

Monitoring and Control Devices

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SIRIUS 3RR Current Monitoring Relays for Electrical and Additional Measurements

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

General data

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Technical Information

can be found at www.siemens.com/industrial-controls/support

under Product List:
- Technical specifications

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- Certificates

Monitoring Relays

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

General data

Overview



Features	3RR21	3RR22	Benefits
General data			
Sizes	S00, S0	S00, S0	<ul style="list-style-type: none"> • Are coordinated with the dimensions, connections and technical characteristics of the other devices in the SIRIUS modular system (contactors, soft starters, ...) • Permit the mounting of slim and compact motor starters in widths of 45 mm (S00 and S0) • Simplify configuration
Current range	S00: 1.6 ... 16 A S0: 4 ... 40 A	S00: 1.6 ... 16 A S0: 4 ... 40 A	<ul style="list-style-type: none"> • Is adapted to the other devices in the SIRIUS modular system • Just a single version per size with a wide setting range enables easy configuration
Monitoring functions			
Current overshoot	✓ (Two-phase)	✓ (Three-phase)	<ul style="list-style-type: none"> • Provides optimum inverse-time delayed protection of loads against excessive temperature rises due to overload • Enables detection of filter blockages or pumping against closed gate valves • Enables drawing conclusions about wear, poor lubrication or other maintenance-relevant phenomena
Current undershoot	✓ (Two-phase)	✓ (Three-phase)	<ul style="list-style-type: none"> • Enables detection of overload due to a slipping or torn belt • Guarantees protection of pumps against dry running • Facilitates monitoring of the functions of resistive loads such as heaters • Permits energy savings through monitoring of no-load operation
Apparent current monitoring	✓	✓ (selectable)	<ul style="list-style-type: none"> • Precision current monitoring especially in a motor's rated and upper torque range
Active current monitoring	--	✓ (selectable)	<ul style="list-style-type: none"> • Optimum current monitoring over a motor's entire torque range through the patented combination of power factor and apparent current monitoring
Range monitoring	✓ (Two-phase)	✓ (Three-phase)	<ul style="list-style-type: none"> • Simultaneous monitoring of current overshoot and undershoot with a single device
Phase failure, open-circuit	✓ (Two-phase)	✓ (Three-phase)	<ul style="list-style-type: none"> • Minimizes heating of induction motors during phase failure through immediate disconnection • Prevents operation of hoisting equipment with reduced load carrying capacity
Phase sequence monitoring	--	✓ (selectable)	<ul style="list-style-type: none"> • Prevents starting of motors, pumps or compressors in the wrong direction of rotation
Internal ground-fault detection (residual current monitoring)	--	✓ (selectable)	<ul style="list-style-type: none"> • Provides optimum protection of loads against high-resistance short-circuits or ground faults due to moisture, condensed water, damage to the insulation material, etc. • Eliminates the need for additional special equipment. • Saves space in the control cabinet • Reduces wiring outlay and costs
Blocking current monitoring	--	✓ (selectable)	<ul style="list-style-type: none"> • Minimizes heating of induction motors when blocked during operation through immediate disconnection • Minimizes mechanical loading of the system by acting as an electronic shear pin

✓ Available

-- Not available

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Features	3RR21	3RR22	Benefits
Features			
RESET function	✓	✓	<ul style="list-style-type: none"> Allows manual or automatic resetting of the relay Resetting directly on the device or by switching the control supply voltage off and on (remote reset)
ON-delay time	0 ... 60 s	0 ... 99 s	<ul style="list-style-type: none"> Enables motor starting without evaluation of the starting current Can be used for monitoring motors with lengthy start-up
Tripping delay time	0 ... 30 s	0 ... 30 s	<ul style="list-style-type: none"> Permits brief threshold value violations during operation Prevents frequent warnings and disconnections with currents near the threshold values
Operating and display elements	LEDs and rotary potentiometers	Displays and buttons	<ul style="list-style-type: none"> For setting the threshold values and delay times For selectable functions For quick and selective diagnostics Displays for permanent indication of measured values
Integrated contacts	1 CO	1 CO, 1 semiconductor output	<ul style="list-style-type: none"> Enable disconnection of the system or process when there is an irregularity Can be used to output signals
Design of motor starters			
Short-circuit strength up to 100 kA at 600 V (in conjunction with the corresponding fuses or the corresponding motor starter protector)	✓	✓	<ul style="list-style-type: none"> Provides optimum protection of the loads and operating personnel in the event of short-circuits due to insulation faults or faulty switching operations
Electrical and mechanical matching to 3RT2 contactors	✓	✓	<ul style="list-style-type: none"> Simplifies configuration Reduces wiring outlay and costs Enables stand-alone installation as well as space-saving direct mounting
Spring-type connection for main circuit and auxiliary circuit	✓ (optional)	✓ (optional)	<ul style="list-style-type: none"> Enables fast connections Permits vibration-resistant connections Enables maintenance-free connections
More features			
Suitable for single- and three-phase loads	✓	✓	<ul style="list-style-type: none"> Enables the monitoring of single-phase systems through parallel infeed at the contactor or looping the current through the three phase connections
Wide setting ranges	✓	✓	<ul style="list-style-type: none"> Reduce the number of variants Minimize the configuration outlay and costs Minimize storage overhead, storage costs, tied-up capital
Wide voltage supply range	✓ (optional)	✓ (optional)	<ul style="list-style-type: none"> Reduces the number of variants Minimizes the configuring outlay and costs Minimize storage overhead, storage costs, tied-up capital

✓ Available

Monitoring Relays

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

General data

Possible combinations of 3RR2 monitoring relays with 3RT2 contactors

Monitoring relays	Current range	Contactors (type, size, rating)	
		3RT20 1	3RT20 2
Type	A	S00 3/5/7.5/10 HP	S0 7.5/10/15/20/25 HP
3RR21 41	1.6 ... 16	✓	With stand-alone installation holder
3RR22 41	1.6 ... 16	✓	With stand-alone installation holder
3RR21 42	4 ... 40	With stand-alone installation holder	✓
3RR22 42	4 ... 40	With stand-alone installation holder	✓

✓ Possible

Connection method

Depending on the device version of the 3RR2 monitoring relays, the terminals for screw or spring-type connection are configured for both the main and auxiliary circuit.



Screw terminals



Spring-type terminals

These terminals are indicated in the corresponding tables by the symbols shown on orange backgrounds.

More information

Order No. scheme

Digit of the Order No.	1. - 3.	4.	5.	6.	7.	8.	9.	10.	11.	12.			
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	▼		
Monitoring relays	3 R R												
SIRIUS 2nd generation	2												
Type of setting	<input type="checkbox"/>												
Type of monitoring relay	<input type="checkbox"/>												
Size	<input type="checkbox"/>												
Connection method	<input type="checkbox"/>												
Number and type of outputs	<input type="checkbox"/>												
Signal type of the supply voltage	<input type="checkbox"/> <input type="checkbox"/>												
Example	3	R	R	2	1	4	1	-	1	A	A	3	0

Note:

The Order No. scheme is presented here merely for information purposes and for better understanding of the logic behind the order numbers.

For your orders, please use the order numbers quote in the catalog under the Selection and ordering data section.

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

Current monitoring

Overview



3RR22 42 and 3RR21 42 current monitoring relays

The SIRIUS 3RR2 current monitoring relays are suitable for the load monitoring of motors or other loads. In two or three phases they monitor the rms value of AC currents for overshooting or undershooting of set threshold values.

Whereas apparent current monitoring is used above all in connection with the rated torque or in case of overload, the active current monitoring option can be used to observe and evaluate the load factor over a motor's entire torque range.

The 3RR2 current monitoring relays can be integrated directly in the starter by mounting onto the 3RT2 contactor; separate wiring of the main circuit is not required. Separate transformers are also not required.

For a line-oriented configuration or simultaneous use of an overload relay, terminal brackets for stand-alone installation are available for separate standard rail mounting.

Versions

- **Basic versions**
The basic versions with two-phase apparent current monitoring, a CO contact output and analog adjustability provide a high level of monitoring reliability especially in the rated and overload range.
- **Standard versions**
The standard versions monitor the current in three phases with selectable active current monitoring. They have additional diagnostics options such as residual current monitoring and phase sequence monitoring, and they are also suitable for monitoring motors below the rated torque. These devices have an additional independent semiconductor output, an actual value indicator, and are digitally adjustable.

Both versions are available optionally with screw terminals or spring-type terminals, in each case for sizes S00 and S0.

Benefits

- Directly mountable onto 3RT2 contactors, i.e. no additional wiring outlay in the main circuit
- Optimally coordinated with the technical characteristics of the 3RT2 contactors
- No separate current transformer required
- Versions with wide voltage supply range
- Variably adjustable to overvoltage, undervoltage or range monitoring
- Freely configurable delay times and RESET response
- Display of ACTUAL value and status messages
- All versions with removable control current terminals
- All versions with screw terminals or alternatively with spring-type terminals
- Simple determination of the threshold values through direct reference to actually measured values for setpoint loading
- Range monitoring and selectable active current measurement mean that only one device for monitoring a motor is required along the entire torque curve
- In addition to current monitoring it is also possible to monitor for broken cables, phase failure, phase sequence, residual current and motor blocking.

Application

- Monitoring of current overshoot and undershoot
- Monitoring of broken conductors
- Monitoring of no-load operation and load shedding, e.g. in the event of a torn V-belt or no-load operation of a pump
- Monitoring of overload, e.g. on pumps due to a dirty filter system
- Monitoring the functionality of electrical loads such as heaters
- Monitoring of wrong phase sequence on mobile equipment such as compressors or cranes
- Monitoring of high-resistance short-circuits, e.g. due to damaged insulation or dampness.

Monitoring Relays

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

Current monitoring

Selection and ordering data

SIRIUS 3RR2 current monitoring relays

- For load monitoring of motors or other loads
- Multi-phase monitoring of undercurrent and overcurrent
- Starting and tripping delay can be adjusted separately
- Tripping delay 0 ... 30 s
- Auto or manual RESET



3RR21 41-1AW30



3RR21 42-1AW30



3RR22 41-1FW30





3RR22 42-1FW30



3RR21 41-2AA30



3RR22 41-2FA30

Size	Measuring range	Hysteresis	Supply voltage U_s	Screw terminals 	Weight approx.	Spring-type terminals 	Weight approx.
				Order No.	kg	Order No.	kg
A	A	A	V				

Basic versions

Analog adjustable, closed-circuit principle, 1 CO, 2-phase current monitoring, apparent current monitoring, start-up delay 0 ... 60 s

S00	1.6 ... 16	6.25 % of threshold value	24 AC/DC 24 ... 240 AC/DC	3RR21 41-1AA30 3RR21 41-1AW30	0.180 0.185	3RR21 41-2AA30 3RR21 41-2AW30	0.180 0.185
S0	4 ... 40	6.25 % of threshold value	24 AC/DC 24 ... 240 AC/DC	3RR21 42-1AA30 3RR21 42-1AW30	0.205 0.210	3RR21 42-2AA30 3RR21 42-2AW30	0.250 0.255

Standard versions

Digitally adjustable, LCD, open-circuit or closed-circuit principle, 1 CO, semiconductor output, 3-phase current monitoring, active or apparent current monitoring, phase sequence monitoring, residual current monitoring, blocking current monitoring, reclosing delay time 0 ... 300 min, startup delay 0 ... 99 s, separate settings for warning and alarm thresholds

S00	1.6 ... 16	0.1 ... 3	24 AC/DC 24 ... 240 AC/DC	3RR22 41-1FA30 3RR22 41-1FW30	0.205 0.205	3RR22 41-2FA30 3RR22 41-2FW30	0.205 0.205
S0	4 ... 40	0.1 ... 8	24 AC/DC 24 ... 240 AC/DC	3RR22 42-1FA30 3RR22 42-1FW30	0.230 0.230	3RR22 42-2FA30 3RR22 42-2FW30	0.280 0.280

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

Current monitoring

Accessories

Use	Version	Size	Order No.	PU (UNIT, SET, M)	PS*	Weight approx. kg
Terminal brackets for stand-alone installation¹⁾						
 3RU29 16-3AA01	For 3RR2 For separate mounting of the overload relays or monitoring relays; screw and snap-on mounting onto TH 35 standard mounting rail <ul style="list-style-type: none"> Screw connection 	S00 S0	Screw terminals 			
			3RU29 16-3AA01 3RU29 26-3AA01	1 1	1 unit 1 unit	0.040 0.050
 3RU29 26-3AC01	<ul style="list-style-type: none"> Spring-type connection 	S00 S0	Spring-type terminals 			
			3RU29 16-3AC01 3RU29 26-3AC01	1 1	1 unit 1 unit	0.040 0.060
Blank labels						
 3RT19 00-1SB20	For 3RR2 Unit labeling plates²⁾ For SIRIUS devices 20 mm x 7 mm, pastel turquoise		3RT19 00-1SB20	100	340 units	0.200
Sealable covers						
 3RR29 40	For 3RR2 For securing against accidental or unauthorized adjustment of the settings		3RR29 40	1	5 units	0.001
Tools for screw terminals						
 8WA2 803	For main and auxiliary circuit connections Screwdrivers 3.5 mm x 0.5 mm; suitable for a max. conductor cross-section of 2.5 mm ² <ul style="list-style-type: none"> Length approx. 175 mm; green, partially insulated Length approx. 175 mm; green 		Screw terminals 			
			8WA2 880 8WA2 803	1 1	1 unit 1 unit	0.035 0.024
Tools for opening spring-type terminals by hand						
 3RA29 08-1A	For auxiliary circuit connections Screwdrivers for all SIRIUS devices with spring-type terminals 3.0 mm x 0.5 mm; length approx. 200 mm; titanium gray/black, partially insulated		Spring-type terminals 			
			3RA29 08-1A	1	1 unit	0.045

¹⁾ The accessories are identical to those of the 3RU21 thermal overload relays and the 3RB3 solid-state overload relays.

²⁾ PC labeling system for individual inscription of unit labeling plates available from: murrplastik Systems, Inc. www.murrplastik.com.

Monitoring Relays

SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

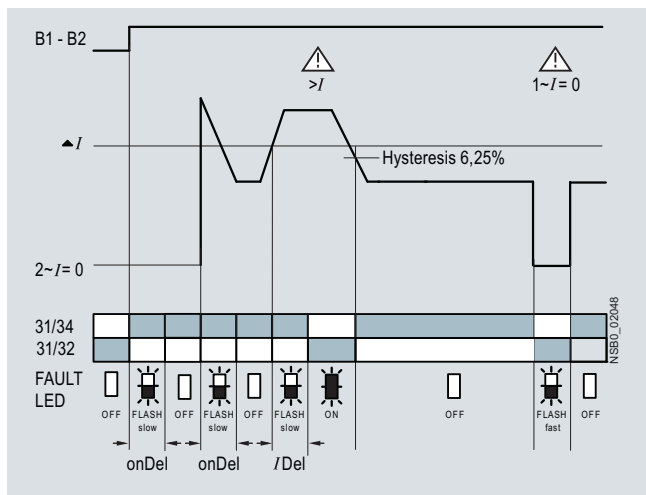
Current monitoring

More information

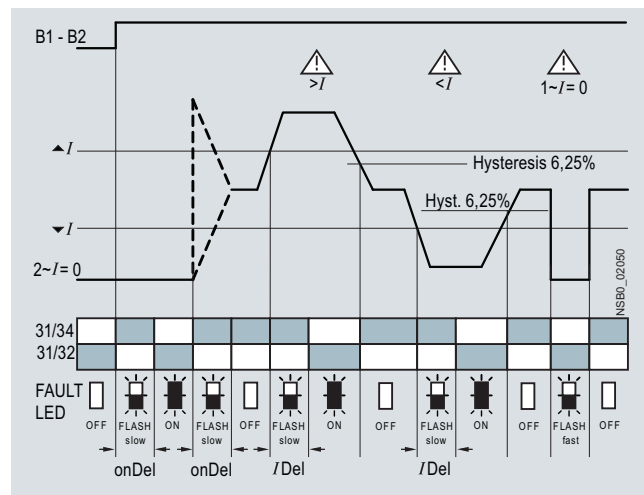
Function diagrams of 3RR21 4.-A.30 basic versions, analog adjustable

Closed-circuit principle upon application of the control supply voltage

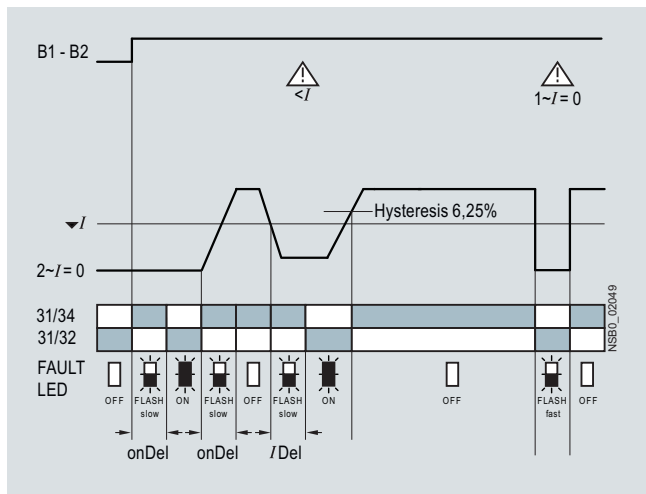
Current overshoot



Range monitoring



Current undershoot



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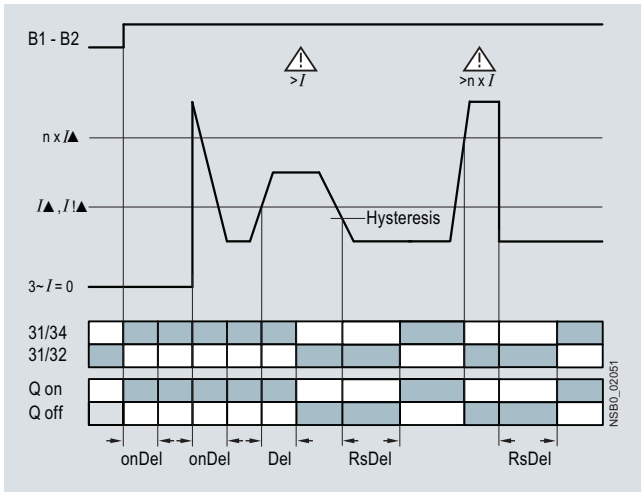
SIRIUS 3RR2 Monitoring Relays for Mounting onto 3RT2 Contactors

Current monitoring

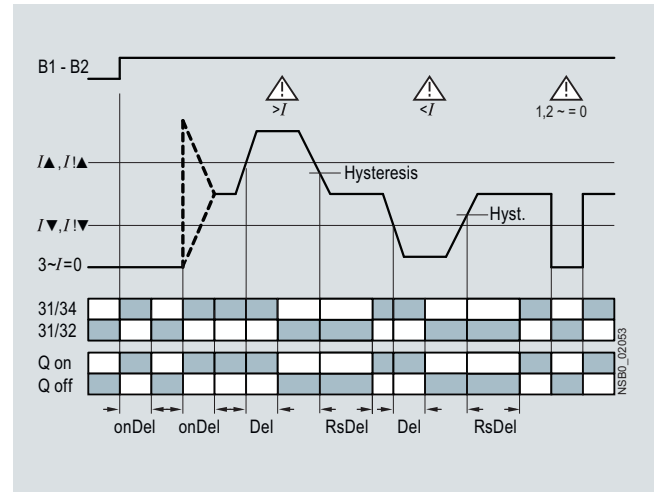
Function diagrams of 3RR22 4.-F.30 standard versions, digitally adjustable

With the closed-circuit principle selected upon application of the control supply voltage

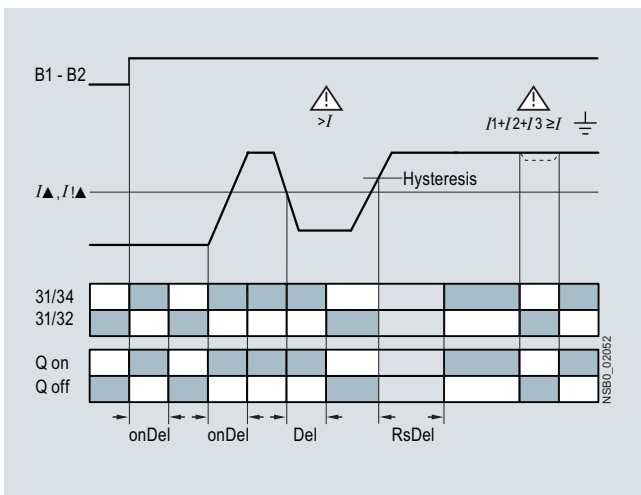
Current overshoot



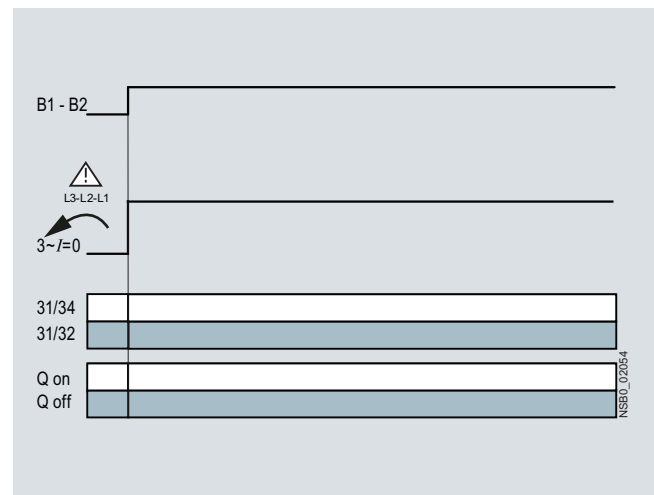
Range monitoring



Current undershoot with residual current monitoring



Phase sequence monitoring



Monitoring Relays

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Notes