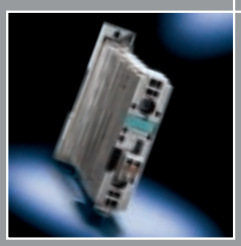
Simply on. Simply off.
Day and Night.

sirius SWITCHING

SIEMENS

SIRIUS contactors

SIRIUS relays



SIRIUS SC solid-state switching devices

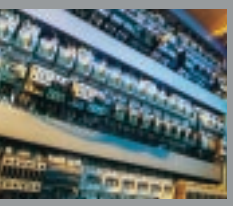
Everything. Easy. **With SIRIUS industrial controls.**

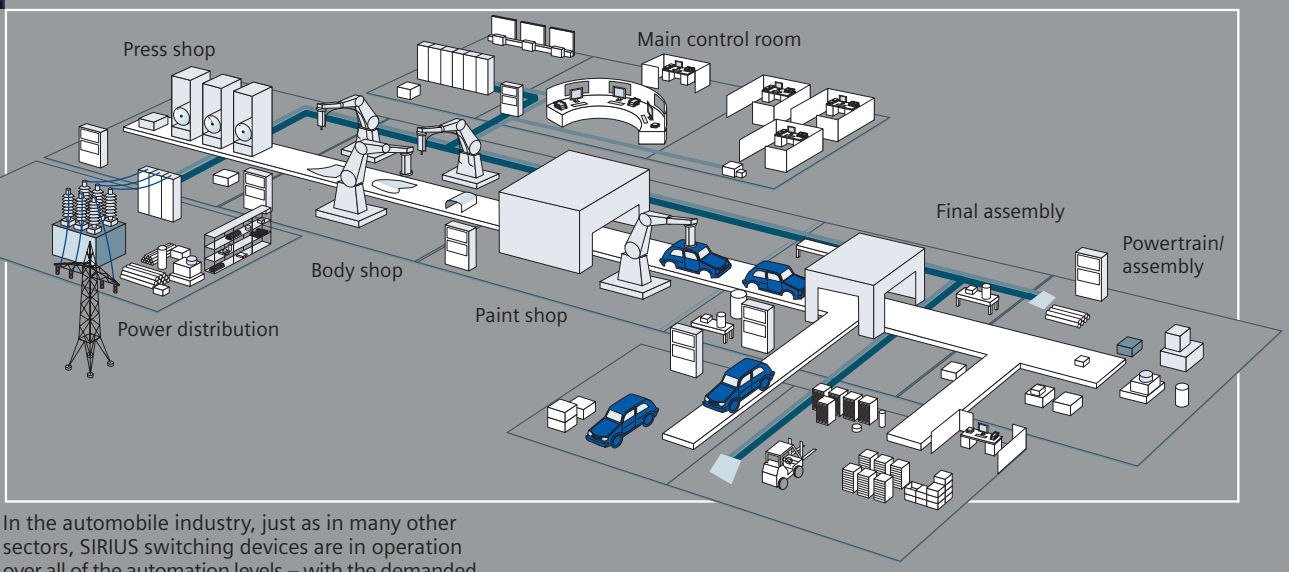
For more than 110 years now we have been developing and manufacturing industrial control products. We have always followed the philosophy to make it easier to use – whether in the electrical cabinet, in the field or directly at the machine. Today, we have combined our complete range of industrial controls under one star: SIRIUS®.

And this is precisely what makes it easy for you: because everything that requires to switch, protect and start loads can be found in our SIRIUS portfolio. Further, products to monitor, control, signal, detect and supply complete the range – and using seamless, integrated concepts, such as Totally Integrated Automation®, Safety Integrated and ECOFAST®, our portfolio can be combined to create optimized systems.

This means that you have access to reliable and innovative industrial controls that have state-of-the-art features such as the integration of communication and safety technology as a basis for leading-edge seamless solutions.

An important element of our SIRIUS industrial controls is the extensive range of products that we can offer associated with controlling and switching motors and systems. From well-proven and reliable contactors through relays that are easy to use to our innovative SIRIUS SC solid-state switching devices for use in the toughest of conditions. With SIRIUS you always switch simply, safely and reliably. With SIRIUS industrial controls, you can look to the future with confidence.



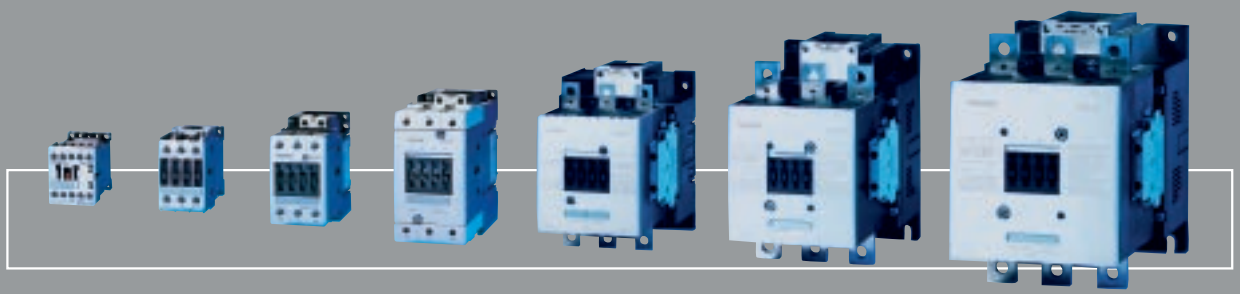


In the automobile industry, just as in many other sectors, SIRIUS switching devices are in operation over all of the automation levels – with the demanded degree of reliability.

Everything for the electrical cabinet –
modular SIRIUS system

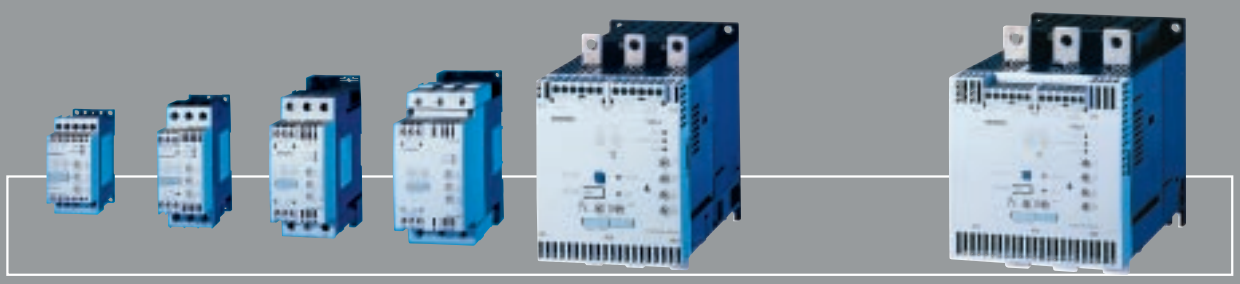
SIRIUS 3RV
Circuit-breakers

SENTRON 3VL



Contactors

Overload relays



Soft starters

Can be flexibly combined, quickly mounted, simply connected: Our modular SIRIUS system structure makes it easy for you.

Everything made easy: Configuring load-feeder

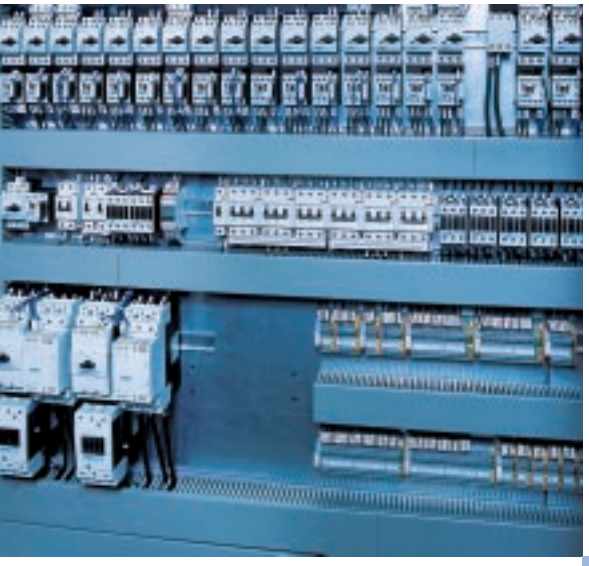
Standard modularcomponents are optimally harmonized with one another and can be easily combined with common accessories. These are benefits that our well-proven modular SIRIUS system can offer you for the simple configuration of load feeders. SIRIUS includes everything that you require for switching, protecting and starting motors and systems. Only seven frame sizes cover the complete power range up to 250kW/400V (400HP/480V).

We are continually improving and expanding our modular SIRIUS system in order to cost effectively meet all of the requirements from the field. The individual components distinguish themselves thanks to their space-saving design and high degree of flexibility. Engineering, mounting, wiring and maintenance are extremely simple and fast. Whether you wish to configure load feeders using circuit-breakers or overload relays, contactor or soft starter – our modular SIRIUS system offers the optimum product for each and every application.

The advantages of the modular SIRIUS system at a glance:	
Load feeders	Up to 250 kW/400 V (400 HP/480 V) can be simply realized using standard devices
Modular design	Everything fits together and can be combined as required
Versions and sizes	Cost-effective and flexible using 7 compact sizes
Accessories	Optimum degree of variance using standard accessories for all devices
Design	Space-saving as a result of the narrow device width and side-by-side mounting up to 60°C
Assembly and configuring	Fast commissioning, short assembly times, simple wiring
Communications	Can be connected to AS-Interface and PROFIBUS DP
Service/maintenance	Reliable performance with extremely long service life and low maintenance
Approvals	Approved and certified worldwide – such as UL, CSA, CE, CCC, marine engineering
Mounting	Screwed or snapped-on for permanent, safe and reliable mounting
Spring-loaded technology	Fast, vibration-proof and maintenance-free terminals
Service	Global logistic network allows short delivery times of spare parts
Environmental issues	Environmentally-compatible production and materials, can be recycled, low power loss
Design	Clear, ergonomical design has received the iF Product Design Award

What you can rely on:
SIRIUS contactors.

Even if some people think that you can no longer depend on anything today – there is one thing that you can count on: Our SIRIUS contactors. Thanks to their extreme ruggedness and contact reliability, our contactors always switch competently and reliably. No matter what conditions, SIRIUS contactors always have the optimum performance for each and every requirement.



Classic applications of SIRIUS contactors: Controlling three-phase motors (below) – can be mounted in a user-friendly fashion in the electrical cabinet – thanks to the standard widths of the feeder elements (left).

Size S00

Size S0

Size S2

Everything is possible: The narrow-profile concept

Compact electrical cabinets with a high component packing density – SIRIUS contactors make it possible. This is because the auxiliary contact blocks and coil surge suppressors are located within the dimensions of the contactor. This makes it easier to expand the functionality and saves space in the electrical cabinet. Further, the contactors have been designed for side-by-side mounting without any de-rating at ambient temperatures of up to 60°C. This is because low-loss operating systems are used which means that the amount of heat generated in the electrical cabinet is significantly lower.

Everything in great shape: Safety

With SIRIUS contactors you are always on the safe side from several perspectives. Not only are they especially reliable in operation, they also have an extremely long lifetime, require little maintenance and are rugged. They comply with all of the relevant standards and can therefore be used worldwide. 3RT contactors and 3RH auxiliary contactors also fulfill the requirements for "safe separation" according to IEC 61140/IEC 60947 and the conditions for positively-driven contacts in accordance with IEC, ZH1 and SUVA. Shock hazard protection for live components is provided for all of the versions, either integrated or added as an accessory.

Everything available: Auxiliary contacts and accessories

SIRIUS contactors are available with mounted auxiliary contacts which can handle interlocking functions. Further, the 3RT and 3RH series can be equipped with auxiliary contacts. An extensive and standard range of accessories is available for all sizes which includes auxiliary contact blocks, surge suppressors, electronically delayed auxiliary contact blocks, timing relay attachments and mechanical interlocks. These flexible accessories make it easier and further reduce handling and stock inventory costs. An example: Auxiliary contacts that can be side or front mounted on contactors from size S0 to S12.

Everything quite simple: Mounting and configuring load feeders

Simply snap onto the mounting rail, and you are ready-to-go: Contactors up to 45 kW (75 HP) – using a standard mounting mechanism – can either be snapped onto 35 mm mounting rails or can be screw mounted. Above 45 kW (75 HP), all of the devices are mounted using screws. The position of the terminals, the connection cross-sections and the basic dimensions are harmonized with one another – the same as for all of the components belonging to the modular SIRIUS system – to make it simpler to engineer and mount load feeders.

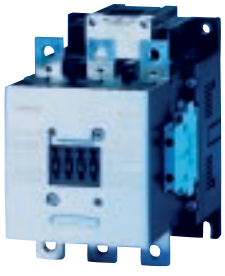
The straightforward and simple configuration of complete load feeders is an important benefit in the installation of large or small plants.

The complete power range up to 250 kW/400 V (400 HP/480 V) is covered using just 7 sizes.

Size S3

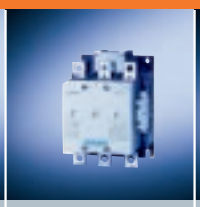
Size S6

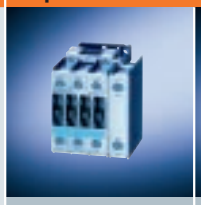
Size S10



Size S12

Applications
of the contactor types

You have the application – we have the optimum SIRIUS contactor							
							
			3RT10 air contactors	3RT12 vacuum contactors	3RT10 coupling relays	3RT14 AC-1 contactors	3RT16 capacitor contactors
Switching AC current		**AC**					
3-phase motors	– starting	AC-2/3	++	++	++		–
	– jogging	AC-4	++	+++	++		–
	– heavy-duty starting		+	+++			–
	– 1000 V		+	+++			–
Resistive loads		AC-1	+	+	+	+++	–
Gas discharge/incandescent lamps		AC-5a/b	+		+		–
3-phase transformers		AC-6a	+	+	+		–
3-phase capacitors		AC-6b	+	+	+		+++
Auxiliary/control circuits		AC-12/14/15	–	–	–	–	–
Switching DC current		**DC**					
Resistive loads		DC-1	+	–	+	+	–
Shunt-wound/series-wound motors		DC-3/5	+	–	+	+	–
Auxiliary/control circuits		DC-12/13	–	–	–	–	–

You have the application – we have the optimum SIRIUS contactor			4 pole		4/8 pole	1 pole
						
			3RT13 4 NO	3RT15 2 NO + 2 NC	3RH11/12/14 auxiliary contactors/coupling relays	3RF2 solid-state contactors
Switching AC current		**AC**				
3-phase motors	– starting	AC-2/3		++	–	+
	– jogging	AC-4			–	++
	– heavy-duty starting		–	–	–	–
	– 1000 V		–	–	–	–
Resistive loads		AC-1/51	++	+	–	+++
Gas discharge/incandescent lamps		AC-5a/b	+	+	–	+
3-phase transformers		AC-6a	–	–	–	–
3-phase capacitors		AC-6b	–	–	–	–
Auxiliary/control circuits		AC-12/14/15	–	–	++	+
Switching DC current		**DC**				
Resistive loads		DC-1	+	+	–	–
Shunt-wound/series-wound motors		DC-3/5	+	+	–	–
Auxiliary/control circuits		DC-12/13	–	–	+	+

What you can expect:
SIRIUS contactors – an overview.

Contactors to control motors

Page 10/11

Air contactors

The 3RT10 3-pole contactors are the optimum choice to control three-phase motors. With just seven sizes, they cover a power range from 3 to 250 kW/400 V (400 HP/480 V) for AC and DC control.

11

Vacuum contactors

You should take a close look at our 3RT12 vacuum contactors for heavy-duty starting or for 1000 V applications. They also offer a significantly higher electrical lifetime when compared to conventional air contactors.

14/15

Coupling relays

SIRIUS coupling relays have been designed to reliably and competently operate with electronic controls and switch motors as well as auxiliary and control circuits.

Contactors for special applications

12

AC-1 contactors to switch resistive loads

The high performance 3RT14 AC-1 contactors are in their element everywhere resistive rated currents have to be switched.

13

4-pole contactors

If you require a contactor to changeover the poles of crane motors, a braking contactor or one to separately switch two loads, then you can select the 4-pole 3RT13 contactors with 4 NO contacts or our SIRIUS 3RT15 contactors with 2 NC and 2 NO contacts. These can also be used to switch resistive loads.

16/17

Capacitor contactors

When it comes to switching power capacitors or for reactive current compensation, then the 3RT16 capacitor contactors are the best choice.

32/33

Solid-state contactors

To frequently switch single phase (resistive) loads up to 90 A, then the long lifetime SIRIUS SC solid-state contactors are the right choice.

Auxiliary contactors

17

SIRIUS auxiliary contactors competently and reliably control output signals and interlock switching devices in control and auxiliary circuits.

Overview: SIRIUS contactors to control motors					
Size			**S00**	**S0**	**S2**	**S3**
						
Contactors	**Type**		**3RT10 15/16/17**	**3RT10 23/24/25/26**	**3RT10 34/35/36**	**3RT10 44/45/46**
Vacuum contactor	**Type**					
AC-3						
I_e/AC-3/400 V		A	7/9/12	9/12/17/25	32/40/50	65/80/95
400 V		**kW**	**3/4/5.5**	**4/5.5/7.5/11**	**15/18.5/22**	**30/37/45**
230 V		kW	2.2/3/3	3/3/4/5.5	7.5/11/15	18.5/22/22
500 V		kW	3.5/4.5/5.5	4.5/7.5/10/11	18.5/22/30	37/45/55
690 V	3RT10, 12	kW	4/5.5/5.5	5.5/7.5/11/11	18.5/22/22	45/55/55
1000 V	3RT10, 12	kW	–	–	–	30/37/37
460 V		HP	3/5/7.5	5/7.5/10/15	25/30/40	50/60/75
AC-1 (40 °C, ≤ 690 V)						
I_e	3RT10, 12	**A**	**18/22/22**	**40/40/40/40**	**50/60/60**	**100/120/120**
Accessories						
Auxiliary contact blocks		at the front	3RH19 11	3RH19 21		
		laterally	–	3RH19 21		
Connection covers			–	–	3RT19 36-4EA2	3RT19 46-4EA 1/2
Box terminal blocks			–	–	–	–
Surge suppressors			3RT19 16	3RT19 26	3RT19 26/36	

Technology in detail: SIRIUS contactors to control motors

With our SIRIUS contactors high contact reliability and ruggedness, you have the optimum choice when it comes to controlling motors. It doesn't make any difference whether these involve the 3-pole 3RT10 contactors, that are used to control three-phase motors or the vacuum contactors that guarantee an especially high electrical endurance.

So well conceived: The terminals
All SIRIUS contactors are equipped with captive screws and are supplied with the terminal points open. Surge suppressors and electronic time relays that can be front mounted (for sizes S00 to S3) are simply plugged-in and automatically connected.

So standard: Mounting
From sizes S00 to S3, the devices can be snapped onto a mounting rail without requiring any tools or they can be screwed into place. This is simple, fast, safe and reliable. The contactors are designed for screw mounting above 45 kW/75 HP (sizes S6 to S12).

So fast, safe and reliable: Contactors with spring-loaded technology
When it comes to simplicity and speed, then you can experience a new dimension with state-of-the-art spring-loaded technology. This screwless terminal type provides a time savings of up to 75% and prevents wiring problems. Thanks to the vibration-proof and shock-proof mounting, they can also stand-up to the most rugged of ambient conditions. Versions of our long lifetime SIRIUS contactors in sizes S00 to S12 are equipped with innovative spring-loaded technology for all of the auxiliary and control circuits.

So flexible: 4 coil connections
The 3- and 4-pole contactors of the SIRIUS family, sizes S0 to S3, allow the coil to be either connected from the bottom, from the top or diagonally. This simplifies the wiring and provides a high degree of flexibility in the overall configuration.

4 connection coil

When things have to just simply run: **SIRIUS contactors to control motors.**

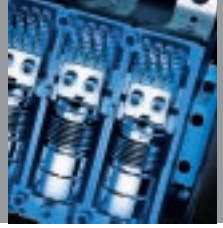
	S6	S10	S12
			
	3RT10 54/55/56	**3RT10 64/65/66**	**3RT10 75/76**
		3RT12 64/65/66	**3RT12 75/76**
	115/150/185	225/265/300	400/500
	55/75/90	**110/132/160**	**200/250**
	37/45/55	55/75/90	132/160
	75/90/110	160/160/200	250/355
	110/132/160	200/250/250	400/400,500
	75/90/90	90,315/132,355/132,400	250,560/250,710
	100/125/150	150/200/250	300/400
	160/185/215	**275,330/330/330**	**430,610/610**
	3RT19 56-4EA1/2/3	3RT19 66-4EA1/2/3	
	3RT19 55/56-4G	3RT19 66-4G	
	3RT19 56-1C		

So simple:
Engineering load feeders

It really is child's play to engineer load feeders as the position of the terminals and the connection cross-sections are harmonized with one another. The thermal overload relays can be mounted easily at the lower contactor terminals without any intermediate space. This means that the two devices have a continuous front plane. Fuseless motor feeders can be configured without having to use any additional wiring. A connection block establishes the mechanical and electrical con nections between the circuit-breaker (MSP) and contactor.

So powerful: Vacuum contactors

The economic advantages of SIRIUS vacuum contactors becomes more evident in applications with high switching frequencies, for heavy duty starting or for applications up to 1000 V. In these cases, when it involves the highest performance and availability, vacuum contactors have clear advantages when compared to conventional air contactors. Neither arcing nor switching gases are generated which means that the wear and erosion of the main contacts remains extremely low – these features make these devices especially useful in jogging and mixed operation applications. Ex: crane control systems. SIRIUS vacuum contactors are available in sizes S10 and S12 over all power classes from 110 to 250 kW/400 V (150 to 400 HP/480 V).



DETAIL

When clever devices are demanded: **SIRIUS AC-1 contactors.**

Overview of SIRIUS AC-1 contactors					
Size		**S3**	**S6**	**S10**	**S12**
					
Type		**3RT14 46**	**3RT14 56**	**3RT14 66**	**3RT14 76**
I_e/AC-1/40 °C/≤ 690 V	A	140	275	400	690

More cost-effective: SIRIUS AC-1 contactors

There are two options when switching resistive loads according to utilization category AC-1. The 3RT10 SIRIUS contactors that can be used both for switching inductive loads, e.g. according to utilization categories AC-2/AC-3 and AC-4 as well as switching resistive loads according to AC-1. Special SIRIUS 3RT14 AC-1 contactors with main contacts 3 NO have been specifically optimized to switch loads according to utilization category AC-1.

Seen from the economic perspective, SIRIUS AC-1 contactors represent a clever solution if the rated operating currents to be switched and conducted are between 100 A and 690 A. These types of applications include switching heating elements, drive converter circuits with input and output contactor or applications with generator or by-pass contactor. Just like all of our contactors, SIRIUS AC-1 contactors distinguish themselves by their high performance and compact size.

When flexibility is demanded: **SIRIUS 4-pole contactors.**

Overview of SIRIUS 4-pole contactors					
Size		**S00**	**S0**	**S2**	**S3**
					
Main contacts 4 NO		**3RT1316/17**	**3RT1325/26**	**3RT1336**	**3RT1344/46**
I_e/AC-1/40 °C/≤ 690 V	A	18/22	35/40	60	110/140
Main contacts 2 NO		**3RT1516/17**	**3RT1526**	**3RT1535**	
I_e/AC-3/400 V	A	9/12	25	40	
400 V	kW	4/5.5	11	18.5	

Simply flexible: SIRIUS 4-pole contactors

4-pole contactors are used in several industry and trade sectors as well as in building installation. The SIRIUS range of contactors 3RT13 with 4 NO main contact elements are the optimum choice when it is necessary to switch three phases and a neutral conductor. These contactors are available in sizes S00 to S3 for rated currents I_e/AC-1 up to 140 A. The compact 3RT15 contactors with 2 NO + 2 NC as main contact elements are suitable for pole changing applications. The same range of accessories is available for both the 4-pole as well as the 3-pole contactors. This simplifies stock inventory and application flexibility.

DETAIL

Overview of SIRIUS coupling relays									
		Coupling relays to control motors						Coupling relays to control auxiliary circuits	
Size		**S00**			**S0**			**S00**	
									
Type		**3RT101**			**3RT102**			**3RH11**	
Width in mm		45			45			45	
Screw and snap mounting on 35 mm mounting rails, DC operation									
Rated control supply voltage 24 V DC									
AC-3/400 V	kW	3	4	5.5	5.5	7.5	11		
I_e/AC-15 at 230 V:	A							6	
I_e/AC-12:	A							10	
Power consumption of the coil at 24 V									
Operating range, 0.7 to 1.25 x V_s	W	2.3			4.2			2.3	
Operating range, 0.85 to 1.85 x V_s	W	1.4			–			1.4	
Auxiliary contacts (max)		1 NO or 1 NC (integrated)			Two 1-pole auxiliary contact blocks can be mounted (2 NO, 1 NO + 1 NC, 2 NC)			4 NO 3 NO + 1 NC 2 NO + 2 NC	
Endurance, mechanical		30 million operating cycles			10 million operating cycles			30 million operating cycles	

System-based interaction: SIRIUS coupling relays

Coupling relays are used wherever electronic controls have to operate with electromechanical signal transmitters and receivers in a system environment. The SIRIUS coupling relays with their especially long lifetime are well suited for controlling motors as well as auxiliary and control circuits. As a result of their low power consumption and the wide operating range of the coil, they fulfill the following requirements:

- The signal receiver is operated with a DC voltage in compliance with the overall system
- The rated voltage and operating range of the signal transmitters/receivers is adapted to the system data
- High contact reliability of the signal transmitter at low voltage and currents while maintaining the full switching capacity at high voltages
- Damaging overvoltages that are caused either inside or outside the system are limited.

When clear signals are required: **SIRIUS coupling relays.**

Technology in detail

The signal receiver is operated in compliance with the system

How does this actually work? The input and output modules of electronic controls are available either with control voltages of 24 V DC or 110/230 V AC. However, for cost reasons, in practice the 24 V DC version is frequently used. The 3RT and 3RH SIRIUS coupling relays, that are used for applications such as these, are equipped with a DC solenoid system and a special coil. This means that they have many advantages – e.g. an extremely high mechanical endurance, an extremely low power consumption when closing and when closed. This is supplemented by the fact that they do not hum and have low leakage fields.

The rated voltage and operating range of the signal receiver are adapted

Why is this necessary? A contactor operating system, that is used in conjunction with an electronic control with 24 V DC rated voltage Vs must operate perfectly with voltages of between 17.4 V and 28.8 V. This is because the supply voltage of such a control ranges from 20.4 V to 28.8 V according to EN 61131-2. A voltage drop of up to 3 V within the output stages must be taken into account. This is the reason that SIRIUS coupling relays have an operating range from 17 to 30 V (0.7 ... 1.25 x Vs). This represents a significant extension with respect to the operating range of contactors in accordance with IEC 60947 that specifies 0.85 ... 1.1 x Vs.

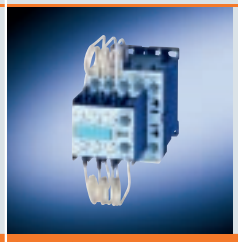
Limiting the switch-off overvoltages

Electronic controls only operate disturbance-free if there is adequate electromagnetic compatibility between the system components. Special protective measures against such disturbing influences are required due to the low signal level. One of the main reasons for overvoltage conditions are switching operations in inductive circuits – e.g. when disconnecting a contactor or auxiliary contactor solenoid coil. SIRIUS coupling relays are available with or without integrated surge suppression. This means that you can select from a wide variety of surge suppressors that version which best corresponds to your particular plant or system.

Surge suppressors are simply plugged-on and simultaneously connected.

DETAIL

When high inrush currents occur: **SIRIUS capacitor contactors.**

Overview of SIRIUS capacitor contactors				
Size		**S00**	**S0**	**S3**
				
Type		**3RT16 1**	**3RT16 2**	**3RT16 4**
Values at 400 V	in kVar	5 ... 12.5	6 ... 25	5 ... 50

DETAIL

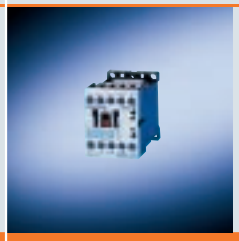
Up to infinity: SIRIUS capacitor contactors

SIRIUS 3RT16 capacitor contactors are suitable for switching power capacitors that are used in reactive power compensation circuits.

Special series resistors and auxiliary contacts, integrated in these contactors dampen the high inrush current of the capacitors. This significantly increases the endurance of both the contactor and the capacitor. The contactors used correspond to sizes S00, S0 and S3 and can be generally equipped with the standard accessories of the basic devices.

For switching control and auxiliary circuits: **SIRIUS auxiliary contactors**

Overview of SIRIUS auxiliary contactors

Size	**S00**	**S00**	**S00**	**S00, latching**
				
Type	**3RH11 40**	**3RH11 31**	**3RH11 22**	**3RH14**
Width in mm	45	45	45	90
Contacts	4 NO (40 E)	3 NO + 1 NC (31 E)	2 NO + 2 NC (22 E)	4 NO; 3 NO + 1 NC; 2 NO + 2 NC
Screw and snap-mounting on 35 mm mounting rails, AC and DC operation				
Rated data:				
Operating voltage V_e V	230	400	500	690
Operating current I_e/AC-15 A	6	3	2	1
I_e/AC-12 A	10	10	10	10
Endurance, mechanical	30 million operating cycles			5 million operating cycles
Power consumption, coil	Closing		Closed	
(AC) VA	27		4.6	
(DC) W	3.2		3.2	

A handle on the control: SIRIUS auxiliary contactors

Auxiliary contactors are switching devices for control and auxiliary circuits and are used to control output signals and interlock switching devices. Our SIRIUS 3RH1 auxiliary contactors have terminal designations in-line with the applicable Standards and have time and cost-saving terminal systems. This means that you can reliably fulfill requirements with low associated costs.

The 3RH1 auxiliary contactors and the 3RT1 motor contactors, size S00, are the same size and have the same design – this represents an important advantage especially considering the available range of accessories. They are designed for AC or DC operation and have either screw or spring-loaded terminals. The basic version of the auxiliary contactors has 4 poles and can be expanded up to 8 poles using auxiliary contact blocks that can be snapped-on. We also offer an 8-pole complete device with auxiliary contact blocks that cannot be removed according to the SUVA specifications.

***By the way* – how do latched contactors actually work?**

For the SIRIUS 3RH14 auxiliary contactors, even when the control voltage fails at the contactor coil, the contacts remain closed thanks to an integrated latching mechanism. The contactor can be released at any time by connecting a voltage to the latching mechanism thus opening the contacts. There is an additional latching block for size S0 contactors that functions in the same way.

The SIRIUS family of contactors > 45 to 250 kW

SIRIUS 3RT contactors, sizes S6, S10, S12

Big when it comes to power: SIRIUS contactors > 45 to 250 kW (>75 to 400 HP)

For powers greater than 45 kW up to 250 kW, our family of SIRIUS contactors has the following versions in three sizes S6, S10 and S12:

- SIRIUS 3RT10 contactors to control motors,
- SIRIUS 3RT12 vacuum contactors to control motors – and
- SIRIUS 3RT14 contactors for AC-1 applications

Our range of SIRIUS contactors is also ideally suited when it comes to switching high power levels – packed with all of the known advantages of the SIRIUS system. These include the remaining lifetime function (RLT) for air contactors or the integrated AS-Interface interface for 3RT10 and 3RT14 contactors.

Technology in detail

How can SIRIUS contactors be controlled?
The contactors can be generally controlled with DC and AC voltages. The control voltage is connected to A1 and A2 as usual. Furthermore, the contactors can be directly controlled from the PLC without having to use an additional coupling relay. This can be accomplished via the PLC with a 24 V DC semiconductor output and 30 mA load capacity or via the PLC with relay output. Last but not least, it is also important to note that SIRIUS 3RT10 and 3RT14 air contactors can be controlled via AS-Interface or – using SIMOCODE® pro – via PROFIBUS DP.

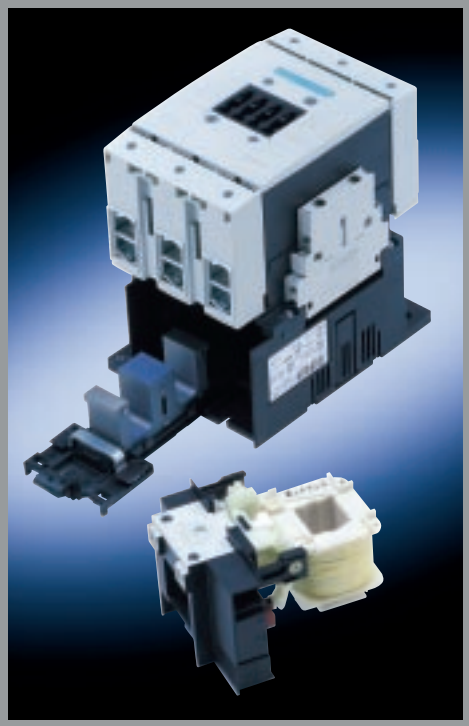
How do contactors with electronic operating systems function?
For conventional operating systems, the control voltage is directly connected to the coil. The electronic operating system supplies the solenoid coil with precisely the required power through an upstream electronic control. This means that many control voltages can be covered using just one coil version. Furthermore, the wide operating range makes switching especially safe and reliable. This is because the danger due to overvoltage or undervoltage conditions is significantly lower. Increased wear of the main contacts and thermal overload of the coil are avoided by using defined switch-in and switch-out thresholds. This is especially advantageous for weak and unstable line supplies.

Which control and message signals are realized via the AS-Interface?
The AS-Interface interface integrated in SIRIUS 3RT10 and 3RT14 contactors ensures that they can be directly controlled from the AS-Interface bus. The following signals can be transferred:

- OPEN/CLOSE contactor
- Overload relay tripped
- Remaining lifetime signal when the limit value of 20% is reached
- Automatic/local control

It is also possible to control the contactor via PROFIBUS DP when SIMOCODE pro is used.

How are the coils replaced?
The coil can be withdrawn from the top and replaced if this becomes necessary during service or if the application is modified. This is advantageous both technically and economically. For example, you can directly and easily select the solenoid coil for your SIRIUS contactor at your local distributor corresponding to your requirements.



Flexible and fast: Plug-in coils.

When performance is demanded
SIRIUS contactors for > 45 to 250 kW.

The remaining lifetime function RLT: LEDs at the contactor indicate the condition locally and the signal is brought to where it is processed.

What is the remaining lifetime function and how does it function?
Although our SIRIUS contactors have been made to last a very long time, the main contacts have a limited endurance. A special display – the remaining lifetime function RLT – provides information about the condition of the main contacts of 3RT10 and 3RT14 contactors. This means that these can then be replaced at the optimal time. The operating cycles are not counted, instead the actual wear and erosion of each of the three main contacts is electronically sensed, evaluated and saved. When the defined limit is reached, a signal is output. This function saves time because the previous routine inspections or visual checks can be eliminated. This is more reliable as it is more precise.

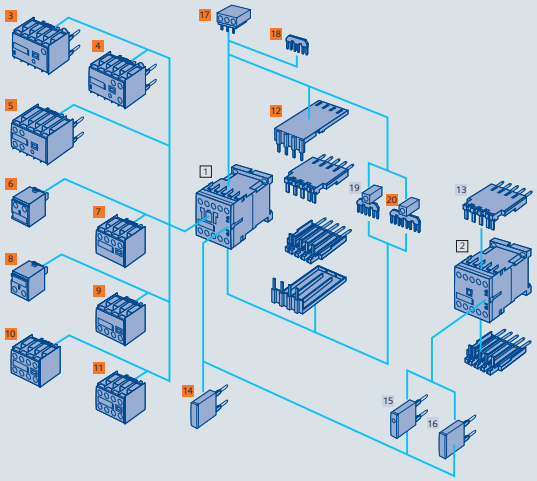
DETAIL

Everything available:
Extensive range of accessories
We have an extensive and standard range of accessories for all sizes of our SIRIUS contactors – auxiliary contact blocks, overvoltage suppressors, electronically delayed auxiliary contact blocks, time relays that can be directly mounted or mechanical interlocking elements: The modular SIRIUS system shows its strengths down to the finest detail.

Everything quite clever:
Modular standard components
When it comes to handling and inventory costs, the standard range of accessories represents a decisive advantage. For example, for air contactors, the auxiliary contacts located at the side or at the front can be used across the board for sizes S0 to S12. For size S0, the accessories for contactors to control motors and for auxiliary contactors are identical. Auxiliary contact blocks, overvoltage suppressors and time relay/blocks can be plugged-in from the front.

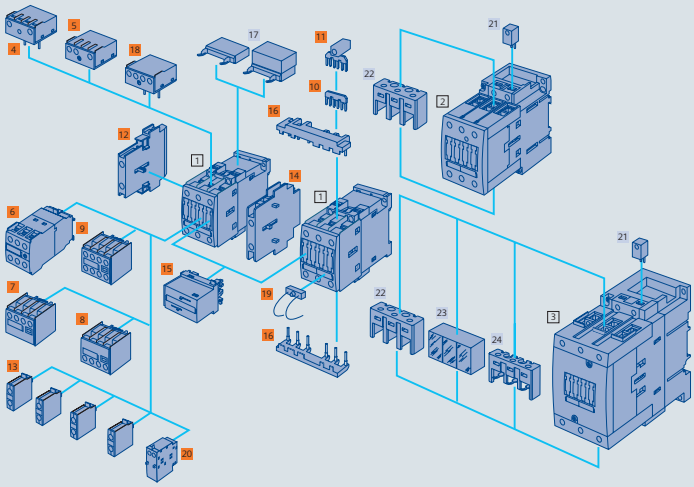
Everything quite simple:
Mounting and removing
The mechanical interlock to configure reversing combinations hardly increases the envelope dimensions of the contactors and mounting is simple. With just one mechanical interlock for sizes S6 to S12, reversing combinations or combinations of different sizes – e.g. for system transfer operation – can be simply and quickly configured.

SIRIUS contactors and coupling relays, size S00 with accessories that can be mounted



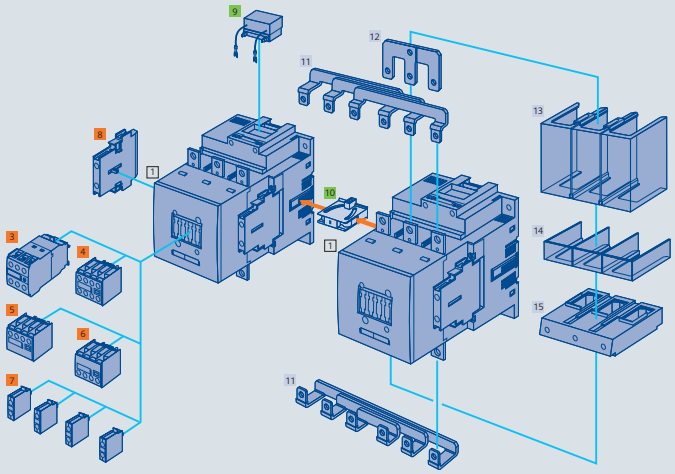
1 Contactor
2 Coupling relay
3 Solid-state time-delay block, ON-delay
4 Solid-state time-delay block, OFF-delay
5 Auxiliary contact block, solid-state time-delay (ON or OFF-delay or star-delta function)
6 1-pole auxiliary contact block, cable entry from above
7 2-pole auxiliary contact block, cable entry from above
8 1-pole auxiliary contact block, cable entry from below
9 2-pole auxiliary contact block, cable entry from below

SIRIUS contactors, sizes S0 to S3 with accessories that can be mounted



1 Contactor, size S0
2 Contactor, size S2
3 Contactor, size S3
For sizes S0 to S3:
4 Solid-state time-delay block, ON-delay
5 Solid-state time-delay block, OFF-delay
6 Auxiliary contact block, solid-state time-delay (ON or OFF-delay or star-delta function)
7 2-pole auxiliary contact block, cable entry from above
8 2-pole auxiliary contact block, cable entry from below
9 4-pole auxiliary contact block (terminal designations according to DIN EN 50012 or DIN EN 50005)

contactors, sizes S6 to S12 with accessories



1 Air contactors 3RT10 and 3RT14, sizes S6, S10 and S12
3 Auxiliary contact block, solid-state time-delay (ON or OFF-delay or star-delta function)
4 4-pole auxiliary contact block (terminal designations according to DIN EN 50012 or DIN EN 50005)
5 2-pole auxiliary contact block, cable entry from above
6 2-pole auxiliary contact block, cable entry from below
7 1-pole auxiliary contact block (up to 4 can be snapped-on)
8 2-pole auxiliary contact block, can be laterally mounted at the right or left (terminal designations acc. to DIN EN 50012 or DIN EN 50005) (identical for S0 to S12)

If you want more:
Accessories for SIRIUS contactors.

ACCESSORIES

10 4-pole auxiliary contact block (terminal designations according to DIN EN 50012 or DIN EN 50005)
11 2-pole auxiliary contact block, standard version or solid-state compatible design (terminal designations acc. to DIN EN 50005)
12 Solder pin adapter for contactors with 4-pole auxiliary contact block
13 Solder pin adapter for contactors and coupling relays
14 Additional load module for increasing the permissible off-state current
15 Surge suppressor with LED
16 Surge suppressor without LED
17 3-phase feeder terminal
18 Link for paralleling (star jumper), 3-pole, without terminal
19 Link for paralleling, 3-pole, with terminal
20 Link for paralleling, 4-pole, with terminal

For contactors
For contactors and coupling relays (interface)

10 Link for paralleling (star jumper), 3-pole, without terminal
11 Link for paralleling, 3-pole, with terminal
12 2-pole auxiliary contact block, can be laterally mounted (left or right) (terminal designations acc. to DIN EN 50012 or DIN EN 50005)
13 Single-pole auxiliary contact block (up to 4 can be snapped-on)
14 Mechanical interlock, can be laterally mounted
15 Mechanical interlock, can be mounted at the front
16 Wiring connectors at the top and bottom (reversing operation – plugging)
17 Surge suppressor (varistor, RC element, diode assembly), can be mounted at the top or bottom(different for S0 and S2/S3)
18 Interface for mounting directly onto the contactor coil
19 LED module to indicate contactor operation

Only for sizes S0 and S2:
20 Mechanical latch

Only for sizes S2 to S3:
21 Repeat coil terminal to configure reversing contactor assemblies
22 Terminal cover for box terminal

Only for sizes S3:
23 Terminal cover for cable lugs and busbar connection
24 Auxiliary conductor terminal, 3 pole

Accessories identical for sizes S0 to S3
Accessories differ according to size

9 Surge suppressor (RC element) can be plugged onto the top of the plug-in coil
10 Mechanical interlock, can be laterally mounted
11 Wiring connectors, top and bottom (reversing operation – plugging)
12 Link for paralleling (star jumper), 3-pole, with through hole, different for sizes S6 and S10/S12
13 Terminal cover for cable lug and busbar connection, different for sizes S6 and S10/S12
14 Terminal cover for box terminal, different for sizes S6 and S10/S12
15 Box terminal block, different for sizes S6 and S10/S12

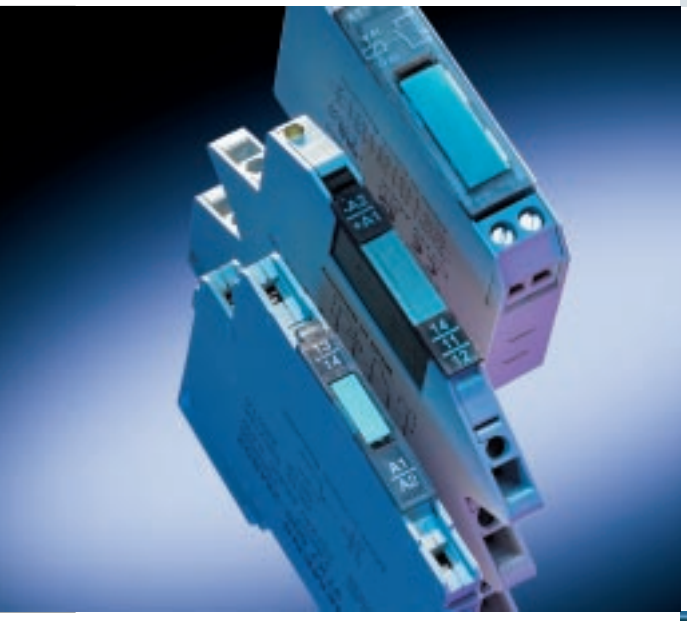
Accessories identical for sizes S0 to S12
Accessories identical for sizes S6 to S12
Accessories differ according to the size

The best for every application: **SIRIUS relays.**

In addition to our extensive range of SIRIUS contactors, we can also offer you everything that is used between the motor feeder and the automation system from a single source. We have a complete range of relays that is second to none when it comes to being complete and extensive – our SIRIUS relays. From interface through plug-in to power relays, you'll find everything you require when it comes to switching and a lot more.

The highlights at a glance:

- Optimum for every application: Extensive range
- User-friendly: Extremely simple handling
- Multi-functional: Relays that have a high degree of versatility
- In-line with those required in practice – graduated for the required performance
- Excellent price-performance ratio



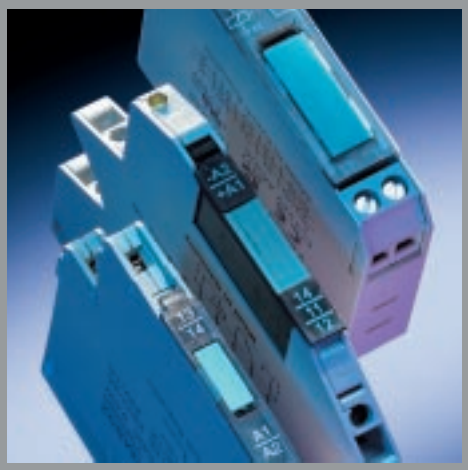
Everything on track: With SIRIUS relays everything runs smoothly. Whether monitoring motors or controlling complex plants and systems, in production or in transportation – our relays have a handle on every application.

Everything that is required: SIRIUS switching relays

It is important for engineers to be up to speed on the latest in controls, load feeders and drives. However, when it comes to basic interface, control or monitoring relays, the time-consuming search starts with the various suppliers. You can now eliminate this tedious searching. Why? – Because all of these products are members of a family – the SIRIUS family. Not only is it easier to select and engineer our devices, but they also give you the best price-performance ratio and are extremely easy to use.

We can offer you a range of products for controlling motors and plants – extremely narrow interface relays, plug-in relays as complete devices or in individual modules as well as power relays.

Slimline: SIRIUS 3TX70 interface relays



SIRIUS 3TX70 interface relays are available in two sizes. One of these is the 3TX7004/05/14 series that is only 6.2 mm wide – for extremely space-saving designs in the electrical cabinet. The other is the 3TX7002/03 series that is especially suitable for configurations with low clearances between mounting rails or low mounting depth in small cabinets.

Your advantages:

- For pre-assembled wiring these devices can be quickly replaced thanks to the plug-in design
- Connecting times are reduced as conductors are introduced and clamped from the front

Applications:

- Electrical isolation
- Converting voltages, e.g. from 24 V DC to 230 V AC, signal amplification

Engineering information:

For rated control supply voltages of 110 V AC and 230 V AC, the maximum permissible cable length must be observed when selecting interfaces.

Extreme reliability: SIRIUS 3TX70 solid-state interfaces

When compared to conventional relays, our solid-state interfaces offer two crucial advantages: The high reliability and the especially long endurance of the electronic components. Solid-state interfaces operate almost wear-free as they have no moving parts and no arcs are generated at switch-off. This means that they are currently one of the most reliable switching devices. For many applications they are the first choice – especially when switching DC.

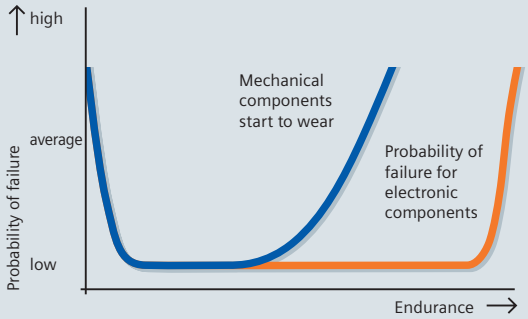
Advantages:

- Extremely high electrical endurance
- The highest contact reliability
- High DC switching capacity

Applications:

- Electrical isolation, voltage conversion
- Switching capacitive loads
- High number of operating cycles

Lifetime comparison



Solid-state interface modules have a significantly higher lifetime than electro-mechanical devices.

Before things get tight: **SIRIUS interface relays – extremely narrow.**

New worldwide: SIRIUS 3RS18 relay interface

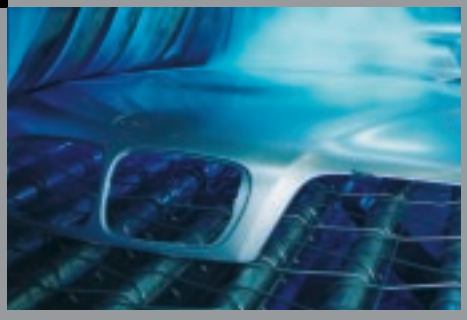
SIRIUS 3RS18 relay interfaces are installed in an industrial enclosure. With a wide-range voltage from 24 V up to 240 V AC/DC, they are absolutely unique in the global interface market. All of the devices are available in a well-proven 22.5 mm housing and we offer this device series with 1, 2 and 3 changeover contacts.

Advantages:

- New worldwide: A product that can be used with all voltages
- Cost savings due to a reduced number of versions

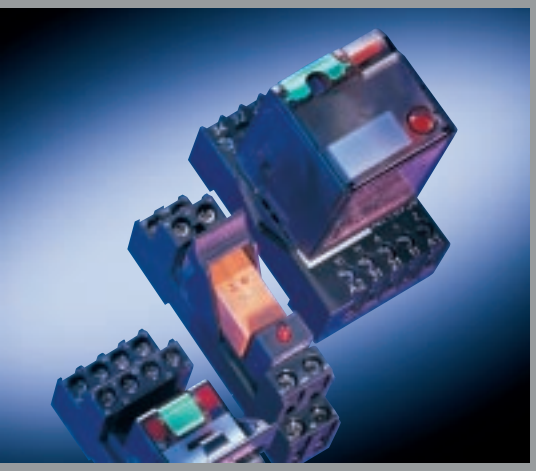
Applications:

Everywhere contacts that are compatible with electronic systems and devices with wide-range voltages are required.



DETAIL

Also as complete devices: SIRIUS LZX plug-in relays



Up until now, plug-in relays were generally ordered and supplied as individual parts and components. This costs valuable time from many perspectives: When ordering the various individual items and naturally when assembling the relay itself. This is the reason that within the framework of our group of LZX relays, in addition to individual modules for self assembly or spare parts, we now have our series of complete devices. The SIRIUS LZX plug-in relays are available in four versions.

Advantages:

- Tested AC-15 and DC-13 switching capacities
- Coil voltages: 24 V DC, 24 V AC, 115 V AC, 230 V AC

Applications:

SIRIUS LZX relays are, among other things, used to multiply contacts and to switch small loads.

Engineering information:

For our LZX:PT relays, the test lever does not latch. If the test lever is pressed until 90° is reached, two small lugs break-off and the test lever can be set so that it latches. When the LZX is operated with a 60 Hz voltage, the lower response value must be increased by 10% and the power loss drops slightly.

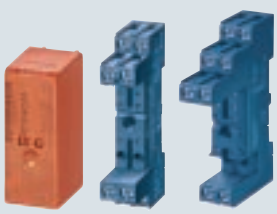
By the way: Logical and safe separation

The terminals for the contact elements and the coil are arranged at different levels. For example, the terminals for the switching elements are at the top and those for the coil are at the bottom. The logical separation is not safe separation. The latter is a separation that prevents the voltage from one circuit crossing-over into another with adequate safety (refer to DIN VDE 106 Part 101).

Versions

LZX:RT
1 or 2 changeover contacts
AC-1: 16/8 A 15.5 mm wide

LZX:RY
1 changeover contact
AC-1:8 A
15.5 mm wide



LZX:PT
2, 3 or 4 changeover contacts
AC-1: 12/10/6 A 27 mm wide

LZX:MT
3 changeover contacts
AC-1: 10 A
38 mm wide

So that everything is optimal: **SIRIUS LZX plug-in relays and 3TG10 power relays**

Small design, low price: SIRIUS 3TG10 power relays

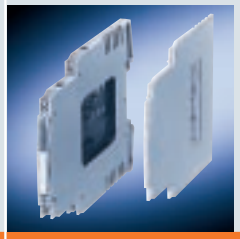
Our 3TG10 power relays/contactors are the optimum choice everywhere small, low-noise relays or contactors are required. They are suitable for simple controls, especially for use in series equipment and control systems that are produced in high volumes. Also for applications that do not require an overload relay and only one auxiliary contact.

Advantages:
- Safe separation
- Integrated auxiliary contact
- Power rating AC-3: 4 kW/400 V (5 HP/480 V)
- Operating current I_e/AC-1: 20 A/400 V
- Integrated overvoltage suppressor

Applications:
- Hoisting gear: Small elevators, elevating platforms
- Building systems, hum-free electrical installations, e.g. in hospitals
- Domestic appliances and electrical installation

DETAIL

Overview of SIRIUS switching relays

			
	3TX70 relay interfaces	**3TX70 solid-state interfaces**	**3RS18 relay interfaces**
Output coupler	X	X	
Input coupler	X	X	
Hard-gold plated contacts	X		X
Widths	6.2; 12.5 mm	6.2; 11.5; 12.5 mm	22.5 mm
Contact elements	1 changeover contact, 1 NO, 2 NO, 2 changeover contacts		1, 2, 3, 4 changeover contacts
Screw terminals	X	X	X
Cage-Clamp terminals	X	X	X
Spade terminals			
Rated control supply voltage V_s AC/DC	AC/DC 24 V AC/DC 110 V AC/DC 115 V AC/DC 230 V	DC 24 V AC 110 ... 230 V AC/DC 24 V	AC/DC 24 ... 240 V AC 110 ... 120 V AC/DC 24 V AC 220 ... 240 V
Electrical isolation (converter)	X	X	
Manual-automatic switch (converter)	X	X	

3TG10 power relays

AC-1 operating current I_e at 400 V (A)	**AC-1 power of three-phase loads at 50 Hz, 400 V (kW)**	**AC-2 and AC-3 operating current at 400 V (A)**	**AC-2 and AC-3 AC loads at 50 Hz, 400 V (kW)**	**Terminal type**
20	13	8.4	4	Screw terminal
20	13	8.4	4	Screw terminal
16	10	8.4	4	Spade terminal
16	10	8.4	4	Spade terminal

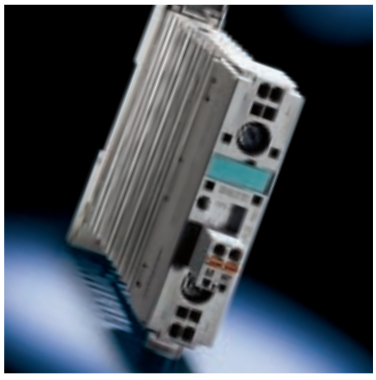
Everything at a glance: **SIRIUS relays.**

	LZX plug-in relays	3TG10 power relays
		
		X
	X	
	15.5; 27; 38 mm	36 mm
	1, 2, 3, 4 changeover contacts	4 NO or 3 NO + 1 NC
		X
	DC 24 V AC 24 V AC 115 V AC 230 V	DC 24 V AC 24 V AC 110 V AC 230 V
		X

Contacts		Control supply voltage	Order No. (MRPD)
NO	NC		
4	–	AC 230 V	**3TG1010-0AL2**
		AC 110 V	**3TG1010-0AG2**
		AC 24 V	**3TG1010-0AC2**
		DC 24 V	**3TG1010-0BB4**
3	1	AC 230 V	**3TG1001-0AL2**
		AC 110 V	**3TG1001-0AG2**
		AC 24 V	**3TG1001-0AC2**
		DC 24 V	**3TG1001-0BB4**
4	–	AC 230 V	**3TG1010-1AL2**
		AC 110 V	**3TG1010-1AG2**
		AC 24 V	**3TG1010-1AC2**
		DC 24 V	**3TG1010-1BB4**
3	1	AC 230 V	**3TG1001-1AL2**
		AC110 V	**3TG1001-1AG2**
		AC 24 V	**3TG1001-1AC2**
		DC 24 V	**3TG1001-1BB4**

If high switching frequencies are present – **SIRIUS SC solid-state switching devices.**

Continually increasing switching frequencies are demanding that switching devices have a very high endurance. The rugged SIRIUS SC solid-state relays and contactors stand out under such tough conditions. Thanks to their especially long endurance, higher service life and improved EMC characteristics, they are fit for an extremely long lifespan. Even under the toughest of conditions of high mechanical and electrical stress.



Well established: SIRIUS SC in use

SIRIUS SC has firmly established itself in the industrial environment – especially for controlling resistive loads, closed-loop control of electrical heat or when controlling valves and motors in conveyor systems. Thanks to their silent switching, our solid-state switching devices are also suitable for noise-sensitive areas such as offices, and hospitals.

Extremely precise: SIRIUS SC for every application

SIRIUS SC solid-state switching devices switch with extreme precision, are extremely reliable and generate little interference. The SIRIUS SC family can be universally used as a result of the wide range of terminal systems and the wide control voltage bandwidth. Standard function modules are available for enhanced functionality.

Well conceived: SIRIUS SC and its advantages

SIRIUS SC has a lot to offer. For instance, the compact design saves a lot of space. The devices can be mounted side-by-side ensuring safe operation up to ambient temperatures of +60 °C. They can be quickly engineered, simply mounted and commisioned which saves time and money.

Overview – and more:
The product portfolio

Product overview 3RF20, 3RF21, 3RF23

Version		3RF21 relays	3RF20 relays	3RF23 contactors								
											Short-circuit proof	Low noise
Terminal system		Screw terminals, Cage Clamp, ring cable lug	Only screw terminals	Screw terminals, Cage Clamp, ring cable lug								
Switching function		Zero point switching		Zero point or instantaneous switching								
Rated voltage	V	24 ... 230 230 ... 460	400 ... 600	24 ... 230 230 ... 460 400 ... 600								
Control voltage	V	DC 4 ... 30 DC 24	AC 110 ... 230	DC 4 ... 30 DC 24 AC 110 ... 230								
Load current	A	20 30 50 70 90		10	20	30	40	50	70	90	20	20
Width	mm	22.5	45	22.5	22.5	45	67	67	135	190	22.5	22.5
Applications												
Can be used to simply replace existing solid-state relays		○	●	○								
"Ready to use" complete device				●								
Especially compact		●	○	●								
Can be expanded in a modular fashion using function modules		●		●								
Mounting		Mounted on heatsinks		Mounted on DIN rails								
Cable routing												
The load circuit connected Line on Top and Load on Bottom		●		●								
Line and Load circuit connected on Top			●									

● *always the case* ○ *only conditionally*

Product overview, function modules

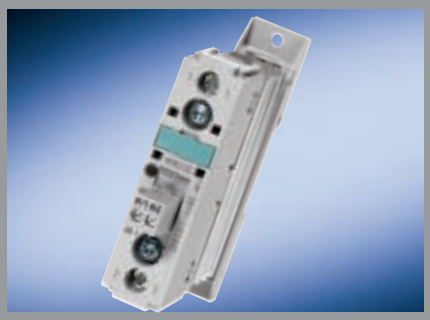
Module		Converter	Load monitoring, basis	Load monitoring, extended	Power controller
					
Function		Converts an analog input voltage into a pulse-width modulated digital signal	Load monitoring of up to 6 sub-loads	Load monitoring of up to 12 sub-loads	Autonomous power control, inrush current limiting, load circuit monitoring
Current measuring range	A	Not relevant	0.62 ... 20	0.65 ... 20 1.6 ... 50 2.9 ... 90	4 ... 20 10 ... 50 18 ... 90
Operating voltage	V	Not relevant	Not relevant	110 ... 230 400 ... 600	110 ... 230 400 ... 600
Control voltage	V	AC/DC 24	DC 24	AC/DC 24 AC 110	AC/DC 24 AC 110
Width	mm	22.5	22.5	45	45

Quickly mounted: SIRIUS SC solid-state relays

SIRIUS SC solid-state relays can be mounted onto existing heatsink surfaces. This can be quickly and simply done using just two screws. The special power semiconductor technology used ensures extremely good thermal contact to the heatsink. Depending on the heatsink characteristics for resistive (ohmic) loads, between 0 and 90 A can be switched. Solid-state relays can be expanded using various function modules to individually adapt them to a particular application.

These solid-state relays are available in two widths. Only 22.5 mm wide and with an industrial connection system (the power is connected at the top, the load is connected at the bottom) our 3RF21 solid-state relays ensure that cabinet layouts are straightforward.
The 45 mm wide 3RF20 devices can be easily integrated into existing configurations and circuits; this is because the power feed and load are both connected at the top. For both of these device widths, the control cable is simply plugged-in.

Ready-to-use: SIRIUS SC solid-state contactors
SIRIUS SC solid-state contactors are complete devices – comprised of a solid-state relay mounted on an optimized heatsink. They have defined current ratings which makes selection extremely simple. Depending on the particular version, currents of up to 90 A can be switched. With an integrated insulated mounting foot, these devices can be snapped-onto mounting rails or can be screwed to panels.



The isolation allows the devices to be used in circuits with safety or functional extra-low voltages in building electrical systems. For other applications, the heatsink can be grounded using a predrilled screw connection.

Always the optimum fit:
Terminals for every configuration
The range of SIRIUS SC devices distinguishes itself as a result of the versatile range of terminals. You can select between the following:

- Well-proven screw terminals (the industry standard for loads up to 50 A),
- Innovative spring-loaded terminals that are immune to high vibration levels (for loads up to 20 A), or
- Ring-type cable lugs (to securely retain large cable cross-sections for currents up to 90 A).

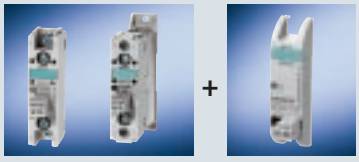
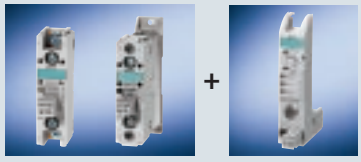
Keeps you flexible:
SIRIUS SC function modules
Day-to-day operations in industry are speeding-up. New requirements and challenges are confronted on a daily basis. In some cases the change is increased productivity – in other cases flexibility to adapt to evolving production capacities is important. These represent application opportunities for SIRIUS SC solid-state devices. This is because they can be quickly and reliably expanded using standard function modules to adapt to individual demands and requirements.

The function modules almost mount themselves. All of the connections to the solid-state relay or contactor are established when the modules are snapped-on. Further, the plug connection to control the solid-state devices are re-used and ready to go – as simple as that.

Versatile terminal systems: Screw connection, spring-loaded terminals or ring-type cable lug: SIRIUS SC offers the optimum system.

In detail: **SIRIUS SC solid-state relays, contactors and function modules**

Function modules
An extremely wide range of applications can be easily addressed using function modules.

	Converter	Load monitoring	Power controller
Applications	• Distributed, autonomous closed-loop temperature control • The temperature controller operates directly with SIRIUS SC	• Several heating elements with a constant resistance can be controlled from a solid-state relay or solid-state contactor	• Complex heating systems • Heating elements with temperature-dependent resistance • Heating elements subject to long-time aging • Simple indirect temperature control by controlling the power
Combinations	 Solid-state relay or solid-state contactor and a converter module	 Solid-state relay or solid-state contactor and a monitoring module	 Solid-state relay or solid-state contactor and a power controller module
Function	• Converts an analog control signal, e.g. from temperature controllers, into a pulse-width modulated digital signal • Connected solid-state relays or contactors control the load power as a percentage	• Monitors the load circuit connected to the solid-state device • Fast fault detection, e.g. when load elements fail, destroyed power semiconductors, no voltage condition or interrupted load circuit • LED fault display – fault signal using a PLC-compatible output • The basic version monitors up to 6 sub loads • The extended version monitors up to 12 sub loads; additional voltage compensation; fault signal using relay contacts (changeover contact)	Integrated functions: • Power controller with P control to maintain the power constant during voltage fluctuations or when the load resistance changes • Inrush current limiting with adjustable voltage ramp to limit the inrush (power-on) current using phase control – e.g. for lamps and floodlights • Load circuit monitoring to detect load failure, destroyed power semiconductors, no voltage condition or an interrupted load circuit
			

DETAIL

Contact erosion:
This is the loss of contact material caused by arcing when electrical current is switched. Erosion is caused by the contact material evaporating and splashing. Important factors which influence contact erosion are in addition to the type of contact material, physical effects such as the current density, the phase angle of the current during contact separation, the speed with which the contacts move apart as well as the heat dissipation and the thermal capacity of the contact elements.

Working range:
Range in which the operating voltage may deviate from the rated operating voltage without this having a negative impact on the operational safety and reliability of the contactor.

Rated control supply voltage V_s:
Voltage that is connected to the terminals of the current control circuit of a contactor. This can deviate from the rated operating voltage due to a transformer or resistance in the control circuit.

Utilization category:
The utilization category defines the intended application and stressing of the contactors. It involves the combination of requirements defined in the equipment regulations and Standards (e.g. IEC 60947, DIN EN 60947) – which correspond to an important group of practical applications. The utilization category is characterized by:

- Values of the making and breaking currents expressed as multiples of the rated operating current I_e
- Values of the voltage expressed as multiples of the rated operating voltage (rated voltage),
- Values of the power factor cos φ or time constant L/R.

Here are the main utilization categories for contactors:

Utilization category for AC voltages, contactors

AC	Typical application	Switching capacity making I/I_e	Switching capacity breaking I/I_e	Endurance, electrical making I/I_e	Endurance, electrical breaking I/I_e
AC-1/ AC-51	Non-inductive or weakly inductive loads, resistance ovens	1,5	1,5	1	1
AC-2	Slipring rotor motors: Starting, stopping	4	4	2,5	2,5
AC-3	Squirrel-cage induction motors: Starting, powering-down while running	10	8	6	1
AC-4	Squirrel-cage induction motors: Starting, plug braking or reversing, jogging	12	10	6	6

Utilization categories, test conditions for AC voltages

Utilization category for AC voltages, auxiliary contactors and auxiliary contacts

AC	Typical application	Switching capacity making I/I_e	Switching capacity breaking I/I_e	Endurance, electrical making I/I_e	Endurance, electrical breaking I/I_e
AC-12	Controlling resistive and semiconductor loads in input circuits of optocouplers	1		1	
AC-14	Controlling small electromagnetic loads (max. 72 VA)	6		1	
AC-15	Controlling electromagnetic loads (higher than 72 VA)	10		1	

Utilization categories, test conditions for AC voltage

Utilization category for DC voltages, contactors

DC	Typical application	Switching capacity making I/I_e	Switching capacity breaking I/I_e	L/R (ms)
DC-1	Non-inductive or weakly inductive loads, resistance ovens	1,5		1
DC-3	Shunt-wound motors: Starting, plug braking, reversing, jogging	4		2,5
DC-5	Series-wound motors, Starting, plug braking, reversing, jogging	4		15

Utilization categories, test conditions for DC voltages

Utilization category for DC voltages, auxiliary contactors and auxiliary contacts

DC	Typical application	Switching capacity making I/I_e	Switching capacity breaking I/I_e	L/R (ms)
DC-12	Controlling resistive and semiconductor loads in input circuits of optocouplers	1		1
DC-13	Controlling solenoids	1		300

Utilization categories, test conditions for DC voltage

SIRIUS and open questions:
Definitions and explanations.

GLOSSARY

Endurance:
The duration in which a switching device operates reliably under normal, specified operating conditions. This is specified as the number of operating cycles. A distinction is made between mechanical endurance and electrical endurance (contact life). The end of the electrical endurance is reached when the contacts have been eroded to an extent that reliable making and breaking operation is no longer guaranteed. The manufacturer specifies the mechanical endurance of a contactor as the number of operating cycles under no load conditions and without parts having to be repaired or replaced. The mechanical endurance can be negatively influenced, for example, by harsh environments (e.g. abrasive dust that causes increased wear), incorrect maintenance procedures, incorrect control supply voltages, impermissible mounting positions.

Switching contact endurance:
This is the number of operating cycles that a set of contacts can achieve under specified electrical and/or mechanical load conditions. The switching contact endurance is reached, for example, if the volume or the thickness of the switching contact material at the contact tips is reduced, as a result of contact erosion. This means that the material, on which the contacts are mounted, is exposed and the risk of contact welding is extremely high. Switching contacts are also subject to mechanical wear so that the switching contact endurance is itself limited although the switching contact erosion is extremely low due to the electrical load. If, for example, the contactor load is known, it is possible to predict the expected contact endurance from diagrams. Of course, the validity of predictions such as these diagrams depends very heavily on whether short-circuits or unexpected overcurrents occur.

Heavy-duty starting:
If a motor requires more than approximately 10 to 15 seconds to reach its rated speed due to the load characteristics, then this represents heavy-duty starting. With heavy-duty starting the opposing load torque is greater during starting than in rated operation. It takes a considerable time to reach the rated speed as high moments of inertia have to be accelerated, e.g. for rolling mills and centrifuges. Special overload relays or thermistor motor protection devices are required to protect motors that are used to accelerate high inertia loads.

Safe separation:
Safe separation designates a special mechanical design measure, for example, reinforced or double insulation that safely and reliably prevents a voltage being transferred from one circuit at a hazardous voltage to another circuit, e.g. a circuit with a safety extra-low voltage. Safe separation is especially used between all of the main and auxiliary circuits of switching devices.

Co-ordination type:
This describes the state of a switchgear combination (motor starter) during and after a short-circuit trip. The following always applies: Neither personnel nor plant parts and components may be endangered.

Co-ordination type “1”:
- The equipment does not have to be immediately suitable for further operation,

and
- It is permissible that the starter is damaged.

Co-ordination type “2”:
- The starter can still be operated,

and
- It is not permissible that the starter is damaged with the exception of slight welding of the contacts if these can be easily separated without causing any significant deformation.

Positively-driven contacts:
Positively-driven contacts are such that the contacts are mechanically coupled with one another so that normally open (NO) and normally closed (NC) contacts can never be closed at the same time. For instance, if an NO contact that is welded does not return to its initial state, then it is not permissible that the NC contact closes. This means that incorrect behavior can be detected.

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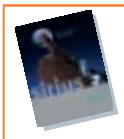
SWITCHING



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