

# Monitoring technique

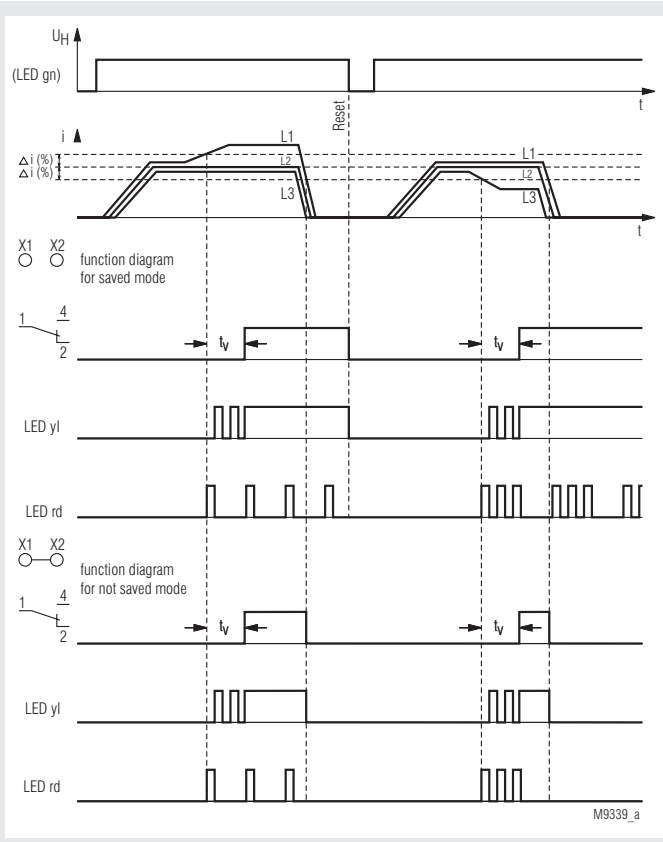


## Current-asymmetry-relay IP 9278, SP 9278CT with integrated current transformer up to 100 A - varimeter



- 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

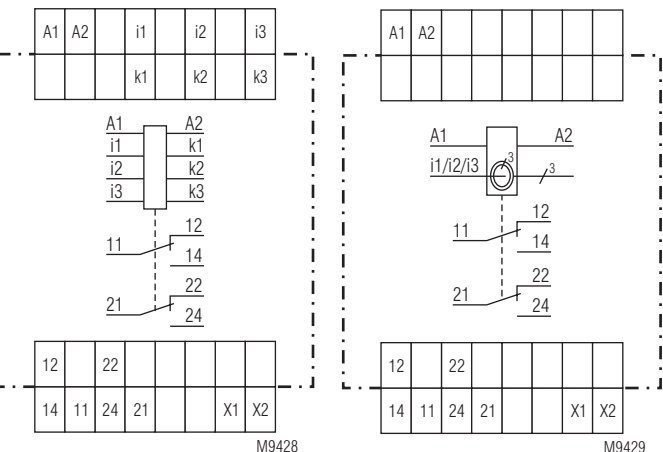
### Indicators

- 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%.

### Circuit diagrams



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.

IP 9278.12

SP 9278.12CT

## Technical Data

### Input

#### Measuring ranges

	IP 9278 SP9278	SP 9278CT	
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 <sup>5</sup> switching cycles 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	
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	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	

#### Current path i/k

on SP 9278CT: 3 x 25 mm<sup>2</sup> 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  
DIN rail IEC/EN 60 715

#### Mounting:

##### 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 changeover 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	
	Switching delay
	Measuring range
	Nominal frequency
	Auxiliary voltage
	Variant, if required
	Built in CT
	Contacts
	Type