## 3RU11, 3RB10, 3RB12 Overload relays

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<td>4.7.4</td>
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<td>4-66</td>
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</table>
4.1 Specifications/regulations/approvals

Standards

- The 3RU11 thermal overload relays and the 3RB10 and 3RB12 electronic overload relays comply with the following standards:
  IEC 60947-1/DIN VDE 0660 Part 100
  IEC 60947-4-1/DIN VDE 0660 Part 102
  IEC 60947-5-1/DIN VDE 0660 Part 200
  IEC 60801-2, -3, -4, -5; UL 508/CSA C 22.2.

- The 3RB10 and 3RB12 electronic overload relays also comply with the EMC standards. This standard isn’t relevant for the 3RU11 thermal overload relays.

Approvals/test reports

Requests for confirmation of approvals, testing certificates and tripping characteristics can be sent to Technical Assistance per E-mail at E-mail-Address: technical-assistance@siemens.com.

Tripping classes

The tripping classes describe time intervals within which the overload relays have to trip from a cold state at 7.2 times the set current in the case of a symmetrical, three-pole load. The following table shows the tripping times in relationship to the tripping classes in accordance with the IEC 60947-4-1 standard:

<table>
<thead>
<tr>
<th>Tripping class</th>
<th>Tripping time $t_A$ in sec. at $7.2 \times I_e$ from a cold state</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 A</td>
<td>$2 &lt; t_A \leq 10$</td>
</tr>
<tr>
<td>10</td>
<td>$4 &lt; t_A \leq 10$</td>
</tr>
<tr>
<td>20</td>
<td>$6 &lt; t_A \leq 20$</td>
</tr>
<tr>
<td>30</td>
<td>$9 &lt; t_A \leq 30$</td>
</tr>
</tbody>
</table>

Table 4-1: Tripping classes/Tripping time

The tripping classes that the 3RU11, 3RB10 and 3RB12 overload relays are available in, can be found in section 4.2.

Time-delayed overload releases

The following table contains the operating limits of time-delayed overload releases in the case of an all-pole load:

<table>
<thead>
<tr>
<th>Overload release type</th>
<th>Multiple of the set current</th>
<th>Reference ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Ambient temperature-compensated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not tripped &lt; 2 h</td>
<td>1.05</td>
<td>1.2</td>
</tr>
<tr>
<td>Tripped &lt; 2 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripped &lt; 4 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripped &lt; 6 min.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-2: Operating limits of time-delayed overload releases in the case of an all-pole load
**Resistance to extreme climates**

The 3RU11, 3RB10, and 3RB12 overload relays are climate-proof in acc. with IEC 721.

**Shock protection**

The 3RU11, 3RB10, and 3RB12 overload relays are shockproof in acc. with DIN VDE 0106 Part 100. Depending on the attachment to other devices, extended terminal covers are to be attached to the connecting bars.

**Ships’ systems**

The 3RU11, 3RB10, and 3RB12 overload relays are suitable for use on ships. The overload relays have been submitted to:
- GL (Germany)
- LRS (Great Britain)
- DNV (Norway)

**Explosion-proof motors**

The 3RU11 thermal overload relays and the 3RB10 and 3RB12 electronic overload relays comply with the regulations for the overload protection of explosion-proof motors of "increased safety" protection types (EEx d and EEx e) in acc. with EN 50 019/DIN VDE 0165 and DIN VDE 0170/0171:

The numbers of the individual test reports as well as individual notes on the application of overload relays are in Section 4.3 "Application and operation".
4.2 Device description

4.2.1 Overview

Protection function

Overload relays are used for current dependent protection of electrical equipment (for example motors) against overheating. Overheating can be caused by overload, asymmetrical current consumption, phase loss in the power network, or locked rotor. With Overload, phase imbalance, phase loss or locked rotor there is an increase in the motor current that is well above the set rated motor current. This increase in current, that over a longer period of time can damage or even destroy the equipment, is monitored and evaluated by the overload relay. There are two function principles for overload relay protection available: thermal and electronic.

Function principles

With Thermal overload relays (see overload relay 3RU11) an increase in current heats up the bimetal strips inside the device by means of heating elements. The strips then bend and activate auxiliary contacts by means of a tripping mechanism.

With an electronic overload relay (see overload relays 3RB10 and 3RB12) the current increase is measured by an integrated current transformer then evaluated by the corresponding electronics, which then send an impulse to the auxiliary contacts.

The auxiliary contact shuts down the contactor and therefore the load. The switching time is dependent on the relationship of tripping current to the set current and can be found in the form of long stability tripping characteristic curves (see section 4.3 “Application and operation”).

Product offering

There are 3 overload relay families available:

3RU11 thermal overload relays

The 3RU11 thermal overload relays, from 0.11 A to 100 A, are designed for current dependent protection of loads with normal starting (Tripping class CLASS 10).

3RB10 electronic overload relays

The self-powered 3RB10 electronic overload relays, from 0.1 A to 630 A, are designed for current dependent protection of loads with normal and heavy starting (Tripping classes CLASS 10 and CLASS 20).

3RB12 electronic overload relays

The externally powered 3RB12 electronic overload relays, from 0.25 A to 820 A are designed for current dependent protection of loads with normal and heavy starting (Tripping classes CLASS 5, 10, 15, 20, 25 and 30, adjustable on the device).

In addition to current dependent protection of loads against non-permissible overheating, the 3RB12 electronic overload relay also offers the possibility for temperature monitoring of the motor windings by use of a Thermistor (PTC-) sensor circuit. The load can also be protected against excess temperature that, for example, could appear indirectly due to blocked coolant flow and therefore could not be measured by current dependent means.
Furthermore the 3RB12 electronic overload relay offers the possibility to protect the installation against the results of a ground fault with its internal/external ground fault monitoring.

4.2.2 Detailed device description

**3RU11 thermal overload relays**
The 3RU11 thermal overload relays from 0.11 A to 100 A are available with tripping class CLASS 10 and offer current dependent protection of loads with normal starting at a low price. This is an economical protection device, especially in the lower ratings range.

**3RB10 electronic overload relays**
The self-powered 3RB10 electronic overload relays from 0.1 A to 630 A are available with tripping classes CLASS 10 and CLASS 20. With these two tripping classes they offer optimal current dependent protection of loads with normal- and heavy starting.
The 3RB10 electronic overload relay is similar to the 3RU11 thermal overload relay in dimensions, in operational control and in the way they mount to contactors. That way the thermal overload relay can be easily substituted by the electronic version, when the application requires phase loss trip within 3 seconds, a wide current adjustment range (1 : 4) or also lower heat generation.
The accessories for the thermal and electronic devices are identical.

**3RB12 electronic overload relays**
The 3RB12 electronic overload relays from 0.25 A to 820 A with external power supply are suitable for normal starting and heavy starting with the adjustable setting of the variable tripping classes CLASS 5 to CLASS 30. In addition to the adjustable variable tripping classes, the 3RB12 electronic overload relay offers a large number of additional built-in features and protection functions: overload warning, thermistor-motor protection-function, ground fault detection, self-monitoring, status indicator by means of LEDs, and analog output. More detailed information about the built-in features and functions in section 4.3 “Application and areas of use”.
The following table provides an overview of the features and resulting benefits of the three overload relay families:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Customer benefits</th>
<th>3RU11</th>
<th>3RB10</th>
<th>3RB12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection functions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripping due to an overload</td>
<td>• Guarantees an optimal current dependent protection of the load against non-permissible overheating as a result of an overload.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Tripping due to phase imbalance</td>
<td>• Guarantees an optimal current dependent protection of the load against non-permissible overheating as a result of phase imbalance.</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Tripping due to phase loss</td>
<td>• minimizes the heating of the three-phase motor during single-phase operation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripping due to excessive temperature</td>
<td>• permits optimal temperature-dependent protection of loads against impermissibly high temperature rises, e.g. for stator-critical motors, reduced coolant flow, pollution of the motor surface or long starting and breaking procedures.</td>
<td>x</td>
<td>2)</td>
<td>x</td>
</tr>
<tr>
<td>by integrated thermistor motor protection function</td>
<td>• saves an additional unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripping due to an earth fault</td>
<td>• permits optimal protection of the load in the case of minor short-circuits or earth faults caused by damage to insulation, humidity, condensation, etc.</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>by internal or external earth fault monitoring</td>
<td>• eliminates additional unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• saves space in the switchgear cabinet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• reduces wiring complexity and costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESET-Function</td>
<td>• allows manual or automatic resetting of the relay.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>TEST-Function</td>
<td>• permits easy checking of correct functioning and the wiring.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Status display</td>
<td>• signals the current operational state.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Large current setting knob</td>
<td>• makes it easier to set the relay accurately to the right current value.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Integrated auxiliary contacts (1 NO + 1 NC)</td>
<td>• allow the load to be disconnected in the case of a disturbance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• enable tripped signals to be output.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Design of load feeders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit strength up to 100 kA at 690 V</td>
<td>• guarantees optimum protection of the load and the operating personnel in the event of short-circuits caused by insulation breakdown or faulty switching operations.</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(in combination with the appropriate fuse or circuit-breaker)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical and mechanical compatibility with the 3RT1 contactors</td>
<td>• simplifies project planning</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• reduces the project engineering work and costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• permits space-saving direct mounting apart from individual mounting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight-through current transformer</td>
<td>• reduces the contact resistances (only one contact point)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(the leads are directly routed short-circuit-proof to the main terminals of the contactor through the feed-through openings of the overload relay)</td>
<td>• saves connection costs (quick, easy and no tools required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• saves material costs (no need for busbars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• reduces installation costs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>only 3RB10 56-.FW0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>only 3RB12 46-....</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Single-phase operation: Abnormal operating state of a three-phase induction motor in which a phase is interrupted.
2) Tripping from warm state within 3 seconds
3) In combination with the 3RN thermistor motor protection devices, additional temperature-based protection can be implemented.
4) Special device variants: See selection and ordering data.
5) Exception: For 3RB12 46, individual mounting.
### Further characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Customer benefits</th>
<th>3RU11</th>
<th>3RB10</th>
<th>3RB12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature compensation</strong></td>
<td>• allows implementation of the relay at high temperatures without derating</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• prevents premature tripping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• permits compact design of the switchgear cabinet without the need for clearance between the devices and/or load feeders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• simplifies project planning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• allows space to be saved in the switchgear cabinet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High long-term stability</strong></td>
<td>• guarantees reliable protection of loads even after years of operation under harsh conditions</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Wide current adjustment ranges</strong></td>
<td>• reduce the number of variants</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• minimize the project engineering work and costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• provide savings in inventories in terms of work, costs and capital tie-up.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trip classes &gt; CLASS 10</strong></td>
<td>• permit solutions for heavy starting and extremely heavy starting.</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Minimal power losses</strong></td>
<td>• reduce the energy consumption (the energy consumption is up to 95% lower than for thermal overload relays) and therefore the energy costs</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• minimize the temperature rise for the contactor and switchgear cabinet – which may obviate the need for a cabinet cooling system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• allow space to be saved by direct mounting on the contactor and in the case of high motor currents (i.e. heat isolation is not necessary)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal power supply</strong></td>
<td>• saves project engineering and connection of an additional control circuit.</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><strong>Variable setting of the trip classes</strong></td>
<td>• reduces the number of variants</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• minimizes the project engineering work and costs</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• permits savings in inventories in terms of work, costs and capital tie-up.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Analog output</strong></td>
<td>• allows an analog output signal to be output to control instruments, PLCs or to bus systems</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• saves an additional transducer and signal converter</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• saves space in the switchgear cabinet</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• reduces wiring complexity and costs</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Overload warning</strong></td>
<td>• indicates impending tripping of the relay due to an overload, phase unbalance or phase failure directly on the device</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• enables impending tripping of the relay to be signalled via an external indicator lamp connected to the corresponding auxiliary contacts</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• permits early implementation of countermeasures in the case of long-term current-dependent loading of the consumer above the limit current</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• saves an additional relay</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• saves space in the switchgear cabinet</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>• reduces wiring complexity and costs</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

1) The SIRIUS 3RU11 thermal overload relays operate according to the bimetal-strip principle and therefore do not require an additional control circuit.

2) Special device variants: See selection and ordering data.
Frame sizes /Device designs

The following table provides an overview of the 3RU11 thermal overload relay and the 3RB10 electronic overload relay in their available frame sizes. The individual frame sizes are arranged to show the maximum rated current, the lowest and highest adjustable ranges as well as the available tripping classes.

<table>
<thead>
<tr>
<th>Frame size</th>
<th>S00</th>
<th>S0</th>
<th>S2</th>
<th>S3</th>
<th>S6</th>
<th>S10/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device width</td>
<td>45 mm</td>
<td>45 mm</td>
<td>55 mm</td>
<td>70 mm</td>
<td>120 mm</td>
<td>145 mm</td>
</tr>
</tbody>
</table>

**3RU11 thermal overload relay**

<table>
<thead>
<tr>
<th>Base Number</th>
<th>Max. Rated current</th>
<th>Lowest adjustable range</th>
<th>Highest adjustable range</th>
<th>Tripping class</th>
</tr>
</thead>
<tbody>
<tr>
<td>3RU11 16</td>
<td>12 A</td>
<td>0.11...0.16 A</td>
<td>9...12 A</td>
<td>CLASS 10</td>
</tr>
<tr>
<td>3RU11 26</td>
<td>25 A</td>
<td>1.8...2.5 A</td>
<td>20...25 A</td>
<td></td>
</tr>
<tr>
<td>3RU11 36</td>
<td>50 A</td>
<td>5.5...8 A</td>
<td>40...50 A</td>
<td></td>
</tr>
<tr>
<td>3RU11 46</td>
<td>100 A</td>
<td>18...25 A</td>
<td>80...100 A</td>
<td></td>
</tr>
</tbody>
</table>

**3RB10 electronic overload relay**

<table>
<thead>
<tr>
<th>Base Number</th>
<th>Max. Rated current</th>
<th>Lowest adjustable range</th>
<th>Highest adjustable range</th>
<th>Tripping class</th>
</tr>
</thead>
<tbody>
<tr>
<td>3RB10 16</td>
<td>12 A</td>
<td>0.1...0.4 A</td>
<td>3...12 A</td>
<td>CLASS 10 and CLASS 20</td>
</tr>
<tr>
<td>3RB10 26</td>
<td>25 A</td>
<td>0.1...0.4 A</td>
<td>6...25 A</td>
<td></td>
</tr>
<tr>
<td>3RB10 36</td>
<td>50 A</td>
<td>6...25 A</td>
<td>13...50 A</td>
<td></td>
</tr>
<tr>
<td>3RB10 46</td>
<td>100 A</td>
<td>13...50 A</td>
<td>25...100 A</td>
<td></td>
</tr>
<tr>
<td>3RB10 56</td>
<td>200 A</td>
<td>50...200 A</td>
<td>50...200 A</td>
<td></td>
</tr>
<tr>
<td>3RB10 66</td>
<td>630 A</td>
<td>55...250 A</td>
<td>300...630 A</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-3: Overview of the designs of both the 3RU11 and 3RB10 overload relays
The 3RB12 electronic overload relay comes in four frame sizes. These can be found in the following table. In the table the individual frame sizes are arranged to show the maximum rated current, the lowest and highest adjustable ranges as well as the available tripping classes. Furthermore the various designs are described below.

<table>
<thead>
<tr>
<th>Base number</th>
<th>3RB12 46</th>
<th>3RB12 53</th>
<th>3RB12 57</th>
<th>3RB12 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Rated current</td>
<td>100 A</td>
<td>205 A</td>
<td>500 A</td>
<td>820 A</td>
</tr>
<tr>
<td>Lowest adjustable range</td>
<td>0.25...6.3 A</td>
<td>50...205 A</td>
<td>125...500 A</td>
<td>200...820 A</td>
</tr>
<tr>
<td>Highest adjustable range</td>
<td>25...100 A</td>
<td>50...205 A</td>
<td>125...500 A</td>
<td>200...820 A</td>
</tr>
<tr>
<td>Tripping class</td>
<td>CLASS 5, 10, 15, 20, 25 and 30, adjustable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Designs**

- **Standard design**: Comes with the option to connect a thermistor (PTC-) sensor circuit as well as an additional current transformer and two outputs (each 1NO + 1NC), that can be used on each model for shut down and alarm for an overload trip, Thermistor trip, ground fault trip and/or a pending overload (overload warning).
- **Design with internal ground fault detection**: Like the standard design, except with additional internal ground fault detection for the detection of fault currents.
- **Design with bistabil output relays**: Like the standard design, except with bistabil output relays.
- **Design with analog output**: Like the standard design, except with additional analog 4...20 mA output signal for the motor current related to motor current setting; for the control of measuring instruments, for processing in management systems, communication using networking systems, indication of overload and motor current.

Table 4-4: Overview of the 3RB12 electronic overload relay designs

**Detailed information**

More detailed technical information on overload relays can be found under section 4.7 "Technical data".
4.3 Application and use

4.3.1 Overload relay in the motor circuit

*Starter: Contactor + overload relay*  
The individual overload relay families protect the following loads against the effects of an overload, phase loss and phase imbalance.

<table>
<thead>
<tr>
<th>For the protection of</th>
<th>3RU11</th>
<th>3RB10</th>
<th>3RB12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three phase loads</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>DC loads</td>
<td>X</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Single phase-AC-loads</td>
<td>X</td>
<td>—</td>
<td>X¹)</td>
</tr>
</tbody>
</table>

¹) devices without internal ground fault detection.

**Important**  
The protection of the load can’t be realized by the overload relay alone. The overload relay only senses the current, evaluates it and switches the auxiliary contacts according to the respective trip curve. The auxiliary contact (95-96, NC) will switch off the connected contactor and therefore the load.
In order to switch the load the following contactors will be needed. The following table offers an overview regarding the coordination of the overload and contactor with their ratings.

<table>
<thead>
<tr>
<th>kW</th>
<th>HP</th>
<th>Contactor</th>
<th>3RU11 16</th>
<th>3RU11 26</th>
<th>3RU11 36</th>
<th>3RU11 46</th>
<th>3RU10 56</th>
<th>3RB10 66</th>
<th>3RB12 46</th>
<th>3RB12 53</th>
<th>3RB12 57</th>
<th>3RB12 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 V</td>
<td>460 V</td>
<td>max. adjust- able current</td>
<td>12 A</td>
<td>25 A</td>
<td>50 A</td>
<td>100 A</td>
<td>200 A</td>
<td>630 A</td>
<td>100 A</td>
<td>205 A</td>
<td>500 A</td>
<td>820 A</td>
</tr>
<tr>
<td>3 kW</td>
<td>3</td>
<td>3RT10 16</td>
<td>S00</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 kW</td>
<td>5</td>
<td>3RT10 16</td>
<td>S00</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 kW</td>
<td>75</td>
<td>3RT10 17</td>
<td>S00</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 kW</td>
<td>75</td>
<td>3RT10 23</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 kW</td>
<td>10</td>
<td>3RT10 26</td>
<td>S0</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 kW</td>
<td>15</td>
<td>3RT10 26</td>
<td>S0</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>SRT10 32</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 kW</td>
<td>25</td>
<td>3RT10 34</td>
<td>S2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5 kW</td>
<td>30</td>
<td>3RT10 35</td>
<td>S2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 kW</td>
<td>40</td>
<td>3RT10 36</td>
<td>S2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 kW</td>
<td>50</td>
<td>3RT10 44</td>
<td>S3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 kW</td>
<td>60</td>
<td>3RT10 45</td>
<td>S3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 kW</td>
<td>75</td>
<td>3RT10 46</td>
<td>S3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 kW</td>
<td>100</td>
<td>3RT10 54</td>
<td>S6</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 kW</td>
<td>125</td>
<td>3RT10 55</td>
<td>S6</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 kW</td>
<td>150</td>
<td>3RT10 56</td>
<td>S6</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110 kW</td>
<td>150</td>
<td>3RT10 64</td>
<td>S10</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>132 kW</td>
<td>200</td>
<td>3RT10 65</td>
<td>S10</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>160 kW</td>
<td>250</td>
<td>3RT10 66</td>
<td>S10</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 kW</td>
<td>300</td>
<td>3RT10 75</td>
<td>S12</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 kW</td>
<td>400</td>
<td>3RT10 76</td>
<td>S12</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>375 kW</td>
<td>500</td>
<td>3TF68</td>
<td>Frame Size 14</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>450 kW</td>
<td>700</td>
<td>3TF69</td>
<td>Frame Size 14</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-5: Coordination of the overload relays to the contactors

X = Directly mounted
.variable = Stand alone installation (device with straight through transformer)

In order to switch the load the following contactors will be needed. The following table offers an overview regarding the coordination of the overload and contactor with their ratings.

When overload relays are used in wye-delta combinations, it must be taken into consideration that only \( \frac{1}{\sqrt{3}} \) of the motor current flows through the line contactor. An overload relay built onto the line contactor must be set to this level (i.e. 0.58 of the motor current).

A coordination of the overload relay to the line contactor in 3RA wye-delta combinations can be found in the catalog.
**Important**
3RB12 electronic overload relays with internal ground fault detection are not suitable for use in wye-delta combinations, since transient current spikes occur at switch-over from wye to delta operation. These can result in the triggering of the ground fault detection.

---

**Short circuit**
For short circuit protection, fuses (fused branch circuit) or circuit breaker (Fuseless load feeder/combination assembly) must be used. Appropriate short-circuit protection devices for overload relay with contactor are found in section 4.7 “Technical Data”.

When selecting from the table, the coordination type needs to be considered.

**Coordination type**
The coordination types (DIN EN 60947-4-1 (VDE 0660 part 102)) describe the performance characteristics after a short-circuit. They are differentiated in 2 types:

- **With coordination type 1** the contactor or starter may not endanger people or installations in the event of a short-circuit and does not need to be suitable for further operation (without repair or partial replacement).
- **With coordination type 2** the contactor or starter may not endanger people or installations in the event of a short-circuit and must be suitable for further operation. There is the danger of welding contacts. In this case, the manufacturer must provide maintenance instructions.

**Operation with Frequency converters**
The 3RU11 thermal overload relays are suitable for use with frequency converters. Depending on the frequency of the converter the trip current must sometimes be adjusted to a higher current than the motor current because of appearing eddy current and Skin effect. The adjusted current settings can be taken from chapter 2 “3RV1 circuit breaker/MSP” under section 2.8 “Application notes for the use of 3RV1 downstream from frequency converters/ inverters with pulsing voltage”.

The 3RB10 electronic overload relay and 3RB12 are suitable for frequencies of 50/60 Hz and their related harmonics. That way it’s possible to use the 3RB10 and 3RB12 on the line side of a frequency converter.

If there is a need for motor protection on the load side of a frequency converter then we recommend the 3RN thermistor motor protection device or the 3RU11 thermal overload relay.

**Normal and heavy starting**
When selecting the correct overload relay the ramp-up time needs to be taken into consideration in addition to the rated motor current. The ramp-up time is the time it takes the motor to reach its full load speed. If this time falls under 10 seconds, it’s called normal starting.

However, if based on special load requirements (for example, the starting up of large centrifuges), the motor needs a ramp-up time of more than 10 seconds it’s called heavy starting. For the protection of heavy starting motors, special overload relays are required with the respective tripping classes (ex: CLASS 20, CLASS 30). With heavy starting, the wiring and contactors must be specially sized due to the increased thermal loading. The
required sizing is taken into consideration in the coordination tables in chapter 4.7 "Technical Data".

**Explosion-proof motors**

The 3RU11 thermal overload relays comply with the regulations for the overload protection of explosion-proof motors of "increased safety" protection types EEx e IEC 50 019/DIN VDE 0165, DIN VDE 0170/171.

KEMA-test certificate no. Ex-97.Y.3235
DMT 98 ATEX G001
EN 50 019: 1977 + A1 ... A5,
increased safety "e": Attachment A, Guidelines for the temperature monitoring of squire-cage motors in operation.

The 3RB10 thermal overload relays comply with the regulations for the overload protection of explosion-proof motors of "increased safety" protection types EEx d and EEx e IEC 50 019/DIN VDE 0165, DIN VDE 0170/171 and PTB-Test rules.

PTB-test report no. Nr. 3.43-8803/98 (for S00 to S3)
EG-special test certificate in acc. with directive 94/9/EG:
PTB 01 ATEX 3306 (for S00 to S3)
PTB 01 ATEX 3203 (for S6)
PTB 01 ATEX 3316 (for S10/S12)

The 3RB12 thermal overload relays comply with the regulations for the overload protection of explosion-proof motors of "increased safety" protection types EEx d and EEx e IEC 50 019/DIN VDE 0165, DIN VDE 0170/171 and PTB-Test rules.

In the case of tripping devices with DC operation, electrical isolation must be secured by means of a battery network or a safety transformer in compliance with DIN VDE 0551.

When the 3RB12....1 electronic overload relays (no change to the switching state of the auxiliary contact elements in the event of the failure of the control supply voltage) are used to protect EEx d and EEx e motors, separate monitoring of the control supply voltage is recommended.

PTB-test report no. Nr. 3.53-3907/96.
EG-special test certificate in acc. with directive 94/9/EG:
PTB 01 ATEX 3220.
Advantages of load feeders/combination starters with overload relays

The assembly of load feeders/combination starters with overload relays (Fuses+contactor+overload relay or circuit breaker+contactor+overload relay) has the following advantages over the purely fuseless assembly (circuit breaker/MSP+contactor):

- It is easy to distinguish between tripping caused by an overload and tripping caused by a short circuit. In the event of a short circuit, the fuses limit the short-circuit current; in the event of an overload, the overload relay switches off the contactor and thus the motor.
- At voltages > 400 V, fuses have a short-circuit breaking capacity of up to 100 kA. As a result, in 690 V systems, in particular, fused motor feeders are often preferred.
- If automatic RESET is set, the overload relay resets itself automatically after a trip and does not have to be switched on again locally.
- A remote reset can be implemented very easily by means of attachable electrical and mechanical RESET modules for the 3RU11 and 3RB10 overload relays. The electrical remote RESET is already integrated in the 3RB12 multifunction devices.
- Longer ramp-up times can be only accomplished in connection with the 3RB10 and 3RB12 electronic overload relays.
- Wide adjustable setting range of 1:4 are only possible with the 3RB10 and 3RB12 electronic overload relays.
- Combinations of a circuit breaker for starter protection, a contactor, and an overload relay also have the advantage that the feeder can be easily isolated and that, in the event of a short circuit, it is disconnected in three poles.
4.3.2 3RU11 thermal overload relays and 3RB10 electronic overload relays

Functions

1. Scale for setting the rated current of the load.
2. Reset button (blue):
   Press the RESET button to get the relay ready before putting it into operation or after tripping.
3. Stop button (red):
   The stop button opens the normally closed contact, which remains open until the button is released again. The downstream contactor and thus the motor can be switched off.
   Press the STOP button to switch the relay off when it is in operation.
   The normally closed contact of the auxiliary switch opens. The relay remains ready for operation.
4. Device type plate
5. Terminals for three motor supply lines
6. Terminals for normally closed/normally open contacts (95/96 for normally closed contacts, 97/98 for normally open contacts)
7. Contact position indicator/test
   The slider for the contact position indicator also serves as a test function. When it is operated, tripping of the overload relay is simulated.
   The normally closed contact (95/96) opens, and the normally open contact (97/98) closes. The switching position is indicated.
8. Switch for manual/auto RESET:
   By pressing and turning the blue button you can select automatic or manual reset.
   In the case of the relay setting M (manual reset), the switching position of the relay is indicated:
   I = ready for operation
   O = tripped
9. Only in the case of frame size S00:
   Terminal A2: repetition terminal of the contactor coil
   Terminal 14/22: repetition terminal of the contactor auxiliary contact.
**Areas of use**

The 3RU11 thermal overload relays are designed for the protection of 3-phase AC, DC and single phase AC loads. If the 3RU11 thermal overload relay is going to protect DC loads or single phase loads, then all bimetal strips must be heated. Therefore, all main current paths of the relay need to be wired in series.

The 3RB10 electronic overload relays are designed for the protection of three phase loads in sine-wave 50/60 Hz-voltage networks. The relay is not suitable for protection of DC loads or single phase loads. In loads with single pole loading, the 3RU11 thermal overload relays or the 3RB12 electronic overload relays (only suitable for the protection of single phase loads) can be used.

**Supply power**

For the operation of the 3RU11 overload relay there is no additional supply voltage necessary.

The 3RB10 overload relay is self-powered. That means there is no additional supply voltage necessary.

**Setting**

The 3RU11 thermal overload relay and the 3RB10 electronic overload relay are set by adjusting to the rated motor current with a setting dial. The range on the setting dial is calibrated in amperes.

**Important**

The overload relays may only be operated between the lower and upper adjustment marks on the current setting range. That means that the operation of the overload relay under or over the current setting range is not permitted.

The following drawing shows an example of setting the 3RU11 thermal overload relay, frame size S00, to the rated motor current.

![Setting the rated motor current](image)

**Sealable cover**

The following drawing shows how to secure the current setting dial and the “Manual/Automatic-RESET” selector switch against unauthorized adjustment for the 3RU11 thermal overload relay and the 3RB10 electronic overload relay.
Sealing the current setting dial

3RU11

Fig. 4-3: Sealing the current setting dial (frame size S00)

Important
When the sealing cover (transparent sliding window) is closed (3RU11) or mounted (3RB10), it is not possible to use the blue reset button for a switch-over between M (manual reset) and A (automatic reset).

Ambient requirements

The 3RU11 thermal overload relays are temperature (ambient) compensated according to IEC 60 947-4-1/DIN VDE 0660 part 102 for a temperature range of –20 °C to +60 °C. At a temperature from +60 °C to +80 °C the setting value of the setting range needs to be reduced by a specific factor according to the table below.

<table>
<thead>
<tr>
<th>Ambient temperature in °C</th>
<th>Reduction factor for the top setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>+60</td>
<td>1.0</td>
</tr>
<tr>
<td>+65</td>
<td>0.94</td>
</tr>
<tr>
<td>+70</td>
<td>0.87</td>
</tr>
<tr>
<td>+75</td>
<td>0.81</td>
</tr>
<tr>
<td>+80</td>
<td>0.73</td>
</tr>
</tbody>
</table>

According to the table 70 °C has a reduction factor of 13 %. This factor is so small, that because of the overlapping of the current setting ranges no gaps appear to the next setting range. So that at 70 °C a continuous current range of 0.11 A to 87 A can be used.

The 3RB10 electronic overload relay are insensitive to outside influences, such as vibration, aggressive environment, weathering and strong temperature swings. In the temperature range of –25 °C to +70 °C the 3RB10 electronic overload relays in the sizes S00 to S3 are temperature (ambient) compensated according to IEC 60 947-4-1/DIN VDE 0660 part 102.
The 3RB10 electronic overload relays in the sizes S6 and S10/12 require an adjustment to the setting value of the setting range by a specific factor at ambient temperatures of ≥ +60 °C according to the tables below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+60° C</td>
</tr>
<tr>
<td>3RB10 56..F0</td>
<td>1.00</td>
</tr>
<tr>
<td>3RB10 66..GG0</td>
<td>1.00</td>
</tr>
<tr>
<td>3RB10 66..KG0</td>
<td>1.00</td>
</tr>
<tr>
<td>3RB10 66..LG0</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Table 4-6: Reduction factor for the top setting value of a stand alone device

<table>
<thead>
<tr>
<th>Type</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+60° C</td>
</tr>
<tr>
<td>3RB10 56..F0</td>
<td>0.70</td>
</tr>
<tr>
<td>3RB10 66..GG0</td>
<td>0.70</td>
</tr>
<tr>
<td>3RB10 66..KG0</td>
<td>0.82</td>
</tr>
<tr>
<td>3RB10 66..LG0</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Table 4-7: Reduction factor for the top setting value when direct mounting to the contactor

**Manual-automatic RESET**

By pushing in and turning the blue button (RESET-button) on the 3RU11 thermal overload relays and 3RB10 electronic overload relays, you can choose between manual and automatic reset.

The following figure shows how to switch between manual and automatic for the 3RU11 and 3RB10 using the example of the 3RU11, frame size S00.

![Fig. 4-4: Manual-automatic RESET](image)

When manual resetting is selected, a reset can be performed directly on the device by pressing the RESET button. Remote resetting can be implemented by using the mechanical and electrical RESET modules from the range of accessories (see "Accessories"). When the blue button is set to Automatic RESET, the relay will be reset automatically.

A reset is not possible until the recovery time has elapsed (see “Recovery time”).
**Recovery time**

After tripping due to an overload, it takes a certain length of time for the bimetal strips of the 3RU11 thermal overload relays to cool down. The relay can only be reset once it has cooled down. This time (recovery time) is dependent on the tripping characteristic and the level of the tripping current. After tripping due to overload, the recovery time allows the load to cool down.

With the 3RB10 electronic overload relays the recovery time is fixed when set on Automatic-RESET and lasts about 4 minutes for frame sizes S00 to S3 and about 7 minutes for frame sizes S6 and S10/S12. When set to manual RESET then the device can be reset immediately.

**TEST function**

Correct functioning of the ready status of the overload relay can be tested with the TEST slide. The slide is operated to simulate tripping of the relay. During this simulation, the NC contact (95-96) is opened and the NO contact (97-98) is closed whereby the overload relay checks that the auxiliary circuit is wired correctly. When the overload relay is set to Automatic RESET, an automatic reset takes place when the TEST slide is released. The relay must be reset using the RESET button when it is set to Manual RESET.

**STOP-Function**

When the STOP button is pressed, the NC contact (95-96) is pressed, the NC contact is opened and the series-connected contactor and therefore the load is switched off. The load is reconnected via the contactor when the STOP button is released. Pressing the STOP button does not close the NO contact (97-98).

**Status indication**

The current status of the overload relay is indicated by the position of the marking on the "TEST function/switching position indicator" slide. The marking on the slide is on the left at the "O" mark following a trip due to overload or phase failure and at the "I" mark otherwise.

**Auxiliary contacts**

The overload relay is equipped with an NO contact (97-98) for the tripped signal and an NC contact (95-96) for switching off the contactor. The auxiliary contacts have high contact reliability and are therefore suitable for with PLC's. Also due to the high switching capacity they can be directly connected to the contactor coil.

The following table shows the reaction of the auxiliary contact when activating the TEST-, STOP- and RESET-button.

<table>
<thead>
<tr>
<th></th>
<th>TEST</th>
<th>STOP</th>
<th>RESET</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC 95/96</td>
<td><img src="image1" alt="NC 95/96" /></td>
<td><img src="image2" alt="NC 95/96" /></td>
<td><img src="image3" alt="NC 95/96" /></td>
</tr>
<tr>
<td>NO 97/98</td>
<td><img src="image4" alt="NO 97/98" /></td>
<td><img src="image5" alt="NO 97/98" /></td>
<td><img src="image6" alt="NO 97/98" /></td>
</tr>
</tbody>
</table>

Table 4-8: Auxiliary contact 3RU11/3RB10
**Tripping characteristic**

The tripping characteristics show the relationship between the tripping time and the tripping current as a multiple of the operational current $I_e$ and are specified for symmetrical three-pole and two-pole loading from cold state. The smallest current at which tripping occurs is called the limiting tripping current. In accordance with IEC 60 947-4-1/ DIN VDE 0660 Part 102, this must lie within certain specified limits. The limit tripping current for the 3RU11 overload relay for symmetrical three-pole loading lies between 105 % and 120 % of the current setting and for the 3RB10 electronic overload relay at 114 % of the current setting.

Starting from the limiting tripping current, the tripping characteristic moves on to larger tripping currents based on the characteristics of the so-called trip classes (CLASS 10, CLASS 20 etc., see section 4.1 "Specifications/regulations/approvals").

The tripping characteristic of a three-pole 3RU11 thermal overload relay (see characteristic curve for symmetrical three-pole loading from cold state) is valid when all three bimetal strips are loaded with the same current simultaneously. If, however, only two bimetal strips are heated as a result of phase failure, these two strips would have to provide the force necessary for operating the release mechanism and, if no additional measures were implemented, they would require a longer tripping time or a higher current. These increased current levels over long periods usually result in damage to the load. To prevent damage, the 3RU11 thermal overload relay features phase failure sensitivity which, thanks to an appropriate mechanical mechanism, results in accelerated tripping according to the characteristic for two-pole loading from cold state.

---

**Fig. 4-5: Schematic representation of time-current-characteristic for 3RU11**

These are schematic representations of characteristics. The characteristics for individual 3RU11 thermal overload relays can be requested from Technical Assistance at the following E-mail-Address: technical-assistance@siemens.com.
The tripping characteristic of a three-pole loaded 3RB10 electronic overload relay from cold state (see Characteristic "1") is valid when all three phases are loaded with the same current simultaneously. In the case of phase loss or a current unbalance of more than 40 %, the 3RB10 solid-state overload relay trip contacts switch within 3 seconds. Thanks to rapid tripping in accordance with the tripping characteristic for two-pole loading from cold state (characteristic "3"), the temperature rise in the load is minimized.

These are schematic representations of characteristics. The characteristics for individual 3RB10 electronic overload relays can be requested from Technical Assistance at the following E-mail-Address: technical-assistance@siemens.com.

In contrast to a load in the cold state, a load at operating temperature has a lower heat reserve. This fact affects the overload relay in that following long-term loading at operational current $I_e$ needs to be reduced. The tripping time for the 3RU11 thermal overload relay is reduced to 25 % and for the 3RB10 electronic overload relay to about 30 % (see schematic representation, Characteristic "2").

**Phase loss protection**

The 3RU11 thermal overload relays and the 3RB10 electronic overload relays both have phase loss protection (see "Tripping characteristics") for the purpose of minimizing the heating of the load during single-phase operation as a result of phase loss.
Important
The 3RB10 electronic overload relays are not suitable for the protection of loads with a grounded wye point.

Fig. 4-7: Load types, that the 3RB10 can provide with current dependent protection

4.3.3 3RB12 electronic overload relays

Functions

Drawing of the front view 3RB12:

Fig. 4-8: Front view of the 3RB12 electronic overload relays

1. Terminals for the control supply voltage
2. Green "Ready" LED
3. Red "Ground Fault" LED
4. Red "Overload" LED
5. Combined test/reset button with function test
6. 1 NO contact/1 NC contact for overload/thermistor tripping or 1 NO contact/1 NC contact for overload/thermistor or ground fault tripping
7. Terminals for thermistor input
8. Terminals for external summation current transformer
9. Terminals for remote or automatic reset
10. Rotary dial for current setting
11. Rotary dial for the trip class
12. 1 NO contact/1 NC contact for ground fault tripping or 1 NO contact/1 NC contact for overload warning
13. Analog output 4 mA ... 20 mA
Areas of use

The 3RB12 electronic overload relays are designed for the protection of 3-phase and single phase AC loads. If single-phase AC motors are to be protected with the 3RB12 electronic overload relay, the microprocessor only monitors one phase conductor. The main circuits must therefore be connected to the current transformer in accordance with the operating instructions for the 3RB12 electronic overload relay.

Supply voltage

The 3RB12 electronic overload relays require an external voltage supply. The devices are available for the following control voltages:
- 24 V DC
- 110 V to 120 V AC
- 220 V to 240 V AC

The 3RB12 overload relay with the control voltage of 24 V DC can be operated with the help of the DC/DC power supply SITOP POWER 24 V / 0.375 A (see section 4.4 "Accessories") on a DC supply from 30 V to 264 V.

Setting

The 3RB12 electronic overload relay is adjusted to the rated motor current using a rotary knob. The scale of the setting dial is calibrated in Amperes.

Important

The overload relays may only be operated between the lower and upper adjustment marks on the current setting range, that means that the operation of the overload relay above or below the current setting range is not permitted.

Note

In order to achieve a setting range of 0.25 A to 1.25 A, the wires going to the motor must be looped through the openings in the 3RB1246 overload relay multiple times in accordance with the instructions in section 4.5 "Mounting and connection".

Furthermore the overload relay needs to be set for the required tripping class.

Note

The wiring and the contactor must be sized for the appropriate tripping class (CLASS). The overload relay is delivered with a default setting of tripping class CLASS 10.

Sealable cover

With the help of the sealable cover, 3RB1900-0A, the setting dial for rated motor current and dial for tripping class selection can be secured against unauthorized adjustment. The cover needs to be snapped in the place of the middle identification tab.
**Ambient requirements**

The 3RB12 electronic overload relays are insensitive to outside influences, such as vibration, aggressive environment, weathering and strong temperature swings. In the temperature range of −25 °C to +70 °C the 3RB12 electronic overload relays are temperature (ambient) compensated according to IEC 60 947-4-1/DIN VDE 0660 part 102.

**Manual-automatic RESET**

A reset can be performed directly on the device by pressing the TEST/RESET button. A remote reset is possible by connecting a button to terminals Y1 and Y2 of the 3RB12 solid-state overload relay. Automatic resetting is still possible by bridging terminals Y1 and Y2.

A reset is not possible until the recovery time has elapsed (see "Recovery time").

**Important**

In the case of ground fault tripping, an automatic reset is not possible.

**Recovery time**

Following a current-dependent trip due to overload, phase unbalance or phase failure, the recovery time is approximately 5 minutes regardless of the reset mode that has been selected. This time is permanently set in the microprocessor to allow the load sufficient time to cool down.

If, however, temperature-dependent tripping takes place as a result of a connected PTC thermistor circuit, the device cannot be reset manually or automatically until the winding temperature at the PTC thermistor falls to 5 K below the response temperature.

After a ground fault trip, the overload relay can be activated again immediately without waiting for a recovery time to elapse. After tripping as a result of a ground fault an Automatic-RESET is not possible.

The recovery time can be taken from the following table depending on the reset mode and the cause of the trip:

<table>
<thead>
<tr>
<th>When the 3RB12 tripped as a result of:</th>
<th>Then the overload relay is reset after the following time by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>brief push of the Test/RESET Button</td>
</tr>
<tr>
<td>Overload*</td>
<td>immediate</td>
</tr>
<tr>
<td>Thermistor*</td>
<td>after 5 min.</td>
</tr>
<tr>
<td>Ground fault</td>
<td>when 5 K under the tripping temperature is reached</td>
</tr>
</tbody>
</table>

* In the case the thermistor and overload trip at the same time, the longer of the two Reset times is correct.

** Jumper (B) is at the time of delivery connected to Y1.

Table 4-9: Recovery times
TEST function

The relay can be tested to ensure the relay is functioning by using the combined TEST/RESET button. The device hardware, LEDs, current monitoring, thermistor input and ground fault input are tested when the button is pressed for up to 2 seconds. If the button is depressed for up to 5 seconds, the current transformer, resistive load and the microprocessor can be tested without the need to deactivate the motor feeder. The motor feeder is deactivated after 5 seconds via the output relay of the 3RB12. On deactivation, all functions of the 3RB12 solid-state overload relay are tested. The current transformer and the resistive load are excluded from the functional test when no voltage is applied to the main circuit.

Testing of the device functions can be done during operation.

STOP-Function

When the TEST/RESET button is pressed, the overload relay switches off the contactor and therefore the load after 5 seconds. The load is switched on again via the contactor when the TEST/RESET button is pressed again briefly.

Status indication

The status of the 3RB12 solid-state relay is displayed on 3 LEDs:

Green LED "Ready": Continuous green light indicates the operational readiness. The 3RB12 is not ready (LED "Off") when control supply voltage is not applied and when the function test was negative.

Red LED "Overload": Continuous red light signals overload tripping due to current overload and flashing red light indicates imminent tripping due to overload (overload warning).

Red LED "Ground Fault": Continuous red light indicates the presence of a ground fault.

Auxiliary contacts

The 3RB12 solid-state overload relay is equipped with two outputs each with one NO contact and one NC contact. Their use depends on the device variation:

1 NO (97-98) for the signal "tripped due to overload and/or thermistor";
1 NC (95-96) for shutting off the contactor and
1 NO(07-08) for the signal "tripped due to ground fault";
1 NC (05-06) for shutting off the contactor

1 NO (97-98) for the signal "tripped due to overload and/or thermistor and/or ground fault";
1 NC (95-96) for shutting off the contactor and
1 NO (07-08) for overload warning;
1 NC (05-06) for shutting off the contactor

Mono- and bistable output relays

The difference between monostable and bistable can be seen in terms of the tripping response of the auxiliary contacts on failure of the control supply voltage.

Note

The 3RB12 electronic overload relays come standard with monostable output relays. A special variation is available with bistable output relays.
The monostable overload relays take up the "tripped" position on failure of the control voltage (> 200 ms) and resume their original state once voltage has been restored. These devices are suitable for systems in which the control voltage is not specifically monitored.

The bistable 3RB12 solid-state overload relays do not change state from "tripped" or "not tripped" on failure of the control voltage. The auxiliary contacts only switch in the event of an overload when supply voltage is applied. These devices are therefore suitable for systems in which the control voltage is separately monitored.

In the event of the failure of the control supply voltage for any length of time (> 0.2 seconds), the output relays respond in either a monostable or bistable manner, depending on the variant involved.

<table>
<thead>
<tr>
<th>Behavior of the output relays given:</th>
<th>monostable 3RB12..-....0</th>
<th>bistable 3RB12..-....1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of the control supply voltage</td>
<td>Device trips</td>
<td>No change to the switching status of the auxiliary contact elements</td>
</tr>
<tr>
<td>Return of the control supply voltage without prior tripping</td>
<td>Device resets</td>
<td></td>
</tr>
<tr>
<td>Return of the control supply voltage after prior tripping</td>
<td>Device remains tripped</td>
<td></td>
</tr>
</tbody>
</table>

Reset at:
- Overload trips after 5 minutes
- Thermistor trips when 5 K under the operating temperature reached
- Ground fault trips immediately

Table 4-10: Loss of the control supply voltage

Fig. 4-9: Reaction of the monostable and bistable auxiliary contacts
Thermistor motor protection-Function

Connecting a thermistor (PTC-) sensor circuit offers, in addition to the current dependent protection, the possibility of directly monitoring the temperature of the motor windings. That way the load is protected against excessive temperature, that, may be derived from:
- stator critical motors,
- motors with long start-up and braking processes
- motors with blocked cooling or high ambient temperature.

When excessive temperature is measured at the motor windings the 3RB12 switches the auxiliary contact (see point "Auxiliary contacts") shutting off the contactor and therefore the load. The connection for the excessive temperature protection is broken-wire proof. That means the device trips when there is an opening at the connection terminal. The thermistor-motor protection function comes with this feature deactivated.

Analog output

The motor current that is measured by the 3RB12..-....40 overload relay’s microprocessor is converted and sent with an analog output signal of 4 mA to 20 mA DC (max. current value of the 3 phases). The following shows the relationship between the motor current and the analog output signal:

\[
4 \, \ldots \, 20 \, mA \\
1 \% \times I_e = 0.128 \, mA
\]

\[
\frac{I}{I_e} [\%] = \frac{I_{out} - 4 \, mA}{0.128 \, mA} \\
I_{Motor} [A] = \frac{I_{out} - 4 \, mA \times I_e}{12.8 \, mA}
\]

<table>
<thead>
<tr>
<th>(I_{out} [mA])</th>
<th>(I/I_e [%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No connection, wire break!</td>
</tr>
<tr>
<td>4.000</td>
<td>0</td>
</tr>
<tr>
<td>4.128</td>
<td>1</td>
</tr>
<tr>
<td>5.280</td>
<td>10</td>
</tr>
<tr>
<td>7.200</td>
<td>25</td>
</tr>
<tr>
<td>10.40</td>
<td>50</td>
</tr>
<tr>
<td>15.52</td>
<td>90</td>
</tr>
<tr>
<td>16.80</td>
<td>100</td>
</tr>
<tr>
<td>18.08</td>
<td>110</td>
</tr>
<tr>
<td>20.00</td>
<td>125</td>
</tr>
</tbody>
</table>

Example

\[
I_{out} = 10.40 \, mA; \, I_e = 6.0 \, A \\
I = 50 \% \text{ v. } I_e \\
I_{Motor} = 3 \, A
\]

Technical data:
- Max. output current: 23 mA
- Terminals: ‘+’ and ‘-’
- Max. load: 100 Ω
- Accuracy: +/- 10%
- Short circuit-proof and idling-proof
The analog output signal can control moving coil instruments with a 4 mA-to 20 mA-input (the upper limit of the scale for all frame sizes is 125 %) or can be stored through analog inputs of PLCs. Furthermore the current values can be transferred with a AS-Interface-analog module over the AS-Interface network.

**Ground fault protection**

To protect your load from minor short-circuits or ground faults caused by damage to the insulation, humidity, condensation, etc., the 3RB12 solid-state overload relays offer the following two possibilities for earth fault monitoring:

- Internal ground fault monitoring (not possible with wye-delta combinations) for motors with 3-wire connections for the detection of fault currents > 30 % of the operational current $I_e$ under rated operation.
- External ground fault detection by connecting a summation current transformer (see "Accessories") for motors with 3-wire and 4-wire connection for detecting sinusoidal fault currents (50/60 Hz) of 0.3 A, 0.5 A and 1 A. In the case of a ground fault, the relay trips without a delay and switches off the contactor and therefore the load via the auxiliary contactors (see "Auxiliary contactors"). The "Tripped" state is signalled by a red LED "Ground Fault" (see "Indication of status").

**Overload warning**

A blinking LED on the relay indicates when tripping is imminent as a result of overload, phase imbalance or phase loss after exceeding a limit current. This warning can also be signalled externally.

The overload warning occurs:

- at $1.5 \times I_e$ with symmetrical loading and
- at $0.85 \times I_e$ with asymmetrical loading.

The overload warning makes it possible to take corrective measures (for example, disconnecting the load) right away and avoid longer over current dependent stress on the branch circuit.

**Self-monitoring**

Self-monitoring causes the device to trip in the event of an internal fault. In this case, the overload relay cannot be reset.

**Tripping characteristics**

The tripping characteristics show the relationship between the tripping time and the tripping current as a multiple of the operational current $I_e$ and are specified for symmetrical three-pole and two-pole loading from cold state.

The smallest current at which tripping occurs is called the limiting tripping current. In accordance with IEC 60 947-4-1/ DIN VDE 0660 Part 102, this must be within certain specified limits. The limits of the limiting tripping current lie, in the case of the 3RB12 solid-state overload relay for symmetrical three-pole loading, between 110 % and 120 % of the operational current.

Starting from the limiting tripping current, the tripping characteristic moves on to higher tripping currents based on the characteristics of the so-called trip classes (CLASS 10, CLASS 20 etc. see section 4.1 "Specifications/regulations/approvals").
The tripping characteristic of an overload relay with three-pole loading from cold state (see the diagram “Tripping characteristic for three-pole loading”) is valid when all three phases are loaded with the same current simultaneously. In the event of a phase loss or current unbalance of more than 40 \%, the 3RB12 overload relay switches off the contactor more quickly to minimize the temperature rise in the load in accordance with the tripping characteristic for two-pole loading from cold state (see the diagram "Tripping characteristic for 2-pole loading").

Fig. 4-10: Time-current-characteristics, schematic representation 3RB12

These are schematic representations of characteristics. The characteristics for individual 3RB12 electronic overload relays can be requested from Technical Assistance at the following E-mail Address:

technical-assistance@siemens.com.

In contrast to a load in the cold state, a load at operating temperature has a lower heat reserve. This fact affects the 3RB12 overload relay, in that, following an extended period of loading at operational current $I_e$, the tripping time is reduced by about 30 \%.

**Phase loss protection**

The 3RB12 electronic overload relays have phase loss protection (see "Tripping characteristics") for the purpose of minimizing the heating of the load during single-phase operation as a result of phase loss.
4.4 Accessories

4.4.1 Electrical remote RESET

Beschreibung
For the 3RU11 thermal overload relays, frame sizes S00 to S3, and the 3RB10 electronic overload relays, frame sizes S00 to S10/S12, there is an electrical remote RESET module that can be used for every frame size. With this module the overload relay can be electrically reset after tripping once the recovery time is met. The coil of the module is designed for an operation duration of 0.2 to 4 seconds. Maintained-contact control is not permissible. An electrical RESET can be achieved without an accessory with the 3RB12 electronic overload relay (see section 4.3 "Application and use").

Installation/Removal
The following graphic shows how the electrical remote reset is installed and removed, using the example of the 3RU11 in frame size S00.

![Electrical remote reset, installation/removal](image)

Voltages
The electrical remote RESET-module is available for the following voltages:
- 24 to 30 V AC/DC
- 110 to 127 V AC/DC
- 220 to 250 V AC/DC

Operational range
The operational range of the coil is 0.85 to 1.1 × U_s

Current consumption
The current consumption of the electrical remote RESET-module is:
- AC 80 VA, DC 70 W

Manual RESET
The electrical reset can be bypassed by manually pushing the blue reset button on the electrical remote RESET-module.

Connection
The screw connections on terminals E1 and E2 of the electrical remote RESET-module are similar to the screw connections of the auxiliary contacts of the 3RU11 and 3RB10 overload relays. (see section 4.7 "Technical Data").
4.4.2 Mechanical thru-the-door reset

For the 3RU11 thermal overload relays, frame sizes S00 to S3, and the 3RB10 electronic overload relays, frame sizes S00 to S10/S12, can also be remotely reset by mechanical means. For the mechanical remote RESET there are the two following possibilities:

1. Resetting plunger (Same for all frame sizes)
   A resetting plunger with a support and funnel 3RU1900-1A for operation from the enclosure door.
   The plunger must be cut to the required length.

2. Cable release (Same for all frame sizes)
   Cable release with support 3RU1900-1B, -1C for panel layouts that do not allow for the standard resetting plunger.
   The cable comes in the following lengths
   400 mm (3RU1900-1B) and
   600 mm (3RU1900-1C)
   The 3RB12 electronic overload relays don’t have an accessory for mechanical remote RESET.

Resetting plunger

**Installation**

The following graphic shows how to install the resetting plunger, support, funnel and push button, using the example of the 3RU11 thermal overload relay, frame size S00:

![Fig. 4-12: Mechanical remote RESET: resetting plunger, installation](image)

**Removal**

The following graphic shows the removal of the holder, using the example of the 3RU11 thermal overload relay:

![Fig. 4-13: Mechanical remote reset: resetting plunger, removal](image)
Cable release

Montage

The following graphic shows the installation of the cable release with support, using the example of the 3RU11 thermal overload relay in frame size S00:

![Cable release, installation](image1)

Fig. 4-14: Mechanical remote RESET: cable release, installation

Removal

The following graphic shows the removal of the support for the cable release, using the example of the 3RU11 thermal overload relay:

![Cable release, removal](image2)

Fig. 4-15: Mechanical remote RESET: cable release, removal
4.4.3 Other accessories

Sealable cover

There is a frame size independent sealable cover for both the 3RB10 and 3RB12 electronic overload relay. In contrast, the 3RU11 thermal overload relay has a built-in sealable cover.

Adapters for individual installation

There is an adapter for individual installation for the 3RU11 thermal overload relay and the 3RB10 electronic overload relay, frame sizes S00 to S3. The 3RB10 overload relays, frame sizes S6 and S10/S12 can be individually installed without an accessory.

The 3RB12 46 electronic overload relays require the use of push-in lugs for panel mounting. The 3RB12 53 overload relay can also be snapped onto 75mm DIN rail, when using the 3UF1900-0JA00 base plate.

Terminal covers

For the 3RU11 thermal overload relay, frame sizes S2 and S3, the 3RB10 electronic overload relays, frame sizes S2 to S10/S12 and the 3RB12 53 3RB12 57 and 3RB12 62 electronic overload relays, there are terminal covers available. The designs and use of the covers can be taken from the installation instructions.

Box terminal blocks

For the 3RB10 electronic overload relay, frame sizes S6 and S10/S12 there are box terminal blocks for connection to round cables and ribbon cable. The designs and use of the box terminal blocks can be taken from the installation instructions.

Summation current transformer

A summation current transformer for external ground fault detection is available for the 3RB12 electronic overload relay.

DC power supply

For the operation of the externally supplied 3RB12 with a control voltage of 24 V DC on a DC network of 30 V to 264 V the SITOP POWER 24 V/0.375 A, DC power supply can be used.
4.5 Mounting and connection

4.5.1 Mounting

4.5.1.1 3RU11 thermal overload relays and 3RB10 electronic overload relays

Mounting options

The 3RU11 thermal overload relays and the 3RB10 electronic overload relays are electrically and mechanically designed to work in harmony with the 3RT contactor. For that reason it is possible to directly mount the overload relay to a contactor. With a separate accessory it is possible to mount the overload relay as a stand alone device.

The 3RB10 overload relays can also be used in connection with the 3RW30/31 softstarters. However, the mounting instructions found in chapter 8 must be observed.

Direct mounting

The following drawing shows an example of a 3RU11 thermal overload relay in frame size S00 being mounted directly to a 3RT contactor and an example of a 3RB10 electronic overload relay in frame size S00 being mounted to the 3RW30/31 softstarter.

![Fig. 4-16: Mounting to the 3RT contactor/3RW3 softstarter](image-url)

**Important**

For the use of the overload relays in connection with the 3RW30/31 softstarters, observe the instructions found in chapter 8.
The following drawing shows the direct mounting of the 3RB10 electronic overload relays, frame size S6 (3RB105) and S10/S12 (3RB106), to the 3RT contactors:

Fig. 4-17: Mounting of the 3RB10 electronic overload relays, frame size S6 (3RB105) and S10/S12 (3RB106), to the 3RT contactors.
Important
When installing the 3RB10 electronic overload relays, frame size S6, with the busbar connection pieces, the 3RB10 may not be guided with the nose of the top of the overload housing in the guides of the contactor. The guides on the contactor are for the direct mounting of the overload relay 3RB10, frame size S6 with straight-through current transformer.
To cover the busbar when combining 3RB10 6 and 3RT1.6 or 3RB10 6 and 3RT1.7, use the terminal cover 3RT19 66-4EA3. There is a piece that must be removed as shown in the figure 4-17.

The following drawing shows the removal of the 3RB10 electronic overload relay with straight-through current transformer:

Fig. 4-18: Removal of the 3RB10 electronic overload relays, frame size S6 with straight-through current transformer

The contactor-overload combination, frame sizes S00 to S3 can be snapped on to 35 mm DIN rail, according to DIN EN 50 022. This is shown in the following drawing of a combination in frame size 00:

Fig. 4-19: Mounting on 35 mm DIN rail
For the removal of S00/S0 combinations from the DIN rail, the contactor must be pushed downward and then swung forward. By contrast, in S2/S3 combinations the overload relay must be removed first and then the contactor needs to be disengaged from the DIN rail with a screw driver (see description in chapter 3).

As an alternative to DIN rail mounting, it is possible to screw mount the S00 to S3 combinations. The combinations in the frame sizes S6 to S12, on the other hand, were designed for screw mounting only. When mounting the S00 to S12 combinations with screws, the contactor should be mounted first and then the overload relay should be mounted to the contactor as in the drawing on the previous page.

**Individual installation**

The 3RU11 thermal overload relays and the 3RB10 electronic overload relays frame sizes S00 to S3, can also be used as stand alone units when used with adapters for individual installation.

<table>
<thead>
<tr>
<th>Adapter for individual installation</th>
<th>Frame size</th>
<th>for 3RU11</th>
<th>for 3RB10</th>
</tr>
</thead>
<tbody>
<tr>
<td>3RU19 16-3AA01</td>
<td>S00</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3RU19 26-3AA01</td>
<td>S0</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3RU19 36-3AA01</td>
<td>S2</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3RU19 46-3AA01</td>
<td>S3</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The following drawing shows the mounting and removal of the adapter for individual installation with a 3RU11 thermal overload relay, frame size S2.

![Fig. 4-20: Mounting and removal of the adapter for individual installation (S2)](image-url)

The adapter can be mounted to 35 mm DIN rail according to DIN EN 50 022. The frame size S3 adapter can also be mounted to 75 mm DIN rail. It is also possible to panel mount the adapter.

The frame size S6 3RB10 electronic overload relays are suitable for panel mounting and DIN rail mounting on 35 mm DIN rail - without an additional adapter.
The 3RB10 electronic overload relays, frame sizes S10/S12, are designed for panel mounting.

Fig. 4-21: Mounting to 35 mm DIN rail

Fig. 4-22: The panel mounting of the 3RB10 electronic overload relay (S10/S12)
**Mounting position**

The following drawing shows the permissible mounting position when mounted to the contactor and for individual installation of the 3RU11 thermal overload relays. If the mounting position falls in the shaded range, the current setting needs to be adjusted by 10%.

![Diagram of permissible mounting positions](image)

**Contactor with Overload relay**

**Overload relay in individual installation**

The mounting position of the 3RB10 electronic overload relays is not restricted.

**Minimal clearance**

A minimal side clearance to grounded parts of > 6.5 mm is required.
### 4.5.1.2 3RB12 electronic overload relays

**Mounting possibilities**
The 3RB12 electronic overload relays can be directly connected to 3RT contactors with the exception of the 3RB12 46. Individual installation is possible with all of the overload relays.

**Direct mounting**
The 3RB12 53 and 3RB12 57 electronic overload relays can be mounted directly to the 3RT contactor in the manner shown in the following drawing.

![Diagram of 3RB12 electronic overload relays](image)

**Individual installation**
The 3RB12 46 electronic overload relays can be mounted on 35 mm DIN rail according to DIN EN 50 022 or directly to a panel with the use of push-in lugs that are available as an accessory. The other overload relays are designed for panel mounting with screws. The 3RB12 53 overload relay can also be snapped onto 75 mm DIN rail when using a base plate accessory.

**Mounting position**
The mounting position of the 3RB12 electronic overload relays is not restricted.

**Minimal clearance**
A minimal side clearance to grounded parts of > 6.5 mm is required.
4.5.2 Connection

**3RU11 thermal overload relays and 3RB10 electronic overload relays**

**Connection options**

The connections for the main current paths are either screw terminals, bus-bars, Cage Clamp terminals or straight-through current transformers depending on the frame size and model of the device.

The auxiliary circuits have either screw terminals or Cage Clamp terminals, depending on the frame size and model of the device. The connection type as well as the type of screw driver/bit width, required torque and conductor cross-sections (min.; max.) for the individual devices can be found in section 4.7 “Technical Data”.

**Straight-through current transformer**

The 3RB10 electronic overload relays in frame size S6 are available with straight-through current transformer technology. As shown in the picture below the cables are passed through the straight-through current transformer openings and connected directly to the main terminals on the contactor.

![Fig. 4-24: 3RB10 electronic overload relay, frame size S6 with straight-through current transformer technology](image)

**Cage Clamp-Technology**

For Cage Clamp-terminal technology please observe the instructions in chapter 1 “System overview”.

**Coil- and auxiliary contact repeat terminal**

When directly mounting the 3RU11 thermal overload relays and the 3RB10 electronic overload relays of frame size S00, the auxiliary contact runs through the coil terminal A2. This simplifies the wiring.

**Protection against electrical shock**

Observe the data in section 4.7 “Technical Data” regarding protection against electrical shock (according to DIN VDE 0106 part 100) with the 3RU11 thermal overload relays and 3RB10 electronic overload relays. Possibilities on how to achieve shock protection can be found in the mounting instructions.
**3RB12 electronic overload relays**

**Connection options**

The connections for the main current paths are either bar connection or straight-through current transformer technology, depending on frame size and device design. The auxiliary, control, and thermistor sensor circuits have screw terminals. The connection type as well as the type of screw driver/bit width, required torque and conductor cross-sections (min.; max.) for the individual devices can be found in section 4.7 “Technical Data”.

**Straight-through current transformer**

The 3RB12 46 electronic overload relay is designed with straight-through current transformer technology. The cables are passed through the straight-through current transformer openings and are connected directly to the main terminals on the contactor.

**Looping of the cables**

The 3RB12 46 electronic overload relays with the setting range 1.25 to 6.3 A can also be used to protect loads with the rated current of 0.25 to 1.25 A. With these rated currents, $I_N$, every phase must be looped through the openings in the overload multiple times (n-times). With this multiple looping through of the cables, calculate the setting current $I_e$ according to the following formula:

$$I_e = n \times I_N$$

with $n \leq 5$

The following drawing shows the looping through technique:

![Looping through technique, 3RB12 46](image)

**Protection against electrical shock**

Observe the data in section 4.7 “Technical Data” regarding protection against electrical shock (according to DIN VDE 0106 part 100) with the 3RB12 electronic overload relays. Possibilities on how to achieve shock protection can be found in the mounting instructions.
4.5.3 Circuit diagrams

The following diagrams show wiring examples for the 3RU11 thermal overload relays, the 3RB10 and 3RB12 electronic overload relays:

**Protection of DC motors with 3RU11**

3RU11

![Circuit diagram 3RU11](image1)

1-pole

2-pole

Fig. 4-26: Circuit diagrams 3RU11

**General circuit diagrams for 3RU11 and 3RB10**

3RU11 and 3RB10

![Internal circuit diagrams 3RU11 and 3RB10](image2)

3RU11 16/3RB10 16

3RU11 26 to 3RU11 46/3RB10 26 to 3RB10 66

Fig. 4-27: Internal circuit diagrams 3RU11 and 3RB10

**3RB10 1 and 3RU11 1**

![Diagram for thermal 3RU11 1 overload relay and 3RB10 1 electronic overload relay](image3)

Fig. 4-28: Diagram for thermal 3RU11 1 overload relay and 3RB10 1 electronic overload relay
3RU11, 3RB10, 3RB12 Overload relays

**3RU11 2 to 3RU11 4 / 3RB10 2 to 3RB10 6**

![Diagram](image)

Fig. 4-29: Diagram for 3RU11 2 to 3RU11 4 thermal overload relays and 3RB10 2 to 3RB10 6 electronic overload relays

In single pole loads the 3 main current paths are to be connected in series. (applies only good for 3RU11).

---

**Warning**

When using automatic reset and a maintained contact device for starting, the motor restarts automatically.

---

**3RB12 electronic overload relays**

3RB12 46- ...0., - ... 1 ;
3RB12 53- ...0., - ... 1 .
3RB12 57- ...0., - ... 1 .
3RB12 62- ...0., - ... 1 .

![Diagram](image)

Fig. 4-30: Wiring diagrams for single-phase motors using 3RB12

---

**Important**

The electronic overload relays with integrated ground fault detection (3RB12...-...2./3RB12...-...3.) are not suitable for single-phase motors.
3RB12 overload relay, standard design

Fig. 4-31: 3RB12 Overload relay, standard design
4.6 Dimensional drawings (dimensions in mm)

3RU11/3RB10/3RB12 overload relays - screw-type terminals

Fig. 4-32: 3RU11 16-..B0, (Frame size S00) with accessories

Fig. 4-33: 3RU11 16-..B-, 3RB10 16-..B-, (Frame size S00) with adapter for stand-alone installation with accessories

Fig. 4-34: 3RU11 26-..B-, 3RB10 26-..B-, (Frame size S0) with adapter for stand-alone installation

Fig. 4-35: 3RU11 36-..B-, 3RB10 36-..B-, (Frame size S2) with adapter for stand-alone installation

1) Mechanical RESET
2) Cable release
(400 mm or 600 mm long, Installation on front or side on the support)
3) Support for RESET

1) Adapter for remote RESET

1) NSB00338
2) NSB00339
3) NSB00340
4) NSB00341a
3RU11, 3RB10, 3RB12 Overload relays

Fig. 4-36: 3RU11 46-..B., 3RB10 46-..B. (Frame size S3) with adapter for stand-alone installation

Fig. 4-37: 3RB12 46

Fig. 4-38: 3RB12 5. / 3RB12 62

Overload relay a b c d e f
3RB12 46-1E 15 29 24 47 — —
3RB12 46-1P 10 34 29 46 48 4
3RB12 46-1Q 10 34 29 46 48 4

Overload relay a b c d e f g h i j k l m n o p
3RB12 53-0F 120 85 155 110 40 67 42 37 125 41 20 131 72 13 145 4
3RB12 57-0K 145 85 175 105 50 69 52 48 130 46 30 151 72 — 160 6
3RB12 62-0L 230 85 190 120 70 71 70 — 135 55 40 166 72 — 175 8

1) Mounting to 35 mm, DIN rail
15 mm deep according to DIN EN 50 022
or 75 mm DIN rail according to DIN EN 50 023
**3RU11 overload relay- Cage Clamp-terminals**

1) Mechanical RESET  
2) Cable release  
   400 mm or 600 mm long  
   Installation on front or side on the support  
3) Support  

Fig. 4-39: 3RU11 16-..C1 (Frame size S00)  
with accessories (same for frame sizes S00 to S3)

Fig. 4-40: 3RU11 26-..D. (Frame size S0) with adapter for stand alone installation

Fig. 4-41: 3RU11 36-..D. (Frame size S2) with adapter for stand alone installation

Fig. 4-42: 3RU11 46-..D. (Frame size S3) with adapter for stand alone installation

1) Adapter for remote-RESET

---

1) Mounting to 35 mm, DIN rail  
15 mm deep according to DIN EN 50 022  
or 75 mm DIN rail according to DIN EN 50 023
# 4.7 Technical Data

## 4.7.1 3RU11 thermal overload relays

<table>
<thead>
<tr>
<th>Type</th>
<th>3RU11 16</th>
<th>3RU11 26</th>
<th>3RU11 36</th>
<th>3RU11 46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>S00</td>
<td>S0</td>
<td>S2</td>
<td>S3</td>
</tr>
<tr>
<td>Width</td>
<td>45 mm</td>
<td>45 mm</td>
<td>55 mm</td>
<td>70 mm</td>
</tr>
</tbody>
</table>

### General specifications

<table>
<thead>
<tr>
<th>Tripped at</th>
<th>Overload and phase loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tripping class</td>
<td>In acc. with IEC 60947-4-1 CLAS S 10</td>
</tr>
</tbody>
</table>

### Phase loss sensitivity

- Yes

### Overload warning

- No

#### Resetting and recovery

<table>
<thead>
<tr>
<th>Resetting options after tripping</th>
<th>Manual, remote, and automatic resetting ¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery time</td>
<td>With automatic reset min. Depends on the height of the tripping current and the tripping characteristic</td>
</tr>
<tr>
<td></td>
<td>With manual reset min. Depends on the height of the tripping current and the tripping characteristic</td>
</tr>
<tr>
<td></td>
<td>With remote reset min. Depends on the height of the tripping current and the tripping characteristic</td>
</tr>
</tbody>
</table>

### Configuration

| Indication of operating status on device | Yes, by means of the "test function/contact position indicator" slider |
| Test function                          | Yes |
| Reset button                           | Yes |
| Stop button                            | Yes |

### For the safe operation of motors with increased safety protection

- EC special test certificate number in compliance with directive 94/9/EC
- KEMA test certificate no. EX-97Y3235
- DMT 98 ATEX G001

### Ambient temperatures

| Storage/transportation °C | -55 to +80 |
| Operation °C              | -20 to +70 |
| Temperature compensation °C | To 60 |

### Permissible rated current at

- Internal cubicle temperature of 60 °C % 100 (current reduction is required at above +60 °C)
- Internal cubicle temperature of 70 °C % 87

### Repetition terminals

| Terminal for contactor coil | Yes | Not required |
| Auxiliary switch repetition terminal | Yes | Not required |

### Degree of protection

- In acc. with IEC 60529/DIN VDE 0470 Part 1
- IP20 |

### Shock protection

- In acc. with DIN VDE 0106 Part 100
- Protected against touching by fingers

### Sinus shock resistance

- In acc. with IEC 68 Part 2-27
- g/ms 810

### EMC noise immunity

- Conducted disturbance neutralization - burst In acc. with IEC 61 000-4-4; (corresponds to severity grade 3) kV |
  - EMC noise immunity is not relevant to thermal overload relays
- Conducted disturbance neutralization - surge In acc. with IEC 61 000-4-5; (corresponds to severity grade 3) kV |
  - EMC noise immunity is not relevant to thermal overload relays
- Electrostatic discharge In acc. with IEC 61 000-4-2; (corresponds to severity grade 3) kV |
  - EMC noise immunity is not relevant to thermal overload relays
- Field-related disturbance neutralization In acc. with IEC 61 000-4-3; (corresponds to severity grade 3) V/m |
  - EMC noise immunity is not relevant to thermal overload relays

### EMC emitted interference

- EMC noise immunity is not relevant to thermal overload relays

### Resistance to extreme climates

- (atmospheric humidity) % 100

### Site altitude

- m Up to 2000 above sea level; above on request

### Construction type/mounting

- Direct mounting stands-alone installation with terminal bracket ³)

---

¹) Remote reset in conjunction with suitable accessories

²) Terminal compartment: IP00 degree of protection

³) Only stand-alone installation is possible for the 3RU11 16 overload relay with the Cage Clamp terminal system.
# 3RU11, 3RB10, 3RB12 Overload relays

<table>
<thead>
<tr>
<th>Type</th>
<th>3RU11 16</th>
<th>3RU11 26</th>
<th>3RU11 36</th>
<th>3RU11 46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>S00</td>
<td>S0</td>
<td>S2</td>
<td>S3</td>
</tr>
<tr>
<td>Width</td>
<td>45 mm</td>
<td>45 mm</td>
<td>55 mm</td>
<td>70 mm</td>
</tr>
</tbody>
</table>

## Main circuit

<table>
<thead>
<tr>
<th>Rated insulation voltage $U_i$ (pollution degree 3)</th>
<th>V 690</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated impulse strength $U_{imp}$</td>
<td>kV 6</td>
<td>8</td>
</tr>
<tr>
<td>Rated operating voltage $U_e$</td>
<td>V 690</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Current setting
- Direct current
  - 0.11 - 0.16
  - Up to 9 - 12
  - 5.5 - 8
  - 18 - 25
- Alternating current
  - 1.8 - 2.5
  - Up to 20 - 25
  - Up to 40 - 50
  - Up to 80 - 100

### Power loss per device (max.)
- W 3.9 to 6.6
- 6 to 9
- 10 to 16.5

## Short-circuit protection
- With fuse, without contactor
  - See the selection and ordering data in the catalog
- With fuse and contactor
  - See the technical specifications (short-circuit protection with fuses/circuit breakers for motor feeders)

## Safe isolation between main and auxiliary conducting paths
- In acc. with DIN VDE 0106 Part 101
- IEC 60 947-1-A1

### Connection of the main circuit

#### Connection type
- Screw-type terminal/Cage Clamp terminal
- Screw-type terminal with box terminal
- Screw-type terminal with bus terminal

#### Screw-type terminal
- **Terminal screw**
  - Pozidriv 2
- **Tightening torque**
  - Nm 0.8 to 1.2
  - 2 to 2.5
  - 3 to 4.5
  - 4 to 6
- **Connection cross-section** (min./max.), 1 or 2 conductors
  - Single-core
    - mm² 2 x (0.5 to 1.5)
    - 2 x (0.75 to 2.5)
    - max. 2 x (1 to 4)
  - Finely stranded without wire end ferrule
    - mm² —
  - Finely stranded with wire end ferrule
    - mm² 2 x (0.5 to 1.5)
    - 2 x (1 to 2.5)
  - Stranded
    - mm² 2 x (0.5 to 1.5)
    - 2 x (1 to 2.5)
  - AWG cables, single- or multi-core
    - AWG 2 x (18 to 14)
    - 1 x (18 to 1)
  - Ribbon cables (number x width x depth)
    - mm 2 x (6 x 9 x 0.8)

#### Bar connection
- **Terminal screw**
  - M 6 x 20
- **Tightening torque**
  - Nm 4 to 6
- **Connection cross-section** (min./max.)
  - Finely stranded with cable lug
    - mm² —
  - Stranded with cable lug
    - mm² —
  - AWG cables, single-core or stranded with cable lug
    - AWG —
  - With connecting bars (max. width)
    - mm —

---

1) For the connection cross-sections for the Cage Clamp terminal system, see “Connecting the auxiliary circuit”.
2) The box terminal can be removed. After the box terminal has been removed, busbar and cable-lug connections are possible.
### Auxiliary circuit

#### Auxiliary contact elements (number x (variant))
- 1 x (1 NO contact + 1 NC contact)

#### Assignment of the auxiliary contact elements
- 1 NO contact for the "tripped by overload" signal
- 1 NC contact for switching off the contactor

#### Rated insulation voltage $U_i$ (pollution degree 3)
- $V \leq 690$

#### Rated impulse strength $U_{imp}$
- $kV \leq 6$

### Contact rating of the auxiliary contact elements

#### NC contact with alternating current AC-14/AC-15

- Rated operational current $I_{op}$ at $U_e$:
  - 24 V: $A \leq 4$
  - 120 V: $A \leq 4$
  - 230 V: $A \leq 3$
  - 400 V: $A \leq 2$
  - 600 V: $A \leq 0.6$
  - 690 V: $A \leq 0.5$

#### NO contact with alternating current AC-14/AC-15

- Rated operational current $I_{op}$ at $U_e$:
  - 24 V: $A \leq 3$
  - 120 V: $A \leq 3$
  - 230 V: $A \leq 2$
  - 400 V: $A \leq 1$
  - 600 V: $A \leq 0.6$
  - 690 V: $A \leq 0.5$

#### NC contact, NO contact with direct current DC-13

- Rated operational current $I_{op}$ at $U_e$:
  - 24 V: $A \leq 1$
  - 60 V: $A \leq 0.22$
  - 110 V: $A \leq 0.22$
  - 125 V: $A \leq 0.11$
  - 220 V: $A \leq 0.11$

#### Conventional free air thermal current $I_{th}$

- $A6$

#### Contact reliability (suitable for PLC; 17 V, 5 mA)
- ja

### Short-circuit protection

#### With fuse
- Performance class $gL/gG$ rapid
  - $A \leq 6$

#### With miniature circuit breaker (C characteristic)
- $A \leq 10$

### Safe isolation between auxiliary conducting paths

#### in acc. with DIN VDE 0106 Part 101
- $V \leq 415$

### Connection of the auxiliary circuit

#### Connection type
- Screw-type terminal or Cage Clamp terminal

#### Connection characteristics

##### With screw
- Terminal screw: Pozidriv 2
- Tightening torque: Nm 0.8 to 1.2
- Connection cross-sections (min./max.) 1 or 2 conductors
  - Single-core $mm^2$
    - 2 x (0.5 to 1.5)
    - 2 x (0.25 to 2.5)
  - Finely stranded without wire end ferrule $mm^2$
    - 2 x (0.75 to 2.5)
  - Finely stranded with wire end ferrule $mm^2$
    - 2 x (0.5 to 1.5)
  - 2 x (0.75 to 2.5)
  - Stranded $mm^2$
    - 2 x (0.5 to 1.5)
    - 2 x (0.75 to 2.5)
  - AWG cables, single- or multi-core AWG
    - 2 x (18 to 14)
    - 2 x (24 to 14)

#### Connection type for $\&$, $\&$, $\&$
- Switching capacity
  - $B600$, $R300$

1) Up to $I_{op} \leq 0.5 kA$; $U \leq 260 V$
Short-circuit protection with fuses for motor feeders with short-circuit currents of up to 70 kA at 50/60 Hz 690 VAC

Permissible short-circuit protection for motor starters consisting of an overload relay and a contactor of the coordination type “2”

1) Type of coordination and short-circuit protection devices according to IEC 60 947-4-1/DIN VDE 660 Part 102:

**Type of coordination 1:** In the event of a short-circuit, persons and equipment must not be in danger from the contactor or starter. These do not have to be suitable for subsequent operation (without repair and replacement of parts).

**Type of coordination 2:** In the event of a short-circuit, persons and equipment must not be in danger from the contactor or starter. These must be suitable for subsequent operation. There is a risk of welding of the contacts.

2) at max. 415 V.
Short-circuit protection with fuses for motor feeders with short-circuit currents of up to 50 kA at 50/60 Hz 690 VAC
Permissible short-circuit protection for motor starters consisting of an overload relay and a contactor of the coordination type "2" 

<table>
<thead>
<tr>
<th>Adjustment range</th>
<th>Frame size S2</th>
<th>Frame size S3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gL/gG aM BS88</td>
<td>gL/gG aM BS88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 to 8</td>
<td>25 10 25</td>
<td>63 32 63</td>
</tr>
<tr>
<td>7 to 10</td>
<td>32 16 32</td>
<td>80 35 80</td>
</tr>
<tr>
<td>9 to 12.5</td>
<td>35 16 35</td>
<td>80 50 80</td>
</tr>
<tr>
<td>11 to 16</td>
<td>40 20 40</td>
<td>125 50 125</td>
</tr>
<tr>
<td>14 to 20</td>
<td>50 25 50</td>
<td>160 60 160</td>
</tr>
<tr>
<td>18 to 25</td>
<td>63 32 63</td>
<td>160 60 160</td>
</tr>
<tr>
<td>22 to 32</td>
<td>80 35 80</td>
<td>180 60 180</td>
</tr>
<tr>
<td>28 to 40</td>
<td>125 50 125</td>
<td>240 60 240</td>
</tr>
<tr>
<td>36 to 45</td>
<td>160 60 160</td>
<td>240 60 240</td>
</tr>
<tr>
<td>40 to 50</td>
<td>240 60 240</td>
<td>240 60 240</td>
</tr>
</tbody>
</table>

1) Type of coordination and short-circuit protection devices according to IEC 60 947-4-1/DIN VDE 660 Part 102:

**Type of coordination 1:** In the event of a short-circuit, persons and equipment must not be in danger from the contactor or starter.
These do not have to be suitable for subsequent operation (without repair or replacement of parts).

**Type of coordination 2:** In the event of a short-circuit, persons and equipment must not be in danger from the contactor or starter.
These must be suitable for subsequent operation. There is a risk of welding of the contacts.
### 4.7.2 3RB10 electronic overload relays

<table>
<thead>
<tr>
<th>Type</th>
<th>3RB10 16</th>
<th>3RB10 26</th>
<th>3RB10 36</th>
<th>3RB10 46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>S00</td>
<td>S0</td>
<td>S2</td>
<td>S3</td>
</tr>
<tr>
<td>Width</td>
<td>45 mm</td>
<td>45 mm</td>
<td>55 mm</td>
<td>70 mm</td>
</tr>
</tbody>
</table>

**General specifications**

- **Tripped at**: Overload, phase loss, and phase imbalance (>40% in acc. with NEMA)
- **Tripping class**: In acc. with IEC 60 947-4-1 CLASS 10 and 20, depending on the variant
- **Phase loss sensitivity**: Yes, tripped from a warm state < 3 seconds
- **Overload warning**: no

**Resetting and recovery**

- **Resetting options after tripping**: Manual, remote, and automatic resetting
- **Recovery time**: With automatic reset min. Approx. 4
  - With manual reset: min. Immediate
  - With remote reset: min. Immediate

**Configuration**

- **Indication of operating status on device**: Yes, by means of the "test function/contact position indicator" slider
- **Test function**: yes
- **Reset button**: yes
- **Stop button**: yes

**For the safe operation of motors with increased safety protection**

- EC special test certificate
  - number in compliance with directive 94/9/EC
  - On request

**Ambient temperatures**

- **Storage/transportation**: °C -55 to +80
- **Operation**: °C -20 to +70
- **Temperature compensation**: °C Up to 70
- **Permissible rated current at internal cubic temperature of 60 °C**: % 100 (current reduction is required at above +60 °C)
- **Permissible rated current at internal cubic temperature of 70 °C**: % 100 (current reduction is required at above +60 °C)

**Repetition terminals**

- **Terminal for contactor coil**: Yes
  - Not required
- **Auxiliary switch repetition terminal**: Yes
  - Not required

**Degree of protection**

- **In acc. with IEC 60 529/DIN VDE 0470 Part 1**: IP20
  - IP20

**Shock protection**

- **In acc. with DIN VDE 0106 Part 100**: protected against touching by fingers

**Sinus shock resistance**

- **In acc. with IEC 68 Part 2-27**: g/ms 8/10 and 15/11

**EMC noise immunity**

- **Conducted disturbance neutralization - burst**: In acc. with IEC 61 000-4-4:
  - (corresponds to severity grade 3)
  - kV 2
- **Conducted disturbance neutralization - surge**: In acc. with IEC 61 000-4-5:
  - (corresponds to severity grade 3)
  - kV 2/1 (line to ground|line to line)
- **Electrostatic discharge**: In acc. with IEC 61 000-4-2:
  - (corresponds to severity grade 3)
  - kV 6/8 (contact/air discharge)
- **Field-related disturbance neutralization**: In acc. with IEC 61 000-4-3:
  - (corresponds to severity grade 3)
  - V/m 3
  - \(10^5\) 10

**EMC emitted interference**

- **Limit value class B in acc. with CISPR 11**

**Resistance to extreme climates (atmospheric humidity)**

- **%**: 100

**Dimensions**

- **See dimensioned drawings**

**Site altitude**

- **Up to 2000 above sea level**

**Installation position**

- **Any**

**Construction type/mounting**

- **Direct mounting/stand-alone installation with terminal bracket**

---

1) Remote reset in conjunction with suitable accessories
2) Terminal compartment: IP00 degree of protection
3) For the setting ranges 0.1 to 0.4 A, 0.4 to 1.6 A, and 1.5 to 6 A, it is 3 V/m.
### Type 3RU11, 3RB10, 3RB12 Overload relays

**GWA 4NEB 430 0999-02 DS 01 4-55**

1) The box terminal can be removed. After the box terminal has been removed, busbar and cable-lug connections are possible.

### Main circuit

<table>
<thead>
<tr>
<th>Type</th>
<th>3RB10 16</th>
<th>3RB10 26</th>
<th>3RB10 36</th>
<th>3RB10 46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>S00</td>
<td>S0</td>
<td>S2</td>
<td>S3</td>
</tr>
<tr>
<td>Width</td>
<td>45 mm</td>
<td>45 mm</td>
<td>55 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td><strong>Rated insulation voltage</strong> $U_i$ (pollution degree 3)</td>
<td>V</td>
<td>690</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td><strong>Rated impulse strength</strong> $U_{imp}$</td>
<td>kV</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Rated operating voltage</strong> $U_o$</td>
<td>V</td>
<td>690</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current type</th>
<th>Direct current</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternating current</td>
<td>Yes, 50/60 Hz ± 3 (other frequencies on request)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current setting</th>
<th>A</th>
<th>0.1 - 0.4</th>
<th>0.1 - 0.4</th>
<th>6 - 25</th>
<th>13 - 50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 3 - 12</td>
<td>Up to 6 - 25</td>
<td>Up to 13 - 50</td>
<td>Up to 25 - 100</td>
<td></td>
</tr>
</tbody>
</table>

| Power loss per device (max.) | W | Approximately 0.5 |

#### Short-circuit protection

- With fuse, without contactor
- With fuse and contactor

See the selection and ordering data in the catalog
See the technical specifications (short-circuit protection with fuses for motor feeders)

#### Safe isolation between main and auxiliary conducting paths

In acc. with DIN VDE 0106 Part 101 IEC 60 947-1-A1 V On request

#### Connection type

- Screw-type terminal
- Screw-type terminal with box terminal
- Screw-type terminal with box terminal \(^1\) or bar connection

### Screw-type terminal

- **Terminal screw**
  - Pozidriv 2
  - Allen screw 4 mm

- **Tightening torque**
  - Nm
  - 0.8 to 1.2
  - 2 to 2.5
  - 3 to 4.5
  - 4 to 6

- **Connection cross-sections**
  - (min./max.), 1 or 2 conductors
  - Single-core
  - mm\(^2\)
  - 2 x (0.5 to 1.5)
  - 2 x (1 to 2.5)
  - 2 x (2.5 to 6)
  - max. 2 x (1 to 4)
  - max. 2 x (2.5 to 10)

- Finely stranded without wire end ferrule
  - mm\(^2\)
  - —

- Finely stranded with wire end ferrule
  - mm\(^2\)
  - 2 x (0.5 to 1.5)
  - 2 x (1 to 2.5)
  - 2 x (2.5 to 6)
  - max. 2 x (1 to 4)
  - max. 2 x (2.5 to 10)

- Stranded
  - mm\(^2\)
  - 2 x (0.5 to 1.5)
  - 2 x (1 to 2.5)
  - 2 x (2.5 to 6)
  - max. 2 x (1 to 4)
  - max. 2 x (2.5 to 10)

- AWG cables, single- or multi-core
  - AWG
  - 2 x (18 to 14)
  - 2 x (14 to 10)
  - max. 2 x (18 to 14)
  - max. 2 x (14 to 10)

- AWG
  - —
  - —

- Ribbon cables (number x width x depth)
  - mm
  - 2 x (6 x 9 x 0.8)
  - 2 x (6 x 9 x 0.8)

### Bar connection

- **Terminal screw**
  - M 6 x 20

- **Tightening torque**
  - Nm
  - 4 to 6

- **Connection cross-section**
  - (min./max.)
  - Finely stranded with cable lug
    - mm\(^2\)
    - —
    - 2 x 70

  - Stranded with cable lug
    - mm\(^2\)
    - —
    - 2 x 70

  - AWG cables, single-core or stranded with cable lug
    - AWG
    - —
    - 2/0

  - With connecting bars (max. width)
    - mm
    - —
    - 12

---

1) The box terminal can be removed. After the box terminal has been removed, busbar and cable-lug connections are possible.
### Type 3RB10 56 3RB10 66

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Width</th>
<th>General specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>S6</td>
<td>120 mm</td>
<td>Overload relays</td>
</tr>
<tr>
<td>S10/S12</td>
<td>145 mm</td>
<td></td>
</tr>
</tbody>
</table>

#### Overload relays

1. **Trip class**: In acc. with IEC 60 947-4-1 CLASS 10 and 20, depending on the model
2. **Phase loss sensitivity**: Yes, tripped from a warm state < 3 seconds
3. **Overload warning**: No

#### Resetting and recovery

1. **Resetting options after tripping**: Manual, remote, and automatic resetting
2. **Resetting time**: Manual and remote reset: approx. 7 minutes
3. **Automatic reset**: Min. 7 minutes

#### Configuration

1. **Indication of operating status on device**: Yes, by means of the "test function/contact position indicator" slider
2. **Test function**: Yes
3. **Reset button**: Yes
4. **Stop button**: Yes

#### Ambient temperatures

1. **Storage/transportation**: °C -55 to +80
2. **Operation**: °C -25 to +70
3. **Temperature compensation**: °C see description
4. **Permissible rated current at internal cubicle temperature of 60 °C**: % see description
5. **Permissible rated current at internal cubicle temperature of 70 °C**: % see description

#### Repetition terminals

1. **Terminal for contactor coil**: Not required
2. **Auxiliary switch repetition terminal**: Not required

#### Shock protection

1. **Degree of protection**: IP20
2. **Sinus shock resistance**: g/ms 8/10 and 15/11

#### EMC noise immunity

1. **Conducted disturbance neutralization - burst**: In acc. with IEC 61 000-4-4; (corresponds to severity grade 3) kV 2
2. **Conducted disturbance neutralization - surge**: In acc. with IEC 61 000-4-6; (corresponds to severity grade 3) kV 2/1 (line to earth/line to line)
3. **Electrostatic discharge**: In acc. with IEC 61 000-4-2; (corresponds to severity grade 3) kV 6/8 (contact/air discharge)
4. **Field-related disturbance neutralization**: In acc. with IEC 61 000-4-3; (corresponds to severity grade 3) V/m 10

#### EMC emitted interference

1. **Limit value class B in acc. with CISPR 11**
2. **Resistance to extreme climates (atmospheric humidity)**: % 100

#### Dimensions

1. **Site altitude**: m Up to 2000 above sea level
2. **Installation position**: Any

#### Construction type/mounting

1. **Direct mounting/stand-alone installation with terminal bracket**
2. **For screw-on and snap-on attachment to 35 mm DIN rail**

---

1) Remote reset in conjunction with suitable accessories.
2) Terminals: IP00 degree of protection.
3) For screw-on and snap-on attachment to 35 mm DIN rail (with S10/S12 DIN rail mounting not possible).

---

**SIRIUS System Manual**

GWA 4NEB 430 0999-02 DS 01
<table>
<thead>
<tr>
<th>Type</th>
<th>3RB10 56</th>
<th>3RB10 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>S6</td>
<td>S10/S12</td>
</tr>
<tr>
<td>Width</td>
<td>120 mm</td>
<td>145 mm</td>
</tr>
</tbody>
</table>

### Main Circuit

<table>
<thead>
<tr>
<th>Parameter</th>
<th>3RU11</th>
<th>3RB10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage $U_i$ (pollution degree 3)</td>
<td>V 1000</td>
<td>no</td>
</tr>
<tr>
<td>Rated impulse strength $U_{imp}$</td>
<td>kV 8</td>
<td>Ja, 50/60 Hz ± 3 (other frequencies upon request)</td>
</tr>
<tr>
<td>Rated operating voltage $U_r$</td>
<td>V 1000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Type</th>
<th>Gleichstrom</th>
<th>Wechselstrom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current setting</td>
<td>A 50 - 200</td>
<td>55 - 250</td>
</tr>
<tr>
<td></td>
<td>to 300 - 630</td>
<td></td>
</tr>
</tbody>
</table>

### Power loss per device (max.)

|              | W          | ca. 0.05 |

### Short-circuit protection

<table>
<thead>
<tr>
<th></th>
<th>With fuse, without contactor</th>
<th>With fuse and contactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>See the selection and ordering data in the catalog</td>
<td>See the technical specifications (short-circuit protection with fuses/ circuit breakers for motor feeders)</td>
<td></td>
</tr>
</tbody>
</table>

### Safe isolation between main and auxiliary conducting paths

<table>
<thead>
<tr>
<th>acc. with IEC 60 947-1</th>
<th>DIN VDE 0106 part 101</th>
</tr>
</thead>
<tbody>
<tr>
<td>V 1000</td>
<td></td>
</tr>
</tbody>
</table>

### Connection of the main circuit

<table>
<thead>
<tr>
<th>Connection type</th>
<th>Screw-type terminal with box terminal</th>
<th>Screw-type terminal with box terminal</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Schraubanschluss</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal screw</td>
<td>Allen screw</td>
<td>Allen screw</td>
</tr>
<tr>
<td>4 mm</td>
<td>5 mm</td>
<td></td>
</tr>
<tr>
<td>Tightening torque</td>
<td>Nm 10 to 12</td>
<td>20 to 22</td>
</tr>
<tr>
<td>Connection cross-section (min./max.)</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Finely stranded without wire end ferrule</td>
<td>mm²</td>
<td></td>
</tr>
<tr>
<td>2 x (1 x max. 50, 1 x max. 70)</td>
<td>2 x (50 to 185)</td>
<td></td>
</tr>
<tr>
<td>1 x (10 to 70)</td>
<td>1 x (70 to 240)</td>
<td></td>
</tr>
<tr>
<td>2 x (1 x max. 95, 1 x max. 120)</td>
<td>2 x (120 to 185)</td>
<td></td>
</tr>
<tr>
<td>1 x (10 to 120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finely stranded with wire end ferrule</td>
<td>mm²</td>
<td></td>
</tr>
<tr>
<td>2 x (1 x max. 50, 1 x max. 70)</td>
<td>2 x (50 to 185)</td>
<td></td>
</tr>
<tr>
<td>1 x (10 to 70)</td>
<td>1 x (70 to 240)</td>
<td></td>
</tr>
<tr>
<td>2 x (1 x max. 95, 1 x max. 120)</td>
<td>2 x (120 to 185)</td>
<td></td>
</tr>
<tr>
<td>1 x (10 to 120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stranded</td>
<td>mm²</td>
<td></td>
</tr>
<tr>
<td>2 x (max. 70)</td>
<td>2 x (70 to 240)</td>
<td></td>
</tr>
<tr>
<td>1 x (16 to 70)</td>
<td>1 x (95 to 300)</td>
<td></td>
</tr>
<tr>
<td>2 x (max. 120)</td>
<td>2 x (120 to 240)</td>
<td></td>
</tr>
<tr>
<td>1 x (16 to 120)</td>
<td>1 x (120 to 185)</td>
<td></td>
</tr>
<tr>
<td>AVG cables, single- or multi-core</td>
<td>AVG</td>
<td>AVG</td>
</tr>
<tr>
<td>with box terminals 3RT19 55-4G</td>
<td>2 x (2/0 to 500 kcmil)</td>
<td>1 x (2/0 to 600 kcmil)</td>
</tr>
<tr>
<td>2 x (max. 1/0)</td>
<td>front clamping point only:</td>
<td>front clamping point only:</td>
</tr>
<tr>
<td>1 x (6 to 200)</td>
<td>1 x (95 to 300)</td>
<td></td>
</tr>
<tr>
<td>2 x (max. 3/0)</td>
<td>2 x (120 to 240)</td>
<td></td>
</tr>
<tr>
<td>1 x (6 to 250 kcmil)</td>
<td>1 x (120 to 185)</td>
<td></td>
</tr>
<tr>
<td>Ribbon cables (number x width x depth)</td>
<td>AVG</td>
<td>AVG</td>
</tr>
<tr>
<td>with box terminals 3RT19 55-4G</td>
<td>2 x (2/0 to 500 kcmil)</td>
<td>1 x (2/0 to 600 kcmil)</td>
</tr>
<tr>
<td>2 x (max. 15.5 x 0.8)</td>
<td>front clamping point only:</td>
<td>front clamping point only:</td>
</tr>
<tr>
<td>1 x (3 x 9 x 0.8 to 6 x 15.5 x 0.8)</td>
<td>1 x (6 x 9 x 0.8 to 20 x 24 x 0.5)</td>
<td></td>
</tr>
<tr>
<td>2 x (10 x 15.5 x 0.8)</td>
<td>2 x (15.5 x 0.8 to 185 mm²)</td>
<td></td>
</tr>
<tr>
<td>1 x (3 x 3 x 15 x 0.8)</td>
<td>1 x (70 to 240)</td>
<td></td>
</tr>
</tbody>
</table>

### Bar connection

| Terminal screw                                       | M8 x 25 | M 10 x 30 |
| Tightening torque                                    | Nm 10 to 14 | 14 to 24 |
| Connection cross-section (min./max.)                 | Finely stranded with cable lug mm² | 16 to 95² |
|                                                      | 50 to 240² |
|                                                      | 25 to 120² |
|                                                      | 70 to 240² |
|                                                      | 2 x 70    |
| Stranded                                             | mm²       | AVG       |
|                                                      | 2 x (2/0 to 500 kcmil)                | 1 x (2/0 to 600 kcmil)                |

1) Screw connection is possible using the appropriate box terminals from the accessories range.

2) When connecting cable lugs acc. to DIN 46 236 with conductor cross-sections of 96 mm² and above, the 3RT19 56-EA1 terminal cover is required to maintain the phase spacing.

3) When connecting cable lugs acc. to DIN 46 234 with conductor cross-sections of 240 mm² and above, as well as acc. to DIN 46 235 with conductor cross-sections of 185 mm² and above, the 3RT19 66-EA1 terminal cover is required to maintain the phase spacing.

---

SIRIUS System Manual
GWA 4NEB 430 0999-02 DS 01

4-57
Type
3RB10 16 | 3RB10 26 | 3RB10 36 | 3RB10 46
---|---|---|---
Frame size | S00 | S0 | S2 | S3
Width | 45 mm | 45 mm | 55 mm | 70 mm

Auxiliary circuit

Auxiliary contact elements (number \( x \) (variant)
\( 1 \times (1 \text{ NO contact} + 1 \text{ NC contact}) \)

Assignment of the auxiliary contact elements
1 NO contact for the "tripped by overload" signal
1 NC contact for switching off the contactor

Rated insulation voltage \( U_i \) (pollution degree 3)
\( V \) | 690

Rated impulse strength \( U_{imp} \)

\( kV \) | 6

Contact rating of the auxiliary contact elements

NC contact with alternating current AC-14/AC-15 Rated operational current \( I_e \) at \( U_e \):
- 24 V
- 120 V
- 125 V
- 230 V
- 400 V
- 600 V
- 690 V

NO contact with alternating current AC-14/AC-15 Rated operational current \( I_e \) at \( U_e \):
- 24 V
- 120 V
- 125 V
- 230 V
- 400 V
- 600 V
- 690 V

NC contact, NO contact with direct current DC-13 Rated operational current \( I_e \) at \( U_e \):
- 24 V
- 60 V
- 110 V
- 125 V
- 220 V

Conventional free air thermal current \( I_{th} \)
\( A \) | 6

Contact reliability (suitable for PLC; 17 V, 5 mA)
yes

Short-circuit protection

With fuse Performance class gL/gG A 6
rbdapt A 10

With miniature circuit breaker (C characteristic) A 6

Safe isolation between auxiliary conducting paths in acc. with DIN VDE 0106 Part 101 V 300

Connection of the auxiliary circuit

Connection type Screw-type terminal

Connection characteristics

- Terminal screw Pozidriv 2
- Tightening torque Nm 0.8 to 1.2
- Connection cross-sections Single-core mm\(^2\) 2 x (0.5 to 1.5)
  - mm\(^2\) 2 x (0.75 to 2.5)
  - Finely stranded without wire end ferrule mm\(^2\) —
  - Finely stranded with wire end ferrule mm\(^2\) 2 x (0.5 to 1.5)
  - mm\(^2\) 2 x (0.75 to 2.5)
  - Stranded mm\(^2\) 2 x (0.5 to 1.5)
  - mm\(^2\) 2 x (0.75 to 2.5)
  - AWG cables, single- or multi-core AWG 2 x (18 to 14)

\( \Phi, \sigma, \eta \) rating data

Auxiliary circuit Switching capacity B600, R300

1) to \( I_e \leq 0.5 \text{ kA}; \leq 260 \text{ V} \)
1) From 60 °C upwards, the conventional thermal current \( I_{th} \) across the auxiliary contacts is 2 A.

2) to \( I_k \leq 0.5 \text{kA} \); \( \leq 260 \text{ V} \).

### Type 3RB10 56 3RB10 66

<table>
<thead>
<tr>
<th>Frame size</th>
<th>S6</th>
<th>S10/S12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>120 mm</td>
<td>145 mm</td>
</tr>
</tbody>
</table>

#### Auxiliary circuit

- **Auxiliary contact elements (number x (model))**
  - 1 x (1 NO contact + 1 NC contact)

- **Assignment of the auxiliary contact elements**
  - 1 NO contact for the “tripped by overload” signal
  - 1 NC contact for switching off the contactor

- **Rated insulation voltage \( U_i \) (pollution degree 3)**
  - 690 V

- **Rated impulse strength \( U_{imp} \)**
  - 6 kV

#### Contact rating of the auxiliary contact elements

- **NC contact with alternating current AC-14/AC-15**
  - Rated operational current \( I_e \) at \( U_e \):
    - \( 24 \text{ V} \):
      - 4 A
    - \( 120 \text{ V} \):
      - 4 A
    - \( 125 \text{ V} \):
      - 4 A
    - \( 230 \text{ V} \):
      - 3 A
    - \( 400 \text{ V} \):
      - 2 A
    - \( 600 \text{ V} \):
      - 1 A
    - \( 690 \text{ V} \):
      - 1 A

- **NO contact with alternating current AC-14/AC-15**
  - Rated operational current \( I_e \) at \( U_e \):
    - \( 24 \text{ V} \):
      - 4 A
    - \( 120 \text{ V} \):
      - 4 A
    - \( 125 \text{ V} \):
      - 4 A
    - \( 230 \text{ V} \):
      - 3 A
    - \( 400 \text{ V} \):
      - 2 A
    - \( 600 \text{ V} \):
      - 1 A
    - \( 690 \text{ V} \):
      - 1 A

- **NC, NO for DC DC-13**
  - Rated operational current \( I_e \) at \( U_e \):
    - \( 24 \text{ V} \):
      - 1 A
    - \( 60 \text{ V} \):
      - 0.22 A
    - \( 110 \text{ V} \):
      - 0.22 A
    - \( 125 \text{ V} \):
      - 0.22 A
    - \( 220 \text{ V} \):
      - 0.11 A

- **Conventional free air thermal current \( I_{th} \)**
  - 6.1 A

- **Contact reliability**
  - (suitable for PLC; 17 V, 5 mA)
  - Yes

#### Short-circuit protection

- **With fuse**
  - Performance class \( gL/gG \)
    - A
    - 6
  - **rapid**
    - A
    - 10

- **With miniature circuit breaker (C characteristic)**
  - A
  - 6.5

#### Safe isolation between auxiliary conducting paths

- In acc. with DIN VDE 0106 Part 101
- \( V \): 300 V

#### Connection of the auxiliary circuit

- **Connection type**
  - Screw-type terminal

- **Connection characteristics**
  - Terminal screw: Pozidriv size 2
  - Tightening torque: Nm: 0.8 to 1.2
  - Connection cross-sections
    - Single-core (min.,max.) 1 or 2 conductors:
      - mm²:
        - 2 x (0.5 to 1.5)
        - 2 x (0.75 to 2.5)
    - Finely stranded without wire end ferrule:
      - mm²:
        - —
      - Finely stranded with wire end ferrule:
        - mm²:
          - 2 x (0.5 to 1.5)
        - mm²:
          - 2 x (0.75 to 2.5)
    - Stranded:
      - mm²:
        - 2 x (0.5 to 1.5)
        - mm²:
        - 2 x (0.75 to 2.5)
    - AWG cables, single- or multi-core:
      - AWG: 2 x (18 to 14)

#### \( \delta, \phi, \gamma \) rating data

- **Auxiliary circuit**
  - Switching capacity: B600, R300

---

1) From 60 °C upwards, the conventional thermal current \( I_{th} \) across the auxiliary contacts is 2 A.
2) to \( I_k \leq 0.5 \text{kA} \); \( \leq 260 \text{ V} \).
## Short-circuit protection with fuses for motor feeders with short-circuit currents of up to 50 kA at 690 VAC

<table>
<thead>
<tr>
<th>Overload relay</th>
<th>Contactor CLASS</th>
<th>400 V</th>
<th>500 V</th>
<th>690 V</th>
<th>400 V</th>
<th>500 V</th>
<th>690 V</th>
<th>415 V</th>
<th>600 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment range</td>
<td>10</td>
<td>20</td>
<td>Rated operating current Iₚ</td>
<td>AC-3 in A at</td>
<td></td>
<td></td>
<td></td>
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<td>25 A to 100 A</td>
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<td>13 A to 50 A</td>
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<td>25 A to 100 A</td>
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<td>13 A to 50 A</td>
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<td>25 A to 100 A</td>
<td>3RT10 44(2)</td>
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<td>57</td>
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<td>50 A to 200 A</td>
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<td>55 A to 250 A</td>
<td>3RT10 64(1)</td>
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<td>225</td>
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<td>500</td>
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<td>188</td>
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<td>6 A to 25 A</td>
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<tr>
<td>55 A to 250 A</td>
<td>3RT10 64(2)</td>
<td>225</td>
<td>225</td>
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<td>200 A to 540 A</td>
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<td>188</td>
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<td>500</td>
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</tr>
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<td>572</td>
<td>572</td>
<td>572</td>
<td>800</td>
<td>630</td>
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</tr>
</tbody>
</table>

1) Please note the operating voltage.
2) Assignment and short-circuit facilities in acc. with IEC 60 947-4-1/DIN VDE 660 Part 102
3) Coordination type "1": Contactors or starters must not endanger people or the system in the event of a short circuit. They do not have to be suitable for further operation without repair and part replacement.
4) Coordination type "2": Contactors or starters must not endanger people or the system in the event of a short circuit and must be suitable for further use.
5) There is a danger of contact welding.
6) Mounting on the contactor is possible after removal of the box terminal block.

---

4-60 SIRIUS System Manual

GWA 4NEB 430 0999-02 DS 01
### 4.7.3 3RB12 electronic overload relays

<table>
<thead>
<tr>
<th>Type</th>
<th>Width</th>
<th>3RB12 46</th>
<th>3RB12 53</th>
<th>3RB12 57</th>
<th>3RB12 62</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>70 mm</td>
<td>120 mm</td>
<td>145 mm</td>
<td>230 mm</td>
</tr>
</tbody>
</table>

#### General specifications
- **Tripped at**: Overload, phase loss, phase imbalance (>40% in acc. with NEMA), ground fault, and operation of thermistor motor protection

#### Tripping class
- In acc. with IEC 60947-4-1
- CLASS 5, 10, 15, 20, 25, and 30; adjustable by means of a 6-way rotary switch

#### Phase loss sensitivity
- Yes

#### Overload warning
- Yes, as of 1.5 x Ie given a symmetric load, and as of 0.85 x Ie given an asymmetric load

#### Resetting and recovery
- **Resetting options after tripping**
- **Recovery time**
  - With automatic reset: min.
  - When tripped by overcurrent: 5 (stored permanently)
  - When tripped by thermistor: time until the motor temperature 5K sinks under the operating temperature
  - When tripped by ground fault: no automatic reset
  - With manual reset: min.
  - When tripped by overcurrent: 5 (stored permanently)
  - When tripped by thermistor: time until the motor temperature 5K sinks under the operating temperature
  - When tripped by ground fault: immediate
  - With remote reset: min.
  - When tripped by overcurrent: 5 (stored permanently)
  - When tripped by thermistor: time until the motor temperature 5K sinks under the operating temperature
  - When tripped by ground fault: immediate

#### Configuration
- **Indication of operating status on device**
  - Yes, with 3 LEDs; green "Ready" LED, red "Overload" LED, and red "Ground fault" LED
- **Test function**
  - Yes, with combined TEST/RESET button
- **Reset button**
  - Yes, with combined TEST/RESET button
- **Stop button**
  - Yes, with combined TEST/RESET button

#### For the safe operation of motors with increased safety protection
- EC special test certificate number in compliance with directive 94/9/EC
  - PTB 01 ATEX 3220

#### Ambient temperatures
- **Storage/transportation**: °C -40 to +80
- **Operation**: °C -25 to +70
- **Temperature compensation**: °C Up to 70
- **Permissible rated current at internal cubicle temperature of 60 °C**: % 100 (current reduction is not required at above +60 °C)
- **Permissible rated current at internal cubicle temperature of 70 °C**: % 100 (current reduction is not required at above +60 °C)

#### Repetition terminals
- **Terminal for contactor coil**
  - Not required
- **Auxiliary switch repetition terminal**
  - Not required

#### Degree of protection
- **In acc. with IEC 60990/DIN VDE 0470 Part 1**: IP20 (≤ 100 A max. set current Ie)
- **In acc. with DIN VDE 0106 Part 100**: IP60 (≤ 100 A max. set current Ie)

#### Shock protection
- **In acc. with DIN VDE 0106 Part 100**: Protected against finger touch
- **EC special test certificate number in compliance with directive 94/9/EC**: PTB 01 ATEX 3220

#### Sinus shock resistance
- In acc. with IEC 68 Part 2-27
- g/ms 15/11

#### EMC noise immunity
- **Conducted disturbance neutralization - burst**
  - In acc. with IEC 61000-4-4: kV 2
- **Conducted disturbance neutralization - surge**
  - In acc. with IEC 61000-4-5: kV 2
- **Electrostatic discharge**
  - In acc. with IEC 61000-4-2: kV 8
- **Field-related disturbance neutralization**
  - In acc. with IEC 61000-4-3: V/m 10

#### EMC emitted interference
- Limit value class B in acc. with EN 55 011

#### Resistance to extreme climates (atmospheric humidity)
- % 100

#### Dimensions
- See dimensioned drawings

#### Site altitude
- m Up to 2000 above sea level

#### Construction type/mounting
- Stand-alone installation
- Direct mounting/stand-alone installation without additional terminal bracket

---

1) Tripped at ground fault only in the case of devices with the order number suffixes 20 and 30 or in conjunction with the external summation current transformer.
2) For a detailed explanation, see "Description".
3) Snap-on attachment to 35 mm rail or screw-on attachment with accessories.
4) For screw-on attachment.
### Type

<table>
<thead>
<tr>
<th>Width</th>
<th>3RB12 46</th>
<th>3RB12 53</th>
<th>3RB12 57</th>
<th>3RB12 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 mm</td>
<td>120 mm</td>
<td>145 mm</td>
<td>230 mm</td>
<td></td>
</tr>
</tbody>
</table>

### Main circuit

- **Rated insulation voltage** $U_i$ (pollution degree 3) $V$
  - 690 (for bare/Non insulated conductors)
  - 1000 (for insulated conductors)

- **Rated impulse strength** $U_{imp}$ $kV$
  - 6

- **Rated operating voltage** $U_e$ $V$
  - 690

- **Current type**
  - Direct current
  - Alternating current

- **Current setting** $A$
  - 1.25 - 6.3
  - 50 - 205
  - 125 - 500
  - 200 - 820

- **Power loss per device (max.)** $W$
  - Approx. 2

### Short-circuit protection

- **With fuse, without contactor**
- See the selection and ordering data in the catalog
- See the technical specifications (short-circuit protection with fuses for motor feeders)

### Safe isolation between main and auxiliary conducting paths

- In acc. with DIN VDE 0106 Part 101 IEC 60 947-1-A1
- Up to 690 V

### Connection of the main circuit

#### Screw-type terminal

- **Terminal screw**
- **Tightening torque** $Nm$
- **Connection cross-section**
  - Finely stranded without wire end ferrule $mm^2$
  - Finely stranded with wire end ferrule $mm^2$
  - Stranded $mm^2$
  - AWG cables, single- or multi-core $AWG$
  - Ribbons cables (number x width x depth) $mm$

#### Bar connection

- **Terminal screw**
- **Tightening torque** $Nm$
- **Connection cross-section**
  - Finely stranded with cable lug $mm^2$
  - Stranded with cable lug $mm^2$
  - AWG cables, single-core or stranded with cable lug $AWG$
  - With connecting bars (max. width) $mm$

#### Bar-type transformer connection

- **Opening diameter** $mm$
  - 10 (devices $I_e$ 28 A max. set current $I_f$)
  - 15 (devices with max. 100 A set current $I_f$)
- **Conductor cross-section**
  - NYY $mm^2$
  - H07RN-F 10/16
<table>
<thead>
<tr>
<th>Type</th>
<th>Width</th>
<th>3RB12 46</th>
<th>3RB12 53</th>
<th>3RB12 57</th>
<th>3RB12 62</th>
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<td></td>
<td>70 mm</td>
<td>120 mm</td>
<td>145 mm</td>
<td>230 mm</td>
</tr>
</tbody>
</table>

### Auxiliary circuit

#### Auxiliary contact elements: number x (variant)

- 2 x (1 NO contact + 1 NC contact)

#### Assignment of the auxiliary contact elements

1. NO contact for the "tripped by overload and/or thermistor" signal
2. NC contact for tripping the contactor
3. NO contact for the "tripped by ground fault" signal
4. NC contact for tripping the contactor
5. NO contact for the "tripped by overload and/or thermistor and/or ground fault" signal
6. NC contact for switching off the contactor
7. NO contact for the "tripped by ground fault" signal
8. NC contact for tripping the contactor

### Rated insulation voltage \( U_i \) (pollution degree 3)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>300</td>
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</tbody>
</table>

### Rated impulse strength \( U_{\text{imp}} \)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>kV</td>
<td>4</td>
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</table>

### Contact rating of the auxiliary contact elements

#### NC contact with alternating current AC-14/AC-15

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
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</thead>
<tbody>
<tr>
<td>24 V</td>
<td>A 6</td>
</tr>
<tr>
<td>120 V</td>
<td>A 6</td>
</tr>
<tr>
<td>125 V</td>
<td>A 3</td>
</tr>
<tr>
<td>230 V</td>
<td>A 1.5</td>
</tr>
<tr>
<td>400 V</td>
<td>A 2.1</td>
</tr>
<tr>
<td>600 V</td>
<td>A 2.1</td>
</tr>
<tr>
<td>690 V</td>
<td>A 2.1</td>
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</table>

#### NO contact with alternating current AC-14/AC-15

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V</td>
<td>A 6</td>
</tr>
<tr>
<td>120 V</td>
<td>A 6</td>
</tr>
<tr>
<td>125 V</td>
<td>A 3</td>
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<td>230 V</td>
<td>A 1.5</td>
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<td>400 V</td>
<td>A 2.1</td>
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<tr>
<td>600 V</td>
<td>A 2.1</td>
</tr>
<tr>
<td>690 V</td>
<td>A 2.1</td>
</tr>
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</table>

#### NC contact, NO contact with direct current DC-13

<table>
<thead>
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<th>Voltage</th>
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<tbody>
<tr>
<td>24 V</td>
<td>A 2</td>
</tr>
<tr>
<td>60 V</td>
<td>A 0.55</td>
</tr>
<tr>
<td>110 V</td>
<td>A 0.25</td>
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<tr>
<td>125 V</td>
<td>A 0.25</td>
</tr>
<tr>
<td>220 V</td>
<td>A 0.14</td>
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</table>

### Conventional free air thermal current \( I_{\text{th}} \)

<table>
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<th>Voltage</th>
<th>Current</th>
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</thead>
<tbody>
<tr>
<td>24 V</td>
<td>A 6</td>
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</tbody>
</table>

### Contact reliability (suitable for PLC, 17 V, 5 mA)

- A 2

### Short-circuit protection

#### With fuse

<table>
<thead>
<tr>
<th>Performance class</th>
<th>Rated Operational Current ( I_{\text{op}} ) at ( U_i )</th>
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</thead>
<tbody>
<tr>
<td>gLgG rapid</td>
<td>A 6</td>
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</table>

#### With miniature circuit breaker (IC characteristic)

<table>
<thead>
<tr>
<th>Rated Operational Current ( I_{\text{op}} ) at ( U_i )</th>
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</thead>
<tbody>
<tr>
<td>A 1.6</td>
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</table>
### Connection of the auxiliary circuit

<table>
<thead>
<tr>
<th>Connection type</th>
<th>Screw-type terminal</th>
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</thead>
<tbody>
<tr>
<td><strong>Connection characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>• Terminal screw</td>
<td>Pozidriv 2</td>
</tr>
<tr>
<td>• Tightening torque</td>
<td>Nm 0.8 to 1.2</td>
</tr>
<tr>
<td>• Connection cross-sections</td>
<td>Single-core</td>
</tr>
<tr>
<td>(min., max.) 1 or 2 conductors</td>
<td>mm² 1 x (0.5 to 4)</td>
</tr>
<tr>
<td></td>
<td>mm² 2 x (0.5 to 2.5)</td>
</tr>
<tr>
<td>Finely stranded without wire end ferrule</td>
<td>mm² 1 x (0.5 to 2.5)</td>
</tr>
<tr>
<td></td>
<td>mm² 2 x (0.5 to 1.5)</td>
</tr>
<tr>
<td>Finely stranded with wire end ferrule</td>
<td>mm² 1 x (0.5 to 2.5)</td>
</tr>
<tr>
<td></td>
<td>mm² 2 x (0.5 to 1.5)</td>
</tr>
<tr>
<td>Stranded</td>
<td>mm² —</td>
</tr>
<tr>
<td>AWG cables, single- or multi-core</td>
<td>AWG Without wire end ferrule</td>
</tr>
<tr>
<td></td>
<td>2 x (20 to 14)</td>
</tr>
<tr>
<td></td>
<td>1 x (20 to 12)</td>
</tr>
<tr>
<td></td>
<td>With wire end ferrule:</td>
</tr>
<tr>
<td></td>
<td>2 x (20 to 15)</td>
</tr>
<tr>
<td></td>
<td>1 x (20 to 14)</td>
</tr>
</tbody>
</table>

### 6, 8, 56 rating data

<table>
<thead>
<tr>
<th>Auxiliary circuit</th>
<th>Switching capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B600, R300</td>
</tr>
</tbody>
</table>

1) The assignment of the auxiliary contact elements depends on the order number suffix
2) On request
3) Up to $I_K \leq 1000$ A
### SIRIUS System Manual

#### Short-circuit protection with fuses for motor feeders for short-circuit currents of up to 50 kA at 690 V for 3RB12 and 3UF50

<table>
<thead>
<tr>
<th>Overload relay</th>
<th>Contactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASS</td>
<td>CLASS</td>
</tr>
<tr>
<td>Adjustment range</td>
<td>Contactor</td>
</tr>
<tr>
<td>5 and 10</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

- Rated operating current \( I_{\text{o}} \) in A at AC-3 in A
- Type 3NA
- Type 3ND standards fuses
- Fuse links

#### Coordination type

1. **Coordination type 1**: The contactor or starter must not endanger people or the system in the event of a short circuit. They do not have to be suitable for further operation without repair and part replacement.

2. **Coordination type 2**: The contactor or starter must not endanger people or the system in the event of a short circuit and must be suitable for further operation. There is a danger of contact welding.

#### fuse link adjustment range

<table>
<thead>
<tr>
<th>I&lt;sub&gt;e&lt;/sub&gt;</th>
<th>DIAZED</th>
<th>TYPE 5SB</th>
<th>NEÖZED</th>
<th>TYPE 5SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>80</td>
<td>100</td>
<td>120</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>160</td>
<td>200</td>
<td>300</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td>315</td>
<td>500</td>
<td>300</td>
<td>500</td>
<td>1200</td>
</tr>
<tr>
<td>630</td>
<td>1000</td>
<td>630</td>
<td>1000</td>
<td>1200</td>
</tr>
<tr>
<td>1500</td>
<td>2000</td>
<td>1500</td>
<td>2000</td>
<td>2000</td>
</tr>
</tbody>
</table>

#### Short-circuit protection with fuses for motor feeders for short-circuit currents of up to 50 kA at 690 V for 3RB12 and 3UF50

<table>
<thead>
<tr>
<th>I&lt;sub&gt;e&lt;/sub&gt;</th>
<th>British LI-listed fuses</th>
<th>Type T</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>630</td>
<td>400</td>
</tr>
<tr>
<td>150</td>
<td>630</td>
<td>400</td>
</tr>
<tr>
<td>200</td>
<td>630</td>
<td>400</td>
</tr>
<tr>
<td>350</td>
<td>630</td>
<td>400</td>
</tr>
<tr>
<td>500</td>
<td>630</td>
<td>400</td>
</tr>
<tr>
<td>700</td>
<td>630</td>
<td>400</td>
</tr>
</tbody>
</table>

---

1. Please note the operating voltage
2. Assignment and short-circuit facilities in acc. with IEC 60947-4-1/DIN VDE 660 Part 102
3. Please ensure that the safety clearance between the max. 3 AC operating current and the fuse rated current is maintained.
4. Mounting onto contactor possible
## 4.74 Terminal bracket for stand-alone installation

<table>
<thead>
<tr>
<th>Type</th>
<th>3RU19 16-3AA01</th>
<th>3RU19 26-3AA01</th>
<th>3RU19 36-3AA01</th>
<th>3RU19 46-3AA01</th>
</tr>
</thead>
<tbody>
<tr>
<td>For overload relays</td>
<td>3RU11 16</td>
<td>3RU11 26</td>
<td>3RU11 36</td>
<td>3RU11 46</td>
</tr>
<tr>
<td>Mounting type</td>
<td></td>
<td></td>
<td></td>
<td>For screw-on and snap-on attachment to a 35 mm DIN rail; frame size S3 also on 75 mm DIN rail</td>
</tr>
<tr>
<td>Connection of the main circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anschlussart</td>
<td>Screw-type terminal</td>
<td>Screw-type terminal with box terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Terminal screw</td>
<td>Pozidriv Gr. 2</td>
<td>Allen screw 4 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Connection cross-section (min., max.) 1 or 2 conductors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-core</td>
<td>mm²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine-stranded without wire end ferrule</td>
<td>1 x (0.5 to 2.5)</td>
<td>1 x (1 to 6)</td>
<td>2 x (0.75 to 16)</td>
<td>2 x (2.5 to 16)</td>
</tr>
<tr>
<td>Fine-stranded with wire end ferrule</td>
<td>1 x (0.5 to 2.5)</td>
<td>1 x (1 to 6)</td>
<td>2 x (0.75 to 16)</td>
<td>2 x (2.5 to 35)</td>
</tr>
<tr>
<td>Stranded</td>
<td>mm²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AWG cables, single- or multi-core</td>
<td>1 x (18 to 14)</td>
<td>1 x (14 to 10)</td>
<td>2 x (18 to 3)</td>
<td>2 x (10 to 1/0)</td>
</tr>
<tr>
<td>Ribbon cables</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(number x width x thickness)</td>
<td></td>
<td></td>
<td>2 x (6 x 9 x 0.8)</td>
<td>2 x (6 x 9 x 0.8)</td>
</tr>
</tbody>
</table>