

## VARIMETER

### Over- and Undercurrent Relay

IL 9277, IP 9277, SL 9277, SP 9277



- According to IEC/EN 60 25-1
- IP 9277, SP 9277, SP 9277CT: 3-phase  
IL 9277, SL 9277, SL 9277CT: single phase
- Detects over- and undercurrent
- Measuring ranges from 0.1 ... 15 A
- With built in current transformer for 0.5 ... 100 A
- IL 9277, SL 9277 with 4 programmable ranges
- Settable  $0.1 \dots 1 I_N$
- 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
- De-energized on trip
- 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
- Optionally energized on trip
- Devices available in 2 enclosure versions:
  - I-model, e.g. IL \_\_\_\_, depth 61 mm  
with terminals at the bottom for installations systems and industrial distribution systems according to DIN 43 880
  - S-model, e.g. SL \_\_\_\_, depth 100 mm  
with terminals at the top for cabinets with mounting plate and cable duct
- DIN rail or screw mounting
- Width IL 9277, SL 9277, SL 9277CT: 35 mm  
IP 9277, SP 9277, SP 9277CT: 70 mm

#### Approvals and Markings



\*) only IL-devices

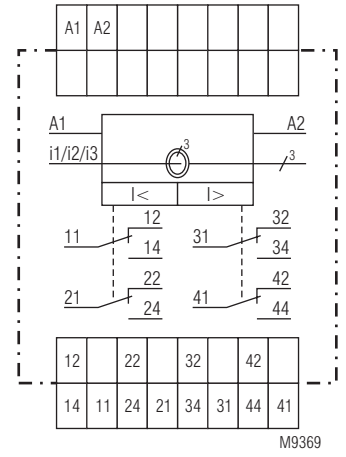
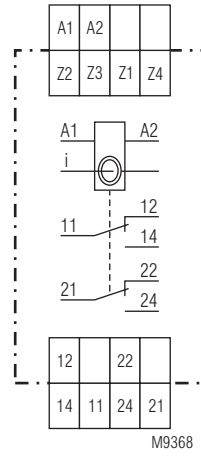
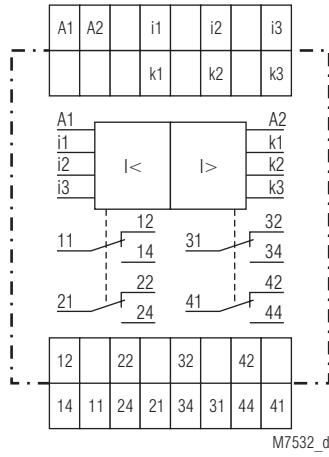
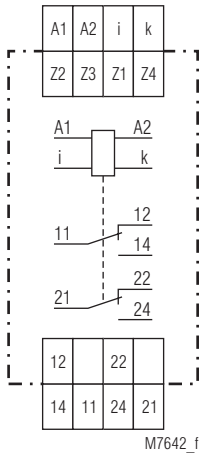
#### Applications

- Over- and undercurrent detection in single phase or 3-phase voltage systems
- For industrial and railway applications

#### 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

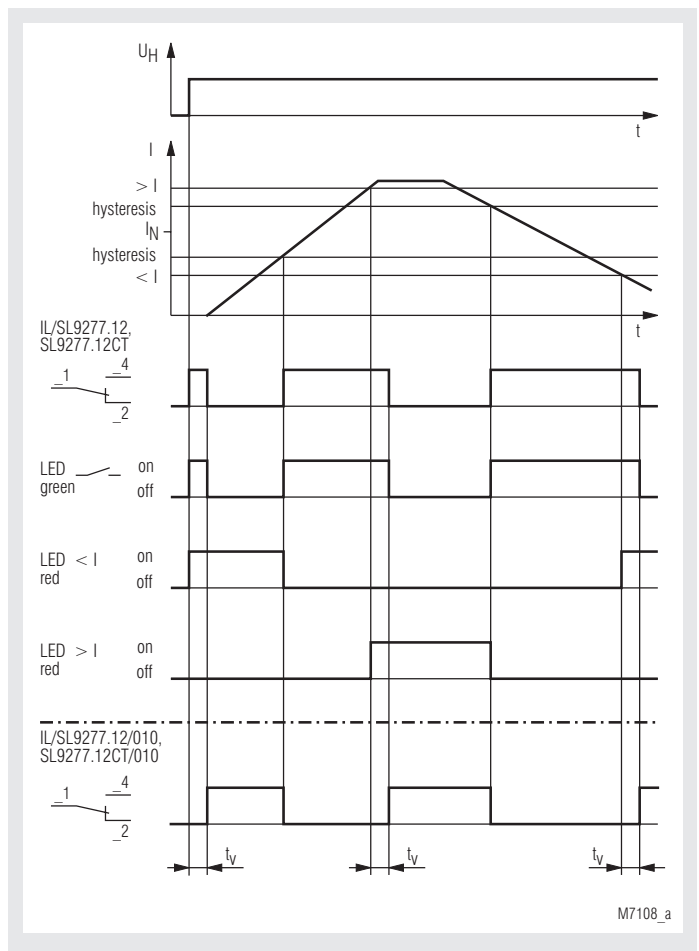
SL 9277.12CT

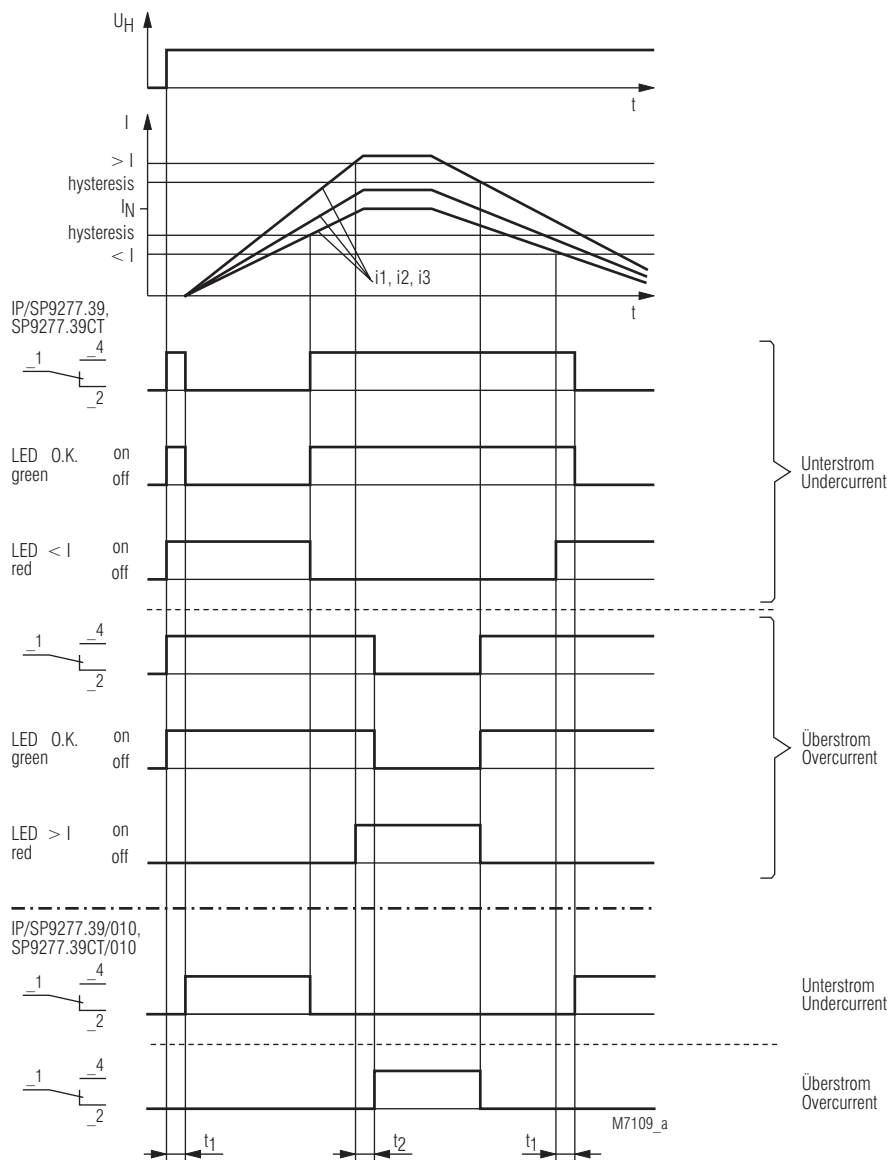
SP 9277.39CT

## Connection Terminals





| Terminal designation   | Signal designation                          |
|------------------------|---|
| A1, A2                 | Auxiliary voltage AC or DC                  |
| i, k                   | Current measuring circuit AC or DC          |
| i1, k1; i2, k2; i3, k3 | Current measuring circuit phase 1; 2; 3     |
| Z1 / Z2, Z3, Z4        | Measuring ranges with bridges via terminals |
| IL-device: 11, 12, 14  | Contacts Rel. 1 over- / undercurrent signal |
| IL-device: 21, 22, 24  | Contacts Rel. 2 over- / undercurrent signal |
| IP-device: 11, 12, 14  | Contacts Rel. 1 underrcurrent signal        |
| IP-device: 21, 22, 24  | Contacts Rel. 2 underrcurrent signal        |
| IP-device: 31, 32, 34  | Contacts Rel. 3 overcurrent signal          |
| IP-device: 41, 42, 44  | Contacts Rel. 4 overcurrent signal          |

## Function Diagram IL 9277, SL 9277, SL 9277CT





**Technical Data**

| Type  |   |                |  |  |
|---|--|---|--|---|
|   | <b>IL 9277</b>   | <b>SL 9277CT</b>  | <b>IP 9277</b>   | <b>SP 9277CT</b>  |
| Depth 61 mm                                     | IL 9277.12   |   | IP 9277.39   |   |
| Depth 100 mm                                    | SL 9277.12   | SL 9277.12CT  | SP 9277.39   | SP 9277.39CT  |
| Width   | 35 mm  | 35 mm   | 70 mm  | 70 mm   |
| Measuring input                                 | single-phase   | single-phase  | 3-phase  | 3-phase   |
| Measuring range                                 | 0.1 ... 15 A<br>settable with<br>switch<br>range / bridge  | 0.5 ... 100 A<br>settable with<br>bridges:<br>range / bridge                                    | 1 Meas. range<br>per unit  | 1 Meas. range<br>per unit   |
| Nominal frequency<br>50 ... 400 Hz              | 0.1 ... 1 A / Z1-Z2<br>0.5 ... 5 A / Z1-Z3<br>1 ... 10 A / Z1-Z4<br>1.5 ... 15 A / Z3-Z1-Z4<br><br>0.01 ... 1.5 A<br>programmable with<br>bridges:<br>range / bridge<br>0.01 ... 0.1 A / Z1-Z3<br>0.05 ... 0.5 A / Z1-Z2<br>0.1 ... 1 A / Z1-Z4<br>0.15 ... 1.5 A / Z2-Z1-Z4 | 0.5 ... 5 A / Z1-/Z2<br>2.5 ... 25 A / Z1-Z3<br>7.5 ... 75 A / Z1-Z4<br>10 ... 100 A / Z3-Z1-Z4 | 0.1 ... 1 A<br>0.5 ... 5 A<br>1 ... 10 A<br>1.5 ... 15 A                           | 0.5 ... 5 A<br>2.5 ... 25 A<br>5 ... 50 A<br>7.5 ... 75 A<br>10 ... 100 A           |
| Continuous current/<br>Max. ambient temperature | 20 A / 50 °C<br>15 A / 60 °C   | limited only by diameter of<br>cable 25 mm <sup>2</sup>   | 3 x 15 A / 50 °C<br>3 x 20 A / 45 °C   | limited only by diameter of<br>cable 25 mm <sup>2</sup>                             |
| Wire current path<br>Solid<br>Stranded ferrule  | 2 x 2.5 mm <sup>2</sup><br>2 x 1.5 mm <sup>2</sup>   | CT-diameter = 10 mm<br>25 mm <sup>2</sup>   | 2 x 2.5 mm <sup>2</sup><br>2 x 1.5 mm <sup>2</sup>                                 | CT-diameter = 10 mm<br>25 mm <sup>2</sup>   |
| Contacts  | 2 C/O contacts   | 2 C/O contacts  | 2 x 2 C/O contacts *)  | 2 x 2 C/O contacts *)   |
| Weight:   | IL 9277: 125 g<br>SL 9277: 150 g   | approx. 230 g   | IP 9277: 200 g<br>SP 9277: 250 g   | approx. 470 g   |

\*) 2 changeover contacts for overcurrent, 2 changeover contacts for undercurrent

## Technical Data

**Max. overload:** see table  
**Temperature influence:**  $\leq 0.05\%$  / 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:**  $\leq \pm 1\%$   
**Switching delay:** 0.1 ... 20 sec settable

### Auxiliary Circuit

#### Auxiliary voltage $U_H$

IL 9277, SL 9277, SL 9277CT: AC/DC 24 V  
AC 115 ... 127 V, AC 220 ... 240 V,  
AC 400 ... 440 V

IP 9277, SP 9277, SP 9277CT: 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, SL 9277CT

at AC 230 V: 3.2 VA

at DC 24 V: 0.8 W

IP 9277, SP 9277, SP 9277CT

at AC 230 V: 7.2 VA

at DC 24 V: 1 W

**Nominal frequency:** 50 / 60 Hz

**Frequency range:**  $\pm 5\%$

### Output

#### Contacts

IL 9277.12, SL 9277.12,

SL 9277.12CT: 2 changeover contact

IP 9277.39, SP 9277.39,

SP 9277.39CT: 2 x 2 changeover contact

**Thermal current  $I_{th}$ :** 5 A

#### Switching capacity

to AC 15

NO contact: 5 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1

#### Electrical life

to AC 15 at 2 A, AC 230 V

NO contact: 2 x 10<sup>6</sup> switch. cycles IEC/EN 60 947-5-1

#### Short-circuit strength

**max. fuse rating:** 6 A gL IEC/EN 60 947-5-1

**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:** < 2.000 m

#### Clearance and creepage distances

rated impulse voltage voltage/

pollution degree:

IEC 60 664-1

|  | IP/SP-devices  | IL/SL-devices |
|--|----------------|---------------|
| Supply - Contacts  | 4 kV/2         | 4 kV/2        |
| Supply - Measuring Circuit   | 6 kV/2         | 4 kV/2        |
| Measuring circuit-Measuring circuit                                | 6 kV/2         | -             |
| Measuring Circuit - contacts                                       | 6 kV/2         | 4 kV/2        |
| Contact-Contact  | 4 kV/2         | 4 kV/2        |
| Measuring Circuit, max. voltage:                                   | 3 AC 400/690 V | AC 230 V/400  |
| The contacts are not designed for voltage systems with 400 / 690 V |                |               |
| contacts, max. voltage:  | AC 230/400 V   | AC 230/400 V  |

### EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation

IL/SL 9277, IP/SP 9277

80 MHz ... 1 GHz: 20 V/m IEC/EN 61 000-4-3

1 GHz ... 2,7 GHz: 10 V/m IEC/EN 61 000-4-3

SL/SP 9277CT

80 MHz ... 1 GHz: 10 V/m IEC/EN 61 000-4-3

Fast transients: 4 kV IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

HF-wire guided: 10 V IEC/EN 61 000-4-6

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

Amplitude 0.35 mm

frequency 10 ... 55 Hz IEC/EN 60 068-2-6

20 / 060 / 04 IEC/EN 60 068-1

EN 50 005

**Wire connection:** 2 x 2.5 mm<sup>2</sup> solid or

2 x 1.5 mm<sup>2</sup> stranded ferruled

DIN 46 228-1/-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 60 999-1

0.8 Nm

**Fixing torque:** DIN rail mounting (IEC/EN 60715) or

screw mounting M4, 90 mm hole pattern,

with additional clip available as accessory

### Dimensions

#### Width x height x depth

IL 9277: 35 x 90 x 61 mm

SL 9277, SL 9277CT: 35 x 90 x 100 mm

IP 9277: 70 x 90 x 61 mm

SP 9277, SP 9277CT: 70 x 90 x 100 mm

### Classification to DIN EN 50155 for IL 9277

**Vibration and shock resistance:** Category 1, Class B IEC/EN 61 373

Ambient temperature: T1 compliant

T2, T3 und TX with operational limitations

**Protective coating of the PCB:** No

### CCC-Data

#### Switching capacity

to AC 15: 5 A / AC 230 V IEC/EN 60 947-5-1

to DC 13: 2 A / DC 24 V IEC/EN 60 947-5-1

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

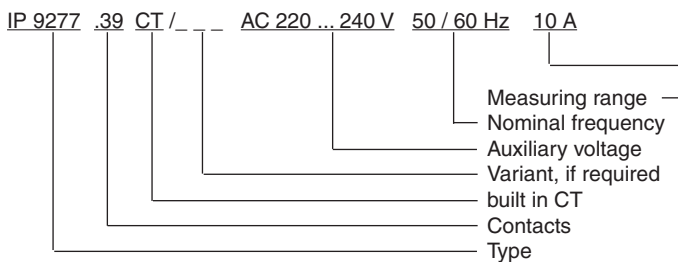
## Standard Types

- IL 9277.12 AC 220 ... 240 V  
 Article number: 0049306  
 SL 9277.12 AC 220 ... 240 V  
 Article number: 0054111
- Single phase
  - 4 programmable ranges up to 15 A
  - De-energized on trip
  - 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 number: 0049308  
 SP 9277.39 0,5 ... 5 A AC 220 ... 240 V  
 Article number: 0056075
- 3-phase
  - Range 0.5 ... 5 A
  - De-energized on trip
  - 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 energized on trip
- IP 9277.39/010, SP 9277.39/010: 3-phase current relay energized on trip
- IP 9277.39/002, SP 9277.39/002: 3-phase current relay undercurrent de-energized on trip  
 overcurrent energized on trip
- SL 9277.12CT single phase current relay with built in CT
- SP 9277.39CT 3-phase current relay with built in CT

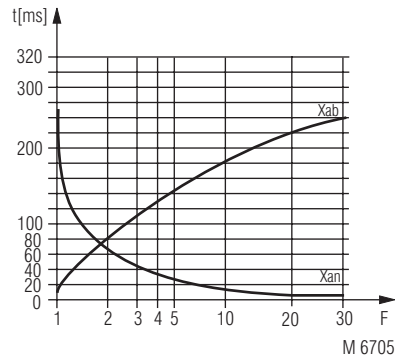
## Ordering example for variants



## Accessories

- ET 4086-0-2: Additional clip for screw mounting  
 Article number: 0046578

## 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.

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