EATON | MEM

Enclosed Motor, Heating and Lighting Control

Product guide

- ADS8 Metal clad starters
- ADS8 Moulded starters
- Pushbutton control units
- Local disconnectors
- Heating & lighting controls

Trusted by generations of electrical contractors

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STEP 1

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Indexes

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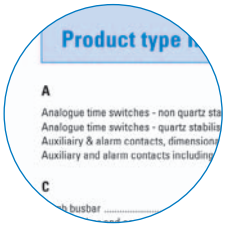

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General characteristics

Motor, Heating and Lighting control

Eaton's MEM wide range of Motor Control Gear and Heating and Lighting Control equipment is an integral part of our single source commitment.

Since the late 1920's we have built countless motor starters, fitted and trusted by generations of contractors, while the increasing requirements of our markets have led us to constantly update and expand our ADS range to allow for an increased choice of current ratings and ingress protection.

This wealth of experience and expertise in the design and manufacture of Motor Control Gear is mirrored by our Heating and Lighting range which offers a versatile and comprehensive choice.

Although already offering a multitude of configurations and optional features, for those with particular requirements our Specials facility can cater for a variety of special purpose equipment including automatic changeover contactors and Stator-Rotor Starters.

Standards

- Designed to meet or exceed UL, IEC and CSA
- IEC 60947-4-1
- VDE 0660
- IEC 60269
- BS EN 60947-4-1

The feature packed Eaton ADS8 AC motor starters

Enclosures – moulded
- 9kW DOL max
- Tough polycarbonate in grey provides high IP protection to IP65
- Start and stop pushbuttons
- Internal earth terminals
- Cable entries — 20mm knockouts for M20 threaded glands.

Enclosures – metalclad
- Attractively styled rust protected pressed steel finished in grey polyester powder paint
- Start and mushroom-headed stop pushbuttons
- Substantial earth terminal
- Cable entries – 20mm knockouts for M20 threaded glands

Switch-disconnectors
- Means of isolation and switching for mechanical maintenance
- Padlocking facility available
- Isolators type tested for on-load disconnection
- T.P. interlocked with main cover

Overload relays
- T.P. adjustable thermal pattern connected directly to contactor
- Ambient temperature compensated between -40°C to +60°C
- Phase failure sensitive relays
- Changeover trip contact
- Simple Auto-reset

Contactors
- Modern block type
- 6 – 15 x 10^6 mechanical and 1.5 x 10^6 electrical operations – AC3 duty.
- Provisions for fitting additional auxiliary contacts either N/O or N/C – depending on version

Optional fittings and specials
- Provision for various optional fitments on standard starters
- Special starter arrangements

The feature packed Eaton ADS8 enclosed industrial starters

- Developed to increase the range of enclosed starters up to 90kW
- Design profile and numerous optional features available developed from experience of user requirements.
- Starters will satisfy most specifications and are designed for mounting above or below busbar chambers
- Complements the lower rated ADS8 motor starters
- Provisions for TP interlocked and switch disconnectors with HRC main fuses
- Start and Stop pushbuttons, control circuit fuses, remote control terminal block and overload relays are fitted as standard
- Enclosures are robust rust-protected sheet steel with fully gasketed hinged covers

Contactors
- Modern block-type
- Each has provision for accepting additional auxiliary contacts.

Overload relays
- Starters supplied with appropriate ambient temperature compensated phase-failure-sensitive thermal relay.

Switch-disconnectors
- Interlocked stalled-motor complete with padlocking switch-disconnectors facility
- Available with provisions for auxiliary poles

Operating Conditions
-40°C to +60°C.

Optional features
- Motor rated ammeter with suppressed scale to indicate starting peaks
- Low voltage control circuit transformer
- Isolator auxiliary poles for separate control circuit supply
- Pilot indicating lamps
- Off/Auto or Local/Off/Remote selector switch
- Higher ratings up to 200kW available on request

Typical Specials
- Reversing starters
- Two-speed starters for dual or tapped-wound motors
- Stator and rotor starters
- Main/Standby starters

The feature packed Eaton MSU pushbutton control units

- Designed to match Eaton's MEM ADS motor starter range
- Simplicity, versatility and robust construction successfully allied to attractive styling
- One, two and three button types available in a variety of configurations
- 3-button types 23MSU and 23MSU/L supplied with fitted front label reading Forward, Reverse, Stop
- Separate loose label provided for situations requiring Up, Down, Stop
- Each contact block comprises 1 – N/O and 1 – N/C contact
- Start units are push to make (N/O)
- Stop units are push to break (N/C)
- Latching device where fitted holds stop pushbutton in depressed position until latch is released by clockwise rotation of mushroom head.
- One 'a' contact + one 'b' contact per way
- Form Za Uimp = 6kV.
- Housings made from tough polycarbonate
- Enclosure material resistant to diluted mineral and organic acids
- 20mm conduit knockouts complete with M20 conduit threads incorporated at top and bottom
- Single way enclosures may be turned through 90° to permit side cable entry
- Ambient temperature rating -5°C to +40°C.
- Switch and earth terminals 2 x 1mm^2 – 2.5mm^2 rigid, 2 x 1.5mm^2 – 2.5mm^2 flexible
- Single way control stations readily available with a range of 22mm cover mounted control and indicating devices

The feature packed Eaton CSU pushbutton control units

- Robust construction
- Ideally suited for heavy industrial applications
- Available in general purpose enclosures to IP4X and dust and hoseproof enclosures to IP65
- Cast iron bases and front plates
- Earth terminal is provided
- Finished in a grey stoved paint finish
- Contacts are single pole double break
- Stop units push to break
- Start units push to make.
- Ambient temperature -5°C to +40°C
- Maximum terminal capacity 2 x 2.5mm^2

The feature packed Eaton local disconnectors — Type RDMP

- Suitable for on load switching of general distribution AC power circuits and infrequent duty motor isolation
- Grey, moulded thermoplastic enclosures suitable for most indoor and outdoor environmental conditions
- Fitted with red/yellow operating handles padlockable in the 'OFF' position with up to three padlocks
- Enclosure design allows easy access for cabling
- Solid neutral and earth termination points are a standard feature

The feature packed Eaton local disconnectors — Type PC2

- Suitable for on load switching of general distribution AC power circuits and infrequent duty motor isolation
- Robust pressed steel enclosures, rust protected with grey paint finish
- Fitted with black operating handles, padlockable in the 'OFF' position with up to 3 padlocks
- Enclosure design allows easy access for cabling by removal of the switch interior
- Switches with additional poles available on request
- 2 pole and 4 pole units have removable neutral links included for SPN (from 2P) or TPN (from 4P) conversions
- Earth terminals provided as standard

The feature packed Eaton Autoline heating and lighting contactors

Open Contactors

- 18A, 25A and 32A, 4-pole, with optional auxiliary contacts

Enclosed Contactors

- 25A and 40A, 4-pole; 40A and 64A, 2-pole; 70A and 112A, single pole with fitted neutral link
- Robust pressed steel enclosures, rust protected with grey paint finish
- 220…240V units available with or without rectifiers for silent running
- 90-225A, 3-pole enclosed contactors can be supplied with switch-disconnector-fuse including HRC main fuses

ADS8 AC contactors, starters and assemblies

This chapter covers the ADS8 range of DOL, DOL Reversing and Star Delta starters with associated overload relays and accessories / spares. Overload relays are supplied separately and enclosures are IP54 metal clad. A higher rated IP65 moulded 9kW DOL starter is also available.

- IEC / EN60947
- CE marked

See page 10 for Overload relays.
See page 31 for trip and electrical life curves.
See page 20 for dimensional drawings.

28ADSM1X

9kW DOL starter without switch disconnect

- IP 65 moulded surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220–240	**28ADSM1X**
		380–415	**48ADSM1X**

[1]Other control voltages available, contact Eaton

28ADS3X

15kW DOL starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220–240	**28ADS1X**
		380–415	**48ADS1X**
25	11	220–240	**28ADS2X**
		380–415	**48ADS2X**
32	15	220–240	**28ADS3X**
		380–415	**48ADS3X**

[1]Other control voltages available, contact Eaton

28ADSA1X

15kW DOL starter with switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220–240	**28ADSA1X**
		380–415	**48ADSA1X**
25	11	220–240	**28ADSA2X**
		380–415	**48ADSA2X**
32	15	220–240	**28ADSA3X**
		380–415	**48ADSA3X**

[1]Other control voltages available, contact Eaton

48ARD1X

11kW DOL Reversing starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220–240	**28ARD1X**
		380–415	**48ARD1X**
25	11	220–240	**28ARD2X**
		380–415	**48ARD2X**

[1]Other control voltages available, contact Eaton

28SDA2X18

25kW Star Delta starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
31	15	220–240	**28SDA2X18**
		380–415	**48SDA2X18**
43	22	220–240	**28SDA3X25**
		380–415	**48SDA3X25**
55	25	220–240	**28SDA3X32**
		380–415	**48SDA3X32**

[1]Other control voltages available, contact Eaton

8TT92

DOL, DOL reversing, line connected thermal overload relays

Full load current A	Motor rating kW	Eaton list number
0.63–1	0.37	**8TT87**
1–1.6	0.55	**8TT88**
1.6–2.5	1.1	**8TT89**
2.5–4	1.5	**8TT90**
4–6	2.2	**8TT91**
5.5–8	3.7	**8TT98**
7–10	4	**8TT92**
10–13	5.5	**8TT93**
13–18	9	**8TT94**
18–25	11	**8TT104**
23–32	15	**8TT96**

8TT92SD

Star Delta, phase connected thermal overload relays

Full load current A	Motor rating kW	Eaton list number
4.3–6.9	3	**8TT90SD**
6.9–10.4	5.5	**8TT91SD**
9.5–13.8	7	**8TT98SD**
12.1–17.3	9	**8TT92SD**
17.3–22.5	11	**8TT93SD**
22.5–31	15	**8TT94SD**
31–43	22	**8TT104SD**
40–55	25	**8TT96SD**

4832VCO

Replacement contactors, DOL, DOL reversing & Star Delta Main contactor

- Open contactor, 3 pole with 1NO auxiliary
- Contactor technical details, see page 17

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220 – 240	**2818VCO**
		380 – 415	**4818VCO**
25	11	220 – 240	**2825VCO**
		380 – 415	**4825VCO**
32	15	220 – 240	**2832VCO**
		380 – 415	**4832VCO**
50	25	220 – 240	**2850VCO**
		380 – 415	**4850VCO**

[1]Other control voltages available, contact Eaton

4832VCOSD

Replacement contactors, Star Delta. Star & Delta contactors

- Open contactor, 3 pole with 1NC auxiliary
- Contactor technical details, see page 17

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	220–240	**2818VCOSD**
		380–415	**4818VCOSD**
25	11	220–240	**2825VCOSD**
		380–415	**4825VCOSD**
32	15	220–240	**2832VCOSD**
		380–415	**4832VCOSD**
50	25	220–240	**2850VCOSD**
		380–415	**4850VCOSD**

[1]Other control voltages available, contact Eaton

8COIL418

Replacement coils, DOL, DOL reversing starters

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
18	9	110	**8COIL118**
		220–240	**8COIL218**
		380–415	**8COIL418**
25	11	110	**8COIL132**
		220–240	**8COIL232**
		380–415	**8COIL432**
32	15	110	**8COIL132**
		220–240	**8COIL232**
		380–415	**8COIL432**
50	25	220–240	**8COIL250**
		380–415	**8COIL450**

[1]Other control voltages available, contact Eaton

8COIL418

Replacement coils, Star Delta starters

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz[1] Vac	Eaton list number
31	15	220–240	**8COIL218**
		380–415	**8COIL418**
43	22	220–240	**8COIL232**
		380–415	**8COIL432**
55	25	220–240	**8COIL232**
		380–415	**8COIL432**

[1]Other control voltages available, contact Eaton

8TA2DS2

Replacement pneumatic timer, Star Delta Starter

Description	Contact rating AC11, 500v	Ith, Ui 600v	Eaton list number
Pneumatic timer	6A	10A	**8TA2DS2**

8TA8DN11

Replacement and additional auxiliary contacts

- Suitable for all DOL, DOLR and Star Delta Starters

Description	Contact configuration	Contact rating Ith (A) Ui 600v	Eaton list number[1]
Side mounting auxiliary contact	1NO – 1NC	10	**8TA8DN11**
Front mountng auxiliary contact	1NO – 1NC	10	**8TA1DN11**

[1]See pages 29–30 for permissible configurations

This chapter covers the moulded IP65 pushbutton control units - type MSU and the heavy duty cast iron CSU pushbutton control units (IP41 and IP65).

- IEC / EN60947
- CE marked

See page 27 for technical details.

22MSU

MSU pushbutton control units (moulded IP65)

Number of buttons	Description	Eaton list number
1	Start	**21MSSU**
1	Stop	**21MSU**
1	Stop, latching pattern (push to latch, turn to release)	**21MSUL**
1	Stop (50mm dia. mushroom head)	**21MSUM**
1	Stop, latching pattern – (push to latch, turn to release) (50mm dia. mushroom head)	**21MSUML**
2	Start-Stop	**22MSU**
2	Start-Latch Stop/Reset	**22MSUL**
3	Forward-Reverse-Stop (Alternative label: Up-Down-Stop)	**23MSU**
3	Forward-Reverse-Latch Stop/Reset (Alternative label: Up-Down-Stop)	**23MSUL**

■ *Spare switch unit (not suitable for 22mm devices)*

Description	Eaton list number
Complete replacement unit with N/O and N/C contacts and fixing screw	**21MSB**

21MSU2K

MSU pushbutton control units (moulded IP65)

■ *Single way control stations incorporating 22mm control devices*

Description	Eaton list number
Mushroom head latch stop, key release with 1-N/C contact	**21MSULK**
Two position key operated selector switch with 1-N/O contact labelled 0/1 (Key removable in both positions)	**21MSU2K**
Two position key operated spring return to "off" selector switch with 1-N/O and 1-N/C contact labelled 0/1 (Key removable in off position)	**21MSU2SK**

1CSUL

CSU pushbutton control units (IP41 / IP65)

Number of buttons	Description	Eaton list number
1	Stop (IP41)	**1CSU**
1	Latched stop/reset (IP41)	**1CSUL**
1	Stop, large mushroom head 50mm dia. (IP41)	**1CSUM**
1	Latched stop/reset (IP65)	**1CSUWL**

Local disconnectors

Moulded and metalclad

This chapter covers the range of moulded IP65 RDMP local disconnectors, covering the range from 20A to 63A and from 2 pole and neutral up to 8 pole. Also covered is the PC2 range of metal clad IP54 disconnectors covering the range from 20A to 63A and 2 pole to 6 pole.

- IEC / EN60947-3
- CE marked

See page 27 for technical details.

204RDMP

Local disconnectors standard duty, type RDMP, 20 – 63A IP65

Nominal unit rating Ie	Poles	Eaton list number
20A	2P +sldN	**2021RDMP**[1]
25A	2P +sldN	**2521RDMP**[1]
40A	2P +sldN	**4021RDMP**[1]
63A	2P +sldN	**6321RDMP**[1]
20A	3P +sldN	**2031RDMP**[1]
25A	3P +sldN	**2531RDMP**[1]
40A	3P +sldN	**4031RDMP**[1]
63A	3P +sldN	**6331RDMP**[1]
20A	4P	**204RDMP**
25A	4P	**254RDMP**
40A	4P	**404RDMP**
63A	4P	**634RDMP**
20A	4P +sldN	**2041RDMP**[1]
25A	4P +sldN	**2541RDMP**[1]
40A	4P +sldN	**4041RDMP**[1]
63A	4P +sldN	**6341RDMP**[1]
20A	6P +sldN	**2061RDMP**[1]
25A	6P +sldN	**2561RDMP**[1]
40A	6P +sldN	**4061RDMP**[1]
63A	6P +sldN	**6361RDMP**[1]
25A	8P	**258RDMP**
63A	8P	**638RDMP**

[1]Includes early break auxiliary contact.
2P+sldN = 2 pole and solid neutral

PC28G403

Local disconnectors standard duty, type PC2, 20 – 63A IP54

Nominal unit rating Ie	Poles	Eaton list number
20A	2P	**PC28G202**
25A	2P	**PC28G252**
40A	2P	**PC28G402**
63A	2P	**PC28G632**
20A	3P	**PC28G203**
25A	3P	**PC28G253**
40A	3P	**PC28G403**
63A	3P	**PC28G633**
20A	4P	**PC28G204**
25A	4P	**PC28G254**
40A	4P	**PC28G404**
63A	4P	**PC28G634**
20A	6P	**PC28G206**
25A	6P	**PC28G256**
40A	6P	**PC28G406**
63A	6P	**PC28G636**

Autoline heating and lighting contactors

This chapter covers the range of Autoline heating and lighting contactors, in 1 pole, 2 pole and 4 pole configuration, with ratings at AC1 and AC5a. Metalclad enclosures have an IP55 rating.

- IEC / EN60947
- IEC408
- CE marked

See page 29 for technical details.

248ALCFP

Heating and lighting contactors

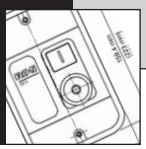
Description	Cable capacity mm²	Coil voltage 50 Hz	Heating and general mixed loads, slightly inductive, amps per pole AC1	Lighting load, amps per pole AC5a	Eaton list number
4P enclosed without rectifier	4	220–240	25	12	**228ALCFP**
4P enclosed without rectifier	4	380–415	25	12	**248ALCFP**
4P enclosed without rectifier	10	220–240	40	32	**428ALCFP**
4P enclosed without rectifier	10	380–415	40	32	**448ALCFP**
4P enclosed with rectifier	4	220–240	25	12	**228ALCFPR**
4P enclosed with rectifier	10	220–240	40	32	**428ALCFPR**
2P enclosed without rectifier	16	220–240	40	25	**228ALCDP**
2P enclosed without rectifier	25	220–240	64	40	**428ALCDP**
2P enclosed with rectifier	16	220–240	40	25	**228ALCDPR**
2P enclosed with rectifier	25	220–240	64	40	**428ALCDPR**
1P enclosed without rectifier	50	220–240	70	50	**228ALCSPN**
1P enclosed without rectifier	50	220–240	112	50	**428ALCSPN**
1P enclosed with rectifier	50	220–240	70	50	**228ALCSPNR**
1P enclosed with rectifier	50	220–240	112	50	**428ALCSPNR**

2812004VCOA

Replacement contactors – Autoline

- Open contactor, 4 pole
- Contactor technical details, see p17

Maximum Current rating (AC1) (A)	Control coil voltage 50Hz Vac	Poles	Eaton list number
25	220-240	4P	**2812004VCOA**
25	380-415	4P	**4812004VCOA**
40	220-240	4P	**2825004VCOA**
40	380-415	4P	**4825004VCOA**
40	220-240	2P	**2812004VCOA**
40	380-415	2P	**4812004VCOA**
64	220-240	2P	**2825004VCOA**
64	380-415	2P	**4825004VCOA**
70	220-240	1P	**2812004VCOA**
70	380-415	1P	**4812004VCOA**
112	220-240	1P	**2825004VCOA**
112	380-415	1P	**4825004VCOA**



Technical details

Non-reversing and reversing Contactor and Starter technical details

AC motors, 3 phase full load current table, 1450rpm approx.

Provided as a guide to the selection of suitable Eaton control gear

The tables are based on motors of approx, 1450 rpm of average efficiency and power factor. Motors of higher speed than 1450 rpm usually take a lower current than that shown in the table; while motors of lower speed usually take higher current. Wide variations from these figures can arise, especially on single phase motors and engineers should, whenever possible, determine the actual full load current (F.L.C.) from the motor rating plate in each case

Motor rating kW	Approx F.L.C. at line voltage 220V	240V	380V	400–415V	550V
0.07	–	–	–	–	–
0.1	0.7	0.6	0.4	0.4	0.3
0.12	1	0.9	0.5	0.5	0.3
0.18	1.3	1.2	0.8	0.7	0.4
0.25	1.6	1.5	0.9	0.9	0.6
0.37	2.5	2.3	1.4	1.3	0.8
0.56	3.1	2.8	1.8	1.6	1.1
0.75	3.5	3.2	2	1.8	1.4
1.1	5	4.5	2.8	2.6	1.9
1.5	6.4	5.8	3.7	3.4	2.6
2.2	9.5	8.7	5.5	5	3.5
3	12	11	7	6.5	4.7
3.7	15	13	8	8	6
4	16	14	9	8	6
5.5	20	19	12	11	8
7.5	27	25	16	15	11
9.3	34	32	20	18	14
10	37	34	22	20	15
11	41	37	23	22	16
15	64	50	31	28	21
18.5	67	62	39	36	26
22	74	70	43	39	30
30	99	91	57	52	41

AC motors, 1 phase full load current table, 1450rpm approx.

Motor rating (kW)	Approx F.L.C. at line voltage 110V	220V	230–240V
0.07	2.4	1.2	1.1
0.1	3.3	1.6	1.5
0.12	3.8	1.9	1.7
0.18	4.5	2.3	2.1
0.25	5.8	2.9	2.6
0.37	7.9	3.9	3.6
0.56	11	5.5	5
0.75	15	7.3	6.7
1.1	21	10	9
1.5	26	13	12
2.2	37	19	17
3	49	24	22
3.7	54	27	25
4	60	30	27
5.5	85	41	38
7.5	110	55	50

ADS8 Contactors, technical characteristics overview: Voltage & Maximum rated current for motor control

- Maximum rated operational voltage is 690v in all units.

Contactor Reference		Voltage	Maximum rated current for motor control
2812VCO	DOL and Main[1]	220 - 240v Coil	12A
2818VCO	DOL and Main[1]	220 - 240v Coil	18A
2825VCO	DOL and Main[1]	220 - 240v Coil	25A
2832VCO	DOL and Main[1]	220 - 240v Coil	32A
2850VCO	DOL and Main[1]	220 - 240v Coil	50A
4812VCO	DOL and Main[1]	380 - 415v Coil	12A
4818VCO	DOL and Main[1]	380 - 415v Coil	18A
4825VCO	DOL and Main[1]	380 - 415v Coil	25A
4832VCO	DOL and Main[1]	380 - 415v Coil	32A
4850VCO	DOL and Main[1]	380 - 415v Coil	50A
2812VCOSD	Star and Delta[1]	220 - 240v Coil	12A
2818VCOSD	Star and Delta[1]	220 - 240v Coil	18A
2825VCOSD	Star and Delta[1]	220 - 240v Coil	25A
2832VCOSD	Star and Delta[1]	220 - 240v Coil	32A
2850VCOSD	Star and Delta[1]	220 - 240v Coil	50A
4812VCOSD	Star and Delta[1]	380 - 415v Coil	12A
4818VCOSD	Star and Delta[1]	380 - 415v Coil	18A
4825VCOSD	Star and Delta[1]	380 - 415v Coil	25A
4832VCOSD	Star and Delta[1]	380 - 415v Coil	32A
4850VCOSD	Star and Delta[1]	380 - 415v Coil	50A
2812004VCOA	Autoline 4 pole[2]	220 - 240v Coil	25A
2825004VCOA	Autoline 4 pole[2]	220 - 240v Coil	40A
4812004VCOA	Autoline 4 pole[2]	380 - 415v Coil	25A
4825004VCOA	Autoline 4 pole[2]	380 - 415v Coil	40A

1 DOL and Star Delta (3 phase 440v, 50-60hz, for AC3 Duty)

2 Autoline 4 pole (3 phase 440v, 50-60hz, for AC1 Duty)

ADS8 Contactors, technical characteristics overview: Maximum standard power rating

Contactor Reference	Maximum standard power rating (for motor control for AC3 Duty; temperature less than or equal to 55°C)					
	415v	220 - 230v	380 - 400v	440v	500v	660 - 690v
2812VCO	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
2818VCO	9kW / 12.5hp	4kW	7.5kW	9kW	10kW	10kW
2825VCO	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW
2832VCO	15kW / 20hp	7.5kW	15kW	15kW	18.5kW	18.5kW
2850VCO	25kW / 35hp	15kW	22kW	30kW	30kW	33kW
4812VCO	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
4818VCO	9kW / 12.5hp	4kW	7.5kW	9kW	10kW	10kW
4825VCO	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW
4832VCO	15kW / 20hp	7.5kW	15kW	15kW	18.5kW	18.5kW
4850VCO	25kW / 35hp	15kW	22kW	30kW	30kW	33kW
2812VCOSD	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
2818VCOSD	9kW / 12.5hp	4kW	7.5kW	9kW	10kW	10kW
2825VCOSD	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW
2832VCOSD	15kW / 20hp	7.5kW	15kW	15kW	18.5kW	18.5kW
2850VCOSD	25kW / 35hp	15kW	22kW	30kW	30kW	33kW
4812VCOSD	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
4818VCOSD	9kW / 12.5hp	4kW	7.5kW	9kW	10kW	10kW
4825VCOSD	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW
4832VCOSD	15kW / 20hp	7.5kW	15kW	15kW	18.5kW	18.5kW
4850VCOSD	25kW / 35hp	15kW	22kW	30kW	30kW	33kW
2812004VCOA	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
2825004VCOA	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW
4812004VCOA	5.5kW / 7.5hp	3kW	5.5kW	5.5kW	7.5kW	7.5kW
4825004VCOA	11kW / 15hp	5.5kW	11kW	11kW	15kW	15kW

ADS8 Contactors, technical characteristics overview: 3 phase AC3

Contactor Reference	3 phase AC3 (UL and CSA) 230v	460 / 480v	575 / 600v
2812VCO	3	7.5	10
2818VCO	5	10	15
2825VCO	7.5	15	20
2832VCO	10	20	25
2850VCO	15	40	40
4812VCO	3	7.5	10
4818VCO	5	10	15
4825VCO	7.5	15	20
4832VCO	10	20	25
4850VCO	15	40	40
2812VCOSD	3	7.5	10
2818VCOSD	5	10	15
2825VCOSD	7.5	15	20
2832VCOSD	10	20	25
2850VCOSD	15	40	40
4812VCOSD	3	7.5	10
4818VCOSD	5	10	15
4825VCOSD	7.5	15	20
4832VCOSD	10	20	25
4850VCOSD	15	40	40
2812004VCOA	3	7.5	10
2825004VCOA	7.5	15	20
4812004VCOA	3	7.5	10
4825004VCOA	7.5	15	20

ADS8 Contactors, technical characteristics: Maximum thermal current, Average coil consumtion & Heat dissipation

- Maximum operating rate with both AC and DC is 3600 operations per hour in all units.

Contactor reference	Maximum thermal current Ith (temp less than or equal to 40 oc)	Average coil consumtion (inrush / sealed) 50Hz	60Hz	50/60HZ	DC	Heat dissipation at 50 & 60 Hz	DC
2812VCO	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
2818VCO	32A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
2825VCO	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
2832VCO	50A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
2850VCO	80A	200/ 20VA	200 / 22VA	245 / 26VA	22 / 22W	6 to 10W	22W
4812VCO	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
4818VCO	32A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
4825VCO	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
4832VCO	50A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
4850VCO	80A	200/ 20VA	200 / 22VA	245 / 26VA	22 / 22W	6 to 10W	22W
2812VCOSD	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
2818VCOSD	32A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
2825VCOSD	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
2832VCOSD	50A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
2850VCOSD	80A	200/ 20VA	200 / 22VA	245 / 26VA	22 / 22W	6 to 10W	22W
4812VCOSD	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
4818VCOSD	32A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
4825VCOSD	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
4832VCOSD	50A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
4850VCOSD	80A	200/ 20VA	200 / 22VA	245 / 26VA	22 / 22W	6 to 10W	22W
2812004VCOA	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
2825004VCOA	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W
4812004VCOA	25A	60 / 7VA	60 / 7.5VA	70 / 8VA	9 / 9W	2 to 3W	9W
4825004VCOA	40A	90 / 7.5VA	90 / 8.5VA	100 / 8.5VA	11 / 11W	2.5 to 3.5W	11W

ADS8 Contactors, technical characteristics overview: Mechanical life & Power contact terminal capacity

Contactor reference	Mechanical life (millions of operations)		Power contact terminal capacity
	50 or 60 Hz	50 / 60Hz	mm2
2812VCO	20	15	4
2818VCO	20	15	6
2825VCO	16	12	10
2832VCO	16	12	10
2850VCO	16	6	25
4812VCO	20	15	4
4818VCO	20	15	6
4825VCO	16	12	10
4832VCO	16	12	10
4850VCO	16	6	25
2812VCOSD	20	15	4
2818VCOSD	20	15	6
2825VCOSD	16	12	10
2832VCOSD	16	12	10
2850VCOSD	16	6	25
4812VCOSD	20	15	4
4818VCOSD	20	15	6
4825VCOSD	16	12	10
4832VCOSD	16	12	10
4850VCOSD	16	6	25
2812004VCOA	20	15	4
2825004VCOA	16	12	10
4812004VCOA	20	15	4
4825004VCOA	16	12	10

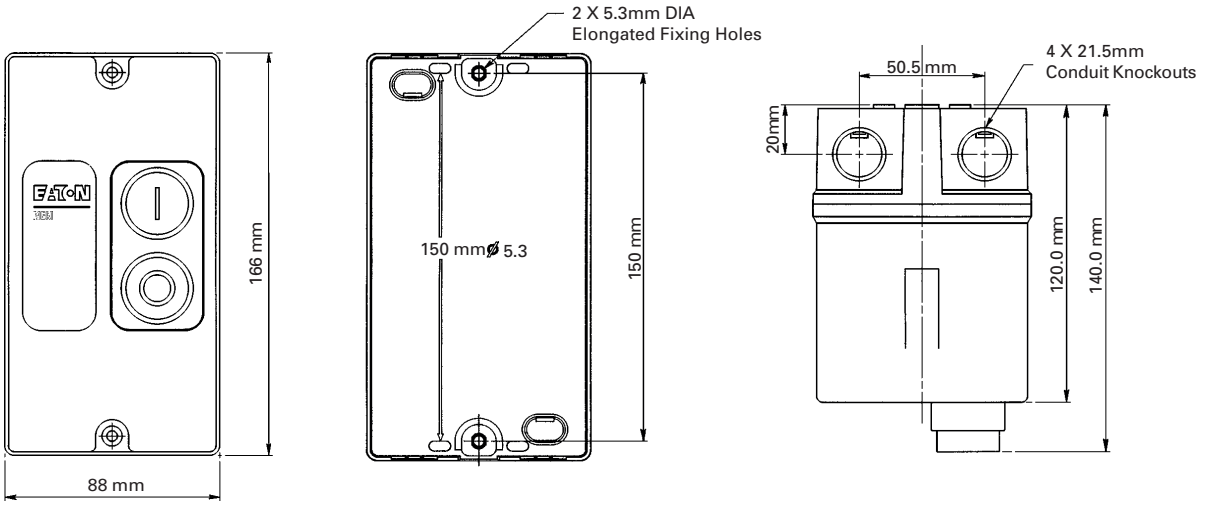
ADS8 Contactors, technical characteristics overview: Overall dimensions, Weight & Mounting hole centres

- Mounting position (wrt normal vertical mounting plane) +/- 30° in all units.
- Ambient temperature compensation and operating limits -30°C to +60°C in all units.
- Ambient temperature storage limits -60°C to +70°C in all units.
- Auxilliary contacts

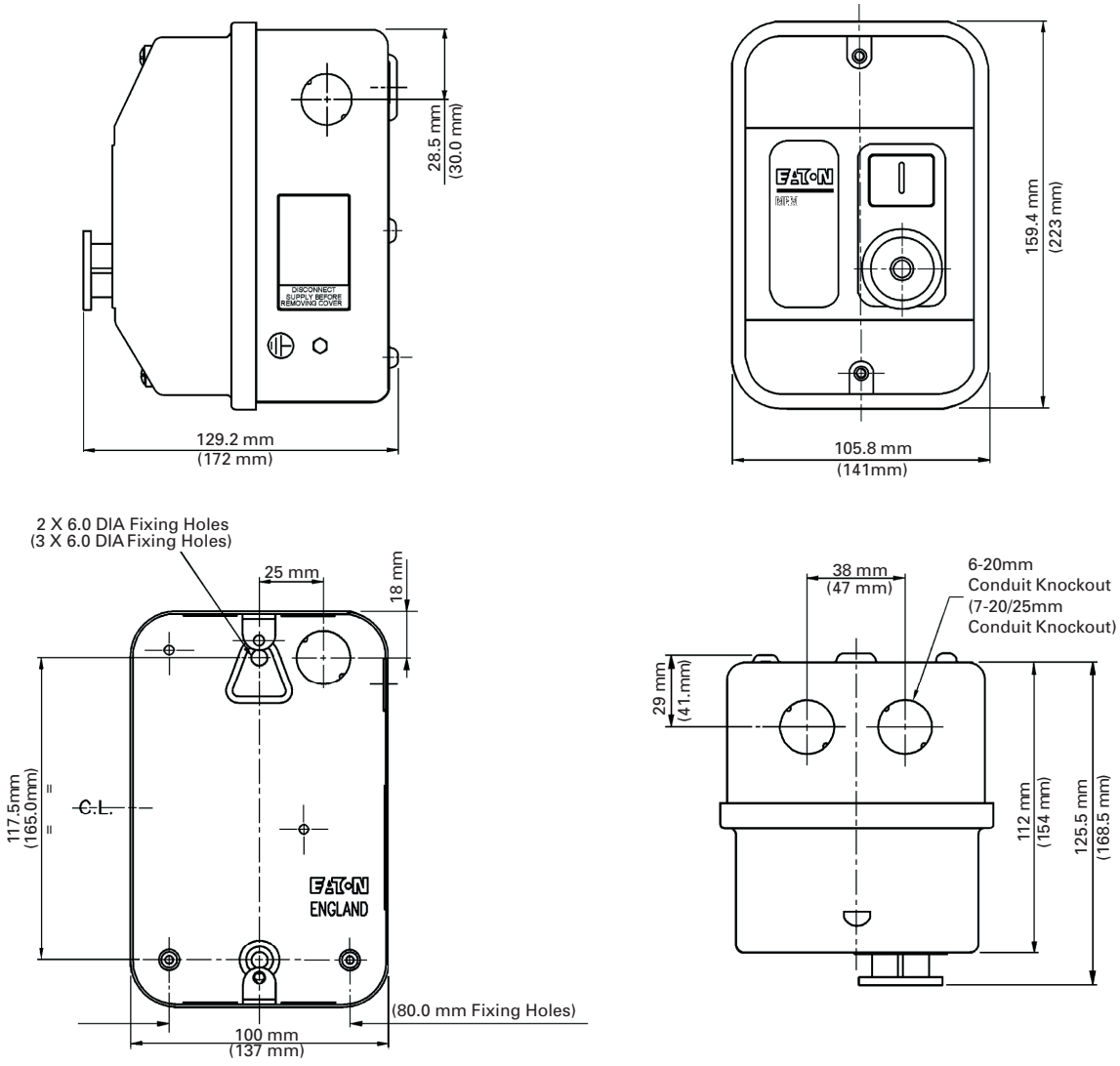
  Type VCO (main & DOL) 1N/O in all units.
  Type VCOSD (Star Delta) 1N/C in all units.
  Rated thermal current (A) is 10 in all units.

Contactor reference	Overall dimensions (mm)			Weight	Mounting hole centres (mm)	
	Width	Depth	Projection	Kg	Width	Depth
2812VCO	45	74	80	0.32	35	50 / 60
2818VCO	45	74	85	0.35	35	50 / 60
2825VCO	56	84	93	0.505	40	50 / 60
2832VCO	56	84	98	0.525	40	50 / 60
2850VCO	75	127	114	1.15	40	100 / 110
4812VCO	45	74	80	0.32	35	50 / 60
4818VCO	45	74	85	0.35	35	50 / 60
4825VCO	56	84	93	0.505	40	50 / 60
4832VCO	56	84	98	0.525	40	50 / 60
4850VCO	75	127	114	1.15	40	100 / 110
2812VCOSD	45	74	80	0.32	35	50 / 60
2818VCOSD	45	74	85	0.35	35	50 / 60
2825VCOSD	56	84	93	0.505	40	50 / 60
2832VCOSD	56	84	98	0.525	40	50 / 60
2850VCOSD	75	127	114	1.15	40	100 / 110
4812VCOSD	45	74	80	0.32	35	50 / 60
4818VCOSD	45	74	85	0.35	35	50 / 60
4825VCOSD	56	84	93	0.505	40	50 / 60
4832VCOSD	56	84	98	0.525	40	50 / 60
4850VCOSD	75	127	114	1.15	40	100 / 110
2812004VCOA	45	74	80	0.32	35	50 / 60
2825004VCOA	56	84	93	0.505	40	50 / 60
4812004VCOA	45	74	80	0.32	35	50 / 60
4825004VCOA	56	84	93	0.505	40	50 / 60

9kW DOL starter without switch disconnect, IP 65 moulded surface mounting enclosure, dimensional drawings



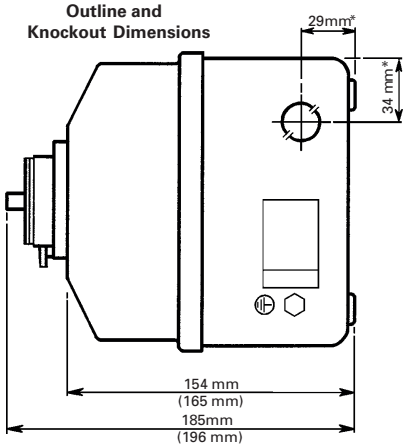
15kW DOL starter without switch disconnect, IP 54 metalclad surface mounting enclosure,dimensional drawings

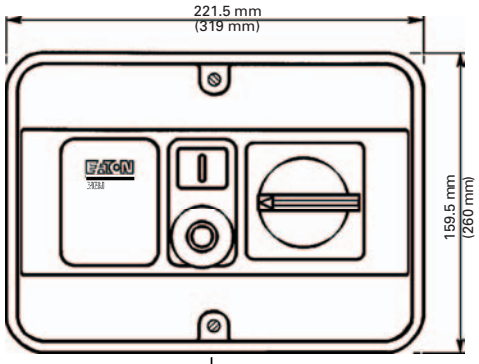


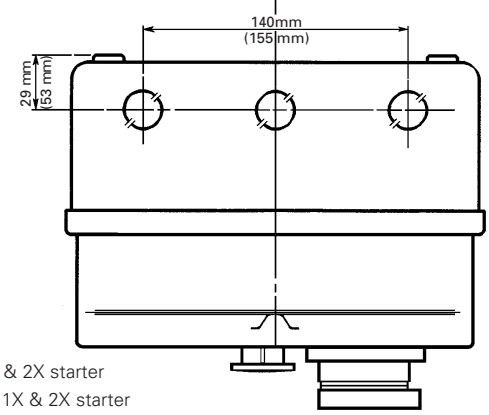
Dimensions in brackets refer to types **2528ADS(2X)** & **3228ADS(3X)** sized enclosures

15kW DOL starter with switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

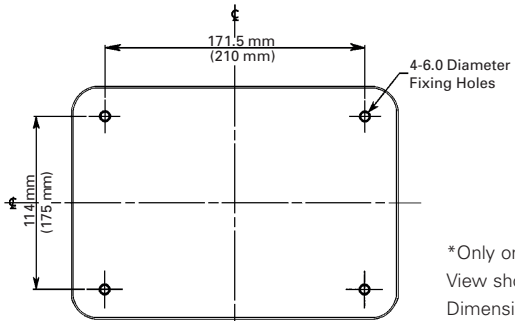
Outline and Knockout Dimensions







Box Fixing Dimensions

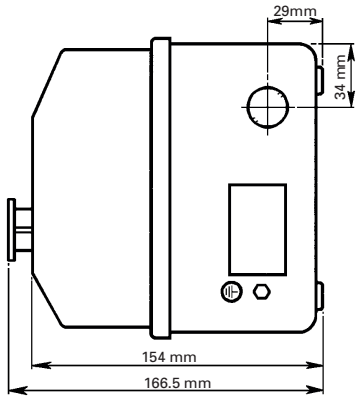


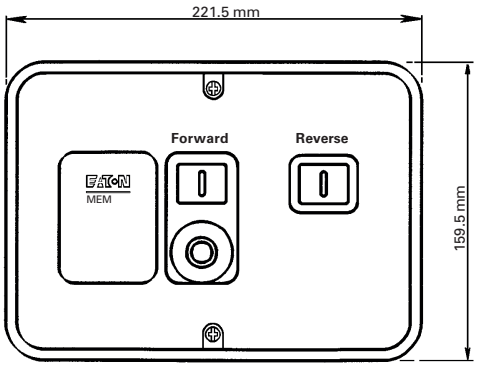
*Only on size 1X & 2X starter
View shows size 1X & 2X starter
Dimensions in brackets refer to size 3X starter

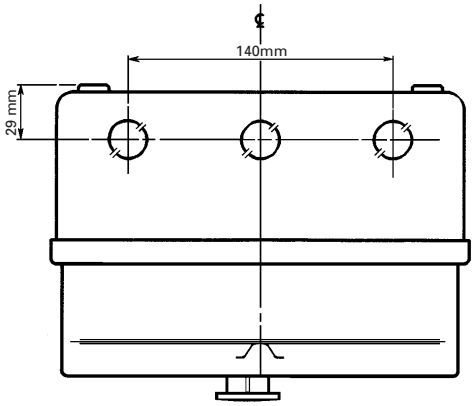
11kW DOL reversing starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

8 X 20.9mm (3/4") conduit knockouts are provided for cable entry at top,bottom and side of the enclosure and The earth terminal may be reversed for external connection but the components must be assembled in the same order as supplied.

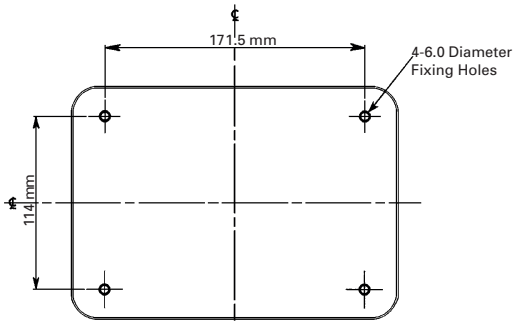
Outline and Knockout Dimensions



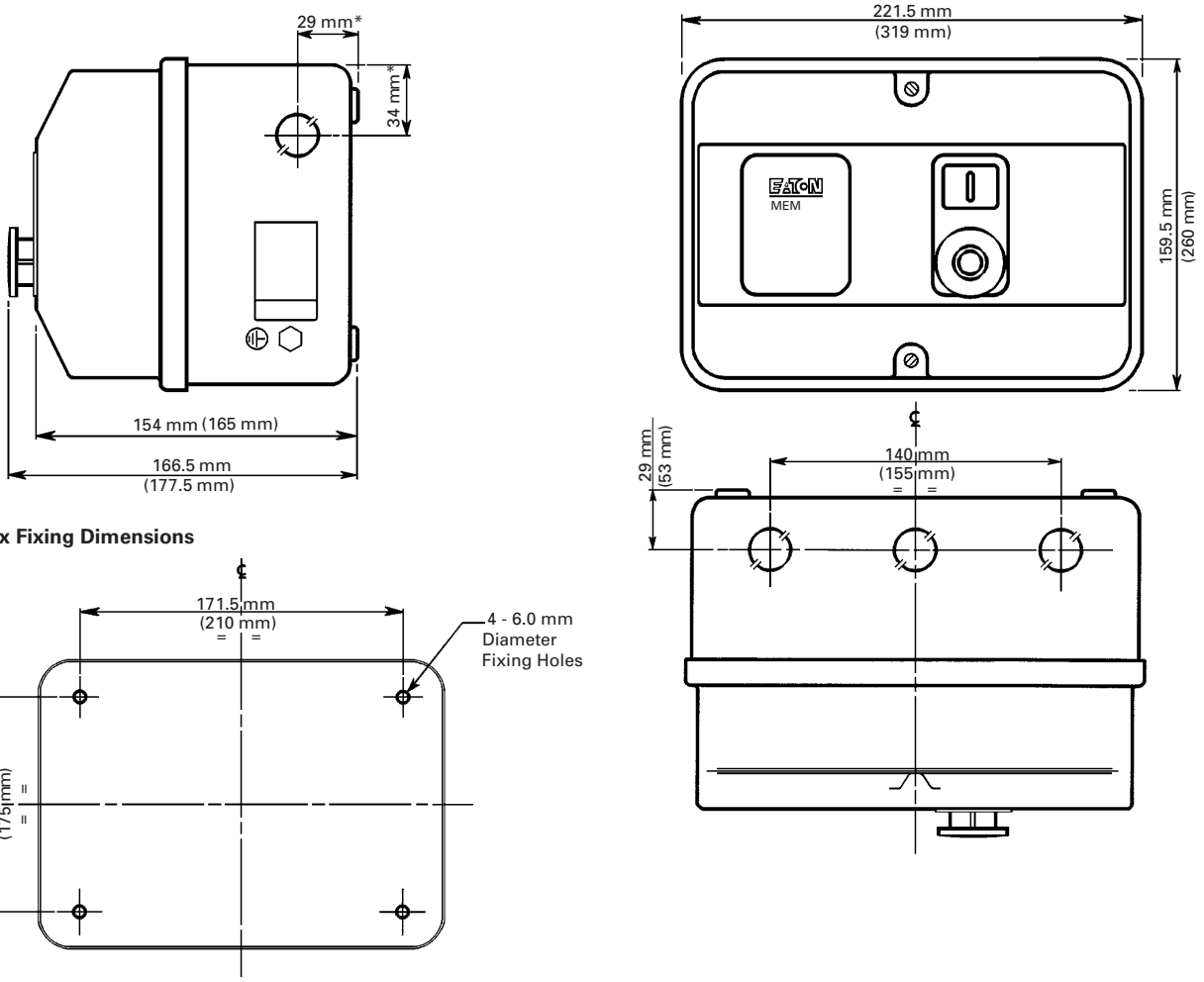




Box Fixing Dimensions



25kW Star Delta starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings



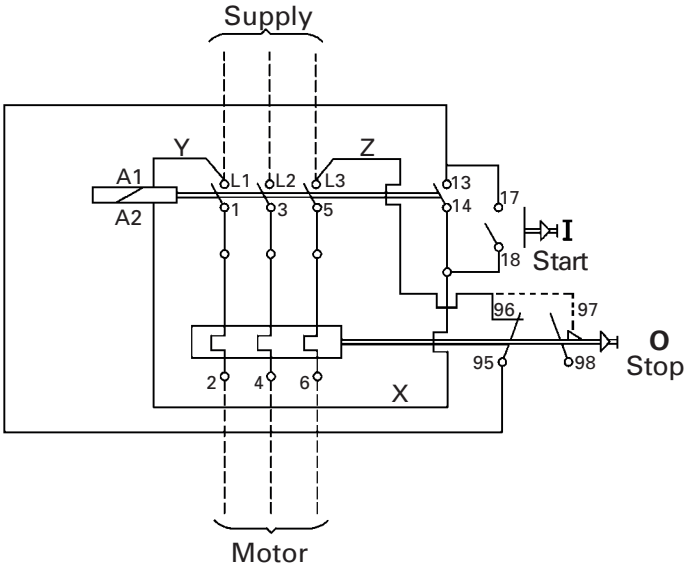
Star Delta starter enclosure (IP54 to BSEN60529:1992) 20.9mm (3/4") conduit knockouts are provided for cable entry at top, bottom and side of the enclosure and the earth terminal may be reversed for external connection, but the components must be assembled in the same order as supplied.

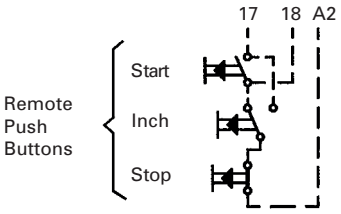
*These 20.9mm conduit knockouts (not available on **28/48SDA3X25** or **28/48SDA3X32**.

Outline and knockout dimensions
View shows type **28/48SDA2X18** dimensions in brackets ( ) are for types **28/48SDA3X25** and **28/48SDA3X32**.

Circuit Diagrams

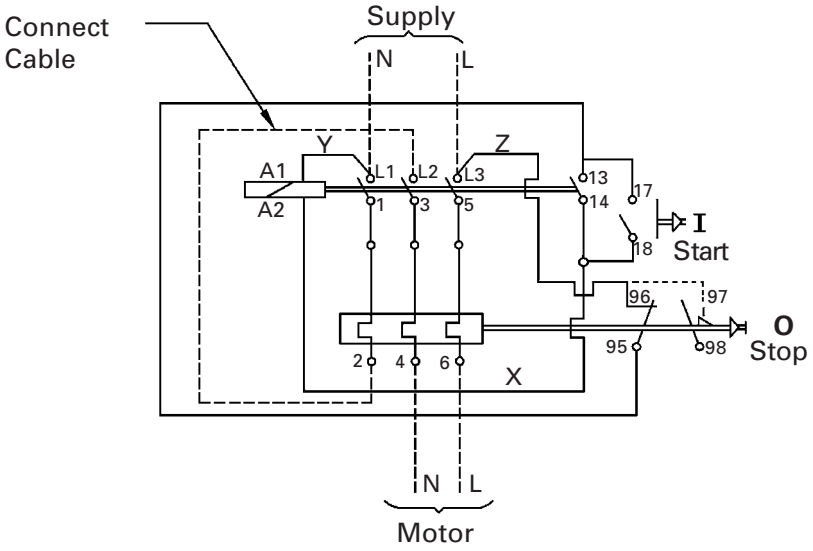
A. Three Phase Motors-D.O.L. Starter.
Local 3-Wire (Push Button) Control.

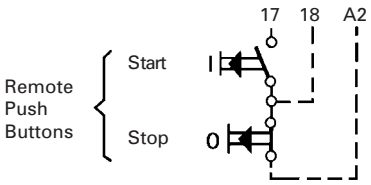




Remote Start/Inch/Stop Control
Connect as above except remove lead X and add connections shown.

B. Single Phase Motors-D.O.L. Starter
Local 3-Wire (Push Button) Control.



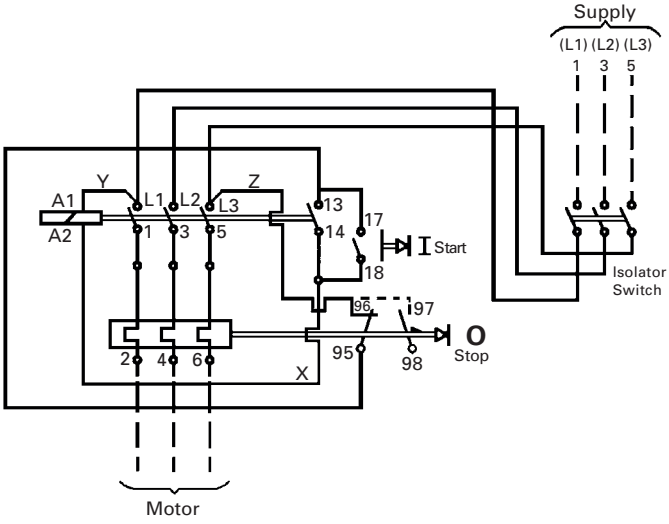


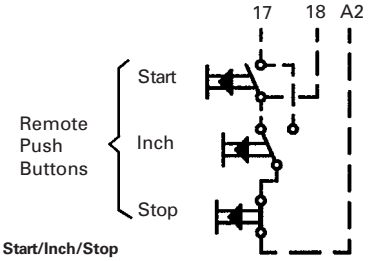
Local & Remote 3-Wire (Push Button) Control
Connect as above except remove lead X and add connections shown.

Connect supply to 1 and 5. Connect Motor to 4 and 6 and insert a cable of cross-sectional area equal to the supply cables between 3 and 2 as shown.

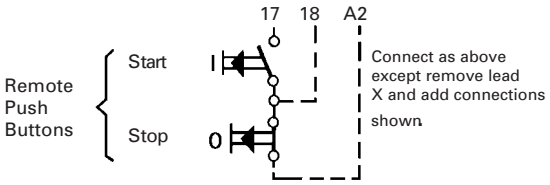
Coil phase to neutral: remove connector Y, connect Neutral to A1
Separate coil supply: remove connectors Y and Z, connect coil supply to A1 and 96.
Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase toneutral applications.
External interlock: Remove connection Z and insert interlock between 5 and 96.
Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 & 97. The switch is rated at 440VA, 500V maximum.
Control circuit fuses (10A MAX).
Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.
Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1.
Note: the voltage rating of the fuse(s) must be suitable for the control circuit voltage.
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 26.
To reverse direction of rotation (3-Phase Motors): Interchange any two supply lines 1, 3 or 5.

Three Phase Motors-D.O.L. Starter Isolator Local 3-Wire (Push Button) Control





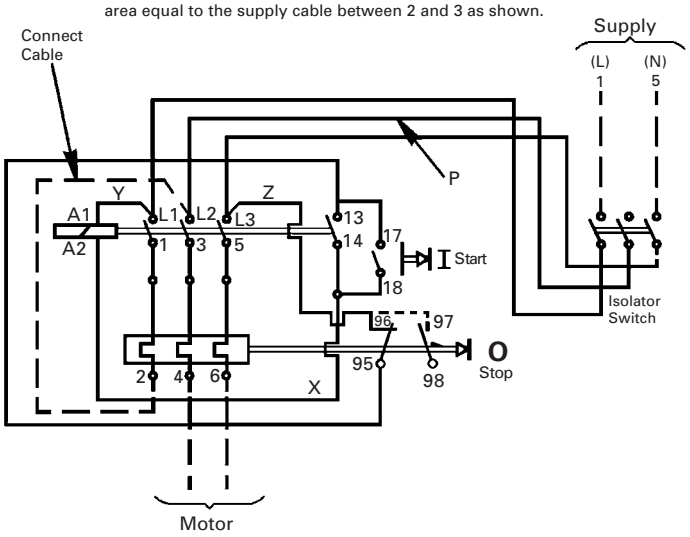
Remote Start/Inch/Stop Control
Connect as above except remove lead X and add connections shown



Local & Remote 3-Wire (Push Button) Control

Single Phase Motors-D.O.L. Starter Isolator Local 3-Wire (Push Button) Control

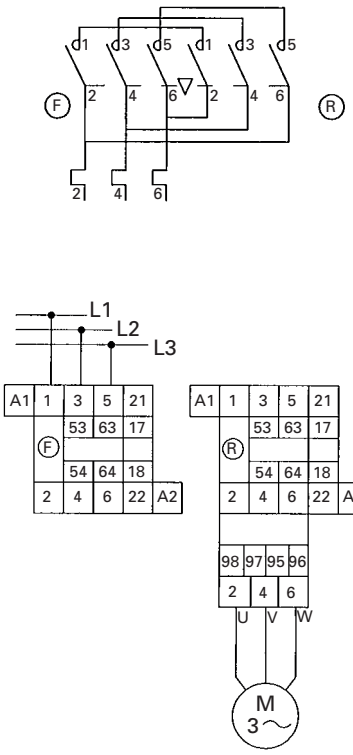
Connect supply to 1 and 5 at the Isolator.
Connect Motor to 4 and 6 at the overload relay
Remove existing cable P and connect a cable of cross sectional area equal to the supply cable between 2 and 3 as shown.



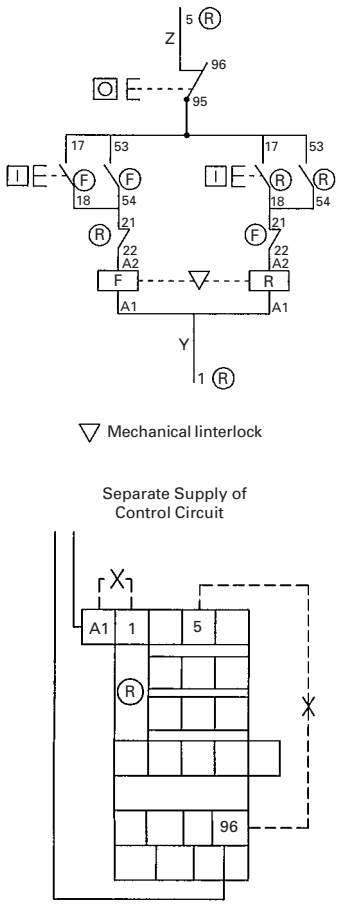
Coil phase to neutral: Remove connector Y, connect Neutral to A1
Separate coil supply: Remove connectors Y and Z, connect coil supply to A1 and 96.
Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase to neutral applications.
Control circuit fuses (10A MAX).
Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.
Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1.
Note: The voltage rating of the fuses must be suitable for the control circuit voltage.
External interlock: Remove connection Z and insert interlock between 5 and 96
Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 & 97. The switch is rated at 440VA, 500V maximum.
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 26.

11kW DOL reversing starter without switch disconnect, IP 54 metalclad surface mounting enclosure, wiring diagrams

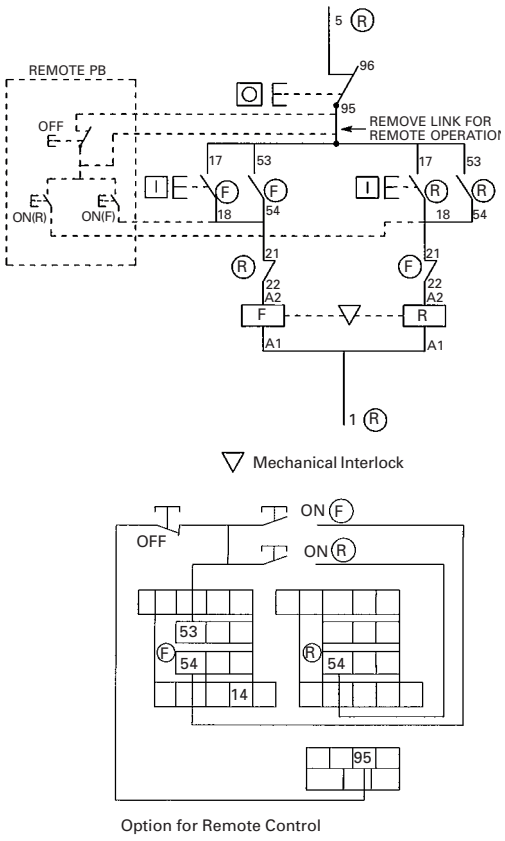
Circuit Diagrams:- Power



Control



Remote Control Option

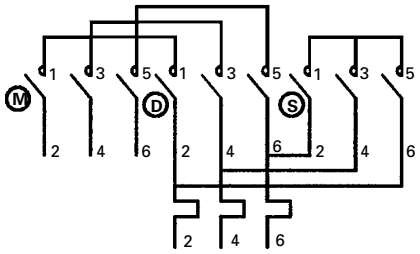


Coil phase to neutral: Remove connector Y, connect Neutral to A1 F
Separate coil supply: Remove connectors Y and Z, connect coil supply to A1 R and 96.
Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase to neutral applications.
Control circuit fuses (10A MAX).
Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.
Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1 R.
Note: The voltage rating of the fuses must be suitable for the control circuit voltage.
External interlock: Remove connector Z and connect interlock between 5 and 96. When using remote control, connect external interlock in series with remote 2 wire (switch control).
To reverse direction of rotation: (3 Phase Motors) interchange any two supply lines 1, 3 or 5.
Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 and 97. The switch is rated at 400VA, 500V maximum.
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 26.

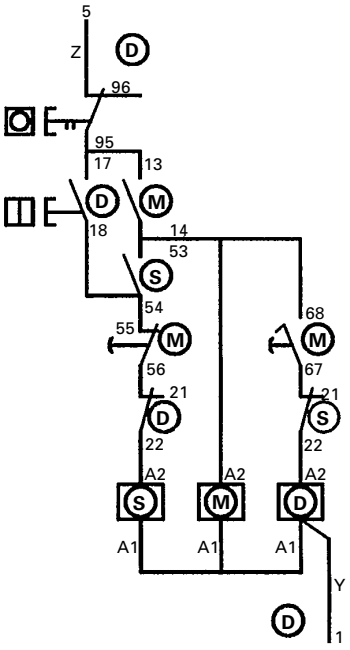
Limit Switch Connections
Forward limit: Remove connection between 54Forward and 21Reverse - connect limit switch between 54F and 21R.
Reverse limit: Remove connection between 54Reverse and 21Forward - connect limit switch between 54R and 21F.

25kW Star Delta starter without switch disconnect, IP 54 metalclad surface mounting enclosure, wiring diagram

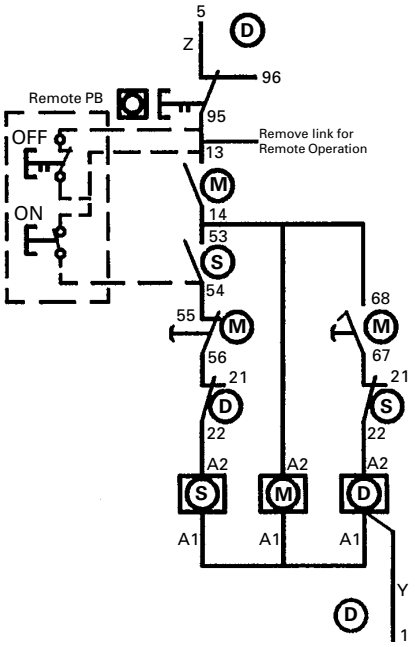
Circuit Diagram; Power



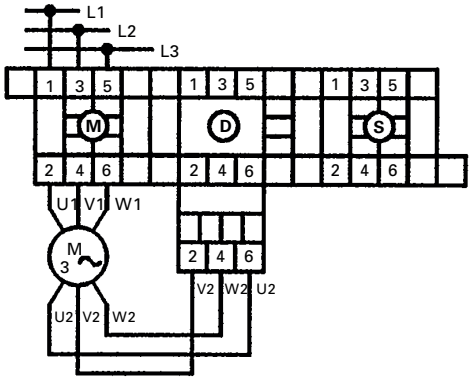
Control



Remote Control Option

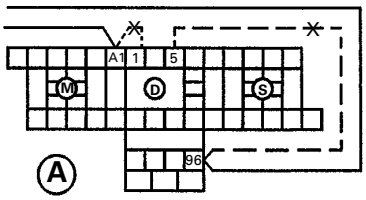


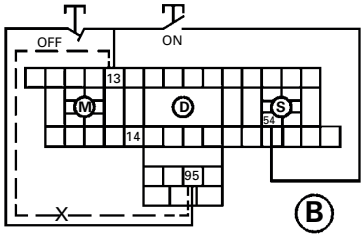
Power Connections to be made



Control Connections to be made

1. Coil Voltage same as Power Voltage → No Change
2. Coil Voltage different to Power Voltage → Scheme (A)
3. Remote Control Option → Scheme (B)





Short circuit protection

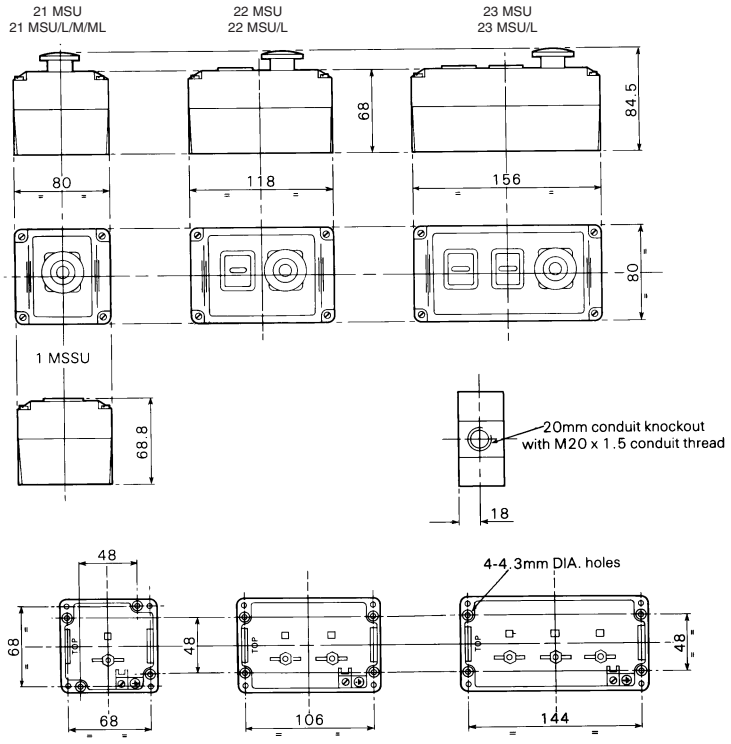
■ *Direct on Line*

Overload Relay list number	Motor FLC Ie (A)	SCPD Back-up protection MAX HRC fuse BS88:1 aM (A)	Back-up protection Max MCB Type C
8TT87	0.63–1	4	**MCH306**
8TT88	1–1.6	6	**MCH306**
8TT89	1.6–2.5	10	**MCH306**
8TT90	2.5–4	16	**MCH310**
8TT91	4–6	16	**MCH310**
8TT98	5.5–8.0	20	**MCH316**
8TT92	7–10	25	**MCH320**
8TT93	10–13	32	**MCH320**
8TT94	13–18	40	**MCH332**
8TT104	18–25	50	**MCH340**
8TT96	23 - 32	63	**MCH363**

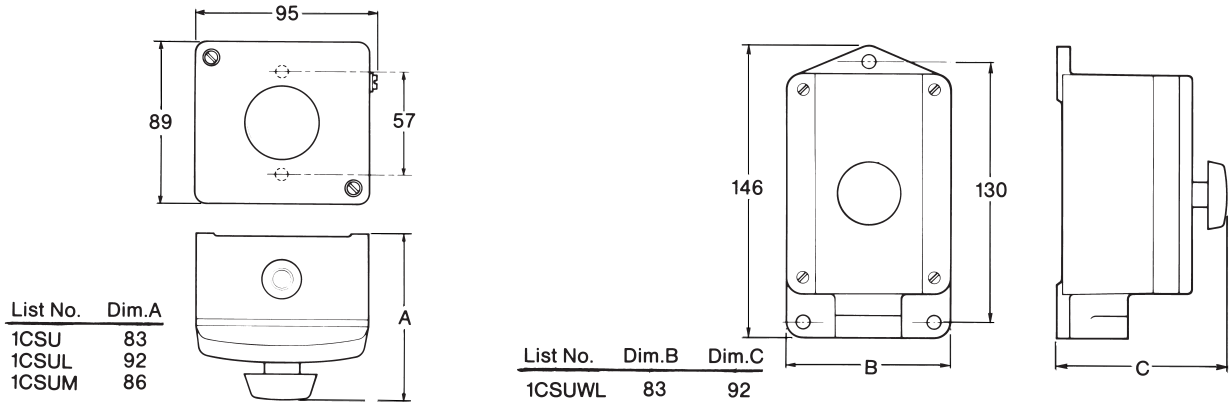
■ *Star Delta*

Overload Relay list number	Motor FLC Ie (A)	SCPD Back-up protection MAX HRC fuse BS88:1 aM (A)	Back-up protection Max MCB Type C
8TT90SD	4.3–6.9	16	**MCH310**
8TT91SD	6.9–10.4	16	**MCH310**
8TT98SD	9.5–13.8	20	**MCH316**
8TT92SD	12.1–17.3	25	**MCH320**
8TT93SD	17.3–22.5	32	**MCH320**
8TT94SD	22.5–31	40	**MCH332**
8TT104SD	31–43	50	**MCH340**
8TT96SD	40–55	63	**MCH363**

MSU pushbutton control units (moulded IP65) dimensions



CSU pushbutton control units dimensions



List No.	Dim.A
1CSU	83
1CSUL	92
1CSUM	86

List No.	Dim.B	Dim.C
1CSUWL	83	92

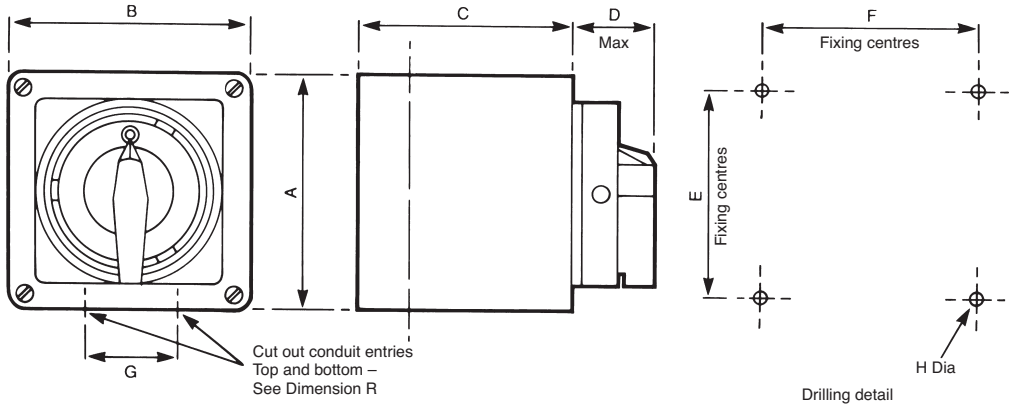
Local disconnectors standard duty, type RDMP, 2-63A, IP65, 2-8pole

Nominal unit rating Ith (A)	AC23A-3ph 415V	AC23-1p motors 240V	Optional current DC21 (resistive loads) (A) 24V	110V	220V	Rated short withstand current RMS for 10sec Icw (A)	Rated conditional short circuit current (prospective RMS amps at 415V AC, fused) kA	Fuse rated BS88 (max) (A)	Max terminal capacty mm^2
20A	7.5kW	2.5kW	20	4	0.6	80	10	20	1x4
							50	16	2x2.5
25A	11.0kW	3.7kW	25	4	0.7	150	10	25	1x6
							50	20	2x4
40A	18.5kW	6.0kW	40	6	0.9	250	10	40	1x10
							50	40	2x6
63A	30kW	7.5kW	63	8	1	400	10	63	1x16
							50	63	2x10

Note: Units supplied with a late make/early break auxiliary are indicated by a figure 1 in the list number e.g. **2041RDMP** Auxilary terminals are marked 1 and 2. Auxilary contact rating as main poles.

Local disconnectors standard duty, type RDMP, 20-63A, IP65, 2–8 poles, dimensions

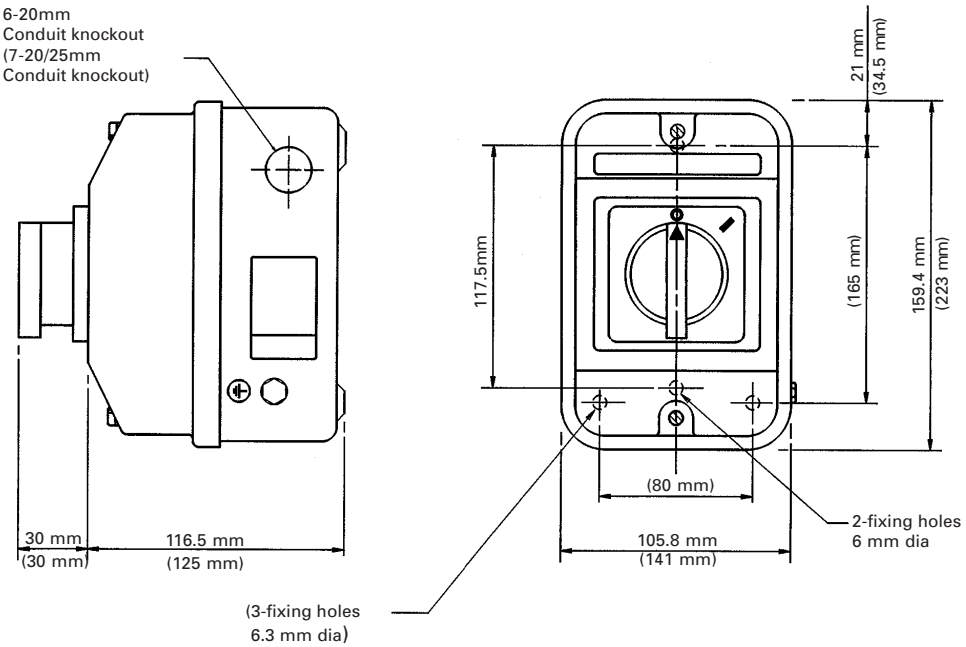
NOMINAL UNIT rating, Ie	A	B	C 2-4 pole 20 & 40A 2-3 pole 25 & 63A	C 6 pole 20 & 40A 4-6 pole 25 & 63A	D	E	F	G	H	R ISO Thread
20 and 25A	90	90	71	98	30	79	63	30	4.5	2 x 20
40 and 63A	176	125	85	119	36	146	112	68	5.5	2 x 25 1 x 16



Local disconnectors standard duty, type PC2, 20–63A, IP55, 2–6 poles

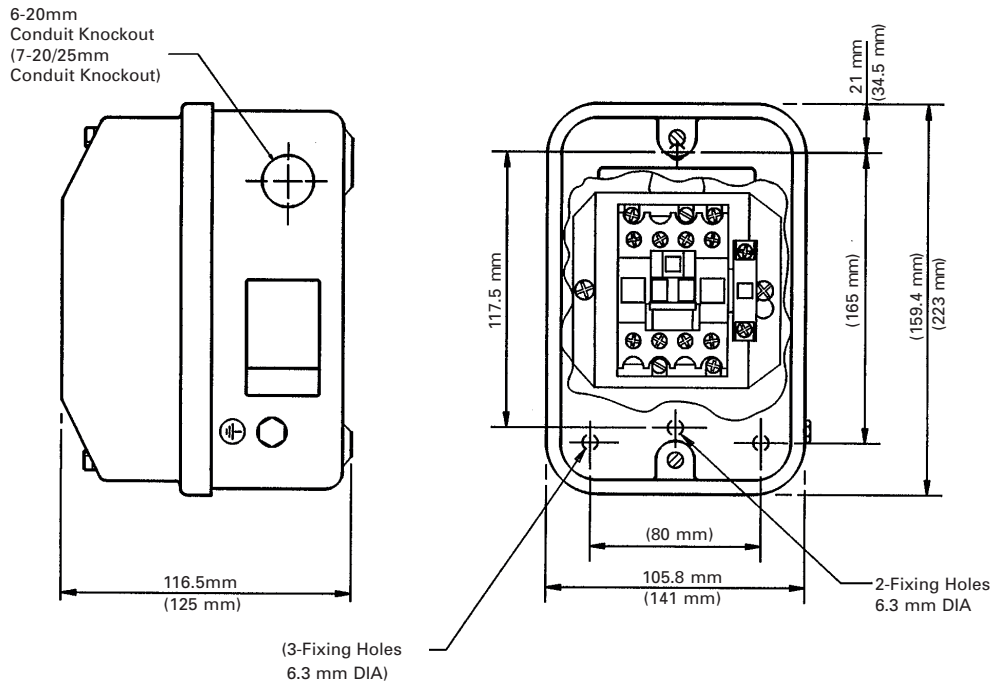
Nominal unit rating Ith	Operational current, Ie and power, 415V 3ph category: AC21	AC23	Operational current, Ie and power, 660V 3ph category: AC21	AC23	Rated short time withstand current RMS for 1 sec	Rated conditional short circuit current (prospective RMS amps at 415V AC, fused) kA	Fuse rating	Max terminal capacity mm²	Degree of protection
20A	20A	5.5kW	20A	5.5kW	0.25kA	25 50	20A 16A	1 x 4 2 x 2.5	IP55
25A	25A	7.5kW	25A	7.5kW	0.40kA	25 50	25A 20A	1 x 6 2 x 4	IP55
40A	40A	15kW	40A	15kW	0.80kA	62	40A	1 x 10 2 x 6	IP55
63A	63A	22kW	63A	18.5kW	1.70kA	50	63A	1 x 16 2 x 10	IP55

Local disconnectors standard duty, type PC2, 20–63A, IP55, 2-6pole dimensions



Dimensions in brackets ( ) refer to **PC28G632**, **PC28G633**, **PC28G634**, **PC28G636**.

Heating and lighting contactors



Dimensions in brackets ( ) refer to **228ALDPR**, **228ALCSPN/R**, **428ALCFP/R**, **448ALCFP**, **428ALCDP/R**, **428ALCSPN/R**. All others refer to list numbers; **228ALCFP/R**, **248ALCFP** and **228ALCDP**.

Additional side mounting auxilary contacts for DOL, DOL reversing, Star Delta starters and Autoline

- 1 NO, 1NC Ith 10A Ui 600v

Description	Current rating (A)	Coil voltage	Starter list number	Maximum side mount auxilaries	Eaton list number
DOL Starter	25	220–240	**28ADS2X**	2	**8TA8DN11**
DOL Starter	25	380–415	**48ADS2X**	2	**8TA8DN11**
DOL Starter	32	220–240	**28ADS3X**	2	**8TA8DN11**
DOL Starter	32	380–415	**48ADS3X**	2	**8TA8DN11**
Starter with disconnector	18	220–240	**28ADSA1X**	2	**8TA8DN11**
Starter with disconnector	18	380–415	**48ADSA1X**	2	**8TA8DN11**
Starter with disconnector	25	220–240	**28ADSA2X**	1	**8TA8DN11**
Starter with disconnector	25	380–415	**48ADSA2X**	1	**8TA8DN11**
Starter with disconnector	32	220–240	**28ADSA3X**	1	**8TA8DN11**
Starter with disconnector	32	380–415	**28ADSA3X**	1	**8TA8DN11**
Reversing starter	18	220–240	**28ARD1X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	18	380–415	**48ARD1X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	25	220–240	**28ARD2X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	25	380–415	**48ARD2X**	1 reverse, 1 forward	**8TA8DN11**
Star Delta starter	18	220–240	**28SDA2X18**	1 main, 1 star	**8TA8DN11**
Star Delta starter	18	380–415	**48SDA2X18**	1 main, 1 star	**8TA8DN11**
Star Delta starter	25	220–240	**28SDA3X25**	1 main, 1 star	**8TA8DN11**
Star Delta starter	25	380–415	**48SDA3X25**	1 main, 1 star	**8TA8DN11**
Star Delta starter	32	220–240	**28SDA3X32**	1 main, 1 star	**8TA8DN11**
Star Delta starter	32	380–415	**48SDA3X32**	1 main, 1 star	**8TA8DN11**
Autoline 4 pole		230–240	**228ALCFP**	2	**8TA8DN11**
Autoline 4 pole with rectifier		230–240	**228ALCFPR**	1	**8TA8DN11**
Autoline 4 pole		400–415	**248ALCFP**	2	**8TA8DN11**
Autoline 2 pole		230–240	**228ALCDP**	2	**8TA8DN11**
Autoline 2 pole with rectifier		230–240	**228ALCDPR**	1	**8TA8DN11**
Autoline 1 pole and neutral		230–240	**228ALCSPN**	1	**8TA8DN11**
Autoline 1 pole and neutral with rectifier		230–240	**228ALCSPNR**	1	**8TA8DN11**
Autoline 4 pole		230–240	**428ALCFP**	2	**8TA8DN11**
Autoline 4 pole with rectifier		230–240	**428ALCFPR**	1	**8TA8DN11**
Autoline 4 pole		400–415	**448ALCFP**	2	**8TA8DN11**
Autoline 2 pole		230–240	**428ALCDP**	2	**8TA8DN11**
Autoline 2 pole with rectifier		230–240	**428ALCDPR**	1	**8TA8DN11**
Autoline 1 pole and neutral		230–240	**428ALCSPN**	1	**8TA8DN11**
Autoline 1 pole and neutral with rectifier		230–240	**428ALCSPNR**	1	**8TA8DN11**

Replacement front mounting auxiliary contacts and pneumatic timer for Star Delta

- 1 NO, 1NC Ith 10A Ui 600v

For Star Delta	Pneumatic timer Eaton list number	Front mounting auxilary Eaton list number
28SDA2X18	**8TA2DS2**	**8TA1DN11**
28SDA2X25	**8TA2DS2**	**8TA1DN11**
28SDA2X32	**8TA2DS2**	**8TA1DN11**
48SDA2X18	**8TA2DS2**	**8TA1DN11**
48SDA2X25	**8TA2DS2**	**8TA1DN11**
48SDA2X32	**8TA2DS2**	**8TA1DN11**

Tightening torques for Star Delta and DOL starters

Starter type	Maximum starter rating (kW)	Relay tightening torque (Nm) Power	Aux	Contactor tightening torque (Nm) Power	Aux
DOL	9	1.85	1.2	1.7	1.2
DOL	11	1.85	1.2	1.85	1.85
DOL	15	2.5	1.2	2.5	1.2
Star delta	15	1.85	1.2	1.7	1.2
Star delta	22	1.85	1.2	1.85	1.85
Star delta	25	2.5	1.2	2.5	1.2

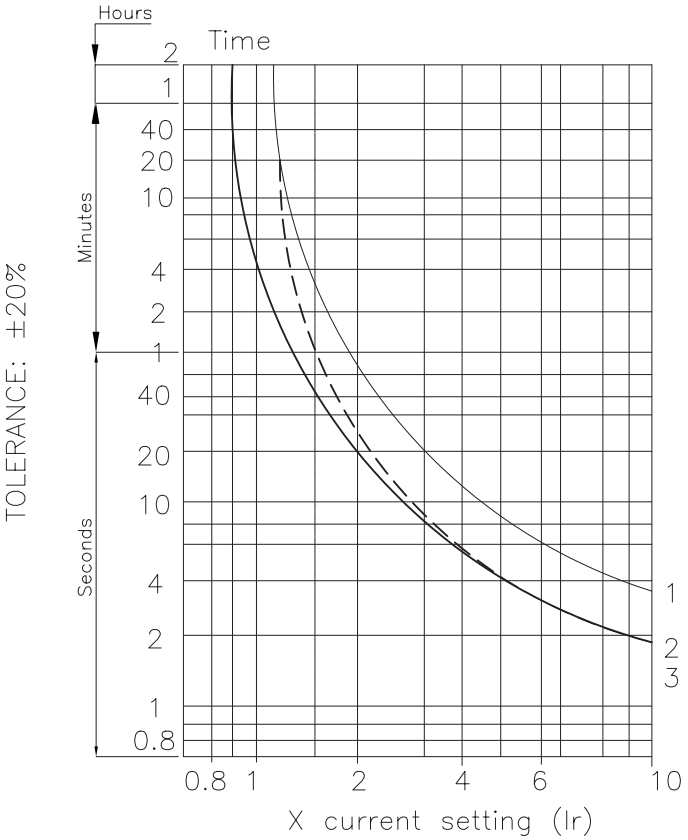
Tightening torques for Autoline contactors

Starter type	Contactor tightening torque (Nm) Power
228ALCFP	1.7
248ALCFP	1.7
428ALCFP	2.5
448ALCFP	2.5
228ALCFPR	1.7
428ALCFPR	2.5
228ALCDP	3.0
428ALCDP	3.5
228ALCDPR	3.0
428ALCDPR	3.0
228ALCSPN	3.5
428ALCSPN	4.0
228ALCSPNR	4.0
428ALCSPNR	4.0

Tightening torques for Spare contactors

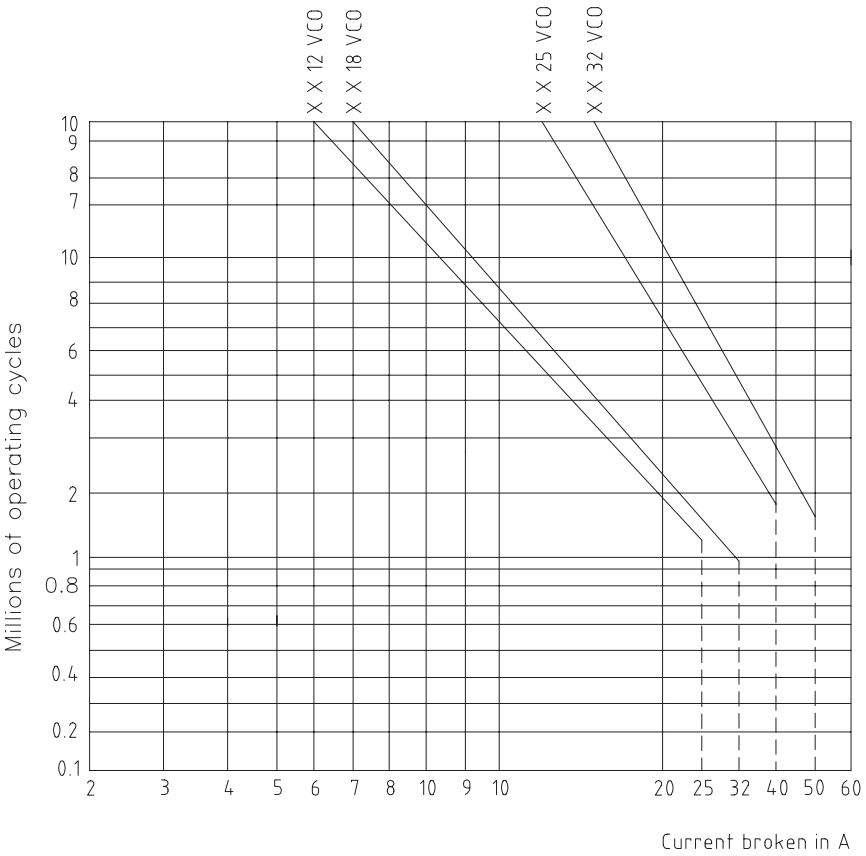
Starter type	Relay tightening torque (Nm) Power	Aux	Contactor tightening torque (Nm) Power	Aux
2818VCO/SD	1.85	1.2	1.7	1.2
4818VCO/SD	1.85	1.2	1.7	1.2
2825VCO/SD	1.85	1.2	1.85	1.85
4825VCO/SD	1.85	1.2	1.85	1.85
2832VCO/SD	2.5	1.2	2.5	1.2
4832VCO/SD	2.5	1.2	2.5	1.2
2812004VCOA	–	–	1.7	–
4812004VCOA	–	–	1.7	–
2825004VCOA	–	–	1.85	–
4825004VCOA	–	–	1.85	–

8TT series, overload relay tripping characteristics

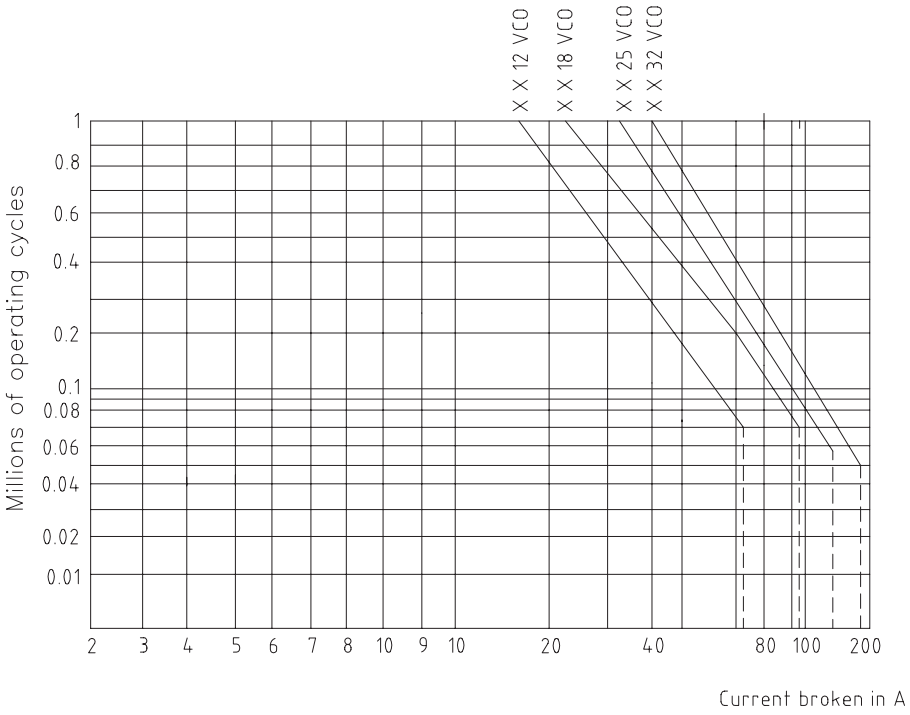


1. ——— Balanced operation, 3–phase, from cold state
2. – – – – – Balanced operation, 3–phase, after a long period at the set current (hot state)
3. ——— Operation following the loss of one phase (single phase tripping) from cold state

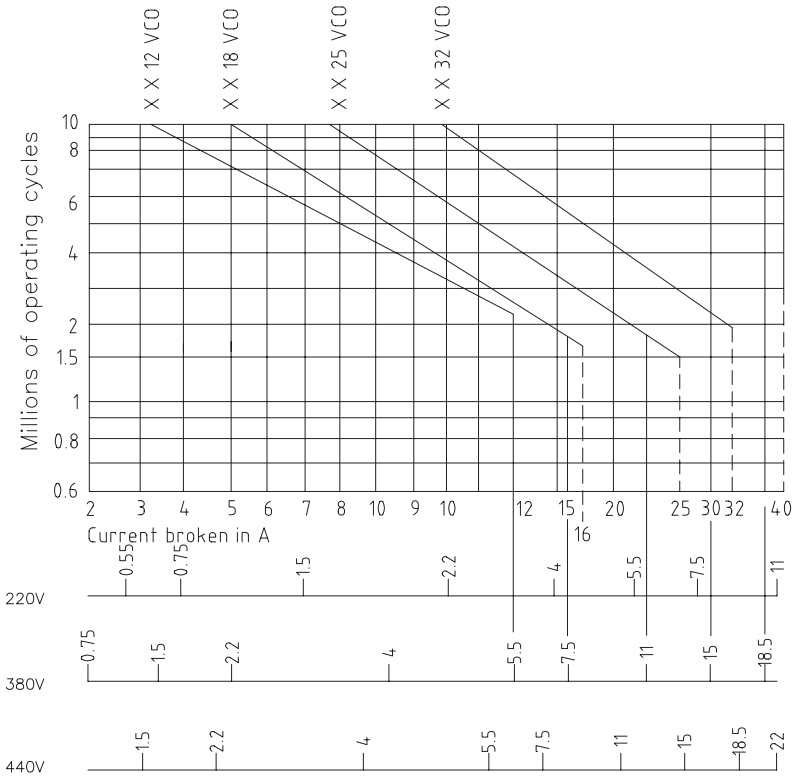
Contactor utilisation category, AC1 (Ue_<440v) Electrical life curve



Contactor utilisation category, AC2 (Ue_<440v) Electrical life curve



Contactor utilisation category, AC3 (Ue_<440v) Electrical life curve



Rated operating power in KW–50Hz

Product type index

Eaton list number index

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November 2006

MPS - MAKING PAN
TYPICAL APPLICATIONS

The Memshield 2 Modular Panelboard System complements our successful Memshield 2 - 125 and 200 MCCB Panelboard ranges and fulfils the requirement for higher rated more intricate systems.

Memshield 2 MPS provides the choice of creating a simple panelboard consisting only of an incoming module and outgoing module or a comprehensive panelboard system. This could incorporate horizontal busbar modules that allow you to extend the system with a wide variety of outgoing modules, ancillary devices, accessories and even enables you to extend the system further in the future.

Memshield 2 MPS is essentially a panelboard or switchboard in modular form. By choosing from the wide variety of modules you are able to create the ideal panelboard system for your application. Memshield 2 will provide far more flexibility than conventional panelboards and provide a lower cost alternative to an equivalent cubicle switchboard. Individual modules can be conveniently delivered and easily handled on site obviating the need for special access arrangements or handling equipment.

Site assembly of modules is uncomplicated and a panelboard system can be quickly produced.

Memshield 2 MPS can also be extended to accommodate any future requirements.

In simple terms Memshield 2 MPS provides a choice of:

- Incoming modules, MCCB, fused combination switch (FCS) and direct connection options
- Outgoing modules, MCCB, MCB and FCS options
- Horizontal busbar modules
- Incoming / outgoing module accessories
- Plinth modules
- Ancillary modules including DIN - rail enclosures and meter packs
- Side cableway boxes
- Connection kits

Modules offer IP3X protection and are formed of rust protected sheet steel finished in light grey epoxy polyester to RAL 7004.

Completed systems can be wall / floor or frame mounted.

FORMS OF SEPARATION:

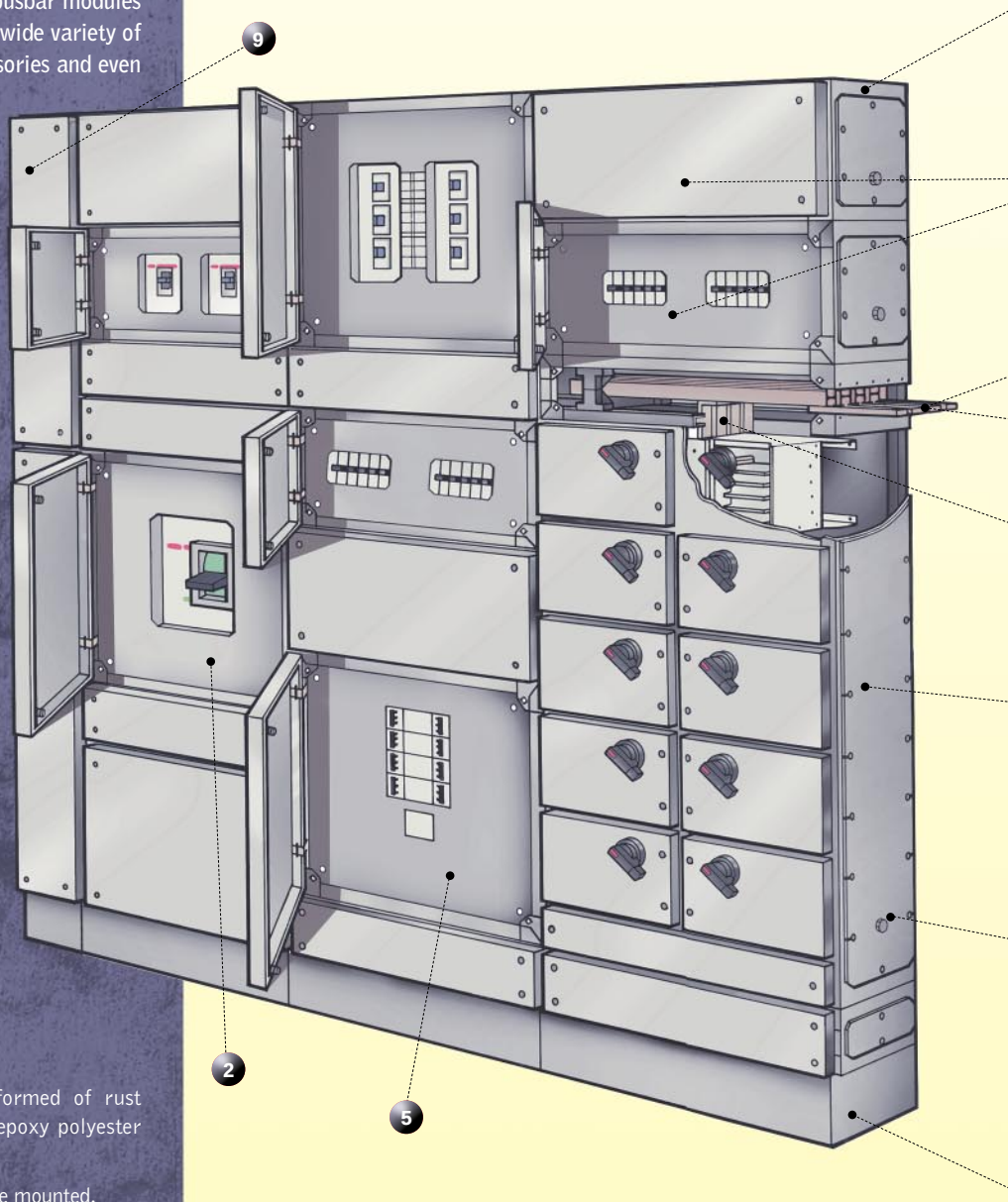
Form 2 Type 2 - All modules as standard.
Form 3B Type 2 - All modules when shields are fitted to outgoing terminals of MCCB's.
Form 4 Type 2 - On selected modules as indicated in tables from page 33.

MODULAR CONVENIENCE

- All modules are 250mm deep.
- All modules are 750mm wide.
- Side cableway boxes are 250mm wide.
- All module heights increase in increments of 150mm.

APPLICATION

Memshield 2 MPS has been designed with inherent flexibility and installer convenience to accommodate the requirements of modern commercial and industrial applications.



UNIQUE SOFTWARE ASSISTANCE

Memshield 2 MPS offers a simple and effective software selection system - Memshield 2 MPS Advantage. This software can be used to produce layout drawings, establish pricing, identify dimensions and weights and also to output a completed order form.

Memshield 2 MPS Advantage is available on request.

E L B O A R D S S I M P L E

1. **STANDARD MEMSHIELD 2 MPS CONFIGURATION**
   Front access, wall / floor mounting. Top or bottom cable entry.
2. **INCOMING MODULES**
   Choice of incoming devices up to 1250A; MCCB, fused combination switch (FCS), direct connection. Contact us for details of 1600/2000A ACB options.
3. **HORIZONTAL BUSBAR MODULES**
   Enabling horizontal extension of the panelboard system.
4. **OUTGOING MODULES**
   Choice of outgoing devices; MCCB, FCS, MCB.
5. **TYPE B MCB DISTRIBUTION MODULE**
6. **ANCILLARY MODULES**
   MCB distribution modules.
   Service centre modules.
   Empty general purpose (filler) modules.
   Meter pack modules (analogue or digital).
7. **ACCESSORIES**
   Spare gland plates.
   Spare side plates.
   Fire barrier kits.
8. **PLINTH MODULES**
   To form base of modular panelboard system.
9. **SIDE CABLE WAY BOXES**
   Reducing the need for cable trunking.
10. **CONNECTION KITS**
    To electrically connect all required modules.

Incoming modules, MCCB or FCS

Outgoing modules, MCB, MCCB or FCS

Busbar system, fully extendable

Empty general purpose module

A choice of 3 or 4 pole drawout air circuit breaker (ACB) as incoming device up to 2000A. Modular panelboard systems with the new ACB incoming section are available as factory built assemblies to customer's specific requirements. The section is only 600mm wide and 475mm deep.

MPS - MAKING APPLICATION CLEAR

FEATURES AND BENEFITS

1. UNIQUE 'MEMSHIELD 2 MPS ADVANTAGE' SOFTWARE PACKAGE
   Aids layout designs, produces price, dimensions, weights and parts list for ordering. Speeds up and simplifies the process from conception to ordering with high accuracy.
2. FCS OR MCCB INCOMERS AND OUTGOERS
   To suit fusegear or circuit breaker applications.
3. INCOMERS UP TO 1250A
   An alternative to switchboards where the main incoming supply is up to 1250A. For larger incomer ratings up to 2000A contact Technical Support.
4. OUTGOERS UP TO 800A
   Standard Memshield 2 MPS can cope with large loads.
5. CHOICE OF 3 OR 4 POLE INCOMING AND OUTGOING CIRCUITS
   Standard 3 pole switching or 4 pole where switching of neutral circuits is required.
6. STANDARD SIDE, TOP AND BOTTOM CABLE ENTRY
   To suit cabling requirements of any application
7. CHOICE OF SELF ASSEMBLY OR FACTORY BUILT ASSEMBLIES
   Memshield 2 MPS modules available via MEM Preferred Stockists on a quick lead-time for site assembly. Optional factory assembled unit when required.
8. FORM 2 TYPE 2 AS STANDARD, FORM 3B TYPE 2 OR FORM 4 TYPE 2 OPTIONS
   To meet high degrees of device separation required by the installation.
9. HORIZONTAL BUSBAR MODULE EXTENSION
   Enables many modules to be assembled meeting applications traditionally met by distribution switchboards. Also allows future expansion.
10. UP TO 50KA FOR 1 SECOND RATED BUSBARS
    Matches many standard switchboard specification requirements in a panelboard design.

    Busbar ratings below 630A-35kA for 1 second, 630A and above - 50kA for 1 second.
11. CHOICE OF 1 TO AN ALMOST INFINITE NUMBER OF OUTGOING WAYS
    Can meet the needs of small to large installations.
12. MODULAR CONVENIENCE
    All modules are 250mm deep. All modules are 750mm wide. Side cableway boxes are 250mm wide. All module heights increase in increments of 150mm.
13. IP3X PROTECTION
    High integrity protection against ingress of foreign bodies when mounted against a wall
14. COMPLIANCE IEC/BSEN 60439-1
    Full compliance with the latest British and International standards.
15. ANALOGUE OR DIGITAL METERING MODULES CAN BE MOUNTED ON THE LINE OR LOAD SIDE OF THE INCOMING CIRCUIT

    Enables monitoring of both voltage and current levels.
16. STANDARD MECHANICALLY INTERLOCKED DUAL INCOMER OPTION
    Ideal for applications with mains and standby supplies.
17. GENERAL PURPOSE MODULES TO HOUSE ANCILLARY DEVICES
    Sub - distribution equipment such as MCB's and modular devices can be incorporated within the Memshield 2 MPS system.
18. FULLY SHROUDED PAN ASSEMBLIES
    To prevent contact with live parts.
19. REMOVABLE PAN ASSEMBLIES
    For easier installation and wiring.
20. REMOVABLE GLAND PLATES
    Prevents any chance of foreign bodies entering into device sections.
21. BLANKING MODULES
    Prevents access to unused live busbar stabs and blanks off apertures in front plates.
22. ALL SWITCHED DEVICES HAVE POSITIVE CONTACT INDICATION
    True indication of device contact status.
23. COVERS AND DOORS FIT WITHIN ENCLOSURE DIMENSIONS
    Allows adjacent mounting.
24. DOORS COVER ALL DEVICES AND FRONT COVER SCREWS
    Device sections can be locked to prevent unwanted access.
25. REMOVABLE DOORS
    Aid access in restricted working areas.
26. ROBUST CONSTRUCTION
    Will provide many years of service in industrial and commercial applications.
27. MODERN AESTHETIC APPEARANCE
    Blends well with modern building design and existing Memshield 2 products providing a complete circuit protection solution.

MEMSHIELD 2 MPS - MAKING PANELBOARDS SIMPLE
Technical Support: 0121 685 2100

Series G
Moulded Case Circuit Breakers

Product Focus

- Up to 690 Vac
- 18kA to 100kA I_{cu}
- 16-2500 Amperes
- IEC 60947-2

Safety, Reliability and Performance verified with the KEMA KEUR mark

Safety, Reliability and Performance.

Endorsed by third party witness testing and certified in compliance with IEC 60947-2, and other global standards.

Continuous follow-up witness test programmes that re-assure safety, reliability and performance as endorsed by the KEMA KEUR mark.

Moulded Case Circuit Breakers in only five frame sizes covering ratings from 16 to 2500 amperes have been designed to meet:

One of our globally located component assembly centres working to Eaton's Business System processes to ensure safety, reliability and performance of the Series G Moulded Case Circuit Breakers are built-in and delivered on time, every time.

- The application and discrimination considerations of the specification and consulting engineers
- The product selection, delivery and panel assembly lead times of the electrical equipment builder
- The different cable termination options and the quick on-site accessory installations demanded by site contractors
- The safety, reliability and performance requirements of lifelong service essential to facility or equipment owners.

Eaton's frame size GE, KEMA certified, 160A circuit breaker, one of five sizes covering ratings from 16 to 2500 amperes and interrupting capacities up to 100kA and voltages up to 690V AC.

Innovation

As with all Eaton products, every part undergoes the most stringent testing and review during the development and production stages to ensure critical performance factors are built-in. You can be assured, in a system where reliability and performance is paramount; the Series G Moulded Case Circuit Breaker will consistently perform to IEC 60947-2.

Series G utilises a patented contact conductor design, this feature is a high-speed "opening force" action that results in superior performance when high level fault currents produce extraordinary electromechanical forces.

Unmatched flexibility

While meeting IEC 60947-2 and other global standards these breakers provide unmatched flexibility by employing a wide variety of thermal magnetic and electronic trip units with earth leakage options. They are calibrated to 40°C ambient as standard with higher temperature calibrations available.

Global circuit protection solutions…that's Series G Moulded Case Circuit Breakers from Eaton

Certification marks assure product compliance with standards via the third party witnessing of tests by globally recognised, independent certification organisations. KEMA is a highly recognised, completely independent international organisation that offers certification and inspection facilities for equipment in many industries. The KEMA-KEUR mark is the highest certification an electrical product can receive from KEMA.

Only five frame sizes - any number of applications. Eaton's Series G range of Moulded Case Circuit Breakers provides safe and reliable protection to every application, anywhere in the world.

From the main distribution board to the final load, Eaton's moulded case circuit breakers are designed for applications, anywhere in the world. The Series G range gives complete system protection across all levels, including overload protection of the transformer secondary.

The modular design and construction of Series G makes it the breaker of choice. Its in-built flexibility helps reduce inventory costs, and during the design and build stage, changes in requirements can be made later in the project without consequential delays to the critical path of completion.

The design also ensures that maintenance is simple too, as individual components can be exchanged quickly on site. With a range from 16A to 2500A in 5 frame sizes, Series G is a truly a global family of Moulded Case Circuit Breakers.

Speed and responsive service

Eaton's Component Assembly Centres have been conceived with speed and responsiveness to service in mind. Components are quickly configured to meet individual project requirements. This provides late point definition of individual MCCB's resulting in short order lead times – saving time and cost.

With all Series G MCCB's, installation, maintenance and modification can be easily carried out with access from the front, using standard tools. This modular design approach means that cost-intensive downtimes can be considerably minimised – providing extremely valuable cost-savings.

A complete family of accessories

Series G flexibility is enhanced with a wide range of internal and externally mounted accessories that complements the family of moulded case circuit breakers.

Plug-in internal accessories are common for the first three frame sizes covering 16 – 630 Amps and have been certified for on-site installation.

Plug-in accessories include:

- Alarm switch
- Auxiliary switch
- Shunt trip
- Low energy shunt trip
- Under voltage release mechanism

An extensive line of operating accessories provides indirect electrical or manual circuit breaker operations, these include:

- Electrical (solenoid) operator
- Motor driven electrical operator
- Rotary handle
- Variable depth handle mechanism
- Flexible shaft handle mechanism

Whether bench, or field installed, all accessories are easily located from the front of the breaker. Plug-ins are certified for on-site installation and are simple to fit and remove. Terminal shields are available for 1, 2, 3, & 4-pole breakers.

Plug-in adaptors are available providing front removal and rear cable connections for 3 and 4 pole breakers.

The Series G Earth Leakage devices are field-installable and self-powered. Features include adjustable earth leakage pick-up, adjustable time delay, status indication, earth fault alarm contacts, push to test and push to trip.

Unparalleled protection and monitoring

Eaton's family of electronic trip units offer unparalleled protection and monitoring. These units provide long delay, short delay, instantaneous and earth fault protection. Curve shaping, system diagnostics and system monitoring with communications available to create the ultimate higher level energy management and system protection solutions.

Electrical Characteristics

Frame Sizes GE through GL

Frame size			GE				GJ			GL		
												
Maximum Rated Current (Amperes)			**125**			**160**	**125**	**250**			**400, 630**	
Breaker Type			**B**		**E**	**S**	**H**	**S**	**H**	**C** ①	**S**	**H**	**C** ①
Number of Poles			1	2, 3	1, 3,4	3, 4	3, 4	3, 4			3, 4		
Breaking Capacity (kA rms) ac 50 – 60 Hz													
IEC 60947-2	220 – 240 Vac	I_{cu}	18	25	25	35	85	100	85	100	200	85	100	200
		I_{cs}	12	13	13	18	43	50	85	100	150	85	100	150
	380 – 415 Vac	I_{cu}	—	18	—	25	40	70	40	70	100	50	70	100
		I_{cs}	—	12	—	13	30	35	40	70	75	50	70	75
	660 – 690 Vac	I_{cu}	—	—	—	—	4	6	12	14	20	20	25	35
		I_{cs}	—	—	—	—	3	3	6	7	10	10	13	18
	250 Vdc ②	I_{cu}	10	10	10	10	35	42	35	42	42	22	42	42
		I_{cs}	10	10	10	10	35	42	35	42	42	22	42	42
Ampere Range			16 – 160 A					20 – 250 A			100 – 630 A		
Trip Units F= Fixed A= Adjustable T=Thermal M= Magnetic			FT-FM AT-FM					AT-AM Electronic (Digitrip RMS 310)			AT-AM Electronic (Digitrip RMS 310)		
Thermal Magnetic	Fixed Thermal		■					—			—		
	Adjustable Thermal		■			■					■		
	Magnetic		Fixed					Adjustable			Adjustable		
Electronic rms ③	LSI		—					■ ③			■ ③		
	LSIG		—					■ ③			■ ③		
Dimensions mm			H	W	D			H	W	D	H	W	D
	1-Pole		139.7	25.4	81.1			—	—	—	—	—	—
	2-Pole			50.8				—	—	—	—	—	—
	3-Pole			76.2				177.8	105.0	87.4	258.0	140.0	104.0
	4-Pole			101.6					135.6			183.0	
Weight (approximate) kg			1-Pole	2-Pole	3-Pole	4-Pole		3-Pole	4-Pole		3-Pole	4-Pole	
			0.5	0.9	1.4	1.8		5.2	7.0		7.3	9.1	
Utilisation Category			A					A			A		

① Contact your Eaton representative for availability.
② Two poles in series.
③ Not suitable for dc application. 4-pole earth fault not available.
■ Available
— Not Available

Frame Sizes GN & GR

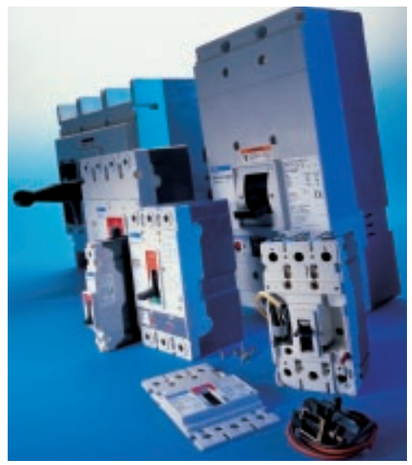
Frame size			GN			GR	
							
Maximum Rated Current (Amperes)			**800, 1250**		**1600**	**1600, 2000, 2500**	
Breaker Type			**S**	**H**	**C**	**S**	**H**	**C**
Number of Poles			3, 4			3,4	3, 4	
Breaking Capacity (kA rms) ac 50 – 60 Hz								
IEC 60947-2	220 – 240 Vac	I_{cu}	85	100	200	85	135	200
		I_{cs}	85	100	100	85	100	100
	380 – 415 Vac	I_{cu}	50	70	100	50	70	100
		I_{cs}	50	50	50	50	50	50
	660 – 690 Vac	I_{cu}	20	25	35	20	25	35
		I_{cs}	10	13	18	10	13	18
	250 Vdc	I_{cu}	—	—	—	—	—	—
		I_{cs}	—	—	—	—	—	—
Ampere Range			400 – 1250 A		1600 A	800 – 2500 A		
Trip Units			Electronic (Digitrip RMS 310)			Electronic (Digitrip RMS 310, 610 and 910)		
Electronic ③	LSI		■ ③			■ ③		
	LSIG		■ ③			■ ③		
Dimensions mm			H	W	D	H	W	D
	1-Pole		—	—	—	—	—	—
	2-Pole		—	—	—	—	—	—
	3-Pole		406.0	210.0	140.0	406.0	394.0	229.0
	4-Pole			280.0			508.0	
Weight (approximate) kg			3-Pole	4-Pole		3-Pole	4-Pole	
			21.3	28.3		47.0	54.0	
Utilisation Category			A			A		

③ Not suitable for dc application. 4-pole earth fault not available.
■ Available
— Not Available

Request your Product Guide for full specification and selection information on Eaton's Series G range of Moulded Case Circuit Breakers and accessories.

The Eaton Series G family includes five frame sizes in ratings from 16 – 2500 Amperes, with a choice of several interrupting capacities up to 100kA at 415 Volts ac.

- Field-fit accessories
- Common accessories through 630 Amperes
- Electronic Trip Units from 20 – 2500 Amperes
- Earth Leakage Modules
- Built-in earth fault-protection down to 20 Amperes



Eaton's Electrical business is a global leader in electrical control, power distribution, and industrial automation products and services. Through advanced product development, world-class manufacturing methods, and global engineering services and support, Eaton's Electrical business provides customer-driven solutions under brand names such as Cutler-Hammer®, Durant®, Heinemann®, Holec® and MEM®, which globally serve the changing needs of the industrial, utility, light commercial, residential, and OEM markets. For more information, visit www.EatonElectrical.com.

Eaton Corporation is a diversified industrial manufacturer with 2003 sales of $8.1 billion. Eaton is a global leader in fluid power systems and services for industrial, mobile and aircraft equipment; electrical systems and components for power quality, distribution and control; automotive engine air management systems and powertrain controls for fuel economy; and intelligent drivetrain systems for fuel economy and safety in trucks. Eaton has 54,000 employees and sells products to customers in more than 100 countries. For more information, visit www.eaton.com.

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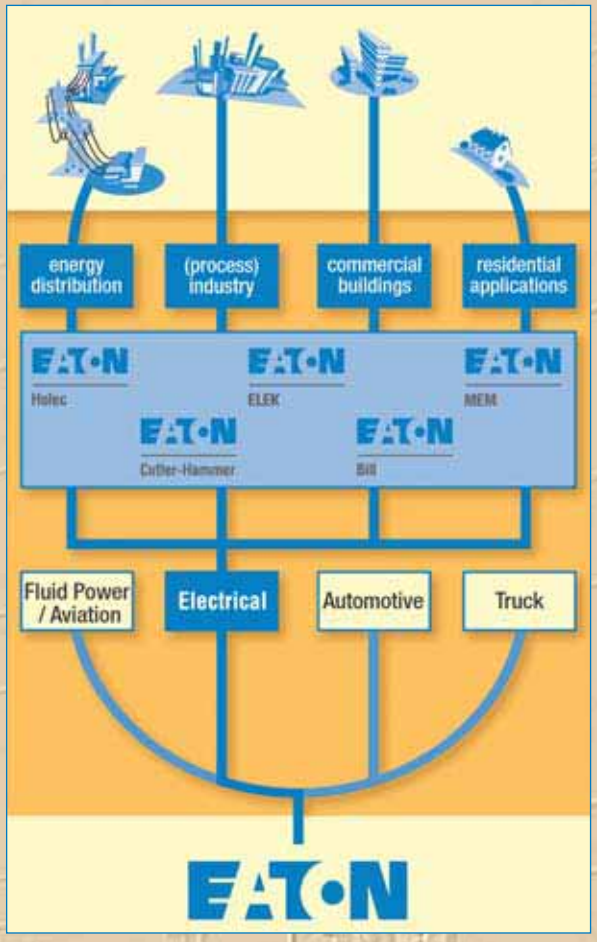
Eaton's Electrical Group: European Operations
IEC Products, Services and Solutions

Eaton's Bill, Cutler-Hammer, ELEK, Holec and MEM brands



Eaton's Electrical Group

As a market-leading manufacturer of circuit protection and control equipment, Eaton's world leading switch and fuse-gear, circuit breaker and wiring accessory products are distributed across the globe. Incorporating the latest technological advances, Eaton products are the result of a comprehensive ongoing development programme and comply with the industry's most rigorous quality standards. This all serves to make Eaton an industry benchmark, with unsurpassed quality and performance guaranteed. This extensive product range, together with a lengthy experience and specialist knowledge serves to make Eaton the only source for your installation needs.

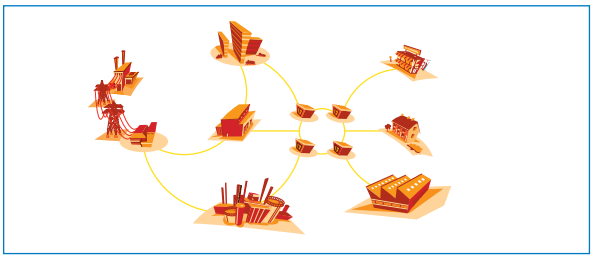
Experience

Eaton's Electrical business in Europe encompasses the market leading brands of Bill®, Cutler-Hammer®, Elek®, Holec® and MEM®. This means that the company can provide MV and LV products and project solutions to suit installation requirements throughout utilities, industrial, commercial and residential sectors.

The company is a world leader in low voltage distribution and a dominant player in the medium voltage market. The reputation developed by the brands over almost a century, is today matched by the ability with a very wide product range, to offer the client a unique breadth of product along with a project management capability offering a genuine 'one-stop-shop' facility, including project programme management.

The Energy Line

Reliable and safe electrical energy is one of the corner stones of today's industrialised society. Its continuous availability and everyday use have become a matter of course for all of us. Industrial and business activities, transport, communication, data processing, they are inconceivable without the 'energy supply line', the extensive electricity network between power stations and end-users.



Products and services of Eaton's Electrical Group play an important role in medium and low voltage applications in the Energy Line. At all nodal points of the network electrical solutions of Eaton guarantee a safe and reliable power supply. All Eaton's solutions are based on the latest insulation and interruption technologies and manufactured in compliance with IEC safety and ISO quality standards.

Energy Distribution

The activities of Eaton for applications in distribution networks (main feeder, subdistribution and transformer stations), are directed towards switchgear installations and components. The switchgear systems are air or epoxy-resin insulated and are in most cases equipped with circuit breakers based on Eaton vacuum interrupters. Eaton offers an extensive range of switchgear systems and switchgear components, ensuring a safe and reliable distribution of electrical energy.



Process and Petrochemical Industry

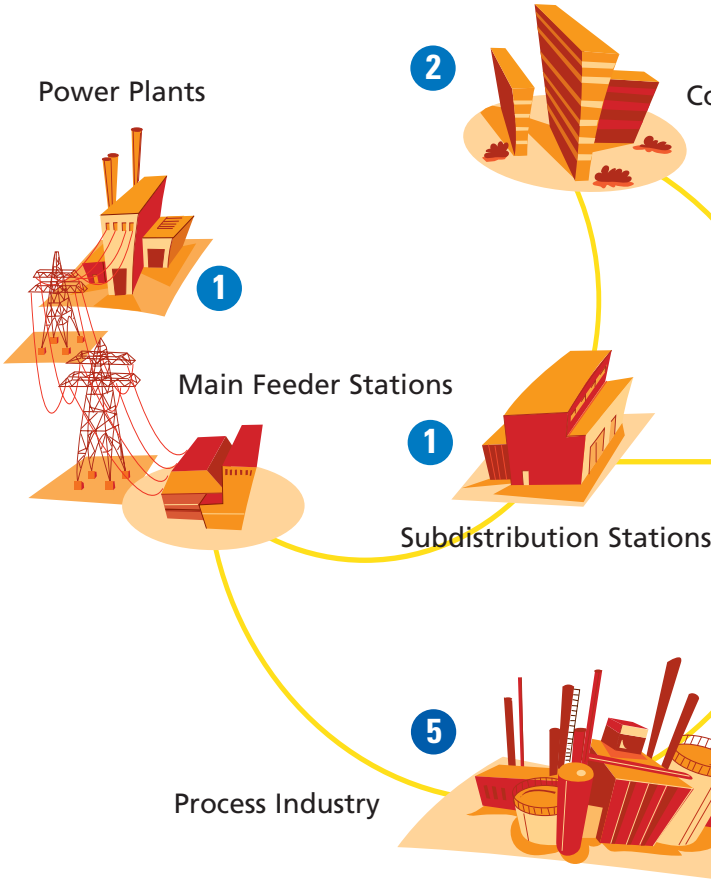
The flexible switchgear systems and components manufactured by Eaton comply with the stringent requirements for safety and reliability as demanded in process and petrochemical industries. Eaton offers a comprehensive range of sheet steel cubicle and insulation enclosed systems for energy distribution, including control and monitoring. Together with the extended range of switchgear devices, our program meets the requirements of these specific application areas.



Commercial Buildings

In large buildings and shopping centres, medium and low voltage electricity distribution is often applied together. The Eaton brands excel in combining their products and know-how into application specific solutions. Right from the medium voltage distribution to intelligent bus systems for building automation. A comprehensive range of circuit protection and control equipment utilising the very latest technology, enables us to provide the solution to almost any installation problem.





Industry

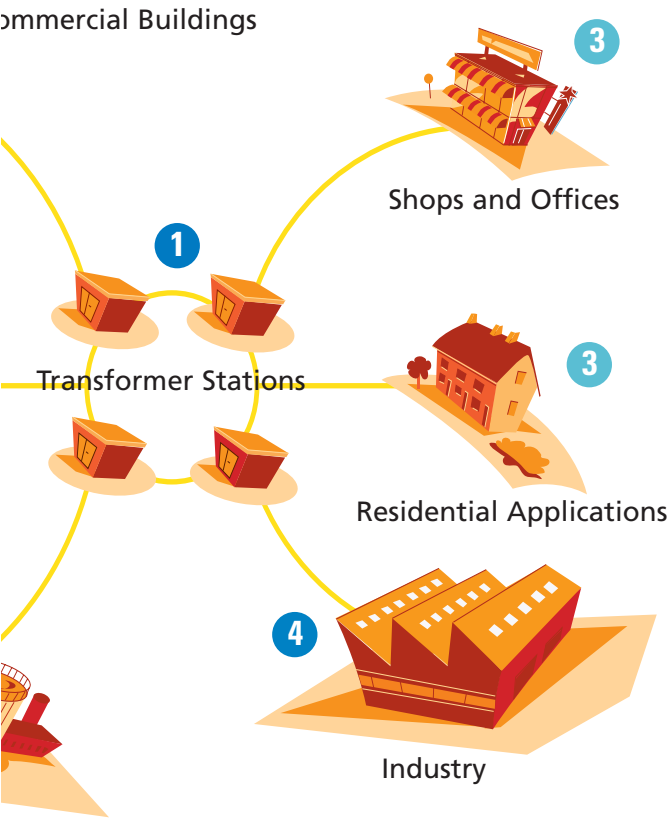
For industrial applications Eaton's is Electrical Business offers reliable solutions for the power supply to operational processes under severe conditions, as well as the central feeding of large consumers. Special distribution and control equipment can be designed to incorporate, either individually or in combination, a variety of fused equipment, MCB's, MCCB's, motor control gear and associated equipment. Our cubicle switchboards give a great degree of flexibility and good technical performance with cost effectiveness.



Shops and Offices / Residential Applications

The Eaton brands lead their market segments for circuit protection and control in residential applications, shops and offices. Our philosophy is based on being led by our market place. By listening to our customer's needs, we are constantly improving the quality, safety, reliability, performance and choice on offer throughout the whole product range.





OEM and Panel Building

As supplier of a complete range of IEC certified components, Eaton has an intimate knowledge of their performance and operating characteristics. This depth of understanding provides an unequalled set of data to inspire ultimate confidence in the calculations necessary to safeguard complete design and build integrity. The full range of components for Original Equipment Manufactures (OEM) includes; MCB's, MCCB's, ACB's contactors, relays, timers, sensors, instrumentation, pushbuttons, selector switches and indicating lights.

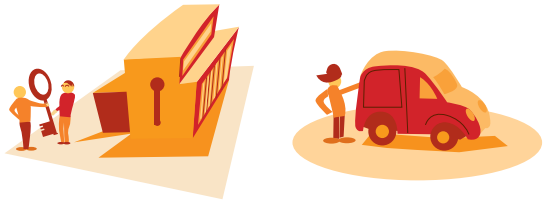
Furthermore, Eaton supplies modular low and medium voltage kit systems and devices for panel builder assembly to provide economical solutions in a variety of forms all complying with the latest IEC standards.

Intelligent Automation

Eaton can deliver any control solution that is right for your business. Our product focus includes: intelligent motor control equipment starters, soft starters and variable speed drives; motor monitoring and protection products, power distribution and power management products, HMI interfaces and communicating IO architectures. All products are designed with the ultimate application in mind, and by integrating the latest communication and telemetry architectures, Eaton offers the user the capability of driving down installed costs.

Eaton-Electrical Services & Systems (E-ESS)

E-ESS is the European service, know-how and project centre for Eaton's Electrical Business. E-ESS specialises in service and project-based and turnkey activities in energy distribution and industry for both low and medium voltage switchgear. As a result of the expansion of the Eaton's Electrical group within Europe, the company is well positioned to provide new and existing customers with the very best customer focused specialist engineering services up to and including 132kV.



Operational services

E-ESS has an international reputation for offering operational electrical distribution services to both the private and utility sectors of the market ranging from programmed maintenance to emergency crisis response. The services offered are non-product specific and are available across the whole spectrum of electricity supply equipment, protection and relay systems from all major manufacturers but with an unrivalled expertise with Eaton products.

Our services include:

- Erection and commissioning
- Repairs, maintenance and maintenance contracts
- Customer training
- Extension to and renovation of existing installations
- Spare parts
- Service-contracts
- Turnkey projects
- Protection grading service
- Thermographic inspections
- Fault Location
- Refurbishment
- Electro-mechanical services

Independent Testing

Full test facilities are available at our sites in Birmingham (UK) and Hengelo (Netherlands). In Birmingham the company's electrical laboratories complex is authorised to carry out full type testing to major worldwide standards and incorporates an ASTA accredited testing station with the capacity to carry out short circuit tests up to 22kA at 415V.

Prof. Ir DAMSTRA LABORATORY

The Prof. Ir. Damstra Laboratory, located in Hengelo, the Netherlands, is the present name of the former Holec Laboratory. Since the start in 1936, the Prof. Ir. Damstra Laboratory gained a rich experience in the field of testing switchgear and controlgear as well as switchgear and controlgear assemblies. Test facilities are available for Low Voltage and Medium Voltage. Short-circuit testing and switching testing is performed using a 500 MVA short-circuit generator or short-circuit transformers. Dielectric testing, temperature rise testing, climate testing, mechanical testing, and so on complete the many possibilities. The Prof. Ir. Damstra Laboratory complies with EN45001 (implementation of IEC17025 in 2001). For testing the Prof. Ir. Damstra Laboratory has experience in a wide area of standards. The Prof. Ir. Damstra Laboratory has been accredited by KEMA and ASTA and has a separate cooperation agreement to offer testing services in order to obtain international recognized KEMA-certificates.

Company Information

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For more information, visit
www.eatonelectrical.com.

Jan. 2005

MEM® Electrical sub-distribution
Lighting and power metering solutions

L2 building regulations compliant
Single phase MCB boards
Three phase MCB boards
MCCB panelboards

Get smart. Reduce energy consumption

EATON
Powering Business Worldwide

If it's measured then it can be managed – and energy consumption will be reduced

According to the Confederation of British Industry, 30% of the energy that companies buy is wasted. The Royal Institution of Chartered Surveyors estimates that buildings in the UK account for around 44% of our carbon emissions.

As energy costs escalate and regulations to save energy and reduce carbon emissions proliferate, there is an ever increasing need to understand the requirements and take measures to implement them.

Eaton has a thorough knowledge of European and global energy regulations and, as part of its PowerChain Management® solutions is able to provide an industry-leading range of metering solutions, with distribution and panelboard systems and components to satisfy every commercial need.

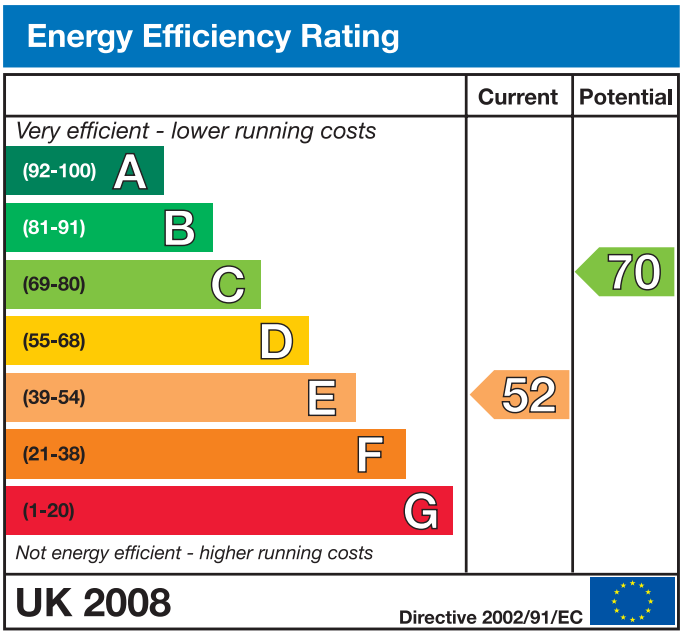
A combination of increasing energy costs and EU directives on the reduction of consumption – and therefore carbon emissions – is causing a dramatic change in the metering requirements of all buildings.

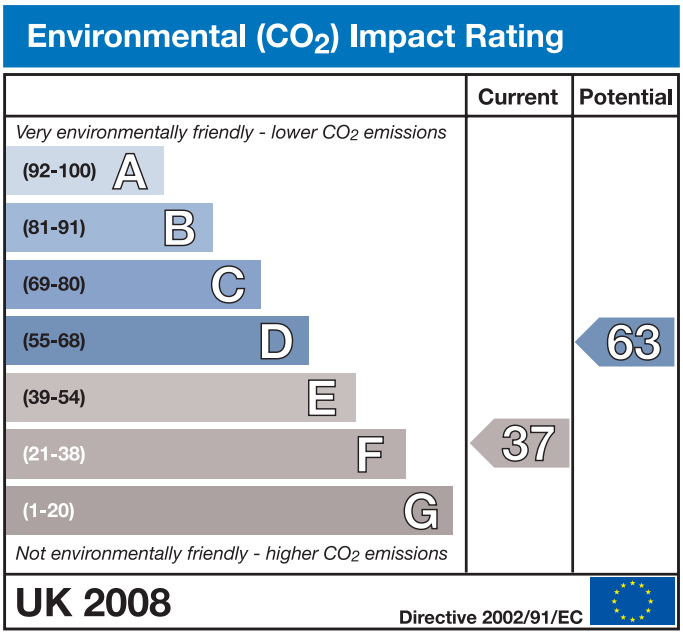
Metering helps the occupiers of buildings to understand energy usage and identify patterns and trends, giving them the ability to control consumption and costs. By providing valuable feedback, it can directly reduce consumption by up to 10% – a key reason behind the recognition given by part L2 of the current Building Regulations and its subsequent requirement for sub-metering in commercial buildings.

In addition, sellers and landlords are now required by law to provide an Energy Performance Certificate (EPC) for all non-domestic buildings when they are sold or rented.

DID YOU KNOW?

Metering can enable you to reduce energy by up to 10%





L2 Building Regulations' requirements

Installing sub-meters in non-domestic buildings that enable at least 90% of the estimated annual energy consumption of each fuel to be accounted for is considered reasonable provision. As well as new build, this is applied to existing buildings when consequential improvements are made – that is, if building regulations control approval is required.*

If improvements are made, then 10% of these improvements must be for energy savings and carbon reduction. Reasonable provision of sub metering would be to provide sub metering as such that the consumption of final distribution boards of 50kW and above can be directly metered or reliably estimated.

Where MCB sub-distribution boards represent a significant part of the overall demand within a building, breaking down this demand into more useable elements provides a greater visibility and understanding of the energy usage. Grouping lighting circuits together, and having separate information for the grouped small power circuits, provides substantial improvements in energy monitoring.

Key reasons to adopt a metering strategy

- To meet the legal demands of the Building Regulations, part L2 of which addresses the energy efficiency requirements in non-domestic buildings
- Escalating energy costs
- To provide critical energy usage data for owners and tenants to help reduce energy consumption, expected to be 5–10% per annum
- Split load power and lighting boards provide more meaningful information on where energy is being consumed

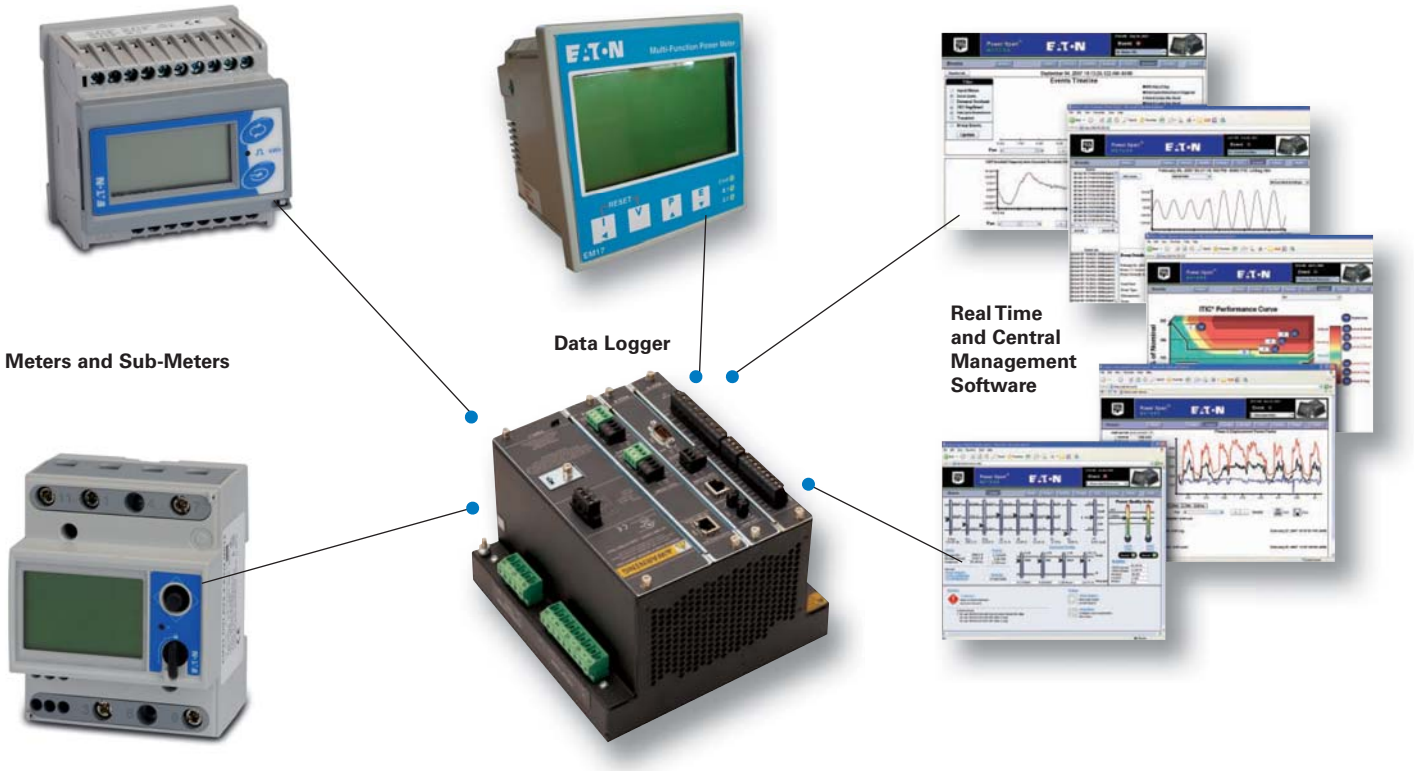
*CIBSE General Information Leaflet 65

The current building regulations for energy monitoring in commercial buildings has resulted in an increased number of sub meters being utilised for energy management.

In buildings of over 1000m^2, the only practical solution to gather the required energy data is to provide automatic metering and trending (AM&T), utilising networked meters. This requires the meters to have appropriate levels of connectivity to the chosen energy management system (EMS).

Meters with pulsed output kWh information provide the simplest form of connectivity at the lowest cost, whilst Modbus RS 485 versions facilitate access to enhanced monitoring capability.

Pulsed output of kWh information or Modbus RS 485 connection options, are available on all Eaton's MEM metering solutions.



Eaton's metering solutions provide cost effective compliance

Building Regulations Part L2 requires a strategy for the collection and analysis of data to achieve its objectives – in other words, to ensure that sufficient meters and sub-meters are installed to enable owners or occupiers to measure their actual energy consumption.

Section 3.5 states: reasonable provision of meters would be to install sub metering meters in every building greater than 500m^2 floor area.

In buildings with a total useful floor area greater than 1000m^2, to install automatic meter reading and data collection facilities is evolving into being the only practical solution.

The latest metering requirements including building regulations part L2 and the EU measuring instruments directive (MID) for billing applications are causing a complete change in the way we measure energy consumption in all commercial buildings.

The most practical and cost effective solution is to provide the metering integral to the electrical distribution equipment.

Eaton has developed an industry leading line of comprehensive metering solutions for MCB distribution boards and MCCB panelboards.

For MCB distribution board applications, Eaton's unique Smart power and lighting board delivers independent metering of power and lighting grouped loads.

OPERATING COST EFFICIENCIES

Reduce operating costs with effective energy management and maintenance strategies.

Eaton's unique Smart design for split lighting and power sub-distribution boards

Grouping lighting circuits together and having separate information for the grouped "small power" circuits provides substantial improvement in energy monitoring. This can be achieved by installing independent sub-distribution boards for each type of load. However a more cost-effective solution is to use split power and lighting boards which not only reduce the number of sub boards required but, more importantly, the number of sub distribution feeds required from the main board.

Eaton's unique solution uses smart meter technology to monitor embedded transducers in a high integrity shrouded 200A busbar assembly. This solution provides independent readings of each section of the board as net values, as well as providing information of the total demand on the board – all from a single smart meter.

A choice of two meter options provide either two pulsed output signals for kWh information, or Modbus RS 485 communication. Both meters display other useful parameters, including line voltage and current for each section of the board, plus power factor and max demand information. Through the Modbus RS 485 version meter these parameters can also be accessed remotely.

Eaton's new smart metered board is available in 4 sizes up to 24TPN or 72SP ways. The board is supplied with a 200A switch disconnector pre-installed and tested. The board is suitable for both three and single phase applications without the need for further accessories.

- Calculates the net values of each section of the distribution board without further external calculations
- Meter transducers within the busbar profile reduces overall board size, saving valuable space
- Meter and transducers are matched to ensure meter accuracy and MID compliance
- Pre-installed and tested main incomer minimises installation time
- Meter is pre-installed and ready for operation
- Additional high-integrity Earth connections are included as standard
- Standard Earth and additional high-integrity Earths can be configured as Functional Earths (Clean Earth) without additional accessories to ensure compatibility with a wide range of applications
- Removable side gland plates provide a variety of cabling options to match application needs

Eaton's range of metering product solutions

Type A Metered boards

For electrical distribution applications

Eaton's sub-metering solutions, addresses the need to measure electricity consumption and now; Split Metering options for separate small power and lighting circuits have been added to the range to fully meet the needs of the L2 regulations. The meters provide a pulsed output for kWh for simple integration, with Modbus communication as an alternative option. In many cases, the Meters display other useful parameters, including Line voltage and current etc.

Eaton's Memshield 3 meter packs provide simple integration with matched aesthetics to the 'A' and 'B' style Memshield 3 MCB Distribution boards. Versions for type 'A' boards utilise MID compliant meters as standard and for type B boards, there is a version with an MID approved meter as well as an OFGEM version, for billing application.

"Simple integration with matched aesthetics"

Type A metered boards

- Type A SPN boards with integrated meter
- Split load versions utilise a two channel meter, feeding two independent busbars and groups of MCB/RCBOs
- Split load versions provide independent monitoring of "Power" and "Lighting" loads and total load.
- Aids compliance with Part L2 of the building regulations (England & Wales)

EAMMP65

Meterpack for SPN Type A (Fits alongside Type A, boards)

EAM12M

12 way SPN Type A metered board (Pre-installed meter included)

EAMSL93M

9 + 3 way SPN Type A split metered board (Pre-installed 2 channel meter included) for separate monitoring of Small Power and Lighting

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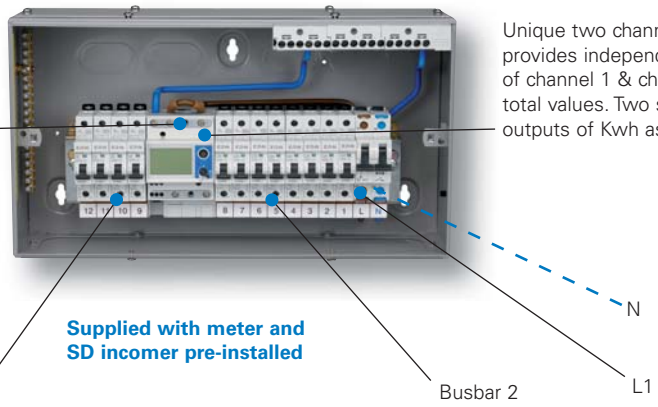
MCB 'A' Boards provide independent monitoring of power and lighting

Memshield 3 'A' type boards

- Split bus arrangements provide greater breakdown of loads as well as reducing physical size and cost.

L1 supply is split into two channels here and feeds two independent Busbars at the bottom of the board

Unique two channel meter provides independent monitoring of channel 1 & channel 2 plus total values. Two separate pulsed outputs of Kwh as standard



Supplied with meter and SD incomer pre-installed

Type B Meterpack Assemblies

For Three phase applications, Eaton's EBMMPCT250 employs a multi-function meter to measure the electrical parameters on the supplies to TPN Distribution Boards. It can also be used to meter single-phase loads. The unit is supplied complete with CT's and wiring terminals. Suitable for 100A – 250A applications with a pulsed output for kWh, the meter also monitors for display, other parameters, including line voltage and current. The voltage reference connection within the associated distribution board is facilitated on the main busbar, maintaining the full capacity of outgoing circuits.

EBMMPDC120

120A direct connection, OFGEM approved meter

EBMMPCT250

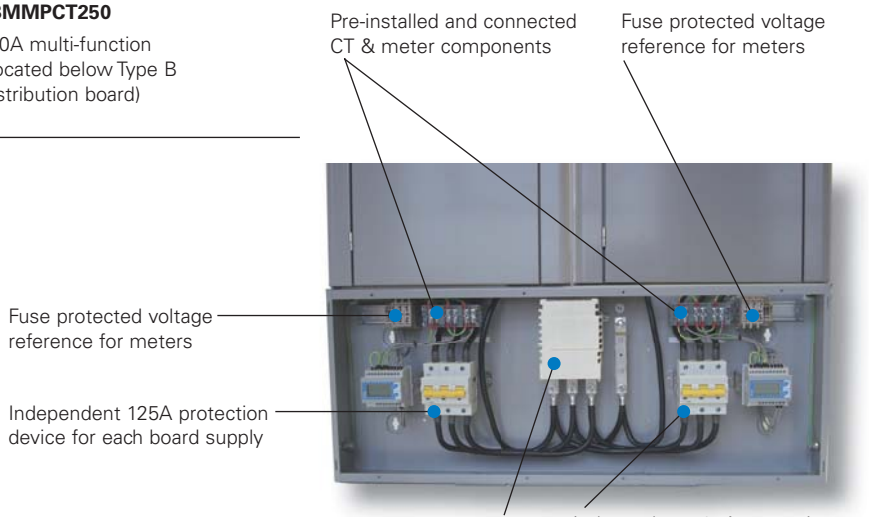
250A multi-function (Located below Type B Distribution board)

Type B Double meter pack assemblies

The double Meterpack provides for monitoring of two standard TPN distribution boards from one main cabled supply. Designed to provide a solution for separate "small power" and "lighting" applications. Two double meterpack versions cover 125A & 250A applications. The 250A version provides independant 125A protection to each board. Standard Memshield 3 boards can be mounted above, utilising the standard choice of connection options, within the main board e.g. Switch disconnector or lugs (see main catalogue).

EBMMPSL250

250A split load meter pack (Shown fitted below two standard Memshield 3 type B boards)

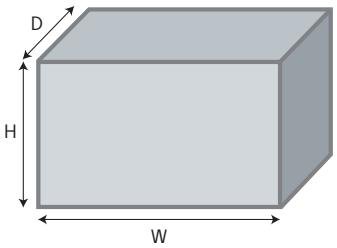


Outgoing metering with Eaton's MCCB panelboards

See main catalogue for comprehensive selection guide.

- Side cable chambers with pre-cut meter locations and hinged doors simplifies meter installation
- Design uses open sided construction and removable side gland plates for easy cable routing
- Meter chambers provide enough meter locations to cover all outgoing circuits where TP MCCB's are used
- Everything required to cable the CT's and meter is provided
- Cabling components are supplied with the CT kits

Distribution Board Meterpacks



Use the following chart to select the most appropriate meterpack or metered board for your application.

			Installed meter, characteristics					Load type compatibility		
	Rating (A)	Outgoing ways	Modbus	Pulsed output kWh	MID Certified	OFGEM Certified	MID Compliant	Single Phase	Three Phase	Size mm (W x H x D)
EAMMP65	65	△		•			•	•		238 x 254 x 140
EAM9M	65	9		•			•	•		440 x 254 x 140
EAM9MB	65	9	•				•	•		440 x 254 x 140
EAM12M	65	12		•			•	•		454 x 254 x 140
EAM12MB	65	12	•				•	•		454 x 254 x 140
EAMSL66M	100	6+6		•			•	•		454 x 254 x 140
EAMSL93M	100	9+3		•			•	•		454 x 254 x 140
EAMSL66MB	100	6+6	•				•	•		454 x 254 x 140
EAMSL93MB	100	9+3	•				•	•		454 x 254 x 140
EBMMPDC120	120	☐		•		•		•	•	440 x 430 x 130
EBMMPSL125	125	☐		•			•	•	•	880 x 350 x 125
EBMMPSL125M	125	☐	•				•	•	•	880 x 350 x 125
EBMMPSL250	250	☐		•			•	•	•	880 x 350 x 125
EBMMPSL250M	250	☐	•				•	•	•	880 x 350 x 125
EBMMPCT250	250	☐		•			•	•	•	440 x 256 x 130
EBMMPCT250MID	250	☐		•	•			•	•	440 x 256 x 130
EBMMPCT250M	250	☐	•				•	•	•	440 x 256 x 130
EBMSL642M	200	6+4		•			•	•	•	440 x 1130 x 130
EBMSL642MB	200	6+4	•				•	•	•	440 x 1130 x 130
EBMSL862M	200	8+6		•			•	•	•	440 x 1236 x 130
EBMSL862MB	200	8+6	•				•	•	•	440 x 1236 x 130
EBMSL1082M	200	10+8		•			•	•	•	440 x 1342 x 130
EBMSL1082MB	200	10+8	•				•	•	•	440 x 1342 x 130
EBMSL14102M	200	14+10		•			•	•	•	440 x 1501 x 130
EBMSL14102MB	200	14+10	•				•	•	•	140 x 1501 x 130

△ For use with standard SPN type A boards

☐ For use with standard 125A TPN type B boards

Eaton Corporation is a diversified power management company ranked among the largest Fortune 500 companies. Eaton is a global technology leader in electrical components and systems for power quality, distribution and control; hydraulics components, systems and services for industrial and mobile equipment; aerospace fuel, hydraulics and pneumatic systems for commercial and military use; and truck and automotive drivetrain and powertrain systems for performance, fuel economy and safety. For more information, visit www.eaton.com.

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Powering Business Worldwide

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PowerChain Management®

Powering Business Worldwide

Frequently Asked Questions

MEM MCB & MCCB Distribution Solutions, Protective Devices and Energy Monitoring and Measuring

Question 1 -When will the new range be available for sale?
Answer 1 – Memshield 3 will be released for sale in two phases. 125A type 'A' & type 'B' boards and associated devices will be launched 2nd November. 250A high load boards will be available at the end of November. Release for sale dates are two weeks earlier than these dates.

Question 2 - Will the existing range of Circuit Protection Devices fit into this new enclosure platform?
Answer 2 - The existing range of Circuit Protection Devices will not fit into the new enclosure platform as the size profile is different. There is no forward or backward compatibility between Memshield 2 and Memshield 3 boards or devices.

Question 3 - Will the existing range of Circuit protection devices continue to be available for projects already planned and to serve our installed base?
Answer 3 - We forecast significant demand for the existing M2 devices for sometime into the future and have therefore put in place a manufacturing strategy to meet this demand.

When demand falls we will make it an Aftermarket product and continue to supply spares for many years to come as we have for the Memshield 1 device range which is now more than 13 years old

Question 4 - When will we stop supplying the current Memshield 2 Distribution boards?
Answer 4 - Our plan is to start withdrawing the existing Memshield 2 Distribution board from general sale early in 2010, but advance notice will be given.

Question 5 - Will Eaton accept stock returns for Memshield 2 products?
Answer 5 - Distributors already have the ability to return stock under the existing commercial policy and this includes Memshield 2 items. We anticipate that the levels of returns will be minimal, due to the pull through demand for M2 in the market place.

We will be working closely with our Distributors to mange the introduction and transition to the new range.

Question 6 - Why is Eaton changing such a successful range of products?
Answer 6 - Memshield 2 is regarded as the Benchmark for MCB Distribution Boards in the UK and has earned a strong reputation for meeting today's electrical sub-distribution needs.

However the product and manufacturing technologies are now 15 years old and Eaton has looked to future market requirements to developed an innovative new enclosure platform on which to deliver new sub distribution solutions for managing electrical power. The new device platform will facilitate product innovation in the future.

Question 7 – Will the RCBO pod fit the new range of MCB's.
Answer 7 – No, there will be no pod option in the new range of MCB's, but the M2 RCBO pod will continue to be available for after market applications. The pod concept has delivered value to customers by making late adaptation of the MCB in to an RCBO possible. However, the solution is costly to manufacture and has a large footprint, which limits cabling space in the board. As RCBO's become more popular, Eaton's goal is to compliment the new RCBO range with a lower cost; compact sized range of RCBO's which will be released for sale in Q1 2010.

Question 8 – Will all product variants be available at the launch on 2nd November.
Answer 8 – The launch will be phased, to accommodate development and testing programmes and therefore the initial introduction will focus on the 125A type 'A' & type 'B' boards. This board is also suitable for 250A application in sizes 18 way and 24 way TPN and will cover the majority of applications. The High load 250A board represents a new concept in MCB Distribution board design and will be introduced at the end of November.

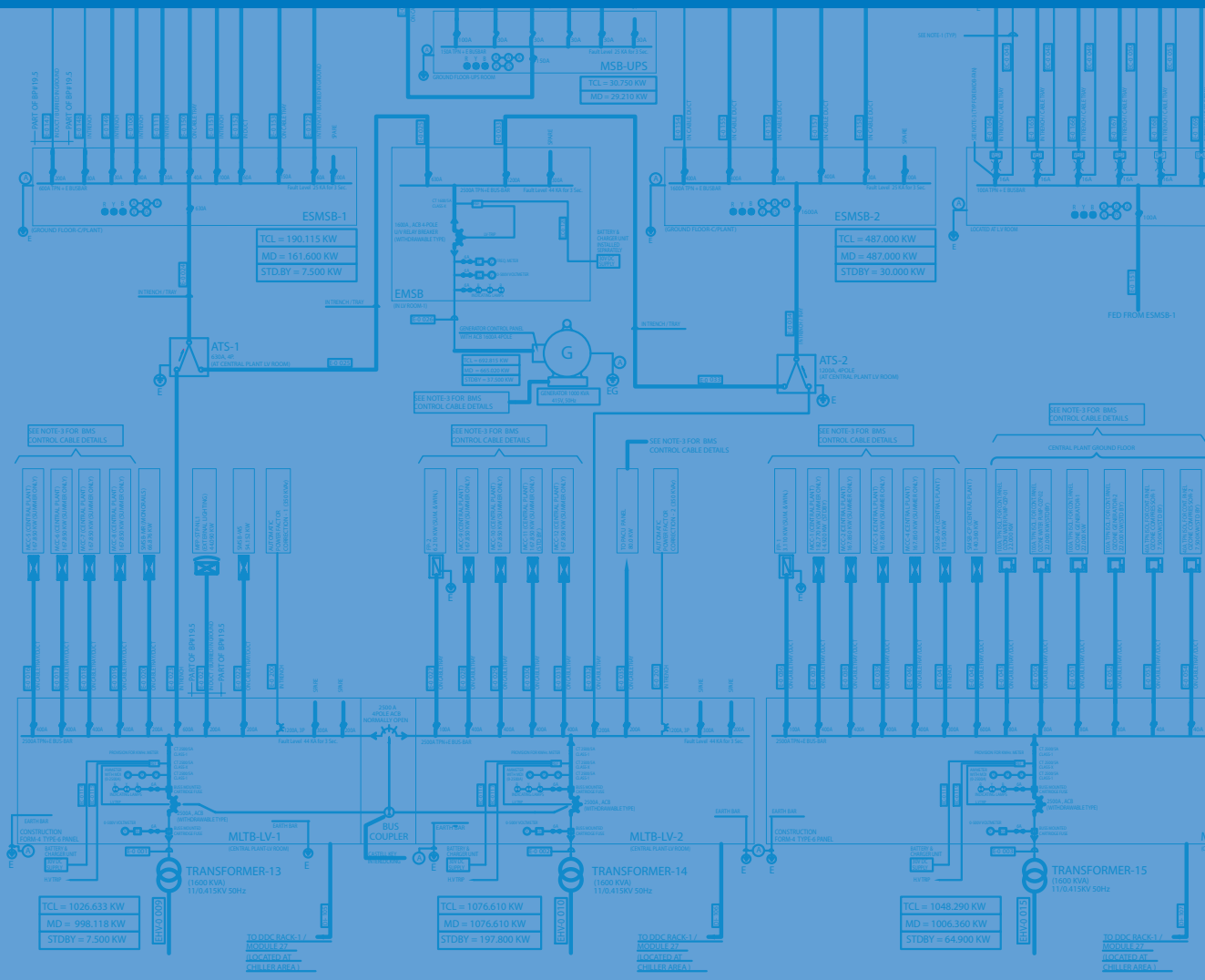
Question 9 - What if my Distributor or Customer asks for more information.
Answer 8 – We will be writing to the Distributors again to provide an overview of the new range, pricing information, cross reference details etc shortly. A new MCB / MCCB solutions catalogue will be available at the launch.

Question 10 - Who should further questions be referred to in Eaton.

Mike Lawrence - Product Line Team Leader - Commercial Assemblies
Alan Birks - Commercial Marketing Manager
Andy Hudson - Marketing Communications

Discrimination and Back-up tables
Technical Data

- Moulded Case Circuit Breakers
- Miniature Circuit Breakers
- HRC Fuses



Contents:

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Powering Business Worldwide

OVERLOAD & SHORT CIRCUIT DISCRIMINATION (SELECTIVITY) – FAULT LEVEL TO WHICH DISCRIMINATION IS ACHIEVED (A)

Circuit breakers upstream / circuit breakers downstream

Table A

Powering Business Worldwide

UPSTREAM ⟶ (max.settings) 'T' represents maximum discrimination to kA rating level of the downstream device

DOWNSTREAM ↓

BREAKER RATING A		EMBS MCB C or D Curve				Series-G E FRAME MCCB										Series-G J FRAME MCCB							Series-G L FRAME					Series-G N FRAME			Series-G R FRAME		
		63	80	100	125	16	20	32	40	50	63	80	100	125	160	50	80	100	125	160	200	250	250	320	400	500	630	800	1250	1600	1600	2000	2500
		18, 25, 45, or 70kA versions														45 or 70kA versions							50 or 70kA versions					50 or 70 or 100kA versions			70 or 100kA versions		
EATON MCB 10kA IEC60898 & 15kA IEC60947-2 Series: EMBH EMCH EMDH	1	.63kA	.8kA	1kA	1.25kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	2	.63kA	.8kA	1kA	1.25kA	7kA	7kA	8kA	8kA	8kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	4	.63kA	.8kA	1kA	1.25kA	7kA	7kA	8kA	8kA	8kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	6	.63kA	.8kA	1kA	1.25kA	7kA	7kA	7kA	8kA	8kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	8	.63kA	.8kA	1kA	1.25kA			7kA	7kA	8kA	8kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	10	.63kA	.8kA	1kA	1.25kA			7kA	7kA	7kA	8kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	13	.63kA	.8kA	1kA	1.25kA				7kA	7kA	7kA	8kA	9kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T	T						
	16	.63kA	.8kA	1kA	1.25kA					7kA	7kA	8kA	8kA	9kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T						
	20	.63kA	.8kA	1kA	1.25kA						7kA	7kA	8kA	8kA	9kA	T	T	T	T	T	T	T	T	T	T	T	T						
	25	.63kA	.8kA	1kA	1.25kA						6kA	7kA	7kA	8kA	8kA		T	T	T	T	T	T	T	T	T	T	T						
	32	.63kA	.8kA	1kA	1.25kA						5kA	6kA	7kA	7kA	7kA		T	T	T	T	T	T	T	T	T	T	T						
	40	.63kA	.8kA	1kA	1.25kA							5kA	6kA	7kA	7kA		T	T	T	T	T	T	T	T	T	T	T						
	50		.8kA	1kA	1.25kA								5kA	6kA	6kA			T	T	T	T	T	T	T	T	T	T						
	63			1kA	1.25kA								1.5kA	5kA	5kA				T	T	T	T	T	T	T	T	T						
EATON MCB IEC60947-2 63A=25kA, 80-100A=20kA, 125A=15kA Series EMBS, EMCS, EMDS	63												1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	T	T	T	T	T						
	80												1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	T	T	T	T	T						
	100													1kA	1.6kA					10kA	10kA	10kA	T	T	T	T	T						
	125																				3kA	3kA	T	T	T	T	T						
Series-G E-frame MCCB 18kA & 25kA Versions	16							.32kA	.4kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	20							.2kA	,4kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	32								.1kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	40									.1kA	.63kA	.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	T	T	T	T	T	T	T	T	T	T	T	T
	50										.63kA	.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	T	T	T	T	T	T	T	T	T	T	T
	63											.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	T	T	T	T	T	T	T	T	T	T	T
	80												1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	T	T	T	T	T	T	T	T	T	T	T
	100													1kA	1.6kA					10kA	10kA	10kA	T	T	T	T	T	T	T	T	T	T	T
	125																				3kA	3kA	T	T	T	T	T	T	T	T	T	T	T
	160																					3kA	T	T	T	T	T	T	T	T	T	T	T
Series-G E-frame MCCB 45kA & 70kA Versions	16							.32kA	.4kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	20							.2kA	,4kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	32								.1kA	.5kA	.63kA	.8kA	1kA	1.3kA	1.6kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	40									.1kA	.63kA	.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	50										.63kA	.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	63											.8kA	1kA	1.3kA	1.6kA			10kA	10kA	10kA	10kA	10kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	80												1kA	1.3kA	1.6kA					10kA	10kA	10kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	100													1kA	1.6kA						3kA	3kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA	65kA	65kA	65kA
	125																					3kA	26kA	26kA	26kA	26kA	26kA	65kA	65kA	65kA	65kA	65kA	65kA
Series-G J-frame MCCB 45kA & 70kA Versions	50																	1kA	1.25kA	1.6kA	2kA	2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA
	63																		1.25kA	1.6kA	2kA	2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA
	80																		1.25kA	1.6kA	2kA	2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	65kA	65kA	65kA
	100																			1.6kA	2kA	2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	125																			1.6kA	2kA	2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	160																					2.5kA			40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	200																								40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	250																								40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
Series-G L-frame MCCB 50kA & 70kA Versions	250																											40kA	40kA	40kA	40kA	40kA	40kA
	320																											40kA	40kA	40kA	40kA	40kA	40kA
	400																											40kA	40kA	40kA	40kA	40kA	40kA
	500																											22kA	22kA	22kA	40kA	40kA	40kA
	630																											22kA	22kA	22kA	40kA	40kA	40kA
Series-G N-frame MCCB 50kA & 70kA Versions	800																														40kA	40kA	40kA
	1250																														40kA	40kA	40kA
	1600																														40kA	40kA	40kA

OVERLOAD & SHORT CIRCUIT DISCRIMINATION (SELECTIVITY) - FAULT LEVEL TO WHICH DISCRIMINATION IS ACHIEVED (A)
Circuit breakers upstream / circuit breakers downstream

OVERLOAD & SHORT CIRCUIT DISCRIMINATION (SELECTIVITY) – FAULT LEVEL TO WHICH DISCRIMINATION IS ACHIEVED (A)

Fuses upstream / circuit breakers downstream

Table B

Powering Business Worldwide

UPSTREAM ⟶ BS88 Fuses MEM SB3 to SH10 'T' represents maximum discrimination to kA rating level of the downstream device

DOWNSTREAM ↓

FUSE RATING (A)		20	25	32	40	50	63	80	100	125	160	200	250	315	355	400	450	500	560	630	710	800
BREAKER RATING (A)																						
EATON MCB 10kA IEC60898 & 15kA IEC60947-2 Series: EMBH EMCH EMDH	1	.16kA	.28kA	.65kA	1.6kA	2.6kA	5.4kA	7.5kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	2	.16kA	.28kA	.65kA	1.6kA	2.6kA	5.4kA	7.5kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	4	.16kA	.28kA	.65kA	1.6kA	2.6kA	5.4kA	7.5kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	6	.16kA	.28kA	.65kA	1.6kA	2.6kA	5.4kA	7.5kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	8		.23kA	.45kA	1.6kA	2.6kA	5.4kA	7.5kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	10		.23kA	.45kA	1kA	1.6kA	2.7kA	3.7kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	13			.28kA	.65kA	1.6kA	2.7kA	3.7kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	16			.28kA	.65kA	.95kA	1.8kA	2.3kA	7kA	T	T	T	T	T	T	T	T	T	T	T	T	T
	20				.6kA	.88kA	1.75kA	2.2kA	6.1kA	T	T	T	T	T	T	T	T	T	T	T	T	T
	25					.88kA	1.75kA	2.2kA	6.1kA	T	T	T	T	T	T	T	T	T	T	T	T	T
	32					.75kA	1.5kA	1.8kA	4.6kA	6.2kA	T	T	T	T	T	T	T	T	T	T	T	T
	40						1.2kA	1.6kA	4kA	5.5kA	T	T	T	T	T	T	T	T	T	T	T	T
	50							1.4kA	3.4kA	4.5kA	7kA	T	T	T	T	T	T	T	T	T	T	T
	63								.5kA	3kA	4.3kA	T	T	T	T	T	T	T	T	T	T	T
EATON MCB IEC60947-2 63A=25kA, 80-100A=20kA, 125A=15kA Series EMBS, EMCS, EMDS	63								.5kA	3kA	4.3kA	T	T	T	T	T	T	T	T	T	T	T
	80											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	T	T	T	T
	100											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	T	T	T	T
	125													6KkA	9kA	22kA	24kA	24kA	T	T	T	T
Series-G E-frame MCCB 18kA & 25kA Versions	16				.45kA	.53kA	1.6kA	1.6kA	1.6kA	1.8kA	2.3kA	4.3kA	8kA	14kA	22kA	T	T	T	T	T	T	T
	20					.55kA	1kA	1kA	1.6kA	1.8kA	2.3kA	4.3kA	8kA	14kA	18kA	T	T	T	T	T	T	T
	32							.92kA	1.6kA	1.75kA	2.2kA	4kA	6KkA	8.5kA	13.T	T	T	T	T	T	T	T
	40								1.6kA	1.75kA	2.2kA	3.7kA	5.25kA	7.5kA	11kA	T	T	T	T	T	T	T
	50									1.7kA	2.1kA	3.5kA	4.9kA	6.7kA	9.6kA	23.5kA	23.5kA	23.5kA	T	T	T	T
	63									1.7kA	2.1kA	3.5kA	4.9kA	6.7kA	9.6kA	23.5kA	23.5kA	23.5kA	T	T	T	T
	80											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	T	T	T	T
	100											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	T	T	T	T
	125													6KkA	9kA	22kA	24kA	24kA	T	T	T	T
	160														9kA	19kA	22kA	22kA	T	T	T	T
Series-G E-frame MCCB 45kA & 70kA Versions	20					.55kA	1kA	1kA	1.6kA	1.8kA	2.3kA	4.3kA	8kA	14kA	18kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	32							.92kA	1.6kA	1.75kA	2.2kA	4kA	6KkA	8.5kA	13.25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	40								1.6kA	1.75kA	2.2kA	3.7kA	5.25kA	7.5kA	11kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	50									1.7kA	2.1kA	3.5kA	4.9kA	6.7kA	9.6kA	23.5kA	23.5kA	23.5kA	25kA	25kA	25kA	25kA
	63									1.7kA	2.1kA	3.5kA	4.9kA	6.7kA	9.6kA	23.5kA	23.5kA	23.5kA	25kA	25kA	25kA	25kA
	80											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	25kA	25kA	25kA	25kA
	100											3.5kA	4.5kA	6KkA	9kA	22kA	24kA	24kA	25kA	25kA	25kA	25kA
	125													6KkA	9kA	22kA	24kA	24kA	25kA	25kA	25kA	25kA
	160														9kA	19kA	22kA	22kA	25kA	25kA	25kA	25kA
Series-G J-frame MCCB 45kA & 70kA Versions	50									2.2kA	2.75kA	4.6kA	7kA	8.8kA	12kA	24kA	24kA	24kA	25kA	40kA	40kA	40kA
	63										2.75kA	4.3kA	7kA	8.8kA	12kA	24kA	24kA	24kA	25kA	40kA	40kA	40kA
	80											4.2kA	6.2kA	8kA	10kA	22kA	24kA	24kA	25kA	40kA	40kA	40kA
	100											4.1kA	6.2kA	8kA	10kA	22kA	24kA	24kA	25kA	40kA	40kA	40kA
	125													8kA	10kA	22kA	24kA	24kA	25kA	40kA	40kA	40kA
	160														9.5kA	19kA	22kA	22kA	25kA	40kA	40kA	40kA
	200																		25kA	40kA	40kA	40kA
	250																			25kA	25kA	40kA
Series-G L-frame MCCB 50kA & 70kA Versions	250																	8kA	9.5kA	18kA	18kA	40kA
	320																		9kA	14kA	14kA	40kA
	400																					35kA
	500																					
	630																					

OVERLOAD & SHORT CIRCUIT DISCRIMINATION (SELECTIVITY) – FAULT LEVEL TO WHICH DISCRIMINATION IS ACHIEVED (A)

Eaton Magnum ACBs upstream / Eaton Series G MCCBs downstream

Table C

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UPSTREAM →

DOWNSTREAM ↓

BREAKER RATING (A)		Magnum ACB Range - Utilisation Category B (provides for time graded discrimination)								
		800	1250	1600	2000	2500	3200	4000	5000	6300
Series-G E-frame MCCB (* = up to Icu rated breaking capacity of downstream MCCB)	16	T *	T *	T *	T *	T *	T *	T *	T *	T *
	20	T *	T *	T *	T *	T *	T *	T *	T *	T *
	32	T *	T *	T *	T *	T *	T *	T *	T *	T *
	40	T *	T *	T *	T *	T *	T *	T *	T *	T *
	50	T *	T *	T *	T *	T *	T *	T *	T *	T *
	63	T *	T *	T *	T *	T *	T *	T *	T *	T *
	80	T *	T *	T *	T *	T *	T *	T *	T *	T *
	100	T *	T *	T *	T *	T *	T *	T *	T *	T *
	125	T *	T *	T *	T *	T *	T *	T *	T *	T *
	160	T *	T *	T *	T *	T *	T *	T *	T *	T *
Series-G J-frame MCCB (* = up to Icu rated breaking capacity of downstream MCCB)	50	T *	T *	T *	T *	T *	T *	T *	T *	T *
	63	T *	T *	T *	T *	T *	T *	T *	T *	T *
	80	T *	T *	T *	T *	T *	T *	T *	T *	T *
	100	T *	T *	T *	T *	T *	T *	T *	T *	T *
	125	T *	T *	T *	T *	T *	T *	T *	T *	T *
	160	T *	T *	T *	T *	T *	T *	T *	T *	T *
	200	T *	T *	T *	T *	T *	T *	T *	T *	T *
	250	T *	T *	T *	T *	T *	T *	T *	T *	T *
Series-G L-frame MCCB (* = up to Icu rated breaking capacity of downstream MCCB)	250	T *	T *	T *	T *	T *	T *	T *	T *	T *
	320	T *	T *	T *	T *	T *	T *	T *	T *	T *
	400	T *	T *	T *	T *	T *	T *	T *	T *	T *
	500	T *	T *	T *	T *	T *	T *	T *	T *	T *
	630	T *	T *	T *	T *	T *	T *	T *	T *	T *
Series-G N-frame MCCB (* = up to Icu rated breaking capacity of downstream MCCB)	800	T *	T *	T *	T *	T *	T *	T *	T *	T *
	1250		T *	T *	T *	T *	T *	T *	T *	T *
	1600		T *	T *	T *	T *	T *	T *	T *	T *

OVERLOAD & SHORT CIRCUIT DISCRIMINATION (SELECTIVITY) - FAULT LEVEL TO WHICH DISCRIMINATION IS ACHIEVED (A)
Eaton Magnum ACBs upstream / Eaton Series G MCCBs downstrea

BACKUP PROTECTION* – FAULT LEVEL TO WHICH PROTECTION IS ACHIEVED (kA) (* Also known as 'series-rating' or 'co-ordination')
MCCBs or fuses upstream / MCBs downstream
Table D

Powering Business Worldwide

UPSTREAM ⟶ (max.settings)

DOWNSTREAM ↓

BREAKER RATING A		kA	MCCB E-frame: Series-G E Frame MCCB (18kA)								
			16	20	32	40	50	63	80	100	125
			18	18	18	18	18	18	18	18	18
	1	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	2	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	4	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	6	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	8	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	10	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	13	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	16	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	20	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	25	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	32	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	40	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	50	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA
	63	10	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA	18kA

BREAKER RATING A		kA	MCCB E-frame: Series-G E FRAME MCCB (25kA)								
			16	20	32	40	50	63	80	100	125
			25	25	25	25	25	25	25	25	25
	1	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	2	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	4	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	6	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	8	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	10	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	13	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	16	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	20	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	25	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	32	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	40	10	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA	25kA
	50	10	25kA	25kA	25kA	25kA	25kA	25kA	22kA	22kA	22kA
	63	10	25kA	25kA	25kA	25kA	25kA	25kA	22kA	22kA	22kA

BREAKER RATING A		kA	MCCB E-frame: Series-G E FRAME MCCB (45kA)									
			20	32	40	50	63	80	100	125	160	
			45	45	45	45	45	45	45	45	45	
	1	10	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	
	2	10	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	
	4	10	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	
	6	10	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	45kA	
	8	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	10	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	13	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	16	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	20	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	25	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	32	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	40	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	50	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	
	63	10	45kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA	

BREAKER RATING A		kA	MCCB E-frame: Series-G E FRAME MCCB (70kA)							
			20	32	40	50	63	80	100	125
			70	70	70	70	70	70	70	70
	1	10	70kA	70kA	70kA	70kA	70kA	70kA	70kA	70kA
	2	10	70kA	70kA	70kA	70kA	70kA	70kA	70kA	70kA
	4	10	70kA	70kA	70kA	70kA	70kA	70kA	70kA	70kA
	6	10	70kA	70kA	70kA	70kA	70kA	50kA	50kA	50kA
	8	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	10	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	13	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	16	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	20	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	25	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	32	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	40	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	50	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	63	10	70kA	40kA	40kA	40kA	40kA	40kA	40kA	40kA

BREAKER RATING A		kA	MCCB J-frame: Series-G J FRAME MCCB (45kA)						
			50	80	100	125	160	200	250
			40	40	40	40	40	40	40
	1	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	2	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	4	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	6	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	8	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	10	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	13	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	16	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	20	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	25	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	32	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	40	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	50	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	63	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA

BREAKER RATING A		kA	MCCB J-frame: Series-G J FRAME MCCB (70kA)						
			50	80	100	125	160	200	250
			70	70	70	70	70	70	70
	1	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	2	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	4	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	6	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	8	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	10	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	13	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	16	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	20	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	25	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	32	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	40	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	50	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA
	63	10	40kA	40kA	40kA	40kA	40kA	40kA	40kA

BREAKER RATING A		kA	BS FUSE: BS88					BS 1361
			<80	100	160	200	100	
			80	80	80	80	33	
	1	10	80kA	40kA	25kA	25kA	33kA	
	2	10	80kA	40kA	25kA	25kA	33kA	
	4	10	80kA	40kA	25kA	25kA	33kA	
	6	10	80kA	40kA	25kA	25kA	33kA	
	8	10	80kA	40kA	25kA	25kA	33kA	
	10	10	80kA	40kA	25kA	25kA	33kA	
	13	10	80kA	50kA	40kA	25kA	33kA	
	16	10	80kA	50kA	40kA	25kA	33kA	
	20	10	80kA	50kA	40kA	25kA	33kA	
	25	10	80kA	50kA	40kA	25kA	33kA	
	32	10	80kA	50kA	40kA	25kA	33kA	
	40	10	80kA	50kA	40kA	25kA	33kA	
	50	10	80kA	50kA	40kA		33kA	
	63	10	80kA	50kA	40kA		33kA	

BACKUP PROTECTION* - FAULT LEVEL TO WHICH PROTECTION IS ACHIEVED (kA)
(* Also known as 'series-rating' or 'co-ordination')
MCCBs or fuses upstream / MCBs downstream

BACKUP PROTECTION* – FAULT LEVEL TO WHICH PROTECTION IS ACHIEVED (kA) (* Also known as 'series-rating' or 'co-ordination')

MCCBs or fuses upstream / MCCBs downstream

Table E

Powering Business Worldwide

UPSTREAM ⟶ (max.settings)

DOWNSTREAM ↓

BREAKER RATING (A)			MCCB								BS FUSE
			Series-G J FRAME MCCB		Series-G L FRAME MCCB		Series-G N FRAME MCCB		Series-G R FRAME MCCB		BS88
			45kA	70kA	50kA	70kA	50kA	70kA	70kA		80kA
			all current ratings		all current ratings		all current ratings		all current ratings		200A Max
Series-G E-frame MCCB	18kA	all current ratings	40kA	40kA							80kA
	25kA		40kA	40kA							80kA
	45kA		45kA	70kA	50kA	70kA	50kA	70kA	70kA		80kA
	70kA			70kA		70kA		70kA	70kA		80kA
Series-G J-frame MCCB	45kA	all current ratings	45kA	70kA	50kA	70kA	50kA	70kA	70kA		80kA
	70kA			70kA		70kA		70kA	70kA		80kA
Series-G L-frame MCCB	50kA	all current ratings					50kA	70kA	70kA		
	70kA							70kA	70kA		
Series-G N-frame MCCB	50kA	all current ratings					50kA	70kA	70kA		
	70kA							70kA	70kA		
	100kA										
Series-G R-frame MCCB	70kA	all current ratings							70kA		
	100kA										

BACKUP PROTECTION* - FAULT LEVEL TO WHICH PROTECTION IS ACHIEVED (kA)
(* Also known as 'series-rating' or 'co-ordination')
MCCBs or fuses upstream / MCCBs downstream