Control relays
C-Lynx
Instinctive control

- Close supervision
- Simplicity of use
- Productivity gains
3 good reasons for installing a control relay in your equipment!

1. Close-up protection for total availability of equipment!

By installing a control relay, the user can be informed of abnormal operating conditions, and is therefore able to take the necessary action to correct the fault by stopping the machine briefly before expensive breakdowns occur.

A major challenge for industry is to improve the availability of production tools, for which the close supervision and protection offered by **C-Lynx** is the perfect solution. It therefore makes sense for every device to be monitored by a **C-Lynx** control relay. Each device or machine would therefore be able to complete its allotted task at the appropriate time.
2 All anomalies are detected!

Control relays monitor and detect abnormal operating conditions of an electrical or physical value (voltage, current, phase, level) in any device, even the most specialised (hoist, machine, motor, conveyor, etc). If an anomaly is detected, the control relays emit a visible signal and trigger a change in the output contacts.

3 Optimise continuity of service

In industrial and commercial installations, every device should be monitored by a C-Lynx control relay so as to optimise continuity of service. The control relay enables the operator to initiate maintenance operations or corrective actions to avoid production shutdowns.

Result:
Improved operation and productivity for your installation!

By using control relays, you optimise your production management and reduce incidents which could adversely affect your productivity.
C-Lynx, control relays dedicated

Supervision of motors, lifts, hoists, conveyor belts, packaging and air extraction, pumping... from standard products to bespoke products, C-Lynx control relays adapt to a multitude of applications, to meet all your requirements.

1 Supervision of Motors

On 3-phase supplies, C-Lynx control relays check phase sequence and phase failure preventing a change in direction of rotation, and single-phase operating modes. They therefore avoid overheating faults linked to phase imbalance.

2 Temperature control in lifts

C-Lynx temperature control relays monitor the ambient temperature of service rooms or lift pulley rooms, to check that it remains with the statutory limits (between 5°C and 40°C) in compliance with standard EN 81.

3 HVAC

Heating, cooling, air conditioning or extraction... C-Lynx control relays stop the motor to protect the unit in the event of current, phase and/or supply voltage faults.
to your applications

4. **Pump and level control**

Agricultural applications, watering, irrigation, drying, pressure surge, lift pumps and fire pumps, distribution and treatment of water, etc. **C-Lynx** control relays are used to manage and protect equipment by current measurement and phase monitoring. **C-Lynx** control relays can also be used to control emptying and filling levels.

5. **Load monitoring**

Conveying, packaging, assembly or bottling lines, grinders, crushers, etc. **C-Lynx** control relays monitor overloads on driving motors and detect any jamming.

6. **Speed monitoring**

Whatever the application, **C-Lynx** control relays react and alert the operator if the machine operating rate is abnormally high or low.

C-Lynx control relays can adapt to both standard and specialist applications.
C-Lynx, all functions ready

1. The strong points of C-Lynx

- The combination of several functions in the same housing optimises your wiring time and simplifies installation.

- The new 17.5 mm modular format considerably reduces the dimensions of your equipment.

- The Easy to use function: the visual LED interface informs you of operating faults in your installation and any errors made when setting the parameters.

- The new-generation built-in multi-voltage power supplies optimise the number of parts and simplify product selection.

- Eco-design: C-Lynx control relays have been developed in accordance with the principles of eco-design (choice of materials, manufacturing process, energy consumption and component recycling). The recycling rate for these control relays is higher than that imposed by the WEEE (Waste Electrical and Electronic Equipment) European directive.

- C-Lynx control relays comply with all the required electrical standards and are easily integrated in your electrical equipment.
Ease of reading

Simplified connections

Adaptability: C-Lynx’s trump card

The Crouzet design office can create control relays tailored to suit your needs, based on your specification.

Crouzet offers you the following adaptations:
- Adaptation of the level of regeneration for phase failure checks,
- Conversion of adjustable products into products with a fixed threshold,
- Adaptation of input voltage ranges and measurement ranges,
- Modification of timing ranges and addition of fixed values, etc,
- Possibility of customising colours and labelling, etc.

Crouzet can satisfy all your automation requirements, from custom components to the most dedicated product. Throughout the world Crouzet provides technical and industrial expertise to ensure that its products are perfectly customised and adapted for integration in any of your equipment. This is why Crouzet guarantees customisation or adaptation of the whole range of C-Lynx control relays.
C-Lynx by Crouzet: a complete collection of

1. New features of the C-Lynx range

- Positive logic output also indicating loss of power supply,
- True RMS measurement: even if the sine waves are distorted, the measurement is correct,
- Reduction in the number of housing sizes: with a 17.5 mm and 35 mm modular compact format, C-Lynx control relays can be integrated more easily in industrial and commercial cabinets,
- Built-in universal power supplies: a version with power supply for single-phase products and a self-powered version for 3-phase products,
- Adjustable time delay on crossing thresholds, thus avoiding transient faults,
- Settings can be protected by fitting a sealable cover,
- Very clear display of control status via LEDs.
control relays

2 A complete range of standard control relays

To satisfy all your automation requirements, Crouzet offers you an extensive range of standard control relays.

- **Phase control relays** (MWS, MWS2, MWG, MWU, MWA, MWUA, HWUA, H3US, H3USN, M3US):
  - presence and regeneration, phase sequence, phase, balance and level of asymmetry (or balance),
  - adjustment of voltage thresholds.
- **Voltage control relays** (MUS, MUSF, HUL, HUH):
  - overvoltage, undervoltage control,
  - self-powered versions.
- **Current control relays** (MIC, HIL, HIH):
  - overcurrent and undercurrent control,
  - version with built-in current transformer.
- **Frequency control relays** (HHZ):
  - Overfrequency and underfrequency control of the 50 or 60 Hz AC signal.
- **Pump control relays** (HPC):
  - control of single-phase or 3-phase pumps,
  - dry run and overload protection,
  - 3-phase control.
- **Level control relays** (HNM, MNS, HNE):
  - automation of filling and emptying cycles,
  - high or low level information,
  - check for presence of a conductive or non-conductive liquid by temperature probe or discrete sensor.
- **Speed control relays** (HSV):
  - monitoring of pulse rates,
  - overspeed and underspeed control, rotation or movement control.
- **Lift temperature control relays** (HT81, HT81-2, HWT81):
  - temperature monitoring in machine rooms and lift pulley rooms in accordance with standard EN 81,
  - version with built-in phase control,
  - phase failure with regeneration up to 70%.
- **Phase and temperature control relays** (HWTM, HWTM2):
  - 3-phase network control,
  - motor temperature control with PTC probe test and memory function on temperature control.
### Phase control

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part number</th>
<th>Description</th>
<th>Operating conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWS</td>
<td>84873020</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MWS2</td>
<td>84873021</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MWG</td>
<td>84873022</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MWU</td>
<td>84873023</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MWA</td>
<td>84873024</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MWUA</td>
<td>84873025</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>HWUA</td>
<td>84873026</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>H3US</td>
<td>84873220</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>H3USN</td>
<td>84873221</td>
<td>Loss of phase and neutral</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>M3US</td>
<td>84873222</td>
<td>Phase failure and phase sequence</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
</tbody>
</table>

### Voltage control

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part number</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MUS12DC</td>
<td>84872140</td>
<td>Undervoltage or overvoltage</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MUS80ACDC</td>
<td>84872141</td>
<td>Undervoltage or overvoltage</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MUS260ACDC</td>
<td>84872142</td>
<td>Undervoltage or overvoltage</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MUSF80ACDC</td>
<td>84872151</td>
<td>Overvoltage (undervoltage window)</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>MUSF260ACDC</td>
<td>84872152</td>
<td>Overvoltage (undervoltage window)</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>HUL</td>
<td>84872120</td>
<td>Undervoltage or overvoltage</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>HUH</td>
<td>84872130</td>
<td>Undervoltage or overvoltage</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
</tbody>
</table>

### Current control

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part number</th>
<th>Description</th>
<th>Operating conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIC</td>
<td>84871122</td>
<td>Overcurrent (or underrcurrent)</td>
<td>With built-in current transformer</td>
</tr>
<tr>
<td>HIL</td>
<td>84871120</td>
<td>Undercurrent or overcurrent</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>HIH</td>
<td>84871130</td>
<td>Undercurrent or overcurrent</td>
<td>208-480 V AC 50/60 Hz Self-powered</td>
</tr>
<tr>
<td>Control values</td>
<td>Supply voltage</td>
<td>Time delay</td>
<td>Output relay</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>-</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-440 V AC 50/60 Hz</td>
<td>Self-powered 208-440 V AC</td>
<td>-</td>
<td>2 single changeover relay (2 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>-</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>5% to 15%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
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<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
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<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>Self-powered 208-480 V AC</td>
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</tr>
<tr>
<td>-20% to +20%</td>
<td>Self-powered 208-480 V AC</td>
<td>0.1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
</tbody>
</table>

**Control values**
- Over voltage Phase/phase Un: 220/380/400/415/440/480 V AC

**Supply voltage**
- 208-480 V AC
- 208-440 V AC
- 208-480 V AC 50/60 Hz
- 208-480 V AC 50/60 Hz
- 208-480 V AC 50/60 Hz

**Time delay**
- 0.1 s to 10 s
- 0.3 s to 30 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s
- 0.1 s to 10 s

**Output relay**
- 1 single changeover relay (1 SPDT) 5 A
- 2 single changeover relay (2 SPDT) 5 A
- 1 double changeover relay (2 DPDT) 2 x 5 A
### Selection guide

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part number</th>
<th>Description</th>
<th>Operating conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HHZ</td>
<td>84872501</td>
<td>Underfrequency and overfrequency (window)</td>
<td>50 Hz or 60 Hz</td>
</tr>
<tr>
<td><strong>Level control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HNM</td>
<td>84870700</td>
<td>Filling or emptying with conductive liquids</td>
<td>1 or 2 levels</td>
</tr>
<tr>
<td>MNS</td>
<td>84870720</td>
<td>Filling</td>
<td>–</td>
</tr>
<tr>
<td>HNE</td>
<td>84870710</td>
<td>Filling or emptying</td>
<td>1 or 2 levels</td>
</tr>
<tr>
<td><strong>Speed control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSV</td>
<td>84874320</td>
<td>Underspeed or overspeed</td>
<td>–</td>
</tr>
<tr>
<td><strong>Temperature control in lifts according to EN 81</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTB1</td>
<td>84874110</td>
<td>Undertemperature and overtemperature (window)</td>
<td>–</td>
</tr>
<tr>
<td>HTB1-2</td>
<td>84874120</td>
<td>Undertemperature and overtemperature (window)</td>
<td>–</td>
</tr>
<tr>
<td>HWT81</td>
<td>84874130</td>
<td>Undertemperature and overtemperature (window)</td>
<td>Phase failure and phase sequence: Regeneration 70% of Un</td>
</tr>
<tr>
<td><strong>Pump and level control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPC</td>
<td>84874200</td>
<td>Network monitoring</td>
<td>1 phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 phase: Phase failure and phase sequence</td>
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<td></td>
<td></td>
<td>Undercurrent and overcurrent (window)</td>
</tr>
<tr>
<td><strong>Temperature and phase control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HWTM</td>
<td>84873027</td>
<td>Phase failure and phase sequence</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermal protection</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test</td>
<td>Reset on front panel via pushbutton and remotely</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Memory</td>
<td>Reset on front panel via pushbutton and remotely</td>
</tr>
<tr>
<td>HWTM2</td>
<td>84873028</td>
<td>Phase failure and phase sequence</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermal protection</td>
<td>–</td>
</tr>
<tr>
<td><strong>Control values</strong></td>
<td><strong>Supply voltage</strong></td>
<td><strong>Time delay</strong></td>
<td><strong>Output relay</strong></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>40 Hz to 60 Hz, 50 Hz to 70 Hz</td>
<td>120-277 V AC/DC 50/60 Hz</td>
<td>0.1 s to 10 s</td>
<td>2 single changeover relay (2 SPDT) 5 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Control values</strong></th>
<th><strong>Supply voltage</strong></th>
<th><strong>Time delay</strong></th>
<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>250 g to 5 kg, 5 kg to 100 kg, 50 kg to 1 kg</td>
<td>24-240 V AC/DC 50/60 Hz</td>
<td>0.1 s to 5 s</td>
<td>1 double changeover relay (1 DPDT) 2 x 5 A</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th><strong>Control values</strong></th>
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<th><strong>Time delay</strong></th>
<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact input for discrete sensor</td>
<td>24-240 V AC/DC 50/60 Hz</td>
<td>0.1 s to 5 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
</tbody>
</table>

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<tr>
<th><strong>Control values</strong></th>
<th><strong>Supply voltage</strong></th>
<th><strong>Time delay</strong></th>
<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature and phase control</td>
<td>24-240 V AC/DC 50/60 Hz</td>
<td>0.6 s to 60 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
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<tr>
<th><strong>Control values</strong></th>
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<th><strong>Time delay</strong></th>
<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>3-wire Pt 100 input, Low threshold: -1°C to +11°C, High threshold +34°C to +46°C</td>
<td>24-240 V AC/DC 50/60 Hz</td>
<td>1 s to 10 s</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
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</tbody>
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<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>1 A to 10 A AC</td>
<td>Self-powered (1 or 3 phases)</td>
<td>1 single changeover relay (1 SPDT) 5 A</td>
</tr>
</tbody>
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<th><strong>Output relay</strong></th>
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</thead>
<tbody>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>2 single contact relays (NO) (2 SPST) 5 A</td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th><strong>Control values</strong></th>
<th><strong>Supply voltage</strong></th>
<th><strong>Output relay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermistor with automatic reset</td>
<td>24-240 V AC/DC</td>
<td>-</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td>208-480 V AC 50/60 Hz</td>
<td>2 single contact relays (NO) (2 SPST) 5 A</td>
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<td>24-240 V AC/DC</td>
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<td>208-480 V AC 50/60 Hz, Thermistor with automatic reset</td>
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## Contents

### Phase control
- Single function phase control relay 17.5 mm
  - MWS, MWS2
- Multi-function phase control relay 17.5 mm
  - MWG, MWU, MWA, MWUA
- Multi-function phase control relay 35 mm
  - HWUA
- 3-phase voltage control relay 17.5 mm / 35 mm
  - M3US, H3US, H3USN

### Voltage control
- Voltage control relay 17.5 mm
  - MUS, MUSF
- Multi-function voltage control relay 35 mm
  - HUL, HUH

### Current control
- Single function current control relay with current transformer 17.5 mm
  - MIC
- Multi-function current control relay 35 mm
  - HIL, HIH

### Frequency control
- Frequency control relay 35 mm
  - HHZ

### Level control
- Level control relay 17.5 mm
  - MNS
- Level control relay 35 mm
  - HNM, HNE
- Electrode and probe holders

### Speed control
- Speed control relay 35 mm
  - HSV

### Lift temperature control in accordance with EN 81
- Temperature control relay for lift service rooms 35 mm
  - HT81, HT81-2, HWT81

### Pump control
- 3-phase and single phase pump control relay 35 mm
  - HPC

### Phase and temperature control
- Motor phase and temperature control relay 35 mm
  - HWTM, HWTM2

---

Courtesy of Steven Engineering, Inc. - 230 Ryan Way, South San Francisco, CA 94080-6370 - Main Office: (650) 588-9200 - Outside Local Area: (800) 258-9200 - www.stevenengineering.com
Phase control

→ Single function phase control relay - 17.5 mm

- Control of 3-phase networks: phase sequence, total phase failure
- Multi-voltage from 3 x 208 to 3 x 480 V
- Controls its own supply voltage
- True RMS measurement
- LED status indication

<table>
<thead>
<tr>
<th>Part numbers</th>
<th>MWS</th>
<th>MWS2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Phase sequence and failure</td>
<td>Phase sequence and failure</td>
</tr>
<tr>
<td>Nominal voltage (V)</td>
<td>3 x 208 -&gt; 3 x 480 V</td>
<td>3 x 208 -&gt; 3 x 440 V</td>
</tr>
<tr>
<td>Output</td>
<td>1 single pole changeover relay</td>
<td>2 single pole changeover relay</td>
</tr>
<tr>
<td>Part numbers</td>
<td>84873020</td>
<td>84873021</td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 17.5 mm casing</td>
<td>84800000</td>
</tr>
</tbody>
</table>

General characteristics

<table>
<thead>
<tr>
<th>Sample</th>
<th>MWS</th>
<th>MWS2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Un</td>
<td>3 x 208 -&gt; 3 x 480 V</td>
<td>3 x 208 -&gt; 3 x 440 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>183 -&gt; 528 V</td>
<td>183 -&gt; 484 V</td>
</tr>
<tr>
<td>Voltage on measuring unit</td>
<td>183 -&gt; 528 V</td>
<td>183 -&gt; 484 V</td>
</tr>
<tr>
<td>Measurement ranges</td>
<td>183 -&gt; 528 V</td>
<td>183 -&gt; 484 V</td>
</tr>
<tr>
<td>Weight</td>
<td>80 g</td>
<td>80 g</td>
</tr>
<tr>
<td>Comments</td>
<td>* 3-phase mains with earth</td>
<td>* 3-phase mains with earth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product adaptations</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customisable colours and labels</td>
<td>84800000</td>
</tr>
</tbody>
</table>
Supply voltage tolerance: -12% / +10%
Supply voltage frequency: 50 / 60 Hz ± 10%
Galvanic isolation of power supply/measurement: No
Power consumption at Un: 1.8 VA
Frequency of measured signal: 50 ± 10 Hz

Immunity from micro power cuts: 60 ms
Inputs and measuring circuit:
Guaranteed phase failure detection threshold < 100 V
Frequency of measured signal: 50 ➞ 60 Hz ± 10%

Timing:
Delay on pick-up: 500 ms
Alarm on delay time max.: 100 ms

Output:
Type of contacts: No cadmium
Maximum breaking voltage: 250 V ~ / ~
Max. breaking current: 5 A ~
Min. breaking current: 10 mA / 5 V ~
Electrical life (number of operations): 1 x 10^5 MWS / 1 x 10^4 MWS2
Breaking capacity (resistive): 1250 VA ~
Mechanical life (operations): 30 x 10^6

Isolation:
Nominal insulation voltage: IEC 60664-1 400 V
Overvoltage category: III
degree of pollution: 3
Rated impulse withstand voltage: IEC 60664-1/60255-5 4 kV (1.2 / 50 µs)
Dielectric strength: IEC 60664-1/60255-5 2 kV AC 50 Hz 1 min.
Insulation resistance: IEC 60664-1 / 60255-5 > 500 MΩ / 500 V

General characteristics:
Output relay status indication: Yellow LED
Casing: 17.5 mm
Mounting position: All positions
Material: enclosure plastic type VO to UL94 standard
Incorporated type test according to IEC: 60895-2-11 & NF - EN 60895-2-11
Protection (IEC 60529): Terminal block: IP20
Casing: IP30
Connecting capacity: IEC 60947-1 Rigid: 1 x 4² - 2 x 2.5² mm²
Flexible with ferrules: 1 x 2.5² - 2 x 1.5² mm²
Max. tightening torques: IEC 60947-1 0.6 ➞ 1 Nm / 5.3 ➞ 8.8 Lbf.In
Operating temperature: IEC 60068-2 -20 ➞ +50°C
Storage temperature: IEC 60068-2 -40 ➞ +70°C
Humidity: IEC 60068-2-30 2 x 24 hr cycle 95% RH max. without condensation 55°C
Vibration according to IEC 214:2000:8-3 15 ➞ 150 Hz A = 0.055 mm
Shock IEC 60958-2-6 5 g

Certifications:
CE (LVD) 73/23/EEC - EMC 89/336/EEC
Product standard: NF EN 60255-4 / IEC 60255-4 / UL 508 / CSA C22.2 N°14
Electromagnetic compatibility:
EN 61000-6-2
IEC 61000-6-3
IEC 61000-6-4
Emission EN 61000-6-1
Immunity EN 61000-6-2
IEC 61000-6-3
IEC 61000-6-4
IEC 61000-6-3
Emission EN 55022 class B
Conformity with environmental directives: RoHS, WEEE
Overview

3-phase network control relays monitor the sequence of phases L1, L2, L3 and failure of one or more phases. LEDs are used for signalling.

MWS-MWS2 - Phase failure and sequence

Operating principle
MWS-MWS2: Phase controller
The relay monitors its own supply voltage. The relay controls:
- correct sequencing of the three phases,
- total failure of one of the three phases.
When the phase sequence and voltages are correct (> 183 V), the output relay(s) are closed and the yellow LED is lit.
In the event of a phase sequence or total phase failure fault (detected when one of the voltages drops below 100 V), the relay opens instantly and its LED is extinguished.
When the unit is powered up with a measured fault, the relay stays open.

Dimensions (mm)

Connections

100 mA fast-blow fuse
Phase control

Multi-function phase control relay - 17.5 mm

- Control of 3-phase networks: phase sequence, phase failure, imbalance (asymmetry), over and undervoltage
- Range includes mono-function product and multi-function product
- Multi-voltage from 3 x 208 to 3 x 480 V ~
- Controls its own supply voltage
- True RMS measurement
- LED status indication

### Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Functions</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWG</td>
<td>Phase sequence and failure</td>
<td>3 x 208 – 3 x 480 V ~</td>
<td>84873022</td>
</tr>
<tr>
<td>MWU</td>
<td>Phase sequence, failure, undervoltage</td>
<td>3 x 208 – 3 x 480 V ~</td>
<td>84873023</td>
</tr>
<tr>
<td>MWA</td>
<td>Phase sequence, failure and imbalance</td>
<td>3 x 208 – 3 x 480 V ~</td>
<td>84873024</td>
</tr>
<tr>
<td>MWUA</td>
<td>Phase sequence, failure, imbalance, under and overvoltage in window mode</td>
<td>3 x 208 – 3 x 480 V ~</td>
<td>84873025</td>
</tr>
</tbody>
</table>

### Product adaptations

- Customisable colours and labels
- Single voltage in the generic range
- Adjustable fixed hysteresis
- Fixed or adjustable time delay except for MWG
  - Dedicated adaptation on MWG:
  - Adjustable regeneration rate
  - Dedicated adaptation on MWU:
    - Fixed undervoltage threshold in the generic range
    - Dedicated adaptations to MWUA:
      - Fixed undervoltage threshold in the generic range

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 17.5 mm casing</td>
<td>84800000</td>
</tr>
</tbody>
</table>

### General characteristics

<table>
<thead>
<tr>
<th>Supply</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Un</td>
<td>MWG / MWU / MWA / MWUA</td>
</tr>
<tr>
<td>Voltage supply tolerance</td>
<td>183 – 528 V ~</td>
</tr>
<tr>
<td>Operating range</td>
<td>0% ± 10%</td>
</tr>
<tr>
<td>Power consumption at Un</td>
<td>1.8 VA in ~</td>
</tr>
<tr>
<td>Measuring from main power code</td>
<td>14 file</td>
</tr>
</tbody>
</table>
### General characteristics

**Inputs and measuring circuit**
- **Measurement ranges**: 183 – 528 V
- **Selection of phase-phase nominal voltage**: 208 - 220 - 380 - 400 - 415 - 440 - 480 V
- **Frequency of measured signal**: 50 → 60 Hz ± 10%
- **Max. measuring cycle time**: 150 ms/True RMS measurement
- **Voltage threshold adjustment**: 20% of selected Un
- **(−2 to −12% across the 3 x 208 V range / −2 to −17% across the 3 x 220 V range / 2 to 10% across the 3 x 480 V range)**
- **Voltage threshold hysteresis**: 2% of fixed Un
- **Asymmetry threshold hysteresis**: 2% of fixed Un
- **Asymmetry threshold adjustment**: 5 to 15% of fixed Un
- **Display precision**: ± 3% of the displayed value
- **Repetition accuracy with constant parameters**: ± 0.5%
- **Measuring error with voltage drift**: < 1% across the whole range
- **Measuring error with temperature drift**: < 0.05%/°C
- **Maximum regeneration (phase failure)**: 70%
- **Delay on threshold crossing**: 0.1 to 10 s (0, +10%)
- **Reset time**: 1500 ms
- **Delay on pick-up**: 500 ms
- **Alarm on delay time max.**: < 200 ms

**Output**
- **Type of output**: 1 single pole changeover relay
- **Type of contacts**: No cadmium
- **Maximum breaking voltage**: 250 V
- **Max. breaking current**: 5 A
- **Min. breaking current**: 10 mA / 5 V
- **Electrical life (number of operations)**: 1 x 10^5
- **Breaking capacity (resistive)**: 1250 VA
- **Maximum rate**: 360 operations/hour at full load
- **Operating categories acc. to IEC 60947-5-1**: AC 12, AC 13, AC 14, AC 15, DC 12, DC 13, DC 14
- **Mechanical life (operations)**: 30 x 10^6

**Insulation**
- **Nominal insulation voltage**: IEC 60664-1 400 V
- **Insulation coordination (IEC 60664-1 / 60255-5)**: Overvoltage category III: degree of pollution 3
- **Rated impulse withstand voltage**: IEC 60664-1/60255-5 4 KV (1.2 / 50 µs)
- **Dielectric strength**: IEC 60664-1/60255-5 2 kV AC 50 Hz 1 min
- **Insulation resistance**: IEC 60664-1 / 60255-5 > 500 MΩ / 500 V

**General characteristics**
- **Display power supply**: Green LED
- **Display brightness**: 1 mA LED flashes during the threshold delay
- **Casing**: 17.5 mm
- **Mounting**: On 35 mm symmetrical DIN rail, IEC/EN 60715
- **Mounting position**: All positions
- **Material: enclosure plastic**: type VO to UL94 standard
- **In accordance with test according to IEC 60950-2-11 & NF EN 60950-2-11**
- **Protection (IEC 60529)**: 1 Terminal block: IP20
- **Casing**: IP30

**Environmental conditions**
- **Weight**: 80 g
- **Connecting capacity IEC 60947-1**: Rated 1 x 4 mm² - 2 x 2.5 mm²
- **Max. tightening torque IEC 60947-1**: 0.8 Nm ≈ 1.5 – 10 Nm
- **Storage temperature IEC 60947-2**: −20 → +70°C
- **Humidity IEC 60947-2**: 2 x 24 h non-condensing 95% RH max. without condensation 50–90°C
- **Temperature according to IEC/EN60669-2-9**: 15% to 100% A ≤ 0.05 mm
- **Shocks IEC 60947-2-4**: 1.8 g

**Certifications**
- **Marking**: CE (LVD) 73/23/EEC - EMC 89/336/EEC
- **Electromagnetic compatibility**: immunity EN 61000-6-2 / EN 61000-6-3
- **Application to IEC 60068-2-30**: 2 x 24 h cycle 95% RH max. without condensation 55°C
- **Conformity with environmental directives**: RoHS, WEEE
- **Comments**: 3-phase mains with earthing

---

**www.crouzet.com**
Overview

3-phase network control relays monitor:
- The correct sequence of phases L1, L2, L3
- Total phase failure
- Undervoltage and overvoltage from 2 to 20\% of Un
- Asymmetry rate from 5 to 15\% of Un
- LEDs are used for fault signaling.

If a fault persists for longer than the threshold crossing delay configured by the user, the output relay opens and the LED R is extinguished.

**MWG - Phase failure and sequence**

(with regeneration)

1. Phase L1
2. Phase L2
3. Phase L3
4. Relay

**Operating principle**

MWG: Phase controller with voltage regeneration
Voltage selector switch:
- Set the selector switch to the 3-phase network voltage Un.
- The position of this selector switch is only taken into account when the unit is powered up.
- The relay monitors its own supply voltage.
- If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.
- The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

In the event of a phase sequence or failure fault, the relay opens instantaneously.

When the unit is powered up with a measured fault, the relay stays open.

**MWU - Phase failure and sequence**

(with regeneration)

1. Phase L1
2. Phase L2
3. Phase L3
4. Relay

**Operating principle**

MWU: Phase controller with voltage and undervoltage regeneration
Voltage selector switch:
- Set the selector switch to the 3-phase network voltage Un.
- The position of this selector switch is only taken into account when the unit is powered up.
- The relay monitors its own supply voltage.
- If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.
- The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

In the event of a phase sequence or failure fault, the relay opens instantaneously.

When the unit is powered up with a measured fault, the relay stays open.

**MWU - Undervoltage**

1. Hysteresis
2. Undervoltage
3. Phases L1, L2, L3
4. Relay
5. Delay on threshold crossing (Tt)
### Principles

#### MWUA - Failure, phase sequence and asymmetry

<table>
<thead>
<tr>
<th>1</th>
<th>Phase L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Phase L2</td>
</tr>
<tr>
<td>3</td>
<td>Phase L3</td>
</tr>
<tr>
<td>4</td>
<td>Asymmetry threshold</td>
</tr>
<tr>
<td>5</td>
<td>Relay</td>
</tr>
<tr>
<td>6</td>
<td>Delay on threshold crossing (Tt)</td>
</tr>
</tbody>
</table>

#### Operating principle

**MWUA:** Phase controller with voltage regeneration + Asymmetry + Under/Overvoltage

**Voltage selector switch:**

Set the selector switch to the 3-phase network voltage Un.

The position of this selector switch is only taken into account when the unit is powered up.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

- **Under and overvoltage:** adjustable from -2 to -17% across the 3 x 220 V a range.
- **Asymmetry:** adjustable from 5 to 15% of Un.
- **Failure of one of the three phases:** U measured < 0.7 x Un.

The relay controls:

- correct sequencing of the three phases
- asymmetry, adjustable from 5 to 15% of Un.

In the event of an asymmetry or voltage fault, the relay opens instantaneously.

In the event of a phase sequence or failure fault, the relay opens at the end of the time delay set by the user.

When the unit is powered up with a measured fault, the relay stays open.

Asymmetry is defined as follows: \((V_{rms\ max.} - V_{rms\ min.}) / V_{rms\ mains}\).

**Vrms mains** corresponds to the voltage selected by the switch on the front face.

#### MWUA - Under and overvoltage in window mode

<table>
<thead>
<tr>
<th>1</th>
<th>Overvoltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Hysteresis</td>
</tr>
<tr>
<td>3</td>
<td>Undervoltage</td>
</tr>
<tr>
<td>4</td>
<td>Phases L1, L2, L3</td>
</tr>
<tr>
<td>5</td>
<td>Relay</td>
</tr>
<tr>
<td>6</td>
<td>Delay on threshold crossing (Tt)</td>
</tr>
</tbody>
</table>

**MWUA - Failure, phase sequence and asymmetry**

<table>
<thead>
<tr>
<th>1</th>
<th>Phase L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Phase L2</td>
</tr>
<tr>
<td>3</td>
<td>Phase L3</td>
</tr>
<tr>
<td>4</td>
<td>Asymmetry threshold</td>
</tr>
<tr>
<td>5</td>
<td>Relay</td>
</tr>
<tr>
<td>6</td>
<td>Delay on threshold crossing (Tt)</td>
</tr>
</tbody>
</table>

#### Operating principle

**MWUA:** Phase controller with voltage regeneration + Asymmetry + Under/Overvoltage

**Voltage selector switch:**

Set the selector switch to the 3-phase network voltage Un.

The position of this selector switch is only taken into account when the unit is powered up.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

- **Under and overvoltage:** adjustable from 2 to 20% of Un (-2 to -12% across the 3 x 480 V a range, -2 to -10% across the 3 x 220 V a range due to the maximum voltage 528 V). In the event of an asymmetry or voltage fault, the relay opens at the end of the time delay set by the user.

When the unit is powered up with a measured fault, the relay stays open.

Asymmetry is defined as follows: \((V_{rms\ max.} - V_{rms\ min.}) / V_{rms\ mains}\).

**Vrms mains** corresponds to the voltage selected by the switch on the front face.

#### Dimensions (mm)

**MWG - MWU - MWUA**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>63.2</td>
<td>90.5</td>
</tr>
<tr>
<td>L2</td>
<td>20.6</td>
<td>59.5</td>
</tr>
<tr>
<td>L3</td>
<td>44.0</td>
<td>75.0</td>
</tr>
</tbody>
</table>

#### Connections

**MWG - MWU - MWUA**

1. 100 mA fast-blow fuse
2. L1
3. L2
4. L3
5. R

---

**MWG - MWU - MWUA**

<table>
<thead>
<tr>
<th>1</th>
<th>100 mA fast-blow fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>L1</td>
</tr>
<tr>
<td>3</td>
<td>L2</td>
</tr>
<tr>
<td>4</td>
<td>L3</td>
</tr>
<tr>
<td>5</td>
<td>R</td>
</tr>
</tbody>
</table>
Phase control

Multi-function phase control relay 35 mm

- Control of 3-phase networks: phase sequence, phase failure, asymmetry, under and overvoltage with independent settings
- Multi-function/Multi-voltage product
- Controls its own supply voltage
- True RMS measurement
- LED status indication

Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Functions</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWUA</td>
<td>Phase sequence, failure, asymmetry, under/overvoltage</td>
<td>3 x 220 – 3 x 480 V~</td>
<td>84873026</td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels
- Single voltage in the generic range
- Fixed undervoltage threshold in the generic range
- Fixed overvoltage threshold in the generic range
- Fixed asymmetry threshold in the generic range or adjustable ± 25 %
- Fixed or adjustable time delay

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

General characteristics

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Un</td>
<td>3 x 220 – 3 x 480 V~</td>
</tr>
<tr>
<td>Voltage supply tolerance</td>
<td>-12% / +15%</td>
</tr>
<tr>
<td>Operating range</td>
<td>124 – 528 V</td>
</tr>
<tr>
<td>Supply voltage frequency</td>
<td>50 / 60 Hz ± 10%</td>
</tr>
<tr>
<td>Numeric selection of power supply/measurement</td>
<td>N/A</td>
</tr>
<tr>
<td>Power consumption at Un</td>
<td>2.2 VA in ~</td>
</tr>
<tr>
<td>Input and measuring circuit</td>
<td>10 ms</td>
</tr>
<tr>
<td>Measurement ranges</td>
<td>194 – 528 V</td>
</tr>
<tr>
<td>Frequency of measured signal</td>
<td>50 / 60 Hz ± 10%</td>
</tr>
<tr>
<td>Max. measuring cycle time</td>
<td>140 ms for RMS measurement</td>
</tr>
<tr>
<td>Voltage threshold adjustment</td>
<td>± 2% of selected un</td>
</tr>
<tr>
<td>Asymmetry threshold adjustment</td>
<td>± 15% of fixed Un</td>
</tr>
<tr>
<td>Display precision</td>
<td>± 0.5% of the displayed value</td>
</tr>
<tr>
<td>Measuring error with voltage drift</td>
<td>± 1%</td>
</tr>
<tr>
<td>Measuring error with temperature drift</td>
<td>0.03% / °C</td>
</tr>
</tbody>
</table>
### General characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td></td>
</tr>
<tr>
<td>Delay on threshold crossing</td>
<td>0.1 to 10 s (0.1 to 10%)</td>
</tr>
<tr>
<td>Repetition accuracy with constant parameters</td>
<td>± 0.3%</td>
</tr>
<tr>
<td>Reset time</td>
<td>1.5 s</td>
</tr>
<tr>
<td>Alarm on delay time</td>
<td>&lt; 200 ms</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td></td>
</tr>
<tr>
<td>Type of output</td>
<td>1 double changeover relay</td>
</tr>
<tr>
<td>Type of contacts</td>
<td>No cadmium</td>
</tr>
<tr>
<td>Maximum breaking voltage</td>
<td>250 V AC</td>
</tr>
<tr>
<td>Max. breaking current</td>
<td>5 A</td>
</tr>
<tr>
<td>Min. breaking current</td>
<td>10 mA</td>
</tr>
<tr>
<td>Electrical life of operations</td>
<td>1.5 x 10^9 operations</td>
</tr>
<tr>
<td>Breakdown capacity (resistive)</td>
<td>1250 VA</td>
</tr>
<tr>
<td>Maximum rate</td>
<td>390 operations/hour at full load</td>
</tr>
<tr>
<td><strong>Operating (categories acc. to IEC 60947-5-1)</strong></td>
<td>AC 12, AC 13, AC 14, AC 15, DC 12, DC 13, DC 14</td>
</tr>
<tr>
<td><strong>Mechanical life (operations)</strong></td>
<td>30 x 10^9</td>
</tr>
</tbody>
</table>

### Electrical characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal insulation voltage (IEC 60664-1)</td>
<td>400 V</td>
</tr>
<tr>
<td>Insulation category (IEC 60664-1/60255-5)</td>
<td>UL category III, degree of pollution 3</td>
</tr>
<tr>
<td>Rated Insulation Current (IEC 60664-1/60255-5)</td>
<td>2 kA AC, 5 kA DC 1 min</td>
</tr>
<tr>
<td>Insulation resistance (IEC 60664-1/60255-5)</td>
<td>&gt; 500 MΩ / 500 V</td>
</tr>
</tbody>
</table>

### Insulation

- **Nominal insulation voltage** (IEC 60664-1) 400 V
- **Insulation coordination** (IEC 60664-1/60255-5) Overvoltage category III: degree of pollution 3
- **Rated impulse withstand voltage** (IEC 60664-1/60255-5) 4 kV (1.2 / 50 µs)
- **Dielectric strength** (IEC 60664-1/60255-5) 2 kV AC 50 Hz 1 min
- **Insulation resistance** (IEC 60664-1 / 60255-5) > 500 MΩ / 500 V

### General characteristics

- **Display power supply** Green LED
- **Display relay** Table LED
- **Fault indication** Table LED
- **Latching** 30 mm
- **Mounting** ‘35 mm symmetrical DIN rail, IEC/EN 60715
- **Material - enclosure plastic type V0 to UL94 standard**
- **Protection** (IEC 60529) IP 20

### Weight

- **Nominal capacity** (IEC 60947-1) 1.5 kg
- **DIN rail compatibility**
  - Horizontal: 1 to 4 x 2 to 5.5 mm
  - Vertical: 1 to 1.5 AWG, 2 to 14 AWG

### Operating temperature

- IEC 60068-2 -20°C to +50°C
- Storage temperature IEC 60068-2 -40°C to +70°C

### Maximum tightening torques

<table>
<thead>
<tr>
<th>Compatibility</th>
<th>IEC 60947-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>High 1 4 x 2.5 x 5 mm</td>
<td>0.6 Nm to 5.3 to 8.8 Lbf-In</td>
</tr>
<tr>
<td>1 x 11 AWG, 2 x 14 AWG</td>
<td>Flexible with ferrules: 1 x 2.5 x 2 x 1.5 mm²</td>
</tr>
<tr>
<td>1 x 14 AWG, 2 x 16 AWG</td>
<td></td>
</tr>
</tbody>
</table>

### Standards

- **Marking** CE (LVD) 73/23/EEC - EMC 89/336/EEC
- **Product standard**
  - NF EN 60255-6
  - UL 508
  - CSA C22.2 N° 14
- **Electromagnetic/EMC**
  - Immunity: EN 61000-6-2, IEC 61000-6-3
  - Emission: EN 61000-6-3, IEC 61000-6-3
- **Certifications** UL, CSA, GL pending
- **Conformity with environmental directives**
  - RoHS, WEEE

### Comments

- * 3-phase mains with earth
Overview
The HWUA 3-phase network control relay monitors:
- The correct sequence of phases L1, L2, L3
- Total phase failure
- Undervoltage and overvoltage from 2 to 20 % of Un
- Asymmetry rate from 5 to 15% of Un
- Faults are signalled via LEDs, distinguishing the origin of the fault.
If a fault persists for longer than the threshold crossing delay configured by the user, both output relays open and LED R is extinguished.

Operating principle
HWUA: Phase + Asymmetry + Under/Overvoltage controller
Voltage selector switch:
Set the selector switch to the 3-phase network voltage Un.
The position of this selector switch is only taken into account when the unit is powered up.
If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.
The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

The relay monitors its own supply voltage.
The relay controls:
- correct sequencing of the three phases,
- failure of one of the three phases (U measured < 0.7 x Un),
- asymmetry, adjustable from 5 to 15% of Un,
- undervoltage adjustable from -2 to -20% of Un, (-2 to -12% for the 220 V range) and
overvoltage adjustable from +2 to +20% (+2 to +10% over the 3 x 480 V range due to the maximum voltage 528 V).
In the event of a phase sequence or failure fault, the relay opens instantaneously.
In the event of an asymmetry or voltage fault, the relay opens at the end of the time delay set by...
Dimensions (mm)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>HWUA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>60</td>
</tr>
<tr>
<td>Height</td>
<td>44</td>
</tr>
<tr>
<td>Depth</td>
<td>23.2</td>
</tr>
<tr>
<td>Width</td>
<td>67.5</td>
</tr>
<tr>
<td>Height</td>
<td>45</td>
</tr>
<tr>
<td>Depth</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Connections

HWUA

1 100 mA fast-blow fuse
Phase control

3-phase voltage control relay - 17.5 mm / 35 mm

- H3US and M3US relays control, on 3-phase networks:
  - overvoltage between phases,
  - undervoltage between phases
- The H3USN relay controls, on 3-phase networks:
  - overvoltage between phases and neutral,
  - undervoltage between phases and neutral,
  - loss of neutral
- Multi-voltage Products
  - Controls its own supply voltage
  - True RMS measurement
  - LED status indication

Part numbers

<table>
<thead>
<tr>
<th>Function</th>
<th>Nominal voltage (V)</th>
<th>Output</th>
<th>Part numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>H3US</td>
<td>3 x 208 ~ 3 x 480 V</td>
<td>1 relay</td>
<td>84873222</td>
</tr>
<tr>
<td>M3US</td>
<td>3 x 220 ~ 3 x 480 V</td>
<td>2 relays/one per threshold</td>
<td>84873220</td>
</tr>
<tr>
<td>H3USN</td>
<td>3 x 120 ~ 3 x 277 V</td>
<td>2 relays/one per threshold</td>
<td>84873221</td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels
- Single voltage in the generic range
- Fixed or adjustable time delay
- Adjustable fixed hysteresis
- Fixed threshold in the generic range
- Adaptations dedicated to M3US:
  - Fixed overvoltage threshold in the generic range
  - Fixed undervoltage threshold in the generic range
- Adaptations dedicated to H3US:
  - Fixed threshold in the generic range
- Adaptations dedicated to H3USN:
  - Fixed threshold in the generic range
  - Loss of neutral

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 17.5 mm casing</td>
<td>84800000</td>
</tr>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

General characteristics

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3US</td>
<td>208-220-380-400-415-440-480 V ~</td>
</tr>
<tr>
<td>HSUS</td>
<td>208-230-380-400-415-440-480 V ~</td>
</tr>
<tr>
<td>H3USN</td>
<td>3 x 120 ~ 3 x 277 V ~</td>
</tr>
</tbody>
</table>

- Customisable colours and labels
- Single voltage in the generic range
- Fixed or adjustable time delay
- Adjustable fixed hysteresis
- Fixed threshold in the generic range
- Adaptations dedicated to M3US:
  - Fixed overvoltage threshold in the generic range
  - Fixed undervoltage threshold in the generic range
- Adaptations dedicated to H3US:
  - Fixed threshold in the generic range
- Adaptations dedicated to H3USN:
  - Fixed overvoltage threshold in the generic range
  - Fixed undervoltage threshold in the generic range

Courtesies

- Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
General characteristics

Supply
~ supply voltage frequency 50 / 60 Hz ±10%

Measuring voltage measurement No

Frequency of measured signal 50 ~ 60 Hz ±10%

Max. measuring cycle time 150 ms / True RMS measurement

Voltage threshold adjustment
- Undervoltage: -2 to -30% of selected Un
  (2 to -12% across the 3 x 220 V range)
- Overvoltage: +2 to +20% of selected Un
  (2 to -12% across the 3 x 220 V range)

Fixed hysteresis 2% of Un (for M3US and H3US)

Display precision ± 0.5%

Measuring error with voltage shift < 0.5% across the entire range

Resolution

Delay on threshold crossing 0.3 ~ 30 s (0, +10%)

Hysteresis accuracy with constant parameters ± 3%

Reset time 100 ms

Delay on pick-up 500 ms

Output

Type of contacts No cadmium

Maximum breaking voltage 250 V ~

Max. breaking current 5 A ~

Min. breaking current 10 mA / 5 V

Breaking capacity (resistive) 1250 VA ~

Maximum rate 360 operations/hour at full load

Mechanical life (operations) 30 x 10^6

Insulation

Nominal insulation voltage IEC 60664-1 400 V

Insulation coordination (IEC 60664-1 / 60255-5) Overvoltage category III: degree of pollution 3

Rated impulse withstand voltage IEC 60664-1/60255-5 4 KV (1.2 / 50 µs)

Dielectric strength IEC 60664-1/60255-5 2 kV AC 50 Hz 1 min

Insulation resistance IEC 60664-1 / 60255-5 > 500 MΩ / 500 V

Display power supply Green LED

Display relay Yellow LED (1 for M3US, 2 for H3US and H3USN)

Mounting On 35 mm symmetrical DIN rail, IEC/EN 60715

Mounting position All positions

Material: enclosure plastic type VO to UL94 standard

Protection category IEC 60947-1 Rigid: 1 x 42 - 2 x 2.5 mm²
  1 x 11 AWG - 2 x 14 AWG

Flexible with ferrules: 1 x 2.5 mm² - 2 x 1.5 mm²
  1 x 14 AWG - 2 x 16 AWG

Max. tightening torques IEC 60947-1 0.6 ~ 1 Nm / 5.3 ~ 8.8 Lbf.Ft

Operating temperature IEC 60688-2-17 0°C ~ +50°C

Storage temperature IEC 60688-2-17 -40°C ~ +70°C

Humidity IEC 60688-2-32 2 x 24 hr cycle 95% RH max. without condensation 55°C

Vibration according to IEC 61000-6-2-3

Shock to IEC 61000-6-2-3

Mechanical characteristics

Display power supply Green LED

Display relay Yellow LED (1 for M3US, 2 for H3US and H3USN)

Mounting 40x40 mm symmetrical DIN rail, IEC/EN 60715

Safety characteristics

Protection class IEC 60947-33 1000 V

Connecting capacity IEC 60947-1 15 x 42 mm² - 2 x 2.5 mm²
  1 x 11 AWG - 2 x 14 AWG

Flexible with ferrules: 1 x 2.5 mm² - 2 x 1.5 mm²
  1 x 14 AWG - 2 x 16 AWG

Max. tightening torques IEC 60947-1 0.6 ~ 1 Nm / 5.3 ~ 8.8 Lbf.Ft

Operating temperature IEC 60688-2-17 0°C ~ +50°C

Storage temperature IEC 60688-2-17 -40°C ~ +70°C

Humidity IEC 60688-2-32 2 x 24 hr cycle 95% RH max. without condensation 55°C

Vibration according to IEC 61000-6-2-3

Shock to IEC 61000-6-2-3

Marking CE (LVD 73/23/EEC - EMC 89/336/EEC

Product standard NP EN 60255-6 / CEI 60255-6 / UL S06 / CSA C22.2 N°14

Electromagnetic compatibility Immunity EN 61000-4-2 / IEC 61000-4-2

Emission EN 61000-6-3 / IEC 61000-6-3

IEC 61000-6-4

Emission EN 55022 class B

Conformity with environmental directives RoHS, WEEE
**Overview**

3-phase voltage controllers which monitor:
- Undervoltage, adjustable from -20 to -2% of Un
- Overvoltage, adjustable from 2 to 20% of Un
- Presence of the neutral (H3USN only)

Measurements are taken between Phases for the H3US - M3US and between Phases and Neutral for the H3USN.

Faults are signalled via LEDs, distinguishing the origin of the fault (one LED for the upper threshold, one LED for the lower threshold).

Voltage selector switch: Set the selector switch to the 3-phase network voltage Un.

The position of this selector switch is only taken into account when the unit is powered up.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

**M3US - Under/Overvoltage**

- Overvoltage
- Hysteresis
- Undervoltage
- Phases L1, L2, L3
- Relay
- Over and undervoltage threshold delay

**H3US - H3USN - Under/Overvoltage**

- Overvoltage
- Hysteresis
- Undervoltage
- Phases L1, L2, L3
- Relay R1
- Relay R2
- Overvoltage threshold delay
- Undervoltage threshold delay

Operating principle

**M3US**

The relay monitors its own supply voltage. It controls:
- Undervoltage, adjustable from -20 to -2% of Un (-12 to -2% over the 3 x 208 V range and -17% to -2% for the 3 x 220 V range due to the minimum voltage 183 V range due to the maximum voltage 528 V~).

An adjustable time delay from 0.3 to 30s can be used to disable the output relay during a transient fault.

In the event of a voltage fault, the relay opens at the end of the time delay set by the user.

In the event of phase failure, the relay opens instantaneously, without waiting for the end of the time delay.

When the unit is powered up with a measured fault, the relay stays open.

Operating principle

**H3US**

The relay monitors its own supply voltage. It controls:
- Undervoltage, adjustable from -2 to -20% of Un (-2 to -12% over the 3 x 220 V range due to the minimum voltage 194 V~)
- Overvoltage, adjustable from +2 to +20% (+2 to +10% over the 3 x 480 V~ range due to the maximum voltage 528 V~).

Each threshold has its own time delay with independent setting between 0.3 and 30 s.

In the event of a voltage fault, the corresponding relay (one undervoltage output/one overvoltage output) opens at the end of the time delay set by the user.

In the event of phase failure, both relays open instantaneously, without waiting for the end of the time delay. The two relay LEDs go out.

**H3USN**

The relay monitors its own supply voltage. It controls:
- Presence of the neutral,
- Undervoltage, adjustable from -2 to -20% of Un,
- Overvoltage, adjustable from +2 to +20%.

Each threshold has its own time delay with independent setting between 0.3 and 30 s.

In the event of a voltage fault, the corresponding relay (one undervoltage output/one overvoltage output) opens at the end of the time delay set by the user.

If neutral is lost, both relays open instantaneously and the corresponding LED is extinguished, without waiting for the end of the time delay. The two relay LEDs are extinguished.
Dimensions (mm)

**M3US**

- Width: 60 mm
- Height: 44 mm
- Depth: 23.2 mm

**H3US - H3USN**

- Width: 60 mm
- Height: 44 mm
- Depth: 23.2 mm

Connections

**M3US**

- L1
- L2
- L3
- N
- F1

1. 100 mA fast-blown fuse or cut-out

**H3US - H3USN**

- L1
- L2
- L3
- N
- F1

1. 100 mA fast-blown fuse or cut-out

2. 100 mA fast-blown fuse or cut-out
Voltage control

→ Voltage control relay - 17.5 mm

- Control relays monitoring their own power supply
  - MUS: Over/undervoltage control
    - Selectable latching (memory) function
  - MUSF: Over/undervoltage control
- Adjustable time delays
- Control in 50 Hz, 60 Hz or
- True RMS measurement
- LED status indication

Part numbers

<table>
<thead>
<tr>
<th>Controlled ranges</th>
<th>MUS 12</th>
<th>MUS/MUSF 80</th>
<th>MUS/MUSF 260</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under/Overvoltage control</td>
<td>24972140</td>
<td>24972141</td>
<td>24972142</td>
</tr>
<tr>
<td>Under/Overvoltage control in window mode</td>
<td>24972139</td>
<td>24972131</td>
<td>24972132</td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay
- Adjustable hysteresis
  - Adaptations dedicated to MUS 12 ~, MUS 80 ~, MUS 260 ~:
    - Possible to delete settings
    - Adjustable fixed hysteresis

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 17.5 mm casing</td>
<td>24800000</td>
</tr>
</tbody>
</table>

General characteristics

<table>
<thead>
<tr>
<th>Supply</th>
<th>MUS 12</th>
<th>MUS/MUSF 80</th>
<th>MUS/MUSF 260</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>12 V</td>
<td>24 → 48 V</td>
<td>110 → 240 V</td>
</tr>
<tr>
<td>Power consumption at 24 V</td>
<td>7 W</td>
<td>15 → 20 W</td>
<td>50 → 270 W</td>
</tr>
<tr>
<td>Range of adjustment</td>
<td>9 → 15 V</td>
<td>20 → 80 V</td>
<td>65 → 260 V</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>5 → 20% of threshold (MUS)</td>
<td>5 → 20% of threshold (MUS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3% (fixed) of threshold (MUS)</td>
<td>3% (fixed) of threshold (MUSF)</td>
<td></td>
</tr>
</tbody>
</table>

| General characteristics           |         |
|                                  |         |
| Weight                           | 75 g    | 80 g        | 80 g        |
General characteristics

**Supply**
- **Polarity with DC voltage**: ✓ / 50 Hz ± 10%
- **Maximal deviation of power supply/measurement**: No
- **Immunity from micro power cuts**: 10 ms

**Properties**
- **Max. measuring cycle time**: 250 ms/True RMS measurement
- **Temperature drift**: ± 0.5% across the whole range
- **Relative accuracy with constant parameters**: ± 0.5%
- **Resolution**
  - **Delay on threshold crossing**: 0.1 – 10 sec. (0, ±10%)
  - **Reset time**: 1.5 s
  - **Delay on pick-up**: 500 ms en / 1 s in

**Inputs and measuring circuit**
- **Max. measuring cycle time**: 250 ms/True RMS measurement
- **Display precision**: ±10% of full scale
- **Repetition accuracy with constant parameters**: ± 0.5%
- **Measuring error with voltage drift**: < 1% across the whole range
- **Measuring error with temperature drift**: ± 0.05% / °C

**Timing**
- **Delay on threshold crossing**: 0.1 – 10 sec. (0, ±10%)
- **Reset time**: 1.5 s
- **Delay on pick-up**: 500 ms en / 1 s in

**Display**
- **Type of output**: 1 single pole changeover relay
- **Display power supply**: Green LED
- **Display relay**: Yellow LED

**Mounting**
- **Mounting**: 35 mm symmetrical DIN rail, IEC/EN 60715

**Material**
- **Material**: enclosure plastic type VO to UL94 standard

**Protection (IEC 60529)**
- **Terminal block**: IP 20
- **Casing**: IP 30

**Connecting capacity**
- **IEC 60947-1**:
  - Rigid: 1 x 4 - 2 x 2.5 mm²
  - 1 x 11 AWG - 2 x 14 AWG
  - Flexible with ferrules: 1 x 2.5 - 2 x 1.5 mm²
  - 1 x 14 AWG - 2 x 16 AWG

**Electromagnetic compatibility**
- **Immunity EN 61000-4-2**
- **Immunity EN 61000-4-3**
- **Immunity EN 61000-4-4**
- **Immunity EN 61000-4-5**
- **Immunity EN 61000-4-6**

**Certifications**
- UL, CSA, CE

**Conformity with environmental directives**
- RoHS, WEEE

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Visit our website: www.crouzet.com
Overview

MUS and MUSF voltage control relays monitor single-phase DC network voltages. These products monitor their own supply voltage. MUS relays allow the user to choose between two operating modes:
- Under/overvoltage
- With or without fault latching

An adjustable time delay, on threshold crossing, provides immunity from transient phenomena, thus preventing spurious triggering of the output relay.

Operating principle

MUS - Under/overvoltage controller

The operating mode is set by the user. A switch is used to select under or overvoltage modes, with or without latching. The switch position, and hence the operating mode, is read by the product on energisation.

If the switch is set to a non-conforming position, the product goes into fault mode, the output relay stays open, and the LEDs flash to signal the position error.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the voltage selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

MUS - Under/overvoltage - without latching

The under or overvoltage threshold value is set by a graduated potentiometer by reading the Un scale to be monitored directly. The hysteresis is set by a graduated potentiometer from 5 to 20% of the preset threshold. The hysteresis value cannot be higher than the extremes of the measurement range.

In overvoltage mode, if the controlled voltage exceeds the preset threshold for longer than the time set on the front face (0.1 to 10 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes.

Once the voltage falls below the threshold value minus the hysteresis, the relay closes instantaneously.

In undervoltage mode, if the controlled voltage falls below the preset threshold for longer than the time set on the front face (0.1 to 10 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes.

Once the voltage rises above the threshold value plus the hysteresis, the relay closes instantaneously.

MUS - Under/overvoltage - with latching

If “with memory” mode has been selected, the relay opens and stays in this position when threshold crossing is detected. The power supply must be disconnected to reset the product.
MUSF - Under and overvoltage controller in window mode

MUSF relays operate in window mode: they check that the controlled voltage stays between a minimum and maximum threshold. The under and overvoltage threshold values are set by two graduated potentiometers by reading the Un scale to be monitored directly.

The hysteresis is fixed, value: 3 % of the preset thresholds.

If the controlled voltage exceeds the preset upper threshold, or falls below the preset lower threshold for longer than the time set on the front face (0.1 to 10 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes.

Once the voltage returns to below the upper threshold value minus the hysteresis, or above the lower threshold value plus the hysteresis, the relay closes instantaneously.

When the unit is powered up with a measured fault, the relay stays open.

---

**Principles**

- High threshold
- Low threshold
- Hysteresis
- Controlled signal
- Delay on threshold crossing (Tt)
- Relais

**Dimensions (mm)**

**MUS - MUSF**

**Connections**

**MUS - MUSF**

1. A fast-blow fuse or cut-out
### Voltage control

**Multi-function voltage control relay - 35 mm**

- Control of AC and DC voltages
- Automatic recognition of AC/DC
- Measurement ranges from 0.2 V to 600 V
- Choice between under and overvoltage
- True RMS measurement
- Selectable latching (memory) function

#### Part numbers

<table>
<thead>
<tr>
<th>Function</th>
<th>HUL</th>
<th>Under/Overvoltage</th>
<th>HUH</th>
<th>Under/Overvoltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>0.2 V → 50 V</td>
<td>15 V → 600 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part numbers</td>
<td>84872120</td>
<td>84872130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Product adaptations

- Customisable colours and labels
- Measuring ranges within the generic limits
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay
- Adjustable hysteresis

#### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable securable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

#### General characteristics

<table>
<thead>
<tr>
<th>Input resistance</th>
<th>HUL</th>
<th>HUH</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 - M: 60 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 30 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 180 Ω</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Permanent overload at 25°C</th>
<th>HUL</th>
<th>HUH</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 - M: 15 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 30 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 150 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### General characteristics

#### Supply
- **Supply voltage Un**: 24 V → 240 V
- **Frequency**: 50 / 60 Hz ± 10%
- **Polarity with DC voltage**: No
- **Supply voltage range**: 20.4 V → 264 V
- **Immunity from micro power cut**: 10 ms

#### Voltage supply tolerance
- -15% / +10%

#### Measuring at Un
- 3.5 VA in AC/0.6 W in DC

#### Measuring conditions
- **Frequency of measured signal**: 0 Hz, 40 → 70 Hz
- **Max. measuring cycle time**: 30 ms
- **Threshold adjustment**: 10 → 100% of the range
- **Adjustable hysteresis**: 5 → 50% of displayed threshold
- **Repetition accuracy with constant parameters**: ± 5%
- **Measuring error with voltage drift**: ± 5% across the whole range
- **Measuring error with temperature drift**: ± 0.05% / °C

#### Timing
- **Delay on threshold crossing**: 0.1 → 3 s (0, + 10%)
- **Repetition accuracy with constant parameters**: ± 2%

#### Immunity from micro power cuts
- 10 ms

#### Operating conditions
- **Operating categories acc. to IEC 60947-5**: AC12, AC13, AC14, AC15, DC12, DC13, DC14
- **Insulation**: 2 KV AC 50 Hz 1 min.

#### Protection
- **Nominal insulation voltage IEC 60664-1**: 250 V
- **Insulation coordination (IEC 60664-1 / 60255-5)**: Overvoltage category III: degree of pollution 3
- **Insulation resistance IEC 60664-1/60255-5**: > 500 MΩ / 500 V

#### Weight
- **Weight**: 130 g

#### Standards
- **Marking CE (LVD) 73/23/EEC - EMC 89/336/EEC**
- **Product standard**: NF EN 60255-6 / IEC 60255-6 / UL 508 / CSA C22.2 N°14
- **Electromagnetic compatibility (EMC)**
  - Immunity EN 61000-6-2/EN 61000-4-2
  - Emission EN 61000-6-3
  - Emission EN 55022 class B
- **Conformity with environmental directives**: RoHS, WEEE
**Voltage control**

**Principles**

**HUL-HUH**

**Overview**

HUL and HUH control relays are designed to control AC or DC voltages. They automatically recognise the shape of the DC or AC signal (50 or 60 Hz).

**General principle:**

The operating mode is set by the user. A switch is used to select under or overvoltage modes, with or without latching.

The switch position, and hence the operating mode, is read by the product on energisation.

If the switch is set to a non-conforming position, the product goes into fault mode, the output relay stays open, and the LEDs flash to signal the position error.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the function selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

The under or overvoltage threshold value is set by a graduated potentiometer as a percentage of the U scale to be monitored.

The hysteresis is set by a graduated potentiometer from 5 to 50% of the preset threshold. The hysteresis value cannot be higher than the extremes of the measurement range.

**HUL-HUH - Under/overvoltage - without latching**

In overvoltage mode, if the controlled voltage exceeds the preset threshold for longer than the time set on the front face (0.1 to 3 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes. Once the voltage falls below the threshold value minus the hysteresis, the relay closes instantaneously.

In undervoltage mode, if the controlled voltage falls below the preset threshold for longer than the time set on the front face (0.1 to 3 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes. Once the voltage rises above the threshold value plus the hysteresis, the relay closes instantaneously.

**HUL-HUH - Under/overvoltage - with latching**

If "with memory" mode has been selected, the relay opens and stays in this position when threshold crossing is detected.

The power supply must be disconnected to reset the product.
**Dimensions (mm)**

**HUL-HUH**

![Dimensions diagram]

**Connections**

**HUL-HUH**

![Connections diagram]

1 A fast-blow fuse or cut-out

**NB**
When controlling DC voltage from the same source supplying terminals A1 and A2, terminal M must be connected directly to the "minus" pole of this power supply.
Current control

→ Single function current control relay with current transformer - 17.5 mm

- Control of AC currents
- Built-in current transformer
- Measurement ranges from 2 A to 20 A
- Choice of output relay action
- True RMS measurement

### Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Functions</th>
<th>Measurement range</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIC</td>
<td>Undervolt. or overvolt.</td>
<td>2 → 20 A</td>
<td>24 → 240 V</td>
<td>8MM112Z</td>
</tr>
</tbody>
</table>

### Product adaptations

- Customisable colours and labels
- Current range adjustable up to 50 A
- Adjustable fixed hysteresis

### General characteristics

- **Supply**
  - Supply voltage Un: 24 V → 240 V
  - Voltage supply tolerance: ± 15% / +10%
  - Operating range: 20.4 V → 264 V
  - Frequency of measured signal: 40 → 70 Hz sinusoidal
  - Frequency of measured signal: 40 → 70 Hz sinusoidal
  - Measured current: 10% → 100% of the range
  - Fixed hysteresis: 15% (fixed) of displayed threshold
  - Display precision: ± 0.5% of full scale
  - Measuring error with constant parameters: ± 1%
  - Measuring error with voltage shift: ± 0.5%/°C
  - Delay on pick-up: 200 ms
  - Relay tension pick-up: 500 ms

- **Testing**
  - Test voltage: 24 V → 240 V

- **Inputs and measurement**
  - Measurement range: 2 → 20 A
  - Nominal current: 100 A
  - Overload protection: I = 25°C
  - Pulse overload: I = 25°C, 25°C
  - Measuring cycle time: 30 ms (true RMS measurement)
  - Fixed hysteresis: 15% (fixed) of displayed threshold
  - Measuring error: ± 0.5% of full scale
  - Measuring error with temperature shift: ± 0.5%/°C
  - Response time: 200 ms
  - Delay on pick-up: 500 ms

- **Measuring**
  - Type of output: Single pole changeover relay
  - Type of contacts: No cadmium
  - Maximum breaking voltage: 250 V
  - Maximum breaking current: 5 A
  - Electrical life (number of operations): 1 x 10⁵ manœuvres
  - Breaking capacity (theoretical): 1250 VA
  - Maximum rate: 20 operations/hour at full load
  - Operating categories acc. to IEC 60947-5-1: AC12, AC13, AC14, AC15, DC12, DC13, DC14
  - Mechanical life (operations): 50 x 10⁵ manœuvres

### Insulation

- Nominal insulation voltage: 500 V
- Nominal insulation voltage: 1000 V
- Nominal insulation voltage: 2000 V
- Nominal insulation voltage: 3000 V
- Rated impulse withstand voltage: 500 V / 1.2/50 us
- Rated impulse withstand voltage: 1000 V / 1.2/50 us
- Rated impulse withstand voltage: 2000 V / 1.2/50 us
- Rated impulse withstand voltage: 3000 V / 1.2/50 us
- Rated impulse withstand voltage: 5000 V / 1.2/50 us
General characteristics

- Display power supply: Green LED
- Display relay: Yellow LED
- Casing: 17.5 mm
- Mounting: On 35 mm symmetrical DIN rail, IEC/EN 60715
- Mounting position: All positions
- Material: enclosure plastic type VO to UL94 standard Incandescent wire test according to IEC 60695-2-11 & NF EN 60695-2-11
- Protection (IEC 60529): Terminal block: IP20, Casing: IP30
- Weight: 110 g
- Connecting capacity IEC 60947-1: Rigid: 1 x 42 - 2 x 2.52 mm², 1 x 11 AWG - 2 x 14 AWG
  Flexible with ferrules: 1 x 2.52 - 2 x 1.52 mm², 1 x 14 AWG - 2 x 16 AWG
- Max. tightening torques IEC 60947-1: 0.6 ➞ 1Nm / 5.3 ➞ 8.8 Lbf.In
- Operating temperature IEC 60068-2-20 ➞ +50°C
- Storage temperature IEC 60068-2-20 ➞ +70°C
- Humidity IEC 60068-2-30: 2 x 24 hr cycle 95% RH max. without condensation, 55°C
- Vibration according to IEC/EN60068-2-6: 10 ➞ 150 Hz, A = 0.035 mm
- Shock: IEC 60068-2-6: 5 g

Standards

- Product standard: NF EN 60255-6 / IEC 60255-6 / UL 508 / CSA C22.2 N°14
- Electromagnetic compatibility: Immunity EN 61000-6-2/IEC 61000-6-2
  Emission EN 61000-6-4/EN 61000-6-3
  IEC 61000-6-4/IEC 61000-6-3
  Emission EN 55022 class B
- Certifications: UL, CSA, GL pending
- Conformity with environmental directives: RoHS, WEEE

MIC Overview

The MIC control relay is designed to control overcurrents (or undercurrents). It has a built-in current transformer.

MIC - Overcurrent

Operating principle

The MIC relay controls the overcurrent. The relay closes when the current exceeds the threshold displayed on the front face and opens when it falls below the threshold minus the hysteresis. When terminal Y1 is connected to A1 (+), the output is inverted. The relay opens when the current exceeds the threshold displayed on the front face and closes again when it falls back below the hysteresis (undercurrent).

Can be used for undercurrent control: ask your sales adviser.

- Threshold
- Hysteresis
- Closing on threshold crossing mode (Y1 and A1 not connected)
- Opening on threshold crossing mode (Y1 and A1 connected)
- Unit power-up
- Current control

Dimensions (mm)

Connections

- 100 mA fast-blow fuse or cut-out

MIC - Overcurrent

Dimensions (mm)

Connections

- MIC - Overcurrent
- 100 mA fast-blow fuse or cut-out

MIC - Overcurrent

Dimensions (mm)

Connections

- MIC - Overcurrent
- 100 mA fast-blow fuse or cut-out
**Current control**

→ Multi-function current control relay - 35 mm

- Control of AC and DC currents
- Automatic recognition of AC/DC
- Measurement ranges from 2 mA to 10 A
- Choice between over and undercurrent
- True RMS measurement
- Selectable latching (memory) function

---

### Part numbers

<table>
<thead>
<tr>
<th>Functions</th>
<th>HIL</th>
<th>HIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>Over or undercurrent</td>
<td>Over or undercurrent</td>
</tr>
<tr>
<td>Nominal voltage (V)</td>
<td>2 A → 240 V</td>
<td>0.1 A → 10 A</td>
</tr>
</tbody>
</table>

### Product adaptations

- Customisable colours and labels
- Measuring ranges within the generic limits
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay
- Adjustable hysteresis

---

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable seizable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

### General characteristics

<table>
<thead>
<tr>
<th>Inputs and measuring circuit</th>
<th>HIL</th>
<th>HIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 mA - 500 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 - M: 2 - 20 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 10 - 100 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 50 - 500 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 - M: 1.1 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 0.1 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 0.02 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent overload at 25°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 - M: 0.4 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 1 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 2 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse overload &lt; 1 sec at 25°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 - M: 1 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - M: 0.5 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 - M: 0.1 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6270-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### General characteristics

**Supply**
- Supply voltage Un: 24 V → 240 V
- Voltage supply tolerance: -15% / +10%
- Operating range: 20.4 V ➞ 264 V
- Voltage supply frequency: 50 / 60 Hz ± 10%
- Measuring error with voltage shift: ± 1% across the white range
- Measuring error with temperature shift: ± 0.05% / °C

**Power consumption at Un**
- 3.5 VA in AC/0.6 W in DC

**Inputs and measuring circuit**
- Frequency of measured signal: 0 Hz, 40 ➞ 70 Hz
- Max. measuring cycle time: 30 ms
- True RMS measurement
- Threshold adjustment: 10 ➞ 100% of the range
- Maximum 3-phase voltage: 277 / 480 V (3-phase mains with earth)
- Adjustable hysteresis: 5 ➞ 50% of displayed threshold
- Display precision: ±5% of full scale
- Display power supply: Green LED
- Display relay: Yellow LED

**Measuring accuracy**
- Display precision: ±10% of full scale
- Repetition accuracy with constant parameters: ±0.5% ± 2%

**Timing**
- Delays on power up: 1 ➞ 20 s 0, +10%
- Delay on threshold crossing: 0.1 ➞ 3 s 0, +10%
- Reset time: 1500 ms
- Timing accuracy: ±0.1 s

**Output**
- Type of output: 1 double changeover relay
- Type of contacts: No cadmium
- Maximum breaking current: 5 A
- Min. breaking current: 10 mA / 5 V
- Maximum breaking voltage: 250 V
- Maximum breaking capacity (resistive): 1250 VA
- Maximum rate: 360 operations/hour at full load
- Breaking capacity (resistive): 1250 VA
- Maximum 3-phase voltage: 277 / 480 V (3-phase mains with earth)
- Adjustable hysteresis: 5 ➞ 50% of displayed threshold
- Display precision: ±5% of full scale
- Display power supply: Green LED
- Display relay: Yellow LED
- Display precision: ±5% of full scale
- Repetition accuracy with constant parameters: ±0.5% ± 2%

**Repetition accuracy with constant parameters**
- ±0.5% ± 2%

**Material safety data sheet**
- Insulation material: plastic type VO to UL94 standard
- Insulation resistance: > 500 MΩ / 500 V

**Electrical life**
- Number of operations: 1 x 10⁵

**Mechanical life**
- Operations: 30 x 10⁶

**Insulation**
- Insulation voltage: IEC 60664-1 250 V
- Insulation coordination (IEC 60664-1 / 60255-5) Overvoltage category III: degree of pollution 3
- Rated impulse withstand voltage: IEC 60664-1/60255-5 4 KV (1.2 / 50 µs)
- Dielectric strength: IEC 60664-1/60255-5 2 KV
- Insulation resistance: IEC 60664-1 / 60255-5 > 500 MΩ / 500 V

**Standards**
- Product standard: NF EN 60255-6 / IEC 60255-6 / UL 508 / CSA C22.2 N°14
- Electromagnetic compatibility:
  - Immunity EN 61000-6-2/IEC 61000-6-2
  - Emission EN 61000-6-3 EN 61000-6-3
  - Emission EN 55022 class B
- Conformity with environmental directives: RoHS, WEEE

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**Current control**

**Principles**

**HIL-HIH**

**Overview**
HIL and HIH control relays are designed to control AC or DC currents. They automatically recognise the shape of the DC or AC signal (50 or 60 Hz) and can control up to 10 A in DC. Above this level, a current transformer can be connected.

**General principle:**
The operating mode is set by the user. A switch is used to select over or undercurrent modes, with or without latching.

If the switch is set to a non-conforming position, the product goes into fault mode, the output relay stays open, and the LEDs flash to signal the position error.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the function selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

The over or undercurrent threshold value is set by a graduated potentiometer as a percentage of the I scale to be monitored.

The hysteresis is set by a graduated potentiometer from 5 to 50% of the preset threshold. The hysteresis value cannot be higher than the extremes of the measurement range.

An adjustable time delay from 1 to 20 s on energisation is used to prevent current peaks or troughs on starting.

**HIL-HIH - Under/overcurrent - without latching**

In overcurrent mode, if the controlled current exceeds the preset threshold for longer than the time set on the front face (0.1 to 3 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes. Once the current falls below the threshold value minus the hysteresis, the relay closes instantaneously.

In undercurrent mode, if the controlled current falls below the preset threshold for longer than the time set on the front face (0.1 to 3 s), the output relay opens and LED R is extinguished. During the time delay, this LED flashes. Once the current rises above the threshold value plus the hysteresis, the relay closes instantaneously.

**HIL-HIH - Under/overcurrent - with latching**

If "with memory" mode has been selected, the relay opens and stays in this position when threshold crossing is detected. The power supply must be disconnected to reset the product.
HIL-HH

Dimensions (mm)

Connections

HIL-HH

1 A fast-blow fuse or cut-out

NB: When controlling DC current from the same source supplying terminals A1 and A2, terminal M must be connected directly to the “minus” pole of this power supply.
Frequency control

Frequency control relay - 35 mm

- Controls frequency variations on 50 or 60 Hz AC networks
- Controls its own supply voltage, connected between phase and neutral
- Over and underfrequency with two independent relay outputs
- Selectable latching (memory) function
- LED status indication

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHZ</td>
<td>50 or 60 Hz over and underfrequency</td>
<td>120–277 V~</td>
<td>84872501</td>
</tr>
</tbody>
</table>

**Product adaptations**

- Customisable colours and labels
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay
- Adjustable fixed hysteresis

**Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>
## Supply

- **Supply voltage Un**: 120 to 277 V
- **Voltage supply tolerance**: -15% / +10%
- **Operating range**: 102 to 308 V
- **Supply voltage frequency**: 50/60 Hz ± 15%
- **Immunity from micro power cuts**: 10 ms

## Inputs and measuring circuit

- **Measuring range**: 40 to 70 Hz
- **Max. measuring cycle time**: 200 ms
- **Adjustment of upper threshold**: -2, +0, +2, +4, +6, +8, +10 Hz
- **Adjustment of lower threshold**: +2, -0, -2, -4, -6, -8, -10 Hz
- **Fixed hysteresis**: 0.3 Hz
- **Display precision**: ±10% of full scale
- **Repetition accuracy with constant parameters**: ±0.5%
- **Measuring error with voltage drift**: <±1% across the whole range
- **Measuring error with temperature drift**: ±0.05% / °C

## Timing

- **Delay on threshold crossing**: 0.1 to 10 s
- **Display precision**: ±10% of full scale
- **Reset time**: 2 s
- **Delay on pick-up**: 500 ms

## Output

- **Type of output**: 2 single pole changeover relay
- **Type of contacts**: NH switching
- **Maximum breaking voltage**: 250 V
- **Max. breaking current**: 5 A
- **Min. breaking current**: 10 mA / 5 V
- **Electrical life (number of operations)**: 1 x 10^4
- **Breaking capacity (resistive)**: 1250 VA
- **Maximum rate**: 360 operations/hour at full load
- **Operating categories acc. to IEC 60947-5-1**: AC 12, AC 13, AC 14, AC 15, DC 12, DC 13, DC 14
- **Mechanical life (operations)**: 30 x 10^6
- **Insulation coordination (IEC 60664-1 / 60255-5)**: Overvoltage category III: degree of pollution 3
- **Rated impulse withstand voltage**: 4 KV (1.2 / 50 µs)
- **Dielectric strength**: 2 KV / 50 Hz 1 min.
- **Insulation resistance**: >500 MΩ / 500 V
- **Display power supply**: Green LED
- **Display relay**: 2 x yellow LEDs - These LEDs flash during the threshold time delay
- **Casing**: 35 mm
- **Mounting**: IP20
- **Material: enclosure plastic type VO to UL94 standard
- **Protection (IEC 60529)**: Terminal block: IP65
- **Ceiling (IP60)**
- **Max. tightening torques IEC 60947-5-1**: 0.6 to 1Nm / 5.3 to 8.8 Lbf.In
- **Operating temperature**: IEC 60068-2 -20 to +50°C
- **Storage temperature**: IEC 60068-2 -40 to +70°C
- **Humidity**: IEC 60068-2-30

### General characteristics

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**Marking**: CE (LVD) 73/23/EEC - EMC 89/336/EEC

**Product standards**: IEC 61000-6-2 / IEC 61000-6-3 / IEC 61000-6-4

**Electromagnetic compatibility**: Immunity EN 61000-4-2 / EN 61000-4-3 / IEC 61000-4-4

**Certifications**: UL, CSA, GL pending

**Conformity with environmental directives**: RoHS, WEEE
**Frequency control**

**Principles**

**Overview**
The HHZ control relay controls frequency variations on 50 or 60 Hz networks. It can be used to monitor under and overfrequency, by setting two independent thresholds. It has two relay outputs: one per threshold.

**Operating principle**

**HHZ - Over and underfrequency controller**

Function selector switch:
Set the selector switch to the 50 or 60 Hz frequency of the network being monitored, select with or without memory mode. The switch position, and hence the operating mode, is read by the product on energisation.

If the switch is set to a non-conforming position on energisation, the product goes into fault mode, the output relay stays open and the LEDs flash to signal the position error.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the function selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

The relay monitors its own supply voltage.

The over and underfrequency threshold values are set using two potentiometers, graduated with the drift value of the frequency to be monitored.

A x1/x2 switch can be used to double the control scale. The hysteresis is set at 0.3 Hz.

When the unit is powered up with a measured fault, the relay stays open.

**HHZ - Under and overfrequency - without latching**

If the frequency of the controlled voltage exceeds the preset overfrequency threshold for longer than the time set on the front face (0.1 to 10 s), the corresponding output relay opens and its LED is extinguished. During the time delay, this LED flashes. Once the frequency falls below the value of the threshold minus the hysteresis, the relay closes instantly.

If the frequency of the controlled voltage falls below the underfrequency threshold for longer than the time set on the front face (0.1 to 10 s), the corresponding output relay opens and its LED is extinguished. During the time delay, this LED flashes. Once the frequency rises above the threshold value plus the hysteresis, the relay closes instantly.

**HHZ - Under and overfrequency - with latching**

If "with memory" mode has been selected, the relay opens and stays in this position when threshold crossing is detected. The power supply must be disconnected to reset the product.
Dimensions (mm)

HHZ

Connections

HHZ

1 A fast-blow fuse or cut-out
**Level control**

Level control relay - 17.5 mm

- Level control by means of a discrete sensor

---

**Part numbers**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNS</td>
<td>By discrete sensor</td>
<td>24 V = 240 V ~</td>
<td>84800000</td>
</tr>
</tbody>
</table>

**Product adaptations**

- Customisable colours and labels
- Fixed time delay or adjustable range

---

**Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 17.5 mm casing</td>
<td>84800000</td>
</tr>
</tbody>
</table>

---

**General characteristics**

**Supply**

- Supply voltage Un: 24 V = 240 V ~
- Operating range: 18.5 V ~ 264 V
- Supply voltage frequency: 50/60 Hz ± 10%
- Power consumption at Un: 5.5 VA in ~ 0.4 W in
- Immunity from micro power cases: ± 5 ms

**Inputs and measuring circuit**

- Display precision: ±10% of full scale
- Higher probe input circuit: Volt-free contact
- Max. voltage at probe terminals: Supply voltage Un
- Minimum pulse formation test duration: 50 ms
- Max. input current: 1 mA
- Max. length of probe cables: 100 m

**Delay on threshold crossing**

10 ms (1±10%)

**Reset time**

< 100 ms

**Optional**

- Type of output: 1 single pole changeover relay
- Type of contacts: No cadmium
- Maximum breaking voltage: 250 V ~
- Max. breaking current: 5 A ~
- Min. breaking current: 10 mA / 5 V ~

**Electrical life (number of operations)**

1 x 10^6

**Breaking capacity (resistive)**

1250 VA ~

**Maximum rate**

3500 operations/hour for all load

**Operating categories acc. IEC 60947-5-1**

- AC-1: AC-14; AC-15; DC-12; DC-13; DC-14

**Mechanical life (operations)**

30 x 10^6

**Nominal insulation voltage IEC 60664-1**

250 V

**Insulation coordination (IEC 60664-1 / 60255-5)**

- Overvoltage category III: degree of pollution 3

**Voltage isolation (IEC 60664-1 / 60255-5)**

- 2 kV AC 50 Hz 1 min

**Insulation resistance (IEC 60664-1) > 10^12 / 500 V ~**
## General characteristics

**Display power supply**: Green LED

**Display relay**: Yellow LED

**Casing**: 17.5 mm

**Mounting**: On 35 mm symmetrical DIN rail, IEC/EN 60715

**Mounting position**: All positions

**Protection (IEC 60529)**
- Terminal block: IP 20
- Casing: IP 30

**Weight**: 80 g

**Connecting capacity**
- Rigid: 1 x 42 - 2 x 2.5 mm², 1 x 11 AWG - 2 x 14 AWG
- Flexible with ferrules: 1 x 2.5 - 2 x 1.5 mm², 1 x 14 AWG - 2 x 16 AWG

**Max. tightening torques**
- IEC 60947-1: 0.6 ➞ 1 Nm / 5.3 ➞ 8.8 Lbf.In

**Operating temperature**
- IEC 60068-2-2: +20°C ➞ +50°C

**Storage temperature**
- IEC 60068-2-2: +40°C ➞ +70°C

**Humidity**
- IEC 60068-2-30: 2 x 24 hr cycle 95% RH max. without condensation 55°C

**Vibrations according to IEC/EN60068-2-6**
- 10 ➞ 150 Hz, A = 0.035 mm

**Shocks**
- IEC 60068-2-6: 5 g

**Standards**
- Product standard: NF EN 60255-6 / CEI 60255-6 / UL 508 / CSA C22.2 N°14
- Electromagnetic compatibility
  - Immunity: EN 61000-6-2/IEC 61000-6-2
  - Emission: EN 61000-6-4/EN 61000-6-3
  - Emission: EN 55022 class B
- Certifications: UL, CSA, GL pending
- Conformity with environmental directives: RoHS, WEEE

## Operating principle

**MNS - Level controller using a discrete sensor**

This product is designed to control a level by means of a discrete probe (float switch). On power-up, the relay remains in the rest position. The level control function only begins after the pushbutton (PB) is pressed. This pushbutton is located on the front of the product, but can also be remotely located between Y1 and A1.

The output relay only closes if the float switch is open. If the level rises enough to make the float switch close, the relay will be deactivated after the time delay Toff.

When the level drops and the probe opens, the relay is re-energised after the time delay Ton.

The LEDs flash when the product is energised but the cycle has not started (PB has not yet been pressed).

The time delays Ton and Toff are set at between 0.1 and 10 sec by means of two potentiometers on the front face.

## Principles

1. Cycle start PB
2. High threshold level
3. Monitored level
4. Ton time delay
5. Toff time delay

## Dimensions (mm)

### MNS

```
Dimensions (mm)

L1: 60
L2: 44
L3: 23
L4: 17.5
N: 90
```

## Connections

```
Connections

1 A fast-blow fuse or cut-out
"Float" switch

- Cycle start PB
- High threshold level
- Monitored level
- Ton time delay
- Toff time delay

L1: 100 μF/3937 nl
```

1. Cycle start PB
2. High threshold level
3. Monitored level
4. Ton time delay
5. Toff time delay
Level control

→ Level control relay - 35 mm

- Control of one or two levels
- Filling or emptying function
- HNM: Control by a resistive level probe
- HNE: Control by a discrete sensor

### Part numbers

<table>
<thead>
<tr>
<th>Sensing</th>
<th>HNM</th>
<th>HNE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>By resistive probes</td>
<td>By discrete sensors</td>
</tr>
<tr>
<td>Part numbers</td>
<td>84870700</td>
<td>84870710</td>
</tr>
</tbody>
</table>

### Product adaptations

- Customisable colours and labels
- Fixed or adjustable time delay
- Adaptation dedicated to HNM:
  - Fixed threshold in the generic measurement range

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>84800001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General characteristics

<table>
<thead>
<tr>
<th>Supply</th>
<th>HNM</th>
<th>HNE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption at Un</td>
<td>5 VA in / 1.5 W in</td>
<td>5 VA in / 2.7 W in</td>
</tr>
<tr>
<td>Immunity from micro power cuts (ms)</td>
<td>90 max. in 100 max. en</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of output</td>
<td>1 double changeover relay</td>
<td>1 single pole changeover relay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum reset time</td>
<td>4 s</td>
<td>1.7 s</td>
</tr>
<tr>
<td>Timing circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>250 Ω = 1 MΩ</td>
<td>-</td>
</tr>
<tr>
<td>Low sensitivity adjustment gamme Ls</td>
<td>5 kΩ = 100 kΩ</td>
<td>-</td>
</tr>
<tr>
<td>High sensitivity adjustment gamme Hs</td>
<td>50 kΩ = 1 MΩ</td>
<td>-</td>
</tr>
<tr>
<td>Adjustment of sensitivity</td>
<td>90% - 100% of the selected range</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display precision</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>± 2% of full scale for Ls- and St ranges</td>
<td>± 2% of full scale</td>
<td>± 2% of full scale</td>
</tr>
<tr>
<td>± 4% of +4% of full scale for Hs range</td>
<td>± 4% of full scale</td>
<td>± 4% of full scale</td>
</tr>
</tbody>
</table>

| Measuring error with temperature drift                | 0.5%/°C in standard sensitivity | 0.5%/°C in standard sensitivity |
| Measuring error with voltage drift                    | 0%/V across the whole range     | 0%/V across the whole range     |
| Max. voltage at probe terminals                        | 10 V 150 Hz ± 10%               | 12 V                           |
| Max. current via probe                                 | 4 mA                            | 42 mA                          |
| Max. length of probe cables (nF)                       | 1.7 nF for Hs range 2.2 nF for St range 4.7 nF for Ls range | - |
| Max. capacity of probe cable (nF)                      | No                              | - |
| Input circuit 3-wire sensors                          |       |       |

<table>
<thead>
<tr>
<th>General characteristics</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>115 g</td>
<td>110 g</td>
</tr>
</tbody>
</table>
## General characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply</strong></td>
<td></td>
</tr>
<tr>
<td>Supply voltage Un</td>
<td>24 V → 240 V ~</td>
</tr>
<tr>
<td>Voltage supply tolerance</td>
<td>18% → 12%</td>
</tr>
<tr>
<td>Operating range</td>
<td>20.4 → 264 V ~</td>
</tr>
<tr>
<td>Supply with AC voltage</td>
<td>No</td>
</tr>
<tr>
<td>~supply voltage frequency</td>
<td>50/60 Hz ± 10%</td>
</tr>
<tr>
<td><strong>Voltage supply tolerance</strong></td>
<td>-15% / +10%</td>
</tr>
<tr>
<td><strong>Operating range</strong></td>
<td>20.4 → 264 V ~</td>
</tr>
<tr>
<td><strong>Polarity with DC voltage</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Supply voltage frequency</strong></td>
<td>50/60 Hz ± 10%</td>
</tr>
<tr>
<td><strong>Delay on threshold crossing</strong></td>
<td>0.1 s (0% → 10%)</td>
</tr>
<tr>
<td><strong>Repetition accuracy with threshold</strong></td>
<td>± 2%</td>
</tr>
<tr>
<td><strong>Delay on pick-up</strong></td>
<td>500 ms</td>
</tr>
<tr>
<td><strong>Type of contacts</strong></td>
<td>No cadmium</td>
</tr>
<tr>
<td><strong>Maximum breaking voltage</strong></td>
<td>250 V ~</td>
</tr>
<tr>
<td><strong>Max. breaking current</strong></td>
<td>15 mA / 5 V ~</td>
</tr>
<tr>
<td><strong>Min. breaking current</strong></td>
<td>1 A</td>
</tr>
<tr>
<td><strong>Breaking capacity (resistive)</strong></td>
<td>1 250 VA ~</td>
</tr>
<tr>
<td><strong>Maximum rate</strong></td>
<td>50 operations/hour at full load</td>
</tr>
<tr>
<td><strong>Operating categories acc. IEC 60947-5-1</strong></td>
<td>AC-14, AC-15, AC-16, UL-14, UL-15, UL-16</td>
</tr>
<tr>
<td><strong>Mechanical life (operations)</strong></td>
<td>30 x 10^6</td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Nominal insulation voltage IEC 60664-1</strong></td>
<td>250 V</td>
</tr>
<tr>
<td><strong>Stated impulse withstand voltage IEC 60664-1/60255-5</strong></td>
<td>4 kV 1/2 50 μs</td>
</tr>
<tr>
<td><strong>Dielectric strength IEC 60664-1/60255-5</strong></td>
<td>2 kV AC 50 Hz 1 min.</td>
</tr>
<tr>
<td><strong>Rated impulse withstand voltage</strong></td>
<td>&gt; 500 kV/750 V ~</td>
</tr>
<tr>
<td><strong>Dielectric strength</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Insulation resistance IEC 60664-1/60255-5</strong></td>
<td>&gt; 500 MΩ/500 V ~</td>
</tr>
<tr>
<td><strong>General characteristics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Display power supply</strong></td>
<td>Green LED</td>
</tr>
<tr>
<td><strong>Display relay</strong></td>
<td>Yellow LED</td>
</tr>
<tr>
<td><strong>Delay</strong></td>
<td>Yellow LED</td>
</tr>
<tr>
<td><strong>Casing</strong></td>
<td>35 mm</td>
</tr>
<tr>
<td><strong>Mounting position</strong></td>
<td>All positions</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>Incandescent wire test according to IEC 60695-2-11 &amp; NF EN 60695-2-11</td>
</tr>
<tr>
<td><strong>Voltage supply tester</strong></td>
<td>Yellow 1x 30 mm / White 1x 15 mm / Red 1x 5 mm / Blue 1x 10 mm</td>
</tr>
<tr>
<td><strong>Connecting capacity IEC 60841-1</strong></td>
<td>1 x 4 x 2.5 x 2.5 mm / 2 x 4 x 4 mm / 2 x 2 x 2 mm / 1 x 1 x 1 mm</td>
</tr>
<tr>
<td><strong>Max. tightening torque IEC 60841-1</strong></td>
<td>2.5 Nm / 5.5 ft-lb</td>
</tr>
<tr>
<td><strong>Operating temperature IEC 60898-2</strong></td>
<td>-25 → +50 °C</td>
</tr>
<tr>
<td><strong>Storage temperature IEC 60898-2</strong></td>
<td>-25 → +70 °C</td>
</tr>
<tr>
<td><strong>Humidity IEC 60898-2-30</strong></td>
<td>2 ± 40% Phillips 30% / 90% RH max. without condensation up to 50 °C</td>
</tr>
<tr>
<td><strong>Vibration according to IEC/EN 60068-2-6</strong></td>
<td>15 = 100 Hz A = 0.025 mm</td>
</tr>
<tr>
<td><strong>Shock IEC 60068-2-9</strong></td>
<td>5 g</td>
</tr>
<tr>
<td><strong>Marking</strong></td>
<td>C (LVD) 73/23/EEC - EMC 89/336/EEC</td>
</tr>
<tr>
<td><strong>Product standard</strong></td>
<td>NF EN 60255-6 / IEC 60255-6 / UL 1577 / CSA C22.2 No 14</td>
</tr>
<tr>
<td><strong>Electromagnetic compatibility</strong></td>
<td>Immunity EN 61000-4-4:2003/EN 61000-4-8</td>
</tr>
<tr>
<td><strong>Certifications</strong></td>
<td>UL, CSA, GL pending</td>
</tr>
<tr>
<td><strong>Conformity with environmental resolutions</strong></td>
<td>Norfe, VDE, UL</td>
</tr>
</tbody>
</table>

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### Level control

#### Principles

**HNM-HNE**

**Overview**

HNM and HNE control relays are designed to monitor the levels of:

- Conductive liquid (HNM)
- Any other product (HNE)

The HNM relay takes its measurements by means of resistive probes. The HNE relay takes its measurements by means of discrete sensors.

Both these products actuate their output relay during emptying or filling of a tank.

**General principle**

HNM relays control levels of conductive liquids. The principle is based on measuring the apparent resistance of the liquid between two submerged probes. When this value is below the preset threshold displayed on the front face of the unit, the relay changes state. To avoid electrolytic phenomena, an AC current runs across the probes. A rotary switch on the front face can be used to select the desired function and sensitivity range.

HNE relays control levels of products which may or may not be conductive. High and low-level data is produced by 3-wire output discrete sensors.

- A green LED indicates the presence of the supply voltage.
- A yellow LED indicates the status of the output relay.
- A yellow LED flashes during the time delay.

**Parameter setting**

- A rotary switch on the front face can be used to select the sensitivity range, and the emptying or filling function.
- A second switch can be used to select the number of levels (1 or 2), as well as the type of time delay in the case of 1-level mode.
- The configuration of these switches is taken into account on energisation.
- If the switch is set to a non-conforming position on energisation, the product goes into fault mode, the output relay stays open and the LEDs flash to signal the position error.
- If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the function selected on energisation prior to the change of position.
- The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

#### HNM-HNE - Emptying/filling function - two levels

**Control of two levels, emptying function**

- Level 1: 100 kΩ to 1 MΩ, HS emptying (High sensitivity: 50 kΩ to 1 MΩ).

As long as the liquid level has not reached the probe maximum, the output relay stays open. Once the max. level is reached, the contact closes, thus allowing the tank to empty (valve opens, pump starts, etc.). When the liquid drops below the min. level, the contact opens again and pumping restarts so as to make the liquid level rise again.

**Control of two levels, filling function**

- Level 1: 100 kΩ to 1 MΩ, LS emptying (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 250 kΩ to 5 kΩ, HS emptying (High sensitivity: 5 kΩ to 100 kΩ).

As long as the liquid level has not reached the probe maximum, the output relay stays closed. Once the max. level is reached, the contact opens and pumping stops. When the level drops below the min. level, the contact closes again and pumping restarts so as to make the liquid level rise again.

**Parameter setting**

- A rotary switch on the front face can be used to select the sensitivity range, and the emptying or filling function.
- A second switch can be used to select the number of levels (1 or 2), as well as the type of time delay in the case of 1-level mode.

**HNM-HNE - One-level filling function/off-delay**

**One-level control (min. probe), filling function, off-delay**

- Level 1: 100 kΩ to 1 MΩ, LS emptying function (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 500 kΩ to 250 kΩ, HS emptying function (High sensitivity: 5 kΩ to 100 kΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay T1 set on the front face, the relay closes and stays closed until the liquid level reaches the probe again.

**HNM-HNE - One-level filling function/on-delay**

**One-level control (min. probe), filling function, on-delay**

- Level 1: 100 kΩ to 1 MΩ, LS filling function (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 500 kΩ to 250 kΩ, HS filling function (High sensitivity: 5 kΩ to 100 kΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay T1 set on the front face, the relay opens and stays open until the liquid level reaches the probe again and stays above it for a duration longer than time delay T1 set on the front face.

**HNM-HNE - One-level filling function/off-delay**

**One-level control (min. probe), filling function, off-delay**

- Level 1: 100 kΩ to 1 MΩ, LS filling function (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 500 kΩ to 250 kΩ, HS filling function (High sensitivity: 5 kΩ to 100 kΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay T1 set on the front face, the relay closes and stays closed until the liquid level reaches the probe again.

**HNM-HNE - One-level filling function/on-delay**

**One-level control (min. probe), filling function, on-delay**

- Level 1: 100 kΩ to 1 MΩ, LS filling function (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 500 kΩ to 250 kΩ, HS filling function (High sensitivity: 5 kΩ to 100 kΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay T1 set on the front face, the relay opens and stays open until the liquid level reaches the probe again and stays above it for a duration longer than time delay T1 set on the front face.

**HNM-HNE - One-level filling function/off-delay**

**One-level control (min. probe), filling function, off-delay**

- Level 1: 100 kΩ to 1 MΩ, LS filling function (Low sensitivity: 5 kΩ to 100 kΩ).
- Level 2: 500 kΩ to 250 kΩ, HS filling function (High sensitivity: 5 kΩ to 100 kΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay T1 set on the front face, the relay closes and stays closed until the liquid level reaches the probe again.
**Principles**

**HNM-HNE - One-level emptying function/on-delay**

One-level control (min. probe), emptying function, on-delay

(Low sensitivity: 5 kΩ to 50 kΩ), HN emptying (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level rises above the probe for a duration longer than the value of time delay T_{t} set on the front face, the relay closes and stays closed until the liquid level drops back below the probe.

If the liquid level drops back below the level set before the end of the time delay, the relay does not close.

**HNM-HNE - One-level emptying function/off-delay**

One-level control (min. probe), emptying function, off-delay

(Low sensitivity: 250 Ω to 5 kΩ), HN emptying (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level rises above the probe, the relay closes instantly and stays closed until the liquid level drops back below the probe for a duration longer than the value of time delay T_{t} set on the front face.

If the liquid level rises back above the level set before the end of the time delay, the relay stays closed.

**Dimensions (mm)**

**Connections**

1. A fast-blow fuse or cut-out
2. Common

**NB:** Probe cable: screened cable recommended, screening and “common” connected to earth. The probe cable does not have to be screened, but it is advisable to mount it close to the power cables. For mono level, use the “com” and “min.” electrodes.

1. A fast-blow fuse or cut-out

**NB:** Probe cable: screened cable recommended, screening and “common” connected to earth. The probe cable does not have to be screened, but it is advisable to mount it close to the power cables. For mono level, use the “com” and “min.” electrodes.
## Level control

### Electrode and probe holders

#### Level control accessories

<table>
<thead>
<tr>
<th>Part numbers</th>
<th>Accessories</th>
<th>Operating temperature (°C)</th>
<th>Pressure</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>S8</td>
<td>Light and compact 3 probe electrode holder (stainless steel) Electrode holder and 1000 mm probe Especially recommended for drinks dispensers and for applications where space is limited</td>
<td>80</td>
<td>2 Kg/cm²</td>
<td>79 696 044</td>
</tr>
<tr>
<td>S4</td>
<td>Electrode holder with a single probe supplied in a standard length of 1000 mm. (304 stainless steel) Mounting with external 3/8” BSP thread and hexagonal head. Use 24 mm. spanner for hexagon. Suitable for use on boilers, autoclaves</td>
<td>≤ 300</td>
<td>Max.: 26 Kg/cm²</td>
<td>79 696 014</td>
</tr>
<tr>
<td>S7</td>
<td>Protected electrode for mounting by suspension. Protective shell: PUC (S7) Electrode: stainless steel Length of cable as requested (ref. C1) : 79 696 001</td>
<td>350</td>
<td>Max.: 15 Kg/cm²</td>
<td>79 696 006</td>
</tr>
<tr>
<td>S5</td>
<td>Suitable for high pressures and high temperatures. Metal parts of stainless steel, isolated by ceramic. 3/8” BSP mounting thread.</td>
<td>350</td>
<td>Max.: 15 Kg/cm²</td>
<td>79 696 006</td>
</tr>
</tbody>
</table>

#### Dimensions (mm)

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>79 696 014</td>
<td>G 3/3A 60 65 1000</td>
</tr>
<tr>
<td>S7</td>
<td>79 696 043</td>
<td>C1 80 60</td>
</tr>
<tr>
<td>S5</td>
<td>79 696 041</td>
<td>49 46 29 60 84</td>
</tr>
</tbody>
</table>

Electrode holder with a single probe supplied in a standard length of 1000mm. (304 stainless steel). Mounting with external 3/8” BSP thread and hexagonal head. Use 24 mm. spanner for hexagon. Suitable for use on boilers, autoclaves and under high temperature conditions up to 200°C and high pressure conditions up to 25 kg/cm².

Protected electrode for mounting by suspension. Protective shell: PUC (S7) Electrode: stainless steel Length of cable as requested (ref. C1) : 79 696 001

Suitable for high pressures and high temperatures. For use up to 350 °C and 15 kg/cm² Metal parts of stainless steel, isolated by ceramic. 3/8” BSP mounting thread.
Light and compact 3-probe electrode holder (stainless steel).
Electrode holder and 1000 mm probe.
Especially recommended for drinks dispensers and for applications where space is limited.

Operating temperature: 80 °C
Max. pressure: 2 kg/cm²

Dimensions (mm)
79 696 044 - S8
Speed control

Speed control relay - 35 mm

- Control of overspeed, underspeed, operating rate, stopping
- Measurement via discrete sensors - 3-wire PNP or NPN, voltage 0-30V or volt-free contact type
- Works with either NO or NC sensors
- Time between pulses adjustable from 0.05 s to 10 min.
- Power-on inhibit time, adjustable from 0.6 to 60 s
- Inhibit time can be managed via an external contact

Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV</td>
<td>24 → 240 V</td>
<td></td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels
- Possible to delete settings
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay

Accessories

- Removable sealable cover for 35 mm casing

General characteristics

Supply:
- Supply voltage Un: 24 V → 240 V
- Voltage supply tolerance: ±15% / +10%
- Operating range: 23.4 V → 264 V
- Power supply voltage: 220 → 60 Hz ±10%
- Frequency of measured signal: 1.5 mHz minimum, 22 Hz maximum
- Measurement ranges: 0.5 s - 1 s - 5 s - 10 s - 1 min - 5 min - 10 min
- Threshold adjustment: ±10% of full scale
- Fixed hysteresis: 5% of displayed threshold
- Display precision: ±0.1% of full scale
- Measuring error with temperature drift: ±0.1% / °C max.
- Measuring error with temperature drift: ±0.1% / °C max.
- Galvanic isolation of power supply/measurement: Yes
- Power consumption at Un: 5 VA or ~3 W

Inputs and measuring circuit:
- Input circuit 3-wire sensors PNP or NPN: 12 V, 50 mA max.
- Input circuit NAMUR sensor: 12 V / 1.5 KΩ*
- Input circuit Contact: 12 V / 9.5 KΩ*
- Input circuit Voltage input: 0 V min. / 30 V max. / 9.5 KΩ*
- High state: 4.5 V min.
- Low state: 1 V max.
- Minimum pulse time: 5 ms in high and low state
- Frequency of measured signal: 1 Hz for maximum / 10 Hz for maximum

Timing:
- Maximum threshold crossing response time: 15 ms
- Reset time: 0 ms (memory mode: power breaks - 1500 ms maximum)
- Reset time delay: Un energisation: 0.6 → 50 s (±10% of full scale)
- Reset time delay: 50 ms
- Display precision: ±10% of full scale
General characteristics

**Output**
- Type of output: 1 single pole changeover relay
- Type of contacts: No cadmium
- Maximum breaking voltage: 250 V
- Max. breaking current: 5 A
- Minimum life of operation: 1 x 10^5
- Breaking capacity: 1250 VA
- Maximum rate: 360 operations/hour at full load
- Operating categories: AC 12, AC 13, AC 14, AC 15, DC 12, DC 13, DC 14
- Mechanical life (operations): 30 x 10^6

**Insulation**
- Nominal insulation voltage: IEC 60664-1: 250 V
- Rated impulse withstand voltage: IEC 60664-1: 4 kV (1.2/50 µs)
- Dielectric strength: IEC 60664-1: 2 kV AC 50 Hz 1 min
- Insulation resistance: IEC 60664-1: > 500 MΩ / 500 V

**Electrical life (number of operations):**
- 1 x 10^5

**Vibrations according to IEC/EN60068-2-6:**
- 10 → 150 Hz, A = 0.035 mm

**Standards**
- CE (LVD) 73/23/EEC - EMC 89/336/EEC
- Electromagnetic compatibility:
  - Immunity: EN 61000-6-2, IEC 61000-6-3
  - Emission: EN 55022, IEC 61000-6-3
- RoHS
- WEEE

**Protection (IEC 60529):**
- Terminal blocks: IP20
- Casing: IP30

**Weight:**
- 120 g

**Operating temperature:**
- IEC 60068-2: -20 → +50°C

**Storage temperature:**
- IEC 60068-2: -40 → +70°C

**Humidity:**
- IEC 60068-2-30: 55°C

**Certifications:**
- UL, CSA, GL pending

**Conformity with environmental directives:**
- RoHS, WEEE

**Comments:**
- The IEC 60947-5-6/1999-12 NAMUR standard does not impose the operating voltage (open circuit voltage) or the load resistance (source resistance of the control amplifier), but it defines the test conditions for which, using the sensor voltage/current characteristics with high and low impedance, the normal operating zones are specified. The great majority of NAMUR sensors use a 12 V supply voltage. Matching the load resistance to the operating voltage allows the nominal switching distance to be maintained.
 HSV relay controls the speed (or, more strictly speaking, the operating rate, or frequency) of a process (moving walkway, conveyor, etc.) using discrete sensors:
- 3-wire PNP or NPN output proximity sensor
- voltage input 0 - 30 V
- NAMUR proximity sensor
- volt-free contact

It can be used to monitor under OR overspeed

Operating principle
Measurement
The monitored process cycle is the succession of pulses characterised by a signal with two states: high and low. The speed measurement is obtained by measuring the duration of this signal, from the first detected change of state (either a rising or falling edge).

Digital signal processing avoids the problem of disparity of signals.

From energisation, or after the appearance (or reappearance) of the sensor signal, detection (characterisation) of the signal requires processing of one or more periods (two maximum).

During this time, control is inoperative.

Operating mode
Using the selector switch, select one of four modes:
- Underspeed without latching
- Underspeed with latching
- Overspeed without latching
- Overspeed with latching

If, on energisation, the switch is placed in one of the three intermediate positions (between “underspeed with latching” and “overspeed with latching”), the relay stays in the rest state ("alarm") and the error is signalled by all three LEDs flashing simultaneously.

The mode selector switch position is taken into account on energisation.

Modifications made during operation will have no effect: the active configuration may therefore be different from that indicated by the switch, the relay operates normally but the change in configuration is signalled by all three LEDs flashing simultaneously.

Latching
In “memory” mode, when a fault has been recorded, the HSV relay latches in the rest position (“alarm” operational state). Once the speed is correct again, the relay can be un latch ed (reset) by closing contact S2 (for 50 ms minimum).

Irrespective of the speed of the controlled process, when S2 is closed the HSV relay is inhibited, the output is at the operating point (“normal” operational state). The relay stays in the rest position (“alarm” operational state).

The HSV can also be reset, by switching off and on again several times in succession (the power break must last at least 1500 ms).

If the process speed is incorrect, this method is limited by the same restriction as resetting using S2.

HSV - Control of underspeed without latching

After the end of the inhibit delay on starting, "Ti", as soon as the measured speed drops below the threshold value, the output relay changes state, from operating point to rest position ("alarm" operational state, 11-12 open and 11-13 closed).

It returns to the initial state when the speed is above the threshold plus the hysteresis (fixed at 5% of the displayed threshold).

After the power supply returns, following a break that has lasted at least 1500 ms, the relay is in the ("normal") operating state during the time delay and stays there until the speed is above the threshold.
When the HSV has been configured in "memory" mode, if underspeed is detected, the output relay stays in the rest state ("alarm") irrespective of any subsequent change in the speed of the process. It will not be able to revert to ("normal") operating state until contact S2 closes (50 ms minimum). If, when S2 reopens, the speed is inadequate, the relay reverts to the rest latched state ("alarm").

The HSV can also be reset by a power break (1500 ms minimum) ; the relay then returns to the ("normal") operating state for at least the duration of the time delay, irrespective of the speed of the process.

---

**HSV - Control of underspeed with latching**

<table>
<thead>
<tr>
<th>1 Voltage (S1)</th>
<th>2 Contact S2</th>
<th>3 Threshold</th>
<th>4 Inhibit LED</th>
<th>5 Relay</th>
<th>6 Inhibit delay on starting (Ti)</th>
<th>7 Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (S1)</td>
<td>Contact S2</td>
<td>Threshold</td>
<td>Inhibit LED</td>
<td>Relay</td>
<td>Inhibit delay on starting (Ti)</td>
<td>Speed</td>
</tr>
</tbody>
</table>

On energisation, to allow the controlled process to reach its nominal operating speed, the HSV relay is inhibited for a period that is adjustable from 0.6 to 60 seconds. This time delay can be modified during inhibition to be shorter or longer. The HSV relay can also be inhibited by the closing of contact S2: on starting, for example, if the process acceleration time is more than 60 s, or at any time during operation. Irrespective of the origin (delay on starting or S2 closing), inhibition maintains the output relay in the "closed" state ("normal" operational state, contacts 11-14 closed and 11-12 open) and is signalled by the Inhibit LED lighting up. If, after removal of the inhibition (end of delay on starting or opening of contact S2), the signal detection phase has not ended, the relay drops out after the expected time between two pulses (measured from the end of inhibition). Inhibition must last for as long as required for the product to detect at least 2 periods. Similarly, during operation, it is possible to inhibit the HSV relay at any time by closing S2.

---

**HSV - Control of overspeed without latching**

<table>
<thead>
<tr>
<th>1 Voltage (S1)</th>
<th>2 Threshold</th>
<th>3 Inhibit LED</th>
<th>4 Relay</th>
<th>5 Inhibit delay on starting (Ti)</th>
<th>6 Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (S1)</td>
<td>Threshold</td>
<td>Inhibit LED</td>
<td>Relay</td>
<td>Inhibit delay on starting (Ti)</td>
<td>Speed</td>
</tr>
</tbody>
</table>

After the end of the inhibit delay on starting, "Ti", as soon as the measured speed rises above the threshold value, the output relay changes state, from operating point to rest position ("alarm" operational state, 11-14 open and 11-12 closed). It returns to the initial state when the speed falls back below the threshold minus the hysteresis (fixed at 5% of the displayed threshold). After a power break that has lasted at least 1500 ms, the relay is in the ("normal") operating state during the time delay and stays there until the speed is below the threshold.
**Speed control**

**Principles**

HSV - Control of overspeed with latching

When the HSV has been configured in “memory” mode, if overspeed is detected, the output relay stays in the rest state (“alarm”) irrespective of any subsequent change in the speed of the process. It will not be able to revert to (“normal”) operating state until contact S2 closes (50 ms minimum). If, when S2 reopens, the speed is too high, the relay reverts to the rest latched state (“alarm”).

The HSV can also be reset by a power break (1500 ms minimum) ; the relay then returns to the (“normal”) operating state for at least the duration of the time delay, irrespective of the speed of the process.

HSV - Overspeed with inhibition by S2

It is possible to inhibit the HSV relay by closing external contact S2 until the process has reached its nominal speed.
HSV - Input circuits

1. S2 Inhibit - Reset
2. Volt-free contact input 12 V, 9.5 kΩ
3. NAMUR proximity sensor input 12 V, 1.5 kΩ
4. 3-wire PNP/NPN proximity switch 12 V, 50 mA max.
5. Voltage input 0 V - 30 V

Dimensions (mm)

Connections
Temperature control relay for lift service rooms - according to EN81 - 35 mm

- Control relay designed to monitor the temperature in lift machine rooms in accordance with standard EN81
- Adjustable control between 5 °C and 40 °C
- Independent setting of high and low thresholds
- Built-in phase control option

**Part numbers**

<table>
<thead>
<tr>
<th>Function</th>
<th>HT81</th>
<th>HT81-2</th>
<th>HWT81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>24 → 240 V (~)</td>
<td>24 → 240 V (~)</td>
<td>24 → 240 V (~)</td>
</tr>
<tr>
<td>3-phase control</td>
<td>56874110</td>
<td>56874120</td>
<td>56874130</td>
</tr>
</tbody>
</table>

**Product adaptations**

- Customisable colours and labels
- Fixed threshold in the generic measurement range
- Fixed or adjustable time delay
- Adjustable fixed hysteresis

**Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

**General characteristics**

<table>
<thead>
<tr>
<th>Inputs and measuring circuit</th>
<th>HT81</th>
<th>HT81-2</th>
<th>HWT81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase control voltage range</td>
<td>240 V → 480 V (~)</td>
<td>240 V → 480 V (~)</td>
<td>240 V → 480 V (~)</td>
</tr>
<tr>
<td>3-phase input resistors</td>
<td>300 KΩ</td>
<td>300 KΩ</td>
<td>300 KΩ</td>
</tr>
<tr>
<td>Frequency of measured signal</td>
<td>50 ± 1 Hz</td>
<td>50 ± 1 Hz</td>
<td>50 ± 1 Hz</td>
</tr>
<tr>
<td>Maximum response time in the event of a 3-phase fault (ms)</td>
<td>10 ms</td>
<td>10 ms</td>
<td>10 ms</td>
</tr>
<tr>
<td>Type of output</td>
<td>2 single pole NO relay</td>
<td>2 single pole NO relay</td>
<td>2 single pole NO relay</td>
</tr>
<tr>
<td>Insulation</td>
<td>Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer)</td>
<td>Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer)</td>
<td>Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer) Yes, between power supply and PT100 (transformer)</td>
</tr>
</tbody>
</table>

**Nominal insulation voltage**

<table>
<thead>
<tr>
<th>HT81</th>
<th>HT81-2</th>
<th>HWT81</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 V</td>
<td>250 V</td>
<td>400 V</td>
</tr>
</tbody>
</table>
### General characteristics

**HT81 / HT81-2 / HWT81**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Un 24 V</th>
<th>240 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Un</td>
<td>24 V</td>
<td>240 V</td>
</tr>
<tr>
<td>Voltage supply tolerance</td>
<td>-15%, +10%</td>
<td>-15%, +10%</td>
</tr>
<tr>
<td>Operating range</td>
<td>20.4 V to 264 V</td>
<td>21.6 V to 264 V</td>
</tr>
<tr>
<td>Polarity with DC voltage</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Voltage supply tolerance (%) in a</td>
<td>-15%</td>
<td>+10%</td>
</tr>
<tr>
<td>Voltage supply tolerance (%) in c</td>
<td>-15%</td>
<td>+10%</td>
</tr>
<tr>
<td>Operating range</td>
<td>20.4 V to 264 V</td>
<td>21.6 V to 264 V</td>
</tr>
<tr>
<td>Power consumption at Un 3.5 VA in a</td>
<td>0.6 W</td>
<td></td>
</tr>
<tr>
<td>Immunity from micro power cuts</td>
<td>10 ms</td>
<td></td>
</tr>
</tbody>
</table>

**Input and measuring circuit**

- **Low temperature measurement selection**: -1°C, 1°C, 3°C, 5°C, 7°C, 9°C, 11°C
- **High temperature measurement selection**: 34°C, 36°C, 38°C, 40°C, 42°C, 44°C, 46°C
- **Temperature measurement input resistance**: 1330 Ω
- **Fixed hysteresis**: 2 °C
- **Display precision**: ± 2%
- **Max. length of PT100 probe cables**: 10 m

**Timing**

- **Delay on threshold crossing**: 1 s to 10 s
- **Display precision**: 0.1 %
- **Reset time**: 8 s
- **Delay on pick-up**: 200 ms
- **Maximum repetitive time on disappearance of fault**: 3 x t for a temperature fault, 50 t ms for a phase fault

**Output**

- **Type of contacts**: No cadmium
- **Maximum breaking voltage**: 250 V
- **Max. breaking current**: 5 A
- **Breaking capacity (resistive)**: 1250 VA
- **Operating categories acc. to IEC 60947-5-1**: AC-1, AC-14, DC-1, DC-13, DC-14
- **Insulation coordination (IEC 60664-1 / 60255-5)**: Overvoltage category III, degree of pollution 3
- **Rated impulse withstand voltage IEC 60664-1/60255-5**: 4 kV (1.2 / 50 µs)
- **Dielectric strength IEC 60664-1/60255-5**: 2 kV 50 Hz 1 min.
- **Insulation resistance IEC 60664-1 / 60255-5**: > 100 MΩ - 500 V

**General characteristics**

- **Display power supply**: Green LED
- **Display temperature**: Yellow LED (HT81, HT81-2)
- **Display phases**: Yellow LED (HT81, HT81-2)
- **High threshold relay**: Yellow LED (HT81, HT81-2)
- **Low threshold relay**: Yellow LED (HT81, HT81-2)
- **Casing**: 35 mm
- **Mounting**: On 35 mm symmetrical DIN rail, IEC/EN 60715
- **Protection (IEC 60529)**: Terminal block: IP 20, IP 30 casing
- **Weight**: 121 g
- **Connecting capacity IEC 60947-1**: 1.0 mm² / 16 A
- **Max. tightening torques IEC 60947-1**: 0.6 Nm
- **Humidity IEC 6068-2-30**: 95% RH max. without condensation 55°C
- **Vibration according to IEC/EN60068-2-6**: 5 g
- **Insulation resistance IEC 6068-2**: 0.5

**Certifications**

- **CE (LVD) 73/23/EEC - EMC 89/336/EEC**
- **Product standard**: NF EN 60255-6 / IEC 60255-6 / UL 508 / CSA C22.2 N°14 / EN 81-1
- **Electromagnetic compatibility**: EN 61000-6-2 / EN 61000-6-4 / EN 61000-6-3

**Conformity with environmental directives**

- **ROHS, WEEE**: Pending

**Comments**

- 3-phase mains with earth
Temperature control in lifts according to EN81

Principles

Overview
Temperature control relays for lift machine rooms are designed for monitoring the temperature between 5 °C and 40 °C according to standard EN81.

HT81 - Under/Overtemperature

HT81 operating principle:
As long as the temperature controlled by the PT100 stays between the two preset thresholds on the front face, the output relay is closed and the yellow LEDs are lit. When the temperature exceeds one of the preset thresholds on the front face (upper or lower threshold), the preset time delay on the front face (Tt) is activated. The yellow LED corresponding to the threshold exceeded (upper or lower) flashes. At the end of the time delay, if the temperature still exceeds one of the preset thresholds, the output relay opens and the yellow LED corresponding to the threshold is extinguished.

The output relay closes instantaneously (at about the response time for disappearance of a fault) when the temperature returns within the window of the two preset thresholds on the front face plus (or minus) the fixed hysteresis. If the PT100 probe is wired incorrectly (missing or short-circuited) the output relays open and all 3 LEDs flash.

HT81-2 - Under/Overtemperature

HT81-2 operating principle:
As long as the temperature controlled by the PT100 stays between the two preset thresholds on the front face, the output relays are closed and their yellow LEDs are lit. When the temperature exceeds one of the preset thresholds on the front face (upper or lower threshold), the preset time delay on the front face (Tt) is activated. The yellow LED corresponding to the threshold exceeded (upper or lower) flashes. At the end of the time delay, if the temperature is still beyond one of the preset thresholds, the corresponding output relay opens and the yellow LED corresponding to the threshold exceeded is extinguished.

The output relay closes instantaneously (at about the response time for disappearance of a fault) when the temperature returns within the window of the two preset thresholds on the front face plus (or minus) the fixed hysteresis. If the PT100 probe is wired incorrectly (missing or short-circuited) the output relays open and all 3 LEDs flash.

HWT81 - Under/Overtemperature

HWT81 operating principle:
As long as the temperature controlled by the PT100 stays between the two preset thresholds on the front face, the temperature relay is closed. When the temperature exceeds one of the preset thresholds on the front face (upper or lower threshold), the preset time delay on the front face (Tt) is activated. The yellow temperature LED on the front face, the temperature relay is closed. As long as the temperature controlled by the PT100 stays between the two preset thresholds on the front face plus or minus the fixed hysteresis. The unit also monitors correct sequencing of phases L1, L2 and L3 of the 3-phase network and the total phase failure in the event of phase regeneration (c70%).

After a time delay on pick-up (t) and as long as the presence and sequence of the phases are correct, relay R2 and the R2 “phase” LED are active. When a fault appears, the “phase” relay opens and the R2 “phase” LED is extinguished instantaneously (response time from the appearance of a fault).

On disappearance of the fault, both relay R2 and the phase control LED are activated (response time from the disappearance of a fault). See “Phase failure and phase sequence” curve on page 67. If the PT100 probe is wired incorrectly (missing or short-circuited), output relay R1 opens and the yellow R1 LED flashes.
Dimensions (mm)

Connections

HT81

1 A fast-blow fuse or cut-out

HT81-2

1 A fast-blow fuse or cut-out

HWT81

1 A fast-blow fuse or cut-out
Pump control

3-phase and single phase pump control relay - 35 mm

- Allows control and monitoring of single phase and 3-phase pumps
- Monitors phase sequence and phase failure
- Checks for undercurrent to protect against running dry
- Checks for overcurrent to protect against overload
- Digital inputs for operation control logic
- True RMS current measurement

<table>
<thead>
<tr>
<th>Measurement ranges</th>
<th>Nominal voltage (V)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A</td>
<td>230 V~ monophase</td>
<td></td>
</tr>
<tr>
<td>3-phase</td>
<td>208 – 480 V~</td>
<td></td>
</tr>
</tbody>
</table>

Product adaptations

- Customisable colours and labels
- Fixed or adjustable time delay
- Fixed threshold in the generic range

Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>
**General characteristics**

### Supply
- Supply voltage Un: 208 V — 480 V
  - 3-phase
- Voltage supply tolerance: -12% / +10%
- "Un" supply voltage frequency: 50/60 Hz ± 10%
- Automatic detection of power supply/measurement: Na
- Power consumption at Un: 5 VA in
- Immunity from micro power cuts: 500 ms

#### Measurement ranges
- 1 A — 10 A

### Input resistance
- E1-L2: 0.01 Ω
- E1-L2: 0.01 M

### E1-L2: 0.01 M
- Pulse overload: 1 sec at 50 Hz
- Frequency of measured signal: 50 / 60 Hz ± 10%
- Permanent overload: 25°C
- Pulses per second: 30 / 60 Hz ± 10%
- Maximum measuring cycle time: 150 ms
- Adjustment of upper threshold: ± 10 A
- Adjustment of lower threshold: ± 10 A
- Fixed hysteresis: ± 5% of displayed threshold

### Display precision
- ±10% of full scale

### Repetition accuracy with constant parameters
- ±0.5%
- ±0.5%

### Timing
- Power up (Ti): 1 to 60 s (0, + 10%)
- Threshold crossing: 0.1 to 10 s (0, + 10%)
- Reset time: 2 s
- Minimum reset time: 300 ms
- Delay on pick-up: 500 ms
- Display on delay time max: 300 ms

### Output
- Type of output: single pole changeover relay
- Maximum breaking voltage: 250 V
- Maximum breaking current: 5 A
- Min. breaking current: 10 mA / 5 V
- Electrical life (number of operations): 1 x 10^6
- Mechanical life (operations): DC 14. DC 30 x 10^6

### Nominal insulation voltage
- IEC 60664-1: 400 V
- Overvoltage category III: degree of pollution 3
- Rated impulse withstand voltage: 4 kV (1.2 / 50 µs)
- Dielectric strength: 2 kV
- Insulation resistance: > 500 MΩ

### www.crouzet.com
Pump control

General characteristics

- **Display power supply**: Green LED
- **Display relay**: Yellow LED
- **Fault indication**: Yellow LED
- **Casing**: 35 mm
- **Mounting**: On 35 mm symmetrical DIN rail, IEC/EN 60715
- **Mounting position**: All positions
- **Protection (IEC 60529)**:
  - Terminal block: IP 20
  - Casing: IP 30
- **Weight**: 100 g
- **Connecting capacity** (IEC 60947-1):
  - Rigid: 1 x 4 - 2 x 2.5 mm²
  - Flexible with ferrules: 1 x 2.5 - 2 x 1.5 mm²
- **Max. tightening torques**: 0.6 ➞ 1 Nm / 5.3 ➞ 8.8 Lbf.In
- **Operating temperature** (IEC 60068-2):
  - -20°C ➞ +50°C
- **Storage temperature** (IEC 60068-2):
  - -40°C ➞ +70°C
- **Humidity** (IEC 60068-2-30):
  - 2 x 24 hr cycle 95% RH max. without condensation 55°C
- **Vibrations** (IEC/EN60068-2-6):
  - 10 ➞ 150 Hz, A = 0.035 mm
- **Shocks** (IEC 60068-2-6):
  - 5 g
- **Standards**:
  - Product standard: NF EN 60255-6 / IEC 60255-6 / UL 508 / CSA C22.2 N°14
  - Electromagnetic compatibility:
    - Immunity: EN 61000-6-2/IEC 61000-6-2
    - Emission: EN 61000-6-4/EN 61000-6-3
  - Certifications: UL, CSA, GL pending
  - Conformity with environmental directives: RoHS, WEEE
- **Comments**: 3-phase mains with earth

Principles

HPC

Overview
The pump controller can operate on a single phase or 3-phase network. It provides 3 functions in one unit:
- Checking current,
- Checking phase presence (in 3-phase mode),
- Checking phase sequence (in 3-phase mode).

These two signals are controlled by volt-free contacts.

Faults are signalled via LEDs, distinguishing the origin of the fault.

Operating principle
Selecting the operating mode
A rotary switch on the front is used to select:
- single control mode,
- dual control mode,
- single-phase or 3-phase network.

The position of this selector switch is only taken into account when the unit is powered up.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the mode selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

HPC - Single control mode

This mode is for controlling a pump based on one external signal (Y1).

After a fault the relay remains open (even if the current returns to normal) and the module can be reinserted in two different ways:
- By a reset: cutting of power supply,
- Or by a reset through pressing an external contact (pushbutton for example) entering the second control input (Y2).

HPC - Dual control mode

This mode is for controlling a pump based on two external signals (Y1, Y2).

After a fault the relay remains open (even if the current returns to normal) and the module can be reinserted in two different ways:
- By a reset: cutting of power supply,
- Or by a reset through pressing an external contact (pushbutton for example) entering the second control input (Y2).
### HPC - Dual control mode

This mode is for controlling a pump based on two external signals (Y1 and Y2). The output relay closes when both input signals are present (Y1 and Y2 closed). It will open as soon as either of these two signals is absent.

If the controller is configured in single phase, it monitors the current drawn by the pump. If the controller is configured in 3-phase, it monitors current, phase sequence and phase failure. If a phase fault is detected, the output relay opens immediately. On energisation, the output relay cannot be closed if there is a phase fault or phase failure.

<table>
<thead>
<tr>
<th>Current fault</th>
<th>Relay</th>
<th>Fault monitoring inhibit time on pump start-up (Ti)</th>
<th>Delay timing in case of fault (Tt)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HPC - Overcurrent control

The under and overcurrent values are set by two independent potentiometers graduated from 1 to 10 A. In case of a control error (low threshold higher than high threshold), the output relay opens and all the LEDs flash to signal the error.

If a current fault occurs (under or overcurrent) the relay opens if the fault persists beyond the preset threshold delay. When the current returns to a correct value, the output relay remains open. It can only be closed by a reset: either by de-energisation or by closing on external contact Y2 (in single control mode).

An inhibit delay (Td) on energisation allows current peaks due to start-up of the motor to be disregarded.

<table>
<thead>
<tr>
<th>Overcurrent</th>
<th>Hysteresis</th>
<th>Relay</th>
<th>Fault monitoring inhibit time on pump start-up (Ti)</th>
<th>Delay timing in case of fault (Tt)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HPC - Undercurrent control

<table>
<thead>
<tr>
<th>Undercurrent</th>
<th>Hysteresis</th>
<th>Relay</th>
<th>Fault monitoring inhibit time on pump start-up (Ti)</th>
<th>Delay timing in case of fault (Tt)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pump control

Dimensions (mm)

Connections

3 ph < 10 A

100 mA fast-blow fuse or cut-out

1 ph ~ 230 V < 10 A

100 mA fast-blow fuse or cut-out
Connections

3 ph > 10 A

1. 100 mA fast-blow fuse or cut-out

1 ph ~ 230 V > 10 A

2. 100 mA fast-blow fuse or cut-out

100 mA fast-blow fuse or cut-out
Motor phase and temperature control relay - 35 mm

- Control of 3-phase networks: phase sequence, phase failure
- Multi-voltage
- True RMS measurement
- Motor temperature control via PTC probes
- With line break or probe short-circuit detection
- Version with fault latching function and reset / test
- LED status indication

### Part numbers

<table>
<thead>
<tr>
<th>Type</th>
<th>Functions</th>
<th>Nominal voltage (V)</th>
<th>Phase control voltage range</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWTM</td>
<td>Phase sequence, phase failure, motor temperature via PTC probe, test, memory</td>
<td>24 V to 240 V ac</td>
<td>3 x 208 V to 3 x 480 V ac</td>
<td>84873027</td>
</tr>
<tr>
<td>HWTM2</td>
<td>Phase sequence, phase failure, motor temperature via PTC probe, test, memory</td>
<td>24 V to 240 V ac</td>
<td>3 x 208 V to 3 x 480 V ac</td>
<td>84873028</td>
</tr>
</tbody>
</table>

### Product adaptations

- Customisable colours and labels

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable sealable cover for 35 mm casing</td>
<td>84800001</td>
</tr>
</tbody>
</table>

### General characteristics

<table>
<thead>
<tr>
<th>Supply</th>
<th>Un 24 V to 240 V ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply tolerance</td>
<td>±15% / ±10%</td>
</tr>
<tr>
<td>Operating range</td>
<td>20.4 V to 264 V ac</td>
</tr>
<tr>
<td>Minimum supply voltage</td>
<td>16 V</td>
</tr>
<tr>
<td>Supply voltage frequency</td>
<td>50 / 60 Hz ± 10%</td>
</tr>
<tr>
<td>Tolerance of power supply/measurement</td>
<td>±1.5%</td>
</tr>
<tr>
<td>Power consumption at Un</td>
<td>4 VA in, 0.5 W in</td>
</tr>
<tr>
<td>Immunity from micro power cuts</td>
<td>20 ms at 20.4 V</td>
</tr>
</tbody>
</table>
### General characteristics

#### Inputs and measuring circuit

**3-phase control**

- Measurement ranges: 3 x 208 to 3 x 480 V
- Frequency of measured signal: 50 / 60 Hz ±10%
- Input resistance: 60 KΩ / line

#### Temperature control

- Maximum voltage of heat detection circuit: 3.6 V (T1-T2 open)
- Short-circuit current: 7 mA (T1, T2 close circuit)
- Maximum detector resistance at 20°C: 1500 Ω
- Trip threshold: 3100 Ω ± 10%
- Reset threshold: 1650 Ω ± 10%
- Short-circuit detection range: 0 to 15 Ω ± 5 Ω
- Resistance measurement temperature drift: ± 0.1% / °C max.
- Repetition accuracy with constant parameters: ± 0.5%

#### Timing

- Delay on threshold crossing: 300 ms max. (phase)
- Operating range: 176 to 528 V
- Frequency of measured signal: 50 / 60 Hz ±10%

#### Output

- Type of output: 2 NO relays
- Type of contacts: No cadmium
- Maximum breaking voltage: 250 V
- Max. breaking current: 5 A
- Min. breaking current: 10 mA / 5 V

#### Operating temperature

- IEC 60068-2: -20 to +50°C

#### Storage temperature

- IEC 60068-2: -40 to +70°C

#### Humidity

- IEC 60068-2-30: 95% RH max. without condensation 55°C

#### Vibrations

- IEC 60068-2-6: 10 to 150 Hz, A = 0.035 mm

#### Shock

- IEC 60068-2-6: 5 g

#### Standards

- CE (LVD) 73/23/EEC - EMC 89/336/EEC
- Product standards: NF EN 60715-1, NF EN 60715-2-1, NF EN 60715-2-2, NF EN 60715-2-3, NF EN 60715-2-4, NF EN 60715-2-5, NF EN 60715-2-6
- Electromagnetic compatibility: Immunity EN 61000-6-2 / IEC 61000-6-2
- Emission EN 55022 class B

#### Conformity with environmental directives

- RoHS, WEEE

---

* 3-phase mains with earth
Relays HWTM and HWTM2 check the availability of the 3-phase network and the temperature of the motors using integrated PTC probes. The "phase" and "temperature" control functions are independent of one another.

The 3-phase (208 to 480 V) network control verifies the sequence of phases L1, L2, L3 and their presence:
- the complete failure of a phase is detected, also in the event of regeneration (U measured < 0.7 x Un).

The result of the check is indicated by the status of the "phase" output relay. NO contact 21-24 will be open in case of fault.

The temperature control accepts up to 6 PTC probes (positive temperature coefficient resistor) wired in series between terminals T1 and T2.

A fault is reported if the resistance of the thermal detector circuit exceeds 3100 $\Omega$.

Return to normal is verified when the resistance falls below 1650 $\Omega$.

The result of the check is indicated by the status of the "temperature" output relay. NO contact 11-14 will be open in case of fault.

Opening of the thermal detector circuit has the same effect as high temperature (resistance exceeding 3100 $\Omega$) and is therefore interpreted as a fault.

Total short-circuit of the thermal probe (s), detected when resistance is less than 15 $\Omega \pm 5$ $\Omega$, is treated as a fault.

**Overview**

**Phase and temperature control**

**Principles**

- **Overview**: Relays HWTM and HWTM2 check the availability of the 3-phase network and the temperature of the motors using integrated PTC probes. The "phase" and "temperature" control functions are independent of one another. The 3-phase (208 to 480 V) network control verifies the sequence of phases L1, L2, L3 and their presence: the complete failure of a phase is detected, also in the event of regeneration (U measured < 0.7 x Un). The result of the check is indicated by the status of the "phase" output relay. NO contact 21-24 will be open in case of fault. The temperature control accepts up to 6 PTC probes (positive temperature coefficient resistor) wired in series between terminals T1 and T2. A fault is reported if the resistance of the thermal detector circuit exceeds 3100 $\Omega$. Return to normal is verified when the resistance falls below 1650 $\Omega$. The result of the check is indicated by the status of the "temperature" output relay. NO contact 11-14 will be open in case of fault. Opening of the thermal detector circuit has the same effect as high temperature (resistance exceeding 3100 $\Omega$) and is therefore interpreted as a fault. Total short-circuit of the thermal probe (s), detected when resistance is less than 15 $\Omega \pm 5$ $\Omega$, is treated as a fault.

- **Temperature control without latching**: As soon as it is verified that the resistance of the thermal detector is between 15 and 3.100 $\Omega$, the contact of the output relay closes and, subject to the result of the phase control check, LED "R1" lights up. If the resistance of the thermal detector circuit exceeds 3.100 $\Omega$, the output relay opens and LED "R1" is extinguished. After an overheating fault, the resistance must fall below 1.650 $\Omega$ for the output relay contact to reclose and, subject to the result of the phase check, LED "R1" to light up. If the resistance falls below 15 $\Omega$ (short-circuit), the output relay opens and LED "R1" is extinguished. As soon as it returns to between 15 and 3.100 $\Omega$, the contact of the output relay closes again and, subject to the result of the phase control check, LED "R1" to light up.

- **Control of 3-phase network**: As soon as the phase sequence (L1 L2 L3) and phase amplitude symmetry (D < 30 %) are considered correct, the contact of the output relay closes and, subject to the result of the temperature check, LED "R2" lights up. In case of total failure or a drop in the amplitude of a phase (absence of phase with regeneration) or inversion of the phase sequence, the contact of the output relay opens and LED "R2" is extinguished.

- **HWTM - Phase failure and phase sequence**

- **HWTM2 - Phase failure and phase sequence**

**NB**: On energisation, the switch placed in one of the five intermediate positions keeps the relays in the open contact state and the error is signalled by the LEDs flashing simultaneously. Changes made during operation have no effect: the active configuration may therefore be different from that indicated by the switch; relay HWTM2 operates normally but the change in configuration is signalled by both LEDs flashing simultaneously.
The HWTM2 version has a rotary switch which can be used to configure the temperature control operating mode with or without latching. In “memory” mode, when a fault has been recorded, the “temperature” relay latches in the open position. Once the temperature has returned to a correct value, the relay can be unlatched (reset), either by pressing the “Test/Reset” pushbutton (50 ms minimum), or by closing (50 ms minimum) a volt-free contact between terminals Y1 and T1 (without parallel load). The HWTM2 can also be reset more abruptly, by switching it off and on again several times in succession (see reset time).
## Phase and temperature control

### Dimensions (mm)

<table>
<thead>
<tr>
<th>HW/TM</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60</td>
<td>44</td>
<td>23</td>
</tr>
<tr>
<td>Connectors</td>
<td>67.5</td>
<td>45</td>
<td>3.5</td>
</tr>
</tbody>
</table>

### Connections

**HW/TM**

1. A fast-blow fuse or cut-out

**HW/TM2**

1. A fast-blow fuse or cut-out

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- Selection guide
- FAQ
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Application - temperature control in lifts

Applications - Pump and level control

Selection guide
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