VARIMETER
Over- and Undercurrent Relay
IL 9277, IP 9277, SL 9277, SP 9277

0224264



- According to IEC/EN 60 25-1
- IP 9277, SP 9277, SP 9277CT: 3-phase
  IL 9277, SL 9277, SL 9277CT: singele 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 ... 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

CE cULus *) A025518

*) only IL-devices

Applications

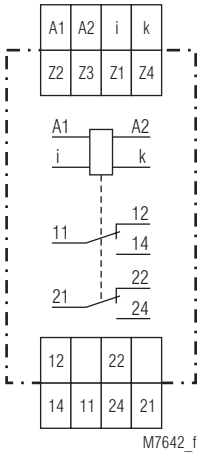
- Over- and undercurrent detection in single phase or 3-phase voltage systems
- For industrial and railway applications

Indicators

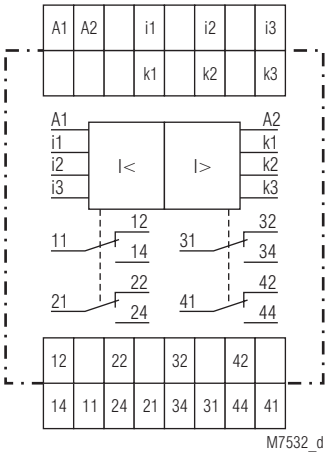
LED green:	current within limits
LED red I_{max}:	overcurrent
LED red I_{min}:	undercurrent

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

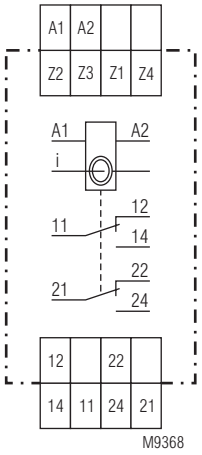
Circuit Diagram



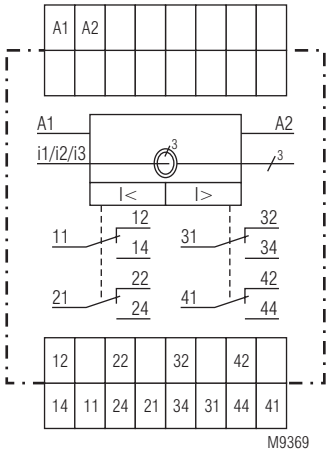
IL 9277.12, SL 9277.12



IP 9277.39, SP 9277.39



SL 9277.12CT

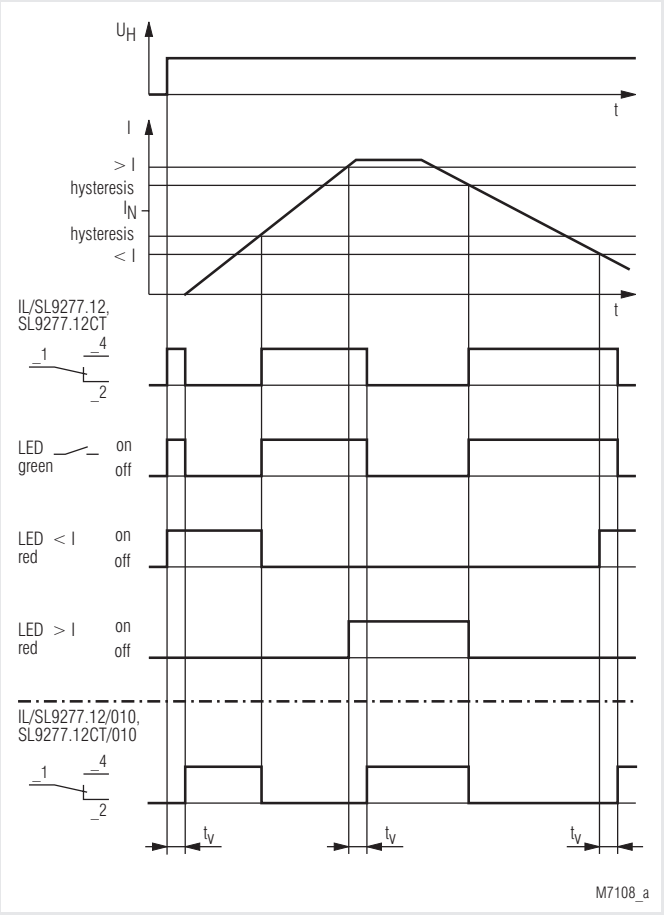


SP 9277.39CT

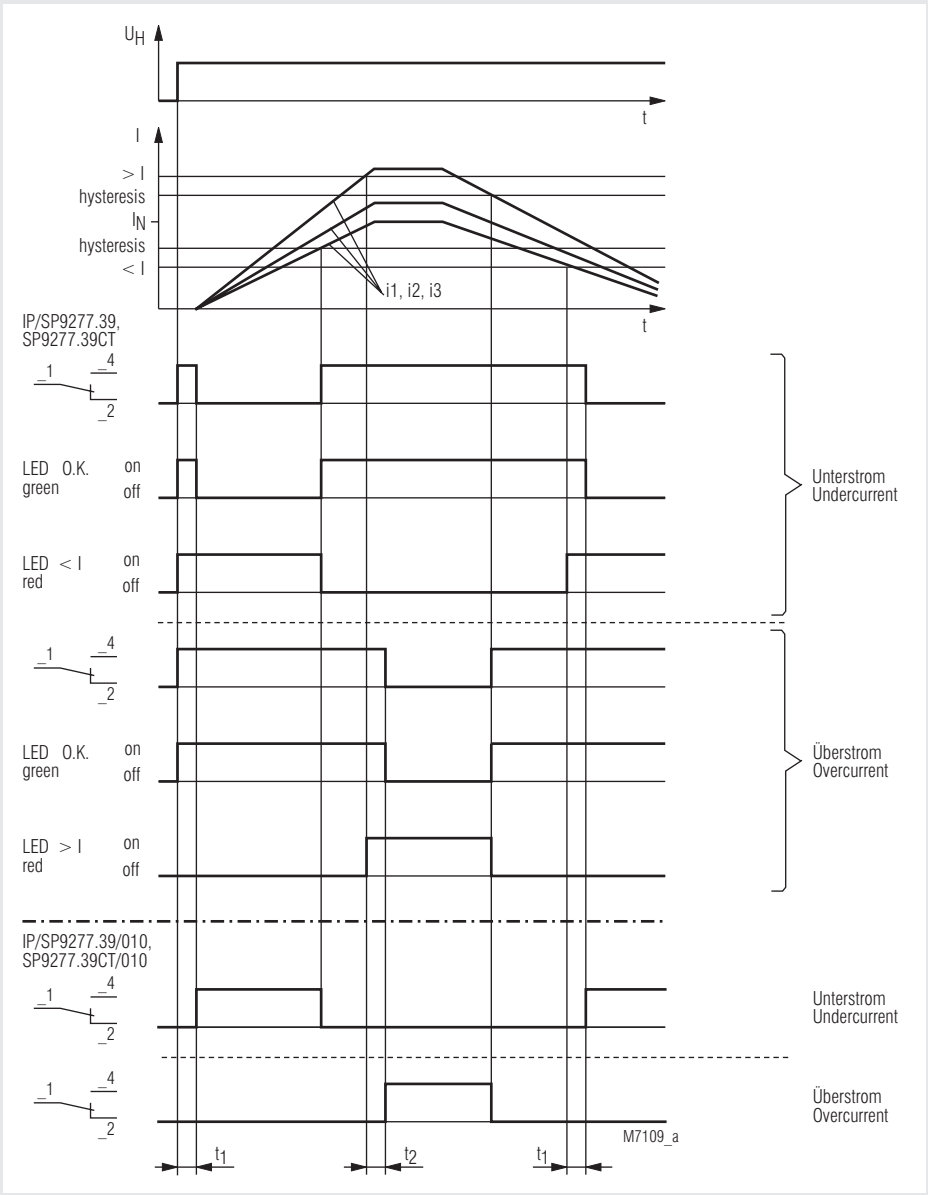
Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage AC or DC
i, k	Current measuring ciruit AC
i1, k1; i2, k2; i3, k3	Current measuring ciruit 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



Function Diagram IP 9277, SP 9277, SP 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 Nominal frequency 50 ... 400 Hz	0.1 ... 15 A settable with switsch range / bridge 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 ... 100 A settable with bridges: range / bridge 0.5 ... 5 A / Z1-/Z2 2.5 ... 25 A / Z1-Z3 7.5 ... 75 A / Z1-Z4 10 ... 100 A / Z3-Z1-Z4	1 Meas. range per unit 0.1 ... 1 A 0.5 ... 5 A 1 ... 10 A 1.5 ... 15 A	1 Meas. range per unit 0.5 ... 5 A 2.5 ... 25 A 5 ... 50 A 7.5 ... 75 A 10 ... 100 A
Continouos 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	a<pprox. 470 g

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

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
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: ± 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 10^5 switch. cycles IEC/EN 60 947-5-1
Short-circuit strength
max. fuse rating: 6 A gG / gL IEC/EN 60 947-5-1
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: < 2.000 m
Clearance and creepage distances
rated 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
Vibration resistance: Amplitude 0.35 mm
frequency 10 ... 55 Hz IEC/EN 60 068-2-6
Climate resistance: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: 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
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 60 999-1
Fixing torque: 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 compilant
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

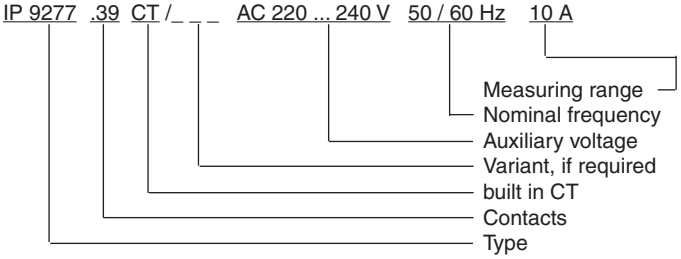
IL 9277.12 AC 220 ... 240 V
Article number: 0049306
SL 9277.12 AC 220 ... 240 V
Article number: 0054111
- Single phase
- 4 programmable ranges up to 15 A
- De-energized on trip
- Auxiliary voltage U_H: AC 220 ... 240 V
- 2 changeover contacts
- Width: 35 mm

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 undercurrend 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

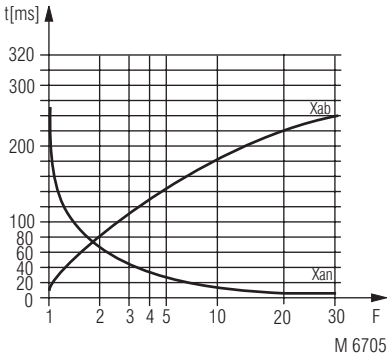
Ordering example for variants



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.

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