

Current and Voltage Controls 3-Phase Asymmetrical Control Types S 171, SY 175

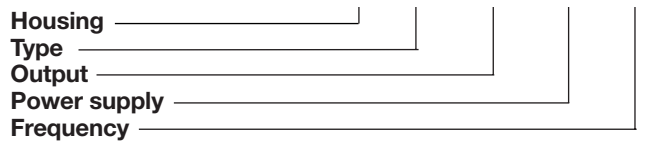


- Mains network quality and load monitoring relay
- Monitors phase sequence, phase loss, phase asymmetry and phase angle
- Measures asymmetry on 3-ph. voltage without neutral
- Built-in adjustable timer function
- Knob-adjustable asymmetry sensitivity
- Output: 10 A SPDT relay
- Plug-in type module
- S-housing
- LED-indication for power supply and output ON
- Power supply is the 3-phased measuring voltage

Product Description

3-phase plug-in monitoring relay for phase sequence, phase loss, phase asymmetry and phase angle. Frequently used to control the mains in electrical distribution systems. The S 171 module features built-in time delay.

Ordering Key **S 171 156 220-50**



Product Selection

Plug	Output	Timer	Frequency	Supply: 220 VAC	Supply: 380 VAC	Supply: 400 VAC	Supply: 415 VAC
Circ.	SPDT	Yes	50 Hz	S 171 156 220-50	S 171 156 380-50	S 171 156 400-50	S 171 156 415-50
		Yes	60 Hz	S 171 156 220-60	S 171 156 380-60	S 171 156 400-60	S 171 156 415-60
Circ.	SPDT	No	50 Hz	SY 175 220-50	SY 175 380-50		SY 175 415-50
		No	60 Hz	SY 175 220-60	SY 175 380-60		SY 175 415-60

Input Specifications

Input	
Pin 5	Phase L1
Pin 6	Phase L2
Pin 7	Phase L3
	measures on own supply

Supply Specifications

Power supply AC types	Overvoltage cat. III (IEC 60664)
Rated operational voltage through pins 5, 6 & 7	(IEC 60038)
220	3 x 220 VAC ± 15%, 50 or 60 Hz
380	3 x 380 VAC ± 15%, 50 or 60 Hz
400	3 x 400 VAC ± 15%, 50 or 60 Hz
415	3 x 415 VAC ± 15%, 50 or 60 Hz
Voltage interruption	≤ 40 ms
Dielectric voltage	None (supply/elect.)
Rated impulse withstand volt.	4 kV (1.2/50 µs) (line/neutral, line/line), direct connection to electronics
Rated operational power	3 VA

Output Specifications

Output	SPDT relay
Rated insulation voltage	250 VAC (rms) (cont./elect.)
Contact ratings (AgCdO)	µ (micro gap)
Resistive loads	AC 1 10 A/250 VAC (2500 VA)
	DC 1 1 A/250 VDC (250 W)
	or 10 A/25 VDC (250 W)
Small inductive loads	AC 15 2.5 A/230 VAC
	DC 13 5 A/24 VDC
Mechanical life	≥ 30 x 10 ⁶ operations
Electrical life	AC 1 ≥ 2.5 x 10 ⁵ operations (at max. load)
Operating frequency	≤ 7200 operations/h
Dielectric strength	
Dielectric voltage	≥ 2 kVAC (rms) (cont./elect.)
Rated impulse withstand volt.	4 kV (1.2/50 µs) (cont./elect.) (IEC 60664)



General Specifications

Reaction time	$\tau = 0.2$ s, worst case reaction time may be up to $5 \times \tau$ Adjustable delay on release built-in (0.2s - 10s) Note: Reaction time + set time = actual delay on release time	Environment	(IEC 60947-1) Degree of protection IP 20 B (IEC 60529) Pollution degree (IEC 60664) 1: S 171 380/400/415 SY 175 380/415 2: S 171 220, SY 175 220 Operating temperature -20° to $+50^{\circ}$ C (-4° to $+122^{\circ}$ F) Storage temperature -50° to $+85^{\circ}$ C (-58° to $+185^{\circ}$ F)
Accuracy	OFF delay 10 s, $-1/+3$ s on max. < 0,1 s on min.	Weight	200 g
Time function (S 171)	Delay on release 0.2-10 s. adj.	Approvals	S 171: UL, CSA, SEV (SEV only 3 x 220 VAC) SY 175: UL, CSA, SEV
Indication for			
Power supply ON	LED, green		
Output ON	LED, red		

Mode of Operation

The knob-adjustable relays detect phase asymmetries of 2 to 12% of phase-phase amplitude.

The relay operates when all three phases are present at the same time and the phase sequence is correct as well as the measured asymmetry/unbalance is below set point (2 to 12% of phase asymmetry). Phase angle failures are registered as phase asymmetry.

S 171 releases if one or more of the above factors deviate for more than the set time. SY 175 releases immediately.

If the supply voltage drops to approx. 25% of the phase-phase voltage, the relay releases without time delay.

Applications of asymmetry

- I: Mains monitoring:
 - Phase sequence.
 - Phase loss.
 - Phase amplitude asymmetry.
- II: Load monitoring:
 - Phase sequence (direction of motor rotation).
 - Fuse blowing.

Example 1 Mains network monitoring

The relay monitors phase loss, that the power supply has correct phase sequence, that all three phases are present, and that the phase asymmetry is within the pre-set level.

Setting
The allowed asymmetry for the mains voltage amplitudes is set on the potentiometer.

Example 2 Starting and operating load monitoring

The 3-phased monitoring relays for electrical loads ensure correct starting and operating conditions. The relays measure phase sequence and consequently the correct direction of motor rotation.

The most frequent cause of asymmetry and unbalance is fuse blowing. In this case the motor regenerates the interrupted phase. The size of the regenerated phase depends on the actual mechanical load and motor size. In this case it is a combination of phase amplitude and phase angle asymmetry, and normally the regenerated voltage will cause an asymmetry higher than 2-3%.

Setting

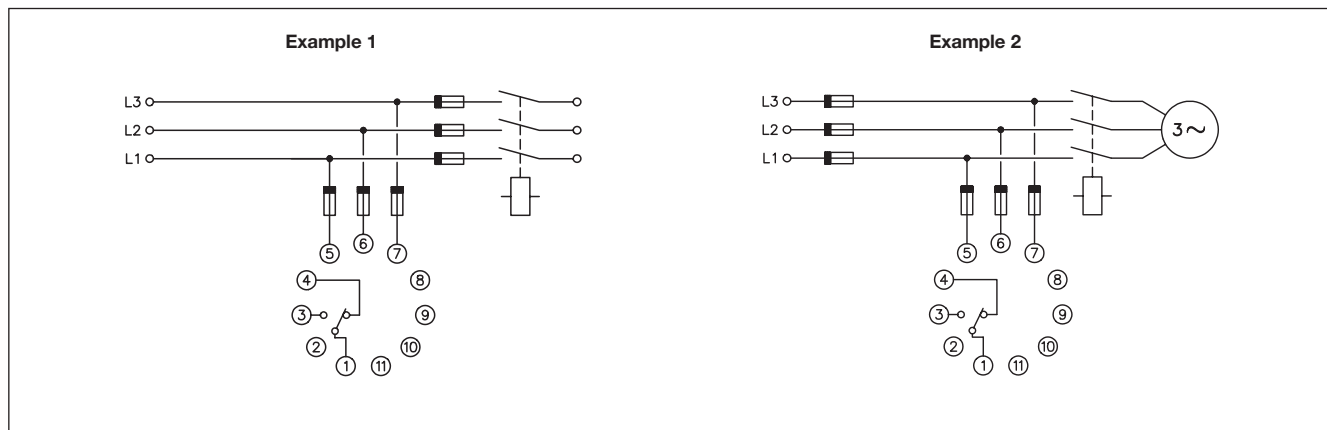
Turn the asymmetry potentiometer counterclockwise (from max.) until the relay releases.

Continue turning approx. 1 mark clockwise to ensure correct operation. At approx. 5% or less asymmetry, ensure that possible power supply variations do not result in erroneous releases.

Example:

Usupply nom. = 380 VAC
Setpoint = 6% ~ 23 VAC
Hysteresis = 1% ~ 4 VAC
The relay is ON if all 3 phase-phase voltages are within the range of 357 to 403 VAC. The relay is OFF if one or several phase-phase voltages are higher than 403 VAC plus 1% = 410 VAC or lower than 357 less 1% = 349 VAC.

Wiring Diagrams



Time/Range Setting

Range setting

Lower potentiometer:
Phase asymmetry sensitivity
2% ($\pm 1,7\%$) to 12% (+4,5%,
-0,5%) of phase-phase am-
plitude. Adjustable on abso-
lute scale.

Hysteresis:

$\leq 2\%$ of nominal voltage.

Time setting

Upper potentiometer
(not SY 175):

Time

Adjustable time delay on re-
lease: 0.2 to 10s
Time setting on relative scale.

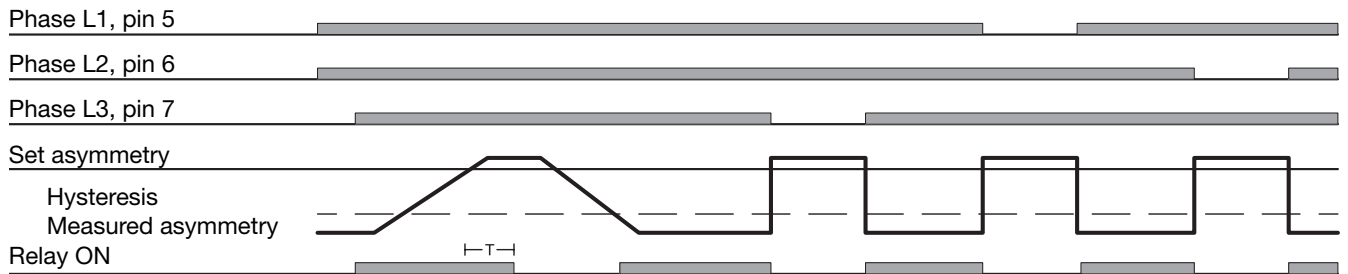
Accessories

Sockets \diamond	S 411
Hold down spring \diamond	HF
Mounting rack	SM 13
Socket covers	BB 4
Front mounting bezel	FRS 2
Potentiometer lock	PL 2

For further information refer to "Accessories".

Operation Diagrams

S 171



SY 175

