

## 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 AC 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

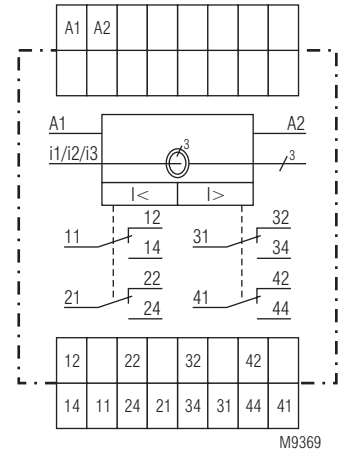
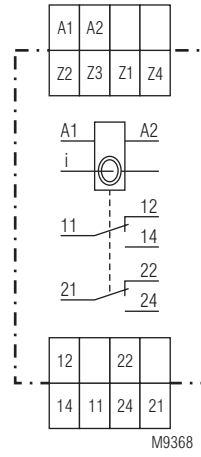
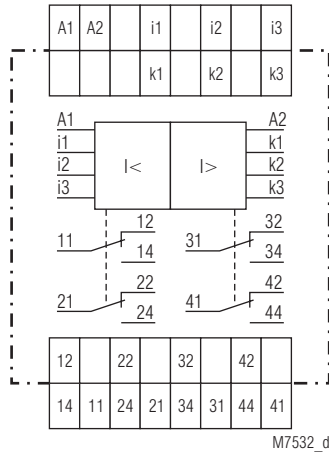
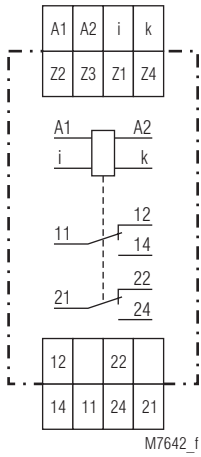
#### Applications

- 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

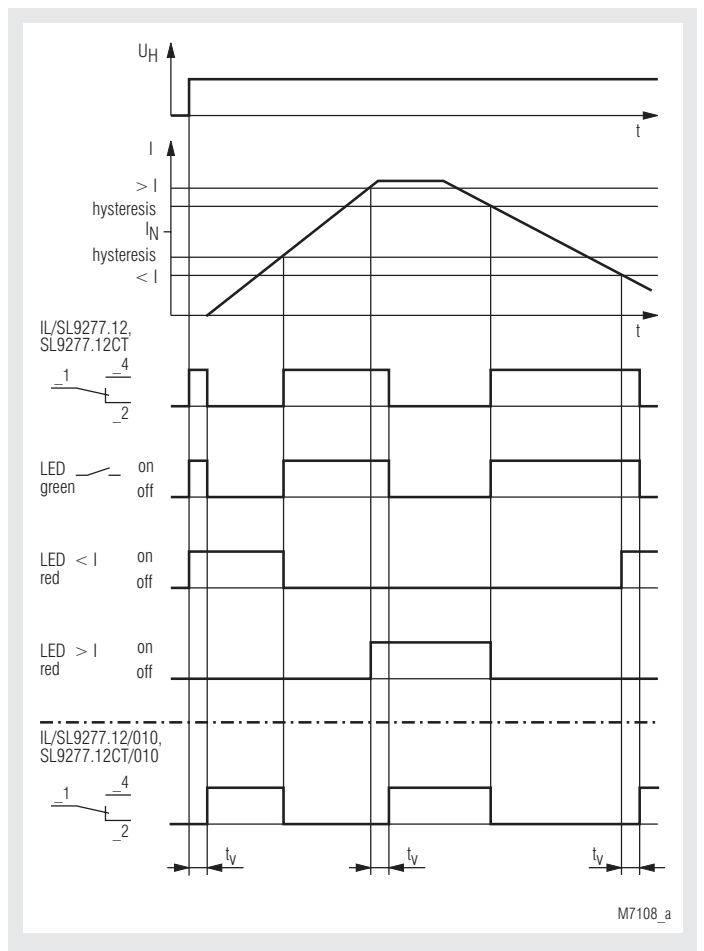
SL 9277.12CT

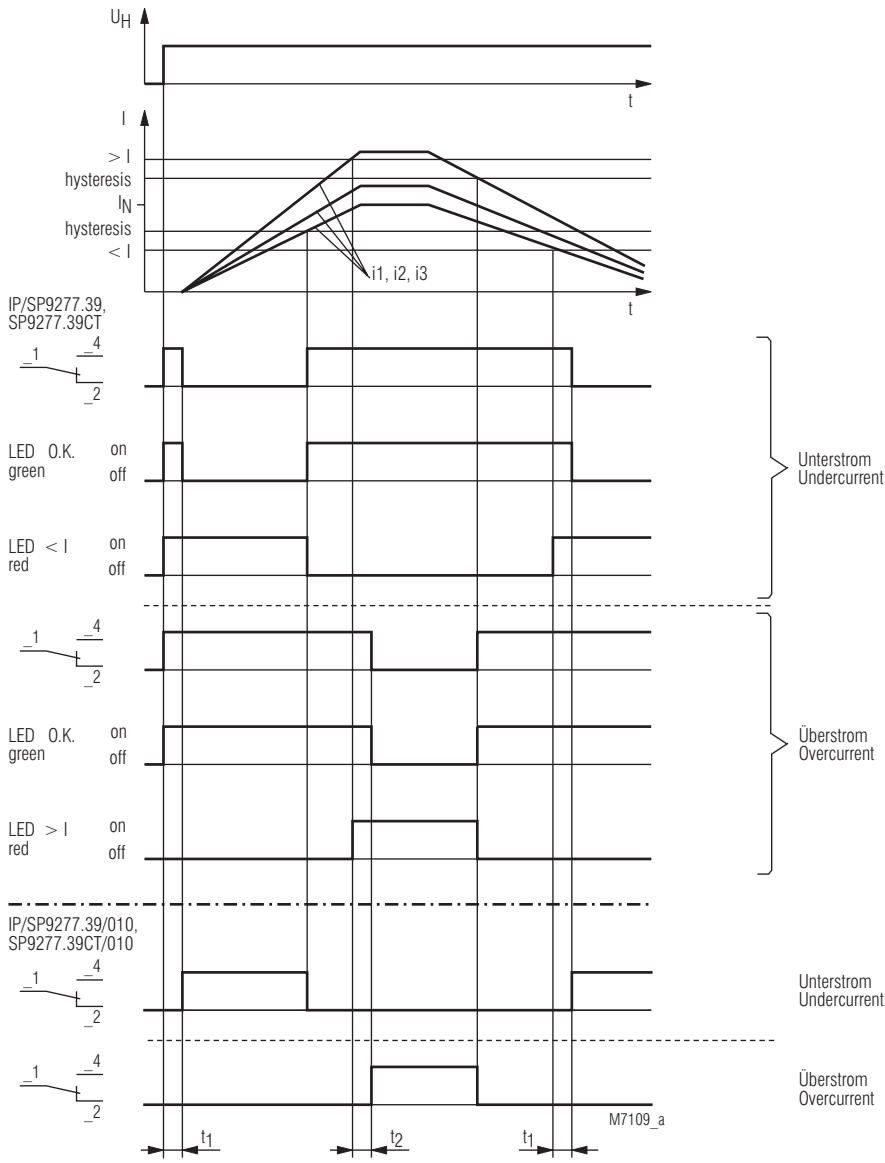
SP 9277.39CT

## Connection Terminals





Terminal designation	Signal 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
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 settable with switch range / bridge	0.5 ... 100 A settable with bridges: range / bridge	1 Meas. range per unit	1 Meas. range per unit
Nominal frequency 50 ... 400 Hz	0.1 ... 1 A / Z1-Z2 0.5 ... 5 A / Z1-Z3 1 ... 10 A / Z1-Z4 1.5 ... 15 A / Z3-Z1-Z4  0.01 ... 1.5 A programmable with bridges: range / bridge 0.01 ... 0.1 A / Z1-Z3 0.05 ... 0.5 A / Z1-Z2 0.1 ... 1 A / Z1-Z4 0.15 ... 1.5 A / Z2-Z1-Z4	0.5 ... 5 A / Z1-/Z2 2.5 ... 25 A / Z1-Z3 7.5 ... 75 A / Z1-Z4 10 ... 100 A / Z3-Z1-Z4	0.1 ... 1 A 0.5 ... 5 A 1 ... 10 A 1.5 ... 15 A	0.5 ... 5 A 2.5 ... 25 A 5 ... 50 A 7.5 ... 75 A 10 ... 100 A
Continuous current/ Max. ambient temperature	20 A / 50 °C 15 A / 60 °C	limited only by diameter of cable 25 mm <sup>2</sup>	3 x 15 A / 50 °C 3 x 20 A / 45 °C	limited only by diameter of cable 25 mm <sup>2</sup>
Wire current path Solid Stranded ferrule	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	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 SL 9277: 150 g	approx. 230 g	IP 9277: 200 g 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 47-5-1

NC contact: 1 A / AC 230 V IEC/EN 60947-5-1

### Electrical life

to AC 15 at 2 A, AC 230 V

NO contact: 2 x 10<sup>5</sup> switch. cycles IEC/EN 60947-5-1

### Short-circuit strength

**max. fuse rating:** 6 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:** < 2.000 m

### Clearance and creepage distances

rated impulse voltage voltage/

pollution degree: IEC 60664-1

	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 61000-4-2

HF irradiation

IL/SL 9277, IP/SP 9277

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 9277CT

80 MHz ... 1 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: 1 kV IEC/EN 61000-4-5

between wire and ground: 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

Amplitude 0.35 mm

frequency 10 ... 55 Hz IEC/EN 60068-2-6

20 / 060 / 04 IEC/EN 60068-1

EN 50005

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

0.8 Nm

**Mounting:** 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.

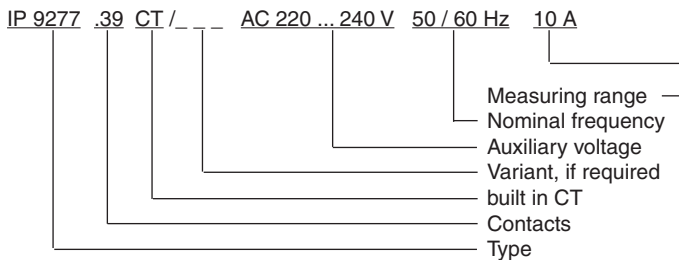
## Standard Types

- 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

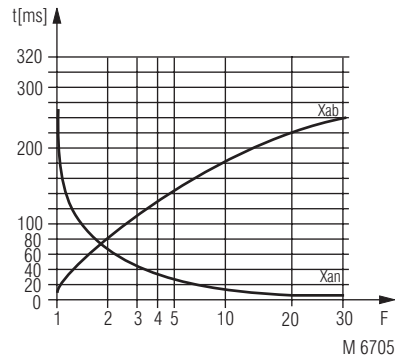
## Ordering example for variants



## 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.

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