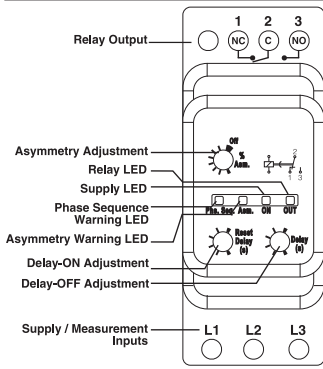


# PHASE FAILURE RELAYS

## MKC-04-U69/06-U69



Phs. Seq. (Asm.)	On	Out	Meanings of the Device LEDs
○ ○ ○	● ● ●	○ ○ ○	Voltage(s) is(are) within limits
○ ○ ○	○ ○ ○	● ● ●	Voltage(s) is(are) out of limits
● ● ●	○ ○ ○	○ ○ ○	Phase Sequence Fault Warning
○ ○ ○	● ● ●	○ ○ ○	Phase Fault Warning
○ ○ ○	○ ○ ○	● ● ●	Insufficient Supply Warning

● LED ON ○ LED OFF ● Flashing

### General

One of the common faults encountered in industrial plants is the overheating and the resulting damaging of the 3-phase motors due to the phase failure. Thermal-magnetic relay, which is an essential element in motor protection is generally too slow to assure demurrage without tripping due to both

its electromechanical structure and the use of high current setting range. MKC-06-U69 Motor Protection Relays which are designed to protect the desired equipment against phase failure for 690 V phase-phase voltages, asymmetry and phase sequence failure on 3 phase systems are manufactured to serve the following purposes.

### Utilisation and Working Principle

By using the asymmetry adjustment knob(%asm.) on the front panel, the upper asymmetry limit of the system which will be protected is determined. If the unbalance on the system(asymmetry) exceeds the adjusted value, the device waits as long as the Delay-OFF time(Delay) and if the unbalance is still over the adjusted value, the relay of the device breaks contact(OUT LED turns off and Asm. LED turns on). If the unbalance on the system(asymmetry) falls under the adjusted value, the device waits as long as the Delay-ON time(Reset Delay) and if the unbalance is still under the adjusted value, the relay of the device makes contact(OUT LED turns on and Asm. LED turns off).

### PROTECTION FEATURES :

#### 1- Voltage Unbalance

(MKC-06-U69 - Can be Adjusted or Disabled)(MKC-04-U69 - Fixed %10)

Unbalanced voltage(asymmetry) may occur when;

The mains are loaded with unbalanced distribution,

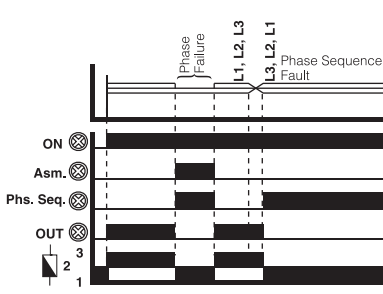
One of the 3 phases of the motor has lost. In this case, some amount of voltage which is produced by other phases will be induced on the lost phase. Amount of this voltage depends on both the motor type and amount of load.

Output relay is making contact when a phase has been lost or an unbalanced Phase-Phase voltage value, which is occurred for any reason, is smaller than the user defined asymmetrical value. If this unbalanced voltage value exceeds the adjusted asymmetrical value(5-15%); output relay will break contact and switch off the motor at the end of adjusted time delay(0.1-20 sec.); relays LED on the front panel is turned off. Asymmetry error LED is turned ON. If the fault disappears within the delay time, the output relay will not break contact and will not switch off the motor.

In applications; a proper asymmetrical value should be adjusted considering the induced voltage value in two-phase which are remained after the other one has lost.

Example: On a 3 x 380 V network, switching value in case of 10% asymmetry

$$\frac{(380-\min)}{(\min+380+\min)/3} \times 100 = \%10 \Rightarrow \frac{380-\min}{(380+2*\min)} = \frac{1}{30} \Rightarrow \min = 344,3V$$



Phase Sequence Fault Function Diagram

#### 2- Phase Sequence Protection

When the phase sequence is incorrect (L1, L2, L3 not in clockwise direction) the motor is not activated. If the sequence is changed by any reason, the output relay switches OFF immediately. Relay LED turns OFF, Phase Sequence error LED turns ON.

#### 3-Lost Phase Fault

If the value for any of the phases drop down the lost phase limit value (160 V), Phs.Seq. - Asm. LEDs turn on simultaneously and the relay breaks contact without delay.

#### 4- Insufficient Supply Voltage

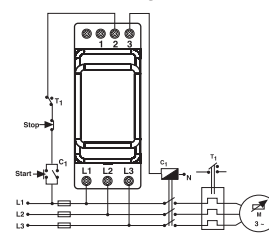
If the average of Phase-Phase voltages falls below 160V, device creates insufficient supply voltage error (Asm. and Phs. Seq. LEDs start to blink one after the other) and the relay releases without any delay.

### Precautions For Installation and Safe Use

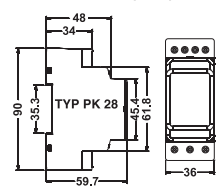
Failure to follow those instructions will result in death or serious injury.

- Disconnect all power before working on equipment.
  - When the device is connected to the network, do not remove the front panel.
  - Do not try to clean the device with solvent or the like. Only clean the device with a dried cloth.
  - Verify correct terminal connections before operation.
  - Mount device to the panel.
  - Electrical equipment should be serviced only by your compedent seller.
- Connect a start /stop button as shown in the connection diagram. A switch or circuit breaker can be used on the supply of the equipment.

### Connection Diagrams



### Dimensions (mm)



### TECHNICAL PROPERTIES

Measurement and Supply Circuit	
Supply Voltage (Un)	160-690 V AC
Supply Frequency	50/60 Hz.
Power Consumption (max.)	30 VA / 2 W (50 Hz.)
Measurement Method	True RMS
Settings	
Asymmetry (asm. %)	MKC-06-U69 (5%...15% Can be disabled), MKC-04-U69 (10%)
Hysteresis	30% of the adjusted asymmetry value
Delay-Off(Delay)	0.1 ... 20 sec.
Delay-On(Reset Delay)	0.1 ... 20 sec.
Repetition Accuracy(Voltage)	± 0.5%
Repetition Accuracy(Time)	± 0.5%
Output	
Output Type	1 Change-over(CO) Contact, 8A, 250V, 2000VA (Cosφ=1)
Electrical Life	10 <sup>5</sup>
Mechanical Life	10 <sup>7</sup>
Connection	
Cable Cross-sections for Terminals	4mm <sup>2</sup> (12AWG) stranded rigid cable 6mm <sup>2</sup> (10AWG) solid conductor cable
Screw-On Force	0.5 Nm (4.5in.lbs)
Body	
Installation	Inside the panel vertically or on to the rail
Material Type	Plastic Compliant with UL 94 VO
Protection Class	IP 20 (Terminals), IP 40 (Front Panel)
Dimensions	Type PK 28
Weight	100 gr.
Followed Standards	
Impulse voltage resistance / rated value	6kV
Recorded real power	2W
Protection class IP	IP20
Electromagnetic compatibility	IEC 60947-1 / IEC 61000-6-2 / IEC 61000-6-4
Resistance against vibration / according to IEC 60068-2-6	1 ... 6 Hz: 15 mm, 6 ... 500 Hz: 2g
Resistance against shock / according to IEC 60068-2-27	sinusoidal half-wave 15g / 11 ms
Installation altitude / at a height over sea level / maximum	2000 m
Conductor-bound parasitic coupling BURST / according to IEC 61000-4-4	4 kV
Conductor-bound parasitic coupling conductor-earth SURGE / according to IEC 61000-4-5	4 kV
Electrostatic discharge / according to IEC 61000-4-2	6 kV contact discharge / 8 kV air discharge
Field-bound parasitic coupling / according to IEC 61000-4-3	10 V/m
Insulation voltage / for overvoltage category III according to IEC 60664 / with degree of pollution 3 / rated value	690V
Degree of pollution	2
Ambiant Conditions	
Degree of pollution	• during operating °C -25 ... +60
Ambient temperature	• during storage °C -40 ... +85 • during transport °C -40 ... +85 <%90 (without condensation)
Relative Humidity	• between entrance and outlet Yes • between the outputs Yes
Galvanic isolation	• between the voltage supply and other circuits Yes

! No responsibility is assured by the manufacturer or any of its subsidiaries for any consequences arising out of the use of this material.

**Note:**The contact resistance at ohmic load (eg: Incandescent bulb, Resistance devices) is 8A.It is recommended to use a contactor if the inductive load eg: AC motor, fluorescent, etc.) or capacitive load (eg : Led Drivers, UPS, Fluorescent (Electronic Ballast), etc.) switch. Otherwise adhesion may occur in relay contacts.



