Current and Voltage Controls
3-Phase Cos φ Control
Type SY 115

- **Load guard for asynchronous motors and other symmetrical loads**
- **Measures on phase difference (cos φ) between motor current and voltage**
- **Measuring range: Cos φ = 0-0.9 with 1-phase current metering transformer, type MI...**
- **Knob-adjustable cos φ level**
- **Delay on operate at power ON**
- **Output: 10 A SPDT relay**
- **Plug-in type module**
- **S-housing**
- **LED-indication for power supply and output ON**
- **AC power supply**

Product Description

3-phase load guard monitoring plug-in relay. Measures the phase difference (cos φ) between motor current and voltage. Often used for protecting a motor from overload in applications where stops can damage the whole mechanical system.

Ordering Key

SY 115 220

Housing
Function
Output
Type
Power supply

Type Selection

Plug	Output	Supply: 220 VAC	Supply: 380 VAC	Supply: 415 VAC
Circular plug	SPDT	**SY 115 220**	**SY 115 380**	**SY 115 415**

Input Specifications

Input		
Pins 5, 6 & 7		Phase L1, L2, L3
Pins 8 & 11		0.4-4 V_p from current transformer, type MI100/MI 500 black wire connected to pin 8

Supply Specifications

Power supply AC types		Overvoltage cat. III (IEC 60664)
Rated operational voltage		(IEC 60038)
Through pins 5, 6 & 7	220	3 x 220 VAC ± 10%, 45 to 65 Hz
	380	3 x 380 VAC ± 10%, 45 to 65 Hz
	415	3 x 415 VAC ± 10%, 45 to 65 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		2.5 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)

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General Specifications

Power ON delay	3-7 s
Reaction time	typically 0.5 s
Indication for	
Power supply ON	LED, green
Output ON	LED, red
Environment	(IEC 60947-1)
Degree of protection	IP 20 B (IEC 60529)
Pollution degree	2 (IEC 60664)
Operating temperature	-20° to +50°C (-4° to +122°F)
Storage temperature	-50° to +85°C (-58° to +185°F)
Weight	200 g
Approvals	UL, CSA, SEV

Mode of Operation

SY 115 can be used for monitoring the actual load of asynchronous motors.

The relay measures the angle between motor current and motor voltage, i.e. phase angle difference. This angle always exists, and its change is almost proportional to the actual motor load (contrary to the motor current).

The characteristics of the load depend on the type of motor, and the phase difference, cos φ, depends on the actual load. It is therefore recommended to adjust cos φ after practical tests.

The relay contact in SY 115 should be employed as a stop function in a system with external restart. Phase sequence is arbitrary.

Example 1
SY 115 is connected to a current metering transformer, type MI, as well as to a 3-phased asynchronous motor. The relay operates when cos φ is below the set value. At inversion (dotted line) the relay operates when cos φ exceeds the set value.

Example 2
By a combination of normal and inverted functions, SY 115 monitors whether cos φ is within either set upper or lower limits.

Range Setting

Measuring range
cos φ = 0-0.9.
With current metering transformer, type MI 100 or MI 500.

Measuring of current phase
Measuring input for connection of current metering transformer: Pins 8 and 11.

If the current is below 2.5 A, the cable may pass through the central hole of the current metering transformer several times so that the number of turns multiplied by the current consumption lies within the current range of the transformer.

The current metering transformer should be mounted in such a way that the current "flows" from the front towards the rear of the transformer.

Measuring
The voltage as well as the current are measured on the phase connected to pin 5.

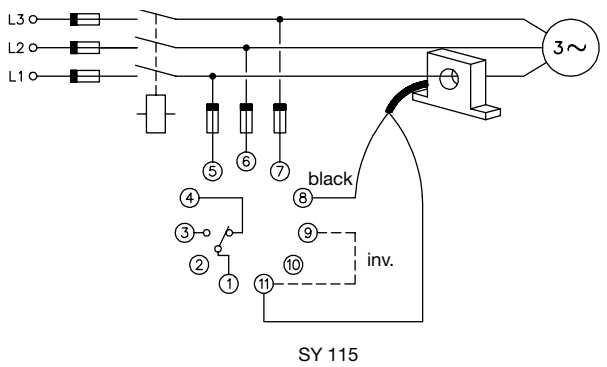
Range setting
Knob-adjustable on absolute scale (cos φ).

Inversion
The output signal can be inverted by interconnecting pins 9 and 11 directly on the socket.

Hysteresis
10° equalling approx. 1 graduation mark on the scale.

Wiring Diagrams

Example 1



SY 115

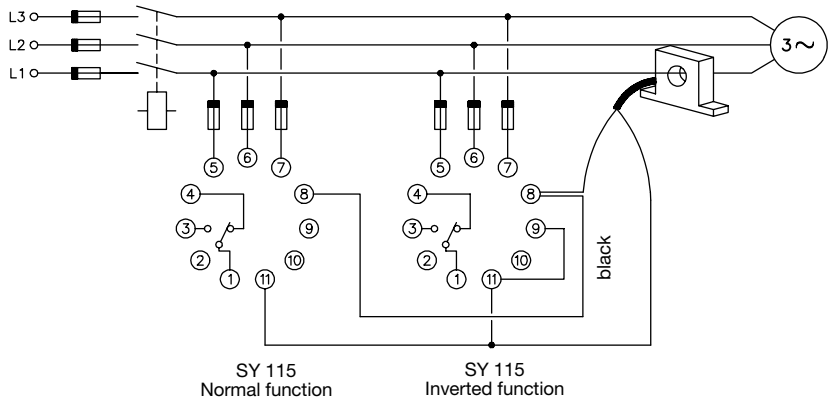
Accessories

Sockets◊	S 411
Hold down spring◊	HF
Mounting rack	SM 13
Socket cover	BB 4
Front mounting bezel	FRS 2
Potentiometer lock	PL 3
Current metering transformers	MI 100, MI 500.

For further information refer to "Current Metering Transformers" and "Accessories ".

Wiring Diagrams (cont.)

Example 2



Operation Diagram