

# Transmission maintenance relay M 470

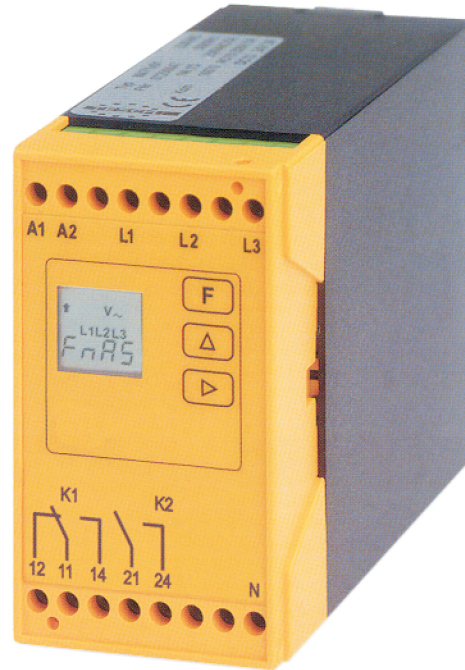
Over-voltage, Under-voltage, Phase- sequence and -imbalance

## Features

- Over- and under-voltage, phase imbalance limit points digitally programmable, independently of one another
- Phase sequence fault detection
- High repeatability through innovative microprocessor technology
- Voltage monitoring based on RMS measurement
- Adjustable relay delay up to 24.9 seconds per limit point
- Easy to read LCD display
- Password protected programming access

The model **M470** is used for protection of 3-phase AC powered equipment and systems. The limit points for over-voltage, under-voltage and phase imbalance margin can be programmed independently of each other. Therefore the device can be configured to precisely suit specific power line and load conditions.

Independently programmable time delays for relay energisation / de-energisation prevent unwanted responses to transient voltage variations. Microprocessor based operation and digital programming ensure quick and precise set-up and adjustment of limit values.



Order code : M470 -

### 1. Supply voltage

- 01 230V AC -20 / +10%
- 04 24V DC -15 / +10%

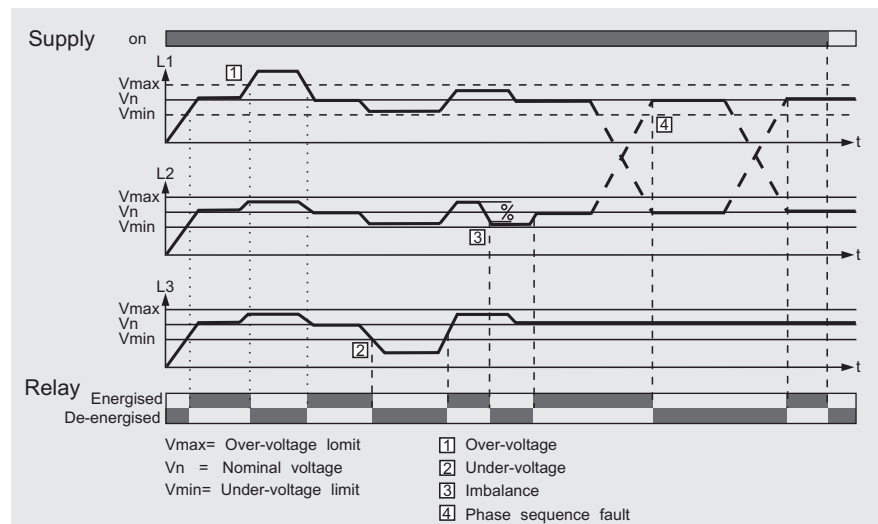
## Mode of operation

The M470 can be programmed via front side membrane keypad, while its supply voltage is switched on. To prevent unintended changes in the settings, programming is possible only through password access. The user is prompted through the programming sequence by parameter symbols on the LCD display. After entering the password, the user can adjust the high and low voltage limit points, phase imbalance margin (as a percentage of voltage measuring range), and relay energise / de-energise delay times up to 24.9 sec. The device can thus be configured exactly per the application requirements.

Effects of voltage transient can be suppressed by setting suitable relay delay times.

After completing the programming sequence, the settings are stored in the unit's non-volatile memory, unaffected by power supply interruptions.

## Function diagrams

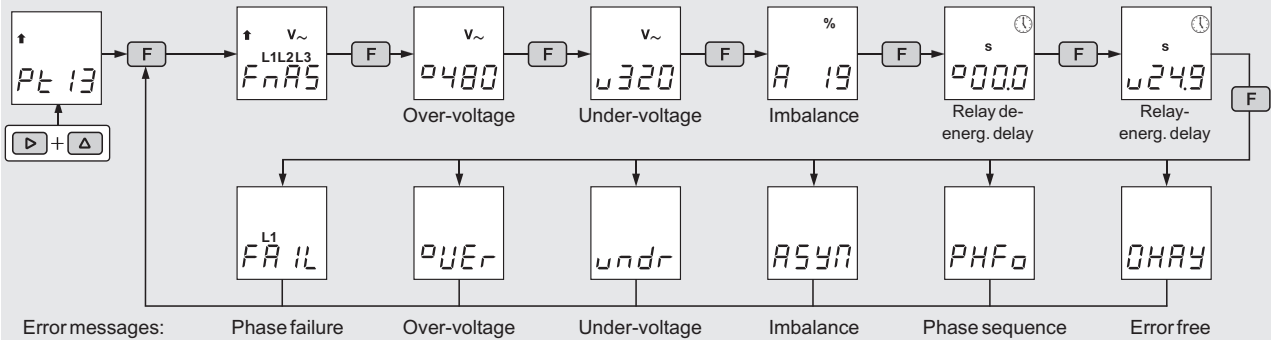


## Configuration description

The M470 is programmed by a sequence of operations of its membrane keys. To put the unit in the programming mode, the keys  $\triangleright$  +  $\triangle$  are pressed simultaneously, upon which  $Pt 00$  appears on the display. The  $\triangleright$  key is used to select one of the two numeric digits, causing it to blink. The  $\triangle$  key is used to change the value of the blinking digit. The value of a digit can be changed only when it is in the blinking mode. In this way, the password is set to "13", after which programming can proceed by sequentially selecting the parameters, using the  $F$  key. After entering the password, the first operation of the  $F$  key confirms the phase imbalance monitoring function. Subsequent operations of the  $F$  key enable setting of the over-voltage limit value, under-voltage limit value, phase imbalance margin, relay de-energise delay time and relay energise delay time. The values are entered by adjusting digit values one at a time, as for password entry.

After programming steps are finished, the message "OKAY" appears on the LCD display, if voltage and phase imbalance are within programmed limits, and phase sequence is correct. To adjust any parameter value thereafter, the password must be first entered, the  $F$  key repeatedly pressed until the desired parameter step is reached and the digit values adjusted as before. When a power fault condition occurs, both internal relays are de-energised, and the LCD display indicates the fault having the highest priority. After the fault is cleared, both relays are energised once again. In the event of a phase sequence fault, the relay de-energisation delay is ineffective (i.e., in this event, the relay is de-energised instantly). The relay energised state (contact 11-14 closed) is indicated by  $\uparrow$  symbol on the LCD display.

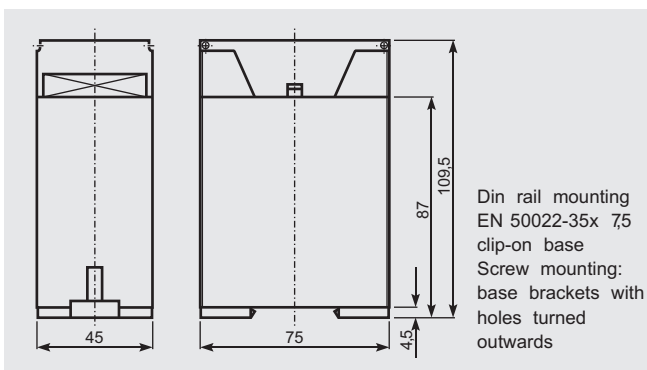
Display parameters	
$Pt 13$	Password: 13
$\square$	Over-voltage limit
$\surd$	Under-voltage limit
$\%$	Imbalance
$s \text{ } \square$	Relay de-energisation delay: max. 24.9s
$s \text{ } \surd$	Relay energisation delay : max. 24.9s
$\uparrow$	Relay energised



## Technical data

Voltage range	0.8 (0.85/24V) upto 1.1x rated voltage	Voltage measuring range	500VAC/ 2V resolution
Frequency	50 /60 Hz	Imbalance monit.range	5-19% of the voltage measuring range
Power consumption	approx. 2VA	Hysteresis	10V AC (fixed setting)
Relay mechanical life	10 <sup>7</sup> switching cycles	Protection	terminals IP 20, case IP 40 acc. to DIN VDE 0470 -1 (11/92)
Voltage threshold accuracy	± 2%	Electrical connection	Screw terminal with pressure plate
Timing accuracy	<± 0.5% under constant conditions	Line cross section	flexible 2,5 mm <sup>2</sup> , connection lead to be stripped up to 7 mm
Temperature drift	<0,01% / K	Switching capacity	AC15 250 V 4 A DC13 24 V 3 A
Ambient temperature	-5 °C to 60 °C, no condensation	Weight	approx. 260 g
Rated voltage	250 V		
Creep and airpaths	Group III acc. to VDE 0110		
	Degree of pollution 2		
Test voltage	2000 V acc. to VDE 0435		

## Dimensions



## Connection diagram

