

## General:

FKV-24F phase failure relay are designed to avoid any failure of three phase motors(which works phase sequence) caused from network.

## Usage of Device and Working Principle:

Make the connections according to the diagram. When power is on and device check the phase voltage values are in the between the maximum and minimum set values, phase balance and phase sequences. This control takes 3-4 seconds. If voltages of phases, phase balance and phase sequences are correct, relay pulls and relay led is switched on. When relay pulls, contact 2 and 3 outputs are short circuit. If any phase voltage is bigger than maximum voltage set value U> led is switched on. If phase voltage value does not turn back normal value in 2 seconds, relay releases and relay led is switched off. When relay releases, contact 1 and 2 outputs are short circuit. When all of phase voltage values are lower than the maximum set value, U> led is switched off. If phase voltage value does not exceed the maximum set value with 5V hysteresis in 3 seconds, relay pulls and relay led is switched on. When relay pulls, contact 2 and 3 outputs are short circuit. If any phase voltage is lower than minimum voltage set value U< led is switched on. If phase voltage value does not turn back normal value in 2 seconds, relay releases and relay led is switched off. When relay releases, contact 1 and 2 outputs are short circuit. When all of phase voltage values are bigger than the minimum set value, U< led is switched off. If phase voltage value does not exceed the minimum set value with 5V hysteresis in 3 seconds, relay pulls and relay led is switched on. When relay pulls, contact 2 and 3 outputs are short circuit.

Asymmetry ratio is ratio of maximum phase voltage to difference between the maximum phase voltage and minimum phase voltage. If asymmetry ratio is bigger than asymmetry set ratio, Asym led is switched on. If asymmetry ratio value does not turn back normal value in 2 seconds, relay releases and relay led is switched off. When relay releases, contact 1 and 2 outputs are short circuit. If Asymmetry ratio does not exceed the asymmetry set ratio with %2 hysteresis in 3 seconds, relay pulls and relay led is switched on. When relay pulls, contact 2 and 3 outputs are short circuit.

### Example:

**Asymmetry ratio =  $\left[ \frac{L_{max} - L_{min}}{L_{max}} \right] \times 100$**

Phase Voltages : L12=430V, L23=370V ve L31=390V. Lmax=430V ve Lmin=370V

Asymmetry ratio= $\left[ \frac{430V - 370V}{430V} \right] \times 100 = \left[ \frac{60}{430} \right] \times 100 = 0,14 \times 100 = 14$ .

If phase sequence is reverse, relay releases and relay led is switched off and phase sequence(U1) led is switched on. When relay releases, contact 1 and 2 outputs are short circuit. When phase sequence is right, phase sequence(U1)led is switched off and after 5 seconds relay pulls and relay led is switched on .When relay pulls, contact 2 and 3 outputs are short circuit.

## Maintenance:

Switch off the device and release from connections. Clean the trunk of device with a swab. Don't use any conductor or chemical might damage the device. Make sure device works after cleaning.

## Warnings:

Please use the device according to the manual.

Don't use the device in wet.

Include a switch and circuit breaker in the assembly.

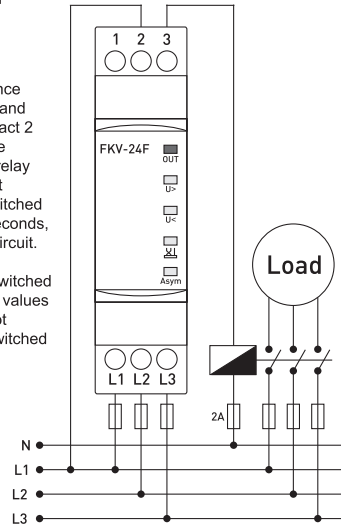
Put the switch and circuit breaker nearby the device, operator can reach easily.

Mark the switch and circuit breaker as releasing connection for device.

## Tecnical Specifications:

Operating Voltage(Un).....	3 x 380V AC and neutral
Operating Frequency.....	50/60 Hz.
Operating Power.....	<4VA
Operating Temperature.....	-20°C.....+55°C
Asymmetry Set.....	~%11
U> and U< Voltage Set.....	180V - 500V AC
Display.....	Out led and U>, U<, Asymmetry, Phase Sequence error leds.
Connection Type.....	Terminal connection
Weight.....	Max. 110gr.
Contact.....	5A/250V AC (Resistive Load)
Mounting.....	Vertical assembled in the panel or assembled on the din rail
Operating Altitude.....	<2000meter
Cable Diameter.....	2.5mm²

## Connection diagram:



## Dimensions:

