Description:
The phase failure relays are designed for applications where a three-phase system needs to be monitored for unbalance or deviation in balanced voltage. The relays includes a standard timing function. In addition the PADI and PANI offers a true time delay on drop out even at total power failure. The relay works in “fail safe” mode and need no external power supply. If an external stable power supply is available the 45mm housing offers separate terminals for internal power.

A - function monitors the three-phase system for unbalance due to phase angle and phase voltage deviations e.g. a blown fuse or a bad connection.
B - function monitors the three-phase system for both unbalance (as the A - function) and balanced under voltage.
C - function monitors the three-phase system for both unbalance (as the A - function) and balanced over voltage.
D - function Monitors the three-phase system for all possible deviations by monitoring unbalance and balanced under-and over voltage.

Unbalance due to phase angle and phase voltage deviations 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 very insensitive to electrical noise.

Balanced voltage is measured by rectifying and adding the three-phase voltages.

Operation:
Under normal phase conditions the relay is energized and the green LEDs are switched on. If a phase failure is detected, or the supply voltage for the electronic system is lost, the relay drops out and the LED, related to the type of failure, is switched off.

Application:
To switch off motors automatically before damage due to faulty supply, and to switch them on again as soon as the supply is re-established. E.g. pumps, oilburners, ventilators and refrigerators. To monitor the three-phase main system and control the use of local emergency generators. To prevent motors from being switched on to a faulty supply e.g. cranes and elevators.

FEATURES
- Detect phase-loss and phase-regeneration in three phase systems
- High sensitivity for the protection of motors and power transformers
- Insensitive to harmonics and spikes as the detection system includes a narrow band pass filter
- Adjustable version with individual adjustments for unbalanced and balanced under- and overvoltage settings
- Function setting with dipswitch
- Time delay - on and off - individually adjustable
- One unit for three mains voltages
- LED indicates the state of input, relay and timing function

PROGRAMMABLE FEATURES

TABLE: Nominal Voltage Settings (Phase to phase)

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal Voltage</th>
<th>ACTUATOR</th>
<th>FUNCTION</th>
<th>SET</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V</td>
<td>200V to 400V</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>110V</td>
<td>230V to 460V</td>
<td></td>
<td>ASYM &amp; SYM LOW</td>
<td>B</td>
</tr>
<tr>
<td>115V</td>
<td>240V to 490V</td>
<td></td>
<td>ASYM &amp; SYM HIGH</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>460V to 480V</td>
<td></td>
<td>ASYM &amp; SYM HIGH, LOW</td>
<td>D</td>
</tr>
</tbody>
</table>

INPUT & SUPPLY

Socket mounting*

*CE up to 230V phase to phase voltage
**PANA with externally supply only 1C/O

CONNECTION DIAGRAM

Rail mounting 35mm

Rail mounting 45mm

Socket mounting*

*CE up to 230V phase to phase voltage
**PANA with externally supply only 1C/O
**INPUT**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>B110</td>
<td>100, 110 and 115 V</td>
</tr>
<tr>
<td>B230</td>
<td>220, 230 and 240 V</td>
</tr>
<tr>
<td>B400</td>
<td>380, 400 and 415 V</td>
</tr>
</tbody>
</table>

- **Selectable by dipswitch**
  - Type B110: 100, 110 and 115 V
  - Type B230: 220, 230 and 240 V
  - Type B400: 380, 400 and 415 V

- **Input resistance**
  - 300 kΩ: 100 < U<sub>N</sub> < 200 V
  - 500 kΩ: 200 < U<sub>N</sub> < 500 V

- **Frequency range**: 45 to 66 Hz

- **Balanced under voltage**
  - Approx. -40 % to +20 %

- **Balanced over voltage**
  - C & D Function

- **Differential**
  - Unbalance: 2 % of U<sub>N</sub>
  - Balanced: 2 % of U<sub>N</sub>

**PERFORMANCE PARAMETERS**

**TIMING**

- **Response time**: Approx. 500 msec. with small variation
  - Approx. 100 msec. with drop out

- **Time range during run**
  - Separate On and Off delay
  - 0 - 10 sec. adjustable

- **True time delay**
  - PADI & PANI > 6 sec. at total supply loss

**ELECTRICAL**

- **Unbalance sensitivity**
  - Typ. ± 0.02 % / °C

- **Temp. dependence**
  - Typ. ± 0.01 % / % ∆U

- **Supply dependence**
  - Typ. ± 0.01 % / % ∆U

**OUTPUT**

- **Contact rating**: 6 A, 250 VAC, 1500 W

- **Mechanical life**: 30 Million operations

**SUPPLY**

- **AC and DC**: 18-360 VDC and 20-240 VAC
- **Isolated switch mode supply**
- **AC supply range**
  - 110 V (From 80 to 138 V)
  - 230 V (From 176 to 288 V)
  - 460 V (From 352 to 576 V)
- **Standard voltage**
  - 400 V (From 304 to 498 V)
  - 460 V (From 352 to 576 V)
- **AC/DC voltage from A1 & A2**
  - 24 to 480V can be specified
- **AC frequency range**: 45 to 440 Hz

**GENERAL**

- **Temperature range**: -25 °C to +55 °C ambient

- **Humidity**: Up to 90 % RH non-condensing

- **Dielectric test voltage**
  - Coil to relay contacts: 4000 VAC
  - Pole to pole (45 mm.): 2500 VAC

- **Weight**: 0.22 kg

**SPECIFICATIONS**

**ORDERING INFORMATION**

**EXAMPLE: 35mm Housing**

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PADA</td>
<td>400 2 A A 3 C</td>
</tr>
</tbody>
</table>

**TYPE**

- **3 Phase voltage control relay**
- **PANA + True time delay**

**INPUT**

- **with transformer intern connected to L1-L3**
  - 100, 110 and 115 V
  - 220, 230 and 240 V
  - 380, 400 and 415 V
  - 440, 460 and 480 V

**ADJUSTMENT**

- **Trimpot and dipswitch adj.**

**HOUSING**

- **Rail mounting socket 11 pin**

**SIZE**

- **35 mm.

**EXTERNAL SUPPLY CONNECTIONS**

**EXAMPLE: 45mm Housing**

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PADA</td>
<td>B400 A A 3 C</td>
</tr>
</tbody>
</table>

**TYPE**

- **3 Phase voltage control relay**
- **PANA + True time delay**

**NOMINAL INPUT**

- **standard input**
  - 100, 110 and 115 V
  - 220, 230 and 240 V
  - 380, 400 and 415 V
  - 440, 460 and 480 V
  - (other voltages on request)

- **From 80 to 138 V**
- **From 176 to 288 V**
- **From 304 to 498 V**
  - (other voltages on request)
- **From 176 to 288 V**
- **From 304 to 498 V**

**SUPPLY VOLTAGE**

- **5-360 VDC and 20-240 VAC**
- **E400**
  - From 19.2 to 28.8 VAC
  - From 38.4 to 57.6 VAC
  - From 80 to 138 VAC
  - From 176 to 288 VAC
  - From 304 to 498 VAC
  - (other voltages on request)

**ADJUSTMENT**

- **Trimpot and dipswitch adj.**

**HOUSING**

- **Rail mounting 45 mm.**
- **Socket 11 pin 35mm.**

**INTERNATIONAL STANDARDS**

- **EMC directive 89/336: EN50081 - Emission**
- **EN50082 - Immunity**
- **Low voltage directive 73/23: EN60255 - Electrical Relays**