

# PHASE FAILURE DEVICES

## MK-05 / 05P / 06 / 06P, MKC-05 / 05P / 06 / 06P

### General

One of the common faults faced in industrial plants is overheating and damaging of 3 phase motors due to the phase failure. "Thermic-magnetic device" which is an essential element in motor protection is generally too slow due to both its electromechanical structure and the use of high current setting range to assure demerage without tripping. Being designed to eliminate the above disadvantages, MK-05, MKC-05, MKC-06 and MK-06 Phase Failure Devices serve the following protection features

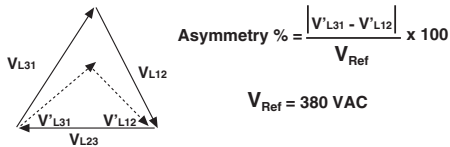
#### 1. Voltage Unbalance (Not Adjustable)

Unbalanced voltage may occur when;

- The mains are loaded with unbalanced distribution,
- One of the 3-phase of motor has lost. In this case, some amount of voltage which produced by other phases will be inducted on the lost phase. Amount of this value depends on both the motor type and amount of load.

Output relay is activated when a phase has lost or an unbalanced Phase-Phase voltage value, which is occurred with 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 release itself and switches off the motor at the end of adjusted time delay (0.1-10 sec.); Relay's LED is turned off. Asymetry error LED is turned ON. If the fault has gone within the delay time, the output relay is remained and will not switch off the motor.

In Applications; a proper asymmetrical value should be adjusted regarding to the inducted voltage value in two-phase which are remained after the other one has lost.



The voltage asymmetry causes the rise in motor temperature and a reduction of the rated motor power.

Voltage asymmetry limit values are adjusted (5%-15%) by the user. Hysteresis is fixed at 20%.

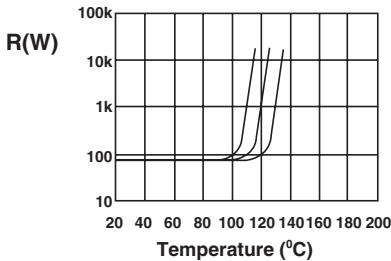
Example: Given 3x380 V supply with 10% asymmetry,  
Relay switches OFF at:  $380 - (380 \times 10\%) = 342 \text{ V}$   
Relay switches ON at:  $342 + (342 \times 10\% \times 20\%) = 348.8 \text{ V}$

#### 2. Phase Sequence

When the phase sequence is correct (L1, L2, L3 in clockwise direction) the output relay is activated; however, if the sequence is changed by any reason, the output relay switches OFF immediately. Relay LED is OFF, Phase Sequence error LED is ON.

#### 3.PTC Protection (Only Available in MK-05P, MKC-05P, MKC-06P & MK-06P versions)

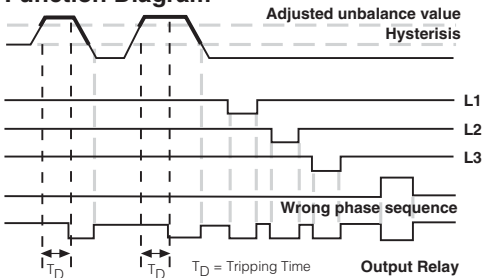
When the coil temperature in motors exceeds  $T_c$ , the limit temperature of PTC, the output relay switches off immediately, Relay LED is OFF. This feature is included only in MK-05P, MKC-05P, MK-06P and MKC-06P. See following figure for typical resistance of PTC vs temperature characteristics for three different swiching temperatures (110 °C, 120 °C, 130 °C). Normally, PT-110 is used and it can be changed upon request.



#### 5. Insufficient Supply

L1 is the supply phase of the MK-05 and MK-05P in PK21 package while L3 is the supply phase of MKC-05 and MKC-05P devices. For MK and MKC devices if supply voltage falls below 60-65% of rated voltage, output relay switches off without delay and error leds start to blink one after another sequentially.

#### Function Diagram

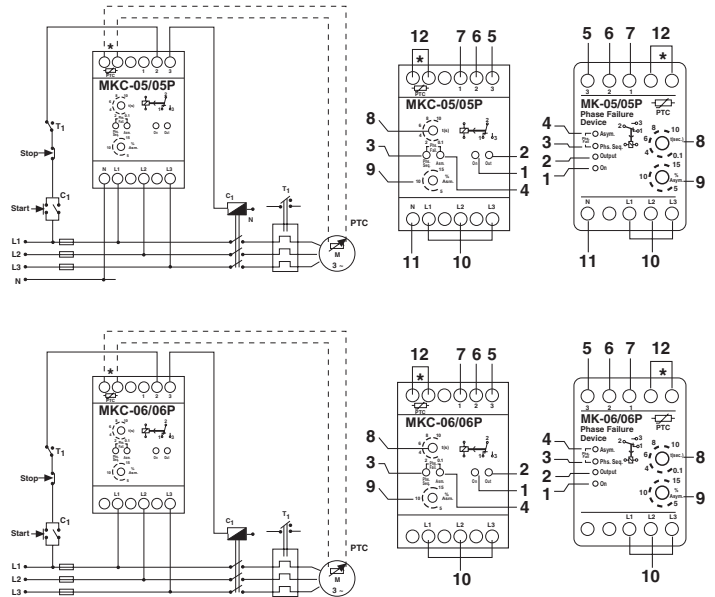


#### PRECAUTIONS FOR INSTALLATION AND SAFE USE

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 when wiring.
- Electrical equipment should be serviced only by your compedent seller.
- No responsibility is assured by the manufacturer or any of its subsidiaries for any consequences arising out of the use of this material.
- Mount device to the panel.

### Connection Diagrams



1. On LED
2. Out LED
3. Phase sequence fault LED
4. Asymmetry fault LED (While LED no. 3 and 4 are ON at the same time, it means there is phase failure)
5. Contact ( 3 ) NO connection of output relay
6. Contact ( 2 ) common connection of output relay
7. Contact (1) NC connection of output relay
8. Time adjustment (0.1 sec.-10 sec.)
9. Asymmetry adjustment (5%-15%)
10. L1, L2, L3 phase connection (Only for 05 and 05P series)
11. Neutral connection (Only for 05 and 05P series)
12. PTC connection\*

\*: Only available in MK-05P, MKC-05P If PTC is not used in MK-06P, MKC-06P by any reason, the PTC terminals should be short circuited.

### Technical Data

|                    |  |
|--------------------|--|
| Rated Voltage (Un) | : 220 VAC (For MK-05/05P, MKC-05/05P)                              |
|                    | : 3 phase + neutral: 4 wires connection                            |
|                    | : 120 VAC  |
|                    | : 3 phase + neutral: 4 wires connection (MKC-05/05P Custom design) |
|                    | : 380 VAC  |
|                    | : 3 phase :3 wires connection (For MK-06/06P, MKC-06/06P)          |
|                    | : 440 VAC  |
|                    | : 3 phase :3 wires connection (MKC-06/06P Special design)          |

#### The three phase network being protected is used as the device power supply.

|                     |  |
|---------------------|--|
| Operating Range     | : (0.9-1.1) x Un   |
| Rated Frequency     | : 50/60 Hz   |
| Output Contacts     | : 1 C/O with 8A, 2000 VA (For resistive load)                                      |
| Asymmetry Range     | : 5% - 15%; 3 x 380 VAC  |
| Tripping Time       | : 0.1 - 10 sec. (adjustable)   |
| Phase Sequence      | : Available  |
| Ambient Temperature | : -5 °C to + 50 °C   |
| Protection Class    | : IP 20  |
| Diemensions         | : Type PK 21 (For MK-05/05P, MK-06/06P)<br>Type PK 25 (For MKC-05/05P, MKC-06/06P) |
| Installation        | : Surface mounting or on the mounting rails  |
| Weight              | : 0.3 kg (For MK-05/05P, MK-06/06P)<br>0.2 kg (For MKC-05/05P/06/06P)              |

### Dimensions

