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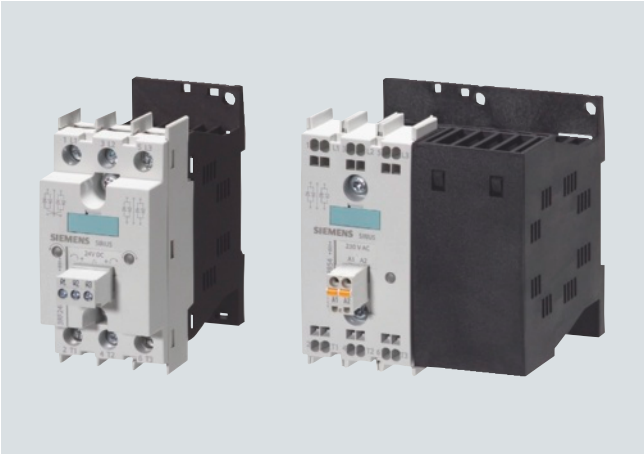
Overview



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

Switching functions

The solid-state contactors to switch motors are "instantaneous switching" because this method is particularly suited for inductive loads. By distributing the ON point over the entire sine curve of the mains voltage, disturbances are reduced to a minimum.

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 manual). 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!

Alternatively the correct device size can be determined on the Internet by entering the network and motor data along with the application and ambient conditions in the tool for the selection of solid-state contactors for switching motors. You will find the tool at:

www.siemens.com/solid-state-switching-devices

Benefits

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

Application

There is no typical design of a load feeder with solid-state relays or solid-state contactors; instead, the great variety of connection methods and control voltages offers universal application opportunities. SIRIUS solid-state relays and solid-state contactors can be installed in fuseless or fused feeders, as required. There are special versions with which it is even possible to achieve short-circuit strength in a fuseless design.

Standards and approvals

- IEC 60947-4-3
- UL 508, CSA for North America[1)]
- 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.

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General data

More information

Connection methods

You can choose between the following connection methods for the solid-state contactors for switching motors:

Screw connection

The screw connection system is the standard among industrial controls. Open terminals and a plus-minus screw are just two features of this technology. Two conductors of up to 6 mm² can be connected in just one terminal. As a result, loads of up to 50 A can be connected.

Spring-type terminal connection system

This innovative technology manages without any screw connection. This means that very high vibration resistance is achieved. Two conductors of up to 2.5 mm² can be connected to each terminal. As a result, loads of up to 20 A can be dealt with.

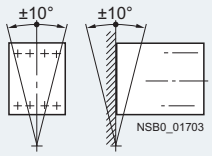
Short-circuit protection

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

Siemens generally recommends using SITOR semiconductor 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.

Specification

Order No.		**3RF24 ..-.BB.., 3RF24 ..-.BD..**
General data		
Ambient temperature		
• During operation, derating from 40 °C	°C	-25 ... +60
• During storage	°C	-55 ... +80
Installation altitude	m	0 ... 1000; derating over 1000 m upon request
Shock resistance acc. to IEC 60068-2-27	*g*/ms	15/11
Vibration resistance acc. to IEC 60068-2-6	*g*	2
Degree of protection		IP20
Insulation strength at 50/60 Hz (main/control circuit to floor)	V rms	4000
Electromagnetic compatibility (EMC)		
• Emitted interference acc. to IEC 60947-4-3		
- Conducted interference voltage		Class A for industrial applications[1)]
- Emitted, high-frequency interference voltage		Class A for industrial applications
• Interference immunity		
- Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)	kV	Contact discharge: 4; Air discharge: 8; Behavior criterion 2
- Induced RF fields acc. to IEC 61000-4-6	MHz	0.15 ... 80; 140 dBµV; Behavior criterion 1
- Burst acc. to IEC 61000-4-4	kV	2/5 kHz; behavior criterion 1
- Surge acc. to IEC 61000-4-5	kV	Conductor - Ground: 2; Conductor - Conductor: 1; Behavior criterion 2
Permissible mounting positions		

[1)] These products were built as Class A devices. The use of these devices in residential areas could result in lead in radio interference. In this case these may be required to introduce additional interference suppression measures.

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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 manual) and the product data sheets.

For applications with a very large power requirement it is possible to use SIVOLT AC power controller. More information on the product range can be found in the Catalog DA 68 or in our Mall.

support.automation.siemens.com/WW/view/de/10862346

See ID: 10752358

Short-circuit and overload protection

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

Siemens generally recommends using 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.

Electromagnetic compatibility (EMC)

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

Suitable filters can be ordered from EPCOS AG. You can find more information on the Internet at:

www.epcos.com

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Solid-State Contactors

SIRIUS 3RF24 solid-state contactors, three-phase

Overview

These two-phase controlled, instantaneous switching solid-state contactors in the insulting 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 with screw connection can use a link module[1] to directly connect to a circuit breaker. Direct mounting on a 3RB20 electronic overload relay[2] 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	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
Rated operational voltage U_e 48 ... 460 V								
5.2	**2.2**	24 DC	A	**3RF24 05-1BB04**	1	1 unit	101	0.250
9.2	**4.0**	acc. to EN 61131-2	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
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 voltage U_e 48 ... 600 V, blocking voltage 1600 V								
5.2	**2.2**	24 DC	B	**3RF24 05-1BB06**	1	1 unit	101	0.250
9.2	**4.0**	acc. to EN 61131-2	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	Rated control supply voltage U_s	DT	Spring-type terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	400 V kW	V		Order No. / Price per PU				kg
Rated operational voltage U_e 48 ... 460 V								
5.2	**2.2**	24 DC	B	**3RF24 05-2BB04**	1	1 unit	101	0.250
9.2	**4.0**	acc. to EN 61131-2	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

3RF24 10-2BB

Rated operational voltage U_e 48 ... 600 V, blocking voltage 1600 V								
5.2	**2.2**	24 DC	B	**3RF24 05-2BB06**	1	1 unit	101	0.250
9.2	**4.0**	acc. to EN 61131-2	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

[1] For 3RA19 21-1AA00 link modules see next page.

[2] For 3RB20 overload relays see Chapter 5.

* You can order this quantity or a multiple thereof.

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SIRIUS 3RF24 solid-state reversing contactors, three-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 or with a 3RB20[1] solid-state overload relay 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
Rated operational voltage U_e 48 ... 460 V								
3.8	**1.5**	24 DC	B	**3RF24 03-1BD04**	1	1 unit	101	0.280
5.4	**2.2**	acc. to EN 61131-2	B	**3RF24 05-1BD04**	1	1 unit	101	0.280
7.4	**3.0**		B	**3RF24 10-1BD04**	1	1 unit	101	0.410
3.8	**1.5**	110 ... 230 AC	B	**3RF24 03-1BD24**	1	1 unit	101	0.280
5.4	**2.2**		B	**3RF24 05-1BD24**	1	1 unit	101	0.280
7.4	**3.0**		B	**3RF24 10-1BD24**	1	1 unit	101	0.410

3RF24 03-1BD

3RF24 10-1BD

[1] For 3RB20 overload relays see Chapter 5.

Accessories

Version	Packing material	DT	Screw terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
			Order No. / Price per PU				kg
Link modules							
For mechanical and electrical connection between contactor and motor starter protector with screw terminals	Single-unit packaging	►	**3RA19 21-1AA00**	1	1 unit	101	0.037
	Multi-unit packaging	►	**3RA19 21-1A**	1	10 units	101	0.028

3RA19 21-1AA00

* You can order this quantity or a multiple thereof.