Network Monitoring Relays

Voltage relay BA 9036, AI 936
varimeter

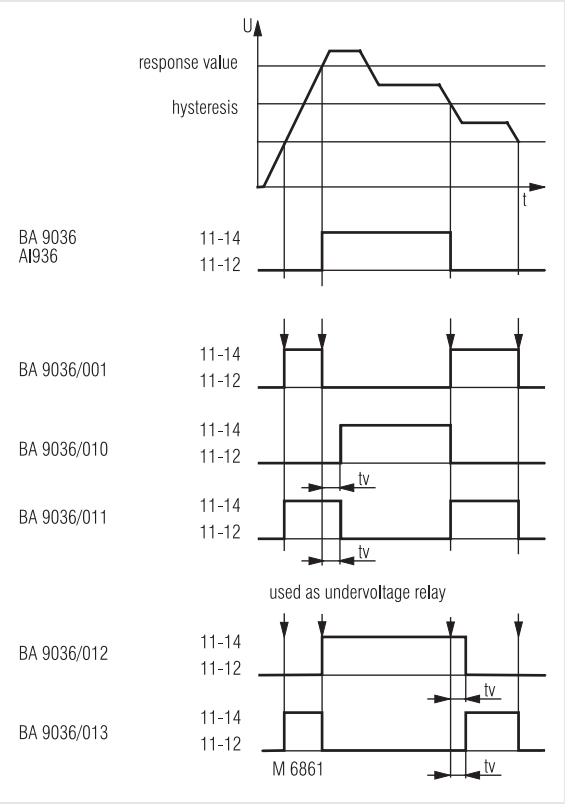
0225114


BA 9036


AI 936

- According to IEC 255, VDE 0435 part 303
- Single-phase
- Measuring ranges from 24 to 400
- Settable response and release value
- Without auxiliary supply
- BA 9036 optionally available with adjustable time delay at response or release value
- BA 9036 with LED indicators for operation and state of contacts
- BA 9036: 2 changeover contacts
  AI 936: 1 changeover contact
- Width 45 mm

Function diagram



Approvals and marking

USA * see variants

Application

Monitoring of voltage in DC and AC systems

Indicators

BA 9036:
upper LED: on, when voltage connected
lower LED: on, when output contact activated

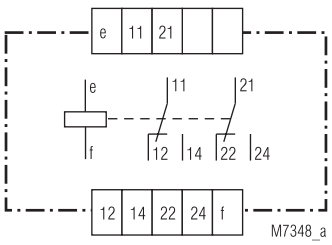
Standard types

BA 9036 AC 230 V 50 / 60 Hz
Article number: 0045288 stock item
AI 936 AC 230 V 50 / 60 Hz
Article number: 0001152 stock item
- Nominal voltage U_N: AC 230 V

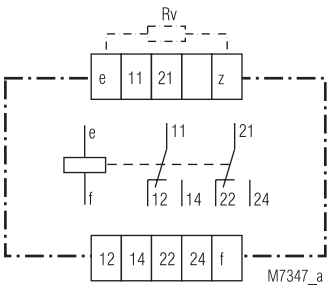
Variants

BA 9036/61: with UL approval
BA 9036/001: overvoltage / closed circuit operation
BA 9036/010: overvoltage / open circuit operation / time delay
BA 9036/011: overvoltage / closed circuit operation / time delay
BA 9036/012: undervoltage / open circuit operation / time delay
BA 9036/013: undervoltage / closed circuit operation / time delay

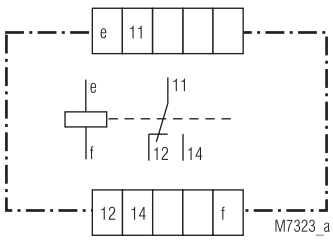
Circuit diagrams



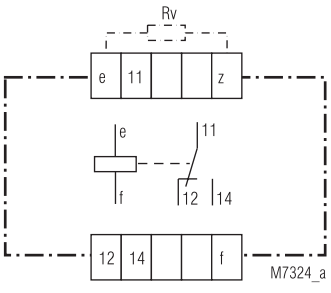
BA 9036
connection diagram for AC voltage



BA 9036
connection diagram for DC voltage



AI 936
connection diagram for AC voltage



AI 936
connection diagram for DC voltage

When using a drop resistor the measuring has to be connected to e^+ and f

Technical data

Input

Nominal voltage U_N:	AC 42, 110, 127, 230, 240, 290, 400 V DC 24, 48, 60 V DC 110*, 127*, 220*, 240 V* BA 9036: DC 110 V*: ZWS 20 SL 1,5 kΩ 20 W DC 127 V*: ZWS 20 SL 1,6 kΩ 20 W DC 220 V*: ZWS 35 SL 3,9 kΩ 35 W DC 240 V*: ZWS 35 SL 4,7 kΩ 35 W AI 936: DC 110 V*: ZWS 20 SL 1,5 kΩ 20 W DC 220 V*: ZWS 35 SL 3,9 kΩ 35 W *) with external drop resistor
Nominal consumption:	6 VA / 10 W
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %
Temperature influence:	< 0,05 % / K
Max. overload:	1,2 U_N continuously

Setting ranges

Setting:	0,85 ... 1,05 U_N
Hysteresis:	0,75 ... 0,95 of setting value
Setting accuracy:	± 5 %
Repeat accuracy:	± 0,5 %
Time delay t_v:	
only with BA 9036	0,5 ... 10 s adjustable

Output

Contacts		
BA 9036:	2 changeover contacts	
AI 936:	1 changeover contact	
Thermal current I_{th}:	6 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical contact life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V:	≥ 2,5 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	6 kV (air)	EN 61 000-4-2
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
BA 9036:	310 g	
AI 936:	300 g	

Ordering example

BA 9036 /_ _ _ AC 230 V 50 Hz

- Nominal frequency
- Nominal voltage
- Variant, if required
- Type

Dimensions

Width x height x depth

BA 9036:	45 x 73 x 132 mm
AI 936:	45 x 77 x 127 mm

Characteristic

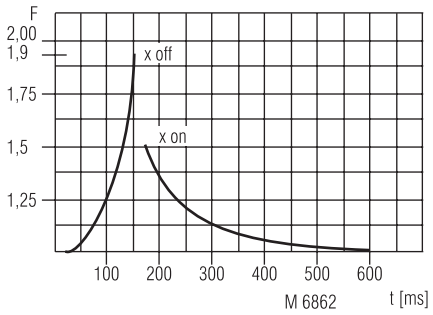


Diagram switching delay

Switching delay t_M:
The characteristic shows the switching delay depending on the values of X_{on} - X_{off} when switching the voltage on or off. A slow voltage change reduces the delay.

Example:

U setting = 200 V
U applied = 230 V

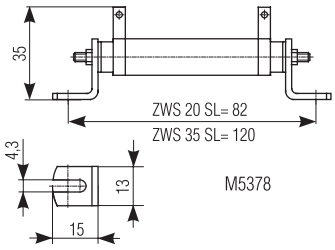
$$F = \frac{230\ V}{200\ V} = 1{,}1$$

$t_M$on = approx. 300 ms
$t_M$off = approx. 60 ms

$$F = \frac{U\ applied}{U\ setting}$$

Accessories

ZWS 20 SL, ZWS 35 SL Drop resistor



AI 936:
K 70-34 Cover

Voltage relay BA 9054, MK 9054
varimeter

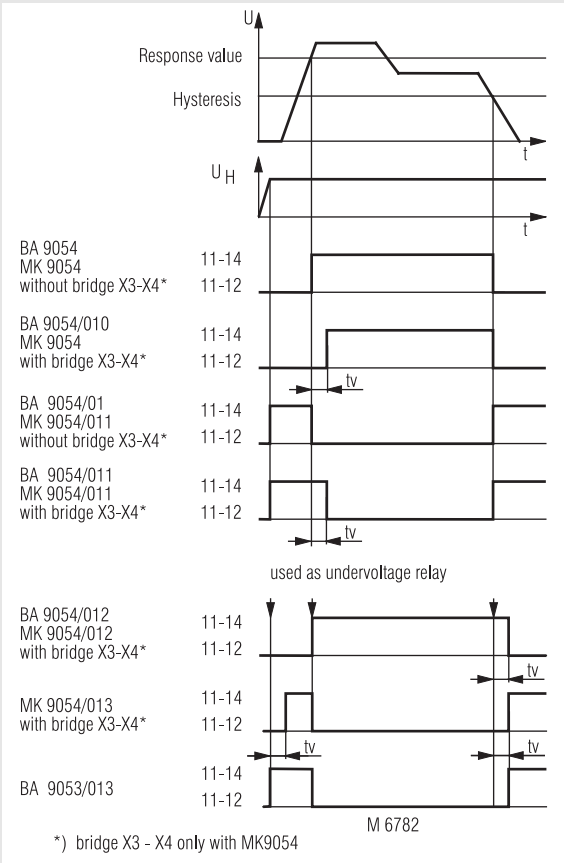
0221541

BA 9054

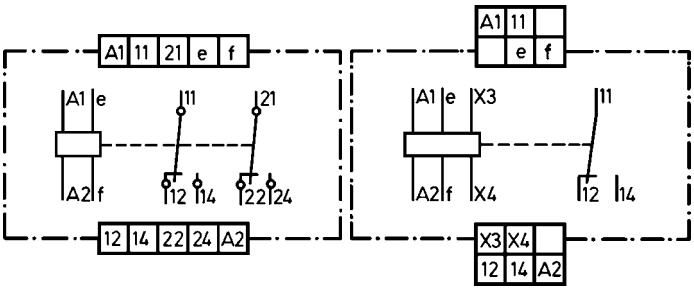
MK 9054

- According to IEC 255, VDE 0435 part 303
- One model for AC and DC voltages
- Measuring ranges from 15 mV to 500 V
- BA 9054 optionally with galvanic separated DC auxiliary supply
- MK 9054 optionally with remote potentiometer
- Open circuit operation
- Optionally closed circuit operation
- High overload possible
- Permissible frequency range of the measuring voltage: 50 ... 400 Hz
- Optionally with time delay
- LED indicators for operation and contact position
- Width MK 9054: 22,5 mm
  Width BA 9054: 45 mm

Function diagram



Circuit diagrams



BA 9054 MK 9054

Approvals and marking

Deutschland	USA	USA / Canada	
GL	*	c UL us *	CE

* see Variants

Applications

Monitoring voltage in AC or DC systems

Function

The relays measure the arithmetic mean value of the rectified measuring voltage. The AC units are adjusted to the r.m.s value. They have settings for response value and hysteresis. The units work as overvoltage relays but can also be used for undervoltage detection. The hysteresis is dependent on the response value. The BA 9054 is optionally available with time delay. On the MK 9054 a fixed time delay can be activated by linking terminals X3-X4.

Indicators

upper LED: on, when auxiliary supply connected
lower LED: on, when output relay acitvated

Standard type

BA 9054 AC 25 ... 250 A AC 230 V
Article number: 0029191
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H: AC 230 V
- Without time delay
- Open circuit operation

MK 9054 AC 25 ... 250 V AC 230 V 1 s
Article number: 0026686 stock item
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H: AC 230 V
- Time delay: 1 s
- Open circuit operation

Variants

BA 9054.12/61:	with UL-approval
BA 9054/001:	closed circuit operation
BA 9054/010:	open circuit operation with time delay at U_{an}
BA 9054/011:	closed circuit operation with time delay at U_{an}
BA 9054/012*:	closed circuit operation with time delay at U_{ab}
BA 9054/013*:	open circuit operation with time delay at U_{off}

The units BA/MK 9054/012 and BA/MK 9054/013 can be used as undervoltage relays. The delay starts when the inputs signal drops below the setting value.

MK 9054/61:	with UL-approval (Canada/USA)
MK 9054/011:	closed circuit operation
MK 9054/012*:	closed circuit operation
MK 9054/013*:	open circuit operation
MK 9054/1_ _:	connection of remote potentiometer with 470 kΩ

Technical data

Input

BA 9054		
Measuring range[1)]	internal resistance	max. permissible continuous voltage
15 - 150 mV	40 kΩ	6 V
50 - 500 mV	270 kΩ	20 V
0,5 - 5 V	330 kΩ	200 V
5 - 50 V	2 MΩ	500 V [2)]
25 - 250 V	2 MΩ	500 V [2)]
50 - 500 V	2 MΩ	500 V [2)]

[1)] DC or AC voltage 50 ... 400 Hz
[2)] at Overvoltage category II: 600 V

MK 9054		
Measuring range[1)]	internal resistance	max. permissible continuous voltage
15 - 150 mV	40 kΩ	100 V
50 - 500 mV	270 kΩ	250 V
0,5 - 5 V	500 kΩ	300 V
1 - 10 V	1 MΩ	300 V
5 - 50 V	2 MΩ	600 V [2)]
25 - 250 V	2 MΩ	600 V [2)]
50 - 500 V	2 MΩ	600 V [2)]

[1)] DC or AC voltage 50 ... 60 Hz
[2)] at Overvoltage category II: 600 V

Please note:
To avoid measuring mistakes, on units with mV input the input must always be terminated. In addition screened wires should be used.

Measuring principle:	arithmetic mean value
Adjustment:	DC units are adjusted to the DC-voltage mean value, AC units to the r.m.s value. It ist possible to use AC units to measure DC and the other way round. The scaling is the shifted by the factor: ($U_{r.m.s}$ = 1,1 $\bar{U}$: $\bar{U}$ = 0,9 $U_{r.m.s}$)
Temperature influence:	< 0,05 % / K

Technical data

Setting ranges

Setting:

Response value:	infinite variable 0,1 U_N ... 1 U_N relative scale
Hysteresis:	infinite variable 0,5 ... 0,98 of setting value
Accuracy:	≤ ± 5 %
Time delay t_v	
BA 9054:	infinite variable from 0,5 ... 5 s only with BA 9054/010, BA 9054/011,BA 9054/012, BA 9054/013 other values on request
MK 9054:	approx. 1 s or 5 s, fixed The units are delivered with a bridge between terminals X3 - X4. If this bridge is removed the time delay is inactive

Auxiliary circuit

Auxiliary voltage U_H:	
BA 9054:	AC 24, 42, 110, 127, 230 V AC/DC 24 ... 60 V, AC/DC 110 ... 230 V
MK 9054:	AC 24, 42, 110, 127, 230 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption:	
BA 9054:	ca. 2,5 VA
MK 9054:	ca. 2,0 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
BA 9054.12:	2 changeover contacts	
MK 9054:	1 changeover contact	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15:		
NO contact (MK9054):	3 A / AC 230 V	EN 60 947-5-1
NC contact (MK 9054):	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 3 A, AC 230 V:	10^5 switching cycles	
Short-circuit strength		
max. fuse rating:	6 AgL	EN 60 947-5-1
Mechanical life:	30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:		
BA 9054:	- 40 ... + 60°C	
MK 9054:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	EN 61 000-4-5
between wire and ground:	4 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance		
BA 9054:	40 / 60 / 04	EN 60 068-1
MK 9054:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	

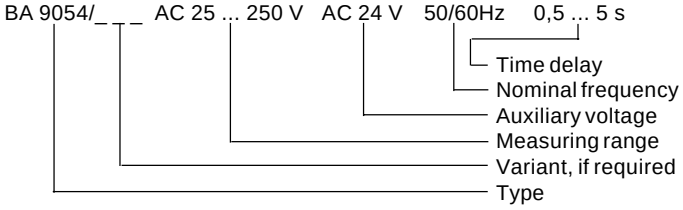
Technical data

Wire connection

BA 9054:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
MK 9054:	2 x 1,5 mm² solid or 2 x 1 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:		
BA 9054:	270 g	
MK 9054:	160 g	

Ordering example

BA 9054/_ _ _ AC 25 ... 250 V AC 24 V 50/60Hz 0,5 ... 5 s



Dimensions

Width x height x depth

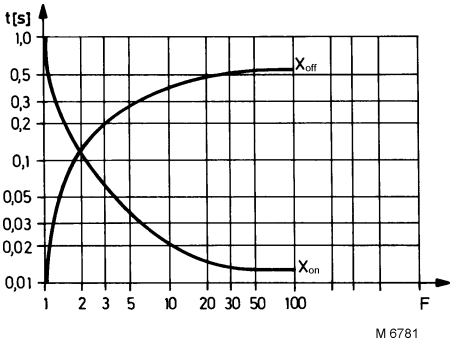
BA 9054:	45 x 73 x 132 mm
MK 9054:	22,5 x 82 x 102 mm

Accessories

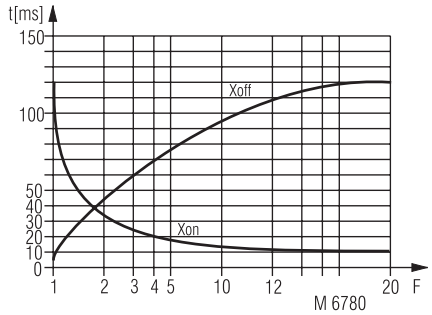
for MK 9054

ET 4752-143:	Marking plate

Characteristics



BA 9054



MK 9054

Switching delay

The characteristic shows the switching delay depending on the values of X_{on} - X_{off} when switching the current on or off. A slow current change reduces the delay.

$$F = \frac{\text{U applied}}{\text{U setting}}$$

Setting

Example:
Voltage relay BA 9054 / MK 9054 AC 25 ... 250 V

AC according to type plate:
i.e. the unit is adjusted to AC voltage
25 ... 250 V = measuring range

setting on upper potentiometer: 0,6
setting on lower potentiometer: 0,5

response value = 0,6 x 250 V = 150 V
release value = 0,5 x 150 V = 75 V

Undervoltage relay BA 9043, AA 9943 varimeter

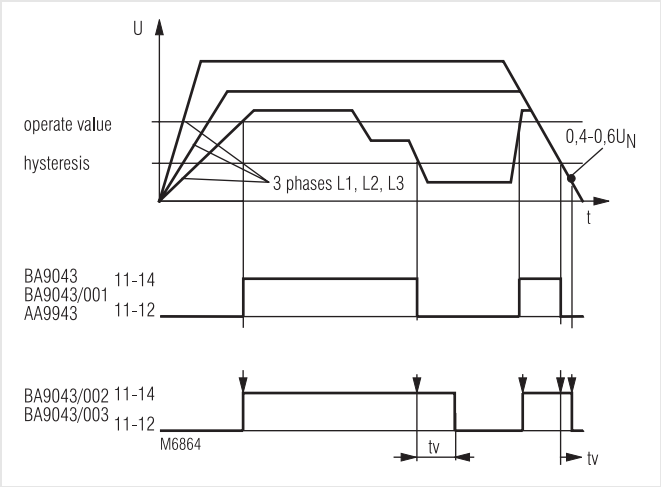
0221539


BA 9043

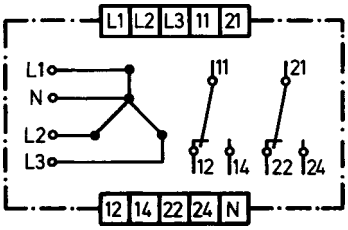

AA 9943

- According to IEC 255, VDE 0435 part 303
- 3-phase
- For nominal voltage of 3 AC 100/57 to 500/290 V
- Measures arithmetic mean value
- Adjustable operate and release value
- For 3p3w or 3p4w systems
- BA 9043 optionally with adjustable time delay
- Closed circuit operation
- LED indicator for operation and state of contact
- Insensitive to harmonics
- Width 45 mm

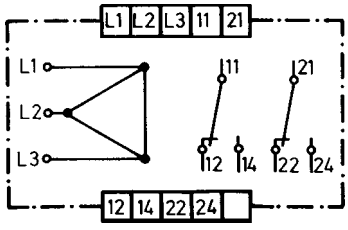
Function diagram



Circuit diagram



BA 9043, BA 9043/002
AA 9943



BA 9043/001, BA9043/003
AA 9943/001

Approvals and marking

CE

Application

Undervoltage detection in 3 phase systems

Indicators

upper LED:	on, when voltage connected
(only BA 9043)	
lower LED:	on, when output contact activated

Standard type

BA 9043 3/N AC 400 / 230 V

Article number:	0039676	stock item
• for 3p4w systems		
• Nominal voltage U_N:	3/N AC 400 / 230 V	
• Output:	2 changeover contacts	

Variants

AA 9943/001:	without neutral
BA 9043/001:	without neutral
BA 9043/002:	with neutral, adjustable time delay t_v = 0,5 ... 10 sec
BA 9043/003:	without neutral, adjustable time delay t_v = 0,5 ... 10 sec

Technical data

Input

Nominal voltage U_N

BA 9043, BA 9043/002
AA 9943: 3/N AC 100/57 V; 230/127 V; 400/230 V
415/240 V; 440/254 V; 500/290 V
50/60 Hz

BA 9043/001, BA 9043/003
AA 9943/001: 3 AC 100 V; 230 V; 400 V; 415 V, 440 V; 500 V; 50/60 Hz

Max. overload

BA 9043:	1,2 U_N continuously
AA 9943:	1,1 U_N continuously
Nominal consumption:	AC 4 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %
Temperature influence:	< 0,05 % / K

Technical data

Setting ranges

Response value:	0,85 ... 1,05 U_N, infinite variable with upper potentiometer
Hysteresis:	0,75 ... 0,95 of operate value
Setting accuracy:	≤ ± 10 %
Switching delay t_M:	see diagram switching delay
Time delay t_v:	infinite variable from 0,5 ... 10 sec for BA 9043/002, BA 9043/003 Between 0,4 and 0,6 U_N the contacts fall back according to the diagram without additional delay

Output

Contacts		
BA 9043:	2 changeover contacts	
AA 9943.11:	1 changeover contact	
AA 9943.12:	2 changeover contacts	
Thermal current I_{th}:	6 A; see diagramm Continuous current limit curve	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 3 A, AC 230 V:	3 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	> 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
HF wire guided:	10 V	EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	DIN EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
BA 9043:	310 g	
AA 9943:	300 g	

Ordering example

BA 9043 /_ _ _ 3/N AC 400/230 V 50 / 60 Hz
- Nominal frequency
- Nominal voltage
- Variant, if required
- Type

AA 9943 .11 /_ _ _ 3/N AC 400/230 V 50 / 60 Hz
- Nominal frequency
- Nominal voltage
- Variant, if required
- Contact
- Type

Dimensions

Width x height x depth

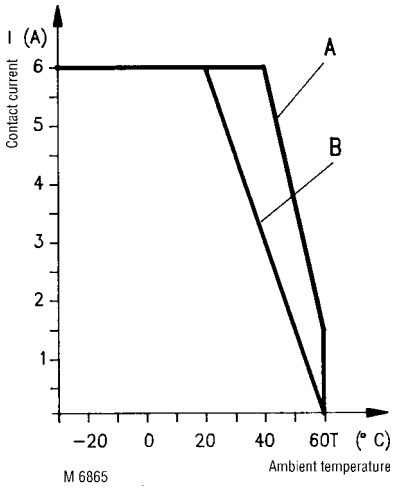
BA 9043:	45 x 73 x 132 mm
AA 9943:	45 x 77 x 127 mm

Accessories

AA 9943:

K 70-34	Cover

Characteristics



Continuous current limit curve

A = Devices mounted with 2 cm distance
B = Devices mounted without distance

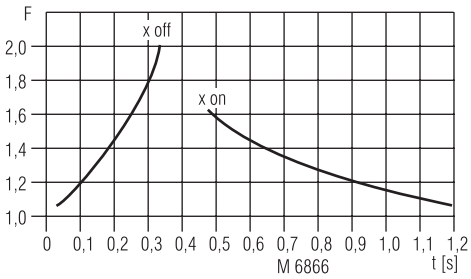


Diagram switching delay

Switching delay t_M:

When the voltage changes fast on the measuring input, the arithmetic mean value can only adjust after a short delay.

Example:

$$F = \frac{\text{U applied}}{\text{U setting}} \qquad F = \frac{240\ \text{V}}{190\ \text{V}} = 1{,}26$$

U applied = 190 V
U setting = 240 V

according to diagram:
$t_M$on = approx. 800 ms
$t_M$off = approx. 100 ms

Specification for tender for BA 9043

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p4w systems
Width 45 mm
Type BA 9043
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p4w systems, adjustable time delay up to 10 s.
Width 45 mm
Type BA 9043/002
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p3w systems
Width 45 mm
Type BA 9043/001
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p3w systems, adjustable time delay up to 10 s.
Width 45 mm
Type BA 9043/003
Manufactured by E. DOLD & SÖHNE KG

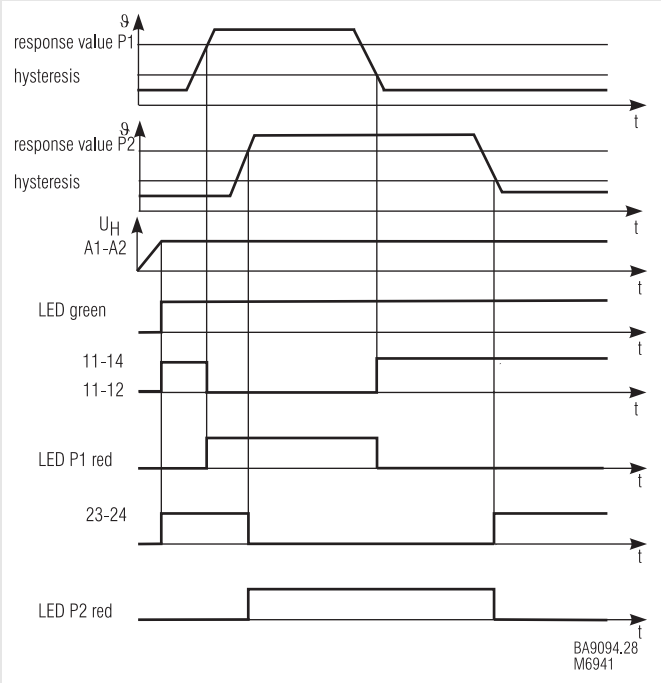
Temperatur monitoring relay BA 9094 varimeter

0225238

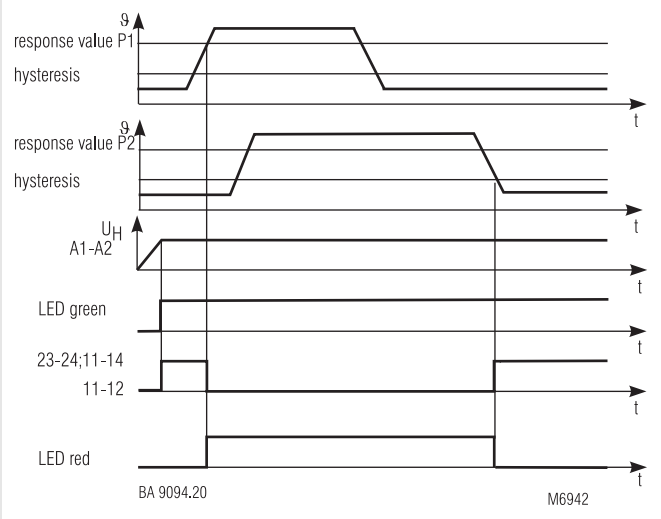
BA 9094/001

- According to IEC 255, VDE 0435
- 2 PT 100 inputs with separate outputs or alternatively common output
- Optionally 1 PT 100 input with 2 separate outputs for 2 different response values
- Separate adjustable response and release values for each input
- Optionally with fixed response and release values
- Broken wire detection in sensor circuit
- Closed circuit operation
- 2 wire connection
- Width 45 mm

Function diagrams



BA 9094.28, BA 9094.82/100



BA 9094.20

Applications

Monitoring of temperature e.g. Motors, ball bearings, etc.

Function

On overtemperature and broken wire the output relay deenergises

Indicator

green LED:	on, when auxiliary supply connected
red LED P1, P2:	on, when overtemperature

Notes

An input which is not used must be bridged

Standard type

BA 9094.28 AC 230 V 50/60 Hz 2 x 20 ... 100°C

Article number:	0048194	stock item
• Output:	1 changeover contact for P1 1 NO contact for P2	
• Nominal voltage U_N:	AC 230 V	
• Response value:	2 x 20 ... 100°C	

Variants

BA 9094. _ _ /001:	with fixed response and release value **Response value:** 135°C ± 2°C other values on request **Release value:** 125°C ± 2°C other values on request
BA 9094.82/100:	only 1 PT 100 input with 2 seperate outputs for 2 different response values

Technical data

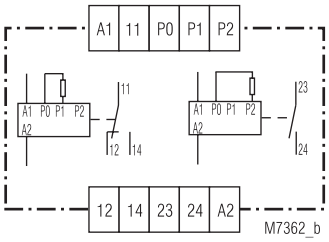
Input

Inputs:	2 PT 100 inputs
Setting range response value:	20°C ... 100°C other ranges on request
Hysteresis:	85 % ... 95 % of response value
Setting accuracy:	± 2 % of end of scale value

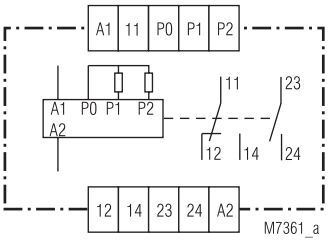
Auxiliary circuit

Auxiliary voltage U_H:	AC 24, 42, 110, 127, 230 V DC 24 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption:	3,4 VA
Nominal frequency:	50/60 Hz

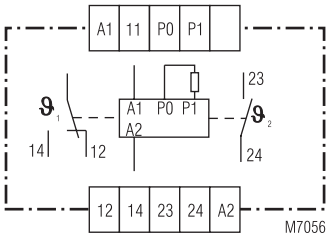
Circuit diagrams



BA 9094.28



BA 9094.20



BA 9094.28/100

Technical data

Output

Contacts:

BA 9094.28:	1 changeover contact for P1 1 NO contact for P2	
BA 9094.20:	1 changeover, 1 NO contact for P1, P2	
Thermal current I_{th} :	6 A	
Switching capacity		
to AC15:		
BA 9094.82:	5 A / AC 230 V	EN 60 947-5-1
BA 9094.20:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
BA 9094.28:		
to AC 15 at 5 A, AC 230 V:	> 0,1 x 10^6 switching cycles	
BA 9094.20:		
to AC 15 at 1 A, AC 230 V:	> 0,1 x 10^6 switching cycles	
Short-circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	> 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppressions:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz	
Climate resistance:	20 / 60 / 04	EN 60 068-2-6
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	320 g	

Ordering example

BA 9094 .28 AC 230 V 50 / 60 Hz 20°C ... 100°C 20°C ... 100°C

- Response value P1
- Response value P2
- Nominal frequency
- Auxiliary supply
- Contacts
- Type

BA 9094 .28 / ___ AC 230 V 50 / 60 Hz 135°C 125°C 135°C 125°C

- Release value P2
- Response value P2
- Release value P1
- Response value P1
- Nominal frequency
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Dimensions

Width x height x depth: 45 x 74 x 132 mm

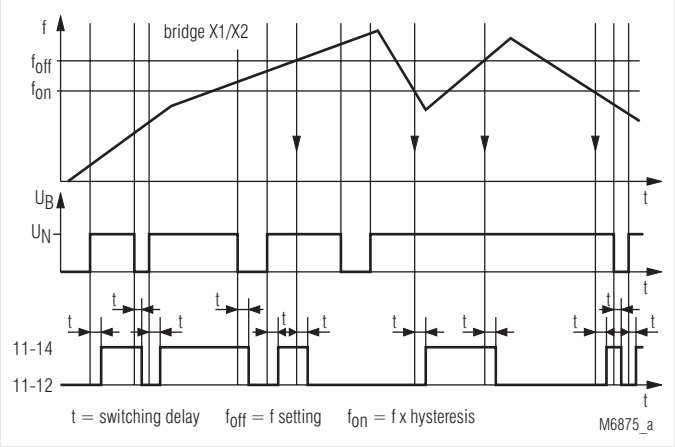
Frequency relay BA 9837, AA 9837
varimeter

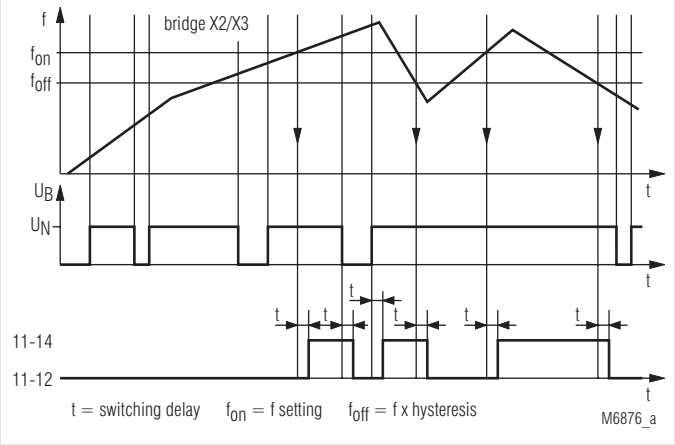
0225154

BA 9837 AA 9837

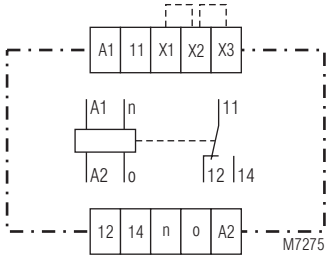
- According IEC/EN 60255, DIN VDE 0435-303
- Detection of under- or overfrequency
- Adjustable response value
- Optionally 1 or 2 changeover contacts
- Width 45 mm

Function diagram

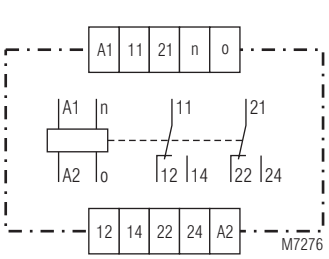




Circuit diagrams



BA 9837.11, AA 9837.11



BA 9837.12, AA 9837.12

Approvals and marking

CE

Application

The frequency relay can be used especially in applications where the rotor frequency of a slip-ring motor must be measured. The rotor frequency is reciprocal proportional to the speed (see diagram rotor frequency at contercurrent braking).
This behaviour allows to find speed depending switching values and can be used for start up and contercurrent braking of motors on cranes.

Function

The device compares 2 frequencies. The measuring frequency is compared to an internally generated, settable frequency reference.

With bridge on X1-X2 the output relay deenergises when the measuring frequency is higher then the setted frequency. The relay energises again when the measuring frequency drops under the setted frequency x hysteresis.

With bridge on X2-X3 the output relay energises when the measuring frequency is higher then the setted frequency. The relay deenergises again when the measuring frequency drops under the setted frequency x hysteresis.

An indicating LED shows that the frequency signal is connected. At low frequency the LED flashes. A second LED indicates the state of the output relay.

Notes

Terminals X1, X2, X3 should only be connected together with the corresponding wire links. Do not connect external voltage, neutral or ground.
The measuring input is designed for an amplitude of AC 8...500 V. Higher values AC 12...800 V can be achieved by connecting a series resistor, type IK 5110 into the measuring circuit either to terminal n or o.

Technical data

Input

Measuring input:	AC Amplitude AC 8 ... 500 V r.m.s internal resistance: > 400 kΩ
Setting range:	5 ... 15 Hz 40 ... 120 Hz 10 ... 30 Hz 100 ... 300 Hz 20 ... 60 Hz 200 ... 600 Hz 30 ... 90 Hz
Setting:	infinite on absolute scale
Response value:	≥ setting value
Hysteresis:	0,8 ... 0,97 of response value
Accuracy:	< ± 1 %
Temperature influence:	< ± 0,15 % /°C
Influence of auxiliary supply:	< ± 0,5 % at 0,8 ... 1,1 U_N

Technical data

Auxiliary circuit

Auxiliary voltage U_H:	AC 24, 42, 110, 127, 230, 240 V
Voltage range of U_H:	0,8 ... 1,1 U_H
Nominal consumption U_H:	< 3 VA
Nominal frequency of U_H:	50 / 60 Hz ± 5 %

Output

Contacts

BA 9837.11, AA 9837.11: 1 changeover contact
BA 9837.12, AA 9837.12: 2 chanceover contacts

Switching delay:

setting range (Hz)	bridge X1-X2	bridge X2-X3
5 - 15	500 - 800	650 - 1 000
10 - 30	250 - 300	600 - 800
20 - 60	120 - 150	300 - 430
setting range (Hz)	bridge X1-X2	bridge X2-X3
30 - 90	90 - 120	280 - 400
40 - 120	60 - 80	140 - 210
100 - 300	25 - 45	70 - 120
200 - 600	15 - 25	70 - 100

switching delay in ms

Thermal current I_{th}:	6 A	
Switching capacity		IEC/EN 60 947-5-1
to AC 15, AC 230 V:	3 A	
Electrical life		IEC/EN 60 947-5-1
to AC 15, at 3 A, AC 230 V:	2,5 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	IEC/EN 60 947-5-1
Mechanical life:	> 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm^2 solid or 2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Screw mounting:	35 x 50 mm and 35 x 60 mm	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	250 g	

Dimensions

Width x height x depth: 45 x 77 x 127 mm

Standard type

BA 9837.11 30 / 90 Hz AC 230 V AC 50 / 60 HZ

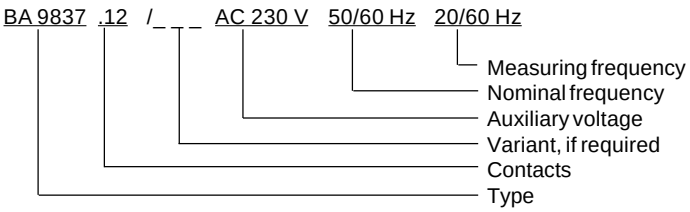
Article number:	0050216
• Output:	1 changeover contact
• Measuring frequency:	30 / 90 Hz
• Auxiliary voltage U_H:	230 V
• Width:	45 mm

Variants

Frequency relay with 2 changeover contacts and internal bridges (X1, X2, X3)

BA 9837.12/010:	with internal bridge X1 - X2
BA 9837.12/020:	with internal bridge X2 - X3
AA 9837.12/010:	with internal bridge X1 - X2
AA 9837.12/020:	with internal bridge X2 - X3

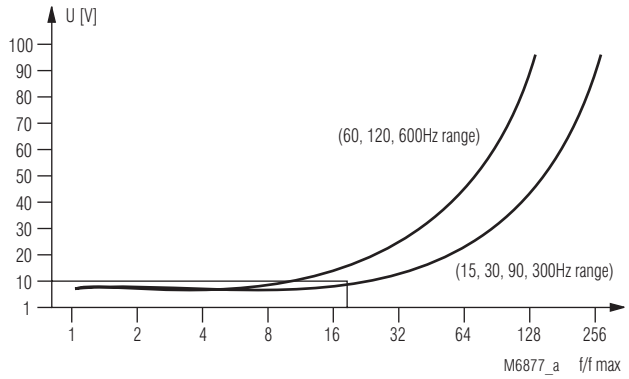
Ordering example for Variants



Accessories

IK 5110:	Series resist or for higher measuring voltage AC 12 ... 800 V eff.

Characteristics



Measuring sensitivity

The diagram shows the sensitivity of the input of the frequency relay AA 9837. If the measuring voltage is lower then the curve values the frequency cannot be measured anymore. Please note.
Superimposed interference voltages on the measuring input with a ration.

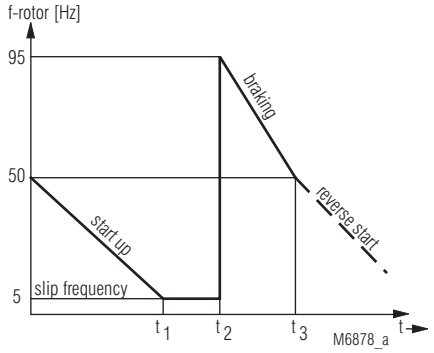
$$\frac{f}{f_{max}}$$

above the curve values can influence the measuring results.
f - frequency on input
f_{max} - highest value of the actual frequency range

Example:
$U_{meß}$: 10 V; measuring frequency: f = 4 800 Hz
chosen frequency range: 100 - 300 Hz, f_{max} = 300 Hz

$$\frac{f}{f_{max}} = \frac{4\,800\ Hz}{300\ Hz} = 16$$

The meauring frequency is detected, as the measuring voltage is above the response curve.

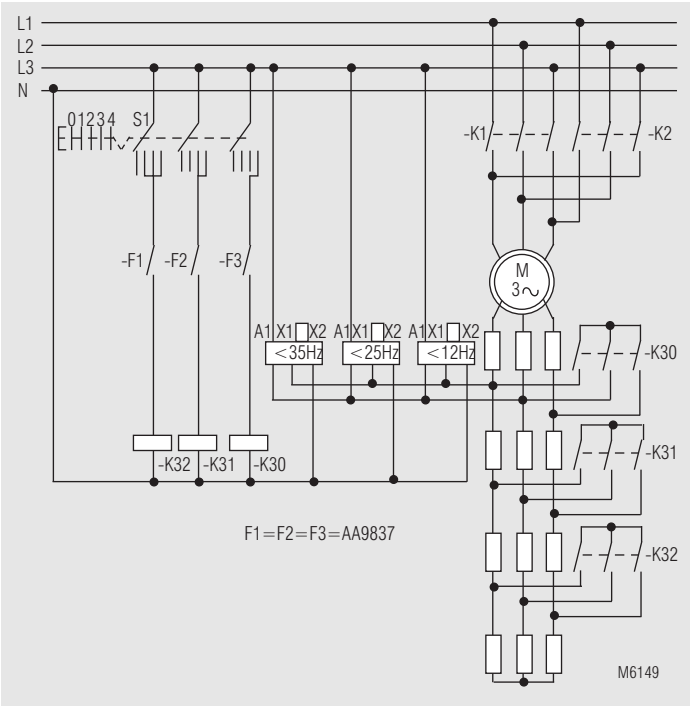


t_1 nominal speed reached
t_2 start braking
t_3 standstill (end of braking to avoid reverse start)

Rotor frequency at countercurrent braking

Braking:
When reversing the phases for braking the rotor frequency changes and drops proportional to the speed to mains frequency. E.g. when the rotor frequency is 5 Hz at nominal speed, it to 95 Hz. When the motor is at stand still the rotor frequency is nominal frequency. At this point the frequency relay has to give the signal to stop braking, before the motor starts up in the opposite direction.

Connection example

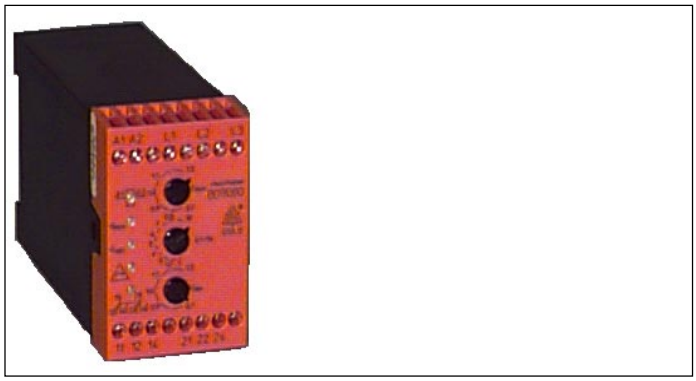


Motor control with starting resistance

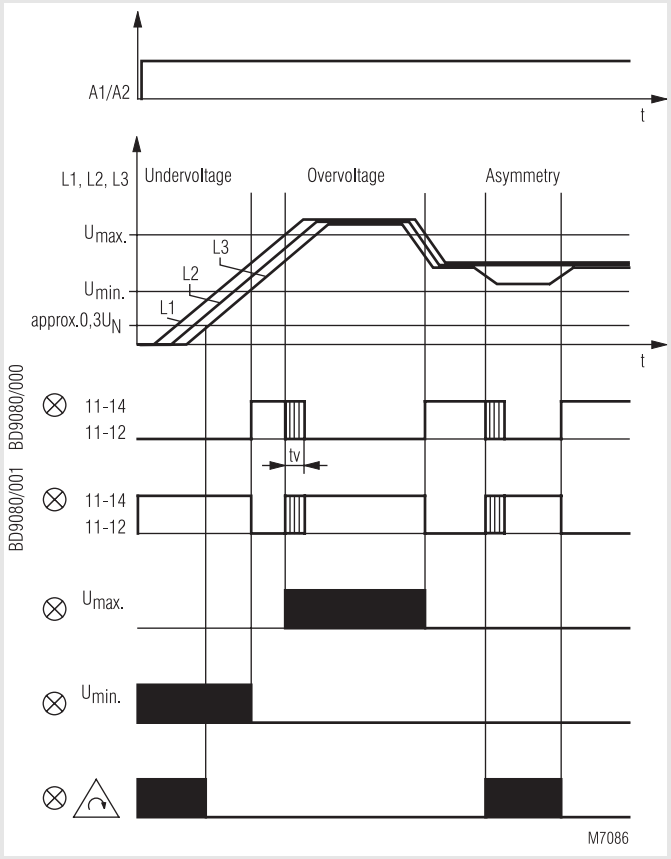
Start:
To achieve an optimum speed depending starting inertia, different starting resistors are switched into the rotor circuit, when certain speed values are reached. Often this procedure is controlled with timers, but with small loads the motor reaches the speed to switch over much faster then with high loads and the motor still runs on the lower stage. When the switching of the resistors is controlled speed depending by frequency relays, the start up cycles can be shortened and the plant can be used more effective.

Phase monitor BD 9080
varimeter

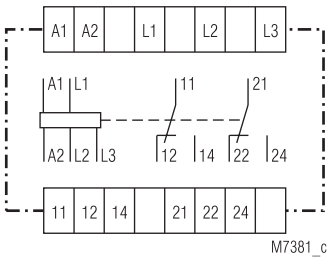
0221554



Function diagram



Circuit diagram



- According to IEC 255, VDE 0435 part 303
- Monitoring of
  - Under- and overvoltage
  - Asymmetry
  - Phase failure
  - Phase sequence
- Intensitive to harmonics up to distortion factor K 20 %
- Release time adjustable between 0,1 ... 5 s
- One LED in each case for
  - Auxiliary voltage A1/A2
  - Overvoltage $U_{max.}$
  - Undervoltage $U_{min.}$
  - Asymmetry / Phase sequence / Power failure
  - Contact position
- Closed circuit operation
- Available open circuit operation
- 2 changeover contacts
- Width 45 mm

Approvals and marking

CE

Applications

For mounting three-phase networks for undervoltage, overvoltage, phase sequence, asymmetry, power failure.

Indication

1. LED A1 / A2:	on when operating voltage present
2. LED U_{max}:	on in event of overvoltage
3. LED U_{min}:	on in event of undervoltage
4. LED Δ:	on in event of:
	- asymmetry
	- incorrect phase sequence
	- power failure
5. LED:	on when output relay activated

Notes

Measurement procedures: arithmetical mean value measurement over several half-waves of rectified phase voltages L1/L2 and L2/L3. Reference phase is L3. Networks with or without neutral can be monitored. The auxiliary voltage to be applied to A1/A2 can also be taken from the three-phase network which is to be monitored. This reduces to 0,8 - 1,1 U_H the permitted range of voltage of the network to be monitored.

Standard type

BD 9080.12 3 AC 400 V AC 230 V

Article number:	0045382	stock item
• Output:	2 changeover contacts	
• Nominal voltage U_N:	3 AC 400 V	
• Auxiliary voltage U_H:	AC 230 V	
• Closed circuit operation		

Variant

BD 9080.12/001	Open circuit operation

Technical data

Input circuit

Nominal voltage U_N
L1 / L2 / L3: 3 AC 230, 400, 690 V
(other voltages on request)
Overload capacity of U_N: 1,5 U_N / 2 U_N (10 s) max. 1 000 V
Nominal frequency of U_N: 50 / 60 Hz
Frequency range of U_N: 45 ... 65 Hz
Accuracy: ≤ ± 0,5 % of U_N
Power consumption with U_N: L1 approx. 0,5 mA
L2 approx. 0,5 mA
L3 approx. 0,8 mA
Hysteresis: ≤ 5 % x U_A (U_A = response value)
Asymmetry detection
Voltage: U_A ± 10 ... 20 %
Fault angle: approx. 120° ± 15°
Temperature influence: ≤ 0,08 % / K
Harmonic distortion sensitivity: Distortion factor K 20 %

Auxiliary circuit

Auxiliary voltage U_H
A1 / A2: AC 110, 230, 400 V
(other voltages on request)
Voltage range of U_H: 0,8 ... 1,1 U_H
Nominal frequency of U_H: 50 / 60 Hz
Frequency range of U_H: 45 ... 500 Hz
Nominal consumption: 2,4 VA

Setting ranges

$U_{max.}$: 0,7 ... 1,3 U_N
$U_{min.}$: 0,7 ... 1,3 U_N
Setting range: ≤ ± 10 % of U_N

Output circuit

Contacts
BD 9080.12: 2 changeover contacts
Response-/Release time: approx. 900 / 150 ms
Time delay t_v: 0,1 ... 5 s
Thermal current I_{th}: 6 A (see continuous current limit curve)
Switching capacity
to AC 15
NO contact: 3 A / AC 230 V EN 60 947-5-1
NC contact: 1 A / AC 230 V EN 60 947-5-1
Electrical life: EN 60 947-5-1
to AC 15 at 1 A, AC 230 V:
NO contact: 2,5 x 10^5 switching cycles
Permissible switching frequency: 20 switching cycles / s
Short circuit strength
max. fuse rating: 4 A gL EN 60 947-5-1
Mechanical life: ≥ 50 x 10^6 switching cycles

General data

Operating mode: Continuous operation
Temperature range: - 20 ... + 60°C
Clearance and creepage distances
overvoltage category / contamination level: 4 kV / 2 DIN VDE 0110-1 (04.97)
EMC
Electrostatic discharge: 8 kV (air) EN 61 000-4-2
HF irradiation: 10 V/m EN 61 000-4-3
Fast transients: 2 kV EN 61 000-4-4
Surge voltages between
wires for power supply: 1 kV EN 61 000-4-5
between wire and ground: 2 kV EN 61 000-4-5
Interference suppression: Limit value class B EN 55 011
Degree of protection: Housing: IP 40 EN 60 529
Terminals: IP 20 EN 60 529
Housing: Thermoplastic with V0 behaviour according to UL subject 94

Technical data

Vibration resistance: Frequency 10 ... 55 Hz,
Amplitude 0,35 mm EN 60 068-2-6
Climate resistance: 20 / 60 / 04 EN 60 068-1
Wire connection: 2 x 2,5 mm² solid DIN 46 288 or
2 x 1,5 mm² stranded wire with sleeve
DIN 46 228-1/-2/-3/-4
Wire fixing: Flat terminals with self-lifting
clamping piece EN 60 999
Mounting: DIN rail EN 50 022
Weight: 325 g

Ordering example

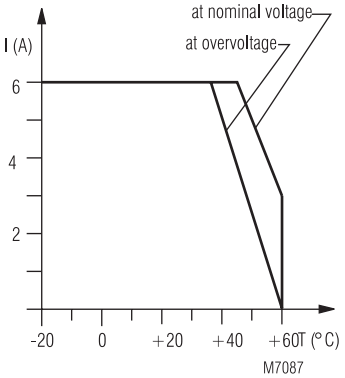
BD 9080 .12 /_ _ _ 3 AC 400 V 50/60 Hz AC 230 V 50/60 Hz

- Nominal frequency of U_H
- Auxiliary voltage U_H
- Nominal frequency of U_N
- Nominal voltage U_N
- Variant, if required
- Contacts
- Type

Dimensions

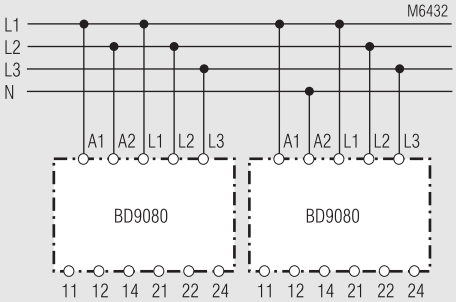
Width x height x depth: 45 x 74 x 133 mm

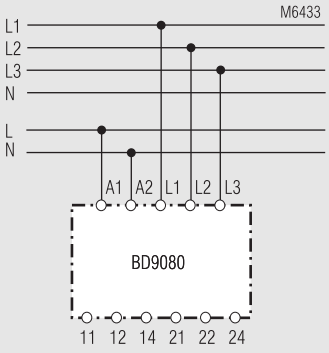
Characteristic



Continuous current limit curve

Connection examples

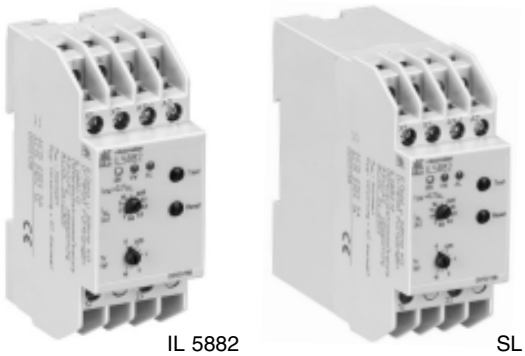




Installation- / Monitoring technique

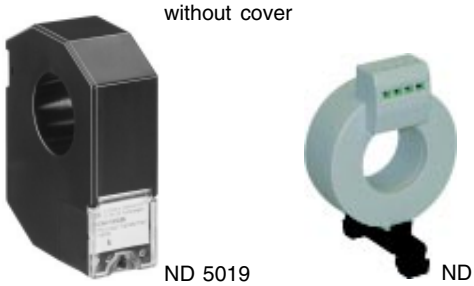
Differential current relay IL 5882, SL 5882 varimeter

A 0239971



IL 5882
without cover

SL 5882
without cover



ND 5019

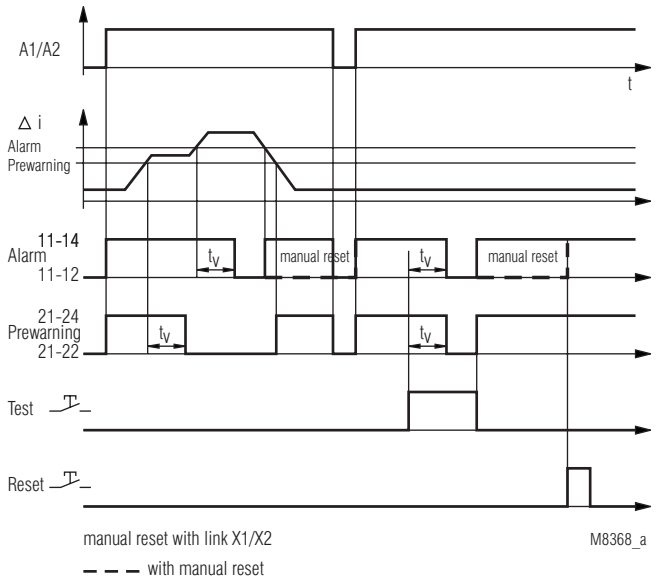
ND 5019/020

- According to IEC/EN 62 020
- for AC and pulsating DC currants (Type A to IEC 60755 A2))
- 9 tripping values from 10 mA to 10 A
- Connected to core balance transformer, e. g. DOLD ND 5019
- Selection of manual or automatic reset
- With prewarning
- With test and reset button
- Broken wire detection
- Short reaction time
- With adjustable delay t_v
- De-energised on trip
- LED indication for auxiliary supply and state of contact
- 2 x 1 changeover contact
- With sealable cover
- **Devices available in 2 enclosure versions:**
  IL 5882: 63 mm deep with terminals near to the bottom to be mounted in consumer units or industrial distribution systems according to DIN 43 880
  SL 5882: 100 mm deep with terminals near to the top to be mounted in cabinets with mounting plate and cable ducts
- 35 mm width

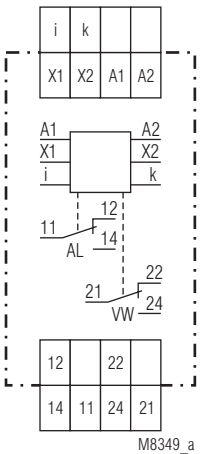
Approvals and marking

CE

Function diagram



Circuit diagram



Application

Detection of insulation faults in grounded voltage systems. The differential current relay is used to maintain electrical plants before faults occur. Decrease in insulation can be detected and indicated early without interruption of operation.

Function

The function of the IL/SL 5882 can be compared to a fault current circuit braker unit. It detects and indicates residual currents, but does not disconnect. The measurement is done by an external differential current transformer e. g. ND 5019 which is connected via terminals i and k to the IL/SL 5882. All conductors of the voltage system to be monitored are run through the CT except the ground wire. In a fault free voltage system the sum of all current is 0 and the CT induces no secondary voltage. If due to an insulation fault a fault current flows to ground, the current difference in the CT creates a measuring current, which is detected and measured by the IL/SL 5882. A broken wire in the sensing circuit would disable the measurement, therefore a special circuit detects broken wire and forces the unit to trip.

The unit has 2 x 1 changeover contacts. Contact 11-12-14 for alarm (AL) and 21-22-24 for prewarning (VW). Prewarning is detected at 70 % of the selected alarm value. With external bridge X1-X2 the alarm is stored and has to be reset by pressing the reset button or by disconnecting the auxiliary supply. Without bridge X1-X2 the unit works with auto-reset and the fault is not stored. With the button "Test" a fault can be simulated (Alarm). Each contact is delayed with an adjustable time delay t_v (same delay time for alarm and pre-warning).

To avoid unauthorised adjustment of the potentiometers the unit has a transparent cover that could be seald with laquer. Two holes above the push buttons allow activation of test and reset.

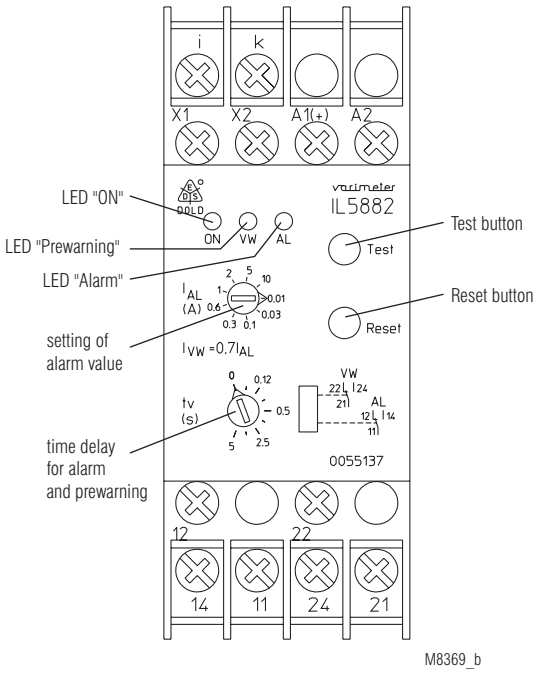
Indication

green LED: on, when supply connected
2 red LEDs: on, when insulation failure (prewarning and alarm)

Note

If time is set to 0 and a pulsating fault current is flowing (e.g. 1-way rectified) the output relay may flicker because of the short reaction time. By increasing the time delay this effect can be avoided.

Setting and adjustment



Technical data

Input

Auxiliary voltage U_H:	AC/DC 12 V, AC/DC 24 ... 230 V
Voltage range:	
AC:	0,8 ... 1,1 U_N
DC:	0,9 ... 1,25 U_N
Nominal frequency U_H:	50 ... 400 Hz
Nominal consumption	
AC 230 V:	4 VA
AC 24 V:	1,6 VA
DC 24 V:	1 W
Measuring value adjustable via rotational switch:	AC 0,01; 0,03 A; 0,1 A; 0,3 A; 0,6 A 1 A; 2 A; 5 A; 10 A
Frequency range:	50 / 60 Hz
Hysteresis:	approx. 4% of trip value, fixed
Accuracy:	≤ ± 15 %
Repeat accuracy:	≤ ± 1 %
Temperature drift:	≤ ± 0,05 % / K
Reaction time:	10 ... 30 ms
Response delay t_v:	0 ... 10 s adjustable (logarithmic scale in order to allow also short time delay to be adjusted without problems)

Output

Contacts:		
IL / SL 5882.38:	1 changeover contact for Prewarning, 1 changeover contact for Alarm	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15:		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		
to AC 15 at 1 A, AC 230 V:	3 x 10^5 switching cycles	EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	≥ 10^8 switching cycles	

Technical data

General data

Operating mode:	Continuous	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level		
supply / contacts:	4 kV / 2	IEC 60 664-1
supply / measuring circuit:	corresponding to CT	
EMC		
Surge voltages:	class 3 (5 kV / 0,5 J)	DIN VDE 0435-303
HF-interference:	class 3 (2,5 kV)	DIN VDE 0435-303
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V / m (class 3)	IEC/EN 61 000-4-3
Fast transients:	4 kV (class 4)	IEC/EN 61 000-4-4
Surge voltages:	2 kV (class 4)	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0-behaviour according UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 03	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Mounting:	DIN rail	IEC/EN 60 715
Weight		
IL 5882:	approx. 125 g	
SL 5882:	approx. 150 g	

Dimensions

Width x height x depth:	
IL 5882:	35 x 90 x 63 mm
SL 5882:	35 x 90 x 100 mm

Standard types

IL 5882.38 AC/DC 24 ... 230 V 50 / 60 Hz
Article number: 0055138
- De-energised on trip
- Auxiliary voltage U_H: AC/DC 24 ... 230 V
- Width: 35 mm

SL 5882.38 AC/DC 24 ... 230 V 50 / 60 Hz
Article number: 0055515
- De-energised on trip
- Auxiliary voltage U_H: AC/DC 24 ... 230 V
- Width: 35 mm

Varianten

IL 5882.12/002: with 2 changeover contacts for alarm and no pre-warning

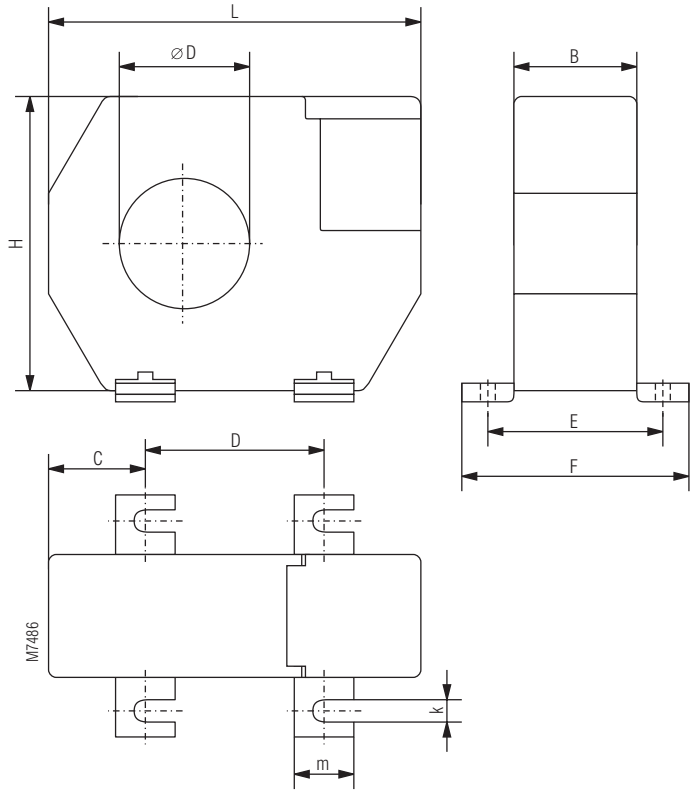
Ordering example for Variants

IL 5882 .12 /_ _ _ AC/DC 24 ... 230 V

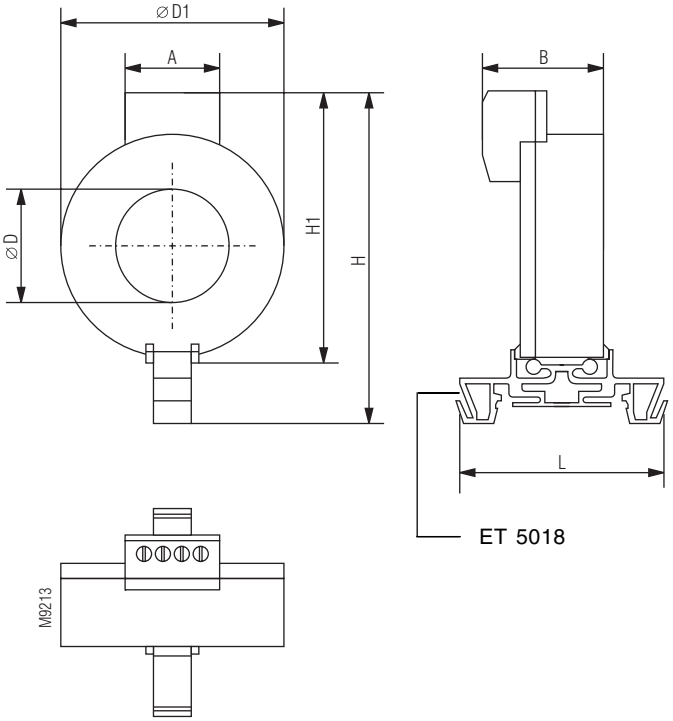
- AC/DC 24 ... 230 V: Auxiliary voltage
- /_ _ _: Variant, if required
- .12: Contacts
- IL 5882: Type

Accessories

ND 5019 Differential current transformer



for Screw connection



for DIN rail mounting

Dimensions in mm			
	ND 5019/035	ND5019/070	ND5019/105
øD	35	70	105
L	100	130	170
B	33	33	33
H	79	110	146
C	26	32	38
D	48,5	66	94
E	46	46	46
F	61	61	61
k	6,5	6,5	6,5
m	16	16	16

Weight			
	ND 5019/035	ND5019/070	ND5019/105
kg	0.15	0.24	0.5

Accessories for ND 5019/035, ND 5019/070, ND 5019/105
ET 5018: DIN rail mounting adapter, article no. 0058754
package unit 2 pieces

Dimensions in mm		
	ND 5019/020	ND 5019/030
øD	20	30
øD1	46	59
L	55	55
B	32	32
A	25	25
H	77	87
H1	60	70

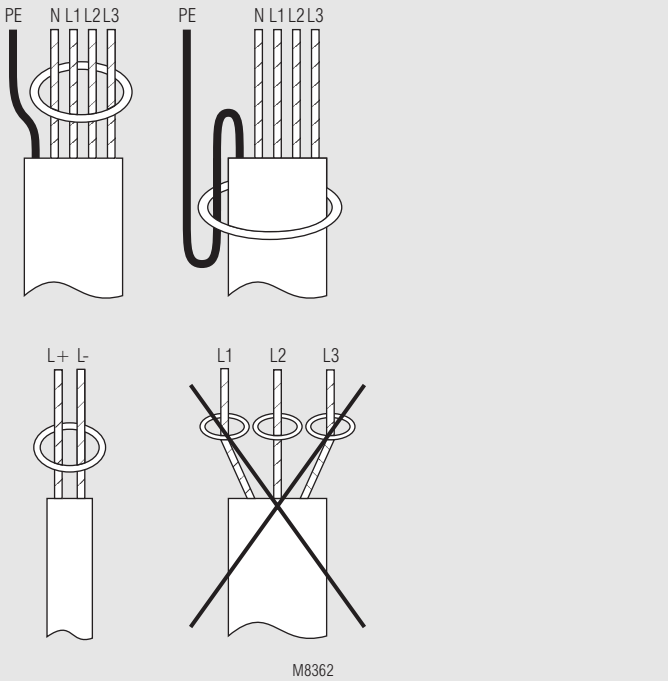
Weight		
	ND 5019/020	ND 5019/030
kg	0.07	0.085

Technical Data

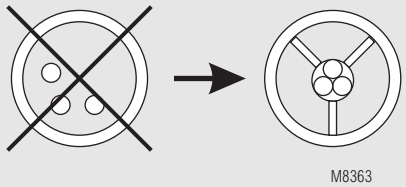
Ambient temperature:	- 10°C ... + 50°C / 263 K ... 323 K
Inflammability class:	V0 according to UL94
Nominal insulation voltage according to IEC 60 664-1:	AC 630 V
Overvoltage category / contamination level:	6 kV/3
Voltage test according to DIN VDE 0435-303 / IEC/EN 60 255:	AC 3 kV
Transformation ratio:	500 /1
Length of connection wires	
Type of wire:	
Single wire 0.75 mm^2:	up to 1 m
Twisted pair 0.75 mm^2:	up to 10 m
Screened wire 0.75 mm^2 screen on terminal k:	up to 25 m
Screw connection:	
(only at ND 5019/035, ND 5019/070, ND 5019/105)	M 5
DIN rail mounting:	using mounting adapter ET 5018

The delivery of ND 5019/020 and ND 5019/030 includes the DIN rail mounting adapter ET 5018.

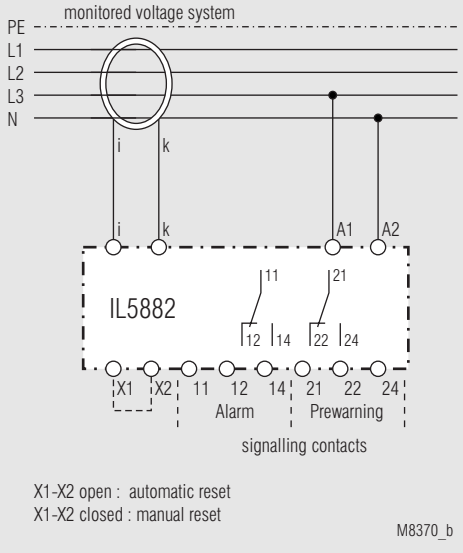
Installation of wires



To avoid interference with high starting currents



Connection example



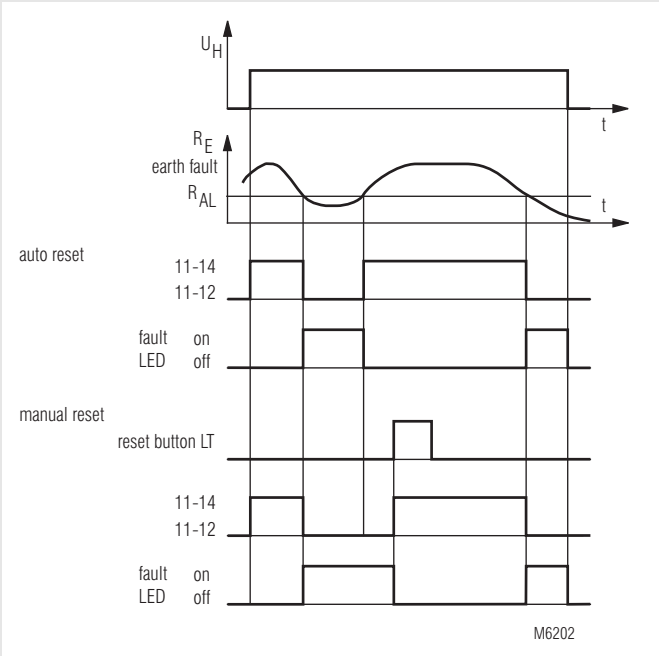
Insulation monitor IL 5881, SL 5881 varimeter

0238810

IL 5881

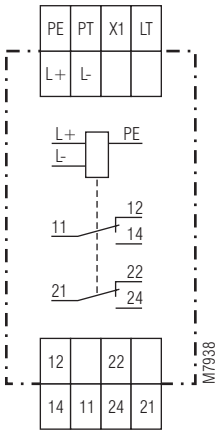
SL 5881

Function diagram

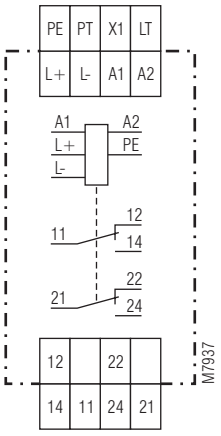


IL 5881/100, SL 5881/100; IL 5881, SL 5881

Circuit diagram



IL 5881.12/100



IL 5881.12

- According to IEC/EN 61 557
- For DC voltage systems up to 12 ... 280 V
- Wide voltage range of measuring input U_N DC 12 ... 280 V (on request DC 24 ... 500 V with separate auxiliary supply, Measuring range 20 ... 500 kΩ)
- Adjustable tripping value R_{AL} of 5 ... 200 kΩ
- Selective ground fault indication for L+ and L- allows fast fault finding
- Without auxiliary supply
- De-energised on trip
- 2 changeover contacts
- Automatic or manual reset, programmable
- With test and reset buttons
- Connection for external test and reset button possible
- galvanic separated AC or DC auxiliary supply available as option
- adjustable time delay as option
- **2 models available:**
  - **IL 5881: 61 mm deep with terminals near to the bottom to be mounted in consumer units or industrial distribution systems according to DIN 43 880**
  - **SL 5881: 98 mm deep with terminals near to the top to be mounted in cabinets with mounting plate and cable ducts**
- 35 mm width

Approvals and marking

CE

Application

Monitoring of insulation resistance of ungrounded DC-voltage systems to earth.

Function

If the insulation resistance R_E between L+ or L- to ground drops below the adjusted alarm value R_{AL} (insulation failure) the corresponding red LED goes on and the output relay switches off (de-energised on trip). If the unit is on auto reset (bridge between LT-X1) and the insulation resistance gets better (R_E rises), the insulation monitor switches on again with a certain hysteresis and the red LED goes off.
Without the bridge between LT-X1 the insulation monitor remains in faulty state even if the insulation resistance is back to normal. The location of the fault on L+ or L- is indicated on the corresponding LED (selective fault indication).
The reset is done by pressing the internal or external reset button or by disconnecting the auxiliary supply.
By activating the "Test" button internal or external an insulation failure can be simulated to test the function of the unit.

Indicators

Green LED "ON":	On, when supply voltage connected
Red LED "RE+":	On, when insulation fault detected ($R_{E+} < R_{AL}$) on L+
Red LED "RE-":	On, when insulation fault detected ($R_{E-} < R_{AL}$) on L-

Notes

The IL/SL 5881 can be used in systems with high leakage capacity to ground. When the unit is adjusted to high alarm values a leakage capacity can create a pulse when switching the system on (short alarm pulse). This happens at the following values:

IL/SL 5881: R_{AL} = 200 kΩ: C_E > 1 µF
IL/SL 5881: R_{AL} = 50 kΩ: C_E > 6 µF
IL/SL 5881: R_{AL} = 20 kΩ: C_E > 16 µF

IL/SL 5881/100: R_{AL} = 200 kΩ: C_E > 0,8 µF
IL/SL 5881/100: R_{AL} = 50 kΩ: C_E > 2,0 µF
IL/SL 5881/100: R_{AL} = 20 kΩ: C_E > 4,5 µF

An optional time delay (on request) could suppress this pulse.

Because of the measuring principle with a resistor bridge the insulation monitor IL/SL 5881 will not detect symmetric ground faults of L+ and L-. Exact symmetric ground faults normally do not exist in practice.

On models with separate auxiliary supply the alarm state is not defined when the voltage drops below 3 V. To avoid false alarm an additional auxiliary relay should be used which is connected to the monitored voltage.

On the models with galvanic separation between DC auxiliary supply and measuring input, the supply (A1/A2) can be connected to the monitored voltage system (L+/L-). The voltage range of the auxiliary input must be noticed which is only 1.25 of U_H while the measuring input always goes up to 280 V.

If no auxiliary supply is available the model IL/SL 5881/100 (without auxiliary supply) can be used which takes the auxiliary supply from the monitored system ($U_H = U_N$ = DC 12 ... 280 V).

Technical data

Auxiliary circuit
(only at IL/SL 5881)

Auxiliary voltage U_H:	AC 220 ... 240 V, 380 ... 415 V DC 12 V, 24 V
Voltage range:	
AC:	0,8 ... 1,1 U_H
DC:	0,9 ... 1,25 U_H
Frequency range (AC):	45 ... 400 Hz
Nominal consumption	
AC:	ca. 2 VA
DC:	ca. 1 W

Measuring circuit

Nominal voltage U_N:	DC 12 ... 280 V (residual ripple ≤ 5 %) DC 12 ... 220 V (residual ripple 48 %)
Voltage range:	0,9 ... 1,1 U_N
Alarm value R_{AL}:	5 ... 200 kΩ
Setting R_{AL}:	infinite setting
Internal AC resistance	
L+ and L- to PE:	each approx. 75 kΩ
Max. measuring current	
PE (R_E = 0):	U_N / 75 kΩ
Operate delay	
at R_{AL} = 50 kΩ, C_E = 1 µF	
R_E from ∞ to 0,9 R_{AL}:	approx. 0,8 s
R_E from ∞ to 0 kΩ:	approx. 0,4 s
Hysteresis	
at R_{AL} = 50 kΩ:	approx. 10 ... 15 %
Time delay:	0,5 ... 20 s (variant)

Technical data

Output

Contacts:		
IL / SL 5881.12:	2 changeover contacts	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15:	3 A / AC 230 V	IEC/EN 60 947-5-1
Switching capacity		
to DC 13:	2 A / DC 24 V	
	0,2 A / DC 250 V	IEC/EN 60 947-5-1
Electrical life		
to AC 15 at 1 A, AC 230 V:	≥ 2 x 10^5 switching cycles	IEC/EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gL	IEC/EN 60 947-5-1
Mechanical life:	≥ 10 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level		
between auxiliary supply		IEC 60 664-1
connections(A1 / A2):	4 kV / 2 at AC-auxiliary voltage	
between measuring input		IEC 60 664-1
connections (L+ / L- / PE):	4 kV / 2	
between auxiliary supply		IEC 60 664-1
and measuring input		
connections:	4 kV / 2 (3 kV at DC-auxiliary voltage)	
Input to output(contacts):	6 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages		
between A1 - A2		
(only at AC-auxiliary supply):	2 kV	IEC/EN 61 000-4-5
between L+ / L- / PE:	1 kV	IEC/EN 61 000-4-5
Degree of protection:		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL Subjekt 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded ferruled DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Mounting:	DIN rail	IEC/EN 60 715
Weight		
IL 5881:	approx. 170 g	
SL 5881:	approx. 200 g	

Dimensions

Width x height x depth:	
IL 5881:	35 x 90 x 61 mm
SL 5881:	35 x 90 x 98 mm

Standard types

IL 5881.12/100 DC 12 ... 280 V 5 ... 200 kΩ
Article number: 0053805
- Without auxiliary supply U_H
- Nominal voltage U_N: DC 12 ... 280 V
- adjustable alarm value R_{AL}: 5 ... 200 kΩ
- Width: 35 mm

SL 5881.12/100 DC 12 ... 280 V 5 ... 200 kΩ
Article number:
- Without auxiliary supply U_H
- Nominal voltage U_N: DC 12 ... 280 V
- adjustable alarm value R_{AL}: 5 ... 200 kΩ
- Width: 35 mm

Variant

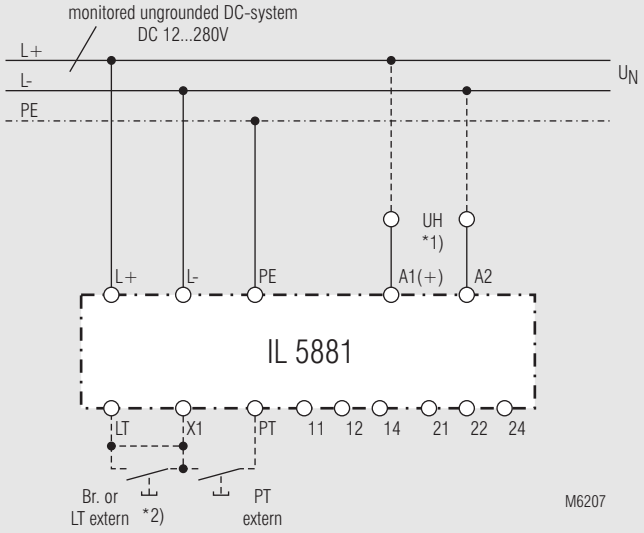
IL / SL 5881.12: with auxiliary supply

Order example for variant

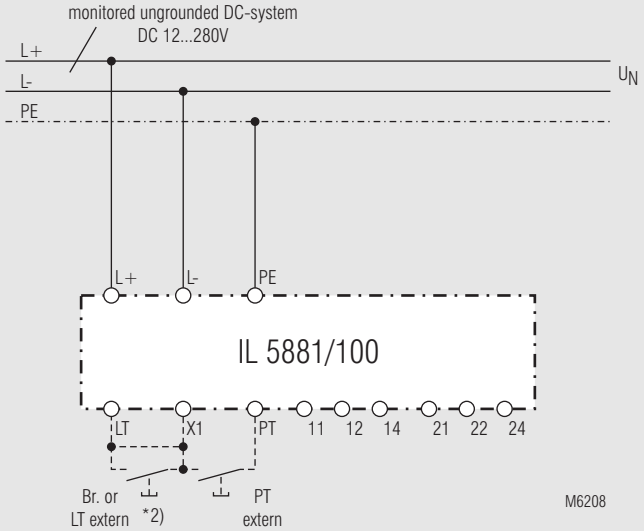
IL 5881 .12 AC 220 ... 240 V 5 ... 200 kΩ

- 5 ... 200 kΩ — Response value
- AC 220 ... 240 V — Auxiliary voltage
- .12 — Contacts
- IL 5881 — Type

Connections diagrams



Monitoring of an ungrounded system.
*1) Auxiliary supply U_H (A1-A2) can be taken from monitored voltage system. The range of the auxiliary supply input must be observed.
*2) with bridge LT - X1: automatic reset
without bridge LT - X1: manual reset, reset with button LT



Monitoring of an ungrounded system without auxiliary supply.
*2) with bridge LT - X1: automatic reset
without bridge LT - X1: manual reset, reset with button LT

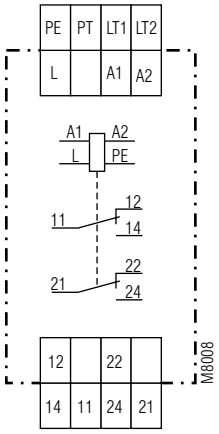
Insulation monitor IL 5880, SL 5880 varimeter

0238809

IL 5880

SL 5880

Circuit diagram



- According to VDE 0413, IEC 255, IEC / EN 61 557
- For single and 3-phase AC-systems up to 0 ... 500 V and 10 ... 1000 Hz
- Adjustable tripping value R_{AL} of 5 ... 100 kΩ
- Monitors also disconnected voltage systems
- De-energised on trip
- Auxiliary voltage measuring circuit and output contacts are galvanically separated
- Manual and auto reset
- With test and reset button
- Connections of external test and reset buttons possible
- LED indicators for operation and alarm
- 2 changeover contacts
- IL/SL 5880/200 with additional prewarning
  - adjustable prewarning value 10 kΩ ... 5 MΩ
  - output function programmable
- **2 models available:**
  IL 5880: 61 mm deep with terminals near to the bottom to be mounted in consumer units or industrial distribution systems according to DIN 43 880
  SL 5880: 98 mm deep with terminals near to the top to be mounted in cabinets with mounting plate and cable ducts
- 35 mm width

Approvals and marking

CE

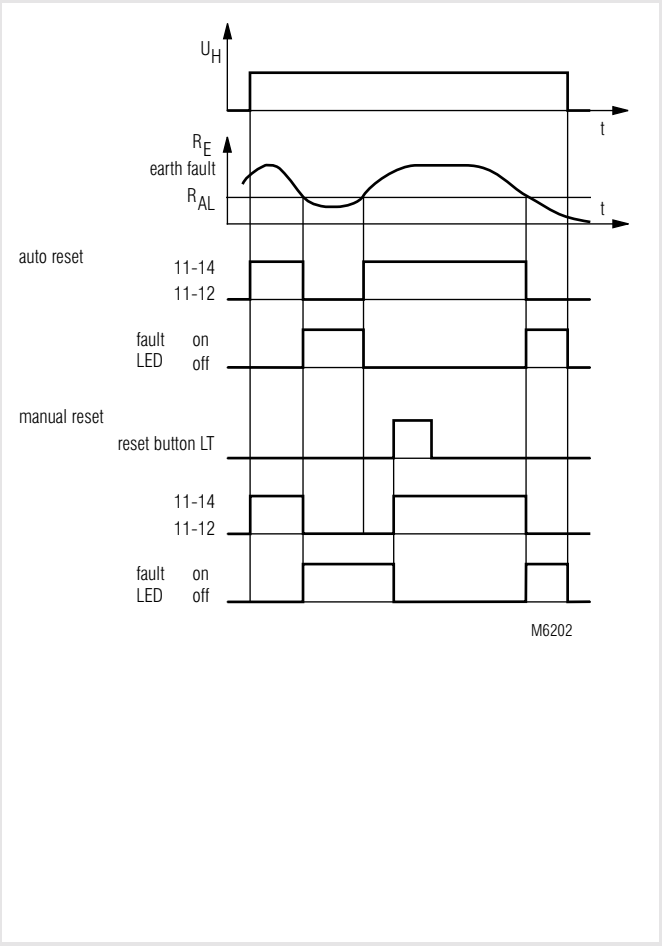
Applications

- Monitoring of insulation resistance of ungrounded voltage systems to earth.
- IL/SL 5880/200 can also be used to monitor standby devices for earth fault, e.g. motor windings of devices that have to function in the case of emergency.
- Other resistance monitoring applications.

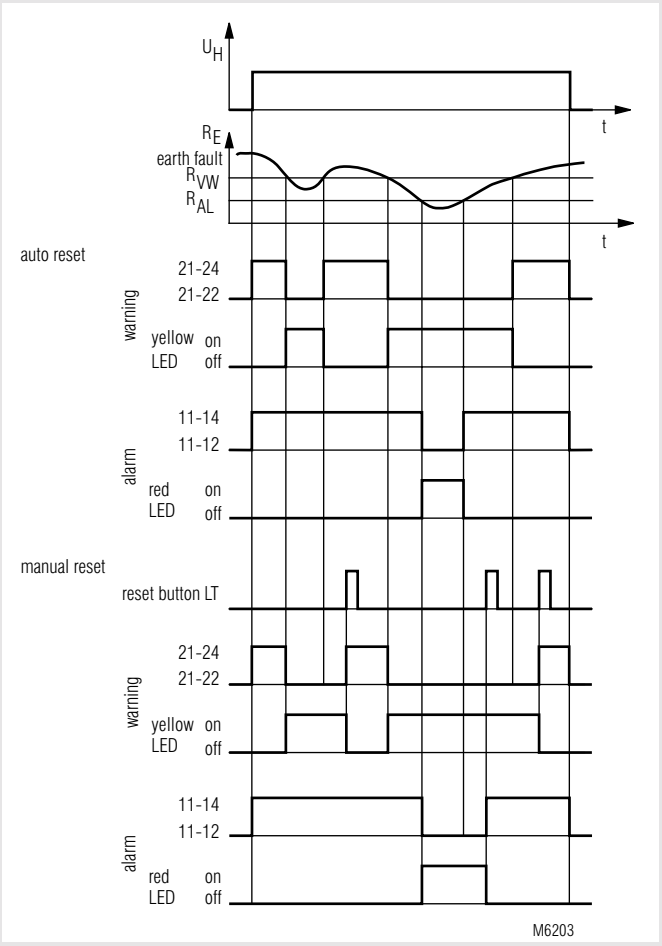
Function

The device is connected to the supply via terminals A1-A2. The unit can either be supplied from the monitored voltage system or from an separate auxiliary supply. Terminal L is connected to the monitored voltage and PE to earth. If the insulation resistance R_E drops below the adjusted alarm value R_{AL} the red LED goes on and the output relay switches off (de-energised on trip). If the unit is on auto reset (bridge between LT1-LT2) and the insulation resistance gets better (R_E rises), the insulation monitor switches on again with a certain hysteresis and the red LED goes off. Without the bridge between LT1-LT2 the Insulation monitor remains in faulty state even if the insulation resistance is back to normal. The reset is done by pressing the internal or external reset button or by disconnecting the auxiliary supply. By activating the "Test" button an insulation failure can be simulated to test the function of the unit.
The variants IL/SL 5880.12/200 have a second setting range with a higher resistance up to 5 MΩ (Potentiometer R_{VW}). This setting value can be used for pre-warning with relay output, by positioning the lower setting switch to "AL 11-12-14; VW 21-22-24".
If the higher setting range should be used only, the setting switch is put in position "VW 2u" and both contacts react only to the higher setting.
If the lower setting range should be used only, the setting switch is put in position "AL 2u" and both contacts react only to the lower setting.
When set to manual reset the latching is active on both settings R_{AL} and R_{VW}. Therefore it is possible in the case of a short insulation decrease (Switch position AL 11-12-14; VW 21-22-24), to pass the warning signal to a PLC while the main fault does not lead to a disconnection of the mains via the contacts 11-12-14.

Function diagram



IL 5880, SL 5880



IL 5880/200, SL 5880/200

Indicators

Green LED "ON":	On, when supply voltage connected
Red LED "AL":	On, when insulation fault detected, ($R_E < R_{AL}$)
Yellow LED "VW":	On, when insulation resistance is under prewarning value, $R_E < R_{VW}$ (only with variant /200)

Notes

The Insulation monitors IL/SL 5880 are designed to monitor AC-voltage systems. Overlayed DC voltage does not damage the instrument but may change the conditions in the measuring circuit. In one voltage system only one Insulation monitor must be connected. This has to be observed when coupling voltage system.

Line capacitance C_E to ground does not influence the insulation measurement, as the measurement is made with DC-voltage. It is possible that the reaction time in the case of insulation time gets longer corresponding to the time constant $R_E * C_E$.

The model /200 can be used, because of it´s higher setting value, to monitor single or 3-phase loads for ground fault.

If the load is operated from a grounded system the insulation resistance of the load can only be monitored when disconnected from the mains. This is normally the fact with loads which are operated seldom or only in the case of emergency but then must be function (see connection example).

The auxiliary supply can be connected to a separate auxiliary supply or to the monitored voltage system. The range of the auxiliary supply input has to be observed.

Technical data

Auxiliary circuit

Nominal voltage U_N:	AC 220 ... 240 V, AC 380 ... 415 V DC 12 V, DC 24 V
Voltage range:	
AC:	0,8 ... 1,1 U_N
DC:	0,9 ... 1,25 U_N
Frequency range (AC):	45 ... 400 Hz
Nominal consumption:	
AC:	ca. 2 VA
DC:	ca. 1 W

Measuring circuit

Nominal voltage U_N:	AC 0 ... 500 V
Voltage range:	0 ... 1,1 U_N
Frequency range:	10 ... 1000 Hz
Alarm value R_{AL}:	5 ... 100 kΩ
Prewarning value R_{VW} (only at IL/SL 5880/200):	10 kΩ ... 5 MΩ
Setting R_{AL}, R_{VW}:	infinite variable
Internal test resistor:	equivalent to earth resistance of < 5 kΩ
Internal AC resistance:	> 250 kΩ
Internal DC resistance:	> 250 kΩ
Measuring voltage:	approx. DC 15 V, (internally generated)
Max. measuring current (R_E = 0):	< 0,1 mA
Max. permissible noise DC voltage:	DC 500 V
Operate delay	
at R_{AL} = 50 kΩ, CE = 1 µF	
R_E from ∞ to 0,9 R_{AL}:	< 1,3 s
R_E from ∞ to 0 kΩ:	< 0,7 s
Hysteresis	
at R_{AL} = 50 kΩ:	approx. 15 %

Technical data

Output

Contacts:

IL / SL 5880.12:	2 changeover contacts	
IL / SL 5880.12/200:	2 x 1 changeover contact, programmable	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO:	5 A / AC 230 V	EN 60 947-5-1
NC:	2 A / AC 230 V	EN 60 947-5-1
Electrical life		
to AC 15 at 1 A, AC 230 V:	≥ 5 x 10^5 switching cycles	EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level		
between auxiliary supply connections (A1- A2):	4 kV / 2 at AC-auxiliary voltage	IEC 60 664-1
between measuring input connections (L - PE):	4 kV / 2	IEC 60 664-1
between auxiliary supply and measuring input connections:	4 kV / 2 (3 kV at DC-auxiliary voltage)	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages		
between A1 - A2:	1 kV	EN 61 000-4-5
between L - PE:	1 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:		
Housing:	IP 40	EN 60 529
Terminals:	IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL Subjekt 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 060 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:		
IL 5880:	160 g	
SL 5880:	189 g	

Dimensions

Width x height x depth:	
IL 5880:	35 x 90 x 61 mm
SL 5880:	35 x 90 x 98 mm

Standard types

IL 5880.12 AC 220 ... 240 V

Article number:	0053378	stock item
• Auxiliary voltage U_H :	AC 220 ... 240 V	
• adjustable alarm value R_{AL}:	5 ... 100 kΩ	
• Width:	35 mm	

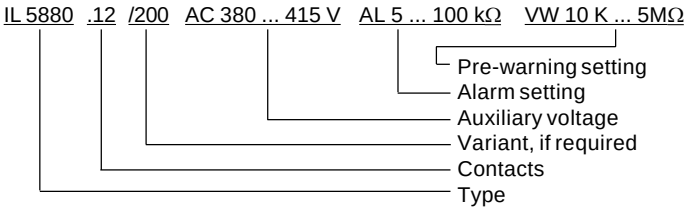
SL 5880.12 AC 380 ... 415 V

Article number:	
• Auxiliary voltage U_H :	AC 380 ... 415 V
• adjustable alarm value R_{AL}:	5 ... 100 kΩ
• Width:	35 mm

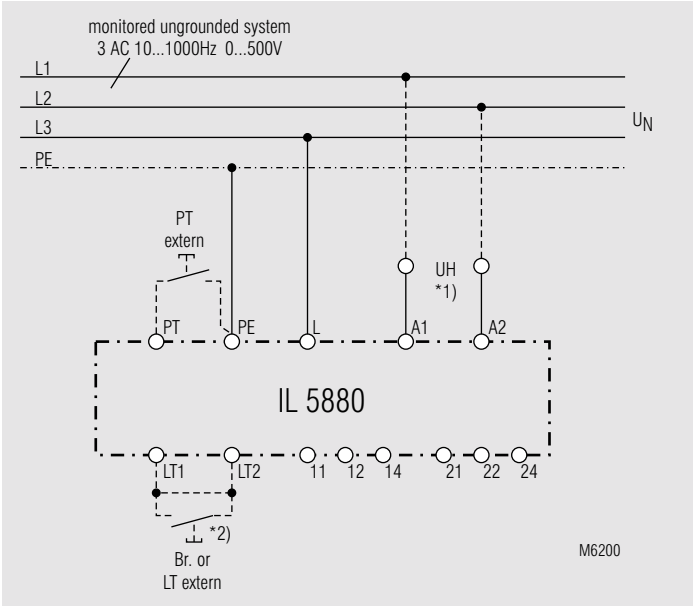
Variants

IL / SL 5880.12/200: with pre-warning and programmable outputs

Ordering example for variants



Connection diagram

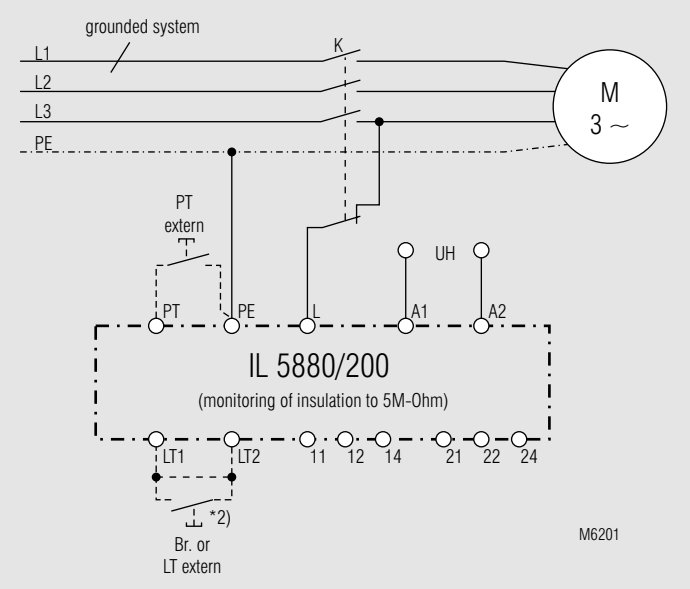


Monitoring of an ungrounded voltage system.

*1) Auxiliary supply U_H (A1 - A2) can be taken from the monitored voltage system. The range of the auxiliary supply input must be observed.

*2) with bridge LT1 - LT2: automatic reset
without bridge LT1 - LT2: manual reset, reset with button LT

Connection diagram



Monitoring of motorwindings against ground.
The insulation of the motor to ground is monitored as long as contactor K does not activate the load.

*2) with bridge LT1 - LT2: automatic reset
without bridge LT1 - LT2: manual reset, reset with button LT

Differential current monitor IP 5883, Type B for AC and DC systems varimeter

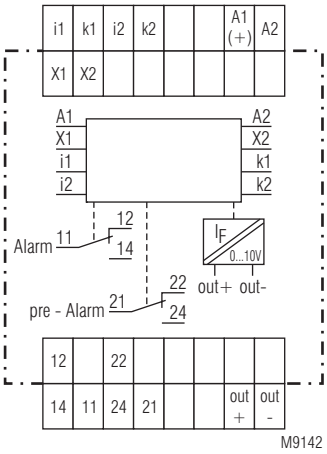
Preliminary Data sheet

A 0249633

IP 5883 ND 5018/035 ND 5018/030

- According to IEC/EN 62 020, VDE 0663
- To detect earth faults in grounded voltage systems
- For AC and DC systems (Type B)
- 4 setting ranges from 10 mA to 3 A
- Manual reset, with pre-warning
- With adjustable pre-warning
- With adjustable switching delay
- Energised or de-energised on trip
- LED indicator for operation prewarning and alarm
- With test function
- Broken wire detection
- 70 mm width

Circuit diagramm



Approvals and marking

CE

Application

The differential current monitor type B is designed to monitor DC systems and AC systems up to 250 Hz.

Function

The function is similar to an RCD tripping device. The voltage system is monitored to detect a fault current to ground. It does not disconnect the voltage, it only indicates the fault. The measuring circuit includes an external differental current transformer. All conductors of a voltage system are fed through the transformer except the ground wire. In a healthy system the sum of all flowing currents is zero, so that no voltage is induced in the CT. If an earth fault occurs, sourcing a current flowing to ground, the current difference induces a current in the CT that is detected by the IP 5883.

On broken sensor wires and broken CT coils the unit goes into alarm state and the 2 red LEDs flash. The unit has 2 changeover output contacts. One for alarm (11,12, 14) and one for pre-warning (21, 22, 24). The prewarning can be set to 20, 40, 60, 80 and 100 % of the alarm with or without 1 s time delay.

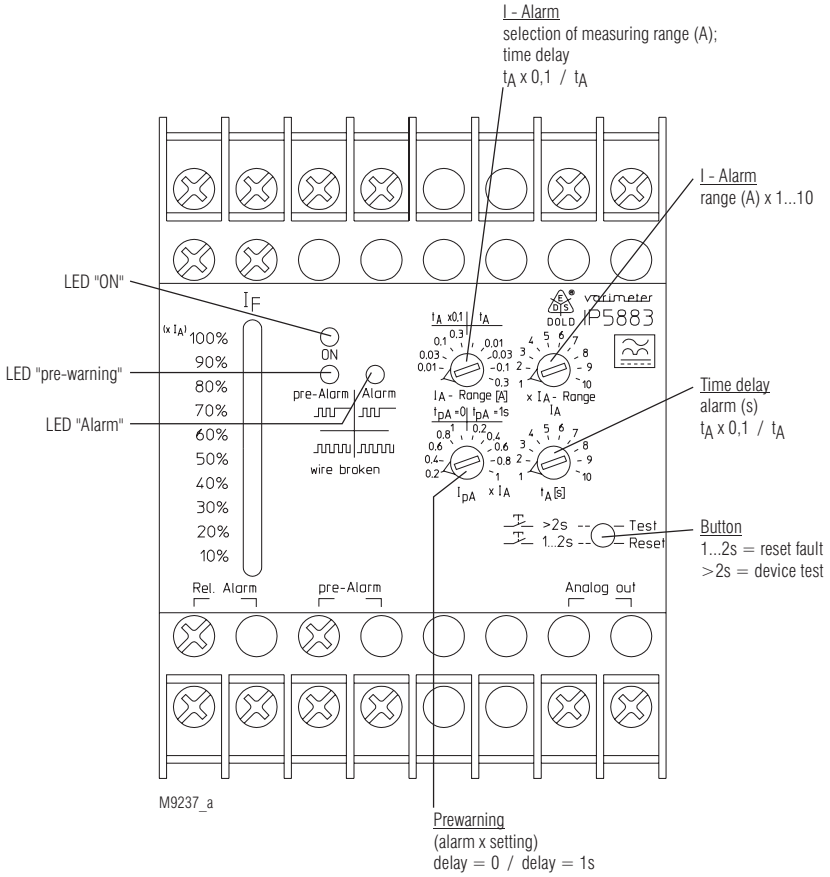
4 setting ranges can be slected from 10 mA to 3 A. An adjustable time delay up to 1 or 10 s is possible. The fine adjustment of the measuring value and the time delay is made via 2 potentiometers with setting ratio 1:10.

An external link on X1-X2 allows the change between energised and de-energised on trip. With inserted link the unit de-energises on trip.

If an adjusted value is reached on the measuring input (alarm or pre-warning) the signal is stored. Reset is made by pressing the button "Test/ Reset" for 1 - 2 s or by disconnecting the auxiliary supply.
If the "Test/Reset" button is pressed for more than 2 s, a test of the unit is made. The time delays run, the pre-warning and alarm is activated.

An LED chain shows the fault current between 10 and 100 % of the adjusted alarm value. An analogue output 0 - 10 V indicates also the fault current. 10 V corresponds to 100 % of the adjusted alarm value.

Set up and adjustment facilities



Indication

Green LED "ON":	On, when auxiliary supply connected
Red LED "pre alarm":	flashes during time delay, on, when pre-alarm active
Red LED "alarm":	flashes during time delay, on, when alarm active
Both red LEDs:	flashing on broken wire or extremely high input signal
Yellow LEDs:	LED chain indicates fault current in % of adjusted alarm value

Technical Data

Input

Auxiliary voltage U_H:	AC/DC 24 ... 80 V, AC/DC 80 ... 230 V
Voltage range:	DC 19 ... 110 V, AC 19 ... 90 V, DC 64 ... 300 V, AC 64 ... 265 V
Nominal frequency U_H:	AC 50 / 60 Hz
Nominal consumption	
at AC:	5 VA
at DC:	2.5 W
Measuring range:	10 ... 100 mA, 30 ... 300 mA, 100 ... 1000 mA, 300 ... 3000 mA
Measuring range fine adjustment:	1 ... 10
Pre-warning:	20, 40, 60, 80, 100 %
Frequency range:	DC und AC bis 250 Hz
Repeat accuracy:	≤ ± 3 %
Temperature drift:	≤ ± 0,1 % / K
Reaction time:	< 50 ms
Switching delay pre-warning:	without delay or 1 s adjustable
Switching delay alarm:	x 0.1, x 1, fine adjustment 1 ... 10

Output

Contacts:	1 changeover contact for pre-warning, 1 changeover contact for alarm	
Thermal current I_{th}:	5 A	
Switching capacity		
at AC 15:		
NO contact:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60 947-5-1

Technische Daten

Electrical life		
to AC 15 at 1 A, AC 230 V:	3 x 10^5 switching cycles	IEC/EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gL	IEC/EN 60 947-5-1
Mechanical life:	≥ 10^8 switching cycles	

Analogue output

Terminal out+ / out-:	0 ... 10 V; 5 mA

General Data

Operating mode:	Continuous	
Temperature range:	- 20 ... + 50°C	
Clearance and creepage distances		
overvoltage category / contamination level:	6 kV / 2	IEC 60 664-1
EMC		
Surge voltages:	Class 3 (5 kV / 0,5 J)	DIN VDE 0435-303
HF-interference:	Class 3 (2,5 kV)	DIN VDE 0435-303
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	10 V / m (class 3)	IEC/EN 61 000-4-3
Fast transients:	4 kV (class 4)	IEC/EN 61 000-4-4
Surge voltages:	2 kV class 4)	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0-behaviour according UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz	IEC/EN 60 068-2-6
Climate resistance:	20 / 60 / 03	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm² solid or 2 x 1.5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	220 g	

Technical Data

Dimensions

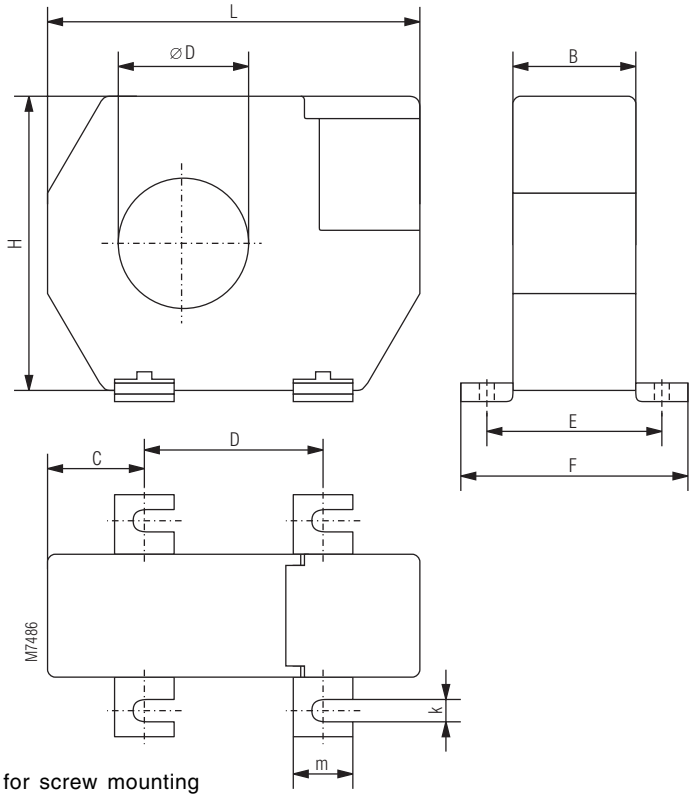
Width x height x depth: 70 x 90 x 59 mm

Standard type

IP 5883 AC/DC 80 ... 230 V 50 / 60 Hz
Article number: 0058463
- Energised or de-energised on trip
- Auxiliary voltage U_H: AC/DC 80 ... 230 V
- Width: 70 mm

Accessories

ND 5018/035 Differential current transformer



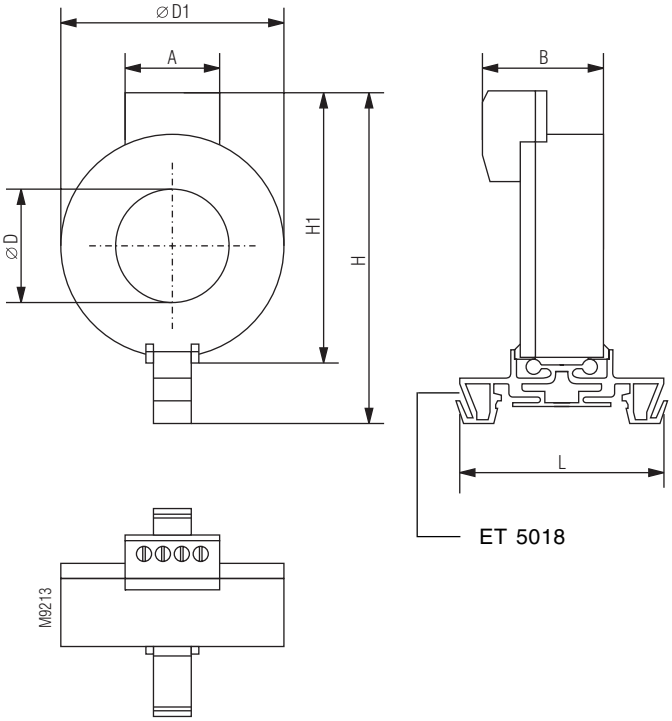
for screw mounting

ND 5018/035	⌀D	L	B	H	C	D	E	F	k	m
Dimensions/mm	35	100	33	79	26	48,5	46	61	6,5	16
Weight/kg	0.15									

Accessories for ND 5018/035
ET 5018: DIN rail mounting adapter, article no. 0058754 (2 pieces)

Accessories

ND 5018/030 Differential current transformer



for DIN rail mounting

ND 5018/030	⌀D	⌀D1	L	B	A	H	H1
Dimensions/mm	30	59	55	32	25	87	70
Weight/kg	0.085						

Technical Data

Ambient temperature: - 10°C ... + 50°C / 263 K ... 323 K
Inflammability class: V0 according to UL94

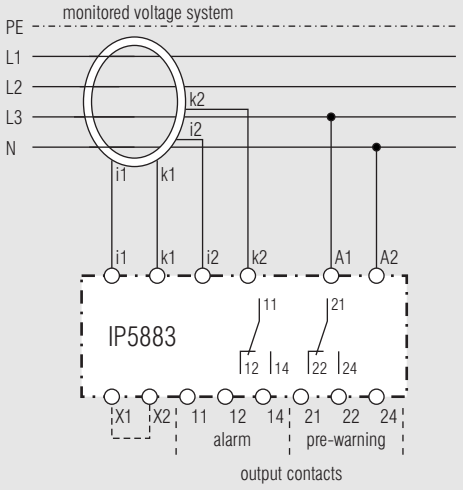
Nominal insulation voltage according to IEC 60 664-1: AC 630 V
Overvoltage category / contamination level: 6 kV/3
Voltage test according to DIN VDE 0435-303 / IEC/EN 60 255: AC 3 kV

Transformation ratio: 2 x 200:1

Length of connection wires
Type of wire:
Single wire 0.75 mm²: up to 1 m
Twisted pair 0.75 mm²: up to 10 m
Screened wire 0.75 mm² screen on terminal k: up to 25 m
Screw connection:
(only at ND 5018/035) M 5
DIN rail mounting: using mounting adapter ET 5018

The delivery of ND 5018/030 includes the DIN rail mounting adapter ET 5018.

Connection example

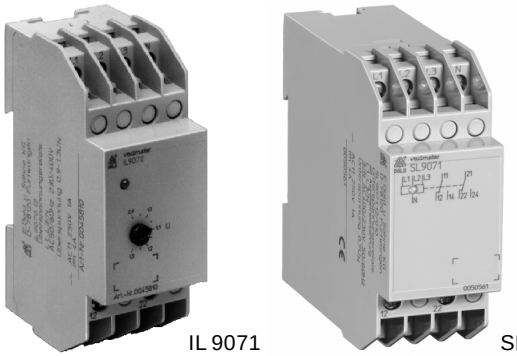


X1-X2 without bridge : energised on trip
X1-X2 with bridge : de-energised on trip

M9238

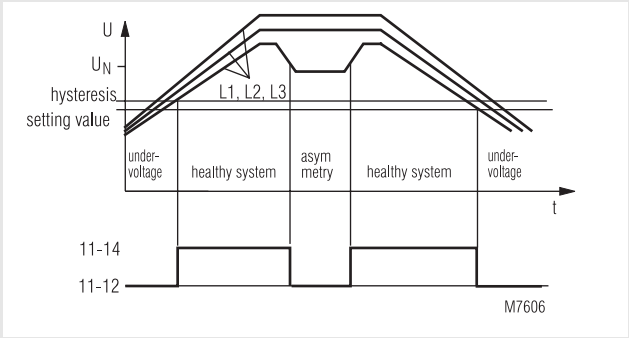
Undervoltage relay IL 9071, SL 9071 varimeter

0222092

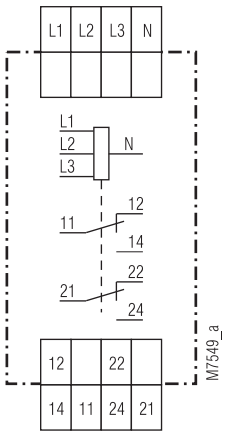


IL 9071 SL 9071

Function diagram



Circuit diagram



IL 9071.12, SL 9071.12

- According to IEC 255, VDE 0435 part 303
- Devices available in 2 enclosure version:
  IL 9071: depth 61 mm with terminals as the bottom for installations systems and industrial distribution systems
  SL 9071: depth 98 mm with terminals at the top for cabinets with mounting plate and cable duct
- Identification of undervoltage, phase failure and asymmetry also with reverse voltage
- single phase connection possible
- According to VDE 0107 (for rooms used for medical purposes) as an option
- Fixed setting value (variable as an option)
- Closed circuit operation principle
- LED indicator
- With safe disconnection according to VDE 0106 part 101 between the measuring circuit and the contacts as an option
- Independant of phase sequence
- 2 changeover contacts
- Width 35 mm

Additional information to this subject

- datasheet undervoltage relay IK/IL 9171
- Relay workshop No. 15 and No. 16:
  The meaning of asymmetry in 3 phase systems (only in German)

Approvals and marking

CE

Application

Monitoring of three-phase voltage systems to identify undervoltage, asymmetry or phase failure and switching-on of safety lighting in accordance with VDE 0108.

Indication

green LED: on, when the mains system is working properly (contact 11-14 and 21-24 closed)

Notes

For single phase operation the terminals L1, L2 and L3 have to be bridged

Standard types

IL 9071.12/010 3/N AC 400 / 230 V 0,85 U_N
Article number: 0047074 stock item
SL 9071.12/010 3/N AC 400 / 230 V 0,85 U_N
Article number: 0051006

- with asymmetry detection
- 2 changeover contacts
- Nominal voltage U_N: AC 230 / 3 AC 400 V
- Setting value: 0,85 U_N
- Width: 35 mm

Variants

IL 9071/117, SL 9071/117: according to VDE 0107, rooms used for medical purposes, variable setting value with asymmetry detection also whith reverse voltage

Technical data

Input

Nominal voltage U_N:
IL 9071.12/ _ _ _
SL 9071.12/_ _ _: 3/N AC 400 / 230 V
Maximum overload: 1,1 U_N, permanent
Nominal consumption approx. 8 VA (L3-N)
Nominal frequency: 50 / 60 Hz
Input resistance: approx. 150 kΩ (L1-N, L2-N)

Setting ranges

Setting value U_{off}
IL 9071/010, SL 9071/010: 0,7 U_N or 0,85 U_N (hysteresis approx. 4 %)
IL 9071/117, SL 9071/117: 0,7 ... 0,95 U_N (hysteresis approx. 4 %)

Asymmetry identification
IL 9071/117, IL 9071/010,
SL 9071/117, SL 9071/010: approx. 6 ... 8 % phase asymmetry

Output

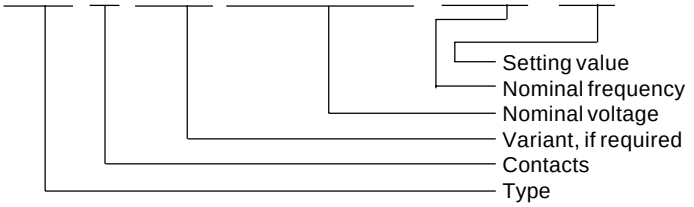
Contacts
IL 9071.12, SL 9071.12: 2 changeover contacts
Thermal current I_{th}: 4 A
Switching capacity EN 60 947-5-1
AC 15
NO contact: 3 A / AC 230 V
NC contact: 2 A / AC 230 V
Electrical life EN 60 947-5-1
AC 15 at 1 A, AC 230 V: 5×10^5 switching cycles
Short circuit strength
max. fuse rating: 4 A gL EN 60 947-5-1
Mechanical life: 30×10^6 switching cycles

General data

Operating mode: Continuous operation
Temperature range: – 20 ... + 60°C
Clearance and creepage distances
overvoltage category /
contamination level: 4 kV / 2 DIN VDE 0110-1 (04.97)
EMC
Electrostatic discharge: 8 kV (air) EN 61 000-4-2
HF irradiation: 10 V / m EN 61 000-4-3
Fast transients: 4 kV EN 61 000-4-4
Surge voltages
between
wires for power supply: 2 kV EN 61 000-4-5
between wire and ground: 2 kV EN 61 000-4-5
Interference suppression: Limit value class B EN 55 011
Degree of protection: Housing: IP 40 EN 60 529
Terminals: IP 20 EN 60 529
Housing: Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0,35 mm, frequency 10 ... 55 Hz, EN 60 068-2-6
Climate resistance: 20 / 60 / 04 EN 60 068-1
Terminal designation: EN 50 005
Wire connection: 2 x 2,5 mm^2 solid or
2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3
Wire fixing: Flat terminals with self-lifting clamping piece EN 60 999
Mounting: DIN rail EN 50 022
Weight
IL 9071/010: 122 g
SL 9071/010: 168 g

Ordering example

IL 9071 .12 / _ _ _ 3/N AC 400 / 230 V 50/60 Hz 0,7 U_N



Dimensions

Width x height x depth
IL 9071: 35 x 90 x 61 mm
SL 9071: 35 x 90 x 98 mm

Specifiaction for tender for IL 9071

Undervoltage relay according to IEC 255, VDE 0435 part 303 to be built in consumer units with identification of phase failure in 3 phase systems with neutral-line 230/400 V, setting value 0,85 U_N, closed circuit operation, 2 changeover contacts, LED indicator.
Width 35 mm.
Type IL 9071.12
Manufactured by: E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 part 303 to be built in consumer units with identification of phase failure in 3 phase systems with neutral-line 230/400 V, setting value 0,7 U_N, closed circuit operation, 2 changeover contacts, LED indicator.
Width 35 mm.
Type IL 9071.12
Manufactured by: E. DOLD & SÖHNE KG

Overvoltage relay IL 9070
varimeter

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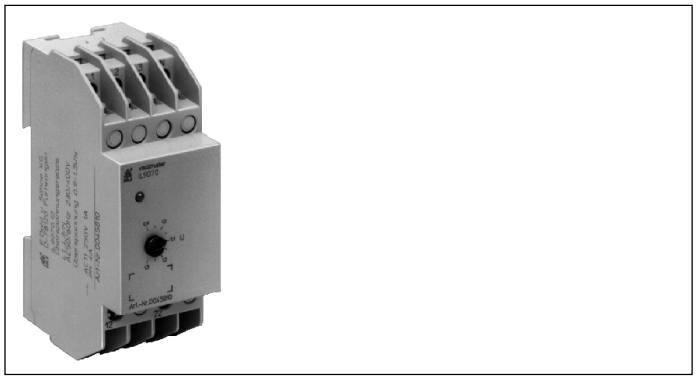
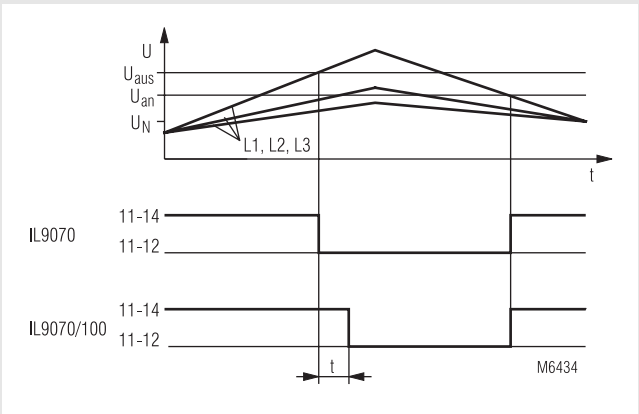
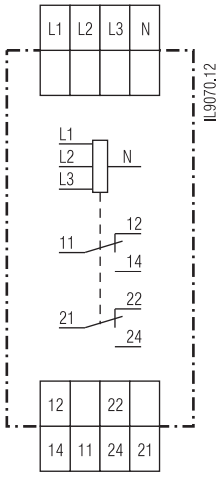


- According to IEC 255, VDE 0435 part 303
- Identification of overvoltage in three-phase voltage systems
- With asymmetry identification (even with feed back voltage) as an option
- Single-phase connection possible
- Variable setting value
- Fixed time delay as an option
- Closed circuit operation
- LED display
- Independant of phase sequence
- Optionally for 3P3W Systems
- 2 changeover contacts
- Width 35 mm

Function diagram



Circuit diagram



Approvals and marking

CE

Application

Monitoring of singel- and three-phase voltage systems to identify overvoltage and asymmetry.

Indicators

LED on green:	output relay activated
LED on red:	overvoltage / asymmetry

Variants

IL 9070/001:	for 3P3W systems
IL 9070/010:	with asymmetry identification, even when there is feed back voltage
IL 9070/100:	with a fixed delay time

Technical data

Input

Nominal voltage U_N:	
IL 9070.12/ _ _ _:	AC 230 / 3 AC 400 V
Maximum overload:	1,35 U_N, permanent
Nominal consumption	approx. 8 VA (L3-N)
Nominal frequency:	50 / 60 Hz
Input resistance:	approx. 180 kΩ (L1-N, L2-N)

Setting ranges

Setting value U_{off}:	0,9 ... 1,3 U_N
Hysteresis:	approx. 4 %
Asymmetry identification	
IL 9070/010:	approx. 6 ... 8 % phase asymmetry
Delay time	
IL 9070/100:	0,5 or 1 s, fixed

Output

Contacts	
IL 9070.12:	2 changeover contacts
Thermal current I_{th}:	4 A
Switching capacity	
AC 11:	1 A / AC 230 V DIN VDE 0660 p. 200
Electrical life	EN 60 947-5-1
to AC 15 at 1 A, AC 230 V:	5 x 10^5 switching cycles
Short circuit strength	
max. fuse rating:	4 A gL EN 60 947-5-1
Mechanical life:	30 x 10^6 switching cycles

Technical data

General data

Operating mode:	Continuous operation	
Temperature range:	– 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz,	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm^2 solid or 2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	110 g	

Ordering example

IL 9070 .12 /100 AC 230 V / 3 AC 400 V 50/60 Hz 0.9 ... 1.3 U_N 1 s

- Time delay
- Resetting value
- Nominal frequency
- Nominal voltage
- Variants
- Contacts
- Type

Dimensions

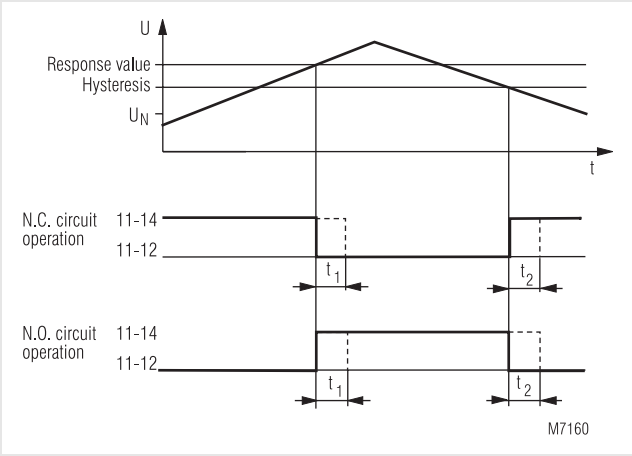
Width x height x depth: 35 x 90 x 59 mm

Overvoltage relay IK 9172
varimeter

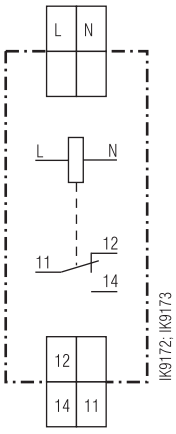
0223315

- According to IEC 255, VDE 0435 part 303
- Monitoring of overvoltage in single-phase systems
- Without auxiliary supply
- Settable response value
- Fixed or settable operate delay
- Fixed or settable release delay
- NC circuit operation (optionally NO circuit operation)
- LED indicator for state of output relay
- 1 changeover contact
- Width 17,5 mm

Function diagram



Circuit diagram



IK 9172

Approvals and marking

CE

Applications

Monitors overvoltage, in single-phase voltage systems

Function

The arithmetic mean value of the voltage L-N ist measured.

Indicators

Yellow LED: output contact active (11-14 closed)

Standard type

IK 9172.11 AC 230 V 50/60 Hz 0,9 ... 1,3 U_N
Article number: 0048644

- Adjustable response value 0,9 ... 1,3 U_N
- Without time delay
- Closed circuit operation
- Output: 1 changeover contact
- Nominal voltage U_N: AC 230 V

Variants

IK 9172/001

- 0 N.C. circuit operation
- 1 N.O. circuit operation

- 0 without time delay
- 1 fixed time delay t_1
- 2 fixed time delay t_2
- 3 settable time delay t_1
- 4 settable time delay t_2

- 0 settable response value

Technical data

Input circuit

Nominal voltage U_N:	AC 24, 42, 110, 230 V DC 24 V
Voltage range:	0,7 ... 1,3 U_N
Max. overload:	1,35 U_N continuously
Nominal consumption:	max. 5 VA / DC 1 W
Frequency range:	45 ... 65 Hz

Setting ranges

Response value:	adjustable: 0,9 ... 1,3 U_N
Hysteresis:	approx. 4 % of setting value

Technical data

Time delay t_1 / t_2:	0,5 ... 20 s	
	2 ... 200 s	
	5 ... 15 min	
	0,1 ... 20 min	
Reaction time:	approx. 100 ms	

Output

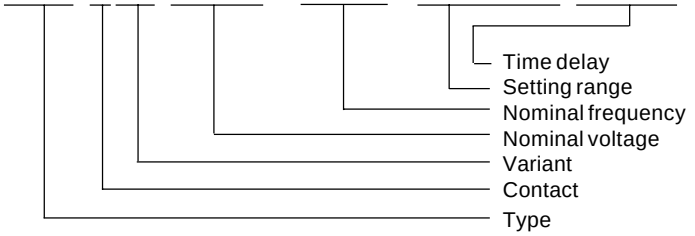
Contacts		
IK 9172.11:	1 changeover contact	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical contact life		EN 60 947-5-1
at AC 230 V, 1 A (cos φ = 0,5):	$\geq 3 \times 10^5$ switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	$\geq 30 \times 10^6$ switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages:	1 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz,	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	65 g	

Ordering example

IK 9172 .11/031 AC 230 V 50/60 Hz 0,9 ... 1,3 U_N 0,5 ... 20 s

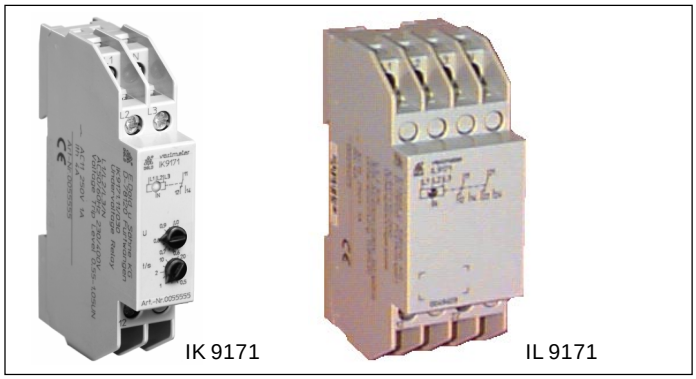


Dimensions

Width x height x depth: 17,5 x 90 x 59 mm

Undervoltage relay IK 9171 / IL 9171, 3-phase varimeter

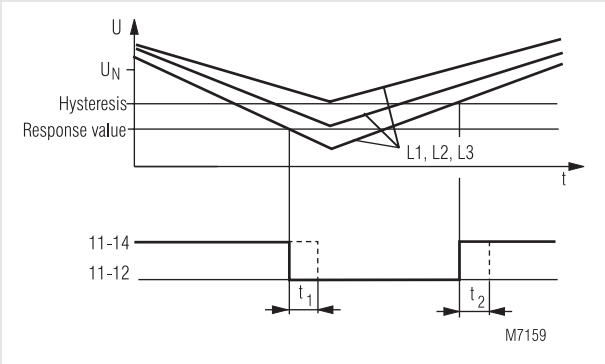
0223313



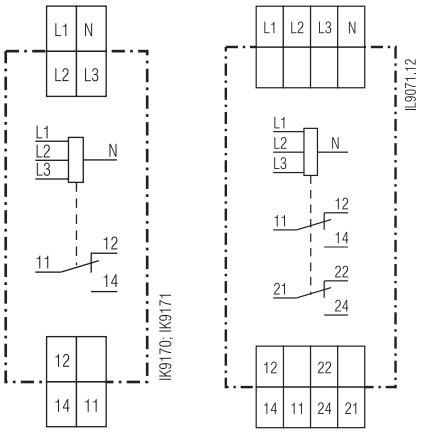
IK 9171 IL 9171

- According to IEC 255, VDE 0435 part 303
- Monitoring of undervoltage in 3-phase system
- Also for single phase
- Without auxiliary supply
- Optionally fixed or settable response value
- N.C. circuit operation
- Optionally for 3p3w systems
- Optionally with off-delay t_1
- Optionally with on-delay t_2
- LED indicator for state of output relay
- Independent of phase sequence
- 1 or 2 changeover contacts
- Width IK 9171: 17,5 mm
  Width IL 9171: 35 mm

Function diagram



Circuit diagram



IK 9171 IL 9171

Approvals and marking

CE

Applications

Monitoring of voltage systems on undervoltage. Automatic switching to emergency supply or of emergency light in the case of phase loss.

Variant with t_2 is used in unstable voltage systems, where after phase failure detection the consumers should be energized one after the other. This is done by setting the operate delay of the other. This ist done by setting the operate delay of the different relays to different values.
This variant ist also used where a consumer after only short phase failure should not be started immediately (e.g. compressors).

Function

The arithmetic mean value of each phase is measured against N. The variants without N measure L1 and L3 against L2 (IK 9171) and L1 and L2 against L3 (IL 9171).

Indicators

Yellow LED: output contact active (11-14 closed)

Notes

To measure single-phase voltage terminals L1, L2, L3 have to be linked together.
The time delay t1 is only active if the voltage L1-N (IK 9171) or L3-N (IL 9171) is at least 0,5 U_N.

Standard type

IK 9171.11/200 3/N AC 400/230 V 50/60 Hz 0,85 U_N
Article-number: 0049292 stock item

- Output: 1 changeover contact
- Nominal voltage U_N: 3/N AC 400/230 V
- Detection of undervoltage at < 0,85 U_N
- Fixed response value 0,85 U_N
- No time delay
- For 3p3w connection

Variants

IK 9171/001

- 0 NC circuit operation with N
- 1 NC circuit operation without N
- 0 without time delay
- 3 settable time delay t_1
- 4 settable time delay t_2
- 0 settable response value
- 2 fixed response value

Technical data

Input circuit

Nominal voltage U_N:	3 AC 400 / 230 V (with neutral) 3 AC 400 V (without neutral)
Max overload:	1,15 U_N continuously
Nominal consumption	
IK 9171.11:	approx. 6 VA
IL 9171.12:	approx. 8 VA
Frequency range:	45 ... 65 Hz

Setting ranges

Response value:	fixed: 0,7 or 0,85 U_N adjustable: 0,55 ... 1,05 U_N
Hysteresis:	approx. 4 % of setting value
Time delay t_1 / t_2:	0,5 ... 20 s
Reaction time:	approx. 100 ms

Output

Contacts		
IK 9171.11:	1 changeover contact	
IL 9171.12:	2 changeover contacts	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
at AC 230 V, 1 A (cos φ = 0,5):	≥ 3 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz,	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm^2 solid or 2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3	

Technical data

Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
IK 9171:	65 g	
IL 9171:	110 g	

Ordering example

IK 9171 .11/_ _ _ 3 AC 400 V 50/60 Hz 0,55 ... 1,05 U_N 0,5 ... 20 s

- Time delay
- Response value
- Nominal frequency
- Nominal voltage
- Variant, if required
- Contact
- Type

Dimensions

Width x height x depth

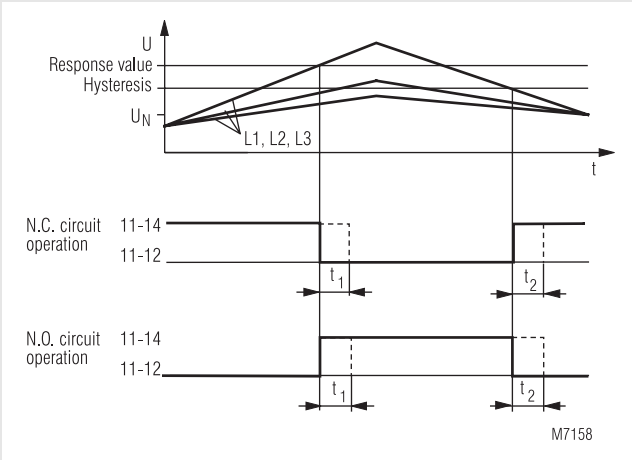
IK 9171:	17,5 x 90 x 59 mm
IL 9171:	35 x 90 x 59 mm

Overvoltage relay IK 9170
varimeter

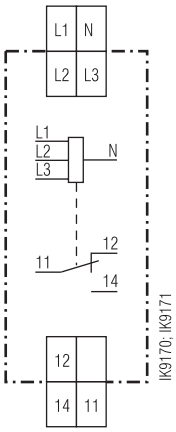
0223314

- According to IEC 255, VDE 0435 part 303
- Monitoring of overvoltage in 3-phase systems
- Optionally phase sequence monitoring
- Also for single phase
- Without auxiliary supply
- Settable response value
- Optionally for 3p3w systems
- Fixed or settable time operate delay
- Fixed or settable time release delay
- N.C. circuit operation (optionally N.O. circuit operation)
- LED indicator for state of output relay
- Indepenent of phase sequence
- 1 changeover contact
- DIN rail mounting
- Width 17,5 mm

Function diagram



Circuit diagram



IK 9170

Approvals and marking

CE

Applications

Monitors overvoltage, in 3-phase voltage systems

Notes

The arithmetic mean value of each phase is measured against N. The variants without N measure L1 and L3 against L2.

Indicators

Yellow LED: output contact active (11-14 closed)

Standard type

IK 9170.11 3/N AC 400/230V 50/60 Hz 0,9 ... 1,3 U_N
Article-number: 0048645

- Adjustable response value 0,9 ... 1,3 U_N
- Without time delay
- 3p4w connection
- Closed circuit operation
- Output: 1 changeover contact
- Nominal voltage U_N: 3/N AC 400/230 V

Variants

IK 9170/001

- 0 N.C. circuit operation with N
- 1 N.C. circuit operation without N
- 2 N.O. circuit operation with N
- 3 N.O. circuit operation without N

- 0 without time delay
- 1 fixed time delay t_1
- 2 fixed time delay t_2
- 3 settable time delay t_1
- 4 settable time delay t_2

- 0 settable response value

Technical data

Input circuit

Nominal voltage U_N:	3/N AC 400/230 V (with neutral) 3 AC 400 V (without neutral)
Voltage range:	0,7 ... 1,3 U_N
Max. overload:	1,35 U_N, continuously
Nominal consumption:	approx. 4 VA
Frequency range:	45 ... 65 Hz

Technical data

Setting ranges

Response value

adjustable:	0,9 ... 1,3 U_N
Hysteresis:	approx. 4 % of setting value
Time delay t_1 / t_2:	0,5 ... 20 s
	2 ... 200 s
	5 ... 15 min
	0,1 ... 20 min

Output

Contacts

IK 9170.11:	1 changeover contact	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical contact life		EN 60 947-5-1
at AC 230 V, 1 A (cos φ = 0,5):	$\geq 3 \times 10^5$ switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	$\geq 30 \times 10^6$ switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages:	1 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz,	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm^2 solid or 2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	65 g	

Ordering example

IK 9170 .11/031 3 AC 400 V 0,9 ... 1,3 U_N 0,5 ... 20 s

- Time delay
- Setting range
- Nominal voltage
- Variant
- Contact
- Type

Dimensions

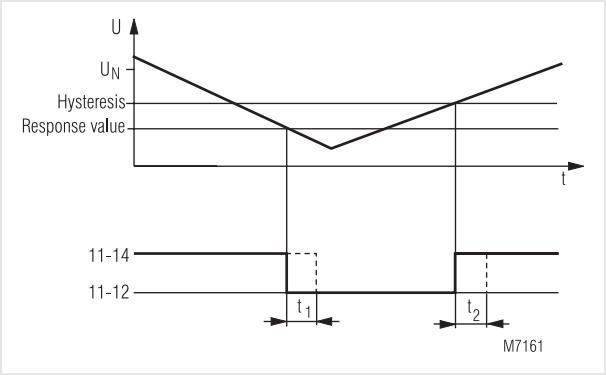
Width x height x depth: 17,5 x 90 x 59 mm

Undervoltage relay IK 9173
varimeter

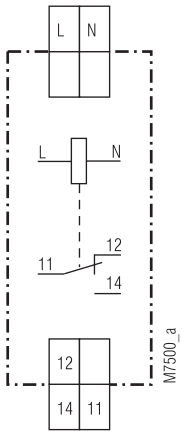
0223316

- According to IEC 255, VDE 0435 part 303
- Monitoring of undervoltage
- Without auxiliary supply
- Optionally fixed or settable response value
- N.C. circuit operation
- Optionally with off-delay t_1
- Optionally with on-delay t_2
- LED indicator for state of output relay
- 1 changeover contact
- Width 17,5 mm

Function diagram



Circuit diagram



IK 9173

Approvals and marking

CE

Applications

Monitoring of voltage systems on undervoltage. Automatic switching to emergency supply or of emergency light in the case of phase loss.

Variant with t_2 is used in unstable voltage systems, where after phase failure detection the consumers should be energized one after the other. This is done by setting the operate delay of the different relays to different values.
This variant is also used where a consumer after only short phase failure should not be started immediately (e.g. compressors).

Function

The arithmetic mean value of the voltage L-N is measured.

Indication

yellow LED:	output contact active (11-14 closed)

Notes

The time delay for the models with delay t_1 is only active as long as the phase voltage L-N is above 0,5 U_N.

Standard type

IK 9173.11/200, AC 230 V, 0,7 U_N
Article-number: 0049812

- Detection of undervoltage at < 0,7 U_N
- Fixed response value
- Without time delay
- Output: 1 changeover contact
- Nominal voltage U_N: AC 230 V
- Width: 17,5 mm

Variants

IK 9173/000

- 0 NC circuit operation
- 0 without time delay
- 3 settable time delay t_1
- 4 settable time delay t_2
- 0 settable response value
- 2 fixed response value

Technical data

Input circuit

Nominal voltage U_N:	AC 24, 42, 110, 230 V DC 24 V
Max. overload:	1,15 U_N continuously
Nominal consumption:	approx. 6 VA
Frequency range:	45 ... 65 Hz

Setting ranges

Response value:	fixed: 0,7 or 0,85 U_N adjustable: 0,55 ... 1,05 U_N
Hysteresis:	approx. 4 % of setting value
Time delay t_1 / t_2:	0,5 ... 20 s
Reaction time of the measuring input at phase failure:	approx. 100 ms

Output

Contacts:	1 changeover contact	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15:		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
at AC 230 V, 1 A (cos φ = 0,5):	≥ 3 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60 °C	
Clearance and creepage distances		
overvoltage category/ contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm, frequency 10 ... 55 Hz,	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm^2 solid or 2 x 1,5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	65 g	

Ordering example

IK 9173 .11/_ _ _ AC 230 V 0,55 ... 1,05 U_N 0,5 ... 20 s

- Time delay
- Response value
- Nominal voltage
- Variant, if required
- Contact
- Type

Dimensions

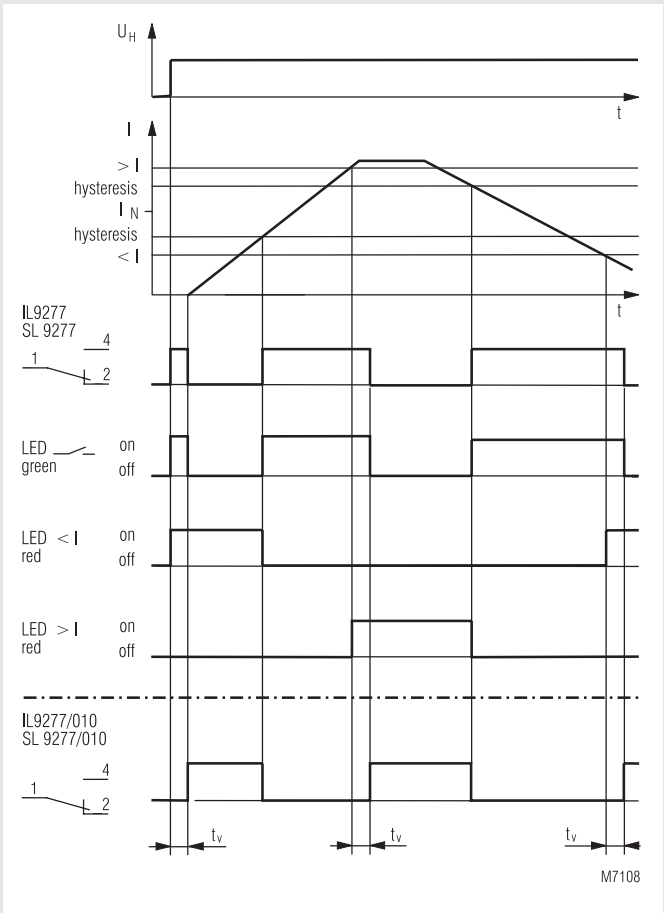
Width x height x depth: 17,5 x 90 x 59 mm

Over- and undercurrent relay varimeter
IL 9277, IP 9277, SL 9277, SP 9277

0224264

- According to IEC 255, VDE 0435 part 303
- Devices available in 2 enclosure versions:
  I-model, e.g. IL _ _ _ _, depth 61 mm
  with terminals as the bottom for installations systems and industrial distribution systems
  S-model, e.g. SL _ _ _ _, depth 100 mm
  with terminals at the top for cabinets with mounting plate and cable duct
- IP 9277, SP 9277: 3-phase
  IL 9277, SL 9277: single phase
- Detects over- and undercurrent
- Measuring ranges from 0,1 ... 15 A
- IL 9277, SL 9277 with 4 programmable ranges
- Settable 0,1 ... 1 I_N
- Separate setting for over- and undercurrent
- Fixed hysteresis approx. 4 %
- Settable time delay
- IP 9277, SP 9277 with separate settable time delay for over- and undercurrent
- Closed circuit operation
- Optionally open circuit operation
- LED indicators for over-, under- and normal current
- Auxiliary supply and measuring input galvanic separated
- IL 9277, SL 9277 with one output relay for over- and undercurrent
- IP 9277, SP 9277 with separate output relays for over- and undercurrent
- Width IL 9277, SL 9277: 35 mm
  IP 9277, SP 9277: 70 mm

Function diagram IL 9277, SL 9277



Approvals and marking

CE

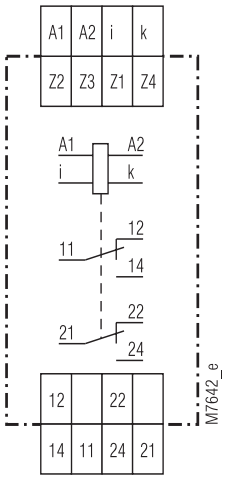
Applications

Over- and undercurrent detection in single phase or 3-phase voltage systems

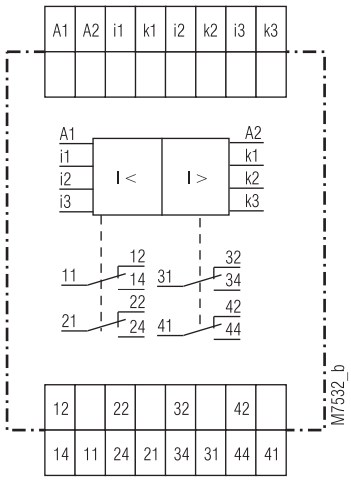
Indicators

LED green:	current within limits
LED red I_{max}:	overcurrent
LED red I_{min}:	undercurrent

Circuit diagram



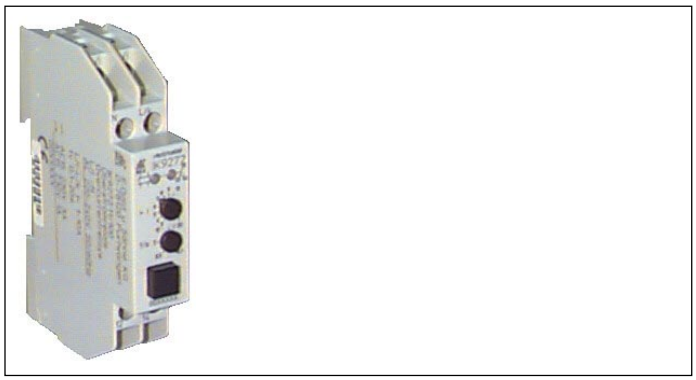
IL 9277.12, SL 9277.12



IP 9277.39, SP 9277.39

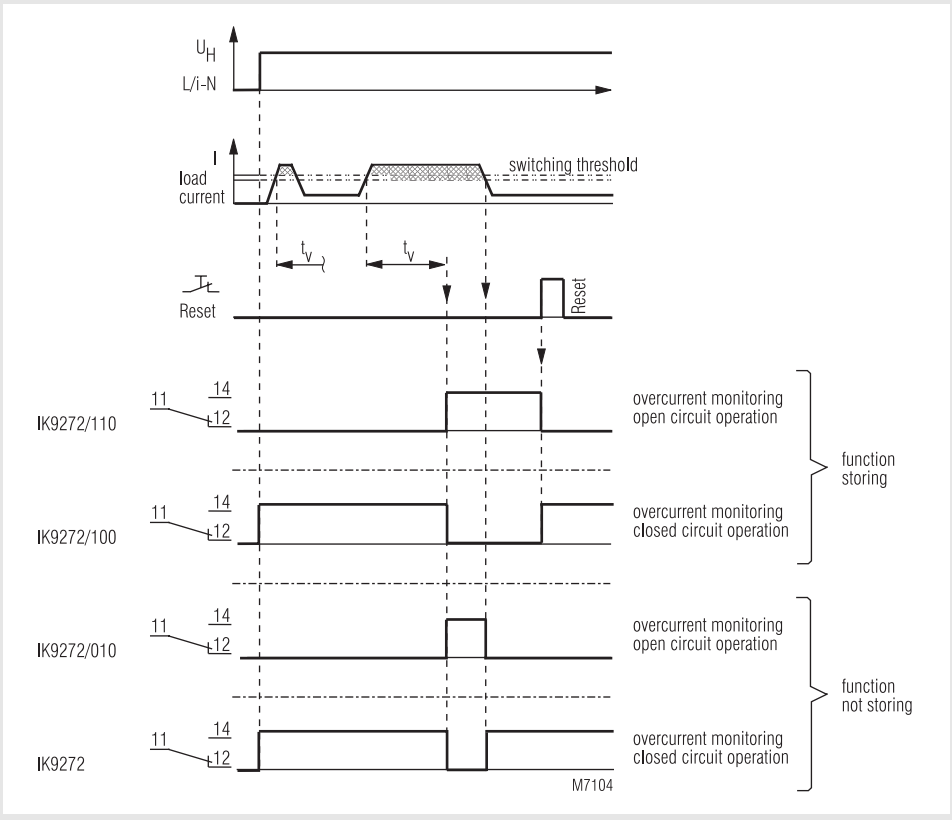
Overcurrent relay IK 9272
varimeter

0226828

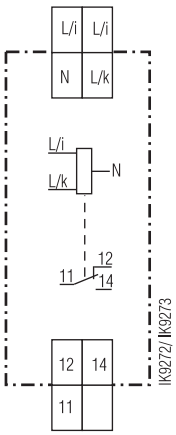


- According to IEC 255, VDE 0435 part 303
- single phase
- Measuring ranges from 0,05 ... 10 A
- Setting value adjustable from 0,1 ... 1 I_N
- Fixed hysteresis approx. 4 %
- Adjustable switching delay
- Closed circuit operation
- Optionally open circuit operation
- Automatic reset
- Optionally manual reset, reset button on the front
- LED indication for auxiliary voltage
- 1 changeover contact
- Width 17,5 mm

Function diagram



Circuit diagram



Approvals and marking

CE

Application

Overcurrent detection in AC power supplies

Indication

green LED:	on when auxiliary supply connected
yellow LED:	on when output contacts switched

Notes

Auxiliary voltage and measuring circuit are not galvanically seperated. Thus they need the same reference potential "N", if there is no external seperation, e.g. through a current transformer see application examples.

Standard type

IK 9272.11/010 AC 220 ... 240 V 50/60 Hz 10 A
Article number:

- Open circuit operation
- Output: 1 changeover contact
- Nominal voltage U_N: AC 220 ... 240 V
- Measuring range: 1 ... 10 A

Variants

IK 9272:	Closed circuit operation
IK 9272.11/010:	Open circuit operation
IK 9272.11/100:	manual reset, closed circuit operation
IK 9272.11/110:	manual reset, open circuit operation

Technical data

Input

Measuring range:	AC 50 ... 500 mA AC 0,1 ... 1 A AC 0,5 ... 5 A AC 1 ... 10 A higher currents via external current transformer (2,5 VA)
Nominal frequency of measuring current:	50 / 60 Hz
Maximum continuous measuring current:	
at AC 50 ... 500 mA:	2,5 A, at 50°C ambient temperature
at AC 0,1 ... 1 A:	5 A, at 50°C ambient temperature
at AC 0,5 ... 5 A:	11 A, at 50°C ambient temperature
at AC 1 ... 10 A:	15 A, at 50°C ambient temperature
Maximum overload:	
at AC 50 ... 500 mA:	8 A, max. 3 s
at AC 0,1 ... 1 A:	10 A, max. 3 s
at AC 0,5 ... 5 A:	20 A, max. 3 s
at AC 1 ... 10 A:	20 A, max. 3 s
Temperature influence:	≤ 0,2 % / K
Reaction time:	see characteristic switching delay

Setting ranges

Response value:	infinite variable within measuring range
Hysteresis:	approx. 0,96 of setting value, fixed approx. 4 % hysteresis
Setting accuracy:	≤ ± 10 % of setting value
Repeat accuracy:	≤ ± 1 %
Time delay tv:	0,1 ... 20 s adjustable

Auxiliary circuit

Auxiliary voltage U_H:	AC 115 ... 127 V, AC 220 ... 240 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption	
at AC 230 V:	5,5 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
IK 9272.11:	1 changeover contact	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V		
NO contact:	3 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	> 10^8 switching cycles	

General data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 60°C

Technical data

Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
HF wire guided:	10 V	EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	65 g	

Ordering example

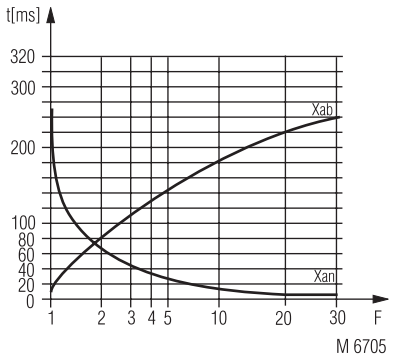
IK 9272 .11 /_ _ _ AC 220 ... 240 V 50 / 60 Hz 10 A

- Measuring range
- Nominal frequency
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Dimensions

Width x height x depth: 17,5 x 90 x 59 mm

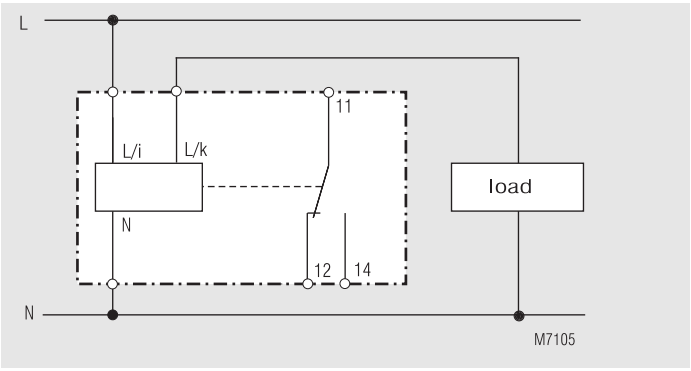
Characteristics



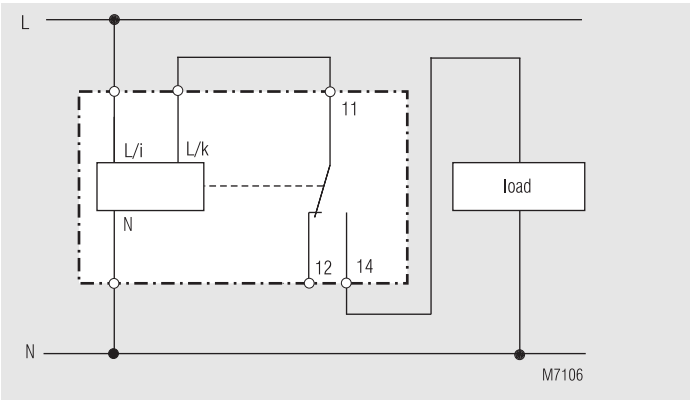
Switching delay
The characteristic shows the switching delay depending on the values of X_{an} - X_{ab} when switching the current on or off. A slow current change reduces the delay

$$F = \frac{\text{I applied}}{\text{I setting}}$$

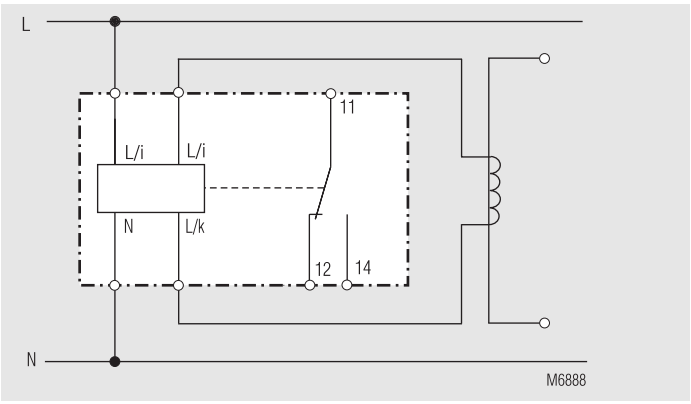
Connection examples



L/i - N auxiliary voltage
L/i - L/k current input



Connection example for IK 9272/100
Load in series to the contact. When overcurrent the load is turned off. The fault is stored. New start by pressing reset button or auxiliary voltage off, on.
Maximum continuous measuring current for this application is 5 A:

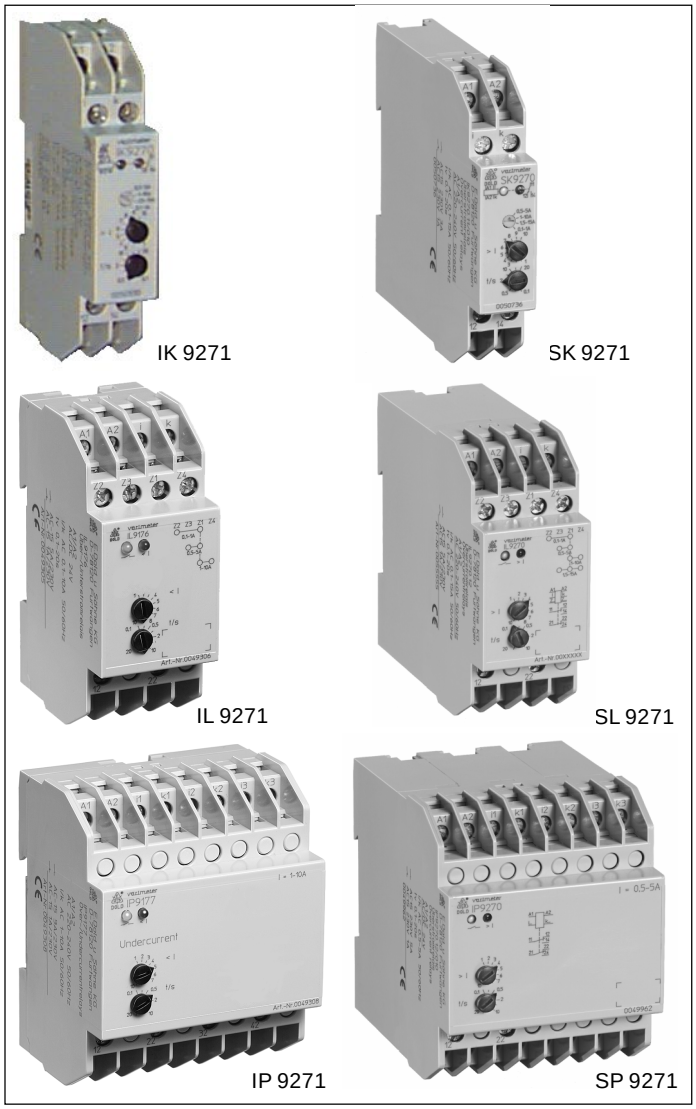


Connection example with external galvanical seperation, e.g. via current transformer.

Attention: On the secondary side of the current transformer is the potential L.
L/i is allowed to be changed, so that the secondary side of the current ransformer has the potential N.

Undercurrent relay varimeter
IK 9271, IL 9271, IP 9271, SK 9271, SL 9271, SP 9271

0224263



- According to IEC 255, VDE 0435 part 303
- Devices available in 2 enclosure versions:
  - I-model, e.g. IK _ _ _ _, depth 61 mm
    with terminals as the bottom for installations systems
    and industrial distribution systems
  - S-model, e.g. SK _ _ _ _, depth 100 mm
    with terminals at the top for cabinets with mounting plate
    and cable duct
- IP 9271, SP 9271: 3-phase
  IK 9271, IL 9271, SK 9271, SL 9271: single phase
- Measuring ranges from 0,1 ... 15 A
- IK 9271, SK 9271:
  with 4 ranges settable by rotational switch, 1 changeover contact
- IL 9271, SL 9271:
  with 4 programmable ranges, 2 changeover contacts
- IP 9271, SP 9271: with 1 range, 2 changeover contacts
- Settable response value
- Fixed hysteresis
- Settable time delay
- Closed circuit operation
- Optionally open circuit operation
- LED indicators
- With auxiliary voltage
- Auxiliary supply and measuring input galvanic separated
- Width IK 9271, SK 9271: 17,5 mm
  IL 9271, SL 9271: 35 mm
  IP 9271, SP 9271: 70 mm

Approvals and marking

CE

Applications

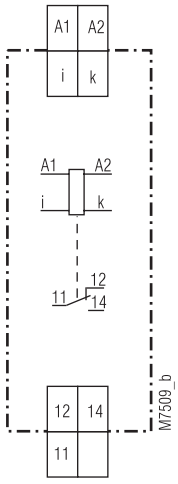
Undercurrent detection in single phase or 3-phase voltage systems

Indicators

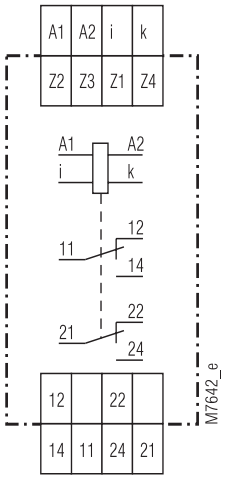
IK 9271, SK 9271:
green LED: on when aux. supply connected
yellow LED: on when output contacts switched

IL 9271, SL 9271, IP 9271, SP 9271:
green LED: on when current within limits
red LED I_{max}: on when undercurrent

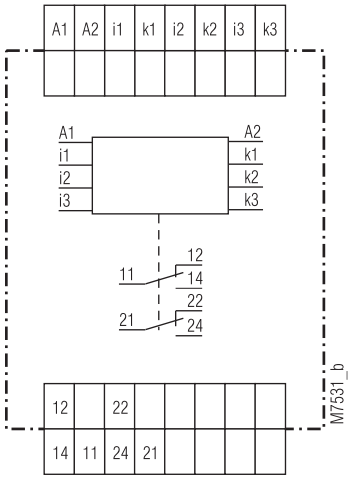
Circuit diagrams



IK 9271.11, SK 9271.11

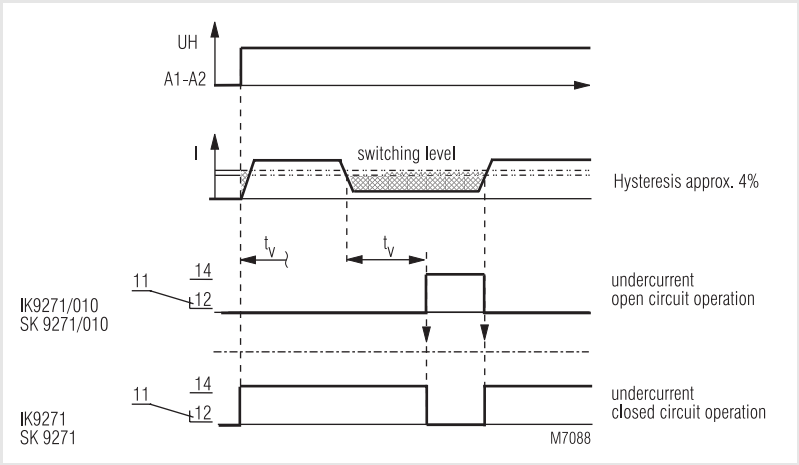


IL 9271.12, SL 9271.12

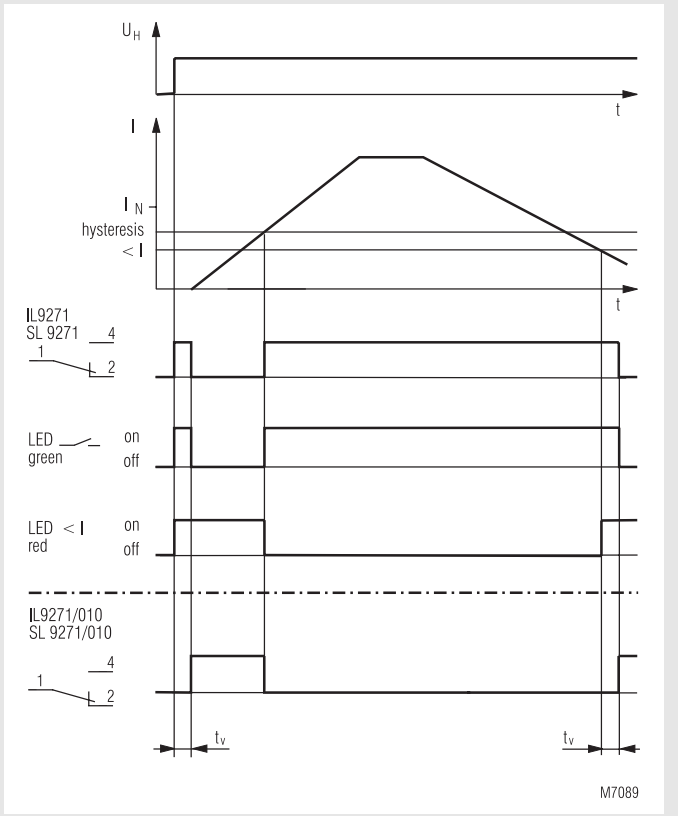


IP 9271.12, SP 9271.12

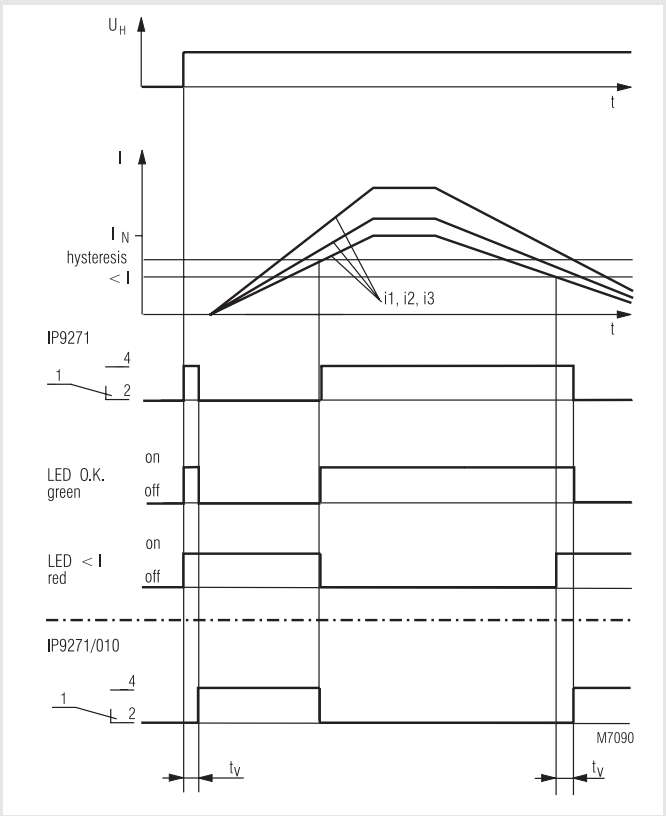
Function diagram IK 9271, SK 9271



Function diagram IL 9271, SL 9271



Function diagram IP 9271, SP 9271



Standard types

IK 9271.11 AC 220 ... 240 V 50/60 Hz 0,1 ... 15 A
Article number: 0050331
SK 9271.11 AC 220 ... 240 V 50/60 Hz 0,1 ... 15 A
Article number: 0050647

- Single phase
- 4 programmable ranges up to 15 A
- Open circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 1 changeover contact
- Width 17,5 mm

IP 9271.12 AC 220 ... 240 V 50/60 Hz 0,5 ... 5 A
Article number: 0049961
SP 9271.12 AC 220 ... 240 V 50/60 Hz 0,5 ... 5 A
Article number: 0050648

- 3-phase
- Range 0,5 ... 5 A
- Closed circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts
- Width 70 mm

Variants

IK 9271.11/010, SK 9271.11/010:	single phase current relay open circuit operation, 1 changeover contact
IL 9271.12/010, SL 9271.12/010:	single phase current relay open circuit operation, 2 changeover contacts
IP 9271.12/010, SP 9271.12/010:	3-phase current relay open circuit operation 2 changeover contacts

Technical data

Input

Measuring ranges:	4 measuring ranges
IK 9271, SK 9271:	settable with switch: AC 0,1 ... 1 A AC 0,5 ... 5 A AC 1 ...10 A AC 1,5 ...15 A or optionally 1 measuring range: AC 0,1 ... 1 A; 0,5 ... 5 A; 1 ... 10 A; 1,5 ... 15 A
IL 9271, SL 9271:	4 measuring ranges settable with bridges: AC 0,1 ... 1 A (bridge Z1-Z2) AC 0,5 ... 5 A (bridge Z1-Z3) AC 1 ...10 A (bridge Z1-Z4) AC 1,5 ...15 A (bridge Z1-Z3-Z4)
IP 9271, SP 9271:	only single range: AC 0,1 ... 1 A; 0,5 ... 5 A; 1 ... 10 A; 1,5 ... 15 A

Measuring circuit

Nominal frequency of measuring current:	50 / 60 Hz
Maximum continuous measuring current	
IK 9271, SK 9271:	20 A at 50°C ambient temperature 15 A at 60°C ambient temperature
IL 9271, SL 9271:	20 A at 50°C ambient temperature
IP 9271, SP 9271:	20 A at 45°C ambient temperature 15 A at 50°C ambient temperature
Max. overload:	30 A, max. 3 s
Temperature influence:	≤ 0,05 % / K
Reaction time:	see characteristic switching delay

Setting ranges

Response value:	infinite variable within measuring range
Hysteresis:	approx. 4 % of setting value, fixed
Setting accuracy:	≤ ± 10 % of setting value
Repeat accuracy:	≤ ± 1 %
Switching delay:	0,1 ... 20 s settable

Auxiliary circuit

Auxiliary voltage U_H:	AC/DC 24 V, AC 220 ... 240 V other voltages on request
Voltage range	
at AC:	0,8 ... 1,1 U_H
at DC:	0,8 ... 1,25 U_H
Nominal consumption	
at AC 230 V:	3,2 VA
at DC 24 V:	0,8 W
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
IK 9271.11, SK 9271.11:	1 changeover contact	
IL 9271.12, SL 9271.12:	2 changeover contacts	
IP 9271.12, SP 9271.12:	2 changeover contacts	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15		
NO contact:		
IK 9271:	3 A / AC 230 V	EN 60 947-5-1
IL 9271, IP 9271:	5 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V		
NO contact:		
IK 9271:	3 x 10^5 switching cycles	
to AC 15 at 2 A, AC 230 V		
IL 9271, IP 9271:	2 x 10^5 switching cycles	

Technical data

Short circuit strength		
max. fuse rating		
IK 9271:	4 A gL	EN 60 947-5-1
IL 9271, IP 9271:	10 A gL	EN 60 947-5-1
Mechanical life:	> 50 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between wires for power supply:		
IK 9271:	2 kV	EN 61 000-4-5
IL 9271, IP 9271:	1 kV	EN 61 000-4-5
between wire and ground:		
IK 9271:	4 kV	EN 61 000-4-5
IL 9271, IP 9271:	2 kV	EN 61 000-4-5
HF-wire guided		
IK 9271:	10 V	EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
IK 9271:	70 g	
SK 9271:	90 g	
IL 9271:	125 g	
SL 9271:	150 g	
IP 9271:	200 g	
SP 9271:	250 g	

Ordering example

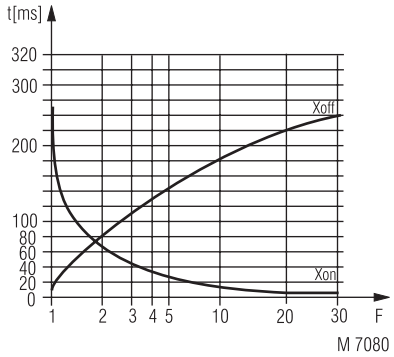
IP 9271 .12 /_ _ _ AC 220 ... 240 V 50 / 60 Hz 1 ... 10 A

- Measuring range
- Nominal frequency
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Dimensions

Width x height x depth	
IK 9271:	17,5 x 90 x 61 mm
SK 9271:	17,5 x 90 x 100 mm
IL 9271:	35 x 90 x 61 mm
SL 9271:	35 x 90 x 100 mm
IP 9271:	70 x 90 x 61 mm
SP 9271:	70 x 90 x 100 mm

Characteristics



Switching delay

The characteristic shows the switching delay depending on the values of X_{on} - X_{off} when switching the current on or off. A slow current change reduces the delay.

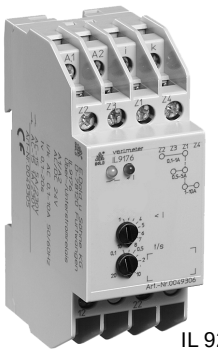
$$F = \frac{\text{I applied}}{\text{I setting}}$$

Overcurrent relay varimeter
IK 9270, IL 9270, IP 9270, SK 9270, SL 9270, SP 9270

0224259


IK 9270


SK 9270


IL 9270


SL 9270

IP 9270


SP 9270

- According to IEC 255, VDE 0435 part 303
- Devices available in 2 enclosure versions:
  - I-model, e.g. IK _ _ _ _, depth 61 mm
    with terminals as the bottom for installation systems and industrial distribution systems
  - S-model, e.g. SK _ _ _ _, depth 100 mm
    with terminals at the top for cabinets with mounting plate and cable duct
- IP 9270, SP 9270: 3-phase
  IK 9270, SK 9270, IL 9270, SL 9270: single phase
- Measuring ranges from 0,1 ... 15 A
- IK 9270, SK 9270:
  with 4 ranges settable by rotational switch, 1 changeover contact
- IL 9270, SL 9270:
  with 4 programmable ranges, 2 changeover contacts
- IP 9270, SP 9270: with 1 range, 2 changeover contacts
- Settable response value
- Fixed hysteresis
- Settable time delay
- Closed circuit operation
- Optionally open circuit operation
- LED indicators
- With auxiliary voltage
- Auxiliary supply and measuring input galvanic separated
- Width IK 9270, SK 9270: 17,5 mm
  IL 9270, SL 9270: 35 mm
  IP 9270, SP 9270: 70 mm

Approvals and marking

CE

Applications

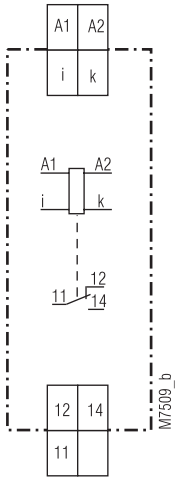
Overcurrent detection in single phase or 3-phase voltage systems

Indicators

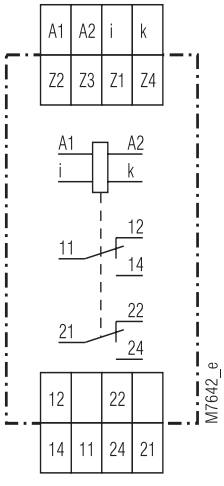
IK 9270, SK 9270:
LED green: aux. supply connected
LED yellow: output contacts switched

IL 9270, SL 9270, IP 9270, SP 9270:
LED green: current within limits
LED red I_{max}: overcurrent

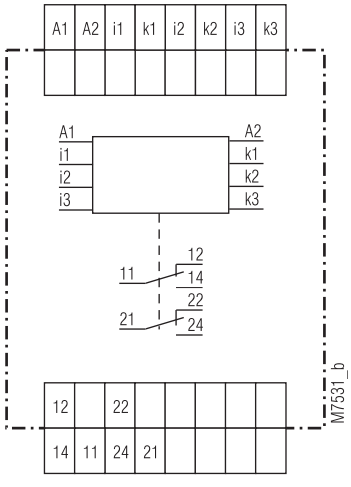
Circuit diagram



IK 9270.11, SK 9270.11

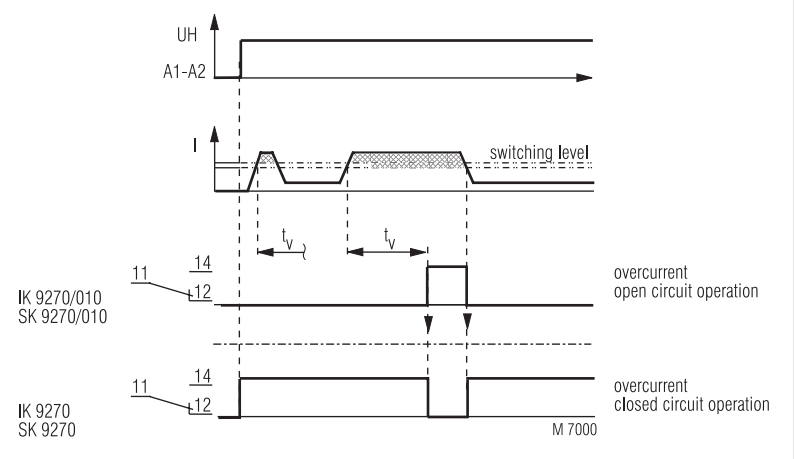


IL 9270.12, SL 9270.12

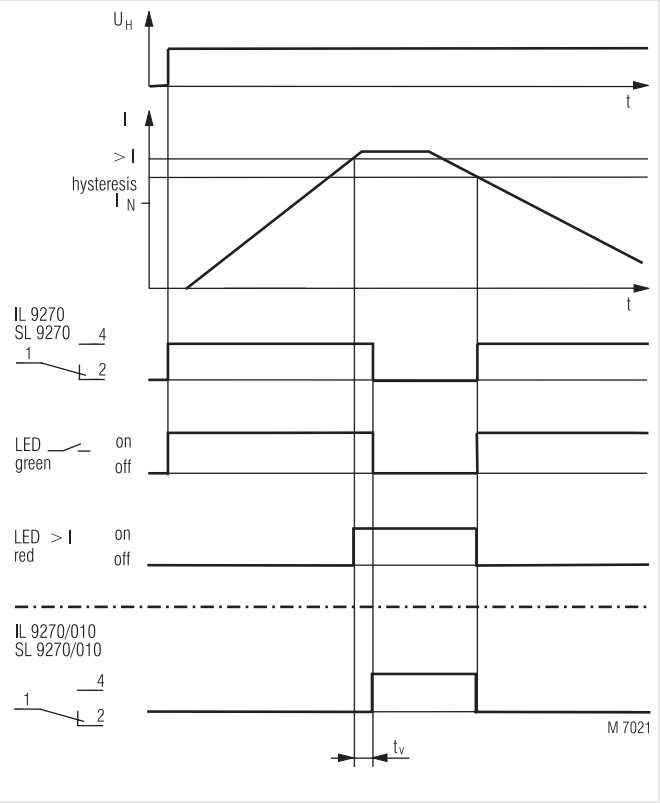


IP 9270.12, SP 9270.12

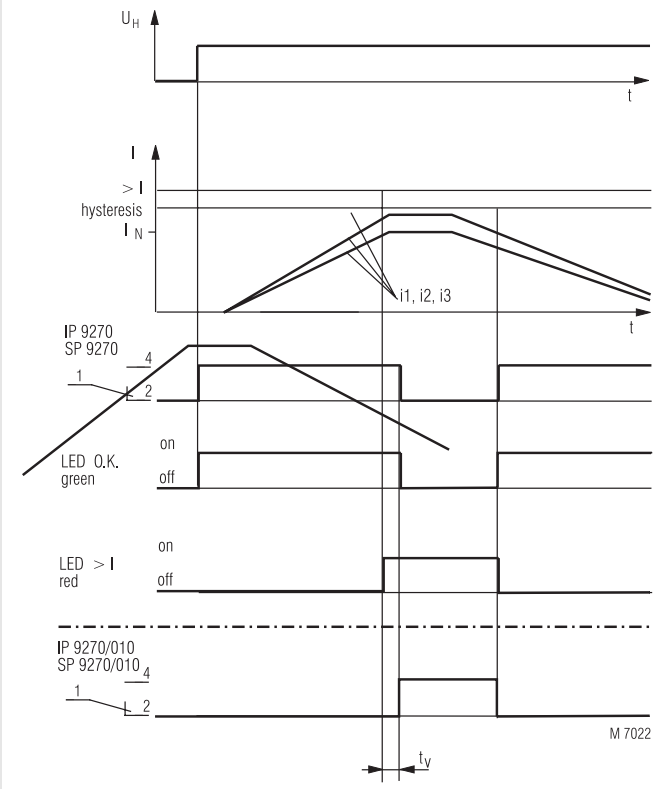
Function diagram IK 9270, SK 9270



Function diagram IL 9270, SL 9270



Function diagram IP 9270, SP 9270



Standard types

IK 9270.11/010 AC 220 ... 240 V 50/60 Hz 0,1 ... 15 A
Article number: 0050330

- Single phase
- 4 programmable ranges up to 15 A
- Open circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 1 changeover contact
- Width 17,5 mm

IP 9270.12/010 AC 220 ... 240 V 50/60 Hz 0,5 ... 5 A
Article number: 0049438
SP 9270.12/010 AC 220 ... 240 V 50/60 Hz 0,5 ... 5 A
Article number:

- 3-phase
- Range 0,5 ... 5 A
- Open circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts
- Width 70 mm

Variants

IK 9270.11, SK 9270.11:	single phase current relay, closed circuit operation, 1 changeover contact
IL 9270.12, SL 9270.12:	single phase current relay, closed circuit operation, 2 changeover contacts
IL 9270.12/010, SL 9270.12/010:	single phase current relay, open circuit operation, 2 changeover contacts
IP 9270.12, SP 9270.12:	3-phase current relay, closed circuit operation, 2 changeover contacts

Technical data

Input

Measuring ranges

IK 9270, SK 9270:	4 measuring ranges settable with switch: AC 0,1 ... 1 A AC 0,5 ... 5 A AC 1 ... 10 A AC 1,5 ... 15 A or optionally 1 measuring range: AC 0,1 ... 1 A; 0,5 ... 5 A; 1 ... 10 A; 1,5 ... 15 A
IL 9270, SL 9270:	4 measuring ranges settable with bridges: AC 0,1 ... 1 A (bridge Z1-Z2) AC 0,5 ... 5 A (bridge Z1-Z3) AC 1 ... 10 A (bridge Z1-Z4) AC 1,5 ... 15 A (bridge Z1-Z3-Z4)
IP 9270, SP 9270:	only single range: AC 0,1 ... 1 A; 0,5 ... 5 A; 1 ... 10 A; 1,5 ... 15 A;

Measuring circuit

Nominal frequency of measuring current:	50 / 60 Hz
Maximum continuous measuring current	
IK 9270, SK 9270:	20 A at 50°C ambient temperature
IL 9270, SL 9270:	15 A at 60°C ambient temperature
IP 9270, SP 9270:	20 A at 45°C ambient temperature 15 A at 50°C ambient temperature
Max. overload:	30 A for 3 sec
Temperature influence:	≤ 0,05 % / K
Reaction time:	see characteristic switching delay

Setting ranges

Response value:	infinite variable within measuring range
Hysteresis:	approx. 4 % of setting value, fixed
Setting accuracy:	≤ ± 10 % of setting value
Repeat accuracy:	≤ ± 1 %
Switching delay:	0,1 ... 20 sec settable

Auxiliary circuit

Auxiliary voltage U_H:	AC/DC 24 V, AC 220 ... 240 V other voltages on request
Voltage range	
at AC:	0,8 ... 1,1 U_H
at DC:	0,8 ... 1,25 U_H
Nominal consumption	
at AC 230 V:	3,2 VA
at DC 24 V:	0,8 W
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
IK 9270.11, SK 9270.11:	1 changeover contact	
IL 9270.12, SL 9270.12:	2 changeover contacts	
IP 9270.12, SP 9270.12:	2 changeover contacts	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15		
NO contact:		
IK 9270:	3 A / AC 230 V	EN 60 947-5-1
IL 9270, IP 9270:	5 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V		
NO contact:		
IK 9270:	3 x 10^5 switching cycles	
to AC 15 at 2 A, AC 230 V		
IL 9270, IP 9270:	2 x 10^5 switching cycles	

Technical data

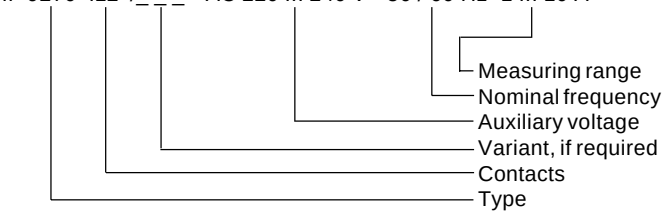
Short-circuit strength		
max. fuse rating:		
IK 9270:	4 A gL	EN 60 947-5-1
IL 9270, IP 9270:	10 A gL	EN 60 947-5-1
Mechanical life:	> 50 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category/ contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between wires for power supply		
IK 9270:	2 kV	EN 61 000-4-5
IL 9270, IP 9270:	1 kV	EN 61 000-4-5
between wire and ground:		
IK 9270:	4 kV	EN 61 000 4-5
IL 9270, IP 9270:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
IK 9270:	70 g	
SK 9270:	89 g	
IL 9270:	122 g	
SL 9270:	151 g	
IP 9270:	200 g	
SP 9270:	249 g	

Ordering example

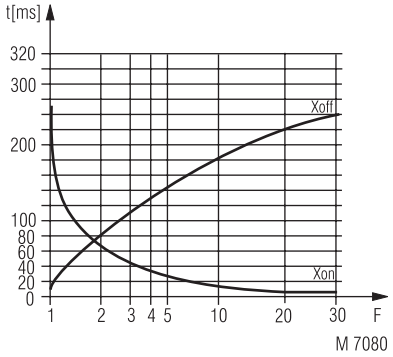
IP 9270 .12 /_ _ _ AC 220 ... 240 V 50 / 60 Hz 1 ... 10 A



Dimensions

Width x height x depth	
IK 9270:	17,5 x 90 x 61 mm
SK 9270:	17,5 x 90 x 100 mm
IL 9270:	35 x 90 x 61 mm
SL 9270:	35 x 90 x 100 mm
IP 9270:	70 x 90 x 61 mm
SP 9270:	70 x 90 x 100 mm

Characteristics

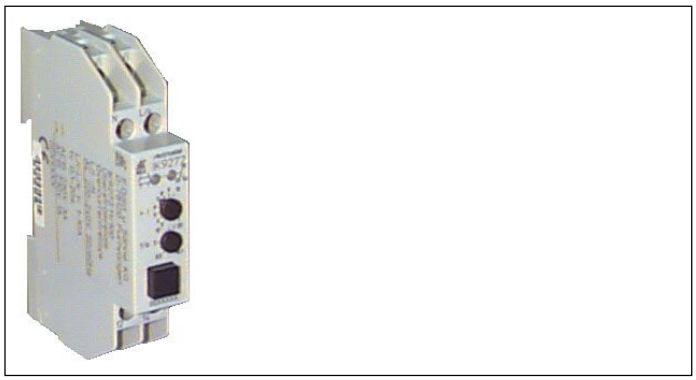


Switching delay
The characteristic shows the switching delay depending on the values of X_{on} - X_{off} when switching the current on or off. A slow current change reduces the delay.

$$F = \frac{\text{I applied}}{\text{I setting}}$$

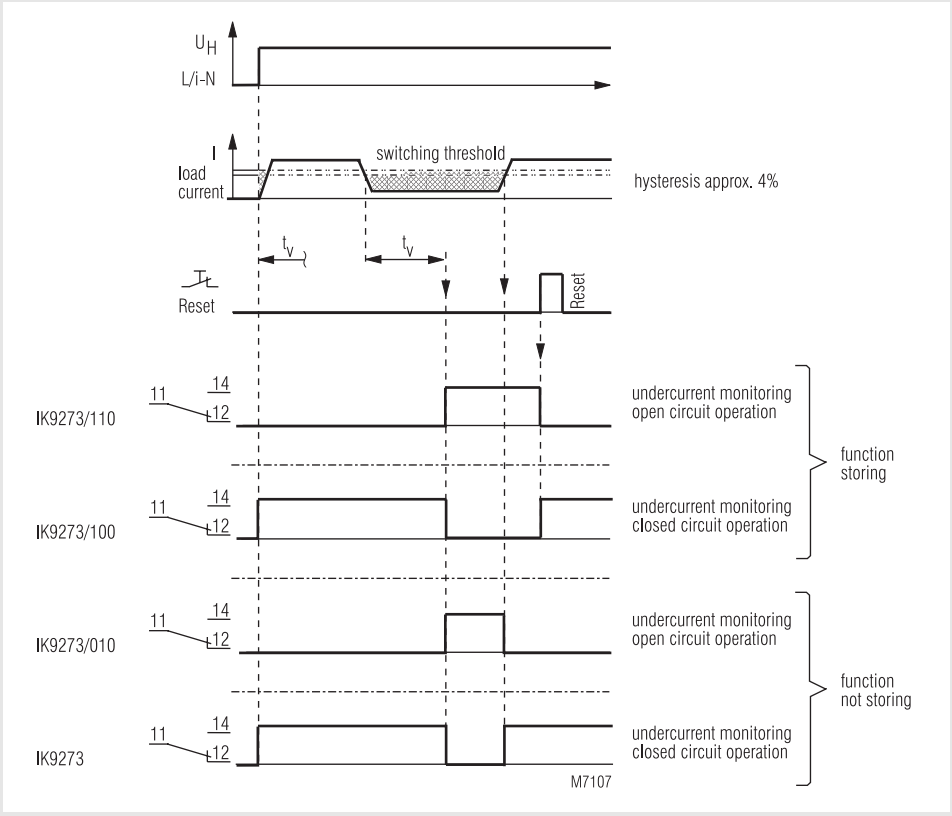
Undercurrent relay IK 9273
varimeter

0226829

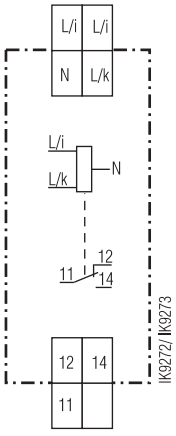


- According to IEC 255, VDE 0435 part 303
- Single phase
- Measuring ranges from 0,05 ... 10 A
- Setting value adjustable from 0,1 ... 1 I_N
- Fixed hysteresis approx. 4 %
- Settable switching delay
- Closed circuit operation
- Optionally open circuit operation
- Automatic reset
- Optionally manual reset, reset button on the front
- LED indication for auxiliary voltage and contact position
- 1 changeover contact
- Width 17,5 mm

Function diagram



Circuit diagram



Approvals and marking

CE

Application

Undercurrent monitoring in AC voltage power supplies

Indication

green LED:	on when auxiliary supply connected
yellow LED:	on when output contacts switched

Notes

Auxiliary voltage and measuring circuit are not galvanically seperated. Thus they need, the same reference potential "N" if there is no external galvanic seperation, e.g. through a current transformer see application examples.

Standard type

IK 9273.11 AC 220 ... 240 V 50/60 Hz 10 A
Article number:

- Closed circuit operation
- Output: 1 changeover contact
- Nominal voltage U_N: AC 220 ... 240 V
- Measuring range: 1 ... 10 A

Variants

IK 9273.11/010:	Open circuit operation
IK 9273.11/100:	manual reset, closed circuit operation
IK 9273.11/110:	manual reset, open circuit operation

Technical data

Input

Measuring ranges:	AC 50 ... 500 mA AC 0,1 ... 1 A AC 0,5 ... 5 A AC 1 ... 10 A higher currents via external current transformer (2,5 VA)
Nominal frequency of measuring current:	50 / 60 Hz
Maximum continuous measuring current:	
at AC 50 ... 500 mA:	2,5 A, at 50°C ambient temperature
at AC 0,1 ... 1 A:	5 A, at 50°C mabient temperature
at AC 0,5 ... 5 A:	11 A, at 50°C ambient temperature
at AC 1 ... 10 A:	15 A, at 50°C ambient temperature
Max. overload:	
at AC 50 ... 500 mA:	8 A, max. 3 s
at AC 0,1 ... 1 A:	10 A, max. 3 s
at AC 0,5 ... 5 A:	20 A, max. 3 s
at AC 1 ... 10 A:	20 A, max. 3 s
Temperature influence:	≤ 0,2 % / K
Reaction time:	see characteristics, switching delay

Setting ranges

Response value:	infinite variable within measuring range
Hysteresis:	approx. 0,96 of setting value, fixed approx. 4 % hysteresis
Setting accuracy:	≤ ± 10 % of setting value
Repeat accuracy:	≤ ± 1 %
Switching delay tv:	0,1 ... 20 s adjustable

Auxiliary circuit

Auxiliary voltage U_H:	AC 115 ... 127 V, AC 220 ... 240 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption	
at AC 230 V:	5,5 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
IK 9273.11:	1 changeover contact	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V		
NO contact:	3 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	> 10^8 Schaltspiele	

General data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 60°C

Technical data

Clearance and creepage distances		
overvoltage category / contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
HF wire guided:	10 V	EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight:	65 g	

Ordering example

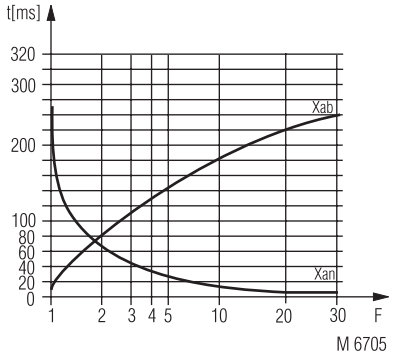
IK 9273 .11 /_ _ _ AC 220 ... 240 V 50 / 60 Hz 10 A

- Measuring range
- Nominal frequency
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Dimensions

Width x heigth x depth: 17,5 x 90 x 59 mm

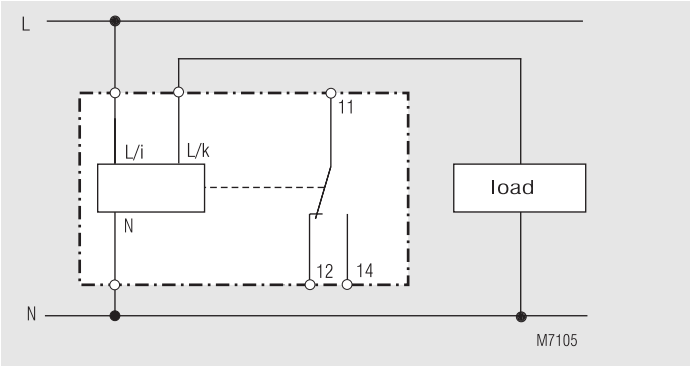
Characteristics



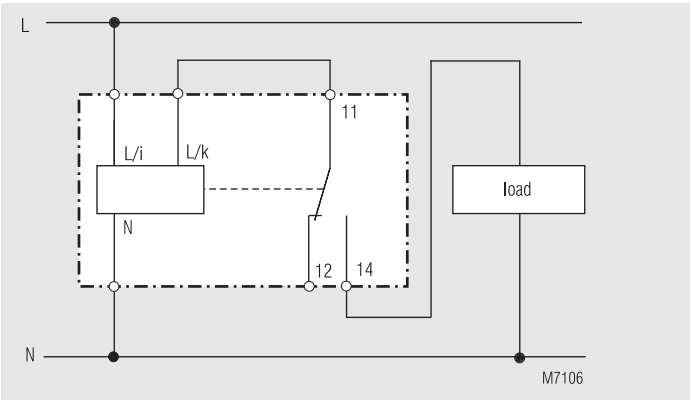
Switching delay
The characteristic shows the switching delay depending on the values of X_{an} - X_{ab} when switching the current on or off. A slow current change reduces the delay.

$$F = \frac{\text{I applied}}{\text{I setting}}$$

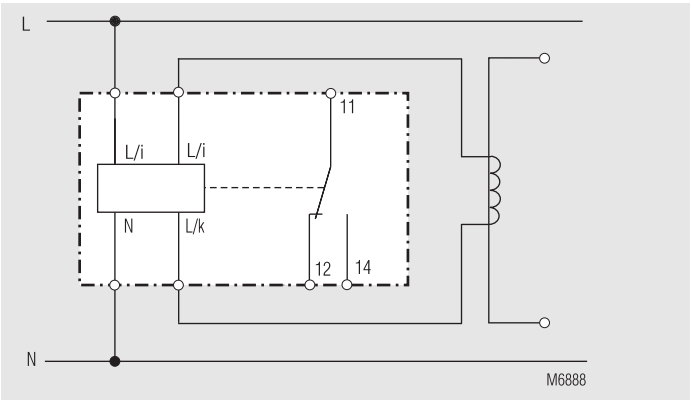
Application examples



L/i - N auxiliary voltage
L/i - L/k current input



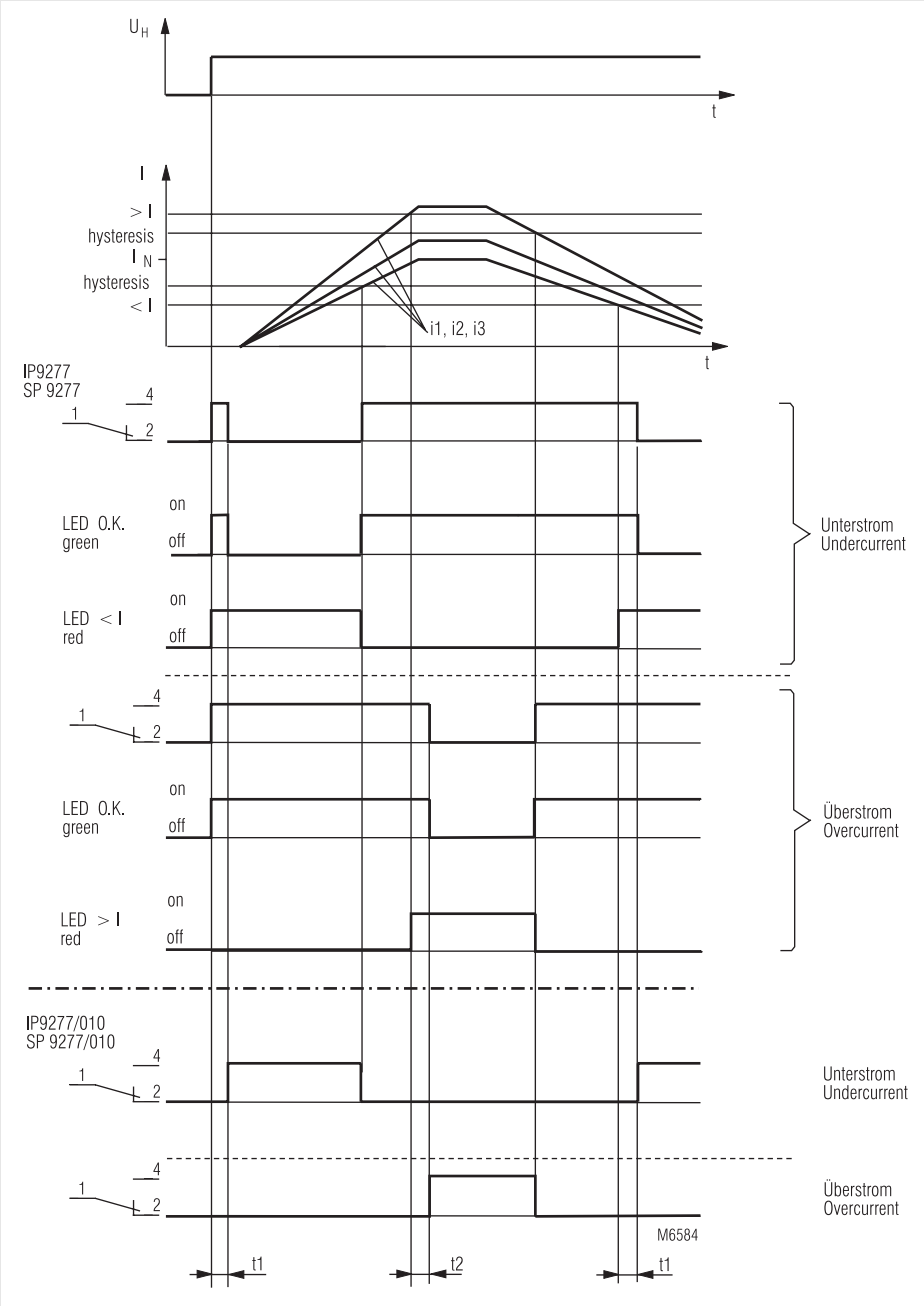
Connection example for IK 9273/100 + IK 9273
Load in series to the contact. When undercurrent the load is turned on. The fault is stored. New start by pressing reset button or auxiliary voltage off, on.Maximum continuous measuring current for this application is 5 A.



Connection example with external galvanic seperation, e.g. by current transformer

Attention: On the secondary side of the current transformer is the potential L.
L/i is allowed to be exchanged, so that the secondary side of the current transformer has the potential N.

Function diagram IP 9277, SP 9277



Standard types

IL 9277.12 AC 220 ... 240 V
Article no: 0049306 stock item
SL 9277.12 AC 220 ... 240 V
Article no:

- Single phase
- 4 programmable ranges up to 15 A
- Closed circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts
- Width 35 mm

IP 9277.39 0,5 ... 5 A AC 220 ... 240 V
Article no: 0049308 stock item
SP 9277.39 0,5 ... 5 A AC 220 ... 240 V
Article no:

- 3-phase
- Range 0,5 ... 5 A
- Closed circuit operation
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts each for over- and undercurrent
- Width 70 mm

Variants

IL 9277.12/010, SL 9277.12/010:	single phase current relay open circuit operation
IP 9277.39/010, SP 9277.39/010:	3-phase current relay open circuit operation
IP 9277.39/002, SP 9277.39/002:	3-phase current relay undercurrend closed circuit operation overcurrent open circuit operation

Technical data

Input

Measuring ranges

IL 9277, SL 9277:	programmable by bridges: AC 0,1 ... 1 A (bridge Z1-Z2) AC 0,5 ... 5 A (bridge Z1-Z3) AC 1 ... 10 A (bridge Z1-Z4) AC 1,5 ... 15 A (bridge Z1-Z3-Z4)
IP 9277, SP 9277:	optionally: AC 0,1 ... 1 A; 0,5 ... 5 A; 1 ... 10 A; 1,5 ... 15 A;
Nominal frequency of measuring current:	50 / 60 Hz

Technical data

Maximum continuous measuring current

IL 9277, SL 9277:	20 A at 50° ambient temperature
IP 9277, SP 9277:	20 A at 40° ambient temperature
	15 A at 50° ambient temperature
Max. overload:	30 A for 3 sec
Temperature influence:	≤ 0,05 % / K
Reaction time:	see characteristic switching delay

Setting ranges

Response value:	infinite variable within measuring range
Hysteresis:	approx. 4 % of setting value, fixed
Setting accuracy:	≤ ± 10 % of setting value
Repeat accuracy:	≤ ± 1 %
Switching delay t_v:	0,1 ... 20 sec settable

Auxiliary circuit

Auxiliary voltage U_H

IL 9277, SL 9277:	AC/DC 24 V
	AC 115 ... 127 V, AC 220 ... 240 V,
	AC 400 ... 440 V
IP 9277, SP 9277:	AC/DC 24 V
	AC 115, 127 V
	AC 220 ... 240 V, AC 400 ... 440 V
Voltage range	
at AC:	0,8 ... 1,1 U_H
at DC:	0,8 ... 1,25 U_H
Nominal consumption	
IL 9277, SL 9277	
at AC 230 V:	3,2 VA
at DC 24 V:	0,8 W
IP 9277, SP 9277	
at AC 230 V:	7,2 VA
at DC 24 V:	1 W
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %

Output

Contacts		
IL 9277.12, SL 9277.12:	2 changeover contacts	
IP 9277.39, SP 9277.39:	2 x 2 changeover contacts	
Thermal current I_{th}:	5 A	
Switching capacity		
to AC 15		
NO contact:	5 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical life		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V		
NO contact:	2 x 10^5 switching cycles	
Short circuit strength		
max. fuse rating:	10 A gL	EN 60 947-5-1
Mechanical life:	> 50 x 10^6 switching cycles	

General data

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
overvoltage category/ contamination level:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6

Technical data

Climate resistance:	20 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or	
	2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
IL 9277:	130 g	
SL 9277:	150 g	
IP 9277:	220 g	
SP 9277:	270 g	

Ordering example

IP 9277 .39 /_ _ _ AC 220 ... 240 V 50 / 60 Hz 10 A

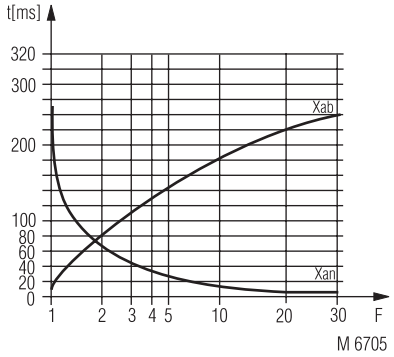
- Measuring range
- Nominal frequency
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Dimensions

Width x height x depth

IL 9277:	35 x 90 x 61 mm
SL 9277:	35 x 90 x 100 mm
IP 9277:	70 x 90 x 61 mm
SP 9277:	70 x 90 x 100 mm

Characteristics



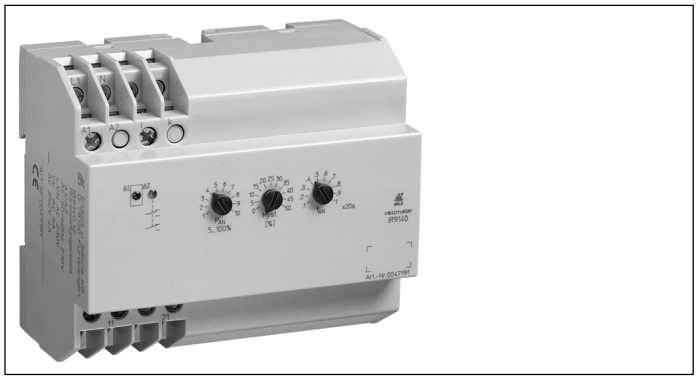
Switching delay

The characteristic shows the switching delay depending on the values of X_{an} - X_{ab} when switching the current on or off. A slow current change reduces the delay.

$$F = \frac{\text{I applied}}{\text{I setting}}$$

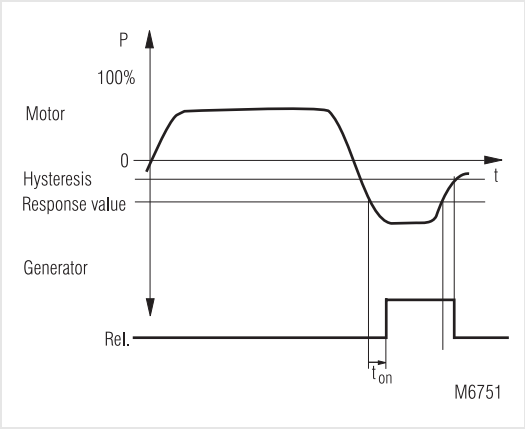
Reverse power relay IR 9140
varimeter

0224317



- According to IEC 255, VDE 0435 part 303
- Measures effective power independent of curve shape e.g. to be operated with frequency converters
- For single- or 3-phase systems
- Wide auxiliary voltage range
- Adjustable response value 5 ... 100 % reverse power
- Adjustable hysteresis 0 ... 50 % of response value
- Nominal current 5 or 10 A (on request)
- Adjustable operate delay
- Open or closed circuit operation
- LED indicators for auxiliary supply and state of output contacts
- 2 changeover contacts
- Width 105 mm

Function diagram



Approvals and marking

CE

Applications

Monitoring of reverse power in single- and 3-phase voltage systems.

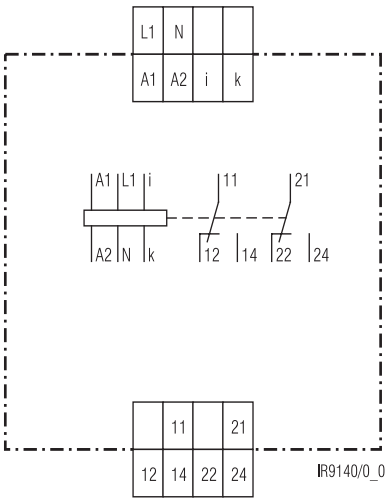
Function

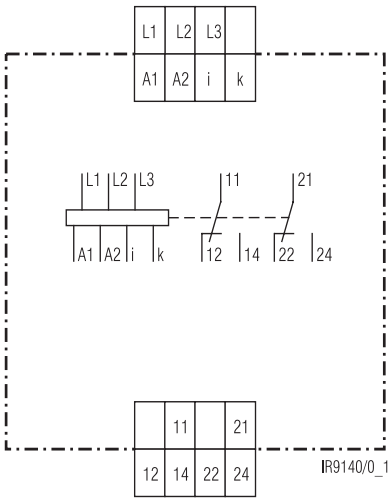
The reverse power relay monitors the direction of the energy transport in a voltage system. This might be necessary on connection points between public mains and industrial system, when operation generator sets or emergency power supplies, when motors can run as generator, etc.
The instrument is designed for a max. current of 5 A (optionally 10 A). If the current is higher a current transformer must be used. The setting value of the reverse power can be setted from 5 to 100 %.
The reverse power ist calculated using the formula:
U x I x cos φ
With a response value of 100 % this is:
230 V x 5 A x 1 = 1150 VA
230 V x 10 A x 1 = 2300 VA

Indicators

green LED:	on, when auxiliary supply connected
yellow LED:	on, when output relay active

Circuit diagrams





Notes

When installing the reverse power relay it is necessary to make sure that the measuring voltage (terminals L1, N) and the current input res. CT (terminals i, k) are connected to the same phase. Terminal L1 must be bridged with terminal i. The CT must not be grounded on secondary side. (On model IR 9140/1_ _ _ the link is not necessary and the CT can be grounded). If the output relay already reacts on right direction of current, the wires on terminals i and k must be changed against each other.
With the potentiometer "Hyst" a hysteresis of 0 to 50 % can be set. This value relates to the setted response value. 2 versions of the IR 9140 are available with or without neutral (see variants).

Variants

IR 9140/_0_:	closed circuit operation
IR 9140/_1_:	open circuit operation
IR 9140/_ _0:	with neutral
IR 9140/_ _1:	without neutral
IR 9140/1_ _:	galvanic separation between voltage and current input

Technical data

Measuring circuit

Nominal voltage U_N	
L1-N:	AC 230 V
L1-L2-L3:	3 x AC 400 V
Voltage range:	0 ... 1,2 U_N
Response value:	5 ... 100 % reverse power
Hysteresis:	0 ... 50 % of setted response value
Max. overvoltage:	1,2 U_N continuously
Frequency range:	45 ... 65 Hz
Nominal current:	5 A
	10 A (on request)
Operate delay t_{an}:	adjustable, 2 ... 20 s
Nominal consumption	
voltage input:	< 1 VA
current input:	< 1 VA

Auxiliary circuit

Auxiliary voltage A1, A2:	AC 230, 240, 400, 415 V
Voltage range:	0,75 ... 1,2 U_H
Frequency range:	45 ... 65 Hz
Nominal consumption:	< 4 VA

Output

Contacts	
IR 9140.12:	2 changeover contacts
Thermal current I_{th}:	4 A
Switching capacity of contacts	
according to AC 11:	1 A / AC 230 V DIN VDE 0660 p. 200
Electrical life:	EN 60 947-5-1
according to AC 15 at 1 A, AC 230 V:	≥ 5 x 10^5 switching cycles
Short circuit strength	
max. fuse rating:	6 A gL EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles

General data

Operating mode:	Continuous operation
Temperature range:	- 20 ... + 60°C
Clearance and creepage distances	
Overvoltage category / contamination level:	4 kV / 2 DIN VDE 0110-1 (04.97)
EMC	
Electrostatic discharge:	8 kV (air) EN 61 000-4-2
HF irradiation:	10 V / m EN 61 000-4-3
Fast transients:	2 kV EN 61 000-4-4
Surge voltages:	1 kV EN 61 000-4-5
Interference suppression:	Limit value class B EN 55 011
Degree of protecion:	Housing: IP 40 EN 60 529
	Terminals: IP 20 EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94

Technical data

Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz EN 60 068-2-6
Climate resistance:	20 / 60 / 04 EN 60 068-1
Terminal designation:	EN 50 005
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3
Wire fixing:	Flat terminals with self-lifting clamping piece EN 60 999
Mounting:	DIN rail EN 50 022
Weight:	500 g

Odering example

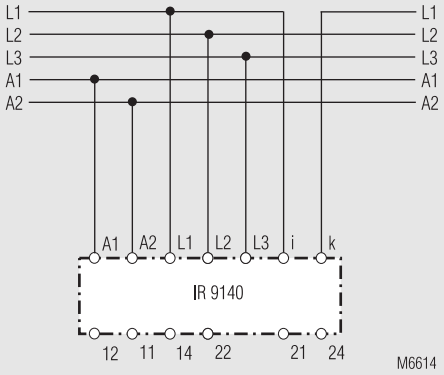
IR 9140 .12 /_ _ _ 3 AC 400 V 5 A AC 230 V 2 ... 20 s

- Operate delay
- Auxiliary voltage
- Nominal current
- Nominal voltage
- Variants, if required
- Contacts
- Type

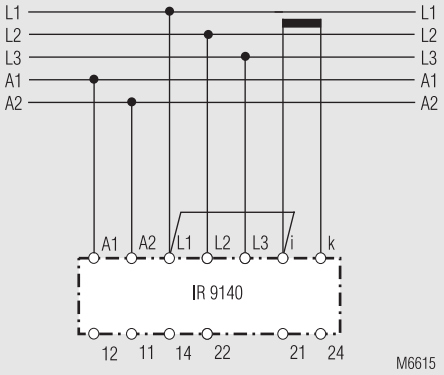
Dimensions

Width x height x depth: 105 x 90 x 59 mm

Connection examples

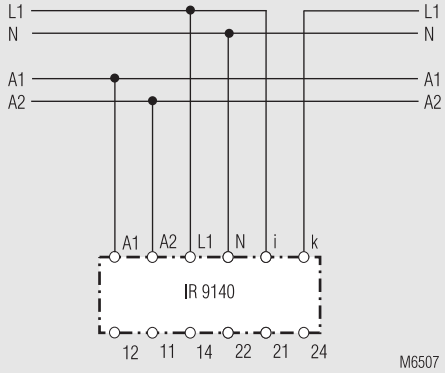


For 3p3w systems at I < 5 A

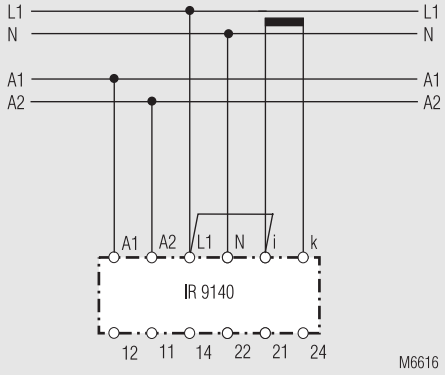


For 3p3w systems at I > 5 A with CT

Connection examples



For single phase or 3p4w systems at I < 5 A



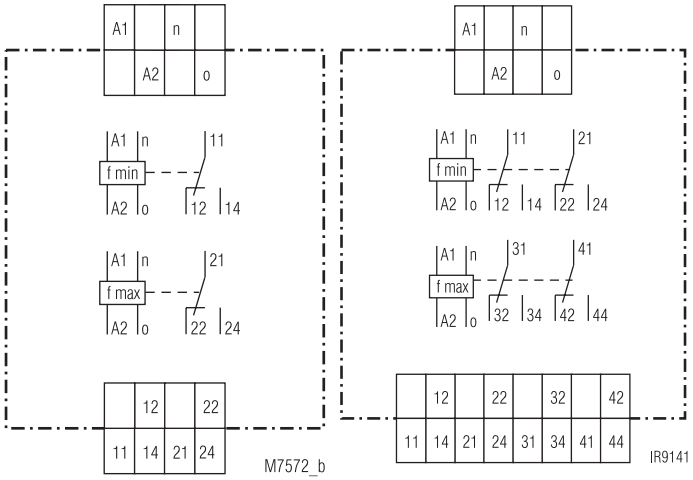
For single phase or 3p4w systems at I > 5A with CT

Over- and Underfrequency relay IP 9141, IR 9141 varimeter

0224438

- According to IEC 255, VDE 0435 part 303
- Measuring ranges from 0,5 to 1000 Hz
- Separate settable response value for f_{min} and f_{max}
- Optionally fixed response value for f_{min} and f_{max}
- Fixed hysteresis
- Optionally settable hysteresis
- Settable functions:
  - Position 1: open circuit operation / automatic reset
  - Position 2: open circuit operation / manual reset
  - Position 3: closed circuit operation / automatic reset
  - Position 4: closed circuit operation / manual reset
- Optionally without settable functions
- Optionally start up delay 0 ... 10 s
- LED indicators for auxiliary supply, f_{min} and f_{max}
- 1 or 2 changeover contacts for f_{min} and f_{max}
- Width IP 9141: 70 mm
  Width IR 9141: 105 mm

Circuit diagrams



Approvals and marking

CE

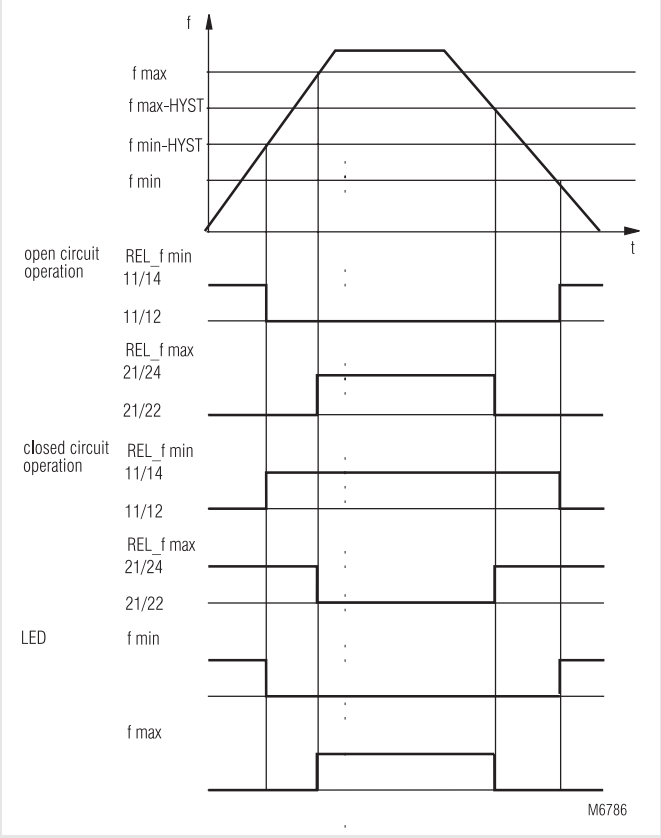
Applications

Monitors over- and underfrequency in generator systems.

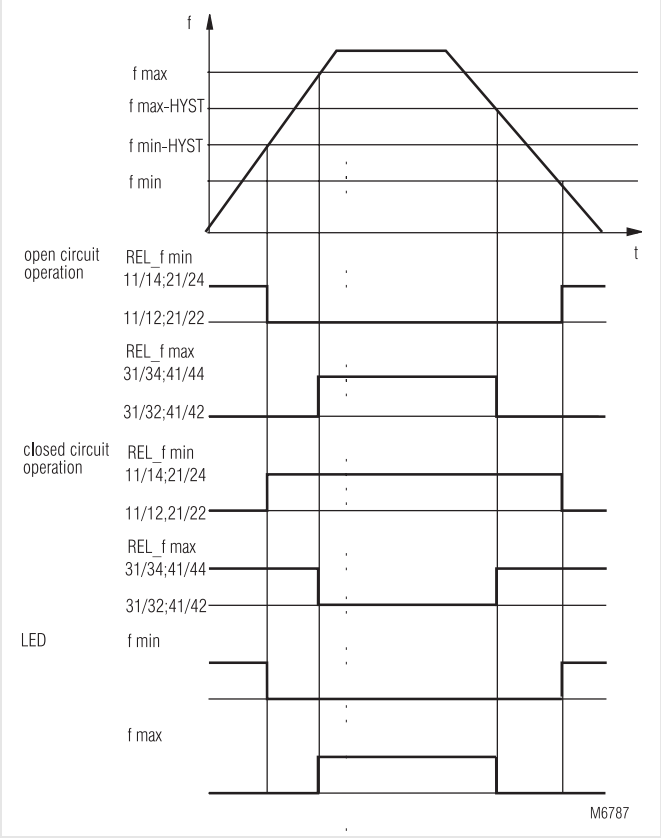
Indicators

LED f_{min}:	underfrequency
LED f_{max}:	overfrequency
LED A1/A2:	auxiliary supply

Function diagram IP 9141



Function diagram IR 9141



Standard type

IP 9141.38 AC 230 V AC 230 V 45 ... 65 Hz
Article number: 0047813

- 1 changeover contact for f_{min} and f_{max}
- Auxiliary voltage U_H: AC 230 V
- Nominal voltage U_N: AC 230 V
- Setting value: 45 ... 65 Hz, settable
- Fixed hysteresis
- With selectable function and reset button

Variants

IP 9141.38/ _ _ _

- 0 with function setting and reset button
  1 closed circuit operation fixed function no reset button
  2 open circuit operation fixed function no reset button
- 0 without start up delay
  1 with start up delay
- 0 settable response value / fixed hysteresis
  1 settable response value / settable hysteresis
  2 fixed response value / fixed hysteresis

IR 9141.39/101 functions see above

Technical data

Measuring circuit

Nominal voltage U_N:	AC 127, 230, 400, 690 V
Voltage range:	0,65 ... 1,1 U_N
Response value:	45 ... 65 Hz settable for f_{min} and f_{max} or fixed 49 Hz for f_{min} and 51 Hz for f_{max} (others on request)
Hysteresis	
at IP 9141.38, IP 9141.38/0_ _	
IP 9141.38/2_ _:	
f_{min}:	1,01 of response value
f_{max}:	0,99 of response value
at IP 9141.38/1_ _,	
IR 9141.39/1_ _:	
f_{min}:	1,0 ... 1,2 of response value
f_{max}:	0,8 ... 1,0 of response value
Galvanic separation of the measuring circuit to:	Auxiliary circuit and output
Influence of auxiliary supply:	< ± 0,1 % at 0,8 ... 1,1 U_N
Temperature influence:	< ± 0,1 % / K

Auxiliary circuit

Auxiliary voltage U_H:	AC/DC 24 ... 60 V galvanic separated AC 127, 230, 400, 690 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption:	max. 2,2 W
Frequency range:	50 ... 60 Hz
Start up delay:	0 ... 10 sec activated by aux. supply
Max. buffer time at loss off aux. supply:	30 ms

Output

Contacts		
IP 9141.38:	1 changeover contact for f_{min} 1 changeover contact for f_{max}	
IR 9141.39:	2 changeover contact for f_{min} 2 changeover contact for f_{max}	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO contact:	3 A / AC 230 V	EN 60 947-5-1
NC contact:	1 A / AC 230 V	EN 60 947-5-1
Electrical contact life:		EN 60 947-5-1
to AC 15 at 1 A, AC 230 V:	> 1,5 x 10^5 switching cycles	
Short circuit strength max. fuse rating:	4 A gL	EN 60 947-5-1
Mechanical life:	> 100 x 10^6 switching cycles	

Technical data

General data

Operating mode:	Continuous operation	
Temperature range:	0 ... + 60°C	
Clearance and creepage distances		
overvoltage category / contamination level:		
Aux. supply, measuring circuit, contacts:	6 kV / 2	DIN VDE 0110-1 (04.97)
Contact, contact:	4 kV / 2	DIN VDE 0110-1 (04.97)
EMC		
Electrostatic discharge:	8 kV (Luftentladung)	EN 61 000-4-2
HF irradiation:	10 V / m	EN 61 000-4-3
Fast transients:	2 kV	EN 61 000-4-4
Surge voltages between		
wires for power supply:	1 kV	EN 61 000-4-5
between wire and ground:	2 kV	EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011
Degree of protection:	Housing: IP 40	EN 60 529
	Terminals: IP 20	EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0,35 mm frequency 10 ... 55 Hz	EN 60 068-2-6
Climate resistance:	0 / 60 / 04	EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2,5 mm² solid or 2 x 1,5 mm² stranded wire DIN 46 228-1/-2/-3	
Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
Mounting:	DIN rail	EN 50 022
Weight		
IP 9141:	290 g	
IR 9141:	360 g	

Ordering example

IP 9141 .38 /_ _ _ AC 230 V AC 400 V 45 ... 65 Hz

- Measuring range
- Nominal voltage
- Auxiliary voltage
- Variant, if required
- Contact
- Type

Dimensions

Width x height x depth
IP 9141: 70 x 90 x 59 mm
IR 9141: 105 x 90 x 59 mm

Application example