

Current and Voltage Controls 3-Phase Asymmetrical Relay Type H 471

CARLO GAVAZZI



- 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
- For mounting on DIN-rail in accordance with DIN/EN 50 022
- H4-housing
- LED-indication for power supply and output ON
- Power supply is the 3-phased measuring voltage

Product Description

3-phase monitoring relay for DIN-rail mounting for phase sequence, phase loss, phase asymmetry and phase angle.

Often used to control phase asymmetry in order to prevent any damage to the connected motors.

Ordering Key

H 471 156 380-50 Hz

Housing _____
Type _____
Output _____
Power supply _____
Frequency _____

Type Selection

Plug	Output	Freq.	Supply: 220 VAC	Supply: 380 VAC	Supply: 400 VAC	Supply: 415 VAC
Screw terminals	SPDT	50 Hz	H 471 156 220-50 Hz	H 471 156 380-50 Hz	H 471 156 400-50 Hz	H 471 156 415-50 Hz
		60 Hz	H 471 156 220-60 Hz	H 471 156 380-60 Hz	H 471 156 400-60 Hz	H 471 156 415-60 Hz

Input Specifications

Input	
Terminal 22	Phase L3 Phase L2 Phase L1 measures on own supply
Terminal 23	
Terminal 24	

Supply Specifications

Power supply AC types	Overvoltage cat. III (IEC 60664) (IEC 60038)
Rated operational voltage Through term. 22, 23 & 24	
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

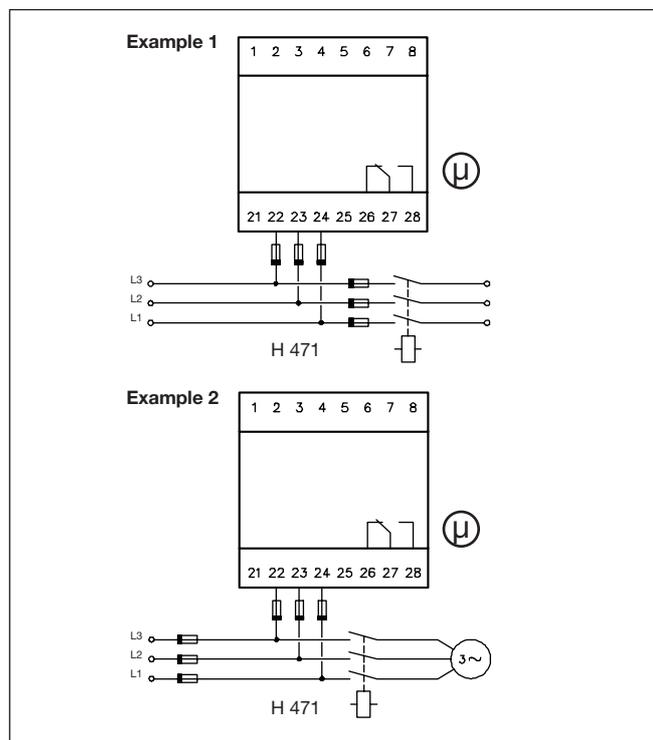
Output	SPDT relay
Rated insulation voltage	250 VAC (rms) (cont./elect.)
Contact ratings (AgCdO)	μ (micro gap)
Resistive loads	AC 1 10 A/250 VAC (2500 VA) DC 1 1 A/250 VDC (250 W) or 10 A/25 VDC (250 W)
Small inductive loads	AC 15 2.5 A/230 VAC DC 13 5 A/24 VDC
Mechanical life	≥ 30 x 10 ⁶ operations
Electrical 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 (0.2 s - 10s) Note: Reaction time + set time = actual delay on release time
Accuracy OFF delay	10 s, -1/+3 s on max. < 0.1 s on min.
Time function	Delay on release 0.2-10 s. adj.
Indication for Power supply ON Output ON	LED, green LED, red
Environment Degree of protection Pollution degree Operating temperature Storage temperature	(IEC 60947-1) IP 20 B/front IP 40 D (IEC 60529) 3 (IEC 60664) -20° to +50°C (-4° to +122°F) -50° to +85°C (-58° to +185°F)
Weight	300 g
Approval	CSA

Wiring Diagrams



Mode of Operation

The knob-adjustable H 471 detects 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.

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 measures phase loss, that the power supply has correct phase sequence, that all three phases are present, and that the phase asymmetry is within the preset level.

Setting

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

Example 2 Load monitoring

The 3-phased monitoring relay for electrical loads ensures correct starting and operating conditions. The relay monitors 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 higher than 2-3%.

Setting

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

Continue adjusting 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 release.

Time/Range Setting

Range setting

Left potentiometer:
Phase asymmetry sensitivity 2 to 12% of phase-phase amplitude. Adjustable on absolute scale.

Time setting

Right potentiometer:
Time setting on relative scale.
Adjustable delay on release: 0.2 to 10 s.

Operation Diagram

