

Controls – Soft Starters and Solid-State Switching Devices

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SIRIUS 3RW Soft Starters
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Solid-State Contactors

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3RF34 solid-state contactors, three-phase

3RF34 solid-state reversing contactors, three-phase

Technical Information

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

under Product List:
 - Technical specifications

under Entry List:
 - Updates
 - Download
 - FAQ
 - Manuals
 - Characteristics
 - Certificates

Controls – Soft Starters and Solid-State Switching Devices

Introduction

Overview



3RW30



3RW40

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3RW soft starters

3RW soft starters for standard applications

3RW30 soft starters

- SIRIUS 3RW30 soft starters for soft starting of three-phase asynchronous motors
- Performance range of up to 75 HP (at 480 V)

3RW30

4/6

3RW40 soft starters

- SIRIUS 3RW40 soft starters with the integral functions
 - Solid-state motor overload and intrinsic device protection
 - Adjustable current limiting
 For the soft starting and stopping of three-phase asynchronous motors
- Performance range of up to 75 HP (at 480 V)

3RW40

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3RF34 05-1BB..



3RF34 05-1BD..

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SIRIUS solid-state switching devices for switching motors

Solid-state contactors

Solid-state contactors, solid-state reversing contactors

- Complete units in the insulated enclosure with integrated heat sink, "ready to use"
- Compact and space-saving design
- Version for motors, "instantaneous switching"

3RF34 ..-1BB..

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3RF34 ..-1BD..

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Connection methods

The devices are available with screw terminals or spring-type terminals.



Screw terminals



Spring-type terminals

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

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

General data

Overview



		SIRIUS 3RW30 Standard applications	SIRIUS 3RW40 Standard applications
Rated current at 50 °C	A	3 ... 98	11 ... 98
Rated operational voltage	V	200 ... 480	200 ... 600
Motor rating at 460 V	HP	1.5 ... 75	7.5 ... 75
Ambient temperature	°C	-25 ... +60	-25 ... +60
Soft starting/ramp-down		✓ ¹⁾	✓
Voltage ramp		✓	✓
Starting/stopping voltage	%	40 ... 100	40 ... 100
Starting and ramp-down time	s	0 ... 20	0 ... 20
Integral bypass contact system		✓	✓
Intrinsic device protection		--	✓
Motor overload protection		--	✓
Thermistor motor protection		--	✓ ²⁾
Integrated remote RESET		--	✓
Adjustable current limiting		--	✓
Power semiconductors (thyristors)		2 controlled phases	2 controlled phases
Screw terminals		✓	✓
Spring-type terminals		✓	✓
UL/CSA		✓	✓
CE marking		✓	✓
ATEX explosion protection		--	✓ ³⁾
Configuring support		Win-Soft Starter, electronic selection slider ruler, Technical Assistance Telephone: 800-333-7421	

✓ Function is available

-- Function not available

1) Only soft starting available for 3RW30

2) Optional

3) Use upstream disconnect mechanism

You can find further information on the Internet at:

www.siemens.com/softstarter

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

General data

Selection aid for soft starters



Application	SIRIUS 3RW30 Standard applications	SIRIUS 3RW40 Standard applications
Normal starting (CLASS 10)		
Pump	●	●
Pump with special pump ramp-down (to prevent water hammer)		
Heat pump	●	●
Hydraulic pump	○	●
Press	○	●
Conveyor belt	○	●
Roller conveyor	○	●
Screw conveyor	○	●
Escalator		●
Small fan ¹⁾		●
Centrifugal blower		●
Bow thruster		●
Heavy starting (CLASS 20)		
Stirrer		○
Extruder		○
Lathe		○
Milling machine		○

● Recommended soft starter

○ Possible soft starter

¹⁾ The mass inertia of the fan is <10 times the mass inertia of the motor.

Boundary conditions

Type	Maximum starting time s	Current limiting %	Starts per hour 1/h
Normal starting (CLASS 10)			
• 3RW30	3	300	20
• 3RW40	10	300	5
Heavy starting (CLASS 20)			
• 3RW40 2., 3RW40 3., 3RW40 4.	20	300	5

The quoted motor ratings are only approximate values. The soft starter should always be designed on the basis of the motor current (rated operational current). In the event of deviating conditions, it may be necessary to choose a larger device.

Motor rating data are based on DIN 42973 (kW) and NEC 96/UL 508 (hp).

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

General data

Benefits

- The advantages of the SIRIUS soft starters at a glance:
- Soft starting and smooth ramp-down (only soft starting available for 3RW30)
 - Stepless starting
 - Reduction of current peaks
 - Avoidance of mains voltage fluctuations during starting
 - Reduced load on the power supply network

- Reduction of the mechanical load in the operating mechanism
- Considerable space savings and reduced wiring compared with conventional starters
- Maintenance-free switching
- Very easy handling

Fits perfectly in the SIRIUS modular system

More information

Order No. scheme

Digit of the Order No.	1st - 3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th
	□□□	□	□	□	□	-	□	□	□	□	-	□	□	□
Soft starters	3 R W													
SIRIUS soft starter generation														
Size														
Rated operational current I_e														
Connection type (screw terminals / spring-type terminals)														
Soft starter functionality (bypass, thermistor, etc.)														
Rated control supply voltage U_s														
Rated operational voltage U_e														
Special versions														
Example	3	R	W	4	0	2	4	-	1	B	B	1	4	

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 in the Selection and ordering data.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW30

Overview

The SIRIUS 3RW30 soft starters reduce the motor voltage through variable phase control and increase it in ramp-like mode from a selectable starting voltage up to mains voltage. During starting, these devices limit the torque as well as the current and prevent the shocks which arise during direct starts or wye-delta starts. In this way, mechanical loads and mains voltage dips can be reliably reduced.

Soft starting reduces the stress on the connected equipment and results in lower wear and therefore longer periods of trouble-free production. The selectable start value means that the soft starters can be adjusted individually to the requirements of the application in question and unlike wye-delta starters are not restricted to two-stage starting with fixed voltage ratios.

The SIRIUS 3RW30 soft starters are characterized above all by their small space requirements. Integrated bypass contacts mean that no power loss has to be taken into the bargain at the power semiconductors (thyristors) after the motor has started up. This cuts down on heat losses, enabling a more compact design and making external bypass circuits superfluous.

Various versions of the SIRIUS 3RW30 soft starters are available:

- Standard version for fixed-speed three-phase motors, sizes S00, S0, S2 and S3, with integrated bypass contact system
- Version for fixed-speed three-phase motors in a 22.5 mm enclosure without bypass

Soft starters rated up to 75 HP (at 480 V) for standard applications in three-phase networks are available. Extremely small sizes, low power losses and simple commissioning are just three of the many advantages of this soft starter.

Functionality

The space required by the compact SIRIUS 3RW30 soft starter is often only about one third of that required by a contactor assembly for wye-delta starting of comparable rating. This not only saves space in the control cabinet and on the standard mounting rail but also does away completely with the wiring work needed for wye-delta starters. This is notable in particular for higher motor ratings which are only rarely available as fully wired solutions.

At the same time the number of cables from the starter to the motor is reduced from six to three. Compact dimensions, short start-up times, easy wiring and fast commissioning make themselves felt as clear-cut cost advantages.

The bypass contacts of these soft starters are protected during operation by an integrated solid-state arc quenching system. This prevents damage to the bypass contacts in the event of a fault, e.g. brief disconnection of the control voltage, mechanical shocks or life-related component defects on the coil operating mechanism or main contact spring.

The new series of devices comes with the "polarity balancing" control method, which is designed to prevent direct current components in two-phase controlled soft starters. On two-phase controlled soft starters the current resulting from superimposition of the two controlled phases flows in the uncontrolled phase. This results for physical reasons in an asymmetric distribution of the three phase currents during the motor ramp-up. This phenomenon cannot be influenced, but in most applications it is non-critical.

Controlling the power semiconductors results not only in this asymmetry, however, but also in the previously mentioned direct current components which can cause severe noise generation on the motor at starting voltages of less than 50 %. The control method used for these soft starters eliminates these direct current components during the ramp-up phase and prevents the braking torque which they can cause.

It creates a motor ramp-up that is uniform in speed, torque and current rise, thus permitting a particularly gentle, two-phase starting of the motors. At the same time the acoustic quality of

the starting operation comes close to the quality of a three-phase controlled soft starter. This is made possible by the on-going dynamic harmonizing and balancing of current half-waves of different polarity during the motor ramp-up. Hence the name "polarity balancing".

- Soft starting with voltage ramp; the starting voltage setting range U_S is 40 to 100 % and the ramp time t_R can be set from 0 to 20 s.
- Integrated bypass contact system to minimize power loss
- Setting with two potentiometers
- Simple mounting and commissioning
- Mains voltages 50/60 Hz, 200 to 480 V
- Two control voltage versions 24 V AC/DC and 110 to 230 V AC/DC
- Wide temperature range from -25 to +60 °C
- The built-in auxiliary contact ensures user-friendly control and possible further processing within the system ([for status graphs see page 4/10](#))

Application

The 3RW30 soft starters are suitable for soft starting of three-phase asynchronous motors.

Due to two-phase control, the current is kept at minimum values in all three phases throughout the entire starting time. Due to continuous voltage influencing, the current and torque peaks which are unavoidable in the case of wye-delta starters for instance do not occur.

Application areas

See "Selection aid for soft starters" on page 4/4.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW30

Selection and ordering data



3RW30 18-1BB14

3RW30 28-1BB14

3RW30 38-1BB14

3RW30 47-1BB14

Ambient temperature 40 °C				Ambient temperature 50 °C				Size	Order No.	Weight approx. kg	
Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e			Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e						
	230 V	400 V	500 V		200 V	230 V	460 V	575 V			
	kW	kW	kW		hp	hp	hp	hp			
Rated operational voltage U_e 200 ... 480 V²⁾											
• With screw terminals											
3.6	0.75	1.5	--	3	0.5	0.5	1.5	--	S00	3RW30 13-1BB□4	0.580
6.5	1.5	3	--	4.8	1	1	3	--	S00	3RW30 14-1BB□4	0.580
9	2.2	4	--	7.8	2	2	5	--	S00	3RW30 16-1BB□4	0.580
12.5	3	5.5	--	11	3	3	7.5	--	S00	3RW30 17-1BB□4	0.580
17.6	4	7.5	--	17	3	3	10	--	S00	3RW30 18-1BB□4	0.580
• Spring-type terminals											
3.6	0.75	1.5	--	3	0.5	0.5	1.5	--	S00	3RW30 13-2BB□4	0.580
6.5	1.5	3	--	4.8	1	1	3	--	S00	3RW30 14-2BB□4	0.580
9	2.2	4	--	7.8	2	2	5	--	S00	3RW30 16-2BB□4	0.580
12.5	3	5.5	--	11	3	3	7.5	--	S00	3RW30 17-2BB□4	0.580
17.6	4	7.5	--	17	3	3	10	--	S00	3RW30 18-2BB□4	0.580
• With screw terminals											
25	5.5	11	--	23	5	5	15	--	S0	3RW30 26-1BB□4	0.690
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW30 27-1BB□4	0.690
38	11	18.5	--	34	10	10	25	--	S0	3RW30 28-1BB□4	0.690
• Spring-type terminals											
25	5.5	11	--	23	5	5	15	--	S0	3RW30 26-2BB□4	0.690
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW30 27-2BB□4	0.690
38	11	18.5	--	34	10	10	25	--	S0	3RW30 28-2BB□4	0.690
• With screw or spring-type terminals											
45	11	22	--	42	10	15	30	--	S2	3RW30 36-□BB□4	1.200
63	18.5	30	--	58	15	20	40	--	S2	3RW30 37-□BB□4	1.200
72	22	37	--	62	20	20	40	--	S2	3RW30 38-□BB□4	1.200
• With screw or spring-type terminals											
80	22	45	--	73	20	25	50	--	S3	3RW30 46-□BB□4	1.710
106	30	55	--	98	30	30	75	--	S3	3RW30 47-□BB□4	1.710

Order No. supplement for connection types

- With screw terminals
- With spring-type terminals²⁾

Order No. supplement for rated control supply voltage U_c

- 24 V AC/DC
- 110 ... 230 V AC/DC

1
20
1

1) Stand-alone installation.

2) Main circuit connection: screw terminals.

Note:

Selection of the soft starter depends on the rated motor current.

Please observe the notes for the selection of soft starters on page 4/4.

The SIRIUS 3RW30 solid-state soft starters are designed for easy starting conditions. $J_{Load} < 10 \times J_{Motor}$. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device.

Siemens recommends the use of the selection and simulation program Win-Soft Starter. For information about rated currents for ambient temperatures > 40 °C, see "Technical specifications".

SIRIUS 3RW Soft Starters

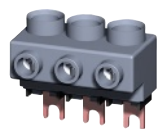
3RW30, 3RW40 for Standard Applications

3RW30

Accessories

Conductor cross-section			Tightening torque	For soft starters	Order No.	PU (UNIT, SET, M)	PS*	Weight approx.
Solid or stranded	Finely stranded with end sleeve	AWG cables, solid or stranded						
mm ²	mm ²	AWG	Nm	Size				kg

Three-phase feeder terminals



3RW29 25-5AB

2.5 ... 16	2.5 ... 16	10 ... 4	3 ... 4	S00 (3RW30 1.), S0 (3RW30 2.)	3RW29 25-5AB	1	1 unit	0.043
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For soft starters		Order No.	Weight approx.
Type	Size		

Auxiliary terminals

Auxiliary terminals, 3-pole

3RW30 4.	S3	3RT19 46-4F	0.035
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Covers for soft starters



Terminal covers for box terminals

Additional touch protection to be fitted at the box terminals (2 units required per device)

3RW30 3.	S2	3RT19 36-4EA2	0.020
3RW30 4.	S3	3RT19 46-4EA2	0.025



Terminal covers for cable lugs and busbar connections

For complying with the phase clearances and as touch protection if box terminal is removed (2 units required per contactor)

3RW30 4.	S3	3RT19 46-4EA1	0.040
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Device manuals 3RW30/3RW40

3RW30 1.	S00	3ZX10 12-0RW30-1AB1	0.550
3RW30 2.	S0		
3RW30 3.	S2		
3RW30 4.	S3		

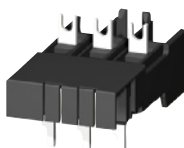
Operating instructions¹⁾

3RW30 1.	S00	--	3ZX10 12-0RW30-2DA1
3RW30 2.	S0		
3RW30 3.	S2		
3RW30 4.	S3		

¹⁾ The operating instructions are included in the scope of supply.

For soft starters		Motor starter protector	Order No.	Weight approx.
Type	Size			

Link modules for soft starters to motor starter protectors¹⁾



3RA29 21-1BA00

• With screw terminals

		Screw terminals			
3RW30 1.	S00	S00	3RA29 21-1BA00	0.001	
3RW30 2.	S0	S00/S0		0.001	
3RW30 36	S2	S2		0.042	
3RW30 46,	S3	S3		3RA19 41-1AA00	0.090
3RW30 47					

• Spring-type terminals

		Spring-type terminals		
3RW30 1.	S00	S00	3RA29 11-2GA00	0.038
3RW30 2.	S0	S0		3RA29 21-2GA00

¹⁾ Can be used in size S0 up to maximum 32 A.
Can be used in size S00/S0 only for 3RV2 motor starter protectors.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW30

Version	Order No.	PU (UNIT, SET, M)	PS*	Weight approx. kg
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Tools for opening spring-type terminals by hand



3RA29 08-1A

Screwdrivers

for all SIRIUS devices with spring-type terminals
length approx. 200 mm, 3.0 mm x 0.5 mm,
titanium gray/black, partially insulated

Spring-type terminals



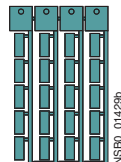
3RA29 08-1A

1

1 unit

0.045

Blank labels



3RT19 00-1SB20

Unit labeling plates¹⁾

for SIRIUS devices
20 mm x 7 mm, pastel turquoise

3RT19 00-1SB20

100

340 units

0.200

¹⁾ PC labeling system for individual inscription
of unit labeling plates available from:
murrplastik Systems, Inc.
www.murrplastik.com.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW30

More information

Application examples for normal starting (Class 10)

Normal starting Class 10 (up to 20 s with 300 % $I_{n \text{ motor}}$).

The soft starter rating can be selected to be as high as the rating of the motor used

Application	Conveyor belt	Roller conveyor	Compressor	Small fan ¹⁾	Pump	Hydraulic pump
Starting parameters						
• Voltage ramp and current limiting						
- Starting voltage	%	70	60	50	40	40
- Starting time	s	10	10	20	10	10

¹⁾ The mass inertia of the fan is <10 times the mass inertia of the motor.

Note:

These tables present sample set values and device sizes. They are intended only for the purposes of information and are not binding. The set values depend on the application in question and must be optimized during commissioning.

The soft starter dimensions should be checked where necessary with the Win-Soft Starter software or with the help of Technical Assistance.

Configuration

The 3RW solid-state motor controllers are designed for easy starting conditions. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. For accurate dimensioning, use the Win-Soft Starter selection and simulation program.

If necessary, an overload relay for heavy starting must be selected where long starting times are involved. PTC sensors are recommended.

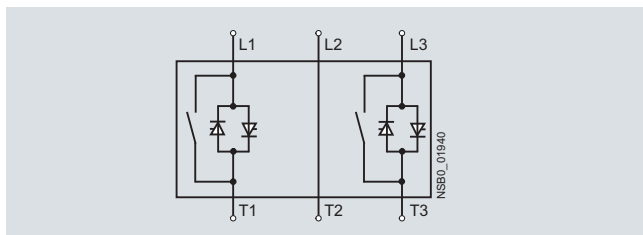
No capacitive elements are permitted in the motor starter between the SIRIUS 3RW soft starter and the motor (e.g. no reactive-power compensation equipment). In addition, neither static systems for reactive-power compensation nor dynamic PFC (Power Factor Correction) must be operated in parallel during starting and ramp-down of the soft starter. This is important to prevent faults arising on the compensation equipment and/or the soft starter.

All elements of the main circuit (such as fuses, controls and overload relays) should be dimensioned for direct starting, following the local short-circuit conditions. Fuses, controls and overload relays must be ordered separately. Please observe the maximum switching frequencies specified in the technical specifications.

Note:

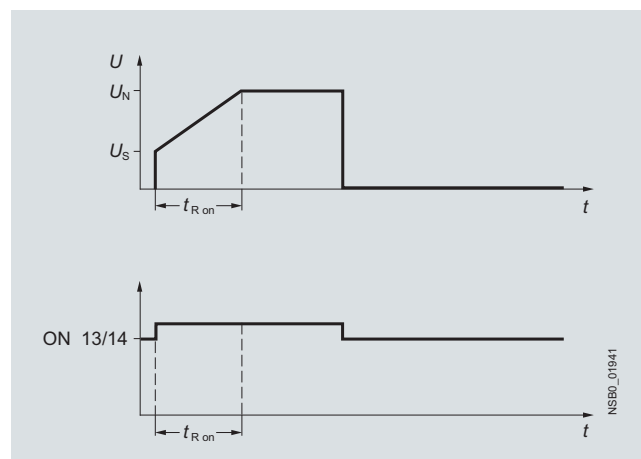
When induction motors are switched on, voltage drops occur as a rule on starters of all types (direct starters, wye-delta starters, soft starters). The infeed transformer must always be dimensioned such that the voltage dip when starting the motor remains within the permissible tolerance. If the infeed transformer is dimensioned with only a small margin, it is best for the control voltage to be supplied from a separate circuit (independently of the main voltage) in order to avoid the potential switching off of the soft starter.

Power electronics schematic circuit diagram



A bypass contact system is already integrated in the 3RW30 soft starter and therefore does not have to be ordered separately.

Status graphs



Manual for SIRIUS 3RW30/40

Besides containing all important information on configuring, commissioning and servicing, the manual also contains example circuits and the technical specifications for all devices.

Win-Soft Starter selection and simulation program

With this software, you can simulate and select all Siemens soft starters, taking into account various parameters such as mains properties, motor and load data, and special application requirements.

The software is a valuable tool, which makes complicated, lengthy manual calculations for determining the required soft starters superfluous.

The Win-Soft Starter selection and simulation program can be downloaded from:

www.siemens.com/softstarter --> Software

You can find more information about soft starters on the Internet likewise at:

www.siemens.com/softstarter

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

Overview

SIRIUS 3RW40 soft starters have all the same advantages as the 3RW30 soft starters.

The SIRIUS 3RW40 soft starters are characterized above all by their small space requirements. Integrated bypass contacts mean that no power loss has to be taken into the bargain at the power semiconductors (thyristors) after the motor has started up. This cuts down on heat losses, enabling a more compact design and making external bypass circuits superfluous.

At the same time this soft starter comes with additional integrated functions such as adjustable current limiting, motor overload and intrinsic device protection, and optional thermistor motor protection. The higher the motor rating, the more important these functions because they make it unnecessary to purchase and install protection equipment such as overload relays.

Internal intrinsic device protection prevents the thermal overloading of the thyristors and the power section defects this can cause. As an option the thyristors can also be protected by semiconductor fuses from short-circuiting.

Thanks to integrated status monitoring and fault monitoring, this compact soft starter offers many different diagnostics options. Up to four LEDs and relay outputs permit differentiated monitoring and diagnostics of the operating mechanism by indicating the operating state as well as for example mains or phase failure, missing load, non-permissible tripping time/class setting, thermal overloading or device faults.

Soft starters rated up to 75 HP (at 480 V) for standard applications in three-phase networks are available. Extremely small sizes, low power losses and simple start-up are just three of the many advantages of the SIRIUS 3RW40 soft starters.

"Increased safety" type of protection EEx e according to ATEX directive 94/9/EC

The 3RW40 soft starter sizes S0 to S12 are suitable for the starting of explosion-proof motors with "increased safety" type of protection EEx e.

Functionality

The space required by the compact SIRIUS 3RW40 soft starter is often only about one third of that required by a contactor assembly for wye-delta starting of comparable rating. This not only saves space in the control cabinet and on the standard mounting rail but also does away completely with the wiring work needed for wye-delta starters. This is notable in particular for higher motor ratings which are only rarely available as fully wired solutions.

At the same time the number of cables from the starter to the motor is reduced from six to three. Compact dimensions, short start-up times, easy wiring and fast commissioning make themselves felt as clear-cut cost advantages.

The bypass contacts of these soft starters are protected during operation by an integrated solid-state arc quenching system. This prevents damage to the bypass contacts in the event of a fault, e.g. brief disconnection of the control voltage, mechanical shocks or life-related component defects on the coil operating mechanism or main contact spring.

The starting current of particularly powerful operating mechanisms can place an unjustifiable load on the local supply system. Soft starters reduce this starting current by means of their voltage ramp. Thanks to the adjustable current limiting, the SIRIUS 3RW40 soft starter takes even more pressure off the supply system. It leaves the set start ramp during the ramp-up – the ramp gradient is fixed by the starting voltage and the ramp time – as soon as the selected current limit is reached. From this moment the voltage of the soft starter is controlled so that the current supplied to the motor remains constant. This process is ended either by completion of the motor ramp-up or by tripping by the intrinsic device protection or the motor overload protection. As the result of this function the actual motor ramp-up can well take longer than the ramp time selected on the soft starter.

Thanks to the integrated motor overload protection according to IEC 60947-4-2 there is no need of an additional overload relay on the new soft starters. The rated motor current, the setting of the overload tripping time (CLASS times) and the reset of the motor overload protection function can be adjusted easily and quickly. Using a 4-step rotary potentiometer it is possible to set different overload tripping times on the soft starter. In addition to CLASS 10, 15 and 20 it is also possible to switch off the motor overload protection if a different motor management control device is to be used for this function, e.g. with connection to PROFIBUS.

Device versions with thermistor motor protection evaluation are available up to a rating of 75 HP (at 480 V). A "Thermoclick" measuring probe can be connected directly, as can a PTC of type A. Thermal overloading of the motor, open-circuits and short-circuits in the sensor circuit all result in the direct disconnection of the soft starter. And if ever the soft starter trips, various reset options are available the same as with intrinsic device protection and motor load protection: manually with the reset button, automatically or remotely through brief disconnection of the control voltage.

The new series of devices comes with the "polarity balancing" control method, which is designed to prevent direct current components in two-phase controlled soft starters. On two-phase controlled soft starters the current resulting from superimposition of the two controlled phases flows in the uncontrolled phase. This results for physical reasons in an asymmetric distribution of the three phase currents during the motor ramp-up. This phenomenon cannot be influenced, but in most applications it is non-critical.

Controlling the power semiconductors results not only in this asymmetry, however, but also in the previously mentioned direct current components which can cause severe noise generation on the motor at starting voltages of less than 50 %.

The control method used for these soft starters eliminates these direct current components during the ramp-up phase and prevents the braking torque which they can cause. It creates a motor ramp-up that is uniform in speed, torque and current rise, thus permitting a particularly gentle, two-phase starting of the motors. At the same time the acoustic quality of the starting operation comes close to the quality of a three-phase controlled soft starter. This is made possible by the on-going dynamic harmonizing and balancing of current half-waves of different polarity during the motor ramp-up. Hence the name "polarity balancing".

Application

The SIRIUS 3RW40 solid-state soft starters are used for the soft starting and stopping of three-phase asynchronous motors.

Due to two-phase control, the current is kept at minimum values in all three phases throughout the entire starting time and disturbing direct current components are eliminated in addition. This not only enables the two-phase starting of motors up to 55 kW (at 400 V) but also avoids the current and torque peaks which occur e.g. with wye-delta starters.

Application areas

See "Selection aid for soft starters" on page 4/4.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

Selection and ordering data

SIRIUS 3RW40 for normal starting (CLASS 10)



3RW40 28-1BB14



3RW40 38-1BB14



3RW40 47-1BB14

Ambient temperature 40 °C				Ambient temperature 50 °C				Size	Normal starting (CLASS 10)	Weight approx. kg	
Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e			Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e						
	230 V	400 V	500 V		200 V	230 V	460 V	575 V			
	kW	kW	kW		hp	hp	hp	hp	Order No.		
Rated operational voltage U_e 200 ... 480 V²⁾											
• With screw terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 24-1BB□4	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 26-1BB□4	0.770
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW40 27-1BB□4	0.770
38	11	18.5	--	34	10	10	25	--	S0	3RW40 28-1BB□4	0.770
• Spring-type terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 24-2BB□4	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 26-2BB□4	0.770
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW40 27-2BB□4	0.770
38	11	18.5	--	34	10	10	25	--	S0	3RW40 28-2BB□4	0.770
• With screw or spring-type terminals											
45	11	22	--	42	10	15	30	--	S2	3RW40 36-□BB□4	1.350
63	18.5	30	--	58	15	20	40	--	S2	3RW40 37-□BB□4	1.350
72	22	37	--	62	20	20	40	--	S2	3RW40 38-□BB□4	1.350
• With screw or spring-type terminals											
80	22	45	--	73	20	25	50	--	S3	3RW40 46-□BB□4	1.900
106	30	55	--	98	30	30	75	--	S3	3RW40 47-□BB□4	1.900
Rated operational voltage U_e 400 ... 600 V											
• With screw terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 24-1BB□5	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 26-1BB□5	0.770
32	--	15	18.5	29	--	--	20	25	S0	3RW40 27-1BB□5	0.770
38	--	18.5	22	34	--	--	25	30	S0	3RW40 28-1BB□5	0.770
• Spring-type terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 24-2BB□5	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 26-2BB□5	0.770
32	--	15	18.5	29	--	--	20	25	S0	3RW40 27-2BB□5	0.770
38	--	18.5	22	34	--	--	25	30	S0	3RW40 28-2BB□5	0.770
• With screw or spring-type terminals											
45	--	22	30	42	--	--	30	40	S2	3RW40 36-□BB□5	1.350
63	--	30	37	58	--	--	40	50	S2	3RW40 37-□BB□5	1.350
72	--	37	45	62	--	--	40	60	S2	3RW40 38-□BB□5	1.350
• With screw or spring-type terminals											
80	--	45	55	73	--	--	50	60	S3	3RW40 46-□BB□5	1.900
106	--	55	75	98	--	--	75	75	S3	3RW40 47-□BB□5	1.900

Order No. supplement for connection types

- With screw terminals
- With spring-type terminals²⁾

Order No. supplement for rated control supply voltage U_c

- 24 V AC/DC
- 110 ... 230 V AC/DC

¹⁾ Stand-alone installation without auxiliary fan.

²⁾ Main circuit connection: screw terminals.

Note:

Selection of the soft starter depends on the rated motor current.

Please observe the notes for the selection of soft starters on page 4/4.

The SIRIUS 3RW40 solid-state soft starters are designed for easy starting conditions. $J_{Load} < 10 \times J_{Motor}$. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. Siemens recommends the

use of the selection and simulation program Win-Soft Starter. For information about rated currents for ambient temperatures > 40 °C, see "Technical specifications".

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40



3RW40 28-1TB04



3RW40 38-1TB04



3RW40 47-1TB04

Ambient temperature 40 °C				Ambient temperature 50 °C				Size	Normal starting (CLASS 10)	Weight approx.	
Rated operational current $I_e^{1)}$	Rated power of induction motors for rated operational voltage U_e			Rated operational current $I_e^{1)}$	Rated power of induction motors for rated operational voltage U_e						
A	230 V	400 V	500 V	A	200 V	230 V	460 V	575 V	Order No.	kg	
Rated operational voltage U_e 200 ... 480 V,²⁾ with thermistor motor protection, rated control supply voltage U_s 24 V AC/DC											
• With screw terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 24-1TB04	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 26-1TB04	0.770
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW40 27-1TB04	0.770
38	11	18.5	--	34	10	10	25	--	S0	3RW40 28-1TB04	0.770
• Spring-type terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 24-2TB04	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 26-2TB04	0.770
32	7.5	15	--	29	7.5	7.5	20	--	S0	3RW40 27-2TB04	0.770
38	11	18.5	--	34	10	10	25	--	S0	3RW40 28-2TB04	0.770
• With screw or spring-type terminals											
45	11	22	--	42	10	15	30	--	S2	3RW40 36-□TB04	1.350
63	18.5	30	--	58	15	20	40	--	S2	3RW40 37-□TB04	1.350
72	22	37	--	62	20	20	40	--	S2	3RW40 38-□TB04	1.350
• With screw or spring-type terminals											
80	22	45	--	73	20	25	50	--	S3	3RW40 46-□TB04	1.900
106	30	55	--	98	30	30	75	--	S3	3RW40 47-□TB04	1.900
Rated operational voltage U_e 400 ... 600 V, with thermistor motor protection, rated control supply voltage U_s 24 V AC/DC											
• With screw terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 24-1TB05	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 26-1TB05	0.770
32	--	15	18.5	29	--	--	20	25	S0	3RW40 27-1TB05	0.770
38	--	18.5	22	34	--	--	25	30	S0	3RW40 28-1TB05	0.770
• Spring-type terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 24-2TB05	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 26-2TB05	0.770
32	--	15	18.5	29	--	--	20	25	S0	3RW40 27-2TB05	0.770
38	--	18.5	22	34	--	--	25	30	S0	3RW40 28-2TB05	0.770
• With screw or spring-type terminals											
45	--	22	30	42	--	--	30	40	S2	3RW40 36-□TB05	1.350
63	--	30	37	58	--	--	40	50	S2	3RW40 37-□TB05	1.350
72	--	37	45	62	--	--	40	60	S2	3RW40 38-□TB05	1.350
• With screw or spring-type terminals											
80	--	45	55	73	--	--	50	60	S3	3RW40 46-□TB05	1.900
106	--	55	75	98	--	--	75	75	S3	3RW40 47-□TB05	1.900

Order No. supplement for connection types

- With screw terminals
- With spring-type terminals²⁾

1) Stand-alone installation without auxiliary fan.

2) Main circuit connection: screw terminals.

Note:

Selection of the soft starter depends on the rated motor current. Please observe the notes for the selection of soft starters on page 4/4.

The SIRIUS 3RW40 solid-state soft starters are designed for easy starting conditions. $J_{Load} < 10 \times J_{Motor}$. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. Siemens recommends the

use of the selection and simulation program Win-Soft Starter. For information about rated currents for ambient temperatures > 40 °C, see "Technical specifications".

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SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

SIRIUS 3RW40 for heavy starting (CLASS 20)



3RW40 28-1BB14



3RW40 38-1BB14



3RW40 47-1BB14

Ambient temperature 40 °C				Ambient temperature 50 °C				Size	Heavy starting (CLASS 20)	Weight approx.	
Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e			Rated operational current $I_e^{1)}$ A	Rated power of induction motors for rated operational voltage U_e						
	230 V	400 V	500 V		200 V	230 V	460 V	575 V			
	kW	kW	kW		hp	hp	hp	hp	Order No.	kg	
Rated operational voltage U_e 200 ... 480 V²⁾											
• With screw terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 26-1BB□4	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 27-1BB□4	0.770
• Spring-type terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 26-2BB□4	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 27-2BB□4	0.770
• With screw or spring-type terminals											
32	7.5	15	--	29	7.5	7.5	20	--	S2	3RW40 36-□BB□4	1.350
38	11	18.5	--	34	10	10	25	--	S2	3RW40 37-□BB□4	1.350
45	11	22	--	42	10	15	30	--	S2	3RW40 37-□BB□4	1.350
63	18.5	30	--	58	15	20	40	--	S3	3RW40 47-□BB□4	1.900
72	22	37	--	62	20	20	40	--	S3	3RW40 47-□BB□4	1.900
Rated operational voltage U_e 400 ... 600 V											
• With screw terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 26-1BB□5	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 27-1BB□5	0.770
• Spring-type terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 26-2BB□5	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 27-2BB□5	0.770
• With screw or spring-type terminals											
32	--	15	18.5	29	--	--	20	25	S2	3RW40 36-□BB□5	1.350
38	--	18.5	22	34	--	--	25	30	S2	3RW40 37-□BB□5	1.350
45	--	22	30	42	--	--	30	40	S2	3RW40 37-□BB□5	1.350
63	--	30	37	58	--	--	40	50	S3	3RW40 47-□BB□5	1.900
72	--	37	45	62	--	--	40	60	S3	3RW40 47-□BB□5	1.900

Order No. supplement for connection types

- With screw terminals
- With spring-type terminals²⁾

Order No. supplement for rated control supply voltage U_c

- 24 V AC/DC
- 110 ... 230 V AC/DC

¹⁾ Stand-alone installation without auxiliary fan.

²⁾ Main circuit connection: screw terminals.

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Note:

Selection of the soft starter depends on the rated motor current.

Please observe the notes for the selection of soft starters on page 4/4.

The SIRIUS 3RW40 solid-state soft starters are designed for easy starting conditions. $J_{Load} < 10 \times J_{Motor}$. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. Siemens recommends the use of the selection and simulation program Win-Soft Starter. For information about rated currents for ambient temperatures > 40 °C, see "Technical specifications".

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40



3RW40 28-1TB04



3RW40 38-1TB04



3RW40 47-1TB04

Ambient temperature 40 °C				Ambient temperature 50 °C				Size	Heavy starting (CLASS 20)	Weight approx.	
Rated operational current $I_e^{1)}$	Rated power of induction motors for rated operational voltage U_e			Rated operational current $I_e^{1)}$	Rated power of induction motors for rated operational voltage U_e			Order No.		kg	
	230 V	400 V	500 V		200 V	230 V	460 V				575 V
A	kW	kW	kW	A	hp	hp	hp	hp			
Rated operational voltage U_e 200 ... 480 V,²⁾, with thermistor motor protection, rated control supply voltage U_s 24 V AC/DC											
• With screw terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 26-1TB04	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 27-1TB04	0.770
• Spring-type terminals											
12.5	3	5.5	--	11	3	3	7.5	--	S0	3RW40 26-2TB04	0.770
25	5.5	11	--	23	5	5	15	--	S0	3RW40 27-2TB04	0.770
• With screw or spring-type terminals											
32	7.5	15	--	29	7.5	7.5	20	--	S2	3RW40 36-□TB04	1.350
38	11	18.5	--	34	10	10	25	--	S2	3RW40 37-□TB04	1.350
45	11	22	--	42	10	15	30	--	S2	3RW40 37-□TB04	1.350
63	18.5	30	--	58	15	20	40	--	S3	3RW40 47-□TB04	1.900
72	22	37	--	62	20	20	40	--	S3	3RW40 47-□TB04	1.900
Rated operational voltage U_e 400 ... 600 V, with thermistor motor protection, rated control supply voltage U_s 24 V AC/DC											
• With screw terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 26-1TB05	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 27-1TB05	0.770
• Spring-type terminals											
12.5	--	5.5	7.5	11	--	--	7.5	10	S0	3RW40 26-2TB05	0.770
25	--	11	15	23	--	--	15	20	S0	3RW40 27-2TB05	0.770
• With screw or spring-type terminals											
32	--	15	18.5	29	--	--	20	25	S2	3RW40 36-□TB05	1.350
38	--	18.5	22	34	--	--	25	30	S2	3RW40 37-□TB05	1.350
45	--	22	30	42	--	--	30	40	S2	3RW40 37-□TB05	1.350
63	--	30	37	58	--	--	40	50	S3	3RW40 47-□TB05	1.900
72	--	37	45	62	--	--	40	60	S3	3RW40 47-□TB05	1.900

Order No. supplement for connection types

- With screw terminals
- With spring-type terminals²⁾

1) Stand-alone installation without auxiliary fan.

2) Main circuit connection: screw terminals.

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2

Note:

Selection of the soft starter depends on the rated motor current.

Please observe the notes for the selection of soft starters on page 4/4.

The SIRIUS 3RW40 solid-state soft starters are designed for easy starting conditions. $J_{Load} < 10 \times J_{Motor}$. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. Siemens recommends the use of the selection and simulation program Win-Soft Starter. For information about rated currents for ambient temperatures > 40 °C, see "Technical specifications".

SIRIUS 3RW Soft Starters

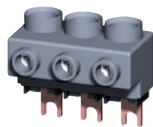
3RW30, 3RW40 for Standard Applications

3RW40

Accessories

Conductor cross-section			Tightening torque	For soft starters	Order No.	Weight approx.
Solid or stranded	Finely stranded with end sleeve	AWG cables, solid or stranded				
mm ²	mm ²	AWG	Nm	Size		kg

Three-phase feeder terminals



3RV29 25-5AB

2.5 ... 16	2.5 ... 16	10 ... 4	3 ... 4	S00 (3RW30 1.), S0 (3RW30 2.)	3RV29 25-5AB	0.043
------------	------------	----------	---------	--	---------------------	-------

For soft starters		Version	Order No.	Weight approx.
Type	Size			

Auxiliary terminals

Auxiliary terminals, 3-pole				
3RW40 4.	S3		3RT19 46-4F	0.035

Covers for soft starters

Terminal covers for box terminals			Order No.	Weight approx.
3RW40 3.	S2	Additional touch protection to be fitted at the box terminals (2 units required per device)		
3RW40 4.	S3		3RT19 46-4EA2	0.025



Terminal covers for cable lugs and busbar connections			Order No.	Weight approx.
3RW40 4.	S3	For complying with the phase clearances and as touch protection if box terminal is removed (2 units required per contactor)		



Sealing covers			Order No.	Weight approx.
3RW40 2. to 3RW40 4.	S0, S2, S3			

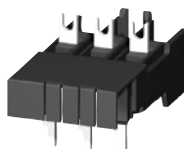
Fans (to increase switching frequency and for device mounting in positions different from the normal position)

3RW40 2.	S0		3RW49 28-8VB00	0.010
3RW40 3., 3RW40 4.	S2, S3		3RW49 47-8VB00	0.020



For soft starters		Motor starter protector	Order No.	Weight approx.
Type	Size			

Link modules for soft starters to motor starter protectors¹⁾



3RA29 21-1BA00

• With screw terminals			Screw terminals	
3RW40 2.	S0	S00/S0	3RA29 21-1BA00	0.001
3RW40 36.	S2	S2	3RA19 31-1AA00	0.042
3RW40 46., 3RW40 47.	S3	S3	3RA19 41-1AA00	0.090
• Spring-type terminals			Spring-type terminals	
3RW40 2.	S0	S0	3RA29 21-2GA00	0.072

¹⁾ Can be used in size S0 up to maximum 32 A.
Can be used in size S0 only for 3RV2 motor starter protectors.



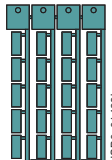
SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

For soft starters Type	Size	Order No.	PU (UNIT, SET, M)	PS*	Weight approx. kg
Device manuals 3RW30/3RW40					
3RW40 2.	S0	3ZX10 12-0RW30-1AB1	1	1 unit	0.550
3RW40 3.	S2				
3RW40 4.	S3				
Operating instructions¹⁾					
3RW40 2.	S0	3ZX10 12-0RW40-1AA1			
3RW40 3.	S2				
3RW40 4.	S3				

¹⁾ The operating instructions are included in the scope of supply.

Version	Order No.	PU (UNIT, SET, M)	PS*	Weight approx. kg
Tools for opening spring-type terminals by hand				
 3RA29 08-1A	Spring-type terminals 	1	1 unit	0.045
	Screwdrivers for all SIRIUS devices with spring-type terminals length approx. 200 mm, 3.0 mm x 0.5 mm, titanium gray/black, partially insulated			
Blank labels				
 3RT19 00-1SB20	Unit labeling plates¹⁾ for SIRIUS devices 20 mm x 7 mm, pastel turquoise	100	340 units	0.200

¹⁾ PC labeling system for individual inscription of unit labeling plates available from: murrplastik Systems, Inc. www.murrplastik.com.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

More information

Application examples for normal starting (CLASS 10)

Normal starting CLASS 10 (up to 20 s with 350 % $I_{n \text{ motor}}$).

The soft starter rating can be selected to be as high as the rating of the motor used.

Application		Conveyor belt	Roller conveyor	Compressor	Small fan ¹⁾	Pump	Hydraulic pump
Starting parameters							
• Voltage ramp and current limiting							
- Starting voltage	%	70	60	50	40	40	40
- Starting time	s	10	10	10	10	10	10
- Current limit value		$5 \times I_M$	$5 \times I_M$	$4 \times I_M$	$4 \times I_M$	$4 \times I_M$	$4 \times I_M$
Ramp-down time	s	5	5	0	0	10	0

¹⁾ The mass inertia of the fan is <10 times the mass inertia of the motor.

Application examples for heavy starting (CLASS 20)

Heavy starting CLASS 20 (up to 40 s with 350 % $I_{n \text{ motor}}$).

The soft starter has to be selected at least one performance class higher than the motor used.

Application		Stirrer	Centrifuge
Starting parameters			
• Voltage ramp and current limiting			
- Starting voltage	%	40	40
- Starting time	s	20	20
- Current limit value		$4 \times I_M$	$4 \times I_M$
Ramp-down time		0	0

Note:

These tables present sample set values and device sizes. They are intended only for the purposes of information and are not binding. The set values depend on the application in question and must be optimized during commissioning.

The soft starter dimensions should be checked where necessary with the Win-Soft Starter software or with the help of Technical Assistance.

SIRIUS 3RW Soft Starters

3RW30, 3RW40 for Standard Applications

3RW40

Configuration

The 3RW solid-state soft starters are designed for easy starting conditions. In the event of deviating conditions or increased switching frequency, it may be necessary to choose a larger device. For accurate dimensioning, use the Win-Soft Starter selection and simulation program.

Where long starting times are involved, the integrated solid-state overload relay for heavy starting should not be disconnected. PTC sensors are recommended. This also applies for the smooth ramp-down because during the ramp-down time an additional current loading applies in contrast to free ramp-down.

In the case of high switching frequencies in S4 mode, Siemens recommends the use of PTC sensors. For corresponding device versions with integrated thermistor motor protection or separate thermistor evaluation devices see Catalog LV 1.

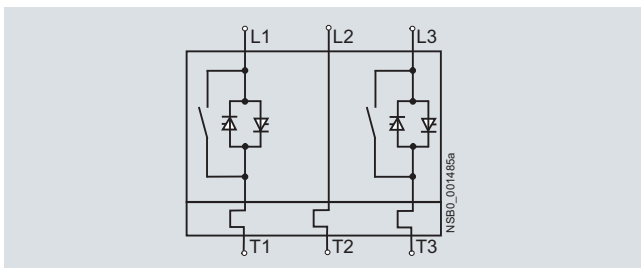
No capacitive elements are permitted in the motor starter between the SIRIUS 3RW soft starter and the motor (e.g. no reactive-power compensation equipment). In addition, neither static systems for reactive-power compensation nor dynamic PFC (Power Factor Correction) must be operated in parallel during starting and ramp-down of the soft starter. This is important to prevent faults arising on the compensation equipment and/or the soft starter.

All elements of the main circuit (such as fuses and controls) should be dimensioned for direct starting, following the local short-circuit conditions. Fuses, controls and overload relays must be ordered separately. Please observe the maximum switching frequencies specified in the technical specifications.

Note:

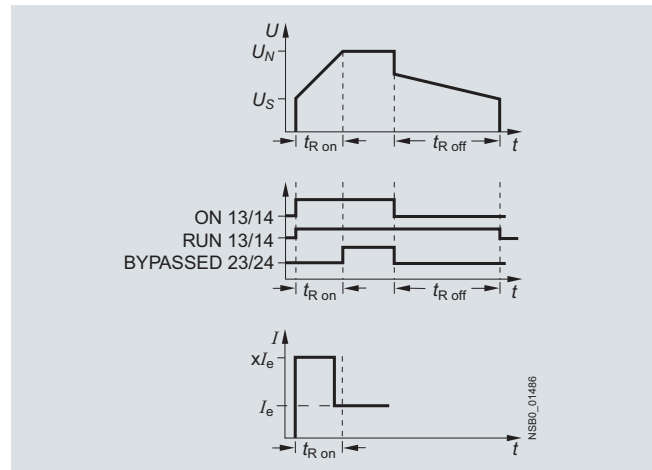
When induction motors are switched on, voltage drops occur as a rule on starters of all types (direct starters, wye-delta starters, soft starters). The infeed transformer must always be dimensioned such that the voltage dip when starting the motor remains within the permissible tolerance. If the infeed transformer is dimensioned with only a small margin, it is best for the control voltage to be supplied from a separate circuit (independently of the main voltage) in order to avoid the potential switching off of the soft starter.

Power electronics schematic circuit diagram



A bypass contact system and solid-state overload relay are already integrated in the 3RW40 soft starter and therefore do not have to be ordered separately.

Status graphs



Manual for SIRIUS 3RW30/40

Besides containing all important information on configuring, commissioning and servicing, the manual also contains example circuits and the technical specifications for all devices.

Win-Soft Starter selection and simulation program

With this software, you can simulate and select all Siemens soft starters, taking into account various parameters such as mains properties, motor and load data, and special application requirements.

The software is a valuable tool, which makes complicated, lengthy manual calculations for determining the required soft starters superfluous.

The Win-Soft Starter selection and simulation program can be downloaded from:

www.siemens.com/softstarter --> Software

More information about soft starters can be found on the Internet at:

www.siemens.com/softstarter

SIRIUS 3RW Soft Starters

Notes

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