Reliable solid-state switching devices
for frequent switching of resistive or motor loads



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SOLID-STATE SWITCHING DEVICES

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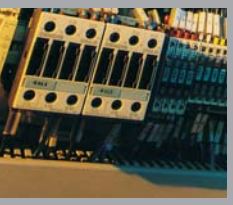
Everything. Easy.
SIRIUS Industrial Controls.

For more than 110 years now we have been developing and manufacturing industrial control products for you. We have always followed the philosophy to make it easier for you by using innovative industrial controls – whether they are in the electrical cabinet, in the field or directly on the machine. This is the reason that today we have combined our complete range of industrial controls under just one star – SIRIUS®.

Everything required to switch, protect and start loads is now in the SIRIUS portfolio. The breath of products includes those which monitor, control, command, signal, detect and supply. Combining our portfolio with higher-level, seamless concepts such as Totally Integrated AutomationTM, Safety Integrated® and ECOFAST® enable the user to create optimized systems.

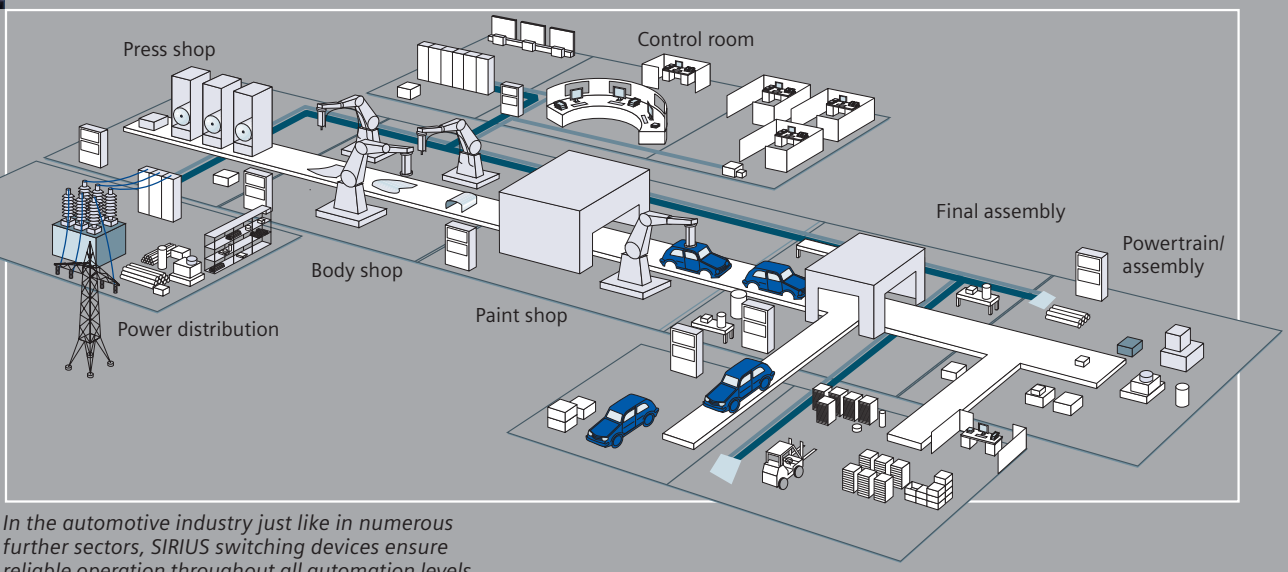
The result is that you obtain reliable and innovative industrial controls that utilize state-of-the-art features – for instance communications and safety systems are integrated – as basis for leading-edge and seamless solutions.

The extensive range that we offer for switching motors and equipment is an important part of our SIRIUS industrial controls. Starting with well-proven and reliable contactors through simple-to-handle relays up to our innovative solid-state switching devices for use in the most rugged of applications – with SIRIUS you simply always switch safely and reliably. With SIRIUS industrial controls you can look forward to the future with confidence.









In the automotive industry just like in numerous further sectors, SIRIUS switching devices ensure reliable operation throughout all automation levels.

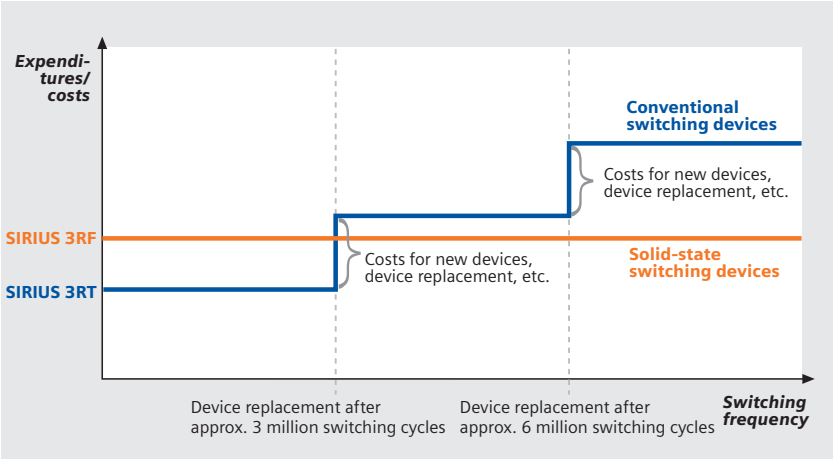
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High switching frequencies, long service life: **Solid-state switching devices with added value**

To improve the competitiveness of industrial systems and plants, the increasing of productivity is becoming more and more important. The result: rising switching frequencies, which can often no longer be mastered by conventional switching devices. A clean-cut case for our SIRIUS solid-state switching devices – once installed, they offer almost unlimited activity. Regular time- and cost-intensive device replacements are thus a thing of the past. Using SIRIUS solid-state switching devices for tasks requiring high switching frequencies is therefore profitable. See for yourself!

Sustainable improvements – solid-state switching technology

Compared to conventional switching devices, our SIRIUS solid-state switching devices stand out with their wear-free and quiet switching behavior. Despite the high switching frequencies, these characteristics are aided by the use of powerful semiconductors, which means that the devices do not use any mechanically moving parts. Where conventional electro-mechanical devices fail and need to be replaced after a certain number of switching cycles, the SIRIUS solid-state switching devices continue their reliable operation.



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Single- and three-phase solid-state relays for resistive loads



Single- and three-phase solid-state contactors for resistive loads



New – three-phase solid-state contactors and reversing contactors for motors



Standardized function modules for various applications

SIRIUS solid-state switching devices – a wide range of advantages

No matter how complex and diversified your tasks may be: Our seamless and integrated product range for frequent switching offers the ideal solution for all applications. We offer single- and three-phase solid-state contactors and relays for resistive loads. As a novelty, our portfolio now also includes three-phase solid-state contactors for motor loads as well as solid-state reversing contactors. Furthermore, we offer function modules which allow easy and highly flexible responses to new requirements.

Accurate, reliable and cost-effective

SIRIUS solid-state switching devices are accurate and reliable. Their compact design assures safe operation up to an ambient temperature of 60 °C (140 °F). Variable connection technologies and a wide control voltage range provide for universal application and variant reduction. The connection technology with removable control terminal further ensures fast and uncomplicated assembly of control cabinets and distribution boards. Ease of mounting and rapid commissioning provide substantial time and cost savings.

Convincing, manifold and proven

The use of our SIRIUS solid-state switching devices is great for multiple application cases: particularly for the control of electric heat, the actuation of valves and motors in conveyor technology or for reversing applications. Due to their quiet switching capability, they are suitable for noise-sensitive areas such as offices or hospitals.

Maximum quality

The fully automatic production of our SIRIUS solid-state switching devices forms the basis for their unique quality. Due to special carrier materials and selected semiconductors, the technical data such as heat transition and power loss is optimized. Therefore, the solid-state relays can be easily mounted onto diverse cooling surfaces while mastering the rated currents specified by the EN 60947-4-3 product standard. In addition, due to the power semiconductors' maximum blocking capacity, additional protective circuits can be eliminated.







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Multiple individual assembly options: **SIRIUS solid-state switching devices in detail**

SIRIUS solid-state switching devices for the switching of resistive loads

Even maximum switching frequencies are easily handled by our solid-state switching devices. In addition to their basic application area, the switching of heaters, they can also be employed for valves or other inductive loads. Depending on the respective application, "zero-point switching" or "instantaneous switching" variants are available. Besides simple on- and off-switching, the load circuits are monitored by retrofittable function modules, allowing even heating power to be controlled.

SIRIUS solid-state relays

SIRIUS solid-state relays are suitable for assembly on existing cooling surfaces. The mounting process is completed quickly and easily with only two screws. The power semiconductor's special technology ensures a perfect thermal contact with the heat sink. Depending on the heat sink's characteristics, the devices offer a capacity of up to 88 A for resistive loads. If very many resistive loads have to be controlled, the relays can be mounted on a large group heat sink. With a dissipation of the power loss to the outside, the control cabinet's heating is minimized. For individual adjustments, the solid-state relays can be extended by various function modules.

Single-phase versions



Solid-state relays 22.5 mm

With its narrow width of 22.5 mm, our 3RF21 solid-state relay saves space. The logical connection technology, the power supply from the top and the load connection from the bottom ensure a structured assembly inside the control cabinet.

Solid-state relays 45 mm

The 45 mm standard version 3RF20 offers a top connection of the power supply line and the load. This facilitates easy replacement of available solid-state relays in existing assemblies. As with the 22.5 mm version, the control line is simply plugged on.

Three-phase versions



With their compact width of 45 mm, the three-phase solid-state relays offer a space-saving and cost-affordable solution for the operation of three-phase loads. Depending on the employed heat sink, loads of up to 55 A can be switched. You can also choose between two- and three-phase controlled versions. The two-phase controlled version distinguishes itself as a result of having the lowest power loss; the three-phase version can be used when all three phases need to be switched operationally. Similarly to the 3RF21 solid-state relays, the power supply line is connected from the top and the load from the bottom. The removable control plug allows for pre-wiring of the circuit.

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SIRIUS solid-state contactors

The complete devices consist of a solid-state relay plus an optimized heat sink and are “ready to use”. Due to the heat sink’s exact matching to the power semiconductor, defined rated currents are realized. This way, solid-state switching devices which are accurately matched to the respective load can be selected rapidly and easily. Depending on the version, current strengths of up to 88 A are supported. Like all of our solid-state switching devices, our SIRIUS solid-state contactors stand out with their compact and space-saving design. The devices can be mounted closely, side-by-side, due to the special design of their terminals which are protected against direct touch. The insulated mounting foot allows for the devices’ easy snap-on installation on the mounting rail or fitting to mounting plates using fixation screws. This insulation facilitates the contactors’ application in circuits accommodating extra-low protective or function voltages in building technology. For other application cases, e.g. extended personal protection, the heat sink can be grounded by means of screw-type connections.

Optionally, SIRIUS solid-state relays and contactors can be installed in fuseless or fused load feeders. Our single-phase solid-state contactors are furthermore available in a “short-circuit proof” special version. This way, semiconductor protection is also assured in fuseless assemblies. Due to a convenient matching of the power semiconductor to the solid-state contactor’s power rating, short-circuit proof functionality is attained with a standard supplementary protector. When combined with a B-type supplementary protector or a conventional line protection fuse, a short-circuit proof load feeder is assembled.

Single-phase versions



With seven versions, a current range up to 88 A is covered. The 10.5 and 20 A versions have a narrow width of 22.5 mm. Special versions facilitate the devices’ application in public mains or a short-circuit proof assembly using a supplementary protector up to 25 A.

Three-phase versions



The three-phase solid-state contactors are typically used in three-phase applications. With five versions, offered in two- and three-phase controlled versions, a current range from 10 to 50 A is covered. As with the three-phase solid-state relays, they serve a voltage range from 48 to 600 V AC and are offered as “zero-point switching” version. The wide control voltage range from 4 to 30 V DC allows for the devices’ operation on digital controls (PLC) or simple temperature controllers.

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SIRIUS solid-state switching devices for motor switching

Ever increasing productivity requirements are driving an increase in the switching frequency requirements for motor applications. This challenge poses no problem for our SIRIUS solid-state contactors for motor switching. With three-phase motors up to 7.5 kW (5 hp), the SIRIUS solid-state contactors reliably operate even the maximum switching frequencies. The application of solid-state reversing contactors allows for a continuous reversal of the motor rotation. The typical application examples include conveyor belts in parcel distribution systems or palletizing machines.

Both versions are designed to be easily combined with components of the SIRIUS modular system. Connection with the SIRIUS motor starter protectors or overload relays is easy. The assembly of fuseless or fused motor feeders can thus be rapidly realized.

Three-phase solid-state contactors

These two-phase controlled, instantaneous-switching solid-state contactors embedded in an insulated enclosure are rated up to 5 A in a width of 45 mm and up to 16 A in a width of 90 mm. The devices can be connected to a motor starter protector using a link module. The direct mounting of a solid-state overload relay is likewise possible. Motors of up to 7.5 kW (5 hp) can be operated.



Three-phase solid-state reversing contactors

The integration of four current paths in a reversing circuit accommodated in a single enclosure turns this device into a particularly compact solution. Compared to conventional systems, for which two contactors are required, the three-phase reversing contactors facilitate space savings of up to 50% of the width. Devices with a width of 45 mm cover motors up to 2.2 kW (3 hp) and the 90 mm width design serves motor applications up to 3 kW (3 hp).



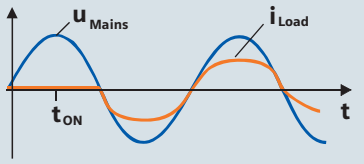
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Optimized control principles

Version for resistive loads: "zero-point switching"

Zero-point switching

Switching of resistive loads, e.g. heating circuits

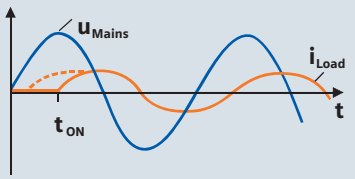


To assure an optimized control principle for various loads, the functionality of our single- and three-phase solid-state switching devices has been adapted. For resistive loads, the "zero-point switching" principle is best. This means: The power semiconductor is controlled exactly when the voltage passes through zero.

Version for inductive loads: "instantaneous-switching"

Instantaneous-switching

Switching of inductive loads, e.g. motors



For inductive loads, such as valves, the "instantaneous-switching" principle is a better solution. Due to the distribution of the switch-on point over the complete sinusoidal curve of the mains voltage, disturbances are minimized. This version of the solid-state switching devices is specifically matched to inductive loads. Tasks such as the frequent operation of valves in a filling system as well as the start-up and shut-down of small drives in parcel distribution systems are reliably and quietly completed.

Special version for resistive loads: "low-noise"

Due to a special control circuit, this version of the single-phase solid-state contactor can be used in public mains up to 16 A without additional measures such as noise suppression filters. Thus, the emitted interference does not exceed the limit value curve Class B in accordance with EN 60947-4-3.

Variable connection technology

All SIRIUS solid-state switching devices are characterized by a large number of available connection technologies. You can choose between screw-type connection, the industrial standard for loads up to 50 A, or the innovative spring-loaded technology for loads up to 20 A, which requires no screw connections while guaranteeing a high vibration resistance. Another option is the ring cable lug connection technology for safe attachment of large cross-sections with currents up to 88 A. SIRIUS solid-state switching devices offer the best suited main current connection for all assembly types including protection against direct touch.







Variable connection technology: Screw-type connection, spring-loaded or ring cable lug connection: SIRIUS solid-state switching devices offer the optimum technology for all applications

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Your project in perfect company: **Solid-state switching devices in practical applications**



"The monitoring modules for the SIRIUS solid-state contactors are a cost-favorable and technically easily feasible solution to realize system transparency."

Ulrich Lesser, electrical construction department, machine manufacturing company Herbert Meyer

Plug-on load monitoring modules ease construction at the Herbert Meyer machine manufacturing company in Roetz

For the equipment of its fully automatic carpet molding presses, the traditional company relies on pulse package control to adapt the radiant heaters' capacity to the respective requirements. This necessitates a solution which allows for a detection of the current flow even with a pulsed actuation of heating elements.

The solution
Even high-frequency pulsed electric currents are reliably monitored by the solid-state contactors – including a load monitoring module.

The advantages
- Space savings in the control cabinet – the load monitoring module is simply plugged onto the solid-state contactor
- Easy and flexible teach-in of the setpoint current via the teach button
- Faults or failures of radiant heaters are immediately signaled by the load monitoring module – safeguarding of the production process due to short response times



"With the SIRIUS solid-state contactors, we are able to attain an excellent temperature control of our machines based on a simple concept."

Herbert Kaiser, head of the electrical construction department, Kallfass company

Powerful alternative to non-solid-state solutions at the Kallfass company in Nuertingen

As one of the leading manufacturers of foil packing machines, the Kallfass company faced the challenge of packing chocolates in a particularly high-quality but extremely temperature-sensitive foil. This requires sensitive control of the heating zones, which can be realized by operating the heating rods with high switching frequencies.

The solution
The conversion from mechanical contactors to SIRIUS solid-state contactors for frequent switching.

The advantages
- Almost unlimited service life – no regular replacement required
- Reliable maintenance of the setpoint temperature in all situations – due to dynamic power control
- Additional overload reserve – due to the application of 50 A solid-state contactors as a standard for the foil packing machines

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Accurate temperature control in climate chambers at the CTS Umweltsimulation company

With their test chambers, CTS Umweltsimulation, a company specialized in environmental simulations, tests varying components under extreme climatic conditions. Low-voltage switching devices are required which can accurately reproduce and control different temperature conditions.

The solution
The SIRIUS solid-state contactors are employed for a temperature-accurate switching of the heating elements.

The advantages
- Noise- and wear-free switching even with high switching frequencies
- Solid-state contactors are immediately ready for operation – due to an optimally matched heat sink
- Fast mounting of the solid-state contactors – due to insulated mounting foot which is snapped onto the mounting rail



"We have made optimum experience with the SIRIUS solid-state contactors; which have reduced heating failures to almost zero."

Udo Meerbott, head of the order and material logistics department, CTS Umweltsimulation company

Optimized bumper production at the Ford car manufacturer in Saarlouis

While comprehensively modernizing their machinery, the Ford car manufacturer in Saarlouis had to convert its low-voltage controls and distribution components to state-of-the-art technology. For the plastic machines, a sensitive control of the numerous heating circuits in the injection molding tools was required.

The solution
The decision-makers opted for the rugged and particularly fast-switching SIRIUS solid-state contactors. They ensure the required temperature control inside the injection molding tools.

The advantages
- Improved quality and cycle times reduced from 80 to 54 seconds due to optimized temperature control
- Power setting in percent – with the plug-on converter module, analog signals are transformed into pulse-width modulated digital signals
- Flexible adaptation of the system to future requirements – due to matched, modular system components of the SIRIUS range



"We decided to install the SIRIUS solid-state contactors in this application for the first time because they simply offered the best cost/performance-ratio."

Alois Kiefer, production engineer in the plastic production department, Ford in Saarlouis

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Extended functionality, improved options: **Function modules and SIRIUS modular system**



Single-phase solid-state contactor with load monitoring



Three-phase solid-state contactor with converter



Fuseless and fused motor feeder

In the industrial world, challenges form part of the everyday business. Production capacities need to be adjusted to the respective requirements with even more flexibililty. This presents a clean-cut case for our SIRIUS solid-state switching devices for the switching of resistive loads. Combined with standardized function modules, these devices can be quickly and reliably extended and adapted to individual needs.

The functionality of the solid-state contactors for motor switching is easily extended due to their integration in the SIRIUS modular system. This saves time in the assembly of motor feeders for frequently switching applications.

Simply snap-on and work away

Assembly of our function modules is completed in quickly. By simply snapping them on, all connections to the solid-state relay or contactor are established. The plug connection for the control of the solid-state switching devices can be used. It could hardly be simpler.

The function extension of the single-phase solid-state relays with a width of 22.5 mm and the solid-state contactors by the function modules' simple plug-on installation supports numerous different applications.

With three-phase applications, the three-phase solid-state contactors and relays can be extended by converters to assemble a simple power control.

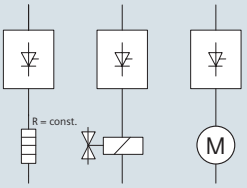
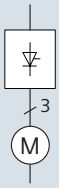
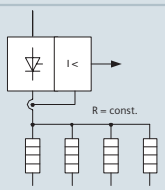
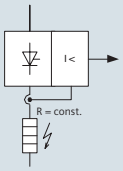
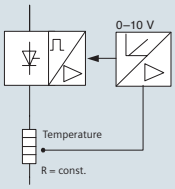
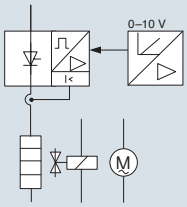
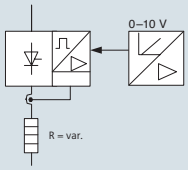
Systematic combination and mounting

By combining the solid-state contactors for the switching of motors with a motor starter protector, fuseless motor feeders can be quickly and easily assembled. Fused motor feeders are also easy-to-build – by mounting an overload relay to the solid-state contactors.

All in all, the SIRIUS modular system and its components – such as motor starter protectors, overload relays and fuses – provides you with a reliable overall solution for load feeders subject to high switching frequencies.

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Overview table of the SIRIUS solid-state switching devices portfolio

Function	Applications
Frequent switching of resistive and inductive loads Solid-state relay or solid-state contactor 	• Operation of individual heating elements with constant resistance • Operation of valves • Starting and stopping small single-phase motors 
Frequent switching of motors Solid-state contactor or solid-state reversing contactor, three phase units with 2 or 3 phase control 	• Starting and stopping small three phase motors – Connection to the 3RV motor starter protector via link module – Capable of attaching to the 3RB2 solid-state overload relay 
Frequent switching and load monitoring of solid-state relays/solid-state contactors Solid-state relay or solid-state contactor plus load or heat monitoring module 	• Operation of several heating elements with constant resistance at a solid-state relay or solid-state contactor  • Operation and monitoring of critical heating systems 
Control of the heating power through ON/OFF ratio Solid-state relay or solid-state contactor plus converter module 	• Distributed autonomous temperature control (the temperature controller directly cooperates with the SIRIUS solid-state switching device) 
Control of the heating power through ON/OFF ratio (or phase angle control) Solid-state relay or solid-state contactor plus power controller module 	• Power control through analog signal 
Power control Solid-state relay or solid-state contactor plus power regulator module 	• Complex heating systems • Heating elements with temperature-dependent resistance • Heating elements with long-time aging • Simple indirect temperature control through power control 

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SIRIUS Solid-state switching devices

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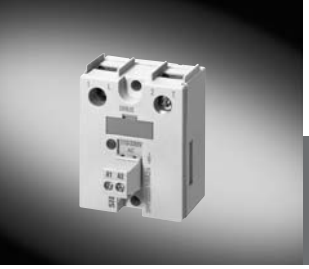


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SOLID-STATE SWITCHING DEVICES

Selection and ordering data

SIEMENS



Solid-State Switching Devices for the Switching of Resistive Loads

3RF20 solid-state relays, single-phase, 45 mm

Type current [1, 2] A	Rated operating voltage U_e in V 24–230	48–460	48–600	48–600 (1600 V block voltage)
Control voltage 24 V DC in acc. with EN 61161-2 **– zero-point switching**				
20	3RF2020-1AA02	3RF2020-1AA04	–	–
30	3RF2030-1AA02	3RF2030-1AA04	–	3RF2030-1AA06
50	3RF2050-1AA02	3RF2050-1AA04	–	3RF2050-1AA06
50	3RF2050-4AA02 [3]	–	–	–
70	3RF2070-1AA02	3RF2070-1AA04	–	3RF2070-1AA06
90	3RF2090-1AA02	3RF2090-1AA04	–	3RF2090-1AA06
Control voltage 4–30 V DC – zero-point switching				
20	3RF2020-1AA42	–	3RF2020-1AA45	–
30	3RF2030-1AA42	–	–	–
50	–	3RF2050-1AA44	3RF2050-1AA45	–
70	–	–	3RF2070-1AA45	–
90	–	–	3RF2090-1AA45	–
Control voltage 110–230 V AC – zero-point switching				
20	3RF2020-1AA22	3RF2020-1AA24	–	–
30	3RF2030-1AA22	3RF2030-1AA24	–	3RF2030-1AA26
50	3RF2050-1AA22	3RF2050-1AA24	–	3RF2050-1AA26
70	3RF2070-1AA22	3RF2070-1AA24	–	3RF2070-1AA26
90	3RF2090-1AA22	3RF2090-1AA24	–	3RF2090-1AA26
Control voltage 24 V DC in acc. with EN 61161-2 **– instantaneous-switching**				
20	–	–	–	–
30	–	3RF2030-1BA04	–	–
50	–	–	–	–
70	–	–	–	–
90	–	–	–	–

Further versions upon request

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

2) Please note that the version with screw-type connection can be used for a rated current of up to 50 A and a conductor cross-section of 10 mm^2.

3) Version with spring-loaded control plug.



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

Order no. supplement for the connection system 1 = Screw-type [1]
2 = Spring-loaded [2]
3 = Ring cable lug

Type current [3] A	Rated operating voltage U_e in V 24–230	48–460	48–600	48–600 (1600 V block voltage)
Control voltage 24 V DC in acc. with EN 61161-2 **– zero-point switching**				
20	3RF2120-□AA02	3RF2120-□AA04	–	–
30	3RF2130-1AA02	3RF2130-1AA04	–	3RF2130-1AA06
50	3RF2150-□AA02	3RF2150-□AA04	–	3RF2150-□AA06
70	3RF2170-1AA02	3RF2170-1AA04	–	3RF2170-1AA06
90	3RF2190-□AA02	3RF2190-□AA04	–	3RF2190-□AA06
Control voltage 4–30 V DC – zero-point switching				
20	3RF2120-1AA42	–	3RF2120-1AA45	–
20	3RF2120-2AA42	–	–	–
30	3RF2130-1AA42	–	3RF2130-1AA45	–
50	–	–	3RF2150-1AA45	–
70	–	–	3RF2170-1AA45	–
90	–	3RF2190-3AA44	3RF2190-1AA45	–
Control voltage 110–230 V AC – zero-point switching				
20	3RF2120-□AA22	3RF2120-□AA24	–	–
30	3RF2130-1AA22	3RF2130-1AA24	–	3RF2130-1AA26
50	3RF2150-□AA22	3RF2150-□AA24	–	3RF2150-□AA26
70	3RF2170-1AA22	3RF2170-1AA24	–	3RF2170-1AA26
90	3RF2190-□AA22	3RF2190-□AA24	–	3RF2190-□AA26
Control voltage 24 V DC – instantaneous-switching				
20	–	3RF2120-1BA04	–	–
30	–	3RF2130-1BA04	–	–
50	–	3RF2150-1BA04	–	3RF2150-1BA06
70	–	3RF2170-1BA04	–	–
90	–	3RF2190-1BA04	–	–

Further versions upon request

Accessory: Terminal cover	
for 3RF21 solid-state relays and 3RF23 solid-state contactors with ring cable lug connection system (by means of a simple adjustment, this terminal cover can also be used for the screw-type connection system).	3RF2900-3PA88

1) Please note that the version with screw-type connection can be used for a rated current of up to 50 A and a conductor cross-section of 10 mm².

2) Please note that the version with spring-loaded terminal can be used for a rated current of up to 20 A and a conductor cross-section of 2.5 mm². Larger currents can be attained by connecting 2 conductors per connection point.

3) The type current provides information about the performance of the solid-state relay. The actual permitted rated operating current I_e can be smaller, depending on the connection system and cooling conditions.



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

Type current [1, 2] A	Rated operating voltage U_e 48–600 V Screw-type connection	Spring-loaded terminal	Ring cable lug connection
2-phase controlled			
Control voltage 4–30 V DC – zero-point switching			
30	3RF2230-1AB45	3RF2230-2AB45	3RF2230-3AB45
55	3RF2255-1AB45	3RF2255-2AB45	3RF2255-3AB45
3-phase controlled			
Control voltage 4–30 V DC – zero-point switching			
30	3RF2230-1AC45	3RF2230-2AC45	3RF2230-3AC45
55	3RF2255-1AC45	3RF2255-2AC45	3RF2255-3AC45

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

2) Please note that the version with screw-type connection can be used for a rated current of up to 50 A and a conductor cross-section of 10 mm^2.



3RF23 solid-state contactors, single-phase
zero-point switching

Order no. supplement for the connection system 1 = Screw-type
2 = Spring-loaded
3 = Ring cable lug

Type current[1] I_{max} in A	Rated operating voltage U_e in V 24–230	48–460	48–600	48–600 (1600 V block voltage)
Control voltage 24 V DC in acc. with EN 61161-2				
10.5	3RF2310-□AA02	3RF2310-□AA04	–	3RF2310-□AA06
20	3RF2320-□AA02	3RF2320-□AA04	–	3RF2320-□AA06
30	3RF2330-□AA02[2]	3RF2330-□AA04[2]	–	3RF2330-□AA06[2]
40	3RF2340-□AA02[2]	3RF2340-□AA04[2]	–	3RF2340-□AA06[2]
50	3RF2350-□AA02[2]	3RF2350-□AA04[2]	–	3RF2350-□AA06[2]
70	3RF2370-3AA02	3RF2370-3AA04	–	3RF2370-3AA06
90	3RF2390-3AA02	3RF2390-3AA04	–	3RF2390-3AA06
Control voltage 4–30 V DC				
10.5	–	3RF2310-1AA44	3RF2310-1AA45	–
20	–	3RF2320-□AA44[2]	3RF2320-1AA45	–
30	–	3RF2330-□AA44[2]	3RF2330-1AA45	–
40	–	3RF2340-1AA44	3RF2340-□AA45[2]	–
50	–	3RF2350-□AA44[2]	3RF2350-1AA45	–
70	–	–	3RF2370-3AA45	–
90	–	–	3RF2390-3AA45	–
Control voltage 110–230 V AC				
10.5	3RF2310-□AA22	3RF2310-□AA24	–	3RF2310-□AA26
20	3RF2320-□AA22	3RF2320-□AA24	–	3RF2320-□AA26
30	3RF2330-□AA22[2]	3RF2330-□AA24[2]	–	3RF2330-□AA26[2]
40	3RF2340-□AA22[2]	3RF2340-□AA24[2]	–	3RF2340-□AA26[2]
50	3RF2350-□AA22[2]	3RF2350-□AA24[2]	–	3RF2350-□AA26[2]
70	3RF2370-3AA22	3RF2370-3AA24	–	3RF2370-3AA26
90	3RF2390-3AA22	3RF2390-3AA24	–	3RF2390-3AA26
Control voltage 24 V AC/DC				
10.5	3RF2310-1AA12	3RF2310-1AA14	–	–
20	–	3RF2320-1AA14	–	–
30	–	3RF2330-1AA14	–	–
40	–	3RF2340-1AA14	–	–
50	–	3RF2350-1AA14	–	–

Further versions upon request

1) The type current provides information about the performance of the solid-state contactor. The actual permitted rated operating current I_e can be smaller, depending on the connection system and assembly conditions.

2) Not available in spring-loaded technology.



3RF23 solid-state contactors, single-phase
Instantaneous-switching

Order no. supplement for the connection system 1 = Screw-type
3 = Ring cable lug

Type current [1] I_{max} in A	Rated operating voltage U_e in V 24–230	48–460	48–600 (1600 V block voltage)
Control voltage 24 V DC in acc. with EN 61161-2			
10.5	3RF2310-1BA02	3RF2310-1BA04	3RF2310-1BA06
20	3RF2320-1BA02	3RF2320-1BA04	3RF2320-1BA06
30	3RF2330-1BA02	3RF2330-1BA04	3RF2330-1BA06
40	3RF2340-1BA02	3RF2340-1BA04	3RF2340-1BA06
50	3RF2350-1BA02	3RF2350-1BA04	3RF2350-1BA06
70	3RF2370-□BA02	3RF2370-□BA04	3RF2370-□BA06
90	3RF2390-□BA02	3RF2390-□BA04	3RF2390-□BA06
Control voltage 4–30 V DC			
10.5	–	–	–
20	–	–	–
30	–	3RF2330-1BA44	–
40	–	–	–
50	–	3RF2350-1BA44	–
70	–	–	–
90	–	–	–
Control voltage 110–230 V AC			
10.5	3RF2310-1BA22	3RF2310-1BA24	3RF2310-1BA26
20	3RF2320-1BA22	3RF2320-1BA24	3RF2320-1BA26
30	3RF2330-1BA22	3RF2330-1BA24	3RF2330-1BA26
40	3RF2340-1BA22	3RF2340-1BA24	3RF2340-1BA26
50	3RF2350-1BA22	3RF2350-1BA24	3RF2350-1BA26
70	3RF2370-□BA22	3RF2370-□BA24	3RF2370-□BA26
90	3RF2390-□BA22	3RF2390-□BA24	3RF2390-□BA26

Further versions upon request

1) The type current provides information about the performance of the solid-state contactor. The actual permitted rated operating current I_e can be smaller, depending on the connection system and assembly conditions.



3RF23 solid-state contactors, single-phase
zero-point switching – special versions

Order no. supplement for the connection system 1 = Screw-type
2 = Spring-loaded

Type current [1] I_{max} in A	Rated operating voltage U_e in V 24–230	48–460
Solid-state contactors "low-noise"		
Control voltage 24 V DC in acc. with EN 61161-2		
20	3RF2320-□CA02	3RF2320-□CA04
30	3RF2330-1CA02	–
Control voltage 4–30 V DC		
20	–	3RF2320-1CA44
Control voltage 110–230 V AC		
20	3RF2320-□CA22	3RF2320-□CA24

Order no. supplement for the connection system 1 = Screw-type
2 = Spring-loaded
3 = Ring cable lug

Rated operating current in A	Rated operating voltage U_e in V 24–230	48–460
Solid-state contactors "short-circuit proof with B-type supplementary protector"		
Control voltage 24 V DC in acc. with EN 61161-2 – zero-point switching		
20	3RF2320-□DA02[2]	3RF2320-□DA04[2]
Control voltage 4–30 V DC – zero-point switching		
20	–	3RF2320-1DA44
30	–	3RF2330-1DA44
Control voltage 110–230 V AC		
20	3RF2320-□DA22	3RF2320-□DA24

Further versions upon request

Accessory: Terminal cover	
for 3RF21 solid-state relays and 3RF23 solid-state contactors with ring cable lug connection system (by means of a simple adjustment, this terminal cover can also be used for the screw-type connection system).	3RF2900-3PA88

1) The type current provides information about the performance of the solid-state contactor. The actual permitted rated operating current I_e can be smaller, depending on the connection system and assembly conditions.

2) Not available in spring-loaded technology.



3RF24 solid-state contactors, single-phase
zero-point switching

Type current [1] I_{max} in A	Rated operating voltage U_e 48–600 V Screw-type connection	Spring-loaded terminal	Ring cable lug connection
2-phase controlled			
Control voltage 4–30 V DC			
10	3RF2410-1AB45	3RF2410-2AB45	–
20	3RF2420-1AB45	3RF2420-2AB45	–
30	3RF2430-1AB45	–	–
40	3RF2440-1AB45	–	–
50	3RF2450-1AB45	–	3RF2450-3AB45
Control voltage 230 V AC			
10	3RF2410-1AB55	3RF2410-2AB55	–
20	3RF2420-1AB55	3RF2420-2AB55	–
30	3RF2430-1AB55	–	–
40	3RF2440-1AB55	–	–
50	3RF2450-1AB55	–	3RF2450-3AB55
3-phase controlled			
Control voltage 4–30 V DC			
10	3RF2410-1AC45	3RF2410-2AC45	–
20	3RF2420-1AC45	3RF2420-2AC45	–
30	3RF2430-1AC45	–	–
40	3RF2440-1AC45	–	–
50	3RF2450-1AC45	–	3RF2450-3AC45
Control voltage 230 V AC			
10	3RF2410-1AC55	3RF2410-2AC55	–
20	3RF2420-1AC55	3RF2420-2AC55	–
30	3RF2430-1AC55	–	–
40	3RF2440-1AC55	–	–
50	3RF2450-1AC55	–	3RF2450-3AC55

Further versions upon request

1) The type current provides information about the performance of the solid-state contactor. The actual permitted rated operating current I_e can be smaller, depending on the connection system and assembly conditions.



3RF24 solid-state contactors, three-phase
2-phase controlled / instantaneous-switching

Order no. supplement for the connection system 1 = Screw-type
2 = Spring-loaded

IEC Ambient temperature 40 °C (104 °F) Rated power in kW (400 V)	Rated operating current in A	UL/CSA Ambient temperature 50 °C (122 °F) Rated power in hp (460 V)	Rated operating current in A	Rated operating voltage U_e in V 48–480	48–600
Solid-state contactors					
Control voltage 24 V DC					
2.2	5.2	2	3.6	3RF2405-□BB04	3RF2405-□BB06
4.0	9.2	3	7	3RF2410-□BB04	3RF2410-□BB06
5.5	12.5	5	8.5	3RF2412-□BB04	3RF2412-□BB06
7.5	16	5	10	3RF2416-□BB04	3RF2416-□BB06
Control voltage 230 V AC					
2.2	5.2	2	3.6	3RF2405-□BB54	3RF2405-□BB56
4.0	9.2	3	7	3RF2410-□BB54	3RF2410-□BB56
5.5	12.5	5	8.5	3RF2412-□BB54	3RF2412-□BB56
7.5	16	5	10	3RF2416-□BB54	3RF2416-□BB56

IEC Ambient temperature 40 °C (104 °F) Rated power in kW (400 V)	Rated operating current in A	UL/CSA Ambient temperature 50 °C (122 °F) Rated power in hp (460 V)	Rated operating current in A	Rated operating voltage U_e in V 48–480	48–600
Solid-state reversing contactors					
Control voltage 24 V DC					
1.5	3.8	2	3.5	3RF2403-1BD04	–
2.2	5.4	3	5	3RF2405-1BD04	–
3.0	7.4	3	6.8	3RF2410-1BD04	–
Control voltage 230 V AC					
1.5	3.8	2	3.5	3RF2403-1BD54	–
2.2	5.4	3	5	3RF2405-1BD54	–
3.0	7.4	3	6.8	3RF2410-1BD54	–

Further versions upon request



3RF29 Function Modules

Rated operating current in A	Rated control supply voltage U_s	Rated operating voltage U_e in V Not relevant
Converter		
Not relevant	24 V AC/DC	3RF2900-0EA18
Load monitoring, basic		
20	24 V DC	3RF2920-0FA08

Rated operating current in A	Rated control supply voltage U_s	Rated operating voltage U_e in V 110–230	400–600
Load monitoring, extended			
20	24 V AC/DC	3RF2920-0GA13	3RF2920-0GA16
20	110 V AC	3RF2920-0GA33	3RF2920-0GA36
50	24 V AC/DC	3RF2950-0GA13	3RF2950-0GA16
50	110 V AC	3RF2950-0GA33	3RF2950-0GA36
90	24 V AC/DC	3RF2990-0GA13	3RF2990-0GA16
90	110 V AC	3RF2990-0GA33	3RF2990-0GA36
Heating current monitoring			
16	24 V AC/DC	3RF2916-0JA13	3RF2916-0JA16-1KK0
32	24 V AC/DC	3RF2932-0JA13-1KK0	3RF2932-0JA16
Power controller			
4	24 V AC/DC	3RF2904-0KA13-0KC0[1]	–
4	24 V AC/DC	3RF2904-0KA13-0KT0[2]	–
20	24 V AC/DC	3RF2920-0KA13	3RF2920-0KA16
50	24 V AC/DC	3RF2950-0KA13	3RF2950-0KA16
90	24 V AC/DC	3RF2990-0KA13	3RF2990-0KA16
Power regulator			
20	24 V AC/DC	3RF2920-0HA13	3RF2920-0HA16
20	110 V AC	3RF2920-0HA33	3RF2920-0HA36
50	24 V AC/DC	3RF2950-0HA13	3RF2950-0HA16
50	110 V AC	3RF2950-0HA33	3RF2950-0HA36
90	24 V AC/DC	3RF2990-0HA13	3RF2990-0HA16
90	110 V AC	3RF2990-0HA33	3RF2990-0HA36

Further versions upon request

Accessory: Terminal cover	
Sealable terminal cover	3RF2900-0RA88

1) No partial load monitoring; no current flow during the "teach" process.

2) No partial load monitoring.

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Automation and Drives
Low-Voltage Controls and Distribution
P.O. Box 48 48, 90327 NUREMBERG, GERMANY

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