

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

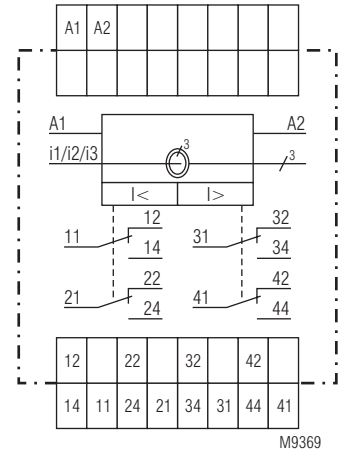
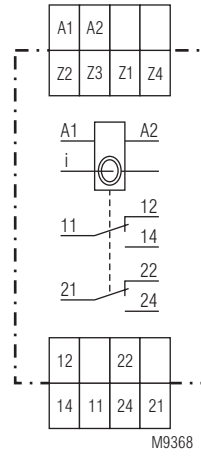
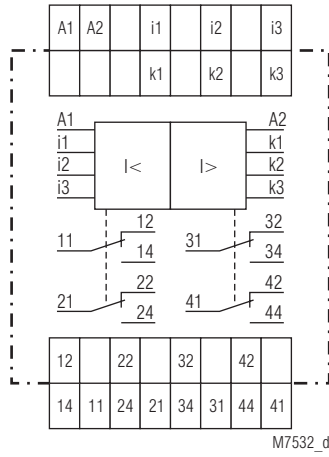
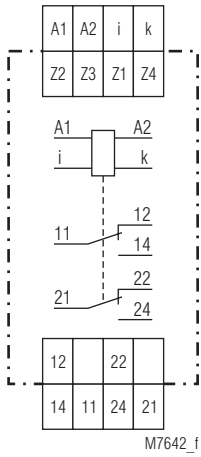
Applications

- 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

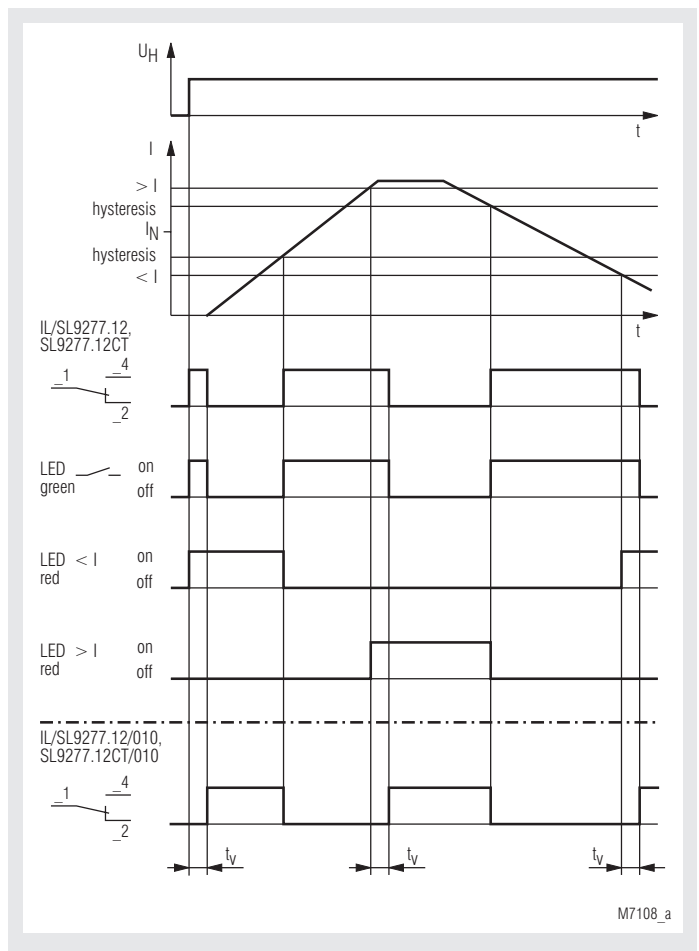
SL 9277.12CT

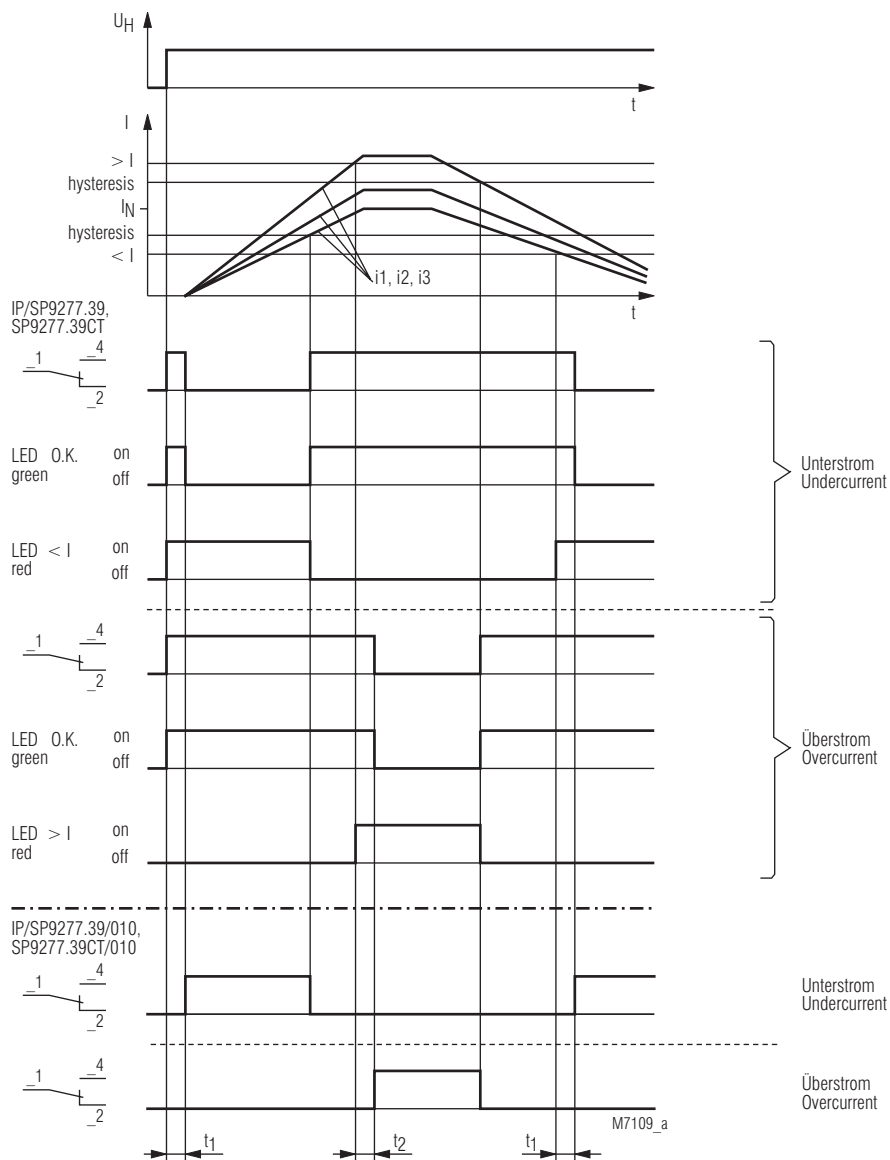
SP 9277.39CT

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				
	IL 9277	SL 9277CT	IP 9277	SP 9277CT
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 ²	3 x 15 A / 50 °C 3 x 20 A / 45 °C	limited only by diameter of cable 25 mm ²
Wire current path Solid Stranded ferrule	2 x 2.5 mm ² 2 x 1.5 mm ²	CT-diameter = 10 mm 25 mm ²	2 x 2.5 mm ² 2 x 1.5 mm ²	CT-diameter = 10 mm 25 mm ²
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 60 947-5-1

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 10⁶ 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 10⁶ 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 mm² solid or

2 x 1.5 mm² stranded ferruled

DIN 46 228-1/-2/-3/-4

0,6 mm²

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.

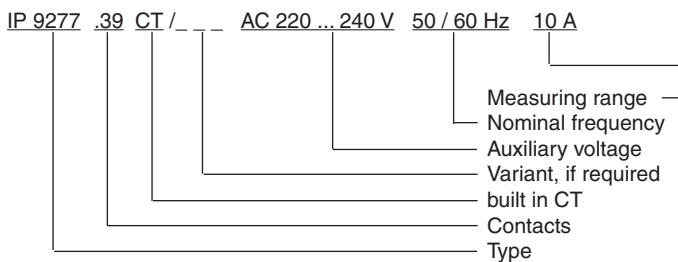
Standard Types

- 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

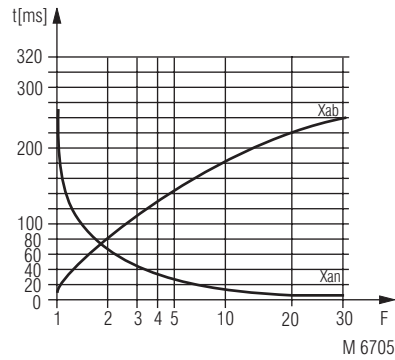
Ordering example for variants



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.

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