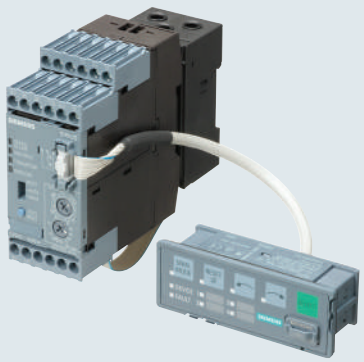
contents

Thermal overload relays

3RU21 overload relays up to 100 A with screw connection, CLASS 10

Solid state overload relays



3RB24 overload relays up to 630A with IO-Link current monitoring

SIRIUS 3RV motor starter protectors up to 100 A

3RB20/21, 3RB30/31 overload relays up to 630 A, 3RB20/30 CLASS 10 or 20 3RB21/31 CLASS 5, 10, 20, 30

3RB22/23 overload relays up to 820 A for full motor protection, CLASS 5 to CLASS 30 adjustable

3UF7 SIMOCODE Pro Motor management and control devices

General data

Overview

Features	3RU21	3RB30/3RB31	3RB20/3RB21	3RB22/3RB23	3RB24	Benefits
General data						
Sizes	S00 ... S3	S00 ... S3	S6 ... S12	S00 ... S12	S00 ... S12	• Are coordinated with the dimensions, connections and technical characteristics of the other devices in the SIRIUS modular system (contactors, etc., ...) • Permit the mounting of slim and compact load feeders in widths of 45 mm (S00), 45 mm (S0), 55 mm (S2), 70 mm (S3), 120 mm (S6) and 145 mm (S10/S12); this does not include the current measuring modules for the 3RB22 to 3RB24 evaluation modules sizes S00 to S3 • Simplify configuration
Seamless current range	0.11 ... 100 A	0.1 ... 100 A	50 ... 630 A	0.3 ... 630 A (up to 820 A)[1]	0.3 ... 630 A (up to 820 A)[1]	• Allows easy and consistent configuration with one series of overload relays (for small to large loads)
Protection functions						
Tripping due to overload	✓	✓	✓	✓	✓	• Provides optimum inverse-time delayed protection of loads against excessive temperature rises due to overload
Tripping due to phase unbalance	✓	✓	✓	✓	✓	• Provides optimum inverse-time delayed protection of loads against excessive temperature rises due to phase unbalance
Tripping due to phase failure	✓	✓	✓	✓	✓	• Minimizes heating of induction motors during phase failure
Protection of single-phase loads	✓	—	—	✓	✓	• Enables the protection of single-phase loads
Tripping in the event of overheating by **integrated thermistor motor protection function**	—[2]	—[2]	—[2]	✓	✓	• Provides optimum temperature-dependent protection of loads against excessive temperature rises e.g. for stator-critical motors or in the event of insufficient coolant flow, contamination of the motor surface or for long starting or braking operations • Eliminates the need for additional special equipment • Saves space in the control cabinet • Reduces wiring outlay and costs
Tripping in the event of a ground fault by **internal ground-fault detection (activatable)**	—	✓ (only 3RB31)	✓ (only 3RB21)	✓	✓	• Provides optimum protection of loads against high-resistance short circuits or ground faults due to moisture, condensed water, damage to the insulation material, etc. • Eliminates the need for additional special equipment • Saves space in the control cabinet • Reduces wiring outlay and costs

✓ Available
— Not available

[1] Motor currents up to 820 A can be recorded and evaluated by a current measuring module, e.g. 3RB29 06-2BG1 (0.3 to 3 A), in combination with a 3UF18 68-3GA00 (820 A/1 A) series transformer.

[2] The SIRIUS 3RN thermistor motor protection devices can be used to provide additional temperature-dependent protection.

General data





Features	3RU21	3RB30/3RB31	3RB20/3RB21	3RB22/3RB23	3RB24	Benefits
Features						
RESET function	✓	✓	✓	✓	✓	• Allows manual or automatic resetting of the device
Remote RESET function	✓ (by means of separate module)	✓ (only with 3RB31 and external auxiliary voltage 24 V DC)	✓ (only with 3RB21 and external auxiliary voltage 24 V DC)	✓ (electrically via external button)	✓ (electrically with button or via IO-Link)	• Allows the remote resetting of the device
TEST function for auxiliary contacts	✓	✓	✓	✓	✓	• Allows easy checking of the function and wiring
TEST function for electronics	—	✓	✓	✓	✓	• Allows checking of the electronics
Status display	✓	✓	✓	✓	✓	• Displays the current operating state
Large current adjustment button	✓	✓	✓	✓	✓	• Makes it easier to set the relay exactly to the correct current value
Integrated auxiliary contacts (1 NO + 1 NC)	✓	✓	✓	✓ (2 ×)	--	• Allows the load to be switched off if necessary • Can be used to output signals
Integrated auxiliary contacts (1 CO and 1 NO in series)	—	—	—	—	✓	• Enables the controlling of contactors directly from the higher-level control system through IO-Link
IO-Link connection	—	—	—	—	✓	• Reduction of wiring in the control cabinet • Enables communication
Connection of optional handheld device	—	—	—	—	✓	• Enables local operation
Communication capability through IO-Link						
Full starter functionality through IO-Link	—	—	—	—	✓	• Enables in combination with the SIRIUS 3RT contactors the assembly of communication-capable motor starters (direct-on-line, reversing and wye-delta starting)
Reading out of diagnostics functions	—	—	—	—	✓	• Enables the reading out of diagnostics information such as overload, open circuit, ground fault, etc.
Reading out of current values	—	—	—	—	✓	• Enables the reading out of current values and their direct processing in the higher-level control system
Reading out all set parameters	—	—	—	—	✓	• Enables the reading out of all set parameters, e.g. for plant documentation

✓ Available

— Not available





Features	3RU21	3RB30/3RB31	3RB20/3RB21	3RB22/3RB23	3RB24	Benefits
Design of load feeders						
Short-circuit strength up to 100 kA at 690 V (in conjunction with the corresponding fuses or the corresponding motor starter protector)	✓	✓	✓	✓	✓	• Provides optimum protection of the loads and operating personnel in the event of short circuits due to insulation faults or faulty switching operations
Electrical and mechanical matching to 3RT contactors	✓	✓	✓	✓[1]	✓[1]	• Simplifies configuration • Reduces wiring outlay and costs • Enables stand-alone installation as well as space-saving direct mounting
Straight-through transformers for main circuit[2] (in this case the cables are routed through the feed-through openings of the overload relay and connected directly to the box terminals of the contactor)	—	✓ (S2, S3)	✓ (S3 to S6)	✓ (S00 ... S6)	✓ (S00 ... S6)	• Reduces the contact resistance (only one point of contact) • Saves wiring costs (easy, no need for tools, and fast) • Saves material costs • Reduces installation costs
Spring-type connection system for main circuit[2]	✓ (S00, S0)	✓ (S00, S0)	—	—	—	• Enables fast connections • Permits vibration-resistant connections • Enables maintenance-free connections
Spring-type connection system for auxiliary circuits[2]	✓	✓	✓	✓	✓	• Enables fast connections • Permits vibration-resistant connections • Enables maintenance-free connections
Ring terminal lug connection method for main and auxiliary circuits[2]	✓ (S00, S0)	—	—	—	—	• Enables fast connections • Permits vibration-resistant connections • Enables maintenance-free connections
Full starter functionality through IO-Link	—	—	—	—	✓	• Enables in combination with the SIRIUS 3RT contactors the assembly of communication-capable motor starters (direct-on-line, reversing and wye-delta starting)
Starter function	—	—	—	—	✓	• Integration of feeders via IO-Link in the control system up to 630 A or 820 A

✓ Available
— Not available

[1] Exception: up to size S3, only stand-alone installation is possible.
[2] Alternatively available for screw terminals.





Features	3RU21	3RB30/3RB31	3RB20/3RB21	3RB22/3RB23	3RB24	Benefits
Other features						
Temperature compensation	✓	✓	✓	✓	✓	• Allows the use of the relays at high temperatures without derating • Prevents premature tripping • Allows compact installation of the control cabinet without distance between the devices/load feeders
Very high long-term stability	✓	✓	✓	✓	✓	• Provides safe protection for the loads even after years of use in severe operating conditions
Wide setting ranges	—	✓ (1:4)	✓ (1:4)	✓ (1:10)	✓ (1:10)	• Minimize the configuration outlay and costs • Minimize storage overheads, storage costs, tied-up capital
Fixed trip class	CLASS 10 CLASS 10A	3RB30: CLASS 10E or CLASS 20E	3RB20: CLASS 10 or CLASS 20			• Optimum motor protection for standard starts
Trip classes adjustable on the device CLASS 5, 10, 20, 30	—	3RB31: ✓	3RB21: ✓	✓	✓	• Enables solutions for very fast starting motors requiring special protection (e.g. Ex motors) • Enables heavy starting solutions • Reduces the number of versions
Low power loss	—	✓	✓	✓	✓	• Reduces energy consumption and energy costs (up 98 % less energy is used than for thermal overload relays). • Minimizes temperature rises of the contactor and control cabinet – in some cases this may eliminate the need for control-gear cabinet cooling. • Direct mounting to contactor saves space, even for high motor currents (i.e. no heat decoupling is required).
Internal power supply	—[1)]	✓	✓	—	—	• Eliminates the need for configuration and connecting an additional control circuit
Supplied from an external voltage through IO-Link	—	—	—		✓	• Eliminates the need for configuration and connecting an additional control circuit
Overload warning	—	—	—	✓	✓	• Indicates imminent tripping of the relay directly on the device due to overload, phase unbalance or phase failure through flickering of the LEDs or in the case of the 3RB24 as a signal through IO-Link • Allows the imminent tripping of the relay to be signaled • Allows measures to be taken in time in the event of inverse-time delayed overloading of the load for an extended period over the current limit
Analog output	—	—	—	✓	✓	• Allows the output of an analog output signal for actuating moving-coil instruments, feeding programmable logic controllers or transfer to bus systems • Eliminates the need for an additional measuring transducer and signal converter

✓ Available
— Not available

[1)] SIRIUS 3RU21 thermal overload relays use a bimetal contactor and therefore do not require a control supply voltage.

Overview of overload relays – matching contactors

Overload relays	Current measure-ment	Current range	**Contactors** (type, size, rating in HP) **3RT20 1.**	**3RT20 2.**	**3RT20 3.**	**3RT20 4.**	**3RT20 5.**	**3RT20 6.**	**3RT20 7**	**3TF68/ 3TF69**
			S00	S0	S2	S3	S6	S10	S12	Size 14
Type	Type	A	3/5/7.5/10	5/7.5/10/15/20/25	30/40/50	50/60/70	100/125/150	150/200/250	300/400	500/700
SIRIUS 3RU21 thermal overload relays										
3RU21 1	Integrated	0.11 … 16	✓	—	—	—	—	—	—	—
3RU21 2	Integrated	1.8 … 40	—	✓	—	—	—	—	—	—
3RU21 3	Integrated	22 … 80	—	—	✓	—	—	—	—	—
3RU21 4	Integrated	28 … 100	—	—	—	✓	—	—	—	—
SIRIUS 3RB30 solid-state overload relays[1]										
3RB30 1	Integrated	0.1 … 16	✓	—	—	—	—	—	—	—
3RB30 2	Integrated	0.1 … 40	—	✓	—	—	—	—	—	—
3RB30 3	Integrated	12 … 80	—	—	✓	—	—	—	—	—
3RB30 4	Integrated	32 … 115	—	—	—	✓	—	—	—	—
SIRIUS 3RB31 solid-state overload relays[1]										
3RB31 1	Integrated	0.1 … 16	✓	—	—	—	—	—	—	—
3RB31 2	Integrated	0.1 … 40	—	✓	—	—	—	—	—	—
3RB31 3	Integrated	12 … 80	—	—	✓	—	—	—	—	—
3RB31 4	Integrated	32 … 115	—	—	—	✓	—	—	—	—
SIRIUS 3RB20 solid-state overload relays[1]										
3RB20 5	Integrated	50 … 200	—	—	—	—	✓	—	—	—
3RB20 6	Integrated	55 … 630						✓	✓	✓
3RB20 1 + 3UF18	Integrated	630 … 820	—	—	—	—	—	—	—	✓
SIRIUS 3RB21 solid-state overload relays[1]										
3RB21 5	Integrated	50 … 200	—	—	—	—	✓	—	—	—
3RB21 6	Integrated	55 … 630						✓	✓	✓
3RB21 1 + 3UF18	Integrated	630 … 820	—	—	—	—	—	—	—	✓

3RU21

3RB30

3RB31

3RB20

3RB21

✓ Can be used

— Cannot be used

[1] "Technical Specifications" for use of the overload relays with trip class ≥ CLASS 20 can be found in "Short-circuit protection with fuses for motor feeders",

Overview of overload relays – matching contactors (continued)

Overload relays	Current measure-ment	Current range	**Contactors** (type, size, rating in HP) **3RT20 1**	**3RT20 2**	**3RT20 3**	**3RT20 4**	**3RT20 5**	**3RT20 6**	**3RT20 7**	**3TF68/ 3TF69**
			S00	S0	S2	S3	S6	S10	S12	Size 14
Type	Type	A	3/5/7.5/1.	5/7.5/10/15/ 20/25	30/40/50	50/60/75	100/125/150	150/200/250	300/400	500/700
SIRIUS 3RB22 to 3RB24 solid-state overload relays[1]										
3RB22 83/ 3RB23 83/ 3RB24 83+	3RB29 0	0.3 … 25	✓	✓	—	—	—	—	—	—
	3RB29 0	10 … 100	✓	✓	✓	✓	—	—	—	—
	3RB29 5	20 … 200	—	✓	✓	✓	✓	—	—	—
	3RB29 6	63 … 630	—	—	—	—	—	✓	✓	✓
	3RB29 0 + 3UF18	630 … 820	—	—	—	—	—	—	—	✓

3RB22, 3RB23

3RB24

✓ Can be used

— Cannot be used

[1] "Technical Specifications" for use of the overload relays with trip class ≥ CLASS 20 can be found in "Short-circuit protection with fuses for motor feeders",

Connection methods

Depending on the device version of the 3RU2 and 3RB3 overload relays, the terminals for screw terminals, spring-type terminals or ring terminal lug connection are configured for both the main and auxiliary circuit in frame sizes S00 and S0.

The 3RU21 thermal overload relays come with screw terminals.

The electronic overload relays 3RB20 and 3RB21 are available with screw terminals (box terminals) or spring-type terminals on the auxiliary current side; the same applies for the evaluation modules of the 3RB22 to 3RB24 electronic overload relays for High-Feature applications.

Thermal Overload Relays

3RU21 up to 100 A, CLASS 10

Description

The 3RU thermal overload relays up to 100 A are designed for current-dependent protection of applications with normal start-up conditions (see "Trip classes") against impermissibly high rises in temperature as a result of overload or phase failure (see "Phase failure protection"). An overload or phase failure causes the motor current to rise above the set rated motor current (see "Setting"). This current rise heats up the bimetal strips within the relay via heating elements which, in turn, operate the auxiliary contacts via a tripping mechanism due to their deflection (see "Auxiliary contacts"). These switch the load off via a contactor. The switch-off time is dependent on the ratio of tripping current to operational current I_e and is stored in the form of a tripping characteristic with long-term stability (see "Tripping characteristics"). The "Tripped" state is signalled by means of a switching position indicator (see "Indication of status").

Resetting takes place manually or automatically (see "Manual and automatic resetting") after a recovery time has elapsed (see "Recovery time").

The 3RU thermal overload relays are electrically and mechanically optimised to the 3RT contactors such that, in addition to individual mounting, they can also be directly mounted onto the contactors to save space (see "Design and mounting"). The main and auxiliary circuits can be connected in various ways (see "Connection"), including the use of Cage Clamp terminals. When the overload relay has been connected, it can be tested for correct functioning using a TEST slide (see "TEST function"). In addition to the TEST function, the 3RU thermal overload relay is equipped with a STOP function (see "STOP function").

For a wide variety of application possibilities for the 3RU thermal overload relay, please refer to the sections "Application", "Ambient conditions", "Overload relays in WYE-delta combinations" and "Operation with frequency converters".

The 3RU thermal overload relays can protect your loads from overload and phase failure. You must implement short-circuit protection (see "Short-circuit protection") by means of a fuse or circuit-breaker.

The 3RU thermal overload relays are environmentally friendly (see "Environmental considerations") and comply with all the main international standards and approvals (see "Specifications" and "Increased safety type of protection EEx").

The accessories for the 3RU thermal overload relays have been designed on the principle that all requirements are covered by a small number of variants.

Application

The 3RU thermal overload relays are designed for the protection of three-phase and single-phase AC and DC motors.

If single-phase AC or DC loads are to be protected using 3RU thermal overload relays, all three bimetal strips should be heated. Therefore all main circuits of the relay must be connected in series.

Overload relays in WYE-delta combinations

When overload relays are used in WYE-delta combinations, it is important to note that only $1/\sqrt{3}$ of the motor current flows through the mains contactor. An overload relay mounted on the main contactor must be set to 0.58 times the motor current.

A second overload relay must be mounted on the star contactor if your load is also to be optimally protected in WYE operation. The WYE current is 1/3 of the rated motor current. The relevant relay must be set to this current.

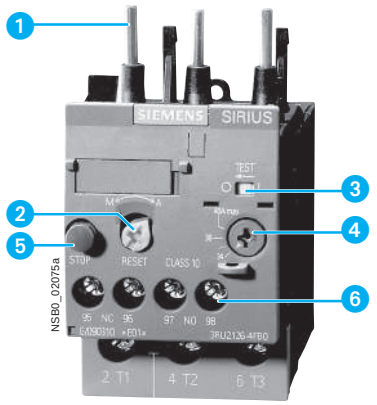
Control circuit

An additional power supply is not required for operation of the 3RU thermal overload relays.

Ambient conditions

The 3RU thermal overload relays are temperature compensating according to IEC 60 947-4-1/DIN VDE 0660 Part 102 in the temperature range –20 °C to +60 °C. For temperatures from +60 °C to +80 °C, the upper setting value of the setting range must be reduced by a specific factor as given in the table below.

Ambient temperature in °C	Reduction factor for the upper setting value
+60	1.0
+65	0.94
+70	0.87
+75	0.81
+80	0.73



1 **Connection for mounting onto contactors:**
Optimally adapted in electrical, mechanical and design terms to the contactors. The overload relay can be connected directly to these contactor using these pins. Stand-alone installation is possible as an alternative (in conjunction with a terminal bracket for stand-alone installation).

2 **Selector switch for manual/automatic RESET and RESET button:**
With this switch you can choose between manual and automatic RESET. A device set to manual RESET can be reset locally by pressing the RESET button. A remote RESET is possible using the RESET modules (accessories), which are independent of size.

3 **Switch position indicator and TEST function of the wiring:**
Indicates a trip and enables the wiring test.

4 **Motor current setting:**
Setting the device to the rated motor current is easy with the large rotary knob.

5 **STOP button:**
If the STOP button is pressed, the NC contact is opened. This switches off the contactor downstream. The NC contact is closed again when the button is released.

6 **Supply terminals:**
Depending on the device version, the terminals for screw, spring-type or ring lug terminal connection are configured for the main and auxiliary circuit.

A sealable transparent cover can be optionally mounted (accessory). It secures the motor current setting against adjustment.

3RU21 26-4FB00 thermal overload relays

Trip classes

The 3RU thermal overload relay is available for normal start-up conditions in CLASS 10. For further details about trip classes, see "Tripping characteristics".

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.

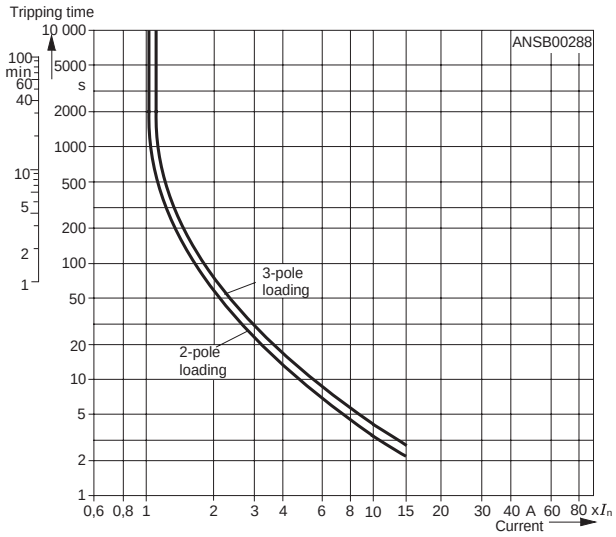
The smallest current at which tripping occurs is called the limiting tripping current. In accordance with IEC 60 947-4-1/DIN VDE 0660 Part 102, this must lie within certain specified limits. The limits of the limiting tripping current lie, in the case of the 3RU11 thermal overload relay for symmetrical three-pole loading between 105 % and 120 % of the operational current. 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.). The trip classes describe time-intervals within which the overload relay must trip with 7.2 times the operational current I_e for symmetrical three-pole loading from cold.

The tripping times are:

CLASS	Tripping times
10A	2 s to 10 s
10	4 s to 10 s
20	6 s to 20 s
30	9 s to 30 s

Description

This is the schematic representation of a characteristic. The characteristics of the individual 3RU thermal overload relays can be requested from Technical Assistance at the e-mail address: nst.technical-assistance@siemens.de



The tripping characteristic of a three-pole 3RU thermal overload relay (see characteristic for symmetrical three-pole loading from cold) 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 consumer. To prevent damage, the 3RU 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.

In contrast to a load in the cold state, a load at operating temperature has a lower heat reserve. This fact affects the 3RU thermal overload relay in that following an extended period of loading at operational current I_e, the tripping time reduces by about a quarter.

Phase failure protection

The 3RU thermal overload relays feature phase failure protection (see "Tripping characteristics") for the purpose of minimizing the heating of the load during single-phase operation as a result of phase failure.

Setting

The 3RU thermal overload relay is adjusted to the rated motor current using a rotary knob. The scale of the rotary knob is calibrated in Amperes.

Manual and automatic resetting

It is possible to switch between manual resetting and automatic resetting by depressing and rotating the blue button (RESET button). 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 3RU 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.

TEST function

Correct functioning of the ready 3RU thermal 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 3RU thermal 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 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.

Status indication

The current status of the 3RU thermal 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 3RU thermal overload relay is equipped with an NO contact for the tripped signal and an NC contact for switching off the contactor.

Connection

All the 3RU thermal overload relays have screw terminals for the main and auxiliary circuits. Once the box terminals have been removed from the main conductor connections of the overload relays of size S3, it is possible to connect busbars.

Alternatively the devices are available with either spring loaded or with ring lug terminals on both the control and the main terminals. For details of various connection possibilities, see the "Technical data" and "Selection and ordering data".

Design and mounting

The 3RU thermal overload relays are suitable for direct mounting on the 3RT contactors. They can also be mounted as single units if the appropriate adapters are used. For details of the mounting possibilities, see the "Selection and ordering data" and the "Technical data".

Operation with frequency converters

The 3RU thermal overload relays are suitable for operation with frequency converters. Depending on the frequency of the converter, a current higher than the motor current may have to be set due to the occurrence of eddy currents and skin effects.

Environmental considerations

The devices are manufactured taking environmental considerations into account and comprise environmentally-friendly and recyclable materials.

Specifications

The 3RU thermal overload relays comply with the requirements of:

- IEC 60 947-1/ DIN VDE 0660 Part 100
- IEC 60 947-4-1/ DIN VDE 0660 Part 102
- IEC 60 947-5-1/ DIN VDE 0660 Part 200
- IEC 60801-2, -3, -4, -5 and
- UL 508/CSA C 22.2.

The 3RU11 thermal overload relays are also safe from touch according to DIN VDE 0106 Part 100 and climate-proof to IEC 721.

Degree of protection "Increased safety" EEx

The 3RU thermal overload relay meets the requirements for overload protection of motors of the "Increased safety" type of protection EEx e IEC 50 019/ DIN VDE 0165, DIN VDE 0170, DIN VDE 171.
KEMA test certificate number Ex-97.Y.3235,
DMT 98 ATEX G001,
EN 50 019: 1977 + A1 ... A5,
Increased Safety "e": Appendix A, Guideline for temperature monitoring of squirrel cage motors during operation.

Accessories

For the 3RU thermal overload relay, there are:

- one adapter for each of the four overload relay sizes S00 to S3 for individual mounting
- one electrical remote RESET module for all sizes in three different voltage variants
- one mechanical remote RESET module for all sizes
- one cable release for all sizes for resetting inaccessible devices
- terminal covers

The accessories can also be used for the 3RB solid state overload relay.

Thermal Overload Relays

3RU21 up to 100 A, CLASS 10

Selection and ordering data

Features and technical characteristics

- Auxiliary contacts: 1 NO + 1 NC
- Manual/automatic RESET
- Switching position indication
- CLASS 10
- TEST function
- STOP button
- Phase failure sensitivity
- Sealable cover: optional in S00, S0 & S2. Integrated in S3

Ordering information

- Replace the (••) with the letter Number combination from the Terminal types I table
- Replace the (††) with the letter Number combination from the Terminal types II table
- For description, see page 3/8
- For technical data, see pages 3/12-3/15
- For circuit diagrams, see page 3/15
- For dimension drawings, see page 3/16-3/17.

•• Terminal Types I

Type	Mounting Type	Ltr
Screw	Direct to Contactor	B0
Screw[1]	Stand Alone	B1
Spring[2]	Direct to Contactor	C0
Spring[1] [2]	Stand Alone	C1
Ring Lug	Direct to Contactor	J0

†† Terminal Types II

Type	Mounting Type	Ltr
Screw	Direct to Contactor	B0
Screw [4]	Stand Alone	B1
Spring [3]	Direct to Contactor	D0
Spring [3] [4]	Stand Alone	D1

3RU2116-1GB0

3RU2116-1GC0

3RU2126-4NB0

3RU2136-4RB1

3RU2146-4JB0

Thermal Overload Relays up to 40A Frame Size S00 and S0 ••

Setting Range A	Order No.	Setting Range A	Order No.	Weight approx. (screw/ spring) kg
Frame Size S00: For mounting directly to 3RT201 contactors or for stand-alone installation				
0.11 - 0.16	**3RU2116-0A••**	1.4 - 2	**3RU2116-1B••**	0.13/0.15
0.14 - 0.2	**3RU2116-0B••**	1.8 - 2.5	**3RU2116-1C••**	
0.18 - 0.25	**3RU2116-0C••**	2.2 - 3.2	**3RU2116-1D••**	
0.22 - 0.32	**3RU2116-0D••**	2.8 - 4	**3RU2116-1E••**	
0.28 - 0.4	**3RU2116-0E••**	3.5 - 5	**3RU2116-1F••**	0.13/0.15
0.35 - 0.5	**3RU2116-0F••**	4.5 - 6.3	**3RU2116-1G••**	
0.45 - 0.63	**3RU2116-0G••**	5.5 - 8	**3RU2116-1H••**	
0.55 - 0.8	**3RU2116-0H••**	7 - 10	**3RU2116-1J••**	
0.7 - 1	**3RU2116-0J••**	9 - 12.5	**3RU2116-1K••**	0.13/0.15
0.9 - 1.25	**3RU2116-0K••**	11 - 16	**3RU2116-4A••**	
1.1 - 1.6	**3RU2116-1A••**			
Frame Size S0: For mounting directly to 3RT202 contactors or for stand-alone installation				
1.8 - 2.5	**3RU2126-1C••**	11 - 16	**3RU2126-4A••**	0.16/0.22
2.2 - 3.2	**3RU2126-1D••**	14 - 20	**3RU2126-4B••**	
2.8 - 4	**3RU2126-1E••**	17 - 22	**3RU2126-4C••**	
3.5 - 5	**3RU2126-1F••**	20 - 25	**3RU2126-4D••**	
4.5 - 6.3	**3RU2126-1G••**	23 - 28	**3RU2126-4N••**	0.16/0.22
5.5 - 8	**3RU2126-1H••**	27 - 32	**3RU2126-4E••**	
7 - 10	**3RU2126-1J••**	30 - 36	**3RU2126-4P••**	
9 - 12.5	**3RU2126-1K••**	34 - 40	**3RU2126-4F••**	

Thermal Overload Relays up to 100A Frame Size S2 and S3 ††

Setting Range A	Order No.	Setting Range A	Order No.	Weight approx. (screw/ spring) kg
Frame Size S2: For mounting directly to 3RT203 contactors [4]				
22 - 32	**3RU2136-4E††**	47 - 57	**3RU2136-4Q††**	0.34
28 - 40	**3RU2136-4F††**	54 - 65	**3RU2136-4J††**	
36 - 45	**3RU2136-4G††**	62 - 73	**3RU2136-4K††**	
40 - 50	**3RU2136-4H††**	70 - 80	**3RU2136-4R††**	
Frame Size S3: For mounting directly to 3RT104 contactors [4]				
28 - 40	**3RU2146-4F††**	57 - 75	**3RU2146-4K††**	
36 - 50	**3RU2146-4H††**	70 - 90	**3RU2146-4L††**	
45 - 63	**3RU2146-4J††**	80 - 100[5]	**3RU2146-4M††**	

[1] Not available for size S0 3RU212 with current setting range below 14 A.

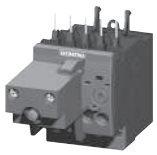
[2] Size S00 and S0: main and auxiliary conductor terminals are spring-type.

[3] Size S2 and S3 auxiliary terminals are spring-type only. Main conductor terminals are screw.

[4] 3RU Overloads in S2 and S3 frame are available preassembled with a terminal bracket for standalone mounting. S2 and S3 overloads can also be customer assembled to the terminal bracket (see Accessories).

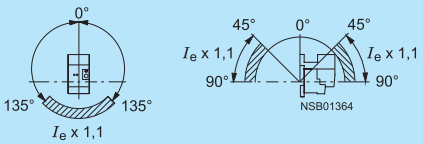
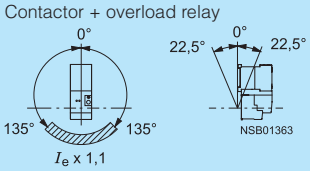
[5] For overload relays > 100A, see electronic overload relays.

Accessories

	Design		for type Size	Order No.	Weight approx kg
Terminal brackets for stand-alone installation [1]					
 3RU29 36-3AA01	For separate mounting of the overload relay; panel mount or snapped onto 35 mm standard mounting rail, size S3 also for 75 mm standard mounting rail	*Screw terminals*	S00 S0 S2 S3	**3RU29 16-3AA01** **3RU29 26-3AA01** **3RU29 36-3AA01** **3RU29 46-3AA01**	0.04 0.05 0.18 0.28
		Spring Loaded terminals	S00 S0	**3RU29 16-3AC01** **3RU29 26-3AC01**	0.04 0.06
Mechanical RESET					
 3RU29 00-1A with pushbutton, and reset extension	**Resetting plunger, holder, and former overload reset adapter**		S00 to S3	**3RU29 00-1A**	0.038
	Pushbuttons with extended stroke IP 65 Ø 22 mm, 12 mm hub		S00 to S3	**3SU1200-0FB10-0AA0**	0.020
	Extension plungers For compensation of the distance bewteen the pushbutton and the unlatching button of the relay		S00 to S3	**3SU1900-0KG10-0AA0**	0.004
	Complete mechanical reset assembly		S00 to S3	**3SBES-RESET**	
Cable release with holder for RESET					
 3RU29 00-1	For drilled hole Ø 6.5 mm in the control panel max. control panel thickness 8 mm	Length 400 mm Length 600 mm	S00 to S3 S00 to S3	**3RU29 00-1B** **3RU29 00-1C**	0.063 0.073
Module for remote RESET, electrical					
 3RU19 00-2A.71	Operating range 0.85 to 1.1 × U_s Power consumption AC 80 VA, DC 70 W ON period 0.2 s to 4 s AC/DC 24 V to 30 V AC/DC 110 V to 127 V AC/DC 220 V to 250 V		S00 to S3	**3RU19 00-2AB71** **3RU19 00-2AF71** **3RU19 00-2AM71**	0.066 0.066 0.066
Terminal cover					
 3RT1946-4EA1	Cover for cable lug and bar connection		S3	**3RT19 46-4EA1**	0.040
	Cover for box terminals		S2 S3	**3RT29 36-4EA2** **3RT29 46-4EA2**	0.020 0.025
Sealable covers					
 3RV29 08-0P	For covering the rotary setting dials. Order in multiples of 10.		S00 to S2	**3RV29 08-0P**	0.100
Tool for opening Spring Loaded terminal connections					
 3RA2908-1A	Suitable up to a For all SIRIUS devices with spring-type terminals • Length: approx. 200 mm; 3.0 × 0.5 mm (green)			**3RA2908-1A**	0.045

[1] The accessories are identical to those of the 3RB30/3RB31 solid-state overload relays.

Technical data

			3RU21 16	3RU21 26	3RU21 36	3RU21 46
Type			**3RU21 16**	**3RU21 26**	**3RU21 36**	**3RU21 46**
Size			**S00**	**S0**	**S2**	**S3**
Width			**45 mm**	**45 mm**	**55 mm**	**70 mm**
General data						
Release on			overload or phase failure			
Trip class	acc. to IEC 60947-4-1	CLASS	10		10, 10A	10
Phase failure sensitivity			Yes			
Overload warning			No			
Resetting and recovery						
Reset possibilities after tripping			Manual, remote and automatic RESET [1]			
Recovery time	on automatic RESET	min	depending on the level of tripping current and the tripping characteristic			
	on manual RESET	min	depending on the level of tripping current and the tripping characteristic			
	on remote RESET	min	depending on the level of tripping current and the tripping characteristic			
Features						
Indication of status on the device			Yes, using the slide "TEST function/ON-OFF indicator"			
TEST function			Yes			
RESET button			Yes			
STOP button			Yes			
Safe operation of motors with "increased safety" type of protection						
EC type test certificate number according to directive 94/9/EC (ATEX)			DMT 98 ATEX G 001 Ⓔx II (2) GD		On request	
Ambient temperatures						
Storage/transport		°C	–55 to +80			–55 to +80
Operation		°C	–40 to +70			–40 to +70
Temperature compensation		°C	up to +60			up to +60
Permissible rated current at	Internal cabinet temperature of 60 °C	%	100 (over +60°C, the current must be reduced)			100 (over +60°C, current reduction is not required)
	Internal cabinet temperature of 70 °C	%	87			87
Repeat terminals						
Repeat coil terminal			Yes	Not required		
Auxiliary switch repeat terminal			Yes	Not required		
Degree of protection	acc. to IEC 60529		IP 20			IP 20 [2]
Touch protection	acc. to IEC 61140		Finger-safe for vertical contact from the front Finger-safe only with optional terminal covers			
Shock resistance (sine)	acc. to IEC 60068-2-27	g/ms	15/11 (auxiliary contacts 95/96 and 97/98: 8g/11ms)			8/10
EMC						
• Interference immunity			Not relevant			
• Emitted interference			Not relevant			
Resistance to extreme climates (humidity)		%	90			100
Dimensions			see dimensional drawings			
Site altitude		m	Up to 2000; above this on request			
Installation angle			The permissible installation angles for mounting onto contactors and individual mounting are shown in the diagrams. For mounting in the shaded area, adjustment compensation of 10 % is necessary. Individual mounting  Contactor + overload relay  			
Type of installation/mounting			Mounting onto contactor/stand-alone installation with terminal support (For screw and snap-on mounting onto TH 35 standard mounting rail)			Direct mounting/ stand-alone installation with terminal support (For screw and snap-on mounting onto TH34 standard mounting rail size; size S3 also for TH 75 standard mounting rail."

1) Remote RESET in combination with the appropriate accessories.
2) Terminal compartment: IP 00 degree of protection.

Technical data

Type			**3RU21 16**	**3RU21 26**	**3RU21 36**	**3RU21 46**
Size			**S00**	**S0**	**S2**	**S3**
Width			**45 mm**	**45 mm**	**55 mm**	**70 mm**
Main circuit						
Rated insulation voltage U_i (pollution degree 3)		V	690			1000
Rated impulse withstand voltage U_{imp}		kV	6			8
Rated operational voltage U_e		V	690			1000
Type of current	DC		Yes			
	AC		Yes, frequency range up to 400 Hz			
Current setting		A	0.11– 0.16 to 11 – 16	1.8 – 2.5 to 34 – 40	11-16 up to 70-80	18 – 25 to 80 – 100
Power loss per device (max.)		W	4.1...6.3	6.2...7.5	8...14	10 to 16.5
Short-circuit protection	With fuse without contactor		See selection and ordering data			
	With fuse and contactor		See technical data (short-circuit protection with fuses / circuit-breaker for motor feeders)			
Protective separation between main and auxiliary current paths Acc. to IEC 60947-1,		V				
• Screw terminals or ring terminal lug connections			440	690: Setting ranges ≤ 25 A 440: Setting ranges > 25 A	690	690
• Spring - type terminals			440		690	
Connection of the main circuit						
Type of connection			Screw terminals			Screw connection with box terminal [2]/ bar connection
Screw terminals						
• Terminal screw			M3, Pozidriv size 2	M4, Pozidriv size 2	M6, Pozidriv size 2	Hexagon socket screw 4 mm
• Operating devices		mm	Ø5 ... 6	Ø5 ... 6	Ø5 ... 6	Ø5 ... 6
• Tightening torque		Nm	0.8 to 1.2	2 to 2.5	3 to 4.5	4 to 6
• Conductor cross-section (min./max.), 1 or 2 wires	Solid or stranded	mm^2	2 × (0.5 to 1.5), 2 × (0.75 to 2.5), max. 2 x 4	2 × (1 to 2.5), 2 × (2.5 to 6), max. 2 × (2.5 to 10)	2x(2.5 to 35) 1x(2.5 to 50)	2 × (2.5 to 16)
	Finely stranded with end sleeve	mm^2	2 × (0.5 to 1.5), 2 × (0.75 to 2.5)	2 × (1 to 2.5), 2 × (2.5 to 6) max. 1 x 10	2 x (1 to 25) 1 × (1 to 35)	2 × (2.5 to 35), 1 × (2.5 to 50)
	AWG conductor con., solid or stranded	AWG	2 x (20 ... 16) 2 x (18 ... 14) 2 x 12	2 x (16 ... 12) 2 x (14 ... 8)	2 x (18 to 2) 1 × (18 to 1)	2 × (10 to 1/0), 1 × (10 to 2/0)
	Ribbon cable (No. × width × thickness)	mm	–	–	–	2 × (6 × 9 × 0.8)
Bar connection						
• Terminal screw			–			M 6 × 20
• Tightening torque		Nm	–			4 to 6
• Conductor cross-section (min./max.)	Finely stranded with cable lug	mm^2	–			2 × 70
	Stranded with cable lug	mm^2	–			2 × 70
	AWG conductor connections, solid or stranded with cable lug	AWG	–			2/0
	With connecting bars (max. width)	mm	–			12
Auxiliary circuit						
Main contacts: Number of NO contacts			1			
Number of NC contacts			1			
Assignment of auxiliary contacts			1 NO for the signal "tripped"; 1 NC for disconnecting the contactor			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Rated impulse withstand voltage U_{imp}		kV	6			
Switching capacity of auxiliary contacts						
NC for AC AC-14/AC-15	Rated operational current I_e at U_e:					
	• 24 V	A	4			
	• 120 V	A	4			
	• 125 V	A	4			
	• 230 V	A	3			
	• 400 V	A	2			
	• 600 V	A	0.75			
	• 690 V	A	0.75			

1) For conductor cross-sections for Cage Clamp terminals, see "Connection of the auxiliary circuit."

2) The box terminal can be removed. After the box terminal has been removed, bar connection and lug connection is possible.

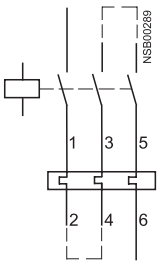
Technical data

Type			**3RU21 16**	**3RU21 26**	**3RU21 36**	**3RU11 46**
Size			**S00**	**S0**	**S2**	**S3**
Width			**45 mm**	**45 mm**	**55 mm**	**70 mm**
NO for AC	Rated operational current I_e at U_e:					
AC-14/AC-15	• 24 V	A	3			3
	• 120 V	A	3			3
	• 125 V	A	3			3
	• 230 V	A	2			2
	• 400 V	A	1			1
	• 600 V	A	0.75			0.6
	• 690 V	A	0.75			0.5
NC, NO for DC	Rated operational current I_e at U_e:					
DC-13	• 24 V	A	1			1
	• 60 V	A	On request			On request
	• 110 V	A	0.22			0.22
	• 125 V	A	0.22			0.22
	• 220 V	A	0.11			0.11
Conventional thermal current I_{th}		A	6			6
Contact reliability	(suitable for PLC; 17 V, 5 mA)		Yes			Yes
Short-circuit protection						
With fuse	Utilization cat. gL/gG	A	6			
	fast	A	10			
With miniature circuit-breaker (C characteristic)		A	6[1])			
Reliable operational voltage for protective separation between auxiliary current paths	acc. to IEC 60947-1	V	440			
Connection of the auxiliary circuit						
Type of connection			Screw terminal or Cage Clamp terminal			
Connection characteristics			Screw terminals			Cage Clamp terminals
• Terminal screw			Pozidrive Size 2			–
• Tightening torque		Nm	0.8 to 1.2			2 × (0.25 to 2.5)
• Conductor cross-sections (min./max.), 1 or 2 wires	Solid or stranded	mm^2	2 × (0.5 to 1.5), 2 × (0.75 to 2.5)			
	Finely stranded without end sleeve	mm^2	–			2 × (0.25 to 2.5)
	Finely stranded with end sleeve	mm^2	2 × (0.5 to 1.5), 2 × (0.75 to 2.5)			2 × (0.25 to 1.5)
	AWG conductor connections, solid or stranded	AWG	2 x (20 to 16) 2 x (18 to 14)			2 × (20 to 14)

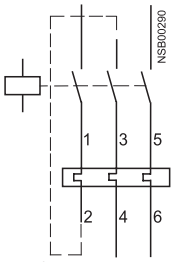
1) Up to $I_k \leq 0.5$ kA; ≤ 260 V.

Circuit diagrams

Protection of DC motors

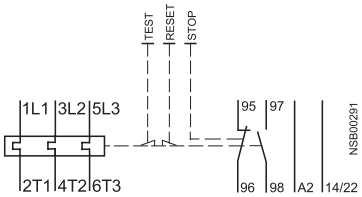


1-pole

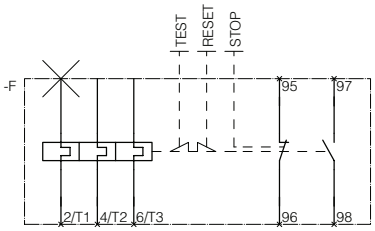


2-pole

3RU21 16 overload relay



3RU21 26 to 3RU21 46 overload relays

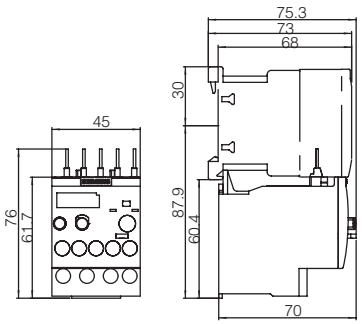


Dimension drawings

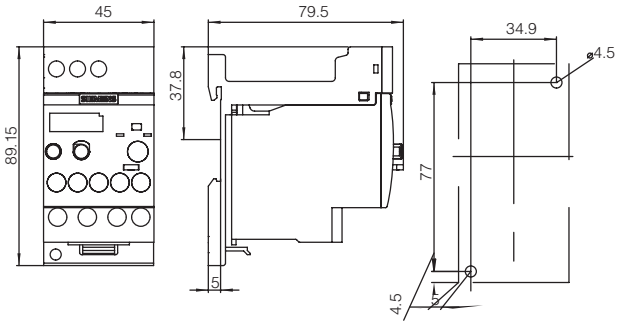
Screw connection

Lateral clearance to grounded components: at least 6 mm.

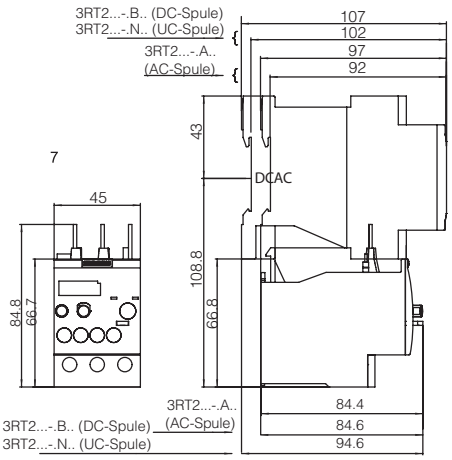
3RU21 16-..B0
Size S00



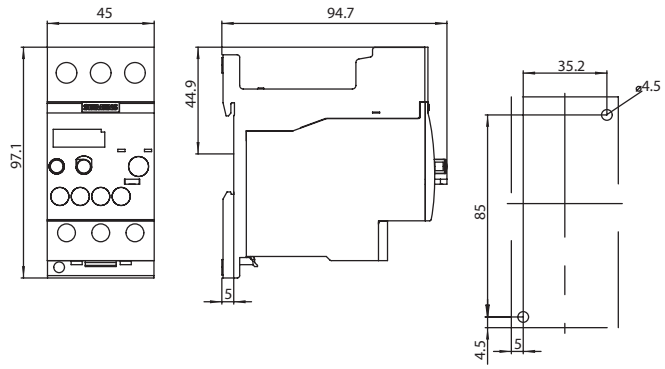
3RU21 16-..B1
Size S00
with adapter for installation as a single unit with accessories



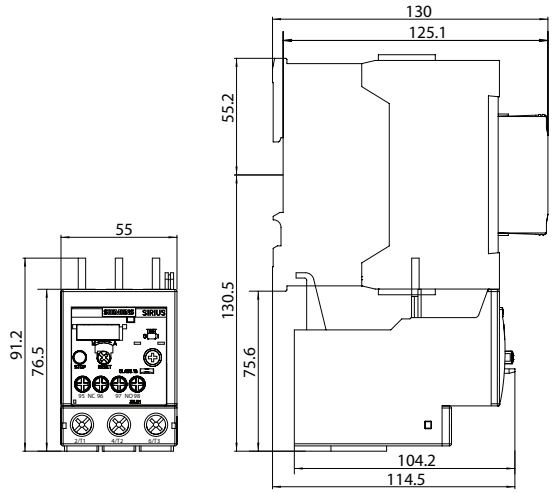
3RU21 26-..B.
Size S0



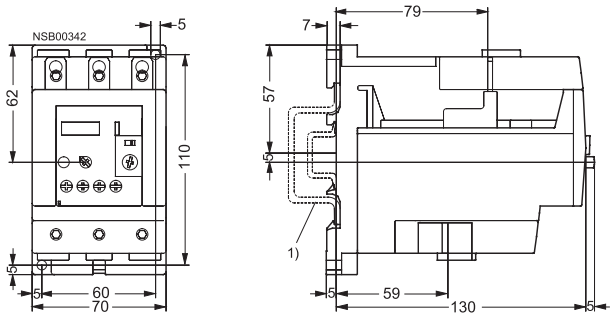
3RU21 26-..B1
Size S0
with adapter for installation as a single unit



3RU21 36-..B.
Size S2
with adapter for installation as a single unit



3RU21 46-..B.
Size S3
with adapter for installation as a single unit



1) For mounting on 35 mm standard mounting rail (15 mm deep) acc. to EN 50 022 or 75 mm standard mounting rail acc. to EN 50023

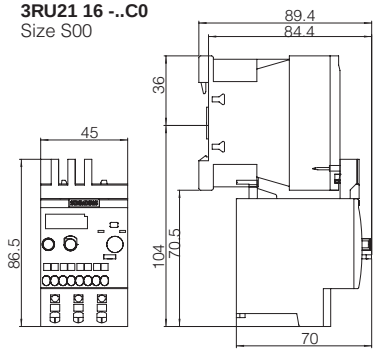
Dimension drawings "Contactor with built-on overload relay" see contactors and contactor combinations.

Dimension drawings

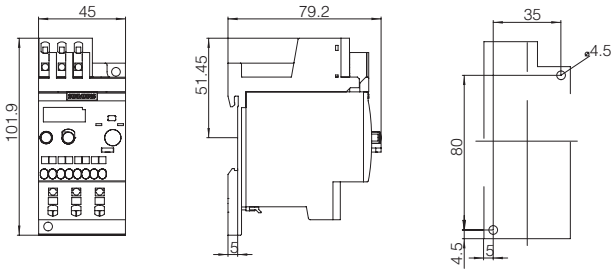
Spring Loaded terminals

Lateral clearance to grounded components: at least 6 mm.

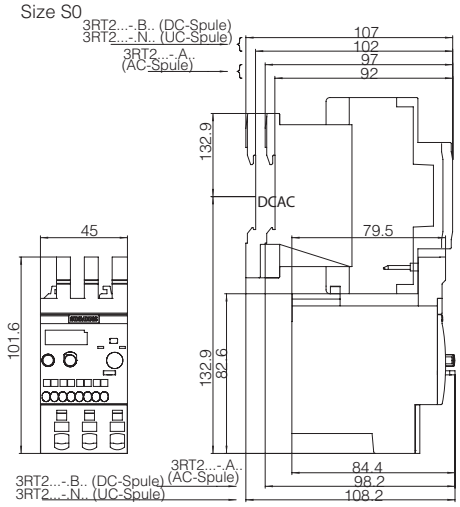
3RU21 16 -..C0
Size S00



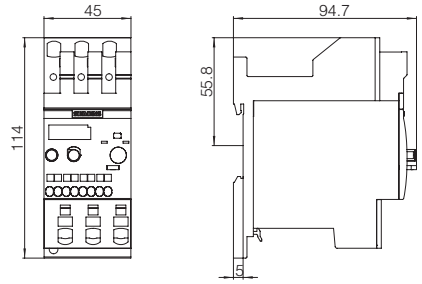
3RU21 16 -..C1
Size S00 with with adapter for installation as a single unit



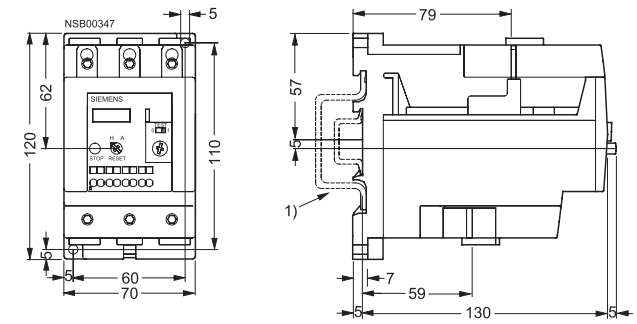
3RU21 26-..C0
Size S0



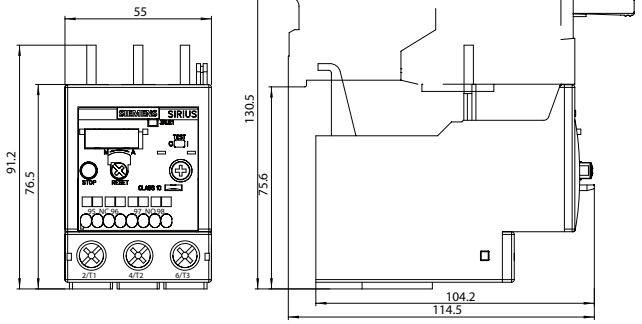
3RU21 26-..C1
Size S0 with adapter for installation as a single unit



3RU11 46-..D.
Size S3



3RU2136-..D.
Size S2



1) For mounting on 35 mm standard mounting rail (15 mm deep) acc. to EN 50 022 or 75 mm standard mounting rail acc. to EN 50 023

Dimension drawings "Contactor with built-on overload relay" see contactors and contactor combinations.