Power & Signal Quality TRABTECH

Monitoring

Residual current monitoring
Arrester testing
Lightning current monitoring
Interference-free mains supply and signal transmission

A constant power supply and secure data links are especially important for the operational reliability of electrical systems, installations, and devices.

Phoenix Contact meets these requirements with the comprehensive TRABTECH product range. Tailored solutions consisting of surge protection, monitoring, device circuit breakers, and EMC products ensure a consistently high power and signal quality for maximum availability.
Electrical installations as culprits

According to IFS e.V., the most frequent cause of fires are electrical installations and devices. Time and again, when searching for clues, fire investigators find fused wires – and therefore clear evidence of a short circuit in an electrical device.

Source: Institut für Schadenverhütung und Schadenforschung der öffentlichen Versicherer e.V. (IFS), 2009 (Institute for loss prevention and risk management for public insurers)
Residual current monitoring for electrical installations

RCM devices provide residual current monitoring in grounded power supply systems. They detect residual currents at an early stage, such as those that occur as a result of insulation errors. Imminent forced system shutdowns can therefore be prevented, since error rectification processes can be planned to take place outside of operating hours. RCM devices also act as a form of fire prevention.

**Functional principle of the RCM devices**

- **Floating PDTs for pre-alarm and main alarm**
- **LED chain for optical residual current indication (percentage of input measuring range)**
- **Wide-range voltage input 85 V AC ... 264 V AC**
- **Setting the input measurement range**
- **Pre-alarm adjustment**
- **Adjustment to pre-alarm response delay**
Residual currents can increase continually due to gradual processes. This can be attributed to humidity or conductive contamination on live parts, for example. Residual current circuit breakers trip at different rated $I_{\Delta n}$ residual currents, depending on their type. Additionally installed residual current monitoring devices prevent sudden system downtimes thanks to early warnings. The continuous supply of information about gradually increasing residual currents means that measures can be taken in good time. Unplanned system failures can be avoided.

**Equipped for the future:**
**Differential residual currents of up to 100 kHz**

Increasing use is being made of operating equipment such as frequency inverters that can generate residual currents with a frequency of up to 50 kHz in the event of an error. RCM devices from Phoenix Contact are already able to detect residual currents with frequencies up to 100 kHz. This far exceeds present-day requirements of 20 kHz for type B+ devices.
Residual current monitoring – selection guide

Circuit

Intended load current

Residual current to ground potential

Solution

Type A RCM evaluation unit

RCM-A/50/85-264V
Order No. 2806016

- Nominal voltage range: 85 V AC ... 264 V AC
- Nominal frequency \( f_N \): 50 Hz (60 Hz)
- Maximum required backup fuse: 16 A (B)
- Rated residual current response \( I_{\Delta n} \): 3 A
- Residual current response \( I_{\Delta n} \): 30, 100, 300, 1000, 3000 mA (adjustable)
- Main alarm response threshold: 80% ... 100% (of the set residual current response \( I_{\Delta n} \))
- Pre-alarm response threshold: 10% ... 90% (of the main alarm threshold, adjustable)
- Response time at 2 x \( I_{\Delta n} \): 0.1 s ... 1 s (adjustable)

Converter for type A RCM

RCM-A-SCT-20 (50 A*)
Order No. 2806045
RCM-A-SCT-30 (100 A*)
Order No. 2806058
RCM-A-SCT-35 (125 A*)
Order No. 2806061
RCM-A-SCT-70 (200 A*)
Order No. 2806074
RCM-A-SCT-105 (250 A*)
Order No. 2806087
RCM-A-SCT-140 (350 A*)
Order No. 2806090
RCM-A-SCT-210 (400 A*)
Order No. 2806100

- Rated residual current response \( I_{\Delta n} \): 3 A
- Residual current detection characteristics: type A (50/60 Hz)
- Residual current response \( I_{\Delta n} \): 0.03 A ... 3 A

Note:
Slightly different construction depending on the type (example: RCM-A-SCT-70)
## Selection of RCM devices based on the expected residual currents

<table>
<thead>
<tr>
<th>Type A detects:</th>
<th>Type B (universal current) detects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AC residual currents</td>
<td>• Pure DC residual currents</td>
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<tr>
<td>• Pulsating DC residual currents</td>
<td>• AC residual currents</td>
</tr>
<tr>
<td></td>
<td>• Pulsating DC residual currents</td>
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</table>

<table>
<thead>
<tr>
<th>Full bridge circuit</th>
<th>Semi-controlled full bridge circuit</th>
<th>Full bridge circuit between phase conductors</th>
<th>Three-phase full bridge circuit</th>
<th>Phase control</th>
<th>Burst control</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="full bridge circuit" /></td>
<td><img src="image2" alt="semi-controlled full bridge circuit" /></td>
<td><img src="image3" alt="full bridge circuit between phase conductors" /></td>
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<td><img src="image5" alt="phase control" /></td>
<td><img src="image6" alt="burst control" /></td>
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<tr>
<th>TYPE A</th>
<th>TYPE A</th>
<th>–</th>
<th>–</th>
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<th>TYPE A</th>
</tr>
</thead>
</table>

Source: in accordance with IEC 60755:2008

### Type B+ RCM evaluation unit

**RCM-B/50/85-264V**
Order No. 2806210

![RCM-B/50/85-264V](image7) kHz

- Nominal voltage range: 85 V AC ... 264 V AC
- Nominal frequency \( f_N \): 50 Hz (60 Hz)
- Maximum required backup fuse: 16 A (B)
- Rated residual current response \( I_{\Delta n} \): 3 A
- Residual current response \( I_{\Delta n} \): 30, 100, 300, 1000, 3000 mA (adjustable)
- Main alarm response threshold: 75% ... 100% (of the set residual current response \( I_{\Delta n} \))
- Pre-alarm response threshold: 10% ... 90% (of the main alarm threshold, adjustable)
- Response time at \( 2 \times I_{\Delta n} \): 0.1 s ... 1 s (adjustable)

### Converter for type B+ RCM

**RCM-B-SCT-35 (125 A*)**
Order No. 280623

**RCM-B-SCT-70 (200 A*)**
Order No. 2806236

**RCM-B-SCT-105 (300 A*)**
Order No. 2806249

![Converter for type B+ RCM](image8)

**Note:**
Slightly different design depending on the type (example: RCM-B-SCT-35)

- Rated residual current response \( I_{\Delta n} \): 3 A
- Residual current detection characteristics: Type B+ (DC up to 100 kHz)
- Residual current response \( I_{\Delta n} \): 0.03 A ... 3 A

* Rated current \( I_n \).
Lightning protection systems must be tested in accordance with the requirements of IEC 62305-3 and official regulations. Here, a basic visual check is not enough to identify surge protective devices that were previously damaged.

Only an electrical check using the CHECKMASTER produces convincing results. It checks all the relevant components of an arrester. The nominal data of protective elements, such as spark gaps, varistors, gas-filled surge arresters, and suppressor diodes, is tested in a single test cycle.

The CHECKMASTER offers real advantages for safety in all sectors where a high level of system availability is crucial.
User-friendly and reliable testing of plug-in arresters in just four steps

1. Easy selection
The CHECKMASTER has a modular design. You can use your surge protective devices to determine which test socket you require.
Further information about the test sockets required can be found on the next page.

2. User-friendly scanning
The barcodes on the surge protection devices present a fast and error-free solution for entering items.
System-specific abbreviations or user-defined IDs can be entered via the operator interface or read in from the individually created barcode labels.

3. Safe testing
When started, an automatic test process is run which checks the arresters with regard to their specific electrical properties. The results are visualized via the display and via two signal lamps.

4. Fast logging
The tests are documented according to standard IEC 62305-3. In addition to the immediate processing of all test values, the CHECKMASTER also allows the contents of the internal memory to be exported directly to an Excel worksheet, for example.

* Other test sockets are available on request
CHECKMASTER – selection guide

Using an electrical testing method, the CHECKMASTER tests all of the installed protective elements, such as spark gaps, gas-filled surge arresters, varistors, and suppressor diodes, in the arrester plugs. Test sockets and accessories ensure a long service life for the system.

CHECKMASTER
Order No. 2838924
Mobile testing laboratory for protective circuits in plug-in surge protective devices.

Test sockets* – flexible and extendable compatibility

CM-PA-FLT/VAL-CP
Order No. 2880392
Test socket for:
• FLASHTRAB compact
• VALVETRAB compact

CM-PA-PT
Order No. 2882844
Test socket for:
• PLUGTRAB PT
(Standard assembly - included in the CHECKMASTER scope of supply)

CM-PA-VAL
Order No. 2858454
Test socket for:
• VALVETRAB-MS

CM-PA-CTM
Order No. 2816962
Test socket for:
• COMTRAB modular

* Other test sockets are available on request
**The top features at a glance**

- Comfortable, safe and fast check
- The "Tolerance barrier is reached" test status prevents unnecessary service calls
- Automatic log function of test results
- The internal memory also enables subsequent processing of the test results on the PC
- The update function always keeps the CHECKMASTER up-to-date with the latest developments
- High level of investment security, thanks to variable test sockets
- Increased system availability, thanks to screening test
- IEC 62305-3 compliant testing
- High quality and safety standard

Always know what is going on – with the screening test

**Accessories**

**PA-CASE**
Order No. 2858988
Transport case to accommodate six CHECKMASTER CM-PA... test sockets.

**CM-KBL-RS232/USB**
Order No. 2881078
Connecting cable to connect the CHECKMASTER to the USB port of a PC.
Supplementary software packages for the CHECKMASTER are available in the Phoenix Contact e-shop.

**CM-KBL-PROG**
Order No. 2881557
This cable and the update tool can be used to update the CHECKMASTER firmware via a PC. The latest version of the update tool can be downloaded free of charge from the Phoenix Contact e-shop.

**TRABTECH-PPB**
Order No. 2783040
Sheet of inspection labels with 190 self-adhesive labels for labeling tested protective devices.
LM-S lightning monitoring system – optimum maintenance planning

You can be informed online of lightning strikes in your system and benefit from the option of adaptive maintenance.

LM-S detects and analyzes all significant parameters of lightning surge currents. This thereby allows you to assess the actual system load. Based on this information, you can determine whether any checks or maintenance are required.

Other fields of application
- Buildings
- Telecommunications technology
- High and extra-high voltage technology
- Traffic engineering
- Industry
**Acquisition and evaluation**

The sensors are mounted on the lightning arrester cables. They record the magnetic field that occurs around the conductor due to the lightning surge current. The measured result is transmitted to the optoelectronic module of the evaluation unit via fiber optics, where the optical signal is converted into an electrical signal. Based on the values obtained, the evaluation unit determines the lightning characteristic with the typical parameters, such as the maximum lightning current strength, lightning current rise time, charge, and energy.

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**Remote monitoring in realtime**

The evaluation unit can be easily integrated into standard network systems via the RJ45 Ethernet interface. An internal web server is used as the basis for accessing recorded data and configuring the system. Using standard network technologies enables flexible system integration and offers users a wide range of options for using existing management or remote control systems.
LM-S lightning monitoring system – selection guide

A complete measuring system application consists of a maximum of three sensors, fiber optic cables, and the analysis module. On each of these, a sensor is installed on the lightning rod of an object. Fiber optics connect the sensors with the optoelectronic converter on the analysis module.

**Evaluation unit**

**LM-S-A/C-3S-ETH**
Order No. 2800618
Evaluation unit for live monitoring system for the continuous detection and evaluation of lightning strikes.

**Sensor**

**LM-S-LS-H**
Order No. 2800616
Sensor for live monitoring system for the continuous detection and evaluation of lightning strikes.
The internal measuring principle of the LM-S is based on the Faraday effect. Polarized light in a specific medium is rotated through a magnetic field over a defined length and measured. The lightning monitoring system detects this change in the light signal and uses this as the basis for the corresponding measured value results.

**Connecting cable**

Note:
The specified plug configuration must be used in order to use the connecting cable in the LM-S lightning monitoring system. Recommended length: 10 - 200 m

**FOC-PN-HCS-1018/...**
Order No. 1402190/PPCME/BFOC/X (length [m])
Ordering example: assembled connecting cable for the LM-S lightning monitoring system, with a metal push/pull plug-in connector, a B-FOC plug, and a cable length of X m.

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Length X [m], max. 2000 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>1402190/PPCME/BFOC</td>
<td>10 - 2000 m</td>
</tr>
<tr>
<td>Increment: 1 m</td>
<td></td>
</tr>
</tbody>
</table>

**O/E module**

**LM-S-C-3LS**
Order No. 2800617
O/E module for live monitoring system for the continuous detection and evaluation of lightning strikes.
Further information on the products presented here and on the world of solutions from Phoenix Contact can be found at www.phoenixcontact.net/catalog

Or contact us directly.

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