

## VARIMETER

### Undercurrent Relay

IK 9271, IL 9271, IP 9271, SK 9271, SL 9271, SP 9271

Translation  
of the original instructions



D02244263



IK 9271



IL 9271



IL 9271/5\_



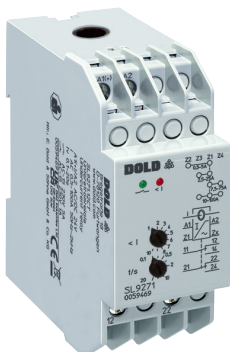
SL 9271/5\_



SK 9271



IP 9271



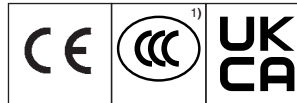
SL 9271CT



SP 9271CT

- According to IEC/EN 60255-1
- IP 9271, SP 9271, SP 9271CT: 3-phase  
IK 9271, IL 9271, SK 9271, SL 9271, SL 9271CT: Single phase
- Measuring ranges from AC 0.1 ... 100 A
- IK 9271, SK 9271:  
With 4 ranges settable by rotational switch, 1 changeover contact
- IL 9271, SL 9271:  
With 5 ranges settable by rotational switch, 1 changeover contact  
With 4 ranges programmable by bridges, 2 changeover contacts
- IP 9271, SP 9271: with 1 range, 2 changeover contacts
- Settable response value
- Fixed hysteresis
- Settable time delay
- De-energized on trip
- Optionally 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 installations systems  
and industrial distribution systems according to DIN 43 880
  - S-model, e.g. SK \_\_\_\_, depth 100 mm  
with terminals at the top for cabinets with mounting plate  
and cable duct
- Width IK 9271, SK 9271: 17.5 mm  
IL 9271, SL 9271, SL 9271CT: 35 mm  
IP 9271, SP 9271, SP 9271CT: 70 mm

#### Approvals and Markings



<sup>1)</sup> For IL-devices

#### Applications

Undercurrent detection in single phase or 3-phase voltage systems

#### Indicators

IK 9271.11, SK 9271.11

IL 9271.11/5\_

SL 9271.11/5\_:

Green LED:

On when aux. supply connected

Yellow LED:

On when output contacts switched

IL 9271, SL 9271,

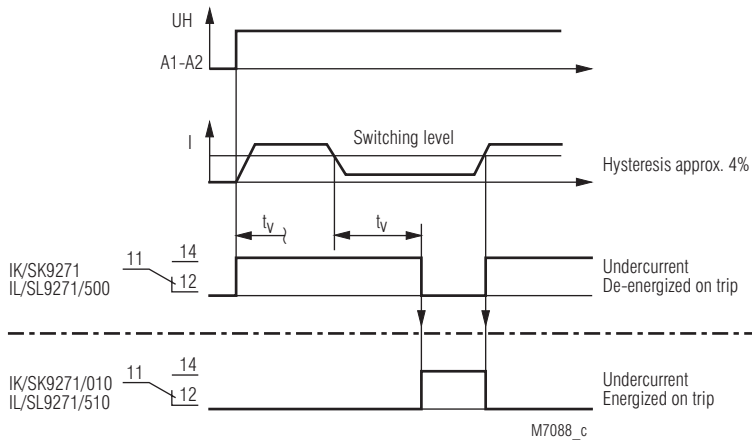
IP 9271, SP 9271:

Green LED:

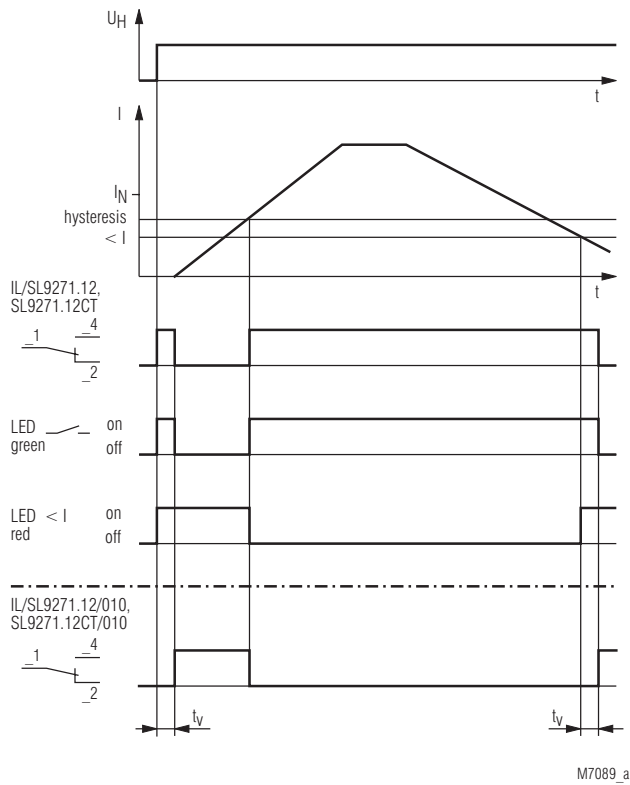
On when current within limits

Red LED  $I_{max}$ :

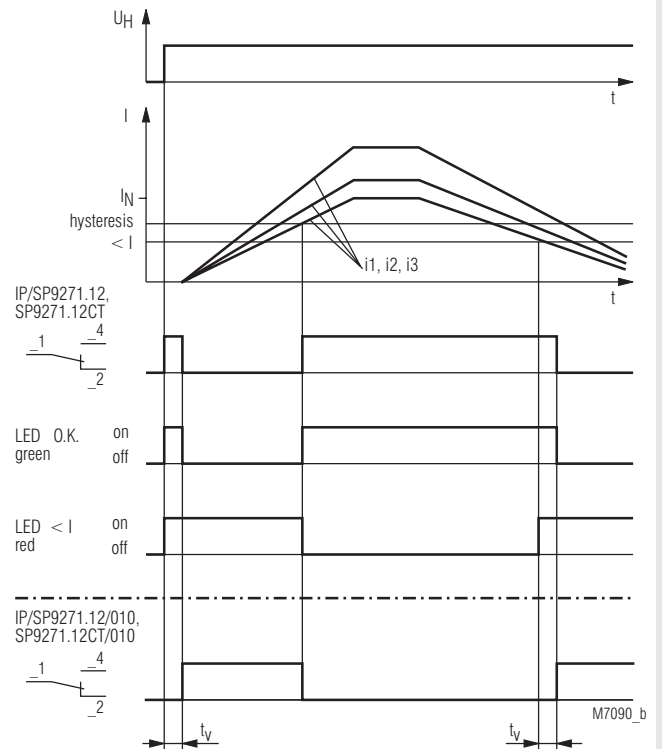
On when undercurrent



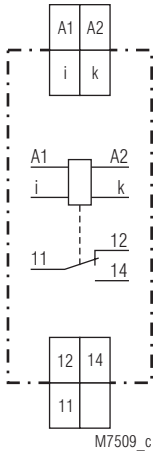
Function Diagram IL 9271.12, SL 9271.12



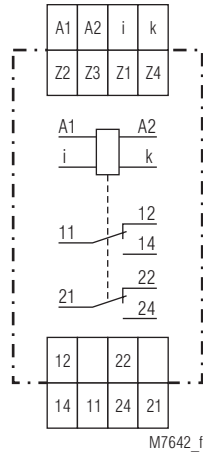
Function Diagram IP 9271, SP 9271



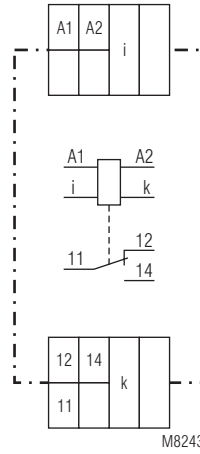
## Circuit Diagrams



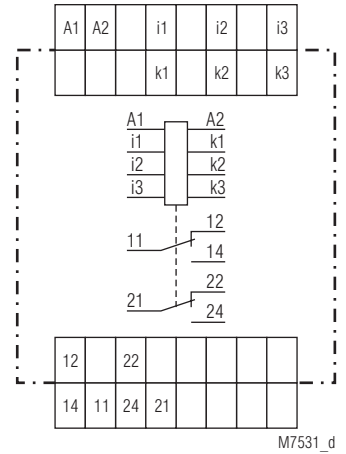
IK 9271.11, SK 9271.11



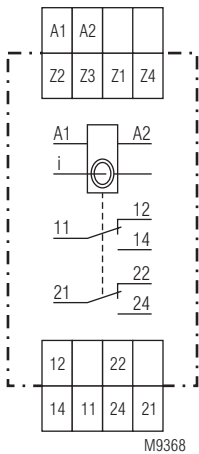
IL 9271.12, SL 9271.12



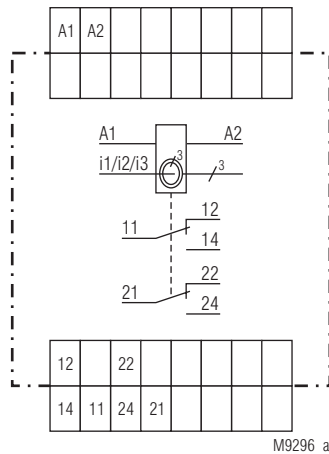
IL 9271.11/5\_



IP 9271.12, SP 9271.12



SL 9271.12CT









SP 9271.12CT

## 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						
	<b>IK 9271</b>	<b>SL 9271/5_ _</b>	<b>IL 9271</b>	<b>SL 9271CT</b>	<b>IP 9271</b>	<b>SP 9271CT</b>
Depth 61 mm	IK 9271.11	IL 9271.11/5_ _	IL 9271.12	-	IP 9271.12	-
Depth 100 mm	SK 9271.11	SL 9271.11/5_ _	SL 9271.12	SL 9271.12CT	SP 9271.12	SP 9271.12CT
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)	<b>0.1 ... 15 A</b>  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	<b>0.1 ... 50 A</b>  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	<b>0.1 ... 15 A</b>  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 at 50 °C 15 A at 60 °C	<b>0.5 ... 100 A</b>  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 mm <sup>2</sup>	<b>0.1 ... 15 A</b>  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 at 50 °C 3 x 20 A at 45 °C	<b>0.5 ... 100 A</b>  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 mm <sup>2</sup>
	<b>5 ... 750 mA<sup>*)</sup></b>  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		<b>0.01 ... 1.5 A</b>  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 mm <sup>2</sup> 2 x 1.5 mm <sup>2</sup>	1 x 10 mm <sup>2</sup> 1 x 6 mm <sup>2</sup>	2 x 2.5 mm <sup>2</sup> 2 x 1.5 mm <sup>2</sup>	CT-diameter = 10 mm 25 mm <sup>2</sup>	2 x 2.5 mm <sup>2</sup> 2 x 1.5 mm <sup>2</sup>	CT-diameter = 10 mm 25 mm <sup>2</sup>
Contacts	1 changeover	1 changeover	2 changeover	2 changeover	2 changeover	2 changeover
Weight:	IK 9271: 70 g SK 9271: 90 g	IL 9271/5_ _: 125 g SL 9271/5_ _: 150 g	IL 9271: 125 g SL 9271: 150 g	approx. 230 g	IP 9271: 200 g SP 9271: 250 g	approx. 470 g

<sup>\*)</sup> 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

### 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 9271, IP/SP 9271: 3.2 VA  
 IK/SK 9271, IL/SL 9271/500: 2.3 VA  
 At DC 24 V:  
 IL/SL 9271, IP/SP 9271: 0.8 W  
 IK/SK 9271, IL/SL 9271/500: 0.4 W  
**Nominal frequency:** 50 / 60 Hz  
**Frequency range:** ± 5 %

### Output

#### Contacts

IK 9271.11, SK 9271.11  
 IL/SL 9271.11/5\_\_ : 1 changeover contact  
 IL 9271.12, SL 9271.12  
 SL 9271.12CT: 2 changeover contacts  
 IP 9271.12, SP 9271.12  
 SP 9271.12CT: 2 changeover contacts  
**Thermal current  $I_{th}$ :** 5 A

#### Switching capacity

To AC 15  
 NO contact:  
 IK 9271, IL 9271/5\_\_ : 3 A / AC 230 V IEC/EN 60947-5-1  
 NC contact: 1 A / AC 230 V IEC/EN 60947-5-1  
 IL/SL 9271, IP/SP 9271,  
 SL 9271CT, SP 9271CT: 5 A / AC 230 V IEC/EN 60947-5-1  
 NC contact: 2 A / AC 230 V IEC/EN 60947-5-1

#### Electrical life

To AC 15 bei 1 A, AC 230 V  
 NO contact  
 IK/SK 9271, IL/SL 9271/5\_\_ : 3 x 10<sup>6</sup> switching cycles  
 IEC/EN 60947-5-1

To AC 15 at 2 A, AC 230 V  
 IL/SL 9271, IP/SP 9271,  
 SL 9271CT, SP 9271CT: 2 x 10<sup>5</sup> switching cycles  
 IEC/EN 60947-5-1

#### Short-circuit strength

**max. fuse rating:**  
 IK/SK 9271, IL/SL 9271/5\_\_ : 4 A gG / gL IEC/EN 60947-5-1  
 IL/SL 9271, IP/SP 9271  
 SL 9271CT, SP 9271CT: 10 A gG / gL IEC/EN 60947-5-1  
**Mechanical life:** > 50 x 10<sup>6</sup> 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 9271 with measuring range 5 ... 750 mA  
 and IK 9271.11/800

#### EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61000-4-2  
 HF irradiation:  
 IK/SK9271, IP/SP 9271,  
 SL/SP 9271:  
 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 9271CT, SL9271/5:  
 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 9271, IL/SL 9271/5\_\_ : 2 kV IEC/EN 61000-4-5  
 IL/SL 9271, IP/SP 9271,  
 SL/SP 9271CT: 1 kV IEC/EN 61000-4-5  
 Between wire and ground:  
 IK/SK 9271, IL/SL 9271/5\_\_ : 4 kV IEC/EN 61000-4-5  
 IL/SL 9271, IP/SP 9271,  
 SL/SP 9271CT: 2 kV IEC/EN 61000-4-5  
 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  
 Amplitude 0.35 mm  
 frequency 10 ... 55 Hz IEC/EN 60068-2-6  
 20 / 060 / 04 IEC/EN 60068-1

#### Climate resistance:

#### Terminal designation:

#### Wire connection:

2 x 2.5 mm<sup>2</sup> solid or  
 2 x 1.5 mm<sup>2</sup> stranded ferruled  
 DIN 46228-1/-2/-3/-4  
 0,6 mm<sup>2</sup>  
 Min. cross section:  
 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 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, SL 9271CT: 35 x 90 x 100 mm  
 IP 9271: 70 x 90 x 61 mm  
 SP 9271, SP 9271CT: 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 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
- De-energized on trip
- 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

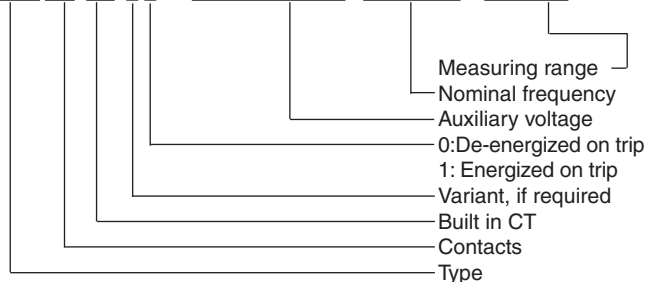
- 3-phase
- Range: 0.5 ... 5 A
- De-energized on trip
- Auxiliary voltage  $U_H$ : AC 220 ... 240 V
- 2 changeover contacts
- Width: 70 mm

## Variants

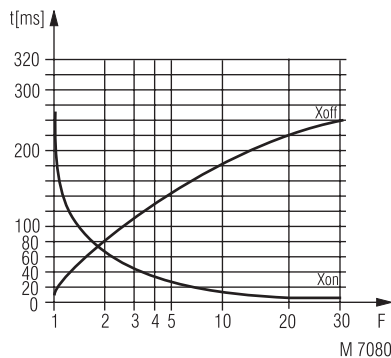
- IK 9271.11/010, SK 9271.11/010: Single phase current relay energized on trip, 1 changeover contact
- IK 9271.11/800: Single phase current relay energized on trip, except with 1 measuring ranges from 10 ... 100 mA, 1 changeover contact
- IL 9271.12/010, SL 9271.12/010: Single phase current relay energized on trip, 2 changeover contacts
- IL 9271.11/500, SL 9271.11/500: Same as IK/SK 9271.11, except with 5 measuring ranges from 0.1 ... 50 A
- IL 9271.11/510, SL 9271.11/510: Same as IK/SK 9271.11/010, except with 5 measuring ranges from 0.1 ... 50 A
- IP 9271.12/010, SP 9271.12/010: 3-phase current relay energized on trip, 2 changeover contacts
- SL 9271.12CT: Single phase current relay with built in CT, de-energized on trip, 2 changeover contacts
- SP 9271.12CT: 3-phase current relay with built in CT, de-energized on trip, 2 changeover contacts

## Ordering example for variants

SP 9271 .12 CT / \_ 0 AC 220 ... 240 V 50 / 60 Hz 5 ... 50 A



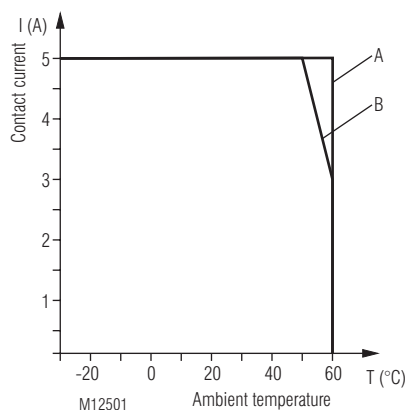
## Characteristics



### 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.

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



### Continuous current limit curve

A = Devices mounted away from heat generation components  
 B = IK 9271, SK 9271 mounted without distance, heated by units with similar load



