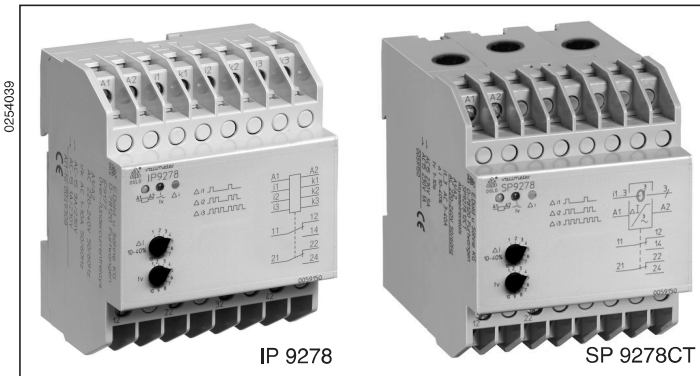


Monitoring Technique

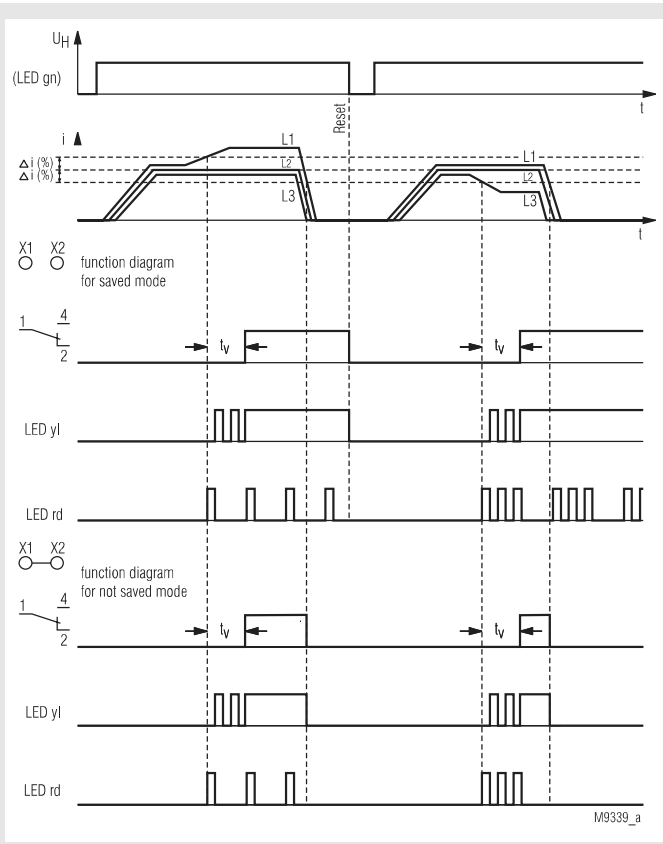
VARIMETER

Current Asymmetry Relay with integrated current transformer up to 100 A - IP 9278, SP 9278CT



- According to IEC/EN 60 255, DIN VDE 0435-303
- IP 9278, SP 9278: 3-phase
- Measuring range IP 9278, SP 9278: up to 15 A
SP 9278CT: up to 100 A
- 2 changeover contacts
- Adjustable asymmetry
- Settable time delay
- Open circuit operation
- LED indicators
- With auxiliary voltage
- Auxiliary supply and measuring input galvanic separated
- As option with external remote reset
- Width 70 mm

Function Diagram



Approvals and Marking



Applications

Monitoring of current asymmetry in 3-phase systems e.g. monitoring of heating elements, heating and load circuits

Indicators

- LED green: on when aux. supply connected
- LED yellow: on when output contacts switched, flashes during timing
- LED red: Failure code:
 - 1 short pulse, followed by longer space = failure in current path i1/k1
 - 2 short pulses, followed by longer space = failure in current path i2/k2
 - 3 short pulses, followed by longer space = failure in current path i3/k3
 - 4 short pulses, followed by longer space = current is out of operating range

Function

The IP 9278 monitors 3 currents (phases) on asymmetry. Within the operating range the device searches continuously for the 2 currents with the smallest current difference in %. The currents in these 2 paths are the reference for the asymmetry calculation of the third current path. The asymmetry is adjustable within 10 ... 40%.

If asymmetry is detected, the fault is indicated after an adjustable time delay t_v by 2 changeover contacts. Without bridge the fault is stored, with bridge it auto resets.

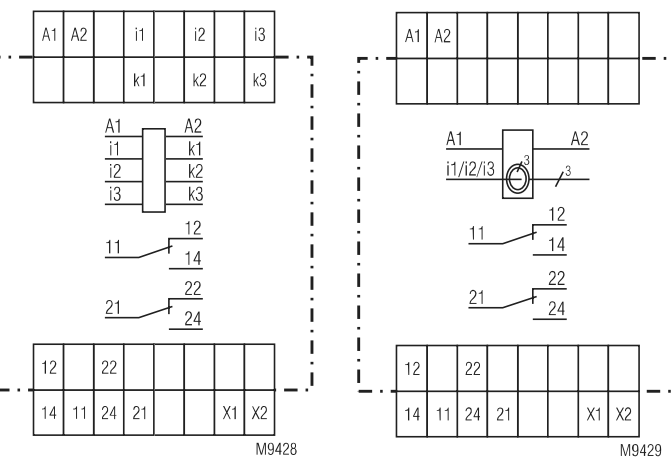
The flashing code on the red LED indicates in which current path the failure occurred.

The reset is made by disconnecting the auxiliary voltage. On request the unit is also available with remote reset.

Notes

For small currents at the bottom end of the operating range it is recommended to adjust the asymmetry value slightly higher to reduce the response sensitivity.

Circuit Diagrams



IP 9278.12

SP 9278.12CT

Technical Data**Input****Measuring Ranges**

	IP 9278	SP 9278CT	
	SP 9278		
Measuring range:	1 ... 15 A	4 ... 50 A	8 ... 100 A
	other ranges on request		
Operating range (asymmetry $\pm 10\%$):	0.9 ... 16.5 A	3.5 ... 55 A	9 ... 110 A
	at asymmetry setting $> 10\%$ the operating range is reduced, e. g.		
Asymmetry $\pm 20\%$:	1.2 ... 13.7 A	4.5 ... 45 A	9 ... 90 A
Asymmetry $\pm 40\%$:	1.5 ... 11.5 A	6 ... 39 A	12 ... 78 A

When the current falls below or rises above the operating range a fault is indicated by the output relay and the red LED gives the flash code 4 (Out of range).

The current transformers are mounted in the base of the SP 9278, the wires are lead through the CTs (no terminals).

Measuring Circuit

Frequency range of measuring current:	50 ... 400 Hz
Max. permitted continuous current of the current paths IP 9278:	20 A at 45°C ambient temperature 15 A bei 50°C ambient temperature
SP 9278CT:	100 A
Temperature influence:	$\leq 0.05\%$ / K
Reaction time:	approx. 500 ms

Setting Ranges

Response value of asymmetry:	adjustable within the operating range 10 ... 40 % compared to the mean value of the 2 current paths with the lowest difference.
Repeat accuracy:	$\leq \pm 1\%$
Time delay t_d:	0.1 ... 20 s settable (logarithmic scale)

Auxiliary Circuit

Auxiliary voltage U_H:	AC/DC 24 V, AC 220 ... 240 V others 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:	3.2 VA
at DC 24 V:	1 W
Nominal frequency:	50 / 60 Hz
Frequency range:	$\pm 5\%$

Output

Contacts	
IP 9278.12, SP 9278.12CT:	2 changeover contacts
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 1 A, AC 230 V	
NO contact:	2 x 10 ⁵ switch. cycl. IEC/EN 60 947-5-1
Short-circuit strength	
max. fuse rating:	10 A gL IEC/EN 60 947-5-1
Mechanical life:	$> 50 \times 10^6$ switching cycles

Technical Data**General Data**

Operating mode:	Continuous operation	
Temperature range:	- 20 ... + 60°C	
Clearance and creepage distances		
rated impuls voltage/ pollution degree:		IEC 60 664-1
Supply - contacts:	4 kV/2	
Supply - Measuring circuit:	6 kV/2	
Measuring circuit - contacts:	6 kV/2	
Measuring circuit - Measuring circuit -	6 KV/2	
The contacts are not designed for voltage systems with 400 / 690 V		
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:	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
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 20 / 060 / 04 IEC/EN 60 068-1	
Climate resistance:		
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm ² solid or 2 x 1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4	
Current path i/k on SP 9278CT:	3 x 25 mm ² with insulation max. 10 mm \varnothing DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1	
Mounting:	DIN rail IEC/EN 60 715	
Weight		
IP 9278:	200 g	
SP 9278CT:	300 g	

Dimensions	
Width x height x depth	
IP 9278:	70 x 90 x 61 mm
SP 9278CT:	70 x 90 x 100 mm

Standard Type

IP 9278.12 AC/DC 24 V	1 ... 15 A	0.1 ... 20 s
Article number:	0057915	
• Measuring range:	1 ... 15 A	
• 2 changover contacts		
• Auxiliary voltage U_H :	AC/DC 24 V	
• Time delay:	0.1 ... 20 s	

Variants

IP 9278.12/100:	Variant with external remote reset control voltage on terminals X1-X2 AC/DC 10 ... 265 V for reset
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Ordering example for variants

SP 9278.12 CT / _ _ _ AC 220 ... 240 V 50 / 60 Hz 4 ... 50 A 0.1 ... 20 s

