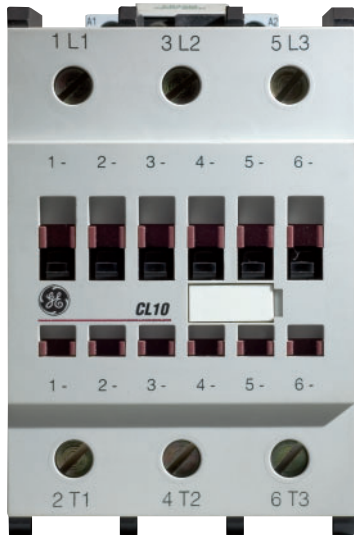


# Control and Automation

For industrial applications ED.03

Everything is under control



GE imagination at work

Plug-in relays and Auxiliary contactors	A
Motor protection devices	B
Contactors and Thermal overload relays	C
Motorstarters	D
Control and signalling units	E
Electronic relays	F
Limit switches	G
Speed drive units	H
Main switches	I
Numerical index	X



## A

### Plug-in relays and Auxiliary contactors

#### Series PRC - Plug-in relays



Miniature plug-in relays  
Standard 8-11 pin plug-in relays  
Interface relay

● A.2

#### Series M - Auxiliary minicontactors



lth = 16A

● A.16

#### Series RL - Auxiliary contactors



lth = 20A

● A.22

## B

### Motor protection devices

#### Series SFK -

##### Motor protection circuit breaker



Thermal and magnetic protection of AC and DC motors  
Setting ranges from 0.1 to 25A

● B.2

#### Surion - Manual motor starter



Thermal and magnetic protection - Magnetic protection  
Setting ranges from 0.1 to 63A

● B.8

## C

### Contactors and Thermal overload relays

#### Series M - Minicontactors



3 and 4P (4NO, 2NO+2NC, 4NC) 6,9 and 12A (AC-3)  
20A (AC-1)  
Control circuit AC and DC

● C.2

#### Series CL - Contactors



3 and 4P (4NO, 2NO+2NC)  
9 to 105A (AC-3) 25 to 140A (AC-1) AC, DC and with electronic module

● C.10

#### Series CK - Contactors



3 and 4P (4NO) 150 to 825A (AC-3) 200 to 1250A (AC-1)  
AC, DC and with electronic module

● C.18

#### Series MTO - Thermal overload relays



For minicontactors series M from 0.11 to 14A

● C.60

#### Series RT - Thermal overload relays



For contactors series CL and CK from 0.16 to 850A  
Class 10A, 10, 20, 30

● C.62

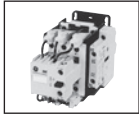
#### Series RE - Electronic overload relays



For contactors series CL from 0.1 to 150A

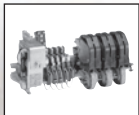
● C.66

#### Series CSCN - Contactors for capacitors switching



● C.78

#### Series 390.R - Clapper contactors

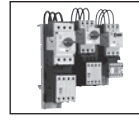


● C.86

## D

### Motorstarters

#### Coordination



Link modules for mechanical and electrical connection of the manual motor starter and the M/CL contactor ranges

● D.2

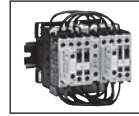
#### Direct-on-line starters



Series M: 6 to 12A (AC-3)  
Series CL: 9 to 105A (AC-3)  
Series CK: 150 to 825A (AC-3)

● D.18

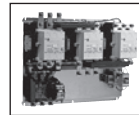
#### Reversing starters



Series M: 6 to 12A (AC-3)  
Series CL: 9 to 105A (AC-3)  
Series CK: 150 to 825A (AC-3)

● D.20

#### Star-delta starters



Series CL  
Series CK

● D.22

#### ASTAT S - Soft starter



Small soft starter with integral by-pass

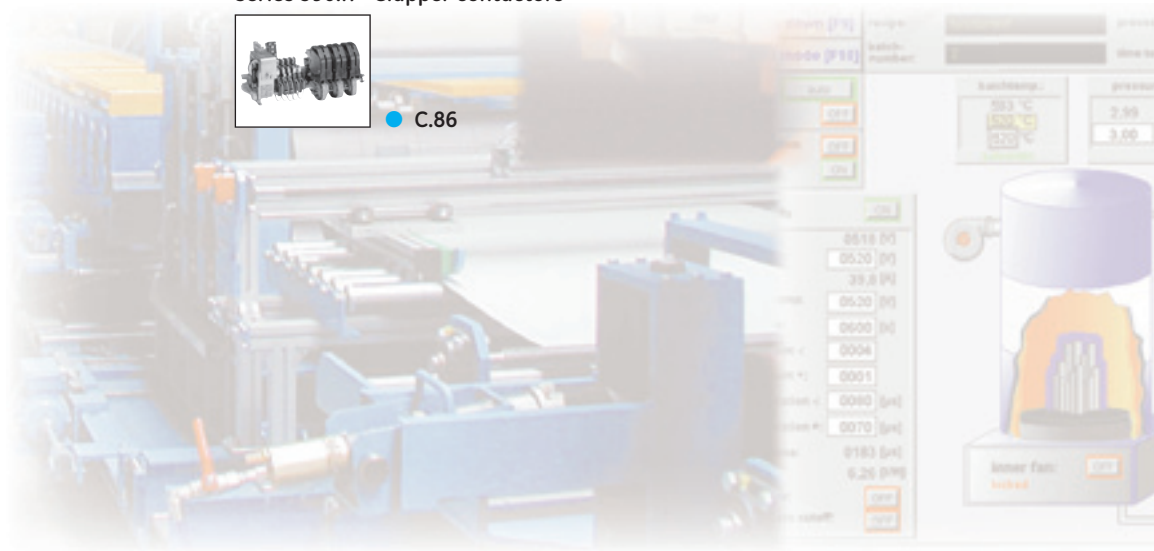
● D.66

#### ASTAT XT - Digital Soft Starter



Digital Soft Starter for 3 phase standard induction motors

● D.71



## E

### Control and signalling units

Series P9 - Panel mounting -  
Units Ø 22 mm



● E.8

Series P9 - Base mounting



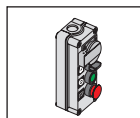
● E.23

Series P9 - Push-button stations



● E.24

Series P9 - Equipped boxes



● E.27

Series P9 - Common accessories



● E.30

Series 077 - Units Ø 30 mm



● E.42

Series NLT - Light towers



● E.60

Series IP - Foot switches



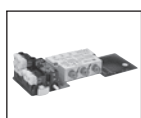
● E.66

Safety foot switches



● E.68

Series 105 - Signalling devices



● E.69

## F

### Electronic relays

Series NMV - Multivoltage relays



22.5mm module  
Direct supply voltage (24-  
240V AC/DC)  
With transformer

● F.3

Series D - Single voltage electronic timers



45mm module  
Direct supply voltage

● F.4

Liquid level detectors



45 mm module  
DIN mounting

● F.4

Earth leakage relays



45 mm module  
Direct supply voltage  
With transformer

● F.4

Protection relays



45 mm module  
Direct supply voltage  
With transformer

● F.5

Detection relays



Direct supply voltage  
With transformer

● F.6

Control and protection relays



● F.6



## G

### Limit switches

#### Series IS and IM



Metal and Thermoplastic  
EN 50041  
Positive opening

● G.2

#### Series IUG



Thermoplastic EN 50047  
Positive opening

● G.4

#### Series IZ



Thermoplastic miniature  
design

● G.6

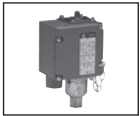
#### Series 114FCT



Three pole limit switches  
Thermoplastic  
Positive opening

● G.8

#### Series 115 - Pressure switches



Bellows type  
Piston type

● G.16

## H

### Speed drive units

#### VAT20



Single-phase or three-phase  
digital inverters for control-  
ling the speed of three-  
phase induction AC motors  
from 0.2 to 2.2 kW  
IP20 or IP65

● H.2

#### VAT200



From 0.4 to 2.2kW at 200V,  
single phase power supply  
From 0.4 to 7.5kW at 200V,  
three phase power supply  
From 0.75 to 11kW at 400V,  
three phase power supply

● H.8

#### VAT300



Three phase drives for  
AC motors 220-240V or  
380-480V. Covering power  
ratings from 0.75kW up to  
475kW in normal duty, or up  
to 400kW in heavy duty

● H.18

## I

### Main switches

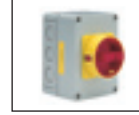
#### Series ML - standard programme



Main switches and Emer-  
gency-stop switches for  
machinery

● I.4

#### Series ML - enclosed switches



● I.7



Go to [www.ge.com/eu/powerprotection](http://www.ge.com/eu/powerprotection) and click on e-Catalogue

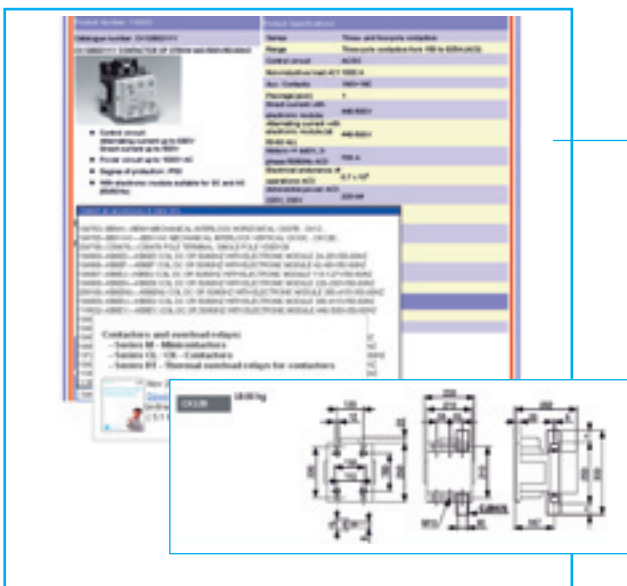


Use the Quick search to directly search on product number or keyword

Another way to find a product easily is by using "parametric search", entering the technical characteristics of the product you are looking for



Compare many products next to each other, looking at common and comparable features



Every product page contains all available data: technical specifications, mounting instructions, dimensional drawings, texts for tenders...

- ✓ All product info in one centralised place on our site
- ✓ All product info is downloadable, printable and emailable !
- ✓ Always the latest up-to-date info at hand !

Everything is

## Series PRC - Plug-in relays

- A.3 Order codes
- A.7 Technical data
- A.14 Dimensions

## Series M - Auxiliary minicontactors

- A.17 Order codes
- A.26 Technical data
- A.31 Terminal numbering
- A.40 Dimensions

## Series RL - Auxiliary contactors

- A.23 Order codes
- A.34 Technical data
- A.36 Terminal numbering
- A.42 Dimensions

## Plug-in relays and Auxiliary contactors

Motor protection devices

Contactors and Thermal overload relays

Motorstarters

Control and signalling units

Electronic relays

Limit switches

Speed drive units

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under control







## Plug-in auxiliary relays

- AC or DC coils
- Lockable test button with mechanical flag indicator.
- Sockets with rear 35 mm rail (EN 50022) mounting.
- With LED indicator incorporated.

### Miniature relays

Types	Poles	AC ratings
PRC4M2...	2 CO	12A/250V
PRC4M3...	3 CO	10A/250V
PRC4M4...	4 CO	6A/250V

### Sockets

Types
PRCG-ES15/2N
PRCG-ES15/3N
PRCG-ES15/4N

### Standard 8-11 pin relays

Types	Poles	AC ratings
PRC2P2...	2 CO	10A/250V
PRC3P3...	3 CO	10A/250V

### Sockets

Types
PRZ8
PRZ11

## Approvals

According to types:

Plug-in relays	Sockets
CE	CE
CSA	CSA
cUL	cUL
VDE	

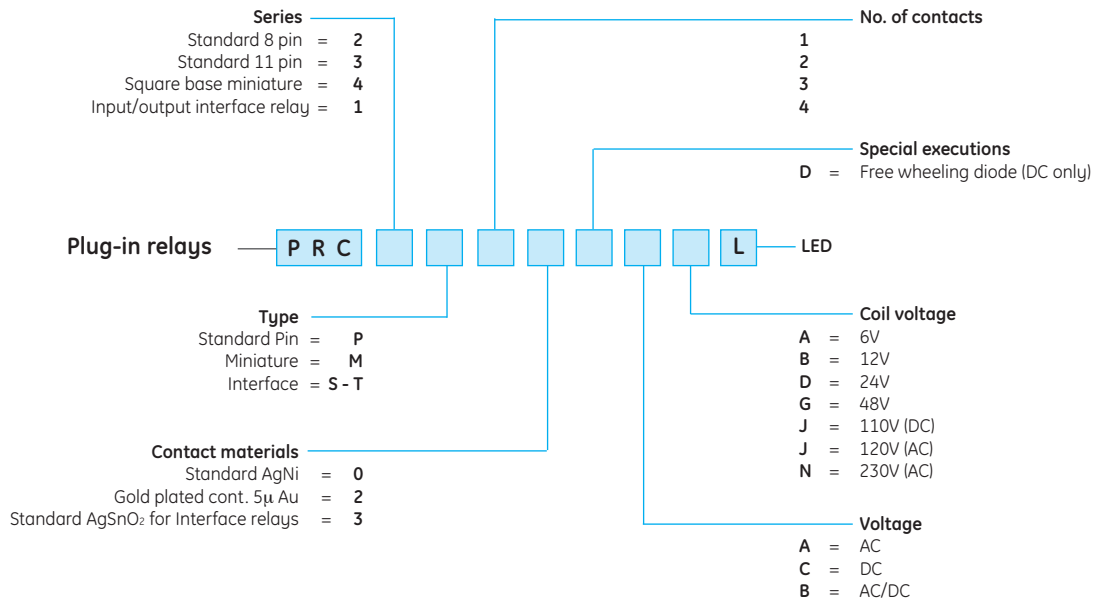
### Interface relay module

Types	Poles	AC ratings
PRC1S1...	1 CO	6A/250V
<b>For use with PLC systems</b>		
PRC1T1...	1 CO	16A/250V
PRC1T2...	2 CO	8A/250V

### Sockets

Types
-
PRCGZT80
PRCGZT80

## Catalogue number structure



- Order codes ● pg. A.3
- Modules for sockets ● pg. A.6
- Technical characteristics ● pg. A.7
- Dimensions ● pg. A.14

Miniature plug-in relays



2 changeover contacts

Ratings	Contacts Standard material	Voltage		With LED		Pack	
				Cat. no.	Ref. no.		
AC 12A/250V	0 AgNi		AC 50/60 Hz	12V	PRC4M20ABL	220710	10
				24V	PRC4M20ADL	220711	10
				48V	PRC4M20AGL	220712	10
				120V	PRC4M20AJL	220715	10
				230V	PRC4M20ANL	220717	10
			DC	12V	PRC4M20CBL	220713	10
				24V	PRC4M20CDL	220714	10
				48V	PRC4M20CGL	220716	10
				110V	PRC4M20CJL	220718	10
				DC Diode	12V	PRC4M20DCBL	220754
			24V		PRC4M20DCDL	220755	10
			48V		PRC4M20DCGL	220756	10
			110V		PRC4M20DCJL	220757	10

3 changeover contacts

AC 10A/250V	0 AgNi		AC 50/60 Hz	12V	PRC4M30ABL	221051	10
				24V	PRC4M30ADL	221052	10
				48V	PRC4M30AGL	221053	10
				120V	PRC4M30AJL	221056	10
				230V	PRC4M30ANL	221058	10
			DC	12V	PRC4M30CBL	221054	10
				24V	PRC4M30CDL	221055	10
				48V	PRC4M30CGL	221057	10
				110V	PRC4M30CJL	221059	10
				DC Diode	12V	PRC4M30DCBL	221074
			24V		PRC4M30DCDL	221075	10
			48V		PRC4M30DCGL	221076	10
			110V		PRC4M30DCJL	221077	10

4 changeover contacts

AC 6A/250V	0 AgNi		AC 50/60 Hz	12V	PRC4M40ABL	221809	10
				24V	PRC4M40ADL	221810	10
				48V	PRC4M40AGL	221811	10
				120V	PRC4M40AJL	221814	10
				230V	PRC4M40ANL	221816	10
			DC	12V	PRC4M40CBL	221812	10
				24V	PRC4M40CDL	221813	10
				48V	PRC4M40CGL	221815	10
				110V	PRC4M40CJL	221817	10
				DC Diode	12V	PRC4M40DCBL	221851
			24V		PRC4M40DCDL	221852	10
			48V		PRC4M40DCGL	221853	10
			110V		PRC4M40DCJL	221854	10

Sockets



For PRC4M2...  
2 changeover contacts

			Cat. no.	Ref. no.	Pack
Screw terminals Two levels	Socket		PRCG-ES15/2N	220912	10
	Fixing clip	Metal	PRCG1052	220914	10
	Retainer/Extractor	White plastic	PRCMS35	220915	10
	Identification plate		PRCTR1	220916	10

For PRC4M3...  
3 changeover contacts

Screw terminals Two levels	Socket		PRCG-ES15/3N	221442	10
	Fixing clip	Metal	PRCG1052	220914	10
	Retainer/Extractor	White plastic	PRCMS35	220915	10
	Identification plate		PRCTR1	220916	10

For PRC4M4...  
4 changeover contacts

Screw terminals Two levels	Socket		PRCG-ES15/4N	221934	10
	Fixing clip	Metal	PRCG1052	220914	10
	Retainer/Extractor	White plastic	PRCMS35	220915	10
	Identification plate		PRCTR1	220916	10

Order codes

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## Standard 8-11 pin plug-in relays

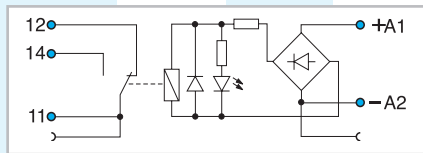
	Ratings	Contacts Standard material	Voltage		With LED					
					Cat. no.	Ref. no.	Pack			
 <p><b>Standard 8 pin</b></p>	2 changeover contacts 10A/250V	0 AgNi	AC 50/60 Hz	12V	PRC2P20ABL	220019	10			
				24V	PRC2P20ADL	220020	10			
				48V	PRC2P20AGL	220021	10			
				120V	PRC2P20AJL	220024	10			
				230V	PRC2P20ANL	220026	10			
				DC	12V	PRC2P20CBL	220022	10		
					24V	PRC2P20CDL	220023	10		
					48V	PRC2P20CGL	220025	10		
				DC diode	110V	PRC2P20CJL	220027	10		
					12V	PRC2P20CDL	220041	10		
					24V	PRC2P20CDL	220042	10		
					48V	PRC2P20DCGL	220043	10		
							110V	PRC2P20DCJL	220044	10
				 <p><b>Standard 11 pin</b></p>	3 changeover contacts 10A/250V	0 AgNi	AC 50/60 Hz	12V	PRC3P30ABL	220310
24V	PRC3P30ADL	220311	10							
48V	PRC3P30AGL	220312	10							
120V	PRC3P30AJL	220315	10							
230V	PRC3P30ANL	220317	10							
DC	12V	PRC3P30CBL	220313					10		
	24V	PRC3P30CDL	220314					10		
	48V	PRC3P30CGL	220316					10		
DC diode	110V	PRC3P30CJL	220318					10		
	12V	PRC3P30DCBL	220335					10		
	24V	PRC3P30DCDL	220336					10		
	48V	PRC3P30DCGL	220337					10		
			110V					PRC3P30DCJL	220338	10

## Sockets


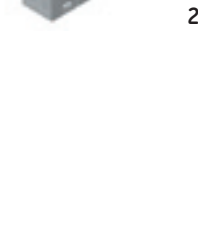
				Cat. no.	Ref. no.	Pack
 <p><b>For PRC2P20... Standard 8 pin</b></p>	Screw terminals One level	Socket		PRCZ8	220216	10
		Fixing clip		PRCPZ11	220218	10
	Solder terminal	Socket		PRCG8	220217	10
		Fixing clip		PRCR159	220219	10
<p><b>For PRC3P30... Standard 11 pin</b></p>	Screw terminals One level	Socket		PRCZ11	220647	10
		Fixing clip		PRCPZ11	220218	10
	Solder terminal	Socket		PRCG11	220648	10
		Fixing clip		PRCR159	220219	10

Interface relay

	Ratings AC1	Ratings DC1	Contacts material	Voltage		With LED				
						Cat. no.	Ref. no.	Pack		
 <p>1 single pole</p> <p>1 changeover contact</p>	6A/250V	-	3 AgSnO <sub>2</sub>	AC/DC	230V	PRC1S13BNL	222013	10		
					AC	230V	PRC1S13ANL	222012	10	
						DC	12V	PRC1S13CBL	222007	10
							24V	PRC1S13CDL	222008	10
					AC/DC	24V	PRC1S13BDL	222004	10	
						Identification label		PRCTR1S	222043	10
					20-way jumper link		PRCW20	222039	10	



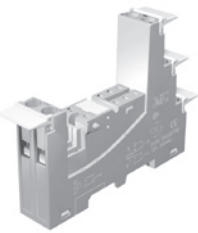


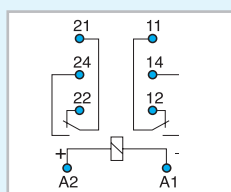
Interface relay for PLC systems

	Ratings AC1	Ratings DC1	Contacts material	Voltage		With LED								
						Cat. no.	Ref. no.	Pack						
 <p>1 changeover contact</p>	16A/250V	16A/24V	0 AgNi	AC	24V	PRC1T10ADL	221868	10						
					AC	120V	PRC1T10AJL	221869	10					
						230V	PRC1T10ANL	221870	10					
						DC	12V	PRC1T10CBL	221860	10				
					24V		PRC1T10CDL	221861	10					
					110V		PRC1T10CJL	221862	10					
					 <p>2 changeover contacts</p>	8A/250V	8A/24V	0 AgNi	AC	24V	PRC1T20ADL	221883	10	
										AC	120V	PRC1T20AJL	221884	10
											230V	PRC1T20ANL	221885	10
											DC	12V	PRC1T20CBL	221875
24V	PRC1T20CDL	221876	10											
110V	PRC1T20CJL	221877	10											

Complete set of relay, socket, module (diode+Led for DC-Varistor + Led for AC) and retaining clip + marking plate. 16mm width

Spare parts

				Voltage		Cat. no.	Ref. no.	Pack
 <p>Miniature P.C.B. relays. 16A 1 changeover contact</p>	50/60 Hz	AC	24V	PRCT1AD	221896	20		
			120V	PRCT1AJ	221897	20		
			230V	PRCT1AN	221898	20		
		DC	12V	PRCT1CB	221890	20		
			24V	PRCT1CD	221891	20		
			110V	PRCT1CJ	221892	20		
 <p>Miniature P.C.B. relays. 8A 2 changeover contacts</p>	50/60 Hz	AC	24V	PRCT2AD	221913	20		
			120V	PRCT2AJ	221914	20		
			230V	PRCT2AN	221915	20		
		DC	12V	PRCT2CB	221905	20		
			24V	PRCT2CD	221906	20		
			110V	PRCT2CJ	221907	20		
 <p>Socket for miniature P.C.B. relays</p>	Three level screws			PRCGZT80	221918	10		
	Retainer/Retractor			PRCMS16	221920	10		
	Plate			PRCTR	221921	10		



NOTE: If more than 12A are applied to the relay contact, twin wiring is required. See the connection diagram of the relay



Order codes

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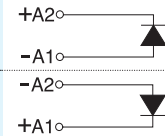
## Modules for sockets



### Diode

Protection against polarity inversion

For use with sockets:  
PRCG-ES15/2N  
PRCG-ES15/3N  
PRCG-ES15/4N



6 / 230V DC

6 / 230V DC

Color  
Led

Cat. no.

Ref. no.

Pack

PRCM21P

222100

10

PRCM21N

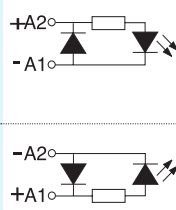
222101

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### Diode and Led

Protection against polarity inversion  
Coil energizing indication

For use with sockets:  
PRCG-ES15/2N  
PRCG-ES15/3N  
PRCG-ES15/4N  
PRCGZT80



6 / 24V DC

24 / 60V DC

110 / 230V DC

6 / 24V DC

24 / 60V DC

110 / 230V DC

Red

Green

Red

Green

Red

Green

Red

Green

PRCM31R

PRCM31G

PRCM32R

PRCM32G

PRCM33R

PRCM33G

PRCM41R

PRCM41G

PRCM42R

PRCM42G

PRCM43R

PRCM43G

222102

222104

222103

222105

222109

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222110

222107

222111

222124

222112

222125

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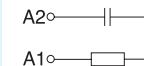
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### RC group

Arc suppression circuit

For use with sockets:  
PRCG-ES15/2N  
PRCG-ES15/3N  
PRCG-ES15/4N



6 / 24V AC

24 / 60V AC

110 / 240V AC

PRCM51

PRCM52

PRCM53

222113

222114

222115

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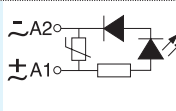
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### Led and varistor

No protection against polarity inversion  
Coil energizing indication  
AC/DC voltage allowed

For use with sockets:  
PRCG-ES15/2N  
PRCG-ES15/3N  
PRCG-ES15/4N  
PRCGZT80



6 / 24V AC

110 / 230V AC

Red

Green

Green

PRCM91R

PRCM91G

PRCM93G

222116

222126

222120

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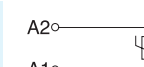
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### Varistor group

No indication  
Protection against overvoltage

For use with sockets:  
PRCG-ES15/2N  
PRCG-ES15/3N  
PRCG-ES15/4N



24V AC

230V AC

PRCM71

PRCM73

222121

222122

10

10

## Technical data

### Sockets for miniature plug-in relays

		PRCG-ES15/2N	PRCG-ES15/3N	PRCG-ES15/4N
		Screw terminals two levels	Screw terminals two levels	Screw terminals two levels
<i>Specifications</i>				
Nominal load	(A)	12 (300V)	10 (300V)	10 (300V)
Dielectric strength				
Adjacent screws	(kV)	3	3	3
Screws - rail	(kV)	3	3	3
Terminals Type				
		Screw M4, Pozidriv	Screw M4, Pozidriv	Screw M3, Pozidriv
Max. torque	(Nm)	0,7	0,7	0,7
Protection category		IP20	IP20	IP20
Capacity Solid wire	(mm <sup>2</sup> )	2x2.5	2x2.5	2x2.5
Flexible wire		22-14 AWG	22-14 AWG	22-14 AWG
Ambient temperature	(°C)	-40 ... +70	-40 ... +70	-40 ... +70

### Sockets for 8-11 pin standard plug-in relays

		PRCZ8	PRCG08	PRCZ11	PRCG11
		Screw terminals One level	8 pin Solder terminal socket	Screw terminals One level	11 pin Solder terminal socket
<i>Specifications</i>					
Nominal load	(A)	10 (250V)	10 (250V)	10 (250V)	10 (250V)
Dielectric strength					
Adjacent screws	(kV)	2.5	2.5	2.5	2.5
Screws - rail	(kV)	3		3	
Terminals Type					
		Screw M3, Pozidriv	Hard brass tin-plated terminals	Screw M3, Pozidriv	Hard brass tin-plated terminals
Max. torque	(Nm)	0,7		0,7	
Protection category		IP20		IP20	
Capacity Solid wire	(mm <sup>2</sup> )	2x2.5		2x2.5	
Flexible wire		22-14 AWG		22-14 AWG	
Ambient temperature	(°C)	-40 ... +70		-40 ... +70	

### Sockets for miniature P.C.B. relays

		PRCGZ80
		Screw terminals Two levels
<i>Specifications</i>		
Nominal load	(A)	12 (300V)
Dielectric strength		
Adjacent screws	(kV)	3
Screws - rail	(kV)	3
Terminals Type		
		Screw M4, Pozidriv
Max. torque	(Nm)	0,7
Protection category		IP20
Capacity Solid wire	(mm <sup>2</sup> )	2x2.5
Flexible wire		22-14 AWG
Ambient temperature	(°C)	-40 ... +70

### Miniature plug-in relays

		PRC4M20...	PRC4M30...	PRC4M40...
		2 pole	3 pole	4 pole
<b>Contacts</b>				
Number of contacts		2 changeover	3 changeover	4 changeover
Standard material		AgNi	AgNi	AgNi
Optional material		AgNi/Au 5μ	AgNi/Au 5μ	AgNi/Au 5μ
<b>Voltage</b>				
Max. switching AC/DC (poll. 3) voltage AC (poll. 2)		250V	250V	250V
Min. switching voltage AC/DC		5V	5V	5V
<b>Current</b>				
Rated load	AC1 (A)	12 (250V AC)	10 (250V AC)	6 (250V AC)
	AC15 (A)	4 (250V AC)	4 (250V AC)	2,5 (250V AC)
	DC1 (A)	12 (24V DC)	10 (24V DC)	6 (24V DC)
Min. switching current	(mA)	5	5	5
Max. inrush current	(A)	24	20	12
Rated current	(A)	12	10	6
Max. breaking capacity	(VA)	3000	2500	1500
Resistance	(mΩ)	≤100 (100mA, 24V)	≤100 (100mA, 24V)	≤100 (100mA, 24V)
<b>Max. operating frequency</b>				
At rated load	cycles/hour	1200	1200	1200
No load	cycles/hour	18000	18000	18000
<b>Coil</b>				
Rated voltage	AC 50/60Hz (V)	6 ... 240	6 ... 240	6 ... 240
	DC (V)	5 ... 220	5 ... 220	5 ... 220
Must release time voltage	AC ≥0.2 Un	≥0.2 Un	≥0.2 Un	≥0.2 Un
	DC ≥0.1 Un	≥0.1 Un	≥0.1 Un	≥0.1 Un
Operating range of supply voltage		Table 1, 2	Table 1, 2	Table 1, 2
Rated power consumption	AC 50Hz (VA)	1.5	1.6	1.6
	60Hz (VA)	1.3	1.3	1.3
	DC (W)	0.9	0.9	0.9
	AC/DC (W)	-	-	-
<b>Insulation</b>				
Insulation category		C250	C250	B250
Insulation rated voltage	(VAC)	250	250	250
Dielectric strength	Coil-Contact (VAC)	2500	2500	2500
	Contact-Contact(VAC)	1500	1500	1500
	Pole-Pole (VAC)	2500	2500	2000
Contact coil distance	Clearance (mm)	≥ 2.5	≥ 2.5	≥ 1.6
	Creepage (mm)	≥ 4	≥ 4	≥ 3.2
<b>General data</b>				
Operating time (typical value)	AC (ms)	10	10	10
	DC (ms)	13	13	13
Release time (typical value)	AC (ms)	8	8	8
	DC (ms)	3	3	3
Electrical life	Resistive	≥ 10 <sup>5</sup> (12A, 250V AC)	≥ 10 <sup>5</sup> (10A, 250V AC)	≥ 10 <sup>5</sup> (6A, 250V AC)
	Cos φ	See curves	See curves	See curves
Mechanical life	(cycles)	≥ 10 <sup>7</sup>	≥ 10 <sup>7</sup>	≥ x10 <sup>7</sup>
Ambient temperature	Storage (°C)	-40 ... +85	-40 ... +85	-40 ... +85
	Operating AC (°C)	-40 ... +55	-40 ... +55	-40 ... +55
	DC (°C)	-40 ... +70	-40 ... +70	-40 ... +70
Cover protection category		IP40	IP40	IP40
Shock resistance	(G)	10	10	10
Vibration resistance	(G)	5 (for 10..150Hz)	5 (for 10..150Hz)	5 (for 10..150Hz)

Table 1. Coil data DC version

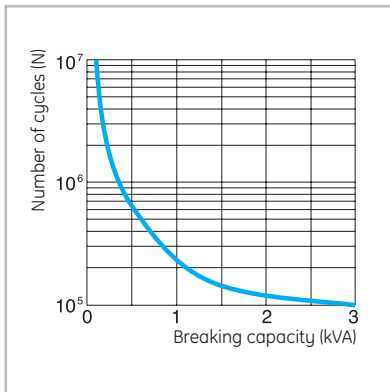
Rated voltage V DC	Coil resistance Ω	Coil operating range V DC	
		Min. (at 20°C)	Max. (at 55°C)
12	160	9.6	13.2
24	640	19.2	26.4
48	2600	38.4	52.8
110	13600	88	121
220	54000	176	242

Table 2. Coil data AC 50/60Hz version

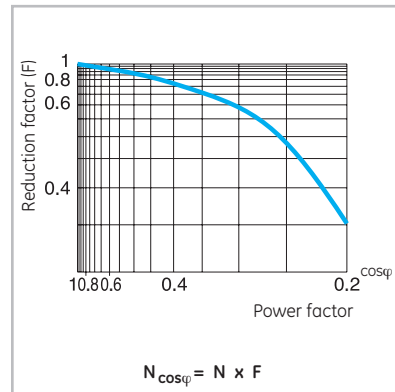
Rated voltage V AC	Coil resistance Ω	Coil operating range V AC	
		Min. (at 20°C)	Max. (at 55°C)
12	39	9.6	13.2
24	158	19.2	26.4
48	640	38.4	52.8
120	3770	88	121
230	16100	184	253

### Miniature 2 pole plug-in relays

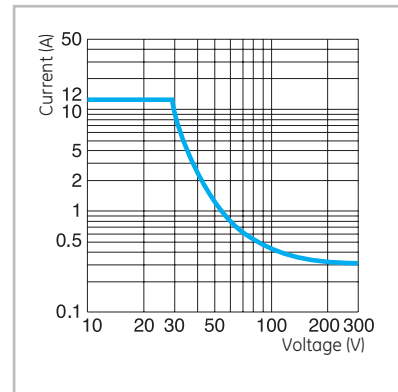
Electrical life at AC resistive load



Electrical life reduction factor at AC inductive load

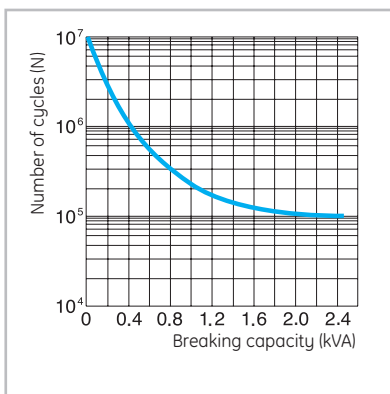


Max. DC resistive load breaking capacity

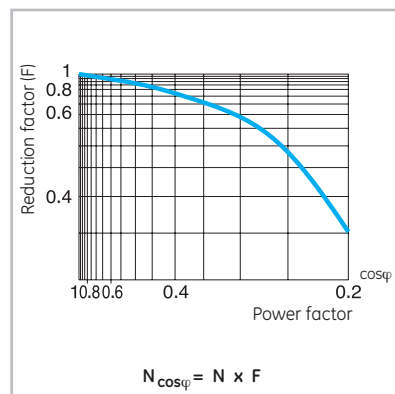


### Miniature 3 pole plug-in relays

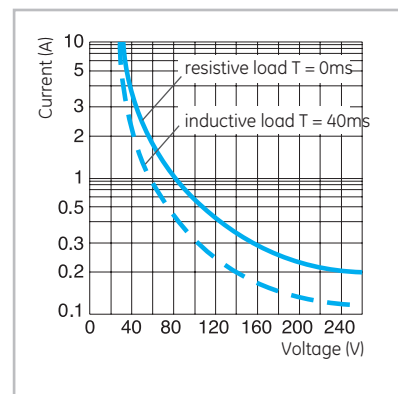
Electrical life at AC resistive load



Electrical life reduction factor at AC inductive load

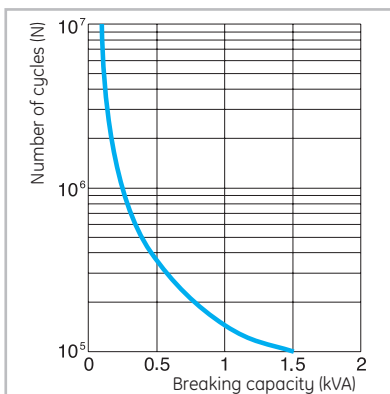


Max. DC load breaking capacity

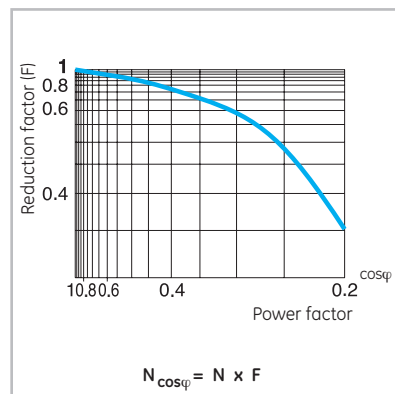


### Miniature 4 pole plug-in relays

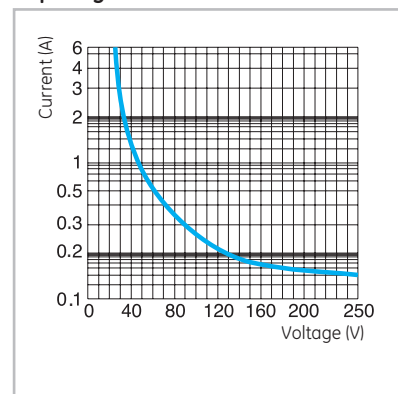
Electrical life at AC resistive load



Electrical life reduction factor at AC inductive load



Max. DC resistive load breaking capacity





Standard 8-11 pin plug-in relays

		PRC2P20...	PRC3P30...
		Standard 8-pin	Standard 11-pin
<b>Contacts</b>			
Number of contacts		2 changeover	3 changeover
Standard material		AgNi	AgNi
Optional material		AgNi/Au 5μ	AgNi/Au 5μ
<b>Voltage</b>			
Max switching voltage AC/DC (poll. 3)		250V	250V
AC (poll. 2)		400V	400V
Min switching voltage AC/DC		10V (AgNi) 5V (AgNi/Au 5μ)	10V (AgNi) 5V (AgNi/Au 5μ)
<b>Current</b>			
Rated load	AC1 (A)	10 (250V AC)	10 (250V AC)
	AC15 (A)	4 (250V AC)	4 (250V AC)
	DC1 (A)	10 (24V DC)	10 (24V DC)
Min. switching current	(mA)	5	5
Max. inrush current	(A)	30	30
Rated current	(A)	10	10
Max. breaking capacity	(VA)	2500	2500
Resistance	(mΩ)	H100 (100mA, 24V)	H100 (100mA, 24V)
<b>Max. operating frequency</b>			
At rated load	cycles/hour	1200	1200
No load	cycles/hour	12000	12000
<b>Coil</b>			
Rated voltage	AC 50/60Hz (V)	6 ... 240	6 ... 240
	DC (V)	6 ... 220	6 ... 220
Must release time	AC	≥0.15 Un	≥0.15 Un
voltage	DC	≥0.1 Un	≥0.1 Un
Operating range of supply voltage		Table 1, 2	Table 1, 2
Rated power consumption	AC 50Hz (VA)	2,7	2,7
	60Hz (VA)	2,5	2,5
	DC (W)	1,5	1,5
	AC/DC (W)	-	-
<b>Insulation</b>			
Insulation category		C250	C250
Insulation rated voltage	(VAC)	250	250
Dielectric strength	Coil-Contact (VAC)	2500	2500
	Contact-Contact (VAC)	1500	1500
	Pole-Pole (VAC)	2000	2000
Distance	Clearance (mm)	≥ 3	≥ 3
contact coil	Creepage (mm)	≥ 4.2	≥ 4.2
<b>General</b>			
Operating time	AC (ms)	12	12
(typical value)	DC (ms)	12	12
Release time	AC (ms)	10	10
(typical value)	DC (ms)	7	7
Electrical life	Resistive	≥ 2x10 <sup>8</sup> (10A, 250V AC)	≥ 2x10 <sup>8</sup> (10A, 250V AC)
	Cos φ	See curves	See curves
Mechanical life (cycles)		≥ 2x10 <sup>7</sup>	≥ 2x10 <sup>7</sup>
Ambient temperature	Storage (°C)	-40 ... +85	-40 ... +85
	Operating AC (°C)	-40 ... +55	-40 ... +55
	DC (°C)	-40 ... +70	-40 ... +70
Cover protection category		IP40	IP40
Shock resistance	(G)	10	10
Vibration resistance	(G)	5	5

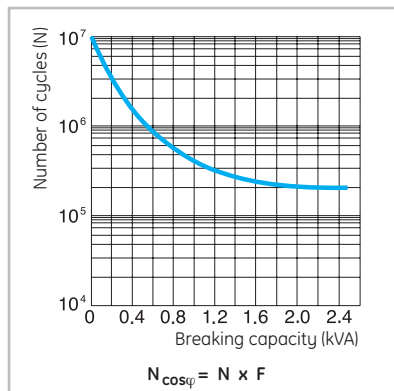
Table 1. Coil data DC version

Rated voltage V DC	Coil resistance Ω	Coil operating range V DC	
		Min. (at 20°C)	Max. (at 55°C)
12	110	9.6	13.2
24	430	19.2	26.4
48	1750	38.4	52.8
110	9200	88	121
220	37000	176	242

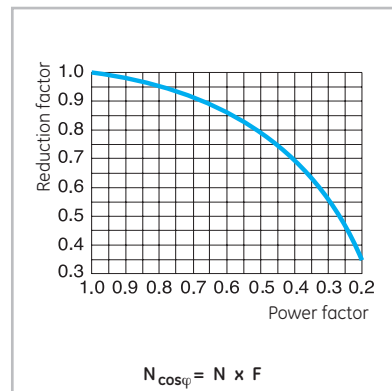
Table 2. Coil data AC 50/60Hz version

Rated voltage V AC	Coil resistance Ω	Coil operating range V AC	
		Min. (at 20°C)	Max. (at 55°C)
12	18.5	9.6	13.2
24	75	19.2	26.4
48	305	38.4	52.8
120	1910	96	132
230	7080	184	253

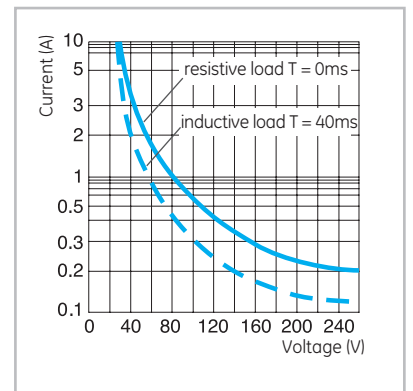
Electrical life at AC resistive load



Electrical life reduction factor at AC inductive load



Max. DC load breaking capacity



## Interface plug-in relays

			PRC1S13...	
<b>Contacts</b>				
Number of contacts			1 changeover	
Standard material			AgSnO <sub>2</sub>	
<b>Optional material</b>				
<b>Voltage</b>				
Max switching voltage	AC/DC (poll. 3)		AC 250V / DC 150V	
	AC (poll. 2)		AC 400V / DC 300V	
Min switching voltage	AC/DC		12V	
<b>Current</b>				
Rated load	AC1	(A)	6 (250V AC)	
	AC15	(A)		
	DC1	(A)	6 (24V DC)	
Min. switching current	(mA)		10	
Max. inrush current (A)			15	
Rated current	(A)		6	
Max. breaking capacity	(VA)		1500V	
Resistance	(mΩ)		≤100 (100mA, 24V)	
<b>Max. operating frequency</b>				
At rated load			360 cycles/hour	
No load			72000 cycles/hour	
<b>Coil</b>				
Rated voltage	AC/DC	(V)	24, 230	
	AC 50/60Hz	(V)	230	
	DC	(V)	12, 24	
Must release time voltage	AC		≥0,2 Un	
	DC		≥0,1 Un	
Operating range of supply voltage			See Table 1	
Rated power consumption	AC 50Hz	(VA)	0.6...1.9	
	60Hz	(VA)	-	
	DC	(W)	0.33	
	AC/DC	(W)	0.48 (at 24V), 1.8 (at 230V)	
<b>Insulation</b>				
Insulation category			C250	
Insulation rated voltage	(VAC)		400	
Dielectric strength	Coil-Contact	(VAC)	4000	
	Contact-Contact	(VAC)	1000	
	Pole-Pole	(VAC)	-	
Distance contact coil	Clearance	mm	≥ 8	
	Creepage	mm	≥ 8	
<b>General</b>				
Operating time (typical value)	AC	(ms)	8	
	DC	(ms)	6	
Release time (typical value)	AC	(ms)	15	
	DC	(ms)	8	
Electrical life	Resistive			
	Cos φ			
Mechanical life (cycles)			20x10 <sup>6</sup>	
Ambient temperature	Storage	(°C)	-40 ... +70	
	Operating	AC	(°C)	-20 ... +55
		DC	(°C)	-20 ... +55
Cover protection category			IP20	
Shock resistance	(G)		10	
Vibration resistance	(G)		0.062" DA (10 ... 55Hz)	

**Table 1. Interface relay**

Rated voltage V		Coil operating range V DC	
		Min.	Max.
12	DC	9	17
24	DC	17	30
24	AC/DC	18	30
230	AC	80	250
230	AC/DC	185	250

A

B

C

D

E

F

G

H

I

X



## Interface relay for PLC systems

PRC1T10...		
<b>Contacts</b>		
Number of contacts		1 changeover
Standard material		AgNi
Optional material		
<b>Voltage</b>		
Max. switching voltage	AC/DC	AC 400V / DC 300V
Min. switching voltage	AC/DC	5V
<b>Current</b>		
Rated load	AC1	(A) 16 (250V AC)
	DC1	(A) 16 (24V DC)
Min. switching current	(mA)	5
Max. inrush current	(A)	30
Rated current	(A)	16
Max. breaking capacity	(VA)	4000
Min. breaking capacity	(W)	0.3
Resistance	(mΩ)	≤100 (at 1A, 24V)
<b>Max. operating frequency</b>		
At rated load		600 cycles/hour
No load		72000 cycles/hour
<b>Coil</b>		
Rated voltage	AC 50/60Hz	(V) 24, 120, 230
	DC	(V) 12, 24, 110
Must release time	AC	≥0.15 Un
	DC	≥0.1 Un
Operating range of supply voltage		See Table 1, 2
Rated power	AC	(VA) 0.75
	consumption DC	(W) 0.4
<b>Insulation</b>		
Insulation category		C250
Insulation rated voltage	(VAC)	400
Dielectric strength	Coil-Contact	(VAC) 5000
	Contact-Contact	(VAC) 1000
	Pole-Pole	(VAC) -
Distance	Clearance	mm ≥ 10
	contact coil	Creepage
<b>General</b>		
Operating time (typical value)	AC	(ms) 7
	DC	(ms) 7
Release time (typical value)	AC	(ms) 5
	DC	(ms) 3
Electrical life	Resistive	(s) ≥ 0.7 × 10 <sup>5</sup> (at 16A, 250VAC)
	Cos φ	See curves
	L/R = 40ms	≥ 10 <sup>5</sup> (at 0.12A, 220VDC)
Mechanical life (cycles)		3 × 10 <sup>7</sup>
	Ambient temperature	Storage (°C) -40 ... +70
	Operating (°C) -40 ... +70	
Cover protection category		IP40
Shock resistance	(G)	30
Vibration resistance	(G)	10 (for 10 ... 150Hz)

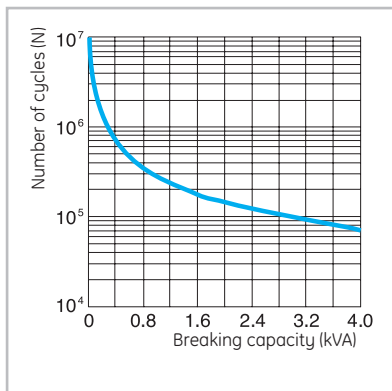
**Table 1. Coil data DC version**

Rated voltage V DC	Coil resistance (±10%) at 20°C Ω	Coil operating range V DC	
		U Min.	U Max.
12	360	8.4	30.6
24	1440	16.8	61.2
110	25200	77	280

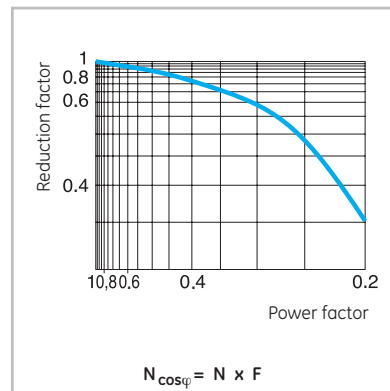
**Table 2. Coil data AC 50/60Hz version**

Rated voltage V AC	Coil resistance (±10%) at 20°C Ω	Coil operating range V AC	
		U Min.	U Max.
24	400	19.2	28.8
120	10200	96	144
230	38500	184	276

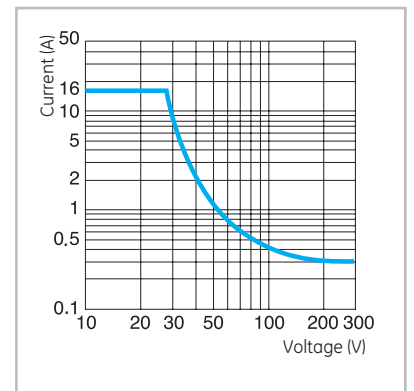
**Electrical life at AC resistive load**



**Electrical life reduction factor at AC inductive load**



**Max. DC load breaking capacity**



Interface relay for PLC systems

PRC1T20...

Contacts

Number of contacts	2 changeover
Standard material	AgNi

Optional material

Voltage

Max. switching voltage	AC/DC	AC 400V / DC 300V
Min. switching voltage	AC/DC	5V

Current

Rated load	AC1	(A)	8 (250V AC)
	DC1	(A)	8 (24V DC)
Min. switching current	(mA)	5	
Max. inrush current	(A)	15	
Rated current	(A)	8	
Max. breaking capacity	(VA)	2000	
Min. breaking capacity	(W)	0,3	
Resistance	(mΩ)	≤100 (at 1A, 24V)	

Max. operating frequency

At rated load	600 cycles/hour
No load	72000 cycles/hour

Coil

Rated voltage	AC 50/60Hz	(V)	24, 230
	DC	(V)	12, 24
Must release time voltage	AC		≥0.15 Un
	DC		≥0.1 Un
Operating range of supply voltage	See Table 1, 2		
Rated power consumption	AC	(VA)	0.75
	DC	(W)	0.4

Insulation

Insulation category	C250		
Insulation rated voltage	(VAC)	400	
Dielectric strength	Coil-Contact	(VAC)	5000
	Contact-Contact	(VAC)	1000
	Pole-Pole	(VAC)	-
Distance contact coil	Clearance	mm	≥ 10
	Creepage	mm	≥ 10

General

Operating time (typical value)	AC	(ms)	7
	DC	(ms)	7
Release time (typical value)	AC	(ms)	5
	DC	(ms)	3
Electrical life	Resistive	(s)	≥ 0.7 × 10 <sup>5</sup> (at 8A, 250VAC)
	Cos φ		See curves
	L/R = 40ms		≥ 10 <sup>5</sup> (at 0,12A, 220VDC)

Mechanical life (cycles)	3x10 <sup>7</sup>		
Ambient temperature	Storage	(°C)	-40 ... +70
	Operating	(°C)	-40 ... +70
Cover protection category	IP40		
Shock resistance	(G)	20	
Vibration resistance	(G)	10 (for 10 ... 150Hz)	

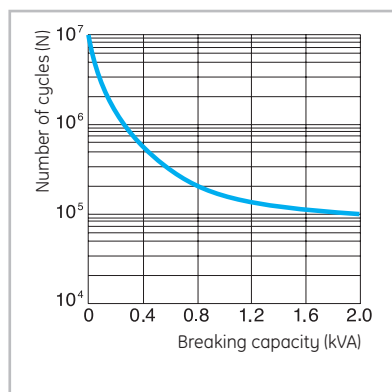
Table 1. Coil data DC version

Rated voltage V DC	Coil resistance (±10%) at 20°C Ω	Coil operating range V DC	
		U Min.	U Max.
12	360	8.4	30.6
24	1440	16.8	61.2
110	25200	77	280

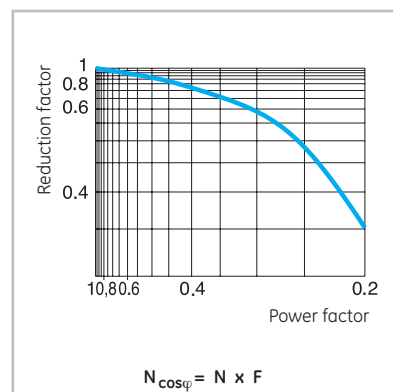
Table 2. Coil data AC 50/60 Hz version

Rated voltage V AC	Coil resistance (±10%) at 20°C Ω	Coil operating range V AC	
		U Min.	U Max.
24	400	19.2	28.8
120	10200	96	144
230	38500	184	276

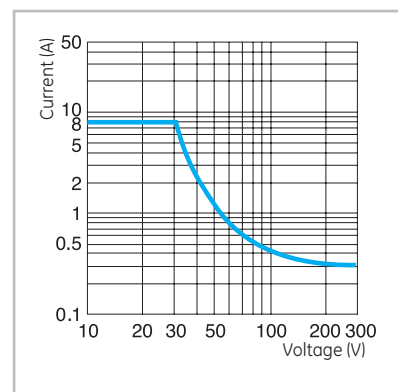
Electrical life at AC resistive load



Electrical life reduction factor at AC inductive load

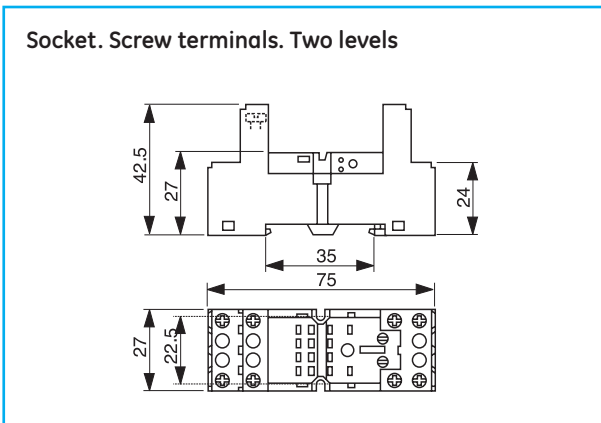
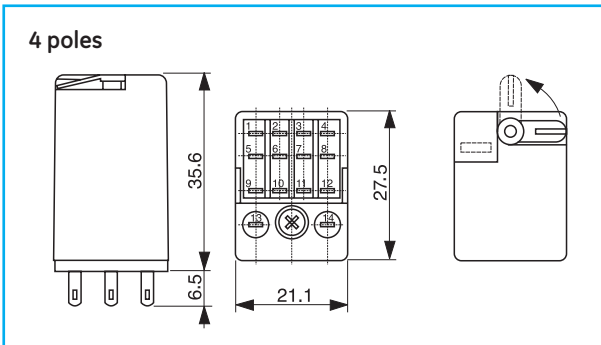
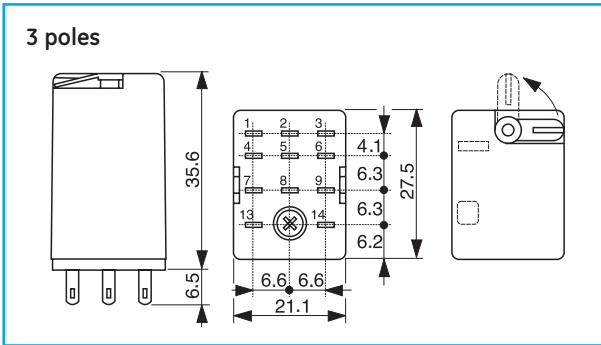
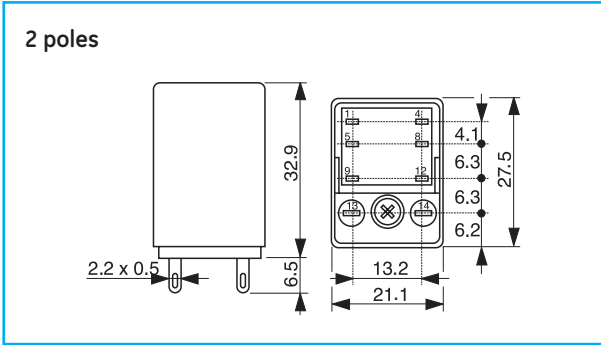


Max. DC load breaking capacity

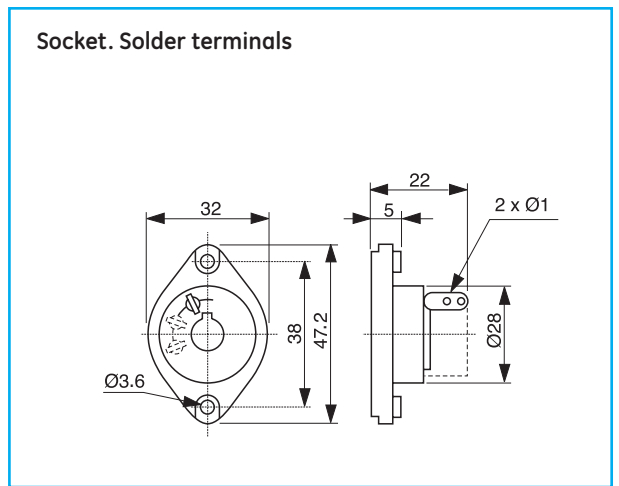
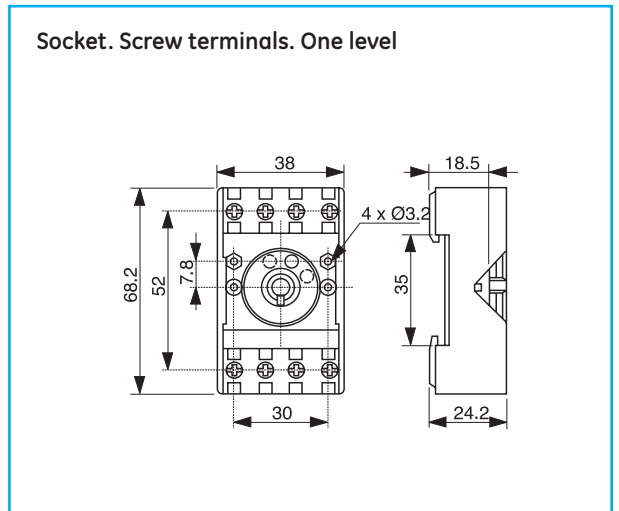
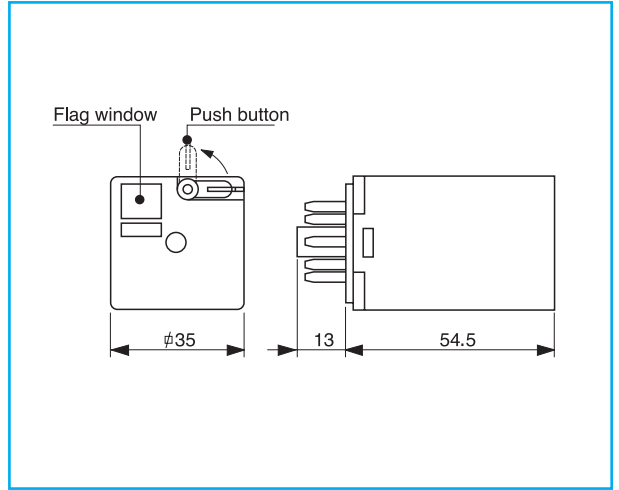


**Dimensional drawings**

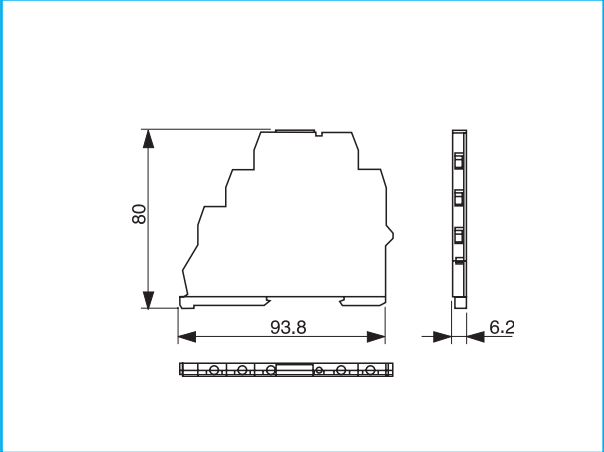
**Miniature**



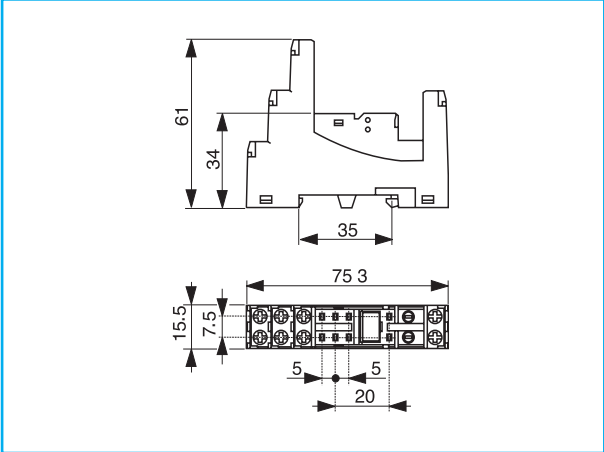
**Standard 8-11 pin**



Interface relay



Socket for miniature P.C.B. relays



Dimensions

A

B

C

D

E

F

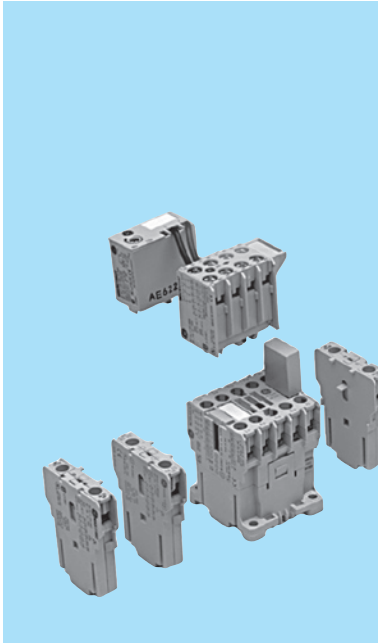
G

H

I

X





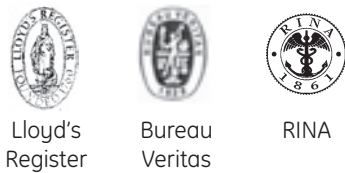
## Auxiliary minicontactors Ith = 16A

- Control circuit: Alternating current up to 600V  
Direct current up to 250V
- Terminal numbering in accordance with EN 50011
- Fixing system for rapid and simple mounting by clamping onto standard 35 mm DIN rail (EN 50022).
- Screw and push-on terminals protected against accidental contacts in accordance with VDE 0106 T.100 and VBG4.
- Printed circuit version.
- Ring terminal version.
- Facility to mount instant or timed auxiliary contact blocks and voltage suppressor blocks.
- Maximum number of auxiliary contacts to add: 6
- Degree of protection IP20 (EN 60529).
- According to IEC/EN 60947-1.

### Standards

IEC/EN 60947-5-1	BS 4794
IEC/EN 60947-1	CENELEC HD 420
EN 50002	NFC 63-110
EN 50005	NFC 63-140
EN 50011	CSA C22.2/14
UL 508	VDE 0660

### Approvals



- Order codes ● pg. A.17
- Auxiliary contacts blocks ● pg. A.18
- Accessories ● pg. A.20
- Technical data ● pg. A.26
- Combinations of contacts ● pg. A.32
- Dimensions ● pg. A.40

### General data

<b>Maximum number of contacts (MCR...)</b>	4
<b>Rated thermal current (Ith) θ ≤ 60°</b>	(A) 16
<b>Rated operational voltage (Ue) acc. IEC 60947-1</b>	(V) 690
<b>Insulation voltage (Ui) acc. IEC 60947-1</b>	(V) 750

#### Utilisation category:

<b>AC-15</b>	<b>V</b>	110	220/240	380/400	415	440	500	660/690
	<b>A</b>	6	6	4	4	3	2.5	1.5

<b>DC-13</b>	<b>V</b>	24	48	110	220
	<b>A</b>	5	3.5	1.2	0.6

### Standard voltages

To complete the catalogue number, replace the symbol ◆ by the code corresponding to the voltage and frequency of the control circuit.

#### Alternating current (V). Bifrequency coil

◆	10	1	2	9	3	4	5	6	7	8	12	13
<b>AC</b>	12	24	42	48	110	120	220	230	240	440	380	400
<b>50/60Hz</b>					115							

#### Voltage operating limits of dual-frequency coil:

at 60Hz = 0.85 a 1.1 × Us

at 50Hz = 0.8 a 1.1 × Us for uninterrupted duty (ED=100%), temperature = 40°C

#### Alternating current (V)

◆	A	E	G	K	M	N	S	U	W	Y
<b>AC</b>			48	115		220	260	380	415	500
<b>50Hz</b>				127		240		400	440	
<b>AC</b>	6	32	60		208	240		440	480	600
<b>60Hz</b>					220	277				

#### Direct current (V)






◆	A	B	C	D	E	F	G	H	I	J	K	L	N	17	R	S	16
<b>DC</b>	6	12	32	24	36	42	48	60	72	110	120	125	220	230	240	250	440

#### Direct current (V) - Wide voltage range

◆	WD	WE	WG	WI	WJ	WN
<b>DC</b>	24	33	48	72	110	220





### Auxiliary minicontactors

	Contacts acc. EN 50011		Control circuit: alternating current			Control circuit: direct current		
	.3	.4	Cat. no. <sup>(1)</sup>	Ref. no. see bottom	Pack	Cat. no. <sup>(1)</sup>	Ref. no. see bottom	Pack
	Screw terminal							
	40E	4 0	MCRA040AT	◆	5	MCRC040AT	◆	10
	31E	3 1	MCRA031AT	◆	5	MCRC031AT	◆	10
	22E	2 2	MCRA022AT	◆	5	MCRC022AT	◆	10
	13E	1 3	MCRA013AT	◆	5			
	04E	0 4	MCRA004AT	◆	5			
	Ring terminal							
	40E	4 0	MCRA040AR	◆	5	MCRC040AR	◆	10
	31E	3 1	MCRA031AR	◆	5	MCRC031AR	◆	10
	22E	2 2	MCRA022AR	◆	5	MCRC022AR	◆	10
	13E	1 3	MCRA013AR	◆	5			
	04E	0 4	MCRA004AR	◆	5			
	Terminal: faston 2x2,8 insulated (2)							
	40E	4 0	MCRA040AF	◆	5	MCRC040AF	◆	10
	31E	3 1	MCRA031AF	◆	5	MCRC031AF	◆	10
	22E	2 2	MCRA022AF	◆	5	MCRC022AF	◆	10
	13E	1 3	MCRA013AF	◆	5			
	04E	0 4	MCRA004AF	◆	5			
	Terminal: printed circuit							
	40E	4 0	MCRA040AI	◆	5	MCRC040AI	◆	10
	31E	3 1	MCRA031AI	◆	5	MCRC031AI	◆	10
	22E	2 2	MCRA022AI	◆	5	MCRC022AI	◆	10
	13E	1 3	MCRA013AI	◆	5			
	04E	0 4	MCRA004AI	◆	5			
	Spare coil							
			MB0A	◆	10	MB0C	◆	10

- (1) To complete the catalogue number, replace the symbol ◆ by the code corresponding to the voltage and frequency of the control circuit. (see pg.A.16).  
 (2) Terminal: - with wire 1.5 mm<sup>2</sup>: Ie = 16A - with wire 1 mm<sup>2</sup>: Ie = 10A  
 Insulated terminal type B2.8x0.8 with wire 1 mm<sup>2</sup>: Ie = 8A to DIN 46247  
 Faston terminal 1 x 6.3 on request, replace the letter **F** by **H** in the catalogue number

### Auxiliary minicontactors interface

	Contacts acc. to EN 50011		Control circuit: direct current 24V / 1.2W <sup>(3)</sup>			Control circuit: direct current 24V / 2W <sup>(4)</sup>		
	.3	.4	Operating limits from 19 to 30V (0.8-1.25xUs)			Operating limits from 17 to 30V (0.7-1.25xUs)		
			Cat. no.	Ref. no.	Pack	Cat. no.	Ref. no.	Pack
	Screw terminal							
	40E	4 0	MCRI040ATD	100530	10	MCRK040ATD	100533	10
	31E	3 1	MCRI031ATD	100531	10	MCRK031ATD	100534	10
	22E	2 2	MCRI022ATD	100532	10	MCRK022ATD	100535	10
	Spare coil							
			MB0ID	100470	10	MB0KD	100471	10

- (3) No possibility of adding instantaneous auxiliary blocks.  
 (4) Facility to mount instantaneous auxiliary contact block of two contacts (MARN2...) or two instantaneous auxiliary contact blocks of one contact (MARL1...).

For reference numbers, see chapter X, pg. X.2





**Instantaneous auxiliary contacts blocks**

Number of contacts	Combination with MCRA040AT♦ (40E) according to EN 50011	Contacts acc. to EN 50005		Cat. no.	Ref. no.	Pack
		Designation (block marking)				
<b>Front mounting</b>						
<b>Screw terminal</b>						
2	60E	20	2 0	MARN220AT	100994	10
2	51E	11	1 1	MARN211AT	100993	10
2	42E	02	0 2	MARN202AT	100992	10
<b>Ring terminal</b>						
2	60E	20	2 0	MARN220AR	103349	10
2	51E	11	1 1	MARN211AR	103350	10
2	42E	02	0 2	MARN202AR	103351	10
<b>Screw terminal</b>						
4	80E	40	4 0	MARN440AT	100991	10
4	71E	31	3 1	MARN431AT	100990	10
4	62E	22	2 2	MARN422AT	100989	10
4	53E	13	1 3	MARN413AT	100988	10
4	44E	04	0 4	MARN404AT	100987	10
<b>Terminal : Ring terminal</b>						
4	80E	40	4 0	MARN440AR	103352	10
4	71E	31	3 1	MARN431AR	103353	10
4	62E	22	2 2	MARN422AR	103354	10
4	53E	13	1 3	MARN413AR	103355	10
4	44E	04	0 4	MARN404AR	103300	10



**Instantaneous auxiliary contacts blocks**

Lateral mounting



Number of contacts	Combination with MCRA040AT♦ (40E) according to EN 50011	Contacts acc. to EN 50005			Cat. no.	Ref. no.	Pack
		Designation (Block marking)	.3	.1			
<ul style="list-style-type: none"> <li>One or two blocks to cover combinations of 5 or 6 contacts without increasing the height of the basic unit.</li> </ul>							
<b>Screw terminal</b>							
1	50E	10	1	0	MARL110AT	100513	10
1	-	01	0	1	MARL101AT	100514	10
<b>Ring terminal</b>							
1	50E	10	1	0	MARL110AR	103556	10
1	-	01	0	1	MARL101AR	103557	10
<b>Terminal : Faston 2x2,8 insulated (1)</b>							
1	50E	10	1	0	MARL110AF	100515	10
1	-	01	0	1	MARL101AF	100516	10
<b>Terminal : Printed circuit</b>							
1	50E	10	1	0	MARL110AI	100517	10
1	-	01	0	1	MARL101AI	100518	10
<ul style="list-style-type: none"> <li>One or two additional blocks, when 9 or 10 contacts are required (combination possible with the front mounting block)</li> <li>One or two additional blocks on both sides, to cover up to 8 contacts (combination only possible with lateral blocks)</li> </ul>							
<b>Screw terminal</b>							
1	50E	10	1	0	MARL110ATS	100519	10
1	-	01	0	1	MARL101ATS	100520	10
<b>Ring terminal</b>							
1	50E	10	1	0	MARL110ARS	103299	10
1	-	01	0	1	MARL101ARS	103298	10
<b>Terminal : Faston 2x2,8 insulated (1)</b>							
1	50E	10	1	0	MARL110AFS	100521	10
1	-	01	0	1	MARL101AFS	100522	10
<b>Terminal : Printed circuit</b>							
1	50E	10	1	0	MARL110AIS	100523	10
1	-	01	0	1	MARL101AIS	100524	10

(1) Terminal with wire 1 mm<sup>2</sup>: Ie = 10A  
Insulated terminal type B2.8x0.8 with wire 1 mm<sup>2</sup>: Ie = 8A

Order codes

A

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### Accessories

	For use with:	Time	Function	Ue	Cat. no.	Ref. no.	Pack
 <p><b>Electronic timer block</b></p>	Lateral or front fixing on the contactor						
	MCR..MC ...	0.5 - 60 sec.	Delay ON	24 to 250V AC/DC	<b>MREBC10AC2</b>	100541	10
	MCR..MC ...	0.2 - 24 sec.	Delay ON	24 to 250V AC/DC	<b>MREBC20AC2</b>	100542	10
 <p><b>Timer fitment</b></p>	For fixing onto 35mm DIN-rail (EN 5022)						
	MREBC...				<b>MVB0R</b>	100543	10
 <p><b>Voltage suppressor block</b></p>	Connection and (plug-in) fixing onto front of the contactor						
	MCRA,MC ...	RC	AC	12 to 60V 50/60Hz	<b>MPOAAE1</b>	100544	10
	MCRA,MC ...	RC	AC	72 to 250V 50/60Hz	<b>MPOAAE2</b>	100545	10
	MCRC,MC ...	Diode	DC	6 to 250V DC	<b>MPOCAE3</b>	100546	10
	MCRC,MC ...	Varistor	AC/DC	24-48V	<b>MPODAE4</b>	100536	10
 <p><b>Mechanical interlock</b></p>	Kit comprising mechanical interlock and contactor jointing parts						
	MCR, MC_ ...				<b>MMH0</b>	100547	10
<p><b>Identification</b></p>	For use with:						
	MCR, MC_ ...	Sheets of labels (10 sheets of 260 labels each)			<b>EAT 260</b>	100548	1
	MCR, MC_ ...	Labelling plate base. Plug-in labelling plate bases (50 pieces in one pack)			<b>SPR</b>	100549	1



Notes

Large grid of dotted lines for taking notes.

Order codes

A

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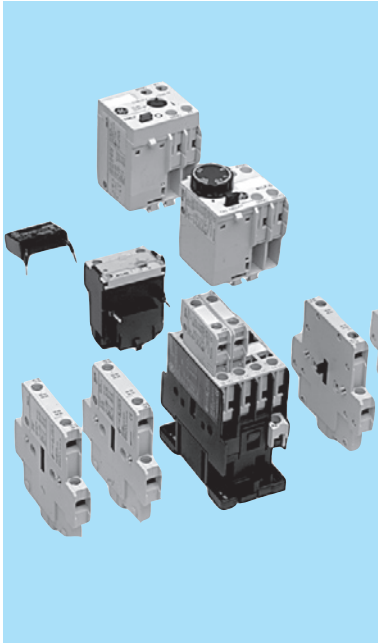
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## Auxiliary contactors *I<sub>th</sub>* = 20A

- Control circuit: Alternating current up to 690V  
Direct current up to 440V
- Terminal numbering in accordance with EN 50005 and EN 50011
- Fixing system for rapid and simple mounting onto standard 35mm DIN-rail (EN 50022-35)
- Terminals protected against accidental contact in accordance with VDE 0106 T.100, VBG4
- Ring terminal versions
- Three coil terminals
- Facility to mount side and/or front instantaneous contact blocks, timed auxiliary contacts, mechanical latch, voltage suppressor blocks and interface modules.
- Degree of protection IP20 (EN 60529)

### Standards

IEC/EN 60947-5-1	BS 4794
IEC/EN 60947-1	CENELEC HD410
EN 90947	CENELEC HD420
EN 60947	NFC 63-110
EN 50005	NFC 63-140
EN 50011	CSA C22.2/14
UL 508	VDE 0660/102
NEMA ICS 1	

### Approvals



- Order codes ● pg. A.23
- Auxiliary contacts blocks ● pg. A.23
- Accessories ● pg. A.24
- Technical data ● pg. A.34
- Diagrams ● pg. A.36
- Combinations of contacts ● pg. A.38
- Dimensions ● pg. A.42

### General data

<b>Maximum number of contacts (RL...)</b>	4
<b>Rated thermal current (I<sub>th</sub>) θ ≤ 55°</b>	(A) 20
<b>Rated operational voltage (U<sub>e</sub>)</b>	(V) 690
<b>Insulation voltage (U<sub>i</sub>)</b>	(V) 1000

#### Utilisation category:

AC-15	V	120	230/220	400/380	440/415	500	690/660
A	10	10	6	5	4	2	

DC-13	V	24	48	110	220	440
A	6	4	2	0.7	0.35	

### Standard voltages

To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit.

#### Alternating current (V). Dual-frequency coil

♦	1	2	9	3	4	5	6	7	13	8	15
AC	24	42	48	110	120	220	230	240	400	440	480
50/60Hz			115								

#### Alternating current (V)

♦	A	B	E	K	L	N	T	U	W	Y	Z
AC			32	127		220		380	415	500	660
50Hz						230		400		690	
AC	6	12				208	277	380	480	460	600
60Hz											

#### Direct current (V)




♦	B	D	E	F	G	H	I	J	K	N	P	R	T
DC	12	24	36	42	48	60	72	110	120	220	230	240	250

#### Direct current (V) - Wide voltage range

♦	WB	WD	WE	WF	WG	WH	WI	WJ	WK	WN	WP	WR	WT
DC	12	24	33	42	48	60	72	110	125	220	230	240	250






### Auxiliary contactors

Contacts		Control circuit: Alternating current up to 690V		Control circuit: Direct current up to 440V	
		Cat. no. <sup>(1)</sup>	Pack	Cat. no. <sup>(1)</sup>	Pack
		Ref. no. see bottom		Ref. no. see bottom	
	Screw terminal				
	4 0 0 0	RL4RA040T ◆	5	RL4RD040T ◆	10
	3 1 0 0	RL4RA031T ◆	5	RL4RD031T ◆	10
	2 2 0 0	RL4RA022T ◆	5	RL4RD022T ◆	10
	0 4 0 0	RL4RA004T ◆	5	RL4RD004T ◆	10
1 1 1 1	RL4RA022G ◆	5	RL4RD022G ◆	10	
	Ring terminal				
	4 0 0 0	RL4RA040R ◆	5	RL4RD040R ◆	10
	3 1 0 0	RL4RA031R ◆	5	RL4RD031R ◆	10
	2 2 0 0	RL4RA022R ◆	5	RL4RD022R ◆	10
	0 4 0 0	RL4RA004R ◆	5	RL4RD004R ◆	10
	Screw terminal	LB1A ◆	5	LB1D ◆	5
	Ring terminal	LR1A ◆	5	LR1D ◆	5

(1) To complete the catalogue number, replace the symbol ◆ by the code corresponding to the voltage and frequency of the control circuit. (See pg. A.22).

### Auxiliary contacts

Instantaneous	Number of contacts	Contacts				Function	Time	Cat. no.	Ref. no.	Pack		
		.3 .4	.1 .2	.7 .8	.5 .6							
	Screw terminal	1	1	0	0			BCLF10	104700	10		
		1	0	1	0			BCLF01	104701	10		
		1	0	0	1	0			BCLF10G	104702	10	
		1	0	0	0	1			BCLF01G	104703	10	
	Ring terminal	1	1	0	0	0			BCRF10	108901	10	
		1	0	1	0	0			BCRF01	108902	10	
	Screw terminal	2	2	0	0			BRLL20	104704	10		
		2	1	1	0	0			BRLL11	104705	10	
		2	0	2	0	0			BRLL02	106622	10	
	Screw terminal	2	0	0	1	1	Delayed ON	0.1 - 30 sec.	BTLF30C	104709	10	
		2	0	0	1	1	Delayed ON	1 - 60 sec.	BTLF60C	104710	10	
		2	0	0	1	1	Delayed OFF	0.1 - 30 sec.	BTLF30D	104711	10	
		2	0	0	1	1	Delayed OFF	1 - 60 sec.	BTLF60D	104712	10	
		Ring terminal	2	0	0	1	1	Delayed ON	0.1 - 30 sec.	BTRF30C	108903	10
			2	0	0	1	1	Delayed ON	1 - 60 sec.	BTRF60C	108904	10
			2	0	0	1	1	Delayed OFF	0.1 - 30 sec.	BTRF30D	108905	10
			2	0	0	1	1	Delayed OFF	1 - 60 sec.	BTRF60D	108906	10
		Sealing cover protection for pneumatic timer								BTLFX	113001	5

For reference numbers, see chapter X, pg. X.3



Order codes

A

B

C

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E

F



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## Accessories

	Number of contacts	Contacts				Cat. no.	Ref. no.	Pack
		.3  .4	.1  .2	.7  .8	.5  .6			
 <b>Mechanical interlock</b>	<b>Mechanical</b>	-	-	-	-	<b>BELA</b>	104723	5
	<b>Mechanical / electrical</b>	2	0	2	-	<b>BELA02</b>	104724	5
 <b>Mechanical latch blocks</b>	Frontal mounted to the contactor							
					RL4RA..., RL4RD...	<b>RMLF</b> ♦ <sup>(1)</sup>	see bottom	20
(1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit.								
		<b>D</b>	<b>G</b>	<b>HC</b>	<b>J</b>	<b>N</b>	<b>U</b>	<b>Y</b>
<b>50Hz</b>	24, 32	42, 48		110, 115, 120, 127	220, 230, 240	380, 400, 415, 440, 480	500, 660/690	
<b>60HZ</b>	24, 32	48, 60		110, 115, 120, 127	208, 220, 240, 277	380, 400, 415, 440, 480	600	
<b>DC</b>	24, 32, 36	42, 48	60, 72	110, 120, 125	220, 230, 240, 250	440		

	For use with:	Type	Control circ.	Ue	Cat. no.	Ref. no.	Pack
 <b>Transient voltage suppressor block</b>	Directly connected parallel to the coil terminals, allows simultaneous use with auxiliary contact blocks.						
	RL4RA...	R/C	AC	12V ... 48V	<b>BSLR2G</b>	104713	10
	RL4RA...	R/C	AC	50V ... 127V	<b>BSLR2K</b>	104714	10
	RL4RA...	R/C	AC	130V ... 250V	<b>BSLR2R</b>	104715	10
	RL4RD...	Diode	DC	12V ... 600V	<b>BSLDZ</b>	104719	10
	RL4RA..., RL4RD...	Varistor	AC / DC	24V ... 48V	<b>BSLV3G</b>	104720	10
	RL4RA..., RL4RD...	Varistor	AC / DC	50V ... 127V	<b>BSLV3K</b>	104721	10
RL4RA..., RL4RD...	Varistor	AC / DC	130V ... 250V	<b>BSLV3R</b>	104722	10	
RL4RA..., RL4RD...	Varistor	AC / DC	277V ... 500V	<b>BSLV3U</b>	110836	10	
<b>Identification</b>	For use with:				Cat. no.	Ref. no.	Pack
	RL4RA..., RL4RD...	Sheets of labels (10 sheets of 260 labels each)			<b>EAT 260</b>	100548	1
	RL4RA..., RL4RD...	Labelling plate base. Plug-in labelling plate bases (50 pieces in one pack)			<b>SPR</b>	100549	1

For reference numbers, see chapter X, pg. X.3

**Accessories (continued)**

**Electronic timer module**



For use with:	Control circuit	Function	Time	Cat. no.	Ref. no.	Pack
Directly connected parallel to the coil terminals, allows simultaneous use with auxiliary contact blocks.						
RL4...	24-250V AC/DC	Delayed ON	0,1 - 2 sec.	<b>BETL02C</b>	113602	5
RL4...	24-250V AC/DC	Delayed ON	1,5 - 45 sec.	<b>BETL45C</b>	113603	5
RL4...	24-250V AC/DC	Delayed OFF	0,1 - 2 sec.	<b>BETL02D</b>	113604	5
RL4...	24-250V AC/DC	Delayed OFF	1,5 - 45 sec.	<b>BETL45D</b>	113605	5

Order codes

A

B

C

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F

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## Technical data

### General

Maximum number of contacts (MCR...)	4
Rated thermal current (I <sub>th</sub> ) θ ≤ 60°	16A
Rated operational voltage (U <sub>e</sub> ) acc. IEC 60947.1	690V
Insulation voltage (U <sub>i</sub> ) acc. IEC 60947.1	750V

### Conformity to standards

IEC / EN 60947-5-1	IEC / EN 60947-1	BS 4794
EN 50002	EN 50005	EN 50011
NFC 63-110	NFC 63-140	CENELEC HD 420
CSA C22.2/14	VDE 0660	UL 508

### Approvals

cULus	DEMKO	NEMKO
SEMKO	SETI	RINA
Lloyd's Register	Bureau Veritas	CE

### Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +60°C	
Altitude	up to 3000m	
	from 3000 to 4000m	90%Ie 80%Ue
	from 4000 to 5000m	80%Ie 75%Ue

### Climatic resistance (IEC 68-2)

Continuous tests		40 / 125 / 56
Cold (72h)	Temperature	-40°C
	Dry heat (96h)	Temperature +125°C
Humid heat (56 days)	Relative humidity	< 50%
	Temperature	+40°C
Cyclical tests (6 cycles)	Relative humidity	95%
	Humid heat	Low temperature
First half-cycle (12h)		Relative humidity
	Second half-cycle (12h)	Low temperature
		Relative humidity

### Shock resistance (IEC 68-2-27)

Continuously closed (at 0,8Us)	
Admissible acceleration	25 g
Impulse duration	11 ms
Continuously opened (no voltage)	
Admissible acceleration	20 g
Impulse duration	11 ms

### Vibration resistance (IEC 68-2-6)

Continuously closed (at 0,8Us)	
Admissible acceleration	15 g
Sweep between	10 - 200 Hz
Continuously opened (no voltage)	
Admissible acceleration	5 g AC - 3.5 g DC
Sweep between	10 - 200 Hz

## Mounting positions

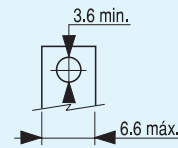
With the same pick-up and drop-out voltage  
With the same rated power

-7% of connection voltage  
+4% of disconnection voltage  
With the same rated power

-7% of connection voltage  
+4% of disconnection voltage  
With the same rated power

## Terminal capacity

Terminal with screw M3.5 Tightening torque		
(with pozidrive head and safety flange)		0.8 Nm - 7 Lb-in
Solid wire	mm <sup>2</sup>	0.75 to 2x2 w.
Flexible wire without terminal	mm <sup>2</sup>	0.75 to 2.5x2 w.
Flexible wire with terminal with cap	mm <sup>2</sup>	0.75 to 2.5x1 w
	mm <sup>2</sup>	0.75 to 1x2 w
Ring terminal cap		0.8 Nm - 7 Lb/in

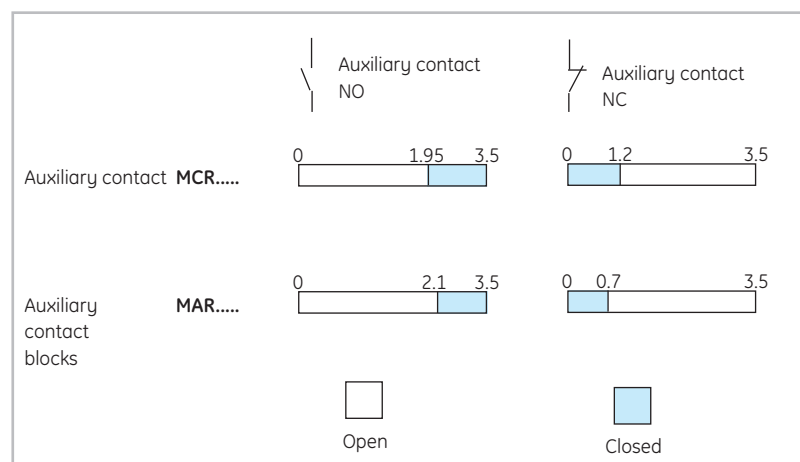


Fast-on 2.8 - 2 insulated terminals	mm <sup>2</sup>	1 x 2 w.
Terminal for printed circuit (Ø of PCB hole)		1.8mm
Ring terminal cap		7.8mm
Fork terminal cap		6.5mm

### Control circuit

		MCRA...	MCRC...	MCRC...	MCRI...	MCRK...
Rated insulation voltage (Ui)	(V)	750	750	750	750	750
Standard voltages (Us)						
50Hz	(V)	24..690	-	-	-	-
60Hz	(V)	6..600	-	-	-	-
DC	(V)	-	6..440	12..440	24	24
Voltage <sup>(1)</sup>						
Operating limits	xUs	0.8..1.1	0.8..1.1	0.7..1.3	0.8..1.25	0.7..1.25
Drop-out	xUs	0.35..0.55	0.15..0.3	0.15..0.3	0.15..0.3	0.13..0.35
Consumption						
Pick-up	(VA)	26	-	-	-	-
Seal	(VA)	4	-	-	-	-
DC	(W)	-	3	4	1.2	2
Power factor						
Pick-up	(cos φ)	0.8	-	-	-	-
Seal	(cos φ)	0.35	-	-	-	-
Power dissipation	(W)	1.4	3	4	1.2	2
Opening and closing times						
Values between ± %Us	%	+10...-20	+10...-20	+30...-30	+25...-20	+25...-20
Time at energisation NO	(ms)	6..13	22..36	17..28	30..70	20..50
Time at de-energisation NC	(ms)	8..16	9..12	9..12	9..16	9..16
Time at energisation NC	(ms)	5..11	18..27	12..25	20..45	18..35
Time at de-energisation NO	(ms)	6..13	5..7	5..7	5..9	5..9
Values at Us						
Time at energisation NO	(ms)	7..12	24..27	19..23	25..45	25..40
Time at de-energisation NC	(ms)	8..16	9..11	9..11	9..16	9..16
Time at energisation NC	(ms)	6..10	20..26	15..21	25..35	20..30
Time at de-energisation NO	(ms)	6..13	5..8	5..8	5..9	5..9
Maximum time without voltage (without effecting the closed magnetic circuit)	(ms)	3	3	3	3	3
Mechanical endurance						
Monofrequency	x10 <sup>6</sup> ops.	15	-	-	-	-
Dual-frequency	x10 <sup>6</sup> ops.	10	-	-	-	-
DC	x10 <sup>6</sup> ops.	-	10	10	10	10
Maximum rate (no load)						
Monofrequency	n° ops./h	9000	-	-	-	-
Dual-frequency	n° ops./h	3600	-	-	-	-
DC	n° ops./h	-	9000	9000	9000	9000

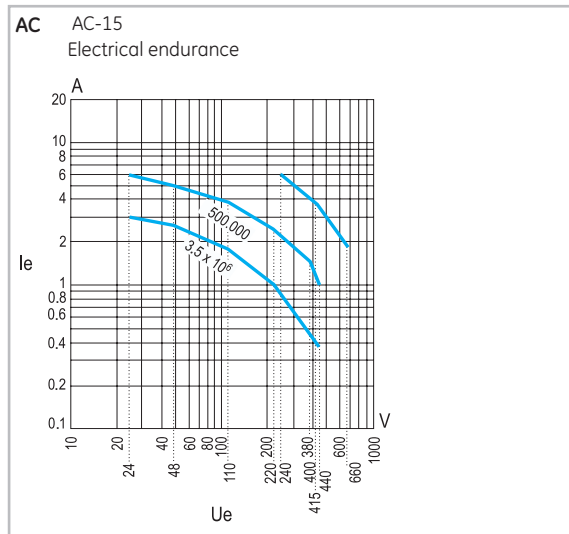
### Contact sequence (distance in mm.)



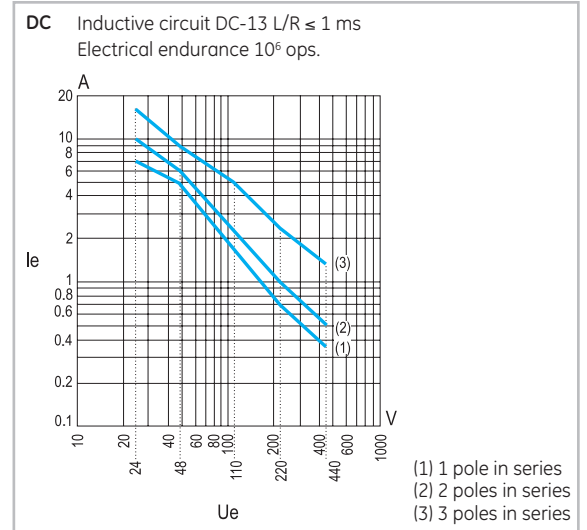
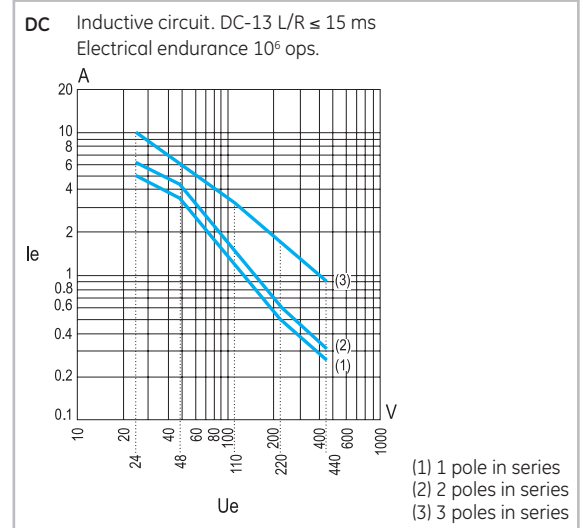
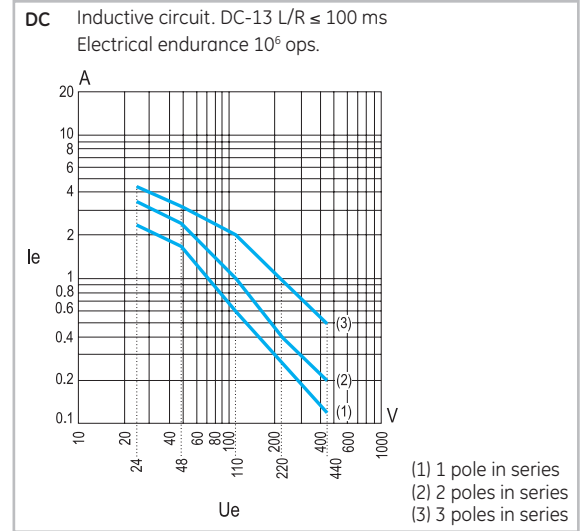
### Internal auxiliary contacts

		MCR.....
Rated insulation voltage (Ui) acc. IEC 60947-1		750V
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}^{(1)}$		16A
Making capacity (r.m.s.) acc. IEC 60947-5		
AC-15	$U_e \leq 440\text{V } 50/60 \text{ Hz}$	160A
DC-13	$U_e \leq 220\text{V DC}$	3A
Breaking capacity (r.m.s.) acc. IEC 60947-5		
AC-15	$U_e \leq 440\text{V } 50/60 \text{ Hz}$	106A
DC-13 (L/R = 100 ms)	$U_e \leq 220\text{V DC}$	1.2A
	$U_e = 110\text{V DC}$	3A
	$U_e = 48\text{V DC}$	10A
Rated voltage and rated current $U_e-I_e$		
AC-15	according to IEC 947	110/120V - 6A 220/240V - 6A 380/400V - 4A 415/440V - 4A 500V - 2.5A 660/690V - 1.5A
	according to UL, CSA	A600
DC-13	according to IEC	24V - 5A 48V - 3.5 A 110V - 1.2A 220V - 0.6A 440V - 0.25A
	according to UL, CSA	P600
Minimum operational power (operational safety)		5 mA, 17V
Short-circuit protection (max.class gI fuse without welding)		10A
Insulation resistance		
	between contacts	> 10 m $\Omega$
	between contacts and earth	> 10 m $\Omega$
	between input and output	> 10 m $\Omega$
Guaranteed no overlap of the contacts		
	Space	1,1 mm
	minimum time	> 2 ms
Impedance		2,3 m $\Omega$
Terminal capacity		Same as main circuit

### Tripping characteristics (AC)



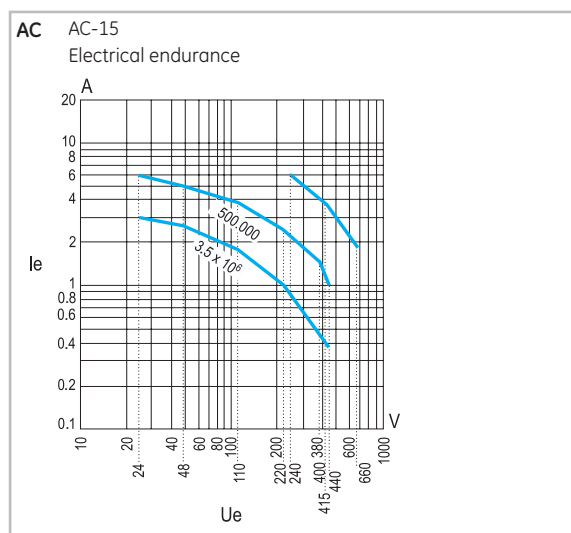
### Tripping characteristics $I_e/U_e$



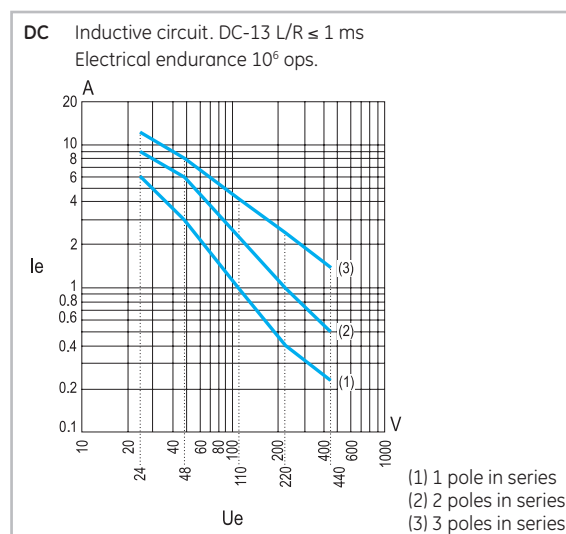
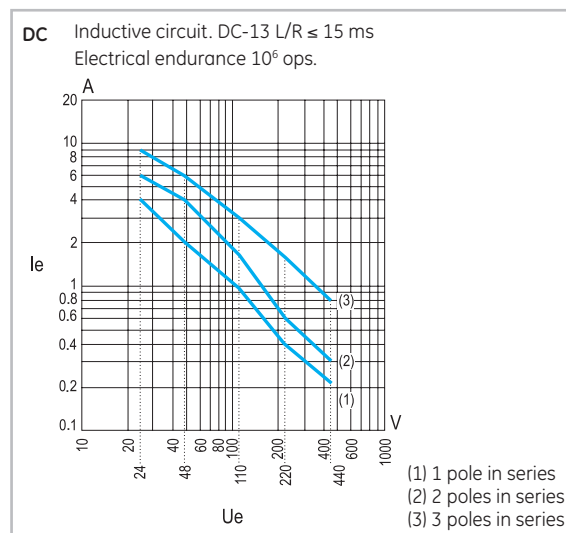
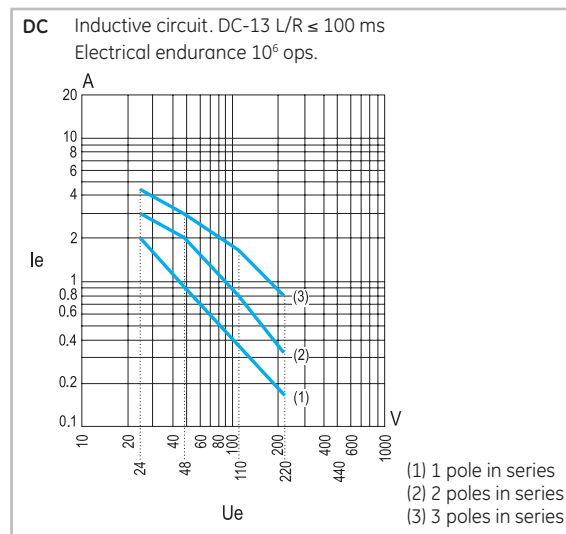
### External auxiliary contact blocks

		MARN..., MARL...
Rated insulation voltage (Ui) acc. IEC 60947-1		750V
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$ <sup>(1)</sup>		10A
Making capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue $\leq$ 220V 50/60 Hz	73A
	Ue = 380V 50/60 Hz	38A
	Ue = 690V 50/60 Hz	22A
DC-13 L/R = 100 ms	Ue $\leq$ 100V DC	2.6A
	Ue = 220V DC	1A
	Ue = 440V DC	0.6A
Breaking capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue $\leq$ 220V 50/60 Hz	73A
	Ue = 380V 50/60 Hz	38A
	Ue = 690V 50/60 Hz	22A
DC-13 L/R = 100 ms	Ue $\leq$ 100V DC	2A
	Ue = 220V DC	0.8A
	Ue = 440V DC	0.4A
Rated voltage and rated current Ue-Ie		
AC-15	according to IEC 60947	110/120V - 6A
		220/240V - 6A
		380/400V - 3A
		415/440V - 3A
		500V - 1A
		660/680V - 1A
	according to UL, CSA	A600
DC-13	according to IEC 60947	24V - 4A
		48V - 2A
		110V - 0.7A
		220V - 0.3A
		440V - 0.1A
	according to UL, CSA	Q600
Minimum operational power (operational safety)		5 mA, 17V
Short-circuit protection (max.class gI fuse without welding)		10A
Insulation resistance		
	between contacts	> 10 m $\Omega$
	between contacts and earth	> 10 m $\Omega$
	between input and output	> 10 m $\Omega$
Guaranteed no overlap of the contacts		
	Space	0.5 mm
	minimum time	> 2 ms
Impedance		2.4 m $\Omega$
Terminal capacity		Same as main circuit

### Tripping characteristics (AC)



### Tripping characteristics Ie/ue



A

B

C

D

E

F

G

H

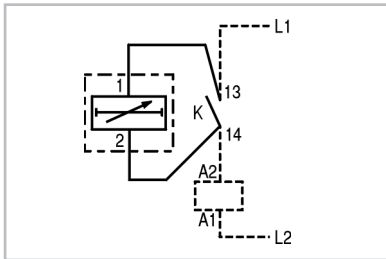
I

X

## Electronic timer block

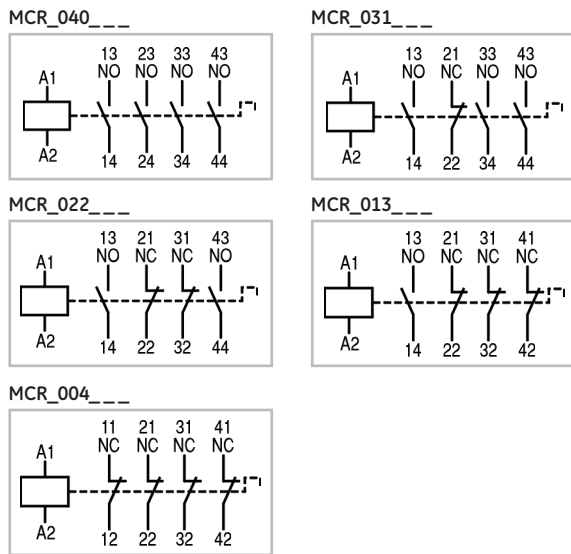
		MREBC...
Rated insulation voltage (Ui)		750V
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$ <sup>(1)</sup>		0.55V
Standard voltages (AC y DC)		24 to 250V
Operation limits		0.80 to 1.1 Us (0.85 to 1.1 Us at 12V)
Voltage drop		< 3V
Maximum load current at		
	20°C	0.9A
	40°C	0.72A
	60°C	0.55A
Minimum load for safe operation		> 10 mA
Maximum current (peak)		10A for 40 ms
Leakage current at 220V		< 5 mA
Operational current		
	AC-15	0.7A
	DC-13	0.9A
Timing range (delay ON)		0.5 to 60 s ( $\pm 6$ s)
Rearrangement time		< 100 ms
Repeatability (accuracy)		$\pm 1$ %
Ambient temperature		
	Storage	from $-55$ up to $+80^\circ\text{C}$
	Operation	from $-5$ up to $+60^\circ\text{C}$
Degree of protection		IP20
Mounting position		any
Terminals : 2 free cables		1 mm <sup>2</sup> (AWG 17) 250 mm

MREBC\_0AC2



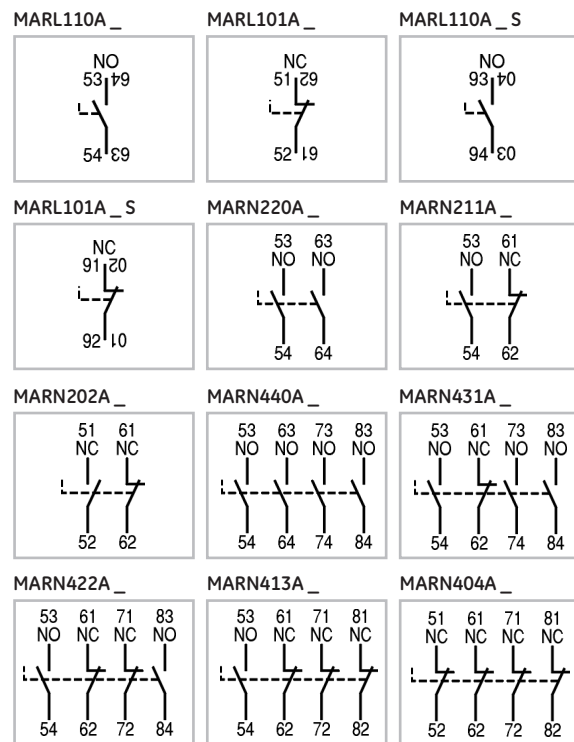
Terminal numbering

Auxiliary contactors. According to EN 50011

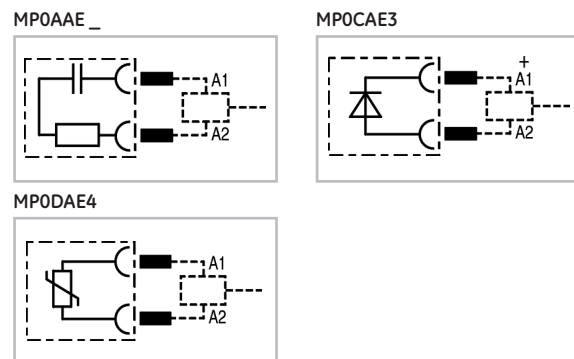


Auxiliary contact blocks.

According to EN 50005 & EN 50011



Transient voltage suppressor block




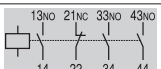

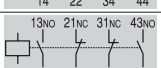

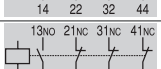

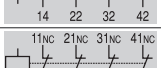

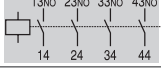
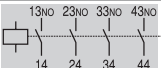
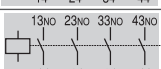

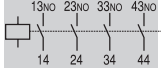
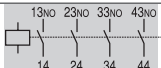

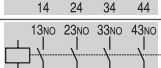
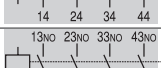

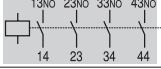
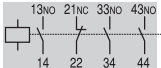
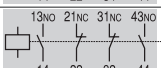
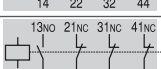
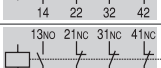
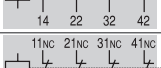


## Terminal numbering in accordance with EN 50011

By combining other basic auxiliary contactors with auxiliary contact blocks MAR..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be ten.

### Type E

Standard contact combination in which the interchangeability of the devices does not affect the cabling or the diagram. Specifies a particular contact numbering and positioning.

	Final structure of the combination	Auxiliary contacts		Auxiliary contactor + Auxiliary contact blocks to be added	
		Combination Description	NO NC		
Type E	 	4E	4 0	MCRA040A..	
	 	31E	3 1	MCRA031A..	
	 	22E	2 2	MCRA022A..	
	 	13E	1 3	MCRA013A..	
	 	04E	0 4	MCRA004A..	
			60E	6 0	MCRA040A.. + MARN220A..
			51E	5 1	MCRA040A.. + MARN211A..
			42E	4 2	MCRA040A.. + MARN202A..
			80E	8 0	MCRA040A.. + MARN440A..
			71E	7 1	MCRA040A.. + MARN431A..
		62E	6 2	MCRA040A.. + MARN422A..	
		53E	5 3	MCRA040A.. + MARN413A..	
		44E	4 4	MCRA040A.. + MARN404A..	
			50E	5 0	MCRA040A.. + MARL110A..
		41E	4 1	MCRA031A.. + MARL110A..	
		32E	3 2	MCRA022A.. + MARL110A..	
		23E	2 3	MCRA013A.. + MARL110A..	
		14E	1 4	MCRA013A.. + MARL101A..	
		05E	0 5	MCRA004A.. + MARL101A..	



**Terminal numbering in accordance with EN 50011 (continued)**

By combining other basic auxiliary contactors with auxiliary contact blocks MAR..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be ten.

**Type Z**  
Contact combination the same as Type E. Interchangeability of the devices may affect the cabling and the diagram. Neither contact numbering nor positioning are retained.

**Type X**  
Contact combination the same as Type E. Interchangeability of the devices may affect the cabling but not the diagram. The contact numbering is maintained but not their position.

**Type Y**  
Contact combination which differs from Type E, although it is obtained by a combination of devices provided for this Type E.

	Final structure of the combination	Auxiliary contacts		Auxiliary contactor + Auxiliary contact blocks to be added
		Combination	NO NC	
		Description		
Type Z			6 0	MCRA040A.. + MARL110A.. + MARL110A..
			5 1	MCRA040A.. + MARL110A.. + MARL101A..
			4 2	MCRA040A.. + MARL101A.. + MARL101A..
			10 0	MCRA040A.. + MARN440A.. + MARL110A..S + MARL110A..S
			5 5	MCRA040A.. + MARN413A.. + MARL101A..S + MARL101A..S
Type X			8 0	MCRA040A.. + MARL110A.. + MARL110A.. + MARL110A..S + MARL110A..S
			7 1	MCRA040A.. + MARL110A.. + MARL101A.. + MARL110A..S + MARL110A..S
			6 2	MCRA040A.. + MARL110A.. + MARL101A.. + MARL101A..S + MARL110A..S
			5 3	MCRA040A.. + MARL110A.. + MARL101A.. + MARL101A..S + MARL101A..S
			4 4	MCRA040A.. + MARL101A.. + MARL101A.. + MARL101A..S + MARL101A..S
			9 1	MCRA040A.. + MARN431A.. + MARL110A..S + MARL110A..S
			8 2	MCRA040A.. + MARN431A.. + MARL101A..S + MARL110A..S
			7 3	MCRA040A.. + MARN422A.. + MARL101A..S + MARL110A..S
			6 4	MCRA040A.. + MARN422A.. + MARL101A..S + MARL101A..S
Type Y			4 2	MCRA031A.. + MARL110A.. + MARL101A..
			3 3	MCRA022A.. + MARL110A.. + MARL101A..
			4 2	MCRA031A.. + MARN211A..
			3 3	MCRA022A.. + MARN211A..
			5 3	MCRA031A.. + MARN422A..
			4 4	MCRA022A.. + MARN422A..

Technical data

A  
B  
C  
D  
E  
F  
G  
H  
I  
X





## General

Maximum number of contacts	4
Rated thermal current (I <sub>th</sub> ) θ < 55°C	20A
Rated operational voltage (U <sub>e</sub> )	690V
Insulation voltage (U <sub>i</sub> )	1000V

## Conformity to standards

IEC / EN 60947-1	IEC / EN 60947-5-1	ASE 1025
EN 50005	EN 50011	VDE 0660 / 102
NFC 63-110	NFC 63-140	
CENELEC HD 410	CENELEC HD 420	
NEMA ICS 1	CSA C22.2/14	
UL 508	BS 4794	

## Approvals

cULus	DEMKO	NEMKO
SEMKO	FI	CE
Lloyd's Register	Bureau Veritas	

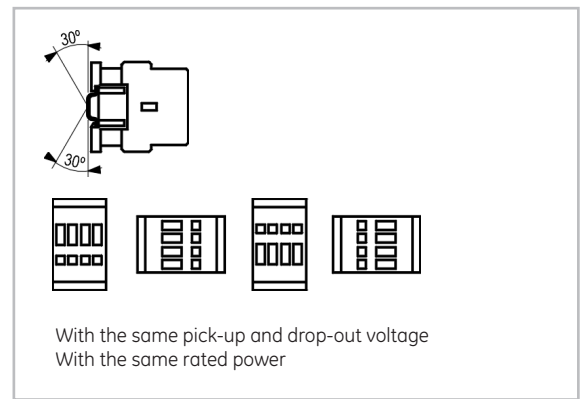
## Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +60°C	
Altitude	up to 3000m	Nominal values
	from 3000 to 4000m	90%Ie 80%Ue
	from 4000 to 5000m	80%Ie 75%Ue

## Climatic resistance (IEC 68-2)

Continuous tests	40 / 125 / 56	
Cold (72h)	Temperature	-40°C
	Relative humidity	< 50%
	Relative humidity	< 50%
Dry heat (96h)	Temperature	+125°C
	Relative humidity	< 50%
	Relative humidity	< 50%
Humid heat (56 days)	Temperature	+40°C
	Relative humidity	95%
	Relative humidity	95%
Cyclical tests (6 cycles)		
Humid heat	Temperature	+25°C
	Relative humidity	93%
	Relative humidity	93%
First half-cycle (12h)	Low temperature	+25°C
	Relative humidity	93%
	Relative humidity	93%
Second half-cycle (12h)	Low temperature	+55°C
	Relative humidity	95%
	Relative humidity	95%

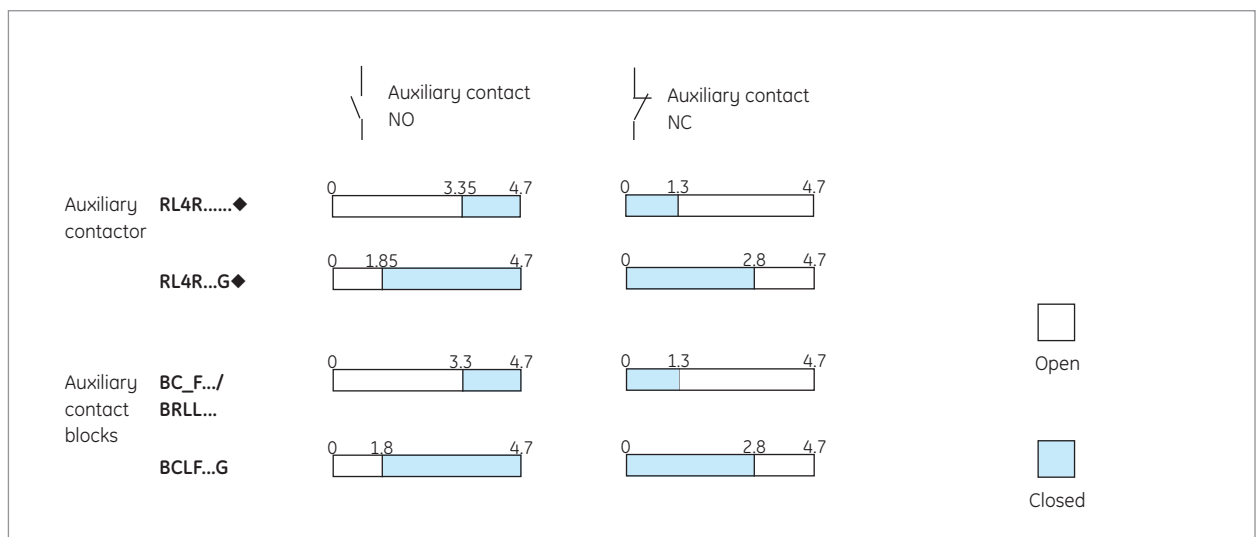
## Mounting positions



## Control circuit

		RL4RA...	RL4RD...	RL4RD...W
Rated insulation voltage U <sub>i</sub>	(V)	1000	1000	1000
Standard voltages U <sub>s</sub>				
50Hz (V)		24 ... 690	-	-
60Hz (V)		24 ... 600	-	-
DC	(V)	-	12 ... 440	12 ... 440
Voltage <sup>(1)</sup>				
Operating limits	xU <sub>s</sub>	0.8 ... 1.1	0.8 ... 1.1	0.7 ... 1.3
Pick-up	xU <sub>s</sub>	0.65 ... 0.75	0.45 ... 0.65	0.45 ... 0.55
Seal	xU <sub>s</sub>	0.4 ... 0.55	0.15 ... 0.3	0.15 ... 0.3
Consumption				
AC	Magnetic circuit closed	(VA)	6	-
	Magnetic circuit open	(VA)	45	-
DC	Magnetic circuit closed	(W)	-	5.5
	Magnetic circuit open	(W)	-	5.5
Power dissipation	(W)	2.4	5.5	6.5
Power factor				
Magnetic circuit closed	cos φ	0.34	-	-
	cos φ	0.82	-	-
Opening and closing times				
at 0.8 to 1.1 U <sub>s</sub>				
Closing time NO	(ms)	6 ... 25	35 ... 65	25 ... 65
Opening time NO	(ms)	6 ... 13	6 ... 13	6 ... 13
at U <sub>s</sub>				
Closing time NO	(ms)	8 ... 20	35 ... 45	25 ... 55
Opening time NO	(ms)	6 ... 13	7 ... 12	6 ... 13
Mechanical endurance	10 <sup>6</sup> ops	15	15	15
Maximum rate no load	ops/h	9000	3600	3600

## Contact sequence (distance in mm)

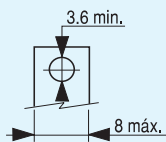


### Internal auxiliary contacts

	RL4.....
Rated insulation voltage (Ui) acc. IEC 60947-5	1000V
Rated thermal current (Ith) < 55°C	20A
Making capacity (r.m.s.) acc. IEC 60947-5	
AC-15 Ue ≤ 400V, 50/60 Hz	250A
DC-13 Ue ≤ 220V DC	250A
Breaking capacity (r.m.s.) acc. IEC 60947-5	
AC-15 Ue ≤ 400V, 50/60 Hz	250A
DC-13 Ue ≤ 220V DC	2A (4A with 2 contacts in series)
Ue ≤ 110V DC	7A (12A with 2 contacts in series)
Ue ≤ 48V DC	10A (18A with 2 contacts in series)
Rated voltage and rated current Ue-Ie	
AC-15 according to IEC	110/120V - 10A 220/240V - 10A 380/400V - 6A 415/440V - 5A 500V - 4A 660/690V - 2A
according to UL, CSA	A600
DC-13 according to IEC	24V - 6A 48V - 4A 110V - 2A 220V - 0,7A 440V - 0,35A
according to UL, CSA	P600
Electrical endurance	1 × 10 <sup>6</sup> ops.
Minimum operational voltage (operational safety)	17V
Minimum operational current	5mA
Short-circuit protection	
max. fus. class gL fuse	20A
without welding	10A
Insulation resistance	
between contacts	> 10 mΩ
between contacts and earth	> 10 mΩ
between input and output	> 10 mΩ
Guaranteed no overlap between NO and NC contacts	
space	1.3 mm
minimum time	1.5 ms
Impedance	1.28 mΩ

### Terminal capacity

Solid, stranded and finely stranded without end sleeve	mm <sup>2</sup>	2 × 0.5 to 6
Finely stranded with end sleeve	mm <sup>2</sup>	2 × 1 to 6
AWG wires, solid and stranded	mm <sup>2</sup>	2 × 20 to 12
Tightening torque		1.1 Nm / 10 Lb.in
Ring terminals		1.6 Nm / 15 Lb.in

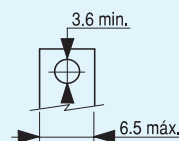


### Instantaneous auxiliary contact blocks

	BCLF./BCRF./BRLL..
Rated insulation voltage (Ui) acc. IEC 60947-5	1000V
Rated thermal current (Ith) θ < 55°C	10A
Making capacity (r.m.s.) acc. IEC 60947-5	
AC-15 Ue ≤ 440V, 50/60 Hz	90A
DC-13 Ue ≤ 220V DC	90A
Breaking capacity (r.m.s.) acc. IEC 60947-5	
AC-15 Ue ≤ 400V, 50/60 Hz	60A
DC-13 Ue ≤ 220V DC	0,95A
Rated voltage and rated current Ue-Ie	
AC-15 according to IEC	110/120V - 6A 220/240V - 6A 380/400V - 4A 415/440V - 3.5A 500V - 2.5A 660/690V - 1.5A
according to UL, CSA	A600
DC-13	24V - 4A 48V - 2A 110V - 0.7A 220V - 0.3A 415/440V - 0.15A
according to UL, CSA	Q600
Electrical endurance	1 × 10 <sup>6</sup> ops.
Minimum operational voltage (operational safety)	17V
Minimum operational current	5mA
Short-circuit protection (without welding) gL	10A
Insulation resistance	
between contacts	> 10 mΩ
between contacts and earth	> 10 mΩ
between input and output	> 10 mΩ
Guaranteed no overlap between NO and NC contacts	
Space	1.3 mm
minimum time	1.5 ms
Impedance of the contacts	1.28 mΩ

### Terminal capacity

Solid, stranded and finely stranded without end sleeve	mm <sup>2</sup>	2 × 0.5 to 2.5
Finely stranded with end sleeve	mm <sup>2</sup>	2 × 2.5 to 4
AWG wires, solid and stranded	mm <sup>2</sup>	2 × 0.5 to 2.5
Tightening torque		0.8 Nm / 7 Lb.in
Ring terminals		0.8 Nm / 7 Lb.in

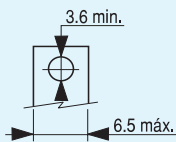


**Timed auxiliary contact blocks**

	BTLF... / BTRF...
Rated insulation voltage (Ui) acc. IEC 60947-5	1000V
Rated thermal current (Ith) $\theta < 55^{\circ}\text{C}$	10A
Making capacity (r.m.s.) acc. IEC 60947-5	
AC-15 $U_e \leq 440\text{V}, 50/60\text{ Hz}$	90A
DC-13 $U_e \leq 220\text{V DC}$	90A
Breaking capacity (r.m.s.) acc. IEC 60947-5	
AC-15 $U_e \leq 400\text{V}, 50/60\text{ Hz}$	60A
DC-13 $U_e \leq 220\text{V DC}$	0.95A
Rated voltage and rated current $U_e$ -Ie	
AC-15      according to IEC	110/120V - 6A 220/240V - 6A 380/400V - 4A 415/440V - 3.5A 500V - 2.5A 660/690V - 1.5A
	according to UL, CSA      A600
DC-13      according to IEC	24V - 4A 48V - 2A 110V - 0.7A 220V - 0.3A 415/440V - 0.15A
	according to UL, CSA      Q600
Electrical endurance	$1 \times 10^6$ ops.
Minimum operational voltage (operational safety)	17V
Minimum operational current	5mA
Short-circuit protection (without welding) $g_L$	10A
Insulation resistance	
between contacts	$> 10\text{ M}\Omega$
between contacts and earth	$> 10\text{ M}\Omega$
between input and output	$> 10\text{ M}\Omega$
Guaranteed no overlap between NO and NC contacts	
space	1.3 mm
minimum time	1.5 ms
Timing	
(Ambient temperature between $- 25$ and $+ 55^{\circ}\text{C}$ )	
Accuracy	$\pm 5\%$
Loss of accuracy after $0.5 \times 10^6$ ops.	$+ 20\%$
Loss of accuracy per rise $^{\circ}\text{C}$ ( $0 - 55^{\circ}\text{C}$ )	$+ 0.75\%$ per $^{\circ}\text{C}$
Impedance of the contacts	1.28 m $\Omega$
Mechanical endurance	$5 \times 10^6$ ops.
Peak current	
during 1 s.	50A
during 0.1 s.	100A

**Terminal capacity**

Solid, stranded and finely stranded without end sleeve	(mm <sup>2</sup> )	$2 \times 0.5$ to 2.5
Finely stranded with end sleeve	(mm <sup>2</sup> )	$2 \times 0.5$ to 2.5
AWG wires, solid and stranded	(mm <sup>2</sup> )	$2 \times 20$ to 10
Tightening torque		0.8 Nm / 7 Lb.in
Ring terminals		0.8 Nm / 7 Lb.in



**Mechanical latch blocks**

	RMLF.....
Rated insulation voltage (Ui)	1000V
Standard voltages (Us); 50-60Hz and direct current	24 ... 690V
Operating limits	0.75 to 1.1 xUs
Consumption for unlatching (auto cut-out)	210W /VA (24-72V) 130W /VA (110-440V)
Unlatching control <sup>(1)</sup>	
Electrical      Min.impuls	10 ms Maintained auto cut-out by integral contact 55-56 (only AC slots)
Manual	By local (0) push-button
Contactor control	
Electrical      Min.impuls	40 ms
Manual	By local (I) push-button
Mechanical endurance	CL00 ... CL45 $3 \times 10^6$ (1200ops./h) CL05 ... CL10 $0.1 \times 10^6$ (300 ops./h)

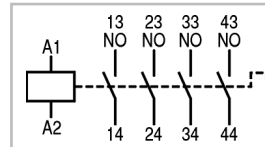
**Terminal capacity**

Solid, stranded and finely stranded without end sleeve	mm <sup>2</sup>	$2 \times 0.5$ to 2.5
Finely stranded with end sleeve	mm <sup>2</sup>	$2 \times 0.5$ to 2.5
AWG wires, solid and stranded	mm <sup>2</sup>	$2 \times 20$ to 10
Tightening torque		0.8 Nm / 7 Lb.in

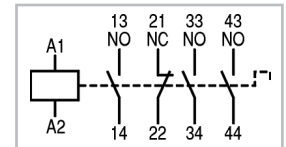
**Terminal numbering**

**Auxiliary contactors**

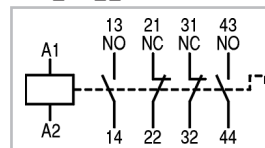
RL4R\_040\_



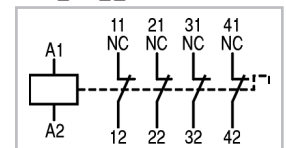
RL4R\_031\_



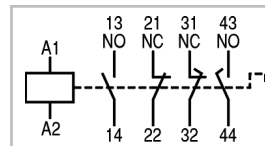
RL4R\_022\_



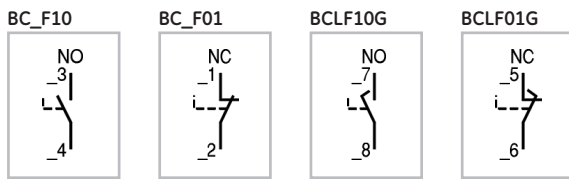
RL4R\_004\_



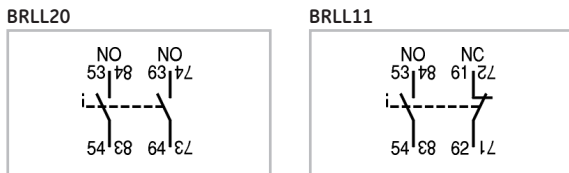
RL4R\_022G\_



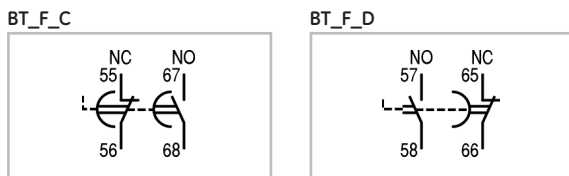
Auxiliary contact blocks. Front mounting



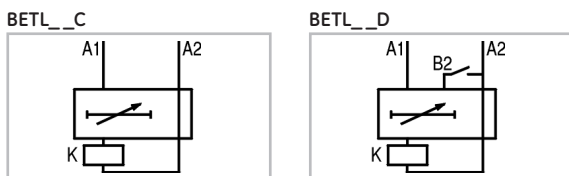
Auxiliary contact blocks. Lateral mounting



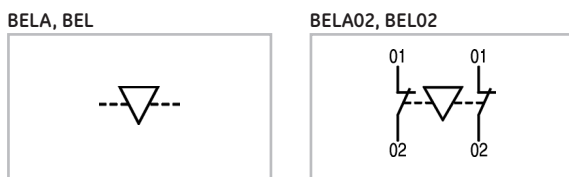
Pneumatic timer blocks



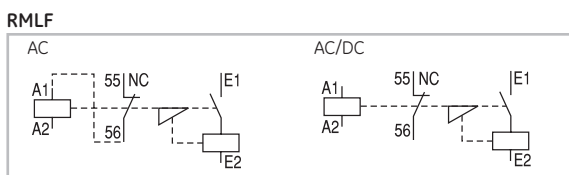
Electronic timer blocks



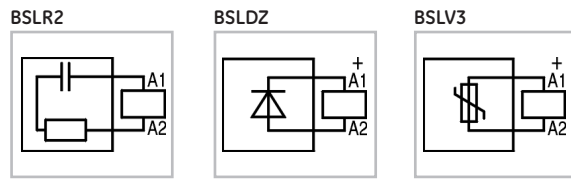
Mechanical (-/electrical) interlock



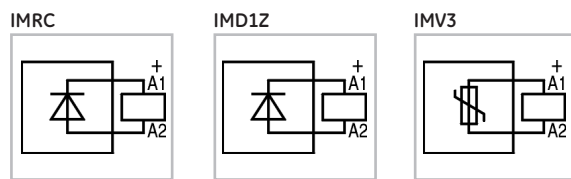
Mechanical latch block



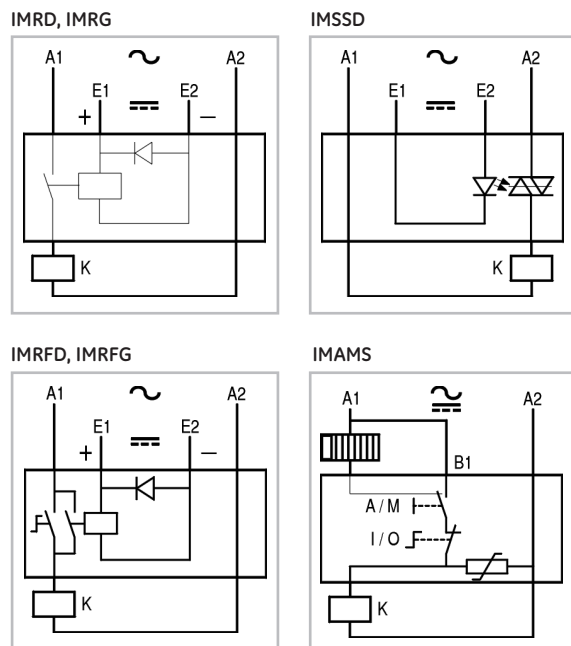
Voltage suppressor blocks



Voltage suppressor blocks to use with interface modules and electronic timer blocks



Interface modules




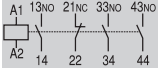

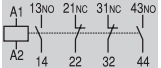

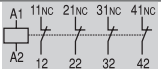


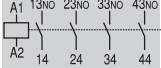

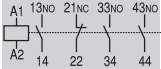

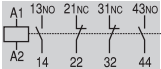

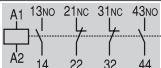

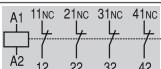

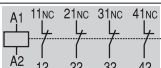


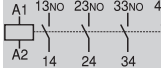

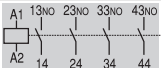

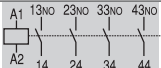




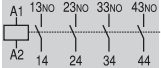

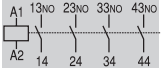

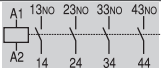

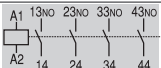


## Terminal numbering in accordance with EN 50011

By combining other basic auxiliary contactors with auxiliary contact blocks BLC..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be four.

### Type E

Standard contact combination in which the interchangeability of the devices does not affect the cabling or the diagram. Specifies a particular contact numbering and positioning.

Type	Final structure of the combination	Auxiliary contacts		Auxiliary contactor +Auxiliary contact blocks to be added		
		Combination Description	NO NC			
Type E	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span> </div>		40E	4 0	RL4RA040...	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>21NC</span><span>33NO</span><span>43NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>22</span><span>34</span><span>44</span> </div>		31E	3 1	RL4RA031...	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>21NC</span><span>31NC</span><span>43NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>22</span><span>32</span><span>44</span> </div>		22E	2 2	RL4RA022...	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>11NC</span><span>21NC</span><span>31NC</span><span>41NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>12</span><span>22</span><span>32</span><span>42</span> </div>		04E	0 4	RL4RA004...	
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span> </div>		50E	5 0	RL4RA040... + BC_F10
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>21NC</span><span>33NO</span><span>43NO</span><span>53NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>22</span><span>34</span><span>44</span><span>54</span> </div>		41E	4 1	RL4RA031... + BC_F10
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>21NC</span><span>31NC</span><span>43NO</span><span>53NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>22</span><span>32</span><span>44</span><span>54</span> </div>		32E	3 2	RL4RA022... + BC_F10
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>21NC</span><span>31NC</span><span>43NO</span><span>51NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>22</span><span>32</span><span>44</span><span>52</span> </div>		23E	2 3	RL4RA022... + BC_F01
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>11NC</span><span>21NC</span><span>31NC</span><span>41NC</span><span>53NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>12</span><span>22</span><span>32</span><span>42</span><span>54</span> </div>		14E	1 4	RL4RA004... + BC_F10
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>11NC</span><span>21NC</span><span>31NC</span><span>41NC</span><span>51NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>12</span><span>22</span><span>32</span><span>42</span><span>52</span> </div>		05E	0 5	RL4RA004... + BC_F01
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span> </div>		60E	6 0	RL4RA040... + BC_F10 + BC_F10
		 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span><span>61NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span><span>62</span> </div>		51E	5 1	RL4RA040... + BC_F10 + BC_F01
 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>51NC</span><span>61NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>52</span><span>62</span> </div>			42E	4 2	RL4RA040... + BC_F01 + BC_F01	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span><span>63NO</span><span>73NO</span><span>83NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span><span>64</span><span>74</span><span>84</span> </div>		80E	8 0	RL4RA040... + BC_F10 + BC_F10 + BC_F10 + BC_F10	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span><span>61NC</span><span>73NO</span><span>83NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span><span>62</span><span>74</span><span>84</span> </div>		71E	7 1	RL4RA040... + BC_F10 + BC_F01 + BC_F10 + BC_F10	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span><span>61NC</span><span>71NC</span><span>83NO</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span><span>62</span><span>72</span><span>84</span> </div>		62E	6 2	RL4RA040... + BC_F10 + BC_F01 + BC_F01 + BC_F10	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>53NO</span><span>61NC</span><span>71NC</span><span>81NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>54</span><span>62</span><span>72</span><span>82</span> </div>		53E	5 3	RL4RA040... + BC_F10 + BC_F01 + BC_F01 + BC_F01	
	 <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A1</span><span>13NO</span><span>23NO</span><span>33NO</span><span>43NO</span><span>51NC</span><span>61NC</span><span>71NC</span><span>81NC</span> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>A2</span><span>14</span><span>24</span><span>34</span><span>44</span><span>52</span><span>62</span><span>72</span><span>82</span> </div>		44E	4 4	RL4RA040... + BC_F01 + BC_F01 + BC_F01 + BC_F01	

### Terminal numbering in accordance with EN 50011
















By combining other basic auxiliary contactors with auxiliary contact blocks BLC..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be four.

**Type Z**

Contact combination the same as Type E.  
Interchangeability of the devices may affect the cabling and the diagram. Neither contact numbering nor positioning are retained.

**Type Y**

Contact combination which differs from Type E, although it is obtained by a combination of devices provided for this Type E.

	Final structure of the combination	Auxiliary contacts		Auxiliary contactor +Auxiliary contact blocks to be added	
		Combination	NO NC		
		Description			
Type Z	 <pre> A1 13NO 23NO 33NO 43NO 53NO 63NO                                       A2 14 24 34 44 54 64             </pre>	60Z	6	0	RL4RA040... + BRL20
	 <pre> A1 13NO 23NO 33NO 43NO 53NO 61NC                                       A2 14 24 34 44 54 62             </pre>	51Z	5	1	RL4RA040... + BRL11
	 <pre> A1 13NO 23NO 33NO 43NO 53NO 63NO 73NO 83NO   A2 14 24 34 44 54 64 74 84             </pre>	80Z	8	0	RL4RA040... + BRL20 + BRL20
	 <pre> A1 13NO 23NO 33NO 43NO 53NO 61NC 73NO 83NO   A2 14 24 34 44 54 62 74 84             </pre>	71Z	7	1	RL4RA040... + BRL11 + BRL20
	 <pre> A1 13NO 23NO 33NO 43NO 53NO 61NC 71NC 83NO   A2 14 24 34 44 54 62 72 84             </pre>	62Z	6	2	RL4RA040... + BRL11 + BRL11
	 <pre> A1 13NO 21NC 33NO 43NO 53NO 61NC                                       A2 14 22 34 44 54 62             </pre>	42Y	4	2	RL4RA031... + BC_F10 + BC_F01
Type Y	 <pre> A1 13NO 21NC 33NO 43NO 53NO 61NC                                       A2 14 22 34 44 54 62             </pre>	42Y	4	2	RL4RA031... + BRL11
	 <pre> A1 13NO 21NC 33NO 43NO 53NO 61NC 71NC 83NO   A2 14 22 34 44 54 62 72 84             </pre>	53Y	5	3	RL4RA031... + BC_F10 + BC_F01 + BC_F01 + BC_F10
	 <pre> A1 13NO 21NC 31NC 43NO 53NO 61NC 71NC 83NO   A2 14 22 32 44 54 62 72 84             </pre>	44Y	4	4	RL4RA022... + BC_F10 + BC_F01 + BC_F01 + BC_F10
	 <pre> A1 13NO 21NC 31NC 43NO 53NO 61NC                                       A2 14 22 32 44 54 62             </pre>	33Y	3	3	RL4RA022... + BC_F10 + BC_F01
	 <pre> A1 13NO 21NC 31NC 43NO 53NO 61NC                                       A2 14 22 32 44 54 62             </pre>	33Y	3	3	RL4RA022... + BRL11
	 <pre> A1 13NO 23NO 33NO 43NO 55NC 67NO 73NO 83NO   A2 14 24 34 44 56 68 74 84             </pre>				RL4RA040... + BTLF...C + BRL20
	 <pre> A1 13NO 23NO 33NO 43NO 57NO 65NC 73NO 83NO   A2 14 24 34 44 58 66 74 84             </pre>				RL4RA040... + BTLF...D + BRL20
	 <pre> A1 13NO 23NO 33NO 43NO 55NC 67NO 71NC 83NO   A2 14 24 34 44 56 68 72 84             </pre>				RL4RA040... + BTLF...C + BRL11
 <pre> A1 13NO 23NO 33NO 43NO 57NO 65NC 71NC 83NO   A2 14 24 34 44 58 66 72 84             </pre>				RL4RA040... + BTLF...D + BRL11	

Technical data

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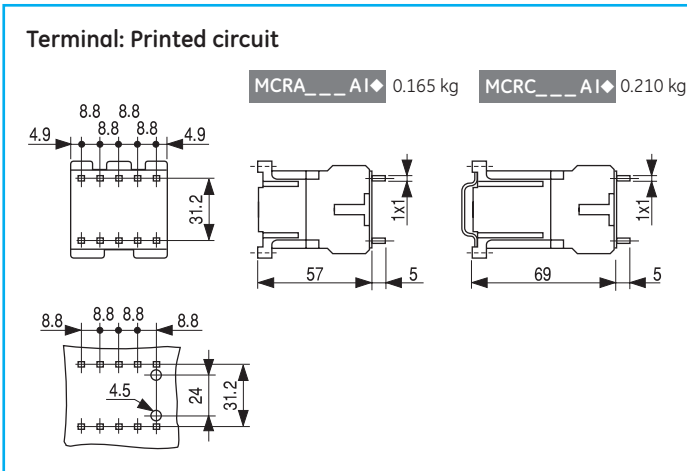
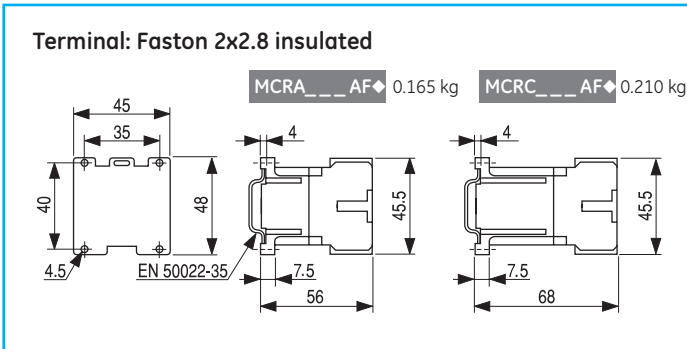
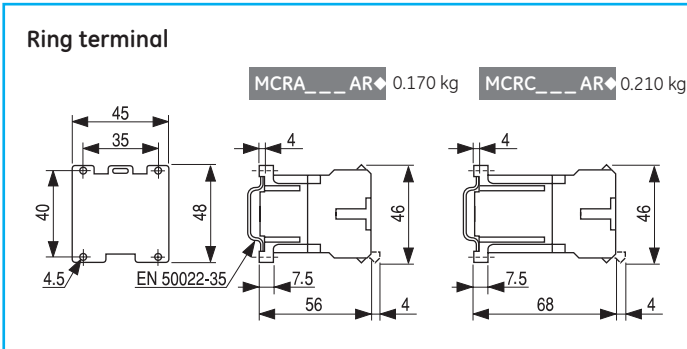
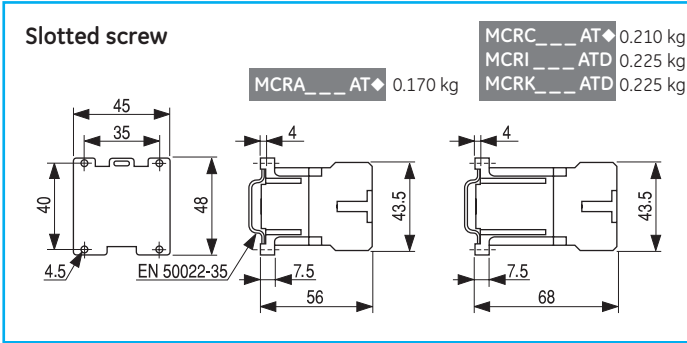
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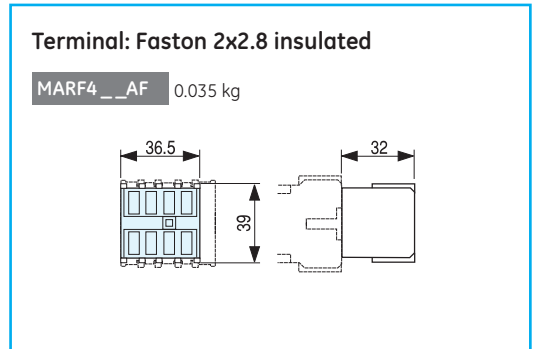
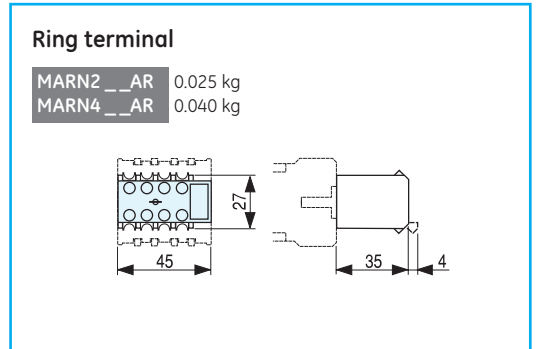
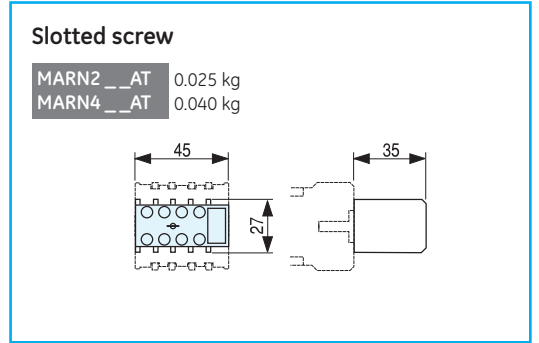


Dimensional drawings

Auxiliary minicontactors



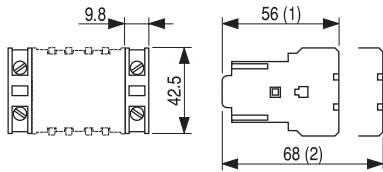
Auxiliary contact blocks. Front mounting



**Auxiliary contact blocks. Lateral mounting**

**Slotted screw**

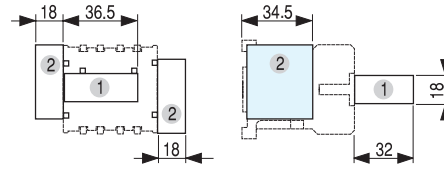
MARL\_\_AT, ATS 0.013 kg



(1) AC-control.  
(2) DC-control

**Electronic timer block**

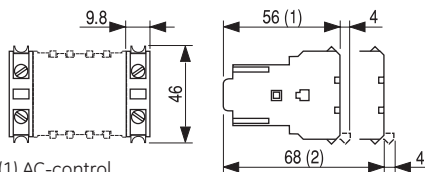
MREBC\_0AC2 0.040 kg



(1) Frontal mounting  
(2) Lateral mounting

**Ring terminal**

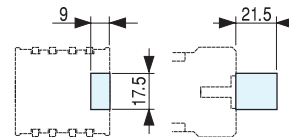
MARL\_\_AR, ARS 0.013 kg



(1) AC-control.  
(2) DC-control

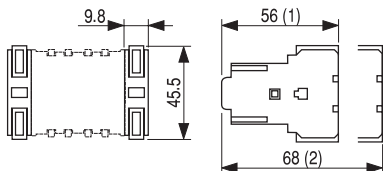
**Voltage suppressor block**

MPOA\_AE\_ 0.010 kg  
MPOC\_AE3 0.010 kg



**Terminal: Faston 2x2.8 insulated**

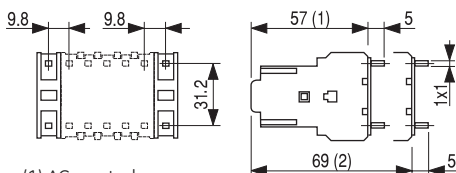
MARL\_\_AF, AFS 0.009 kg



(1) AC-control.  
(2) DC-control

**Terminal: Printed circuit**

MARL\_\_AI, AIS 0.009 kg



(1) AC-control  
(2) DC-control

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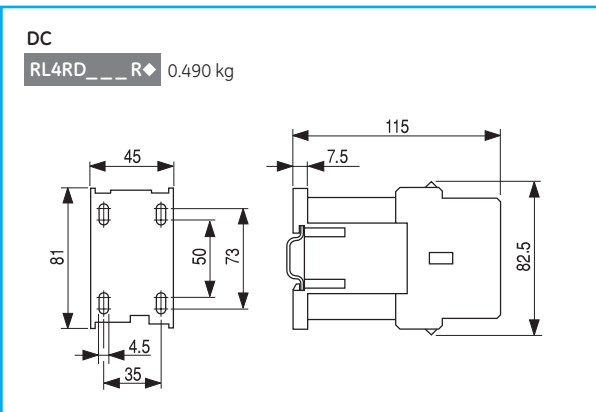
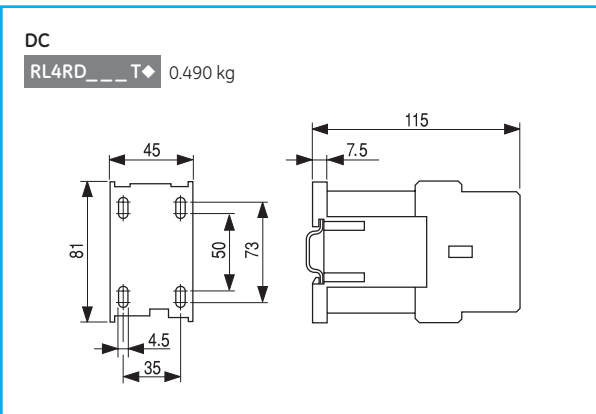
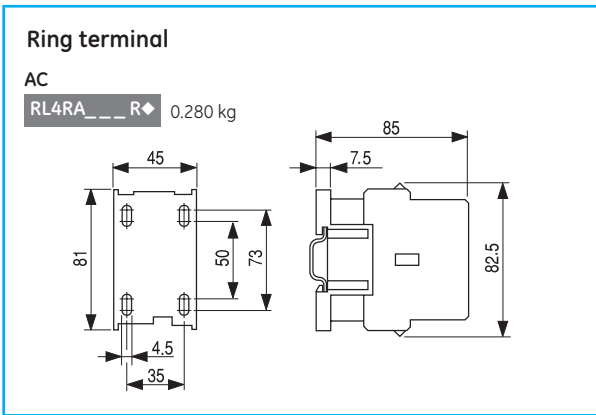
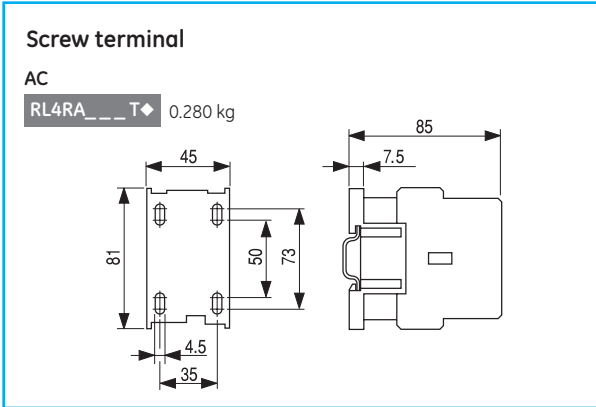
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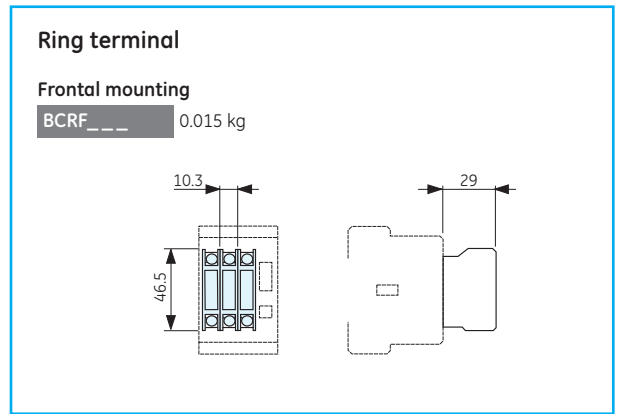
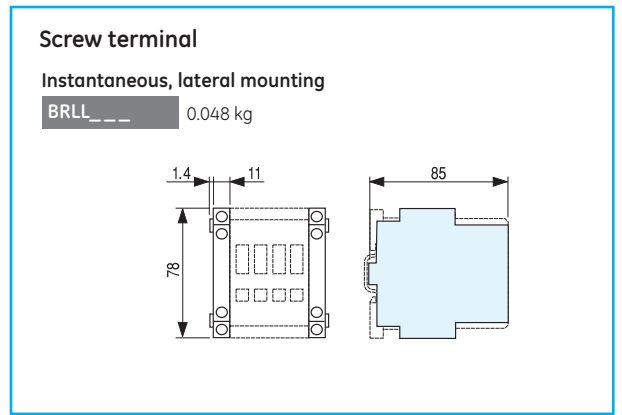
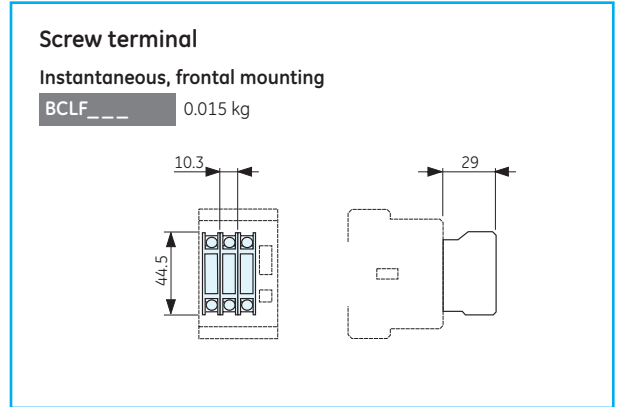


**Dimensional drawings**

**Auxiliary contactors**



**Instantaneous auxiliary contact blocks**



**Timed auxiliary contact blocks**

**Screw terminal**  
**Front mounting**  
 BTLF\_... 0.085 kg

**Ring terminal**  
**Front mounting**  
 BTRF\_... 0.085 kg

**Mechanical (-/electrical) interlock**

BELA 0.025 kg  
 BELA02 0.025 kg

**Mechanical latch block**

RMLF\_... 0.082 kg

**Voltage suppressor blocks**

BSLR2\_ 0.020 kg  
 BSLDZ\_ 0.020 kg  
 BSLV3\_ 0.020 kg

**Electronic timer block**

BETL\_...C 0.040 kg  
 BETL\_...D 0.040 kg

**Interface**

IMR\_ 0.060 kg  
 IMRF\_ 0.050 kg  
 IMSSD 0.045 kg  
 IMAMS 0.045 kg

Everything is

## SFK - Motor protection circuit breaker

- B.2 Order codes
- B.3 Auxiliary contact blocks and auxiliary functions
- B.4 Enclosures and accessories
- B.5 Terminal numbering
- B.6 Technical data
- B.7 Dimensions

Plug-in relays and Auxiliary contactors

**Motor protection devices**

## SURION - Manual motor starter

- B.8 GPS1B... - Thermal and magnetic protection
- B.10 GPS2B... - Thermal and magnetic protection
- B.12 GPS1M... - Magnetic protection
- B.14 GPS2M... - Magnetic protection
- B.16 Accessories
- B.20 Enclosures
- B.22 Technical data
- B.26 Mounting possibilities of the auxiliaries
- B.28 Dimensions

Contactors and Thermal overload relays

Motorstarters

Control and signalling units

Electronic relays

Limit switches

Speed drive units

Main switches

Numerical index

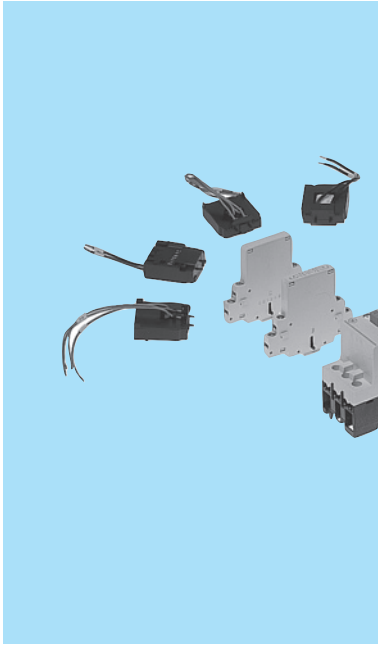
*SURION*

*Manual Motor Starters and Coordination tables*

*see chapter D pages D2-D13*

under control





### Motor protection circuit breaker

- For thermal and magnetic protection of AC and DC motors
- Conformity to standards IEC 947-2, IEC 947-4-1 and VDE 0660
- Manual push-button operation
- Setting ranges from 0.1 to 25A at 690V AC and 220V DC
- Short-circuit capacity of 65kA up to setting range of 1.6-2.5A/400V

#### Standards

IEC 947-2  
IEC 947-4-1  
VDE 0660

#### Approvals



UL



CSA



CE

- Trip class 10
- Instant magnetic tripping (12 times the maximum operating current Ie)
- Single phase protection
- Ambient temperature compensation between - 5° C and + 40° C
- Internal and external accessories easy to mount
- Quick fixing on DIN rail EN 50022-35 and, with two screws, on plate or wall
- Terminals protected against accidental contacts (IP20)
- Suitable for isolation ( ) and positive padlocking in open position (IEC 947-1 § 7-1-6)

### Motor protection circuit breakers





3-phase motor AC3 380/415V kW	Magnetical tripping current A	Thermal tripping current (setting range)		Cat. no.	Ref. no.	Pack
		Min. A	Max. A			
0.02	1.9	0.1	0.16	SFK0A	120001	1/5
0.06	3.0	0.16	0.25	SFK0B	120002	1/5
0.06 / 0.09	4.8	0.25	0.4	SFK0C	120003	1/5
0.12 / 0.18	7.5	0.4	0.63	SFK0D	120004	1/5
0.25	12	0.63	1	SFK0E	120005	1/5
0.37 / 0.55	19	1	1.6	SFK0F	120006	1/5
0.75	30	1.6	2.5	SFK0G	120007	1/5
1.1 / 1.5	48	2.5	4	SFK0H	120008	5
2.2	75	4	6.3	SFK0I	120009	5
3.7 / 4.0	120	6.3	10	SFK0J	120010	5
5.5 / 7.5	190	10	16	SFK0K	120011	5
9.0	240	16	20	SFK0L	120012	1/5
11 / 12.5	300	20	25	SFK0M	120013	1/5




Circuit breaker to protect transformers on request



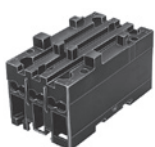
**Auxiliary contact blocks**

				Cat. no.	Ref. no.	Pack	
 <p><b>Side mounting</b></p>		1NO	1NC	SFAL11N	120020	5	
		2NO		SFAL20N	120021	5	
		1NO	1NC	SFAL11D	120022	5	
		(advanced on closing)					
		2NO		SFAL20D	120023	5	
		(advanced on closing)					
	For lower energy levels ( $\geq 4V, \geq 4mA$ )	1change-over PE + N conductor		SFAL11S	120027	1	
				SFALPEN	264826	1	
 <p><b>Internal mounting</b></p>		1NO	1NC	SFAI11	120024	5	
	Switch trip indicator-alarm	1NO		SFAK10	120025	5	
		1NC		SFAK01	120026	5	

**Coils for internal mounting**

				Cat. no.	Ref. no.	Pack
 <p><b>Minimum power</b></p>	Functioning range: $0.35U_e < U < 0.7U_e$ Manual reset Dissipated power 2.2VA / 1W	110V / 50Hz	120V / 60Hz	SFB0RJ	120034	5
		220V / 50Hz	240V / 60Hz	SFB0RN	120035	5
		380V / 50Hz	440V / 60Hz	SFB0RU	120036	5
 <p><b>Undervoltage release special for machinery</b></p>	According to IEC204-1, DIN VDE 0113, INRS Art. L233-5 A combination of a special undervoltage release and auxiliary contact block SFAL20D	110V / 50Hz	120V / 60Hz	SFB0RJM	107256	1
		220V / 50Hz	240V / 60Hz	SFB0RNM	120114	1
		380V / 50Hz	440V / 60Hz	SFB0RUM	120115	1
 <p><b>Shunt trip</b></p>	Functioning range: $0.7U_e < U < 1.2U_e$ Manual reset	110V / 50Hz	120V / 60Hz	SFB0AJ	120030	5
		220V / 50Hz	240V / 60Hz	SFB0AN	120031	5
		380V / 50Hz	440V / 60Hz	SFB0AU	120032	5

**Current limiter**

				Cat. no.	Ref. no.	Pack
 <p><b>Current limiter</b></p>	Combined with SFK. Upgrades breaking capacity to 50kA/3~400V Not available UL, CSA.			SFVH03	243713	1
		$I_n = 32A$				

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## Enclosures

				Cat. no.	Ref. no.	Pack
	Surface mounting		IP41-PG16	SFS04	120040	1
			Conversion kit IP55	SFS0K2	120046	1
			IP55-PG16	SFS05	120041	1
			IP41-M25	SFS04M	212558	1
			IP65-M25	SFS05M	212559	1
	Flush mounting		IP41	SFE04	120042	1
			Conversion kit IP55	SFE0K2	120047	1
			IP55	SFE05	120043	1

## Accessories for enclosures

				Cat. no.	Ref. no.	Pack
	Neutral connection	For use with surface and flush mounting enclosures		SFVN0	101369	1
						
	Padlocking device	Up to 3 padlocks 6 - 8 mm		SFVCD	120054	1
						
	Emergency mushroom push-buttons IP55	Impulse function		SFPS0	120051	1
		Latched, pull to release		SFPR0	120052	1
		Key locked, turn to release		SFPE0	120053	5
		Conversion kit IP55 for SFS04		SFS04K1	245217	1
		Conversion kit IP55 for SFE04		SFE04K1	216604	1
						
	Indicator lamps for AC and DC	Green 110/120V		GPELGAJ	101375	1
		Green 220/240V		GPELGAN	101376	1
		Green 380/440V		GPELGAU	101377	1
		Green 480/500V		GPELGAX	101378	1
		Green 600V		GPELGAY	101379	1
		Red 110/120V		GPELRAJ	101380	1
		Red 220/240V		GPELRAU	101381	1
		Red 380/440V		GPELRAU	101382	1
		Red 480/500V		GPELRAX	101383	1
		Red 600V		GPELRAY	101384	1
		Transparent 110/120V		GPELCAJ	101385	1
		Transparent 220/240V		GPELCAU	101386	1
		Transparent 380/440V		GPELCAU	101387	1
		Transparent 480/500V		GPELCAU	101388	1
	Transparent 600V		GPELCAY	101389	1	
						

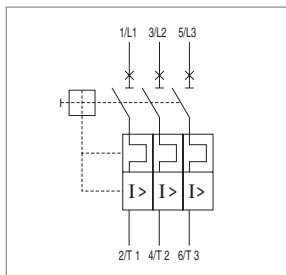
Accessories for enclosures (continued)

				Cat. no.	Ref. no.	Pack
Three phase busbar block	4 units	Ui 690V / Ie 63A	L = 207mm	<b>GPB104A</b>	101392	2
	5 units	Ui 690V / Ie 63A	L = 261mm	<b>GPB105A</b>	101393	2
	Plastic cover for 3 unused terminals			<b>GPB1GA</b>	101408	2
Supply block	Ie = 63A Fully insulated			<b>SFVB8</b>	254537	5

Terminal numbering

Motor protection circuit breaker

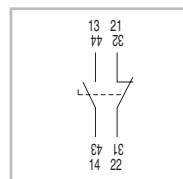
SFK...



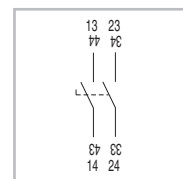
Auxiliary contact blocks

Side mounting

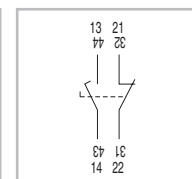
SFAL11N



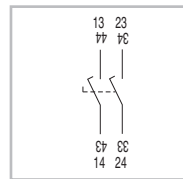
SFAL20N



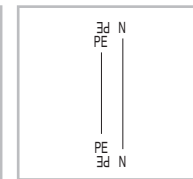
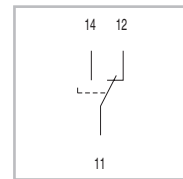
SFAL11D



SFAL20D

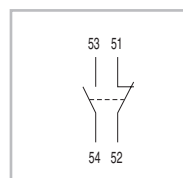


SFAL11S

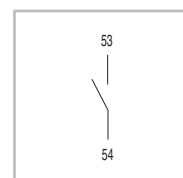


Internal mounting

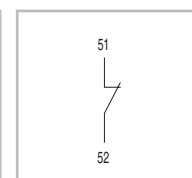
SFAI11



SFAK10



SFAK01



A

B

C

D

E

F

G

H

I

X





## Technical data

### General

Rated thermal current (Ith) at 40°C	25A
Rated insulation voltage (Ui)	690V
Rated operational voltage (Ue) AC	690V, 40/60Hz
(see application diagram) DC	220V, with or without earth

### Standards

IEC 947-2	IEC 947-4-1	VDE 0660
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### Approvals

UL	CSA
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### Main circuit

Category	AC3, DC4
Operational frequency limits	40 to 60 Hz
Opening time	aprox. 7 ms
Mechanical endurance	10 <sup>5</sup> operations
Electrical endurance category AC3	10 <sup>5</sup> operations
Maximum operating rate	40 operations/hour
Total dissipated power at rated thermal current and hot state	6 W

### Tripping characteristics

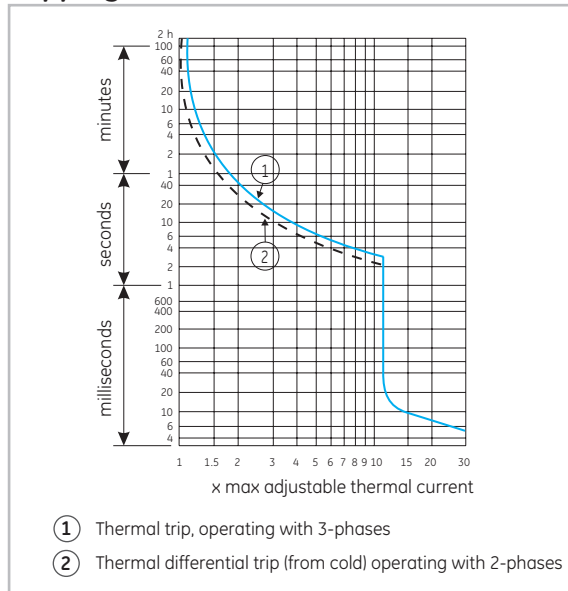
Thermal	
Symmetrical overloads	Class 10 (see curve 1, tripping curves)
Asymmetrical overloads (phase failure)	To IEC 947-4-1 (see curve 2, tripping curves)
Temperature compensation	- 5 to + 40°C

Magnetic	
	12 × Ie (Ie = max. thermal setting value)
Shunt release	
	0.7 - 1.2 Ue 100% ED
Operating voltage limits	
	2.2 VA
Consumption	
AC	1 W
DC	0.85 - 1.1 Ue 100% ED

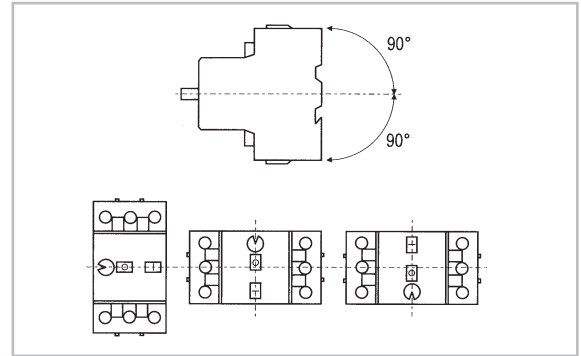
Undervoltage release	
Operating voltage limits	0.75 - 0.35 Ue
Breaking voltage limits	2.2 VA
Consumption	1 W

Wiring capacity	
Rigid wire	min. 2 wires of 0,75mm <sup>2</sup> max. 2 wires of 6mm <sup>2</sup>
Flexible wire	min. 2 wires of 0,75mm <sup>2</sup> max. 2 wires of 4mm <sup>2</sup>

### Tripping curve



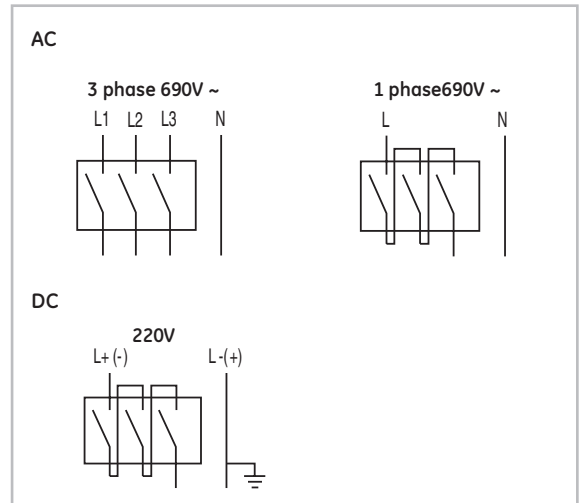
### Mounting positions



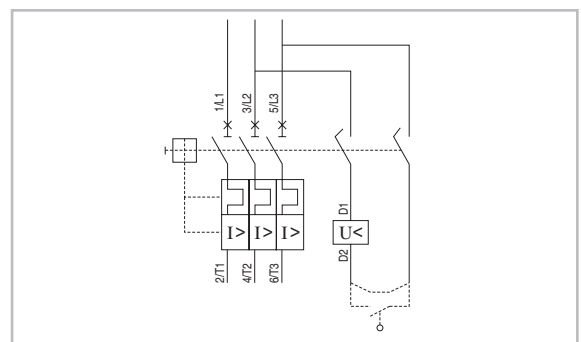
### Auxiliary contact blocks

	SFAL	SFAI - SFAK
Rated insulation voltage (Ui)	500V	500V
according VDE 0110		
Rated thermal current (Ith)	6A	6A
AC-15	Ue 230V 400V 500V Ie 3,5A 2A 1A	230V 400V 500V 2A 1A 0,5A
DC-13	Ue 60V 110V 220V Ie 1,5A 1A 0,5A	60V 110V 220V 0,7A 0,55A 0,25A
Protective fuse gl	6A	6A
Wiring capacity,		
Flexible wire	min. 2 × 0.75mm <sup>2</sup> max. 2 × 2.5mm <sup>2</sup>	2 × 0.75mm <sup>2</sup> 2 × 2.5mm <sup>2</sup>
Terminal type	M3,5, Pozidriv, safety flange screws	

### Wiring diagram



### Application diagram for tooling machines



Short-circuit breaking capacity Icu/Ics according to IEC 947-2

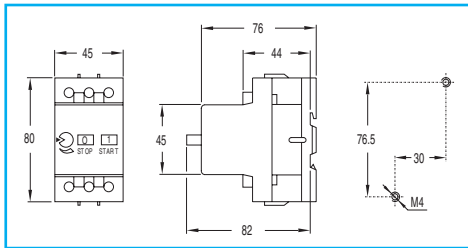
Thermal adjustment (A)	230V AC / 220V DC <sup>(1)</sup>				400V AC				415V AC				500V AC				690V AC			
	3ph motor AC3 (kW)	Icu (kA)	Ics (kA)	Fuse <sup>(2)</sup> (A)	3ph motor AC3 (kW)	Icu (kA)	Ics (kA)	Fuse <sup>(2)</sup> (A)	3ph motor AC3 (kW)	Icu (kA)	Ics (kA)	Fuse <sup>(2)</sup> (A)	3ph motor AC3 (kW)	Icu (kA)	Ics (kA)	Fuse <sup>(2)</sup> (A)	3ph motor AC3 (kW)	Icu (kA)	Ics (kA)	Fuse <sup>(2)</sup> (A)
0.1 - 0.16	-	65	65	(3)	0.02	65	65	(3)	0.02	65	65	(3)	0.04	65	65	(3)	0.06	42	42	(3)
0.16 - 0.25	-	65	65	(3)	0.06	65	65	(3)	0.06	65	65	(3)	0.06	65	65	(3)	0.12	42	42	(3)
0.25 - 0.4	0.06	65	65	(3)	0.09	65	65	(3)	0.12	65	65	(3)	0.12	65	65	(3)	0.18	42	42	(3)
0.4 - 0.63	0.09	65	65	(3)	0.12	65	65	(3)	0.18	65	65	(3)	0.25	65	65	(3)	0.37	42	42	(3)
0.63 - 1	0.12	65	65	(3)	0.25	65	65	(3)	0.25	65	65	(3)	0.37	65	65	(3)	0.75	1	1	20
1 - 1.6	0.25	65	65	(3)	0.55	65	65	(3)	0.55	65	65	(3)	0.75	65	65	(3)	1.1	1	1	20
1.6 - 2.5	0.37	65	65	(3)	0.75	65	65	(3)	0.75	10	5	25	1.1	3	1.5	25	1.5	1	0.5	20
2.5 - 4	0.75	65	65	(3)	1.5	10 (4)	5 (4)	35	1.5	10	5	35	2.2	3	1.5	35	3	1	0.5	25
4 - 6.3	1.1	65	37.5(4)	(3)	2.2	10 (4)	5 (4)	50	2.2	10	5	50	3	3	1.5	50	4	1	0.5	35
6.3 - 10	2.2	10 (4)	5 (4)	80	4	4 (4)	2 (4)	80	4	4	2	80	5.5	3	1.5	50	7.5	1	0.5	35
10 - 16	4	6 (4)	3 (4)	80	7.5	4 (4)	2 (4)	80	7.5	3.5	1.75	80	9	3	1.5	63	11	1	0.5	35
16 - 20	5	6 (4)	3 (4)	80	9	4 (4)	2 (4)	80	9	2.5	1.25	80	11	1.5	0.75	63	15	1	0.5	50
20 - 25	5.5	6 (4)	3 (4)	80	11	4 (4)	2 (4)	80	12.5	2.5	1.25	80	15	1.5	0.75	63	22	1	0.5	50

Icu = Ultimate short-circuit breaking capacity  
Ics = Service short-circuit breaking capacity

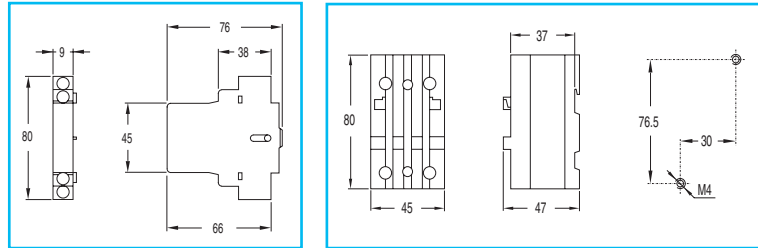
- (1) At 220V, t = 15 ms
- (2) Maximum value of the fuses when the presumed short circuit current is higher than the breaking capacity of the device. Type D, slow or NH type gG/gL.
- (3) No back-up fuse required to the Icu value
- (4) 50 kA in combination with current limiter

Dimensional drawings

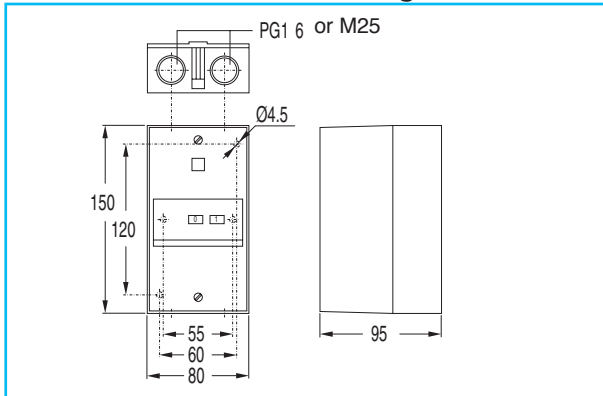
Motor protection circuit breaker



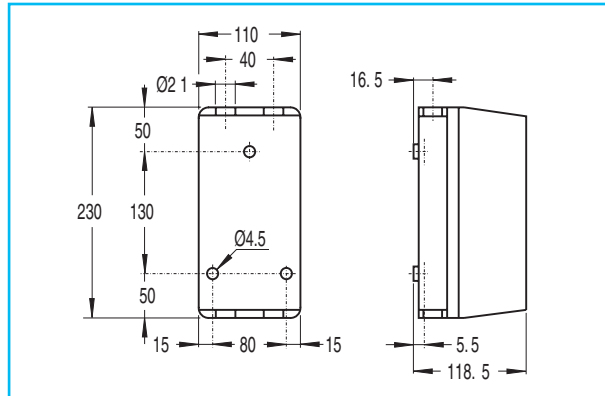
Auxiliary contact block Current limiter



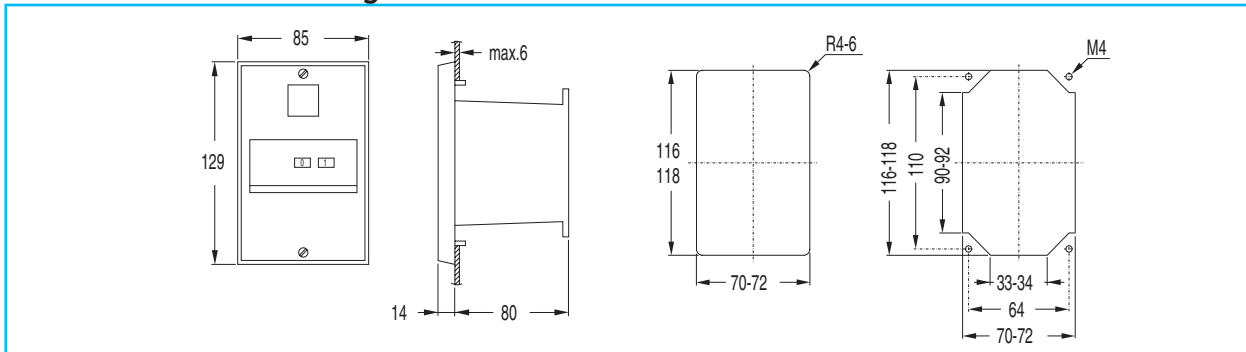
Enclosures: surface mounting



Enclosure to combine with contactor



Enclosures: flush mounting



A

B

C

D

E

F

G

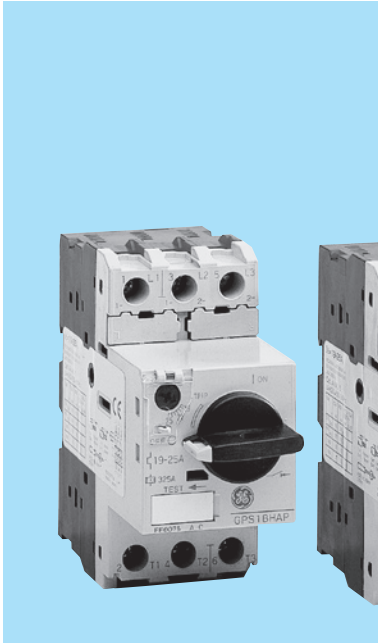
H

I

X

## Thermal and magnetic protection

### GPS1B



#### Standards/Approvals

IEC 60947-1, 60947-2, 60947-4-1  
 DIN VDE 0660T 100/101/102  
 UL508/CSA - UL508/cULus  
 Shipping approvals:



RINA



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 Germanischer Lloyd



cULus

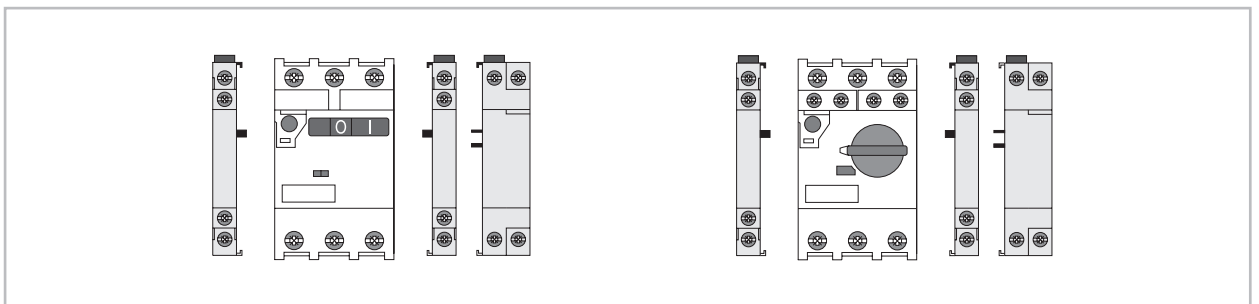


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#### Characteristics

- Rocker and rotary handle operator
- Thermal and magnetic protection
- Standard and high breaking capacity  
 $I_{cu} = 100kA \geq I_{cs} = 100\% I_{cu}$   
 $I_{cu} < 100kA \geq I_{cs} \text{ min. } 75\% I_{cu}$
- Clear identification of the operation state (ON-OFF-tripped)
- Ambient temperature compensation
- Phase failure protection

#### Auxiliaries



#### Technical performances

Rated current $I_n$	(A)	0.1-32
Rated operational current $I_e$ (A)		0.1-32
Rated power at 400Vac	(kW)	0.02-15
Utilisation category		
IEC 60947-2 (circuit breaker)		A
IEC 60947-4-1 (MMS)		AC-3
Tripping class IEC 60947-4-1		10
Magnetic release $I_e \text{ max.}$	(A)	x13
Mechanical/electrical endurance		100,000

#### Accessories

- Auxiliaries ● pg. B.16
- Busbar system ● pg. B.19

- Technical data ● pg. B.22
- Dimensions ● pg. B.28
- Fuseless starters ● pg. D.2
- Coordination tables ● pg. D.5



**GPS1B - Standard breaking capacity**

CLASS 10	Rated power 3 phase motors at 400Vac Pn	Rated current In (1)	Thermal current setting range	Instantaneous short-circuit release	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V Ics (kA)	Cat. no.	Ref. no.	Pack.
	(kW)	(A)	(A)	(A)					
	0.02	0.16	0.1 - 0.16	2.1	100	100	GPS1BSAA	101211	5
	0.06	0.25	0.16 - 0.25	3.3	100	100	GPS1BSAB	101212	5
	0.09	0.4	0.25 - 0.4	5.2	100	100	GPS1BSAC	101213	5
	0.12/0.18	0.63	0.4 - 0.63	8.2	100	100	GPS1BSAD	101214	5
	0.25	1	0.63 - 1	13	100	100	GPS1BSAE	101215	5
	0.37/0.55	1.6	1 - 1.6	20.8	100	100	GPS1BSAF	101216	5
	0.75	2.5	1.6 - 2.5	32.5	100	100	GPS1BSAG	101217	5
	1.5	4	2.5 - 4	52	100	100	GPS1BSAH	101218	5
	2.2	6.3	4 - 6.3	81.9	100	100	GPS1BSAJ	101219	5
	3/4	10	6.3 - 10	130	100	100	GPS1BSAK	101220	5
	5.5	13	9 - 13	169	50	38	GPS1BSAL	101221	5
	7.5	16	11 - 16	208	25	19	GPS1BSAM	101222	5
	10	20	14 - 20	260	25	19	GPS1BSAN	101223	5
	11	25	19 - 25	325	25	19	GPS1BSAP	101224	5
	15	32	24 - 32	416	25	19	GPS1BSAR	101225	5



**Multipack by 40**

To reduce the amount of waste packaging material and to save time during installation, we offer the opportunity to order manual motor starters in a multipack without the individual packaging.

	0.02	0.16	0.1 - 0.16	2.1	100	100	GPS1BSAAMP	101195	40
	0.06	0.25	0.16 - 0.25	3.3	100	100	GPS1BSABMP	101196	40
	0.09	0.4	0.25 - 0.4	5.2	100	100	GPS1BSACMP	101197	40
	0.12/0.18	0.63	0.4 - 0.63	8.2	100	100	GPS1BSADMP	101198	40
	0.25	1	0.63 - 1	13	100	100	GPS1BSAEMP	101199	40
	0.37/0.55	1.6	1 - 1.6	20.8	100	100	GPS1BSAFMP	101200	40
	0.75	2.5	1.6 - 2.5	32.5	100	100	GPS1BSAGMP	101201	40
	1.5	4	2.5 - 4	52	100	100	GPS1BSAHMP	101202	40
	2.2	6.3	4 - 6.3	81.9	100	100	GPS1BSAJMP	101203	40
	3/4	10	6.3 - 10	130	100	100	GPS1BSAKMP	101204	40
	5.5	13	9 - 13	169	50	38	GPS1BSALMP	101205	40
	7.5	16	11 - 16	208	25	19	GPS1BSAMMP	101206	40
	10	20	14 - 20	260	25	19	GPS1BSANMP	101207	40
	11	25	19 - 25	325	25	19	GPS1BSAPMP	101208	40
	15	32	24 - 32	416	25	19	GPS1BSARMP	101209	40

(1) Rated current: highest thermal current setting range value.

**GPS1B - High breaking capacity.**

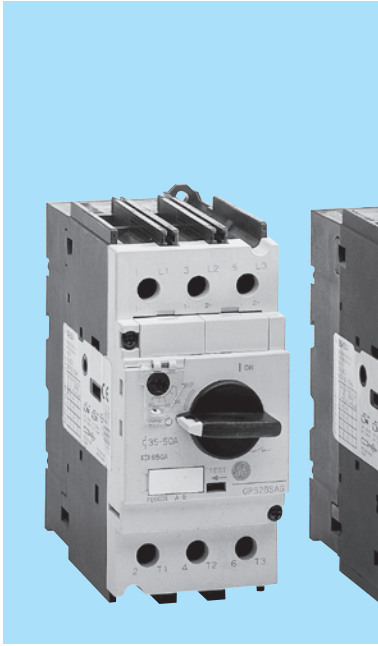
CLASS 10	Rated power 3 phase motors at 400Vac Pn	Rated current In (1)	Thermal current setting range	Instantaneous short-circuit release	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V Ics (kA)	Cat. no.	Ref. no.	Pack.
	(kW)	(A)	(A)	(A)					
	0.02	0.16	0.1 - 0.16	2.1	100	100	GPS1BHAA	101234	5
	0.06	0.25	0.16 - 0.25	3.3	100	100	GPS1BHAB	101235	5
	0.09	0.4	0.25 - 0.4	5.2	100	100	GPS1BHAC	101236	5
	0.12/0.18	0.63	0.4 - 0.63	8.2	100	100	GPS1BHAD	101237	5
	0.25	1	0.63 - 1	13	100	100	GPS1BHA E	101238	5
	0.37/0.55	1.6	1 - 1.6	20.8	100	100	GPS1BHAF	101239	5
	0.75	2.5	1.6 - 2.5	32.5	100	100	GPS1BHAG	101240	5
	1.5	4	2.5 - 4	52	100	100	GPS1BHAH	101241	5
	2.2	6.3	4 - 6.3	81.9	100	100	GPS1BHAJ	101242	5
	3/4	10	6.3 - 10	130	100	100	GPS1BHAK	101243	5
	5.5	13	9 - 13	169	100	100	GPS1BHAL	101244	5
	7.5	16	11 - 16	208	50	38	GPS1BHAM	101245	5
	10	20	14 - 20	260	50	38	GPS1BHAN	101246	5
	11	25	19 - 25	325	50	38	GPS1BHAP	101247	5
	15	32	24 - 32	416	50	38	GPS1BHAR	101248	5



(1) Rated current: highest thermal current setting range value.

## Thermal and magnetic protection

### GPS2B



#### Standards/Approvals

IEC 60947-1, 60947-2, 60947-4-1  
 DIN VDE 0660T 100/101/102  
 UL508/CSA - UL508/cULus  
 Shipping approvals:



RINA



Bureau Veritas



Lloyd's Register  
 Germanischer Lloyd

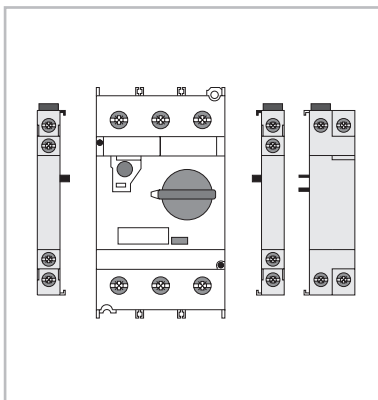


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#### Auxiliaries



#### Accessories

- Auxiliaries ● pg. B.16
- Busbar system ● pg. B.19

- Technical data ● pg. B.22
- Dimensions ● pg. B.28
- Fuseless starters ● pg. D.2
- Coordination tables ● pg. D.5


#### Characteristics

- Rotary handle operator
- Thermal and magnetic protection
- Standard and high breaking capacity
  - I<sub>cu</sub> = 100kA ≥ I<sub>cs</sub> = 100% I<sub>cu</sub>
  - I<sub>cu</sub> < 100kA ≥ I<sub>cs</sub> min. 75% I<sub>cu</sub>
- Clear identification of the operation state (ON-OFF-tripped)
- Ambient temperature compensation
- Phase failure protection

#### Technical performances


<b>Rated current I<sub>n</sub></b>	(A)	10-63
<b>Rated operational current I<sub>e</sub></b>	(A)	10-63
<b>Rated power at 400Vac</b>	(kW)	4-30
<b>Utilisation category</b>		
IEC 60947-2 (circuit breaker)		A
IEC 60947-4-1 (MMS)		AC-3
<b>Tripping class IEC 60947-4-1</b>		10
<b>Magnetic release I<sub>e</sub> max.</b>	(A)	×13
<b>Mechanical/electrical endurance</b>		50,000/25,000

**GPS2B - Standard breaking capacity**

<b>CLASS 10</b>	Rated power 3 phase motors at 400Vac Pn	Rated current In (1)	Thermal current setting range	Instantaneous short-circuit release	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V Ics (kA)	Cat. no.	Ref. no.	Pack.
	(kW)	(A)	(A)	(A)					
		3/4	10	6.3 - 10	130	100	100	GPS2BSAK	101226
	5.5	13	9 - 13	169	50	38	GPS2BSAL	107119	1
	7.5	16	11 - 16	208	25	19	GPS2BSAM	101227	1
	10	20	14 - 20	260	25	19	GPS2BSAN	101228	1
	11	25	19 - 25	325	25	19	GPS2BSAP	101229	1
	15	32	24 - 32	416	25	19	GPS2BSAR	101230	1
	18.5	40	28 - 40	520	25	19	GPS2BSAS	101231	1
	22	50	35 - 50	650	25	19	GPS2BSAT	101232	1
	30	63	45 - 63	819	25	19	GPS2BSAU	101233	1

(1) Rated current: highest thermal current setting range value.

**GPS2B - High breaking capacity**

<b>CLASS 10</b>	Rated power 3 phase motors at 400Vac Pn	Rated current In (1)	Thermal current setting range	Instantaneous short-circuit release	Short-circuit breaking capacity at 400V Icu (kA)	Short-circuit breaking capacity at 400V Ics (kA)	Cat. no.	Ref. no.	Pack.
	(kW)	(A)	(A)	(A)					
		3/4	10	6.3 - 10	130	100	100	GPS2BHAK	101249
	5.5	13	9 - 13	169	100	100	GPS2BHAL	107120	1
	7.5	16	11 - 16	208	50	38	GPS2BHAM	101250	1
	10	20	14 - 20	260	50	38	GPS2BHAN	101251	1
	11	25	19 - 25	325	50	38	GPS2BHAP	101252	1
	15	32	24 - 32	416	50	38	GPS2BHAR	101253	1
	18.5	40	28 - 40	520	50	38	GPS2BHAS	101254	1
	22	50	35 - 50	650	50	38	GPS2BHAT	101255	1
	30	63	45 - 63	819	50	38	GPS2BHAU	101256	1

(1) Rated current: highest thermal current setting range value.

**Magnetic protection**

**GPS1M**



**Standards/Approvals**

IEC 60947-1, 60947-2, 60947-4-1  
 DIN VDE 0660T 100/101/102  
 UL508/CSA - UL508/cULus  
 Shipping approvals:



RINA



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 Germanischer Lloyd



cULus

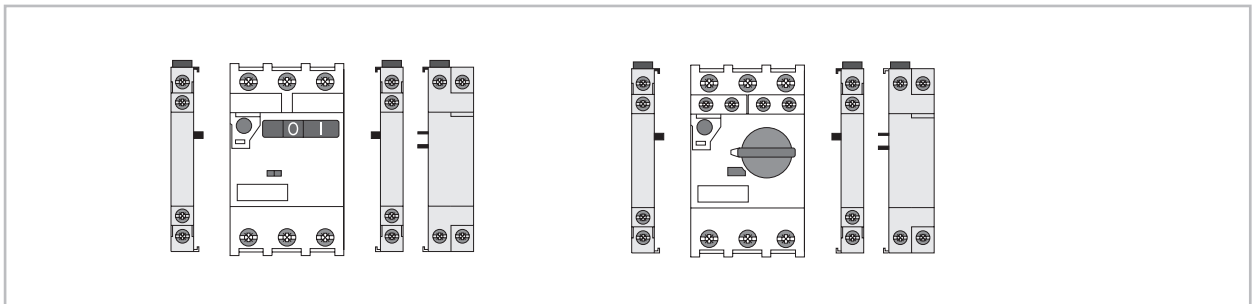


CE

**Characteristics**

- Short-circuit protection for starters
- Rocker and rotary handle operator
- Magnetic protection
- Standard and high breaking capacity  
 $I_{cu} = 100kA \geq I_{cs} = 100\% I_{cu}$   
 $I_{cu} < 100kA \geq I_{cs} \text{ min. } 75\% I_{cu}$
- Clear identification of the operation state (ON-OFF-tripped)

**Auxiliaries**



**Accessories**

- Auxiliaries ● pg. B.16
- Busbar system ● pg. B.19

- Technical data ● pg. B.22
- Dimensions ● pg. B.28
- Fuseless starters ● pg. D.2
- Coordination tables ● pg. D.5

**Technical performances**

<b>Rated current <math>I_n</math></b>	(A) 0.1-32
<b>Rated operational current <math>I_e</math></b>	(A) 0.1-32
<b>Utilisation category</b>	A
<b>IEC 60947-2 (circuit breaker)</b>	
<b>Magnetic release <math>I_e \text{ max.}</math></b>	(A) x13
<b>Mechanical/electrical endurance</b>	100.000



**GPS1M - Standard breaking capacity**



Rated power 3 phase motors at 400Vac Pn  (kW)	Rated current In  (A)	Thermal current setting range (1)  (A)	Instantaneous short-circuit release  (A)	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V  Ics (kA)	Cat. no.	Ref. no.	Pack.
0.02	0.16	-	2.1	100	100	GPS1MSAA	101257	5
0.06	0.25	-	3.3	100	100	GPS1MSAB	101258	5
0.09	0.4	-	5.2	100	100	GPS1MSAC	101259	5
0.12/0.18	0.63	-	8.2	100	100	GPS1MSAD	101260	5
0.25	1	-	13	100	100	GPS1MSAE	101261	5
0.37/0.55	1.6	-	20.8	100	100	GPS1MSAF	101262	5
0.75	2.5	-	32.5	100	100	GPS1MSAG	101263	5
1.5	4	-	52	100	100	GPS1MSAH	101264	5
2.2	6.3	-	81.9	100	100	GPS1MSAJ	101265	5
3/4	10	-	130	100	100	GPS1MSAK	101266	5
5.5	13	-	169	50	38	GPS1MSAL	101267	5
7.5	16	-	208	25	19	GPS1MSAM	101268	5
10	20	-	260	25	19	GPS1MSAN	101269	5
11	25	-	325	25	19	GPS1MSAP	101270	5
15	32	-	416	25	19	GPS1MSAR	101271	5

(1) Select appropriate thermal overload relay for the starter. See chapter C pages C.62 - C.68.

**GPS1M - High breaking capacity**



Rated power 3 phase motors at 400Vac Pn  (kW)	Rated current In  (A)	Thermal current setting range (1)  (A)	Instantaneous short-circuit release  (A)	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V  Ics (kA)	Cat. no.	Ref. no.	Pack.
0.02	0.16	-	2.1	100	100	GPS1MHAA	101280	5
0.06	0.25	-	3.3	100	100	GPS1MHAB	101281	5
0.09	0.4	-	5.2	100	100	GPS1MHAC	101282	5
0.12/0.18	0.63	-	8.2	100	100	GPS1MHAD	101283	5
0.25	1	-	13	100	100	GPS1MHAE	101284	5
0.37/0.55	1.6	-	20.8	100	100	GPS1MHAF	101285	5
0.75	2.5	-	32.5	100	100	GPS1MHAG	101286	5
1.5	4	-	52	100	100	GPS1MHAH	101287	5
2.2	6.3	-	81.9	100	100	GPS1MHAJ	101288	5
3/4	10	-	130	100	100	GPS1MHAK	101289	5
5.5	13	-	169	100	100	GPS1MHAL	101290	5
7.5	16	-	208	50	38	GPS1MHAM	101291	5
10	20	-	260	50	38	GPS1MHAN	101292	5
11	25	-	325	50	38	GPS1MHAP	101293	5
15	32	-	416	50	38	GPS1MHAR	101294	5

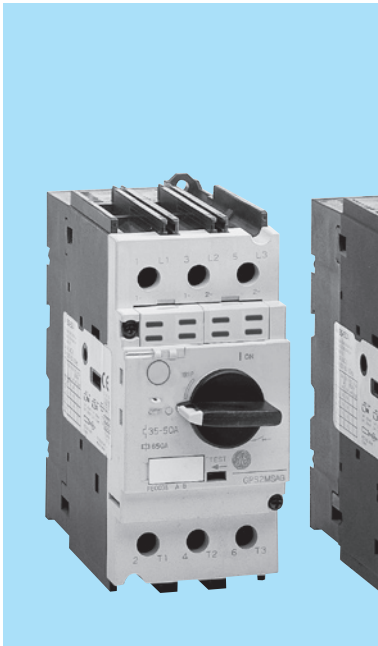
(1) Select appropriate thermal overload relay for the starter. See chapter C pages C.62 - C.68.





## Magnetic protection

### GPS2M



### Standards/Approvals

IEC 60947-1, 60947-2, 60947-4-1  
 DIN VDE 0660T 100/101/102  
 UL508/CSA - UL508/cULus  
 Shipping approvals:



RINA



Bureau Veritas



Lloyd's Register  
 Germanischer Lloyd

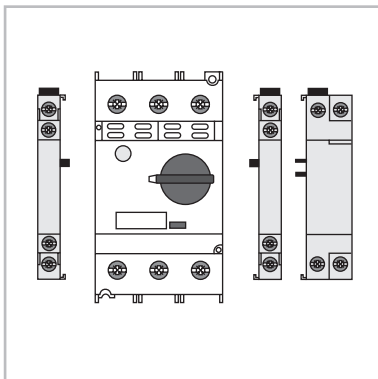


CE

### Characteristics

- Short-circuit protection for starters
- Rotary handle operator
- Magnetic protection
- Standard and high breaking capacity
  - $I_{cu} = 100kA \geq I_{cs} = 100\% I_{cu}$
  - $I_{cu} < 100kA \geq I_{cs} \text{ min. } 75\% I_{cu}$
- Clear identification of the operation state (ON-OFF-tripped)

### Auxiliaries



### Technical performances

Rated current $I_n$	(A) 10-63
Rated operational current $I_e$	(A) 10-63
Utilisation category	A
IEC 60947-2 (circuit breaker)	
Magnetic release $I_e \text{ max.}$	(A) x13
Mechanical/electrical endurance	50,000/25,000

#### Accessories

- Auxiliaries ● pg. B.16
- Busbar system ● pg. B.19

- Technical data ● pg. B.22
- Dimensions ● pg. B.28
- Fuseless starters ● pg. D.2
- Coordination tables ● pg. D.5

**GPS2M - Standard breaking capacity**



Rated power 3 phase motors at 400Vac Pn  (kW)	Rated current In  (A)	Thermal current setting range (1)  (A)	Instantaneous short-circuit release  (A)	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V  Ics (kA)	Cat. no.	Ref. no.	Pack.
4	10	-	130	100	100	GPS2MSAK	101272	1
5.5	13	-	169	50	38	GPS2MSAL	107121	1
7.5	16	-	208	25	19	GPS2MSAM	101273	1
10	20	-	260	25	19	GPS2MSAN	101274	1
11	25	-	325	25	19	GPS2MSAP	101275	1
15	32	-	416	25	19	GPS2MSAR	101276	1
18.5	40	-	520	25	19	GPS2MSAS	101277	1
22	50	-	650	25	19	GPS2MSAT	101278	1
30	63	-	819	25	19	GPS2MSAU	101279	1

(1) Select appropriate thermal overload relay for the starter. See chapter C pages C.64 - C.68.

**GPS2M - High breaking capacity**



Rated power 3 phase motors at 400Vac Pn  (kW)	Rated current In  (A)	Thermal current setting range (1)  (A)	Instantaneous short-circuit release  (A)	Rated ultimate short-circuit breaking capacity at 400V Icu (kA)	Rated service short-circuit breaking capacity at 400V  Ics (kA)	Cat. no.	Ref. no.	Pack.
4	10	-	130	100	100	GPS2MHAK	101295	1
5.5	13	-	169	100	100	GPS2MHAL	107122	1
7.5	16	-	208	50	38	GPS2MHAM	101296	1
10	20	-	260	50	38	GPS2MHAN	101297	1
11	25	-	325	50	38	GPS2MHAP	101298	1
15	32	-	416	50	38	GPS2MHAR	101299	1
18.5	40	-	520	50	38	GPS2MHAS	101300	1
22	50	-	650	50	38	GPS2MHAT	101301	1
30	63	-	819	50	38	GPS2MHAU	101302	1

(1) Select appropriate thermal overload relay for the starter. See chapter C pages C.63 - C.68.

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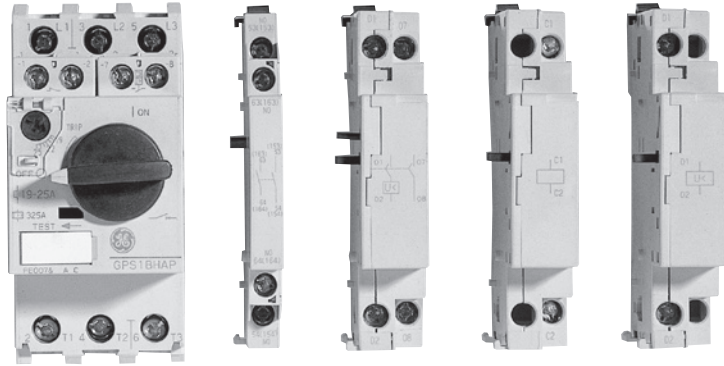
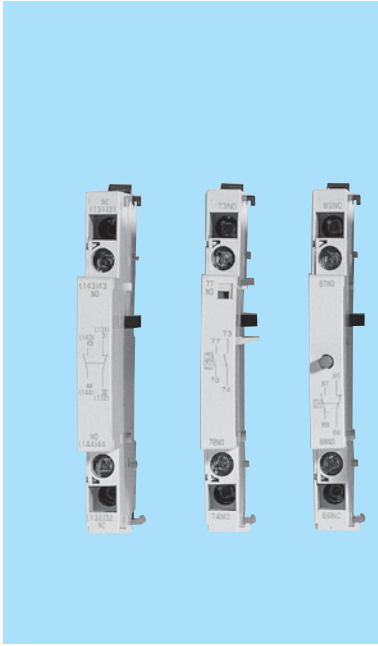
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Auxiliaries



Standards/Approvals

IEC 60947-1, 60947-2, 60947-4-1  
 DIN VDE 0660T 100/101/102  
 UL508/CSA - UL508/cULus  
 Shipping approvals:



RINA



Bureau Veritas



Lloyd's Register  
 Germanischer Lloyd



cULus

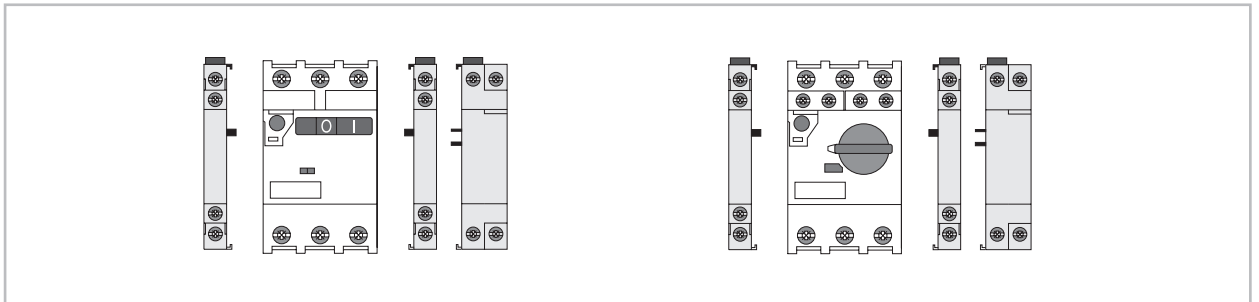


CE

Product range

- Auxiliary contacts (frontal & lateral)
- Alarm contact block
- Auxiliary and alarm contact block
- Short-circuit alarm contact block
- Shunt trip
- Undervoltage release
- Undervoltage release with 2NO early make contacts
- External handle operator
- Terminal protector
- Busbar system

Auxiliaries



Technical performances

- All auxiliaries can be mounted and changed easily, without any tools
- Both frames GPS1 and GPS2 uses same auxiliaries
- All terminals are capable for 2 cables (0.5mm<sup>2</sup> - 2.5mm<sup>2</sup>)
- Side auxiliary contacts are rated to A600, P300 duty
- Frontal auxiliary contacts are rated to B300, Q300 duty
- Minimum operational contact 5mA, 17Vdc
- All terminal screwhead are Pozidriv 2 and slotted combination

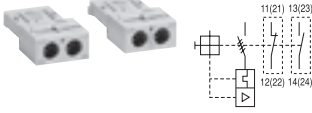
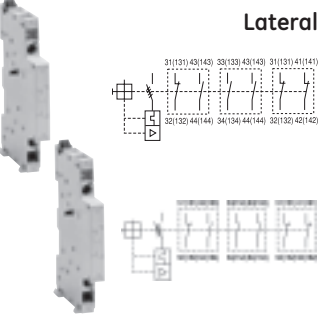
Accessories

- Auxiliaries ● pg. B.16
- Busbar system ● pg. B.19

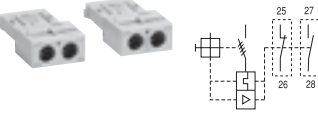
- Technical data ● pg. B.22
- Dimensions ● pg. B.28
- Fuseless starters ● pg. D.2
- Coordination tables ● pg. D.5



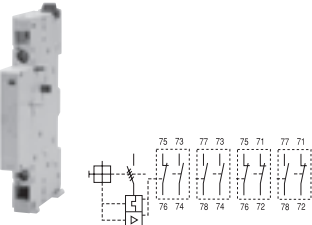
**Auxiliary contact blocks**

	Description	For use with	Type	Cat. no.	Ref. no.	Pack.
<b>Frontal</b> 	Maximum 2 auxiliary contact blocks per manual motor starter	GPS1... and GPS2...	1 NO	<b>GPAC10FBA</b>	101303	10
		GPS1... and GPS2...	1 NC	<b>GPAC01FBA</b>	101304	10
<b>Lateral</b> 	Two contacts Side mounting on the <b>left</b>	GPS1... and GPS2...	1 NO + 1 NC	<b>GPAC11LLA</b>	101305	10
		GPS1... and GPS2...	2 NO	<b>GPAC20LLA</b>	101306	10
		GPS1... and GPS2...	2 NC	<b>GPAC02LLA</b>	101307	10
	Two contacts Side mounting on the <b>right</b>	GPS1... and GPS2...	1 NO + 1 NC	<b>GPAC11LRA</b>	101308	10
		GPS1... and GPS2...	2 NO	<b>GPAC20LRA</b>	101309	10
		GPS1... and GPS2...	2 NC	<b>GPAC02LRA</b>	101310	10


**Alarm contact block**

	Description	For use with	Type	Cat. no.	Ref. no.	Pack.
	Frontal mounting on the <b>right</b>	GPS1... and GPS2...	1 NO	<b>GPAL10FRA</b>	101311	10
	Single contact	GPS1... and GPS2...	1 NC	<b>GPAL01FRA</b>	101312	10

**Auxiliary / alarm contact block**

	Description	For use with	Type	Cat. no.	Ref. no.	Pack.
	Side mounting on the <b>left</b> (front alarm contact block can not be used at the same time)	GPS1... and GPS2...	1 NO(Alarm)+1 NO(Aux)	<b>GPAD1010LLA</b>	101313	10
		GPS1... and GPS2...	1 NO(Alarm)+1 NC(Aux)	<b>GPAD1001LLA</b>	101314	10
		GPS1... and GPS2...	1 NC(Alarm)+1 NO(Aux)	<b>GPAD0110LLA</b>	101315	10
		GPS1... and GPS2...	1 NC(Alarm)+1 NC(Aux)	<b>GPAD0101LLA</b>	101316	10
	Two contacts	GPS1... and GPS2...	1 NC(Alarm)+1 NC(Aux)	<b>GPAD0101LLA</b>	101316	10

**Short-circuit alarm contact block**

	Description	For use with	Type	Cat. no.	Ref. no.	Pack.
	Side mounting on the <b>left</b> Two contacts NO + NC Mechanical indication marking	GPS1... and GPS2...	1 NO + 1 NC	<b>GPAE11LLA</b>	101317	10

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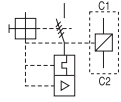
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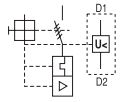
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**Shunt trip device**



Description	For use with	Coil voltage	Cat. no.	Ref. no.	Pack.
Side mounting on the <b>right</b> Can not be used together with the undervoltage trip device	GPS1... and GPS2...	24V 50/60Hz	GPASLRAA1	101318	5
	GPS1... and GPS2...	48V 60Hz	GPASLRAAF	101319	5
	GPS1... and GPS2...	48V 50Hz / 60V 60Hz	GPASLRAAG	101320	5
	GPS1... and GPS2...	110/127V 50Hz / 120V 60Hz	GPASLRAAJ	101321	5
	GPS1... and GPS2...	208V 60Hz	GPASLRAAM	101322	5
	GPS1... and GPS2...	220/230V 50Hz / 240/260V 60Hz	GPASLRAAN	101323	5
	GPS1... and GPS2...	240V 50Hz / 277V 60Hz	GPASLRAAR	101324	5
	GPS1... and GPS2...	380/400V 50Hz	GPASLRAAU	101325	5
	GPS1... and GPS2...	415/440V 50Hz / 460/480V 60Hz	GPASLRAAW	101326	5
	GPS1... and GPS2...	500V 50Hz / 600V 60Hz	GPASLRAAY	101327	5
	GPS1... and GPS2...	24 to 60Vdc	GPASLRADD	101328	5
	GPS1... and GPS2...	110 to 240Vdc	GPASLRADJ	101329	5
	GPS1... and GPS2...	100V 50/60Hz	GPASLRAA11	101194	5

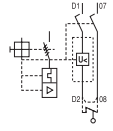
**Undervoltage trip device**



Description	For use with	Coil voltage	Cat. no.	Ref. no.	Pack.
Side mounting on the <b>right</b> Can not be used together with the shunt trip device	GPS1... and GPS2...	24V 50Hz	GPAULRAAD	101330	10
	GPS1... and GPS2...	24V 60Hz	GPAULRAAC	101331	10
	GPS1... and GPS2...	48V 50Hz	GPAULRAAG	101332	10
	GPS1... and GPS2...	48V 60Hz	GPAULRAAF	101333	10
	GPS1... and GPS2...	110/127V 50Hz / 120V 60Hz	GPAULRAAJ	101334	10
	GPS1... and GPS2...	208V 60Hz	GPAULRAAM	101335	10
	GPS1... and GPS2...	220/230V 50Hz / 240/260V 60Hz	GPAULRAAN	101336	10
	GPS1... and GPS2...	240V 50Hz / 277V 60Hz	GPAULRAAR	101337	10
	GPS1... and GPS2...	380/400V 50Hz	GPAULRAAU	101338	10
	GPS1... and GPS2...	415/440V 50Hz / 460/480V 60Hz	GPAULRAAW	101339	10
	GPS1... and GPS2...	500V 50Hz / 600V 60Hz	GPAULRAAY	101340	10
	GPS1... and GPS2...	100V 50/60Hz	GPAULRAA11	102625	10



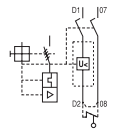
**With 2NO early make auxiliary contacts**



Description	For use with	Coil voltage	Cat. no.	Ref. no.	Pack.
Side mounting on the <b>right</b> Can not be used together with the shunt trip device	GPS1*S...	24V 50Hz	GPAU20LTAAD	101341	10
	GPS1*S...	24V 60Hz	GPAU20LTAAC	101342	10
	GPS1*S...	48V 50Hz	GPAU20LTAAG	101343	10
	GPS1*S...	48V 60Hz	GPAU20LTAAF	101344	10
	GPS1*S...	110/127V 50Hz / 120V 60Hz	GPAU20LTAAJ	101345	10
	GPS1*S...	208V 60Hz	GPAU20LTAAM	101346	10
	GPS1*S...	220/230V 50Hz / 240/260V 60Hz	GPAU20LTAAN	101347	10
	GPS1*S...	240V 50Hz / 277V 60Hz	GPAU20LTAAR	101348	10
	GPS1*S...	380/400V 50Hz	GPAU20LTAAU	101349	10
	GPS1*S...	415/440V 50Hz / 460/480V 60Hz	GPAU20LTAAW	101350	10
	GPS1*S...	500V 50Hz / 600V 60Hz	GPAU20LTAAY	101351	10
	GPS1*S...	100V 50/60Hz	GPAU20LTA11	110360	10



**With 2NO early make auxiliary contacts**



Description	For use with	Coil voltage	Cat. no.	Ref. no.	Pack.
Side mounting on the <b>right</b> Can not be used together with the shunt trip device	GPS1*H and GPS2...	24V 50Hz	GPAU20LCAAD	101352	10
	GPS1*H and GPS2...	24V 60Hz	GPAU20LCAAC	101353	10
	GPS1*H and GPS2...	48V 50Hz	GPAU20LCAAG	101354	10
	GPS1*H and GPS2...	48V 60Hz	GPAU20LCAAF	101355	10
	GPS1*H and GPS2...	110/127V 50Hz / 120V 60Hz	GPAU20LCAAJ	101356	10
	GPS1*H and GPS2...	208V 60Hz	GPAU20LCAAM	101357	10
	GPS1*H and GPS2...	220/230V 50Hz / 240/260V 60Hz	GPAU20LCAAN	101358	10
	GPS1*H and GPS2...	240V 50Hz / 277V 60Hz	GPAU20LCAAR	101359	10
	GPS1*H and GPS2...	380/400V 50Hz	GPAU20LCAAU	101360	10
	GPS1*H and GPS2...	415/440V 50Hz / 460/480V 60Hz	GPAU20LCAAW	101361	10
	GPS1*H and GPS2...	500V 50Hz / 600V 60Hz	GPAU20LCAAY	101362	10
	GPS1*H and GPS2...	100V 50/60Hz	GPAU20LCA11	112185	10

**Terminal protector**




101509

107182


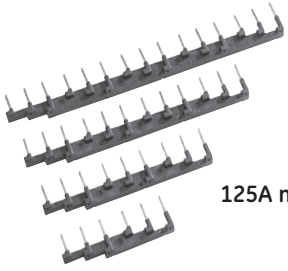


Description	For use with	Cat. no.	Ref. no.	Pack.
Snap-in tabs for screw mounting (set of 10)	GPS1*	GPAKS1A	101509	1
IP20 terminal covers	GPS2*	GPAPT2A	107182	50
DIN rail vibration clamps	GPS1* / GPS2*	GPVDA	101514	2
Panel vibration clamps	GPS1* / GPS2*	GPVPA	101515	2
Increases vibration resistance of GPS1* from 5G to 8G (5-150 Hz) in all directions. One clamp must be mounted on each side which increases total mounting width by 22 mm (0.87"). For vibration resistance of GPS2*, contact customers service.				



### External handle operator

	Description	For use with	Type	Cat. no.	Ref. no.	Pack.	
	Used for distance mounting on a panel Lockable with 1, 2 or 3 padlocks diameter 4 to 8 mm Two types: standard and emergency applications ON/OFF/TRIPPING position marking Protection degree: IP54 Shaft mounting depths: 139.8 - 289.8 mm for GPA1HAB, GPA1HAR 161 - 311.1 mm for GPA2HAB, GPA2HAR Package parts and quantities: 1 handle unit 1 shaft 1 shaft guide 1 latch (screws) 4 mounting screws	GPS1*H...	Standard (black)	<b>GPA1HAB</b>	101363	5	
		GPS1*H ...	Emergency (red/yellow)	<b>GPA1HAR</b>	101364	5	
		GPS2...	Standard (black)	<b>GPA2HAB</b>	101502	5	
		GPS2 ...	Emergency (red/yellow)	<b>GPA2HAR</b>	101503	5	

### Busbar system

	Description	For use with	Connection	Cat. no.	Ref. no.	Pack.
 <p><b>3-phase feed-in terminals</b></p>	Main feeding terminal Upper connection	GPS1...	Terminal capacity: 25 mm <sup>2</sup> Pin	<b>GPB1FA</b>	107186	10
		GPS2...	Terminal capacity: 50 mm <sup>2</sup> Pin	<b>GPB2FA</b>	107187	10
		GPS1...	Terminal capacity: 25mm <sup>2</sup> Fork	<b>SFVB8</b>	254537	1
 <p><b>Main busbar 63A max.  125A max.</b></p>	Modular spacing 45 mm	for 2 GPS1... + frontal auxiliaries	Pin	<b>GPB1B02A</b>	101390	5
		for 3 GPS1... + frontal auxiliaries	Pin	<b>GPB1B03A</b>	101391	5
		for 4 GPS1... + frontal auxiliaries	Pin	<b>GPB1B04A</b>	101392	5
		for 5 GPS1... + frontal auxiliaries	Pin	<b>GPB1B05A</b>	101393	5
	Modular spacing 54 mm	for 2 GPS1... + 9mm lateral aux.	Pin	<b>GPB1B12A</b>	101394	5
		for 3 GPS1... + 9mm lateral aux.	Pin	<b>GPB1B13A</b>	101395	5
		for 4 GPS1... + 9mm lateral aux.	Pin	<b>GPB1B14A</b>	101396	5
		for 5 GPS1... + 9mm lateral aux.	Pin	<b>GPB1B15A</b>	101397	5
	Modular spacing 63 mm	for 2 GPS1... + 18mm lateral aux. or 2 x 9mm lateral auxiliary	Fork	<b>GPB1B22A</b>	101398	10
for 4 GPS1... + 18mm lateral aux. or 2 x 9mm lateral auxiliary		Fork	<b>GPB1B24A</b>	101399	10	
Modular spacing 55 mm	for 2 GPS2... + frontal auxiliaries	Pin	<b>GPB2B02A</b>	101400	1	
	for 3 GPS2... + frontal auxiliaries	Pin	<b>GPB2B03A</b>	101401	1	
	for 4 GPS2... + frontal auxiliaries	Pin	<b>GPB2B04A</b>	101402	1	
Modular spacing 64 mm	for 2 GPS2... + 9mm lateral aux.	Pin	<b>GPB2B12A</b>	101403	1	
	for 3 GPS2... + 9mm lateral aux.	Pin	<b>GPB2B13A</b>	101404	1	
	for 4 GPS2... + 9mm lateral aux.	Pin	<b>GPB2B14A</b>	101405	1	
Modular spacing 73 mm	for 2 GPS2... + 18mm lateral aux. or 2 x 9mm lateral auxiliary	Pin	<b>GPB2B22A</b>	101406	1	
	for 4 GPS2... + 18mm lateral aux. or 2 x 9mm lateral auxiliary	Pin	<b>GPB2B24A</b>	101407	1	
 <p><b>Busbar cover</b></p>	Touch guard for non used space	GPS1...	Pin	<b>GPB1GA</b>	101408	10
		GPS1...	Fork	<b>GPB1GAF</b>	101511	1
		GPS2...	Pin	<b>GPB2GA</b>	101409	10
 <p><b>Terminal cover type E</b></p>	For compliance UL508E	GPS1...H	-	<b>GPAPT1E</b>	107315	1
		When using a Surion GPS1*BH as a manual self-protected combination motor starter (Type E). Cover enables compliance with NEC Section 430-52, 1" over air creepage and over surface clearance, phase to phase on the line side.				

A

B

C

D

E

F

G

H

I

X



## Enclosures for manual motor starters




### Product range

- Surface and flush mounting plastic enclosures (IP41 and IP55)
- Neutral and ground connection
- Three different types of push-buttons
  - Mushroom with impulse function
  - Mushroom self latching, unlatching by turning
  - Mushroom self latching, unlatching with a key
- Indicator lamps
- Padlocking device for three padlocks
- Conversion kit IP41 to IP55


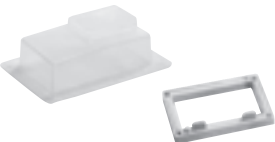

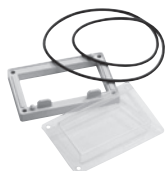


### Technical performances

- Used with GPS1\*S manual motor starters
- Protection degree IP41 or IP55
- Possibility to mount frontal/lateral auxiliary contact blocks with an undervoltage release (without or with 2NO early make auxiliary contacts) inside the enclosures

**Enclosures for only GPS 1\*S**

	Description	Cat. no.	Ref. no.	Pack.
 <b>Plastic enclosures</b>	Surface mounting IP41	GPE41A	101365	1
	Surface mounting IP55	GPE55A	101366	1
	Flush mounting IP41	GPEF41A	101367	1
	Flush mounting IP55	GPEF55A	101368	1

**Mounting accessories for all enclosures**

	Description	Cat. no.	Ref. no.	Pack.
 <b>Neutral connection</b>	To be used inside the enclosure	GPENA	101369	1
 <b>Adaptor set</b>	For enclosures used with GPS1*S and undervoltage release with 2 NO auxiliary contacts	GPEUTA	107097	1
 <b>Padlocking device</b>	For three padlocks with max. 8 mm shackle diameter Not to be used with emergency stop handle	GPEPA	101370	1
 <b>Conversion kit IP41 to IP55</b>		GPECA	101371	1
 <b>Mushroom push-button</b>	Mushroom spring return	GPEPMA	101372	1
	Mushroom self latching, turn to release	GPEPLA	101373	1
	Mushroom self latching, release with a key	GPEPKA	101374	1
 <b>Indicator lamps</b>	Green 110/120V	GPELGAJ	101375	1
	Green 220/240V	GPELGAN	101376	1
	Green 380/440V	GPELGAU	101377	1
	Green 480/500V	GPELGAX	101378	1
	Green 600V	GPELGAY	101379	1
	Red 110/120V	GPELRAJ	101380	1
	Red 220/240V	GPELRAN	101381	1
	Red 380/440V	GPELRAU	101382	1
	Red 480/500V	GPELRAX	101383	1
	Red 600V	GPELRAY	101384	1
	Transparent 110/120V	GPELCAJ	101385	1
	Transparent 220/240V	GPELCAN	101386	1
	Transparent 380/440V	GPELCAU	101387	1
	Transparent 480/500V	GPELCAX	101388	1
Transparent 600V	GPELCAY	101389	1	

A

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Technical data

General data

Frame size	GPS1	GPS2
Rated insulation voltage U <sub>i</sub>	690V	1000V
Rated operating voltage U <sub>e</sub>	690V ac	690V ac
Rated impulse withstand strength U <sub>imp</sub>	6kV	8kV
Rated frequency	50/60Hz	50/60Hz
Total power loss P (W)	0.16 to 25A 7W 32A 8.5W	up to 32A 11W 40A to 50A 15W 63A 17W
Utilisation category:		
IEC 947-2 (Circuit breaker)	Cat. A	Cat. A
IEC 947-4-1 (Motor starter)	AC3	AC3
Mechanical operational performance	100,000 (70,000 for 32A)	50,000
Electrical operational performance	100,000 (70,000 for 32A)	25,000
Max. operations per hour (motor start-up)	25	25
Ambient conditions:		
Storage temperature	-40°C to +80°C	-40°C to +80°C
Operation temperature	-25°C to +60°C	-25°C to +60°C
Temperature compensation	-20°C to +60°C	-20°C to +60°C
Ambient temperature compensation	yes	yes
Operational altitude	up to 2000m	up to 2000m
Shock resistance (IEC 68)	30g (width 20ms)	30g (width 20ms)
Vibration resistance	8g (5 to 150Hz)	8g (5 to 150Hz)
Shock-hazard prot. (acc. DIN VDE 0106)	fingerproof	fingerproof
Protection degree (acc. to IEC529)	IP20	IP10 (IP20 with acc. GPAPT2A)
Rated current I <sub>e</sub>	up to 32A	up to 63A
Overload protection	IEC 947-4-1	IEC 947-4-1
Phase failure protection	yes	yes
Tripping class	10	10
Magnetic release (factory set)	13 x I <sub>emax</sub>	13 x I <sub>emax</sub>
Test trip button	yes	yes
Standards & Approvals		
IEC 947-1 / -2 / -4-1	yes	yes
DIN VDE 0660T 100 / 101 / 102	yes	yes
UL508	yes	yes
UL508 type E	Only GPS1*H	yes
CE	yes	yes
cULus	yes	yes
D / S / N / Fi	In process	-
Shipping approvals	yes	yes

Mounting data

Terminal capacity:		
Solid or stranded without end sleeve	1 x 1...10 mm <sup>2</sup> 2 x 1...6 mm <sup>2</sup>	1 or 2 x 1...25 mm <sup>2</sup>
Stranded with end sleeve	1 or 2 x 1...6 mm <sup>2</sup>	1 x 1...25 mm <sup>2</sup> / 2 x 1...16 mm <sup>2</sup>
AWG	1 x 18...8 / 2 x 18...10	1 x 18...2 / 2 x 18...4
Operating mechanism lockable in OFF position diameter (mm)	3.5 to 4.5	3.5 to 4.5
Terminal type	screw	box
Tightening torque	2 Nm / 18Lb.in	5 Nm / 45 Lb.in
Screwdriver	Pz2 / slotted combination	Pz2 / slotted combination
Mounting:		
DIN-rail	yes	yes
Screws	no	yes
Operating position:		
turning to the front	30°	30°
turning to the back	90°	90°
turning to both sides	180°	180°
Handle operation	Rocker level / Rotary	Rotary
Dimensions		
width (mm)	45	55
height (mm)	90	120
depth (mm)	(GPS1*S) 75 / 92.5 (GPS1*H)	107.5



Ultimate short-circuit breaking capacity (Icu) in kA

		For ranges GPS1BSA* / GPS1MSA*																	
Rated current (A)	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	
	1.6	0.25	0.4	0.63	1	1.6	2.5	4	6.3	10	13	16	20	25	32	40	50	63	
220/230V	100	100	100	100	100	100	100	100	100	100	100	100	50	50	50	-	-	-	
400/415V	100	100	100	100	100	100	100	100	100	100	50	25	25	25	25	-	-	-	
440V	100	100	100	100	100	100	100	100	50	15	10	10	10	10	10	-	-	-	
500/525V	100	100	100	100	100	100	100	100	50	10	6	6	6	6	6	-	-	-	
600V	100	100	100	100	100	100	3	3	3	3	3	3	3	3	3	-	-	-	
690V	100	100	100	100	100	100	3	3	3	3	3	3	3	3	3	-	-	-	
		For ranges GPS1BHA* / GPS1MHA*																	
220/230V	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	-	-	-	
400/415V	100	100	100	100	100	100	100	100	100	100	100	50	50	50	50	-	-	-	
440V	100	100	100	100	100	100	100	100	100	50	50	35	35	35	35	-	-	-	
500/525V	100	100	100	100	100	100	100	100	100	50	42	10	10	10	10	-	-	-	
600V	100	100	100	100	100	100	8	8	6	6	6	4	4	4	4	-	-	-	
690V	100	100	100	100	100	100	8	8	6	6	6	4	4	4	4	-	-	-	
		For ranges GPS2BSA* / GPS2MSA*																	
220/230V	-	-	-	-	-	-	-	-	-	100	100	100	50	50	50	50	50	50	
400/415V	-	-	-	-	-	-	-	-	-	100	50	25	25	25	25	25	25	25	
440V	-	-	-	-	-	-	-	-	-	15	10	10	10	10	10	10	10	10	
500/525V	-	-	-	-	-	-	-	-	-	10	6	6	6	6	6	5	5	5	
600V	-	-	-	-	-	-	-	-	-	4	4	4	4	4	4	4	4	4	
690V	-	-	-	-	-	-	-	-	-	4	4	4	4	4	4	4	4	4	
		For ranges GPS2BHA* / GPS2MHA*																	
220/230V	-	-	-	-	-	-	-	-	-	100	100	100	100	100	100	100	100	100	
400/415V	-	-	-	-	-	-	-	-	-	100	100	50	50	50	50	50	50	50	
440V	-	-	-	-	-	-	-	-	-	50	50	50	50	35	35	35	35	35	
500/525V	-	-	-	-	-	-	-	-	-	50	42	12	12	12	10	10	10	10	
600V	-	-	-	-	-	-	-	-	-	6	6	5	5	5	5	5	5	5	
690V	-	-	-	-	-	-	-	-	-	6	6	5	5	5	5	5	5	5	

Short-circuit proof with an Icu = 100kA or 50kA

Rated service short-circuit breaking capacity (Ics) in kA

		For ranges GPS1BSA* / GPS1MSA*																	
Rated current (A)	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	
	1.6	0.25	0.4	0.63	1	1.6	2.5	4	6.3	10	13	16	20	25	32	40	50	63	
220/230V	100	100	100	100	100	100	100	100	100	100	100	100	38	38	38	-	-	-	
400/415V	100	100	100	100	100	100	100	100	100	100	38	19	19	19	19	-	-	-	
440V	100	100	100	100	100	100	100	100	38	11	8	8	8	8	8	-	-	-	
500/525V	100	100	100	100	100	100	100	100	38	8	5	5	5	5	5	-	-	-	
600V	100	100	100	100	100	100	3	3	3	3	3	3	3	3	3	-	-	-	
690V	100	100	100	100	100	100	3	3	3	3	3	3	3	3	3	-	-	-	
		For ranges GPS1BHA* / GPS1MHA*																	
220/230V	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	-	-	-	
400/415V	100	100	100	100	100	100	100	100	100	100	100	38	38	38	38	-	-	-	
440V	100	100	100	100	100	100	100	100	100	38	38	25	25	25	25	-	-	-	
500/525V	100	100	100	100	100	100	100	100	100	38	32	8	8	8	8	-	-	-	
600V	100	100	100	100	100	100	6	6	5	5	5	3	3	3	3	-	-	-	
690V	100	100	100	100	100	100	6	6	5	5	5	3	3	3	3	-	-	-	
		For ranges GPS2BSA* / GPS2MSA*																	
220/230V	-	-	-	-	-	-	-	-	-	100	100	100	38	38	38	38	38	38	
400/415V	-	-	-	-	-	-	-	-	-	100	32	19	19	19	19	19	19	19	
440V	-	-	-	-	-	-	-	-	-	12	8	8	8	8	8	8	8	8	
500/525V	-	-	-	-	-	-	-	-	-	8	5	5	5	5	5	4	4	4	
600V	-	-	-	-	-	-	-	-	-	3	3	3	3	3	3	3	3	3	
690V	-	-	-	-	-	-	-	-	-	3	3	3	3	3	3	3	3	3	
		For ranges GPS2BHA* / GPS2MHA*																	
220/230V	-	-	-	-	-	-	-	-	-	100	100	100	100	100	100	100	100	100	
400/415V	-	-	-	-	-	-	-	-	-	100	100	38	38	38	38	38	38	38	
440V	-	-	-	-	-	-	-	-	-	38	38	38	38	25	25	25	25	25	
500/525V	-	-	-	-	-	-	-	-	-	38	32	9	9	9	8	8	8	8	
600V	-	-	-	-	-	-	-	-	-	5	5	4	4	4	4	4	4	4	
690V	-	-	-	-	-	-	-	-	-	5	5	4	4	4	4	4	4	4	

Back-up fuses are necessary in case of possibility of a short-circuit current higher than 100kA or 50kA at the installation point of the device (on request)

Ics = 100%Icu when Icu = 100kA

Ics = 75%Icu when Icu < 100kA



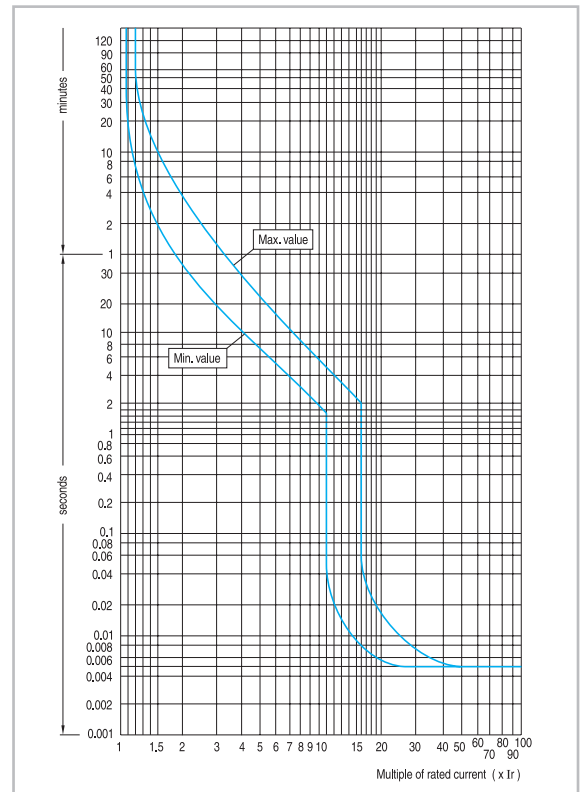
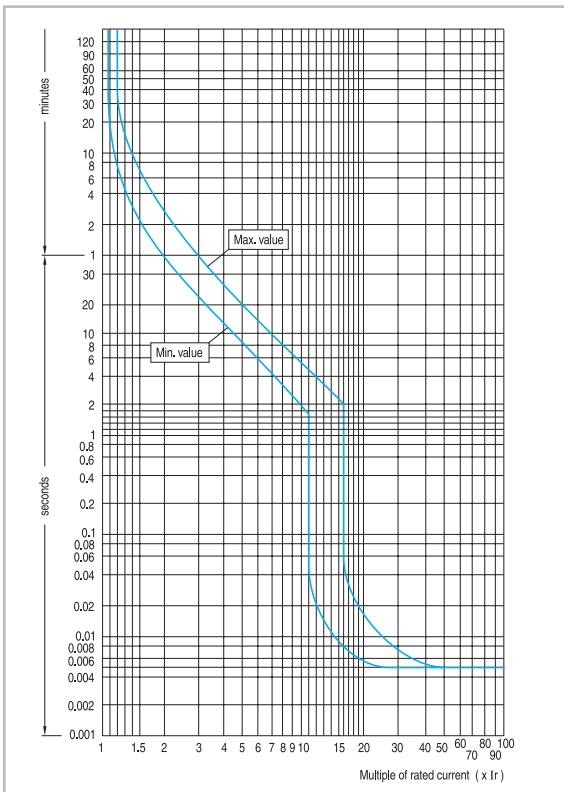
Back-up gl/gG fuses only if  $I_{cs} > I_{cu}$  (kA)

		For ranges GPS1BSA* / GPS1MSA*																	
gl/gG fuses (A)		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
		1.6	0.25	0.4	0.63	1	1.6	2.5	4	6.3	10	13	16	20	25	32	40	50	63
230V	#	#	#	#	#	#	#	#	#	#	#	#	#	100	100	100	-	-	-
400V	#	#	#	#	#	#	#	#	#	#	#	80	100	100	100	100	-	-	-
440V	#	#	#	#	#	#	#	#	#	50	63	63	80	80	80	80	-	-	-
500V	#	#	#	#	#	#	#	#	#	50	50	63	63	63	80	80	-	-	-
600V	#	#	#	#	#	#	#	20	32	40	50	63	63	63	80	80	-	-	-
690V	#	#	#	#	#	#	#	20	32	40	50	50	63	63	63	63	-	-	-
		For ranges GPS1BHA* / GPS1MHA*																	
230V	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	-	-	-
400V	#	#	#	#	#	#	#	#	#	#	#	#	100	125	125	125	-	-	-
440V	#	#	#	#	#	#	#	#	#	#	63	63	80	80	100	100	-	-	-
500V	#	#	#	#	#	#	#	#	#	#	50	63	80	80	80	80	-	-	-
600V	#	#	#	#	#	#	#	25	40	50	50	63	63	63	80	80	-	-	-
690V	#	#	#	#	#	#	#	25	40	50	50	63	63	63	63	63	-	-	-
		For ranges GPS2BSA* / GPS2MSA*																	
230V	-	-	-	-	-	-	-	-	-	-	#	#	#	125	125	125	125	125	160
400V	-	-	-	-	-	-	-	-	-	-	#	80	100	125	125	125	125	125	160
440V	-	-	-	-	-	-	-	-	-	-	63	63	80	80	100	100	125	125	125
500V	-	-	-	-	-	-	-	-	-	-	63	63	80	80	80	80	100	100	125
600V	-	-	-	-	-	-	-	-	-	-	63	63	63	63	80	80	100	100	100
690V	-	-	-	-	-	-	-	-	-	-	63	63	63	63	63	63	63	80	100
		For ranges GPS2BHA* / GPS2MHA*																	
230V	-	-	-	-	-	-	-	-	-	-	#	#	#	#	#	#	#	#	#
400V	-	-	-	-	-	-	-	-	-	-	#	#	100	125	125	125	125	125	160
440V	-	-	-	-	-	-	-	-	-	-	63	63	80	80	100	100	125	125	125
500V	-	-	-	-	-	-	-	-	-	-	63	63	80	80	80	80	100	100	125
600V	-	-	-	-	-	-	-	-	-	-	80	63	63	63	80	80	100	100	100
690V	-	-	-	-	-	-	-	-	-	-	80	63	63	63	63	63	63	80	100

Back-up gl/gG fuses only if  $I_{cs} > I_{cu}$  (kA)

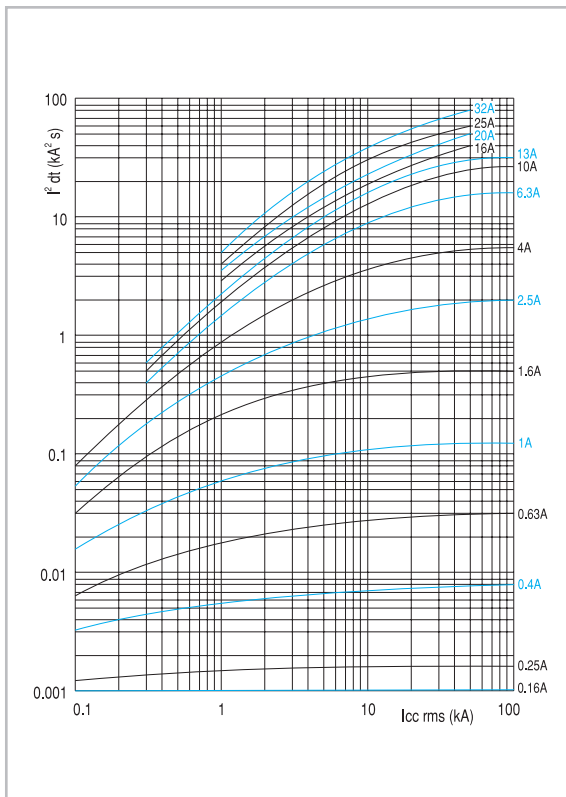
Manual motor starter: GPS1...

Manual motor starter: GPS2...

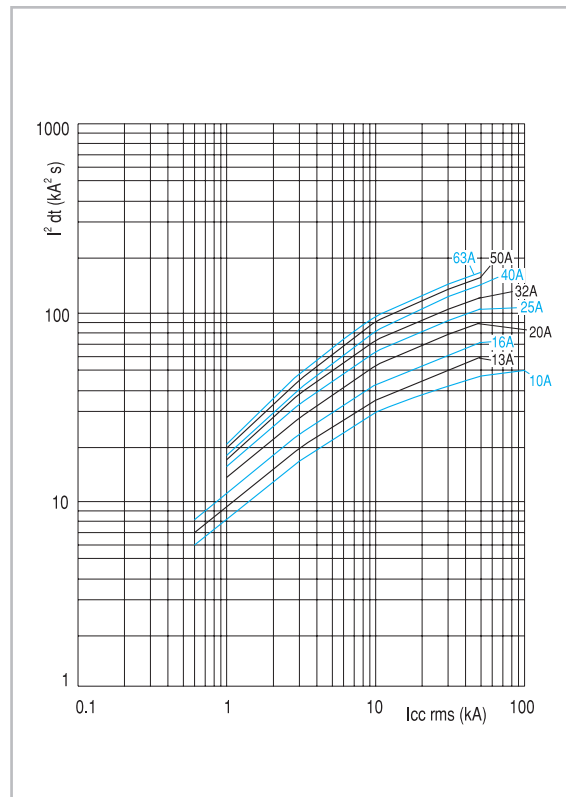


**Specific let-through energy at  $U_e = 400/415\text{ V}$**

Manual motor starter: GPS1...

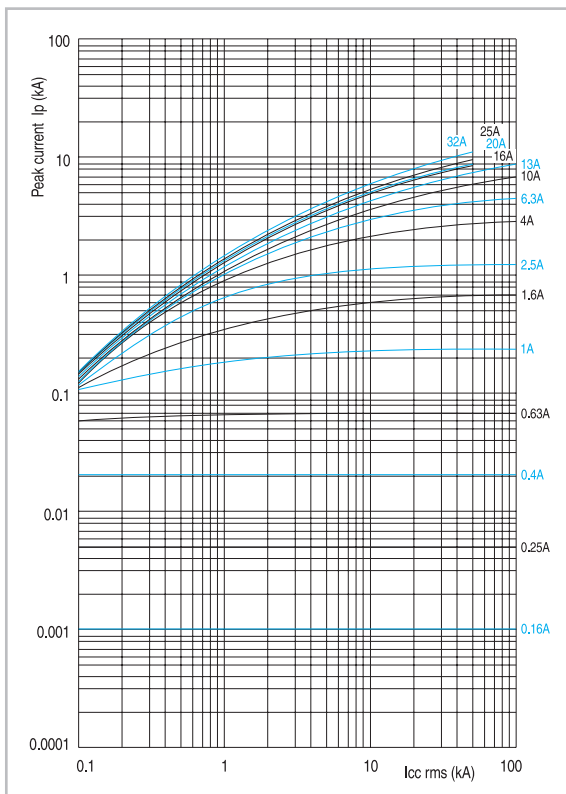


Manual motor starter: GPS2...

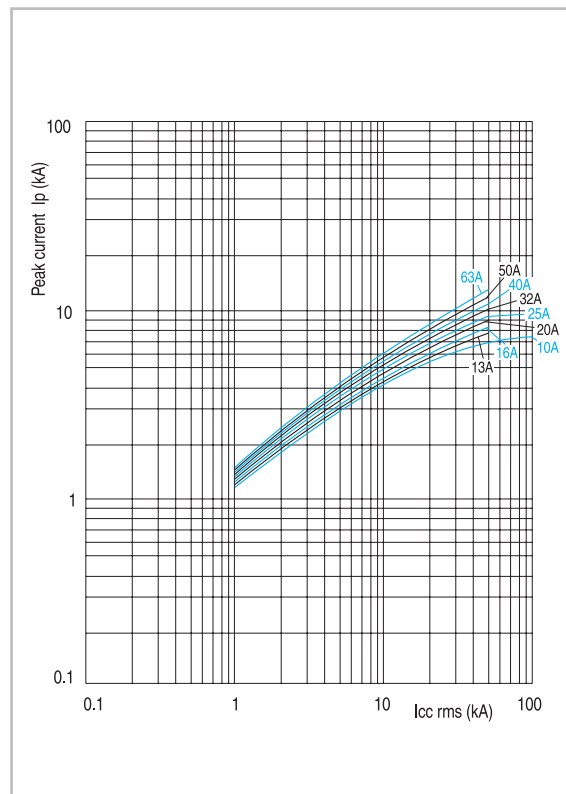


**Peak current limitation at  $U_e = 400/415\text{ V}$**

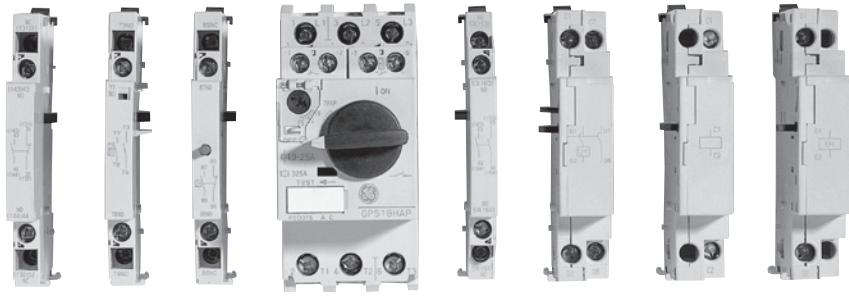
Manual motor starter: GPS1...



Manual motor starter: GPS2...



Mounting possibilities of the auxiliaries



Wiring diagram	Type	Description	
<b>Frontal auxiliaries</b>			
	Auxiliary contact block	1NO or 1NC	Two <u>frontal</u> auxiliary contact blocks can be installed at the same time maintaining the overall width of the manual motor starter.
	Alarm contact block	1NO or 1NC	Installed on the <u>frontal</u> right side. Can be mounted in combination with the frontal auxiliary block. The overall width of the manual motor starter is maintained.
<b>Lateral auxiliaries</b>			
	Auxiliary contact block	2NO 1NO + 1NC 2NC	Different catalogue numbers for <u>left</u> or <u>right</u> mounting. Maximum number of auxiliary contact blocks mounted on each side: 2. Total number of auxiliary contacts in combination frontal and lateral: 8. Width of each lateral auxiliary contact block: 9 mm. GPS1 rated at 32A allows maximum 2 auxiliary contact blocks (4 contacts).
	Auxiliary/alarm contact block	1NO (alarm) + 1NO (auxiliary) 1NO (alarm) + 1NC (auxiliary) 1NC (alarm) + 1NO (auxiliary) 1NC (alarm) + 1NC (auxiliary)	Installed on the <u>left</u> side. Maximum number of blocks per manual motor starter: 1. Can be fitted together with one lateral auxiliary contact block or one short-circuit alarm block mounted on the left side. Width of each lateral alarm/auxiliary contact block: 9 mm.
	Short-circuit alarm contact block	1NO + 1NC	Installed on the <u>left</u> side. Tripping in case of short-circuit only. Can be fitted together with one lateral auxiliary contact block or one auxiliary/ alarm block mounted on the left side. Width of each short-circuit alarm contact block: 9 mm.
	Shunt trip		Installed on the <u>right</u> side. Can not be mounted together with the undervoltage release or any lateral block mounted on the same side. Width of each shunt trip: 18 mm.
	Undervoltage trip		Installed on the <u>right</u> side. Can not be mounted together with a shunt trip device or any lateral block mounted on the same side. Width of each undervoltage trip: 18 mm.
	Undervoltage trip with 2NO early make auxiliary contacts		Installed on the <u>right</u> side. Two different types, one for the GPS1*S.. and another for the GPS1*H..and GPS2.. Can not be mounted together with a shunt trip device or any lateral block mounted on the same side. Width of each undervoltage trip: 18 mm.

Shunt trip, undervoltage trip and undervoltage with 2NO contacts can be mounted together with any frontal block or left lateral block with above mentioned restrictions



**Auxiliaries**

Catalogue reference	GPAC*F..	GPAC*L..	GPAL..	GPAD..	GPAE..
	Aux. frontal block	Aux. lateral block	Alarm frontal block	Alarm/aux. lateral block	Short-circuit alarm block
Cont. cap. contacts class (UL508)	B300 / Q300	A600 / P300	B300 / Q300	A600 / P300	A600 / P300
Back-up fuses gG, gl	6A	10A	6A	10A	10A
<b>Utilization category AC-15</b>					
Rated operating voltage Ue (Vac)	48 125 230	48 125 230 400 500 690	48 125 230	48 125 230 400 500 690	48 125 230 400 500 690
Rated operational current (A)	5 3 1.5	6 4 4 2.2 1.5 0.6	5 3 1.5	6 4 4 2.2 1.5 0.6	6 4 4 2.2 1.5 0.6
<b>Utilization category DC-13</b>					
Rated operating voltage Ue (Vdc)	48 110 220	48 110 220	48 110 220	48 110 220	48 110 220
Rated operational current (A)	1.38 0.55 0.27	5 1.3 0.5	1.38 0.55 0.27	5 1.3 0.5	5 1.3 0.5
<b>Mounting data</b>					
Mounting side	Front	Left or right	Frontal right	Left	Left
Terminals capacity: Solid or stranded without end sleeve	2x0.5...2.5 mm <sup>2</sup>	2x0.5...2.5 mm <sup>2</sup>	2x0.5...2.5 mm <sup>2</sup>	2x0.5...2.5 mm <sup>2</sup>	2x0.5...2.5 mm <sup>2</sup>
AWG	2x18...14	2x18...14	2x18...14	2x18...14	2x18...14
Terminal type	screw	screw	screw	screw	screw
Tightening torque	0.8Nm	0.8Nm	0.8Nm	0.8Nm	0.8Nm
Screwdriver	Pz2/Slotted	Pz2/Slotted	Pz2/Slotted	Pz2/Slotted	Pz2/Slotted
Dimensions width (mm)	Maintain same width	Increase width 9 mm	Maintain same width	Increase width 9 mm	Increase width 9 mm

Detailed dimensions see page B.29

**Auxiliaries**

Catalogue reference	GPAU	GPAS
	Undervoltage trip	Shunt trip
Power consumption:		
Pick-up (VA/W)	21/12	21/12
Hold (VA/W)	8/1.2	-
Operating voltage		
Tripping (V)	0.35Ve-0.7Ve	0.7Ve-1.1Ve
Pick-up (V)	0.85Ve-1.1Ve	-
Max. operation supply (ms)	-	5(DC)
Rated operating voltage Ue	24V 50Hz 24V 60Hz 48V 50Hz 48V 60Hz 110/127V 50Hz / 120V 60Hz 208V 60Hz 220/230V 50Hz / 240/260V 60Hz 240V 50Hz / 277V 60Hz 380/400V 50Hz 415/440V 50Hz / 460/480V 60Hz 500V 50Hz / 600V 60Hz	24V 50/60Hz 48V 60Hz 48V 50Hz / 60V 60Hz 110/127V 50Hz / 120V 60Hz 208V 60Hz 220/230V 50Hz / 240/260V 60Hz 240V 50Hz / 277V 60Hz 380/400V 50Hz 415/440V 50Hz / 460/480V 60Hz 500V 50Hz / 600V 60Hz 24 to 60Vdc 110 to 240Vdc
Contacts class (UL508)	-	-
Back-up fuses (gG,gl)	10A	10A
<b>Mounting data</b>		
Mounting side	Right	Right
Terminals capacity: Solid or stranded without end sleeve	2x0.5...2.5 mm <sup>2</sup>	2x0.5...2.5 mm <sup>2</sup>
AWG	2x18...14	2x18...14
Terminal type	Screw	Screw
Tightening torque	0.8Nm	0.8Nm
Screwdriver	Pz2/Slotted	Pz2/Slotted
Dimensions width (mm)	Increase width 18 mm	Increase width 18 mm

A

B

C

D

E

F

G

H

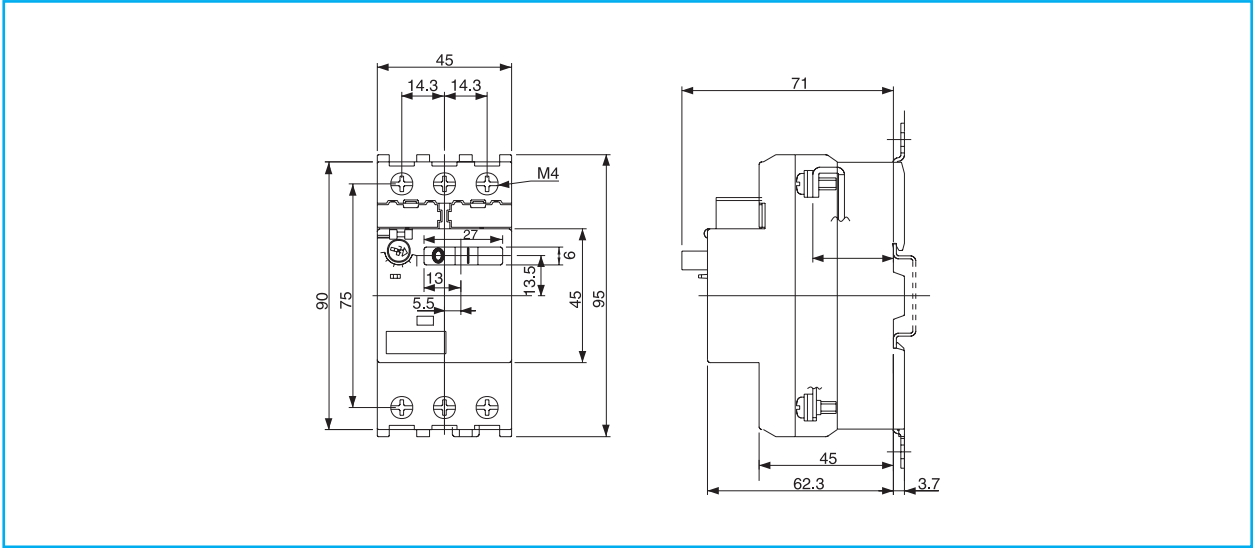
I

X

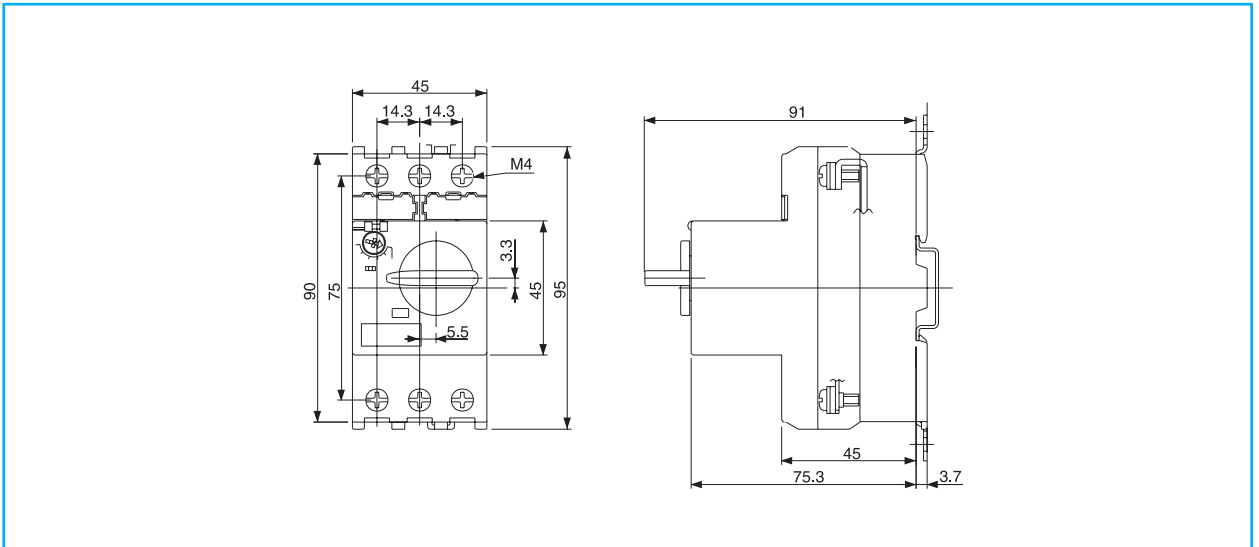


**Dimensional drawings**

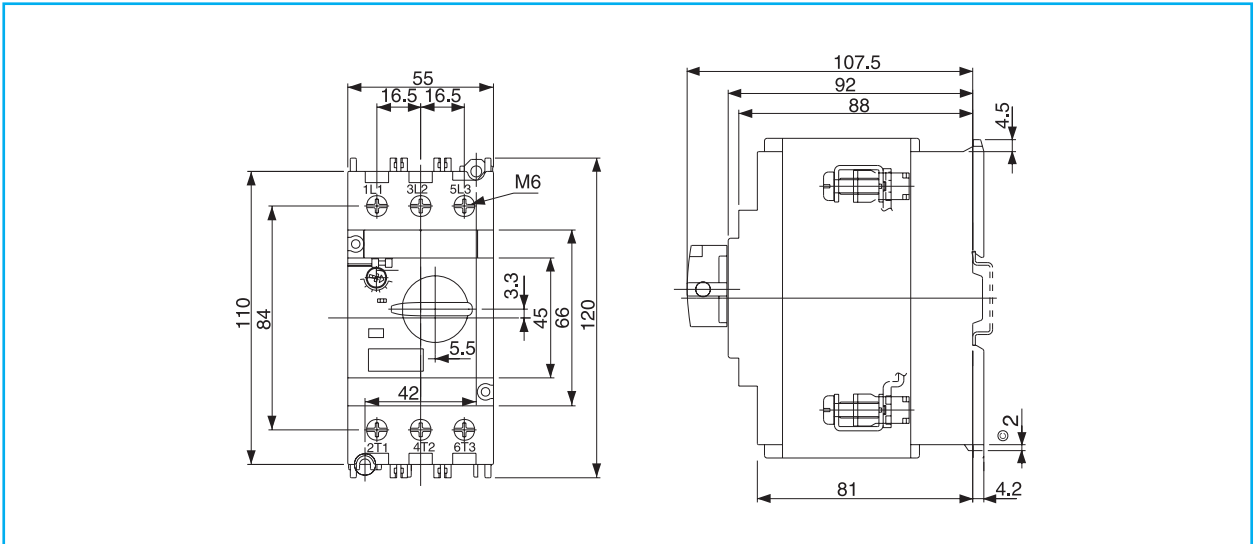
**Manual Motor Starter - GPS1 rocker**



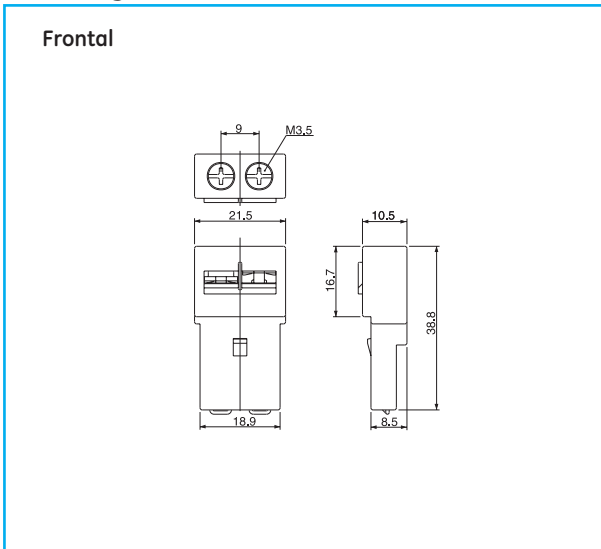
**Manual Motor Starter - GPS1 rotary**



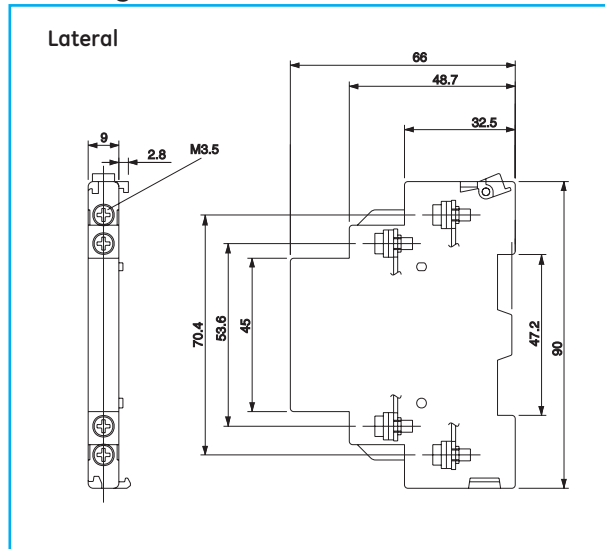
**Manual Motor Starter - GPS2**



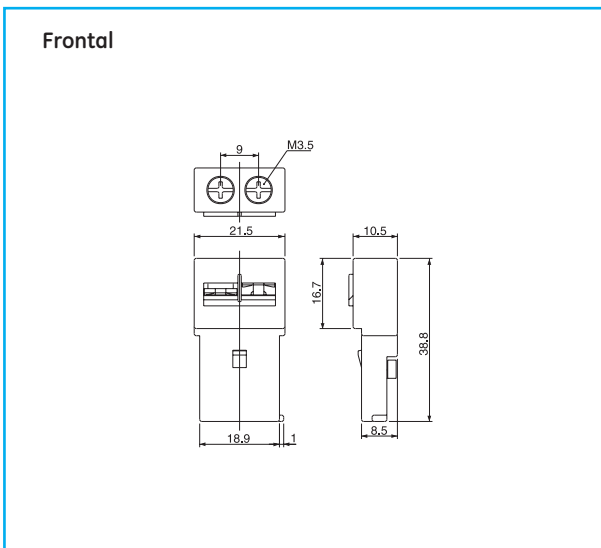
**Auxiliary contact blocks**



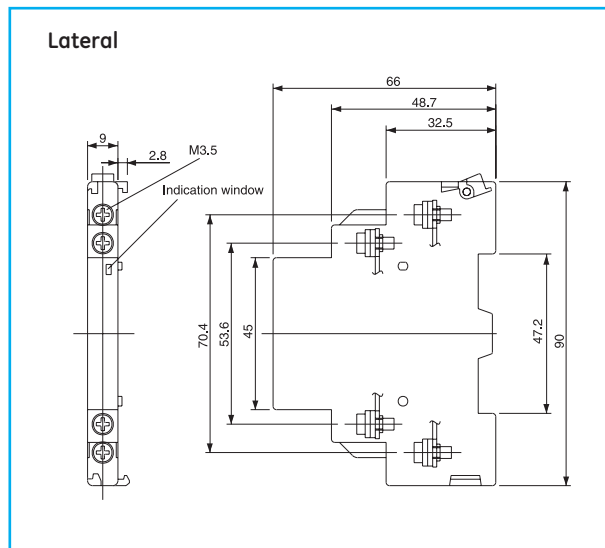
**Auxiliary contact blocks**



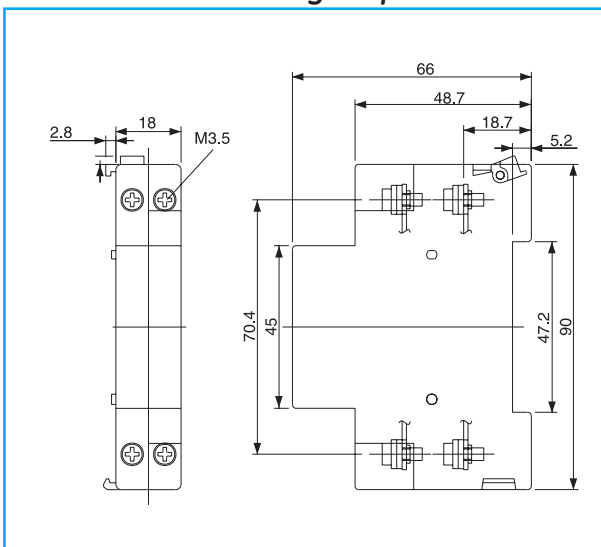
**Alarm contact blocks**



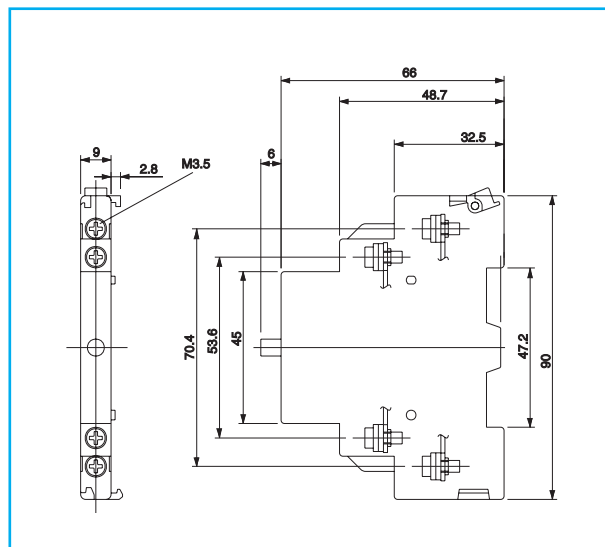
**Alarm contact blocks**



**Shunt and undervoltage trip devices**



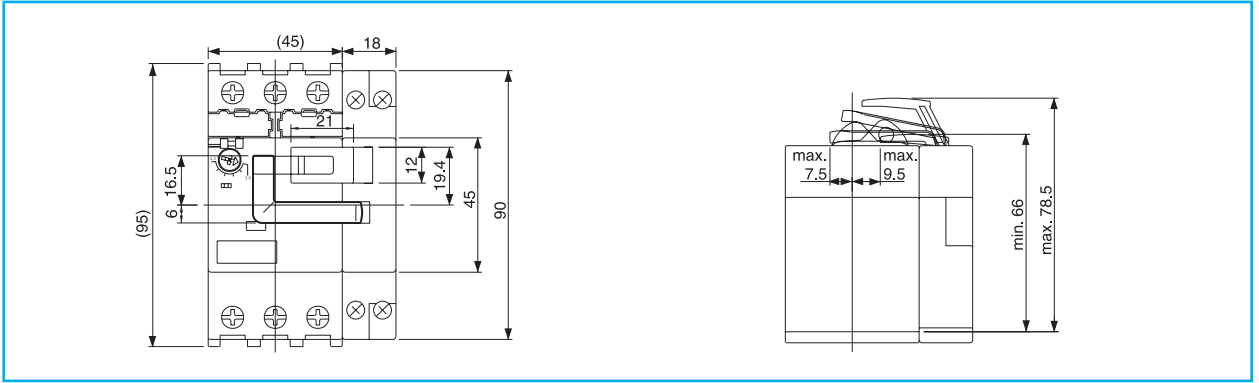
**Short-circuit contact block**



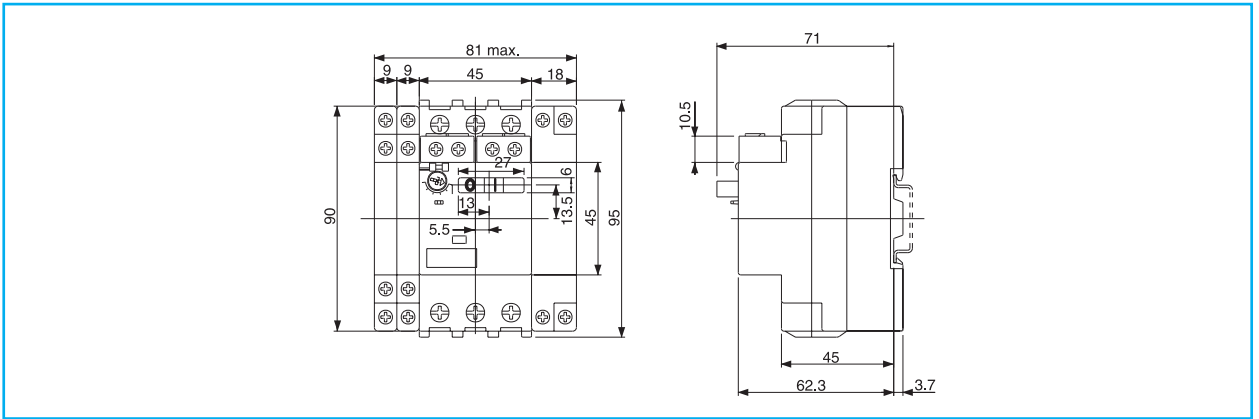


**Dimensional drawings**

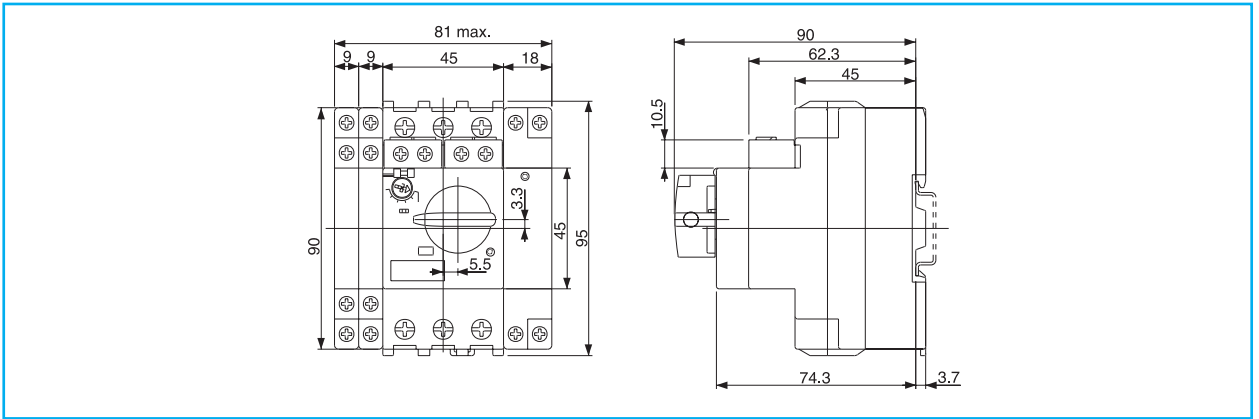
**GPS1 rocker + Undervoltage trip device with 2NO contacts**



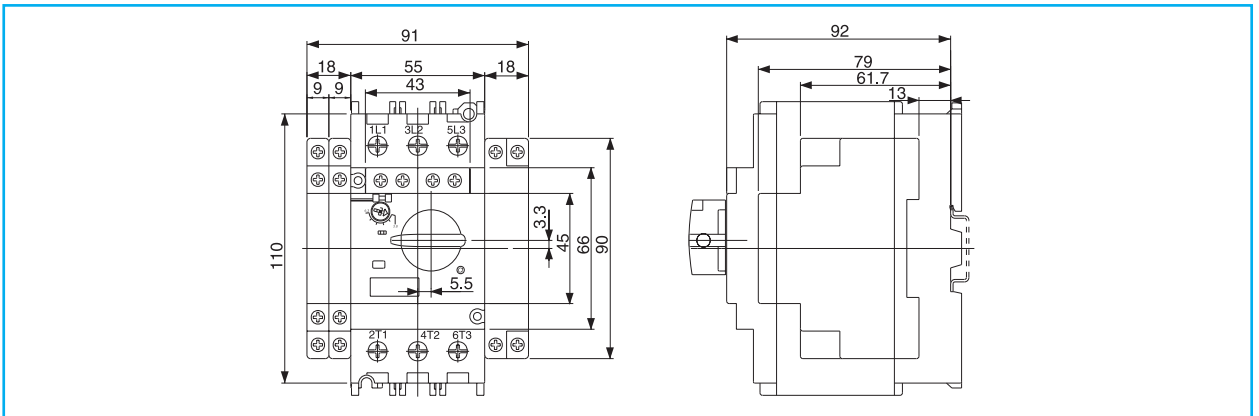
**GPS1 rocker + Auxiliaries**



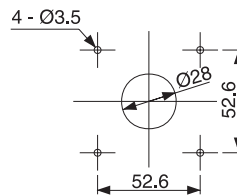
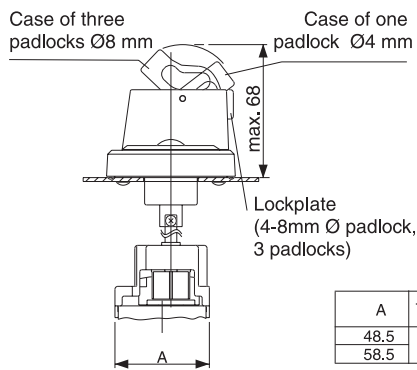
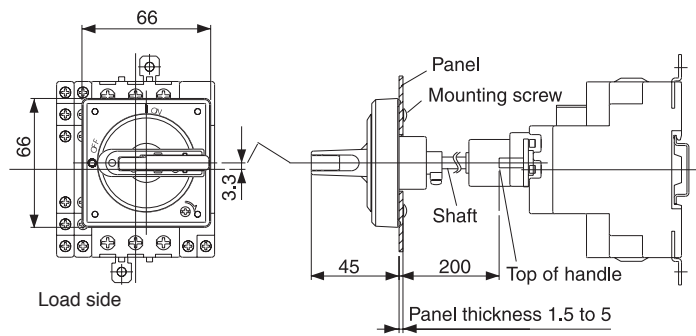
**GPS1 rotary + Auxiliaries**



**GPS2 + Auxiliaries**



External handle operator



A	Type	Applicable frame
48.5	Standard / emergency stop	GPS1*H
58.5		GPS2

A

**B**

C

D

E

F

G

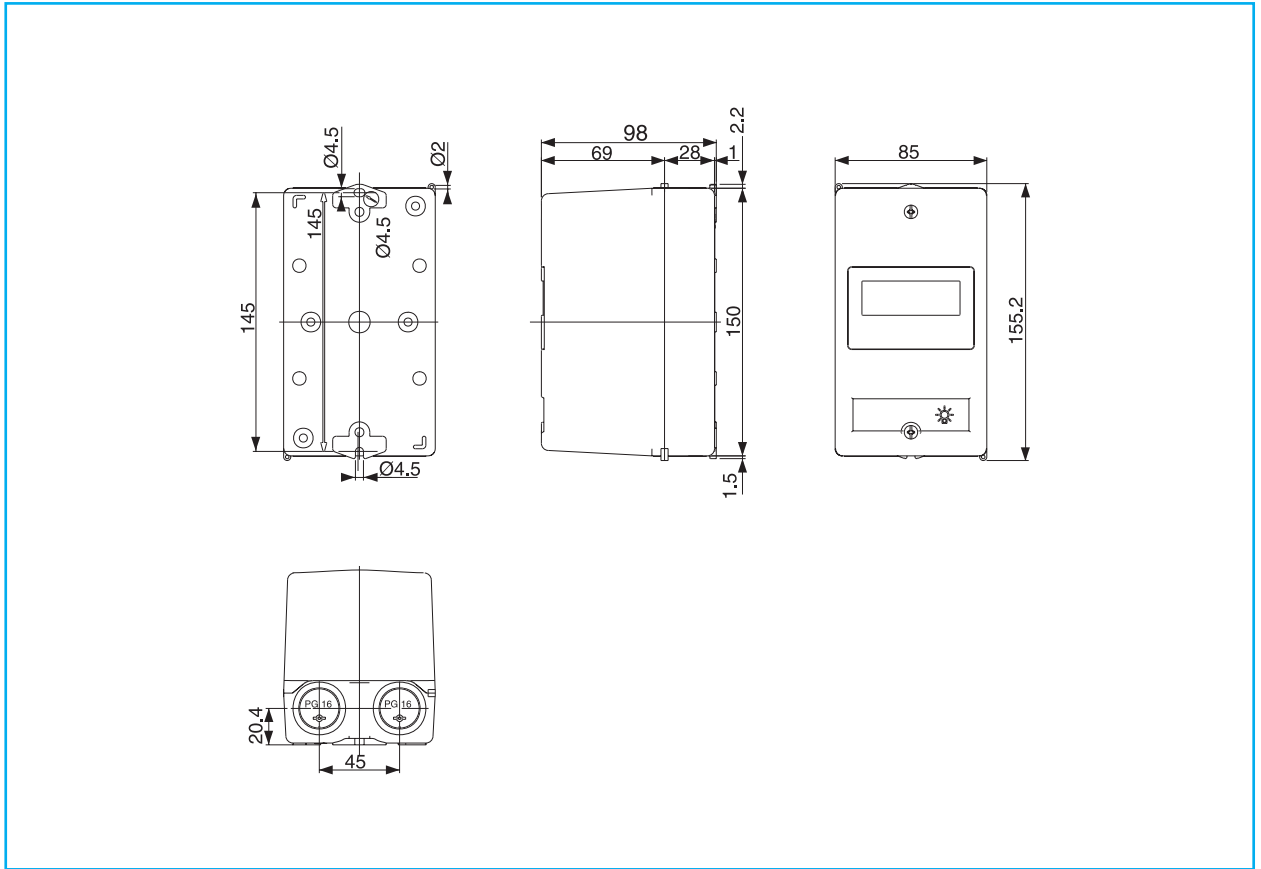
H

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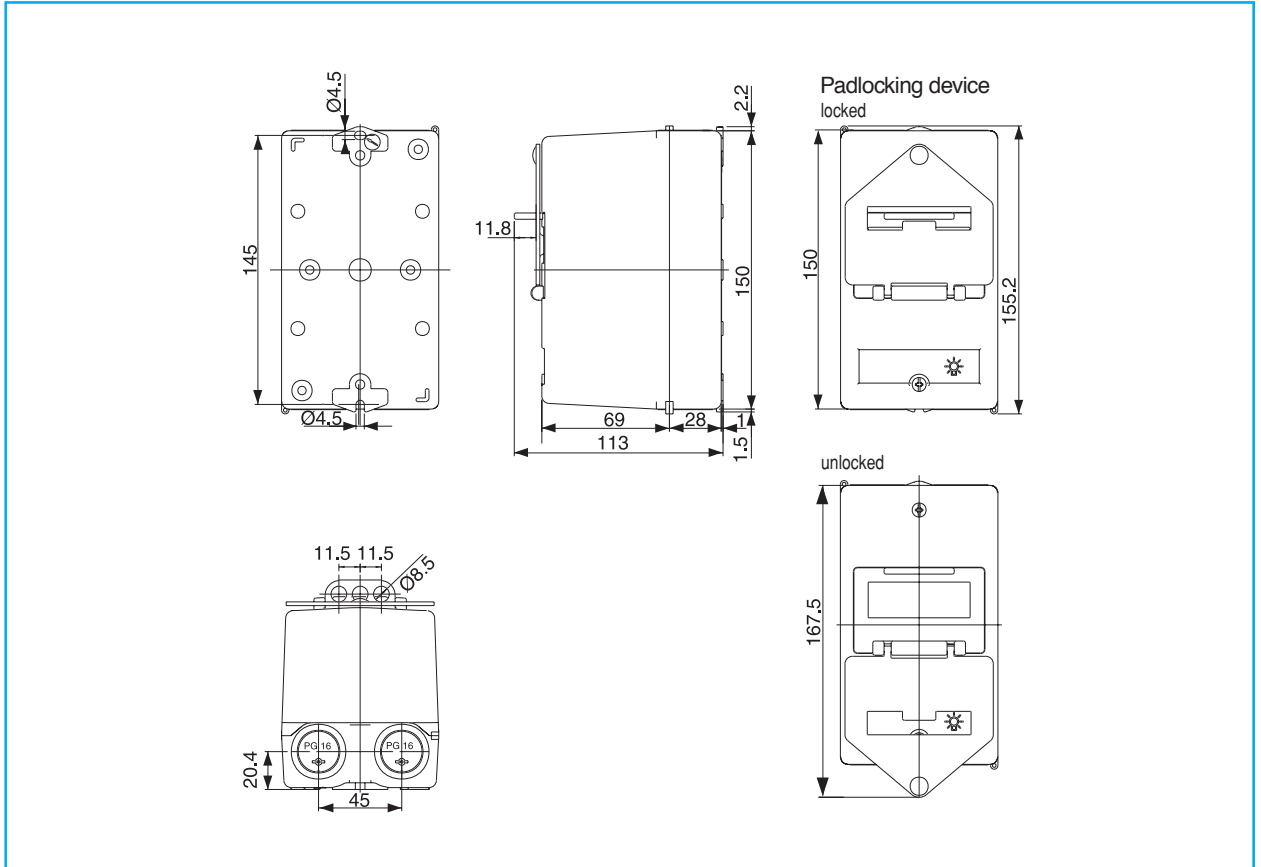
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**Dimensional drawings**

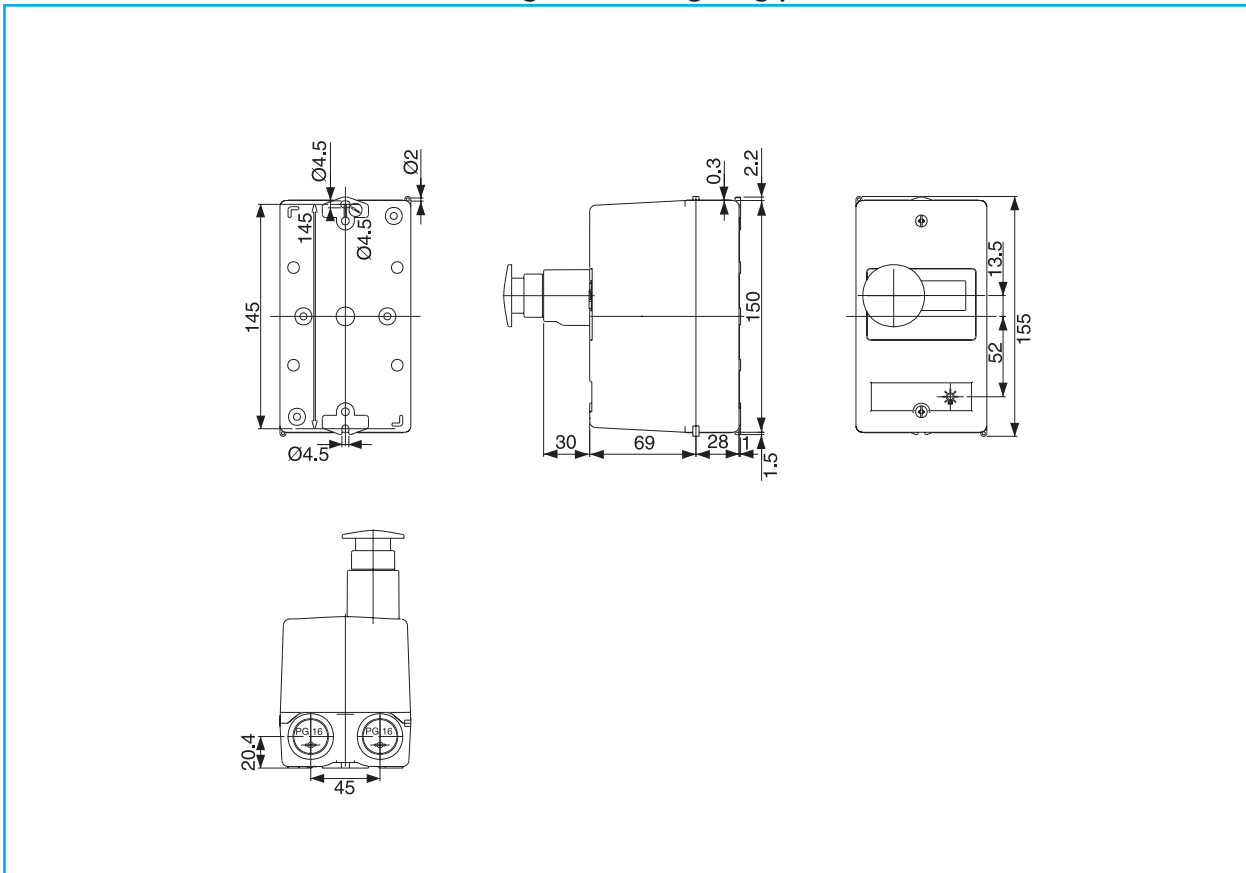
**Enclosure for GPS1 - Surface mounting**



**Enclosure for GPS1 - Surface mounting with padlocking device**



Enclosure for GPS1 - Surface mounting with emergency push-button



Manual motor starter

A

B

C

D

E

F

G

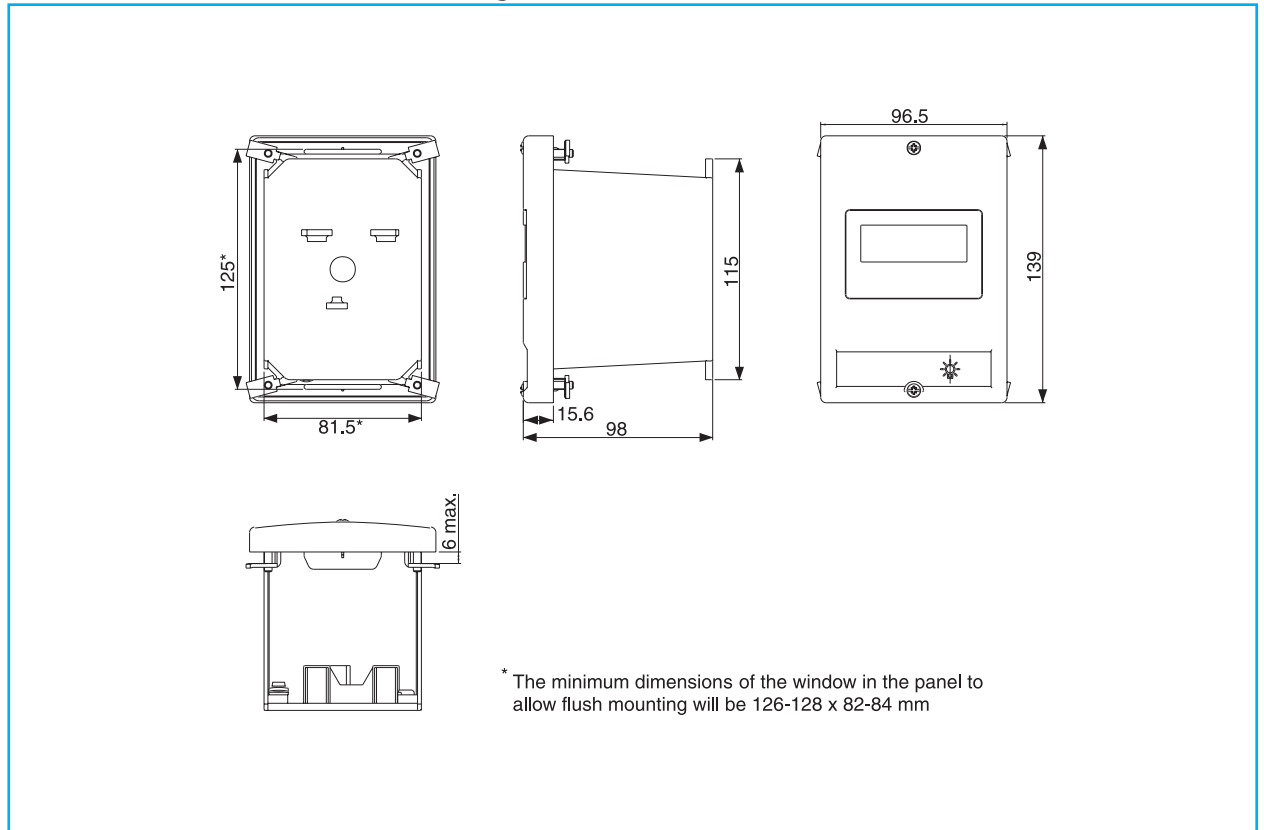
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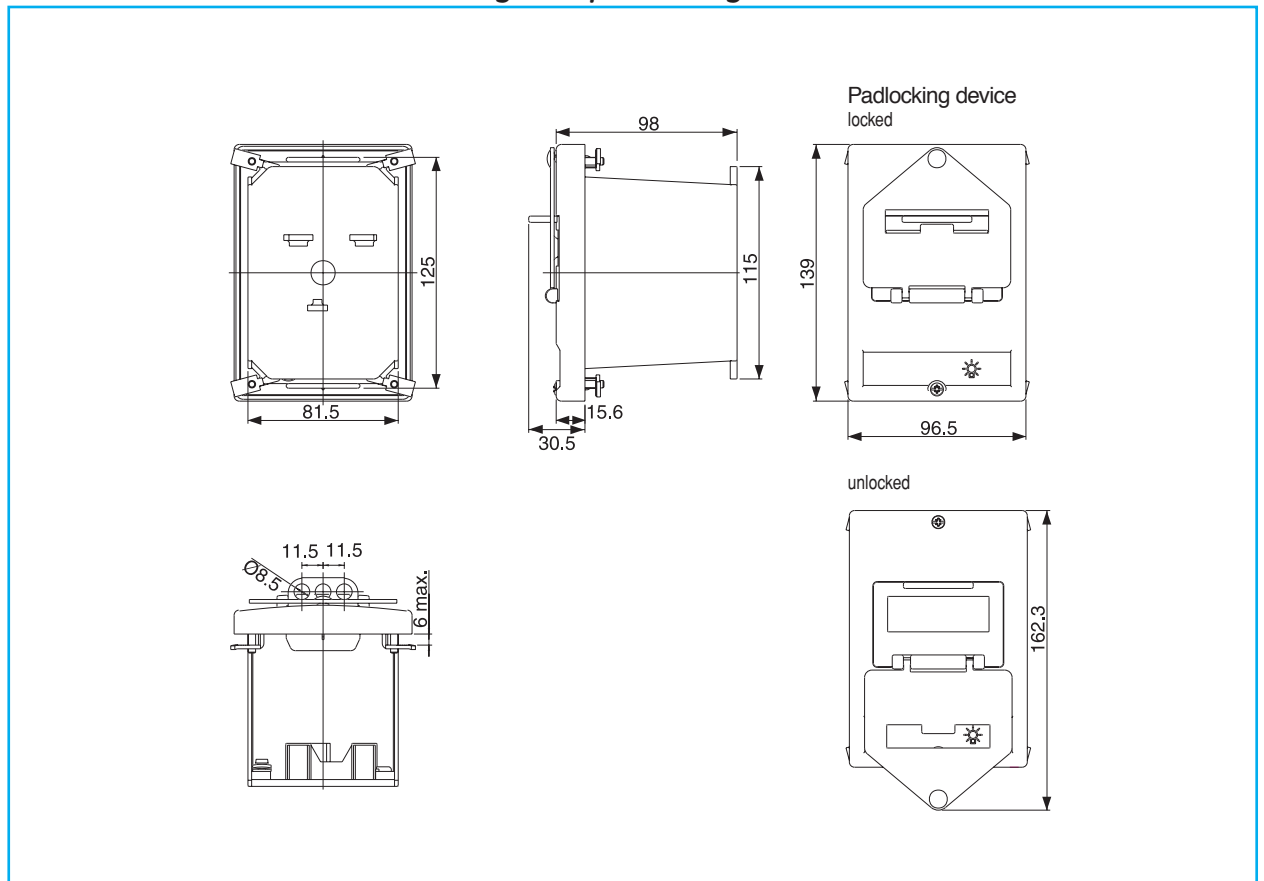
X

**Dimensional drawings**

**Enclosure for GPS1 - Flush mounting**



**Enclosure for GPS1 - Flush mounting with padlocking device**



## Series M - Minicontactors

- C.3 Order codes
- C.23 Technical data
- C.29 Terminal numbering
- C.50 Dimensions

## Series CL - Contactors

- C.11 Order codes
- C.31 Technical data
- C.39 Terminal numbering
- C.52 Dimensions

## Series CK - Contactors

- C.19 Order Codes
- C.42 Technical data
- C.58 Dimensions

Plug-in relays and Auxiliary contactors

## Series MT0 - Thermal overload relays for minicontactors

- C.61 Order codes
- C.68 Technical data
- C.69 Dimensions

Motor protection devices

## Contactors and Thermal overload relays

## Series RT - Thermal overload relays for contactors

- C.63 Order codes
- C.70 Technical data
- C.74 Dimensions

Motorstarters

Control and signalling units

## Series RE - Electronic overload relays

- C.66 Order codes
- C.77 Technical data
- C.78 Dimensions

NEW

Electronic relays

Limit switches

## Series CSCN - Contactors for capacitors

- C.81 Order codes
- C.82 Technical data
- C.84 Dimensions

NEW

Speed drive units

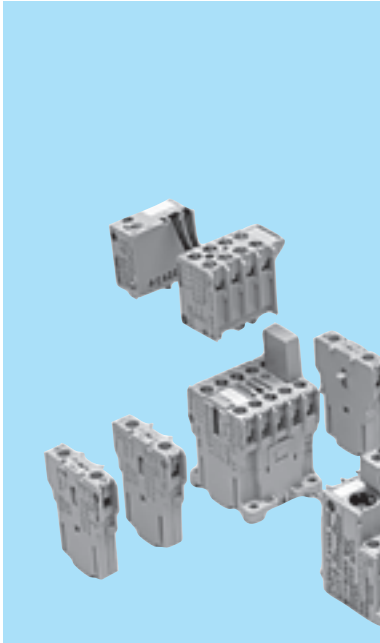
Main switches

## Series 390.R - Clapper contactors

- C.87 Order codes
- C.93 Technical data
- C.96 Dimensions

Numerical index





### Three and four pole minicontactors 6, 9 and 12A (AC3) 20A (AC1)

- Control circuit: Alternating current up to 600V  
Direct current up to 440V
- Terminal numbering in accordance with EN 50012
- Fixing by clipping onto 35 mm DIN rail (EN 50022-35) or by screws
- Screws and fast-on terminals protected against accidental contact in accordance with VDE 0106 T.100 and VBG4
- Versions: Ring terminal and printed circuit terminals
- Facility to mount instant and timed auxiliary contact blocks and voltage suppressor block
- Degree of protection IP20 (EN 60529).
- Maximum number of auxiliary contacts to be added: 6

#### Standards

IEC/EN 60947-1	BS 4794
IEC/EN 60947-4-1	NFC 63-110
IEC/EN 60947-5-1	CSA C22.2/14
EN 50003	VDE 0660
EN 50005	SEV 10254
EN 50012	JIS C8325
UL 508	JEM 1038
NEMA ICS-1	CENELEC HD 419

#### General data

	MC0...	MC1...	MC2...
<b>Maximum number of poles</b>	4	4	4
<b>Rated thermal current (Ith) <math>\theta \leq 60^{\circ}\text{C}</math></b>	(A) 20	20	20
<b>Rated operational current Ie<sup>(2)</sup></b> <b>(3x440V, 50/60Hz, AC3)</b>	(A) 6	9	12
<b>Rated insulation current Ui</b>	(V) 750	750	750
<b>Rated operational current Ue</b>	(V) 690	690	690

#### Approvals



- Order codes pg. C.3
- Auxiliary contact blocks pg. C.6
- Accessories pg. C.8
- Technical data pg. C.23
- Terminal numbering pg. C.29
- Dimensions pg. C.50

#### Standard voltages

To complete the catalogue number, replace the symbol  $\blacklozenge$  by the code corresponding to the voltage and frequency of the control circuit (other voltages on request)

##### Alternating current (V). Bifrequency coil

$\blacklozenge$	10	1	2	9	3	4	5	6	7	8	12	13
AC	12	24	42	48	110	120	220	230	240	440	380	400
50/60Hz					115							

##### Operating voltages limits with bifrequency coils:

With 60Hz = 0.85 to 1.1 x Us

With 50Hz = 0.8 to 1.1 x Us in continuous service (ED=100%) with a maximum ambient temperature of 40°C

##### Alternating current (V).

$\blacklozenge$	A	E	G	K	M	N	S	U	W	Y
AC			48	115		220	260	380	415	500
50Hz				127		240		400	440	
AC	6	32	60		208	240		440	480	600
60Hz					220	277				

##### Direct current (V)

$\blacklozenge$	A	B	C	D	E	F	G	H	I	J	K	L	N	17	R	S	16
DC	6	12	32	24	36	42	48	60	72	110	120	125	220	230	240	250	440

##### Direct current (V) - Wide voltage range

$\blacklozenge$	WD	WE	WG	WI	WJ	WN
DC	24	33	48	72	110	220



### Three pole minicontactors

Max.operat.current Non- inductive loads AC1 <sup>(2)</sup> A	Motors <440V, 3 ~ 50/60Hz AC3 <sup>(3)</sup> A	Admissible power AC3					Aux. contacts		Control circuit: Alternating current		Control circuit: Direct current	
		1-phase 115V 220V		3-phase 220V 380V 500V 230V 400V			.3  .4	.1 .2	Cat. no. <sup>(1)</sup>	Pack	Cat. no. <sup>(1)</sup>	Pack
		kW HP	kW HP	kW HP	kW HP	kW HP			Ref. no. see bottom		Ref. no. see bottom	
<b>Terminal: screw</b>												
20	6	0.37	0.75	1.5	2.2	3	1	0	MC0A310AT	20	MC0C310AT	10
		0.5	1	2	3	4	0	1	MC0A301AT	20	MC0C301AT	10
20	9	0.56	1.12	2.2	4	4	1	0	MC1A310AT	20	MC1C310AT	10
		0.75	1.5	3	5.5	5.5	0	1	MC1A301AT	20	MC1C301AT	10
20	12	0.75	2	3	5.5	5.5	1	0	MC2A310AT	20	MC2C310AT	10
		1	2.6	4	7.3	7.3	0	1	MC2A301AT	20	MC2C301AT	10
<b>Terminal: ring terminal</b>												
20	6	0.37	0.75	1.5	2.2	3	1	0	MC0A310AR	20	MC0C310AR	10
		0.5	1	2	3	4	0	1	MC0A301AR	20	MC0C301AR	10
20	9	0.56	1.12	2.2	4	4	1	0	MC1A310AR	20	MC1C310AR	10
		0.75	1.5	3	5.5	5.5	0	1	MC1A301AR	20	MC1C301AR	10
20	12	0.75	2	3	5.5	5.5	1	0	MC2A310AR	20	MC2C310AR	10
		1	2.6	4	7.3	7.3	0	1	MC2A301AR	20	MC2C301AR	10
<b>Terminal: faston 2x2.8 insulated (5)</b>												
16 <sup>(4)</sup>	6	0.37	0.75	1.5	2.2	3	1	0	MC0A310AF	20	MC0C310AF	10
		0.5	1	2	3	4	0	1	MC0A301AF	20	MC0C301AF	10
16 <sup>(4)</sup>	9	0.56	1.12	2.2	4	4	1	0	MC1A310AF	20	MC1C310AF	10
		0.75	1.5	3	5.5	5.5	0	1	MC1A301AF	20	MC1C301AF	10
<b>Terminal: printed circuit</b>												
20	6	0.37	0.75	1.5	2.2	3	1	0	MC0A310AI	20	MC0C310AI	10
		0.5	1	2	3	4	0	1	MC0A301AI	20	MC0C301AI	10
20	9	0.56	1.12	2.2	4	4	1	0	MC1A310AI	20	MC1C310AI	10
		0.75	1.5	3	5.5	5.5	0	1	MC1A301AI	20	MC1C301AI	10
20	12	0.75	2	3	5.5	5.5	1	0	MC2A310AI	20	MC2C310AI	10
		1	2.6	4	7.3	7.3	0	1	MC2A301AI	20	MC2C301AI	10
<b>Spare coil</b>									MB0A	10	MB0C	10

- (1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (other voltages on request) (see C.2)
- (2) Electrical endurance AC-1: MC0... 0.2 × 10<sup>6</sup> operations  
MC1... 0.3 × 10<sup>6</sup> operations  
MC2... 0.35 × 10<sup>6</sup> operations
- (3) Electrical endurance AC-3: MC0... (6A) = 1.2 × 10<sup>6</sup> operations  
MC1... (9A) = 0.85 × 10<sup>6</sup> operations  
MC2... (12A) = 0.6 × 10<sup>6</sup> operations
- (4) Terminal with wire 1.5 mm<sup>2</sup>: I<sub>e</sub> = 16A  
with wire 1 mm<sup>2</sup>: I<sub>e</sub> = 10A  
Insulated terminal type B 2.8 × 0.8 and wire 1 mm<sup>2</sup> I<sub>e</sub> = 8A in accordance with DIN 46247.
- (5) Fast-on 1 × 6.3 terminals on request (replace letter F by H in the catalogue number)

For reference numbers, see chapter X, pg. X.4



A

B

C

D

E

F

G

H

I

X





## Three pole interface contactors

Max. oper. current Non- inductive load AC1 A	Motors <440V, 3 ~ 50/60Hz AC3 <sup>(3)</sup> A	Admissible power AC3					Aux. contacts		Voltage 24V D.C, coil 1.2W <sup>(1)</sup>			Voltage 24V D.C, coil 2W <sup>(2)</sup>		
		1-phase		3-phase			.3   .4	.1  .2	Cat. no. <sup>(1)</sup>	Ref. no.	Pack	Cat. no. <sup>(1)</sup>	Ref. no.	Pack
		115V	220V	220V	380V	500V								
		kW	kW	kW	kW	kW								
<b>Terminal: screw</b>														
20	6	0.37	0.75	1.5	2.2	3	1	0	MC0I310ATD	100570	10	MC0K310ATD	100574	10
							0	1	MC0I301ATD	100571	10	MC0K301ATD	100575	10
20	9	0.56	1.12	2.2	4	4	1	0	MC1I310ATD	100572	10	MC1K310ATD	100576	10
							0	1	MC1I301ATD	100573	10	MC1K301ATD	100577	10
20	12	0.75	2	3	5.5	5.5	1	0	MC2I310ATD	100559	10	MC2K310ATD	103590	10
							0	1	MC2I301ATD	100538	10	MC2K301ATD	103591	10
<b>Spare coil</b>									MB0ID	100470	10	MB0KD	100471	10



- (1) No possibility of adding instantaneous auxiliary contact blocks.
- (2) Facility to mount an instantaneous auxiliary contact block of two contacts or two instantaneous auxiliary contact blocks of one contact.
- (3) Electrical endurance AC-3:
  - MC0... (6A) =  $1.2 \times 10^6$  operations.
  - MC1... (9A) =  $0.85 \times 10^6$  operations.
  - MC2... (12A) =  $0.6 \times 10^6$  operations.

## Four poles minicontactors

Max.oper.current Non- inductive load	Motors <440V, 3 ~ 50/60Hz AC3 <sup>(3)</sup>	Admissible power AC3					Poles		Control circuit: Alternating current		Control circuit: Direct current	
		1-phase		3-phase					Cat. no. <sup>(1)</sup>	Pack	Cat. no. <sup>(1)</sup>	Pack
		115V	220V	220V	380V	500V						
AC1 <sup>(2)</sup> A	A	kW HP	kW HP	kW HP	kW HP	kW HP			Ref. no. see bottom		Ref. no. see bottom	
<b>Screw terminal</b>												
20	6	<b>AC1</b>					4	0	MC0A400AT ♦	20	MC0C400AT ♦	10
		1.8	3.5	6.1	10.5	13.8						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC0AB00AT ♦	20	MC0CB00AT ♦	10		
0.37	0.75	1.5	2.2	3								
0.5	1	2	3	4								
20	9	<b>AC1</b>					4	0	MC1A400AT ♦	20	MC1C400AT ♦	10
		2.3	4.4	7.5	13	17						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC1AB00AT ♦	20	MC1CB00AT ♦	10		
0.56	1.12	2.2	4	4								
0.75	1.5	3	5.5	5.5								
20	12	<b>AC1</b>					4	0	MC2A400AT ♦	20	MC2C400AT ♦	10
		2.3	4.4	7.5	13	17						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC2AB00AT ♦	20	MC2CB00AT ♦	10		
0.75	2	3	5.5	5.5								
1	2.6	4	7.3	7.3								
<b>Terminal: faston 2x2.8 insulated (5)</b>												
20	6	<b>AC1</b>					4	0	MC0A400AF ♦	20	MC0C400AF ♦	10
		1.8	3.5	6.1	10.5	13.8						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC0AB00AF ♦	20	MC0CB00AF ♦	10		
0.37	0.75	1.5	2.2	3								
0.5	1	2	3	4								
16 <sup>(4)</sup>	9	<b>AC1</b>					4	0	MC1A400AF ♦	20	MC1C400AF ♦	10
		2.3	4.4	7.5	13	17						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC1AB00AF ♦	20	MC1CB00AF ♦	10		
0.56	1.12	2.2	4	4								
0.75	1.5	3	5.5	5.5								
<b>Terminal: printed circuit</b>												
20	6	<b>AC1</b>					4	0	MC0A400AI ♦	20	MC0C400AI ♦	10
		1.8	3.5	6.1	10.5	13.8						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC0AB00AI ♦	20	MC0CB00AI ♦	10		
0.37	0.75	1.5	2.2	3								
0.5	1	2	3	4								
20	9	<b>AC1</b>					4	0	MC1A400AI ♦	20	MC1C400AI ♦	10
		2.3	4.4	7.5	13	17						
		-	-	-	-	-						
<b>AC3</b>					2	2	MC1AB00AI ♦	20	MC1CB00AI ♦	10		
0.56	1.12	2.2	4	4								
0.75	1.5	3	5.5	5.5								
<b>Spare coil</b>								MC0A ♦	10	MC0C ♦	10	

(1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.2)

(2) Electrical endurance AC-1: MC0... 0.2 × 10<sup>6</sup> operations  
MC1... 0.3 × 10<sup>6</sup> operations  
MC2... 0.35 × 10<sup>6</sup> operations

(3) Electrical endurance AC-3: MC0... (6A) = 1.2 × 10<sup>6</sup> operations  
MC1... (9A) = 0.85 × 10<sup>6</sup> operations  
MC2... (12A) = 0.6 × 10<sup>6</sup> operations

(4) Terminal with wire 1.5 mm<sup>2</sup>: I<sub>e</sub> = 16A  
with wire 1 mm<sup>2</sup>: I<sub>e</sub> = 10A  
Insulated terminal type B 2.8 × 0.8 and wire of 1 mm<sup>2</sup> I<sub>e</sub> = 8A in accordance with DIN 46247.

(5) Faston 1 × 6.3 terminals on request, (replace letter F by H in the catalogue number).

For reference numbers, see chapter X, pg. X.4



## Instantaneous auxiliary contact blocks

Front mounting



Number contacts	Combinations with basic contactor 10E	Contacts in acc. with EN 50012	Contacts in acc. with EN 50005	Aux. contacts		Cat. no.	Ref. no.	Pack
				.3  .4	.1  .2			
<b>Screw terminal</b>								
2	21E	11		1	1	MACN211AT	100999	10
2	12E	02		0	2	MACN202AT	100998	10
2			20	2	0	MARN220AT	100994	10
2			11	1	1	MARN211AT	100993	10
2			02	0	2	MARN202AT	100992	10
4	41E	31		3	1	MACN431AT	100997	10
4	32E	22		2	2	MACN422AT	100996	10
4	23E	13		1	3	MACN413AT	100995	10
4			40	4	0	MARN440AT	100991	10
4			31	3	1	MARN431AT	100990	10
4			22	2	2	MARN422AT	100989	10
4			13	1	3	MARN413AT	100988	10
4			04	0	4	MARN404AT	100987	10
<b>Ring terminal</b>								
2	21E	11		1	1	MACN211AR	103557	10
2	12E	02		0	2	MACN202AR	103558	10
2			20	2	0	MARN220AR	103349	10
2			11	1	1	MARN211AR	103350	10
2			02	0	2	MARN202AR	103351	10
4	41E	31		3	1	MACN431AR	103559	10
4	32E	22		2	2	MACN422AR	103560	10
4	23E	13		1	3	MACN413AR	103561	10
4			40	4	0	MARN440AR	103352	10
4			31	3	1	MARN431AR	103353	10
4			22	2	2	MARN422AR	103354	10
4			13	1	3	MARN413AR	103355	10
4			04	0	4	MARN404AR	103300	10

• Two or four additional contacts, to cover combinations of 3 or 5 contacts without increasing the surface area of the basic contactor

Contactors

A

B

C

D

E

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Instantaneous auxiliary contact blocks

Lateral mounting



Number contacts	Combinations with basic contactor 10E	Contacts in acc. with EN 50012	Contacts in acc. with EN 50005	Aux. contacts 	Cat. no.	Ref. no.	Pack
-----------------	---------------------------------------	--------------------------------	--------------------------------	-------------------	----------	----------	------

• One or two additional blocks, to cover combinations of 1 or 2 contacts without increasing the height of the basic unit contactor

<b>Screw terminal</b>							
1	20	10		1 0	MACL110AT	100560	10
1	11E	01		0 1	MACL101AT	100561	10
<b>Ring terminal</b>							
1	20	10		1 0	MACL110AR	103555	10
1	11E	01		0 1	MACL101AR	103556	10
<b>Terminal: faston 2x2.8 insulated (1)</b>							
1	20	10		1 0	MACL110AF	100562	10
1	11E	01		0 1	MACL101AF	100563	10
<b>Terminal: printed circuit</b>							
1	20	10		1 0	MACL110AI	100564	10
1	11E	01		0 1	MACL101AI	100565	10

- One or two additional blocks, when up to 6 or 7 contacts are needed (combination possible with frontal blocks)
- One or two additional blocks on both sides, to cover up to five contacts (combination possible only with lateral blocks)

<b>Screw terminal</b>							
1			10	1 0	MARL110ATS	100519	10
1			01	0 1	MARL101ATS	100520	10
<b>Ring terminal</b>							
1			10	1 0	MARL110ARS	103299	10
1			01	0 1	MARL101ARS	103298	10
<b>Terminal: faston 2x2.8 insulated (1)</b>							
1			10	1 0	MARL110AFS	100521	10
1			01	0 1	MARL101AFS	100522	10
<b>Terminal: printed circuit</b>							
1			10	1 0	MARL110AIS	100523	10
1			01	0 1	MARL101AIS	100524	10

(1) Terminal with wire 1 mm<sup>2</sup>: Ie = 10A  
 Insulated terminal type B 2.8 x 0.8 with wire 1 mm<sup>2</sup>: Ie = 8A, in accordance with DIN 46247

A

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### Accessories

	For use with:	Time	Function	Ue	Cat. no.	Ref. no.	Pack	
 <p><b>Electronic timer block</b></p>	Lateral or front fixing to the contactor							
	MCR..MC_ ...	0.5 - 60 seg.	delay ON	24... 250V AC/DC	<b>MREBC10AC2</b>	100541	10	
	MCR..MC_ ...	0.2 - 24 seg.	delay ON	24...250V AC/DC	<b>MREBC20AC2</b>	100542	10	
 <p><b>DIN rail adaptor for electronic timer block</b></p>	For fixing onto EN 50022-35							
	MREBC...				<b>MVB0R</b>	100543	10	
 <p><b>Voltage suppressor block</b></p>	Connection and (plug-in) fixing on to the connector							
	MCRA,MC_ ...	R/C	AC	12...60V 50/60Hz	<b>MP0AAE1</b>	100544	10	
	MCRA,MC_ ...	R/C	AC	72...250V 50/60Hz	<b>MP0AAE2</b>	100545	10	
	MCRC,MC_ ...	Diode	DC	6...250V DC	<b>MP0CAE3</b>	100546	10	
	MCRC,MC_ ...	Varistor	AC/DC	24-48V	<b>MP0DAE4</b>	100536	10	
 <p><b>Pole paralleling links</b></p>	To connect two, three or four phases in parallel							
	MC_ ...	2, 3, 4 (parallel)	Ø4.5mm - 16mm <sup>2</sup>		<b>MVPOC</b>	100600	10	
 <p><b>Mechanical interlock</b></p>	Mechanical interlock and pole jumpers							
	MCR, MC_ ...				<b>MMHO</b>	100547	10	
<p><b>Identification</b></p>	Mechanical interlock and pole jumpers							
	MCR, MC_ ...	Labels (10 sheets of 260 labels)				<b>EAT 260</b>	100548	1
	MCR, MC_ ...	Labelling plate base. Plug-in labelling plate bases (50 pieces in one pack)				<b>SPR</b>	100549	1

## Multipack. Series M and Series CL

To reduce the amount of waste packaging material and to save time during installation, we offer the opportunity to order contactors in a multipack without the individual packaging.

	Product	Type	Standard pack	Multipack (1)
	Minicontactors	MCOA...MC2A	20	40
	Contactors	CL00A...CL25A...	20	40
		CL03...CL45...	10	20

(1) The quantity ordered must be a multiple of the quantity in each multipack (with the same frame/size and coil voltage)

## How to order

To order a multipack, add the suffix **MP** to the standard catalogue number

Example	Standard pack	Multipack
	MCOA310ATN	MCOA310ATN <b>MP</b> (40 pieces)
	CL03A400MJ	CL03A400MJ <b>MP</b> (20 pieces)

A

B

C

D

E

F

G

H

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X



## Three and four pole contactors 9 to 105A (AC3) 25 to 140A (AC1)

- Control circuit: Alternating current up to 690V  
Direct current up to 440V
- Terminal numbering in accordance with EN 50005 and EN 50012
- Fixing by clipping onto 35mm DIN rail EN 50022-35 or by screws
- Screws protected against accidental contact in accordance with VDE 0106 T.100, VBG4.
- Ring terminal version
- Three coil terminals
- Mounting possibilities of front/side instantaneous auxiliary contact blocks, timed auxiliary contact blocks, mechanical latch, transient suppressor block and interface modules.
- Degree of protection: IP20 to CL00 ... CL02  
IP10 to CL25 ... CL10
- Maximum number of auxiliary contacts: 4 for CL00 ... CL25  
6 for CL04 ... CL45  
8 for CL06 ... CL10

### Standards

IEC/EN 60947-1	CSA 22.2/14
IEC/EN 60947-4-1	NFC 63-110
IEC/EN 60947-5-1	ASE 1025
EN 50005	VDE 0660/102
UL 508	CENELEC HD 419
NEMA ICS 1	
BS 5424 & 775	

### Standard voltages

To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit.

#### Alternating current (V). Dual-frequency coil

♦	1	2	9	3	4	5	6	7	13	8	15
AC	24	42	48	110	120	220	230	240	400	440	480
50/60Hz				115							

#### Alternating current (V).

♦	E	K	L	N	T	U	W	Y	Z
AC	32	127		220		380	415	500	660
50Hz				230		400		690	
AC			208	277	380	480	460	600	
60Hz									

#### Direct current (V)

For contactors type CL...D / Operating limits: 0.80 ... 1.10 x Us

♦	B	D	E	F	G	H	I	J	K	N	P	R	T	X
Voltage	12	24	36	42	48	60	72	110	120	220	230	240	250	440
										125				

Coil with electronic module for contactors CL...E (can also be used with alternating current)

♦	D	F	H	J	N	Y
Voltage	24	42	60	110	220	440
	28	48	72	125	250	

#### Direct current (V). Coil with wide voltage range (0.70 ... 1.30 x Us)

For contactors type CL...D

♦	WB	WD	WE	WF	WG	WH	WI	WJ	WK	WN	WP	WR	WT	WX
DC	12	24	33	42	48	60	72	110	125	220	230	240	250	440

Maximum number of add-on auxiliary contact blocks:

CL00D...CL02D : 2NO or 1NC  
CL03D...CL45D : 1NO and 1NC  
CL05D...CL10D : 4NO or 2NC  
CL05E...CL10E : 4 cont. aux.

#### Coil with electronic module for contactors CL...E

♦	WD	WE	WF	WH	WJ	WN
Voltage	24	33	48	72	110	220

Different auxiliary contact configurations, contact us.

### Approvals



Lloyd's Register



Bureau Veritas



RINA



CE

- Order codes ● pg. C.11
- Auxiliary contact blocks ● pg. C.15
- Accessories ● pg. C.16
- Technical data ● pg. C.31
- Terminal numbering ● pg. C.39
- Dimensions ● pg. C.52

Three pole contactors. Screw terminal

Max.oper.current Non-inductive load AC1 A	Motors <440V, 3 ~ 50/60Hz AC3 A	Admissible power AC3				Electrical endurance Cat. AC3 Operations	Aux. contacts		Control circuit: Alternating current		Control circuit: Direct current		Control circuit: Coil with electronic module (AC/DC)	
		220V 230V	380V 400V	415V 440V	500V		.3  .4	.1 .2	Cat. no. (1)	Pack (3)	Cat. no. (1)	Pack (3)	Cat. no. (1)	Pack (3)
25	9	2.2 3	4 5.5	4 5.5	5.5 7.5	2x10 <sup>6</sup>	0 1 0	0 0 1	CL00A300T♦ CL00A310T♦ CL00A301T♦	5 5 5		CL00D310T♦ CL00D301T♦	10 10	
25	12	3 4	5.5 7.5	5.5 7.5	7.5 10	2x10 <sup>6</sup>	0 1 0	0 0 1	CL01A300T♦ CL01A310T♦ CL01A301T♦	5 5 5		CL01D310T♦ CL01D301T♦	10 10	
32	18	4 5.5	7.5 10	7.5 10	10 13.5	1.7x10 <sup>6</sup>	0 1 0	0 0 1	CL02A300T♦ CL02A310T♦ CL02A301T♦	5 5 5		CL02D310T♦ CL02D301T♦	10 10	
45	25	7.5 10	11 15	11 15	15 20	1.2x10 <sup>6</sup>	0 1 0	0 0 1	CL25A300T♦ CL03A300M♦ CL03A310M♦ CL03A301M♦	5 10 10 10		CL25D300T♦ CL03D310M♦ CL03D301M♦	10 10 10	
45	25	7.5 10	12 16	12 16	15 20	2x10 <sup>6</sup>	0 1 0	0 0 1	CL03A300M♦ CL03A310M♦ CL03A301M♦	10 10 10		CL03D310M♦ CL03D301M♦	10 10	
60	32	9 12	16 22	16 22	18.5 25	2x10 <sup>6</sup>	0 1 0	0 0 1	CL04A300M♦ CL04A310M♦ CL04A301M♦	10 10 10		CL04D310M♦ CL04D301M♦	10 10	
60	40	11 15	18.5 25	22 30	25 34	2x10 <sup>6</sup>	0 1	0 1	CL45A300M♦ CL45A311M♦ (2)	10 10		CL45D300M♦	10	
90	50	15 20	22 30	25 34	30 40	1.8x10 <sup>6</sup>	0 1	0 1	CL06A300M♦ CL06A311M♦ (2)	1 1		CL06D300M♦	1	CL06E300M♦ 1
110	65	18.5 25	30 40	37 50	40 55	1.7x10 <sup>6</sup>	0 1	0 1	CL07A300M♦ CL07A311M♦ (2)	1 1		CL07D300M♦	1	CL07E300M♦ 1
110	80	22 30	37 50	45 60	45 60	1.5x10 <sup>6</sup>	0 1	0 1	CL08A300M♦ CL08A311M♦ (2)	1 1		CL08D300M♦	1	CL08E300M♦ 1
140	95	25 34	45 60	50 68	55 75	1.7x10 <sup>6</sup>	0 1	0 1	CL09A300M♦ CL09A311M♦ (2)	1 1		CL09D300M♦	1	CL09E300M♦ 1
140	105	30 40	55 75	55 75	65 88	1.5x10 <sup>6</sup>	0 1	0 1	CL10A300M♦ CL10A311M♦ (2)	1 1		CL10D300M♦	1	CL10E300M♦ 1
Spare coils						CL00 - CL25	LB1A ♦		5	LB1D ♦	5			
						CL03 - CL45	LB3A ♦		5	LB3D ♦	5			
						CL06 - CL10	LB4A ♦		5	LB4D ♦	1			
						coil + electronic module CL06E - CL10E						LB4E ♦	1	

- (1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.10).
- (2) Equipped with two blocks BCLF
- (3) Multipack, see C.9

For reference numbers, see chapter X, pg. X.6



3P and 4P contactors

A  
B  
C  
D  
E  
F  
G  
H  
I  
X



## Three pole contactors. Ring terminal

Contactors

A

B

C

D

E

F

G

H

I

X



Max.oper.current Non- inductive load AC1 A	Motors <440V, 3 ~ 50/60Hz AC3 A	Admissible power AC3				Electrical endurance Cat. AC3 Operations	Aux. contacts		Control circuit: Alternating current		Control circuit: Direct current			
		220V 230V	380V 400V	415V 440V	500V		-3  .4	.1  .2	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>		
25	9	2.2	4	4	5.5	2x10 <sup>6</sup>	0	0	CL00A300R♦	5	Ref. no. see bottom	Ref. no. see bottom		
		3	5.5	5.5	7.5		1	0	CL00A310R♦	5			CL00D310R♦	10
		0	1	CL00A301R♦	5		CL00D301R♦	10						
25	12	3	5.5	5.5	7.5	2x10 <sup>6</sup>	0	0	CL01A300R♦	5	Ref. no. see bottom	Ref. no. see bottom		
		4	7.5	7.5	10		1	0	CL01A310R♦	5			CL01D310R♦	10
		0	1	CL01A301R♦	5		CL01D301R♦	10						
32	18	4	7.5	7.5	10	1.7x10 <sup>6</sup>	0	0	CL02A300R♦	5	Ref. no. see bottom	Ref. no. see bottom		
		5.5	10	10	13.5		1	0	CL02A310R♦	5			CL02D310R♦	10
		0	1	CL02A301R♦	5		CL02D301R♦	10						
45	25	7.5	11	11	15	1.2x10 <sup>6</sup>	0	0	CL25A300R♦	5	Ref. no. see bottom	Ref. no. see bottom		
		10	15	15	20		1	0	CL03A310R♦	10			CL03D310R♦	10
		0	1	CL03A301R♦	10		CL03D301R♦	10						
45	25	7.5	12	12	15	2x10 <sup>6</sup>	0	0	CL03A300R♦	10	Ref. no. see bottom	Ref. no. see bottom		
		10	16	16	20		1	0	CL03A310R♦	10			CL03D310R♦	10
		0	1	CL03A301R♦	10		CL03D301R♦	10						
60	32	9	16	16	18.5	2x10 <sup>6</sup>	0	0	CL04A300R♦	10	Ref. no. see bottom	Ref. no. see bottom		
		12	22	22	25		1	0	CL04A310R♦	10			CL04D310R♦	10
		0	1	CL04A301R♦	10		CL04D301R♦	10						
60	40	11	18.5	22	25	2x10 <sup>6</sup>	0	0	CL45A300R♦	10	Ref. no. see bottom	Ref. no. see bottom		
		15	25	30	34		1	0	CL06A310R♦	1			CL06D310R♦	1
		0	1	CL06A301R♦	1		CL06D301R♦	1						
90	50	15	22	25	30	1.8x10 <sup>6</sup>	0	0	CL06A300R♦	1	Ref. no. see bottom	Ref. no. see bottom		
		20	30	34	40		1	0	CL07A310R♦	1			CL07D310R♦	1
		0	1	CL07A301R♦	1		CL07D301R♦	1						
110	65	18.5	30	37	40	1.7x10 <sup>6</sup>	0	0	CL07A300R♦	1	Ref. no. see bottom	Ref. no. see bottom		
		25	40	50	55		1	0	CL08A310R♦	1			CL08D310R♦	1
		0	1	CL08A301R♦	1		CL08D301R♦	1						
110	80	22	37	45	45	1.5x10 <sup>6</sup>	0	0	CL08A300R♦	1	Ref. no. see bottom	Ref. no. see bottom		
		30	50	60	60		1	0	CL09A310R♦	1			CL09D310R♦	1
		0	1	CL09A301R♦	1		CL09D301R♦	1						
140	95	25	45	50	55	1.7x10 <sup>6</sup>	0	0	CL09A300R♦	1	Ref. no. see bottom	Ref. no. see bottom		
		34	60	68	75		1	0	CL10A310R♦	1			CL10D310R♦	1
		0	1	CL10A301R♦	1		CL10D301R♦	1						
140	105	30	55	55	65	1.5x10 <sup>6</sup>	0	0	CL10A300R♦	1	Ref. no. see bottom	Ref. no. see bottom		
		40	75	75	88		1	0	CL10A310R♦	1			CL10D310R♦	1
		0	1	CL10A301R♦	1		CL10D301R♦	1						

### Spare coils


CL00 - CL25	LB1A ♦	5	LB1D ♦	5
CL03 - CL45	LB3A ♦	5	LB3D ♦	5
CL06 - CL10	LB4A ♦	5	LB4D ♦	1

(1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.10).

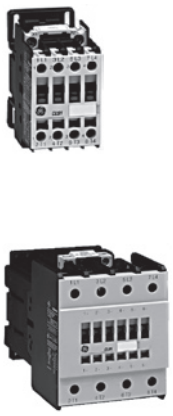
(2) Multipack, see C.9




Four pole contactors. Screw terminal



Max.oper.current Non-inductive loads		Admissible power AC1				Electrical endurance Operations	Power contacts		Control circuit: Alternating current		Control circuit: Direct current		Control circuit: Coil with electronic module (AC/DC)		
AC1 A	AC3 A	220V 230V	380V 400V	415V 440V	500V		Cat. AC1	d	b	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>
		kW	kW	kW	kW							Ref. no. see bottom		Ref. no. see bottom	
25	12	9.5	16.5	18	21.5	1.5x10 <sup>6</sup>	4	0	CL01A400T♦	5	CL01D400T♦	10			
32	18	12	22	23	27.5	1.5x10 <sup>6</sup>	4	0	CL02A400T♦	5	CL02D400T♦	10			
45	25	17	29	32	39	2x10 <sup>6</sup>	4	0	CL03A400M♦	10	CL03D400M♦	10			
60	32	22.5	39.5	43	52	1.5x10 <sup>6</sup>	4	0	CL04A400M♦	10	CL04D400M♦	10			CL05E400M♦ 1
90	50	34	59	64	78	1.5x10 <sup>6</sup>	4	0	CL05A400M♦	1	CL05D400M♦	1			CL07E400M♦ 1
110	65	42	72.5	79	95	1.8x10 <sup>6</sup>	4	0	CL07A400M♦	1	CL07D400M♦	1			CL09E400M♦ 1
140	95	53	92	100	121	1.8x10 <sup>6</sup>	4	0	CL09A400M♦	1	CL09D400M♦	1			



Max.oper.current Non-inductive loads		Admissible power AC3				Electrical endurance Operations	Power contacts		Control circuit: Alternating current		Control circuit: Direct current		Control circuit: Coil with electronic module (AC/DC)	
AC1 A	Motors <440V, 3~ 50/60Hz AC3 A	220V 230V	380V 400V	415V 440V	500V		d	b	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>
		kW HP	kW HP	kW HP	kW HP					Ref. no. see bottom		Ref. no. see bottom		Ref. no. see bottom
25	12	3 4	5.5 7.5	5.5 7.5	7.5 10	2	2	CL01AB00T♦	5	CL01DB00T♦	5			
32	18	4 5.5	7.5 10	7.5 10	10 13.5	2	2	CL02AB00T♦	5	CL02DB00T♦	5			
45	25	7.5 10	12 16	12 16	15 20	2	2	CL03AB00M♦	10	CL03DB00M♦	10			
60	32	9 12	16 22	16 22	18.5 25	2	2	CL04AB00M♦	10	CL04DB00M♦	10			
90	40	11 15	18.5 25	22 30	25 34	2	2	CL05AB00M♦	1	CL05DB00M♦	1	CL05EB00M♦	1	
110	65	18.5 25	30 40	37 50	40 55	2	2	CL07AB00M♦	1	CL07DB00M♦	1	CL07EB00M♦	1	
110	80	22 30	37 50	45 60	45 60	2	2	CL08AB00M♦	1	CL08DB00M♦	1	CL08EB00M♦	1	



Spare coils	Model	Cat. no. ♦	Pack	Cat. no. ♦	Pack	Cat. no. ♦	Pack
	CL00 - CL25	LB1A ♦	5	LB1D ♦	5		
	CL03 - CL45	LB3A ♦	5	LB3D ♦	5		
	CL05A - CL08A	LB4A ♦	5	LB4D ♦	1		
	Coil + Electronic module CL05E - CL08E	LB4E ♦	1			LB4E ♦	1

(1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.10).  
 (2) Multipack, see C.9

For reference numbers, see chapter X, pg. X.6



## Four poles. Ring terminal



Max.oper.current Non-inductive load		Admissible power AC1				Electrical endurance Cat. AC1 Operations	Power contacts		Control circuit: Alternating current		Control circuit: Direct current		
AC1 A	AC3 A	220V 230V	380V 400V	415V 440V	500V		kW	kW	kW	kW	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>
25	12	9.5	16.5	18	21.5	1.5x10 <sup>6</sup>	4	0	CL01A400R♦	5	CL01D400R♦	10	
32	18	12	22	23	27.5	1.5x10 <sup>6</sup>	4	0	CL02A400R♦	5	CL02D400R♦	10	
45	25	17	29	32	39	2x10 <sup>6</sup>	4	0	CL03A400R♦	10	CL03D400R♦	10	
60	32	22.5	39.5	43	52	1.5x10 <sup>6</sup>	4	0	CL04A400R♦	10	CL04D400R♦	10	
90	50	34	59	64	78	1.5x10 <sup>6</sup>	4	0	CL05A400R♦	1	CL05D400R♦	1	
110	65	42	72.5	79	95	1.8x10 <sup>6</sup>	4	0	CL07A400R♦	1	CL07D400R♦	1	
140	95	53	92	100	121	1.8x10 <sup>6</sup>	4	0	CL09A400R♦	1	CL09D400R♦	1	

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Max.oper.current Non-inductive load		Admissible power AC3				Power contacts	Control circuit: Alternating current		Control circuit: Direct current				
AC1 A	Motors <440V, 3~ 50/60Hz AC3 A	220V 230V	380V 400V	415V 440V	500V		kW HP	kW HP	kW HP	kW HP	Cat. no. <sup>(1)</sup>	Pack <sup>(2)</sup>	Cat. no. <sup>(1)</sup>
25	12	3 4	5.5 7.5	5.5 7.5	7.5 10	2	2	CL01AB00R♦	5	CL01DB00R♦	5		
32	18	4 5.5	7.5 10	7.5 10	10 13.5	2	2	CL02AB00R♦	5	CL02DB00R♦	5		
45	25	7.5 10	12 16	12 16	15 20	2	2	CL03AB00R♦	10	CL03DB00R♦	10		
60	32	9 12	16 22	16 22	18.5 25	2	2	CL04AB00R♦	10	CL04DB00R♦	10		

### Spare coils





CL00 - CL25	LR1A ♦	5	LR1D ♦	5
CL03 - CL45	LR3A ♦	5	LR3D ♦	5
CL05A - CL08A	LR4A ♦	5	LR4D ♦	1

- (1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.10).  
 (2) Multipack, see C.9



For reference numbers, see chapter X, pg. X.6



Auxiliary contact blocks

Instantaneous		Number of contacts	Contacts				Type	Time	Cat. no.	Ref. no.	Pack	
	Frontal mounting	Terminal: screw	1	1	0	0	0			BCLF10	104700	10
			1	0	1	0	0			BCLF01	104701	10
			1	0	0	1	0			BCLF10G	104702	10
			1	0	0	0	1			BCLF01G	104703	10
			1	0	0	0	0					
	Side mounting	Terminal: ring terminal	1	1	0	0	0			BCRF10	108901	10
			1	0	1	0	0			BCRF01	108902	10
			2	2	0	0	0			BCLL20	104706	10
			2	1	1	0	0			BCLL11	104707	10
			For combinations of more than 4 front-mounted and 2 side-mounted auxiliary contact blocks									
		2	2	0	0	0			BRLL20	104704	10	
		2	1	1	0	0			BRLL11	104705	10	
		2	0	2	0	0			BRLL02	106622	10	
Pneumatic timer												
	Front mounting	Terminal: screw	2	0	0	1	1	Delay ON	0.1 - 30 sec.	BTLF30C	104709	10
			2	0	0	1	1	Delay ON	1 - 60 sec.	BTLF60C	104710	10
			2	0	0	1	1	Delay OFF	0.1 - 30 sec.	BTLF30D	104711	10
			2	0	0	1	1	Delay OFF	1 - 60 sec.	BTLF60D	104712	10
		Terminal: ring terminal	2	0	0	1	1	Delay ON	0.1 - 30 sec.	BTRF30C	108903	10
			2	0	0	1	1	Delay ON	1 - 60 sec.	BTRF60C	108904	10
			2	0	0	1	1	Delay OFF	0.1 - 30 sec.	BTRF30D	108905	10
			2	0	0	1	1	Delay OFF	1 - 60 sec.	BTRF60D	108906	10
		Seaking cover protection for pneumatic timer								BTLFX	113001	5

Accessories

		Number of contacts	Contacts				For use with:	Cat. no. <sup>(1)</sup>	Ref. no.	Pack		
	Interlock	Mechanical	-	-	-	-	-	CL00 ... CL10	BELA	104723	5	
			Mech./ electrical	2	0	2	-	-	CL00 ... CL10	BELA02	104724	5
				Support interlock								
			Only for direct current contactors						CL00D...CL10D	SBELA	101017	5
				Mechanical latch blocks	Frontal mounted to the contactor					CL00 ... CL10	RMLF ♦	see bottom
♦	D	G			HC	J	N	U	Y			
50Hz	24, 32	42, 48				110, 115, 120, 127	220, 230, 240	380, 400, 415, 440, 480	500, 660/690			
60Hz	24, 32	48, 60		110, 115, 120, 127	208, 220, 240, 277	380, 400, 415, 440, 480	600					
DC	24, 32, 36	42, 48	60, 72	110, 120, 125	220, 230, 240, 250	440						

1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.10).

For reference numbers, see chapter X, pg. X.6



## Accessories

### Transient voltage suppressor block



For use with:	Type	Control circuit	Ue	Cat. no.	Ref. no.	Pack
Fixation to the coil terminals, that allows simultaneous use with the auxiliary contact blocks.						
CL00 ... CL45	R/C	AC	12V ... 48V	<b>BSLR2G</b>	104713	10
CL00 ... CL45	R/C	AC	50V ... 127V	<b>BSLR2K</b>	104714	10
CL00 ... CL45	R/C	AC	130V ... 250V	<b>BSLR2R</b>	104715	10
CL05A ... CL10A	R/C	AC	12V ... 48V	<b>BSLR3G</b>	104716	10
CL05A ... CL10A	R/C	AC	50V ... 127V	<b>BSLR3K</b>	104717	10
CL05A ... CL10A	R/C	AC	130V ... 250V	<b>BSLR3R</b>	104718	10
CL ... D	Diode	DC	12V ... 600V	<b>BSLDZ</b>	104719	10
CL00 ... CL10	Varistor	AC / DC	24V ... 48V	<b>BSLV3G</b>	104720	10
CL00 ... CL10	Varistor	AC / DC	50V ... 127V	<b>BSLV3K</b>	104721	10
CL00 ... CL10	Varistor	AC / DC	130V ... 250V	<b>BSLV3R</b>	104722	10
CL00 ... CL10	Varistor	AC / DC	277V ... 500V	<b>BSLV3U</b>	110836	10

### Electronic timer module



For use with:	Control circ.	Type	Time	Cat. no.	Ref. no.	Pack
Fixation to the coil terminals, that allows simultaneous use with the auxiliary contact blocks.						
CL00 ... CL10	24-250V AC/DC	delay ON	0.1 - 2 sec.	<b>BETL02C</b>	113602	5
CL00 ... CL10	24-250V AC/DC	delay ON	1.5 - 45 sec.	<b>BETL45C</b>	113603	5
CL00 ... CL10	24-250V AC/DC	delay OFF	0.1 - 2 sec.	<b>BETL02D</b>	113604	5
CL00 ... CL10	24-250V AC/DC	delay OFF	1.5 - 45 sec.	<b>BETL45D</b>	113605	5

**Accessories**

	For use with:			Cat. no.	Ref. no.	Pack
<b>Identification</b>	CL00 ... CL10	Sheets of labels (sheets of 260 labels each)		<b>EAT 260</b>	100548	1
	CL00 ... CL10	Labelling plate base (50 pieces in one pack)		<b>SPR</b>	100549	1
<b>Pole terminal protector IPXXB</b>	CL03 ... CL04			<b>PTP04</b>	113850	8
	CL45			<b>PTP45</b>	113851	6
	CL05 ... CL08			<b>PTP08</b>	113852	8
	CL09 ... CL10			<b>PTP10</b>	113853	8

**Spares**

	For use with:	Number of sets	Type		Cat. no.	Ref. no.	Pack
<b>Contact kits</b>	CL00	3	NO		<b>V31200B</b>	104738	1
	CL01_3 /CL01_4	3	NO		<b>V31201B</b>	104739	1
	CL01_B	4	2NO-2NC		<b>VB1201B</b>	104740	1
	CL02_3 /CL02_4	3	NO		<b>V31202B</b>	104741	1
	CL02_B	4	2NO-2NC		<b>VB1202B</b>	104742	1
	CL25_3	3	NO		<b>V31225B</b>	104757	1
	CL03_3 /CL03_4	3	NO		<b>V31203B</b>	104743	1
	CL03_B	4	2NAO-2NC		<b>VB1203B</b>	133170	1
	CL04_3 /CL04_4	3	NO		<b>V31204B</b>	104745	1
	CL04_B	4	2NO-2NC		<b>VB1204B</b>	133885	1
	CL45_3	3	NO		<b>V31245B</b>	104758	1
	CL05_4	4	NO		<b>V31205B</b>	104747	1
	CL05_B	4	2NO-2NC		<b>VB1205B</b>	104748	1
	CL06	3	NO		<b>V31206B</b>	104749	1
	CL07_3 /CL07_4	3	NO		<b>V31207B</b>	104750	1
	CL07_B	4	2NO-2NC		<b>VB1207B</b>	104751	1
	CL08_3 /CL08_4	3	NO		<b>V31208B</b>	104752	1
	CL08_B	4	2NO-2NC		<b>VB1208B</b>	104753	1
	CL09	3	NO		<b>V31209B</b>	104754	1
	CL10	3	NO		<b>V31210B</b>	104755	1

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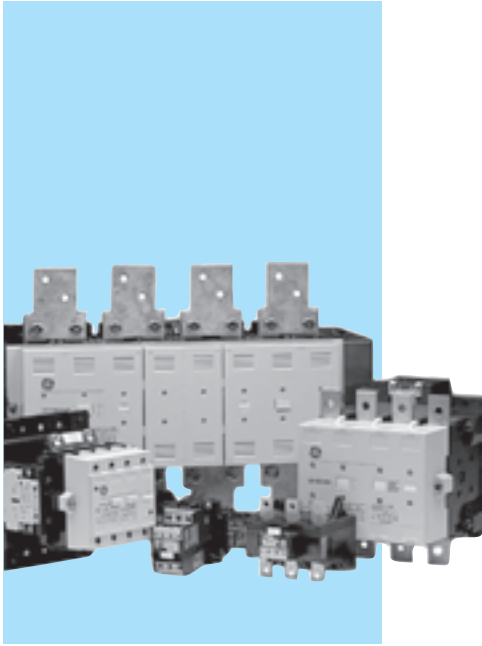
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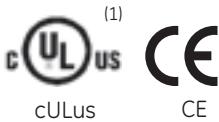
## Three and four pole contactors 150 to 825A (AC3) 200 to 1250A (AC1)

- Control circuit: Alternating current up to 690V  
Direct current up to 500V
- Degree of protection IP00 (IPxxB with accessories)
- CK07...CK13: auxiliary and coil terminals originally protected against accidental contacts.  
Protection for power contacts on request (see accessories)
- Terminals protected against accidental contacts according to VDE 0106 T.100, VBG4.
- CK\_ \_E with electronic module suitable for DC and AC. (50/60Hz)
- CK contactors always provided with one auxiliary contact block BCLL11 (1NO+1NC)

### Standards

IEC/EN 60947-1	CSA 22.2/14
IEC/EN 60947-4-1	CENELEC HD 419
IEC/EN 60947-5-1	NFC 63-110
EN 50005	ASE 1025
UL 508	UNE 20109
NEMA ICS 1	VDE 0660/102
BS 5424 & 775	

### Approvals



### Standard voltages

To complete the catalogue number, replace the symbol  $\blacklozenge$  by the code corresponding to the voltage and frequency of the control circuit.

#### Alternating current (V)

Three-pole contactors: CK75CA3..., CK08CA3..., CK85BA3...  
Four-pole contactors: CK07BA4..., CK08BA4...

$\blacklozenge$	C	D	F	G	H	I	J	K	M	N	R	S	T	U	V	W	X	Y	Z
50Hz	24	42	48				110	127		220	240			380		415	440	500	660
60Hz	24		48		110	120			220	277		240	380	480	440				600

#### Alternating current (V). Dual-frequency coil

Three-pole contactors: CK75CA3..., CK08CA3..., CK85BA3...  
Four-pole contactors: CK07BA4..., CK08BA4...

$\blacklozenge$	1	2	3	6	13
50/60Hz	24	48	110	230	400

#### Alternating current (V)

Three-pole contactors: CK13BA3...  
Four-pole contactors: CK13BA4...

$\blacklozenge$	J	N	U	Y	Z
50/60Hz	110	220	380	480	600
	240	440	500	660	

#### Control circuit with rectifier bridge

$\blacklozenge$	J	N	U
50Hz	110	220	380
	230	400	
60Hz	120	240	480

#### Direct current (V). With electronic module (0.7 ... 1.3 x Us)

Three-pole contactors: CK75CE3..., CK08CE3....

$\blacklozenge$	WD	WE	WF	WH	WJ	WN
Voltage	24	33	48	72	110	220

#### Alternating c. / Direct c. (V). With electronic module (0.8 ... 1.10 x Us)

Three-pole & four-pole contactors: CK ..... E.....

$\blacklozenge$	D	F	J	N	U	Y
Voltage	24	42	110	220	380	440
	28	48	127	250	415	500

(1) CK13 not UL

- Order codes ● pg. C.19
- Aux. contact blocks ● pg. C.20
- Accessories & Spares ● pg. C.21
- Technical data ● pg. C.42
- Dimensions ● pg. C.58



Three pole contactors



Max.oper.current Non-inductive loads AC1 A	Motors <440V, 3 ~ 50/60Hz AC3 A	Admissible power AC3					Electrical endurance  Cat. AC3 Operations	Control circuit: Alternating current		Control circuit: A.C. / D.C.	
		220V 230V	380V 400V	415V 440V	440V 440V	500V		Cat. no. <sup>(1)</sup>	Pack	Cat. no. <sup>(1)</sup>	Pack
250	150	45 60	75 100	80 108	80 108	100 135	1.7x10 <sup>6</sup>	CK75CA311 ♦	1	CK75CE311 ♦	1
250	185	55 75	90 125	100 135	100 135	110 150	1.2x10 <sup>6</sup>	CK08CA311 ♦	1	CK08CE311 ♦	1
315	205	65 88	110 150	125 170	125 170	132 180	1.7x10 <sup>6</sup>	CK85BA311 ♦	1	CK85BE311 ♦	1
315	250	75 100	132 180	132 180	132 180	160 220	1.5x10 <sup>6</sup>			CK09BE311 ♦	1
450	309	90 125	160 220	160 220	185 250	200 270	1.1x10 <sup>6</sup>			CK95BE311 ♦	1
600	420	125 170	220 300	230 312	230 312	300 405	1x10 <sup>6</sup>			CK10CE311 ♦	1
700	550	160 220	280 380	315 425	315 425	400 540	0.8x10 <sup>6</sup>			CK11CE311 ♦	1
1000	700	220 300	375 510	400 540	425 540	480 650	0.7x10 <sup>6</sup>			CK12BE311 ♦	1
1250	825	250 340	450 610	450 610	450 610	500 680	0.7x10 <sup>6</sup> (2)	CK13BA311 ♦	1		

Spare coil	CK75CA3 ... CK08CA3	C12168 ♦	1	
	CK85BA3	C04255 ♦	1	
	CK13BA3	C08998 ♦	1	
	Control circuit with incorporated rectifier bridge CK13BA3	C09120 ♦	1	
Coil	CK75CE3 ... CK08CE3	KB4E ♦	1	
	CK85BE3 ... CK95BE3	KB5E ♦	1	
	CK12BE3	KB6E ♦	1	
	CK10CE3 ... CK11CE3	KB7E ♦	1	
Electronic module	CK75CE3 ... CK08CE3	KM4E ♦	1	
	CK85BE3 ... CK95BE3	KM5E ♦	1	
	CK12BE3	KM6E ♦	1	
	CK10CE3 ... CK11CE3	KM7E ♦	1	

- (1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.18).  
 (2) CK13 non allow the aux. block in right side.

For reference numbers, see chapter X, pg. X.7



3P and 4P contactors

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Four pole contactors

Max.oper. current	Admissible power						Electrical endurance	Control circuit: Alternating current		Control circuit: A.C. / D.C.		
	AC3		AC1					Cat. AC3	Cat. no. <sup>(1)</sup>	Pack	Cat. no. <sup>(1)</sup>	Pack
Non-inductive loads AC1 A	380V 400V		220V 230V	380V 400V	415V	440V 500V	Operations	Ref. no. see bottom		Ref. no. see bottom		
200	55	105	76	131	143	151	173	1x10 <sup>6</sup>	CK07BA41 ♦	1	CK07BE411 ♦	1
325	100	185	123	214	233	247	281	0.6x10 <sup>6</sup>	CK08BA411 ♦	1	CK08BE411 ♦	1
400	132	250	152	263	287	304	346	0.6x10 <sup>6</sup>			CK09BE411 ♦	1
500	160	309	191	329	359	380	415	0.6x10 <sup>6</sup>			CK95BE411 ♦	1
600	220	408	228	395	431	456	519	0.5x10 <sup>6</sup>			CK10CE411 ♦	1
700	280	530	266	460	503	533	606	0.4x10 <sup>6</sup>			CK11CE411 ♦	1
1000	375	680	381	658	719	762	866	0.4x10 <sup>6</sup>			CK12BE411 ♦	1
1250	450	800	476	822	898	952	1082	0.6x10 <sup>6</sup> (2)	CK13BA411 ♦	1		



Spare coil

	CK07BA4	C04255 ♦	1	
	CK08BA4	C04787 ♦	1	
	CK13BA4	C08998 ♦	1	
	Control circuit with incorporated rectifier bridge CK13BA4	C09120 ♦	1	
Coil	CK07BE4			KB5E ♦ 1
	CK08BE4 ... CK95BE4, CK12BE4			KB6E ♦ 1
	CK10CE4 ... CK11CE4			KB7E ♦ 1
Electronic module	CK07BE4			KM5E ♦ 1
	CK08BE4 ... CK95BE4, CK12BE4			KM6E ♦ 1
	CK10CE4 ... CK11CE4			KM7E ♦ 1

(1) To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit (see C.18).  
 (2) CK13 non allow the aux. block in right side.

Auxiliary instantaneous contact block

Number of contacts	Contacts				Cat. no.	Ref. no.	Pack
	•3   •4	•1   •2	•7   •8	•5   •6			
2	2	0	0	0	BCLL20	104706	10
2	1	1	0	0	BCLL11	104707	10
combinations of more than 2 blocks							
2	2	0	0	0	BRLl20	104704	10
2	1	1	0	0	BRLl11	104705	10
2	0	2	0	0	BRLl02	106622	10



Side mounting



For reference numbers, see chapter X, pg. X.9




## Accessories

	For use with:	Mounting	Voltage	Ue	Cat. no.	Ref. no.	Pack	
 <p><b>Transient voltage suppressor</b></p>	Fixation to the coil terminals, that allows simultaneous use with the auxiliary contact blocks.							
	CK75 ... CK08		AC	24V - 48V	<b>BSLR3G</b>	104716	10	
	CK75 ... CK08		AC	50V - 127V	<b>BSLR3K</b>	104717	10	
	CK75 ... CK08		AC	130V - 240V	<b>BSLR3R</b>	104718	10	
	CK75 ... CK08		AC	227V - 500V	<b>BSLV3U</b>	110836	10	
	CK85 ... CK13		AC	24V	<b>KRC24</b>	104760	10	
	CK85 ... CK13		AC	260V	<b>KRC48/260</b>	104761	10	
	CK85 ... CK13		AC	415V	<b>KRC380/415</b>	104762	10	
 <p><b>Mechanical interlock</b></p>	CK07B ... CK12	Horizontal			<b>BEKH</b>	104763	1	
	CK07B ... CK95	Vertical			<b>BEKVS 1</b>	104786	1	
	CK10C ... CK12B	Vertical			<b>BEKVA 1</b>	104785	1	
	CK13	Vertical			<b>BEKV</b>	104764	1	
<p><b>Pole terminal protection</b></p>	CK75C ... CK08C	1 pole. VDE0106			<b>CM1CA5F</b>	105200	1	
	CK85B ... CK12B	1 pole. VDE0106	Contactors 3P		<b>C09476</b>	104766	6	
	CK08B ... CK12B	1 pole. VDE0106	Contactors 4P		<b>C09479</b>	204800	8	
	CK75C ... CK08C	1 pole IPXXB			<b>PTPCK75</b>	103747	1 <sup>(1)</sup>	
	CK85B ... CK95B	1 pole IPXXB			<b>PTPCK95</b>	103748	3 <sup>(2)</sup>	
	CK10C ... CK12B	1 pole IPXXB			<b>PTPCK11</b>	103749	1 <sup>(1)</sup>	

(1) One phase  
(2) Three pole

## Spares

	For use with:	Type		Cat. no.	Ref. no.	Pack	
 <p><b>Contact kits</b></p>	One set consists of two fixed contacts, one moving contact and accessory parts. When contact replacement is needed, it is recommended to replace all the contacts at the same time.						
	CK07B	NA		<b>V1107BA</b>	113612	1	
	CK75C	NA		<b>V1175CA</b>	113613	1	
	CK08C	NA		<b>V1108CA</b>	113614	1	
	CK08B	NA	Contactors 4P	<b>V1108BA</b>	113505	1	
	CK85B	NA		<b>V1185BA</b>	113615	1	
	CK09B	NA		<b>V1109BA</b>	113616	1	
	CK09B	NA	Contactors 4P	<b>V1109BA</b>	113899	1	
	CK95B	NA		<b>V1195BA</b>	113617	1	
	CK10C	NA		<b>V1110CE</b>	113618	1	
	CK11C	NA		<b>V1111CE</b>	113619	1	
	CK12B	NA		<b>V1112BA</b>	113620	1	
	CK13B	NA		<b>V1113BA</b>	113621	1	

Notes

Grid area for notes.

Contactors

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## Technical data

### General

		MC0...	MC1...	MC2...
Rated thermal current $I_{th} \theta \leq 60^{\circ C(1)}$	(A)	20	20	20
Rated operational current $I_e^{(2)}$ (3 x 440V, 50/60Hz, AC-3)	(A)	6	9	12
Maximum number of poles		4	4	4
Rated insulation current $U_i$	(V)	750	750	750
Rated operational current $U_e$	(V)	690	690	690

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm<sup>2</sup>:

$I_e = 8A$ , design DIN 46 247

(2) Max.operational current AC3, 3 -phases  $\leq 440V$ , according to IEC 947-4-1

### Conformity to standards

IEC/EN 60947-1	CSA C22.2/14	SEV 10254
IEC/EN 60947-4-1	CENELEC HD 419	JIS C8325
IEC/EN 60947-5-1	VDE 0660	JEM 1038
EN 50003	NFC 63110	NEMA ICS-1
EN 50005	BS 4794	UL 508
EN 50012		

### Approvals

cULus	NEMKO	SEMKO
SETI	DEMKO	RINA
IMQ		
Lloyd's Register	Bureau Veritas	CE

### Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +60°C	
Altitude	up to 3000m	Nominal values
	from 3000 up to 4000m	90% $I_e$ 80% $U_e$
	from 4000 up to 5000m	80% $I_e$ 75% $U_e$

### Climatic resistance

Continuous tests 40 / 125 / 56		
Cold (72h)	Temperature	-40°C
	Relative humidity	< 50%
Dry heat (96h)	Temperature	+125°C
	Relative humidity	< 50%
Humid heat (56h)	Temperature	+40°C
	Relative humidity	95%
Cyclic tests		
First half-cycle (12h)	Low temperature	+25°C
	Relative humidity	93%
Second half-cycle (12h)	Low temperature	+55°C
	Relative humidity	95%
Number of consecutive cycles	6	

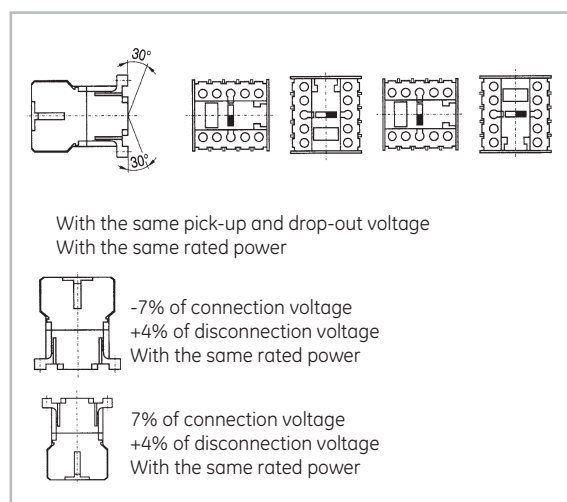
### Shock resistance (IEC 68-2-27)

Continuously closed (at 0.8Us)	
Admissible acceleration	25 g
Impulse duration	11 ms
Continuously opened (no voltage)	
Admissible acceleration	20 g
Impulse duration	11 ms

### Vibration resistance (IEC 68-2-6)

Continuously closed (at 0.8Us)	
Admissible acceleration	15 g
Sweep between	10 - 200 Hz
Continuously opened (no voltage)	
Admissible acceleration	5g (AC) - 35g (DC)
Sweep between	10 - 200 Hz

### Mounting positions



### Terminal capacity

Terminal with M3.5 screw (with pozidrive head and safety flange)	Tightening torque	
	0.8 Nm - 7 Lb/in	
Solid wire	mm <sup>2</sup>	0.75 to 2 x 2 w.
Flexible wire without terminal	mm <sup>2</sup>	0.75 to 2.5 x 2 w.
Flexible wire without terminal with cap	mm <sup>2</sup>	0.75 to 2.5 x 1 w.
	mm <sup>2</sup>	0.75 to 1 x 2 w.
Ring terminal	0.8 Nm - 7 Lb/in	
Faston terminal 2.8 - 2 insulated terminals	mm <sup>2</sup>	1 x 2 w.
Terminal for printed circuit ( $\varnothing$ of PCB hole)	1.8 mm	
Ring terminal cap	7.8 mm	
Fork terminal cap	6.5 mm	

### Control circuit

		MC_A...	MC_C...	MC_I...	MC_K...	MC_C...W
Rated insulation voltage (Ui)	(V)	750	750	750	750	750
Standard voltages (Us)						
50Hz(V)		24 ... 690	-	-	-	-
60Hz(V)		6 ... 600	-	-	-	-
DC	(V)	-	6 ... 440	24	24	12 ... 440
Operating voltages limits						
Operating <sup>(1)</sup>	xUs	0.8 ... 1.1	0.8 ... 1.1	0.8 ... 1.25	0.7 ... 1.25	0.7 ... 1.3
Drop-out	xUs	0.35 ... 0.55	0.15 ... 0.4	0.15 ... 0.3	0.15 ... 0.35	0.15 ... 0.3
Operating voltages limits with coil 50/60 Hz						
Operating	xUs	0.8 ... 1.1	-	-	-	-
Drop-out	xUs	0.35 ... 0.55	-	-	-	-
Consumption						
50 or 60Hz - monofrequency coil						
Pick-up	(VA)	26	-	-	-	-
Seal	(VA)	4	-	-	-	-
50/60Hz - bifrequency coil						
Pick-up	(VA)	32	-	-	-	-
Seal	(VA)	6	-	-	-	-
DC	(W)	-	3	1.2	2	4
Power factor						
Magnetic circuit open	(cos φ)	0.8	-	-	-	-
Magnetic circuit closed	(cos φ)	0.35	-	-	-	-
Power dissipation	(W)	1.4	3	1.2	2	4
Opening and closing times						
Values between ± %Us						
Time on energisation NO	(ms)	6 ... 13	22 ... 36	30 ... 70	20 ... 50	17 ... 28
Time on de-energisation NC	(ms)	8 ... 16	9 ... 12	9 ... 16	9 ... 16	9 ... 12
Time on energisation NC	(ms)	5 ... 11	18 ... 27	20 ... 45	18 ... 35	12 ... 25
Time on de-energisation NO	(ms)	6 ... 13	5 ... 7	5 ... 9	5 ... 9	5 ... 7
Values at Us						
Time on excitation NO	(ms)	7 ... 12	24 ... 27	25 ... 45	25 ... 40	11 ... 23
Time on desexcitation NC	(ms)	8 ... 16	9 ... 11	9 ... 16	9 ... 16	9 ... 11
Time on excitation NC	(ms)	6 ... 10	20 ... 26	25 ... 35	20 ... 30	15 ... 21
Time on desexcitation NO	(ms)	6 ... 13	5 ... 8	5 ... 9	5 ... 8	5 ... 8
Maximum time without voltage	(ms)	3	3	3	3	3
Mechanical endurance						
Monofrequency coil	10 <sup>6</sup> ops.	>15	-	-	-	-
Bifrequency coil	10 <sup>6</sup> ops.	>10	-	-	-	-
DC	10 <sup>6</sup> ops.	-	10	10	10	10
Maximum rate						
No load	Monofrequency coil	ops./h	9000	-	-	-
	Bifrequency coil	ops./h	3600	-	-	-
	DC	ops./h	-	9000	9000	9000
AC1 and AC3 (at rated power)		ops./h	1200	1200	1200	1200
AC4 (at rated power)		ops./h	300	300	300	300

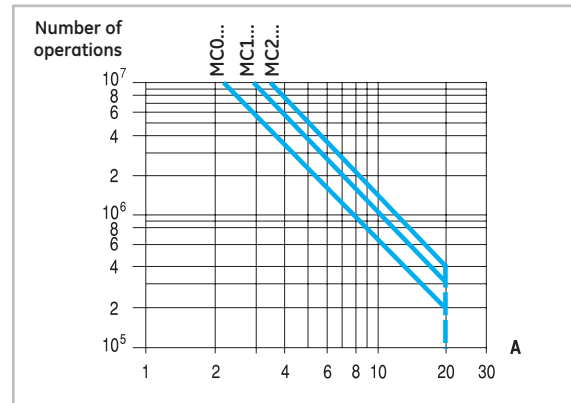
### Main circuit (poles)

		MC 0...	MC1...	MC2...
Rated insulation voltage (Ui) (acc. IEC 947-4)	(V)	750	750	750
Rated thermal current (Ith) $\theta \leq 60^\circ$ (1)	(A)	20	20	20
Frequency limits	(Hz)	0...400	0...400	0...400
Making capacity (r.m.s.) $U_e \leq 690V$ 50/60Hz	(A)	160	160	160
Breaking capacity (r.m.s.) $U_e \leq 440V$	(A)	106	106	106
$U_e = 500V$	(A)	90	90	90
$U_e = 690V$	(A)	80	80	90
Short-time current				
0.3 sec.	(A)	470	470	470
1 sec.	(A)	250	250	250
5 sec.	(A)	125	125	125
10 sec.	(A)	95	95	95
30 sec.	(A)	70	70	70
1 min.	(A)	50	50	50
3 min.	(A)	40	40	40
Recovery time	min.	10	10	10
Protec. against short-circuits (IEC 947-4). w/o TOR				
Coordination type "1" gL/gG	(A)	32	32	32
Coordination type "2" gL/gG	(A)	16	20	20
w/o welding contacts gL/gG	(A)	12	16	16
Circuit breaker rating (curve G CEE 19.1)		16	20	20
Impedance per pole	(m $\Omega$ )	1.5	1.5	1.5
Power dissipation per pole				
AC1	(W)	0.6	0.6	0.6
AC3	(W)	0.06	0.128	0.228
Insulation resistance				
Between adjacent poles	(m $\Omega$ )	> 10	> 10	> 10
Between pole and earth	(m $\Omega$ )	> 10	> 10	> 10
Between input and output	(m $\Omega$ )	> 10	> 10	> 10
Guaranteed no overlap between NO and NC contacts				
Space	(mm)	1	1	1
Time	(ms)	> 2	> 2	> 2

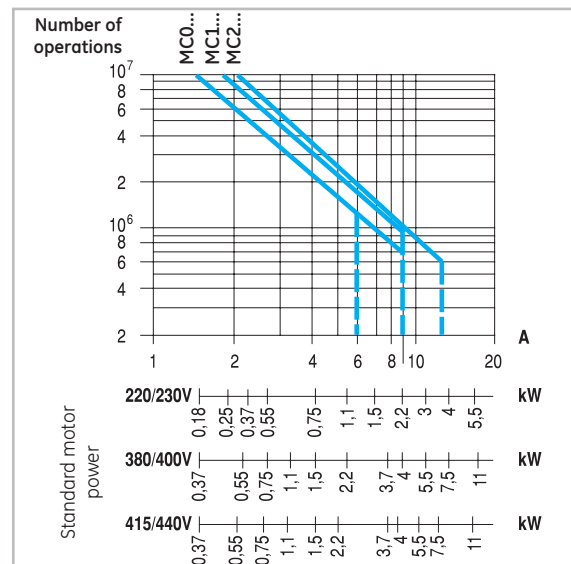
(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm<sup>2</sup> Ie = 8A acc. to DIN 46247

### Electrical endurance

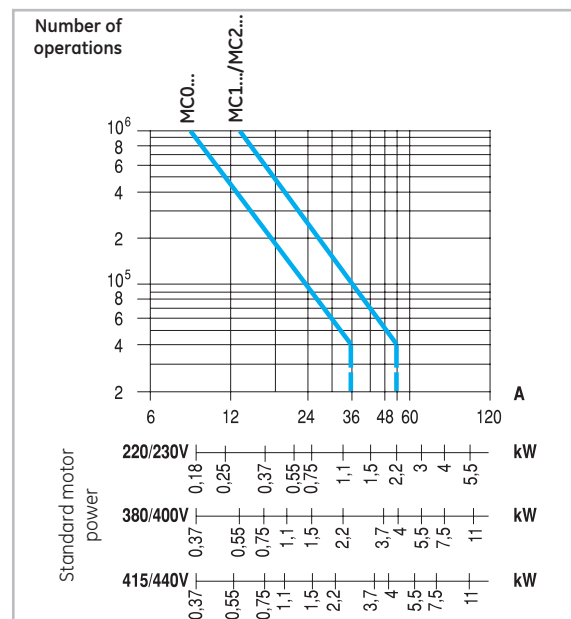
#### Category AC1



#### Category AC3



#### Category AC4

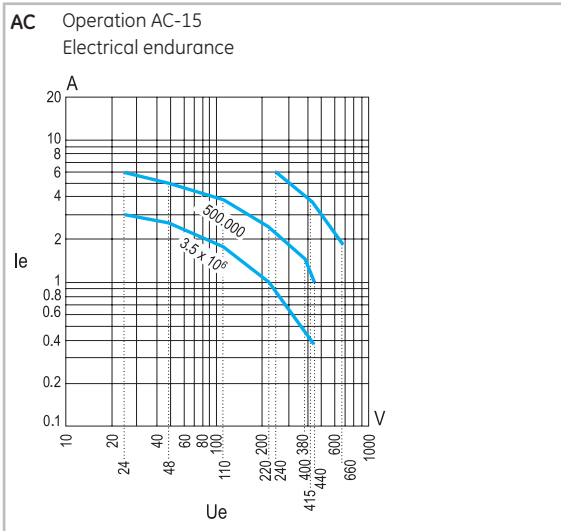


### Internal auxiliary contacts

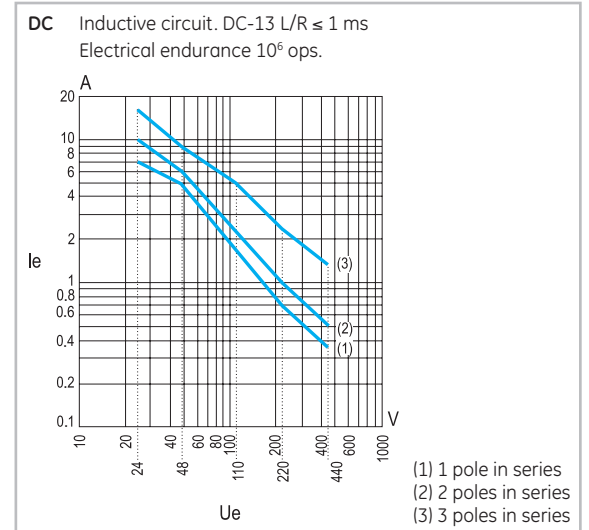
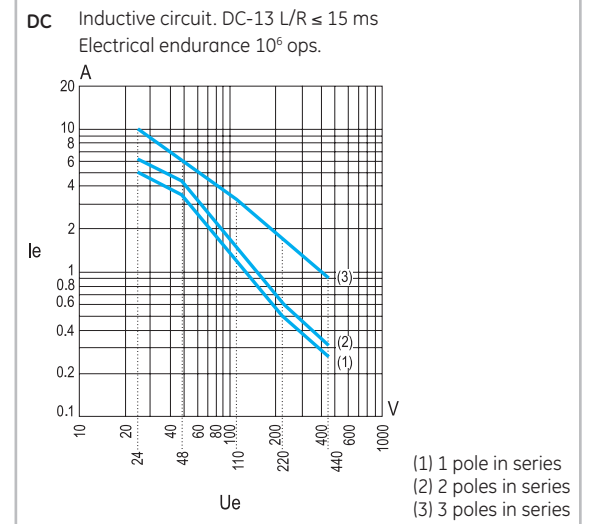
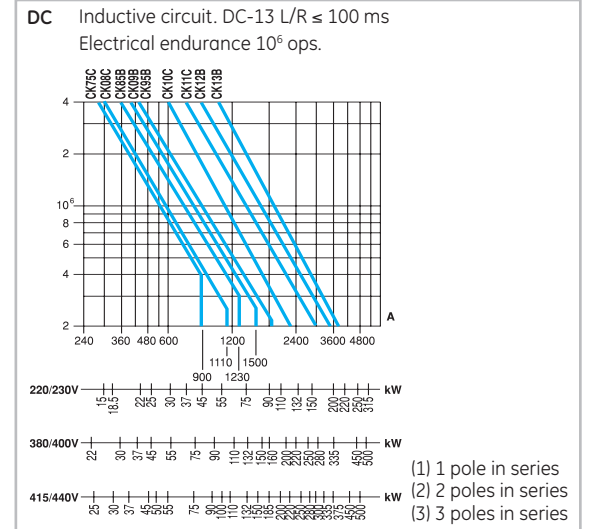
	MC0 / MC1 / MC2
Rated insulation voltage (Ui) IEC 60947-5	(V) 750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$ (1)	(A) 16
Making capacity according with IEC 60947-5-1	
$U_e \leq 690$ 50-60 Hz	(A) 160
$U_e \leq 440\text{V DC}$	(A) 160
Breaking capacity (r.m.s.) IEC 60947-5-1	
AC-15	
$U_e \leq 440\text{V} / 50-60$ Hz	(A) 106
DC-13	
$U_e \leq 110\text{V DC}$	(A) 3
$U_e = 220\text{V DC}$	(A) 1.2
$U_e = 48\text{V DC}$	(A) 10
Minimum operational power (operational safety.)	5mA, 17V
Short-circuit protection (max.class gI fuse) w/o welding	(A) 10
Insulation resistance	
Between adjacent contacts	(m $\Omega$ ) > 10
Between contacts and earth	(m $\Omega$ ) > 10
Between input and output	(m $\Omega$ ) > 10
Guaranteed no overlap between NO and NC contacts	
Space	(mm) 0.5
Minimal time	(ms) > 2
Impedance	(m $\Omega$ ) 2.3
Terminal capacity	Same as main circuit

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm<sup>2</sup> Ie = 8A acc. with DIN 46247

### Tripping characteristics (AC)



### Tripping characteristics (DC)

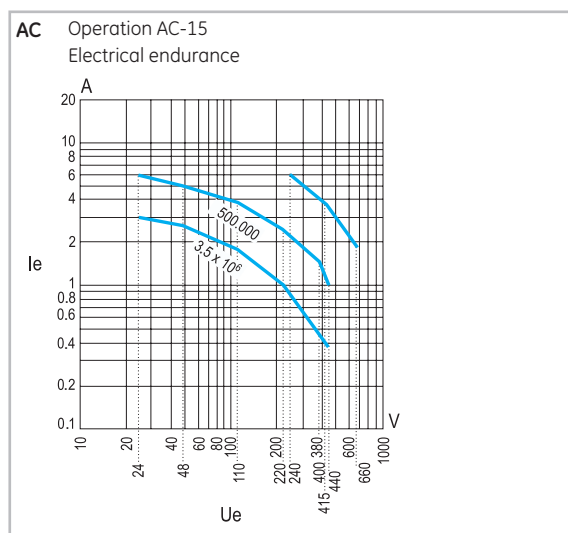


### Instantaneous auxiliary contact blocks

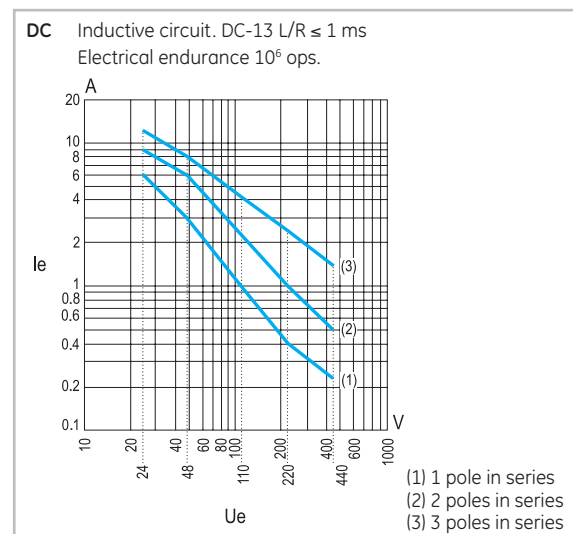
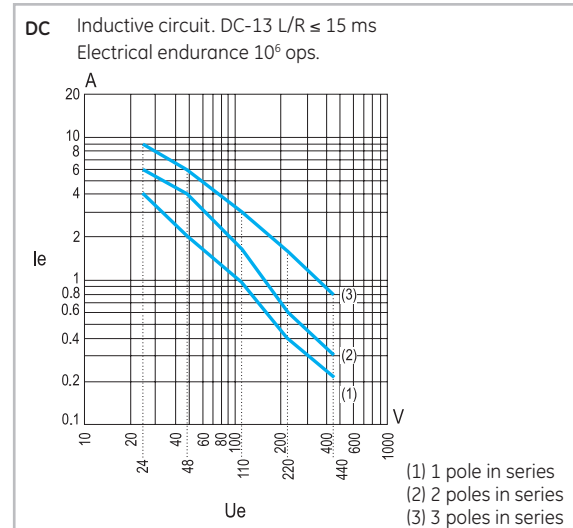
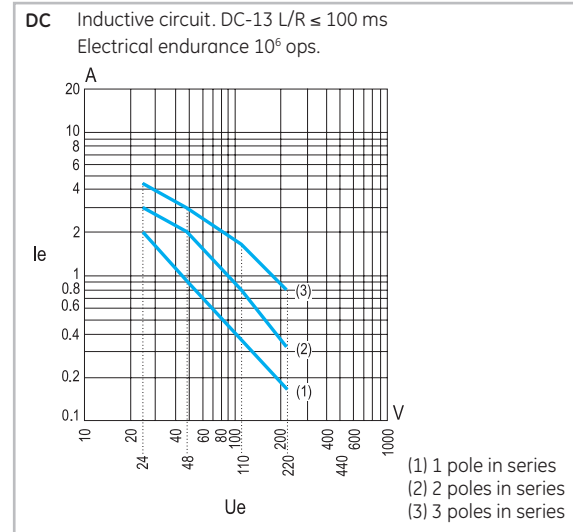
		MACN..., MACL...
Rated insulation voltage (Ui) acc. IEC 60947-1	(V)	750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$ <sup>(1)</sup>	(A)	10
Making capacity (r.m.s.) according with IEC/EN 60947-5-1		
AC-15	Ue $\leq$ 220V 50/60 Hz	(A) 73
	Ue = 380V 50/60 Hz	(A) 38
	Ue = 690V 50/60 Hz	(A) 22
DC-13	Ue $\leq$ 100V DC	(A) 2.6
	L/R=100ms Ue = 220V DC	(A) 1
	Ue = 440V DC	(A) 0.6
Breaking capacity (r.m.s.) acc. IEC/EN 60947-5-1		
AC-15	Ue $\leq$ 220V 50/60 Hz	(A) 73
	Ue = 380V 50/60 Hz	(A) 38
	Ue = 690V 50/60 Hz	(A) 22
DC-13	Ue $\leq$ 100V DC	(A) 2
	LR=100ms Ue = 220V DC	(A) 0,8
	Ue = 440V DC	(A) 0.4
Rated voltage and rated current Ue-le		
AC-15	according to IEC 60947	120V - 6A
		230V - 6A
		400V - 4A
		500V - 1A
		600V - 1A
		according to UL, CSA
DC-13	according to IEC 60947	24V - 4A
		48V - 2A
		110V - 0.7A
		220V - 0.3A
		440V - 0.1A
		according to UL, CSA
Minimum operational power (operational safety)		5 mA, 17V
Short-circuit protection (max. class gI fuse) w/o welding	(A)	10
Insulation resistance		
Between adjacent contacts	(m $\Omega$ )	> 10
Between contacts an earth	(m $\Omega$ )	> 10
Between input and output	(m $\Omega$ )	> 10
Guaranteed no overlap between NO and NC contacts		
Space	(mm)	0,5
Minimal time	(ms)	> 2
Impedance	(m $\Omega$ )	2,4
Terminal capacity		Same as main circuit

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm<sup>2</sup> Ie = 8A acc. with DIN 46247

### Tripping characteristics (AC)



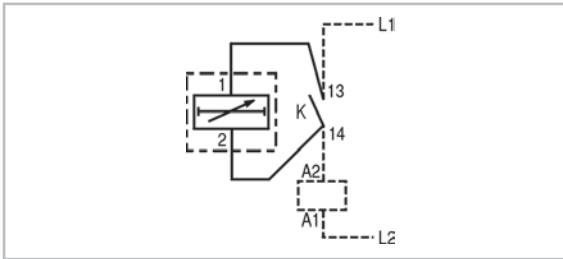
### Tripping characteristics (DC)





### Electronic timer block




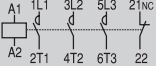

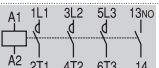

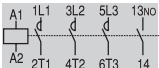

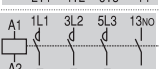

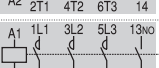

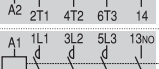

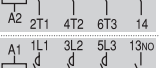

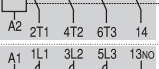

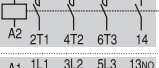

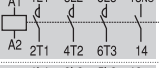

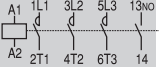

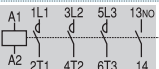

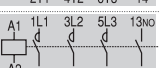

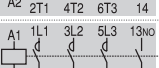
		MREBC...
Rated insulation voltage (Ui)	(V)	750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$ <sup>(1)</sup>	(V)	0.55
Supply voltage (AC and DC)	(V)	24 to 250
Operating limits		0.80 to 1.1 Us (0.85 to 1.1 Us to 12V)
Voltage drop	(V)	< 3
Maximum load current at :		
20°C	(A)	0.9
40°C	(A)	0.72
60°C	(A)	0.55
Minimum load for safe operation	(A)	> 10
Maximum current	(A)	10A per 40 ms
Leakage current at 220V	(mA)	< 5
Operational current		
AC-15	(A)	0.7
DC-13	(A)	0.9
Timing range (delay ON)	(s)	0.5 to 60 ( $\pm 6$ s)
Rearrangement time	(ms)	< 100
Repeatability (accuracy) (%)		$\pm 1$
Ambient temperature		
storage	(°C)	-55 to +80
operation	(°C)	-5 to +60
Degree of protection		IP20
Mounting positions		Any
Terminals : 2 free cables		1 mm <sup>2</sup> (AWG 17) 250 mm



### Contact sequence

	Main contact (NO)	Main contact (NC)	Auxiliary contact (NO)	Auxiliary contact (NC)
<b>Three-pole minicontactor</b>				
MC...310...				
MC...301...				
<b>Four-pole minicontactor</b>				
MC...400...				
MC...B00...				
MC...A00...				
<b>Auxiliary contact block</b>				
MAC...				
MAR...				

Terminal numbering in accordance with EN 50012

Final structure of the contactor	Auxiliary contactors		Possible basic contactors + Auxiliary contact blocks to be added
	Combination	 	
	Description		
<b>Without auxiliary contact blocks</b>			
 	01E	0 1	MC_A301A...
 	10E	1 0	MC_A310A...
<b>Auxiliary contact blocks front mounted with two or four contacts</b>			
 	11E	1 1	MC_A310A... + MACN211A
 	21E	2 1	MC_A310A... + MACN211A
 	12E	1 2	MC_A310A... + MACN202A
 	31E	3 1	MC_A310A... + MACN431A
 	41E	4 1	MC_A310A... + MACN431A
 	22E	2 2	MC_A310A... + MACN422A
 	32E	3 2	MC_A310A... + MACN422A
 	13E	1 3	MC_A310A... + MACN413A
 	23E	2 3	MC_A310A... + MACN413A
<b>Auxiliary contact blocks lateral mounted with one contact</b>			
 	11E	1 1	MC_A310A... + MACL101A
 	21E	2 1	MC_A310A... + MACL101A + MACL110A
 	12E	1 2	MC_A310A... + MACL101A + MACL101A

3P and 4P minicontactors

A

B

C

D

E

F

G

H

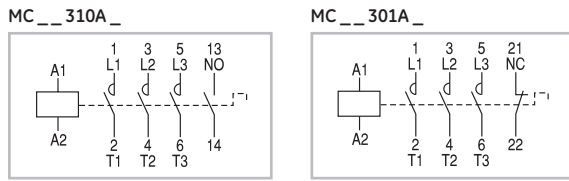
I

X

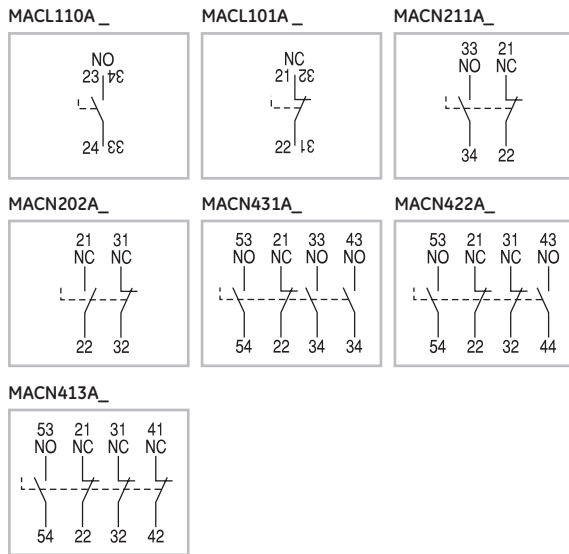


**Terminal numbering**

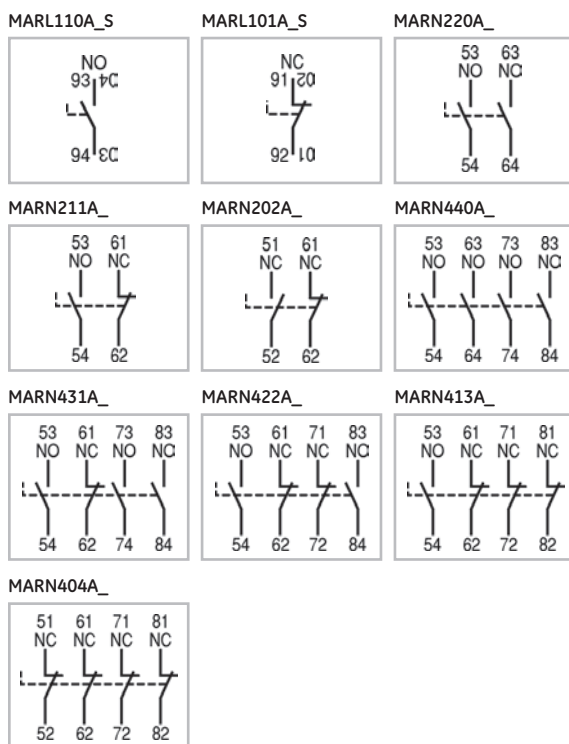
*Basic three-pole contactors. (EN 50012)*



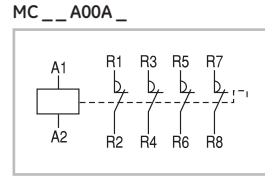
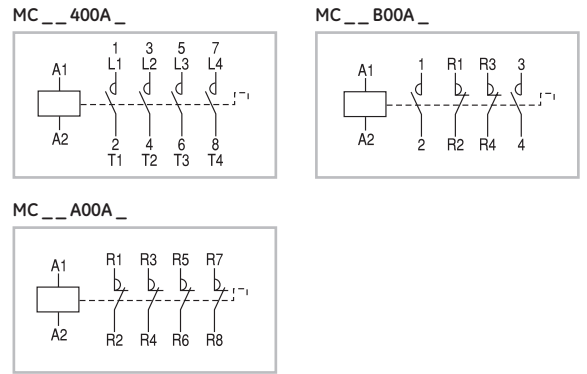
*Instantaneous auxiliary contact blocks. (EN 50012)*



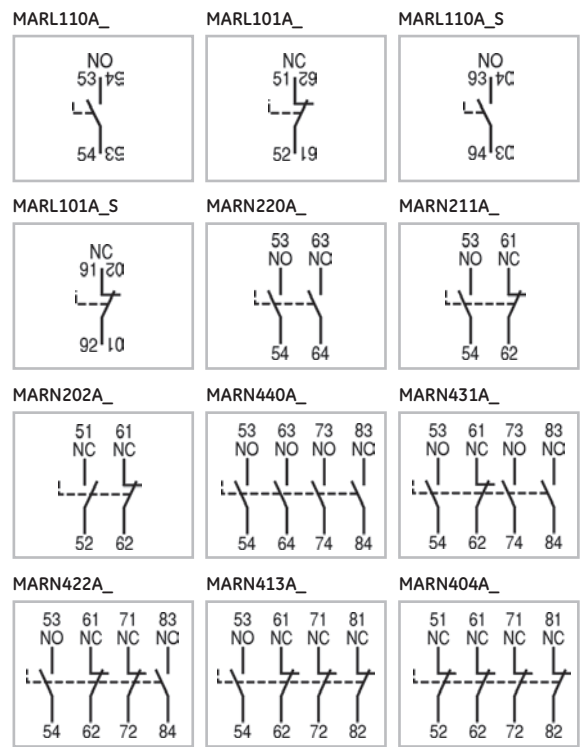
*Instantaneous auxiliary contact blocks. (EN 50005)*



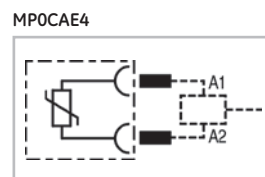
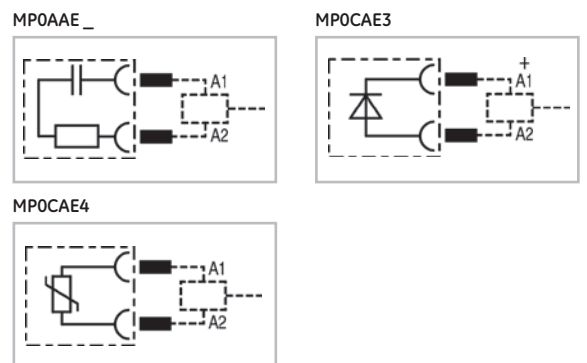
*Base four-pole contactors. (EN 50005)*



*Instantaneous auxiliary contact blocks. (EN 50005)*



*Voltage suppressor block*



### Conformity to standards

IEC/EN 60947-1	EN 50005	UNE 20109
IEC/EN 60947-4-1	CENELEC HD419	BS 5424 & 775
IEC/EN 60947-5-1	NF C63-110	NEMA ICS 1
UL 508	ASE 1025	VDE 0660/102
CSA 22.2/14		

### Approvals

cULus	RINA	CE
SETI	IMQ (up to Ith:32A)	
Lloyd's Register	Bureau Veritas	

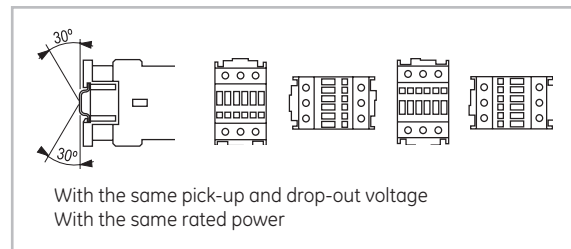
### Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +60°C	
Altitude	up to 3000m Nominal values	
	from 3000 up to 4000m	90%le 80%Ue
	from 4000 up to 5000m	80%le 75%Ue

### Climatic resistance (IEC 68-2)

Continuous tests 40 / 125 / 56	Cyclic test (6 cycles)
Cold (72h)	Humid heat
Temperature -40°C	First half-cycle (12h)
Dry heat (96h)	Low temperature +25°C
Temperature +125°C	Relative humidity 93%
Relative humidity < 50%	Second half-cycle (12h)
Humid heat (56h)	Low temperature +55°C
Temperature +40°C	Relative humidity 95%
Relative humidity 95%	

### Mounting positions



### Terminal capacity and tightening torque

		CL00 ... CL02	CL25	CL03 ... CL04	CL45	CL05 ... CL08	CL09 ... CL10
	Solid, stranded and finely stranded without end sleeve (mm²)	2 x 0.5 ... 2.5	2 x 0.5 ... 2.5	-	-	-	-
	Finely stranded with or without end sleeve (mm²)	2 x 1 ... 2.5	2 x 2.5 ... 10	-	-	-	-
	AWG wires	2 x 20 ... 12	2 x 20 ... 8	-	-	-	-
	Tightening torque (Nm)	1.6	2.2	-	-	-	-
	(Lb x in.)	15	20	-	-	-	-
	Solid, stranded and finely stranded without end sleeve (mm²)	-	-	0.75 ... 16	0.75 ... 16	1 ... 35	1.5 ... 50
	Finely stranded with end sleeve (mm²)	-	-	0.75 ... 16	0.75 ... 16	1 ... 35	1.5 ... 50
	Finely stranded w/o end sleeve (mm²)	-	-	1 ... 16	1 ... 16	1 ... 35	1.5 ... 50
	AWG wires	-	-	18 ... 6	18 ... 6	16 ... 2	16 ... 2
Tightening torque (Nm)	-	-	1.4	1.8	4	5.6	
	(Lb x in.)	-	-	12	16	35	50
	Solid (mm²)	-	-	0.75 ... 16	0.75 ... 16	1 ... 16	4 ... 35
	Stranded (mm²)	-	-	0.75 ... 16	0.75 ... 16	1 ... 25	4 ... 35
	Finely stranded w/o end sleeve (mm²)	-	-	0.75 ... 16	0.75 ... 16	1 ... 25	4 ... 35
	Finely stranded with end sleeve (mm²)	-	-	1 ... 16	1 ... 16	1 ... 25	4 ... 35
AWG wires	-	-	18 ... 6	18 ... 6	16 ... 4	10 ... 1	
Tightening torque (Nm)	-	-	1.4	1.8	4	5.6	
	(Lb x in.)	-	-	12	16	35	50
	Solid, stranded and finely stranded without end sleeve (mm²)	-	-	Max. 16	Max. 16	Max. 50 ... 4	Max. 50 ... 35
	Finely stranded w/o end sleeve (mm²)	-	-			Max. 25 ... 16	
	Finely stranded with end sleeve (mm²)	-	-			Max. 25 ... 16	
	AWG wires	-	-	Max. 6	Max. 6	Max. 25 ... 25	Max. 1
Tightening torque (Nm)	-	-	1.4	1.8	4	5.6	
	(Lb x in.)	-	-	12	16	35	50
	Ring terminals (Ø i)	3,6	4,2	4,2	4,2	6,2	6,2
	(acc. with IEC/EN 60947-1) (A)	8	10	10	10	12,5	12,5
Tightening torque (Nm)	1,6	1,4	1,4	1,4	3	3	
	(Lb x in.)	15	12	12	12	26	26

3P and 4P contactors

A

B

C

D

E

F

G

H

I

X



### Power circuit

		CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL05	CL06	CL07	CL08	CL09	CL10
<b>Three pole version</b>														
Rated thermal current I <sub>th</sub> at θ ≤ 55°C (A)		25	25	32	45	45	60	60	-	90	110	110	140	140
Rated operational current I <sub>e</sub> AC-3 (A)		9	12	18	25	25	32	40	-	50	65	80	95	105
Rated operational voltage U <sub>e</sub> (V)		690	690	690	690	690	690	690	-	690	690	690	690	690
<b>Four pole version (4NO and 2NO+2NC)</b>														
Rated thermal current I <sub>th</sub> at θ ≤ 55°C (A)		-	25	32	-	45	60	-	90	-	110	110	140	-
Rated operational voltage U <sub>e</sub> (V)		-	690	690	-	690	690	-	690	-	690	690	690	-
<b>Three and four pole version</b>														
Rated insulation voltage U <sub>i</sub> (V)		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Maximum continuous current AC-1 (A)		25	25	32	45	45	60	60	90	90	110	110	140	140
Frequency limits (Hz)		25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400	25..400
Making capacity (RMS) (IEC 947) (A)		450	450	450	450	550	550	550	1000	1000	1000	1000	1280	1280
Breaking capacity (RMS) (IEC 947)														
U <sub>e</sub> ≤ 400V (A)		250	250	250	350	450	450	450	920	920	920	920	1050	1050
U <sub>e</sub> = 500V (A)		250	250	250	320	450	450	450	920	920	920	920	1050	1050
U <sub>e</sub> = 690V (A)		130	130	130	170	205	205	205	780	780	780	780	950	950
Short-time current														
1 sec. (A)		455	455	570	630	1010	1010	1265	1580	1580	2530	2530	3300	3300
5 sec. (A)		205	205	254	280	450	450	450	565	710	1130	1130	1485	1485
10 sec. (A)		144	144	180	200	320	320	400	500	500	800	800	1050	1050
30 sec. (A)		85	85	104	115	185	185	230	290	290	460	460	600	600
1 min. (A)		60	60	74	80	130	130	165	205	205	325	325	430	430
3 min. (A)		35	35	46	50	90	90	100	120	120	185	185	250	250
Recovery time (min.)		10	10	10	10	10	10	10	10	10	10	10	10	10
Protec. against short-circuit with fuses without TOR														
Coordination type "1"														
gL/gG (A)		50	50	63	63	100	100	125	200	200	200	200	250	250
Coordination type "2"														
gL-gG (A)		25	35	35	50	63	63	80	100	100	125	125	160	200
Without welding														
gL-gG (A)		10	10	25	35	35	35	50	80	80	100	100	140	160
Impedance per pole (mΩ)		2.35	2.35	2.41	1.65	1.28	1.28	0.95	0.85	0.85	0.86	0.86	0.76	0.76
Power dissipation per pole														
AC-1 (W)		1.47	1.47	2.46	3.34	2.59	4.6	3.42	6.89	6.86	10.40	10.40	14.89	14.89
AC-3 (W)		0.19	0.34	0.78	1.03	0.80	1.31	1.52	1.36	2.12	3.63	5.5	6.86	8.37
Insulation resistance														
Between adjacent poles (mΩ)		>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10
Between poles and earth (mΩ)		>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10
Between input and output (mΩ)		>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10	>10



Control circuit

		CL00 ... CL25	CL03 ... CL45	CL05 ... CL08	CL09 ... CL10
<b>Alternating current</b>					
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000
Standard voltages $U_s$ 50 Hz	(V)	24...690	24...690	24...690	24...690
Standard voltages $U_s$ 60 Hz	(V)	24...600	24...600	24...600	24...600
Voltage operating limits monofrequency coils					
Operating	xUs	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Pick-up	xUs	0.6...0.8	0.65...0.8	0.65...0.8	0.65...0.8
Seal	xUs	0.35...0.55	0.4...0.6	0.4...0.6	0.4...0.6
Voltage operating limits 50/60 Hz coils					
Operating 50 Hz	xUs	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Operating 60 Hz	xUs	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1
Pick-up 50 Hz	xUs	0.5...0.8	0.6...0.8	0.6...0.8	0.6...0.8
Pick-up 60 Hz	xUs	0.65...0.85	0.7...0.85	0.7...0.85	0.7...0.85
Seal 50 Hz	xUs	0.3...0.55	0.35...0.60	0.35...0.60	0.35...0.60
Seal 60 Hz	xUs	0.35...0.65	0.4...0.6	0.4...0.6	0.4...0.6
Consumption monofrequency coils					
Magnetic circuit closed	(VA)	6	9	15.5	15.5
Magnetic circuit opened (VA)		48	88	190	190
Consumption bifrequency coils					
Magnetic circuit closed (50 Hz/60 Hz)	(VA)	6.8 / 5.6	11.4 / 9.5	20 / 16.6	20 / 16.6
Magnetic circuit opened (50 Hz/60 Hz)	(VA)	53 / 44	120 / 100	245 / 204	245 / 204
Thermal power dissipation (50 Hz/60 Hz)	(W)	2.2 / 1.8	3.2 / 2.6	5.2 / 4.3	5.2 / 4.3
Power factor					
Magnetic circuit closed	cos $\varphi$	0.33	0.28	0.26	0.26
Magnetic circuit opened	cos $\varphi$	0.84	0.73	0.54	0.54
Opening and closing times					
Values between + 10 % $U_s$ and - 20 % $U_s$					
Time on energisation (NO)	(ms)	6...20	7...25	9...35	9...35
Time on de-energisation (NO)	(ms)	6...13	5...25	9...15	9...15
Values at $U_s$					
Time on energisation (NO)	(ms)	8...20	10...19	15...30	15...30
Time on de-energisation (NO)	(ms)	6...13	5...25	9...15	9...15
Mechanical endurance					
Monofrequency coils	10 <sup>6</sup> ops.	15	15	15	15
Bifrequency coils (at 50 Hz)	10 <sup>6</sup> ops.	10	10	8	8
Maximum rate					
Monofrequency coils. No load	ops./h	9000	9000	9000	5000
AC-1 at rated power	ops./h	1200	1200	1200	1200
AC-2 at rated power	ops./h	1000	1000	1000	750
AC-3 at rated power	ops./h	1200	1200	1200	600
AC-4 at rated power	ops./h	360	360	200	200
Bifrequency coils. No load	ops./h	3600	3600	3600	3600

		Coils with electronic module		Coils with wide voltage range				
		CL00D ... CL25D	CL03D ... CL45D	CL05E ... CL08E	CL09E ... CL10E	CL00D..W ... CL25D..W	CL03D..W ... CL45D..W	CL05D..W ... CL10D..W
<b>Direct current</b>								
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000	1000	1000	1000
Standard voltages $U_s$	(V)	12...440	12...440	24...440	24...440	12...440	12...440	12...440
Operating limits								
Operating	xUs	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.7...1.3	0.7...1.3	0.7...1.3
Pick-up	xUs	0.45...0.65	0.45...0.65	0.70...0.80	0.70...0.80	0.45...0.55	0.45...0.55	0.45...0.55
Drop-out	xUs	0.15...0.3	0.15...0.3	0.4...0.6	0.4...0.6	0.15...0.3	0.15...0.3	0.15...0.3
Consumption								
Magnetic circuit closed	(W)	5.5	8	10	10	6.5	10.4	20
Magnetic circuit opened (W)		5.5	8	170	170	6.5	10.4	20
Opening and closing times								
Values between + 10 % $U_s$ and - 20 % $U_s$								
Time on energisation (NO)	(ms)	35...65	35...70	60...80	60...80	26...55	30...65	64...133
Time on de-energisation (NO)	(ms)	6...15	40...65	40...50	40...50	6...15	5...10	20...23
Values at $U_s$								
Time on energisation (NO)	(ms)	35...45	40...55	50...60	50...60	35...45	40...55	75...95
Time on de-energisation (NO)	(ms)	7...12	30...65	55...60	55...60	7...12	6...8	20...22
Mechanical endurance								
No load	10 <sup>6</sup> ops.	15	15	12	12	15	15	12
Maximum rate								
No load	ops./h	3600	3600	2500	2500	3600	3600	3600
AC1 and AC3 at rated power	ops./h	1200	1200	1200	600	1200	1200	1200
AC4 at rated power	ops./h	360	360	200	200	360	360	200



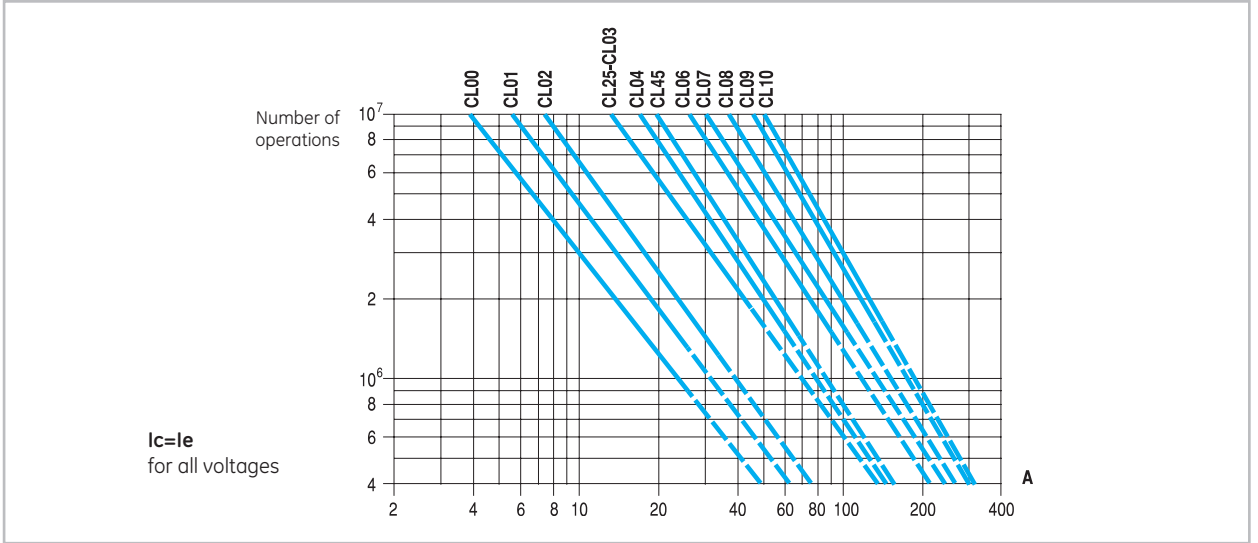
**Electrical endurance**

**Mixed category AC4 / AC3**

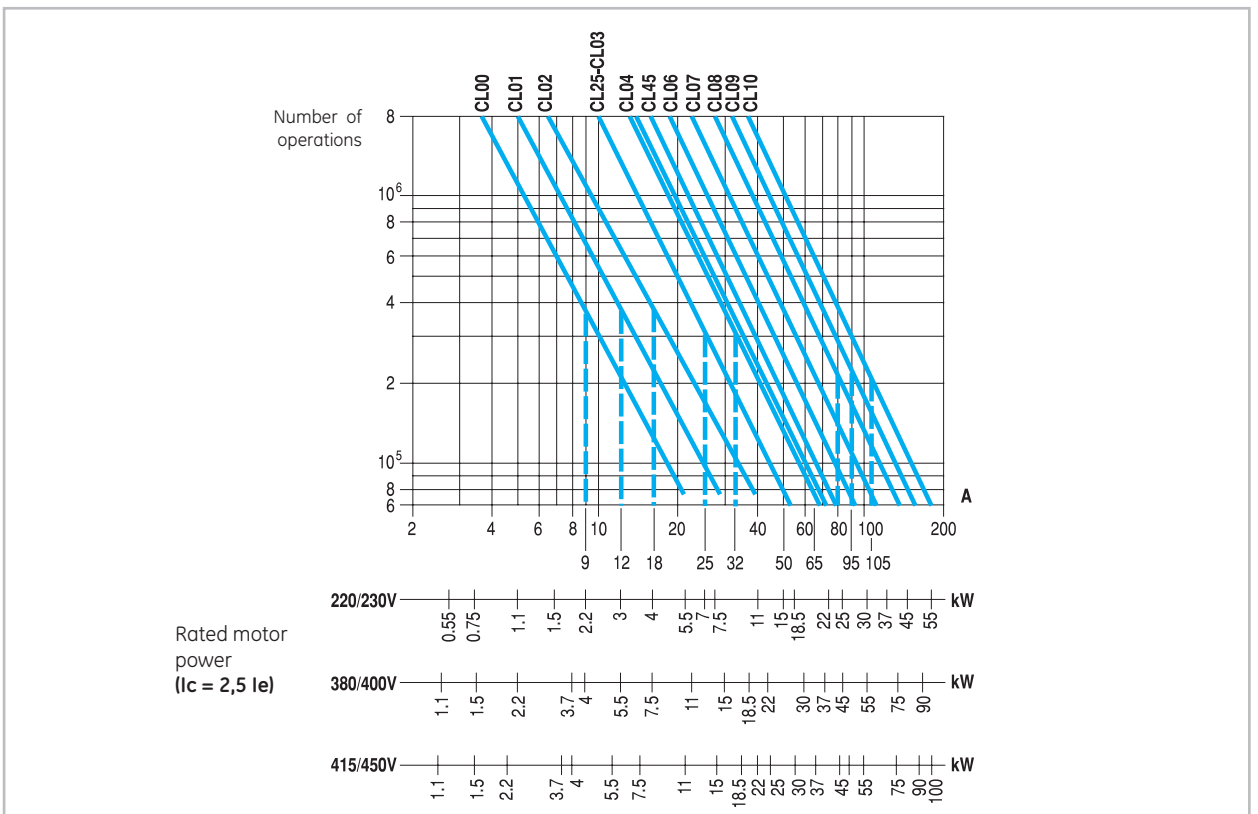
Electrical endurance for mixed category (AC-3/AC-4) is calculated with the following formula :

$$\text{Electrical endurance (AC-3/AC-4)} = \frac{\text{Electrical endurance (AC-3)}}{1 + \frac{\% \text{ oper AC-4}}{100}} \times \left( \frac{\text{Elec.endur. (AC-3)}}{\text{Elec.endur.(AC-4)}} - 1 \right)$$

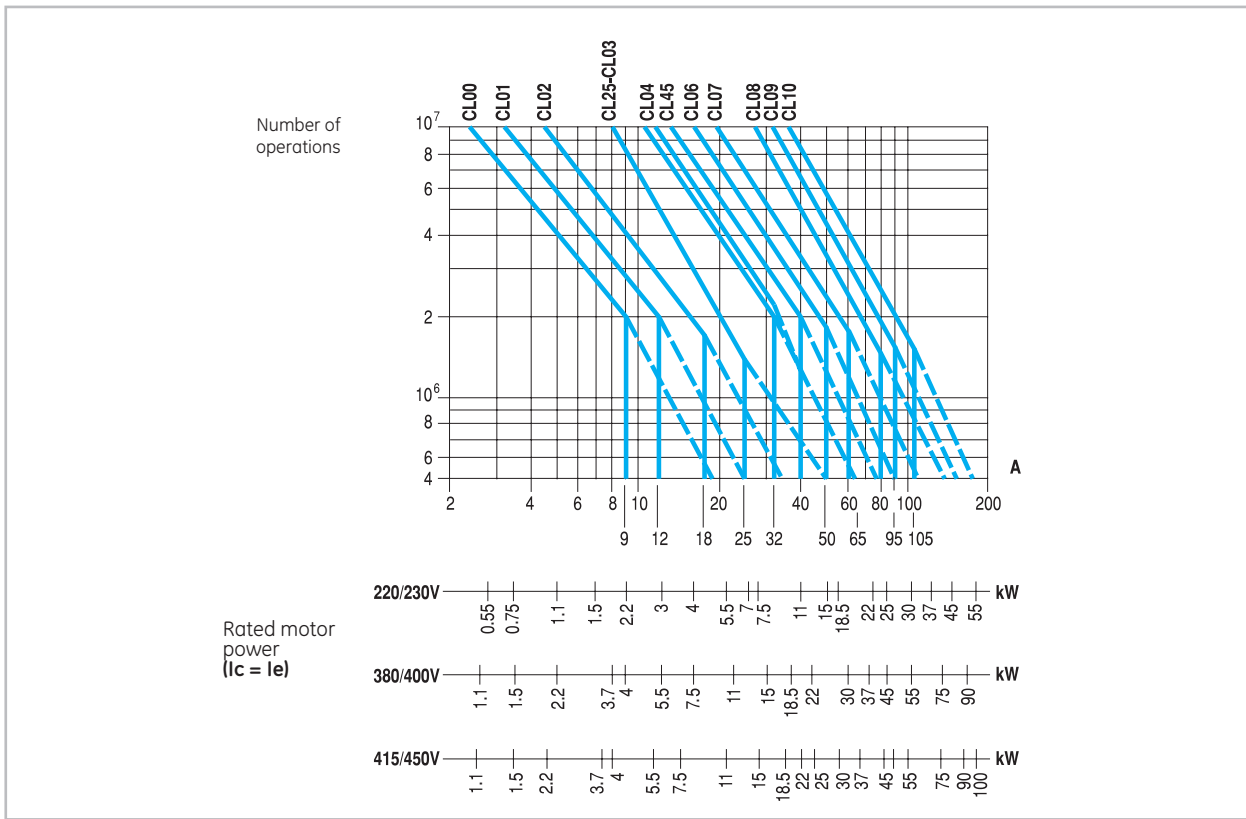
**Category AC1**



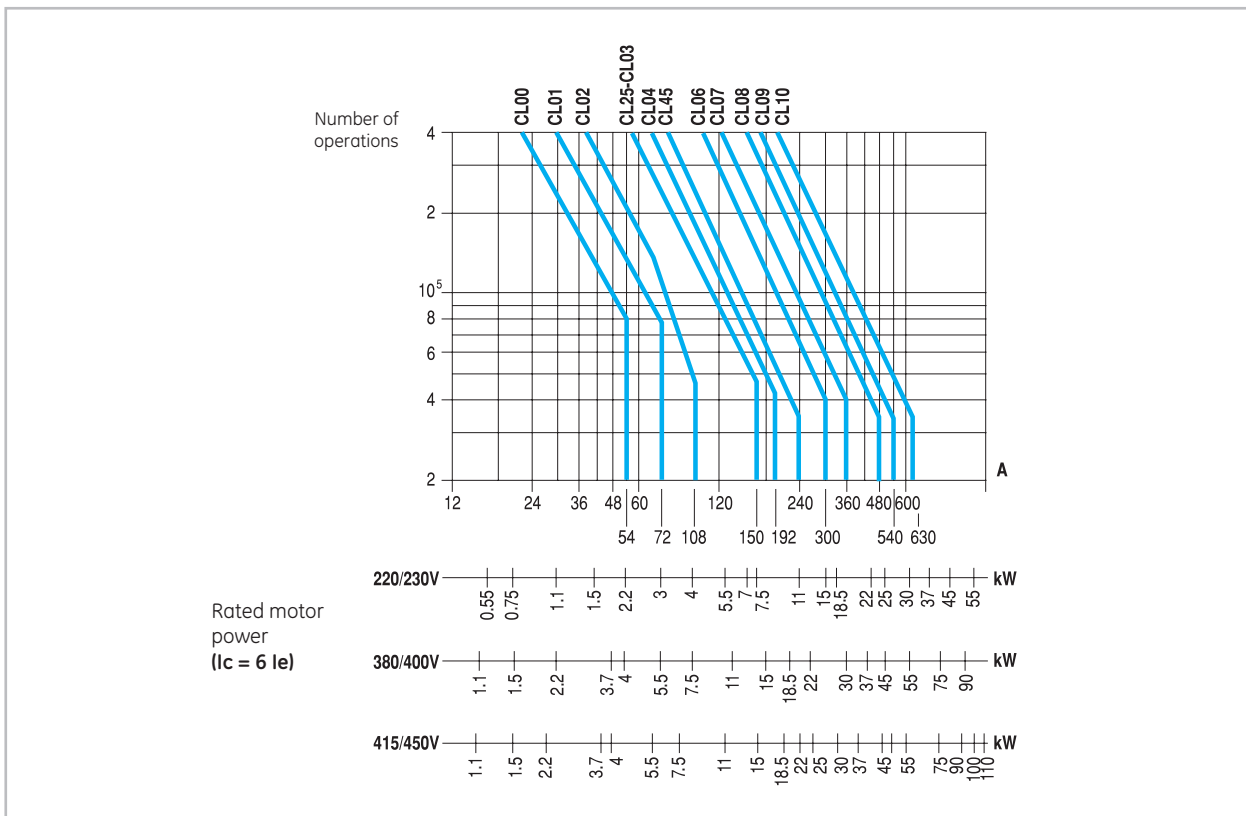
**Category AC2**



Category AC3



Category AC4



3P and 4P contactors

A

B

C

D

E

F

G

H

I

X





## Internal auxiliary contacts

			CL00 ... CL02		CL03 ... CL04	
Rated insulation voltage $U_i$ according to IEC 60947	(V)		1000		1000	
Rated thermal current $I_{th}$ at $\theta \leq 55^\circ\text{C}$	(A)		20		20	
Making capacity (r.m.s.) acc. to IEC 60947						
AC-15	$U_e \leq 400\text{V}, 50/60\text{ Hz}$	(A)	250		250	
DC-13	$U_e \leq 220\text{V DC}$	(A)	250		250	
Breaking capacity (r.m.s.) acc.to IEC 60947						
AC-15	$U_e \leq 400\text{V}, 50/60\text{ Hz}$	(A)	250		250	
DC-13	$U_e \leq 220\text{V DC}$	(A)	2		2	
AC-15	Rated voltage and current $U_e$ - $I_e$	according to IEC	110/120V-10A 400/380V-6A 500V-4A	220/230V-10A 415/450V-5A 690/660V-2A	110/120V-10A 400/380V-6A 500V-4A	230/220V-10A 415/450V-5A 690/660V-2A
		according to UL, CSA	A600		A600	
DC-13	Rated voltage and current $U_e$ - $I_e$	according to IEC	24V-6A 110V-2A 440V-0.35A	48V-4A 220V-0.7A	24V-6A 110V-2A 440V-0.35A	48V-4A 220V-0.7A
		according to CSA	P600		P600	
Electrical endurance		ops.	$10^6$		$10^6$	
Minimum operational power (operational safety)			17V - 5mA		17V - 5mA	
Short-circuit protect.	Max.fuse class gI-gG without welding	(A)	10		10	
Insulation resistance	Between contacts	( $m\Omega$ )	$> 10$		$> 10$	
	Between contacts and earth	( $m\Omega$ )	$> 10$		$> 10$	
	Between input and output	( $m\Omega$ )	$> 10$		$> 10$	
Guaranteed no overlap between NO and NC contacts						
	Space	(mm)	1.3		2.6	
	Time	(ms)	1.5		1.5	
Impedance of the contacts		( $m\Omega$ )	1.28		1.28	

## Auxiliary contact blocks

			Instantaneous BCLF..., BCRF..., BCLL..., BRLL...		Timed blocks BTLF..., BTRF...	
Rated insulation voltage $U_i$ according to IEC 60947	(V)		1000		1000	
Rated thermal current $I_{th}$ at $\theta \leq 55^\circ\text{C}$	(A)		10		10	
Making capacity (Ieff) according to IEC 60947						
AC-15	$U_e \leq 400\text{V}, 50/60\text{ Hz}$	(A)	90		90	
DC-13	$U_e \leq 220\text{V DC}$	(A)	90		90	
Breaking capacity (Ieff) according to IEC 60947						
AC-15	$U_e \leq 400\text{V}, 50/60\text{ Hz}$	(A)	60		60	
DC-13	$U_e \leq 220\text{V}, \text{DC}$	(A)	0.95		0.95	
AC-15	Rated voltage and current $U_e$ - $I_e$	according to IEC	120/110V-6A 400/380V-4A 500V-2.5A	230/220V-6A 440/415V-3.5A 690/660V-1.5A	120/110V-6A 400/380V-4A 500V-2.5A	230/220V-6A 440/415V-3.5A 690/660V-1.5A
		according to UL, CSA	A600		A600	
DC-13	Rated voltage and current $U_e$ - $I_e$	according to IEC	24V-4A 110V-0.7A 440V-0.15A	48V-2A 220V-0.3A	24V-4A 110V-0.7A 440V-0.15A	48V-2A 220V-0.3A
		according to UL, CSA	Q600		Q600	
Electrical endurance		$10^6$ ops.	1		1	
Mechanical endurance		$10^6$ ops.	10		5	
Minimum operational current (operational safety)			17V - 5mA		17V - 5mA	
Short-circuit protect.	Max.fuse class gI-gG without welding	(A)	10		10	
Insulation resistance	Between contacts	( $m\Omega$ )	$> 10$		$> 10$	
	Between contacts and earth	( $m\Omega$ )	$> 10$		$> 10$	
	Between input and output	( $m\Omega$ )	$> 10$		$> 10$	
Guaranteed no overlap between NO and NC contacts						
	Space	(mm)	1.3		1.3	
	Time	(ms)	1.5		5	
Impedance of the contacts		( $m\Omega$ )	1.28		1.28	
Timing (ambient temperature between $-25^\circ\text{C}$ and $+55^\circ\text{C}$ )						
	Accuracy		-		$\pm 5\%$	
	Loss of accuracy $0.5 \times 10^6$ ops.		-		$+ 20\%$	
	Loss of accuracy per rise $^\circ\text{C}$ ( $0 - 55^\circ\text{C}$ )		-		$+ 0.75\%$ per $^\circ\text{C}$	

### Mechanical latch blocks

	RMLF..	
Rated insulation voltage Ui	1000 V	
Standard voltages Us : 50 to 60 Hz and DC	24...690 V	
Operating limits	0.75...1.1 xUs	
Consumption for unlatching (auto cut-out)	24 to 72 V	210 W / VA
	110 to 440 V	130 W / VA
Electrical unlatching control <sup>(1)</sup>		
Minimum impulse	10 ms	
Maintained	auto cut-out by integral contact	
Manual unlatching control	by local push-button	
Electrical making control		
Minimum pulse	40 ms auto cut-out by integral contact	
Manual making control	by local push-button	
Auxiliary contact NC		
Utilisation AC-15 according to IEC	120V - 6A	500V - 1.5A
	230V/220V - 4A 400V/380V - 2.5A	690V/660V - 1A
according to UL/CSA	A600	
Utilisation DC-13 according to IEC	24V - 3A	220V - 0.3A
	48V - 1.5A	400V - 0.15A
	110V - 0.6A	
according to UL/CSA	Q600	
Mechanical endurance		
CL00...CL45	3 million (1200 ops./h)	
CL05...CL10	0.1 million (300 ops./h)	
Wiring diagram Alternating current		
Alternating current / Direct current		

(1) The contactor coil and the unlatch control must not be energised simultaneously

### Terminal capacity

	Terminal: screw BCLF, BCLL, BTLF y RMLF	Terminal: ring terminal BCRF, BTRF
Solid	2 x 0.5 to 2.5 or 1 x 4	
Stranded and finely stranded without end sleeve	2 x 0.5 to 2.5 or 1 x 4	
Finely stranded with end sleeve	2 x 0.5 to 2.5 or 1 x 4	
AWG wires, solid and stranded	12 - 22 AWG 75°C	
Tightening torque	1.1 Nm / 10 Lb x in.	
	Ring terminal	Ø i
		A
Tightening torque		3.6 min. 6.5 max. 0.8 Nm / 7 Lb x in.

A

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Contact sequence

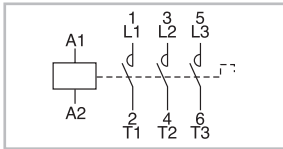
		Basic contactor	Auxiliary contact blocks Front mounted		Auxiliary contact blocks Lateral mounted		
			BCLF 10 BCRF 10	BCLF 01 BCRF 01	BCLL 20 BRLL 20	BCLL 11 BRLL 11	
Three pole contactors 3 NO	CL00... CL01... CL02...						
	CL25...						
	CL03... CL04...						
	CL45...						
	CL06...						
	CL07... CL08...						
	CL09...						
	CL10...						
	Four pole contactors 4 NO	CL01... CL02...					
		CL03... CL04...					
CL05...							
CL07...							
CL09...							
Four pole contactors 2 NO + 2 NC		CL01... CL02...					
	CL03... CL04...						
	CL05...						
	CL07... CL08...						



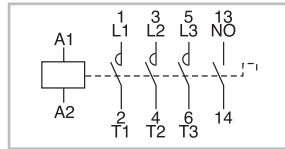
**Terminal numbering**

**Three-pole and four-pole AC contactors**

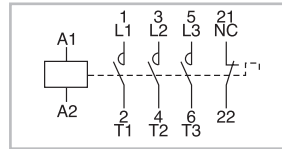
CL00A300 ... CL10A300 ...  
CL25D300 ... CL45D300 ...  
CL06E300 ... CL10E300 ...



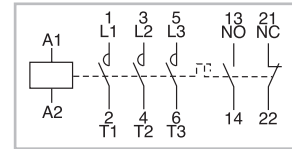
CL00\_310 ... CL02\_310 ...  
CL03\_310 ... CL04\_310 ...



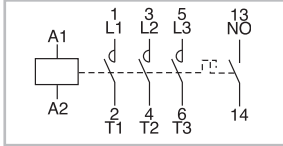
CL00\_301 ... CL02\_301 ...  
CL03\_301 ... CL04\_301 ...



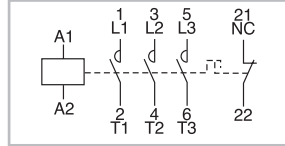
CL45A311 ... CL10A311 ...



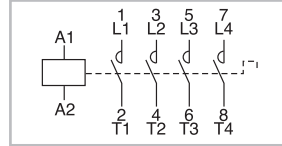
CL25\_310 ...



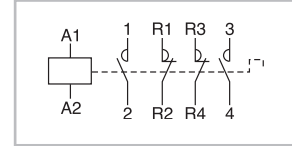
CL25\_301 ...



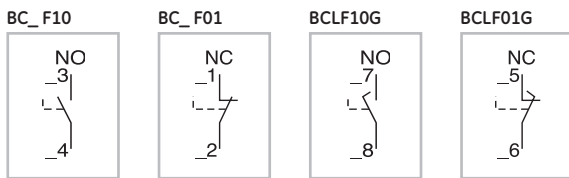
CL00A400 ... CL08A400 ...  
CL01D400 ... CL04D400 ...  
CL05E400 ... CL09E400 ...



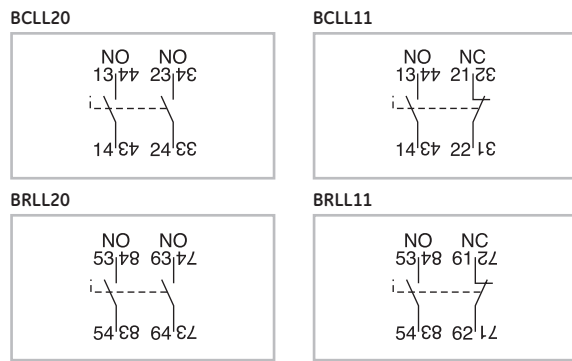
CL01AB00 ... CL08AB00 ...  
CL01DB00 ... CL04DB00 ...  
CL05EB00 ... CL08EB00 ...



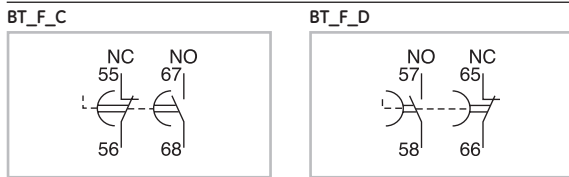
**Auxiliary contact blocks. Front mounting**



**Auxiliary contact blocks. Lateral mounting**



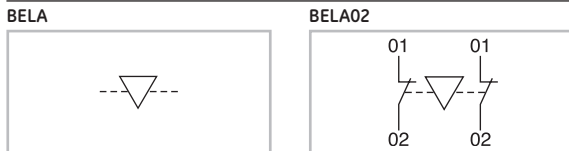
**Pneumatic timer blocks**



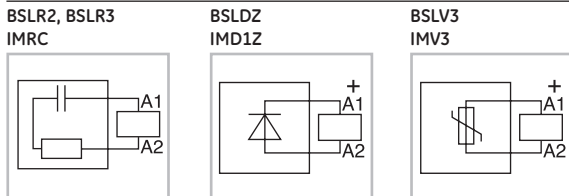
**Electronic timer blocks**



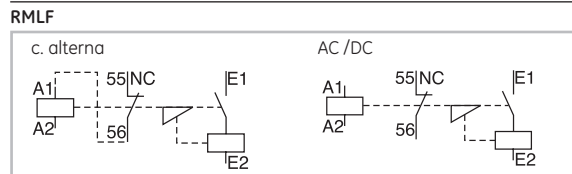
**Mechanical and mechanical/electrical interlock**



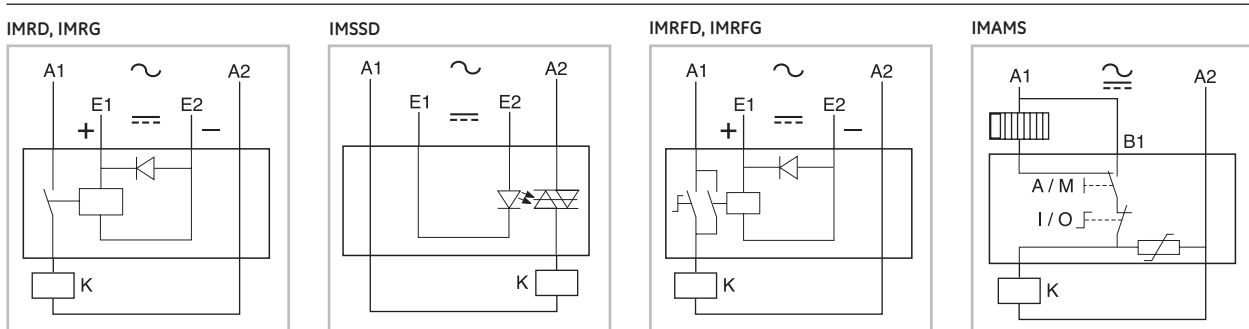
**Voltage suppressor blocks**





**Mechanical latch block**



**Interface modules**



## Terminal numbering according to EN 50012

		Auxiliary contacts		Possible basic contactors + Auxiliary contacts blocks to be added		
		Combination				
		Description				
<b>Without auxiliary contact blocks</b>						
	10E	1	0		CL00_310... - CL04_310...	
	01E	0	1		CL00_301... - CL04_301...	
<b>Front mounting auxiliary contact blocks with one contact each</b>						
	11E	1	1		CL00_310... - CL04_310... + BC_F01	
	21E	2	1		CL00_310... - CL04_310... + BC_F01 + BC_F10	
	12E	1	2		CL00_310... - CL04_310... + BC_F01 + BC_F01	
	31E	3	1		CL00_310... - CL04_310... + BC_F01 + BC_F10 + BC_F10	
	41E	4	1		CL00_310... - CL04_310... + BC_F01 + BC_F10 + BC_F10 + BC_F10	
	22E	2	2		CL00_310... - CL04_310... + BC_F01 + BC_F01 + BC_F10	
	32E	3	2		CL00_310... - CL04_310... + BC_F01 + BC_F01 + BC_F10 + BC_F10	
	13E	1	3		CL00_310... - CL04_310... + BC_F01 + BC_F01 + BC_F01	
	23E	2	3		CL00_310... - CL04_310... + BC_F01 + BC_F01 + BC_F01 + BC_F10	
<b>Lateral mounting auxiliary contact blocks with two contacts each</b>						
	11E	1	1		CL00_300... - CL45_300... + BCLL11	
	31E	3	1		CL00_300... - CL45_300... + BCLL11 + BCLL20	
	22E	2	2		CL00_300... - CL45_300... + BCLL11 + BCLL11	

The maximum number of auxiliary contacts is 4 for CL00 to CL25, 6 for CL03 -CL04 and 8 for CL45, CL06 to CL10. When using the pneumatic BTLF-block, these numbers are reduced to two, resp. four. (2 for CL00 to CL25, 4 for CL03 and CL04, etc.)

Terminal numbering according to EN 50012 (continued)

Diagram	Auxiliary contacts		Possible basic contactors + Auxiliary contacts blocks to be added
	Combination	Description	
<b>Without auxiliary contact blocks</b>			
			CL25_300... - CL45_300... CL06_300... - CL10_300...
<b>Front mounting auxiliary contact blocks with one contact each</b>			
	10E	1 0	CL25_300... - CL45_300... + BC_F10 CL06_300... - CL10_300... + BC_F10
	01E	0 1	CL25_300... - CL45_300... + BC_F01 CL06_300... - CL10_300... + BC_F01
	11E	1 1	CL25_300... - CL45_300... + BC_F10 + BC_F01 CL06_300... - CL10_300... + BC_F10 + BC_F01
	21E	2 1	CL25_300... - CL45_300... + BC_F10 + BC_F01 + BC_F10 CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F10
	12E	1 2	CL25_300... - CL45_300... + BC_F10 + BC_F01 + BC_F01 CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F01
	31E	3 1	CL25_300... - CL45_300... + BC_F10 + BC_F01 + BC_F10 + BC_F01 CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F10 + BC_F01
	41E	4 1	CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F10 + BC_F10 + BC_F10
	22E	2 2	CL25_300... - CL45_300... + BC_F10 + BC_F01 + BC_F01 + BC_F10 CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F01 + BC_F10
	32E	3 2	CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F01 + BC_F10 + BC_F10
	13E	1 3	CL25_300... - CL45_300... + BC_F10 + BC_F01 + BC_F01 + BC_F01 CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F01 + BC_F01
	23E	2 3	CL06_300... - CL10_300... + BC_F10 + BC_F01 + BC_F01 + BC_F01 + BC_F10
<b>Lateral mounting auxiliary contact blocks with two contacts each</b>			
	11E	1 1	CL25_300... - CL45_300... + BCLL11 CL06_300... - CL10_300... + BCLL11
	31E	3 1	CL25_300... - CL45_300... + BCLL11 + BCLL20 CL06_300... - CL10_300... + BCLL11 + BCLL20
	22E	2 2	CL25_300... - CL45_300... + BCLL11 + BCLL11 CL06_300... - CL10_300... + BCLL11 + BCLL11

3P and 4P contactors

A

B

C

D

E

F

G

H

I

X



## Conformity to standards

IEC/EN 60947-1	NF C 63-110	BS 5424 & 775
IEC/EN 60947-4-1	ASE 1025	NEMA ICS 1
CENELEC HD 419	CSA 22.2/14	VDE 0660/102
UL 508	UNE 20109	
EN 50005		

## Approvals

cULus	RINA	CE
NOM	FI	
Lloyd's Register	Bureau Veritas	

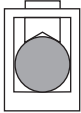
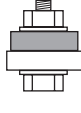
## Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +60°C	
Altitude	up to 3000m	Nominal values
	from 3000 up to 4000m	90%le 80%Ue
	from 4000 up to 5000m	80%le 75%Ue

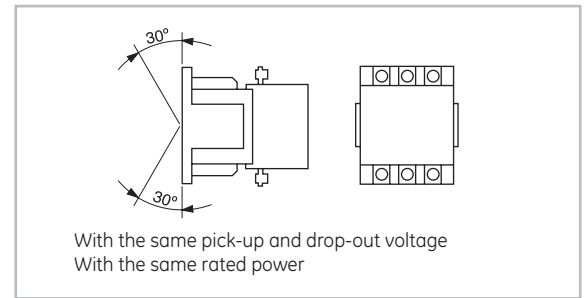
## Climatic resistance (IEC 68-2)

Continuous tests 40 / 125 / 56		
Cold (72h)	Temperature	-40°C
	Dry heat (96h)	
	Temperature	+125°C
	Relative humidity	< 50%
Humid heat (56 days)	Temperature	+40°C
	Relative humidity	95%
Cyclical test		
First half-cycle (12h)	Low temperature	+25°C
	Relative humidity	93%
Second half-cycle (12h)	Low temperature	+55°C
	Relative humidity	95%
Number of consecutive cycles	6	

## Terminal capacity and tightening torque

		CK07B	CK75C CK08C	CK08B CK95B	CK10C	CK11C	CK12B	CK13B
	Solid (mm²)	1.5..95						
	Finely stranded w/end sleeve (mm²)	2..35						
	Finely stranded w/o end sleeve (mm²)	2..50						
	Stranded (mm²)	1.5..95						
	AWG wires (mm²)	16..00						
	Tightening torque (Nm)	8						
	(Lb x in)	70						
	Finely stranded w/end sleeve (mm²)		1 x 120 2 x 95	1 x 240 2 x 150	2 x 185	2 x 240	-	-
	AWG wires with end sleeve (mm²)		1 x 300 2 x 107	1 x 500 2 x 300	2 x 350	2 x 500	-	-
	Busbars		2 (25 x 5)	2 (25 x 5)	2 (35 x 10)	2 (35 x 10)	2 (35 x 10)	2 (60 x 10)
	Tightening torque (Nm)		8	23	31.5	31.5	31.5	31.5
	(Lb x in)		70	200	275	275	275	275

## Mounting positions



## Power circuit

			CK75C	CK08C	CK85B	CK09B	CK95B	CK10C	CK11C	CK12B	CK13B
<b>Three pole contactors</b>											
Rated thermal current I <sub>th</sub> at $\theta \leq 40^\circ\text{C}$	(A)		250	250	315	315	450	600	700	1000	1250
Rated operational current I <sub>e</sub> AC-3	(A)		150	185	205	250	309	420	550	700	825
Rated operational voltage U <sub>e</sub>	(V)		1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated insulation voltage U <sub>i</sub>	(V)		1000	1000	1000	1000	1000	1000	1000	1000	1000
Maximum continuous current AC-1	(A)		250	250	315	315	450	600	700	1000	1250
Frequency limits	(Hz)		25...400	25...400	25...400	25...400	25...400	25...400	25...400	25...400	25...400
Making capacity (RMS) (IEC 947)	(A)		1850	2200	2500	2500	3700	6500	6500	8400	8250
Breaking capacity (RMS) (IEC 947)											
U <sub>e</sub> ≤ 400V	(A)		1600	1850	2000	3500	3500	5600	5600	7300	6600
U <sub>e</sub> = 500V	(A)		1600	1850	2000	3500	3500	5600	5600	7000	6600
U <sub>e</sub> = 690V	(A)		1000	1200	1660	2200	2200	5000	5000	6700	6000
U <sub>e</sub> = 1000V	(A)		350	350	850	1100	1100	3000	3000	3500	3500
Short-time current											
1 sec.	(A)		2500	2500	4000	5500	5500	7500	7500	9700	11600
5 sec.	(A)		2500	2500	3200	3500	3500	5200	5200	7700	8800
10 sec.	(A)		2300	2300	2400	2500	2500	4000	4000	6100	7350
30 sec.	(A)		1250	1250	1400	1600	1600	2800	2800	4400	5300
1 min.	(A)		900	900	1000	1200	1200	1800	1800	3500	4500
3 min.	(A)		600	600	750	900	900	1200	1200	2300	2800
Short-time current	(min.)		10	10	10	10	10	10	10	10	10
Protec. against short-circuit with fuses without TOR											
Coord. type "1"	gL/gG	(A)	355	355	500	500	630	1250	1250	1250	2x800
Coord. type "2"	gL/gG	(A)	250	250	315	400	500	630	800	1000	1250
Without welding	gL/gG	(A)	200	200	250	315	425	500	630	800	1000
Impedance per pole	(mΩ)		0.30	0.30	0.28	0.28	0.28	0.15	0.13	0.14	0.11
Power dissipation AC-1	(W)		19	19	27.7	27.7	56.7	54.3	63.7	140	171.8
per pole AC-3	(W)		6.8	10.3	11.7	17.5	26.7	26.5	45.3	68.6	74.8
Insulation resistance											
Between adjacent poles	(mΩ)		> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10
Between poles and earth	(mΩ)		> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10
Between input and output	(mΩ)		> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10	> 10
			CK07B	CK08B		CK09B	CK95B	CK10C	CK11C	CK12B	CK13B
<b>Four pole contactors</b>											
Rated thermal current I <sub>th</sub> at $\theta \leq 40^\circ\text{C}$	(A)		200	325		400	500	600	700	1000	1250
Rated operational voltage U <sub>e</sub>	(V)		690	1000		1000	1000	1000	1000	1000	1000
Rated insulation voltage U <sub>i</sub>	(V)		1000	1000		1000	1000	1000	1000	1000	1000
Maximum continuous current AC-1	(A)		200	325		400	500	600	700	1000	1250
Frequency limits	(Hz)		25...400	25...4000		25...400	25...400	25...400	25...400	25...400	25...400
Making capacity (RMS) (IEC 947)	(A)		1150	1850		2500	3700	6500	6500	6700	8250
Breaking capacity (RMS) (IEC 947)											
U <sub>e</sub> ≤ 400V	(A)		950	1600		3500	3500	5600	5600	6700	6600
U <sub>e</sub> = 500V	(A)		950	1600		3500	3500	5600	5600	6700	6600
U <sub>e</sub> = 690V	(A)		800	1000		2200	2200	3500	3500	6000	6000
U <sub>e</sub> = 1000V	(A)		-	350		1100	1100	2000	2000	3500	3500
Short-time current											
1 sec.	(A)		2100	2500		5500	5500	7500	7500	9700	11600
5 sec.	(A)		1500	2500		3500	3500	5200	5200	7700	8800
10 sec.	(A)		1150	2300		2500	2500	4000	4000	6100	7350
30 sec.	(A)		750	1250		1600	1600	2800	2800	4400	5300
1 min.	(A)		550	900		1200	1200	1800	1800	3500	4500
3 min.	(A)		350	600		900	900	1200	1200	2300	2800
Recovery time	min.		10	10		10	10	10	10	10	10
Short-circuit protection with fuse without TOR											
Coord. type "1"	gL/gG	(A)	315	500		500	630	1250	1250	1250	2x800
Coord. type "2"	gL/gG	(A)	250	400		400	500	630	800	1000	1250
Without welding	gL/gG	(A)	200	315		315	425	500	630	800	1000
Impedance per pole	(mΩ)		0.45	0.32		0.28	0.28	0.15	0.13	0.14	0.11
Power dissipation per pole AC-1	(W)		18	33.8		44.8	56.7	61.2	68.6	140	171.8
Insulation resistance											
Between adjacent poles	(mΩ)		> 10	> 10		> 10	> 10	> 10	> 10	> 10	> 10
Between poles and earth	(mΩ)		> 10	> 10		> 10	> 10	> 10	> 10	> 10	> 10
Between input and output	(mΩ)		> 10	> 10		> 10	> 10	> 10	> 10	> 10	> 10



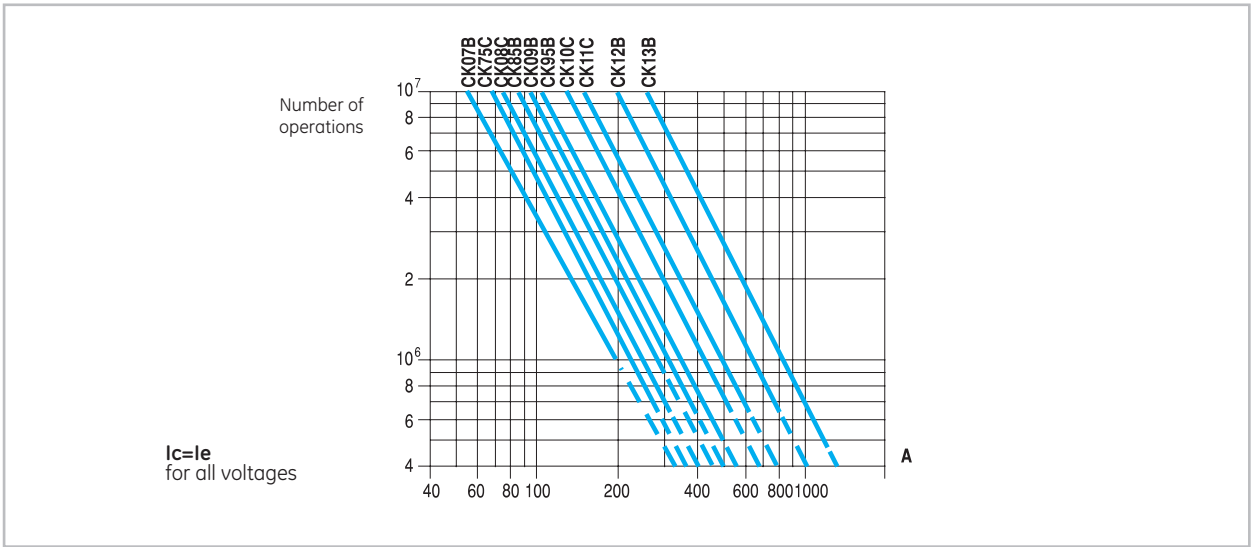
**Electrical endurance**

**Mixed category AC4 / AC3**

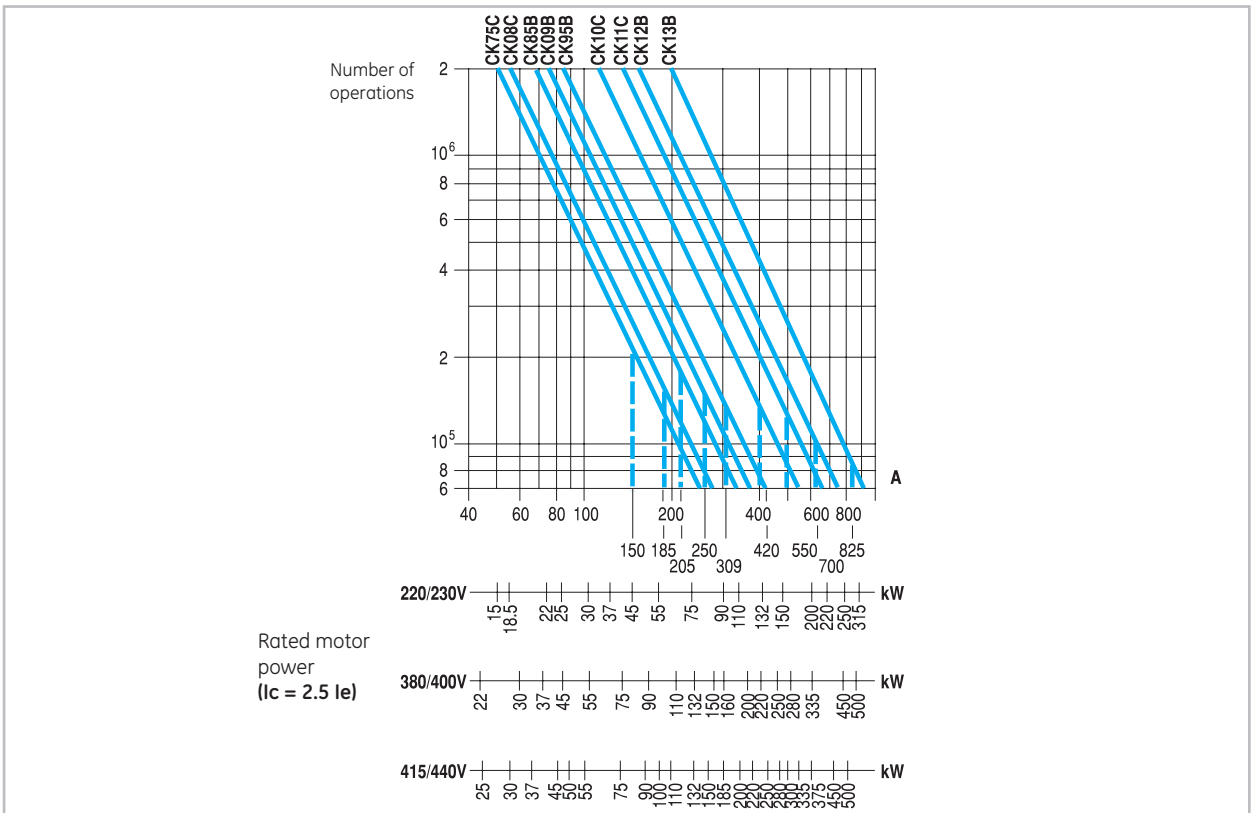
Electrical endurance for mixed category (AC-3/AC-4) is calculated with the following formula:

$$\text{Electrical endurance (AC-3/AC-4)} = \frac{\text{Electrical endurance (AC-3)}}{1 + \frac{\% \text{ oper AC-4}}{100} \times \left( \frac{\text{Elec.endur. (AC-3)}}{\text{Elec.endur. (AC-4)}} - 1 \right)}$$

**Category AC1**

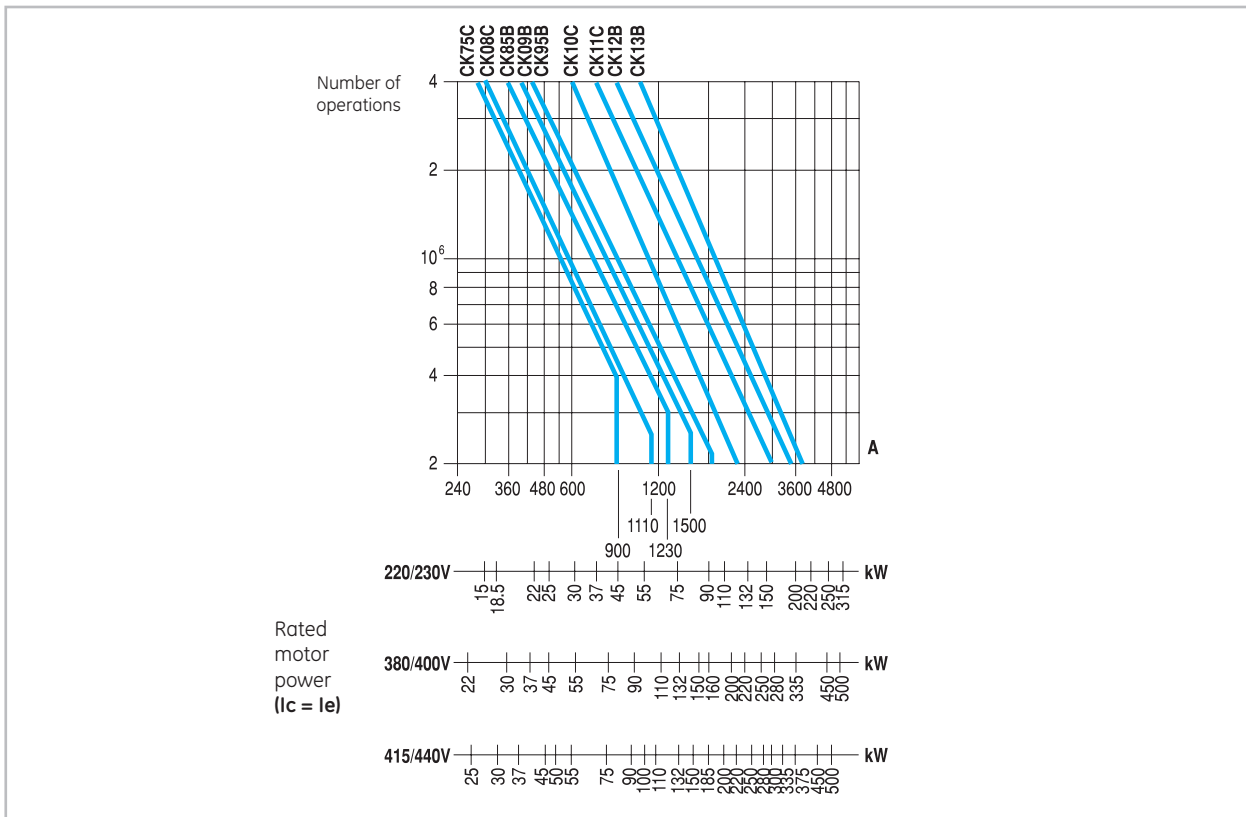


**Category AC2**

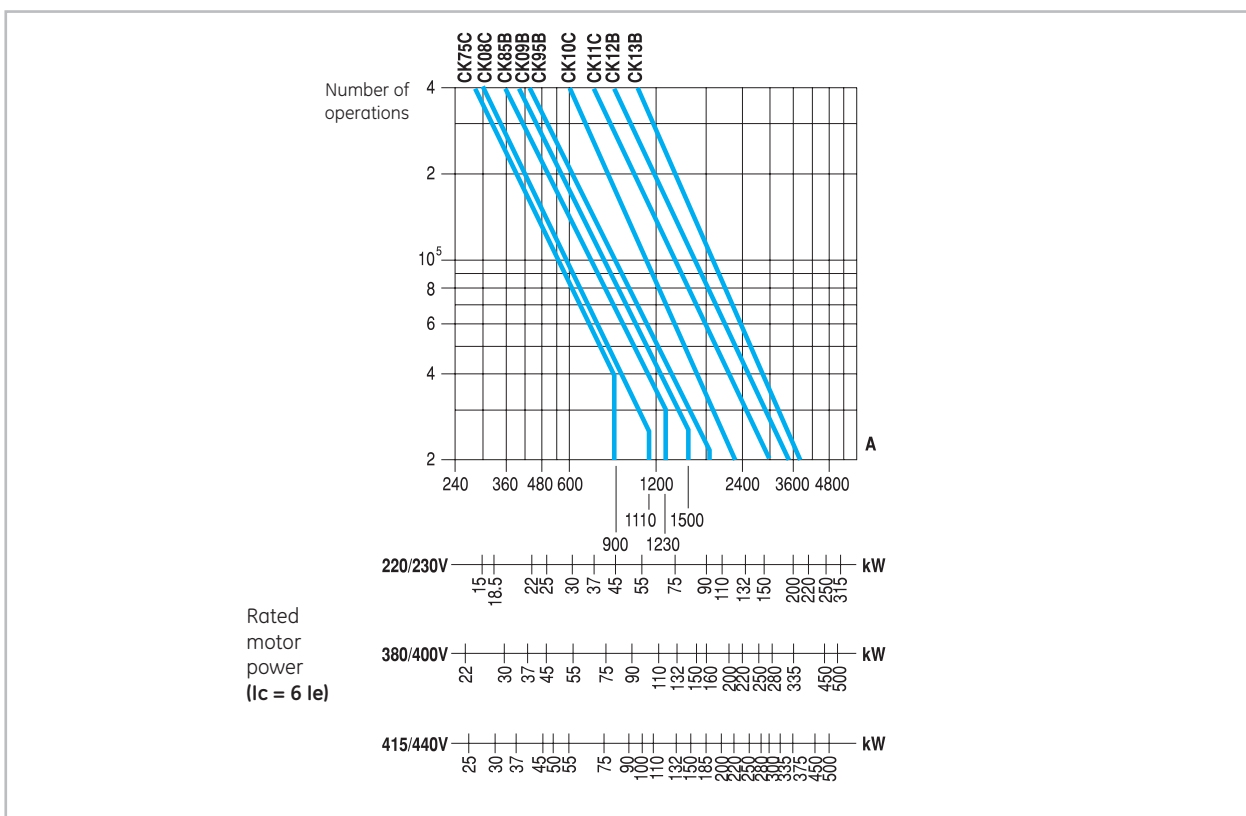


Electrical endurance (continued)

Category AC3



Category AC4



3P and 4P contactors

A

B

C

D

E

F

G

H

I

X



Three pole contactors. Control circuit

Alternating current

		CK75CA	CK08CA	CK85BA CK85BE	CK09BE	CK95BE	CK10CE	CK11CE	CK12BE	CK13BA
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Standard voltages $U_s$ (50/60 Hz)	(V)	24...690	24...690	24...690	24...690	24...690	24...690	24...690	24...690	24...440
Operating limits										
Switch-on	x $U_s$	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Switch-off	x $U_s$	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.25...0.55
Consumption. Monofrequency coils										
Magnetic circuit closed	CK...A (VA)	42	42	46	-	-	-	-	-	6
Magnetic circuit open	CK...E (VA)	-	-	20	20	20	23	23	25	-
Power dissipation	CK...A (W)	500	500	830	-	-	-	-	-	2760
	CK...E (W)	-	-	425	425	425	680	680	750	-
Consumption. Bifrequency coils										
Magnetic circuit closed (CK...A)	50Hz (VA)	46	46	60	-	-	-	-	-	-
	60Hz (VA)	38.3	38.3	50	-	-	-	-	-	-
Magnetic circuit open (CK...A)	50Hz (VA)	568	568	1082	-	-	-	-	-	-
	60Hz (VA)	473	473	901	-	-	-	-	-	-
Power dissipation (CK...A)	50Hz (W)	23	23	22.2	-	-	-	-	-	-
	60Hz (W)	19.1	19.1	18.5	-	-	-	-	-	-
Power factor										
Magnetic circuit closed	CK...A (cos $\varphi$ )	0.4	0.4	0.37	-	-	-	-	-	approx. 1
	CK...E (cos $\varphi$ )	-	-	-	-	-	-	-	-	-
Magnetic circuit open	CK...A (cos $\varphi$ )	0.6	0.6	0.6	-	-	-	-	-	approx. 1
	CK...E (cos $\varphi$ )	-	-	-	-	-	-	-	-	-
Opening and closing times at $U_s$										
Making time at excitation (NO)	(ms)	20...25	20...25	36...40	60...70	60...70	80...90	80...90	70...80	50...55
Breaking time at de-energisation (NO)	(ms)	10...13	10...13	10...15	13...17	13...17	40...50	40...50	70...80	115...130
Mechanical endurance										
Maximum rate	$10^6$ ops	10	10	10	10	10	10	10	10	3
No load	ops/h	2400	2400	2400	1200	1200	900	900	900	600
AC-1/AC-3 at rated power	ops/h	600	600	600	600	600	300	300	300	120
AC-2 at rated power	ops/h	250	250	250	250	250	200	200	200	120
AC-4 at rated power	ops/h	150	150	150	150	150	120	120	120	120

Direct current

		CK75CE	CK08CE	CK85BE	CK09BE	CK95BE	CK10CE	CK11CE	CK12BE
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000	1000	1000	1000	1000
Standard voltages $U_s$ (50/60 Hz)	(V)	24...500	24...500	24...500	24...500	24...500	24...500	24...500	24...500
Operating limits									
Switch-on	x $U_s$	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Switch-off	x $U_s$	0.4...0.6	0.4...0.6	0.35...0.5	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6
Consumption									
Magnetic circuit closed	(W)	2	2	3.5	3.5	3.5	4	4	4.5
Magnetic circuit open	(W)	135	135	350	350	350	405	405	650
Opening and closing times at $U_s$									
Making time at excitation (NO contacts)	(ms)	60...70	60...70	60...70	60...70	60...70	80...90	80...90	70...80
Breaking time at de-energisation (NO contacts)	(ms)	13...17	13...17	13...17	13...17	13...17	40...50	40...50	40...50
Mechanical endurance									
Maximum rate	$10^6$ ops	10	10	10	10	10	10	10	10
No load	ops/h	1200	1200	1200	1200	1200	900	900	900
AC-3 at rated power	ops/h	600	600	600	600	600	300	300	300
AC-4 at rated power	ops/h	150	150	150	150	150	120	120	120

Contactor

A

B

C

D

E

F

G

H

I

X



## Four pole contactors. Control circuit

## Alternating current

		CK07BA CK07BE	CK08BA CK08BE	CK09BE	CK95BE	CK10CE	CK11CE	CK12BE	CK13BA
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000	1000	1000	1000	1000
Standard voltages $U_s$ (50/60 Hz)	(V)	24...690	24...690	24...690	24...690	24...690	24...690	24...690	110...440
Operating limits									
Switch-on	xUs	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Switch-off	xUs	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.25...0.55
Consumption. Monofrequency coils									
Magnetic circuit closed	CK...A (VA)	46	130	-	-	-	-	-	6
	CK...E (VA)	20	25	25	25	23	23	25	-
Magnetic circuit open	CK...A (VA)	830	2860	-	-	-	-	-	2760
	CK...E (VA)	425	750	750	750	680	680	750	-
Power dissipation	CK...A (W)	17	53	-	-	-	-	-	5
	CK...E (W)	3.5	4.5	4.5	4.5	4	4	4.5	-
Consumption. Bifrequency coils									
Magnetic circuit closed (CK...A)	50Hz (VA)	60	159.3	-	-	-	-	-	-
	60Hz (VA)	50	132.7	-	-	-	-	-	-
Magnetic circuit open (CK...A)	50Hz (VA)	1082	3509	-	-	-	-	-	-
	60Hz (VA)	901	2924	-	-	-	-	-	-
Power dissipation (CK...A)	50Hz (W)	22.2	65.3	-	-	-	-	-	-
	60Hz (W)	18.5	54.4	-	-	-	-	-	-
Power factor									
Magnetic circuit closed	CK...A (cos $\varphi$ )	0.37	0.37	-	-	-	-	-	approx. 1
	CK...E (cos $\varphi$ )	-	-	-	-	-	-	-	-
Magnetic circuit open	CK...A (cos $\varphi$ )	0.6	0.6	-	-	-	-	-	approx. 1
	CK...E (cos $\varphi$ )	-	-	-	-	-	-	-	-
Opening and closing times at Us									
Making time at excitation (NO)	(ms)	36...40	60...70	70...80	70...80	110...115	80...90	110...115	50...55
Breaking time at de-energisation (NO)	(ms)	10...15	13...17	70...80	70...80	70...80	40...50	70...80	70...80
Mechanical endurance	$10^6$ ops.	10	10	10	10	10	10	10	3
Maximum rate									
No load	ops/h	2400	900	900	900	900	900	900	600
AC-1/AC-3 at rated power	ops/h	600	600	600	600	300	300	300	120

## Direct current

		CK07BE	CK08BE	CK08BE	CK95BE	CK10CE	CK11CE	CK12BE
Rated insulation voltage $U_i$	(V)	1000	1000	1000	1000	1000	1000	1000
Standard voltages $U_s$	(V)	24...500	24...500	24...500	24...500	24...500	24...500	24...500
Operating limits								
Switch-on	xUs	0.75...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Switch-off	xUs	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6	0.4...0.6
Consumption.								
Magnetic circuit closed	(W)	3.5	4.5	4.5	4.5	4.5	4.5	4.5
Magnetic circuit open	(W)	350	650	650	650	650	650	650
Opening and closing times at Us								
Making time at excitation (NO contacts)	(ms)	60...70	70...80	70...80	70...80	80...90	80...90	110...115
Breaking time at de-energisation (NO contacts)	(ms)	13...17	70...80	70...80	70...80	40...50	40...50	70...80
Mechanical endurance	$10^6$ ops.	10	10	10	10	10	10	10
Maximum rate								
No load	ops/h	1200	900	900	900	900	900	900
AC-3 at rated power	ops/h	600	600	600	600	600	300	300

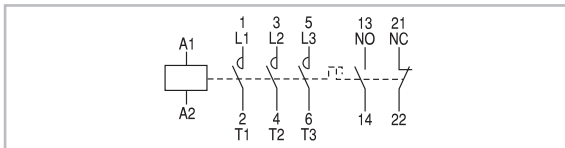
Contact sequence

		Basic contactor	Auxiliary contact blocks Lateral mounted	
			BCLL 20 BRLL 20	BCLL 11 BRLL 11
Three-pole contactors 3 NO	CK75C... CK08C...			
	CK85B... CK09B... CK95B...			
	CK10C... CK11C...			
	CK12B... CK13B...			
	CK07B...			
	CK08B... CK09B... CK95B...			
	CK10C... CK11C...			
	CK12B... CK13B...			

Numbering of the terminals

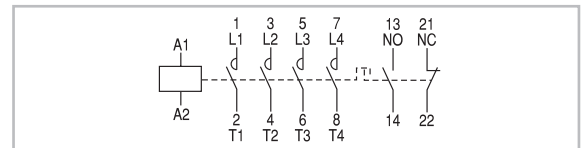
Three pole contactors

CK75C\_\_3\_... CK13B\_\_3\_



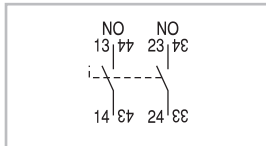
Four pole contactors

CK07B\_\_4\_... CK13B\_\_4\_

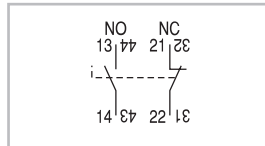


Auxiliary contact blocks. Lateral mounting

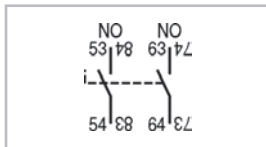
BCLL20



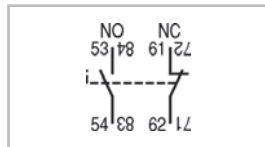
BCLL11



BRLL20

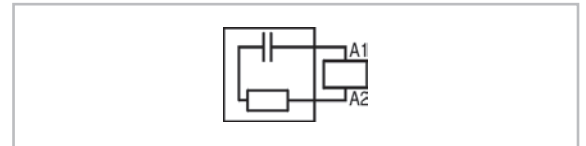


BRLL11



Voltage suppressor block

K/RC...



Mechanical interlock

BEKV, BEKVA1, BEKVS1, BEKVH



Notes

Grid area for notes.

3P and 4P contactors

A

B

C

D

E

F

G

H

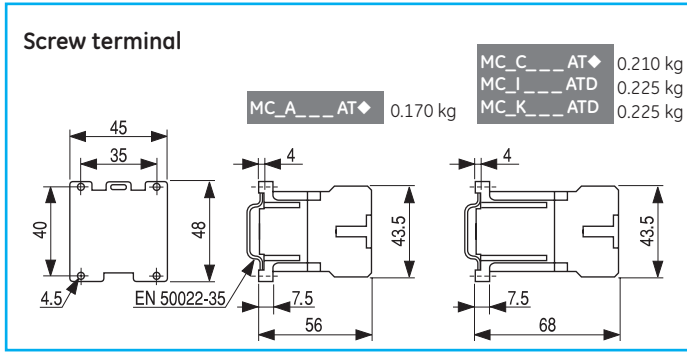
I

X

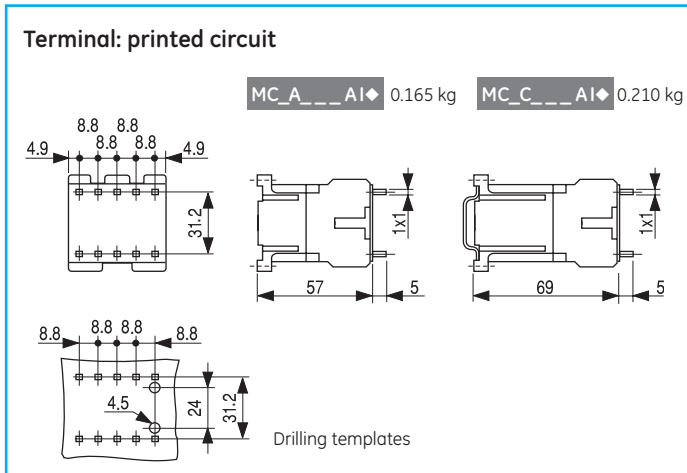
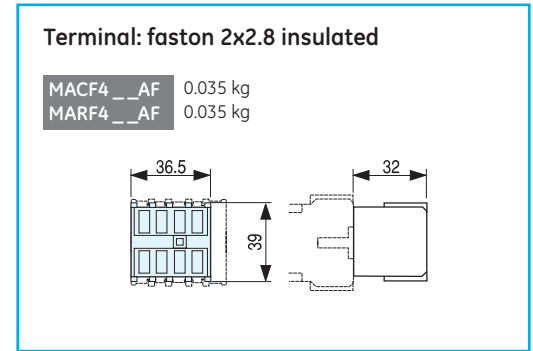
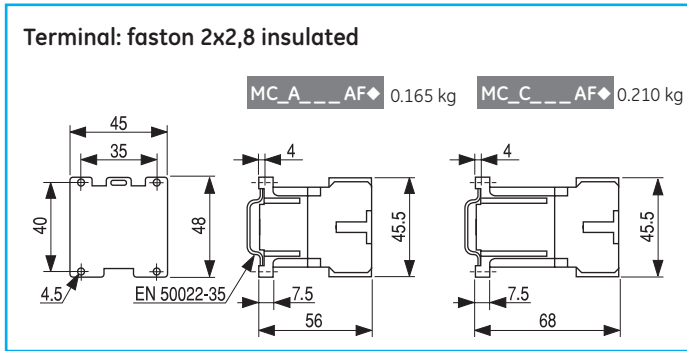
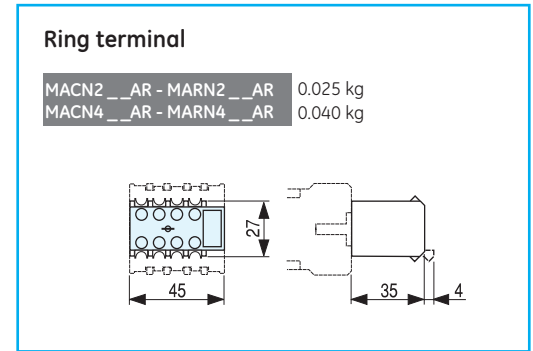
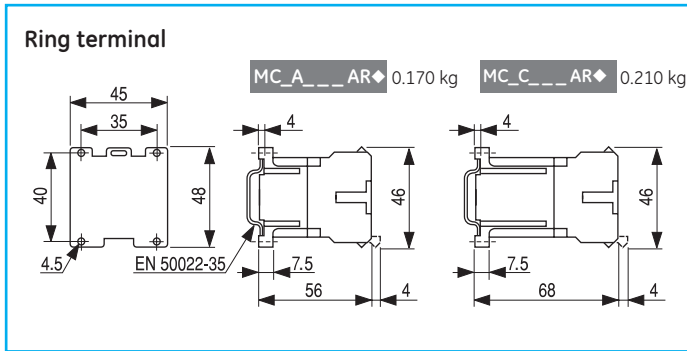
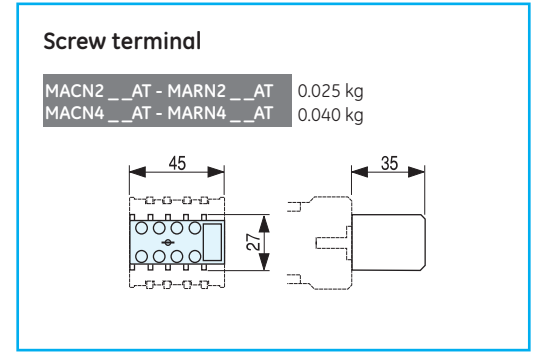


Dimensional drawings

Three and four pole minicontactors



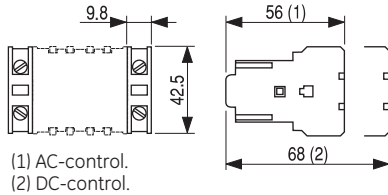
Auxiliary contact block. Lateral mounting



**Auxiliary contact blocks. Lateral mounting**

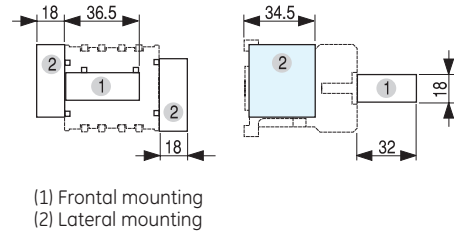
**Screw terminal**

MACL\_\_AT 0.013 kg  
MARL\_\_ATS 0.013 kg



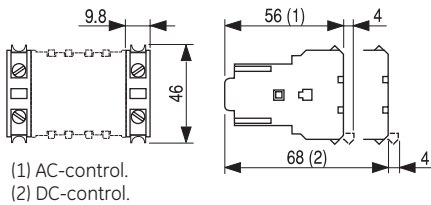
**Electronic timer block**

MREBC\_0AC2 0.040 kg



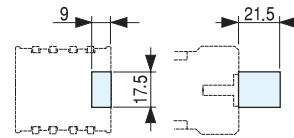
**Ring terminal**

MACL\_\_AR 0.013 kg  
MARL\_\_ARS 0.013 kg



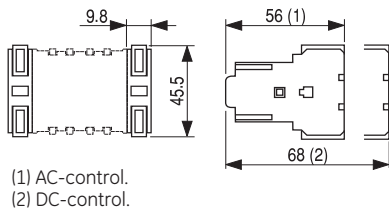
**Voltage suppressor block**

MP0A\_AE 0.010 kg  
MPOC\_AE3 0.010 kg



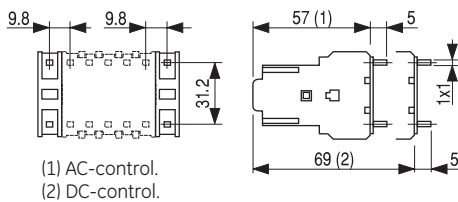
**Terminal: faston 2x2.8 insulated**

MACL\_\_AF 0.009 kg  
MARL\_\_AFS 0.009 kg



**Terminal: printed circuit**

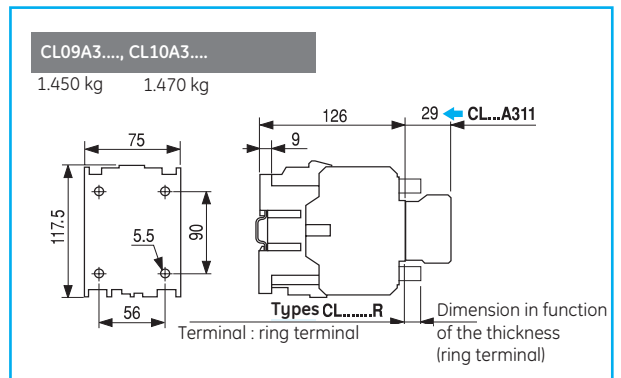
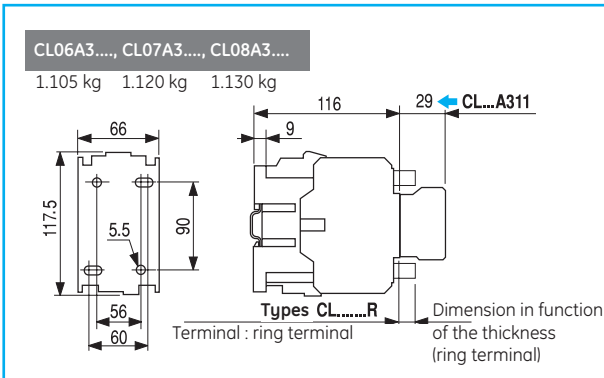
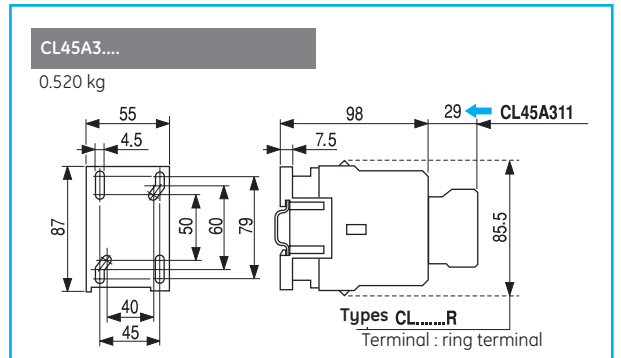
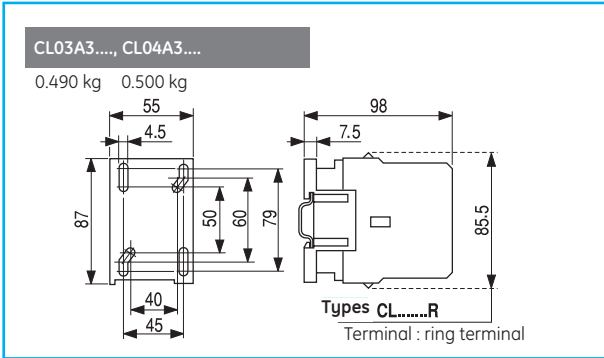
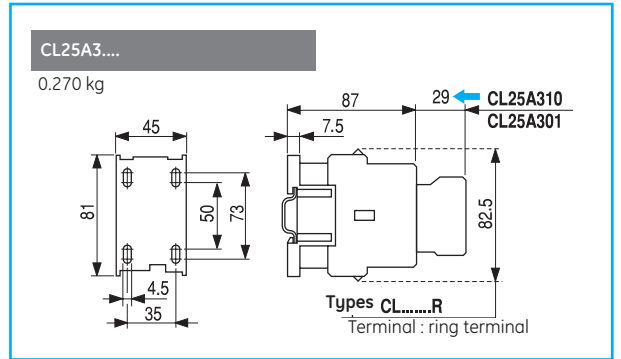
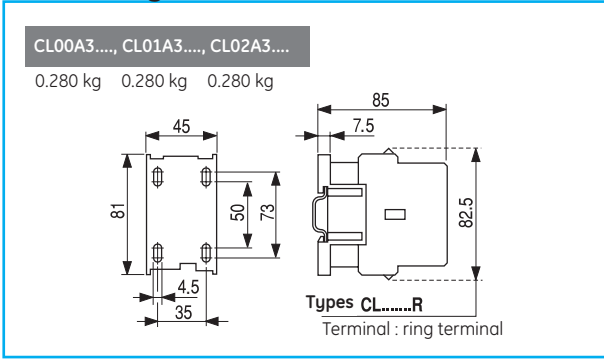
MACL\_\_AI 0.009 kg  
MARL\_\_AIS 0.009 kg





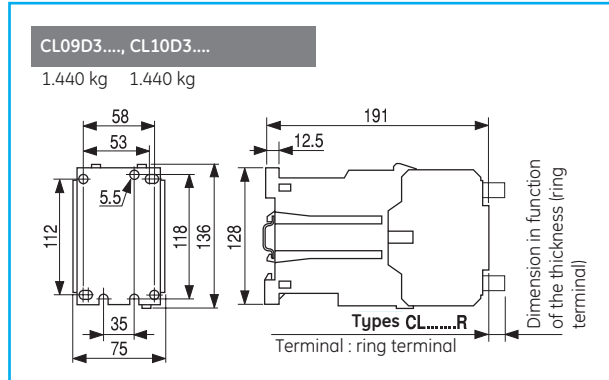
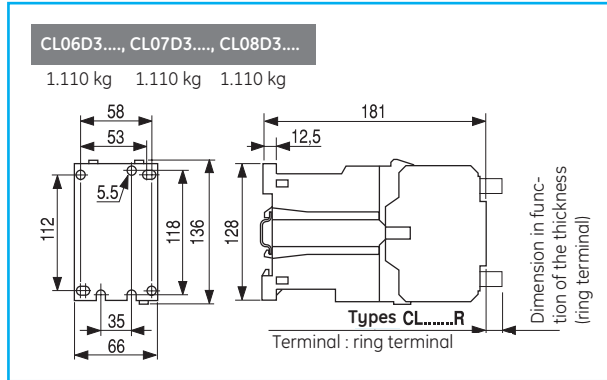
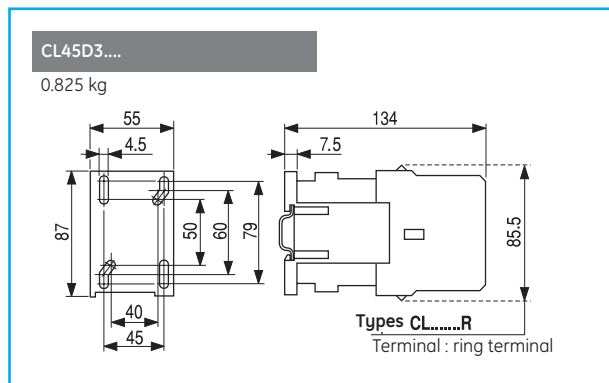
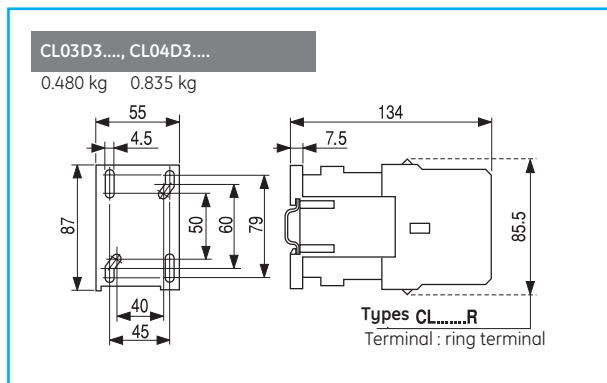
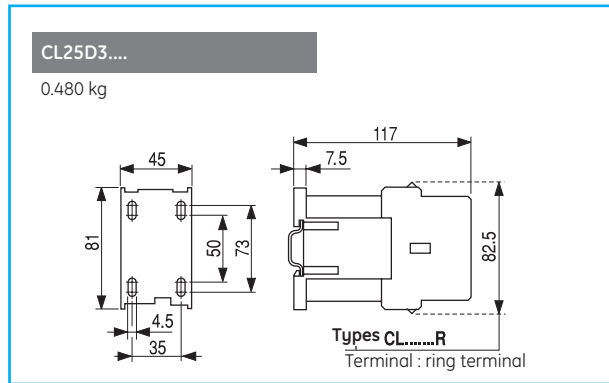
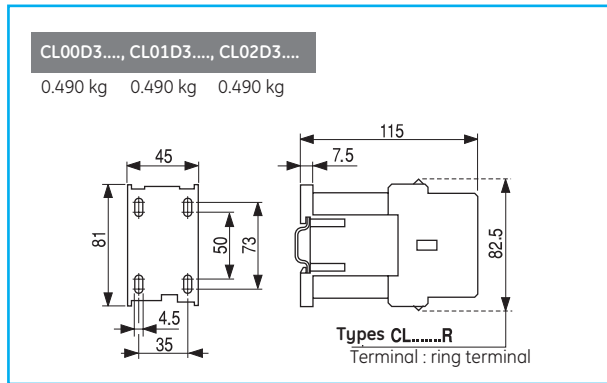
Dimensional drawings. Three pole contactors

Alternating current

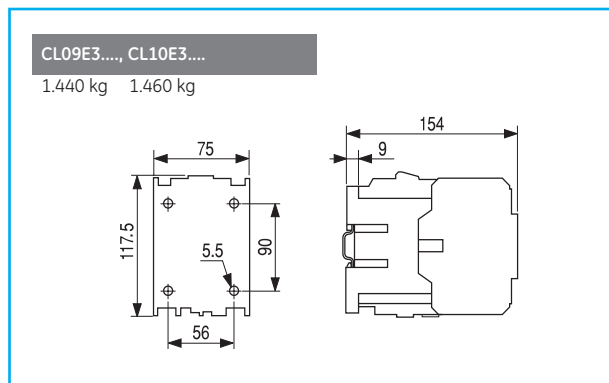
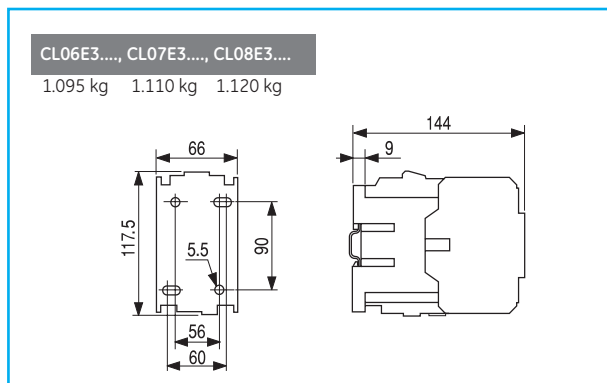


## Three pole contactors

### Direct current

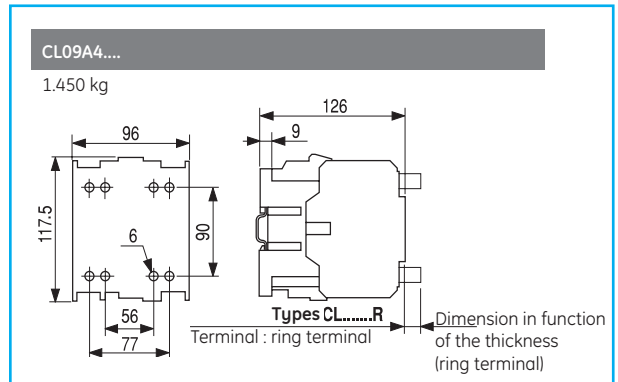
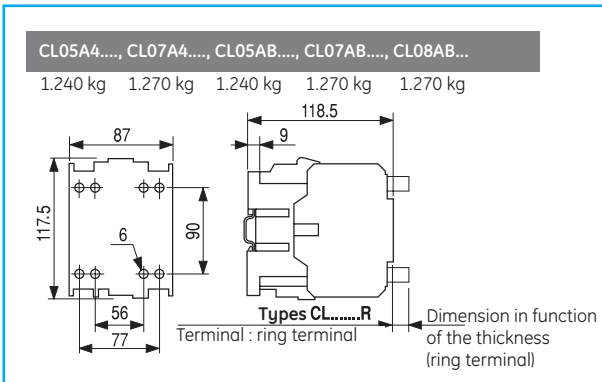
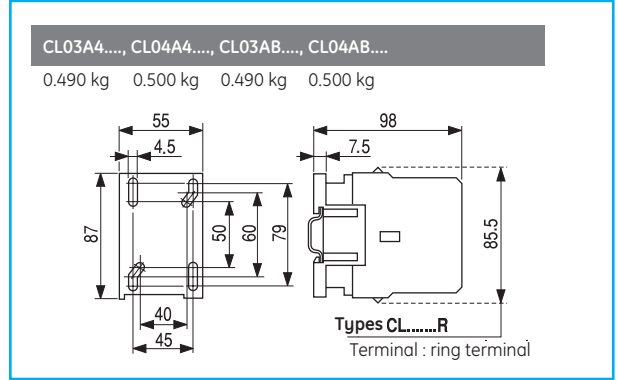
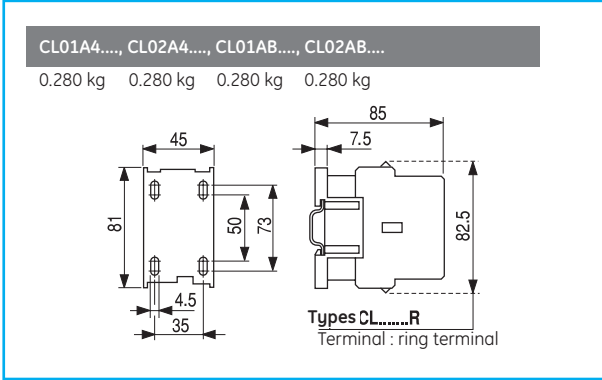


### Coil with electronic module

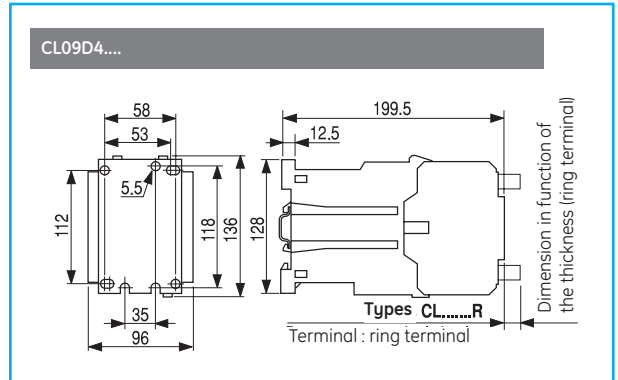
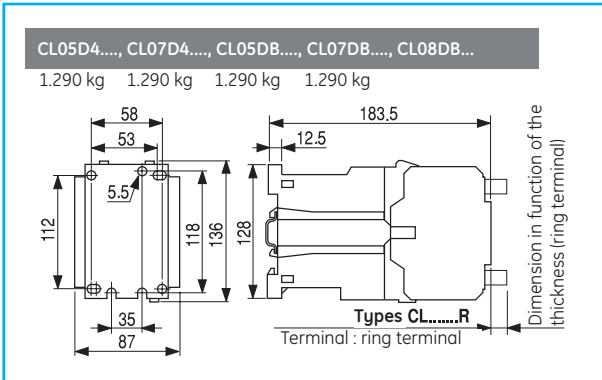
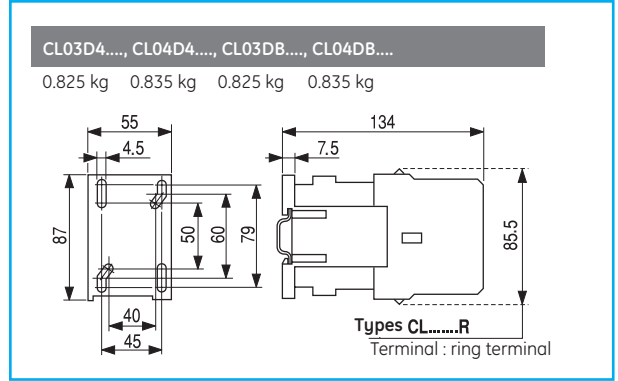
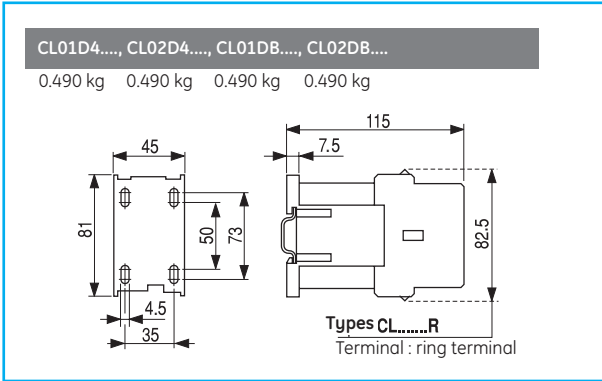


Dimensional drawings. Four pole contactors

Alternating current

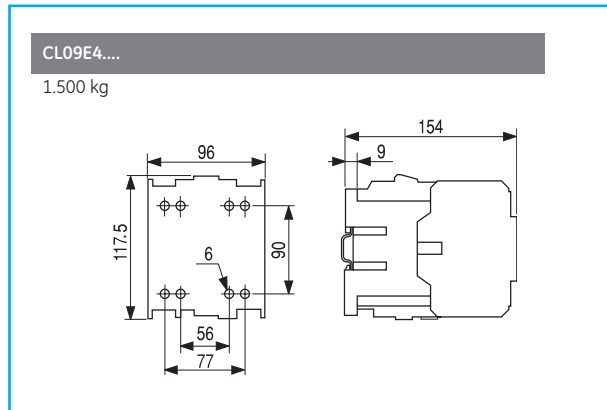
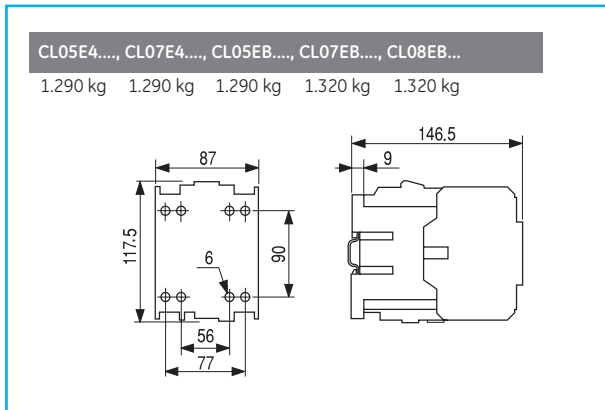


Direct current



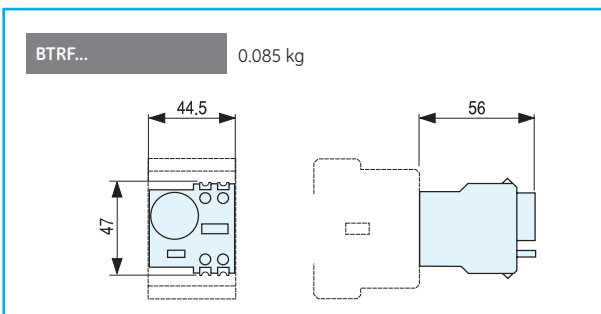
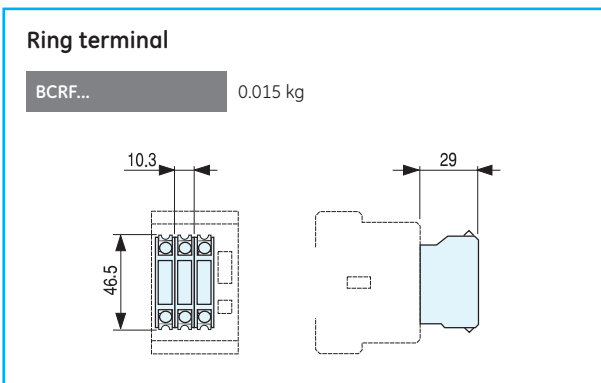
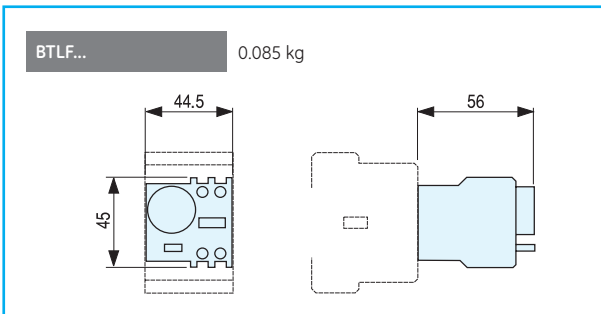
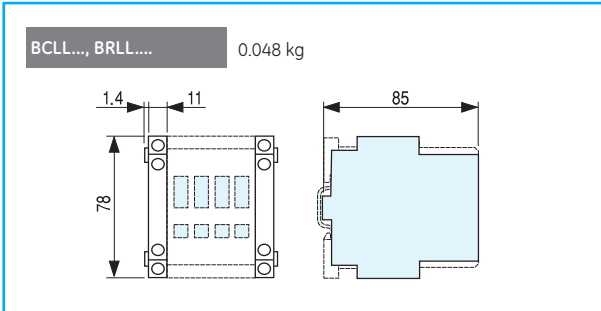
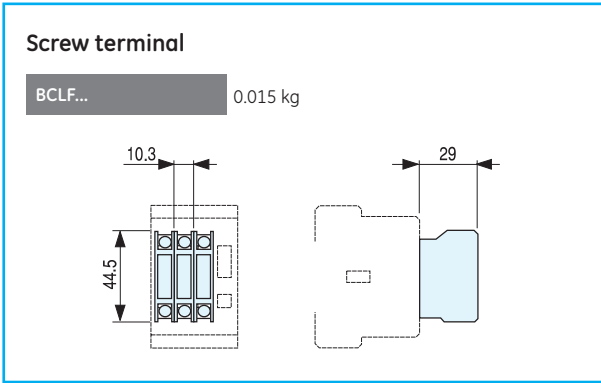
## Four pole contactors

### Coil with electronic module

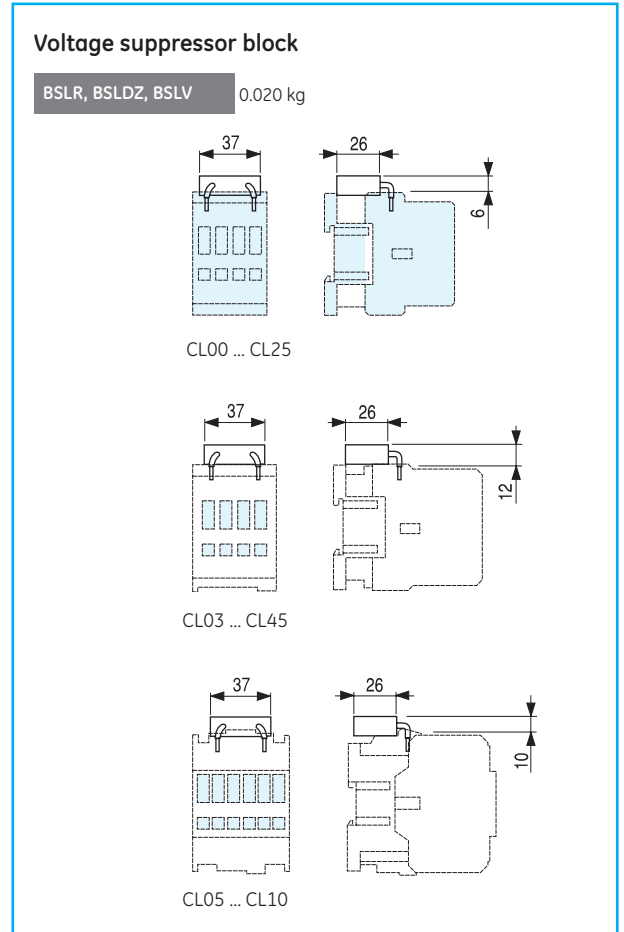


## Dimensional drawings

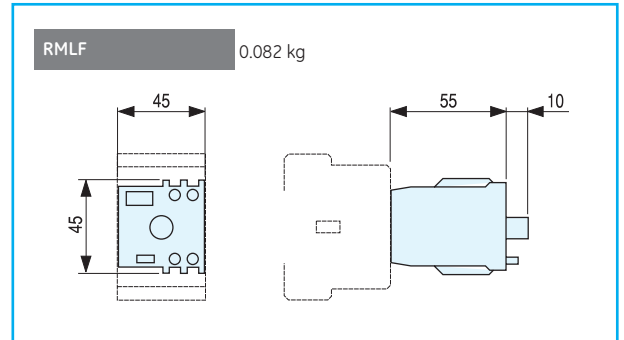
### Auxiliary contact blocks



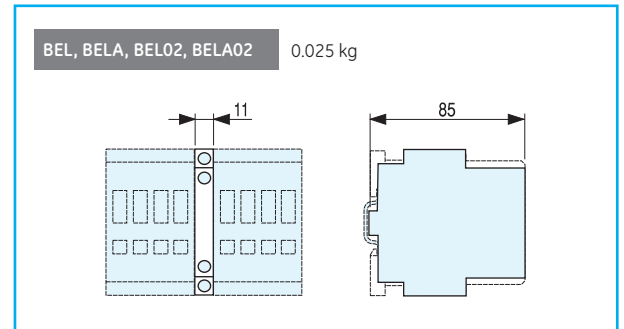
### Accessories



### Mechanical latch block

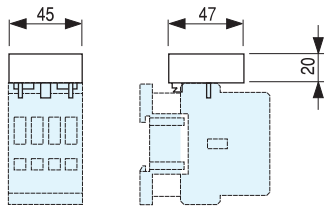


### Mechanical / mechanical-electrical interlock

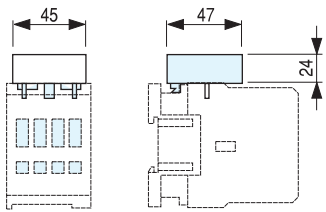


**Electronic timer block**

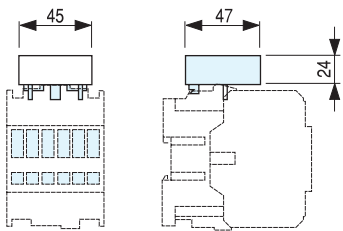
BETL02, BETL45 0.040 kg



CL00 ... CL25



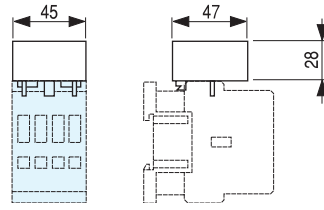
CL03 ... CL45



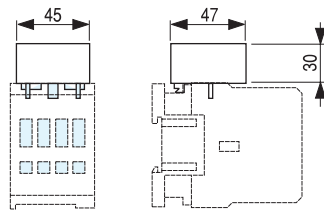
CL05 ... CL10

**Interface modules**

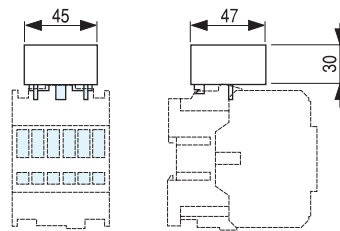
IMR..., IMRF..., IMSSD, IMAMS 0.020 kg



CL00 ... CL25



CL03 ... CL45



CL05 ... CL10

A

B

**C**

D

E

F

G

H

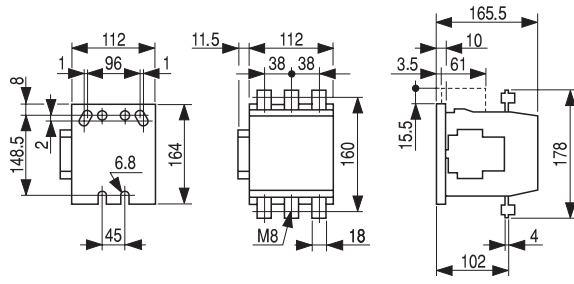
I

X

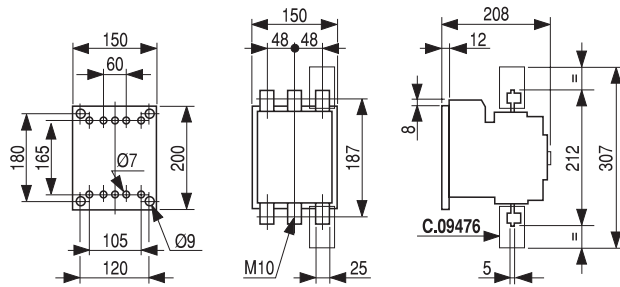
Dimensional drawings

Three pole contactors

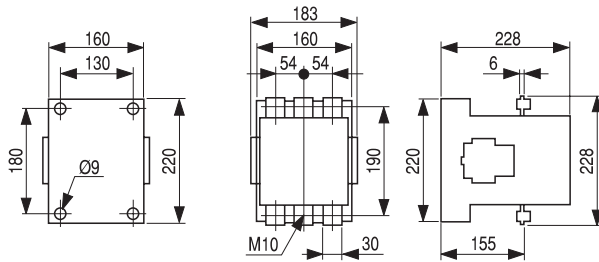
CK75C 3.500 kg  
CK08C 3.500 kg



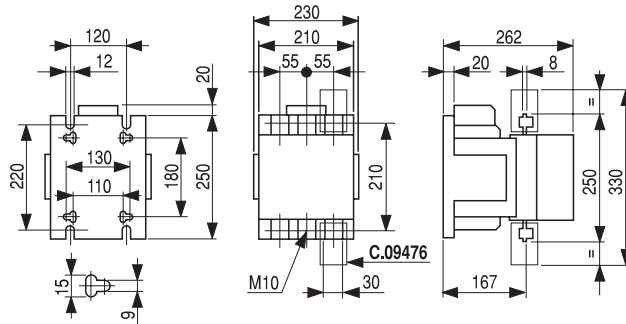
CK85B 6.100 kg  
CK09B 6.200 kg  
CK95B 6.300 kg



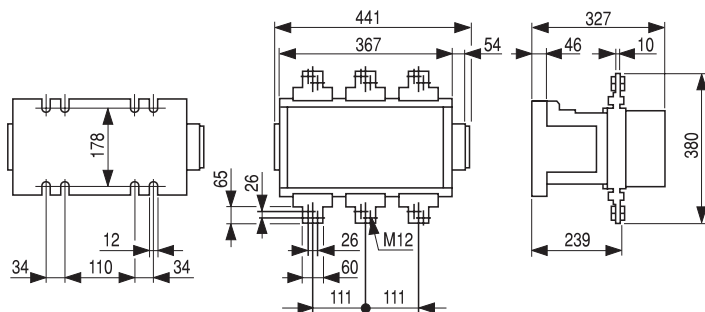
CK10C 11.00 kg  
CK11C 11.00 kg



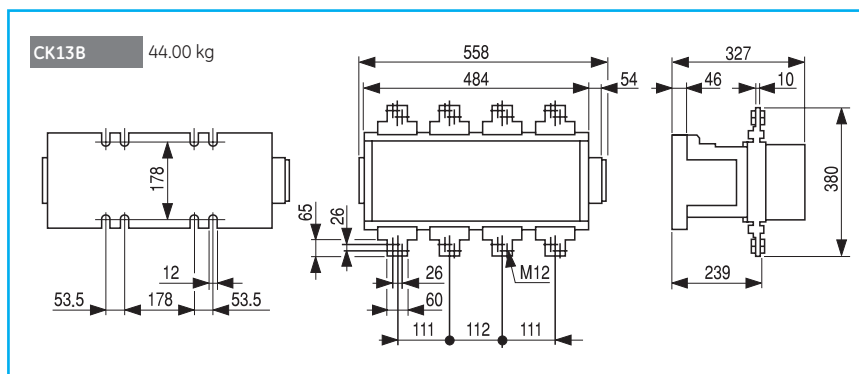
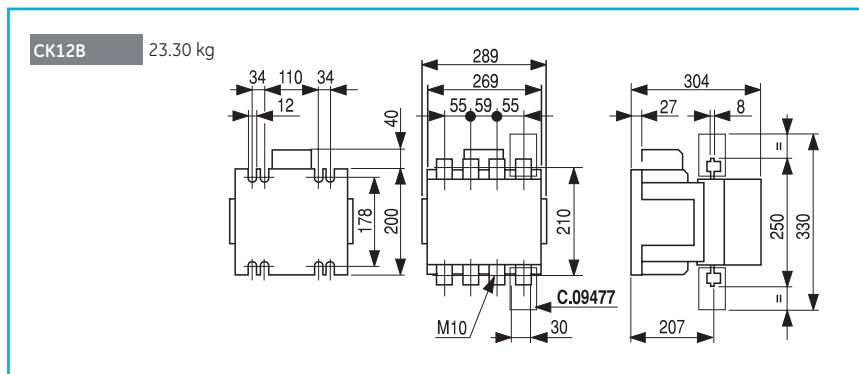
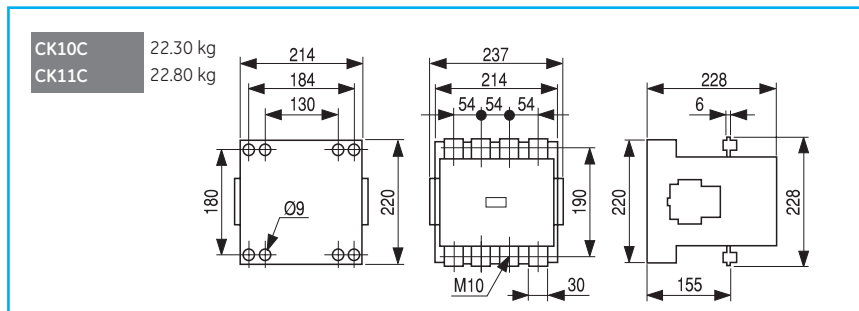
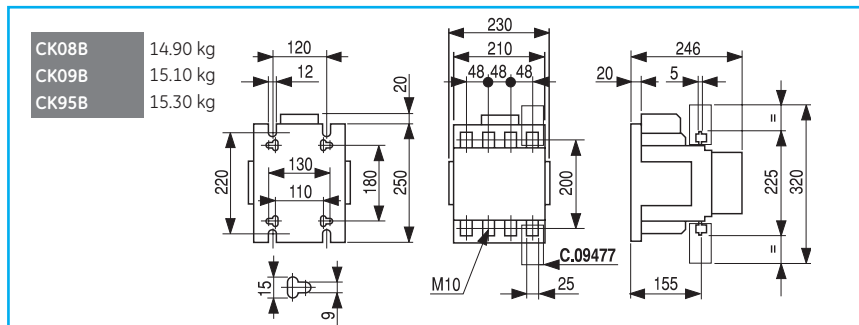
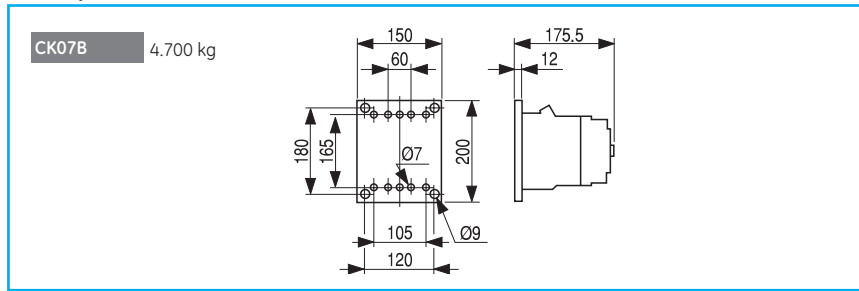
CK12B 18.00 kg



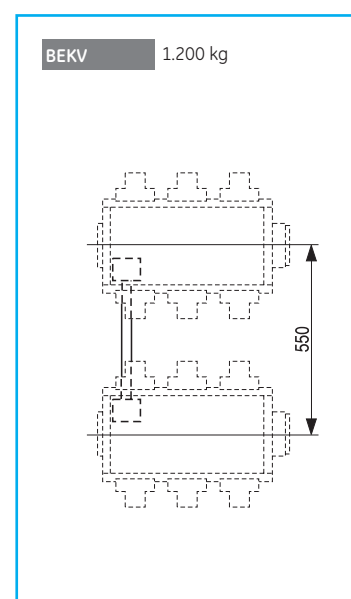
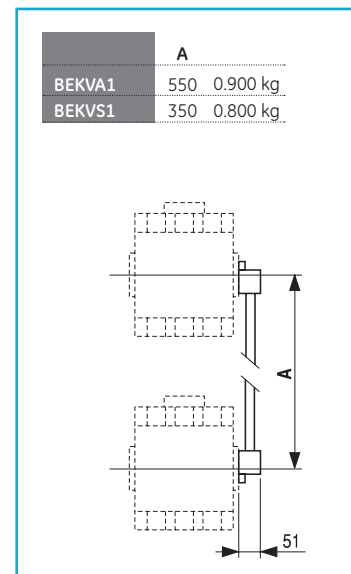
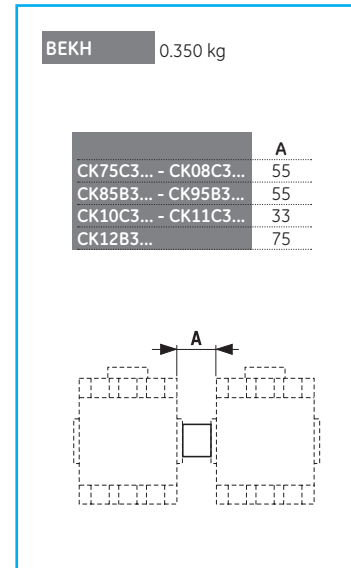
CK13B 35.00 kg



Four pole contactors



Mechanical interlock



3P and 4P contactors

A

B

C

D

E

F

G

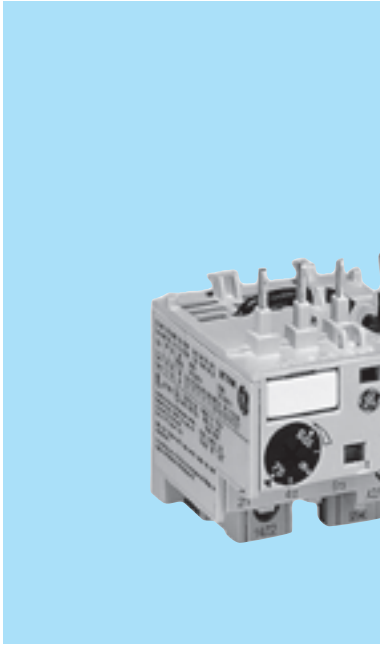
H

I

X







## Thermal overload relays for minicontactors from 0.11 to 14A

- Control circuit up to 690V
- Power circuit up to 690V
- Three-pole differential (phase unbalance protection)
- Automatic ambient temperature compensation between -25°C and +60°C
- Choice of manual or automatic reset
- Direct connection to contactor or independent mounting using accessories.
- Screw and Ring terminal versions
- Terminals protected against accidental contact in accordance with VDE 0106 T.100 and VBG4.
- Terminal numbering in accordance with EN 50005
- Degree of protection IP20 (EN 60529)
- Additional auxiliary contact block 1NO (with manual reset only)

### Standards

IEC/EN 60947-4-1	CSA 22.2/14
IEC/EN 60947-5-1	NI C 63-650
UNE 115	VDE 0660
NFC 63-650	UL 508

### Approvals

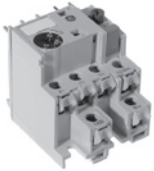


### General characteristics

- Thermal protection against balanced overload.
- Three-pole differential (phase unbalance protection).
- Automatic ambient temperature compensation.
- Front mounted selector for choosing utilisation current.
- Reset button, 2 positions :  
Manual(H) and Automatic(A) by turning the blue selector.
- Stop push button, independent of reset (red).
- Manual trip lever (tripping test).
- Tripping indicator (0-1).
- To facilitate wiring arrangements terminal 96 fits directly onto coil terminal (A2) and terminal 14/22 fits directly onto the feedback auxiliary contact.

Order codes ● pg. C.61  
 Technical data ● pg. C.68  
 Dimensions ● pg. C.69

Thermal overload relays for minicontactors



For use with:	Setting range (regulation)		Fuse				Terminal: screw		Terminal: ring terminal		Pack
			aM		gL		Cat. no.	Ref. no.	Cat. no.	Ref. no.	
			Type 2	Type 1	Type 2	Type 1					
	min. A	max. A	A	A	A	A					
MC0...	0.11	0.17	0.5	0.5	0.5	0.5	MT03A	101000	MT03RA	103540	10
MC1...	0.17	0.26	0.85	1	1	1	MT03B	101001	MT03RB	103541	10
MC2...	0.26	0.43	1	2	2	4	MT03C	101002	MT03RC	103542	10
	0.43	0.65	1	4	2	8	MT03D	101003	MT03RD	103543	10
	0.65	1	2	6	4	12	MT03E	101004	MT03RE	103544	10
	0.85	1.3	2	6	4	12	MT03F	101005	MT03RF	103545	10
	1.1	1.6	2	10	4	16	MT03G	101006	MT03RG	103546	10
	1.35	2	4	10	6	16	MT03H	101007	MT03RH	103547	10
	1.7	2.4	4	16	6	25	MT03I	101008	MT03RI	103548	10
	2.2	3.2	4	20	6	32	MT03J	101009	MT03RJ	103549	10
	2.5	4	4	20	6	32	MT03R	101015			10
	3	4.7	6	20	10	32	MT03K	101010	MT03RK	103550	10
	4	6.3	10	32	16	50	MT03L	101011	MT03RL	103551	10
	5.5	8	12	50	20	63	MT03M	101012	MT03RM	103552	10
	7.5	10.5	16	50	25	80	MT03N	101013	MT03RN	103553	10
	10	14	20	32	32	100	MT03P	101014	MT03RP	103554	10

Accessories



Input terminals

Terminal	Cat. no.	Ref. no.	Pack
Screw	MVE0T	101020	5
Ring terminal	MVE0R	103562	5



Base

For separate mounting onto standard EN 50022-35 profile	MVB0T	101021	5
---	-------	--------	---



Auxiliary contact block

Frontal fixing to the relay With trip indicator (0-I) One block per relay and only for manual reset	Screw	MATV10AT	101022	10
	Ring terminal	MATV10AR	103563	10

Identification

Sheets of labels (sheets of 260 labels each)	EAT 260	100548	1
Labeling plate base (50 pieces in one pack)	SPR	100549	1

Order codes

A

B

C

D

E

F

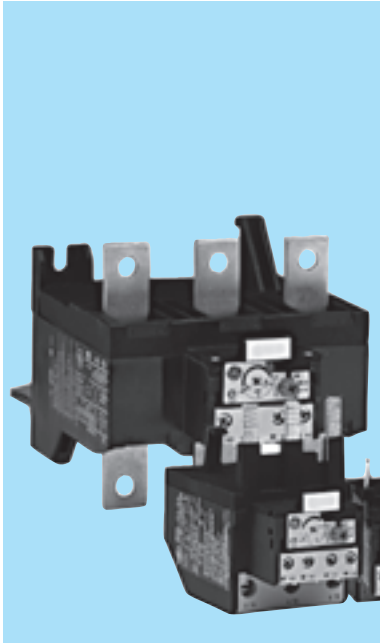
G

H

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X





### Thermal overload relays for contactors from 0.16 to 850A

- Control circuit up to 690V AC
- Power circuit:
  - RT1, RT12: up to 690V
  - RT2, RT22, RT3, RT32, RT4/4L, RT5/5L & RT6/6L: up to 1000V
- Thermal protection against normal overloads.
- Three pole differential (phase unbalance protection).
- Protection against long starting times.
- Automatic ambient temperature compensation between - 25°C y + 60°C.
- Front mounted test button.
- Trip indication.
- Independent auxiliary contacts with double rupture (1NO + 1NC).
- Function selector:
  - Manual RESET
  - Manual RESET and STOP
  - Automatic RESET with STOP
  - Automatic RESET without STOP

#### Standards

IEC/EN 60947-4-1	CSA 22.2/14
IEC/EN 60947-5-1	NI C 63-650
UNE 115	VDE 0660
NFC 63-650	UL 508
CEI 17-50	

#### Approvals



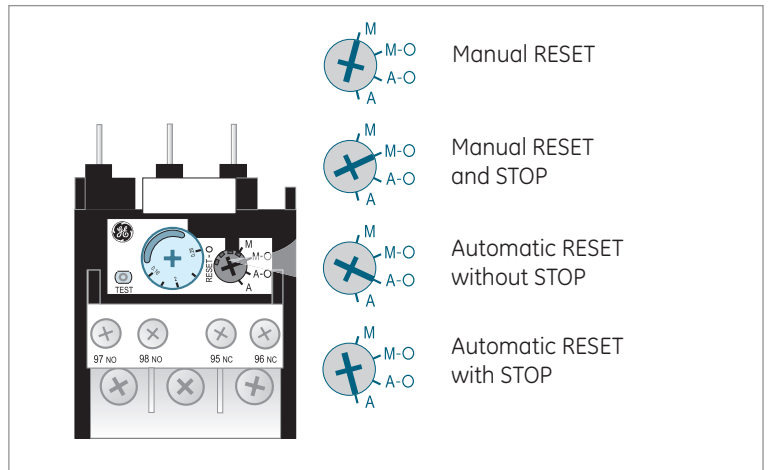
Lloyd's Register



Bureau Veritas



RINA



Order codes ● pg. C.63  
 Technical data ● pg. C.70  
 Dimensions ● pg. C.74



Thermal overload relays for contactors



	For use with:	Setting range (regulation)		Fuses <sup>(1)</sup>		Srew terminal		Ring terminal		Pack	
				aM	gL - gG						
				min. A	max. A	A	A	Cat. no.	Ref. no.		Cat. no.
<b>Class 10A</b>	CL00	0.16	0.26	2	2	RT1B	113700	RT1RB	114087	5	
	CL01	0.25	0.41	2	2	RT1C	113701	RT1RC	114088	5	
	CL02	0.4	0.65	2	2	RT1D	113702	RT1RD	114089	5	
	CL25	0.65	1.1	2	4	RT1F	113703	RT1RF	114090	5	
	CL03	1.0	1.5	4	6	RT1G	113704	RT1RG	114091	5	
	CL04	1.3	1.9	4	6	RT1H	113705	RT1RH	114092	5	
	CL45	1.8	2.7	6	10	RT1J	113706	RT1RJ	114093	5	
		2.5	4.0	8	16	RT1K	113707	RT1RK	114094	5	
		4.0	6.3	12	20	RT1L	113708	RT1RL	114095	5	
		5.5	8.5	16	20	RT1M	113709	RT1RM	114096	5	
		8.0	12.0	20	25	RT1N	113710	RT1RN	114097	5	
		10.0	16.0	25	35	RT1P	113711	RT1RP	114098	5	
		14.5	18.0	32	50	RT1S	113712	RT1RS	114099	5	
		17.5	22.0	40	50	RT1T	113713	RT1RT	114100	5	
		21.0	26.0	40	63	RT1U	113714	RT1RU	114101	5	
		25.0	32.0	50	80	RT1V	113715	RT1RV	114102	5	
		30.0	40.0	63	100	RT1W	113716	RT1RW	114103	5	
<b>Class 10</b>	CL05	11.5	15.0	32	35	RT2A	113717	RT2RA	114104	1	
	CL06	14.5	19.0	40	50	RT2B	113718	RT2RB	114105	1	
	CL07	18.5	25.0	50	63	RT2C	113719	RT2RC	114106	1	
	CL08	24.0	32.0	63	100	RT2D	113720	RT2RD	114107	1	
	CL09	30.0	43.0	80	125	RT2E	113721	RT2RE	114108	1	
	CL10	42.0	55.0	100	160	RT2G	113722	RT2RG	114109	1	
		54.0	65.0	125	160	RT2H	113723	RT2RH	114110	1	
		64.0	82.0	125	200	RT2J	113724	RT2RJ	114111	1	
		78.0	97.0	125	200	RT2L	113725	RT2RL	114112	1	
		90.0	110	160	250	RT2M	113726	RT2RM	114113	1	
<b>Class 20</b>	CL00	0.4	0.65	2	2	RT12D	139138	RT12RD	114060	5	
	CL01	0.65	1.1	2	4	RT12F	139139	RT12RF	114061	5	
	CL02	1	1.5	4	6	RT12G	139140	RT12RG	114062	5	
	CL25	1.3	1.9	4	6	RT12H	139141	RT12RH	114063	5	
	CL03	1.8	2.7	8	10	RT12J	139142	RT12RJ	114159	5	
	CL04	2.5	4.1	8	16	RT12K	113640	RT12RK	114114	5	
	CL45	4	6.3	12	20	RT12L	113641	RT12RL	114115	5	
		5.5	8.5	16	20	RT12M	113642	RT12RM	114116	5	
		8	12	20	35	RT12N	113643	RT12RN	114117	5	
		10	16	25	35	RT12P	113644	RT12RP	114118	5	
		14.5	18	32	50	RT12S	113645	RT12RS	114119	5	
		17.5	22	40	50	RT12T	113646	RT12RT	114120	5	
		21	26	40	63	RT12U	113647	RT12RU	114121	5	
		25	32	50	80	RT12V	113648	RT12RV	114122	5	
		30	40	63	100	RT12W	113649	RT12RW	114123	5	
		CL05	24	32	63	80	RT22D	113650	RT22RD	114124	1
		CL06	30	43	80	100	RT22E	113651	RT22RE	114125	1
		CL07	42	55	100	160	RT22G	113652	RT22RG	114126	1
		CL08	54	65	125	160	RT22H	113653	RT22RH	114127	1
		CL09	64	82	125	200	RT22J	113654	RT22RJ	114128	1
	CL10	78	97	125	200	RT22L	113655	RT22RL	114129	1	
		90	110	160	250	RT22M	113656	RT22RM	114130	1	

(1) Most suitable fuse in accordance with IEC 60947-4-1.

Order codes

A

B

C

D

E

F

G




H

I

X



### Thermal overload relays for contactors

	For use with:	Setting range (regulation)		Fuses <sup>(1)</sup>		Cat.no. (Screw terminal)	Ref. no.	Pack		
		min.	max.	aM	gL - gG					
		A	A	A	A					
	Class 10 Direct mounting	CK75	55	80	125	200	RT3B	113727	1	
		CK08	63	90	125	200	RT3C	113728	1	
			90	120	160	250	RT3D	113729	1	
			110	140	200	315	RT3E	113730	1	
			140	190	250	355	RT3F	113731	1	
		CK85	120	190	250	315	RT4N	113732	1	
		CK09	175	280	315	400	RT4P	113733	1	
		CK95 <sup>(2)</sup>	200	310	400	500	RT4R	113734	1	
		CK10	120	190	250	315	RT5A	113750	1	
		CK11	175	280	315	400	RT5B	113751	1	
		CK12 <sup>(3)</sup>	250	400	500	630	RT5C	113752	1	
			315	500	630	800	RT5D	113753	1	
			430	700	800	1000	RT5E	113754	1	
		CK13 <sup>(4)</sup>	500	850	100	1250	RT6A	113760	1	
	Class 20 Direct mounting	CK75	63	90	125	200	RT32C	113657	1	
		CK08	90	120	160	250	RT32D	113658	1	
			110	140	200	315	RT32E	113659	1	
			140	190	250	355	RT32F	113660	1	
	Class 30 Mounting with screws	CL...	2.5	4	10	16	RT4LA	113735	1	
		CK...	4	6.5	12	20	RT4LB	113736	1	
			5.5	8.5	16	25	RT4LC	113737	1	
			7.5	11	20	32	RT4LD	113738	1	
			10	16	25	40	RT4LE	113739	1	
			12.5	20	32	50	RT4LF	113740	1	
			17	27	50	80	RT4LG	113741	1	
			26	40	80	125	RT4LH	113742	1	
			32	52	100	160	RT4LJ	113743	1	
			45	70	125	160	RT4LK	113744	1	
			60	90	160	200	RT4LL	113745	1	
			80	125	200	250	RT4LM	113746	1	
			CK85	120	190	250	315	RT4LN	113747	1
			CK09	175	280	315	400	RT4LP	113748	1
			CK95 <sup>(2)</sup>	200	310	400	500	RT4LR	113749	1
			CK10	120	190	250	315	RT5LA	113755	1
			CK11	175	280	315	400	RT5LB	113756	1
			CK12 <sup>(3)</sup>	250	400	500	630	RT5LC	113757	1
	315	500		630	800	RT5LD	113758	1		
		430	700	800	1000	RT5LE	113759	1		
	CK13 <sup>(4)</sup>	500	850	1000	1250	RT6LA	113761	1		

(1) Most suitable fuse in accordance with IEC 60947-4-1.




(2) Fitting direct to the contactor.

(3) Fitting direct to the contactor: by means of a coupling and connection set.

Separate mounting: with screws on DIN rail / with cable connection.

(4) RT6A = RT1 with right setting range plus RTXP, independent mounting base adaptor, to be utilised with current transformer connected by passing cable chosen by customer. Current transformer data on request.

Accessories

			Cat. no.	Ref. no.	Pack
 <p><b>Base for separate mounting</b></p>	DIN EN50022-35				
	RT1		RTXP	105170	1
	RT2		RT2XP	113764	1
<hr/>					
<p><b>Setting range cover protection</b></p>	RT...		RTX3	113762	1
<hr/>					
 <p><b>Push-button with flexible cable</b></p>	for distance RESET				
	RT1... - RT6... (front)	0.5 meters	RTXS	113855	1
	RT1... - RT6... (front)	1 meters	RTXSL	113856	1
	RT1..., RT2..., RT4..., RT5..., RT6... (back)		RTXBS	108864	1
<hr/>					
<p><b>Terminal protection</b></p>	for RT3 or CK75C/CK08C				
	Thermal overload relay	1 pole IPxxB	PTPCK75	103747	1
	Connection contactor-relay	3 poles	RT3PXX3P	110565	1
<hr/>					
 <p><b>Remote electrical reset</b></p>	RT1... - RT6...		RTXRR ♦		1

Available coil voltages (V)

	♦	B	D	G	J	N	U	X
AC/DC		12	24	48	110	220	380	440
					240	415	480	

Order codes

A

B

C

D

E

F

G

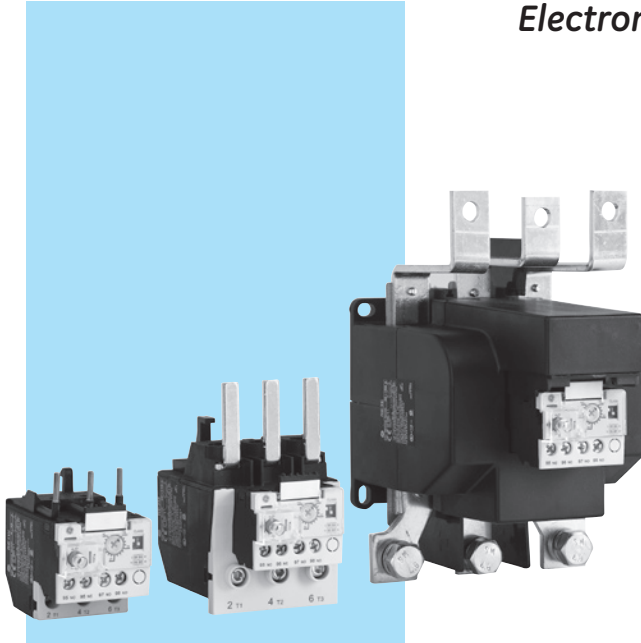
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*Electronic overload relay*



*Approvals*



*Product features*

*➤ Your benefits*

Lower power consumption	➤ Saving space into cabinet
Great accuracy	➤ Better motor protection
Full reliability	➤ Low risk to burn motor
Phase unbalance protection	➤ Better motor protection and current control
Direct fitting to contactors Series CL	➤ Compact starter
Interchangeable with thermal overload relay	➤ No need to redesign existing cabinet
Multiple trip class selection	➤ One device cover for start time motor
Manual / Auto reset	➤ One device for two solutions




*Main characteristics*

- Setting range from 0.1 up to 150A
- Self powered
- Thermal memory
- Phase loss protection
- Phase unbalance protection
- Direct fitting to contactors Series CL
- Interchangeable with thermal overload relay
- Multiple trip class selection
- Manual / Auto reset
- Increased flexibility, less order codes, less stock
- Tripp class: 5 - 10 - 20 - 30


Order codes ● pg. C.67  
 Technical data ● pg. C.76  
 Dimensions ● pg. C.78



**Electronic overload relay for contactors**

	Suitable for	Setting range (A)		Fuses (A) <sup>(1)</sup>	Cat. no.	Ref. no.	Pack.
		Min.	Max.	gL - gG			
 <b>Frame 1</b>	CL00...CL45	0,1	0,5	2	RE1D	101866	5
		0,4	2	4	RE1H	101867	5
		1,0	5	10	RE1K	101868	5
		1,6	8	20	RE1M	101869	5
		6,4	32	63	RE1S	101870	5
		9,0	45	80	RE1W	101871	5
		 <b>Frame 2</b>	CL05...CL10	15	75	125	RE2H
22	110			125	RE2M	101873	1
 <b>Frame 3</b>	CK75-CK08	30	150	250	RE3E	101874	1

**Accessories**

		Cat. no.	Ref. no.	Pack.
 <b>Independent mounting base adaptor</b>	Frame 1	RE1XP	247302	1
	Frame 2	RE2XP	247303	1

(1) Most suitable fuse in accordance with IEC 60947-4-1, see coordination table on pg. C.76.

Order codes

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X





## Technical data

### General

- Thermal protection against balanced overload.
- Three-pole differential ( phase unbalance protection).
- Automatic ambient temperature compensation.
- Front mounted selector for choosing utilisation current.
- Reset button, 2 positions :  
Manual(H) and Automatic(A) by turning the blue selector.
- Stop push button, independent of reset (red).
- Manual trip lever (tripping test).
- Tripping indicator (0-1).
- To facilitate wiring arrangements terminal 96 fits directly onto coil terminal (A2) and terminal 14/22 fits directly onto the feedback auxiliary contact.

### Conformity to standards

IEC 60947-4	CEI 17-50	VDE660
UNE 115	NI C63-650	UL508
NFC63-650		

### Approvals

UL	CSA	SEMKO
SETI	NEMKO	CE

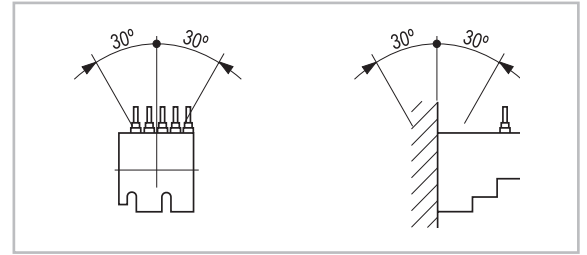
### Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-25°C to +60°C	
Altitude	up to 3000m	Nominal values
	from 3000 to 4000m	90%le 80%Ue
	from 4000 to 5000m	80%le 75%Ue
Degree of protection	IP20	
Protection treatment	Tropical finish	

### Climatic resistance

Continuous tests 40 / 125 / 56		
Cold (72h)	Temperature	-40°C
	Dry heat (96h)	
	Temperature	+125°C
	Relative humidity	< 50%
Humid heat (56 days)	Temperature	+40°C
	Relative humidity	95%
Cyclical tests		
First half-cycle (12h)	Low temperature	+25°C
	Relative humidity	93%
Second half-cycle (12h)	Low temperature	+55°C
	Relative humidity	95%
Number of consecutive cycles	6	

### Mounting positions



### Main circuit (poles)

		MT0...
Rated insulation voltage (Ui) according to IEC 947	(V)	750
Frequency	(Hz)	0..400
Power dissipation per pole	(W)	min. 1 / max. 2.5
Terminal capacity		
Screw M 3.5 (pozidrive head) safety flange		
Maximum capacity :		
Solid	(Ø mm)	2 x 2 wires
Stranded without end sleeve	(mm²)	2 wires Ø 2.5
Stranded with end sleeve		
pen (2 end sleeves)	(mm²)	2 wires Ø 0.75
pen (1 end sleeve)	(mm²)	2 wires Ø 1
		1 wires Ø 2.5
Tightening torque	(Nm)	0.8

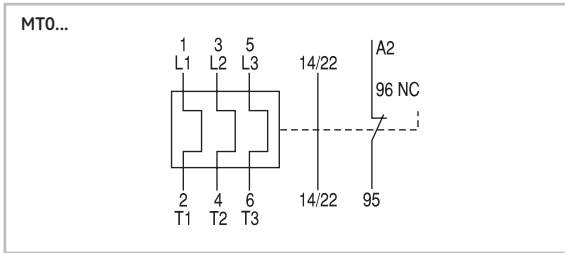
### Control circuit (incorporated auxiliary contact)

		MT0...
Rated insulation voltage (Ui) according to IEC 947	(V)	750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$	(A)	10
Tripping currents		
AC-15	Ue-le (V-A)	223-3, 380-2, 500-1
DC-13	Ue-le (V-A)	60-0.5, 110-0.2, 220-0.1
Short-circuit protection (max.glass gL fuse - w/h welding)	(A)	6
Number and type of contacts		

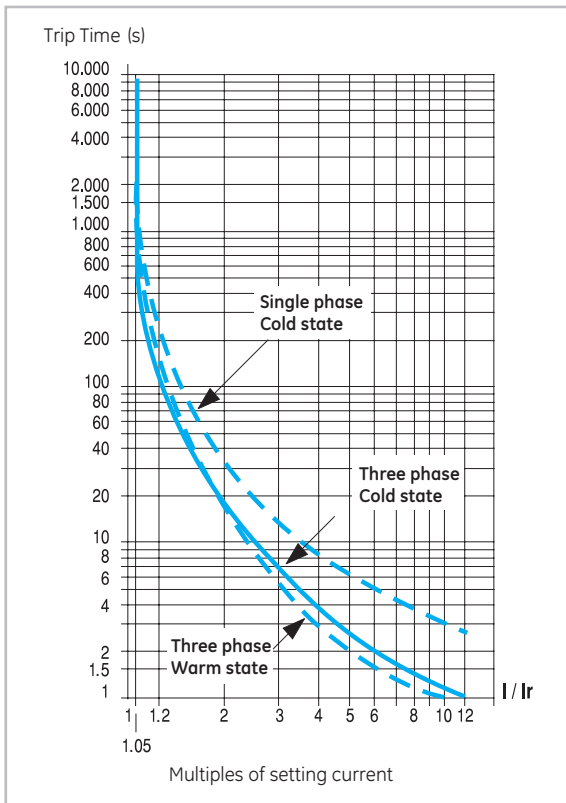
### Control circuit (auxiliary contact block)

		MATV10AT
Rated insulation voltage (Ui) according to IEC 947	(V)	750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}$	(A)	10
Tripping currents		
AC-15	Ue-le (V-A)	223-1, 380-0.5
DC-13	Ue-le (V-A)	60-0.1, 110-0.5
Short-circuit protection (max.glass gL fuse - w/h welding)	(A)	6
Number and type of contacts		

**Numbering of the terminals**

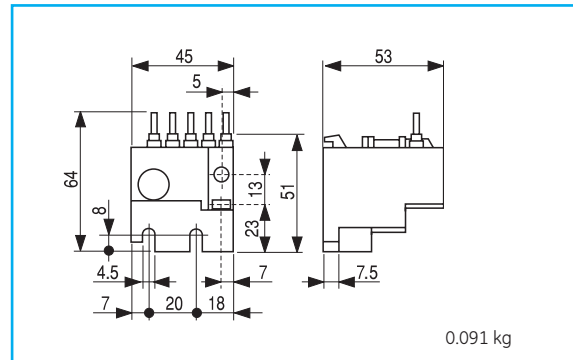


**Tripping curves**

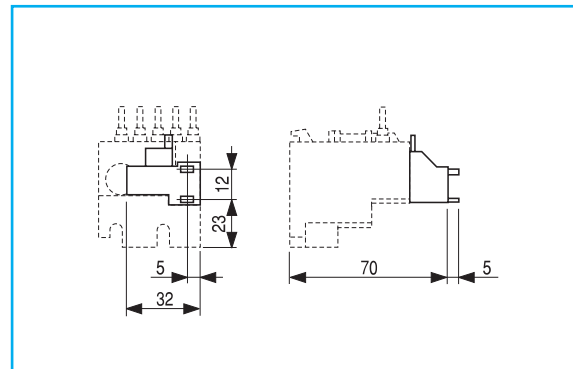


**Dimensional drawings**

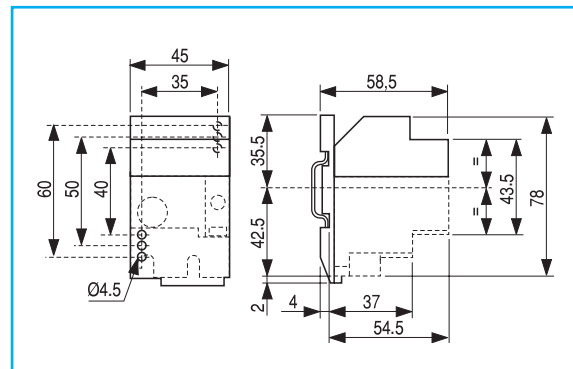
**Thermal overload relay**



**Thermal overload relay + aux. contact block (front mounting)**



**Independent mounting of the thermal overload relay**



## Technical data

		RT1...	RT2...	RT3...	RT4.../ 4L...	RT5.../ 5L...	RT6.../ 6L...
<b>General</b>							
Class		10A / 20	10 / 20	10 / 20	10 / 30	10 / 30	10 / 30
Setting range	(A)	0.16 ... 40	11.5 ... 110	55 ... 190	2.5 ... 310	120 ... 700	500 ... 850
Suitable for		CL00...CL45	CL05...CL10	CK75...CK08	CL,CK	CK10...CK12	CK13
<b>Main circuit</b>							
Rated insulation voltage	(V)	690	1000	1000	1000	1000	1000
(IEC947-4) Ui							
Frequency limits	(Hz)	0...400	0...400	0...400	50...60	50...60	50...60
Terminal capacity							
Clamp terminal - solid	(mm <sup>2</sup> )	16	50	120	-	-	-
Clamp terminal - flexible	(mm <sup>2</sup> )	10	50	120	-	-	-
Flat terminal	(mm)	-	-	25 x 5	-	-	80 x 10
Passing by hole (wire) through C.T. core	(mm <sup>2</sup> )	-	-	-	-	400	-
Passing by hole (bar) through C.T. core	(mm)	-	-	-	30 x 10	30 x 10	-
Tightening torque	(Nm)	2.5	4.5	6.5	23	31.5	-
<b>Control circuit</b>							
Rated insulation voltage	(V)	690					
(IEC60947-4) Ui							
Rated thermal current I <sub>th</sub>	(A)	10					
Operation current							
AC-15 - Ue-Ie	(V - A)	110/120 - 3 ; 220/240 - 2 ; 380/415 - 1 ; 480/500 - 0.8 ; 660/690 - 0.3					
DC-13 - Ue-Ie	(V - A)	24 - 2 ; 48 - 1.4 ; 110 - 0.6 ; 250 - 0.3 ; 440 - 0.1					
Utilisation according UL and CSA							
Protective fuse type gL	(A)	B600 - Q600					
Terminal capacity	(mm <sup>2</sup> )	2.5					
Tightening capacity	(Nm)	0.8					

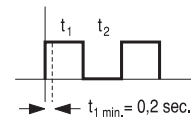
## Conformity to standards

IEC/EN 60947-4-1	NFC 63-650	NI C 63-650
IEC/EN 60947-5-1	CEI 17-50	VDE 0660
UNE 115	CSA 22.2/14	UL 508

## Remote electrical reset

Power consumption		
AC	(VA)	100
DC	(W)	100

Coils not suitable for continuous operating duty



- t<sub>1</sub> = 1 sec.    ◆    t<sub>2</sub> = 30 sec.
  - t<sub>1</sub> = 5 sec.    ◆    t<sub>2</sub> = 90 sec.
  - t<sub>1</sub> = 10 sec.   ◆    t<sub>2</sub> = 180 sec.
- (t<sub>1</sub> = ON time t<sub>2</sub> = OFF time)

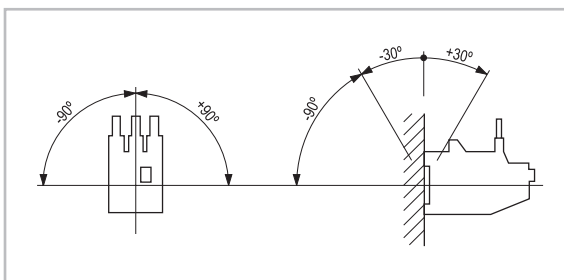
## Approvals

cULus	RINA	CE
Lloyd's Register	Bureau Veritas	

## Ambient conditions

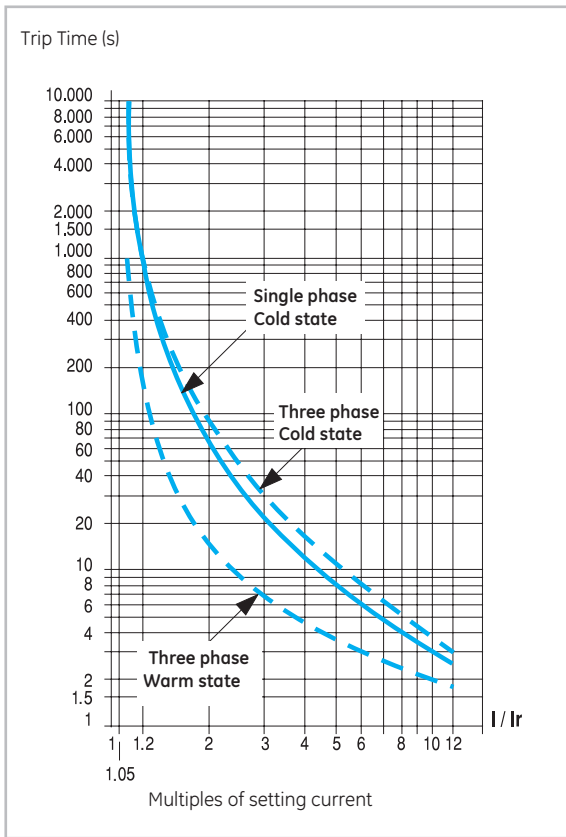
Storage temperature	-40°C to +70°C	
Operation temperature (compensated)	-25°C to +60°C	
Altitude	up to 3000m	w/o any changes in characteristics
Relative humidity	98%	
Protection treatment	Tropical finish	

## Mounting positions

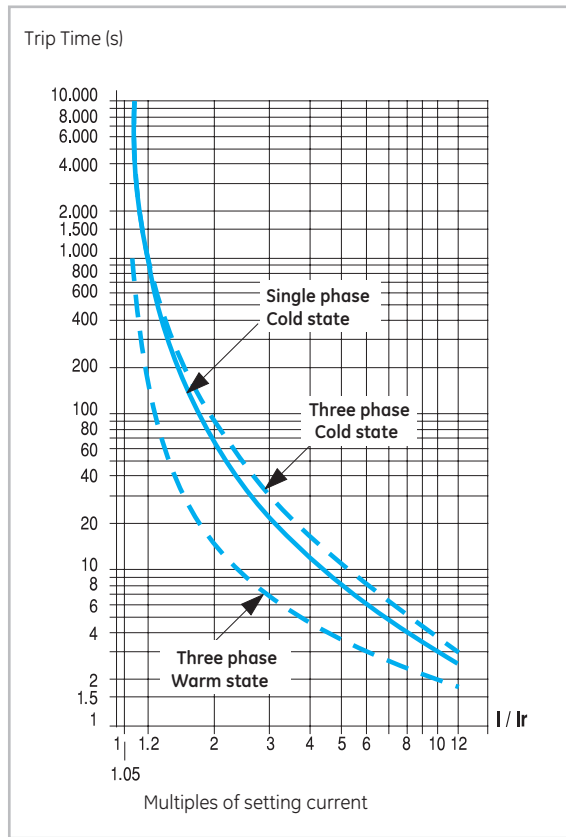


### Tripping curves

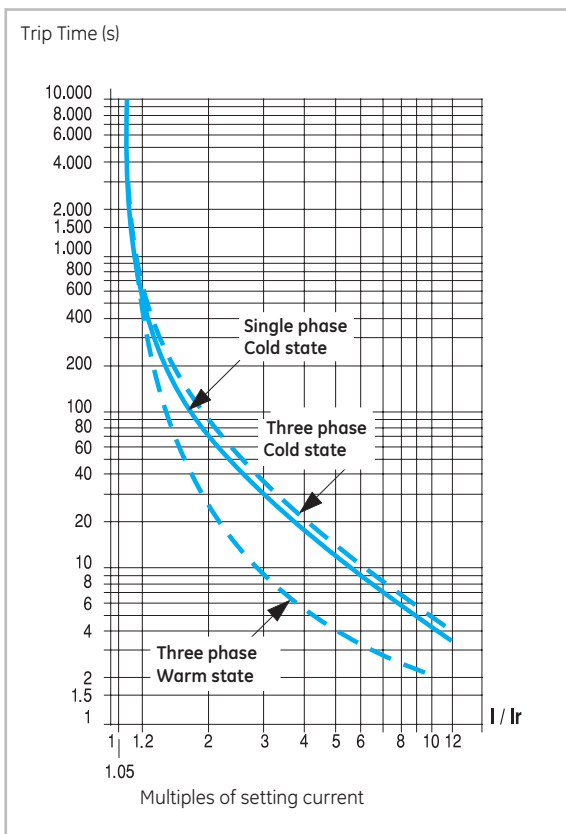
RT1 Class 10A



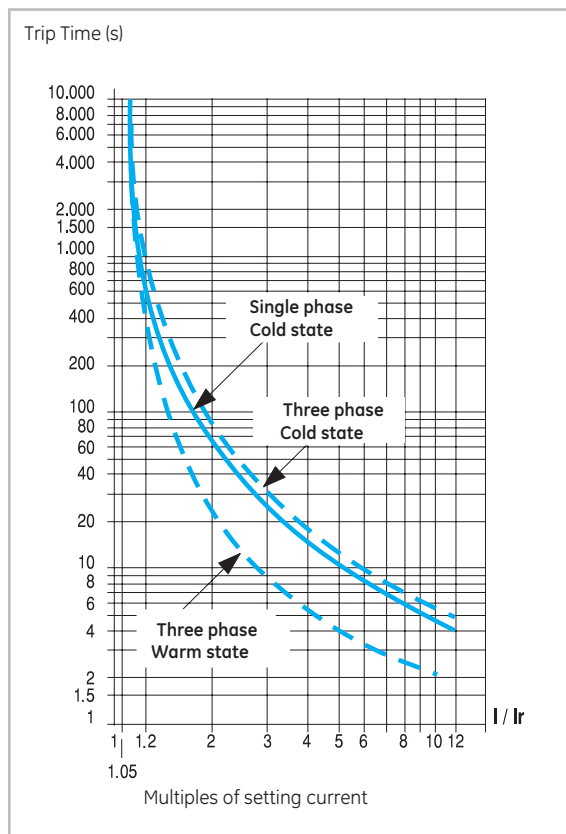
RT2 Class 10



RT12 Class 20



RT22 Class 20



Technical data

A

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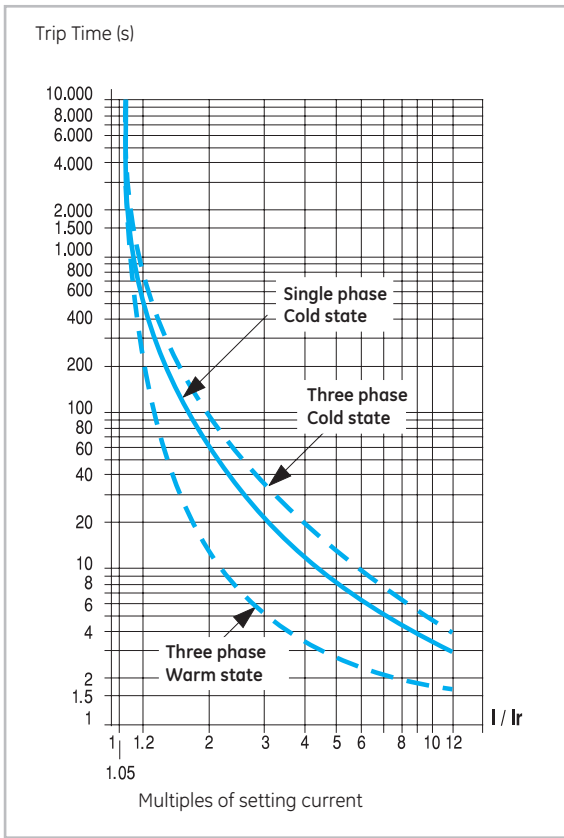
I

X

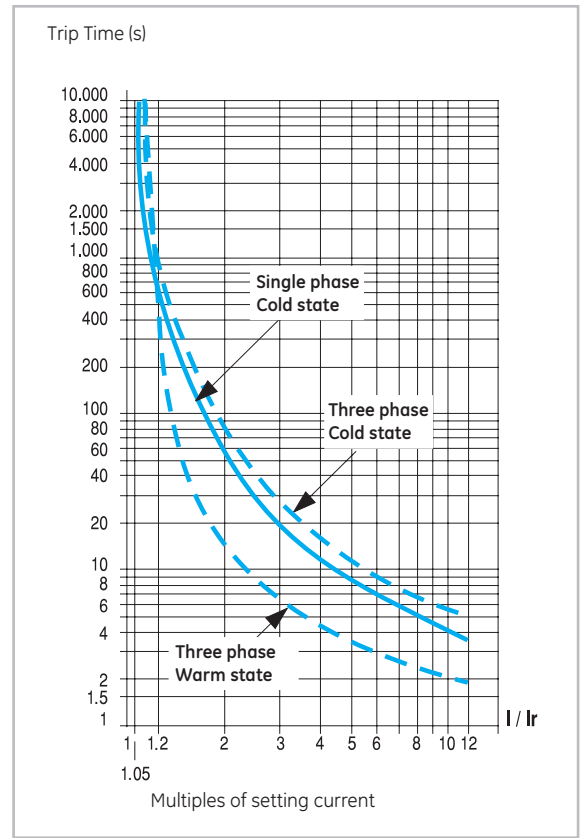


Tripping curves

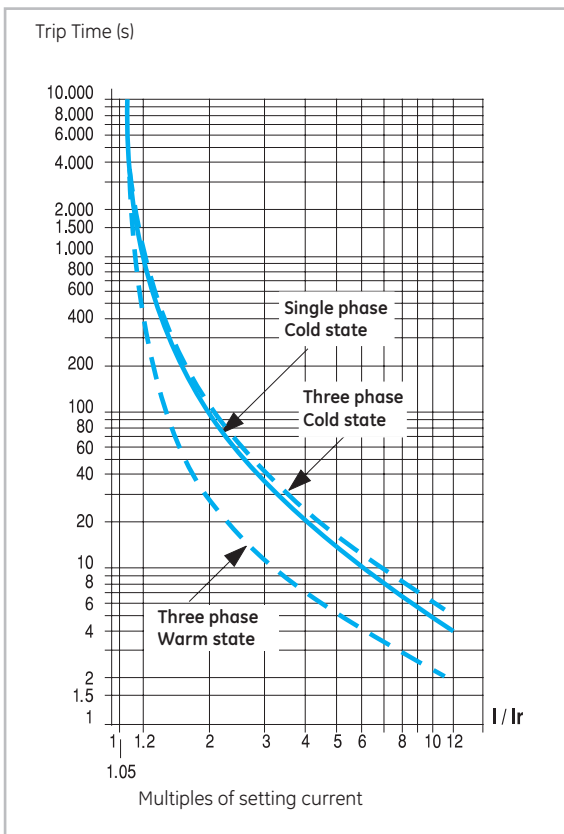
RT3 Class 10



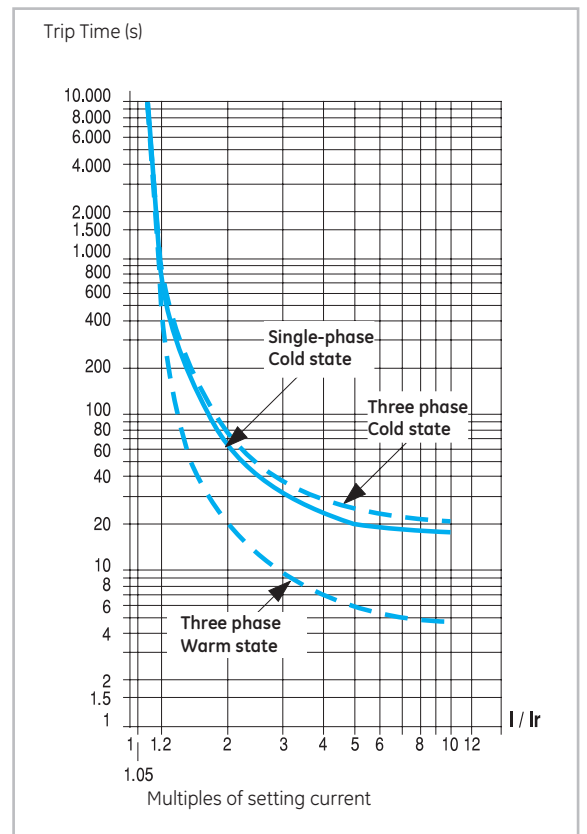
RT4 Class 10



RT32 Class 20

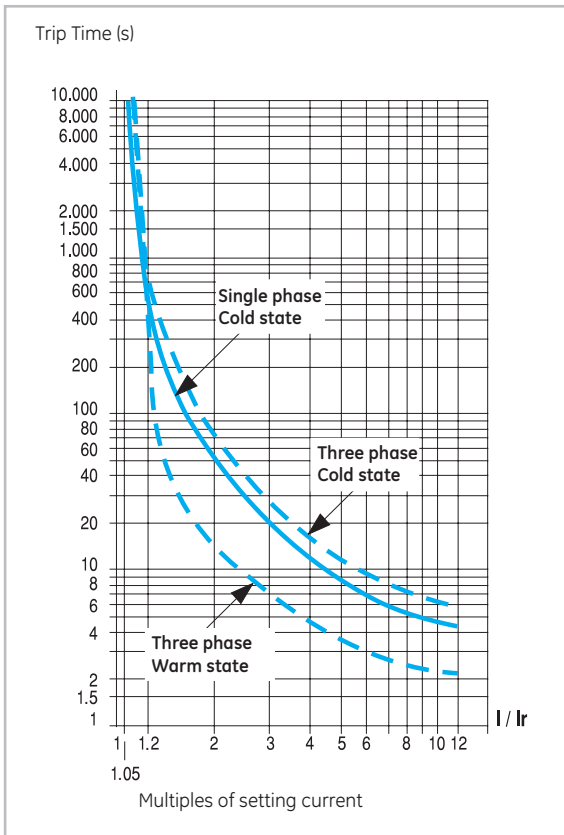


RT4L Class 30

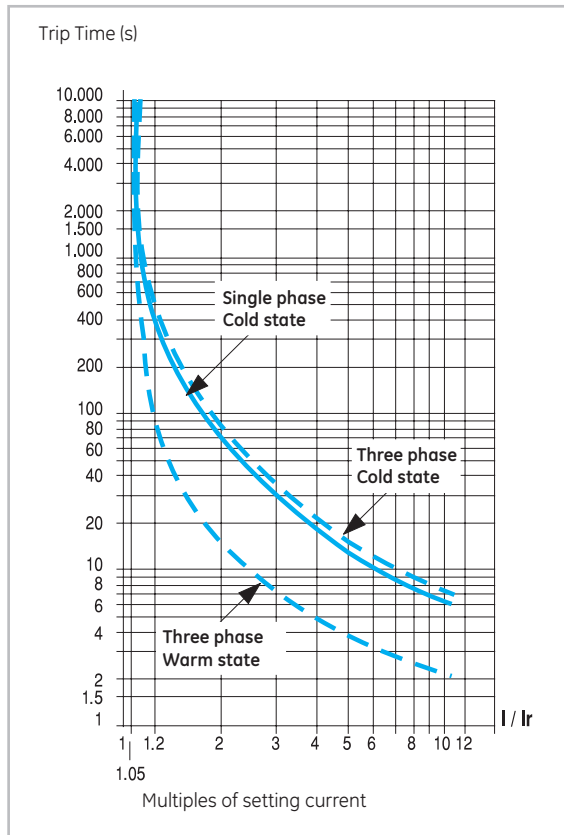


Tripping curves

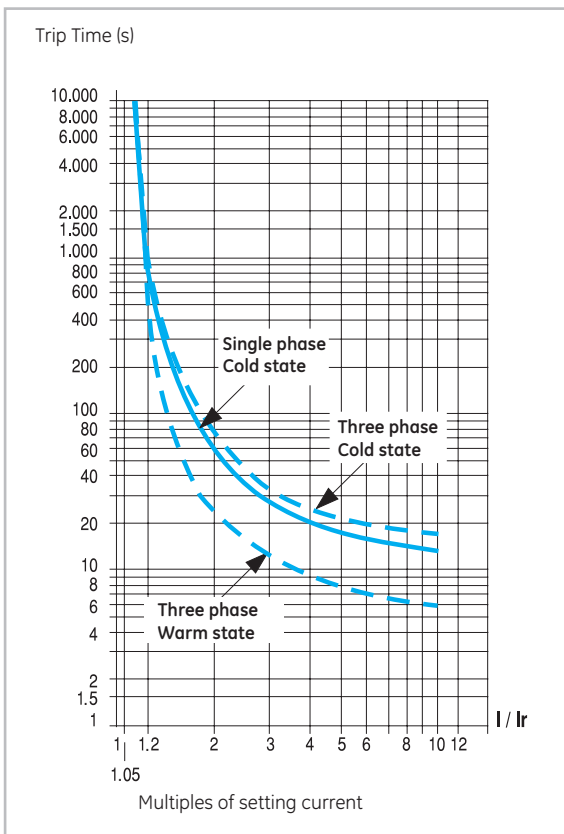
RT5 Class 10



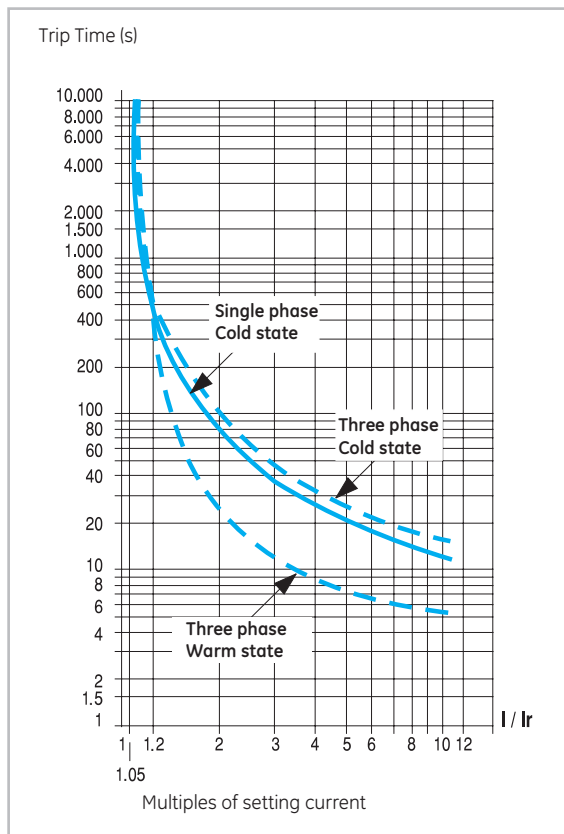
RT6 Class 10



RT5L Class 30



RT6L Class 30



Technical data

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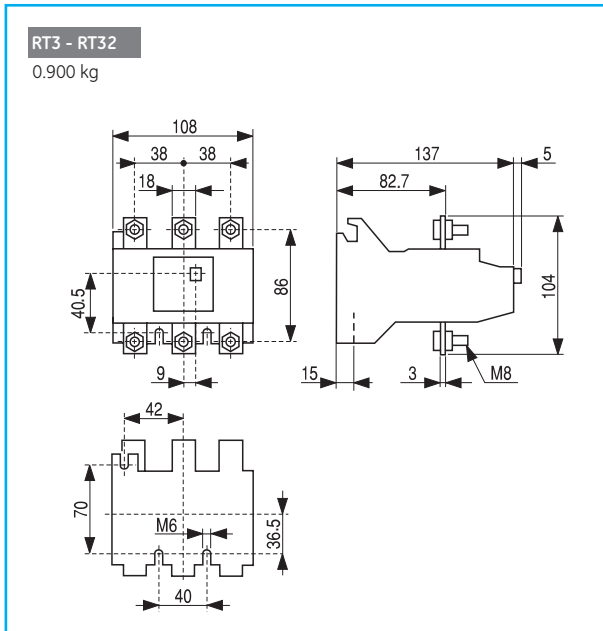
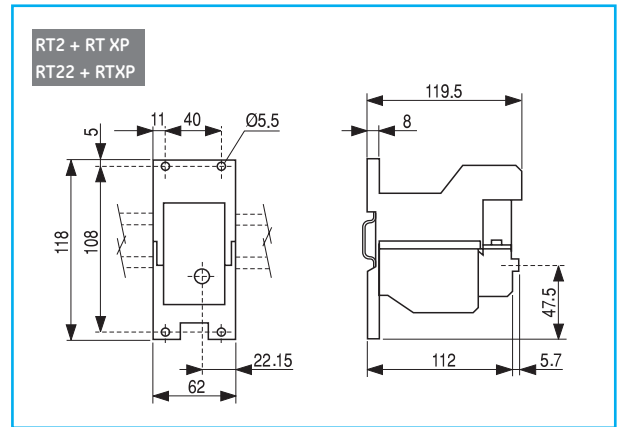
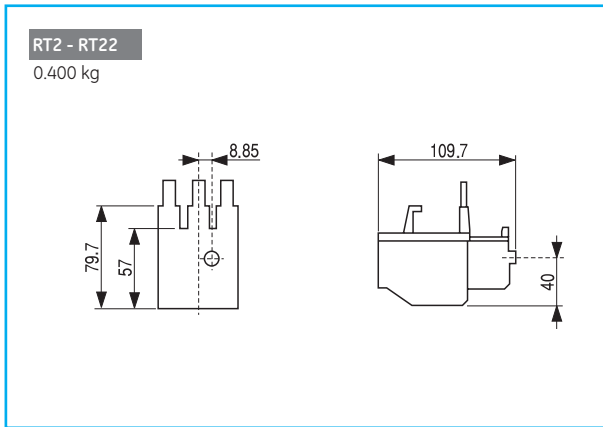
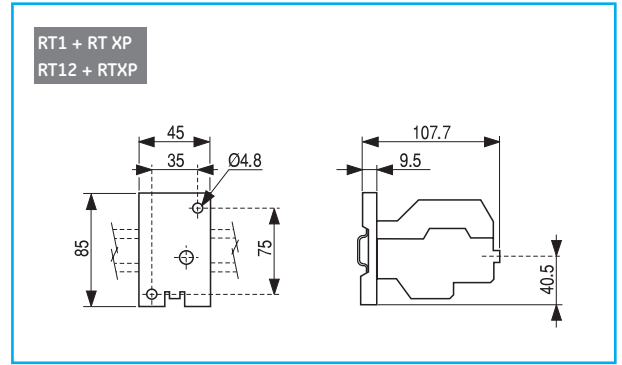
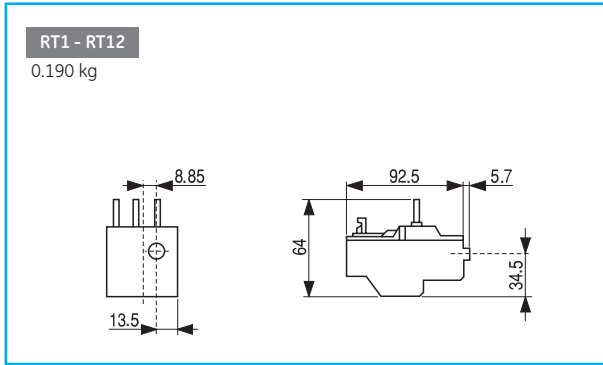
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## Dimensional drawings

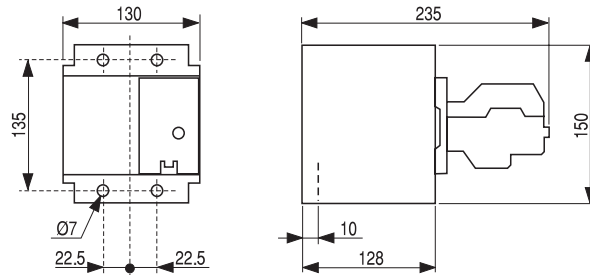
### Thermal overload relay for contactors



Thermal overload relay for contactors

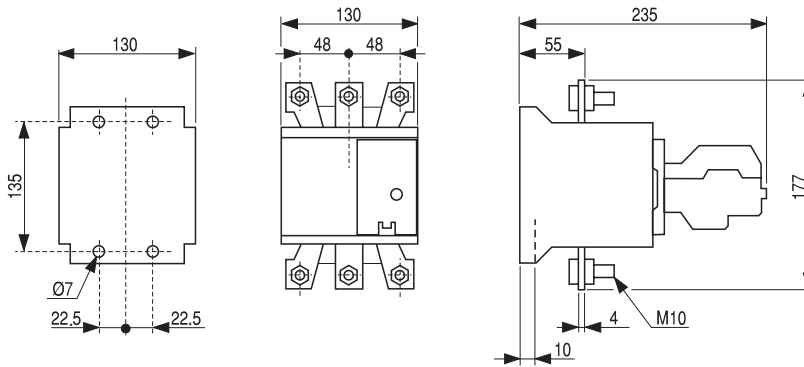
RT4LA...RT4LM

2.400 kg



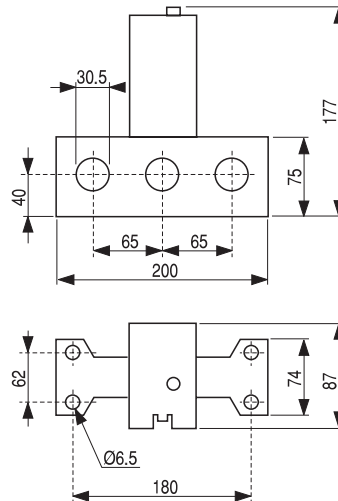
RT4/4LN...RT4/4LR

2.400 kg

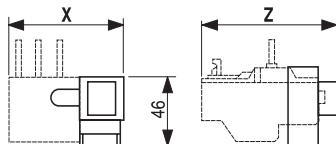


RT5 / 5L

0.875 kg



Remote electrical reset



RTXRR + ...	X	Z
RT1	75	110
RT2	84	121
RT3	108	153
RT4	150	240
RT5	200	196

A

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Coordination tables

Coordination Type 2 - 65kA at 380/400V and 415V - 50/60Hz

Rated power (kW)	MOTOR <sup>(1)</sup>		Cat. no. #	BREAKER			CONTACTOR Series	OVERLOAD RELAY		WIRE	
	Rated current			Rated current In (A)	Magnetic setting 1m Pick-up ±20% Im (A)	Magnetic current (A)		Series	Setting range (A)	Smallest wire Cu (PVC) <sup>(2)</sup> (mm <sup>2</sup> )	Min frontal safety (mm)
	380/400V (A)	415V									
0.06	0.23	0.21	GPS1MHAB	0.25	-	3.3	CLOO	RE1D	0.1-0.5	1	20
0.09	0.34	0.31	GPS1MHAC	0.4	-	5.2	CLOO	RE1D	0.1-0.5	1	20
0.12	0.44	0.4	GPS1MHAD	0.63	-	8.2	CLOO	RE1D	0.1-0.5	1	20
0.18	0.65	0.63	GPS1MHA E	1	-	13	CLOO	RE1H	0.4-2.0	1	20
0.25	0.9	0.8	GPS1MHA E	1	-	13	CLOO	RE1H	0.4-2.0	1	20
0.37	1.25	1.1	GPS1MHAF	1.6	-	20.8	CLOO	RE1H	0.4-2.0	1	20
0.55	1.6	1.5	GPS1MHAF	1.6	-	20.8	CLOO	RE1H	0.4-2.0	1	20
0.75	2	1.9	GPS1MHAG	2.5	-	32.5	CLOO	RE1K	1.5-5.0	1	20
1.1	2.6	2.5	GPS1MHAH	4	-	52	CL25	RE1K	1.5-5.0	1	20
1.5	3.5	3.4	GPS1MHAH	4	-	52	CL25	RE1K	1.5-5.0	1	20
2.2	5	4.5	GPS1MHAJ	6.3	-	81.9	CL25	RE1K	1.5-5.0	1	20
3	7	6.5	GPS1MHA K	10	-	130	CL25	RE1M	1.6-8.0	1.5	20
4	9	8	GPS1MHA K	10	-	130	CL25	RE1S	6.4-32.0	1.5	20
5.5	12	11	GPS1MHAL	13	-	169	CL25	RE1S	6.4-32.0	2.5	20
7.5	-	14	GPS1MHAM	16	-	208	CL25	RE1S	6.4-32.0	2.5	20
8.8	16	-	GPS1MHAM	16	-	208	CL25	RE1S	6.4-32.0	2.5	20
11	22.5	21	GPS1MHAP	25	-	325	CL25	RE1S	6.4-32.0	4	20
15	30	28	GPS1MHAR	32	-	416	CL04	RE1S	6.4-32.0	6	20
11	22.5	21	GPS2MHAR	25	-	325	CL04	RE1S	6.4-32.0	4	20
15	30	28	GPS2MHAP	32	-	416	CL04	RE1S	6.4-32.0	6	20
18.5	37	35	GPS2MHAS	40	-	520	CL45	RE1W	9.0-45.0	10	20
22	-	40	GPS2MHAT	50	-	650	CL06	RE2H	15.0-75.0	10	25
-	44	--	GPS2MHAT	50	-	650	CL06	RE2H	15.0-75.0	10	25
30	60	55	GPS2MHAU	63	-	819	CL07	RE2H	15.0-75.0	16	25
35	65	60	FDH36MC080GD	80	900-1300	1100	CL08	RE2H	15.0-75.0	25	25
45	85	80	FDH36MC100GD	100	1000-1500	1400	CL09	RE2M	22.0-110.0	25	30
55	-	100	FDH36MC100GD	100	1000-1500	1400	CL10	RE2M	22.0-110.0	25	30
55	105	-	FEH36MC125JF	125	1250-1875	1250	CL10	RE2M	22.0-110.0	25	30
75	138	135	FEH36MC200KF	200	2250-3350	2800	CK75	RE3E	30.0-150.0	50	40

Coordination Type 2 - 100kA at 500 - 525V - 50/60Hz

Rated power kW	MOTOR <sup>(1)</sup>		gL/gG Fuses		EOL			CONTACTOR		WIRE	
	Rated current 500V (A)	Rated current 525V (A)	In (A)	Size	Series	Type	Setting range (A)	Series	PAC3 (kW)	Seco min	Safety clearance (mm)
0.06	0.17	0.16	2	000	RE1	D	0.1-0.5	CLOO	5.5	1	20
0.03	0.24	0.22	2	000	RE1	D	0.1-0.5	CLOO	5.5	1	20
0.12	0.33	0.3	2	000	RE1	D	0.1-0.5	CLOO	5.5	1	20
0.18	0.48	0.46	2	000	RE1	D	0.1-0.5	CLOO	5.5	1	20
0.25	0.66	0.64	2	000	RE1	H	0.4-2.0	CLOO	5.5	1	20
0.37	0.3	0.85	4	000	RE1	H	0.4-2.0	CLOO	5.5	1	20
0.55	1.2	1.15	4	000	RE1	H	0.4-2.0	CLOO	5.5	1	20
0.75	1.5	1.45	4	000	RE1	H	0.4-2.0	CLOO	5.5	1	20
1.1	2.1	1.3	6	000	RE1	K	1.5-5.0	CLOO	5.5	1	20
1.5	2.8	2.6	10	000	RE1	K	1.5-5.0	CLOO	5.5	1	20
1.1	2.1	1.3	6	000	RE1	K	1.5-5.0	CL01	7.5	1	20
1.5	2.8	2.6	10	000	RE1	K	1.5-5.0	CL01	7.5	1	20
2.2	3.3	3.6	10	000	RE1	K	1.5-5.0	CL01	7.5	1	20
1.5	2.8	2.6	10	000	RE1	K	1.5-5.0	CL25	15	1	20
2.2	3.3	3.6	10	000	RE1	K	1.5-5.0	CL25	15	1	20
3	5.3	5	16	000	RE1	M	1.6-8.0	CL25	15	1	20
4	6.8	6.5	20	000	RE1	M	1.6-8.0	CL25	15	1	20
5.5	3.1	8.6	25	000	RE1	S	6.4-32.0	CL25	15	1.5	20
7.5	12	11.4	32	000	RE1	S	6.4-32.0	CL25	15	2.5	20
10	15.5	14.8	40	000	RE1	S	6.4-32.0	CL25	15	2.5	20
11	17.6	17	40	000	RE1	S	6.4-32.0	CL25	15	2.5	20
15	23	22	50	000	RE1	S	6.4-32.0	CL04	18.5	4	20
18.5	28.5	27	63	000	RE1	S	6.4-32.0	CL04	18.5	6	20
4	6.8	6.5	20	000	RE1	M	1.6-8.0	CL45	25	1.5	20
5.5	3.1	8.6	25	000	RE1	S	6.4-32.0	CL45	25	2.5	20
7.5	12	11.4	32	000	RE1	S	6.4-32.0	CL45	25	2.5	20
11	17.6	17	40	000	RE1	S	6.4-32.0	CL45	25	2.5	20
15	23	22	50	000	RE1	S	6.4-32.0	CL45	25	4	20
18.5	28.5	27	63	000	RE1	W	3.0-45.0	CL45	25	5	20
22	33	31.5	80	000	RE1	H	15.0-75.0	CL45	25	5	20
18.5	28.5	27	63	000	RE2	H	15.0-75.0	CL06	30	5	25
22	33	31.5	80	000	RE2	H	15.0-75.0	CL06	30	5	25
30	45	43	80	000	RE2	H	15.0-75.0	CL06	30	10	25
37	53	52	100	000	RE2	H	15.0-75.0	CL07	40	10	25
40	53	56	100	000	RE2	H	15.0-75.0	CL08	45	16	25
45	65	62	125	00	RE2	H	15.0-75.0	CL09	55	16	30
55	80	76	125	00	RE2	M	22.0-110.0	CL10	65	25	30
75	105	100	160	01/1	RE3	E	30.0-150.0	CK75	100	35/25	40
30	130	124	250	01/1	RE3	E	30.0-150.0	CK08	110	50	40

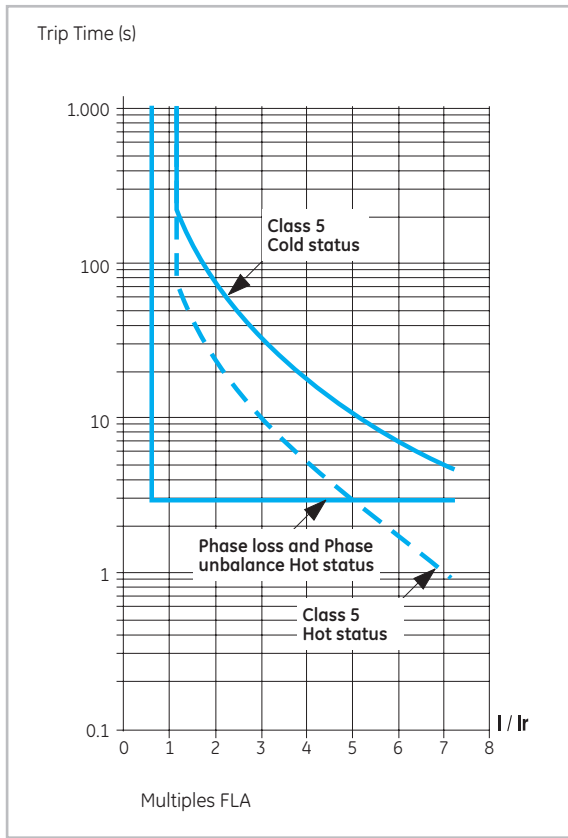
(1) Current are relevant to four pole motors not having special characteristics of torque.

(2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature if it is different.

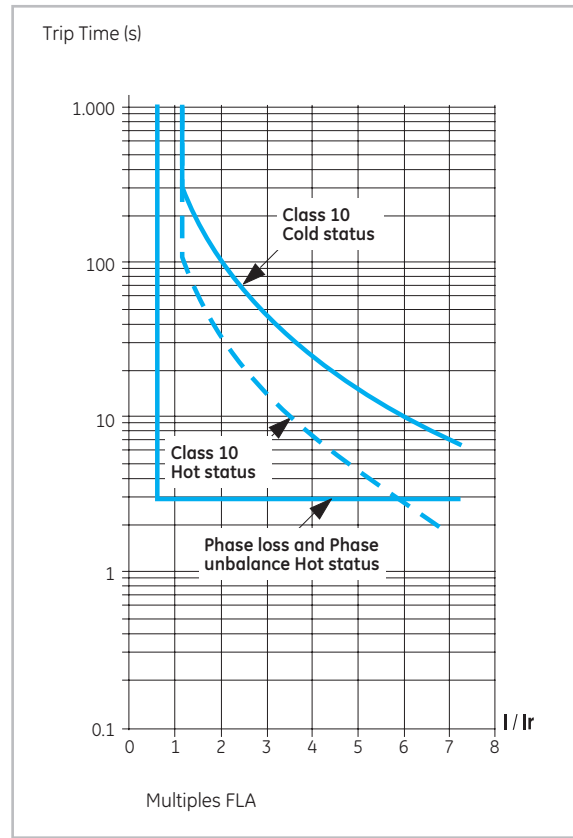


Tripping curves

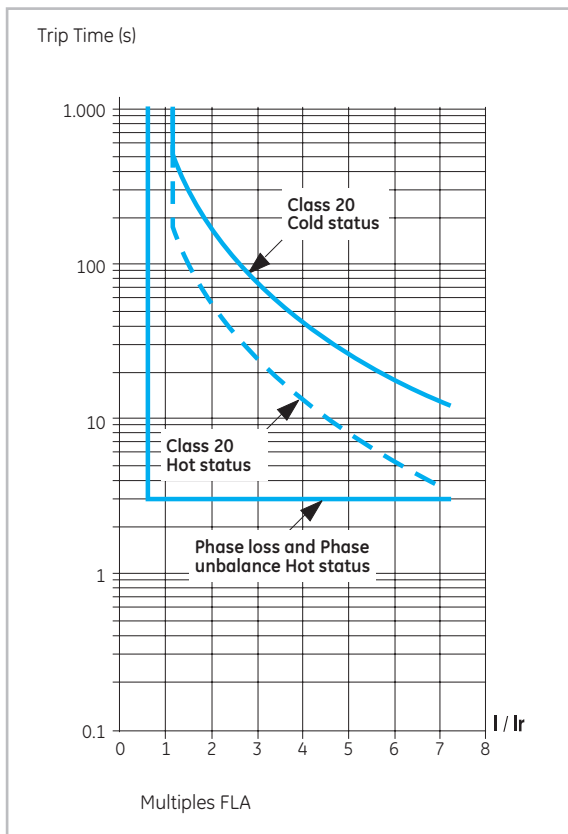
Class 5



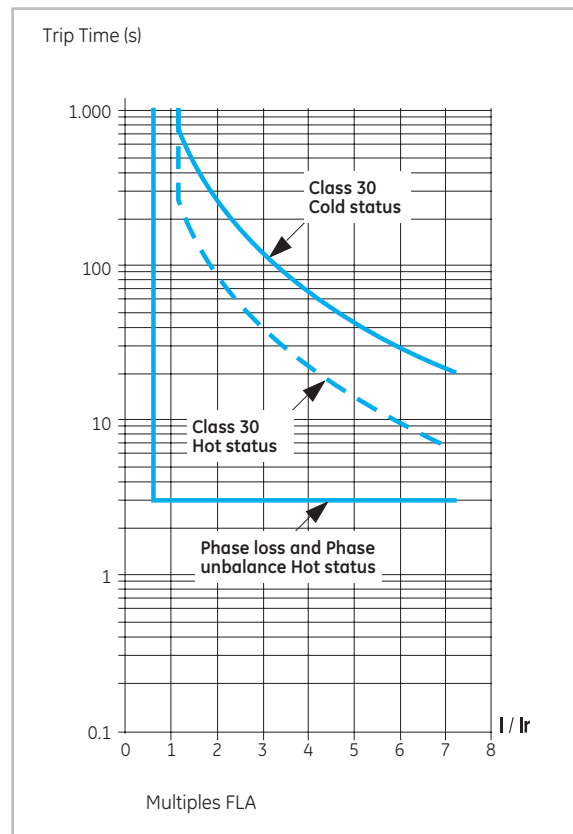
Class 10



Class 20



Class 30



Technical data

A

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C

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E

F

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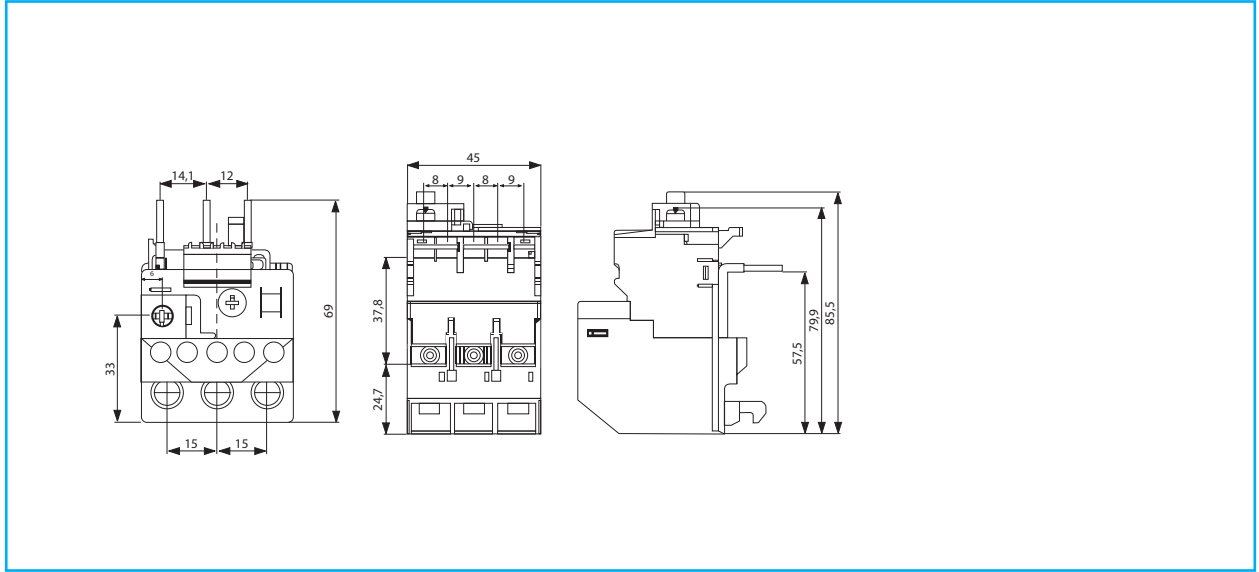
I

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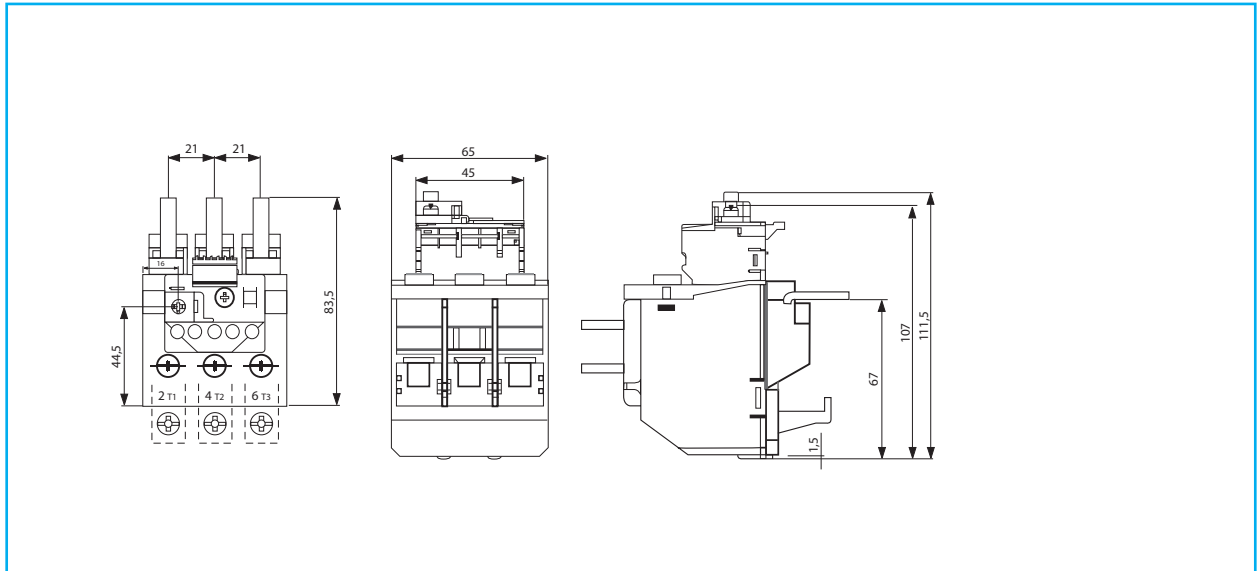


Dimensional drawings

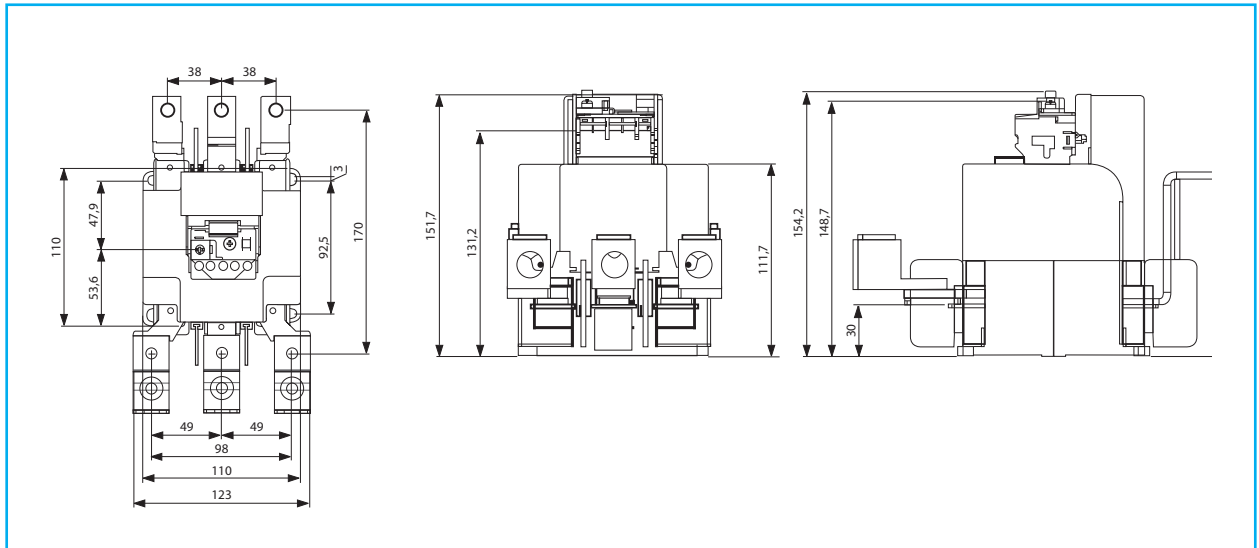
Frame 1



Frame 2



Frame 3



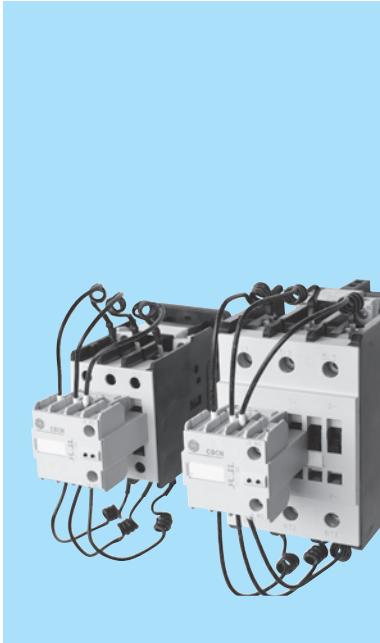
Notes

Grid area for notes.

Dimensions

A
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H
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### Contactors for capacitors switching

*With built-in resistance to switch three phase capacitor banks*

“CSCN” contactors incorporate a front block with three early-make auxiliary contacts together with 6 quick discharge resistors (two per phase) through which the capacitors are switched to the network, reducing the current peak. Once the resistors have damped the current peak, the main contacts short-circuit the resistors, carrying the uninterrupted current. A few milliseconds later the early-make auxiliary contact closes to guarantee that all current flows through the main contacts.

#### Standards / Marking

IEC/EN 60947-1	CENELEC HD 419
IEC/EN 60947-4-1	VDE 0660/102
IEC/EN 60947-5-1	NFC 63-110
EN 50005	ASE 1025
UL 508	UNE 20109
CSA C22.2/14	

#### Approvals



#### Standard voltages

To complete the catalogue number, replace the symbol ♦ by the code corresponding to the voltage and frequency of the control circuit, other voltages on request.

##### Alternating current (V). Dual-frequency

♦	1	2	3	4	5	6	7	8	9
50/60Hz	24	42	110	120	220	230	240	440	48
			115						



##### Alternating current (V)

♦	E	K	L	N	T	U	W	Y	Z
50Hz	32	127		220		380	415	500	660
				230		400			690
60Hz			208	277	380	480	460	600	

Order codes ● pg. C.81  
 Technical data ● pg. C.82  
 Dimensional drawings ● pg. C.84



Contactors for capacitors switching

Ith	Ambient temperature										Fuse gl - gG	Contacts		Cat. no. <sup>(1)</sup>	Pack	
	$\theta \leq 55^{\circ}\text{C}$					$\theta \leq 70^{\circ}\text{C}$						.3  .1	.4  .2			
	230V 240V kvar	400V kvar	415V kvar	500V kvar	660V 690V kvar	230V 240V kvar	400V kvar	415V kvar	500V kvar	660V 690V kvar						
	25	7.5	12.5	13	16	15	3.7	7.5	8	9.5	10	25	2	0	CSCN12A320 ♦	1
													1	1	CSCN12A311 ♦	1
													0	2	CSCN12A302 ♦	1
	32	10	16.7	17	21	20	5	10	11	12.5	12.5	35	2	0	CSCN16A320 ♦	1
													1	1	CSCN16A311 ♦	1
													0	2	CSCN16A302 ♦	1
	45	12.5	20	21	25	25	7.5	12.5	13	16	15	40	1	0	CSCN20A310 ♦	1
													0	1	CSCN20A301 ♦	1
													2	1	CSCN20A321 ♦	1
													1	2	CSCN20A312 ♦	1
	45	15	25	26	31	30	10	15	16	18	20	50	1	0	CSCN25A310 ♦	1
													0	1	CSCN25A301 ♦	1
												2	1	CSCN25A321 ♦	1	
												1	2	CSCN25A312 ♦	1	
60	20	30	31	38	35	16	22	23	27	25	63	1	0	CSCN30A310 ♦	1	
												0	1	CSCN30A301 ♦	1	
												2	1	CSCN30A321 ♦	1	
												1	2	CSCN30A312 ♦	1	
90	25	45	47	56	55	20	35	36	44	40	80	1	0	CSCN45A310 ♦	1	
												0	1	CSCN45A301 ♦	1	
												2	0	CSCN45A320 ♦	1	
												1	1	CSCN45A311 ♦	1	
												1	2	CSCN45A312 ♦	1	
110	35	55	57	69	65	30	45	47	56	50	125	1	0	CSCN55A310 ♦	1	
												0	1	CSCN55A301 ♦	1	
												2	0	CSCN55A320 ♦	1	
												1	1	CSCN55A311 ♦	1	
												1	2	CSCN55A312 ♦	1	
140	45	70	73	88	85	35	60	62	75	70	160	1	0	CSCN70A310 ♦	1	
												0	1	CSCN70A301 ♦	1	
												2	0	CSCN70A320 ♦	1	
												1	1	CSCN70A311 ♦	1	
												1	2	CSCN70A312 ♦	1	
	Spare coils															
	For series CSCN12 ... CSCN25												LB1A ♦	5		
	For series CSCN30												LB3A ♦	5		
For series CSCN45 ... CSCN70												LB4A ♦	5			

(1) To complete the reference, replace ♦ by the code corresponding to the voltage and frequency of the control circuit. (see pg. C.80)

Order codes

A

B

C

D

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X



## Technical data

### Technical characteristics

		CSCN12	CSCN16	CSCN20	CSCN25	CSCN30	CSCN45	CSCN55	CSCN70
<b>Main circuit (poles)</b>									
Rated operational voltage	(V)	690	690	690	690	690	690	690	690
Rated insulation voltage according to IEC947	(V)	1000	1000	1000	1000	1000	1000	1000	1000
Rated thermal current	(A)	25	32	45	45	60	90	110	140
Max. power utilization at 55°C	230/240V (kvar)	7,5	10	12,5	15	20	25	35	45
	380/400V (kvar)	12,5	16,7	20	25	30	45	55	70
	660/690V (kvar)	15	20	25	30	35	55	65	85
Electrical endurance	(ops.)	280.000	280.000	280.000	250.000	200.000	150.000	120.000	90.000
Max. ops./hour	(ops./hour)	350	350	350	240	240	150	150	150
<b>Control circuit</b>									
Standard voltages	50Hz (V)	24-690	24-690	24-690	24-690	24-690	24-690	24-690	24-690
	60Hz (V)	24-600	24-600	24-600	24-600	24-600	24-600	24-600	24-600
Consumption									
Single frequency	Mar. circuit open (VA)	45	45	48	48	88	191	191	198
	Mar. circuit closed (VA)	6	6	7	7	9	15,5	15,5	17
Dual frequency	Mar. circuit open (VA)	54	54	58	58	125	245	245	250
	Mar. circuit closed (VA)	7	7	8	8	11,5	20	20	23
Dual frequency	Mar. circuit open (VA)	35	35	39	39	110	215	215	220
	Mar. circuit closed (VA)	5	5	6	6	11	15	15	19


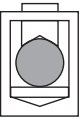
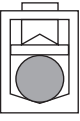
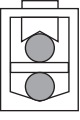
### Instantaneous auxiliary contact blocks

Rated insulation voltage Ui	(V)	1000
Rated thermal current Ith	(A)	10

### Ambient conditions

Storage temperature	(°C)	-50 ... +80
Operating temperature	(°C)	-25 to +55 (without derating)
Altitude up to 3000m		Nominal values
Mounting positions		Vertical mounting +/- 30°

### Terminal capacity and tightening torque

		CSCN12	CSCN16	CSCN20	CSCN25	CSCN30	CSCN45	CSCN55	CSCN70
	Solid, stranded and finely stranded without end sleeve (mm <sup>2</sup> )	1 x 0.5 ... 2,5		1 x 0.5 ... 2,5		-	-	-	-
	Finely stranded with or without end sleeve (mm <sup>2</sup> )	1 x 1 ... 2,5		1 x 1 ... 2,5		-	-	-	-
	AWG wires	1 x 20 ... 12		1 x 20 ... 8		-	-	-	-
	Tightening torque (Nm)	1,6		2,2		-	-	-	-
	(Lb x in.)	15		20		-	-	-	-
	Solid, stranded and finely stranded without end sleeve (mm <sup>2</sup> )	-		-		0.75 ... 16	1 ... 35	1.5 ... 50	
	Finely stranded with end sleeve (mm <sup>2</sup> )	-		-		0.75 ... 16	1 ... 35	1.5 ... 50	
	Finely stranded without end sleeve (mm <sup>2</sup> )	-		-		1 ... 16	1 ... 35	1.5 ... 50	
	AWG wires	-		-		18 ... 6	16 ... 2	16 ... 2	
	Tightening torque (Nm)	-		-		1,8	4	5,6	
(Lb x in.)	-		-		16	35	50		
	Solid (mm <sup>2</sup> )	-		-		0.75 ... 16	1 ... 16	4 ... 35	
	Stranded (mm <sup>2</sup> )	-		-		0.75 ... 16	1 ... 25	4 ... 35	
	Finely stranded without end sleeve (mm <sup>2</sup> )	-		-		0.75 ... 16	1 ... 25	4 ... 35	
	Finely stranded with end sleeve (mm <sup>2</sup> )	-		-		1 ... 16	1 ... 25	4 ... 35	
	AWG wires	-		-		18 ... 6	16 ... 4	10 ... 1	
Tightening torque (Nm)	-		-		1,8	4	5,6		
(Lb x in.)	-		-		16	35	50		
	Solid, stranded and finely stranded without end sleeve (mm <sup>2</sup> )	-		-		Max. 16	Max. 50 ... 4	Max. 50 ... 35	
	Finely stranded without end sleeve (mm <sup>2</sup> )	-		-		Max. 16	Max. 35 ... 2,5	Max. 35	
	Finely stranded with end sleeve (mm <sup>2</sup> )	-		-		Max. 16	Max. 35 ... 16	Max. 35	
	AWG wires	-		-		Max. 6	Max. 2 ... 12	Max. 1	
	Tightening torque (Nm)	-		-		1,8	4	5,6	
(Lb x in.)	-		-		16	35	50		

Standard contactors

Series "CL" and "CK" contactors, to switch three phase capacitor banks

Electrical endurance: >100,000 operations

Contactor		$\theta \leq 55^{\circ}\text{C}$					$\theta \leq 70^{\circ}\text{C}$					Fuse	I max.
Type <sup>(1)</sup>	Ith	220V 230V 240V kvar	400V kvar	415V kvar	500V kvar	690V 660V kvar	220V 230V 240V kvar	400V kvar	415V kvar	500V kvar	690V 660V kvar	gl - gG	(peak)
	A											A	A
CL00A	25	3	5	5.5	6.5	5.7	2.4	4	4.5	5.2	4.5	10	1000
CL01A	25	4.5	9.5	10.5	12.5	11	3.6	6	6.5	10	7	16	1000
CL02A	32	6.5	11	12	14.5	12.5	5.2	8.5	9	11.5	10	25	1000
CL25A	45	7.5	12.5	14	16	15	6.5	10	11	13	12	25	1000
CL03A	45	9	15	16.5	20	17.5	7.2	12	13	16	14	35	2500
CL04A	60	12.5	21	23	27.5	24	10	17	18	22	19.5	40	2500
CL45A	60	16.5	25	27	32	30	13	20	22	25	22	50	2500
CL06A	90	22	40	43	52	50	17	30	33	41	35	80	3500
CL07A	110	25	45	48	58	65	19	35	37	46	40	125	3500
CL08A	110	30	50	54	65	70	22	40	43	52	50	125	3500
CL09A	140	40	65	70	85	95	35	58	62	75	85	160	3500
CL10A	140	50	80	85	105	120	43	70	75	90	105	160	3500
CK75C	250	60	110	118	145	150	48	88	94	116	120	250	5000
CK08C	250	70	125	135	162	170	56	100	107	130	136	250	5000
CK85B	315	80	150	160	195	200	64	120	130	156	160	315	5000
CK09B	315	95	165	177	215	230	85	148	160	192	205	315	5000
CK95B	450	105	190	205	250	288	95	175	188	230	265	450	5500
CK10C	600	135	260	280	340	370	120	235	252	375	330	630	10000
CK11C	700	190	325	350	425	450	152	260	280	340	360	800	10000
CK12B	1000	250	400	430	520	600	200	320	344	416	480	1000	12000
CK13B	1250	315	525	565	685	650	252	420	452	548	520	1250	15000

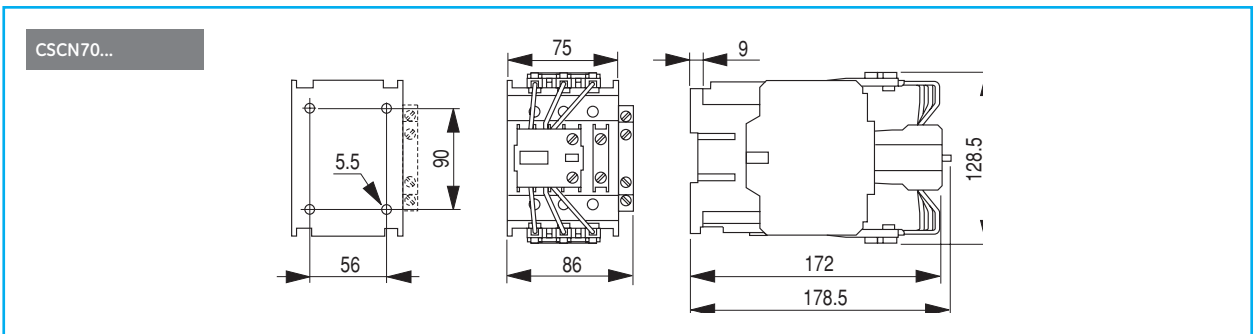
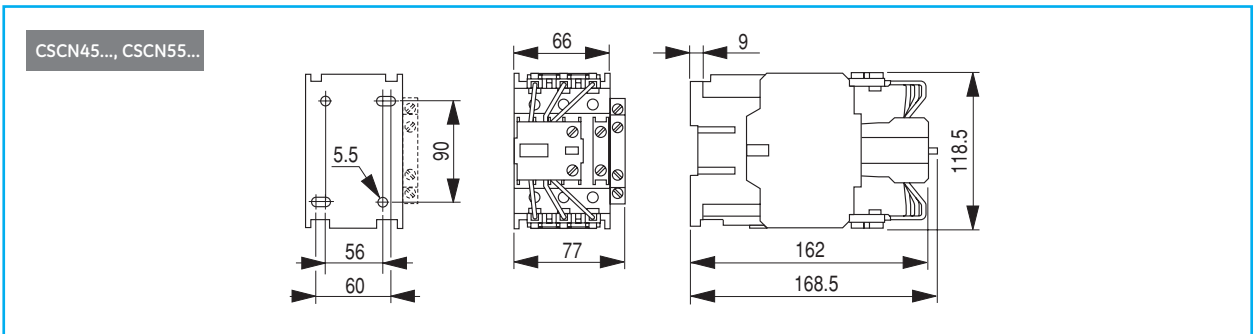
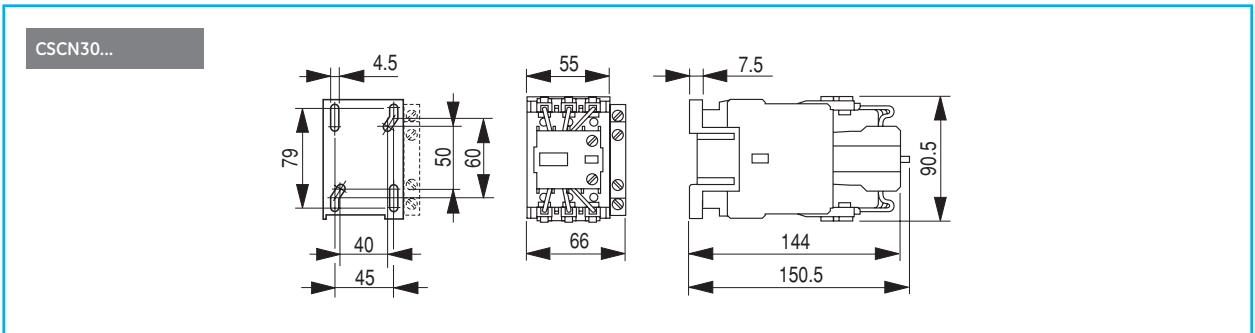
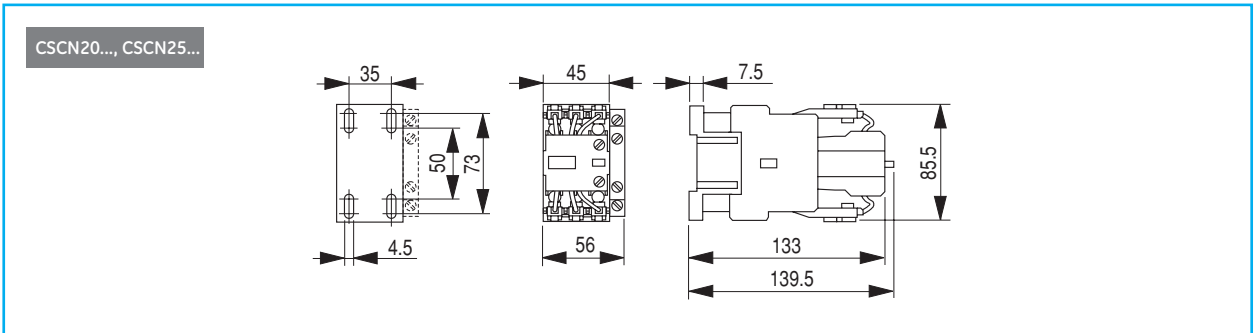
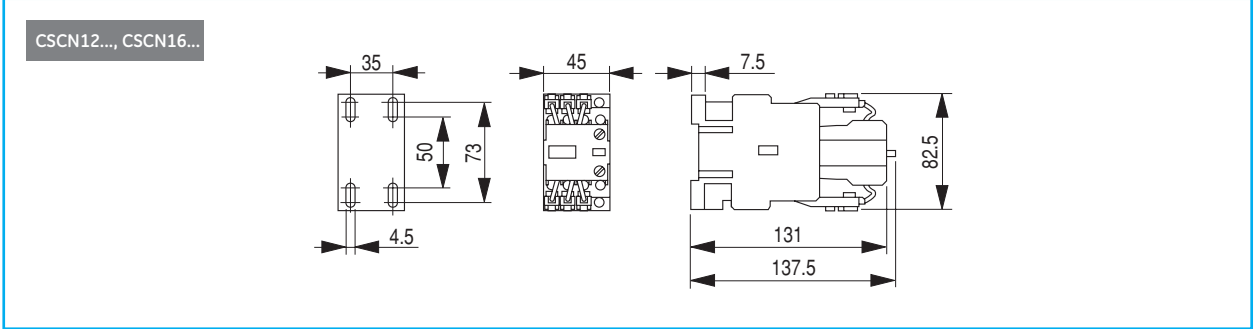
(1) To complete contactor reference, see C.10 for CL and C.18 for CK





**Dimensional drawings**

**Contactors for capacitors switching**



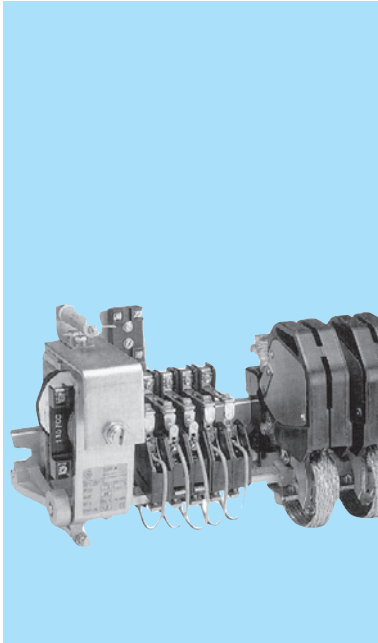
Notes

Grid area for notes.

Dimensions

A
B
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## Clapper contactors 40A to 800A (AC-3) / 45A to 1200A (AC-1)

AC and DC control using a bridge rectifier, designed to meet the most recent stringent requirements in terms of reliability, service life and performance.

### Main characteristics

- Sliding contact holder, set on self-centering and self-lubricating bronze bushings
- Minitubes made of high-strength, high electrical resistance material
- Individual auxiliary contacts

### Construction

Variable composition contactors (the number of main poles and auxiliary contacts may vary), preferably secured on mounts

### Control circuit

Solid iron magnetic circuit with coil powered by direct or rectified current, particularly for heavy-duty applications (e.g., cranes, roll mills, reversing winches, etc.).

The coils are sized for intermittent operation. For continuous operation, insert an economy resistor in series with the coil using the respective auxiliary contact.

### Main contacts

The sintered main contacts are classified as Type 4/2 for intermittent operation and Type 5/2 for continuous operation.

The 4/2 sintered contact may be used only for heavy-duty operation when the number of switching operations per hour is above 60 and the operating intermittence is equal or less than 60% (cranes, roll mills, etc.).

If used for continuous operation, the contact will overheat.

The 5/2 sintered contact may be used only for normal duty when the number of switching operations per hour is equal to or less than 60% and the operating intermittence is above 60%.

### Auxiliary contacts

Individual NO or NC single-broke contacts

Possibility to advance or delay contact making or breaking

### Special versions

The following items may be supplied upon request:

- Contactors with coils having an operating limit that exceeds the limits required by the standards
- Contactors with an operating voltage up to 3000V (rotary disconnect switches, induction furnaces, etc.)
- Vertical mechanical interlocks ideal for interlocking 3 contactors.

### Spare parts and additional components

Spare parts and additional components for the contactors are listed on page C.91.

### Standards

IEC/EN 60947-1  
IEC/EN 60947-4-1  
IEC/EN 60947-5-1

### Standard voltages

#### Alternating current (V) Dual-frequency coils

	AP	CP	EP	GP
50/60Hz	24	48	110	220

#### Direct current (V)

	A	B	C	D	E	F	G	H	M	R
Voltage	20	24	40	48	97	110	197	220	230	125

Order codes ● pg. C.87

Coils ● pg. C.90

Spare parts ● pg. C.91

Technical data ● pg. C.94

Dimensional drawings ● pg. C.96

## Control voltage and normal combinations

Normal rated voltages, shaft spacing and combinations (main and auxiliary poles) have been defined for each switchgear unit, thereby allowing the contactor to be rapidly selected.

AC rated voltages: 24V - 48V - 110V - 220/230V

DC rated voltages: 24V - 48V - 110V - 220/230V

Spacing between standardised shafts and combinations:

See pages C.96 to C.98

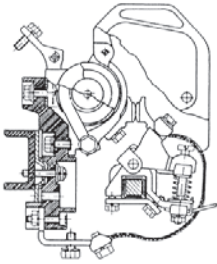
Standard center-to-center spacing (mm): 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000

### Main poles

The poles can be constructed as follows, depending on the operating conditions:

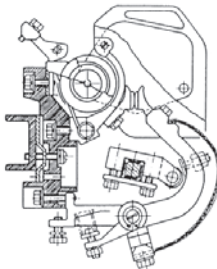
#### Z design (NO)

- For load breaking, with high breaking capacity
- For AC or DC use
- Equipped with magnetic arc-quenching coil. In the case of AC, the poles are normally supplied with an appropriate arc-quenching coil for the maximum rated current of the pole.
- Arc-quenching coils for medium rated currents with respect to the expected peak current are available for DC use upon request, for more effective pole performance (see table on page C.90).



#### RN design (NC)

- Based on the use of break poles, which are open when the coil is energized and closed when the coil is de-energized.
- For AC or DC use in special circuits where high interrupting capacities are not required.
- This design is intended to be used with contactors R1, R2, R3, R4, R5, R7.

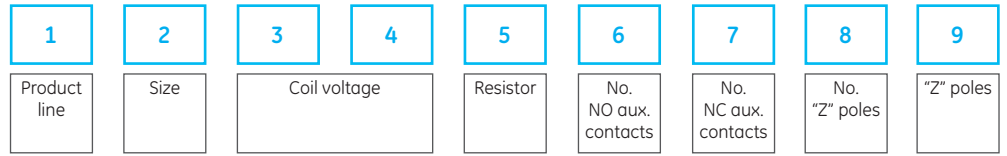


Poles	R1	R2	R3	R4	R5	R6	R7	R8	R9
Z	■	■	■	■	■	■	■	■	■
RN	■	■	■	■	■		■		

### Order codes - Clapper contactors

Peak operating current	AC-3 admissible rated powers					Electric endurance	AC or DC	Pack.
	Resistive loads	Motors <440V, 3 ~ 50/60Hz	220V 230V	380V 400V	415V 440V			
AC1 A	AC3 A	kW HP	kW HP	kW HP	kW HP	Cat. AC3 Switching operations	See the following pages C.84 and C.85 on how to complete the catalogue number	
45	40	11,5	20	20	20	1 × 10 <sup>6</sup>	R1...	1
90	90	26	45	45	45	1 × 10 <sup>6</sup>	R2...	1
125	120	36,5	62	62	73,5	1 × 10 <sup>6</sup>	R3...	1
250	200	72,5	100	100	120	1 × 10 <sup>6</sup>	R4...	1
320	320	93	160	160	165	1,2 × 10 <sup>6</sup>	R5...	1
450	450	130	225	225	300	1,5 × 10 <sup>6</sup>	R6...	1
630	630	184	315	315	400	1 × 10 <sup>6</sup>	R7...	1
800	800	232	400	400	500	0,9 × 10 <sup>6</sup>	R8...	1
1500	-	-	-	-	-	-	R9...	1

## Catalogue number structure



Size		1	2
1	Max.	45	R 1
	500V AC	90	R 2
2	250V DC	125	R 3
		250	R 4
		320	R 5
		450	R 6
		630	R 7
		800	R 8
		1200	R 9

Auxiliary contacts		6	7
6	NO		
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
7	6	6	
		1	1
		2	2
		3	3
	4		

"RN" poles" (NC)		11
"RN" poles	"RN" poles	
0	0	-
1	1	1
2	2	2
3	3	3
4	4	4

Note: The "RN" poles are not available for the R6, R8 and R9 types.

Coil voltage		3	4
AC	DC		
<b>Types R1 ... R7</b>			
24V		A	P
48V		C	P
110V		E	P
220V		G	P
	20V	A	-
	24V	B	-
	40V	C	-
	48V	D	-
	97V	E	-
	110V	F	-
	197V	G	-
	220V	H	-
	230V	M	-
	125V	R	-
<b>Types R8 and R9</b>			
110V		E	P
220V	97V	G	P
	110V	E	-
	197V	F	-
	220V	G	-
	230V	H	-
	125V	M	-

"Z" poles" (N)		8
"Z" poles	"Z" poles	
0		-
1		1
2		2
3		3
4		4

"RN" poles		12
Type of pole		
RN		V
No "RN" poles		-

Note: The "RN" poles are not available for the R6, R8 and R9 types.

Economy resistor		5
	If required (5/2 contacts)	R
	If not required	-

"Z" poles		9
Type of pole		
Z		Z
No "Z" poles		-

Arc-quenching coil "Z" poles		Standard Upon request		
Type		A	B	C
R1		45A	14A	25A
R2		90A	45A	-
R3		125A	75A	-
R4		200A	50A	130A
R5		320A	150A	-
R6		450A	270A	-
R7		630A	320A	-
R8		800A	320A	400A
R9		1200A	-	-

Arc-quenching coil «RN» poles		Standard Upon request		
Type		A	B	C
R1		45A	14A	25A
R2		90A	45A	-
R3		125A	75A	-
R4		200A	50A	130A
R5		320A	150A	-
R6		-	-	-
R7		630A	320A	-
R8		-	-	-
R9		-	-	-

Note: The "RN" poles are not available for the R6, R8 and R9 types.

Type of contacts		14
Type		
4/2	Intermittent op.	4
5/2	Continuous op.	5



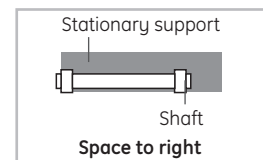
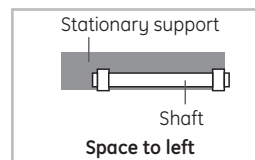
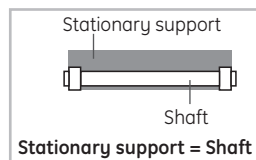
<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>
Arc-quenching coil "Z" poles	No. "RN" poles	"RN" poles	Arc-quenching coil "RN" poles	Type of contacts	Stationary support	Space	Shaft	Isolation

	Stationary support	Contactor type			
		R1 R2 R3	R4 R5	R6 R7 R8	R9
<b>15</b>	Length (mm)				
	150	A	-	-	-
	200	B	-	-	-
	250	C	C	-	-
	300	D	D	-	-
	350	E	E	E	-
	400	F	F	F	F
	450	G	G	G	G
	500	H	H	H	H
	600	I	I	I	I
	700	L	L	L	L
	800	M	M	M	M
	900	N	N	N	N
	1000	O	O	O	O

	Schaft (≤stat. sup.)	Contactor type			
		R1 R2 R3	R4 R5	R6 R7 R8	R9
<b>17</b>	Length (mm)				
	150	A	-	-	-
	200	B	-	-	-
	250	C	C	-	-
	300	D	D	-	-
	350	E	E	E	-
	400	F	F	F	F
	450	G	G	G	G
	500	H	H	H	H
	600	I	I	I	I
	700	L	L	L	L
	800	M	M	M	M
	900	N	N	N	N
	1000	O	O	O	O

	Isolation	<b>18</b>
<b>18</b>	For more isolation	M
	Not required	-

	Space	<b>16</b>
<b>16</b>	No space	Station. sup.=Shaft -
	Space	Left S
		Right -



Order codes

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## Standardised DC or rectified coils

The DC coils are suitable for intermittent operation; for continuous operation, an economy resistor must be used.

The coils for rectified rated voltages 20-40-97-197V obtained from AC power supplies. (before the rectifier). 24-48-110-220V are available upon request. For the contactor of "RN" break poles, contact GE.

Clapper contactors

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Contactor	Voltage VDC	Coil		Economy resistor for continuous operation ± 5%				Single-phase bridge rectifier for AC power		
		Cat. no.	Ref. no.	W	Ω	Cat. no.	Ref. no.	V 50/60Hz	Cat. no.	Ref. no.
R1 R2	20	39012Y20D	244107	4	8.2	RSS13/64TA8,2	204177	24	MSK-B250/220-1,5	209997
	24	39012Y24D	202327		18	RSS13/64TA18	211727	-		
	40	39012Y40D	244106		33	RSS13/64TA33	211728	48		
	48	39012Y48D	244734		68	RSS13/64TA6,8	214869	-		
	97	39012Y97D	202328		220	RSS13/64TA220	212702	110		
	110	39012Y110D	202323		330	RSS13/64TA330	211745	-		
	197	39012Y197D	202325		680	RSS13/64TA680	214580	220		
	220	39012Y220D	202326		1200	RSS13/64TA1200	213034	-		
	230	39012Y230D	211706		1200	RSS13/64TA1200	213034	-		
	125	39012Y125D	202324		330	RSS13/64TA300	211714	-		
R3	20	3903Y20D	215278	4	8.2	RSS13/64TA8,2	204177	24	MSK-B250/220-1,5	209997
	24	3903Y24D	244735		18	RSS13/64TA18	211727	-		
	40	3903Y40D	244088		39	RSS13/64TA39	211730	48		
	48	3903Y48D	212705		47	RSS13/64TA47	211731	-		
	97	3903Y97D	213691		270	RSS13/64TA270	214399	110		
	110	3903Y110D	202437		330	RSS13/64TA330	211745	-		
	197	3903Y197D	214442		820	RSS13/64TA820	214400	220		
	220	3903Y220D	202438		1200	RSS13/64TA1200	213034	-		
	230	3903Y230D	211107		1200	RSS13/64TA1200	213034	-		
	125	3903Y125D	216100		330	RSS13/64TA300	211714	-		
R4	20	3904Y20D	244084	6	8.2	RSS13/64TA8,2	204177	24	MSK-B250/220-1,5	209997
	24	3904Y24D	202483		18	RSS13/64TA18	211727	-		
	40	3904Y40D	244083		33	RSS13/64TA33	211728	48		
	48	3904Y48D	213814		33	RSS13/64TA33	211728	-		
	97	3904Y97D	213601		180	RSS13/64TA180	211744	110		
	110	3904Y110D	202479		180	RSS13/64TA180	211744	-		
	197	3904Y197D	202481		680	RSS13/64TA680	214580	220		
	220	3904Y220D	202482		680	RSS13/64TA680	214580	-		
	230	3904Y230D	211708		680	RSS13/64TA680	214580	-		
	125	3904Y125D	202480		180	RSS13/64TA180	211744	-		
R5	20	3905Y20D	244073	10	6.8	RSS13/64TA6,8	214869	24	SKB-B80/70-4	211716
	24	3905Y24D	244072		10	RSS13/64TA10	211742	-		
	40	3905Y40D	244071		27	RSS13/64TA27	244192	48		
	48	3905Y48D	244736		27	RSS13/64TA27	244192	-		
	97	3905Y97D	202513		120	RSS13/64TA120	243281	110		
	110	3905Y110D	202512		180	RSS13/64TA180	211744	-		
	197	3905Y197D	244074		470	RSS13/64TA470	244191	220		
	220	3905Y220D	212706		680	RSS13/64TA680	214580	-		
	230	3905Y230D	211709		680	RSS13/64TA680	214580	-		
	125	3905Y125D	242260		180	RSS13/64TA180	211744	-		
R6	20	3906Y20D	244065	10	6.8	RSS13/64TA6,8	214869	24	SKB-B80/70-4	211716
	24	3906Y24D	244064		8.2	RSS13/64TA8,2	204177	-		
	40	3906Y40D	244063		27	RSS13/64TA27	244192	48		
	48	3906Y48D	212707		27	RSS13/64TA27	244192	-		
	97	3906Y97D	202533		100	RSS13/64TA100	211744	110		
	110	3906Y110D	202532		180	RSS13/64TA180	211744	-		
	197	3906Y197D	244066		470	RSS13/64TA470	244191	220		
	220	3906Y220D	213612		680	RSS13/64TA680	214580	-		
	230	3906Y230D	211770		680	RSS13/64TA680	214580	-		
	125	3906Y125D	211711		180	RSS13/64TA180	211744	-		
R7	20	3907Y20D	244058	16	5.6	RSS13/64TA5,6	211735	24	SKB-B80/70-4	211716
	24	3907Y24D	244057		5.6	RSS13/64TA5,6	211735	-		
	40	3907Y40D	244056		15	RSS13/64TA15	211737	48		
	48	3907Y48D	244737		18	RSS13/64TA18	211727	-		
	97	3907Y97D	244738		82	RSS13/64TA82	204177	110		
	110	3907Y110D	202547		100	RSS13/64TA100	211743	-		
	197	3907Y197D	244059		330	RSS13/64TA330	211745	220		
	220	3907Y220D	202548		390	RSS13/64TA390	211746	-		
	230	3907Y230D	211712		1200	RSS13/64TA1200	213034	-		
	125	3907Y125D	211713		330	RSS13/64TA330	211745	-		
R8	97	3908Y97D	212959	16	82	RSS20/165TA82	214081	110	SKB-B250/220-4	212165
	110	3908Y110D	202565		120	RSS20/165TA120	213664	-		
	197	3908Y197D	214066		390	RSS20/165TA390	211748	220		
	220	3908Y220D	202566		470	RSS20/165TA470	211739	-		
R9	97	3909Y97D	214146	140	100	RSS20/165TA100	213663	110	SKB-B30/08	211720
	110	3909Y110D	202572		150	RSS20/165TA150	215004	-		
	197	3909Y197D	204181		390	RSS20/165TA390	211748	220		
	220	3909Y220D	244739		560	RSS20/165TA560	244987	-		

(1) To insert the resistors, use NC auxiliary contacts in series.

(2) Two 20x165 resistors connected in parallel, each with a resistive value listed in the table.



## Spare parts

Contactors	Description	Cat. no.	Ref. no.	Pack (units)	
R1	"Z" stationary part with 14A arc-quenching coil and spark suppressor	390/3921PFZCS14	202273	1	
	"Z" stationary part with 25A arc-quenching coil and spark suppressor	390/3921PFZCS25	244172	1	
	"Z" stationary part with 45A arc-quenching coil and spark suppressor	390/3921PFZCS45	202274	1	
	"RN" stationary part with spark suppressor	390/3921PFRN	244173	1	
	"Z" moving part (with pressure spring and strap)	390/3921PMZI	202276	1	
	"RN" moving part (with pressure spring and strap)	390/3921PMRN	202275	1	
	Stationary and moving main contact, type 4/2 (intermittent operation)	390/3921/2FOM4/2	214120	1	
	Stationary and moving main contact, type 5/2 (continuous operation)	390/3922FOM5/2	214121	1	
	Spark suppressor for "Z" and "RN" poles	390/3921PZ	202277	1	
	R2	"Z" stationary part with 45A arc-quenching coil and spark suppressor	390/3922PFZCS45	244744	1
		"Z" stationary part with 90A arc-quenching coil and spark suppressor	390/3922PFZCS90	202278	1
"RN" stationary part with spark suppressor		390/3922PFRN	212709	1	
"Z" moving part (with pressure spring and strap)		390/3922PMZI	202279	1	
"RN" moving part (with pressure spring and strap)		390/3922PMRN	213014	1	
Stationary and moving main contact, type 4/2 (intermittent operation)		390/3921/2FOM4/2	214120	1	
Stationary and moving main contact, type 5/2 (continuous operation)		390/3922FOM5/2	214121	1	
Spark suppressor for "Z" and "RN" poles		390/3922PZ	202280	1	
R3		"Z" stationary part with 75A arc-quenching coil and spark suppressor	390/3923PFZCS75	244745	1
		"Z" stationary part with 125A arc-quenching coil and spark suppressor	390/3923PFZCS125	202281	1
		"RN" stationary part with spark suppressor	390/3923PFRN	213986	1
	"Z" moving part (with pressure spring and strap)	390/3923PMZI	202283	1	
	"RN" moving part (with pressure spring and strap)	390/3923PMRN	202282	1	
	Stationary and moving main contact, type 4/2 (intermittent operation)	390/3923/2FOM4/2	214122	1	
	Stationary and moving main contact, type 5/2 (continuous operation)	390/3923FOM5/2	214123	1	
	Spark suppressor for "Z" and "RN" poles	390/3923PZ	202284	1	
	R4	"Z" stationary part with 125A arc-quenching coil and spark suppressor	390/3924PFZCS125	202288	1
		"Z" stationary part with 200A arc-quenching coil and spark suppressor	390/3924PFZCS200	202289	1
		"RN" stationary part with spark suppressor	390/3924PFRN	202287	1
"Z" moving part (with pressure spring and strap)		390/3924PMZI	202291	1	
"RN" moving part (with pressure spring and strap)		390/3924PMRN	202290	1	
Stationary main contact, type 4/2 (intermittent operation)		390/3924F4	214124	1	
Moving main contact, type 4/2 (intermittent operation)		390/3924M4/2	214126	1	
Stationary main contact, 5/2 type (continuous operation)		390/3924F5/2	204178	1	
Moving main contact, type 5/2 (continuous operation)		390/3924M5/2	214127	1	
Spark suppressor for "Z" and "RN" poles		390/3924PZ	202292	1	
R5		"Z" stationary part with 125A arc-quenching coil and spark suppressor	390/3925PFZCS150	213573	1
	"Z" stationary part with 320A arc-quenching coil and spark suppressor	390/3925PFZCS320	202295	1	
	"RN" stationary part with spark suppressor	390/3925PFRN	244746	1	
	"Z" moving part (with pressure spring and strap)	390/3925PMZI	202298	1	
	"RN" moving part (with pressure spring and strap)	390/3925PMRN	202297	1	
	Stationary main contact, type 4/2 (intermittent operation)	390/3925F4/2	214128	1	
	Moving main contact, type 4/2 (intermittent operation)	390/3925M4/2	214130	1	
	Stationary main contact, 5/2 type (continuous operation)	390/3925F5/2	214129	1	
	Moving main contact, type 5/2 (continuous operation)	390/3925M5/2	214131	1	
	Spark suppressor for "Z" and "RN" poles	390/3925PZ	202299	1	
	R5	"Z" stationary part with 270A arc-quenching coil and spark suppressor	390/3926PFZCS270	202303	1
"Z" stationary part with 450A arc-quenching coil and spark suppressor		390/3926PFZCS450	213574	1	
"Z" moving part (with pressure spring and strap)		390/3926PMZI	202304	1	
Stationary main contact, type 4/2 (intermittent operation)		390/3926F4/2	214133	1	
Moving main contact, type 4/2 (intermittent operation)		390/3926M4/2	214135	1	
Stationary main contact, 5/2 type (continuous operation)		390/3926F5/2	214134	1	
Moving main contact, type 5/2 (continuous operation)		390/3926M5/2	214136	1	
Spark suppressor for "Z" and "RN" poles	390/3926PZ	202654	1		

Order codes

A

B

C

D

E

F

G

H

I

X





## Spare parts (continued)

Contactora	Description	Cat. no.	Ref. no.	Pack (units)
R7	"Z" stationary part with 320A arc-quenching coil and spark suppressor	390/3927PFZCS320	202307	1
	"Z" stationary part with 630A arc-quenching coil and spark suppressor	390/3927PFZCS630	202308	1
	"RN" stationary part with spark suppressor	390/3927PFRN	202306	1
	"Z" moving part (with pressure spring and strap)	390/392PMZI	202310	1
	"RN" moving part (with pressure spring and strap)	390/3927PMRN	202309	1
	Stationary main contact, type 4/2 (intermittent operation)	390/3927F4/2	214137	1
	Moving main contact, type 4/2 (intermittent operation)	390/3927M4/2	214139	1
	Stationary main contact, 5/2 type (continuous operation)	390/3927F5/2	214138	1
	Moving main contact, type 5/2 (continuous operation)	390/3927M5/2	214140	1
	Spark suppressor for "Z" and "RN" poles	390/3927PZ	202311	1
R8	"Z" stationary part with 400A arc-quenching coil and spark suppressor	3908PFZCS400	202555	1
	"Z" stationary part with 800A arc-quenching coil and spark suppressor	3908PFZCS800	202562	1
	"Z" moving part (with pressure spring and strap)	3908PMZ	202563	1
	Stationary main contact, type 4/2 (intermittent operation)	3908F4/2	214144	1
	Moving main contact, type 4/2 (intermittent operation)	3908/9M4/2	214141	1
	Stationary main contact, 5/2 type (continuous operation)	3908F5/2	214145	1
	Moving main contact, type 5/2 (continuous operation)	3908/9M5/2	214142	1
	Spark suppressor for "Z" and "RN" poles	3908PZ	202564	1
R8	"Z" stationary part with 1200A arc-quenching coil and spark suppr.	3909PFZCS120	244983	1
	"Z" moving part (with pressure spring and strap)	3909PMZ	212962	1
	Stationary main contact, type 4/2 (intermittent operation)	3909F4/2	204179	1
	Moving main contact, type 4/2 (intermittent operation)	3908/9M4/2	214141	1
	Stationary main contact, 5/2 type (continuous operation)	3909F5/2	204180	1
Moving main contact, type 5/2 (continuous operation)	3908/9M5/2	214142	1	



Operating categories

			R1...	R2...	R3...	R4...	R5...	R6...	R7...	R8...	R9...		
AC-1	Peak operating current at ambient temp. of: (for all rated voltages)	40°C (A)	45	90	125	250	320	450	630	800	1200		
		55°C (A)	45	90	125	250	320	450	600	750	1200		
		70°C (A)	30	70	100	200	280	360	500	700	950		
	Max. operating power Resistor III	230/220V (kW)	17	30	45	90	114	170	195	240	450		
		400/380V (kW)	29	55	75	155	196	310	330	410	750		
		440/415V (kW)	32	57	85	180	227	340	330	500	900		
		500V (kW)	39	69	102	200	250	390	420	550	1030		
Conductor (mm <sup>2</sup> )		10	35	50	120	185	2 x (30x5)	2 x (40x5)	2 x (60x5)	4 x (50x5)			
Operation in % of peak operating current	120 ops/h (%)	100	100	100	100	100	100	100	100	100	50		
	300 ops/h (%)	50	50	50	50	30	30	20	10	10			
AC-3	Peak operating current	Ue = 400V (A)	40	90	110	200	320	450	630	800	-		
	Max. operating power	230/220V (kW)	11.5	26	36.5	72.5	93	130	184	232	-		
		400/380V (kW)	20	45	62	100	160	225	315	400	-		
		440/415V (kW)	20	45	68	100	160	225	315	400	-		
		500V (kW)	20	45	72.5	120	165	280	400	500	-		
Use in % of peak operating current	120 ops/h (%)	100	100	100	100	100	100	100	100	-			
	300 ops/h (%)	50	50	50	50	50	50	30	30	-			
AC-4	Peak operating current	Ue = 500V (A)	18.5	44	55	110	125	150	165	250	-		
	Operating power (200,000 switching)	230/220V (kW)	4	11	15	33	37	45	50	80	-		
		400/380V (kW)	9	22	28	55	63	80	90	132	-		
		(HP)	11.9	29.2	37.2	73.1	83.8	106	119.7	175.5	-		
		500V (kW)	11	25	33	75	90	100	110	225	-		
		(HP)	14.6	33.2	43.9	99.7	119.7	133	146	299	-		
	Peak operating current ≤ 400V (A)		40	90	110	185	280	420	590	700	-		
Max. operating power 400/380V (kW)		18.5	38	55	90	150	220	300	375	-			
			R1...	R2...	R3...	R4...	R5...	R6...	R7...	R8...	R9...		
DC1 L/R ≤ 1ms	Ue	Series poles	125V	1	40	85	115	180	300	400	600	700	900
			2	60	90	125	200	320	450	630	750	1000	
		3	60	90	125	200	320	450	630	800	1250		
		4	60	90	125	200	320	450	630	800	1250		
	220V	1	20	75	110	160	275	350	500	600	800		
		2	30	90	115	200	300	370	560	650	900		
		3	40	90	125	250	320	400	630	750	1000		
		4	40	90	125	250	320	450	630	800	1250		
	440V	1	-	-	-	-	-	-	-	-	-	-	
		2	-	75	100	200	275	350	500	600	800		
		3	20	90	125	250	320	400	600	700	900		
		4	20	90	125	250	320	450	630	800	1000		
	DC3 L/R ≤ 2.5ms	125V	1	30	75	100	170	280	380	550	650	-	
			2	40	80	110	200	320	450	630	800	-	
			3	45	90	110	200	320	450	630	800	-	
			4	45	100	120	220	340	480	-	-	-	
220V		1	-	-	-	-	-	-	-	-	-		
		2	15	65	90	155	245	340	460	550	-		
		3	20	90	110	200	320	450	630	800	-		
		4	25	90	110	200	320	450	630	800	-		
440V		1	-	-	-	-	-	-	-	-	-		
		2	-	-	-	-	-	-	-	-	-		
		3	10	55	75	120	200	300	400	500	-		
		4	13	70	100	160	260	400	550	660	-		
DC5 L/R ≤ 15ms		125V	1	27	50	70	90	240	320	400	500	-	
			2	35	70	90	150	280	380	450	550	-	
			3	40	90	100	200	320	420	500	600	-	
			4	40	90	110	200	320	450	500	650	-	
	220V	1	-	-	-	-	-	-	-	-	-		
		2	13	55	80	140	220	300	410	490	-		
		3	18	80	100	180	290	400	560	700	-		
		4	22	80	100	180	290	400	560	700	-		
	440V	1	-	-	-	-	-	-	-	-	-		
		2	-	-	-	-	-	-	-	-	-		
		3	9	50	67	100	180	270	360	450	-		
		4	11	60	90	130	224	360	480	600	-		



## Technical data

### Standards

IEC/EN 60947-1  
IEC/EN 60947-4-1  
IEC/EN 60947-5-1

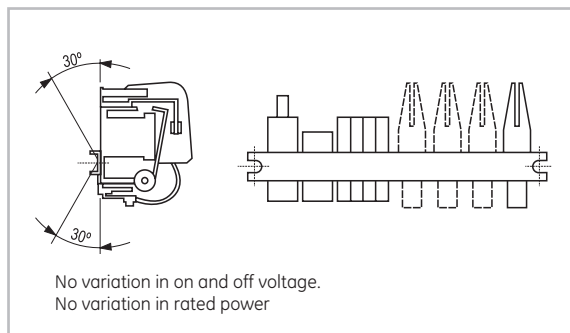
### Ambient conditions

Storage temperature	-55°C to +80°C	
Operating temperature	-40°C to +60°C	
Altitude	up to 2500m	Rated values
	3000 to 4000m	90%le 80%Ue
	4000 to 5000m	80%le 75%Ue

### Climatic withstand capacity (IEC 68-2)

Continuous testing 40/125/56			
Cold (72h)	Temperature	-40°C	
Dry heat (96h)	Temperature	+125°C	
	Relative humidity	< 50%	
Moist heat (56 days)	Temperature	+40°C	
	Relative humidity	95%	
Cyclic testing			
First half-cycle (12h)	Low temperature	+25°C	
	Relative humidity	93%	
Second half-cycle (12h)	Low temperature	+55°C	
	Relative humidity	95%	
No. consecutive cycles	6		

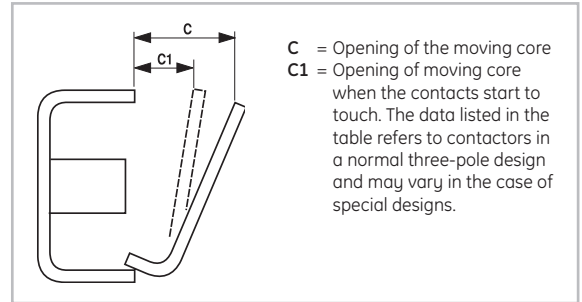
### Mounting positions



### Capacity of terminals and torque

		R1... R2...	R3...	R4...	R5...	R6...	R7...	R8...	R9...
	Single-core conductor	(mm <sup>2</sup> ) 2.5...25	2.5...50						
	Multi-strand conductor with terminal sheath	(mm <sup>2</sup> ) 2.5...25	2.5...50						
	Multi-strand conductor without terminal sheath	(mm <sup>2</sup> ) 2.5...25	2.5...50						
	Multi-strand	(mm <sup>2</sup> ) 4...25	4...50						
	Single- and multi-strand AWG	(mm <sup>2</sup> ) 16...4	16...2						
	Torque	(Nm)	4	5,6					
		(Lb x in)	35	50					
	Multi-strand with terminal	(mm <sup>2</sup> )		1 x 120 2 x 95	1 x 185 2 x 150	-	-	-	
	Clappers			-	-	2 x (30x5)	2 x (40x5)	2 x (60x5)	
	Torque	(Nm)		7	23	31	31	31	
		(Lb x in)		60	200	275	275	275	

## Maintenance



DC power supply		Pressure of closed contact in kg (+10% / -30%)
C (mm) ±1	C1 (mm) ±1	
18	5	0.750
18	5	0.750
20	6	0.750
22	6	1.300
24	7	2.000
28	8	3.500
28	8	5.500
34	10	8.000
34	10	15.000

### Replacement of main contact

The replacement (due to wear) of the main contacts requires an adjustment to ensure proper distance between the moving and the stationary contacts. The respective adjustment screws should be turned until the main contacts start to touch simultaneously when the gap indicated by A1 or C1 exists between the stationary and the moving magnetic circuit. Make sure that all contactor poles have the same stroke by manually closing the magnetic circuit; if the poles are properly adjusted, they should come into contact at the same time.

If contact wear is abnormal, please contact the manufacturer since the apparatus has been improperly chosen for the application conditions. To replace the contacts, loosen the screw securing the contacts to the respective contact holder, making sure that the screws are well-tightened when installing the new contacts.

GE Power Controls warrants proper operation of the contactors only if the contacts are replaced with OEM contacts.

**Power circuit**

		R1...	R2...	R3...	R4...	R5...	R6...	R7...	R8...	R9...	
Thermal rated current I <sub>th</sub> at $\theta \leq 55^\circ\text{C}$	(A)	45	90	125	250	320	450	630	800	1500	
Rated operating current I <sub>e</sub> AC-3	(A)	40	90	110	200	320	450	630	800	-	
Rated operating voltage U <sub>e</sub> (1)	(V)	500	500	500	500	500	500	500	500	500	
<b>3-pole contactors</b>											
Rated isolation voltage U <sub>i</sub>	(V)	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Maximum continuous current AC-1	(A)	45	90	125	250	320	450	630	800	1200	
Frequency limits (Hz)	(Hz)										
Making capacity (RMS) (IEC947)	(A)	540	1200	1250	2400	3800	5400	7500	9600	4000	
Breaking capacity (RMS) (IEC 947) U <sub>e</sub> ≤ 400V	(A)	450	960	1250	1900	3050	4350	6000	7700	4000	
	(A)	-	650	1050	1900	3050	4350	6000	7700	4000	
Short-time current	1 s.	(A)	1200	1500	2000	2500	3000	4250	5000	6000	10000
	5 s.	(A)	800	900	1500	2200	2800	4000	4800	5700	9000
	10 s.	(A)	500	650	1200	1600	2500	3900	4600	5500	8800
	30 s.	(A)	250	300	750	1100	2000	3700	4400	5200	8500
	1 min.	(A)	180	200	450	800	1500	2500	3000	4000	5000
	3 min.	(A)	100	150	250	500	600	900	1500	2300	3000
Recovery time	(min.)	10	10	10	10	10	10	10	10	10	
Fused short-circuit protection	aM	(A)	50	125	160	250	400	630	800	1000	-
	gL-gG	(A)	80	160	200	315	425	630	800	1000	-
Impedance per pole	(mΩ)	1	1	0.5	0.4	0.2	0.3	0.2	0.25	0.10	
Power dissipated per pole	AC-1	(W)	2.1	8.1	7.8	25	20	60	79	160	144
	AC-3	(W)	1.6	8.1	6	16	20	60	79	160	-
Isolation resistance											
Pole-to-pole	(mΩ)	>10	>10	>10	>10	>10	>10	>10	>10	>10	
Pole-to-ground	(mΩ)	>10	>10	>10	>10	>10	>10	>10	>10	>10	
Input-to-output	(mΩ)	>10	>10	>10	>10	>10	>10	>10	>10	>10	

(1) For rated voltages above 500V, contact the manufacturer.

**Control circuit**

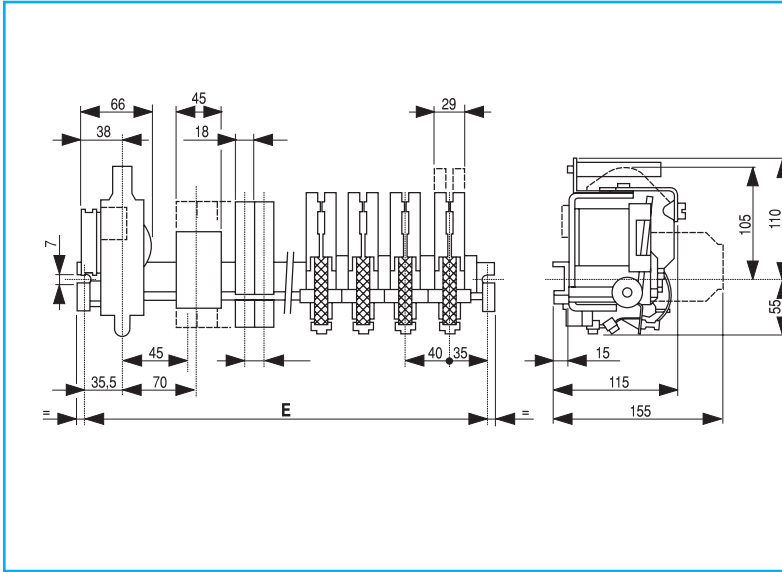
		R1...	R2...	R3...	R4...	R5...	R6...	R7...	R8...	R9...
Rated isolation voltage U <sub>i</sub>	(V)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Standardized voltages U <sub>s</sub> at 50/60 Hz	(V)	24...220	24...220	24...220	24...220	24...220	24...220	24...220	24...220	24...220
Single-frequency coil voltage limits										
Operation	xU <sub>s</sub>	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1
Off	xU <sub>s</sub>	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55	0.22...0.55
Consumption of dual-frequency coils (1)										
Closed magnetic circuit (50 Hz/60 Hz)	(VA)	19	19	20	25	35	38	53	100	190
Open magnetic circuit (50 Hz/60Hz)	(VA)	27	27	38	41	57	60	90	440	1400
Dissipated thermal power (50 Hz/60 Hz)	(W)	19	19	20	25	35	38	53	100	190
On and off times. Values at U <sub>s</sub>										
Making time at de-energisation (NA)	(ms)	60/70	60/70	60/70	110/120	150/160	180/200	200/210	150/160	-
Making time at de-energisation (NA)	(ms)	80/95	80/95	80/95	160/170	200/210	350/450	240/250	150/160	-
Mechanical endurance										
Dual-frequency coils (at 50 Hz)	10 <sup>6</sup> ops.	10	10	10	10	10	10	10	8	8
Maximum rate										
Dual-frequency coils. No-load	ops./h	1200	1200	600	400	400	400	400	300	300
AC-1 with rated power	ops./h	600	600	300	120	120	120	120	90	60
AC-2 with rated power	ops./h	250	250	200	120	120	120	120	90	-
AC-3 with rated power	ops./h	600	600	300	120	120	120	120	90	-
AC-4 with rated power	ops./h	150	150	100	60	60	60	60	30	-
<b>Direct current</b>										
Rated isolation voltage U <sub>i</sub>	(V)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Standardized voltages U <sub>s</sub>	(V)	24...230	24...230	24...230	24...230	24...230	24...230	24...230	24...230	24...230
Voltage limits										
Operating	xU <sub>s</sub>	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1	0.8...1.1
Off	xU <sub>s</sub>	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5	0.15...0.5
Power consumption										
Closed magnetic circuit	(W)	14	14	16	22	28	30	42	80	140
Open magnetic circuit	(W)	21	21	25	31	45	46	65	400	1000
On and off time										
Values at U <sub>s</sub>										
Making time at energization (NA)	(ms)	60/70	60/70	60/70	110/120	150/160	180/200	200/210	150/160	-
Breaking time at de-energization (NA)	(ms)	19/20	19/20	19/20	28/30	40/45	59/60	30/35	25/30	-
Mechanical endurance										
	10 <sup>6</sup> ops.	10	10	10	10	10	10	10	8	8
Maximum rate										
No-load	ops./h	1200	1200	600	400	400	400	400	300	300
AC1 and AC3 with rated power	ops./h	600	600	300	120	120	120	120	90	-
AC4 with rated power	ops./h	150	150	100	60	60	60	60	30	-

(1) With 5/2 contact



Dimensional drawings

R1..., R2...

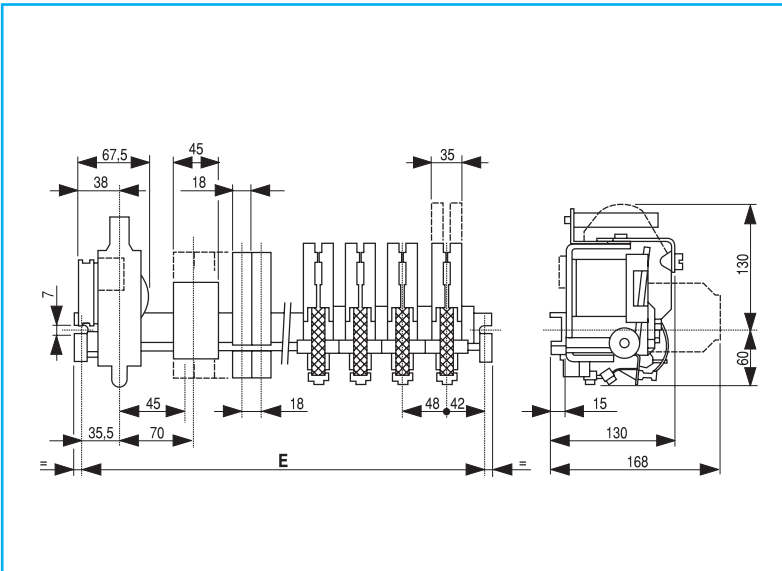


Contact combination

"Z" main pole (1)	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	1	1	1	150
	3	3	3	200
	6	6	4	250
	9	6	4	300
	10	6	4	350
2	10	6	4	400
	1	1	1	200
	4	4	4	250
	7	6	4	300
	9	6	4	350
3	9	6	4	400
	2	2	2	250
	5	5	4	300
	7	6	4	350
	7	6	4	400
4	4	4	4	400
	5	5	4	350
	5	5	4	400

(1) A "RN" pole can be used to replace one of the "Z" poles. To use a higher number of "RN" poles, contact the manufacturer.

R3...

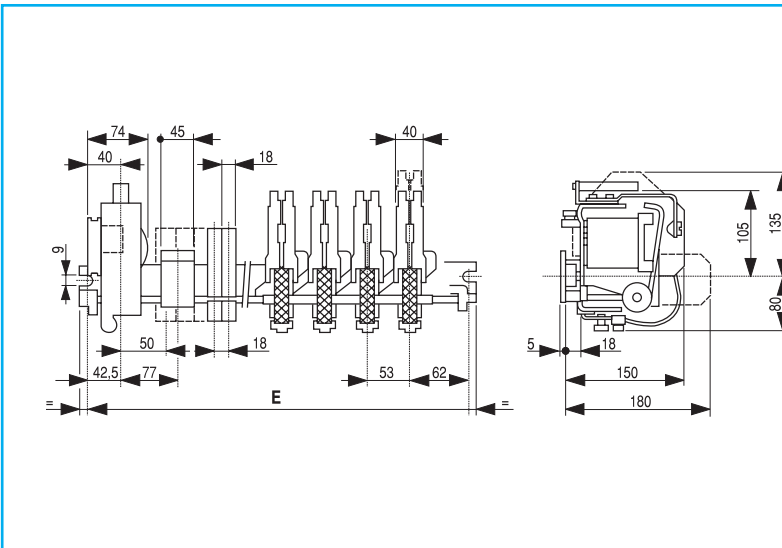


Contact combination

"Z" main pole (1)	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	-	-	-	150
	3	3	3	200
	6	6	4	250
	9	6	4	300
	10	6	4	350
2	10	6	4	400
	-	-	-	200
	3	3	3	250
	6	6	4	300
3	8	6	4	350
	9	6	4	400
	3	3	3	250
	6	6	4	300
4	6	6	4	350
	7	6	4	400
	-	-	-	300
	3	3	3	350
4	4	4	400	

(1) A "RN" pole can be used to replace one of the "Z" poles. To use a higher number of "RN" poles, contact the manufacturer.

R4...

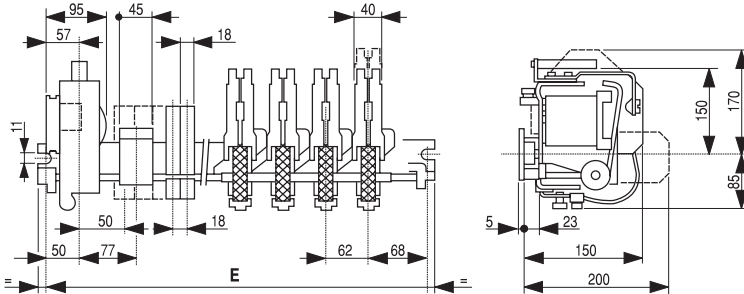


Contact combination

"Z" main pole (1)	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	3	3	3	250
	6	6	4	300
	9	6	4	350
	10	6	4	400
	10	6	4	450
2	10	6	4	450
	-	-	-	250
	3	3	3	300
	6	6	4	350
	9	6	4	400
3	10	6	4	450
	-	-	-	300
	3	3	3	350
	6	6	4	400
4	9	6	4	450
	3	3	3	400
	4	4	3	450

(1) A "RN" pole can be used to replace one of the "Z" poles. To use a higher number of "RN" poles, contact the manufacturer.

R5...

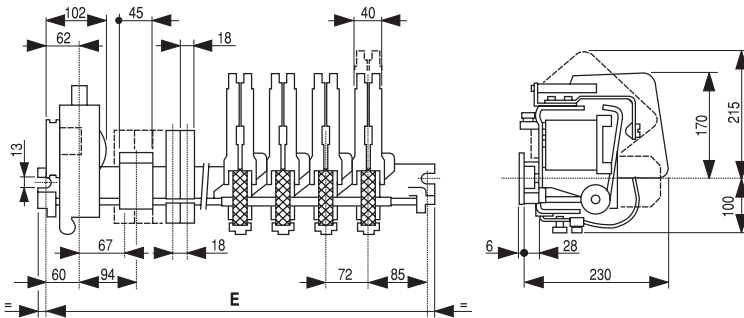


Contact combination

"Z" main pole (1)	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	2	2	2	250
	5	5	4	300
	8	6	4	350
	10	6	4	400
	10	6	4	450
2	10	6	4	500
	2	2	2	300
	4	4	4	350
	7	6	4	400
3	10	6	4	450
	10	6	4	500
	1	-	-	350
	4	4	4	400
4	6	6	4	450
	7	6	4	500
	-	-	-	400
	3	3	3	450
	3	3	3	500

(1) A "RN" pole can be used to replace one of the "Z" poles. To use a higher number of "RN" poles, contact the manufacturer.

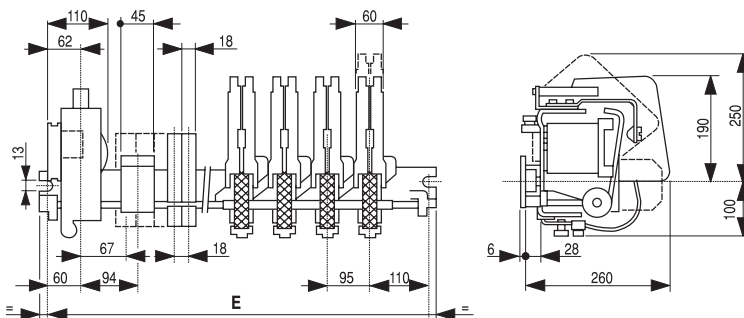
R6...



Contact combination

"Z" main pole	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	5	2	4	350
	8	6	4	400
	10	6	4	450
	10	6	4	500
	10	6	4	600
2	10	6	4	700
	1	1	1	350
	4	4	4	400
	7	6	4	450
3	9	6	4	500
	10	6	4	600
	10	6	4	700
	2	2	2	450
4	5	5	4	500
	7	6	4	600
	7	6	4	700
	1	1	1	500
	2	2	2	600
	2	2	2	700

R7...



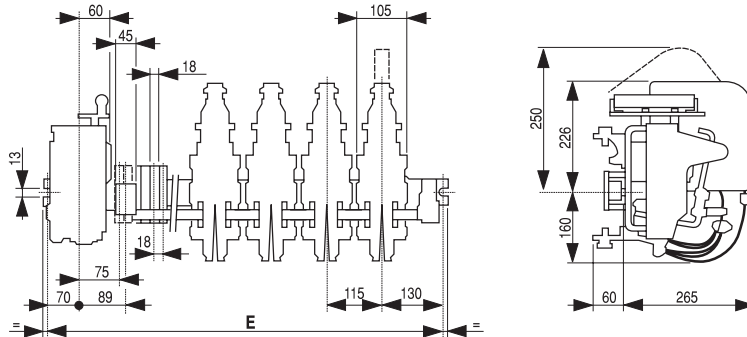
Contact combination

"Z" main pole (1)	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	4	4	4	350
	6	6	4	400
	9	6	4	450
	10	6	4	500
	10	6	4	600
2	10	6	4	700
	1	1	1	400
	4	4	4	450
	7	6	4	500
3	10	6	4	600
	10	6	4	700
	1	1	1	500
	7	6	4	600
4	8	6	4	700
	2	2	2	600
	5	5	3	700

(1) A "RN" pole can be used to replace one of the "Z" poles. To use a higher number of "RN" poles, contact the manufacturer.

Dimensional drawings

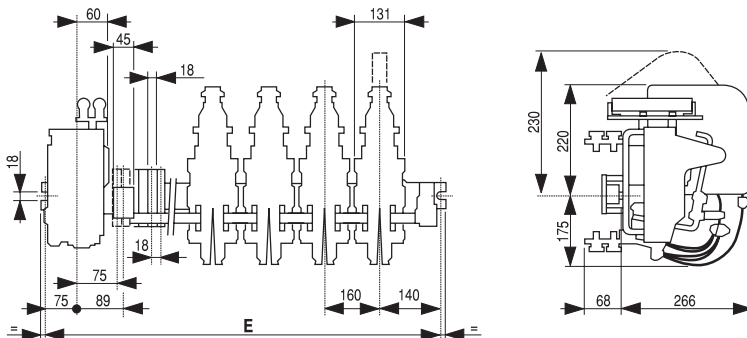
R8...



Contact combination

"Z" main pole	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	1	1	1	350
	4	4	4	400
	6	6	4	450
	9	6	4	500
	10	6	4	600
	10	6	4	700
2	10	6	4	800
	-	-	-	450
	3	3	3	500
	8	6	4	600
3	10	6	4	700
	10	6	4	800
	2	2	2	600
4	8	6	4	700
	8	6	4	800
	1	1	1	700
	4	3	3	800

R9...



Contact combination

"Z" main pole	Max. no. of aux. contacts	Max. NO	Max. NC	Center-to-center spacing
1	2	2	2	400
	4	4	4	450
	7	6	4	500
	10	6	4	600
	10	6	4	700
	10	6	4	800
	10	6	4	900
	10	6	4	1000
2	4	4	4	600
	9	6	4	700
	10	6	4	800
	10	6	4	900
	10	6	4	1000
3	-	-	-	700
	6	6	4	800
	8	6	4	900
4	8	6	4	1000
	3	3	3	900
	4	3	3	1000

## SURION - Fuseless starters

- D.2 Fuseless starters
- D.5 Coordination tables
- D.14 Dimensions

## Series M, CL, CK - Direct-on-line starters

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## Series M, CL, CK - Reversing starters

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## Series CL, CK - Star-delta starters

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## Applications

- D.39 Utilisation categories
- D.42 Electrical endurance
- D.46 DC utilisation categories

## Selection tables

- D.49 Direct-on-line starters
- D.52 Star-delta starters
- D.56 Autotransformer starters

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Contactors and Thermal overload relays

Motorstarters

Control and signalling units

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Main switches

Numerical index

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- D.60 Contactors for rotor speed drives
- D.62 Contactors for connection of power transformers
- D.63 Contactors for capacitors (category AC6b)
- D.64 Contactors for control lighting circuits

## ASTAT S - Softstarters

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- D.68 Diagrams
- D.69 Performance
- D.70 Dimensions

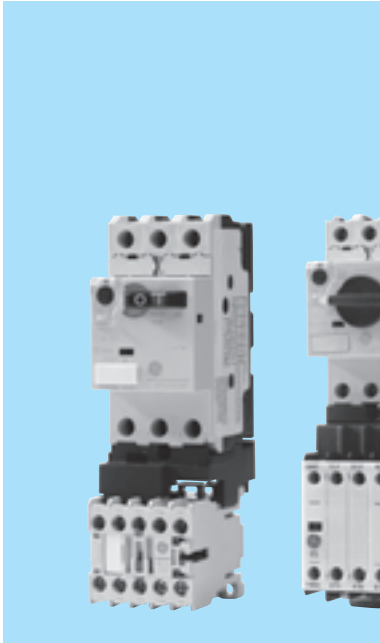
## ASTAT XT Digital Soft Starters

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- D.79 I/O terminal board specifications
- D.80 Wiring diagrams
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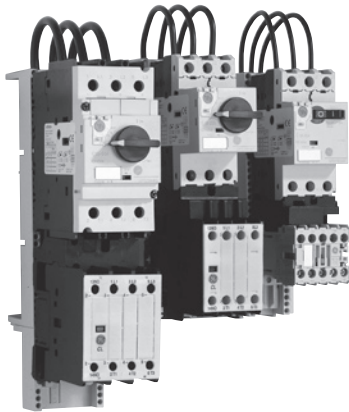
**NEW**







## Fuseless starters and busbar adapter plates



### Product range

- Link modules for mechanical and electrical connection of the manual motor starter and the M / CL contactor range
- Base plates for Din rail and busbar adapters
- Wiring kits for reversing applications
- Link connection for two base plates for three phase busbar system with 40 and 60mm center line spacing and 5 to 10mm thickness
- Accessories

### Technical performances

- Compact and high performance solution
- Easy accessibility to the contactor coil terminal A1-A2
- Save spacing only using 45 and 55mm width base plates for busbar adapters
- Quick "clip on" and secure connections
- Minimum 50kA short-circuit breaking capacity applies throughout

#### Thermal and magnetic protection

- GPS1B ● pg. B.8
- GPS2B ● pg. B.10
- GPS1M ● pg. B.12
- GPS2M ● pg. B.14

#### Contactors

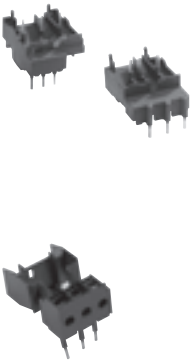





- Serie M ● pg. C.2
- Serie CL ● pg. C.10

- Coordination tables ● pg. D.5
- Dimensions ● pg. D.14

For fuseless starter application turn the contactor 180° to have direct accessibility to the A1-A2 coil terminals when contactor is assembled to the manual motor starter. Then fit the contactor plastic cover into the contactor front to have the terminal numbering in the correct position.

Note: when turning the contactor 180° the built-in auxiliary contact (in case) will be located on the first left side terminal.

**Fuseless starters**

	Description	For use with contactor	ac/dc	Frame size	Cat. no.	Ref. no.	Pack.
 <p><b>Link modules</b></p>	For mechanical and electrical connection between contactors and manual motor starters	MC0...MC1..	ac/dc	GPS1	<b>GPF1LMCBA</b>	101410	5
		CL00A... CL01A... CL02A..	ac	GPS1	<b>GPF1L02AA</b>	101411	5
		CL00D... CL01D... CL02D..	dc	GPS1	<b>GPF1L02DA</b>	101412	5
		CL25A..	ac	GPS1	<b>GPF1L25AA</b>	101413	5
		CL25D..	dc	GPS1	<b>GPF1L25DA</b>	101414	5
		CL03A... CL04A	ac	GPS1	<b>GPF1L04AA</b>	107165	5
		CL03D... CL04D	dc	GPS1	<b>GPF1L04DA</b>	107166	5
		CL03A... CL04A..	ac	GPS2	<b>GPF2L04AA</b>	107190	5
		CL45A..	ac	GPS2	<b>GPF2L45AA</b>	101415	5
		CL03D... CL04D..	dc	GPS2	<b>GPF2L04DA</b>	107191	5
		CL45D..	dc	GPS2	<b>GPF2L45DA</b>	101416	5
		CL06A... CL07A..	ac	GPS2	<b>GPF2L07AA</b>	101417	5
		For use with MCCB Record Plus with CL09/10A	-	-	-	<b>GPF3L09AA</b>	107252
	For mechanical and electrical connection between contactor and thermal overload relays RT1	CL00... - CL25	ac/dc	GPS1	<b>GPF1L25CT1</b>	101512	5
CL03... - CL45		ac/dc	GPS2	<b>GPF1L45CT1</b>	101513	5	
 <p><b>Base plates</b></p>	Plastic plates for mounting the fuseless starter in panels or in 35 mm DIN rail	CL00... CL01... CL02... CL25..	ac/dc	GPS1	<b>GPF1B1A</b>	101418	5
		CL03... CL04... and CL45..	ac/dc	GPS2	<b>GPF2B2A</b>	101419	5
		CL06... CL07..	ac/dc	GPS2	<b>GPF2B3A</b>	101420	5
		CL03... CL04..	ac/dc	GP	<b>GPF1B4A</b>	107163	5
 <p><b>Base plates</b></p>	For use with MCCB Record Plus	-	-	-	<b>GPF3B5A</b>	107253	1
		 <p><b>Link connector</b></p>	For two base plates for reversing applications	-	-	-	<b>GPF1CBA</b>
 <p><b>Wiring kits for reversing starters</b></p>	Suitable to be used with link modules Upper and lower connections without overload relays			MC0... MC1... MC2..	ac/dc		<b>WKMIU</b>
		CL00... CL01... CL02..	ac/dc		<b>WKLI02P</b>	101422	1
		CL25..	ac/dc		<b>WKLI25P</b>	101423	1
		CL03... CL04...	ac/dc		<b>WKLI04P</b>	101424	1
		CL45..	ac/dc		<b>WKLI45P</b>	101425	1
		CL06A... CL07A..	ac		<b>WKLI07P</b>	101426	1
 <p><b>Plastic cover</b></p>	Fit the plastic cover into the front of the correspondent contactor to allow a clear identification of the terminal numbering	For use with contactor					
		CL00... CL01.. and CL02 without built-in auxiliary contact		<b>GPF00C02</b>	107098	5	
		CL00... CL01.. and CL02 with built-in 1NO auxiliary contact		<b>GPF10C02</b>	107099	5	
		CL00... CL01.. and CL02 with built-in 1NC auxiliary contact		<b>GPF01C02</b>	107100	5	
		CL25..		<b>GPF00C25</b>	107101	2	
		CL03... CL04.. without built-in auxiliary contact		<b>GPF00C04</b>	107102	5	
		CL03... CL04.. with built-in 1NO auxiliary contact		<b>GPF10C04</b>	107103	5	
		CL03... CL04.. with built-in 1NC auxiliary contact		<b>GPF01C04</b>	107105	5	
		CL45..		<b>GPF00C45</b>	107106	5	
		CL06... CL07..		<b>GPF00C08</b>	107107	5	

Order codes

A

B

C

D

E

F

G

H

I

X



Notes

Manual motorstarter

A

B

C

D

E

F

G

H

I

X

Grid area for notes



Technical data

Surion GPS-B: Coordination Type 1 65kA at 380/400V and 415V

MOTOR (1)			MANUAL MOTOR STARTER				CONTACTOR			LINKS
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current Setting range (A)	Magnetic current (A)	Series	Smallest wire Cu (PVC)(2) 380/415V (mm <sup>2</sup> )	Minimum frontal electrical safety clearance (mm)	Cat. no. (3)
	380/400V (A)	415V (A)								
0.06	0.23	0.21	GPS1BSAB	0.25	0.16 - 0.25	3.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.09	0.34	0.31	GPS1BSAC	0.4	0.25 - 0.4	5.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.12	0.44	0.4	GPS1BSAD	0.63	0.4 - 0.63	8.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.18	0.65	0.63	GPS1BSAE	1	0.63 - 1	13	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.25	0.9	0.8	GPS1BSAE	1	0.63 - 1	13	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.37	1.25	1.1	GPS1BSAF	1.6	1 - 1.6	20.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.55	1.6	1.5	GPS1BSAF	1.6	1 - 1.6	20.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.75	2	1.9	GPS1BSAG	2.5	1.6 - 2.5	32.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.1	2.6	2.5	GPS1BSAH	4	2.5 - 4	52	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.5	3.5	3.4	GPS1BSAH	4	2.5 - 4	52	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
2.2	5	4.5	GPS1BSAJ	6.3	4 - 6.3	82	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
3	7	6.5	GPS1BSAK	10	6.3 - 10	130	MC1 / CL00	1.5	20	GPF1LMCBA / GPF1L02*
4	9	8	GPS1BSAK	10	6.3 - 10	130	MC1 / CL00	1.5	20	GPF1LMCBA / GPF1L02*
5.5	12	11	GPS1BHAL	13	9 - 13	169	CL01	2.5	20	GPF1L02*
7.5	16	14	GPS1BHAM	16	11 - 16	208	CL02	2.5	20	GPF1L02*
11	22.5	21	GPS1BHAP	25	19 - 25	325	CL25	4	20	GPF1L25*
15	30	28	GPS1BHAR	32	24 - 32	416	CL04	6	20	GPF1L04*
11	22.5	21	GPS2BHAP	25	19 - 25	325	CL04	4	20	GPF2L04*
15	30	28	GPS2BHAR	32	24 - 32	416	CL04	6	20	GPF2L04*
18.5	37	35	GPS2BHAS	40	28 - 40	520	CL45	10	20	GPF2L45*
22	44	41	GPS2BHAT	50	35 - 50	650	CL06	10	25	GPF2L07AA
30	60	55	GPS2BHAU	63	45 - 63	820	CL07	16	25	GPF2L07AA

Surion GPS-B: Coordination Type 2 65kA at 380/400V and 415V

MOTOR (1)			MANUAL MOTOR STARTER				CONTACTOR			LINKS
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current Setting range (A)	Magnetic current (A)	Series	Smallest wire Cu (PVC)(2) 380/415V (mm <sup>2</sup> )	Minimum frontal electrical safety clearance (mm)	Cat. no. (3)
	380/400V (A)	415V (A)								
0.06	0.23	0.21	GPS1BHAB	0.25	0.16 - 0.25	3.2	CL00	1	20	GPF1L02*
0.09	0.34	0.31	GPS1BHAC	0.4	0.25 - 0.4	5.2	CL00	1	20	GPF1L02*
0.12	0.44	0.4	GPS1BHAD	0.63	0.4 - 0.63	8.2	CL00	1	20	GPF1L02*
0.18	0.65	0.63	GPS1BHAE	1	0.63 - 1	13	CL00	1	20	GPF1L02*
0.25	0.9	0.8	GPS1BHAE	1	0.63 - 1	13	CL00	1	20	GPF1L02*
0.37	1.25	1.1	GPS1BHAF	1.6	1 - 1.6	20.5	CL00	1	20	GPF1L02*
0.55	1.6	1.5	GPS1BHAF	1.6	1 - 1.6	20.5	CL00	1	20	GPF1L02*
0.75	2	1.9	GPS1BHAG	2.5	1.6 - 2.5	32.5	CL00	1	20	GPF1L02*
1.1	2.6	2.5	GPS1BHAH	4	2.5 - 4	52	CL25	1	20	GPF1L25*
1.5	3.5	3.4	GPS1BHAH	4	2.5 - 4	52	CL25	1	20	GPF1L25*
2.2	5	4.5	GPS1BHAJ	6.3	4 - 6.3	82	CL25	1	20	GPF1L25*
3	7	6.5	GPS1BHAK	10	6.3 - 10	130	CL25	1.5	20	GPF1L25*
4	9	8	GPS1BHAK	10	6.3 - 10	130	CL25	1.5	20	GPF1L25*
5.5	12	11	GPS1BHAL	13	9 - 13	169	CL25	2.5	20	GPF1L25*
7.5	16	14	GPS1BHAM	16	11 - 16	208	CL25	2.5	20	GPF1L25*
11	22.5	21	GPS1BHAP	25	19 - 25	325	CL25	4	20	GPF1L25*
15	30	28	GPS1BHAR	32	24 - 32	416	CL04	6	20	GPF1L04*
11	22.5	21	GPS2BHAP (4)	25	19 - 25	325	CL04	4	20	GPF2L04*
15	30	28	GPS2BHAR (4)	32	24 - 32	416	CL04	6	20	GPF2L04*
18.5	37	35	GPS2BHAS (4)	40	28 - 40	520	CL45	10	20	GPF2L45*
22	44	41	GPS2BHAT (4)	50	35 - 50	650	CL06	10	25	GPF2L07*
30	60	55	GPS2BHAU (4)	63	45 - 63	820	CL07	16	25	GPF2L07*

- (1) Currents are relevant to four pole motors not having special characteristics of torque. Inrush currents: 8 time rated current for 1s.
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air. Cables are to withstand the maximum let-through energy and the motor rated current. Besides the user should consider the drop voltage on the cables, the type of laying and the ambient temperature.
- (3) Complete cat. nrs., see page D.3
- (4) Test running.



Technical data

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**Surion GPS-B: Coordination Type 1 50kA at 500V and 525V**

MOTOR (1)			MANUAL MOTOR STARTER				CONTACTOR			LINKS
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current Setting range (A)	Magnetic current (A)	Series	Smallest wire Cu (PVC)(2) 380/415V (mm <sup>2</sup> )	Minimum frontal electrical safety clearance (mm)	Cat. no. (3)
	500V	525V (A)								
0.06	0.17	0.16	GPS1BSAB	0.25	0.16 - 0.25	3.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.09	0.24	0.22	GPS1BSAB	0.25	0.16 - 0.25	3.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.12	0.33	0.3	GPS1BSAC	0.4	0.25 - 0.4	5.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.18	0.48	0.46	GPS1BSAD	0.63	0.4 - 0.63	8.2	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.25	0.66	0.64	GPS1BSAE	1	0.63 - 1	13	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.37	0.9	0.85	GPS1BSAE	1	0.63 - 1	13	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.55	1.2	1.15	GPS1BSAF	1.6	1 - 1.6	20.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.75	1.5	1.45	GPS1BSAF	1.6	1 - 1.6	20.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.1	2.1	1.9	GPS1BSAG	2.5	1.6 - 2.5	32.5	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.5	2.8	2.6	GPS1BSAH	4	2.5 - 4	52	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
2.2	3.9	3.6	GPS1BSAH	4	2.5 - 4	52	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
3	5.3	5	GPS1BSAJ	6.3	4 - 6.3	82	MC0 / CL00	1	20	GPF1LMCBA / GPF1L02*
4	6.8	6.5	GPS1BHAV	10	6.3 - 10	130	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
5.5	9.1	8.6	GPS1BHAV	10	6.3 - 10	130	CL00	1.5	20	GPF1L02*
7.5	12	11.4	GPS1BHAL	13	9 - 13	169	CL01	2.5	20	GPF1L02*
10	15.5	14.8	GPS1BHAM	16	11 - 16	208	CL02	2.5	20	GPF1L02*
11	17.6	17	GPS1BHAN	20	14 - 20	260	CL25	2.5	20	GPF1L25*
15	23	22	GPS1BHAP	25	19 - 25	325	CL25	4	20	GPF2L25*
18.5	28.5	27	GPS1BHAR	32	24 - 32	416	CL04	6	20	GPF1L04*
11	17.6	17	GPS2BHAN	20	14 - 20	260	CL04	2.5	20	GPF2L04*
15	23	22	GPS2BHAP	25	19 - 25	325	CL04	4	20	GPF2L04*
18.5	28.5	27	GPS2BHAR	32	24 - 32	416	CL04	6	20	GPF2L04*
22	33	31.5	GPS2BHAS	40	28 - 40	520	CL45	6/10	20	GPF2L45*
30	45	43	GPS2BHAT	50	35 - 50	650	CL06	10	25	GPF2L07*
37	53	52	GPS2BHAU	63	45 - 63	820	CL07	16	25	GPF2L07*

**Surion GPS-B: Coordination Type 2 50kA at 500V and 525V**

MOTOR (1)			MANUAL MOTOR STARTER				CONTACTOR			LINKS
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current Setting range (A)	Magnetic current (A)	Series	Smallest wire Cu (PVC)(2) 380/415V (mm <sup>2</sup> )	Minimum frontal electrical safety clearance (mm)	Cat. no. (3)
	500V	525V (A)								
0.06	0.17	0.16	GPS1BS/HAB	0.25	0.16 - 0.25	3.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.09	0.24	0.22	GPS1BS/HAB	0.25	0.16 - 0.25	3.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.12	0.33	0.3	GPS1BS/HAC	0.4	0.25 - 0.4	5.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.18	0.48	0.46	GPS1BS/HAD	0.63	0.4 - 0.63	8.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.25	0.66	0.64	GPS1BS/HAE	1	0.63 - 1	13	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.37	0.9	0.85	GPS1BS/HAE	1	0.63 - 1	13	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.55	1.2	1.15	GPS1BS/HAF	1.6	1 - 1.6	20.5	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.75	1.5	1.45	GPS1BS/HAF	1.6	1 - 1.6	20.5	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.1	2.1	1.9	GPS1BS/HAG	2.5	1.6 - 2.5	32.5	CL00	1	20	GPF1L02*
1.5	2.8	2.6	GPS1BS/HAH	4	2.5 - 4	52	CL25	1	20	GPF1L25*
2.2	3.9	3.6	GPS1BS/HAH	4	2.5 - 4	52	CL25	1	20	GPF1L25*
3	5.3	5	GPS1BS/HAJ	6.3	4 - 6.3	82	CL25	1	20	GPF1L25*
4	6.8	6.5	GPS1BHAK	10	6.3 - 10	130	CL25	1	20	GPF1L25*
5.5	9.1	8.6	GPS1BHAK	10	6.3 - 10	130	CL25	1.5	20	GPF1L25*
7.5	12	11.4	GPS1BHAL	13	9 - 13	169	CL25	2.5	20	GPF1L25*
10	15.5	14.8	GPS1BHAM	16	11 - 16	208	CL25	2.5	20	GPF1L25*
11	17.6	17	GPS1BHAN	20	14 - 20	260	CL25	2.5	20	GPF1L25*
15	23	22	GPS1BHAP	25	19 - 25	325	CL04	4	20	GPF1L04*
18.5	28.5	27	GPS1BHAR	32	24 - 32	416	CL04	6	20	GPF1L04*
11	17.6	17	GPS2BHAN	20	14 - 20	260	CL04	2.5	20	GPF2L04*
15	23	22	GPS2BHAP	25	19 - 25	325	CL04	4	20	GPF2L04*
18.5	28.5	27	GPS2BHAR	32	24 - 32	416	CL45	6	20	GPF2L45*
22	33	31.5	GPS2BHAS	40	28 - 40	520	CL06	6/10	25	GPF2L07*
30	45	43	GPS2BHAT	50	35 - 50	650	CL06	10	25	GPF2L07*
37	53	52	GPS2BHAU	63	45 - 63	820	CL07	16	25	GPF2L07*

- (1) Currents are relevant to four pole motors not having special characteristics of torque. Inrush currents: 8 time rated current for 1s.
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air. Cables are to withstand the maximum let-through energy and the motor rated current. Besides the user should consider the drop voltage on the cables, the type of laying and the ambient temperature.
- (3) Complete cat. nrs., see page D.3



**Surion GPS-M and Record Plus: Coordination Type 1 65kA at 380/400V and 415V**

MOTOR (1)			BREAKER				CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Magnetic setting Im Pick-up band ± 20% Im (A)	Magnetic current (A)	Series	Series	Setting range	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V									
0.06	0.23	0.21	GPS1MSAB	0.25	-	3.3	CL00	RT1B	0.16-0.26	1	20
0.09	0.34	0.31	GPS1MSAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.12	0.44	0.4	GPS1MSAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.18	0.65	0.63	GPS1MSAE	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.9	0.8	GPS1MSAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	1.25	1.1	GPS1MSAF	1.6	-	20.8	CL00	RT1G	1-1.5	1	20
0.55	1.6	1.5	GPS1MSAF	1.6	-	20.8	CL00	RT1H	1.3-1.9	1	20
0.75	2	1.9	GPS1MSAG	2.5	-	32.5	CL00	RT1J	1.8-2.7	1	20
1.1	2.6	2.5	GPS1MSAH	4	-	52	CL00	RT1K	2.5-4	1	20
1.5	3.5	3.4	GPS1MSAH	4	-	52	CL00	RT1K	2.5-4	1	20
2.2	5	4.5	GPS1MSAJ	6.3	-	81.9	CL00	RT1L	4-6.3	1	20
3	7	6.5	GPS1MSAK	10	-	130	CL00	RT1M	5.5-8.5	1.5	20
4	9	8	GPS1MSAK	10	-	130	CL00	RT1N	8-12	1.5	20
5.5	12	11	GPS1MHAL	13	-	169	CL01	RT1P	10-16	2.5	20
7.5	-	14	GPS1MHAM	16	-	208	CL02	RT1P	10-16	2.5	20
7.5	16	-	GPS1MHAM	16	-	208	CL02	RT1S	14.5-18	2.5	20
11	22.5	21	GPS1MHAP	25	-	325	CL25	RT1U	21-26	4	20
15	30	28	GPS1MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	22.5	21	GPS2MHAP	25	-	325	CL04	RT1U	21-26	4	20
15	30	28	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
18.5	37	35	GPS2MHAS	40	-	520	CL45	RT1W	30-40	10	20
22	-	40	GPS2MHAT	50	-	650	CL06	RT2E	30-43	10	25
22	44	-	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
30	60	55	GPS2MHAU	63	-	819	CL07	RT2H	54-65	16	25
45	85	80	FDH36MC100GD	100	1000 - 1500	1140	CL09	RT2L	78 - 97	35	30
55	-	100	FDH36MC160JF	160	1600 - 2400	1400	CL10	RT2M	90 - 110	35	30
55	105	-	FDH36MC160JF	160	1600 - 240	1400	CL10	RT2M	90 - 110	35	30

**Surion GPS-M and Record Plus: Coordination Type 2 65kA at 380/400V and 415V**

MOTOR (1)			BREAKER				CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Magnetic setting Im Pick-up band ± 20% Im (A)	Magnetic current (A)	Series	Series	Setting range	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V									
0.06	0.23	0.21	GPS1MHAB	0.25	-	3.3	CL00	RT1B	0.16-0.26	1	20
0.09	0.34	0.31	GPS1MHAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.12	0.44	0.4	GPS1MHAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.18	0.65	0.63	GPS1MHA E	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.9	0.8	GPS1MHA E	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	1.25	1.1	GPS1MHA F	1.6	-	20.8	CL00	RT1G	1-1.5	1	20
0.55	1.6	1.5	GPS1MHA F	1.6	-	20.8	CL00	RT1H	1.3-1.9	1	20
0.75	2	1.9	GPS1MHA G	2.5	-	32.5	CL00	RT1J	1.8-2.7	1	20
1.1	2.6	2.5	GPS1MHA H	4	-	52	CL25	RT1K	2.5-4	1	20
1.5	3.5	3.4	GPS1MHA H	4	-	52	CL25	RT1K	2.5-4	1	20
2.2	5	4.5	GPS1MHA J	6.3	-	81.9	CL25	RT1L	4-6.3	1	20
3	7	6.5	GPS1MHA K	10	-	130	CL25	RT1M	5.5-8.5	1.5	20
4	9	8	GPS1MHA K	10	-	130	CL25	RT1N	8-12	1.5	20
5.5	12	11	GPS1MHAL	13	-	169	CL25	RT1P	10-16	2.5	20
7.5	-	14	GPS1MHAM	16	-	208	CL25	RT1P	10-16	2.5	20
7.5	16	-	GPS1MHAM	16	-	208	CL25	RT1S	14.5-18	2.5	20
11	22.5	21	GPS2MHAP	25	-	325	CL25	RT1U	21-26	4	20
15	30	28	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	22.5	21	GPS2MHAP	25	-	325	CL04	RT1U	21-26	4	20
15	30	28	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
18.5	37	35	GPS2MHAS	40	-	520	CL45	RT1W	30-40	10	20
22	-	40	GPS2MHAT	50	-	650	CL06	RT2E	30-43	10	25
22	44	-	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
30	60	55	GPS2MHAU	63	-	819	CL07	RT2H	54-65	16	25
45	85	80	FDH36MC100GD	100	1000 - 1500	1140	CL09	RT2L	78 - 97	35	30
55	-	100	FDH36MC100GD	100	1000 - 1500	1400	CL10	RT2M	90 - 110	35	30
55	105	-	FDH36MC160JF	160	1600 - 2400	1400	CL10	RT2M	90 - 110	35	30

(1) Current are relevant to four pole motors not having special characteristics of torque. Inrush currents: ≤ 8 time rated current for ≤ 1s.  
 (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature.



**Surion GPS-B: Coordination Type 2 50kA at 380/400V and 415V**

Manual motorstarter

MOTOR (1)			MANUAL MOTOR STARTER				CONTACTOR			LINKS
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current Setting range (A)	Magnetic current (A)	Series	Smallest wire Cu (PVC)(2) 380/415V (mm <sup>2</sup> )	Minimum frontal electrical safety clearance (mm)	Cat. no. (3)
	380/400V (A)	415V								
0.06	0.23	0.21	GPS1BS/HAB	0.25	0.16 - 0.25	3.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.09	0.34	0.31	GPS1BS/HAC	0.4	0.25 - 0.4	5.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.12	0.44	0.4	GPS1BS/HAD	0.63	0.4 - 0.63	8.2	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.18	0.65	0.63	GPS1BS/HAE	1	0.63 - 1	13	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.25	0.9	0.8	GPS1BS/HAE	1	0.63 - 1	13	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.37	1.25	1.1	GPS1BS/HAF	1.6	1 - 1.6	20.5	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.55	1.6	1.5	GPS1BS/HAF	1.6	1 - 1.6	20.5	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
0.75	2	1.9	GPS1BS/HAG	2.5	1.6 - 2.5	32.5	MC1 / CL00	1	20	GPF1LMCBA / GPF1L02*
1.1	2.6	2.5	GPS1BS/HAH	4	2.5 - 4	52	CL01	1	20	GPF1L02*
1.5	3.5	3.4	GPS1BS/HAH	4	2.5 - 4	52	CL01	1	20	GPF1L02*
2.2	5	4.5	GPS1BS/HAJ	6.3	4 - 6.3	82	CL02	1	20	GPF1L02*
3	7	6.5	GPS1BS/HAK	10	6.3 - 10	130	CL25	1.5	20	GPF1L25*
4	9	8	GPS1BS/HAK	10	6.3 - 10	130	CL25	1.5	20	GPF1L25*
5.5	12	11	GPS1BHAL	13	9 - 13	169	CL25	2.5	20	GPF1L25*
7.5	16	14	GPS1BHAM	16	11 - 16	208	CL25	2.5	20	GPF1L25*
11	22.5	21	GPS1BHAP	25	19 - 25	325	CL25	4	20	GPF1L25*
15	30	28	GPS1BHAR	32	24 - 32	416	CL04	6	20	GPF1L04*
11	22.5	21	GPS2BHAP	25	19 - 25	325	CL04	4	20	GPF2L04*
15	30	28	GPS2BHAR	32	24 - 32	416	CL04	6	20	GPF2L04*
18.5	37	35	GPS2BHAS	40	28 - 40	520	CL45	10	20	GPF2L45*
22	44	41	GPS2BHAT	50	35 - 50	650	CL06	10	25	GPF2L07*
30	60	55	GPS2BHAU	63	45 - 63	820	CL07	16	25	GPF2L07*

- (1) Currents are relevant to four pole motors not having special characteristics of torque. Inrush currents: ≤ 8 time rated current for ≤ 1s.
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air. Cables are to withstand the maximum let-through energy and the motor rated current. Besides the user should consider the drop voltage on the cables, the type of laying and the ambient temperature.
- (3) Complete cat. nrs., see page D.3

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**Surion GPS-M and Record Plus: Coordination Type 1 65kA at 380/400V and 415V**

MOTOR (1)			BREAKER				CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current (A)	Magnetic current (A)	Series	Series	Setting range	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V									
0.06	0.23	0.21	GPS1MS/HAB	0.25	-	3.3	CL00	RT1B	0.16-0.26	1	20
0.09	0.34	0.31	GPS1MS/HAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.12	0.44	0.4	GPS1MS/HAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.18	0.65	0.63	GPS1MS/HAE	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.9	0.8	GPS1MS/HAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	1.25	1.1	GPS1MS/HAF	1.6	-	20.8	CL00	RT1G	1-1.5	1	20
0.55	1.6	1.5	GPS1MS/HAF	1.6	-	20.8	CL00	RT1H	1.3-1.9	1	20
0.75	2	1.9	GPS1MS/HAG	2.5	-	32.5	CL00	RT1J	1.8-2.7	1	20
1.1	2.6	2.5	GPS1MS/HAH	4	-	52	CL00	RT1K	2.5-4	1	20
1.5	3.5	3.4	GPS1MS/HAH	4	-	52	CL00	RT1K	2.5-4	1	20
2.2	5	4.5	GPS1MS/HAJ	6.3	-	81.9	CL00	RT1L	4-6.3	1	20
3	7	6.5	GPS1MS/HAK	10	-	130	CL00	RT1M	5.5-8.5	1.5	20
4	9	8	GPS1MS/HAK	10	-	130	CL00	RT1N	8-12	1.5	20
5.5	12	11	GPS1MHAL	13	-	169	CL01	RT1P	10-16	2.5	20
7.5	-	14	GPS1MHAM	16	-	208	CL02	RT1P	10-16	2.5	20
7.5	16	-	GPS1MHAM	16	-	208	CL02	RT1S	14.5-18	2.5	20
11	22.5	21	GPS1MHAP	25	-	325	CL25	RT1U	21-26	4	20
15	30	28	GPS1MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	22.5	21	GPS2MHAP	25	-	325	CL25	RT1U	21-26	4	20
15	30	28	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
18.5	37	35	GPS2MHAS	40	-	520	CL45	RT1W	30-40	10	20
22	-	40	GPS2MHAT	50	-	650	CL06	RT2E	30-43	10	25
22	44	-	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
30	60	55	GPS2MHAU	63	-	819	CL07	RT2H	54-65	16	25
37	72	68	FDN36MC080GD	80	-	950	CL08	RT2J	64-82	25	25
45	85	80	FDN36MC100GD	100	-	1140	CL09	RT2L	78-97	35	30
55	105	100	FDN36MC100GD	100	-	1400	CL10	RT2M	90-110	35	30

**Surion GPS-M and Record Plus: Coordination Type 2 50kA at 380/400V and 415V**

MOTOR (1)			BREAKER				CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no.	Rated current In (A)	Thermal current (A)	Magnetic current (A)	Series	Series	Setting range	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V									
0.06	0.23	0.21	GPS1MS/HAB	0.25	-	3.3	CL00	RT1B	0.16-0.26	1	20
0.09	0.34	0.31	GPS1MS/HAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.12	0.44	0.4	GPS1MS/HAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.18	0.65	0.63	GPS1MS/HAE	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.9	0.8	GPS1MS/HAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	1.25	1.1	GPS1MS/HAF	1.6	-	20.8	CL00	RT1G	1-1.5	1	20
0.55	1.6	1.5	GPS1MS/HAF	1.6	-	20.8	CL00	RT1H	1.3-1.9	1	20
0.75	2	1.9	GPS1MS/HAG	2.5	-	32.5	CL00	RT1J	1.8-2.7	1	20
1.1	2.6	2.5	GPS1MS/HAH	4	-	52	CL01	RT1K	2.5-4	1	20
1.5	3.5	3.4	GPS1MS/HAH	4	-	52	CL01	RT1K	2.5-4	1	20
2.2	5	4.5	GPS1MS/HAJ	6.3	-	81.9	CL02	RT1L	4-6.3	1	20
3	7	6.5	GPS1MS/HAK	10	-	130	CL25	RT1M	5.5-8.5	1.5	20
4	9	8	GPS1MS/HAK	10	-	130	CL25	RT1N	8-12	1.5	20
5.5	12	11	GPS1MHAL	13	-	169	CL25	RT1P	10-16	1.5	20
7.5	-	14	GPS1MHAM	16	-	208	CL25	RT1P	10-16	2.5	20
7.5	16	-	GPS1MHAM	16	-	208	CL25	RT1S	14.5-18	2.5	20
11	22.5	21	GPS1MHAP	25	-	325	CL25	RT1U	21-26	4	20
15	30	28	GPS1MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	22.5	21	GPS2MHAP	25	-	325	CL04	RT1U	21-26	4	20
15	30	28	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
18.5	37	35	GPS2MHAS	40	-	520	CL45	RT1W	30-40	6	20
22	-	40	GPS2MHAT	50	-	650	CL06	RT2E	30-43	10	25
22	44	-	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
30	60	55	GPS2MHAU	63	-	819	CL07	RT2H	54-65	16	25
37	72	68	FDN36MC080GD	80	-	950	CL08	RT2J	64-82	25	25
45	85	80	FDN36MC100GD	100	-	1140	CL09	RT2L	78-97	35	30
55	105	100	FDN36MC100GD	100	-	1400	CL10	RT2M	90-110	35	30

(1) Current are relevant to four pole motors not having special characteristics of torque. Inrush currents: ≤ 8 time rated current for ≤ 1s.  
 (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature.





**Surion GPS-M and Record Plus: Coordination Type 1 50kA at 500 and 525V**

MOTOR (1)			BREAKER			CONTACTOR	OVERLOAD RELAY		Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)	
Rated power (kW)	Rated current (A)		Cat. no.	Rated current In (A)	Magnetic setting Im Pick-up band ± 20% Im (A)	Magnetic current (A)	Series	Series			Setting range
	500V	525V									
0.06	0.17	0.16	GPS1MSAB	0.25	-	3.2	CL00	RT1B	0.16-0.26	1	20
0.09	0.24	0.22	GPS1MSAB	0.25	-	3.2	CL00	RT1B	0.16-0.26	1	20
0.12	0.33	0.3	GPS1MSAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.18	0.48	0.46	GPS1MSAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.25	-	0.64	GPS1MSAE	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.66	-	GPS1MSAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	0.9	0.85	GPS1MSAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.55	1.2	1.15	GPS1MSAF	1.6	-	20.5	CL00	RT1G	1.0-1.5	1	20
0.75	1.5	1.45	GPS1MSAF	1.6	-	20.5	CL00	RT1H	1.3-1.9	1	20
1.1	2.1	1.9	GPS1MSAG	2.5	-	32.5	CL00	RT1J	1.8-2.7	1	20
1.5	2.8	2.6	GPS1MSAH	4	-	52	CL00	RT1K	2.5-4	1	20
2.2	3.9	3.6	GPS1MSAH	4	-	52	CL00	RT1K	2.5-4	1	20
3	5.3	5	GPS1MSAJ	6.3	-	82	CL00	RT1L	4.0-6.3	1	20
4	6.8	6.5	GPS1MHAK	10	-	130	CL00	RT1M	5.5-8.5	1	20
5.5	9.1	8.6	GPS1MHAK	10	-	130	CL00	RT1N	8.0-12.0	1.5	20
7.5	12	11.4	GPS1MHAL	13	-	169	CL01	RT1P	10-16	2.5	20
10	15.5	14.8	GPS1MHAM	16	-	208	CL02	RT1S	14.5-18	2.5	20
11	17.6	17	GPS1MHAN	20	-	260	CL25	RT1S	14.5-18	2.5	20
15	23	22	GPS1MHAP	25	-	325	CL25	RT1U	21-26	4	20
18.5	28.5	27	GPS1MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	17.6	17	GPS2MHAN	20	-	260	CL04	RT1S	14.5-18	2.5	20
15	23	22	GPS2MHAP	25	-	325	CL04	RT1U	21-26	4	20
18.5	28.5	27	GPS2MHAR	32	-	416	CL04	RT1V	25-32	6	20
22	33	31.5	GPS2MHAS	40	-	520	CL45	RT2E	30-43	6/10	20
30	45	43	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
37	53	52	GPS2MHAU	63	-	820	CL07	RT2G	42-55	16	25
45	-	62	FDN36MC080GD	80	800 - 1200	1000	CL08	RT2H	54 - 65	16	30
45	65	-	FDN36MC080GD	80	800 - 1200	1000	CL08	RT2J	64 - 82	25	30
55	80	76	FDN36MC100GD	100	1000 - 1500	1200	CL09	RT2J	64 - 82	25	30

**Surion GPS-M and Record Plus: Coordination Type 2 50kA at 500 and 525V**

MOTOR (1)			BREAKER			CONTACTOR	OVERLOAD RELAY		Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)	
Rated power (kW)	Rated current (A)		Cat. no.	Rated current In (A)	Magnetic setting Im Pick-up band ± 20% Im (A)	Magnetic current (A)	Series	Series			Setting range
	500V	525V									
0.06	0.17	0.16	GPS1MS/HAB	0.25	-	3.2	CL00	RT1B	0.16-0.26	1	20
0.09	0.24	0.22	GPS1MS/HAB	0.25	-	3.2	CL00	RT1B	0.16-0.26	1	20
0.12	0.33	0.3	GPS1MS/HAC	0.4	-	5.2	CL00	RT1C	0.25-0.41	1	20
0.18	0.48	0.46	GPS1MS/HAD	0.63	-	8.2	CL00	RT1D	0.4-0.65	1	20
0.25	-	0.64	GPS1MS/HAE	1	-	13	CL00	RT1D	0.4-0.65	1	20
0.25	0.66	-	GPS1MS/HAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.37	0.9	0.85	GPS1MS/HAE	1	-	13	CL00	RT1F	0.65-1.1	1	20
0.55	1.2	1.15	GPS1MS/HAF	1.6	-	20.5	CL00	RT1G	1.0-1.5	1	20
0.75	1.5	1.45	GPS1MS/HAF	1.6	-	20.5	CL00	RT1H	1.3-1.9	1	20
1.1	2.1	1.9	GPS1MS/HAG	2.5	-	32.5	CL01	RT1J	1.8-2.7	1	20
1.5	2.8	2.6	GPS1MS/HAH	4	-	52	CL25	RT1K	2.5-4	1	20
2.2	3.9	3.6	GPS1MS/HAH	4	-	52	CL25	RT1K	2.5-4	1	20
3	5.3	5	GPS1MS/HAJ	6.3	-	82	CL25	RT1L	4.0-6.3	1	20
4	6.8	6.5	GPS1MHAK	10	-	130	CL25	RT1M	5.5-8.5	1	20
5.5	9.1	8.6	GPS1MHAK	10	-	130	CL25	RT1N	8.0-12	1.5	20
7.5	12	11.4	GPS1MHAL	13	-	169	CL25	RT1P	10-16	2.5	20
10	15.5	14.8	GPS1MHAM	16	-	208	CL25	RT1S	14.5-18	2.5	20
11	17.6	17	GPS1MHAN	20	-	260	CL25	RT1S	14.5-18	2.5	20
15	23	22	GPS1MHAP	25	-	325	CL04	RT1U	21-26	4	20
18.5	28.5	27	GPS1MHAR	32	-	416	CL04	RT1V	25-32	6	20
11	17.6	17	GPS2MHAN	20	-	260	CL04	RT1S	14.5-18	2.5	20
15	23	22	GPS2MHAP	25	-	325	CL04	RT1U	21-26	4	20
18.5	28.5	27	GPS2MHAR	32	-	416	CL45	RT1V	25-32	6	20
22	33	31.5	GPS2MHAS	40	-	520	CL06	RT2E	30-43	6/10	25
30	45	43	GPS2MHAT	50	-	650	CL06	RT2G	42-55	10	25
37	53	52	GPS2MHAU	63	-	820	CL07	RT2G	42-55	16	25
45	-	62	FDN36MC080GD	80	800 - 1200	1000	CL09	RT2H	54 - 65	16	30
45	65	-	FDN36MC080GD	80	800 - 1200	1000	CL09	RT2J	64 - 82	25	30
55	80	76	FDN36MC100GD	100	1000 - 1500	1200	CL10	RT2J	64 - 82	25	30



**Surion GPS-B and Record Plus: Coordination Type 2 65kA at 380/400V and 415V**

MOTOR			MOTOR PROTECTION CIRCUITBREAKER			CONTACTOR	THERMAL RELAY
Rated power (kW)	le	le	Cat. no.	Setting range In	Magnetic setting Im	Series	Class 10
	380/400V (A)	415V (A)		(A)	(A)		
0.25	0.9	0.8	GPS1BHAE	0.63-1	13	CL00	Integrated into the motor protection circuit breaker
0.37	1.25	1.1	GPS1BHAF	1-1.6	20.5	CL00	Integrated into the motor protection circuit breaker
0.55	1.6	1.5	GPS1BHAF	1-1.6	20.5	CL00	Integrated into the motor protection circuit breaker
0.75	2	1.9	GPS1BHAG	1.6-2.5	32.5	CL00	Integrated into the motor protection circuit breaker
1.1	2.6	2.5	GPS1BHAH	2.5-4	52	CL25	Integrated into the motor protection circuit breaker
1.5	3.5	3.45	GPS1BHAH	2.5-4	52	CL25	Integrated into the motor protection circuit breaker
2.2	5	4.7	GPS1BHAJ	4-6.3	82	CL25	Integrated into the motor protection circuit breaker
3	7	6.5	GPS1BHAK	6.3-10	130	CL25	Integrated into the motor protection circuit breaker
4	9	8	GPS1BHAK	6.3-10	130	CL25	Integrated into the motor protection circuit breaker
5.5	12	11	GPS1BHAL	9.0-13	169	CL25	Integrated into the motor protection circuit breaker
7.5	16	14	GPS1BHAM	11.0-16	208	CL25	Integrated into the motor protection circuit breaker
11	22.5	21	GPS1BHAP	19-25	325	CL25	Integrated into the motor protection circuit breaker
15	30	28	GPS1BHAR	24-32	416	CL04	Integrated into the motor protection circuit breaker
18.5	37	35	GPS2BHAS	28-40	520	CL45	Integrated into the motor protection circuit breaker
22	44	41	GPS2BHAT	25-50	650	CL06	Integrated into the motor protection circuit breaker
30	60	55	GPS2BHAU	45-63	820	CL07	Integrated into the motor protection circuit breaker
37	72.5	65	FDH36MC080	80	950	CL08	RT2J (64-82A)
45	85	79	FDH36MC100	100	1140	CL09	RT2L (78-97A)

**Surion GPS-B and Record Plus: Coordination Type 2 80kA at 380/400V and 415V**

MOTOR			MOTOR PROTECTION CIRCUITBREAKER			CONTACTOR	THERMAL RELAY
Rated power (kW)	le	le	Cat. no.	Setting range In	Magnetic setting Im	Series	Class 10
	380/400V (A)	415V (A)		(A)	(A)		
0.25	0.9	0.8	GPS1BHAE	0.63-1	13	CL00	Integrated into the motor protection circuit breaker
0.37	1.25	1.1	GPS1BHAF	1-1.6	20.5	CL00	Integrated into the motor protection circuit breaker
0.55	1.6	1.5	GPS1BHAF	1-1.6	20.5	CL00	Integrated into the motor protection circuit breaker
0.75	2	1.9	GPS1BHAG	1.6-2.5	32.5	CL00	Integrated into the motor protection circuit breaker
1.1	2.6	2.5	GPS1BHAH	2.5-4	52	CL25	Integrated into the motor protection circuit breaker
1.5	3.5	3.45	GPS1BHAH	2.5-4	52	CL25	Integrated into the motor protection circuit breaker
2.2	5	4.7	GPS1BHAJ	4-6.3	82	CL25	Integrated into the motor protection circuit breaker
3	7	6.5	GPS1BHAK	6.3-10	130	CL25	Integrated into the motor protection circuit breaker
4	9	8	GPS1BHAK	6.3-10	130	CL25	Integrated into the motor protection circuit breaker
5.5	12	11	GPS1BHAL	9.0-13	169	CL05	Integrated into the motor protection circuit breaker
7.5	16	14	FDH36MC020	20	210	CL04	RT1S (14.5-18A)
11	22.5	21	FDH36MC030	30	300	CL45	RT1U (21-26A)
15	30	28	FDH36MC030	30	450	CL45	RT1V (25-32A)
18.5	37	35	FDH36MC050	50	500	CL45	RT1W (30-40A)
22	44	41	FDH36MC050	50	580	CL06	RT2G (42-55A)
30	66	55	FDH36MC080	80	800	CL07	RT2H (54-65A)
37	72.5	65	FDH36MC080	80	950	CL08	RT2J (64-82A)
45	85	79	FDH36MC100	100	1140	CL09	RT2L (78-97A)

- (1) Current are relevant to four pole motors not having special characteristics of torque. Inrush currents: ≤ 8 time rated current for ≤ 1s.
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature.

Technical data

A

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**Record Plus: Coordination Type 2 150kA at 380/400V and 415V (Class 10 protection)**

MOTOR (1)			THERMAL-MAGNETIC CIRCUIT BREAKER					CONTACTOR		
Rated power (kW)	Rated current		Cat. no. (3)	Magnetic setting I <sub>m</sub> pick-up band ± 20% I <sub>m</sub> (A)	Magnetic current Setpoint (A)	Thermal setting range (A)	Thermal setpoint (400V) (A)	Series	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V								
7.5	16	14	FD*36TD016ED	160	160	12.8 - 16	16	CL45	2.5	20
11	22.5	21	FD*36TD025ED	250	250	20 - 25	22.5	CL45	4	20
15	30	28	FD*36TD032ED	320	320	26 - 32	30	CL45	6	20
18.5	37	35	FD*36TD040ED	400	400	32 - 40	37	CL45	10	20
22	44	40	FD*36TD050ED	500	500	40 - 50	40	CL06	10	25
30	60	55	FD*36TD063ED	630	630	50 - 63	55	CL07	16	25
37	72	68	FD*36TD080GD	800	800	64 - 80	68	CL08	25	25
45	85	80	FD*36TD100GD	1000	1000	80 - 100	80	CL09	35	30
55	105	100	FD*36TD125GD	1250	1250	100 - 125	100	CL10	35	30
75	138	135	FD*36TD160GD	1280	1280	128 - 160	135	CK75	50	40
90	170	165	FE*36TD200KF	1000 - 2000	1700	160 - 200	165	CK08	70	40
110	211	200	FE*36TD250KF	1250 - 2500	2100	200 - 250	200	CK85	95	40
132	245	240	FE*36TD250KF	1250 - 2500	2500	200 - 250	240	CK09	120	40

(\*) Max I<sub>q</sub> rating in kA: type N = 50 kA, type H = 80 kA, type L = 150 kA.

- (1) Current are relevant to four pole motors not having special characteristics of torque.  
Inrush currents: ≤ 8 times rated current for ≤ 1s (Normal starting) or H 5s (Heavy starting).
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature.
- (3) Foreseen values for E-frame.

A

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**Record Plus: Coordination Type 2 Up to 150kA at 380/400V and 415V (Class 10 protection)**

MOTOR (1)			ONLY MAGNETIC CIRCUIT BREAKER			CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no. (3)	Magnetic setting I <sub>m</sub> pick-up band ± 20% I <sub>m</sub> (A)	Magnetic current Setpoint (A)	Series	Series	Setting range (A)	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V								
4	9	8	FD*36MC012ED	125 - 188	120	CL04	RT1N	8 - 12	1.5	20
5.5	12	11	FD*36MC012ED	125 - 188	150	CL04	RT1P	10 - 16	2.5	20
7.5	-	14	FD*36MC020ED	200 - 300	200	CL04	RT1P	10 - 16	2.5	20
7.5	16	-	FD*36MC020ED	200 - 300	210	CL04	RT1S	14.5 - 18	2.5	20
11	22.5	21	FD*36MC030ED	300 - 450	450	CL45	RT1U	21 - 26	4	20
15	30	28	FD*36MC030ED	300 - 450	500	CL45	RT1V	25 - 32	6	20
18.5	37	35	FD*36MC050ED	500 - 750	500	CL45	RT1W	30 - 40	10	20
22	-	40	FD*36MC050ED	500 - 750	540	CL06	RT2E	30 - 43	10	25
22	44	-	FD*36MC050ED	500 - 750	580	CL06	RT2G	42 - 55	10	25
30	60	55	FD*36MC080GD	800 - 1200	800	CL07	RT2H	54 - 65	16	25
37	72	68	FD*36MC080GD	800 - 1200	950	CL08	RT2J	64 - 82	25	25
45	85	80	FD*36MC100GD	1000 - 1500	1140	CL09	RT2L	78 - 97	35	30
55	-	100	FD*36MC100GD	1000 - 1500	1400	CL10	RT2M	90 - 110	35	30
55	105	-	FE*36MC160JF	1600 - 2400	1400	CL10	RT2M	90 - 110	35	30
75	138	135	FE*36MC160JF	1600 - 2400	1900	CK75	RT3E	110 - 140	50	40
90	170	165	FE*36MC250KF	2500 - 3750	2500	CK08	RT3F	140 - 190	70	40
110	211	200	FE*36MC250KF	2500 - 3750	2800	CK85	RT4P	175 - 280	95	40
132	245	240	FE*36MC250KF	2500 - 3750	3150	CK09	RT4P	175 - 280	120	40

**Record Plus: Coordination Type 2 Up to 150kA at 380/400V and 415V (Class 30 protection)**

MOTOR (1)			ONLY MAGNETIC CIRCUIT BREAKER			CONTACTOR	OVERLOAD RELAY			
Rated power (kW)	Rated current		Cat. no. (3)	Magnetic setting I <sub>m</sub> pick-up band ± 20% I <sub>m</sub> (A)	Magnetic current Setpoint (A)	Series	Series	Setting range (A)	Smallest wire Cu (PVC) (2) 380/415V (mm <sup>2</sup> )	Min frontal safety clearance (mm)
	380/400V (A)	415V								
2.2	5	4.5	FD*36MC008ED	80 - 120	80	CL25	RT4LB	4 - 6.5	1.5	20
3	7	6.5	FD*36MC008ED	80 - 120	90	CL04	RT4LC	5.5 - 8.5	1.5	20
4	9	8	FD*36MC012ED	125 - 188	120	CL04	RT4aLD	7.5 - 11	1.5	20
5.5	12	11	FD*36MCa012ED	125 - 188	150	CL45	RT4LE	10 - 16	2.5	20
7.5	-	14	FD*36MC020EaD	200 - 300	200	CL45	RT4LE	10 - 16	2.5	20
7.5	16	-	FD*36MC020ED	200 - 300	210	CL45	RT4LF	12.5 - 20	2.5	20
11	22.5	21	FD*36MC030ED	300 - 450	450	CL45	RT4LG	17 - 27	4	20
15	30	28	FD*36MC030ED	300 - 450	500	CL45	RT4LH	26 - 40	6	20
18.5	37	35	FD*36MC050ED	500 - 750	500	CL06	RT4LH	26 - 40	10	25
22	-	40	FD*36MC050ED	500 - 750	540	CL06	RT4LJ	32 - 52	10	25
22	44	-	FD*36MC050ED	500 - 750	580	CL06	RT4LJ	32 - 52	10	25
30	60	55	FD*36MC080GD	800 - 1200	800	CL07	RT4LK	45 - 70	16	25
37	72	68	FD*36MC080GD	800 - 1200	950	CL08	RT4LL	60 - 90	25	25
45	85	80	FD*36MC100GD	1000 - 1500	1140	CL09	RT4LL	60 - 90	35	30
55	-	100	FD*36MC100GD	1000 - 1500	1400	CL10	RT4LM	80 - 125	35	30
55	105	-	FE*36MC160JF	1600 - 2400	1400	CL10	RT4LM	80 - 125	35	30
75	138	135	FE*36MC160JF	1600 - 2400	1900	CK75	RT4LN	120 - 190	50	40a
90	170	165	FE*36MC250KF	2500 - 3750	2500	CK08	RT4LN	120 - 190	70	40
110	211	200	FE*36MC250KF	2500 - 3750	2800	CK85	RT4LR	200 - 310	95	40
132	245	240	FE*36MC250KF	2500 - 3750	3150	CK09	RT4LR	200 - 310	120	40

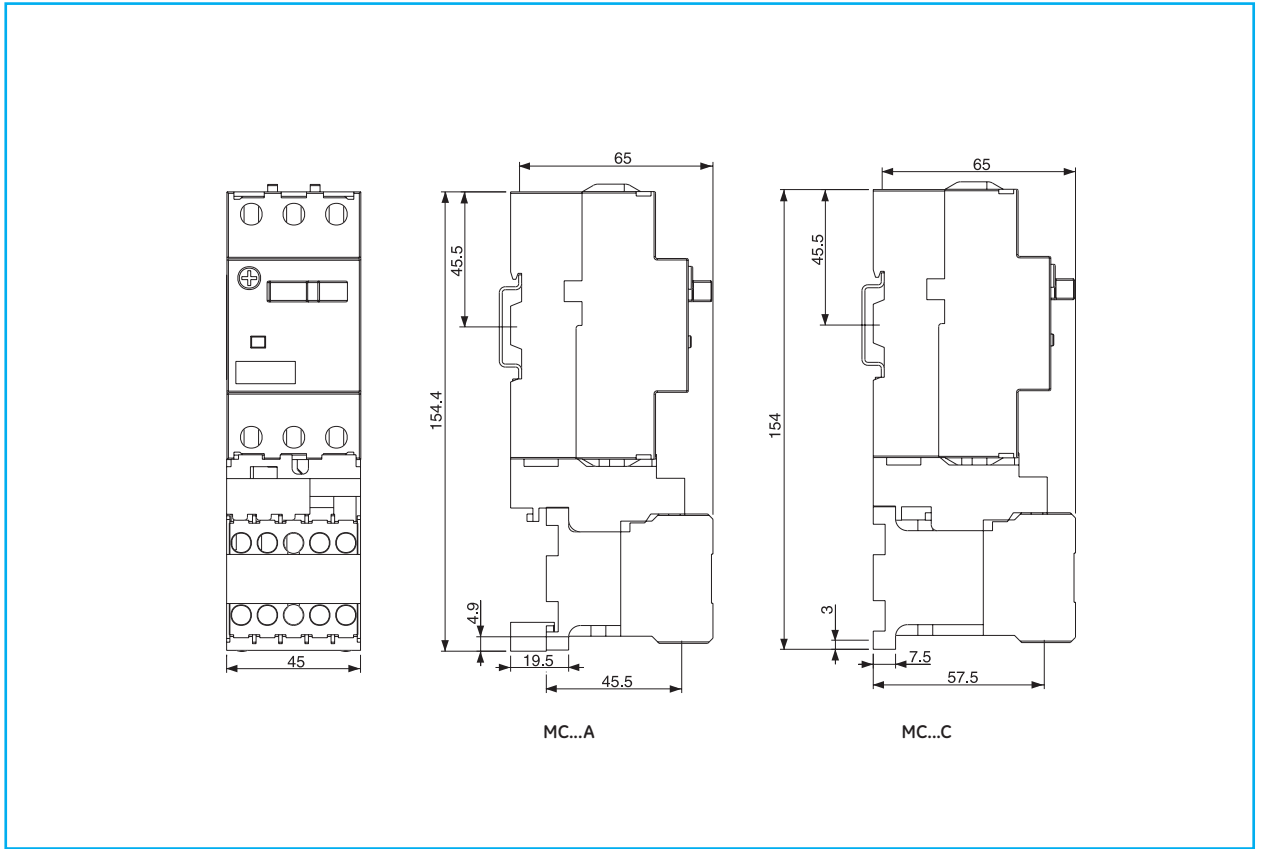
(\*) Max I<sub>q</sub> rating in kA: type N = 50 kA, type H = 80 kA, type L = 150 kA.

- (1) Current are relevant to four pole motors not having special characteristics of torque.  
Inrush currents: ≤ 8 times rated current for ≤ 1s (Normal starting) or H 5s (Heavy starting).
- (2) The minimum cycle cross-sections are referred to an ambient temperature of 30°C max. in free air and are selected to withstand the maximum let-through energy and the motor rated current. Besides the user has to consider the drop voltage, the type of laying and ambient temperature.
- (3) Foreseen values for E-frame.

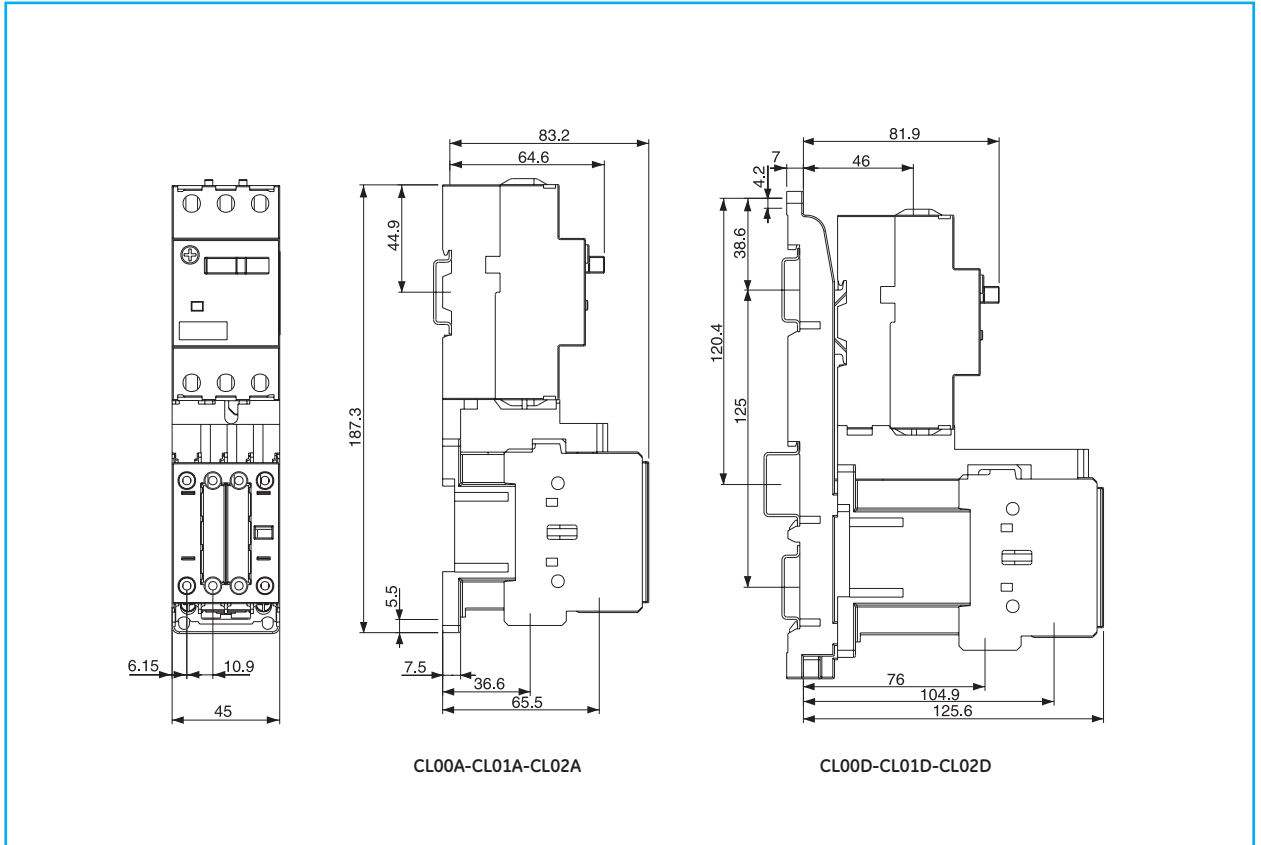


**Dimensional drawings**

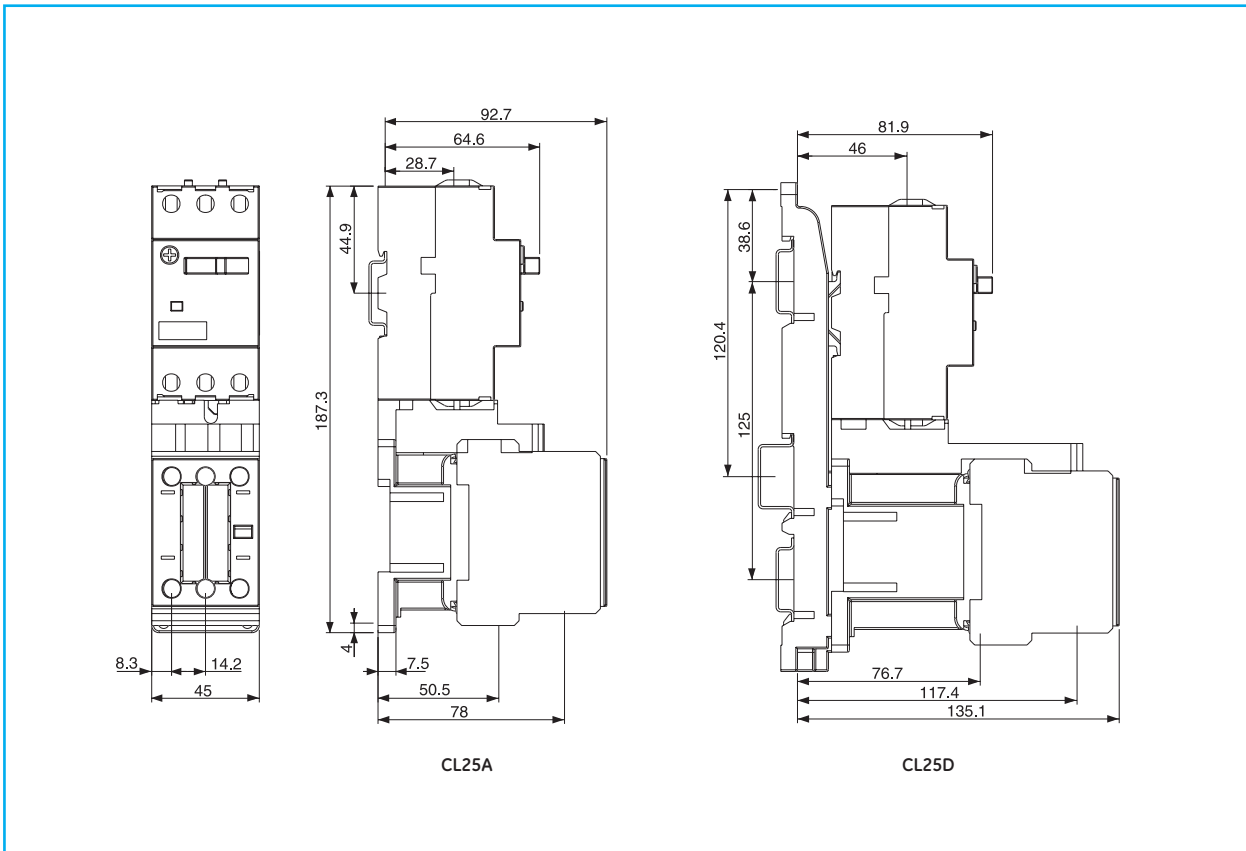
**Fuseless starter - GPS1 rocker + Minicontactor MC**



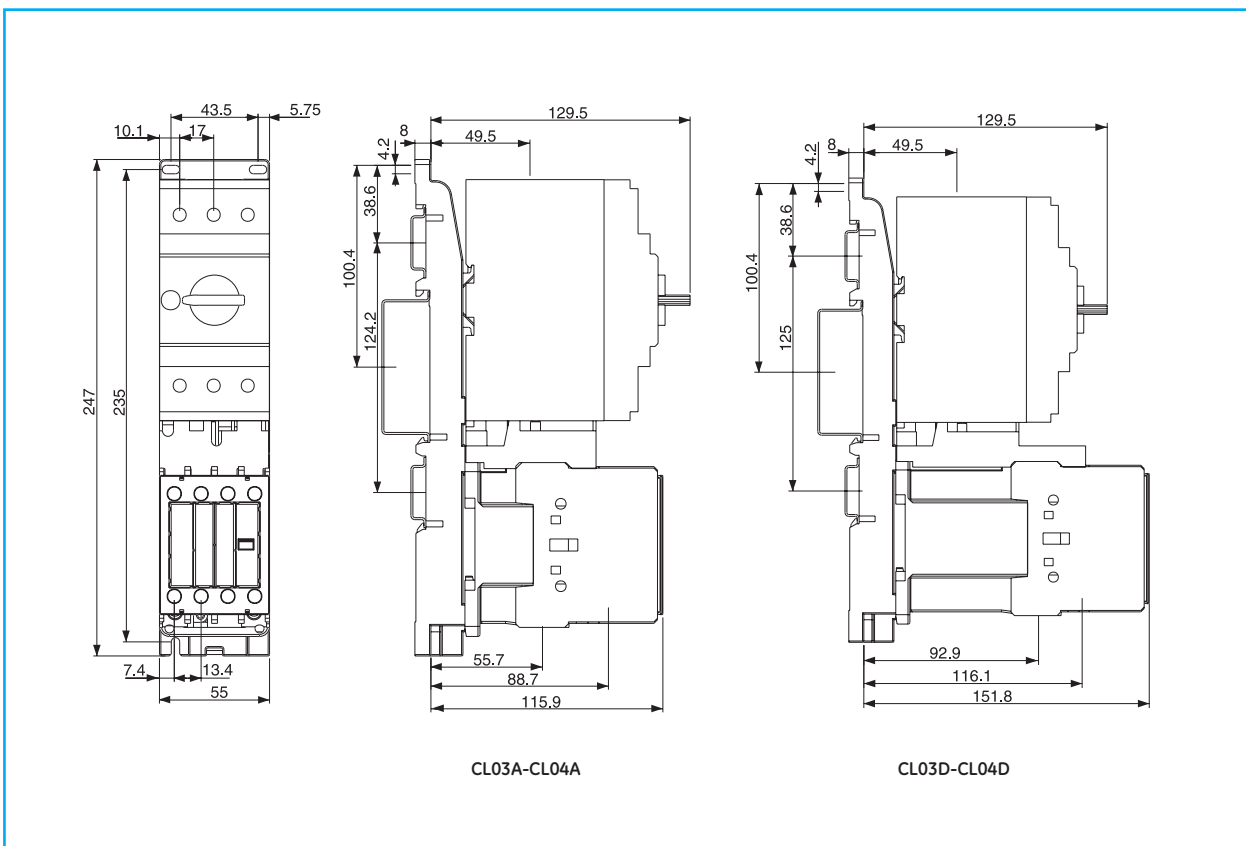
**Fuseless starter - GPS1 rocker + Contactor CL00-CL01-CL02**



Fuseless starter - GPS1 rocker + Contactor CL25



Fuseless starter - GPS2 + Contactor CL03-CL04



Dimensions

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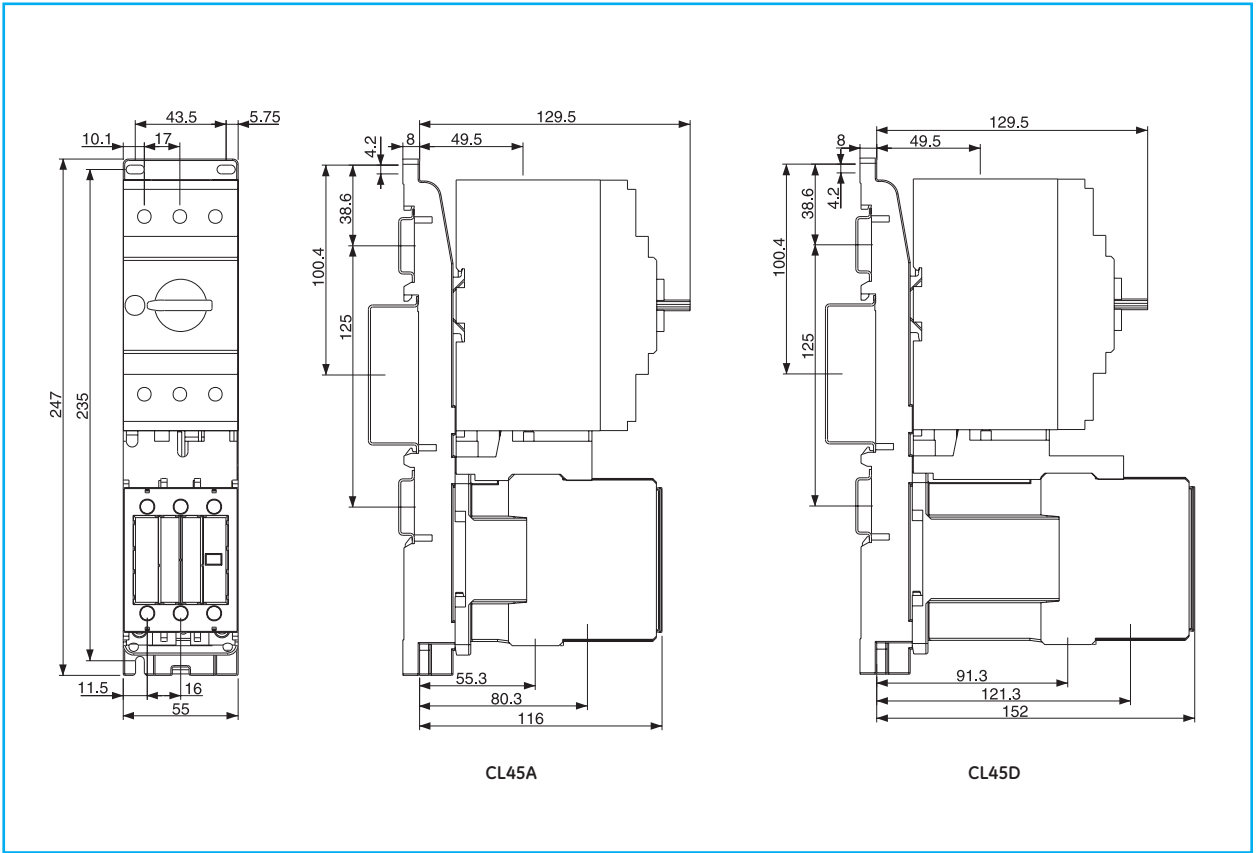
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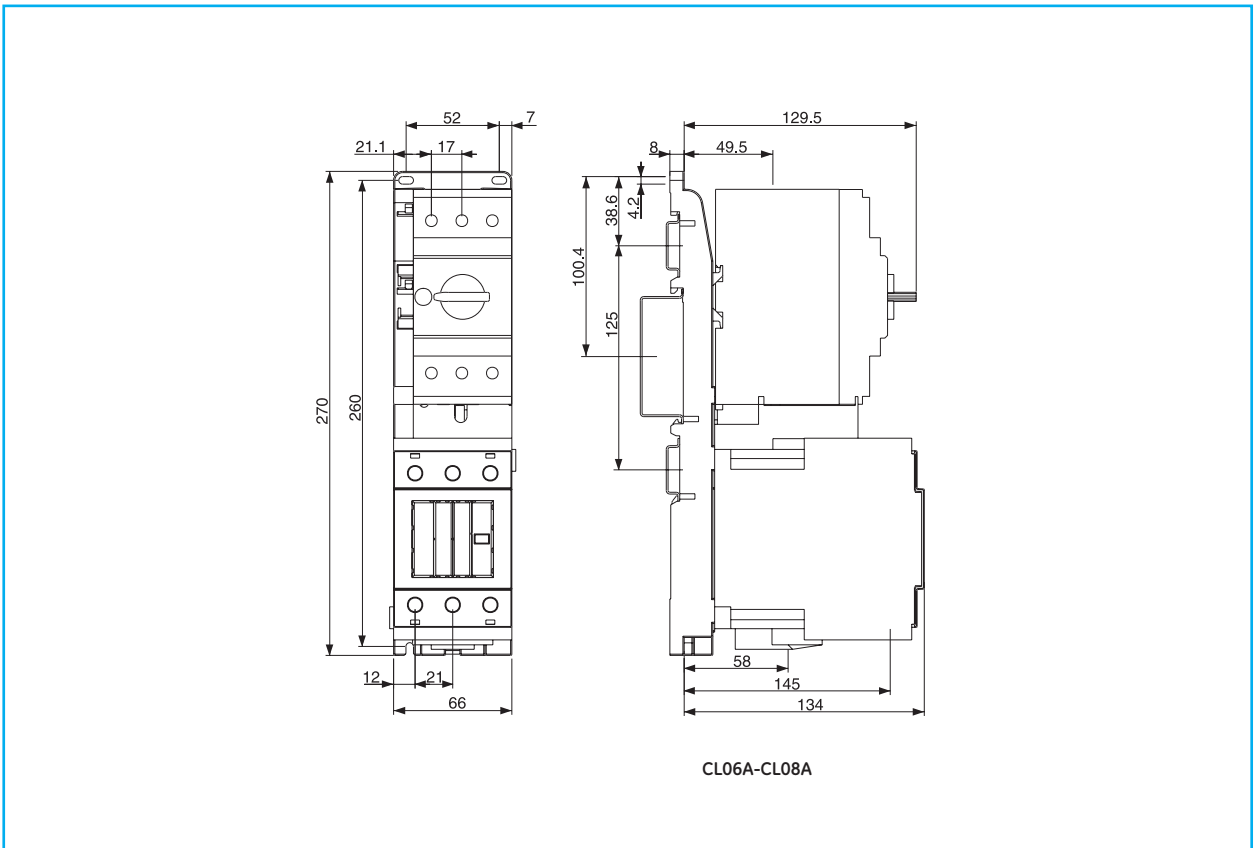


**Dimensional drawings**

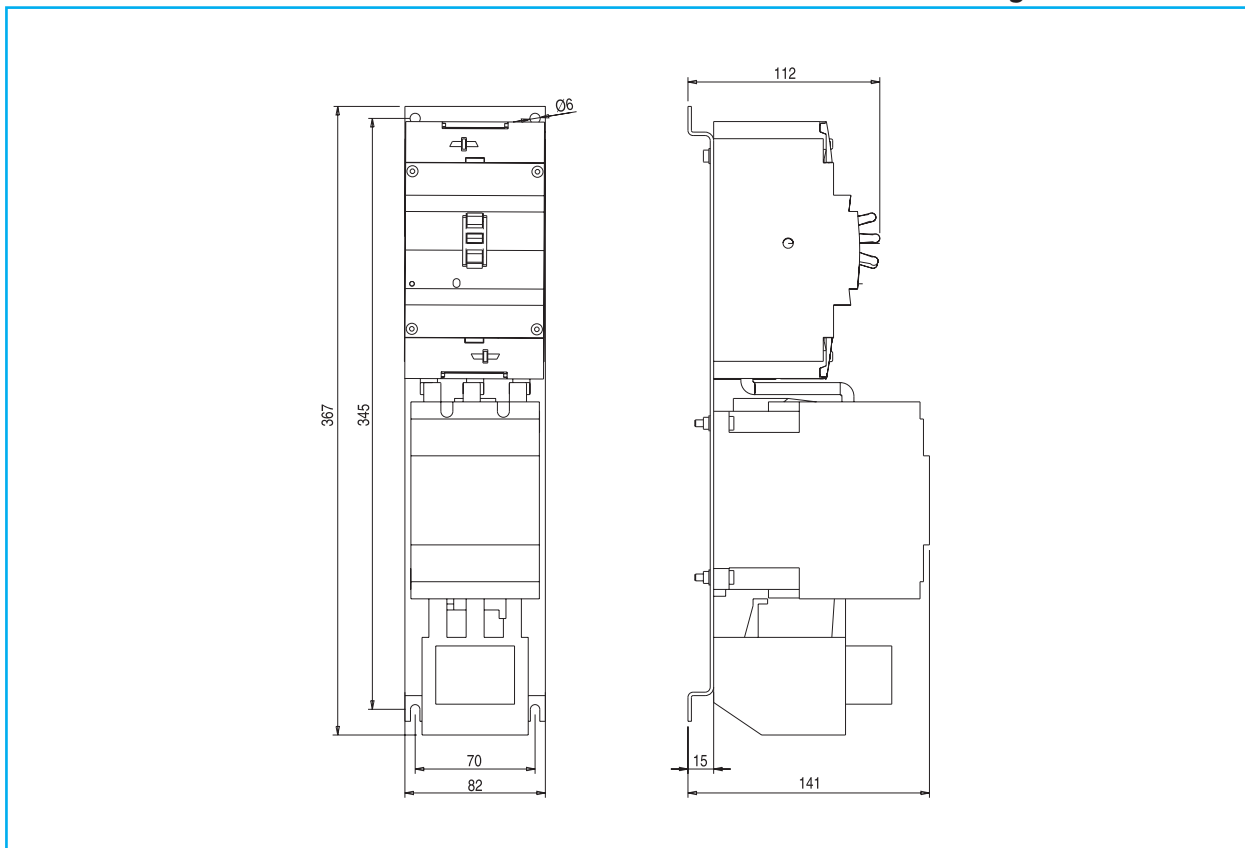
**Fuseless starter - GPS2 + Contactor CL45**



**Fuseless starter - GPS2 + Contactor CL06-CL08**



Fuseless starter - Record Plus + Contactor CL09 + Thermal overload relay RT2



Dimensions

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Order codes ● page D.19  
 Wiring diagrams ● page D.24  
 Dimensions ● page D.32

## Direct-on-line starters

### Series M 6 to 12A (AC-3)

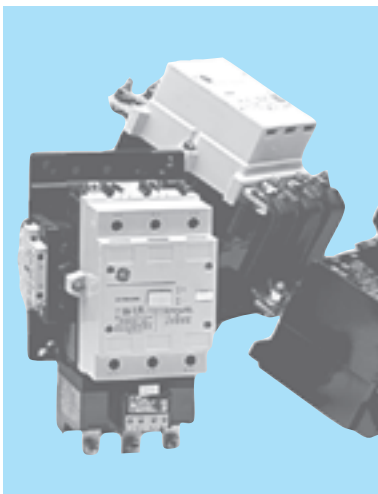
- Power circuit: up to 690V AC
- Control circuit: up to 600V AC
- Polycarbonate enclosure (IP40 - IP65)
  - Shock resistance
  - Total insulation  $\square$
  - 4 knock-out input holes PG13.5
  - Cable entry in the base
- Terminals protected against accidental contact
- 16 setting ranges from 0.11 up to 14A
- Start contact block



Order codes ● page D.19  
 Wiring diagrams ● page D.25  
 Dimensions ● page D.32

### Series CL 9 to 40A (AC-3)

- Power circuit: up to 690V AC
- Control circuit: up to 690V AC
- IP00 version
- Polycarbonate enclosure (IP40 - IP65)
  - Shock resistance
  - Total insulation  $\square$
  - 4 knock-out input holes
- Empty enclosures version
- Start contact block



Order codes ● page D.19  
 Wiring diagrams ● page D.26  
 Dimensions ● page D.33





### Series CK 150 to 825A (AC-3)

- Power circuit: up to 1000V AC
- Control circuit: up to 690V AC
- Protection degree IP00
- Terminals protected against accidental contact: IP20
  - KG75 to KG12: Coil and auxiliary terminals with built-in protection  
Main terminals protector on request
  - KG13: Coil and auxiliary terminals with built-in protection

**Series M - Direct-on-line starters**

		Push-buttons	Protection degree		Cat. no.	Ref. no	Pack
Empty boxes		Start/Stop + Reset	IP40		MG0004PATO	209780	1
			IP65		MG0006PATO	209781	1
		Reset only	IP40		MG0004RATO	137567	1
			IP65		MG0006RATO	116402	1
		Start/Emergency stop	IP40		MG0004QATO	137566	1
			IP65		MG0006QATO	116074	1
Start contact block	Laterally mounted to the contactor, allowing the electrical operation the box push-button which incises on it.				MAGL110AT	100608	1

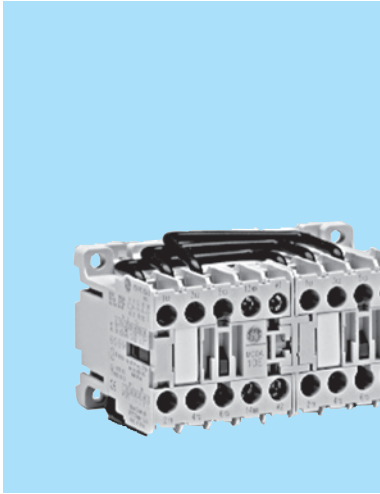
**Series CL - Direct-on-line starters**

	For use with	Push-buttons	Protection degree		Cat. no.	Ref. no	Pack
	CL00, CL01, CL02	Start/Stop + Reset	IP40		LG0004P1B0	209344	1
			IP65		LG0006P1B0	200004	1
		Without push-buttons	IP40		LG0004S1B0	209347	1
			IP65		LG0006S1B0	116011	1
		Only Reset	IP40		LG0004R1B0	116651	1
			IP65		LG0006R1B0	116652	1
	CL25	Start/Stop + Reset	IP40		LG2504P1B0	100885	1
			IP65		LG2506P1B0	101095	1
		Only Reset	IP40		LG2504R1B0	116226	1
			IP65		LG2506R1B0	133611	1
	CL04	Start/Stop + Reset	IP40		LG0404P1B0	116653	1
			IP65		LG0406P1B0	116656	1
	Only Reset	IP40		LG0404R1B0	133264	1	
		IP65		LG0406R1B0	133265	1	
CL25, CL04	Without push-buttons	IP40		LG0404S1B0	116996	1	
		IP65		LG0406S1B0	116997	1	
Neutral terminal					BNL	104797	10
							
Conversion to permanent control	Pressure-fixed between push-buttons in direct-on-line enclosures for mechanical interlocking into permanent control.				EPL	104798	10
							
Start contact block	Pressure-fixed onto the front of direct-on-line starters allowing electrical operation using the start push-button on the enclosure				BMLF	104800	10
							

**Series CK - Direct-on-line starters. IP00**

			Cat. no.	Ref. no.	Pack
Connection sets	Busbar set for power circuit	CK85, CK09, CK95	KVP85G	104770	1
		CK10, CK11	KVP10G	104771	1
		CK12	KVP12G	104767	1
Plate	Metallic plate	CK85, CK09, CK95	PVP85G	241747	1
		CK10, CK11	PVP10G	241748	1
		CK12	PCP12G	241749	1



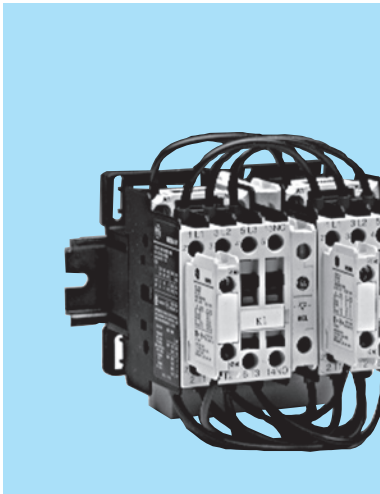


Order codes ● page D.21  
 Wiring diagrams ● page D.28  
 Dimensions ● page D.34

## Reversing starters

### Series M 6 to 12A (AC-3)

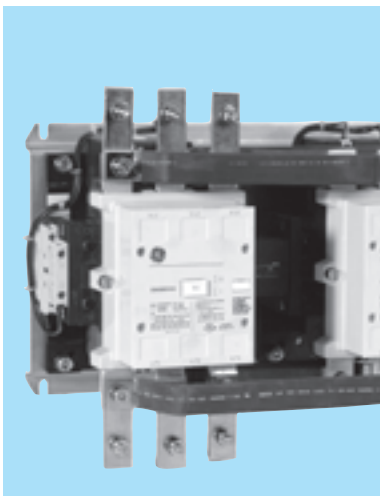
- Power circuit: up to 690V AC
- Control circuit: up to 600V AC  
up to 250V DC
- Assembled versions on request.
- Screw and push-on terminals protected against accidental contact.
- Protection degree IP20 in accordance with EN 60529.
- Facility to mount instant and timed auxiliary contact blocks and voltage suppressor blocks.



Order codes ● page D.21  
 Wiring diagrams ● page D.28  
 Dimensions ● page D.34

### Series CL 9 to 105A (AC-3)

- Power circuit: up to 690V AC
- Control circuit: up to 690V AC
- Protection degree IP00




Order codes ● page D.21  
 Wiring diagrams ● page D.29  
 Dimensions ● page D.35

### Series CK 150 to 825A (AC-3)

- Power circuit: up to 1000V AC
- Control circuit: up to 690V AC
- Protection degree IP00

**Series M and CL - Reversing starters**

Wiring kits for reversing starters	Description	For use with contactor	ac/dc	Cat. no.	Ref. no.	Pack.
		Suitable to be used with link modules	MC0., MC1., MC2..	ac/dc	WKMIU	101421
CL00., CL01., CL02..			ac/dc	WKLI02P	101422	1
Upper and lower connections without overload relays		CL25..	ac/dc	WKLI25P	101423	1
		CL03., CL04...	ac/dc	WKLI04P	101424	1
		CL45..	ac/dc	WKLI45P	101425	1
		CL06A., CL07A.	ac	WKLI07P	101426	1
Plate	Metallic plate	CL06, CL07, CL08		WKI0910	241751	1
		CL08, CL09, CL10		WKI0608	241752	1

**Series CK - Reversing starters. IP00**

Connection sets	Description	For use with contactor	ac/dc	Cat. no.	Ref. no.	Pack.
	Busbar set for power circuit		CK75, CK08		KVP75U	113627
CK85, CK09, CK95				KVP85U	113628	1
CK10, CK11				KVP10U	133374	1
Busbar set for power circuit For assembly with thermal overload relay.		CK12		KVP12U	113630	1
		CK75, CK08		KVP75I	133370	1
		CK85, CK09, CK95		KVP85I	113631	1
Plate	Metallic plate	CK10, CK11		KVP10I	133371	1
		CK12		KVP12I	113633	1
		CK75, CK08		KVB75I	104690	1
		CK85, CK95		KVB95I	104691	1
		CK10, CK11		KVB10I	104692	1
		CK12		KVB12I	104693	1

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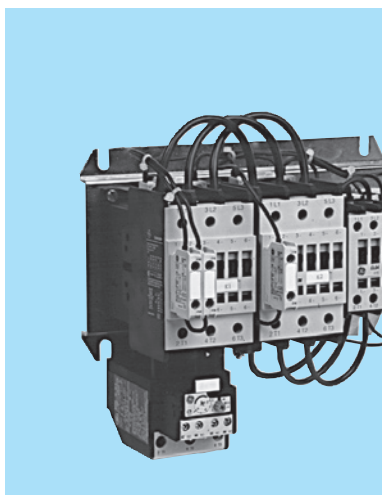
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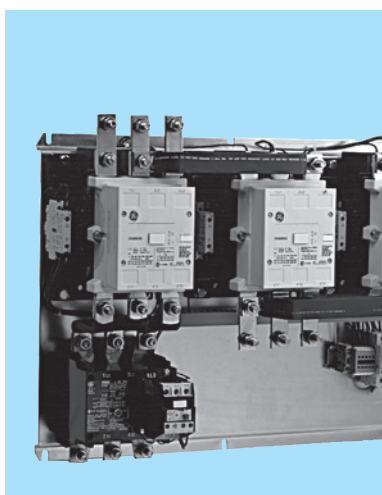
Order codes ● page D.23  
 Wiring diagrams ● page D.30  
 Dimensions ● page D.37

## Star-delta starters

### Series CL

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- Power circuit: up to 690V AC
- Control circuit: up to 690V AC
- Protection degree IP00
- Use delay setting by electronic relay NMET
- Terminals protected against accidental contact



Order codes ● page D.23  
 Wiring diagrams ● page D.30  
 Dimensions ● page D.37

### Series CK

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- Power circuit: up to 1000V AC
- Control circuit: up to 690V AC
- Protection degree IP00
- Protection against accidental contacts: IP20
  - KE75: Built-in protection
  - KE08 - KE12: Coil and auxiliary terminals with built-in protection  
Main terminals protector on request
  - KE13: Coil and auxiliary terminals with built-in protection

**Series CL - Star-delta starters**

		Line-delta contactor		Cat. no.	Ref. no.	Pack
Busbar sets for power circuit		CL00		WKLE00	103238	1
		CL01, CL02		WKLE02	103241	1
		CL25		WKLE25	103243	1
Plate	Metallic plate	CL06, CL07, CL08		WLSD	103247	1
		CL09, CL10		WLSD1	241750	1

**Series CK - Star-delta starters. IP00**

		Line-delta contactor	Star contactor	Cat. no.	Ref. no.	Pack
Busbar sets for power circuit		CK75, CK08	CK75, CK08	KVP75E	133378	1
		CK85, CK09, CK95	CK75, CK08	KVP08E	116212	1
		CK95	CK85, CK09, CK95	KVP85E	133379	1
		CK10, CK11	CK85, CK09, CK95	KVP95E	113637	1
		CK10, CK11	CK10, CK11	KVP10E	133380	1
		CK12	CK10, CK11	KVP12E	116235	1
Plate	Metallic plate	CK75, CK08		KVB75E	104694	1
		CK85, CK95		KVB95E	104695	1
		CK10, CK11		KVB10E	104597	1
		CK12		KVB12E	104587	1

Star-delta starters

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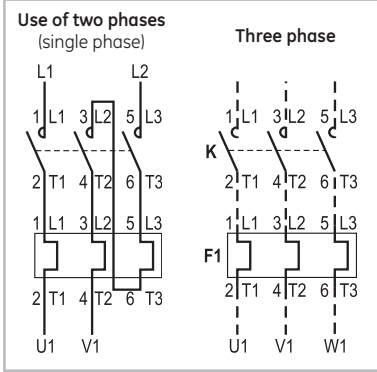
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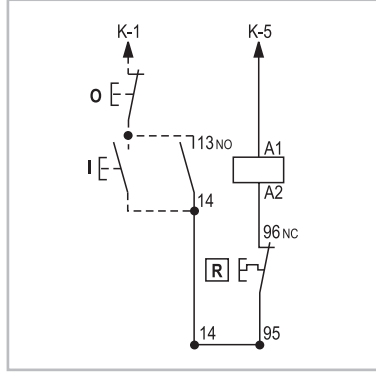
Wiring diagrams

Series M. Direct-on-line starter with reset

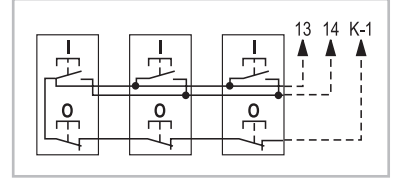
Power circuit



Control circuit

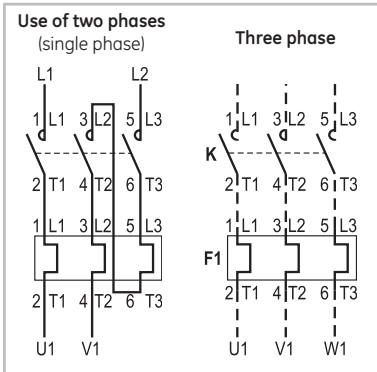


Control by two or more push-buttons

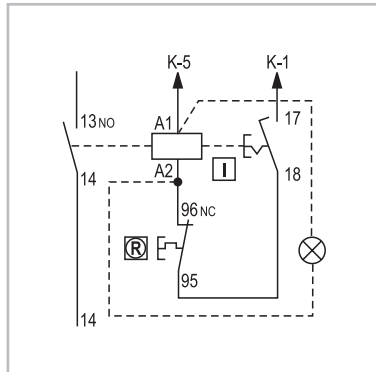


Series M. Direct-on-line starter with start/emergency stop push-button

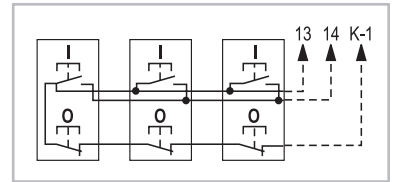
Power circuit



Control circuit

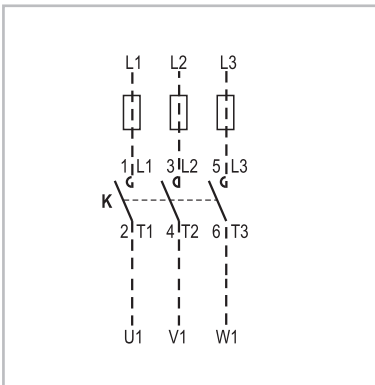


Control by two or more push-buttons

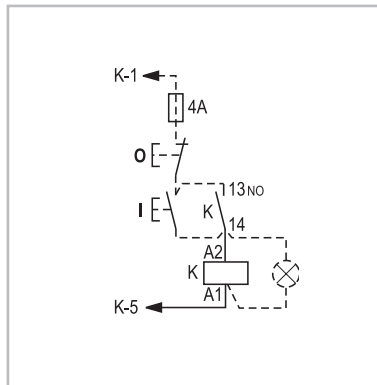


Series CL. Direct-on-line starter

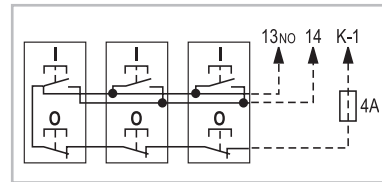
Power circuit



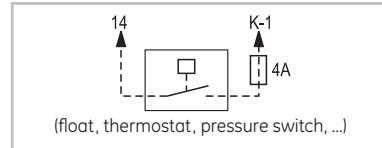
Control circuit



Control by two or more push-buttons

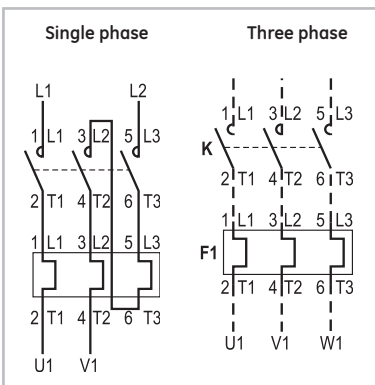


Control by permanent contact

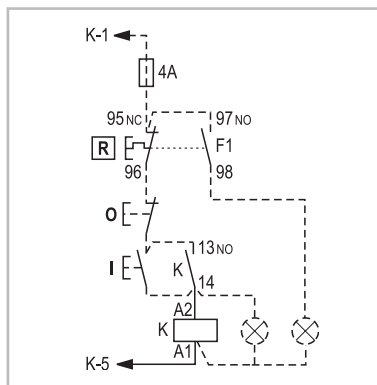


Series CL. Direct-on-line starter with reset push-button

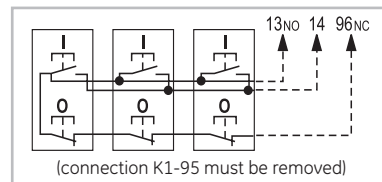
Power circuit



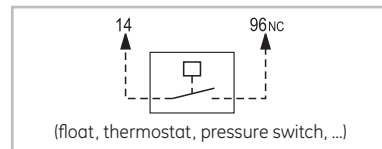
Control circuit



Control by two or more push-buttons

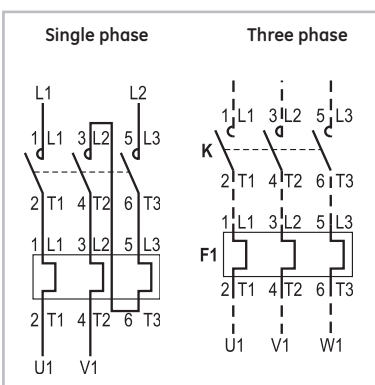


Control by permanent contact

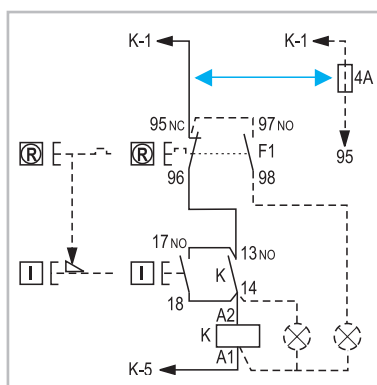


Series CL. Direct-on-line starter with start/stop/reset push-button

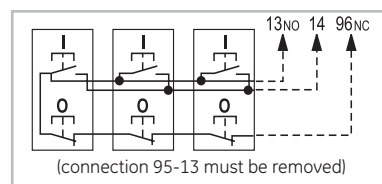
Power circuit



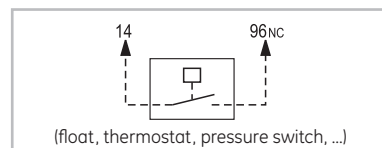
Control circuit



Control by two or more push-buttons



Control by permanent contact

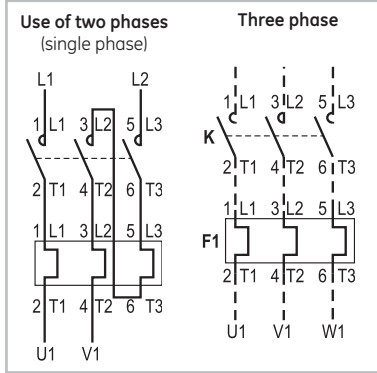




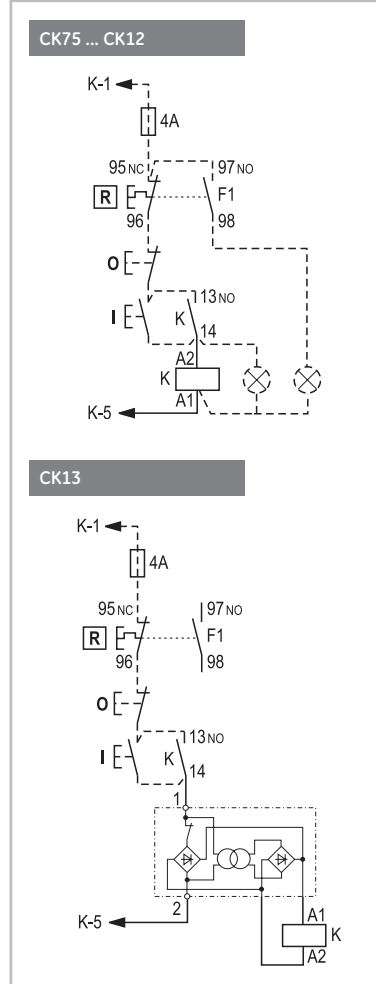
## Wiring diagrams

### Series CK. Direct-on-line starter

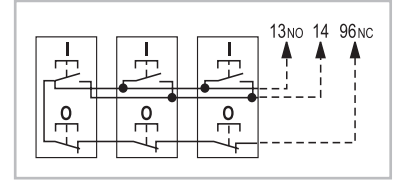
#### Power circuit



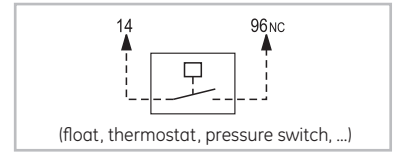
#### Control circuit



#### Control by two or more push-buttons



#### Control by permanent contact



Notes

Grid area for notes.

Direct-on-line starters

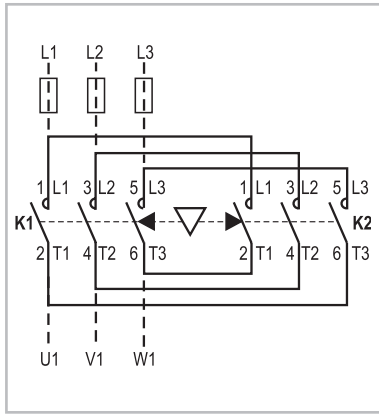
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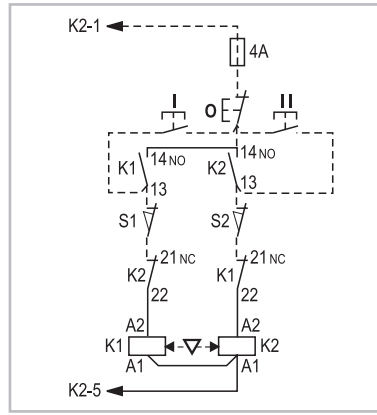
Wiring diagrams

Series M. Reversing starter without thermal overload relay

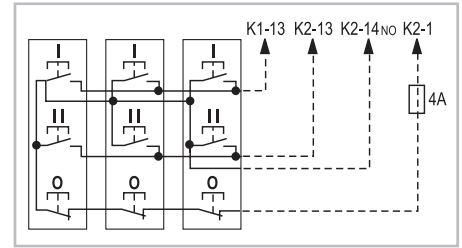
Power circuit



Control circuit

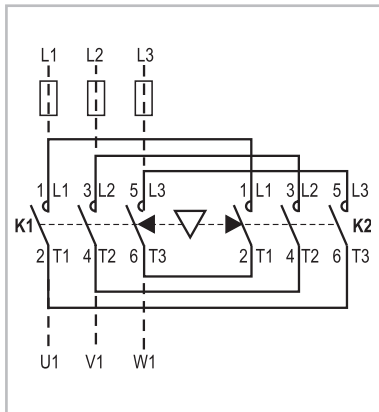


Control by two or more push-buttons

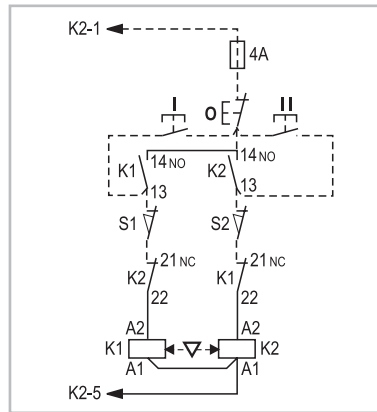


Series CL. Reversing starter without thermal overload relay

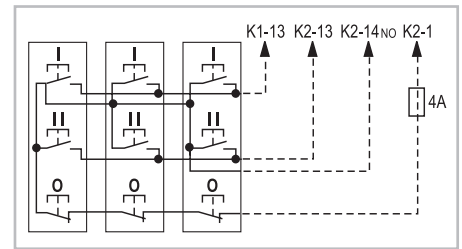
Power circuit



Control circuit

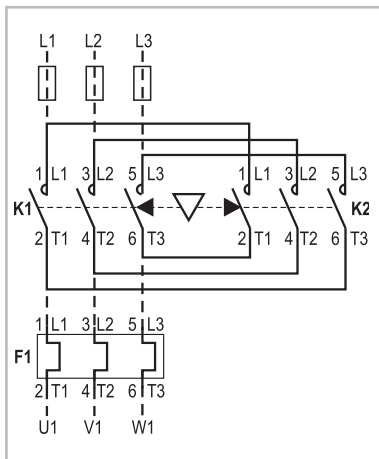


Control by two or more push-buttons

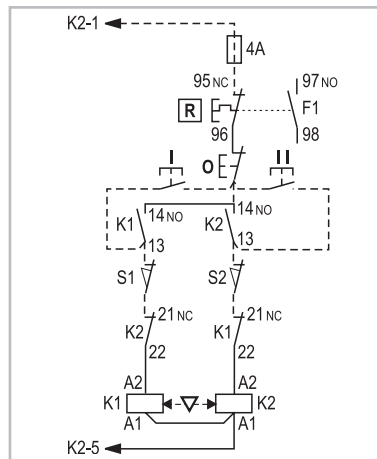


Series CL. Reversing starter with thermal overload relay

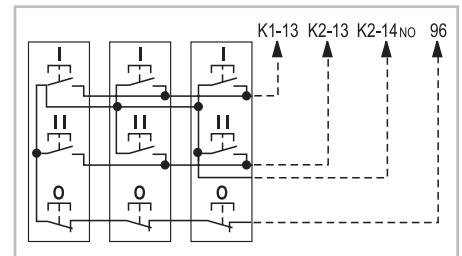
Power circuit



Control circuit

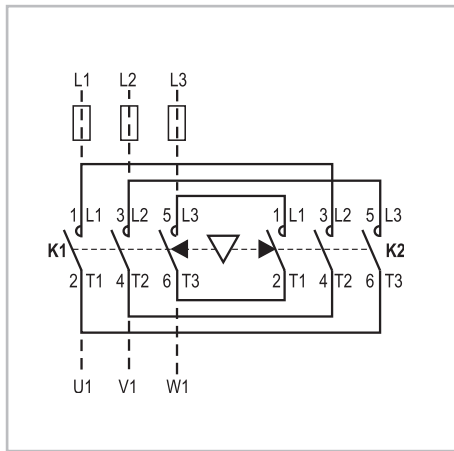


Control by two or more push-buttons

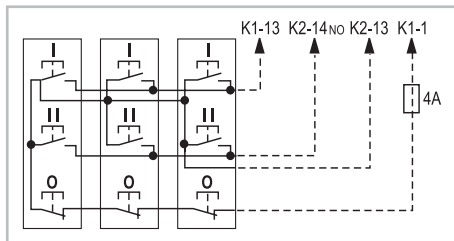


Series CK. Reversing starter without thermal overload relay

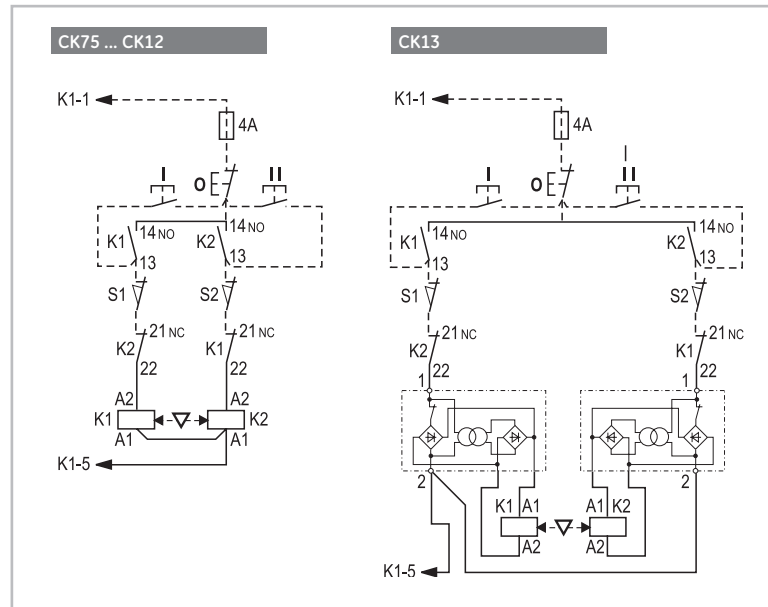
Power circuit



Control by two or more push-buttons

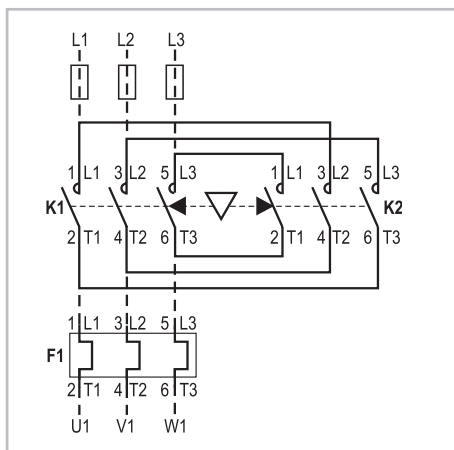


Control circuit

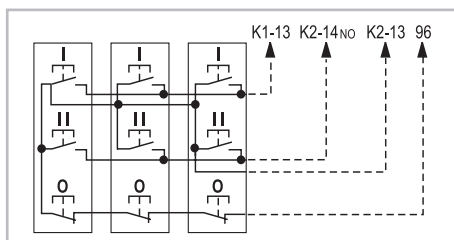


Series CK. Direct-on-line starters with thermal overload relay

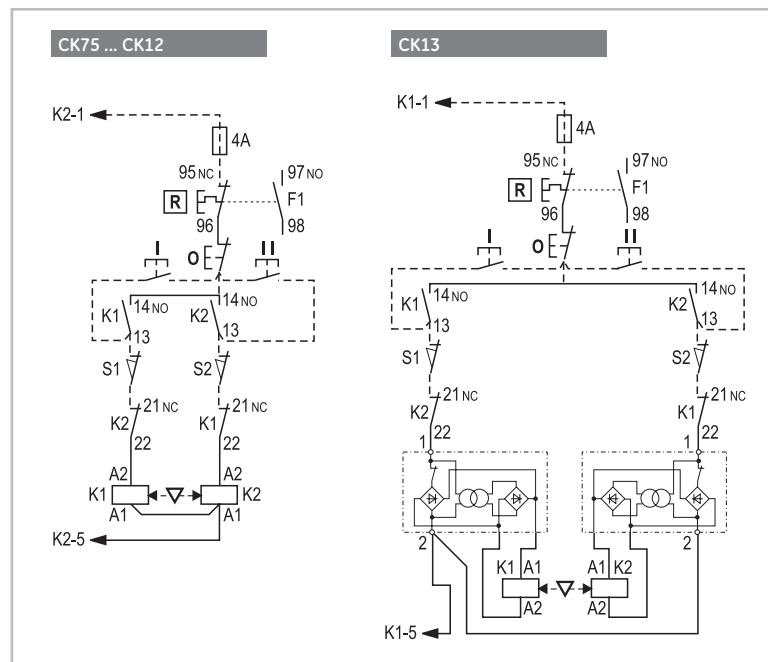
Power circuit



Control by two or more push-buttons



Control circuit



A

B

C

D

E

F

G

H

I

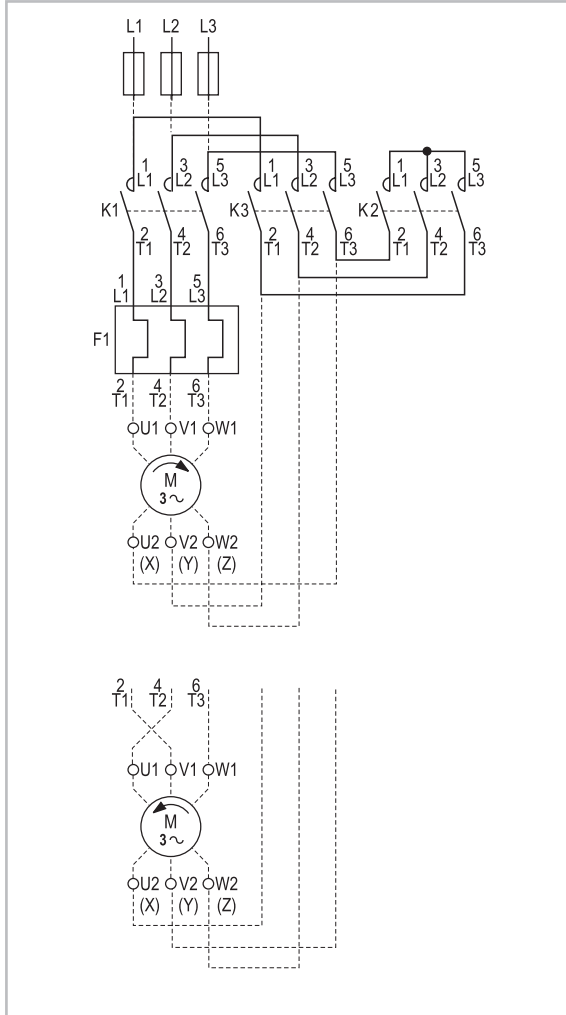
X



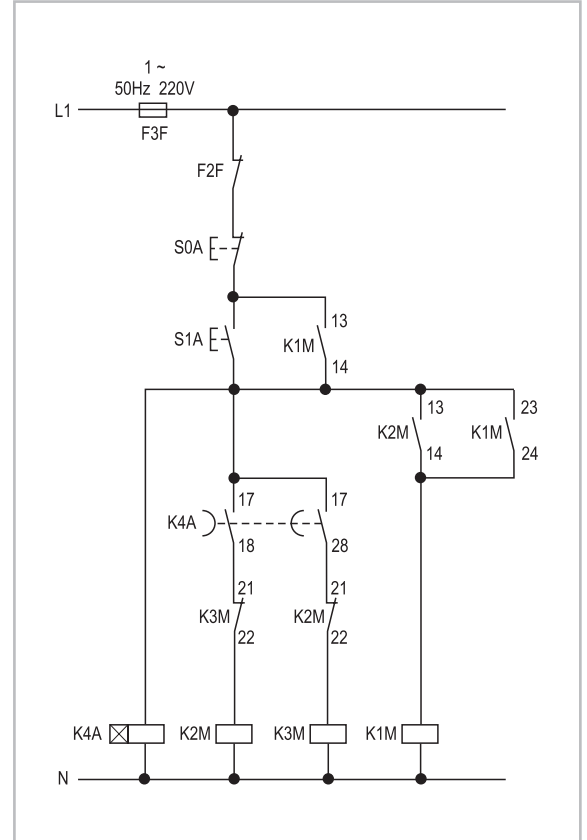
## Wiring diagrams

### Series CL and CK. Star-delta starters

Power circuit



Control circuit



Notes

Grid area for notes.

Star-delta starters

A

B

C

D

E

F

G

H

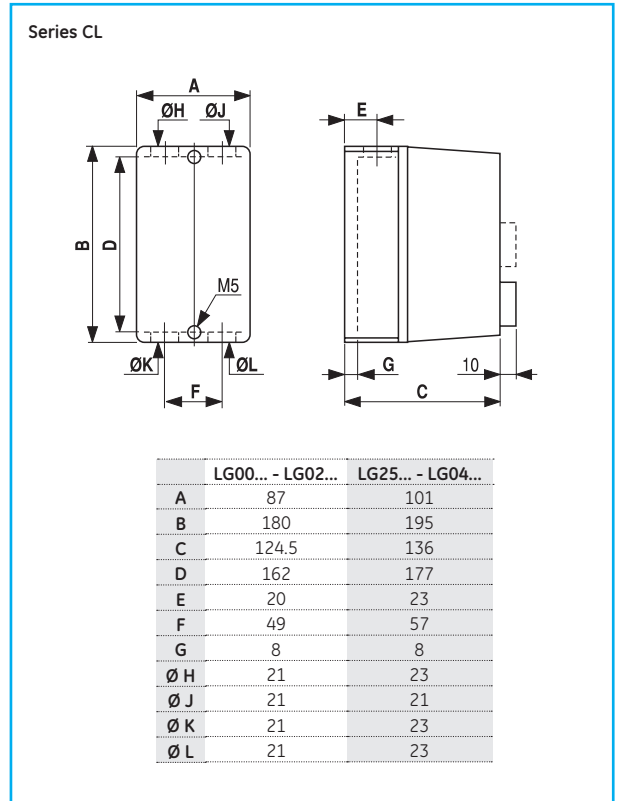
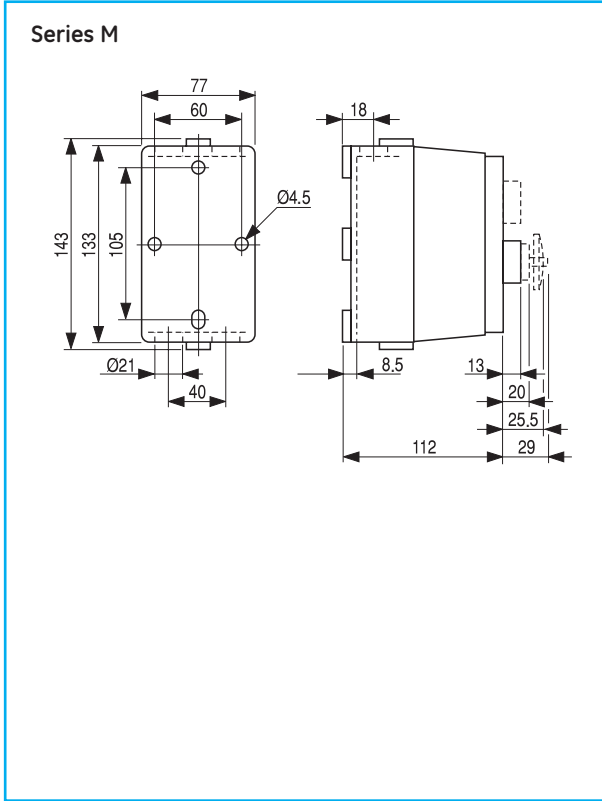
I

X

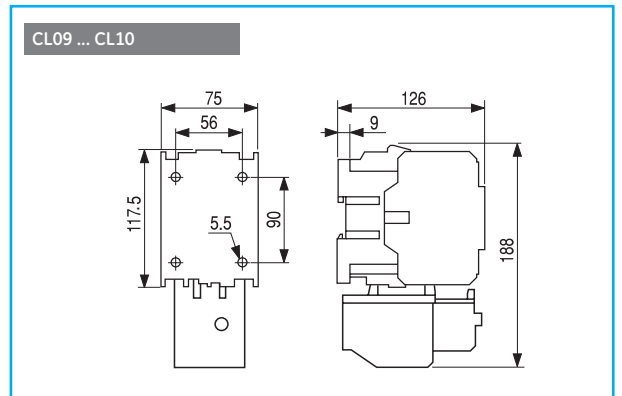
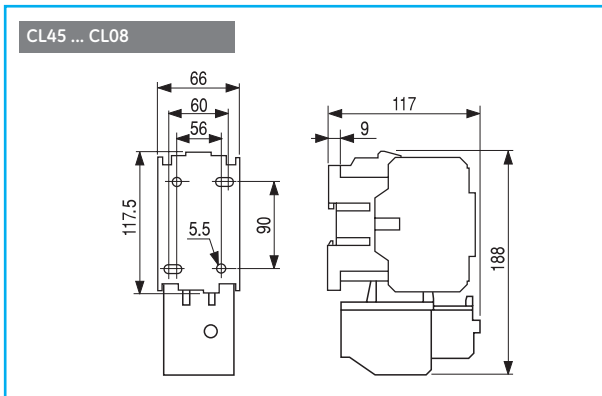
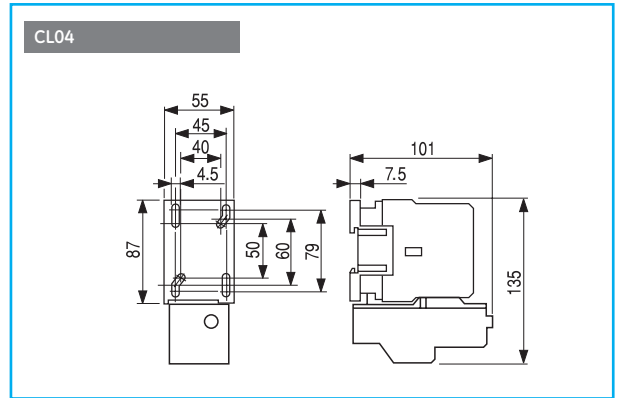
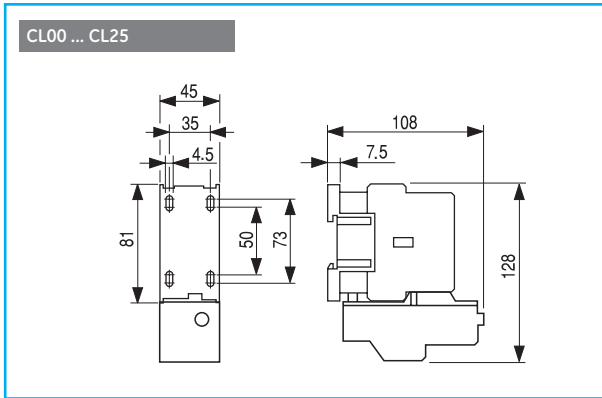


## Dimensional drawings

### Direct-on-line starters. IP40 / IP65

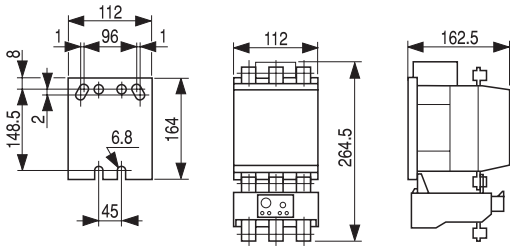


### Series CL - Direct-on-line starters

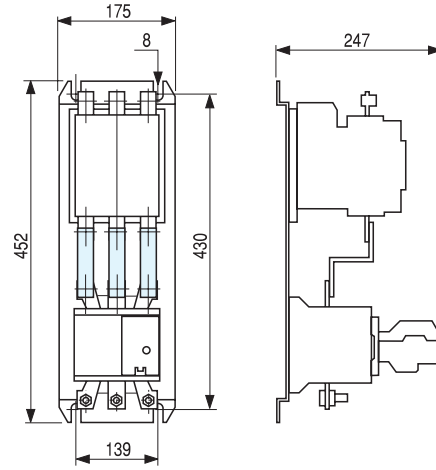


Series CK - Direct-on-line starters

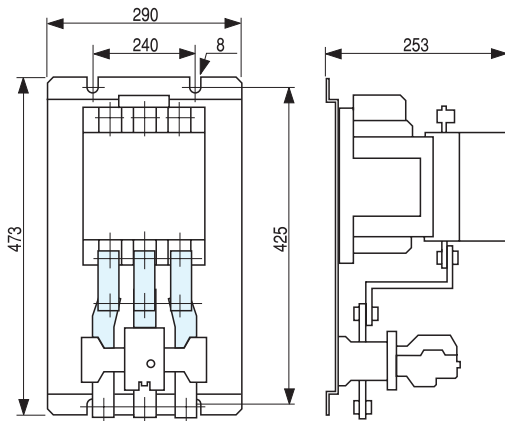
CK75 ... CK08



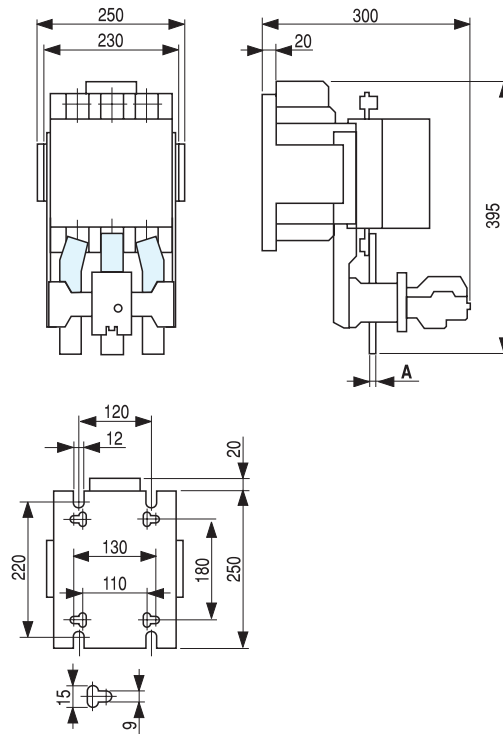
CK85 ... CK95



CK10 ... CK11



CK12



Direct-on-line starters

A

B

C

D

E

F

G

H

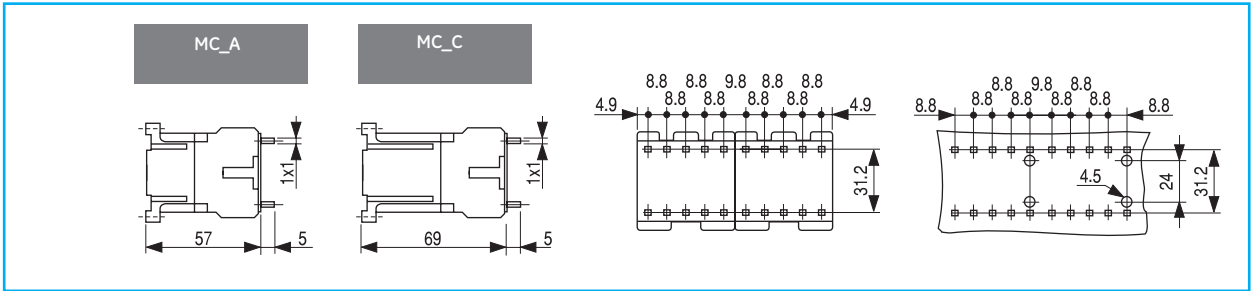
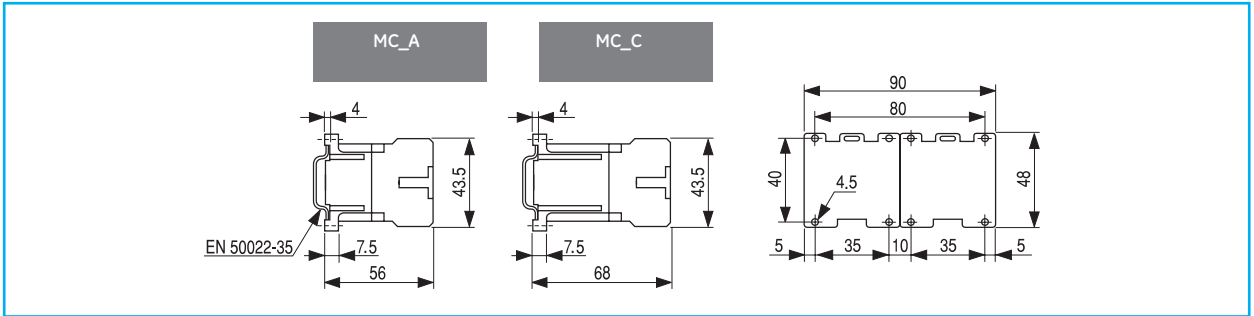
I

X

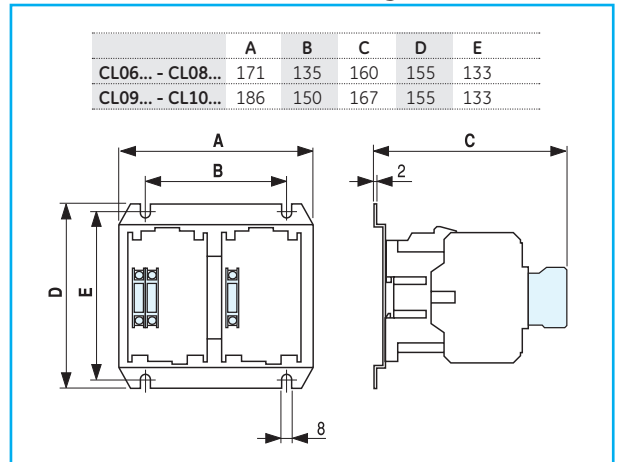
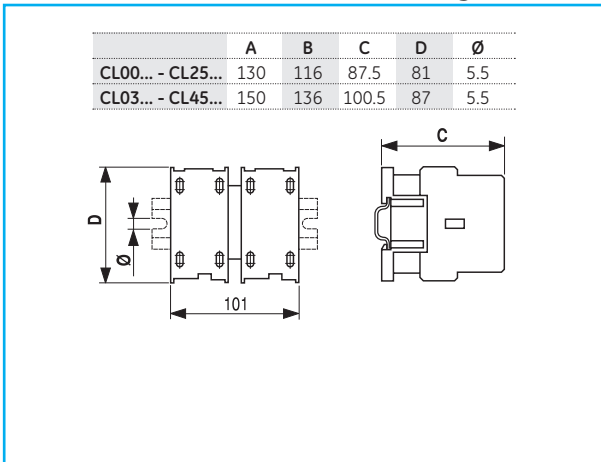


## Dimensional drawings

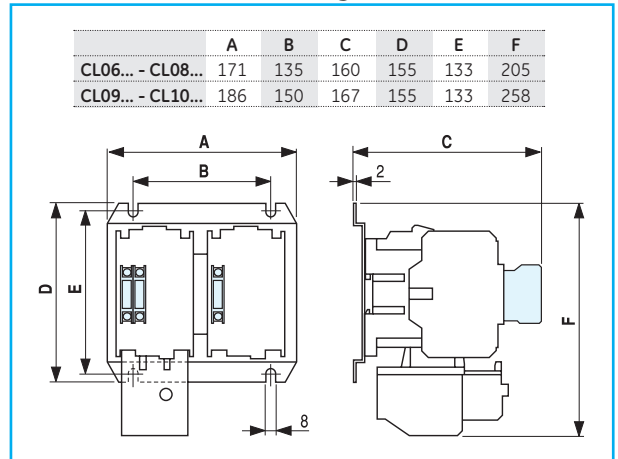
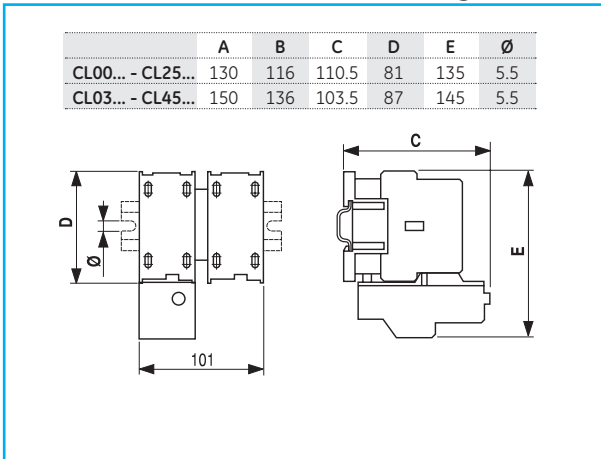
### Series M. Direct-on-line reversing starters



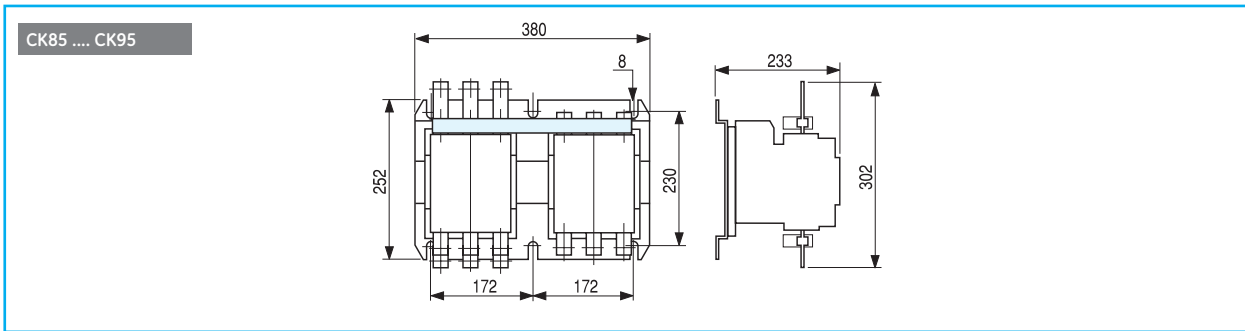
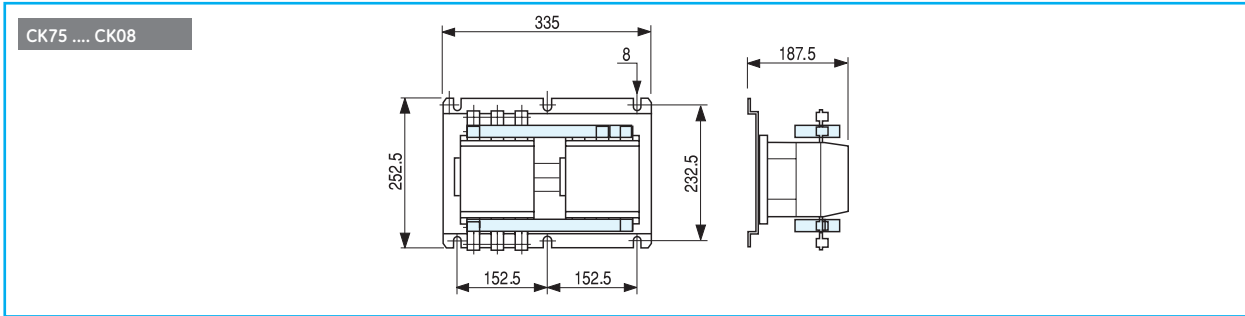
### Series CL. Direct-on-line reversing starters without thermal overload relay



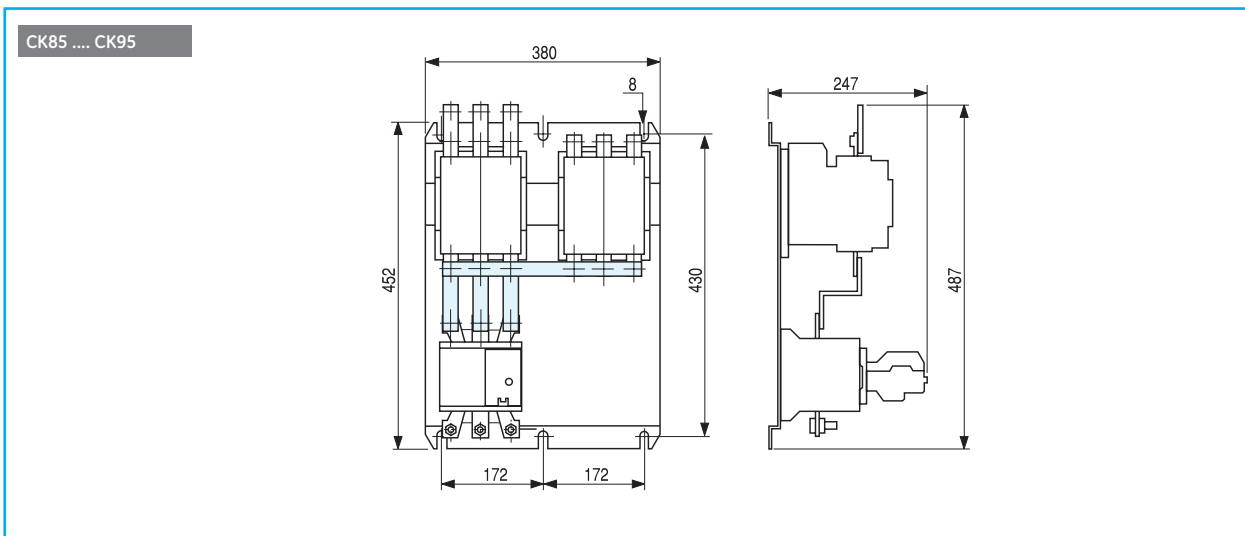
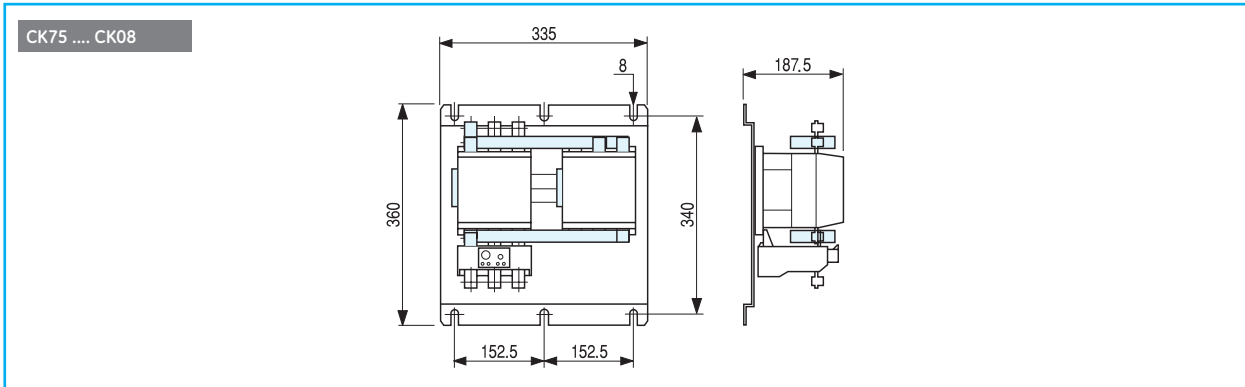
### Series CL. Direct-on-line reversing starters with thermal overload relay



**Series CK. Direct-on-line reversing starters without thermal overload relay**

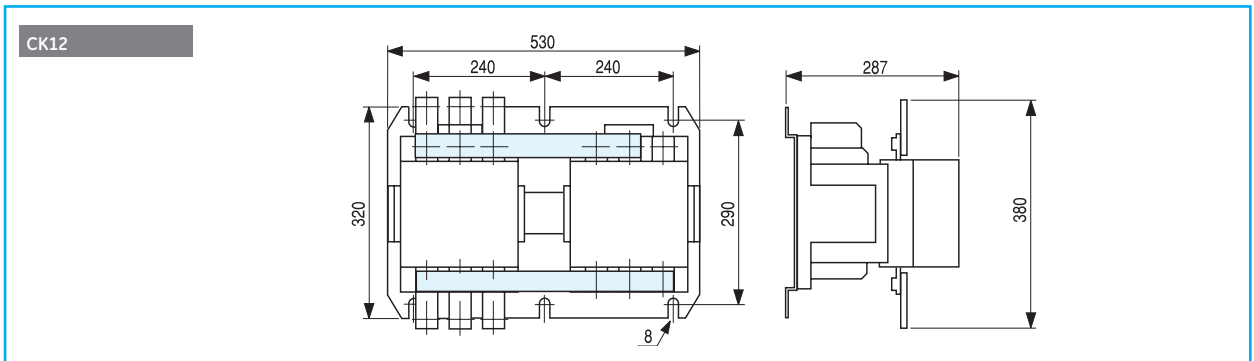
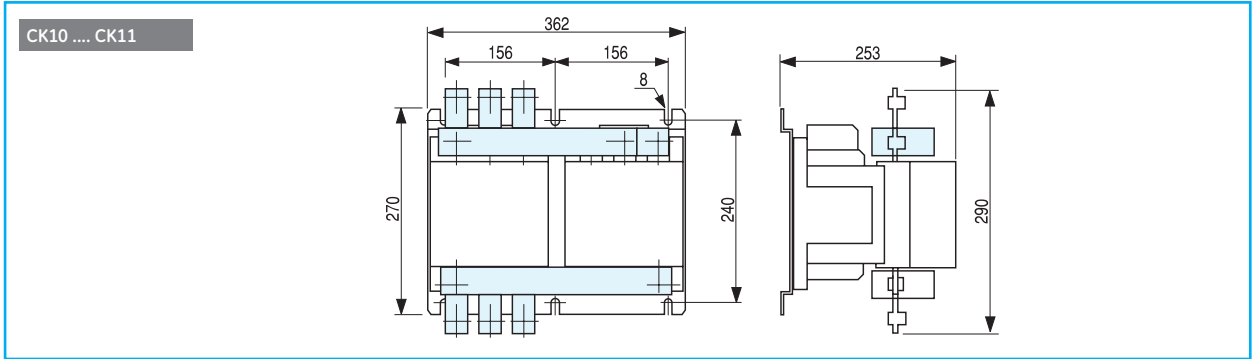


**Series CK. Direct-on-line reversing starters with thermal overload relay**

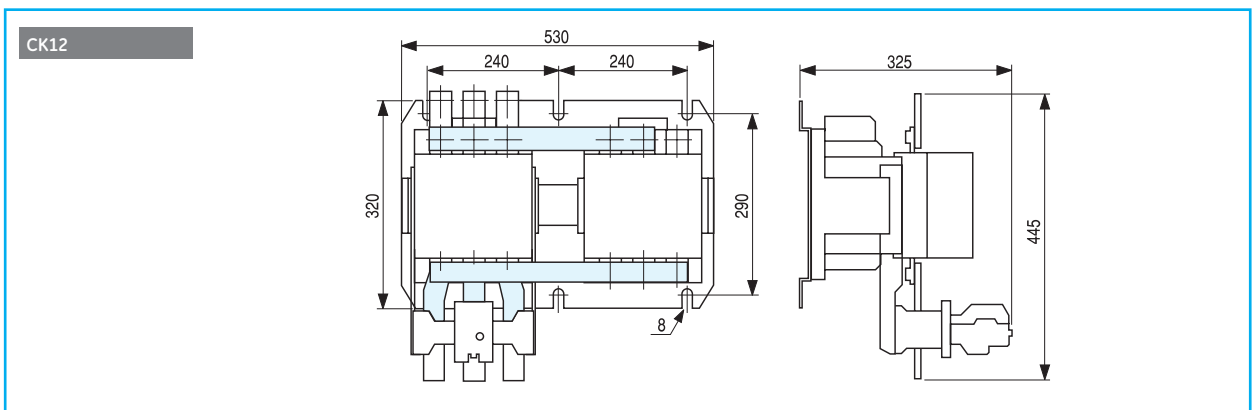
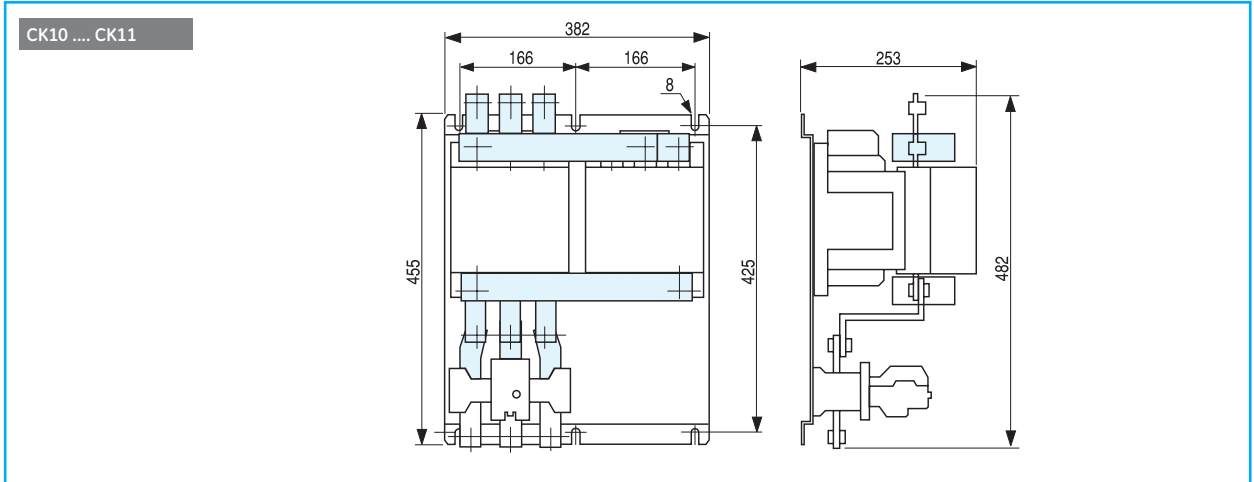


## Dimensional drawings

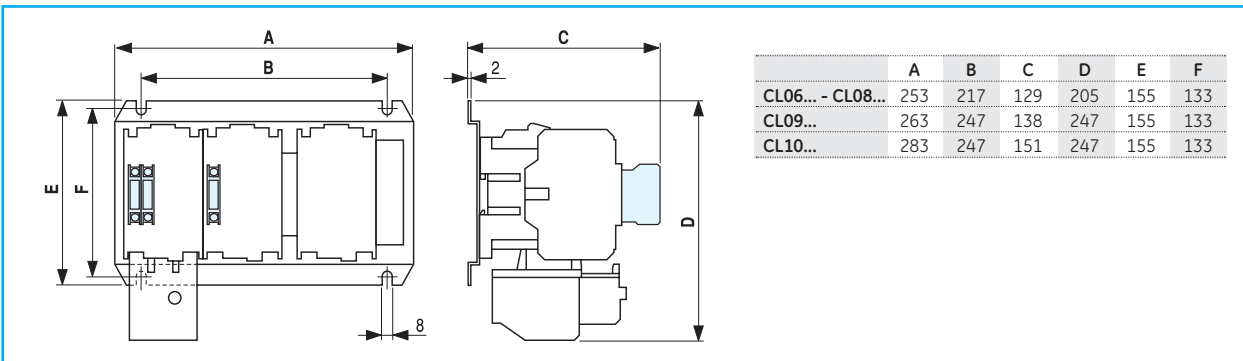
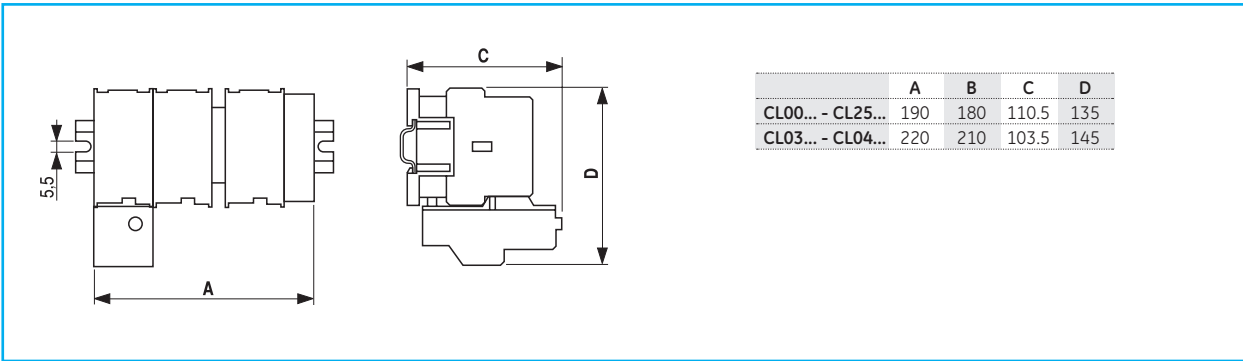
### Series CK - Direct-on-line reversing starters without thermal overload relay



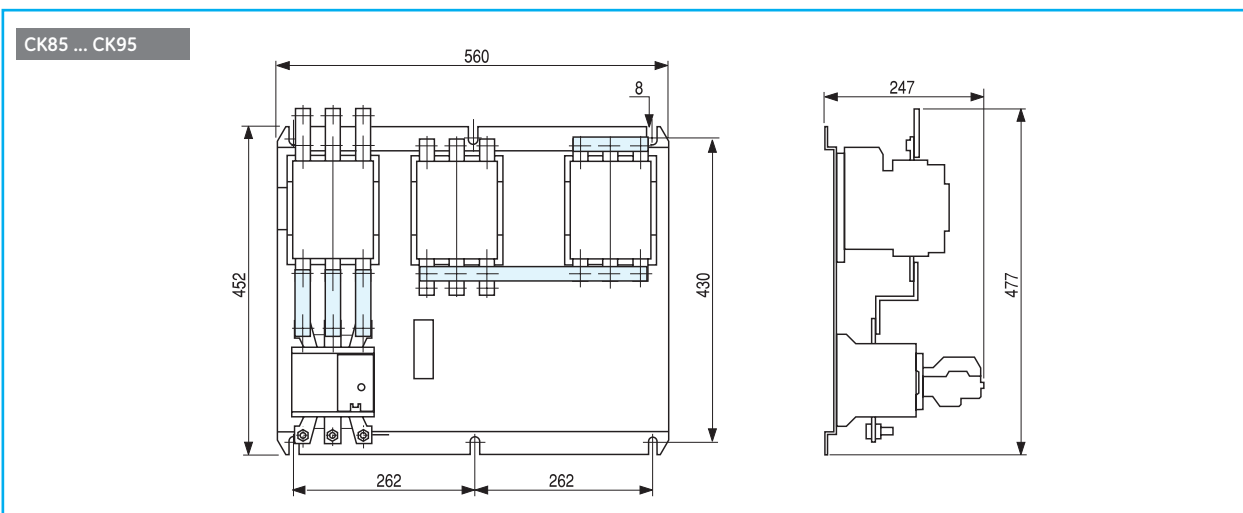
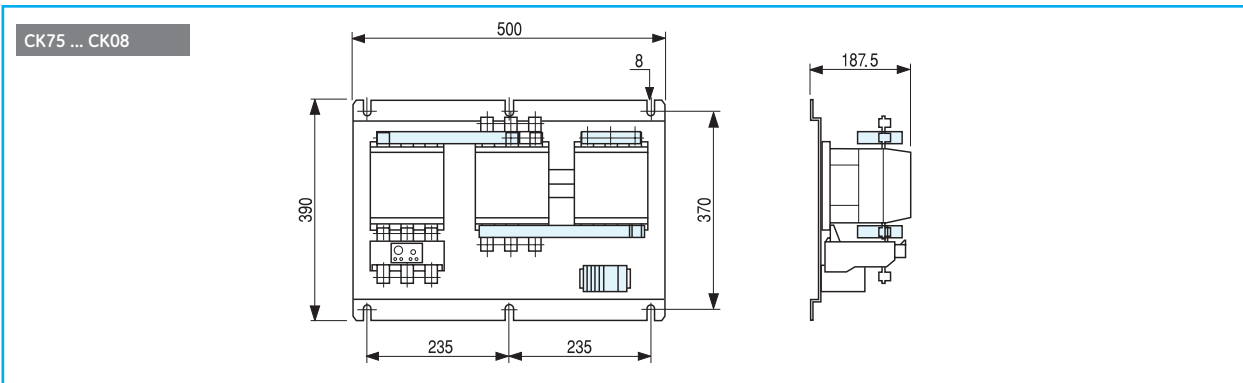
### Series CK - Direct-on-line reversing starters with thermal overload relay



Series CL - Star-delta starters



Series CK - Star-delta starters



A

B

C

D

E

F

G

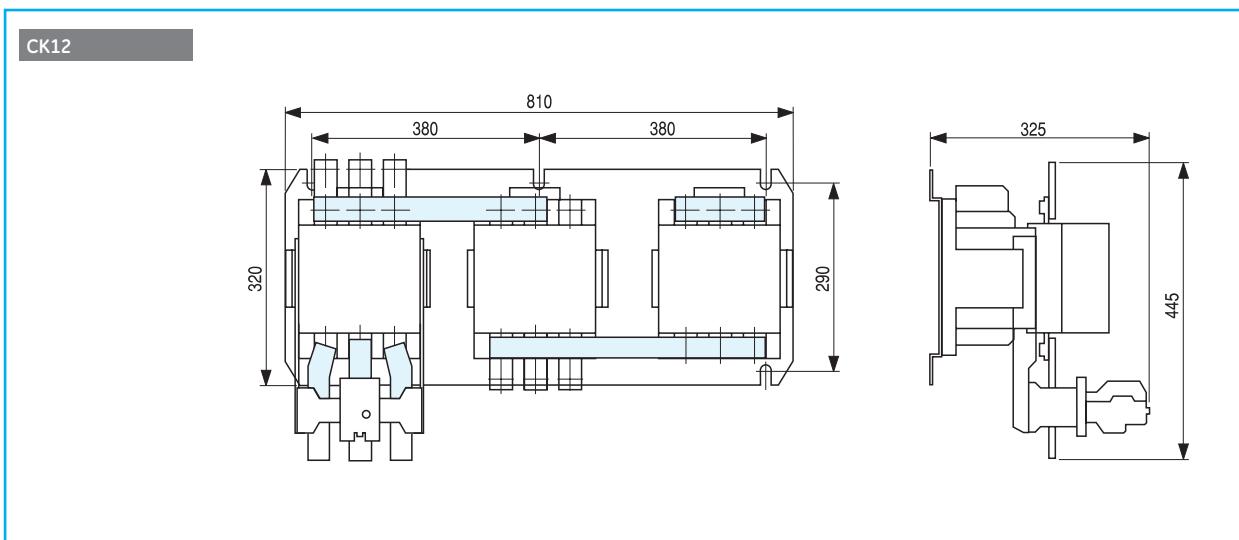
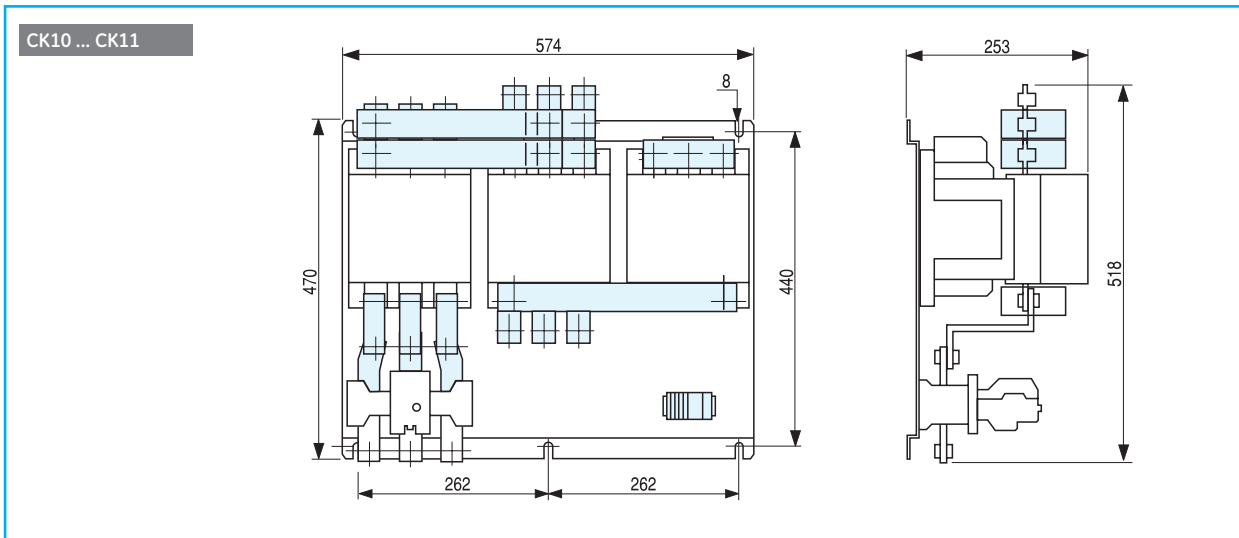
H

I

X

## Dimensional drawings

### Series CK - Star-delta starters



## Utilisation categories according to IEC 60947-4-1

### Standard utilisation categories AC

Category	Typical applications
AC-1	Non-inductive or slightly loads. Resistance furnaces
AC-2	Slip-ring motors: starting, plugging
AC-3	Squirrel-cage motors (1): starting, switching off motors during running.
AC-4	Squirrel-cage motors: starting, plugging, inching.
AC-5 a	Discharge lamps
AC-5 b	Incandescent lamps
AC-6 a	Transformers
AC-6 b	Cos $\varphi$ capacitors
AC-7 a	Slightly inductive loads for domestic applications
AC-7 b	Motors in domestic applications
AC-8 a	Drive motors for cooling compressors (2) with manual reset and thermal overload relay
AC-8 b	Drive motors for cooling compressors (2) with manual reset and automatic reset

### Standard utilisation categories DC

Category	Typical applications
DC-1	Non-inductive or slightly inductive loads. Resistance furnaces
DC-3	Shunt motors: starting, plugging, inching
DC-5	Series motors: starting, plugging, inching
DC-6	Incandescent lamps

- (1) Category AC-3 can be used for accidental not continuous short period service, while mounting and testing machines. The number of operations shall not be greater than 5 per minute or 10 per 10 minutes.
- (2) The drive motor of a hermetic cooling compressor is an assembly of a motor and compressor in the same housing, without any axle; the motor is working in the cooling liquid.
- (3) Making conditions in alternating current are expressed by effective value. Moreover the asymmetrical current high value, referred to  $\cos \varphi$ , can assume a higher value.
- (4) Tolerance for  $\cos \varphi = \pm 0.05$
- (5) Tolerance for  $L/R = \pm 15\%$

## Making and breaking capacity

### IEC 60947-4-1

Values given for closing and opening by intermittent use

Cat.	Rated current	Closing (3)			Opening		
		Ic/Ie	Ur/Ue	cos $\varphi$ (4)	Ic/Ie	Ur/Ue	cos $\varphi$ (4)
AC-1	All values	1.5	1.05	0.80	1.5	1.05	0.80
AC-2	All values	4	1.05	0.65	4	1.05	0.65
AC-3	Ie $\leq$ 100A	10	1.05	0.45	8	1.05	0.45
	Ie > 100A	10	1.05	0.35	8	1.05	0.35
AC-4	Ie $\leq$ 100A	12	1.05	0.45	10	1.05	0.45
	Ie > 100A	12	1.05	0.35	10	1.05	0.35

Cat.	Rated current	Closing			Opening		
		Ic/Ie	Ur/Ue	L/R(5) (ms)	Ic/Ie	Ur/Ue	L/R(5) (ms)
DC-1	All values	1.5	1.05	1	1.5	1.05	1
DC-3	All values	4	1.05	2.5	4	1.05	2.5
DC-5	All values	4	1.05	15	4	1.05	15

## Electrical endurance

### IEC 60947-4-1

Values given for closing and opening intermittent use

Cat.	Rated current	Closing (3)			Opening		
		Ic/Ie	Ur/Ue	cos $\varphi$ (4)	Ic/Ie	Ur/Ue	cos $\varphi$ (4)
AC-1	All values	1	1	0.95	1	1	0.95
AC-2	All values	2.5	1	0.65	2.5	1	0.65
AC-3	Ie $\leq$ 17A	6	1	0.65	1	0.17	0.65
	Ie > 17A	6	1	0.35	1	0.17	0.35
AC-4	Ie $\leq$ 17A	6	1	0.65	6	1	0.65
	Ie > 17A	6	1	0.35	6	1	0.35

Cat.	Rated current	Closing			Opening		
		Ic/Ie	Ur/Ue (ms)	L/R(5)	Ic/Ie	Ur/Ue (ms)	L/R(5)
DC-1	All values	1	1	1	1	1	1
DC-3	All values	2.5	1	2	2.5	1	2
DC-5	All values	2.5	1	7.5	2.5	1	7.5

<b>Ue</b>	Rated operational voltage
<b>Ie</b>	Rated operational current
<b>Ur</b>	Feed-back voltage
<b>Ic</b>	Current made or broken

## Utilisation category AC-1

### Three pole contactors

Type		MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL06	CL07	CL08	CL09	CL10
<b>Max. operat. current at ambient temp. of</b>	40°C (A)	20	20	20	25	25	32	45	45	60	60	90	110	110	140	140
	55°C (A)	20	20	20	25	25	32	45	45	60	60	90	110	110	140	140
(for all voltages)	70°C (A)	16	16	16	20	20	25	32	32	48	48	72	88	88	110	110
<b>Max. operat. power</b>	230/220V (kW)	7.5	7.5	7.5	9.5	9.5	12	17	17	22.5	22.5	30	42	42	53	53
Three-phase resistors	400/380V (kW)	13	13	13	16.5	16.5	22	29	29	39.5	39.5	55	72.5	72.5	92	92
	440/415V (kW)	15	15	13	18	18	23	32	32	43	43	57	79	79	100	100
	500V (kW)	17	17	17	21.5	21.5	27.5	39	39	52	52	69	95	95	121	121
	690/660V (kW)	22.5	22.5	22.5	28.5	28.5	38	51	51	68.5	68.5	95	125	125	160	160
<b>Cable size</b>	(mm <sup>2</sup> )	2.5	2.5	2.5	4	4	6	10	10	16	16	35	35	35	50	50
<b>Percentage of the max. operational current at</b>	120 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	300 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	600 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	1200 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	80	80
	3000 ops./h (%)	50	50	50	50	50	50	50	50	50	50	50	50	50	40	40

Type		CK75C	CK08C	CK85B	CK09B	CK95B	CK10C	CK11C	CK12B	CK13B						
<b>Max. operat. current at ambient temp. of</b>	40°C (A)	250	250	315	315	450	600	700	1000	1250						
	55°C (A)	200	200	252	252	382	510	546	736	1125						
(for all voltages)	70°C (A)	155	155	195	195	300	402	468	680	1060						
<b>Max. operat. power</b>	230/220V (kW)	90	90	114	114	170	191	234	289	450						
Three-phase resistors	400/380V (kW)	155	155	196	196	310	329	406	500	780						
	440/415V (kW)	180	180	227	227	343	329	470	578	904						
	500V (kW)	200	200	259	259	389	415	533	657	1027						
	690/660V (kW)	270	270	341	341	537	572	705	867	1354						
	1000V (kW)	400	400	517	517	780	866	1060	1314	2054						
<b>Cable size</b>	(mm <sup>2</sup> )	120	120	185	185	2x (30X5)	2x (30X8)	2x (30X8)	2x (30X10)	2x (30X10)						
<b>Percentage of the max. operational current at</b>	120 ops./h (%)	100	100	100	100	100	100	100	100	100						
	300 ops./h (%)	100	100	100	100	100	100	100	100	90						
	600 ops./h (%)	100	100	100	100	100	80	80	80	70						
	1200 ops./h (%)	80	80	80	80	80	-	-	-	-						
	3000 ops./h (%)	40	40	40	40	-	-	-	-	-						

### Four pole contactors

Type		MC0	MC1	MC2	CL01	CL02	CL03	CL04	CL05	CL07	CL08(1)	CL09(2)
<b>Max. operat. current at ambient temp. of</b>	40°C (A)	20	20	20	25	32	45	60	90	110	110	140
	55°C (A)	20	20	20	25	32	45	60	90	110	110	140
(for all voltages)	70°C (A)	16	16	16	20	25	32	48	72	88	88	110
<b>Max. operat. power</b>	230/220V (kW)	7.5	7.5	7.5	9.5	12	17	22.5	30	42	42	53
Three-phase resistors	400/380V (kW)	13	13	13	16.5	22	29	39.5	55	72.5	72.5	92
	440/415V (kW)	15	15	15	18	23	32	43	57	79	79	100
	500V (kW)	17	17	17	21.5	27.5	39	52	69	95	95	121
	690/660V (kW)	22.5	22.5	22.5	28.5	38	51	68.5	95	125	25	160
<b>Cable size</b>	(mm <sup>2</sup> )	2.5	2.5	2.5	4	6	10	16	35	35	35	50
<b>Percentage of the max. operational current at</b>	120 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100
	300 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100
	600 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100
	1200 ops./h (%)	100	100	100	100	100	100	100	100	100	100	80
	3000 ops./h (%)	50	50	50	50	50	50	50	50	50	50	40

Type		CK07B	CK08B	CK09B	CK95B	CK10C	CK11C	CK12B	CK13B			
<b>Max. operat. current at ambient temp. of</b>	40°C (A)	200	325	400	500	600	700	1000	1250			
	55°C (A)	170	260	320	425	510	546	736	1125			
(for all voltages)	70°C (A)	140	201	272	335	402	468	680	1060			
<b>Max. operat. power</b>	230/220V (kW)	76	123	152	191	228	266	381	476			
Three-phase resistors	400/380V (kW)	131	214	263	329	395	460	658	822			
	440/415V (kW)	143	233	287	359	431	503	719	898			
	500V (kW)	173	281	346	415	519	606	866	1082			
	690/660V (kW)	228	371	457	572	686	800	1143	1428			
	1000V (kW)	-	562	692	866	1039	1212	1732	2165			
<b>Cable size</b>	(mm <sup>2</sup> )	95	185	2x (25X5)	2x (30X5)	2x (30X8)	2x (30X8)	2x (30X10)	2x (40X10)			
<b>Percentage of the max. operational current at</b>	120 ops./h (%)	100	100	100	100	100	100	100	100			
	300 ops./h (%)	100	100	100	100	100	100	100	90			
	600 ops./h (%)	100	100	100	100	80	80	80	70			
	1200 ops./h (%)	80	80	80	80	-	-	-	-			
	3000 ops./h (%)	40	40	40	40	-	-	-	-			

Increase in maximum operational current through connection poles in parallel:  
 - 2 poles in parallel: I<sub>e</sub> x 1.8  
 - 3 poles in parallel: I<sub>e</sub> x 2.4  
 - 4 poles in parallel: I<sub>e</sub> x 3.2

(1) Only types (2NO + 2NC)  
 (2) Only types (4NO)



## Utilisation category AC-3

### Three pole contactors

Types		MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL06	CL07	CL08	CL09	CL10
Operational current I <sub>e</sub> for U <sub>e</sub> ≤ 400V	(A)	6	9	12	9	12	18	25	25	32	40	50	65	80	95	105
Max. operat. power 230/220V	(kW)	1.5	3	3	2.2	3	4	7.5	7.5	9	11	15	18.5	22	25	30
	(HP)	2	4	4	3	4	5.5	10	10	12	15	20	25	30	34	40
Three-phase motors 50/60Hz	400/380V (kW)	2.2	4	5.5	4	5.5	7.5	12	12	16	18.5	22	30	37	45	55
	(HP)	3	5.5	7.3	5.5	7.5	10	16	16	22	25	30	40	50	60	75
440/415V	(kW)	2.2	4	5.5	4	5.5	7.5	12	12	16	22	25	37	45	50	55
	(HP)	3	5.5	7.3	5.5	7.5	10	16	16	22	30	34	50	60	68	75
500V	(kW)	3	4	5.5	5.5	7.5	10	15	15	18.5	25	30	40	45	55	65
	(HP)	4	5.5	7.3	7.5	10	13.5	20	20	25	34	40	55	60	75	88
690/660V	(kW)	3	4	5.5	5.5	7.5	10	15	15	18.5	30	35	45	45	55	65
	(HP)	4	5.5	7.3	7.5	10	13.5	20	20	25	40	48	60	60	75	88
Percentage of the max. operational current at	120 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	300 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	600 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	1200 ops./h (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	75	75
	3000 ops./h (%)	35	35	35	35	35	35	35	35	35	35	35	35	35	25	25

Type		CK75C	CK08C	CK85B	CK09B	CK95B	CK10C	CK11C	CK12B	CK13B
Operational current I <sub>e</sub> for U <sub>e</sub> ≤ 400V	(A)	150	185	205	250	309	420	550	700	825
Max. operat. power 230/220V	(kW)	45	55	65	75	90	125	160	220	250
	(HP)	60	75	88	100	125	170	220	300	340
Three-phase motors 50/60Hz	400/380V (kW)	75	90	110	132	160	220	280	375	450
	(HP)	100	125	150	180	220	300	380	510	610
440/415V	(kW)	80	100	125	132	185	230	315	400	450
	(HP)	108	135	170	180	250	312	425	540	610
500V	(kW)	100	110	132	160	200	300	400	480	500
	(HP)	135	150	180	220	270	405	540	650	680
690/660V	(kW)	100	132	155	200	250	375	450	500	550
	(HP)	135	180	205	270	335	510	610	680	750
1000V	(kW)	65	100	110	150	200	300	375	450	500
	(HP)	88	135	150	205	270	405	510	610	680
Percentage of the max. operational current	120 ops./h (%)	100	100	100	100	100	100	100	100	100
	300 ops./h (%)	100	100	100	100	100	100	100	100	80
	600 ops./h (%)	100	100	100	100	100	75	75	75	65
	1200 ops./h (%)	75	75	75	75	75	-	-	-	-
	3000 ops./h (%)	25	25	25	25	-	-	-	-	-

## Utilisation category AC-4

### Three pole contactors

Type		MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL06	CL07	CL08	CL09	CL10
Operational current U <sub>e</sub> ≤ 690V	(A)	2.75	3.5	3.5	5	7	8	12	12	16	18.5	23	30	37	44	50
Operational power 230/220V (200.000 operations)	(kW)	0.55	0.75	0.75	1.1	1.5	1.8	3	3	3.7	4	5.5	7.5	10	11	13
	(HP)	0.73	1	1	1.5	2	2.4	4	4	5	5.3	7.3	9.7	13	14.6	17.3
400/380V	(kW)	1.1	1.5	1.5	2.2	3	3.7	5.5	5.5	7.5	9	11	15	18.5	22	25
	(HP)	1.5	2	2	3	4	5	7.3	7.3	9.7	12	14.6	20	24.6	29.2	33
500V	(kW)	1.5	2.2	2.2	3	4	5.5	7.5	7.5	10	11	15	18.5	22	25	30
	(HP)	2	3	3	4	5.3	7.3	9.7	9.7	13	14.6	20	24.6	29.2	33	40
690/660V	(kW)	2.2	3	3	4	5.5	7.5	10	10	11	15	18.5	22	25	30	37
	(HP)	3	4	4	5.3	7.3	9.7	13	13	14.6	20	24.6	29.2	33	40	49
Max. operational current ≤ 400V (35.000 operations)	(A)	6	9	9	9	12	18	25	25	32	40	50	65	80	95	105
Max. operational power 400/380V	(kW)	2.2	4	4	4	5.5	7.5	11	12	16	18.5	22	30	37	45	55

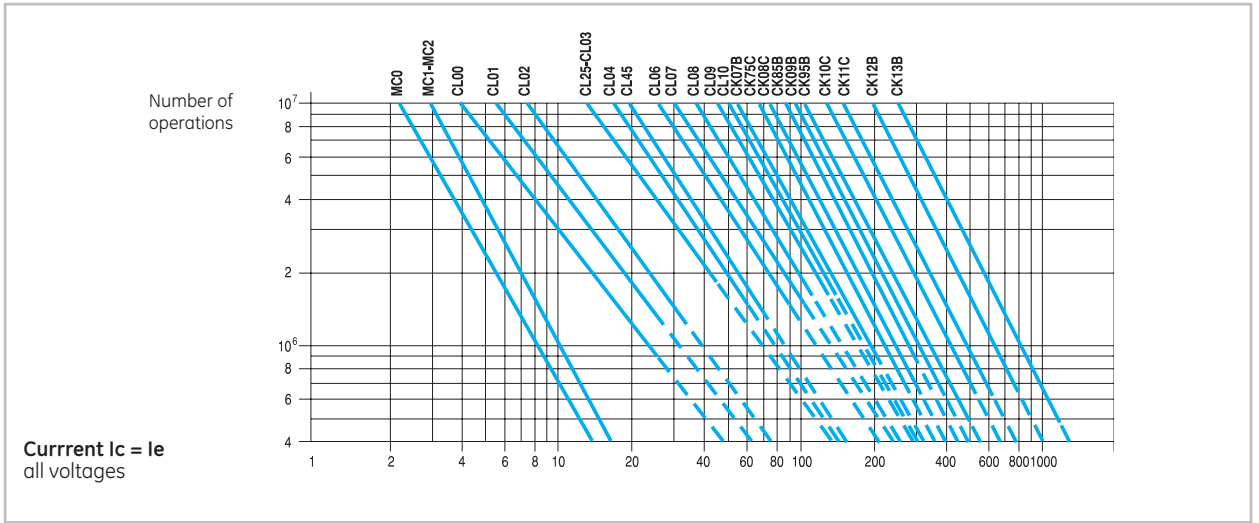
Type		CK75C	CK08C	CK85B	CK09B	CK95B	CK10C	CK11C	CK12B	CK13B
Operational current U <sub>e</sub> ≤ 400V	(A)	65	75	90	110	125	150	165	250	350
Operational power 230/220V	(kW)	18.5	22	25	33	37	45	50	80	110
	(HP)	24.6	29.2	33	44	49	60	66.5	106	146
Three-phase motors 50/60Hz (200.000 operations)	400/380V (kW)	33	40	45	55	63	80	90	132	165
	(HP)	44	53	60	73	83.8	106	119	175	219
500V	(kW)	45	50	63	75	90	100	110	225	250
	(HP)	60	66.5	83.8	100	119	133	146	300	332
690/660V	(kW)	55	63	80	100	110	132	150	250	315
	(HP)	73	83.8	106	133	146	175	200	332	419
Max. operational current ≤ 400V (35.000 operations)	(A)	150	185	205	250	309	420	550	700	825
Max. operational power 400/380V	(kW)	75	90	110	132	160	220	280	375	450



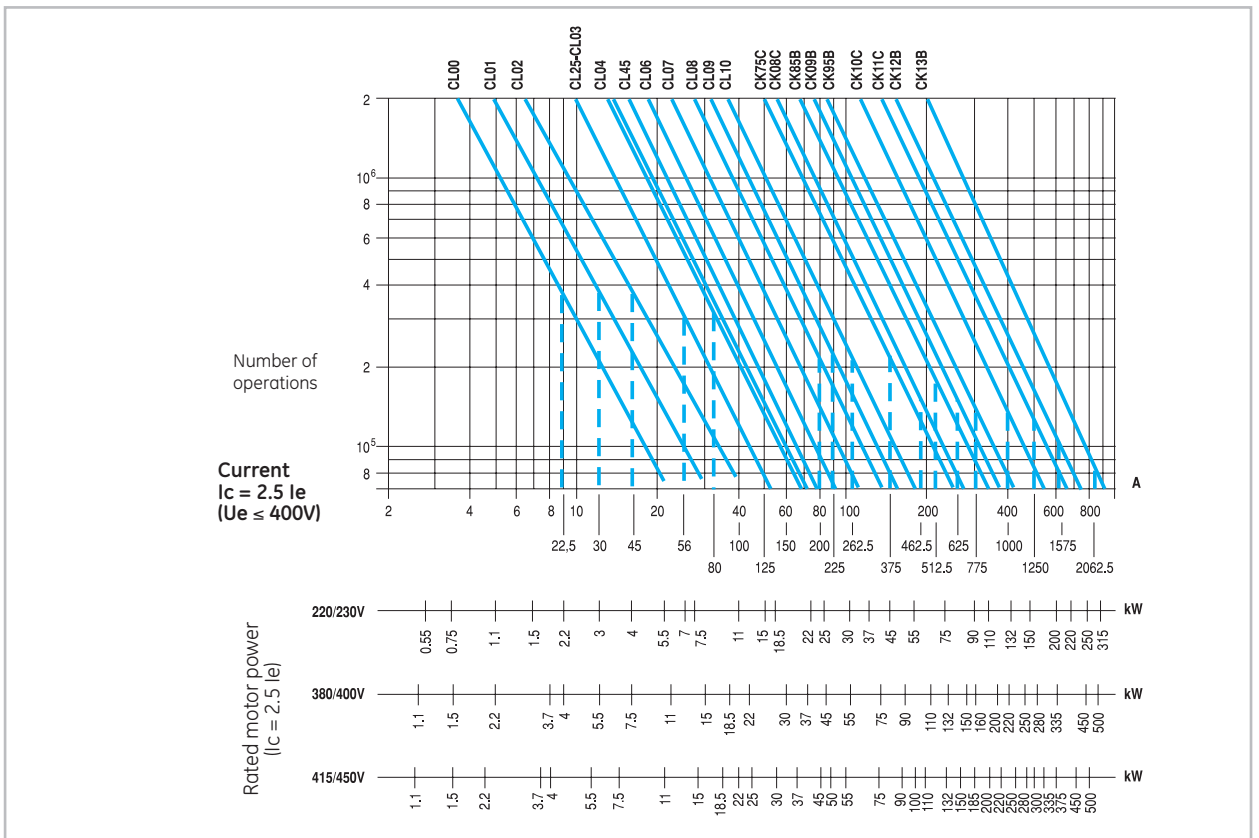


## Electrical endurance

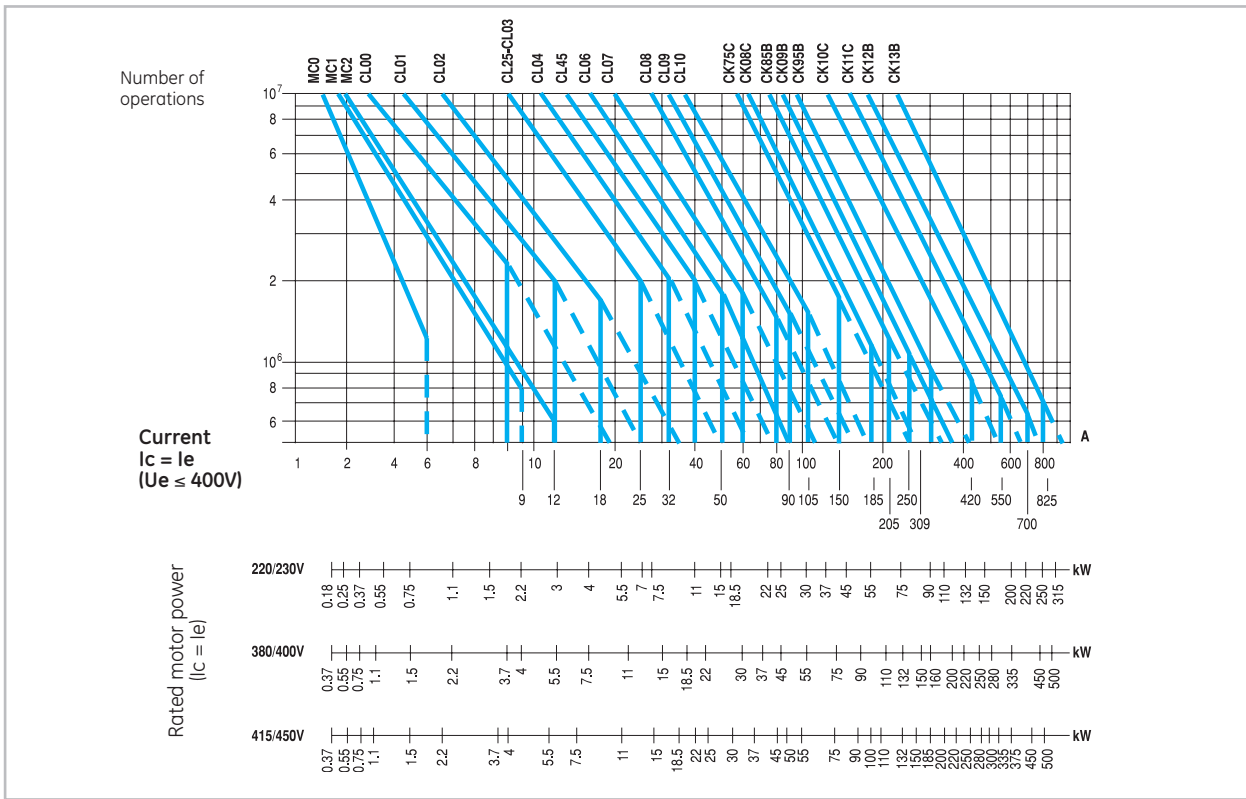
### Category AC1



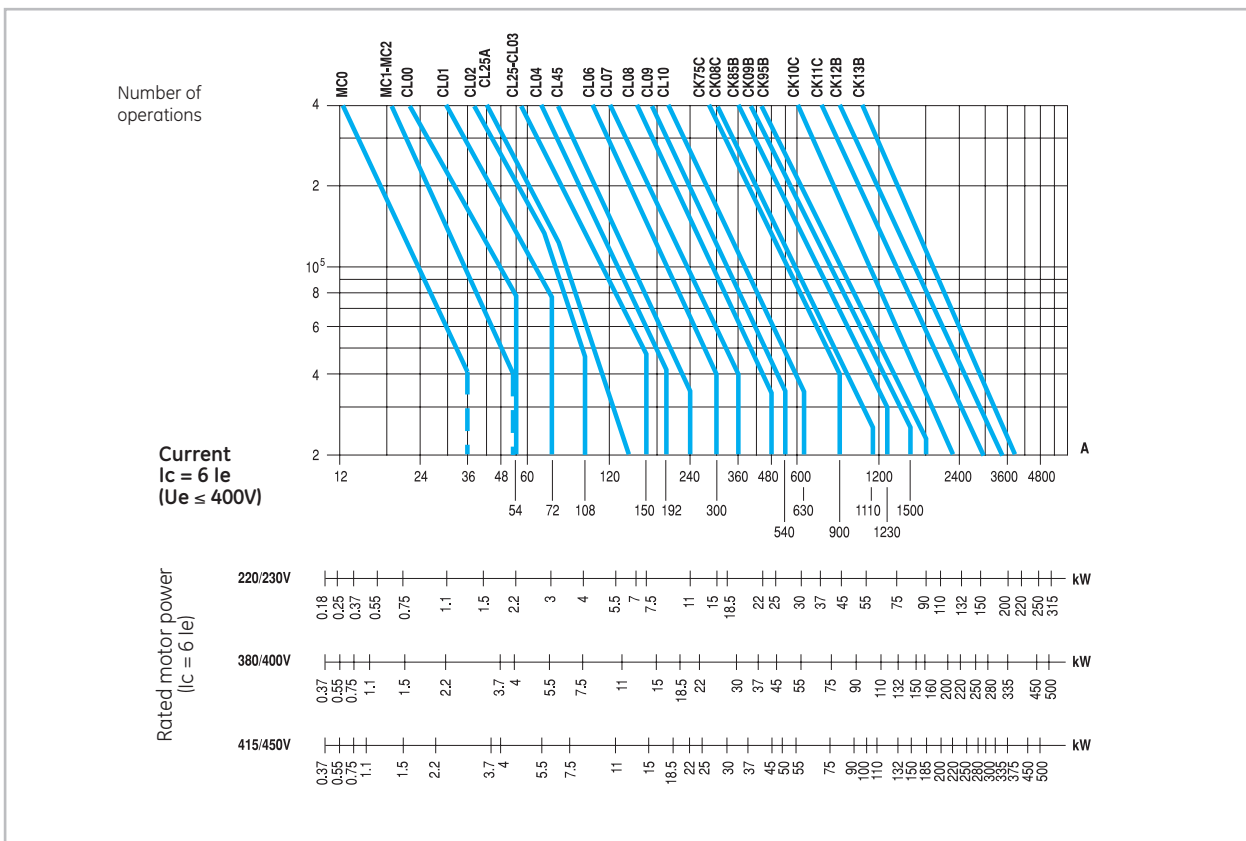
### Category AC2



Category AC3



Category AC4



Applications

A

B

C

D

E

F

G

H

I

X



## Electrical endurance

### Mixed category AC2 / AC'2

Graph to determine the coefficient which when multiplied by the contactor electrical endurance in category AC'2, will give the electrical endurance in mixed category AC2/AC'2.

Example:

- % of operations in AC2:  
35% (or 65% as AC'2)
- Breaking current  $I_c = 2.54 I_e$
- Contactor considered: CK08BA  
Resultant coefficient from the graph: 0.35  
Electrical endurance in AC'2 for contactor CK085A, to drive a motor of 45kW at 380V:  
 $I_e = 85A; 5.5 \times 10^6$  operations.

Resultant electrical endurance for mixed service considered:

$$0.35 \times 5.5 \times 10^6 = 1.92 \times 10^6 \text{ operations.}$$

### Mixed category AC4 / AC3

Electrical endurance for mixed category (AC3/AC4) is calculated with the following formula:

$$\text{Electrical endurance (AC3/AC4)} = \frac{\text{Electrical endurance (AC3)}}{1 + \frac{\% \text{ ops. AC4}}{100} \times \left( \frac{\text{Electr. endur. (AC3)}}{\text{Electr. endur. (AC4)}} - 1 \right)}$$

Notes

Grid area for notes.

Applications

A
B
C
D
E
F
G
H
I
X



Series M and CL. Max. operational current *Ie* (A) - DC utilisation categories

Category DC1. L/R ≤ 1ms

Ue	Poles in serie	MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL05	CL06	CL07	CL08	CL09	CL10
24V	1	6	9	9	18	18	18	25	25	32	40	50	50	65	65	80	80
	2	8	12	12	25	25	32	45	45	60	60	90	90	110	110	140	140
	3	15	20	20	25	25	32	45	45	60	60	90	90	110	110	140	140
	4	15	20	20	-	25	32	-	45	60	-	90	-	110	-	140	-
48V	1	5	7.5	7.5	15	15	15	20	20	25	35	45	45	55	55	70	70
	2	8	12	12	25	25	32	45	45	60	60	90	90	110	110	140	140
	3	12	16	16	25	25	32	45	45	60	60	90	90	110	110	140	140
	4	15	20	20	-	25	32	-	45	60	-	90	-	110	-	140	-
60V	1	4	6	6	12	12	12	18	18	18	32	40	40	50	50	65	65
	2	6	9	9	25	25	32	45	45	60	60	90	90	110	110	140	140
	3	12	16	16	25	25	32	45	45	60	60	90	90	110	110	140	140
	4	15	20	20	-	25	32	-	45	60	-	90	-	110	-	140	-
125V	1	1.6	2.5	2.5	6	6	6	8	8	8	16	16	16	16	16	16	16
	2	4	6	6	18	18	18	25	25	45	45	80	80	90	90	110	110
	3	5	10	10	25	25	25	32	45	60	60	90	90	110	110	140	140
	4	5	10	10	-	25	32	-	45	60	-	90	-	110	-	140	-
220V	1	0.2	0.36	0.36	0.8	0.8	0.8	1	1	1	2	2	2	2	2	2	2
	2	1.7	2.6	2.6	7.5	7.5	7.5	8	8	8	20	20	20	20	20	20	20
	3	4	8	8	25	25	25	32	45	50	50	90	90	110	110	140	140
	4	4	8	8	-	25	32	-	45	60	-	90	-	110	-	140	-
440V	1	0.09	0.13	0.13	0.4	0.4	0.4	0.4	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	2	0.26	0.4	0.4	0.8	0.8	0.8	0.8	1	1	1	2	2	2	2	2	2
	3	0.5	1	1	8	8	8	10	10	10	10	15	15	15	15	15	15
	4	0.5	1	1	-	15	15	-	20	25	-	80	-	90	-	110	-
600V	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	0.4	0.4	0.4	0.4	0.5	0.5	0.5	1	1	1	1	1	1
	3	-	-	-	4	4	4	5	5	5	5	7.5	7.5	7.5	7.5	7.5	7.5
	4	-	-	-	-	8	10	-	12	12	-	50	-	65	-	75	-

Category DC3. L/R ≤ 2.5ms

Ue	Poles in serie	MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL05	CL06	CL07	CL08	CL09	CL10	
24V	1	-	-	-	12	12	12	18	18	25	32	40	40	50	50	65	65	
	2	4	9	9	18	18	18	25	25	40	40	65	65	80	80	105	105	
	3	8	12	12	18	18	18	25	25	40	40	65	65	80	80	105	105	
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-	
48V	1	-	-	-	9	9	9	12	12	18	20	30	30	35	35	45	45	
	2	3	6	6	18	18	18	25	25	40	40	65	65	80	80	105	105	
	3	6	9	9	18	18	18	25	25	40	40	65	65	80	80	105	105	
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-	
60V	1	-	-	-	7.5	7.5	7.5	10	10	15	15	25	25	30	30	35	35	
	2	3	6	6	18	18	18	25	25	40	40	65	65	80	80	105	105	
	3	6	9	9	18	18	18	25	25	40	40	65	65	80	80	105	105	
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-	
125V	1	-	-	-	2	2	2	2	3	3	3	3	3	3	3	3	3	
	2	0.85	4.5	4.5	10	10	12	18	18	25	32	40	35	35	80	60	80	80
	3	1.7	6	6	15	15	18	25	25	32	40	35	35	80	80	105	105	
	4	-	-	-	-	15	18	-	25	32	-	35	-	80	-	105	-	
220V	1	-	-	-	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
	2	0.35	1.2	1.2	2	2	2	2	2	2	7	7	7	7	7	7	7	
	3	0.7	2.5	2.5	12	12	12	18	18	25	32	50	50	65	65	95	95	
	4	-	-	-	-	15	18	-	32	32	-	65	-	80	-	105	-	
440V	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	2	0.05	0.15	0.15	0.3	0.3	0.3	0.3	0.5	0.5	0.5	1	1	1	1	1	1	
	3	0.13	0.3	0.3	1.5	1.5	1.5	1.5	3	3	3	3	3	3	3	3	3	
	4	-	-	-	-	6	6	-	6	6	-	50	-	65	-	75	-	
600V	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	3	-	-	-	0.8	0.8	0.8	0.8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
	4	-	-	-	-	2.5	2.5	-	2.5	2.5	-	25	-	30	-	35	-	

Category DC5. L/R ≤ 15ms

Ue	Poles in serie	MC0	MC1	MC2	CL00	CL01	CL02	CL25	CL03	CL04	CL45	CL05	CL06	CL07	CL08	CL09	CL10
24V	1	-	-	-	12	12	12	18	18	25	32	40	40	50	50	65	65
	2	3	4.5	4.5	18	18	18	25	25	40	40	65	65	80	80	105	105
	3	6	9	9	18	18	18	25	25	40	40	65	65	80	80	105	105
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-
48V	1	-	-	-	9	9	9	12	12	18	20	30	30	35	35	45	45
	2	2.5	4	4	18	18	18	25	25	40	40	65	65	80	80	105	105
	3	6.5	8	8	18	18	18	25	25	40	40	65	65	80	80	105	105
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-
60V	1	-	-	-	7.5	7.5	7.5	10	10	15	15	25	25	30	30	35	35
	2	2	3	3	18	18	18	25	25	40	40	65	65	80	80	105	105
	3	5	7	7	18	18	18	25	25	40	40	65	65	80	80	105	105
	4	-	-	-	-	18	18	-	25	40	-	65	-	80	-	105	-
125V	1	-	-	-	0.8	0.8	0.8	0.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	2	0.65	1.5	1.5	5	5	5	5	5	5	5	50	50	60	60	85	85
	3	1.3	2	2	15	15	15	20	20	25	32	60	60	70	70	95	95
	4	-	-	-	-	15	18	-	25	32	-	65	-	80	-	105	-
220V	1	-	-	-	-	-	-	-	-	-	-	0.5	0.5	0.5	0.5	0.5	0.5
	2	0.16	0.26	0.26	0.8	0.8	0.8	0.8	0.8	0.8	0.8	3	3	3	3	4	4
	3	0.5	0.8	0.8	3	3	3	3	3	3	3	7	7	7	7	7	7
	4	-	-	-	-	10	10	-	15	15	-	65	-	75	-	95	-
440V	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	0.4	0.1	1.1	0.5	0.5	0.5	0.5	0.7	0.7	0.7	1	1	1	1	1	1
	4	-	-	-	-	2	2	-	4	4	-	40	-	50	-	60	-
600V	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	0.75	0.75	-	2.5	2.5	-	20	-	25	-	30	-

Motorstarters

A

B

C

D

E

F

G

H

I

X



Max. operational current  $I_e$  (A) - DC utilisation categories (continued)

Category DC1.  $L/R \leq 1ms$

Ue	Poles in serie	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
24V	1	150	200	200	250	250	350	500	600	800	1000
	2	200	250	250	315	315	450	600	700	1000	1250
	3	200	250	250	315	315	450	600	700	1000	1250
	4	200	-	250	-	315	450	600	700	1000	1250
48V	1	125	170	170	200	200	295	425	500	600	850
	2	140	175	175	220	220	315	425	480	700	850
	3	200	250	250	315	315	500	600	700	1000	1250
	4	200	-	250	-	315	500	600	700	1000	1250
60V	1	100	140	140	175	175	245	350	420	560	700
	2	140	175	175	220	220	315	425	480	700	850
	3	200	250	250	315	315	500	600	700	1000	1250
	4	200	-	250	-	315	500	600	700	1000	1250
125V	1	20	25	25	30	30	50	60	70	100	125
	2	110	200	200	250	250	300	400	500	600	1000
	3	200	250	250	315	315	500	600	700	1000	1250
	4	200	-	250	-	315	500	600	700	1000	1250
220V	1	-	-	-	-	-	-	-	-	-	-
	2	65	110	110	150	150	200	250	250	300	400
	3	200	250	250	315	315	500	600	700	1000	1250
	4	200	-	250	-	315	500	600	700	1000	1250
440V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	60	120	120	150	150	180	240	300	400	480
	4	110	-	200	-	250	315	400	500	700	800
600V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	32	65	65	80	80	95	130	160	215	250
	4	85	-	100	-	130	170	215	265	375	430

Category DC3.  $L/R \leq 2.5ms$

Ue	Poles in serie	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
24V	1	105	150	185	205	250	309	420	550	700	825
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
48V	1	70	105	130	140	175	215	290	385	490	575
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
60V	1	55	85	105	110	140	175	230	300	390	460
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
125V	1	20	25	25	30	30	50	60	70	100	125
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
220V	1	-	-	-	-	-	-	-	-	-	-
	2	10	60	70	80	85	95	140	185	225	400
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
440V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	8	50	55	65	70	80	120	150	180	320
	4	80	-	105	-	185	205	250	300	400	700
600V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	4	25	25	30	35	40	60	75	90	165
	4	40	-	50	-	90	100	125	150	200	350

Category DC5.  $L/R \leq 15ms$

Ue	Poles in serie	CK07	CK75	CK08	CK85	CK09	CK95	CK10	CK11	CK12	CK13
24V	1	105	150	185	205	250	309	420	550	700	825
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
48V	1	60	90	110	120	150	185	250	330	420	495
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
60V	1	55	85	105	110	140	175	230	300	390	460
	2	105	150	185	205	250	309	420	550	700	825
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
125V	1	15	20	20	25	25	40	50	60	80	100
	2	80	95	105	150	185	205	250	300	400	700
	3	105	150	185	205	250	309	420	550	700	825
	4	105	-	185	-	250	309	420	550	700	825
220V	1	-	-	-	-	-	-	-	-	-	-
	2	8	50	55	65	70	80	120	150	180	320
	3	80	95	105	150	185	205	250	300	400	700
	4	105	-	185	-	250	309	420	550	700	825
440V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	5	40	40	50	50	60	90	100	100	200
	4	65	-	95	-	150	185	205	250	300	400
600V	1	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-
	3	40	45	50	75	90	100	125	150	200	350
	4	35	-	45	-	75	90	100	125	150	200

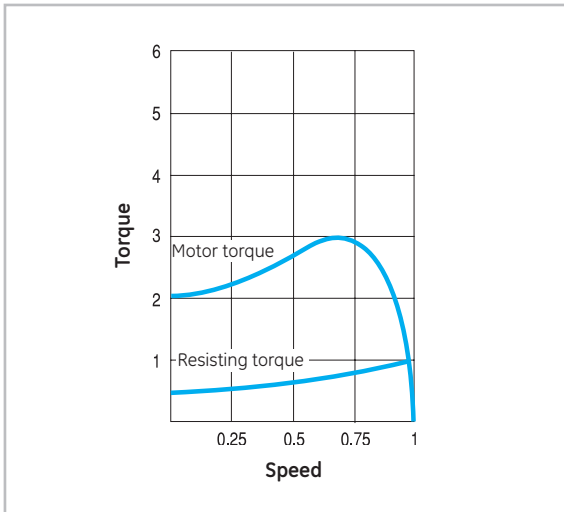


## Direct-on-line starters

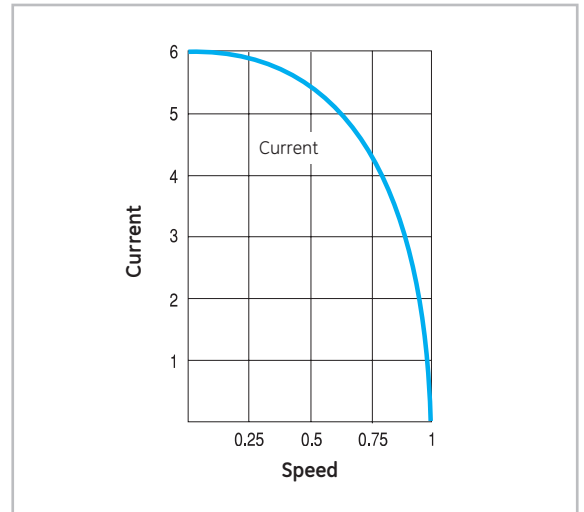
- Motors connected directly on-line with a contactor and a thermal overload relay.
- Simple installation with high starting torque and current.
- For use with motors of medium power that do not need a progressive star

AC-3	Switching off motors during running	$I_c = I_e$
AC-4	Switching off motors during starting	$I_c = 6 I_e$

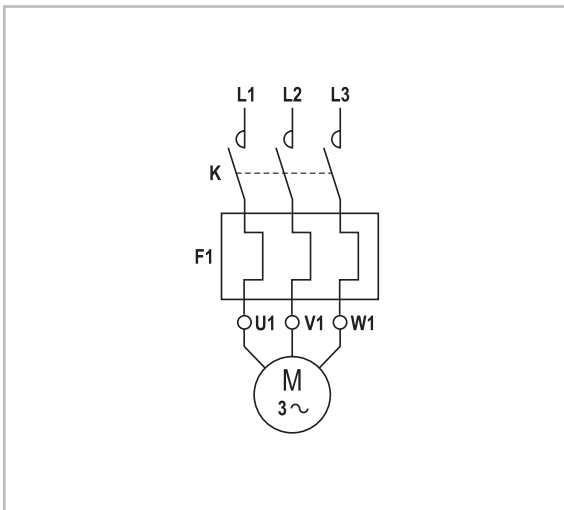
### Torque-speed curve



### Current-speed curve



### Diagram



Selection table

Motor										Contactor	Thermal relay	Fuse			
230/200V		400/380V		440/415V		500V		690/660V				1000V		aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	A	A		
-	-	-	-	-	-	-	-	0.06	0.13	-	-	MC0	MT03A	0.5	1
-	-	0.06	0.23	0.06	0.21	0.06	0.17	0.09	0.2	-	-		MT03B	0.5	1
-	-	-	-	-	-	-	-	0.12	0.25	-	-		MT03B	0.5	1
0.06	0.39	0.09	0.34	0.09	0.31	0.09	0.26	0.18	0.35	-	-		MT03C	1	2
-	-	-	-	0.12	0.4	0.12	0.33	-	-	-	-		MT03C	1	2
0.09	0.58	0.12	0.44	-	-	0.18	0.46	0.25	0.46	-	-		MT03D	1	2
-	-	0.18	0.61	0.18	0.56	0.25	0.6	-	-	-	-		MT03D	1	2
-	-	-	-	-	-	-	-	0.37	0.7	-	-		MT03E	2	4
0.12	0.76	0.25	0.78	0.25	0.7	0.37	0.9	0.55	0.9	-	-		MT03E	2	4
0.18	1.05	0.37	1.13	0.37	1.1	0.55	1.2	0.75	1.1	-	-		MT03F	2	4
0.25	1.4	-	-	-	-	-	-	-	-	-	-		MT03G	2	4
-	-	0.55	1.6	0.55	1.5	0.75	1.5	1.1	1.5	-	-		MT03H	4	6
0.37	2	0.75	2	0.75	2	1.1	2	1.5	2	-	-		MT03I	4	6
-	-	1.1	2.6	1.1	2.5	1.5	2.6	-	-	-	-		MT03J	4	6
0.56	2.75	-	-	-	-	-	-	2.2	2.9	-	-		MT03J	4	6
0.75	3.5	1.5	3.5	1.5	3.4	2.2	3.8	3	3.5	-	-	MT03K	6	10	
1.1	5	2.2	5	2.2	4.5	3	5	-	-	-	-	MT03L	10	16	
1.5	7	-	-	-	-	-	-	-	-	-	-	MT03M	10	16	
-	-	-	-	-	-	-	-	3.7	4.6	-	-	MC1	MT03L	10	16
-	-	-	-	-	-	-	-	4	5	-	-		MT03L	10	16
-	-	3	7	3	6.5	3.7	6	-	-	-	-		MT03M	10	16
-	-	-	-	3.7	7.3	4	6.5	-	-	-	-		MT03M	10	16
-	-	3.7	8	4	8	-	-	-	-	-	-		MT03N	12	20
2.2	9	4	9	-	-	-	-	-	-	-	-	MT03N	12	20	
-	-	-	-	-	-	-	-	5.5	6.7	-	-	MC2	MT03M	12	20
-	-	-	-	-	-	5.5	9	-	-	-	-		MT03N	16	20
3	12	5.5	12	5.5	11	-	-	-	-	-	-		MT03P	16	20
-	-	0.06	0.23	0.06	0.21	0.06	0.17	0.09	0.2	-	-	CL00	RT1B	2	4
-	-	-	-	-	-	0.09	0.26	0.12	0.25	-	-		RT1C	2	4
0.06	0.39	0.09	0.34	0.09	0.31	0.12	0.33	0.18	0.35	-	-		RT1C	2	4
0.09	0.58	0.12	0.44	0.12	0.4	0.18	0.46	0.25	0.46	-	-		RT1D	2	4
-	-	0.18	0.61	0.18	0.56	0.25	0.6	-	-	-	-		RT1D	2	4
-	-	-	-	-	-	-	-	0.37	0.7	-	-		RT1F	2	4
0.12	0.76	0.25	0.78	0.25	0.7	0.37	0.9	0.55	0.9	-	-		RT1F	2	4
0.18	1.05	0.37	1.13	0.37	1.1	0.55	1.2	0.75	1.1	-	-		RT1G	2	4
0.25	1.4	0.55	1.6	0.55	1.5	0.75	1.5	1.1	1.5	-	-		RT1H	2	6
0.37	2	0.75	2	0.75	2	1.1	2	1.5	2	-	-		RT1J	4	6
0.55	2.75	1.1	2.6	1.1	2.5	1.5	2.6	2.2	2.9	-	-		RT1K	4	6
0.75	3.5	1.5	3.5	1.5	3.4	2.2	3.8	-	-	-	-		RT1K	6	10
-	-	-	-	-	-	-	-	3.7	4.6	-	-		RT1L	6	16
1.1	5	2.2	5	2.2	4.5	-	-	-	-	-	-		RT1L	6	16
1.5	7	-	-	3.7	7.3	3.7	6	5.5	7	-	-		RT1M	10	20
-	-	3.7	8	-	-	-	-	-	-	-	-	RT1M	12	25	
2.2	9	4	9	4	9	5.5	9	-	-	-	-	RT1N	16	25	
-	-	-	-	-	-	-	-	7.5	9	-	-	CL01	RT1N	16	25
3	12	5.5	12	5.5	11	7.5	12	-	-	-	-		RT1P	16	35
3.7	14	-	-	7.5	14	-	-	-	-	-	-	CL02	RT1P	20	40
4	16	7.5	16	-	-	10	15.5	-	-	-	-		RT1S	20	40
-	-	-	-	-	-	-	-	11	13	-	-	CL25	RT1P	20	40
-	-	-	-	-	-	11	17	13	16	-	-		RT1S	20	40
5.5	21	-	-	11	21	13	20	-	-	-	-		RT1T	32	50
-	-	11	22.5	-	-	15	23	-	-	-	-		RT1U	32	50

Direct-on-line starters

A

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## Direct-on-line starters

Selection table (continued)

	Motor										Contactor	Thermal relay	Fuse			
	230/200V		400/380V		440/415V		500V		690/660V				1000V		aM	gG-gL
	kW	A	kW	A	kW	A	kW	A	kW	A			kW	A	A	A
	-	-	-	-	-	-	-	-	17	20	-	-	CL04	RT1T	32	50
	7.5	27	15	30	15	28	17.5	26.5	-	-	-	-		RT1V	40	63
	-	-	-	-	-	-	-	-	18.5	23	-	-	CL45	RT1U	32	50
	-	-	-	-	-	-	-	-	22	25	-	-		RT1V	40	63
	-	-	-	-	-	-	18.5	28.5	-	-	-	-	CL06	RT1V	40	63
	-	-	18.5	37	18.5	35	22	33	-	-	-	-		RT1W	50	80
	-	-	-	-	-	-	25	37.5	30	35	-	-	CL07	RT1W	50	80
	11	40	-	-	22	40	-	-	-	-	-	-		RT2E (1)	50	80
	-	-	-	-	-	-	-	-	33	38	-	-	CL08	RT2E	50	80
	-	-	22	44	25	45	-	-	-	-	-	-		RT2G	63	80
	15	50	-	-	-	-	-	-	-	-	-	-	CL09	RT2G	63	80
	-	-	-	-	-	-	-	37	41	-	-	RT2E		63	80	
	-	-	-	-	-	-	30	45	40	43	-	-	CL10	RT2G	63	80
	-	-	30	60	30	55	37	55	-	-	-	-		RT2H	80	125
	18.5	65	-	-	37	66	-	-	-	-	-	-	CL08	RT2J	80	125
	-	-	-	-	-	-	-	-	45	49	-	-		RT2G	80	125
	-	-	37	72	-	-	45	65	-	-	-	-	CL09	RT2J	100	125
	22	75	-	-	-	-	-	-	-	-	-	-		RT2J	100	125
	-	-	-	-	45	80	-	-	-	-	-	-	CL10	RT2L	100	160
	-	-	-	-	-	-	-	-	55	60	-	-		RT2H	80	125
	-	-	-	-	-	-	50	73	-	-	-	-	CL09	RT2J	100	125
	25	84	45	85	50	88	55	80	-	-	-	-		RT2L	100	160
	30	105	55	105	55	100	-	-	-	-	-	-	CL10	RT2M	125	200
	-	-	-	-	-	-	-	-	-	-	55	40	CK75	RT4J	63	80
	-	-	-	-	-	-	-	-	75	80	-	-		RT3C	125	160
	-	-	-	-	-	-	-	-	90	97	-	-	CK85	RT3D	125	160
	-	-	-	-	-	-	75	105	-	-	-	-		RT3D	160	200
	37	126	-	-	-	-	-	-	-	-	-	-	CK08	RT3E	160	200
	-	-	75	138	75	135	90	129	-	-	-	-		RT3E	200	224
	45	150	-	-	-	-	-	-	-	-	-	-	CK08	RT3F	200	224
	-	-	-	-	-	-	-	-	-	75	54	RT4 K		80	125	
	-	-	-	-	-	-	-	-	-	-	90	64	CK08	RT3B	100	160
	-	-	-	-	-	-	-	-	110	118	-	-		RT3E	160	200
	-	-	-	-	-	-	-	-	132	141	-	-	CK08	RT3F	200	250
	-	-	90	170	90	165	110	156	-	-	-	-		RT3F	200	250
	55	182	-	-	100	182	-	-	-	-	-	-	CK85	RT3F	200	250
	-	-	-	-	-	-	-	-	-	110	78	RT4L (1)		100	160	
	-	-	-	-	-	-	-	-	150	166	-	-	CK85	RT4N (1)	250	315
	-	-	-	-	110	200	132	188	-	-	-	-		RT4P (1)	250	315
	-	-	110	211	-	-	-	-	-	-	-	-	CK09	RT4P (1)	250	315
	-	-	-	-	-	-	-	-	-	132	94	RT4M (1)		125	160	
	-	-	-	-	-	-	-	-	-	150	105	CK09	RT4M (1)	160	200	
	-	-	-	-	-	-	-	-	160	170	-		-	RT4N (1)	200	250
	-	-	-	-	-	-	-	-	185	193	-	-	CK95	RT4P (1)	250	315
	-	-	-	-	-	-	-	-	-	160	113	RT4M (1)		160	200	
	-	-	-	-	-	-	-	-	-	185	130	CK95	RT4N (1)	160	200	
	-	-	-	-	-	-	-	-	-	200	141		RT4N (1)	200	250	
	-	-	-	-	-	-	-	-	-	220	155	CK10	RT5A (1)	200	250	
	-	-	-	-	-	-	-	-	-	250	175		RT5A (1)	250	315	
	-	-	-	-	-	-	-	-	220	230	-	-	CK95	RT4P (1)	315	400
	-	-	-	-	150	269	185	261	250	262	-	-		RT4R (1)	355	400
	-	-	150	283	160	285	-	-	-	-	-	-	CK95	RT4R (1)	400	425
	90	309	160	309	-	-	200	281	-	-	-	-		RT4R (1)	400	425

(1) Separate mounting; type RT2XP.

Motorstarters

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Selection table (continued)

Motor										Contactor	Thermal relay	Fuse			
230/200V		400/380V		440/415V		500V		690/660V				1000V		aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	A	A		
-	-	-	-	-	-	220	310	280	292	-	-	CK10	RT5C	400	425
-	-	-	-	185	325	-	-	300	307	-	-	CK10	RT5C	425	500
-	-	-	-	-	-	-	-	315	322	-	-	CK10	RT5C	425	500
110	356	185	355	200	350	250	348	335	344	-	-	CK10	RT5D	425	500
-	-	220	370	220	385	-	-	355	366	-	-	CK10	RT5D	500	500
-	-	-	-	-	-	280	385	375	390	-	-	CK10	RT5D	500	500
-	-	220	408	-	-	300	409	-	-	-	-	CK10	RT5D	500	500
-	-	-	-	-	-	-	-	-	-	280	197	CK11	RT5B	250	315
-	-	-	-	-	-	-	-	-	-	300	211	CK11	RT5B	315	355
-	-	-	-	-	-	-	-	-	-	315	221	CK11	RT5B	315	355
-	-	-	-	-	-	-	-	-	-	335	234	CK11	RT5B	315	355
-	-	-	-	-	-	-	-	-	-	355	245	CK11	RT5B	315	355
-	-	-	-	-	-	-	-	400	412	-	-	CK11	RT5D	500	500
132	425	-	-	250	437	315	426	-	-	-	-	CK11	RT5D	630	630
-	-	-	-	-	-	335	456	425	442	-	-	CK11	RT5D	630	630
-	-	250	475	280	480	355	485	450	462	-	-	CK11	RT5E	630	630
150	500	-	-	300	508	375	513	-	-	-	-	CK11	RT5E	630	630
160	520	280	530	315	530	400	543	-	-	-	-	CK11	RT5E	630	630
-	-	-	-	-	-	-	-	-	-	375	256	CK12	RT5B	315	355
-	-	-	-	-	-	-	-	-	-	400	273	CK12	RT5C	400	425
-	-	-	-	-	-	-	-	-	-	425	290	CK12	RT5C	400	425
-	-	-	-	-	-	-	-	-	-	450	307	CK12	RT5C	400	425
-	-	-	-	-	-	-	-	475	488	-	-	CK12	RT5E	630	630
-	-	-	-	-	-	-	-	500	514	-	-	CK12	RT5E	630	630
-	-	300	563	335	565	-	-	-	-	-	-	CK12	RT5E	630	630
185	609	315	580	355	600	-	-	-	-	-	-	CK12	RT5E	630	630
200	630	335	630	375	630	450	613	-	-	-	-	CK12	RT5E	800	800
220	710	355	650	-	-	475	647	-	-	-	-	CK12	RT5E	800	800
-	-	375	680	400	673	-	-	-	-	-	-	CK12	RT5E	800	800
-	-	-	-	-	-	-	-	-	-	475	324	CK13	RT5C	500	630
-	-	-	-	-	-	-	-	-	-	500	341	CK13	RT5C	500	630
-	-	400	720	425	714	500	680	-	-	-	-	CK13	RT6A	1000	1000
-	-	425	763	450	756	-	-	-	-	-	-	CK13	RT6A	1000	1000
250	823	450	800	-	-	-	-	-	-	-	-	CK13	RT6A	1000	1000

Direct-on-line starters

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## Star-delta starters

### For AC squirrel cage motors

In order to use this type of starting, the following conditions must be met:

The ends of the three stator windings should terminate in a terminal box (6 terminals, see diagram).

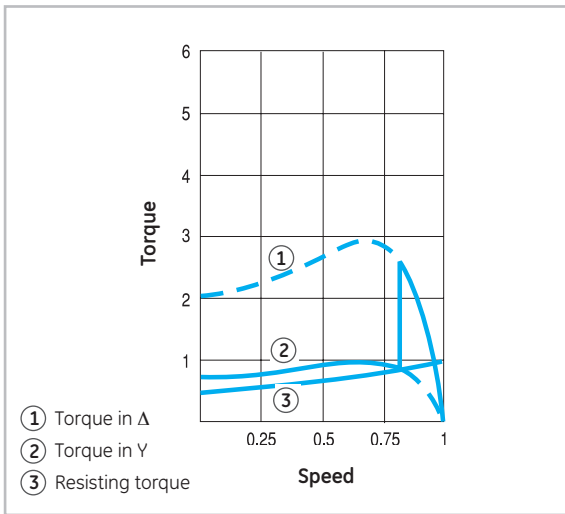
The line voltage should be the same as the motor delta connection voltage.

This starting system is suitable for machines where the resisting torque during starting is less than 1/3 of the motor torque (see torque speed curves).

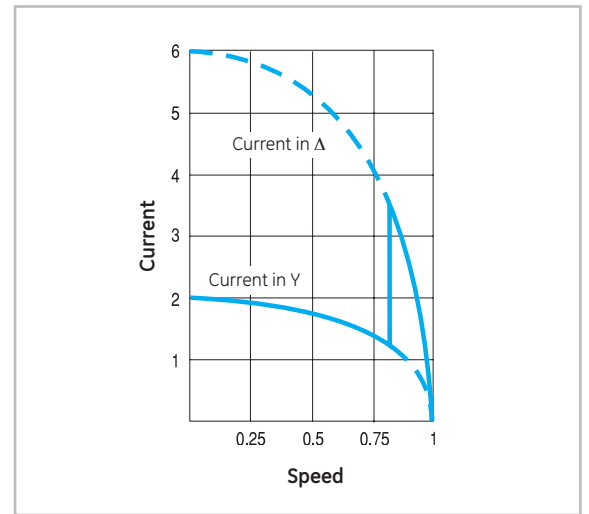
The target of this type of starting is to reduce the current during starting to 1/3, there by reducing the linedrop (see current speed curves).

Reduce the motor torque to 1/3 to smooth out mechanical stress on the machine and on the load (see torque speed curves).

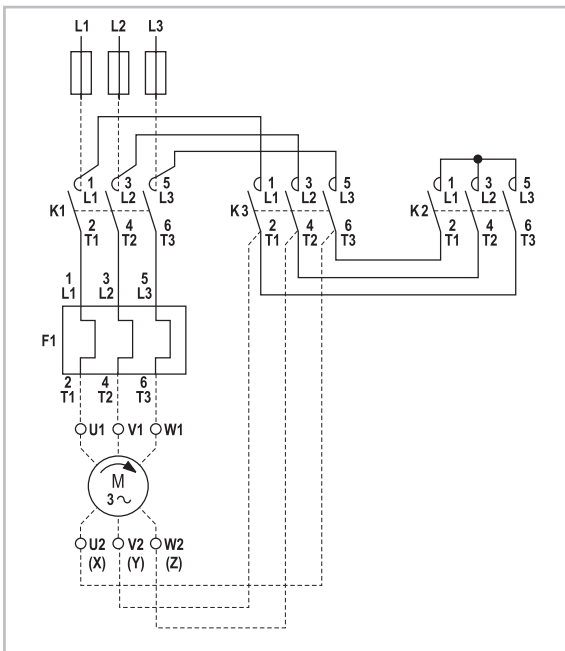
### Torque-speed curve



### Current-speed curve



### Diagram



**Selection table**

		Motor										Contactors		Thermal	Fuse	
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line and	Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	Delta			A	A
2.2	9	4	9	-	-	5.5	9	7.5	9	-	-	CL00	CL00	RT1L	16	25
3	12	5.5	12	5.5	11	7.5	12	-	-	-	-	CL00	CL00	RT1M	16	35
3.7	14	-	-	-	-	-	-	-	-	-	-	CL00	CL00	RT1N	20	40
4	16	7.5	16	7.5	14	-	-	-	-	-	-	CL01	CL00	RT1N	20	40
-	-	-	-	-	-	-	-	11	13	-	-	CL01	CL00	RT1M	20	40
-	-	-	-	-	-	11	17	-	-	-	-	CL01	CL00	RT1N	20	40
5.5	21	11	22.5	11	21	-	-	-	-	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	-	-	15	18	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	15	23	-	-	-	-	CL02	CL01	RT1P	32	50
-	-	-	-	-	-	-	-	18.5	23	-	-	CL25	CL02	RT1P	32	50
7.5	27	15	30	15	28	-	-	-	-	-	-	CL25	CL02	RT1S	40	63
-	-	-	-	-	-	18.5	28.5	22	26	-	-	CL25	CL02	RT1S	40	63
-	-	-	-	18.5	35	22	33	-	-	-	-	CL25	CL02	RT1T	50	80
11	40	18.5	37	-	-	-	-	-	-	-	-	CL25	CL25	RT1U	50	63
-	-	-	-	-	-	-	-	30	35	-	-	CL03	CL25	RT1T	50	63
-	-	22	44	22	40	30	45	-	-	-	-	CL03	CL25	RT1U	63	80
15	50	25	50	-	-	-	-	-	-	-	-	CL04	CL03	RT1V	63	80
-	-	-	-	-	-	-	-	37	41	-	-	CL45	CL03	RT1U	50	80
-	-	30	60	30	55	-	-	-	-	-	-	CL45	CL03	RT1W	63	80
18.5	65	-	-	-	-	-	-	-	-	-	-	CL45	CL03	RT1W	80	125
-	-	-	-	-	-	37	55	45	49	-	-	CL45	CL03	RT1V	63	80
22	75	-	-	-	-	-	-	-	-	-	-	CL06	CL04	RT2G	100	160
-	-	33	65	37	66	-	-	-	-	-	-	CL06	CL04	RT1W	80	100
-	-	-	-	-	-	45	65	55	60	-	-	CL06	CL04	RT2E	100	160
-	-	37	72	-	-	-	-	-	-	-	-	CL06	CL04	RT2E	100	160
-	-	45	85	45	80	55	80	-	-	-	-	CL06	CL04	RT2G	100	160
-	-	-	-	-	-	-	-	75	80	-	-	CL07	CL06	RT2G	100	160
30	105	55	105	55	100	-	-	-	-	-	-	CL07	CL06	RT2H	125	160
-	-	-	-	-	-	75	105	-	-	-	-	CL08	CL06	RT2H	125	160
37	126	-	-	-	-	-	-	-	-	-	-	CL08	CL06	RT2J	160	200
-	-	-	-	75	135	-	-	-	-	-	-	CL08	CL06	RT2J	160	200
-	-	-	-	-	-	-	-	90	97	-	-	CL09	CL06	RT2H	125	160
40	138	-	-	-	-	-	-	-	-	-	-	CL09	CL07	RT2L	160	250
-	-	-	-	-	-	90	129	-	-	-	-	CL09	CL07	RT2J	160	250
-	-	75	138	-	-	-	-	-	-	-	-	CL09	CL07	RT2L	160	250
-	-	-	-	-	-	-	-	110	118	-	-	CL10	CL07	RT2J	160	250
45	150	-	-	-	-	-	-	-	-	-	-	CL10	CL07	RT2L	160	250
-	-	-	-	-	-	110	156	-	-	-	-	CL10	CL08	RT2L	200	250
-	-	90	170	90	165	-	-	-	-	-	-	CL10	CL08	RT2M	200	250
-	-	-	-	-	-	-	-	132	141	-	-	CK75C	CL08	RT3C	160	200
55	182	-	-	-	-	132	188	-	-	-	-	CK75C	CL08	RT3D	200	250
-	-	-	-	110	200	-	-	-	-	-	-	CK75C	CL08	RT3D	250	315
-	-	-	-	-	-	-	-	150	166	-	-	CK75C	CL09	RT3D	200	250
-	-	-	-	-	-	-	-	160	170	-	-	CK75C	CL10	RT3D	200	250
-	-	110	211	-	-	150	218	-	-	-	-	CK75C	CL10	RT3E	250	315
-	-	-	-	132	240	160	228	-	-	-	-	CK75C	CL10	RT3E	250	315
75	239	-	-	-	-	-	-	-	-	-	-	CK75C	CL10	RT3E	250	315
-	-	-	-	-	-	-	-	-	-	90	64	CK75C	CK75C	RT4LJ	80	125
-	-	-	-	-	-	-	-	-	-	110	78	CK75C	CK75C	RT4LJ	108	160
-	-	132	245	-	-	-	-	-	-	-	-	CK75C	CL10	RT3F	315	355
-	-	-	-	-	-	-	-	185	193	-	-	CK75C	CK75C	RT3E	250	315
-	-	150	288	150	269	185	261	-	-	-	-	CK08C	CK75C	RT3F	315	355
-	-	-	-	160	285	-	-	-	-	-	-	CK08C	CK75C	RT3F	315	355
-	-	-	-	-	-	-	-	200	207	-	-	CK08C	CK75C	RT3E	250	315
-	-	-	-	-	-	-	-	220	230	-	-	CK08C	CK75C	RT3E	250	315
90	309	-	-	-	-	-	-	-	-	-	-	CK08C	CK75C	RT3F	315	355

For electrical endurance see page C.34-44, but first divide the rated power and current values shown in the table by 1.73. The thermal overload relay should be set at 0.58 In of the motor.

Star-delta starters

A

B

C

D

E

F

G

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X



Star-delta starters

Selection table (continued)

		Motor										Contactors		Thermal relay	Fuse			
		230/200V		400/380V		440/415V		500V		690/660V		1000V			Line and Delta	Star	aM	gG-gL
		kW	A	kW	A	kW	A	kW	A	kW	A	kW	A					
		-	-	-	-	-	-	-	-	-	132	94	CK08C	CK75C	RT4LK	125	160	
		-	-	-	-	-	-	-	-	-	150	105	CK08C	CK75C	RT3B	125	160	
		-	-	-	-	-	-	-	-	-	160	113	CK08C	CK75C	RT3B	125	160	
		-	-	-	-	-	-	-	-	-	185	130	CK85B	CK75C	RT4LL	160	200	
		-	-	160	309	-	-	200	281	250	262	-	-	CK85B	CK75C	RT4N	355	400
		-	-	-	-	-	-	220	310	-	-	-	-	CK85B	CK75C	RT4N	355	400
		-	-	-	-	185	325	-	-	-	-	-	-	CK85B	CK75C	RT4P	400	425
		110	356	185	355	200	350	-	-	-	-	-	-	CK85B	CK75C	RT4P	400	425
		-	-	-	-	-	-	-	-	280	262	-	-	CK09B	CK75C	RT4N	315	355
		132	425	200	370	220	385	250	348	-	-	-	-	CK09B	CK75C	RT4P	500	500
		-	-	220	408	-	-	280	385	-	-	-	-	CK09B	CK08C	RT4P	500	500
		-	-	-	-	-	-	-	-	-	-	200	141	CK09B	CK08C	RT4LL	200	250
		-	-	-	-	-	-	-	-	-	-	220	155	CK09B	CK08C	RT4LM	200	250
		-	-	-	-	-	-	-	-	-	-	250	175	CK09B	CK08C	RT4LM	200	250
		-	-	-	-	-	-	-	-	300	307	-	-	CK09B	CK08C	RT4N	355	400
		-	-	-	-	-	-	-	-	315	322	-	-	CK09B	CK08C	RT4N	355	400
		-	-	-	-	-	-	-	-	335	349	-	-	CK09B	CK08C	RT4P	500	500
		-	-	-	-	-	-	-	-	-	-	280	197	CK95B	CK09B	RT4LM	250	315
		-	-	-	-	250	437	-	-	-	-	-	-	CK95B	CK08C	RT4P	500	500
		-	-	-	-	-	-	-	-	355	366	-	-	CK95B	CK85B	RT4P	425	500
		-	-	-	-	-	-	300	409	375	390	-	-	CK95B	CK85B	RT4P	500	500
		-	-	-	-	-	-	315	426	-	-	-	-	CK95B	CK85B	RT4P	500	500
A		150	500	250	475	280	480	-	-	-	-	-	-	CK95B	CK85B	RT4R	630	630
		-	-	-	-	-	-	-	-	-	-	300	211	CK95B	CK85B	RT4LM	250	315
B		-	-	-	-	-	-	-	-	-	-	315	221	CK95B	CK85B	RT4LM	250	315
		-	-	-	-	-	-	-	-	400	412	-	-	CK95B	CK85B	RT4R	500	500
		-	-	-	-	-	-	-	-	425	442	-	-	CK95B	CK85B	RT4R	500	500
		-	-	-	-	300	508	335	456	450	462	-	-	CK10C	CK85B	RT5C	630	630
C		160	520	-	-	-	-	355	485	-	-	-	-	CK10C	CK85B	RT4C	630	630
		-	-	-	-	-	-	375	513	-	-	-	-	CK10C	CK85B	RT5C	630	630
		-	-	280	530	315	530	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
		-	-	300	563	355	561	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
		-	-	315	580	-	-	-	-	-	-	-	-	CK10C	CK85B	RT5C	630	630
D		185	609	-	-	355	600	-	-	-	-	-	-	CK10C	CK85B	RT5C	800	800
		-	-	-	-	-	-	-	-	-	-	335	234	CK10C	CK09B	RT5A	315	355
		-	-	-	-	-	-	-	-	-	-	355	245	CK10C	CK09B	RT5A	315	355
		-	-	-	-	-	-	-	-	-	-	375	256	CK10C	CK09B	RT5A	315	355
E		-	-	-	-	-	-	-	-	-	-	400	273	CK10C	CK09B	RT5A	355	400
		-	-	-	-	-	-	-	-	-	-	425	290	CK10C	CK09B	RT5A	355	400
		-	-	-	-	-	-	-	-	-	-	450	307	CK10C	CK09B	RT5A	355	400
		-	-	-	-	-	-	-	-	475	488	-	-	CK10C	CK09B	RT5C	630	630
F		-	-	-	-	-	-	-	-	500	514	-	-	CK10C	CK09B	RT5C	630	630
		-	-	-	-	-	-	400	543	530	545	-	-	CK10C	CK09B	RT5C	630	630
		-	-	-	-	375	587	425	580	560	575	-	-	CK10C	CK09B	RT5C	630	630
G		200	630	335	630	375	630	450	613	-	-	-	-	CK10C	CK09B	RT5D	800	800
		-	-	355	650	-	-	-	-	-	-	-	-	CK10C	CK09B	RT5D	800	800
		-	-	-	-	-	-	-	-	600	616	-	-	CK10C	CK95B	RT5D	800	800
		-	-	-	-	400	622	475	647	630	646	-	-	CK10C	CK95B	RT5D	800	800
		-	-	-	-	-	-	-	-	-	-	475	324	CK10C	CK95B	RT5B	355	400
H		-	-	-	-	-	-	-	-	-	-	500	341	CK10C	CK95B	RT5B	400	425
		-	-	-	-	-	-	-	-	-	-	600	407	CK10C	CK95B	RT5B	500	500
		-	-	-	-	400	673	425	659	-	-	-	-	CK10C	CK10C	RT5D	800	800
		-	-	375	680	-	-	500	680	670	688	-	-	CK11C	CK10C	RT5D	800	800
I		220	710	400	720	425	714	530	725	710	729	-	-	CK11C	CK10C	RT5D	800	800
		-	-	-	-	450	756	560	762	750	770	-	-	CK11C	CK10C	RT5E	1000	1000
		-	-	425	763	475	798	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
		-	-	-	-	-	-	600	817	-	-	-	-	CK11C	CK10C	RT5E	1000	1000

For electrical endurance see page C.34-44, but first divide the rated power and current values shown in the table by 1.73. The thermal overload relay should be set at 0.58 In of the motor.

Motorstarters

A

B

C

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**Selection table (continued)**

Motor										Contactors		Thermal	Fuse			
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line and Delta	Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A	A
250	823	-	-	-	-	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	-	-	-	-	-	-	-	-	630	428	CK11C	CK10C	RT5B	500	630
-	-	-	-	-	-	-	-	-	-	670	455	CK11C	CK10C	RT5C	500	630
-	-	450	800	-	-	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	475	846	500	840	-	-	-	-	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	-	-	-	-	-	-	800	821	-	-	CK11C	CK10C	RT5E	1000	1000
-	-	500	892	530	890	630	857	850	873	-	-	CK11C	CK10C	RT5E	1000	1000
280	910	530	943	560	941	670	912	-	-	-	-	CK11C	CK10C	RT5E	2x630	2x630
300	975	-	-	-	-	710	965	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
315	1023	560	996	600	1010	750	1020	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
335	1083	-	-	630	1058	-	-	-	-	-	-	CK12C	CK10C	RT5E	2x630	2x630
-	-	-	-	-	-	-	-	-	-	750	510	CK12C	CK11C	RT5C	630	630
-	-	-	-	-	-	-	-	900	924	-	-	CK13B	CK11C	RT6A	2x630	2x630
-	-	-	-	-	-	800	1088	950	975	-	-	CK13B	CK11C	RT6A	2x630	2x630
-	-	600	1074	-	-	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
355	1142	-	-	710	1097	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
-	-	-	-	-	-	-	-	-	-	800	543	CK13B	CK11C	RT5C	630	800
-	-	630	1128	670	1125	-	-	-	-	-	-	CK12B	CK11C	RT5E	2x630	2x630
375	1206	670	1200	710	1190	850	1156	-	-	-	-	CK13B	CK11C	RT6A	2x800	2x800
400	1286	710	1270	750	1255	-	-	-	-	-	-	CK13B	CK11C	RT6A	2x800	2x800
425	1364	-	-	-	-	-	-	-	-	-	-	CK13B	CK12C	RT6A	2x800	2x800
-	-	750	1342	-	-	-	-	-	-	-	-	CK13B	CK12C	RT6A	2x800	2x800

For electrical endurance see page C.34-44, but first divide the rated power and current values shown in the table by 1.73. The thermal overload relay should be set at 0.58 In of the motor.

Star-delta starters

A

B

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E

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## Autotransformer starters

### For AC squirrel cage motors

This type of starting is used for machines where the resisting torque during starting is less than the motor torque (see torque speed curves):

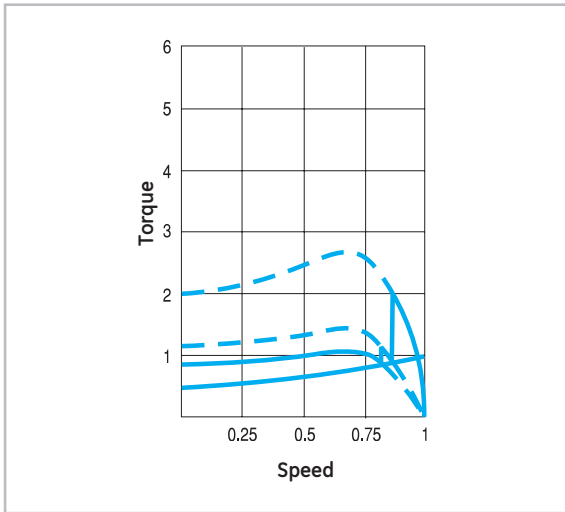
- Reduce current during starting to the required value (this will depend on the autotransformer voltage ratio selected).
- Reduce motor torque to smooth out mechanical stress on the machine and on the load (see torque speed curves). Reduction of the motor will depend on the autotransformer voltage ratio.

The two requirements for star-delta starting do not apply here. That is to say both end of the three windings do not have to be accessible and the line voltage does not have to be the same as the delta connection voltage.

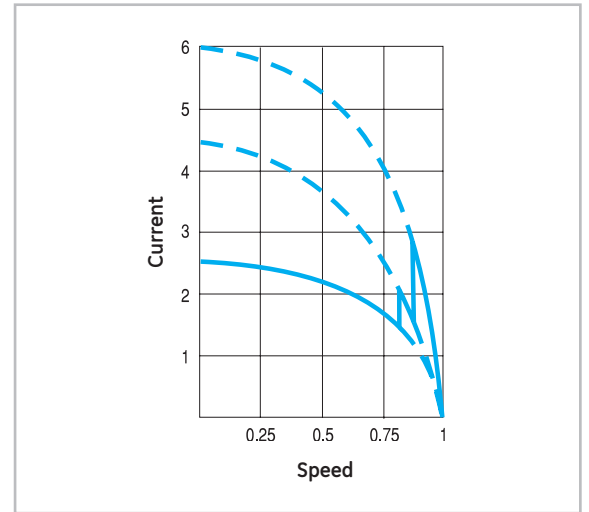
This system also has the following advantages over star-delta starting:

- required current and starting torque can be selected.
- starting can be effected at various points.
- motor voltage continuity during network switching.

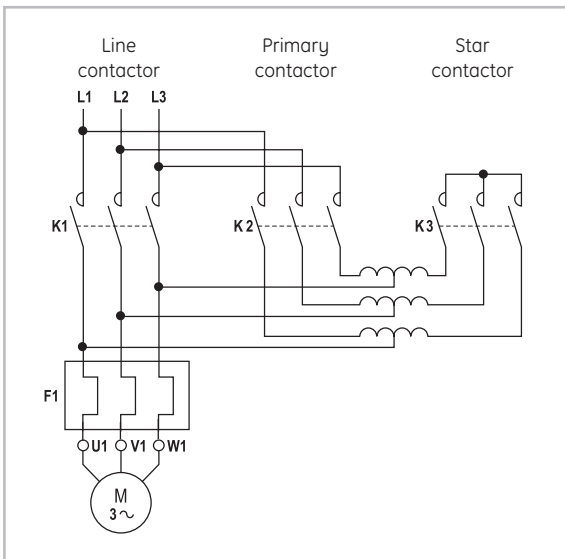
### Torque-speed curve



### Current-speed curve



### Diagram



**Selection table**

Motor												Contactors		Thermal	Fuse	
230/200V		400/380V		440/415V		500V		690/660V		1000V		Line	Pr. trafo + Star	relay	aM	gG-gL
kW	A	kW	A	kW	A	kW	A	kW	A	kW	A				A	A
2.2	9	4	9	4	8	5.5	9	-	-	-	-	CL00	CL00	RT1N	16	25
-	-	-	-	-	-	-	-	7.5	9	-	-	CL01	CL00	RT1N	16	25
3	12	5.5	12	5.5	11	7.5	12	-	-	-	-	CL01	CL00	RT1P	16	35
3.7	14	-	-	7.5	14	-	-	-	-	-	-	CL02	CL00	RT1P	20	40
-	-	7.5	16	-	-	10	15.5	-	-	-	-	CL02	CL00	RT1S	20	40
-	-	-	-	-	-	-	-	11	13	-	-	CL25	CL01	RT1P	20	40
-	-	-	-	-	-	11	17	-	-	-	-	CL25	CL01	RT1S	20	40
5.5	21	11	22.5	11	21	13	20	-	-	-	-	CL25	CL01	RT1T	32	50
-	-	-	-	-	-	-	-	15	18	-	-	CL03	CL01	RT1T	32	50
-	-	-	-	-	-	15	23	-	-	-	-	CL04	CL01	RT1U	32	50
7.5	27	15	30	15	28	-	-	-	-	-	-	CL04	CL02	RT1V	40	63
-	-	-	-	-	-	-	-	18.5	23	-	-	CL45	CL02	RT1U	32	50
-	-	-	-	-	-	18.5	22.5	22	25	-	-	CL45	CL02	RT1U	40	63
-	-	-	-	18.5	35	22	33	-	-	-	-	CL45	CL02	RT1W	50	80
11	40	18.5	37	22	40	-	-	-	-	-	-	CL06	CL03	RT2E	50	80
-	-	-	-	-	-	-	-	30	35	-	-	CL06	CL03	RT2E	50	80
-	-	22	44	-	-	-	-	-	-	-	-	CL06	CL03	RT2G	63	80
15	50	-	-	-	-	-	-	-	-	-	-	CL06	CL03	RT2G	63	80
-	-	-	-	-	-	30	45	-	-	-	-	CL07	CL03	RT2G	63	80
-	-	-	-	-	-	-	-	37	41	-	-	CL07	CL04	RT2E	63	80
-	-	30	60	30	55	37	55	-	-	-	-	CL07	CL04	RT2H	80	125
18.5	65	-	-	37	66	-	-	-	-	-	-	CL07	CL04	RT2J	80	125
-	-	-	-	-	-	-	-	45	49	-	-	CL08	CL04	RT2G	80	125
-	-	-	-	-	-	-	-	55	60	-	-	CL08	CL04	RT2H	80	125
-	-	-	-	-	-	45	65	-	-	-	-	CL08	CL06	RT2J	80	125
22	75	37	72	-	-	-	-	-	-	-	-	CL08	CL06	RT2J	80	125
-	-	-	-	45	80	55	80	-	-	-	-	CL08	CL06	RT2L	100	160
25	84	45	85	50	88	-	-	-	-	-	-	CL09	CL06	RT2L	100	160
-	-	-	-	-	-	-	-	75	80	-	-	CL09	CL06	RT2L	125	160
30	105	55	105	55	100	75	105	-	-	-	-	CL10	CL06	RT2M	160	200
-	-	-	-	-	-	-	-	90	97	-	-	CL10	CL07	RT2M	125	200
37	126	75	138	75	135	90	129	-	-	-	-	CK75C	CL07	RT3E	200	224
-	-	-	-	-	-	-	-	110	118	-	-	CK08C	CL08	RT3E	160	200
-	-	-	-	-	-	-	-	132	141	-	-	CK08C	CL08	RT3F	200	250
45	150	90	170	90	165	110	156	-	-	-	-	CK08C	CL08	RT3F	200	250
55	182	-	-	-	-	-	-	-	-	-	-	CK08C	CL08	RT3F	200	250
-	-	-	-	-	-	-	-	-	90	64	-	CK08C	CL08	RT3B	100	160
-	-	-	-	-	-	-	-	150	166	-	-	CK85B	CL09A	RT4N	250	315
-	-	110	211	110	200	132	188	-	-	-	-	CK85B	CL09A	RT4P	250	315
-	-	-	-	-	-	-	-	-	110	78	-	CK85B	CK75C	RT4N	100	160
-	-	-	-	-	-	-	-	160	170	-	-	CK09B	CK75C	RT4N	200	250
-	-	-	-	-	-	150	218	185	193	-	-	CK09B	CK75C	RT4P	250	315
75	239	132	245	132	240	160	228	200	207	-	-	CK09B	CK75C	RT4R	315	355
-	-	-	-	-	-	-	-	-	-	150	105	CK09B	CK75C	RT4M	160	200
-	-	-	-	-	-	-	-	-	-	160	113	CK95B	CK08C	RT4M	160	200
-	-	-	-	-	-	-	-	-	-	220	155	CK10C	CK08C	RT5A	200	250
-	-	-	-	-	-	-	-	-	-	250	175	CK10C	CK85B	RT5A	250	315
-	-	-	-	-	-	-	-	220	230	-	-	CK95B	CK08C	RT4P	315	355
90	309	160	309	-	-	220	310	-	-	-	-	CK10C	CK08C	RT5C	400	425
-	-	-	-	185	325	-	-	300	307	-	-	CK10C	CK08C	RT5C	425	500
110	356	220	408	220	385	280	285	335	344	-	-	CK10C	CK85B	RT5D	425	500
132	425	-	-	250	437	-	-	-	-	-	-	CK11C	CK85B	RT5D	630	630
-	-	-	-	-	-	-	-	-	-	280	197	CK10C	CK09B	RT5B	250	315
-	-	-	-	-	-	-	-	-	-	335	234	CK11C	CK09B	RT5B	315	355
-	-	-	-	-	-	-	-	-	-	355	245	CK11C	CK09B	RT5B	315	355
-	-	-	-	-	-	300	409	400	412	-	-	CK11C	CK09B	RT5D	500	500
-	-	-	-	-	-	315	426	-	-	-	-	CK11C	CK09B	RT5D	630	630
150	500	250	475	280	480	335	456	-	-	-	-	CK11C	CK09B	RT5E	630	630
-	-	-	-	-	-	-	-	-	-	375	256	CK12B	CK95B	RT5B	315	355
-	-	-	-	300	508	375	513	450	462	-	-	CK12B	CK95B	RT5E	630	630
160	520	315	580	335	565	-	-	-	-	-	-	CK12B	CK95B	RT5E	630	630
-	-	-	-	-	-	-	-	-	-	450	307	CK12B	CK10C	RT5C	400	425
-	-	-	-	-	-	-	-	475	488	-	-	CK12B	CK10C	RT5D	630	630
200	630	335	630	375	630	450	613	-	-	-	-	CK12B	CK10C	RT5E	800	800
-	-	-	-	-	-	-	-	-	-	500	341	CK13B	CK10C	RT5C	500	630
-	-	-	-	-	-	-	-	500	514	-	-	CK13B	CK10C	RT6A	800	800
220	710	425	762	450	756	500	800	-	-	-	-	CK13B	CK10C	RT6A	1000	1000
250	823	450	800	-	-	-	-	-	-	-	-	CK13B	CK10C	RT6A	1000	1000

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## Contactors for rotor starters

### For AC slip-ring motors

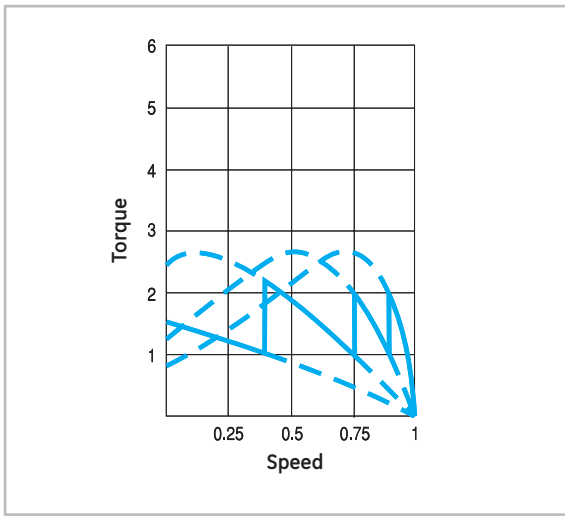
This type of starter is used in machines with resisting torque of any value where it is required to:

- Start with reduced peak currents without consequent motor torque reduction, as is the case with high resisting torques and when starting with reduced peak currents is required.
- Control speed for different load or resisting torque values, with reduced peak currents: lifting and transport gear, flow volume control, etc.

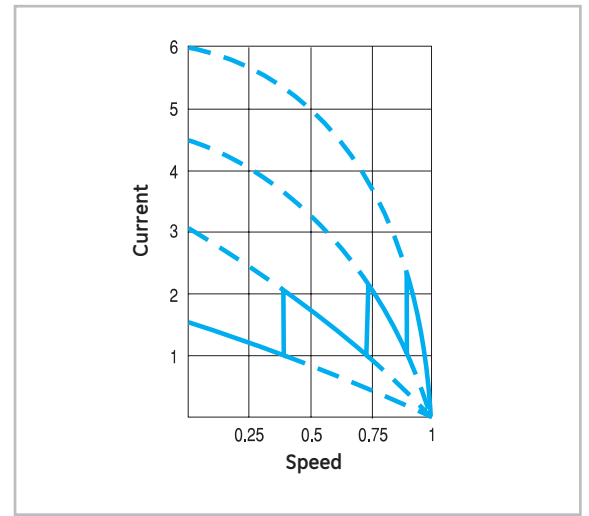
Whatever the application, a distinction should be made between the two electrical circuits which are used in this type of starters:

- Stator circuit, present in two categories and having a different breaking current in each:  
Category AC'2: switching-off motors during running,  $I_c = I_e$   
Category AC 2: switching-off motors during starting,  $I_c = 2.5 I_e$
- Rotor circuit, with similar characteristics to those in category AC1.

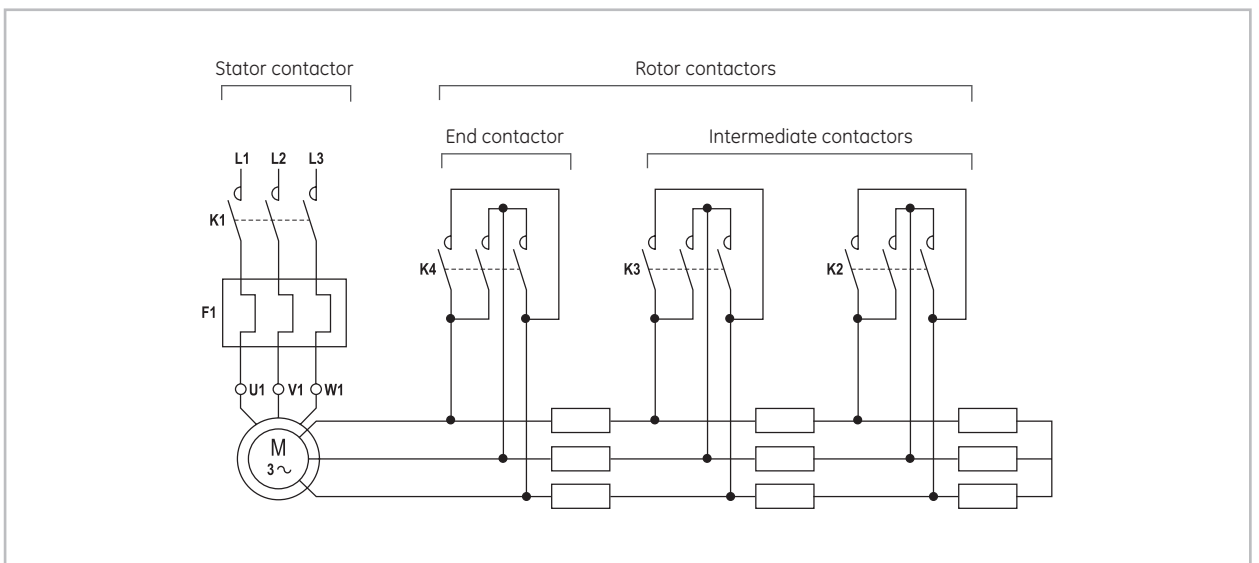
### Torque-speed curve



### Current-speed curve



### Diagram



Stator circuit

Motor power						Con-tactor	Thermal relay	Fuse	
230V 220V kW	400V 380V kW	440V 415V kW	500V kW	690V 660V kW	1000V kW			aM A	gG-gL A
-	-	11	13	-	-	CL25	RT1T	32	50
5.5	11	-	-	-	-	CL25	RT1U	32	50
-	-	-	-	15	-	CL03	RT1T	25	40
-	-	-	-	17	-	CL04	RT1T	32	50
-	-	-	15	-	-	CL04	RT1U	32	50
7.5	15	15	17	-	-	CL04	RT1V	40	63
-	-	-	-	18.5	-	CL45	RT1U	32	50
-	-	18.5	22	33	-	CL45	RT1W	50	80
11	18.5	22	-	-	-	CL06	RT2E	50	80
-	22	25	25	33	-	CL06	RT2G	63	80
15	-	-	-	-	-	CL06	RT2G	63	80
-	-	-	30	40	-	CL07	RT2G	63	80
-	30	30	37	-	-	CL07	RT2H	80	125
18.5	-	37	-	-	-	CL07	RT2J	80	125
-	-	-	-	45	-	CL08	RT2G	63	80
-	-	-	-	55	-	CL09	RT2H	80	125
-	-	-	45	-	-	CL08	RT2J	80	125
22	37	45	-	-	-	CL08	RT2J	100	160
-	-	-	55	75	-	CL10	RT2J	100	160
25	45	50	63	-	-	CL10	RT2L	125	160
-	-	-	-	90	-	CK75C	RT3D	125	160
30	55	55	75	-	-	CK75C	RT3D	160	200
37	75	75	90	-	-	CK75C	RT3E	200	250
-	-	-	-	-	90	CK08C	RT3B	100	125
-	-	-	-	110	-	CK08C	RT3E	160	200
-	-	-	-	132	-	CK08C	RT3F	200	250
45	90	90	110	-	-	CK08C	RT3F	200	250
55	-	100	-	-	-	CK08C	RT4N	250	315
-	-	110	132	-	-	CK85B	RT4P	250	315
-	-	-	-	-	150	CK09B	RT4M	125	160
-	-	-	-	160	-	CK09B	RT4N	200	250
-	-	-	-	200	-	CK09B	RT4P	250	315
75	132	132	160	-	-	CK09B	RT4P	315	355
-	-	-	-	-	185	CK95B	RT4N	160	200
-	-	-	-	-	250	CK10C	RT4N	200	250
-	-	-	-	220	-	CK10C	RT4P	315	355
90	160	160	220	300	-	CK10C	RT5C	355	400
-	-	185	-	315	-	CK10C	RT5C	400	425
110	200	220	250	335	-	CK10C	RT5C	500	630
-	-	-	-	-	280	CK10C	RT5B	250	315
-	-	-	-	-	335	CK11C	RT5B	315	355
-	-	-	-	-	355	CK11C	RT5B	315	355
-	220	-	300	400	-	CK11C	RT5D	500	600
132	-	250	315	-	-	CK11C	RT5D	630	630
150	250	250	335	-	-	CK11C	RT5E	630	630
-	-	-	-	-	375	CK12B	RT5B	355	400
-	-	-	-	-	450	CK12B	RT5C	400	425
-	-	300	375	475	-	CK12B	RT5E	630	800
220	335	375	-	-	-	CK12B	RT5E	800	800
-	-	-	-	-	500	CK13B	RT5C	400	500
-	-	-	-	500	-	CK13B	RT6A	630	800
220	425	-	450	-	-	CK13B	RT6A	1000	1000
250	450	450	500	-	-	CK13B	RT6A	1000	1000

Rotor circuit

Rotor		Contactor	
Current (1)	Max. voltage	Intermediate	End
A	V		
28	1000	CL00	CL00
37	1000	CL00	CL01
42	1000	CL00	CL01
48	1000	CL01	CL02
55	1000	CL02	CL25
60	1000	CL02	CL03
75	1000	CL25	CL04
90	1000	CL25	CL45
98	1000	CL03	CL45
112	1000	CL04	CL06
120	1000	CL45	CL06
135	1000	CL45	CL06
147	1000	CL06	CL06
165	1000	CL06	CL07
180	1000	CL06	CL07
187	1000	CL07	CL08
202	1000	CL07	CL09
240	1000	CL08	CL10
247	1000	CL08	CK75C
280	1000	CL09	CK75C
315	1000	CL09	CK08C
360	1000	CL10	CK85C
390	1500	CK75C	CK09B
472	1500	CK08C	CK95B
525	1500	CK85B	CK95B
585	1500	CK09B	CK10C
660	1500	CK95B	CK10C
825	1500	CK10C	CK11C
945	1500	CK10C	CK12B
1087	1500	CK11C	CK12B
1188	1500	CK11C	CK12B
1485	1500	CK12B	CK13B
1956	1500	CK13B	-

(1) The currents shown relate to the delta connection of the contactors poles. If the poles are star-connected, divide the values given in the column by 1.5.

Electrical endurance

- Stator circuit (see graph AC-2)
- Rotor circuit (see graph AC-1)



## Contactors for rotor speed drives

Motorstarters

A

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### Stator circuit

	Motor power (1)							Contactor
	230V 220V	400V 380V	415V	440V	500V	690V	1000V	
	kW	kW	kW	kW	kW	kW	kW	
Jogging 10% AC-2	2.4	4.5	5	5.5	5.5	6.3	-	CL00
	3.7	6.5	7.5	7.5	8	9	-	CL01
	5	8	10	10	10	11	-	CL02
	7	13	15	15	15	15	-	CL25
	9	16.5	19	19	19	19	-	CL04
	10.5	19.5	24	24	24	27	-	CL45
	13.5	23	27	27	27	30	-	CL06
	18.5	28	32	32	32	35	-	CL07
	21	34	40	40	40	45	-	CL08
	22.5	39	47	47	47	50	-	CL09
27.5	49	55	55	55	60	-	CL10	
38	65	70	70	75	75	-	CK75C	
40	75	85	85	85	95	80	CK08C	
50	85	90	90	100	100	95	CK85B	
55	96	110	110	110	120	110	CK09B	
70	110	115	115	125	125	120	CK95B	
85	147	175	175	175	195	165	CK10C	
105	181	220	220	220	233	220	CK11C	
124	215	235	235	257	270	250	CK12B	
140	250	260	260	300	280	276	CK13B	

### Jogging 20% AC-2

2.1	3.7	4.4	4.4	4.4	5	-	CL00
2.6	4.5	6.1	6.1	6.1	7	-	CL01
3.6	6.5	8.2	8.2	8.2	9	-	CL02
6.3	11	12.7	12.7	12.7	11	-	CL25
8	13.8	15.9	15.9	15.9	17	-	CL04
9.2	16	18.5	18.5	18.5	20	-	CL45
10.5	18.5	22	22	22	25	-	CL06
13	23	27	27	27	31	-	CL07
17.3	30	34.6	34.6	34.6	43	-	CL08
19.6	34	39	39	39	47	-	CL09
22	38	46	46	46	55	-	CL10
32	60	65	65	65	70	65	CK75C
36	75	75	75	75	90	75	CK08C
42	78	85	85	85	100	85	CK85B
47.8	82.5	90	96	96	115	100	CK09B
60	96	110	110	110	135	125	CK95B
77	132	140	150	150	190	160	CK10C
89	153	178	178	185	220	185	CK11C
110	190	218	218	220	258	220	CK12B
132	228	230	230	258	240	230	CK13B

### Rotor circuit

Contactor	Rotor current (2)	Rotor voltage without counter-current	Rotor voltage with counter-current
CL00	22	690	500
CL01	30	690	500
CL02	39	690	500
CL25	60	690	500
CL04	72	690	500
CL45	87	750	600
CL06	105	750	600
CL07	127	750	600
CL08	147	750	600
CL09	177	750	600
CL10	195	750	600
CK75C	220	1000	750
CK08C	240	1000	750
CK85B	280	1000	750
CK09B	315	1000	750
CK95B	360	1000	750
CK10C	405	1000	750
CK11C	525	1000	750
CK12B	780	1000	750
CK13B	885	1000	750
CL00	18	690	500
CL01	25	690	500
CL02	37	690	500
CL25	48	690	500
CL04	60	690	500
CL45	72	750	600
CL06	85	750	600
CL07	106	750	600
CL08	123	750	600
CL09	147	750	600
CL10	165	750	600
CK75C	190	1000	750
CK08C	210	1000	750
CK85B	240	1000	750
CK09B	273	1000	750
CK95B	305	1000	750
CK10C	348	1000	750
CK11C	453	1000	750
CK12B	570	1000	750
CK13B	750	1000	750

Electrical endurance 10<sup>6</sup> x 1.3 operations

continued on D.61

- (1) Power values shown are not standard as they refer to intermittent service.  
 (2) The current shown relates to the delta connection of the contactor poles.  
 If the poles are star-connected, divide the values given in the column by 1.5.



Jogging  
35% AC-2

**Stator circuit (continued)**

Motor power (1)							Contactor
230V 220V kW	400V 380V kW	415V kW	440V kW	500V kW	690V kW	1000V kW	
1.4	2.8	3.4	3.4	3.4	4	-	CL00
2.2	3.8	4.5	4.5	4.5	5.5	-	CL01
3	5.5	7.5	7.5	7.5	7.5	-	CL02
4.9	9	10	10	10	11	-	CL25
6.7	12.8	14.8	14.8	14.8	13	-	CL04
7	13	15	15	15	17	-	CL45
9	15	18	18	18	20	-	CL06
10.5	18.5	22	22	22	25	-	CL07
13.5	24	28	28	28	33	-	CL08
18.5	29	33	33	33	40	-	CL09
19.6	34	39	39	39	45	-	CL10
25	45	47	47	47	55	60	CK75C
30	55	63	63	63	77	63	CK08C
35	78	80	80	80	90	75	CK85B
40	75	85	85	85	100	80	CK09B
46	83	100	100	100	135	117	CK95B
63	110	132	132	132	150	132	CK10C
79	136	157	157	160	190	160	CK11C
91	157	165	176	188	220	185	CK12B
115	200	200	200	220	205	202	CK13B

Electrical endurance 10<sup>6</sup> x 1.3 operations

- (1) Power values shown are not standard as they refer to intermittent service.
- (2) The current shown relates to the delta connection of the contactor poles.  
If the poles are star-connected, divide the values given in the column by 1.5.

**Rotor circuit (continued)**

Rotor current (2)	Rotor voltage without counter-current	Rotor voltage with counter-current	Contactor
14	660	500	CL00
20	660	500	CL01
26	660	500	CL02
42	660	500	CL25
50	660	500	CL04
57	750	600	CL45
70	750	600	CL06
85	750	600	CL07
100	750	600	CL08
120	750	600	CL09
138	750	600	CL10
155	1000	750	CK75C
172	1000	750	CK08C
200	1000	750	CK85B
225	1000	750	CK09B
250	1000	750	CK95B
285	1000	750	CK10C
385	1000	750	CK11C
495	1000	750	CK12B
637	1000	750	CK13B

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## Contactors for connection of power transformers

In this application it is essential to ascertain the no-load inrush current of the transformer  $I_{\mu}$ , (magnetisation current) which in the majority of cases determines the size of the contactor.

Two cases are illustrated in the table:

- No-loop inrush current up to 20 times the rated transformer current
- No-loop inrush current up to 40 times the rated transformer current.

The contactor should not cut out the short-circuit current; if the protective devices used are fuses, this condition will be intrinsically complied with.

In the case however of devices with tripping contacts the general line circuit breaker will be driven rather than the contactor coil.

### Selection table

$\frac{I_{\mu}}{I_e} = 20$		$\frac{I_{\mu}}{I_e} = 40$		Contactor
230V 240V kVA	380V 400V kVA	230V 240V kVA	380V 400V kVA	
2	3.5	1	1.75	CL00A
2.75	5	1.37	2.5	CL01A
4	7	2	3.5	CL02A
5.75	10	2.85	5	CL25A
5.75	10	2.85	5	CL03A
7.25	12.5	3.65	6.25	CL04A
9	15.5	4.50	7.75	CL45A
10	17	5	8.5	CL05A
12	21	6	10.5	CL06A
15	25	7.5	12.5	CL07A
20	35	10	16	CL08A
25	40	12.5	20	CL09A
30	50	15	25	CL10A
35	55	17	27	CK75C
40	60	20	30	CK08C
45	75	22	35	CK85B
50	85	25	42.5	CK09B
80	150	40	75	CK10C
100	170	50	85	CK11C
127	215	64	107	CK12B
160	280	80	140	CK13B

## Contactors for capacitors (category AC6b)

The most usual application of capacitors is for centralised automatic power factor ( $\cos \varphi$ ) correction. A characteristic of capacitors is the high overcurrent which appears as they are connected.

Such overcurrents are due to:

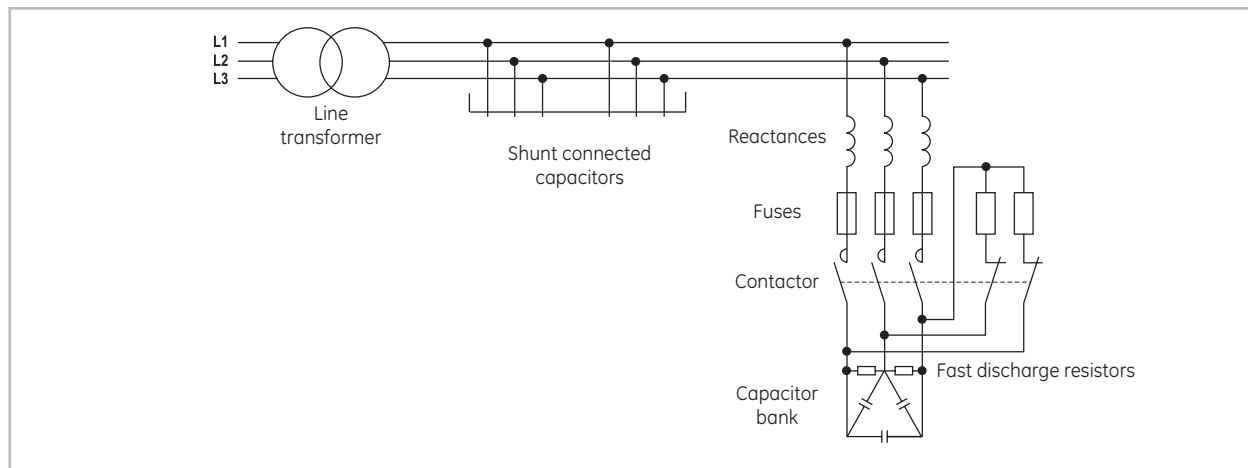
- Harmonic currents produced by saturated transformers, rectifiers, etc.
- Transient currents, the frequency and amplitude of which depend on the network inductance and the capacitor size.
- Additional transient currents arising where a capacitor is connected when others have already been connected, and caused by discharging of the latter.

GE Power Controls contactors are fitted with specially treated hardened alloy contacts which are highly resistant to welding and are therefore capable of withstanding high current peaks on connection.

The operation conditions taken as a basis for usage are:

- Near presence of other previously connected capacitors with a total power of up to eight times that of the capacitor to be connected.
- Shock coils reactances with a minimum inductance of  $4\mu\text{H}$ . These can be obtained by making 4 or 6 turns of 15cm windings on the conductor of each phase.
- Fast discharge resistor for reconnection within 60 seconds.

### Diagram



### Selection table

Contactor		$\theta \leq 55^\circ\text{C}$					$\theta \leq 70^\circ\text{C}$					Fuse gl - gG A	I max. (peak) A
Type	Ith	220V 230V 240V kvar	400V kvar	415V kvar	500V kvar	690V 660V kvar	220V 230V 240V kvar	400V kvar	415V kvar	500V kvar	690V 660V kvar		
CL00A	25	3	5	5.5	6.5	5.7	2.4	4	4.5	5.2	4.5	10	1000
CL01A	25	4.5	9.5	10.5	12.5	11	3.6	6	6.5	10	7	16	1000
CL02A	32	6.5	11	12	14.5	12.5	5.2	8.5	9	11.5	10	25	1000
CL25A	45	7.5	12.5	14	16	15	6.5	10	11	13	12	25	1000
CL03A	45	9	15	16.5	20	17.5	7.2	12	13	16	14	35	2500
CL04A	60	12.5	21	23	27.5	24	10	17	18	22	19.5	40	2500
CL45A	60	16.5	25	27	32	30	13	20	22	25	22	50	2500
CL06A	90	22	40	43	52	50	17	30	33	41	35	80	3500
CL07A	110	25	45	48	58	65	19	35	37	46	40	125	3500
CL08A	110	30	50	54	65	70	22	40	43	52	50	125	3500
CL09A	140	40	65	70	85	95	35	58	62	75	85	160	3500
CL10A	140	45	70	80	90	105	40	60	64	65	75	160	3500
CK75C	250	60	110	118	145	150	48	88	94	116	120	250	5000
CK08C	250	70	125	135	162	170	56	100	107	130	136	250	5000
CK85B	315	80	150	160	195	200	64	120	130	156	160	315	5000
CK09B	315	95	165	177	215	230	85	148	160	192	205	315	5000
CK95B	450	105	190	205	250	288	95	175	188	230	265	450	5500
CK10C	600	135	260	280	340	370	120	235	252	375	330	630	10000
CK11C	700	190	325	350	425	450	152	260	280	340	360	800	10000
CK12B	1000	250	400	430	520	600	200	320	344	416	480	1000	12000
CK13B	1250	315	525	565	685	650	252	420	452	548	520	1250	15000

Electrical endurance: 100.000 operations



## Contactors for control lighting circuits

The characteristics of the most usual lighting systems are as follows:

### Incandescent lamps

The connection current in very high -of the order of 15 times- rated current. Although this is a very short duration, it is only taken into account in order for the contactor connection current not to be exceeded. The power factor is always maintained at 1.

### Fluorescent lamps

The connection current is slightly higher than rated current. The power factor is about 0.5. To improve up to 0.9, compensating capacitors can be used. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

### High pressure mercury vapour lamps

The connection current varies, depending on type, between

1.6 and 2 times the rated current and will hold for between 3 and 5 minutes.

The power factor is of the order of 0.6 and this can be improved up to approximately unit value by means of compensating capacitors. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

### High pressure sodium vapour lamps

The connection current values varies, depending on type, between 1.3 and 1.6 times the rated current and will hold between 3 and 5 minutes.

The power factor is of the order of 0.45 and this can be improved up to apporximately unit value by means of compensating capacitors. In such cases, the connection power of the capacitor must be taken into account, the effect of which is appreciably greater on the smaller contactors.

### Selection table

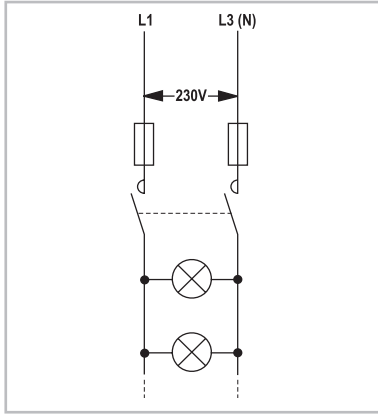
Types	W	A	µF	Maximum number of lamps per phase at 230V									
				MCR	MCO	MC1	MC2	RL	CL00	CL01	CL02	CL25	
Incandescent	60	0.27		27	37	59	59	59	62	62	70	77	
	100	0.45		16	22	35	35	35	40	40	50	60	
	200	0.91		8	11	17	17	17	20	20	25	30	
	300	1.36		5	7	11	11	11	13	13	17	20	
	500	2.27		3	4	7	7	7	8	8	10	12	
	1000	4.5		1	2	3	3	3	4	4	5	6	
2000	9.1		0	1	1	1	1	1	1	2	3		
Fluorescent Single arrangement Without compensation	15	0.23		51	61	79	79	79	88	98	126	155	
	20	0.37		32	38	49	49	49	57	61	78	110	
	40	0.44		28	33	41	41	41	48	51	66	93	
	65	0.7		18	21	26	26	26	30	32	41	58	
100	1.5		8	10	12	12	12	14	16	19	27		
Fluorescent Single arrangement With compensation	15	0.23	3.5	26	32	49	49	49	61	77	94	111	
	20	0.25	4.5	20	25	38	38	38	48	61	74	87	
	40	0.3	4.5	20	25	38	38	38	48	61	74	87	
	65	0.45	7	13	14	25	25	25	31	39	47	56	
100	0.7	18	5	6	9	9	9	11	14	17	21		
High pressure mercury vapour Without compensation	250	2.13		5	5	5	6	6	6	8	10	12	
	400	3.25		3	3	4	4	4	4	5	6	8	
	700	5.4		2	2	2	2	2	2	3	4	5	
1000	7.5		1	1	2	2	2	2	2	3	3		
High pressure mercury vapour With compensation	250	1.3	20	9	9	9	9	11	11	14	18	22	
	400	2.1	25	7	7	7	7	7	7	9	11	14	
	700	3.6	40	5	5	5	5	4	4	5	6	8	
	1000	5.3	60	3	3	3	3	3	3	3	4	5	
High pressure sodium vapour Without compensation	250	3		3	3	4	4	4	4	5	7	9	
	400	4.4		2	2	3	3	3	3	4	5	6	
	1000	10.3		1	1	1	1	1	1	2	2	2	
High pressure sodium vapour With compensation	250	1.45	40	5	5	5	5	10	10	12	16	20	
	400	2.5	45	4	4	4	4	6	6	7	9	11	
	1000	5.5	100	2	2	2	2	3	3	3	4	5	
	2500	2.17	-	3	3	4	4	4	4	5	7	9	
Metal iodide Without compensation	400	3.48	-	2	2	2	3	3	3	3	4	6	
	700	6.09	-	1	1	1	1	1	1	2	2	3	
	1000	8.7	-	1	1	1	1	1	1	1	2	2	
	2000	17.39	-	0	0	0	1	1	1	1	1	1	
	250	1.4	32	0	6	6	7	7	7	9	11	16	
	400	2.0	45	0	4	5	5	5	5	6	8	11	
Metal iodide With compensation	700	3.6	65	0	2	3	3	3	3	3	4	6	
	1000	5.3	85	0	2	2	2	2	2	2	3	4	
	2000	10.6	100	0	0	0	0	0	1	1	2	2	



## Diagrams

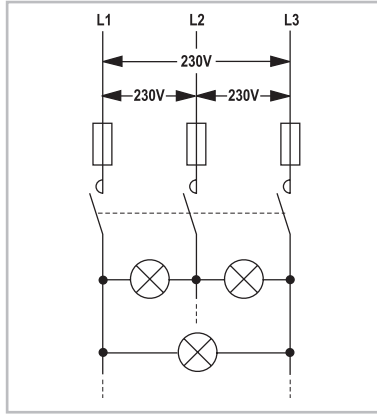
### Single-phase circuit

The total number of lamps will be as shown in the table.



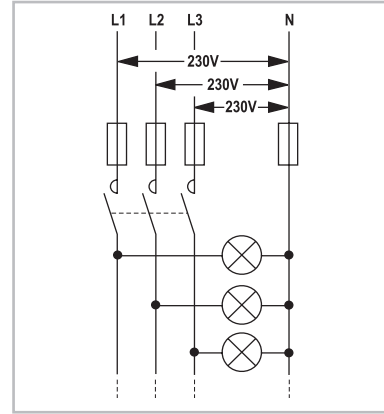
### 3-phase circuit, lamps delta-connected

The total number of lamps will be as shown in the table, multiplied by 1.73 and distributed in three equal quantities.



### 3-phase circuit, lamps star-connected

The total number of lamps will be as shown in the table, multiplied by 3 and distributed in three equal quantities.



Maximum number of lamps per phase at 230V

CL03	CL04	CL45	CL06	CL07	CL08	CL09	CL10	CK75C	CK08C	CK09	CK95	CK10	CK11	CK12	CK13
77	85	122	156	191	222	264	284	333	410	555	820	1320	1550	1860	1860
60	66	73	95	116	133	160	170	200	246	333	490	790	930	1120	1120
30	33	36	47	58	66	79	84	99	122	165	240	390	460	550	550
20	22	24	31	38	44	53	56	66	81	110	165	260	300	370	370
12	12	14	19	23	26	31	33	39	48	66	95	155	185	220	220
6	6	7	9	11	13	16	17	20	24	33	50	80	90	110	110
3	3	3	4	5	7	8	8	10	12	16	25	40	45	55	55
177	224	237	355	390	434	496	553	790	988	1245	1770	2340	2740	3910	4890
125	139	147	221	243	270	309	344	490	614	774	1090	1460	1700	2430	3040
105	118	124	186	204	227	260	289	413	516	650	920	1220	1430	2045	2550
66	74	78	116	127	142	163	181	259	324	409	570	770	900	1280	1600
30	34	36	54	59	66	76	85	121	151	190	270	360	420	600	750
119	134	149	191	232	273	312	347	496	621	786	900	1240	1450	1740	1740
92	103	115	148	180	212	243	270	385	482	610	700	960	1120	1350	1350
92	103	115	148	180	212	243	270	385	482	610	700	960	1120	1350	1350
59	66	74	95	115	136	155	173	248	310	393	440	610	720	860	860
23	23	29	37	45	53	60	67	96	120	152	170	240	280	330	330
14	15	18	27	30	33	36	42	60	75	95	136	181	211	302	377
9	10	12	18	20	22	24	28	40	49	62	89	119	138	198	247
5	6	7	11	12	13	14	17	24	30	38	54	71	83	119	149
4	4	5	8	9	9	10	12	17	21	27	39	51	60	86	107
31	27	33	49	55	60	66	77	109	156	156	171	311	311	374	467
25	17	20	31	34	37	41	48	87	125	125	137	249	249	299	374
16	10	12	18	20	22	24	28	54	78	78	86	156	156	187	234
10	7	8	12	13	15	16	19	36	52	52	57	104	104	125	156
10	11	13	19	21	24	26	30	43	54	68	96	129	150	214	268
7	7	9	13	15	16	18	20	29	37	46	66	88	102	146	183
3	3	4	6	6	7	7	9	12	16	20	28	37	44	62	78
16	25	30	44	49	54	59	69	57	81	81	90	163	163	195	244
14	14	17	26	29	31	34	40	51	72	72	80	145	145	174	217
7	6	8	12	13	14	16	18	23	33	33	36	65	65	78	98
12	12	12	19	21	23	25	29	41	52	65	93	124	145	207	259
8	8	8	12	13	14	16	18	26	32	41	58	78	91	129	162
4	4	4	7	7	8	9	10	15	18	23	33	44	52	74	92
3	3	3	5	5	6	6	7	10	13	16	23	31	36	52	65
2	2	2	2	3	3	3	4	5	6	8	12	16	18	26	32
21	21	21	32	36	39	43	50	68	97	97	107	195	195	234	292
15	15	15	23	25	28	30	35	48	69	69	76	138	138	166	208
8	8	8	13	14	15	17	19	34	48	48	53	96	96	115	144
6	6	6	8	9	10	11	13	26	37	37	40	73	73	88	110
3	3	3	4	5	5	6	7	22	31	31	34	62	62	75	93

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## Small soft starter with integral by-pass

ASTAT S is compact, easy to operate soft starter, designed for use with standard 3-phase squirrel cage motors. It provides an advanced method of reducing current during motor starting and stopping. ASTAT S will start supplying a reduced voltage to the motor, increasing up to the rated voltage, so avoiding, high currents and generating soft starting and stopping.

The motor has to be able to start in a reduced voltage.

- Solid soft starter for standard 3ph AC motors up to 30kW at 400V AC
- Voltage ratings up to 600V
- Two phase control with integral by-pass
- Compact, small case
- DIN rail mounting. Optional from 31A
- Start and soft stop features

### Marking



The cUL is achieved for all range of ASTAT S, except for 58A models, items QA02P058S, QA12P058S, QA22P058S, QA32P058S.

### Technical data

#### Ratings

Voltage ratings	3ph AC systems 220/230V (+10%, -15%) for units QA02P___S 380/415V (+10%, -15%) for units QA12P___S 480/500V (+10%, -15%) for units QA22P___S 575/600V (+10%, -15%) for units QA32P___S
Frequency range	50/60Hz (±5%)
Load	3ph, AC standard motors

#### Control specifications

Ramp up	0,5 - 10 s
Ramp down	0,5 - 10 s
Initial voltage	0 - 80% Un
Starting torque	0 - 64% Tn

#### I/O control

Inputs	one input for Start/Stop
Outputs	one output for «End of Ramp» signal for ratings 31, 44, 58A

#### Ambient conditions

Operating temperature	0 to 40°C. Up to 60°C derating by 1,2% per °C
Storage temperature	-20 to 70°C
Relative humidity	up to 80%, without condensation
Max. altitude	up to 1000m. Above this derate by 5% each 100m
Protection degree	IP20

- Order codes ● page D.67
- Diagrams ● page D.68
- Performances ● page D.69
- Dimensions ● page D.70



Small soft starter with integral by-pass



Input voltage V/CA	Current rating (2) A	Maximum current A	Maximum motor power (1)				Cat. No.	Ref. no.	Pack
			220/230V kW / Hp	380/415V kW / Hp	480/500V kW / Hp	575/600V kW / Hp			
220	8	28	1.5 / 2	-	-	-	QA02P008S	120881	1
	17	60	4 / 5.5	-	-	-	QA02P017S	120882	1
	22	77	5.5 / 7.5	-	-	-	QA02P022S	120883	1
	31	110	7.5 / 10	-	-	-	QA02P031S	120884	1
	44	150	11 / 15	-	-	-	QA02P044S	120885	1
	58	200	15 / 20	-	-	-	QA02P058S	120886	1
400	8	28	-	4 / 5.5	-	-	QA12P008S	120892	1
	17	60	-	7.5 / 10	-	-	QA12P017S	120893	1
	22	77	-	11 / 15	-	-	QA12P022S	120894	1
	31	110	-	15 / 20	-	-	QA12P031S	120895	1
	44	150	-	22 / 30	-	-	QA12P044S	120896	1
	58	200	-	30 / 40	-	-	QA12P058S	120897	1
500	8	28	-	-	5.5 / 7.5	-	QA22P008S	120898	1
	17	60	-	-	11 / 15	-	QA22P017S	120899	1
	22	77	-	-	15 / 20	-	QA22P022S	120900	1
	31	110	-	-	22 / 30	-	QA22P031S	120901	1
	44	150	-	-	30 / 40	-	QA22P044S	120902	1
	58	200	-	-	45 / 60	-	QA22P058S	120903	1
600	8	28	-	-	-	7.5 / 10	QA32P008S	120904	1
	17	60	-	-	-	15 / 20	QA32P017S	120905	1
	22	77	-	-	-	22 / 30	QA32P022S	120906	1
	31	110	-	-	-	30 / 40	QA32P031S	120907	1
	44	150	-	-	-	37 / 50	QA32P044S	120908	1
	58	200	-	-	-	55 / 75	QA32P058S	120909	1
<b>Accessory</b>	DIN rail mounting kit for types 31A, 44A and 58A						QAOPTDIN	120910	1

(1) Ratings for standard 4-poles AC motors  
 (2) See Operations/hour in table below  
 Cycles/hour includes both soft start and soft stop

Times between rampings Start/Stop

	Starting current	Ramp 1 sec.	Ramp 2 sec.	Ramp 5 sec.	Ramp 10 sec.
QA_2P008S	8	7	15	35	70
	16	16	33	77	155
	24	26	51	125	250
	28 (*)	32	62	155	-
QA_2P017S	17	7	15	35	70
	34	16	33	77	155
	51	26	51	125	250
QA_2P022S	60 (*)	32	62	155	-
	22	7	15	35	70
	44	16	33	77	155
QA_2P031S	66	26	51	125	250
	77 (*)	32	62	155	-
	31	4	8	20	40
QA_2P044S	62	8	15	38	76
	93	12	24	62	124
	110 (*)	15	31	80	-
	44	4	8	20	40
QA_2P058S	88	8	15	38	76
	132	12	24	62	124
	155 (*)	15	31	80	-
	58	4	8	20	40
QA_2P058S	116	8	15	38	76
	174	12	24	62	124
	200 (*)	15	31	80	-

(\*) Maximum starting current at all

Small soft starters

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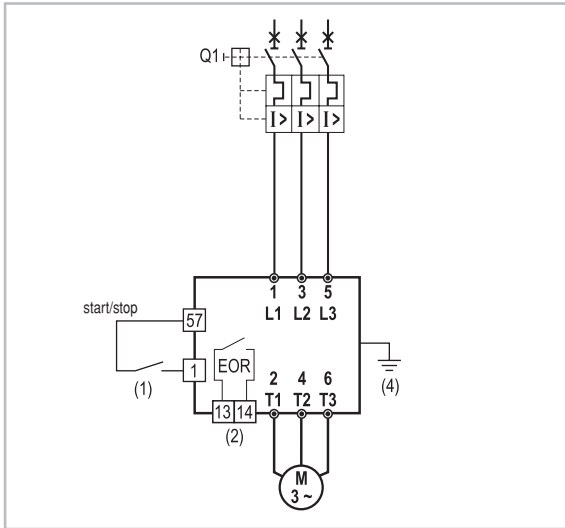
I

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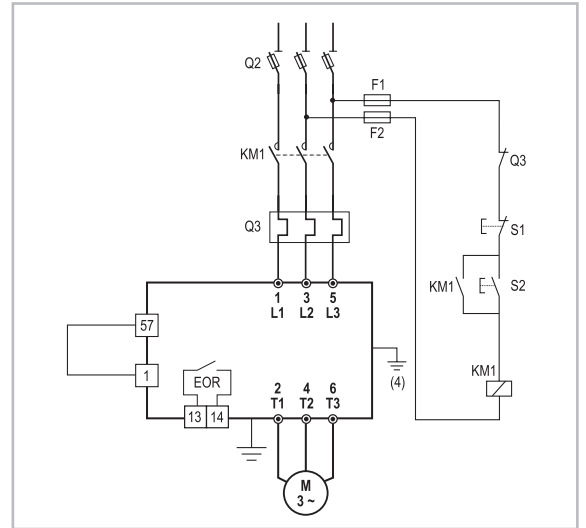


## Diagrams

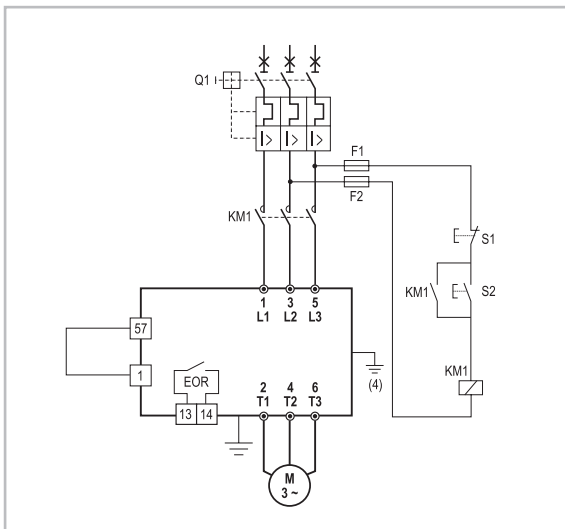
Control by permanent command (soft start and stop)



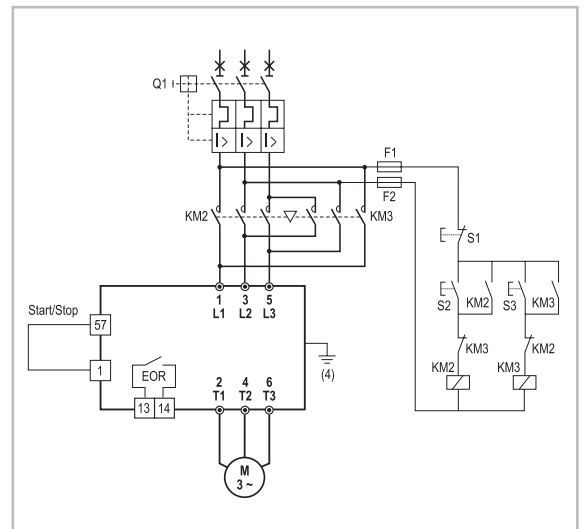
Control by push-buttons, line contactor and thermal overload relay (soft start)



Control by push-buttons and line contactor (soft start)



Forward/reverse control by push-buttons (3)



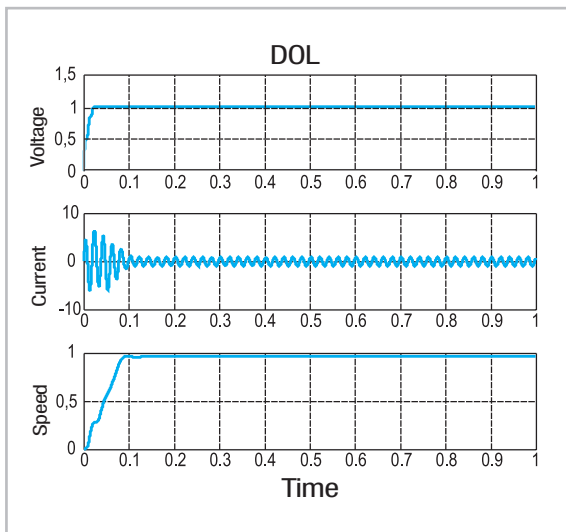
Motor power 380/415V kW	Hp	ASTAT S	Q1	Q2 Am fuses	KM1 Contactor	Q3 Thermal overload relay	F1-F2	S1-S2-S3
4	5.5	QA12P008	GPS1B*AK	10	CL25A	RT A 1N	-	P9-P3
7.5	10	QA12P017	GPS1B*AN	25	CL25A	RT A 1S	-	P9-P3
11	15	QA12P022	GPS1B*AP	32	CL25A	RT A 1T	-	P9-P3
15	20	QA12P031	GPS1B*AR	40	CL04A	RT A 1V	-	P9-P3
22	30	QA12P044	GPS2B*AT	63	CL06A	RT A 2F	-	P9-P3
30	40	QA12P058	GPS2B*AU	80	CL07A	RT A 2H	-	P9-P3

Coordination type 1

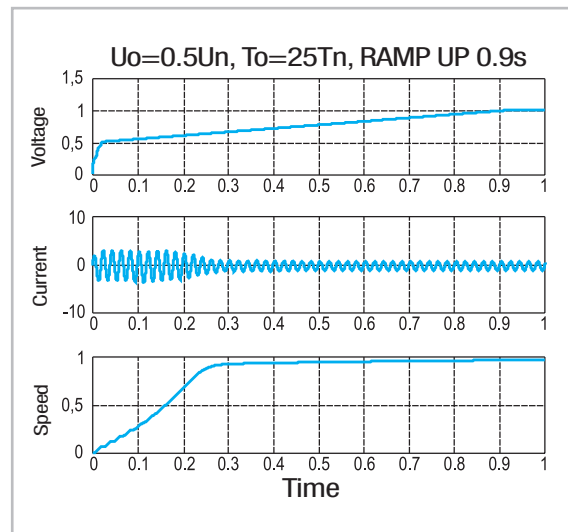
- (1) Use dry contact only.
- (2) End of Ramp output relay (only types 31A, 44A and 58A).
- (3) Forward/Reverse operation must be done when motor is not rotating.
- (4) Ground terminal only for types 31A, 44A and 58A.

Performances

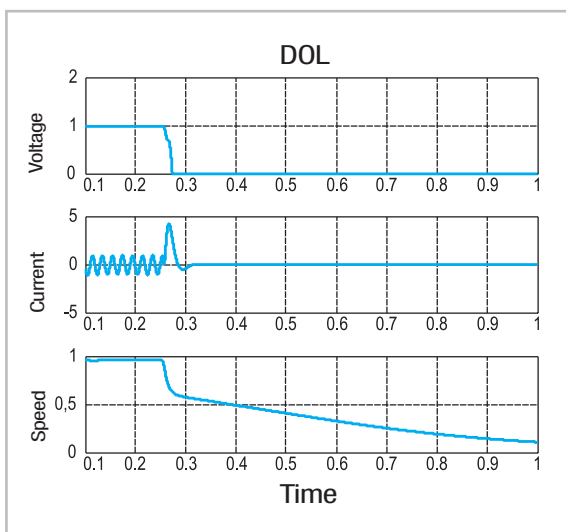
Direct-on-line start



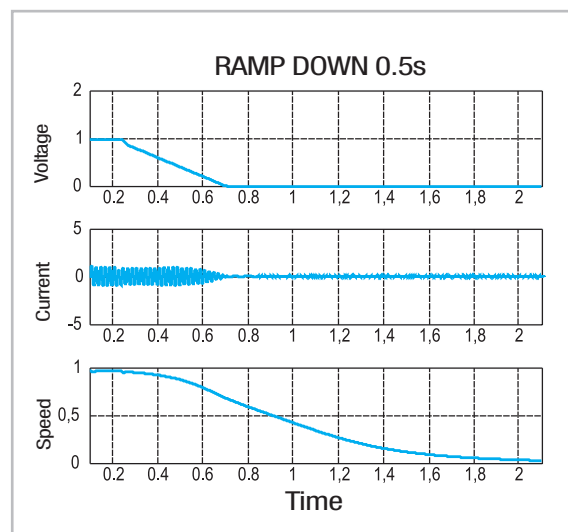
ASTAT S soft start



Direct-on-line stop

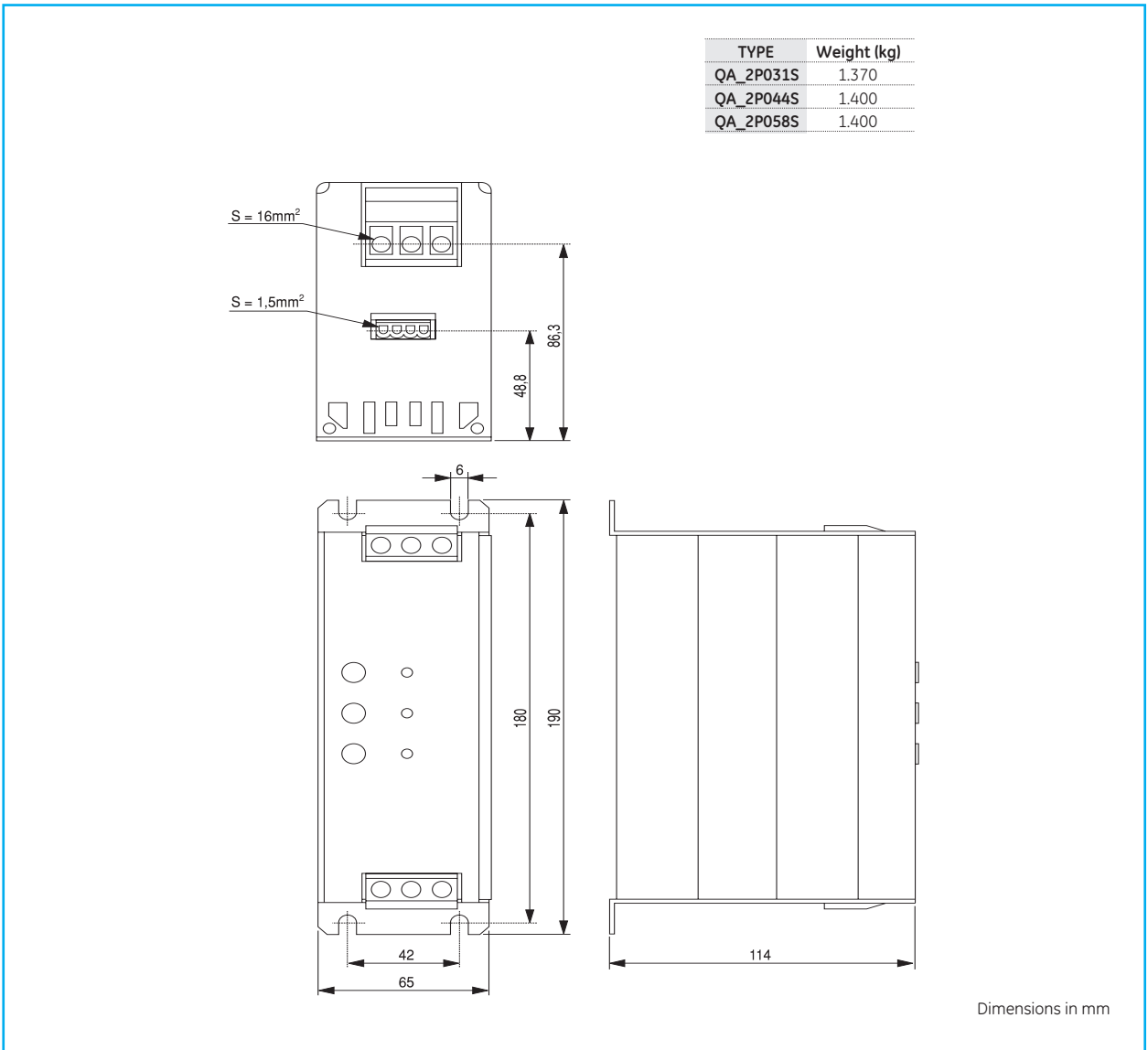
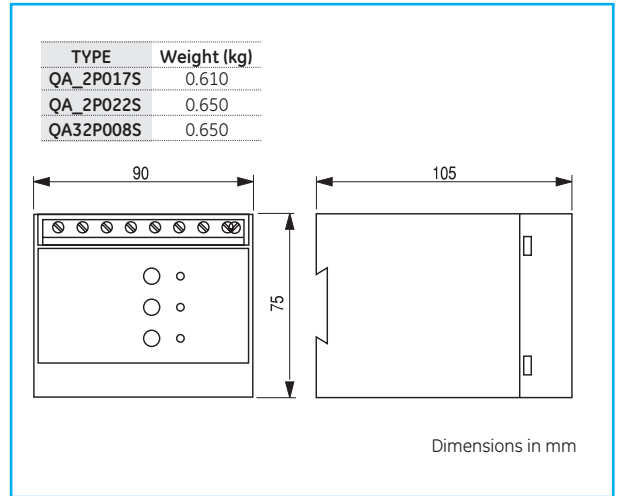
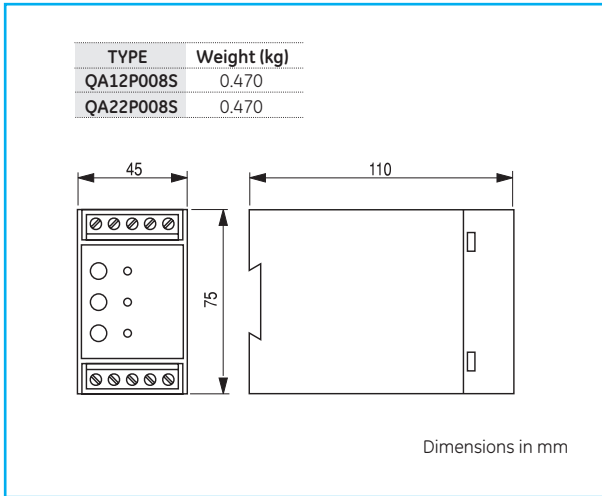


ASTAT S soft stop



## Dimensional drawings

### Small soft starter with integral by-pass





## ASTAT XT

### Digital soft starters for 3ph standard induction motors

GE's new ASTAT XT solid state soft starter features microprocessor control digital technology. Setup and adjustment is performed through a six-button keypad and parameters or messages are displayed out through a friendly LCD multilanguage interface with two rows, sixteen alphanumeric characters each. The design includes isolated I/O and high level of protection in their circuits to minimize the disturbance effects while working in the hardest industrial environment.

ASTAT XT Soft Starter offers reliable performance and smooth acceleration for a variety of standard AC motors up to 1400A and up to 690V, reducing mechanical shock to the driving system, resulting in extended component and motor life.

ASTAT XT offers many traditional features such a motor overload function, adjustable ramps, current limit, kick start, but also other high end features like Inside-Delta operation, Torque Control, Pump control and a reliable motor and unit set of protections.

### Key Features

- Ratings up to 1400Amps and up to 690VAC
- Friendly multilanguage interface with two rows, sixteen characters each
- Built-in with three extra power terminals for external bypass
- In-Line or Inside-Delta operation modes
- Torque control and pump control advanced features
- Motor protection according IEC 10, 20 and NEMA 10, 20, 30, even if ASTAT XT is in By-pass
- Built in communications RS485 port, and ModBus protocol as standard
- ProfibusDP and DeviceNet optional interfaces for communications

### Approvals / Marking



For units up to 820A. "U" type



### Control panel



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### IEC ratings. Recommended motor and type unit ratings

	Mains voltage	Light Duty	NORMAL DUTY (IEC Class 10)				HEAVY DUTY (IEC Class 20)				Cat. No.	Ref. No.		
		Max Current Rating	Rated Current	400V-230V	480V-415V	500V-415V	690V	Rated Current	400V-230V	480V-415V			500V-415V	690V
		A	A	kW	kW	kW	kW	A	kW	kW			kW	kW
230-500VAC	8	8	1.5	3	4	-	8	1.5	3	4	-	QT10008U21MS	169075	
	17	17	4	7.5	7.5	-	12	3	5.5	5.5	-	QT10017U21MS	169076	
	34	31	7.5	15	18.5	-	31	7.5	15	18.5	-	QT10031U21MS	169077	
	54	44	11	22	30	-	44	11	22	30	-	QT10044U21MS	169078	
	65	58	15	30	37	-	55	15	30	37	-	QT10058U21MS	169079	
	72	72	22	37	45	-	66	18.5	37	45	-	QT10072U21MS	169080	
	104	85	22	45	55	-	80	22	45	55	-	QT10085U21MS	169081	
	130	105	30	55	55	-	99	30	55	55	-	QT10105U21MS	169082	
	156	145	45	75	90	-	130	37	55	90	-	QT10145U21MS	169083	
	170	170	55	90	110	-	134	37	75	90	-	QT10170U21MS	169084	
	248	210	55	110	132	-	203	55	110	132	-	QT10210N21MS	169091	
	361	310	90	160	200	-	310	75	160	200	-	QT10310N21MS	169092	
	390	390	110	200	250	-	344	110	160	250	-	QT10390N21MS	169093	
	480	460	132	250	315	-	432	132	250	315	-	QT10460N21MS	169094	
	480	460	132	250	315	-	432	132	250	315	-	QT10460U21MS	169088	
	610	580	160	315	400	-	488	160	250	355	-	QT10580N21MS	169095	
	610	580	160	315	400	-	552	160	315	400	-	QT10580U21MS	169089	
	820	650	200	355	400	-	552	160	315	400	-	QT10650N21MS	169096	
820	820	250	400	560	-	690	200	400	500	-	QT10820U21MS	169090		
1180	950	315	560	630	-	950	315	560	630	-	QT10950N21MS	169097		
1375	1100	355	630	800	-	1076	355	630	800	-	QT11100N21MS	169098		
1750	1400	400	800	1000	-	1400	400	800	1000	-	QT11400N21MS	169099		
690VAC	8	8	-	-	-	5.5	8	-	-	-	5.5	QT30008N21MS	169119	
	17	17	-	-	-	15	12	-	-	-	7.5	QT30017N21MS	169120	
	34	31	-	-	-	22	31	-	-	-	22	QT30031N21MS	169121	
	54	44	-	-	-	37	44	-	-	-	37	QT30044N21MS	169122	
	65	58	-	-	-	55	55	-	-	-	45	QT30058N21MS	169123	
	72	72	-	-	-	55	66	-	-	-	55	QT30072N21MS	169124	
	104	85	-	-	-	75	80	-	-	-	75	QT30085N21MS	169125	
	130	105	-	-	-	90	99	-	-	-	90	QT30105N21MS	169126	
	156	145	-	-	-	132	130	-	-	-	90	QT30145N21MS	169127	
	170	170	-	-	-	160	134	-	-	-	132	QT30170N21MS	169128	
	248	210	-	-	-	200	203	-	-	-	200	QT30210N21MS	169129	
	361	310	-	-	-	250	310	-	-	-	250	QT30310N21MS	169130	
	390	390	-	-	-	355	344	-	-	-	315	QT30390N21MS	169131	
	480	460	-	-	-	400	432	-	-	-	400	QT30460N21MS	169132	
	610	580	-	-	-	560	488	-	-	-	400	QT30580N21MS	169133	
	820	650	-	-	-	630	552	-	-	-	560	QT30650N21MS	169134	
	1180	950	-	-	-	900	950	-	-	-	900	QT30950N21MS	169135	
	1375	1100	-	-	-	1000	1076	-	-	-	1000	QT31100N21MS	169136	
1750	1400	-	-	-	-	1400	-	-	-	-	QT31400N21MS	169137		

#### Remark

Motor kW ratings given in above table are for IEC, standard AC four poles motors. Always check that motor rated current is less than the specified rated current of the starter, for the specific application (Normal Duty or Heavy Duty)



QT10008U21MS  
ASTAT XT 8A-72A



QT10105U21MS  
ASTAT XT 105A-170A



QT10210N21MS  
ASTAT XT 210A-390A



QT10460N21MS  
ASTAT XT 460A-650A

**NEMA ratings. Recommended unit type and motor ratings**

	LIGHT DUTY Nema 10				NORMAL DUTY Nema 20				HEAVY DUTY Nema 30				Cat. No.	Ref. No.
	Current Rating	230V	460V	575V	Current Rating	230V	460V	575V	Current Rating	230V	460V	575V		
	A	HP	HP	HP	A	HP	HP	HP	A	HP	HP	HP		
Mains voltage 230-500VAC	8	2	5	-	8	2	5	-	8	2	5	-	QT10008U21MS	169075
	17	5	10	-	17	5	10	-	12	3	7.5	-	QT10017U21MS	169076
	34	10	25	-	31	10	20	-	31	10	20	-	QT10031U21MS	169077
	54	20	40	-	44	15	30	-	44	15	30	-	QT10044U21MS	169078
	65	20	50	-	58	20	40	-	55	20	40	-	QT10058U21MS	169079
	72	25	50	-	72	25	50	-	66	20	50	-	QT10072U21MS	169080
	104	40	75	-	85	30	60	-	80	30	60	-	QT10085U21MS	169081
	130	50	100	-	105	40	75	-	99	40	75	-	QT10105U21MS	169082
	156	60	125	-	145	50	100	-	130	50	100	-	QT10145U21MS	169083
	170	60	125	-	170	60	125	-	134	50	100	-	QT10170U21MS	169084
	262	100	200	-	210	75	150	-	203	75	150	-	QT10210U21MS	169085
	387	150	300	-	310	100	250	-	310	100	250	-	QT10310U21MS	169086
	414	150	350	-	390	150	300	-	361	150	300	-	QT10390U21MS	169087
	480	200	400	-	460	150	350	-	432	150	350	-	QT10460U21MS	169088
	610	250	500	-	580	200	400	-	552	200	400	-	QT10580U21MS	169089
	820	-	-	-	820	250	500	-	690	250	500	-	QT10820U21MS	169090
Mains voltage 460-600VAC	8	-	5	5	8	-	5	5	8	-	5	5	QT20008U21MS	169100
	17	-	10	15	17	-	10	15	12	-	7.5	10	QT20017U21MS	169101
	34	-	25	30	31	-	20	25	31	-	20	25	QT20031U21MS	169102
	54	-	40	50	44	-	30	40	44	-	30	40	QT20044U21MS	169103
	65	-	50	60	58	-	40	50	55	-	40	50	QT20058U21MS	169104
	72	-	50	60	72	-	50	60	66	-	50	60	QT20072U21MS	169105
	104	-	75	100	85	-	60	75	80	-	60	75	QT20085U21MS	169106
	130	-	100	125	105	-	75	100	99	-	75	100	QT20105U21MS	169107
	156	-	125	150	145	-	100	150	130	-	100	125	QT20145U21MS	169108
	170	-	125	150	170	-	125	150	134	-	100	125	QT20170U21MS	169109
	262	-	200	250	210	-	150	200	203	-	150	200	QT20210U21MS	169110
	387	-	300	400	310	-	250	300	310	-	250	300	QT20310U21MS	169111
	414	-	350	400	390	-	300	400	361	-	300	300	QT20390U21MS	169112
	480	-	400	500	460	-	350	400	432	-	350	400	QT20460U21MS	169113
	610	-	500	-	580	-	400	400	552	-	400	500	QT20580U21MS	169114
	820	-	-	-	820	-	500	500	690	-	500	-	QT20820U21MS	169115

**Remark**

Motor HP ratings given in above table are for NEMA, standard AC four poles motors. Always check that motor rated current is less than the specified rated current of the starter, for the specific application (Light duty, Normal duty or Heavy duty)

Order codes

A

B

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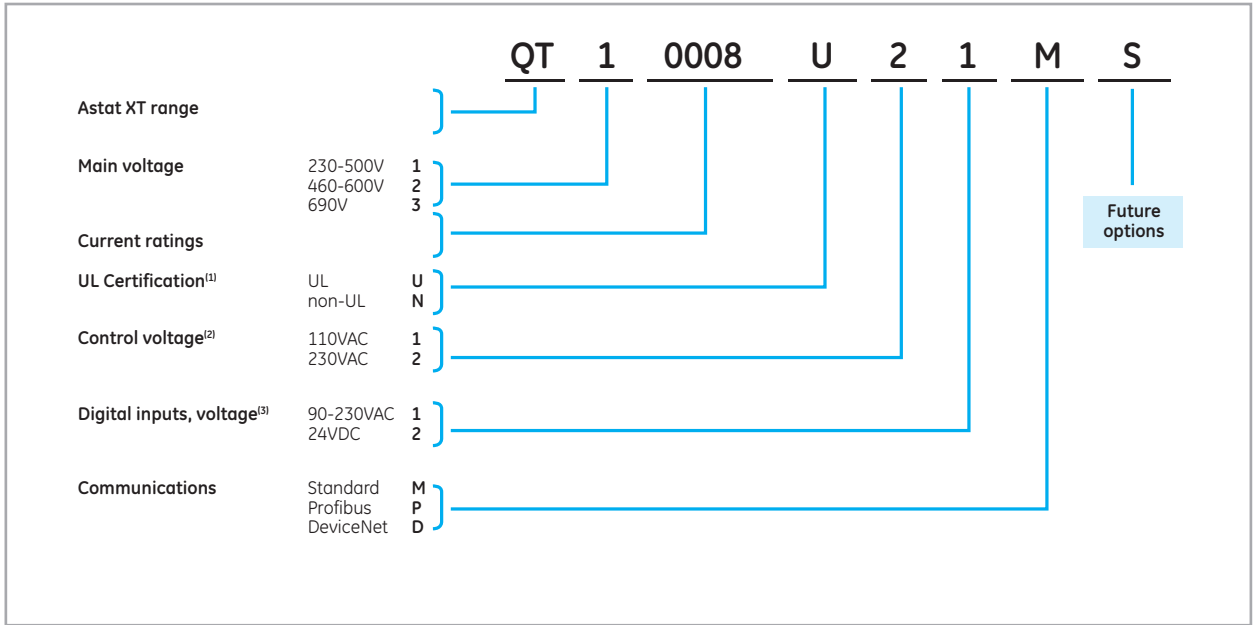
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X





## Unit configuration



(1) - ASTAT XT up to 600V, and up to 170A (Cat Numbers up to QT10170\_ or up to QT20170) are always cUL certified. Option "N" not available  
 - Units QT2, from QT20008\_, up to QT20820\_ are always cUL certified. Option "N" not available.  
 - Units QT1, or QT2 from QTx0950\_ up to QTx1400 are not UL certified. Option "U" not available.  
 - Units QT3\_, rated to 690V, are not UL certified. Option "U" not available

(2) ASTAT XT standard Control Voltage configuration is option 2, Voltage 230VAC, +10%, -15%

(3) ASTAT XT standard configuration for Inputs is option 1, Voltage 90-230VAC, +10%, -15%

A

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## Technical Data

### Ratings

Main voltage	3Ph AC supply	230 to 500VAC +10%, -15% for QT1xxx units 460 to 600VAC +10%, -15% for QT2xxx units 690VAC +10%, -15% for QT3xxx units
Starter current rating	for 3Ph AC motors	From 8A up to 1400A.
Motor current rating	3 phases Induction motors	Motor rated current from 50% to 100% of starter current
Control voltage	1ph AC supply	230VAC, +10, -15%, 50/60Hz, or 110VAC, +10, -15%, 50/60Hz (optional)
Frequency range	50/60Hz systems	Wide from 45Hz to 65Hz. Auto-tracking frequency range

### Control specifications

Control system	Digital control with microcontroller. Starting ramp, with progressive increase in voltage and current limitation
Operation mode	In-Line (three wires) or Inside-Delta (six wires) of the motor
Run operation	Soft Start and Soft stop by multiple choices, including torque control both at start or Stop phases
Operator interface	By LCD display, keypad and Indication LEDs Display: LCD with two rows, 16 characters each Type: Multilanguage, dip-switch selectable for English, Italian, Spanish and German Keys: Six keys, Mode, reset, Set, Select and Up / Down LEDs: ON, Start, Run, Soft Stop, Stop, Save / Slow Speed, Dual Set / Reverse and Fault
Initial voltage	10-50% Un. Up to 80% with expanded settings function
Starting current	100-400% In. Can be extended up to 500%, by using extended settings
Acceleration ramp time	1-30 sec. Can be extended up to 90sec, by using extended settings
Deceleration ramp time	1-30 sec. Can be extended up to 90sec, by using extended settings
Current limitation	100-400% of motor rated current. Can be extended up to 500% by using extended settings
Bypass	By external contactor while motor is full protected by ASTAT XT.
Monitoring	Motor Current, Line Voltage, motor thermistor resistance, Test & Maintenance and Statistics

### Environmental conditions

Operating temperature	-10 up to 50°C, with current derating by 2.5% per °C, from 40°C
Storage temperature	-20°C up to 70°C
Maximum altitude	Up to 1000 mts. Ask your dealer for installation at higher altitude
Humidity	95% at 50°C or 98% at 45°C
Protection degree	IP20 for units up to 72A, IP00 for units from 85A up to 1400A
Pollution degree	Class 3

### Standards

Global standards	CE for the full range. UL, cUL for specified units up to 820A
EMC emissions	EN 61000-6-4 CISPR 11 Class A
Immunity	EN 61000-6-2 ESD 8KV air, IEC 801-2; Electric RF field 10 V/m, 20-100MHz, IEC 801-3 Fast transients 2KV, IEC 801-4
Safety	EN 600947-1 Related to safety requirements. UL508C



## Functions

### Available standard functions

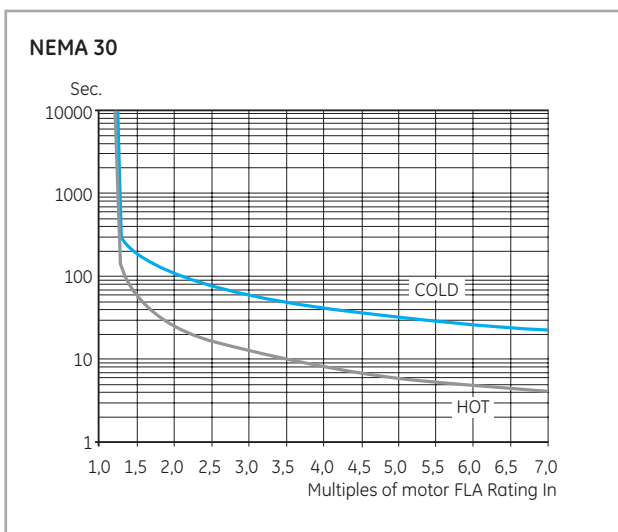
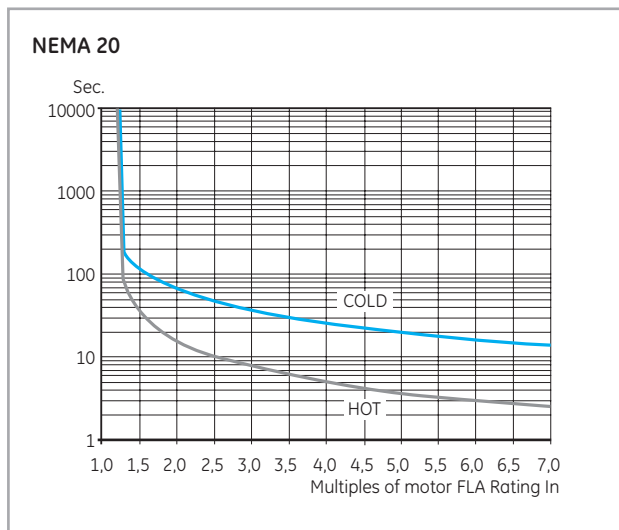
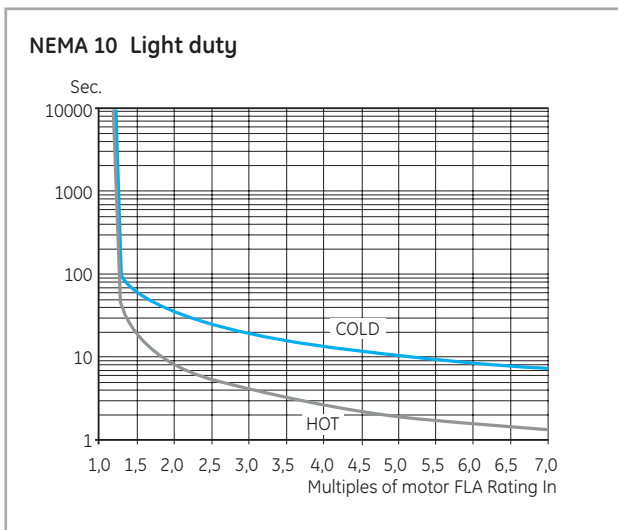
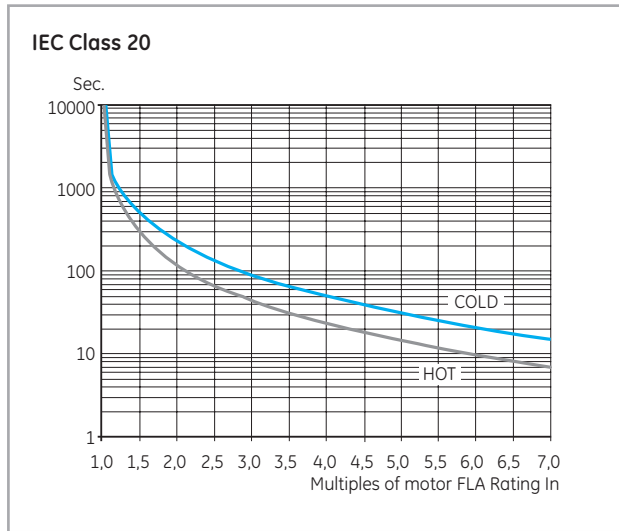
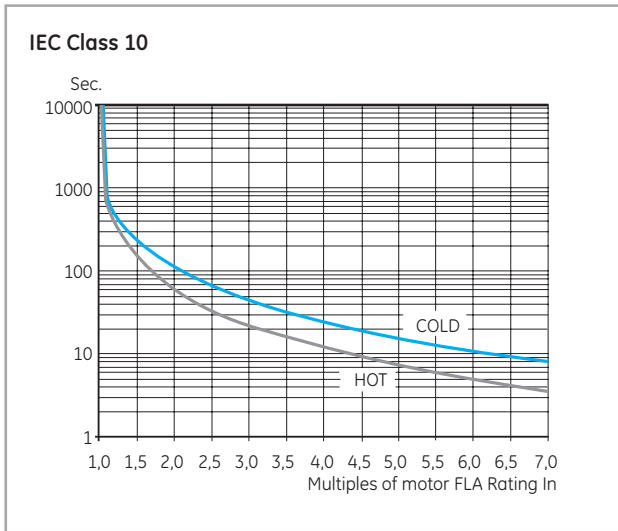
Soft start and soft stop	ASTAT XT is provided with a soft start and soft stop features, including five independent acceleration and deceleration curve models. The factory default curve is used for general purpose, other three are used for pump control and the last one for torque control.
Pump control	Specific function for pump control, that avoids overpressure in the system at the end of acceleration phase and suppresses the hammering at stopping phase.
Torque control	Provides a smooth time controlled torque ramp acceleration and deceleration, with linear deceleration of the torque resulting in a close to linear speed deceleration, thus eliminating stall conditions
In line / Inside delta	ASTAT XT allows either traditional Line operation or Inside Delta operation. When the ASTAT XT is installed to operate Inside Delta, the individual phases of the starter are connected in series with the individual motor windings (six wiring connections like the Start-Delta starters), thus reducing the current x1.73, and allowing the use of a much smaller starter (x1.5 less than motor rated current).
Bypass	ASTAT XT allows bypass operation using an external contactor, controlled ON/OFF by starter function EOR (End Of Ramp). The starter is provided with three dedicated power terminals to facilitate wirings to the bypass contactor. ASTAT XT protections to motor are enabled, even in bypass.
Kick start	This function allows to start high friction loads that require high starting torque for a short period of time. When this function is enabled, a pulse of 80% Un during an adjustable time from 0 to 1sec is given to the motor. After this pulse the output voltage is ramping down to Starting Voltage setting, before ramping up again to full voltage.
End of ramp	Detects end of acceleration and outputs a signal by a dry relay contact. This signal can be delayed by an adjustable timer from 0-120 sec.
Lock-Out	Allows to control the number of startings into a period of time, then protecting both motor and ASTAT.
Dual settings	By this function, ASTAT XT is able to control a secondary motor Dual setting of Starting Voltage, Starting Current, Current Limit, Ramp Up, Ramp Down and Motor current parameters can be selected by using one of the programmable ASTAT XT's inputs
Energy saving	Activated when the motor has a light load for extended periods of time, then reducing the output voltage level and decreasing the reactive current and motor copper/iron losses. This function can be enabled or disabled by dedicated parameters in ASTAT XT.
Slow speed	Function that allows the motor to run at 1/6 constant rated speed, for a short period of time of maximum 30sec. This function supports forward and reverse operation.
Auto reset	This function allows the ASTAT XT automatic recover after a fault caused by Undervoltage, Undercurrent or Phase lost. Auto-Reset can be programmed up to maximum 10 attempts.
Cooling fan control	Allows three methods of control for the ASTAT's built-in cooling fans. - Continuous Operation - Controlled by an external Input - Automatically OFF controlled, after five minutes ASTAT XT is stopped
Generator supply	This is a specific function useful when the Starter is powered from a diesel generator rather than from commercial power supply. The function is enabled by an internal Dip Switch, and helps to minimize the negative effects caused by the generator's voltage fluctuations during starting.
Keypad lock	This function is enabled by means of starter's internal dipswitch, then locking the keypad. This is useful to prevent undesired parameter modifications.
Built-in communications	ASTAT XT includes a ModBus RTU communications protocol. Communications are carried out through a half duplex RS485 port, with maximum baudrate of 9600, supporting up to 247 stations.
Statistic data	ASTAT XT records useful data for maintenance and start up - Last 10 trip events - Statistical data like number of starts, number of trip events and elapsed RUN time. - Last trip data information of Motor current, Starting current and acceleration time.

### Motor and starter protection

Overload	Trips the ASTAT-XT when current exceeds the Overload Trip level according IEC Class 10, 20 or NEMA 10, 20, 30
Motor thermistor	Trips when motor thermistor resistance decreases below trip level set ASTAT XT allows both PTC or NTC sensors, with adjustable trip level
Too many starts	Trips if the number of starts, during Duty Cycle Time exceeds the preset number
Long start time	Trips if output voltage does not reach rated voltage at the preset Max. Start time
O/C JAM fault	Trips under the following conditions: - Instantaneously when current exceeds 8.5 x ASTAT-XT Current - During starting when current exceeds 8.5 x Motor Current - During running when current exceeds 200-850% of Motor Current O/C JAM has a programmable tripping delay of 0-5 seconds
Undercurrent	Trips when line current drops below the preset level for the preset time.
Undervoltage	Trips when line voltage drops below the preset level for the preset time.
Overvoltage	Trips when line voltage increases above a preset level for a preset time
Phase loss	Trips if 1 or 2 phases are lost
Frequency loss	Trips if frequency is not in the range of 40-66.6Hz
Phase sequence	Trips if line phase sequence is wrong
Slow speed time	Trips when operating at slow speed for extended periods
Wrong connection	Trips the ASTAT-XT when one or more motor phases is not properly connected to ASTAT-XT's load terminals or if there is an internal disconnection in the motor winding
Shorted SCR	Trips and prevents starting if any SCR is short-circuited or when motor windings are shorted
Over temperature	Heat-sink over-temperature. Trips the ASTAT-XT when the heat-sink temperature rises above 85°C
External fault	Trips the ASTAT-XT when a N.O. contact between terminals 19-21 closes for over two seconds
Wrong parameters	Parameters not transferred from RAM to EEPROM or vice versa
OC or wrong CON	Trips when the ASTAT-XT is connected Inside Delta and Wrong connection or overcurrent is detected

## Overload protections - Thermal characteristics

The ASTAT XT allows motor protection according IEC Class 10 or Class 20 and NEMA 10, 20 or 30, user free selectable by ASTAT internal dedicated parameter.

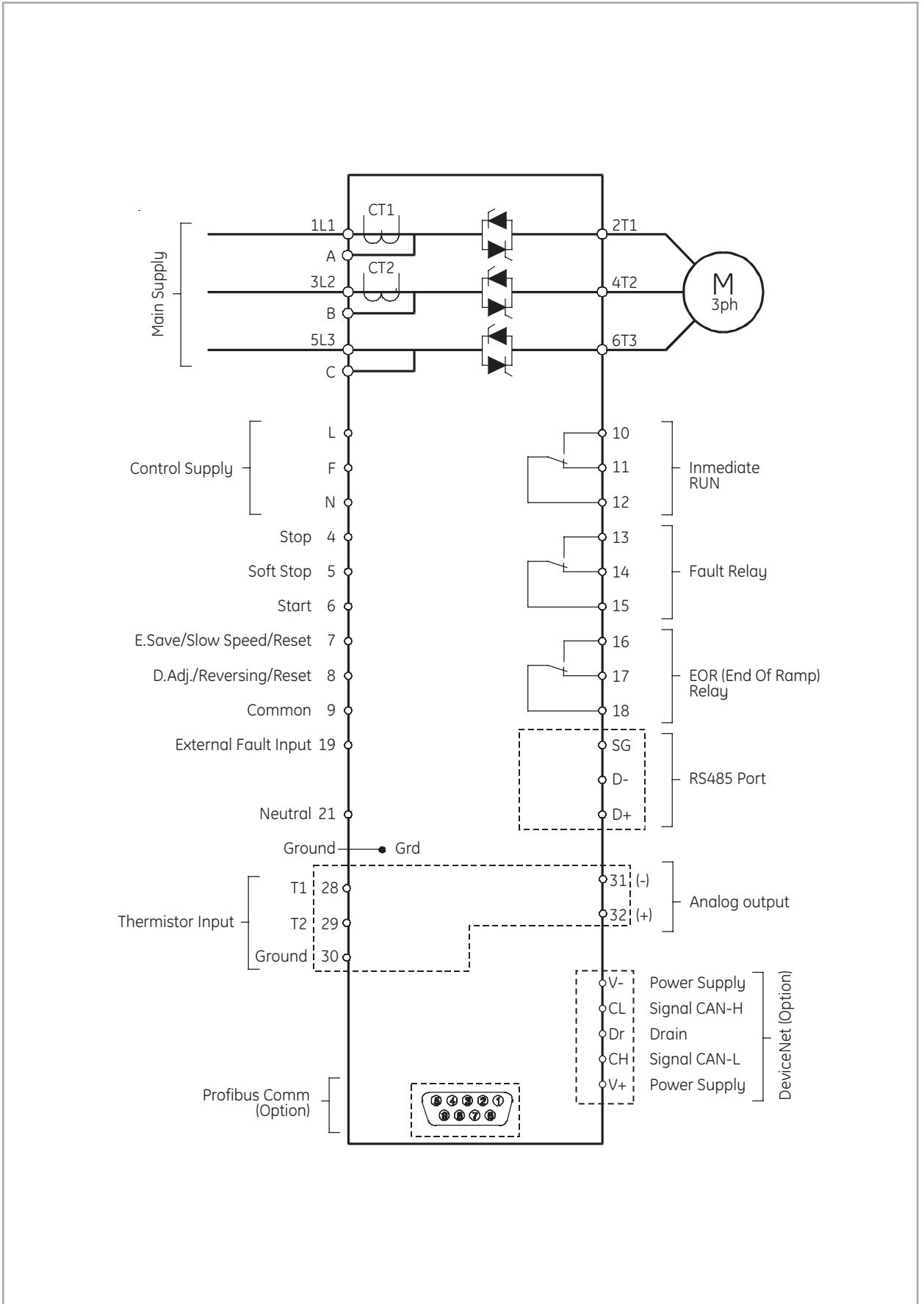


### Maximum number starting /hour

Starting current I/In <sup>(1)</sup>	Ramp time		
	10s	20s	30s
2	24	12	8
3	16	8	5
4	12	6	4

(1) In= rated current of ASTAT XT in the specified class IEC/Nema

I/O Wiring, Basic scheme



## I/O terminal board specifications

### Power I/O terminals

Terminals	Function	Description
1L1, 3L2, 5L3	Mains Input	3ph Input voltage according Astat XT Main Voltage Option rating (Option 1, QT1_) 230-500VAC, +10%/-15% 50/60Hz (Option 2, QT2_) 460-600VAC, +10%/-15% 50/60Hz (Option 3, QT3_) 690VAC, +10%/-15% 50/60Hz
2T1, 4T2, 6T3	Output to motor	Power Output terminals to 3ph AC motor
A, B, C	By-pass	Bypass terminals for external by-pass contactor
G	Ground	ASTAT XT, ground connection

### Control power supply

L, N	Control Supply	a110VAC or 220VAC, according ASTAT XT Control Voltage rating
F	Fan control	Cooling fan external control, together with jumper J1 <b>Control Voltage &amp; Fan consumption VA:</b> QTx0008 to QTx0031: No fan. Total consumption: 150VA QTx0044 to QTx0072: Fan 35 VA. Total consumption 185VA QTx0085 to QTx0170: Fan 60 VA. Total consumption 210VA QTx0210 to QTx0390: Fans 105VA. Total consumption 255VA QTx0390 to QTx 1400A : Fans 150VA.Total consumption 300VA

### Digital inputs

4	Stop	Dedicated input to Stop
5	Soft Stop	Dedicated input to Soft Stop
6	Start	Dedicated input to Start
7	Programmable Inputs	Programmable to functions Energy Saving, Slow Speed and Reset
8	Programmable Inputs	Programmable to functions Dual Set, Reverse and Reset
9	Common	Common terminal for digital inputs from 4, 5, 6, 7 and 8
		<b>Operating Voltage of digital inputs from 4 to 9</b> Digital Input hardware is operated according either of below ordered voltage ratings (Option 1, standard) From 90 to 230VAC +10%, 50/60Hz (Option 2, Optional) 24VDC +10%/ -15%

### Other inputs

19, 21	External fault	Requires a free voltage relay contact, to detect external fault
21	Neutral	This terminal may be connected to Mains Neutral when available
28, 29	Motor thermistor	PTC or NTC programmable input for motor thermistor protection The input can be enabled or disabled, and programmed at desired trip level resistance

### Digital outputs

10, 11, 12	RUN	Run Relay with NO & NC dry contact. Programmable ON delay
13, 14, 15	FAULT	Fault to ON or Fault to OFF programmable function
16, 17, 18	EOR	End Of Ramp relay. Programmable ON delay
		<b>Relay Outputs Ratings</b> Max rating: 8A, 250VAC, 2000VA max

### Analogue output

31, 32	Current output	Range 0 to 2xIn. Programmable 0-10VDC, 0-20mA or 4-20mA.
30	Ground	Ground terminal for Analog Output

### Communications

D+, D-, SG	RS485 terminals	RS485 Communication port, half duplex for ModBus protocol Baudrate 1200, 2400, 4800, 9600 BPS
D-9 connector	Profibus port	Optional Profibus Communications port
V+, CL, Dr, CH, V-	DeviceNet terminals	Optional Devicenet Communications port

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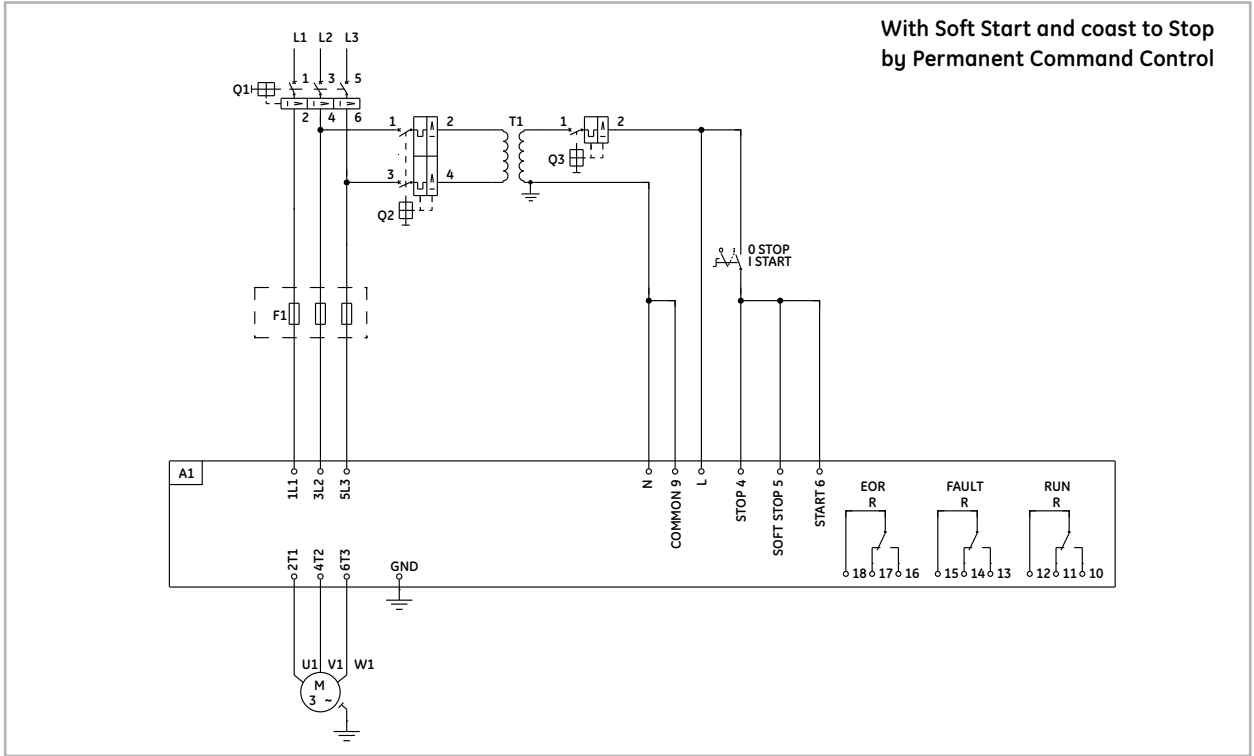
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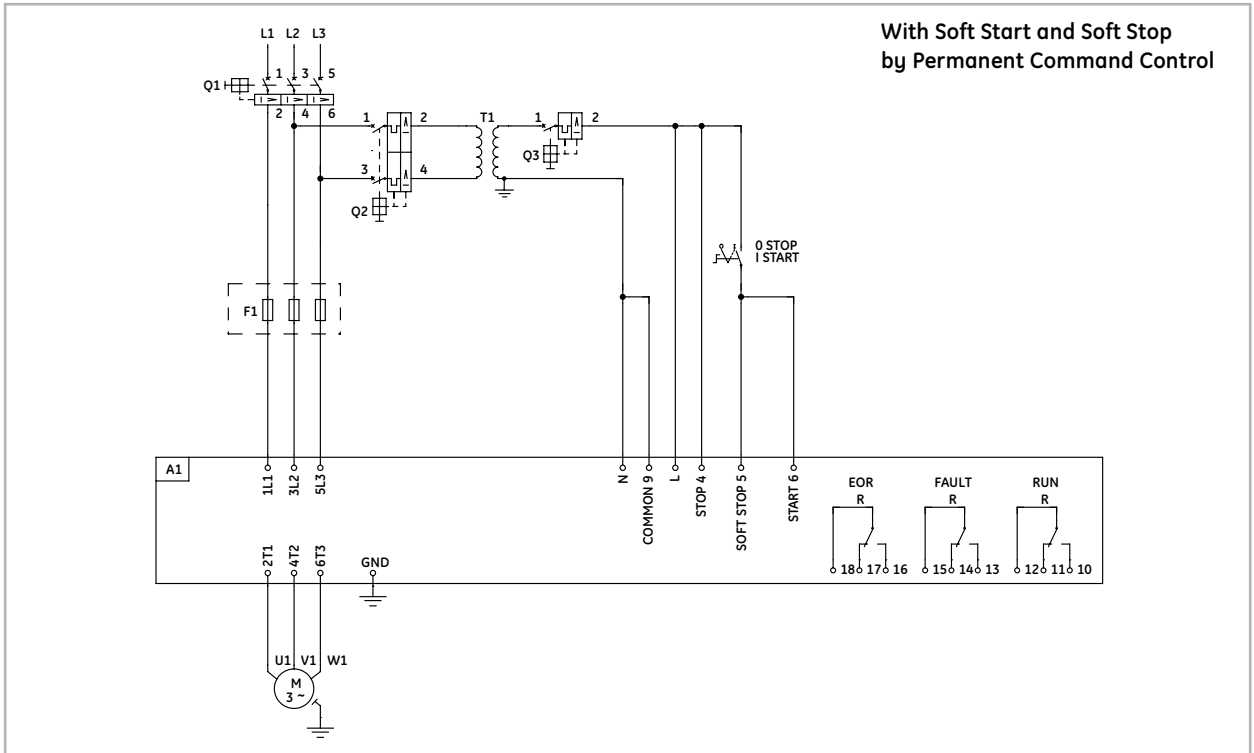
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Application wiring diagrams

Basic diagram without line contactor<sup>(1)</sup>



Basic diagram without line contactor<sup>(1)</sup>



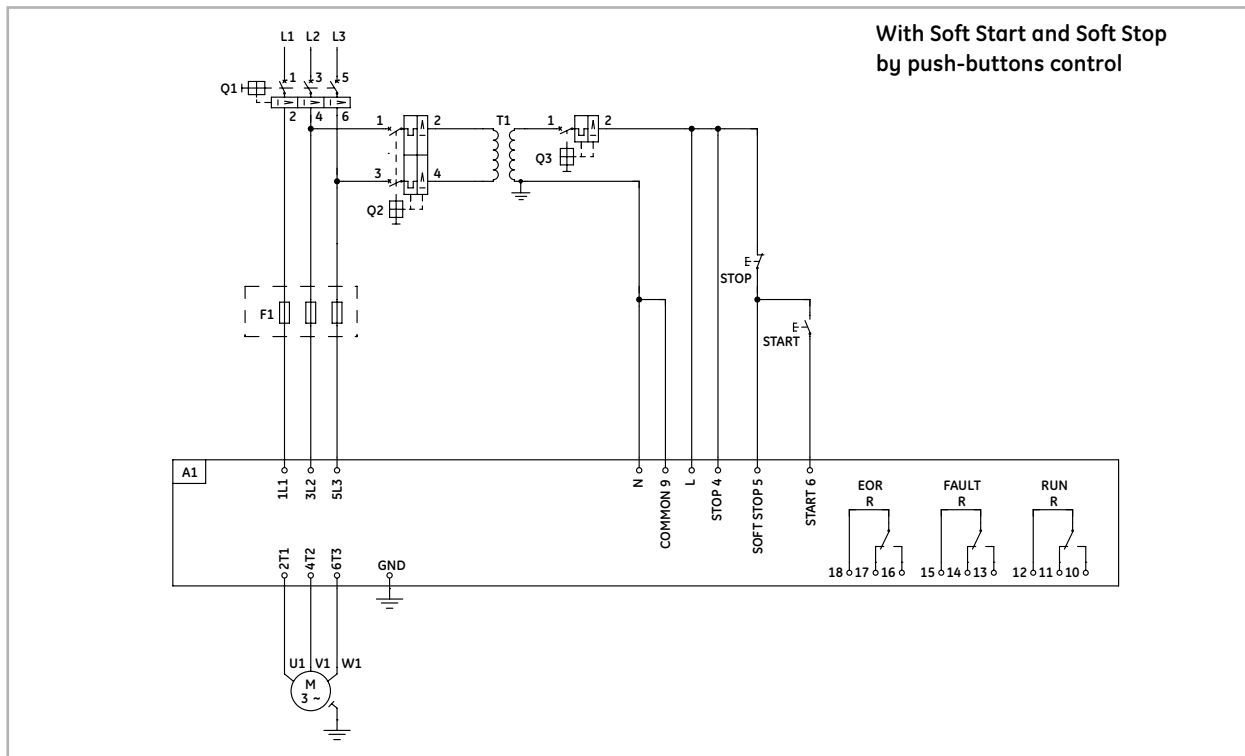
(1) Schemes are given for information purposes. Add additional emergency safety stop, if it is required for your application.

Remarks

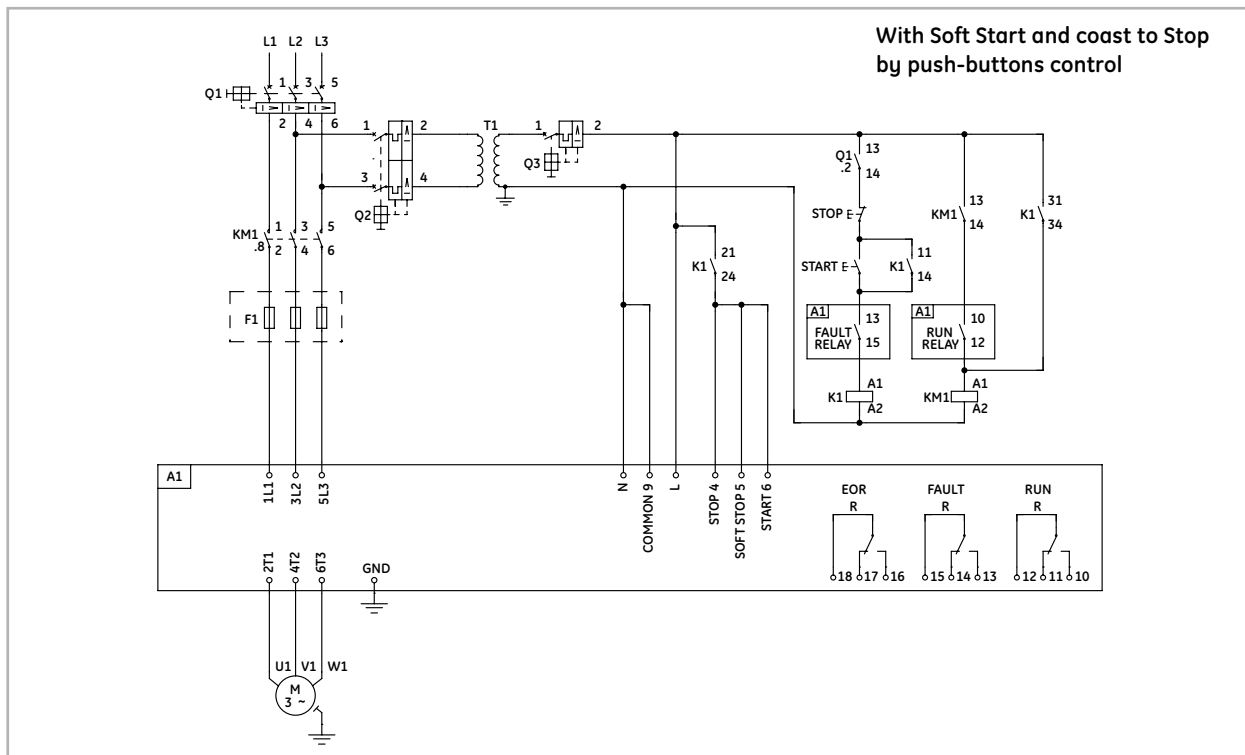
1. Check coordination tables for proper selection of Breaker and Line contactor.
2. Control Voltage and Control Input voltage are from same source in above example. Please check manuals if you have different sources for Control Voltage and Control input Voltage.
3. Semiconductor Fuses "F" are only required for Type 2 coordination. Please check coordination tables
4. In spite of ASTAT XT can operate without line contactor, the use of a line contactor will increase the operation safety. Anyway provide a way to switch off the Breaker in case of an emergency.

## Application wiring diagrams

### Basic diagram without line contactor<sup>(1)</sup>



### Basic diagram with line contactor<sup>(1)</sup>



(1) Schemes are given for information purposes. Add additional emergency safety stop, if it is required for your application.

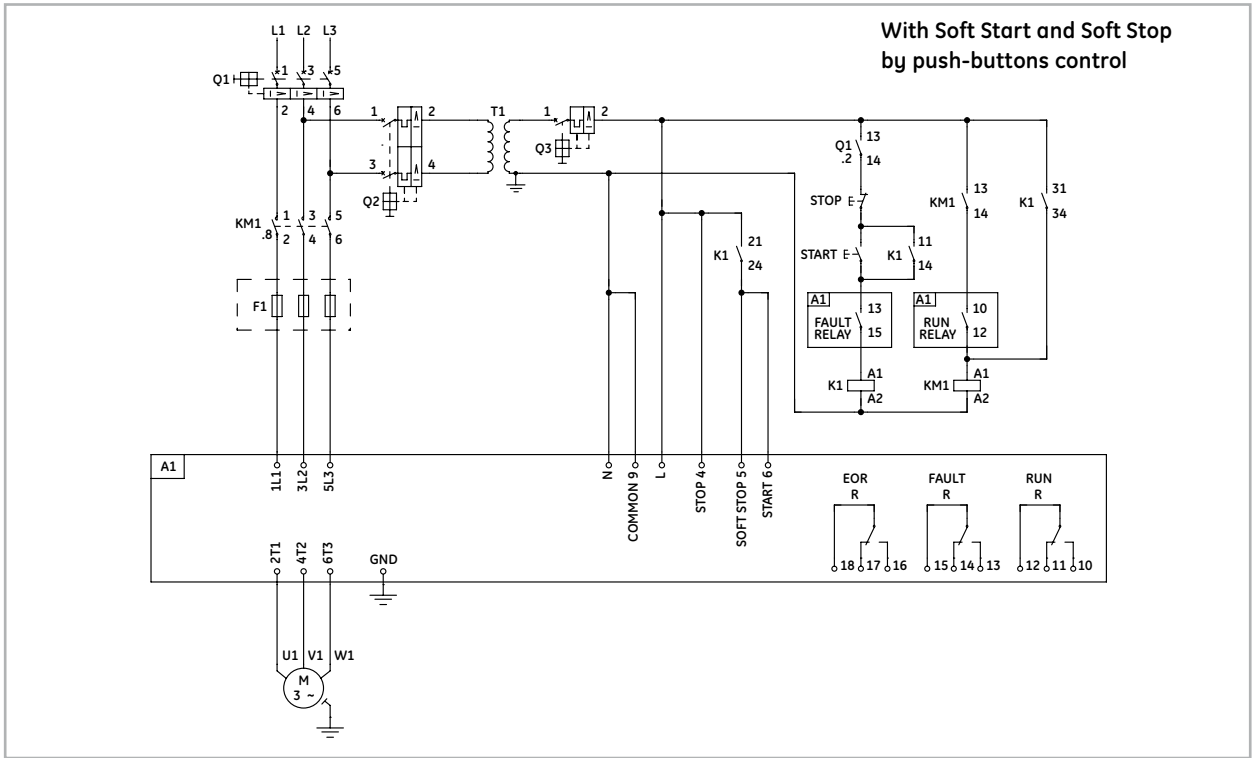
#### Remarks

1. Check coordination tables for proper selection of Breaker and Line contactor.
2. Control Voltage and Control Input voltage are from same source in above example. Please check manuals if you have different sources for Control Voltage and Control input Voltage.
3. Semiconductor Fuses "F" are only required for Type 2 coordination. Please check coordination tables
4. In spite of ASTAT XT can operate without line contactor, the use of a line contactor will increase the operation safety. Anyway provide a way to switch off the Breaker in case of an emergency.

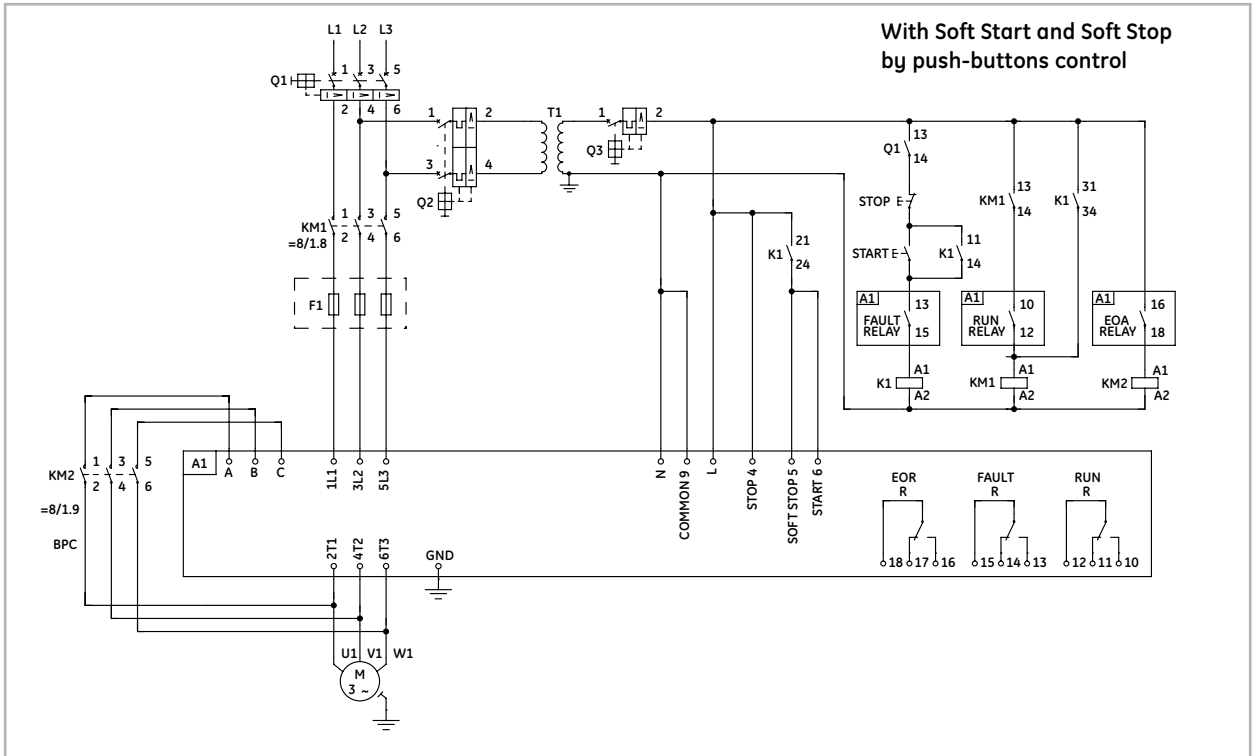


Application wiring diagrams

Basic diagram with line contactor<sup>(1)</sup>



Basic diagram with line and bypass contactors<sup>(1)</sup>



(1) Above schemes are given for information purposes. Add additional emergency safety stop, if it is required for your application.

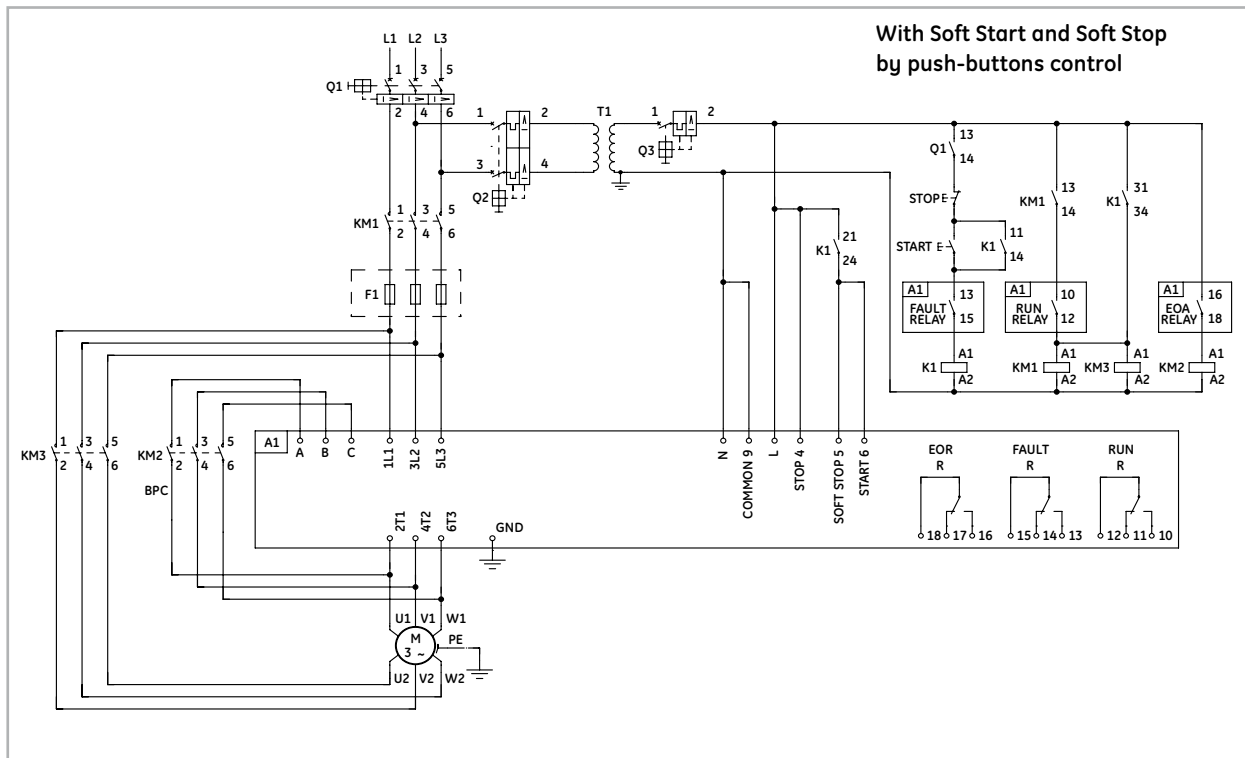
Remarks

1. Check coordination tables for proper selection of Breaker and Line contactor.
2. Control Voltage and Control Input voltage are from same source in above example. Please check manuals if you have different sources for Control Voltage and Control input Voltage.
3. Semiconductor Fuses "F" are only required for Type 2 coordination. Please check coordination tables



## Application wiring diagrams

### Basic diagram in "Inside Delta" configuration with line and bypass contactors<sup>(1)</sup>



(1) Above schemes are given for information purposes. Add additional emergency safety stop, if it is required for your application.

#### Remarks

1. Check coordination tables for proper selection of Breaker and Line contactor.
2. Control Voltage and Control Input voltage are from same source in above example. Please check manuals if you have different sources for Control Voltage and Control input Voltage.
3. Semiconductor Fuses "F" are only required for Type 2 coordination. Please check coordination tables
4. Wrong connection of the motor, or the ASTAT-XT when it is Inside-delta connected may seriously damage the motor or the ASTAT-XT. Please check additional details given in the ASTAT XT's instruction manual.

## Coordination Type 1

A

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### Combination with aM fuses - 415V

Main Voltage Up to 415VAC	Rating (A)	ASTAT-XT type		aM fuses		Contactor Type	Short-circuit current
			Cat. No.		Rating (A)	CL/CK series	Iq (kA)
	8	-	QT10008	-	16	CL00	80
	17	-	QT10017	-	20	CL02	80
	31	-	QT10031	-	35	CL04	80
	44	-	QT10044	-	50	CL06	80
	58	-	QT10058	-	80	CL07	80
	72	-	QT10072	-	100	CL08	80
	85	-	QT10085	-	125	CL09	80
	105	-	QT10105	-	160	CL10	80
	145	-	QT10145	-	200	CK75C	80
	170	-	QT10170	-	200	CK08C	80
	210	-	QT10210	-	250	CK09B	80
	310	-	QT10310	-	400	CK95B	80
	390	-	QT10390	-	500	CK10C	80
	460	-	QT10460	-	630	CK11C	80
	580	-	QT10580	-	800	CK12B	80
	650	-	QT10650	-	1000	CK13B	80
	950	-	QT10950	-	2x630	-	80
	1100	-	QT11100	-	2x800	-	80
	1400	-	QT11400	-	2x800	-	80

### Combination with Record Plus MCCB'S - 415V

Main Voltage Up to 415VAC	Rating (A)	ASTAT-XT type		Circuit Breaker		Contactor Type	Short-circuit current
			Cat. No.	Record Plus	Rating (A)	CL/CK series	Iq (kA)
	8	-	QT10008	FD63	16	CL45	65
	17	-	QT10017	FD63	40	CL06	65
	31	-	QT10031	FD63	50	CL06	65
	44	-	QT10044	FD160	63	CL06	65
	58	-	QT10058	FD160	80	CL07	65
	72	-	QT10072	FD160	80	CL08	65
	85	-	QT10085	FE160	125	CL10	65
	105	-	QT10105	FE160	160	CL10	65
	145	-	QT10145	FE160	160	CK85B	65
	170	-	QT10170	FE250	160	CK08	65
	210	-	QT10210	FE250	160	CK85	65
	310	-	QT10310	FG400	400	CK10C	65
	390	-	QT10390	FG400	400	CK12B	65
	460	-	QT10460	FG630	630	CK12B	65
	580	-	QT10580	FG630	630	CK13B	65
	650	-	QT10650	FK1250	1000	CK13B	50
	950	-	QT10950	FK1250	1000	-	50
	1100	-	QT11100	FK1250	1250	-	50
	1400	-	QT11400	FK1600	1600	-	50

### Combination with aM fuses - 500V

Main Voltage 500 VAC	Rating (A)	ASTAT-XT type		aM fuses		Contactor Type	Short-circuit current
			Cat. No.		Rating (A)	CL/CK series	Iq (kA)
	8	QT10008	QT20008	-	16	CL00	80
	17	QT10017	QT20017	-	20	CL02	80
	31	QT10031	QT20031	-	35	CL04	80
	44	QT10044	QT20044	-	50	CL06	80
	58	QT10058	QT20058	-	80	CL07	80
	72	QT10072	QT20072	-	100	CL08	80
	85	QT10085	QT20085	-	125	CL09	80
	105	QT10105	QT20105	-	160	CL10	80
	145	QT10145	QT20145	-	200	CK75C	80
	170	QT10170	QT20170	-	200	CK08C	80
	210	QT10210	QT20210	-	250	CK09B	80
	310	QT10310	QT20310	-	400	CK95B	80
	390	QT10390	QT20390	-	500	CK10C	80
	460	QT10460	QT20460	-	630	CK11C	80
	580	QT10580	QT20580	-	800	CK12B	80
	650/820	QT10650	QT20820	-	1000	CK13B	80
	950	QT10950	QT20950	-	2x630	-	80
	1100	QT11100	QT21100	-	2x800	-	80
	1400	QT11400	QT21400	-	2x800	-	80



Coordination Type 2

Combination with semiconductor fuses - 415V

Main Voltage Up to 415VAC	Rating (A)	ASTAT-XT type		Semiconductor fuses <sup>(1)</sup>	Contactor Type	Short-circuit current
		Cat. No.	Bussmann type	CL/CK series	Iq (kA)	
	8	-	QT10008	170M3808D	CL25	80
	17	-	QT10017	170M3810D	CL25	80
	31	-	QT10031	170M3813D	CL04	80
	44	-	QT10044	170M3814D	CL45	80
	58	-	QT10058	170M3814D	CL07	80
	72	-	QT10072	170M3815D	CL08	80
	85	-	QT10085	170M3816D	CL09	80
	105	-	QT10105	170M3817D	CL10	80
	145	-	QT10145	170M3817D	CK75C	80
	170	-	QT10170	170M3819D	CK08C	80
	210	-	QT10210	170M4864D	CK09B	80
	310	-	QT10310	170M4864D	CK95B	80
	390	-	QT10390	170M5814D	CK10C	80
	460	-	QT10460	170M5820D	CK11C	80
	580	-	QT10580	170M5816D	CK12B	50
	650	-	QT10650	2x170M5814D	CK13B	80
	950	-	QT10950	2x170M5816D	-	80
	1100	-	QT11100	2x170M6892D	-	80
	1400	-	QT11400	2x170M8555D	-	80

Combination with semiconductor fuses - 500V

Main Voltage 500 VAC	Rating (A)	ASTAT-XT type		Semiconductor fuses <sup>(1)</sup>	Contactor Type	Short-circuit current
		Cat. No.	Bussmann type	CL/CK series	Iq (kA)	
	8	QT10008	QT20008	170M3808D	CL25	80
	17	QT10017	QT20017	170M3810D	CL25	80
	31	QT10031	QT20031	170M3813D	CL04	80
	44	QT10044	QT20044	170M3814D	CL06	80
	58	QT10058	QT20058	170M3814D	CL07	80
	72	QT10072	QT20072	170M3815D	CL08	80
	85	QT10085	QT20085	170M3816D	CL09	80
	105	QT10105	QT20105	170M3817D	CL10	80
	145	QT10145	QT20145	170M3817D	CK75C	80
	170	QT10170	QT20170	170M3819D	CK08C	80
	210	QT10210	QT20210	170M4864D	CK09B	80
	310	QT10310	QT20310	170M4864D	CK10C	80
	390	QT10390	QT20390	170M5814D	CK10C	80
	460	QT10460	QT20460	170M5820D	CK11C	80
	580	QT10580	QT20580	170M5816D	CK12B	50
	650/820	QT10650	QT20820	2x170M5814D	CK13B	80
	950	QT10950	QT20950	2x170M5816D	-	80
	1100	QT11100	QT21100	2x170M6892D	-	80
	1400	QT11400	QT21400	2x170M8555D	-	80

Combination with semiconductor fuses - 690V

Main Voltage 690 VAC	Rating (A)	ASTAT-XT type		Semiconductor fuses <sup>(1)</sup>	Contactor Type	Short-circuit current
		Cat. No.	Bussmann type	CL/CK series	Iq (kA)	
	8	-	QT30008	170M3808D	CL25	50
	17	-	QT30017	170M3810D	CL25	50
	31	-	QT30031	170M3813D	CL06	50
	44	-	QT30044	170M3814D	CL06	50
	58	-	QT30058	170M3814D	CL07	50
	72	-	QT30072	170M3815D	CL08	50
	85	-	QT30085	170M3816D	CK75C	50
	105	-	QT30105	170M3817D	CK75C	50
	145	-	QT30145	170M3817D	CK08B	50
	170	-	QT30170	170M3819D	CK08B	50
	210	-	QT30210	170M4864D	CK08B	50
	310	-	QT30310	170M4864D	CK10C	50
	390	-	QT30390	170M5814D	CK10C	50
	460	-	QT30460	170M5820D	CK12B	50
	580	-	QT30580	170M5816D	CK12B	30
	650	-	QT30650	2x170M5814D	-	50
	950	-	QT30950	2x170M5816D	-	50
	1100	-	QT31100	2x170M6892D	-	50
	1400	-	QT31400	2x170M8555D	-	50

(1) Semiconductor Fuses must be always used for Type 2 coordination



## Dimensions and weights

Cat. No.: QTx0008U\_, QTx0017U\_, QTx0031U\_, QTx0044U\_, QTx0058U\_, QTx0072U\_

Cat. No	Dimensions		Power terminal size (mm <sup>2</sup> )			Weight Kg
	D1	D2	Input 1L1, 3L2, 5L3	Bypass A, B, C	Output 2T1, 4T2, 6T3	
QTx0008U	160	182.5	16	16	16	4.2
QTx0017U	160	182.5	16	16	16	4.2
QTx0031U	160	182.5	16	16	16	5.3
QTx0044U	207	229.5	16	16	35	6.7
QTx0058U	207	229.5	16	16	35	6.7
QTx0072U	207	229.5	35	35	35	6.7

UL Certified units

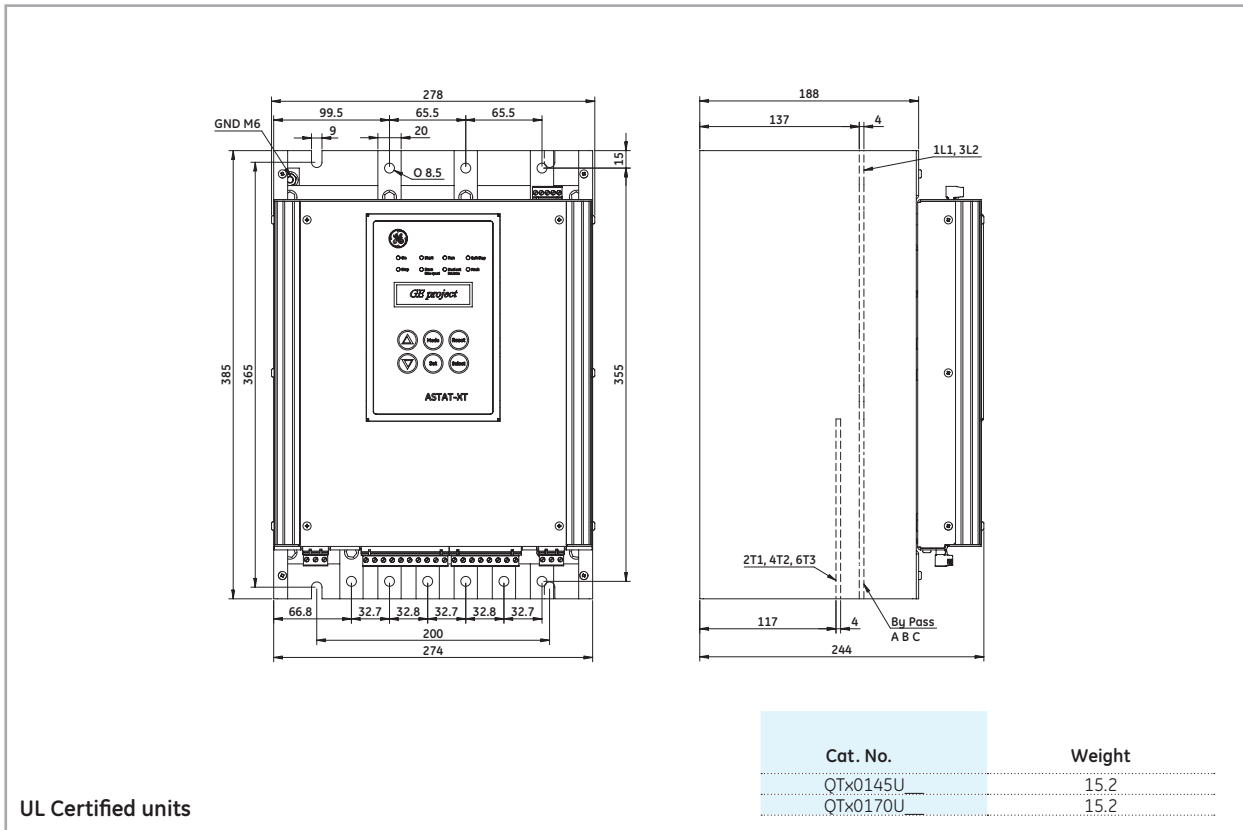
Cat. No.: QTx0085U\_, QTx0105U\_

Cat. No.	Weight
QTx0085U	15.2
QTx0105U	15.2

UL Certified units

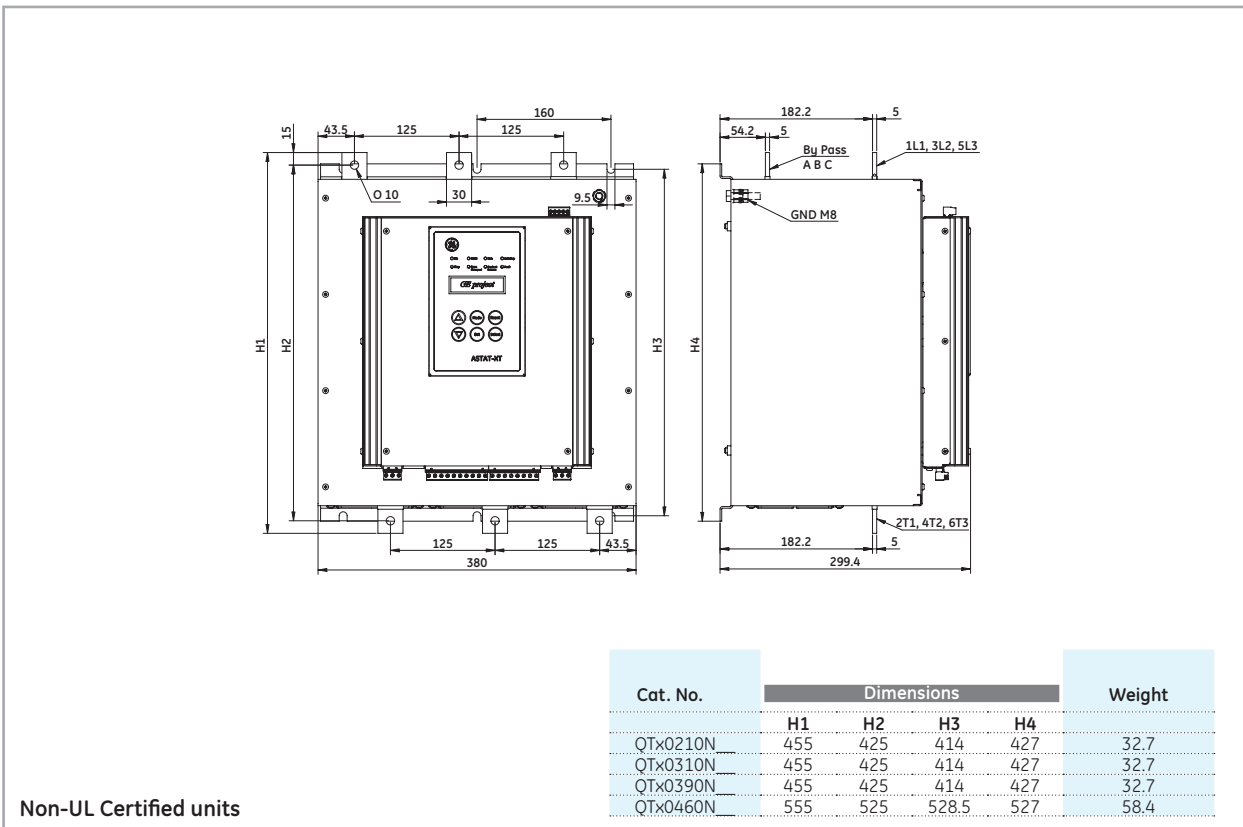
Dimensions and weights

Cat. No.: QTx0145U\_, QTx0170U\_



UL Certified units

Cat. No.: QTx0210N\_, QTx0315N\_, QTx0390N\_, QTx0460N\_



Non-UL Certified units

Dimensions

A

B

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Dimensions and weights

Cat. No.: QTx0580N\_

Digital Soft Starters

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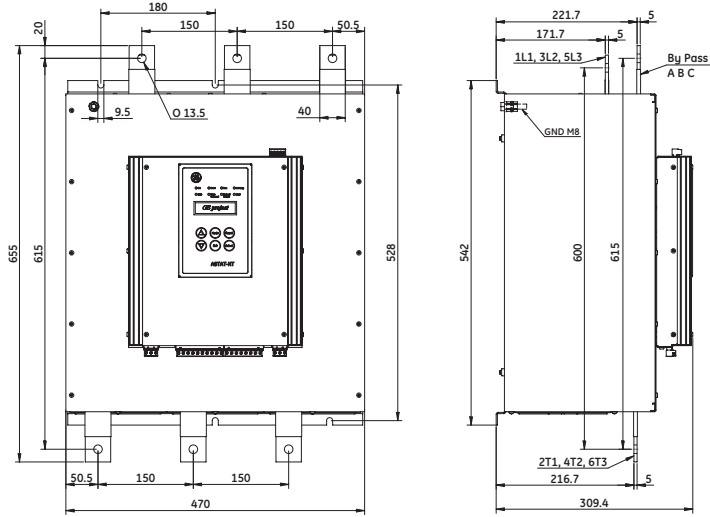
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Non-UL Certified unit

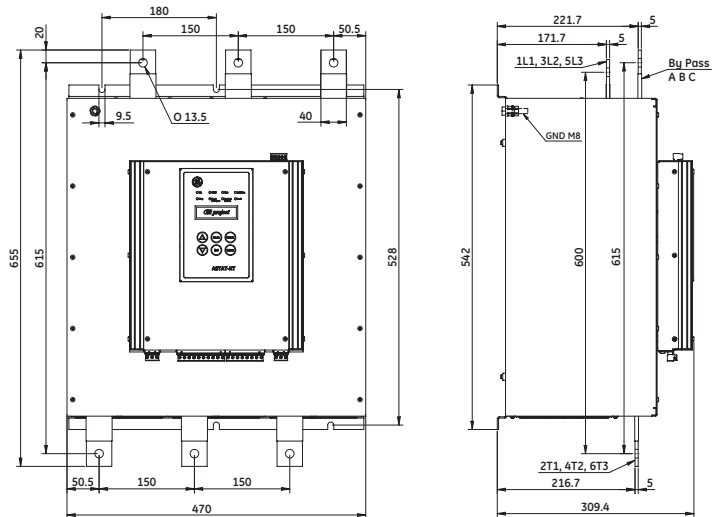
Cat. No.

QTx0580U

Weight

63.2

Cat. No.: QTx0650N\_



Non-UL Certified units

Cat. No.

QTx0650N

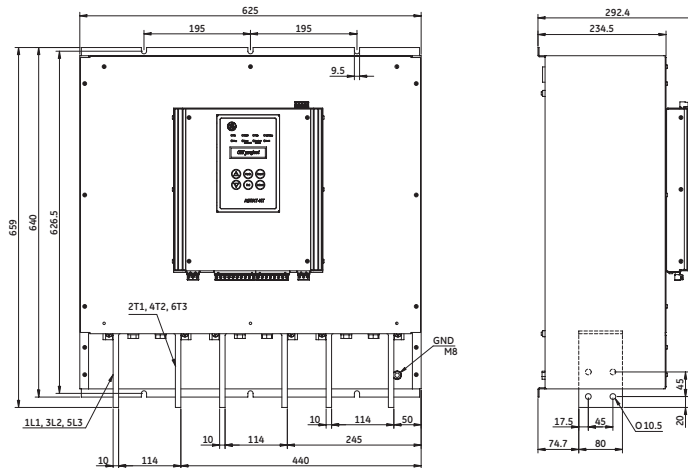
Weight

64.8



## Dimensions and weights

Cat. No.: QTx0950N\_



**Remarks**

1. This unit must be operated with a bypass contactor
2. Add space for current transformers (supplied separately from the main unit) and bus bars for preparation for bypass

Approximate current transformers dimensions: W=240mm, H=130mm, D=90mm

Non-UL Certified unit

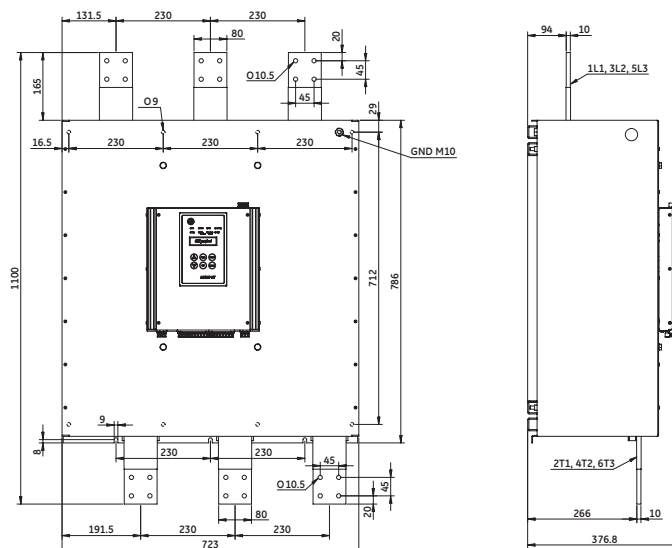
Cat. No.

QTx0950N

Weight

86.7

Cat. No.: QTx1100N\_ , QTx1400N



**Remarks**

1. Units must be operated with a bypass contactor
2. Add space for current transformers (Supplied separately from main unit) and bus bars for preparation for bypass

Approximate current transformers dimensions:

W=240mm, H=130mm, D=90mm. (for 1100A unit, Cat Numbers QTx1100N\_

W=270mm, H=155mm, D=90mm. (for 1400A unit, Cat Numbers QTx1400N\_

Non-UL Certified unit

Cat. No.

QTx1100N

Weight

169.8

QTx1400N

175.5

Dimensions

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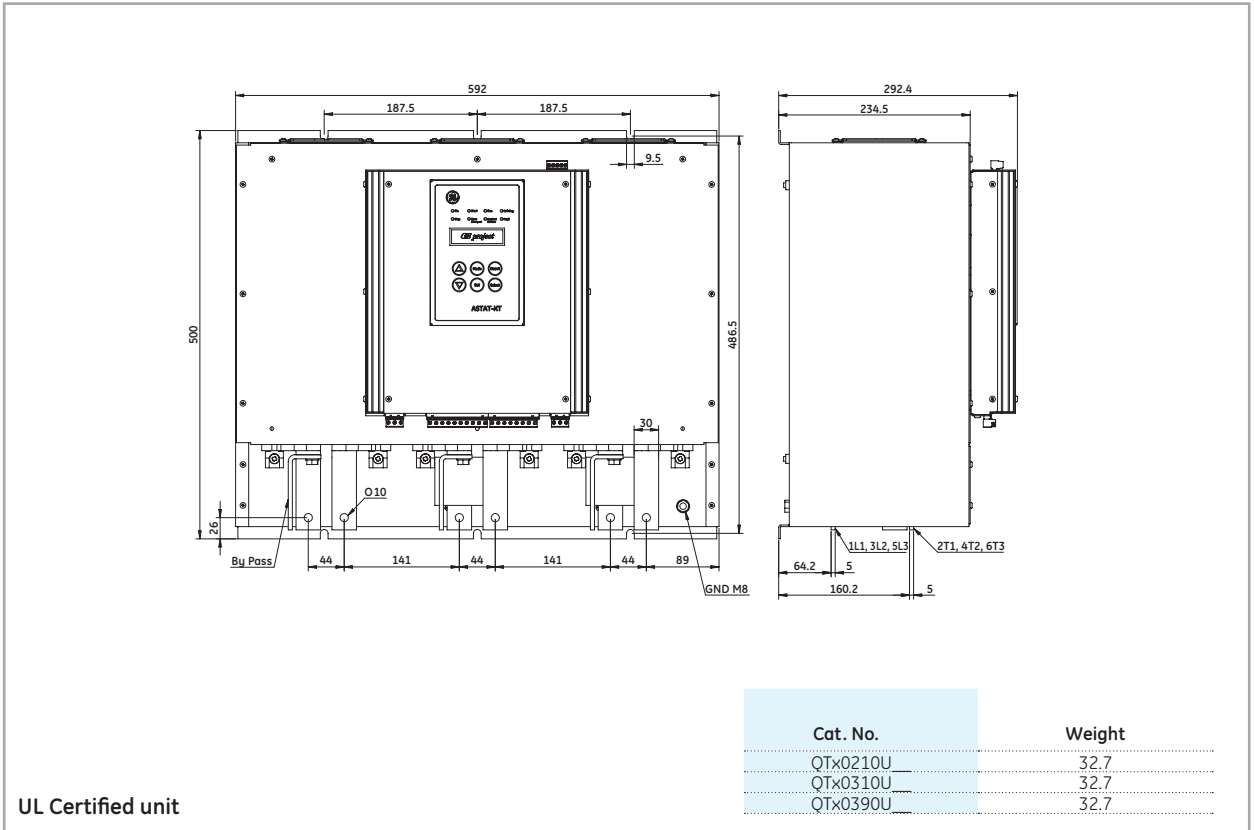
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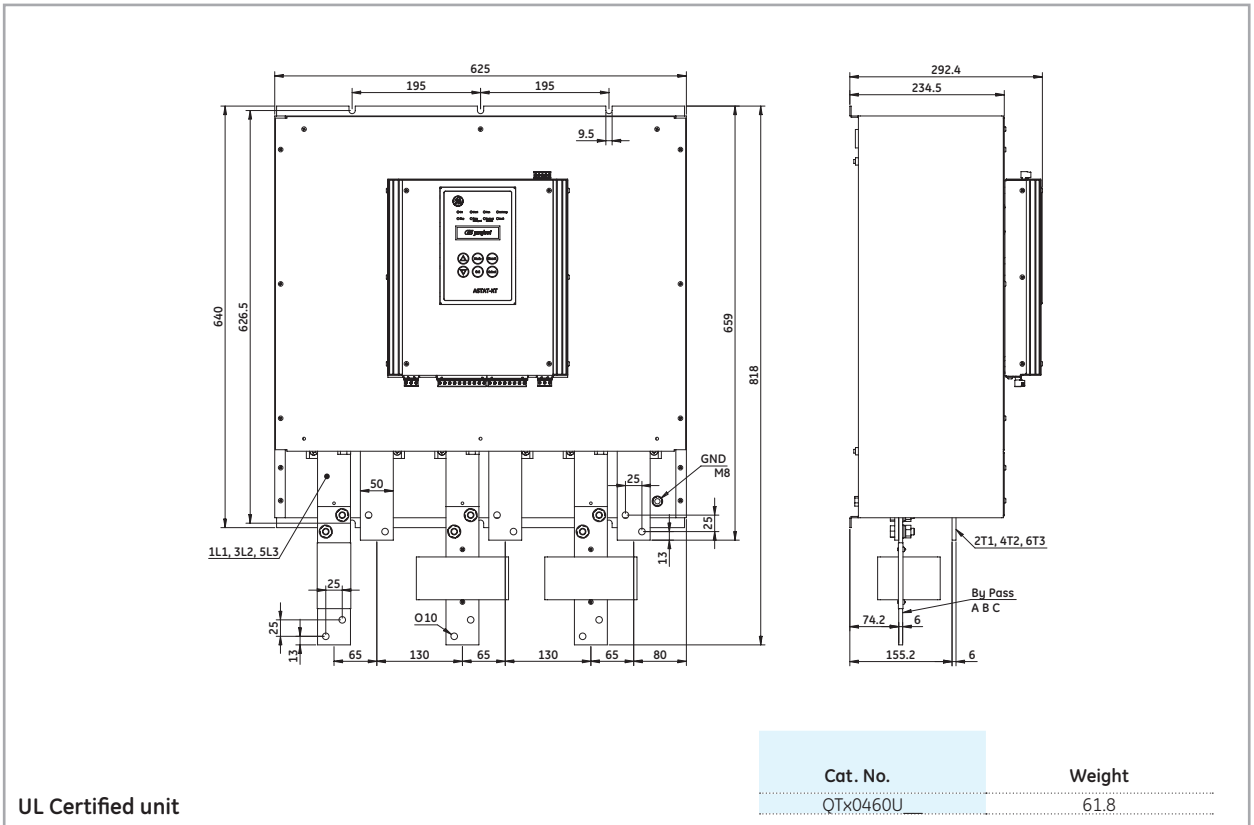


## Dimensions and weights

Cat. No.: QTx0210U\_, QTx0315U\_, QTx0390U\_

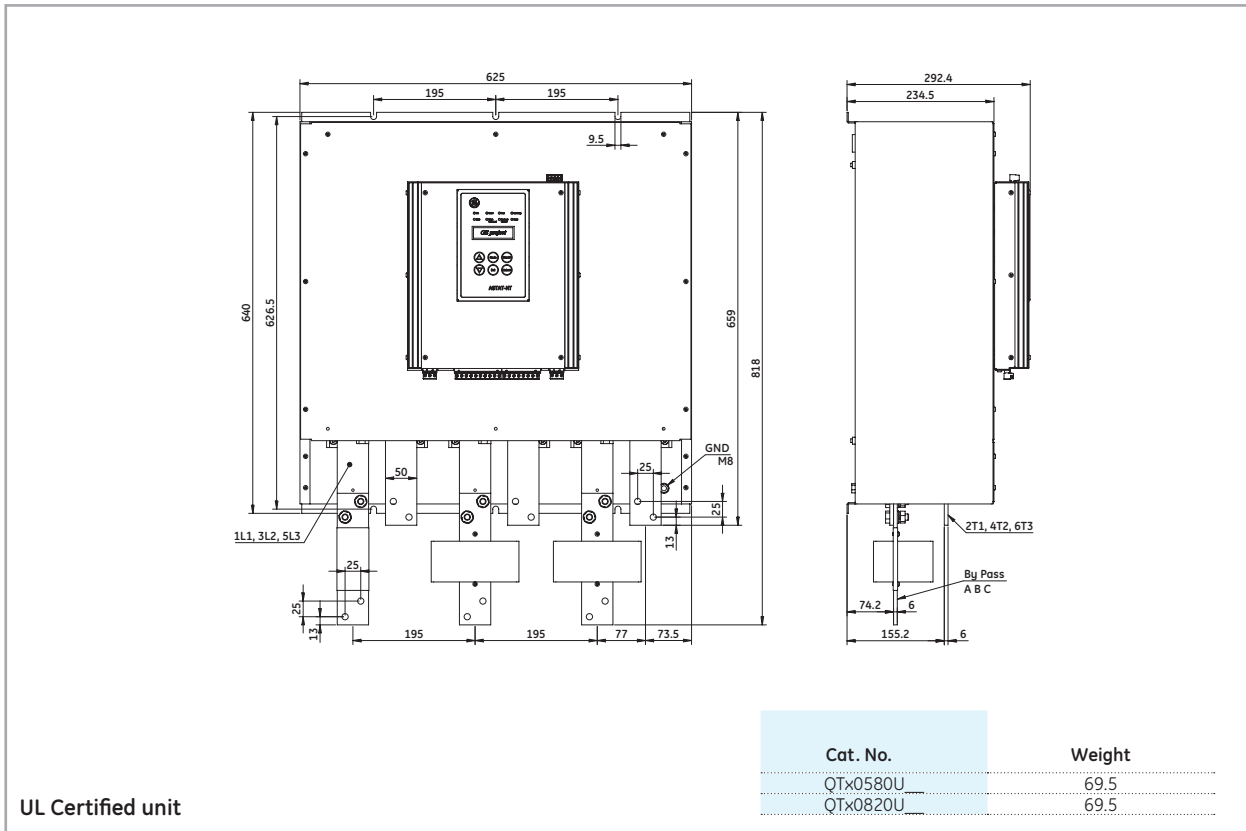


Cat. No.: QTx0460U\_



Dimensions and weights

Cat. No.: QTx0580U\_, QTx0820U\_



Dimensions

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## Series P9

E.2 Control and signalling units Ø 22 mm

## Series 077

E.42 Control and signalling units Ø 30 mm

## Series NLT

E.60 Light towers

E.66 **Foot switches**

E.68 **Safety foot switches**

E.69 **Signalling devices**

Plug-in relays and Auxiliary contactors

Motor protection devices

Contactors and Thermal overload relays

Motorstarters

**Control and signalling units**

Electronic relays

Limit switches

Speed drive units

Main switches

Numerical index

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under control



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- E.3 **Main features**
- E.4 **Range overview**
- E.6 **Technical data**
- E.8 **Order codes - Panel mounting devices**
- E.8 Complete devices
- E.11 Standard push-buttons
- E.11 Mushroom head push-buttons
- E.11 Push buttons with key
- E.12 Selector switches with knob
- E.13 Selector switches with lever
- E.14 Selector switches with key
- E.16 Illuminated push-buttons
- E.16 Illuminated selector switches
- E.17 Selector push-buttons
- E.17 Toggle switches - Joysticks
- E.18 Emergency lever
- E.18 Reset push buttons
- E.18 Potentiometer operators
- E.18 Buzzers - Pilot lights
- E.19 Double function push-buttons
- E.20 Contact blocks
- E.21 Power supplies
- E.22 Electrical diagrams

## Control and signalling units

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- E.23 **Order codes - Base mounting devices**
- E.23 Contact blocks and power supplies
- E.24 **Order codes - Push-button stations in thermoplastic**
- E.26 **Order codes - Equipped boxes**
- E.28 **Order codes - Push-button stations in aluminium**
- E.30 **Order codes - Common accessories**
- E.36 **Overall dimensions**
- E.36 Panel mounting
- E.41 Enclosures for push-button stations



## Main features

### Shape, material and colours



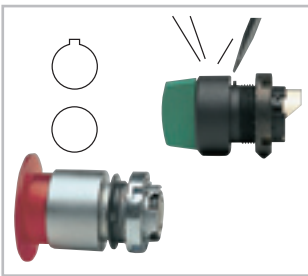
The P9 line offers three types of operators:

- round in satin chrome
- round in engineering thermoplastic
- square in engineering thermoplastic

Modern ergonomic P9 actuators are available in a wide variety of colours and styles, and are the result of superior industrial design experience.

Series P9 satisfies any sophisticated industrial applications.

### Fitting and positioning



All the P9 operators are fitted with seal to ensure IP66 degree of protection.

A locating tab on the operator allows the correct positioning on panels with holes drilled according to CENELEC EN 50007 standards (with notch). The tab also ensures panel stability and prevents unwanted rotations.

The tab can be removed with a screwdriver for applications in holes without notch.

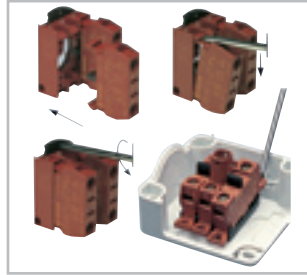
### Rear locking and back mounting procedure



P9 operators are back mounted to the panel by a patented locking ring. The units can be assembled using a standard screwdriver.

As an option, an assembly wrench is available.

### Fast mounting



All the P9 rear panel devices are snap-on.

Mounting between panel and operator is accomplished by means of a patented snap-on flange which ensures a fast fitting.

For base mounting, the fitting is done directly on the adaptor inside the enclosure base.

Each single block can be mounted or removed individually.

In panel mounting, it is also possible to install or remove the snap-on mounting flange with the contact block group;

Blocks and/or flange can be disassembled by a standard screwdriver, to simplify operations.

### Safety and reliability

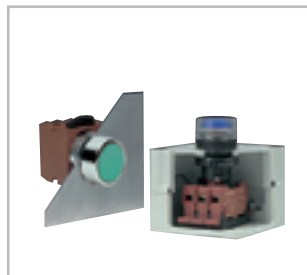


The P9 contact blocks are designed to ensure maximum reliability in every condition and to monitor control circuits at low energy levels

(12V-5mA minimum), thanks to advanced solution such as:

- four contact points
- high efficiency self-cleaning operation
- silver contacts properly shaped
- high contact pressure

### Mounting system



The P9 line offers a wide variety of operators, contact blocks and power supplies for panel mounting.

Furthermore a range of contact blocks and power supplies are available for base mounting.

The base mounting option is simple thanks to plastic enclosures fitted with a standard mounting adaptor, which allows a snap-on and secure fastening.

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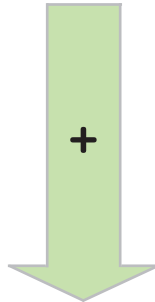
X

Panel mounting devices



Control units

<p>Standard push-b.</p>  <p>E.11</p>	<p>Mushroom push-button</p>  <p>E.11</p>	<p>Emergency push-button</p>  <p>E.11</p>	<p>Key push-button</p>  <p>E.11</p>	<p>Knob selector sw.</p>  <p>E.12</p>	<p>Lever selector sw.</p>  <p>E.13</p>
<p>Key selector sw.</p>  <p>E.14</p>	<p>Selector push-b.</p>  <p>E.17</p>	<p>Toggle switch</p>  <p>E.17</p>	<p>Joystick</p>  <p>E.17</p>	<p>Emergency lever</p>  <p>E.18</p>	<p>Double push-b.</p>  <p>E.19</p>



<p>Contact blocks</p>  <p>E.20</p>
---

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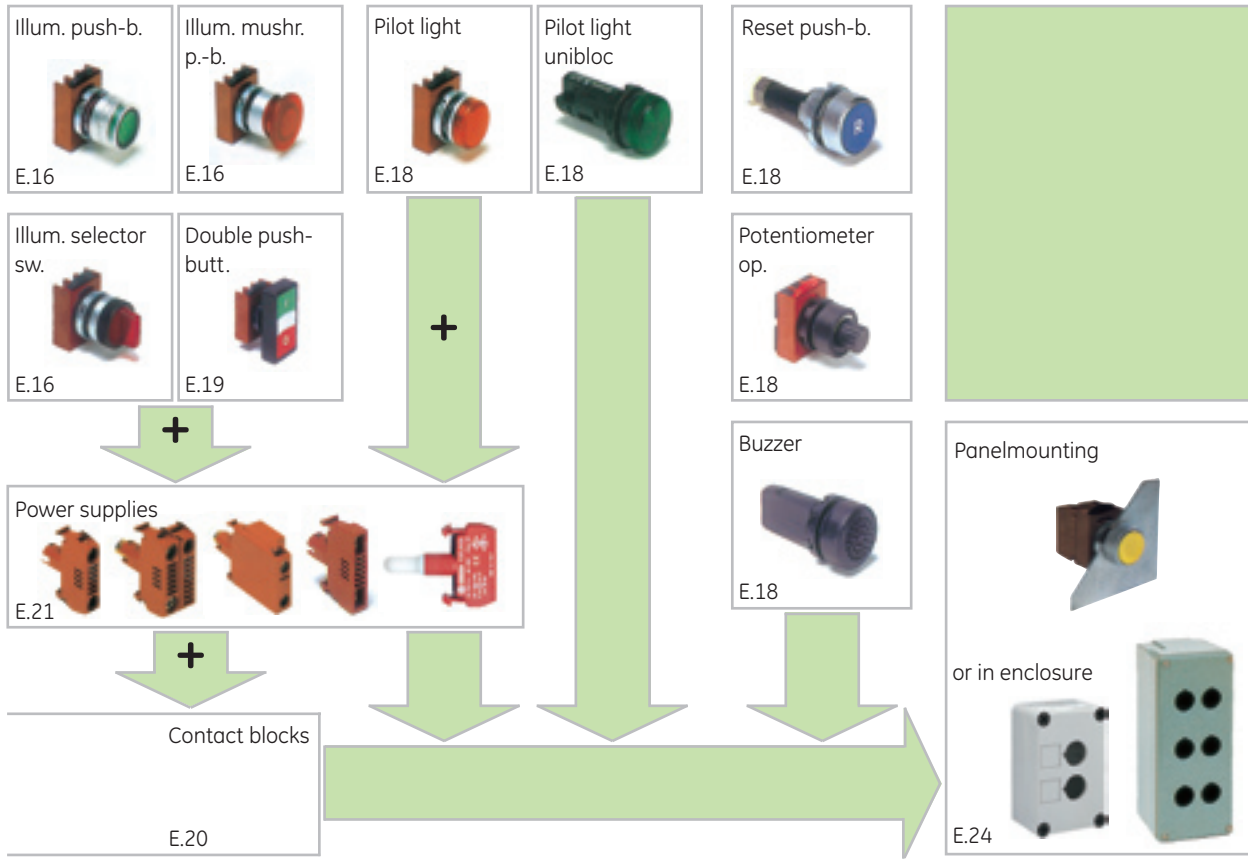
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**Illuminated control units Signalling units**

**Others units**



Range overview

- A
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**Accessories**

General	Push-buttons	Mushroom push-buttons	Selector switches	Illuminated push-buttons	Illuminated mushroom push-buttons	Illuminated selector switches	Pilot lights
Nameplates E.34	Caps E.30	Name plates E.35	Knobs E.32	Diffusers E.31	Lenses E.32	Lenses E.32	Diffusers E.31
Plugs E.33	Rubber caps E.32	Mushr. heads E.32	Lever E.32	Lenses E.32	Collar E.33	Padlock E.33	Lenses E.32
Flanges E.33	Double rubber caps E.19	Collar Ø 40 E.33		Padlock E.33			
Ring wrench E.33	Padlock E.33			Push-on/push-off device E.33			
Neutral plate E.35	Push-on/push-off device E.33			Bulbs BA9S E.34			
	Keys E.34			Bulb extractor E.33			





## Technical data

### Compliance with standards

IEC 947.5.1 - VDE 0660 - NFC 63140  
IEC/EN 60947.5.1 - UTE - BSI - NEMA  
CENELEC EN 50007

### Approvals

cUL U.S. - RINA - CE - GOST R - Lloyd's Register of Shipping - Bureau Veritas - Germanischer Lloyd

### Climatic protections

The standard versions are suitable for use in the following climates:

Temperate climate	cat. 23/50 (DIN 50014)
Wet climate	cat. 23/83 (DIN 50015)
Hot wet climate	cat. 40/92 (DIN 50015)
Variable wet climate	FW24 (DIN 50016)

### Temperature ranges

Operation	-25 °C to + 70 °C
Storage	-40 °C to + 70 °C

### Protection degree of the operators

IP66 according to CENELEC EN 60529 when they are mounted into enclosures with the same or a higher degree of protection.

Suitable for using into enclosures type NEMA 1-3-3R-3S-4-4X-12-13 according to UL 508.

### Protection degree of the terminals

IP2x according to CENELEC EN 60529.

### Shock resistance (acc. to MIL 202 B method 202 A)

1/2 sinusoid 11 ms:

No damage or disassembling at 100 g for all devices, except for the illuminated operators with transformer 38 g.

### Vibration resistance (according to IEC 68-2-6)

16 g with frequency range from 40 to 500 Hz and maximum shifting 0.75 mm (peak-to-peak).

### Rated insulation voltage

690V according to EN 60947.1

### Impulse withstand voltage

4 kV according to EN 60947.1

### Insulation class

Groep C according VDE 0110

### Electrical shocks protection (acc. IEC 536)

Metal operators	Class I
Plastic operators	Class II (double insulation)

### Short-circuit protection

With fuses 16A gG according to IEC 269.1 and 269.3.

### Performances of the contacts

- Slow acting
- Self-cleaning sliding
- NC forced breaking
- Double movable bridge
- Four switching points
- Double break

### Electrical resistance of the contact

≤ 25 m Ω according to IEC 255, cat. 3

### Identification of the terminals

According CENELEC EN 50013

### Electrical performances

Rated thermal current I<sub>th</sub> = 10 A

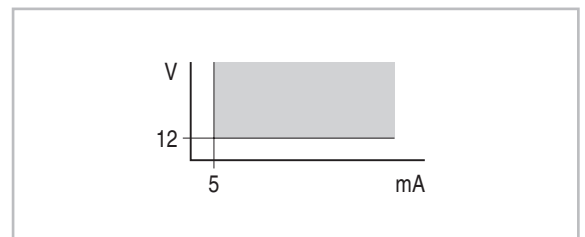
#### Performances according IEC 947.5.1

Categorie AC 15									
Voltage	Ue (V)	24	48	60	110	220	380	500	600
Current	Ie (A)	10	10	10	6	3	2	1.5	1.2
Categorie DC 13									
Voltage	Ue (V)	24	48	60	110	220	300		
Current	Ie (A)	2.5	1.4	1	0.55	0.27	0.2		

#### Performances according to CSA and UL

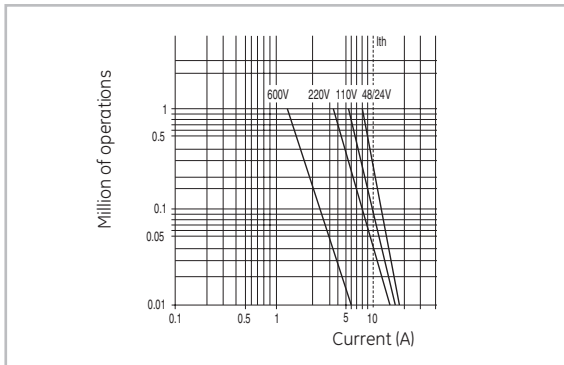
AC Heavy Duty	(A600)
DC Standard Duty	(Q300)

### Operating range

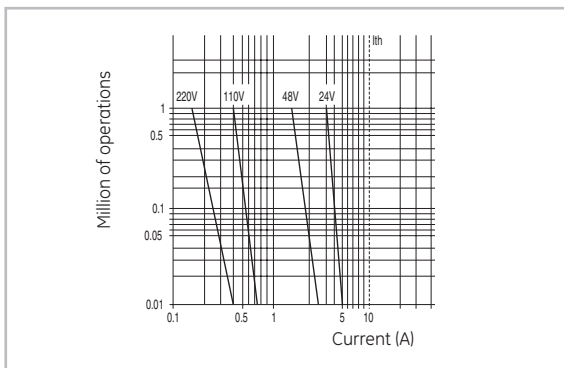


### Electrical endurance

Alternative current 50/60 Hz cat. AC 15



Direct current cat. DC 13



### Mechanical endurance

Locking emergency	
Mushroom head push-buttons 3 positions	0.3 Mil./op.
Illuminated mushroom head push-buttons 3 pos.	
Joysticks	
Key push-buttons	
Toggle switches	0.5 Mil./op.
Illuminated selector switches	
Push-on push-off device	
Standard selector switches	
Key selector switches	
Illuminated push-buttons	1 Mil./op
Selector push-buttons	
Emergency lever	
Standard push-buttons	3 Mil./op.
Mushroom head push-buttons	

### Rear panel modularity

The P9 series is composed with 10 mm or a multiple of 10 mm modular units, fitted side by side on a proper mounting flange. The standard operators are supplied with a three position flange with a capacity of 3 units of 10 mm or 1 of 10 mm and 1 of 20 mm or 1 of 30 mm.

When the three position flange is not enough to satisfy the applications needs, the five position flange is required to add two more units of 10 mm mounted side by side.

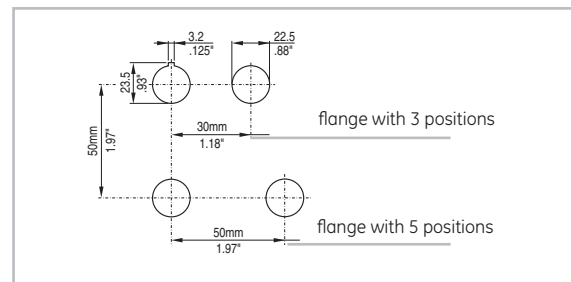
Using the five position flange take into account the bigger with (50 mm instead of 30 mm).

### Number of electrical contacts

	Flange	
	standard 3 positions	optional 5 positions
Standard push-buttons		
Mushroom head push-buttons	max 6	max 8
Emergency lever		
Standard selectors	max 4	max 8
Key selector switches		
Joysticks		
Key push-buttons	max 4	-
Selector push-buttons		
Toggle switches		
Mushroom head with lock	max 4	-
Mushroom head push-buttons 3 pos.	max 2	
Illuminated push-buttons		
Illuminated mushroom head push-buttons	max 4	max 4
Illuminated selector switches		
Illuminated mush. push-buttons with lock	max 2	max 2
Illuminated mush. push-buttons 3 pos.		

### Mounting

Fitted for panels 1 to 6 mm. thick with holes drilled according to CENELEC EN 50007 standards.



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Complete devices

Description	Contact-block	Power supply	Cap colour	Cat. no.		Ref. no.		
				Metal	Plastic			
<b>Momentary push-buttons</b> (head + contact block)	Standard flush	1 NO		Black	P9MPN53007	153007	P9XPN52007	152007
				Green	P9MPN53006	153006	P9XPN52002	152002
	Standard raised	1 NC		Red	P9MPN53061	153061	P9XPN52061	152061
<b>Mushroom/Emergency push-buttons</b> (head + contact block)	Mushroom head momentary	1 NC		Red Ø 40	P9MEM53111	153111	P9XEM52111	152111
	Mush.with latch pull to release	1 NC		Red Ø 40	P9MET53121	153121	P9XET52121	152121
	Mush.with latch turn to release				P9MER53161	153161	P9XER52161	152161
	Mush.with latch key to release (key 3095)				P9MEC53130	153130	P9XEC52130	152130
<b>Knob selector switch</b> (knob head + contact block)	2 fixed positions	1 NO		Black	P9MSM53293	153293	P9XSM52293	152293
	3 fixed positions	2 NO		Black	P9MSM53391	153391	P9XSM52391	152321
<b>Knob selector switch</b> (knob head + contact block)	2 fixed positions	1 NO		Key 3095	P9MSC53435	153435	P9XSC52435	152435
	3 fixed positions	2 NO		Key 3095	P9MSC53497	153497	P9XSC52497	152497

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X



Complete devices

	Description	Contact-block	Power supply	Cap colour	Cat. no.		Ref. no.				
					Metal	Plastic					
<b>Illuminated push-buttons</b> (Head + Standard full voltage power supply+ contact blocks)	Momentary flush (bulb not included)	1NO		Green		P9MPL53502	153501		P9XPL52502	152502	
					1 NC		Red	P9MPL53511	153511	P9XPL52511	152511
					1NO + 1NC		Green	P9MPL53514	153514	P9XPL52514	152514
							Red	P9MPL53515	153515	P9XPL52515	152515
				White	P9MPL53513	153513	P9XPL52513	152513			
<b>Pilot lights</b>	Standard diffused lens- Full voltage Power supply			Green	P9MLD53610	153610	P9XLD52610	152610			
				Red	P9MLD53611	153611	P9XLD52611	152611			
	Standard diffused lens- Integrated LED 24VAC/DC			Green	P9MLD53620	153623	P9XLD52620	152620			
				Red	P9MLD53621	153621	P9XLD52621	152621			
<b>Double functions push-buttons</b> (Head + contact block & power supply when indicated)	Flush both caps	1 NO + 1NC		Green-red			P9DPL54700	154700			
	Flush both caps - Full voltage power supply	1 NO + 1NC		Green-red			P9DPL54720	154720			
	Flush both caps with ISO I/O Full voltage power supply	1 NO + 1NC		Green-red			P9DPL54701	154701			
	Flush both caps with ISO I/O	1 NO + 1NC		Green-red			P9DPL54721	154721			

Panel mounting

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X



Notes

Grid area for notes

A

B

C

D

E

F

G

H

I

X



Push-buttons

Standard / Momentary		Description	Cat. no.		Ref. no.		Cat. no.		Ref. no.	
			Metal	Plastic	Plastic	see bottom		see bottom		see bottom
		With flush cap	<b>P9MPN●G</b>		<b>P9XPN●G</b>				<b>P9SPN●G</b>	
		With raised cap	<b>P9MPN●S</b>		<b>P9XPN●S</b>				<b>P9SPN●S</b>	
		Recessed	<b>P9MPN●E</b>							
<b>Mushroom head / Momentary</b>										
		Mushroom head Ø 28 mm	<b>P9MEM3●N</b>		<b>P9XEM3●N*</b>					
		Mushroom head Ø 40 mm	<b>P9MEM4●N</b>		<b>P9XEM4●N*</b>					
		Mushroom head Ø 60 mm	<b>P9MEM6●N</b>							
		Mushroom head $\nabla$ 30 mm						<b>P9SEM3RN</b>		186031
										* Color N or R
<b>Mushroom head / Emergency with latch</b>										
<b>Standard</b>	<b>Push-pull to release</b>	Mushroom head Ø40 mm	<b>P9MET4●N1</b>		<b>P9XET4●N1</b>			<b>P9SET4R</b>		186061
	<b>Push-twist to release</b>	Red mushroom head Ø28 mm	<b>P9MER3RN</b>	184070	<b>P9XER3RN</b>	185070				
		Red mushroom head Ø40 mm	<b>P9MER4RN</b>	184071	<b>P9XER4RN</b>	185071				
	<b>Push-key to release</b>	Red mushroom head Ø40 mm	<b>P9MEC4RN▲</b>		<b>P9XEC4RN▲</b>					
<b>Positive break</b> in accordance with EN 418 	<b>Push-twist to release</b>	Red mushroom head Ø40 mm			<b>P9XER4RAN</b>	185077	<b>P9SER4RA</b>			186072
	<b>Push-twist to release</b>	Red mushroom head Ø40 mm with status indication			<b>P9XER4RAW</b>	185078				
	<b>Push-key to release</b>	Red mushroom head Ø40 mm with key code 3095			<b>P9XEC4RA95N</b>	185079	<b>P9SEC4RA95</b>			186073
<b>Mushroom head / 3 positions</b>										
		Ø40 mm 1-0 fixed. 2 transient	<b>P9MET4●N2</b>							
		Ø40 mm 0 fixed. 1-2 transient	<b>P9MET4●N3</b>							
<b>With keylock <sup>(1)</sup></b>										
<b>Key withdrawable in position I &amp; II</b> 		normal	<b>P9MPCN1K▲</b>							
		depressed	<b>P9MPCN2K▲</b>							
		normal & depressed	<b>P9MPCN3K▲</b>							
<b>Key withdrawable position III</b> 	<b>Lockable position</b>	normal	<b>P9MPCN1E▲</b>							
		depressed	<b>P9MPCN2E▲</b>							
		normal & depressed	<b>P9MPCN3E▲</b>							

(1) Keys on E.14

The catalogue numbers in **bold** are available from stock.

Colours		black	red	green	yellow	brown	blue	white	grey	without cap
Caps	●	<b>N</b>	<b>R</b>	<b>V</b>	<b>G</b>	<b>M</b>	<b>L</b>	B	H	0
Mushroom heads	●	<b>N</b>	<b>R</b>	<b>V</b>	<b>G</b>	-	<b>L</b>	-	-	-

**Remark:** To complete the catalogue number, substitute the symbol ● by a letter for the choice of the colour and the symbol ▲ by a number for the type of the key.

















For reference numbers, see chapter X, pg. X.8



Panel mounting

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X

Selector switches with knob

2 positions		Function (1)	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom			
									Metal	Plastic	Plastic
											
Fixed		D	<b>P9MSMD0●</b>		<b>P9XSMD0N</b>	185110	<b>P9SSMD0N</b>	186110			
		I	P9MSMI0●		P9XSMI0N	185120	P9SSMI0N	186120			
		H	P9MSMH0●								
With spring return		D	<b>P9MSMD5●</b>		<b>P9XSMD5N</b>	185150	<b>P9SSMD5N</b>	186140			
		I	P9MSMI5●				P9SSMI5N	186150			
		H	P9MSMH1●								
3 positions											
Fixed		E	P9MSME0●				P9SSME0N	186170			
		L	P9MSML0●								
		U	P9MSMU0●		<b>P9XSMU0N</b>	185190	P9SSMU0N	186190			
		Z, B	P9MSMZ0●		<b>P9XSMZ0N</b>	185200	P9SSMZ0N	186200			
With spring return		E	P9MSME1●				P9SSME1N	186210			
		L	P9MSML1●								
		U	P9MSMU1●				P9SSMU1N	186230			
		Z, B	P9MSMZ1●		<b>P9XSMZ1N</b>	185240	P9SSMZ1N	186240			
		E	P9MSME5●								
		L	P9MSML5●								
		U	P9MSMU5●								
		Z, B	P9MSMZ5●		<b>P9XSMZ5N</b>	185280	P9SSMZ5N	186280			
		E	P9MSME3●								
		L	P9MSML3●								
		U	P9MSMU3●								
		Z, B	<b>P9MSMZ3●</b>		<b>P9XSMZ3N</b>	185320	<b>P9SSMZ3N</b>	186320			
4 positions											
Fixed		X	<b>P9MSMX0●</b>		<b>P9XSMX0N</b>	185330	<b>P9SSMX0N</b>	186330			
With spring return		X	<b>P9MSMX5●</b>								
5 positions											
Fixed		X	P9MSMY0●								
		W	P9MSMW0●								

(1) Electrical diagrams, see E.22


































The catalogue numbers **in bold** are available from stock.

Colours round shape	black	red	green	yellow	blue	
Knobs	●	N	R	V	G	L

For reference numbers, see chapter X, pg. X.8



Selector switches with lever

2 positions		Function (1)	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom
			Metal		Plastic	
 	Fixed		D	<b>P9MSVD0</b>		<b>P9XSVD0N</b> 185370
			I	P9MSVI0		P9XaSVI0N 185371
			H	P9MSVH0		
	With spring return		D	<b>P9MSVD5</b>		<b>P9XSVD5N</b> 185373
			I	P9MSVI5		
			H	P9MSVH1		
3 positions						
 	Fixed		E	P9MSVE0		
			L	P9MSVL0		
			U	P9MSVU0		
			Z, B	<b>P9MSVZ0</b>		<b>P9XSVD0N</b> 185379
	With spring return		E	P9MSVE1		
			L	P9MSVL1		
			U	P9MSVU1		
			Z, B	P9MSVZ1		
	With spring return		E	P9MSVE5		
			L	P9MSVL5		
			U	P9MSVU5		
			Z, B	P9MSVZ5		
With spring return		E	P9MSVE3			
		L	P9MSVL3			
		U	P9MSVU3			
		Z, B	<b>P9MSVZ3</b>		<b>P9XSVD3N</b> 185391	
4 positions						
 	Fixed		X	P9MSVX0		P9XSVDX0N 185392
	With spring return		X	P9MSVX5		
5 positions						
	Fixed		X	P9MSVY0		
			W	P9MSVW0		

(1) Electrical diagrams, see E.22

The catalogue numbers in **bold** are available from stock.

Colours	●	black	red	green	yellow	blue
Levers	●	N	R	V	G	L

For reference numbers, see chapter X, pg. X.8















Panel mounting

- A
- B
- C
- D
- E**
- F
- G
- H
- I
- X




Selector switches with key

2 positions		Function (1)	Key removal	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	
Fixed	Metal			Plastic	Plastic (1)					
		D	I	<b>P9MSCD0A▲</b>		<b>P9XSCD0A95</b>	185400	<b>P9SSCD0A95</b>	186400	
			II		<b>P9MSCD0E▲</b>		<b>P9XSCD0E95</b>	185401		
			I-II		<b>P9MSCD0K▲</b>		<b>P9XSCD0K95</b>	185402		
		I	0	<b>P9MSCI0C▲</b>						
			I		<b>P9MSCI0E▲</b>					
			0-I		<b>P9MSCI0N▲</b>					
		H	I	<b>P9MSCHOA▲</b>						
			0		<b>P9MSCH0C▲</b>					
			I-0		<b>P9MSCH0H▲</b>					
	D	I	<b>P9MSCD5A▲</b>		<b>P9XSCD5A95</b>	185409	<b>P9SSCD5A95</b>	186409		
		I	0	<b>P9MSCI5C▲</b>		<b>P9XSCI5C95</b>	185410	<b>P9SSCI5C95</b>	186410	
			0-I		<b>P9MSCI5N▲</b>					
	H	0	<b>P9MSCH1C▲</b>							
	<hr/>									
	3 positions		Function (1)	Key removal	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom
Fixed	Metal	Plastic			Plastic (1)					
		E	I	<b>P9MSCE0A▲</b>						
			0		<b>P9MSCE0C▲</b>					
			II		<b>P9MSCE0E▲</b>					
			I-0		<b>P9MSCE0H▲</b>					
			I-II		<b>P9MSCE0K▲</b>					
			0-II		<b>P9MSCE0N▲</b>					
		L	I	<b>P9MSCLOA▲</b>						
			0		<b>P9MSCLOC▲</b>					
			II		<b>P9MSCLOE▲</b>					
			I-0		<b>P9MSCLOH▲</b>					
			I-II		<b>P9MSCLOK▲</b>					
			0-II		<b>P9MSCLON▲</b>					
		U	I	<b>P9MSCU0A▲</b>						
			0		<b>P9MSCU0C▲</b>					
			II		<b>P9MSCU0E▲</b>					
			I-0		<b>P9MSCU0H▲</b>					
			I-II		<b>P9MSCU0K▲</b>					
			0-II		<b>P9MSCU0N▲</b>					
	Z, B	I	<b>P9MSCZ0A▲</b>		<b>P9XSCZ0A95</b>	185433				
		0		<b>P9MSCZ0C▲</b>		<b>P9XSCZ0C95</b>	185434			
		II		<b>P9MSCZ0E▲</b>		<b>P9XSCZ0E95</b>	185435			
		I-0		<b>P9MSCZ0H▲</b>						
		I-II		<b>P9MSCZ0K▲</b>						
		0-II		<b>P9MSCZ0N▲</b>						
	I-0-II		<b>P9MSCZ0T▲</b>		<b>P9XSCZ0T95</b>	185439	<b>P9SSCZ0T95</b>	186439		

(1) Electrical diagrams, see E.22

The catalogue numbers in **bold** are available from stock.

Keys for round metal shape

	Standard version number	▲	95								
	Standard version with specific number	▲	01	02	03	04	05	10	16	19	55 (Ronis)
	FIAT version number	▲	33	34	37	38	40				
Colour		yellow	black	red	blue	orange					

(1) Key for square shape and round plastic shape, only standard version 95

For reference numbers, see chapter X, pg. X.8



Selector switches with key

3 positions		Function (1)	Key removal	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom
				Metal		Plastic		Plastic (1)	
	With spring return		E	0	<b>P9MSCE1C▲</b>				
				II	<b>P9MSCE1E▲</b>				
				0-II	<b>P9MSCE1N▲</b>				
			L	0	<b>P9MSSL1C▲</b>				
				II	<b>P9MSSL1E▲</b>				
				0-II	<b>P9MSSL1N▲</b>				
		U	0	<b>P9MSCU1C▲</b>					
			II	<b>P9MSCU1E▲</b>					
			0-II	<b>P9MSCU1N▲</b>					
		Z; B	0	<b>P9MSCZ1C▲</b>					
			II	<b>P9MSCZ1E▲</b>					
			0-II	<b>P9MSCZ1N▲</b>					
	With spring return		E	I	<b>P9MSCE5A▲</b>				
				0	<b>P9MSCE5C▲</b>				
				I-0	<b>P9MSCE5H▲</b>				
			L	I	<b>P9MSSL5A▲</b>				
				0	<b>P9MSSL5C▲</b>				
				I-0	<b>P9MSSL5H▲</b>				
	U	I	<b>P9MSCU5A▲</b>						
		0	<b>P9MSCU5C▲</b>						
		I-0	<b>P9MSCU5H▲</b>						
	Z, B	I	<b>P9MSCZ5A▲</b>			<b>P9XSCZ5A95</b>	185461	<b>P9SSCZ5A95</b>	186461
		0	<b>P9MSCZ5C▲</b>			<b>P9XSCZ5C95</b>	185462		
		I-0	<b>P9MSCZ5H▲</b>			<b>P9XSCZ5H95</b>	185463		
With spring return		E	0	<b>P9MSC3C▲</b>					
		L	0	<b>P9MSSL3C▲</b>					
		U	0	<b>P9MSCU3C▲</b>					
		Z, B	0	<b>P9MSCZ3C▲</b>			<b>P9XSCZ3C95</b>	185467	<b>P9SSCZ3C95</b>

4 positions		Function (1)	Key removal	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom
	Fixed		X	I	<b>P9MSCX0A▲</b>				
				II	<b>P9MSCX0B▲</b>				
				III	<b>P9MSCX0D▲</b>				
				IV	<b>P9MSCX0E▲</b>				
				I-II	<b>P9MSCX0F▲</b>				
				I-III	<b>P9MSCX0J▲</b>				
				I-IV	<b>P9MSCX0K▲</b>				
				II-III	<b>P9MSCX0L▲</b>				
				II-IV	<b>P9MSCX0M▲</b>				
				III-IV	<b>P9MSCX0P▲</b>				
				I-II-III	<b>P9MSCX0R▲</b>				
				I-II-IV	<b>P9MSCX0S▲</b>				
	With spring return		X	I	<b>P9MSCX5A▲</b>				
				II	<b>P9MSCX5B▲</b>				
				III	<b>P9MSCX5D▲</b>				
				I-II	<b>P9MSCX5F▲</b>				
				I-III	<b>P9MSCX5J▲</b>				
				II-III	<b>P9MSCX5L▲</b>				
	I-II-III	<b>P9MSCX5R▲</b>							

(1) Electrical diagrams, see E.22

The catalogue numbers in **bold** are available from stock.

Keys for round metal shape

Standard version number	▲	95								
Standard version with specific number	▲	01	02	03	04	05	10	16	19	55 (Ronis)
FIAT version number	▲	33	34	37	38	40				
Colour		yellow	black	red	blue	orange				

(1) Key for square shape and round plastic shape, only standard version 95





For reference numbers, see chapter X, pg. X.8

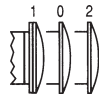


Panel mounting






- A
- B
- C
- D
- E
- F
- G
- H
- I
- X

**Illuminated push-buttons**






		Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.
		Metal	Plastic	Plastic	see bottom	see bottom	see bottom
							
<b>Standard / Momentary</b>							
	With diffused lens:						
	Flush	<b>P9MPL●GD</b>		<b>P9XPL●GD</b>		<b>P9SPL●GD</b>	
	Raised	<b>P9MPL●SD</b>		<b>P9XPL●SD</b>		<b>P9SPL●SD</b>	
	Recessed	<b>P9MPL●ED</b>					
<b>Mushroom head / Momentary</b>							
	Mushroom head Ø40 mm	<b>P9MEM4●L</b>		<b>P9XEM4●L*</b>			
	Mushroom head 30 mm					P9SEM3RL	186551
<b>Mushroom head / With latch</b>							
	Push-pull to release						
	Mushroom head Ø40 mm	<b>P9MET4●L1</b>		<b>P9XET4●L1*</b>		<b>P9SET4RL1</b>	186561
				* Color R, V or G			
<b>Mushroom head / 3 positions</b>							
	With mushroom Ø40 mm						
	1-0 fixed, 2 transient	<b>P9MET4●L2</b>		<b>P9XET4RL2</b>	185571		
	0 transient, 1-2 fixed	<b>P9MET4●L3</b>					



**Illuminated selector switches with knob**

		Function (1)			
<b>2 positions</b>					
<b>Fixed</b>		D	<b>P9MSLD0●</b>	<b>P9XSLD0●</b>	<b>P9SSLD0●</b>
<b>3 positions</b>					
<b>Fixed</b>		Z, B	<b>P9MSLZ0●</b>	<b>P9XSLZ0●</b>	<b>P9SSLZ0●</b>
<b>With spring return</b>		Z, B	<b>P9MSLZ1●</b>		
		Z, B	<b>P9MSLZ5●</b>		
		Z, B	<b>P9MSLZ3●</b>		

**Illuminated selector switches with lever**

		Function (1)			
<b>2 positions</b>					
<b>Fixed</b>		D	<b>P9MSAD0●</b>		
<b>3 positions</b>					
<b>Fixed</b>		Z, B	<b>P9MSAZ0●</b>		
<b>With spring return</b>		Z, B	<b>P9MSAZ1●</b>		
		Z, B	<b>P9MSAZ5●</b>		
		Z, B	<b>P9MSAZ3●</b>		

(1) Electrical diagrams, see E.22

The catalogue numbers **in bold** are available from stock.

Colours		red	green	yellow	orange	blue	white	clear
Lens	●	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>L</b>	<b>B</b>	<b>I</b>
Mushroomheads	●	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>L</b>	<b>B</b>	<b>I</b>
Knob/lever	●	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>L</b>	<b>B</b>	<b>I</b>

For reference numbers, see chapter X, pg. X.8



**Selector push-buttons (black coloured)**

	Function (1)	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.
				Metal	Plastic	Plastic	
<b>2 positions</b>							
	Fixed		201	P9MPS21G	184690		
			231	<b>P9MPS22G</b>	184691		
			235	P9MPS23G	184692		
<b>3 positions</b>							
	Fixed		301	P9MPS34G	184693		
			323	P9MPS35G	184694		

**Toggle switches (black coloured)**

<b>2 positions</b>							
	Fixed position		D	<b>P9MCD</b>	184695	<b>P9XCD</b>	185695
						<b>P9SCD</b>	186695
<b>3 positions</b>							
	Fixed position		B	P9MCB	184696		
			B	P9MCC	184697		
	Transient to zero from one position						

**Joysticks (black coloured)**

<b>2 positions + central zero position <sup>(1)</sup></b>							
	Without interlock		fixed positions	P9MMN2F	184700	P9XMN2F	185700
			transient positions	<b>P9MMN2T</b>	184701	<b>P9XMN2T</b>	185701
			1 transient - 3 fixed positions	P9MMN2A	184702		
			1 fixed - 3 transient positions	P9MMN2B	184703		
	With interlock		fixed positions	P9MMB2F	184710	P9XMB2F	185710
			transient positions	<b>P9MMB2T</b>	184711	<b>P9XMB2T</b>	185711
			1 transient - 3 fixed positions	P9MMB2A	184712	P9XMB2A	185712
			1 fixed - 1 transient positions	P9MMB2B	184713	P9XMB2B	185713
<b>4 positions + central zero position <sup>(1)</sup></b>							
	Without interlock		fixed positions	P9MMN4F	184720	P9XMN4F	185720
			transient positions	<b>P9MMN4T</b>	184721	<b>P9XMN4T</b>	185721
	With interlock		fixed positions	P9MMB4F	184740	P9XMB4F	185740
			transient positions	P9MMB4T	184741	P9XMB4T	185741

(1) Electrical diagrams, see E.22

The catalogue numbers in **bold** are available from stock.

Panel mounting

A

B

C

D

E

F

G

H

I

X



A

B

C

D

E

F





G

H

I

X


**Emergency lever**

	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.
	Metal		Plastic		Plastic	
						
	<b>Red lever</b>	P9MWR	184770			


**Reset push-button**

	<b>White symbol on blue background</b>	P9MRG	184771	P9XRG	185771	
---	--	-------	--------	-------	--------	--


**Potentiometer operator (potentiometer not included)**

	<b>Black knob</b>	<b>P9MZ</b>	184772	<b>P9XZ</b>	185772	<b>P9SZ</b>	186772
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**Buzzer**

	<b>Black coloured</b> Bitonal sound Full voltage AC/DC Frequency: 2kHz Sound intensity: 80dB at 1 m Consumption: 3 to 9 mA 24 V 110-240 V			P9XBD P9XBM	185773 185774	P9SBD P9SBM	186773 186774
---	--	--	--	----------------	------------------	----------------	------------------

**Pilot lights**

	<b>Standard</b> Diffused lens (for filament bulb) Refracted lens (for neon bulb) Glass lens	<b>P9ML</b> ●D <b>P9ML</b> ●R <b>P9ML</b> ●V	see bottom see bottom see bottom	<b>P9XL</b> ●D	see bottom	<b>P9SL</b> ●D	see bottom
	<b>Unibloc (complete pilot light)</b> Full voltage AC/DC BA9S max 382 V - 2 W not included Diffused lens Refracted lens			<b>P9XU</b> ●DDO	see bottom		
	With resistor 220 V BA9S 110 V - 2 W included Diffused lens Refracted lens			<b>P9XU</b> ●DRN	see bottom		


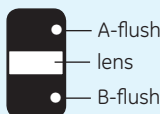


The catalogue numbers **in bold** are available from stock.

Colours							
Lens	●	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>L</b>	<b>B</b> I

For reference numbers, see chapter X, pg. X.8



Double function push-buttons <sup>(1)</sup>

	Colours (2)	Plastic caps without symbols		Plastic caps with symbols	
		Cat. no.	Ref. no.	Cat. no.	Ref. no.
<b>IP40 protection (acc. to IEC 529)</b>					
 <p>With white lens assembled for indicator light. Black insert for not illuminated function included in the packaging.</p>  <p>A-flush lens B-flush</p>	A - Black B - Red	P9DPLNRG00	186880	P9DPLNRG01	186890
	A - Green B - Red	<b>P9DPLVRG00</b>	186881	<b>P9DPLVRG01</b>	186891
	A - Black B - Red	P9DPLNRS00	186882	P9DPLNRS01	186892
	A - Green B - Red	P9DPLVRS00	186883	P9DPLVRS01	186893
 <p><b>Clear cap (silicon rubber)</b></p>  <p>IP66 protection (acc. to IEC 529)</p>	A - flush B - flush	080CPDT	173208	080CPDT	173208
	A - flush B - raised	P9ADCST	187796	P9ADCST	187796

(1) With white lens assembled.  
Black insert for not illuminated function included in the packaging.  
(2) Integral caps, colours not replacable.

Panel mounting

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X



A

B

C

D

**E**

F


G


















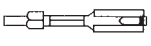




H

I

X


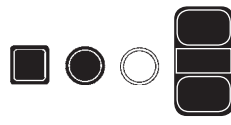














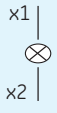
## Contact blocks

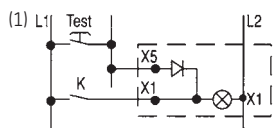
		Cat. no.	Ref. no.
<p><b>Logic Reed</b></p> <p>A new range of LOGIC REED contact blocks with faston terminals for use with power lower than 12V - 5mA.</p> 	Contact type	NC	<b>P9B01FH</b> 187014
		NO	<b>P9B10FH</b> 187015
	Rated voltage	AC2 to 120V max. DC2 to 30V max.	
	Rated current	AC/DC - 0.001 to 0.15A max.	
	Rated power	AC - 8VA max. DC - 4.5W max.	
	Minimum centerline distance	30x32 mm.	
	Mounting on operators	through specific bayonet flange adaptor.	<b>P9ACFSM</b> 187846
	Full voltage power supply		<b>P9PDHF</b> 187056

	With screw	Contact type	Cat. no.	Ref. no.
	 min. 1 of 22 AWG (0.32 mm <sup>2</sup> ) max. 2 of 12 AWG (3.3 mm <sup>2</sup> )			
	 	NC+NO	<b>P9B11VN</b>	187000
	 	NC+NC	<b>P9B02VN</b>	187008
		NO+NO	<b>P9B20VN</b>	187009
	 	NC	<b>P9B01VN</b>	187001
		NO	<b>P9B10VN</b>	187002
	 	NC late opening	<b>P9B01VR</b>	187003
		NO early closing	<b>P9B10VA</b>	187004
	<p><b>Faston</b></p>  1 x (6.35 x 0.8 mm) 2 x (2.8 x 0.8 mm)	 	NC	<b>P9B01FN</b> 187012
		NO	<b>P9B10FN</b> 187013	
	<p><b>Terminal adapter</b></p> <p>printed circuit board adapter</p>		<b>P9ACA6</b>	188804

The catalogue numbers in **bold** are available from stock.

Power supplies

With screw  min. 1 of 22 AWG (0.32 mm <sup>2</sup> ) max. 2 of 12 AWG (3.3 mm <sup>2</sup> )	Position on flange 2 3 1	Contact type	Cat. no.	Ref. no.	
					
		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Full voltage ≅ IEC: BA9S max 380V-2W not included UL-CSA: BA9S max 250V-2W not included	<b>P9PDNV0</b>	187020
			Logic Reed fullvoltage for low power	<b>P9PDHF</b>	187056
		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Long life 110/120V ≅ BA9S 130V-2W included	<b>P9PRLVJ</b>	187021
		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Resistor + Diode 220/240 V ~ BA9S 130V-2W included	<b>P9PRDVN</b>	187022
		<input checked="" type="checkbox"/> <input type="checkbox"/>	Resistor 110/120V ≅ BA9S 60V-1.2W included	<b>P9PRNVJ</b>	187023
			220/240V ≅ BA9S 130V-2W included	<b>P9PRNVN</b>	187024
		<input checked="" type="checkbox"/> <input type="checkbox"/>	Resistor ENEL version BA9S 48V-2W included 110V ≅	<b>P9PREVJ</b>	187025
			125/127V ≅	<b>P9PREVL</b>	187026
		<input checked="" type="checkbox"/> <input type="checkbox"/>	UL-CSA: BA9S max 250V-2W not included Test full voltage (1) ≅ IEC: BA9S max 380V-2W not included	<b>P9PDTV0</b>	187027
		<input checked="" type="checkbox"/> <input type="checkbox"/>	Test resistor (1) 220/240 V ≅ BA9S 130V-2W included	<b>P9PRTVN</b>	187028
		<input checked="" type="checkbox"/> <input type="checkbox"/>	Transformer 50/60 Hz BA9S 6V-1.5W included	<b>P9PTNV♦</b>	see bottom
		<input checked="" type="checkbox"/>	Multifunction (2) full voltage 24V ≅ BA9S 24V-2W included	<b>P9PDMVD</b>	187040
		Multifunction (2) full voltage 110V ≅ BA9S 130V-2W included	<b>P9PDMVJ</b>	187041	
	<input checked="" type="checkbox"/>	Multifunction (2) Transformer 50/60 Hz BA9S 6V-0.6W included	<b>P9PTMV♦</b>	see bottom	
 <b>Faston</b> 1 x (6.35 x 0.8 mm) 2 x (2.8 x 0.8 mm)		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Full voltage IEC: BA9S max 380V-2W not included UL-CSA: BA9S max 250V-2W not included	<b>P9PDNF0</b>	187055
	 <b>Integrated LED</b>		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Standard light	
24V AC/DC				<b>P9PLNVD♦</b>	see bottom
120V AC				<b>P9PLNVJ♦</b>	see bottom
230V AC				<b>P9PLNVN♦</b>	see bottom
Flashing light					
24V AC/DC				<b>P9PLFVD♦</b>	see bottom
120V AC	<b>P9PLFVJ♦</b>	see bottom			
230V AC	<b>P9PLFVN♦</b>	see bottom			



(2) Y1 Y2 Do not connect for flashing light  
 Y1 Y2 Link to external contact in order to have steady or flashing light  
 L C C closed = Steady light  
 L C C open = Flashing light

LED colour	orange	white	yellow	blue	red	green
	<b>A</b>	<b>B</b>	<b>G</b>	<b>L</b>	<b>R</b>	<b>V</b>

The catalogue numbers in **bold** are available from stock.

Voltage	110-120	220-250	380	415-440	480-500
	♦	<b>J</b>	<b>N</b>	<b>U</b>	<b>W</b> <b>Y</b>
	:	<b>J</b>	<b>N</b>	<b>U</b>	- -

For reference numbers, see chapter X, pg. X.8



Panel mounting

- A
- B
- C
- D
- E**
- F
- G
- H
- I
- X



A

B

C

D

E

F

G

H

I

X

Diagrams

Selector switches

Positions	Function	Contacts	Position on flange 2 3 1
	D	B10	
	D	B10 B01	
	D	B11	
	I	B11	
	H	B11 B11	
	B	B10 B10	
	E	B11	
	L	B11	
	U	B11 B11	
	Z	B11 B11	
	Z	B10 B01	
	X	B11 B11	
	Y	B11 B11	
	W	B11 B11	

Selector push-buttons

Positions	Function	Contacts	Normal Depressed	Position on flange 2 3 1
	201	B11 B11		
	231	B11 B11		
	235	B11 B11		
	301	B11 B11		
	323	B11 B11		

\* Can not be depressed

Joysticks

Positions	Contacts	Position on flange 2 3 1
	B11	
	B11	
	B11	
	B11	

Toggle switches

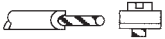



Positions	Function	Contacts	Position on flange 2 3 1
	D	B11	
	B	B11	

Mushroom head push-buttons 3 pos.


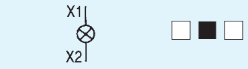

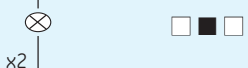
Function	Contacts	Position on flange 2 3 1
2	B01R B01	
3	B11	



Contact blocks

With screw	Contact type	Cat. no.	Ref. no.
		 min. 1 of 22 AWG (0.32 mm <sup>2</sup> ) max. 2 of 12 AWG (3.3 mm <sup>2</sup> )	
		 <b>P9B10BN</b>	187018

Power supplies

With screw	Position on flange 2 3 1	Bulb power supply	Cat. no.	Ref. no.
 min. 1 of 22 AWG (0.32 mm <sup>2</sup> ) max. 2 of 12 AWG (3.3 mm <sup>2</sup> )		Full voltage ≅ IEC: BA9S max 380V-2W not included UL-CSA: BA9S max 250V-2W not included	 <b>P9PDNB0</b>	187070
		Standard light 24V AC/DC 120V AC 230V AC	<b>P9PLNBD•</b> <b>P9PLNBJ•</b> <b>P9PLNBN•</b>	see bottom see bottom see bottom

The catalogue numbers **in bold** are available from stock.

LED colour•	orange	white	yellow	blue	red	green
	A	B	G	L	R	V

For reference numbers, see chapter X, pg. X.8



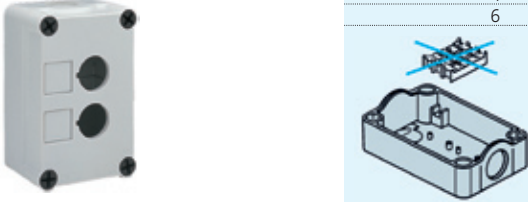
Base mounting

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X

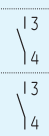




**Push-button stations in thermoplastic (Light grey coloured RAL 7035)**

**For panel and base mounting**

- IP66 according to IEC529, EN 60529
- Engineered thermoplastic covers, bases and screws
- Self extinguishing Class V0, according to UL 94
- Rust resistant (4X according to UL 508)
- Total insulation with all thermoplastic operators
- Contact blocks and power supplies for both base and front mounting

Empty versions	Number of holes	Cat. no.	Ref. no.
Cover with holes Knockouts conduit entry	1 (yellow cover)	<b>P9EPEG1</b>	189000
	1	<b>P9EPE01</b>	189001
	2	<b>P9EPE02</b>	189002
	3	<b>P9EPE03</b>	189003
	4	<b>P9EPE04</b>	189004
	6	<b>P9EPE06</b>	189005
 <p>For panel mounting</p>			

Accessories	Description	Symbols	Cat. no.	Ref. no.
Write-on plates Bilaminated, self adhesive, 20 x 20 mm Black background engravable for white texts	Without text		<b>P9AELN</b>	<b>189030</b>
	Text in English (1) START		P9AELN202	189031
	STOP		P9AELN201	189032
	FORWARD		P9AELN214	189033
	REVERSE		P9AELN215	189034
	CLOSE		P9AELN205	189035
	OPEN		P9AELN206	189036
	UP		P9AELN204	189037
	DOWN		P9AELN203	189038
	LEFT		P9AELN222	189152
	RIGHT		P9AELN224	189154
		→	P9AELN006	189041
		I	P9AELN028	189042
		0	P9AELN029	189043
		II	P9AELN035	189044
	III	P9AELN038	189045	
	0-I	P9AELN039	189046	
	I-0-II	P9AELN042	189047	
Earth terminal clamp			P9AEMT	189029




Equipped versions	Operators	Colour	Diagram	Name-plate	Cat. no.	Ref. no.
One unit	Flush push-button	green		I	<b>P9EPA01Y02</b>	189010
	Flush push-button	white		I	<b>P9EPA01Y03</b>	189011
	<b>Emergency</b> push-button with latch according to EN418 (yellow cover)	red		0	<b>P9EPAG1Y0N</b>	189007
	<b>Emergency</b> push-button with latch & status indicator according to EN418 (yellow cover)	red		0	<b>P9EPAG1Y01W</b>	189008
	<b>Emergency</b> push-button with latch according to EN418 - key to release (yellow cover)	red		0	<b>P9EPAG1Y06N</b>	189009

(1) Other languages on request

The catalogue numbers **in bold** are available from stock.

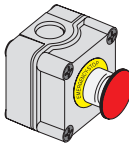
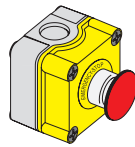
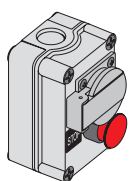
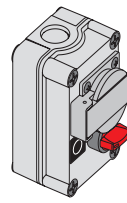
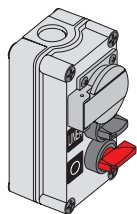
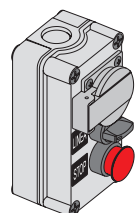
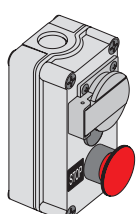


**Push-button stations in thermoplastic (continued)**

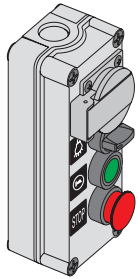
Equipped versions		Operators	Colour	Diagram	Name-plate	Cat. no.	Ref. no.	
	<b>Two units</b>	Flush push-buttons	green	$\begin{matrix} 13 \\ \diagdown \\ 4 \end{matrix}$	I	<b>P9EPA02Y01</b>	189016	
			red	$\begin{matrix} 1L \\ \diagdown \\ 2 \end{matrix}$	0			
 	<b>Three units</b>	Full voltage pilot light max 380V-2W not included	BA9S	white	$\begin{matrix} \text{⊗} \times 1 \\ \text{⊗} \times 2 \end{matrix}$	blank	<b>P9EPA03Y01</b>	189018
		Flush push-buttons	green	$\begin{matrix} 13 \\ \diagdown \\ 4 \end{matrix}$	I			
		Flush push-buttons	red	$\begin{matrix} 1L \\ \diagdown \\ 2 \end{matrix}$	0			
		Flush push-buttons	black	$\begin{matrix} 13 \\ \diagdown \\ 4 \end{matrix}$	↑	<b>P9EPA03Y05</b>		
Flush push-buttons	red	$\begin{matrix} 1L \\ \diagdown \\ 2 \end{matrix}$	0					
Flush push-buttons	black	$\begin{matrix} 13 \\ \diagdown \\ 4 \end{matrix}$	↓					

The catalogue numbers **in bold** are available from stock.

**Equipped boxes**

		Specially enclosures to use for shaft lifts (other versions, please contact us)				
		Composition	Individual operators	Cat. no.	Ref. no.	Pack
	<b>One operator</b>	Thermoplastic box. 1 element	P9EPE01	<b>P9EPC01X00</b>	215432	1
		Emergency push button mushroom head Ø40, push-pull to release	P9XET4RN1			
	1NC contact block	P9B01VN				
	1NO contact block	P9B10VN				
	Nameplate with inscription "EMERGENCY-STOP"	080XTGR02				
	PG16 packing gland					
		Thermoplastic box. Yellow cover. 1 element	P9EPEG1	<b>P9EPC01X01</b>	215433	1
		Emergency push-button mushroom head Ø40, push-twist to release	P9XER4RN			
	1NC contact block	P9B01VN				
	Nameplate with inscription "EMERGENCY-STOP"	080XTGR02				
	<b>Two operators</b>	Thermoplastic box. 2 elements	P9EPE02	<b>P9EPL02X01</b>	189136	1
		Emergency push-button mushroom head Ø28, push-twist to release	P9XER3RN			
	1NC contact block	P9B01VN				
	Nameplate with inscription "STOP"	P9AELN201				
	16A Schuko socket-outlet with cover					
		Thermoplastic box. 2 elements	P9EPE02	<b>P9EPL02X02</b>	189137	1
		Selector switch, 2 positions, with red knob	P9XSMD0R			
	1NC contact block	P9B01VN				
	Nameplate with inscription "O-I"	P9AELN039				
	16A Schuko socket-outlet with cover					
	<b>Three operators</b>	Thermoplastic box. 3 elements	P9EPE03	<b>P9EPL03X01</b>	189138	1
		Selector switch, 2 positions, with black knob	P9XSMD0N			
	1NC contact block	P9B01VN				
	1NO contact block	P9B10VN				
	Nameplate with inscription "LINEA"	P9AELN523				
	Selector switch, 2 positions, with red lever	P9XSVD0R				
	1NO contact block	P9B10VN				
	Nameplate with inscription "O-I"	P9AELN039				
	16A Schuko socket-outlet with cover					
		Thermoplastic box. 3 elements	P9EPE03	<b>P9EPL03X02</b>	189139	1
		Selector switch, 2 positions, with black knob	P9XSMD0N			
	1NC contact block	P9B01VN				
	1NO contact block	P8B10VN				
	Nameplate with inscription "LINEA"	P9AELN523				
	Emergency push-button mushroom head Ø28, push-twist to release	P9XER3RN				
	1NC contact block	P9B01VN				
	Nameplate with inscription "STOP"	P9AELN201				
	16A Schuko socket-outlet with cover					
		Thermoplastic box. 3 elements	P9EPE03	<b>P9EPL03X03</b>	189140	1
		Emergency push-button mushroom head Ø40, push-twist to release	P9XER4RN			
	1NC contact block	P9B01VN				
	Nameplate with inscription "STOP"	P9AELN201				
	Round plug	P9ARHPR				
	16A Schuko socket-outlet with cover					

**Equipped boxes (continued)**



**Four operators**

Specially enclosures to use for shaft lifts (other versions, please contact us)				
Composition	Individual operators	Cat. no.	Ref. no.	Pack
Thermoplastic box, 4 elements	P9EPE04	<b>P9EPL04X01</b>	189141	1
Selector switch, 2 positions, with black knob	P9XSM00N			
1NC contact block	P9B01VN			
1NO contact block	P9B10VN			
Nameplate with "Light" symbol	P9AELN100			
Standard/momentary push button with flush cap, green	P9XPNVG			
1NO contact block	P9B10VN			
Nameplate with "Bell" symbol	P9AELN099			
Emergency push-button mushroom head Ø28, push-twist to release	P9XER3RN			
1NC contact block	P9B01VN			
Nameplate with inscription "STOP"	P9AELN201			
16A Schuko socket-outlet with cover				

Push-button stations

A

B

C

D

**E**

F



G

H

I

X

Push-button stations in aluminium (Grey coloured RAL 7012)

For panel mounting	Protection	Number of holes	Type	Cat. no.	Ref. no.		
 <p>Cover with holes with conduit entry</p>	IP66 (according to IEC 529, EN 60529)	1	1	<b>080SP1</b>	170801		
		1	1M (1)	<b>080SP1M</b>	170831		
		2	2	<b>080SP2</b>	170802		
		2	2M (1)	<b>080SP2M</b>	170832		
		3	3	<b>080SP3</b>	170803		
		4	4	<b>080SP4</b>	170804		
		4	4M (1)	<b>080SP4M</b>	170834		
		6	6	<b>080SP6</b>	170806		
		8	8	<b>080SP8</b>	170807		
		12	12	<b>080SP12</b>	170808		
		18	18	<b>080SP18</b>	170809		
		24	24	<b>080SP24</b>	170810		
		35	35	<b>080SP35</b>	170811		
		<p>Cover with holes without conduit entry</p>	IP66 (according to IEC 529, EN 60529)	1	1	080SP1SFE	170836
				1	1M (1)	080SP1MSFE	170839
2	2			080SP2SFE	170842		
2	2M (1)			080SP2MSFE	170845		
3	3			080SP3SFE	170848		
4	4			080SP4SFE	170850		
4	4M (1)			080SP4MSFE	170851		
6	6			080SP6SFE	170852		
8	8			080SP8SFE	170854		
12	12			080SP12SFE	170857		
18	18			080SP18SFE	170860		
24	24			080SP24SFE	170862		
35	35			080SP35SFE	170864		
 <p>Cover without holes with conduit entry</p>	IP66 (according to IEC 529, EN 60529)			1	1	080SP1SFC	170835
				1	1M (1)	080SP1MSFC	170838
		2	2	080SP2SFC	170841		
		2	2M (1)	080SP2MSFC	170844		
		3	3	080SP3SFC	170847		
		4	4	080SP4SFC	170841		
		4	4M (1)	080SP4MSFC	170844		
		6	6	080SP6SFC	170847		
		8	8	080SP8SFC	170853		
		12	12	080SP12SFC	170856		
		18	18	080SP18SFC	170859		
		24	24	080SP24SFC	170859		
		35	35	080SP35SFC	170863		
		<p>Cover without holes without conduit entry</p>	IP66 (according to IEC 529, EN 60529)	1	1	080SP1SF	170837
				1	1M (1)	080SP1MSF	170840
2	2			080SP2SF	170843		
2	2M (1)			080SP2MSF	170846		
3	3			080SP3SF	170849		
4	4			080SP4SF	170843		
4	4M (1)			080SP4MSF	170846		
6	6			080SP6SF	170849		
8	8			080SP8SF	170855		
12	12			080SP12SF	170858		
18	18			080SP18SF	170861		
24	24			080SP24SF	170861		
35	35			080SP35SF	170865		

(1) With deep socle

Accessories

Description	Cat. no.	Ref. no.
Kit of two hinges for types 18, 24, 35 with holes	<b>080KCSP</b>	170883

Overall dimensions, see E.41

The catalogue numbers **in bold** are available from stock.



Notes

Grid area for notes.















Push-button stations

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X





## Caps for standard push-buttons




Colour	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	
	Flush and recessed		Raised		Flush		Raised		
Neutral									
	<b>P9ARBG ●</b>	18710 ■	<b>P9ARBS ●</b>	18720 ■	<b>P9ASBG ●</b>	18750 ■	<b>P9ASBS ●</b>	18760 ■	
With symbols <sup>(1)</sup>									
Stop 	Black	<b>P9ARBGN 029</b>	187150	<b>P9ARBSN 029</b>	187250	<b>P9ASBGN 029</b>	187550	<b>P9ASBSN 029</b>	187650
	Red	<b>P9ARBGR 029</b>	187110	<b>P9ARBSR 029</b>	187210	<b>P9ASBGR 029</b>	187510	<b>P9ASBSR 029</b>	187610
Start 	Black	<b>P9ARBGN 028</b>	187111	<b>P9ARBSN 028</b>	187211	<b>P9ASBGN 028</b>	187511	<b>P9ASBSN 028</b>	187611
	Green	<b>P9ARBGV 028</b>	187112	<b>P9ARBSV 028</b>	187212	<b>P9ASBGV 028</b>	187512	<b>P9ASBSV 028</b>	187612
	White	<b>P9ARBGB 028</b>	187151	<b>P9ARBSB 028</b>	187251	<b>P9ASBGB 028</b>	187551	<b>P9ASBSB 028</b>	187651
Continuous rectilinear motion 	Black	<b>P9ARBGN 006</b>	187117	<b>P9ARBSN 006</b>	187217	<b>P9ASBGN 006</b>	187517	<b>P9ASBSN 006</b>	187617
	Green	<b>P9ARBGV 006</b>	187118	<b>P9ARBSV 006</b>	187218	<b>P9ASBGV 006</b>	187518	<b>P9ASBSV 006</b>	187618
	White	<b>P9ARBGB 006</b>	187152	<b>P9ARBSB 006</b>	187252	<b>P9ASBGB 006</b>	187552	<b>P9ASBSB 006</b>	187652
Increase 	Black	P9ARBGN 017	187125						
Decrease 	Black	P9ARBGN 018	187127						
Reset 	Blue	P9ARBGL 037	187143			P9ASBGL 037	187543	P9ASBSL 037	187643
Stop/Reset 	Red	P9ARBGR 036	187144						
Test 	Black	P9ARBGN 030	187145	P9ARBSN 030	187245	P9ASBGN 030	187545	P9ASBSN 030	187645
	Green	P9ARBGV 030	187146	P9ARBSV 030	187246	P9ASBGV 030	187546	P9ASBSV 030	187646
Stop 	Red	<b>P9ARBGR 201</b>	187147	<b>P9ARBSR 201</b>	187247	<b>P9ASBGR 201</b>	187547	<b>P9ASBSR 201</b>	187647
Start 	Black	<b>P9ARBGN 202</b>	187148	<b>P9ARBSN 202</b>	187248	<b>P9ASBGN 202</b>	187548	<b>P9ASBSN 202</b>	187648
	Green	<b>P9ARBGV 202</b>	187149	<b>P9ARBSV 202</b>	187249	<b>P9ASBGV 202</b>	187549	<b>P9ASBSV 202</b>	187649
	White	<b>P9ARBGB 202</b>	188909	<b>P9ARBSB 202</b>	188978	<b>P9ASBGB 202</b>	188959	<b>P9ASBSB 202</b>	188928

(1) Other symbols on request

The catalogue numbers **in bold** are available from stock.

Colours		black	red	green	yellow	brown	blue	white	grey
Caps	●	<b>N</b>	<b>R</b>	<b>V</b>	<b>G</b>	<b>M</b>	<b>L</b>	<b>B</b>	<b>H</b>

Diffusers/insert for illuminated units

		Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.
		For pilot lights		For illuminated push buttons		For pilot lights and illuminated push buttons	
							
	Neutral	P9ARDLS	187300	P9ARDPL	187350	080QDF	173220
	With symbols <sup>(1)</sup> on white background						
	Stop	<b>P9ARDLS029</b>	187301	<b>P9ARDPL029</b>	187351	<b>080QDF029</b>	187701
	Start	<b>P9ARDLS028</b>	187302	<b>P9ARDPL028</b>	187352	<b>080QDF028</b>	187702
Continuous rectilinear motion		<b>P9ARDLS006</b>	187305	<b>P9ARDPL006</b>	187355	<b>080QDF006</b>	187705
Increase		P9ARDLS017	187309	P9ARDPL017	187359	080QDF017	187709
Decrease		P9ARDLS018	187310	P9ARDPL018	187360	080QDF018	187710
Auto cycle		P9ARDLS026	187311	P9ARDPL026	187361	080QDF026	187711
Manual		P9ARDLS027	187312	P9ARDPL027	187362	080QDF027	185788
Locking		P9ARDLS031	187313	P9ARDPL031	187363	080QDF031	187713
Releasing		P9ARDLS032	187314	P9ARDPL032	187364	080QDF032	187714
Coolant		P9ARDLS001	187315	P9ARDPL001	187365	080QDF001	187715
Light		P9ARDLS002	187316	P9ARDPL002	187366	080QDF002	187716
Test		P9ARDLS030	187318	P9ARDPL030	187368	080QDF030	185789
Stop		<b>P9ARDLS201</b>	187319	<b>P9ARDPL201</b>	187369	<b>080QDF201</b>	187719
Start		<b>P9ARDLS202</b>	187320	<b>P9ARDPL202</b>	187370	<b>080QDF202</b>	187720

(1) Other symbols on request

The catalogue numbers in **bold** are available from stock.

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**Mushroom heads**

Description	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom		
					Plastic	
						
Momentary operators	Ø 28 mm	P9ARB3●				
	Ø 40 mm	P9ARB4●				
	Ø 60 mm	P9ARB6●				
	∇ 30 mm		P9ASB3●			
Push-pull operators	Ø 40 mm	P9ACB4●	P9ACB4●			



**Knobs and levers**

Description	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom		
					Plastic	
						
Knob for selector switches	P9ACMN●		P9ACMN●			
Lever for selector switches	P9ARMV●					


**Lenses**

Description	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom		
					Plastic	
						
Pilot lights	diffused version	P9ARGLD●	P9ASGLD●			
	refracted version	P9ARGLR●				
	glass version	P9ARGLV●				
Illuminated push-buttons	diffused version	P9ARGPD●	P9ASGPD●			
Illuminated mushroom head push-b.	momentary Ø 40 mm	P9ARGP4●				
	∇ 30 mm					
	push-pull Ø 40 mm	P9ACGP4●				
Illuminated selector switches	knob	P9ACGSL●	P9ACGSL●			
	lever	P9ARGSA●				

**Rubber protective caps (IP66)**

Description	Cat. no.	Ref. no. see bottom	Cat. no.	Ref. no. see bottom		
					Plastic	
						
Standard flush push-buttons	coloured (nitrilic rubber)	080CP●	P9ASC●			
	clear (silicon rubber)	080CPT	P9ASCPT	170198 170790		
Raised push buttons	clear (silicon rubber)	P9ARCST	P9ASCST	187490 187791		

**Spare boots for joysticks**

	Standard rubber boot for joystick	(a)	P9ARSCMN	188043	
	Standard rubber boot for joystick with interlock	(a)	P9ARSCMB	188044	
	Silicone boot for joystick	(b)	P9ARSGMN	187495	
	Silicone boot for joystick with interlock	(b)	P9ARSGMB	187496	

The catalogue numbers in **bold** are available from stock.

Colours		black	red	green	yellow	orange	blue	white	clear
Mushroom heads	●	N	R	V	G	-	L	-	-
Knobs/lever	●	N	R	V	G	-	L	-	-
Lenses	●	-	R	V	G	A	L	B	I
Protective caps	●	N	R	V	G	-	-	-	-






**Common accessories**

Plugs	Description	Cat. no.	Ref. no.	Cat. no.	Ref. no.
		Plastic		Plastic	
	Round	<b>P9ARHPR</b>	187491		
	Square 30 x 30 mm			<b>P9ASHP3</b>	187792
	Rectangular 30 x 50 mm			<b>P9ASHP5</b>	187793
<b>Protections</b>					
	Collar for mushroom head push-buttons Ø40 mm.	P9ARRE4	187492		
	Protection cover padlockable for standard push-buttons, illuminated push-buttons, selector switches, illuminated selector switches with knob.	P9ACRCL	187840	P9ACRCL	187840
<b>Flanges</b>					
	With three positions Centre distances 30 x 50 mm	P9ACFS3	187841	P9ACFS3	187841
	With five positions Centre distances 50 x 50 mm	<b>P9ACFS5</b>	187842	<b>P9ACFS5</b>	187842
	With two positions For Logic Reed contact blocks	<b>P9ACFSM</b>	187846	<b>P9ACFSM</b>	187846
<b>Adapter screw plug-in terminal</b>					
	Only for Logic Reed contact blocks and power supplies	<b>P9ACAFV</b>	187847	<b>P9ACAFV</b>	187847
<b>Adapter</b>					
	Gives round control and signalling units a square appearance. Made in black thermoplastic. Can be used with nameplate for square operators P9ASTBS (see P.30). Excluded for mushroom flush buttons with positive break and types with 3 positions.	<b>P9ARSN1</b>	188805		
<b>Push-on/push off</b>					
	Device for standard push-buttons and illuminated push-buttons. To be added only to single pole contact blocks. The NO-contacts must be early closing types.	<b>P9ACDPP</b>	187843	<b>P9ACDPP</b>	187843
<b>Extended screw</b>					
	For reset push-buttons (setting min. 80, max. 170 mm)	P9ACVLR	187844	P9ACVLR	187844
<b>Central contact driving plug</b>					
	For standard momentary push-buttons and momentary mushroom head push-buttons.			P9ASHAC	187794
<b>Tools</b>					
	Locking ring wrench	<b>P9ACWAF</b>	187845	<b>P9ACWAF</b>	187845
	Bulb extractor	<b>080ESL</b>	170212	<b>080ESL</b>	170212
	Extractor for caps and lenses			<b>P9ASEBG</b>	187795

The catalogue numbers in bold are available from stock.






Spare keys

Description		Cat. no.	Ref. no.	
		Plastic		
				
Standard version	Code			
	3095	<b>077C3095</b>	173095	
	9901	077C9901	173901	
	9902	077C9902	173902	
	9903	077C9903	173903	
	9904	077C9904	173904	
	9905	077C9905	173905	
	9910	077C9910	173910	
	9916	077C9916	173916	
	9919	077C9919	173919	
	3353	077C3353	173353	
	(Ronis) 455	077CR455	173455	
FIAT version	Colour	Code		
	yellow	73033	077CF73033	173033
	black	73034	077CF73034	173034
	red	73037	077CF73037	173037
	blue	73038	077CF73038	173038
	orange	73040	077CF73040	173040






Bulbs BA9s

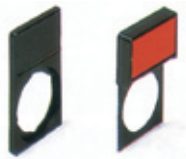
Description			Cat. no.	Ref. no.	
			Plastic		
					
Filament type	Vn	Vn			
	6	0.6	<b>BA9S606</b>	187850	
	6	1.5	<b>BA9S615</b>	187851	
	12	2.0	BA9S122	187852	
	24	2.0	<b>BA9S242</b>	187853	
	30	2.1	<b>BA9S30</b>	187854	
	48	2.0	BA9S48	187855	
	60	1.2	BA9S6012	187856	
	130	2.0	<b>BA9S130</b>	187857	
Neon type					
	110	0.11	BA9SN110	187860	
	220	0.33	<b>BA9SN220</b>	187861	
Mono LED	VN AC/DC ± 10%				
		6	BA9S6L●	see bottom	
		12	BA9S12L●	see bottom	
		24	BA9S24L●	see bottom	
		48	BA9S48L●	see bottom	
		110	BA9S110L●	see bottom	
		(AC) 230	BA9S230L●	see bottom	



Colours	red	green	yellow	blue	white
●	R	V	G	L	B

Insert holders

Description		Cat. no.	Ref. no.	Cat. no.	Ref. no.
		Plastic		Plastic	
					
Supplied with neutral insert engravable on both sides or transparent.					
Standard 30 x 50 mm	Background black/red, white text	<b>P9ARTBS</b>	188000	<b>P9ASTBS</b>	188010
	Background white, black text	<b>P9ARTWS</b>	188005	<b>P9ASTWS</b>	188011
	Transparent	<b>P9ARTTS</b>	188012	<b>P9ASTTS</b>	188014
Extended 45 x 50 mm	Background black/red, white text	<b>P9ARTBM</b>	188001	<b>P9ARTWM</b>	188008
	Background white, black text	<b>P9ARTWM</b>	188008	<b>P9ARTWS</b>	188011
	Transparent	<b>P9ARTTM</b>	188019	<b>P9ASTTS</b>	188014



The catalogue numbers in **bold** are available from stock.

For reference numbers, see chapter X, pg. X.8

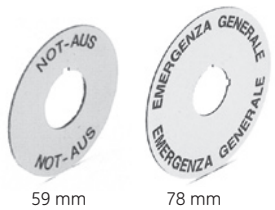


**Rectangular inserts**

For insert holders 30 x 50 mm		Neutral						
		Description	Cat. no.	Ref. no.	Description	Cat. no.	Ref. no.	
		black/red background	<b>P9ACPBS</b>	188015				
		white background	<b>P9ACPWS</b>	188017				
		transparent	<b>P9ACPTS</b>	188018				
		English (1)			French (1)			
START	black background	START	P9ACPBS202	188202	black background	MARCHE	P9ACPBS308 188308	
		STOP	P9ACPBS201	188201		ARRET	P9ACPBS301 188301	
		REVERSE	P9ACPBS215	188215		AVANT	P9ACPBS303 188303	
		CLOSE	P9ACPBS205	188205		ARRIERE	P9ACPBS302 188302	
		OPEN	P9ACPBS206	188206		FERMER	P9ACPBS309 188309	
		UP	P9ACPBS204	188204		OUVRIR	P9ACPBS316 188316	
		DOWN	P9ACPBS203	188203		MONTEE	P9ACPBS317 188317	
		LEFT	P9ACPBS222	188222		DESCENTE	P9ACPBS304 188304	
		RIGHT	P9ACPBS224	188224		GAUCHE	P9ACPBS306 188306	
		FAST	P9ACPBS208	188208		DROITE	P9ACPBS305 188305	
		SLOW	P9ACPBS207	188207		VITE	P9ACPBS324 188324	
		OPEN-CLOSE	P9ACPBS234	188234		LENT	P9ACPBS307 188307	
		HAND-AUTO	P9ACPBS243	188243		OUVERT-FERME	P9ACPBS335 188335	
		STOP-START	P9ACPBS232	188232		MAIN-AUTO	P9ACPBS336 188336	
	MARCHE		FORWARD-REVERSE	P9ACPBS231	188231		ARRET-MARCHE	P9ACPBS328 188328
			OFF-ON	P9ACPBS233	188233		AVANT-ARRIERE	P9ACPBS332 188332
		AUTO-OFF-HAND	P9ACPBS258	188258		HORS-EN	P9ACPBS331 188331	
		FORWARD-0-REVERSE	P9ACPBS239	188239		AUTO-0-MAIN	P9ACPBS334 188334	
		0-1	<b>P9ACPBS039</b>	188030		AVANT-0-ARRIERE	P9ACPBS333 188333	
						0-1	<b>P9ACPBS039</b> 188030	
For insert holders 45 x 50 mm		Neutral						
		black/red background, white text	<b>P9ARPBM</b>	188002				
		white background, black text	<b>P9ARPWM</b>	188028				
		transparent	<b>P9ARPTM</b>	188019				

**Round plates for emergency**

		Diameter 59 mm			Diameter 78 mm		
		Description	Cat. no.	Ref. no.	Description	Cat. no.	Ref. no.
Without text	yellow background		<b>080XTGR</b>	179514	black background	<b>080XTG8</b>	<b>179515</b>
	With text	yellow background			black background		
	EMERGENZA	EMERGENZA	080XTGR01	179525	EMERGENZA	080XTG801	179535
	EMERGENCY STOP	EMERGENCY STOP	<b>080XTGR02</b>	179526	EMERGENCY STOP	<b>080XTG802</b>	179536
	ARRET D'URGENCE	ARRET D'URGENCE	<b>080XTGR03</b>	179510	ARRET D'URGENCE	<b>080XTG803</b>	179511
	NOT - AUS	NOT - AUS	<b>080XTGR04</b>	179527	NOT - AUS	<b>080XTG804</b>	179537
	NOODSTOP	NOODSTOP	080XTGR05	179528	NOODSTOP	080XTG805	179538
	PARO EMERGENCIA	PARO EMERGENCIA	<b>080XTGR06</b>	179529	PARO EMERGENCIA	<b>080XTG806</b>	179539
	NOTSTOP	NOTSTOP	080XTGR07	179530	EMERGENZA GENERALE	080XTG807	179540
	PARAGEM EMERGENCIA	PARAGEM EMERGENCIA	080XTGR08	179531	PARAGEM EMERGENCIA	080XTG808	179541



**Neutral plate**

		Description	Cat. no.	Ref. no.		
Snap-on system	For identification of contact blocks and power supplies		P9ACPIU	188016		

(1) Other languages on request. The catalogue numbers in **bold** are available from stock.

Push-button stations

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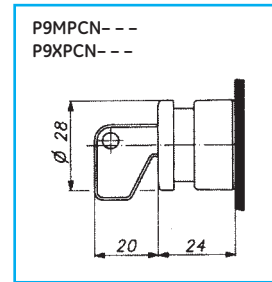
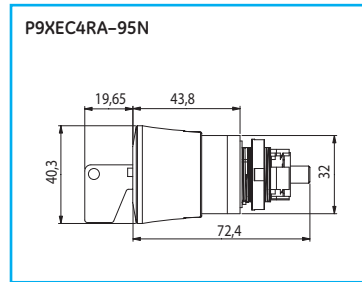
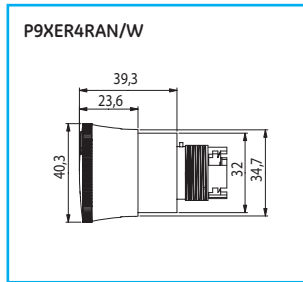
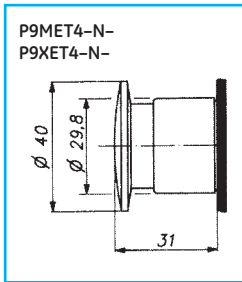
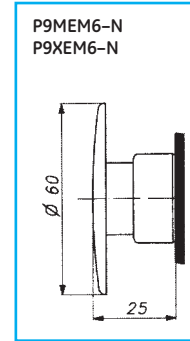
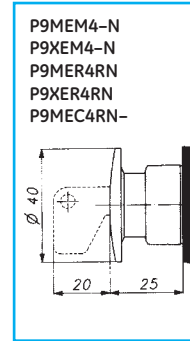
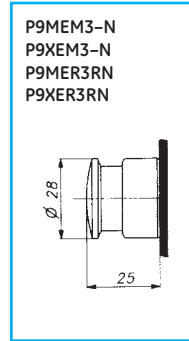
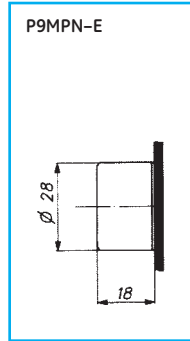
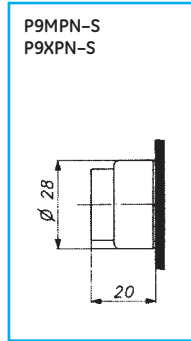
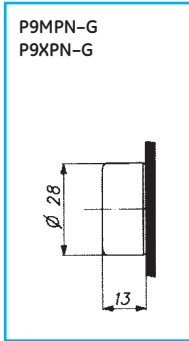
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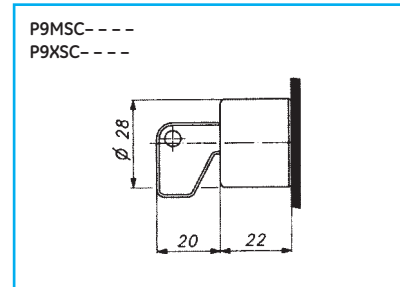
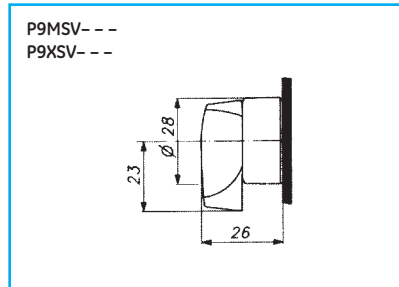
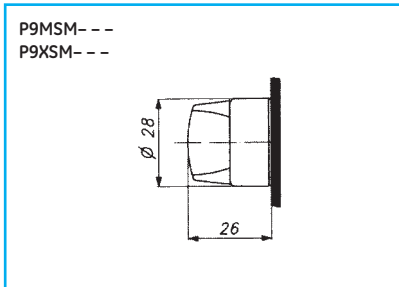


**Dimensional drawings**

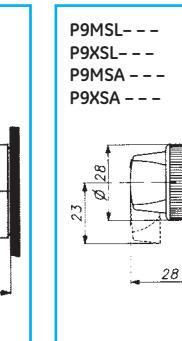
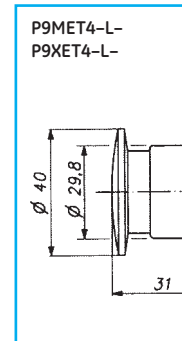
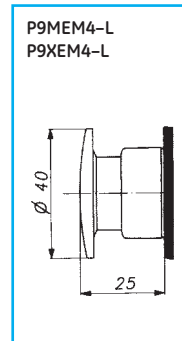
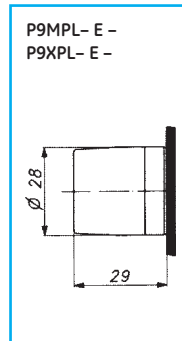
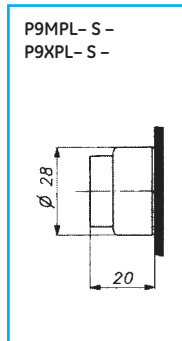
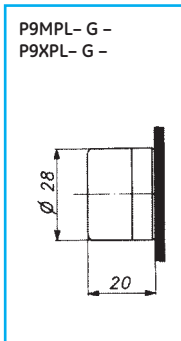
**Round operators - Push-buttons**



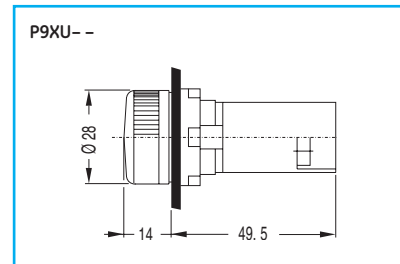
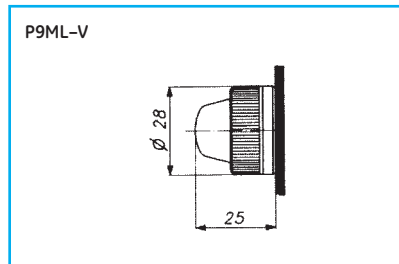
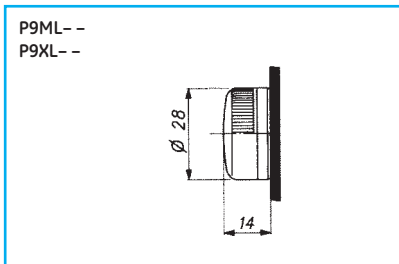
**Round operators - Selector switches**



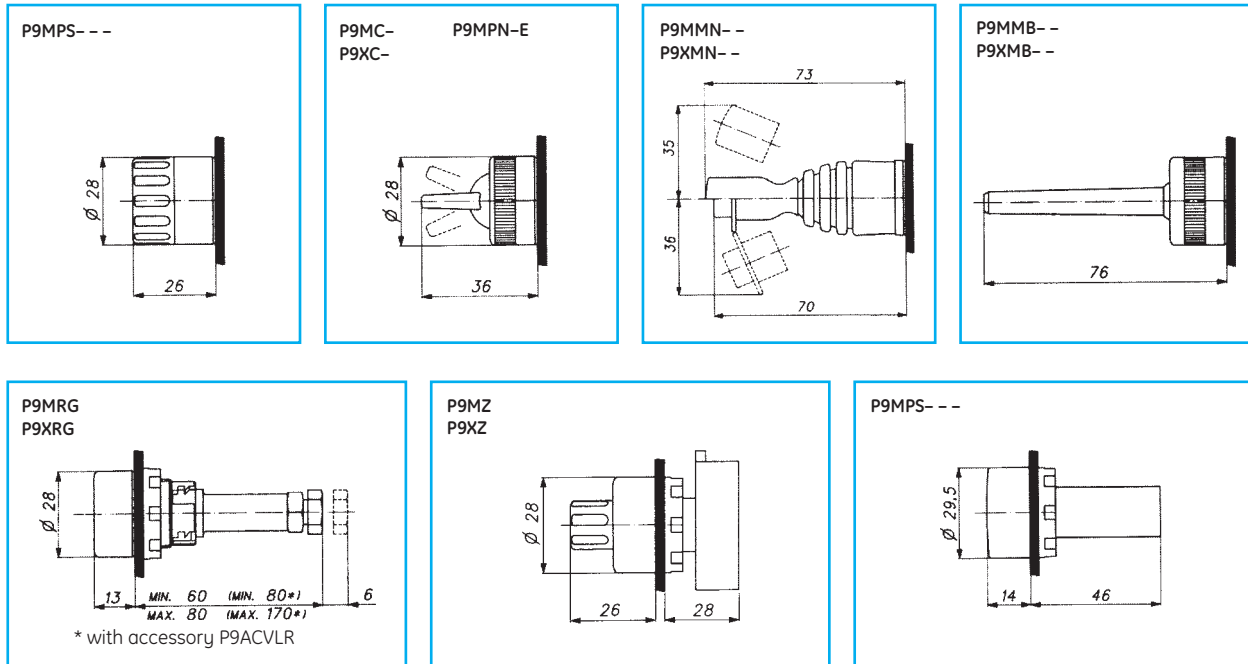
**Round operators - Illuminated push-buttons and selector switches**



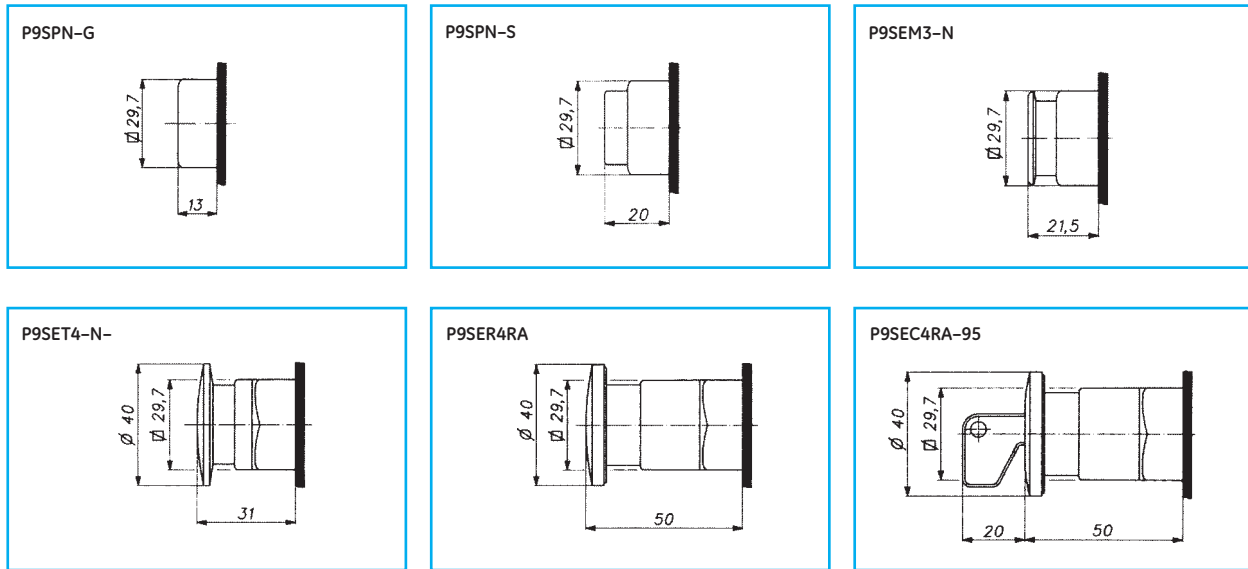
**Round operators - Pilot lights**



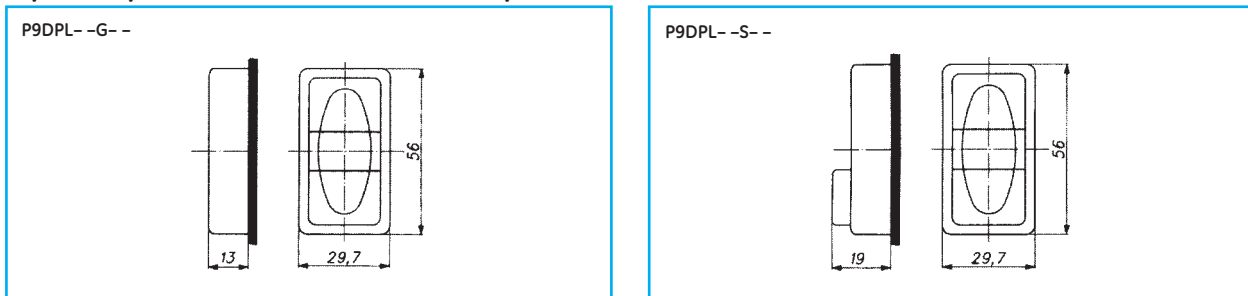
Round operators - Other devices



Square operators - Push-buttons



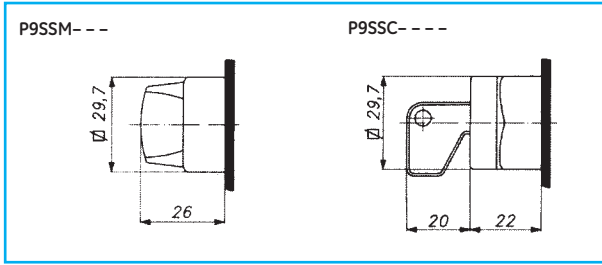
Square operators - Double function push-buttons



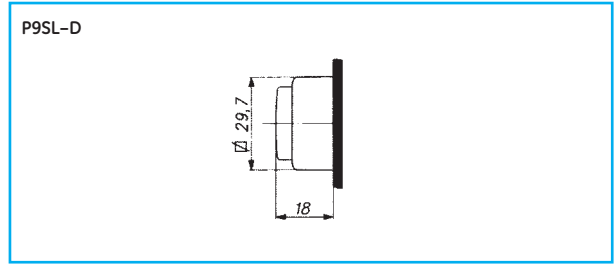


**Dimensional drawings**

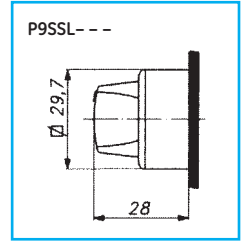
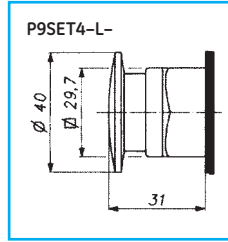
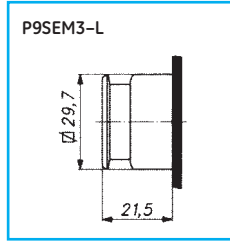
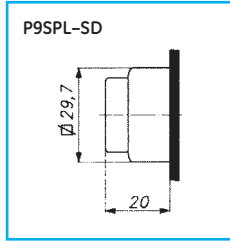
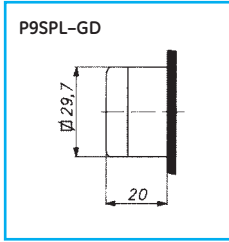
**Square operators - Selector switches**



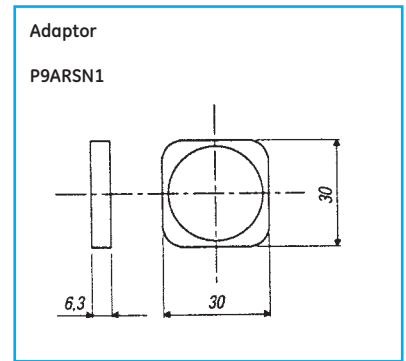
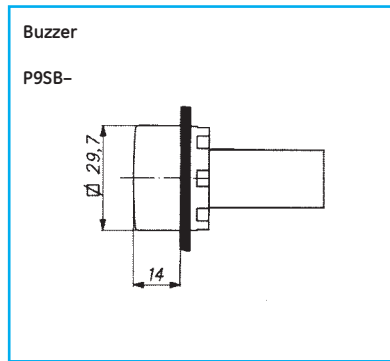
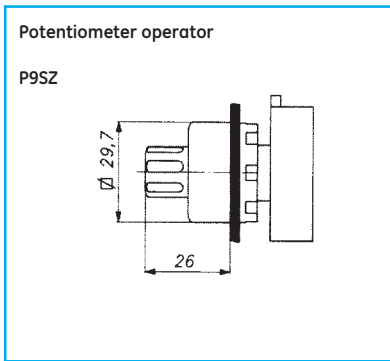
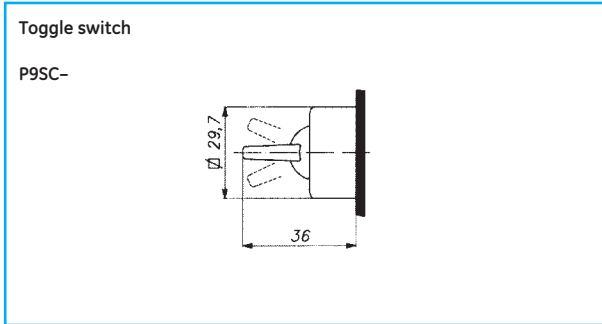
**Square operators - Pilot lights**



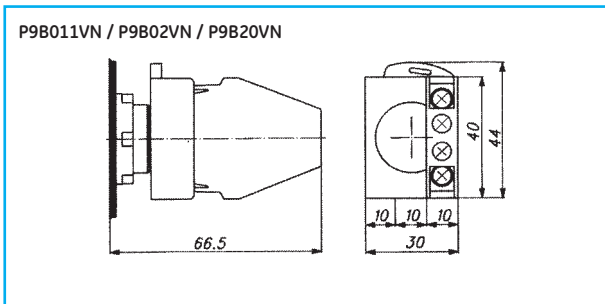
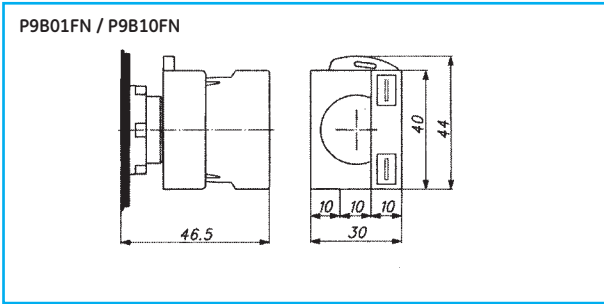
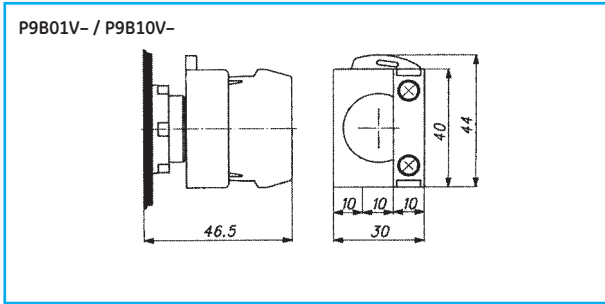
**Square operators - Illuminated push-buttons and selector switches**



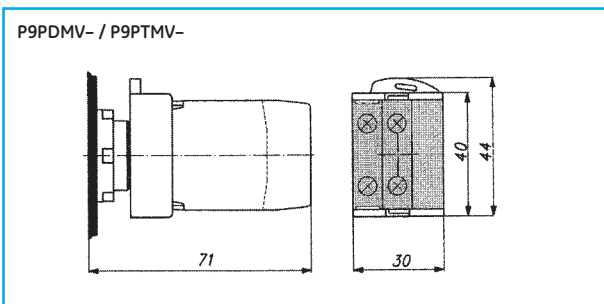
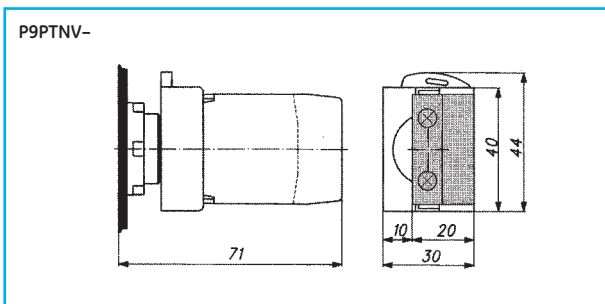
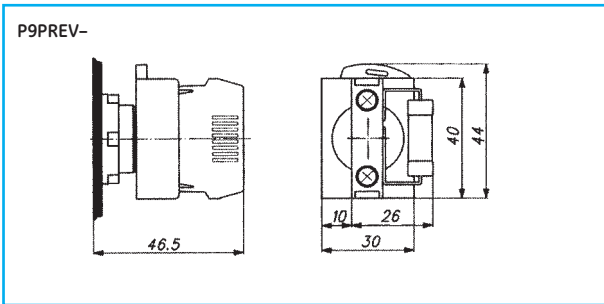
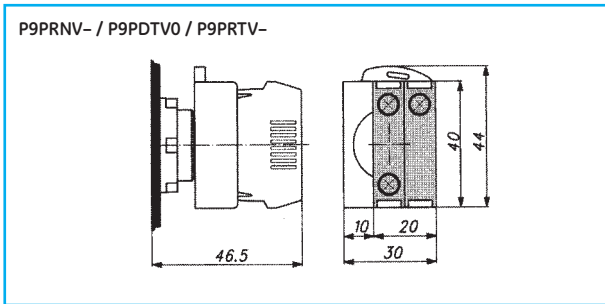
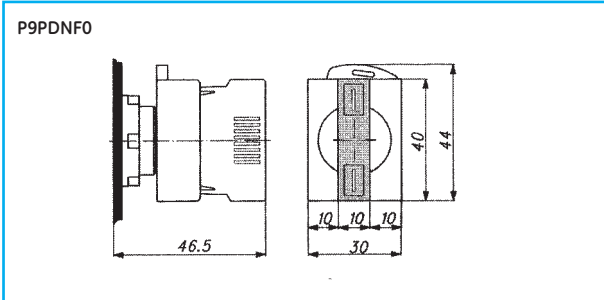
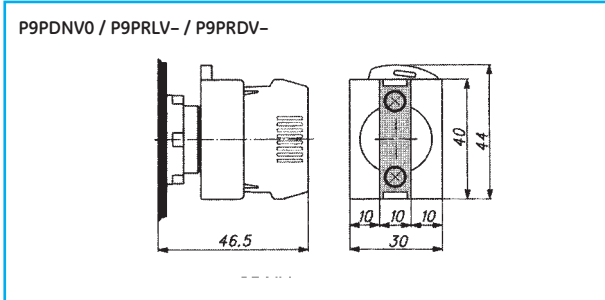
**Square operators - Other devices**



Contact blocks



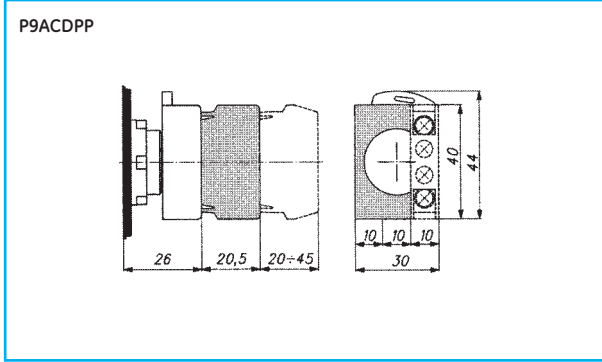
Power supplies



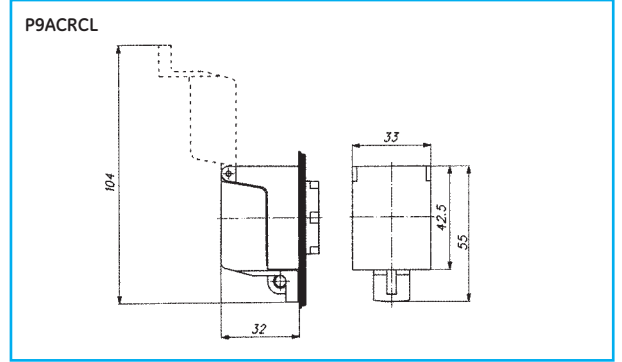
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**Dimensional drawings**

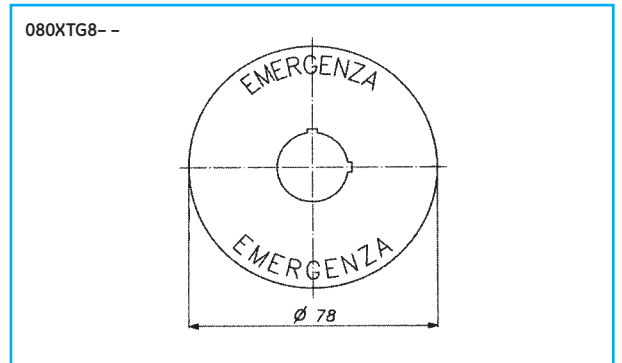
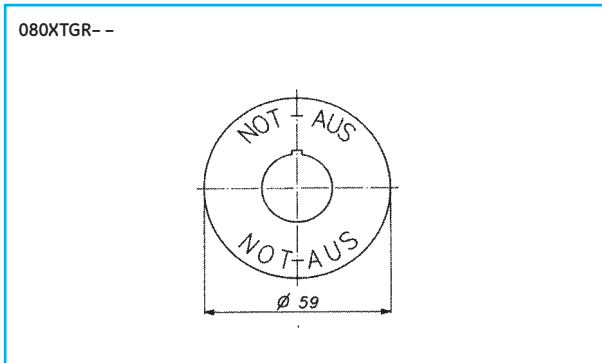
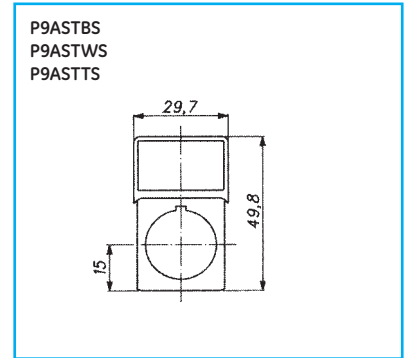
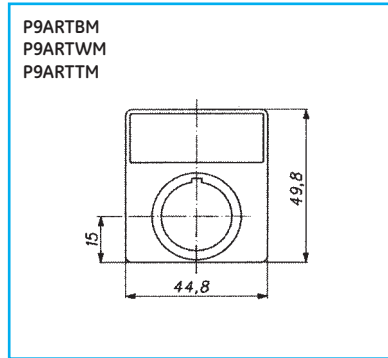
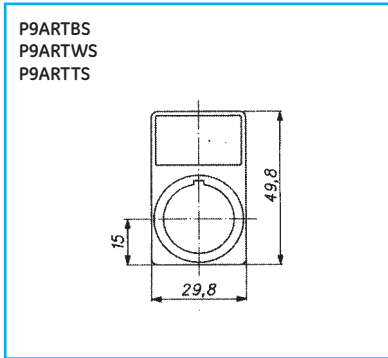
**Push-on / push-off devices**



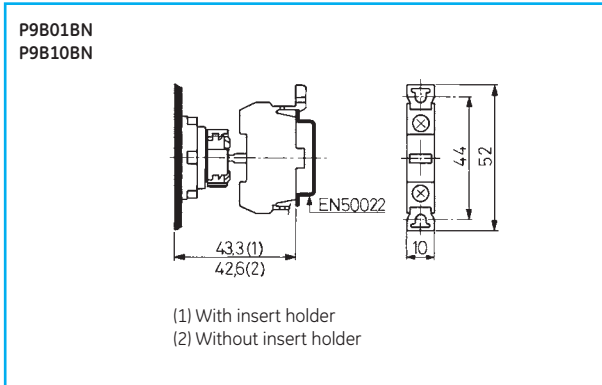
**Protection cover**



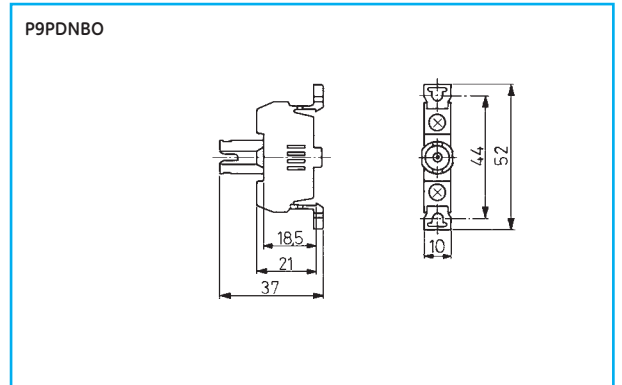
**Insert holders and plates**



**Contact blocks**



**Power supplies**



## Overall dimensions

### Enclosures for push-button stations in thermoplastic

Holes	A	B	C	E1	E2	H
1	72	46	16.5	23 <sup>(1)</sup>	15.5	57
2	110	78	16.5	23 <sup>(1)</sup>	21.5	95
3	140	108	16.5	23 <sup>(1)</sup>	21.5	125
4	175	143	16.5	23 <sup>(1)</sup>	21.5	160
6	235	200	19.5	29 <sup>(2)</sup>	23	220

(1) Suitable for cable gland, with locknut, PG16 or 1/2" NPT  
 (2) Suitable for cable gland, with locknut, PG21 or 3/4" NPT  
 (3) Flush push-button: 13  
 Pilot light: 14  
 Emergency push-button: 50  
 Key selector switch: 22  
 For customized versions see operator dimensions.

### Enclosures for push-button stations in aluminium

Type	Holes Ø 22		Dimensions						Fixing templates	
	vertic.	horizont.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F	HxLxØmax (mm)	position of the holes
1	1	-	87	87	75	72	21.5	PG 21	74x55x4	1-3
1M	1	-	87	87	100	97	21.5	PG 21	68x55x4	1-3
2	2	-	145	87	75	72	21.5	PG 21	132x55x4	1-3
2M	2	-	145	87	100	97	21.5	PG 21	126x55x4	1-3
3	3	-	195	87	100	97	21.5	PG 21	176x55x4	1-3
4	2	2	145	87	75	72	21.5	PG 21	132x55x4	1-3
4M	2	2	145	87	100	97	21.5	PG 21	126x55x4	1-3
6	3	2	195	87	100	97	21.5	PG 21	176x55x4	1-3
8	2	4	152	152	101.5	98.5	27	PG 29	136x119x6	1-3
12	3	4	205	230	101.5	98.5	27	PG 29	172x214x6	1-2-3-4
18	3	6	257	300	101.5	98.5	35	PG 36	221x282x6	1-2-3-4
24	4	6	257	300	101.5	98.5	35	PG 36	221x282x6	1-2-3-4
35	5	7	350	350	123	106.5	41	PG 36	180x180x10	1-2-3-4

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## Technical data

### Compliance with standards

IEC 947.5.1 - VDE 0660 - NFC 63140  
 CEI EN 60947.5.1 - UTE - BSI - NEMA  
 CENELEC EN 50007

### Approvals

UL (U.S.A.) - CSA (Canada) - RINA - CE

### Climatic protections

The standard versions are suitable for use in the following climates:

Temperate climate	cat. 23/50 (DIN 50014)
Wet climate	cat. 23/83 (DIN 50015)
Hot wet climate	cat. 40/92 (DIN 50015)
Variable wet climate	FW24 (DIN 50016)

### Temperature ranges

Operation	-25 °C to + 70 °C
Storage	-40 °C to + 70 °C

### Protection degree of the operators

IP65 according to IEC 529 when they are mounted into enclosures with the same or a higher degree of protection.  
 IP66 with appropriate protective caps.

### Protection degree of the terminals

IP2x according to IEC 529.  
 Fully integrated on signalling units, illuminated push-buttons and illuminated selector switches. With accessory on contact blocks for control units.

### Rated insulation voltage

690V according to EN 60947.1

### Impulse withstand voltage

4 kV according to EN 60947.1

### Insulation class

Group C according to VDE 0110

### Electric shocks protection

Class I according to IEC 536

### Short-circuit protection

With fuses type gI of 10A according to IEC 947.5.1

### Connection terminals

Connection terminals  
 Screw type with retractable clamp.  
 Clamping capacity of rigid and/or flexible conductors:  
 - minimum 22 AWG (0.32 mm<sup>2</sup>)  
 - maximum 12 AWG (3.3 mm<sup>2</sup>)

### Performances of the contacts

- Slow acting
- Self-cleaning
- NC forced breaking
- Double break

### Electrical performances

Rated thermal current I<sub>th</sub> = 10 A

#### Performances according IEC 947.5.1

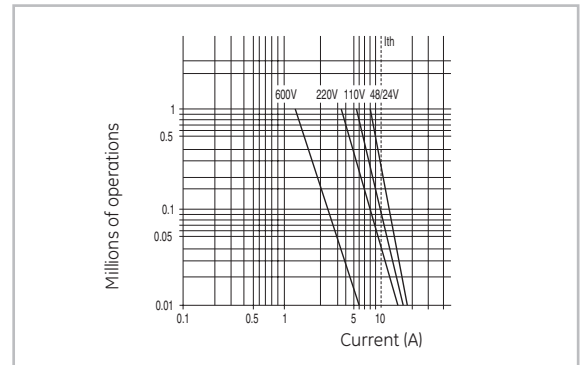
Categorie AC 15 (A600)									
Voltage	U <sub>e</sub> (V)	24	48	60	110	220	380	500	600
Current	I <sub>e</sub> (A)	10	10	10	6	3	2	1.5	1.2
Categorie DC 13 (P600)									
Voltage	U <sub>e</sub> (V)	24	48	60	110	220	300	500	600
Current	I <sub>e</sub> (A)	5	2.7	2	1.1	0.55	0.3	0.22	0.2
Categorie DC 13 (Q300) for illuminated push-buttons and illuminated selector switch									
Voltage	U <sub>e</sub> (V)	24	48	60	110	220	300		
Current	I <sub>e</sub> (A)	2.5	1.1	1	0.55	0.27	0.2		

#### Performances according to CSA and UL

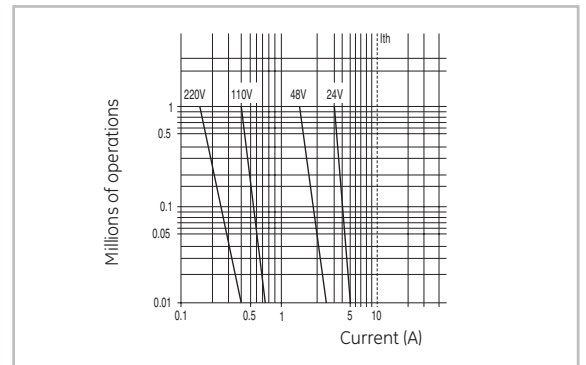
AC Heavy Duty (A600)	
DC Standard Duty (Q300)	for illuminated push-buttons and illuminated selector switch

### Electrical endurance

Alternative current 50/60 Hz cat. AC 15



Direct current cat. DC 13



### Mechanical endurance

Joysticks	0.5 x 10 <sup>6</sup> op.
Key push-buttons	
Locking emergency	1 x 10 <sup>6</sup> op.
Knob selector switches	
Lever selector switches	
Key selector switches	
Illuminated selector switches	
Selector push-buttons	
Timed push-buttons	
Illuminated push-buttons	3 x 10 <sup>6</sup> op.
Momentary std push-buttons	
Momentary mush. push-buttons	

### Number of contact blocks

Momentary standard push-buttons	4 double pole
Momentary mush. push-buttons	(8 single pole)
Key push-buttons	4 double pole
Locking emergency	(4 single pole)
Selector switches	6 double pole
(4 pos. types excl)	(6 single pole)
4 pos. selector switches	2 double pole
Selector push-buttons	6 double pole
	(6 single pole)
Joysticks 2 and	4 double pole
4 positions	(4 single pole)
Illuminated push-buttons	For different contacts
Illuminated selector switches	configuration, contact our sales office

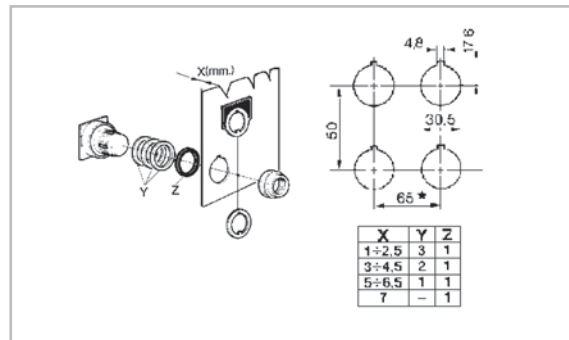
### Fitting of units

The units of Series 077 are designed for fitting onto panels with a thickness between 1 and 7 mm., with holes of 30.5 mm. diameter, according to rules established by EN 60947.5.1.

A special metal ring supplied with each unit or one of the name plates included among the fittings, enables the unit to be exactly positioned.

All equipment is supplied with a set of spacing rings to adjust variations in the thickness of the panel thus ensuring a uniform front protrusion.

For a correct fitting, it needs to observe the diagram below and tables indications.



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### Push-buttons






Standard/Momentary	Description	Contacts	Cat. no.	Ref. no.
		NC+NO	<b>077P11</b>	180019
		NC	<b>077P01</b>	180039
		NO	<b>077P10</b>	180029
Standard/Time delayed <sup>(1)</sup>	Contacts delayed at the release of the push button. Accuracy ± 5% Setting range: 0,1 - 30 sec. 10 - 180 sec.	NC+NO	077P11T30	180120
		NC+NO	077P11T180	180121
To complete by	Fixing kits With 4 coloured caps: black, red, green, yellow	Ring type with guard	<b>077GGBCN</b>	<b>180020</b>
		without guard	<b>077GSBCN</b>	<b>180010</b>
	With 4 coloured caps: brown, orange, blue, white	Ring type with guard	<b>077GGBCS</b>	180050
		without guard	077GSBCS	180040
	With 1 clear and 4 marking etched on both sides	Ring type with guard	077GGBCF	180137
		without guard	077GSBCF	180136

(1) Not approved by RINA and Lloyd's Register

The catalogue numbers **in bold** are available from stock.

For reference numbers, see chapter X, pg. X.10

Push-buttons

Mushroom head/Momentary	Description	Contacts	Cat. no.	Ref. no.
		NC+NO	<b>077E11</b>	180049
		NC	<b>077E01</b>	180069
		NO	<b>077E10</b>	180059
Mushroom head/ Emergency with latch	Push-twist to release	NC+NO	<b>077RE11</b>	<b>180079</b>
		NC	<b>077RE01</b>	<b>180099</b>
		NO	<b>077RE10</b>	180089
With keylock <sup>(1)</sup>	Key withdrawable in positions I & II			
	Lockable in position: normal & depressed depressed without pre-setting <sup>(2)</sup>	NC+NO	<b>077PC11C</b>	180100
		NC+NO	<b>077PC11G</b>	180104
	Locking  (type G unlock)			
To complete by	Description	Diameter	Cat. no.	Ref. no.
	Mushroom head caps			
	For momentary push-button	Ø 35 mm	<b>077E●</b>	see bottom
		Ø 60 mm	<b>077EE●</b>	see bottom
	For push-twist to release push-button	Red Ø 35 mm	<b>077RER</b>	180090
		Red Ø 60 mm	<b>077ECR</b>	181602

The catalogue numbers in **bold** are available from stock.

Colours	black	red	yellow
●	<b>N</b>	<b>R</b>	<b>G</b>

- (1) Supplied with two standard keys 3095.
- (2) Combined with mushroom head 077ECR makes an emergency with latch push-key to release.

For reference numbers, see chapter X, pg. X.10



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





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




X



Selector switches with knob

2 positions			Function (1)	Contacts	Cat. no.	Ref. no. see bottom
	Fixed		D	NC+NO	<b>077SDN11</b>	180170
			H	NC+NO	077SHN11	180180
3 positions						
	Fixed		B	NC+NO	<b>077SBN11</b>	180230
			U	2NC+2NO	<b>077SUN22</b>	180440
			Z	2NC+2NO	<b>077SZN22</b>	180480
	With spring return		B	NC+NO	077SBN11SC	180240
			B	NC+NO	077SBN11DC	180250
	B		B	NC+NO	<b>077SBN11RC</b>	180260
				2NC + 2NO	<b>077SN22RC</b>	180510



Selector switches with lever

2 positions			Function (1)	Contacts	Cat. no.	Ref. no.
	Fixed		D	NC+NO	<b>077SLD11</b>	180601
3 positions						
	Fixed		B	NC+NO	<b>077SLB11</b>	180607
			Z	2NC+2NO	077SLZ22	180623
	With spring return		Z	2NC+2NO	077SLZ22DC	180625
			Z	2NC+2NO	<b>077SLZ22RC</b>	180626
						
4 positions						
	Fixed		X	2NC+2NO	<b>077SLX22</b>	180606

The catalogue numbers in **bold** are available from stock.

(1) Electrical diagrams, see E.55

Selector switches with key <sup>(1)</sup>

2 positions		Function (2)	Contacts	Key removal	Cat. no.	Ref. no.
	Fixed	I II	NC+NO NC+NO NC+NO	I II I-II	<b>077SCD1101</b> <b>077SCD1105</b> <b>077SCD1109</b>	180630 180631 180632
	With spring return	0 I	NC+NO	0	<b>077SCI11DC03</b>	180640
		I 0	NC+NO	0	077SCH11SC03	180636
3 positions						
	Fixed	0 I II	NC+NO	I-0-II	<b>077SCB1120</b>	180843
	With spring return	0 I II	NC+NO	I-0	<b>077SCB11DC07</b>	180852
I 0 II		2NC+2NO	I	077SCZ22DC01	180906	
I 0 II		NC+NO	0	<b>077SCB11RC03</b>	180853	

The catalogue numbers in **bold** are available from stock.

- (1) Supplied with two standard keys 3095.
- (2) Electrical diagrams, see E.55

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






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For reference numbers, see chapter X, pg. X.10






Joysticks

2 positions + central zero position		Function <sup>(1)</sup>	Contacts	Cat. no.		Ref. no.		
				Without interlock	With interlock			
 	Fixed position	N	2NC+2NO	<b>077MTS2422</b>	180910	077MTS2422B	181000	
		R	2NC+2NO	<b>077MTS2422R</b>	180912	077MTS2422RB	181002	
	Transient position	N	2NC+2NO	<b>077MT24S22</b>	180911	<b>077MT24S22B</b>	181001	
		R	2NC+2NO	<b>077MT24S22R</b>	180913	077MT24S22RB	181003	
4 positions + central zero position								
 	Fixed positions	N	2NC+2NO	<b>077MTS123422</b>	180914	077MTS123422B	181004	
	Transient positions		2NC+2NO	<b>077MT1234S22</b>	180915	<b>077MT1234S22B</b>	181005	
2+2 positions + central zero position								
 	Fixed positions	X	4NC+4NO	077M2S2SX44	180918	077M2S2SX44B	181008	
	Transient positions		4NC+4NO	077M2T2TX44	180919	077M2T2TX44B	181009	
	4,8 transient -3,7 fixed		4NC+4NO	077M2S2TX44	180921			
	Transient positions	Y	4NC+4NO	077M2T2TY44	180923			
4+4 positions + central zero position								
 	Transient positions	X	8NC+8NO	077M4T4TX88	180927			
	2,4,6,8 transient -1,3,5,7 fixed		8NC+8NO	077M4S4TX88	180929	077M4S4TX88B	181019	
	Transient positions	Y	8NC+8NO	077M4T4TY88	180931	077M4T4TY88B	181021	

The catalogue numbers in **bold** are available from stock.

(1) Electrical diagrams, see E.55

### Illuminated push-buttons

Momentary	Description	Contacts	Cat. no.	Ref. no.
	Full voltage ~ / $\overline{\text{---}}$ BA9s max 380V - 2 W not included	NC+NO NO+NO NO	<b>077PLM11D0</b> <b>077PLM20D0</b> <b>077PLM10D0</b>	181040 181041 181043
	With transformer 50/60Hz BA9s6V-1.5W included	NC+NO	<b>077PLM11T♦</b>	
To complete by:				
<b>Lenses</b>				
	Standard		<b>077GPL</b> ●	see bottom
	Mushroom head Ø 35 mm (to use with the fixing ring 077GG03)		<b>077GELR</b>	180971
<b>Locking rings</b>				
	Without guard		<b>077GG03</b>	180980
	With metal guard		<b>077GGM</b>	180981
	With transparent guard		<b>077GGT</b>	180982

The catalogue numbers in **bold** are available from stock.

Suffix	110-120V	220-250V
♦	<b>J</b>	<b>N</b>

Colours	red	green	yellow	orange	blue	white	clear
Standard lenses	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>BL</b>	<b>B</b>	<b>I</b>

Control and signalling units Ø 30 mm

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**E**

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For reference numbers, see chapter X, pg. X.10



**Illuminated selector switches**

2 positions		Function (1)	Contacts	Cat. no.	Ref. no.
	<b>Fixed</b> I II Full voltage ~ / $\equiv$ BA9s max. 380V-2W not included	D	NC+NO	<b>077ISD11D0</b>	181060
3 positions		Function (1)	Contacts	Cat. no.	Ref. no.
	<b>Fixed</b> I 0 III Full voltage ~ / $\equiv$ BA9s max. 380V-2W not included	B	NC+NO	<b>077ISB11D0</b>	181170
	<b>With spring return</b> I 0 II Full voltage ~ / $\equiv$ BA9s max. 380V-2W not included	B Z	NC+NO NC+NO	077ISB11D0RC 077ISZ11D0RC	181174 181176
To complete by:					
	Lenses				
	Knob			<b>077MIS●</b>	see bottom

(1) Electrical diagrams, see E.55







The catalogue numbers **in bold** are available from stock.

Suffix	110-120V	220-250V
◆	<b>J</b>	<b>N</b>

Colours	red	green	yellow
●	<b>R</b>	<b>V</b>	<b>G</b>

For reference numbers, see chapter X, pg. X.10

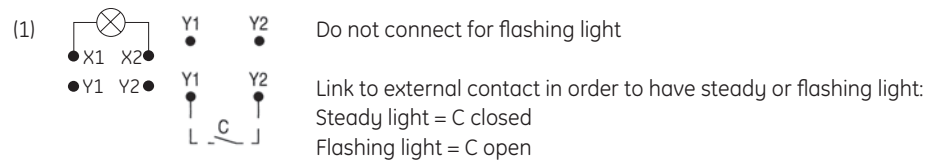
**Pilot lights**

	Description	Cat. no.	Ref. no.
	Full voltage ~ / $\equiv$ BA9s max. 380V-2W not included	<b>077LDNV0</b>	181300
	With resistor ~ / $\equiv$ 110-120V, BA9s60V-1.2W included 220-240V, BA9s130V-2W included	<b>077LRNVJ</b> <b>077LRNVN</b>	181301 181302
	With transformer 50/60Hz BA9s6v-1.5w included	<b>077LTNV♦</b>	
	Multifunction (1) full voltage 24V ~ / $\equiv$ BA9s24V-2W included	<b>077LDMVD</b>	181305
	Multifunction (1) with transformer 50/60 Hz BA9s6V-0.6W included	<b>077LTMV♦</b>	
<b>To complete by:</b>			
	<b>Lenses</b>		
	plastic version	<b>077GL●</b>	see bottom
	Full voltage ~ / $\equiv$ For bulb E14 base max 660V(1)-6W not included	<b>077DLE14</b>	181260
<b>To complete by:</b>			
	<b>Lenses</b>		
	For pilot lights 077DLE14 plastic version	<b>099GW1●</b>	see bottom

The catalogue numbers **in bold** are available from stock.

Suffix	110-120V	220-250V
♦	<b>J</b>	<b>N</b>

Colours	red	green	yellow	orange	blue	white	clear
●	<b>R</b>	<b>V</b>	<b>G</b>	<b>A</b>	<b>BL</b>	<b>B</b>	<b>I</b>



For reference numbers, see chapter X, pg. X.10



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## Accessories

	Description	Cat. no.	Ref. no.			
	<b>Push-on/push-off device</b> For momentary standard push-buttons Converts momentary push-button to push-on/push-off. This device can only be used with 077-01 (NC) and/or 077-10A (NO early make) contact blocks.	<b>077DPP</b>	181550			
	<b>Push-pull to release device</b> For momentary mushroom push-buttons Converts momentary mushroom push-button to push to latch/pull to release.	<b>077DAE</b>	181554			
	<b>Handles</b> Knob for selector switches	<b>077M●</b>	see bottom			
	<b>Protection</b> Guard-ring for mushroom head push-button dia 35 mm.	<b>077GE35</b>	181620			
	<b>Plug</b> For unused mounting hole.	<b>077TPF</b>	181601			
	<b>Potentiometer operator</b> Suitable for potentiometers with shaft 50 mm long and 6 mm diameter. Potentiometer not included.	<b>077OPZ</b>	181570			
	<b>Rubber protective caps</b> For standard push-buttons - coloured - clear	<b>077CP●</b>	see bottom			
		<b>077CPT</b>	181588			
	For illuminated standard push-buttons - clear	<b>077CPLT</b>	181600			
		For knob selector switches - black colour with clear knob	<b>077CST</b>	181603		
	<b>Spare keys</b> Standard version	Code				
		3095	<b>077C3095</b> 173095			
	<b>Bulbs BA9s</b>	Filament type				
		Vn	Wn			
		6	0.6	<b>BA9S606</b>	187850	
		6	1.5	<b>BA9S615</b>	187851	
		12	2	BA9S122	187852	
		24	2	<b>BA9S242</b>	187853	
		30	2.1	<b>BA9S30</b>	187854	
		48	2	BA9S48	187855	
		60	1.2	BA9S6012	187856	
		130	2	<b>BA9S130</b>	187857	
		Neon type	110	0.11	BA9SN110	187860
			220	0.33	<b>BA9SN220</b>	187861
		Mono LED	Vn AC/DC ± 10%			
			6		BA9S6L●	see bottom
			12		BA9S12L●	see bottom
	24		BA9S24L●	see bottom		
	48		BA9S48L●	see bottom		
	110		BA9S110L●	see bottom		
	(DC) 230		BA9S230L●	see bottom		





The catalogue numbers **in bold** are available from stock.

Colours ●	black	red	green	yellow	blue	white
Knobs	N	R	V	G	BL	-
Protective caps	<b>N</b>	<b>R</b>	<b>V</b>	G	-	-
Mono LED	-	R	V	G	BL	B

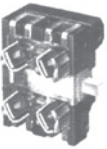
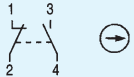





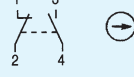


For reference numbers, see chapter X, pg. X.10



**Nameplates**

	Description	Cat. no.	Ref. no.
	For push-button and pilot lights		
	Without text (black background)	077TNA	181650
	With text in English (black background)	077TNA40	181840
	For 2 position selector switch and selector push-button		
	Without text (black background)	077TNA2	181660
	With text (black background)	077TNA230	181930
	For 3 position selector switch and selector push-button		
	Without text (black background)	077TNA3	181670
	With text (black background)	077TNA301	181951
		077TNA312	181962
	077TNA313	181963	
	Diameter 62 mm for emergency push-buttons		
	Without text (yellow background)	077TGR	181720
	With text (yellow background): EMERGENCY STOP	077TGRO2	181722

**Contact blocks**

2 positions	Contacts	Cat. no.	Ref. no.	
	Standard			
	For all the applications Illuminated push-buttons and illuminated selector switches excluded			
		NC+NO	<b>077-11</b>	180001
		NC	<b>077-01</b>	180003
		NO	<b>077-10</b>	180002
		NC late opening	<b>077-01R</b>	180008
		NO early closing	<b>077-10A</b>	180007
	Accessories for contact blocks 077-... IP2X protection	for use with NO for use with NC for use with NO+NC	<b>077PTB10</b> <b>077PTB01</b> <b>077PTB11</b>	181608 181609 181615
	For 2 + 2 and 4 + 4 positions joysticks Snap action		099SPDTDB	180009
		For illuminated push-buttons and illuminated selector switches		
		NC+NO	P9B11VN	187000
		NC	P9B01VN	187001
		NO	P9B10VN	187002

The catalogue numbers in **bold** are available from stock.



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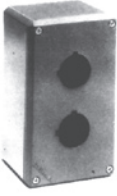
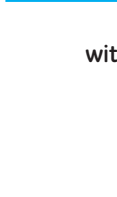


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## Enclosures for push-button stations in aluminium alloy (Grey RAL 7012)

			Cat. no.	Ref. no.	
	Cover with holes with conduit entry	No. of holes	Type		
		1	1	<b>077SP1</b>	180521
		1	1M	<b>077SP1M</b>	180522
		2	2	<b>077SP2</b>	180523
		2	2M	<b>077SP2M</b>	180524
		3	3	<b>077SP3</b>	180525
		4	4V	<b>077SP4V</b>	180526
		4	4	<b>077SP4</b>	180527
		6	6	<b>077SP6</b>	180528
		9	9	<b>077SP9</b>	180529
		12	12	<b>077SP12</b>	180530
		16	16	<b>077SP16</b>	180531
		20	20	<b>077SP20</b>	180532
		25	25	<b>077SP25</b>	180533
		30	30	<b>077SP30</b>	180534
		36	36	077SP36	180535
			Cover with holes without conduit entry	No. of holes	Type
1	1			077SP1SFE	180536
1	1M			077SP1MSFE	180537
2	2			077SP2SFE	180538
2	2M			077SP2MSFE	180539
3	3			077SP3SFE	180540
4	4V			077SP4VSFE	180541
4	4			077SP4SFE	180542
6	6			077SP6SFE	180543
9	9			077SP9SFE	180544
12	12			077SP12SFE	180545
16	16			077SP16SFE	180546
20	20			077SP20SFE	180547
25	25			077SP25SFE	180548
30	30			077SP30SFE	180549
36	36			077SP36SFE	180550
	Cover without holes with conduit entry			Type	
		1	080SP1SFC	170835	
		1M	080SP1MSFC	170838	
		2	080SP2SFC	170841	
		2M	080SP2MSFC	170844	
		3	080SP3SFC	170847	
		4V	077SP4VSFC	180551	
		4	080SP8SFC	170853	
		6	080SP12SFC	170856	
		9	080SP12SFC	170856	
		12	080SP18SFC	170859	
		16	080SP18SFC	170859	
		20	080SP35SFC	170863	
		25	080SP35SFC	170863	
		30	<b>077SP36SFC</b>	180552	
		36	077SP36SFC	180552	
			Cover without holes without conduit entry	Type	
1	080SP1SF			170837	
1M	080SP1MSF			170840	
2	080SP2SF			170843	
2M	080SP2MSF			170846	
3	080SP3SF			170849	
4V	077SP4VSF			180553	
4	080SP8SF			170855	
6	080SP12SF			170858	
9	080SP12SF			170858	
12	080SP18SF			170861	
16	080SP18SF			170861	
20	080SP35SF			170865	
25	080SP35SF			170865	
30	<b>077SP36SF</b>			180554	
36	077SP36SF			180554	
Accessories Kit of two hinges for types from 12 to 36 holes.				<b>080KCSP</b>	170883

The catalogue numbers in **bold** are available from stock.

## Diagrams

### Selector switches

	Function	Contacts	Diagram
	D 077 11...		
	I 077 11...		
	H 077 11...		
	B 077 11...		
	Z 077 11... 077 11...		

### Illuminated selector switches

Full voltage type	Function	Contacts	Diagram
	D 077 10... 077 01...		
	B 077 10... 077 01...		
	Z 077 10... 077 01...		

### Joysticks

Positions	Function	Contacts	Diagram
	N 077 11... 077 11...		
	R 077 11... 077 11...		
	N 077 11... 077 11...		

### Joysticks

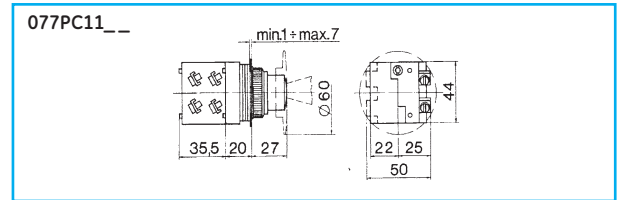
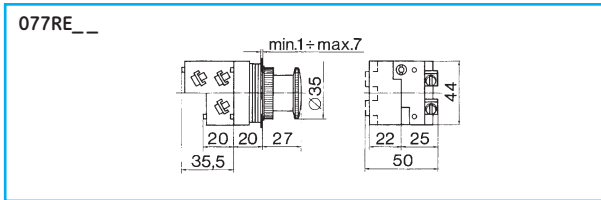
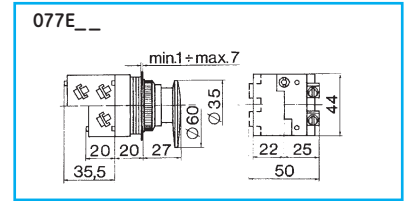
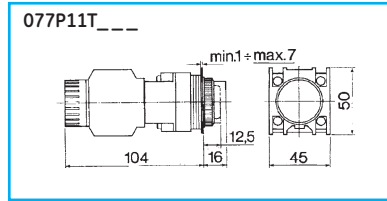
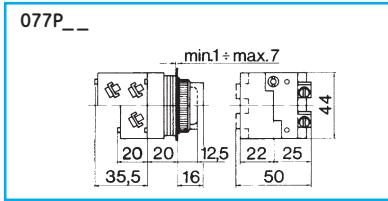
Positions	Function	Contacts	Diagram
	X 077 11... 077 11... 077 11... 077 11...		
	Y 077 11... 077 11... 077 11... 077 11...		
	X 077 11... 077 11... 077 11... 077 11... 077 11... 077 11... 077 11... 077 11...		
	Y 077 11... 077 11... 077 11... 077 11... 077 11... 077 11... 077 11... 077 11...		

■ = closed contact

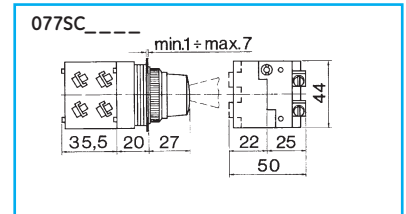
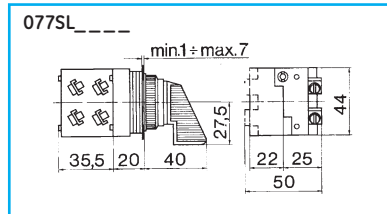
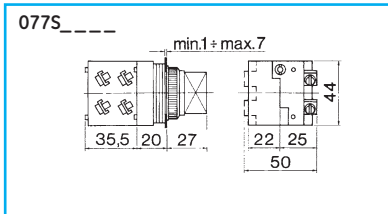


## Dimensional drawings

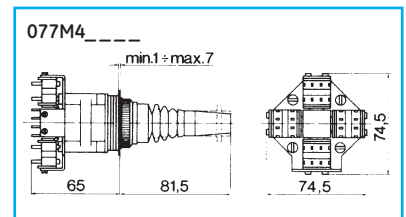
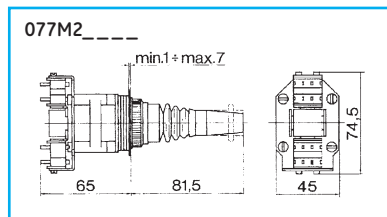
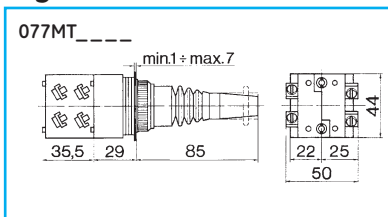
### Push-buttons



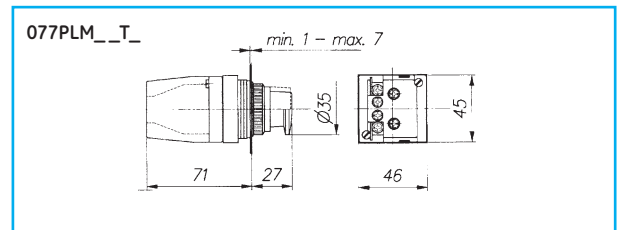
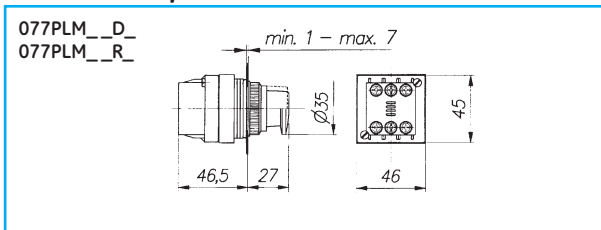
### Selector switches



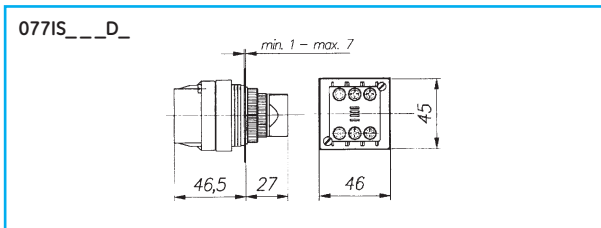
### Joysticks



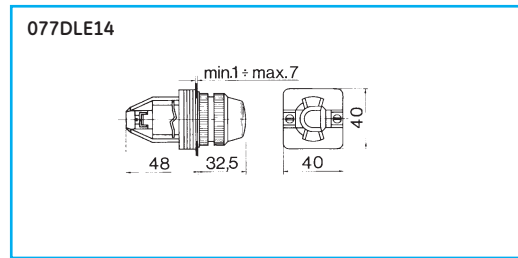
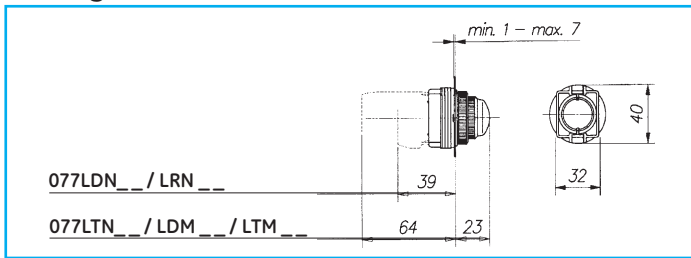
### Illuminated push-buttons



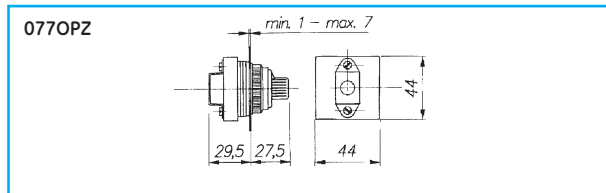
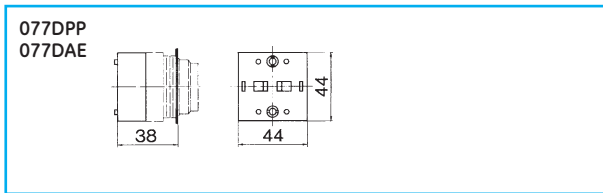
### Illuminated selector switches



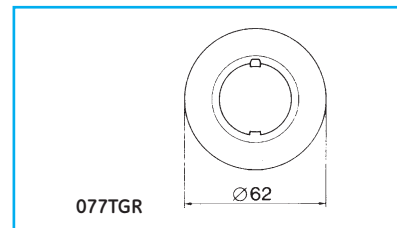
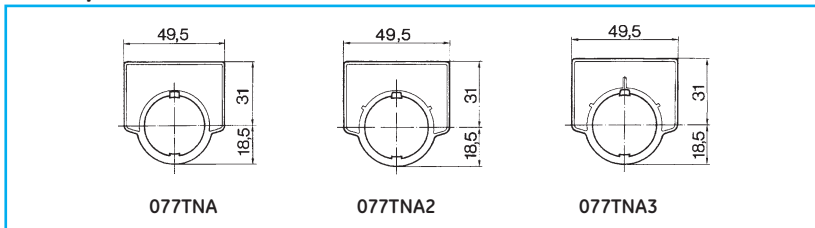
Pilot lights



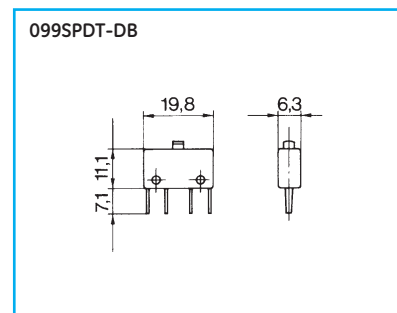
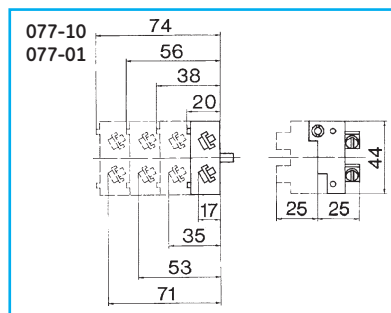
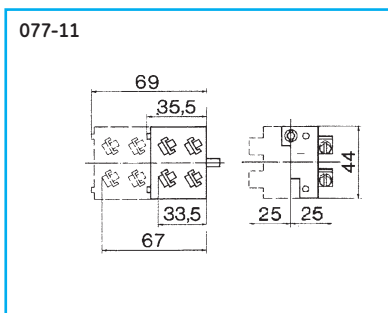
Kits



Nameplates



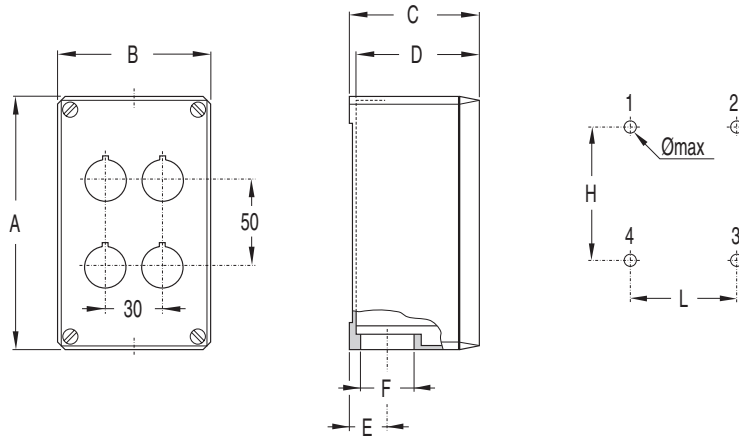
Contact blocks



A
B
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X

Dimensional drawings

Aluminium enclosures



Type	Number of holes Ø 30		Dimensions						Fixing templates	
	Vertic.	Horizont.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F	HxLxØmax (mm)	position of the holes
1	-	-	87	87	75	72	21.5	PG 21	74x55x4	1 - 3
1M	-	-	87	87	100	97	21.5	PG 21	68x55x4	1 - 3
2	2	-	145	87	75	72	21.5	PG 21	132x55x4	1 - 3
2M	2	-	145	87	100	97	21.5	PG 21	126x55x4	1 - 3
3	3	-	195	87	100	97	21.5	PG 21	176x55x4	1 - 3
4V	4	-	257	92	86.5	83.5	23	PG 21	224x76x6	1 - 3
4	2	2	152	152	101.5	98.5	27	PG 29	136x119x6	1 - 3
6	2	3	205	230	101.5	98.5	27	PG 29	172x214x6	1-2-3-4
9	3	3	205	230	101.5	98.5	27	PG 29	172x214x6	1-2-3-4
12	3	4	257	300	101.5	98.5	35	PG 36	221x282x6	1-2-3-4
16	4	4	257	300	101.5	98.5	35	PG 36	221x282x6	1-2-3-4
20	5	4	350	350	123.5	106.5	41	PG 36	180x180x10	1-2-3-4
25	5	5	350	350	123.5	106.5	41	PG 36	180x180x10	1-2-3-4
30	6	5	410	410	144.5	127.5	53	PG 48	180x180x10	1-2-3-4
36	6	6	410	410	144.5	127.5	53	PG 48	180x180x10	1-2-3-4

Control and signalling units

A

B

C

D

E

F

G

H

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X



Notes

Grid area for notes.

Control and signalling units Ø 30 mm

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X






### Light towers

- Outstanding modular concept. One terminal unit can be combined with **up to seven modular signal units**.
- Steady light units, flashing light units, strobe light units, LED light units.
- The buzzer elements emit a clearly audible dual-tone signal for maximum safety.
- A bayonet mounting, through a simple manual operation, allows a quick and simultaneous method of joining the signal units together and the electrical connection of them.
- Compact dimension Ø70mm.
- IP65 for use in extreme conditions.
- Captive screw cable connectors, located with terminal unit are **easy** to reach and guarantee a quick and neat electrical connection.
- The special design makes maintenance quick, easy and carried out in complete safety and without tools.
- The high quality of materials used to manufacture the lenses ensures the light output is at the **highest luminous** intensity, combined with a sturdy construction and a good resistance to aging.

### Marking



### Meaning of optical signals

	Colour	Meaning	Operating state
	Red	Extreme danger Hazardous conditions	Immediate action necessary
	Yellow / Amber	Beware Warning conditions imminent	Abnormal state Monitor or action as necessary
	Green	Normal conditions	No actions required
	Blue	Conditions requiring defined action	Discontinuity Intervention mandatory
	White / Clear	No particular meaning	Other state Can be used as required

### Meaning of audible signals (EN 981, IEC 73)

	Signal tone	Meaning	Operating state
	Intermittent modulated tone	Danger	Immediate action necessary
	Linear tone	Safety	No actions required




## Light units

**NLT1...** **Steady light unit**

- With socket BA15D for filament bulbs (7W max.) and LEDs
- Supply voltage: 240V AC/DC
- Current consumption (with 5W lamps):


24V	115V	240V
210mA	43mA	22mA



**NLT2...** **Flashing light unit**

- With socket BA15D for filament bulbs (7W max.) and LEDs
- Supply voltage: 24V AC/DC, 115V AC, 240V AC
- Current consumption (with 5W lamps):

24V DC	24V AC	115V AC	240V AC
130mA	145mA	25mA	15mA




**NLT3...** **Strobe light unit**

- Lamp type: 4 Joule xenon lamp
- Supply voltage: 24V AC/DC, 115V AC, 240V AC
- Current consumption:

24V DC	24V AC	115V AC	240V AC
75mA	135mA	20mA	15mA


- Flash frequency: 1,4Hz (84 flashes per min.) according with EN 60073



## Audio units

**NLT73BD** **Pulsating tone**

- **Protection degree IP54**
- Tone: pulsating
- Audio frequency: 2900Hz
- Pulsating tone frequency: 0,5Hz according to EN 457
- Sound level at 1 m.: 90 dB (A)
- Supply voltage: 24V AC/DC
- Current consumption: 20mA




**NLT75AJ - NLT75AN** **Pulsating or constant tone**

- **Protection degree IP54**
- Tone: pulsating or constant
- Audio frequency: 2600Hz according to EN 457
- Pulsating tone frequency: 1Hz according to EN 457
- Sound level at 1 m.: pulsating tone: 95 dB (A) constant tone: 93 dB (A)
- Supply voltage: 115VAC (NLT75AJ) / 240VAC (NLT75AN)
- Current consumption:

115VAC	240VAC
40mA	30mA


Pulsating or constant tone, adjustable by removing or inserting bridge JP1 in the printed circuit.



**NLT75BD** **Modulated tone**


- **Protection degree IP54**
- Audio frequency: 2500 - 2800Hz according to EN 457
- Sound level at 1 m.: max. 90 dB (A)
- Supply voltage: 24V AC/DC
- Current consumption: 40mA

16 sounds can be selected by means of the dip switch



**NLT77BD** **Pulsating tone**

- **Protection degree IP65**
- Audio frequency: 1200 - 2600Hz according to EN 457
- Sound level at 1 m.: max. 84 dB (A)
- Supply voltage: 24V AC/DC
- Current consumption: 40mA




**NLT77AJ - NLT77AN** **Pulsating or constant tone**

- **Protection degree IP65**
- Tone: pulsating or constant
- Audio frequency: 2600Hz according to EN 457
- Pulsating tone frequency: 1Hz according to EN 457
- Sound level at 1 m.: pulsating tone: 78 dB (A) constant tone: 75 dB (A)
- Supply voltage: 115VAC (NLT77AJ) / 240VAC (NLT77AN)
- Current consumption:

115VAC	240VAC
40mA	30mA

Pulsating or constant tone, adjustable by removing or inserting bridge JP1 in the printed circuit.



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## Light units

Control and signalling units

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	Supply voltage	Red		Amber		Yellow		Green		Blue		Clear	
		Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no. Pack
<b>Steady light units</b> (bulb not included) 	12...240V	NLT1R	222230	NLT1A	222231	NLT1G	222232	NLT1V	222233	NLT1L	222234	NLT1I	222235 1
<b>Flashing light units</b> (bulb BA15D filament) (bulb included) 	24V AC/DC	NLT2BDR	222236	NLT2BDA	222237	NLT2BDG	222238	NLT2BDV	222239	NLT2BDL	222240	NLT2BDI	222241 1
	115V AC	NLT2AJR	222242	NLT2AJA	222243	NLT2AJG	222244	NLT2AJV	222245	NLT2AJL	222246	NLT2AJI	222247 1
	240V AC	NLT2ANR	222248	NLT2ANA	222249	NLT2ANG	222250	NLT2ANV	222251	NLT2ANL	222252	NLT2ANI	222253 1
<b>Flashing light units (bulb LED)</b> (bulb included) 	24V AC/DC	NLT2BDLR	222289	NLT2BDLA	222290	NLT2BDLG	222291	NLT2BDLV	222292	NLT2BDLL	222293	NLT2BDLI	222294 1
	115V AC	NLT2AJLR	222295	NLT2AJLA	222296	NLT2AJLG	222297	NLT2AJLV	222298	NLT2AJLL	222299	NLT2AJLI	242464 1
	240V AC	NLT2ANLR	222301	NLT2ANLA	222302	NLT2ANLG	222303	NLT2ANLV	222304	NLT2ANLL	222305	NLT2ANLI	222306 1
<b>Strobe light units</b> (bulb included) 	24V AC/DC	NLT3BDR	222254	NLT3BDA	222255	NLT3BDG	222256	NLT3BDV	222257	NLT3BDL	222258	NLT3BDI	222259 1
	115V AC	NLT3AJR	222260	NLT3AJA	222261	NLT3AJG	222262	NLT3AJV	222263	NLT3AJL	222264	NLT3AJI	222265 1
	240V AC	NLT3ANR	222266	NLT3ANA	222267	NLT3ANG	222268	NLT3ANV	222269	NLT3ANL	222270	NLT3ANI	222271 1




**Audio units**


	Protection degree	Supply voltage	Cat. no.	Ref. no.	Pack
 <p>Pulsating tone</p>	IP54	24V AC/DC	NLT73BD	222278	1
	IP65	24V AC/DC	NLT77BD	222279	1
 <p>Pulsating or constant tone Adjustable by removing or inserting bridge JP1 in the printed circuit</p>	IP54	115V AC	NLT75AJ	222287	1
		240V AC	NLT75AN	222288	1
	IP65	115V AC	NLT77AJ	222280	1
		240V AC	NLT77AN	222281	1
 <p>Modulated tone 16 sounds can be selected by means of dip switch</p>	IP54	24V AC/DC	NLT75BD	222286	1

The audio units can only be mounted as final top unit (top cover included)


**Bulbs**

	Supply voltage	Red		Amber		Yellow		Green		Blue		White		Pack		
		Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.			
 <p>LED - BA15D</p>	24V AC/DC	BA15D24LR	222330	BA15D24LA	222331	BA15D24LG	222332	BA15D24LV	222333	BA15D24LL	222334	BA15D24LB	222335	1		
	115V AC	BA15D115LR	222336	BA15D115LA	222337	BA15D115LG	222338	BA15D115LV	222339	BA15D115LL	222340	BA15D115LB	222341	1		
	240V AC	BA15D230LR	222342	BA15D230LA	222343	BA15D230LG	222344	BA15D230LV	222345	BA15D230LL	222346	BA15D230LB	222347	1		
<p>Incandescent BA15D</p>	Supply voltage													Clear		
	12V													BA15D125	222348	5
	24V													BA15D245	222349	5
	30V													BA15D305	222350	5
	115V													BA15D1155	222351	5
	240V													BA15D2305	222352	5

**Terminal**

	Cat. no.	Ref. no.	Pack
 <p>Terminal unit with top cover</p>	NLT9TC	222282	1

**Base with tube**

	Cat. no.	Ref. no.	Pack
 <p>Base + tube height 100mm</p>	NLT5BT	222284	1
Base + tube height 100mm, 90° fixing	NLT90BT	222307	1
Tube height extension 100mm	NLT5ET	222285	1

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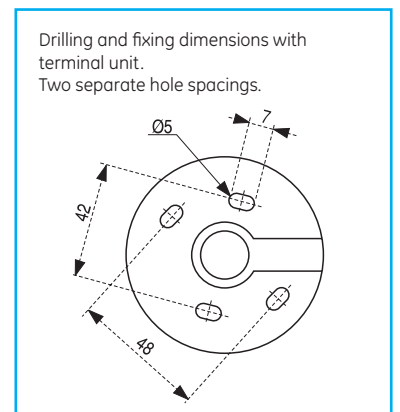
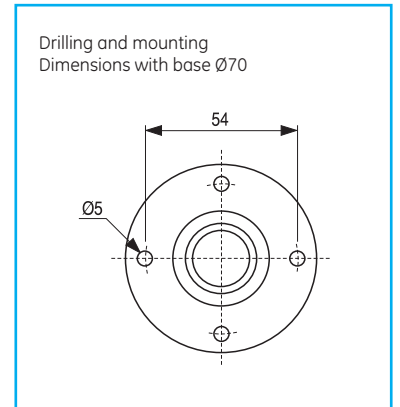
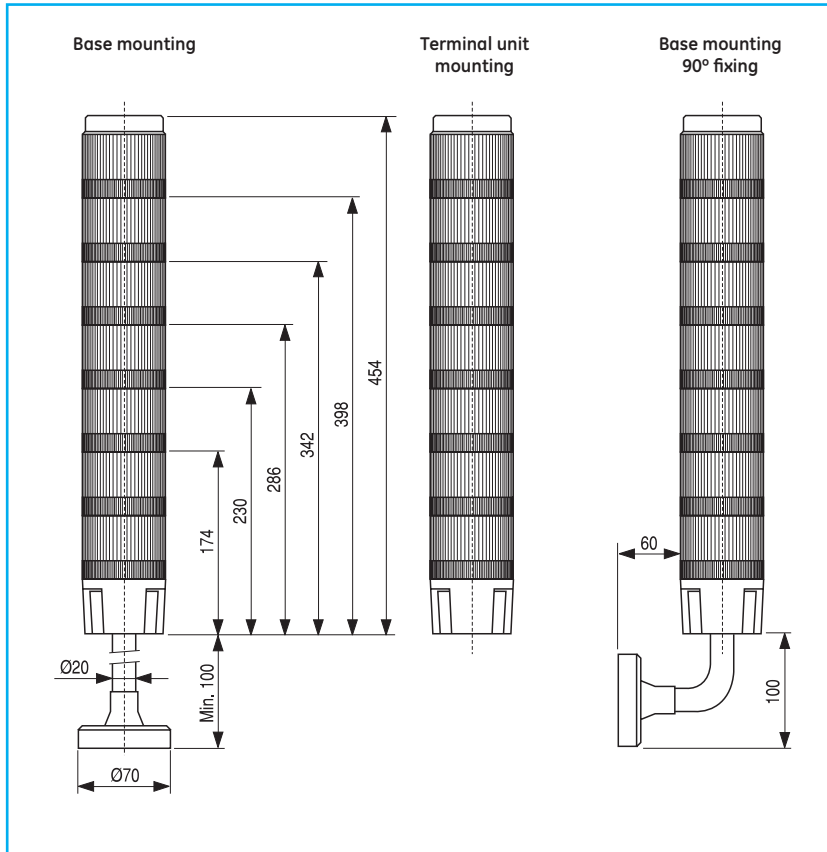
## Technical data

Conformity to standards	EEC regulation 89/336 electromagnetic compatibility EEC regulation 73/23 low voltage, including amendment EEC 93/68 All NLT range are made and tested in full compliance with: EN 60947-5-14 (VDE 0470, IEC 60947) CE, cUL US
Materials	Polycarbonate Visual and audio signal units, terminal unit, top cover, base and extension tubes
Rated insulated voltage	250V max.
Operating temperature	-20°C ... +60°C (except version with bulb 12V = 40°C)
Protection degree (according to EN 60529)	IP65 (IP54 for audio units types NLT73xx and NLT75xx) (indicators must be correctly assembled with top cover, gasket or PG conduit fitting)
Colours (according to EN 60073)	Amber, Blue, Yellow, Clear, Red and Green
Lamp type	Steady/flashing units: Bayonet type BA15D socket: filament (7W max.) or LED Strobe units: Xenon lamps
Nr. of combined units	Up to 7 modular units
Connection	Captive screw cable connectors (max. cable size 1.5mm <sup>2</sup> ) inside terminal sleeve «C» is common to all signal units.
Connection identification code	They are numbered 1/7 from base to top

## Mechanical characteristics

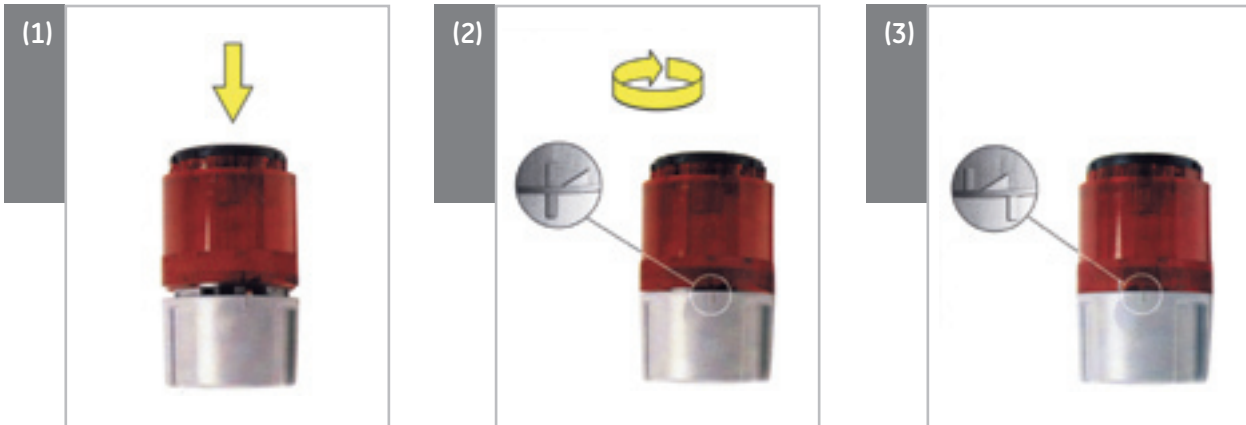
Mounting of the units	
Average torque	2.4Nm
Unfastening of the units	
Average torque	2.3Nm
Vibration resistance	2g min. (10-150Hz) according to IEC 68-2-6
Mounting	Direct through terminal unit or with base and tube

## Dimensions



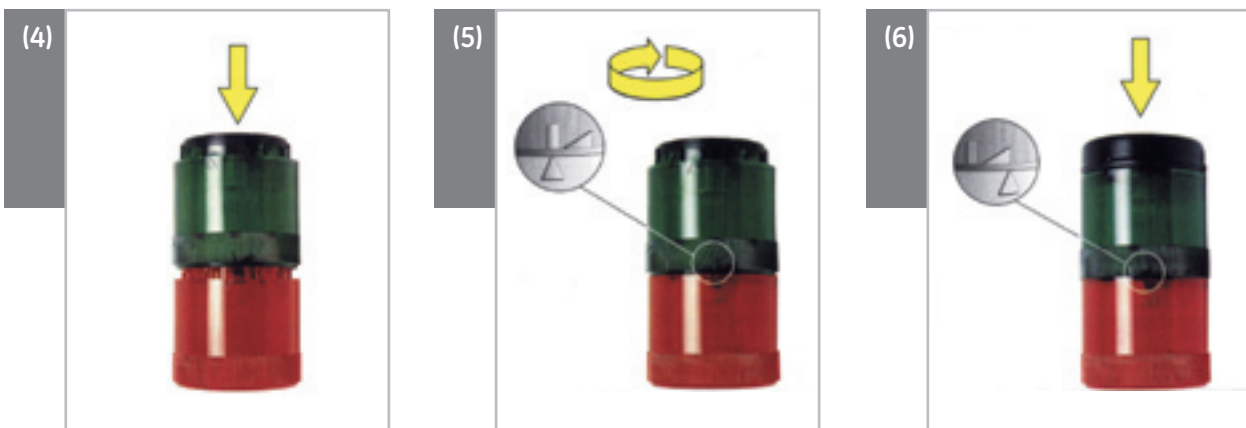
## Modular system

Place signal beacon unit onto terminal unit **(1)** align guide marks and twist clockwise till they are locked **(2) + (3)**

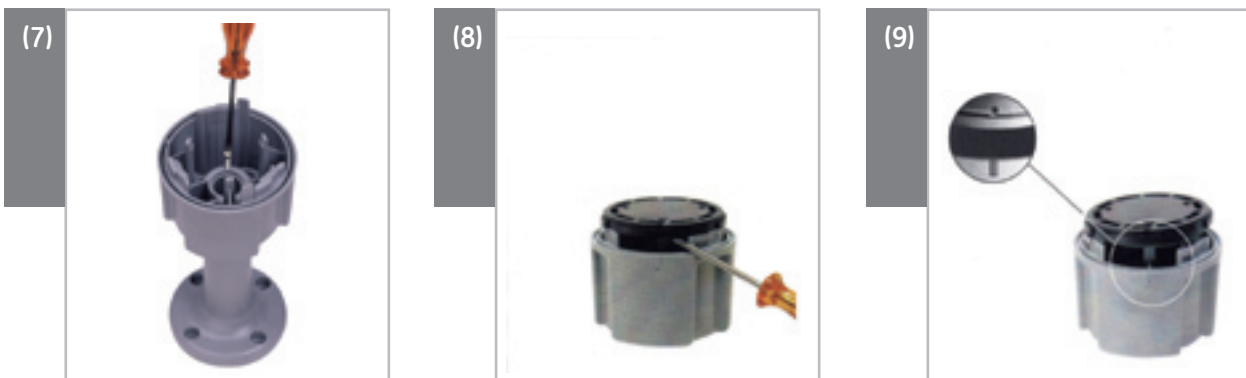


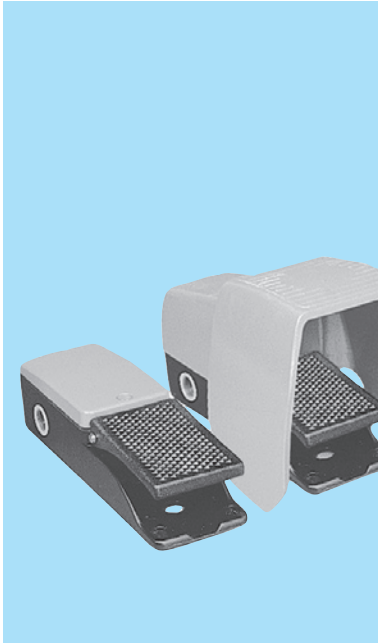
Follow the same steps to add more signal units **(4) + (5) + (6)**

The audible element can be mounted as final top unit, as it is complete with a top cover.



To fix extension tube (base always included), insert it into opening on the underside of the terminal unit and tighten screw on the side **(7)**. To reach the screw cable clamp terminals, remove black disc first, prising with a small screwdriver **(8)**. Connect to terminals (coloured units are numbered from base to top). To place terminal back into position, align the guiding marks **(9)** and press inwards.





## Foot switches

### General

Foot switches, for intensive services suitable for controlling and monitoring of low voltage AC and DC electrical circuits.

### Climatic protections

The standard versions are suitable for use in the following climates:

- Temperate climate cat. 23/50 (DIN 50014)
- Wet climate cat. 23/83 (DIN 50015)
- Hot wet climate cat. 40/92 (DIN 50015)
- Variable wet climate cat. FW 24 (DIN 50016)

### Standards

IEC 947-5-1, CEI EN 60947.5.1  
VDE 0660

### Approvals


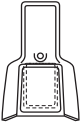
CSA, UL

### Specifications

Temperature ranges	Operation	from -30°C up to +80°C						
	Storage	from -30°C up to +80°C						
Degree of protection (according to IEC 529)	IP 65							
Vibration resistance	20g (10 up to 55Hz)							
Mechanical endurance	2 x 10 <sup>7</sup> for all the types							
<b>Electrical</b>								
Rated insulation voltage according to EN 60947.1	500V							
Insulation class according to VDE 0110	Group C							
Electric shock protection according to IEC 536	Class I							
Short-circuit prot. according to IEC 269.1 and 269.3	10A gL fuses							
<b>Electrical performances of the contact blocks</b>								
Rated thermal current (I <sub>th</sub> )	10A							
Performances according to EN 60947.5.1								
Slow motion contacts	Voltage	U <sub>e</sub> (V)	24	48	110	220	380	
	Category AC 15	Current	I <sub>e</sub> (A)	6	6	6	6	4
Snap action contacts	Voltage	U <sub>e</sub> (V)	24	48	110	220	380	
	Category AC 15	Current	I <sub>e</sub> (A)	6	6	6	5	4
Category DC 13	Voltage	U <sub>e</sub> (V)	24	48	110	220		
	Current	I <sub>e</sub> (A)	1	0,8	0,7	0,3		
Connection	Same polarity for both slow motion and snap action contacts							
Cables entries	IPA1, IPA2, IPB1, IPB2	1 x M20						
	IPA1-P	2 x M20						

Order codes ● pg. E.67  
Dimensional drawings ● pg. E.73

Foot switches - Contact combinations (per pedal)

	Function (1)	Slow break				Snap action				Pack
		Cat. no	Ref. no.	Cat. no	Ref. no.	Cat. no	Ref. no.	Cat. no	Ref. no.	
 <b>ONE pedal Without guard</b>	N	IPA1-N211B	132170			IPA1-N411B	132198	IPA1-N422B	132213	1
	P(2)	IPA1-P211B	132171			-		-		1
	D	-						IPA1-D422B	132214	1
 <b>ONE pedal With guard</b>	N	IPB1-N211B	132172	IPB1-N222B	132186	IPB1-N411B	132201	IPB1-N422B	132215	1
	P(2)	IPB1-P211B	132173	-		-		-		1
	D	-				-		IPB1-D422B	132216	1
	R	-		-		IPB1-R411B	132203	-		1
<b>ONE pedal With guard Heavy duty</b>	N	IPA2-N211B	132182							1
<b>Spare microswitches</b>		N211B	116113	N222B	116664	N411B	116663	N422B	116665	1

- (1) **Function N**  
Normal operation. When the pedal is pressed the contacts change position. When released they return to their position.
- Function P**  
Press-on press-off operation. The position of the contacts changes each time the pedal is pressed.
- Function D**  
Two-stage operation. Used with two contacts blocks. When the pedal is pressed to the first point, the contacts of the first block switch; when pressed as far as the second point the contacts of the second block switch and the first block stays in the same position.
- Function R**  
Normal operation with potentiometer. When the pedal is pressed, the contacts change position at the same time as the potentiometer is operated. When released, the contacts and potentiometer return to their initial position.

 Positive opening.

(2) Version with function P do not correspond to the concept of positive opening.



Approvals



Features

Enclosed in metal with aluminium protection cover, safety latch function "OFF-ON-OFF" with manual reset.

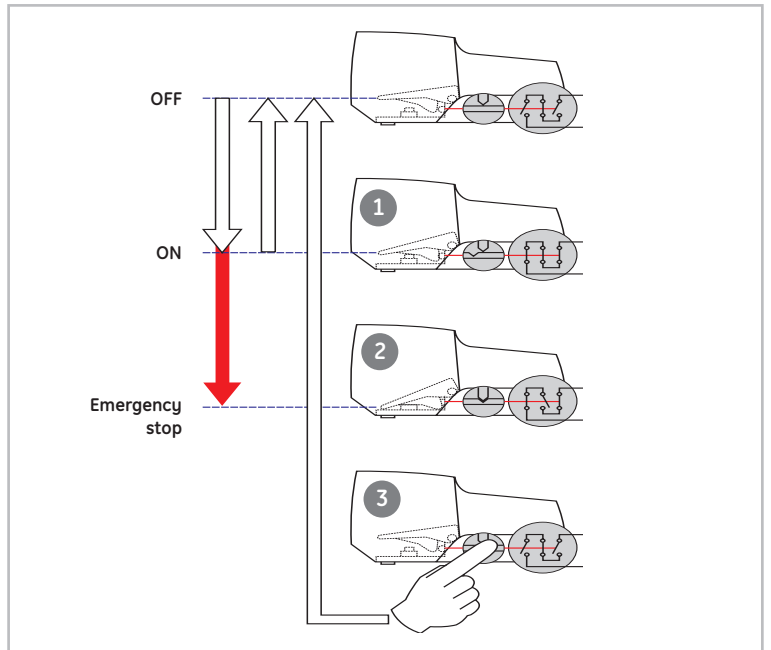
Technical data

Switching diagram	
1) Trigger point	33 — 34
2) Latched position	25 — 26
	13 — 14
Rated insulation voltage $U_i$	max. 400VAC
Thermal continuous current $I_{the}$	max. 10A
Switching frequency	max. 50/min.
Mechanical operational life number of switching cycles	$10 \times 10^6$
Ambient temperature	-30°C to +80°C
Cable conduits	(3x) M20x1.5
Protection degree	IP65
Actuating force (approx.)	10N
Trigger point	200N
Weight	1.5 kg

Safety foot switches

Operation

- 1 Pedal operation up to the trigger point**  
The operating contact is closed, the operating process is started
- 2 Operation past the trigger point in emergency cases**  
The operating contact is opened and latched and the process is stopped. Also if the device is unused, the latch remains in the off-position in this phase. Uncontrolled restart is prevented
- 3 Reset function**  
Only after the danger has passed can the contacts be manually unlatched (push-button on the side). The operating process can now be restarted by pushing the pedal up to the triggering point.



Order codes

	Cat. no.	Ref. no.	Pack
- According to standards: EN 60947-1 / IEC 60947-5-1	<b>IPSF1</b>	223000	1
- Slow-action contact			
- Snap-action contact			
- Trigger point			
- Latch function			
- Making current according to EN/IEC 60947-5-1 AC15/240V/3A			

Dimensions ● pg. E.73



## Signalling devices

### General

Series 105 signalling units are used to indicate the electric equipment power supply conditions.

For this purpose the devices shall be wired after the main disconnecting switch and clearly in view when the cabinet's doors are opened.

Series 105 DTL devices can be used on three-phase lines with or without the neutral wire or single-phase power lines, indicating the hazardous condition due to the applied voltage.

Three luminous red lamps are used. The flashing devices are normally used in combination with limit switches contacts NC type 114FCT03 that provides insertion when the cabinet door are open only.

### Climatic protection

The standard versions are suitable for use in the following climates:

- Temperate climate      cat. 23/50 (DIN 50014)
- Wet climate              cat. 23/83 (DIN 50015)
- Hot wet climate        cat. 40/92 (DIN 50015)
- Variable wet climate    cat. FW 24 (DIN 50016)



### Standards

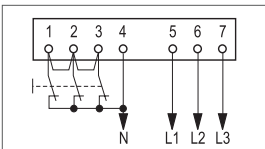
CEI, IEC, VDE, BSI and UTE

### Approvals

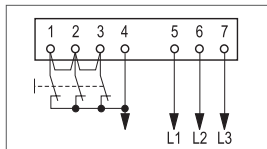
UL, CSA, CE

### Suggested connections

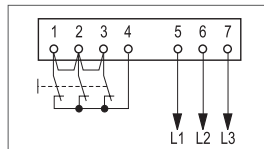
Indicates the presence of 3, 2 or 1 phase only by means of the relative lamp.



3-phase line with insulated neutral    3-phase line with grounded neutral

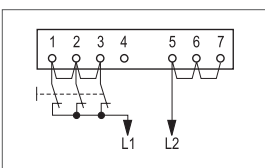


Indicates the presence of 3 or 2 phases by means of the relative lamp. One phase only is not indicated ( all lamps OFF )

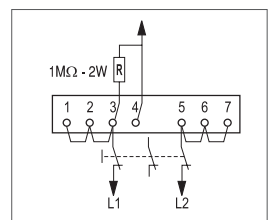


3-phase line without neutral

Indicates both phases with 3 lamps ON at same time. One phase only is not indicated ( all lamps OFF )



Single-phase line (general diagram)



Single phase-line (alternative diagram)

1. Phase to phase connection on a 3 phase line with grounded neutral. Indicates the presence of 2-phases or 1 only with the 3 lamps ON at the same time.
2. Phase to neutral connection on a 3 phase line with grounded neutral or phase to phase by a matching transformer with one phase grounded. Indicates the presence of the ungrounded phase with the 3 lamps ON at the same time. No indication occur if the ungrounded phase is missing ( all lamps OFF ).

### Specifications

Temperature ranges	Operation	from -25°C up to +70°C
	Storage	from -40°C up to +70°C
Degree of protection (according to IEC 529)		IP 20
<b>Electrical</b>		
Rated insulation voltage according to EN 60947.1		690V
Impulse withstand voltage according to EN 60947.1		4kV
Electrical input		2mA max.
Connections	Terminal strip with numbered terminals, accessible from outside	
	protected against accidental contacts according to DIN 57106 and IP 20 according to IEC 529	
Clamping capacity		Maximum one flexible conductor 12 AWG (3.3mm <sup>2</sup> )

Order codes ● pg. E.70  
Dimensional drawings ● pg. E.72





### Flashing devices



Supply voltage		Cat. no	Ref. no.	Pack
Three-phase (50-60Hz)	Single-phase (50/60Hz)			
220V	110-127V	105DTL220	132230	1
380-600V	220-350V	105DTL500	132231	1
690V		105DTL690	132232	1

### 3 pole limit switch for device control



Protection degree	Cables entry	Operation force	Contacts	Cat. no	Ref. no.	Pack
IP40	PG11	8.5 N min.	3NC	114FCT03	130320	25
IP65	PG11	8.5 N min.	3NC	114FCT03T	130321	25

### Paralell bridge for 3 poles limit switches



Cat. no	Ref. no.	Pack
105 PT	132234	50x5

### Single door protection unit



The unit includes the following components:

- one flashing device 105DTL220 or 105DTL500.
- one 3-pole limit switch 114FCT03 for connection of the flashing device
- one electrical interlock device and panel light 105GIL or 105GIL10.
- one mounting plate 105PM on which are fitted on the above devices.

If two doors have to be protected (as double enclosure closing on the middle) the mounting plate shall be fitted also one limit switch 114FCT03 and one device 105GIL or 105GIL10.

#### Approvals:

UL (USA) - CSA (Canada)

Supply voltage			Cat. no	Ref. no.	Pack
Three-phase (50-60Hz)	Single-phase (50/60Hz)	Tripping coil			
220V	110-127V	Shunt trip	105GP1P220	132250	1
220V	110-127V	Undervoltage trip	105GP1P220M	132251	1
380-600V	220-350V	Shunt trip	105GP1P500	132252	1
380-600V	220-350V	Undervoltage trip	105GP1P500M	132253	1

### Electrical interlock device and cubicle lighting <sup>(1)</sup>



The switch can be directly driven by the enclosure door.  
If several doors are employed, one switch per door shall be used.  
When properly connected, the following functions are provided:

- Position 1 (pushed) door closed: light OFF, tripping coil of main switch unpowered ( normal equipment operation )
- Position 2. (free) door opening: light ON, tripping coil of main switch powered (equipment shall cut-out automatically).
- Position 3 (pulled) door open: light ON, tripping coil of main switch unpowered (adjustment on the equipment of dry checks). When door is closed again, the switch revert automatically from position 2 or 3 to position 1.

Terminals have IP2X protection degree according to IEC/EN 60529

Approvals: UL (U.S.A.) - CSA (Canada)

Tripping coil		Cat. no	Ref. no.	Pack																
Shunt trip		105 GIL	132240	1																
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E	○	○	○																	
F	○	○	○																	
G	○	○	○																	
Undervoltage trip		105 GIL 10	132241	1																
	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>○</td> <td>○</td> <td>○</td> </tr> <tr> <td>F</td> <td>○</td> <td>○</td> <td>○</td> </tr> <tr> <td>G</td> <td>○</td> <td>○</td> <td>○</td> </tr> </tbody> </table>		1	2	3	E	○	○	○	F	○	○	○	G	○	○	○			
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E	○	○	○																	
F	○	○	○																	
G	○	○	○																	

### Electrical interlock device <sup>(1)</sup>



The switch is directly driven by the enclosure door.  
If several doors are employed, one switch per door is needed.  
When properly connected, the same functions of devices above shall be provided but without enclosure control light.

Terminals have IP2X protection degree according to IEC 529

Tripping coil		Cat. no	Ref. no.	Pack								
Shunt trip		105 CI	132242	1								
	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>○</td> <td>○</td> <td>○</td> </tr> </tbody> </table>		1	2	3	G	○	○	○			
	1	2	3									
G	○	○	○									
Undervoltage trip		105 CI 10	132243	1								
	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>○</td> <td>○</td> <td>○</td> </tr> </tbody> </table>		1	2	3	G	○	○	○			
	1	2	3									
G	○	○	○									

### Mounting plate



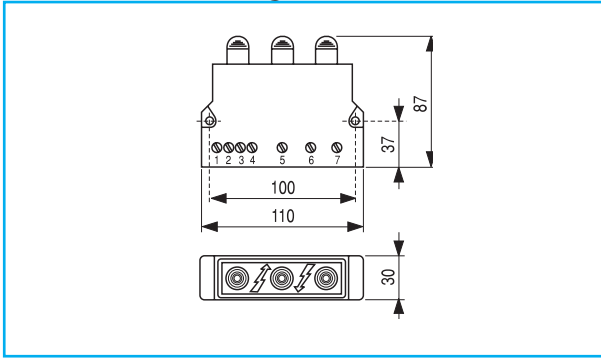
	Cat. no	Ref. no.	Pack
	105 PM	132244	1

(1) For electrical performance and features of contact blocks please see E.42

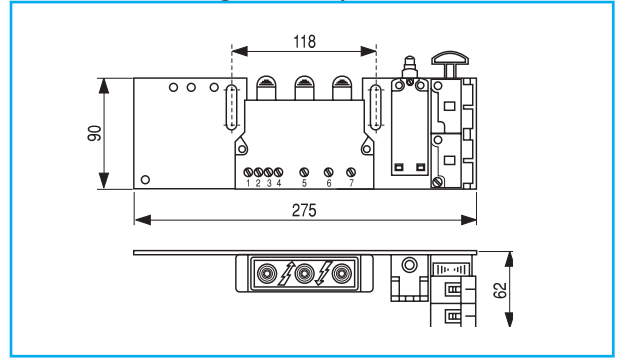


## Dimensional drawings

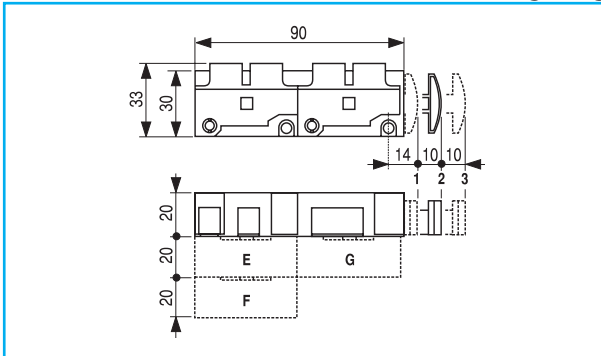
Series 105 - Flashing devices



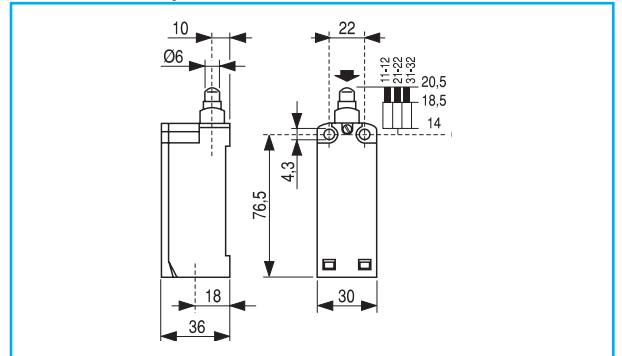
Series 105 - Single door protection unit



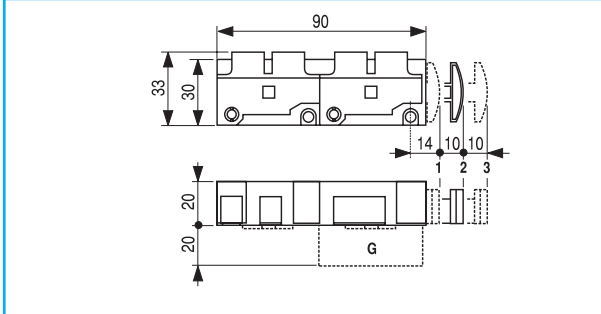
Series 105 - Electrical interlock and cubicle lighting



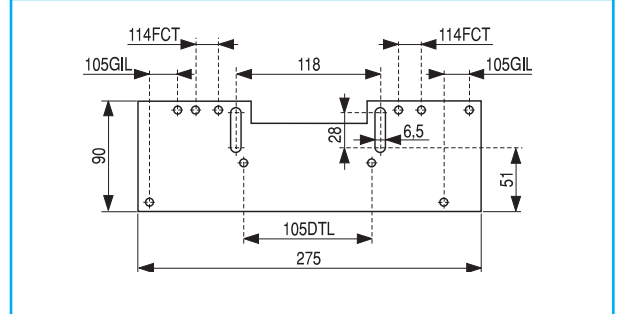
Series 105 - 3 pole limit switch for device control



Series 105 - Electrical interlock device



Series 105 - Mounting plate



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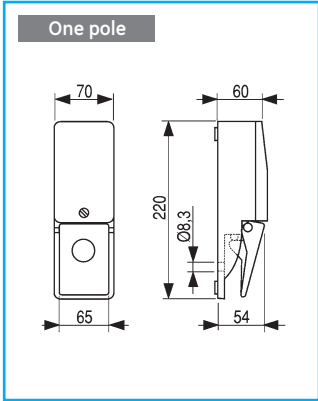
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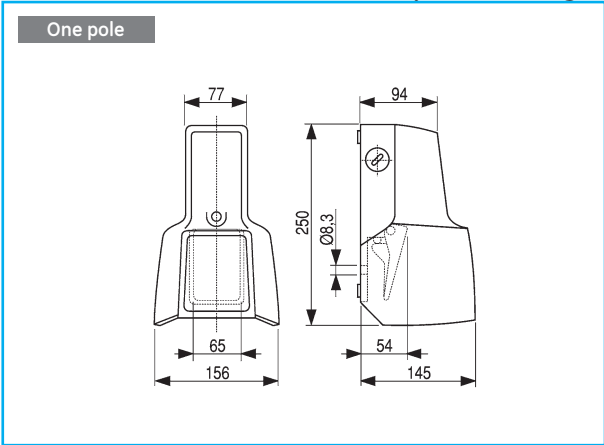
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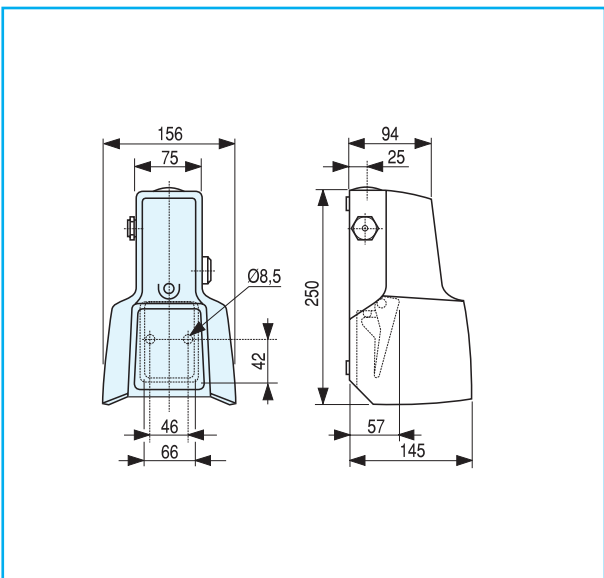
Series IP - Foot switches without protective guard



Series IP - Foot switches with protective guard



Safety foot switches





## Order codes

- F.3 Series NMV  
Multivoltage electronic timers. 22.5mm module
- F.4 Series D  
Single voltage electronic timers. 45mm module
- F.4 Liquid level detectors relay
- F.4 Earth leakage relays
- F.5 Protection relays
- F.6 Detection relays
- F.6 Control and protection relays

## Technical data

- F.7 Series NMV
- F.11 Series D

## Dimensions

- F.20 Series NMV and D

Plug-in relays and Auxiliary contactors

Motor protection devices

Contactors and Thermal overload relays

Motorstarters

Control and signalling units

**Electronic relays**

Limit switches

Speed drive units

Main switches

Numerical index

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under control





**Series NMV** Multivoltage  
22.5mm module

**Series D** Single voltage  
45mm module






### Standards

VDE 0106	CSA C 22.2 Nr.14	UNE 20-119
VDE 0110	UL 94	IEC/EN 60947-5-1
EN 50002	UL 508	IEC/EN 61812-1
EN 50042	IEC 255.5	CE
		CUL

### Range overview

	22.5mm module		45mm module	
	Series NMV Multivoltage		Series D Single voltage	
<b>Delay</b>		Pg.		Pg.
Delayed ON	NMTCV	F.3		
OFF delay	NMRDV	F.3		
			NMMFV	F.5
Star-delta starter	NMETV	F.3		
Multifunction	NMMFV	F.3		
<b>Impulse</b>			NMMFV	F.5
Delayed ON			NMMFV	F.3
ON delay with auxiliary contact	NMMFV	F.3		
OFF delay with auxiliary contact	NMMFV	F.3		
ON + OFF with auxiliary contact	NMMFV	F.3		
<b>Intermittence</b>				
Symmetric intermittence				
Asymmetric intermittence	NMIVV	F.3		
<b>Control</b>				
Motor re-start control relay				RCRT6 F.4
<b>Detectors</b>				
Liquid level detector relay				DINIL F.4
Voltage detector relay				RDT F.6
Current detector relay with delay				RDIT F.6
<b>Relay</b>				
Differential earth leakage				RDHT/A F.4
Thermistor relay				RS01N F.6
Frequency control relay				RCF F.6
<b>Protection (three-phase lines)</b>				
Integral protection relay for 3-Phase lines				RDF1 F.5
Phase sequence				RSF F.5
Phase sequence and phase failure				RSFF F.5
Maximum and minimum voltage				RTMM F.5
<b>Protection (single-phase lines)</b>				
Maximum and minimum voltage				RMM F.5

Multivoltage electronic timers - 22.5mm module

	Supply voltage	Time range	Available contacts	Cat. no.	Ref. no.	Pack	
 <p><b>Delayed ON relay</b></p>	Direct	0.06 sec - 100 h.	2 changeover	NMTCV 2	124901	1	
	24-240V AC/DC						
Technical data: see F.7							
 <p><b>Star-delta starter relay</b></p>	Direct	1 - 10 sec.	1 changeover	NMETV	124908	1	
	24-240V AC/DC	6 - 60 sec.					
	With transformer <sup>(2)</sup>	1 - 10 sec.	1 changeover	NMETV t AU <sup>(1)</sup>	124911	1	
		6 - 60 sec.					
Technical data: see F.8							
 <p><b>Delayed OFF timer</b></p>	Direct	0.5 - 6 sec.	2 changeover	NMRDV 2-6	124915	1	
	24-240V AC/DC	5 - 60 sec.	2 changeover	NMRDV 2-60	124916	1	
	24-240V AC/DC	50 - 600 sec.	2 changeover	NMRDV 2-600	124917	1	
	Technical data: see F.8						
 <p><b>Asymmetric intermittence, started by connection or pause (choice)</b></p>	Direct	0.06 sec - 100 h	1 changeover	NMIVV	124929	1	
	24-240V AC/DC						
Technical data: see F.9							
 <p><b>Multifunction</b></p>	<ul style="list-style-type: none"> <li>- Delayed ON timer</li> <li>- Delayed ON through contact timer</li> <li>- Delayed OFF through contact timer</li> <li>- Delayed ON and OFF through contact timer</li> </ul>		<ul style="list-style-type: none"> <li>- Impulse ON timer</li> <li>- Impulse ON through contact timer</li> <li>- Impulse OFF through contact timer</li> <li>- Impulse ON and OFF through contact timer</li> </ul>				
	<b>Module 22,5mm</b>						
	Direct	0.6 sec - 100 h	1 changeover	NMMFV	124930	1	
24-240V AC/DC							
Technical data: see F.10							

(1) AU = coil 380V 50/60 Hz  
 (2) Transformer inside the timer housing



Single voltage electronic timers - 45mm module

Motor re-start control relay (plug in)	Supply voltage	Voltage (V)	Available contacts	Time range	Cat. no.	Ref. no.	Pack
		Direct <sup>(1)</sup>		RCRT 1 changeover	0.2 - 6 sec. (memory time) 0.2 - 60 sec. (delayed time)	RCRT 6 - 60AN <sup>(2)</sup>	123624
					RCRT 6 - 60AJ <sup>(3)</sup>	123623	1
Technical data: see F.11							

Liquid level detector relay

	Supply voltage	Contacts	No. of circuits	Cat. no.	Ref. no.	Pack	
			DINIL ...E 1 changeover	2	DINIL 02E ENU	123656	1
		11 pins socket for DINIL-02E, -03E. for panel fixing. Front terminals		PRCZ11	220647	1	
Technical data: F.12							

Probes

	Without cable. Waterproof and protected with a thermoplastic housing. Stainless steel probe.				SON-3	123700	1
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Earth leakage relays - 45 mm module

Differential earth leakage relay with hand reset (with test)	Supply voltage	Contacts	Sensiv. (A)	Ø (mm)	Differential transformers			Earth leakage relays		
					Cat. no.	Ref. no.	Pack	Cat. no.	Ref. no.	Pack
		RDHT 1-... With test 1 changeover	0.2 - 1.2	35	WKAT 35-1,2A/2V	204165	1	RDHT 1-1,2AEN <sup>(4)</sup>	123744	1
				70	WKAT 70-1,2A/2V	204166	1			
			1 - 10	35	WKAT 35-10A/2V	204169	1	RDHT 1-10AEN <sup>(4)</sup>	123754	1
				70	WKAT 70-10A/2V	204170	1			
Technical data: see F.13										
Differential earth leakage relay with automatic reset (with test)	Direct and with transformer	RDHA 1-... With test 1 changeover	0.2 - 1.2	35	WKAT 35-1,2A/2V	204165	1	RDHA 1-1,2AEU <sup>(5)</sup>	123965	1
				70	WKAT 70-1,2A/2V	204166	1			
			1 - 10	35	WKAT 35-10A/2V	204169	1	RDHA 1-10AEN <sup>(4)</sup>	123964	1
				70	WKAT 70-10A/2V	204170	1			
Technical data: see F.13										







(1) Possibility of fitting a remote potentiometer.  
 (2) AN = 220V 50/60Hz  
 (3) AJ = 110-125V 50/60Hz

(4) EN = coil 220/230V 50/60Hz  
 (5) EU = coil 380/400V 50/60Hz

Dimensions ● pg. F.21



**Protection relays**

	Supply voltage contact	Contacts	Operating range		Unbalance	Mains frequency	Cat. no.	Ref. no.	Pack	
			Umin.	Umax.						
 <p><b>Integral protection relay for three-phase lines</b></p>	With transformer	RDF1-... 1 changeover	5 - 20%	5 - 15%	2.5 - 10%	50 Hz	RDF1-50AU <sup>(1)</sup>	123985	1	
	Technical data: see F.14									
 <p><b>Unbalance and phase failure protection relay for three-phase lines</b></p>	Direct and with transformer	RPDF 2-... 2 changeover	-	-	2.5 - 10%	50 Hz	RPDF2-50AU <sup>(1)</sup>	124025	1	
	Technical data: see F.15									
 <p><b>Phase sequence and phase failure protection relay for three-phase lines</b></p>	With transformer	RSFF 1-... 1 changeover	-	-	-	50 Hz	RSFF1-50AU <sup>(1)</sup>	124622	1	
	Technical data: see F.16									
 <p><b>Phase sequence protection relay for three-phase lines</b></p>	With transformer	RSF 1-... 1 changeover	-	-	-	50 Hz	RSF1-50ANU <sup>(2)</sup>	124051	1	
	Technical data: see F.16									
 <p><b>Maximum and minimum voltage protection relay for three-phase lines</b></p>	With transformer	RTMM 2-... 2 changeover	5 - 20%	5 - 15%	-		RTMM 2 AU	124085	1	
								RTMM EN <sup>(3)</sup>	124084	1
	Technical data: see F.17									
 <p><b>Maximum and minimum voltage protection relay for a single-phase lines</b></p>	With transformer	RMM 2-... 2 changeover	5 - 20%	5 - 15%	-		RMM 2 EN <sup>(3)</sup>	124104	1	
	Technical data: see F.17									

(1) AU = coil 380V 50Hz  
 (2) ANU = coil 220-230V 380-400V 50/60Hz  
 (3) EN = coil 220/230V 50/60Hz

Dimensions ● pg. F.21



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## Detection relays

	Supply voltage	Contacts	Operating range	Voltage drop	Input impedance	Max. input voltage	Cat. no.	Ref. no.	Pack
<b>Voltage detector relay</b> 	Direct and with transformer	RDT 2-... 2 changeover	40 - 400V	-	800 kΩ	600V	RDT2400VEN <sup>(1)</sup>	124184	1
	Technical data: see F.18								
<b>Current detector with delay (0.5 - 15 sec.)</b> 	Direct and with transformer	RDIT 2-... 2 changeover	0.5 - 5A 20 - 200mV	0.25V	0.05Ω 1 kΩ	10A 15V	RDIT2-5AEN <sup>(1)</sup> RDIT2-02VEN <sup>(1)</sup>	124754 124354	1 1
	Technical data: see F.18								

## Control and protection relays

	Supply voltage	Contacts	Thermal probe <sup>(5)</sup> When cold - When hot		Jumper terminals	Setting range	Cat. no.	Ref. no.	Pack
<b>Thermistor relay</b> 	Direct and with transformer <sup>(4)</sup>	RS01N 1 changeover	1.5 kΩ -	2.5 kΩ			RS01NEN <sup>(1)</sup> RS01NAJ <sup>(2)</sup>	212759 124373	1 1
	Technical data: see F.19								
<b>Frequency control relay</b> 	Supply voltage	Contacts			Jumper terminals	Setting range	Cat. no.	Ref. no.	Pack
	With transformer <sup>(4)</sup>	RCF 1-... 1 changeover			Without Y1 - Y2 Y1 - Y3	5 - 15Hz 15 - 45Hz 45 - 135Hz	RCF-1 AJ <sup>(2)</sup> RCF-1 EN <sup>(1)</sup> RCF-1 AU <sup>(3)</sup>	124433 124434 124435	1 1 1
	Technical data: see F.20								

- (1) EN = coil 220/230V 50/60Hz
- (2) AJ = coil 110V 50/60Hz
- (3) AU = coil 380/400V 50/60Hz
- (4) Transformer inside the timer housing
- (5) Thermal probe resistance not included

Dimensions ● pg. F.21

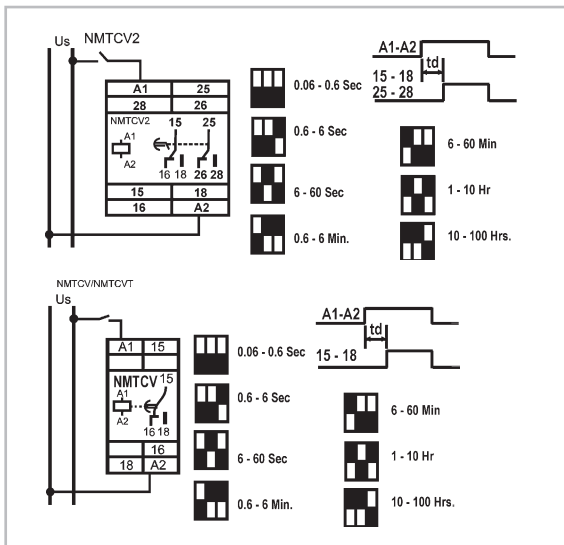
## NMTCV2 Delayed ON timer

### Function

Electronic relay whose output contact connects with a certain adjustable delay from the moment voltage is applied to supply terminals **A1-A2**.

It has seven timing ranges : see drawing. ↗

Range selection is made by dipperswitches located on the front of the relay. Times are set by front potentiometer controlling an Application Specific Integrated Circuit (ASIC) specially designed for this group of relays. This allows for excellent precision and repeatability features.



↗ 0.06 - 0.6s, 0.6 - 6s, 6 - 60s, 0.6 - 6 min, 6 - 60 min, 1 - 10h, 10 - 100h

### Technical characteristics

		NMTCV2
Nr. of changeover contacts		2
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	250
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/230
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/230
Rated current $I_e$	(A)	0.2/0.1
Supply voltages ( $U_n$ )		
AC/DC (direct)	(V)	24-240
AC(with transformer)	(V)	-
Frequency	(Hz)	50/60
Supply voltage tolerance	(%)	+10 / -20
Consumption	(mA)	60 (24V)
	(mA)	15 (240V)
	(VA)	-
Input circuit test voltage (between input, output and group circuits)	(kV)	4
Switch ON response time		0.06s - 100 h.
Switch OFF response time	(ms)	150
Reset time between 2 cycles <sup>(1)</sup>	(ms)	100
Repeat accuracy with 0.85 - 1.1 $U_n$	(%)	1

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### Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

### Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50002	UL 94
EN 50042	UL 508
IEC/EN 60947-5-1	UNE 20-119
CE	

(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

#### Remark

The relay has a green LED that lights when the relay is energised ( flashing during the timing ) and a red LED that lights when output contact is made.

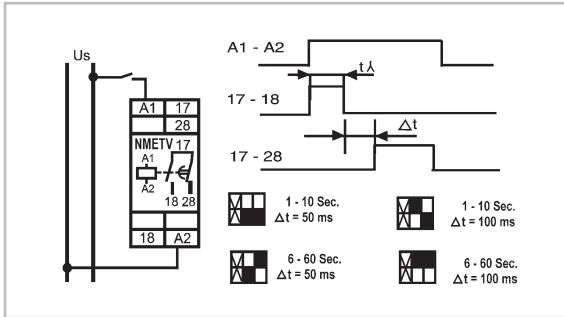


## NMETV... Star-delta starter timer

### Function

Electronic relay timed in steps whose purpose is to control star-delta starting. When supply voltage is applied to the **A1-A2** terminals, the star contact (17-18) closes for an adjustable time between up to 100 h (selectable) When this time is up, it opens, there is a pause and then the delta contact connects (17-18). The standard pause time is about 100ms.

Times are set by front potentiometer controlling an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



### Technical characteristics

	NMETV	NMETV t
Nr. of changeover contacts	2	
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	250
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	125/230
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/230
Rated current $I_e$	(A)	0.2/0.1
Supply voltages ( $U_n$ )		
AC/DC (direct)	(V)	24-240
AC(with transformer)	(V)	- 110-125 200-240 380-440
Frequency	(Hz)	50/60
Supply voltage tolerance	(%)	+10 / -20    +10 / -15
Consumption	(mA)	50 (at 24V)
	(mA)	12 (at 240V)
	(VA)	-    3.5
Test voltage	(kV)	4
(between input, output and ground )		
Switch ON response time	(ms)	100
Reset time between 2 cycles <sup>(1)</sup>	(ms)	100
Repeat accuracy with 0.85 - 1.1 Un(%)		2

### Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

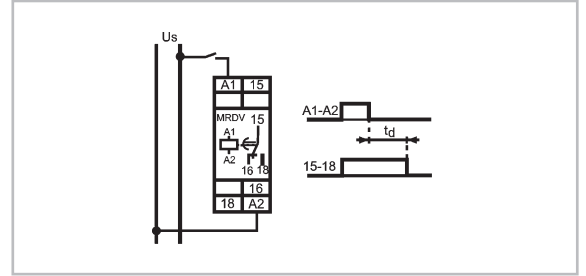
### Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50001 (NMETV)	UL 94
EN 50002	UL 508
EN 50042 (NMRDV)	UNE 20-119 (NMRDV)
IEC/EN 60947-5-1 (NMRDV)	CE

## NMRDV... Delayed OFF timer

### Function

Electronic relay whose output contact instantly connects when supply voltage is applied to terminals **A1-A2**. It disconnects with an adjustable delay as from the moment the relay loses supply voltage. There are several types depending on the range of timers.



### Technical characteristics

	NMRDV2	
Nr. of changeover contacts	2	
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	250
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	125/230
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/230
Rated current $I_e$	(A)	0.2/0.1
Supply voltages ( $U_n$ )		
AC/DC (direct)	(V)	24-240
AC(with transformer)	(V)	- 200-240 380-440
Frequency	(Hz)	50/60
Supply voltage tolerance	(%)	+10 / -20
Consumption	(mA)	1,5 (at 24V)
	(mA)	5 (at 240V)
	(VA)	-
Test voltage	(kV)	4
(between input, output and ground )		
Switch ON response time	(ms)	250 <sup>(2)</sup>
Switch OFF response time		0.5 - 600
Reset time between 2 cycles <sup>(1)</sup>	(ms)	250
Repeat accuracy with 0.85 - 1.1 Un(%)		5

- (1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.
- (2) For 24V c.c. = 300ms

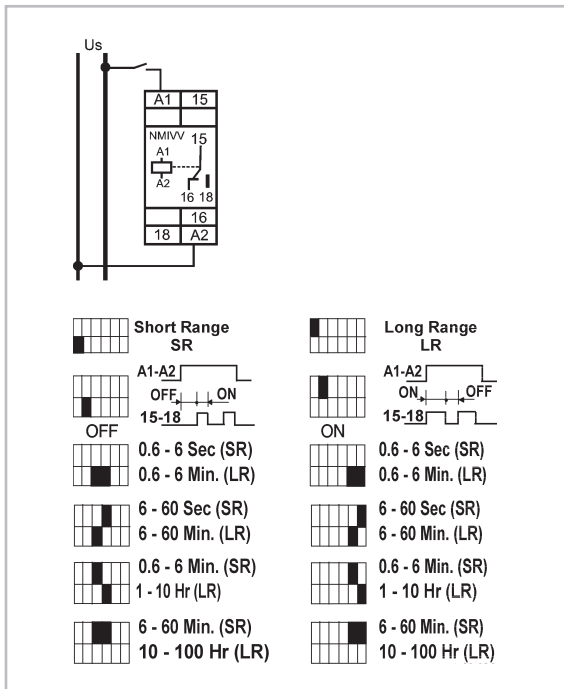
#### Remark

NMETV relays have a green LED that lights up when the relays is energised ( flashing during the timing) and a red LED that lights up when the star contact 17-18 is closed.

## NMIVV Asymmetric intermittence, started by connection or pause (choice)

### Function

Electronic relay whose output contact connects and disconnects intermittently. Connection and pause times may be separately. The intermittency cycle begins a connection or disconnection selected by a dip-switches and start the instant connection is made from supply voltage to the **A1-A2** terminals. A new step is begun if voltage supply is interrupted during operation. It has seven timing ranges ;  
 NMIVV : 0,6 sec - 100 h  
 Range selection is made by dip-switches located on the front of the relay. Times are set by front potentiometer an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



### Technical characteristics

		NMIVV
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	250
	DC (V)	50
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	125/230
Rated current $I_e$	(A)	2,5/1,3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/230
Rated current $I_e$	(A)	0,2/0,1
Supply voltages ( $U_n$ )		
AC/DC (direct)	(V)	24-240
Frequency	(Hz)	50/60
Supply voltage tolerance	(%)	+10 / -20
Consumption	(mA)	60 (at 24V)
	(mA)	15 (at 240V)
	(VA)	-
Test voltage	(kV)	2
(between input, output and ground circuits)		
Switch ON response time	(ms)	150
Intermittent switch ON times <sup>(2)</sup>		0,6 s - 100 h.
Reset time between 2 cycles <sup>(1)</sup>	(ms)	150
Repeat accuracy with 0.85 - 1.1 $U_n$ (%)		1

### Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

### Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50002	UL 94
EN 50005	UL 508
EN 50042	UNE 20-119
IEC/EN 60947-5-1	CE

- (1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.
- (2) Connection and pause times be set within different ranges.

#### Remark

These relays has a green LED that lights up when the relays is energised (flashing during the timing) and a red LED that lights up when output contact is made.



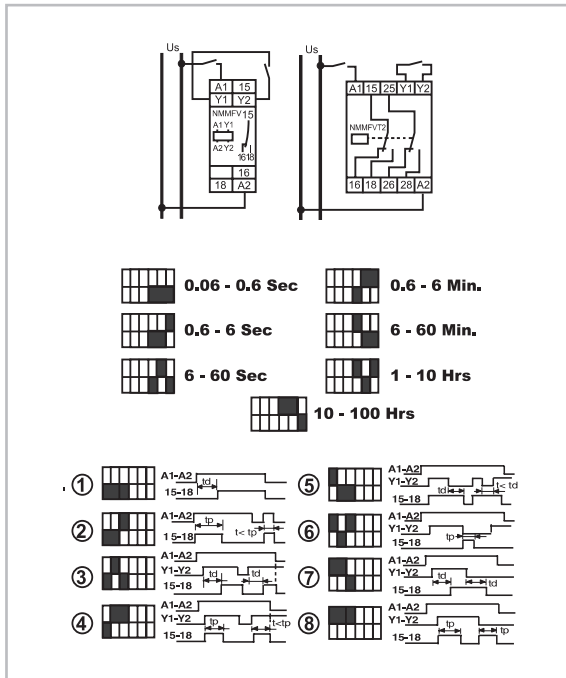
## NMMFV Multifunction relay

### Function

The functions of this multifunction and multirange electronic relay are selected by 3 dip-switches located on the front of the relay. It has eight functions: delayed ON timer, delayed ON through contact timer, delayed OFF through contact timer, delayed ON and OFF through contact timer, impulse ON timer, impulse ON through contact timer, impulse OFF through contact timer, impulse ON and OFF through contact timer. If the relay loses current during timing, it disconnects and is ready for a new cycle. It has seven timing ranges: see drawing.

Range selection is made by dip-switches located on front of the relay.

Times are set by front potentiometer controlling an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



### Technical characteristics

		NMMFV
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage U <sub>i</sub>	AC (V)	250
	DC (V)	250
Thermal current I <sub>th</sub>	(A)	6
Utilisation AC-15		
Rated voltage U <sub>e</sub>	(V)	110/230
Rated current I <sub>e</sub>	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage U <sub>e</sub>	(V)	110/230
Rated current I <sub>e</sub>	(A)	0.2/0.1
Supply voltages (U <sub>n</sub> )		
AC/DC (direct)	(V)	24-240
Frequency	(Hz)	50/60
Supply voltage tolerance	(%)	+10 / -20
Consumption	(mA)	60 (at 24V)
	(mA)	15 (at 240V)
	(VA)	-
Test voltage	(kV)	2
(between input, output and ground circuit)		
Switch ON response time		0.065 s - 100 h.
Switch OFF response time		0.065 s - 100 h.
Reset time between 2 cycles <sup>(1)</sup>	(ms)	150
Repeat accuracy with 0.85 - 1.1 U <sub>n</sub> (%)		1
Voltage open Y1-Y2	(V DC)	5
control contact terminals		
Current through control contact		
Initial	(mA)	15
Permanent	(mA)	1

### Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2,000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

### Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50002	UL 94
EN 50042	UL 508
IEC/EN 60947-5-1	UNE 20-119
CE	

(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

#### Remark

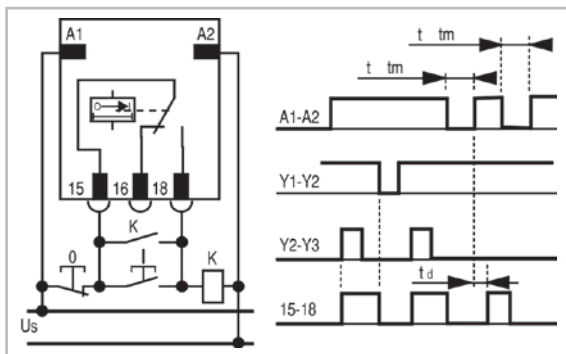
The relays have a green LED that lights up when the relays is energised (flashing during the timing) and a red LED that lights up when output contact is made.

## RCRT... Motor re-start control relay (plug-in)

### Function

#### RCRT...

The relay is used for instantaneous or delayed motor startup after a short-time power failure (max. 6 sec). The start occurs immediately if power supply is disrupted for less than 0.2 sec. If the power failure lasts longer, the relay activates its memory for a time that can be set to 0.2 to 6 sec, after which no automatic restart is possible. If power supply is restored while the memory period is elapsing, the relay commands a motor restart with a delay time from power supply restoration that can be set to 0.2 to 60 sec. A system stop cancels the memory function after 50 ms, and therefore the stop signal should be on for at least this time. The relay is non-sensitive to any control voltage fluctuation or disruption during or after the motor stop.



### Technical characteristics

		RCRT 6-60	
Nr. of changeover contacts		1	
Output contacts:			
Rated insulation voltage $U_i$	AC (V)	400	
	DC (V)	250	
Thermal current $I_{th}$	(A)	6	
Utilisation AC-15			
Rated voltage $U_e$	(V)	120/240	
Rated current $I_e$	(A)	2.5/1.3	
Utilisation DC-13			
Rated voltage $U_e$	(V)	110/220	
Rated current $I_e$	(A)	0.2/0.1	
Supply voltages ( $U_n$ )			
AC	(V)	110, 220-230, 125	
Frequency	(Hz)	50/60	
Permissible supply voltage variation (%)		+10 / -15	
Repeat accuracy with 0.85 - 1.1 $U_n$ (%)		2	
Consumption	(VA)	3	
Input circuit test voltage	(kV)	4	
(between input, output circuit and earth)			
Switch ON response time	(ms)	100	
Power failure detection level		0.8 $U_s$	
Reset time (stop)	(ms)	50 - 75	
Memory reset time	(ms)	100	
Max. restart delay time	(s)	0.2 - 60	
Max. memory time	(s)	0.2 - 6	

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

### Conformity to standards

VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	

### Remark

The relay has one LED that lights up when the contact is made.



## DINIL 02E Liquid level detector relay for simultaneous control of well and tank

### Functions

Plug-in devices for control of level of conductive liquids which can perform the following functions:

**Filling control:** The contact between **1** and **3** closes when the tank to be checked drops below a minimum, fixed by the position of probe **6**, which starts up the pumping system. When the maximum filling level is reached, fixed by the position of probe **7**, the contact between **1** and **3**, opens and the pumping system stops. For the filling control the two well probes must be connected externally to the common one (condition of full well).

**Draining control:** The contact **1-3** closes if the level liquid goes above a maximum, fixed by the position of probe **9**, which starts up the drain pumping system. When the level drops below a minimum, fixed by the position of probe **8** the contact **1-3** opens and stop the pumping system, which prevents the pumpo from losing its prime.

**Simultaneous filling and draining control:** The system starts up whenever the tank requires liquid and the well has sufficient level to supply it, and it stops when the liquid reaches its maximum level in the tank or, as the case may be, the well reaches its minimum level.

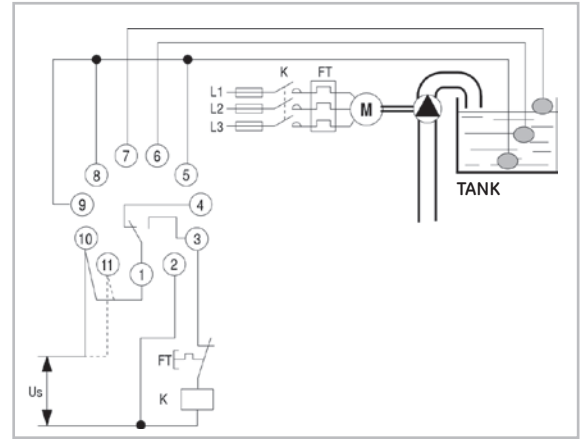
**Remark:** In all the above applications, the contact between **1-3** is used as a permanent contact for starting and stopping the pump starter, whether this is DOL, star-delta or any other type of starter.

**Control voltage:** Two voltages:  
 terminals 2-10 (220 VAC)  
 terminals 2-11 (380 VAC)

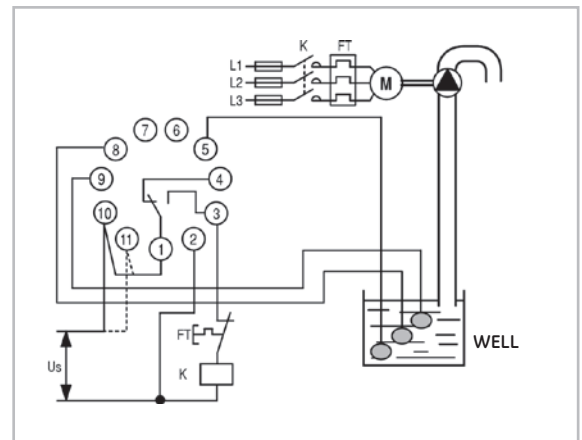
### Technical characteristics

		DINIL-02E
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage Ui	AC (V)	400
	DC (V)	250
Thermal current Ith	(A)	6
Utilisation AC-15		
Rated voltage Ue	(V)	120/240
Rated current Ie	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage Ue	(V)	110/220
Rated current Ie	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	380-400/220-230 (two voltages)
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+10 / -15
Repeat accuracy with 0.85-1.1 Un (%)		2
Consumption	(VA)	3
Input circuit test voltage (between input, output circuit and earth)	(kV)	4
Voltage between probes and common	(V ef.)	6 - 18
Max. consumption of probes	(mA ef.)	0.18
Max. resistance between probes (resistance of controlled liquid)	(kOhms)	200
Switch ON response time	(s)	1
Switch OFF response time	(s)	1

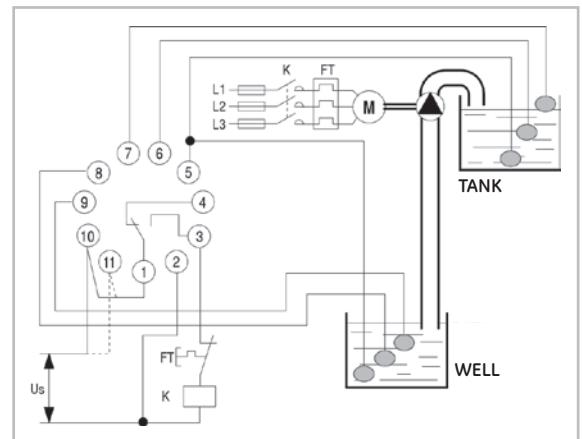
DINIL-02E - Filling control



DINIL-02E - Draining control



DINIL-02E - Simultaneous filling and draining control



### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Maximum operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

VDE 0106 IEC/EN 60947-5-1 CE UNE 20119

#### Remark

The relays has one LED that lights up when the output contact is made.

## RDHT..., RDHA... Earth leakage relays

**RDHT...** Earth leakage relay with manual reset, with test  
**RDHA...** Earth leakage relay with automatic reset, with test

### Function

RDH, RDHT and RDHA are earth leakage detectors for industrial networks with neutral connected to earth, used with WKA (without test) and WKAT (with test) differential transformers. Tripping is produced when leakage current exceeds a threshold which is adjustable by means of a front mounted potentiometer. Tripping ranges are shown in the table below.

RDH and RDHT keep memory of tripping even in the absence of voltage in **A1** and **A2** and resetting is obtained from a push-button. RDHA is self resetting in the absence of control voltage in **A1** and **A2** or when leakage disappears. RDHT and RDHA have in addition a test push-button for control from cubicle door, and therefore those relays should always be use with WKAT transformers with test winding. All types have included a timer, with external ajustement in RDHA and internal ajustement in RDH and RDHT that allows to delay the trip to achieve trip selectivity.

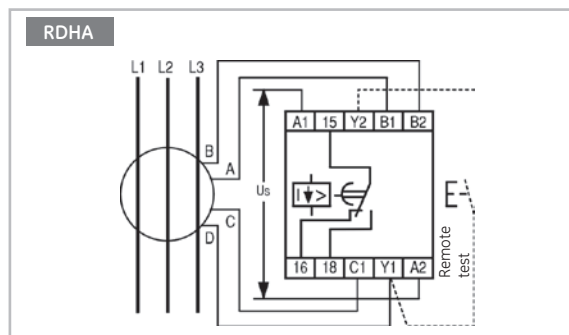
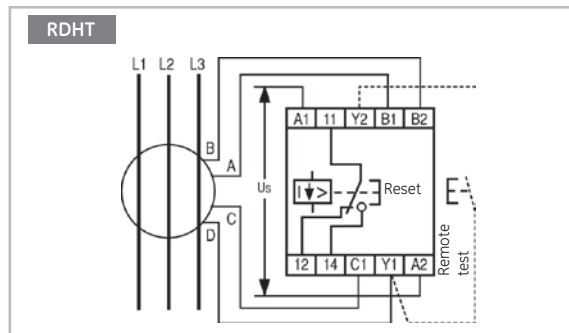
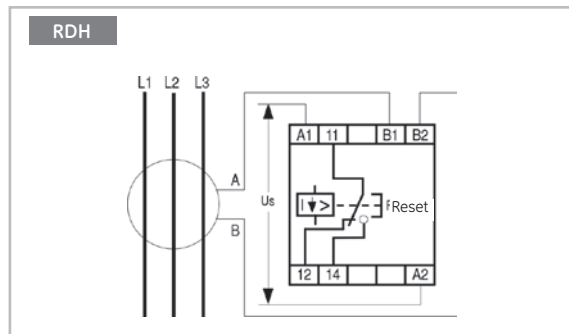
RDHT1-... RDHA1-...	Sensitivity	Transformers		Ø
... 1,2	0.2 - 1.2A	WKAT-35	1.2A/2V	35
		WKAT-70	1.2A/2V	70
... 10	1 - 10A	WKAT-35	10A/2V	35
		WKAT-70	10A/2V	70

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	0°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	



### Technical characteristics

	RDHT1-...	RDHA1-...
Nr. of changeover contacts	1	
Output contacts:		
Rated insulation voltage Ui	AC (V)	400
	DC (V)	250
Thermal current Ith	(A)	6
Utilisation AC-15		
Rated voltage Ue	(V)	120/240
Rated current Ie	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage Ue	(V)	110/220
Rated current Ie	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	380-400
		220-230
DC/AC (direct)	(V)	-
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)	+10 / -15	
Repeat accuracy with 0.85-1.1 Un (%)	2	
Consumption (VA)	3	
Input circuit test voltage (kV)	4	
(between input, output circuit and earth)		
Switch ON response time (s)	150-200	100
(can be delayed up to 5 sec)		

## RDFF1... Integral protection relay for three-phase lines

### Function

Protection against:

- a) Phase failure
- b) Phase sequence
- c) Phase unbalance
- d) Low line voltage
- e) High line voltage

Relay operates by phase angle detection between voltages and not by voltage levels and therefore will drive satisfactorily even with feedback from other motors.

Relays will connect only when all conditions are normal (contact 15-18 closes) and disconnects on any fault including supply, protecting network even with supply failure. It will not connect if phase sequence is incorrect, preventing motors starting in wrong direction.

### Unbalance adjustment

Phase, unbalance, and therefore single phase is very dangerous for the life of a motor. The graph below shows temperature rise in a three-phase motor with a phase unbalance (NEMA MG 1-1433 and 34). The per cent unbalance is obtained as follow:

$$\% \text{ unbalance} = \frac{\text{Max. voltage deviation from average voltage}}{\text{average voltage}} \times 100$$

Tripping is adjustable between 2.5 and 10 %.

Consequently protection is provided for motors working closely adjusted to rated power, to others more generously sized, and even power lines.

In any case adjustments should be made so that on failure of one phase relay will disconnect.

### Voltage adjustment

Voltage tripping is adjustable from -5 to -20 % and +5 to +15 % maximum by which it is possible to adjust to values recommended by IEC 34.1 (1969) and IEC 158 respectively. Tripping for these causes is delayed 1 second approximately.

### Tripping indication

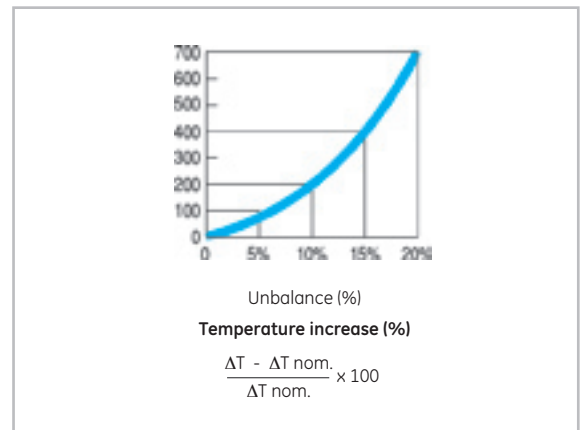
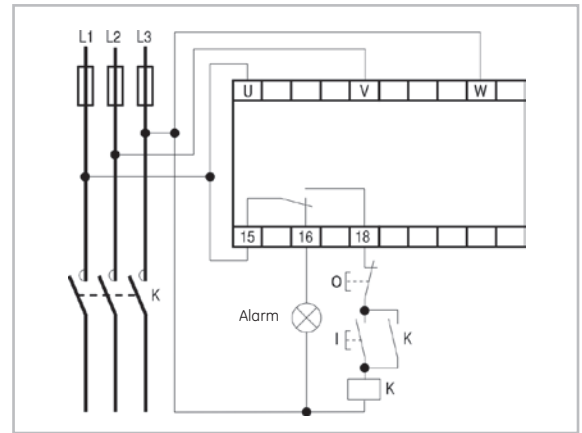
Relays incorporate LED diode tripping indication. When phase sequence is incorrect, both phase sequence and unbalance light up. When unbalance lights up only indicates unbalance or single phasing with feedback.

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

VDE 0106	EN 50011	IEC/EN 60947-5-1
EN 50001	DIN 46199	CE
EN 50005	UNE 20-119	



### Technical characteristics

		RDFF1-5
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	400
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/240
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/220
Rated current $I_e$	(A)	0,2/0,1
Supply voltages ( $U_n$ )		
AC (with transformer)	(V)	380
Frequency	(Hz)	50
Permissible supply voltage variation (%)		+15 / -20
Repeat accuracy with 0.85 - 1.1 $U_n$	(%)	2
Consumption	(VA)	3
Input circuit test voltage	(kV)	4
(between input, output circuit and earth)		
Unbalance tripping (adjustable)	(%)	2.5 to 10
Low voltage tripping (adjustable)	(%)	5 to 20
Overvoltage tripping (adjustable)	(%)	5 to 15
Switch ON response time	(ms)	200
Reset hysteresis	(%)	5 approx.

## RPDF... Unbalance and phase failure protection relay for three-phase lines

### Function

The RPDF-electronic relay is intended for the protection of lines or electronic motors against unbalance between phases or failure of one or more phases. Detection of unbalance or phase failure is done by measuring phase change and not by voltage levels. This guarantees correct working even when there are return paths due to motors running which are connected to the mains networks to be protected. The relay is made when all conditions are normal (contact 11-14 closed); the contacts open in the event of a failure. In this way, any failure, including that of the relay supply, will cause disconnection and so avoid the supply being left unprotected.

### Setting unbalance

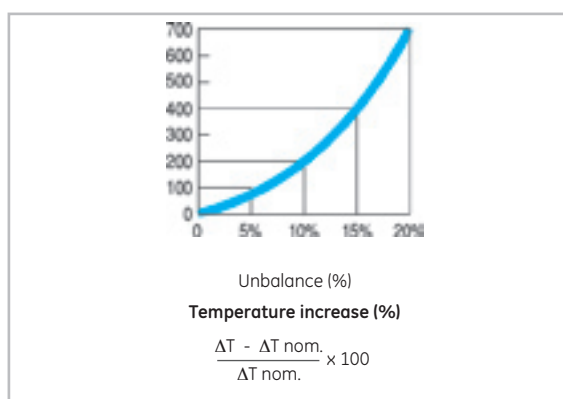
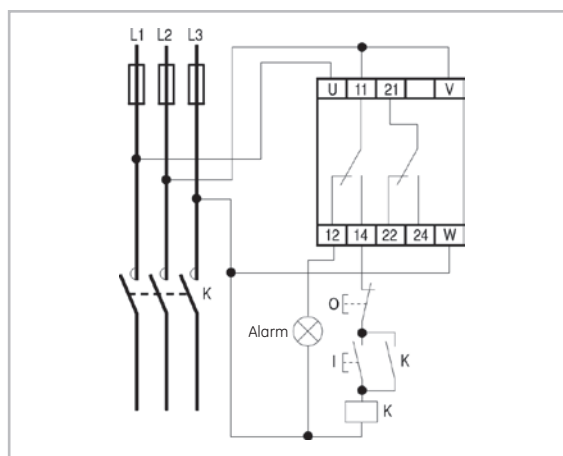
The unbalance in phases and, consequently, the failure of one of these, is a limiting factor in the life of an electric motor. The graph below shows the percentage temperature increase in a three-phase motor as a function of the degree of unbalance (see standards NEMA MG 1-1433 and 34). The per cent unbalance is calculated as follows :

$$\% \text{ unbalance} = \frac{\text{Max. voltage deviation from average voltage}}{\text{average voltage}} \times 100$$

The trip is adjustable between about 2.5% and 10%. Consequently protection is provided for motors working closely adjusted to rated power, to others more generously sized, and even power lines. In any case, the adjustment must be such that the loss of a phase produces the opening of the relay.

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any



### Technical characteristics

	RPDF 2-50
Nr. of changeover contacts	2
Output contacts:	
Rated insulation voltage $U_i$	AC (V) 400 DC (V) 250
Thermal current $I_{th}$	(A) 6
Utilisation AC-15	
Rated voltage $U_e$	(V) 120/240
Rated current $I_e$	(A) 2.5/1.3
Utilisation DC-13	
Rated voltage $U_e$	(V) 110/220
Rated current $I_e$	(A) 0,2/0,1
Supply voltages	( $U_n$ )
AC (with transformer)	(V) 380
Frequency	(Hz) 50
Permissible supply voltage variation	+10 / -20 (%)
Repeat accuracy	(%) 2
Consumption	(VA) 3
Input circuit test voltage	(kV) 4
(between input, output circuit and earth)	
Unbalance tripping (adjustable)	(%) 2.5 to 10
Switch ON response time	(ms) 100
Reset hysteresis	(%) 2

### Conformity to standards

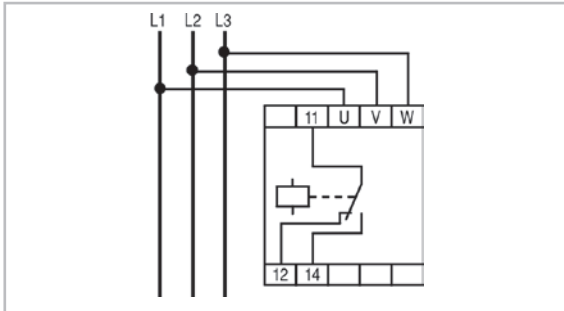
VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	

## RSFF... Phase sequence and phase failure protection relay for three-phase lines

### Function

The RSFF relay is designed to detect phase sequence errors and/or phase failures in three phase lines. Three terminals **U, V, W** are connected to each of the three phases of the mains. Controlling vectors of voltage between lines (amplitude and phase) is detected the direct sequence (phase **V** with 120° in respect of **U** and phase **W** with 240° lag in respect and phase **U**) as well as balance of voltages and angles of phases, for detecting a phase failure even with returns (motor working).

By means of an external potentiometer can be adjusted the network unbalance, level, between 2,5 % and 105 % to adapt the relays sensibility for phase failure function. This unbalance is measured according to NEMA MG1-1433 and 34, and corresponds to a fall of simple tension of phase in amplitude of 7.3 and 28%, respectively. The relay precives either increases or drops of voltage and angle, then it detect the failures even in motors working as breaking devices (loads going down in lifting devices). When relay is powered, it connects instantaneously (max. 200ms) if the power system is correct. Once the switched on relay is switch-on, it switches-off with 1 sec. delay in case of a failure, to avoid false disconnections due to transient unbalances. (Start of other motors, transformers, etc.).



### Technical characteristics

		RSFF1-50
Nr. of changeover contacts		1
Output contacts:		
Rated insulation	AC (V)	400
voltage Ui	DC (V)	250
Thermal current Ith	(A)	6
Utilisation AC-15		
Rated voltage Ue	(V)	120/240
Rated current Ie	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage Ue	(V)	110/220
Rated current Ie	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	380-400
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+15 / -20
Repeat accuracy	(%)	2
Consumption	(VA)	3
Input circuit test voltage	(kV)	4
(between input, output circuit and earth)		
Switch ON response time	(ms)	200
Switch OFF response time	(s)	1

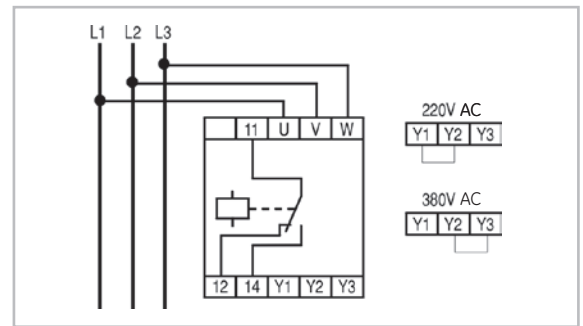
$$\% \text{ unbalance} = \frac{\text{max. voltage derivation from average voltage}}{\text{average voltage}} \times 100$$

## RSF... Phase sequence relay for three-phase lines

### Function

The RSF1 is designed to detect phase sequence in three phase power system. Three supplies **U, V, W**, take voltage from each of the phases of the network. When phase sequence supplying relay is direct (Phase **V** with 120° lag in respect of **U** and phase **W** with 120° lag in respect of **V**) the relays connects with supply (closes contact between **11-14**) and if no it remains OFF. For correct operation, relay must have supplying each of the three phases.

A phase failure, when there is a return current (the motor is rotating), is not detected by the relay and may lead to a relay malfunction.



### Technical characteristics

		RSF1-50
Nr. of changeover contacts		1
Output contacts:		
Rated insulation	AC (V)	400
voltage Ui	DC (V)	250
Thermal current Ith	(A)	6
Utilisation AC-15		
Rated voltage Ue	(V)	120/240
Rated current Ie	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage Ue	(V)	110/220
Rated current Ie	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	380-400 / 220-230 (two voltages)
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+10 / -15
Repeat accuracy	(%)	2
Consumption	(VA)	3
Input circuit test voltage	(kV)	4
(between input, output circuit and earth)		
Switch ON response time	(ms)	500
Switch OFF response time	(ms)	200

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

VDE 0106	IEC/EN 60947-5-1	EN 50001	UNE 20-119
EN 50005	EN 50011	DIN 46199	CE

#### Remark

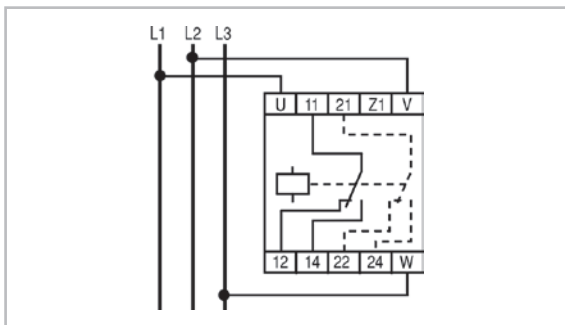
The relay has one LED that lights when the output contact is made.

## RTMM2 Maximum and minimum voltage protection relay for three-phase lines

### Function

The RTMM electronic relay is voltage sensitive and has one or two changeover output contacts. The relay maintains operated (contact between 11-14 or between 21-24 closed) while the voltage is within the tolerance limits and opens when these limits are surpassed in plus or minus. The relay can be used for low voltage or over-voltage detection in three-phase lines.

The trip value, for maximum and minimum voltage, are set by means of two independent potentiometer mounted on the relay front cover. The limits for the trip are adjustable between +5 and +15% for maximum voltage and between -5 and -20% for minimum voltage.



### Technical characteristics

		RTMM2
Nr. of changeover contacts		2
Output contacts:		
Rated insulation	AC (V)	400
voltage $U_i$	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/240
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/220
Rated current $I_e$	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	400,380,240,220
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+20 / -20
Repeat accuracy (%)		2
Consumption (VA)		3
Input circuit test voltage (between input, output circuit and earth) (kV)		4
Low voltage tripping (adjustable) (%)		-5 to -20
Over voltage tripping (adjustable) (%)		+5 to +15
Switch ON response time (ms)		100
Reset hysteresis (%)		2

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2,000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standard

VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	

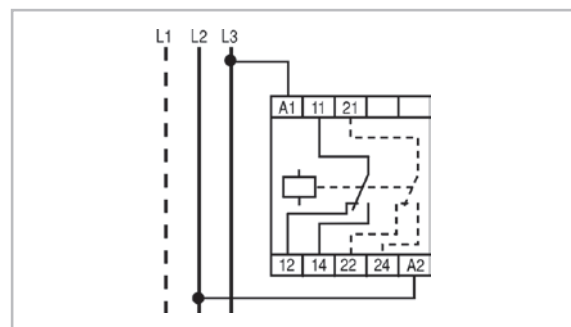
### Remark

The relay has one LED that lights when the output contact is made.

## RMM2 Maximum and minimum voltage relay for single-phase lines

### Function

These voltage-sensitive relays with one or two changeover output contacts remain connected (contact between 11-14 or between 21-24 closed) when voltage is within tolerance limits, and opens when voltage surpasses these limits in plus or minus. Relays can be used to detect low or lower voltage in balanced single or three-phase systems, and maximum and minimum tripping values are adjustable by means of two frontal potentiometers. The limits for the trip are adjustable between 5 and 15% for maximum voltage and between 5 and 20% for minimum voltage.



### Technical characteristics

		RMM 2
Nr. of changeover contacts		2
Output contacts:		
Rated insulation	AC (V)	400
voltage $U_i$	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/240
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/220
Rated current $I_e$	(A)	0.2/0.1
Supply voltages (Un)		
AC	(V)	240,220
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+15 / -20
Repeat accuracy (%)		2
Consumption (VA)		3
Input circuit test voltage (between input, output circuit and earth) (kV)		4
Low voltage tripping (adjustable) (%)		-5 to -20
Over voltage tripping (adjustable) (%)		+5 to +15
Reset hysteresis (%)		5 approx.
Switch ON response time (ms)		100



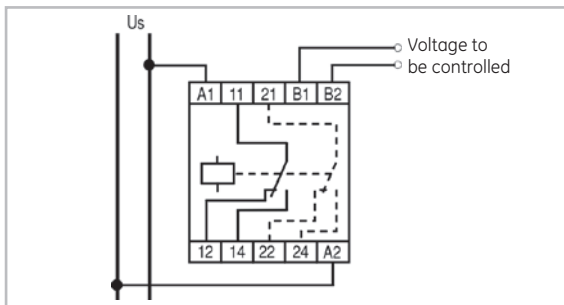
## RDT2 Voltage detector relay <sup>(1)</sup>

### Function

The output contact in this voltage detector will connect when controlled voltage between terminals B1-B2 exceeds a certain adjustable threshold by means of the front potentiometer and will disconnect with a voltage 10% below the setting value.

The relay requires voltages supply between A1-A2. Controlled voltage can be either direct (DC) or alternating (AC). The output contact function can be set to NO by means of an internal jumper (contact 11-14 is normally closed and opens when control power supply or removal is detected at A1-A2).

When the distance between the measurement point and the relay is greater than 1m, in order to avoid any noise problems, connection to the B1-B2 terminals should be made by using a shielded cable, with its screen joined to the B2 terminal and isolated at the other cable end or by using a twisted-pair cable.



### Technical characteristics

			RDT2-...
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage $U_i$	AC (V)		400
	DC (V)		250
Thermal current $I_{th}$	(A)		6
Utilisation AC-15			
Rated voltage $U_e$	(V)		120/240
Rated current $I_e$	(A)		2.5/1.3
Utilisation DC-13			
Rated voltage $U_e$	(V)		110/220
Rated current $I_e$	(A)		0.2/0.1
Supply voltages			(Un)
AC	(V)		220-230
Frequency	(Hz)		50/60
Permissible supply voltage variation	(%)		+10 / -15
Consumption	(VA)		3,7
Input circuit test voltage	(kV)		2,5
(between input, output circuit and earth)			
Reset hysteresis	(%)		10
Switch ON response time	(ms)		100

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

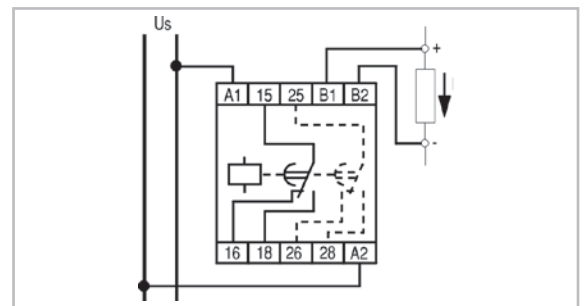
### Conformity to standards

VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	

## RDIT2 Current detector relay <sup>(2)</sup> with delay (0.5-15 seconds)

### Function

This relay is similar to the RDI except that it will connect with a certain adjustable delay of **0.5 to 15 secs**. If current falls below threshold before timeout, relay will reset immediately to recount delay from zero. For higher currents, current transformers or shunts of suitable ratios can be used. The relay requires voltages supply between A1-A2. Controlled voltage can be either direct (DC) or alternating (AC). The output contact function can be set to NO (the 15-18 contact closes when the delay time has elapsed) or to NC (the 15-18 contact is normally closed and opens when the delay time has elapsed or when the control power supply is removed from **A1-A2**) by means of an internal jumper. The **0.2 V** version has been designed to be used with an external shunt and if the distance between the shunt and the relay is greater than 1 m, a connection to the **B1-B2** terminals should be made by using a shielded cable, with its screen joined to the **B2** terminal and isolated on the shunt side or by using a twisted-pair cable.



### Technical characteristics

			RDIT2-...
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage $U_i$	AC (V)		400
	DC (V)		250
Thermal current $I_{th}$	(A)		6
Utilisation AC-15			
Rated voltage $U_e$	(V)		120/240
Rated current $I_e$	(A)		2.5/1.3
Utilisation DC-13			
Rated voltage $U_e$	(V)		110/220
Rated current $I_e$	(A)		0.2/0.1
Supply voltages			(Un)
AC (with transformer)	(V)		220-230
Frequency	(Hz)		50/60
Permissible supply voltage variation	(%)		+10 / -15
Repeat accuracy with 0.8 -1.1 $U_n$	(%)		2
Consumption	(VA)		3
Input circuit test voltage	(kV)		4
(between input, output circuit and earth)			
Switch OFF response time	(s)		0.5 to 15
Reset time between 2 cycles <sup>(3)</sup>	(ms)		100

(1) Remark

The relay has a green LED which lights up when the supply is between A1 and A2, and a red LED when the contact is made (11-14).

(2) Remark

The relay has a yellow LED which lights up when the supply is between A1 and A2, and a red LED when the contact is made 15-18.

(3) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

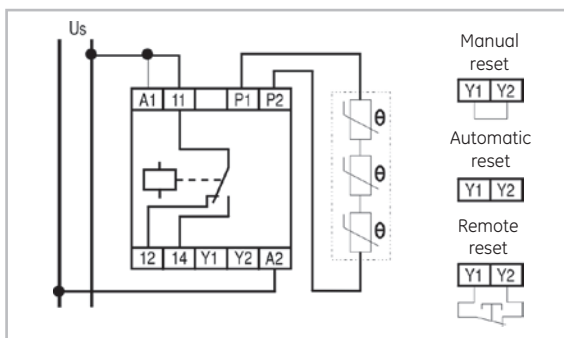
## RS01N Thermistor relay

### Function

This thermal probe relay is sensitive to resistance of several thermal probes (thermistors, PTC) connected to **P1** and **P2** and detect overheating in motor windings transformers, etc. where these PTC are connected.

The relays disconnects when probe resistance exceeds 2500 ohms and cannot reset until resistance is lower than 1500 ohms. Control voltage should be applied to **A1** and **A2**, the absence of this will cause relay to trip and prevent any possibility remaining without protection. In this case resetting is automatic, but if the relay trips through probe heating, resetting may be automatic, hand or remote (distance NC contact).

RS01N detect those cases of probe cables short-circuited (resistance lower than 20 Ohms) or probe cables cut (resistance higher than 2.5k Ohms). The resistance at 25 °C of the probe circuit must be within 40 to 600 ohms range.



### Technical characteristics

		RS01N
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	400
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/240
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/220
Rated current $I_e$	(A)	0.2/0.1
Supply voltages ( $U_n$ )		
AC (with transformer)	(V)	220-230,125,110
Frequency	(Hz)	50/60
Permissible supply voltage variation (%)		+10 / -15
Repeat accuracy with 0.85-1.1 $U_n$ (%)		2
Consumption	(VA)	3
Input circuit test voltage	(kV)	4
(between input, output circuit and earth)		
Switch OFF response time	(s)	100
Hysteresis	(kOhms)	1
Probe resistance min. (at 25°C) (Ohms)		40
Probe resistance max. (at 25°C) (Ohms)		600
Max. voltage in terminals P1-P2 ( $R=2.5kV/V$ )		< 1,6

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

VDE 0106	IEC/EN 60947-5-1
EN 50001	IEC 34-11-2 (RS01N)
EN 50005	UNE 20-119
EN 50011	CE
DIN VDE 0660-303 (RS01N)	
DIN 46199 (RSR)	

### Remark

The relay has one LED that lights when the output contact is made.





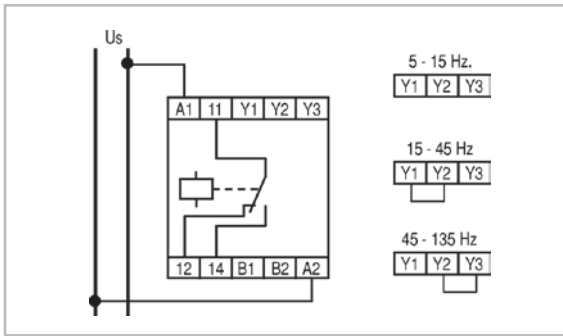
## RCF 1 Frequency control relay

### Function

This frequency control relay is sensitive to frequency of the signal applied to terminals **B1** and **B2** and output contact connects when frequency fails below a threshold adjustable by the front potentiometer. Supply voltage should also be applied to relay between terminals **A1** and **A2** to produce connection. Possibility of three settings ranges (by cross-connection): 5-15Hz, 15-45Hz, 45-135Hz.

Switching is independent of input signal level at **B1-B2**, within a wide range of values, and response is not changed by the input signal wave form (sinusoidal, square, triangular, etc).

Relay is suitable for suppression of rotor resistance in slipping asynchronous motors starters, speed reversal detector in motor wound motors and frequency control in generating sets.



### Technical characteristics

		RCF-1
Nr. of changeover contacts		1
Output contacts:		
Rated insulation voltage $U_i$	AC (V)	400
	DC (V)	250
Thermal current $I_{th}$	(A)	6
Utilisation AC-15		
Rated voltage $U_e$	(V)	120/240
Rated current $I_e$	(A)	2.5/1.3
Utilisation DC-13		
Rated voltage $U_e$	(V)	110/220
Rated current $I_e$	(A)	0.2/0.1
Supply voltages (Un)		
AC (with transformer)	(V)	380-400,220,230,110
Frequency	(Hz)	50/60
Permissible supply voltage variation(%)		+10 / -15
Voltage between B1-B2 terminals(V c.a.)		15 to 500
Repeat accuracy with 0.85-1.1 Un (%)		2
Consumption	(VA)	3
Input circuit test voltage (between input, output circuit and earth)	(kV)	4
Switch ON response time	(ms)	100
Switch OFF response time	(ms)	800
Reset hysteresis	(Hz)	1.5 approx.

### Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

### Conformity to standards

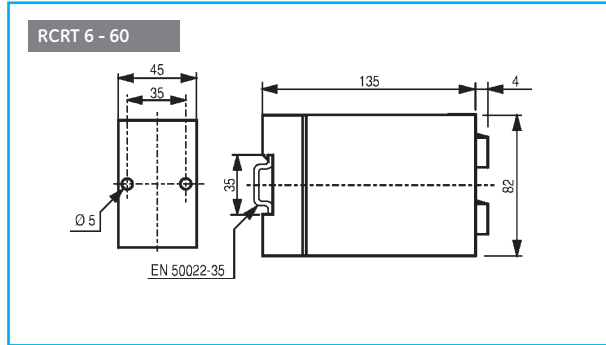
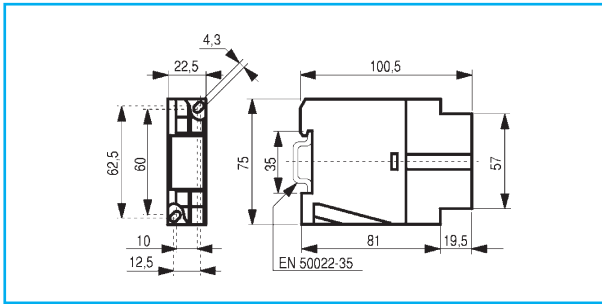
VDE 0106	EN 50042 (MRI)
VDE 0110 (MRI)	DIN 46199 (RCF)
EN 50001 (RCF)	IEC/EN 60947-5-1
EN 50002 (MRI)	UNE 20-119 (RCF)
EN 50005	UL 94 (MRI)
EN 50011	UL 508 (MRI)
CE	

### Remark

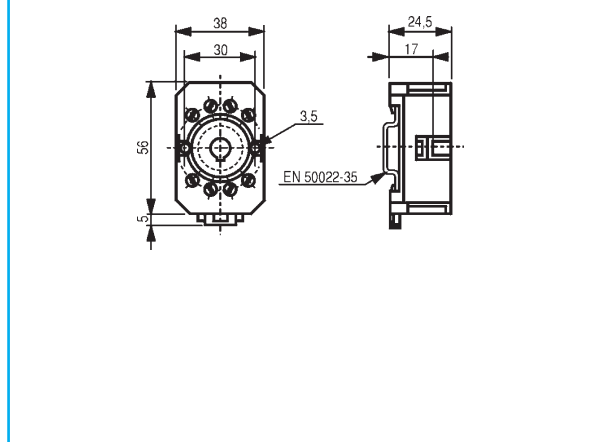
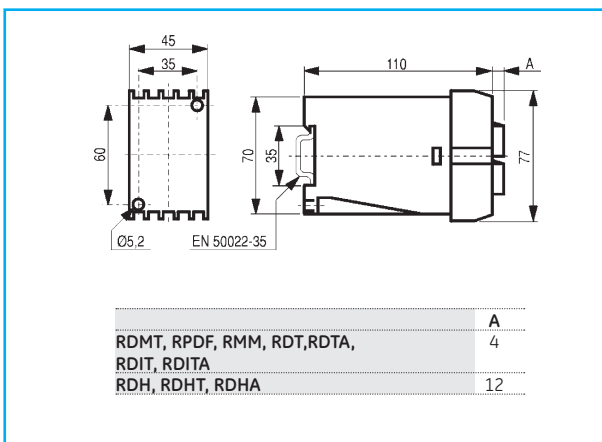
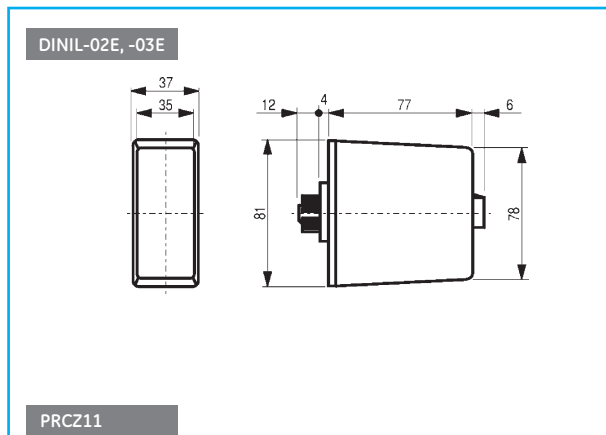
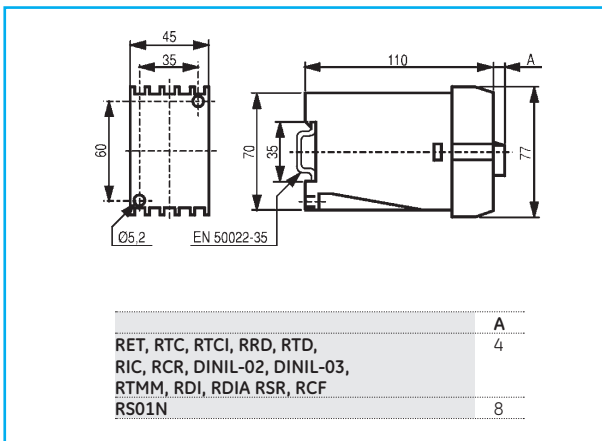
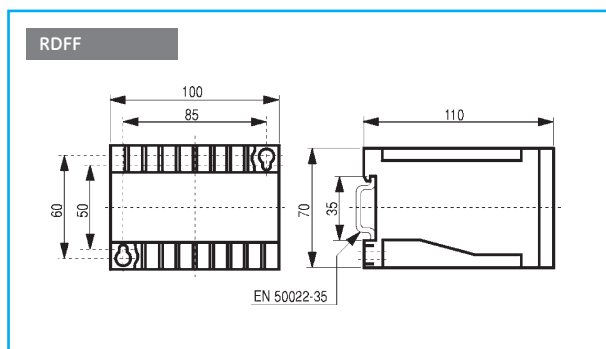
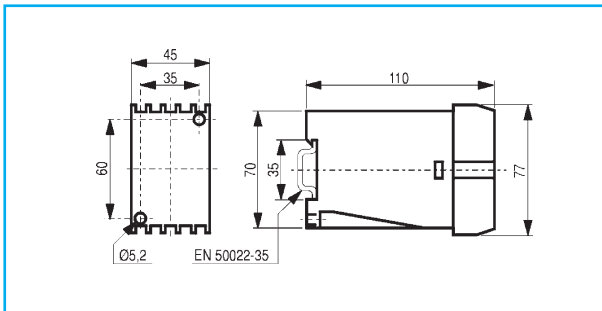
The relay has one LED that lights when the output contact is closed.

Dimensional drawings

Series NMV



Series D



A

B

C

D

E

F

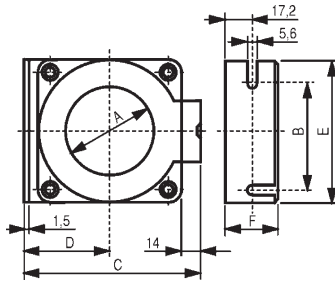
G

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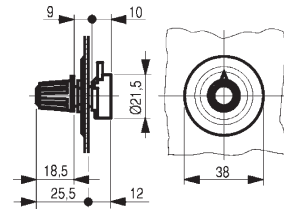
X

Differential transformers



TYPE	A	B	C	D	E	F
WKA-35	35	75	99	42	92	33.5
WKA-70	70	98	132	60.5	115	33.5
WKA-105	105	141	175	82	158	33.5
WKA-140	140	183	218	103.5	200	33.5
WKA-210	210	270	309	150	290	43
WKAT-35	35	75	99	42	92	33.5
WKAT-70	70	98	132	60.5	115	33.5
WKAT-105	105	141	175	82	158	33.5
WKAT-140	140	183	218	103.5	200	33.5
WKAT-210	210	270	309	150	290	43

Remote potentiometer



## Series IS and IM - Metal and thermoplastic EN 50041

- G.3 Order codes
- G.10 Technical data
- G.11 Dimensions

## Series IUG - Thermoplastic EN 50047

- G.5 Order codes
- G.10 Technical data
- G.13 Dimensions

## Series IZ - Thermoplastic, miniature design

- G.6 Order codes
- G.10 Technical data
- G.15 Dimensions

## Series 114FCT - Three pole limit switches

- G.9 Order codes
- G.15 Dimensions

## Series 115 - Pressure switches

- G.18 Order codes
- G.20 Technical data
- G.21 Dimensions

Plug-in relays and Auxiliary contactors

Motor protection devices

Contactors and Thermal overload relays

Motorstarters

Control and signalling units

Electronic relays

**Limit switches**

Speed drive units

Main switches

Numerical index

A

B

C

D

E

F

**G**

H

I

X





## Metal and thermoplastic limit switches. Positive opening. Conforming to EN 50041

- Fixing center lines and operation points in accordance with EN 50041
- NC contacts with positive opening to IEC/EN 60947-5-1
- IP65 protection
- Terminal numbering according to IEC/EN 50013
- Cable entry M20 x 1.5
- Safety switches according to cat. 1 of IEC/EN 60947-5-1 (depends on actuating system)
- CSA and UL certified

### Standards

IEC/EN 60947-5-1  
IEC/EN 60204-1

### Specifications

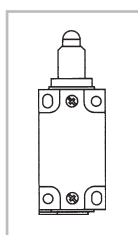
Degree of protection	IP 65
Ambient conditions	
Storage temperature	°C -40 to +80
Operating temperature	°C -25 to +80
Resistance to shocks (10 ms)	G 30
Resistance to vibrations (10-55 Hz)	G 25
Mechanical endurance	ops. 10 x 10 <sup>6</sup>
Cable entry	M20 x 1.5
Fixing screws	4 x M5

### Approvals



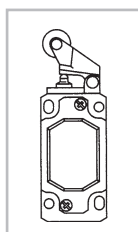
### Mounted versions

#### Series IS...



- Double-insulated bodies, in **thermoplastic material, according to UL-94 VO**
- Clip-fixing and opening of terminal access cover, no screws.










#### Series IM...




- Metal bodies constructed from injected **aluminium**.
- Cover fastening by screws.

Order codes ● pg. G.3  
Technical data ● pg. G.10  
Dimensions ● pg. G.11

Limit switches according to EN 50041

	Mounting position of the head <sup>(3)</sup>			Slow break		Snap action		Pack
	Heads Standard position	Head position	Form to EN 50041	Cat.no	Ref. no.	Cat.no	Ref. no.	
	Plunger	III	B	ISGA-B211	130000	ISGA-B411	130018	5
		III	B				IMGA-B411	130019
	Roller plunger	III	C			ISGR-B411	130020	5
		III	C			IMGR-B411	130021	5
	Roller level	III	(1)			ISGH-B411	130022	5
		III	(1)			IMGH-B411	130023	5
	Roller crank	III	A			ISGL-B411	130028	5
		III	A			IMGL-B411(4)	130029	5
	Adjustable roller crank <sup>(2)</sup>	II	(1)			ISGT-B311	130030	5
		II	(1)			IMGT-B311	130031	5
	Rod lever <sup>(2)</sup>	II	D			IMGP-B311	130035	5
	Cross rod	II	(1)			IMGC-B411	130037	5
	Spring rod lever <sup>(2)</sup>	III	(1)			IMGQ-B311	130039	5
	Omnidirectional spring rod <sup>(2)</sup>	III	(1)			ISGM-B311	130040	5
		III	(1)			IMGM-B311	130041	5

 Positive break

- (1) Fixing center lines and operation points in accordance with EN 50041.
- (2) Heads for these limit switches have no positive opening, as they are adjustable or flexible.
- (3) Supplied in standard mounting position. Positions II and III must be set by user.
- (4) Available with metal roller lever: IMGL-B411M (130107).

Order codes

A

B

C

D

E

F

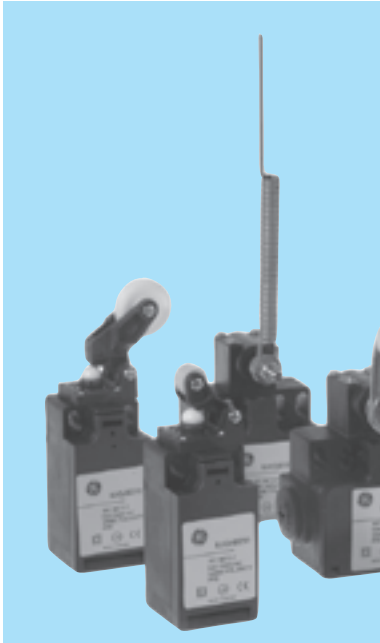
G

H

I

X





## Thermoplastic limit switches. Positive opening conforming to EN 50047

- Fixing center and operation points (IUG...) in accordance with EN 50047
- NC contacts with positive opening according to IEC/EN 60947-5-1
- IP65 protection
- Terminal numbering according to EN 50013
- Thermoplastic material according to UL-94 V0
- One bottom cable entry M20x1.5 on Series IUG...  
Two side cable entries for M16x1.5 on Series IUC.
- Two fixing possibilities for series IUGA...
- Clip fixing and opening of terminals access cover, no screws.
- CSA and UL certified

### Standards

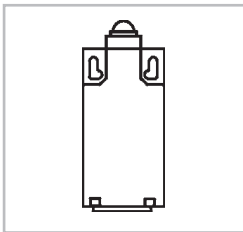
IEC/EN 60947-5-1  
IEC/EN 60204-1

### Approvals



### Mounted versions

Series IUG...



### Specifications












Degree of protection	IP 65
Ambient conditions	
Storage temperature	°C -40 to +80
Operating temperature	°C -25 to +80
Resistance to shocks (10 ms)	G 30
Resistance to vibrations (10-55 Hz)	G 25
Mechanical endurance	ops. 10 x 10 <sup>6</sup>
Cable entry	IUG... 1 x (M20x1.5)
Fixing screws	2 of M5

### Switch function

Contact type	Switch function	Switch contacts	Voltage	Current	
IUG	Slow make & break	Changeover	1NC/1NO	250V	10A
	Snap action	Changeover	1NC/1NO	250V	10A

Order codes ● pg. G.5  
Technical data ● pg. G.10  
Dimensions ● pg. G.13

Limit switches according to EN 50047

	Mounting position of the head			Slow break		Snap action		Pack
	Heads Standard position	Head position	Form to EN 50047	Cat. no.	Ref. no.	Cat. no.	Ref. no.	
	II	III	B	IUGA-B211	130060	IUGA-B411	130082	5
	II	III	(2)	IUGU-B211 S	130057	IUGU-B411	130084	5
		III	(2)			IUGR-B411	130086	5
		III	E	IUGH-B211	130066	IUGH-B411	130088	5
		III	(2)			IUGI-B411	130090	5
		III	(2)	IUGE-B211	130072	IUGE-B411	130094	5
		III	A	IUGL-B211	130074	IUGL-B411	130096	5
		II	(2)	IUGT-B111	130076	IUGT-B311	130098	5
		II	(2)			IUGP-B311	130100	5
		III	(2)	IUGQ-B111	130080	IUGQ-B311	130102	5
		III	(2)			IUGM-B311	130104	5

(1) Heads for these limit switches have no positive opening.  
 (2) Fixing centre lines and operating points according to EN 50047.

⊕ Positive break

Order codes

A

B

C

D

E

F

G

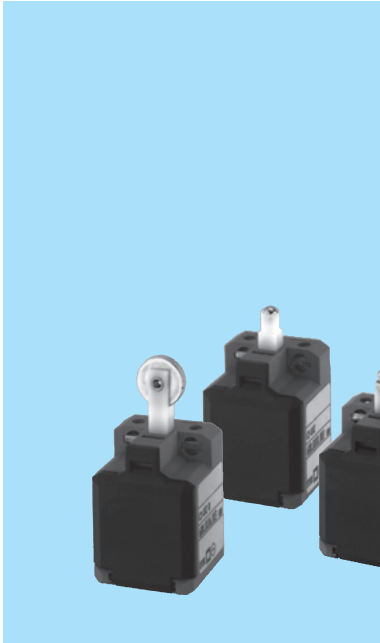
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X







### Miniature thermoplastic limit switches

- The small sizes makes these ideal for use in reduced spaces
- With slow break, NC contacts with positive opening according to IEC/EN 60947-5-1
- 2 mm contact opening of slow-action system according to EN 81-1 for lift application
- IP30 protection
- Terminal numbering according to EN 50013
- Thermoplastic material in accordance with UL-94 V0
- Clip fixing and opening of the contact access cover, no screws
- Two fixing possibilities: 2 x M3 from the top  
2 x M4 for mounting from the front

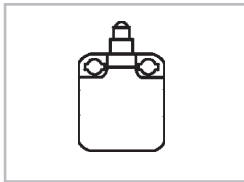
#### Approvals



#### Switch function

Contact type	Switch function	Switch contacts	Voltage	Current
Slow make & break	Changeover	1NC/1NO	250V	10A
Snap action	Changeover	1NC/1NO	250V	10A

#### Mounted versions



Order codes ● pg. G.6  
 Technical data ● pg. G.10  
 Dimensions ● pg. G.15

#### Miniature limit switches

	Heads	Slow break		Snap - action		Pack
		Cat. no.	Ref. no.	Cat. no.	Ref. no.	
	Plunger			<b>IZMA-B311</b>	130144	10
	Push-button (adjustable)	<b>IZMS-B211</b>	130141	<b>IZMS-B311</b>	130145	10
	Roller plunger			<b>IZMR-B311</b>	130146	10



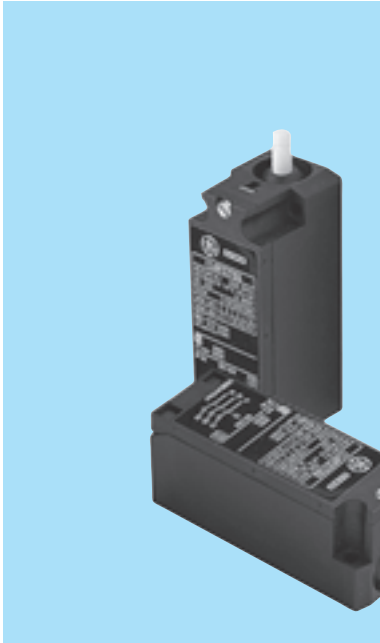
Notes

Grid area for notes.

Order codes

- A
- B
- C
- D
- E
- F
- G
- H
- I
- X





## Three pole limit switches

- Switch-box, cover and operation plunger by thermoplastic resin.
- Silver contacts.
- Lockable cover with one screw only.
- Two basic versions:
  - Without seal Protection IP40 according to IEC 529
  - With seal Protection IP65 according to IEC 529 (Types NEMA 1, 12 and 13 according to UL, ENCL. 3 according to CSA)
- Four electrical functions for both versions.
- Slow operation contacts, double-break and positive break of NC contacts.
- With screws, retractable and captive clamp type. Protection against accidental contact with live parts, degree of protection IP2x according to IEC 529.

### Standards

IEC/EN 60947-5-1  
VDE 0660  
BSI 4794  
NFC 63140

### Approvals



### Actuating force


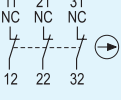


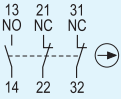

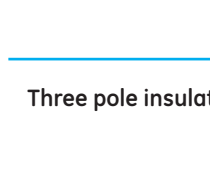
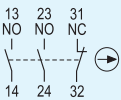
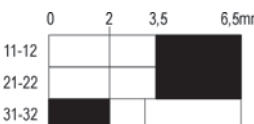

Minimum actuating force		
114FCT03, ...03T		7.5N
114FCT12, ...12T		10N
114FCT21, ...21T		12N
114FCT30, ...30T		13N
Positive opening force		
114FCT03, ...03T		8.5N
114FCT12, ...12T		8.5N
114FCT21, ...21T		8.5N
114FCT30, ...30T		-
Maximum force		
114FCT03, ...03T		12N
114FCT12, ...12T		13.5N
114FCT21, ...21T		15.5N
114FCT30, ...30T		17N

### Specifications

Mechanical performances										
Climatic protections										
Temperate climate (DIN 50014)		23 / 50								
Wet climate (DIN 50015)		23 / 83								
Hot wet climate (DIN 50015)		40 / 92								
Variable wet climate (DIN 50016)		FW 24								
Temperature ranges										
Operation		-25°C to +70°C								
Storage		-40°C to +70°C								
Vibrations resistance		10G								
(according to IEC 68-2-6)		with frequency range from 1 to 100Hz								
Mechanical endurance		10 x 10 <sup>6</sup> operations								
Operation speed										
Min.		0.25 m/sec.								
Max.		1 m/sec.								
Electrical performances										
Rated insulation voltage (Ui) EN 60947.1		690V								
Impulse withstand voltage (Uimp) EN 60947.1		4kV								
Insulation class according to VDE 0660		Group C								
Electrical shocks protection IEC 536		Class II (double insulation)								
Short-circuit protection according to IEC 269.1 and 269.3		10A								
Rated thermal current: Ith		10A								
Performances according to IEC 947.5.1										
Cat. AC15	Voltage Ue (V)	24	48	60	110	220	380	500	600	
	Current Ie (A)	10	10	10	6	3	2	1.5	1.2	
Cat. DC13	Voltage Ue (V)	24	48	60	110	220	300			
	Current Ie (A)	2.5	1.4	1	0.55	0.27	0.2			
Performances according to UL and CSA										
		AC / Heavy duty (A600)								
		DC / Standard duty (Q300)								
Terminals										
Capacity				min.		22 AWG (0.32mm <sup>2</sup> )				
Rigid and/or flexible conductors				max.		12 AWG (3.3mm <sup>2</sup> )				
Cable entry						1 x PG11				

Order codes ● pg. G.9  
Dimensions ● pg. G.15

Three pole limit switches

	Contacts	Diagrams	Protection	Cat. no.	Ref. no.	Pack.
	<p>11 21 31 NC NC NC 12 22 32</p> 	<p>0 2 6,5mm</p>  <p>3,3 Positive opening travel</p>	IP40	<b>114FCT03</b>	130320	1
			IP65	<b>114FCT03T</b>	130321	1
	<p>13 21 31 NO NC NC 14 22 32</p> 	<p>0 2 3,5 6,5mm</p>  <p>3,3 Positive opening travel</p>	IP40	<b>114FCT12</b>	200909	1
	<p>13 23 31 NO NO NC 14 24 32</p> 	<p>0 2 3,5 6,5mm</p>  <p>3,3 Positive opening travel</p>	IP40	<b>114FCT21</b>	200910	1
<p>Three pole insulated jumper</p> 				<b>105PT</b>	132234	1

Order codes

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## Technical data

### Limit switches

		ISG..-B211 IMG..-B211	ISG..-B311 IMG..-B311 ISG..-B411 IMG..-411	IUG..-B111 IUG..-B211	IUG..-B311 IUG..-B411	IZM..-B211	IZM..-B311
Type of break		Slow break	Snap action	Slow break	Snap action	Slow break	Snap action
Number of contacts		2	2	2	2	2	2
Function		1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC
Polarity		Same	Same	Same	Same	Same	Same
Rated thermal current (I <sub>the</sub> ) (A)		10	10	10	10	10	10
<b>Auxiliary contacts</b>							
Rated insulation voltage (U <sub>i</sub> )V		400	400	250	250	380	250
Protection against electrical shocks		Class II (ISG) CLASS I (IMG)	Class II (ISG) CLASS I (IMG)	Class II	Class II	-	-
Protection against electrical shocks (fuse) (A)		10	2	10	2	6	6
<b>Rated current (DIN EN60947-5-1)</b>							
A	A300 AC-15	12/24V (A)	-	-	-	-	-
		48/60V (A)	-	-	-	-	-
		(110V) 120V (A)	6	6	6	6	6
		127V (A)	-	-	-	-	-
		(220V) 240V (A)	3	3	3	3	3
	Q300 DC-13	380V (A)	-	-	-	-	-
		24V (A)	-	-	-	-	-
		48V (A)	-	-	-	-	-
		(110V) 125V (A)	0.55	0.55	-	-	0.55
		(220V) 250V (A)	0.27	0.27	-	-	0.27
	300V (A)	-	-	-	-	-	
Operating rate	ops./h	6000	6000	6000	6000	6000	6000
Switching time	(ms)	-	10	-	10	-	10
Repetition assurance	(mm)	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Clamping capacity	(mm <sup>2</sup> )	0.5 - 1.5	1.5	1.5	1.5	1.5	1.5
Terminal screw		M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Protection		IP65	IP65	IP65	IP65	IP30	IP30

Limit switches

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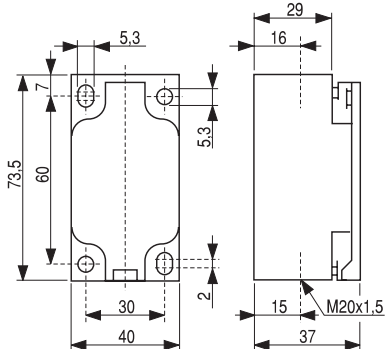
X



Dimensional drawings

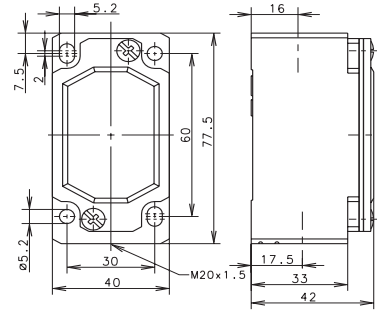
Contact block Series IS

Common for all limit switches Series IS



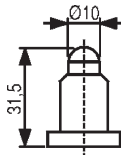
Contact block Series IM

Common for all limit switches Series IM

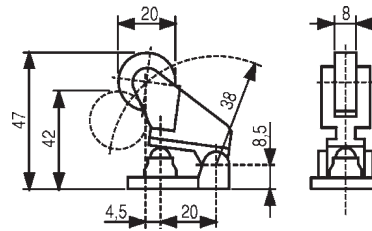


Operating heads

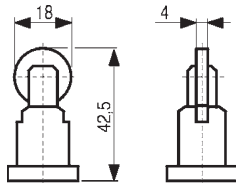
ISGA B..., IMGA B...



ISGH B..., IMGH B...



ISGR B..., IMGR B...



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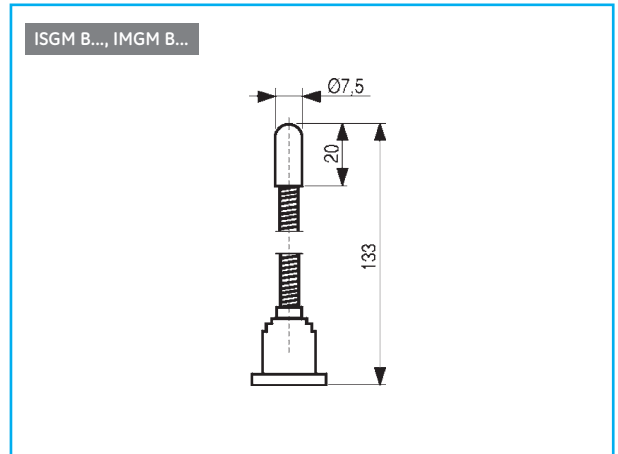
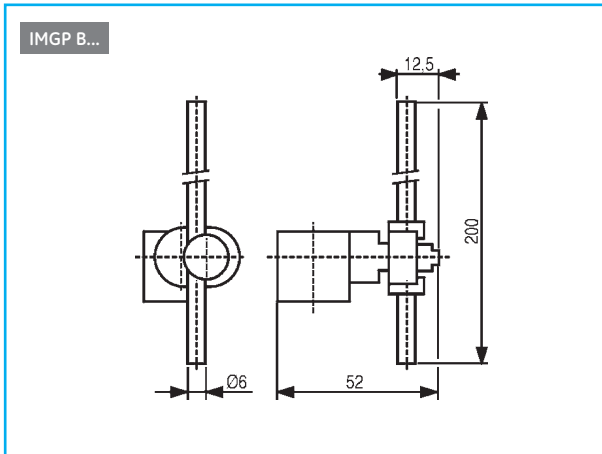
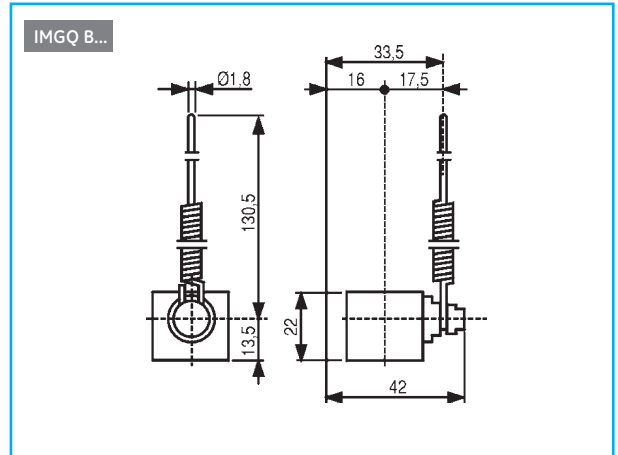
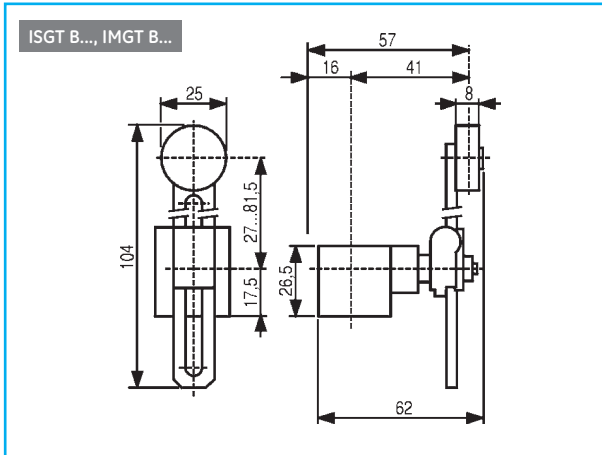
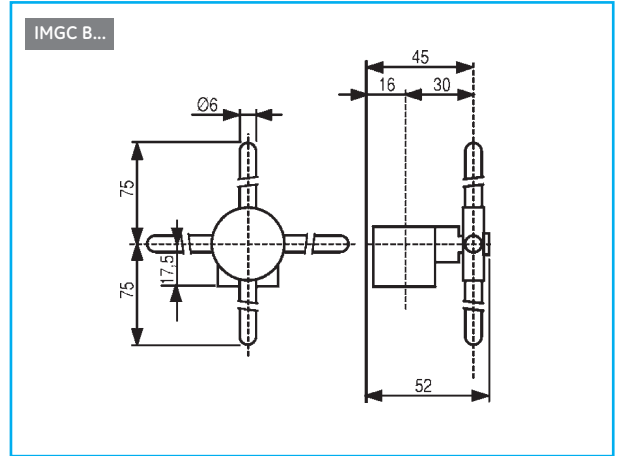
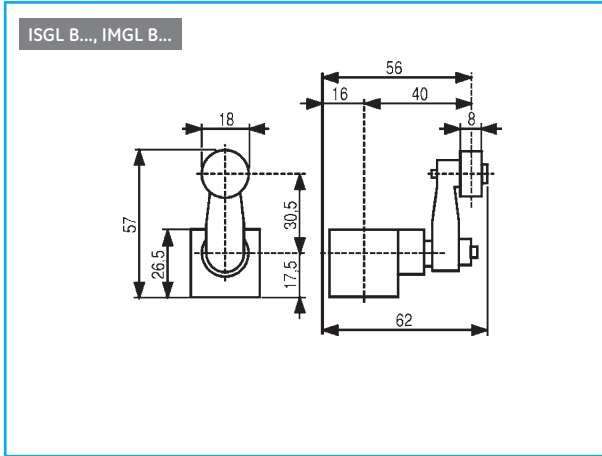
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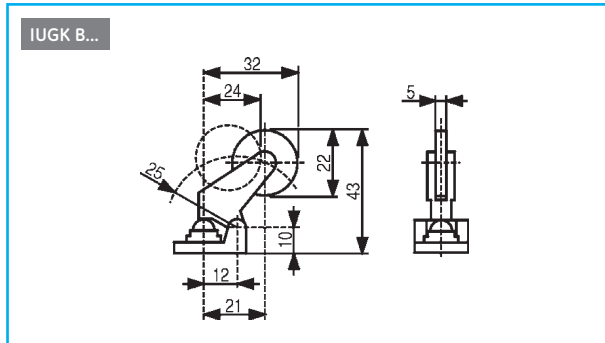
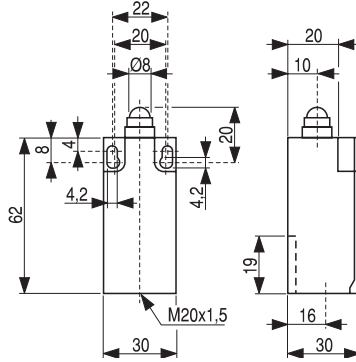
Dimensional drawings

Operating heads (continued)

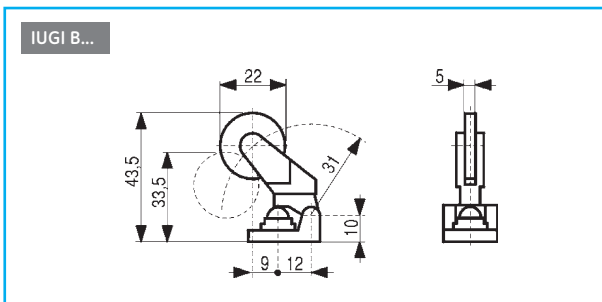
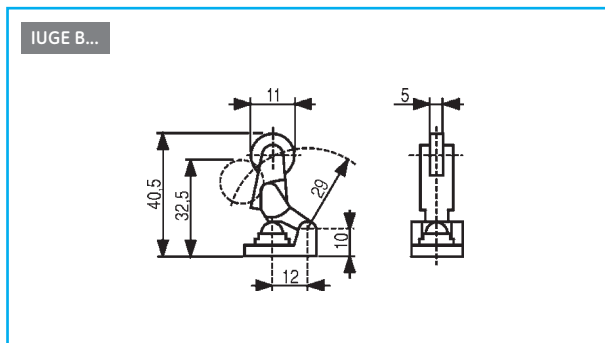
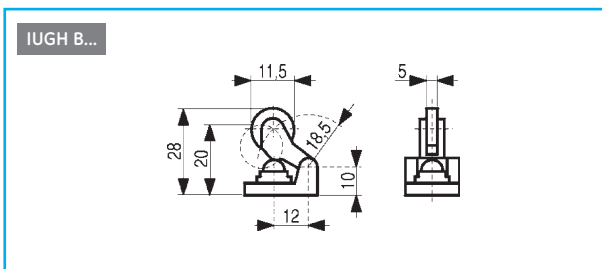
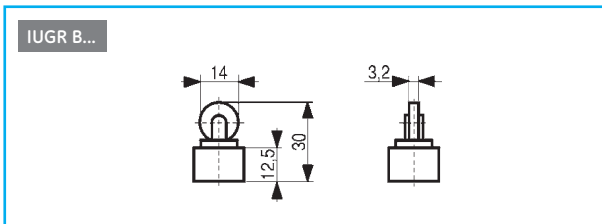
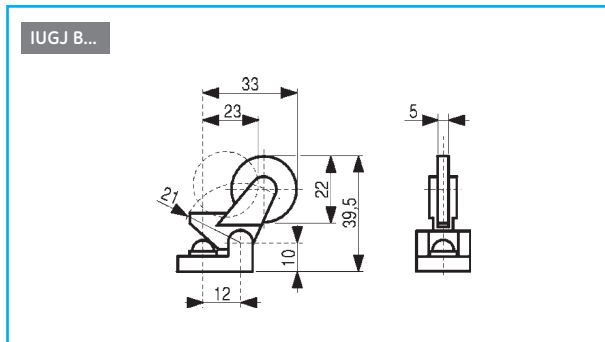
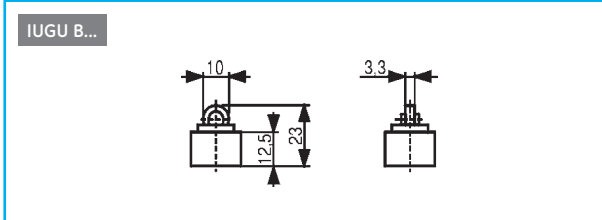


**Contact block Series IUG**

Common for all limit switches Series IUGA B...



**Operating heads**



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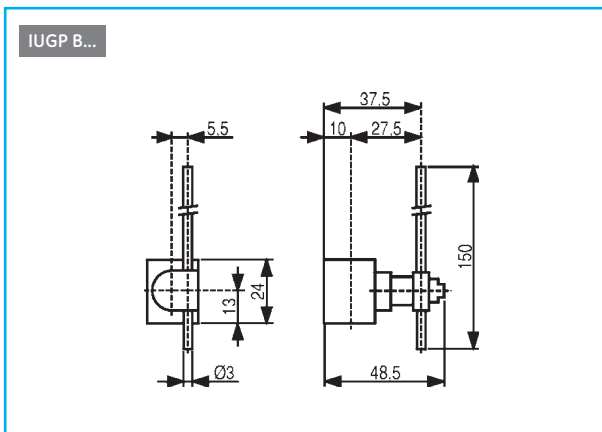
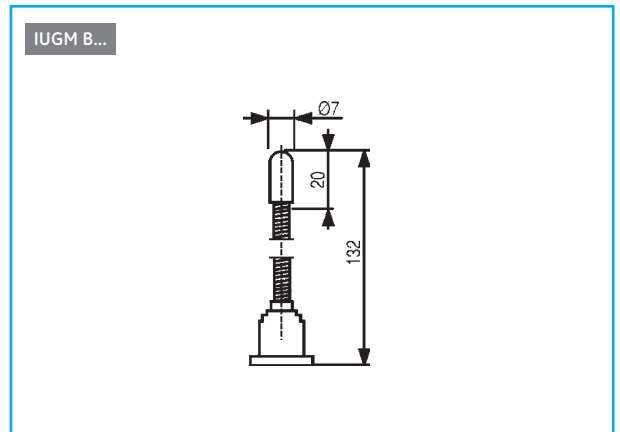
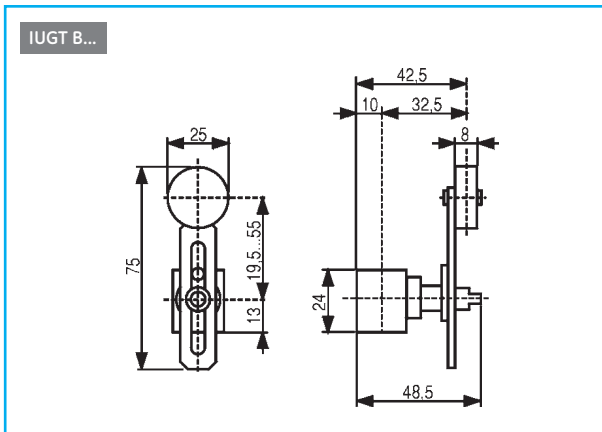
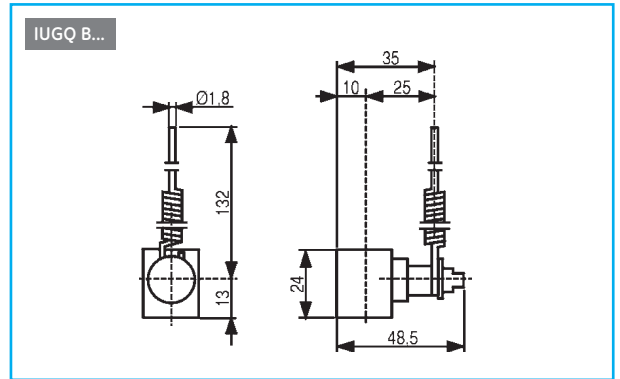
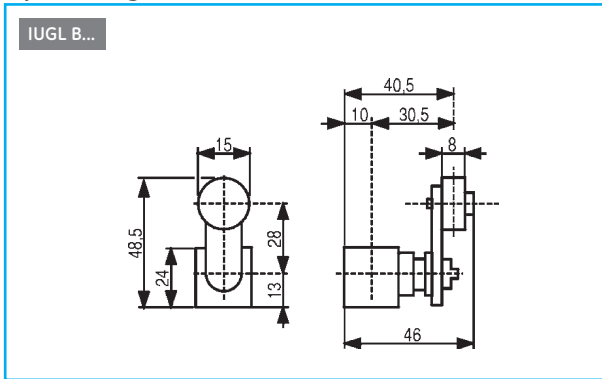
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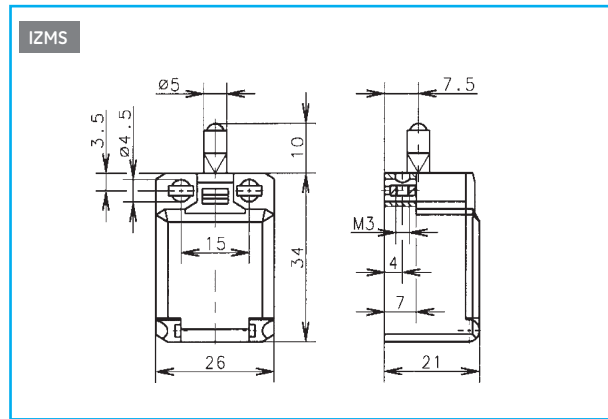
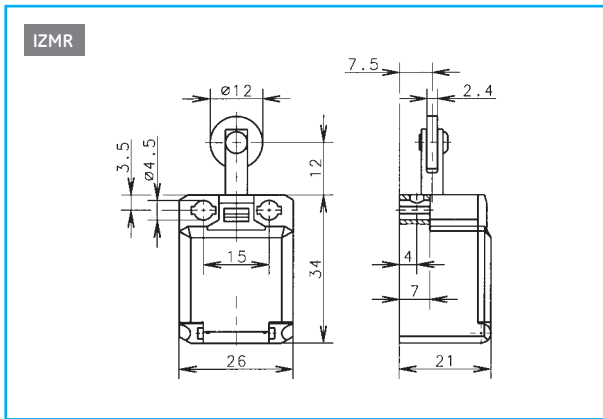
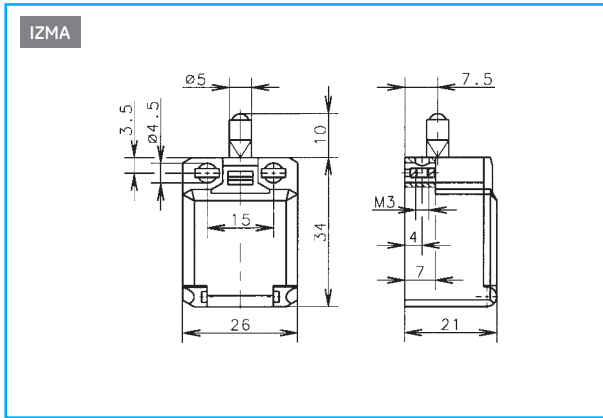


Dimensional drawings

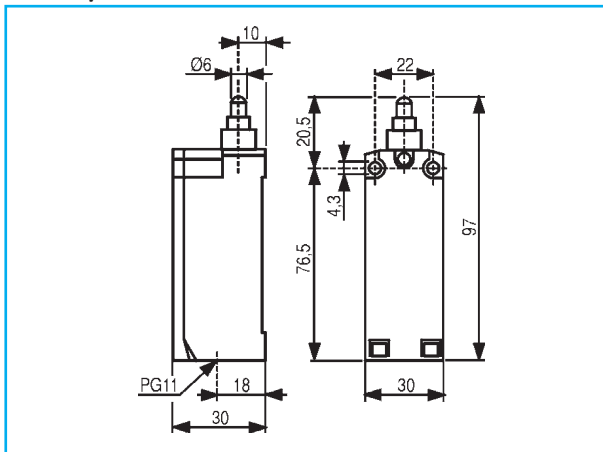
Operating heads (continued)



Series IZ



Three pole limit-switches Series 114FCT



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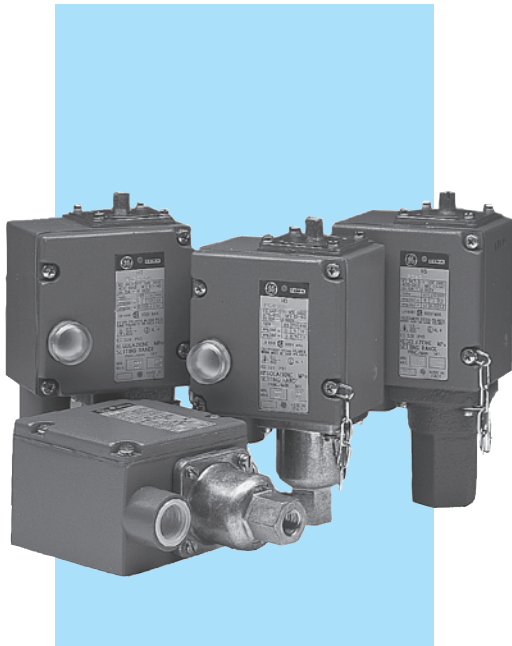
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### Pressure switches

- Controlled fluid temperature: 120°C
- Fluids that can be controlled by bellows pressure switches: air and rare gases, freon, water (sea-water not included), fuel oils, mineral oils, hydraulic oils and other kinds of fluids that do not corrode steel, tin and other kinds of fluids that do not corrode steel, tin and copper alloys. To avoid absolutely and solvents and acids.
- Fluids that can be controlled by piston pressure switches: mineral oils and hydraulic oils that do not corrode steel and cast iron.
- Synthetic oils with base of phosphates, gas and all the other fluids have to be excluded.

### Setting range choice

On the following pages are shown the values within which it is possible to make setting of our pressures switches.

For a correct interpretation, consider that:

- The main setting range defines the values within which it is possible to set the tripping of the pressure switch, when the pressure is decreasing.
- The differential setting range defines the values that, added to those ones of the main range, determine the tripping when pressure is increasing.
- The maximum admissible pressure defines the limit that the devices can stand without consequences. Indicated values have never to exceed also in the case of occasional overpressure of temporary type.

When choosing the most suitable type, consider that the device reaches its excellent efficiency when the tripping point, with decreasing pressure, is set between 25% and 75% of the main setting range.

### Standards

IEC/EN 60947-5-1 BSI  
CEI UTE  
VDE 0660

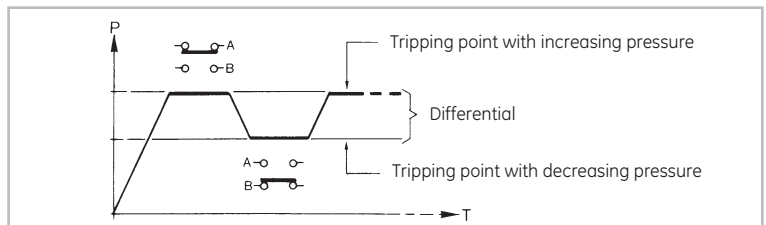
### Approvals



ASE/SEV (Switzerland)

### Setting

- To completely loose the external screw of the main range and the internal pawl of the differential range.
- By a manometer, to set pressure at the value on which the tripping is wanted, when pressure is decreasing. To screw the external screw of the main range until the tripping of the microswitch (A contact shall result open and B closed).
- To completely screw the pawl of the differential range, until its maximum value.
- To set pressure at the value on which the tripping is wanted, when pressure is increasing.
- To loosen the pawl of the differential range until the tripping of the microswitch (A contact shall result closed and B open).



Order codes ● pg. G.18  
Dimensional drawings ● pg.G.15

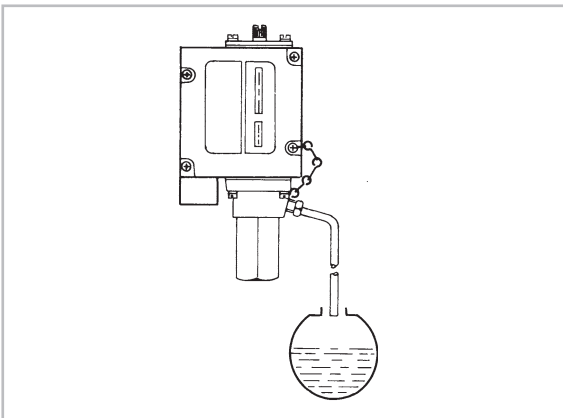


## Location

Generally the location of our pressure switches can be effected as wanted.

Nevertheless, as to the piston types whitout seal ring, location have to be made in such a way as to allow the discharge, through the drainage hole, of the blow-by oil between cylinder and piston (a few drops per hour). The going-out oil can be collected by a proper drainage pipe that conveys it, free falling, into the tank of the hydraulic central, as shown in the below figure.

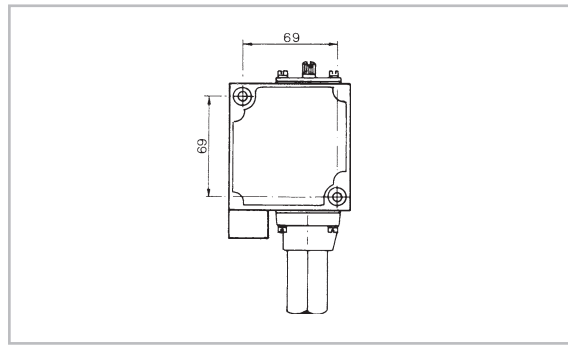
## Caution



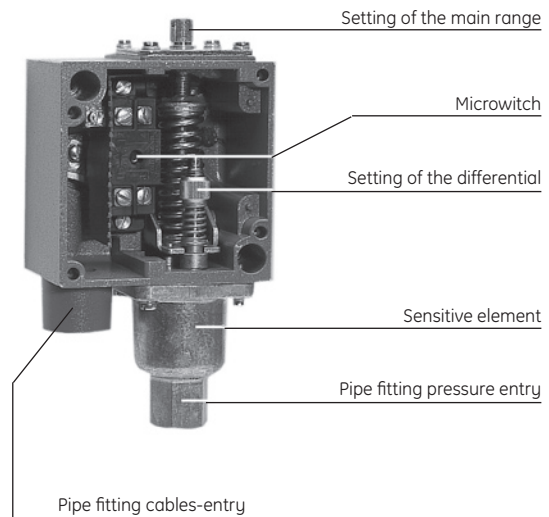
- Do not connect the drainage hole to a return pipe of the line...
- The drainage pipe must not cover a way different from that one indicated (e.g. towards the top).
- Do not plug the drainage holes.

If the above cautions are not met, inside the sensitive group there will be a counter pressure that could damage the sealing washer between actuator and frame of the pressure switch.

## Fixing



To fix the pressure switch on a proper support, use the two pierceable holes  $\varnothing$  6.8 mm. located under the cover. To absolutely avoid to fix it directly on the pipe containing the fluid to be controlled, use the threaded pipe fitting for pressure entry.



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## Pressure switches - Bellows type<sup>(1)</sup>

	Setting range		Maximum admissible pressure Mpa Bar	Weight (kg)	1NO - 1NC		2NO - 2NC		Pack.
	Main	Differential			Cat. no	Ref. no	Cat. no	Ref. no	
	Mpa Bar	Mpa Bar							
	0.002 - 0.15	0.02 - 0.1	0.4	0.950	<b>115PC002</b>	132500	<b>115PC2002</b>	132504	1
	0.02 - 1.5	0.2 - 1	4						
	0.01 - 0.5	0.04 - 0.1	0.6	0.950	<b>115PC015</b>	132501	<b>115PC2015</b>	132505	1
	0.1 - 5	0.4 - 1	6						
	0.01 - 0.8	0.07 - 0.2	1.55	0.950	<b>115PC018</b>	132502	<b>115PC2018</b>	132515	1
	0.1 - 8	0.7 - 2	15.5						
	0.1 - 1.9	0.12 - 0.2	2.45	0.950	<b>115PC119</b>	132503	<b>115PC2119</b>	132506	1
	1 - 19	1.2 - 2	24.5						
	0.002 - 0.15	0.02 - 0.1	0.4	0.950	<b>115PC002L</b>	132507	<b>115PC2002L</b>	132511	1
	0.02 - 1.5	0.2 - 1	4						
	0.01 - 0.5	0.04 - 0.1	0.6	0.950	<b>115PC015L</b>	132508	<b>115PC2015L</b>	132512	1
	0.1 - 5	0.4 - 1	6						
	0.01 - 0.8	0.07 - 0.2	1.55	0.950	<b>115PC018</b>	132509	<b>115PC2018</b>	132513	1
	0.1 - 8	0.7 - 2	15.5						
	0.1 - 1.9	0.12 - 0.2	2.45	0.950	<b>115PC119</b>	132510	<b>115PC2119</b>	132514	1
	1 - 19	1.2 - 2	24.5						

(1) Bellows types in stainless steel on request.

(2) Lamp is not delivered. For types see Accessories on G.19.

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Accessories

Microswitch	Contacts		Weight		Cat. no.		Ref. no.		Pack.		
	1NO - 1NF		0.060		090MI1		130310		25		
	2NO - 2NF		0.100		090MI2		130311		25		
Sensitive group	Basic pressure switch	Weight	Bellow type				Piston type				Pack.
			Standard		Stainless steel		Without seal ring		With seal ring		
			Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	
	115PC002	0.045	115807SP	132562	1158065SPA	215320	-	-	-	-	1
	115PC015	0.045	115803SP	132563	1158067SPA	215321	-	-	-	-	1
	115PC018	0.045	115805SP	132564	1158067SPA	215321	-	-	-	-	1
	115PC119	0.045	115804SP	132565	1158067SPA	215321	-	-	-	-	1
	115PD970	0.505	-	-	-	-	1158029-01GI	132566	1158029-03GIT	132568	1
	115PD15210	0.505	-	-	-	-	1158029-02GI	132567	1158029-04GIT	132569	1
	115PD38350										
Knob for setting main range pressure											
							Weight	Cat. no.	Ref. no.	Pack.	
							0.014	115MA	132570	1	
Protective cap of main range screws											
							Weight	Cat. no.	Ref. no.	Pack.	
							0.078	115CA	132571	100	
Bulb with BA96 base - filament type					Vn AC/DC	Wn	Weight	Cat. no.	Ref. no.	Pack	
					6	1.5	0.002	BA9S615	187851	5	
					12	2	0.002	BA9S122	187852	5	
					24	2	0.002	BA9S242	187853	5	
					30	2.1	0.002	BA9S30	187854	5	
					48	2	0.002	BA9S48	187855	5	
					60	1.2	0.002	BA9S6012	187856	5	
				130 (110)	2	0.002	BA9S130	187857	5		
Bulb with BA9s base - neon type											
					10	0.11	0.002	BA9SN110	187860	5	

Pressure switches

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## Technical data

### General

The pressure switches Series 115 are designed for transforming a pressure variation into an electrical signal when a pre-arranged pressure value is reached.

Pressure switches are utilized in the field of the industry machines, installations and transports.

### Climatic protections

Temperature climate	cat. 23/50 (DIN 50014)
Wet climate	cat. 23/83 (DIN 50015)
Hot wet climate	cat. 40/92 (DIN 50015)
Variable wet climate	cat. FW24 (DIN 50016)

### Temperature ranges

Operation	-25°C to +70° C
Storage	-40°C to +70°C

### Insulation class

IP65	IEC/EN 60529
ENCL. 4, 5	CSA

### Vibration resistance

5g at a sinusoidal frequency ranging from to 100 Hz according to IEC 68-2-6	IEC 68-2-6
---	------------

### Mechanical endurance

#### Bellows type

1 million operations. It can be considerably reduced when the pressure jump reaches the maximum value foreseen for every type of device and the operations number is high. The bellows endurance can be also negatively influenced by the temperature and the kind of controlled fluid.

### Rated insulation voltage

600V AC/DC

### Insulation class

Group C according to VDE 0110

### Short-circuit protection

10 A gL fuses according to IEC 947-5-1

### Electrical performances

090MI1 (1NO + 1NC)

090MI2 (2NO + 2NC)

Rated thermal current: I<sub>th</sub> = 10 A

#### Performances according IEC 947.5.1

Category AC15 (A600)									
Voltage U <sub>e</sub>	V	24	48	60	110	220	380	500	600
Current I <sub>e</sub>	A	10	10	10	6	3	2	1.5	1.2
Category DC 13 (P600)									
Voltage U <sub>e</sub>	V	24	48	60	110	220	300		
Current I <sub>e</sub>	A	2.5	1.4	1	0.55	0.27	0.2		

#### Performances according to CSA

AC/Heavy Duty (A/600)

DC/Standard Duty (Q300)

Connections at same polarity

### Connection terminals

Screw type without clamping screw.

Suitable for eye, fork and hook terminals.

### Cable entry

One PG 13.5 threaded cable entry.

### Range

The pressure switches series 115 are available in two basic versions:

- With bellows sensitive element for pressures ranging between 0.002 Mpa (0.02 bar) minimum and 2.1 Mpa (21 bar) maximum.
- With piston sensitive element for pressures ranging between 0.95 Mpa (9.5 bar) minimum and 37.25 Mpa (372.5 bar) maximum.

Both versions can be supplied:

- Without lighting signaling
- With lighting signaling

### Construction

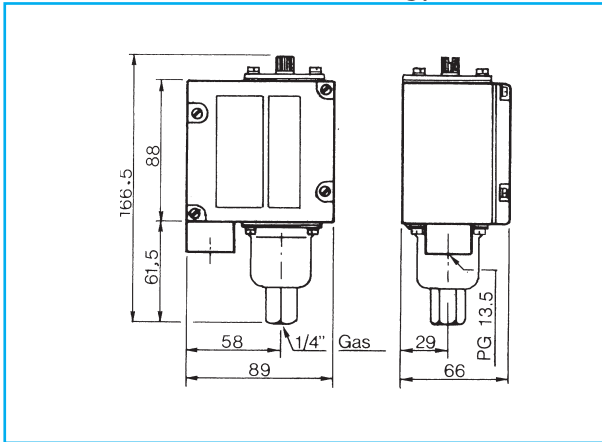
Snap-action 1NO-1NC or 2NO+2NC microswitches with double-break contacts without positive-break of the NC contact.

Bellows sensitive element, hermetic sealing, made by Tombacco (or stainless steel) material enclosed into a die-cast zamac case complete with a 1 mm. damper. Piston sensitive element, with or without seal ring, with steel piston enclosed into a cast-iron cylinder complete with 1 mm. damper.

Enclosure and cover are made of die-cast aluminium and painted with anaphoresis process grey RAL 7012..

Dimensions

Pressure switches - Bellows type



Pressure switches

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## H.2 VAT20 - Micro AC variable speed drives

- H.3 Order codes
- H.5 I/O terminal board specifications
- H.5 I/O wiring
- H.6 Dimensions and weights

## H.8 VAT200 - Mini AC variable speed drives

- H.9 Order codes
- H.10 Technical data
- H.12 I/O Power & control layout
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Plug-in relays and Auxiliary contactors

Motor protection devices

Contactors and Thermal overload relays

Motorstarters

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Main switches

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**NEW**

## H.18 VAT300 - Advanced general purpose AC drive

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- H.21 Technical data
- H.23 I/O wiring basic scheme
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under control





## Micro AC variable speed drives

- Single-phase or three-phase digital inverters for controlling the speed of three-phase induction AC motors from 0.2 to 2.2kW
- Built-in keypad and display
- IP20 or IP65 protection degree
- Built-in EMC filter for industrial environment (class A)
- DIN rail mountable by optional kit
- Global standards CE and cUL



### Technical data

#### Control specifications

Control system	Sinusoidal wave PWM inverter
Output frequency	0 - 200Hz
Voltage / Frequency	Constant torque, Constant power, Torque boost
	Six selectable pre-set patterns
Overload capacity	150%, 60 sec.
Carrier frequency	Selectable 4 - 16kHz
Frequency setting resolution	
Digital	0.1Hz(0-99.9Hz), 1Hz(100-200Hz)
Analogic	0.1Hz/ 60Hz
Acceleration/deceleration	0.1 - 999 sec.
	Acceleration and deceleration set individually
Operating system	Two mode selection: forward run by FWD input, Reverse run by REV input Run by FWD input, forward/reverse command by REV input
Stopping system	Selectable either ramp down or coast to stop
DC braking	DC brake starting frequency 1-10Hz DC braking level 0-20%, DC braking time 0-25.5s
Frequency limit	Upper limit (1-200Hz), lower limit (0-200Hz)
Other functions	Auto re-start, Auto reset, Flying start, Jog Slow speeds

#### I/O configuration

Operation panel	3 digits, 7 segment display with 5 operation keys
Sequence input	Four digital inputs (2 are programmable)
Sequence output	One programmable relay output
Frequency setting input	One analogue either 0-10V, 4-20mA or 0-20mA configurable
Source for potentiometer	10VDC source for 2-10kΩ potentiometer
Analogue outputs	0-10VDC for frequency output display

#### Protection features




Prevention	Overcurrent limitation, Overvoltage limitation, Stall prevention
Trip	Overload, Overvoltage, Undervoltage, Overcurrent, Powerloss, Output short-circuit, Grounding fault, Overtemperature
Fault history	The last three faults are recorded

#### Operating environment

Installation	Indoor, with atmosphere free from corrosive or explosive gases, dust, steam or oil mist.
Protection degree	IP20 and IP65
Temperature range	from -10 to 50 °C
Relative humidity	0-95% without condensation
Vibrations	Under 1G (9.8 m/s <sup>2</sup> )
Standards	cUL, CE



1 phase and 3 phase speed drives

Input voltage		Input power kVA	Output current A	Max. motor power kW (1)	Cooling convection	Losses W	Protection degree	Cat. no.	Ref. no.	Pack
+ 10%, -15%, 50/60 Hz (± 5%)										
	1ph 200V - 240V	0.53	1.4	0.2	natural	21	IP20	U20N0K2S	167075	1
		0.88	2.3	0.4	forced	38	IP20	U20N0K4S	167076	1
		1.6	4.2	0.75	forced	60	IP20	U20N0K7S	167077	1
	1ph / 3ph 200V - 240V	2.9	7.5	1.5	forced	103	IP20	U20N1K5S (2)	167078	1
		4.0	10.5	2.2	forced	149	IP20	U20N2K2S (2)	167079	1
	3ph 380V - 480V	1.6	2.3	0.75	forced	61	IP20	U20X0K7S (2)	167080	1
		2.9	3.8	1.5	forced	79	IP20	U20X1K5S (2)	167081	1
		4.0	5.2	2.2	forced	94	IP20	U20X2K2S (2)	167082	1
	1ph 200V - 240V	0.53	1.4	0.2	natural	21	IP65	U20N0K2P (3)	167088	1
		0.88	2.3	0.4	natural	38	IP65	U20N0K4P (3)	167089	1
		1.6	4.2	0.75	natural	60	IP65	U20N0K7P (3)	167090	1
	1ph / 3ph 200V - 240V	0.53	1.4	0.2	natural	21	IP65	U20N0K2PS (4)	167132	1
		0.88	2.3	0.4	natural	38	IP65	U20N0K4PS (4)	167133	1
		1.6	4.2	0.75	natural	60	IP65	U20N0K7PS (4)	167134	1
		2.9	7.5	1.5	natural	103	IP65	U20N1K5P (3)	167091	1
		4.0	10.5	2.2	natural	149	IP65	U20N2K2P (3)	167092	1
		2.9	7.5	1.5	natural	103	IP65	U20N1K5PS (4)	167135	1
	3ph 380V - 480V	4.0	10.5	2.2	natural	149	IP65	U20N2K2PS (4)	167136	1
		1.6	2.3	0.75	natural	61	IP65	U20X0K7P (3)	167093	1
		2.9	3.8	1.5	natural	79	IP65	U20X1K5P (3)	167094	1
4.0		5.2	2.2	natural	94	IP65	U20X2K2P (3)	167095	1	
1.6		2.3	0.75	natural	61	IP65	U20X0K7PS (4)	167137	1	
2.9		3.8	1.5	natural	79	IP65	U20X1K5PS (4)	167138	1	
	4.0	5.2	2.2	natural	94	IP65	U20X2K2PS (4)	167139	1	

(1) Ratings for standard tree-pole induction motors with four poles.  
 (2) Units including dynamic braking function. An external braking resistor is needed to perform operation.  
 (3) IP65 models type U20\_\_P include only keypad in the front cover.  
 (4) IP65 models type U20\_\_PS include power switch, forward/reverse switch and potentiometer in the front cover.

Micro AC speed drives

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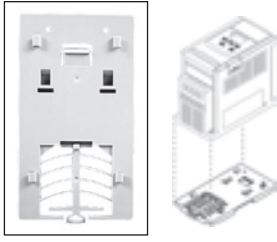
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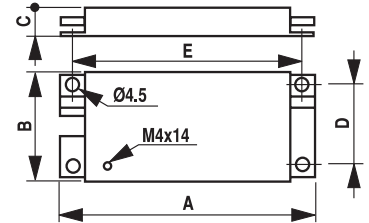
Options and accessories

	DIN rail kit	Applicable to drive	Cat. no.	Ref. no.	Pack
		All drives	U20AR0K7 (pack of 10 pieces)	167087	1

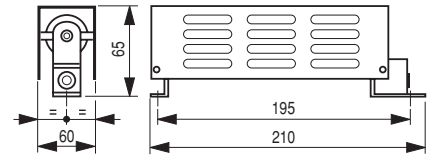
	EMC filters	U20N0K2S	U20AF0K7	167085	1
		U20N0K4S			
		U20N0K7S			
		U20N1K5S	U20AF2K2	167086	1
U20N2K2S					
U20X0K7S	U20AF2K2X	167084	1		
U20X1K5S					
U20X2K2S					

VAT 20 includes as standard a Class A EMC filter, for industrial environment.  
For residential environment, the use of external Class B EMC foot print filter is recommended.

Cat. No.	A	B	C	D	E
U20AF0K7	156	76	25	60	145
U20AF2K2	170	221	38	108	156
U20AF2K2X	170	221	38	108	156



<p>Braking resistors</p> <p>100% braking torque, 10% ED</p>	Motor (kW)	Applicable to drive	Cat. no.	Ref. no.	Pack
	1.5	U20N1K5	TLR100P200	108223	1
	2.2	U20N2K2	TLR75P200	116300	1
	0.75	U20X0K7	TLR750P200	116301	1
	1.5	U20X1K5	TLR400P200	116302	1
	2.2	U20X2K2	TLR250P200	108227	1



<p>Reactors</p>	Input reactors for single phase drives	Losses (W)	Applicable to drive	Cat. no.	Ref. no.	Pack
		2.5	U20N0K2S	ACRP3A7H0	168490	1
		5	U20N0K4S	ACRP8A2H5	168491	1
		7	U20N0K7S	ACRP12A2H5	168492	1
		7.5	U20N1K5S	ACRP18A1H3	168493	1
		8	U20N2K2S	ACRP22A0H84	168494	1
	Input reactors for three phase drives	11	U20N1K5S	ACRP6A2H5	168496	1
		14	U20N2K2S	ACRP9A1H3	168497	1
		8	U20X0K7S	ACRP3A8H1	168509	1
		9	U20X1K5S	ACRP4A5H1	168510	1
		11	U20X2K2S	ACRP6A3H4	168511	1

Cat.No.	Losses W	Fig.	A	B	C	D	E	Ø	Weight (kg)
ACRP3A7H0	2.4	4	75	96	85	80	56	6	1.3
ACRP8A2H5	5.2	4	75	96	100	80	56	6	1.8
ACRP12A2H5	6.8	4	84	102	110	86	65	6	2.7
ACRP18A1H3	7.3	4	96	112	106	96	77	6	3.2
ACRP22A0H84	8	4	96	112	116	96	77	6	3.7
ACRP6A2H5	17	1	120	80	152	41	100	6	1.5
ACRP9A1H3	18	1	120	80	152	41	100	6	1.6
ACRP3A8H1	17	1	120	80	152	41	100	6	1.4
ACRP4A5H1	16	1	120	80	152	41	100	6	1.5
ACRP6A3H4	19	1	120	80	152	41	100	6	1.7

Fig. 4

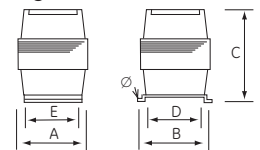
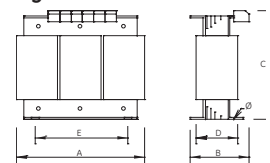


Fig. 1



Dimensions in mm



## I/O terminal board specifications

### Digital inputs

Symbol	Description	Function
12V	Common digital inputs	12V DC supply for all digital inputs
FWD	Forward run	Used for forward run command
REV	Reverse run	Used for reverse run command
SP1	Multifunction input	This is a programmable digital input Either jog, slow speed, emergency stop, output shut off or reset function are allowed
RST	Fault reset	This is a programmable input set to reset function as default Either jog, slow speed, emergency and output shut off are allowed as well

### Digital outputs

Trip relay	Multifunction output	This is a programmable output relay set to fault function as default
1, 2		Run status and frequency reached are allowed as well

### Analogue inputs

MVI	Frequency setting	Programmable analogue frequency signal input 0-10V, 4-20mA or 0-20mA allowed
0V	Common analogue I/O	

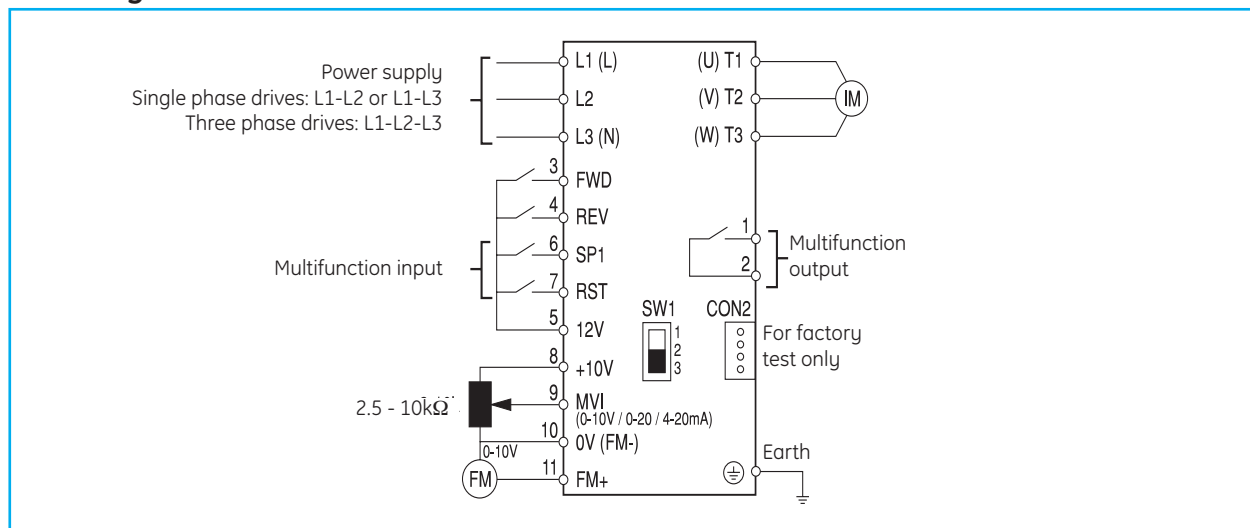
### Analogue outputs

FM	Frequency output	Analogue output 0-10V. May be used as speed meter
0V	Common analogue I/O	

### Other

+10V	10V DC source	10V DC power supply for potentiometer 2-10KΩ (2W)
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### I/O wiring



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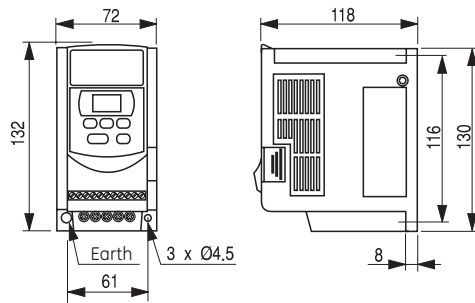
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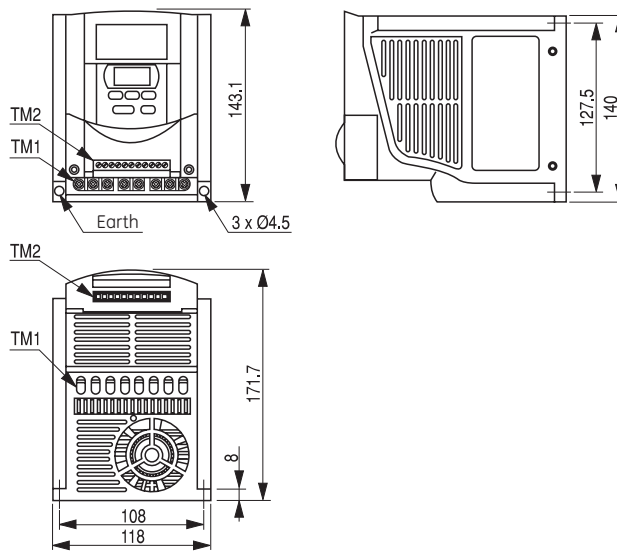
## Dimensional drawings

### Protection IP20



Cat. no.	Ref. no.	Weight (kg)
U20N0K2S	167075	0.76
U20N0K4S	167076	0.77
U20N0K7S	167077	0.8

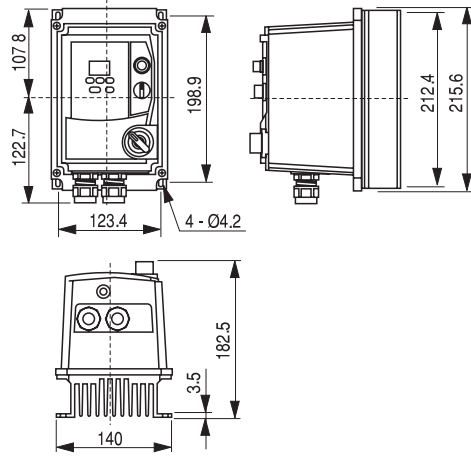
Dimensions in mm



Cat. no.	Ref. no.	Weight (kg)
U20N1K5S	167078	1.66
U20N2K2S	167079	1.76
U20X0K7S	167080	1.60
U20X1K5S	167081	1.60
U20X2K2S	167082	1.63

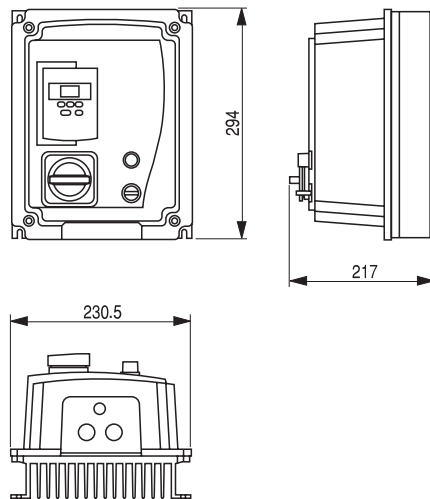
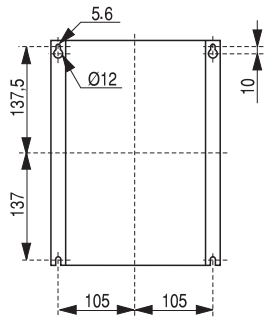
Dimensions in mm

Protection IP65



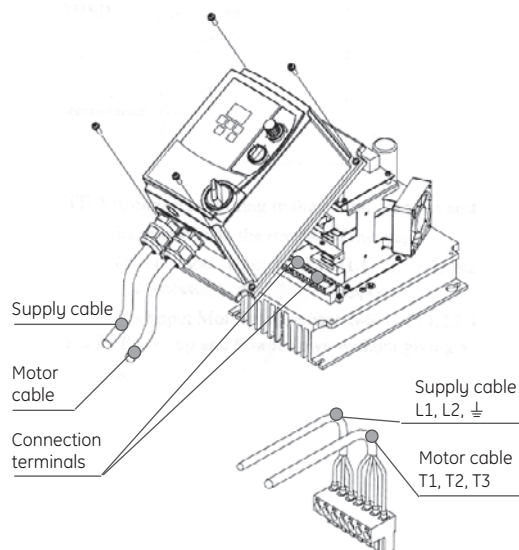
Cat. no.	Ref. no.	Weight (kg)
U20N0K2P	167088	2.9
U20N0K4P	167089	2.9
U20N0K7P	167090	2.9
U20N0K2PS	167132	2.9
U20N0K4PS	167133	2.9
U20N0K7PS	167134	2.9

Dimensions in mm



Cat. no.	Ref. no.	Weight (kg)
U20N1K5P	167091	4.8
U20N2K2P	167092	4.9
U20X0K7P	167093	4.9
U20X1K5P	167094	4.9
U20X2K2P	167095	4.9
U20N1K5PS	167135	5.2
U20N2K2PS	167136	5.3
U20X0K7PS	167137	5.2
U20X1K5PS	167138	5.2
U20X2K2PS	167139	5.2

Dimensions in mm







### Mini AC variable speed drives

The VAT200 is a well performed, sensorless vector VSD for AC standard motors available in the following ranges:

- From 0.4 to 2.2 kW at 200V, single phase power supply
- From 0.4 to 7.5 kW at 200V, three phase power supply
- From 0.75 to 55 kW at 400V, three phase power supply

### Advantages

- Compact size
- Built-in removable LED keypad
- Optional multilanguage LCD keypad
- Sensorless vector control or V/f control, selectable
- Built-in with ModBus RTU communications
- Optional Field bus communication DeviceNet, ProfibusDP
- Integrated EMC filters for U20...FS series
- Built-in with dynamic braking up to 15kW
- Performed with simple PLC and PID functions
- Easy start-up & tuning by PC or keypad
- Advanced programming and drive control by built-in PLC function
- Easy maintenance

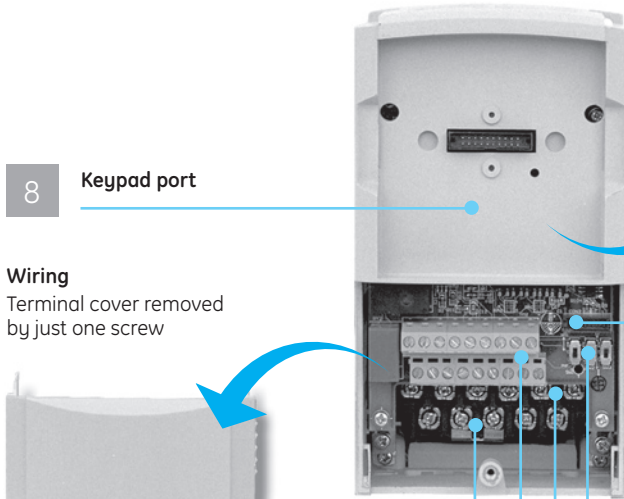
### Approvals



### Simple and reliable

**Removable keypad**  
 - LED keypad as standard  
 - LCD keypad as option

1



8 Keypad port

7 Wiring  
 Terminal cover removed by just one screw



Serial port  
 For copy unit and communications

2

Configuration switches  
 - For analogue I/O  
 - For PNP/NPN digital input selection

3

I/O terminals  
 Supply and motor

4

I/O terminals  
 Control





5

I/O terminal  
 DC reactor




6



1 phase and 3 phase speed drives

Input voltage + 10%, -15%, 50/60 Hz (± 5%)		Suitable motor capacity (kW)	Rated output de current (A)	Rated capacity (KVA)	Frame	Cat. no.	Ref. no.	Pack.	
 Frame 1	1ph 200V - 240V	<b>With EMC filter</b>							
		0.4	3.1	1.2	1	U201N00K4FS	167400	1	
		0.75	4.5	1.7	1	U201N00K7FS	167401	1	
		1.5	7.5	2.9	2	U201N01K5FS	167402	1	
		2.2	10.5	4.0	2	U201N02K2FS	167403	1	
		<b>Without EMC filter</b>							
	200V - 240V	0.4	3.1	1.2	1	U201N00K4SS	167411	1	
		0.75	4.5	1.7	1	U201N00K7SS	167412	1	
		1.5	7.5	2.9	2	U201N01K5SS	167413	1	
		2.2	10.5	4.0	2	U201N02K2SS	167414	1	
		<b>Without EMC filter</b>							
		 Frame 2	3ph 200V - 240V	<b>Without EMC filter</b>					
0.4	3.1			1.2	1	U203N00K4SS	167415	1	
0.75	4.5			1.7	1	U203N00K7SS	167416	1	
1.5	7.5			2.9	1	U203N01K5SS	167417	1	
2.2	10.5			4	2	U203N02K2SS	167418	1	
3.7	17.5			6.7	2	U203N04K0SS	167419	1	
380V - 480V	5.5		26	9.9	3	U203N05K5SS	167420	1	
	7.5		35	13.3	3	U203N07K5SS	167422	1	
	<b>With EMC filter</b>								
	0.75		2.3	1.7	1	U203X00K7FS	167404	1	
	1.5		3.8	2.9	1	U203X01K5FS	167405	1	
	2.2		5.2	4	2	U203X02K2FS	167406	1	
 Frame 3	3ph 380V - 480V	3.7	8.8	6.7	2	U203X04K0FS	167407	1	
		5.5	13	9.9	3	U203X05K5FS	167408	1	
		7.5	17.5	13.3	3	U203X07K5FS	167409	1	
		11	25	19.1	3	U203X11K0FS	167410	1	
		<b>Without EMC filter</b>							
		0.75	2.3	1.7	1	U203X00K7SS	167424	1	
	 Frame 4	3ph 380V - 480V	1.5	3.8	2.9	1	U203X01K5SS	167425	1
			2.2	5.2	4	2	U203X02K2SS	167426	1
			3.7	8.8	6.7	2	U203X04K0SS	167427	1
			5.5	13	9.9	3	U203X05K5SS	167428	1
			7.5	17.5	13.3	3	U203X07K5SS	167429	1
			11	25	19.1	3	U203X11K0SS	167430	1
380V - 480V		15	32	27.4	4	U203X15K0SS	167481	1	
		18.5	40	34	4	U203X18K5SS	167482	1	
		22	48	41	4	U203X22K0SS	167483	1	
		30	64	54	5	U203X30K0SS	167484	1	
		37	80	68	5	U203X37K0SS	167485	1	
		45	96	82	6	U203X45K0SS	167486	1	
55	128	110	6	U203X55K0SS	167487	1			

Accessories

Description	Details	Cat. no.	Ref. no.	Pack.
 U200ARS485 / 167435	External dynamic braking unit	U200ABU430	167468	1
 U200ARS232 / 167436	Communication interface	Profibus-DP	U200APB	167433
		DeviceNet	U200ADN	167434
		RS485	U200ARS485	167435
		RS232 for PC to drive	U200ARS232	167436
 U200AMP / 167437	NEMA1 boxes	For frame 1 drives	U200AN101	167446
		For frame 2 drives	U200AN102	167447
		For frame 3 drives	U200AN103	167448
Memory pack	Program copy	U200AMP	167437	1
Keypad	LED <sup>(1)</sup>	U200ALEDK	167438	1
	LCD multilanguage	U200ALCDK	167439	1
	Blank cover	U200ABK	167440	1
Remote wire for keypad	0.5m	U200AW05	167441	1
	1.0m	U200AW10	167442	1
	2.0m	U200AW20	167443	1
	3.0m	U200AW30	167444	1
	5.0m	U200AW50	167445	1

(1) All VAT200 include a LED keypad U200ALEDK as standard.



## Technical data

### General specifications

		1ph 200-240V (with / without EMC filter)				3ph 200-240V (without EMC filter)						
		U 2 0 1 N _ _ _ _ S				U 2 0 3 N _ _ _ _ S S						
		00K4	00K7	01K5	02K2	00K4	00K7	01K5	02K2	04K0	05K5	07K5
Motor ratings	(HP)	0.5	1	2	3	0.5	1	2	3	5.5	7.5	10
	(kW)	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5
Rated output current	(A)	3.1	4.5	7.5	10.5	3.1	4.5	7.5	10.5	17.5	26	35
Rated capacity	(kVA)	1.2	1.7	2.9	4	1.2	1.7	2.9	4	6.7	9.9	13.3
Max. input voltage		Single phase: 200-240V +10 -15%, 50/60Hz ±5%				Three phase: 380-480V, +10 -15%, 50/60Hz ±5%						
Max. output voltage		Three phase: 0 - 240V				Three phase: 0 - 240V						
Input current	(A)	8.5	12	19	27	4.5	6.5	11	15.4	20	29	40

		3ph 380-480V (with / without EMC filter)							3ph 380-480V (without EMC filter)						
		U 2 0 3 X _ _ _ _ S							U 2 0 3 X _ _ _ _ S S						
		00K7	01K5	02K2	04K0	05K5	07K5	11K0	15K0	18K5	22K0	30K0	37K0	45K0	55K0
Motor ratings	(HP)	1	2	3	5.5	7.5	10	15	20	25	30	40	50	60	75
	(kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Rated output current	(A)	2.3	3.8	5.2	8.8	13	17.5	25	32	40	48	64	80	96	128
Rated capacity	(kVA)	1.7	2.9	4	6.7	9.9	13.3	19.1	27.4	34	41	54	68	82	110
Max. input voltage		Three phase: 380-480V, +10 -15%, 50/60Hz ±5%							Three phase: 380-480V, +10 -15%, 50/60Hz ±5%						
Max. output voltage		Three phase: 0 - 480V							Three phase: 0 - 480V						
Input current	(A)	4.2	5.6	7.3	11.6	17	23	31	38	48	56	75	92	112	142

### Frequency control

Control mode	V / f or sensorless vector control
Range	0,1 to 650,0Hz
Starting torque	150% / 1Hz (sensorless vector)
Speed control range	1 : 50 (sensorless vector)
Speed control accuracy	±0,5% (sensorless vector)
Setting resolution	Digital : 0,01 Hz Analogue: 0,06Hz / 60Hz (10 bits)
Keypad setting	Set directly by $\Delta$ $\nabla$ keys or by potentiometer on the keypad
Display function	Four digital LED (or 2x16 LCD) and status indicator; display frequency / speed / line speed / DC voltage / output voltage / current / rotation direction / inverter parameter / trouble log / program version
Frequency setting	1. External potentiometer 0-5V / 0-10V / 4-20mA / 5-0V / 10-0V / 20-4mA 2. Performs up/down controls, speed control or automatic procedure control with multifunctional contacts on the terminal block (TM2)
Frequency limit function	Respectively setting upper/lower frequency limits and three-stage skip frequencies

### Control

Carrier frequency	2 to 16kHz
V / F pattern	18 fixable patterns, 1 programmable pattern
Acc./Dec. control	Two-stage Acc./Dec. time (0,1 to 3,600 seconds) and two-stage S curve
Multifunctional analog output	5 different functions
Multifunctional input	Assigned to 28 different functions
Multifunctional output	Assigned to 15 different functions
Digital input signal	NPN / PNP toggle
Other functions	Momentary power loss restart, Speed search, Overload detection, Torque detection, 8 preset speeds, Acc./Dec. switch (2 stages), S curve, 3-wire control, PID control, Torque boost, Slip compensation, Frequency upper/lower limit, Auto energy saving, Modbus slave and control link, Abnormal restart, Sequence control, Built-in simple PLC function



## Technical data (continued)

### Others

Communication control	Control by RS232 or RS485
	One to one or multilink up to 254 stations (RS485 only)
	Can be set Baud rate, Stop bit and Parity bit
Braking torque	About 100% with braking resistor (20% without braking resistor)
Operation temperature	-10 to +50°C
Storage temperature	-20 to +60°C
Humidity	0 to 95% relative humidity (without condensation)
Vibration	1G (9,8m/S <sup>2</sup> )
EMC	Comply with requirement EN 61800-3 with optional filter
LVD	Comply with requirement EN 50178
Enclosure	IP20 (NEMA 1 by external box attached)
Safety level	UL 508C

### Protective functions

Overload protection	Inverse characteristic overload protection. Max. 150% inverter current rating / 60 sec.
Fuse protection	The motor stops after FUSE melt
Overvoltage	<b>200V class:</b> DC voltage > 410V <b>400V class:</b> DC voltage > 820V
Undervoltage	<b>200V class:</b> DC voltage < 190V <b>400V class:</b> DC voltage < 380V
Momentary power loss restart	Restart after more than 15ms-power loss possible. Programmed up to 2 sec.
Stall prevention	Stall prevention for Acceleration / Deceleration / Operation
Short-circuit output terminal	Electronic circuit protection
Grounding fault	Electronic circuit protection
Other protections	Heatsink overtemperature, overtorque detection, error contact control, reverse run restriction, restrictions for direct start after power up, error recovery and parameter lock out

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I/O Power & control layout

Speed drive units

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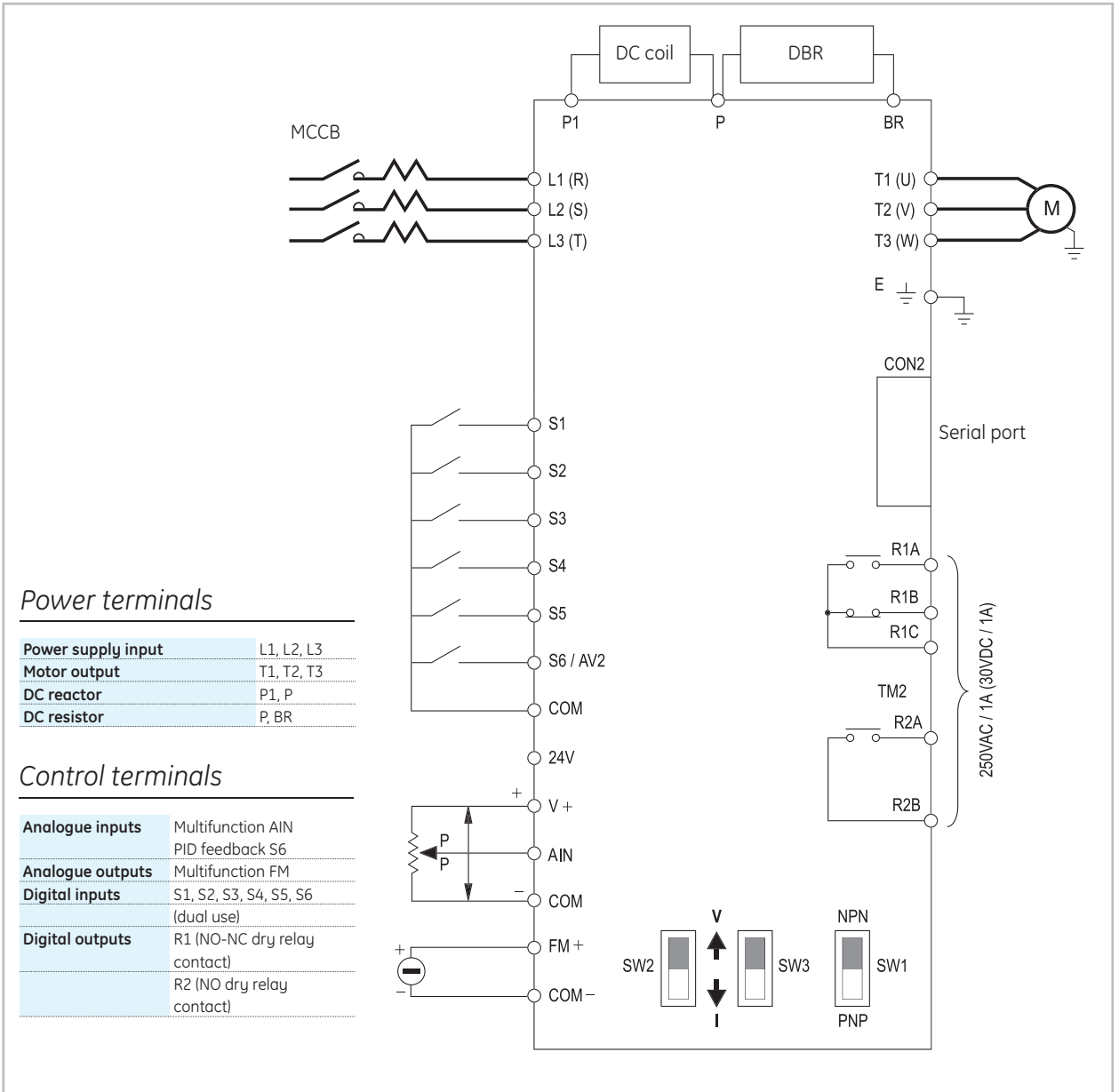
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I/O Control terminal description

Symbol	Description
R2A	Multifunctional terminals - Normally Open
R2B	Multifunctional terminals - Normally Open
R1C	Common contact
R1B	Normally Closed contact
R1A	Normally Open contact
10V	Frequency knob (VR) power source terminal
AIN	Analogue frequency signal input terminal
24V	Common source for S1 to S5 in PNP input. Selectable by switch on main PCB
COM	Common terminal for S1 to S5 in NPN input. Selectable by switch on main PCB
FM +	Multifunction analog output, 0-10V DC
S1	Multifunction input terminals
S2	
S3	
S4	
S5	
S6 / AV2	Digital input or PID input terminal (selectable)



External accessories

	VAT200	Losses W	AC reactors		DC reactors		Encapsulated resistor		Tubular resistors			
1ph 200-240V	U201N00K4FS	167400	32	ACRP8A2H5	168491	DCR4A5H7	168387	ERN00K7	129148	TLR200P200	129165	
	With EMC filter	U201N00K7FS	167401	50	ACRP12A2H5	168492	DCR6A3H9	168388	ERN00K7	129148	TLR200P200	129165
	U201N01K5FS	167402	85	ACRP18A1H3	168493	DCR9A2H4	168389	ERN01K5	129149	TLR100P200	108223	
	U201N02K2FS	167403	157	ACRP22A0H84	168494	DCR12A1H7	168390	ERN02K2	129150	TLR75P200	116300	
	Without EMC filter	U201N00K4SS	167411	28	ACRP8A2H5	168491	DCR4A5H7	168387	ERN00K7	129148	TLR200P200	129165
	U201N00K7SS	167412	45	ACRP12A2H5	168492	DCR6A3H9	168388	ERN00K7	129148	TLR200P200	129165	
	U201N01K5SS	167413	77	ACRP18A1H3	168493	DCR9A2H4	168389	ERN01K5	129149	TLR100P200	108223	
U201N02K2SS	167414	142	ACRP22A0H84	168494	DCR12A1H7	168390	ERN02K2	129150	TLR75P200	116300		
3ph 200-240V	U203N00K4SS	167415	28	ACRP4A2H5	168495	DCR4A5H7	168387	ERN00K7	129148	TLR200P200	129165	
	Without EMC filter	U203N00K7SS	167416	44	ACRP6A2H5	168496	DCR6A3H9	168388	ERN00K7	129148	TLR200P200	129165
	U203N01K5SS	167417	74	ACRP9A1H3	168497	DCR9A2H4	168389	ERN01K5	129149	TLR100P200	108223	
	U203N02K2SS	167418	140	ACRP12A0H84	168498	DCR12A1H7	168390	ERN02K2	129150	TLR75P200	116300	
	U203N04K0SS	167419	247	ACRP18A0H56	168499	DCR18A1H0	168391	ERN04K0	129151	TLR44P600	129166	
	U203N05K5SS	167420	274	ACRP27A0H37	168500	DCRP32A0H78	168542	ERN05K5	129152	TLR29P600	129167	
	U203N07K5SS	167422	372	ACRP35A0H27	168501	DCRP45A0H55	168543	ERN07K5	129153	TLR22P600	129168	
3ph 380-480V	U203X00K7FS	167404	45	ACRP3A8H1	168509	DCR3A15H2	168392	ERX00K7	129154	TLR750P200	116301	
	With EMC filter	U203X01K5FS	167405	69	ACRP4A5H1	168510	DCR4A9H2	168393	ERX01K5	129155	TLR400P200	116302
	U203X02K2FS	167406	137	ACRP6A3H4	168511	DCR6A6H8	168394	ERX02K2	129156	TLR240P200	108227	
	U203X04K0FS	167407	231	ACRP10A2H	168512	DCR9A4H0	168395	ERX04K0	129157	TLR175P600	129173	
	U203X05K5FS	167408	361	ACRP14A1H4	168513	DCRP18A2H9	168555	ERX05K5	129158	TLR118P600	129174	
	U203X07K5FS	167409	446	ACRP18A1H1	168514	DCRP25A2H1	168556	ERX07K5	129159	TLR86P600	129175	
	Without EMC filter	U203X11K0FS	167410	656	ACRP27A0H75	168515	DCRP32A1H6	168557	-	-	TLR43P1000	129177
	U203X00K7SS	167424	40	ACRP3A8H1	168509	DCR3A15H2	168392	ERX00K7	129154	TLR750P200	116301	
	U203X01K5SS	167425	62	ACRP4A5H1	168510	DCR4A9H2	168393	ERX01K5	129155	TLR400P200	116302	
	U203X02K2SS	167426	123	ACRP6A3H4	168511	DCR6A6H8	168394	ERX02K2	129156	TLR240P200	108227	
	U203X04K0SS	167427	208	ACRP10A2H	168512	DCR9A4H0	168395	ERX04K0	129157	TLR175P600	129173	
	U203X05K5SS	167428	325	ACRP14A1H4	168513	DCRP18A2H9	168555	ERX05K5	129158	TLR118P600	129174	
	U203X07K5SS	167429	402	ACRP18A1H1	168514	DCRP25A2H1	168556	ERX07K5	129159	TLR86P600	129175	
	U203X11K0SS	167430	591	ACRP27A0H75	168515	DCRP32A1H6	168557	-	-	TLR43P1000	129177	
	U203X15K0SS	167481	1051	ACRP35A0H58	168516	-	-	-	-	TLR43P1000	129177	
	U203X18K0SS <sup>(1)</sup>	167482	1218	ACRP38A0H58	168517	-	-	-	-	TLR35P1500	129877	
	U203X22K0SS <sup>(1)</sup>	167483	1449	ACRP45A0H45	168518	-	-	-	-	TLR29P1800	129878	
	U203X30K0SS <sup>(1)</sup>	167484	1608	ACRP70A0H29	168519	included	-	-	-	TLR22P2500	129879	
	U203X37K0SS <sup>(2)</sup>	167485	1993	ACRP90A0H22	168520	included	-	-	-	TLR35P1500 <sup>(3)</sup>	129877	
	U203X45K0SS <sup>(2)</sup>	167486	2270	ACRP115A0H18	168521	included	-	-	-	TLR29P1800 <sup>(3)</sup>	129878	
U203X55K0SS <sup>(2)</sup>	167487	2957	ACRP160A0H14	168522	included	-	-	-	TLR22P2500 <sup>(3)</sup>	129879		

(1) (2) Drives 18.5kW and above do not built dynamic braking. In case this is needed, use external braking unit U200ABU430.  
 (2) (3) Dynamic braking for drives 45kW, 55kW may need the use of two sets of braking units U200ABU430 in parallel with two sets of braking resistors (one resistor per braking unit).

Mini speed drives

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## EMC compliance

Drives with built-in filter type U20...FS, comply with EN 618000-3 second environment.

To comply with first environment restricted sector, or to allow EMC compliance to U20...SS drives, an external filter has to be used according following table

Speed drive units

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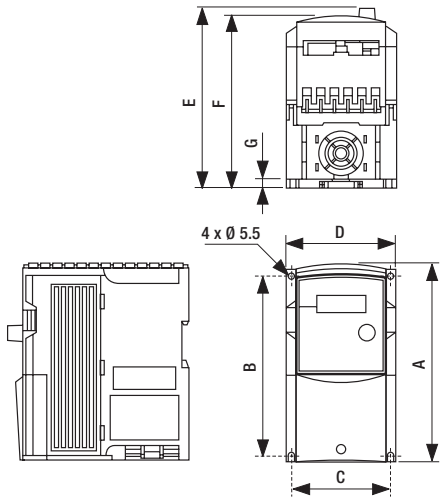
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		VAT200		Second environment		First environment	
Speed drive units	1ph 200-240V	With EMC filter	U201N00K4FS	167400	Not needed	U200F611TA1	167453
			U201N00K7FS	167401	Not needed	U200F611TA1	167453
			U201N01K5FS	167402	Not needed	U200F627TA2	167454
		Without EMC filter	U201N02K2FS	167403	Not needed	U200F627TA2	167454
			U201N00K4SS	167411	U200F611TA1	167453	
			U201N00K7SS	167412	U200F611TA1	167453	
	U201N01K5SS	167413	U200F627TA2	167454			
	U201N02K2SS	167414	U200F627TA2	167454			
	3ph 200-240V	Without EMC filter	U203N00K4SS	167415	U200F709TA1	167456	
			U203N00K7SS	167416	U200F709TA1	167456	
			U203N01K5SS	167417	U200F709TA1	167456	
			U203N02K2SS	167418	U200F719TA2	167457	
			U203N04K0SS	167419	U200F719TA2	167457	
			U203N05K5SS	167420	U200F739TA3	167458	
U203N07K5SS			167422	U200F739TA3	167458		
3ph 380-480V			With EMC filter	U203X00K7FS	167404	Not needed	U200F905TA1
	U203X01K5FS	167405		Not needed	U200F905TA1	167459	
	U203X02K2FS	167406		Not needed	U200F910TA2	167460	
	U203X04K0FS	167407		Not needed	U200F910TA2	167460	
	U203X05K5FS	167408		Not needed	U200F928TA3	167461	
	U203X07K5FS	167409		Not needed	U200F928TA3	167461	
	Without EMC filter	U203X11K0FS	167410	Not needed	U200F928TA3	167461	
		U203X00K7SS	167424	U200F905TA1	167459		
		U203X01K5SS	167425	U200F905TA1	167459		
		U203X02K2SS	167426	U200F910TA2	167460		
		U203X04K0SS	167427	U200F910TA2	167460		
		U203X05K5SS	167428	U200F928TA3	167461		
		U203X07K5SS	167429	U200F928TA3	167461		
		U203X11K0SS	167430	U200F928TA3	167461		
		U203X15K0SS	167481	U200F34048SMA	167474		
		U203X18K0SS	167482	U200F370A	167475		
		U203X22K0SS	167483	U200F370A	167475		
		U203X30K0SS	167484	U200F3100A	167476		
		U203X37K0SS	167485	U200F3100A	167476		
		U203X45K0SS	167486	U200F3150A	167477		
U203X55K0SS	167487	U200F3180A	167478				

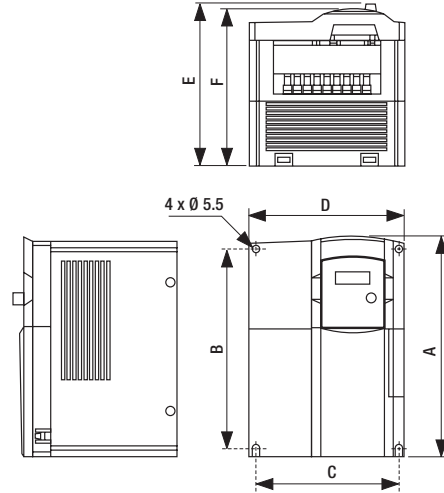


## Dimensions

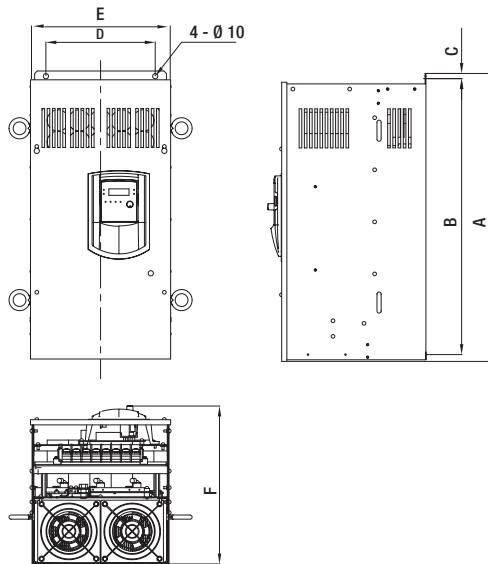
### Speed drive



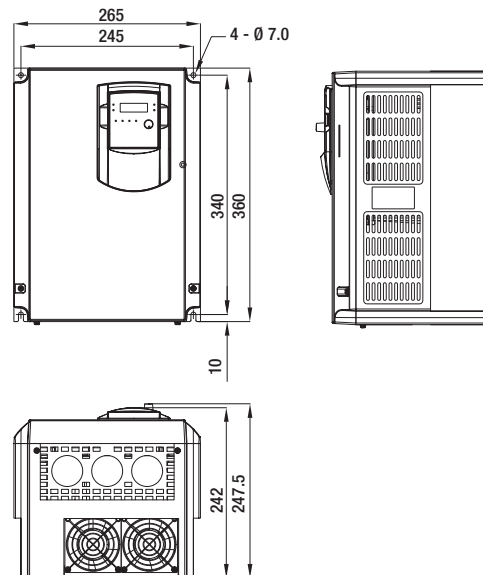
Series	Weight (kg)		Dimensions (mm)						
	SS	FS	A	B	C	D	E	F	G
U201N00K4..	1.2	1.3	163	150	78	90	147	141	7
U201N00K7..	1.2	1.3							
U203N00K4..	1.2	-							
U203N00K7..	1.2	-							
U203N01K5..	1.2	-							
U203X00K7..	1.2	1.3							
U203X01K5..	1.2	1.3							
U201N01K5..	1.5	1.8	187	170.5	114.5	128	148	142	7
U201N02K2..	1.9	2.3							
U203N02K2..	1.75	-							
U203N04K0..	1.9	-							
U203X02K2..	1.8	2.2							
U203X04K0..	1.9	2.3							



Series	Weight (kg)		Dimensions (mm)					
	SS	FS	A	B	C	D	E	F
U203N05K5..	5.6	-	260	244	173	186	195	188
U203N07K5..	5.6	-						
U203X05K5..	5.6	6.6						
U203X07K5..	5.6	6.6						
U203X11K0..	5.6	6.6						



Series	Weight (kg)	Dimensions (mm)					
		A	B	C	D	E	F
U203X30K0SS	33	553	530	10	210	269	303
U203X37K0SS	33	553	530	10	210	269	303
U203X45K0SS	50	653	630	10	250	308	308
U203X55K0SS	50	653	630	10	250	308	308



Series	Weight (kg)
U203X15K0SS	15
U203X18K5SS	15
U203X22K0SS	15

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Dimensions (continued)

Braking resistor

		A	B	C	D	E
ERN00K7	129148	115	80	175	40	20
ERX00K7	219154					
ERN01K5	129149	215	200	175	40	20
ERX01K5	129155					
ERN02K2	129150	165	150	125	60	30
ERX02K2	129156					
ERN04K0	129151	215	200	175	60	30
ERX04K0	129157					
ERN05K5	129152	335	320	295	60	30
ERN07K5	129153					
ERX05K5	129158					
ERX07K5	129159					

EMC external filter

		Inverter mounting		External filter size			External filter mount.	
		A	B	C	D	E	F	G
U200F611TA1	167453	78	150	91	192	28	74	181
U200F709TA1	167456							
U200F905TA1	167459							
U200F627TA2	167454	114.5	170.5	128	215	37	111	204
U200F719TA2	167457							
U200F910TA2	167460							
U200F739TA3	167458	173	244	188	289	42	165	278
U200F928TA3	167461							

U200F34048SMA 167474

		Dimensions (mm)						
		W	W1	H	H1	D	d	M
U200F370A	167475	93	79	312	298	190	7	M6
U200F3100A	167476	93	79	312	298	190	7	M6
U200F3150A	167477	126	112	312	298	224	7	M6
U200F3180A	167478	126	112	312	298	224	7	M6

External dynamic braking unit

		Weight (kg)
U200ABU430	167468	2.3

Dimensions (continued)

AC Input reactors

Mini speed drives

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Fig. 1

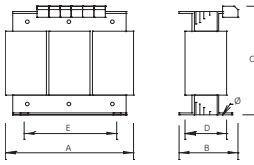


Fig. 3

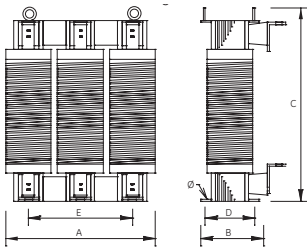
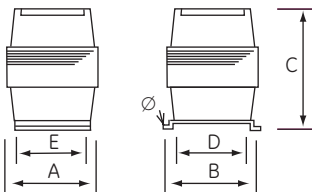


Fig. 4



Cat. No.	Ref.No.	Losses W	Fig.	Dimensions (mm)						Weight (kg)
				A	B	C	D	E	Ø	
ACRP8A2H5	168491	5.2	4	75	96	100	80	56	6	1.8
ACRP12A2H5	168492	6.8	4	84	102	110	86	65	6	2.7
ACRP18A1H3	168493	7.3	4	96	112	106	96	77	6	3.2
ACRP22A0H84	168494	8	4	96	112	116	96	77	6	3.7
ACRP4A2H5	168495	16	1	120	80	152	41	100	6	1.3
ACRP6A2H5	168496	18	1	120	80	152	41	100	6	1.5
ACRP9A1H3	168497	17	1	120	80	152	41	100	6	1.6
ACRP12A0H84	168498	18	1	120	80	152	41	100	6	1.7
ACRP18A0H56	168499	21	1	120	90	152	51	100	6	2.4
ACRP27A0H37	168500	32	1	150	95	183	46	125	6	3.3
ACRP35A0H27	168501	35	1	150	95	183	46	125	6	3.7
ACRP3A8H1	168509	17	1	120	80	152	41	100	6	1.4
ACRP4A5H1	168510	16	1	120	80	152	41	100	6	1.5
ACRP6A3H4	168511	19	1	120	80	152	41	100	6	1.7
ACRP10A2H	168512	23	1	120	90	152	51	100	6	2.5
ACRP14A1H4	168513	29	1	150	95	178	46	125	6	3.2
ACRP18A1H1	168514	35	1	150	95	178	46	125	6	4
ACRP27A0H75	168515	77	1	150	106	233	72	100	9	4.8
ACRP35A0H58	168516	98	1	150	111	233	77	100	9	5.5
ACRP38A0H58	168517	96	1	150	116	233	82	100	9	6.4
ACRP45A0H45	168518	102	1	150	121	233	87	100	9	7.1
ACRP70A0H29	168519	147	1	150	151	250	117	100	9	11
ACRP90A0H22	168520	158	1	180	136	286	102	120	9	13.1
ACRP115A0H18	168521	186	1	180	156	301	122	120	9	16.9
ACRP160A0H14	168522	268	3	240	181	288	107	160	9	25.7

DC reactors

Fig. 2

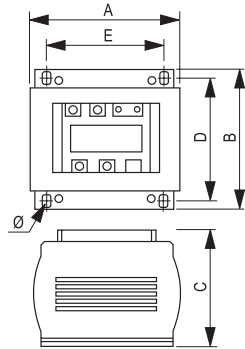
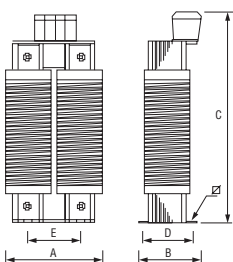


Fig. 5



Cat. No.	Ref.No.	Losses W	Fig.	Dimensions (mm)						Weight (kg)
				A	B	C	D	E	Ø	
DCR4A5H7	168387	4	2	50	97	84	80	34	6	0.78
DCR6A3H9	168388	6	2	50	97	94	80	34	6	0.94
DCR9A2H4	168389	9	2	75	96	95	80	56	6	1.3
DCR12A1H7	168390	15	2	75	96	95	80	56	6	1.3
DCR18A1H0	168391	22	2	75	96	110	80	56	6	1.8
DCR3A15H2	168392	4	2	50	97	94	80	34	6	0.94
DCR4A9H2	168393	4	2	75	96	95	80	56	6	1.3
DCR6A6H8	168394	6	2	75	96	95	80	56	6	1.3
DCR9A4H0	168395	9	2	75	96	95	80	56	6	1.3
DCRP32A0H78	168542	37	5	100	110	173	91	75	6	3.9
DCRP45A0H55	168543	33	5	120	110	203	86	90	6	6.1
DCRP18A2H9	168555	42	5	100	95	178	76	75	6	3.5
DCRP25A2H1	168556	54	5	100	95	183	76	75	6	3.5
DCRP32A1H6	168557	59	5	100	110	183	91	75	6	3.9



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## Approvals

CE Compliance, UL, cUL

## Advanced general purpose AC drive

VAT300 is a new generation of high performance VSD, including latest technology in both software and hardware.

## Features

- The new drive, with smaller foot print than the former generation, covers the power ratings from 0.75kW to 475kW in normal duty, or up to 400kW in heavy duty.
- High starting torque up to 200% or more, can be achieved even using standard induction motors.
- VAT300 is able to drive, not only the standard induction motors, but also the new generation of permanent magnet motors. In both cases, sensorless or close loop control are available.
- As well as satisfying industry requirements, with its advanced and high performance functions, VAT300 is hailed a truly environmentally friendly drive with dedicated energy saving functions and careful selection of components to meet environmental directives.

## Advantages

- **Multimode control - All in one single drive**
  - V/f control for constant torque loads and quadratic loads
  - Vector control, both closed loop and sensorless
  - PM motor control, both closed loop and sensorless
- **Dynamic braking built-in the drive up to 22kW**
- **Advanced features**
  - User programmable built-in PLC
  - Configurable PID control
  - Multi-pump control
- **Communications**
  - ModBus, ProfibusDP, DeviceNet, CANopen, CC-Link
- **Dedicated version drive for lift application - VAT300L**
- **Environmentally friendly design**
  - RoHS Directive compliant
  - High efficiency operation
  - Dioxin-free plastic cases
- **Global design**
  - Meet global standards UL, cUL, CE
  - Multi-language interface

### High performance AC drive

Input Voltage <sup>(1)</sup>	Normal Duty Overload 120%, 60s <sup>(2)</sup>			Heavy Duty Overload 150%, 60s <sup>(3)</sup>			Protection degree	Cat. no. <sup>(4)</sup>	Ref. no.
	Maximum motor power (kW)	Output current (A)	Input power (kVA)	Maximum motor power (kW)	Output current (A)	Input power (kVA)			
<b>With built-in EMC filters</b>									
3ph 380-480V 50/60Hz, +/-5%	0.75	2,5	1,7	0,4	1,5	1,0	IP20	U3SX000K7FBS	129318
	1,5	3,6	2,5	0,75	2,5	1,7	IP20	U3SX001K5FBS	129319
	2,2	5,5	3,8	1,5	3,6	2,5	IP20	U3SX002K2FBS	129320
	3,7	8,6	6,0	2,2	5,5	3,8	IP20	U3SX004K0FBS	129321
	5,5	13	9,0	3,7	8,6	6,0	IP20	U3SX005K5FBS	129322
	7,5	17	12	5,5	13	9,0	IP20	U3SX007K5FBS	129323
	11	23	16	7,5	17	12	IP20	U3SX011K0FBS	129324
	15	31	21	11	23	16	IP20	U3SX015K0FBS	129325
	18,5	37	26	15	31	21	IP20	U3SX018K5FBS	129326
	22	44	30	18,5	37	26	IP20	U3SX022K0FBS	129327
30	60	42	22	44	30	IP20	U3SX030K0FNS	129328	
<b>Without built-in EMC filters</b>									
3ph 380-480V 50/60Hz, +/-5%	0.75	2,5	1,7	0,4	1,5	1,0	IP20	U3SX000K7SBS	129329
	1,5	3,6	2,5	0,75	2,5	1,7	IP20	U3SX001K5SBS	129330
	2,2	5,5	3,8	1,5	3,6	2,5	IP20	U3SX002K2SBS	129331
	3,7	8,6	6,0	2,2	5,5	3,8	IP20	U3SX004K0SBS	129332
	5,5	13	9,0	3,7	8,6	6,0	IP20	U3SX005K5SBS	129333
	7,5	17	12	5,5	13	9,0	IP20	U3SX007K5SBS	129334
	11	23	16	7,5	17	12	IP20	U3SX011K0SBS	129335
	15	31	21	11	23	16	IP20	U3SX015K0SBS	129336
	18,5	37	26	15	31	21	IP20	U3SX018K5SBS	129337
	22	44	30	18,5	37	26	IP20	U3SX022K0SBS	129338
	30	60	42	22	44	30	IP20	U3SX030K0SNS	129339
	37	73	51	30	60	42	IP00	U3SX037K0SNS	129340
	45	87	60	37	73	51	IP00	U3SX045K0SNS	129341
	55	108	75	45	87	60	IP00	U3SX055K0SNS	129342
	75	147	102	55	108	75	IP00	U3SX075K0SNS	129343
	90	179	124	75	147	102	IP00	U3SX090K0SNS	129344
	110	214	148	90	179	124	IP00	U3SX110K0SNS	129345
	132	249	173	110	214	148	IP00	U3SX132K0SNS	129346
	160	321	222	132	249	173	IP00	U3SX160K0SNS	129347
	200	428	297	160	321	222	IP00	U3SX200K0SNS	129348
250	519	360	200	428	297	IP00	U3SX250K0SNS	129349	
315	590	409	250	519	360	IP00	U3SX315K0SNS	129350	
400	740	513	315	590	409	IP00	U3SX400K0SNS	129351	
475	870	603	400	740	513	IP00	U3SX475K0SNS	129352	
<b>With built-in EMC filters</b>									
3ph 200-240V 50/60Hz, +/-5%	0.75	5	1,7	0,4	3	1,0	IP20	U3SN000K7FBS	129300
	1,5	8	2,8	0,75	5	1,7	IP20	U3SN001K5FBS	129301
	2,2	11	3,8	1,5	8	2,8	IP20	U3SN002K2FBS	129302
	3,7	16	5,5	2,2	11	3,8	IP20	U3SN004K0FBS	129303
	5,5	24	8,3	3,7	16	5,5	IP20	U3SN005K5FBS	129304
	<b>Without built-in EMC filters</b>								
3ph 200-240V 50/60Hz, +/-5%	0.75	5	1,7	0,4	3	1,0	IP20	U3SN000K7SBS	129305
	1,5	8	2,8	0,75	5	1,7	IP20	U3SN001K5SBS	129306
	2,2	11	3,8	1,5	8	2,8	IP20	U3SN002K2SBS	129307
	3,7	16	5,5	2,2	11	3,8	IP20	U3SN004K0SBS	129308
	5,5	24	8,3	3,7	16	5,5	IP20	U3SN005K5SBS	129309
	7,5	33	11	5,5	24	8,3	IP20	U3SN007K5SBS	129310
	11	46	16	7,5	33	11	IP20	U3SN011K0SBS	129311
	15	61	21	11	46	16	IP20	U3SN015K0SBS	129312
	18,5	76	26	15	61	21	IP20	U3SN018K5SBS	129313
	22	88	30	18,5	76	26	IP00	U3SN022K0SNS	129314
	30	118	41	22	88	30	IP00	U3SN030K0SNS	129315
	37	146	51	30	118	41	IP00	U3SN037K0SNS	129316
	45	174	60	37	146	51	IP00	U3SN045K0SNS	129317

**(1) Voltage tolerance**

380-480V series: +/-10% up to drive U3SX055K0. For U3SX075K0 and above +5%.  
200-240V series: +/-10% all range.

**(2) Normal duty: 120% for 1 min., 140% for 2.5 seconds**

- Ambient temperature -10 to 50°C. Above 40°C note following deratings:  
For drive U3SN005K0, reduce output current by 2% per 1°C.  
For drives U3SN011K0, U3SX005K5 and U3SX015K0, reduce output current by 1% per 1°C.  
- For carrier frequency above 4kHz, note following deratings:  
For 200-240V series, reduce output current by 3% per kHz.  
For 380-480V series, reduce output current by 5% per kHz.  
Check user manual of VAT300 for additional details.

**(3) Heavy duty: 150% for 1 min., 175% for 2.5 seconds**

- Ambient temperature -10 to 50°C, for all ratings.  
- For carrier frequency above 4kHz, note following deratings.  
For 200-240V series, reduce output current by 3% per kHz.  
For 380-480V series, reduce output current by 3-5% per kHz, depending the unit rating.  
Check user manual of VAT300 for additional details.

**(4) Dynamic braking circuit**

This is included as standard for all drives up to 22kW (400V series), and up to 18.5kW (200V series). Catalogue numbers, up to U3SX022K0 or up to U3SN018K5.

Multimode speed drives

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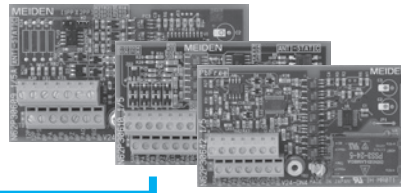
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Optional interfaces and accessories



Speed drive units

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I/O interfaces

Item	Description	Cat. No.	Ref. no.
<b>Encoder interface DN1</b>	For 12VDC, A/B phase, complimentary type encoder	<b>U30V24DN1</b>	129388
<b>Encoder interface DN2</b>	For 5VDC, A/B/Z/S phase, line driver type encoder	<b>U30V24DN2</b>	129389
<b>Encoder interface DN3</b>	For 5VDC, A/B/Z/U/V/W phase encoder, for the PM drive control (pole position). This encoder interface is compatible with the line driver output type encoder	<b>U30V24DN3</b>	129390
<b>Encoder interface DN5</b>	Speed detection interface, compatible with Heidenhain ERN 1387.	<b>U30V24DN5</b>	129391
<b>Encoder interface DN6</b>	1Vpp 2-phase, 2-set sine wave + Z-phase pulse encoders	<b>U30V24DN6</b>	129393
<b>Digital I/O interface</b>	5VDC, A/B phase, complimentary type encoder	<b>U30V24RY0</b>	129394
<b>Analog I/O interface</b>	Additional 4 I + 4 O (relay) interface	<b>U30V24AIO</b>	129396
<b>Analog I/O interface</b>	Insulated 4 channel analog I/O	<b>U30V24AIO</b>	129396

Communication interfaces

<b>ProfibusDP interface</b>	Standard field bus communications interface ProfibusDP	<b>U30V24SL0</b>	129397
<b>CAN-Open interface</b>	Standard field bus communications interface CAN-Open	<b>U30V24SL1</b>	129398
<b>DeviceNet interface</b>	Standard field bus communications interface DeviceNet	<b>U30V24SL2</b>	129399
<b>CC-Link interface</b>	Standard field bus communications interface DeviceNet	<b>U30V24SL3</b>	129400

Other accessories

<b>Extension keypad's cable</b>	For keypad remote mounting (length = 3 meter)	<b>U2KV23W103</b>	168102
<b>LCD keypad</b>	Operator interface LCD	<b>U30V24OP1</b>	129353
<b>LED keypad</b>	Operator interface LED	<b>U30V24OP2</b>	129354



## Technical data

### Ratings

Voltage ratings 200V series (U3SN _) 400V series (U3SX _)	Supply Voltage: 3ph, 200-240VAC, ±10% Supply Voltage: 3ph, 380-480VAC, ±10%(*) (* ) For drives above U3SX055K0 (>55kW), Voltage tolerance is -10%, +5%, over 480VAC	Supply frequency: 50/60Hz, ±5%
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### Frequency control

Control method	All digital control, sine wave approximation PWM	
Carrier frequency	Mono-Sound Mode Soft Sound Mode	1 to 15kHz (0.1kHz increments) Average frequency 2.1 to 5kHz with 3 or 4 tone modulation
Output frequency resolution	0.01Hz	
Frequency setting resolution	Digital Analogue	0.01Hz 0.03% . In respect to maximum frequency
Frequency accuracy	Digital Analogue	±0.01% at 25±10°C ±0.0% at 25±10°C
Output frequency	0-440Hz in V/f control 0-180Hz in vector control for induction motors 0-210Hz in PM mode control, for PM motors	

### Control specifications

V/f control	Standard control for induction motors, with advanced characteristics: - Constant torque, constant output and quadratic characteristics randomly set in range 3-440Hz - High performance torque boost. (Automatic Torque Control)	
Speed control for IM <sup>(1)</sup>	High performance vector control for Induction motors <u>Sensorless</u> <u>Close Loop</u> Control range      1:100      1:1000 Constant output range      Up to 1:2      Up to 1:4 Speed accuracy (Fmax≥50Hz)      ±0.5%      ±0.01% Control response      5Hz      30Hz	
Speed control for PM <sup>(1)</sup>	High performance control for permanent magnet motors <u>Sensorless</u> <u>Close Loop</u> Control range      1:5      1:100 Constant output range      Up to 1:1.5      Up to 1:1.5 Speed accuracy (Fmax≥50Hz)      ±0.01%      ±0.01%	
Automatic tuning	Automatic measurements of motor constants and critical parameters, for all mode control Available for all control modes, V/f, vector control and PM motor control	
Starting torque <sup>(1)</sup>	200% of more, using standard motor, 150% rated current	
Acceleration / deceleration time	0.01 to 60000sec, 11 independent settings Two for standard accel/decel. time, other for jogging, and eight more for program cushion Linear and S-Ramp available	
Operating mode (three selective modes)	- Forward run or reverse run, permanent command by two digital inputs - Run / stop and forward / reverse changeover, permanent command by two digital inputs - RUN / STOP, pulse command by push buttons	
Stop method	Selectable either ramp down to stop or coast to stop - Independent selectable for run/stop, jog, and emergency stop	
Dynamic braking DC braking	Included as standard for all drives up to 22kW (400V series), and up to 18.5kW (200V series) - Braking stop frequency, set from 0.1 to 60.0Hz - Braking voltage, set between 0.1 and 20% - Braking time, set between 0.0 and 20s	

### I/O control

Operator keypad	- Local (keypad) and remote operation changeover - Forward, reverse, stop by key-switches - Change, copy, save facilities of all parameters - Removable and mountable outside the unit by extension wirings	
	LCD keypad	Two rows, 16 characters each. Multi-language format Quick parameter search by rotary knob
	LED keypad	7 segment LED, five digit display and seven points LED indications Parameter search by up / down keys
Analogue I/O	Analogue inputs	Three analogue inputs for speed or torque control, and two analogue output as standard. All programmable AI1 and AI2: Either voltage 0-10V, 0-5V, 1-5V or current 0-20mA, 4-20mA AI3: Voltage input 0 to ±10V, 0 to ±5V P10: Voltage source for potentiometer speed setting
	Analogue outputs	AO1 and AO2: Both configurable either as voltage 0-10V or current 4-20mA, for metering purpose Programmable with more than 20 available functions
Digital I/O	Digital inputs	Seven digital inputs, and five digital outputs as standard. All programmable. Seven, PSI1-PSI7. Configurable source or sink logic. Programmable with more than 50 functions. Input PSI7, can be used as pulse setting (max 10kHz).
	Digital outputs	Two dry relay and three open collector transistors. Programmable with more than 50 functions
Communication I/O	Standard RS485 port. I/O carried out by standard RJ connector or screw terminals. ModBus RTU, standard protocol is built-in the drive as standard	

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## Functions

### Standard functions

Multi-pump control	Control of up to 8 pumps, one controlled in speed and the others ON/OFF. Allows rotation of the outputs to ensure same running time for all the pumps, including the speed controlled pump. Sleep / wake-up function included
PID regulator	Allows close-loop control for process like pressure control, flow etc, including limit detection. When this function is enabled, VAT300 automatically controls the motor speed to keep the process required set point
Energy saving function Built-in PLC	This function automatically decreases output voltage according to the load, improving motor efficiency Logic and arithmetic operations. I/O management Program capacity: 16 instructions per bank (max 20 banks). Scan: 2ms per bank
Automatic run	10 step automatic run function
Traverse run	Specific function for textile industry, weaving machines
Speed time pattern	Specific function for spinning frame machines
Auxiliary drives	Switchover of up to four sets of motor parameters
External brake control UP/DOWN	ON / OFF control of external mechanical brake with feedback and other advanced features Function that allow motor speed UP/DOWN by push buttons. This function can be combined with other reference signals, analogue or digital
Multi-step speed setting Acceleration / deceleration multiple ramp times	8 fixed speed, selectable, with independent acceleration / deceleration time setting Up to 11 independent time settings. One for Jogging, two for default acceleration / deceleration and eight more for the multi-speed function
Multi-step speed setting Ratio interlock speed	8 fixed speed, selectable, with independent acceleration / deceleration time setting Speed reference Input / Output ratio is can be controlled according $y = Ax + B + C$ y: Output frequency or Speed x: Frequency or speed reference A: Gain, adjustable from 0.000 to $\pm 10.000$ B: Adjustable from 0.00 to $\pm 440.00\text{Hz}$ C: Bias signal from auxiliary input
Ratio interlock torque Pick-Up (Flying start) Retry	Torque reference Input / Output ratio is can be controlled according above given expression This function is useful to restart a free-wheel rotating motor even if it is rotating in reverse direction Automatic re-start after a failure. Provides up to 10 programmable re-trials with programmable time between trials
Frequency skip Droop Automatic tuning	Three skip areas. Width can be varied from 0.0Hz up to 10Hz. Operates in V/f control only Useful function that help load balance when several motors are mechanically coupled Automatic measurements of motor constants and other critical parameters, for all mode of control like V/f, Vector control and PM motor control
Torque control Adaptable and programmable I/O	By this function, is possible to control the motor torque by means of analogue or digital signals Programmable inputs and outputs can be assigned up to 50 functions each. Can be adapted to application needs

### Other important functions

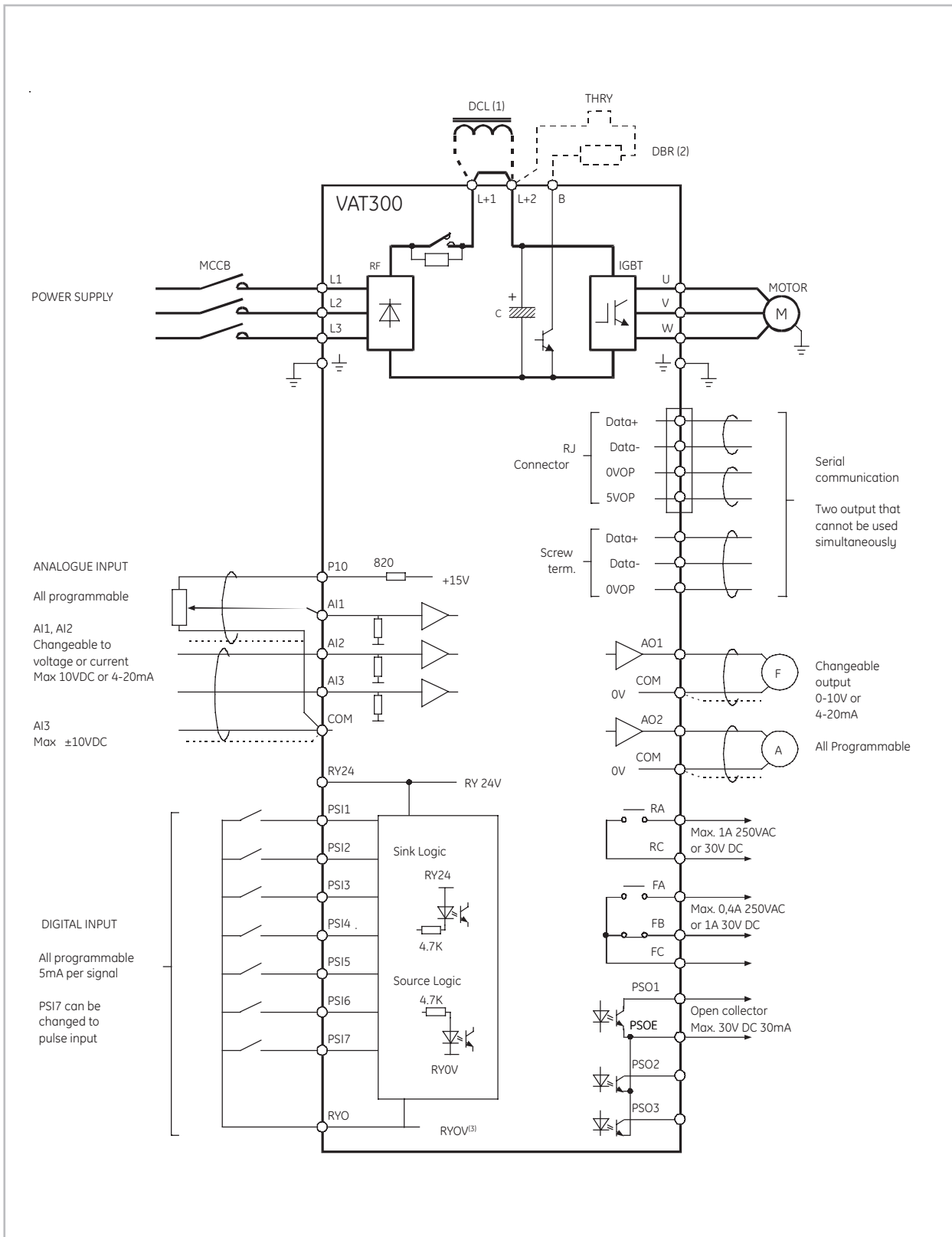
<ul style="list-style-type: none"> <li>- Automatic start</li> <li>- Reverse RUN prevention</li> <li>- Torque limits</li> <li>- Multiple current limits</li> <li>- Adaptable V/f control</li> <li>- Parameter protection lock</li> <li>- DC braking</li> <li>- Cooling fan ON/OFF control</li> </ul>	<ul style="list-style-type: none"> <li>- Pre-excitation</li> <li>- Password protection</li> <li>- Parameter protection</li> <li>- Automatic braking on power failure</li> <li>- Simple speed control</li> <li>- Pulse train I/O function</li> <li>- Extended and configurable display indication</li> </ul>	<ul style="list-style-type: none"> <li>- Jog forward &amp; reverse function</li> <li>- Direct and inverse PID type mode selection</li> <li>- S-Ramps</li> <li>- Multiple stop mode, all configurable, like ramp down, emergency, coast to stop, by DC injection</li> </ul>
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### Protections

Motor & drive protections	<ul style="list-style-type: none"> <li>- Overload independent for ND, HD</li> <li>- Overcurrent trip</li> <li>- Overcurrent limit</li> <li>- Overvoltage trip</li> <li>- Overvoltage limit</li> <li>- Drive overheat</li> <li>- Ground fault</li> <li>- Phase failure</li> </ul>	<ul style="list-style-type: none"> <li>- Overspeed protection</li> <li>- Fuse blown indication</li> <li>- External fault (from I/O)</li> <li>- Precharging circuit fault</li> <li>- EEPROM data Error</li> <li>- PM module fault</li> <li>- Self diagnostics for CPU, and PCBs</li> </ul>
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# I/O wiring basic scheme



- (1) Remove link between L+1 and L+2 when using DC reactor
- (2) Built-in dynamic braking is included up to U3SX22K0, and U3SN18K5 drives. Use external braking devices for large units. Check user manual for details
- (3) No connection should be made between RYO and COM, due to these sections are isolated



## I/O terminal board specifications

### Control terminal board

	Terminals	Function	Description
Digital inputs	RY0, RY24	Common inputs	Common terminal for digital inputs. Available sink / source logic. RY24 and RY0 must not be shorted
	PSI1 to PSI7	Programmable inputs	These commands can be arbitrarily set to any input sequence function. Programmable with more than 50 functions. Input PSI7, can be used as pulse setting (max 10kHz)
Analogue inputs	AI1, 2	Programmable inputs	12 bits, programmable analogue input, for input voltage in the range of 0 to 10V or input current in the range of 0 to 20mA.
	AI3	Programmable input	Usually dedicated for speed or torque control 12 bits, programmable analogue input allowing voltage input of the range of -10 to +10V
	COM P10	Common input Source voltage	Common terminal for the analogue inputs Exclusively dedicated for potentiometer source voltage of 10V, in combination with analogue inputs AI1 or AI2
Analogue outputs	A01, A02 COM	Output metering Common	10 bits, programmable analogue outputs for metering purposes Common terminal for analogue outputs
Digital outputs	RA, RC	Relay (1NO)	Programmable relay to any sequence output, assigned by default to RUN function
	FA, FB, FC	Relay (1NO/NC)	Programmable relay to any sequence output, assigned by default to fault function
	PSO1 to PSO3	Transistor output	Programmable transistor outputs, assigned by default to RDY (ready), IDET (current detection) and ATN (speed reached) functions. Can be programmed with any sequence output function.
	PSOE	Common	Common terminal for digital open collector transistors output

### Input sequence functions (assignable to any programmable digital input)

	Symbol	Function	Description
A	F RUN	Forward run	Forward run command for the remote operation mode
	EMS	Emergency stop	Cancels all run commands. The operation can be stopped with ramp deceleration stop or coast to stop. This signal can also be output as a fault (FLT) (C00-4)
B	R RUN	Reverse run	Command for reverse run
	F JOG	Forward jogging	Jogging commands, with specific speed settings. Either ramp down to stop or coast to stop are available
C	R JOG	Reverse jogging	
	HOLD	Hold	Used for stopping, when forward or reverse commands are operated by push buttons
D	BRAKE	DC brake	DC injection voltage to the motor can be enabled with this signal In the case of PM motor control, this function enables DC field
	RESET	Fault reset	Resets the fault state
E	COP	Switch selector for serial transmission	Selects command control either from VAT300's digital inputs or from serial communication command control signals
	CSEL	Ramp selection	Selects either two acceleration/deceleration ramp settings
F	I PASS	Ratio interlock bypass	Bypasses ratio interlock function
	CPASS	Ramp bypass	Bypasses acceleration or deceleration ramp function
G	PIDEN	PID control selection	Enables or disables the PID function
	AFS1, 2, 3	Speed setting 1, 2 or 3	Functions used for selection of speed or torque analogue inputs
H	PROG	Program function	Used for multiple setting, up to 8 speeds. Speed selection is made by sequence functions S0, S1, S2, S3, SE
	CFS	Switch selector for serial transmission	Selects speed setting either from VAT300's analogue inputs or from serial communication command signals
I	S0 to S3 SE	Program setting selection	Auxiliary functions used for multi-speed operation and other purposes
	FUP, FDW	Speed Up/Down	Allows speed up and down command by push-buttons
X	BUP, BDW	Ratio interlock bias Up/Down	These functions allow to increase or decrease the variable bias "C" in the ratio interlock function, $Y=Ax+B+C$
	IVLM	Ratio interlock bias selection	Enables or disables the ratio interlock bias function
X	AUXDV	Auxiliary drive selection	Enables or disables auxiliary drive function, which allows to use a unique drive with 4 different set of motor parameters
	PICK	Pick-Up	Also called "flying start", allows to re-start a motor which is free wheel rotating
X	MBRK_ans	External brake feedback	Used to input brakes ON/OFF status, from external mechanical brake
	PRST	STP reset	Used to input RESET signal while running the spinning function
X	S5 to S7	Digital torque bias 0 to 4	Selects either of the 5 torque bias settings
	AUXSW0, 1	Auxiliary drive no. selection L and H	Selects up to four set of parameters, for example, to use the drive with four different motors or settings
X	PLS_IN	Pulse train input selection	Enables or disables the digital input PSI7, as pulse input
	OCLLV1, V2	OCL settings 1, 2	Enables or disables the two additional overcurrent limit levels
X	E.FLT1 to 8	External fault	External signals to the VAT300, can be input through digital programmable inputs PSI, then to generate a fault, and to stop the drive In this case the drive stops by coast to stop only
	EXC	Pre-excitation	This provides excitation flux in the motor, before to start, in order to have immediate torque at starting time
X	ACR	ACR	ACR operation is selected, to provide torque control
	PCTL	P control	ASR control is changed from the PI control to the P control
X	LIM1, 2	Drive torque limiter changeovers	Enables the drive torque limiter reduction setting by the analogue input or serial transmission
	MCH	Machine time constant changeover	During ASR operation, ASR gain may be changed by this parameter switch, then select settings either from two different sets of machine time constants
X	RF0	0 setting	The speed setting is changed to 0 min-1 (Zero Speed)
	DROOP	Drooping changeover	Enables drooping function, to synchronize several drives
X	DEDB	Dead band setting	Sets dead band of ASR (speed regulator)
	TROB1, 2	Torque bias set 1, 2	Enables torque bias input 1 or 2



**Output sequence functions (assignable to any digital programmable output)**

Symbol	Function	Description
RUN	Run	Turns ON during running, jogging or DC braking. Also can be ON during pre-excitation
FLT	Fault	Turns ON during a fault
MC	Precharge completed	Turns ON when the DC main circuit voltage reaches the required voltage after Power ON
RDY1	Ready (1)	Turns ON when there is no fault, EMS is not activated, pre-charging is complete and the encoder signal is detected (this last, only in PM motor control with sensor mode)
RDY2	Ready (2)	Turns ON when there is no fault, pre-charging is complete and the encoder signal is detected (this last only in PM motor control with sensor mode)
LCL	Local	Turns ON when the operation mode is local (operation from the keypad)
REV	Reverse run	- V/f Control: This turns ON while the output frequency is reverse running - Vector and PM control: This turns ON while the motor is reverse running
IDET	Current detection	Turns ON when the output current reaches the detection level set in the drive or higher
ATN	Frequency or speed attainment	Turns ON when the output frequency or speed reaches the reference set in the drive
SPD1, 2	Frequency or speed detection (1 or 2)	Turns ON when the output frequency or speed, reaches the value set by detection speed levels 1 or 2
COP	Transmission selection	Turns ON when serial transmission operation switch is enabled
ECO~EC3	Specific fault output	EC0 to EC3 functions, can be programmed with any of the fault events which are available in the VAT300. If one of the programmed faults occurs, then the corresponding ECx function turns ON
ACC	Acceleration	Turns ON during acceleration
DCC	Deceleration	Turns ON during deceleration
AUXDV	Auxiliary drive selection	Turns ON when the auxiliary drive parameter setting is enabled
ALM	Minor fault	Turns ON during a minor fault
FAN	Fan control	Turns ON during running, jogging, pre-excitation and DC braking. After these events, the function turns OFF with three minutes delay
ASW	Automatic start wait	When the automatic start function is used, ASW will turn ON while waiting for automatic start
ZSP	Zero speed	Turns ON when the output frequency (speed) absolute value is below the level set with zero speed (C15-4)
LL MT	PID lower limit output	Turns ON when the feedback value is below the lower limit value (<B43-4) during PID control
ULMT	PID upper limit output	Turns ON when the feedback exceeds the upper limit value (>B43-3) during PID control
DoFF-End	DoFF-End alarm output	Turns ON only at a specific sequence of spinning frame operation
MBRK	External brake output	Outputs an external ON/OFF signal to control an external mechanical brake
DVER	Speed deviation error	Turns ON during a speed deviation error
BPF	Stoppage deceleration output	BPF turns ON when the DC voltage drops below the set value in parameter B12-1, then allowing the automatic braking on power failure if this is enabled
RDELAY	Run delay answer	Delays the turning OFF of the sequence output RUN, according to time set on C15-5
MPO1 to 8	Multi-pump output	Output signal for multi-pump control
PLC1 to 8	Built-in PLC output	Sequence output signal of built-in PLC

Multimode speed drives

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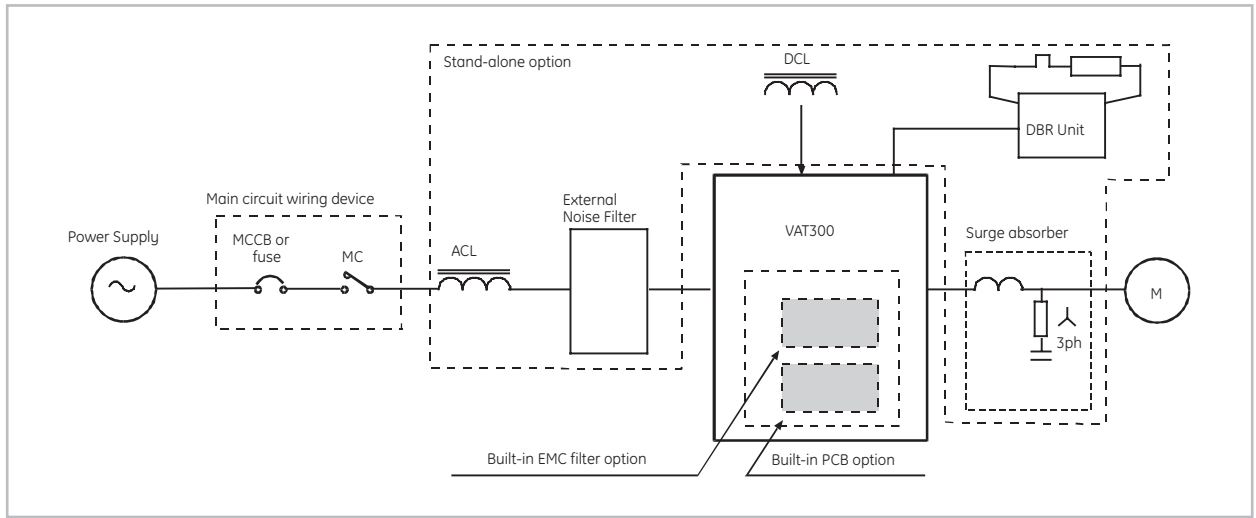
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External accessories



Stand-alone options

A	Line contactor and circuit breakers	CLxx, CKxx	MC line contactor, fuses or MCCBs (Moulded Case Circuit Breakers) must be installed to protect the installation, according either IEC or UL standards. Check application table, for selecting these devices
B	Noise filter DB units	U30F_xxxxx U2KV23DBU_xx	External filters for suppressing the electromagnetic noise generated from the drive Dynamic braking devices. These are required to absorb the regenerative energy during fast braking, or during deceleration of high friction loads. To be used with following VAT300 drives: 400V series: From U3SX030K0 and above (30kW and above) 200V series: From U3SN022K0 and above (22kW and above)
C	DBR units	ER_xxxxx TLR_xxxxx	Always install the appropriate braking resistor. Braking resistors, to be used in combination with external dynamic braking modules, or with VAT300 provided with built-in dynamic braking.  Note VAT300 up to U3SX015K0 and up to U3SN011K0, are provided with a small capacity, built-in braking resistor as standard. When braking torque with built-in resistors is not enough, use external braking resistors. Check VAT300 user manual for technical details
D	ACL	ACRP_xxxxx	ACL provides significant benefits, in reducing the harmonic content, improving the power factor and reducing the ripple in the converter DC stage. In addition, ACL provides additional protection to the VAT300 against surge voltage from the mains. If the line impedance is too low, the current ripple trough converter may become excessive, current peaks too high, and this may produce permanent damage on the VAT300.  Always install an ACL, (AC Input reactor), in below cases: - When mains transformer is larger than 500kVA, for VAT300 drives up to 55kW in heavy duty ratings - When mains transformer is larger than 10 times inverter capacity kVA, for drives larger than 55kW in heavy duty, or all range of VAT300 in normal duty ratings
E	DCL	DCRP_xxxxx	Same benefits than ACL reactors, except for surge voltage protection
F	Surge absorber	ACFRP_xxxxx N11P34018=7	This protection, ia a combination of output reactor ACFRP and a RC filter N11P34018=7. This is used to protect standard motors against surge voltage. It may be required for 400-480VAC systems, when power wirings from VAT300 to the motor are larger than 40mts



VAT300 application with Normal Duty ratings

VAT300 Type	Losses W	Motor kW <sup>(1)</sup>	MCCB <sup>(2)</sup> (A)	Contacto- tor	EMC filter <sup>(3)</sup>	Dynamic braking module	DBR <sup>(4)</sup>	INPUT AC reactor	DC reactor	Surge absorber <sup>(5)</sup> reactor + RC
X000K7	58	0.75	15	CL00	Built-in	Built-in	TLR864P200	ACRP3A8H1	-	ACFRP10A + RC
X001K5	72	1.5	15	CL00	Built-in	Built-in	TLR432P200	ACRP4A5H1	-	ACFRP10A + RC
X002K2	110	2.2	15	CL00	Built-in	Built-in	TLR295P200	ACRP6A3H4	-	ACFRP10A + RC
X004K0	160	4	15	CL00	Built-in	Built-in	TLR175P600	ACRP10A2H	-	ACFRP10A + RC
X005K5	210	5.5	20	CL00	Built-in	Built-in	TLR118P600	ACRP14A1H4	-	ACFRP14A + RC
X007K5	240	7.5	25	CL02	Built-in	Built-in	TLR86P600	ACRP18A1H1	DCRP25A2H1	ACFRP18A + RC
X011K0	350	11	30	CL04	Built-in	Built-in	TLR59P1000	ACRP27A0H75	DCRP32A1H6	ACFRP27A + RC
X015K0	470	15	40	CL04	Built-in	Built-in	TLR43P1000	ACRP35A0H58	DCRP40A1H2	ACFRP35A + RC
X018K5	500	18.5	50	CL04	Built-in	Built-in	TLR35P1500	ACRP38A0H58	DCRP50A0H96	ACFRP38A + RC
X022K0	610	22	60	CL06	Built-in	Built-in	TLR29P1800	ACRP45A0H45	DCRP60A0H82	ACFRP45A + RC
X030K0	800	30	80	CL06	Built-in	U2KV23DBUH3	TLR22P2500	ACRP70A0H29	DCRP80A0H58	ACFRP62A + RC
X037K0	1000	37	100	CL07	External	U2KV23DBUH3	TLR18P3000	ACRP90A0H22	DCRP100A0H49	ACFRP90A + RC
X045K0	1150	45	125	CL09	External	U2KV23DBUH4	TLR15P3700	ACRP90A0H22	DCRP125A0H40	ACFRP90A + RC
X055K0	1620	55	150	CL09	External	U2KV23DBUH4	-	ACRP115A0H18	DCRP140A0H32	ACFRP115A + RC
X075K0	1670	75	200	CK75	External	U2KV23DBUH4	-	ACRP160A0H14	DCRP180A0H25	ACFRP160A + RC
X090K0	2300	90	225	CK08	External	U2KV23DBUH4	-	ACRP185A0H11	DCRP210A0H25	ACFRP185A + RC
X110K0	2860	110	300	CK85	External	U2KV23DBUH4	-	ACRP225A0H096	DCRP270A0H18	ACFRP300A + RC
X132K0	3130	132	350	CK09	External	U2KV23DBUH4	-	ACRP300A0H067	DCRP310A0H14	ACFRP300A + RC
X160K0	4110	160	400	CK09	External	U2KV23DBUH4	-	ACRP360A0H056	DCRP400A0H13	ACFRP360A + RC
X200K0	6560	200	500	CK95	External	U2KV23DBUH4	-	ACRP460A0H056	DCRP540A0H08	ACFRP460A + RC
X250K0	8050	250	600	CK10	External	2xU2KV23DBUH4	-	ACRP550A0H039	DCRP650A0H07	ACFRP520A + RC
X315K0	9500	315	800	CK11	External	2xU2KV23DBUH4	-	ACRP700A0H035	DCRP740A0H06	ACFRP700A + RC
X400K0	12140	400	1000	CK12	External	2xU2KV23DBUH4	-	ACRP850A0H023	DCRP950A0H05	ACFRP850A + RC
X475K0	14370	475	1200	CK13	External	3xU2KV23DBUH4	-	ACRP950A0H016	DCRP1000A0H04	ACFRP950A + RC
N000K7	65	0.75	15	CL00	Built-in	Built-in	TLR216P200	ACRP6A2H5	-	-
N001K5	92	1.5	15	CL00	Built-in	Built-in	TLR108P200	ACRP9A1H3	-	-
N002K2	130	2.2	15	CL00	Built-in	Built-in	TLR74P200	ACRP12A0H84	-	-
N004K0	160	4	20	CL01	Built-in	Built-in	TLR44P600	ACRP18A0H56	-	-
N005K5	230	5.5	30	CL02	Built-in	Built-in	TLR29P600	ACRP27A0H37	-	-
N007K5	350	7.5	40	CL04	External	Built-in	TLR22P600	ACRP35A0H27	DCRP45A0H55	-
N011K0	440	11	60	CL04	External	Built-in	TLR15P1000	ACRP55A0H18	DCRP60A0H4	-
N015K0	510	15	80	CL06	External	Built-in	TLR11P1200	ACRP70A0H14	DCRP80A0H3	-
N018K5	710	18.5	100	CL07	External	Built-in	TLR8,8P1500	ACRP80A0H14	DCRP100A0H24	-
N022K0	700	22	125	CL09	External	U2KV23DBUL2	TLR7,4P1800	ACRP97A0H11	DCRP120A0H2	-
N030K0	930	30	150	CL10	External	U2KV23DBUL3	TLR5P2500	ACRP140A0H072	DCRP150A0H17	-
N037K0	1210	37	200	CK75	External	U2KV23DBUL3	TLR4P3000	ACRP180A0H056	DCRP180A0H14	-
N045K0	1480	45	225	CK75	External	U2KV23DBUL4	-	ACRP200A0H051	DCRP220A0H11	-

- (1) Device selection conditions, for Normal Duty (overload capacity 120%, 60s).
- (2) Fuses or MCCB given are for IEC ratings.  
When complying with UL/cUL, use a UL certified fuse as indicated in section 9-1 of VAT300 user manual.
- (3) Built-in EMC filters only in specified ratings and for drives U3SNxxxxFxx or U3SXxxxxFxx. For drives without built-in filter, or larger than U3SN005K5 or U3SX030K0, select an external EMC filter from tables on page H.31.
- (4) External braking resistors for optimal performance. Note drives up to U3SN011K0 and U3SX11K0 include a built-in braking resistor, which should be disconnected when using the external braking resistors. Check 7-3-1 section of VAT300 user manual.
- (5) The surge absorber -useful when length of motor cable is more than 40mts- is configured using the output reactor shown in above table plus RC filter, N11P34018=7 (Set VAT300 with carrier frequency of 1kHz).

Multimode speed drives

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## VAT300 application with Heavy Duty ratings

Speed drive units

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VAT300 Type	Losses W	Motor kW <sup>(1)</sup>	MCCB <sup>(2)</sup> (A)	Contact- tor	EMC filter <sup>(3)</sup>	Dynamic braking module	DBR <sup>(4)</sup>	INPUT AC reactor	DC reactor	Surge absorber <sup>(5)</sup> reactor + RC
X000K7	53	0.4	15	CL00	Built-in	Built-in	TLR864P200	ACRP3A8H1	-	ACFRP10A + RC
X001K5	65	0.75	15	CL00	Built-in	Built-in	TLR864P200	ACRP3A8H1	-	ACFRP10A + RC
X002K2	90	1.5	15	CL00	Built-in	Built-in	TLR432P200	ACRP4A5H1	-	ACFRP10A + RC
X004K0	120	2.2	15	CL00	Built-in	Built-in	TLR295P200	ACRP6A3H4	-	ACFRP10A + RC
X005K5	170	4	15	CL00	Built-in	Built-in	TLR175P600	ACRP10A2H	-	ACFRP10A + RC
X007K5	230	5.5	20	CL00	Built-in	Built-in	TLR118P600	ACRP14A1H4	DCRP18A2H9	ACFRP14A + RC
X011K0	300	7.5	25	CL02	Built-in	Built-in	TLR86P600	ACRP18A1H1	DCRP25A2H1	ACFRP18A + RC
X015K0	400	11	35	CL04	Built-in	Built-in	TLR59P1000	ACRP27A0H75	DCRP32A1H6	ACFRP27A + RC
X018K5	460	15	50	CL04	Built-in	Built-in	TLR43P1000	ACRP35A0H58	DCRP40A1H2	ACFRP35A + RC
X022K0	550	18.5	60	CL04	Built-in	Built-in	TLR35P1500	ACRP38A0H58	DCRP50A0H96	ACFRP38A + RC
X030K0	620	22	70	CL06	Built-in	U2KV23DBUH2	TLR29P1800	ACRP45A0H45	DCRP60A0H82	ACFRP45A + RC
X037K0	860	30	80	CL06	External	U2KV23DBUH3	TLR22P2500	ACRP70A0H29	DCRP80A0H58	ACFRP62A + RC
X045K0	930	37	100	CL07	External	U2KV23DBUH3	TLR18P3000	ACRP90A0H22	DCRP100A0H49	ACFRP90A + RC
X055K0	1260	45	125	CL09	External	U2KV23DBUH4	TLR15P3700	ACRP115A0H18	DCRP125A0H40	ACFRP115A + RC
X075K0	1190	55	150	CK75	External	U2KV23DBUH4	-	ACRP115A0H18	DCRP140A0H32	ACFRP115A + RC
X090K0	1830	75	200	CK08	External	U2KV23DBUH4	-	ACRP160A0H14	DCRP180A0H25	ACFRP160A + RC
X110K0	2280	90	225	CK85	External	U2KV23DBUH4	-	ACRP185A0H11	DCRP210A0H25	ACFRP185A + RC
X132K0	2600	110	300	CK09	External	U2KV23DBUH4	-	ACRP225A0H096	DCRP270A0H18	ACFRP225A + RC
X160K0	3200	132	350	CK09	External	U2KV23DBUH4	-	ACRP300A0H067	DCRP310A0H14	ACFRP300A + RC
X200K0	4750	160	400	CK95	External	U2KV23DBUH4	-	ACRP360A0H056	DCRP400A0H13	ACFRP360A + RC
X250K0	6350	200	500	CK10	External	U2KV23DBUH4	-	ACRP460A0H056	DCRP540A0H08	ACFRP460A + RC
X315K0	7880	250	700	CK11	External	2xU2KV23DBUH4	-	ACRP550A0H039	DCRP650A0H07	ACFRP550A + RC
X400K0	9300	315	800	CK12	External	2xU2KV23DBUH4	-	ACRP700A0H035	DCRP740A0H06	ACFRP700A + RC
X475K0	11860	400	1000	CK13	External	2xU2KV23DBUH4	-	ACRP850A0H023	DCRP950A0H05	ACFRP850A + RC
N000K7	55	0.4	15	CL00	Built-in	Built-in	TLR405P200	ACRP4A2H5	-	-
N001K5	69	0.75	15	CL00	Built-in	Built-in	TLR216P200	ACRP6A2H5	-	-
N002K2	110	1.5	15	CL00	Built-in	Built-in	TLR108P200	ACRP9A1H3	-	-
N004K0	130	2.2	20	CL00	Built-in	Built-in	TLR74P200	ACRP12A0H84	-	-
N005K5	190	4	30	CL01	Built-in	Built-in	TLR44P600	ACRP18A0H56	-	-
N007K5	320	5.5	35	CL02	External	Built-in	TLR29P600	ACRP27A0H37	DCRP32A0H78	-
N011K0	400	7.5	50	CL04	External	Built-in	TLR22P600	ACRP35A0H27	DCRP45A0H55	-
N015K0	450	11	70	CL04	External	Built-in	TLR15P1000	ACRP55A0H18	DCRP60A0H4	-
N018K5	550	15	90	CL06	External	Built-in	TLR11P1200	ACRP70A0H14	DCRP80A0H3	-
N022K0	610	18.5	125	CL07	External	U2KV23DBUL2	TLR8,8P1500	ACRP80A0H14	DCRP100A0H24	-
N030K0	690	22	125	CL09	External	U2KV23DBUL2	TLR7,4P1800	ACRP97A0H11	DCRP120A0H2	-
N037K0	950	30	150	CL10	External	U2KV23DBUL3	TLR5P2500	ACRP140A0H072	DCRP150A0H17	-
N045K0	1150	37	200	CK75	External	U2KV23DBUL3	TLR4P3000	ACRP180A0H056	DCRP180A0H14	-

(1) Device selection conditions for heavy duty (overload capacity 150%, 60s).

(2) Fuses or MCCB given are for IEC ratings.

When complying with UL/cUL, use a UL certified fuse as indicated in section 9-1 of VAT300 user manual.

(3) Built-in EMC filters only in specified ratings and for drives U3SNxxxxFxx or U3SXxxxxFxx. For drives without built-in filter, or larger than U3SN005K5 or U3SX030K0, select an external EMC filter from tables on page H.31.

(4) External braking resistors for optimal performance. Note drives up to U3SN011K0 and U3SX11K0 include a built-in braking resistor, which should be disconnected when using the external braking resistors. Check 7-3-1 section of VAT300 user manual.

(5) The surge absorber -useful when length of motor cable is more than 40mts- is configured using the output reactor shown in above table plus RC filter, N11P34018=7 (Set VAT300 with carrier frequency of 1kHz).



## Dimensional drawings and weights

### Drives

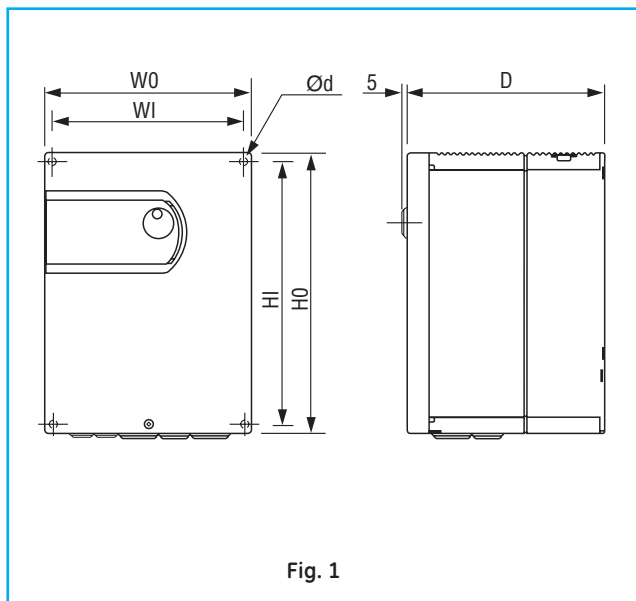


Fig. 1

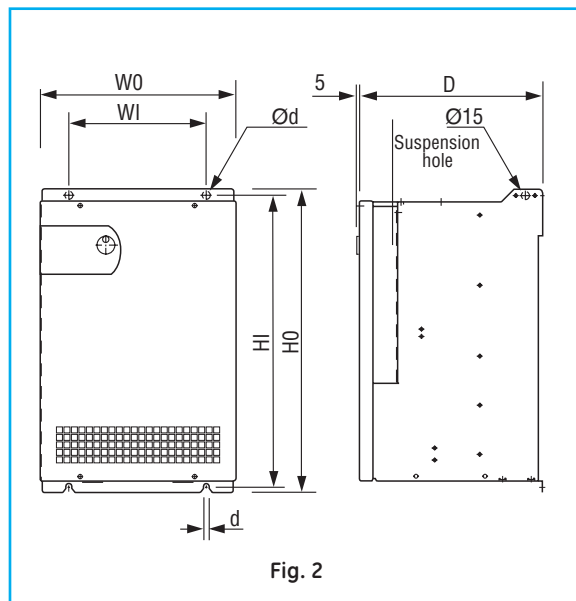


Fig. 2

200V Series: N000K7 to N045K0.

400V Series: X000K7 to X055K0

Type		Dimensions (mm)						Main circuit terminal	Weight (kg)	Fig.	
200V Series	400V Series	W0	W1	H0	H1	D	Ød				
N000K7	X000K7	155	140	250	235	180	6	M4	3	1	
N001K5	X001K5										
N002K2	X002K2										
N004K0	X004K0										
N005K5	X005K5										
N007K5	X007K5	205	190	275	260	196	7	M5	5		
	N011k0										X011K0
	X015K0										
N015K0	X018K0	260	240	350	330	298		M6	12		
	N018K5										X022K0
	N022K0									X030K0	
N030K0	X037K0	300	200	470	450	317	10	M8	23		
	N045K0									X045K0	
	X055K0										
N037K0	N045K0	340	240	520	500			M10	30		

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Dimensional drawings and weights

Drives

Speed drive units

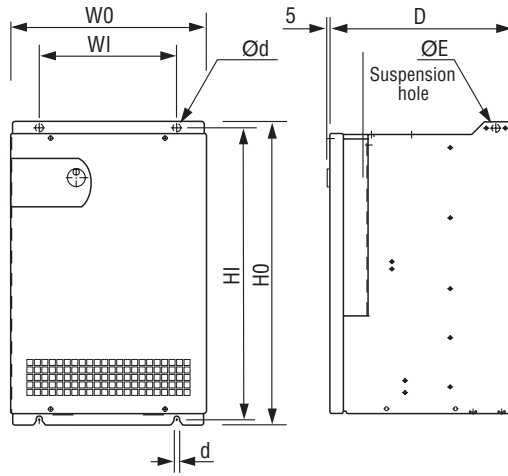


Fig. 3

400V Series: X075K0 to X475K0

Type	Dimensions (mm)							Main circuit terminal	Weight (kg)	Fig.
400V Series	W0	W1	H0	H1	D	ød	øE			
X075K0	435	300	615	595	350	10	20	M10	42	3
X090K0									45	
X110K0									60	
X132K0	65									
X160K0	580	400	1020	990	470	13	23		90	
X200K0									100	
X250K0								200		
X315K0	870	600	1260	1230		15	23	M16	285	
X400K0								290		
X475K0								295		



## EMC Filters

EMC compliance for VAT300 is achieved either by built-in filters in the drive or by external filters. Built-in filters are available for drives up to 30kW/400V (U30SX030K0\_) only. For larger drives, an external EMI filter should be used when compliance with EMC is required. Check the tables below to select the filter according to inverter type.

### VAT300 Drives with built-in filter

VAT300 Series	VAT300 Model	Second environment EN61800-3 category C3	First environment EN61800-3 category C2
		Filter type	Add ferrite cores <sup>(1)</sup>
200V Series with built-in filter	U3SN000K7F	Built-in	P:ZCAT3035-1330x3
	U3SN001K5F		C:ZCAT3035-1330x1
	U3SN002K2F		M:ZCAT3035-1330x1
	U3SN004K0F		NA
	U3SN005K5F		NA
400V Series with built-in filter	U3SX000K7F	Built-in	P:ZCAT3035-1330x3
	U3SX001K5F		C:ZCAT3035-1330x1
	U3SX002K2F		M:ZCAT3035-1330x1
	U3SX004K0F		NA
	U3SX005K5F		NA
	U3SX007K5F		NA
	U3SX011K0F	Built-in	NA
	U3SX015K0F		NA
	U3SX018K5F		NA
	U3SX022K0F		NA
	U3SX030K0F		NA
	U3SX030K0F		NA

(1) P: Ferrite cores for power cable  
C: Ferrite cores for control cable  
M: Ferrite cores for motor cable

### External filters for VAT300 drives without built-in Filter (200V series)

VAT300 Series	VAT300 Model	Second environment (EN61800-3 category C3) External filter selection	
		Use with VAT300 in ND	Use with VAT300 in HD
200V Series	U3SN000K7S	U30F3016EB	U30F3016EB
	U3SN001K5S	U30F3016EB	U30F3016EB
	U3SN002K2S	U30F3016EB	U30F3016EB
	U3SN004K0S	U30F3030EB	U30F3030EB
	U3SN005K5S	U30F3030EB	U30F3030EB
	U3SN007K5S	U30F3075EB	U30F3075EB
	U3SN011K0S	U30F3075EB	U30F3075EB
	U3SN015K0S	U30F3100EB	U30F3100EB
	U3SN018K5S	U30F3100EB	U30F3100EB
	U3SN022K0S	U30F3130EB	U30F3130EB
	U3SN030K0S	U30F3180EB	U30F3180EB
	U3SN037K0S	U30F3250ES	U30F3250ES
	U3SN045K0S	U30F3250ES	U30F3250ES

### External filters for VAT300 drives without built-in filter (400V series)

VAT300 Series	VAT300 Model	Second environment (EN61800-3 category C3) External filter selection	
		Use with VAT300 in ND	Use with VAT300 in HD
400V Series	U3SX000K7S	U30F3016EB	U30F3016EB
	U3SX001K5S	U30F3016EB	U30F3016EB
	U3SX002K2S	U30F3016EB	U30F3016EB
	U3SX004K0S	U30F3016EB	U30F3016EB
	U3SX005K5S	U30F3030EB	U30F3030EB
	U3SX007K5S	U30F3030EB	U30F3030EB
	U3SX011K0S	U30F3030EB	U30F3030EB
	U3SX015K0S	U30F3055EB	U30F3055EB
	U3SX018K5S	U30F3055EB	U30F3055EB
	U3SX022K0S	U30F3075EB	U30F3075EB
	U3SX030K0S	U30F3100EB	U30F3100EB
	U3SX037K0S	U30F3100EB	U30F3100EB
	U3SX045K0S	U30F3130EB	U30F3130EB
	U3SX055K0S	U30F3180EB	U30F3180EB
	U3SX075K0S	U30F3250ES	U30F3180EB
	U3SX090K0S	U30F3250ES	U30F3250ES
	U3SX110K0S	U30F3320ES	U30F3320ES
	U3SX132K0S	U30F3400ES	U30F3320ES
	U3SX160K0S	U30F3600ES	U30F3400ES
	U3SX200K0S	U30F3600ES	U30F3600ES
	U3SX250K0S	U30F31000ES	U30F3600ES
	U3SX315K0S	U30F31000ES	U30F31000ES
	U3SX400K0S	U30F31000ES	U30F31000ES
	U3SX475K0S	U30F31600ES	U30F31000ES





Dimensional drawings and weights

External filter book case type

Speed drive units

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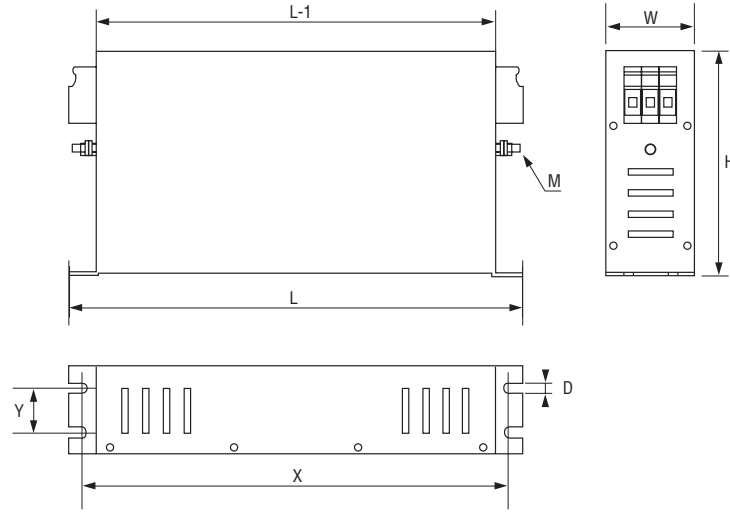
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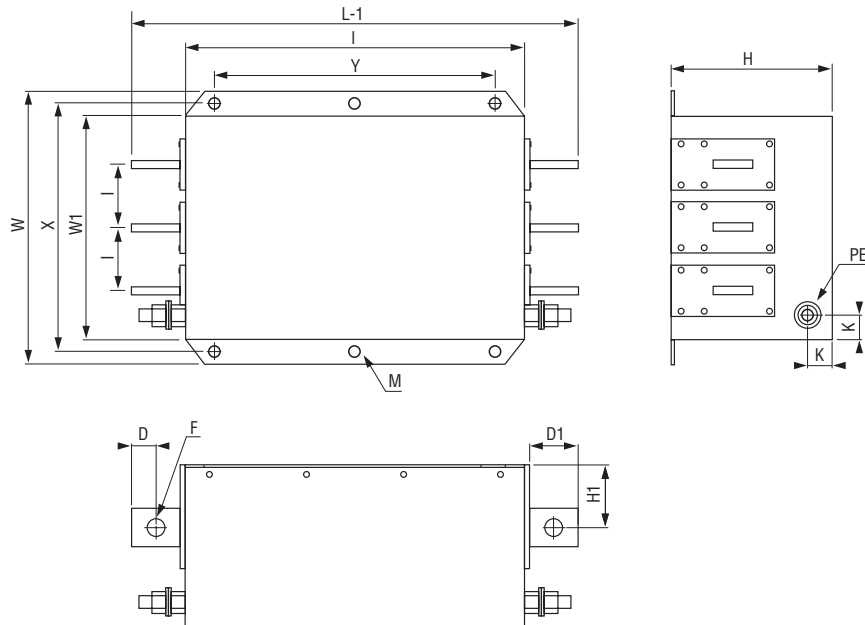
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Cat. no.	Ref. no.	Dimensions								Weight (kg)
		L	L-1	H	W	X	Y	M	D	
U30F3016EB	129284	250	220	70	45	235	25	M5	M5	1.7
U30F3030EB	129285	270	240	85	50	255	30	M5	M5	1.8
U30F3055EB	129286	250	220	90	85	235	60	M6	M5	3.1
U30F3075EB	129287	270	240	135	80	255	60	M6	M6	4
U30F3100EB	129288	270	240	150	90	255	65	M10	M6	5.5
U30F3130EB	129289	270	240	150	90	255	65	M10	M6	7.5
U30F3180EB	129290	380	350	170	120	365	102	M10	M6	11

External filter brick case type



Cat. no.	Ref. no.	Dimensions														Weight (kg)	
		W	W1	X	L	L1	Y	H	H1	K	M	D	D1	F	I		PE
U30F3250ES	129291	190	140	165	300	392	240	116	41	20	Ø12	15	42	Ø11	40	M10	7
U30F3320ES	129292	260	210	235	300	392	240	116	41	20	Ø12	15	42	Ø11	60	M10	10.3
U30F3400ES	129293	260	210	235	300	392	240	116	41	20	Ø12	15	42	Ø11	60	M10	10.3
U30F3600ES	129294	260	210	235	300	392	240	116	48.5	20	Ø12	15	42	Ø11	60	M10	11
U30F31000ES	129295	280	230	255	350	460	290	166	64	25	Ø12	25	50	Ø17	65	M12	18
U30F31600ES	129296	300	250	275	400	592	340	166	61	25	Ø12	25	52	Ø17	80	M12	27



### External dynamic braking units

VAT300 includes a built-in dynamic braking feature as standard, in drives up to U3SX022K0 and up to U3SX18K5. For larger drives the dynamic braking is achieved by using the external dynamic braking device U2KV23DBU\_\_

Fig. 1

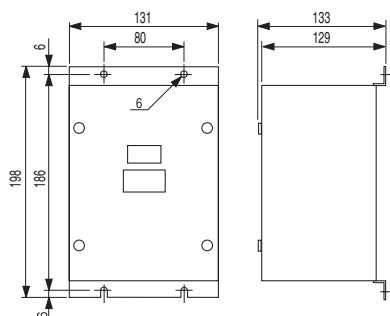
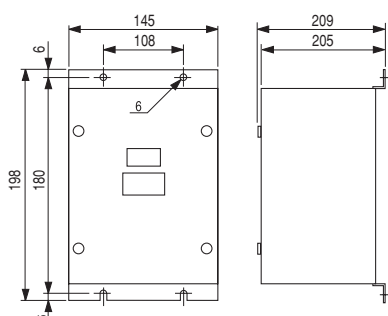


Fig. 2



Cat. no.	Ref. no.	Fig.	Weight (kg)
U2KV23DBUL1	168098	1	1,7
U2KV23DBUL2	168099	1	1,7
U2KV23DBUL3	168100	1	1,7
U2KV23DBUH1	168084	1	1,7
U2KV23DBUH2	168085	1	1,7
U2KV23DBUH3	168086	1	1,7
U2KV23DBUH4	168083	2	3,5

### Braking resistors

A small capacity braking resistor is included in drives up to U3SX015K0 and up to U3SN011K0 as standard. Check VAT300 user manual for technical details.

For larger drives, or when braking torque with Built-in resistors, is not enough, use external braking resistors.

The external braking optional resistors for 100% braking capacity, 10% ED are shown in below table:

Fig. 1

Resistors with terminals for

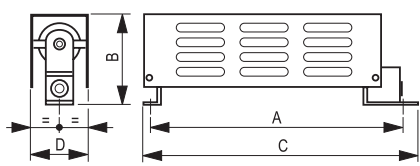
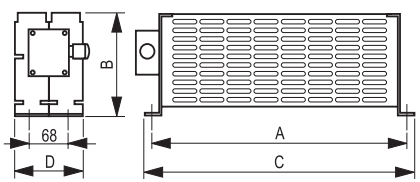


Fig. 2

Resistors with terminals for



Cat. no.	Ref. no.	Fig.	Dimensions (mm)				Weight (kg)
			A	B	C	D	
TLR405P200	129867	1	195	65	210	60	0.6
TLR216P200	129868	1	195	65	210	60	0.6
TLR108P200	129869	1	195	65	210	60	0.6
TLR74P200	129870	1	195	65	210	60	0.6
TLR44P600	129166	1	450	95	465	60	1.2
TLR29P600	129167	1	450	95	465	60	1.2
TLR22P600	129168	1	450	95	465	60	1.2
TLR15P1000	129169	1	450	100	465	70	1.8
TLR11P1200	129170	1	450	120	465	75	2.4
TLR8,8P1500	129171	2	440	100	460	140	2.2
TLR7,4P1800	129172	2	440	100	460	140	3.4
TLR5P2500	129871	2	440	180	460	140	3.2
TLR4P3000	129872	2	440	180	460	140	5.5
TLR864P200	129873	1	195	65	210	60	0.6
TLR432P200	129875	1	195	65	210	60	0.6
TLR295P200	129876	1	195	65	210	60	0.6
TLR175P600	129173	1	450	95	465	60	1.2
TLR118P600	129174	1	450	95	465	60	1.2
TLR86P600	129175	1	450	95	465	60	1.2
TLR59P1000	129176	1	450	100	465	70	1.8
TLR43P1000	129177	1	450	100	465	70	1.8
TLR35P1500	129877	2	440	100	460	140	2.2
TLR29P1800	129878	2	440	100	460	140	3.4
TLR22P2500	129879	2	440	180	460	140	3.2
TLR18P3000	129880	2	440	180	460	140	5.5
TLR15P3700	129881	2	440	180	460	140	5.8

A

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X



Dimensional drawings and weights

AC input reactors

Speed drive units

A

B

C

D

E

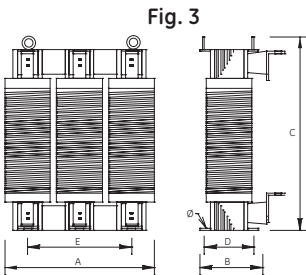
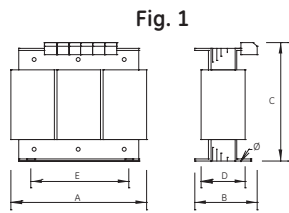
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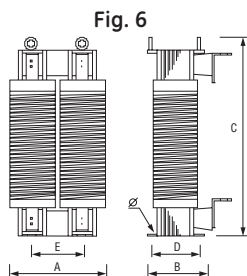
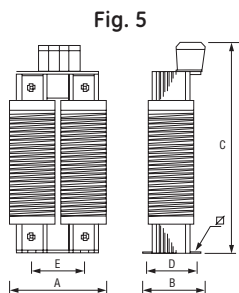
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X



Cat. no.	Ref. no.	Losses W	Fig.	Dimensions (mm)						Weight (kg)
				A	B	C	D	E	Ø	
ACRP4A2H5	168495	16	1	120	80	152	41	100	6	1,3
ACRP6A2H5	168496	18	1	120	80	152	41	100	6	1,5
ACRP9A1H3	168497	17	1	120	80	152	41	100	6	1,6
ACRP12A0H84	168498	18	1	120	80	152	41	100	6	1,7
ACRP18A0H56	168499	21	1	120	90	152	51	100	6	2,4
ACRP27A0H37	168500	32	1	150	95	183	46	125	6	3,3
ACRP35A0H27	168501	35	1	150	95	183	46	125	6	3,7
ACRP55A0H18	168502	42	1	150	110	183	61	125	6	5,5
ACRP70A0H14	168503	100	1	150	111	250	77	100	9	5,6
ACRP80A0H14	168504	108	1	150	121	250	87	100	9	7,1
ACRP97A0H11	168505	124	1	150	126	250	92	100	9	7,8
ACRP140A0H072	168506	155	3	180	166	216	92	120	9	11,9
ACRP180A0H056	168507	175	3	180	176	216	102	120	9	14,2
ACRP200A0H051	168508	210	3	180	186	216	112	120	9	15,9
ACRP3A8H1	168509	17	1	120	80	152	41	100	6	1,4
ACRP4A5H1	168510	16	1	120	80	152	41	100	6	1,5
ACRP6A3H4	168511	19	1	120	80	152	41	100	6	1,7
ACRP10A2H	168512	23	1	120	90	152	51	100	6	2,5
ACRP14A1H4	168513	29	1	150	95	178	46	125	6	3,2
ACRP18A1H1	168514	35	1	150	95	178	46	125	6	4
ACRP27A0H75	168515	77	1	150	106	233	72	100	9	4,8
ACRP35A0H58	168516	98	1	150	111	233	77	100	9	5,5
ACRP38A0H58	168517	96	1	150	116	233	82	100	9	6,4
ACRP45A0H45	168518	102	1	150	121	233	87	100	9	7,1
ACRP70A0H29	168519	147	1	150	151	250	117	100	9	11
ACRP90A0H22	168520	158	1	180	136	286	102	120	9	13,1
ACRP115A0H18	168521	186	1	180	156	301	122	120	9	16,9
ACRP160A0H14	168522	268	3	240	181	288	107	160	9	25,7
ACRP185A0H11	168523	255	3	240	181	288	107	160	9	26,3
ACRP225A0H096	168524	305	3	240	191	288	117	160	9	30,7
ACRP300A0H067	168525	356	3	240	226	288	142	160	9	40,4
ACRP360A0H056	168526	425	3	240	226	288	142	160	9	42,2
ACRP460A0H056	168527	595	3	300	258	400	142	200	9	64,1
ACRP550A0H039	168528	636	3	300	258	400	142	200	9	64,9
ACRP700A0H035	168530	991	3	360	316	472	202	300	11	116,2
ACRP850A0H023	168531	856	3	420	296	544	178	350	11	115
ACRP950A0H016	168532	934	3	420	306	544	188	350	11	123,6

DC reactors



Cat. no.	Ref. no.	Losses W	Fig.	Dimensions (mm)						Weight (kg)
				A	B	C	D	E	Ø	
DCRP32A0H78	168542	37	5	100	110	173	91	75	6	3,9
DCRP45A0H55	168543	33	5	120	110	203	86	90	6	6,1
DCRP60A0H4	168544	41	5	120	120	220	96	90	6	6,4
DCRP80A0H3	168545	45	5	120	135	220	111	90	6	7,1
DCRP100A0H24	168546	51	5	120	135	235	111	90	6	7,1
DCRP120A0H2	168547	43	5	160	150	285	130	120	9	13,4
DCRP150A0H17	168548	50	5	160	160	285	140	120	9	15
DCRP180A0H14	168549	263	6	160	156	288	82	120	9	11,6
DCRP220A0H11	168550	286	6	160	161	288	87	120	9	12,9
DCRP18A2H9	168555	42	5	100	95	178	76	75	6	3,5
DCRP25A2H1	168556	54	5	100	95	183	76	75	6	3,5
DCRP32A1H6	168557	59	5	100	110	183	91	75	6	3,9
DCRP40A1H2	168558	56	5	100	110	183	91	75	6	3,9
DCRP50A0H96	168559	60	5	120	110	209	86	90	6	6,1
DCRP60A0H82	168560	65	5	120	120	226	96	90	6	6,4
DCRP80A0H58	168561	58	5	120	135	226	111	90	6	7,1
DCRP100A0H49	168562	91	5	120	135	241	111	90	6	7,1
DCRP125A0H40	168563	79	5	160	150	293	130	120	9	13,4
DCRP140A0H32	168564	74	5	160	150	293	130	120	9	3,9
DCRP180A0H25	168565	332	6	160	186	288	112	120	9	18,3
DCRP210A0H25	168566	479	6	160	216	288	142	120	9	24,2
DCRP270A0H18	168567	452	6	160	226	288	152	120	9	27,7
DCRP310A0H14	168568	542	6	160	246	288	162	120	9	29,8
DCRP400A0H13	168569	677	6	200	231	400	147	150	9	40,9
DCRP540A0H08	168570	756	6	200	251	400	157	150	9	45,7
DCRP650A0H07	168571	840	6	200	281	400	177	150	9	56,2
DCRP740A0H06	168572	941	6	200	296	400	192	150	9	61,6
DCRP950A0H05	168574	810	6	240	356	472	252	180	11	99,3
DCRP1000A0H04	168575	800	6	240	366	472	262	180	11	103,1



Surge absorber

ACFR reactors

Fig. 1

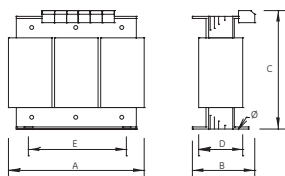
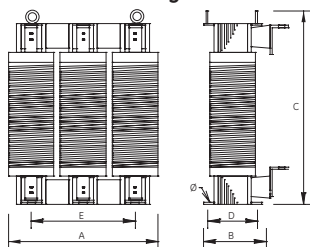
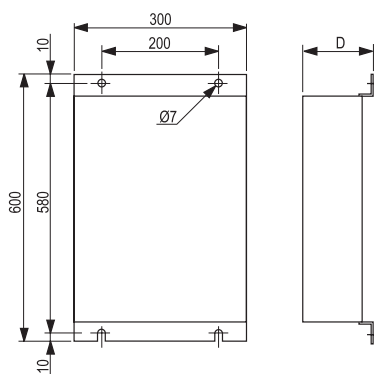


Fig. 3



Cat. no.	Ref. no.	Losses W	Fig.	Dimensions (mm)						Weight (kg)
				A	B	C	D	E	Ø	
ACFRP10A	168576	16	1	120	80	152	41	100	6	1,2
ACFRP14A	168577	15	1	120	80	152	41	100	6	1,2
ACFRP18A	168578	17	1	120	80	152	41	100	6	1,2
ACFRP27A	168579	18	1	120	80	157	41	100	6	1,4
ACFRP35A	168580	21	1	120	90	157	51	100	6	2,2
ACFRP38A	168581	21	1	120	90	157	51	100	6	2,2
ACFRP45A	168582	33	1	150	110	183	67	125	6	4,1
ACFRP62A	168583	66	1	150	101	250	67	100	9	4,2
ACFRP90A	168584	84	1	150	121	250	87	100	9	7,5
ACFRP115A	168585	112	1	180	131	299	97	120	9	12,1
ACFRP160A	168586	183	3	180	211	216	137	120	9	21,1
ACFRP185A	168587	218	3	240	181	288	107	160	9	25,5
ACFRP225A	168588	304	3	240	216	288	142	160	9	36,6
ACFRP300A	168589	477	3	300	231	400	147	200	9	59,3
ACFRP360A	168590	593	3	300	266	400	182	200	9	78,3
ACFRP460A	168591	728	3	360	308	472	212	300	11	122,4
ACFRP550A	168592	863	3	360	338	472	242	300	11	145,8
ACFRP700A	168594	1486	3	420	371	544	273	350	11	209,7
ACFRP850A	168595	1104	3	480	446	616	328	400	11	336,3
ACFRP950A	168596	1267	3	480	476	616	358	400	11	377

RC filter



Cat. no.	Ref. no.	Losses (W)	Max carrier frequency	Dimensions D	Weight (kg)
N11P3401806	168260	1470	4	275	14
N11P3401806	168261	297	1	135	8

A

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X







Plug-in relays and Auxiliary contactors

A

Motor protection devices

B

Contactors and Thermal overload relays

C

Motorstarters

D

Control and signalling units

E

**Series ML - Main switches & Emergency-stop switches for machinery**

- I.3 Mounting possibilities
- I.4 Standard programme
- I.6 Accessories
- I.7 Enclosed switches
- I.8 Technical data
- I.9 Dimensions

Electronic relays

F

Limit switches

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H

**Main switches**

**I**

Numerical index

X

under control





## Main switches

A manual operated main switch must be provided for every mains circuit. It must be a switch-disconnector corresponding to utilization category AC23 (IEC 947-3) fulfils the following requirements:

- Disconnecting the electrical equipment from the main.
- Visible contact indication or a disconnection function by construction (the handle is in the "OFF" position when all contacts are open).
- If the main switch does not serve simultaneously as an emergency-stop switch, its handle should not be red. Black or grey handles are recommended.
- It should be lockable in the off-position (e.g. by padlock).
- All active conductors are to be disconnected from the main.
- The breaking capacity should be sufficient. In order to break the current of the largest motor in a blocked state together with the sum of the operating currents of the remaining motors/loads.
- The handle of the main switch must be easily accessible and must lie between 0.6 and 1.9 m above the incomer level.

A

## Standards

- Complying with:
- IEC 60947-3
  - EN 60947-3
  - DIN VDE 0660 Teil 107
  - low voltage directive 73/73 EEC
  - low voltage directive EMC 89/336 EEC

B

C

D

## Approvals



E

F

G

H

I

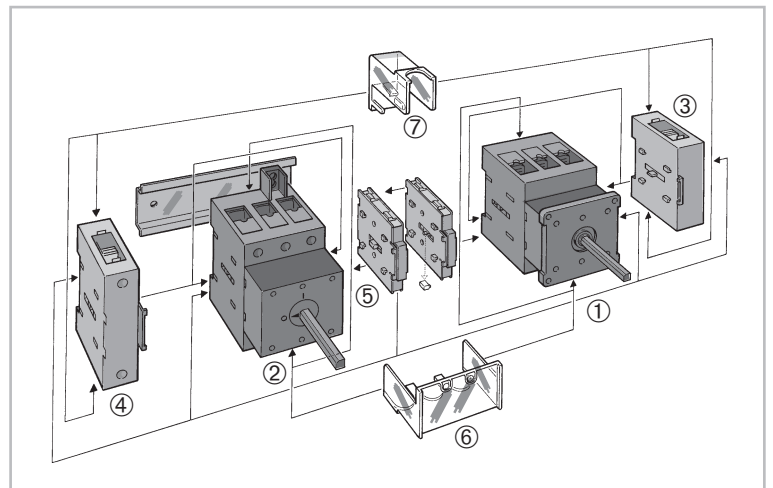
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## Emergency-stop equipment

The main switch may fulfil the function of an emergency-stop switch on certain machines.

The handles must be red on a yellow background.

The contacts of manual operated emergency-stop switch has to be opened by force.

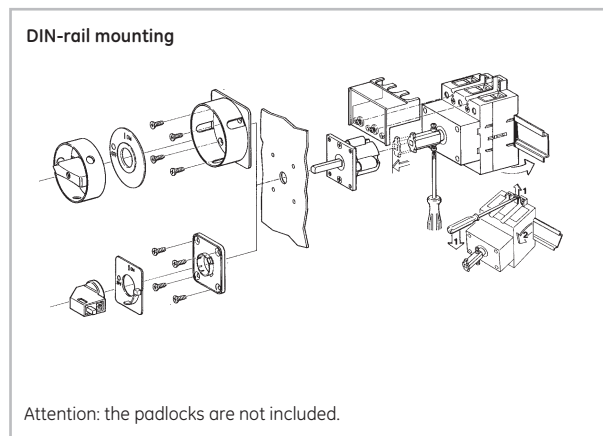
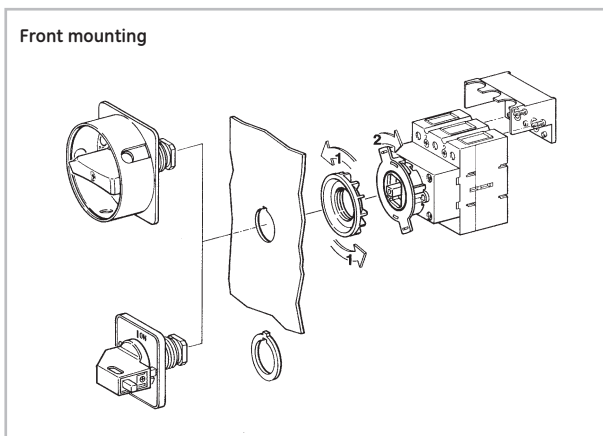


- ① Front mounting (flush mounting)
- ② Rear mounting
- ③ Main contact and PE-or N-terminals for ①
- ④ Main contact and PE-or N-terminals for ②
- ⑤ Auxiliary switch 1NO/1NG for ① and ②
- ⑥ Terminal cover triple for ① and ②
- ⑦ Terminal cover single for ③ and ④

- Mounting possibilities ● pg. I.3  
 Accessories ● pg. I.6  
 Technical data ● pg. I.8  
 Dimensions ● pg. I.9


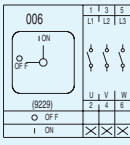

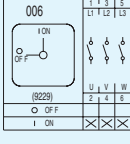

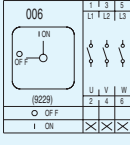

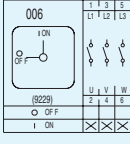

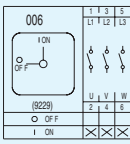
**Mounting possibilities**

	Ith	25A	40A	63A	80A	125A
	Series	ML 1	ML 1	ML 2	ML 2	ML 3
	Type	640	650	660	670	680
<b>Front mounting (flush mounting)</b>						
	Colour					
<b>Central fixing</b>						
Ø 22.5/30.5 mm for 3 padlocks	red/yellow	789178	789179			
Ø 22.5/30.5 mm for 3 padlocks	black	789180	789181			
Ø 22.5/30.5 mm for 1 or 2 padlocks	red/yellow	789174	789175			
Ø 22.5/30.5 mm for 1 or 2 padlocks	black	789176	789177			
<b>4-hole fixing</b>						
With standard handle	black	789239	789240	789241	789242	789243
For 3 padlocks	red/yellow	789186	789187	789188	789189	789190
For 3 padlocks	black	789191	789192	789193	789194	789195
For 1 or 2 padlocks	red/yellow	789182	789183			
For 1 or 2 padlocks	black	789184	789185			
<b>Rear mounting</b>						
<b>With cover coupling</b>						
For 3 padlocks	red/yellow	789200	789201	789202	789203	789204
For 3 padlocks	black	789205	789206	789207	789208	789209
For 1 or 2 padlocks	red/yellow	789196	789197			
For 1 or 2 padlocks	black	789198	789199			
<b>With door coupling</b>						
For 3 padlocks	red/yellow	789214	789215	789216	789217	789218
For 3 padlocks	black	789219	789220	789221	789122	789223
For 1 or 2 padlocks	red/yellow	789210	789211			
For 1 or 2 padlocks	black	789212	789213			
<b>DIN-rail mounting</b>						
With standard handle	black	789234	789235	789236	789237	789238
For 1 or 2 padlocks	red/yellow	789224	789225	789226	789227	789228
For 1 or 2 padlocks	black	789229	789230	789231	789232	789233




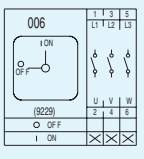

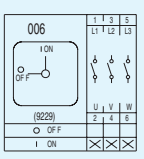

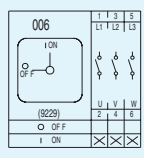

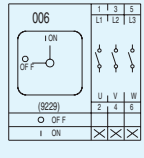
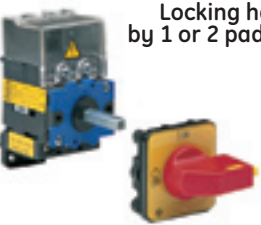
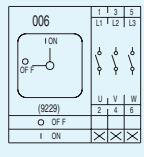

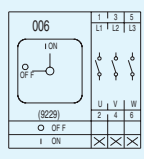


## Standard programme - Front mounting

Central fixing Ø 22.5/30.5 mm		Diagram	Protection	Ithe	Type	Red/yellow	Black/gray	Pack
						Ref. no.	Ref. no.	
 <p>Locking handle by 1 or 2 padlocks</p>		With terminal cover	IP65	25A	640	<b>789174</b>	<b>789176</b>	1
		With terminal cover	IP65	40A	650	<b>789175</b>	<b>789177</b>	1
 <p>Locking handle by 3 padlocks</p>		With terminal cover	IP65	25A	640	<b>789178</b>	<b>789180</b>	1
		With terminal cover	IP65	40A	650	<b>789179</b>	<b>789181</b>	1
4-hole fixing								
 <p>Locking handle by 1 or 2 padlocks</p>		With terminal cover	IP55	25A	640	<b>789182</b>	<b>789184</b>	1
		With terminal cover	IP55	40A	650	<b>789183</b>	<b>789185</b>	1
 <p>Locking handle by 3 padlocks</p>		With terminal cover	IP55	25A	640	<b>789186</b>	<b>789191</b>	1
		With terminal cover	IP55	40A	650	<b>789187</b>	<b>789192</b>	1
		With terminal cover	IP55	63A	660	<b>789188</b>	<b>789193</b>	1
		With terminal cover	IP55	80A	670	<b>789189</b>	<b>789194</b>	1
		With terminal cover	IP55	125A	680	<b>789190</b>	<b>789195</b>	1
 <p>With standard black handle</p>			IP55	25A	640		<b>789239</b>	1
			IP55	40A	650		<b>789240</b>	1
			IP55	63A	660		<b>789241</b>	1
			IP55	80A	670		<b>789242</b>	1
			IP55	125A	680		<b>789243</b>	1

Accessories see I.6

Standard programme - Rear mounting

DIN-rail mounting						Red/yellow	Black/gray	
			Protection	Ithe	Type	Ref. no.	Ref. no.	Pack
 <p>Locking handle by 1 or 2 padlocks</p>		With terminal cover	IP30	25A	640	789224	789229	1
		With terminal cover	IP30	40A	650	789225	789230	1
		With terminal cover	IP30	63A	660	789226	789231	1
		With terminal cover	IP30	80A	670	789227	789232	1
		With terminal cover	IP30	125A	680	789228	789233	1
 <p>With standard black handle</p>			IP30	25A	640		789234	1
			IP30	40A	650		789235	1
			IP30	63A	660		789236	1
			IP30	80A	670		789237	1
			IP30	125A	680		789238	1
With door coupling								
 <p>Locking handle by 1 or 2 padlocks</p>		With terminal cover	IP55	25A	640	789210	789212	1
		With terminal cover	IP55	40A	650	789211	789213	1
 <p>Locking handle by 3 padlocks</p>		With terminal cover	IP55	25A	640	789214	789219	1
		With terminal cover	IP55	40A	650	789215	789220	1
		With terminal cover	IP55	63A	660	789216	789221	1
		With terminal cover	IP55	80A	670	789217	789222	1
		With terminal cover	IP55	125A	680	789218	789223	1
With cover coupling								
 <p>Locking handle by 1 or 2 padlocks</p>		With terminal cover	IP65	25A	640	789196	789198	1
		With terminal cover	IP65	40A	650	789197	789199	1
 <p>Locking handle by 3 padlocks</p>		With terminal cover	IP65	25A	640	789200	789205	1
		With terminal cover	IP65	40A	650	789201	789206	1
		With terminal cover	IP65	63A	660	789202	789207	1
		With terminal cover	IP65	80A	670	789203	789208	1
		With terminal cover	IP65	125A	680	789204	789209	1

Accessories see I.6

Main switches

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## Accessories - Fitable contactbloccs <sup>(1)</sup>

Neutral switched			Fixed neutral module		
Front	Rear		Front	Rear	
789244	789245	1	789262	789263	1
Series ML1 - Type 640/650			Series ML1 - Type 640/650		
789246	789247	1	789264	789265	1
Series ML2 - Type 660/670			Series ML2 - Type 660/670		
789248	789249	1	789266	789267	3
Series ML3 - Type 680			Series ML3 - Type 680		

Switching contact			Auxiliary contact NO+NC I <sub>th</sub> = 16A		
Front	Rear		Front	Rear	
789250	789251	1	789268	789269	1
Series ML1 - Type 640/650			Series ML1 - Type 640/650		
789252	789253	1	789268	789269	1
Series ML2 - Type 660/670			Series ML2 - Type 660/670		
789254	789255	1	789268	789269	1
Series ML3 - Type 680			Series ML3 - Type 680		

PE-terminal (Fixed)		
Front	Rear	
789256	789257	1
Series ML1 - Type 640/650		
789258	789259	1
Series ML2 - Type 660/670		
789260	789261	1
Series ML3 - Type 680		

## Accessories - Terminal cover

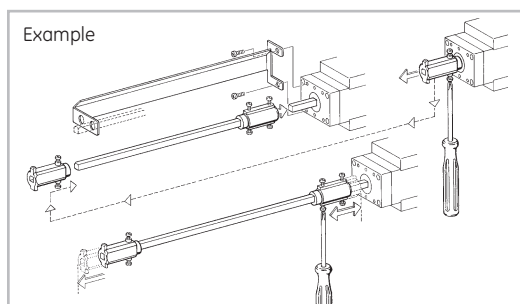
Single terminal cover (HS1)			Triple terminal cover (HS3)		
	789270	1		789272	1
Series ML1 - Type 640/650			Series ML1 - Type 640/650		
	789271	1		789273	1
Series ML2 - Type 660/670			Series ML2 - Type 660/670		
	789271	1		789274	1
Series ML3 - Type 680			Series ML3 - Type 680		
			Same cover for front- or base mounting		

## Extension shafts for door coupling

Shaft length	Depth range between door and base (mm)			Cat. no.
	ML1	ML2, ML3		
AL-65	170-215 mm	185-320 mm		789275
AL-165	265-335 mm	280-350 mm		789276
AL-265 <sup>(2)</sup>	365-435 mm	380-450 mm		789277
AL-365 <sup>(2)</sup>	465-535 mm	480-550 mm		789278
Shaft support for 265 and 365 mm				789279

An extension shaft is necessary when the depth is higher than the length of the standard shaft.  
 ML1: 105-135 mm  
 ML2 and ML3: 120-150 mm

- (1) ML1: max. 2 units  
ML2 and ML3: max 3 units
- (2) Shaft support included.



Enclosed switches



The maintenance switch is an enclosed main switch with locking handle by 3 padlocks. With red handle and yellow front plate, if it should be used as an emergency-stop switch, otherwise black/grey.

There are six sizes of standard enclosures for the series ML. Each is equipped with a cover coupling and a double PE-terminal. Switches type 640 (3 and 4-pole) are provided with an additional N-terminal.

All enclosures have a degree of protection IP65 and are of solid impact and flame resistant polyester.

Enclosed switches

	Diagram	Type	Ithe	Type of enclosure	Red/yellow 3 padlocks	Black/grey 3 padlocks	Pack.		
					Ref. no.	Ref. no.			
Three poles		640	25A	E2	789280	789285	1		
		650	32A	E3	789281	789286	1		
		660	50A	E4	789282	789287	1		
		670	63A	E5	789283	789288	1		
		680	100A	E7	789284	789289	1		
		640	25A	E2	789290	789295	1		
Four poles		650	32A	E3	789291	789296	1		
		660	50A	E4	789292	789297	1		
		670	63A	E5	789293	789298	1		
		680	100A	E7	789294	789299	1		
		Three poles + (1 NO + 1 NC)		640	25A	E2	789300	789305	1
				650	32A	E3	789301	789306	1
660	50A			E4	789302	789307	1		
670	63A			E5	789303	789308	1		
680	100A			E7	789304	789309	1		
Four poles + (1 NO + 1 NC)				640	25A	E2	789310	789315	1
		650	32A	E3	789311	789316	1		
		660	50A	E4	789312	789317	1		
		670	63A	E5	789313	789318	1		
		680	100A	E7	789314	789319	1		
		Six poles		640	25A	E2	789320	789325	1
650	32A			E3	789321	789326	1		
660	50A			E4	789322	789327	1		
670	63A			E5	789323	789328	1		
680	100A			E7	789324	789329	1		
Six poles + (1 NO + 1 NC)				640	25A	E2	789330	789335	1
		650	32A	E3	789331	789336	1		
		660	50A	E4	789332	789337	1		
		670	63A	E5	789333	789338	1		
		680	100A	E7	789334	789339	1		

Main switches

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## Technical data

### Main switches - According to IEC 60947-3, EN 60947-3, DIN VDE 0660 part 107, UL and CSA

Series			ML 1	ML 1	ML 2	ML 2	ML 3
<b>Types</b>			<b>640</b>	<b>650</b>	<b>660</b>	<b>670</b>	<b>680</b>
Rated uninterrupted current	$I_{u \text{ open}} = I_{th}$	(A)	25	40	63	80	125
	$I_{th \text{ enclosed}}$	(A)	25	32	50	63	100
Rated insulation voltage $U_i$ (III/3)		(V)	690	690	690	690	690
Rated impulse withstand voltage $U_{imp}$ (III/3)		(kV)	6	6	6	6	6
Rated operational current $I_e$ AC21 A <sup>(3)</sup>		(A)	25	40	63	80	125
Rated operational voltage $U_e$		(V)	690	690	690	690	690
Frequency		(Hz)	50/60	50/60	50/60	50/60	50/60
<b>Making/breaking capacity</b>							
Utilization category AC3:	3 x 230V	(kW)	5.5	7.5	15	18.5	22
Motor switches for operational switching	3 x 400V	(kW)	7.5	11	22	30	37
	3 x 690V	(kW)	7.5	11	22	30	45
Utilization category AC23A <sup>(3)</sup>	3 x 230V	(kW)	7.5	11	18.5	22	25
Motor switches (Main switches for machinery)	3 x 400V	(kW)	11	15	30 <sup>(1)</sup>	37 <sup>(2)</sup>	45
	3 x 690V	(kW)	11	15	30 <sup>(1)</sup>	37 <sup>(2)</sup>	45
Rated breaking category AC23 A <sup>(3)</sup>	3 x 230V	(A)	260	390	630	750	870
	3 x 400V	(A)	220	300	570	700	850
	3 x 690V	(A)	130	170	330	400	490
<b>Short-circuit capacity</b>							
Max. fuse rating gG		(A)	50	50	80	80	125
Rated conditional short-circuit current		(kA <sub>eff</sub> )	10	10	-	-	-
Rated short-circuit making capacity $I_{cm}$		(kA)	-	-	2.1	2.1	3.4
Rated short-time withstand $I_{cw}$ (1s-current)		(A <sub>eff</sub> )	300	480	765	960	1500
Disconnect function up to		(V)	690	690	690	690	690
Terminal screws (Pozidriv)			M4	M4	M5	M5	M6
Torque terminal screws		(Nm)	2.5	2.5	4	4	6
<b>Cable cross section</b>							
Solid or multi-stranded (Cu)		min. - max. (mm <sup>2</sup> )	1.5-10	1.5-10	2.5-35	2.5-35	6-70
Flexible with ferrule (DIN 46228)		min. - max. (mm <sup>2</sup> )	1.5-6	1.5-6	1.5-25	1.5-25	6-50
General purpose 3-phase		(A)	25	40	63	80	125
		(V)	600	600	600	600	600
 Motor 3-phase	240V	(HP)	7.5	10	15	20	25
	480V	(HP)	10	20	30	40	50
	600V	(HP)	10	20	30	40	50
 Motor 1-phase (2 pole)	120V	(HP)	1	1.5	3	4	6
	240V	(HP)	2	3	7.5	10	15
Cable cross section		AWG-No	14-7	14-3	14-2	14-2	8-1/0

(1) 22 kW in enclosure

(2) 30 kW in enclosure

(3) ML2/ML3 according to EN 60947-3 category B

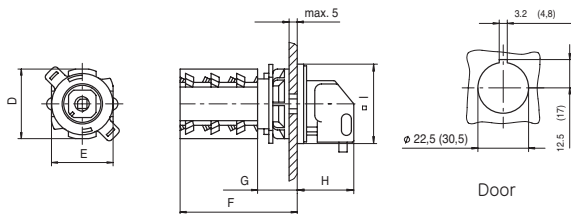
### Auxiliary contact for ML 1/2/3 - According to IEC 60947-5-1

Series			ML 1/2/3			
Rated uninterrupted current	$I_{u \text{ open}} = I_{th}$	(A)	16			
	$I_{th \text{ enclosed}}$	(A)	16			
Rated insulation voltage $U_i$ (III/3)		(V)	690			
Rated impulse withstand voltage $U_{imp}$		(kV)	6			
Rated operational current $I_e$ (AC15)						
	230V	(A)	6			
	400V	(A)	4			
	690V	(A)	2			
Max. fuse rating gG		(A)	16			
Rated conditional short-circuit current		(kA <sub>eff</sub> )	3			
Cable cross section, solid or multi-stranded		min. - max. (mm <sup>2</sup> )	1-4			
Flexible with ferrule (DIN 46228)		min. - max. (mm <sup>2</sup> )	1-2.5			
Terminal screws (Pozidriv)			M3			
Torque terminal screws		(Nm)	0.6			

## Dimensional drawings

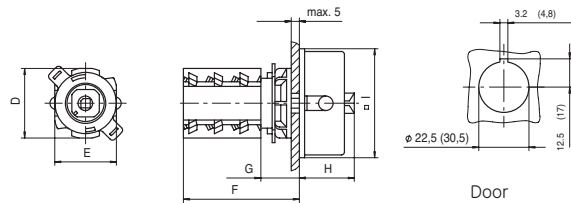
### Front mounting - Central fixing $\varnothing$ 22.5/30.5 mm

For 1 or 2 padlocks,  $\varnothing$  max. 5 mm



Series	D	E	F	G	H	I
ML1	55	45	75	25	35	48

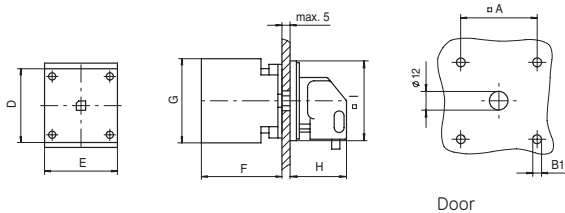
For 3 padlocks,  $\varnothing$  max. 9 mm



Series	D	E	F	G	H	I
ML1	55	45	75	25	35	66

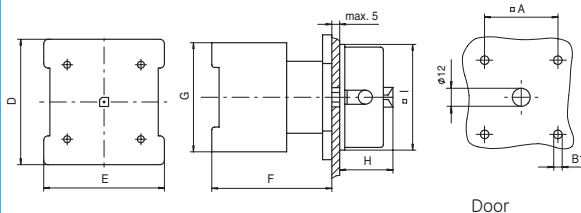
### Front mounting - 4-hole fixing

For 1 or 2 padlocks,  $\varnothing$  max. 5 mm



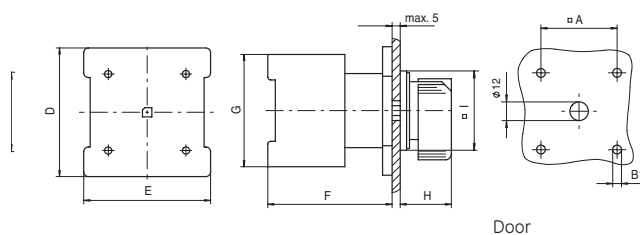
Series	A	B1	D	E	F	G	H	I
ML1	36	4.5	44	44	50	55	35	48

For 3 padlocks,  $\varnothing$  max. 5 mm



Series	A	B1	D	E	F	G	H	I
ML1	36	4.5	44	44	50	55	32	66
ML2	48	5.5	58	58	72	75	37	86
ML3	48	5.5	78	78	72	80	37	86

### Front mounting - 4-hole fixing, with standard black handle



Series	A	B1	D	E	F	G	H	I
ML1	36	4.5	44	44	50	55	29	48
ML2	48	5.5	58	58	72	75	33	64
ML3	69	5.5	78	78	72	80	35	88

A

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D

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F

G

H

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X

A

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D

E

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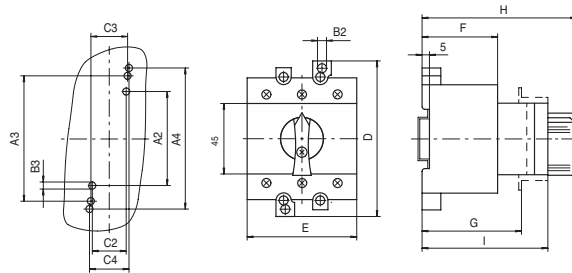
I

X

## Dimensional drawings

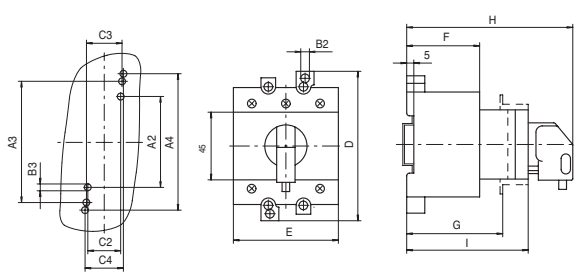
### Rear mounting - DIN-rail mounting

With standard black handle



Series	A2	A3	A4	B2	B3	C2	C3
ML1	60	65	70	4.2	3.8	22	30
ML2	-	80	90	5.5	5.2	-	23.5
ML3	-	80	90	5.5	5.2	-	23.5
Series	C4	D	E	F	G	H	I
ML1	25	78	52.5	42	48.5	87.5	67.5
ML2	25	100	53.5	49	-	100	79
ML3	25	100	70	49	-	100	79

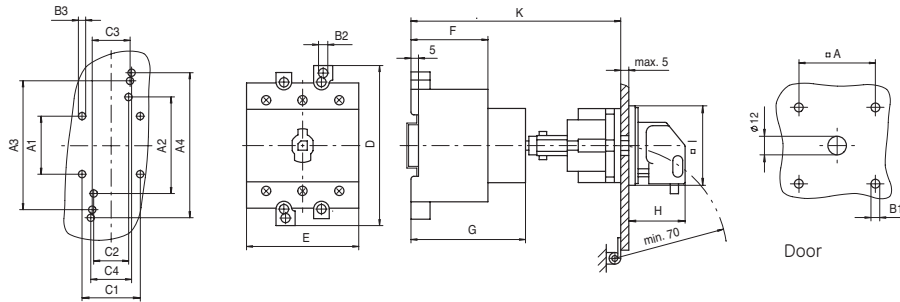
For 1 or 2 padlocks, Ø max. 5 mm



Series	A2	A3	A4	B2	B3	C2	C3
ML1	60	65	70	4.2	3.8	22	30
ML2	-	80	90	5.5	5.2	-	23.5
ML3	-	80	90	5.5	5.2	-	23.5
Series	C4	D	E	F	G	H	I
ML1	25	78	52.5	42	48.5	91.5	67.5
ML2	25	100	53.5	49	-	104	79
ML3	25	100	70	79	-	104	79

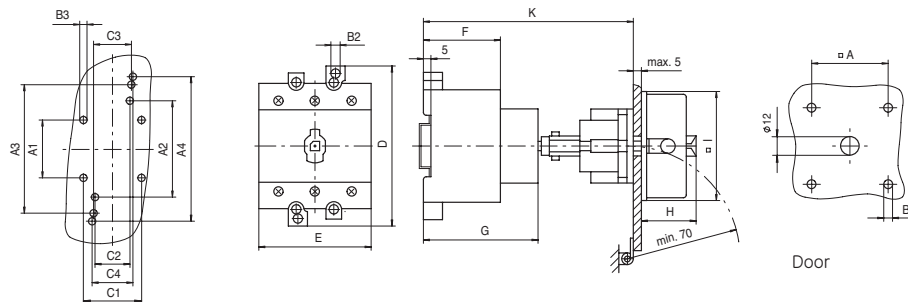
### Rear mounting - With door coupling

For 1 or 2 padlocks, Ø max. 5 mm



Series	A	A2	A3	A4	B1	B2	B3	C2	C3	C4	D	E	F	G	H	I	K
ML1	36	60	65	70	4.5	4.2	3.8	22	30	25	78	45	42	55	35	48	105-135

For 3 padlocks, Ø max. 5 mm

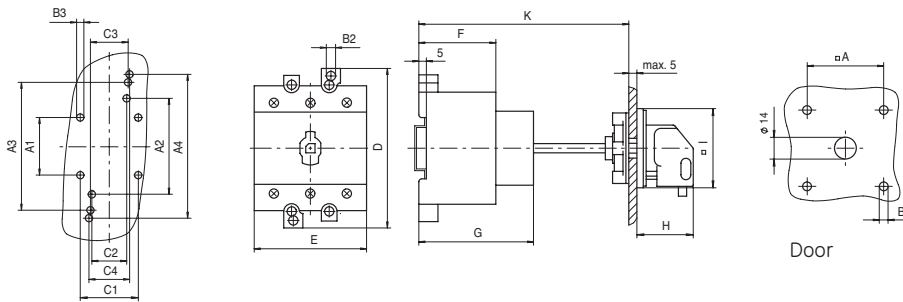


Series	A	A2	A3	A4	B1	B2	B3	C2	C3	C4	D	E	F	G	H	I	K
ML1	36	60	65	70	4.5	4.2	3.8	22	30	25	78	45	42	55	32	66	105-135
ML2	36	-	80	90	5.5	5.5	5.2	-	23.5	25	100	53.5	49	72	37	86	120-150
ML3	36	-	80	90	5.5	5.5	5.2	-	23.5	25	100	70	49	72	37	86	120-150



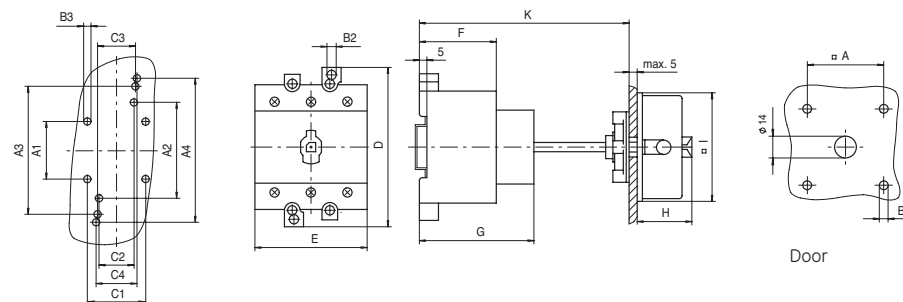
### Rear mounting - With cover coupling

For 1 or 2 padlocks,  $\varnothing$  max. 9 mm



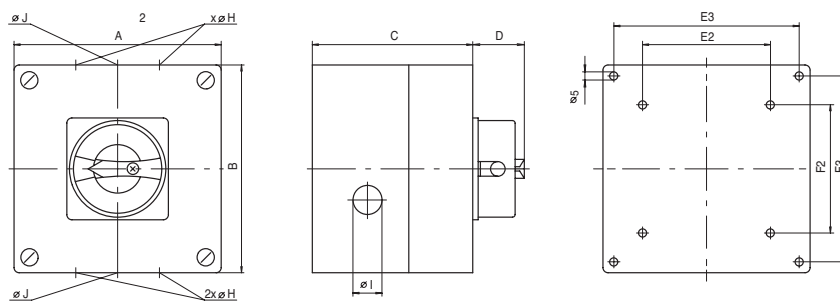
Series	A	A2	A3	A4	B1	B2	B3	C2	C3	C4	D	E	F	G	H	I	K
ML1	36	60	65	70	4.5	4.2	3.8	22	30	25	78	45	42	55	35	48	105-135

For 3 padlocks,  $\varnothing$  max. 9 mm



Series	A	A2	A3	A4	B1	B2	B3	C2	C3	C4	D	E	F	G	H	I	K
ML1	36	60	65	70	4.5	4.2	3.8	22	30	25	78	45	42	55	32	66	88-98
ML2	36	-	80	90	5.5	5.5	5.2	-	23.5	25	100	53.5	49	72	37	86	103-113
ML3	36	-	80	90	5.5	5.5	5.2	-	23.5	25	100	70	49	72	37	86	103-113

### Enclosed switches



Enclosure								
Type	A	B	C	D	E2	E3	F2	F3
E2	94	130	81	32	-	79	-	115
E3	130	130	99	32	-	115	-	115
E4	110	180	11	32	50	95	120	165
E5	180	182	111	37	120	165	120	167
E6	180	254	111	37	120	165	190	239
E7	265	265	140	37	194	-	230	-

Cable entry					
Type	H (1)	I (1)	H (2)	I (2)	J (2)
E2	PG 16/11	PG 11	-	-	-
E3	PG 21/16	PG 16	-	-	-
E4	-	-	PG 21	PG 11	-
E5	-	-	PG 29	-	PG 11
E6	-	-	PG 29	PG 11	-
E7	PG 36/29	PG 29	-	-	-

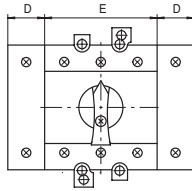
(1) Knock-out entry  
(2) Cable entry



## Dimensional drawings

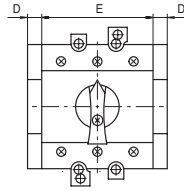
### Accessories

N-module and PE-terminal



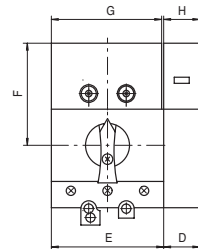
Series	D	E
ML1	14.5	45
ML2	23	53.5
ML3	23	70

Auxiliary contacts (NO + NC)



Series	D	E
ML1	9.5	45
ML2	9.5	53.5
ML3	9.5	70

Terminal covers



Series	D	E	F	G	H
ML1	14.5	45	53	41	14
ML2	23	53.5	61	52	22.5
ML3	23	70	65	68	22.5

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	Plug-in relays and Auxiliary contactors	A
	Motor protection devices	B
X.2 <b>Completed catalogue numbers</b>	Contactors and Thermal overload relays	C
X.2 Chap. A - Series M - Auxiliary minicontactors	Motorstarters	D
X.3 Chap. A - Series RL - Auxiliary contactors	Control and signalling units	E
X.4 Chap. C - Series M - Minicontactors	Electronic relays	F
X.6 Chap. C - Series CL - Contactors	Limit switches	G
X.7 Chap. C - Series CK - Contactors	Speed drive units	H
X.8 Chap. E - Series P9 - Control and signalling units Ø 22 mm	Main switches	I
X.8 Chap. E - Series 077 - Control and signalling units Ø 30 mm	Numerical index	X
X.9 <b>General index by catalogue number</b>		
X.17 <b>General index by reference number</b>		



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This list shows the catalogue and reference numbers for the **auxiliary minicontactors** with the most usual voltages. For other voltages/types, please consult us.

Cat. no.	Ref. no.	
<b>50Hz</b> <span style="float: right;">pg. A.17</span>		
MBOAG	100452	48V
MBOAK	102400	115/127V
MBOAN	100454	220/240V
MBOAS	102403	260V
MBOAU	213532	380/400V
MBOAW	102405	415/440V
MCRA004AFN	100094	220/240V
MCRA004AIN	100144	220/240V
MCRA004ATG	100042	48V
MCRA004ATK	102090	115/127V
MCRA004ATN	100044	220/240V
MCRA004ATS	102093	260V
MCRA004ATU	100045	380/400V
MCRA004ATW	102095	415/440V
MCRA013AFN	100084	220/240V
MCRA013AIN	100134	220/240V
MCRA013ATG	100032	48V
MCRA013ATK	102069	115/127V
MCRA013ATN	100034	220/240V
MCRA013ATS	102072	260V
MCRA013ATU	100035	380/400V
MCRA013ATW	102074	415/440V
MCRA022AFG	100072	48V
MCRA022AFN	100074	220/240V
MCRA022AIN	100124	220/240V
MCRA022AIU	100125	380/400V
MCRA022ATG	100022	48V
MCRA022ATK	102048	115/127V
MCRA022ATN	100024	220/240V
MCRA022ATS	102051	260V
MCRA022ATU	100025	380/400V
MCRA022ATW	102053	415/440V
MCRA031AFG	100062	48V
MCRA031AFN	100064	220/240V
MCRA031AFU	100065	380/400V
MCRA031AIG	100112	48V
MCRA031AIN	100114	220/240V
MCRA031AIU	100115	380/400V
MCRA031ATG	100012	48V
MCRA031ATK	102027	115/127V
MCRA031ATN	100014	220/240V
MCRA031ATS	102030	260V
MCRA031ATU	100015	380/400V
MCRA031ATW	102032	415/440V
MCRA040AFN	100054	220/240V
MCRA040AFU	100055	380/400V
MCRA040AIN	100104	220/240V
MCRA040ATG	100002	48V
MCRA040ATK	102006	115/127V
MCRA040ATN	100004	220/240V
MCRA040ATS	102009	260V
MCRA040ATU	100005	380/400V
MCRA040ATW	102011	415/440V
<b>50Hz</b> <span style="float: right;">pg. A.17</span>		
MBOAE	102397	32V
MBOAF	102398	48V
MBOAM	102401	208/220V
MBOAU	213532	440V
MBOAY	102406	600V
MCRA004ATE	102087	32V
MCRA004ATM	102091	208/220V
MCRA004ATU	100045	440V
MCRA004ATY	102096	600V
MCRA013ATE	102066	32V
MCRA013ATM	102070	208/220V
MCRA013ATU	100035	440V
MCRA013ATY	102075	600V
MCRA022AIU	100125	440V
MCRA022ATE	102045	32V
MCRA022ATH	102047	110V
MCRA022ATM	102049	208/220V
MCRA022ATU	100025	440V
MCRA022ATY	102054	600V
MCRA031AFU	100065	440V
MCRA031AIU	100115	440V
MCRA031ATE	102024	32V
MCRA031ATM	102028	208/220V
MCRA031ATU	100015	440V
MCRA031ATY	102033	600V
MCRA040ATE	102003	32V
MCRA040ATM	102007	208/220V
MCRA040ATU	100005	440V
MCRA040ATY	102012	600V

Cat. no.	Ref. no.		Cat. no.	Ref. no.
<b>50/60Hz</b> <span style="float: right;">pg. A.17</span>			MCRC031ATG	100017 48V
MBOA1	102407	24V	MCRC031ATH	102327 60V
MBOA2	102408	42V	MCRC031ATI	102328 72V
MBOA3	102409	110/115V	MCRC031ATJ	100018 110V
MBOA4	102410	120V	MCRC031ATK	102329 120V
MBOA5	102411	220V	MCRC031ATL	102330 125V
MBOA6	102412	230V	MCRC031ATN	100019 220V
MBOA7	102413	240V	MCRC031ATR	102331 240V
MBOA8	102414	440V	MCRC031ATS	102324 250V
MBOA9	133717	48V	MCRC040AFD	100056 24V
MCRA004AT1	102097	24V	MCRC040AFG	100057 48V
MCRA004AT2	102098	42V	MCRC040AID	102332 24V
MCRA004AT3	102099	110/115V	MCRC040ATB	100000 12V
MCRA004AT4	102100	120V	MCRC040ATC	102315 32V
MCRA004AT5	102101	220V	MCRC040ATD	100006 24V
MCRA004AT6	102102	230V	MCRC040ATE	102316 36V
MCRA004AT7	102103	240V	MCRC040ATF	102317 42V
MCRA004AT8	102104	440V	MCRC040ATG	100007 48V
MCRA004AT9	108859	48V	MCRC040ATH	102318 60V
MCRA013AT1	102076	24V	MCRC040ATI	102319 72V
MCRA013AT2	102077	42V	MCRC040ATJ	100008 110V
MCRA013AT3	102078	110/115V	MCRC040ATK	102320 120V
MCRA013AT4	102079	120V	MCRC040ATL	102321 125V
MCRA013AT5	102080	220V	MCRC040ATN	100009 220V
MCRA013AT6	102081	230V	MCRC040ATR	102322 240V
MCRA013AT7	102082	240V	MCRC040ATS	100040 250V
MCRA013AT8	102083	440V		
MCRA022AFB	107493	440V		
MCRA022AI5	100129	220V		
MCRA022AT1	102055	24V		
MCRA022AT2	102056	42V		
MCRA022AT3	102057	110/115V		
MCRA022AT4	102058	120V		
MCRA022AT5	102059	220V		
MCRA022AT6	102060	230V		
MCRA022AT7	102061	240V		
MCRA022AT8	102062	440V		
MCRA022AT9	108236	48V		
MCRA031AT1	102034	24V		
MCRA031AT2	102035	42V		
MCRA031AT3	102036	110/115V		
MCRA031AT4	102037	120V		
MCRA031AT5	102038	220V		
MCRA031AT6	102039	230V		
MCRA031AT7	102040	240V		
MCRA031AT8	102041	440V		
MCRA031AT9	108238	48V		
MCRA040AT1	102013	24V		
MCRA040AT2	102014	42V		
MCRA040AT3	102015	110/115V		
MCRA040AT4	102016	120V		
MCRA040AT5	102017	220V		
MCRA040AT6	102018	230V		
MCRA040AT7	102019	240V		
MCRA040AT8	102020	440V		
MCRA040AT9	108237	48V		
	<b>Direct current</b>	<b>pg. A.17</b>		
MBOCA	102415	6V		
MBOCB	100460	12V		
MBOCC	102416	32V		
MBOCD	100466	24V		
MBOCE	102417	36V		
MBOCF	102418	42V		
MBOCG	100467	48V		
MBOCI	102420	72V		
MBOCJ	100468	110V		
MBOCK	102421	120V		
MBOCL	102422	125V		
MBOCN	100469	220V		
MBOCR	102423	240V		
MBOCS	100449	250V		
MBOCH	102419	60V		
MCRC022AFG	100077	48V		
MCRC022AFL	102366	125V		
MCRC022AFN	100079	220V		
MCRC022AID	100126	24V		
MCRC022AIJ	100128	110V		
MCRC022ATB	100020	12V		
MCRC022ATC	102333	32V		
MCRC022ATD	100026	24V		
MCRC022ATE	102334	36V		
MCRC022ATF	102335	42V		
MCRC022ATG	100027	48V		
MCRC022ATH	102336	60V		
MCRC022ATI	102337	72V		
MCRC022ATJ	100028	110V		
MCRC022ATK	102338	120V		
MCRC022ATL	102339	125V		
MCRC022ATN	100029	220V		
MCRC022ATR	102340	240V		
MCRC022ATS	108953	250V		
MCRC031AFD	100066	24V		
MCRC031AID	100116	24V		
MCRC031ATA	102323	6V		
MCRC031ATB	100010	12V		
MCRC031ATD	100016	24V		
MCRC031ATE	102325	36V		
MCRC031ATF	102326	42V		



This list shows the catalogue and reference numbers for the **auxiliary contactors** with the most usual voltages.  
For other voltages/ types, please consult us.

Cat. no.	Ref. no.
RL4RA040T3	109018 110/115V
RL4RA040T4	109019 120V
RL4RA040T5	109020 220V
RL4RA040T6	109021 230V
RL4RA040T7	109022 240V
RL4RA040T8	109023 440V

**Direct current** pg. A.23

LB1DB	112310 12V
LB1DD	112316 24V
LB1DE	112650 36V
LB1DF	112651 42V
LB1DG	112317 48V
LB1DH	112652 60V
LB1DI	112653 72V
LB1DJ	112318 110V
LB1DK	112654 120/125V
LB1DN	112319 220V
LB1DP	112655 230V
LB1DR	112656 240V
LB1DT	112657 250V
LB1DWB	113523 12V (WR)
LB1DWD	113524 24V (WR)
LB1DWE	113525 33V (WR)
LB1DWG	113526 48V (WR)
LB1DWI	113527 72V (WR)
LB1DWJ	113528 110V (WR)
LB1DWN	113529 220V (WR)
LB1DX	112658 440V

**50Hz** pg. A.23

LB1AE	110401 32V
LB1AK	110405 127V
LB1AN	104634 220/230V
LB1AU	104635 380/400V
LB1AW	110412 415V
LB1AZ	110415 660/690V
RL4RA004TE	109073 32V
RL4RA004TK	109077 127V
RL4RA004TN	104034 220/230V
RL4RA004TU	104035 380/400V
RL4RA004TW	109084 415V
RL4RA004TZ	109087 660/690V
RL4RA022TE	109049 32V
RL4RA022TK	109053 127V
RL4RA022TN	104024 220/230V
RL4RA022TU	104025 380/400V
RL4RA022TW	109060 415V
RL4RA022TZ	109063 660/690V
RL4RA031TE	109025 32V
RL4RA031TK	109029 127V
RL4RA031TN	104014 220/230V
RL4RA031TU	104015 380/400V
RL4RA031TW	109036 415V
RL4RA031TZ	109039 660/690V
RL4RA040TE	109001 32V
RL4RA040TK	109005 127V
RL4RA040TN	104004 220/230V
RL4RA040TU	104005 380/400V
RL4RA040TW	109012 415V
RL4RA040TZ	109015 660/690V

**60Hz** pg. A.23

LB1AL	110406 208V
LB1AT	110410 380V
LB1AY	110414 600V
RL4RA004TL	109078 208V
RL4RA004TT	109082 380V
RL4RA004TY	109086 600V
RL4RA022TL	109054 208V
RL4RA022TT	109058 380V
RL4RA022TY	109062 600V
RL4RA031TL	109030 208V
RL4RA031TT	109034 380V
RL4RA031TY	109038 600V
RL4RA040TL	109006 208V
RL4RA040TT	109010 380V
RL4RA040TY	109014 600V

**50/60Hz** pg. A.23

LB1A1	110416 24V
LB1A2	110417 42V
LB1A3	110418 110/115V
LB1A4	110419 120V
LB1A5	110420 220V
LB1A6	110421 230V
LB1A7	110422 240V
LB1A8	110423 440V
LB1A9	113979 48V
RL4RA004T1	109088 24V
RL4RA004T2	109089 42V
RL4RA004T3	109090 110/115V
RL4RA004T4	109091 120V
RL4RA004T5	109092 220V
RL4RA004T6	109093 230V
RL4RA004T7	109094 240V
RL4RA004T8	109095 440V
RL4RA022T1	109064 24V
RL4RA022T2	109065 42V
RL4RA022T3	109066 110/115V
RL4RA022T4	109067 120V
RL4RA022T5	109068 220V
RL4RA022T6	109069 230V
RL4RA022T7	109070 240V
RL4RA022T8	109071 440V
RL4RA031T1	109040 24V
RL4RA031T2	109041 42V
RL4RA031T3	109042 110/115V
RL4RA031T4	109043 120V
RL4RA031T5	109044 220V
RL4RA031T6	109045 230V
RL4RA031T7	109046 240V
RL4RA031T8	109047 440V
RL4RA040T1	109016 24V
RL4RA040T2	109017 42V

**RL4RD004TB** 113030 12V

RL4RD004TD	113036 24V
RL4RD004TE	113077 36V
RL4RD004TG	113037 48V
RL4RD004TJ	113038 110V
RL4RD004TK	113081 120/125V
RL4RD004TN	113039 220V
RL4RD004TT	113084 250V
RL4RD022GD	113046 24V
RL4RD022GJ	113048 110V
RL4RD022TB	113020 12V
RL4RD022TD	113026 24V
RL4RD022TE	113068 36V
RL4RD022TG	113027 48V
RL4RD022TJ	113028 110V
RL4RD022TK	113072 120/125V
RL4RD022TN	113029 220V
RL4RD022TP	113073 230V
RL4RD022TT	113075 250V
RL4RD031TB	113010 12V
RL4RD031TD	113016 24V
RL4RD031TE	113059 36V
RL4RD031TG	113017 48V
RL4RD031TH	113061 60V
RL4RD031TJ	113018 110V
RL4RD031TK	113063 120/125V
RL4RD031TN	113019 220V
RL4RD031TT	113066 250V
RL4RD031TX	113067 440V
RL4RD040TB	113000 12V
RL4RD040TD	113006 24V
RL4RD040TE	113050 36V
RL4RD040TG	113007 48V
RL4RD040TJ	113008 110V
RL4RD040TK	113054 120/125V
RL4RD040TN	113009 220V
RL4RD040TT	113057 250V

**Mechanical latch blocks** pg. A.24

RMLFD	112992
RMLFG	112993
RMLFJ	112994
RMLFN	112995
RMLFU	112996
RMLFY	112997

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This list shows the catalogue and reference numbers for the **minicontactors** with the most usual voltages. For other voltages/types, please consult us.

Cat. no.	Ref. no.	pg. C.3-C.5
MBOAG	100452	48V
MBOAK	102400	115/127V
MBOAN	100454	220/240V
MBOAS	102403	260V
MBOAU	213532	380/400V
MBOAW	102405	415/440V
MCOA301AFN	100184	220/240V
MCOA301AIG	100202	48V
MCOA301AIN	100204	220/240V
MCOA301AIU	100205	380/400V
MCOA301ARN	103377	220/240V
MCOA301ARU	103378	380/400V
MCOA301ATG	100162	48V
MCOA301ATK	102451	115/127V
MCOA301ATN	100164	220/240V
MCOA301ATS	102454	260V
MCOA301ATU	100165	380/400V
MCOA301ATW	102456	415/440V
MCOA310AFG	100172	48V
MCOA310AFT	100174	220/240V
MCOA310AIG	100192	48V
MCOA310AIN	100194	220/240V
MCOA310AIU	100195	380/400V
MCOA310ARN	103364	220/240V
MCOA310ARU	103365	380/400V
MCOA310ATG	100152	48V
MCOA310ATK	102430	115/127V
MCOA310ATN	100154	220/240V
MCOA310ATS	102433	260V
MCOA310ATU	100155	380/400V
MCOA310ATW	102435	415/440V
MCOA400AFN	100304	220/240V
MCOA400AIN	100334	220/240V
MCOA400AIU	100335	380/400V
MCOA400ATG	100272	48V
MCOA400ATK	102790	115/127V
MCOA400ATN	100274	220/240V
MCOA400ATS	102793	260V
MCOA400ATU	100275	380/400V
MCOA400ATW	102795	415/440V
MCOA400AFT	100354	220/240V
MCOA400ATG	100292	48V
MCOA400ATK	102832	115/127V
MCOA400ATN	100294	220/240V
MCOA400ATS	102835	260V
MCOA400ATU	100295	380/400V
MCOA400ATW	102837	415/440V
MCOA800AFN	100314	220/240V
MCOA800AIN	100344	220/240V
MCOA800AIG	100282	48V
MCOA800ATK	102811	115/127V
MCOA800ATN	100284	220/240V
MCOA800ATS	102814	260V
MCOA800ATU	100285	380/400V
MCOA800ATW	102816	415/440V
MCI A301AFG	100242	48V
MCI A301AFK	102673	115/127V
MCI A301AFN	100244	220/240V
MCI A301AFS	102676	260V
MCI A301AFU	100245	380/400V
MCI A301AFW	102678	415/440V
MCI A301AIG	100262	48V
MCI A301AIN	100264	220/240V
MCI A301AIU	100265	380/400V
MCI A301ARN	103403	220/240V
MCI A301ARU	103404	380/400V
MCI A301ATG	100222	48V
MCI A301ATK	102631	115/127V
MCI A301ATN	100224	220/240V
MCI A301ATS	102634	260V
MCI A301ATU	100225	380/400V
MCI A301ATW	102636	415/440V
MCI A310AFG	100232	48V
MCI A310AFK	102652	115/127V
MCI A310AFN	100234	220/240V
MCI A310AFS	102655	260V
MCI A310AFU	100235	380/400V
MCI A310AFW	102657	415/440V
MCI A310AIG	100252	48V
MCI A310AIN	100254	220/240V
MCI A310AIU	100255	380/400V
MCI A310ARN	103990	220/240V
MCI A310ARU	103991	380/400V

Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	
MCI A310ATG	100212	48V	MCI A301AFY	102679	600V	MCOA400AT5	102801	220V
MCI A310ATK	102610	115/127V	MCI A301AIM	102716	208/220V	MCOA400AT6	102802	230V
MCI A310ATN	100214	220/240V	MCI A301AIW	100265	440V	MCOA400AT7	102803	240V
MCI A310ATS	102613	260V	MCI A301AIU	103404	440V	MCOA400AT8	102804	440V
MCI A310ATU	100215	380/400V	MCI A301ATE	102628	32V	MCOA400AT9	100290	48V
MCI A310ATW	102615	415/440V	MCI A301ATM	102632	208/220V	MCOA400AT1	102839	24V
MCI A400AFG	100392	48V	MCI A301ATY	100225	440V	MCOA400AT2	102840	42V
MCI A400AFK	103042	115/127V	MCI A301ATV	102637	600V	MCOA400AT3	102841	110/115V
MCI A400AFN	100394	220/240V	MCI A310AFE	102649	32V	MCOA400AT4	102842	120V
MCI A400AFS	103045	260V	MCI A310AFM	102653	208/220V	MCOA400AT5	102843	220V
MCI A400AFU	100395	380/400V	MCI A310AFU	100235	440V	MCOA400AT6	102844	230V
MCI A400AFW	103047	415/440V	MCI A310AFY	102658	600V	MCOA400AT7	102845	240V
MCI A400AIG	100422	48V	MCI A310AIU	100255	440V	MCOA400AT8	102846	440V
MCI A400AIN	100424	220/240V	MCI A310ARI	103391	440V	MCOA800AT1	102818	24V
MCI A400AIU	100425	380/400V	MCI A310ATE	102607	32V	MCOA800AT2	102819	42V
MCI A400AIW	103110	415/440V	MCI A310ATM	102611	208/220V	MCOA800AT3	102820	110/115V
MCI A400ATG	100362	48V	MCI A310ATU	100215	440V	MCOA800AT4	102821	120V
MCI A400ATK	102979	115/127V	MCI A310ATV	100216	600V	MCOA800AT5	102822	200V
MCI A400ATN	100364	220/240V	MCI A400AFE	103039	32V	MCOA800AT6	102823	230V
MCI A400ATS	102982	260V	MCI A400AFM	103043	208/220V	MCOA800AT7	102824	240V
MCI A400ATU	100365	380/400V	MCI A400AFU	100395	440V	MCOA800AT8	102825	440V
MCI A400ATW	102984	415/440V	MCI A400AFY	103048	600V	MCI A301AF1	102680	24V
MCI A400AFT	100412	48V	MCI A400AIF	113267	600V	MCI A301AF2	102681	42V
MCI A400AFK	103084	115/127V	MCI A400ATE	102976	32V	MCI A301AF3	102682	110/115V
MCI A400AFN	100414	220/240V	MCI A400ATM	102980	208/220V	MCI A301AF4	102683	120V
MCI A400AFS	103087	260V	MCI A400ATU	103965	440V	MCI A301AF5	102684	220V
MCI A400AFU	100415	380/400V	MCI A400ATV	102985	600V	MCI A301AF6	102685	230V
MCI A400AFW	103089	415/440V	MCI A400AFT	103081	32V	MCI A301AF7	102686	240V
MCI A400AIG	100444	220/240V	MCI A400AFU	103085	208/220V	MCI A301AF8	102687	440V
MCI A400AIN	100382	48V	MCI A400AFY	100415	440V	MCI A301AF9	102722	24V
MCI A400AIU	103021	115/127V	MCI A400AFZ	103090	600V	MCI A301AI3	102724	110/115V
MCI A400AIW	103084	220/240V	MCI A400ATG	103018	32V	MCI A301AI5	102726	220V
MCI A400ATG	103024	260V	MCI A400ATM	103022	208/220V	MCI A301AI6	107167	230V
MCI A400ATK	100385	380/400V	MCI A400ATU	103385	440V	MCI A301AR1	103399	24V
MCI A400ATN	103026	415/440V	MCI A400ATV	103027	600V	MCI A301AR9	103400	48V
MCI A400ATS	100402	48V	MCI A800AFE	103060	32V	MCI A301AT1	102638	24V
MCI A400AFK	103063	115/127V	MCI A800AFM	103064	208/220V	MCI A301AT2	102639	42V
MCI A400AFN	100404	220/240V	MCI A800AFU	100405	440V	MCI A301AT3	102640	110/115V
MCI A400AFS	103066	260V	MCI A800AFY	103069	600V	MCI A301AT4	102641	120V
MCI A400AFU	100405	380/400V	MCI A800ATE	102997	32V	MCI A301AT5	102642	220V
MCI A400AFW	103068	415/440V	MCI A800ATM	103001	208/220V	MCI A301AT6	102643	230V
MCI A800AIN	100434	220/240V	MCI A800ATU	100375	440V	MCI A301AT7	102644	240V
MCI A800AIG	100372	48V	MCI A800ATV	103006	600V	MCI A301AT8	102645	440V
MCI A800ATK	103000	115/127V	MCI A800ATW	103007	440V	MCI A301AT9	100320	48V
MCI A800ATN	100374	220/240V	MCI A800ATX	103567	440V	MCI A310AF1	102659	24V
MCI A800ATS	103003	260V	MCI A800ATY	103417	440V	MCI A310AF2	102660	42V
MCI A800ATU	100375	380/400V	MCI A800ATZ	103575	440V	MCI A310AF3	102661	110/115V
MCI A800ATW	103005	415/440V	MCI A800AT1	103292	440V	MCI A310AF4	102662	120V
MCI A800ATX	101019	220/240V				MCI A310AF5	102663	220V
MCI A800ATY	103289	380/400V				MCI A310AF6	102664	230V
MCI A800ATZ	103429	220/240V				MCI A310AF7	102665	240V
MCI A800AT1	103430	380/400V				MCI A310AF8	102666	440V
MCI A800AT2	103564	48V				MCI A310AF9	102667	240V
MCI A800AT3	103566	220/240V				MCI A310AI1	102701	24V
MCI A800AT4	103567	380/400V				MCI A310AI3	102703	110/115V
MCI A800AT5	101018	220/240V				MCI A310AI5	102705	220V
MCI A800AT6	103290	380/400V				MCI A310AI9	102706	48V
MCI A800AT7	103416	220/240V				MCI A310AR1	103386	24V
MCI A800AT8	103417	380/400V				MCI A310AR9	103387	48V
MCI A800AT9	103418	440V				MCI A310AT1	102617	24V
MCI A800AT10	103419	440V				MCI A310AT2	102618	42V
MCI A800AT11	133717	48V				MCI A310AT3	102619	110/115V
MCI A800AT12	133718	48V				MCI A310AT4	102620	120V
MCI A800AT13	102542	24V				MCI A310AT5	102621	220V
MCI A800AT14	102544	110/115V				MCI A310AT6	102622	230V
MCI A800AT15	102546	220V				MCI A310AT7	102623	240V
MCI A800AT16	102547	330V				MCI A310AT8	102624	440V
MCI A800AT17	102548	440V				MCI A310AT9	100298	48V
MCI A800AT18	102549	600V				MCI A400AF1	103049	24V
MCI A800AT19	102550	800V				MCI A400AF2	103050	42V
MCI A800AT20	102551	1100V				MCI A400AF3	103051	110/115V
MCI A800AT21	102552	1500V				MCI A400AF4	103052	120V
MCI A800AT22	102553	2000V				MCI A400AF5	103053	220V
MCI A800AT23	102554	2700V				MCI A400AF6	103054	240V
MCI A800AT24	102555	3600V				MCI A400AF7	103055	240V
MCI A800AT25	102556	4800V				MCI A400AF8	103056	440V
MCI A800AT26	102557	6000V				MCI A400AI1	103112	24V
MCI A800AT27	102558	8000V				MCI A400AT1	102986	24V
MCI A800AT28	102559	11000V				MCI A400AT2	102987	42V
MCI A800AT29	102560	15000V				MCI A400AT3	102988	110/115V
MCI A800AT30	102561	20000V				MCI A400AT4	102989	120V
MCI A800AT31	102562	27000V				MCI A400AT5	102990	220V
MCI A800AT32	102563	36000V				MCI A400AT6	102991	230V
MCI A800AT33	102564	48000V				MCI A400AT7	102992	240V
MCI A800AT34	102565	60000V				MCI A400AT8	102993	440V
MCI A800AT35	102566	80000V				MCI A400AT9	100296	48V
MCI A800AT36	102567	110000V				MCI A400AT10	100297	24V
MCI A800AT37	102568	150000V				MCI A400AT11	100298	42V
MCI A800AT38	102569	200000V				MCI A400AT12	100299	24V
MCI A800AT39	102570	270000V				MCI A400AT13	100300	42V
MCI A800AT40	102571	360000V				MCI A400AT14	100301	24V
MCI A800AT41	102572	480000V				MCI A400AT15	100302	42V
MCI A800AT42	102573	600000V				MCI A400AT16	100303	110/115V

Cat. no.	Ref. no.	Cat. no.	Ref. no.		
MC0C400AFD	100306	24V	MC1CB00ATI	103230	72V
MC0C400AFG	100267	48V	MC1CB00ATJ	100378	110V
MC0C400AID	100336	24V	MC1CB00ATK	103231	120V
MC0C400AIH	103202	60V	MC1CB00ATN	100379	220V
MC0C400ATB	100270	12V	MC1CB00ATR	103233	240V
MC0C400ATD	100276	24V	MC1I301ARD	103441	24V
MC0C400ATE	103164	36V	MC1I301ATD	100573	24V
MC0C400ATF	103165	42V	MC1I310ARD	103440	24V
MC0C400ATG	100277	48V	MC1I310ATD	100572	24V
MC0C400ATH	103166	60V	MC2C301AIB	103287	12V
MC0C400ATI	103167	72V	MC2C301AID	103286	24V
MC0C400ATJ	100278	110V	MC2C301AIG	103285	48V
MC0C400ATK	103168	120V	MC2C301AIH	103284	60V
MC0C400ATL	103169	125V	MC2C301AIJ	103283	110V
MC0C400ATN	100279	220V	MC2C301AIK	103282	120V
MC0C400ATR	103170	240V	MC2C301AIN	103281	220V
MC0CB00ATB	100280	12V	MC2C301ARB	103431	12V
MC0CB00ATD	100286	24V	MC2C301ARD	103432	24V
MC0CB00ATE	103173	36V	MC2C301ARG	103433	48V
MC0CB00ATF	103174	42V	MC2C301ARH	103434	60V
MC0CB00ATG	100287	48V	MC2C301ARJ	103435	110V
MC0CB00ATH	103175	60V	MC2C301ARK	103436	120V
MC0CB00ATI	103176	72V	MC2C301ARN	103437	220V
MC0CB00ATJ	100288	110V	MC2C301ATB	103589	12V
MC0CB00ATK	103177	120V	MC2C301ATD	103580	24V
MC0CB00ATL	103178	125V	MC2C301ATG	103581	48V
MC0CB00ATN	100289	220V	MC2C301ATJ	103582	110V
MC0CB00ATR	103179	240V	MC2C301ATN	103583	220V
MC1C301AFD	100246	24V	MC2C310AIB	103280	12V
MC1C301AFJ	100248	110V	MC2C310AID	103279	24V
MC1C301AID	100266	24V	MC2C310AIG	103278	48V
MC1C301ARB	103405	12V	MC2C310AIH	103277	60V
MC1C301ARD	103406	24V	MC2C310AIJ	103276	110V
MC1C301ARG	103407	48V	MC2C310AIK	103275	120V
MC1C301ARH	103408	60V	MC2C310AIN	103274	220V
MC1C301ARJ	103409	110V	MC2C310ARB	103418	12V
MC1C301ARK	103410	120V	MC2C310ARD	103419	24V
MC1C301ARN	103411	220V	MC2C310ARG	103420	48V
MC1C301ATB	100220	12V	MC2C310ARH	103421	60V
MC1C301ATC	102740	32V	MC2C310ARJ	103422	110V
MC1C301ATD	100226	24V	MC2C310ARK	103423	120V
MC1C301ATE	102741	36V	MC2C310ARN	103424	220V
MC1C301ATF	102742	42V	MC2C310ATB	103588	12V
MC1C301ATG	100227	48V	MC2C310ATD	103584	24V
MC1C301ATH	102743	60V	MC2C310ATG	103585	48V
MC1C301ATI	102744	72V	MC2C310ATJ	103586	110V
MC1C301ATJ	100228	110V	MC2C310ATN	103587	220V
MC1C301ATK	102745	120V			
MC1C301ATL	102746	125V			
MC1C301ATN	100229	220V			
MC1C301ATR	102747	240V			
MC1C310AFB	100230	12V			
MC1C310AFD	100236	24V			
MC1C310AID	100256	24V			
MC1C310AIG	100257	48V			
MC1C310ARB	103392	12V			
MC1C310ARD	103393	24V			
MC1C310ARG	103394	48V			
MC1C310ARH	103395	60V			
MC1C310ARJ	103396	110V			
MC1C310ARK	103397	120V			
MC1C310ARN	103398	220V			
MC1C310ATB	100210	12V			
MC1C310ATD	100216	24V			
MC1C310ATE	102732	36V			
MC1C310ATF	102733	42V			
MC1C310ATG	100217	48V			
MC1C310ATH	102734	60V			
MC1C310ATI	102735	72V			
MC1C310ATJ	100218	110V			
MC1C310ATK	102736	120V			
MC1C310ATL	102737	125V			
MC1C310ATN	100219	220V			
MC1C310ATR	102738	240V			
MC1C400AIB	100420	12V			
MC1C400AID	100426	24V			
MC1C400ATB	100360	12V			
MC1C400ATD	100366	24V			
MC1C400ATE	103218	36V			
MC1C400ATF	103219	42V			
MC1C400ATG	100367	48V			
MC1C400ATH	103220	60V			
MC1C400ATI	103221	72V			
MC1C400ATJ	100368	110V			
MC1C400ATK	103222	120V			
MC1C400ATL	103223	125V			
MC1C400ATN	100369	220V			
MC1C400ATR	103224	240V			
MC1CB00AFD	100406	24V			
MC1CB00AFG	100407	48V			
MC1CB00AHD	103232	24V			
MC1CB00AID	100436	24V			
MC1CB00ATB	100370	12V			
MC1CB00ATC	103226	32V			
MC1CB00ATD	100376	24V			
MC1CB00ATE	103227	36V			
MC1CB00ATF	103228	42V			
MC1CB00ATG	100377	48V			
MC1CB00ATH	103229	60V			

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This list shows the catalogue and reference numbers for the **contactors** with the most usual voltages. For other voltages/types, please consult us.

Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.
C04255Y	110513	600V	CK10CE311D	133783	24/28V
C04787C	110515	24V	CK10CE311F	113692	42/48V
C04787F	119517	48V	CK10CE311J	133784	110/127V
C04787H	110518	110V	CK10CE311N	133286	220/250V
C04787I	110519	120V	CK10CE311U	133785	380/415V
C04787M	110522	220V	CK10CE311Y	113694	440/500V
C04787S	110523	240V	CK10CE411D	133786	24/28V
C04787T	110525	380V	CK10CE411J	133787	110/127V
C04787V	110526	440V	CK10CE411N	133287	220/250V
C04787Y	110529	600V	CK10CE411U	133788	380/415V
C12168C	105302	24V	CK11CE311D	133789	24/28V
C12168F	105304	48V	CK11CE311F	113691	42/48V
C12168H	133886	110V	CK11CE311J	133790	110/127V
C12168I	104891	120V	CK11CE311N	133288	220/250V
C12168M	105308	220V	CK11CE311U	133791	380/415V
C12168S	105309	240V	CK11CE311Y	113688	440/500V
C12168T	101060	380V	CK11CE411D	133792	24/28V
C12168V	105312	440V	CK11CE411F	113680	42/48V
C12168Y	133838	600V	CK11CE411J	133793	110/127V
CK07BA411C	110322	24V	CK11CE411N	133289	220/250V
CK07BA411F	110760	48V	CK11CE411U	133794	380/415V
CK07BA411H	110325	110V	CK12BE311D	104516	24/28V
CK07BA411I	133798	120V	CK12BE311F	110304	42/48V
CK07BA411M	110330	220V	CK12BE311J	104518	110/127V
CK07BA411S	110331	240V	CK12BE311N	104519	220/250V
CK07BA411T	110333	380V	CK12BE311U	110305	380/415V
CK07BA411V	110334	440V	CK12BE311Y	110823	440/500V
CK07BA411Y	110337	600V	CK12BE411D	104596	24/28V
CK08BA411M	110348	220V	CK12BE411F	110383	42/48V
CK08CA311F	113272	48V	CK12BE411J	104598	110/127V
CK08CA311H	113130	110V	CK12BE411N	104599	220/250V
CK08CA311M	111581	220V	CK12BE411U	110384	380/415V
CK08CA311S	113890	240V	CK75CE311D	113106	24/28V
CK08CA311V	113891	440V	CK75CE311F	108972	42/48V
CK08CA311Y	101047	600V	CK75CE311J	113108	110/127V
CK75CA311C	113100	24V	CK75CE311N	113109	220/250V
CK75CA311F	113102	48V	CK75CE311U	113125	380/415V
CK75CA311H	113111	110V	CK75CE311WD	113521	24V (WR)
CK75CA311I	113112	120V	CK75CE311WE	113445	33V (WR)
CK75CA311M	133219	220V	CK75CE311WF	113458	48V (WR)
CK75CA311S	113894	240V	CK75CE311WH	113471	72V (WR)
CK75CA311V	113895	440V	CK75CE311WJ	113484	110V (WR)
CK75CA311Y	113122	600V	CK75CE311WN	113497	220V (WR)
CK85BA311H	110267	110V	CK75CE311Y	113126	440/500V
CK85BA311I	110268	120V	CK85BE311D	104476	24/28V
CK85BA311M	110271	220V	CK85BE311F	110280	42/48V
CK85BA311S	110272	240V	CK85BE311J	104478	110/127V
CK85BA311V	110275	440V	CK85BE311N	104479	220/250V
CK85BA311Y	101048	600V	CK85BE311U	110281	380/415V
			CK95BE311D	104616	24/28V
			CK95BE311F	104610	42/48V
			CK95BE311J	104618	110/127V
			CK95BE311N	104614	220/250V
			CK95BE311U	104611	380/415V
			CK95BE311WH	104617	72V (WR)
			CK95BE311Y	113375	440/500V
			CK95BE411D	104560	24/28V
			CK95BE411F	110377	42/48V
			CK95BE411J	104572	110/127V
			CK95BE411N	104569	220/250V
			CK95BE411U	110378	380/415V
			KB4ED	104956	24/28V
			KB4EF	133913	42/48V
			KB4EJ	104957	110/127V
			KB4EN	104958	220/250V
			KB4EU	104959	380/415V
			KB4EWD	113543	24V (WR)
			KB4EWE	113544	33V (WR)
			KB4EWF	113545	48V (WR)
			KB4EWH	113546	72V (WR)
			KB4EY	113547	110V (WR)
			KB4EWN	113548	220V (WR)
			KB4EY	105317	440/500V
			KB5ED	104850	24/28V
			KB5EF	104856	42/48V
			KB5EJ	104857	110/127V
			KB5EN	104858	220/250V
			KB5EU	104859	380/415V
			KB5EWH	104855	72V (WR)
			KB5EY	110831	440/500V
			KB6ED	104860	24/28V
			KB6EF	104866	42/48V
			KB6EJ	104867	110/127V
			KB6EN	104868	220/250V
			KB6EU	104869	380/415V
			KB6EY	110832	440/500V
			KB7ED	113675	24/28V
			KB7EF	133911	42/48V
			KB7EJ	113673	110/127V
			KB7EN	113672	220/250V
			KB7EU	113671	380/415V
			KB7EY	113670	440/500V
			KM4ED	104960	24/28V
			KM4EF	104966	42/48V
			KM4EJ	104967	110/127V
			KM4EN	104968	220/250V
			KM4EU	104969	380/415V
			KM4EWD	113549	24V (WR)
			KM4EWE	113550	33V (WR)

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This list shows the catalogue and reference numbers for the **control and signalling units Ø 22 mm** with the most usual colours. For other types, please consult us.

Cat. no.	Ref. no.	
P9XEM3LN	185036	bleu
P9XEM3NN	185030	black
P9XEM4VN	185042	green
P9XEM4RN	185041	red
P9XEM4GN	185043	yellow
P9XEM4LN	185046	bleu
P9XEM4NN	185040	black
P9XET4VN1	185062	green
P9XET4RN1	185061	red
P9XET4GN1	185063	yellow
P9XET4LN1	185066	bleu
P9XET4NN1	185057	black

Cat. no.	Ref. no.	
<b>Push-buttons standard</b> pg. E.11		
P9XPNVG	185002	green
P9XPNRG	185001	red
P9XPNGG	185003	yellow
P9XPNLG	185006	bleu
P9XPNBG	185007	white
P9XPNNG	185000	black
P9XPNHG	185008	grey
P9XPNMG	185004	brown
P9XPN0G	185009	w/o button
P9XPNVS	185012	green
P9XPNRS	185011	red
P9XPNGS	185013	yellow
P9XPNLS	185016	bleu
P9XPNBS	185017	white
P9XPNNS	185010	black
P9XPNHS	185018	grey
P9XPNMS	185014	brown
P9XPNOS	185019	w/o button
P9MPNVE	184022	green
P9MPNRE	184021	red
P9MPNGE	184023	yellow
P9MPNLE	184026	bleu
P9MPNBE	184027	white
P9MPNNE	184020	black
P9MPNHE	184028	grey
P9MPNME	184024	brown
P9MPNOE	184029	w/o button

Cat. no.	Ref. no.	
<b>Emergency illuminated push-buttons</b> pg. E.16		
P9XPLVGD	185492	green
P9XPLRGD	185491	red
P9XPLGGD	185493	yellow
P9XPLLGD	185496	bleu
P9XPLBGD	185497	white
P9XPLAGD	185495	amber
P9XPLIGD	185498	clear
P9XPLVSD	185502	green
P9XPLRSD	185501	red
P9XPLGSD	185503	yellow
P9XPLLSD	185506	bleu
P9XPLBSD	185507	white
P9XPLASD	185505	amber
P9XPLISD	185508	clear
P9MPLVED	184512	green
P9MPLRED	184511	red
P9MPLGED	184513	yellow
P9MPLLED	184516	bleu
P9MPLBED	184517	white
P9MPLAED	184515	amber
P9MPLIED	184518	clear

Cat. no.	Ref. no.	
<b>Pilot lights unibloc</b> pg. E.18		
P9XLVD	185792	green
P9XLRD	185791	red
P9XLGD	185793	yellow
P9XLDD	185796	bleu
P9XLBD	185797	white
P9XLAD	185795	amber
P9XLID	185798	clear

Cat. no.	Ref. no.	
<b>Emergency push-buttons</b> pg. E.11		
P9XEM3VN	185032	green
P9XEM3RN	185031	red
P9XEM3GN	185033	yellow

Cat. no.	Ref. no.	
<b>Emergency illuminated push-buttons</b> pg. E.16		
P9XEM4VL	185552	green
P9XEM4RL	185551	red
P9XEM4GL	185553	yellow
P9XEM4LL	185556	bleu
P9XEM4BL	185557	white
P9XEM4AL	185555	amber
P9XEM4IL	185558	clear
P9XET4VL1	185562	green
P9XET4RL1	185561	red
P9XET4GL1	185563	yellow
P9XET4LL1	185566	bleu
P9XET4BL1	185567	white
P9XET4AL1	185565	amber
P9XET4IL1	185568	clear

Cat. no.	Ref. no.	
<b>Selector switches not illuminated</b> pg. E.12/13		
P9XSMD5V	185142	green
P9XSMD5R	185141	red
P9XSMD5G	185143	yellow
P9XSMD5L	185146	bleu
P9XSMD5N	185140	black

Cat. no.	Ref. no.	
<b>Emergency illuminated selector switches</b> pg. E.16		
P9XSLD0V	185592	green
P9XSLD0R	185591	red
P9XSLD0G	185593	yellow
P9XSLD0L	185596	bleu
P9XSLD0B	185597	white
P9XSLD0A	185595	amber
P9XSLD0I	185598	clear
P9XSLZ0V	185602	green
P9XSLZ0R	185601	red
P9XSLZ0G	185603	yellow
P9XSLZ0L	185606	bleu
P9XSLZ0B	185607	white
P9XSLZ0A	185605	amber
P9XSLZ0I	185608	clear

Cat. no.	Ref. no.	
<b>Selector switches with key, 3 positions</b> pg. E.14/15		
P9XSCE0T95	185418	Func. E
P9XSCL0T95	185425	Func. L
P9XSCE0U95	185432	Func. U
P9XSCE3C95	185464	Func. E
P9XSCL3C95	185465	Func. L
P9XSCE3U95	185466	Func. U
P9XSCE1N95	185442	Func. E
P9XSCL1N95	185445	Func. L
P9XSCE1U95	185448	Func. U
P9XSCE5H95	185454	Func. E
P9XSCL5H95	185457	Func. L
P9XSCE5U95	185460	Func. U

Cat. no.	Ref. no.	
<b>Not illuminated selector switches, 5 positions</b> pg. E.12/13		
P9TSMY0N	191350	black
P9TSMW0N	191360	black
P9XSVV0V	183897	green
P9XSVV0R	183896	red

Cat. no.	Ref. no.	
<b>Power supplies, integrated LED</b> pg. E.23		
P9PLNBDA	197036	amber
P9PLNBDL	197037	white
P9PLNBDG	197038	yellow
P9PLNBDL	197039	bleu
P9PLNBDR	197040	red
P9PLNB0V	197041	green

Cat. no.	Ref. no.	
<b>Emergency push-buttons</b> pg. E.11		
P9XEM3VN	185032	green
P9XEM3RN	185031	red
P9XEM3GN	185033	yellow

This list shows the catalogue and reference numbers for the **control and signalling units Ø 30 mm** with the most usual colours. For other types, please consult us.

Cat. no.	Ref. no.	
<b>Mushroom head caps</b> pg. E.45		
077EN	180070	black
077ER	180071	red
077EG	180073	yellow

Cat. no.	Ref. no.	
<b>Selector switches with knob - 2 positions</b> pg. E.46		
077SHN11	180180	black
077SHR11	180181	red
077SHV11	180182	green

Cat. no.	Ref. no.	
<b>Emergency illuminated push-buttons - Lenses</b> pg. E.49		
077GPLR	180961	red
077GPLV	180962	green
077GPLG	180963	yellow
077GPLA	180965	orange
077GPLBL	180966	bleu
077GPLB	180967	white
077GPLI	180968	clear

Cat. no.	Ref. no.	
<b>Emergency illuminated selector switches Lenses</b> pg. E.50		
077MISR	181151	red
077MISV	181152	green
077MISG	181153	yellow

Cat. no.	Ref. no.	
<b>Emergency illuminated selector switches - 3 positions</b> pg. E.50		
077ISB11TJRC	181225	110-120V

Cat. no.	Ref. no.	
<b>Pilot lights - Lenses</b> pg. E.50/51		
077GLR	181401	red
077GLV	181402	green
077GLG	181403	yellow
077GLA	181405	orange
077GLBL	181406	bleu
077GLB	181407	white
077GLI	181408	clear
099GW1R	181271	red
099GW1V	181272	green
099GW1A	181275	orange
099GW1BL	181276	bleu
099GW1B	181277	white
099GW1I	181278	clear

Cat. no.	Ref. no.	
<b>Accessories</b> pg. E.52		
077MN	181590	black
077MR	181591	red
077MV	181592	green
077MG	181593	yellow
077MBL	181596	bleu
077CPN	181580	black
077CPR	181581	red
077CPV	181582	green
077CPG	181583	yellow
BA9S6LR	187871	red
BA9S6LV	187872	green
BA9S6LG	187873	yellow
BA9S6LB	187875	white
BA9S12LR	187881	black
BA9S12LV	187882	green
BA9S12LG	187883	yellow
BA9S24LR	187891	black
BA9S24LV	187892	green
BA9S24LG	187893	yellow
BA9S24LB	187895	White
BA9S48LR	187901	black
BA9S48LV	187902	green
BA9S48LG	187903	yellow
BA9S110LR	187911	black
BA9S110LV	187912	green
BA9S110LG	187913	yellow
BA9S110LB	187915	white
BA9S230LR	187921	red
BA9S230LG	187922	yellow
BA9S230LB	187926	white



Cat. no	Ref. no.	Page	Cat. no	Ref. no.	Page	Cat. no	Ref. no.	Page	Cat. no	Ref. no.	Page
077...			07758N11SC	180240	E.46	080SP12SFC	170856	E.28	105GP1P220M	132251	E.70
077-01	180003	E.53	0775CB1120	180843	E.47	080SP12SFC	170856	E.54	105GP1P500	132252	E.70
077-01R	180008	E.53	0775CB11DC07	180852	E.47	080SP12SFC	170856	E.54	105GP1P500M	132253	E.70
077-10	180002	E.53	0775CB11RC03	180853	E.47	080SP12SFE	170857	E.28	105PT	132234	G.9
077-10A	180007	E.53	0775CD1101	180630	E.47	080SP18	170809	E.28	114...		
077-11	180001	E.53	0775CD1105	180631	E.47	080SP18SF	170861	E.28	114FACT03	130320	E.70
077C3095	173095	E.34	0775CD1109	180632	E.47	080SP18SF	170861	E.28	114FACT03	130320	G.9
077C3095	173095	E.52	077SCH11SC03	180636	E.47	080SP18SF	170861	E.54	114FACT03T	130321	E.70
077C3353	173353	E.34	0775CI11DC03	180640	E.47	080SP18SF	170861	E.54	114FACT03T	130321	G.9
077C9901	173901	E.34	0775C222DC01	180906	E.47	080SP18SFC	170859	E.28	114FACT12	200909	G.9
077C9902	173902	E.34	0775DN11	180170	E.46	080SP18SFC	170859	E.28	114FACT21	200910	G.9
077C9903	173903	E.34	0775SHN11	180180	E.46	080SP18SFC	170859	E.54	115...		
077C9904	173904	E.34	0775SLB11	180607	E.46	080SP18SFC	170859	E.54	1158029-01GI	132566	G.19
077C9905	173905	E.34	0775LD11	180601	E.46	080SP18SFE	170860	E.28	1158029-02GI	132567	G.19
077C9910	173910	E.34	0775LX22	180606	E.46	080SP1M	170831	E.28	1158029-03GIT	132568	G.19
077C9916	173916	E.34	0775LZ22	180623	E.46	080SP1MSF	170840	E.28	1158029-04GIT	132569	G.19
077C9919	173919	E.34	0775LZ22DC	180625	E.46	080SP1MSF	170840	E.54	115803SP	132563	G.19
077CF73033	173033	E.34	0775LZ22RC	180626	E.46	080SP1MSFC	170838	E.28	1158045P	132565	G.19
077CF73034	173034	E.34	0775SN22RC	180510	E.46	080SP1MSFC	170838	E.54	1158055P	132564	G.19
077CF73037	173037	E.34	0775SP1	180521	E.54	080SP1MSFE	170839	E.28	1158065SPA	215320	G.19
077CF73038	173038	E.34	0775SP12	180530	E.54	080SP1SF	170837	E.28	1158067SPA	215321	G.19
077CF73040	173040	E.34	0775SP12SFE	180545	E.54	080SP1SF	170837	E.54	1158067SPA	215321	G.19
077CPLT	181600	E.52	0775SP16	180531	E.54	080SP1SFC	170835	E.28	1158067SPA	215321	G.19
077CPT	181588	E.52	0775SP16SFE	180546	E.54	080SP1SFC	170835	E.54	115807SP	132562	G.19
077CR455	173455	E.34	0775SP1M	180522	E.54	080SP1SFE	170836	E.28	115CA	132571	G.19
077CST	181603	E.52	0775SP1MSFE	180537	E.54	080SP2	170802	E.28	115MA	132570	G.19
077DAE	181554	E.52	0775SP1SFE	180536	E.54	080SP24	170810	E.28	115PC002	132500	G.18
077DLE14	181260	E.51	0775SP2	180523	E.54	080SP24SFE	170862	E.28	115PC002L	132507	G.18
077DPP	181550	E.52	0775SP20	180532	E.54	080SP2M	170832	E.28	115PC015	132501	G.18
077E01	180069	E.45	0775SP20SFE	180547	E.54	080SP2MSF	170846	E.28	115PC015L	132508	G.18
077E10	180059	E.45	0775SP25	180533	E.54	080SP2MSF	170846	E.28	115PC018	132502	G.18
077E11	180049	E.45	0775SP25SFE	180548	E.54	080SP2MSF	170846	E.54	115PC018	132509	G.18
077ECR	181602	E.45	0775P2M	180524	E.54	080SP2MSFC	170844	E.28	115PC119	132503	G.18
077GE35	181620	E.52	0775P2MSFE	180539	E.54	080SP2MSFC	170844	E.28	115PC119	132510	G.18
077GELR	180971	E.49	0775P2SFE	180538	E.54	080SP2MSFC	170844	E.54	115PC2002	132504	G.18
077GGR3	180980	E.49	0775P3	180525	E.54	080SP2MSFE	170845	E.28	115PC2002L	132511	G.18
077GGBCF	180137	E.44	0775P30	180534	E.54	080SP2SF	170843	E.28	115PC2015	132505	G.18
077GGBCN	180020	E.44	0775P30SFE	180549	E.54	080SP2SF	170843	E.28	115PC2015L	132512	G.18
077GGBCS	180050	E.44	0775P36	180535	E.54	080SP2SF	170843	E.54	115PC2018	132515	G.18
077GGM	180981	E.49	0775P36SF	180554	E.54	080SP2SFC	170841	E.28	115PC2018	132513	G.18
077GGT	180982	E.49	0775P36SF	180554	E.54	080SP2SFC	170841	E.28	115PC2119	132506	G.18
077GSBCF	180136	E.44	0775P36SFC	180552	E.54	080SP2SFC	170841	E.54	115PC2119	132514	G.18
077GSBCN	180010	E.44	0775P36SFC	180552	E.54	080SP2SFE	170842	E.28	390...		
077GSBCS	180040	E.44	0775P36SFE	180550	E.54	080SP3	170803	E.28	390/3921/2FOM4/2	214120	C.91
077ISB11D0	181170	E.50	0775P3SFE	180540	E.54	080SP35	170811	E.28	390/3921/2FOM4/2	214120	C.91
077ISB11D0RC	181174	E.50	0775P4	180527	E.54	080SP35SF	170865	E.28	390/3921PFRN	244173	C.91
077ISD11D0	181060	E.50	0775P4SFE	180542	E.54	080SP35SF	170865	E.54	390/3921PFZCS14	202273	C.91
077ISZ11D0RC	181176	E.50	0775P4V	180526	E.54	080SP35SF	170865	E.54	390/3921PFZCS25	244172	C.91
077LDMVD	181305	E.51	0775P4VSF	180553	E.54	080SP35SFC	170863	E.28	390/3921PFZCS45	202274	C.91
077LDNVO	181300	E.51	0775P4VSFC	180551	E.54	080SP35SFC	170863	E.54	390/3921PMRN	202275	C.91
077LRNVJ	181301	E.51	0775P4VSFE	180541	E.54	080SP35SFC	170863	E.54	390/3921PMZI	202276	C.91
077LRNVN	181302	E.51	0775P6	180528	E.54	080SP35SFE	170864	E.28	390/3921PZ	202277	C.91
077M2S25X44	180914	E.48	0775P6SFE	180543	E.54	080SP3SF	170849	E.28	390/3922FOM5/2	214121	C.91
077M2S25X44B	181004	E.48	0775P9	180529	E.54	080SP3SF	170849	E.28	390/3922FOM5/2	214121	C.91
077M2S27X44	180918	E.48	0775P9SFE	180544	E.54	080SP3SF	170849	E.54	390/3922PFRN	212709	C.91
077M2T27X44	180915	E.48	0775UN22	180440	E.46	080SP3SFC	170847	E.28	390/3922PFZCS45	244744	C.91
077M2T27X44B	181005	E.48	0775ZN22	180480	E.46	080SP3SFC	170847	E.28	390/3922PFZCS90	202278	C.91
077M2T27Y44	180919	E.48	077TGR	181650	E.53	080SP3SFC	170847	E.54	390/3922PMRZ	213014	C.91
077M4S47X88	180923	E.48	077TGR02	181840	E.53	080SP3SFE	170848	E.28	390/3922PMZI	202279	C.91
077M4S47X88B	181008	E.48	077TNA	181660	E.53	080SP4	170804	E.28	390/3922PZ	202280	C.91
077M4T47X88	180921	E.48	077TNA2	181670	E.53	080SP4M	170834	E.28	390/3923/2FOM4/2	214122	C.91
077M4T47Y88	180927	E.48	077TNA230	181951	E.53	080SP4MSFE	170851	E.28	390/3923FOM5/2	214123	C.91
077M4T47Y88B	181009	E.48	077TNA3	181962	E.53	080SP4SFE	170850	E.28	390/3923PFRN	213986	C.91
077MT1234S22	180931	E.48	077TNA301	181963	E.53	080SP6	170806	E.28	390/3923PFZCS125	202281	C.91
077MT1234S22B	181021	E.48	077TNA312	181720	E.53	080SP6SFE	170852	E.28	390/3923PFZCS75	244745	C.91
077MT24S22	180911	E.48	077TNA313	181722	E.53	080SP8	170807	E.28	390/3923PMRN	202282	C.91
077MT24S22B	181001	E.48	077TNA40	181930	E.53	080SP8SF	170855	E.28	390/3923PMZI	202283	C.91
077MT24S22R	180913	E.48	077TPTF	181601	E.52	080SP8SF	170855	E.54	390/3923PZ	202284	C.91
077MT24S22RB	181003	E.48	080...			080SP8SFC	170853	E.28	390/3924F4	214124	C.91
077MTS123422	180929	E.48	080CPDT	173208	E.19	080SP8SFC	170853	E.54	390/3924F5/2	204178	C.91
077MTS123422B	181019	E.48	080CPDT	173208	E.19	080SP8SFE	170854	E.28	390/3924M4/2	214126	C.91
077MTS2422	180910	E.48	080CPT	170198	E.32	080XTGR	179514	E.35	390/3924M5/2	214127	C.91
077MTS2422B	181000	E.48	080ESL	170212	E.33	080XTGR01	179525	E.35	390/3924PFRN	202287	C.91
077MTS2422R	180912	E.48	080ESL	170212	E.33	080XTGR02	179526	E.35	390/3924PFZCS125	202288	C.91
077MTS2422RB	181002	E.48	080KCSF	170883	E.28	080XTGR03	179510	E.35	390/3924PFZCS200	202289	C.91
077OPZ	181570	E.52	080KCSF	170883	E.54	080XTGR04	179527	E.35	390/3924PMRN	202290	C.91
077P01	180039	E.44	080QDF	173220	E.31	080XTGR05	179528	E.35	390/3924PMZI	202291	C.91
077P10	180029	E.44	080QDF001	187715	E.31	080XTGR06	179529	E.35	390/3924PZ	202292	C.91
077P11	180019	E.44	080QDF002	187716	E.31	080XTGR07	179530	E.35	390/3925F4/2	214128	C.91
077P11T180	180121	E.44	080QDF006	187705	E.31	080XTGR08	179531	E.35	390/3925F5/2	214129	C.91
077P11T30	180120	E.44	080QDF017	187709	E.31	090...			390/3925M4/2	214130	C.91
077PC11C	180100	E.45	080QDF018	187710	E.31	090M1	130310	G.19	390/3925M5/2	214131	C.91
077PC11G	180104	E.45	080QDF026	187711	E.31	090M2	130311	G.19	390/3925PFRN	244746	C.91
077PLM10D0	181043	E.49	080QDF027	185788	E.31	099...			390/3925PFZCS150	213573	C.91
077PLM11D0	181040	E.49	080QDF028	187702	E.31	099SPDPTDB	180009	E.53	390/3925PFZCS320	202295	C.91
077PLM20D0	181041	E.49	080QDF029	187701	E.31	105...			390/3925PMRN	202297	C.91
077PTB01	181609	E.53	080QDF030	185789	E.31	105 CI	132242	E.71	390/3925PMZI	202298	C.91
077PTB10	181608	E.53	080QDF031	187713	E.31	105 CI 10	132243	E.71	390/3925PZ	202299	C.91
077PTB11	181615	E.53	080QDF032	187714	E.31	105 GIL	132240	E.71	390/3926F4/2	214133	C.91
077RE01	180099	E									

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390/3927F5/2	214138	C.92	ACFRP14A	168577	H.35	ACRP3A8H1	168509	H.34	BA9SN110	187860	E.34
390/3927M4/2	214139	C.92	ACFRP14A	168577	H.35	ACRP45A0H45	168518	H.34	BA9SN110	187860	E.52
390/3927M5/2	214140	C.92	ACFRP160A	168586	H.35	ACRP45A0H45	168518	H.17	BA9SN110	187860	G.19
390/3927PFRN	202306	C.92	ACFRP160A	168586	H.35	ACRP45A0H45	168518	H.34	BA9SN220	187861	E.34
390/3927PFZCS320	202307	C.92	ACFRP185A	168587	H.35	ACRP46A0H056	168527	H.34	BA9SN220	187861	E.52
390/3927PFZCS630	202308	C.92	ACFRP185A	168587	H.35	ACRP46A0H056	168527	H.34	BCLF01	104701	A.23
390/3927PMRN	202309	C.92	ACFRP18A	168578	H.35	ACRP4A2H5	168495	H.34	BCLF01	104701	C.15
390/3927PZ	202311	C.92	ACFRP18A	168578	H.35	ACRP4A2H5	168495	H.17	BCLF01G	104703	A.23
390/392PMZI	202310	C.92	ACFRP225A	168588	H.35	ACRP4A2H5	168495	H.34	BCLF01G	104703	C.15
39012Y110D	202323	C.90	ACFRP225A	168588	H.35	ACRP4A5H1	168510	H.34	BCLF10	104700	A.23
39012Y125D	202324	C.90	ACFRP27A	168579	H.35	ACRP4A5H1	168510	H.4	BCLF10	104700	C.15
39012Y197D	202325	C.90	ACFRP27A	168579	H.35	ACRP4A5H1	168510	H.17	BCLF10G	104702	A.23
39012Y20D	244107	C.90	ACFRP300A	168589	H.35	ACRP4A5H1	168510	H.34	BCLF10G	104702	C.15
39012Y220D	202326	C.90	ACFRP300A	168589	H.35	ACRP55A0H039	168528	H.34	BCLL11	104707	C.15
39012Y230D	211706	C.90	ACFRP35A	168580	H.35	ACRP55A0H039	168528	H.34	BCLL11	104707	C.20
39012Y24D	202327	C.90	ACFRP35A	168580	H.35	ACRP55A0H18	168502	H.34	BCLL20	104706	C.15
39012Y40D	244106	C.90	ACFRP360A	168590	H.35	ACRP55A0H18	168502	H.34	BCLL20	104706	C.20
39012Y48D	244734	C.90	ACFRP360A	168590	H.35	ACRP6A2H5	168496	H.34	BCRF01	108902	A.23
39012Y97D	202328	C.90	ACFRP38A	168581	H.35	ACRP6A2H5	168496	H.4	BCRF01	108902	C.15
3903Y110D	202437	C.90	ACFRP38A	168581	H.35	ACRP6A2H5	168496	H.17	BCRF10	108901	A.23
3903Y125D	216100	C.90	ACFRP45A	168582	H.35	ACRP6A2H5	168496	H.34	BCRF10	108901	C.15
3903Y197D	214442	C.90	ACFRP45A	168582	H.35	ACRP6A3H4	168511	H.34	BEKH	104763	C.21
3903Y20D	215278	C.90	ACFRP460A	168591	H.35	ACRP6A3H4	168511	H.4	BEKV	104764	C.21
3903Y220D	202438	C.90	ACFRP460A	168591	H.35	ACRP6A3H4	168511	H.17	BEKVA 1	104785	C.21
3903Y230D	211107	C.90	ACFRP550A	168592	H.35	ACRP6A3H4	168511	H.34	BEKVS 1	104786	C.21
3903Y24D	244735	C.90	ACFRP550A	168592	H.35	ACRP700A0H035	168530	H.34	BELA	104723	A.24
3903Y40D	244088	C.90	ACFRP62A	168583	H.35	ACRP700A0H035	168530	H.34	BELA	104723	C.15
3903Y48D	212705	C.90	ACFRP62A	168583	H.35	ACRP70A0H14	168503	H.34	BELA02	104724	A.24
3903Y97D	213691	C.90	ACFRP700A	168594	H.35	ACRP70A0H14	168503	H.34	BELA02	104724	C.15
3904Y110D	202479	C.90	ACFRP700A	168594	H.35	ACRP70A0H29	168519	H.34	BETL02C	113602	A.25
3904Y125D	202480	C.90	ACFRP850A	168595	H.35	ACRP70A0H29	168519	H.17	BETL02C	113602	C.16
3904Y197D	202481	C.90	ACFRP850A	168595	H.35	ACRP70A0H29	168519	H.34	BETL02D	113604	A.25
3904Y20D	244084	C.90	ACFRP90A	168584	H.35	ACRP80A0H14	168504	H.34	BETL02D	113604	C.16
3904Y220D	202482	C.90	ACFRP90A	168584	H.35	ACRP80A0H14	168504	H.34	BETL45C	113603	A.25
3904Y230D	211708	C.90	ACFRP950A	168596	H.35	ACRP85A0H023	168531	H.34	BETL45C	113603	C.16
3904Y24D	202483	C.90	ACFRP950A	168596	H.35	ACRP85A0H023	168531	H.34	BETL45D	113605	A.25
3904Y40D	244083	C.90	ACRP10A2H	168512	H.34	ACRP8A2H5	168491	H.4	BETL45D	113605	C.16
3904Y48D	213814	C.90	ACRP10A2H	168512	H.17	ACRP8A2H5	168491	H.17	BMLF	104800	D.19
3904Y97D	213601	C.90	ACRP10A2H	168512	H.34	ACRP90A0H22	168520	H.34	BNL	104797	D.19
3905Y110D	202512	C.90	ACRP115A0H18	168521	H.34	ACRP90A0H22	168520	H.17	BRLL02	106622	C.15
3905Y125D	242260	C.90	ACRP115A0H18	168521	H.17	ACRP90A0H22	168520	H.34	BRLL02	106622	C.20
3905Y197D	244074	C.90	ACRP115A0H18	168521	H.34	ACRP95A0H016	168532	H.34	BRLL11	104705	A.23
3905Y20D	244073	C.90	ACRP12A0H84	168498	H.34	ACRP95A0H016	168532	H.34	BRLL11	104705	C.15
3905Y220D	212706	C.90	ACRP12A0H84	168498	H.17	ACRP97A0H11	168505	H.34	BRLL11	104705	C.20
3905Y230D	211709	C.90	ACRP12A0H84	168498	H.34	ACRP97A0H11	168505	H.34	BRLL20	104704	A.23
3905Y24D	244072	C.90	ACRP12A2H5	168492	H.4	ACRP9A1H3	168497	H.34	BRLL20	104704	C.15
3905Y40D	244071	C.90	ACRP12A2H5	168492	H.17	ACRP9A1H3	168497	H.4	BRLL20	104704	C.20
3905Y48D	244736	C.90	ACRP140A0H072	168506	H.34	ACRP9A1H3	168497	H.17	BSLDZ	104719	A.24
3905Y97D	202513	C.90	ACRP140A0H072	168506	H.34	ACRP9A1H3	168497	H.34	BSLDZ	104719	C.16
3906Y110D	202532	C.90	ACRP14A1H4	168513	H.34	B...			BSLR2G	104713	A.24
3906Y125D	211711	C.90	ACRP14A1H4	168513	H.17	BA15D1155	222351	E.63	BSLR2G	104713	C.16
3906Y197D	244066	C.90	ACRP14A1H4	168513	H.34	BA15D115LA	222337	E.63	BSLR2K	104714	A.24
3906Y20D	244065	C.90	ACRP160A0H14	168522	H.34	BA15D115LB	222341	E.63	BSLR2K	104714	C.16
3906Y220D	213612	C.90	ACRP160A0H14	168522	H.17	BA15D115LG	222338	E.63	BSLR2R	104715	A.24
3906Y230D	211770	C.90	ACRP160A0H14	168522	H.34	BA15D115LL	222340	E.63	BSLR2R	104715	C.16
3906Y24D	244064	C.90	ACRP180A0H056	168507	H.34	BA15D115LR	222336	E.63	BSLR3G	104716	C.16
3906Y40D	244063	C.90	ACRP180A0H056	168507	H.34	BA15D115LV	222339	E.63	BSLR3G	104716	C.21
3906Y48D	212707	C.90	ACRP185A0H11	168523	H.34	BA15D125	222348	E.63	BSLR3K	104717	C.16
3906Y97D	202533	C.90	ACRP185A0H11	168523	H.34	BA15D2305	222352	E.63	BSLR3K	104717	C.21
3907Y110D	202547	C.90	ACRP18A0H56	168499	H.34	BA15D230LA	222343	E.63	BSLR3R	104718	C.16
3907Y125D	211713	C.90	ACRP18A0H56	168499	H.17	BA15D230LB	222347	E.63	BSLR3R	104718	C.21
3907Y197D	244059	C.90	ACRP18A0H56	168499	H.34	BA15D230LG	222344	E.63	BSLV3G	104720	A.24
3907Y20D	244058	C.90	ACRP18A1H1	168514	H.34	BA15D230LL	222346	E.63	BSLV3G	104720	C.16
3907Y220D	202548	C.90	ACRP18A1H1	168514	H.17	BA15D230LR	222342	E.63	BSLV3K	104721	A.24
3907Y230D	211712	C.90	ACRP18A1H1	168514	H.34	BA15D230LV	222345	E.63	BSLV3K	104721	C.16
3907Y24D	244057	C.90	ACRP18A1H3	168493	H.4	BA15D245	222349	E.63	BSLV3R	104722	A.24
3907Y40D	244056	C.90	ACRP18A1H3	168493	H.17	BA15D24LA	222331	E.63	BSLV3R	104722	C.16
3907Y48D	244737	C.90	ACRP200A0H051	168508	H.34	BA15D24LB	222335	E.63	BSLV3U	110836	A.24
3907Y97D	244738	C.90	ACRP200A0H051	168508	H.34	BA15D24LG	222332	E.63	BSLV3U	110836	C.16
3908/9M4/2	214141	C.92	ACRP225A0H096	168524	H.34	BA15D24LL	222334	E.63	BSLV3U	110836	C.21
3908/9M4/2	214141	C.92	ACRP225A0H096	168524	H.34	BA15D24LR	222330	E.63	BTLF30C	104709	A.23
3908/9M5/2	214142	C.92	ACRP22A0H84	168494	H.4	BA15D24LV	222333	E.63	BTLF30C	104709	C.15
3908/9M5/2	214142	C.92	ACRP22A0H84	168494	H.17	BA15D305	222350	E.63	BTLF30D	104711	A.23
3908F4/2	214144	C.92	ACRP27A0H37	168500	H.34	BA9S122	187852	E.34	BTLF30D	104711	C.15
3908F5/2	214145	C.92	ACRP27A0H37	168500	H.17	BA9S122	187852	E.52	BTLF60C	104710	A.23
3908PFZCS400	202555	C.92	ACRP27A0H37	168500	H.34	BA9S122	187852	G.19	BTLF60C	104710	C.15
3908PFZCS800	202562	C.92	ACRP27A0H75	168515	H.34	BA9S130	187857	E.34	BTLF60D	104712	A.23
3908PMZ	202563	C.92	ACRP27A0H75	168515	H.17	BA9S130	187857	E.52	BTLF60D	104712	C.15
3908PZ	202564	C.92	ACRP27A0H75	168515	H.34	BA9S130	187857	G.19	BTLFX	113001	A.23
3908Y110D	202565	C.90	ACRP300A0H067	168525	H.34	BA9S242	187853	E.34	BTLFX	113001	C.15
3908Y197D	214066	C.90	ACRP300A0H067	168525	H.34	BA9S242	187853	E.52	BTRF30C	108903	A.23
3908Y220D	202566	C.90	ACRP35A0H27	168501	H.34	BA9S242	187853	G.19	BTRF30C	108903	C.15
3908Y97D	212959	C.90	ACRP35A0H27	168501	H.17	BA9S30	187854	E.34	BTRF30D	108905	A.23
3909F4/2	204179	C.92	ACRP35A0H27	168501	H.34	BA9S30	187854	E.52	BTRF30D	108905	C.15
3909F5/2	204180	C.92	ACRP35A0H58	168516	H.34	BA9S48	187855	E.34	BTRF60C	108904	A.23
3909PFZCS120	244983	C.92	ACRP35A0H58	168516	H.17	BA9S48	187855	E.34	BTRF60C	108904	C.15
3909PMZ	212962	C.92	ACRP35A0H58	168516	H.34	BA9S48	187855	E.52	BTRF60D	108906	A.23
3909Y110D	202572	C.90	ACRP360A0H056	168526	H.34	BA9S48	187855	E.34	BTRF60D	108906	C.15
3909Y197D	204181	C.90	ACRP360A0H056	168526	H.34	BA9S6012	187856	G.19	D...		
3909Y220D	244739	C.90	ACRP38A0H58	168517	H.34	BA9S6012	187856	E.52	C09476	104766	C.21
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DCR4A9H2	168393	H.17	GPAC10FBA	101303	B.17	GPSELCAJ	101386	B.21	GPS1BSADMP	101198	B.9
DCR6A3H9	168388	H.17	GPAC11LLA	101305	B.17	GPSELCAU	101387	B.4	GPS1BSAE	101215	B.9
DCR6A6H8	168394	H.17	GPAC11LRA	101308	B.17	GPSELCAU	101387	B.21	GPS1BSAEMP	101199	B.9
DCR9A2H4	168389	H.17	GPAC20LLA	101306	B.17	GPSELCAJ	101388	B.4	GPS1BSAF	101216	B.9
DCR9A4H0	168395	H.17	GPAC20LRA	101309	B.17	GPSELCAJ	101388	B.21	GPS1BSAFMP	101200	B.9
DCRP1000A0H04	168575	H.34	GPAD0101LLA	101316	B.17	GPSELCAJ	101389	B.4	GPS1BSAG	101217	B.9
DCRP1000A0H04	168575	H.34	GPAD0110LLA	101315	B.17	GPSELCAJ	101389	B.21	GPS1BSAGMP	101201	B.9
DCRP100A0H24	168546	H.34	GPAD1001LLA	101314	B.17	GPSELGAJ	101375	B.4	GPS1BSAH	101218	B.9
DCRP100A0H24	168546	H.34	GPAD1010LLA	101313	B.17	GPSELGAJ	101375	B.21	GPS1BSAHMP	101202	B.9
DCRP100A0H49	168562	H.34	GPAE11LLA	101317	B.17	GPSELGAN	101376	B.4	GPS1BSAJ	101219	B.9
DCRP100A0H49	168562	H.34	GPAKS1A	101509	B.18	GPSELGAN	101376	B.21	GPS1BSAJMP	101203	B.9
DCRP120A0H2	168547	H.34	GPAL01FRA	101312	B.17	GPSELGAU	101377	B.4	GPS1BSAK	101220	B.9
DCRP120A0H2	168547	H.34	GPAL10FRA	101311	B.17	GPSELGAJ	101377	B.21	GPS1BSAKMP	101204	B.9
DCRP125A0H40	168563	H.34	GPAPT1E	107315	B.19	GPSELGAX	101378	B.4	GPS1BSAL	101221	B.9
DCRP125A0H40	168563	H.34	GPAPT2A	107182	B.18	GPSELGAX	101378	B.21	GPS1BSALMP	101205	B.9
DCRP140A0H32	168564	H.34	GPASLRAA1	101318	B.18	GPSELGAY	101379	B.4	GPS1BSAM	101222	B.9
DCRP140A0H32	168564	H.34	GPASLRAA11	101194	B.18	GPSELGAY	101379	B.21	GPS1BSAMMP	101206	B.9
DCRP150A0H17	168548	H.34	GPASLRAAF	101319	B.18	GPSELRAJ	101380	B.4	GPS1BSAN	101223	B.9
DCRP150A0H17	168548	H.34	GPASLRAAG	101320	B.18	GPSELRAJ	101380	B.21	GPS1BSANMP	101207	B.9
DCRP180A0H14	168549	H.34	GPASLRAAJ	101321	B.18	GPSELRAJ	101381	B.4	GPS1BSAP	101224	B.9
DCRP180A0H14	168549	H.34	GPASLRAAM	101322	B.18	GPSELRAJ	101381	B.21	GPS1BSAPMP	101208	B.9
DCRP180A0H25	168565	H.34	GPASLRAAN	101323	B.18	GPSELRAU	101382	B.4	GPS1BSAR	101225	B.9
DCRP180A0H25	168565	H.34	GPASLRAAR	101324	B.18	GPSELRAU	101382	B.21	GPS1BSARMP	101209	B.9
DCRP18A2H9	168555	H.34	GPASLRAAU	101325	B.18	GPSELRAU	101382	B.4	GPS1MHAA	101280	B.13
DCRP18A2H9	168555	H.17	GPASLRAAV	101326	B.18	GPSELRAU	101383	B.21	GPS1MHAB	101281	B.13
DCRP18A2H9	168555	H.34	GPASLRAAY	101327	B.18	GPSELRAV	101384	B.4	GPS1MHAC	101282	B.13
DCRP210A0H25	168566	H.34	GPASLRAAD	101328	B.18	GPSELRAV	101384	B.21	GPS1MHAD	101283	B.13
DCRP210A0H25	168566	H.34	GPASLRADJ	101329	B.18	GPENA	101369	B.21	GPS1MHAE	101284	B.13
DCRP220A0H11	168550	H.34	GPAU20LCAA11	112185	B.18	GPEPA	101370	B.21	GPS1MHAF	101285	B.13
DCRP220A0H11	168550	H.34	GPAU20LCAAC	101353	B.18	GPEPKA	101374	B.21	GPS1MHAG	101286	B.13
DCRP25A2H1	168556	H.34	GPAU20LCAAD	101352	B.18	GPEPLA	101373	B.21	GPS1MHAH	101287	B.13
DCRP25A2H1	168556	H.17	GPAU20LCAAF	101355	B.18	GPEPMA	101372	B.21	GPS1MHAJ	101288	B.13
DCRP25A2H1	168556	H.34	GPAU20LCAAG	101354	B.18	GPES41A	101365	B.21	GPS1MHAK	101289	B.13
DCRP270A0H18	168567	H.34	GPAU20LCAAJ	101356	B.18	GPES55A	101366	B.21	GPS1MHAL	101290	B.13
DCRP270A0H18	168567	H.34	GPAU20LCAAM	101357	B.18	GPEUTA	107097	B.21	GPS1MHAN	101291	B.13
DCRP310A0H14	168568	H.34	GPAU20LCAAN	101358	B.18	GPFO0C02	107098	D.3	GPS1MHAP	101292	B.13
DCRP310A0H14	168568	H.34	GPAU20LCAAR	101359	B.18	GPFO0C02	107098	D.3	GPS1MHAR	101293	B.13
DCRP32A0H78	168542	H.34	GPAU20LCAAU	101360	B.18	GPFO0C04	107102	D.3	GPS1MHAS	101294	B.13
DCRP32A0H78	168542	H.17	GPAU20LCAAU	101361	B.18	GPFO0C04	107102	D.3	GPS1MSAA	101257	B.13
DCRP32A0H78	168542	H.34	GPAU20LCAAV	101362	B.18	GPFO0C08	107107	D.3	GPS1MSAB	101258	B.13
DCRP32A1H6	168557	H.34	GPAU20LTA11	110360	B.18	GPFO0C08	107107	D.3	GPS1MSAC	101259	B.13
DCRP32A1H6	168557	H.17	GPAU20LTAAC	101342	B.18	GPFO0C25	107101	D.3	GPS1MSAD	101260	B.13
DCRP32A1H6	168557	H.34	GPAU20LTAAD	101341	B.18	GPFO0C25	107101	D.3	GPS1MSAE	101261	B.13
DCRP400A0H13	168569	H.34	GPAU20LTAAF	101344	B.18	GPFO0C45	107106	D.3	GPS1MSAF	101262	B.13
DCRP400A0H13	168569	H.34	GPAU20LTAAG	101343	B.18	GPFO0C45	107106	D.3	GPS1MSAG	101263	B.13
DCRP40A1H2	168558	H.34	GPAU20LTAAG	101343	B.18	GPFO1C02	107100	D.3	GPS1MSAH	101264	B.13
DCRP40A1H2	168558	H.34	GPAU20LTAAM	101346	B.18	GPFO1C02	107100	D.3	GPS1MSAJ	101265	B.13
DCRP45A0H55	168543	H.34	GPAU20LTAAN	101347	B.18	GPFO1C04	107105	D.3	GPS1MSAK	101266	B.13
DCRP45A0H55	168543	H.17	GPAU20LTAAR	101348	B.18	GPFO1C04	107105	D.3	GPS1MSAL	101267	B.13
DCRP45A0H55	168543	H.34	GPAU20LTAAS	101349	B.18	GPFO1C02	107099	D.3	GPS1MSAM	101268	B.13
DCRP50A0H96	168559	H.34	GPAU20LTAAT	101350	B.18	GPFO1C02	107099	D.3	GPS1MSAN	101269	B.13
DCRP50A0H96	168559	H.34	GPAU20LTAAY	101351	B.18	GPFO1C04	107103	D.3	GPS1MSAP	101270	B.13
DCRP540A0H08	168570	H.34	GPAULRAA11	102625	B.18	GPFO1C04	107103	D.3	GPS1MSAR	101271	B.13
DCRP540A0H08	168570	H.34	GPAULRAAC	101331	B.18	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
DCRP60A0H4	168544	H.34	GPAULRAAD	101330	B.18	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
DCRP60A0H4	168544	H.34	GPAULRAAF	101333	B.18	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
DCRP60A0H82	168560	H.34	GPAULRAAG	101332	B.18	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
DCRP60A0H82	168560	H.34	GPAULRAAJ	101334	B.18	GPFI181A	101418	D.3	GPS2BHAJ	101253	B.11
DCRP650A0H07	168571	H.34	GPAULRAAM	101335	B.18	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
DCRP650A0H07	168571	H.34	GPAULRAAN	101336	B.18	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
DCRP740A0H06	168572	H.34	GPAULRAAR	101337	B.18	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
DCRP740A0H06	168572	H.34	GPAULRAAS	101338	B.18	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
DCRP80A0H3	168545	H.34	GPAULRAAU	101339	B.18	GPFI181A	101418	D.3	GPS2BHAJ	101253	B.11
DCRP80A0H3	168545	H.34	GPAULRAAV	101339	B.18	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
DCRP80A0H58	168561	H.34	GPAULRAAY	101340	B.18	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
DCRP80A0H58	168561	H.34	GPB104A	101392	B.5	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
DCRP80A0H58	168561	H.34	GPB105A	101393	B.5	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
DCRP950A0H05	168574	H.34	GPB1802A	101390	B.19	GPFI181A	101418	D.3	GPS2BHAJ	101253	B.11
DCRP950A0H05	168574	H.34	GPB1803A	101391	B.19	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
DINIL 02E ENU	123656	F.4	GPB1804A	101392	B.19	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
E...			GPB1805A	101393	B.19	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
EAT 260	100548	A.20	GPB1812A	101394	B.19	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
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EAT 260	100548	C.8	GPB1814A	101396	B.19	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
EAT 260	100548	C.17	GPB1815A	101397	B.19	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
EAT 260	100548	C.61	GPB1822A	101398	B.19	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
EPL	104798	D.19	GPB1824A	101399	B.19	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
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ERN01K5	129149	H.16	GPB1GA	101408	B.5	GPFI181A	101418	D.3	GPS2BHAK	101249	B.11
ERN02K2	129150	H.16	GPB1GA	101408	B.19	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
ERN04K0	129151	H.16	GPB1GAF	101511	B.19	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
ERN05K5	129152	H.16	GPB2B02A	101400	B.19	GPFI181A	101418	D.3	GPS2BHAN	101252	B.11
ERN07K5	129153	H.16	GPB2B03A	101401	B.19	GPFI181A	101418	D.3	GPS2BHAJ	101253	B.11
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ERX01K5	129155	H.16	GPB2B12A	101403	B.19	GPFI181A	101418	D.3	GPS2BHAL	101250	B.11
ERX02K2	129156	H.16	GPB2B13A	101404	B.19	GPFI181A	101418	D.3	GPS2BHAM	101251	B.11
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KVP10E	133380	D.23	MARN413AT	100988	C.6	N11P3401806	168261	H.35	P9ACFSM	187846	E.33
KVP10G	104771	D.19	MARN422AR	100354	A.18	N211B	116113	E.67	P9ACPBS	188015	E.35
KVP10I	133371	D.21	MARN422AR	100354	C.6	N222B	116664	E.67	P9ACPBS039	188030	E.35
KVP10U	133374	D.21	MARN422AT	100989	A.18	N411B	116663	E.67	P9ACPBS201	188201	E.35
KVP12E	116235	D.23	MARN422AT	100989	C.6	N422B	116665	E.67	P9ACPBS202	188202	E.35
KVP12G	104767	D.19	MARN431AR	100353	A.18	NLT1A	222231	E.62	P9ACPBS203	188203	E.35
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KVP85I	113631	D.21	MATV10AR	100356	C.61	NLT2AJI	222247	E.62	P9ACPBS224	188224	E.35
KVP85U	113628	D.21	MATV10AT	101022	C.61	NLT2AJL	222246	E.62	P9ACPBS231	188231	E.35
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LG0004R1B0	116651	D.19	MB0KD	100471	C.4	NLT2AJLL	222299	E.62	P9ACPBS239	188239	E.35
LG0004S1B0	209347	D.19	MC0I301ATD	100571	C.4	NLT2AJLR	222295	E.62	P9ACPBS243	188243	E.35
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LG0006S1B0	116011	D.19	MC0K310ATD	100574	C.4	NLT2AJV	222245	E.62	P9ACPTS	188018	E.35
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LG0404R1B0	133264	D.19	MC1I310ATD	100572	C.4	NLT2ANG	222250	E.62	P9ACRCL	187840	E.33
LG0404S1B0	116996	D.19	MC1K301ATD	100577	C.4	NLT2ANI	222253	E.62	P9ACRCL	187840	E.33
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LG0406S1B0	116997	D.19	MC2I310ATD	100559	C.4	NLT2ANLG	222303	E.62	P9ACWAF	187845	E.33
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P9ARBGR 036	187144	E.30	P9ASBSV 202	187649	E.30	P9MPS34G	184693	E.17	P9XSCI5C95	185410	E.14
P9ARBGR 201	187147	E.30	P9ASCCT	170790	E.32	P9MPS35G	184694	E.17	P9XSCU0T95	185432	E.14
P9ARBGV 006	187118	E.30	P9ASCST	187791	E.32	P9MRG	185771	E.18	P9XSC20A95	185433	E.14
P9ARBGV 028	187112	E.30	P9ASEBG	187795	E.33	P9MSC53435	153435	E.8	P9XSC20C95	185434	E.14
P9ARBGV 030	187146	E.30	P9ASHAC	187794	E.33	P9MSC53497	153497	E.8	P9XSC20E95	185435	E.14
P9ARBGV 202	187149	E.30	P9ASHP3	187792	E.33	P9MSM53293	153293	E.8	P9XSC20T95	185439	E.14
P9ARBSB 006	187252	E.30	P9ASHP5	187793	E.33	P9MSM53391	153391	E.8	P9XSC23C95	185467	E.15
P9ARBSB 028	187251	E.30	P9ASTBS	188010	E.34	P9MWR	184770	E.18	P9XSC25A95	185461	E.15
P9ARBSB 202	188978	E.30	P9ASTTS	188014	E.34	P9MZ	185772	E.18	P9XSC25C95	185462	E.15
P9ARBSN 006	187217	E.30	P9ASTWS	188011	E.34	P9PDHF	187056	E.20	P9XSC25H95	185463	E.15
P9ARBSN 028	187211	E.30	P9B01BN	187017	E.23	P9PDHF	187056	E.21	P9XSM52293	152293	E.8
P9ARBSN 029	187250	E.30	P9B01FH	187014	E.20	P9PDMVD	187040	E.21	P9XSM52391	152321	E.8
P9ARBSN 030	187245	E.30	P9B01FN	187012	E.20	P9PDMVJ	187041	E.21	P9XSM5DN	186110	E.12
P9ARBSN 202	187248	E.30	P9B01VN	187001	E.20	P9PDNBO	187070	E.23	P9XSM5DN	186140	E.12
P9ARBSR 029	187210	E.30	P9B01VN	187001	E.53	P9PDNFO	187055	E.21	P9XSMI0N	186120	E.12
P9ARBSR 201	187247	E.30	P9B01VR	187003	E.20	P9PDNVO	187020	E.21	P9XSMUON	185190	E.12
P9ARBSV 006	187218	E.30	P9B02VN	187008	E.20	P9PDTVO	187027	E.21	P9XSMXON	185330	E.12
P9ARBSV 028	187212	E.30	P9B10BN	187018	E.23	P9PRDVN	187022	E.21	P9XSMZON	185200	E.12
P9ARBSV 030	187246	E.30	P9B10FH	187015	E.20	P9PREVJ	187025	E.21	P9XSMZ1N	185240	E.12
P9ARBSV 202	187249	E.30	P9B10FN	187013	E.20	P9PREVL	187026	E.21	P9XSMZ3N	186320	E.12
P9ARCAST	187490	E.32	P9B10VA	187004	E.20	P9PRLVJ	187021	E.21	P9XSMZ5N	185280	E.12
P9ARDLS	187300	E.31	P9B10VN	187002	E.20	P9PRNVJ	187023	E.21	P9XSVDON	185370	E.13
P9ARDLS001	187315	E.31	P9B10VN	187002	E.53	P9PRNVN	187024	E.21	P9XSVDSN	185373	E.13
P9ARDLS002	187316	E.31	P9B11VN	187000	E.20	P9PRTVN	187028	E.21	P9XSVXON	185392	E.13
P9ARDLS006	187305	E.31	P9B11VN	187000	E.53	P9PSB	186773	E.18	P9XSVZON	185379	E.13
P9ARDLS017	187309	E.31	P9B20VN	187009	E.20	P9SBM	186774	E.18	P9XSVZ3N	185391	E.13
P9ARDLS018	187310	E.31	P9DPL54700	154700	E.9	P9SCD	185695	E.17	P9XZ	186772	E.18
P9ARDLS026	187311	E.31	P9DPL54701	154701	E.9	P9SEC4RA95	186073	E.11	PCP12G	241749	D.19
P9ARDLS027	187312	E.31	P9DPL54720	154720	E.9	P9SEM3RL	186551	E.16	PRC1S13ANL	222012	A.5
P9ARDLS028	187302	E.31	P9DPL54721	154721	E.9	P9SEM3RN	186031	E.11	PRC1S13BDL	222004	A.5
P9ARDLS029	187301	E.31	P9DPLNRG00	186880	E.19	P9SER4R	185077	E.11	PRC1S13BNL	222013	A.5
P9ARDLS030	187318	E.31	P9DPLNRG01	186890	E.19	P9SET4R	186061	E.11	PRC1S13CBL	222007	A.5
P9ARDLS031	187313	E.31	P9DPLNRS00	186882	E.19	P9SET4RL1	186561	E.16	PRC1S13CDL	222008	A.5
P9ARDLS032	187314	E.31	P9DPLNRS01	186892	E.19	P9SSCD0A95	186400	E.14	PRC1T10ADD	221883	A.5
P9ARDLS201	187319	E.31	P9DPLVRG00	186881	E.19	P9SSCD5A95	186409	E.14	PRC1T10AJL	221884	A.5
P9ARDLS202	187320	E.31	P9DPLVRG01	186891	E.19	P9SSCI5C95	186410	E.14	PRC1T10ANL	221885	A.5
P9ARDPL	187350	E.31	P9DPLVRS00	186883	E.19	P9SSC20T95	186439	E.14	PRC1T10CBL	221875	A.5
P9ARDPL001	187365	E.31	P9DPLVRS01	186893	E.19	P9SSC23C95	186467	E.15	PRC1T10CDL	221876	A.5
P9ARDPL002	187366	E.31	P9EPA01Y02	189010	E.24	P9SSC25A95	186461	E.15	PRC1T10CJL	221877	A.5
P9ARDPL006	187355	E.31	P9EPA01Y03	189011	E.24	P9SSMDON	185110	E.12	PRC1T20ADD	221868	A.5
P9ARDPL017	187359	E.31	P9EPA02Y01	189016	E.25	P9SSMD5N	185150	E.12	PRC1T20AJL	221869	A.5
P9ARDPL018	187360	E.31	P9EPA03Y01	189018	E.25	P9SSMEON	186170	E.12	PRC1T20ANL	221870	A.5
P9ARDPL026	187361	E.31	P9EPA03Y05	189022	E.25	P9SSME1N	186210	E.12	PRC1T20CBL	221860	A.5
P9ARDPL027	187362	E.31	P9EPAG1Y01W	189008	E.24	P9SSMI0N	185120	E.12	PRC1T20CDL	221861	A.5
P9ARDPL028	187352	E.31	P9EPAG1Y06N	189009	E.24	P9SSMI5N	186150	E.12	PRC1T20CJL	221862	A.5
P9ARDPL029	187351	E.31	P9EPAG1Y0N	189007	E.24	P9SSMUON	186190	E.12	PRC2P20ABL	220019	A.4
P9ARDPL030	187368	E.31	P9EPC01X00	215432	E.26	P9SSMU1N	186230	E.12	PRC2P20ADL	220020	A.4
P9ARDPL031	187363	E.31	P9EPC01X01	215433	E.26	P9SSMXON	186330	E.12	PRC2P20AGL	220021	A.4
P9ARDPL032	187364	E.31	P9EPE01	189001	E.24	P9SSMZON	186200	E.12	PRC2P20AJL	220024	A.4
P9ARDPL201	187369	E.31	P9EPE02	189002	E.24	P9SSMZ1N	186240	E.12	PRC2P20ANL	220026	A.4
P9ARDPL202	187370	E.31	P9EPE03	189003	E.24	P9SSMZ3N	185320	E.12	PRC2P20CBL	220022	A.4
P9ARHPR	187491	E.33	P9EPE04	189004	E.24	P9SSMZ5N	186280	E.12	PRC2P20CDL	220023	A.4
P9ARPB	188002	E.35	P9EPE06	189005	E.24	P9SZ	184772	E.18	PRC2P20CGL	220025	A.4
P9ARPTM	188019	E.35	P9EPEG1	189000	E.24	P9XaSVI0N	185371	E.13	PRC2P20CJL	220027	A.4
P9ARPWM	188028	E.35	P9EPL02X01	189136	E.26	P9XBD	185773	E.18	PRC2P20DCBL	220041	A.4
P9ARRE4	187492	E.33	P9EPL02X02	189137	E.26	P9XBM	185774	E.18	PRC2P20DCDL	220042	A.4
P9ARSCMB	188044	E.32	P9EPL03X01	189138	E.26	P9XCD	186695	E.17	PRC2P20DCGL	220043	A.4
P9ARSCMN	188043	E.32	P9EPL03X02	189139	E.26	P9XEC4RA95N	185079	E.11	PRC2P20DCJL	220044	A.4
P9ARSGMB	187496	E.32	P9EPL03X03	189140	E.26	P9XEC52130	152130	E.8	PRC3P30ABL	220310	A.4
P9ARSGMN	187495	E.32	P9EPL04X01	189141	E.27	P9XEM52111	152111	E.8	PRC3P30ADL	220311	A.4
P9ARSN1	188805	E.33	P9MCC	184696	E.17	P9XER3RN	184070	E.11	PRC3P30AGL	220312	A.4
P9ARTBM	188001	E.34	P9MCD	184695	E.17	P9XER4RAN	186072	E.11	PRC3P30AJL	220315	A.4
P9ARTBS	188000	E.34	P9MEC53130	153130	E.8	P9XER4RAW	185078	E.11	PRC3P30ANL	220317	A.4
P9ARTTM	188019	E.34	P9MEM53111	153111	E.8	P9XER4RN	184071	E.11	PRC3P30CBL		

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PRC3P30DCBL	220335	A.4	PRCTR1	220916	A.3	QT20820U21MS	169115	D.73	RSS13/64TA6,8	214869	C.90
PRC3P30DCDL	220336	A.4	PRCTR1	220916	A.3	QT30008N21MS	169119	D.72	RSS13/64TA680	214580	C.90
PRC3P30DCGL	220337	A.4	PRCTR1S	222043	A.5	QT30017N21MS	169120	D.72	RSS13/64TA680	214580	C.90
PRC3P30DCJL	220338	A.4	PRCW20	222039	A.5	QT30031N21MS	169121	D.72	RSS13/64TA680	214580	C.90
PRC4M20ABL	220710	A.3	PRCZ11	220647	A.4	QT30044N21MS	169122	D.72	RSS13/64TA680	214580	C.90
PRC4M20ADL	220711	A.3	PRCZ11	220647	F.4	QT30058N21MS	169123	D.72	RSS13/64TA680	214580	C.90
PRC4M20AGL	220712	A.3	PRCZ8	220216	A.4	QT30072N21MS	169124	D.72	RSS13/64TA680	214580	C.90
PRC4M20AJL	220715	A.3	PTP04	113850	C.17	QT30085N21MS	169125	D.72	RSS13/64TA680	214580	C.90
PRC4M20ANL	220717	A.3	PTP08	113852	C.17	QT30105N21MS	169126	D.72	RSS13/64TA680	214580	C.90
PRC4M20CBL	220713	A.3	PTP10	113853	C.17	QT30145N21MS	169127	D.72	RSS13/64TA8,2	204177	C.90
PRC4M20CDL	220714	A.3	PTP45	113851	C.17	QT30170N21MS	169128	D.72	RSS13/64TA8,2	204177	C.90
PRC4M20CGL	220716	A.3	PTPCK11	103749	C.21	QT30210N21MS	169129	D.72	RSS13/64TA8,2	204177	C.90
PRC4M20CJL	220718	A.3	PTPCK75	103747	C.21	QT30310N21MS	169130	D.72	RSS13/64TA8,2	204177	C.90
PRC4M20DCBL	220754	A.3	PTPCK75	103747	C.65	QT30390N21MS	169131	D.72	RSS13/64TA82	204177	C.90
PRC4M20DCDL	220755	A.3	PTPCK95	103748	C.21	QT30460N21MS	169132	D.72	RSS13/64TA820	214400	C.90
PRC4M20DCGL	220756	A.3	PVP10G	241748	D.19	QT30580N21MS	169133	D.72	RSS20/165TA100	213663	C.90
PRC4M20DCJL	220757	A.3	PVP85G	241747	D.19	QT30650N21MS	169134	D.72	RSS20/165TA120	213664	C.90
PRC4M30ABL	221051	A.3	Q...			QT30950N21MS	169135	D.72	RSS20/165TA150	215004	C.90
PRC4M30ADL	221052	A.3	QA02P008S	120881	D.67	QT31100N21MS	169136	D.72	RSS20/165TA390	211748	C.90
PRC4M30AGL	221053	A.3	QA02P017S	120882	D.67	QT31400N21MS	169137	D.72	RSS20/165TA390	211748	C.90
PRC4M30AJL	221056	A.3	QA02P022S	120883	D.67	R...			RSS20/165TA470	211739	C.90
PRC4M30ANL	221058	A.3	QA02P031S	120884	D.67	RCF-1 AJ	124433	F.6	RSS20/165TA560	244987	C.90
PRC4M30CBL	221054	A.3	QA02P044S	120885	D.67	RCF-1 AU	124435	F.6	RSS20/165TA82	214081	C.90
PRC4M30CDL	221055	A.3	QA02P058S	120886	D.67	RCF-1 EN	124434	F.6	RT12D	139138	C.63
PRC4M30CGL	221057	A.3	QA12P008S	120892	D.67	RCRT 6 - 60AJ	123623	F.4	RT12F	139139	C.63
PRC4M30CJL	221059	A.3	QA12P017S	120893	D.67	RCRT 6 - 60AN	123624	F.4	RT12G	139140	C.63
PRC4M30DCBL	221074	A.3	QA12P022S	120894	D.67	RDF1-50AU	123985	F.5	RT12H	139141	C.63
PRC4M30DCDL	221075	A.3	QA12P031S	120895	D.67	RDHA 1-1,2AEU	123965	F.4	RT12J	139142	C.63
PRC4M30DCGL	221076	A.3	QA12P044S	120896	D.67	RDHA 1-1,2OEN	123964	F.4	RT12K	113640	C.63
PRC4M30DCJL	221077	A.3	QA12P058S	120897	D.67	RDHT 1-1,2AEN	123744	F.4	RT12L	113641	C.63
PRC4M40ABL	221809	A.3	QA22P008S	120898	D.67	RDHT 1-10AEN	123754	F.4	RT12M	113642	C.63
PRC4M40ADL	221810	A.3	QA22P017S	120899	D.67	RDIT2-02VEN	124354	F.6	RT12N	113643	C.63
PRC4M40AGL	221811	A.3	QA22P022S	120900	D.67	RDIT2-5AEN	124754	F.6	RT12P	113644	C.63
PRC4M40AJL	221814	A.3	QA22P031S	120901	D.67	RDT2400VEN	124184	F.6	RT12RD	114060	C.63
PRC4M40ANL	221816	A.3	QA22P044S	120902	D.67	RE1D	101866	C.67	RT12RF	114061	C.63
PRC4M40CBL	221812	A.3	QA22P058S	120903	D.67	RE1H	101867	C.67	RT12RG	114062	C.63
PRC4M40CDL	221813	A.3	QA32P008S	120904	D.67	RE1K	101868	C.67	RT12RH	114063	C.63
PRC4M40CGL	221815	A.3	QA32P017S	120905	D.67	RE1M	101869	C.67	RT12RJ	114159	C.63
PRC4M40CJL	221817	A.3	QA32P022S	120906	D.67	RE1S	101870	C.67	RT12RK	114114	C.63
PRC4M40DCBL	221851	A.3	QA32P031S	120907	D.67	RE1W	101871	C.67	RT12RL	114115	C.63
PRC4M40DCDL	221852	A.3	QA32P044S	120908	D.67	RE1XP	247302	C.67	RT12RM	114116	C.63
PRC4M40DCGL	221853	A.3	QA32P058S	120909	D.67	RE2H	101872	C.67	RT12RN	114117	C.63
PRC4M40DCJL	221854	A.3	QA0PTDIN	120910	D.67	RE2M	101873	C.67	RT12RP	114118	C.63
PRCG-ES15/2N	220912	A.3	QT10008U21MS	169075	D.72	RE2XP	247303	C.67	RT12RS	114119	C.63
PRCG-ES15/3N	221442	A.3	QT10008U21MS	169075	D.73	RE3E	101874	C.67	RT12RT	114120	C.63
PRCG-ES15/4N	221934	A.3	QT10017U21MS	169076	D.72	RMM 2 EN	124104	F.5	RT12RU	114121	C.63
PRCG1052	220914	A.3	QT10017U21MS	169076	D.73	RPDF2-50AU	124025	F.5	RT12RV	114122	C.63
PRCG1052	220914	A.3	QT10031U21MS	169077	D.72	RS01NAJ	124373	F.6	RT12RW	114123	C.63
PRCG1052	220914	A.3	QT10031U21MS	169077	D.73	RS01NEN	1212759	F.6	RT12S	113645	C.63
PRCG11	220648	A.4	QT10044U21MS	169078	D.72	RSF1-50ANU	124051	F.5	RT12T	113646	C.63
PRCG8	220217	A.4	QT10044U21MS	169078	D.73	RSSF1-50AU	124622	F.5	RT12U	113647	C.63
PRCGZT80	221918	A.5	QT10058U21MS	169079	D.72	RSS13/64TA10	211742	C.90	RT12V	113648	C.63
PRCM21N	222101	A.6	QT10058U21MS	169079	D.73	RSS13/64TA100	211744	C.90	RT12W	113649	C.63
PRCM21P	222100	A.6	QT10072U21MS	169080	D.72	RSS13/64TA100	211743	C.90	RT1B	113700	C.63
PRCM31G	222104	A.6	QT10072U21MS	169080	D.73	RSS13/64TA120	243281	C.90	RT1C	113701	C.63
PRCM31R	222102	A.6	QT10085U21MS	169081	D.72	RSS13/64TA1200	213034	C.90	RT1D	113702	C.63
PRCM32G	222105	A.6	QT10085U21MS	169081	D.73	RSS13/64TA1200	213034	C.90	RT1F	113703	C.63
PRCM32R	222103	A.6	QT10105U21MS	169082	D.72	RSS13/64TA1200	213034	C.90	RT1G	113704	C.63
PRCM33G	222106	A.6	QT10105U21MS	169082	D.73	RSS13/64TA1200	213034	C.90	RT1H	113705	C.63
PRCM33R	222109	A.6	QT10145U21MS	169083	D.72	RSS13/64TA1200	213034	C.90	RT1J	113706	C.63
PRCM41G	222107	A.6	QT10145U21MS	169083	D.73	RSS13/64TA15	211737	C.90	RT1K	113707	C.63
PRCM41R	222110	A.6	QT10170U21MS	169084	D.72	RSS13/64TA18	211727	C.90	RT1L	113708	C.63
PRCM42G	222124	A.6	QT10170U21MS	169084	D.73	RSS13/64TA18	211727	C.90	RT1M	113709	C.63
PRCM42R	222111	A.6	QT10210N21MS	169091	D.72	RSS13/64TA18	211727	C.90	RT1N	113710	C.63
PRCM43G	222125	A.6	QT10210U21MS	169085	D.73	RSS13/64TA18	211727	C.90	RT1P	113711	C.63
PRCM43R	222112	A.6	QT10310N21MS	169092	D.72	RSS13/64TA180	211744	C.90	RT1RB	114087	C.63
PRCM51	222113	A.6	QT10310U21MS	169086	D.73	RSS13/64TA180	211744	C.90	RT1RC	114088	C.63
PRCM52	222114	A.6	QT10390N21MS	169093	D.72	RSS13/64TA180	211744	C.90	RT1RD	114089	C.63
PRCM53	222115	A.6	QT10390U21MS	169087	D.73	RSS13/64TA180	211744	C.90	RT1RF	114090	C.63
PRCM71	222121	A.6	QT10460N21MS	169094	D.72	RSS13/64TA180	211744	C.90	RT1RG	114091	C.63
PRCM73	222122	A.6	QT10460U21MS	169088	D.72	RSS13/64TA180	211744	C.90	RT1RH	114092	C.63
PRCM91G	222126	A.6	QT10460U21MS	169088	D.73	RSS13/64TA180	211744	C.90	RT1RJ	114093	C.63
PRCM91R	222116	A.6	QT10580N21MS	169095	D.72	RSS13/64TA220	212702	C.90	RT1RK	114094	C.63
PRCM93G	222120	A.6	QT10580U21MS	169089	D.72	RSS13/64TA27	244192	C.90	RT1RL	114095	C.63
PRCM93R	221920	A.5	QT10580U21MS	169089	D.73	RSS13/64TA27	244192	C.90	RT1RM	114096	C.63
PRCMS35	220915	A.3	QT10650N21MS	169096	D.72	RSS13/64TA27	244192	C.90	RT1RN	114097	C.63
PRCMS35	220915	A.3	QT10820U21MS	169090	D.72	RSS13/64TA27	244192	C.90	RT1RP	114098	C.63
PRCMS35	220915	A.3	QT10820U21MS	169090	D.73	RSS13/64TA270	214399	C.90	RT1RS	114099	C.63
PRCPZ11	220218	A.4	QT10950N21MS	169097	D.72	RSS13/64TA300	211714	C.90	RT1RT	114100	C.63
PRCPZ11	220218	A.4	QT11100N21MS	169098	D.72	RSS13/64TA300	211714	C.90	RT1RU	114101	C.63
PRCR159	220219	A.4	QT11400N21MS	169099	D.72	RSS13/64TA33	211728	C.90	RT1RV	114102	C.63
PRCR159	220219	A.4	QT20008U21MS	169100	D.73	RSS13/64TA33	211728	C.90	RT1RW	114103	C.63
PRCT1AD	221896	A.5	QT20017U21MS	169101	D.73	RSS13/64TA33	211728	C.90	RT1S	113712	C.63
PRCT1AJ	221897	A.5	QT20031U21MS	169102	D.73	RSS13/64TA330	211745	C.90	RT1T	113713	C.63
PRCT1AN	221898	A.5	QT20044U21MS	169103	D.73	RSS13/64TA330	211745	C.90	RT1U	113714	C.63
PRCT1CB	221890	A.5	QT20058U21MS	169104	D.73	RSS13/64TA330	211745	C.90	RT1V	113715	C.63
PRCT1CD	221891	A.5	QT20072U21MS	169105	D.73	RSS13/64TA330	211745	C.90	RT1W	113716	C.63
PRCT1CJ	221892	A.5	QT20085U21MS	169106	D.73	RSS13/64TA39	211730	C.90	RT22D	113650	C.63
PRCT2AD	221913	A.5	QT20105U21MS	169107	D.73	RSS13/64TA390	211746	C.90	RT22E	113651	C.63
PRCT2AJ	221914	A.5	QT20145U21MS	169108	D.73	RSS13/64TA47	211731	C.90	RT22G	113652	C.63
PRCT2AN	221915	A.5	QT20170U21MS	169109	D.73	RSS13/64TA470	244191	C.90	RT22H	113653	C.63
PRCT2CB	221905	A.5	QT202								

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RT22RE	114125	C.63	SFE05	120043	B.4	U200ABU430	167468	H.16	U201N02K2FS	167403	H.9
RT22RG	114126	C.63	SFE0K2	120047	B.4	U200ADN	167434	H.9	U201N02K2ZFS	167403	H.13
RT22RH	114127	C.63	SFK0A	120001	B.2	U200ALCDK	167439	H.9	U201N02K2ZFS	167403	H.14
RT22RJ	114128	C.63	SFK0B	120002	B.2	U200ALEDK	167438	H.9	U201N02K2ZSS	167414	H.9
RT22RL	114129	C.63	SFK0C	120003	B.2	U200AMP	167437	H.9	U201N02K2ZSS	167414	H.13
RT22RM	114130	C.63	SFK0D	120004	B.2	U200AN101	167446	H.9	U201N02K2ZSS	167414	H.14
RT2A	113717	C.63	SFK0E	120005	B.2	U200AN102	167447	H.9	U203N00K4SS	167415	H.9
RT2B	113718	C.63	SFK0F	120006	B.2	U200AN103	167448	H.9	U203N00K4SS	167415	H.13
RT2C	113719	C.63	SFK0G	120007	B.2	U200APB	167433	H.9	U203N00K4SS	167415	H.14
RT2D	113720	C.63	SFK0H	120008	B.2	U200ARS232	167436	H.9	U203N00K7SS	167416	H.9
RT2E	113721	C.63	SFK0I	120009	B.2	U200ARS485	167435	H.9	U203N00K7SS	167416	H.13
RT2G	113722	C.63	SFK0J	120010	B.2	U200AW05	167441	H.9	U203N00K7SS	167416	H.14
RT2H	113723	C.63	SFK0K	120011	B.2	U200AW10	167442	H.9	U203N01K5SS	167417	H.9
RT2J	113724	C.63	SFK0L	120012	B.2	U200AW20	167443	H.9	U203N01K5SS	167417	H.13
RT2L	113725	C.63	SFK0M	120013	B.2	U200AW30	167444	H.9	U203N01K5SS	167417	H.14
RT2M	113726	C.63	SFPE0	120053	B.4	U200AW50	167445	H.9	U203N02K2SS	167418	H.9
RT2RA	114104	C.63	SFPRO	120052	B.4	U200F3100A	167476	H.14	U203N02K2SS	167418	H.13
RT2RB	114105	C.63	SFPS0	120051	B.4	U200F3100A	167476	H.14	U203N02K2SS	167418	H.14
RT2RC	114106	C.63	SFS04	120040	B.4	U200F3100A	167476	H.14	U203N04KOSS	167419	H.9
RT2RD	114107	C.63	SFS04K1	245217	B.4	U200F3100A	167476	H.14	U203N04KOSS	167419	H.13
RT2RE	114108	C.63	SFS04M	212558	B.4	U200F3100A	167476	H.16	U203N04KOSS	167419	H.14
RT2RG	114109	C.63	SFS05	120041	B.4	U200F3150A	167477	H.14	U203N05K5SS	167420	H.9
RT2RH	114110	C.63	SFS05M	212559	B.4	U200F3150A	167477	H.14	U203N05K5SS	167420	H.13
RT2RJ	114111	C.63	SFS0K2	120046	B.4	U200F3150A	167477	H.16	U203N05K5SS	167420	H.14
RT2RL	114112	C.63	SFV88	254537	B.5	U200F3180A	167478	H.14	U203N07K5SS	167422	H.9
RT2RM	114113	C.63	SFV88	254537	B.19	U200F3180A	167478	H.14	U203N07K5SS	167422	H.13
RT2XP	113764	C.65	SFVCD	120054	B.4	U200F3180A	167478	H.16	U203N07K5SS	167422	H.14
RT32C	113657	C.64	SFVH03	243713	B.3	U200F34048SMA	167474	H.14	U203X00K7FS	167404	H.9
RT32D	113658	C.64	SFVN0	101369	B.4	U200F34048SMA	167474	H.14	U203X00K7FS	167404	H.13
RT32E	113659	C.64	SON-3	123700	F.4	U200F370A	167475	H.14	U203X00K7FS	167404	H.14
RT32F	113660	C.64	SPR	100549	A.20	U200F370A	167475	H.14	U203X00K7SS	167424	H.9
RT3B	113727	C.64	SPR	100549	A.24	U200F370A	167475	H.14	U203X00K7SS	167424	H.13
RT3C	113728	C.64	SPR	100549	C.8	U200F370A	167475	H.14	U203X00K7SS	167424	H.14
RT3D	113729	C.64	SPR	100549	C.17	U200F370A	167475	H.16	U203X01K5FS	167405	H.9
RT3E	113730	C.64	SPR	100549	C.61	U200F611TA1	167453	H.14	U203X01K5FS	167405	H.13
RT3F	113731	C.64	T...			U200F611TA1	167453	H.14	U203X01K5FS	167405	H.14
RT3PXX3P	110565	C.65	TLR100P200	108223	H.4	U200F611TA1	167453	H.14	U203X01K5SS	167425	H.9
RT4LA	113735	C.64	TLR108P200	129869	H.33	U200F611TA1	167453	H.14	U203X01K5SS	167425	H.13
RT4LB	113736	C.64	TLR108P200	129869	H.33	U200F611TA1	167453	H.16	U203X01K5SS	167425	H.14
RT4LC	113737	C.64	TLR118P600	129174	H.33	U200F627TA2	167454	H.14	U203X02K2FS	167406	H.9
RT4LD	113738	C.64	TLR118P600	129174	H.33	U200F627TA2	167454	H.14	U203X02K2FS	167406	H.13
RT4LE	113739	C.64	TLR11P1200	129170	H.33	U200F627TA2	167454	H.14	U203X02K2FS	167406	H.14
RT4LF	113740	C.64	TLR11P1200	129170	H.33	U200F627TA2	167454	H.14	U203X02K2SS	167426	H.9
RT4LG	113741	C.64	TLR15P1000	129169	H.33	U200F627TA2	167454	H.16	U203X02K2SS	167426	H.13
RT4LH	113742	C.64	TLR15P1000	129169	H.33	U200F709TA1	167456	H.14	U203X02K2SS	167426	H.14
RT4LJ	113743	C.64	TLR15P3700	129881	H.33	U200F709TA1	167456	H.14	U203X04KOSS	167407	H.9
RT4LK	113744	C.64	TLR15P3700	129881	H.33	U200F709TA1	167456	H.14	U203X04KOFS	167407	H.13
RT4LL	113745	C.64	TLR175P600	129173	H.33	U200F709TA1	167456	H.16	U203X04KOFS	167407	H.14
RT4LM	113746	C.64	TLR175P600	129173	H.33	U200F719TA2	167457	H.14	U203X04KOSS	167427	H.9
RT4LN	113747	C.64	TLR18P3000	129880	H.33	U200F719TA2	167457	H.14	U203X04KOSS	167427	H.13
RT4LP	113748	C.64	TLR18P3000	129880	H.33	U200F719TA2	167457	H.16	U203X04KOSS	167427	H.14
RT4LR	113749	C.64	TLR216P200	129868	H.33	U200F739TA3	167458	H.14	U203X05K5FS	167408	H.9
RT4N	113732	C.64	TLR216P200	129868	H.33	U200F739TA3	167458	H.14	U203X05K5FS	167408	H.13
RT4P	113733	C.64	TLR22P2500	129879	H.33	U200F739TA3	167458	H.16	U203X05K5FS	167408	H.14
RT4R	113734	C.64	TLR22P2500	129879	H.33	U200F905TA1	167459	H.14	U203X05K5SS	167428	H.9
RT5A	113750	C.64	TLR22P600	129168	H.33	U200F905TA1	167459	H.14	U203X05K5SS	167428	H.13
RT5B	113751	C.64	TLR22P600	129168	H.33	U200F905TA1	167459	H.14	U203X05K5SS	167428	H.14
RT5C	113752	C.64	TLR250P200	108227	H.4	U200F905TA1	167459	H.14	U203X07K5FS	167409	H.9
RT5D	113753	C.64	TLR295P200	129876	H.33	U200F905TA1	167459	H.14	U203X07K5FS	167409	H.13
RT5E	113754	C.64	TLR295P200	129876	H.33	U200F905TA1	167459	H.14	U203X07K5FS	167409	H.14
RT5LA	113755	C.64	TLR29P1800	129878	H.33	U200F905TA1	167459	H.16	U203X07K5SS	167429	H.9
RT5LB	113756	C.64	TLR29P1800	129878	H.33	U200F910TA2	167460	H.14	U203X07K5SS	167429	H.13
RT5LC	113757	C.64	TLR29P600	129167	H.33	U200F910TA2	167460	H.14	U203X07K5SS	167429	H.14
RT5LD	113758	C.64	TLR29P600	129167	H.33	U200F910TA2	167460	H.14	U203X11KOFS	167410	H.9
RT5LE	113759	C.64	TLR35P1500	129877	H.33	U200F910TA2	167460	H.14	U203X11KOFS	167410	H.13
RT6A	113760	C.64	TLR35P1500	129877	H.33	U200F910TA2	167460	H.14	U203X11KOFS	167410	H.14
RT6LA	113761	C.64	TLR400P200	116302	H.4	U200F910TA2	167460	H.14	U203X11KOSS	167430	H.9
RTMM 2 AU	124085	F.5	TLR405P200	129867	H.33	U200F910TA2	167460	H.16	U203X11KOSS	167430	H.13
RTMM EN	124084	F.5	TLR405P200	129867	H.33	U200F928TA3	167461	H.14	U203X11KOSS	167430	H.14
RTX3	113762	C.65	TLR432P200	129875	H.33	U200F928TA3	167461	H.14	U203X15KOSS	167481	H.9
RTXBS	108864	C.65	TLR432P200	129875	H.33	U200F928TA3	167461	H.14	U203X15KOSS	167481	H.13
RTXP	105170	C.65	TLR43P1000	129177	H.33	U200F928TA3	167461	H.14	U203X15KOSS	167481	H.14
RTXS	113855	C.65	TLR43P1000	129177	H.33	U200F928TA3	167461	H.14	U203X18KOSS	167482	H.13
RTXSL	113856	C.65	TLR44P600	129166	H.33	U200F928TA3	167461	H.14	U203X18KOSS	167482	H.14
S...			TLR44P600	129166	H.33	U200F928TA3	167461	H.14	U203X18K5SS	167482	H.9
SBELA	101017	C.15	TLR4P3000	129872	H.33	U200F928TA3	167461	H.14	U203X22KOSS	167483	H.9
SFAI11	120024	B.3	TLR4P3000	129872	H.33	U200F928TA3	167461	H.14	U203X22KOSS	167483	H.13
SFAK01	120026	B.3	TLR59P1000	129176	H.33	U200F928TA3	167461	H.16	U203X22KOSS	167483	H.14
SFAK10	120025	B.3	TLR59P1000	129176	H.33	U201N00K4FS	167400	H.9	U203X30KOSS	167484	H.9
SFAL11D	120022	B.3	TLR5P2500	129871	H.33	U201N00K4FS	167400	H.13	U203X30KOSS	167484	H.13
SFAL11N	120020	B.3	TLR5P2500	129871	H.33	U201N00K4FS	167400	H.14	U203X30KOSS	167484	H.14
SFAL11S	120027	B.3	TLR7,4P1800	129172	H.33	U201N00K4SS	167411	H.9	U203X37KOSS	167485	H.9
SFAL20D	120023	B.3	TLR7,4P1800	129172	H.33	U201N00K4SS	167411	H.13	U203X37KOSS	167485	H.13
SFAL20N	120021	B.3	TLR74P200	129870	H.33	U201N00K4SS	167411	H.14	U203X37KOSS	167485	H.14
SFALPEN	264826	B.3	TLR74P200	129870	H.33	U201N00K7FS	167401	H.9	U203X45KOSS	167486	H.9
SFB0AJ	120030	B.3	TLR750P200	116301	H.4	U201N00K7FS	167401	H.13	U203X45KOSS	167486	H.13
SFB0AN	120031	B.3	TLR75P200	116300	H.4	U201N00K7FS	167401	H.14	U203X45KOSS	167486	H.14
SFB0AU	120032	B.3	TLR8,8P1500	129171	H.33	U201N00K7SS	167412	H.9	U203X55KOSS	167487	H.9
SFB0RJ	120034	B.3	TLR8,8P1500	129171	H.33	U201N00K7SS	167412	H.13	U203X55KOSS	167487	H.13
SFB0RJM	107256	B.3	TLR864P200	129873	H.33	U201N01K5FS	167402	H.14	U203X55KOSS	167487	H.14
SFB0RN	120035	B.3	TLR864P200	129873	H.33	U201N01K5FS	167402	H.9	U20AF0K7	167085	H.4
SFB0RNM	120114	B.3	TLR86P600	129175	H.33	U201N01K5FS	167402	H.13	U20AF2K2	167086	H.4
SFB0RU	120036	B.3	TLR86P600	129175	H.33	U201N01K5FS	167402	H.14	U20AF2K2X	167084	H.4
SFB0RUM	120115	B.3	U...			U201N01K5SS	167413	H.9	U20AR0K7	167087	H.4
SFE04	120042	B.4	U200ABK	167440	H.9	U201N01K					



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U20N0K2PS	167132	H.7	U30V24DN5	129391	H.20	VB1201B	104740	C.17
U20N0K2S	167075	H.3	U30V24DN6	129393	H.20	VB1202B	104742	C.17
U20N0K2S	167075	H.6	U30V24DN6	129393	H.20	VB1203B	133170	C.17
U20N0K4P	167089	H.3	U30V24OP1	129353	H.20	VB1204B	133885	C.17
U20N0K4P	167089	H.7	U30V24OP1	129353	H.20	VB1205B	104748	C.17
U20N0K4PS	167133	H.3	U30V24OP2	129354	H.20	VB1207B	104751	C.17
U20N0K4PS	167133	H.7	U30V24OP2	129354	H.20	VB1208B	104753	C.17
U20N0K4S	167076	H.3	U30V24RY0	129394	H.20	W...		
U20N0K4S	167076	H.6	U30V24RY0	129394	H.20	WKI0608	241752	D.21
U20N0K7P	167090	H.3	U30V24SL0	129397	H.20	WKI0910	241751	D.21
U20N0K7P	167090	H.7	U30V24SL0	129397	H.20	WKLE00	103238	D.23
U20N0K7PS	167134	H.3	U30V24SL1	129398	H.20	WKLE02	103241	D.23
U20N0K7PS	167134	H.7	U30V24SL1	129398	H.20	WKLE25	103243	D.23
U20N0K7S	167077	H.3	U30V24SL2	129399	H.20	WKLI02P	101422	D.3
U20N0K7S	167077	H.6	U30V24SL2	129399	H.20	WKLI02P	101422	D.21
U20N1K5P	167091	H.3	U30V24SL3	129400	H.20	WKLI04P	101424	D.3
U20N1K5P	167091	H.7	U30V24SL3	129400	H.20	WKLI04P	101424	D.21
U20N1K5PS	167135	H.3	U3SN000K7FBS	129300	H.19	WKLI07P	101426	D.3
U20N1K5PS	167135	H.7	U3SN000K7SBS	129305	H.19	WKLI07P	101426	D.21
U20N1K5S	167078	H.3	U3SN001K5FBS	129301	H.19	WKLI25P	101423	D.3
U20N1K5S	167078	H.6	U3SN001K5SBS	129306	H.19	WKLI25P	101423	D.21
U20N2K2P	167092	H.3	U3SN002K2FBS	129302	H.19	WKLI45P	101425	D.3
U20N2K2P	167092	H.7	U3SN002K2SBS	129307	H.19	WKLI45P	101425	D.21
U20N2K2PS	167136	H.3	U3SN004K0FBS	129303	H.19	WKMIU	101421	D.3
U20N2K2PS	167136	H.7	U3SN004K0SBS	129308	H.19	WKMIU	101421	D.21
U20N2K2S	167079	H.3	U3SN005K5FBS	129304	H.19	WLSL	103247	D.23
U20N2K2S	167079	H.6	U3SN005K5SBS	129309	H.19	WLSL	103247	D.23
U20X0K7P	167093	H.3	U3SN007K5SBS	129310	H.19	WLSL	103247	D.23
U20X0K7P	167093	H.7	U3SN011K0SBS	129311	H.19	WLSL	103247	D.23
U20X0K7PS	167137	H.3	U3SN015K0SBS	129312	H.19	WLSL	103247	D.23
U20X0K7PS	167137	H.7	U3SN018K5SBS	129313	H.19	WLSL	103247	D.23
U20X0K7S	167080	H.3	U3SN022K0SNS	129314	H.19	WLSL	103247	D.23
U20X0K7S	167080	H.6	U3SN030K0SNS	129315	H.19	WLSL	103247	D.23
U20X1K5P	167094	H.3	U3SN037K0SNS	129316	H.19	WLSL	103247	D.23
U20X1K5P	167094	H.7	U3SN045K0SNS	129317	H.19	WLSL	103247	D.23
U20X1K5PS	167138	H.3	U3SX000K7FBS	129318	H.19	WLSL	103247	D.23
U20X1K5PS	167138	H.7	U3SX000K7SBS	129329	H.19	WLSL	103247	D.23
U20X1K5S	167081	H.3	U3SX001K5FBS	129319	H.19	WLSL	103247	D.23
U20X1K5S	167081	H.6	U3SX001K5SBS	129330	H.19	WLSL	103247	D.23
U20X2K2P	167095	H.3	U3SX002K2FBS	129320	H.19	WLSL	103247	D.23
U20X2K2P	167095	H.7	U3SX002K2SBS	129331	H.19	WLSL	103247	D.23
U20X2K2PS	167139	H.3	U3SX004K0FBS	129321	H.19	WLSL	103247	D.23
U20X2K2PS	167139	H.7	U3SX004K0SBS	129332	H.19	WLSL	103247	D.23
U20X2K2S	167082	H.3	U3SX005K5FBS	129322	H.19	WLSL	103247	D.23
U20X2K2S	167082	H.6	U3SX005K5SBS	129333	H.19	WLSL	103247	D.23
U2KV23DBUH1	168084	H.33	U3SX007K5FBS	129323	H.19	WLSL	103247	D.23
U2KV23DBUH1	168084	H.33	U3SX007K5SBS	129334	H.19	WLSL	103247	D.23
U2KV23DBUH2	168085	H.33	U3SX011K0FBS	129324	H.19	WLSL	103247	D.23
U2KV23DBUH2	168085	H.33	U3SX011K0SBS	129335	H.19	WLSL	103247	D.23
U2KV23DBUH3	168086	H.33	U3SX015K0FBS	129325	H.19	WLSL	103247	D.23
U2KV23DBUH3	168086	H.33	U3SX015K0SBS	129336	H.19	WLSL	103247	D.23
U2KV23DBUH4	168083	H.33	U3SX018K5FBS	129326	H.19	WLSL	103247	D.23
U2KV23DBUH4	168083	H.33	U3SX018K5SBS	129337	H.19	WLSL	103247	D.23
U2KV23DBUL1	168098	H.33	U3SX022K0FBS	129327	H.19	WLSL	103247	D.23
U2KV23DBUL1	168098	H.33	U3SX022K0SBS	129338	H.19	WLSL	103247	D.23
U2KV23DBUL2	168099	H.33	U3SX030K0FNS	129328	H.19	WLSL	103247	D.23
U2KV23DBUL2	168099	H.33	U3SX030K0SNS	129339	H.19	WLSL	103247	D.23
U2KV23DBUL3	168100	H.33	U3SX037K0SNS	129340	H.19	WLSL	103247	D.23
U2KV23DBUL3	168100	H.33	U3SX045K0SNS	129341	H.19	WLSL	103247	D.23
U2KV23W103	168102	H.20	U3SX055K0SNS	129342	H.19	WLSL	103247	D.23
U2KV23W103	168102	H.20	U3SX075K0SNS	129343	H.19	WLSL	103247	D.23
U30F3016EB	129284	H.32	U3SX090K0SNS	129344	H.19	WLSL	103247	D.23
U30F3016EB	129284	H.32	U3SX110K0SNS	129345	H.19	WLSL	103247	D.23
U30F3030EB	129285	H.32	U3SX132K0SNS	129346	H.19	WLSL	103247	D.23
U30F3030EB	129285	H.32	U3SX160K0SNS	129347	H.19	WLSL	103247	D.23
U30F3055EB	129286	H.32	U3SX200K0SNS	129348	H.19	WLSL	103247	D.23
U30F3055EB	129286	H.32	U3SX250K0SNS	129349	H.19	WLSL	103247	D.23
U30F3075EB	129287	H.32	U3SX315K0SNS	129350	H.19	WLSL	103247	D.23
U30F3075EB	129287	H.32	U3SX400K0SNS	129351	H.19	WLSL	103247	D.23
U30F31000ES	129295	H.32	U3SX475K0SNS	129352	H.19	WLSL	103247	D.23
U30F31000ES	129295	H.32	V...			WLSL	103247	D.23
U30F31000EB	129288	H.32	V1107BA	113612	C.21	WLSL	103247	D.23
U30F31000EB	129288	H.32	V1108B4	113505	C.21	WLSL	103247	D.23
U30F3130EB	129289	H.32	V1108CA	113614	C.21	WLSL	103247	D.23
U30F3130EB	129289	H.32	V1109B4	113899	C.21	WLSL	103247	D.23
U30F31600ES	129296	H.32	V1109BA	113616	C.21	WLSL	103247	D.23
U30F31600ES	129296	H.32	V1110CE	113618	C.21	WLSL	103247	D.23
U30F3180EB	129290	H.32	V1111CE	113619	C.21	WLSL	103247	D.23
U30F3180EB	129290	H.32	V1112BA	113620	C.21	WLSL	103247	D.23
U30F3250ES	129291	H.32	V1113BA	113621	C.21	WLSL	103247	D.23
U30F3250ES	129291	H.32	V1175CA	113613	C.21	WLSL	103247	D.23
U30F3320ES	129292	H.32	V1185BA	113615	C.21	WLSL	103247	D.23
U30F3320ES	129292	H.32	V1195BA	113617	C.21	WLSL	103247	D.23
U30F3400ES	129293	H.32	V31200B	104738	C.17	WLSL	103247	D.23
U30F3400ES	129293	H.32	V31201B	104739	C.17	WLSL	103247	D.23
U30F3600ES	129294	H.32	V31202B	104741	C.17	WLSL	103247	D.23
U30F3600ES	129294	H.32	V31203B	104743	C.17	WLSL	103247	D.23
U30V24AI0	129396	H.20	V31204B	104745	C.17	WLSL	103247	D.23
U30V24AI0	129396	H.20	V31205B	104747	C.17	WLSL	103247	D.23
U30V24DN1	129388	H.20	V31206B	104749	C.17	WLSL	103247	D.23
U30V24DN1	129388	H.20	V31207B	104750	C.17	WLSL	103247	D.23
U30V24DN2	129389	H.20	V31208B	104752	C.17	WLSL	103247	D.23
U30V24DN2	129389	H.20	V31209B	104754	C.17	WLSL	103247	D.23
U30V24DN3	129390	H.20	V31210B	104755	C.17	WLSL	103247	D.23
U30V24DN3	129390	H.20	V31225B	104757	C.17	WLSL	103247	D.23



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100000			101001	MT03B	C.61	101271	GPS1MSAR	B.13	101367	GPEF41A	B.21
100470	MB0ID	A.17	101002	MT03C	C.61	101272	GPS2MSAK	B.15	101368	GPEF55A	B.21
100470	MB0ID	C.4	101003	MT03D	C.61	101273	GPS2MSAM	B.15	101369	GPENA	B.21
100471	MB0KD	A.17	101004	MT03E	C.61	101274	GPS2MSAN	B.15	101369	SFVNO	B.4
100471	MB0KD	C.4	101005	MT03F	C.61	101275	GPS2MSAP	B.15	101370	GPEPA	B.21
100513	MARL110AT	A.19	101006	MT03G	C.61	101276	GPS2MSAR	B.15	101371	GPECA	B.21
100514	MARL101AT	A.19	101007	MT03H	C.61	101277	GPS2MSAS	B.15	101372	GPEPMA	B.21
100515	MARL110AF	A.19	101008	MT03I	C.61	101278	GPS2MSAT	B.15	101373	GPEPLA	B.21
100516	MARL101AF	A.19	101009	MT03J	C.61	101279	GPS2MSAU	B.15	101374	GPEPKA	B.21
100517	MARL110AI	A.19	101010	MT03K	C.61	101280	GPS1MHAA	B.13	101375	GPELGAJ	B.4
100518	MARL101AI	A.19	101011	MT03L	C.61	101281	GPS1MHAB	B.13	101375	GPELGAJ	B.21
100519	MARL110ATS	A.19	101012	MT03M	C.61	101282	GPS1MHAC	B.13	101376	GPELGAN	B.4
100519	MARL110ATS	C.7	101013	MT03N	C.61	101283	GPS1MHAD	B.13	101376	GPELGAN	B.21
100520	MARL101ATS	A.19	101014	MT03P	C.61	101284	GPS1MHAE	B.13	101377	GPELGAU	B.4
100520	MARL101ATS	C.7	101015	MT03R	C.61	101285	GPS1MHAF	B.13	101377	GPELGAU	B.21
100521	MARL110AFS	A.19	101017	SBELA	C.15	101286	GPS1MHAG	B.13	101378	GPELGAX	B.4
100521	MARL110AFS	C.7	101020	MVEOT	C.61	101287	GPS1MHAH	B.13	101378	GPELGAX	B.21
100522	MARL101AFS	A.19	101021	MVB0T	C.61	101288	GPS1MHAJ	B.13	101379	GPELGAY	B.4
100522	MARL101AFS	C.7	101022	MATV10AT	C.61	101289	GPS1MHAK	B.13	101379	GPELGAY	B.21
100523	MARL110AIS	A.19	101095	LG2506P1B0	D.19	101290	GPS1MHAL	B.13	101380	GPELRAJ	B.4
100523	MARL110AIS	C.7	101194	GPASLRAA11	B.18	101291	GPS1MHAM	B.13	101380	GPELRAJ	B.21
100524	MARL101AIS	A.19	101195	GPS1BSAAMP	B.9	101292	GPS1MHAN	B.13	101381	GPELRAN	B.4
100524	MARL101AIS	C.7	101196	GPS1BSABMP	B.9	101293	GPS1MHAP	B.13	101381	GPELRAN	B.21
100530	MCRI040ATD	A.17	101197	GPS1BSACMP	B.9	101294	GPS1MHAR	B.13	101382	GPELRAU	B.4
100531	MCRI031ATD	A.17	101198	GPS1BSADMP	B.9	101295	GPS2MHAK	B.15	101382	GPELRAU	B.21
100532	MCRI022ATD	A.17	101199	GPS1BSAEMP	B.9	101296	GPS2MHAM	B.15	101383	GPELRAX	B.4
100533	MCRK040ATD	A.17	101200	GPS1BSAFMP	B.9	101297	GPS2MHAN	B.15	101383	GPELRAX	B.21
100534	MCRK031ATD	A.17	101201	GPS1BSAGMP	B.9	101298	GPS2MHAP	B.15	101384	GPELRAY	B.4
100535	MCRK022ATD	A.17	101202	GPS1BSAHMP	B.9	101299	GPS2MHAR	B.15	101384	GPELRAY	B.21
100536	MP0DAE4	A.20	101203	GPS1BSAJMP	B.9	101300	GPS2MHAS	B.15	101385	GPELCAJ	B.4
100536	MP0DAE4	C.8	101204	GPS1BSAKMP	B.9	101301	GPS2MHAT	B.15	101385	GPELCAJ	B.21
100538	MC2I301ATD	C.4	101205	GPS1BSALMP	B.9	101302	GPS2MHAU	B.15	101386	GPELCAN	B.4
100541	MREBC10AC2	A.20	101206	GPS1BSAMMP	B.9	101303	GPAC10FBA	B.17	101386	GPELCAN	B.21
100541	MREBC10AC2	C.8	101207	GPS1BSANMP	B.9	101304	GPAC01FBA	B.17	101387	GPELCAU	B.4
100542	MREBC20AC2	A.20	101208	GPS1BSAPMP	B.9	101305	GPAC11LLA	B.17	101387	GPELCAU	B.21
100542	MREBC20AC2	C.8	101209	GPS1BSARMP	B.9	101306	GPAC20LLA	B.17	101388	GPELCAJ	B.4
100543	MVB0R	A.20	101211	GPS1BSAA	B.9	101307	GPAC02LLA	B.17	101388	GPELCAJ	B.21
100543	MVB0R	C.8	101212	GPS1BSAB	B.9	101308	GPAC11LRA	B.17	101389	GPELCAJ	B.4
100544	MPOAAE1	A.20	101213	GPS1BSAC	B.9	101309	GPAC20LRA	B.17	101389	GPELCAJ	B.21
100544	MPOAAE1	C.8	101214	GPS1BSAD	B.9	101310	GPAC02LRA	B.17	101390	GPB1B02A	B.19
100545	MPOAAE2	A.20	101215	GPS1BSAE	B.9	101311	GPAL10FRA	B.17	101391	GPB1B03A	B.19
100545	MPOAAE2	C.8	101216	GPS1BSAF	B.9	101312	GPAL01FRA	B.17	101392	GPB104A	B.5
100546	MPOCAE3	A.20	101217	GPS1BSAG	B.9	101313	GPAD1010LLA	B.17	101392	GPB1B04A	B.19
100546	MPOCAE3	C.8	101218	GPS1BSAH	B.9	101314	GPAD1001LLA	B.17	101393	GPB105A	B.5
100547	MMHO	A.20	101219	GPS1BSAJ	B.9	101315	GPAD0110LLA	B.17	101393	GPB1B05A	B.19
100547	MMHO	C.8	101220	GPS1BSAK	B.9	101316	GPAD0101LLA	B.17	101394	GPB1B12A	B.19
100548	EAT 260	A.20	101221	GPS1BSAL	B.9	101317	GPAE11LLA	B.17	101395	GPB1B13A	B.19
100548	EAT 260	A.24	101222	GPS1BSAM	B.9	101318	GPASLRAA1	B.18	101396	GPB1B14A	B.19
100548	EAT 260	C.8	101223	GPS1BSAN	B.9	101319	GPASLRAAF	B.18	101397	GPB1B15A	B.19
100548	EAT 260	C.17	101224	GPS1BSAP	B.9	101320	GPASLRAAG	B.18	101398	GPB1B22A	B.19
100548	EAT 260	C.61	101225	GPS1BSAR	B.9	101321	GPASLRAAJ	B.18	101399	GPB1B24A	B.19
100549	SPR	A.20	101226	GPS2BSAK	B.11	101322	GPASLRAAM	B.18	101400	GPB2B02A	B.19
100549	SPR	A.24	101227	GPS2BSAM	B.11	101323	GPASLRAAN	B.18	101401	GPB2B03A	B.19
100549	SPR	C.8	101228	GPS2BSAN	B.11	101324	GPASLRAAR	B.18	101402	GPB2B04A	B.19
100549	SPR	C.17	101229	GPS2BSAP	B.11	101325	GPASLRAAU	B.18	101403	GPB2B12A	B.19
100549	SPR	C.61	101230	GPS2BSAR	B.11	101326	GPASLRAAW	B.18	101404	GPB2B13A	B.19
100559	MC2I310ATD	C.4	101231	GPS2BSAS	B.11	101327	GPASLRAAY	B.18	101405	GPB2B14A	B.19
100560	MACL110AT	C.7	101232	GPS2BSAT	B.11	101328	GPASLRADD	B.18	101406	GPB2B22A	B.19
100561	MACL101AT	C.7	101233	GPS2BSAU	B.11	101329	GPASLRADJ	B.18	101407	GPB2B24A	B.19
100562	MACL110AF	C.7	101234	GPS1BHAA	B.9	101330	GPALRAAD	B.18	101408	GPB1GA	B.5
100563	MACL101AF	C.7	101235	GPS1BHAB	B.9	101331	GPALRAAC	B.18	101408	GPB1GA	B.19
100564	MACL110AI	C.7	101236	GPS1BHAC	B.9	101332	GPALRAAG	B.18	101409	GPB2GA	B.19
100565	MACL101AI	C.7	101237	GPS1BHAD	B.9	101333	GPALRAAF	B.18	101410	GPFL1MCBA	D.3
100570	MCOI310ATD	C.4	101238	GPS1BHAE	B.9	101334	GPALRAAJ	B.18	101411	GPFL102AA	D.3
100571	MCOI301ATD	C.4	101239	GPS1BHAF	B.9	101335	GPALRAAM	B.18	101412	GPFL102DA	D.3
100572	MC1I1310ATD	C.4	101240	GPS1BHAG	B.9	101336	GPALRAAN	B.18	101413	GPFL125AA	D.3
100573	MC1I301ATD	C.4	101241	GPS1BHAH	B.9	101337	GPALRAAR	B.18	101414	GPFL125DA	D.3
100574	MCOK310ATD	C.4	101242	GPS1BHAI	B.9	101338	GPALRAAU	B.18	101415	GPFL245AA	D.3
100575	MCOK301ATD	C.4	101243	GPS1BHAK	B.9	101339	GPALRAAW	B.18	101416	GPFL245DA	D.3
100576	MC1K310ATD	C.4	101244	GPS1BHAL	B.9	101340	GPALRAAY	B.18	101417	GPFL207AA	D.3
100577	MC1K301ATD	C.4	101245	GPS1BHAM	B.9	101341	GPALRAAD	B.18	101418	GPFL1B1A	D.3
100600	MVPOC	C.8	101246	GPS1BHAN	B.9	101342	GPALRAAC	B.18	101419	GPFL2B2A	D.3
100608	MAGL110AT	D.19	101247	GPS1BHAP	B.9	101343	GPALRAAG	B.18	101420	GPFL2B3A	D.3
100885	LG2504P1B0	D.19	101248	GPS1BHAR	B.9	101344	GPALRAAF	B.18	101421	WKMIU	D.3
100987	MARN404AT	A.18	101249	GPS2BHAK	B.11	101345	GPALRAAJ	B.18	101421	WKMIU	D.21
100987	MARN404AT	C.6	101250	GPS2BHAM	B.11	101346	GPALRAAM	B.18	101422	WKLI02P	D.3
100988	MARN413AT	A.18	101251	GPS2BHAN	B.11	101347	GPALRAAN	B.18	101422	WKLI02P	D.21
100988	MARN413AT	C.6	101252	GPS2BHAP	B.11	101348	GPALRAAR	B.18	101423	WKLI25P	D.3
100989	MARN422AT	A.18	101253	GPS2BHAR	B.11	101349	GPALRAAU	B.18	101423	WKLI25P	D.21
100989	MARN422AT	C.6	101254	GPS2BHAS	B.11	101350	GPALRAAW	B.18	101424	WKLI04P	D.3
100990	MARN431AT	A.18	101255	GPS2BHAT	B.11	101351	GPALRAAY	B.18	101424	WKLI04P	D.21
100990	MARN431AT	C.6	101256	GPS2BHAU	B.11	101352	GPAL20LCAAD	B.18	101425	WKLI45P	D.3
100991	MARN440AT	A.18	101257	GPS1MSAA	B.13	101353	GPAL20LCAAC	B.18	101425	WKLI45P	D.21
100991	MARN440AT	C.6	101258	GPS1MSAB	B.13	101354	GPAL20LCAAG	B.18	101426	WKLI07P	D.3
100992	MARN202AT	A.18	101259	GPS1MSAC	B.13	101355	GPAL20LCAAF	B.18	101426	WKLI07P	D.21
100992	MARN202AT	C.6	101260	GPS1MSAD	B.13	101356	GPAL20LCAAJ	B.18	101427	GPFL1CBA	D.3
100993	MARN211AT	A.18	101261	GPS1MSAE	B.13	101357	GPAL20LCAAM	B.18	101502	GPAZHAB	B.19
100993	MARN211AT	C.6	101262	GPS1MSAF	B.13	101358	GPAL20LCAAN	B.18	101503	GPAZHAR	B.19
100994	MARN220AT	A.18	101263	GPS1MSAG	B.13	101359	GPAL20LCAAR	B.18	101509	GPAK1SA	B.18
100994	MARN220AT	C.6	101264	GPS1MSAH	B.13	101360	GPAL20LCAAU	B.18	101511	GPB1GAF	B.19
100995	MACN413AT	C.6	101265	GPS1MSAJ	B.13	101361	GPAL20LCAAW	B.18	101512	GPFL125CT1	D.3
100996	MACN422AT	C.6	101266	GPS1MSAK	B.13	101362	GPAL20LCAAY	B.18	101513	GPFL145CT1	D.3
100997	MACN431AT	C.6	101267	GPS1MSAL	B.13	101363	GPA1HAB	B.19	101514	GPVDA	B.18
100998	MACN202AT	C.6	101268	GPS1MSAM	B.13	101364	GPA1HAR	B.19	101515	GPVPA	B.18
100999	MACN211AT	C.6	101269	GPS1MSAN	B.13	101365	GPES41A	B.21	101866	RE1D	C.67
101000	MT03A	C.61	101270	GPS1MSAP	B.13	101366	GPES55A	B.21	101867	RE1H	C.67



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101868	RE1K	C.67	104712	BTLF60D	A.23	107315	GPAPT1E	B.19	113725	RT2L	C.63
101869	RE1M	C.67	104712	BTLF60D	C.15	108223	TLR100P200	H.4	113726	RT2M	C.63
101870	RE1S	C.67	104713	BSLR2G	A.24	108227	TLR250P200	H.4	113727	RT3B	C.64
101871	RE1W	C.67	104713	BSLR2G	C.16	108864	RTXBS	C.65	113728	RT3C	C.64
101872	RE2H	C.67	104714	BSLR2K	A.24	108901	BCRF10	A.23	113729	RT3D	C.64
101873	RE2M	C.67	104714	BSLR2K	C.16	108901	BCRF10	C.15	113730	RT3E	C.64
101874	RE3E	C.67	104715	BSLR2R	A.24	108902	BCRF01	A.23	113731	RT3F	C.64
102625	GPAULRAA11	B.18	104715	BSLR2R	C.16	108902	BCRF01	C.15	113732	RT4N	C.64
103238	WKLE00	D.23	104716	BSLR3G	C.16	108903	BTRF30C	A.23	113733	RT4P	C.64
103241	WKLE02	D.23	104716	BSLR3G	C.21	108903	BTRF30C	C.15	113734	RT4R	C.64
103243	WKLE25	D.23	104717	BSLR3K	C.16	108904	BTRF60C	A.23	113735	RT4LA	C.64
103247	WLS0	D.23	104717	BSLR3K	C.21	108904	BTRF60C	C.15	113736	RT4LB	C.64
103298	MARL101ARS	A.19	104718	BSLR3R	C.16	108905	BTRF30D	A.23	113737	RT4LC	C.64
103298	MARL101ARS	C.7	104718	BSLR3R	C.21	108905	BTRF30D	C.15	113738	RT4LD	C.64
103299	MARL110ARS	A.19	104719	BSLDZ	A.24	108906	BTRF60D	A.23	113739	RT4LE	C.64
103299	MARL110ARS	C.7	104719	BSLDZ	C.16	108906	BTRF60D	C.15	113740	RT4LF	C.64
103300	MARN404AR	A.18	104720	BSLV3G	A.24	110000			113741	RT4LG	C.64
103300	MARN404AR	C.6	104720	BSLV3G	C.16	110360	GPAU20LTA11	B.18	113742	RT4LH	C.64
103349	MARN220AR	A.18	104721	BSLV3K	A.24	110565	RT3PXX3P	C.65	113743	RT4LJ	C.64
103349	MARN220AR	C.6	104721	BSLV3K	C.16	110836	BSLV3U	A.24	113744	RT4LK	C.64
103350	MARN211AR	A.18	104722	BSLV3R	A.24	110836	BSLV3U	C.16	113745	RT4LL	C.64
103350	MARN211AR	C.6	104722	BSLV3R	C.16	110836	BSLV3U	C.21	113746	RT4LM	C.64
103351	MARN202AR	A.18	104723	BELA	A.24	112185	GPAU20LCAA11	B.18	113747	RT4LN	C.64
103351	MARN202AR	C.6	104723	BELA	C.15	113001	BTLFX	A.23	113748	RT4LP	C.64
103352	MARN440AR	A.18	104724	BELA02	A.24	113001	BTLFX	C.15	113749	RT4LR	C.64
103352	MARN440AR	C.6	104724	BELA02	C.15	113505	V1108B4	C.21	113750	RT5A	C.64
103353	MARN431AR	A.18	104738	V31200B	C.17	113602	BETL02C	A.25	113751	RT5B	C.64
103353	MARN431AR	C.6	104739	V31201B	C.17	113602	BETL02C	C.16	113752	RT5C	C.64
103354	MARN422AR	A.18	104740	VB1201B	C.17	113603	BETL45C	A.25	113753	RT5D	C.64
103354	MARN422AR	C.6	104741	V31202B	C.17	113603	BETL45C	C.16	113754	RT5E	C.64
103355	MARN413AR	A.18	104742	VB1202B	C.17	113604	BETL02D	A.25	113755	RT5LA	C.64
103355	MARN413AR	C.6	104743	V31203B	C.17	113604	BETL02D	C.16	113756	RT5LB	C.64
103540	MT03RA	C.61	104745	V31204B	C.17	113605	BETL45D	A.25	113757	RT5LC	C.64
103541	MT03RB	C.61	104747	V31205B	C.17	113605	BETL45D	C.16	113758	RT5LD	C.64
103542	MT03RC	C.61	104748	VB1205B	C.17	113612	V1107BA	C.21	113759	RT5LE	C.64
103543	MT03RD	C.61	104749	V31206B	C.17	113613	V1175CA	C.21	113760	RT6A	C.64
103544	MT03RE	C.61	104750	V31207B	C.17	113614	V1108CA	C.21	113761	RT6LA	C.64
103545	MT03RF	C.61	104751	VB1207B	C.17	113615	V1185BA	C.21	113762	RTX3	C.65
103546	MT03RG	C.61	104752	V31208B	C.17	113616	V1109BA	C.21	113764	RT2XP	C.65
103547	MT03RH	C.61	104753	VB1208B	C.17	113617	V1195BA	C.21	113850	PTP04	C.17
103548	MT03RI	C.61	104754	V31209B	C.17	113618	V1110CE	C.21	113851	PTP45	C.17
103549	MT03RJ	C.61	104755	V31210B	C.17	113619	V1111CE	C.21	113852	PTP08	C.17
103550	MT03RK	C.61	104757	V31225B	C.17	113620	V1112BA	C.21	113853	PTP10	C.17
103551	MT03RL	C.61	104758	V31245B	C.17	113621	V1113BA	C.21	113855	RTX5	C.65
103552	MT03RM	C.61	104760	KRC24	C.21	113627	KVP75U	D.21	113856	RTX5L	C.65
103553	MT03RN	C.61	104761	KRC48/260	C.21	113628	KVP85U	D.21	113899	V1109B4	C.21
103554	MT03RP	C.61	104762	KRC380/415	C.21	113630	KVP12U	D.21	114060	RT12RD	C.63
103555	MACL110AR	C.7	104763	BEKH	C.21	113631	KVP85I	D.21	114061	RT12RF	C.63
103556	MACL101AR	C.7	104764	BEKV	C.21	113633	KVP12I	D.21	114062	RT12RG	C.63
103556	MARL110AR	A.19	104766	C09476	C.21	113637	KVP95E	D.23	114063	RT12RH	C.63
103557	MARN211AR	C.6	104767	KVP12G	D.19	113640	RT12K	C.63	114087	RT1RB	C.63
103557	MARL101AR	A.19	104770	KVP85G	D.19	113641	RT12L	C.63	114088	RT1RC	C.63
103558	MACN202AR	C.6	104771	KVP10G	D.19	113642	RT12M	C.63	114089	RT1RD	C.63
103559	MACN431AR	C.6	104785	BEKVA 1	C.21	113643	RT12N	C.63	114090	RT1RF	C.63
103560	MACN422AR	C.6	104786	BEKVS 1	C.21	113644	RT12P	C.63	114091	RT1RG	C.63
103561	MACN413AR	C.6	104797	BNL	D.19	113645	RT12S	C.63	114092	RT1RH	C.63
103562	MVE0R	C.61	104798	EPL	D.19	113646	RT12T	C.63	114093	RT1RJ	C.63
103563	MATV10AR	C.61	104800	BMLF	D.19	113647	RT12U	C.63	114094	RT1RK	C.63
103590	MC2K310ATD	C.4	105170	RTXP	C.65	113648	RT12V	C.63	114095	RT1RL	C.63
103591	MC2K301ATD	C.4	105200	CM1CA5F	C.21	113649	RT12W	C.63	114096	RT1RM	C.63
103747	PTPCK75	C.21	106622	BRLL02	C.15	113650	RT22D	C.63	114097	RT1RN	C.63
103747	PTPCK75	C.65	106622	BRLL02	C.20	113651	RT22E	C.63	114098	RT1RP	C.63
103748	PTPCK95	C.21	107097	GPEUTA	B.21	113652	RT22G	C.63	114099	RT1RS	C.63
103749	PTPCK11	C.21	107098	GPFO0C02	D.3	113653	RT22H	C.63	114100	RT1RT	C.63
104587	KVB12E	D.23	107098	GPFO0C02	D.3	113654	RT22J	C.63	114101	RT1RU	C.63
104597	KVB10E	D.23	107099	GPF10C02	D.3	113655	RT22L	C.63	114102	RT1RV	C.63
104690	KVB75I	D.21	107099	GPF10C02	D.3	113656	RT22M	C.63	114103	RT1RW	C.63
104691	KVB95I	D.21	107100	GPFO1C02	D.3	113657	RT32C	C.64	114104	RT2RA	C.63
104692	KVB10I	D.21	107100	GPFO1C02	D.3	113658	RT32D	C.64	114105	RT2RB	C.63
104693	KVB12I	D.21	107101	GPFO0C25	D.3	113659	RT32E	C.64	114106	RT2RC	C.63
104694	KVB75E	D.23	107101	GPFO0C25	D.3	113660	RT32F	C.64	114107	RT2RD	C.63
104695	KVB95E	D.23	107102	GPFO0C04	D.3	113700	RT1B	C.63	114108	RT2RE	C.63
104700	BCLF10	A.23	107102	GPFO0C04	D.3	113701	RT1C	C.63	114109	RT2RG	C.63
104700	BCLF10	C.15	107103	GPFO1C04	D.3	113702	RT1D	C.63	114110	RT2RH	C.63
104701	BCLF01	A.23	107103	GPFO1C04	D.3	113703	RT1F	C.63	114111	RT2RJ	C.63
104701	BCLF01	C.15	107105	GPFO1C04	D.3	113704	RT1G	C.63	114112	RT2RL	C.63
104702	BCLF10G	A.23	107105	GPFO1C04	D.3	113705	RT1H	C.63	114113	RT2RM	C.63
104702	BCLF10G	C.15	107106	GPFO0C45	D.3	113706	RT1J	C.63	114114	RT2RK	C.63
104703	BCLF01G	A.23	107106	GPFO0C45	D.3	113707	RT1K	C.63	114115	RT2RL	C.63
104703	BCLF01G	C.15	107107	GPFO0C08	D.3	113708	RT1L	C.63	114116	RT2RM	C.63
104704	BRLL20	A.23	107107	GPFO0C08	D.3	113709	RT1M	C.63	114117	RT2RN	C.63
104704	BRLL20	C.15	107119	GPS2BSAL	B.11	113710	RT1N	C.63	114118	RT2RP	C.63
104704	BRLL20	C.20	107120	GPS2BHAL	B.11	113711	RT1P	C.63	114119	RT2RS	C.63
104705	BRLL11	A.23	107121	GPS2MSAL	B.15	113712	RT1S	C.63	114120	RT2RT	C.63
104705	BRLL11	C.15	107122	GPS2MHAL	B.15	113713	RT1T	C.63	114121	RT2RU	C.63
104705	BRLL11	C.20	107163	GPF1B4A	D.3	113714	RT1U	C.63	114122	RT2RV	C.63
104706	BCLL20	C.15	107165	GPF1L04AA	D.3	113715	RT1V	C.63	114123	RT2RW	C.63
104706	BCLL20	C.20	107166	GPF1L04DA	D.3	113716	RT1W	C.63	114124	RT2RD	C.63
104707	BCLL11	C.15	107182	GPAPT2A	B.18	113717	RT2A	C.63	114125	RT2RE	C.63
104707	BCLL11	C.20	107186	GPB1FA	B.19	113718	RT2B	C.63	114126	RT2RG	C.63
104709	BTLF30C	A.23	107187	GPB2FA	B.19	113719	RT2C	C.63	114127	RT2RH	C.63
104709	BTLF30C	C.15	107190	GPF2L04AA	D.3	113720	RT2D	C.63	114128	RT2RJ	C.63
104710	BTLF60C	A.23	107191	GPF2L04DA	D.3	113721	RT2E	C.63	114129	RT2RL	C.63
104710	BTLF60C	C.15	107252	GPF3L09AA	D.3	113722	RT2G	C.63	114130	RT2RM	C.63
104711	BTLF30D	A.23	107253	GPF3B5A	D.3	113723	RT2H	C.63	114131	RT2RN	C.63
104711	BTLF30D	C.15	107256	SFB0RJM	B.3	113724	RT2J	C.63	116011	LG0006S1B0	D.19



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116074	MG0006QATO	D.19	124104	RMM 2 EN	F.5	129318	U3SX000K7FBS	H.19	130028	ISGL-B411	G.3
116113	N211B	E.67	124184	RDT2400VEN	F.6	129319	U3SX001K5FBS	H.19	130029	IMGL-B411	G.3
116212	KVP08E	D.23	124354	RDIT2-02ZEN	F.6	129320	U3SX002K2FBS	H.19	130030	ISGT-B311	G.3
116226	LG2504R1B0	D.19	124373	RS01NAJ	F.6	129321	U3SX004K0FBS	H.19	130031	IMGT-B311	G.3
116235	KVP12E	D.23	124433	RCF-1 AJ	F.6	129322	U3SX005K5FBS	H.19	130035	IMGP-B311	G.3
116300	TLR75P200	H.4	124434	RCF-1 EN	F.6	129323	U3SX007K5FBS	H.19	130037	IMGC-B411	G.3
116301	TLR750P200	H.4	124435	RCF-1 AU	F.6	129324	U3SX011K0FBS	H.19	130039	IMGO-B311	G.3
116302	TLR400P200	H.4	124622	RSFF1-50AU	F.5	129325	U3SX015K0FBS	H.19	130040	ISGM-B311	G.3
116402	MG0006RATO	D.19	124754	RDIT2-5AEN	F.6	129326	U3SX018K5FBS	H.19	130041	IMGM-B311	G.3
116651	LG0004R1B0	D.19	124901	NMTCV 2	F.3	129327	U3SX022K0FBS	H.19	130057	IUGU-B211 S	G.5
116652	LG0006R1B0	D.19	124908	NMETV	F.3	129328	U3SX030K0FNS	H.19	130060	IUGA-B211	G.5
116653	LG0404P1B0	D.19	124911	NMETV t AU	F.3	129329	U3SX000K7SBS	H.19	130066	IUGH-B211	G.5
116656	LG0406P1B0	D.19	124915	NMRDV 2-6	F.3	129330	U3SX001K5SBS	H.19	130072	IUGE-B211	G.5
116663	N411B	E.67	124916	NMRDV 2-60	F.3	129331	U3SX002K2SBS	H.19	130074	IUGL-B211	G.5
116664	N222B	E.67	124917	NMRDV 2-600	F.3	129332	U3SX004K0SBS	H.19	130076	IUGT-B111	G.5
116665	N422B	E.67	124929	NMIV	F.3	129333	U3SX005K5SBS	H.19	130080	IUGQ-B111	G.5
116996	LG0404S1B0	D.19	124930	NMMFV	F.3	129334	U3SX007K5SBS	H.19	130082	IUGA-B411	G.5
116997	LG0406S1B0	D.19	129148	ERN00K7	H.16	129335	U3SX011K0SBS	H.19	130084	IUGU-B411	G.5
120000			129149	ERN01K5	H.16	129336	U3SX015K0SBS	H.19	130086	IUGR-B411	G.5
120001	SFK0A	B.2	129150	ERN02K2	H.16	129337	U3SX018K5SBS	H.19	130088	IUGH-B411	G.5
120002	SFK0B	B.2	129151	ERN04K0	H.16	129338	U3SX022K0SBS	H.19	130090	IUGI-B411	G.5
120003	SFK0C	B.2	129152	ERN05K5	H.16	129339	U3SX030K0SNS	H.19	130094	IUGE-B411	G.5
120004	SFK0D	B.2	129153	ERN07K5	H.16	129340	U3SX037K0SNS	H.19	130096	IUGL-B411	G.5
120005	SFK0E	B.2	129155	ERX01K5	H.16	129341	U3SX045K0SNS	H.19	130098	IUGT-B311	G.5
120006	SFK0F	B.2	129156	ERX02K2	H.16	129342	U3SX055K0SNS	H.19	130100	IUGP-B311	G.5
120007	SFK0G	B.2	129157	ERX04K0	H.16	129343	U3SX075K0SNS	H.19	130102	IUGQ-B311	G.5
120008	SFK0H	B.2	129158	ERX05K5	H.16	129344	U3SX090K0SNS	H.19	130104	IUGM-B311	G.5
120009	SFK0I	B.2	129159	ERX07K5	H.16	129345	U3SX110K0SNS	H.19	130141	IZMS-B211	G.6
120010	SFK0J	B.2	129166	TLR44P600	H.33	129346	U3SX132K0SNS	H.19	130144	IZMA-B311	G.6
120011	SFK0K	B.2	129166	TLR44P600	H.33	129347	U3SX160K0SNS	H.19	130145	IZMS-B311	G.6
120012	SFK0L	B.2	129167	TLR29P600	H.33	129348	U3SX200K0SNS	H.19	130146	IZMR-B311	G.6
120013	SFK0M	B.2	129167	TLR29P600	H.33	129349	U3SX250K0SNS	H.19	130310	090M11	G.19
120020	SFAL11N	B.3	129168	TLR22P600	H.33	129350	U3SX315K0SNS	H.19	130311	090M12	G.19
120021	SFAL20N	B.3	129168	TLR22P600	H.33	129351	U3SX400K0SNS	H.19	130320	114FCT03	G.9
120022	SFAL11D	B.3	129169	TLR15P1000	H.33	129352	U3SX475K0SNS	H.19	130320	114FCT03	E.70
120023	SFAL20D	B.3	129169	TLR15P1000	H.33	129353	U30V24OP1	H.20	130321	114FCT03T	G.9
120024	SFA111	B.3	129170	TLR11P1200	H.33	129353	U30V24OP1	H.20	130321	114FCT03T	E.70
120025	SFAK10	B.3	129170	TLR11P1200	H.33	129354	U30V24OP2	H.20	132170	IPA1-N211B	E.67
120026	SFAK01	B.3	129171	TLR8,8P1500	H.33	129354	U30V24OP2	H.20	132171	IPA1-P211B	E.67
120027	SFAL11S	B.3	129171	TLR8,8P1500	H.33	129388	U30V24DN1	H.20	132172	IPB1-N211B	E.67
120030	SFBOAJ	B.3	129172	TLR7,4P1800	H.33	129388	U30V24DN1	H.20	132173	IPB1-P211B	E.67
120031	SFBOAN	B.3	129172	TLR7,4P1800	H.33	129389	U30V24DN2	H.20	132182	IPA2-N211B	E.67
120032	SFBOAU	B.3	129173	TLR175P600	H.33	129389	U30V24DN2	H.20	132186	IPB1-N222B	E.67
120034	SFBOBJ	B.3	129173	TLR175P600	H.33	129390	U30V24DN3	H.20	132198	IPA1-N411B	E.67
120035	SFBORN	B.3	129174	TLR118P600	H.33	129390	U30V24DN3	H.20	132201	IPB1-N411B	E.67
120036	SFBORU	B.3	129174	TLR118P600	H.33	129391	U30V24DN5	H.20	132203	IPB1-R411B	E.67
120040	SFS04	B.4	129175	TLR86P600	H.33	129391	U30V24DN5	H.20	132213	IPA1-N422B	E.67
120041	SFS05	B.4	129175	TLR86P600	H.33	129393	U30V24DN6	H.20	132214	IPA1-D422B	E.67
120042	SFE04	B.4	129176	TLR59P1000	H.33	129393	U30V24DN6	H.20	132215	IPB1-N422B	E.67
120043	SFE05	B.4	129176	TLR59P1000	H.33	129394	U30V24RY0	H.20	132216	IPB1-D422B	E.67
120046	SFS0K2	B.4	129177	TLR43P1000	H.33	129394	U30V24RY0	H.20	132230	105DTL220	E.70
120047	SFE0K2	B.4	129177	TLR43P1000	H.33	129396	U30V24AIO	H.20	132231	105DTL500	E.70
120051	SFPS0	B.4	129284	U30F3016EB	H.32	129396	U30V24AIO	H.20	132232	105DTL690	E.70
120052	SFPP0	B.4	129284	U30F3016EB	H.32	129397	U30V24SL0	H.20	132234	105PT	G.9
120053	SFPE0	B.4	129285	U30F3030EB	H.32	129397	U30V24SL0	H.20	132234	105 PT	E.70
120054	SFVCD	B.4	129285	U30F3030EB	H.32	129398	U30V24SL1	H.20	132240	105 GIL	E.71
120114	SFBORN M	B.3	129286	U30F3055EB	H.32	129398	U30V24SL1	H.20	132241	105 GIL 10	E.71
120115	SFBORUM	B.3	129286	U30F3055EB	H.32	129399	U30V24SL2	H.20	132242	105 CI	E.71
120881	QA02P008S	D.67	129287	U30F3075EB	H.32	129399	U30V24SL2	H.20	132243	105 CI 10	E.71
120882	QA02P017S	D.67	129287	U30F3075EB	H.32	129400	U30V24SL3	H.20	132244	105 PM	E.71
120883	QA02P022S	D.67	129288	U30F3100EB	H.32	129400	U30V24SL3	H.20	132250	105GPIP220	E.70
120884	QA02P031S	D.67	129288	U30F3100EB	H.32	129867	TLR405P200	H.33	132251	105GPIP220M	E.70
120885	QA02P044S	D.67	129289	U30F3130EB	H.32	129867	TLR405P200	H.33	132252	105GPIP500	E.70
120886	QA02P058S	D.67	129289	U30F3130EB	H.32	129868	TLR216P200	H.33	132253	105GPIP500M	E.70
120892	QA12P008S	D.67	129290	U30F3180EB	H.32	129868	TLR216P200	H.33	132500	115PC002	G.18
120893	QA12P017S	D.67	129290	U30F3180EB	H.32	129869	TLR108P200	H.33	132501	115PC015	G.18
120894	QA12P022S	D.67	129291	U30F3250ES	H.32	129869	TLR108P200	H.33	132502	115PC018	G.18
120895	QA12P031S	D.67	129291	U30F3250ES	H.32	129870	TLR74P200	H.33	132503	115PC119	G.18
120896	QA12P044S	D.67	129292	U30F3320ES	H.32	129870	TLR74P200	H.33	132504	115PC2002	G.18
120897	QA12P058S	D.67	129292	U30F3320ES	H.32	129871	TLR5P2500	H.33	132505	115PC2015	G.18
120898	QA22P008S	D.67	129293	U30F3400ES	H.32	129871	TLR5P2500	H.33	132506	115PC2119	G.18
120899	QA22P017S	D.67	129293	U30F3400ES	H.32	129872	TLR4P3000	H.33	132507	115PC002L	G.18
120900	QA22P022S	D.67	129294	U30F3600ES	H.32	129872	TLR4P3000	H.33	132508	115PC015L	G.18
120901	QA22P031S	D.67	129294	U30F3600ES	H.32	129873	TLR864P200	H.33	132509	115PC018	G.18
120902	QA22P044S	D.67	129295	U30F31000ES	H.32	129873	TLR864P200	H.33	132510	115PC119	G.18
120903	QA22P058S	D.67	129295	U30F31000ES	H.32	129875	TLR432P200	H.33	132511	115PC2002L	G.18
120904	QA32P008S	D.67	129296	U30F31600ES	H.32	129875	TLR432P200	H.33	132512	115PC2015L	G.18
120905	QA32P017S	D.67	129296	U30F31600ES	H.32	129876	TLR295P200	H.33	132513	115PC2018	G.18
120906	QA32P022S	D.67	129300	U3SN000K7FBS	H.19	129876	TLR295P200	H.33	132514	115PC2119	G.18
120907	QA32P031S	D.67	129301	U3SN001K5FBS	H.19	129877	TLR35P1500	H.33	132515	115PC2018	G.18
120908	QA32P044S	D.67	129302	U3SN002K2FBS	H.19	129877	TLR35P1500	H.33	132562	115807SP	G.19
120909	QA32P058S	D.67	129303	U3SN004K0FBS	H.19	129878	TLR29P1800	H.33	132563	115803SP	G.19
120910	QA0PTDIN	D.67	129304	U3SN005K5FBS	H.19	129878	TLR29P1800	H.33	132564	115805SP	G.19
123623	RCRT 6 - 60AJ	F.4	129305	U3SN000K7SBS	H.19	129879	TLR22P2500	H.33	132565	115804SP	G.19
123624	RCRT 6 - 60AN	F.4	129306	U3SN001K5SBS	H.19	129879	TLR22P2500	H.33	132566	1158029-01GI	G.19
123656	DINIL 02E ENU	F.4	129307	U3SN002K2SBS	H.19	129880	TLR18P3000	H.33	132567	1158029-02GI	G.19
123700	SON-3	F.4	129308	U3SN004K0SBS	H.19	129880	TLR18P3000	H.33	132568	1158029-03GIT	G.19
123744	RDHT 1-1,2AEN	F.4	129309	U3SN005K5SBS	H.19	129881	TLR15P3700	H.33	132569	1158029-04GIT	G.19
123754	RDHT 1-10AEN	F.4	129310	U3SN007K5SBS	H.19	129881	TLR15P3700	H.33	132570	115MA	G.19
123964	RDHA 1-10AEN	F.4	129311	U3SN011K0SBS	H.19	130000			132571	115CA	G.19
123965	RDHA 1-1,2AEU	F.4	129312	U3SN015K0SBS	H.19	130018	ISGA-B411	G.3	133170	VB120	

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133379	KVP85E	D.23	167133	U20NOK4PS	H.7	167429	U203X07K5SS	H.14	167485	U203X37KOSS	H.9
133380	KVP10E	D.23	167134	U20NOK7PS	H.3	167430	U203X11KOSS	H.9	167485	U203X37KOSS	H.13
133611	LG2506R1B0	D.19	167134	U20NOK7PS	H.7	167430	U203X11KOSS	H.13	167485	U203X37KOSS	H.14
133885	VB1204B	C.17	167135	U20N1K5PS	H.3	167430	U203X11KOSS	H.14	167486	U203X45KOSS	H.9
137566	MG0004QATO	D.19	167135	U20N1K5PS	H.7	167433	U200APB	H.9	167486	U203X45KOSS	H.13
137567	MG0004RATO	D.19	167136	U20N2K2PS	H.3	167434	U200ADN	H.9	167486	U203X45KOSS	H.14
139138	RT12D	C.63	167136	U20N2K2PS	H.7	167435	U200ARS485	H.9	167487	U203X55KOSS	H.9
139139	RT12F	C.63	167137	U20X0K7PS	H.3	167436	U200ARS232	H.9	167487	U203X55KOSS	H.13
139140	RT12G	C.63	167137	U20X0K7PS	H.7	167437	U200AMP	H.9	167487	U203X55KOSS	H.14
139141	RT12H	C.63	167138	U20X1K5PS	H.3	167438	U200ALEDK	H.9	168083	U2KV23DBUH4	H.33
139142	RT12J	C.63	167138	U20X1K5PS	H.7	167439	U200ALCDK	H.9	168083	U2KV23DBUH4	H.33
150000			167139	U20X2K2PS	H.3	167440	U200ABK	H.9	168084	U2KV23DBUH1	H.33
152002	P9XPN52002	E.8	167139	U20X2K2PS	H.7	167441	U200AW05	H.9	168084	U2KV23DBUH1	H.33
152007	P9XPN52007	E.8	167400	U201N00K4FS	H.9	167442	U200AW10	H.9	168085	U2KV23DBUH2	H.33
152061	P9XPN52061	E.8	167400	U201N00K4FS	H.13	167443	U200AW20	H.9	168085	U2KV23DBUH2	H.33
152111	P9XEM52111	E.8	167400	U201N00K4FS	H.14	167444	U200AW30	H.9	168086	U2KV23DBUH3	H.33
152121	P9KET52121	E.8	167401	U201N00K7FS	H.9	167445	U200AW50	H.9	168086	U2KV23DBUH3	H.33
152130	P9KES52130	E.8	167401	U201N00K7FS	H.13	167446	U200AN101	H.9	168086	U2KV23DBUH3	H.33
152161	P9XERS52161	E.8	167401	U201N00K7FS	H.14	167447	U200AN102	H.9	168086	U2KV23DBUH3	H.33
152293	P9XSM52293	E.8	167402	U201N01K5FS	H.9	167448	U200AN103	H.9	168089	U2KV23DBUL2	H.33
152321	P9XSM52321	E.8	167402	U201N01K5FS	H.13	167453	U200F611TA1	H.14	168089	U2KV23DBUL2	H.33
152435	P9XSC52435	E.8	167402	U201N01K5FS	H.14	167453	U200F611TA1	H.14	168100	U2KV23DBUL3	H.33
152497	P9XSC52497	E.8	167403	U201N02K2FS	H.9	167453	U200F611TA1	H.14	168100	U2KV23DBUL3	H.33
152502	P9XPL52502	E.9	167403	U201N02K2FS	H.13	167453	U200F611TA1	H.14	168102	U2KV23W103	H.20
152511	P9XPL52511	E.9	167403	U201N02K2FS	H.14	167453	U200F611TA1	H.16	168102	U2KV23W103	H.20
152513	P9XPL52513	E.9	167404	U203X00K7FS	H.9	167454	U200F627TA2	H.14	168260	N11P3401806	H.35
152514	P9XPL52514	E.9	167404	U203X00K7FS	H.13	167454	U200F627TA2	H.14	168261	N11P3401806	H.35
152515	P9XPL52515	E.9	167404	U203X00K7FS	H.14	167454	U200F627TA2	H.14	168387	DCR4A5H7	H.17
152610	P9XLD52610	E.9	167405	U203X01K5FS	H.9	167454	U200F627TA2	H.14	168388	DCR6A3H9	H.17
152611	P9XLD52611	E.9	167405	U203X01K5FS	H.13	167454	U200F627TA2	H.16	168389	DCR9A2H4	H.17
152620	P9XLD52620	E.9	167405	U203X01K5FS	H.14	167456	U200F709TA1	H.14	168390	DCR12A1H7	H.17
152621	P9XLD52621	E.9	167406	U203X02K2FS	H.9	167456	U200F709TA1	H.14	168391	DCR18A1H0	H.17
153006	P9MPN53006	E.8	167406	U203X02K2FS	H.13	167456	U200F709TA1	H.14	168392	DCR3A15H2	H.17
153007	P9MPN53007	E.8	167406	U203X02K2FS	H.14	167456	U200F709TA1	H.16	168393	DCR4A9H2	H.17
153061	P9MPN53061	E.8	167407	U203X04K0FS	H.9	167457	U200F719TA2	H.14	168394	DCR6A6H8	H.17
153111	P9MEM53111	E.8	167407	U203X04K0FS	H.13	167457	U200F719TA2	H.14	168395	DCR9A4H0	H.17
153121	P9MET53121	E.8	167407	U203X04K0FS	H.14	167457	U200F719TA2	H.16	168490	ACRP3A7H0	H.4
153130	P9MEC53130	E.8	167408	U203X05K5FS	H.9	167458	U200F739TA3	H.14	168491	ACRP8A2H5	H.4
153161	P9MER53161	E.8	167408	U203X05K5FS	H.13	167458	U200F739TA3	H.14	168491	ACRP8A2H5	H.17
153293	P9MSM53293	E.8	167408	U203X05K5FS	H.14	167458	U200F739TA3	H.16	168492	ACRP12A2H5	H.4
153391	P9MSM53391	E.8	167409	U203X07K5FS	H.9	167459	U200F905TA1	H.14	168492	ACRP12A2H5	H.17
153435	P9MSC53435	E.8	167409	U203X07K5FS	H.13	167459	U200F905TA1	H.14	168493	ACRP18A1H3	H.4
153497	P9MSC53497	E.8	167409	U203X07K5FS	H.14	167459	U200F905TA1	H.14	168493	ACRP18A1H3	H.17
153501	P9MPL53501	E.9	167410	U203X11K0FS	H.9	167459	U200F905TA1	H.14	168494	ACRP22A0H84	H.4
153511	P9MPL53511	E.9	167410	U203X11K0FS	H.13	167459	U200F905TA1	H.14	168494	ACRP22A0H84	H.17
153513	P9MPL53513	E.9	167410	U203X11K0FS	H.14	167459	U200F905TA1	H.14	168495	ACRP4A2H5	H.34
153514	P9MPL53514	E.9	167411	U201N00K4SS	H.9	167459	U200F905TA1	H.16	168495	ACRP4A2H5	H.17
153515	P9MPL53515	E.9	167411	U201N00K4SS	H.13	167460	U200F910TA2	H.14	168495	ACRP4A2H5	H.34
153610	P9MLD53610	E.9	167411	U201N00K4SS	H.14	167460	U200F910TA2	H.14	168496	ACRP6A2H5	H.34
153611	P9MLD53611	E.9	167412	U201N00K7SS	H.9	167460	U200F910TA2	H.14	168496	ACRP6A2H5	H.4
153621	P9MLD53621	E.9	167412	U201N00K7SS	H.13	167460	U200F910TA2	H.14	168496	ACRP6A2H5	H.17
153623	P9MLD53620	E.9	167412	U201N00K7SS	H.14	167460	U200F910TA2	H.14	168496	ACRP6A2H5	H.34
154700	P9DPL54700	E.9	167413	U201N01K5SS	H.9	167460	U200F910TA2	H.14	168497	ACRP9A1H3	H.34
154701	P9DPL54701	E.9	167413	U201N01K5SS	H.13	167460	U200F910TA2	H.16	168497	ACRP9A1H3	H.4
154720	P9DPL54720	E.9	167413	U201N01K5SS	H.14	167461	U200F928TA3	H.14	168497	ACRP9A1H3	H.34
154721	P9DPL54721	E.9	167414	U201N02K2SS	H.9	167461	U200F928TA3	H.14	168497	ACRP9A1H3	H.34
160000			167414	U201N02K2SS	H.13	167461	U200F928TA3	H.14	168498	ACRP12A0H84	H.34
167075	U20NOK2S	H.3	167414	U201N02K2SS	H.14	167461	U200F928TA3	H.14	168498	ACRP12A0H84	H.17
167075	U20NOK2S	H.6	167415	U203N00K4SS	H.9	167461	U200F928TA3	H.14	168498	ACRP12A0H84	H.34
167076	U20NOK4S	H.3	167415	U203N00K4SS	H.13	167461	U200F928TA3	H.14	168499	ACRP18A0H56	H.34
167076	U20NOK4S	H.6	167415	U203N00K4SS	H.14	167461	U200F928TA3	H.14	168499	ACRP18A0H56	H.17
167077	U20NOK7S	H.3	167416	U203N00K7SS	H.9	167461	U200F928TA3	H.14	168499	ACRP18A0H56	H.34
167077	U20NOK7S	H.6	167416	U203N00K7SS	H.13	167461	U200F928TA3	H.14	168500	ACRP27A0H37	H.34
167078	U20N1K5S	H.3	167416	U203N00K7SS	H.14	167461	U200F928TA3	H.16	168500	ACRP27A0H37	H.17
167078	U20N1K5S	H.6	167417	U203N01K5SS	H.9	167468	U200ABU430	H.9	168500	ACRP27A0H37	H.34
167079	U20N2K2S	H.3	167417	U203N01K5SS	H.13	167468	U200ABU430	H.16	168501	ACRP35A0H27	H.34
167079	U20N2K2S	H.6	167417	U203N01K5SS	H.14	167474	U200F34048SMA	H.14	168501	ACRP35A0H27	H.17
167080	U20X0K7S	H.3	167418	U203N02K2SS	H.9	167474	U200F34048SMA	H.14	168501	ACRP35A0H27	H.34
167080	U20X0K7S	H.6	167418	U203N02K2SS	H.13	167475	U200F370A	H.14	168502	ACRP55A0H18	H.34
167081	U20X1K5S	H.3	167418	U203N02K2SS	H.14	167475	U200F370A	H.14	168502	ACRP55A0H18	H.34
167081	U20X1K5S	H.6	167419	U203N04KOSS	H.9	167475	U200F370A	H.14	168503	ACRP70A0H14	H.34
167082	U20X2K2S	H.3	167419	U203N04KOSS	H.13	167475	U200F370A	H.14	168503	ACRP70A0H14	H.34
167082	U20X2K2S	H.6	167419	U203N04KOSS	H.14	167475	U200F370A	H.16	168504	ACRP80A0H14	H.34
167084	U20AF2K2X	H.4	167420	U203N05K5SS	H.9	167476	U200F3100A	H.14	168504	ACRP80A0H14	H.34
167085	U20AF0K7	H.4	167420	U203N05K5SS	H.13	167476	U200F3100A	H.14	168505	ACRP97A0H11	H.34
167086	U20AF2K2	H.4	167420	U203N05K5SS	H.14	167476	U200F3100A	H.14	168505	ACRP97A0H11	H.34
167087	U20AR0K7	H.4	167422	U203N07K5SS	H.9	167476	U200F3100A	H.14	168506	ACRP140A0H072	H.34
167088	U20NOK2P	H.3	167422	U203N07K5SS	H.13	167476	U200F3100A	H.16	168506	ACRP140A0H072	H.34
167088	U20NOK2P	H.7	167422	U203N07K5SS	H.14	167477	U200F3150A	H.14	168507	ACRP180A0H056	H.34
167089	U20NOK4P	H.3	167424	U203X00K7SS	H.9	167477	U200F3150A	H.14	168507	ACRP180A0H056	H.34
167089	U20NOK4P	H.7	167424	U203X00K7SS	H.13	167477	U200F3150A	H.16	168508	ACRP200A0H051	H.34
167090	U20NOK7P	H.3	167424	U203X00K7SS	H.14	167478	U200F3180A	H.14	168508	ACRP200A0H051	H.34
167090	U20NOK7P	H.7	167425	U203X01K5SS	H.9	167478	U200F3180A	H.14	168509	ACRP3A8H1	H.34
167091	U20N1K5P	H.3	167425	U203X01K5SS	H.13	167478	U200F3180A	H.16	168509	ACRP3A8H1	H.4
167091	U20N1K5P	H.7	167425	U203X01K5SS	H.14	167481	U203X15KOSS	H.9	168509	ACRP3A8H1	H.17
167092	U20N2K2P	H.3	167426	U203X02K2SS	H.9	167481	U203X15KOSS	H.13	168509	ACRP3A8H1	H.34
167092	U20N2K2P	H.7	167426	U203X02K2SS	H.13	167481	U203X15KOSS	H.14	168510	ACRP4A5H1	H.

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168512	ACRP10A2H	H.34	168567	DCRP270A0H18	H.34	169102	QT20031U21MS	D.73	170858	080SP12SF	E.54
168513	ACRP14A1H4	H.34	168567	DCRP270A0H18	H.34	169103	QT20044U21MS	D.73	170859	080SP18SFC	E.28
168513	ACRP14A1H4	H.17	168568	DCRP310A0H14	H.34	169104	QT20058U21MS	D.73	170859	080SP18SFC	E.28
168513	ACRP14A1H4	H.34	168568	DCRP310A0H14	H.34	169105	QT20072U21MS	D.73	170859	080SP18SFC	E.54
168514	ACRP18A1H1	H.34	168569	DCRP400A0H13	H.34	169106	QT20085U21MS	D.73	170859	080SP18SFC	E.54
168514	ACRP18A1H1	H.17	168569	DCRP400A0H13	H.34	169107	QT20105U21MS	D.73	170860	080SP18SFE	E.28
168514	ACRP18A1H1	H.34	168570	DCRP540A0H08	H.34	169108	QT20145U21MS	D.73	170861	080SP18SF	E.28
168515	ACRP27A0H75	H.34	168570	DCRP540A0H08	H.34	169109	QT20170U21MS	D.73	170861	080SP18SF	E.28
168515	ACRP27A0H75	H.17	168571	DCRP650A0H07	H.34	169110	QT20210U21MS	D.73	170861	080SP18SF	E.54
168515	ACRP27A0H75	H.34	168571	DCRP650A0H07	H.34	169111	QT20310U21MS	D.73	170861	080SP18SF	E.54
168516	ACRP35A0H58	H.34	168572	DCRP740A0H06	H.34	169112	QT20390U21MS	D.73	170862	080SP24SFE	E.28
168516	ACRP35A0H58	H.17	168572	DCRP740A0H06	H.34	169113	QT20460U21MS	D.73	170863	080SP35SFC	E.28
168516	ACRP35A0H58	H.34	168574	DCRP950A0H05	H.34	169114	QT20580U21MS	D.73	170863	080SP35SFC	E.54
168517	ACRP38A0H58	H.34	168574	DCRP950A0H05	H.34	169115	QT20820U21MS	D.73	170863	080SP35SFC	E.54
168517	ACRP38A0H58	H.17	168575	DCRP1000A0H04	H.34	169119	QT30008N21MS	D.72	170864	080SP35SFE	E.28
168517	ACRP38A0H58	H.34	168575	DCRP1000A0H04	H.34	169120	QT30017N21MS	D.72	170865	080SP35SF	E.28
168518	ACRP45A0H45	H.34	168576	ACFRP10A	H.35	169121	QT30031N21MS	D.72	170865	080SP35SF	E.54
168518	ACRP45A0H45	H.17	168576	ACFRP10A	H.35	169122	QT30044N21MS	D.72	170865	080SP35SF	E.54
168518	ACRP45A0H45	H.34	168577	ACFRP14A	H.35	169123	QT30058N21MS	D.72	170883	080KCSF	E.28
168519	ACRP70A0H29	H.34	168577	ACFRP14A	H.35	169124	QT30072N21MS	D.72	170883	080KCSF	E.54
168519	ACRP70A0H29	H.17	168578	ACFRP18A	H.35	169125	QT30085N21MS	D.72	173033	077CF73033	E.34
168519	ACRP70A0H29	H.34	168578	ACFRP18A	H.35	169126	QT30105N21MS	D.72	173034	077CF73034	E.34
168520	ACRP90A0H22	H.34	168579	ACFRP27A	H.35	169127	QT30145N21MS	D.72	173037	077CF73037	E.34
168520	ACRP90A0H22	H.17	168579	ACFRP27A	H.35	169128	QT30170N21MS	D.72	173038	077CF73038	E.34
168520	ACRP90A0H22	H.34	168580	ACFRP35A	H.35	169129	QT30210N21MS	D.72	173040	077CF73040	E.34
168521	ACRP115A0H18	H.34	168580	ACFRP35A	H.35	169130	QT30310N21MS	D.72	173095	077C3095	E.34
168521	ACRP115A0H18	H.17	168581	ACFRP38A	H.35	169131	QT30390N21MS	D.72	173095	077C3095	E.52
168521	ACRP115A0H18	H.34	168581	ACFRP38A	H.35	169132	QT30460N21MS	D.72	173208	080CPDT	E.19
168522	ACRP160A0H14	H.34	168582	ACFRP45A	H.35	169133	QT30580N21MS	D.72	173208	080CPDT	E.19
168522	ACRP160A0H14	H.17	168582	ACFRP45A	H.35	169134	QT30650N21MS	D.72	173220	080QDF	E.31
168522	ACRP160A0H14	H.34	168583	ACFRP62A	H.35	169135	QT30950N21MS	D.72	173353	077C3353	E.34
168523	ACRP185A0H11	H.34	168583	ACFRP62A	H.35	169136	QT31100N21MS	D.72	173455	077CR455	E.34
168523	ACRP185A0H11	H.34	168584	ACFRP90A	H.35	169137	QT31400N21MS	D.72	173901	077C9901	E.34
168524	ACRP225A0H096	H.34	168584	ACFRP90A	H.35	170000			173902	077C9902	E.34
168524	ACRP225A0H096	H.34	168585	ACFRP115A	H.35	170198	080CPT	E.32	173903	077C9903	E.34
168525	ACRP300A0H067	H.34	168585	ACFRP115A	H.35	170212	080ESL	E.33	173904	077C9904	E.34
168525	ACRP300A0H067	H.34	168586	ACFRP160A	H.35	170212	080ESL	E.33	173905	077C9905	E.34
168526	ACRP360A0H056	H.34	168586	ACFRP160A	H.35	170790	P9ASCGT	E.32	173910	077C9910	E.34
168526	ACRP360A0H056	H.34	168587	ACFRP185A	H.35	170801	080SP1	E.28	173916	077C9916	E.34
168527	ACRP460A0H056	H.34	168587	ACFRP185A	H.35	170802	080SP2	E.28	173919	077C9919	E.34
168527	ACRP460A0H056	H.34	168588	ACFRP225A	H.35	170803	080SP3	E.28	179510	080XTGR03	E.35
168528	ACRP50A0H039	H.34	168588	ACFRP225A	H.35	170804	080SP4	E.28	179514	080XTGR	E.35
168528	ACRP50A0H039	H.34	168589	ACFRP300A	H.35	170806	080SP6	E.28	179525	080XTGR01	E.35
168530	ACRP700A0H035	H.34	168589	ACFRP300A	H.35	170807	080SP8	E.28	179526	080XTGR02	E.35
168530	ACRP700A0H035	H.34	168590	ACFRP360A	H.35	170808	080SP12	E.28	179527	080XTGR04	E.35
168531	ACRP850A0H023	H.34	168590	ACFRP360A	H.35	170809	080SP18	E.28	179528	080XTGR05	E.35
168531	ACRP850A0H023	H.34	168591	ACFRP460A	H.35	170810	080SP24	E.28	179529	080XTGR06	E.35
168532	ACRP950A0H016	H.34	168591	ACFRP460A	H.35	170811	080SP35	E.28	179530	080XTGR07	E.35
168532	ACRP950A0H016	H.34	168592	ACFRP550A	H.35	170831	080SP1M	E.28	179531	080XTGR08	E.35
168542	DCRP32A0H78	H.34	168592	ACFRP550A	H.35	170832	080SP2M	E.28	180000		
168542	DCRP32A0H78	H.17	168594	ACFRP700A	H.35	170834	080SP4M	E.28	180001	077-11	E.53
168542	DCRP32A0H78	H.34	168594	ACFRP700A	H.35	170835	080SP1SFC	E.28	180002	077-10	E.53
168543	DCRP45A0H55	H.34	168595	ACFRP850A	H.35	170835	080SP1SFC	E.54	180003	077-01	E.53
168543	DCRP45A0H55	H.17	168595	ACFRP850A	H.35	170836	080SP1SFE	E.28	180007	077-10A	E.53
168543	DCRP45A0H55	H.34	168596	ACFRP950A	H.35	170837	080SP1SF	E.28	180008	077-01R	E.53
168544	DCRP60A0H4	H.34	168596	ACFRP950A	H.35	170837	080SP1SF	E.54	180009	099SPD7DB	E.53
168544	DCRP60A0H4	H.34	169075	QT10008U21MS	D.73	170838	080SP1MSF	E.28	180010	077G8BCN	E.44
168545	DCRP80A0H3	H.34	169075	QT10008U21MS	D.72	170838	080SP1MSFC	E.54	180019	077P11	E.44
168545	DCRP80A0H3	H.34	169076	QT10017U21MS	D.72	170839	080SP1MSFE	E.28	180020	077G8BCN	E.44
168546	DCRP100A0H24	H.34	169076	QT10017U21MS	D.73	170840	080SP1MSF	E.28	180029	077P10	E.44
168546	DCRP100A0H24	H.34	169077	QT10031U21MS	D.72	170840	080SP1MSF	E.54	180039	077P01	E.44
168547	DCRP120A0H2	H.34	169077	QT10031U21MS	D.72	170841	080SP2SFC	E.28	180040	077G8BCS	E.44
168547	DCRP120A0H2	H.34	169078	QT10044U21MS	D.73	170841	080SP2SFC	E.28	180049	077E11	E.45
168548	DCRP150A0H17	H.34	169078	QT10044U21MS	D.73	170841	080SP2SFC	E.54	180050	077G8BCS	E.44
168548	DCRP150A0H17	H.34	169079	QT10058U21MS	D.72	170842	080SP2SFE	E.28	180059	077E10	E.45
168549	DCRP180A0H14	H.34	169079	QT10058U21MS	D.73	170843	080SP2SF	E.28	180069	077E01	E.45
168549	DCRP180A0H14	H.34	169080	QT10072U21MS	D.72	170843	080SP2SF	E.28	180079	077RE11	E.45
168550	DCRP220A0H11	H.34	169080	QT10072U21MS	D.73	170843	080SP2SF	E.54	180089	077RE10	E.45
168550	DCRP220A0H11	H.34	169081	QT10085U21MS	D.72	170844	080SP2MSFC	E.28	180090	077RER	E.45
168555	DCRP18A2H9	H.34	169081	QT10085U21MS	D.73	170844	080SP2MSFC	E.28	180099	077RE01	E.45
168555	DCRP18A2H9	H.17	169082	QT10105U21MS	D.72	170844	080SP2MSFC	E.54	180100	077PC11C	E.45
168555	DCRP18A2H9	H.34	169082	QT10105U21MS	D.73	170845	080SP2MSFE	E.28	180104	077PC11G	E.45
168556	DCRP25A2H1	H.34	169083	QT10145U21MS	D.72	170846	080SP2MSF	E.28	180120	077P11T30	E.44
168556	DCRP25A2H1	H.17	169083	QT10145U21MS	D.73	170846	080SP2MSF	E.28	180121	077P11T180	E.44
168556	DCRP25A2H1	H.34	169084	QT10170U21MS	D.72	170846	080SP2MSF	E.54	180136	077G8BCF	E.44
168557	DCRP32A1H6	H.34	169084	QT10170U21MS	D.73	170847	080SP3SFC	E.28	180137	077G8BCF	E.44
168557	DCRP32A1H6	H.17	169085	QT10210U21MS	D.73	170847	080SP3SFC	E.28	180170	077SDN11	E.46
168557	DCRP32A1H6	H.34	169086	QT10310U21MS	D.73	170847	080SP3SFC	E.54	180180	077SHN11	E.46
168558	DCRP40A1H2	H.34	169087	QT10390U21MS	D.73	170848	080SP3SFE	E.28	180230	077SBN11	E.46
168558	DCRP40A1H2	H.34	169088	QT10460U21MS	D.72	170849	080SP3SF	E.28	180240	077SBN11SC	E.46
168559	DCRP50A0H96	H.34	169088	QT10460U21MS	D.73	170849	080SP3SF	E.28	180250	077SBN11DC	E.46
168559	DCRP50A0H96	H.34	169089	QT10580U21MS	D.72	170849	080SP3SF	E.54	180260	077SBN11RC	E.46
168560	DCRP60A0H82	H.34	169089	QT10580U21MS	D.73	170850	080SP4SFE	E.28	180440	077SUN22	E.46
168560	DCRP60A0H82	H.34	169090	QT10820U21MS	D.72	170851	080SP4MSFE	E.28	180480	077SZN22	E.46
168561	DCRP80A0H58	H.34	169090	QT10820U21MS	D.73	170852	080SP6SFE	E.28	180510	077SN22RC	E.46
168561	DCRP80A0H58	H.34	169091	QT10210N21MS	D.72	170853	080SP8SFC	E.28	180521	077SP1	E.54
168562	DCRP100A0H49	H.34	169092	QT10310N21MS	D.72	170853	080SP8SFC	E.54	180522	077SP1M	E.54
168562	DCRP100A0H49	H.34	169093	QT10390N21MS	D.72	170854	080SP8SFE	E.28	180523	077SP2	E.54
168563	DCRP125A0H40	H.34	169094	QT10460N21MS	D.72	170855	080SP8SF	E.28	180524	077SP2M	E.54
168563	DCRP125A0H40	H.34	169095	QT10580N21MS	D.72	170855	080SP8SF	E.54	180525	077SP3	E.54

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180531	077SP16	E.54	181722	077TNA313	E.53	186240	P9SSM21N	E.12	187316	P9ARDLS002	E.31
180532	077SP20	E.54	181840	077TGR02	E.53	186280	P9SSM25N	E.12	187318	P9ARDLS030	E.31
180533	077SP25	E.54	181930	077TNA40	E.53	186320	P9XSMZ3N	E.12	187319	P9ARDLS201	E.31
180534	077SP30	E.54	181951	077TNA230	E.53	186330	P9SSMX0N	E.12	187320	P9ARDLS202	E.31
180535	077SP36	E.54	181962	077TNA3	E.53	186400	P9SSCDOA95	E.14	187350	P9ARDPL	E.31
180536	077SP15FE	E.54	181963	077TNA301	E.53	186409	P9SSCDSA95	E.14	187351	P9ARDPL029	E.31
180537	077SP1MSFE	E.54	184070	P9XER3RN	E.11	186410	P9SSCI5C95	E.14	187352	P9ARDPL028	E.31
180538	077SP25FE	E.54	184071	P9XER4RN	E.11	186439	P9SSCZ0T95	E.14	187355	P9ARDPL006	E.31
180539	077SP2MSFE	E.54	184690	P9MPS21G	E.17	186461	P9SSCZ5A95	E.15	187359	P9ARDPL017	E.31
180540	077SP35FE	E.54	184691	P9MPS22G	E.17	186467	P9SSCZ3C95	E.15	187360	P9ARDPL018	E.31
180541	077SP4VSFE	E.54	184692	P9MPS23G	E.17	186551	P9SEM3RL	E.16	187361	P9ARDPL026	E.31
180542	077SP4SFE	E.54	184693	P9MPS34G	E.17	186561	P9SET4RL1	E.16	187362	P9ARDPL027	E.31
180543	077SP6SFE	E.54	184694	P9MPS35G	E.17	186695	P9XCD	E.17	187363	P9ARDPL031	E.31
180544	077SP9SFE	E.54	184695	P9MCD	E.17	186772	P9XZ	E.18	187364	P9ARDPL032	E.31
180545	077SP12SFE	E.54	184696	P9MCB	E.17	186773	P9SBD	E.18	187365	P9ARDPL001	E.31
180546	077SP16SFE	E.54	184697	P9MCC	E.17	186774	P9SBM	E.18	187366	P9ARDPL002	E.31
180547	077SP20SFE	E.54	184700	P9MMN2F	E.17	186880	P9DPLNNG00	E.19	187368	P9ARDPL030	E.31
180548	077SP25SFE	E.54	184701	P9MMN2T	E.17	186881	P9DPLVRG00	E.19	187369	P9ARDPL201	E.31
180549	077SP30SFE	E.54	184702	P9MMN2A	E.17	186882	P9DPLNRS00	E.19	187370	P9ARDPL202	E.31
180550	077SP36SFE	E.54	184703	P9MMN2B	E.17	186883	P9DPLVRS00	E.19	187490	P9ARCT	E.32
180551	077SP4VSFC	E.54	184710	P9MMB2F	E.17	186890	P9DPLNNG01	E.19	187491	P9ARHPR	E.33
180552	077SP36SFC	E.54	184711	P9MMB2T	E.17	186891	P9DPLVRS01	E.19	187492	P9ARRE4	E.33
180552	077SP36SFC	E.54	184712	P9MMB2A	E.17	186892	P9DPLNRS01	E.19	187495	P9ARSGMN	E.32
180553	077SP4VSF	E.54	184713	P9MMB2B	E.17	186893	P9DPLVRS01	E.19	187496	P9ARSGMB	E.32
180554	077SP36SF	E.54	184720	P9MMN4F	E.17	187000	P9B11VN	E.20	187500	P9ASBGR 029	E.30
180554	077SP36SF	E.54	184721	P9MMN4T	E.17	187000	P9B11VN	E.53	187511	P9ASBGN 028	E.30
180601	077SLD11	E.46	184740	P9MMB4F	E.17	187001	P9B01VN	E.20	187512	P9ASBVG 028	E.30
180606	077SLX22	E.46	184741	P9MMB4T	E.17	187001	P9B01VN	E.53	187517	P9ASBGN 006	E.30
180607	077SLB11	E.46	184770	P9MWR	E.18	187002	P9B10VN	E.20	187518	P9ASBVG 006	E.30
180623	077SLZ22	E.46	184771	P9XRG	E.18	187002	P9B10VN	E.53	187543	P9ASBGL 037	E.30
180625	077SLZ22DC	E.46	184772	P9SZ	E.18	187003	P9B01VR	E.20	187545	P9ASBGN 030	E.30
180626	077SLZ22RC	E.46	185070	P9MER3RN	E.11	187004	P9B10VA	E.20	187546	P9ASBVG 030	E.30
180630	077SCD1101	E.47	185071	P9MER4RN	E.11	187008	P9B02VN	E.20	187547	P9ASBGR 201	E.30
180631	077SCD1105	E.47	185077	P9SER4RA	E.11	187009	P9B20VN	E.20	187548	P9ASBGN 202	E.30
180632	077SCD1109	E.47	185078	P9XER4RAW	E.11	187012	P9B01FN	E.20	187549	P9ASBGV 202	E.30
180636	077SCH115C03	E.47	185079	P9XEC4RA95N	E.11	187013	P9B10FN	E.20	187550	P9ASBGN 029	E.30
180640	077SCH11DC03	E.47	185110	P9SSMDON	E.12	187014	P9B01FH	E.20	187551	P9ASBGN 028	E.30
180843	077SCB1120	E.47	185120	P9SSMI0N	E.12	187015	P9B10FH	E.20	187552	P9ASBGB 006	E.30
180852	077SCB11DC07	E.47	185150	P9SSMD5N	E.12	187017	P9B01BN	E.23	187610	P9ASBSR 029	E.30
180853	077SCB11RC03	E.47	185190	P9XSMU0N	E.12	187018	P9B10BN	E.23	187611	P9ASBSN 028	E.30
180906	077SCZ22DC01	E.47	185200	P9XSMZ0N	E.12	187020	P9PDNV0	E.21	187612	P9ASBSV 028	E.30
180910	077MTS2422	E.48	185240	P9XSMZ1N	E.12	187021	P9PRLVJ	E.21	187617	P9ASBSN 006	E.30
180911	077MT24S22	E.48	185280	P9XSMZ5N	E.12	187022	P9PRDVN	E.21	187618	P9ASBSV 006	E.30
180912	077MTS2422R	E.48	185320	P9SSMZ3N	E.12	187023	P9PRNVJ	E.21	187643	P9ASBSL 037	E.30
180913	077MT24S22R	E.48	185330	P9XSMX0N	E.12	187024	P9PRNVN	E.21	187645	P9ASBSN 030	E.30
180914	077M2S25X44	E.48	185370	P9XSV0N	E.13	187025	P9PREVJ	E.21	187646	P9ASBSV 030	E.30
180915	077M2T2TX44	E.48	185371	P9XgSVION	E.13	187026	P9PREVL	E.21	187647	P9ASBSR 201	E.30
180918	077M2S2TX44	E.48	185373	P9XSV05N	E.13	187027	P9PDTV0	E.21	187648	P9ASBSN 202	E.30
180919	077M2T2TX44	E.48	185379	P9XSV20N	E.13	187028	P9PRTVN	E.21	187649	P9ASBSV 202	E.30
180921	077M4T4TX88	E.48	185391	P9XSVZ3N	E.13	187040	P9PDMVD	E.21	187650	P9ASBSN 029	E.30
180923	077M4S4TX88	E.48	185392	P9XSVX0N	E.13	187041	P9PDMVJ	E.21	187651	P9ASBSB 028	E.30
180927	077M4T4TY88	E.48	185400	P9XSCDOA95	E.14	187055	P9PDNFO	E.21	187652	P9ASBSB 006	E.30
180929	077MTS123422	E.48	185401	P9XSCDOE95	E.14	187056	P9PDHF	E.20	187701	080QDF029	E.31
180931	077MT1234S22	E.48	185402	P9XSCDOK95	E.14	187056	P9PDHF	E.21	187702	080QDF028	E.31
180971	077GELR	E.49	185409	P9XSCDSA95	E.14	187070	P9PDNBO	E.23	187705	080QDF006	E.31
180980	077GG03	E.49	185410	P9SSCI5C95	E.14	187110	P9ARBGR 029	E.30	187709	080QDF017	E.31
180981	077GGM	E.49	185432	P9XSCUOT95	E.14	187111	P9ARBGN 028	E.30	187710	080QDF018	E.31
180982	077GGT	E.49	185433	P9XSCZ0A95	E.14	187112	P9ARBGV 028	E.30	187711	080QDF026	E.31
181000	077MTS2422B	E.48	185434	P9XSCZ0C95	E.14	187117	P9ARBGN 006	E.30	187713	080QDF031	E.31
181001	077MT24S22B	E.48	185435	P9XSCZ0E95	E.14	187118	P9ARBGV 006	E.30	187714	080QDF032	E.31
181002	077MTS2422RB	E.48	185439	P9XSCZ0T95	E.14	187125	P9ARBGN 017	E.30	187715	080QDF001	E.31
181003	077MT24S22RB	E.48	185461	P9XSCZ5A95	E.15	187127	P9ARBGN 018	E.30	187716	080QDF002	E.31
181004	077M2S25X44B	E.48	185462	P9XSCZ5C95	E.15	187143	P9ARBGL 037	E.30	187719	080QDF201	E.31
181005	077M2T2TX44B	E.48	185463	P9XSCZ5H95	E.15	187144	P9ARBGR 036	E.30	187720	080QDF027	E.31
181008	077M4S4TX88B	E.48	185467	P9XSCZ3C95	E.15	187145	P9ARBGN 030	E.30	187791	P9ASCST	E.32
181009	077M4T4TY88B	E.48	185571	P9XET4RL2	E.16	187146	P9ARBGV 030	E.30	187792	P9ASHP3	E.33
181019	077MTS123422B	E.48	185695	P9SCD	E.17	187147	P9ARBGR 201	E.30	187793	P9ASHP5	E.33
181021	077MT1234S22B	E.48	185700	P9XMN2F	E.17	187148	P9ARBGN 202	E.30	187794	P9ASHAC	E.33
181040	077PLM11D0	E.49	185701	P9XMN2T	E.17	187149	P9ARBGV 202	E.30	187795	P9ASEBG	E.33
181041	077PLM20D0	E.49	185710	P9XMB2F	E.17	187150	P9ARBGN 029	E.30	187796	P9ADCST	E.19
181043	077PLM10D0	E.49	185711	P9XMB2T	E.17	187151	P9ARBGB 028	E.30	187796	P9ADCST	E.19
181060	077ISD11D0	E.50	185712	P9XMB2A	E.17	187152	P9ARBGB 006	E.30	187840	P9ACRCL	E.33
181170	077ISB11D0	E.50	185713	P9XMB2B	E.17	187210	P9ARBSR 029	E.30	187840	P9ACRCL	E.33
181174	077ISB11D0RC	E.50	185720	P9XMN4F	E.17	187211	P9ARBSN 028	E.30	187841	P9ACFS3	E.33
181176	077ISZ11D0RC	E.50	185721	P9XMN4T	E.17	187212	P9ARBSV 028	E.30	187841	P9ACFS3	E.33
181260	077DLE14	E.51	185740	P9XMB4F	E.17	187217	P9ARBSN 006	E.30	187842	P9ACFS5	E.33
181300	077LDNV0	E.51	185741	P9XMB4T	E.17	187218	P9ARBSV 006	E.30	187842	P9ACFS5	E.33
181301	077LRNVJ	E.51	185771	P9MRG	E.18	187245	P9ARBSN 030	E.30	187843	P9ACDPP	E.33
181302	077LRNVN	E.51	185772	P9MZ	E.18	187246	P9ARBSV 030	E.30	187843	P9ACDPP	E.33
181305	077LDMVD	E.51	185773	P9XBD	E.18	187247	P9ARBSR 201	E.30	187844	P9ACVLR	E.33
181550	077DPP	E.52	185774	P9XBM	E.18	187248	P9ARBSN 202	E.30	187844	P9ACVLR	E.33
181554	077DAE	E.52	185788	080QDF027	E.31	187249	P9ARBSV 202	E.30	187845	P9ACWAF	E.33
181570	077OPZ	E.52	185789	080QDF030	E.31	187250	P9ARBSN 029	E.30	187845	P9ACWAF	E.33
181588	077CPT	E.52	186031	P9SEM3RN	E.11	187251	P9ARBSB 028	E.30	187846	P9ACFSM	E.20
181600	077CPLT	E.52	186061	P9SET4R	E.11	187252	P9ARBSB 006	E.30	187846	P9ACFSM	E.33
181601	077TPF	E.52	186072	P9XER4RAN	E.11	187300	P9ARDLS	E.31	187846	P9ACFSM	E.33
181602	077ECR	E.45	186073	P9SEC4RA95	E.11	187301	P9ARDLS029	E.31	187847	P9ACAFV	E.33
181603	077CST	E.52	186110	P9XSM0N	E.12	187302	P9ARDLS028	E.31	187847	P9ACAFV	E.33
181608	077PTB10	E.53	186120	P9XSMION	E.12	187305	P9ARDLS006	E.31	187850	BA95606	E.34
181609	077PTB10	E.53	186140	P9XSM5N	E.12	187309	P9ARDLS017	E.31	187850	BA95606	E.52
181615	077PTB11	E.53	186150	P9SSMI5N	E.12	187310	P9ARDLS018	E.31	187851	BA95615	E.34
181620	077GE35	E.52	186170	P9SSME0N	E.12	187311	P9ARDLS026	E.31	187851	BA95615	E.52
181650	077TGR	E.53	186190	P9SSMU0N	E.12	187312	P9ARDLS027	E.31	187851	BA95615	G.19
181660	077TNA	E.53									

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187853	BA9S242	E.34	189140	P9EPL03X03	E.26	211728	RSS13/64TA33	C.90	215004	RSS20/165TA150	C.90
187853	BA9S242	E.52	189141	P9EPL04X01	E.27	211728	RSS13/64TA33	C.90	215278	3903Y20D	C.90
187853	BA9S242	G.19	189152	P9AELN222	E.24	211728	RSS13/64TA33	C.90	215320	1158065SPA	G.19
187854	BA9S30	E.34	189154	P9AELN224	E.24	211730	RSS13/64TA39	C.90	215321	1158067SPA	G.19
187854	BA9S30	E.52	189859	P9ASBGB 202	E.30	211731	RSS13/64TA47	C.90	215321	1158067SPA	G.19
187854	BA9S30	G.19	189928	P9ASBSB 202	E.30	211735	RSS13/64TA5,6	C.90	215321	1158067SPA	G.19
187855	BA9S48	E.34	200000			211735	RSS13/64TA5,6	C.90	215432	P9EPC01X00	E.26
187855	BA9S48	E.52	200004	LG0006P1B0	D.19	211737	RSS13/64TA15	C.90	215433	P9EPC01X01	E.26
187855	BA9S48	G.19	200909	114FCT12	G.9	211739	RSS20/165TA470	C.90	216100	3903Y125D	C.90
187856	BA9S6012	E.34	200910	114FCT21	G.9	211742	RSS13/64TA10	C.90	216604	SFE04K1	B.4
187856	BA9S6012	E.52	202273	390/3921PFZCS14	C.91	211743	RSS13/64TA100	C.90	219154	ERX00K7	H.16
187856	BA9S6012	G.19	202274	390/3921PFZCS45	C.91	211744	RSS13/64TA100	C.90	220000		
187857	BA9S130	E.34	202275	390/3921PMRN	C.91	211744	RSS13/64TA180	C.90	220019	PRC2P20ABL	A.4
187857	BA9S130	E.52	202276	390/3921PMZI	C.91	211744	RSS13/64TA180	C.90	220020	PRC2P20ADL	A.4
187857	BA9S130	G.19	202277	390/3921PZ	C.91	211744	RSS13/64TA180	C.90	220021	PRC2P20AGL	A.4
187860	BA9SN110	E.34	202278	390/3922PFZCS90	C.91	211744	RSS13/64TA180	C.90	220022	PRC2P20CBL	A.4
187860	BA9SN110	E.52	202279	390/3922PMZI	C.91	211744	RSS13/64TA180	C.90	220023	PRC2P20CDL	A.4
187860	BA9SN110	G.19	202280	390/3922PZ	C.91	211744	RSS13/64TA180	C.90	220024	PRC2P20AJL	A.4
187861	BA9SN220	E.34	202281	390/3923PFZCS125	C.91	211744	RSS13/64TA180	C.90	220025	PRC2P20CGL	A.4
187861	BA9SN220	E.52	202282	390/3923PMRN	C.91	211745	RSS13/64TA330	C.90	220026	PRC2P20ANL	A.4
188000	P9ARTBS	E.34	202283	390/3923PMZI	C.91	211745	RSS13/64TA330	C.90	220027	PRC2P20CJL	A.4
188001	P9ARTBM	E.34	202284	390/3923PZ	C.91	211745	RSS13/64TA330	C.90	220041	PRC2P20DCBL	A.4
188002	P9ARPB	E.35	202287	390/3924PFRN	C.91	211745	RSS13/64TA330	C.90	220042	PRC2P20DCDL	A.4
188005	P9ARTWS	E.34	202288	390/3924PFZCS125	C.91	211746	RSS13/64TA390	C.90	220043	PRC2P20DCGL	A.4
188008	P9ARTWM	E.34	202289	390/3924PFZCS200	C.91	211748	RSS20/165TA390	C.90	220044	PRC2P20DCJL	A.4
188010	P9ASTBS	E.34	202290	390/3924PMRN	C.91	211748	RSS20/165TA390	C.90	220216	PRCZ8	A.4
188011	P9ASTWS	E.34	202291	390/3924PMZI	C.91	211770	3906Y230D	C.90	220217	PRCZ8	A.4
188012	P9ARTS	E.34	202292	390/3924PZ	C.91	212558	SFS04M	B.4	220218	PRCPZ11	A.4
188014	P9ASTS	E.34	202295	390/3925PFZCS320	C.91	212559	SFS05M	B.4	220218	PRCPZ11	A.4
188015	P9ACPBS	E.35	202297	390/3925PMRN	C.91	212702	RSS13/64TA220	C.90	220219	PRCR159	A.4
188016	P9ACPIU	E.35	202298	390/3925PMZI	C.91	212705	3903Y48D	C.90	220219	PRCR159	A.4
188017	P9ACPW	E.35	202299	390/3925PZ	C.91	212706	3905Y220D	C.90	220310	PRC3P30ABL	A.4
188018	P9ACPTS	E.35	202303	390/3926PFZCS270	C.91	212707	3906Y48D	C.90	220311	PRC3P30ADL	A.4
188019	P9ARPTM	E.35	202304	390/3926PMZI	C.91	212709	390/3922PFRN	C.91	220312	PRC3P30AGL	A.4
188019	P9ARTTM	E.34	202306	390/3927PFRN	C.92	212759	RS01NEN	F.6	220313	PRC3P30CBL	A.4
188028	P9ARPWM	E.35	202307	390/3927PFZCS320	C.92	212959	3908Y97D	C.90	220314	PRC3P30CDL	A.4
188030	P9ACPBS039	E.35	202308	390/3927PFZCS630	C.92	212962	3909PMZ	C.92	220315	PRC3P30AJL	A.4
188043	P9ARSCMN	E.32	202309	390/3927PMRN	C.92	213014	390/3922PMRN	C.91	220316	PRC3P30CGL	A.4
188044	P9ARSCMB	E.32	202310	390/392PMZI	C.92	213034	RSS13/64TA1200	C.90	220317	PRC3P30ANL	A.4
188201	P9ACPBS201	E.35	202311	390/3927PZ	C.92	213034	RSS13/64TA1200	C.90	220318	PRC3P30CJL	A.4
188202	P9ACPBS202	E.35	202323	39012Y110D	C.90	213034	RSS13/64TA1200	C.90	220335	PRC3P30DCBL	A.4
188203	P9ACPBS203	E.35	202324	39012Y125D	C.90	213034	RSS13/64TA1200	C.90	220336	PRC3P30DCDL	A.4
188204	P9ACPBS204	E.35	202325	39012Y197D	C.90	213034	RSS13/64TA1200	C.90	220337	PRC3P30DCGL	A.4
188205	P9ACPBS205	E.35	202326	39012Y220D	C.90	213573	390/3925PFZCS150	C.91	220338	PRC3P30DCJL	A.4
188206	P9ACPBS206	E.35	202327	39012Y24D	C.90	213574	390/3926PFZCS450	C.91	220647	PRCZ11	A.4
188207	P9ACPBS207	E.35	202328	39012Y97D	C.90	213601	3904Y97D	C.90	220647	PRCZ11	F.4
188208	P9ACPBS208	E.35	202437	3903Y110D	C.90	213612	3906Y220D	C.90	220648	PRCG11	A.4
188215	P9ACPBS215	E.35	202438	3903Y220D	C.90	213663	RSS20/165TA100	C.90	220710	PRC4M20ABL	A.3
188222	P9ACPBS222	E.35	202479	3904Y110D	C.90	213664	RSS20/165TA120	C.90	220711	PRC4M20ADL	A.3
188224	P9ACPBS224	E.35	202480	3904Y125D	C.90	213691	3903Y97D	C.90	220712	PRC4M20AGL	A.3
188231	P9ACPBS231	E.35	202481	3904Y197D	C.90	213814	3904Y48D	C.90	220713	PRC4M20CBL	A.3
188232	P9ACPBS232	E.35	202482	3904Y220D	C.90	213986	390/3923PFRN	C.91	220714	PRC4M20CDL	A.3
188233	P9ACPBS233	E.35	202483	3904Y24D	C.90	214066	3908Y197D	C.90	220715	PRC4M20AJL	A.3
188234	P9ACPBS234	E.35	202512	3905Y110D	C.90	214081	RSS20/165TA82	C.90	220716	PRC4M20CGL	A.3
188239	P9ACPBS239	E.35	202513	3905Y97D	C.90	214120	390/3921/2FOM4/2	C.91	220717	PRC4M20ANL	A.3
188243	P9ACPBS243	E.35	202532	3906Y110D	C.90	214120	390/3921/2FOM4/2	C.91	220718	PRC4M20CJL	A.3
188258	P9ACPBS258	E.35	202533	3906Y97D	C.90	214121	390/3922FOM5/2	C.91	220754	PRC4M20DCBL	A.3
188804	P9ACA6	E.20	202547	3907Y110D	C.90	214121	390/3922FOM5/2	C.91	220755	PRC4M20DCDL	A.3
188805	P9ARSN1	E.33	202548	3907Y220D	C.90	214122	390/3923/2FOM4/2	C.91	220756	PRC4M20DCGL	A.3
188909	P9ARBSB 202	E.30	202555	3908PFZCS400	C.92	214123	390/3923FOM5/2	C.91	220757	PRC4M20DCJL	A.3
188978	P9ARBSB 202	E.30	202562	3908PFZCS800	C.92	214124	390/3924F4	C.91	220912	PRCG-ES15/2N	A.3
189000	P9PEEG1	E.24	202563	3908PMZ	C.92	214126	390/3924M4/2	C.91	220914	PRCG1052	A.3
189001	P9PEE01	E.24	202564	3908PZ	C.92	214127	390/3924M5/2	C.91	220914	PRCG1052	A.3
189002	P9PEE02	E.24	202565	3908Y110D	C.90	214128	390/3925F4/2	C.91	220914	PRCG1052	A.3
189003	P9PEE03	E.24	202566	3908Y220D	C.90	214129	390/3925F5/2	C.91	220915	PRCMS35	A.3
189004	P9PEE04	E.24	202572	3909Y110D	C.90	214130	390/3925M4/2	C.91	220915	PRCMS35	A.3
189005	P9PEE06	E.24	202654	390/3926PZ	C.91	214131	390/3925M5/2	C.91	220915	PRCMS35	A.3
189007	P9EPAG1Y0N	E.24	204177	RSS13/64TA8,2	C.90	214133	390/3926F4/2	C.91	220916	PRCTR1	A.3
189008	P9EPAG1Y01W	E.24	204177	RSS13/64TA8,2	C.90	214134	390/3926F5/2	C.91	220916	PRCTR1	A.3
189009	P9EPAG1Y06N	E.24	204177	RSS13/64TA8,2	C.90	214135	390/3926M4/2	C.91	220916	PRCTR1	A.3
189010	P9EPA01Y02	E.24	204177	RSS13/64TA8,2	C.90	214136	390/3926M5/2	C.91	221051	PRC4M30ABL	A.3
189011	P9EPA01Y03	E.24	204177	RSS13/64TA82	C.90	214137	390/3927F4/2	C.92	221052	PRC4M30ADL	A.3
189016	P9EPA02Y01	E.25	204178	390/3924F5/2	C.92	214138	390/3927F5/2	C.92	221053	PRC4M30AGL	A.3
189018	P9EPA03Y01	E.25	204179	3909F4/2	C.91	214139	390/3927M4/2	C.92	221054	PRC4M30CBL	A.3
189022	P9EPA03Y05	E.25	204180	3909F5/2	C.92	214140	390/3927M5/2	C.92	221055	PRC4M30CDL	A.3
189029	P9AEMT	E.24	204181	3909Y197D	C.90	214141	3908/9M4/2	C.92	221056	PRC4M30AJL	A.3
189030	P9AELN	E.24	204800	C09479	C.21	214141	3908/9M4/2	C.92	221057	PRC4M30CGL	A.3
189031	P9AELN202	E.24	209140	IUGA-B211 S	G.5	214142	3908/9M5/2	C.92	221058	PRC4M30ANL	A.3
189032	P9AELN201	E.24	209344	LG0004P1B0	D.19	214142	3908/9M5/2	C.92	221059	PRC4M30CJL	A.3
189033	P9AELN214	E.24	209347	LG0004S1B0	D.19	214144	3908F4/2	C.90	221074	PRC4M30DCBL	A.3
189034	P9AELN215	E.24	209780	MG0004PATO	D.19	214145	3908F5/2	C.92	221075	PRC4M30DCDL	A.3
189035	P9AELN205	E.24	209781	MG0006PATO	D.19	214146	3909Y97D	C.90	221076	PRC4M30DCGL	A.3
189036	P9AELN206	E.24	210000			214399	RSS13/64TA270	C.90	221077	PRC4M30DCJL	A.3
189037	P9AELN204	E.24	211107	3903Y230D	C.90	214400	RSS13/64TA820	C.90	221442	PRCG-ES15/3N	A.3
189038	P9AELN203	E.24	211706	39012Y230D	C.90	214442	3903Y197D	C.90	221809	PRC4M40ABL	A.3
189041	P9AELN006	E.24	211708	3904Y230D	C.90	214580	RSS13/64TA680	C.90	221810	PRC4M40ADL	A.3
189042	P9AELN028	E.24	211709	3905Y230D	C.90	214580	RSS13/64TA680	C.90	221811	PRC4M40AGL	A.3
189043	P9AELN029	E.24	211711	3906Y125D	C.90	214580	RSS13/64TA680	C.90	221812	PRC4M40CBL	A.3
189044	P9AELN035	E.24	211712	3907Y230D	C.90	214580	RSS13/64TA680	C.90	221813	PRC4M	



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221860	PRC1T20CBL	A.5	222269	NLT3ANV	E.62	244739	3909Y220D	C.90
221861	PRC1T20CDL	A.5	222270	NLT3ANL	E.62	244744	390/3922PFZCS45	C.91
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221868	PRC1T20ADL	A.5	222278	NLT73BD	E.63	244746	390/3925PFRN	C.91
221869	PRC1T20AJL	A.5	222279	NLT77BD	E.63	244983	3909PFZCS120	C.92
221870	PRC1T20ANL	A.5	222280	NLT77AJ	E.63	244987	RSS20/165TA560	C.90
221875	PRC1T10CBL	A.5	222281	NLT77AN	E.63	245217	SFS04K1	B.4
221876	PRC1T10CDL	A.5	222282	NLT9TC	E.63	247302	RE1XP	C.67
221877	PRC1T10CJL	A.5	222284	NLT5BT	E.63	247303	RE2XP	C.67
221883	PRC1T10ADL	A.5	222285	NLT5ET	E.63	250000		
221884	PRC1T10AJL	A.5	222286	NLT75BD	E.63	254537	SFVB8	B.5
221885	PRC1T10ANL	A.5	222287	NLT75AJ	E.63	254537	SFVB8	B.19
221890	PRCT1CB	A.5	222288	NLT75AN	E.63	260000		
221891	PRCT1CD	A.5	222289	NLT2BDLR	E.62	264826	SFALPEN	B.3
221892	PRCT1CJ	A.5	222290	NLT2BDLA	E.62			
221896	PRCT1AD	A.5	222291	NLT2BDLG	E.62			
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221898	PRCT1AN	A.5	222293	NLT2BDLL	E.62			
221905	PRCT2CB	A.5	222294	NLT2BDLI	E.62			
221906	PRCT2CD	A.5	222295	NLT2AJLR	E.62			
221907	PRCT2CJ	A.5	222296	NLT2AJLA	E.62			
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221918	PRCGZT80	A.5	222301	NLT2ANLR	E.62			
221920	PRCMS16	A.5	222302	NLT2ANLA	E.62			
221921	PRCTR	A.5	222303	NLT2ANLG	E.62			
221934	PRCG-ES15/4N	A.3	222304	NLT2ANLV	E.62			
222004	PRC1S13BDL	A.5	222305	NLT2ANLL	E.62			
222007	PRC1S13CBL	A.5	222306	NLT2ANLI	E.62			
222008	PRC1S13CDL	A.5	222307	NLT90BT	E.63			
222012	PRC1S13ANL	A.5	222330	BA15D24LR	E.63			
222013	PRC1S13BNL	A.5	222331	BA15D24LA	E.63			
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222100	PRCM21P	A.6	222334	BA15D24LL	E.63			
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222102	PRCM31R	A.6	222336	BA15D115LR	E.63			
222103	PRCM32R	A.6	222337	BA15D115LA	E.63			
222104	PRCM31G	A.6	222338	BA15D115LG	E.63			
222105	PRCM32G	A.6	222339	BA15D115LV	E.63			
222106	PRCM33G	A.6	222340	BA15D115LL	E.63			
222107	PRCM41G	A.6	222341	BA15D115LB	E.63			
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222110	PRCM41R	A.6	222343	BA15D230LA	E.63			
222111	PRCM42R	A.6	222344	BA15D230LG	E.63			
222112	PRCM43R	A.6	222345	BA15D230LV	E.63			
222113	PRCM51	A.6	222346	BA15D230LL	E.63			
222114	PRCM52	A.6	222347	BA15D230LB	E.63			
222115	PRCM53	A.6	222348	BA15D125	E.63			
222116	PRCM91R	A.6	222349	BA15D245	E.63			
222120	PRCM93G	A.6	222350	BA15D305	E.63			
222121	PRCM71	A.6	222351	BA15D1155	E.63			
222122	PRCM73	A.6	222352	BA15D2305	E.63			
222124	PRCM42G	A.6	223000	IPSF1	E.68			
222125	PRCM43G	A.6	240000					
222126	PRCM91G	A.6	241747	PVP85G	D.19			
222230	NLT1R	E.62	241748	PVP10G	D.19			
222231	NLT1A	E.62	241749	PCP12G	D.19			
222232	NLT1G	E.62	241750	WLS01	D.23			
222233	NLT1V	E.62	241751	WKI0910	D.21			
222234	NLT1L	E.62	241752	WKI0608	D.21			
222235	NLT1I	E.62	242260	3905Y125D	C.90			
222236	NLT2BDR	E.62	242464	NLT2AJLI	E.62			
222237	NLT2BDA	E.62	243281	RSS13/64TA120	C.90			
222238	NLT2BDG	E.62	243713	SFVH03	B.3			
222239	NLT2BDV	E.62	244056	3907Y40D	C.90			
222240	NLT2BDL	E.62	244057	3907Y24D	C.90			
222241	NLT2BDI	E.62	244058	3907Y20D	C.90			
222242	NLT2AJR	E.62	244059	3907Y197D	C.90			
222243	NLT2AJA	E.62	244063	3906Y40D	C.90			
222244	NLT2AJG	E.62	244064	3906Y24D	C.90			
222245	NLT2AJV	E.62	244065	3906Y20D	C.90			
222246	NLT2AJL	E.62	244066	3906Y197D	C.90			
222247	NLT2AJI	E.62	244071	3905Y40D	C.90			
222248	NLT2ANR	E.62	244072	3905Y24D	C.90			
222249	NLT2ANA	E.62	244073	3905Y20D	C.90			
222250	NLT2ANG	E.62	244074	3905Y197D	C.90			
222251	NLT2ANV	E.62	244083	3904Y40D	C.90			
222252	NLT2ANL	E.62	244084	3904Y20D	C.90			
222253	NLT2ANI	E.62	244088	3903Y40D	C.90			
222254	NLT3BDR	E.62	244106	39012Y40D	C.90			
222255	NLT3BDA	E.62	244107	39012Y20D	C.90			
222256	NLT3BDG	E.62	244172	390/3921PFZCS25	C.91			
222257	NLT3BDV	E.62	244173	390/3921PFRN	C.91			
222258	NLT3BDL	E.62	244191	RSS13/64TA470	C.90			
222259	NLT3BDI	E.62	244191	RSS13/64TA470	C.90			
222260	NLT3AJR	E.62	244192	RSS13/64TA27	C.90			
222261	NLT3AJA	E.62	244192	RSS13/64TA27	C.90			
222262	NLT3AJG	E.62	244192	RSS13/64TA27	C.90			
222263	NLT3AJV	E.62	244192	RSS13/64TA27	C.90			
222264	NLT3AJL	E.62	244734	39012Y48D	C.90			
222265	NLT3AJI	E.62	244735	3903Y24D	C.90			
222266	NLT3ANR	E.62	244736	3905Y48D	C.90			
222267	NLT3ANA	E.62	244737	3907Y48D	C.90			

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GE Consumer & Industrial



# GE Consumer & Industrial Power Protection

Power Protection (formerly GE Power Controls), a division of GE Consumer & Industrial, is a first class European supplier of low-voltage products including wiring devices, residential and industrial electrical distribution components, automation products, enclosures and switchboards. Demand for the company's products comes from, wholesalers, installers, panel-board builders, contractors, OEMs and utilities worldwide.

  
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