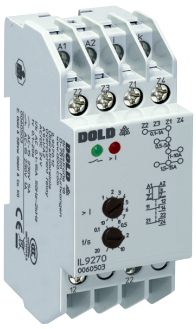
VARIMETER
Overcurrent Relay
IK 9270, IL 9270, IP 9270, SK 9270, SL 9270, SP 9270

Translation of the original instructions

DOLD

0224259

IK 9270



IL 9270

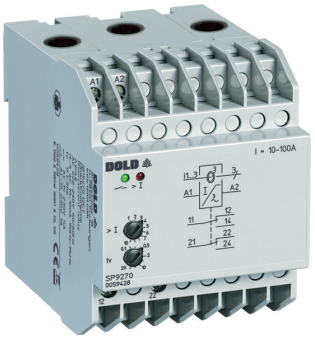
IL 9270/5_ _

SL 9270/5_ _

SK 9270

IP 9270

SL 9270CT



SP 9270CT

- According to IEC/EN 60255-1
- IP 9270, SP 9270CT: 3-phase
  IK 9270, SK 9270, IL 9270, SL 9270CT: single phase
- Measuring ranges from AC 0.1 ... 100 A
- Settable response value
- Fixed hysteresis
- Settable time delay
- De-energized on trip
- As option energized on trip
- LED indicators
- With auxiliary voltage
- Auxiliary supply and measuring input galvanic separated
- Devices available in 2 enclosure versions:
  - I-model, e.g. IK _ _ _ _, depth 61 mm
    with terminals at the bottom for installation systems and industrial distribution systems according to DIN 43880
  - S-model, e.g. SK _ _ _ _, depth 100 mm
    with terminals at the top for cabinets with mounting plate and cable duct
- Width IK 9270, SK 9270: 17.5 mm
  IL 9270, SL 9270CT: 35 mm
  IP 9270, SP 9270CT: 70 mm

Approvals and Markings

CE cULus *)

*) Only IL-devices

Applications

Overcurrent detection in single phase or 3-phase voltage systems

Indicators

IK 9270.11, SK 9270.11
IL 9270.11/5_ _,
SL 9270.11/5_ _:

LED green:	Aux. supply connected
LED yellow:	Output contacts switched

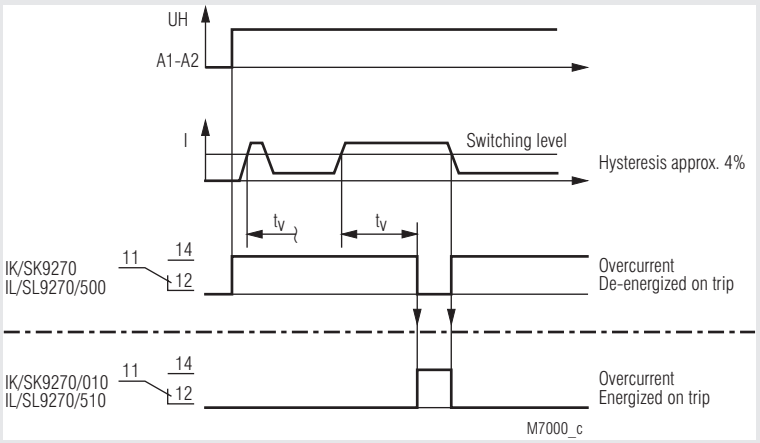
IL 9270, SL 9270,
IP 9270, SP 9270:

LED green:	Current within limits
LED red I_{max}:	Overcurrent

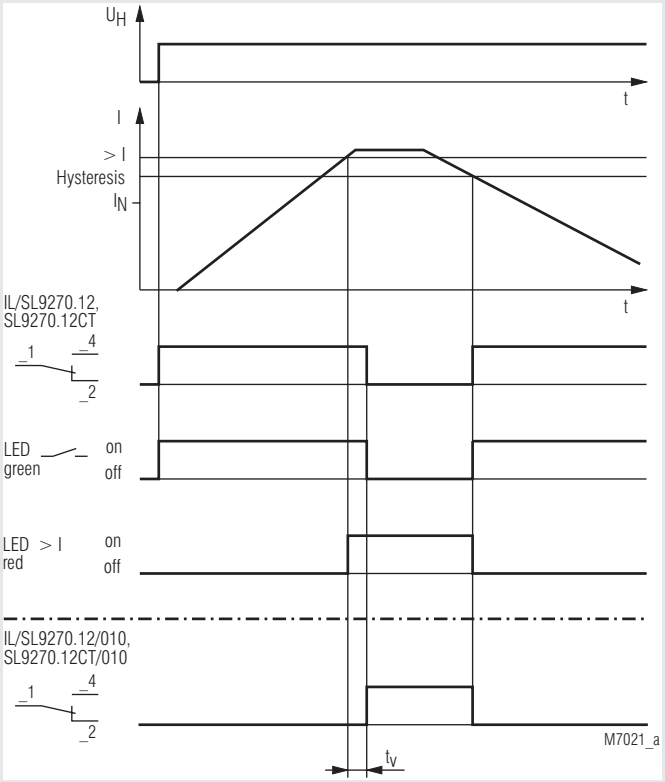
Product Description

The overcurrent relay is suitable for monitoring currents in three-phase and alternating current networks. When the switching point is exceeded, the relays changed their state after the time lapse. Due to the adjustable switching point, the relays are universally applicable. By means of the adjustable time delay, current peaks can be taken into account or faded out if required. Readiness for operation and overcurrent are each signaled via an LED.

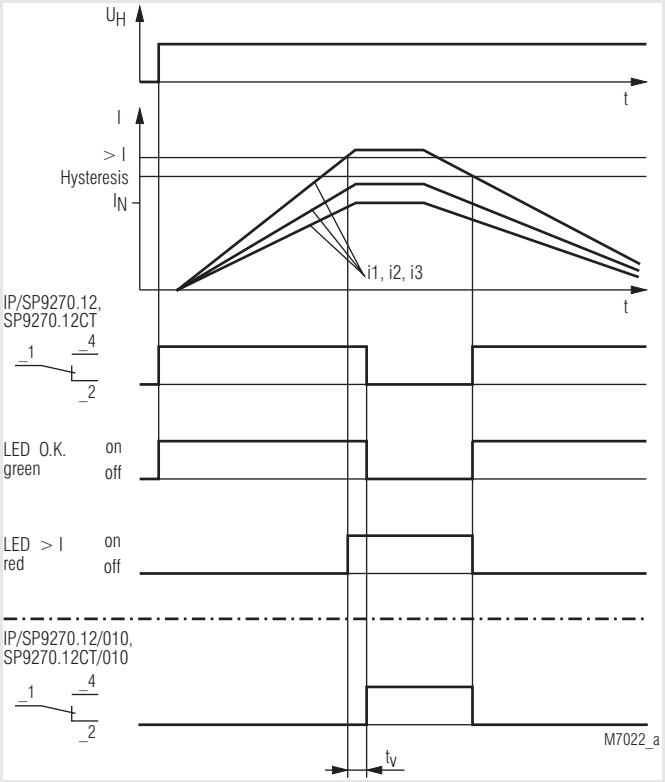
Function Diagram IK/SK 9270, IL/SL 9270.11/500



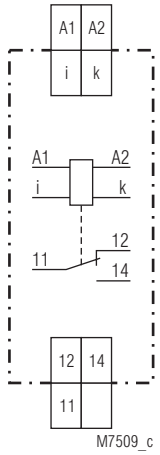
Function Diagram IL 9270.12, SL 9270.12



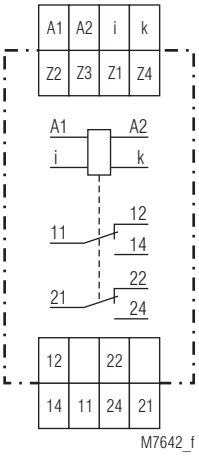
Function Diagram IP 9270, SP 9270



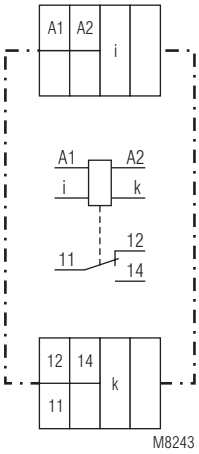
Circuit Diagrams



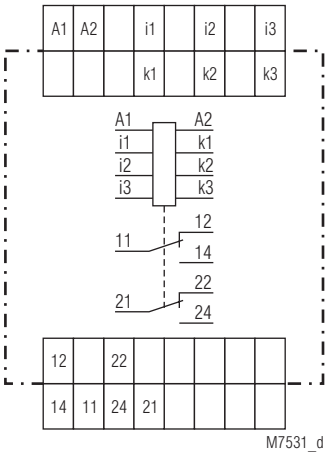
IK 9270.11, SK 9270.11



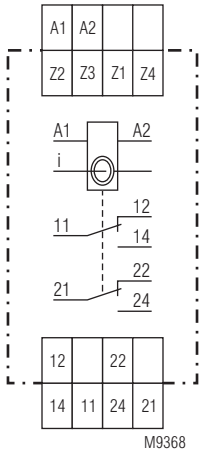
IL 9270.12, SL 9270.12



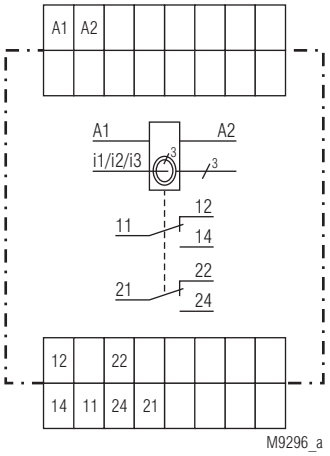
IL 9270.11/5_ _



IP 9270.12, SP 9270.12



SL 9270.12CT



SP 9270.12CT

Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage AC or DC
i, k	Current measuring circuit AC
i1, k1; i2, k2; i3, k3	Current measuring circuit phase 1; 2; 3
Z1 / Z2, Z3, Z4	Measuring ranges with bridges via terminals
11, 12, 14	Contacts Rel. 1
21, 22, 24	Contacts Rel. 2

Technical Data

Type						
	IK 9270	**SL 9270/5_ _**	**IL 9270**	**SL 9270CT**	**IP 9270**	**SP 9270CT**
Depth 61 mm	IK 9270.11	IL 9270.11/5_ _	IL 9270.12	-	IP 9270.12	-
Depth 100 mm	SK 9270.11	SL 9270.11/5_ _	SL 9270.12	SL 9270.12CT	SP 9270.12	SP 9270.12CT
Width	17.5 mm	35 mm	35 mm	35 mm	70 mm	70 mm
Measuring input	single-phase	single-phase	single-phase	single-phase	3-phase	3-phase
Measuring range (Nominal frequency 50 ... 400 Hz)	**0.1 ... 15 A** 4 part ranges settable with switch: 0.1 ... 1 A 0.5 ... 5 A 1 ... 10 A 1.5 ... 15 A Max. thermal continuous current: 20 A at 50 °C 15 A at 60 °C	**0.1 ... 50 A** 5 part ranges settable with switch: 0.1 ... 1 A 0.5 ... 5 A 2.5 ... 25 A 3 ... 30 A 5 ... 50 A Max. thermal continuous current: 50 A at 50 °C 60 A at 40 °C	**0.1 ... 15 A** 4 part ranges programmable with bridges: 0.1 ... 1 A (Z1-Z2) 0.5 ... 5 A (Z1-Z3) 1 ... 10 A (Z1-Z4) 1.5 ... 15 A (Z3-Z1-Z4) Max. thermal continuous current: 20 A t 50 °C 15 A at 60 °C	**0.5 ... 100 A** 4 part ranges programmable with bridges: 0.5 ... 5 A (Z1-Z2) 2.5 ... 25 A (Z1-Z3) 7.5 ... 75 A (Z1-Z4) 10 ... 100 A (Z3-Z1-Z4) Max. thermal continuous current: limited only by diameter of cable 25 mm²	**0.1 ... 15 A** 1 fixed measuring range per unit 0.1 ... 1 A 0.5 ... 5 A 1 ... 10 A 1.5 ... 15 A Max. thermal continuous current: 3 x 15 A t 50 °C 3 x 20 A at 45 °C	**0.5 ... 100 A** 1 fixed measuring range per unit 0.5 ... 5 A 2.5 ... 25 A 5 ... 50 A 7.5 ... 75 A 10 ... 100 A Max. thermal continuous current: limited only by diameter of cable 25 mm²
	5 ... 750 mA*) 4 part ranges settable with switch: 5 ... 50 mA 25 ... 250 mA 50 ... 500 mA 75 ... 750 mA Max. thermal continuous current: 5 A at 50 °C		**0.01 ... 1.5 A** 4 part ranges programmable with bridges: 0.01 ... 0.1 A (Z1-Z3) 0.5 ... 0.5 A (Z1-Z2) 0.1 ... 1 A (Z1-Z4) 0.15 ... 1.5 A (Z2-Z1-Z4) Max. thermal continuous current: 20 A at 50 °C 15 A at 60 °C			
Max. current at 50 °C		all ranges 80 A / 3 s				
Wire current path Solid Stranded ferruled	2 x 2.5 mm² 2 x 1.5 mm²	1 x 10 mm² 1 x 6 mm²	2 x 2.5 mm² 2 x 1.5 mm²	CT-diameter = 10 mm 25 mm²	2 x 2.5 mm² 2 x 1.5 mm²	CT-diameter = 10 mm 25 mm²
Contacts	1 changeover	1 changeover	2 changeover	2 changeover	2 changeover	2 changeover
Weight:	IK 9270: 70 g SK 9270: 90 g	IL 9270/5_ _: 125 g SL 9270/5_ _: 150 g	IL 9270: 125 g SL 9270: 150 g	approx. 230 g	IP 9270: 200 g SP 9270: 250 g	approx. 470 g

*) Rated impulse voltage / pollution degree (auxiliary voltage - measuring circuit): 4 kV/2

Technical Data

Max. overload: See table
Temperature influence: ≤ 0.05 % / K
Reaction time: See characteristic switching delay
Internal resistor: < 5 mΩ

Setting Ranges

Response value: Infinite variable within measuring range
Hysteresis: Approx. 4 % of setting value, fixed
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:
IL/SL 9270, IP/SP 9270: 3.2 VA
IK/SK 9270, IL/SL 9270/500: 2.3 VA
At DC 24 V:
IL/SL 9270, IP/SP 9270: 0.8 W
IK/SK 9270, IL/SL 9270/500: 0.4 W
Nominal frequency: 50 / 60 Hz
Frequency range: ± 5 %

Output

Contacts
IK 9270.11, SK 9270.11
IL/SL 9270.11/5_ _: 1 changeover contact
IL 9270.12, SL 9270.12
SL 9270.12CT: 2 changeover contacts
IP 9270.12, SP 9270.12
SP 9270.12CT: 2 changeover contacts
Thermal current I_{th}: 5 A
Switching capacity
To AC 15
NO contact:

IK 9270, IL 9270/5_ _:	3 A / AC 230 V	IEC/EN 60947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60947-5-1
IL/SL 9270, IP/SP 9270,		
SL 9270CT, SP 9270CT:	5 A / AC 230 V	IEC/EN 60947-5-1
NC contact:	2 A / AC 230 V	IEC/EN 60947-5-1

Electrical life IEC/EN 60947-5-1
To AC 15 bei 1 A, AC 230 V
NO contact

IK/SK 9270, IL/SL 9270/5_ _:	3 x 10^5 switching cycles	IEC/EN 60947-5-1

To AC 15 at 2 A, AC 230 V

IL/SL 9270, IP/SP 9270,		
SL 9270CT, SP 9270CT:	2 x 10^5 switching cycles	IEC/EN 60947-5-1

Short-circuit strength
max. fuse rating:

IK/SK 9270, IL/SL 9270/5_ _:	4 A gG / gL	IEC/EN 60947-5-1
IL/SL 9270, IP/SP 9270		
SL 9270CT, SP 9270CT:	6 A gG / gL	IEC/EN 60947-5-1

Mechanical life: > 50 x 10^6 switching cycles

Technical Data

General Data

Operating mode: Continuous operation
Temperature range
Operation: - 20 ... + 60°C
Storage: - 25 ... + 70°C
Altitude: < 2000 m
Clearance and creepage distances
Rated impulse voltage/
pollution degree: IEC 60664-1

	IP/SP	IK/SK IL/SL-devices/5_ _	IL/SL
Auxiliary voltage - Contacts	4 kV/2	4 kV/2	4 kV/2
Auxiliary voltage - Measuring circuit	6 kV/2	6 kV/2*)	4 kV/2
Measuring circuit - Contacts	6 kV/2	6 kV/2	4 kV/2
Measuring circuit-Measuring circuit	6 kV/2	-	-
Contacts-Contacts	4 kV/2	-	4 kV/2
The contacts are not designed for voltage systems with 400 / 690 V.			

*) 4 kV/2 at IK/SK 9270 with measuring range 5 ... 750 mA

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61000-4-2
HF irradiation:		
IK/SK9270, IP/SP 9270,		
SL/SP 9270:		
80 MHz ... 1 GHz:	20 V / m	IEC/EN 61000-4-3
1 GHz ... 2.7 GHz:	10 V / m	IEC/EN 61000-4-3
SL/SP 9270CT, SL9270/5:		
80 MHz ... 2.7 GHz:	10 V / m	IEC/EN 61000-4-3
Fast transients:	4 kV	IEC/EN 61000-4-4
Surge voltages between		
wires for power supply		
IK/SK 9270, IL/SL 9270/5_ _:	2 kV	IEC/EN 61000-4-5
IL/SL 9270, IP/SP 9270,		
SL/SP 9270CT:	1 kV	IEC/EN 61000-4-5
Between wire and ground:		
IK/SK 9270, IL/SL 9270/5_ _:	4 kV	IEC/EN 61000-4-5
IL/SL 9270, IP/SP 9270,		
SL/SP 9270CT:	2 kV	IEC/EN 61000-4-5
HF wire guided:	10 V	IEC/EN 61000-4-6
Interference suppression:	Limit value class B	EN 55011

Degree of protection

Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529

Housing: Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0.35 mm frequency 10 ... 55 Hz IEC/EN 60068-2-6
Climate resistance: 20 / 060 / 04 IEC/EN 60068-1
Terminal designation: EN 50005
Wire connection: 2 x 2.5 mm² solid or
2 x 1.5 mm² stranded ferruled
DIN 46228-1/-2/-3/-4
Min. cross section: 0,6 mm²
Insulation of wires
or sleeve length: 10 mm
Wire fixing: Flat terminals with self-lifting clamping piece IEC/EN 60999-1
Fixing torque: 0.8 Nm
Mounting: DIN rail IEC/EN 60715

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, SL 9270CT: 35 x 90 x 100 mm
IP 9270: 70 x 90 x 61 mm
SP 9270, SP 9270CT: 70 x 90 x 100 mm

CCC-Data

Switching capacity

To AC 15:	5 A / AC 230 V	IEC/EN 60947-5-1
To DC 13:	2 A / DC 24 V	IEC/EN 60947-5-1

Technical data that is not stated in the CCC-Data, can be found in the technical data section.

Standard Types

IK 9270.11/010 AC 220 ... 240 V 50/60 Hz 0.1 ... 15 A
Article number: 0050330
SK 9270.11/010 AC 220 ... 240V 50/60Hz 0.1 ... 15 A
Article number: 0050736

- Single phase
- 4 programmable ranges up to 15 A
- Energized on trip
- 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: 0050736

- 3-phase
- Range: 0.5 ... 5 A
- Energized on trip
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts
- Width: 70 mm

Variants

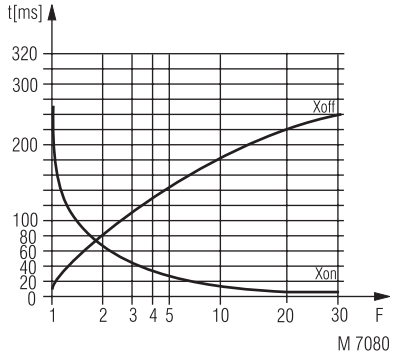
IK 9270.11, SK 9270.11:	Single phase current relay, de-energized on trip, 1 changeover contact
IL 9270.12, SL 9270.12:	Single phase current relay, de-energized on trip, 2 changeover contacts
IL 9270.12/010, SL 9270.12/010:	Single phase current relay, energized on trip, 2 changeover contacts
IL 9270.11/500, SL 9270.11/500:	Same as IK/SK 9270.11, except with 5 measuring ranges from 0.1 ... 50 A
IL 9270.11/510, SL 9270.11/510:	Same as IK/SK 9270.11/010, except with 5 measuring ranges from 0.1 ... 50 A
IP 9270.12, SP 9270.12:	3-phase current relay, de-energized on trip, 2 changeover contacts
SL 9270.12CT:	Single phase current relay with built in CT, de-energized on trip, 2 changeover contacts
SP 9270.12CT:	3-phase current relay with built in CT, energized on trip, 2 changeover contacts

Ordering Example for variants

SP 9270 .12 CT /_ _ 0 AC 220 ... 240 V 50 / 60 Hz 5 ... 50 A

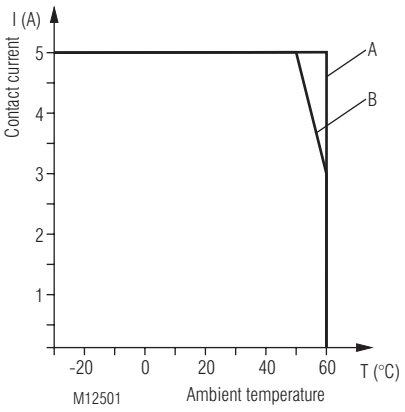
- Measuring range
- Nominal frequency
- Auxiliary voltage
- 0:De-energized on trip
  1: Energized on trip
- Variant, if required
- Built in CT
- Contacts
- Type

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.

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



Continuous current limit curve

A = Devices mounted away from heat generation components
B = IK 9270, SK 9270 mounted without distance, heated by units with similar load