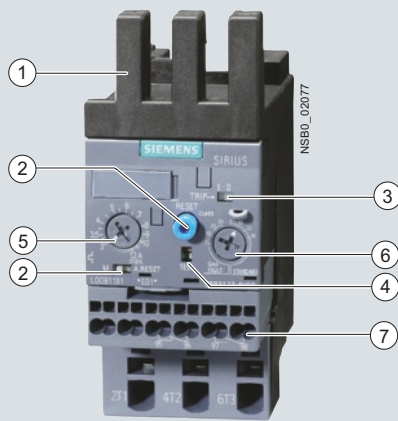


Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

General data

Overview



- ① Connection for mounting onto contactors:
Optimally adapted in electrical, mechanical and design terms to the contactors and soft starters. The overload relay can be connected directly using these connection 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 the slide switch you can choose between manual and automatic RESET. A device set to manual RESET can be reset locally by pressing the RESET button. On the 3RB31 an electrical remote RESET is integrated.
 - ③ Switch position indicator and TEST function of the wiring:
Indicates a trip and enables the wiring test.
 - ④ Solid-state test (device test):
Enables a test of all important device components and functions.
 - ⑤ Motor current setting:
Setting the device to the rated motor current is easy with the large rotary knob.
 - ⑥ Trip class setting/internal ground-fault detection (only 3RB31):
Using the rotary switch you can set the required trip class and activate the internal ground-fault detection dependent on the start-up conditions.
 - ⑦ Connecting terminals (removable joint block for auxiliary circuits):
Depending on the device version, the terminals for screw and spring-type 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.

3RB31 23-4VE00 solid-state overload relays

The 3RB30 and 3RB31 solid-state overload relays up to 40 A with internal power supply have been designed for inverse-time delayed protection of loads with normal and heavy starting (for "Function" see note on [Technical Information on page 5/1](#)) against excessive temperature rises due to overload, phase unbalance or phase failure. An overload, phase unbalance or phase failure result in an increase of the motor current beyond the set rated motor current. This current rise is detected by the current transformers integrated into the devices and evaluated by corresponding solid-state circuits which then output a pulse to the auxiliary contacts. The auxiliary contacts then switch off the load by means of a contactor. The break time depends on the ratio between the tripping current and set current I_e and is stored in the form of a long-term stable tripping characteristic (for "Characteristic Curves" see the note on [Technical Information on page 5/1](#)).

In addition to inverse-time delayed protection of loads against excessive temperature rises due to overload, phase unbalance and phase failure, the 3RB31 solid-state overload relays also allow internal ground-fault detection (not possible in conjunction with contactor assemblies for wye-delta starting). This provides protection of loads against high-resistance short-circuits due to damage to the insulation material, moisture, condensed water etc.

The "tripped" status is signaled by means of a switch position indicator. Resetting takes place either manually or automatically after a recovery time has elapsed (for "Function" see note on [Technical Information on page 5/1](#)).

The devices are manufactured in accordance with environmental guidelines and contain environmentally friendly and reusable materials. They comply with all important worldwide standards and approvals.

"Increased safety" type of protection EEx e according to ATEX directive 94/9/EC

The 3RB30/3RB31 solid-state overload relays are suitable for the overload protection of explosion-proof motors with "increased safety" type of protection EEx e. The relays meet the requirements of EN 60079-7 (Electrical apparatus for areas subject to explosion hazards – Increased safety "e"); see [Chapter 9 "Appendix" --> "Standards and approvals" --> "Type overview of approved devices for explosion-protected areas \(ATEX Explosion Protection\)".](#)

Benefits

The most important features and benefits of the 3RB30/3RB31 solid-state overload relays are listed in the overview table (see ["General data" on page 5/34](#)).

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

General data

Application

Industries

The 3RB30/3RB31 solid-state overload relays are suitable for customers from all industries who want to guarantee optimum inverse-time delayed protection of their electrical loads (e.g. motors) under normal and heavy starting conditions (CLASS 5 to CLASS 30), minimize project completion times, inventories and power consumption, and optimize plant availability and maintenance management.

Application

The 3RB30/3RB31 solid-state overload relays have been designed for the protection of induction motors in sinusoidal 50/60 Hz voltage networks. The relays are not suitable for the protection of single-phase AC or DC loads.

The 3RU21 thermal overload relay or the 3RB22/3RB23 solid-state overload relay can be used for single-phase AC loads. For DC loads we recommend the 3RU21 thermal overload relay.

Ambient conditions

The devices are insensitive to external influences such as shocks, corrosive environments, ageing and temperature fluctuation.

For the temperature range from -25 to +60 °C, the 3RB30/3RB31 solid-state overload relays compensate the temperature according to IEC 60947-4-1.

Accessories

The following optional accessories are available for the 3RB30/3RB31 solid-state overload relays:

- Terminal bracket for stand-alone installation with screw or spring-type terminals for all sizes

- Mechanical RESET for all sizes
- Cable release for resetting devices which are difficult to access for all sizes
- Sealable cover for all sizes

More information

Order No. scheme

Digit of the Order No.	1. - 3.	4.	5.	6.	7.	8.	9.	10.	11.
	□ □ □	□	□	□	□	-	□	□	□
Solid-state overload relays	3 R B								
SIRIUS 3rd generation		3							
Device series			□						
Size, rated operational current and power				□					
Version of the automatic RESET, electrical remote RESET					□				
Trip class (CLASS)						□			
Setting range of the overload release							□		
Connection method								□	
Installation type									□
Example	3 R B	3	0	1	6	-	1	R	B 0

Note:

The Order No. scheme is presented here merely for information purposes and for better understanding of the logic behind the order numbers.

For your orders, please use the order numbers quote in the catalog under the Selection and ordering data section.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

General data

Type			3RB30 1., 3RB31 1. S00	3RB30 2., 3RB31 2. S0
Size				
Dimensions (W x H x D) (overload relay with stand-alone installation support)				
• Screw terminals	mm	45 x 89 x 80	45 x 97 x 94	
• Spring-type terminals	mm	45 x 102 x 80	45 x 116 x 95	
General technical specifications				
Trips in the event of		Overload, phase failure, and phase unbalance + ground fault (for 3RB31 only)		
Trip class acc. to IEC 60947-4-1	CLASS	3RB30: 10, 20; 3RB31: 5, 10, 20 and 30 adjustable		
Phase failure sensitivity		Yes		
Overload warning		No		
Reset and recovery		Manual, automatic and remote RESET (depending on the version)		
• Reset options after tripping				
• Recovery time				
- For automatic RESET	min	Approx. 3		
- For manual RESET	min	Immediately		
- For remote RESET	min	Immediately		
Features				
• Display of operating state on device		Yes, by means of switch position indicator slide		
• TEST function		Yes, test of electronics by pressing the TEST button / Test of auxiliary contacts and wiring of control circuit by actuating the switch position indicator slide / Self-monitoring		
• RESET button		Yes		
• STOP button		No		
Explosion protection – Safe operation of motors with "increased safety" type of protection				
EC type test certificate number acc. to directive 94/9/EC (ATEX)		PTB 09 ATEX 3001  II (2) GD		
Ambient temperatures				
• Storage/transport	°C	-40 ... +80		
• Operation	°C	-25 ... +60		
• Temperature compensation	°C	+60		
• Permissible rated current at				
- Temperature inside control cabinet 60 °C	%	100		
- Temperature inside control cabinet 70 °C	%	On request		
Repeat terminals				
• Coil repeat terminals		Yes	Not required	
• Auxiliary contact repeat terminal		Yes	Not required	
Degree of protection acc. to IEC 60529		IP20		
Touch protection acc. to IEC 61140		Finger-safe		
Shock resistance with sine acc. to IEC 60068-2-27		g/ms	15/11 ²⁾	
Electromagnetic compatibility (EMC) – Interference immunity				
• Conductor-related interference				
- Burst acc. to IEC 61000-4-4 (corresponds to degree of severity 3)	kV	2 (power ports), 1 (signal ports)		
- Surge acc. to IEC 61000-4-5 (corresponds to degree of severity 3)	kV	2 (line to earth), 1 (line to line)		
• Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)	kV	8 (air discharge), 6 (contact discharge)		
• Field-related interference acc. to IEC 61000-4-3 (corresponds to degree of severity 3)	V/m	10		
Electromagnetic compatibility (EMC) – Emitted interference		Degree of severity B according to EN 55011 (CISPR 11) and EN 55022 (CISPR 22)		
Resistance to extreme climates – Air humidity		%	95	
Dimensions		For "Dimensional drawings" see the note on Technical Information on page 5/1.		
Installation altitude above sea level		m	Up to 2000	
Mounting position		Any		
Type of mounting		Direct mounting/stand-alone installation with terminal bracket		

¹⁾ Permissible rated current for heavy starting

Size S0 at 10 to 40 A:

- CLASS 20, $I_{e \max} = 32$ A,

- CLASS 30, $I_{e \max} = 25$ A.

²⁾ Signaling contact 97/98 in position "tripped": 4/11 g/ms.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

General data

Type		3RB30 1., 3RB31 1.	3RB30 2., 3RB31 2.
Size		S00	S0
Width		45 mm	45 mm
Main circuit			
Rated insulation voltage U_i (pollution degree 3)	V	690	
Rated impulse withstand voltage U_{imp}	kV	6	
Rated operational voltage U_e	V	690	
Type of current			
• Direct current		No	
• Alternating current		Yes, 50/60 Hz ± 5 %	
Current setting	A	0.1 ... 0.4	0.1 ... 0.4
	A	to 4 ... 16	to 10 ... 40
Power loss per unit (max.)	W	0.05 ... 0.2	
Short-circuit protection			
• With fuse without contactor		See "Selection and ordering data" See "Technical specifications" --> "Short-circuit protection with fuses/motor starter protectors for motor starters", see note on Technical Information on page 5/1.	
• With fuse and contactor			
Protective separation between main and auxiliary conducting path acc. to IEC 60947-1 (pollution degree 2)	V	690 ¹⁾	
Conductor cross-sections of main circuit			
Connection type screw terminals		 Screw terminals	
Terminal screw		M3, Pozidriv size 2	M4, Pozidriv size 2
Operating devices	mm	$\varnothing 5 \dots 6$	$\varnothing 5 \dots 6$
Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm ²	2 x (0.5 ... 1.5) ²⁾ , 2 x (0.75 ... 2.5) ²⁾ , 2 x (0.5 ... 4) ²⁾	2 x (1 ... 2.5) ²⁾ , 2 x (2.5 ... 10) ²⁾
• Finely stranded with end sleeves (DIN 46228 T1)	mm ²	2 x (0.5 ... 1.5) ²⁾ , 2 x (0.75 ... 2.5) ²⁾	2 x (1 ... 2.5) ²⁾ , 2 x (2.5 ... 6) ²⁾ , max. 1 x 10
• AWG cables, solid or stranded	AWG	2 x (20 ... 16) ²⁾ , 2 x (18 ... 14) ²⁾ , 2 x 12	2 x (16 ... 12) ²⁾ , 2 x (14 ... 8) ²⁾
Connection type spring-type terminals		 Spring-type terminals	
Operating devices	mm	3.0 x 0.5 and 3.5 x 0.5	
Conductor cross-sections (min./max.)			
• Solid	mm ²	1 x (0.5 ... 4)	1 x (1 ... 10)
• Finely stranded without end sleeve	mm ²	1 x (0.5 ... 2.5)	1 x (1 ... 6)
• Finely stranded with end sleeves (DIN 46228 T1)	mm ²	1 x (0.5 ... 2.5)	1 x (1 ... 6)
• AWG cables, solid or stranded	AWG	1 x (20 ... 12)	1 x (18 ... 8)

¹⁾ For grounded networks, otherwise 600 V.

²⁾ If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

General data

Type		3RB30 1., 3RB31 1.	3RB30 2., 3RB31 2.
Size		S00	S0
Width		45 mm	45 mm
Auxiliary circuit			
Number of NO contacts		1	
Number of NC contacts		1	
Auxiliary contacts – Assignment		1 NO for the signal "tripped", 1 NC for disconnecting the contactor	
Rated insulation voltage U_i (pollution degree 3)	V	300	
Rated impulse withstand voltage U_{imp}	kV	4	
Auxiliary contacts – Contact rating			
• NC contact with alternating current AC-14/AC-15 Rated operational current I_e at U_e :			
- 24 V	A	4	
- 120 V	A	4	
- 125 V	A	4	
- 250 V	A	3	
• NO contact with alternating current AC-14/AC-15: Rated operational current I_e at U_e :			
- 24 V	A	4	
- 120 V	A	4	
- 125 V	A	4	
- 250 V	A	3	
• NC, NO contact with direct current DC-13: Rated operational current I_e at U_e :			
- 24 V	A	2	
- 60 V	A	0.55	
- 110 V	A	0.3	
- 125 V	A	0.3	
- 250 V	A	0.11	
• Conventional thermal current I_{th}	A	5	
• Contact reliability (suitability for PLC control; 17 V, 5 mA)		Yes	
Short-circuit protection			
• With fuse, gG operational class	A	6	
Ground-fault protection (only 3RB31)			
• Tripping value I_{Δ}		The information refers to sinusoidal residual currents at 50/60 Hz > $0.75 \times I_{motor}$	
• Operating range I		Lower current setting value < I_{motor} < $3.5 \times$ upper current setting value	
• Response time t_{trip} (in steady-state condition)	s	< 1	
Integrated electrical remote RESET (only 3RB31)			
Connecting terminals A3, A4		24 V DC, max. 200 mA for approx. 20 ms, then < 10 mA	
Protective separation between main and auxiliary conducting path acc. to IEC 60947-1	V	300	
CSA, UL, UR rated data			
Auxiliary circuit – Switching capacity		3RB30: B600, R300; 3RB31: B300, R300	
Conductor cross-sections for auxiliary circuit			
Connection type screw terminals		 Screw terminals	
Terminal screw		M3, Pozidriv size 2	
Operating devices		mm	∅ 5 ... 6
Prescribed tightening torque		Nm	0.8 ... 1.2
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm ²	1 × (0.5 ... 4), 2 × (0.5 ... 2.5)	
• Finely stranded with end sleeve	mm ²	1 × (0.5 ... 2.5), 2 × (0.5 ... 1.5)	
• AWG cables, solid or stranded	AWG	2 × (20 ... 14)	
Connection type spring-type terminals		 Spring-type terminals	
Operating devices		mm	3.0 x 0.5
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm ²	2 × (0.25 ... 1.5)	
• Finely stranded without end sleeve	mm ²	2 × (0.25 ... 1.5)	
• Finely stranded with end sleeve	mm ²	2 × (0.25 ... 1.5)	
• AWG cables, solid or stranded	AWG	2 × (24 ... 16)	

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A
for standard applications

Selection and ordering data

3RB30 solid-state overload relays for mounting onto contactor¹⁾, CLASS 10

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicators
- TEST function and self-monitoring
- Sealable covers (optional accessory)



3RB30 16-1TB0



3RB30 16-1TE0



3RB30 26-1VB0



3RB30 26-1VE0

Size of contactor ²⁾	Set current value of the inverse-time delayed overload release	Screw terminals		Weight approx.	Spring-type terminals		Weight approx.
		Order No.		kg	Order No.		kg
A							
Size S00 ¹⁾							
S00	0.1 ... 0.4	3RB30 16-1RB0		0.172	3RB30 16-1RE0		0.172
	0.32 ... 1.25	3RB30 16-1NB0		0.172	3RB30 16-1NE0		0.172
	1 ... 4	3RB30 16-1PB0		0.172	3RB30 16-1PE0		0.172
	3 ... 12	3RB30 16-1SB0		0.172	3RB30 16-1SE0		0.172
	4 ... 16	3RB30 16-1TB0		0.172	3RB30 16-1TE0		0.172
Size S0 ¹⁾							
S0	0.1 ... 0.4	3RB30 26-1RB0		0.250	3RB30 26-1RE0		0.240
	0.32 ... 1.25	3RB30 26-1NB0		0.250	3RB30 26-1NE0		0.240
	1 ... 4	3RB30 26-1PB0		0.250	3RB30 26-1PE0		0.240
	3 ... 12	3RB30 26-1SB0		0.250	3RB30 26-1SE0		0.240
	6 ... 25	3RB30 26-1QB0		0.250	3RB30 26-1QE0		0.240
	10 ... 40	3RB30 26-1VB0		0.250	3RB30 26-1VE0		0.240

¹⁾ With the suitable terminal brackets (see "Accessories", page 5/55), these overload relays can also be installed as stand-alone units.

²⁾ Observe maximum rated operational current of the devices.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A
for standard applications

3RB30 solid-state overload relays for mounting onto contactor¹⁾, CLASS 20

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicators
- TEST function and self-monitoring
- Sealable covers (optional accessory)



3RB30 16-2TB0



3RB30 16-2TE0



3RB30 26-2VB0



3RB30 26-2VE0

Size of contactor ²⁾	Set current value of the inverse-time delayed overload release	Screw terminals	Weight approx.	Spring-type terminals	Weight approx.
	A	Order No.	kg	Order No.	kg
Size S00¹⁾					
S00	0.1 ... 0.4	3RB30 16-2RB0	0.172	3RB30 16-2RE0	0.172
	0.32 ... 1.25	3RB30 16-2NB0	0.172	3RB30 16-2NE0	0.172
	1 ... 4	3RB30 16-2PB0	0.172	3RB30 16-2PE0	0.172
	3 ... 12	3RB30 16-2SB0	0.172	3RB30 16-2SE0	0.172
	4 ... 16	3RB30 16-2TB0	0.172	3RB30 16-2TE0	0.172
Size S0¹⁾					
S0	0.1 ... 0.4	3RB30 26-2RB0	0.200	3RB30 26-2RE0	0.250
	0.32 ... 1.25	3RB30 26-2NB0	0.200	3RB30 26-2NE0	0.250
	1 ... 4	3RB30 26-2PB0	0.200	3RB30 26-2PE0	0.250
	3 ... 12	3RB30 26-2SB0	0.200	3RB30 26-2SE0	0.250
	6 ... 25	3RB30 26-2QB0	0.200	3RB30 26-2QE0	0.250
	10 ... 40	3RB30 26-2VB0	0.200	3RB30 26-2VE0	0.250

¹⁾ With the suitable terminal brackets (see "Accessories", page 5/55), these overload relays can also be installed as stand-alone units.

²⁾ Observe maximum rated operational current of the devices.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

**3RB30, 3RB31 up to 40 A
for standard applications**

3RB31 solid-state overload relays for mounting onto contactor¹⁾, CLASS 5, 10, 20 and 30 adjustable

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal ground-fault detection (requires activation)
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Electrical remote RESET integrated
- Switch position indicators
- TEST function and self-monitoring
- Sealable covers (optional accessory)



3RB31 13-4TB0



3RB31 13-4TE0



3RB31 23-4VB0



3RB31 23-4VE0

Size of contactor ²⁾	Set current value of the inverse-time delayed overload release	Screw terminals 	Weight approx.	Spring-type terminals 	Weight approx.
	A	Order No.	kg	Order No.	kg
Size S00¹⁾					
S00	0.1 ... 0.4	3RB31 13-4RB0	0.175	3RB31 13-4RE0	0.175
	0.32 ... 1.25	3RB31 13-4NB0	0.175	3RB31 13-4NE0	0.175
	1 ... 4	3RB31 13-4PB0	0.175	3RB31 13-4PE0	0.175
	3 ... 12	3RB31 13-4SB0	0.175	3RB31 13-4SE0	0.175
	4 ... 16	3RB31 13-4TB0	0.175	3RB31 13-4TE0	0.175
Size S0¹⁾					
S0	0.1 ... 0.4	3RB31 23-4RB0	0.200	3RB31 23-4RE0	0.250
	0.32 ... 1.25	3RB31 23-4NB0	0.175	3RB31 23-4NE0	0.175
	1 ... 4	3RB31 23-4PB0	0.200	3RB31 23-4PE0	0.250
	3 ... 12	3RB31 23-4SB0	0.200	3RB31 23-4SE0	0.250
	6 ... 25	3RB31 23-4QB0	0.200	3RB31 23-4QE0	0.250
	10 ... 40	3RB31 23-4VB0	0.200	3RB31 23-4VE0	0.250

¹⁾ With the suitable terminal brackets (see "Accessories", page 5/55), these overload relays can also be installed as stand-alone units.

²⁾ Observe maximum rated operational current of the devices.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

Accessories

Overview

Overload relays for standard applications

The following optional accessories are available for the 3RB30/3RB31 solid-state overload relays:

- Terminal bracket for stand-alone installation with screw or spring-type terminals for all sizes

- Mechanical RESET for all sizes
- Cable release for resetting devices which are difficult to access for all sizes
- Sealable cover for all sizes

Selection and ordering data

Version	Size	Order No.	Weight approx. kg
Terminal brackets for stand-alone installation¹⁾			
 3RU29 16-3AA01	Terminal brackets for overload relays with screw terminals For separate mounting of the overload relays; screw and snap-on mounting onto TH 35 standard mounting rail		
	S00	Screw terminals 	
 3RU29 26-3AA01			
	S0	Spring-type terminals 	
 3RU29 16-3AC01	Terminal brackets for overload relays with spring-type terminals For separate mounting of the overload relays; screw and snap-on mounting onto TH 35 standard mounting rail		
	S0	Spring-type terminals 	
 3RU29 26-3AC01			
	S0	Spring-type terminals 	
Mechanical RESET			
 3RB39 80-0A with pushbutton and extension plunger	Resetting plungers, holders and formers	3RB39 80-0A	0.038
	Pushbuttons with extended stroke (12 mm), IP65, Ø 22 mm	3SB30 00-0EA11	0.020
	Extension plungers For compensation of the distance between a pushbutton and the unlatching button of the relay	3SX1 335	0.004
Cable releases with holder for RESET			
 3RB39 80-0.	For Ø 6.5 mm holes in the control panel; max. control panel thickness 8 mm		
	- Length 400 mm - Length 600 mm	3RB39 80-0B 3RB39 80-0C	0.063 0.073
Sealable covers			
 3RB39 84-0	For covering the setting knobs	3RB39 84-0	0.001

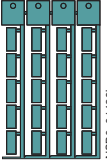
¹⁾ The accessories are identical to those of the 3RU21 thermal overload relays.

Overload Relays

SIRIUS 3RB3 Solid-State Overload Relays

Accessories

General accessories

Version	Use	Order No.	PU (UNIT, SET, M)	PS*	Weight approx. kg
Tools for opening spring-type terminals					
 3RA29 08-1A	Screwdrivers for all SIRIUS devices with spring-type terminals Length approx. 200 mm, 3.0 mm x 0.5 mm, titanium gray/black, partially insulated	Spring-type terminals  3RA29 08-1A	1	1 unit	0.045
	Main and auxiliary circuit connection: 3RU2, 3RB3				
Blank labels					
 3RT19 00-1SB20	Unit labeling plates¹⁾ for SIRIUS devices 20 mm x 7 mm, pastel turquoise	3RU2, 3RB3	3RT19 00-1SB20	100	340 units 0.200
¹⁾ PC labeling system for individual inscription of unit labeling plates available from: murrplastik Systems, Inc. www.murrplastik.com .					