

Solid-State Switching Devices for Resistive/Inductive Loads

General data

Overview

Type	Solid-state relays			Solid-state contactors		Function modules					
	Single-phase		3-phase	Single-phase	3-phase	Converters	Load monitoring		Heating current monitoring	Power controllers	Power regulators
	22.5 mm	45 mm	45 mm				Basic	Extended			
Usage											
Simple use of existing solid-state relays	☐	✓	☐	☐	☐	--	--	--	--	--	--
Complete unit "Ready to use"	☐	☐	☐	✓	✓	--	--	--	--	--	--
Space-saving	✓	--	✓	✓	✓	✓	✓	--	--	--	--
Can be extended with modular function modules	✓	--	1)	✓	1)	--	--	--	--	--	--
Frequent switching and monitoring of loads and solid-state relays/solid-state contactors	--	--	--	--	--	--	✓	✓	✓	✓	✓
Monitoring of up to 6 partial loads	--	--	--	--	--	--	✓	--	✓	✓	--
Monitoring of more than 6 partial loads	--	--	--	--	--	--	--	✓	--	--	--
Control of the heating power through an analog input	--	--	--	--	--	✓	--	--	--	✓	✓
Power control	--	--	--	--	--	--	--	--	--	--	✓
Startup											
Easy setting of setpoint values with "Teach" button	--	--	--	--	--	--	✓	✓	--	✓	✓
"Remote Teach" input for setting setpoints	--	--	--	--	--	--	--	--	✓	--	--
Mounting											
Mounting onto mounting rails or mounting plates	--	--	--	✓	✓	--	--	--	--	--	--
Can be snapped directly onto a solid-state relay or contactor	--	--	--	--	--	✓	✓	✓	✓	✓	✓
For use with "Coolplate" heat sink	✓	✓	✓	--	--	--	--	--	--	--	--
Cable routing											
Connection of load circuit as for controlgear	✓	--	✓	✓	✓	--	✓	✓	✓	✓	✓
Connection of load circuit from above	--	✓	--	--	--	--	--	--	--	--	--

✓ Function available

☐ Function possible

-- Function not possible

1) The converter can also be used with three-phase devices.

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Article No. scheme

Product versions		Article number					
Solid-state switching devices for resistive/inductive loads	Solid-state relays	3RF20	☐	☐	☐	☐	1-phase, 45-mm width
		3RF21	☐	☐	☐	☐	1-phase, 22.5-mm width
		3RF22	☐	☐	☐	☐	3-phase, 45-mm width
	Solid-state contactors	3RF23	☐	☐	☐	☐	Single-phase
		3RF24	☐	☐	☐	☐	Three-phase
Type current	e.g. 20 = 20 A	☐	☐				
Connection type	Screw terminals			1			
	Spring-type terminals			2			
	Ring terminal lug connection			3			
Switching function	Zero-point switching			A			Low Noise Short-circuit-proof with B MCB
	Instantaneous switching			B			
	Zero-point switching			C			
	Zero-point switching			D			
Single-phase or number of controlled phases	Single-phase			A			
	2-phase			B			
	Three-phase			C			
	Reversing contactor			D			
Rated control supply voltage U_s	24 V DC			0			
	24 V AC/DC			1			
	110 ... 230 V AC			2			
	110 V AC			3			
	4 ... 30 V DC			4			
	230 V AC			5			
Rated operational voltage U_e	24 ... 230 V AC			2			
	48 ... 460 V AC			4			
	48 ... 600 V AC			5			
	48 ... 600 V AC			6			Blocking voltage 1600 V
Example		3RF21	2	0	-	1	A A 0 6

Note:

The Article No. scheme shows an overview of product versions for better understanding of the logic behind the article numbers.

For your orders please use the article numbers quoted in the selection and ordering data.

Benefits

Features

- Considerable space savings thanks to a width of only 22.5 mm
- Variety of connection methods: Screw terminal, spring-type connection or ring terminal lug, there is no problem – they are all finger-safe
- Flexible for all applications with function modules for retrofitting
- Possibility of fuseless short-circuit proof design

Benefits

- Saves time and costs with fast mounting and commissioning, short start up times and easy wiring
- Extremely long life, low maintenance, rugged and reliable
- Space-saving and safe thanks to side-by-side mounting up to an ambient temperature of +60 °C
- Modular design: Standardized function modules and heat sinks can be used in conjunction with solid-state relays to satisfy individual requirements
- Safety due to lifelong, vibration-resistant and shock-resistant spring-type terminal connection method even under tough conditions

Application

Applications

Example: Plastics processing industry

Thanks to their high switching endurance SIRIUS 3RF2 solid-state switching devices are ideal for controlling electrical heat. This is because the more precise the temperature regulation process has to be, the higher the switching frequency. The accurate regulation of electrical heat is used for example in many processes in the plastics processing industry:

- Band heaters heat the extrudate to the correct temperature in plastic extruders
- Heat emitters heat plastic blanks to the correct temperature
- Heat drums dry plastic granules
- Heating channels keep molds at the correct temperature in order to manufacture different plastic parts without defects

The powerful SIRIUS 3RF2 solid-state relays and contactors can be used for the simultaneous control of several heating loads. By using a load monitoring module the individual partial loads can easily be monitored, and in the event of a failure a signal is generated to be sent to the controller.

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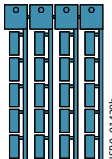
Use in fuseless load feeders

Compared with the fused configuration of load feeders, short circuit and line protection using miniature circuit breakers is easy to achieve with SIRIUS 3RF2 solid-state relays and contactors.

A special version of the solid-state contactors can be protected against damage in the case of a short circuit with a miniature circuit breaker with type B tripping characteristic. This allows the low-cost and simple design of fuseless load feeders with full protection of the switchgear.

Selection and ordering data

Inscription labels for 3RF2 series

Designation	Labeling area (W x H)	Color	SD	Article No.	Price per PU	PU (UNIT, SET, M)	PS*	PG
	mm x mm		d					
Blank labels								
 3RT19 00-1SB20 (1 frame = 20 units)	Unit labeling plates for SIRIUS¹⁾	10 x 7	Pastel turquoise	15	3RT1900-1SB10	100	816 units	41B
		20 x 7	Pastel turquoise	20	3RT1900-1SB20	100	340 units	41B
	Adhesive labels for SIRIUS	19 x 6	Pastel turquoise	15	3RT1900-1SB60	100	3 060 units	41B
		19 x 6	Zinc yellow	15	3RT1900-1SD60	100	3 060 units	41B

¹⁾ PC labeling system for the individual inscription of unit labeling plates are available from: murrplastik Systemtechnik GmbH [see page 16/20](https://support.industry.siemens.com/cs/ww/en/ps/16222).

More information

Notes on integration in the load feeders

The SIRIUS solid-state switching devices are very easy to integrate into the load feeders thanks to their industrial connection method and design.

Particular attention must however be paid to the circumstances of the installation and ambient conditions, as the performance of the solid-state switching devices is largely dependent on these. Depending on the version, certain restrictions must be observed. Detailed information in relation to solid-state contactors, e.g. on minimum spacing, and in relation to solid-state relays on the choice of heat sink can be found in the technical specifications and in the product data sheets, [see https://support.industry.siemens.com/cs/ww/en/ps/16222](https://support.industry.siemens.com/cs/ww/en/ps/16222).

Short-circuit and overload protection

Despite the rugged power semiconductors that are used, solid-state switching devices respond more sensitively to short circuits in the load feeder. Consequently, special precautions have to be taken against destruction, depending on the type of design.

Siemens generally recommends using SITOP semiconductor protection fuses. These fuses also provide protection against destruction in the event of a short circuit even when the solid-state contactors and solid-state relays are fully utilized.

Alternatively, if there is lower loading, protection can also be provided by standard fuses or miniature circuit breakers. This protection is achieved by overdimensioning the solid-state switching devices accordingly. The technical specifications and the product data sheets contain details both about the solid-state fuse protection itself and about use of the devices with conventional protection equipment.

Electromagnetic compatibility (EMC)

The solid-state switching devices are suitable for interference-free operation in industrial networks without further measures. If they are used in public networks, it may be necessary for conducted interference to be reduced by means of filters.

This does not include the solid-state contactors for resistive loads of the special type 3RF23...-CA.. "Low Noise". These comply with the class B limit values up to a rated current of 16 A. If other versions are used, and at currents of over 16 A, standard filters can be used in order to comply with the limit values. The decisive factors when it comes to selecting the filters are essentially the current loading and the other parameters (operational voltage, design type, etc.) in the load feeder.

Suitable filters can be ordered from EPCOS AG. For more information [see www.epcos.com](https://www.epcos.com).

Product information and technical specifications

For product data sheets with detailed technical specifications, dimensional drawings and characteristic curves [see https://support.industry.siemens.com/cs/ww/en/ps/16222](https://support.industry.siemens.com/cs/ww/en/ps/16222).

For additional information, please enter the article number of the required device under the tab "Product List".

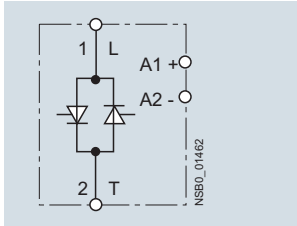
Solid-State Switching Devices for Resistive/Inductive Loads

Solid-State Relays

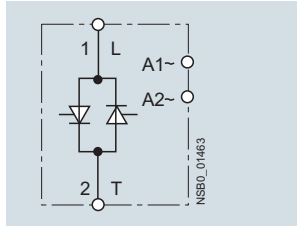
SIRIUS 3RF21 solid-state relays, single-phase, 22.5 mm

Circuit diagrams

DC control supply voltage



AC control supply voltage



Selection and ordering data

Single-phase solid-state relays (without heat sink) with a width of 22.5 mm

	Type current/ performance capacity ¹⁾	Rated control supply voltage U_s	SD	Screw terminals ²⁾		PU (UNIT, SET, M)	PS*	PG
	A	V	d	Article No.	Price per PU			
Zero-point switching, rated operational voltage U_e 24 ... 230 V AC								
	20	24 DC	2	3RF2120-1AA02		1	1 unit	41C
	30		2	3RF2130-1AA02		1	1 unit	41C
	50		2	3RF2150-1AA02		1	1 unit	41C
	70		2	3RF2170-1AA02		1	1 unit	41C
	90		5	3RF2190-1AA02		1	1 unit	41C
	20	110 ... 230 AC	2	3RF2120-1AA22		1	1 unit	41C
	30		2	3RF2130-1AA22		1	1 unit	41C
	50		5	3RF2150-1AA22		1	1 unit	41C
	70		5	3RF2170-1AA22		1	1 unit	41C
	90		5	3RF2190-1AA22		1	1 unit	41C
3RF2120-1AA02	20	4 ... 30 DC	2	3RF2120-1AA42		1	1 unit	41C
30	2		3RF2130-1AA42		1	1 unit	41C	
Zero-point switching, rated operational voltage U_e 48 ... 460 V AC								
	20	24 DC	2	3RF2120-1AA04		1	1 unit	41C
	30		2	3RF2130-1AA04		1	1 unit	41C
	50		2	3RF2150-1AA04		1	1 unit	41C
	70		2	3RF2170-1AA04		1	1 unit	41C
	90		2	3RF2190-1AA04		1	1 unit	41C
	20	24 AC/DC	5	3RF2150-1AA14		1	1 unit	41C
	30							
	20	110 ... 230 AC	2	3RF2120-1AA24		1	1 unit	41C
	30		2	3RF2130-1AA24		1	1 unit	41C
	50		5	3RF2150-1AA24		1	1 unit	41C
	70		2	3RF2170-1AA24		1	1 unit	41C
	90		5	3RF2190-1AA24		1	1 unit	41C
Zero-point switching, rated operational voltage U_e 48 ... 600 V AC								
	70	24 DC Low Power	5	3RF2170-1AA05-0KN0		1	1 unit	41C
	20	4 ... 30 DC	5	3RF2120-1AA45		1	1 unit	41C
	30		5	3RF2130-1AA45		1	1 unit	41C
	50		5	3RF2150-1AA45		1	1 unit	41C
	70		2	3RF2170-1AA45		1	1 unit	41C
	90		5	3RF2190-1AA45		1	1 unit	41C
Zero-point switching · Blocking voltage 1 600 V, rated operational voltage U_e 48 ... 600 V AC								
	30	24 DC	2	3RF2130-1AA06		1	1 unit	41C
	50		2	3RF2150-1AA06		1	1 unit	41C
	70		5	3RF2170-1AA06		1	1 unit	41C
	90		5	3RF2190-1AA06		1	1 unit	41C
	30	110 ... 230 AC	5	3RF2130-1AA26		1	1 unit	41C
	50		5	3RF2150-1AA26		1	1 unit	41C
	70		5	3RF2170-1AA26		1	1 unit	41C
	90		5	3RF2190-1AA26		1	1 unit	41C

¹⁾ The type current provides information about the performance capacity of the solid-state relay.
The actual permitted rated operational current I_o can be smaller depending on the connection method and cooling conditions.

²⁾ Please note that this version can only be used for a rated current of up to approx. 50 A and a conductor cross-section of 10 mm².

Other rated control supply voltages on request.