

# Controls – Solid-State Switching Devices



4/2	<b>Introduction</b>
4/3	<b>Solid-State Switching Devices</b> General data
4/5	<b>Solid-State Switching Devices for Resistive Loads</b> General data
4/7	<u>Solid-State Relays</u> General data
4/8	3RF21 solid-state relays, single-phase, 22.5 mm
4/11	3RF20 solid-state relays, single-phase, 45 mm
4/12	3RF22 solid-state relays, three-phase, 45 mm
4/13	<u>Solid-State Contactors</u> General data
4/14	3RF23 solid-state contactors, single-phase
4/20	3RF24 solid-state contactors, 3-phase
4/22	<u>3RF29 Function Modules</u> General data
4/27	Converters
4/28	Load monitoring
4/29	Heating current monitoring
4/30	Power controllers
4/31	Power regulators
	<b>Solid-State Switching Devices for Switching Motors</b>
4/32	<u>Solid-State Contactors</u> General data
4/33	3RF24 solid-state contactors, 3-phase
4/34	3RF24 solid-state reversing contactors, 3-phase

# Controls – Solid-State Switching Devices

## Introduction

### Overview



3RF21



3RF20



3RF22



3RF23



3RF24



3RF24 (Motor)



3RF29

Order No.

Page

#### SIRIUS solid-state switching devices for switching resistive loads

##### Solid-state relays

##### 22.5 mm solid-state relays, 45 mm solid-state relays

- Widths of 22.5 mm and 45 mm
- Compact and space-saving design
- "Zero-point switching" version
- Mounting onto existing heat sinks

3RF21,  
3RF20  
3RF224/8  
4/11  
4/12

##### Solid-state contactors

##### Solid-state contactors

- Complete units comprising a solid-state relay and an optimized heat sink, "ready to use"
- Compact and space-saving design
- Versions for resistive loads "Zero-point switching" and inductive loads "Instantaneous switching"
- Special versions "Low noise" and "Short-circuit resistant"

3RF23  
3RF244/14  
4/20

##### Function modules

For extending the functionality of the 3RF21 solid-state relays and the 3RF23 solid-state contactors for many different applications:

##### Converters

- For converting an analog input signal into an on/off ratio; can also be used on 3RF22 and 3RF24 3-phase switching devices

3RF29 00-0EA18

4/27

##### Load monitoring

- For load monitoring of one or more loads (partial loads)

3RF29 20-0FA08,  
3RF29 ..0-GA..

4/28

##### Heating current monitoring

- For load monitoring of one or more loads (partial loads); remote teach

3RF29 ..-0JA..

4/29

##### Power controllers

- For supplying the current by means of a solid-state switching device depending on a setpoint value. There is a choice of full-wave control and generalized phase control.

3RF29 ..-0KA..

4/30

##### Power regulators

- For supplying the current by means of a solid-state switching device depending on a setpoint value. Closed-loop control: Full-wave control or generalized phase control

3RF29 ..0-HA..

4/31

#### SIRIUS solid-state switching devices for switching motors

##### Solid-state contactors

##### Solid-state contactors, solid-state reversing contactors

- Complete units comprising an insulated enclosure with integrated heat sink, "ready to use"
- Compact and space-saving design
- Version for motors, "Instantaneous switching"

3RF24

4/33

## Overview

**SIRIUS 3RF2 solid-state switching devices**

The 3RF solid-state switching devices reliably switch a wide range of different loads with alternating voltages in 50 and 60 Hz systems.

Solid-state switching devices for resistive loads

- Solid-state relays
- Solid-state contactors
- Function modules

Solid-state switching devices for switching motors

- Solid-state contactors
- Solid-state reversing contactors

**SIRIUS 3RF2 – for almost unending activity**

Conventional electromechanical controlgear is often overtaxed by the rise in the number of switching operations. A high switching frequency results in frequent failure and short replacement cycles. However, this does not have to be the case, because with the latest generation of our SIRIUS 3RF2 solid-state switching devices we provide you with solid-state relays and contactors with a particularly long endurance - for almost unending activity even under the toughest conditions and under high mechanical load, but also in noise-sensitive areas.

**Proved time and again in service**

SIRIUS 3RF2 solid-state switching devices have firmly established in industrial applications. They are used above all in applications where loads are switched frequently – mainly with resistive load controllers, with the control of electrical heat or the control of valves and motors in conveyor systems. In addition to its use in areas with high switching frequencies, their silent switching means that SIRIUS is also ideally suited for use in noise-sensitive areas, such as offices or hospitals.

**The most reliable solution for any application**

Compared to mechanical controlgear, our SIRIUS 3RF2 solid-state switching devices stand out due to their considerably longer service life. Thanks to the high product quality, their switching is extremely precise, reliable and, above all, insusceptible to faults. With its variable connection methods and a wide spread of control voltages, the SIRIUS 3RF2 family is universally applicable. Depending on the individual requirements of the application, our modular controlgear can also be quite easily expanded by the addition of standardized function modules.

**Also for switching motors**

In order to achieve higher productivity, the switching frequency is continuously increased. It is no problem for our SIRIUS solid-state contactors to switch motors. With induction motors up to 7.5 kW, they can reliably withstand even the highest switching frequencies. Even a continuous change in the direction of rotation is possible with the solid-state reversing contactors. Both versions can be perfectly combined with components from the SIRIUS modular system. Connecting with SIRIUS motor starter protectors or SIRIUS overload relay can be implemented without any further steps.




**Always on the sunny side with SIRIUS**

Because SIRIUS 3RF2 offers even more:

- The space-saving and compact side-by-side mounting ensures reliable operation up to an ambient temperature of +60 °C.
- Thanks to fast configuration and the ease of mounting and start-up, you save not only time but also expenses.

**Connection methods**

The devices are available with screw terminals (box terminals), spring-loaded terminals or ring terminal lugs.

-  Screw terminals
-  Spring-loaded terminals
-  Ring terminal lug connections

The terminals are indicated in the selection and ordering data by orange backgrounds.

# Solid-State Switching Devices

## General data

### Selection and ordering data

Designation	Labeling area (W x H) mm x mm	Color	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
<b>Blank labels</b>									
<b>Unit labeling plates for "SIRIUS"</b> <sup>1)</sup>	10 x 7	Pastel turquoise	D	<b>3RT19 00-1SB10</b>		100	816 units	101	0.110
	20 x 7	Pastel turquoise	C	<b>3RT19 00-1SB20</b>		100	340 units	101	0.220
<b>Labels for sticking for "SIRIUS"</b>	19 x 6	Pastel turquoise	D	<b>3RT19 00-1SB60</b>		100	3060 units	101	0.150
	19 x 6	Zinc yellow	C	<b>3RT19 00-1SD60</b>		100	3060 units	101	0.150

Unit labeling plates  
(1 frame = 20 units)

1) Computer labeling system for individual inscription of unit labeling plates  
available from:  
murrplastik Systemtechnik GmbH (<http://www.murrplastik.de>).

### Integration

#### 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, for example in relation to solid-state contactors about the minimum spacing and to solid-state relays about the choice of heat sink, is given in the technical specifications (see [Technical Information LV 1 T](#) or [our Mall](#)) and the product data sheets.

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 SITOR 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.

Semiconductor motor and reversing contactors can be easily combined with the 3RV motor starter protectors and 3RB2 overload relay from the SIRIUS modular system. Thus, fuseless and fuse motor feeders can be designed easily and in a space-saving manner.

The solid-state switching devices for resistive loads 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 special solid-state contactors of 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.

You can find more information on the Internet at:

<http://www.epcos.com>

## Overview

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

✓ Function is available

☐ Function is possible

1) The converter can also be used with 3-phase devices.

# Solid-State Switching Devices for Resistive Loads

## General data

### Benefits

- 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 resistant design

### Advantages

- 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-loaded terminal connection method even under tough conditions

### Application

#### Uses

#### Example: plastics processing industry

Thanks to their high switching endurance, SIRIUS solid-state switching devices are ideally suited for use in the control of 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 solid-state relays and contactors can be used to control several heating loads at the same time. 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.

#### Protecting the solid-state relays and solid-state contactors with miniature circuit breakers (MCB with type B tripping characteristic)

Short-circuit protection and line protection with miniature circuit breakers is easy to achieve with SIRIUS solid-state relays and solid-state contactors in comparison with designing load feeders with fuses. 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.

### Overview

#### *Solid-state relays*

SIRIUS solid-state relays are suitable for surface mounting on existing cooling surfaces. Mounting is quick and easy, involving just two screws. The special technology of the power semiconductor ensures there is excellent thermal contact with the heat sink. Depending on the nature of the cooler, the capacity reaches up to 88 A on resistive loads.

The solid-state relays are available in three different versions:

- 3RF21 single-phase solid-state relays with a width of 22.5 mm
- 3RF20 single-phase solid-state relays with a width of 45 mm
- 3RF22 three-phase solid-state relays with a width of 45 mm

The 3RF21 and 3RF22 solid-state relays can be expanded with various function modules to adapt them to individual applications.

#### *Version for resistive loads, "zero-point switching"*

This standard version is often used for switching space heaters on and off.

#### *Version for inductive loads, "instantaneous switching"*

In this version the solid-state relay is specifically matched to inductive loads. Whether it is a matter of frequent actuation of the valves in a filling plant or starting and stopping small operating mechanisms in packet distribution systems, operation is carried out safely and noiselessly.

#### *Special "Low noise" version*

Thanks to a special control circuit, this special version can be used in public networks up to 16 A without any additional measures such as interference suppressor filters. As a result it conforms to limit value curve class B according to EN 60947-4-3 in terms of emitted interference.

#### *Single-phase solid-state relay with a width of 22.5 mm*

With its compact design, which stays the same even at currents of up to 88 A, the 3RF21 solid-state relay is the ultimate in space-saving construction, at a width of 22.5 mm. The logical connection method, with the power infeed from above and load connection from below, ensures tidy installation in the control cabinet.

#### *Single-phase solid-state relay with a width of 45 mm*

The solid-state relays with a width of 45 mm provide for connection of the power supply lead and the load from above. This makes it easy to replace existing solid-state relays in existing arrangements. The connection of the control cable also saves space in much the same way as the 22.5 mm design, as it is simply plugged on.

#### *Three-phase solid-state relay with a width of 45 mm*

With its compact design, which stays the same even at currents of up to 55 A, the 3RF22 solid-state relay is the ultimate in space-saving construction, at a width of 45 mm. The logical connection method, with the power infeed from above and load connection from below, ensures tidy installation in the control cabinet.

The three-phase solid-state relays are available with

- Two-phase control (suitable in particular for circuits without connection to the neutral conductor) and
- Three-phase control (suitable for star circuits with connection to the neutral conductor or for applications in which the system requires all phases to be switched).

#### *Selection notes*

When selecting solid-state relays, in addition to information about the network, the load and the ambient conditions it is also necessary to know details of the planned design. The solid-state relays can only conform to their specific technical specifications if they are mounted with appropriate care on an adequately dimensioned heat sink.

The following procedure is recommended:

- Determine the rated current of the load and the mains voltage
- Select the relay design and choose a solid-state relay with higher rated current than the load
- Determine the thermal resistance of the proposed heat sink
- Check the correct relay size with the aid of the diagrams

You can find more information on the Internet at:


<http://www.siemens.de/halbleiterschaltgeraete>

# Solid-State Switching Devices for Resistive Loads

## Solid-State Relays

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

#### Selection and ordering data

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Screw terminals <sup>2)</sup>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.		
A	V		Order No.	Price per PU			kg		
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>									
	20	24 DC acc. to EN 61131-2	A	<b>3RF21 20-1AA02</b>		1	1 unit	101	0.075
	30		A	<b>3RF21 30-1AA02</b>		1	1 unit	101	0.075
	50		A	<b>3RF21 50-1AA02</b>		1	1 unit	101	0.075
	70		A	<b>3RF21 70-1AA02</b>		1	1 unit	101	0.075
	90		A	<b>3RF21 90-1AA02</b>		1	1 unit	101	0.075
	20	110 ... 230 AC	A	<b>3RF21 20-1AA22</b>		1	1 unit	101	0.075
	30		A	<b>3RF21 30-1AA22</b>		1	1 unit	101	0.075
	50		A	<b>3RF21 50-1AA22</b>		1	1 unit	101	0.075
	70		A	<b>3RF21 70-1AA22</b>		1	1 unit	101	0.075
	90		A	<b>3RF21 90-1AA22</b>		1	1 unit	101	0.075
20	4 ... 30 DC	B	<b>3RF21 20-1AA42</b>		1	1 unit	101	0.075	
30		B	<b>3RF21 30-1AA42</b>		1	1 unit	101	0.075	
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>									
	20	24 DC acc. to EN 61131-2	A	<b>3RF21 20-1AA04</b>		1	1 unit	101	0.075
	30		A	<b>3RF21 30-1AA04</b>		1	1 unit	101	0.075
	50		A	<b>3RF21 50-1AA04</b>		1	1 unit	101	0.075
	70		A	<b>3RF21 70-1AA04</b>		1	1 unit	101	0.075
	90		A	<b>3RF21 90-1AA04</b>		1	1 unit	101	0.075
	20	110 ... 230 AC	A	<b>3RF21 20-1AA24</b>		1	1 unit	101	0.075
	30		A	<b>3RF21 30-1AA24</b>		1	1 unit	101	0.075
	50		A	<b>3RF21 50-1AA24</b>		1	1 unit	101	0.075
	70		A	<b>3RF21 70-1AA24</b>		1	1 unit	101	0.075
	90		A	<b>3RF21 90-1AA24</b>		1	1 unit	101	0.075
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
70	24 DC Low Power	B	<b>3RF21 70-1AA05-0KNO</b>		1	1 unit	101	0.075	
20	4 ... 30 DC	B	<b>3RF21 20-1AA45</b>		1	1 unit	101	0.075	
30		B	<b>3RF21 30-1AA45</b>		1	1 unit	101	0.075	
50		B	<b>3RF21 50-1AA45</b>		1	1 unit	101	0.075	
70		B	<b>3RF21 70-1AA45</b>		1	1 unit	101	0.075	
90		B	<b>3RF21 90-1AA45</b>		1	1 unit	101	0.075	
<b>Zero-point switching · Blocking voltage 1600 V</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
30	24 DC acc. to EN 61131-2	A	<b>3RF21 30-1AA06</b>		1	1 unit	101	0.075	
50		A	<b>3RF21 50-1AA06</b>		1	1 unit	101	0.075	
70		B	<b>3RF21 70-1AA06</b>		1	1 unit	101	0.075	
90		B	<b>3RF21 90-1AA06</b>		1	1 unit	101	0.075	
30	110 ... 230 AC	B	<b>3RF21 30-1AA26</b>		1	1 unit	101	0.075	
50		B	<b>3RF21 50-1AA26</b>		1	1 unit	101	0.075	
70		B	<b>3RF21 70-1AA26</b>		1	1 unit	101	0.075	
90		B	<b>3RF21 90-1AA26</b>		1	1 unit	101	0.075	
<b>Instantaneous switching</b>									
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>									
50	110 ... 230 AC	A	<b>3RF21 50-1BA22</b>		1	1 unit	101	0.075	
<b>Instantaneous switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>									
20	24 DC acc. to EN 61131-2	B	<b>3RF21 20-1BA04</b>		1	1 unit	101	0.075	
30		B	<b>3RF21 30-1BA04</b>		1	1 unit	101	0.075	
50		B	<b>3RF21 50-1BA04</b>		1	1 unit	101	0.075	
70		A	<b>3RF21 70-1BA04</b>		1	1 unit	101	0.075	
90		B	<b>3RF21 90-1BA04</b>		1	1 unit	101	0.075	
<b>Instantaneous switching · Blocking voltage 1600 V</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
50	24 DC acc. to EN 61131-2	B	<b>3RF21 50-1BA06</b>		1	1 unit	101	0.075	
<b>Low noise<sup>3)</sup> · Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>									
70	24 DC acc. to EN 61131-2	B	<b>3RF21 70-1CA04</b>		1	1 unit	101	0.075	

Other rated control supply voltages on request.

1) The type current provides information about the performance capacity of the solid-state relay. The actual permitted rated operational current  $I_e$  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 mm<sup>2</sup>.


3) See page 4/7.



# Solid-State Switching Devices for Resistive Loads

## Solid-State Relays

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

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Spring-loaded terminals <sup>2)</sup>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
A	V		Order No.	Price per PU			kg	
<b>Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
	20	24 DC acc. to	A	<b>3RF21 20-2AA02</b>	1	1 unit	101 0.075	
	50	EN 61131-2	B	<b>3RF21 50-2AA02</b>	1	1 unit	101 0.075	
	90		B	<b>3RF21 90-2AA02</b>	1	1 unit	101 0.075	
	20	110 ... 230 AC	B	<b>3RF21 20-2AA22</b>	1	1 unit	101 0.075	
	50		B	<b>3RF21 50-2AA22</b>	1	1 unit	101 0.075	
	90		B	<b>3RF21 90-2AA22</b>	1	1 unit	101 0.075	
	20	4 ... 30 DC	B	<b>3RF21 20-2AA42</b>	1	1 unit	101 0.075	
	<b>Zero-point switching</b>							
	<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>							
20	24 DC acc. to	B	<b>3RF21 20-2AA04</b>	1	1 unit	101 0.075		
50	EN 61131-2	B	<b>3RF21 50-2AA04</b>	1	1 unit	101 0.075		
90		B	<b>3RF21 90-2AA04</b>	1	1 unit	101 0.075		
50	24 AC/DC	B	<b>3RF21 50-2AA14</b>	1	1 unit	101 0.075		
20	110 ... 230 AC	B	<b>3RF21 20-2AA24</b>	1	1 unit	101 0.075		
50		B	<b>3RF21 50-2AA24</b>	1	1 unit	101 0.075		
90		B	<b>3RF21 90-2AA24</b>	1	1 unit	101 0.075		
<b>Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>								
20	4 ... 30 DC	B	<b>3RF21 20-2AA45</b>	1	1 unit	101 0.075		
<b>Zero-point switching · Blocking voltage 1600 V</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>								
50	24 DC acc. to	B	<b>3RF21 50-2AA06</b>	1	1 unit	101 0.075		
90	EN 61131-2	B	<b>3RF21 90-2AA06</b>	1	1 unit	101 0.075		
50	110 ... 230 AC	B	<b>3RF21 50-2AA26</b>	1	1 unit	101 0.075		
90		B	<b>3RF21 90-2AA26</b>	1	1 unit	101 0.075		



Other rated control supply voltages on request.

- 1) The type current provides information about the performance capacity of the solid-state relay. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and cooling conditions.
- 2) Please note that the version with spring-loaded terminals can only be used for a rated current of up to approx. 20 A and a conductor cross-section of 2.5 mm<sup>2</sup>. Higher currents are possible by connecting two conductors per terminal.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Relays


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

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Ring terminal lug connection 	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg
<b>Zero-point switching</b> Rated operational voltage $U_e$ 24 V ... 230 V							
	20	24 DC acc. to EN 61131-2	A	<b>3RF21 20-3AA02</b>	1	1 unit	101 0.075
	50		B	<b>3RF21 50-3AA02</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA02</b>	1	1 unit	101 0.075
	20	110 ... 230 AC	B	<b>3RF21 20-3AA22</b>	1	1 unit	101 0.075
	50		B	<b>3RF21 50-3AA22</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA22</b>	1	1 unit	101 0.075
<b>Zero-point switching</b> Rated operational voltage $U_e$ 48 V ... 460 V							
	20	24 DC acc. to EN 61131-2	B	<b>3RF21 20-3AA04</b>	1	1 unit	101 0.075
	50		B	<b>3RF21 50-3AA04</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA04</b>	1	1 unit	101 0.075
	20	110 ... 230 AC	B	<b>3RF21 20-3AA24</b>	1	1 unit	101 0.075
	50		B	<b>3RF21 50-3AA24</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA24</b>	1	1 unit	101 0.075
	90	4 ... 30 DC	B	<b>3RF21 90-3AA44</b>	1	1 unit	101 0.075
<b>Zero-point switching · Blocking voltage 1600 V</b> Rated operational voltage $U_e$ 48 V ... 600 V							
	50	24 DC acc. to EN 61131-2	B	<b>3RF21 50-3AA06</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA06</b>	1	1 unit	101 0.075
	50	110 ... 230 AC	B	<b>3RF21 50-3AA26</b>	1	1 unit	101 0.075
	90		B	<b>3RF21 90-3AA26</b>	1	1 unit	101 0.075

3RF21 20-3AA02

Other rated control supply voltages on request.

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


Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
							kg
<b>Optional accessories</b>							
	<b>Screwdrivers</b> for spring-loaded connection method	C	<b>8WA2 880</b>	1	1 unit	041	0.034
	<b>Terminal covers</b> for 3RF21 solid-state relays and 3RF23 solid-state contactors in ring terminal lug connection (After simple adaptation, this terminal cover can also be used for screw connection).	A	<b>3RF29 00-3PA88</b>	1	10 units	101	0.004

3RF29 00-3PA88

# Solid-State Switching Devices for Resistive Loads

## Solid-State Relays

**3RF20 solid-state relays, single-phase, 45 mm**
**Selection and ordering data**


Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Screw terminals <sup>2)</sup>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg
<b>Zero-point switching</b>							
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>							
	20	24 DC acc. to EN 61131-2	A	<b>3RF20 20-1AA02</b>	1	1 unit	101 0.085
	30		A	<b>3RF20 30-1AA02</b>	1	1 unit	101 0.085
	50		A	<b>3RF20 50-1AA02</b>	1	1 unit	101 0.085
	70		A	<b>3RF20 70-1AA02</b>	1	1 unit	101 0.085
	90		A	<b>3RF20 90-1AA02</b>	1	1 unit	101 0.085
	20	110 ... 230 AC	A	<b>3RF20 20-1AA22</b>	1	1 unit	101 0.085
	30		A	<b>3RF20 30-1AA22</b>	1	1 unit	101 0.085
	50		A	<b>3RF20 50-1AA22</b>	1	1 unit	101 0.085
	70		A	<b>3RF20 70-1AA22</b>	1	1 unit	101 0.085
	90		A	<b>3RF20 90-1AA22</b>	1	1 unit	101 0.085
3RF20 20-1AA02	20	4 ... 30 DC	B	<b>3RF20 20-1AA42</b>	1	1 unit	101 0.085
	30		B	<b>3RF20 30-1AA42</b>	1	1 unit	101 0.085

<b>Zero-point switching</b>							
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>							
	20	24 DC acc. to EN 61131-2	A	<b>3RF20 20-1AA04</b>	1	1 unit	101 0.085
	30		A	<b>3RF20 30-1AA04</b>	1	1 unit	101 0.085
	50		A	<b>3RF20 50-1AA04</b>	1	1 unit	101 0.085
	70		A	<b>3RF20 70-1AA04</b>	1	1 unit	101 0.085
	90		A	<b>3RF20 90-1AA04</b>	1	1 unit	101 0.085
	20	110 ... 230 AC	A	<b>3RF20 20-1AA24</b>	1	1 unit	101 0.085
	30		A	<b>3RF20 30-1AA24</b>	1	1 unit	101 0.085
	50		A	<b>3RF20 50-1AA24</b>	1	1 unit	101 0.085
	70		A	<b>3RF20 70-1AA24</b>	1	1 unit	101 0.085
	90		A	<b>3RF20 90-1AA24</b>	1	1 unit	101 0.085
	50	4 ... 30 DC	B	<b>3RF20 50-1AA44</b>	1	1 unit	101 0.085

<b>Zero-point switching</b>							
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>							
	20	4 ... 30 DC	B	<b>3RF20 20-1AA45</b>	1	1 unit	101 0.085
	50		B	<b>3RF20 50-1AA45</b>	1	1 unit	101 0.085
	70		B	<b>3RF20 70-1AA45</b>	1	1 unit	101 0.085
	90		B	<b>3RF20 90-1AA45</b>	1	1 unit	101 0.085

<b>Zero-point switching · Blocking voltage 1600 V</b>							
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>							
	30	24 DC acc. to EN 61131-2	B	<b>3RF20 30-1AA06</b>	1	1 unit	101 0.085
	50		B	<b>3RF20 50-1AA06</b>	1	1 unit	101 0.085
	70		B	<b>3RF20 70-1AA06</b>	1	1 unit	101 0.085
	90		B	<b>3RF20 90-1AA06</b>	1	1 unit	101 0.085
	30	110 ... 230 AC	B	<b>3RF20 30-1AA26</b>	1	1 unit	101 0.085
	50		B	<b>3RF20 50-1AA26</b>	1	1 unit	101 0.085
	70		B	<b>3RF20 70-1AA26</b>	1	1 unit	101 0.085
	90		B	<b>3RF20 90-1AA26</b>	1	1 unit	101 0.085

<b>Instantaneous switching</b>							
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>							
	30	24 DC acc. to EN 61131-2	B	<b>3RF20 30-1BA04</b>	1	1 unit	101 0.085

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Screw terminals + spring-loaded terminals (control current side)	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg
<b>Zero-point switching</b>							
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>							
	50	24 DC acc. to EN 61131-2	A	<b>3RF20 50-4AA02</b>	1	1 unit	101 0.085

1) The type current provides information about the performance capacity of the solid-state relay. The actual permitted rated operational current  $I_e$  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 mm<sup>2</sup>.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Relays

### 3RF22 solid-state relays, 3-phase, 45 mm

#### Selection and ordering data

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Screw terminals <sup>2)</sup>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg
<b>Zero-point switching</b>							
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>							
<i>Two-phase controlled</i>							
30	110 AC	B	<b>3RF22 30-1AB35</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-1AB35</b>		1	1 unit	101 0.150
30	4 ... 30 DC	B	<b>3RF22 30-1AB45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-1AB45</b>		1	1 unit	101 0.150
<i>Three-phase controlled</i>							
30	110 AC	B	<b>3RF22 30-1AC35</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-1AC35</b>		1	1 unit	101 0.150
30	4 ... 30 DC	B	<b>3RF22 30-1AC45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-1AC45</b>		1	1 unit	101 0.150



3RF22 30-1AB45

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Spring-loaded terminals <sup>3)</sup>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg

#### Zero-point switching

Rated operational voltage  $U_e$  48 V ... 600 V



3RF22 30-2AB45

<i>Two-phase controlled</i>							
30	4 ... 30 DC	B	<b>3RF22 30-2AB45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-2AB45</b>		1	1 unit	101 0.150
<i>Three-phase controlled</i>							
30	4 ... 30 DC	B	<b>3RF22 30-2AC45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-2AC45</b>		1	1 unit	101 0.150

Type current <sup>1)</sup>	Rated control supply voltage $U_s$	DT	Ring terminal lug connection	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU			kg

#### Zero-point switching

Rated operational voltage  $U_e$  48 V ... 600 V



3RF22 30-3AB45

<i>Two-phase controlled</i>							
30	4 ... 30 DC	B	<b>3RF22 30-3AB45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-3AB45</b>		1	1 unit	101 0.150
<i>Three-phase controlled</i>							
30	4 ... 30 DC	B	<b>3RF22 30-3AC45</b>		1	1 unit	101 0.150
55		B	<b>3RF22 55-3AC45</b>		1	1 unit	101 0.150

- 1) The type current provides information about the performance capacity of the solid-state relay. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and cooling conditions.
- 2) Please note that the version with an M4 screw connection can only be used for a rated current of up to approx. 50 A and a conductor cross-section of 10 mm<sup>2</sup>.
- 3) Please note that this version can only be used for a rated current of up to approx. 20 A and a conductor cross-section of 2.5 mm<sup>2</sup>. Higher currents are possible by connecting two conductors per terminal.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

General data

### Overview

#### Solid-state contactors

The complete units consist of a solid-state relay plus optimized heat sink, and are therefore ready to use. They offer defined rated currents to make selection as easy as possible. Depending on the version, current strengths of up to 88 A are achieved. Like all of our solid-state switching devices, one of their particular advantages is their compact and space-saving design.

With their insulated mounting foot they can easily be snapped onto a standard mounting rail, or they can be mounted on support plates with fixing screws. This insulation enables them to be used in circuits with protective extra-low voltage (PELV) or safety extra-low voltage (SELV) in building management systems. For other applications, such as for extended personal safety, the heat sink can be grounded through a screw terminal.

The solid-state contactors are available in 2 different versions:

- 3RF23 single-phase solid-state contactors,
- 3RF24 three-phase solid-state contactors

#### Single-phase versions

The 3RF23 solid-state contactors can be expanded with various function modules to adapt them to individual applications.

#### Version for resistive loads, "zero-point switching"

This standard version is often used for switching space heaters on and off.

#### Version for inductive loads, "instantaneous switching"

In this version the solid-state contactor is specifically matched to inductive loads. Whether it is a matter of frequent actuation of the valves in a filling plant or starting and stopping small operating mechanisms in packet distribution systems, operation is carried out safely and noiselessly.

#### Special "Low noise" version

Thanks to a special control circuit, this special version can be used in public networks up to 16 A without any additional measures such as interference suppressor filters. As a result it conforms to limit value curve class B according to EN 60947-4-3 in terms of emitted interference.

#### Special "Short-circuit-proof" version

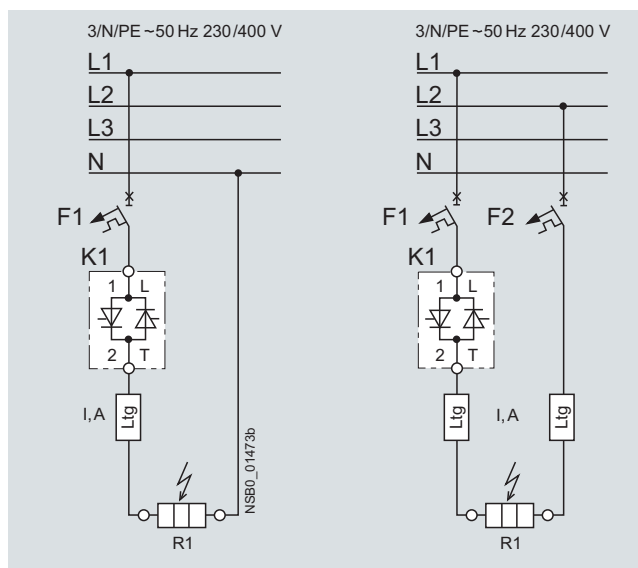
Skillful matching of the power semiconductor with the performance capacity of the solid-state contactor means that "short-circuit strength" can be achieved with a standard miniature circuit breaker. In combination with a B-type MCB or a conventional line protection fuse, the result is a short-circuit resistant feeder.

In order to achieve problem-free short-circuit protection by means of miniature circuit breakers, however, certain boundary conditions must be observed. As the magnitude and duration of the short-circuit current are determined not only by the short-circuit breaking response of the miniature circuit breaker but also the properties of the wiring system, such as the internal resistance of the input to the network and damping by controls and cables, particular attention must also be paid to these parameters. The necessary cable lengths are therefore shown for the main factor, the line resistance, in the table below.

The following miniature circuit breakers with a type B tripping characteristic and 10 kA or 6 kA breaking capacity protect the 3RF23...DA.. solid-state contactors in the event of short-circuits on the load and the specified conductor cross-sections and lengths:

Rated current of the miniature circuit breaker	Example Type <sup>1)</sup>	Max. conductor cross-section	Minimum cable length from contactor to load
6 A	5SY4 106-6, 5SX2 106-6	1 mm <sup>2</sup>	5 m
10 A	5SY4 110-6, 5SX2 110-6	1.5 mm <sup>2</sup>	8 m
16 A	5SY4 116-6, 5SX2 116-6	1.5 mm <sup>2</sup>	12 m
16 A	5SY4 116-6, 5SX2 116-6	2.5 mm <sup>2</sup>	20 m
20 A	5SY4 120-6, 5SX2 120-6	2.5 mm <sup>2</sup>	20 m
25 A	5SY4 125-6, 5SX2 125-6	2.5 mm <sup>2</sup>	26 m

1) The miniature circuit breakers can be used up to a maximum rated voltage of 480 V!



The setup and installation above can also be used for the solid-state relays with a  $I^2t$  value of at least 6600 A<sup>2</sup>s.

#### Three-phase versions

The three-phase solid-state contactors for resistive loads up to 50 A are available with

- two-phase control (suitable in particular for circuits without connection to the neutral conductor) and
- three-phase control (suitable for star circuits with connection to the neutral conductor or for applications in which the system requires all phases to be switched).

The converter function module can be snapped onto both versions for the simple power control of AC loads by means of analog signals.

- Check the correct contactor size with the aid of the rated current diagram, taking account of the design conditions.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase




#### Selection and ordering data

##### Selection notes

The solid-state contactors are selected on the basis of details of the network, the load and the ambient conditions. As the solid-state contactors are already equipped with an optimally matched heat sink, the selection process is considerably simpler than that for solid-state relays.

The following procedure is recommended:

- Determine the rated current of the load and the mains voltage
- Select a solid-state contactor with the same or higher rated current than the load

Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Screw terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
A	V		Order No.	Price per PU			kg	
<b>Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
	10.5	24 DC acc. to EN 61131-2	A	<b>3RF23 10-1AA02</b>	1	1 unit	101 0.165	
	20		A	<b>3RF23 20-1AA02</b>	1	1 unit	101 0.240	
	30		A	<b>3RF23 30-1AA02</b>	1	1 unit	101 0.400	
	40		A	<b>3RF23 40-1AA02</b>	1	1 unit	101 0.550	
	50		A	<b>3RF23 50-1AA02</b>	1	1 unit	101 0.550	
	20	24 DC Low Power	A	<b>3RF23 20-1AA02-OKNO</b>	1	1 unit	101 0.240	
	10.5	24 AC/DC	A	<b>3RF23 10-1AA12</b>	1	1 unit	101 0.165	
	10.5	110 ... 230 AC	A	<b>3RF23 10-1AA22</b>	1	1 unit	101 0.165	
	20		A	<b>3RF23 20-1AA22</b>	1	1 unit	101 0.240	
	30		A	<b>3RF23 30-1AA22</b>	1	1 unit	101 0.400	
	40		A	<b>3RF23 40-1AA22</b>	1	1 unit	101 0.550	
	50		A	<b>3RF23 50-1AA22</b>	1	1 unit	101 0.550	
	<b>Zero-point switching</b>							
	<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>							
		10.5	24 DC acc. to EN 61131-2	A	<b>3RF23 10-1AA04</b>	1	1 unit	101 0.165
20			A	<b>3RF23 20-1AA04</b>	1	1 unit	101 0.240	
30			A	<b>3RF23 30-1AA04</b>	1	1 unit	101 0.400	
40			A	<b>3RF23 40-1AA04</b>	1	1 unit	101 0.550	
50			A	<b>3RF23 50-1AA04</b>	1	1 unit	101 0.550	
10.5		24 DC Low Power	A	<b>3RF23 10-1AA04-OKNO</b>	1	1 unit	101 0.165	
10.5		24 AC/DC	A	<b>3RF23 10-1AA14</b>	1	1 unit	101 0.165	
20			A	<b>3RF23 20-1AA14</b>	1	1 unit	101 0.240	
30			B	<b>3RF23 30-1AA14</b>	1	1 unit	101 0.400	
40			B	<b>3RF23 40-1AA14</b>	1	1 unit	101 0.550	
50			B	<b>3RF23 50-1AA14</b>	1	1 unit	101 0.550	
10.5		110 ... 230 AC	A	<b>3RF23 10-1AA24</b>	1	1 unit	101 0.165	
20			A	<b>3RF23 20-1AA24</b>	1	1 unit	101 0.240	
30			A	<b>3RF23 30-1AA24</b>	1	1 unit	101 0.400	
40			A	<b>3RF23 40-1AA24</b>	1	1 unit	101 0.550	
50			A	<b>3RF23 50-1AA24</b>	1	1 unit	101 0.550	
10.5		4 ... 30 DC	B	<b>3RF23 10-1AA44</b>	1	1 unit	101 0.165	
20			A	<b>3RF23 20-1AA44</b>	1	1 unit	101 0.240	
30		A	<b>3RF23 30-1AA44</b>	1	1 unit	101 0.400		
<b>Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>								
30	110 ... 230 AC	B	<b>3RF23 30-1AA25</b>	1	1 unit	101 0.400		
10.5	4 ... 30 DC	B	<b>3RF23 10-1AA45</b>	1	1 unit	101 0.165		
20		B	<b>3RF23 20-1AA45</b>	1	1 unit	101 0.240		
30		B	<b>3RF23 30-1AA45</b>	1	1 unit	101 0.400		
40		B	<b>3RF23 40-1AA45</b>	1	1 unit	101 0.550		
50		A	<b>3RF23 50-1AA45</b>	1	1 unit	101 0.550		
<b>Zero-point switching · Blocking voltage 1600 V</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>								
	10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-1AA06</b>	1	1 unit	101 0.165	
	20		A	<b>3RF23 20-1AA06</b>	1	1 unit	101 0.240	
	30		A	<b>3RF23 30-1AA06</b>	1	1 unit	101 0.400	
	40		B	<b>3RF23 40-1AA06</b>	1	1 unit	101 0.550	
	50		B	<b>3RF23 50-1AA06</b>	1	1 unit	101 0.550	
	10.5	110 ... 230 AC	B	<b>3RF23 10-1AA26</b>	1	1 unit	101 0.165	
	20		B	<b>3RF23 20-1AA26</b>	1	1 unit	101 0.240	
	30		B	<b>3RF23 30-1AA26</b>	1	1 unit	101 0.400	
	40		B	<b>3RF23 40-1AA26</b>	1	1 unit	101 0.550	
	50		B	<b>3RF23 50-1AA26</b>	1	1 unit	101 0.550	




Other rated control supply voltages on request.

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

Type current <sup>1)</sup> $I_{max}$	Operational current $I_e$ (AC-15 <sup>2)</sup>	Rated control supply voltage $U_s$	DT	Screw terminals	⊕	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
										Order No.
A	A	V								
<b>Instantaneous switching</b>										
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>										
	10.5	6	24 DC acc. to	B	<b>3RF23 10-1BA02</b>		1	1 unit	101	0.165
	20	12	EN 61131-2	B	<b>3RF23 20-1BA02</b>		1	1 unit	101	0.240
	30	15		B	<b>3RF23 30-1BA02</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA02</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA02</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA02</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA02</b>		1	1 unit	101	2.900
	10.5	6	110 ... 230 AC	B	<b>3RF23 10-1BA22</b>		1	1 unit	101	0.165
	20	12		B	<b>3RF23 20-1BA22</b>		1	1 unit	101	0.240
	30	15		B	<b>3RF23 30-1BA22</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA22</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA22</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA22</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA22</b>		1	1 unit	101	2.900
<b>Instantaneous switching</b>										
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>										
	10.5	6	24 DC acc. to	A	<b>3RF23 10-1BA04</b>		1	1 unit	101	0.165
	20	12	EN 61131-2	A	<b>3RF23 20-1BA04</b>		1	1 unit	101	0.240
	30	15		A	<b>3RF23 30-1BA04</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA04</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA04</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA04</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA04</b>		1	1 unit	101	2.900
	10.5	6	110 ... 230 AC	B	<b>3RF23 10-1BA24</b>		1	1 unit	101	0.165
	20	12		B	<b>3RF23 20-1BA24</b>		1	1 unit	101	0.240
	30	15		B	<b>3RF23 30-1BA24</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA24</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA24</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA24</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA24</b>		1	1 unit	101	2.900
20	12	4 ... 30 DC	B	<b>3RF23 20-1BA44</b>		1	1 unit	101	0.240	
30	15		B	<b>3RF23 30-1BA44</b>		1	1 unit	101	0.400	
50	25		B	<b>3RF23 50-1BA44</b>		1	1 unit	101	0.550	
<b>Instantaneous switching · Blocking voltage 1600 V</b>										
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>										
	10.5	6	24 DC acc. to	B	<b>3RF23 10-1BA06</b>		1	1 unit	101	0.165
	20	12	EN 61131-2	B	<b>3RF23 20-1BA06</b>		1	1 unit	101	0.240
	30	15		B	<b>3RF23 30-1BA06</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA06</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA06</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA06</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA06</b>		1	1 unit	101	2.900
	10.5	6	110 ... 230 AC	B	<b>3RF23 10-1BA26</b>		1	1 unit	101	0.165
	20	12		B	<b>3RF23 20-1BA26</b>		1	1 unit	101	0.240
	30	15		B	<b>3RF23 30-1BA26</b>		1	1 unit	101	0.400
	40	20		B	<b>3RF23 40-1BA26</b>		1	1 unit	101	0.550
	50	25		B	<b>3RF23 50-1BA26</b>		1	1 unit	101	0.550
	50	27.5		B	<b>3RF23 70-1BA26</b>		1	1 unit	101	1.200
	50	30		B	<b>3RF23 90-1BA26</b>		1	1 unit	101	2.900

Other rated control supply voltages on request.


- The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.
- Utilization category AC-15:  
Electromagnetic loads, e. g. valves according to EN 60947-5.  
Parameters: max. 1200 1/h, 50 % ON Period, 10-times inrush current for 60 ms.



# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Screw terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU				kg
<b>Low noise<sup>2)</sup> · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
20	24 DC acc. to EN 61131-2	B	<b>3RF23 20-1CA02</b>		1	1 unit	101	0.240
30	24 DC acc. to EN 61131-2	B	<b>3RF23 30-1CA02</b>		1	1 unit	101	0.400
20	110 ... 230 AC	B	<b>3RF23 20-1CA22</b>		1	1 unit	101	0.240
<b>Low noise<sup>2)</sup> · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>								
20	24 DC acc. to EN 61131-2	B	<b>3RF23 20-1CA04</b>		1	1 unit	101	0.240
20	110 ... 230 AC	B	<b>3RF23 20-1CA24</b>		1	1 unit	101	0.240
20	4 ... 30 DC	A	<b>3RF23 20-1CA44</b>		1	1 unit	101	0.240
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
20	24 DC acc. to EN 61131-2	A	<b>3RF23 20-1DA02</b>		1	1 unit	101	0.240
20	110 ... 230 AC	B	<b>3RF23 20-1DA22</b>		1	1 unit	101	0.240
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>								
20	24 DC acc. to EN 61131-2	A	<b>3RF23 20-1DA04</b>		1	1 unit	101	0.240
20	110 ... 230 AC	B	<b>3RF23 20-1DA24</b>		1	1 unit	101	0.240
20	4 ... 30 DC	A	<b>3RF23 20-1DA44</b>		1	1 unit	101	0.240
30	4 ... 30 DC	B	<b>3RF23 30-1DA44</b>		1	1 unit	101	0.240



3RF23 20-1

Other rated control supply voltages on request.

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.


2) See page 4/13.



# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Spring-loaded terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU				kg
<b>Zero-point switching</b> Rated operational voltage $U_e$ 24 V ... 230 V								
10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-2AA02</b>		1	1 unit	101	0.166
20		A	<b>3RF23 20-2AA02</b>		1	1 unit	101	0.240
10.5	110 ... 230 AC	B	<b>3RF23 10-2AA22</b>		1	1 unit	101	0.166
20		B	<b>3RF23 20-2AA22</b>		1	1 unit	101	0.240
<b>Zero-point switching</b> Rated operational voltage $U_e$ 48 V ... 460 V								
10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-2AA04</b>		1	1 unit	101	0.166
20		A	<b>3RF23 20-2AA04</b>		1	1 unit	101	0.240
10.5	110 ... 230 AC	B	<b>3RF23 10-2AA24</b>		1	1 unit	101	0.166
20		B	<b>3RF23 20-2AA24</b>		1	1 unit	101	0.240
<b>Zero-point switching · Blocking voltage 1600 V</b> Rated operational voltage $U_e$ 48 V ... 600 V								
10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-2AA06</b>		1	1 unit	101	0.166
20		A	<b>3RF23 20-2AA06</b>		1	1 unit	101	0.240
10.5	110 ... 230 AC	B	<b>3RF23 10-2AA26</b>		1	1 unit	101	0.166
20		B	<b>3RF23 20-2AA26</b>		1	1 unit	101	0.240
<b>Low noise<sup>2)</sup> · Zero-point switching</b> Rated operational voltage $U_e$ 24 V ... 230 V								
20	24 DC acc. to EN 61131-2	B	<b>3RF23 20-2CA02</b>		1	1 unit	101	0.240
20	110 ... 230 AC	B	<b>3RF23 20-2CA22</b>		1	1 unit	101	0.240
<b>Low noise<sup>2)</sup> · Zero-point switching</b> Rated operational voltage $U_e$ 48 V ... 460 V								
20	24 DC acc. to EN 61131-2	B	<b>3RF23 20-2CA04</b>		1	1 unit	101	0.240
20	110 ... 230 AC	B	<b>3RF23 20-2CA24</b>		1	1 unit	101	0.240
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b> Rated operational voltage $U_e$ 24 V ... 230 V								
20	110 ... 230 AC	B	<b>3RF23 20-2DA22</b>		1	1 unit	101	0.240
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b> Rated operational voltage $U_e$ 48 V ... 460 V								
20	110 ... 230 AC	B	<b>3RF23 20-2DA24</b>		1	1 unit	101	0.240

Other rated control supply voltages on request.


1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

2) See page 4/13.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Ring terminal lug connection	⊕	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
A	V		Order No.	Price per PU				kg	
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>									
	10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-3AA02</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA02</b>		1	1 unit	101	0.200
	30		B	<b>3RF23 30-3AA02</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA02</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA02</b>		1	1 unit	101	0.550
	70		B	<b>3RF23 70-3AA02</b>		1	1 unit	101	1.200
	88	B	<b>3RF23 90-3AA02</b>		1	1 unit	101	2.900	
	10.5	110 ... 230 AC	B	<b>3RF23 10-3AA22</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA22</b>		1	1 unit	101	0.200
	30		B	<b>3RF23 30-3AA22</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA22</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA22</b>		1	1 unit	101	0.550
	70		B	<b>3RF23 70-3AA22</b>		1	1 unit	101	1.200
	88		B	<b>3RF23 90-3AA22</b>		1	1 unit	101	2.900
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>									
4	10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-3AA04</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA04</b>		1	1 unit	101	0.200
	30		A	<b>3RF23 30-3AA04</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA04</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA04</b>		1	1 unit	101	0.550
	70		A	<b>3RF23 70-3AA04</b>		1	1 unit	101	1.200
	88	B	<b>3RF23 90-3AA04</b>		1	1 unit	101	2.900	
	10.5	110 ... 230 AC	B	<b>3RF23 10-3AA24</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA24</b>		1	1 unit	101	0.200
	30		B	<b>3RF23 30-3AA24</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA24</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA24</b>		1	1 unit	101	0.550
	70		B	<b>3RF23 70-3AA24</b>		1	1 unit	101	1.200
	88		B	<b>3RF23 90-3AA24</b>		1	1 unit	101	2.900
	20		4 ... 30 DC	B	<b>3RF23 20-3AA44</b>		1	1 unit	101
	30	B		<b>3RF23 30-3AA44</b>		1	1 unit	101	0.435
	50	B		<b>3RF23 50-3AA44</b>		1	1 unit	101	0.550
	<b>Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
4	40	4 ... 30 DC	B	<b>3RF23 40-3AA45</b>		1	1 unit	101	0.550
	70		B	<b>3RF23 70-3AA45</b>		1	1 unit	101	1.200
	88		B	<b>3RF23 90-3AA45</b>		1	1 unit	101	2.900
<b>Zero-point switching · Blocking voltage 1600 V</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
4	10.5	24 DC acc. to EN 61131-2	B	<b>3RF23 10-3AA06</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA06</b>		1	1 unit	101	0.200
	30		B	<b>3RF23 30-3AA06</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA06</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA06</b>		1	1 unit	101	0.550
	70		B	<b>3RF23 70-3AA06</b>		1	1 unit	101	1.200
	88	B	<b>3RF23 90-3AA06</b>		1	1 unit	101	2.900	
	10.5	110 ... 230 AC	B	<b>3RF23 10-3AA26</b>		1	1 unit	101	0.166
	20		B	<b>3RF23 20-3AA26</b>		1	1 unit	101	0.200
	30		B	<b>3RF23 30-3AA26</b>		1	1 unit	101	0.435
	40		B	<b>3RF23 40-3AA26</b>		1	1 unit	101	0.550
	50		B	<b>3RF23 50-3AA26</b>		1	1 unit	101	0.550
	70		A	<b>3RF23 70-3AA26</b>		1	1 unit	101	1.200
	88		B	<b>3RF23 90-3AA26</b>		1	1 unit	101	2.900

Other rated control supply voltages on request.

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors


### 3RF23 solid-state contactors, single-phase

Type current <sup>1)</sup> $I_{max}$	Operational current $I_e/AC-15^{2)}$	Rated control supply voltage $U_s$	DT	Ring terminal lug connection	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
A	A	V		Order No.	Price per PU			
<b>Instantaneous switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
70	27.5	24 DC acc. to EN 61131-2	B	<b>3RF23 70-3BA02</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA02</b>		1	1 unit	101 2.900
70	27.5	110 ... 230 AC	B	<b>3RF23 70-3BA22</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA22</b>		1	1 unit	101 2.900
<b>Instantaneous switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>								
70	27.5	24 DC acc. to EN 61131-2	B	<b>3RF23 70-3BA04</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA04</b>		1	1 unit	101 2.900
70	27.5	110 ... 230 AC	B	<b>3RF23 70-3BA24</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA24</b>		1	1 unit	101 2.900
<b>Instantaneous switching · Blocking voltage 1600 V</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>								
70	27.5	24 DC acc. to EN 61131-2	B	<b>3RF23 70-3BA06</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA06</b>		1	1 unit	101 2.900
70	27.5	110 ... 230 AC	B	<b>3RF23 70-3BA26</b>		1	1 unit	101 1.200
88	30		B	<b>3RF23 90-3BA26</b>		1	1 unit	101 2.900
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 24 V ... 230 V</b>								
20	--	24 DC acc. to EN 61131-2	B	<b>3RF23 20-3DA02</b>		1	1 unit	101 0.200
20	--	110 ... 230 AC	B	<b>3RF23 20-3DA22</b>		1	1 unit	101 0.200
<b>Short-circuit-proof with B-type MCB · Zero-point switching</b>								
<b>Rated operational voltage <math>U_e</math> 48 V ... 460 V</b>								
20	--	24 DC acc. to EN 61131-2	B	<b>3RF23 20-3DA04</b>		1	1 unit	101 0.200
20	--	110 ... 230 AC	B	<b>3RF23 20-3DA24</b>		1	1 unit	101 0.200

Other rated control supply voltages on request.

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

2) Utilization category AC-15:  
Electromagnetic loads, e. g. valves according to EN 60947-5.  
Parameters: max. 1200 1/h, 50 % ON Period, 10-times inrush current for 60 ms.

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
<b>Optional accessories</b>							
		<b>Screwdrivers</b> for spring-loaded connection method	C	<b>8WA2 880</b>		1	1 unit 041 0.034
		<b>Terminal covers</b> for 3RF21 solid-state relays and 3RF23 solid-state contactors in ring terminal lug connection (after simple adaptation, this terminal cover can also be used for screw connection)	A	<b>3RF29 00-3PA88</b>		1	10 units 101 0.004



3RF29 00-3PA88

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF24 solid-state contactors, 3-phase

#### Selection and ordering data


Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Screw terminals	⊕	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
A	V		Order No.	Price per PU				kg	
<b>Zero-point switching</b>									
<b>Rated operational voltage <math>U_e</math> 48 V ... 600 V</b>									
<i>Two-phase controlled</i>									
 3RF24 20-1AB45	10.5	4 ... 30 DC	A	<b>3RF24 10-1AB45</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AB45</b>		1	1 unit	101	0.400
	30		B	<b>3RF24 30-1AB45</b>		1	1 unit	101	0.540
	40		B	<b>3RF24 40-1AB45</b>		1	1 unit	101	0.800
	50		B	<b>3RF24 50-1AB45</b>		1	1 unit	101	1.100
	10.5	110 AC	A	<b>3RF24 10-1AB35</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AB35</b>		1	1 unit	101	0.400
	30		B	<b>3RF24 30-1AB35</b>		1	1 unit	101	0.540
	40		B	<b>3RF24 40-1AB35</b>		1	1 unit	101	0.800
	50		B	<b>3RF24 50-1AB35</b>		1	1 unit	101	1.100
	10.5	230 AC	B	<b>3RF24 10-1AB55</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AB55</b>		1	1 unit	101	0.400
	30		B	<b>3RF24 30-1AB55</b>		1	1 unit	101	0.540
	40		B	<b>3RF24 40-1AB55</b>		1	1 unit	101	0.800
	50		B	<b>3RF24 50-1AB55</b>		1	1 unit	101	1.100
<i>Three-phase controlled</i>									
 3RF24 10-1AC45	10.5	4 ... 30 DC	B	<b>3RF24 10-1AC45</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AC45</b>		1	1 unit	101	0.540
	30		A	<b>3RF24 30-1AC45</b>		1	1 unit	101	0.800
	40		B	<b>3RF24 40-1AC45</b>		1	1 unit	101	1.100
	50		B	<b>3RF24 50-1AC45</b>		1	1 unit	101	1.850
	10.5	110 AC	B	<b>3RF24 10-1AC35</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AC35</b>		1	1 unit	101	0.540
	30		A	<b>3RF24 30-1AC35</b>		1	1 unit	101	0.800
	40		B	<b>3RF24 40-1AC35</b>		1	1 unit	101	1.100
	50		B	<b>3RF24 50-1AC35</b>		1	1 unit	101	1.850
	10.5	230 AC	B	<b>3RF24 10-1AC55</b>		1	1 unit	101	0.320
	20		B	<b>3RF24 20-1AC55</b>		1	1 unit	101	0.540
	30		B	<b>3RF24 30-1AC55</b>		1	1 unit	101	0.800
	40		B	<b>3RF24 40-1AC55</b>		1	1 unit	101	1.100
	50		B	<b>3RF24 50-1AC55</b>		1	1 unit	101	1.850

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF24 solid-state contactors, 3-phase


Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Spring-loaded terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU				kg

#### Zero-point switching Rated operational voltage $U_e$ 48 V ... 600 V



3RF24 10-2AB45

<i>Two-phase controlled</i>								
10	4 ... 30 DC	B	<b>3RF24 10-2AB45</b>		1	1 unit	101	0.320
20	4 ... 30 DC	B	<b>3RF24 20-2AB45</b>		1	1 unit	101	0.400
10	230 AC	B	<b>3RF24 10-2AB55</b>		1	1 unit	101	0.320
20	230 AC	B	<b>3RF24 20-2AB55</b>		1	1 unit	101	0.400
<i>Three-phase controlled</i>								
10	4 ... 30 DC	B	<b>3RF24 10-2AC45</b>		1	1 unit	101	0.320
20	4 ... 30 DC	B	<b>3RF24 20-2AC45</b>		1	1 unit	101	0.540
10	230 AC	B	<b>3RF24 10-2AC55</b>		1	1 unit	101	0.320
20	230 AC	B	<b>3RF24 20-2AC55</b>		1	1 unit	101	0.540

Type current <sup>1)</sup> $I_{max}$	Rated control supply voltage $U_s$	DT	Ring terminal lug connection		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	V		Order No.	Price per PU				kg

#### Zero-point switching Rated operational voltage $U_e$ 48 V ... 600 V

<i>Two-phase controlled</i>								
50	4 ... 30 DC	B	<b>3RF24 50-3AB45</b>		1	1 unit	101	1.100
50	230 AC	B	<b>3RF24 50-3AB55</b>		1	1 unit	101	1.100
<i>Three-phase controlled</i>								
50	4 ... 30 DC	B	<b>3RF24 50-3AC45</b>		1	1 unit	101	1.850
50	230 AC	B	<b>3RF24 50-3AC55</b>		1	1 unit	101	1.850

1) The type current provides information about the performance capacity of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions. For derating, see Technical Information LV 1 T, Characteristic Curves.

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### General data

#### Overview

##### Function modules for SIRIUS 3RF2 solid-state switching devices

A great variety of applications demand an expanded range of functionality. With our function modules, these requirements can be met really easily. The modules are mounted simply by clicking them into place; straight away the necessary connections are made with the solid-state relay or contactor. The plug-in connection to control the solid-state switching devices can simply remain in use.

The following function modules are available:

- Converters
- Load monitoring
- Heating current monitoring
- Power controllers
- Power regulators

With the exception of the converter, the function modules can be used only with single-phase solid-state switching devices.

##### Recommended assignment of the function modules to the 3RF21 single-phase solid-state relays

Order No.	Accessories		Heating current monitoring	Power controllers <sup>1)</sup>	Power regulators <sup>1)</sup>
	Converters	Load monitoring Basic                      Extended			
<b>Type current = 20 A</b>					
<b>3RF21 20-1A.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13
<b>3RF21 20-1A.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0HA13 3RF29 20-0HA16
<b>3RF21 20-1A.22</b>	--	--	3RF29 20-0GA33	--	--
<b>3RF21 20-1A.24</b>	--	--	3RF29 20-0GA36	--	--
<b>3RF21 20-1A.42</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13
<b>3RF21 20-1A.45</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16 3RF29 20-0HA13 3RF29 20-0HA16
<b>3RF21 20-1B.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16 3RF29 20-0HA13 3RF29 20-0HA16
<b>3RF21 20-2A.02</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 20-2A.04</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 20-2A.22</b>	--	--	--	--	--
<b>3RF21 20-2A.24</b>	--	--	--	--	--
<b>3RF21 20-2A.42</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 20-2A.45</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 20-3A.02</b>	3RF29 00-0EA18	--	3RF29 20-0GA13	--	--
<b>3RF21 20-3A.04</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16 3RF29 20-0HA13 3RF29 20-0HA16
<b>3RF21 20-3A.22</b>	--	--	3RF29 20-0GA33	--	3RF29 20-0KA13
<b>3RF21 20-3A.24</b>	--	--	3RF29 20-0GA36	--	3RF29 20-0KA16 3RF29 20-0HA13 3RF29 20-0HA16
<b>Type current = 30 A</b>					
<b>3RF21 30-1A.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--
<b>3RF21 30-1A.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 30-1A.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 30-1A.22</b>	--	--	3RF29 50-0GA33	--	--
<b>3RF21 30-1A.24</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA33
<b>3RF21 30-1A.26</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36 3RF29 50-0HA36
<b>3RF21 30-1A.42</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--
<b>3RF21 30-1A.45</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 30-1B.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>Type current = 50 A</b>					
<b>3RF21 50-1A.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--
<b>3RF21 50-1A.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-1A.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-1A.22</b>	--	--	3RF29 50-0GA33	--	--
<b>3RF21 50-1A.24</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA33
<b>3RF21 50-1A.26</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36 3RF29 50-0HA36
<b>3RF21 50-1A.45</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-1B.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-1B.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-1B.22</b>	--	--	3RF29 50-0GA33	--	--
<b>3RF21 50-2A.02</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 50-2A.04</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 50-2A.06</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 50-2A.14</b>	3RF29 00-0EA18	--	--	--	--
<b>3RF21 50-2A.22</b>	--	--	--	--	--
<b>3RF21 50-2A.24</b>	--	--	--	--	--
<b>3RF21 50-2A.26</b>	--	--	--	--	--
<b>3RF21 50-3A.02</b>	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--
<b>3RF21 50-3A.04</b>	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-3A.06</b>	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16 3RF29 50-0HA13 3RF29 50-0HA16
<b>3RF21 50-3A.22</b>	--	--	3RF29 50-0GA33	--	--
<b>3RF21 50-3A.24</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA33
<b>3RF21 50-3A.26</b>	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36 3RF29 50-0HA36

1) The use of power controllers/regulators is also possible on zero-point switching versions for full-wave control mode. The generalized phase control mode is recommended only for the combination with instantaneous switching versions.

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### General data

Order No.	Accessories					
	Converters	Load monitoring		Heating current monitoring	Power controllers <sup>1)</sup>	Power regulators <sup>1)</sup>
		Basic	Extended			
<b>Type current = 70 A</b>						
3RF21 70-1A.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF21 70-1A.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 70-1A.05	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 70-1A.06	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 70-1A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF21 70-1A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF21 70-1A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF21 70-1A.45	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 70-1B.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 70-1C.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
<b>Type current = 90 A</b>						
3RF21 90-1A.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF21 90-1A.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 90-1A.06	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 90-1A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF21 90-1A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF21 90-1A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF21 90-1A.45	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 90-1B.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF21 90-2A.02	3RF29 00-0EA18	--	--	--	--	--
3RF21 90-2A.04	3RF29 00-0EA18	--	--	--	--	--
3RF21 90-2A.06	3RF29 00-0EA18	--	--	--	--	--
3RF21 90-2A.22	--	--	--	--	--	--
3RF21 90-2A.24	--	--	--	--	--	--
3RF21 90-2A.26	--	--	--	--	--	--
3RF21 90-3A.02	3RF29 00-0EA18	--	3RF29 90-0GA13	--	--	3RF29 90-0HA13
3RF21 90-3A.04	3RF29 00-0EA18	--	3RF29 90-0GA16	3RF29 32-0JA16	3RF29 90-0KA16	3RF29 90-0HA16
3RF21 90-3A.06	3RF29 00-0EA18	--	3RF29 90-0GA16	3RF29 32-0JA16	3RF29 90-0KA16	3RF29 90-0HA16
3RF21 90-3A.22	--	--	3RF29 90-0GA33	--	--	3RF29 90-0HA33
3RF21 90-3A.24	--	--	3RF29 90-0GA36	--	--	3RF29 90-0HA36
3RF21 90-3A.26	--	--	3RF29 90-0GA36	--	--	3RF29 90-0HA36
3RF21 90-3A.44	3RF29 00-0EA18	--	3RF29 90-0GA16	3RF29 32-0JA16	3RF29 90-0KA16	3RF29 90-0HA16

1) The use of power controllers/regulators is also possible on zero-point switching versions for full-wave control mode. The generalized phase control mode is recommended only for the combination with instantaneous switching versions.

#### Recommended assignment of the function modules to the 3RF22 three-phase solid-state relays

Order No.	Accessories					
	Converters	Load monitoring		Heating current monitoring	Power controllers	Power regulators
		Basic	Extended			
<b>Type current up to 55 A</b>						
3RF22 ...-1A...	3RF29 00-0EA18	--	--	--	--	--
3RF22 ...-2A...	3RF29 00-0EA18	--	--	--	--	--
3RF22 ...-3A...	3RF29 00-0EA18	--	--	--	--	--

#### Recommended assignment of the function modules to the 3RF23 single-phase solid-state contactors

Order No.	Accessories					
	Converters	Load monitoring		Heating current monitoring	Power controllers <sup>1)</sup>	Power regulators <sup>1)</sup>
		Basic	Extended			
<b>Type current <math>I_e = 10.5 A</math></b>						
3RF23 10-1A.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	3RF29 16-0JA13	3RF29 20-0KA13	3RF29 20-0HA13
3RF23 10-1A.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
3RF23 10-1A.06	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
3RF23 10-1A.12	3RF29 00-0EA18	--	3RF29 20-0GA13	3RF29 16-0JA13	3RF29 20-0KA13	3RF29 20-0HA13
3RF23 10-1A.14	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
3RF23 10-1A.22	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
3RF23 10-1A.24	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
3RF23 10-1A.26	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
3RF23 10-1A.44	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
3RF23 10-1A.45	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16



# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### General data

Order No.	Accessories					
	Converters	Load monitoring		Heating current monitoring	Power controllers <sup>1)</sup>	Power regulators <sup>1)</sup>
		Basic	Extended			
<b>Type current <math>I_e = 10.5 \text{ A}</math></b>						
<b>3RF23 10-1B.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	3RF29 16-0JA13	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 10-1B.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 10-1B.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 10-1B.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 10-1B.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 10-1B.26</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 10-2A.02</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 10-2A.04</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 10-2A.06</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 10-2A.22</b>	--	--	--	--	--	--
<b>3RF23 10-2A.24</b>	--	--	--	--	--	--
<b>3RF23 10-2A.26</b>	--	--	--	--	--	--
<b>3RF23 10-3A.02</b>	3RF29 00-0EA18	--	3RF29 20-0GA13	3RF29 16-0JA13	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 10-3A.04</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 10-3A.06</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 10-3A.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 10-3A.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 10-3A.26</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>Type current <math>I_e = 20 \text{ A}</math></b>						
<b>3RF23 20-1A.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 20-1A.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1A.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1A.14</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	--	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1A.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 20-1A.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1A.26</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1A.44</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1A.45</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1B.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 20-1B.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1B.06</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1B.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 20-1B.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1B.26</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1B.44</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1C.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 20-1C.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1C.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 20-1C.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1C.44</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1D.02</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 20-1D.04</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-1D.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 20-1D.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-1D.44</b>	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-2A.02</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 20-2A.04</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 20-2A.06</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 20-2A.22</b>	--	--	--	--	--	--
<b>3RF23 20-2A.24</b>	--	--	--	--	--	--
<b>3RF23 20-2A.26</b>	--	--	--	--	--	--
<b>3RF23 20-2C.02</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 20-2C.04</b>	3RF29 00-0EA18	--	--	--	--	--
<b>3RF23 20-2C.22</b>	--	--	--	--	--	--
<b>3RF23 20-2C.24</b>	--	--	--	--	--	--
<b>3RF23 20-2D.22</b>	--	--	--	--	--	--
<b>3RF23 20-2D.24</b>	--	--	--	--	--	--
<b>3RF23 20-3A.02</b>	3RF29 00-0EA18	--	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
<b>3RF23 20-3A.04</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-3A.06</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
<b>3RF23 20-3A.22</b>	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
<b>3RF23 20-3A.24</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-3A.26</b>	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>3RF23 20-3A.44</b>	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16

1) The use of power controllers/regulators is also possible on zero-point switching versions for full-wave control mode. The generalized phase control mode is recommended only for the combination with instantaneous switching versions.



# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### General data

Order No.	Accessories					
	Converters	Load monitoring		Heating current monitoring	Power controllers <sup>1)</sup> / Power regulators <sup>1)</sup>	
		Basic	Extended			
<b>Type current <math>I_e = 20\text{ A}</math></b>						
3RF23 20-3D.02	3RF29 00-0EA18	--	3RF29 20-0GA13	--	3RF29 20-0KA13	3RF29 20-0HA13
3RF23 20-3D.04	3RF29 00-0EA18	--	3RF29 20-0GA16	3RF29 32-0JA16	3RF29 20-0KA16	3RF29 20-0HA16
3RF23 20-3D.22	--	--	3RF29 20-0GA33	--	--	3RF29 20-0HA33
3RF23 20-3D.24	--	--	3RF29 20-0GA36	--	--	3RF29 20-0HA36
<b>Type current <math>I_e = 30\text{ A}</math></b>						
3RF23 30-1A.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 30-1A.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1A.06	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1A.14	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 30-1A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-1A.25	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-1A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-1A.44	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1A.45	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1B.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 30-1B.04	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1B.06	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1B.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 30-1B.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-1B.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-1B.44	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-1C.02	3RF29 00-0EA18	3RF29 20-0FA08	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 30-1D.44	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-3A.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 30-3A.04	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-3A.066	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 30-3A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 30-3A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-3A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 30-3A.44	3RF29 00-0EA18	--	3RF29 50-0GA16	3RF29 32-0JA16	3RF29 50-0KA16	3RF29 50-0HA16
<b>Type current <math>I_e = 40\text{ A}</math></b>						
3RF23 40-1A.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 40-1A.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1A.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1A.14	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 40-1A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-1A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-1A.45	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1B.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 40-1B.04	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1B.06	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-1B.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 40-1B.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-1B.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-3A.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 40-3A.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-3A.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 40-3A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 40-3A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-3A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 40-3A.45	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
<b>Type current <math>I_e = 50\text{ A}</math></b>						
3RF23 50-1A.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	--	3RF29 50-0HA13
3RF23 50-1A.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 50-1A.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 50-1A.14	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16
3RF23 50-1A.22	--	--	3RF29 50-0GA33	--	--	3RF29 50-0HA33
3RF23 50-1A.24	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 50-1A.26	--	--	3RF29 50-0GA36	--	--	3RF29 50-0HA36
3RF23 50-1A.45	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0KA16	3RF29 50-0HA16

1) The use of power controllers/regulators is also possible on zero-point switching versions for full-wave control mode. The generalized phase control mode is recommended only for the combination with instantaneous switching versions.

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### General data

Order No.	Accessories		Heating current monitoring	Power controllers <sup>1)</sup>	Power regulators <sup>1)</sup>
	Converters	Load monitoring Basic      Extended			
<b>Type current <math>I_e = 50</math> A</b>					
3RF23 50-1B.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0HA13
3RF23 50-1B.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 50-1B.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 50-1B.22	--	--	3RF29 50-0GA33	--	3RF29 50-0HA33
3RF23 50-1B.24	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 50-1B.26	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 50-1B.44	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 50-3A.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0HA13
3RF23 50-3A.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 50-3A.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 50-3A.22	--	--	3RF29 50-0GA33	--	3RF29 50-0HA33
3RF23 50-3A.24	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 50-3A.26	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 50-3A.44	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
<b>Type current <math>I_e = 70</math> A</b>					
3RF23 70-1B.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0HA13
3RF23 70-1B.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 70-1B.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 70-1B.22	--	--	3RF29 50-0GA33	--	3RF29 50-0HA33
3RF23 70-1B.24	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 70-1B.26	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 70-3A.02	3RF29 00-0EA18	--	3RF29 90-0GA13	--	3RF29 90-0HA13
3RF23 70-3A.04	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 70-3A.06	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 70-3A.22	--	--	3RF29 90-0GA33	--	3RF29 90-0HA33
3RF23 70-3A.24	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 70-3A.26	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 70-3A.45	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 70-3B.02	3RF29 00-0EA18	--	3RF29 90-0GA13	--	3RF29 90-0HA13
3RF23 70-3B.04	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 70-3B.06	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 70-3B.22	--	--	3RF29 90-0GA33	--	3RF29 90-0HA33
3RF23 70-3B.24	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 70-3B.26	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
<b>Type current <math>I_e = 90</math> A</b>					
3RF23 90-1B.02	3RF29 00-0EA18	--	3RF29 50-0GA13	--	3RF29 50-0HA13
3RF23 90-1B.04	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 90-1B.06	3RF29 00-0EA18	--	3RF29 50-0GA16	--	3RF29 50-0HA16
3RF23 90-1B.22	--	--	3RF29 50-0GA33	--	3RF29 50-0HA33
3RF23 90-1B.24	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 90-1B.26	--	--	3RF29 50-0GA36	--	3RF29 50-0HA36
3RF23 90-3A.02	3RF29 00-0EA18	--	3RF29 90-0GA13	--	3RF29 90-0HA13
3RF23 90-3A.04	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 90-3A.06	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 90-3A.22	--	--	3RF29 90-0GA33	--	3RF29 90-0HA33
3RF23 90-3A.24	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 90-3A.26	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 90-3A.45	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 90-3B.02	3RF29 00-0EA18	--	3RF29 90-0GA13	--	3RF29 90-0HA13
3RF23 90-3B.04	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 90-3B.06	3RF29 00-0EA18	--	3RF29 90-0GA16	--	3RF29 90-0HA16
3RF23 90-3B.22	--	--	3RF29 90-0GA33	--	3RF29 90-0HA33
3RF23 90-3B.24	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36
3RF23 90-3B.26	--	--	3RF29 90-0GA36	--	3RF29 90-0HA36

1) The use of power controllers/regulators is also possible on zero-point switching versions for full-wave control mode. The generalized phase control mode is recommended only for the combination with instantaneous switching versions.

### Recommended assignment of the function modules to the 3RF24 three-phase solid-state contactors

Order No.	Accessories		Heating current monitoring	Power controllers	Power regulators
	Converters	Load monitoring Basic      Extended			
<b>Type current up to 50 A</b>					
3RF24 ...1..4.	3RF29 00-0EA18	--	--	--	--
3RF24 ...2..4.	--	--	--	--	--
3RF24 ...3..4.	3RF29 00-0EA18	--	--	--	--
3RF24 ...4..5.	--	--	--	--	--

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

Converters

### Overview

#### Converters for 3RF2 solid-state switching devices

These modules are used to convert analog control signals, such as those output from many temperature controllers for example, into a pulse-width-modulated digital signal. The connected solid-state contactors and relays can therefore regulate the output of a load as a percentage.

### Application

This function module is used for conversion from an analog input signal to an on/off ratio. The module can only be used in conjunction with 3RF21 and 3RF23 single-phase solid-state switching devices or 3RF22 and 3RF24 three-phase devices. It can be used on versions with 24 V DC and 24 V AC/DC control supply voltage.

### Selection and ordering data

Rated operational current $I_e$	Rated operational voltage $U_e$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
---------------------------------	---------------------------------	----	-----------	--------------	-------------------	-----	----	--------------------------

A	V							
<b>Converters</b>								
Rated control supply voltage 24 V AC/DC								
--	--	A	<b>3RF29 00-0EA18</b>		1	1 unit	101	0.041



\* You can order this quantity or a multiple thereof.

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### Load monitoring

#### Overview

##### Load monitoring for 3RF2 single-phase solid-state switching devices

Many faults can be quickly detected by monitoring a load circuit connected to the solid-state switching device, as made possible with this module. Examples include the failure of load elements (up to 6 in the basic version or up to 12 in the extended version), alloyed power semiconductors, a lack of voltage or a break in a load circuit. A fault is indicated by one or more LEDs and reported to the controller by way of a PLC-compatible output.

The principle of operation is based on permanent monitoring of the current strength. This figure is continuously compared with the reference value stored once during start-up by the simple press of a button. In order to detect the failure of one of several loads, the current difference must be 1/6 (in the basic version) or 1/12 (in the extended version) of the reference value. In the event of a fault, an output is actuated and one or more LEDs indicate the fault.

#### Application

The device is used for monitoring one or more loads (partial loads). The function module can only be used in conjunction with a 3RF21 solid-state relay or a 3RF23 solid-state contactor. The devices with spring-loaded connections in the load circuit are not suitable.

#### Selection and ordering data

Rated operational current $I_e$	Rated operational voltage $U_e$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
---------------------------------	---------------------------------	----	-----------	--------------	-------------------	-----	----	--------------------------

##### Basic load monitoring



Rated control supply voltage 24 V DC

6	--	A	<b>3RF29 06-0FA08</b>		1	1 unit	101	0.068
20	--	A	<b>3RF29 20-0FA08</b>		1	1 unit	101	0.068
• With mounted 3RF29 00-0RA88 cover								
6	--	A	<b>3RF29 06-0FA08-0KH0</b>		1	1 unit	101	0.068
20	--	A	<b>3RF29 20-0FA08-0KH0</b>		1	1 unit	101	0.068

##### Extended load monitoring



Rated control supply voltage 24 V AC/DC

20	110 ... 230	A	<b>3RF29 20-0GA13</b>		1	1 unit	101	0.175
20	400 ... 600	A	<b>3RF29 20-0GA16</b>		1	1 unit	101	0.175
50	110 ... 230	A	<b>3RF29 50-0GA13</b>		1	1 unit	101	0.175
50	400 ... 600	A	<b>3RF29 50-0GA16</b>		1	1 unit	101	0.175
90	110 ... 230	A	<b>3RF29 90-0GA13</b>		1	1 unit	101	0.175
90	400 ... 600	A	<b>3RF29 90-0GA16</b>		1	1 unit	101	0.175

Rated control supply voltage 110 V AC

20	110 ... 230	A	<b>3RF29 20-0GA33</b>		1	1 unit	101	0.175
20	400 ... 600	A	<b>3RF29 20-0GA36</b>		1	1 unit	101	0.175
50	110 ... 230	A	<b>3RF29 50-0GA33</b>		1	1 unit	101	0.175
50	400 ... 600	A	<b>3RF29 50-0GA36</b>		1	1 unit	101	0.175
90	110 ... 230	A	<b>3RF29 90-0GA33</b>		1	1 unit	101	0.175
90	400 ... 600	A	<b>3RF29 90-0GA36</b>		1	1 unit	101	0.175

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
---------	----	-----------	--------------	-------------------	-----	----	--------------------------

##### Optional accessories



3RF29 00-0RA88

**Sealable covers for function modules** (not for converters)

B	<b>3RF29 00-0RA88</b>		1	10 units	101	0.001
---	-----------------------	--	---	----------	-----	-------

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### Heating current monitoring

#### Overview

##### Heating current monitoring for 3RF2 single-phase solid-state switching devices

Many faults can be quickly detected by monitoring a load circuit connected to the solid-state switching device, as made possible with this module. Examples include the failure of up to 6 load elements, alloyed power semiconductors, a lack of voltage or a break in a load circuit. A fault is indicated by LEDs and reported to the controller by way of a relay output (NC contact).

The principle of operation is based on permanent monitoring of the current strength. This figure is continuously compared with the reference value stored once during start-up. In order to detect the failure of one of several loads, the current difference must be 1/6 of the reference value. In the event of a fault, an output is actuated and the LEDs indicate the fault.

The heating current monitoring has a teach input and therefore differs from the load monitoring. This remote teaching function enables simple adjustment to changing loads without manual intervention.

#### Special versions:

##### deviations from the standard version

##### 3RF29 ...-0JA1.-1KK0

If the current is below 50 % of the lower teach current during the teach routine, the device will go into "Standby" mode; the LOAD LED will flicker. The device thus detects a non-connected load, e. g. channels not required for tool heaters, and does not signal a fault. This mode can be reset by re-teaching.

#### Application

The device is used for monitoring one or more loads (partial loads). The function module can only be used in conjunction with a 3RF21 solid-state relay or a 3RF23 solid-state contactor. The devices with spring-loaded connections in the load circuit are not suitable.

#### Selection and ordering data

Rated operational current $I_e$	Rated operational voltage $U_e$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
A	V							

##### Heating current monitoring<sup>1)</sup>



Rated control supply voltage 24 V AC/DC

16	110 ... 230	A	<b>3RF29 16-0JA13</b>		1	1 unit	101	0.175
16	110 ... 230	A	<b>3RF29 16-0JA13-1KK0</b>		1	1 unit	101	0.175
16	400 ... 600	A	<b>3RF29 16-0JA16-1KK0</b>		1	1 unit	101	0.175
32	110 ... 230	A	<b>3RF29 32-0JA13-1KK0</b>		1	1 unit	101	0.175
32	400 ... 600	A	<b>3RF29 32-0JA16</b>		1	1 unit	101	0.175
32	400 ... 600	A	<b>3RF29 32-0JA16-1KK0</b>		1	1 unit	101	0.175

1) Supplied without control connector. The control connector can be purchased from Phoenix Contact by quoting Order No. 1982 790 (2.5 HC/6-ST-5.08).

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
---------	----	-----------	--------------	-------------------	-----	----	--------------------------

##### Optional accessories



3RF29 00-0RA88

<b>Sealable covers for function modules</b> (not for converters)	B	<b>3RF29 00-0RA88</b>		1	10 units	101	0.001
--	---	-----------------------	--	---	----------	-----	-------

# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

### Power controllers

#### Overview

##### Power controllers for 3RF2 single-phase solid-state switching devices

The power controller is a function module for the autonomous power control of complex heating systems and inductive loads.

The following functions have been integrated:

- **Power controller** for adjusting the power of the connected load. Here, the setpoint value is set with a rotary knob on the module as a percentage with reference to the 100 % power stored as a setpoint value.
- **Inrush current limitation**: With the aid of an adjustable voltage ramp, the inrush current is limited by means of phase control. This is useful above all with loads such as lamps or infrared lamps which have an inrush transient current.
- **Load circuit monitoring** for detecting load failure, partial load faults, alloyed power semiconductors, lack of voltage or a break in the load circuit.

##### Special versions: deviations from the standard version

###### 3RF29 04-0KA13-0KC0

During the teaching process the connected solid-state relay or contactor is not activated; i. e. no current flow takes place. No current reference value is stored. No part-load monitoring!

###### 3RF29 ..-0KA1.-0KTO

No part-load monitoring!

#### Application

The power controller can be used for:

- Complex heating systems
- Inductive loads
- Loads with temperature-dependent resistor
- Loads with ageing after long-time service
- Simple indirect control of temperature

The power controller can be used on the instantaneously switching 3RF21 and 3RF23 solid-state switching devices (single-phase). If only the full-wave operating mode is used, the power controller can also be used on the "zero-point switching" solid-state relays and contactors.

##### Power control

The power controller adjusts the power in the connected load by means of a solid-state switching device depending on the setpoint selection. It does not compensate for changes in the mains voltage or load resistance. The setpoint value can be predefined externally as a 0 to 10 V signal or internally by means of a potentiometer. Depending on the setting of the potentiometer ( $t_R$ ), the control is carried out according to the principle of full-wave control or generalized phase control.

##### Full-wave control

In this operating mode the output is adjusted to the required setpoint value changing the on-to-off period. The period duration is predefined at one second.

##### Generalized phase control

In this operating mode the output is adjusted to the required setpoint value by changing the current flow angle. In order to observe the limit values of the conducted interference voltage for industrial networks, the load circuit must include a reactor with a rating of at least 200  $\mu$ H.

#### Selection and ordering data

Rated operational current $I_e$	Rated operational voltage $U_e$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
A	V							

#### Power controllers



Rated control supply voltage 24 V AC/DC								
4	110 ... 230	A	<b>3RF29 04-0KA13-0KC0</b>		1	1 unit	101	0.175
4		A	<b>3RF29 04-0KA13-0KTO</b>		1	1 unit	101	0.175
20		A	<b>3RF29 20-0KA13</b>		1	1 unit	101	0.175
50		A	<b>3RF29 50-0KA13</b>		1	1 unit	101	0.175
90		A	<b>3RF29 90-0KA13</b>		1	1 unit	101	0.175
20	400 ... 600	A	<b>3RF29 20-0KA16</b>		1	1 unit	101	0.175
50		A	<b>3RF29 50-0KA16</b>		1	1 unit	101	0.175
50		A	<b>3RF29 50-0KA16-0KTO</b>		1	1 unit	101	0.175
90		A	<b>3RF29 90-0KA16</b>		1	1 unit	101	0.175

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
---------	----	-----------	--------------	-------------------	-----	----	--------------------------

#### Optional accessories



3RF29 00-0RA88

<b>Sealable covers for function modules</b> (not for converters)	B	<b>3RF29 00-0RA88</b>		1	10 units	101	0.001
--	---	-----------------------	--	---	----------	-----	-------



# Solid-State Switching Devices for Resistive Loads

## 3RF29 Function Modules

Power regulators

### Overview

#### Power regulators for 3RF2 single-phase solid-state switching devices

The power regulator is a function module for the autonomous power control of complex heating systems.

The following functions have been integrated:

- **Power controller with proportional-action control** for adjusting the power of the connected load. Here, the setpoint value is set with a rotary knob on the module as a percentage with reference to the 100 % power stored as a setpoint value. Changes in the mains voltage or in the load resistance are compensated in this case.
- **Inrush current limitation:** With the aid of an adjustable voltage ramp, the inrush current is limited by means of phase control. This is useful above all with loads such as lamps which have an inrush transient current.
- **Load circuit monitoring** for detecting load failure, alloyed power semiconductors, lack of voltage or a break in the load circuit. Part-load monitoring is not possible. Load fluctuations are compensated.

### Application

The power regulator can be used for:

- Complex heating systems
- Heating elements with temperature-dependent resistor
- Heating elements with ageing after long-time service
- Simple indirect control of temperature

The power regulator can be used on the instantaneously switching 3RF21 and 3RF23 solid-state switching devices (single-phase). If only the full-wave operating mode is used, the power regulator can also be used on the zero-point switching solid-state relays and contactors.

#### Power control

The power regulator adjusts the power in the connected load by means of a solid-state switching device depending on the taught power and the selected setpoint. Changes in the mains voltage or in the load resistance are thus compensated by the power regulator. The setpoint value can be predefined externally as a 0 to 10 V signal or internally by means of a potentiometer. Depending on the setting of the potentiometer ( $f_R$ ), the adjustment is carried out according to the principle of full-wave control or generalized phase control.

#### Full-wave control

In this operating mode the output is adjusted to the required setpoint value changing the on-to-off period. The period duration is predefined at one second.

#### Generalized phase control

In this operating mode the output is adjusted to the required setpoint value by changing the current flow angle. In order to observe the limit values of the conducted interference voltage for industrial networks, the load circuit must include a reactor with a rating of at least 200  $\mu$ H.

### Selection and ordering data

Rated operational current $I_e$	Rated operational voltage $U_e$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
A	V							

#### Power regulators



Rated control supply voltage 24 V AC/DC								
20	110 ... 230	A	<b>3RF29 20-0HA13</b>		1	1 unit	101	0.175
20	400 ... 600	A	<b>3RF29 20-0HA16</b>		1	1 unit	101	0.175
50	110 ... 230	A	<b>3RF29 50-0HA13</b>		1	1 unit	101	0.175
50	400 ... 600	A	<b>3RF29 50-0HA16</b>		1	1 unit	101	0.175
90	110 ... 230	A	<b>3RF29 90-0HA13</b>		1	1 unit	101	0.175
90	400 ... 600	A	<b>3RF29 90-0HA16</b>		1	1 unit	101	0.175
Rated control supply voltage 110 V AC								
20	110 ... 230	A	<b>3RF29 20-0HA33</b>		1	1 unit	101	0.175
20	400 ... 600	A	<b>3RF29 20-0HA36</b>		1	1 unit	101	0.175
50	110 ... 230	A	<b>3RF29 50-0HA33</b>		1	1 unit	101	0.175
50	400 ... 600	A	<b>3RF29 50-0HA36</b>		1	1 unit	101	0.175
90	110 ... 230	A	<b>3RF29 90-0HA33</b>		1	1 unit	101	0.175
90	400 ... 600	A	<b>3RF29 90-0HA36</b>		1	1 unit	101	0.175

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg

#### Optional accessories



3RF29 00-0RA88

<b>Sealable covers for function modules</b> (not for converters)	B	<b>3RF29 00-0RA88</b>		1	10 units	101	0.001
--	---	-----------------------	--	---	----------	-----	-------

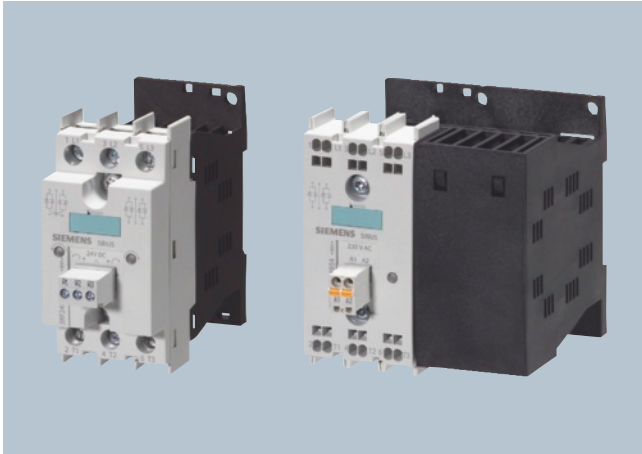
\* You can order this quantity or a multiple thereof.

# Solid-State Switching Devices for Switching Motors

## Solid-State Contactors

### General data

#### Overview



#### Solid-state contactors for switching motors

The solid-state contactors for switching motors are intended for frequently switching on and off three-phase current operating mechanisms up to 7.5 kW and reversing up to 3.0 kW. The devices are constructed with complete insulation and can be mounted directly on circuit breakers and SIRIUS overload relays, resulting in a very simple integration into motor feeders.

These three-phase solid-state contactors are equipped with a two-phase control which is particularly suitable for typical motor current circuits without connecting to the neutral conductor.

Important features:

- Insulated enclosure with integrated heat sink
- Degree of protection IP20
- Integrated mounting foot to snap on a standard mounting rail or for assembly onto a support plate
- Variety of connection methods
- Plug-in control connection
- Display via LEDs

#### Selecting solid-state contactors

The solid-state contactors are selected on the basis of details of the network, the load and the ambient conditions. As the solid-state contactors are already equipped with an optimally matched heat sink, the selection process is considerably simpler than that for solid-state relays.

The following procedure is recommended:

- Determine the rated current of the load and the mains voltage
- Select a solid-state contactor with the same or higher rated current than the load
- Testing the maximum permissible switching frequency based on the characteristic curves (see [Technical Information LV 1 T](#)). To do this, the starting current, the starting time and the motor loaded in in the operating phase must be known.
- If the permissible switching frequency is under the desired frequency, it is possible to achieve an increase by overdimensioning the motor!

#### Benefits

- Units with integrated heat sink, "ready to use"
- Compact and space-saving design
- Reversing contactors with integrated interlocking

#### Application

##### Standards and approvals

- IEC 60947-4-3
- UL 508, CSA for North America<sup>1)</sup>
- CE marking for Europe
- C-Tick approval for Australia

1) Please note: Use overvoltage protection device;  
max. cut-off-voltage 6000 V;  
min. energy handling capability 100 J.



# Solid-State Switching Devices for Switching Motors

## Solid-State Contactors

### 3RF24 solid-state contactors, 3-phase

#### Overview

These two-phase controlled, instantaneous switching solid-state contactors in the insulating enclosure are offered in 45 mm width to 5.2 A – and in 90 mm width to 16 A. This means that it is possible to operate motors up to 7.5 kW.

The devices can use a link module<sup>1)</sup> to directly connect to a circuit breaker. Direct mounting on a 3RB20 electronic overload relay<sup>2)</sup> is possible. Rapid-switching fuseless and fuse motor feeders can thereby be implemented in a time-saving manner.

#### Selection and ordering data

##### Motor contactors · Instantaneous switching · Two-phase controlled

Rated operational current $I_e$	Rated power at $I_e$ and $U_e$ 400 V kW	Rated control supply voltage $U_s$ V	DT	Screw terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
				Order No.	Price per PU				
<b>Rated operational voltage <math>U_e</math> 48 ... 460 V</b>									
5.2	2.2	24 DC acc. to EN 61131-2	B	3RF24 05-1BB04		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-1BB04		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-1BB04		1	1 unit	101	0.380
16	7.5		B	3RF24 16-1BB04		1	1 unit	101	0.380
<b>Rated operational voltage <math>U_e</math> 48 ... 600 V</b>									
5.2	2.2	110 ... 230 AC	B	3RF24 05-1BB24		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-1BB24		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-1BB24		1	1 unit	101	0.380
16	7.5		B	3RF24 16-1BB24		1	1 unit	101	0.380

3RF24 05-1BB

Rated operational current $I_e$	Rated power at $I_e$ and $U_e$ 400 V kW	Rated control supply voltage $U_s$ V	DT	Spring-loaded terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
				Order No.	Price per PU				
<b>Rated operational voltage <math>U_e</math> 48 ... 600 V</b>									
<b>Blocking voltage 1600 V</b>									
5.2	2.2	24 DC acc. to EN 61131-2	B	3RF24 05-1BB06		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-1BB06		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-1BB06		1	1 unit	101	0.380
16	7.5		B	3RF24 16-1BB06		1	1 unit	101	0.380
5.2	2.2	110 ... 230 AC	B	3RF24 05-1BB26		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-1BB26		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-1BB26		1	1 unit	101	0.380
16	7.5		B	3RF24 16-1BB26		1	1 unit	101	0.380

3RF24 10-1BB

Rated operational current $I_e$	Rated power at $I_e$ and $U_e$ 400 V kW	Rated control supply voltage $U_s$ V	DT	Spring-loaded terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
				Order No.	Price per PU				
<b>Rated operational voltage <math>U_e</math> 48 ... 460 V</b>									
5.2	2.2	24 DC acc. to EN 61131-2	B	3RF24 05-2BB04		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-2BB04		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-2BB04		1	1 unit	101	0.380
16	7.5		B	3RF24 16-2BB04		1	1 unit	101	0.380
5.2	2.2	110 ... 230 AC	B	3RF24 05-2BB24		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-2BB24		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-2BB24		1	1 unit	101	0.380
16	7.5		B	3RF24 16-2BB24		1	1 unit	101	0.380
<b>Rated operational voltage <math>U_e</math> 48 ... 600 V</b>									
<b>Blocking voltage 1600 V</b>									
5.2	2.2	24 DC acc. to EN 61131-2	B	3RF24 05-2BB06		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-2BB06		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-2BB06		1	1 unit	101	0.380
16	7.5		B	3RF24 16-2BB06		1	1 unit	101	0.380
5.2	2.2	110 ... 230 AC	B	3RF24 05-2BB26		1	1 unit	101	0.250
9.2	4.0		B	3RF24 10-2BB26		1	1 unit	101	0.380
12.5	5.5		B	3RF24 12-2BB26		1	1 unit	101	0.380
16	7.5		B	3RF24 16-2BB26		1	1 unit	101	0.380

3RF24 10-2BB

1) For 3RA19 21-1AA00 link modules see Chapter 5, page 5/29 or our Mall.

2) For 3RB20 overload relays see Chapter 5, page 5/50.

# Solid-State Switching Devices for Switching Motors

## Solid-State Contactors

### 3RF24 solid-state reversing contactors, 3-phase


#### Overview

The integration of four conducting paths to a reverse switch, combined in one enclosure makes this device a particularly compact solution. Compared to conventional systems, for which two contactors are required, it is possible to save up to 50 % width with the three-phase reversing contactors. Devices with 45 mm width cover motors up to 2.2 kW – and those with 90 mm width up to 3 kW.

Due to the integration into the SIRIUS modular system, it is possible to make a connection to a SIRIUS motor starter protector using a link module<sup>1)</sup> or with a 3RB20 solid-state overload relay<sup>2)</sup> without additional steps. It is possible to mount fuseless or fused motor feeders easily and quickly.

#### Selection and ordering data

##### Reversing contactors · Instantaneous switching · Two-phase controlled

Rated operational current $I_e$	Rated power at $I_e$ and $U_e$	Rated control supply voltage $U_s$	DT	Screw terminals 	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	400 V kW	V		Order No.	Price per PU			kg
<b>Rated operational voltage <math>U_e</math> 48 ... 460 V</b>								
3.8	<b>1.5</b>	24 DC acc. to	B	<b>3RF24 03-1BD04</b>		1	1 unit	101 0.280
5.4	<b>2.2</b>	EN 61131-2	B	<b>3RF24 05-1BD04</b>		1	1 unit	101 0.280
7.4	<b>3.0</b>		B	<b>3RF24 10-1BD04</b>		1	1 unit	101 0.410
3.8	<b>1.5</b>	110 ... 230 AC	B	<b>3RF24 03-1BD24</b>		1	1 unit	101 0.280
5.4	<b>2.2</b>		B	<b>3RF24 05-1BD24</b>		1	1 unit	101 0.280
7.4	<b>3.0</b>		B	<b>3RF24 10-1BD24</b>		1	1 unit	101 0.410



3RF24 03-1BD



3RF24 10-1BD

1) For 3RA19 21-1AA00 link modules see Chapter 5, page 5/29 or our Mall.

2) For 3RB20 overload relays see Chapter 5, page 5/50.