FEATURES

• Active contact function for both phase sequences with two relays

• Detects phase sequence, phase failure, phase regeneration and phase loss in three-phase mains

• High sensitivity for the protection of installations, control gear, motors and power transformers

• Time delay - on and off - individually adjustable. PAHI and PAMI includes a true time delay independent of the power supply

• Insensitive to harmonics and spikes as the detection system includes a narrow band pass filter

• Adjustable set points with individual adjustments for unbalanced and balanced under and over voltage settings

• Function setting with DIP-switch

• 12 standard mains voltages covered by just 4 units

• LED indication of the state of input, relay and timing function

PROGRAMMABLE FEATURES

VOLTAGE SETTING

<table>
<thead>
<tr>
<th>TYPE</th>
<th>100 V</th>
<th>110 V</th>
<th>115 V</th>
<th>120 V</th>
<th>220 V</th>
<th>230 V</th>
<th>240 V</th>
<th>230 V</th>
<th>400 V</th>
<th>415 V</th>
<th>460 V</th>
<th>400 V</th>
<th>460 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
<td>380 V</td>
<td>400 V</td>
<td>400 V</td>
<td>415 V</td>
<td>460 V</td>
<td>460 V</td>
<td>460 V</td>
<td>460 V</td>
<td>460 V</td>
<td>500 V</td>
<td>500 V</td>
<td>500 V</td>
<td>500 V</td>
</tr>
</tbody>
</table>

ACTUATOR | FUNCTION | SET

| A | ASYM |
| B | ASYM & SYM LOW |
| C | ASYM & SYM HIGH |
| D | ASYM & SYM HIGH, LOW |

DESCRIPTION:
The PAHA & PAHI are 3 wire relays for sequence control and phase monitoring. The PAHI includes a true time delay. The PAMA & PAMI are 4 wire relays for sequence control and phase and neutral monitoring. The PAMI includes a true time delay.

The phase sequence and phase and neutral monitoring relays are designed for applications where the sequence of a three-phase system needs to be controlled. In addition to the sequence control the relays monitors the three-phase system for phase unbalance, and according to the selected setting, they can further monitor balanced under or over voltage, as well as both under and over voltage. The relays work in “fail-safe” mode and the 35mm modules need no external power supply. If an external stable power supply is available, the 45mm modules offer separate terminals for the internal power.

Unbalance, due to phase angle and phase voltage deviation, is very accurately measured by measuring the inverse phase system relatively to the main system. The method is independent of the actual balanced voltage and perfect for the protection of three-phase motors, generators and transformers. The measuring system is insensitive to higher harmonics and secures the relays from false triggering due to “noisy” power lines. As the measuring system includes the phase angles in the measurement, it provides full protection against regenerated phases. Balanced voltage is measured by adding the three individual rectified phase voltages.

OPERATION:
Under normal phase conditions the green input LED is on and on one of the sequence sensitive relays will be energized, indicated by a yellow LED. The yellow LED, next to the description, shows the sequence of the three-phase system. If there is a phase deviation beyond one of the set levels, the failure will be detected, and the red input LED will go on. During the set delay period the yellow timing LED for off delay will be on. At the end of the timing period the relay will drop out and only the red input LED will stay on. If the common phase voltage drops below -40%, the relay will drop out, even if the under voltage detection is disabled. If the phase or the separate supply voltage is lost, the relay and all LED’s will de-energize with out delay for PAHA and PAMA. The PAHI and PAMI will be able to hold the relays for more than 6 sec.

APPLICATION:
To prevent motors from rotating in the wrong direction and being switched on to a faulty supply. Motor protection by controlling the direction of rotation and on-off switching depending on supply conditions. E.g. pumps, compressors, ventilators and refrigerators. Automatic control of phase sequence and monitoring of phase and neutral voltages in mobile equipment like refrigerated containers, control and distribution panels and machines used on building sites and on service jobs.
ORDERING INFORMATION

EXAMPLE: 35mm Housing
Internal supply connection

TYPE
3 Phase sequence & voltage relay PAHA
3 Phase + N sequence & voltage relay PAMA
3 Phase + True time delay PAHI
3 Phase + True time delay PAMI

INPUT
Standard voltages
Transformer internal connected to L1-L3
100, 110 and 115 VAC B110
220, 230 and 240 VAC B230
380, 400 and 415 VAC B400
440, 460 and 480 VAC B460

ADJUSTMENT
Trimpot and dipswitch adj.

HOUSING
Rail mounting Socket 11-pin

SIZE
35 mm.

CODE END
3 C

EXAMPLE: 45mm w/socket
External supply connections

TYPE
3-Phase sequence & voltage relay PAHA
3-Phase + N sequence & voltage relay PAMA
3-Phase + True time delay PAHI
3-Phase + True time delay PAMI

INPUT
Transformer internal connected to L1-L3

standart voltages
100, 110 and 115 VAC 110
220, 230 and 240 VAC 230
380, 400 and 415 VAC 400
440, 460 and 480 VAC 460

ADJUSTMENT
Trimpot and dipswitch adj.

HOUSING
Rail mounting Socket 11-pin

SIZE
45 mm.

CODE END
44 A4 C

SUPPLY
AC/DC with switch mode supply

SUPPLY VOLTAGE
18-360VDC and 20-240VAC 18 E400
From 19.2 to 28.8 VAC 28 B28
From 38.4 to 57.6 VAC B48
From 80 to 138 VAC 138 B110
From 176 to 288 VAC 288 B230
From 304 to 496 VAC 496 B400
From 352 to 576 VAC 576 B460

ADJUSTMENT
Trimpot and dipswitch adj.

HOUSING
Rail mounting 45mm wide Socket 11-pin 35mm wide

CODE END
4 A 3 E

SOCKET MOUNTING*

*CE up to 230V phase to phase voltage

We reserve the right to make changes for product improvement.

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