Simply in safe hands.
Protecting with SIRIUS

sirius 3RB2

Electronic motor protection relays

SIEMENS

Protect what must run

Motor protection with SIRIUS.

Motor protection is not a purely technical issue – but also yields significant business benefits of commercial significance. This is because if there is a considerable increase in the temperature of the motor, it will not only endanger the motor itself but can also disrupt the entire production process. As a result – costly downtime. Don't even allow things to go to that extent in the first place. Protect what should run the show. Our SIRIUS family offers you every possibility to achieve this.

SIRIUS electronic overload relays: Minimise project engineering time, inventory and power consumption. Optimize plant availability and maintenance management.

Why motor protection in the first place?

An electric motor converts electrical energy into mechanical energy. It draws electrical energy from the power source, converts this as mechanical energy at the shaft. In doing so, losses are incurred that cause the motor temperature to increase (copper losses in the motor stator and rotor, iron losses in the stator and friction losses). If the motor temperature increases too much over a longer period of time, this can thermally damage the motor. This for example, can be due to an excessively high load torque in continuous operation, frequent starts, locked rotor, line supply imbalance or phase failure. The result: Motor damage and in the worst case, a short-circuit. The main task of the motor protection function is to prevent an excessively high temperature rise in the stator and rotor i.e. motor overload.

Why is the starting period so decisive?

The starting period of a motor is critical because when starting, the motor draws significantly higher current than during normal operation. The starting current can be between 400 and 840% of the rated current under given operating conditions. As a result of the high starting current, the stator and rotor windings reach an extremely high temperature in just few seconds. When engineering the feeder, it is important to take into account the different starting times. Starting times of up to 10 sec are considered as normal starting and times higher than this are considered to be heavy-duty starting.

Temperature or current-dependent protection?

There are two possibilities of protecting motors: Current-dependent and Temperature-dependent.

Current-dependent motor protection devices utilize the principle wherein as the current increases, the motor temperature also increases. This means that these devices indirectly sense the temperature. Current-dependent motor protection devices include:

- Thermally-delayed overload releases as part of circuit-breakers
- Thermal overload relays
- Electronic overload relays

The temperature-dependent protective devices directly measure the temperature in the motor. For example

- Thermistor motor protection devices, and
- Temperature monitoring relays

SIRIUS overload relays fulfill every requirement

The standard applications can bet met with 3RB20/21 electronic overload relays designed for current-dependent protection of loads against excessive temperature rise due to overload, phase failure and phase unbalance. 3RB21 additionally protects the motors against ground fault caused due to insulation damage, moisture etc. It also allows settable trip CLASS 5 to 30 to suit various starting conditions.

For high feature requirements modular 3RB22/23 electronic overload relays provide both current dependent and temperature dependent protection in one device, thereby reducing the cost and panel space. The temperature dependent protection is achieved by direct temperature monitoring of motor windings by connection of a PTC sensor circuit.

The modular design is most significant feature of 3RB22/23. The relay comprises an evaluation module, independent of the motor current (evaluation unit) and a current measuring module (CT) as per motor current. Both of these modules (units) are electrically connected to each other by connecting leads. The basic functionality of the evaluation module can be expanded by using the appropriate expansion modules (refer details on page 6).

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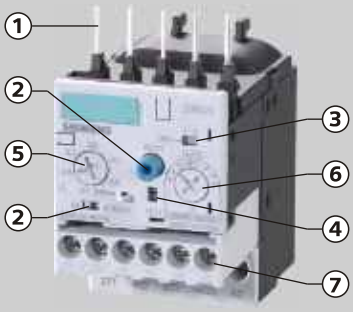
For standard application (3RB20 & 3RB21)

- Unified range up to 630A with integrated CTs
- Wide setting range of 1:4
- Self powered (no external control supply)
- Self monitoring feature to ensure protection reliability
- Remote RESET (with 3RB21)
- Low power loss (0.05W)

Standard applications: 3RB20/3RB21 electronic overload relays



Electronic overload relays 3RB21 (S0)

① **Connecting pins for main circuit**
Overload relays upto 12A are supplied with connecting pins. A separate individual mounting accessory should be ordered for these ratings. For higher rating relays, main circuit connection is with straight through connection or busbar connection.

② **Selector switch for manual/automatic RESET and RESET button**
This switch is used to select either manual or automatic RESET. In the manual RESET setting, the relay can be locally reset by pressing RESET button. For 3RB21 remote RESET is also possible using 24V supply.

③ **Switch position indicator and TEST function to check the wiring**
This indicates that relay has tripped and allows a check to be made whether wiring is correct.

④ **Electronic test**
Enables a test of all important components and functions.

⑤ **Motor current Setting**
The relay can be simply set to the rated motor current using large knob.

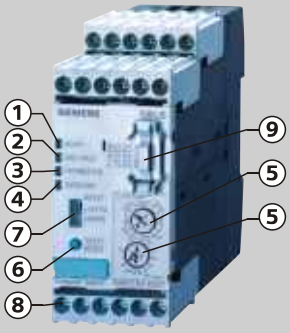
⑥ **Triping class setting/internal ground fault protection (only for 3RB21)**
Using the rotary switch, the required tripping class can be set and internal ground fault protection can be activated.

⑦ **Auxiliary Terminal (Screw Connection)**
The auxiliary terminals are generously dimensioned to permit two conductors with different cross-sections to be connected for the auxiliary circuit. The auxiliary terminals are removable for faster termination.

For high feature requirements (3RB22/23)

- Modular design to reduce inventory
- Wider setting range of 1:10
- Both current & temperature based protection in one device
- Site fittable expansion modules
- Overload pre-warning to reduce downtime
- Transmission of operating data via Analog Output

High feature requirements: 3RB22/23 electronic overload relays



Evaluation module
The evaluation module, (common for all ratings) evaluates the current measured by the current measuring module. Depending on the function selected, this trips when a fault condition develops and provides the appropriate signaling functions.

① **Green "Ready" LED**
Green steady light indicates that the device is functioning perfectly.

② **Red "Ground fault" LED**
Red steady light indicates that there is a ground fault.

③ **Red "thermistor" LED**
Red steady light indicates a thermistor trip.

④ **Red "overload" LED**
Red steady light indicates an overload trip; red flashing light indicates a warning for overload trip (overload alarm).

⑤ **Motor current and tripping class setting**
Using the 2 rotary switches, the device can be simply set to the motor current as well as the required tripping class, which is a function of the prevailing starting conditions.

⑥ **TEST/RESET button**
This allows all of the important device components and functions to be tested. The device can also be reset after a trip if the manual RESET function was selected. Alternatively, the device can be reset automatically or remotely.

⑦ **Selector switch for manual/automatic RESET**
This switch can be used to simply select either a manual or an automatic RESET.

⑧ **Terminals**
Screw terminals permit two conductors with different cross-sections to be connected for the auxiliary, control and sensor circuits.

⑨ **Function expansion module**
This allows the functions of the evaluation module to be expanded, e.g. an internal ground fault detection function can be activated and/or analog output with the appropriate signals. (refer page 6 for details).

⑩ **Current measuring module**
This module measures the motor current flowing.

Technical details:
SIRIUS overload relays.

Standard applications: Overview of the different versions of the 3RB20/3RB21 overload relays

Size	**S00**	**S2**
Width	45	55
Main Order Nos.	3RB201 / 3RB211	3RB203 / 3RB213
Rated operational voltage	690 V	690 V
Current ranges	0.1–0.4 A, 0.32–1.25 A, 1–4 A, 3–12 A	6–25 A, 13–50 A
Tripping class	For 3RB20, CLASS 10 and CLASS 20 are permanently set / For 3RB21, CLASS 5 to	
Trips in the event of	Overload, phase failure and phase unbalance + ground fault (for 3RB21 only)	

High feature requirements: Overview of the 3RB22/3RB23 electronic overload relay versions

Size	**S00/S0**	**S2/S3**
Width	45 mm	55 mm
Main Order Nos.		
Evaluation module	3RB22 (monostable version) and 3RB23	
Current measuring module	3RB2906	3RB2906
Rated operational voltage	690 V	690 V
Current ranges	0.3–3 A, 2.4–25 A	10–100 A
Tripping class		CLASS 5 to 30
Trips in the event of	Overload, Phase failure, phase unbalance, locked rotor and thermistor motor pro	

Special features

Using the 3RB2985 function expansion modules, it is possible to expand the functions of the evaluation modules to fit ind
The following functions can be implemented:

- Internal ground fault protection and ground fault signaling
- Internal ground fault protection and overload alarm
- Analog output and overload alarm
- Analog output and internal ground fault protection and ground fault signaling
- Analog module and internal ground fault protection and overload alarm

* Motor currents up to 820 A can be sensed and evaluated e.g. using the current detection module 0.3 to 3 A in conjunction with a 3UF18 intermediate CT.

– 3RB2 overload relay are not suitable for power frequencies other than 50/60 Hz
– For star-delta starting internal ground-fault detection must be switched off

	S3	S6	S10/S12
	70	120	145
	3RB204 / 3RB214	3RB205 / 3RB215	3RB206 / 3RB216
	1000 V	1000 V	1000 V
	12.5–50 A, 25–100 A	50–200 A	55–250 A, 160–630 A
o 30 can be set			

	S6	S 10/S12
	120 mm	145 mm
(bistable version)		
	3RB2956	3RB2966
	1000 V	1000 V
	20–200 A	63–630 A*
can be set		
otection (with PTC sensor) + ground fault (with expansion module)		

lividual customer requirements.

Response of the output relays in the event of	Monostable 3RB22	Bistable 3RB23
Failure of the control supply voltage	The device trips	No change of the switching status of the auxiliary contacts
Return of the control supply voltage without previous tripping	The device resets	No change of the switching status of the auxiliary contacts
Return of the control supply voltage after previous tripping	The device remains tripped Reset: • For overload tripping, after 3 minutes • For thermistor tripping, after the temperature has fallen 5 K below the response temperature • For ground-fault tripping, immediately	The device remains tripped Reset: • For overload tripping, after 3 minutes • For thermistor tripping, after the temperature has fallen 5 K below the response temperature • For ground-fault tripping, immediately

Selection and Ordering Data

Sirius 3RB20 and 3RB21

		3RB20		3RB21	
Size	**Current Range**	**Trip Class**	**Type Number**	**Trip Class**	**Type Number**
S00	0.1 to 0.4A	Class 10	3RB2016-1RB0	Class 5 to 30	3RB2113-4RB0
	0.32 to 1.25A	Class 10	3RB2016-1NB0	Class 5 to 30	3RB2113-4NB0
	1 to 4A	Class 10	3RB2016-1PB0	Class 5 to 30	3RB2113-4PB0
	3 to 12A	Class 10	3RB2016-1SB0	Class 5 to 30	3RB2113-4SB0
S2	6 to 25A	Class 10	3RB2036-1QW1	Class 5 to 30	3RB2133-4QW1
S2	13 to 50A	Class 10	3RB2036-1UW1	Class 5 to 30	3RB2133-4UW1
S3	25 to 100A	Class 10	3RB2046-1EW1	Class 5 to 30	3RB2143-4EW1
S6	50 to 200A	Class 10	3RB2056-1FC2	Class 5 to 30	3RB2153-4FW2
S10/12	160 to 630A	Class 10	3RB2066-1MC2	Class 5 to 30	3RB2163-4MC2

Note :- For 3RB20 & 3RB21 up to 12A (S00) please order Independent mounting kit 3RB2913-0AA1

Sirius 3RB22/23

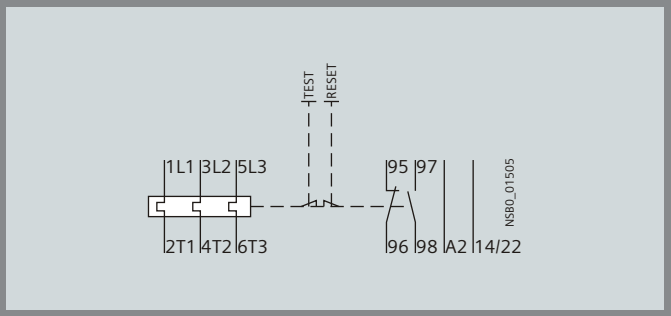
Evaluation Module	
(Suitable for all current measuring modules)	**Type Number**
3RB22 with Monostable output	3RB2283-4AA1
3RB23 with Bistable output	3RB2383-4AA1

Current Measuring Module			
Size	**Current Range**	**Trip Class**	**Type Number**
S00/S0	0.3 to 3A	Class 5 to 30	3RB2906-2BG1
	2.4 to 25A	Class 5 to 30	3RB2906-2DG1
S2/S3	10 to 100A	Class 5 to 30	3RB2906-2JG1
S6	20 to 200A	Class 5 to 30	3RB2956-2TG2
S10/12	63 to 630A	Class 5 to 30	3RB2966-2WH2

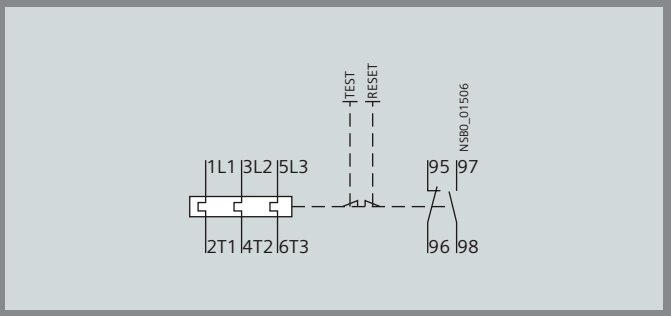
Function Module	
	Type Number
Overload Warning + Analog Output	3RB2985-2AA0
Internal GF protection + Overload Warning + Analog Output	3RB2985-2AA1
Internal GF protection + GF Signalling + Analog Output	3RB2985-2AB1
Internal GF protection + Overload Warning	3RB2985-2CA1
Internal GF protection + GF Signalling	3RB2985-2CB1

Connecting Leads	
(For connection between Evaluation Module and Current Measuring Module)	
	Type Number
Length 0.1 m	3RB2987-2B
Length 0.5 m	3RB2987-2D

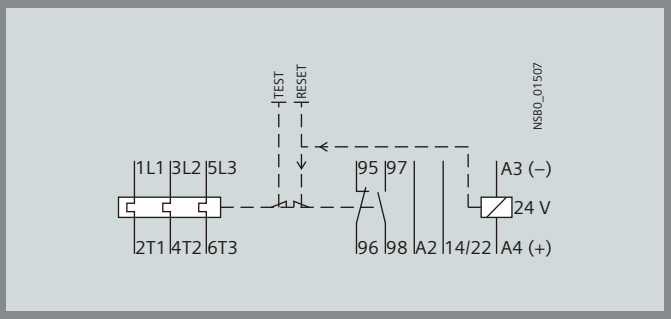
Schematic diagram



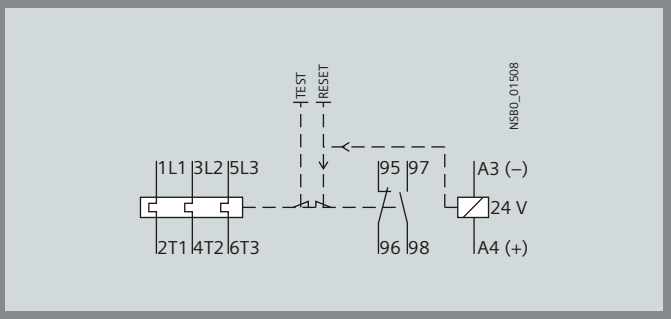
3RB20 16 overload relays



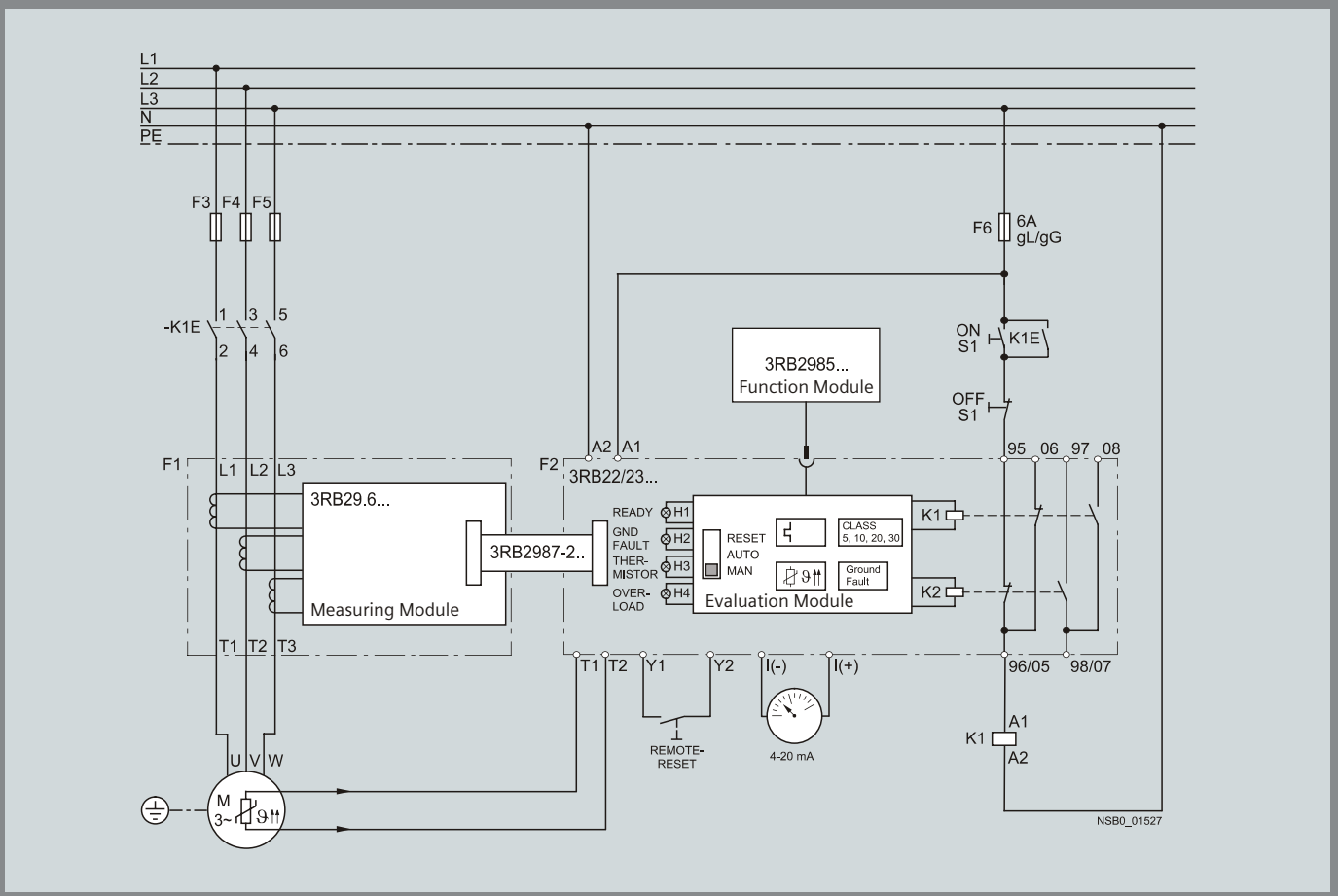
3RB20 26 to 3RB20 66 overload relays



3RB21 13 overload relays

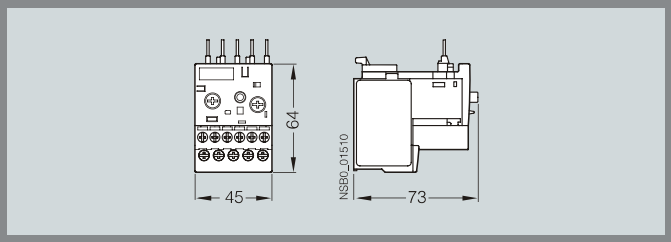


3RB21 23 to 3RB21 63 overload relays

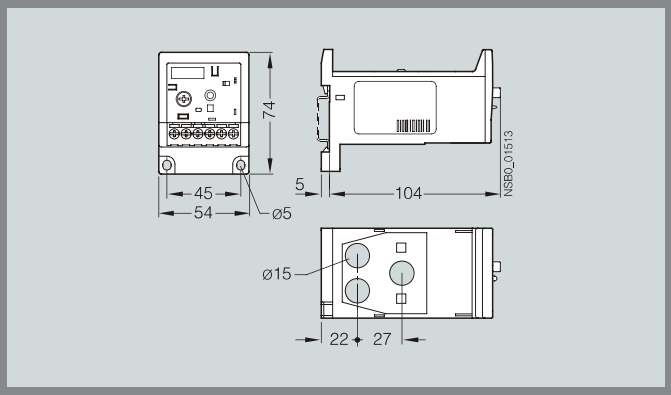


3RB22/23 overload relays

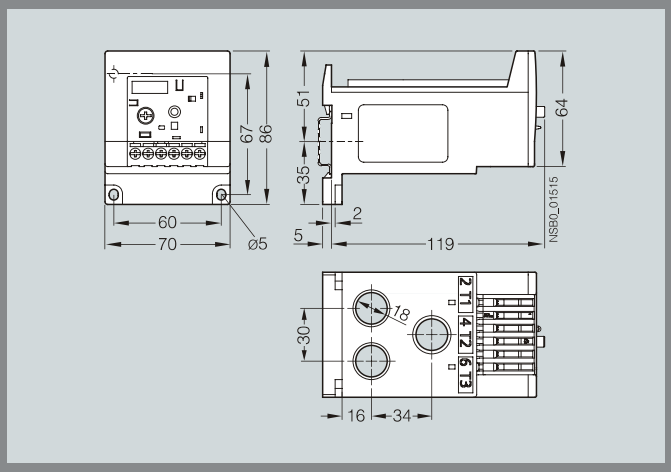
Dimensional drawings



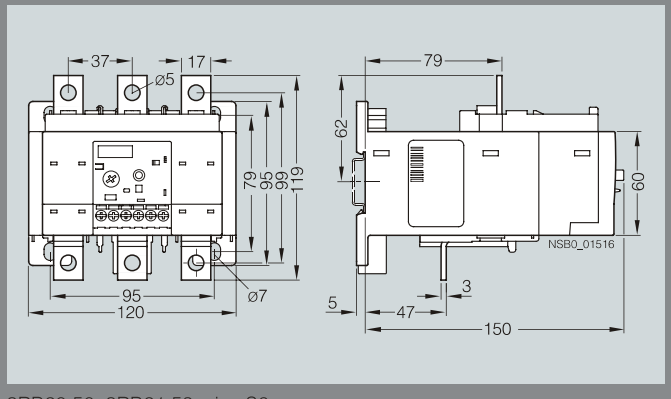
3RB20 16, 3RB21 13, size S00



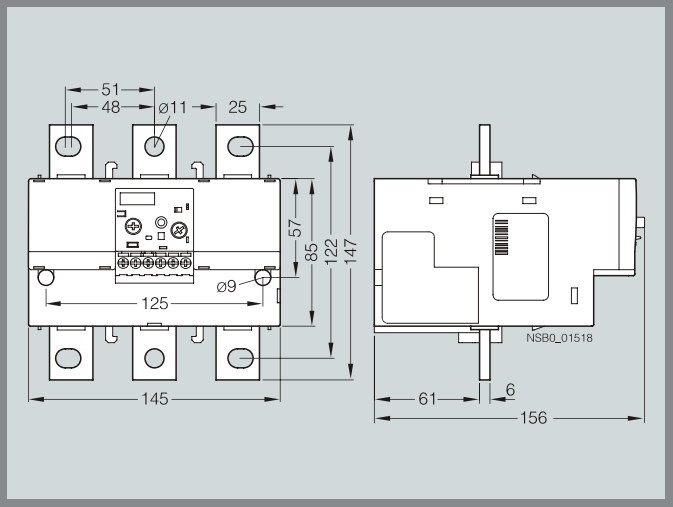
3RB20 36, 3RB21 33, size S2 with straight-through transformer



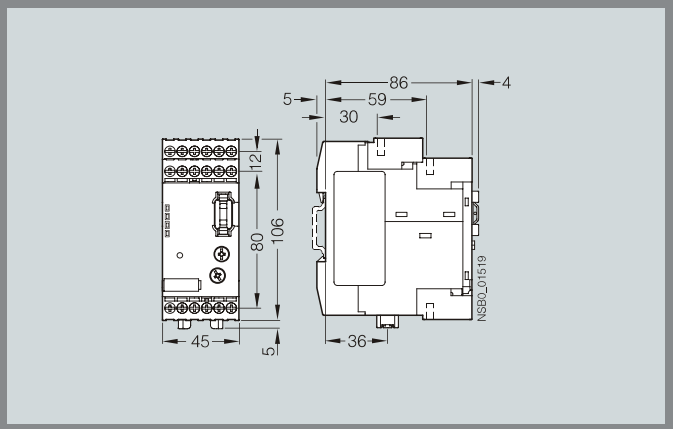
3RB20 46, 3RB21 43, size S3 with straight-through transformer



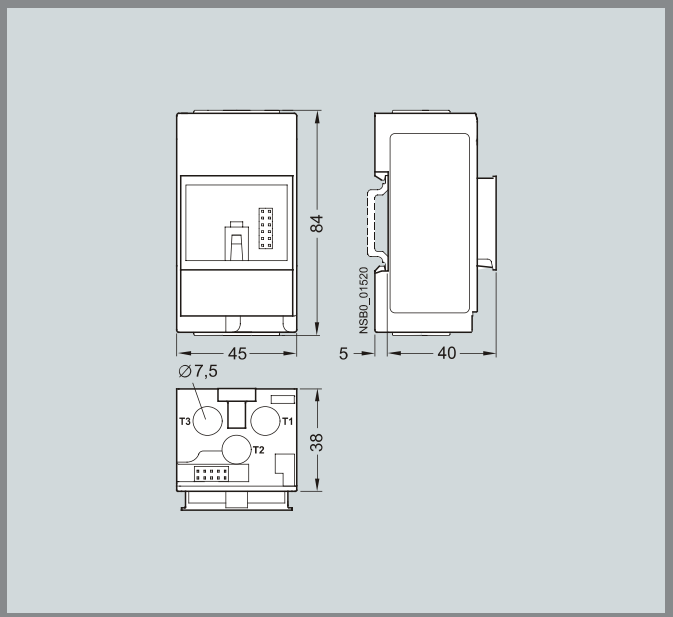
3RB20 56, 3RB21 53, size S6



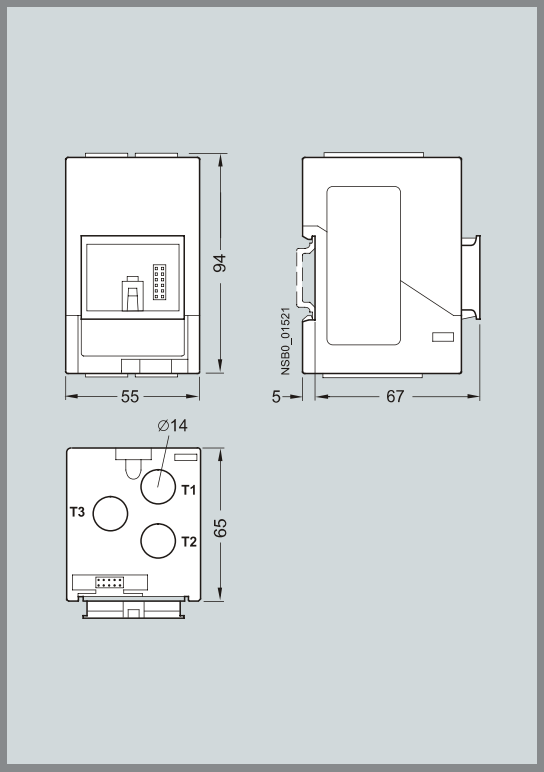
3RB20 66, 3RB21 63, size S10/S12



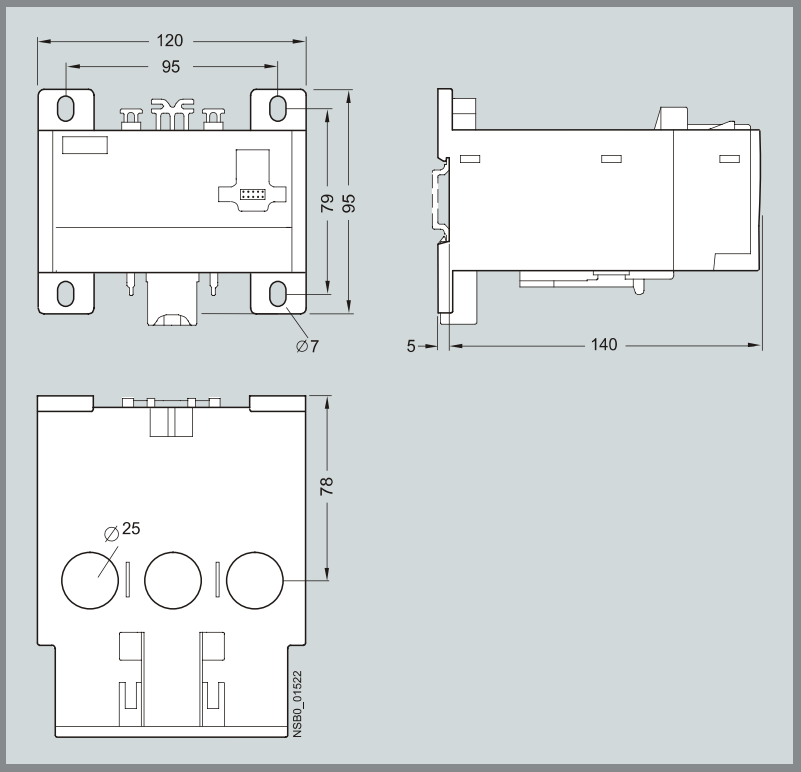
3RB22 83-4, 3RB23 83-4 evaluation module



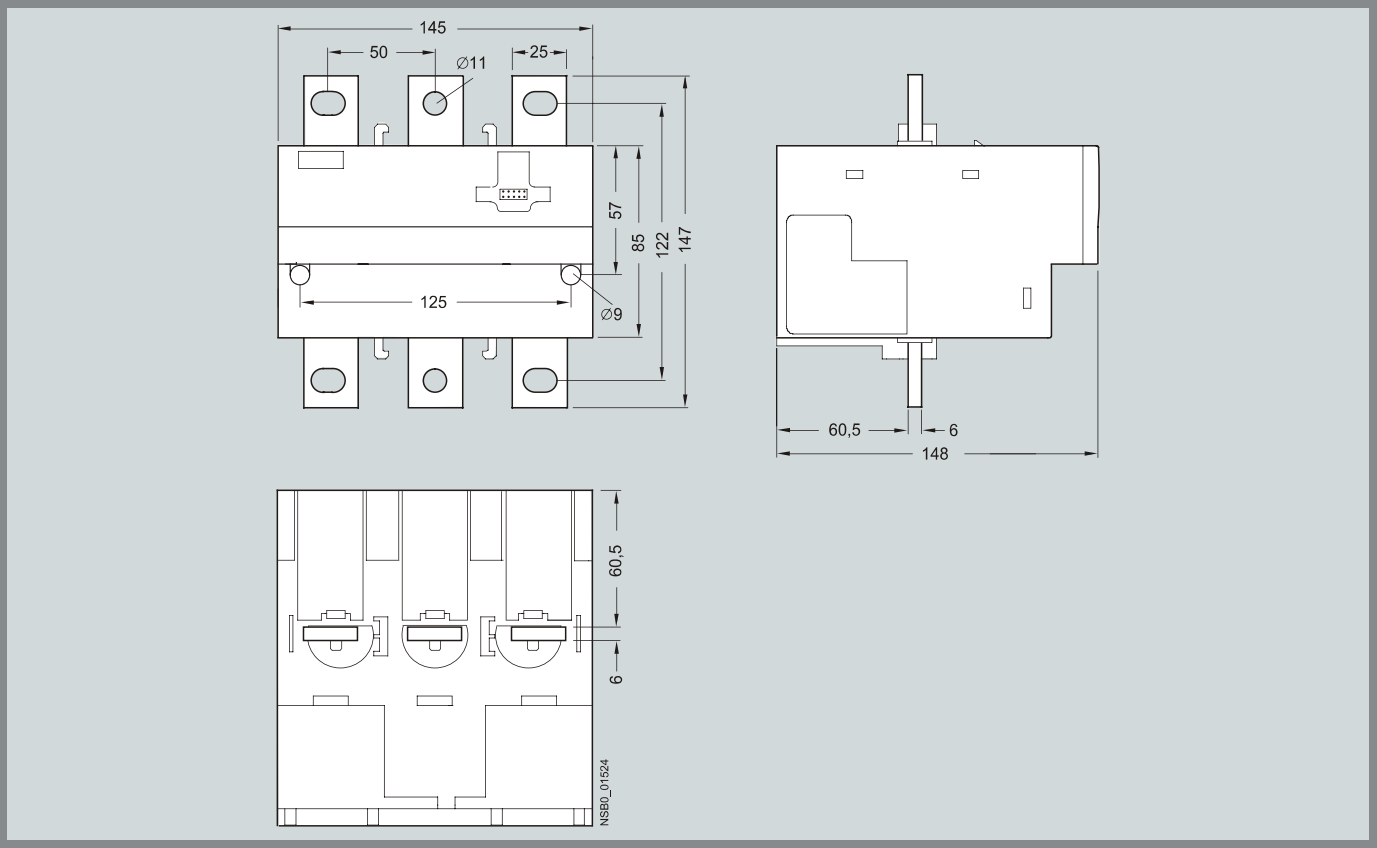
3RB29 06-2BG1, 3RB29 06-2DG1 current measuring module



3RB29 06-2JG1 current measuring module



3RB29 56-2TG2 current measuring module



3RB29 66-2WH2 current measuring module

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