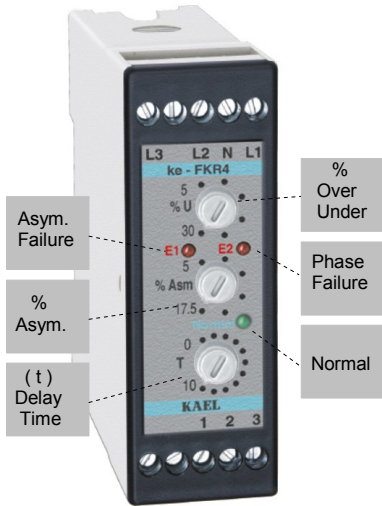


ke - FKR4

PHASE FAILURE and PHASE SEQUENCE DEVICE

- ▶ Asymmetry % Adjustment
- ▶ Phase Sequence
- ▶ Over & Under Voltage % Adjustment
- ▶ Phase Failure
- ▶ Delay Time Adjustment



General:

In three phase systems, when phase sequence is correct and there is no asymmetry between phases, **normal** LED is turned on and relay contact is energised. Protection functions of ke-FKR4 are given below.

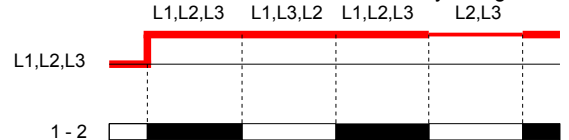
▶ Phase Failure:

In case of absence of at least one phase, relay immediately de-energises its contact and **E2** LED is turned on.



▶ Phase Sequence:

In case of wrong phase order, both of **E1** and **E2** LEDs are turned on at the same time and relay does not energise its contact. If phase order is corrected, both of **E1** and **E2** LEDs are turned off and relay energises its contact.



▶ Voltage Asymmetry (asym. %) (5-17.5 %) :

Phase to phase asymmetry is adjusted using the adjustment knob in the range of (5-17.5%). If asymmetry exceeds adjusted value, LED **E1** starts to flash and at the end of delay time (1-10s) **E1** LED is turned on continuously and relay contact is de-energised.

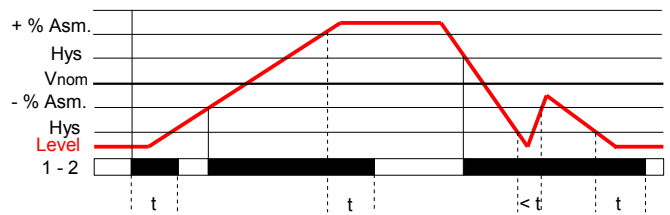
To return normal state, voltage asymmetry value must be under 20% of adjusted value (hysteresis). If phase - phase asymmetry value returns to normal region in a shorter time than adjusted delay time, relay does not de-energise its contact and LED **E1** stops flashing.

Example: Let's say that asymmetry value is set to 15% for a 3 x 380VAC. In this case, relay contact is de-energised at $(380 - (380 \times 0.15)) = 323$ V.

Re-energising the contact is performed at $323 + (380 \times 15\% \times 20\%) = 334$ V. (20% is the hysteresis).

$$\text{Asym \%} = \frac{(V_{\max} - V_{\min})}{380} \times 100$$

$$\text{Hys} = 380 \times (\text{Asym \%}) \times (20 \%)$$

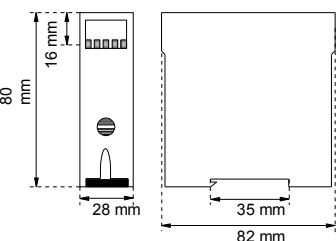


Application Areas:

- Protection of electrical motors
- Protection of 3 phase systems

TECHNICAL DATA:

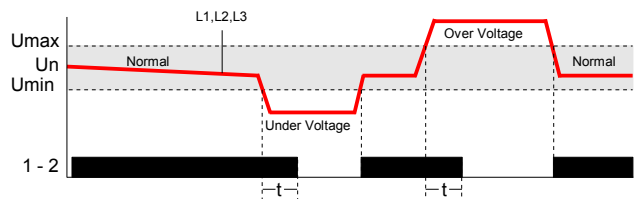
Rated Voltage	: 3 Phase and 1 Neutral 230 VAC
Operating Range	: $(0.8 - 1.2) \times U_n$ (Un nominal voltage)
Frequency	: 50/60 Hz
Asymmetry Adj.	: Phase to phase 5 - 17,5%
Over-Under Adj.	: Phase to Neutral 5 - 30%
Delay Time Adj.	: 1 - 10 sec.
Output Contacts (1-2)	: Normally Open Contact
Contact Current	: Max. 5 A / 240 VAC
Power Consumption	: < 8 VA
Device Protection Class	: IP20
Connector Protection Class	: IP00
Ambient Temperature	: -5°C...+50°C
Connection Type	: To connection rail in electrical panel
Dimensions	: 28x82x80 mm



▶ Voltage Adjustment Range: ± (0,5 - 0,30)

Under Voltage $U_{\min} = (0.70 - 0.95) \times U_n$ and Over Voltage $U_{\max} = (1.05 - 1.30) \times U_n$.

As long as the voltage values do not exceed adjusted values, **normal** LED is kept on and relay contact is energized. Hysteresis is 15%. LED **E2** indicates that the adjusted voltage range is exceeded. There is only one adjustment knob for both over and under voltage values.



Simple Connection :

