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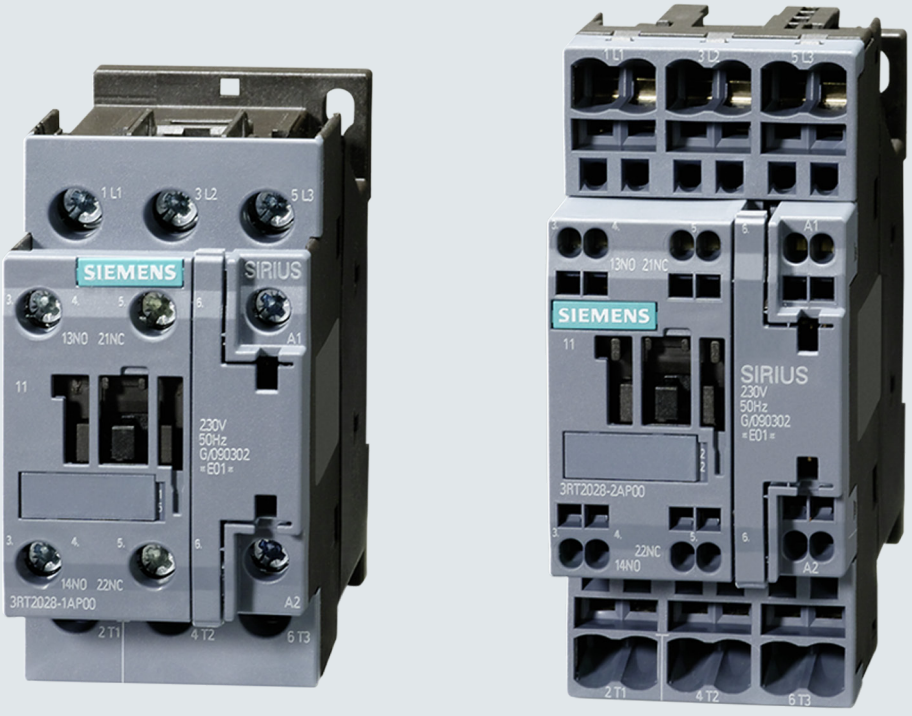

Industrial Controls

Switching Devices

SIRIUS Innovations - SIRIUS 3RT2 Contactors / Contactor assemblies

Manual

Edition 10/2014

Answers for industry.

SIEMENS

Industrial Controls

Switching devices
SIRIUS Innovations - SIRIUS 3RT2 contactors/contactor assemblies

Manual

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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℗ 10/2014 Subject to change

Table of contents

Introduction 1

1.1 Responsibility of the user for system configuration and functionality

The SIRIUS range offers various switching devices for the safe and functional switching of electrical loads:

- 3RT20 power contactor for switching motors
- 4-pole 3RT23 contactors for switching resistive loads and 4-pole 3RT25 contactors for changing the polarity of hoisting gear motors
- 3RH2 contactor relays for switching in the control circuit
- 3RA23 (reversing) and 3RA24 (star-delta (wye-delta)) contactor assemblies
- 3RT26 capacitor contactors for switching capacitive loads (AC-6b)

Siemens AG, its regional offices, and associated companies (hereinafter referred to as "Siemens") cannot guarantee all the properties of an overall installation or machine that has not been designed by Siemens.

Nor can Siemens assume liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the Siemens general terms of supply are to be derived or inferred from the following description.

1.2 Purpose of the manual

This manual describes the 3RT2 contactors, 3RH21 contactor relays and 3RA23/3RA24 contactor assemblies, and provides the following information:

- Information about integrating the contactors and contactor assemblies into the system environment.
- Information on necessary hardware components.
- Information about installing and connecting the contactors.
- Technical information such as dimension drawings and unit wiring diagrams.

The information in this manual enables you to configure and commission the contactors.

1.3 Advantages through energy efficiency

Siemens offers you a unique portfolio for efficient energy management in industry – a process that serves to optimally shape your energy requirement. Operational energy management is subdivided into three phases:

- Identification
- Evaluation
- Realization

Siemens supports you with suitable hardware and software solutions in every phase of a project.

More information can be found on the Internet (http://www.automation.siemens.com/mcms/industrial-controls/en/energy-efficiency).

The 3RT20 contactors make the following contribution to energy efficiency in the overall plant:

- AC/DC coils with electrical control to reduce the closing power and holding power
- Smaller power supplies in the control circuit through low holding power at 24 V DC
- Increased power means contactors of size S2 to 37 kW can be used instead of size S3

Figure 1-1 Overview of the energy management process

1.4 Required basic knowledge

To understand these operating instructions you should have a general knowledge of automation engineering and low-voltage switchgear.

1.5 Scope of the manual

The manual is valid for these contactors and contactor assemblies. It contains a description of the devices that is valid at the time of publication.

1.6 Service&Support

Online Support

The Online Support in the Service&Support portal is an extensive information system for all questions relating to Siemens products and solutions. This service enables direct and central access to in-depth information concerning the products, systems and applications for industry and to a large number of programming, configuration and application examples. Its content is available via a mobile app.

The Technical Forum of the Online Support provides the opportunity for users to swap information. Support Request allows contact to be established with Siemens experts in Technical Support.

Siemens Industry Online Support ensures that users in industry are always kept up-to-date with news, software updates and announcements by means of newsletters and Twitter.

Links: Service&Support Portal (http://support.automation.siemens.com), Online Support (http://support.automation.siemens.com/WW/view/en/16605022)

Product Support

Are you looking for product information such as technical data, updates or FAQs? Here, the "Product Support" section of the Service & Support Portal offers an extensive collection of all information about the Siemens Industry Automation and Drive Technologies products and solutions:

- Answers to frequently asked questions (FAQs)
- Updates/upgrades, service packs and support tools for downloading
- Manuals and operating instructions
- Technical data/CAx data
- Approvals and certificates
- Test certificates and characteristic curves

All Product Support information is at your disposal free of charge and around the clock, and you always get the current version.

Link: Product Support (http://support.automation.siemens.com/WW/view/en/4000024)

CAx data

The CAx Download Manager provides you with a simple means of gaining access to up-to-date product data for your CAx or CAe system.

You configure your own download package with just a few clicks. You can choose from the following information for products

- Product images
- 2D dimensional drawings
- 3D models
- Internal circuit diagrams
- EPLAN macro files
- Manuals
- Characteristics
- Operating instructions
- Certificates
- Product master data

Link: CAx Download Manager (http://support.automation.siemens.com/WW/view/en/42455541)

Applications & Tools

Applications & Tools supports you with various tools and examples when it comes to solving your automation tasks. Solutions are presented in interaction with several components in the system, without focusing on individual products.

- Application examples
- Function blocks & tools
- Background and system descriptions
- Performance statements
- Demonstration systems/videos

Link: Applications & Tools (http://support.automation.siemens.com/WW/view/en/20208582)

My Documentation Manager

My Documentation Manager enables you to compile your own documentation from our standard documents (manuals), which are located in the Product Support section. Under mySupport, you have the opportunity to create and manage you own compilations in a structure of their own.

Link:

MyDocumentationManager (http://support.automation.siemens.com/WW/view/en/38715968)

Reference

You can find further information on structure and navigation in Online Support here (http://support.automation.siemens.com/WW/view/en/11774658).

1.7 Further documentation

To install and connect the contactors and contactor assemblies, you require the operating instructions of the contactors and contactor assemblies used.

You can find a list of operating instructions and an overview of the manuals pertaining to SIRIUS Innovations in the appendix "References (Page 389)".

1.8 Recycling and disposal

These devices can be recycled thanks to their low pollutant content. For environmentally-friendly recycling and disposal of your electronic waste, please contact a company certified for the disposal of electronic waste.

1.9 Technical Assistance

Up-to-the-minute information

You can obtain further assistance by calling the following numbers:

Technical Assistance:

Telephone: +49 (911) 895-5900 (8 a.m. to 5 p.m. CET)

Fax: +49 (911) 895-5907

or on the Internet at:

E-mail: (mailto:technical-assistance@siemens.com)

Internet: (http://www.siemens.com/sirius/technical-assistance)

1.10 Correction sheet

A correction sheet is included at the end of the manual. Please use it to record your suggestions for improvements, additions and corrections, and return the sheet to us. This will help us to improve the next edition of the manual.

Standards

2

2.1 General regulations and standards

Applicable regulations, standards, and approvals

The general regulations and standards below apply to 3RT contactors and 3RH contactor relays:

Table 2- 1 General regulations

Applications	General regulations	Explanation
3RT contactors and 3RH contactor relays	• IEC 60947-1 • DIN EN 60947-1	Low-voltage switchgear and controlgear - General rules
	• IEC 60947-4-1 • DIN EN 60947-4-1	Low-voltage switchgear and controlgear Part 4-1: Electromechanical contactors and motor-starters
	• IEC 60947-5-1	Specifically for contactor relays: Control circuit devices and switching elements; Electromechanical control circuit devices (including positively driven operation)
	• UL 60947-4-1	Standard For Safety For Low-Voltage Switchgear and Controlgear - Part 4-1
	• UL – UL 508 (S00 / S0) – UL 60947-4-1 (S2)	Industrial Control Equipment
	• CSA 22.2 14-95	Industrial Control Equipment

Table 2- 2 Applicable standards

Applications	Applicable standards	Explanation
3RT contactors and 3RH contactor relays	• EN 60335-1	EN 60335, the latest standard for household appliances, precludes the use of plastics of flammability class HB.
	• EN 50155	Standards for railway applications
	• DIN EN 60077	
	• IEC 61373	
	• CSA B44.1	Elevator and Escalator Electrical Equipment
	• SEMI F47	Requirements of the semiconductor industry for contactors
	• EC 89/336/EEC	EC Directive "EMC"
	• IEC 60831-1: 2014-02	Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V Part 1: General – Performance, testing and rating – Safety requirements – Guide for installation and operation
	• DIN EN 60831-1 (DIN VDE 0560 Teil 46): 2003-08	Selbstheilende Leistungs-Parallelkondensatoren für Wechselstromanlagen mit einer Nennspannung bis 1 kV Teil 1: Allgemeines – Leistungsanforderungen, Prüfung und Bemessung – Sicherheitsanforderungen – Anleitung für Errichtung und Betrieb
	• IEC 61921: 2003-04	Power capacitors – Low-voltage power factor correction banks
	• DIN EN 61921 (VDE 0560 Teil 700): 2004-02	Leistungskondensatoren – Kondensatorbatterien zur Korrektur des Niederspannungsleistungsfaktors

Reference

The standards from Catalog IC 10 "SIRIUS Industrial Controls" in the appendix always apply. You will find extracts from the most important standards relating to the innovations from the SIRIUS modular system in the appendix entitled "References" under "SIRIUS Innovations manuals (Page 390)" in the "SIRIUS Innovations - system overview" manual.

2.2 Protective separation

Definition

In order for the "protective separation" of circuits to be achieved, an individual fault must not be able to trigger a voltage overspill from one circuit into another. The kinds of fault to be taken into account include twisted or loose conductive parts, twisted solder pins, broken winding wires, missing screws, or broken barriers within a device.

Protective separation for 3RT20 contactors and 3RH2 contactor relays

The term "protective separation" is used in relation to safety extra low voltage (SELV/PELV) and functional extra low voltage (FELV). Protective separation reliably prevents a dangerous contact voltage from spilling over to the voltage which has been protectively separated (e.g. to a safety extra low voltage which is present or switched in the same device). If the current paths of a contactor are operated at different voltages, "protective separation" requirements must be met. With 3RT2 contactors and 3RH2 contactor relays, "protective separation" is ensured up to a certain voltage.

Regulations

"Protective separation" between circuits within equipment is achieved by complying with the basic requirements contained in standard DIN EN 60947-1, Annex N
(replaces DIN VDE 0106 Part 101/IEC 536, among other standards).

Basic requirements include, for example:

- Double or reinforced insulation
- Electrically protective shielding
- Combination of double or reinforced insulation and electrically protective shielding

The insulation must be resistant to aging for the duration of the expected service life.

Circuits without a safety extra low voltage or a functional extra low voltage do not require protective separation.

Reference

More information ...	Can be found in the chapter titled ...
About "protective separation"	Technical data (Page 243)

2.3 Positively driven contact elements/Mirror contacts

Up until a few years ago, just one standard term, "positively driven contacts", existed for contactors. This term was not clearly defined until the year 2000 in standard EN 60947-1 and it applied to all contactor relays and power contactors.

Positively driven contact elements for contactor relays acc. to EN 60947-5-1, Annex L

According to EN 60947-5-1:1997+A12: 1999+A1:1999+A2:2000, Annnex L, positively driven contact elements are a combination of "n" NO contacts and "m" NC contacts, which are designed such that they cannot be closed simultaneously. "Positively driven operation" may only apply to auxiliary switch elements which are contained in switching devices and whose actuating forces are generated internally. An example of such elements are the SIRIUS 3RH2 contactor relays.

All SIRIUS 3RH2 contactor relays (with at least 1 NC contact) are tested to EN 60947-5-1, and ever since the product was launched, they have featured positively driven contact elements in the basic device, or in the basic device in conjunction with auxiliary switches.

Figure 2-1 Symbol for positively driven contact elements in a switching device

Mirror contact for power contactors in accordance with EN 60947-4-1, Annex F

According to EN 60947-4-1:2001+A1:2002+A2:2005, Annex F, a mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a main NO contact.

Figure 2-2 Symbol for mirror contacts in a switching device

All SIRIUS 3RT2 motor contactors (with at least 1 NC contact) are tested to EN 60947-4-1 and have featured mirror contact characteristics in conjunction with auxiliary switches ever since the product was launched.

Note

Both contact characteristics, the positively driven contact element in the contactor relay as well as the mirror contact in the power contactor, meet the same technical requirements.

The 3RT2/3RH2 contactors are suitable for applications in the safety circuit. For contactor relays, this applies on account of the positively driven operation of the contacts. For motor contactors, it applies on account of the mirror contact properties of the auxiliary contacts.

Employer's Liability Insurance Association / SUVA

In addition to the standards EN 60947-4-1 and EN 60947-5-1, the requirements of the German Employer's Liability Insurance Associations or the Swiss Accident Insurance Institute (SUVA) also apply in the case of safety circuits for the protection of personnel. These requirements set stricter conditions for devices with mirror contacts or positively driven contact elements. The basic SUVA requirement is that all auxiliary switches must be mounted on the basic device at the factory in such a way that they cannot be removed. Manual actuation of the contactor must not be possible.

A SUVAPro type-examination certificate confirms that the switching device meets the basic health and safety requirements and that this requirement agreement has been assessed by an accredited European Notified Body.

Note

The SUVA certificate is required if products or systems are operated in Switzerland.

All SIRIUS 3RH2 contactor relays (with at least 1 NC contact) are tested according to EN 60947-5-1 and possess the SUVA type-examination certificate since product launch.

All SIRIUS 3RT2 motor contactors (with at least 1 NC contact) are tested according to EN 60947-4-1 and can be supplied in accordance with SUVA requirements.

Thanks to use of a double bridge for the contacts, all 3RT2 motor contactors and 3RH2 contactor relays feature contact redundancy and optimization of the contact surface. This crucially enhances the contactors' contact reliability.

2.4 IE3 ready

Ambitious climate protection goals in Europe call for increasingly energy-efficient components.

With this in mind, as from January 2015, the energy efficiency class IE3 shall be mandatory (with exceptions) for three-phase asynchronous motors, and this will have an effect on motors, low-voltage power distribution systems, and industrial controls.

It will be applicable as of:

- 1. January 2015 for motors from 7.5 kW to 375 kW
- 1. January 2017 for motors from 0.75 kW to 375 kW

You will be optimally equipped for the new motor generation with our state-of-the-art SIRIUS modular system components and 3VL molded case circuit breakers.

You will find information on IE3 at:
Information IE3 (http://www.siemens.com/IE3ready)

Note

Use of 3RT2 contactors with IE3 motors

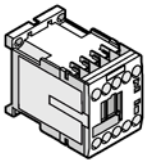
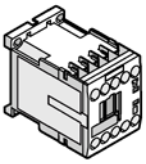
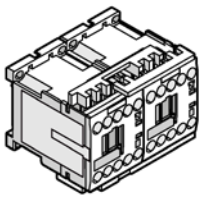
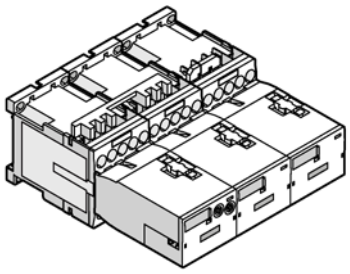
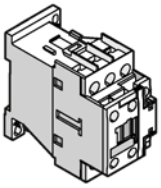
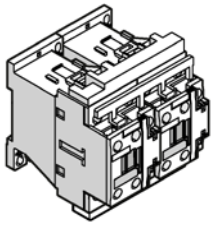
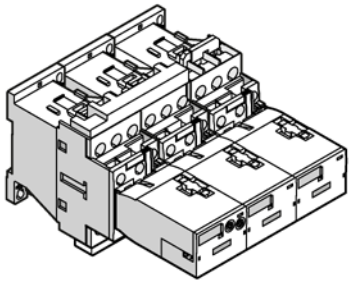
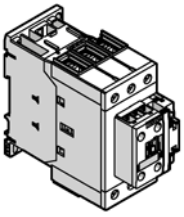
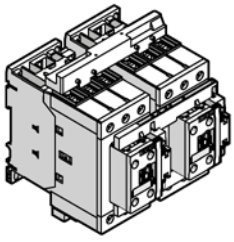
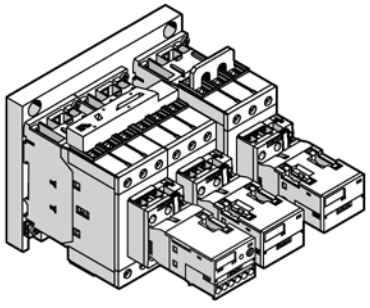
For the use of 3RT2 contactors in conjunction with highly energy-efficient IE3 motors, please observe the information on dimensioning and configuring in the "Configuration Manual for SIRIUS Controls with IE3 Motors (http://support.automation.siemens.com/WW/view/en/94770820)"

Product description

3

3.1 Overview of the contactor range

The SIRIUS range offers various switching devices for the safe and functional switching of electrical loads. The table below provides an overview of the contactor versions and contactor assemblies available in size S00 to S2 (table contains versions featuring screw terminals).

Size	3RH2 contactor relays	3RT2 power contactors	3RA23 reversing contactor assembly	3RA24 contactor assembly for star-delta (wye-delta) start
S00				
S0	---			
S2	---			

3.2 Device versions

Various different switching devices are available for switching electrical loads. The contactor is the ideal device for performing switching operations which are frequently repeated. it is the most commonly used switching device in industry, mechanical engineering, and the manufacture of switching stations.

The SIRIUS contactor range with a width of 45 mm (size S00 / S0) and 55 mm for size S2 comprises:

- 3RT20 power contactors for switching motors up to 37 kW / 400 V (AC-3), 90 A (AC-1)
- 4-pole 3RT23 contactors (4 NO) for switching resistive loads up to 110 kW (AC-1) and 4-pole 3RT25 contactors (2 NO + 2 NC) up to 22 kW
- 3RH2 contactor relays for switching in the control circuit with contact versions of 4 NO contacts, 3 NO contacts + 1 NC contact, and 2 NO contacts + 2 NC contacts
- 3RA23 (reversing) and 3RA24 (star-delta (wye-delta)) contactor assemblies
- 3RT26 capacitor contactors for switching capacitive loads (AC-6b)

Reference

More information ...	Can be found in the chapter titled ...
About the basic and special versions of the contactor relays and power contactors	Configuration (Page 47)

3.2.1 3RH2 contactor relays

3RH2 contactor relays are available in the versions detailed below. The contactors can be supplied with AC and DC operating mechanisms of between 24 V and 230 V (preferred voltages). Different voltage versions are available on request.

Versions

Table 3- 1 Versions of the 3RH2 contactor relays

Feature	Specifications	Contactors for special applications	
Version	Contactor relay	Contactors with extended operating range for railway applications	Coupling relay
Number of poles	4 / 8	4	4
Size	S00		
Width	45 mm		

Connection systems

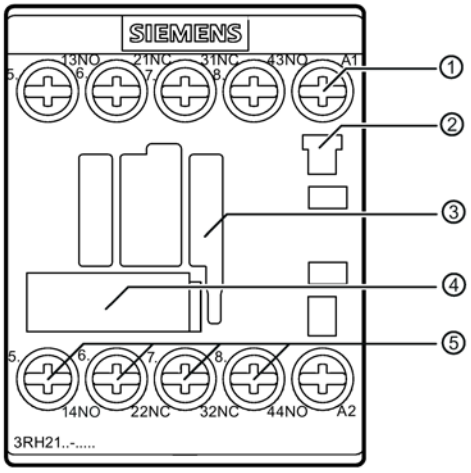
The contactor relays can be supplied with the connection systems detailed below.

Table 3- 2 Connection systems available for 3RH2 contactor relays

Connection system	Contactor relay	Contactors with extended operating range for railway applications	Coupling relay
Screw connection	✓	✓	✓
Spring-loaded connection	✓	✓	✓
Ring cable lug connection	✓	---	---
Solder pin connection (only possible in conjunction with the "solder pin adapter" optional accessory)	✓	✓	✓

The illustrations below show example equipment features of the 3RH2 contactor relays for switching in the auxiliary circuit.

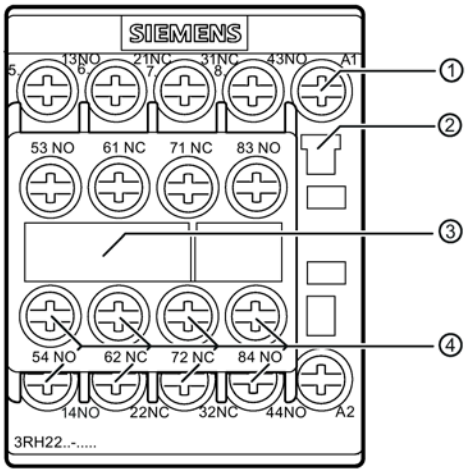
3RH21 contactor relay, 4-pole



① Coil terminal on the front
② Location hole for surge suppression
③ Location hole for 1-, 2-, and 4-pole auxiliary switch blocks
④ Label
⑤ Auxiliary contacts

Figure 3-1 3RH21..-..... contactor relay, 4-pole, size S00, overview

3RH22 contactor relay, 8-pole



① Coil terminal on the front
② Location hole for surge suppression
③ Label
④ Auxiliary contacts

Figure 3-2 3RH22..-..... contactor relay with auxiliary switch block on the front which cannot be removed, 8-pole, size S00, overview

3.2.2 3RT2 power contactors

The table below shows the different versions of the 3RT2 power contactors. The contactors are equipped with AC and DC operating mechanism options. An electronic AC/DC operating mechanism can also be ordered for size S0. An AC operating mechanism and an electronic AC / DC operating mechanism can be ordered for size S2. Special contactor variants with voltage tap of the main circuit are available for contactor integration via AS-Interface or IO-Link using 3RA27 function modules. These power contactors are supplied with 24 V DC coils.

Versions

Table 3- 3 Versions of the 3RT2 power contactors

Feature		**Specifications**				
Version		**Power contactor for switching electrical loads**	**Power contactor with extended operating range for railway applications**	**Coupling relay for switching electrical loads**	**3RT23 power contactor with 4 NO contacts**	**3RT25 power contactor with 2 NO contacts and 2 NC contacts**
Number of poles		3	3	3	4	2 NO contacts + 2 NC contacts
Number of integrated auxiliary contacts	S00	1 NO contact or 1 NC contact	1 NO contact or 1 NC contact	1 NO contact or 1 NC contact	---	---
	S0	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact
	S2	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact	---	1 NO contact and 1 NC contact	1 NO contact and 1 NC contact
Size		S00/S0				
Width		45 mm				
Size		S2				
Width		55 mm				

Connection systems

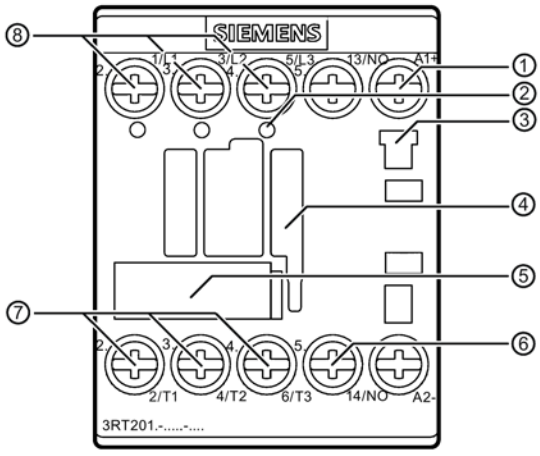
The power contactors can be supplied with the connection systems detailed below:

- Screw connection
- Spring-loaded connection (S2 only auxiliary and control line)
- Ring cable lug connection (S0 and S00)
- Solder pin connection (size S00 only)

  Solder pin connection is only possible in conjunction with the optional solder pin adapter accessory)

The illustrations below show example equipment features of the 3RT2 power contactors for switching motorized loads.

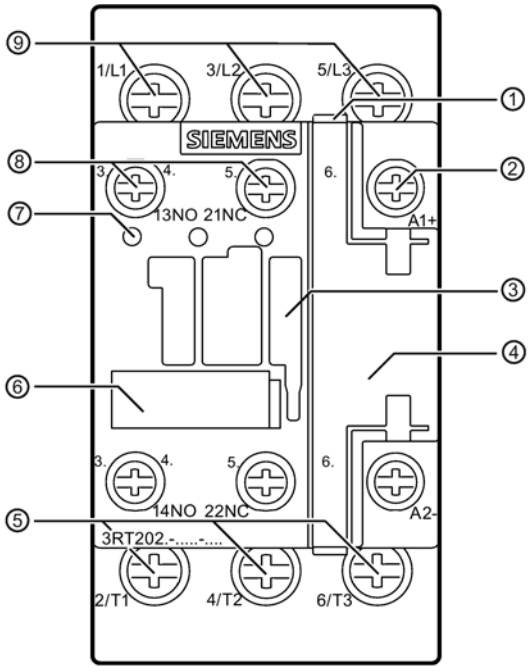
3RT2 power contactors (size S00)



① Coil terminal on the front
② Openings for voltage tap of the main circuit (only special version with voltage tap)
③ Location hole for surge suppression
④ Location hole for 1-, 2-, and 4-pole auxiliary switch blocks
⑤ Label
⑥ 1 auxiliary contact integrated (1 NO contact)
⑦ Contactor's main circuit terminal to the load / motor connection (T1, T2, T3)
⑧ Contactor's main circuit terminal to the power network (L1, L2, L3)

Figure 3-3 3RT201.-.....-.... power contactor, size S00, overview

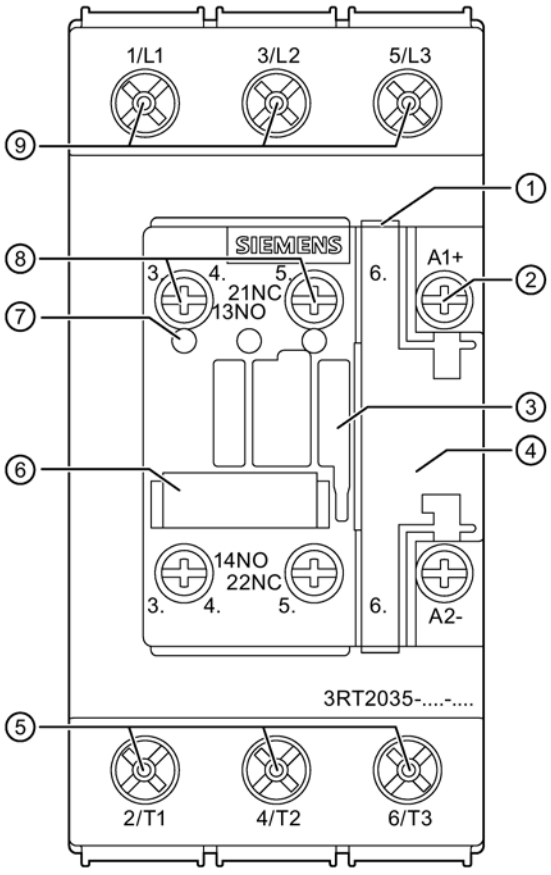
3RT2 power contactors (size S0)



① Cable duct
② Coil terminal on the front
③ Location hole for 1-, 2-, and 4-pole auxiliary switch blocks
④ Location hole for surge suppression (underneath flap)
⑤ Contactor's main circuit terminal to the load / motor connection (T1, T2, T3)
⑥ Label
⑦ Openings for voltage tap of the main circuit (only special version with voltage tap)
⑧ 2 auxiliary contacts integrated (1 NO contact and 1 NC contact)
⑨ Contactor's main circuit terminal to the power network (L1, L2, L3)

Figure 3-4 3RT202.-.....-.... power contactor, size S0, overview

3RT2 power contactors (size S2)



① Cable duct
② Coil terminal on the front
③ Location hole for 1-, 2-, and 4-pole auxiliary switch blocks
④ Location hole for surge suppression (underneath flap)
⑤ Contactor's main circuit terminal to the load / motor connection (T1, T2, T3)
⑥ Label
⑦ Openings for voltage tap of the main circuit (only special version with voltage tap)
⑧ 2 auxiliary contacts integrated (1 NO contact and 1 NC contact)
⑨ Contactor's main circuit terminal to the power network (L1, L2, L3)

Figure 3-5 3RT203.-.....-.... power contactor, size S2, overview

3.2.3 3RT26 capacitor contactors

The table below shows the different versions of the 3RT26 capacitor contactors. The contactors are equipped with AC and DC operating mechanism options (exception: S2). An electronic AC/DC operating mechanism can also be ordered for sizes S0 and S2.

Versions

The diversity of the freely available auxiliary switches has been increased for 3RT26 capacitor contactors in comparison with the predecessor 3RT16. Further versions to those in the table entitled "Versions of the 3RT26 capacitor contactors" are also available. Please inquire.

For size S2, unassigned auxiliary switches are implemented by means of lateral auxiliary switch blocks.

Units with 2 NC contacts are now continuously available.

Feature		Specification
Version		Capacitor contactor for switching capacitive loads
Number of poles		3
Number of integrated auxiliary contacts	S00	2 NC contacts or 1 NO contact and 1 NC contact
	S0	1 NO contact and 2 NC contacts
	S2	2 NC contacts or 1 NO contact and 1 NC contact
Size		S00/S0
Width		45 mm
Size		S2
Width		55 mm

Versions of the 3RT26 capacitor contactors

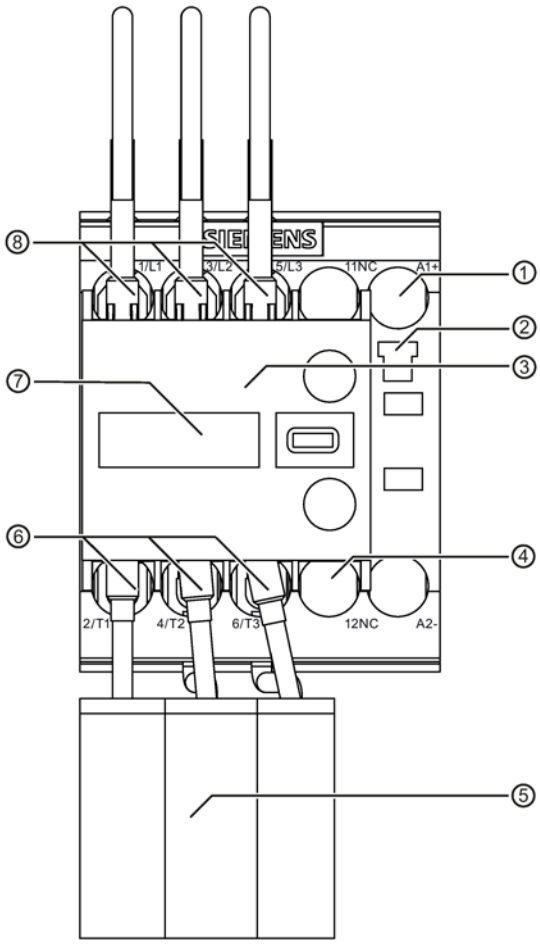
Connection systems

The capacitor contactors can be supplied with the connection systems detailed below:

- Screw connection

The illustrations below show example equipment features of the 3RT26 capacitor contactors for switching capacitive loads.

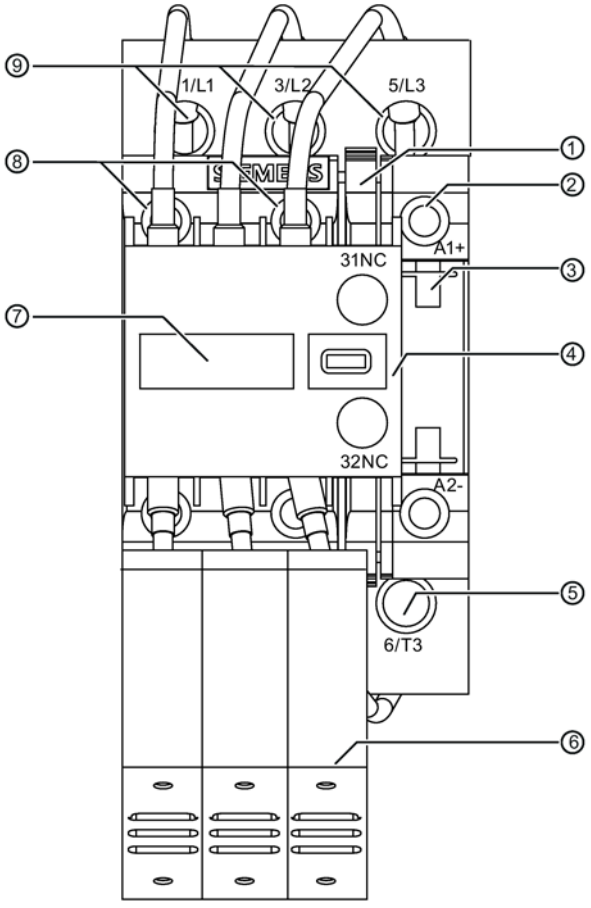
3RT26 capacitor contactors (size S00)



① Coil terminal on the front
② Location hole for surge suppression
③ Permanently mounted 4-pole precharging block for 3 precharging contacts and 1 auxiliary contact
④ 1 integrated auxiliary contact
⑤ Precharging resistors
⑥ Contactor's main circuit terminal to the load (T1, T2, T3)
⑦ Label
⑧ Contactor's main circuit terminal to the power network (L1, L2, L3)

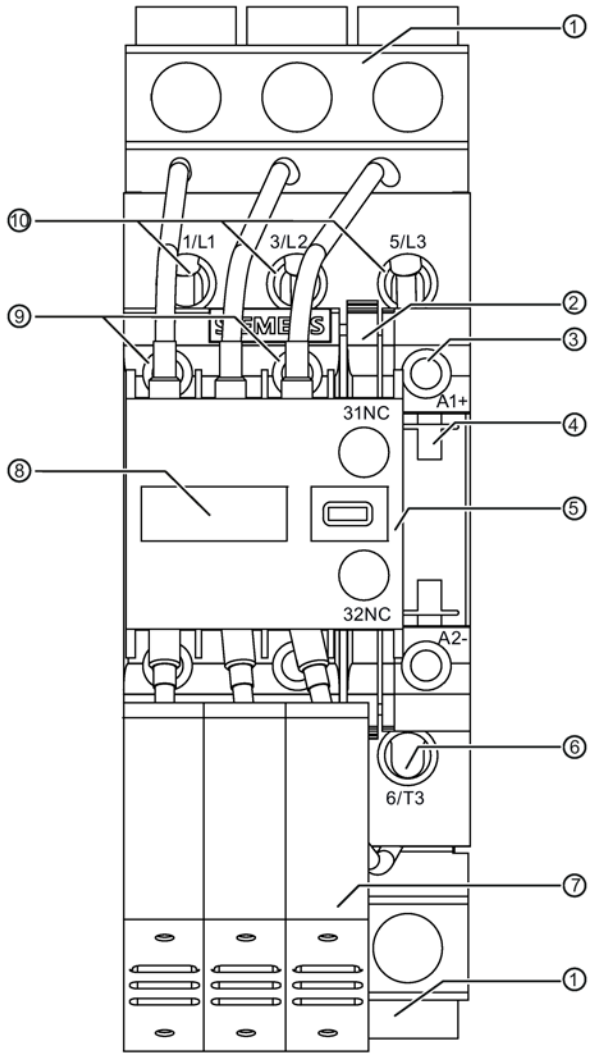
Figure 3-6 3RT2617.-.....-.... capacitor contactor, size S00, overview

3RT26 capacitor contactors (size S0)



① Cable duct
② Coil terminal on the front
③ Location hole for surge suppression
④ Permanently mounted 4-pole precharging block for 3 precharging contacts and 1 auxiliary contact
⑤ Contactor's main circuit terminal to the load (T1, T2, T3)
⑥ Precharging resistors
⑦ Label
⑧ 2 integrated auxiliary contacts
⑨ Contactor's main circuit terminal to the power network (L1, L2, L3)

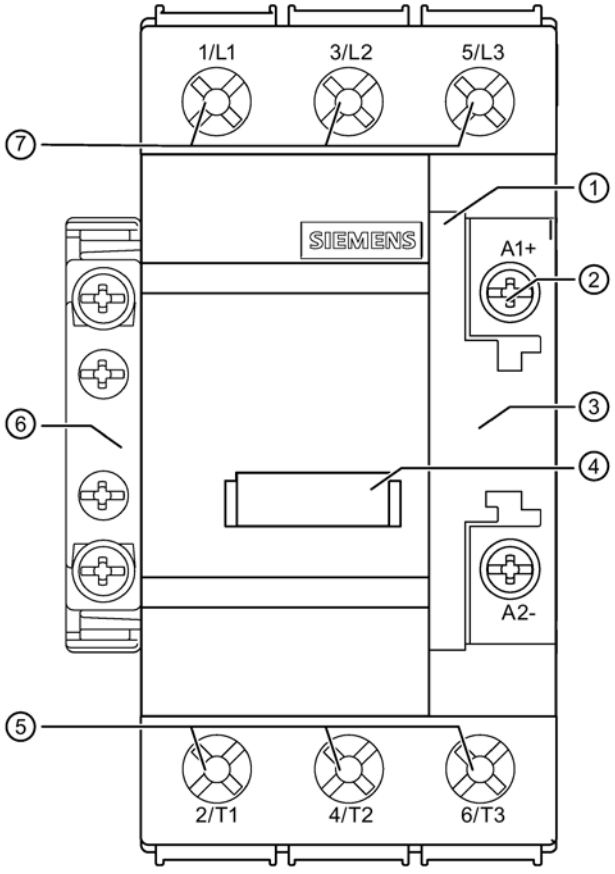
Figure 3-7 3RT2625-.....-.... capacitor contactor, size S0, overview



① Infeed terminal
② Cable duct
③ Coil terminal on the front
④ Location hole for surge suppression
⑤ Permanently mounted 4-pole precharging block for 3 precharging contacts and 1 auxiliary contact
⑥ Contactor's main circuit terminal to the load (T1, T2, T3)
⑦ Precharging resistors
⑧ Label
⑨ 2 integrated auxiliary contacts
⑩ Contactor's main circuit terminal to the power network (L1, L2, L3)

Figure 3-8 3RT2628-.....-.... capacitor contactor, size S0, overview

3RT26 capacitor contactors (size S2)



① Cable duct
② Coil terminal on the front
③ Location hole for surge suppression
④ Label
⑤ Contactor's main circuit terminal to the load (T1, T2, T3)
⑥ Lateral auxiliary switch, left, with 2 auxiliary contacts
⑦ Contactor's main circuit terminal to the power network (L1, L2, L3)

Figure 3-9 3RT263.-.....-.... capacitor contactor, size S2, overview

3.2.4 3RA23 reversing contactor assemblies

The reversing contactor assemblies of sizes S00 to S2 are available in two versions:

- Fully wired and tested with electrical and mechanical interlock.
- As a kit for customer assembly.

The fully wired and tested reversing contactor assembly consists of 2 contactors of the same power rating, each with an NC contact in the basic device, link modules and wiring modules. The contactors are mechanically and electrically interlocked (NC contact interlock). The contactor assemblies for reversing are climate-proof. They are safe to touch according to DIN EN 61140.

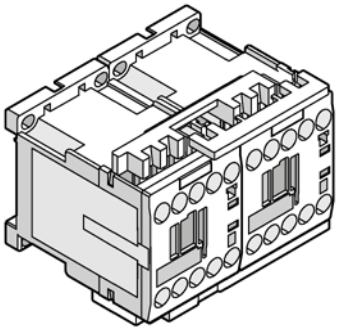
Connection systems

The fully wired 3RA23 reversing contactor assembly is available either with a screw-type connection system or a spring-loaded connection system (S0 and S00).

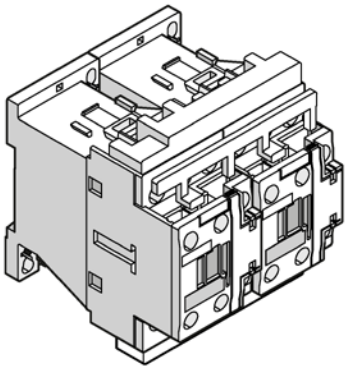
Size S2 is only available with screw-type connection. In size S2, the spring-loaded connection system is only available in the control circuit.

The illustrations below show the fully assembled reversing contactor assemblies, in the version with the screw-type connection system.

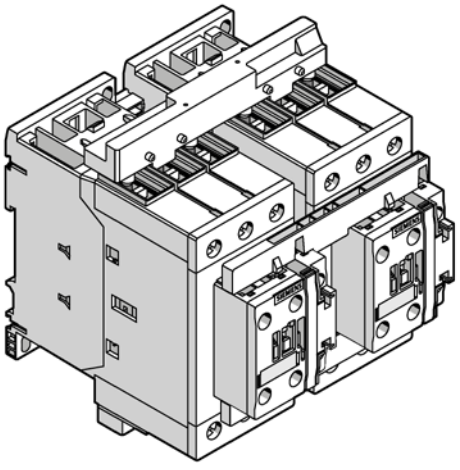
3RA23 reversing contactor assembly, screw connection, size S00



3RA23 reversing contactor assembly, screw connection, size S0



3RA23 reversing contactor assembly, screw connection, size S2



Reversing contactor assemblies with communication interface

The reversing contactor assemblies with communication interface are required for mounting the function modules for connection to the automation level via the bus system.

Reference

More information ...	Can be found in the chapter titled ...
About the 3RA23 reversing contactor assemblies	Operation of a motor in two directions of rotation (3RA23 reversing contactor assembly) (Page 72)
About the components for self-assembly of the reversing contactor assemblies	Assembly kit for reversing contactor assembly (Page 210)

3.2.5 3RA24 contactor assemblies for star-delta (wye-delta) start

The 3RA24 contactor assembly for star-delta (wye-delta) start consists of three 3-pole contactors (line contactor, star contactor, and delta contactor), main circuit wiring modules, and plug-on function modules for the control circuit wiring.

The 3RA24 contactor assembly for star-delta (wye-delta) start of sizes S00 to S2 is available in two versions:

- Fully wired and tested with electrical and mechanical interlock.
- As a kit for customer assembly.

The fully wired 3RA24 contactor assemblies for star-delta (wye-delta) start can be ordered with the following plug-on function modules:

- Without a communication connection.
- With communication connection (IO-Link or AS-Interface)

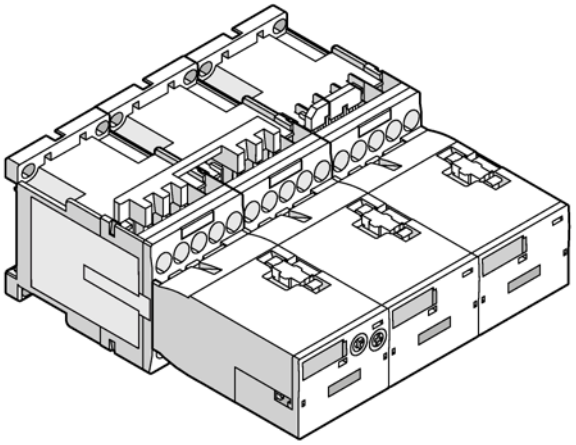
Connection systems

The fully wired 3RA24 contactor assembly for star-delta (wye-delta) start is available either with a screw-type connection system or a spring-loaded connection system (S0 and S00).

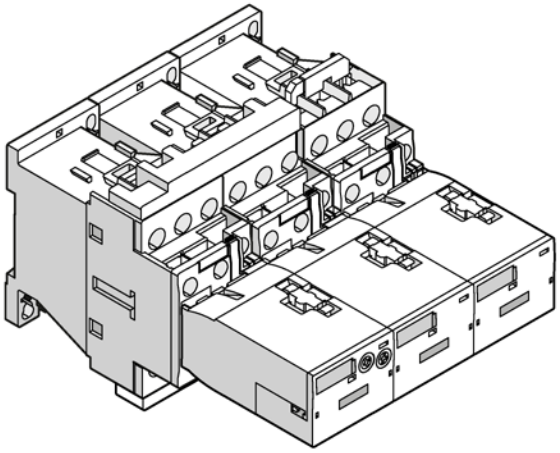
Size S2 is only available with screw-type connection.

The illustrations below show the fully assembled contactor assembly for star-delta (wye-delta) start without a communication connection, in the version with the screw-type connection system.

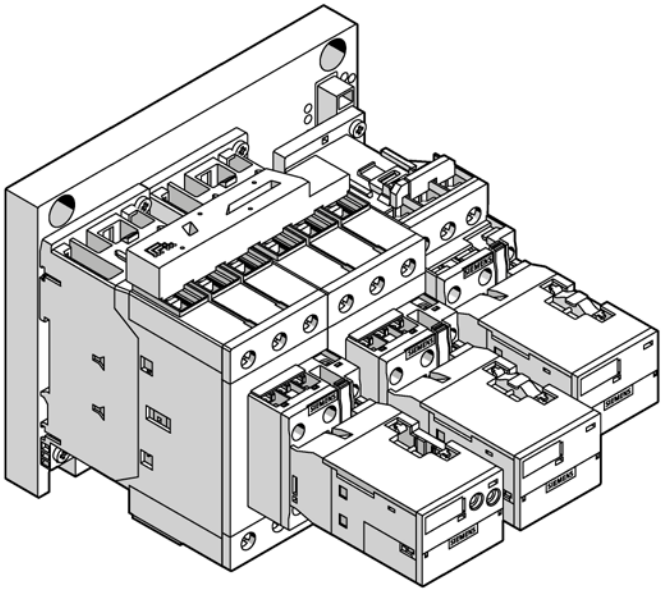
3RA24 contactor assembly for star-delta (wye-delta) start, screw connection, size S00



3RA24 contactor assembly for star-delta (wye-delta) start, screw connection, size S0

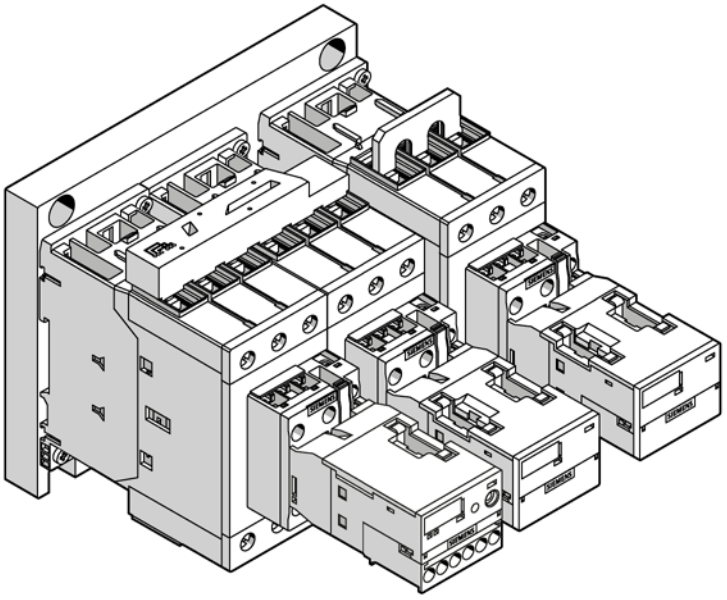


3RA24 contactor assembly for star-delta (wye-delta) start, screw connection, size S2 / S2 / S0



3RA2434-8X.32-1...
3RA2435-8X.32-1...
3RA2436-8X.32-1...

3RA24 contactor assembly for star-delta (wye-delta) start, screw connection, size S2 / S2 / S2



3RA2437-8X.32-1...

Reference

More information ...	Can be found in the chapter titled ...
About the fully wired 3RA24 contactor assembly for star-delta (wye-delta) start	Starting three-phase motors with reduced starting current peaks (3RA24 contactor assembly for star-delta (wye-delta) start) (Page 77)
About the components for customers to assemble their own contactor assemblies for star-delta (wye-delta) start	Assembly kit for contactor assemblies for star-delta (wye-delta) start (Page 221)

3.2.6 Drive options

Operating mechanism options

The following operating mechanism types are available for 3RH2 contactor relays and 3RT2 power contactors:

- AC operating mechanism (sizes S0 to S2)
- DC operating mechanism (sizes S00 and S0)
- AC/DC operating mechanism (sizes S0 and S2)

3.3 Applications

Utilization categories

According to DIN EN 60947-4-1, the application area of and the load applied to power contactors can be identified by looking at the specified utilization category in conjunction with the specified rated operational current or the motor power and the rated voltage. The table below lists the most important utilization categories for contactors.

Utilization categories	
AC	**Main circuit contacts: Utilization category for AC voltages**
AC-1	Non-inductive or slightly inductive loads, resistance furnaces
AC-2	Slip-ring motors: starting, switching off
AC-3	Squirrel-cage motors: starting, switching-off motors during running
AC-4	Squirrel-cage motors: starting, plugging, inching
AC-5a	Switching of discharge lamp controls
AC-5b	Switching of incandescent lamps
AC-6a	Switching of transformers
AC-6b	Switching of capacitive loads
DC	**Main circuit contacts: Utilization category for DC voltages**
DC-1	Non-inductive or slightly inductive loads, resistance furnaces
DC-3	Shunt-wound motors: Starting, plugging, reversing, inching, dynamic braking
DC-5	Series-wound motors: Starting, plugging, reversing, inching, dynamic braking
AC	**Auxiliary circuit contacts: Utilization category for AC voltages**
AC-12	Control of resistive loads and solid-state loads with isolation by opto couplers
AC-14	Control of small electromagnetic loads (max. 72 VA)
AC-15	Control of electromagnetic loads (over 72 VA)
DC	**Auxiliary circuit contacts: Utilization category for DC voltages**
DC-12	Control of resistive loads and solid-state loads with isolation by opto couplers
DC-13	Control of electromagnets

Reference

More information ...	Can be found in the chapter titled ...
About contactor relay and power contactor applications	Configuration (Page 47)

3.4 Performance features

The SIRIUS range of contactors offers the following technical advantages:

Technical highlights	Customer benefits
Uniform connection systems: • Screw connection • Spring-loaded connection • Ring cable lug connection • Solder pin connection	The right connection for every application (e.g. operational reliability (vibration-resistant, non-temperature-specific, etc.) and less wiring thanks to spring-loaded connection system)
Link modules for any device combination from the SIRIUS modular system	Fast, error-free installation for screw-type and spring-loaded connection system
Power contactors • Size (S0, S00) up to 38 A (18.5 kW) in 45 mm width • Size (S2) up to 80 A (37 kW) in 55 mm width	Space and cost savings
Factory-fitted integrated auxiliary switches	Reduced installation complexity
High contact reliability of the auxiliary switches	Enhanced operational reliability (reduction of fault signals)
Joint range of accessories for size S00 and S2	Easy to configure, reduced stockkeeping
Plug-on function modules for connection without tools	Fault avoidance and reduced wiring (without tools)
Connection to AS-Interface or IO-Link	Reduced wiring and integration in TIA

Product combinations

4

The SIRIUS contactors are part of the SIRIUS modular system and offer all the advantages which SIRIUS users have come to expect in terms of the ability to combine any of the system's products together with any others. These benefits are thanks to the uniform mechanical and electrical properties used throughout the modular system and are also due to the interplay with the higher control level.

As well as the contactor accessories, 3RT2 contactors can also be combined with the following other SIRIUS devices for direct mounting:

- 3RV2 motor starter protectors (with 3RA29 link module)
- Thermal (3RU2) or electronic overload relays (3RB3)
- 3RR2 current monitoring relays
- 3RA28 function modules and 3RA27 function modules with a communication connection

Reference

More information ...	Can be found in the appendix ...
About the possible combinations of standard products from the SIRIUS modular system	"References" under "Manuals of the SIRIUS Innovations (Page 390)".

Configuration

5

5.1 Overview of applications for contactors and contactor assemblies

The table below provides an overview of the most important applications for contactors and contactor assemblies.

Application area	Description and suitable contactor versions
Switching motorized loads	Contactors for switching three-phase motors (utilization category AC-3) • 3RT20 3-pole motor contactors • 3RT233..4AA0 4-pole motor contactors
Switching resistive loads	Contactors for switching resistive loads (utilization category AC-1) • 3RT20 3-pole power contactors • 3RT23 4-pole power contactors (4 NO contacts) • 3RT25 4-pole power contactors (2 NO contacts + 2 NC contacts)
Changing the polarity of hoisting gear motors	Changing the polarity of hoisting gear motors or switching two separate loads. • 3RT25 4-pole contactors (2 NO contacts + 2 NC contacts)
Switching in the auxiliary circuit	Switching devices for control and auxiliary circuits (utilization categories AC-12/AC-15/AC-14/DC-12/DC-13). • 3RH21 4-pole contactor relays • 3RH22 8-pole contactor relays
Switching of capacitive loads	Contactors for switching capacitive loads (utilization category AC-6b) • 3RT26 3-pole capacitor contactors

Application area	Description and suitable contactor versions	
Contactors with extended operating range	Contactors for railway applications	Contactors for switching electrical loads in the main and control circuits with extended operating and temperature ranges, e.g. for railway applications or for use in rolling mills (special versions of contactor range 3RT20/3RH21). • 3RT2 3-pole power contactors • 3RH2 4-pole contactor relays • 3RT2 3-pole coupling relays • 3RH2 4-pole coupling relays
	Coupling relays (size S0/S00 only)	The coupling relays are tailored to the special requirements of working with electronic controls (extended operating range and reduced coil power). Different versions are available for main and control circuits (special versions of contactor range 3RT20/3RH21). • 3RT20 3-pole coupling relays • 3RH21 4-pole coupling relays
Contactor assemblies		
Operation of a motor in two directions of rotation (3RA23 reversing contactor assembly)	Contactor assembly for operation of a three-phase motor in two directions of rotation. • 3RA23 reversing contactor assemblies	
Starting three-phase motors with reduced starting current peaks (3RA24 contactor assembly for star-delta (wye-delta) start)	Contactor assembly for reducing the starting current and starting torque when starting three-phase motors. • 3RA24 contactor assemblies for star-delta (wye-delta) start	

5.2 SIRIUS Innovations system configurator

Reference

To assist you with configuration, the "SIRIUS Innovations system configurator" is at your disposal on the Internet. Here, you can gather together all necessary products before the actual configuration process and you can realize complete projects virtually.

You can find the "SIRIUS Innovations system configurator" on the Internet (http://www.siemens.com/sirius/configurators).

5.3 Drive system/Coil selection

The 3RT2 power contactors and 3RH2 contactor relays can be supplied with operating mechanisms for all standard AC and DC coil voltages. In addition, 3RT2 power contactors in sizes S0 and S2 are also available with electronic coil control (AC / DC operation) featuring an extended operating range (helping to reduce variance) and lower closing and holding powers that enable lower power consumption in the control cabinet. The magnet coil for AC / DC operation can be operated with either AC or DC voltage. This is facilitated by control electronics with an upstream DC operating mechanism.

	AC operating mechanisms			**DC operating mechanisms**			**Electronic operating mechanism (AC/DC operating mechanism)**	
Size	**S00 to S2**			**S00 ... S0**		**S00 ... S2**	**S0, S2**	
Actuation	AC operation			DC operation			AC / DC operation	
Operating mechanism type	50 Hz	60 Hz	50/60 Hz	DC standard operating mechanism	DC operating mechanism with low power input	DC operating mechanisms for railway applications	AC or DC connection possible	
Coil surge suppressor	Optional (integrated in coupling relays)			Optional (integrated in coupling relays)		Integrated	Integrated (varistor)	
Operating range	0.8 to 1.1 x U_S[1]			0.8 to 1.1 x U_S[1]		0,7 ... 1.25 x U_S[1]	0.7 ... 1.3 x U_S (for S0) 0.8 ... 1.1 x U_S (for S2)	
Preferred voltages	• 24 V • 110 V • 230 V			• 24 V • 110 V • 220 V		• 24 V • 110 V	S0 • 21 to 28 V • 95 to 130 V • 200 to 280 V [2]	S2 • 20 to 33 V • 83 to 155 V • 175 to 280 V

[1] For further details, refer to the chapter titled "Technical data".

[2] At 280 V: high limit = 1.1 x U_S.

Additional voltage versions are available on request.

5.4 Application environment

5.4.1 3RH2 contactor relays

The following information must be taken into account when planning applications involving 3RH2 contactor relays.

Degree of protection and resistance to extreme climates

3RH2 contactor relays are suitable for use in any climate. They are safe to touch according to DIN EN 50274. 3RH2 contactor relays have degree of protection IP20.

Shock load and vibratory load

The 3RH2 contactor relays have been tested in terms of their shock resistance to sine pulses and rectangular pulses for AC and DC operation.

Ambient temperature

The 3RH2 contactor relays are dimensioned for operation at ambient temperatures of between -25 °C and +60 °C. The devices can be stored at temperatures within the range from -55 °C to +80 °C.

Reference

More information ...	Can be found in the chapter titled ...
About the environments in which contactor relays are used	General data, rated data (CSA and UL), and data relating to short-circuit protection for 3RH2. contactor relays (Page 321)

5.4.2 3RT2 power contactors

The following information must be taken into account when planning applications involving 3RT2 power contactors.

Degree of protection and resistance to extreme climates

3RT2 power contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

Shock load and vibratory load

The 3RT2 contactors have been tested in terms of their shock resistance to sine pulses and rectangular pulses for AC and DC operation.

Ambient temperature

The 3RT2 contactors are dimensioned as standard for operation at ambient temperatures of between -25 °C and +60 °C. Up to 60 °C, side-by-side mounting can be used without any restriction. The devices can be stored at temperatures within the range from -55 °C to +80 °C.

Extended ambient temperature

Contactors can be used at higher ambient temperatures, but various constraints must be considered. The 3RT20 contactors can be operated continuously at an ambient temperature of Ta > 60 °C, taking the following points into account:

Thermal load capacity of the main current paths

The standard contactors are dimensioned for a maximum ambient temperature of Ta = 60 °C. In order to use the contactors at higher ambient temperatures of up to 70 °C, the rated operational current I_e/AC-1 or I_e/DC-1 and the switching frequency z must be reduced. The following linear dependencies can be applied here:

$$I_{e\,max.,Tu} = I_e/AC\text{-}1 \bullet \frac{60°C}{Tu} \qquad I_{e\,max.,Tu} = I_e/DC\text{-}1 \bullet \frac{60°C}{Tu}$$

$$z_{max.,Tu} = z \bullet \frac{60°C}{Tu}$$

I_e max., Ta =	Rated operational current of the contactor at increased ambient temperature, to be calculated
I_e/AC-1 or I_e/DC-1 =	Rated operational current of the contactor for relevant utilization category and Ta ≤ 60 °C
Ta =	Actual ambient temperature Tua > 60 °C

The contactors may be operated for 1 hour at an ambient temperature of up to Ta ≤ 80 °C without reducing the permissible currents. Nevertheless, the average ambient temperature must not exceed Ta ≤ 60 °C for any 24 hour period. Note, however, that contactors that contain electronic components or are combined with electronic accessories (e.g. integrated overvoltage attenuation, etc.) may only be operated at an ambient temperature of up to Ta ≤ 60 °C.

Minimum clearances from adjacent components
The 3RT2 contactors are dimensioned for side-by-side mounting at temperatures of up to +60 °C. At higher temperatures a clearance of 10 mm may be required in order to ensure better heat dissipation with side-by-side mounting. With capacitor contactors, a lateral clearance of 10 mm is required for side-by-side mounting. Further information can be found in the chapter Technical data (Page 243)

Operating range of the magnet coils
All SIRIUS contactors comply with the operating range limits of 0.85 ... 1.1 x U_S (rated control supply voltage) stipulated in the standard IEC EN 60947. The majority of the devices feature an operating range from 0.8 ... 1.1 x U_S; on some versions it is 0.7 ... 1.3 x U_S. Some versions of the contactors for railway applications have an operating range from 0.7 ... 1.25 x U_s at an ambient temperature of +70 °C.

The electronics remain functional at ambient temperatures between -40 °C and +70 °C. This cannot be extended, even with reduced duty factor or lower current.

The reason for this is that some components are approved only to -40 °C, and below this they can be destroyed.

At the other extreme, with a switching transistor at the maximum permissible voltage (36.4 V or 169 V or 305 V), the temperature is already just under the destruction limit. A further increase in the ambient temperature can cause irreparable damage to the component (in the case of a transistor: short-circuit).

A microcontroller in the circuit measures the chip temperature and switches the device off if it is too high.

Reference

More information ...	can be found in the chapter ...
About minimum clearances from adjacent components and the operating range of the magnet coils	Technical data (Page 243)

Using the S00, S0 and S2 contactors at low ambient temperatures

The S00 and S0 contactors can be used at a minimum ambient temperature of Ta = -50 °C, but the mechanical durability will be reduced by up to 50%. The other catalog data remains unaffected. However, measures will need to be taken to combat condensation (e.g. control cabinet heating). In such instances a high switching frequency and long duty cycle are preferable to a low switching frequency and short duty cycle. Contactors which contain electronics or which are combined with electronic accessories must not be used at temperatures below Ta = -40 °C.

Service life

Using the contactors at higher ambient temperatures places a greater stress on molded parts, main current paths, and the magnet coil. This reduces the mechanical durability and shortens the service life of the contactors. The service life is primarily influenced by the ON period. The table below shows the reduced mechanical durability and shortened service life values:

Table 5- 1 Durability and service life of 3RT20 contactors

	S00	S0 to S2	S00 to S2
Ambient temperature Ta	Mechanical durability [x10^6 operating cycles]		Service life [years]
≤ 60 °C	30	10	20
65 °C	15	5	15
70 °C	3	1	10

The specifications for the service life apply to an ON period of 100%. At an ON period of 50%, the values double.

Reference

More information ...	Can be found in the chapter titled ...
About the environments in which power contactors are used	Contactors for switching motors (3RT20) (Page 247)

5.4.3 Contactors for railway applications

The following information must be taken into account when planning applications involving contactors for railway applications (versions of the 3RT2 power contactors and 3RH2 contactor relays). All other data corresponds to that of the standard 3RT2 contactors and 3RH2 contactor relays.

Touch protection

SIRIUS 3RT20/3RH2 contactors are safe to touch according to DIN EN 50274.

Ambient temperature

When operating contactors for railway applications (versions of the 3RT20 power contactors and 3RH21 contactor relays) at the full magnet coil operating range, the permissible ambient temperature is between -40 °C and +70 °C.

Note

Continuous operation at temperatures > +60 °C reduces the mechanical durability, the current carrying capacity of the current paths, and the switching frequency.

Extended operating range of the magnet coil

An important railway requirement as regards SIRIUS contactors is the extended operating range of the magnet coil (0.7 ... 1.25 x U_S). This must be taken into account when selecting devices for railway applications.

Reference

More information ...	Can be found in the chapter titled ...
About the environments in which contactors for railway applications are used	Contactors with extended operating range (Page 313)

5.4.4 Installation altitude

The 3RT2 power contactors (sizes S00 and S0), 3RH2 power contactors, and contactors for railway applications are approved for installation altitudes up to 2,000 m. The reduced air density at altitudes higher than 2,000 meters affects the contactors' electrical characteristics. The reduction factors which have to be taken into account when using contactors at altitudes higher than 2,000 m are specified in the table below. More information can be obtained on request from Technical Assistance (http://www.siemens.com/sirius/technical-assistance).

Table 5- 2 Installation altitude for 3RT2 contactors and 3RH2 contactor relays

Installation altitude	Rated operational current
2,000 m to 2,500 m	0.93 x I_e
Up to 3,000 m	0.88 x I_e
Up to 3,500 m	0.83 x I_e
Up to 4,000 m	0.78 x I_e

5.5 Switching motorized loads

Applications

The 3RT20 3-pole motor contactors or the 3RT233...-4AA0 4-pole motor contactors can be used for switching three-phase motors. These contactors feature 3 / 4 NO contacts as their main contacts.

Versions

The entire performance range of 3 to 37 kW/400 V (utilization category AC-3) is covered by three sizes S00 to S2, each with a width of 45 or 55 mm. The device footprints are the same for all operating mechanism types. In size S0, the installation depth for contactors with DC and AC/DC magnet systems is 10 mm larger than that for versions with an AC magnet system.

Connection to the automation level

3RA28 or 3RA27 function modules can be mounted on the front of 3RT20 power contactors to provide additional functionalities (e.g. star-delta (wye-delta) functionality) and enable a connection to be established with a controller via IO-Link or AS-Interface. If 3RA27 function modules are used, special versions of the 3RT2 power contactors (3RT2...-....-0CC0 as the 13th to 16th digits of the article number) must be used, which facilitate direct voltage tapping of the main current paths. These contactors with voltage tapping are available with a 24 V DC magnet coil. The coil is controlled via the function module.

Rated powers

A single size covers several versions with different standard motor ratings. The specified power (in kW) refers to the output power on the motor shaft (in accordance with the motor's nameplate). The performance range of 3RT20 3-pole power contactors in size S00 extends up to 7.5 kW at a voltage of 400 V. In size S0, the maximum power value is 18.5 kW at a voltage of 400 V. In size S2, the maximum power value is 37 kW at a voltage of 400 V.

The maximum power value of the 3RT233...-4AA0 4-pole power contactors is 22 kW at a voltage of 400 V.

All specified rated powers and rated currents refer to an ambient temperature of 60 °C.

5.6 Switching resistive loads

Applications

The 3RT20 3-pole power contactors or 3RT23 4-pole power contactors can be used for switching resistive loads. These contactors feature 3 / 4 NO contacts as their main contacts.

Typical applications:

- Isolation of systems with ungrounded or poorly grounded neutral conductors.
- System switchover, where alternative AC power supplies are present.
- For inductive loads as contactors which conduct the current, but do not have to perform switching. (e.g. if used in the vicinity of frequency converters)
- Switching mixed loads in distribution systems (e.g. to supply heaters, lamps, motors, PC power supply units) with a cos ϕ value > 0.8 according to IEC 60947-4-1 test conditions for utilization category AC-1.

Versions

The device footprints are the same for all operating mechanism types. In size S0, the installation depth for contactors with a DC magnet system is 10 mm larger than that for versions with an AC magnet system. In the case of size S2, all operating mechanism types have the same installation depth.

Rated powers

A single size covers several versions with different rated operational currents I_e.

The performance range of 18 to 50 A / up to 690 V (utilization category AC-1) is covered by size S00 with a width of 45 mm. The performance range of 60 to 110 A / up to 690 V (utilization category AC-1) is covered by the size S0 (3-pole up to 50 A AC-1 / 690 V at a width of 45 mm; 4-pole up to 50 A AC-1 / 690 V at a width of 60 mm). The performance range of 60 to 110 A / up to 690 V (utilization category AC-1) is covered by the size S2 (3-pole up to 90 A AC-1 / 690 V at a width of 55 mm; 4-pole up to 110 A AC-1 / 690 V at a width of 70 mm). All 3-pole 3RT20 contactors and 4-pole 3RT23 contactors of sizes S00 to S2 are equipped with AC or DC magnet systems.

All specified rated powers and rated currents refer to an ambient temperature of 40 °C.

5.7 Changing the polarity of hoisting gear motors

Applications

The 4-pole 3RT25 contactors (2 NO contacts and 2 NC contacts) can be used for changing the polarity of hoisting gear motors.

Note

The individual device for pole changing is not suitable for reversing operation.

Versions

The entire performance range of 3 to 11 kW/400 V (utilization category AC-3) is covered by two sizes, S00 and S0, each with a width of 45 mm. The performance range of 18.5 kW to 22 kW/400 V (utilization category AC-3) is covered by size S2. All 4-pole 3RT25 contactors of sizes S00 to S2 are equipped with AC or DC magnet systems. The device footprints are the same for all operating mechanism types. In size S0, the installation depth for contactors with a DC magnet system is 10 mm larger than that for versions with an AC magnet system. In the case of size S2, all operating mechanism types have the same installation depth.

Rated powers

The performance range of the 3RT25 4-pole power contactors in size S00 extends up to 5.5 kW at a voltage of 400 V. In size S0, the maximum power value is 11 kW at a voltage of 400 V. In size S2, the maximum power value is 22 kW with a voltage of 400 V. All specified rated powers and rated currents refer to an ambient temperature of 60 °C.

5.8 Switching in the auxiliary circuit

Applications

The 3RH2 contactor relays can be used for switching in the auxiliary circuit (controlling, signaling, interlocking).

Contactor relays must meet particular requirements by featuring clear terminal designations and time- and cost-saving connection systems; the SIRIUS 3RH2 contactor relays (size S00) fulfill all these demands.

Thanks to their high contact reliability at low voltages and currents, the 3RH2 contactor relays are suitable for solid-state circuits down to a lower limit of 1 mA at 17 V.

Versions

3RH2 contactor relays are available in size S00 and can be ordered with magnet coils for AC or DC operation. The external design of the 4-pole 3RH21 contactor relay is identical to that of the motor contactor in size S00 (45 mm width). In addition, 8-pole 3RH22 contactor relays can be supplied with a permanently mounted auxiliary switch block on the front.

Rated powers

The performance range of the 4-pole 3RH21 contactor relays in size S00 extends up to 10 A at a voltage of up to 230 V in utilization category AC-15/AC-14 and up to 10 A at 24 V DC in utilization category DC-12/DC-13.

Auxiliary switch blocks

The 3RH2 contactor relays can be expanded by up to 4 contacts via attachable auxiliary switch blocks. The lateral auxiliary switches cannot be used for contactor relays.

Special version: 3RH24 latched contactor relays

In the event of a short circuit in the low-voltage system or if large drive motors are switched on directly, the control supply voltage for the contactor relays may drop out or fall below the permissible tolerance for a brief period. To guarantee continued operation, the 3RH24 special version of the contactor relays, with mechanical latching, may be used. These contactor relays latch mechanically following switch-on and then remain switched on even if there is a voltage failure. The contactor relay can be released either electrically by means of a release solenoid, or manually by actuating the latched contactor. When the voltage is recovered, the storage properties of the contactor relays mean that the production program can be resumed straightaway without any resetting time. The contactor coil and the coil of the release solenoid are both dimensioned for continuous operation. The power input is the same for the contactor coil and the release coil. The number of auxiliary contacts can be extended by means of auxiliary switch blocks on the front (up to 4 poles).

5.9 Switching of capacitive loads

Applications

3RT26 3-pole capacitor contactors can be used to switch capacitive loads.

Besides switching power capacitors in reactive-current compensation systems, they are also used to switch on converters.

Capacitor contactors are suitable for capacitors with and without reactor protection.

Switching of capacitive loads

The inrush current of a capacitor increases with the short-circuit power of the line.

The capacitor's inrush current is at its highest when it is connected directly to the transformer or in parallel with existing capacitors. This is similar to capacitor banks for reactive power compensation, for example, when a capacitor is connected in parallel to existing capacitors.

The charging current is taken not only from the line. Current is additionally drawn from the parallel-connected capacitors.

To meet this requirement, 3RT26 capacitor contactors have precharging resistors to reduce the inrush current. They are designed to convey the inrush current in such applications, and are weld-resistant for peak inrush currents in accordance with the technical data.

In the case of 3RT26 capacitor contactors, the precharging resistors form a component part of the contactor.

The precharging resistors are activated via leading auxiliary contacts before the main contacts close. During switching, after attenuation of the peak current, they are decoupled again.

Attenuation of the inrush current peaks also reduces interfering harmonics in the supply.

The precharging resistors are separately protected reliably against detrimental mechanical influences by the robust precharging resistor enclosure.

Thanks to the innovated, technical principle of precharging resistor decoupling, the 3RT26 capacitor contactors have an enhanced useful life in comparison with their predecessor.

Reference

Information	can be found in the chapter ...
About operation with frequency converters	Configuration information for use downstream of frequency converters (Page 92)

Versions

The entire performance range from 12.5 to 75 Kvar/400 V (utilization category AC-6b) is covered by three sizes S00 to S2, each with a width of 45 or 55 mm.

The device footprints are the same for all operating mechanism types. In size S0, the installation depth for contactors with DC and AC/DC magnet systems is 10 mm larger than for versions with an AC magnet system. The available power quantities of the 3RT26 have been increased.

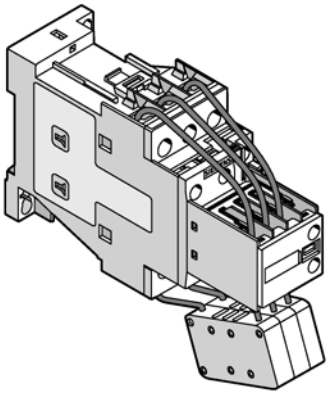
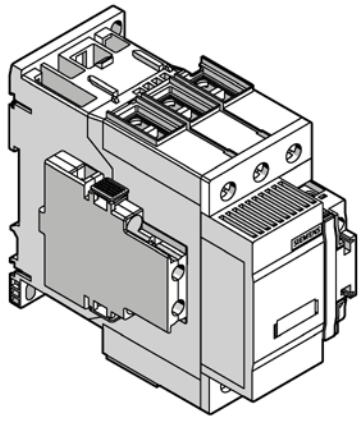
Auxiliary switches

The diversity of the freely available auxiliary switches has been increased according to the table for 3RT26 capacitor contactors in comparison with the predecessor.

For size S2, all freely available auxiliary switches are implemented by means of lateral auxiliary switch blocks.

The following table shows the standard versions available for 3RT26. Other versions are available on request.

Devices with 2NC are now consistently available in all power quantities.

Size	Possible versions[1)]		
		On the front[2)]	On the side [3)]
		4-pole	2-pole
S00	2NC	1NC in the precharging block, 1NC in the basic unit	---
S00	1NC/1NO	1NC in the precharging block, 1NO in the basic device	---
S0	2NC/1NO	1NC in the precharging block, 1NC/1NO in the basic device	---
S2	2NC	---	2NC
S2	1NC/1NO	---	1NC/1NO

1) Other versions possible on request

2) For S00, S0 capacitor contactors with an auxiliary switch block on the front, additional auxiliary switch blocks cannot be mounted on the side

3) Maximum of one auxiliary switch block on the side for size S2

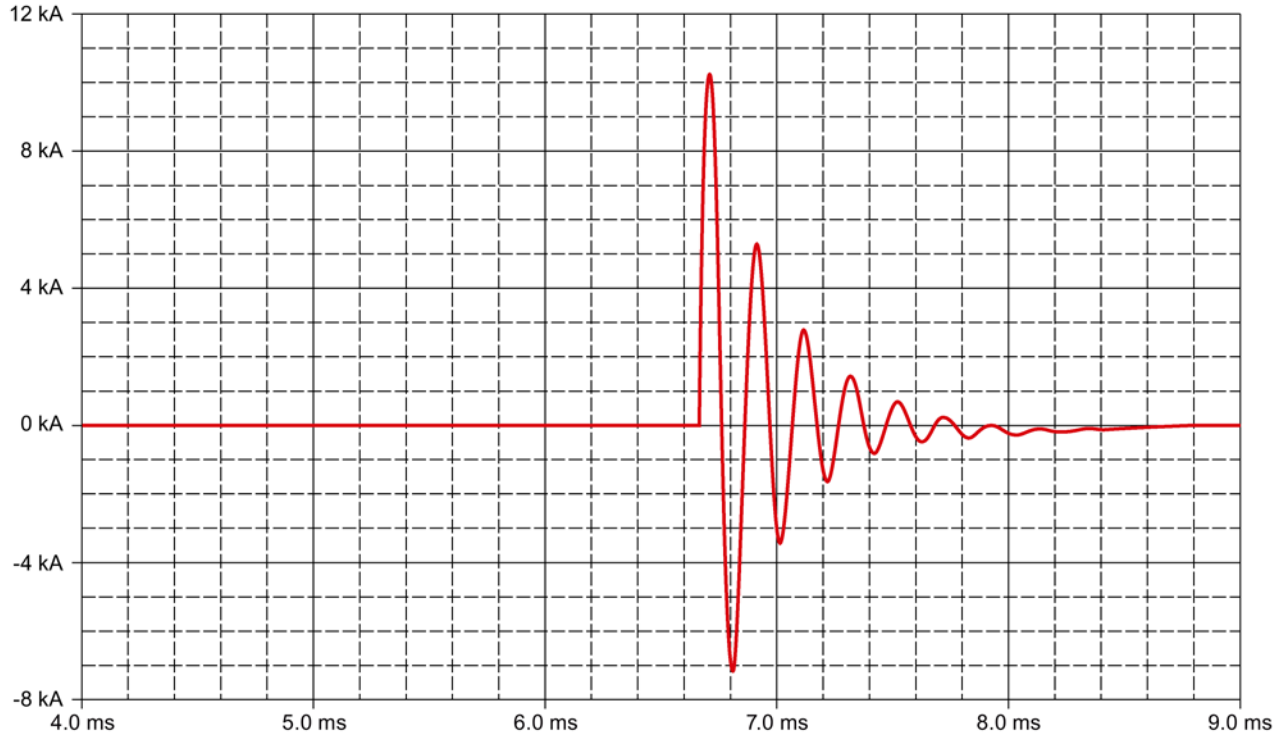
Rated powers

A single size covers several versions with different rated operational currents I_e. The performance range of the 3-pole 3RT26 capacitor contactors in size S00 reaches 12.5 kvar at a voltage of 400 V. In size S0, the range extends to 33.3 kvar at a voltage of 400 V. In size S2, the maximum power value is 75 kvar at 400 V.
The maximum rated operational voltage is 690 V. At higher operational voltages, the rated powers increase as listed in the technical specifications.
All specified rated powers and rated currents refer to an ambient temperature of 60 °C. The capacitor contactors are available with the performance levels 12.5 kvar (S00), 16.7 kvar (S0), 20 kvar, 25 kvar (S0), 33 kvar (S0 with infeed terminal), 50 kvar (S2) and 75 kvar (S2) at 400 V.

Representation of the making operation

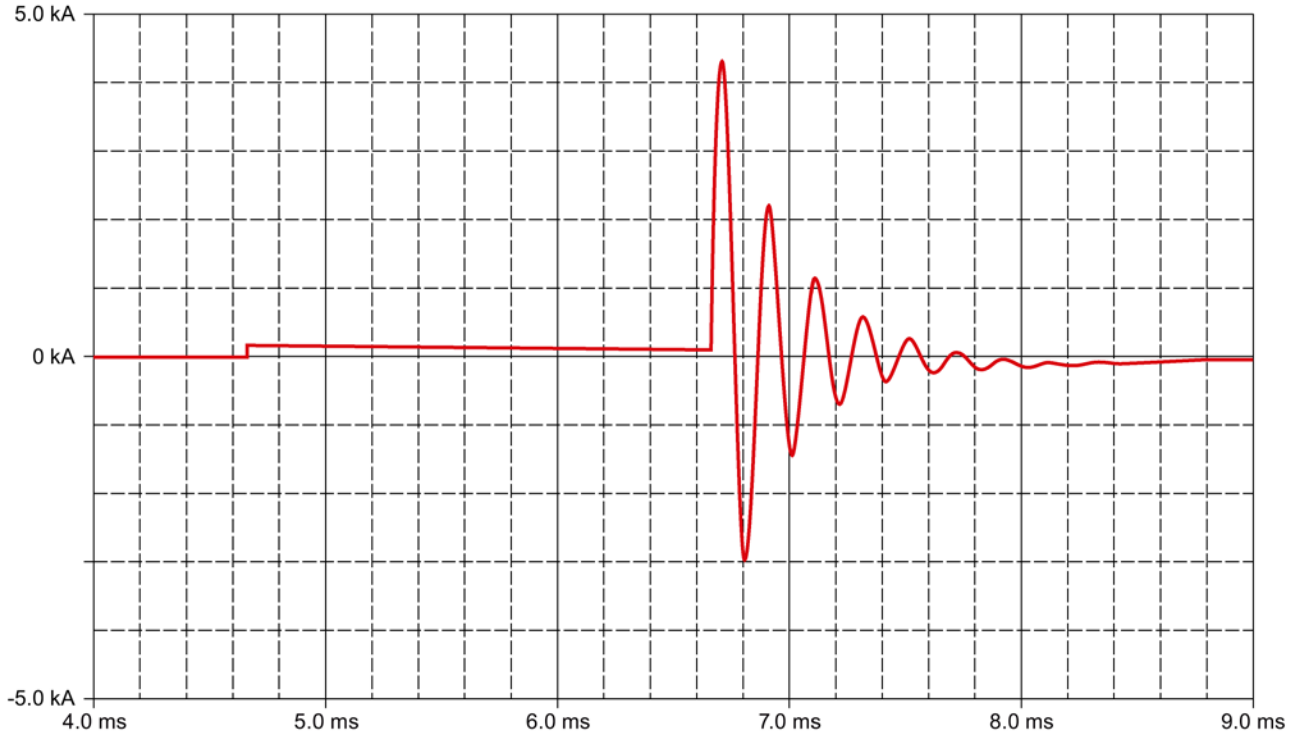
Single-phase representation of maximum capacitor inrush currents when energizing a 50 kvar capacitor at 400 V 50 Hz to an energized capacitor bank of 250 kvar without use of reactors (inductors)

1. Energizing with contactor (without precharging)



Result: The maximum inrush current peak can reach values in excess of 10 kA.

2. Energizing with a 3RT2636 capacitor contactor (with precharging)



Result: The maximum inrush current peak can be reduced to less than 5 kA (depending on precharging).

Conclusion:

With 3RT26 capacitor contactors, it is possible to directly energize capacitors even without the use of reactors. This means that a high useful life of the contacts is achieved without contacts failing prematurely due to contact welding, as conventional contactors can, even without the installation of reactors.

Note

Capacitor energizing was examined at a maximum of the 5-fold parallel load and the useful life checked.

Warning notices

⚠ DANGER

Hazardous voltage. Will cause death or serious injury.

Turn off and lock out all power supplying this device before working on this device.

⚠ CAUTION

Danger of personal injury:

- Do not operate manually
- Do not carry out repairs on faulty contactors

NOTICE

Danger of material damage

To prevent the contactors from being destroyed, please follow these instructions:

- Do not exceed the permissible number of switching operations
- Do not close the contactors when the capacitors are loaded
- Do not operate the contactors unless the precharging resistors are connected
- Do not use any undefined or faulty control voltage (e.g. if control voltage is drawn from the main circuit without a control transformer)
- After short-time interruptions of the control voltage, do not energize capacitors that have not yet discharged
- Do not operate manually for function test

NOTICE

- Switch to discharged capacitors only!
- Do not operate manually for a function test.
- The precharging resistors must not be removed as otherwise the contacts will be damaged during switching operations with load.
- The enclosure of the precharging resistors heats up during the making operation.

Once the main contacts have closed, the temperature rise of the precharging resistors is stopped because the auxiliary contacts decouple. However, as it cannot be ruled out that critical overheating may occur in the event of a fault, it is recommended that you select only appropriate materials for use in the vicinity of the capacitor contactors, e.g. flame-retardant and self-extinguishing materials.

Note

Recommendations for configuration/operation:

- Use the recommended conductor cross-sections only
- Avoid connecting leads that are too short
- Wire capacitors with discharging reactors instead of discharging resistors to avoid energizing of still charged capacitors in the event of a disruption of the control voltage.
- Prevent manual operation of the capacitor contactors under load voltage. This can lead to destruction of the precharging resistors and to welding of contacts.
- Implement circuitry measures to ensure compliance with the required idle times after deactivation or short-time interruption of the control voltage. Inadmissibly short idle times or inadmissibly high switching frequency can produce overloading of the integrated precharging resistors or welding of the contacts if the necessary discharging time of the capacitors is not observed.
- Check connection terminals at least once every year for preserved clamping force and retighten them, if necessary.
- Observation of the effective capacitor current for a period of 24 hours is recommended so as to be able to ensure that the permissible average current load of the contactor's current paths (1.3 x Ie AC-6b) is not exceeded.
- Measurement of the harmonic component of the capacitor current is recommended. If the rms value of the current downstream of the supply transformer, or a proportional converter load, is higher than 20 % then suitable measures must be taken (connection of reactors to the capacitors, or installation of filter circuits).
- To avoid jeopardizing systems and persons, defective capacitor contactors are not permitted to be repaired.
- The minimum idle time is derived from the maximum switching frequency as follows:

$$Tp_{min} = \frac{1}{z}$$

Tp_{min} = Minimum idle time

z = Maximum switching frequency

Table 5- 3 Max. switching frequency z in operating cycles/hour at I_e/AC-6b and for

Type	3RT2617	3RT2625	3RT2626	3RT2627	3RT2628	3RT2636	3RT2637
Size	S00	S0				S2	
230 V, 50/60 Hz 1/h	180	180	100	100	100	100	100
400 V, 50/60 Hz 1/h	180	180	100	100	100	100	100 / 80[1)]
480 V, 50/60 Hz 1/h	180	180	100	100	70	60	50
500 V, 50/60 Hz 1/h	180	180	100	100	65	55	45
600 V, 50/60 Hz 1/h	180	180	100	100	45	40	32
690 V, 50/60 Hz 1/h	180	150	100	72	36	30	25

1) operating cycles/h: 100 with AC operation; 80 with AC/DC operation

5.10 Contactors with extended operating range

5.10.1 Overview

Contactors with an extended operating range are available for certain applications. The table below shows the different contactor versions and their key design features.

Table 5- 4 Overview - Contactors with extended operating range

		Contactors for railway applications			Coupling relays
Contactor versions		**Contactors with series resistor (size S00)**	**Contactors with electronic coil control (sizes S0 and S2)**	**Coupling relays for railway applications (sizes S00 and S0)**	**Coupling relays (sizes S00 and S0)**
Coil	Preferred voltages	• 24 V DC • 110 V DC	• 24 V DC • 110 V DC	• 24 V DC • 110 V DC	24 V DC
	Operating range	0.7 ... 1.25 x U_S	0.7 to 1.25 x U_S	0.7 ... 1.25 x U_S	0.7 ... 1.25 x U_S
Temperature range		-40 to +70 °C	-40 to +70 °C	-40 ... +70 °C[2)]	-25 to +60 °C

1) At 280 V: high limit = 1.1 x U_S.

2) Apply only at a clearance of 10 mm

Rated powers

The various contactor versions with an extended operating range have the following rated powers (with the exception of the coupling relays). For the 3RH21 contact relay versions the performance range extends up to 10 A at a voltage of 230 V. For the 3RT20 motor contactor versions the maximum power values are 5.5 kW (size S00) and 18.5 kW (size S0) and 37 kW at a voltage of 400 V.

The performance range of the 3RH21 coupling relays for switching auxiliary circuits is the same as that of the 3RH21 contactor relays. The performance range of the 3RT20 coupling relays in size S00 extends up to 5.5 kW at a voltage of 400 V. In size S0, the maximum power value is 15 kW at a voltage of 400 V.

5.10.2 Contactors for railway applications

Special versions of the power contactors and contactor relays with an extended temperature range are available for use in railway applications. Different coil voltages can be obtained on request from Technical Assistance (http://www.siemens.com/sirius/technical-assistance).

The requirements are met for size S00 by means of a series resistor and for size S0 and S2 via electronic coil control. Coupling relays for railway applications are also available.

The extended temperature range of -40 to +70 °C applies to all contactors for railway applications.

Reference

More information ...	Can be found in the chapter ...
About the extended operating ranges of the individual contactor versions	Overview (Page 67)

5.10.2.1 Contactors with series resistor (size S00)

The DC magnet system of these contactors is switched on with a defined overexcitation due to the extended operating range of 0.7 to 1.25 x U_S. Following switch-on, the series resistor switches over to holding excitation.

Design

The contactors are available with a plug-on module containing the series resistor (the NC contact required for switchover is integrated in the basic device and already fully wired). The DC magnet coils of the contactor versions are fitted with suppressor diodes to provide protection against overvoltage as standard. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

The power contactors with series resistor are identified by the suffix -0LA0 as the 13th to 16th digits of the article number (3RT201.-2K.42-0LA0). The article number for contactor relays with series resistor is 3RH2122-2K.40-0LA0.

Note

According to DIN EN 50005, these versions of contactor relays and motor contactors can be expanded by means of a 4-pole auxiliary switch block on the front Two lateral auxiliary switch blocks can also be mounted on the motor contactors.

Mounting instruction

Size S00 motor contactors and contactor relays are approved for side-by-side mounting at extended ambient temperatures of up to 70 °C.

5.10.2.2 Contactors with electronic coil control (sizes S0 and S2)

3RT20..-.X.4.-0LA2 motor contactors are controlled via upstream control electronics that ensure an operating range of 0.7 to 1.25 U_S at an ambient temperature of 70 °C.

Design

The contactors are supplied as complete units with integrated coil electronics and are fitted as standard with varistors for damping opening surges in the coil.

Note

Auxiliary switch blocks are fitted on contactors with electronic coil control in the same way as basic versions.

Mounting instruction

These contactor versions of size S0 are approved for side-by-side mounting at extended ambient temperatures of up to 70 °C.

5.10.2.3 Coupling relays for railway applications (sizes S00 and S0)

These contactors have an extended operating range of 0.7 to 1.25 x U_S.

Design

The magnet coils of the contactor relays and motor contactors with extended operating range for railway applications are fitted with varistors (3RT202.-2K, 3RT201.-2L, 3RH2...-2L). The magnet coils of the motor contactors with an extended operating range in size S0 are connected to varistors (3RT202.-2K.40). No additional series resistor is required in either case.

Note

Coupling relays for railway applications cannot be expanded by means of auxiliary switch blocks.

Mounting instruction

A clearance of 10 mm must be observed when using side-by-side mounting at an extended ambient temperature > 60 °C < 70 °C.

5.10.3 Coupling relays

Applications

The coupling relays (24 V DC magnet coil) have been adapted to the specific demands associated with system-compatible interaction with electronic controls, thanks to their extended operating range and reduced coil power.

These are versions of the 3RT20/3RH21 contactor ranges, which are characterized by the following features:

		Wide voltage range of the magnet coil			
Coupling relay version	**Size**	**0.7 to 1.25 x U_S**		**0.8 to 1.85 x U_S**	
		Switch-on power = holding power	**Article number**	**Switch-on power = holding power**	**Article number**
3RH21 contactor relay	S00	2.8 W at 24 V	• 3RH21..-.HB40 (without RC circuit) • 3RH21..-.JB40 (with diode) • 3RH21..-.KB40 (with suppressor diode)	1.6 W at 24 V	• 3RH21..-.MB40-0KT0 (without RC circuit) • 3RH21..-.VB40 (with diode) • 3RH21..-.WB40 (with suppressor diode)
3RT20 motor contactor	S00	2.8 W at 24 V	• 3RT201.-.H. (without RC circuit) • 3RT201.-.J. (with diode) • 3RT201.-.K. (with suppressor diode)	1.8 W at 24 V	• 3RT201.-.M. (without RC circuit) • 3RT201.-.V. (with diode) • 3RT201.-.S. (with suppressor diode)
	S0	4.5 W at 24 V	• 3RT202.-1KB40 (with varistor)	--	

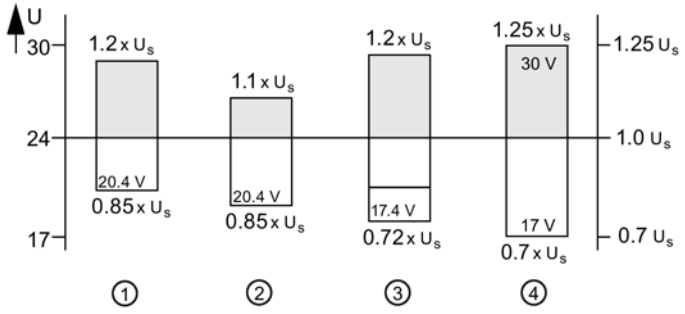
Note

The 3RT20/3RH21 coupling relays cannot be expanded by means of auxiliary switch blocks.

5.10.3.1 Technical background information

The operating range of the coil for coupling relays covers a voltage range of 0.7 to 1.25 x U_s (U_s = rated control supply voltage). This wide operating range has been used as a basis in order to ensure that the supply voltage of the electronic controls stays within the required voltage tolerances. According to DIN 19240, the supply voltage of electronic controls with 24 V DC covers a range of 20.4 V to 28.8 V. If you take an additional voltage drop of up to 3 V within the output stages into account, the contactor drive must function without errors at voltages of between 17.4 V and 28.8 V. The 3RT20 and 3RH21 coupling relays for electronic controls work reliably from 17 V to 30 V, which corresponds to a voltage range of 0.7 x U_s to 1.25 x U_s. Compared to the operating range of 0.85 to 1.1 x U_s for contactors and contactor relays according to IEC 60947, DIN EN 60947 (VDE 0660), this is a significantly expanded operating range.

The illustration below shows the voltage ranges for electronic controls and mechanisms of contactors and contactor relays with a rated control supply voltage U_s = 24 V DC:



1 Supply voltage range for electronic controls according to DIN 19340

2 Operating range for contactors according to (VDE 0660 Part 102)

3 Voltage range for electronic outputs at ≤ 3 V internal voltage drop

4 Operating range of contactors for electronic controls

Figure 5-1 Coupling relays, voltage ranges

5.11 Operation of a motor in two directions of rotation (3RA23 reversing contactor assembly)

Applications

The 3RA23 reversing contactor assembly is used to operate a motor in two directions of rotation. The starting characteristics correspond to those of a direct-on-line starter. When used in conjunction with the relevant protective devices, they facilitate the space-saving and compact assembly of fused and fuseless feeders.
On contactor assemblies with AC operation, 50/60 Hz, a changeover delay of 50 ms must be provided at voltages ≥ 500 V. At voltages ≥ 400 V, a changeover delay of 30 ms is recommended. These idle times do not apply to combinations with DC operation.

Versions

The 3RA23 reversing contactor assemblies are available with a uniform performance range of 3 kW to 37 kW (utilization category AC-3). The 3RA23 reversing contactor assemblies of size S00/S0 are 90 mm wide. The width of size S2 is 120 mm (S2 = 2 * 55 mm + 10 mm reversing lock).

For simplified connection to the controller, the SIRIUS modular system offers 3RA27 function modules with versions for connection via AS-Interface or IO-Link. In this case, the first contactor must be fitted with voltage tapping (special contactor version).

The diagram below shows the fully mounted 3RA23 reversing contactor assembly size S0 with a screw-type connection system.

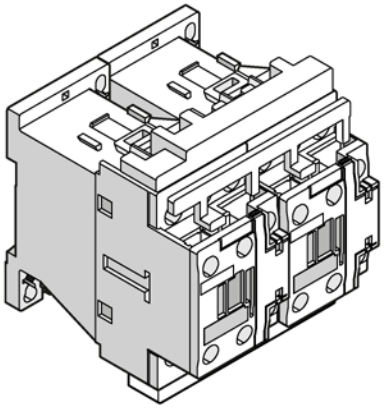


Figure 5-2 Reversing contactor assembly with screw-type connection system (size S0)

Contactor selection for creating a reversing contactor assembly

Table 5- 5 Screw connection

Rated data AC-2 and AC-3 at 50 Hz 400 V AC		Size	Article number			
Power	Operational current I_e		Contactor	Mechanical interlock [1]	Assembly kit [2]	Fully-wired and tested contactor assemblies
[kW]	[A]					
3	7	**S00**	3RT2015-1...2	--	3RA2913-2AA1	3RA2315-8XB30-1...
4	9		3RT2016-1...2			3RA2316-8XB30-1...
5,5	12		3RT2017-1...2			3RA2317-8XB30-1...
7,5	16		3RT2018-1...2			3RA2318-8XB30-1...
5,5	12	**S0**	3RT2024-1...0	--	3RA2923-2AA1	3RA2324-8XB30-1...
7,5	16		3RT2025-1...0			3RA2325-8XB30-1...
11	25		3RT2026-1...0			3RA2326-8XB30-1...
15	32		3RT2027-1...0			3RA2327-8XB30-1...
18,5	38		3RT2028-1...0			3RA2328-8XB30-1...
18,5	40	**S2**	3RT2035-1...0	3RA2934-2B	3RA2933-2AA1	3RA2335-8XB30-1...
22	55		3RT2036-1...0			3RA2336-8XB30-1...
30	65		3RT2037-1...0			3RA2337-8XB30-1...
37	80		3RT2038-1...0			3RA2338-8XB30-1...

[1] The mechanical interlocking for sizes S00 / S0 cannot be ordered as an individual unit.

[2] The assembly kit contains: Connecting clips for 2 contactors, wiring modules at top and bottom (main circuits, control circuits, as well as the mechanical interlock for the sizes S00 / S0)

Table 5- 6 Spring-loaded connection

Rated data AC-2 and AC-3 at 50 Hz 400 V AC		Size	Article number			
Power	Operational current I_e		Contactor	Mechanical interlock [1]	Assembly kit [2]	Fully-wired and tested contactor assemblies
[kW]	[A]					
3	7	S00	3RT2015-2...2	--	3RA2913-2AA2 [2]	3RA2315-8XB30-2...
4	9		3RT2016-2...2			3RA2316-8XB30-2...
5,5	12		3RT2017-2...2			3RA2317-8XB30-2...
7,5	16		3RT2018-2...2			3RA2318-8XB30-2...
5,5	12	S0	3RT2024-2...0	--	3RA2923-2AA2 [3]	3RA2324-8XB30-2...
7,5	16		3RT2025-2...0			3RA2325-8XB30-2...
11	25		3RT2026-2...0			3RA2326-8XB30-2...
15	32		3RT2027-2...0			3RA2327-8XB30-2...
18,5	38		3RT2028-2...0			3RA2328-8XB30-2...

[1] The interlock can only be ordered with the kit.

[2] The assembly kit contains: Mechanical interlock, connecting clips for 2 contactors, wiring modules on the top and bottom (main circuits, control circuits and auxiliary circuits).

[3] The assembly kit contains: Mechanical interlock, connecting clips for 2 contactors, wiring modules on the top and bottom (main circuits).

Reference

More information ...	Can be found in the chapter ...
About the individual components for customers to assemble their own 3RA23 reversing contactor assembly and how to mount said assembly.	Assembly kit for reversing contactor assemblies (Page 210)

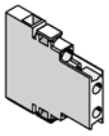
Rated powers

The performance range of the 3RA23 reversing contactor assembly in size S00 extends up to 7.5 kW at a voltage of 400 V. In size S0, the maximum power value is 18.5 kW at a voltage of 400 V. In size S2, the maximum power value is 37 kW at a voltage of 400 V.

Auxiliary switch blocks

The 3RA23 reversing contactor assembly can be fitted with various auxiliary switches (on the front or laterally). A maximum of 8 auxiliary contacts are permitted per reversing contactor assembly:

Table 5- 7 Auxiliary switch combination options for the 3RA23 reversing contactor assembly

3RA23 reversing contactor assembly				
Size	Possible versions	Front		Lateral
		1-pole	4-pole	2-pole
				
S00 / S0 / S2	1	0	2	0
	2	2	0	2

Main circuit

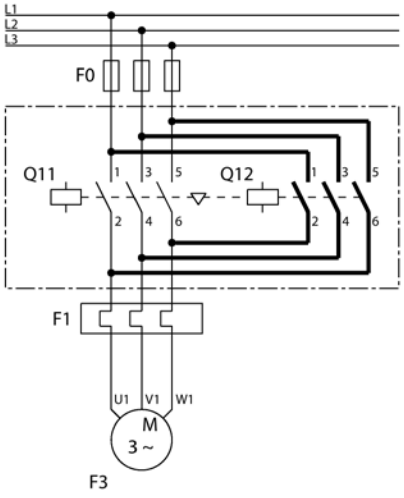


Figure 5-3 Main circuit of the reversing contactor assembly

Control circuit

Table 5- 8 Control circuit of the reversing contactor assembly

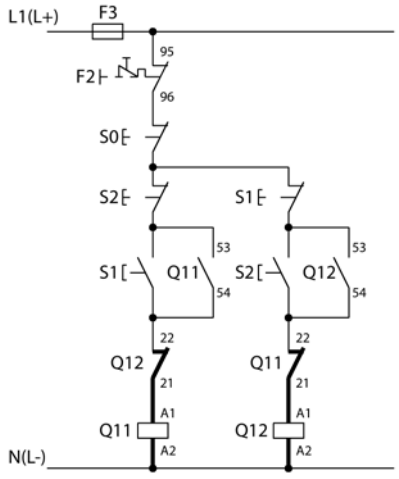
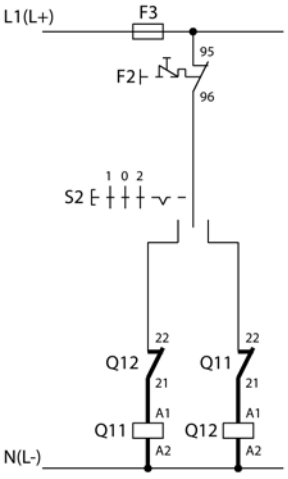
Pushbutton switch control	Maintained-contact operation
	

Table 5- 9 Legend - control circuit of the reversing contactor assembly

Abbreviation	Explanation
S0	"OFF" button
S1	"ON - Clockwise rotation" button
S2	"ON - Counterclockwise rotation" button
S	"Clockwise - Off - Counterclockwise" selector switch
Q11	Clockwise rotation contactor
Q12	Counterclockwise rotation contactor
F1	Fuses for main circuit
F2	Overload relay
F3	Fuses for control circuit

5.12 Starting three-phase motors with reduced starting current peaks (3RA24 contactor assembly for star-delta (wye-delta) start)

Applications

The 3RA24 contactor assembly for star-delta (wye-delta) start is used for starting three-phase motors where current peaks need to be reduced and a low load torque is required during startup. With this circuit type, the motor's starting current is reduced by 1/3 (proportional load torque) compared with direct startup.

Note

Increased current peaks

When switching over from star operation to delta operation, the motor may be subjected to compensation processes (fueled by an unfavorable line frequency/rotor field constellation), which would result in higher current peaks than would be the case if the stationary motor were connected directly in the delta circuit. This must be taken into account when configuring a contactor assembly for star-delta (wye-delta) start.

For detailed information, please refer to section "Technical background information (Page 81)"

Note

The preferred wiring for the 3RA24 contactor assembly minimizes this effect.

The 3RA24 contactor assemblies for star-delta (wye-delta) start described below have been dimensioned for standard applications.

Note

Contactor assemblies for star-delta (wye-delta) start for special applications, such as very heavy starting or star-delta (wye-delta) startup of special motors, must be customized. When dimensioning contactor assemblies for special applications such as these you can obtain support from Technical Assistance (http://www.siemens.com/sirius/technical-assistance).

Versions

The 3RA24 contactor assemblies for star-delta (wye-delta) start are available with a uniform performance range of 5.5 kW to 55 kW (utilization category AC-3). Size S00/S0
3RA24 contactor assemblies for star-delta (wye-delta) start are 135 mm wide. In size S2, the width of the 3RA24 star-delta (wye-delta) contactor assembly is, depending on the power class: S2 = 3 * 55 mm + 10 mm lock or 2 * 55 mm + 45 mm + 10 mm lock.
The overall width of the mounting plate is 177.5 mm.

The SIRIUS modular system offers 3RA27 function modules for connection to the automation level; they are fitted with terminals for connection to AS-Interface or IO-Link.

Note

We recommend installing 3RA24 contactor assemblies on a mounting plate. The mounting plate can be ordered as an individual unit. (Extension can be used for 3RP25 / 3RP15).

Note

If the 3RA24 contactor assembly for star-delta (wye-delta) start is to be connected to a control, the scope of supply will include a contactor with voltage tapping.

The function module replaces all the wiring in the control circuit and can be used in the voltage range from 24 to 240 V AC/DC. The changeover delay of 50 ms (timing relay functionality) is already integrated in the star-delta (wye-delta) function module.

The illustration below shows the 3RA24 contactor assemblies for star-delta (wye-delta) start without a communication connection in size S0 with a screw-type connection system:

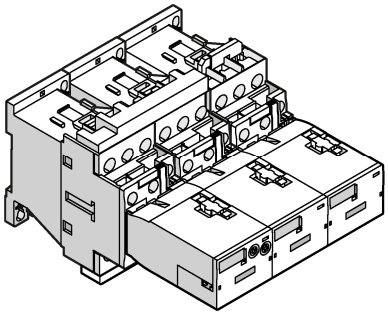


Figure 5-4 Contactor assembly for star-delta (wye-delta) start with screw-type connection system without a communication connection (size S0)

Rated powers

The performance range of the 3RA24 contactor assemblies for star-delta (wye-delta) start in size S00 extends up to 11 kW at a voltage of 400 V. In size S0, the maximum power value is 22 kW at a voltage of 400 V. In size S2, the maximum power value is 55 kW at a voltage of 400 V

Note

With the 3RA24 contactor assembly for star-delta (wye-delta) start the auxiliary switches integrated in the contactor can still be used. Additional auxiliary switch blocks cannot be fitted with the function modules attached.

Contactor selection for configuring a contactor assembly for star-delta (wye-delta) start

3RA24 contactor assemblies have screw or spring-loaded connections and are suitable for screw and or snap-on mounting (not for S2) onto DIN rail TH 35. With the fully-wired and tested 3RA24 contactor assemblies, the auxiliary contacts included in the basic devices are freely available.

3RA24 contactor assemblies are always supplied with a mounting plate.

For effective support from Technical Assistance you must provide the following details:

- Rated motor voltage
- Rated motor current
- Service factor, operating values
- Motor starting current factor
- Runup time
- Ambient temperature

Table 5- 10 Screw connection

Rated data for 50 Hz 400 V AC			Size	Article number		
Power [kW]	Operational current I_e [A]	Motor current [A]		Line / delta contactor	Star contactor	Complete assembly
5,5	12	9,5 … 13,8	S00-S00-S00	3RT2015-1....	3RT2015-1....	3RA2415-8XF31-1...
7,5	16	12,1 … 17		3RT2017-1....	3RT2015-1....	3RA2416-8XF31-1...
11	25	19 … 25		3RT2018-1....	3RT2016-1....	3RA2417-8XF31-1...
11	25	19 … 25	S0-S0-S0	3RT2024-1...0	3RT2024-1...0	3RA2423-8XF32-1...
15	32	24,1 … 34		3RT2026-1...0	3RT2024-1...0	3RA2425-8XF32-1...
18,5	40	34,5 … 40		3RT2026-1...0	3RT2024-1...0	3RA2425-8XF32-1...
22	50	31 … 43		3RT2027-1...0	3RT2026-1...0	3RA2426-8XF32-1...
22/30	50	31 … 43	S2-S2-S0	3RT2035-1...0	3RT2026-1...0	3RA2434-8XF32-1...
37	80	62,1 ... 77,8		3RT2035-1...0	3RT2027-1...0	3RA2435-8XF32-1...
45	86	69 ... 86		3RT2036-1...0	3RT2028-1...0	3RA2436-8XF32-1...
55	115	77,6 ... 108,6	S2-S2-S2	3RT2037-1...0	3RT2035-1...0	3RA2437-8XF32-1...

Table 5- 11 Spring-type terminals (sizes S0 and S00)

Rated data for 50 Hz 400 V AC			Size	Article number		
Power [kW]	Operational current I_e [A]	Motor current [A]		Line / delta contactor	Star contactor	Complete assembly
5,5	12	9,5 … 13,8	S00-S00-S00	3RT2015-2....	3RT2015-2....	3RA2415-8XF31-2...
7,5	16	12,1 … 17		3RT2017-2....	3RT2015-2....	3RA2416-8XF31-2...
11	25	19 … 25		3RT2018-2....	3RT2016-2....	3RA2417-8XF31-2...
11	25	19 … 25	S0-S0-S0	3RT2024-2...0	3RT2024-2...0	3RA2423-8XF32-2...
15	32	24,1 … 34		3RT2026-2...0	3RT2024-2...0	3RA2425-8XF32-2...
18,5	40	34,5 … 40		3RT2026-2...0	3RT2024-2...0	3RA2425-8XF32-2...
22	50	31 … 43		3RT2027-2...0	3RT2026-2...0	3RA2426-8XF32-2...

Note

The selection of contactor types refers to a fused design.

Connection example with spring-loaded connection and large conductors, e.g. with 6 mm² connection cross-section

For a contactor assembly for star-delta (wye-delta) start, e.g. 3RA2426-8XH32-2BB4 (22 kW, 50 A), it is possible to select the following connection type with a 6 mm² conductor cross-section:

- Remove the upper wiring modules to connect the main current paths between line contactor (Q 11) and delta contactor (Q 13).
- Separate infeed of line contactor (Q 11) and delta contactor (Q 13) with 6 mm² (permitted in a three-way network).
  Two conductors per phase with 6 mm² conductor cross-section are connected to the central infeed short-circuit protection device and only one conductor per phase to the contactors.

5.12.1 Technical background information

Starting current ratio

Star-delta (wye-delta) startup can only be used if the motor normally operates in a delta connection or starts softly, or if the load torque is low and does not rise sharply during star startup. In the star (wye) stage motors can be subjected to around 50% (class CL16) or 30% (CL10) of their rated torque. The starting torque falls to about 1/3 of the relevant value during direct switch-on.
The starting current is approximately 2 to 2.7 times the rated motor current.

Switching over

The switchover from star (wye) to delta cannot be carried out until the motor has been fully accelerated to the rated speed. The necessary changeover delay and interlock are integrated in the contactor assembly; drives which require this switchover to be performed earlier are not suitable for star-delta (wye-delta) start.

Reducing the switchover current peak by means of preferred wiring

During star-delta (wye-delta) switching of three-phase motors, the motor may be subjected to compensation processes, which would result in higher current peaks than would be the case if the stationary motor were connected directly in the delta circuit.

The worst-case scenario would lead to the following problems, which can be minimized by using preferred wiring:

- Tripping of short-circuit protection devices
- Welding or substantial contact erosion of the delta contactor
- High dynamic load on the motor

Using a favorable method of connection for the main circuit will reduce the equalizing currents and current peaks which occur when switching over from a star to a delta circuit.

Preferred wiring used

The phasor diagram below shows the voltages which occur in a motor running in the clockwise direction when switching over from star to delta. According to the preferred wiring, the motor terminals are connected correctly, i.e. phase L1 is connected to motor terminals U1 and V2, L2 to V1 and W2, and L3 to W1 and U2.

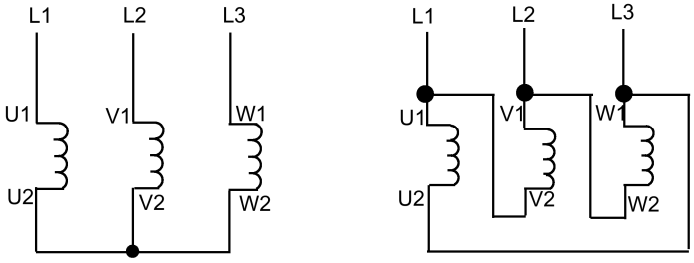
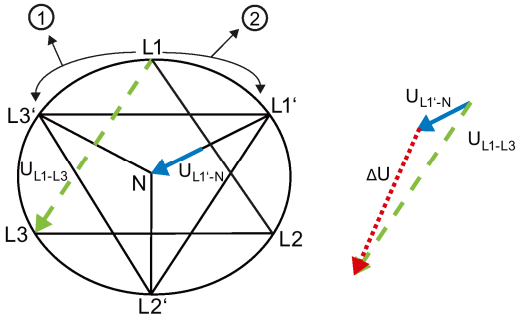


Figure 5-5 Correct connection of motor phases for clockwise rotation



1 Rotating field

2 Rotor's overtravel during the current-free phase

Figure 5-6 Phasor diagram for star-delta switchover during clockwise rotation with motor phases connected correctly

During the current-free changeover delay, the rotor overtravels the rotating field. Its magnetic field induces a decaying residual voltage, entered here in the voltage phasor diagram for phase L1: $U_{L1'-N}$.

On switching to delta (see diagrams above), the stator winding which is conducting this residual voltage is connected to the line voltage U_{L1-L3}. Thanks to the favorable vector position of the residual voltage $U_{L1'-N}$ and the line voltage U_{L1-L3}, which are roughly rectified, the differential voltage ΔU is relatively low. As a result, the current peak generated by this voltage will also remain low.

Preferred wiring not used

The motor also rotates clockwise if the motor terminals are connected as follows: phase L1 to motor terminals U1 and W2, L2 to V1 and U2, and L3 to W1 and V2.

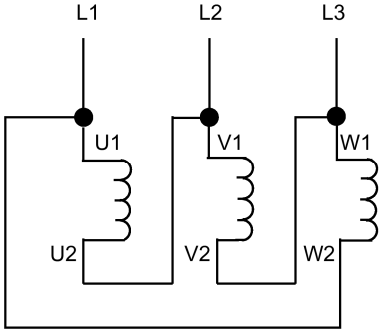
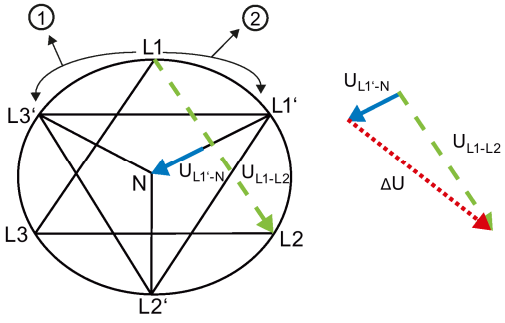


Figure 5-7 Motor phases connected incorrectly results in clockwise rotation

The remanent and decaying residual voltage becomes effective in the stator once more. The phase winding with phasor $U_{L1'-N}$ is now connected to the line phase U_{L1-L2} on switching to delta. However, these two voltages have totally different vectorial directions; differential voltage ΔU is high and produces a correspondingly high switchover current peak.

A switchover from star to delta results in the phasor diagram below.



1 Rotating field

2 Rotor's overtravel during the current-free phase

Figure 5-8 Phasor diagram for motor phase connections made according to the previous diagram results in a high switchover current peak

Changing the direction of rotation from clockwise to counterclockwise

Note

In order to set the motor to counterclockwise rotation, it is not simply a case of swapping over two phases at any location. This would result in the same conditions as those described for clockwise rotation.

The wiring must be performed as follows in order to keep the switchover current peak which occurs on switching from star (wye) to delta as low as possible here too:

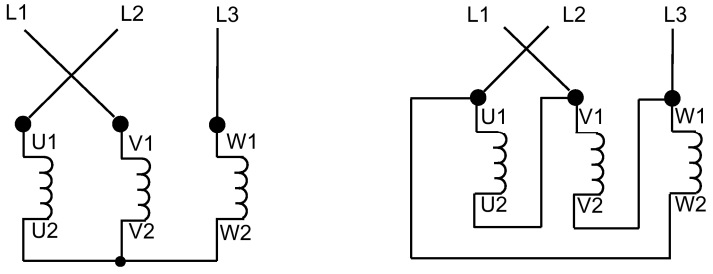


Figure 5-9 Correct connection of motor phases for counterclockwise motor rotation

Table 5- 12 Device sizing during normal starting

Star contactor	Line and delta contactor	Overload relay
I_e motor x 0.33	I_e motor x 0.58	I_e motor x 0.58

Note

If two phases are swapped over in the network in order to change the direction of rotation, the circuit is automatically changed/reversed from the most favorable to the least favorable.

φ = switchover current factor = switchover current peak/starting current peak
The switchover current factor has a theoretical maximum value of 2.
Example measurements:
Favorable circuit: φ = 0.8
Unfavorable circuit: φ = 1.37

Note

See the main and control circuit wiring designs below; these depict the circuit diagrams for contactor assemblies for star-delta (wye-delta) start with clockwise and counterclockwise rotation according to the preferred wiring.

Main circuit

The diagram below shows the preferred main circuit wiring for a star-delta circuit, clockwise and counterclockwise rotation.

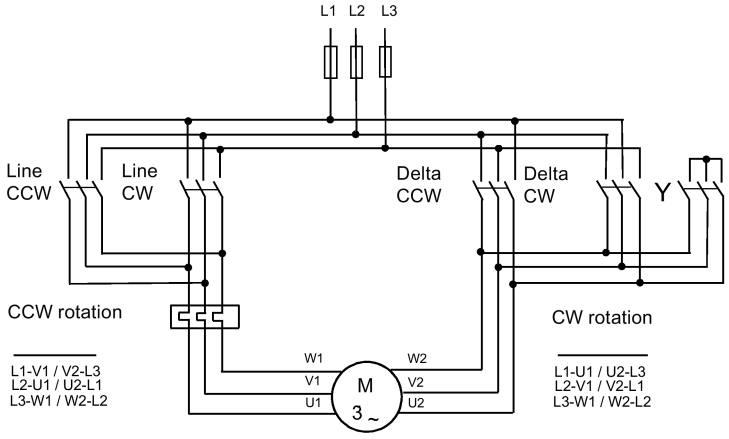


Figure 5-10 Main circuit of the contactor assembly for star-delta (wye-delta) start

Control circuit

The diagram below shows the control circuit for the main circuit depicted above.

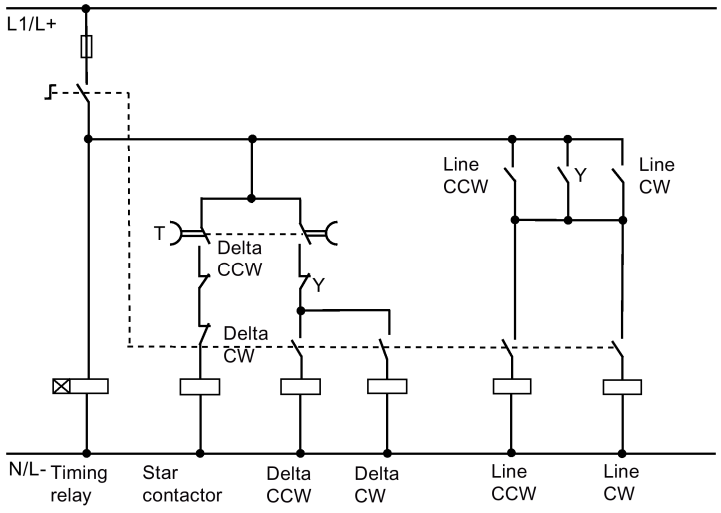


Figure 5-11 Control circuit of the contactor assembly for star-delta (wye-delta) start

5.13 Using long control cables

Malfunctions caused by long control cables

If long control cables are required for the control circuits of contactors or relays, malfunctions may occur during switching under certain conditions. As a result of these malfunctions, the contactors may no longer be able to switch on or off.

Switching on

Due to the voltage drop in long control cables, the control voltage applied to the contactor may fall below the threshold value at which the contactor switches on. This affects both DC- and AC-operated contactors.

The following counter-measures can be taken here:

- Changed circuit topology to allow for the application of shorter control cables.
- Increased conductor cross-section.
- Increased control voltage.
- Use of a contactor whose magnet coil has a lower closing power.

Calculation of the maximum cable length:

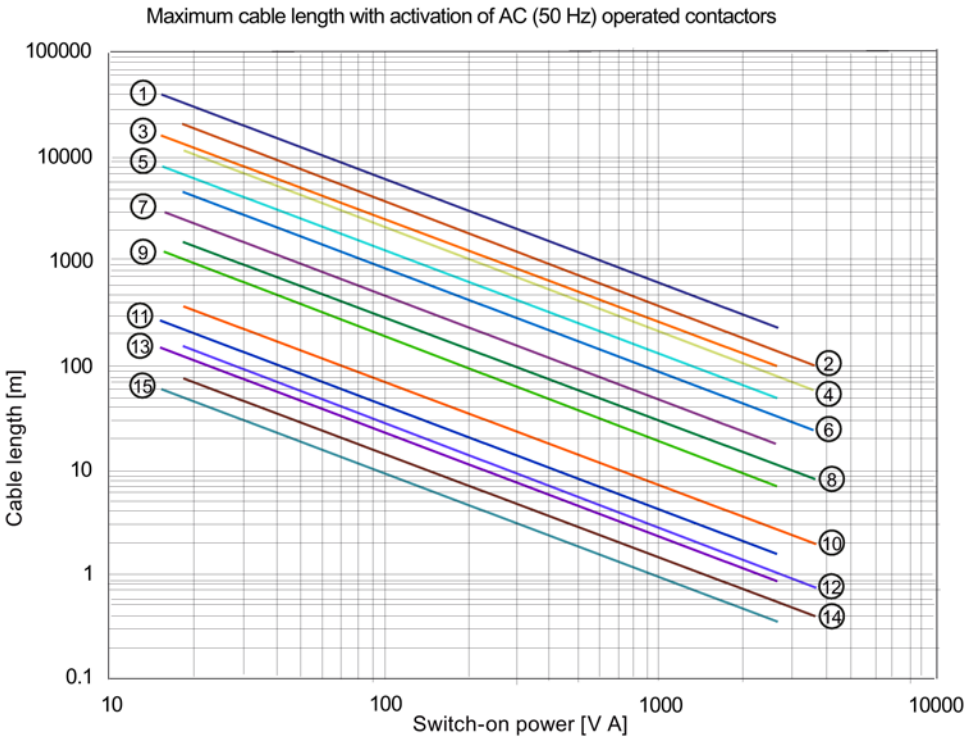
The maximum permissible simple cable length I_{zul} can be roughly calculated using the equations given below.

Table 5- 13 Calculating the cable length

	For AC voltage	For DC voltage
	$I_{zul} = \frac{5 \cdot U_S^2 \cdot u_{SL}}{R_{SL} \cdot P_{ein}}$ (in m)	$I_{zul} = \frac{5 \cdot U_S^2 \cdot u_{SL}}{R_{SL} \cdot P_{ein}}$ (in m)
U_S	Rated control voltage in V	
R_{SL}	Ohmic resistance per conductor and km of the control cable in Ω/km	
U_{SL}	Voltage drop on the control cable in %	
S_{ein}, P_{ein}	Closing power of the contactor in VA/W	
cos ϕ_{ein}	Power factor of the contactor coil on switch-on	

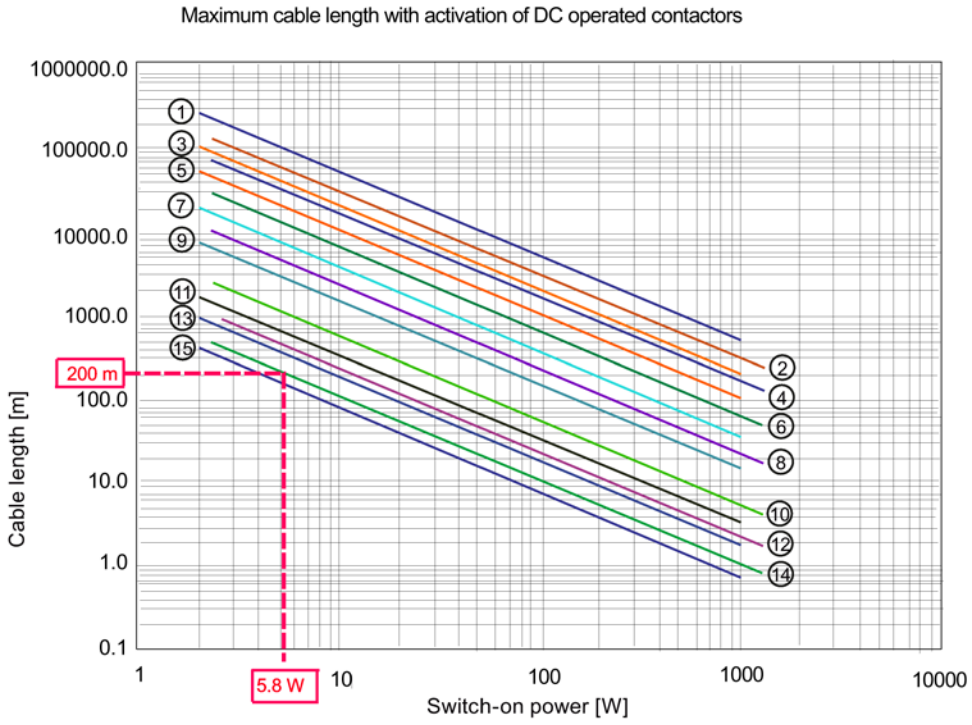
Note

A maximum cable voltage drop of u_{SL} = 5% is permitted for SIRIUS contactors.



1	400 V / 2.5 mm²	9	110 V / 1 mm²
2	400 V / 1.5 mm²	10	42 V / 2.5 mm²
3	400 V / 1 mm²	11	42 V / 1.5 mm²
4	230 V / 2.5 mm²	12	42 V / 1 mm²
5	230 V / 1.5 mm²	13	24 V / 2.5 mm²
6	230 V / 1 mm²	14	24 V / 1.5 mm²
7	110 V / 2.5 mm²	15	24 V / 1 mm²
8	110 V / 1.5 mm²		

Figure 5-12 Graphical representation, switch-on



1	400 V / 2.5 mm²	9	110 V / 1 mm²
2	400 V / 1.5 mm²	10	42 V / 2.5 mm²
3	400 V / 1 mm²	11	42 V / 1.5 mm²
4	230 V / 2.5 mm²	12	42 V / 1 mm²
5	230 V / 1.5 mm²	13	24 V / 2.5 mm²
6	230 V / 1 mm²	14	24 V / 1.5 mm²
7	110 V / 2.5 mm²	15	24 V / 1 mm²
8	110 V / 1.5 mm²		

Figure 5-13 Graphical representation, switch-on - Example

Example for 3RT202. contactor:

- DC-operated
- 5.8 W switch-on power
- Cross-section of the control cable 1.5 mm²
- Maximum permissible control cable length: 200 m at 24 V

Switching off

During the switch-off of AC-operated contactors, the contactor may no longer switch off in case of control circuit interruption due to an excessive line capacity of the control cable.

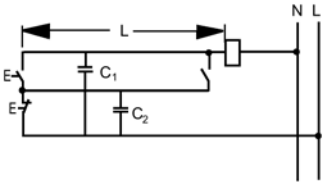
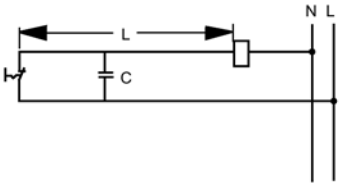
The following counter-measures can be taken here:

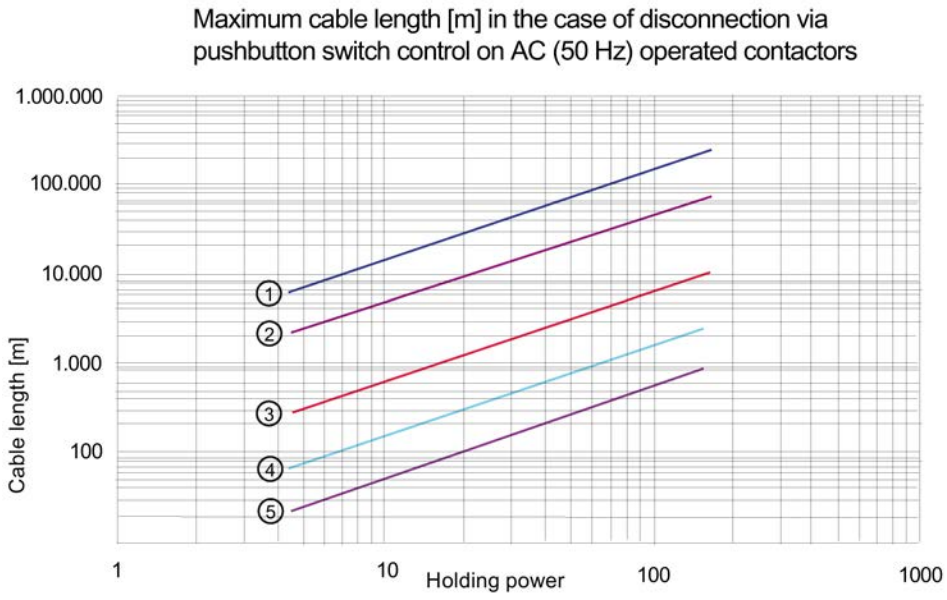
- Changed circuit topology to allow for the application of shorter control cables.
- Application of DC-operated contactors.
- Reduced control voltage.
- Application of a contactor whose magnet coil has a higher holding power.
- Parallel connection of an ohmic resistance for increased holding power.

Sizing of the parallel resistance	Power of the additional resistance
$R_p = \frac{1000}{C_L}$ (in Ω)	$P_p = \frac{U_S^2}{R_p}$ (in W)

For reasons of cost effectiveness, P_P should be lower than 10 W.

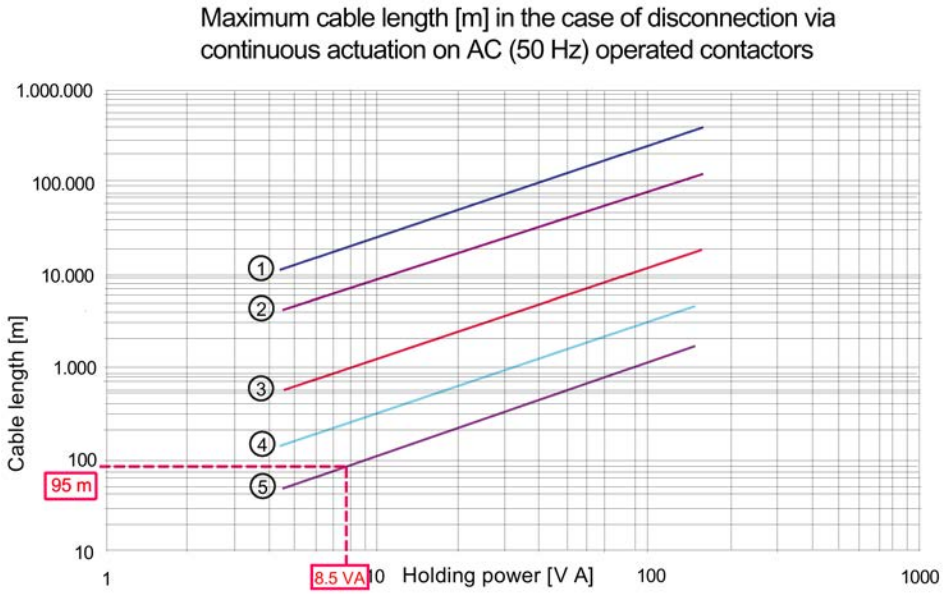
Table 5- 14 Calculation of the maximum cable length

For pushbutton switch control	For maintained-contact operation
For pushbutton switch control with a three-core cable, a line capacity of 0.6 µF/km (2 x 0.3 µF/km) should be expected.	For maintained-contact operation with a two-core cable, a line capacity of 0.3 µF/km should be expected.
	
$I_{perm} = \frac{500 \cdot S_H}{2 \cdot 0.3 \cdot U_S^2} 10^3$ (in m)	$I_{perm} = \frac{500 \cdot S_H}{0.3 \cdot U_S^2} 10^3$ (in m)
U_S Rated control supply voltage in V S_H Holding power of the contactor in VA	U_S Rated control supply voltage in V S_H Holding power of the contactor in VA



1 24 V
2 42 V
3 110 V
4 230 V
5 400 V

Figure 5-14 Graphical representation, switch-off



1 24 V
2 42 V
3 110 V
4 230 V
5 400 V

Figure 5-15 Graphical representation, switch-off - Example

Example for 3RT202. contactor:

- AC-operated
- 8.5 VA holding power
- Control voltage 400 V AC
- Maximum permissible control cable length: 95 m

5.14 Configuration information for use downstream of frequency converters

There are important criteria for the selection of switching devices when operating with converters.

The following general rule applies: Frequency converters comprise DC link capacitors that cause high inrush current peaks if no attenuation measures have been taken inside the converter using reactors or precharging resistors. The non-attenuated charging current is almost the equivalent of a short-circuit and thus a heavy load on the contacts.

Use of 3RT2 contactors on the primary side of a frequency converter

If these current peaks are higher than the making capacity of the contactors, the contactor contacts can bounce. The arcs created liquefy the contact material with subsequent contact sticking and welding. Since the level of the actual current peaks at the installation location of the frequency converter depends essentially on the series impedance of the power system and on the instant of closing, the following must be noted when selecting a suitable contactor.

Converter without precharging resistors

If the current peak value is known:
on converters without precharging resistors and where the current peak value is known, the 3RT20 contactor can be used in accordance with its making capacity (10 x I_e AC-3). This making capacity must not be lower than the current peaks.

If the current peak value is not known:
on converters without precharging resistors and where the current peak value is unknown, capacitor contactors are recommended on the primary side.
The use of capacitor contactors attenuates inrush currents to non-critical levels. In addition, losses must be minimized, particularly in standby periods, but also during operation. In the case of frequency converters, losses occur up to the DC link due to input circuits with filters or reactors. These frequency converter standby losses can be reduced to almost zero by disconnection with a contactor on the main current supply side.

The following 3RT26 capacitor contactors are suitable for use on the primary side of frequency converters:

- 3RT2617: Suitable for the performance range to 5.5 kW/400 V
- 3RT2627: Suitable for the performance range of 7.5 kW to 15 kW/400 V
- 3RT2637: Suitable for the performance range of 22 kW to 37 kW/400 V

This depends on the information provided by the frequency converter manufacturer.

Converters with precharging resistors

Siemens converters (SINAMICS / Masterdrives) have precharging resistors. This is why the charging current is restricted to the rated current of the converter. For this reason, the contactor itself can be dimensioned in accordance with utilization category AC-1 (resistive load).

Ultimately, the manufacturer of the frequency converter is responsible for naming the criteria for contactor selection, because only the manufacturer knows the operating characteristics of the product precisely enough to be able to make responsible product recommendations or define product requirements for the contactors.

Use of 3RT2 contactors on the secondary side of a frequency converter

An output contactor is usually not required. Only if specifically requested by the customer, is an output contactor supplied. An output contactor is required in the following cases:

- Operation of the frequency converter in bypass mode
- Disconnection of the motor in the case of EMERGENCY-STOP
- Use of the frequency converter for several motors that are to be connected optionally

On the output side of frequency converters, contactors are usually dimensioned in accordance with utilization category AC-3 corresponding to the motor rated current and the associated voltage (as with direct-on-line starting). Since voltage and frequency are almost always proportional in frequency converters, shutdown of the load at low frequencies is not critical for the contactor.

Example

A voltage of only 40 V would apply at 5 Hz with respect to a 400 V / 50 Hz power supply system. This can be handled by an AC-3-rated contactor without any problem during the breaking operation.

NOTICE
These statements do not apply to vacuum contactors that are not suitable for low frequencies.

Procedure when shutting down Siemens converters

1. EMERGENCY-OFF (disconnect drive from power as quickly as possible)
   Before the contactor is opened, the converter must shut down via inverter enable / pulse disable (command OFF 2).
2. EMERGENCY-OFF (controlled ramp-down of the drive)
   If a quick stop is to take place, the drive is ramped down (command OFF 3).
   The pulse disable must take place before the contactor is opened (command OFF 2).

Mounting

6

6.1 Mounting

6.1.1 Mounting options

Note the following information when mounting contactors:

- If foreign bodies (such as drillings) can reach the devices, the contactors must be covered during mounting.
- If there is a risk of pollution, heavy dust deposits, or an aggressive atmosphere at the mounting location, the contactors must be installed in an enclosure.
- Dust deposits must be vacuumed away.

Mounting options

The following mounting types are available for contactors in sizes S00, S0 and S2:

- Snapping onto a 35 mm DIN rail according to DIN EN 60715.
- Screwing onto a mounting plate

6.1.2 Mounting position

The contactors are dimensioned for operation on a vertical mounting plane. The following mounting positions are permitted:

Permissible mounting positions for the contactors:

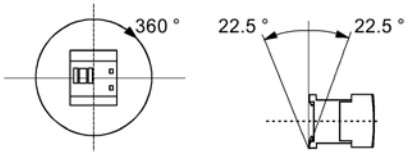


Figure 6-1 Mounting positions for sizes S00, S0 and S2

Note

A lateral distance from grounded parts of over 6 mm must be observed.

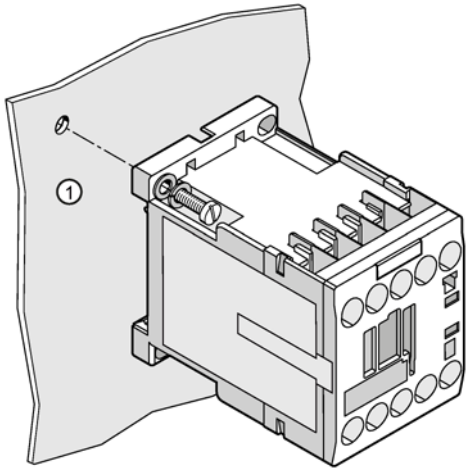
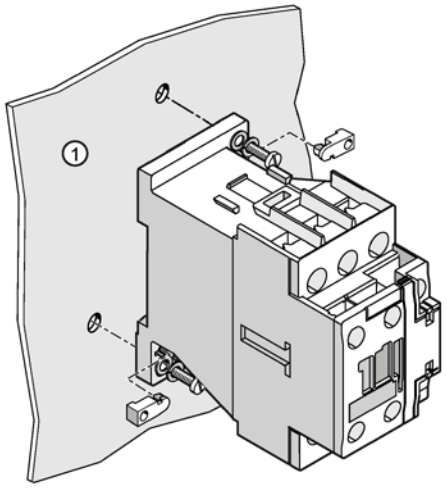
Vertical mounting

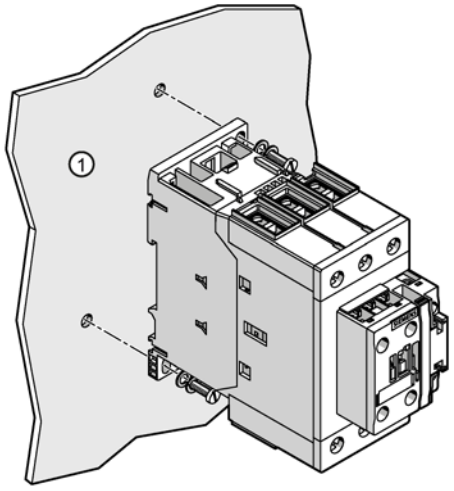
A special version of the 3RH2 contactor relays and 3RT2 power contactors is required for vertical mounting. This special version can be requested from Technical Assistance (http://www.siemens.com/sirius/technical-assistance).

6.1.3 Mounting on mounting plate

The illustrations below show how contactors of sizes S00, S0 and S2 are mounted on a mounting plate:

Table 6- 1 Screw mounting of sizes S00, S0 and S2

Step	Instructions	Figure
1	Using two M4 screws (maximum tightening torque for S0/S00 1.2 to 1.6 Nm; S2 1.2 to 1.4 Nm), plain washers, and spring washers, screw the contactor tight into the designated drill holes diagonally. You can use the 3RT1926-4P screw mounting adapter to make size S0 contactors easier to mount, if necessary (e.g. in the case of vertical access when using an insulated screwdriver). Fit the adapters in the horizontal installation position.	 Screw mounting (size S00)
		 Screw mounting (size S0)

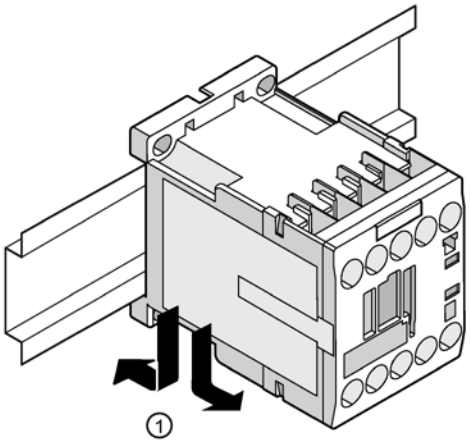
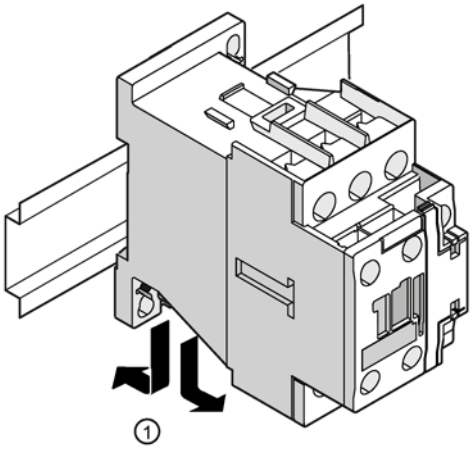
Step	Instructions	Figure
		 Screw mounting (size S2)

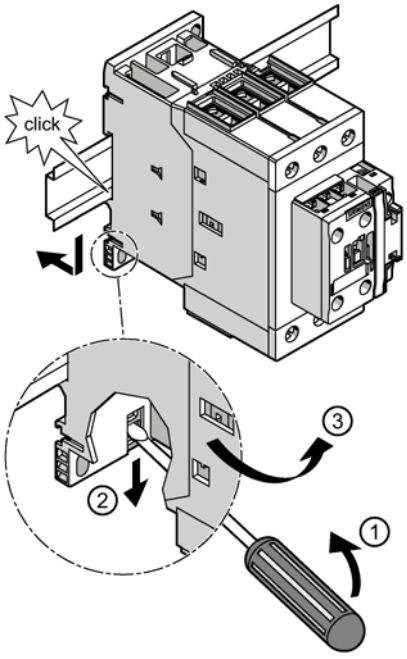
6.1.4 Snapping onto DIN rail (snap-on mounting)

Contactors of sizes S00 to S2 can be snapped onto a 35 mm DIN rail.

The illustrations below show how to snap contactors onto/off a DIN rail:

Table 6- 2 Mounting/disassembling sizes S00 to S2 (snap-on mounting)

Step	Instructions	Figure
1	Position the device on the top edge of the DIN rail and press down until it snaps onto the bottom edge of the DIN rail. To disassemble the device, press it down, pushing against the mounting springs, and swivel the device to remove it.	 Snapping onto/off DIN rail (size S00)
		 Snapping onto/off DIN rail (size S0)

Step	Instructions	Figure
1/ 2 / 3	Position the device on the top edge of the DIN rail and press down until it snaps onto the bottom edge of the DIN rail. To disassemble, press the locking device down with a screwdriver. (①/②) Then push the device down against the mounting springs, and swivel the device to remove it ③.	 Snapping onto/off DIN rail (size S2)

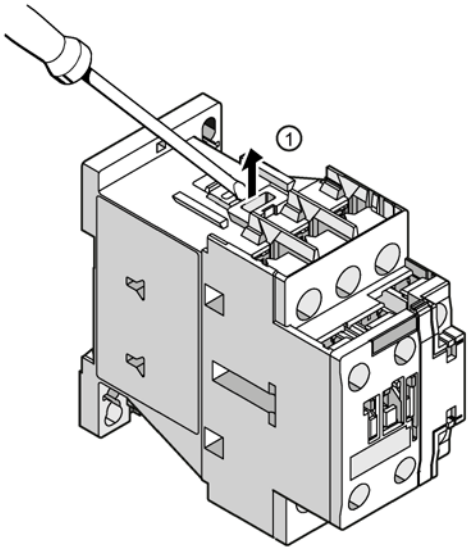
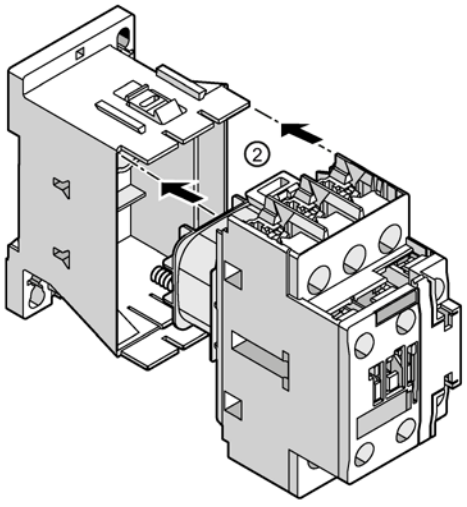
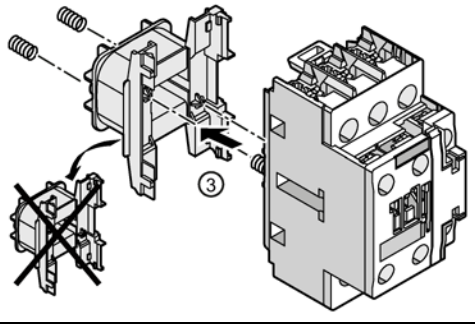
6.2 Replacing magnet coils

The magnet coils on size S0 and S2 contactors can be replaced. The illustration below shows how to replace the magnet coil on a size S0 contactor with an AC coil.

Note

On size S0, the magnet coils can only be replaced for AC devices. On size S2, the magnet coils can be replaced for AC devices (AC-AC) and for AC / DC devices (AC / DC - AC / DC).

Table 6- 3 Replacing a magnet coil (size S0/AC)

Step	Instructions	Figure
1	Use a screwdriver to lift up the retaining clips between the rear and front halves of the contactor.	
2	Push the two halves of the contactor apart.	
3	Take the magnet coil out of the front half of the contactor.	

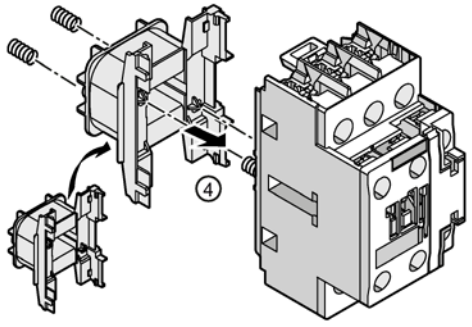
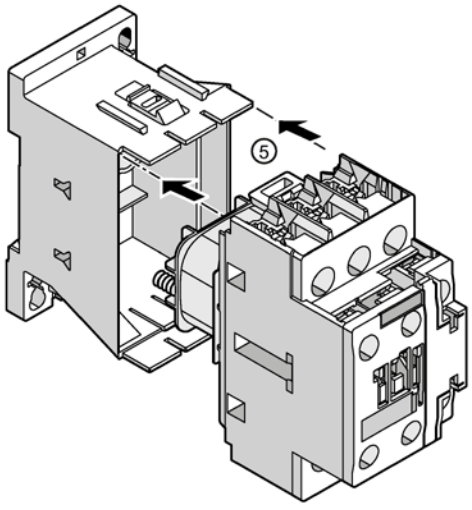
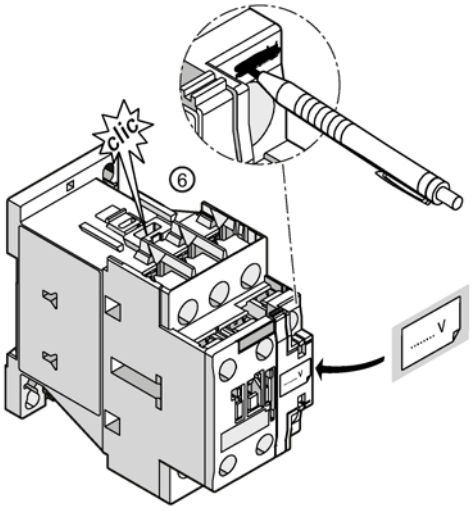
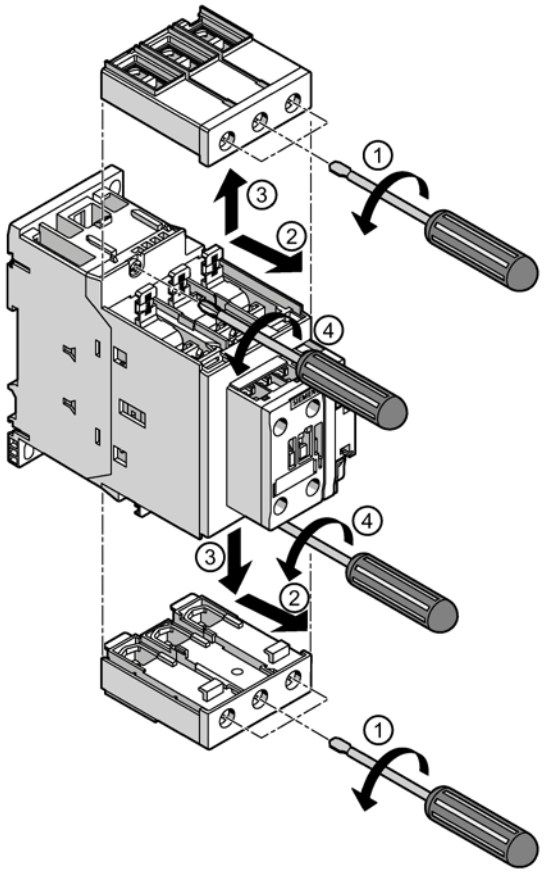
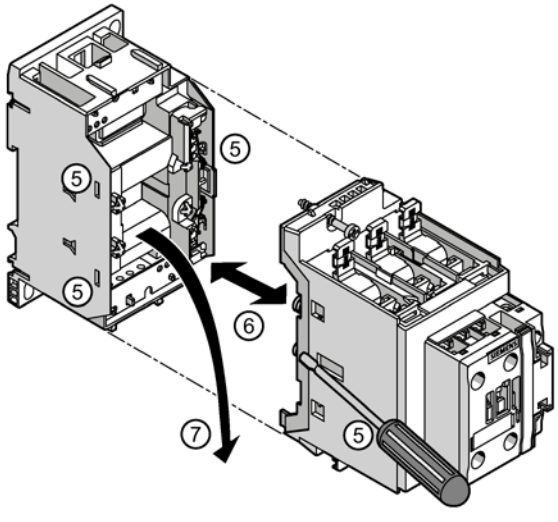
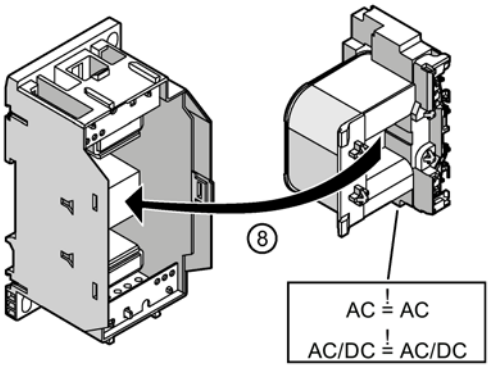
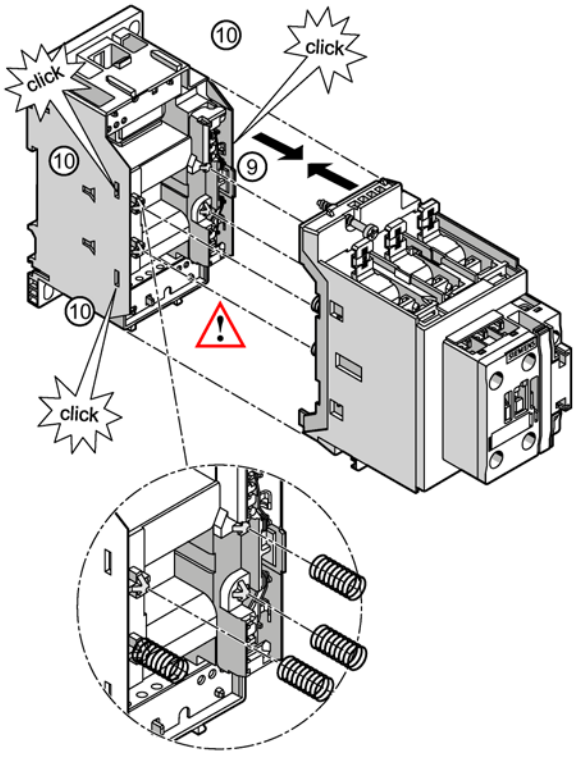
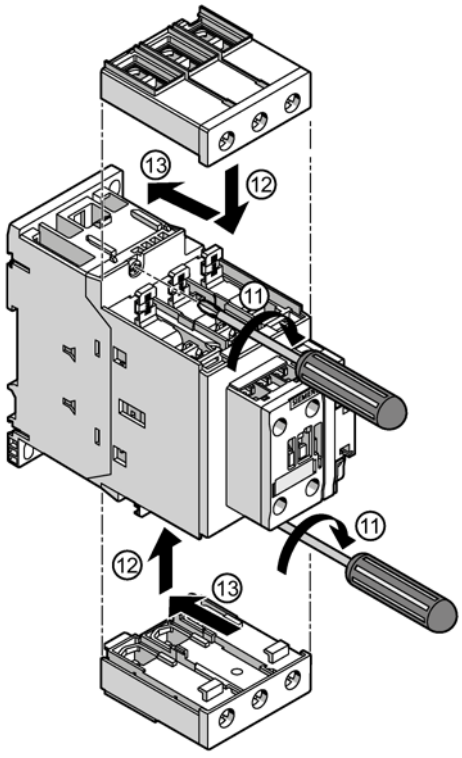
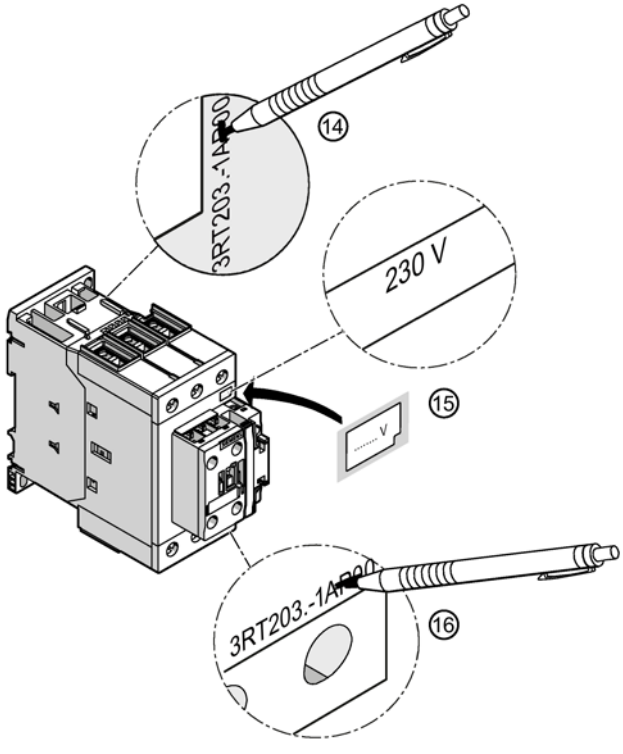
Step	Instructions	Figure
4	Insert the new magnet coil. In doing so, make sure that the springs between the magnet coil and the front half of the contactor are properly located on the support.	
5 / 6	Reattach the front part of the contactor onto the rear half until the retaining clips engage. Write the coil voltage of the newly inserted operating mechanism onto the label supplied and stick the label onto the front panel of the contactor, as shown in the diagram. Thoroughly cross out the coil voltage stated above terminal A1.	
		

Table 6- 4 Replacing a magnet coil (size S2/AC and AC/DC)

Step	Instructions	Figure
1 / 2 / 3 / 4	Use screwdrivers to undo the screws of the detachable terminals. Pull the terminals forward slightly and remove the terminals.	
5 / 6 / 7	Push the two halves of the contactor apart. Note the lateral latching here. Take the magnet coil out of the rear half of the contactor.	

Step	Instructions	Figure
8	Insert the new magnet coil.	
9 / 10	Slide the front part of the contactor back onto the rear half until the retaining clips engage. In doing so, make sure that the springs between the magnet coil and the front half of the contactor are properly located on the support.	

Step	Instructions	Figure
11 / 12 / 13	Screw the two contactor halves together (1.1 - 1.3 Nm). Place the terminals on the device and and push them towards the rear. Make sure the terminals engage.	
14 / 15 / 16	To label the coil voltage of the newly inserted operating mechanism, cover the control supply voltage specification with the labels supplied. Thoroughly cross out the article number.	

Connection

7

Connection systems

The SIRIUS contactors are available with the following connection types:

- Screw-type connection system
- Spring-loaded connection system

  In size S2, the spring-loaded connection system is used only in the control circuit.
- Ring cable lug connection system

  The ring cable lug connection system is not used in size S2.
- Solder pin connection (only possible for size S00, in conjunction with a solder pin adapter)

Terminal designations

Terminal	Designation
A1	Coil terminal +
A2	Coil terminal -
L1, L2, L3	Contactor's main circuit terminal to the power network
T1, T2, T3	Contactor's main circuit terminal to the load/motor connection
13, 14	Auxiliary contact, closing
21, 22	Auxiliary contact, opening

The auxiliary/control contacts have a two-digit designation:

- First digit: Consecutive number of the auxiliary contacts (sequence number).
- Second digit: Task of the relevant auxiliary contact (function number).
  For example, 1-2 for NC contact or 3-4 for NO contact

Terminal designations of the auxiliary contacts

The terminal designations as per DIN EN 50012 apply to size S00 contactors with an integrated auxiliary (NO) contact. Auxiliary contacts are fitted and arranged on size S0 contactors (integrated in the basic device) in accordance with the terminal designations contained in DIN EN 50012.

Additionally, for sizes S00 and S0, complete devices with permanently mounted auxiliary switch blocks (2 NO contacts + 2 NC contacts in accordance with DIN EN 50012) are available.

Coil terminals

Size S00 to S2 contactors feature a coil terminal on the front. An adapter (3RT2926-4R./. coil terminal module) can be used to move the coil terminal up or down on size S0 / S2 contactors (compatible with 3RT102 / 3RT103).

Reference

More information ...	Can be found in the chapter ...
About the coil terminal module and how to mount it on a 3RT20 contactor (size S0)	Coil terminal module (Page 192)

Solder pin connection

For applications where the contactors are to be soldered onto a PCB directly, a solder pin adapter is available for SIRIUS size S00 contactors up to 5.5 kW or 12 A.

Devices with a solder pin connection have the following properties:

- The terminals are suitable for a 1-conductor connection.
- All connections can be accessed from the front and are clearly arranged.
- A maximum of 2 conductors with a cross-section of 0.25 mm^2 to max. 2.5 mm^2 can be used at each connection point.

Reference

More information ...	Can be found in the chapter ...
About the solder pin adapter and how to mount it on a motor/contactor relay (size S00)	Solder pin adapter (Page 190)

2-conductor connection

2 conductor ends can be connected to every main, auxiliary, and control circuit connection. These connections are also suitable for untreated conductors, which may have varying cross-sections. This connection system offers numerous benefits, including laying the foundations for problem-free looping through and parallel connection without intermediate terminals.

Conductor cross-sections

More information ...	Can be found in the chapter ...
About conductor cross-sections	Technical data (Page 243)

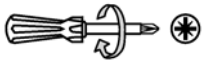
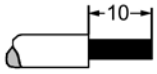
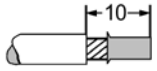
7.1 Conductor cross-sections

7.1.1 Conductor cross-sections for screw-type connection systems

Conductor cross-sections for screw-type connection systems

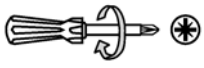
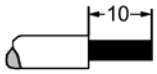
The tables below define the permissible conductor cross-sections for main terminals and auxiliary conductor connections in sizes S00, S0 and S2 for screw-type connection systems.

Table 7- 1 Main conductors of size S00 with M3 combination screws

		Contactors
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm
Tightening torque		0.8 - 1.2 Nm
Solid and stranded		2 x (0.5 ... 1.5) mm²
		2 x (0.75 ... 2.5) mm²
		Max. 2 x 4 mm²
Finely stranded with end sleeve		2 x (0.5 ... 1.5) mm²
		2 x (0.75 ... 2.5) mm²
AWG		2 x (20 … 16)
		2 x (18 … 14)
		2 x 12

1) Only 1 conductor can be clamped on the stand-alone assembly support.

Table 7- 2 Main conductors of size S0 with M4 combination screws

		Contactors
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm
Tightening torque		2.0 ... 2.5 Nm
Solid and stranded		2 x (1.0 ... 2.5) mm²
		2 x (2.5 ... 10) mm²
Finely stranded with end sleeve		2 x (1 ... 2.5) mm²
		2 x (2.5 ... 6) mm²
		Max. 1 x 10 mm²
AWG		2 x (16 ... 12)
		2 x (14 ... 8)

1) Only 1 conductor can be clamped on the stand-alone assembly support.

Table 7- 3 Main conductors of size S2 with M6 box terminal

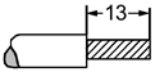
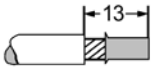
		3RT2.3.-1 contactors (L1, L2, L3)
Tool		Pozidriv size PZ 2, ∅ 5 ... 6 mm
Tightening torque		3.0 ... 4.5 Nm (27 ... 40 lb in)
Solid and stranded		2 x (1.0 ... 35) mm² 1 x (1.0 ... 50) mm²
Finely stranded		---
Finely stranded with end sleeve		2 x (1.0 ... 25) mm² 1 x (1.0 ... 35) mm²
AWG		2 x (18 ... 2) 1 x (18 ... 1)

Table 7- 4 Auxiliary conductors of size S00/S0 and S2 with M3 combination screws

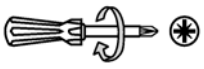
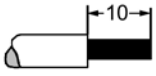
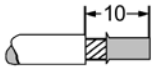
		Accessories for contactors	Contactors, size S00	Contactors, sizes S0 and S2
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm		
Tightening torque		0.8 - 1.2 Nm		
Solid and stranded		2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²
		2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²
			Max. 2 x 4 mm²	
Finely stranded with end sleeve		2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²
		2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²
AWG		2 x (20 … 16)	2 x (20 … 16)	2 x (20 … 16)
		2 x (18 … 14)	2 x (18 … 14)	2 x (18 … 14)
			2 x 12	

Table 7- 5 S00 and S0 capacitor contactors

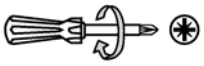
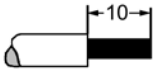
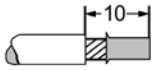
			Contactors, size S00	**Contactors, size S0**	
		A1/A2, NO/NC	**L1, L2, L3 3RT261.-1**	**L1, L2, L3 3RT262.-1**	**3RT262.-1 + 3RV2925-5AB**
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm	Pozidriv size PZ 2, Ø 5 … 6 mm	Pozidriv size PZ 2, Ø 5 … 6 mm	Pozidriv size PZ 2, Ø 5 … 6 mm
Tightening torque		0,8 ... 1.2 Nm (7 to 10.3 lb·in)	0,8 ... 1.2 Nm (7 to 10.3 lb·in)	2 ... 2.5 Nm (18 to 22 lb·in)	3 ... 4 Nm (27 to 35.2 lb·in)
Solid and stranded		2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²	2 x (1 ... 2.5) mm²	1 x (2.5 ... 25) mm²
		2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²	2 x (2.5 ... 10) mm²	
		2 x 4 mm²	2 x 4 mm²		
Finely stranded with end sleeve		2 x (0.5 ... 1.5) mm²	2 x (0.5 ... 1.5) mm²	2 x (1 ... 2.5) mm²	1 x (2.5 ... 16) mm²
		2 x (0.75 ... 2.5) mm²	2 x (0.75 ... 2.5) mm²	2 x (2.5 ... 6) mm²	
				1 x 10 mm²	
AWG		2 x (20 … 16)	2 x (20 … 16)	2 x (14 to 8)	1 x (10 to 4)
		2 x (18 … 14)	2 x (18 … 14)		
		2 x 12	2 x 12		

Table 7- 6 Capacitor contactors main conductors of size S2 (3RT263.-1)

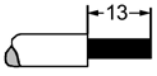
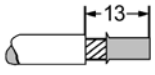
		L1, L2, L3 3RT263.-1
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm
Tightening torque		3,0 ... 4.5 Nm (27 to 40 lb in)
Solid and stranded		2 x (1 to 35) mm²
		1 x (1 to 50) mm²
Finely stranded with end sleeve		2 x (1 to 25) mm²
		1 x (1 to 35) mm²
AWG		2 x (18 to 2)
		1 x (18 to 0)

Table 7- 7 Capacitor contactors auxiliary conductors of size S2 (3RT263.-1)

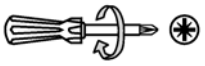
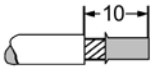
		A1/A2, NO/NC 3RT263.-1 3RH29.1-1
Tool		Pozidriv size PZ 2, Ø 5 … 6 mm
Tightening torque		M3: 0,8 ... 1.2 Nm (7 to 10.3 lb in)
Solid and stranded		2 x (0.5 ... 1.5)
		2 x (0.75 ... 2.5)
		2 x 4
Finely stranded with end sleeve		2 x (0.5 ... 1.5)
		2 x (0.75 ... 2.5)
AWG		2 x (20 to 16)
		2 x (18 to 14)
		2 x 12

Table 7- 8 Capacitor contactors S2 (3RT263.-1 + 3RV2935-5A)

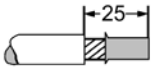
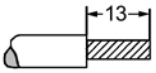
		3RT263.-1 + 3RV2935-5A
Tightening torque		4 ... 6 Nm (35 to 53 lb in)
Solid and stranded		2 x (2.5 to 50) mm²
		1 x (2.5 to 70) mm²
Finely stranded with end sleeve		2 x (2.5 to 35) mm²
		1 x (2.5 to 50) mm²
AWG		2 x (10 to 1 / 0)
		1 x (10 to 2 / 0)

Table 7- 9 Capacitor contactors S2 (3RT2637)

		L1, L2, L3 3RT2637	
I_{eff}		≤ 133 A	> 133 A
Finely stranded		1 x 50 mm²	2 x 35 mm²
AWG		1 x 0	2 x 2
Rated fuse current		Max. 200 A	Max. 160 A

7.1.2 Conductor cross-sections for spring-loaded connection systems

Conductor cross-sections for spring-loaded connection systems

The tables below define the permissible conductor cross-sections for main terminals and auxiliary conductor connections in sizes S00, S0 and S2 for spring-loaded connection systems. In size S2, the spring-loaded connection system is used only in the control circuit.

Table 7- 10 Main conductors of size S00

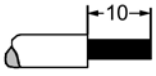
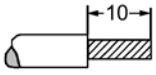
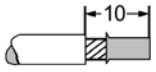
		Contactors
Tool		Ø 3.0 x 0.5 (3RA2908-1A)
Solid and stranded		2 x (0.5 to 4.0) mm²
Finely stranded without end sleeve		2 x (0.5 to 2.5) mm²
Finely stranded with end sleeve		2 x (0.5 to 2.5) mm²
AWG		2 x (20 to 12)

Table 7- 11 Main conductors of size S0

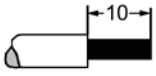
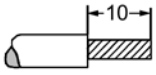
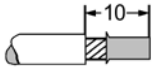
		Contactors
Tool		Ø 3.0 x 0.5 (3RA2908-1A)
Solid and stranded		2 x (1.0 to 10) mm²
Finely stranded without end sleeve		2 x (1.0 to 6.0) mm²
Finely stranded with end sleeve		2 x (1.0 to 6.0) mm²
AWG		2 x (18 to 8)

Table 7- 12 Auxiliary conductors of sizes S00, S0 and S2

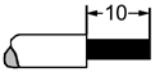
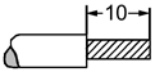
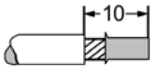
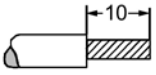
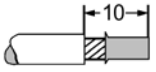
		Contactors, size S00	Contactors, sizes S0 and S2, accessories for contactors
Tool		Ø 3.0 x 0.5 (3RA2908-1A)	
Solid and stranded		2 x (0.5 to 4) mm²	2 x (0.5 to 2.5) mm²
Finely stranded without end sleeve		2 x (0.5 to 2.5) mm²	2 x (0.5 to 2.5) mm²
Finely stranded with end sleeve		2 x (0.5 to 2.5) mm²	2 x (0.5 ... 1.5) mm²
AWG		2 x (20 to 12)	2 x (20 to 14)

Table 7- 13 Auxiliary conductors for front and laterally mounted auxiliary switches

		3RH29 auxiliary switch blocks
Tool		Ø 3.0 x 0.5 (3RA2908-1A)
Solid and stranded		2 x (0.5 to 2.5) mm²
Finely stranded without end sleeve		2 x (0.5 to 2.5) mm²
Finely stranded with end sleeve		2 x (0.5 ... 1.5) mm²
AWG		2 x (20 to 14)

7.1.3 Conductor cross-sections for ring cable lug connection system

Note

Ring cable lug connection system not in the case of S2

Size S2 does not support the ring cable lug connection system.

Conductor cross-sections for ring cable lug connection system

The tables below define the permissible conductor cross-sections for main terminals and auxiliary conductor connections in sizes S00 and S0 for ring cable lug connection systems.

Table 7- 14 Main conductors and auxiliary conductors of size S00 with M3 combination screws

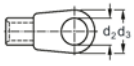
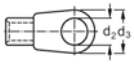
		SIRIUS devices
Tool		Pozidriv size 2, Ø 5 to 6 mm
Tightening torque		0.8 to 1.2 Nm
Ring cable lug [1]		d_2 = min. 3.2 mm
		d_3 = max. 7.5 mm

Table 7- 15 Main conductors and auxiliary conductors of size S0 with M4 combination screws

		SIRIUS devices
Tool		Pozidriv size 2, Ø 5 to 6 mm
Tightening torque		2.0 to 2.5 Nm
Ring cable lug [1]		d_2 = min. 4.3 mm
		d_3 = max. 12.2 mm

[1] The following ring cable lugs are approved for achieving the required clearances and creepage distances:

- For applications according to IEC 60947-1:
  - DIN 46237 (with insulating sleeve)
  - JIS CS805 type RAV (with insulating sleeve)
  - JIS CS805 type RAP (with insulating sleeve)
- For applications according to UL 508:
  - DIN 46 234 (without insulating sleeve)
  - DIN 46225 (without insulating sleeve)
  - JIS CS805 (without insulating sleeve)

A shrink-on sleeve must be used to insulate ring cable lugs without an insulating sleeve. The following conditions must be met:

- Application temperature: -55 °C to +155 °C
- UL 224 approved
- Flame-protected

DANGER

Hazardous voltage.

Will cause death or serious injury.

Only use approved ring cable lugs to meet the required clearances and creepage distances.

Accessories

8

8.1 Accessories overview

SIRIUS contactors with a width of 45 mm (size S00/S0) and with a width of 55 mm (size S2) come with a uniform, versatile range of auxiliary switches and accessories, which are quick to retrofit and replace. The accessories for contactor relays and power contactors are identical in design. The accessories can be attached on the front or the sides of devices.

The 3RH2 contactor relays can be expanded to give versions with a maximum of 8 poles by attaching 2-pole or 4-pole auxiliary switch blocks.

Table 8- 1 Overview - Accessories for 3RT2 power contactors and 3RH2 contactor relays

Accessories	3RH2 contactor relay (size S00)	3RT2 power contactor (size S00)	3RT2 power contactor (size S0)	3RT2 power contactor (size S2)
Auxiliary switch blocks on the front/lateral	✓ / ---	✓ / ✓	✓ / ✓	✓ / ✓
Surge suppressor	✓	✓	✓	✓
EMC interference suppression module	✓	✓	---	---
OFF-delay device	✓	✓	✓	✓
Mechanical latch	---	---	✓	---
Additional load module	✓	✓	---	---
Control kit for manual operation of contactor contacts	✓	✓	✓	✓
Coupling link for PLC	---	✓	✓	✓
LED display indicator module	✓	✓	✓	✓
Solder pin adapter	✓	✓	---	---
Coil terminal module	---	---	✓	✓
Cover for ring cable lug	✓	✓	✓	---
Sealable cover	✓	✓	✓	✓
3-phase infeed terminal	---	✓	✓	✓
Parallel switching connector	✓	✓	✓	✓
Link module for two contactors in series	---	✓	✓	✓
Link module for motor starter protector	---	✓	✓	✓

Accessories	3RH2 contactor relay (size S00)	3RT2 power contactor (size S00)	3RT2 power contactor (size S0)	3RT2 power contactor (size S2)
Insulating stop	✓	✓	✓[1)]	✓[1)]
Terminal module for contactors with screw connections	---	✓	✓	---
Pneumatically delayed auxiliary switch	---	---	✓	✓[2)]
Function modules • Electronic timing relay with semiconductor output for controlling contactors • Solid-state time-delay auxiliary switches • Function module for star-delta (wye-delta) start	---	✓	✓	✓
Function modules for connection to the controller (AS-Interface or IO-Link) for direct starting, reversing starting, star-delta (wye-delta) starting	---	✓	✓	✓
Assembly kit for reversing contactor assembly	---	✓	✓	✓
Assembly kit for contactor assembly for star-delta (wye-delta) start	---	✓	✓	✓

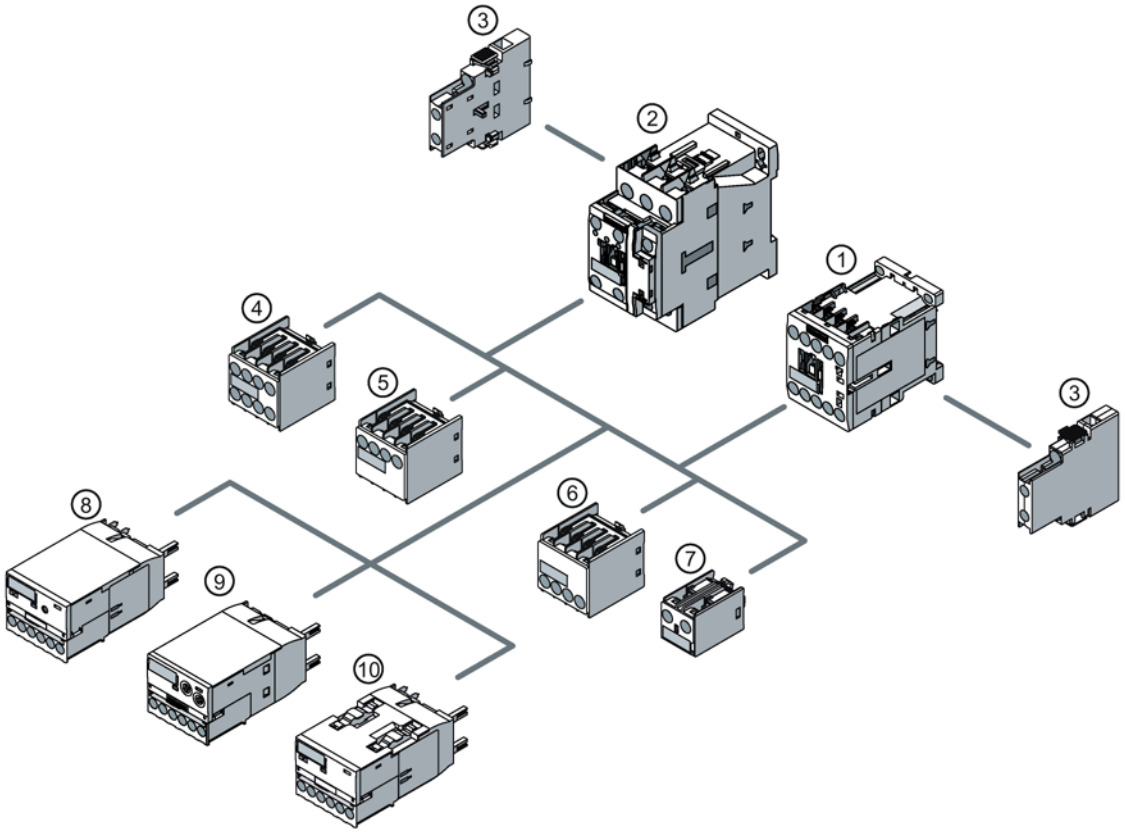
1) The 3RT1916-4JA02 insulating stop can be used on the connection terminals for the auxiliary circuit of the 3RT2.2 and 3RT2.3 contactors.

2) Available from mid 2015

Table 8- 2 Overview of snap-on modules for front mounting on 3RT2 contactors

Auxiliary switches			Snap-on modules for contactor control					
Normal	Time-delayed		Conventional control circuit wiring			Communication connection via ASi / IO-Link		
Electrical	Electrical	Pneumatic	Coupling link for direct starting	Snap-on timing relay Direct starting	Wye-delta	Direct-on-line start	Reversing start	Wye-delta
3RH29.1	3RA2813 3RA2814 3RA2815	3RT2926-2P	3RH2914-.GP11	3RA2811 3RA2812 3RA2831 3RA2832	3RA2816	3RA271.-.A	3RA271.-.B	3RA271.-.C

Fitting of auxiliary switches on 3RT2 contactors (size S00 and S0)



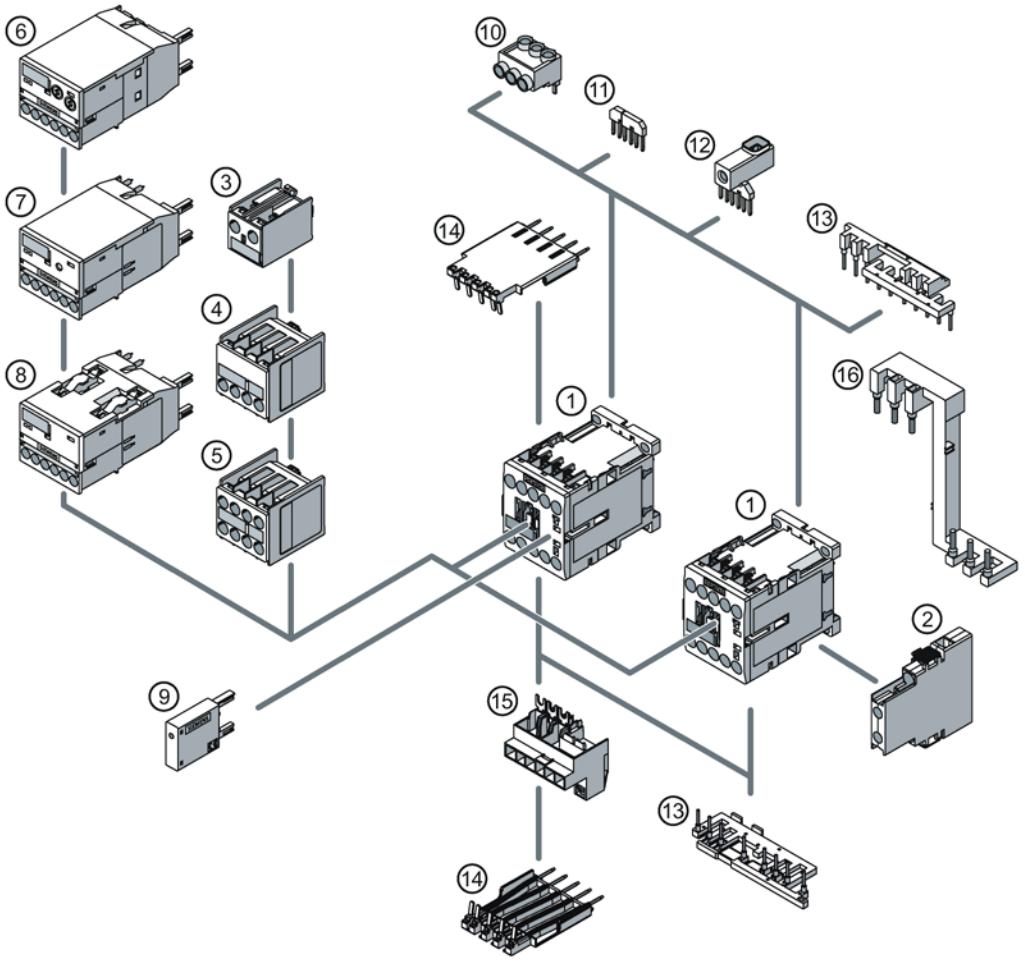
1 Contactor size S00
2 Contactor size S0
3 Laterally mountable auxiliary switch block (right or left), 2-pole
4 Auxiliary switch block for snapping onto the front, 4-pole
5 Auxiliary switch block for snapping onto the front, 2-pole (cable entry from above)
6 Auxiliary switch block for snapping onto the front, 2-pole (cable entry from below)
7 Auxiliary switch block for snapping onto the front, 1-pole (cable entry from above or below)
8 Function module for AS-Interface, direct-on-line start
9 3RA28 function modules
10 Function module for IO-Link, direct-on-line start

Figure 8-1 Fitting of auxiliary switches on 3RT2 contactors (size S00 and S0)

Note

Combining 2-pole auxiliary switches for mounting on the front with a lateral auxiliary switch is not permitted.

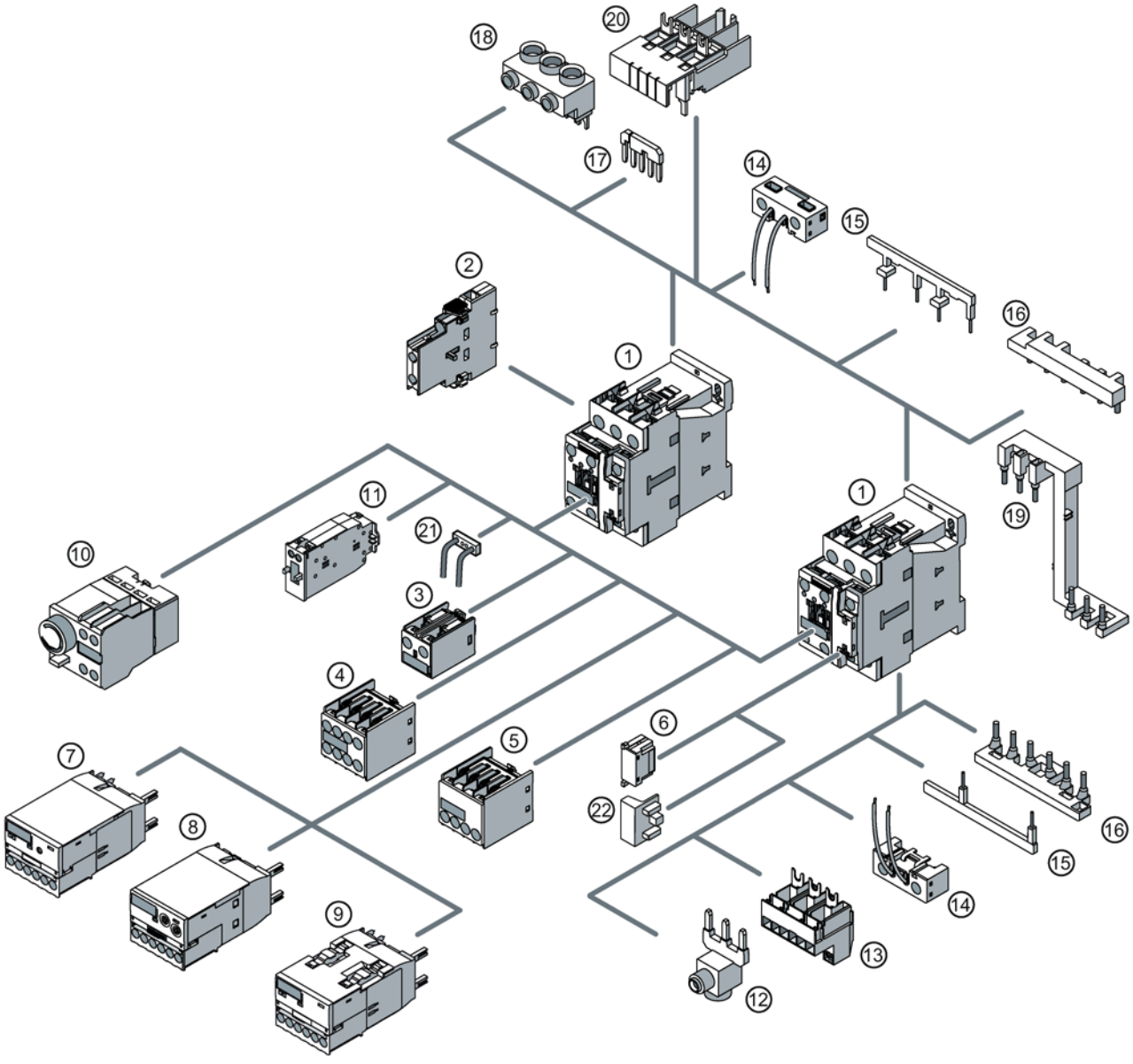
Size-specific accessories for 3RT2 contactors (size S00)



1 Contactor size S00
2 Laterally mountable auxiliary switch block (right or left), 2-pole
3 Auxiliary switch block for snapping onto the front, 1-pole (cable entry from above or below)
4 Auxiliary switch block for snapping onto the front, 2-pole (cable entry from above or below)
5 Auxiliary switch block for snapping onto the front, 4-pole
6 3RA28 function modules
7 Function module for AS-Interface, direct-on-line start
8 Function module for IO-Link, direct-on-line start
9 Surge suppressor
10 3-phase infeed terminal
11 Star jumper, 3-pole, without connection terminal
12 Parallel switching connector, 3-pole or 4-pole, with connection terminal
13 Wiring modules on the top and bottom, for connecting the main and control current paths
14 Solder pin adapter
15 Terminal module (adapter) for contactors with screw connections
16 Safety main circuit connectors for 2 contactors

Figure 8-2 Size-specific accessories for 3RT2 contactors (size S00)

Size-specific accessories for contactors (size S0)

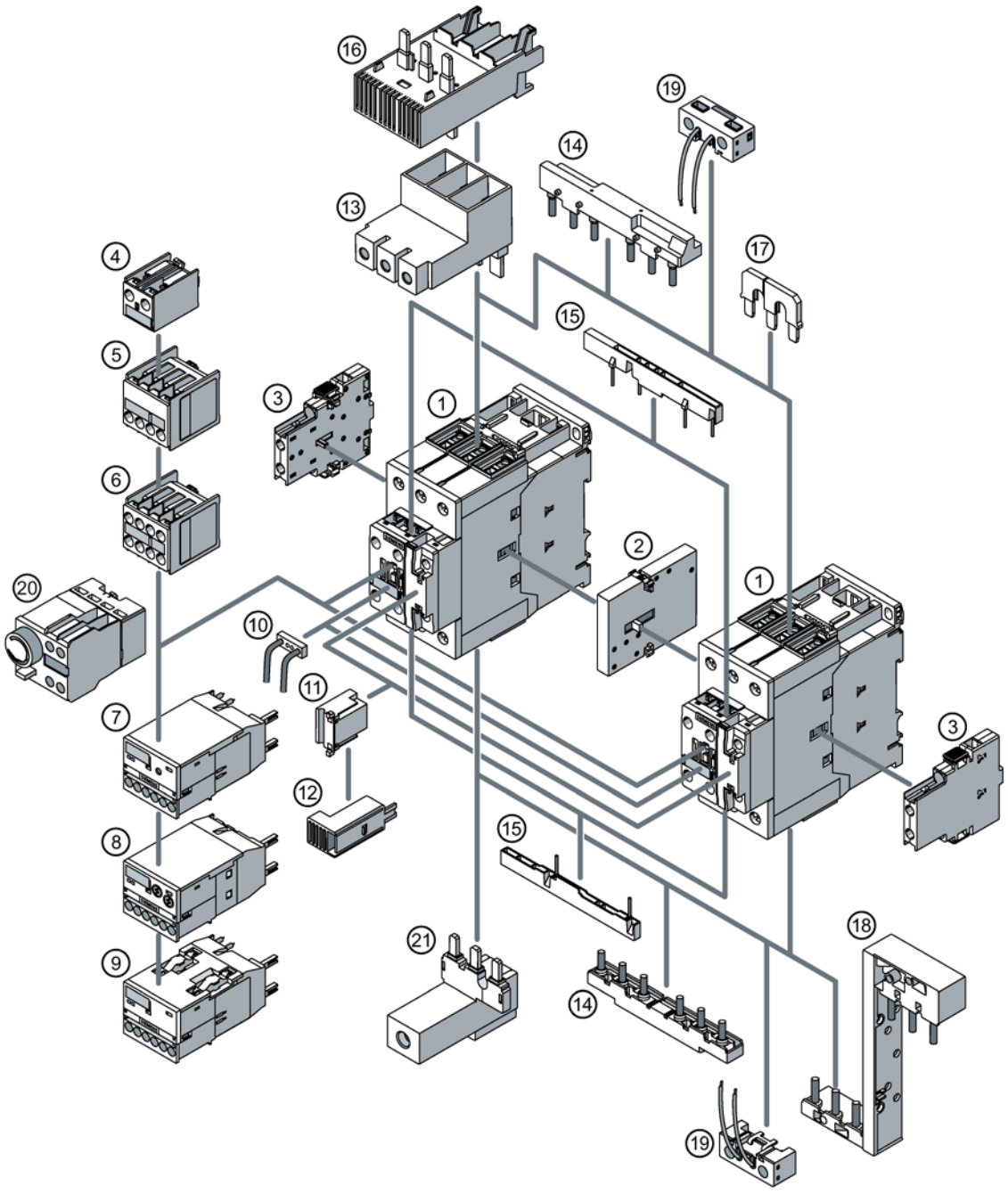


1 Contactor size S0
2 Laterally mountable auxiliary switch block (right or left), 2-pole
3 Auxiliary switch block for snapping onto the front, 1-pole (cable entry from above or below)
4 Auxiliary switch block for snapping onto the front, 4-pole
5 Auxiliary switch block for snapping onto the front, 2-pole (cable entry from above or below)
6 Surge suppressor
7 Function module for AS-Interface, direct-on-line start
8 3RA28 function modules
9 Function module for IO-Link, direct-on-line start
10 Pneumatic delay block
11 Mechanical latch

12 Parallel switching connector
13 Terminal module (adapter) for contactors with screw connections
14 Coil terminal module, top and bottom
15 Wiring modules, top and bottom, for connecting the control current paths
16 Wiring modules, top and bottom, for connecting the main current paths
17 Star jumper, 3-pole, without connection terminal
18 3-phase infeed terminal
19 Link module for two contactors in series (safety main circuit connectors for two contactors)
20 Link module for motor starter protector
21 LED display indicator module
22 Control kit for manual operation of contactor contacts

Figure 8-3 Size-specific accessories for 3RT2 contactors (size S0)

Contactor accessories (size S2)



1 Contactor size S2
2 Mechanical interlock
3 Laterally mountable auxiliary switch block (right or left), 2-pole
4 Auxiliary switch block for snapping onto the front, 1-pole (cable entry from above or below)
5 Auxiliary switch block for snapping onto the front, 2-pole (cable entry from above or below)
6 Auxiliary switch block for snapping onto the front, 4-pole
7 Function module for AS-Interface, direct-on-line start

8 3RA28 function modules
9 Function module for IO-Link, direct-on-line start
10 LED display indicator module
11 Surge suppressor
12 Control kit for manual operation of contactor contacts
13 3-phase infeed terminal (type E)
14 Wiring modules, top and bottom, for connecting the main current paths
15 Wiring modules, top and bottom, for connecting the control current paths
16 Link module for motor starter protector
17 Star jumper, 3-pole, without connection terminal
18 Link module for two contactors in series (safety main circuit connectors for two contactors)
19 Coil terminal module, top and bottom
20 Pneumatically delayed auxiliary switch (available from mid 2015)
21 Parallel switching connector

Figure 8-4 Accessories for 3RT2 contactors (size S2)

8.2 Auxiliary switch blocks

8.2.1 Description

Function

The 3RH21 contactor relays and 3RT2 power contactors in size S00 feature an integrated auxiliary contact. The 3RT2 power contactors in sizes S0 and S2 have an integrated NO contact and an NC contact. Attachable auxiliary switch blocks can be used to add up to four further contacts to the auxiliary contacts already integrated in the basic devices.

Versions and designs

The auxiliary switch blocks for expanding the auxiliary contacts are available with screw-type, spring-loaded, and ring cable lug connections, in the following designs:

- Front (uniform for sizes S00 to S2)
- Lateral (size-specific)

To facilitate wiring in the load feeder, 1-pole and 2-pole auxiliary switch blocks for mounting on the front are offered. Optionally, devices with connection from above or below are available. The 1-pole or 2-pole auxiliary switch blocks mounted on the front with connection option from below or above have fixed location identifiers. These auxiliary switch blocks are only supplied with screw connections. For spring-loaded connection, 4-pole auxiliary switch blocks are offered that are only fitted with auxiliary contacts 1 and 2.

The 3RT2 power contactors can be expanded by means of auxiliary switch blocks mounted on the front or laterally. Only auxiliary switch blocks for mounting on the front can be attached to the 3RH21 contactor relays.

The table below depicts the auxiliary switch blocks for mounting on the front, which can be used across the board for contactors of sizes S00 to S2.

Table 8- 3 Auxiliary switch blocks for mounting on the front

Design of the auxiliary switch block	Connection system	Article number
1/2/3/4-pole auxiliary switch blocks; partial labeling	Screw-type/spring-loaded connection	3RH2911-.HA.. 3RH2911-.FA..
4-pole auxiliary switch blocks; full labeling	Screw-type/spring-loaded connection	3RH2911-.XA..-0MA0
4-pole auxiliary switch blocks for auxiliary contactors; full labeling	Screw-type/spring-loaded connection	3RH2911-.GA..
1/2-pole auxiliary switch blocks, cable entry from top or bottom, full labeling	Screw connection	3RH2911-1AA.. 3RH2911-1BA.. 3RH2911-1LA.. 3RH2911-1MA..
1/2-pole solid-state-compatible auxiliary switch blocks, partial labeling	Screw-type/spring-loaded connection	3RH2911-.NF..
2/4-pole auxiliary switch blocks (with make-before-break); partial labeling	Screw-type/spring-loaded connection	3RH2911-.FB.. 3RH2911-.FC..

The table below depicts the size-specific auxiliary switch blocks for lateral mounting.

Table 8- 4 Laterally mountable auxiliary switch blocks

Design of the auxiliary switch block	Connection system	Article number
2-pole auxiliary switch blocks; full labeling for motor contactors size S00	Screw-type/spring-loaded connection	3RH2911-.DA..
2-pole auxiliary switch blocks; full labeling	Screw-type/spring-loaded connection	3RH2921-.DA..
2-pole solid-state-compatible auxiliary switch blocks; full labeling for motor contactors size S00	Spring-loaded connection	3RH2911-2DE..
2-pole solid-state-compatible auxiliary switch blocks; full labeling	Spring-loaded connection	3RH2921-2DE..

Solid-state compatible auxiliary switch blocks

Solid-state compatible auxiliary switch blocks feature two encapsulated contacts, which are particularly well suited to switching low voltages and currents (hard gold-plated contacts) and for operation in dusty atmospheres. The rated operational current is I_e/AC-14 and DC-13: 1 to 300 mA, voltage: 3 to 60 V.

The solid-state compatible auxiliary switch blocks for mounting on the front are available with screw-type, spring-loaded, and ring cable lug connections. The laterally mountable solid-state compatible auxiliary switch blocks are available with spring-loaded connections.

Auxiliary switch blocks with overlapping contacting

Auxiliary switch blocks with overlapping contacting are available with screw-type and spring-loaded connections. The table below shows the versions of the auxiliary switch blocks available with overlapping contacting.

Table 8- 5 Auxiliary switch blocks with overlapping contacting

Sizes S00 and S0	Auxiliary switch version	
3RH2911-1FC22 (22U)	22U	2 NO contacts + 2 NC contacts
3RH2911-1FB11 (11U)	11U	1 NO contact + 1 NC contact
3RH2911-1FB22 (11, 11U)	11, 11U	1 NO contact + 1 NC contact + 1 leading NO contact + 1 lagging NC contact

Travel diagrams

The travel diagrams below for auxiliary switches in sizes S00 and S0 apply to standard auxiliary switches and to leading/lagging contacts.

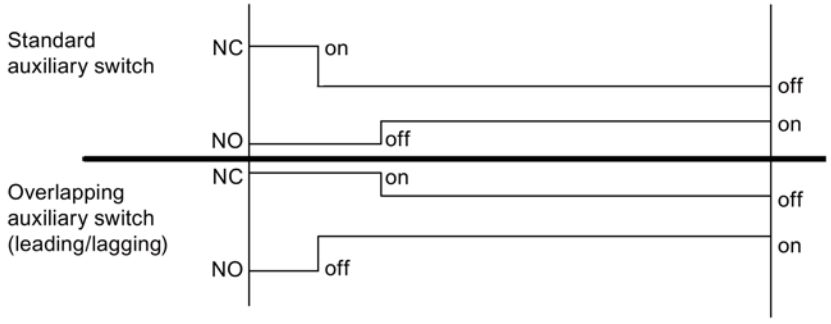


Figure 8-5 Travel diagrams for auxiliary switches (sizes S00 and S0)

8.2.2 Configuration

Maximum number of auxiliary switch blocks

The maximum number of auxiliary switch blocks which can be attached is determined by technical constraints and by the applicable standard.

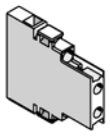
Note

A maximum of four NC contacts is possible (from integrated and laterally mounted auxiliary switch blocks combined).

For 3RT23 and 3RT25 contactors in size S0, auxiliary switches can only be fitted by means of a lateral auxiliary switch block. In the case of the 4-pole variant, you can only fit the auxiliary switch block on one side. With capacitor contactors, you can mount an additional lateral auxiliary switch block on the right side for size S2.

The tables below show the maximum number of auxiliary switch blocks which can be mounted on 3RT2 power contactors/3RH2 contactor relays and the available combination options according to the applicable standard.

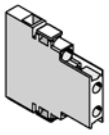
Table 8- 6 Auxiliary switch combination options (3RT2 power contactor)

			3RT2 power contactor		
Size		Possible versions	Front		Lateral
			1-pole	4-pole	2-pole
					
S00	3RT2.1.-.	1	1	0	1
		2	0	1	0
		3	0	0	2[1]
	3RT2.1.-.H.., 3RT2.1.-.J.., 3RT2.1.-.K.., 3RT2.1.-.M.., 3RT2.1.-.Q.., 3RT2.1.-.V.., 3RT2.1.-.W..		--	--	--
	3RT2… + 3RA27… / 3RA28 …		--	--	--
S0/S2	3RT202.	1	1	0	1
		2	0	1	0
		3	0	0	2[1]
	3RT232. 3RT252.	1	1	0	1
		2	0	1	0
		3	0	0	1
	3RT202-.K.[2]		--	--	--
	3RT252.		∑ NC max.2		
	3RT202, 3RT232.		∑ NC max. 4		
	3RT2… + 3RA27… / 3RA28 …		--	--	--

[1] 1 left + 1 right

[2] Not for size S2

Table 8- 7 Auxiliary switch combination options (3RH2 contactor relay)

				3RH21 contactor relay[1]		
Size		Number of integrated auxiliary switches	Possible versions	Front		Lateral
				1-pole	4-pole	2-pole
						
S00	3RH21.-.	2 NO contacts and 2 NC contacts or 3 NO contacts and 1 NC contact or 4 NO contacts	1	1	0	1
			2	0	1	0
			3	0	0	1[2]
	3RH21..-.H.., 3RH21..-.J.., 3RH21..-.K.., 3RH21..-.M.., 3RH21..-.Q.., 3RH21..-.V.., 3RH21..-.W..			--	--	--
	3RH24..	2 NO contacts and 2 NC contacts or 3 NO contacts and 1 NC contact or 4 NO contacts	1	1	0	--
			2	0	1	--
			3	--	--	--

1) Lateral auxiliary contacts without positively driven operation

2) 1 left and only 3RH2921-.DE11

Number of contacts in series (for control circuit / auxiliary circuit)

A large number of electromechanical contacts in series represents an increased potential for functional faults. Since each contact point has a certain contact resistance, the resulting cumulative voltage drop of the series-switched contacts can be sufficient to have a critical effect on the functionality of certain loads or signal inputs.

In applications where it is necessary to scan a large number of contacts in series (e.g. in enabling circuits or emergency-stop circuits), suitable measures must be taken to limit the number of contacts switched directly in series. For example, the sequence of contacts can also be distributed across several inputs for controllers, or the contacts can be multiplied elsewhere.

It is not possible to provide a precise indication of the maximum permissible number of series-switched contacts, as this depends on many factors, such as the current, voltage, or other ambient conditions. Experience and feedback from the field have shown that, in general, switching less than 10 contacts in series is a practicable approach.

In addition, the reliability of an individual contact can be increased by switching a second contact in parallel.

Applicable standards

The auxiliary switch blocks can be fitted according to the following standards:

- DIN EN 50005: Definition of terminal designations; however, the order of the terminal designations and the positions of the contacts can be determined by the user.
- DIN EN 50011 for contactor relays: Defined order for terminal designations and position of contacts.
- DIN EN 50012 for power contactors: Defined order for terminal designations. The positions of the contacts can be freely selected.

Note

Standard DIN EN 50012 is no longer valid, but is still used.

Definition: DIN EN 50005

The terminal designations for contactors are defined in DIN EN 50005, which contains general rules. The following basic rules are defined therein for the contacts of auxiliary circuits:

- The terminals of auxiliary contacts are identified by two-digit numbers.
- The units digit is a **function number** (NC contact: 1 and 2, NO contact: 3 and 4)
- The tens digit is a **sequence number** (all contacts with the same function must have different sequence numbers)

Switching devices with a fixed number of auxiliary contacts (NO or NC contacts) may have a two-digit **identification number** assigned to them. The first digit specifies the number of NO contacts, the second the number of NC contacts. No rules have been defined as regards the order of NO and NC contacts in the contactor/contactor relay.

Note

The identification numbers on the auxiliary switch blocks only apply to the attached auxiliary switches.

Definition: DIN EN 50011

The main standard as regards the designations of contacts for auxiliary contactors is DIN EN 50 011, which defines the terminal designations, identification numbers, and codes of certain contactor relays, with a specified contact layout. The number, type, and position of the contacts must be defined by means of an identification number and a subsequent code. For 8-pole contactor relays, the code "E" means that four NO contacts must be arranged in the bottom (rear) contact area.

Definition: DIN EN 50012

DIN EN 50012 defines the terminal designations and identification numbers for the auxiliary contacts of certain contactors. The terminal designations of the auxiliary contacts match those of the corresponding contactor relays with code E (according to DIN EN 50011). For auxiliary contacts on contactors with the same identification number, the terminal designations must be defined as per the order specified in the standard.

Switching order of auxiliary contacts

When contactors are switched on, with standard auxiliary switches the NC contacts are opened first, then the NO contacts are closed.

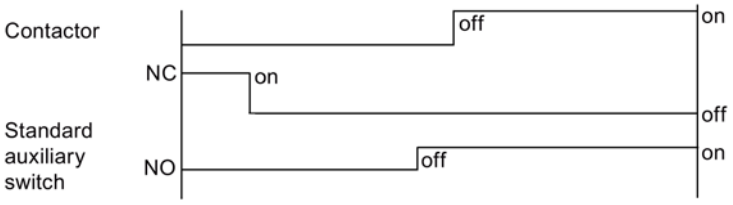


Figure 8-6 Switching auxiliary contacts

Auxiliary switch blocks for contactor relays

The contactor relays with 4 contacts according to DIN EN 50011, with identification code 40E, can be expanded by adding auxiliary switch blocks 80E to 44E, to give contactor relays with 8 contacts according to DIN EN 50011. Identification codes 80E to 44E on the auxiliary switch blocks apply to complete contactors. These auxiliary switch blocks (3RH29 11–1GA.) cannot be combined with contactor relays with identification code 31E or 22E; these are coded. All contactor relays with 4 contacts according to DIN EN 50011, with identification codes 40E to 22E, can be expanded by adding auxiliary switch blocks 40 to 02, to give contactor relays with 6 or 8 contacts according to DIN EN 50005. The identification numbers on the auxiliary switch blocks only apply to the attached auxiliary switch blocks. Fully mounted 8-pole 3RH22 contactor relays are also available; the 4-pole auxiliary switch block on the second level cannot be removed. The terminal designations comply with DIN EN 50011.

Time-delayed auxiliary contacts

The 3RA28 function modules are available for applications which require time-delayed auxiliary contacts.

Reference

More information ...	Can be found in the appendix ...
About the time-delayed switching of contactors	"References" under "SIRIUS Innovations manuals (Page 390)" in the manual "SIRIUS Innovations - 3RA28 function modules for mounting on 3RT2 contactors"

8.2.3 Selection guide for mountable auxiliary switch blocks for power contactors and contactor relays

Terminal designations and identification numbers for auxiliary contacts

Terminal designations

The terminal designations are 2-digit, e.g. 13, 14, 21, 22:

- Tens digit: Sequence number
  - Related terminals have the same sequence number
- Units digit: Function number
  - 1 to 2 for NC contact
  - 3 to 4 for NO contacts

Identification numbers

The identification number indicates the number and type of the auxiliary contacts, e.g. 40, 31, 22, 13:

- 1st Digit: Number of NO contacts
- 2nd Digit: Number of NC contacts

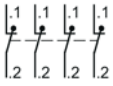
Examples:

- 31 = 3 NO contacts + 1 NC contact
- 40 = 4 NO contacts

Selection guide for mountable auxiliary switch blocks for power contactors and contactor relays

The 3RH29 auxiliary switch blocks for mounting on the front and laterally can be used for both the power contactors and the contactor relays.

At the intersection of the columns and rows you will find the identification number of the combination of a basic device (column) and auxiliary switch block (line).

Additional auxiliary switch block				**3-pole contactors**		
Article number	Auxiliary contact Version			**3RT201 S00**	**3RT201 S00**	**3RT202 S0**
	NO contact	NC contact		**10**	**01**	**11**
						
Auxiliary switches without NO contacts						
3RH2911-.HA01	-	1		**11**	02	**12**
3RH2911-.HA02	-	2		**12**	03	**13**
3RH2911-.HA03	-	3		**13**	04	14
3RH2911-.FA04	-	4		14	-	-
Auxiliary switches with 1 NO contact						
3RH2911-.HA10	1	-		20	11	**21**
3RH2911-.HA11	1	1		**21**	12	**22**

Example 1

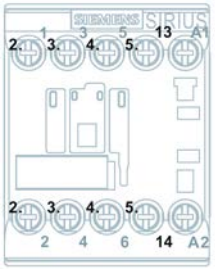
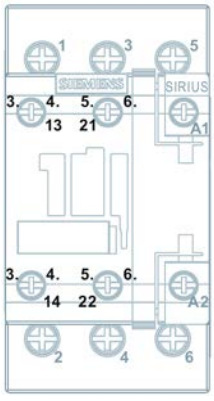
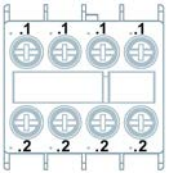
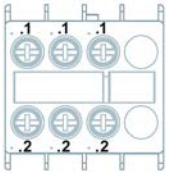
Basic device: 3-pole 3RT2017 motor contactor with 1 NO contact
Desired: 1 NO contact and 4 NC contacts (Ident. No. 14)
Result: 3RH2911-.FA04 auxiliary switch block

Example 2

Basic device: 3-pole 3RT2023 motor contactor with 1 NO contact and 1 NC contact
Desired: 1 NO contact and 4 NC contacts (Ident. No. 14)
Result: 3RH2911-.HA03 auxiliary switch block

Note

The same auxiliary switches can be fitted to size S2 contactors as to size S2.
Example 2 is also applicable to size S2.

	Example 1	Example 2
Type	3RT20 motor contactor, S00 with 1 NO contact (1NO)	3RT20 motor contactor, S0 (S2) with 1 NO contact and 1 NC contact (1 NO + 1 NC)
		
Sequence number	2. 3. 4. 5.	3. 4. 5. 6.
Type	Auxiliary switches with 4 NC contacts, 3RH2911-.FA04	Auxiliary switches with 3 NC contacts, 3RH2911-.HA03
		
Function number	.1 .1 .1 .1 .2 .2 .2 .2	.1 .1 .1 .2 .2 .2

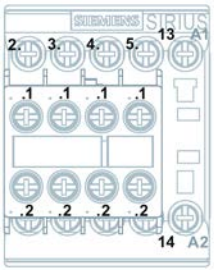
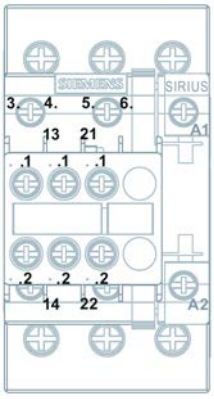
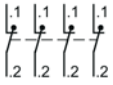
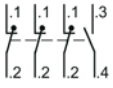
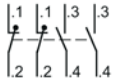
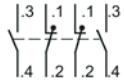
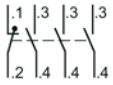
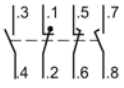
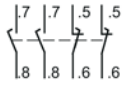
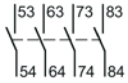
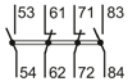
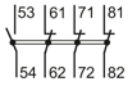
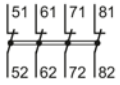
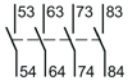
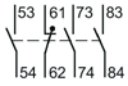
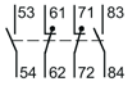
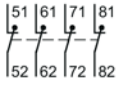
	Example 1	Example 2
Assembly	3RT20 motor contactor, S00 with auxiliary switch block	3RT20 motor contactor, S0 with auxiliary switch block
		
Terminal designation	13 21 31 41 51 14 22 32 42 52	13 21 31 41 51 14 22 32 42 52
Result	Ident. 14	Ident. 14

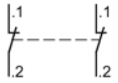
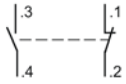
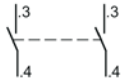
Table 8- 8 Auxiliary switches for mounting on the front for 3-pole and 4-pole contactors

Additional auxiliary switch block				**3-pole contactors**			**4-pole contactors**			
Article No.	Auxiliary contacts Version			S00		S0/S2	S00		S0/S2	
	NO	NC		**3RT201**	**3RT201**	**3RT202**	**3RT231**	**3RT251**	**3RT232**	**3RT252**
				10	**01**	**11**	**--**	**--**	**11**	**11**
										
				2. 3. 4. 5.	5. 6. 7. 8.	3. 4. 5. 6.	1. 2. 3. 4.	1. 2. 3. 4.	3. 4. 5. 6.	3. 4. 5. 6.
				According to EN 50012 [1]			**According to EN 50012** [1]			
Without NO contacts										
3RH2911- .HA01	-	1		**11**	02	**12**	01	01	**12**	**12**
3RH2911- .HA02	-	2		**12**	03	**13**	02	02	**13**	-
3RH2911- .HA03	-	3		**13**	04	14	03	-	-	-
3RH2911- .FA04	-	4		14	-	-	-	-	-	-
With 1 NO contact										
3RH2911- .HA10	1	-		20	11	**21**	**10**	**10**	**21**	**21**
3RH2911- .HA11	1	1		**21**	12	**22**	11	11	**22**	**22**
3RH2911- .HA12	1	2		**22**	13	**23**	12	12	**23**	-
3RH2911- .HA13	1	3		**23**	14	24	13	-	24	24

Additional auxiliary switch block				3-pole contactors			4-pole contactors			
With 2 NO contacts										
3RH2911-.HA20	2	-		30	21	**31**	20	20	**31**	**31**
3RH2911-.HA21	2	1		**31**	22	**32**	21	21	**32**	**32**
3RH2911-.HA22	2	2		**32**	23	33	22	22	33	-
3RH2911-.FA22	2	2		32	23	33	**22**	**22**	33	-
With 3 NO contacts										
3RH2911-.HA30	3	-		40	31	**41**	30	30	**41**	**41**
3RH2911-.HA31	3	1		**41**	32	42	31	31	42	42
With 4 NO contacts										
3RH2911-.FA40	4	-		50	41	51	40	40	51	51
With make-before-break										
3RH2911-.FB11	1	1		21	12	22	11	11	22	22
3RH2911-.FB22	2	2		32	23	33	22	22	33	-
3RH2911-.FC22	2	2		32	23	33	22	22	33	-

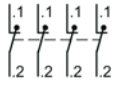
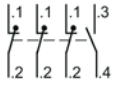
Additional auxiliary switch block				3-pole contactors			4-pole contactors			
Fully labeled										
3RH2911-1AA10	1	-		20	11	21	10	10	21	21
3RH2911-1BA10	1	-		20	11	21	10	10	21	21
3RH2911-1AA01	-	1		11	02	12	01	01	12	12
3RH2911-1BA01	-	1		11	02	12	01	01	12	12
3RH2911-1LA11	1	1		21	12	22	11	11	22	22
3RH2911-1MA11	1	1		21	12	22	11	11	22	22
3RH2911-1LA20	2	-		30	21	31	20	20	31	31
3RH2911-1MA20	2	-		30	21	31	20	20	31	31

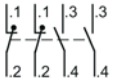
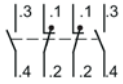
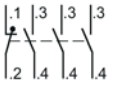
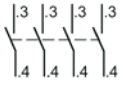
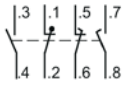
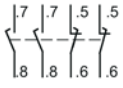
Additional auxiliary switch block				3-pole contactors			4-pole contactors			
Fully labeled (for contactor relays)										
3RH2911- .GA40	4	-		-	-	-	-	-	-	-
3RH2911- .GA31	3	1		-	-	-	-	-	-	-
3RH2911- .GA22	2	2		-	-	-	-	-	-	-
3RH2911- .GA13	1	3		-	-	-	-	-	-	-
3RH2911- .GA04	-	4		-	-	-	-	-	-	-
Fully labeled; special version										
3RH2911- .XA40 -0MA0	4	-		50	41	51	40	40	51	51
3RH2911- .XA31 -0MA0	3	1		41	32	42	31	31	42	42
3RH2911- .XA22 -0MA0	2	2		32	23	33	22	22	33	-
3RH2911- .XA04 -0MA0	-	4		14	-	-	-	-	-	-

Additional auxiliary switch block				3-pole contactors			4-pole contactors			
Solid-state compatible										
3RH2911-.NF02	-	2		12	03	13	02	02	13	-
3RH2911-.NF11	1	1		21	12	22	11	11	22	22
3RH2911-.NF20	2	-		30	21	31	20	20	31	31

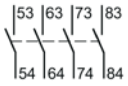
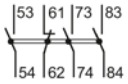
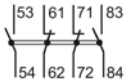
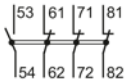
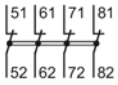
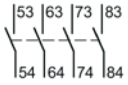
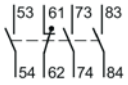
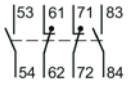
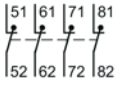
[1]) Assemblies in accordance with EN 50012, EN 50011 or IEC 60947-5-1 are in **bold** type. All assemblies comply with EN 50005.

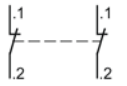
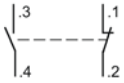
Table 8- 9 Auxiliary switches for mounting on the front for contactor relays

Additional auxiliary switch block				Contactor relays		
Article No.	Auxiliary contacts Version			S00		
	NO	NC		**3RH21**		
				40E	**31E**	**22E**
						
				5. 6. 7. 8	5. 6. 7. 8	5. 6. 7. 8
				According to EN 50011 [1]		
Without NO contacts						
3RH2911- .HA01	-	1		**41X**	**32X**	**23X**
3RH2911- .HA02	-	2		**42E**	**33X**	24
3RH2911- .HA03	-	3		43	34	-
3RH2911- .FA04	-	4		**44E**	-	-
With 1 NO contact						
3RH2911- .HA10	1	-		**50E**	**41E**	**32E**
3RH2911- .HA11	1	1		**51X**	**42X**	**33X**
3RH2911- .HA12	1	2		52	43	34
3RH2911- .HA13	1	3		**53X**	**44X**	-

Additional auxiliary switch block				Contactor relays		
With 2 NO contacts						
3RH2911-.HA20	2	-		**60E**	**51X**	**42X**
3RH2911-.HA21	2	1		61	52	43
3RH2911-.HA22	2	2		**62X**	53	**44X**
3RH2911-.FA22	2	2		**62X**	53	**44X**
With 3 NO contacts						
3RH2911-.HA30	3	-		70	61	52
3RH2911-.HA31	3	1		**71X**	**62X**	**53X**
With 4 NO contacts						
3RH2911-.FA40	4	-		**80E**	**71X**	**62X**
With make-before-break						
3RH2911-.FB11	-	1		51	42	33
3RH2911-.FB22	-	2		62	53	44
3RH2911-.FC22	-	3		62	53	44

Additional auxiliary switch block				Contactor relays		
Fully labeled						
3RH2911-1AA10	1	-		50	41	32
3RH2911-1BA10	1	-		50	41	32
3RH2911-1AA01	-	1		41	32	23
3RH2911-1BA01	-	1		41	32	23
3RH2911-1LA11	1	1		51	42	33
3RH2911-1MA11	1	1		51	42	33
3RH2911-1LA20	2	-		60	51	42
3RH2911-1MA20	2	-		60	51	42

Additional auxiliary switch block				Contactor relays		
Fully labeled (for contactor relays)						
3RH2911- .GA40	4	-		**80E**	-	-
3RH2911- .GA31	3	1		**71E**	-	-
3RH2911- .GA22	2	2		**62E**	-	-
3RH2911- .GA13	1	3		**53E**	-	-
3RH2911- .GA04	-	4		**44E**	-	-
Fully labeled; special version						
3RH2911- .XA40 -0MA0	4	-		**80E**	**71X**	**62X**
3RH2911- .XA31 -0MA0	3	1		**71E**	**62X**	53
3RH2911- .XA22 -0MA0	2	2		**62E**	53	**44X**
3RH2911- .XA04 -0MA0	-	4		**44E**	-	-

Additional auxiliary switch block				Contactor relays		
Solid-state compatible						
3RH2911-.NF02	-	2		42	33	24
3RH2911-.NF11	1	1		51	42	33
3RH2911-.NF20	2	-		60	51	42

[1] Assemblies in accordance with EN 50012, EN 50011 or IEC 60947-5-1 are in **bold** type.
All assemblies comply with EN 50005.

Table 8- 10 Lateral auxiliary switch blocks for 3-pole and 4-pole contactors

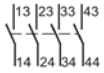
Additional auxiliary switch block					**3-pole contactors**			**4-pole contactors**			
Article number	Auxiliary contacts Version				**S00**		**S0/S2**	**S00**		**S0/S2**	
	NO	NC			**3RT201**	**3RT201**	**3RT202**	**3RT231**	**3RT251**	**3RT232**	**3RT252**
					10	**01**	**11**	**--**	**--**	**11**	**11**
											
					2. 3. 4. 5.	5. 6. 7. 8.	3. 4. 5. 6.	1. 2. 3. 4.	1. 2. 3. 4.	3. 4. 5. 6.	3. 4. 5. 6.
					According to EN 50012 [1]			**According to EN 50012** [1]			
For size S00			Left	Right							
3RH2911-.DA02	-	2			**12**	-	-	02	02	-	-
3RH2911-.DA02	-	4			14	-	-	-	-	-	-
3RH2911-.DA11	1	1			**21**	-	-	11	11	-	-
3RH2911-.DA11	2	2			32	-	-	22	22	-	-
3RH2911-.DA20	2	-			30	-	-	20	20	-	-
3RH2911-.DA20	4	-			50	-	-	40	40	-	-
3RH2911-.DA20 + 3RH2911-.DA11	2 1	- 1			**41**	-	-	31	31	-	-
3RH2911-.DA20 + 3RH2911-.DA02	2 -	- 2			**32**	-	-	22	22	-	-
3RH2911-.DA11 + 3RH2911-.DA02	1 -	1 2			**23**	-	-	13	-	-	-

Additional auxiliary switch block					3-pole contactors			4-pole contactors			
For size S0 / S00											
3RH2921-.DA02	-	2			12	03	**13**	02	02	**13**	-
3RH2921-.DA02	-	4			14	-	-	-	-	-	-
3RH2921-.DA11	1	1			21	12	**22**	11	11	**22**	**22**
3RH2921-.DA11	2	2			32	23	33	22	22	33	-
3RH2921-.DA20	2	-			30	21	**31**	20	20	**31**	**31**
3RH2921-.DA20	4	-			50	41	51	40	40	51	51
3RH2921-.DA20 + 3RH2921-.DA11	2 1	- 1			41	32	42	31	31	42	42
3RH2921-.DA20 + 3RH2921-.DA02	2 -	- 2			32	23	33	22	22	33	-
3RH2921-.DA11 + 3RH2921-.DA02	1 -	1 2			23	14	24	13	-	-	-
For contactor relays											
3RH2921-.DA02	-	2			-	-	-	-	-	-	-
3RH2921-.DA11	1	1			-	-	-	-	-	-	-
3RH2921-.DA20	2	-			-	-	-	-	-	-	-

Additional auxiliary switch block					3-pole contactors			4-pole contactors			
Solid-state-compatible for size S00											
3RH2911-2DE11	1	1			21	-	-	11	11	-	-
3RH2911-2DE11	2	2			32	-	-	22	22	-	-
Solid-state-compatible for size S0 / S00											
3RH2921-2DE11	1	1			21	12	22	11	11	22	22
3RH2921-2DE11	2	2			32	23	33	22	22	33	-
Solid-state-compatible for contactor relays											
3RH2921-.DE11	1	1			-	-	-	-	-	-	-

[1] Assemblies in accordance with EN 50012, EN 50011 or IEC 60947-5-1 are in **bold** type. All assemblies comply with EN 50005.

Table 8- 11 Lateral auxiliary switch blocks for contactor relays

Additional auxiliary switch block					**Contactor relays**		
Article number	Auxiliary contacts Version				**S00**		
	NO	NC			**3RH21**		
					**40E**	**31E**	**22E**
							
					5. 6. 7. 8	5. 6. 7. 8	5. 6. 7. 8
					According to EN 50011 [1]		
For size S00			Left	Right			
3RH2911-.DA02	-	2			-	-	-
3RH2911-.DA02	-	4			-	-	-
3RH2911-.DA11	1	1			-	-	-
3RH2911-.DA11	2	2			-	-	-
3RH2911-.DA20	2	-			-	-	-
3RH2911-.DA20	4	-			-	-	-
3RH2911-.DA20 + 3RH2911-.DA11	2 1	- 1			-	-	-
3RH2911-.DA20 + 3RH2911-.DA02	2 -	- 2			-	-	-
3RH2911-.DA11 + 3RH2911-.DA02	1 -	1 2			-	-	-

Additional auxiliary switch block					Contactor relays		
For size S0/S2							
3RH2921-.DA02	-	2			-	-	-
3RH2921-.DA02	-	4			-	-	-
3RH2921-.DA11	1	1			-	-	-
3RH2921-.DA11	2	2			-	-	-
3RH2921-.DA20	2	-			-	-	-
3RH2921-.DA20	4	-			-	-	-
3RH2921-.DA20 + 3RH2921-.DA11	2 1	- 1			-	-	-
3RH2921-.DA20 + 3RH2921-.DA02	2 -	- 2			-	-	-
3RH2921-.DA11 + 3RH2921-.DA02	1 -	1 2			-	-	-
For contactor relays							
3RH2921-.DA02	-	2			**42Z**	**33X**	24
3RH2921-.DA11	1	1			**51X**	**42X**	**33X**
3RH2921-.DA20	2	-			**60Z**	**51X**	**42X**

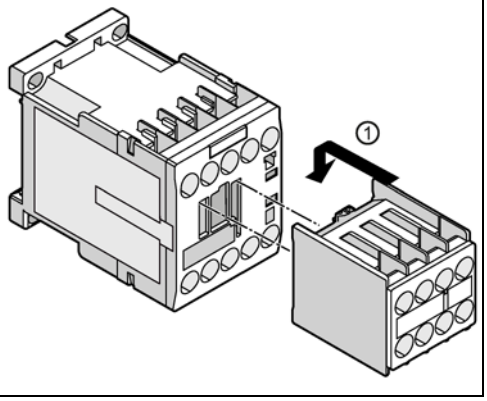
Additional auxiliary switch block					Contactor relays		
Solid-state-compatible for size S00							
3RH2911-2DE11	1	1			-	-	-
3RH2911-2DE11	2	2			-	-	-
Solid-state-compatible for size S0 / S00							
3RH2921-2DE11	1	1			-	-	-
3RH2921-2DE11	2	2			-	-	-
Solid-state-compatible for contactor relays							
3RH2921-.DE11	1	1			**51X**	**42X**	**33X**

[1] Assemblies in accordance with EN 50012, EN 50011 or IEC 60947-5-1 are in **bold** type. All assemblies comply with EN 50005.

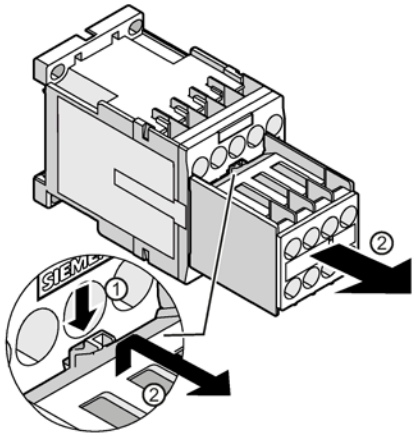
8.2.4 Mounting/Disassembly

The procedures for mounting and disassembling auxiliary switch blocks for mounting on the front and laterally are described below.

Mounting the 2-/4-pole auxiliary switch block on the front (size S00)

Step	Operating instruction	Image
1	Push the auxiliary switch, which is mounted on the front, into the location hole on the contactor. Pull it down until it engages.	

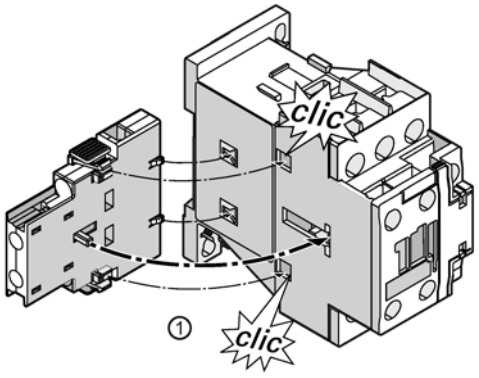
Disassembling the auxiliary switch on the front - 2-/4-pole auxiliary switch block (size S00)

Step	Operating instruction	Image
1	Activate the release lever on the auxiliary switch block.	
2	Push the auxiliary switch block up and pull it forward to remove it from the contactor.	

Note

The procedure for mounting/disassembling the 1-pole auxiliary switch block on the front is the same.

Mounting the lateral auxiliary switch (size S0)

Step	Operating instruction	Image
1	Attach the lateral auxiliary switch to the contactor and snap it on.	

Note

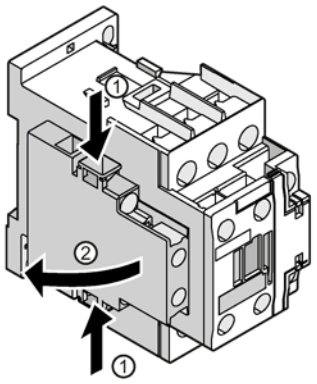
Size S2

Fit the lateral auxiliary switch analogously to size S0.

Note

The laterally mountable auxiliary switch blocks according to DIN EN 50012 can only be used if no 2-pole or 4-pole auxiliary switch blocks are snapped onto the front.

Disassembling the lateral auxiliary switch (size S0)

Step	Operating instruction	Image
1	Release the lateral auxiliary switch by pressing the chequered areas on the auxiliary switch down.	
2	Remove the auxiliary switch from the side of the contactor.	

Note

Size S2

Remove the lateral auxiliary switch analogously to size S0.

8.3 Surge suppressor

8.3.1 Description

When contactor coils are disconnected, overvoltages occur (inductive loads). Voltage peaks of up to 4 kV can occur at a rate of rise of voltage of 1 kV/microsecond (shower discharges). This leads to:

- Substantial erosion and, as a result, premature wear of the contacts which switch the coil.
- Injection of interfering signals, which lead to fault signals in electronic controls.

Therefore, all contactor coils should be attenuated against switching overvoltages, particularly when working in conjunction with electronic controls.

Furthermore, the high rate of rise of the voltage waveforms generated can lead to the capacitive coupling of significant interfering signals with adjacent systems. They necessitate an RC circuit directly at the location where the source of interference originated, i.e. at the contactor coil. This prevents overvoltages from occurring directly at the place of origin and protects the electronic components which are sensitive to voltage too. It also prevents the capacitive coupling of interfering signals with the control cables of electronic circuits.

Types of attenuation

The following RC circuit elements are commonly used for overvoltage attenuation; they are connected in parallel with the contactor coil:

- RC element (resistor and capacitor in series)
- Freewheel diode, diode combination
- Varistors

All 3RT2 contactors and 3RH21 contactor relays can be subsequently connected to RC elements or varistors for attenuating coil switching overvoltages. Diodes or diode combinations can also be used.

Coupling relays, on the other hand, do not require any additional surge suppressor and can be used directly with electronic controls.

Reference

More information ...	Can be found in the chapter ...
About coupling relays	Coupling relays (Page 70)

Surge suppressors for 3RT2/3RH21 contactors

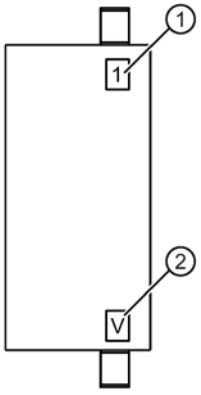
The following surge suppressors are available for the 3RT2/3RH21 contactors:

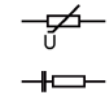
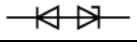
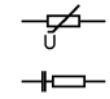
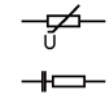
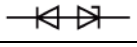
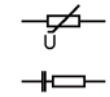
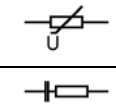
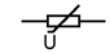
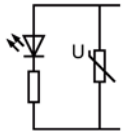
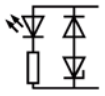
Table 8- 12 Overview - Surge suppressors

Surge suppressors	With LED			Without LED		
	Size S00	Size S0	Size S2	Size S00	Size S0	Size S2
Suppression diode	3RT2916-1L.00	---	---	3RT2916-1DG00	---	---
Diode combination	---	3RT2926-1MR00	---	3RT2916-1EH00	3RT2926-1E.00	3RT2936-1E.00
Varistor	3RT2916-1J.00	3RT2926-1J.00	3RT2936-1J.00	3RT2916-1B.00	3RT2926-1B.00	3RT2936-1B.00
RC element	---	---	---	3RT2916-1C.00	3RT2926-1C.00	3RT2936-1C.00

Identification of the surge suppressors for size S0 and S2 contactors

Table 8- 13 Identification of the surge suppressors for size S0 and S2 contactors



①			
		AC	DC
1		24 ... 48 V	24 ... 70 V
			12 ... 24 V [1]
		–	24 V
2		48 ... 127 V	70 ... 150 V
			24 ... 70 V [1]
3		127 ... 240 V	150 ... 250 V
			70 ... 150 V [1]
		–	30 ... 250 V
4		240 ... 400 V	–
5		400 ... 600 V	–
②			
V		3RT2926-1B.00 3RT2936-1B.00	
		3RT2926-1J.00 3RT2936-1J.00	
R		3RT2926-1C.00 3RT2936-1C.00	
D		3RT2926-1E.00 3RT2936-1E.00	
		3RT2926-1M.00	

1) Applicable to 3RT2936-1J... (varistor with LED)

Switching overvoltage - surge suppressor

Overvoltages when switching off contactors (inductive load) can cause faults in electronic devices (time relays, PLCs, coupling modules) in the same network if the contactors are used without the appropriate filters.

Table 8- 14 Switching overvoltage - surge suppressor

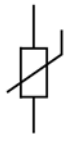
Description	Suitable for	Limited to	Additional delay	Advantage	Disadvantage
Freewheel diode	DC	Forward voltage (U_D = ~1 V)	Very high (6-9x)	• Non-critical dimensioning • Lowest induction voltage • Very simple and reliable • Low-cost	• Long drop-out delay • Short-circuit on failure
Suppressor diode	AC/DC	Breakdown voltage (U_{BR})	Very low	• Non-critical dimensioning • Simple design • Protected against reverse polarity • Short pick-up time	No attenuation below the breakdown voltage (U_{BR})
Diode combination	DC	Breakdown voltage (U_{BR})	Very low	• Non-critical dimensioning • Simple design • Short pick-up time	No attenuation below the breakdown voltage (U_{BR})
Varistor	AC/DC	Varistor voltage ($U_{Varistor}$)	Very low	• Non-critical dimensioning • High energy absorption • Very simple design	No attenuation below $U_{Varistor}$
RC element	AC/DC	U_{RC}	Very low	• HF attenuation through energy storage • Immediate shutdown • Extremely suitable for AC	• Exact dimensions required • Expensive

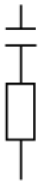
8.3.2 Configuration

Selection aid

The table below compares the effects of the different surge suppressors and specifies the applications to which they are most suited.

Table 8- 15 Mode of operation and preferred applications of surge suppressors

Surge suppressor		Suitable for Control voltage	Overvoltage is limited ...	Effect	Advantages/disadvantages		Preferred application
Noise suppression/freewheel diode		DC	To 0.7 V	• OFF-delay becomes considerably longer (6 to 10 times) • With contactors of size S0 or larger, "2-stage drop-out"[1] cannot be excluded	Advantages	• Simple implementation • Reliable • Non-critical dimensioning • Low induction voltage	Instable control commands/control supply voltage
					Disadvantages	• Long drop-out delay • Only suitable for size S00	
Diode combination: Noise suppression and Zener diode		DC	To Zener voltage	• OFF-delay becomes longer (2 to 6 times) • A 2-stage drop-out no longer occurs	Advantages	• Non-critical dimensioning	EMC-critical components in the vicinity
					Disadvantages	• Attenuation only above U_{ZD} (10 V)	
Varistor		AC/DC	To varistor voltage	• OFF-delay becomes only slightly longer (2 to 5 ms)	Advantages	• Energy absorption • Non-critical dimensioning • Simple implementation	Suitable for most standard applications, e.g. in the SIMATIC environment
					Disadvantages	• Attenuation only above U_{VDR}	

Surge suppressor		Suitable for Control voltage	Overvoltage is limited ...	Effect	Advantages/disadvantages		Preferred application
RC elements		AC/DC	According to dimensioning	• OFF-delay remains unchanged • Rates of rise of voltage are attenuated	Advantages	• RF attenuation • Well suited to AC voltage • Attenuation independent of levels	With critical operating times
					Disadvantages	• High inrush current • Sensitive to harmonics	
Suppressor diode		AC/DC	Breakdown voltage U_{BR}	• Rate of rise of the voltage is not reduced • Additional drop-out delay is too low (1 to 5 ms)	Advantages	• Non-critical dimensioning • Simple design • Protected against reverse polarity • Short pick-up time	Suitable for most standard applications, e.g. in the SIMATIC environment
					Disadvantages	• Attenuation only above the breakdown voltage U_{BR}	

1) The drop-out speed falls to zero once or twice for a few milliseconds:

- Safe drop-out is always ensured during current-free switching.
- When switching with a current present, the contacts are subjected to a higher thermal load. This can lead to an overload when switching at the high current limit.

Technical background information

The oscillograms below show what happens when contactor coils are disconnected without and with overvoltage attenuation.

Coil without RC circuit

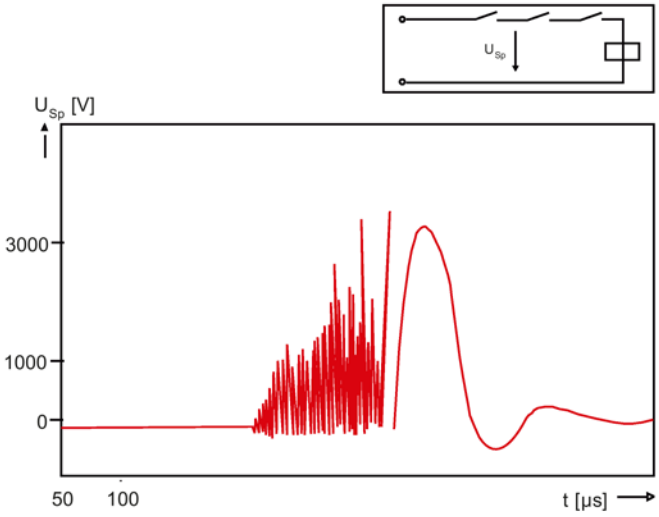


Figure 8-7 Disconnection of a contactor coil without RC circuit

Oscillogram of the disconnection of a contactor relay coil; the coil does not have an RC circuit: Shower discharges are clearly visible (voltage peaks up to around 4 kV). Once the disconnection process has started, the shower discharges occur for about 250 µs; after that, the vibration is simply damped.

RC circuit with varistor

Varistors (voltage-dependent resistors) limit the maximum level of the overvoltage, as they become conductive above a certain threshold voltage. Shower discharges occur up to that level, in a similar way to those seen with the magnet coil without an RC circuit, but they do not last as long overall. Unlike an RC element, varistors do not reduce the rate of the voltage rise. Varistors can be used for DC- and AC-operated contactors.

Note

Varistors extend the contactor's OFF time by around 2 to 5 ms.

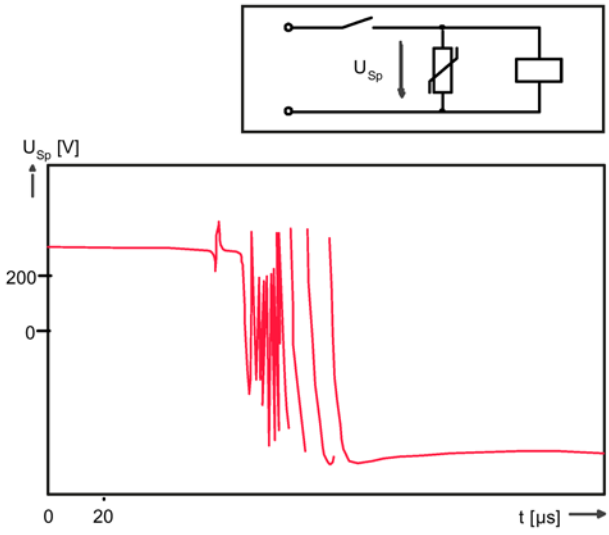


Figure 8-8 RC circuit with varistor (AC/DC operation)

Voltage peaks still occur. They are truncated at around 400 V and do not last as long overall (approximately 50 µs).

Note

Oscillogram is truncated; voltage drops to zero after around 3 ms.

RC circuit with RC element

RC elements are primarily used in the RC circuits of AC-operated contactors. They can also be used with DC-operated contactors. The increase in the effective capacitance at the coil reduces the amplitude to two to three times the control voltage, as well as the rate of rise of the switching overvoltage, so that shower discharges no longer occur. In this way, the RC circuit protects special *dv/dt*-sensitive output stages from unintentional connection.

Note

RC elements which have been selected correctly only have a minor influence on the contactors' switching times.

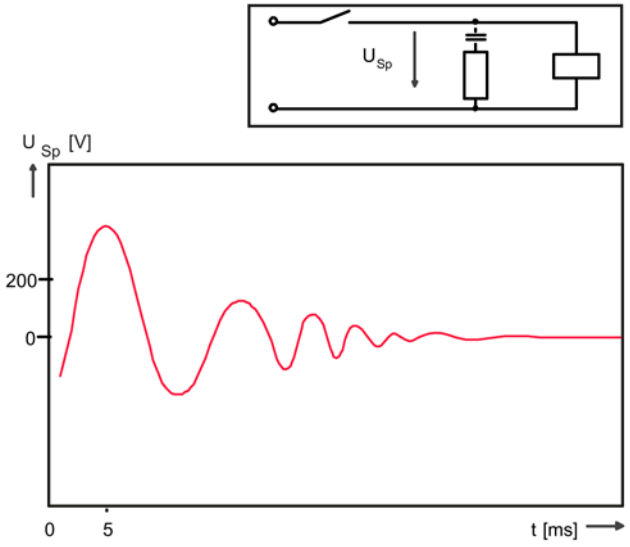


Figure 8-9 RC circuit with RC element (AC/DC operation)

The capacitor reduces the amplitude and the rate of rise of the switching overvoltage. Shower discharges no longer occur. The voltage briefly jumps to 400 V and then decreases gradually. This is the ideal type of attenuation. RC elements are suitable for AC and DC operation. Only a minimal OFF-delay arises (of under 1 ms).

Disadvantage: The component is larger and more expensive than other options.

RC circuit with suppression diode

Including a diode in an RC circuit ensures that switching overvoltages will no longer occur; the diode limits the voltage to 0.7 V.

Note

However, diodes do cause the switch-off delay (the OFF time) to become 6 to 9 times longer. This characteristic can be turned to the user's advantage if short-time voltage dips in the range of a few milliseconds need to be bridged, for example. From a technical point of view, it only makes sense to use freewheel diodes up to a power of 5.5 kW. For higher power ratings we recommend an RC circuit with a diode combination.

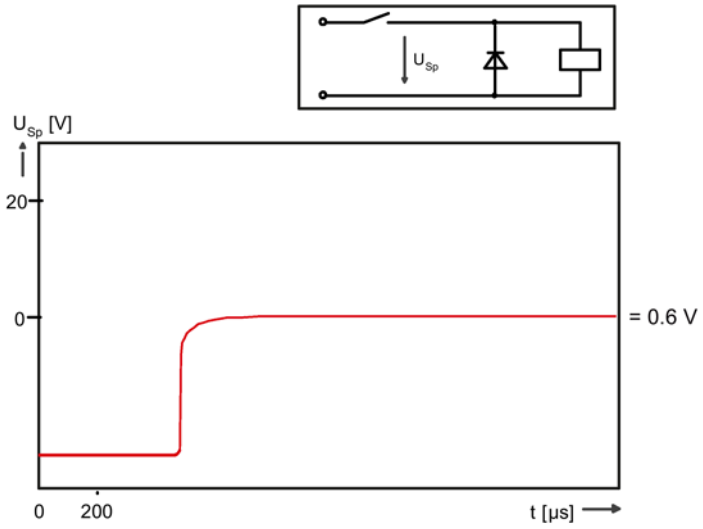


Figure 8-10 RC circuit with diode (DC operation)

Advantage: No overvoltages occur during the switch-off process. The diode blocks at 0.6 V.

Disadvantage: The diode can only be used for DC operation. The contactor's break time is extended considerably, amounting to 6 to 9 times the switch-off delay. This longer break time can be used for control purposes if required, e.g. to bridge short-time voltage dips.

Zener diodes (diode combination) can be used for shorter break times, which will then equate to 2 to 6 times the switch-off delay.

RC circuit with a diode combination

Equipping the contactor coil with an RC circuit featuring a diode combination, consisting of a diode and a Zener diode, also ensures that switching overvoltages will no longer occur; the diode combination limits the voltage to 10 V.

Note

The use of a diode combination does, however, extend the switch-off delay (the OFF time) by a factor of 2 to 6.

The diagram below shows the voltage characteristic for the contactor relay magnet coil with an RC circuit from the graphic named "Disconnection of a contactor coil without RC circuit", with an appropriate diode combination.

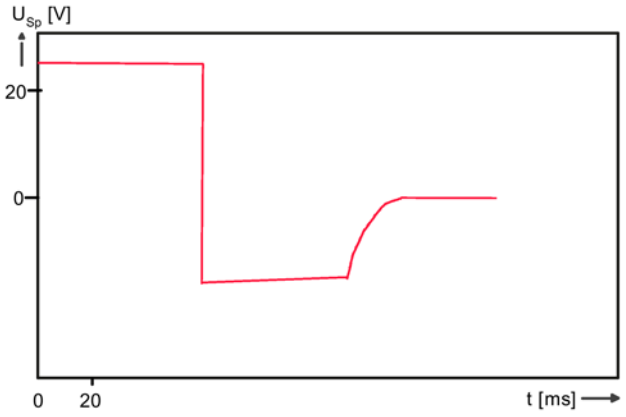


Figure 8-11 RC circuit with diode combination

RC circuit with a suppressor diode

If connected in parallel, suppressor diodes limit the maximum level of the overvoltage as they become conductive above a certain breakdown voltage. Unlike an RC element, suppressor diodes do not reduce the rate of the voltage rise. Suppressor diodes can be used for DC-operated contactors and AC-operated contactors and they influence the switching times only negligibly. In comparison to varistors, suppressor diodes have a shorter pick-up time.

The diagram below shows the voltage characteristic for the contactor relay magnet coil with an RC circuit from the graphic named "Disconnection of a contactor coil without RC circuit", with a suitable suppressor diode

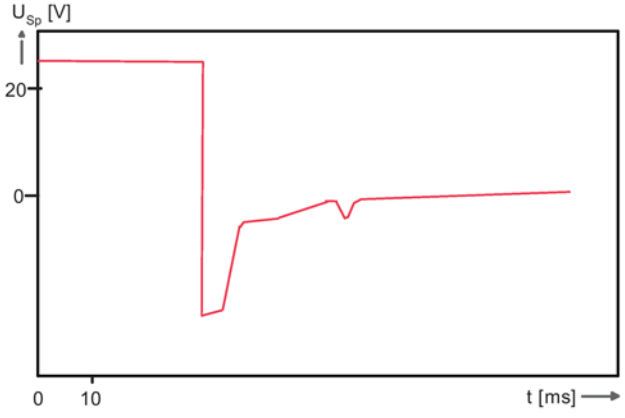
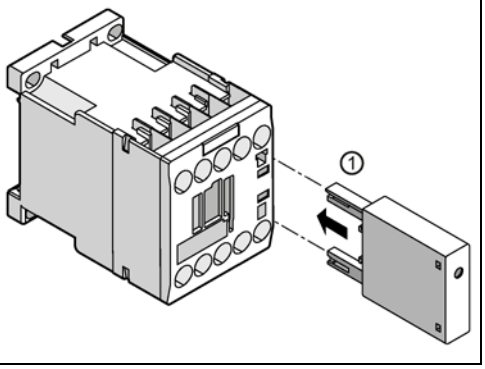


Figure 8-12 RC circuit with a suppressor diode

8.3.3 Mounting

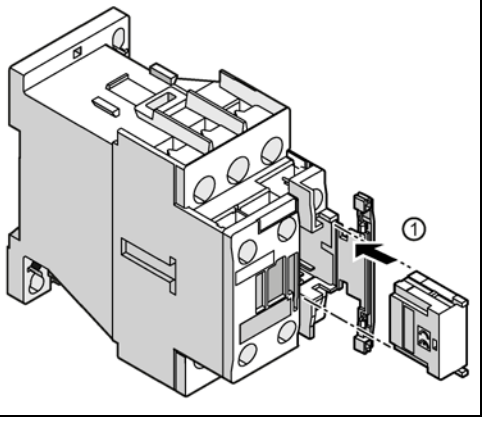
Mounting a surge suppressor (size S00)

Table 8- 16 Mounting the surge suppressor (size S00)

Step	Instructions	Figure
1	Attach the surge suppressor onto the front of the contactor. Codes help you to identify which is the correct way up when inserting the device. Note: There is sufficient space to mount the surge suppressor next to a mounted auxiliary switch block.	

Mounting a surge suppressor (sizes S0 and S2)

Table 8- 17 Mounting the surge suppressor with reference to size S0

Step	Instructions	Figure
1	Open the cover on the front panel of the contactor and push the surge suppressor into the opening until it engages.	

Note

Mounting the surge suppressor (size S2)

On size S2, mount the surge suppressor in the same way as on size S0. Surge suppressors cannot be retrospectively mounted for capacitor contactors for S0.

8.4 EMC suppression module

8.4.1 Description

The EMC interference suppression module for size S00 contactors reduces the high-frequency components and the voltage level of a "counter-source voltage" in three phases. This results in the following advantages:

- **Reduction of arcing**:
  The connection between the main current path and the EMC suppression module enables arcing, which is responsible for contact erosion and the majority of clicking noises, to be reduced; this in turn ensures an EMC-compliant design.
- **Increased operational reliability**:
  Since the EMC suppression module achieves a significant reduction in radio-frequency components and the voltage level in three phases, the contact durability is extended considerably. This makes an important contribution towards enhancing the reliability and availability of the system as a whole.
- **Omission of fine graduation**:
  There is no need for fine graduations within each power class, as smaller motors inherently have a higher inductance, so that one solution is adequate for all fixed-speed operating mechanisms up to 5.5 kW.

Versions

Two electrical versions of the EMC suppression module are available.

Table 8- 18 Versions of the EMC suppression module

Design of the EMC suppression module	Article number
RC circuit	3RT2916-1PA
Varistor circuit	3RT2916-1PB

Circuit diagram

The diagram below shows an RC circuit with an RC element on the left, and an RC circuit with a varistor on the right.

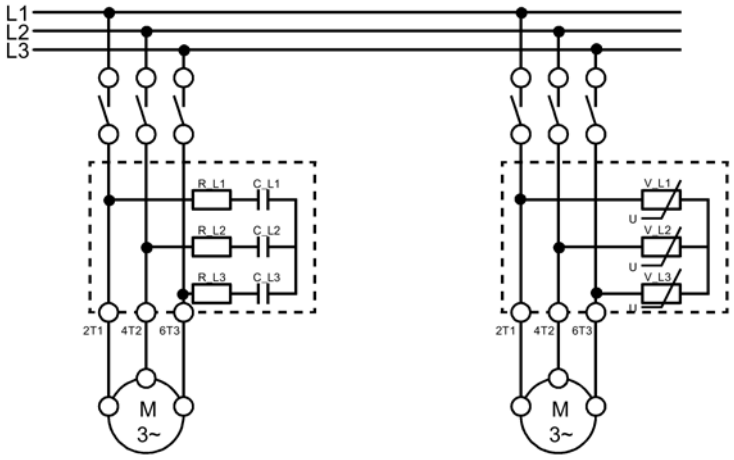


Figure 8-13 EMC suppression module, circuit diagram

8.4.2 Configuration

Selection aid

When motors or various inductive loads are disconnected, a counter-source voltage is generated. This can lead to voltage peaks of up to 4,000 V with a frequency spectrum from 1 kHz to 10 MHz and a rate of voltage variation from 0.1 to 20 V/ns.

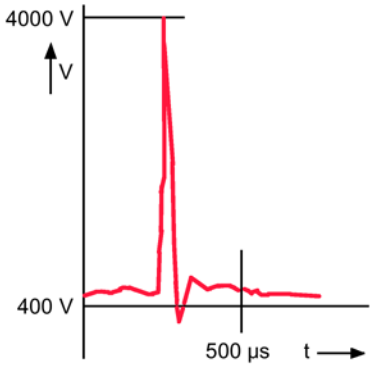
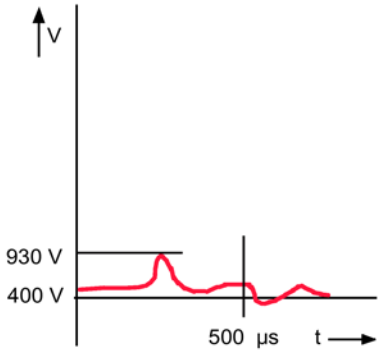
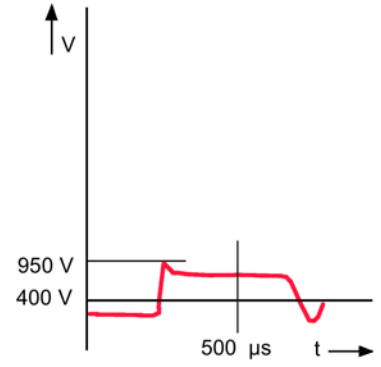


Figure 8-14 Counter-source voltage without RC circuit

Capacitive input to various analog and digital signals makes it necessary to suppress interference in the load circuit.

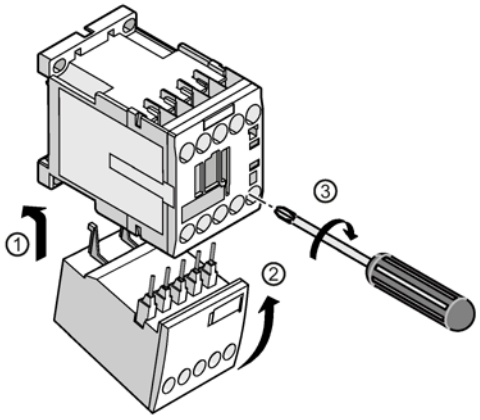
The EMC suppression module is available in two versions. The table below shows how the individual versions of the EMC suppression module differ.

Table 8- 19 Differences between versions of the EMC suppression module

EMC suppression module	Preferred application
 RC circuit	• For reducing the rate of rise • For RF attenuation The values have been selected such that effective interference suppression can be achieved across a broad spectrum.
 Varistor circuit	The varistor circuit can absorb a high level of energy and can be used for frequencies ranging from 10 to 400 Hz (controlled operating mechanisms). There is no limiting below the knee-point voltage.

8.4.3 Mounting

Table 8- 20 Mounting the EMC suppression module (size S00)

Step	Operating instruction	Image
1	Attach both hooks of the EMC suppression module onto the underside of the contactor.	
2	Tilt the EMC suppression module up until its pins are securely located in the contactor's terminal openings.	
3	Screw the EMC suppression module tight with a screwdriver.	

8.5 OFF-delay device

8.5.1 Description

The OFF-delay device prevents a contactor from dropping out unintentionally when there is a short-time voltage dip or voltage failure. The OFF-delay device supplies a downstream, DC-operated contactor with the necessary energy during a voltage dip, ensuring that the contactor does not drop out. The 3RT2916-. OFF-delay devices have been specially adapted to the 3RT contactors (sizes S00 and S0) and the 3RH21 contactor relays (size S00), and are available in the versions shown below.

Note

OFF-delay device requires DC contactor or an AC/DC contactor

The OFF-delay device can be controlled with AC or with DC. However, it always requires a DC contactor or an AC/DC contactor

Table 8- 21 Versions of the OFF-delay device

Control voltage of the OFF-delay device	Article number
24 V DC	3RT2916-2BE01
110 V AC/DC	3RT2916-2BK01
220/230 V AC/DC	3RT2916-2BL01

8.5.2 Configuration

The OFF-delay device operates without external voltage on a capacitive basis and can be energized with either AC or DC (24 V version for DC operation only). Voltage matching is only required for AC operation and is performed using a rectifier bridge.

A contactor opens after a delay when the capacitors integrated in the OFF-delay device are switched in parallel to the contactor's magnet coil. In the event of voltage failures, the capacitors discharge via the magnet coil, thus delaying opening of the contactor.

If the command devices are located upstream of the OFF-delay device in the circuit, the device will be activated with every opening operation. If the activation takes place downstream of the OFF-delay device, an OFF-delay only applies if the line voltage fails. The mean OFF-delay value is around 1.5 times the specified minimum time.

8.5.3 Mounting

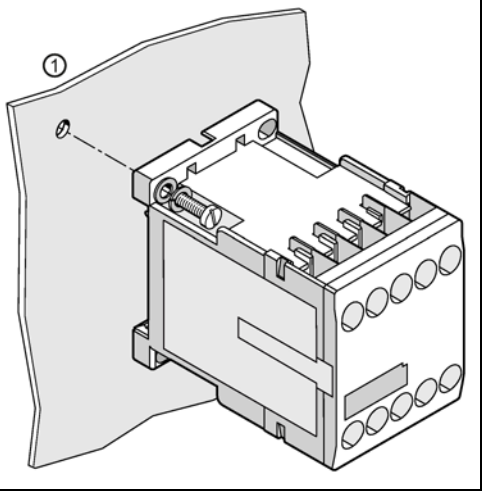
The 3RT2916-. OFF-delay devices are available with the following mounting types:

- Screwing onto a mounting plate
- Snapping onto a 35 mm DIN rail according to DIN EN 60715.

Mounting on mounting plate

The illustrations below depict screw mounting for sizes S00 and S0:

Table 8- 22 Screw mounting (sizes S00 and S0)

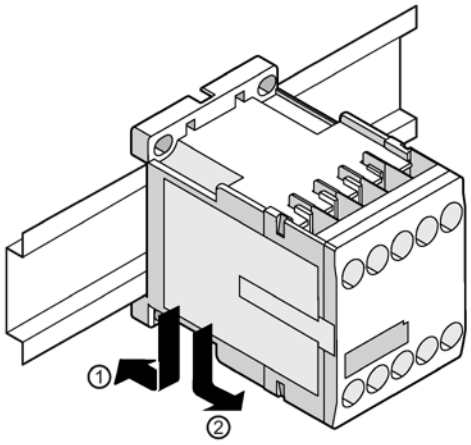
Step	Operating instruction	Image
1	Using two M4 screws (maximum tightening torque 1.2 to 1.6 Nm), plain washers, and spring washers, screw the OFF- delay device tight into the designated drill holes diagonally.	

Snapping onto DIN rail (snap-on mounting)

OFF-delay devices of sizes S00 and S0 can be snapped onto a 35 mm DIN rail.

The illustrations below show how to snap OFF-delay devices onto/off a DIN rail:

Table 8- 23 Mounting/disassembling sizes S00 and S0 (snap-on mounting)

Step	Operating instruction	Image
1	Position the device on the top edge of the DIN rail and press down until it snaps onto the bottom edge of the DIN rail.	
2	To disassemble the device, press it down, pushing against the mounting springs, and swivel the device to remove it.	

8.6 Mechanical latch

8.6.1 Description

The mechanical latch for the 3RT2.2 power contactors ensures that the contactor remains switched on even if there is a voltage failure. The release coil has an ON period of 100%.

Table 8- 24 Versions of the mechanical latch

Design of the mechanical latch	Article number
24 V AC/DC	3RT2926-3AB31
110 V AC/DC	3RT2926-3AF31
230 V AC/DC	3RT2926-3AP31

8.6.2 Mounting/Disassembly

Table 8- 25 Mounting the mechanical latch

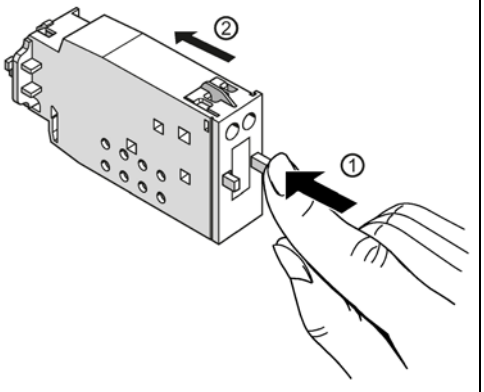
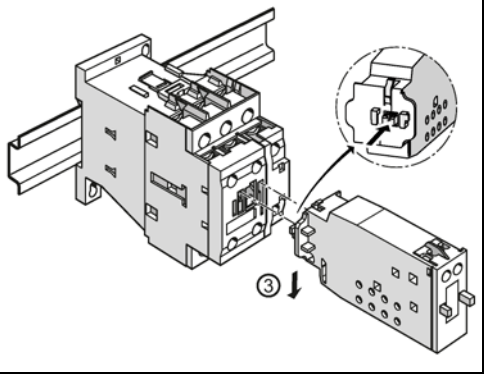
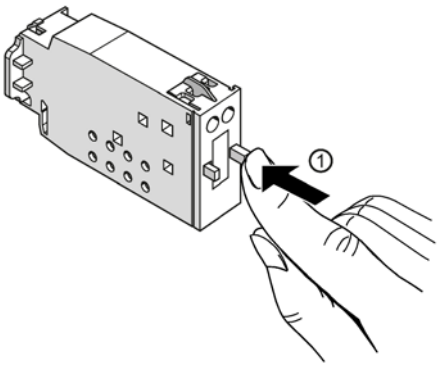
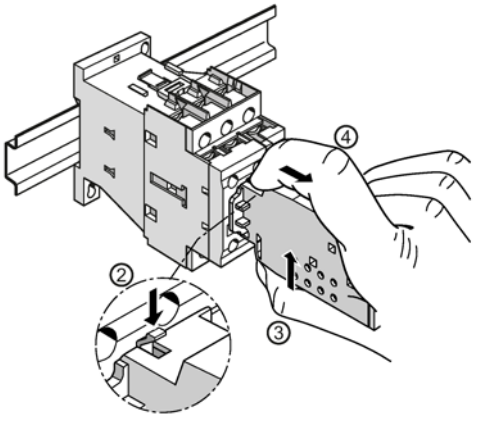
Step	Operating instruction	Image
1 / 2	When snapping on, the switch position indicator's rod must be unlocked. Unlock the rod by pressing on the switch position indicator and pushing the rod into the mechanical latch as far as it will go.	
3	Snap the mechanical latch onto the center of the contactor until it engages.	

Table 8- 26 Disassembling the mechanical latch

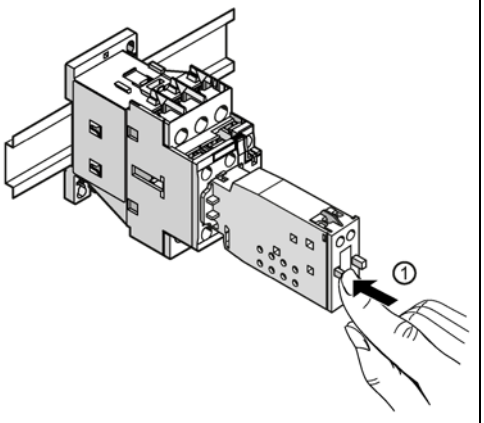
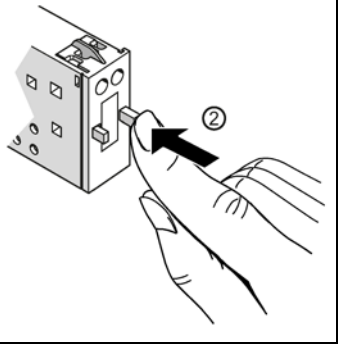
Step	Operating instruction	Image
1	Release the mechanical latch.	
2 / 3 / 4	Unlock the mechanical latch and remove it from the contactor.	

8.6.3 Operation

The mechanical latch can be operated with alternating and direct current; it can be activated and deactivated electrically and manually. The illustrations below show how to operate the mechanical latch manually.

Electrical release is achieved by applying the voltage to terminals E1 and E2 of the mechanical latch.

Table 8- 27 Operating the mechanical latch

Step	Operating instruction	Image
1	To activate the latch, press the left plunger.	
2	To deactivate it, press the right plunger. It can only be unlocked if the contactor coil is not excited.	

8.7 Additional load module

8.7.1 Description

The 3RT2916-1GA00 additional load module for size S00 contactors is used to increase the permissible residual current and to limit the residual voltage of SIMATIC semiconductor outputs.

If SIRIUS contactors and SIRIUS contactor relays of size S00 are used in conjunction with SIMATIC output modules whose residual current on signal "0" is higher than that which is permissible for size S00 contactors, this can sometimes result in malfunctions. The maximum permissible residual current of the electronics for size S00 contactors with a 230 V AC drive is 3 mA; at higher residual currents the contactors will not drop out. The additional load module is used to ensure that size S00 contactors which are directly controlled via 230 V AC semiconductor outputs are disconnected safely by programmable logic controllers. The additional load module also performs the function of an overvoltage attenuation circuit.

Technical data

Rated voltage	AC 50/60 Hz 180 V to 255 V
Power loss	2.4 W at 230 V
Permissible contactor types	3RT2.1 (size S00)

8.7.2 Mounting

The 3RT2916-1GA00 additional load module is connected in parallel with the contactor coil. Its design is identical to that of the surge suppressor and it is attached to the front of the contactor, with or without an auxiliary switch block.

Reference

More information ...	Can be found in the chapter titled ...
About mounting the additional load module	Surge suppressor (Page 156)

8.8 Control kit for manual operation of contactor contacts

8.8.1 Description

The control kit is a tool used for manual operation (closing) of the auxiliary contacts of the 3RT20 power contactors and the main contacts (load-free switching) during commissioning. This way, the auxiliary contact circuit or also a high-voltage test for commissioning can be carried out even without a fully configured control circuit.
The following control kits are available for the different sizes:

- S00: 3RT2916-4MC00 (color: yellow): Use on front connection point
- S0: 3RT2926-4MC00 (color: orange): Use on front connection point
- S2 : 3RT2936-4MC00 (color: yellow): Use in the slot of the surge suppressor

The module is used to check the wiring and the motor direction of rotation under conditions of short-circuit protection. The control kit also enables simple and user-friendly use and support for high-voltage tests according to IEC 60294.

8.8.2 Mounting

NOTICE
Disconnect the contactor from the power supply before you attach or remove the control kit. Only use the control kit for test purposes during commissioning.

Table 8- 28 Mounting the control kit on a contactor (S00)

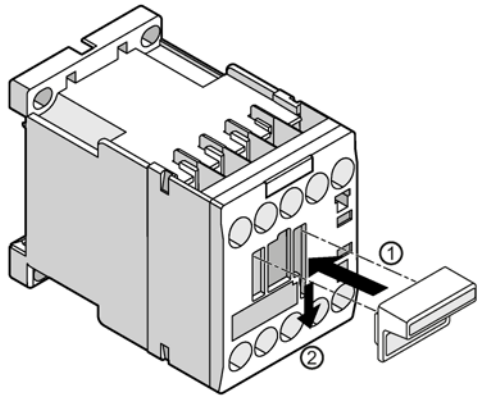
Step	Instructions	Figure
1	Attach the control kit to the contactor from the front.	
2	Press the control kit down until it engages.	

Table 8- 29 Mounting the control kit on a contactor (S0)

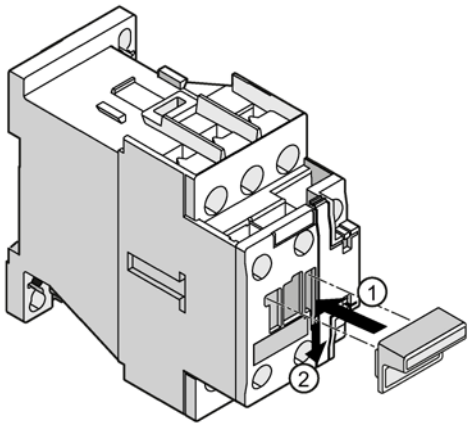
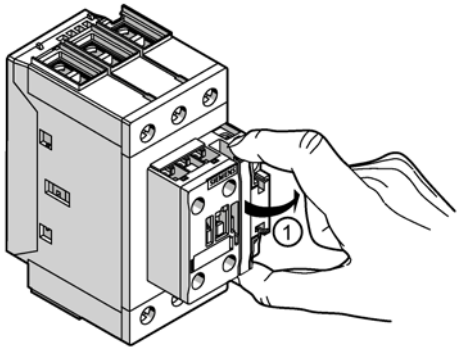
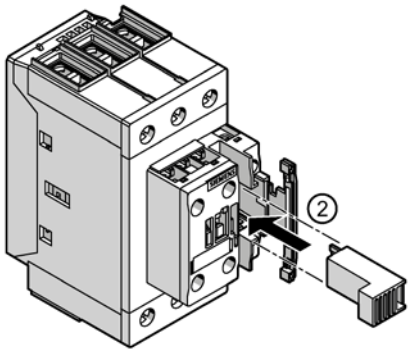
Step	Instructions	Figure
1	Attach the control kit to the contactor from the front.	
2	Press the control kit down until it engages.	

Table 8- 30 Mounting the control kit on a contactor (S2)

Step	Instructions	Figure
1	Open the contactor cover.	
2	Attach the control kit to the contactor from the front. Press the control kit down until it engages.	

8.9 Coupling link for PLC

8.9.1 Description

Thanks to a low control power (< 0.5 W) and an operating range of 17 to 30 V DC, the coupling link enables a size S0 contactor with a 24 V DC operating mechanism to be connected directly to the PLC output. The control voltage for the coupling link and the rated control supply voltage for the contactor are galvanically isolated. An LED indicates the switching state of the coupling link. The coupling link features an integrated surge suppressor (varistor) for the contactor coil being switched.

The coupling link is available in the following versions:

- 3RH2914-.GP11: can be mounted on the front on 3RT2 S00-S2 contactors; spring-loaded connection or screw-type connection
- 3RH2924-1GP11: can be mounted from above on S0 contactors without increasing the installation depth; screw-type connection; comprises 3RT2926-4RA11 coil terminal module and coupling link

Scope of supply

The following components ship with the 3RH2914-1GP11 coupling link:

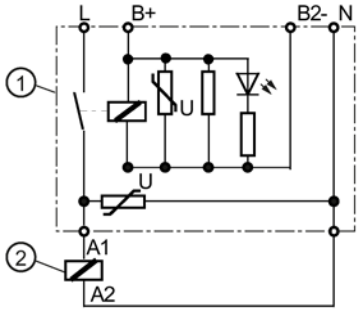
- Coupling link
- 3RT2926-4RA11 coil terminal module with coil terminal from above (screw-type connection system)

The following components ship with the 3RH2926-1AP11/12 coupling module:

- Coupling link

Circuit diagram

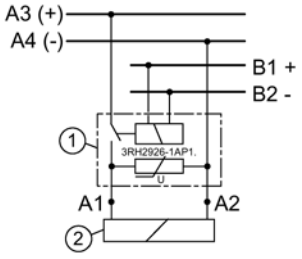
3RH2914-.GP11 coupling link for control from the PLC.



1	Coupling link
2	Contactor
B1+/B2-	Control voltage 24 V DC
L1/N	Rated control supply voltage for the selected contactor

Figure 8-15 Coupling link, circuit diagram (size S0)

3RH2914-.GP11 coupling link (screw-type/spring-loaded) for control from the PLC.



①	Coupling module
②	Contactor (Q1)
A3 (+)/A4 (-)	U_S (Q1)
B1 +/B2 -	Control voltage 24 V DC

Figure 8-16 Coupling link, circuit diagram (sizes S00, S0 and S2)

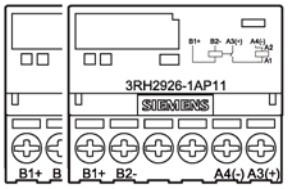


Figure 8-17 Terminals on the 3RH2914-.GP11 . coupling link

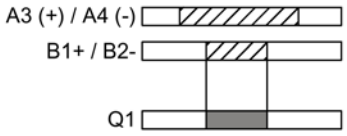


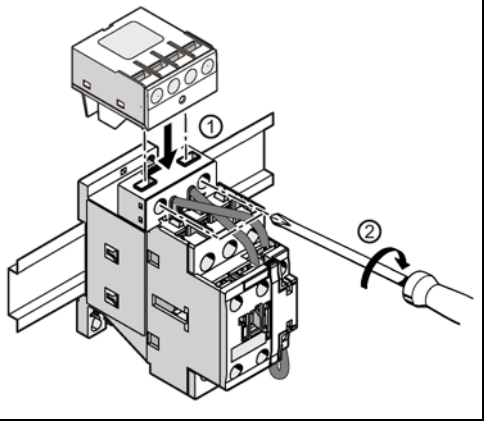
Figure 8-18 Connecting the 3RH2914-.GP11 coupling link

8.9.2 Mounting the 3RH2924-1GP11 coupling link

Prerequisite

The 3RT2926-4R..... coil terminal module must be mounted before you can attach the coupling link.

NOTICE
Before mounting the coupling link, disconnect the voltage from L1 to L3.

Step	Operating instruction	Image
1	Attach the coupling link to the coil terminal module using the two integrated mounting pins.	
2	Screw the coupling link tight with a screw-driver.	

8.9.3 Mounting and disassembling the 3RH2926-1AP1 coupling module

Mounting

Table 8- 31 Replacing the removable terminal block

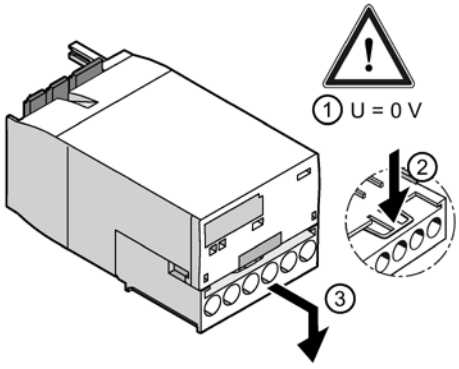
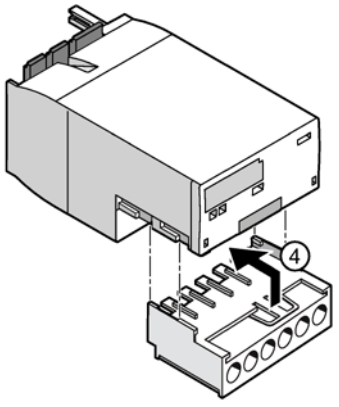
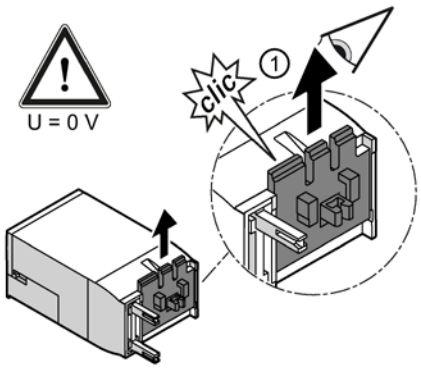
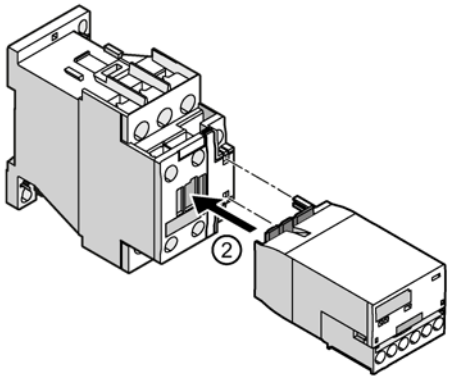
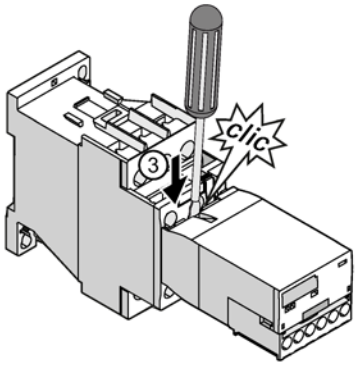
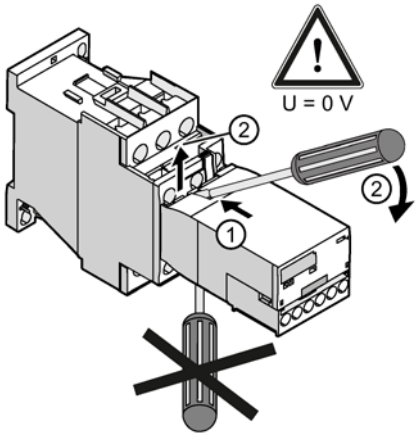
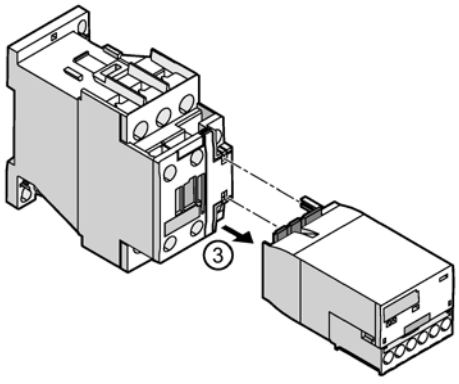
Step	Operating instruction	Image
1	Detach the terminal block: • Press the lug of the terminal block downwards. • Pull the terminal block out to the front and then downwards.	
2	Install the terminal block: • Plug the terminal block onto the coupling module from below. • Slide the terminal block back until the lug engages.	

Table 8- 32 Mounting the 3RH2926-1AP1 coupling module

Step	Operating instruction	Image
1	Pull the rear cover up until it engages.	
2	Attach the coupling module to the coil terminal module using the integrated mounting pins at the front.	
3	Use a screwdriver to press down the cover of the coupling module until it engages.	

Disassembling

Table 8- 33 Disassembling the 3RH2926-1AP1 coupling module

Step	Operating instruction	Image
1	• Apply the screwdriver from above. • With the aid of the screwdriver, pull the rear cover plate of the coupling module upwards.	
2	Pull the coupling module with the integrated mounting pins towards you off the coil terminal module.	

8.10 LED display indicator module

8.10.1 Description

The LED display indicator module can be connected to the coil terminals of the contactors in size S00, S0 and S2; it indicates the energized state of the contactors via yellow LEDs. In practice the LED display indicator module is primarily used for 3RT2 power contactors in size S0.

Table 8- 34 LED display indicator module

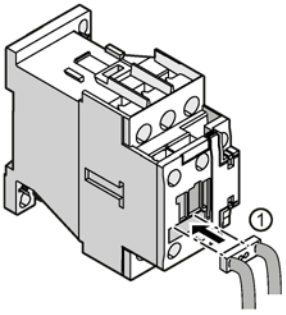
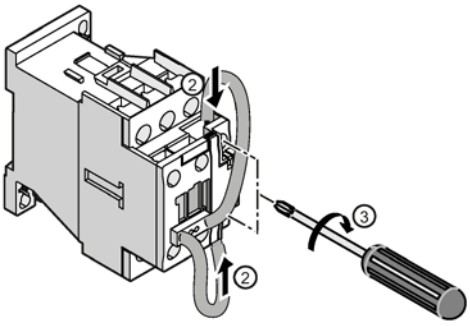
Size	Article number
S00/S0/S2	3RT2926-1QT00

The LED display module can be used for voltages of 24 to 240 V AC/DC. The LEDs are switched on a bidirectional basis in order to ensure they are protected against polarity reversal. With AC control both LEDs light up and with DC control just one LED lights up, depending on the polarity.

8.10.2 Mounting

The LED display indicator module is snapped into the location hole on the front of the contactor, in place of the labeling plate.

Table 8- 35 Mounting the LED display indicator module with reference to size S0

Step	Operating instruction	Image
1	Snap the LED display indicator module into the corresponding location hole provided on the front of the contactor.	
2	Thread the conductors into coil terminals A1 and A2 of the contactor.	
3	Screw the conductors tight with a screwdriver.	

For size S2, mount the LED display indicator module in the same way.

8.11 Solder pin adapter

8.11.1 Description

The solder pin adapter can be used to solder standard contactors in size S00 up to 5.5 kW/12 A onto PCBs.

Table 8- 36 Versions of the solder pin connection

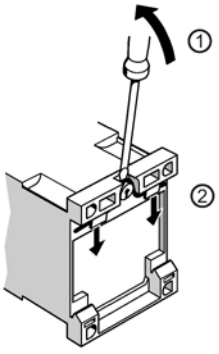
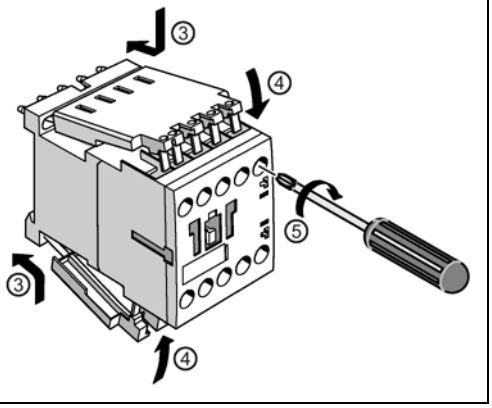
Version of the solder pin connection	Article number
Without auxiliary switch block	3RT1916-4KA1
With auxiliary switch block	3RT1916-4KA2

Solder pin connection can be used:

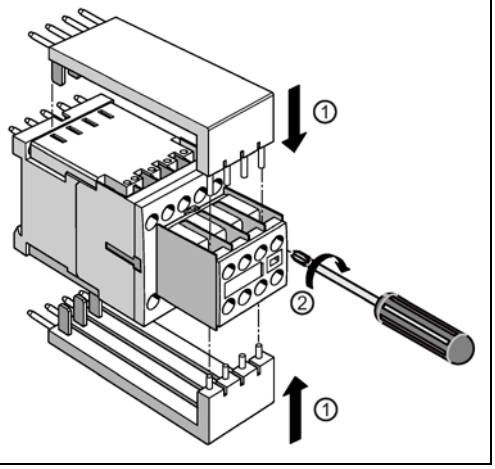
- For motor contactors and contactor relays in size S00.
- For contactors in size S00 with an attached 4-pole auxiliary switch block.
- For the reversing wiring of S00 contactors; in this case, the reversing wiring must be carried out before the contactors are soldered onto the PCB.

8.11.2 Mounting

Mounting on a contactor of size S00

Step	Operating instruction	Image
1 / 2	Position the screwdriver on the contactor as shown in the image and press it down to release the spring for DIN rail mounting.	
3	Insert the solder pin connections into the screw connections at the top and bottom of the contactor.	
4 / 5	Fold the solder pin adapters down/up onto the contactor and screw them tight with a screwdriver.	

Mounting on a contactor of size S00 with an attached 4-pole auxiliary switch block

Step	Operating instruction	Image
1	Insert the solder pin connections into the openings provided at the top and bottom of the contactor until they engage.	
2	Screw the solder pin adapters tight with a screwdriver.	

8.12 Coil terminal module

8.12.1 Description

The 3RT2926-4R. coil terminal module for mounting on 3RT20 power contactors in size S0 serves as an adapter for the coil and ensures the coil wiring is correct for 3RT102 contactors (e.g. for retrofitting a 3RT10 device).

The following versions of the coil terminal module are available (only screw connection available for size S2).

Table 8- 37 Versions of the coil terminal module

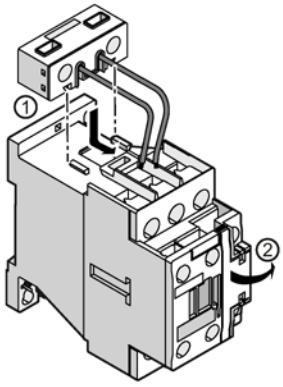
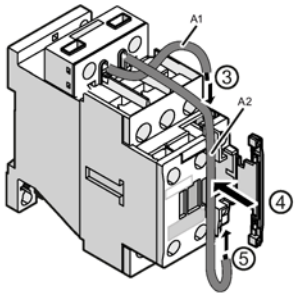
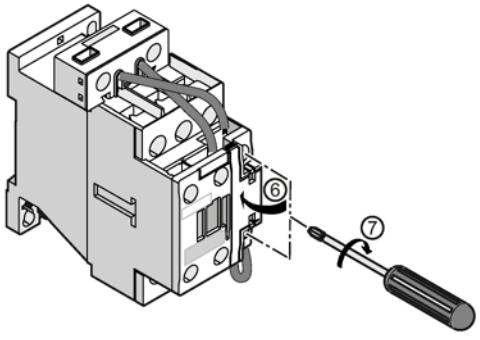
Connection system	Design of the coil terminal module	Article number
Screw connection	Coil terminal from above	3RT2926-4RA11
	Coil terminal from below	3RT2926-4RB11
	Coil terminal diagonal	3RT2926-4RC11
Spring-loaded connection[1)]	Coil terminal from above	3RT2926-4RA12
	Coil terminal from below	3RT2926-4RB12

[1)] For size S0 only.

8.12.2 Mounting

Below is an example of how to mount the 3RT2926-4RA11 coil terminal module (coil terminal from above) onto a 3RT2 power contactor of size S0.

Table 8- 38 Mounting the coil terminal module

Step	Operating instruction	Image
1	Attach the coil terminal module onto the contactor from above until it engages.	
2	Open the cover on the front panel of the contactor.	
3	Thread the conductor from above into coil terminal A1 of the contactor.	
4	Lay the conductor in the cable duct.	
5	Thread the conductor from below into coil terminal A2 of the contactor.	
6	Close the cover on the front panel of the contactor.	
7	Screw the conductors tight with a screwdriver.	

8.13 Cover for ring cable lug

8.13.1 Description

For the version with a ring cable lug connection system the SIRIUS modular system features attachable cover caps for ensuring touch protection (finger safety) according to IEC 61140. Both line-side and output-side covers are available.

Table 8- 39 Versions of the cover for the ring cable lug

Size	Article number
S00	3RT2916-4EA13
S0	3RT2926-4EB13

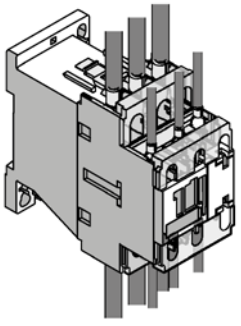


Figure 8-19 3RT2 power contactor with ring cable lug cover (size S0)

8.14 Sealable cover

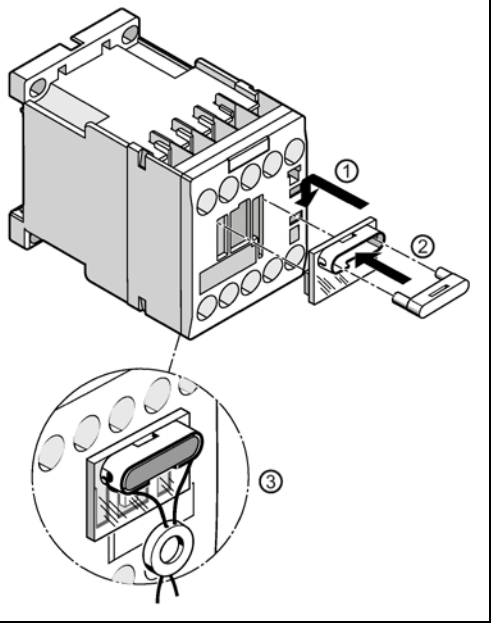
8.14.1 Description

When contactors and contactor relays are used in safety-oriented applications, it must be ensured that the contactors cannot be operated manually. A sealable cover (3RT2916-4MA10), which prevents the contactors being unintentionally operated manually, is available as an accessory for such applications. It is a transparent molded-plastic cap with a clip that enables the contactor to be sealed.

8.14.2 Mounting

Mounting the sealable cover

Table 8- 40 Contactor (size S00) with sealable cover

Step	Operating instruction	Image
1	Attach the loose molded-plastic cap into the location hole on the contactor.	
2	Insert the clip into the molded-plastic cap.	
3	Use a seal to secure the clip so that the molded-plastic cap cannot be removed.	

Note

Proceed in the same way to mount the sealable cover on size S0 and S2 contactors.

8.15 3-phase infeed terminal

8.15.1 Description

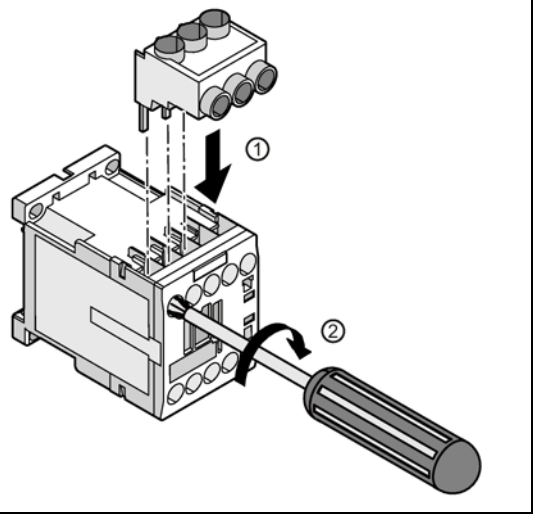
The 3-phase infeed terminal is used for the parallel injection of an L1 cable at L1 to L3. The terminal is available for mounting on 3RT20 power contactors in sizes S00, S0 and S2 with screw-type connection systems.

Table 8- 41 Versions of the 3-phase infeed terminal

Size	Article number
S00	3RA2913-3K
S0	3RV2925-5AB
S2	3RV2935-5A
S2	3RV2935-5E

8.15.2 Mounting

Table 8- 42 Mounting the 3-phase infeed terminal (size S00)

Step	Instructions	Figure
1	Insert the pins of the 3-phase infeed terminal into the contactor's terminal openings from above until they are securely in position.	
2	Screw the 3-phase infeed terminal tight with a screwdriver.	

Note

Proceed in the same way to mount the 3-phase infeed terminal on 3RT20 contactors of size S0. With capacitor contactors, 3-phase infeed terminals can be supplemented in size S0 and S2.

8.16 Parallel switching connectors

8.16.1 Description

3RT2 power contactors can be connected in parallel (e.g. neutral bridge) using parallel switching connections.

The following versions of parallel switching connections are available:

Table 8- 43 Versions of the parallel switching connectors

Size	Design of the parallel switching connector	Connection system	Article number
S00	3-pole, without connection terminal	Screw connection	3RT1916-4BA31
		Spring-loaded connection	3RT2916-4BA32
	3-pole, with connection terminal	Screw connection	3RT1916-4BB31
	4-pole, with connection terminal	Screw connection	3RT1916-4BB41
S0	3-pole, without connection terminal	Screw connection	3RT1926-4BA31
		Spring-loaded connection	3RT2926-4BA32
	3-pole, with connection terminal	Screw connection	3RT2926-4BB31
S2	3-pole, with connection terminal	Screw connection	3RT1936-4BB31

8.16.2 Configuration

If the current paths of multi-pole switching devices are connected in parallel, the total current is distributed across the individual current paths in accordance with their ohmic resistance and their inductive interactions. The ohmic resistance is primarily generated by the contact resistance at the contacts, the value of which can vary as a result of erosion and oxidation. This means that the current distribution is neither even nor stable: Individual current paths may be overloaded and the overload releases or relays will trip too early (tripping error).

Permanent load with parallel connection

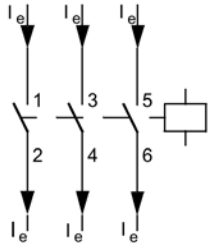
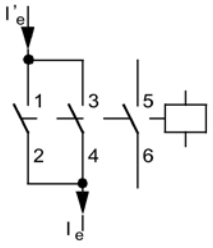
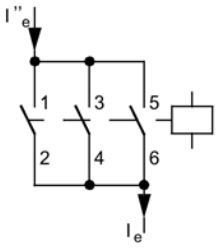
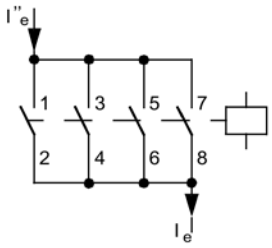
Provided that the relevant catalogs do not contain any information to the contrary, the following applies for a permanent load with parallel connection:

- If three current paths are connected in parallel, 2.5 times the continuous current can be conducted; if two current paths are connected in parallel, 1.8 times the continuous current can be conducted. However, it should be noted that the making and breaking capacities do not increase, since the contacts do not close and open simultaneously, so the contacts of one current path have to switch the entire inrush or breaking current.
- The cables should be routed such that the same cable lengths are used for each current path.
- If a short-circuit current arises, it is divided up in accordance with the ratio of the current path resistances.
  Notice: The operating current of electromagnetic instantaneous short-circuit releases cannot be reached in such cases.

Making capacity/breaking capacity

The table below specifies the magnitude of a contactor's making and breaking capacities, in relation to the load currents for two or three current paths connected in parallel:

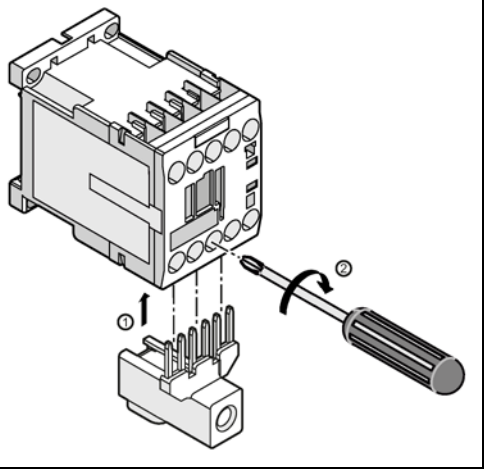
Table 8- 44 Parallel switching connections: Making capacity/breaking capacity

	3-pole switching	2 current paths in parallel	3 current paths in parallel	4 current paths in parallel
				
Making capacity	12 x I_e (utilization category AC-4)	$\frac{12 \cdot I'e}{1.8} = 6.67 \cdot I'e$	$\frac{12 \cdot I''e}{2.5} = 4.8 \cdot I''e$	$\frac{12 \cdot I''e}{3.1} = 3.9 \cdot I''e$
Breaking capacity	10 x I_e (utilization category AC-4)	$\frac{10 \cdot I'e}{1.8} = 5.55 \cdot I'e$	$\frac{10 \cdot I''e}{2.5} = 4.0 \cdot I''e$	$\frac{10 \cdot I''e}{3.1} = 3.2 \cdot I''e$

8.16.3 Mounting

The parallel switching connectors of size S00 and S2 can all be reduced by one pole. The illustration below shows an example of how to mount the 3-pole parallel switching connector with connection terminal to a contactor of size S00.

Table 8- 45 Mounting the 3-pole parallel switching connector with connection terminals

Step	Instructions	Figure
1	Insert the pins of the parallel switching connector into the contactor's terminal openings from below until they are securely in position.	
2	Screw the parallel switching connector tight with a screwdriver.	

8.17 Link module for two contactors in series

8.17.1 Description

The link module for 2 contactors in series is a module used to connect two contactors in series. It is used in Safety applications, for example, where two switching points located in series are required.

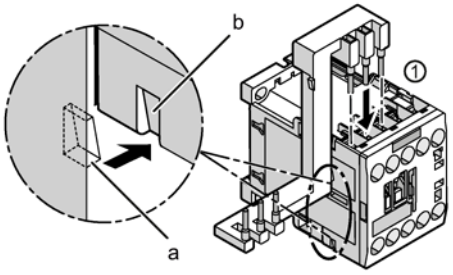
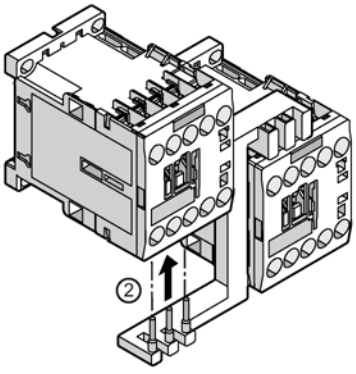
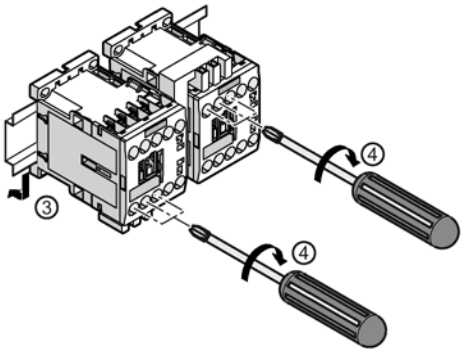
The link module for 2 contactors in series is available in the following versions.

Table 8- 46 Versions of the link module

Size	Article number
S00	3RA2916-1A
S0	3RA2926-1A
S2	3RA2936-1A

8.17.2 Mounting

Table 8- 47 Mounting the link module for 2 contactors in series (size S00)

Step	Operating instruction	Image
1	Insert the pins of the link module into the contactor's terminal openings from above until they are securely in position. Make sure that the wedge (a) engages in the groove (b) provided on the contactor for this purpose.	
2	Attach the contactor onto the link module's pins from above.	
3	Position the contactors connected in series via the link module on the top edge of the DIN rail and press them down until they snap onto the bottom edge of the DIN rail.	
4	Screw the link module tight on both contactors with a screwdriver.	

Note

The procedure is the same for size S0 and S2 contactors.

8.18 Link module for motor starter protector

8.18.1 Description

Link module for motor starter protector - contactor

Link modules can be used to quickly and reliably mount a motor starter protector onto the contactor. In this case, the link modules serve to establish an electrical and mechanical connection between the motor starter protector and the contactor.

Table 8- 48 Versions of the link module for motor starter protector - contactor

Connection system	Version of the link module	Article number
Screw-type	Motor starter protector – contactor in size S00	3RA1921-1DA00
	Motor starter protector – contactor in size S0 AC	3RA2921-1AA00
	Motor starter protector – contactor in size S0 DC	3RA2921-1BA00
	Motor starter protector – contactor in size S2	3RA2931-1AA00
Spring-loaded	Motor starter protector – contactor in size S00	3RA2911-2AA00
	Motor starter protector – contactor in size S0	3RA2921-2AA00

Reference

More information ...	Can be found in the appendix ...
About link modules	"References" under SIRIUS Innovations manuals (Page 390) in the manual "SIRIUS Innovations - SIRIUS 3RA21 / 22 load feeders"
About mounting contactors and motor starter protectors	

8.19 Pneumatically delayed auxiliary switch

8.19.1 Description

In terms of its function, the pneumatically delayed auxiliary switch is comparable with solid-state time-delayed auxiliary switch blocks. It is available for 3RT2.2 (size S0) power contactors in the following versions.

Table 8- 49 Versions of the pneumatically delayed auxiliary switch

Version	Adjustable time range	Article number	Circuit diagrams
With ON-delay	0.1 to 30 s	3RT2926-2PA01	
	1 to 60 s	3RT2926-2PA11	
With OFF-delay	0.1 to 30 s	3RT2926-2PR01	
	1 to 60 s	3RT2926-2PR11	

The pneumatically delayed auxiliary switch block is used if electronic components are not desirable or in the absence of a control supply voltage.

8.19.2 Mounting/Disassembly

Table 8- 50 Versions of the pneumatically delayed auxiliary switch

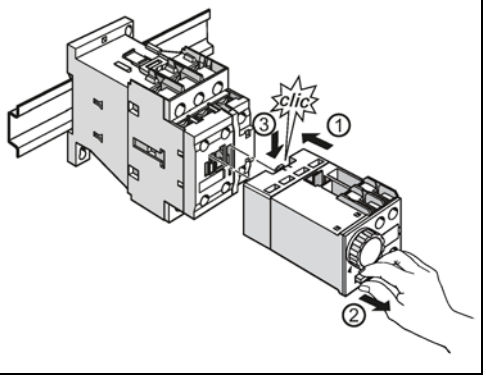
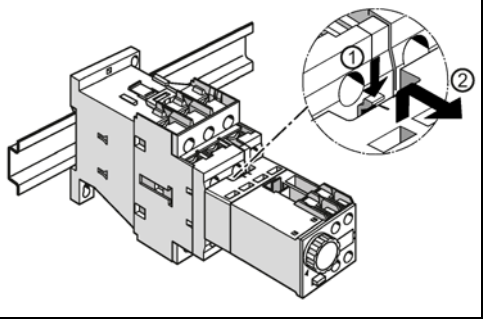
Step	Instructions	Figure
1	Push the pneumatically delayed auxiliary switch, which is attached on the front, into the location hole on the contactor.	
2	Pull the plunger out.	
3	Pull the pneumatically delayed auxiliary switch down until it engages.	

Table 8- 51 Disassembling the pneumatically delayed auxiliary switch

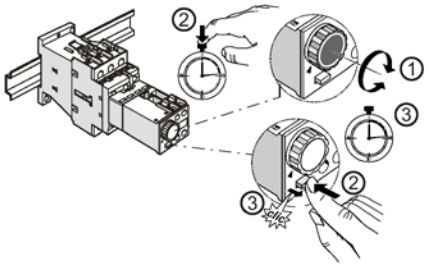
Step	Instructions	Figure
1	Press down the release lever on the pneumatically delayed auxiliary switch.	
2	Pull the pneumatically delayed auxiliary switch toward you and remove it from the contactor.	

Note

The pneumatically delayed auxiliary switch is attached on the front of the contactors and features 1 NO contact and 1 NC contact as its auxiliary contacts. If the pneumatically delayed auxiliary switch is mounted on a contactor, no other auxiliary contacts are permitted.

8.19.3 Operation

Table 8- 52 Operating the pneumatically delayed auxiliary switch

Step	Instructions	Figure
1	Set the required time range.	
2	Press the plunger to start the pneumatically delayed auxiliary switch.	
3	Once the set time has elapsed, the plunger will snap back out.	

8.20 Insulating stop

8.20.1 Description

The insulating stop is available in the following versions.

Table 8- 53 Versions of the insulating stop

Size	Article number	Can be used for
S00	3RT2916-4JA02	Basic units 3RT2.1 and 3RH21
S0/S2	3RT1916-4JA02	• Terminals for the auxiliary circuit and the control circuit of a 3RT2.2 / 3RT2.3 basic unit • Auxiliary switch blocks which can be mounted on the front and side

The insulating stop is for contactors with spring-loaded connections. In the case of conductors with a small conductor cross-section (≤ 1mm^2), it ensures that the conductor insulation is not clamped with the rest of the cable. An insulating stop unit comprises 5 pairs of terminals which can be separated. The diagram below illustrates an example of how the the 3RT2916-4JA02 insulating stop can be used on a size S00 basic device.

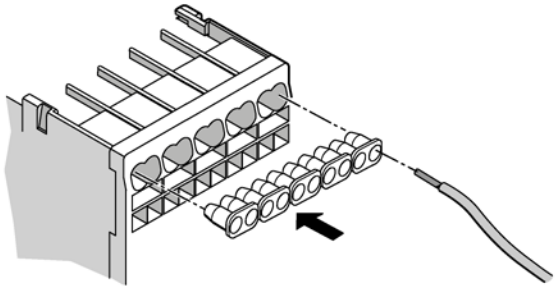


Figure 8-20 Insulating stop on spring-loaded connection

8.21 Terminal module for contactors with screw connections

8.21.1 Description

The terminal module for contactors with screw connections is available in the following versions.

Table 8- 54 Versions of the terminal module for contactors with screw connections

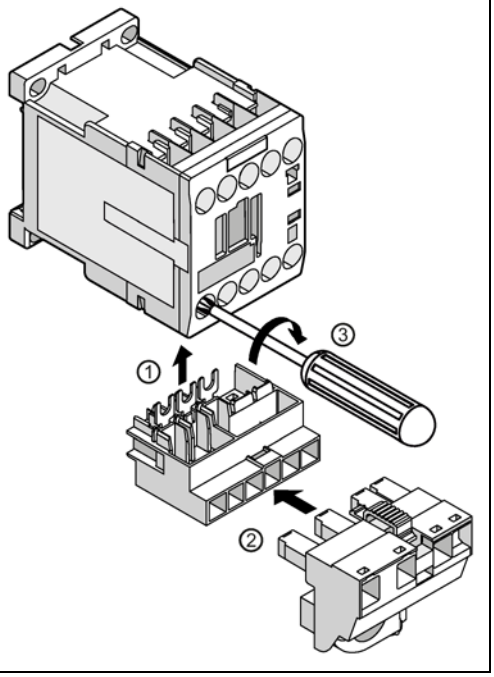
Size	Article number	Version
S00 and S0	3RT1900-4RE01	Plug for contactor
S00	3RT1916-4RD01	Adapter for contactor
S0	3RT1926-4RD01	Adapter for contactor

The terminal module can be used to connect contactors with screw connections in size S00 or S0 to a motor.

8.21.2 Mounting

Mounting the terminal module for contactors with screw connections

Table 8- 55 Mounting the terminal module for contactors (size S00) with screw connections

Step	Operating instruction	Figure
1	Plug the adapter pin into the contactor from below.	
2	Insert the plug into the openings on the adapter from the front, until it engages.	
3	Screw the terminal module tight with a screwdriver.	

Note

Proceed in the same way to mount the terminal module on size S0 contactors.

Note

Replace the contactor and the adapter together when end of service life is reached.

8.22 3RA27 function modules for connection to the automation level (AS-Interface or IO-Link)

8.22.1 Description

Special SIRIUS 3RT2 contactor versions with voltage tapping (3RT2...-....-0CC0) are required to simply connect SIRIUS switching devices to the controller level (PLC) using 3RA27 function modules.
The function modules enable connection to the AS-Interface or IO-Link communication solutions.

The function modules are available for the following contactors and contactor assemblies.

Table 8- 56 Overview - 3RA27 function modules

	AS-Interface	IO-Link
Direct-on-line start	3RA2712- . AA00	3RA2711- . AA00
Reversing start	3RA2712- . BA00	3RA2711- . BA00
Star-delta (wye-delta) start	3RA2712- . CA00	3RA2711- . CA00

Note

No further auxiliary switch blocks may be mounted on the basic devices when using the 3RA27 function modules.

Note

Sizes S00 to S2

Sizes S00 to S2 use the same function modules.
As from product version E04, the 3RA27 function modules can be used for mounting on 3RT2.3 contactors (size S2).

Reference

More information ...	Can be found in the manuals ...
About the 3RA27 function modules for connection to the automation level	• "Function Modules for AS-Interface" (http://support.automation.siemens.com/WW/view/en/39318922) (3ZX1012-0RA27-0AC0) • "Function Modules for IO-Link" (http://support.automation.siemens.com/WW/view/en/39319600) (3ZX1012-0RA27-1AC1)

8.23 3RA28 function modules for mounting on 3RT2 contactors

8.23.1 Description

The SIRIUS modular system features 3RA28 function modules for the delayed switching of contactors and auxiliary switches (e.g. for switching from star operation to delta operation).

3RA28 function modules are available with screw-type or spring-loaded connections in the following versions:

- Solid-state time-delay auxiliary switches 3RA281.-..W10
  With ON-delay or OFF-delay, without auxiliary voltage
- Solid-state timing relays with semiconductor output 3RA2811-.CW10 and 3RA2812-.DW10
  With ON-delay or OFF-delay, with auxiliary voltage
- Star-delta (wye-delta) function module 3RA2816-0EW20
  Complete module kit for star-delta (wye-delta) start

Note

No further auxiliary switch blocks may be mounted on the basic devices when using the 3RA28 function modules.

Note

Sizes S00 to S2

Sizes S00 to S2 use the same function modules.
From product version E03 onwards, the 3RA2813/14/15/16 function modules can be used for mounting on 3RT2 contactors.

The 3RA2811/12 function modules can be used for mounting on 3RT2.1 / 3RT2.2 contactors (sizes S00 and S0).

From product version E01 onwards, 3RA2831/32 function modules can be used for mounting on 3RT2 contactors.

Reference

More information ...	Can be found in the appendix ...
About the different versions of the 3RA28 function modules	"References" under "SIRIUS Innovations manuals (Page 390)" in the manual "SIRIUS Innovations - SIRIUS 3RA28 function modules for mounting on 3RT2 contactors".
About mounting 3RA28 function modules on 3RT2 contactors	

8.24 Assembly kit for reversing contactor assemblies

8.24.1 Description

Users can mount the 3RA23 reversing contactor assembly using various assembly kits for screw and spring-loaded connections.

Note

The 3RT201./3RT202./3RT203. power contactors required for installing the 3RA23 reversing contactor assembly in sizes S00 to S2 have to be ordered separately.

Assembly kit for 3RA23 reversing contactor assembly

The following components are included in delivery with the assembly kit for 3RA23 reversing contactor assembly:

- Mechanical interlock (S00 and S0)[1)]
- 2 connecting clips for 2 contactors (S00, S0)
- Wiring modules, top and bottom
- Auxiliary wiring modules top and bottom (S2 with screw connection only)
- 2 connecting pins (S2)
- 3 cables (S2 with spring-loaded connection)

[1)] To be ordered separately as accessories for S2.

The assembly kit is available in the following versions.

Table 8- 57 Versions of the assembly kit for 3RA23 reversing contactor assembly

Connection system	Size	Article number
Screw connection	S00	3RA2913-2AA1
	S0	3RA2923-2AA1
	S2	3RA2933-2AA1
Spring-loaded connection[1)]	S00	3RA2913-2AA2
	S0	3RA2923-2AA2
	S2	3RA2933-2AA2

[1)] For size S2, spring-loaded connection is only available in the control circuit.

Electrical interlock

The assembly kit for contactors (size S00 to S2) with screw-type connections contains wiring modules for connecting the main and control current paths.
The assembly kit for contactors (size S00) with screw-type connections contains wiring modules for connecting the main and control current paths.
For contactors (size S0) with spring-loaded connections the kit only contains wiring modules for connecting the main circuit. If the control circuit wiring (electrical interlock) is also required, the auxiliary switches must be wired separately as necessary. The procedure is described in the chapter titled Mounting (Page 211).

8.24.2 Mounting

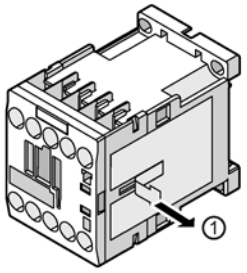
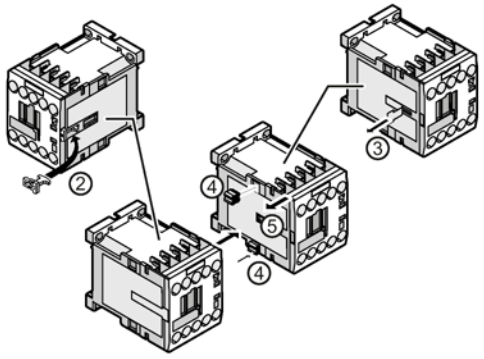
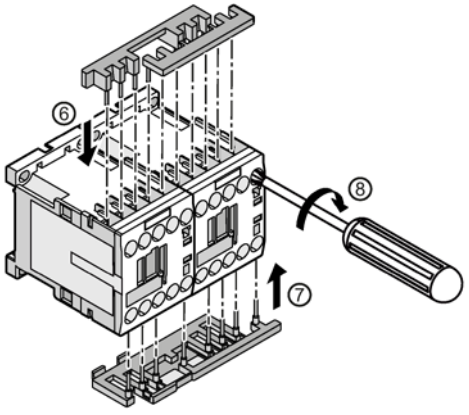
The reversing contactor assemblies can be built from contactors with screw connections or spring-loaded connections:

- Standard contactor (Q 11) for direction of rotation 1 (clockwise rotation): Left
- Standard contactor (Q 12) for direction of rotation 2 (counterclockwise rotation): Right

The illustration below shows example procedures for assembling the reversing contactor assembly 3RA23 size S00 with screw-type connection. Instructions 1 to 5 show how to assemble the contactors using the mechanical interlock and the connecting clips.

Assembling the reversing contactor assembly with screw-type connection - size S00

Table 8- 58 Assembling the reversing contactor assembly with screw-type connection (size S00)

Step	Instructions	Figure
1	Pull the adhesive label off the nameplate on the right-hand side of contactor Q11.	
2	Insert the mechanical interlock into the opening on the right-hand side of the contactor.	
3	Pull the adhesive label off the nameplate on the left-hand side of contactor Q12.	
4	Insert the connecting clips into the openings on the contactor.	
5	Connect contactors Q11 and Q12 together.	
6	Attach the wiring modules for connecting the main and control current paths to the contactors from above.	
7	Attach the wiring modules for connecting the main current paths to the contactors from below.	
8	Screw the wiring modules tight with a screwdriver.	

Electrical interlock

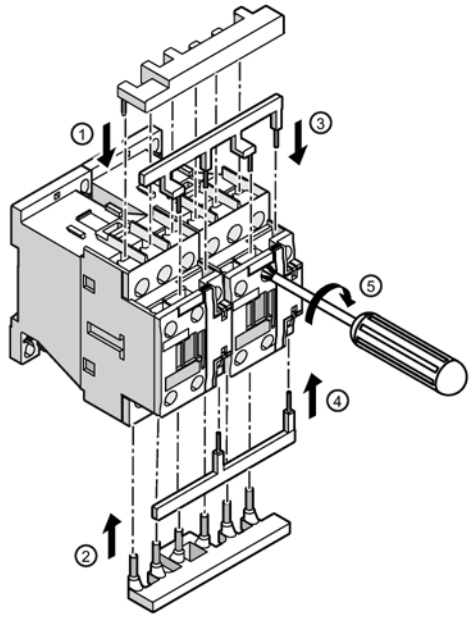
Note

Contactors with one NC contact in the basic device (3RT201.) are required for the electrical interlock.

Assembling the reversing contactor assembly with screw-type connection - size S0

The illustrations below show the components of the assembly kit for the reversing contactor assembly in size S0 and explain the assembly procedure. The mechanical interlock and the connecting clips are mounted in the same way as described for size S00 with screw-type connection.

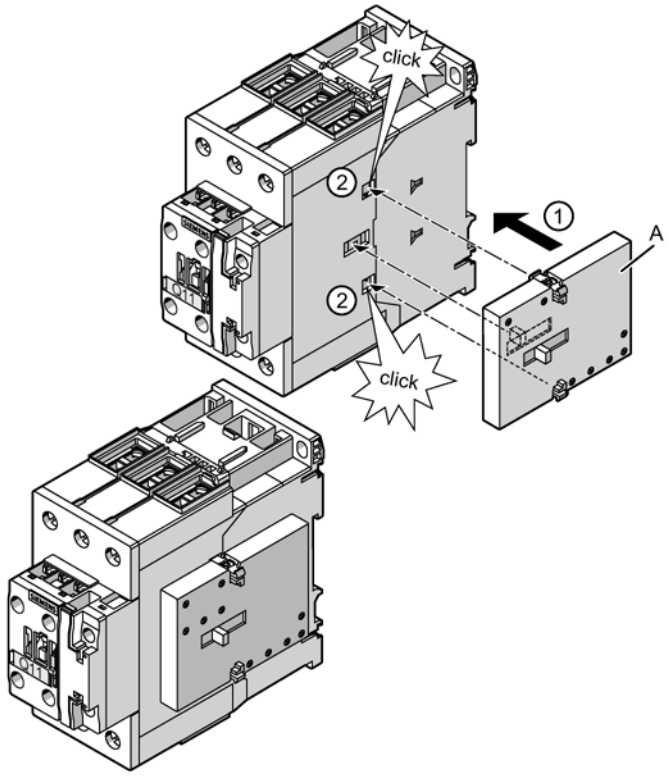
Table 8- 59 Assembling the reversing contactor assembly with screw-type connection (size S0)

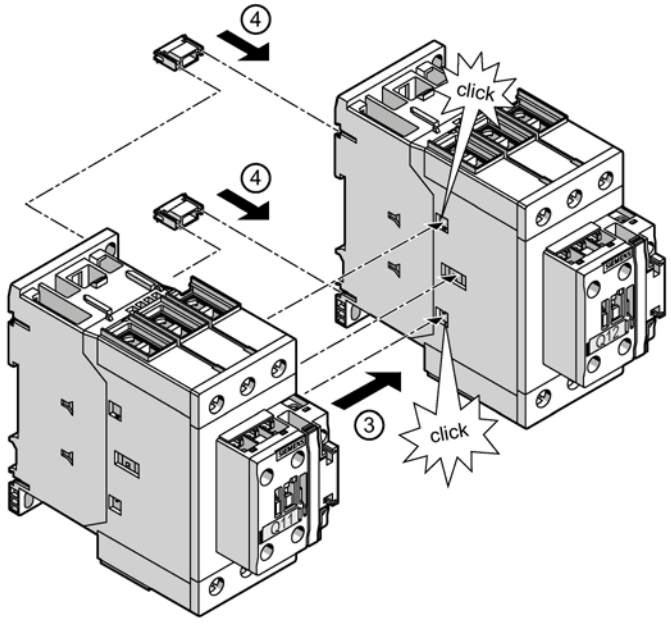
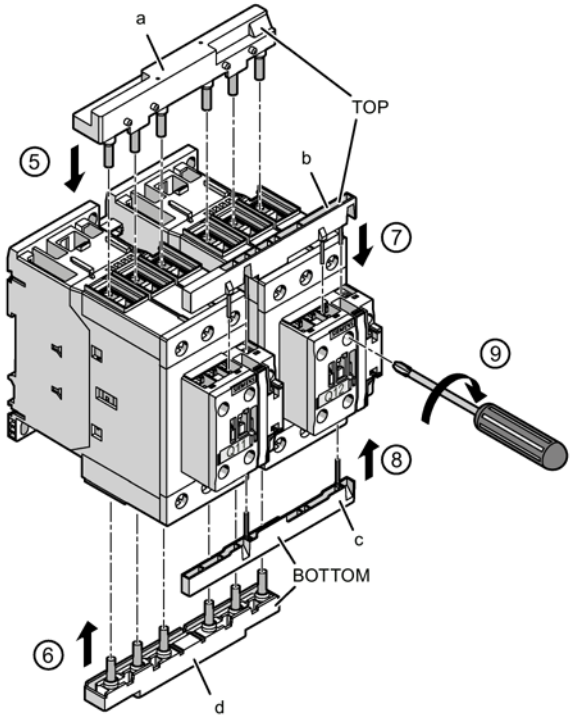
Step	Instructions	Figure
1 / 2	Attach the wiring modules for connecting the main current paths to the contactors from above and below.	
3 / 4	Attach the wiring modules for connecting the control current paths to the contactors from above and below.	
5	Screw the wiring modules tight with a screwdriver.	

Assembling the reversing contactor assembly with screw-type connection - size S2

The illustrations below show the components of the assembly kit for the reversing contactor assembly in size S2 and explain the assembly procedure.

Table 8- 60 Assembling the reversing contactor assembly with screw-type connection (size S2)

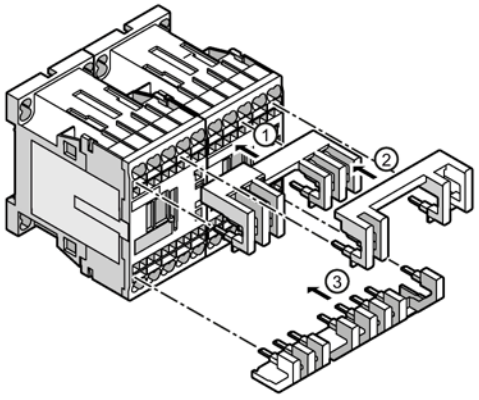
Step	Instructions	Figure
1 / 2	Insert the mechanical interlock (3RA2934-2B) into the opening on the right-hand side of the contactor. Optional component A (mechanical interlock) is mandatory for mechanical interlocking.	

Step	Instructions	Figure
3	Connect the contactors with each other.	
4	Insert the connecting clips into the openings on the contactor.	
5 / 6	Attach the wiring modules for connecting the main current paths to the contactors from above (a) and below (d).	
7 / 8	Attach the wiring modules for connecting the control current paths to the contactors from above (b) and below (c).	
9	Screw the wiring modules tight with a screwdriver.	

Assembling the reversing contactor assembly with spring-loaded connection - size S00

The mechanical interlock and the connecting clips are mounted in the same way as described for size S00 with screw-type connection.

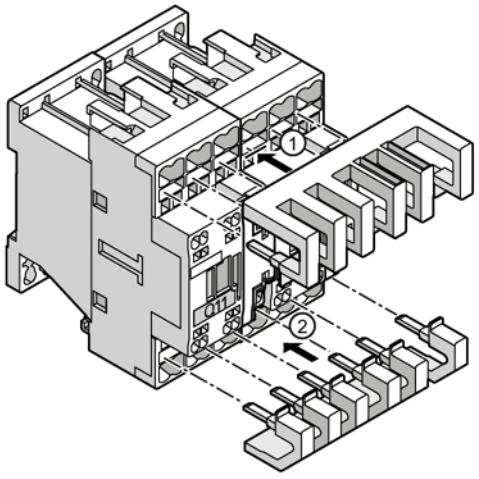
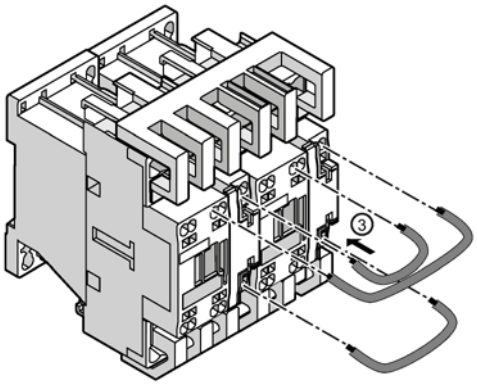
Table 8- 61 Assembling the reversing contactor assembly with spring-loaded connection (size S00)

Step	Instructions	Figure
1	Attach the wiring modules for connecting the main current paths to the contactors from above.	
2	Attach the wiring modules for connecting the control current paths to the contactors from above.	
3	Attach the wiring modules for connecting the main current paths to the contactors from below.	

Assembling the reversing contactor assembly with spring-loaded connection - size S0

The illustrations below show the components of the assembly kit for the reversing contactor assembly in size S0 and explain the assembly procedure. The mechanical interlock and the connecting clips are mounted in the same way as described for size S00 with screw-type connection.

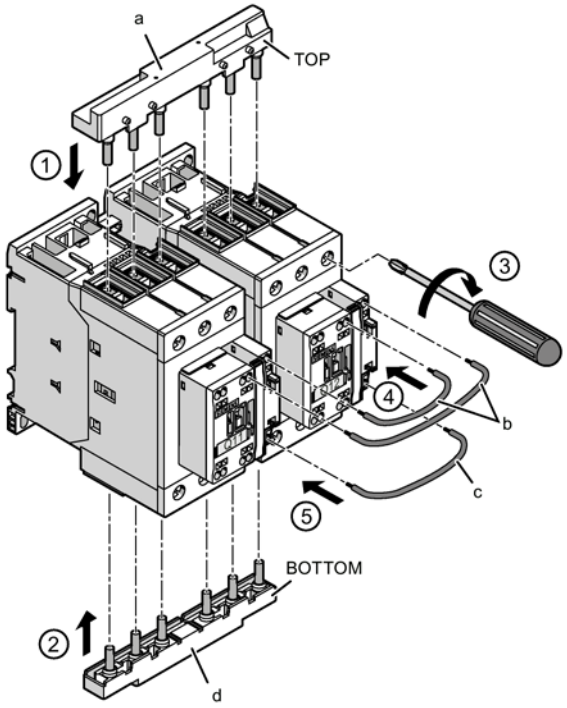
Table 8- 62 Assembling the reversing contactor assembly with spring-loaded connection (size S0)

Step	Instructions	Figure
1 / 2	Attach the wiring modules for connecting the main current paths to the contactors from above and below.	
3	To connect the control current paths, strip the conductors and push them into the contactor terminals. Note: The conductors required for connecting the control current paths are not included in the scope of supply of the assembly kit for reversing contactor assemblies with spring-loaded connection (size S0).	

Assembling the reversing contactor assembly with spring-loaded connection - size S2

The illustrations below show the components of the assembly kit for the reversing contactor assembly in size S2 and explain the assembly procedure. The mechanical interlock and the connecting clips are mounted in the same way as described for size S2 with screw-type connection.

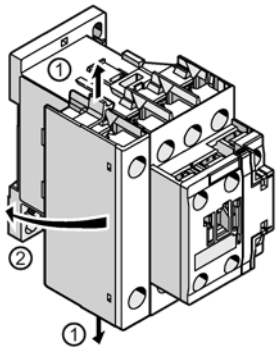
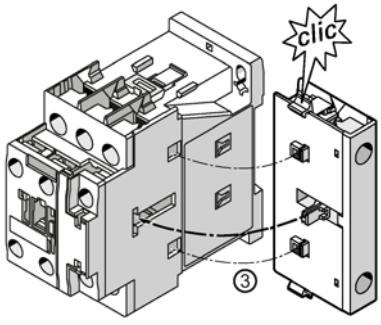
Table 8- 63 Assembling the reversing contactor assembly with spring-loaded connection (size S2)

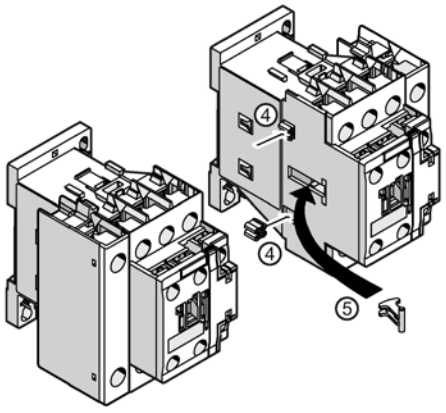
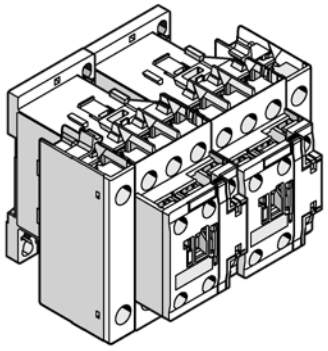
Step	Instructions	Figure
1 / 2	Attach the wiring modules for connecting the main current paths to the contactors from above (a) and below (d).	
3	Screw the wiring modules tight with a screwdriver.	
4 / 5	To connect the control current paths (b / c), push the conductors into the contactor terminals.	

4-pole assembly with mechanical interlock

The illustrations below show how to mount the 4-pole assembly with mechanical interlock in size S0.

Table 8- 64 Mounting the 4-pole assembly with mechanical interlock and screw-type connection (size S0)

Step	Instructions	Figure
1 / 2	Remove the 4th pin from one of the two contactors by releasing the snap hooks.	
3	Attach the 4th pin to the other side of the same contactor by hooking it into the openings on the contactor and snapping the pin to the contactor.	

Step	Instructions	Figure
4	Insert the connecting clips into the openings on contactor Q12.	
5	Secure the mechanical interlock on the left-hand side of contactor Q12.	
6	Connect contactors Q11 and Q12 together.	

8.25 Assembly kit for contactor assemblies for star-delta (wye-delta) start

8.25.1 Description

Prerequisite

The following components, which have to be ordered separately, are required to mount the contactor assembly for star-delta (wye-delta) start:

- Assembly kit for the 3RA24 contactor assembly for star-delta (wye-delta) start
- Function modules with or without communication connection.
- Three power contactors 3RT20

Note

For size S2, spring-loaded connection only in the control circuit

The following assemblies for spring-loaded connection are available for sizes S00 and S0 only.

Note

If the function modules are used, they take over the tasks associated with control circuit wiring and the timing relay. However, an installation without function modules and with an additional external timing relay continues to be possible. Accordingly, the scope of supply of the assembly kit includes the wiring modules for the control circuit wiring (these are not required if function modules are being used).

Assembly kit for 3RA24 contactor assembly for star-delta (wye-delta) start

The assembly kit for customer assembly of the 3RA24 contactor assembly for star-delta (wye-delta) start comprises the following components and is available in various versions.

Table 8- 65 Components for assembling the contactor assembly for star-delta (wye-delta) start

Assembly kit	Assembly kit components	Connection system	Article number
Assembly kit for size S00	• Mechanical interlock • 4 connecting clips • Star jumper • Wiring modules, top and bottom	Screw connection	3RA2913-2BB1
		Spring-loaded connection	3RA2913-2BB2
Assembly kit for size S0	• 4 connecting clips • Star jumper • Mechanical interlock • Wiring modules, top and bottom	Screw connection	3RA2923-2BB1
		Spring-loaded connection	3RA2923-2BB2
Assembly kit for size S2[1] (S2-S2-S0)	• Wiring modules, top and bottom • Star jumper S0 • Contactor base (for AC contactor size S0) The contactor base must not be used for DIN rail mounting. • Spacer disk • 2 connecting clips • 4 cables	Screw connection	3RA2933-2C
Assembly kit for size S2[1] (S2-S2-S2)	• 4 connecting clips • Star jumper S2 • Wiring modules, top and bottom • Auxiliary wiring modules top and bottom (screw connection only) • 1 cable for screw connection • 4 cables for spring-loaded connection	Screw connection	3RA2933-2BB1
		Spring-loaded connection	3RA2933-2BB2

[1] In addition to the assembly kit S2, the mechanical interlock (3RA2934-2B) and the mounting plate (3RA2932-2F) can be optionally used.

Function modules without communication connection

The function module is compatible with both sizes (S00, S0 and S2) of the 3RA24 contactor assembly for star-delta (wye-delta) start and can be plugged in on the front of the contactors regardless of the connection system selected. It comprises the following components, which can be ordered as a complete module kit (3RA2816-0EW20).

- 3RA2912-0 basic module for star-delta (wye-delta) with integrated control logic and time setting
- Two coupling modules with integrated connecting cable 3RA2911-0

Function modules with communication connection

The SIRIUS modular system offers 3RA27 function modules for connection to the automation level; they are fitted with terminals for connection to AS-Interface (3RA2711) or IO-Link (3RA2712).

Note

If the contactor assembly for star-delta (wye-delta) starting is configured with the communication-capable 3RA27 function modules, a contactor with voltage tapping (3RT2...-....-0CC0) must be used as the line contactor.

Reference

More information ...	Can be found in the chapter titled...
About function modules without communication connection 3RA28	"References" under SIRIUS Innovations manuals (Page 390) in the manual "SIRIUS Innovations - SIRIUS 3RA28 function modules for mounting on 3RT2 contactors".

More information ...	Can be found in the manuals ...
About function modules with communication connection 3RA27	• "Function Modules for AS-Interface" (http://support.automation.siemens.com/WW/view/en/39318922) (3ZX1012-0RA27-0AC0) • "Function Modules for IO-Link" (http://support.automation.siemens.com/WW/view/en/39319600) (3ZX1012-0RA27-1AC1)

8.25.2 Mounting

The contactor assemblies for star-delta (wye-delta) start can be built from contactors with screw connections or spring-loaded connections:

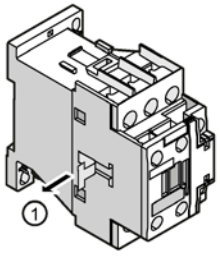
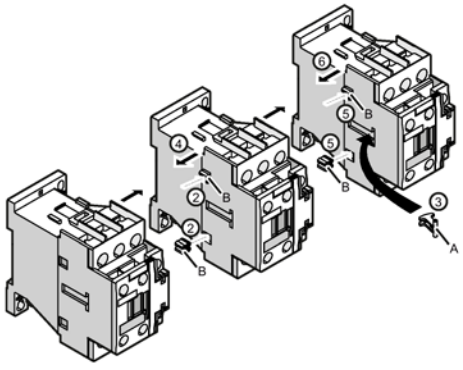
- Line contactor (Q11): Left
- Delta contactor (Q13): Center
- Star contactor (Q12): Right

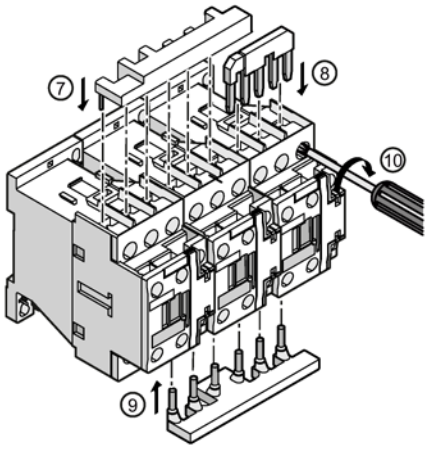
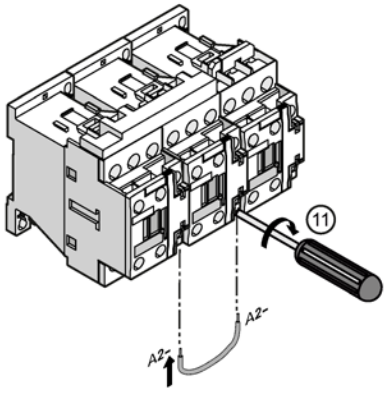
This arrangement applies for all installation instructions described in this chapter.

The illustration below shows example procedures for assembling the contactor assembly for star-delta (wye-delta) start in size S0 with screw-type connection. Instructions 1 to 6 show how to assemble the contactors using the components supplied in the assembly kit.

Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection - size S0

Table 8- 66 Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection (size S0)

Step	Instructions	Figure
1	Pull the adhesive label off the nameplate on the left-hand side of contactor Q12 and off the nameplate on the right-hand side of contactor Q13 (not illustrated).	
2	Insert the connecting clips into the openings on contactor Q13.	
3	Secure the mechanical interlock on the left-hand side of contactor Q12.	
4	Connect contactors Q11 and Q13 together.	
5	Insert the connecting clips into the openings on contactor Q12.	
6	Connect contactors Q11/Q13 and Q12 together.	

Step	Instructions	Figure
7	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13. The wiring modules for connecting the control current paths are not needed to build a contactor assembly for star-delta (wye-delta) start with function modules.	
8	Attach the wiring module for the neutral bridge to contactor Q12 from above.	
9	Attach the wiring modules for connecting the main current paths to contactors Q13 and Q12 from below.	
10	Screw the wiring modules tight with a screwdriver.	
11	Screw the conductors tight with a screwdriver.	

Electrical interlocking is available only if no 3RA28 is used.

Mounting the function module for star-delta (wye-delta) start

⚠ WARNING

Danger, high voltage!

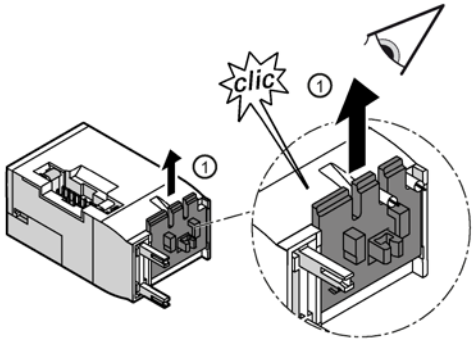
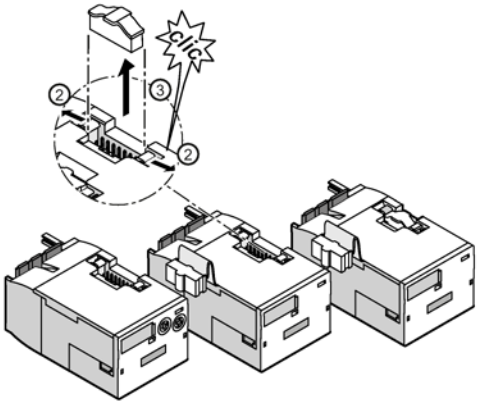
Will cause death or serious injury.

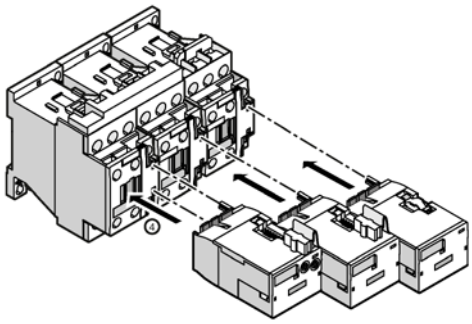
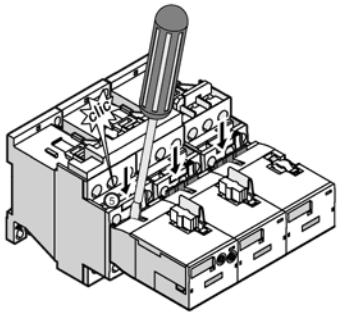
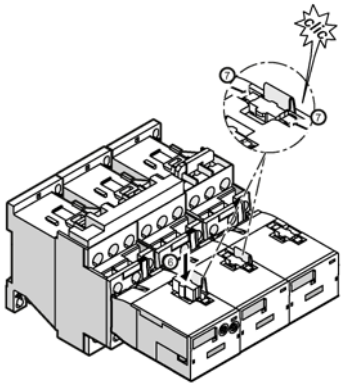
Turn off and lock out all power supplying this device before working on this device.

Note

Function modules perform the tasks of the circuit wiring and the timing relay

If you are building contactor assemblies from individual components, the function modules take over the tasks associated with control circuit wiring and the timing relay. The wiring modules for connecting the control current paths are not required.

Step	Instructions	Figure
1	Check that the locking slide is engaged in the topmost position.	
2 / 3	Remove the interface connection from the slot by lifting it up and out.	

Step	Instructions	Figure
4	Attach the basic module/coupling module to the contactor from the front. To do this, insert the contacts into the openings on the contactor.	
5	Push the locking slide down with a screwdriver until it engages.	
6 / 7	Insert the coded module connector into the slot in the correct position from above until the module connector engages in the locking mechanism.	

Note

The function modules are mounted on the contactor assemblies for star-delta (wye-delta) start described below as previously described.

Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection - size S00

⚠ WARNING

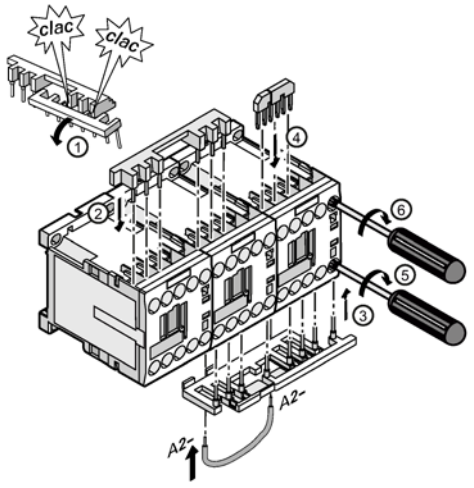
Danger, high voltage!

Will cause death or serious injury.

Turn off and lock out all power supplying this device before working on this device.

The mechanical interlock and the connecting clips are mounted and the function modules are plugged in in the same way as described for size S0 with screw-type connection.

Table 8- 67 Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection (size S00)

Step	Instructions	Figure
1	Break the wiring module apart. The wiring modules for connecting the control current paths are not needed to build a contactor assembly for star-delta (wye-delta) start with function modules.	
2 / 3	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13 from above and below.	
4	Attach the wiring module for the neutral bridge to contactor Q12 from above.	
5 / 6	Screw the wiring modules tight with a screwdriver.	

Electrical interlocking is available only if no 3RA28 is used.

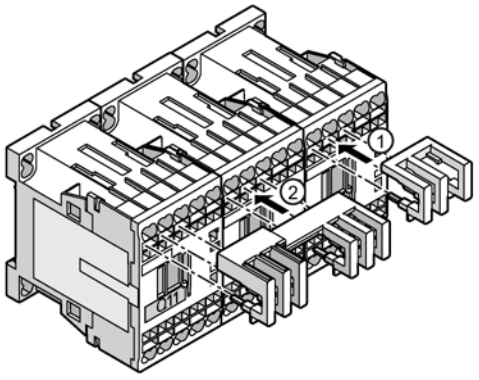
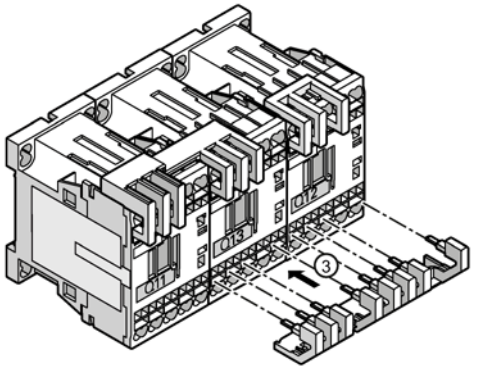
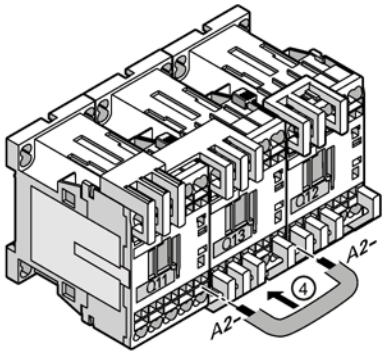
Note

The function modules are assembled as previously described.

Assembling the contactor assembly for star-delta (wye-delta) start with spring-loaded connection - size S00

The mechanical interlock and the connecting clips are mounted and the function modules are plugged in in the same way as described for size S0 with screw-type connection.

Table 8- 68 Assembling the contactor assembly for star-delta (wye-delta) start with spring-loaded connection (size S00)

Step	Instructions	Figure
1	Attach the wiring module for the neutral bridge to contactor Q12 from above. The wiring modules for connecting the control current paths are not needed to build a contactor assembly for star-delta (wye-delta) start with function modules.	
2	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13 from above.	
3	Attach the wiring module for connecting the main current paths to contactors Q13 and Q12 from below.	
4	Insert the screwdriver into the rectangular operating slot as far as it will go. The screwdriver blade keeps the spring-loaded terminal open automatically. Insert the conductor into the oval connection slot and then pull it back out again.	

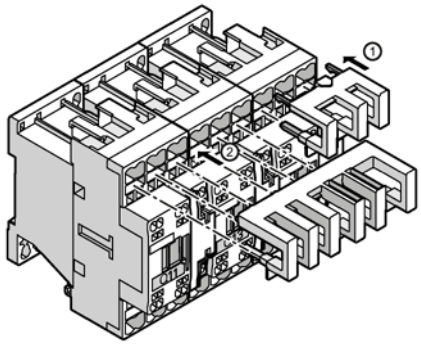
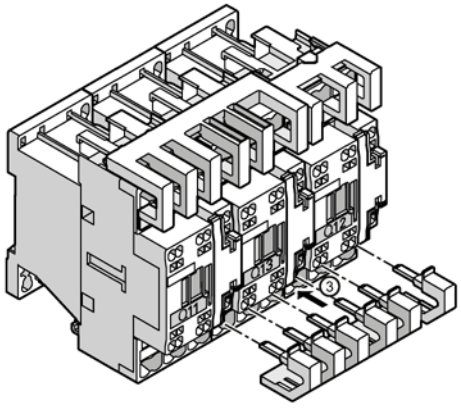
Note

The function modules are assembled as previously described.

Assembling the contactor assembly for star-delta (wye-delta) start with spring-loaded connection - size S0

The mechanical interlock and the connecting clips are mounted and the function modules are plugged in in the same way as described for size S0 with screw-type connection.

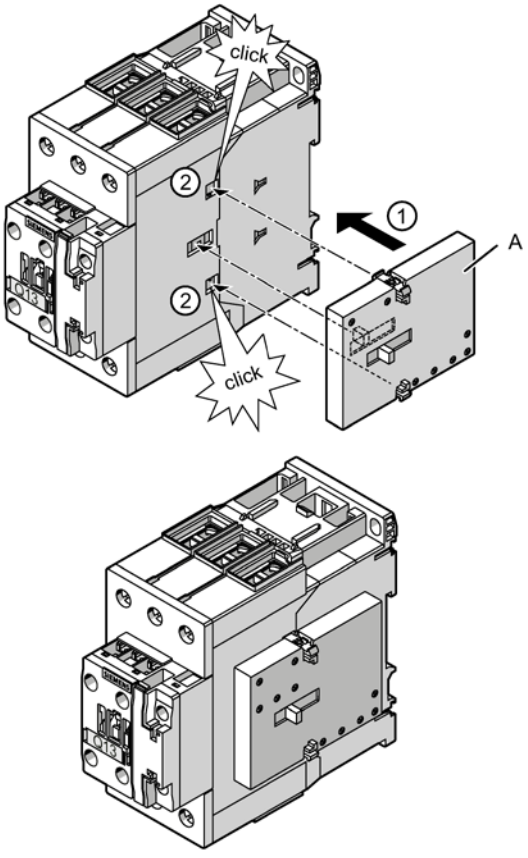
Table 8- 69 Assembling the contactor assembly for star-delta (wye-delta) start with spring-loaded connection (size S0)

Step	Instructions	Figure
1	Attach the wiring module for the neutral bridge to contactor Q12 from above.	
2	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13 from above.	
3	Attach the wiring modules for connecting the main current paths to contactors Q13 and Q12 from below.	

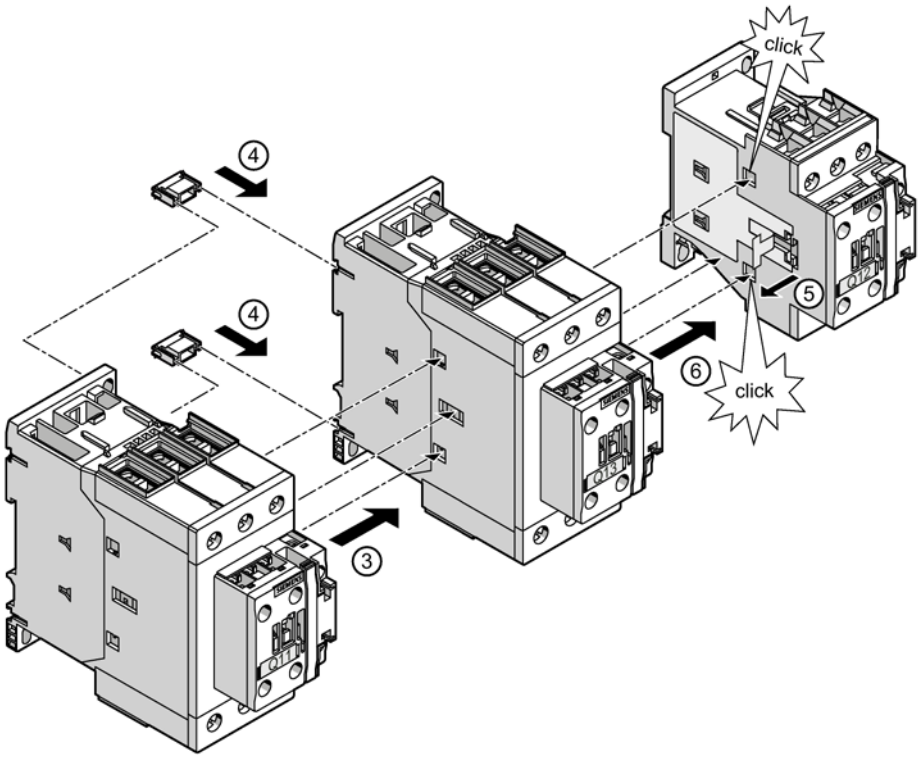
Note

The function modules are assembled as previously described.

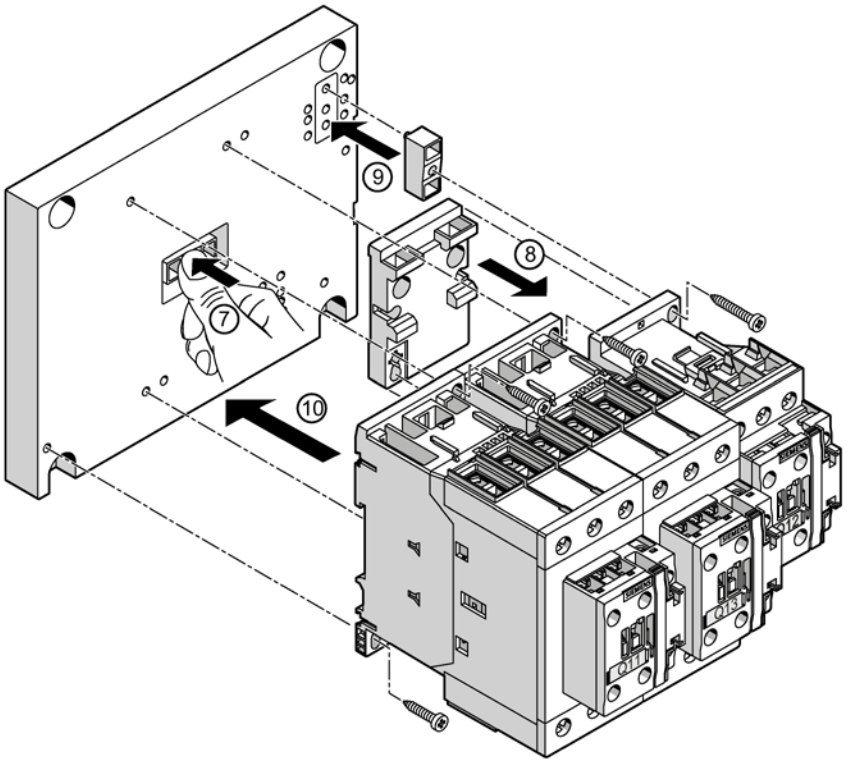
Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection - size S2-S2-S0



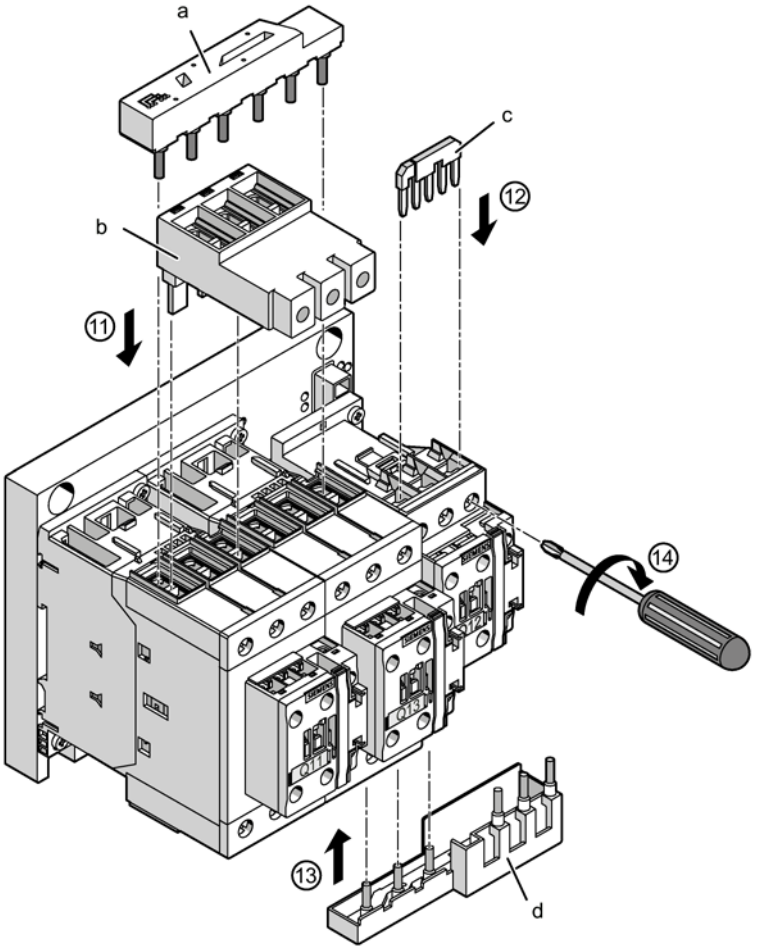
Step	Instructions
1 / 2	Insert the mechanical interlock (3RA2934-2B) into the opening on the right-hand side of contactor Q11. Optional component A (mechanical interlock) is mandatory for mechanical interlocking.



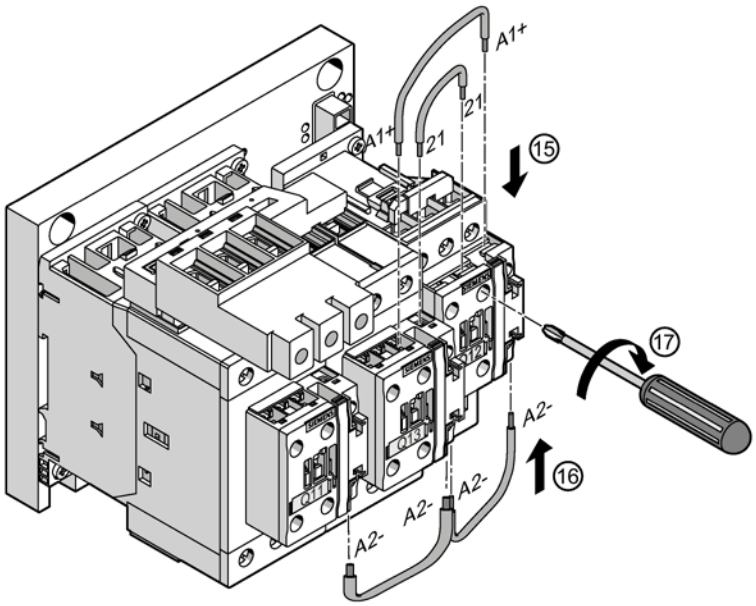
Step	Instructions
3	Connect contactors Q11 and Q13 together.
4	Insert the connection clips into the openings on contactors Q11 and Q13.
5	Pull the adhesive label off the nameplate on the left-hand side of contactor Q12 (size S0).
6	Connect contactors Q13 and Q12 together.



Step	Instructions
7	When using the mounting plate (3RA2932-2F), you must knock the spacers out of the mounting plate.
8	Fit the spacer disk.
9	Mount the spacer on the mounting plate.
10	Mount the contactors on the mounting plate. Screws: 6 x M6 with 1.6 Nm

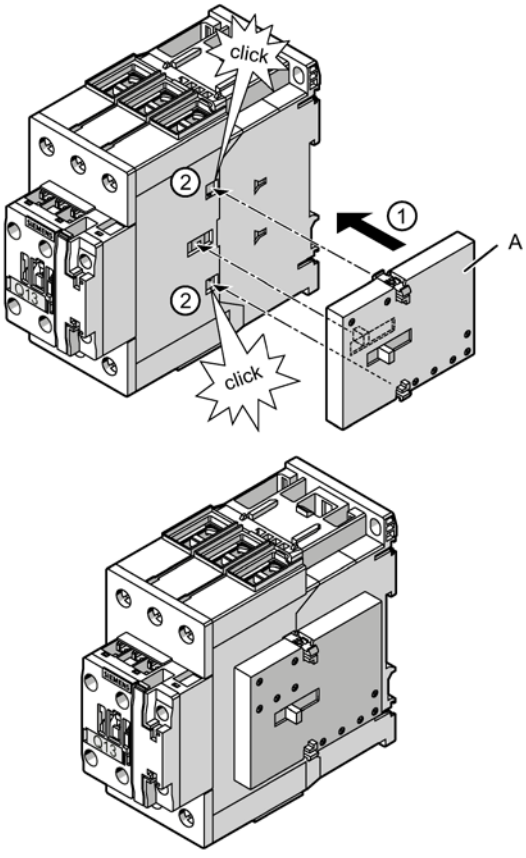


Step	Instructions
11	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13 from above (a). You can optionally use the 3-phase infeed terminal (b).
12	Attach the neutral bridge (c) to contactor Q12 from above.
13	Attach the wiring module for connecting the main current paths to contactors Q13 and Q12 from below (d).
14	Screw the wiring modules tight with a screwdriver.

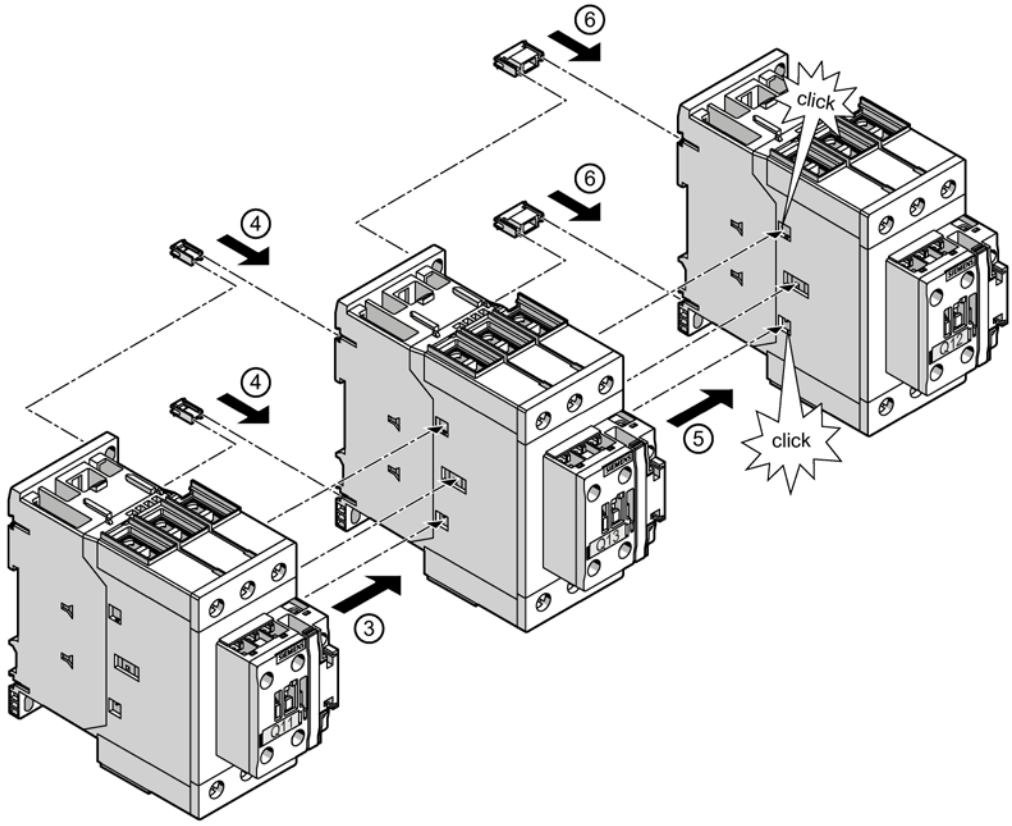


Step	Instructions
15 / 16	To connect the control circuit, push the conductor into the contactor terminals. To connect the coil contacts, push the conductors into the contactor terminals.
17	Screw the terminals tight with a screwdriver.

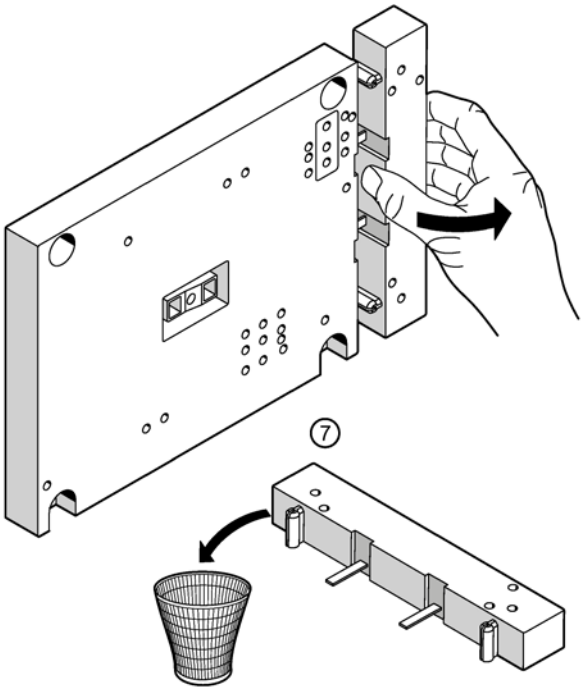
Assembling the contactor assembly for star-delta (wye-delta) start with screw-type connection - size S2-S2-S2



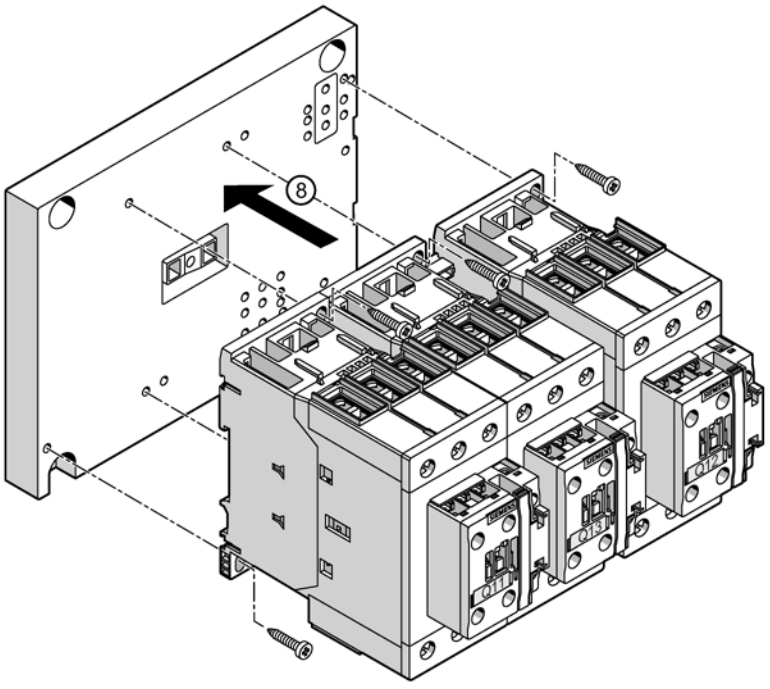
Step	Instructions
1 / 2	Insert the mechanical interlock (3RA2934-2B) into the opening on the right-hand side of contactor Q13. Optional component A (mechanical interlock) is mandatory for mechanical interlocking.



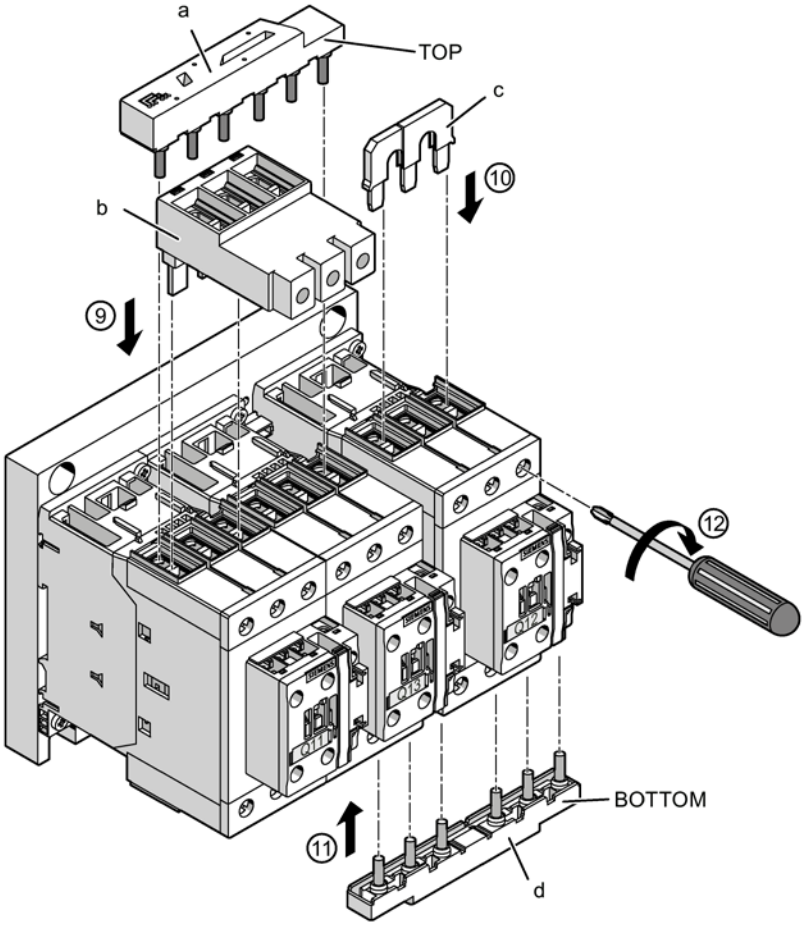
Step	Instructions
3	Connect contactors Q11 and Q13 together.
4	Insert the connection clips into the openings on contactors Q11 and Q13.
5	Connect contactors Q13 and Q12 together.
6	Insert the connection clips into the openings on contactors Q13 and Q12.



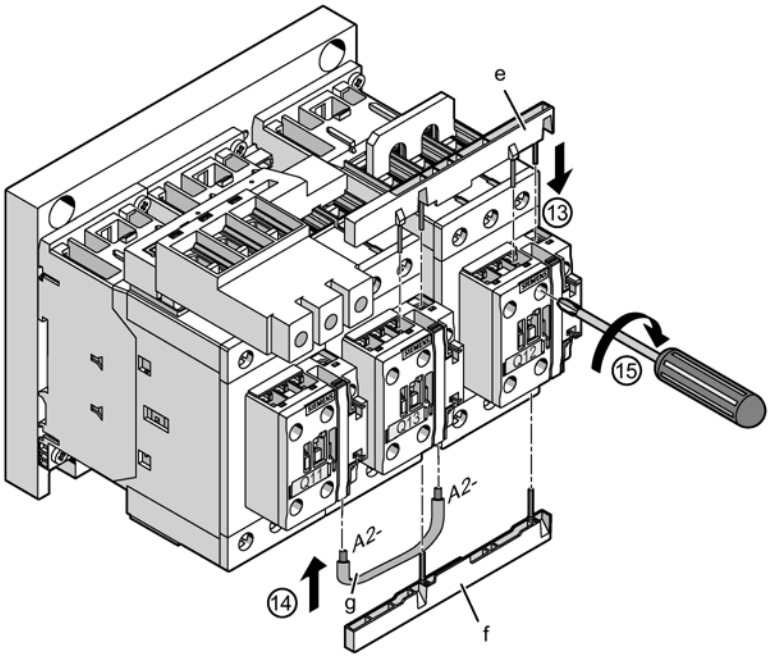
Step	Instructions
7	When using the mounting plate (3RA2932-2F), you must remove its side section. (Note: The side section is required when mounting the 3RP25 or 3RP15 timing relay.)



Step	Instructions
8	Mount the contactors on the mounting plate. Screws: 6 x M6 with 1.6 Nm



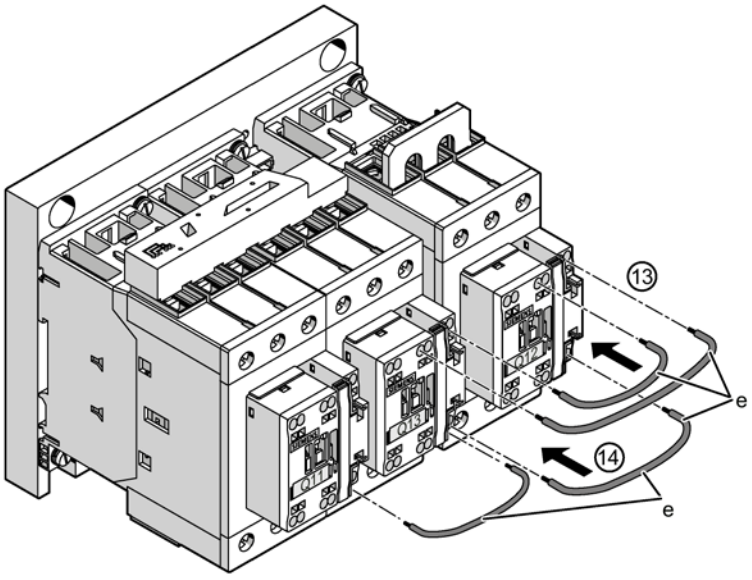
Step	Instructions
9	Attach the wiring module for connecting the main current paths to contactors Q11 and Q13 from above (a). You can optionally use the 3-phase infeed terminal (b).
10	Attach the neutral bridge (c) to contactor Q12 from above.
11	Attach the wiring module for connecting the main current paths to contactors Q13 and Q12 from below (d).
12	Screw the terminals tight with a screwdriver.



Step	Instructions
13	Attach the wiring module for connecting the control current paths to contactors Q13 and Q12 from above (e).
14	Attach the wiring module for connecting the control current paths to contactors Q13 and Q12 from below (f). To connect the coil contacts, push the conductors into the terminals of contactors Q11 and Q13.
15	Screw the terminals tight with a screwdriver.

Assembling the contactor assembly for star-delta (wye-delta) start with spring-loaded connection - size S2-S2-S2

The mechanical interlock, the connecting clips and the wiring modules for connecting the main current paths are mounted (steps 1-12) in the same way as described for size S2-S2-S2 with screw-type connection.



Step	Instructions
13 / 14	To connect the control current paths, push the conductor (e) into the contactor terminals. To connect the coil contacts, push the conductors (e) into the contactor terminals.

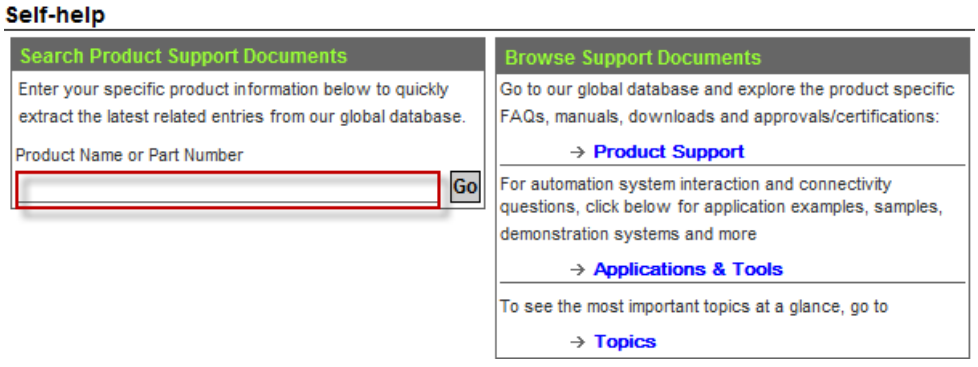
Technical data

9

9.1 Product data sheet

You will find the current SIRIUS Innovations product data sheets in the Service&Support Portal (http://support.automation.siemens.com).

Enter the article number of the device in the "Product Name or Part Number" field and confirm your selection by clicking on the "Go" button.



On the "Product Support" page, select the "Technical/CAx data" tab.

Select the "Technical Data" option box and a list of the contents of the product data sheet will appear:

- Technical data
- Approvals/Certificates
- Dimension drawing
- Wiring diagram
- Internal circuit diagram

3RT2015-1AB01 CONTACTOR,AC3:3KW 1NO AC24V 50/60HZ

Product information | Entries | Technical / CAx data | Modification Manual | Successor product

(•) Technical Data ( ) CAx data

CONTACTOR, AC-3, 3KW/400V, 1NO, AC 24V, 50/60 HZ, 3-POLE, SZ S00 SCREW TERMINAL

General technical data:		
product brand name		SIRIUS
Size of the contactor		S00
Product extension		
• auxiliary switch		Yes
• function module for communication		No
Protection class IP / on the front		IP20
Protection against electrical shock		finger-safe
Degree of pollution		3
Installation altitude / at a height over sea level / maximum	m	2,000
Ambient temperature		
• during storage	°C	-55...+80
• during operating	°C	-25...+60
Shock resistance		
• at rectangular impulse		
◦ at AC		6,7g / 5 ms, 4,2g / 10 ms
• at sine pulse		
◦ at AC		10,5g / 5 ms, 6,6g / 10 ms
Impulse voltage resistance / rated value	kV	6
Insulation voltage / rated value	V	690
Maximum permissible voltage for protective separation / between coil and main contacts / in	V	400

Using the "Create PDF" button on the right-hand side, you have the option of downloading your selection in a PDF file.
All information on the product you have chosen is at your disposal free of charge around the clock and you always get the current version.

9.2 Contactors for switching motors (3RT20)

9.2.1 Rated data for auxiliary contacts

Table 9- 1 Technical data for 3RT2 contactors - Rated data for auxiliary contacts

Type			**3RT2**	
Size			**S00**	**S0**
Rated data for auxiliary contacts				
Acc. to IEC 60947-5-1/DIN EN 60947-5-1 (VDE 0660 Part 200) (Data applies to integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactors size S00 and S0.)				
Rated insulation voltage U_i (pollution degree 3)		V	690	
Conventional thermal current I_{th} =		A	10	
Rated operational current I_e/AC-12				
AC load				
Rated operational current I_e/AC-15/AC-14				
• at rated operational voltage U_e	Up to 125 V	A	10[2)]	
	220 V	A	10[2)]	
	230 V	A	10[2)]	
	380 V	A	3	
	400 V	A	3	
	500 V	A	2	
	660 V	A	1	
	690 V	A	1	
DC load				
Rated operational current I_e/DC-12				
• at rated operational voltage U_e	24 V	A	10	
	60 V	A	6	
	110 V	A	3	
	125 V	A	2	
	220 V	A	1	
	440 V	A	0.3	
	600 V	A	0.15	

Type			**3RT2**	
Size			**S00**	**S0**
Rated data for auxiliary contacts				
Rated operational current I_e/DC-13				
• at rated operational voltage U_e	24 V	A	10[1)]	
	60 V	A	2	
	110 V	A	1	
	125 V	A	0.9	
	220 V	A	0.3	
	440 V	A	0.14	
	600 V	A	0.1	
Contact reliability at 17 V, 1 mA acc. to DIN EN 60947-5-4			Frequency of contact faults $<10^{-8}$ i.e. < 1 fault per 100 million operating cycles	

1) Contacts in auxiliary switch blocks for contactors size S00 and S0: 6 A

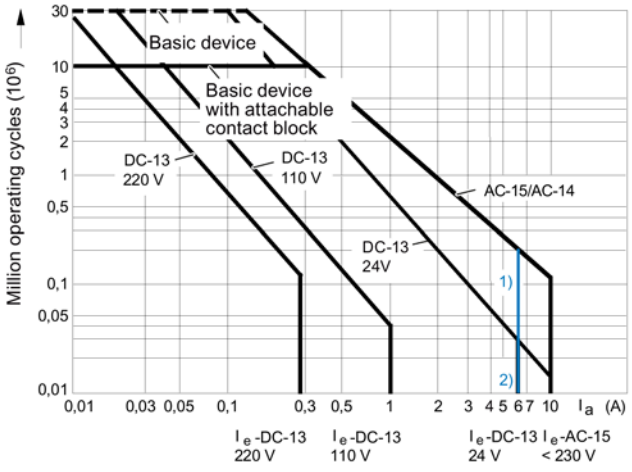
2) 3RH22, 3RH29, 3RT2...-....4: I_e = 6 A for AC-15/AC-14 and DC-13.

9.2.2 Contact service life of auxiliary and main contacts

Contact service life of auxiliary contacts

This requires operating mechanisms that switch at random, i.e. not synchronized with the phase angle of the supply system.
The contact service life is essentially dependent on the breaking current.
The characteristic curves apply to:

- Integrated auxiliary contacts on 3RT20
- Auxiliary switch blocks 3RH2911-., 3RH2921-. for contactors size S00 and S0



Legend for diagram:
I_a = Breaking current
I_e = Rated operational current

1) Integrated auxiliary contacts (size S0) and contacts in the auxiliary switch blocks for contactors (size S00 and S0): 6 A

2) Contacts in auxiliary switch blocks for contactors size S00 and S0: 6 A

Contact service life of main contacts

The characteristic curves show the contact service life of contactors when switching resistive and inductive three-phase loads (AC-1/AC-3) as a function of breaking current and rated operational voltage. This requires operating mechanisms that switch at random, i.e. not synchronized with the phase angle of the supply system.

The rated operational current I_e in accordance with utilization category AC-4 (breaking of 6 times the rated operational current) is specified for a contact service life of at least 200,000 operating cycles.

If a shorter contact service life is sufficient, the rated operational current I_e/AC-4 can be increased.

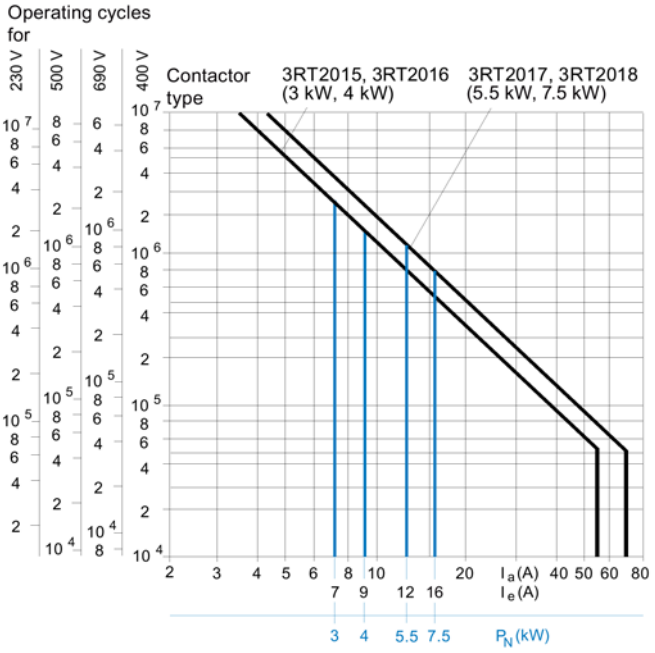
In the case of mixed operation, i.e. if normal switching operation (breaking of rated operational current in accordance with utilization category AC-3) is mixed with occasional inching (breaking of the multiple rated operational current in accordance with utilization category AC-4), the service life of the contacts can be calculated approximately using the following formula:

$$X = \frac{A}{1 + \frac{C}{100} \cdot \left(\frac{A}{B} - 1\right)}$$

Legend for formula:

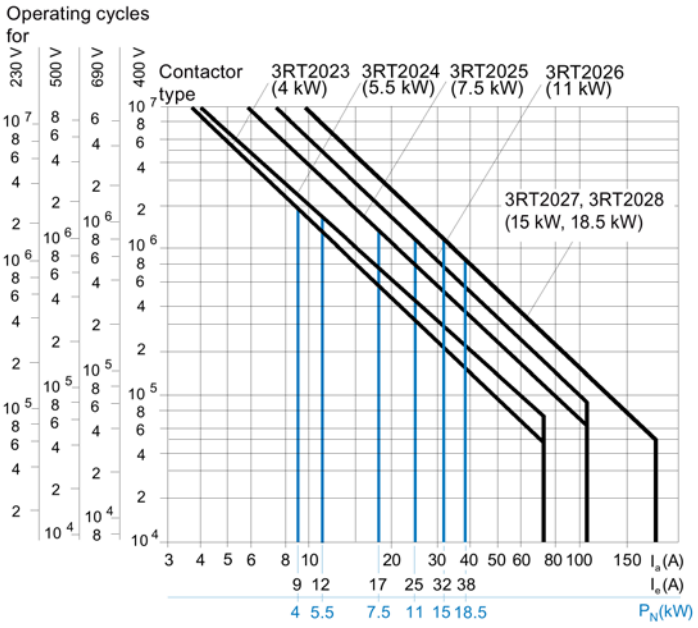
- X: Contact service life for mixed operation in operating cycles
- A: Contact service life for normal operation ($I_a = I_e$) in operating cycles
- B: Contact service life for inching (I_a = multiple of I_e) in operating cycles
- C: Proportion of inching operations as a percentage of all operations

Size S00



Contact service life of main contacts

Size S0



Legend for diagram:

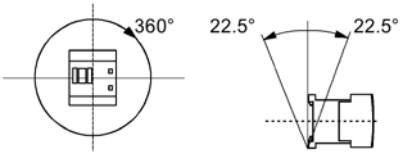
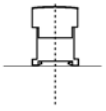
P_N= Rated power of squirrel-cage motors at 400 V

I_a= Breaking current

I_e= Rated operational current

9.2.3 General data and short-circuit protection for 3RT201. contactors without overload relay

Table 9- 2 General data - 3RT201.

Type			**3RT2015, 3RT2016**	**3RT2017, 3RT2018**
Size			**S00**	
General data				
Permissible mounting position	• AC and DC operation			
The contactors are dimensioned for operation on a vertical mounting plane.				
Vertical mounting position:	• AC operation and DC operation			
			Special version required.	
Mechanical endurance	• Basic device	Operating cycles	30 million	
	• Basic device with snap-on auxiliary switch block		10 million	
	• Solid-state compatible auxiliary switch block		5 million	
Electrical durability			[1]	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Rated impulse withstand voltage U_{imp}		kV	6	
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N		V	400	
Mirror contacts				
A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a main NO contact.				
• 3RT201., 3RT231.(removable auxiliary switch block)			Yes, in the basic unit as well as between the basic unit and the snap-on auxiliary switch block in accordance with DIN EN 60947-4-1, Annex F	
• 3RT201., 3RT231. (permanently mounted auxiliary switch block)			Yes, in accordance with DIN EN 60947-4-1, Annex F	
• Solid-state-compatible auxiliary switch blocks 3RH2911-.NF.. and 3RH2911-.DE..			No mirror contacts for the solid-state compatible auxiliary switch blocks	

Type			**3RT2015, 3RT2016**	**3RT2017, 3RT2018**
Size			**S00**	
General data				
Ambient temperature	• Operation	°C	-25 ... + 60	
	• Storage	°C	-55 ... + 80	
Degree of protection to EN 60947-1, Annex C			IP20, operating mechanism system IP40	
Touch protection acc. to DIN EN 50274			Finger-safe	
Shock resistance				
• Rectangular pulse	• AC operation		6.7g/5 ms and 4.2g/10 ms	7.3g/5 ms and 4.7g/10 ms
	• DC operation		6.7g/5 ms and 4.2g/10 ms	7.3g/5 ms and 4.7g/10 ms
• Sine pulse	• AC operation		10.5g/5 ms and 6.6g/10 ms	11.4g/5 ms and 7.3g/10 ms
	• DC operation		10.5g/5 ms and 6.6g/10 ms	11.4g/5 ms and 7.3g/10 ms
Conductor cross-sections			[2]	

[1] Contact service life for main contacts is listed in the table titled "Contact service life of auxiliary and main contacts"

[2] Conductor cross-sections are listed in the table titled "Conductor cross-sections - 3RT201."

Table 9- 3 Short-circuit protection for contactors without overload relay

Type			3RT2015, 3RT2016	3RT2017, 3RT2018
Size			**S00**	
Short-circuit protection for contactors without overload relay				
Main circuit				
• Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/DIN EN 60947-4-1				
	- Type of coordination "1"	A	35	50
	- Type of coordination "2"	A	20	25
	- Weld-free[3)]	A	10	
• Miniature circuit breakers (up to 230 V) with C characteristic short-circuit current 1 kA, type of coordination "1"		A	10	
Auxiliary circuit				
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free fuse protection $I_k \geq 1$ kA)		A	10	
• Miniature circuit breakers up to 230 V with C characteristic short-circuit current $I_k < 400$ A		A	6	

1) Contact service life for main contacts is listed in the table titled "Contact service life of auxiliary and main contacts"

2) Conductor cross-sections are listed in the table titled "Conductor cross-sections - 3RT201."

3) For test currents "r" and I_q in accordance with IEC 60947-4-1.

9.2.4 Actuation - 3RT201. contactors

Table 9- 4 Actuation - 3RT201. contactors

Type			**3RT2015...16**	**3RT2017...18**
Size			**S00**	
Actuation				
Magnet coil operating range				
• AC operation				
		50 Hz	0.8 ... 1.1 x U_S	
		60 Hz	0.85 ... 1.1 x U_S	
• DC operation				
		To 50 °C	0.8 ... 1.1 x U_S	
		To 60 °C	0.85 ... 1.1 x U_S	
Magnet coil power input (for cold coil and 1.0 x U_S)				
AC operation, 50/60 Hz				
• Standard version				
	- Switch-on power	VA	27 / 24,3	37 / 33
	- cos ϕ		0,8 / 0,75	
	- Holding power	VA	4,2 / 3,3	5,7 / 4,4
	- cos ϕ		0,25 / 0,25	
• AC operation, 50 Hz, USA/Canada				
	- Switch-on power	VA	26,4	36
	- cos ϕ at switch-on power		0,81	0,8
	- Holding power	VA	4,4	5,9
	- cos ϕ at holding power		0,24	
• AC operation, 60 Hz, USA/Canada				
	- Switch-on power	VA	31,7	43
	- cos ϕ at switch-on power		0,81	0,8
	- Holding power	VA	4,8	6,5
	- cos ϕ at holding power		0,25	
• DC operation				
	- Closing = Closed	W	4	

Type		**3RT2015...16**	**3RT2017...18**
Size		**S00**	
Actuation			
Permissible residual current of electronics (with 0 signal)			
• AC operation	mA	< 3 mA x (230 V/U_S); the use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.	< 4 mA x (230 V/U_S); the use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.
• DC operation	mA	< 10 mA x (24 V/U_S); the use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.	
Switching times[1)]			
Total break time = opening delay + arcing time			
• AC operation at 0.8 to 1.1 x U_s			
- Closing delay	ms	9 ... 35	8 ... 33
Opening delay	ms	3,5 ... 14	4 ... 15
• DC operation at 0.85 to 1.1 x U_s			
- Closing delay	ms	30 ... 100	
- Opening delay	ms	7 ... 13	
• Arcing time	ms	10 ... 15	
Switching times at 1.0 x U_s[1)]			
• AC operation			
- Closing delay	ms	9,5 ...24	9 ... 22
- Opening delay	ms	4 ... 14	4,5 ... 15
• DC operation			
- Closing delay	ms	35 ... 50	
- Opening delay	ms	7 ... 12	

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (suppression diode 6x to 10x; diode combinations 2x to 6x; varistor +2 ms to 5 ms; suppressor diode: 1 ms to 5 ms).

9.2.5 Main circuit - 3RT201. contactors (current carrying capacity for alternating current and direct current)

Table 9- 5 Main circuit - Current carrying capacity for alternating current (3RT201. contactors)

Type			**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size			**S00**			
Main circuit						
Current carrying capacity for alternating current						
Utilization category AC-1, switching resistive loads						
• Rated operational current I_e						
	At 40 °C up to 690 V	A	18	22		
	At 60 °C up to 690 V	A	16	20		
• Rated powers of three-phase current loads[1] cos ϕ = 0.95 (at 60 °C)						
	230 V	kW	6.3	7.5		
	400 V	kW	11	13		
	690 V	kW	19	22		
• Minimum conductor cross-section for loads with I_e						
	At 40 °C	mm^2	2.5			
	At 60 °C	mm^2	2.5			
Utilization category AC-2 and AC-3						
• Rated operational currents I_e						
	400 V	A	7	9	12	16
	440 V	A	7	9	11	14
	500 V	A	6	7.7	9.2	12.4
	690 V	A	4.9	6.7	6.7	8.9
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz						
	230 V	kW	1.5	2.2	3	4
	400 V	kW	3	4	5.5	7.5
	690 V	kW	4	5.5	5.5	7.5
Thermal load						
	10 s current[2]	A	56	72	96	128
Power loss per current path	At I_e/AC-3	W	0.42	0.7	1.24	2.2
Utilization category AC-4 (at $I_a = 6 \times I_e$)[3]						
• Rated operational current I_e	Up to 400 V	A	6.5	8.5	8.5	11.5
• Rated powers of squirrel-cage motors at 50 and 60 Hz	Up to 400 V	kW	3	4	4	5.5

Type				**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size				**S00**			
Main circuit							
Current carrying capacity for alternating current							
• The following applies for a contact service life of approximately 200,000 operating cycles:							
	- Rated operational currents I_e	Up to 400 V	A	2.6	4.1	4.1	5.5
		690 V	A	1.8	3.3	3.3	4.4
	- Rated powers of squirrel-cage motors at 50 Hz and 60 Hz	At 230 V	kW	0.67	1.1	1.1	1.5
		400 V	kW	1.15	2	2	2.5
		690 V	kW	1.15	2.5	2.5	3.5
Utilization category AC-5a, switching of gas discharge lamps, inductive ballast							
Per main current path at 230 V							
• Uncorrected, rated power per lamp/rated operational current per lamp							
	L 18 W/0.37 A		Qty.	47	52		
	L 36 W/0.43 A		Qty.	40	48		
	L 58 W/0.67 A		Qty.	26	28		
	L 80 W/0.79 A		Qty.	22	24		
• DUO switching (two-lamp)							
	L 18 W/0.22 A		Qty.	90 (≙ 2 x 90 lamps)	100 (≙ 2 x 100 lamps)		
	L 36 W/0.42 A		Qty.	47 (≙ 2 x 47 lamps)	52 (≙ 2 x 52 lamps)		
	L 58 W/0.63 A		Qty.	31 (≙ 2 x 31 lamps)	34 (≙ 2 x 34 lamps)		
	L 80 W/0.87 A		Qty.	22 (≙ 2 x 22 lamps)	25 (≙ 2 x 25 lamps)		
Switching of gas discharge lamps with correction							
Per main current path at 230 V							
• Shunt compensation with inductive ballast, rated power per lamp/capacitance/rated operational current per lamp							
	L 18 W/4.5 µF/0.11 A		Qty.	17	22	29	39
	L 36 W/4.5 µF/0.21 A		Qty.	15	19	21	
	L 58 W/7.0 µF/0.32 A		Qty.	10	14		
	L 80 W/7.0 µF/0.49 A		Qty.	6	9		
• With solid-state ballast[4)] single-lamp							
	L 18 W/6.8 µF/0.10 A		Qty.	49	63	84	112
	L 36 W/6.8 µF/0.18 A		Qty.	27	35	46	62
	L 58 W/10 µF/0.29 A		Qty.	16	21	28	38
	L 80 W/10 µF/0.43 A		Qty.	11	14	19	26

Type			3RT2015	3RT2016	3RT2017	3RT2018
Size			**S00**			
Main circuit						
Current carrying capacity for alternating current						
• With solid-state ballast[4] two-lamp						
	L 18 W/10 µF/0.18 A	Qty.	27 (≙ 2 x 27 lamps)	35 (≙ 2 x 35 lamps)	46 (≙ 2 x 46 lamps)	62 (≙ 2 x 62 lamps)
	L 36 W/10 µF/0.35 A	Qty.	14 (≙ 2 x 14 lamps)	18 (≙ 2 x 18 lamps)	24 (≙ 2 x 24 lamps)	32 (≙ 2 x 32 lamps)
	L 58 W/22 µF/0.52 A	Qty.	9 (≙ 2 x 9 lamps)	12 (≙ 2 x 12 lamps)	16 (≙ 2 x 16 lamps)	21 (≙ 2 x 21 lamps)
	L 80 W/22 µF/0.86 A	Qty.	5 (≙ 2 x 5 lamps)	7 (≙ 2 x 7 lamps)	9 (≙ 2 x 9 lamps)	13 (≙ 2 x 13 lamps)
Utilization category AC-5b, switching incandescent lamps						
Per main current path at 230/220 V		kW	1.3	1.7	2.2	3
Utilization category AC-6a, switching AC transformers						
• Rated operational current I_e						
- For inrush current n = 20	Up to 400 V	A	4	5.3	7.2	9.6
- For inrush current n = 30	Up to 400 V	A	2.7	3.5	4.8	6.4
• Rated power P						
- For inrush current n = 20	At 230 V	kVA	1.4	2	2.9	3.8
	400 V	kVA	2.5	3.5	5	6.6
	500 V	kVA	3.3	4.6	6.2	8.3
	690 V	kVA	4.3	6	8.6	11.4
- For inrush current n = 30	At 230 V	kVA	1	1.3	2	2.5
	400 V	kVA	1.6	2.3	3.5	4.4
	500 V	kVA	2.2	3.1	4.6	5.5
	690 V	kVA	2.9	4	6	7.6
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_n\ 30 \cdot 30/x$						

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (suppression diode 6x to 10x; diode combinations 2x to 6x; varistor +2 to 5 ms).

2) Acc. to IEC 60947-4-1. See the chapter titled "Overload relays" for rated values for different starting conditions.

3) The data specified is valid for 3RT2516 and 3RT2517 (2 NO contacts + 2 NC contacts) only up to a rated operational current of 400 V.

4) The number of lamps can be increased dependent upon the electronic ballast used.

Table 9- 6 Main circuit - Current carrying capacity for direct current (3RT201. contactors)

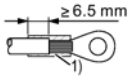
Type				**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size				**S00**			
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)							
• Rated operational current I_e(at 60 °C)							
	- 1 current path	Up to 24 V	A	15	20		
		60 V	A	15	20		
		110 V	A	1.5	2.1		
		220 V	A	0.6	0.8		
		440 V	A	0.42	0.6		
		600 V	A	0.42	0.6		
	- 2 current paths in series	Up to 24 V	A	15	20		
		60 V	A	15	20		
		110 V	A	8.4	12		
		220 V	A	1.2	1.6		
		440 V	A	0.6	0.8		
		600 V	A	0.5	0.7		
	- 3 current paths in series	Up to 24 V	A	15	20		
		60 V	A	15	20		
		110 V	A	15	20		
		220 V	A	15	20		
		440 V	A	0.9	1.3		
		600 V	A	0.7	1		

Type				**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size				**S00**			
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-3 and DC-5, shunt-wound and series-wound motors (L/R ≤ 15 ms)							
• Rated operational current I_e(at 60 °C)							
	- 1 current path	Up to 24 V	A	15	20		
		60 V	A	0.35	0.5		
		110 V	A	0.1	0.15		
		220 V	A	---			
		440 V	A	---			
		600 V	A	---			
	- 2 current paths in series	Up to 24 V	A	15	20		
		60 V	A	3.5	5		
		110 V	A	0.25	0.35		
		220 V	A	---			
		440 V	A	---			
		600 V	A	---			
	- 3 current paths in series	Up to 24 V	A	15	20		
		60 V	A	15	20		
		110 V	A	15	20		
		220 V	A	1.2	1.5		
		440 V	A	0.14	0.2		
		600 V	A	0.14	0.2		
Switching frequency							
Switching frequency z in operating cycles/hour							
• Contactors without overload relay		No-load switching frequency AC	h^{-1}	10000			
		No-load switching frequency DC	h^{-1}	10000			
	- Dependency of switching frequency z'on operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	Rated operation					
		AC-1 (AC/DC)	h^{-1}	1000			
		AC-2 (AC/DC)	h^{-1}	750			
		AC-3 (AC/DC)	h^{-1}	750			
		AC-4 (AC/DC)	h^{-1}	250			
• Contactors with overload relay (mean value)			h^{-1}	15			

9.2.6 Conductor cross-sections - 3RT201. contactors

Table 9- 7 Conductor cross-sections - 3RT201. contactors

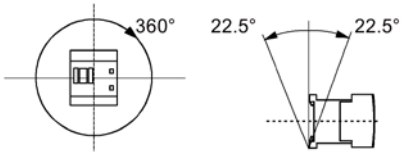
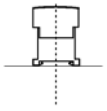
Type			**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size			**S00**			
Conductor cross-sections						
Main and auxiliary conductors			**Screw connection**			
(1 or 2 conductors can be connected) for standard screwdrivers size 2 and Pozidriv 2	• Solid + stranded	mm^2	2 x (0.5 to 1.5)[1]; 2 x (0.75 to 2.5)[1] acc. to IEC 60947; max. 2 x 4			
	• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5)[1]; 2 x (0.75 to 2.5)[1]			
	• Solid or stranded, AWG cables	AWG	2 x (20 to 16)[1]; 2 x (18 to 14)[1]; 2 x 12			
	• Connection screw		M3			
	- Tightening torque	Nm	0.8 to 1.2 (7 to 10.3 lb.in)			
Main and auxiliary conductors			**Spring-loaded connection**			
			Auxiliary conductor		**Main conductor**	
(1-wire or 2-wire connection possible)	• Solid + stranded	mm^2	2 x (0.5 to 4)		2 x (0.5 to 4)	
	• Finely stranded with end sleeve	mm^2	2 x (0.5 to 2.5)		2 x (0.5 to 2.5)	
	• Finely stranded without end sleeve	mm^2	2 x (0.5 to 2.5)		2 x (0.5 to 2.5)	
	• AWG cables, solid or stranded	AWG	2 x (20 to 12)		2 x (20 to 12)	

Type		**3RT2015**	**3RT2016**	**3RT2017**	**3RT2018**
Size		**S00**			
Conductor cross-sections					
Main and auxiliary conductors		**Ring cable lug connection**			
Connection screw		M3 (Pozidriv size PZ 2)			
• Operating tool	mm	∅ 5 … 6			
• Tightening torque	Nm	0.8 to 1.2			
• Usable ring cable lugs	mm	d_2 = min. 3.2			
	mm	d_3 = max. 7.5			
- DIN 46237 with insulating sleeve - JIS C2805 type RAV with insulating sleeve - JIS C2805 type RAP with insulating sleeve					
- DIN 46234 without insulating sleeve - DIN 46225 without insulating sleeve - JIS C2805 type R without insulating sleeve		 A shrink-on sleeve must be used to provide additional insulation for the ring cable lugs [1]. • Application temperature: -55 °C/+155 °C • UL 224 approved • Flame-protected			

[1] If two different conductor cross-sections are being connected to one clamping point, both cross-sections must be located in the range indicated. If identical cross-sections are used, this restriction does not apply.

9.2.7 General data and short-circuit protection for 3RT202. contactors without overload relay

Table 9- 8 General data - 3RT202. contactors

Type			**3RT2023**	**3RT2024**	**3RT2025**	**3RT2026**	**3RT2027**	**3RT2028**
Size			**S0**	**S0**	**S0**	**S0**	**S0**	**S0**
General data								
Permissible mounting position	• AC and DC operation							
The contactors are dimensioned for operation on a vertical mounting plane.								
Vertical mounting position:	• AC and DC operation							
			Special version required, also applies for coupling relays 3RT20.-.K40.					
Mechanical endurance	• Basic device	Operating cycles	10 million					
	• Basic device with snap-on auxiliary switch block		10 million					
	• Solid-state compatible auxiliary switch block		5 million					
Electrical durability			[1]					
Rated insulation voltage U_i (pollution degree 3)		V	690					
Rated impulse withstand voltage U_{imp}		kV	6					
Protective separation between coil and main contacts (acc. to DIN EN 60947-1, Annex N)		V	400					

Type			3RT2023	3RT2024	3RT2025	3RT2026	3RT2027	3RT2028
Size			S0	S0	S0	S0	S0	S0
General data								
Mirror contacts								
A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a main NO contact.								
• Integrated auxiliary switches			Yes, in accordance with DIN EN 60947-4-1, Annex F					
• 3RT202., 3RT232. (removable auxiliary switch block)			Yes, in accordance with DIN EN 60947-4-1, Annex F					
• 3RT202., 3RT232. (permanently mounted auxiliary switch block)			Yes, in accordance with DIN EN 60947-4-1, Annex F					
• 3RH2921-.DE.. solid-state compatible auxiliary switch blocks			No mirror contacts for the solid-state compatible auxiliary switch blocks					
Permissible ambient temperature	• Operation	°C	-25 … + 60					
	• Storage	°C	-55 … + 80					
Degree of protection to EN 60947-1, Annex C			IP20					
Touch protection acc. to DIN EN 50274			Finger-safe					
Shock resistance rectangular pulse	• AC operation		7.5g/5 ms and 4.7g/10 ms			8.3g/5 ms and 5.3g/10 ms		
	• DC operation		10g/5 ms and 7.5g/10 ms					
Shock resistance sine pulse	• AC operation		11.8g/5 ms and 7.4g/10 ms			13g/5 ms and 8.3g/10 ms		
	• DC operation		15g/5 ms and 10g/10 ms					
Conductor cross-sections			2)					

1) Contact service life for main contacts is listed in the table titled "Contact service life of auxiliary and main contacts".

2) Conductor cross-sections are listed in the table titled "Conductor cross-sections - 3RT202.".

Table 9- 9 Short-circuit protection for 3RT202. contactors without overload relay

Type			3RT2023	3RT2024	3RT2025	3RT2026	3RT2027	3RT2028
Size			**S0**					
Short-circuit protection for contactors without overload relay								
Main circuit								
• Fuse links gG NH 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4-1/DIN EN 60947-4-1								
	- Type of coordination "1"	A	63			100	125	
	- Type of coordination "2"	A	25			35	50	
	- Weld-free[1)]	A	10			16	15	
• Miniature circuit breaker with C characteristic (short-circuit current 3 kA, type of coordination "1")		A	25			32	40	
Auxiliary circuit								
• Fuse links gG DIAZED 5SB, NEOZED 5SE (weld-free fuse protection for $I_k \geq$ 1 kA)		A	10					
• Miniature circuit breakers with C characteristic (short-circuit current I_k < 400 A)		A	10					

1) For test currents "r" and I_q in accordance with IEC 60947-4-1.

9.2.8 Actuation - 3RT202. contactors

Table 9- 10 Actuation - 3RT202. contactors

Type			**3RT2023...25**	**3RT2026...28**
Size			**S0**	
Actuation				
Magnet coil operating range				
AC/DC		50 Hz	0.8 to 1.1 x U_S	
		60 Hz	0.85 to 1.1 x U_S	
Magnet coil power input (for cold coil and 1.0 x U_S)				
• AC operation, 50 Hz, standard version				
	- Switch-on power	VA	65	77
	- cos ϕ		0.82	0.82
	- Holding power	VA	8.5	9.8
	- cos ϕ		0.25	0.25
• AC operation, 50/60 Hz, standard version				
	- Switch-on power	VA	68 / 67	81 / 79
	- cos ϕ		0.72 / 0.74	0.72 / 0.74
	- Holding power	VA	9.1 / 7.4	10.5 / 8.5
	- cos ϕ		0.25 / 0.28	0.25 / 0.28
• AC operation, 50 Hz, USA/Canada				
	- Switch-on power	VA	65	77
	- cos ϕ		0.82	0.82
	- Holding power	VA	8.5	9.8
	- cos ϕ		0.25	0.25
• AC operation, 60 Hz, USA/Canada				
	- Switch-on power	VA	73	87
	- cos ϕ		0.76	0.76
	- Holding power	VA	8.2	9.4
	- cos ϕ		0.28	0.28
• DC operation				
	- Switch-on power = holding power	W	5.9	
Permissible residual current of electronics (with 0 signal)				
• AC operation		mA	< 6 mA x (230 V/U_S)	< 7 mA x (230 V/U_S)
• DC operation		mA	< 16 mA x (24 V/U_S)	

Type			**3RT2023...25**	**3RT2026...28**
Size			**S0**	
Actuation				
Switching times at 0.8 to 1.1 x U_S[1)]				
Total break time = opening delay + arcing time				
• AC operation				
	- Closing delay	ms	9 ... 38	8 ... 40
	- Opening delay	ms	4 ... 16	
• DC operation				
	- Closing delay	ms	50 ... 170	50 ... 170
	- Opening delay	ms	15 ... 17.5	
• Arcing time		ms	10	
Switching times at 1.0 x U_s[1)]				
• AC operation				
	- Closing delay	ms	10 ... 18	10 ... 17
	- Opening delay	ms	4 ... 16	
• DC operation				
	- Closing delay	ms	55 ... 80	
	- Opening delay	ms	16 ... 17	

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (varistor + 2 ms to 5 ms, diode combination: 2x to 6x).

Table 9- 11 Actuation - 3RT202.-.NB3, 3RT202.-.NF3, 3RT202.-.NP3 contactors

Type		**3RT202.-.NB3**	**3RT202.-.NF3**	**3RT202.-.NP3**
Size		**S0**		
Actuation				
Magnet coil operating range AC/DC		0.7 to 1.3 x U_S		
Magnet coil power input (for cold coil and 1.0 x U_S)				
• AC operation, 50 Hz, AC/DC version				
- Switch-on power	VA	6.5/5.7	13.6/13.2	16.1/15.9
- cos ϕ		0.98/0.96	0.98/0.99	0.99/0.99
- Holding power	VA	1.26/1.3	1.91/1.9	3.41/3.58
- cos ϕ		0.78/0.8	0.61/0.61	0.36/0.45
• DC operation, AC/DC version				
- Switch-on power	W	6.7	13.2	15
- Holding power	W	0.8	1.56	1.83
Permissible residual current of electronics (with 0 signal)				
• AC operation	mA	< 7 mA x (230 V/U_S)		
• DC operation	mA	< 16 mA x (24 V/U_S)		
Switching times at 0.8 to 1.1 x U_S[1)]				
Total break time = opening delay + arcing time				
• AC operation				
- Closing delay	ms	60 ... 80	50 ... 70	60 ... 80
- Opening delay	ms	30 ... 45	35 ... 45	35 ... 50
• DC operation				
- Closing delay	ms	60 ... 75	50 ... 70	50 ... 75
- Opening delay	ms	30 ... 45	35 ... 45	40 ... 50
• Arcing time	ms	10		
Switching times at 1.0 x U_s[1)]				
• AC operation				
- Closing delay	ms	65 ... 80	50 ... 70	60 ... 80
- Opening delay	ms	30 ... 45	35 ... 45	30 ... 50
• DC operation				
- Closing delay	ms	60 ... 80	56 ... 70	60 ... 80
- Opening delay	ms	30 ... 45	35 ... 45	30 ... 50

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (varistor + 2 ms to 5 ms, diode combination: 2x to 6x).

9.2.9 Main circuit - 3RT202. contactors (current carrying capacity for alternating current)

Table 9- 12 Main circuit - Current carrying capacity for alternating current (3RT202. contactors)

Type			3RT2023	3RT2024	3RT2025	3RT2026	3RT2027	3RT2028
Size			S0					
Main circuit								
Current carrying capacity for alternating current								
Utilization category AC-1, switching resistive loads								
• Rated operational current I_e	At 40 °C up to 690 V	A	40				50	
	At 60 °C up to 690 V	A	35				42	
• Rated powers of three-phase current loads[1] cos ϕ = 0.95 (at 60 °C)	230 V	kW	13.3				16	
	400 V	kW	23				28	
	690 V	kW	40				48	
• Minimum conductor cross-section for loads with I_e	At 40 °C	mm^2	10					
	At 60 °C	mm^2	10					
Utilization category AC-2 and AC-3								
• Rated operational currents I_e	Up to 400 V	A	9	12	17	25	32	38
	440 V	A	9	12	17	22	32	35
	500 V	A	6.8	12.4	17	18	32	32
	690 V	A	6.7	9	13	13	21	21
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz	Up to 110 V	kW	1.1	1.5	2.2	3	4	4
	230 V	kW	3	3	4	5.5	7.5	11
	400 V	kW	4	5.5	7.5	11	15	18.5
	500 V	kW	4	7.5	10	11	18.5	18.5
	660 V/690 V	kW	5.5	7.5	11	11	18.5	18.5
Thermal load capacity	10 s current[2]	A	80	110	150	200	260	300
Power loss per current path	At I_e/AC-3	W	0.4	0.5	0.9	1.6	2.7	3.8

Type				3RT20 23	3RT20 24	3RT20 25	3RT20 26	3RT20 27	3RT20 28
Size				**S0**					
Main circuit									
Current carrying capacity for alternating current									
Utilization category AC-4 (at I_a = 6 x I_e)									
• Rated operational current I_e	Up to 400 V		A	8.5	12.5	15.5	15.5	22	22
• Rated powers of squirrel-cage motors at 50 and 60 Hz	At 400 V		kW	4	5.5	7.5	7.5	11	11
• The following applies for a contact service life of approximately 200,000 operating cycles:									
- Rated operational currents I_e	Up to 400 V		A	4.1	5.5	7.7	9	12	12
	Up to 690 V		A	3.3	5.5	7.7	9	12	12
- Rated powers of squirrel-cage motors at 50 Hz and 60 Hz	At 110 V		kW	0.5	0.73	1	1.2	1.6	1.6
	230 V		kW	1.1	1.5	2	2.5	3.4	3.4
	400 V		kW	2	2.6	3.5	4.4	6	6
	500 V		kW	2	3.3	4.6	5.6	7.5	7.5
	690 V		kW	2.5	4.6	6	7.7	10.3	10.3
Utilization category AC-5a, switching of gas discharge lamps, inductive ballast									
Per main current path at 230 V[3)]									
• Rated power per lamp/rated operational current per lamp									
- Uncorrected	L 18 W/0.37 A		Qty.	95				118	
	L 36 W/0.43 A		Qty.	81				102	
	L 58 W/0.67 A		Qty.	52				65	
	L 80 W/0.79 A		Qty.	44				55	
DUO switching (two-lamp)	L 18 W/0.22 A		Qty.	181 (≙ 2 x 181 lamps)				227 (≙ 2 x 227 lamps)	
	L 36 W/0.42 A		Qty.	95 (≙ 2 x 95 lamps)				119 (≙ 2 x 119 lamps)	
	L 58 W/0.63 A		Qty.	63 (≙ 2 x 63 lamps)				79 (≙ 2 x 79 lamps)	
	L 80 W/0.87 A		Qty.	45 (≙ 2 x 45 lamps)				57 (≙ 2 x 57 lamps)	

Type				3RT20 23	3RT20 24	3RT20 25	3RT20 26	3RT20 27	3RT20 28
Size				**S0**					
Main circuit									
Current carrying capacity for alternating current									
Switching of gas discharge lamps with correction									
Per main current path at 230 V									
• Rated power per lamp/capacitance/rated operational current per lamp									
	- Shunt compensation, with inductive ballast	L 18 W/4.5 µF/0.11 A	Qty.	37		41	61	78	93
		L 36 W/4.5 µF/0.21 A	Qty.	30		30	51	71	71
		L 58 W/7.0 µF/0.32 A	Qty.	20		20	33	46	46
		L 80 W/7.0 µF/0.49 A	Qty.	13		13	22	30	30
	- With solid-state ballast[4] single-lamp	L 18 W/6.8 µF/0.10 A	Qty.	105		119	175	224	266
		L 36 W/6.8 µF/0.18 A	Qty.	58		66	97	124	147
		L 58 W/10 µF/0.29 A	Qty.	36		41	60	77	91
		L 80 W/10 µF/0.43 A	Qty.	24		27	40	52	61
	- With solid-state ballast[4] two-lamp	L 18 W/10 µF/0.18 A	Qty.	58 (≙ 2 x 58 lamps)		66 (≙ 2 x 66 lamps)	97 (≙ 2 x 97 lamps)	124 (≙ 2 x 124 lamps)	147 (≙ 2 x 147 lamps)
		L 36 W/10 µF/0.35 A	Qty.	30 (≙ 2 x 30 lamps)		34 (≙ 2 x 34 lamps)	50 (≙ 2 x 50 lamps)	64 (≙ 2 x 64 lamps)	76 (≙ 2 x 76 lamps)
		L 58 W/22 µF/0.52 A	Qty.	20 (≙ 2 x 20 lamps)		22 (≙ 2 x 22 lamps)	33 (≙ 2 x 33 lamps)	43 (≙ 2 x 43 lamps)	51 (≙ 2 x 51 lamps)
		L 80 W/22 µF/0.86 A	Qty.	12 (≙ 2 x 12 lamps)		13 (≙ 2 x 13 lamps)	20 (≙ 2 x 20 lamps)	26 (≙ 2 x 26 lamps)	30 (≙ 2 x 30 lamps)
Utilization category AC-5b, switching incandescent lamps									
Per main current path at 230/220 V			kW	2.8		3.2	4.7	6	7.2

Type				3RT20 23	3RT20 24	3RT20 25	3RT20 26	3RT20 27	3RT20 28
Size				**S0**					
Main circuit									
Current carrying capacity for alternating current									
Utilization category AC-6a, switching AC transformers									
• Rated operational current I_e									
	- For inrush current n = 20	Up to 400 V	A	11.4			20.2	30.8	
	- For inrush current n = 30	Up to 400 V	A	7.6			13.5	20.5	
• Rated operational power P									
	- For inrush current n = 20	At 230 V	kVA	4.5			8	12.3	
		400 V	kVA	7.9			13.9	21.3	
		500 V	kVA	9.9			15.5	26.6	
		690 V	kVA	13.6			15.5	25	
	- For inrush current n = 30	At 230 V	kVA	3			5.4	8.2	
		400 V	kVA	5.2			9.3	14.2	
		500 V	kVA	6.6			11.7	17.7	
		690 V	kVA	9.1			15.5	24.5	
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$									
Utilization category AC-6b, switching low-inductance (low-loss, metallized-dielectric) AC capacitors									
• Rated operational currents I_e		Up to 400 V	A	5.8			10.8	15	
• Rated powers for single capacitors or capacitor banks (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz and 60 Hz		At 230 V	kvar	2.5			10.8	6	
		400 V	kvar	4			4	10.4	
		500 V	kvar	4			7.4	10.4	
		690 V	kvar	4			7.5	10.4	

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up taken into account).

2) Acc. to IEC 60947-4-1. See the chapter titled "Overload relays" for rated values for different starting conditions.

3) For I_e/AC-1 = 35 A (60 °C) and the corresponding minimum conductor cross-section 10 mm^2.

4) The number of lamps can be increased dependent upon the electronic ballast used.

9.2.10 Rated data for auxiliary contacts (CSA and UL)

Table 9- 13 Rated data for auxiliary contacts (CSA and UL)

Type		Screw or spring-loaded connection	Screw or spring-loaded connection	Screw or spring-loaded connection
		Integrated or snap-on auxiliary switch block	Integrated	Mountable auxiliary switch block
Size		**S00**	**S0**	**S00/S0**
CSA and UL rated data for auxiliary contacts				
Rated voltage	V AC	600	600	600
Switching capacity		A 600, Q 600	A 600, P 600	A 600, Q 600
• Continuous current at 240 V AC	A	10	10	10

9.2.11 Main circuit - 3RT202. contactors (current carrying capacity for direct current)

Table 9- 14 Main circuit - Current carrying capacity for direct current (3RT202. contactors)

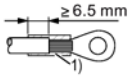
Type				**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size				**S0**					
Main circuit									
Current carrying capacity for direct current									
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)									
• Rated operational current I_e(at 60 °C)									
	- 1 current path	Up to 24 V	A	35					
		60 V	A	20					
		110 V	A	4.5					
		220 V	A	1					
		440 V	A	0.4					
		600 V	A	0.25					
	- 2 current paths in series	Up to 24 V	A	35					
		60 V	A	35					
		110 V	A	35					
		220 V	A	5					
		440 V	A	1					
		600 V	A	0.8					
	- 3 current paths in series	Up to 24 V	A	35					
		60 V	A	35					
		110 V	A	35					
		220 V	A	35					
		440 V	A	2.9					
		600 V	A	1.4					

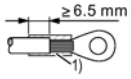
Type				**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size				**S0**					
Main circuit									
Current carrying capacity for direct current									
Utilization category DC-3 and DC-5, shunt-wound and series-wound motors (L/R ≤ 15 ms)									
Rated operational current I_e(at 60 °C)									
	- 1 current path	Up to 24 V	A	20					
		60 V	A	5					
		110 V	A	2.5					
		220 V	A	1					
		440 V	A	0.09					
		600 V	A	0.06					
	- 2 current paths in series	Up to 24 V	A	35					
		60 V	A	35					
		110 V	A	15					
		220 V	A	3					
		440 V	A	0.27					
		600 V	A	0.16					
	- 3 current paths in series	Up to 24 V	A	35					
		60 V	A	35					
		110 V	A	35					
		220 V	A	10					
		440 V	A	0.6					
		600 V	A	0.6					
Switching frequency									
Switching frequency z in operating cycles/hour									
• Contactors without overload relay		No-load switching frequency AC	h^{-1}	5000					
		No-load switching frequency DC	h^{-1}	1500					
Dependency of switching frequency z'on operational current I' and operational voltage U': z' = z ·(Ie/I') ·(400 V/U')1.5 ·1/h		AC-1 (AC/DC)	h^{-1}	1000					
		AC-2 (AC/DC)	h^{-1}	1000			750		
		AC-3 (AC/DC)	h^{-1}	1000			750		
		AC-4 (AC/DC)	h^{-1}	300			250		
• Contactors with overload relay (mean value)			h^{-1}	15					

9.2.12 Conductor cross-sections - 3RT202. contactors

Table 9- 15 Conductor cross-sections - 3RT202. contactors

Type		**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size		**S0**					
Conductor cross-sections (1-wire or 2-wire connection possible)							
Main conductor		**Screw connection**					
Conductor cross-section							
• Solid + stranded	mm^2	2 x (1 to 2.5)[1]; 2 x (2.5 to 10)[1] acc. to IEC 60947					
• Finely stranded with end sleeve	mm^2	2 x (1 to 2.5)[1]; 2 x (2.5 to 6)[1]; max. 1 x 10					
• AWG cables, solid or stranded	AWG	2 x (16 to 12); 2 x (14 to 8)					
• Connection screws		M4 (Pozidriv size PZ 2)					
- Tightening torque	Nm (lb.in.)	2 to 2.5 (18 to 22 lb.in.)					
Auxiliary conductor							
Conductor cross-section							
• Solid + stranded	mm^2	2 x (0.5 to 1.5)[1]; 2 x (0.75 to 2.5)[1] acc. to IEC 60947					
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5)[1]; 2 x (0.75 to 2.5)[1]					
• Solid or stranded AWG (2 x)	AWG	2 x (20 to 16)[1]; 2 x (18 to 14)[1]; 1 x 12					
• Connection screws		M3					
- Tightening torque	Nm (lb.in.)	0.8 to 1.2 (7 to 10.3 lb.in.)					
Main conductor		**Spring-loaded connection**					
Conductor cross-section							
• Solid + stranded	mm^2	2 x (1 to 10)					
• Finely stranded with end sleeve	mm^2	2 x (1 to 6)					
• Finely stranded without end sleeve	mm^2	2 x (1 to 6)					
• AWG cables, solid or stranded	AWG	2 x (18 to 8)					
Auxiliary conductor							
Conductor cross-section							
• Solid + stranded	mm^2	2 x (0.5 to 2.5)					
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5)					
• Finely stranded without end sleeve	mm^2	2 x (0.5 to 2.5)					
• AWG cables, solid or stranded	AWG	2 x (20 to 14)					

Type		**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size		**S0**					
Conductor cross-sections (1-wire or 2-wire connection possible)							
Main conductor		**Ring cable lug connection**					
Connection screw		M4 (Pozidriv size PZ 2)					
• Operating tool		∅ 5 ... 6					
• Tightening torque	Nm	2 ... 2.5					
• Usable ring cable lugs	mm	d_2 = min. 4.3					
	mm	d_3 = min. 12.2					
- DIN 46237 with insulating sleeve							
- JIS C2805 type RAV with insulating sleeve							
- JIS C2805 type RAP with insulating sleeve							
- DIN 46234 without insulating sleeve							
- DIN 46225 without insulating sleeve							
- JIS C2805 type R without insulating sleeve		A shrink-on sleeve must be used to provide additional insulation for the ring cable lugs 1). • Application temperature: -55 °C/+155 °C • UL 224 approved • Flame-protected					

Type		**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size		**S0**					
Conductor cross-sections (1-wire or 2-wire connection possible)							
Auxiliary conductor							
Connection screw		M3 (Pozidriv size PZ 2)					
• Operating tool		∅ 5 ... 6					
• Tightening torque	Nm	0.8 ... 1.2					
• Usable ring cable lugs	mm	d_2 = min. 3.2					
	mm	d_3 = min. 7.5					
- DIN 46237 with insulating sleeve - JIS C2805 type RAV with insulating sleeve - JIS C2805 type RAP with insulating sleeve							
- DIN 46234 without insulating sleeve - DIN 46225 without insulating sleeve - JIS C2805 type R without insulating sleeve		 A shrink-on sleeve must be used to provide additional insulation for the ring cable lugs [1]. • Application temperature: -55 °C/+155 °C • UL 224 approved • Flame-protected					

[1] If two different conductor cross-sections are being connected to one clamping point, both cross-sections must be located in the range indicated. If identical cross-sections are used, this restriction does not apply.

9.2.13 Rated data (CSA and UL) for 3RT201. and 3RT202. contactors

Table 9- 16 CSA and UL rated data (3RT201. contactors)

Type				**3RT20 15**	**3RT20 16**	**3RT20 17**	**3RT20 18**
Size				**S00**			
CSA and UL rated data							
Rated insulation voltage			V AC	600			
Continuous current, at 40 °C	• Open and encapsulated		A	20			
Maximum horsepower ratings							
(CSA- and UL-approved values)							
• Rated powers of three-phase motors at 60 Hz		At 200 V	hp	1,5	2	3	3
		230 V	hp	2	3	3	5
		460 V	hp	3	5	7,5	10
		575 V	hp	5	7,5	10	10
Short-circuit protection/SCCR[1] (contactor or overload relay)				Details of the short-circuit protection can be found on the Internet (http://support.automation.siemens.com/WW/view/en/40232638?Datakey=35831812).			
[1] For more detailed information about short-circuit values, e.g. for protection against high short-circuit currents, see the UL reports (http://www.siemens.com/industrial-controls/support) for the individual devices.							
NEMA/EEMAC ratings							
NEMA/EEMAC size			hp	---		1	
Continuous current							
	- Open		A	---		27	
	- Encapsulated		A	---		127	
• Rated powers of three-phase motors at 60 Hz		At 200 V	hp	---		7,5	
		230 V	hp	---		7,5	
		460 V	hp	---		10	
		575 V	hp	---		10	
Overload relay							
	• Type			3RU2116/3RB3016			
	• Setting range		A	0,11 … 16 / 0,1 ... 16			

Table 9- 17 CSA and UL rated data (3RT202. contactors)

Type				**3RT20 23**	**3RT20 24**	**3RT20 25**	**3RT20 26**	**3RT20 27**	**3RT20 28**
Size				**S0**					
CSA and UL rated data									
Rated insulation voltage			V AC	600					
Continuous current, at 40 °C	• Open and encapsulated		A	35				42	
Maximum horsepower ratings									
(CSA- and UL-approved values)									
• Rated powers of three-phase motors at 60 Hz		At 200 V	hp	2	3	5	7,5	10	10
		230 V	hp	3	3	5	7,5	10	10
		460 V	hp	5	7,5	10	15	20	25
		575 V	hp	7,5	10	15	20	25	25
Short-circuit protection[1] (contactor or overload relay)				Details of the short-circuit protection can be found on the Internet (http://support.automation.siemens.com/WW/view/en/42485494?Datakey=35831812).					
[1] For more detailed information about short-circuit values, e.g. for protection against high short-circuit currents, see the UL reports (http://www.siemens.com/industrial-controls/support) for the individual devices.									
NEMA/EEMAC ratings									
NEMA/EEMAC size			hp	---				1	
Continuous current									
	- Open		A	---			27		
	- Encapsulated		A	---			27		
• Rated powers of three-phase motors at 60 Hz		At 200 V	hp	---			7,5		7,7
		230 V	hp	---			7,5		
		460 V	hp	---			10		
		575 V	hp	---			10		
Overload relay									
	• Type			3RU2126/3RB3026					
	• Setting range		A	1,8 … 40 / 0,1 ... 40					

9.2.14 Rated data for auxiliary contacts

Table 9- 18 Technical data for 3RT2 contactors - Rated data for auxiliary contacts

Type			**3RT2**
Size			**S00 to S2**
Rated data for auxiliary contacts			
Acc. to IEC 60947-5-1/DIN EN 60947-5-1 (VDE 0660 Part 200) (Data applies to integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactors size S00 and S0.)			
Rated insulation voltage U_i (pollution degree 3)		V	690
Conventional thermal current I_{th} =		A	10
Rated operational current I_e/AC-12			
AC load			
Rated operational current I_e/AC-15/AC-14			
• at rated operational voltage U_e	Up to 230 V	A	10[1]
	380 V	A	3
	400 V	A	3
	500 V	A	2
	660 V	A	1
	690 V	A	1
DC load			
Rated operational current I_e/DC-12			
• at rated operational voltage U_e	24 V	A	10
	60 V	A	6
	110 V	A	3
	125 V	A	2
	220 V	A	1
	440 V	A	0,3
	600 V	A	0,15
Rated operational current I_e/DC-13			
• at rated operational voltage U_e	24 V	A	10[1]
	60 V	A	2
	110 V	A	1
	125 V	A	0,9
	220 V	A	0,3
	440 V	A	0,14
	600 V	A	0,1
Contact reliability at 17 V, 1 mA acc. to DIN EN 60947-5-4			Frequency of contact faults $<10^{-8}$ i.e. < 1 fault per 100 million operating cycles

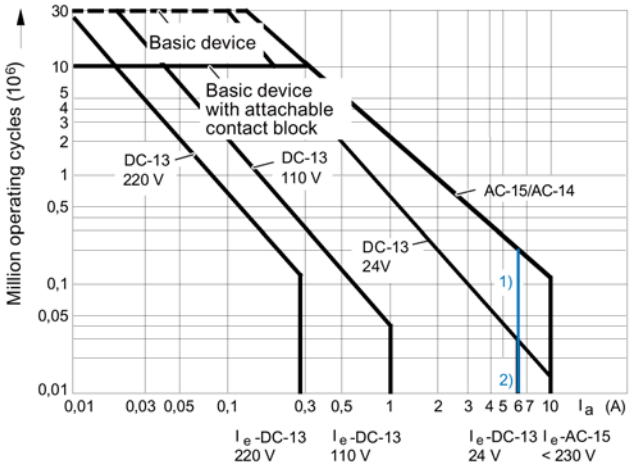
[1] 3RH22, 3RH29, 3RT2...-....4: I_e = 6 A for AC-15/AC-14 and DC-13.

9.2.15 Contact service life of auxiliary and main contacts

Contact service life of auxiliary contacts

This requires operating mechanisms that switch at random, i.e. not synchronized with the phase angle of the supply system.
The contact service life is essentially dependent on the breaking current.
The characteristic curves apply to:

- Integrated auxiliary contacts on 3RT20
- Auxiliary switch blocks 3RH2911-., 3RH2921-. for contactors size S2.



Legend for diagram:
I_a = Breaking current
I_e = Rated operational current

1) Integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactors (size S2): 6 A

2) Contacts in auxiliary switch blocks for contactors size S2: 6 A

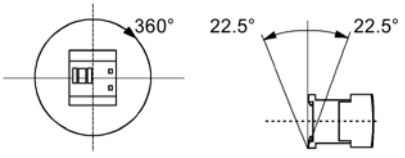
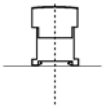
Note

Contact service life of the main contacts size S2

The service life data of size S2 main contacts are available on request.

9.2.16 General data and short-circuit protection for 3RT203. contactors without overload relay

Table 9- 19 General data - 3RT203.

Type			**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size			**S2**			
General data						
Permissible mounting position						
The contactors are dimensioned for operation on a vertical mounting plane.						
Vertical mounting position:						
			Special version required.			
Mechanical endurance	• Basic device	Operating cycles	10 million			
	• Basic device with snap-on auxiliary switch block		10 million			
	• Solid-state compatible auxiliary switch block		5 million			
Electrical durability			[1]			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Rated impulse withstand voltage U_{imp}		kV	6			
Protective separation between coil and main contacts (acc. to DIN EN 60947-1, Annex)		V	400			

Type			**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size			**S2**			
General data						
Mirror contacts						
A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a main NO contact.						
• Integrated auxiliary switches			Yes, in accordance with DIN EN 60947-4-1, Annex F			
• 3RT202., 3RT232. (removable auxiliary switch block)			Yes, in accordance with DIN EN 60947-4-1, Annex F			
• 3RT202., 3RT232. (permanently mounted auxiliary switch block)			Yes, in accordance with DIN EN 60947-4-1, Annex F			
• 3RH2921-.DE.. solid-state compatible auxiliary switch blocks			No mirror contacts for the solid-state compatible auxiliary switch blocks			
Ambient temperature	• Operation	°C	-25 ... + 60			
	• Storage	°C	-55 ... + 80			
Degree of protection to EN 60947-1, Annex C			IP20 (IP00 terminal compartment)			
Touch protection acc. to DIN EN 50274			Finger-safe			
Shock resistance						
• Rectangular pulse	• AC operation	g / ms	11.8 / 5 and 7.4 / 10			
	• DC operation	g / ms	7.7 / 5 and 4.5 / 10			
• Sine pulse	• AC operation	g / ms	18.5 / 5 and 11.6 / 10			
	• DC operation	g / ms	12 / 5 and 7 / 10			
Conductor cross-sections			[2]			

[1] Service life of the main contacts available on request.

[2] Conductor cross-sections are listed in the table titled "Conductor cross-sections - 3RT201."

Table 9- 20 Short-circuit protection for contactors without overload relay

Type			3RT2035	3RT2036	3RT2037	3RT2038
Size			S2			
Short-circuit protection for contactors without overload relay						
Main circuit						
• Fuse links, operational class gG: NH, Type 3NA; DIAZED, Type 5SB; NEOZED, Type 5SE Acc. to IEC 60947-4-1						
	- Type of coordination "1"	A	160	160	250	250
	- Type of coordination "2"	A	80	80	125	160
	- Weld-free[1)]	A	On request			
Auxiliary circuit						
• Fuse links, operational class gG: DIAZED, type 5SB; NEOZED, type 5SE (weld-free protection $I_k \geq 1$ kA)		A	10			
• Miniature circuit breakers 230 V, C characteristic (short-circuit current I_k < 400 Ak)		A	10			

1) Test conditions according to IEC 60947-4-1.

9.2.17 Actuation - 3RT203. contactors

Table 9- 21 Actuation - 3RT203. contactors.

Type		**3RT203.-.A0.**	**3RT203.-.A2.**	**3RT203.-.A6.**	**3RT203.-.N3**
Size		**S2**			
Actuation					
Type of operating mechanism		AC			AC / DC
Magnet coil operating range					
• AC operation, 50 Hz		0,8 ... 1.1 x U_s	0,8 ... 1.1 x U_s	0,8 ... 1.1 x U_s	0,8 ... 1.1 x U_s
• AC operation, 60 Hz		---	0,85 ... 1.1 x U_s	0,8 ... 1.1 x U_s	0,8 ... 1.1 x U_s
• DC operation		---	---	---	0,8 ... 1.1 x U_s
Magnet coil power input (for cold coil and 1.0 x U_s)					
AC operation, 50 Hz, standard version					
• Closing power	VA	190	---	---	---
• cos ϕ		0,72	---	---	---
• Holding power	VA	16	---	---	---
• cos ϕ		0,37	---	---	---
AC operation, 50/60 Hz, standard version					
• Closing power	VA	---	210 / 188	---	---
• cos ϕ		---	0,69 / 0,65	---	---
• Holding power	VA	---	17,2 / 16,5	---	---
• cos ϕ		---	0,36 / 0,39	---	---
AC operation, 50/60 Hz, for USA/Canada					
• Closing power	VA	---	---	212 / 188	---
• cos ϕ		---	---	0,67 / 0,65	---
• Holding power	VA	---	---	18,5 / 16,5	---
• cos ϕ		---	---	0,37 / 0,39	---

Type		**3RT203.-.A.0.**	**3RT203.-.A.2.**	**3RT203.-.A.6.**	**3RT203.-.N.3**
Size		**S2**			
Actuation					
AC/DC operation					
• Closing power for AC operation	VA	---	---	---	40
• cos ϕ		---	---	---	0,64 / 0,5
• Holding power for AC operation	VA	---	---	---	2
• cos ϕ		---	---	---	0,36 / 0,39
• Closing power for DC operation	W	---	---	---	23
• Holding power for DC operation	W	---	---	---	1
Permissible residual current of electronics (with 0 signal)					
• AC operation	mA	< 20			
• DC operation	mA	< 20			
Operating times for 0.8 ... 1.1 x[1)] Total break time = Opening delay + Arcing time					
AC operation					
• Closing delay	ms	10 ... 80			45 ... 70
• Opening delay	ms	10 ... 18			35 ... 55
DC operation					
• Closing delay	ms	---			45 ... 60
• Opening delay	ms	---			35 ... 55
Arcing time	ms	10 ... 20			10 ... 20
Switching times at 1.0 x Us[1)]					
AC operation					
• Closing delay	ms	12 ... 22			50 ... 60
• Opening delay	ms	10 ... 18			40 ... 50
DC operation					
• Closing delay	ms	---			45 ... 55
• Opening delay	ms	---			40 ... 50

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode combination: 2 to 6 times).

9.2.18 Main circuit - 3RT203. contactors (current carrying capacity for alternating current and direct current)

Table 9- 22 Main circuit - Current carrying capacity for alternating current (3RT203. contactors)

Type			3RT2035	3RT2036	3RT2037	3RT2038
Size			**S2**			
Main circuit						
Current carrying capacity for alternating current						
Utilization category AC-1, switching resistive loads						
• Rated operational current I_e						
	At 40 °C up to 690 V	A	60	70	80	90
	At 60 °C up to 690 V	A	55	60	70	80
• Rated powers of three-phase current loads[1] cos ϕ = 0.95 (at 60 °C)						
	230 V	kW	23	26	30	34
	400 V	kW	39	46	53	59
	690 V	kW	68	79	91	102
• Minimum conductor cross-section for loads with I_e						
	At 40 °C	mm^2	16	25	25	35
	At 60 °C	mm^2	16	16	25	25
Utilization category AC-2 and AC-3						
• Rated operational currents I_e						
	Up to 400 V	A	40	51	65	80
	440 V	A	40	50	65	80
	500 V	A	40	50	65	80
	690 V	A	24	24	47	58
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz						
	At 230 V	kW	11	15	18,5	22
	400 V	kW	18,5	22	30	37
	690 V	kW	22	22	37	45

Type			**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size			**S2**			
Main circuit						
Current carrying capacity for alternating current						
Thermal load	10 s current[2]	A	400	420	520	640
Power loss per current path	At I_e/AC-3	W	2,2	4	3,8	5,7
Utilization category AC-4 (at I_a = 6 x I_e)[3]						
Maximum values:						
• Rated operational current I_e	Up to 400 V	A	35	41	55	55
• Rated powers of squirrel-cage motors at 50 Hz and 60 Hz	Up to 400 V	kW	18,5	22	30	30
The following applies for a contact service life of approximately 200,000 operating cycles:						
• Rated operational currents I_e	Up to 400 V	A	22	24	28	30
	690 V	A	18,5	20	22	24
• Rated powers of squirrel-cage motors at 50 Hz and 60 Hz	At 110 V	kW	3,2	3,5	4,1	4,3
	230 V	kW	6,7	7,3	8,5	9,1
	400 V	kW	11,6	12,6	14,7	15,8
	690 V	kW	16,8	18,2	20	21,8

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up taken into account).

2) Acc. to IEC 60947-4-1. Rated values for different starting conditions

Table 9- 23 Main circuit - Current carrying capacity for direct current (3RT201. contactors)

Type				**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size				**S2**			
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)							
• Rated operational current I_e(at 60 °C)							
	- 1 current path	Up to 24 V	A	55			
		60 V	A	23			
		110 V	A	4,5			
		220 V	A	1			
		440 V	A	0,4			
		600 V	A	0,25			
	- 2 current paths in series	Up to 24 V	A	55			
		60 V	A	45			
		110 V	A	25			
		220 V	A	5			
		440 V	A	1			
		600 V	A	0,8			
	- 3 current paths in series	Up to 24 V	A	55			
		60 V	A	55			
		110 V	A	55			
		220 V	A	45			
		440 V	A	2,9			
		600 V	A	1,4			

Type			**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size			**S2**			
Main circuit						
Current carrying capacity for direct current						
Utilization category DC-3 and DC-5, shunt-wound and series-wound motors (L/R ≤ 15 ms)						
• Rated operational current I_e(at 60 °C)						
- 1 current path	Up to 24 V	A	35			
	60 V	A	6			
	110 V	A	2,5			
	220 V	A	2			
	440 V	A	0,1			
	600 V	A	0,06			
- 2 current paths in series	Up to 24 V	A	55			
	60 V	A	45			
	110 V	A	25			
	220 V	A	5			
	440 V	A	0,27			
	600 V	A	0,16			
- 3 current paths in series	Up to 24 V	A	55			
	60 V	A	55			
	110 V	A	55			
	220 V	A	25			
	440 V	A	0,6			
	600 V	A	0,35			
Switching frequency						
Switching frequency z in operating cycles/hour						
Contactors without overload relay						
• No-load switching frequency AC		h^{-1}	5000			
• No-load switching frequency AC / DC		h^{-1}	1500			
Switching frequency z during rated operation[1)]						
• I_e/AC-1		h^{-1}	1200	1000	800	700
• I_e/AC-2		h^{-1}	750	600	400	350
• I_e/AC-3		h^{-1}	1000	800	700	500
• I_e/AC-4		h^{-1}	300	250	200	150
Contactors with overload relay (mean value)		h^{-1}	15			

[1)] Dependency of switching frequency z on operational current I and operational voltage U: $z = z\ (I_e/I)\ (400\ V/U)^{1.5}$ 1/h

9.2.19 Conductor cross-sections - 3RT203. contactors

Table 9- 24 Conductor cross-sections - 3RT203 contactors.

Type		3RT2035	3RT2036	3RT2037	3RT2038
Size		**S2**			
Conductor cross-sections					
Main conductor		**Screw connection**			
• Solid or stranded	mm²	2 x (1 ... 35)[1]; 1 x (1 ... 50)[1]			
• Finely stranded with end sleeve	mm²	2 x (1 ... 25)[1]; 1 x (1 ... 35)[1]			
• AWG cables, solid or stranded	AWG	2 x (18 ... 2)[1]; 1 x (18 ... 1)[1]			
• Terminal screws		Pozidriv size 2; ∅ 5 ... 6			
• Connection screws tightening torque	Nm	3 ... 4,5 (27 ... 40 lb.in)			
Auxiliary and control conductors					
• Solid or stranded	mm²	2 x (0.5 ... 1.5)[1]; 2 x (0.75 ... 2.5)[1]			
• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5)[1]; 2 x (0.75 ... 2.5)[1]			
• AWG cables, solid or stranded	AWG	2 x (20 ... 16)[1]; 2 x (18 ... 14)[1]			
• Terminal screws		M3 (for Pozidriv size 2, ∅ 5 ... 6)			
• Connection screws tightening torque	Nm	0,8 ... 1,2 (7 ... 10.3 lb.in)			
Auxiliary and control conductors[2]		**Spring-loaded connection**			
• Operating tool	mm	3.0 x 0.5			
• Solid or stranded	mm²	2 x (0.5 ... 2.5)			
• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5)			
• AWG cables, solid or stranded	AWG	2 x (20 ... 14)			

1) If two different conductor cross-sections are being connected to one clamping point, both cross-sections must be located in the range indicated.

2) Max. external diameter of the cable insulation: 3.6 mm. With spring-loaded connection with conductor cross-sections ≤ 1 mm², an insulation stop must be used.

9.2.20 Rated data (CSA and UL), 3RT203. contactors

Table 9- 25 CSA and UL rated data (3RT203. contactors)

Type			**3RT2035**	**3RT2036**	**3RT2037**	**3RT2038**
Size			**S2**			
CSA and UL rated data						
Rated insulation voltage		V AC	600			
Uninterrupted current, at 40 °C, open and enclosed		A	55	60	80	90
Maximum horsepower ratings (CSA and UL-approved values)						
• Rated powers of three-phase motors at 60 Hz	at 200/208 V	hp	10	15	20	20
	230/240 V	hp	15	15	20	25
	460/480 V	hp	30	40	50	50
	575/600 V	hp	40	50	50	60
Short-circuit protection[1] (contactor or overload relay)	At 600 V	kA	5	10	10	10
RK5 fuse		A	150	200	250	250
Circuit breakers with overload protection acc. to UL 489	At 480 V	Type	3RV1742			
		A	50	50	60	70
		kA	---[2]			
	At 600 V	Type	3RV1742			
		A	40	50	50	60
		kA	---[2]			
Overload relay			Thermal / solid-state			
• Type			3RU213 / 3RB303			
• Setting range		A	11 ... 80 / 12 ... 80			

[1] For further information on short-circuit values, e.g. for protecting high short-circuit currents, see "UL reports for the individual devices (http://www.siemens.com/sirius/manuals)"
For the dimensioning of the load feeders, see also the configuration manual "Configuring SIRIUS Innovations for UL (http://support.automation.siemens.com/WW/view/en/53433538)"

[2] Values on request.

9.3 Contactors for specific applications (3RT23 and 3RT25)

9.3.1 General data, short-circuit protection for contactors without overload relay and actuation (3RT231. and 3RT232. contactors)

Table 9- 26 General data - 3RT231. and 3RT232. contactors

Type			3RT2316	3RT2317	3RT2325	3RT2326	3RT2327
Size			S00		S0		
General data							
Permissible mounting position[1]							
Mechanical durability		Operating cycles	30 million		10 million		
Electrical durability		Operating cycles	Approx. 0.5 million				
Rated insulation voltage U_i (pollution degree 3)		V	690				
Permissible ambient temperature	• Operation	°C	-25 ... +60				
	• Storage	°C	-55 ... +80				
Degree of protection to EN 60947-1, Annex C		Device	IP20				
Touch protection acc. to DIN EN 50274			Finger-safe				

[1] Corresponding to the relevant 3-pole 3RT2. contactors.

Table 9- 27 Short-circuit protection for contactors without overload relay (3RT231. and 3RT232. contactors)

Type			**3RT2316**	**3RT2317**	**3RT2325**	**3RT2326**	**3RT2327**
Size			**S00**		**S0**		
Short-circuit protection for contactors without overload relay							
Main circuit							
• Fuse links, operating class gL/gG: NH 3NA, DIAZED 5SB, NEOZED 5SE in accordance with IEC 60947-4-1 / DIN EN 60947-4-1							
	- Type of coordination "1"	A	35		63		
	- Type of coordination "2"	A	20		20		
	- Weld-free	A	10		16		

Table 9- 28 Actuation of 3RT231. and 3RT232. contactors

Type			**3RT2316**	**3RT2317**	**3RT2325**	**3RT2326**	**3RT2327**
Size			**S00**		**S0**		
Actuation							
Magnet coil operating range AC/DC			---		0.8 to 1.1 x U_S		
• AC operation							
	50 Hz		0.8 to 1.1 x U_S		---		
	60 Hz		0.85 to 1.1 x U_S		---		
• DC operation							
	Up to 50 °C		0.8 to 1.1 x U_S		---		
	Up to 60 °C		0.85 to 1.1 x U_S		---		
Magnet coil power input (for cold coil and 1.0 x U_S)							
• AC operation, 50 Hz, standard version							
- Switch-on power		VA	---		77		
- cos ϕ			---		0.82		
- Holding power		VA	---		9.8		
- cos ϕ			---		0.25		
• AC operation, 50/60 Hz, standard version							
- Switch-on power		VA	27/24.3	37/33	81/79		
- cos ϕ			0.8/0.75	0.8/0.75	0.72/0.74		
- Holding power		VA	4.2/3.3	5.7/4.4	10.5/8.5		
- cos ϕ			0.25/0.25	0.25/0.25	0.25/0.28		

Type			**3RT2316**	**3RT2317**	**3RT2325**	**3RT2326**	**3RT2327**
Size			**S00**		**S0**		
Actuation							
• AC operation, 50 Hz, USA/Canada							
	- Switch-on power	VA	26.4	36	77		
	- cos ϕ		0.81	0.8	0.82		
	- Holding power	VA	4.4	5.9	9.8		
	- cos ϕ		0.24	0.24	0.25		
• AC operation, 60 Hz, USA/Canada							
	- Switch-on power	VA	31.7	43	87		
	- cos ϕ		0.77	0.77	0.76		
	- Holding power	VA	4.8	6.5	9.4		
	- cos ϕ		0.25	0.25	0.28		
• DC operation							
	- Switch-on power = holding power	W	4		5.9		
Permissible residual current of electronics (with 0 signal)							
• AC operation		mA	< 4 mA x (239 V/U_S); the use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.		< 6 mA x (230 V/U_S)		
• DC operation		mA	< 10 mA x (24 V/U_S); the use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.		< 16 mA x (24 V/U_S)		
Switching times at 0.8 to 1.1 x U_S[1)]							
Total break time = opening delay + arcing time							
• AC operation							
	- Closing delay	ms	8 ... 35	8 ... 33	9 ... 38	8 ... 40	
	- Opening delay	ms	3.5 ... 14	4 ... 15	4 ... 16	4 ... 16	
• DC operation							
	- Closing delay	ms	30 ... 100		50 ... 170		
	- Opening delay	ms	7 ... 13		15 ... 17.5		
• Arcing time		ms	10 ...15		10		

Type			3RT2316	3RT2317	3RT2325	3RT2326	3RT2327
Size			S00		S0		
Actuation							
Switching times at 1.0 x U_S[1)]							
• AC operation							
	- Closing delay	ms	9.5 ... 24	9 ... 22	10 ... 18	10 ... 17	
	- Opening delay	ms	4 ... 14	4.5 ... 15	4 ... 16		
• DC operation							
	- Closing delay	ms	35 ... 50	35 ... 50	55 ... 80		
	- Opening delay	ms	7 ... 12	7 ... 12	16 ... 17		

1) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (varistor +2 ms to 5 ms, diode combination: 2x to 6x).

9.3.2 Main circuit - 3RT231. and 3RT232. (current carrying capacity for alternating current and direct current)

Table 9- 29 Main circuit - Current carrying capacity for alternating current (3RT231. and 3RT232. contactors)

Type			3RT2316	3RT2317	3RT2325	3RT2326	3RT2327
Size			**S00**		**S0**		
Main circuit							
Current carrying capacity for alternating current							
Utilization category AC-1, switching resistive loads							
• Rated operational currents I_e	At 40 °C, up to 690 V	A	18	22	35	40	50
	At 60 °C, up to 690 V	A	16	20	30	35	42
• Rated powers of three-phase current loads cos ϕ = 0.95 (at 60 °C)	At 230 V	kW	6.5	7.5	11	13	16
	400 V	kW	11	13	20	23	28
• Minimum conductor cross-section for loads with I_e	At 40 °C	mm^2	2.5		10		
	At 60 °C	mm^2	2.5		10		
Utilization category AC-2 and AC-3							
• Rated operational currents I_e(at 60 °C)	At 60 °C, up to 400 V	A	9	12	15.5		
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz	At 230 V	kW	2.2	3	4		
	400 V	kW	4	5.5	7.5		

Table 9- 30 Main circuit - Current carrying capacity for direct current (3RT231. and 3RT232. contactors)

Type			**3RT2316**	**3RT2317**	**3RT2325**	**3RT2326**	**3RT2327**
Size			**S00**		**S0**		
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)							
• Rated operational currents I_e(at 60 °C)							
- 1 current path	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	20		
	110 V	A	2.1		4.5		
	220 V	A	0.8		1		
	440 V	A	0.6		0.4		
- 2 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	30	35	42
	110 V	A	12		30	35	42
	220 V	A	1.6		1		
	440 V	A	0.8		1		
- 3 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	30	35	42
	110 V	A	16	20	30	35	42
	220 V	A	16	20	30	35	42
	440 V	A	1.3		2.9		
- 4 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	30	35	42
	110 V	A	16	20	30	35	42
	220 V	A	16	20	30	35	42
	440 V	A	1.3		2.9		

Type			**3RT2316**	**3RT2317**	**3RT2325**	**3RT2326**	**3RT2327**
Size			**S00**		**S0**		
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-3/DC-5, shunt-wound and series-wound motors (L/R ≤ 15 ms)							
• Rated operational currents I_e(at 60 °C)							
- 1 current path	Up to 24 V	A	16	20			
	60 V	A	0.5		5		
	110 V	A	0.15		2.5		
	220 V	A	---	---	1		
	440 V	A	---	---	0.09		
- 2 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	5		30	35	42
	110 V	A	0.35		15		
	220 V	A	---	---	3		
	440 V	A	---	---	0.27		
- 3 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	30	35	42
	110 V	A	16	20	30	35	42
	220 V	A	1.5		10		
	440 V	A	0.2		0.6		
- 4 current paths in series	Up to 24 V	A	16	20	30	35	42
	60 V	A	16	20	30	35	42
	110 V	A	16	20	30	35	42
	220 V	A	1.5		30	35	42
	440 V	A	0.2		0.6		

9.3.3 General data, short-circuit protection for contactors without overload relay and actuation (3RT251. and 3RT252. contactors)

Table 9- 31 General data - 3RT251. and 3RT252. contactors

Type			**3RT2516**	**3RT2517**	**3RT2518**	**3RT2526**
Size			**S00**			**S0**
General data						
Permissible mounting position[1]						
Mechanical durability		Operating cycles	30 million			10 million
Electrical durability		Operating cycles	Approx. 0.5 million			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Permissible ambient temperature	• Operation	°C	-25 … + 60			
	• Storage	°C	-55 … + 80			
Degree of protection to EN 60947-1, Annex C			IP20			
Touch protection acc. to DIN EN 50274			Finger-safe			

[1] Corresponding to the relevant 3-pole 3RT2. contactors.

Table 9- 32 Short-circuit protection for contactors without overload relay (3RT251. and 3RT252. contactors)

Type			**3RT2516**	**3RT2517**	**3RT2518**	**3RT2526**
Size			**S00**			**S0**
Short-circuit protection for contactors without overload relay						
Main circuit						
• Fuse links, operating class gL/gG: NH 3NA, DIAZED 5SB, NEOZED 5SE in accordance with IEC 60947-4-1 / DIN EN 60947-4-1						
	- Type of coordination "1"	A	35			63
	- Type of coordination "2"	A	20			35
	- Weld-free	V	10			16

Table 9- 33 Actuation of 3RT251. and 3RT252. contactors

Type	**3RT2516**	**3RT2517**	**3RT2518**	**3RT2526**
Size	**S00**			**S0**
Actuation				
Magnet coil operating range	See 3RT2316	See 3RT2317		See 3RT2326
Magnet coil power input (for cold coil and 1.0 x U_S)	See 3RT2316	See 3RT2317		See 3RT2326
Switching times at 0.8 to 1.1 x U_S	See 3RT2316	See 3RT2317		See 3RT2326
Total break time = opening delay + arcing time				

9.3.4 Main circuit - 3RT251. and 3RT252. (current carrying capacity for alternating current and direct current)

Table 9- 34 Main circuit - Current carrying capacity for alternating current (3RT251. and 3RT252. contactors)

Type			**3RT2516**	**3RT2517**	**3RT2518**	**3RT2526**	
Size			**S00**			**S0**	
Main circuit							
Current carrying capacity for alternating current							
Utilization category AC-1, switching resistive loads							
• Rated operational currents I_e	At 40 °C up to 690 V	A	18	22	22	40	
	At 60 °C up to 690 V	A	16	20	20	35	
• Rated powers of three-phase current loads cos ϕ = 0.95 (at 60 °C)	At 230 V	kW	6.5	7.5	7.5	15	
	400 V	kW	11	13	13	26	
• Minimum conductor cross-section for loads with I_e	At 40 °C	mm^2	2.5	2.5	2.5	10	
Utilization category AC-2 and AC-3						AC[1)]	DC[1)]
• Rated operational currents I_e(at 60 °C)	NO contact up to 400 V	A	9	12	16	25	25
	NC contact up to 400 V	A	9	9	9	25	20
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz	NO contact at 230 V	kW	2.2	3	4	5.5	5.5
	NC contact at 230 V	kW	2.2	2.2	2.2	5.5	5.5
	NO contact at 400 V	kW	4	5.5	7.5	11	11
	NC contact at 400 V	kW	4	4	4	11	7.5

[1)] Values for AC operation and DC operation: Deviating values for the NC contact apply to AC-2 and AC-3 for the 3RT2526 with DC operation.

Table 9- 35 Main circuit - Current carrying capacity for direct current (3RT251. and 3RT252. contactors)

Type				**3RT2516**	**3RT2517**	**3RT2518**	**3RT2526**
Size				**S00**			**S0**
Main circuit							
Current carrying capacity for direct current							
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)							
• Rated operational currents I_e(at 60 °C)							
- 1 current path	Up to 24 V		A	16	20	20	35
	60 V		A	16	20	20	20
	110 V		A	2.1	2.1	2.1	4.5
	220 V		A	0.8	0.8	0.8	1
	440 V		A	0.6	0.6	0.6	0.4
- 2 current paths in series	Up to 24 V		A	16	20	20	35
	60 V		A	16	20	20	35
	110 V		A	12	12	12	35
	220 V		A	1.6	1.6	1.6	5
	440 V		A	0.8	0.8	0.8	1
Utilization category DC-3/DC-5[1], shunt-wound and series-wound motors (L/R ≤ 15 ms)							
• Rated operational currents I_e(at 60 °C)							
- 1 current path	Up to 24 V		A	16	20	20	20
	60 V		A	0.5	0.5	0.5	5
	110 V		A	0.15	0.15	0.15	2.5
	220 V		A	0.75	0.75	0.75	1
	440 V		A	---	---	---	0.09
- 2 current paths in series	Up to 24 V		A	16	20	20	35
	60 V		A	5	5	5	35
	110 V		A	0.35	0.35	0.35	15
	220 V		A	---	---	---	3
	440 V		A	---	---	---	0.27

[1] For U_S > 24 V the rated operational currents I_e for the NC contact current paths are equal to 50% of the values for the NO contact current paths.

9.3.5 General data, short-circuit protection for contactors without overload relay and actuation (3RT233. contactors)

Table 9- 36 General data - 3RT233 contactors.

Type			**3RT2336**	**3RT2337**
Size			**S2**	
General data				
Permissible mounting position The contactors are dimensioned for operation on a vertical mounting plane.				
Mechanical endurance		Operating cycles	10 million	
Electrical endurance at I_e/AC-1		Operating cycles	Approx. 0.5 million	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Permissible ambient temperature	• Operation	°C	-25 ... +60	
	• Storage	°C	-55 ... +80	
Degree of protection to EN 60947-1, Annex C			IP20 (IP00 terminal compartment)	
Touch protection acc. to DIN EN 50274			Finger-safe	

1) Corresponding to the relevant 3-pole 3RT2. contactors.

Table 9- 37 Short-circuit protection for contactors without overload relays (3RT233. contactors)

Type		**3RT2336**	**3RT2337**
Size		**S2**	
Short-circuit protection for contactors without overload relay			
Main circuit Fuse links, gG operational class: LV HRC, type 3NA; DIAZED, type 5SB; NEOZED, type 5SE according to IEC 60947-4-1/EN 60947-4-1			
• Type of coordination "1"	A	On request	
• Type of coordination "2"	A	On request	
• Weld-free	A	On request	

Table 9- 38 Actuation of 3RT233 contactors.

Type		**3RT2336**	**3RT2337**
Size		**S2**	
Actuation			
Magnet coil operating range AC/DC		---	
• AC operation			
	50 Hz	0.8 ... 1.1 x U_S	
	60 Hz	0.85 ... 1.1 x U_S	
• AC / DC operation		0.8 x U_{smin}...1.1 x U_{smax}	
Magnet coil power input (for cold coil and 1.0 x U_S)			
AC operation, 50 Hz, standard version			
• Closing power	VA	190	
• cos ϕ		0,72	
• Holding power	VA	16	
• cos ϕ		0,37	
AC operation, 50/60 Hz, standard version			
• Closing power	VA	210/188	
• cos ϕ		0,69/0,65	
• Holding power	VA	17,2/16,5	
• cos ϕ		0,36/0,39	
AC operation, 60 Hz, USA, Canada			
• Closing power	VA	212	
• cos ϕ		0,67	
• Holding power	VA	18,5	
• cos ϕ		0,37	
AC/DC operation			
• Closing power for AC operation	VA	40	
• cos ϕ		0,64/0,5	
• Holding power for AC operation	VA	2	
• cos ϕ		1	
• Closing power for DC operation	W	25	
• Holding power for DC operation	W	1	
DC operation (closing power = holding power)		---	

Type			3RT2336	3RT2337
Size			**S2**	
Actuation				
Operating times for 0.8 ... 1.1 x U_S Total break time = Opening delay + Arcing time				
AC operation				
• Closing delay		ms	10 ... 80	
• Opening delay		ms	10 ... 18	
DC operation				
• Closing delay		ms	---	
• Opening delay		ms	---	
AC / DC operation				
• Closing delay		ms	50 ... 110	
• Opening delay		ms	35 ... 55	
Arcing time		ms	10 ... 20	

9.3.6 Main circuit - 3RT233. (current carrying capacity for alternating current and direct current)

Table 9- 39 Main circuit - Current carrying capacity for alternating current (3RT233. contactors)

Type			3RT2336	3RT2337
Size			**S2**	
Main circuit				
Current carrying capacity for alternating current				
Utilization category AC-1, switching resistive loads				
• Rated operational currents I_e	At 40 °C, up to 690 V	A	60	110
	At 60 °C, up to 690 V	A	55	95
• Rated powers of three-phase current loads cos ϕ = 0.95 (at 60 °C)	At 230 V	kW	21	36
	400 V	kW	36	63
• Minimum conductor cross-section for loads with I_e	At 40 °C	mm^2	16	35
	At 60 °C	mm^2	25	50
Utilization category AC-2 and AC-3				
• Rated operational currents I_e	At 60 °C, up to 400 V	A	---	
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz	At 230 V	kW	---	
	400 V	kW	---	

Table 9- 40 Main circuit - Current carrying capacity for direct current (3RT233. contactors)

Type				**3RT2336**	**3RT2337**
Size				**S2**	
Main circuit					
Current carrying capacity for direct current					
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)					
• Rated operational currents I_e(at 60 °C)					
	- 1 current path	Up to 24 V	A	55	95
		60 V	A	23	23
		110 V	A	4,5	4,5
		220 V	A	1	
		440 V	A	0,4	
	- 2 current paths in series	Up to 24 V	A	55	
		60 V	A	55	
		110 V	A	45	
		220 V	A	5	
		440 V	A	1	
	- 3 current paths in series	Up to 24 V	A	55	
		60 V	A	55	
		110 V	A	45	
		220 V	A	45	
		440 V	A	2,9	
	- 4 current paths in series	Up to 24 V	A	55	65
		60 V	A	55	65
		110 V	A	45	55
		220 V	A	45	55
		440 V	A	2,9	3,5

Type				**3RT2336**	**3RT2337**
Size				**S2**	
Main circuit					
Current carrying capacity for direct current					
Utilization category DC-3/DC-5, shunt-wound and series-wound motors (L/R ≤ 15 ms)					
• Rated operational currents I_e(at 60 °C)					
	- 1 current path	Up to 24 V	A	20	
		60 V	A	---	
		110 V	A	2,5	
		220 V	A	1	
		440 V	A	0,1	
	- 2 current paths in series	Up to 24 V	A	55	
		60 V	A	45	
		110 V	A	25	
		220 V	A	5	
		440 V	A	0,27	
	- 3 current paths in series	Up to 24 V	A	55	
		60 V	A	55	
		110 V	A	45	
		220 V	A	25	
		440 V	A	0,6	
	- 4 current paths in series	Up to 24 V	A	55	65
		60 V	A	55	65
		110 V	A	45	55
		220 V	A	25	55
		440 V	A	0,6	0,8

9.3.7 General data, short-circuit protection for contactors without overload relay and actuation (3RT253. contactors)

Table 9- 41 General data - 3RT253 contactors.

Type			**3RT2535**	**3RT2536**
Size			**S2**	
General data				
Permissible mounting position The contactors are dimensioned for operation on a vertical mounting plane				
Mechanical endurance		Operating cycles	10 million	
Electrical endurance at I_e/AC-1		Operating cycles	Approx. 0.5 million	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Permissible ambient temperature	• Operation	°C	-25 … + 60	
	• Storage	°C	-55 … + 80	
Degree of protection to EN 60947-1, Annex C			IP20 (IP00 terminal compartment)	
Touch protection acc. to DIN EN 50274			Finger-safe	

Table 9- 42 Short-circuit protection for contactors without overload relays (3RT253. contactors)

Type		**3RT2535**	**3RT2536**
Size		**S2**	
Short-circuit protection for contactors without overload relay			
Main circuit			
Fuse links, operating class gL/gG: NH 3NA, DIAZED 5SB, NEOZED 5SE in accordance with IEC 60947-4-1 / DIN EN 60947-4-1			
• Type of coordination "1"	A	125	160
• Type of coordination "2"	A	63	80
• Weld-free	V	---	---

Table 9- 43 Actuation of 3RT253 contactors.

Type	3RT2535	3RT2536
Size	**S2**	
Actuation		
Magnet coil operating range		
• AC operation	0.8 x U_{smin}... 1.1 x U_{smax}	
• AC/DC operation	0.8 x U_{smin}... 1.1 x U_{smax}	
Magnet coil power input (for cold coil and 1.0 x U_S)	See 3RT233	
Operating times for 0.8 ... 1.1 x U_S Total break time = Opening delay + Arcing time	See 3RT233	

9.3.8 Main circuit - 3RT253. (current carrying capacity for alternating current and direct current)

Table 9- 44 Main circuit - Current carrying capacity for alternating current (3RT253. contactors)

Type			3RT2535	3RT2536
Size			**S2**	
Main circuit				
Current carrying capacity for alternating current				
Utilization category AC-1, switching resistive loads				
• Rated operational currents I_e	At 40 °C up to 690 V	A	60	70
	At 60 °C up to 690 V	A	55	60
• Rated powers of three-phase current loads cos ϕ = 0.95 (at 60 °C)	At 230 V	kW	21	23
	400 V	kW	36	39
• Minimum conductor cross-section for loads with I_e	At 40 °C	mm^2	16	25
Utilization category AC-2 and AC-3				
• Rated operational currents I_e(at 60 °C)	NO contact up to 400 V	A	35	41
	NC contact up to 400 V	A	35	41
• Rated powers of slip-ring or squirrel-cage motors at 50 Hz and at 60 Hz	NO contact at 230 V	kW	11	11
	NC contact at 230 V	kW	11	11
	NO contact at 400 V	kW	18,5	22
	NC contact at 400 V	kW	18,5	22

1) Values for AC operation and DC operation: Deviating values for the NC contact apply to AC-2 and AC-3 for the 3RT2526 with DC operation.

Table 9- 45 Main circuit - Current carrying capacity for direct current (3RT253. contactors)

Type				**3RT2535**	**3RT2536**
Size				**S2**	
Main circuit					
Current carrying capacity for direct current					
Utilization category DC-1, switching resistive loads (L/R ≤1 ms)					
• Rated operational currents I_e(at 60 °C)					
	- 1 current path	Up to 24 V	A	55	60
		60 V	A	23	
		110 V	A	4,5	
		220 V	A	1	
		440 V	A	0,4	
	- 2 current paths in series	Up to 24 V	A	55	
		60 V	A	45	
		110 V	A	45	
		220 V	A	5	
		440 V	A	1	
Utilization category DC-3/DC-5[1], shunt-wound and series-wound motors (L/R ≤ 15 ms)					
• Rated operational currents I_e(at 60 °C)					
	- 1 current path	Up to 24 V	A	35	
		60 V	A	6	
		110 V	A	2,5	
		220 V	A	1	
		440 V	A	0,1	
	- 2 current paths in series	Up to 24 V	A	55	
		60 V	A	45	
		110 V	A	25	
		220 V	A	5	
		440 V	A	0,27	

[1] For U_S > 24 V the rated operational currents I_e for the NC contact current paths are equal to 50% of the values for the NO contact current paths.

9.4 Contactors with extended operating range

9.4.1 Contactors for railway applications

Table 9- 46 Contactors with series resistor and coupling relays for railway applications

Type			**3RT2017**	**3RT202.**
Size			**S00**	**S0**
Magnet coil operating range AC/DC			0.7 to 1.25 x U_S	0.7 to 1.25 x U_S
Magnet coil power input (for cold coil and 1.0 x U_S)				
Contactors with series resistor				
	- Switch-on power	W	13	---
	- Holding power	W	4	---
Coupling relays for railway applications (contactors without series resistor)				
	- Switch-on power	W	2,8	4,5
	- Holding power	W	2,8	4,5
Vertical mounting position			Special version required	

Where specifications have not been included the information and technical data for the standard contactors apply.

Table 9- 47 Contactors with electronic operating mechanism (size S0)

Type			**3RT202.-2XB4..-0LA2**	**3RT202.-2XBF4..-0LA2**
Size			**S0**	
Magnet coil operating range			0.7 to 1.25 x U_S	
Magnet coil power input (for cold coil and 1.0 x U_S)				
	- Switch-on power	W	6,7	13,2
	- Holding power	W	0,8	1,6
Vertical mounting position			Special version required	

Where specifications have not been included the information and technical data for the standard contactors apply.

Note

The contactors are dimensioned for operation on a vertical mounting plane (+/- 30 %).

Table 9- 48 Contactors with electronic operating mechanism (size S2)

Type			**3RT203.-3XB40-0LA2**	**3RT203.-3XF40-0LA2**
Size			**S2**	
Magnet coil operating range AC/DC			0.7 to 1.25 x U_S	
Magnet coil power input (for cold coil and 1.0 x U_S)				
Coupling relays for railway applications (contactors without series resistor)				
	- Switch-on power	W	23	
	- Holding power	W	1	
Vertical mounting position			Special version required	

Where specifications have not been included the information and technical data for the standard contactors apply.

Note

The contactors are dimensioned for operation on a vertical mounting plane (+/- 30 %).

9.4.2 Coupling relays

9.4.2.1 3RH21 coupling relays for switching auxiliary circuits

Technical data for 3RH21 coupling relays

Unless listed below, the technical data is the same as that for 3RH21 auxiliary contactor relays.

Table 9- 49 Technical data for 3RH21..-.HB40, 3RH21..-.JB40, 3RH21..-.KB40 contactors

Type			**3RH21..-.HB40**	**3RH21..-.JB40**	**3RH21..-.KB40**
Size			**S00**		
Magnet coil operating range			0.7 to 1.85 x U_S		
Magnet coil power input (with cold coil)					
Switch-on power = holding power					
At U_S = 17 V		W	1.4		
At U_S = 24 V		W	2.8		
At U_S = 30 V		W	4.4		
Permissible residual current of electronics with 0 signal			< 10 mA x (24 V/U_S)		
Magnet coil suppressor circuit			Without overvoltage attenuation 	With diode 	Suppressor diode 
Switching times					
Switching on at 17 V					
	- ON-delay NO	ms	40 ... 130		
	- OFF-delay NC	ms	30 ... 80		
At 24 V					
	- ON-delay NO	ms	35 ... 60		
	- OFF-delay NC	ms	25 ... 40		
At 30 V					
	- ON-delay NO	ms	25 ... 50		
	- OFF-delay NC	ms	15 ... 30		
Switching off at 17 to 30 V					
	- OFF-delay NO	ms	7 ... 20	38 ... 65	7 ... 20
	- ON-delay NC	ms	20 ... 30	55 ... 75	20 ... 30
Vertical mounting position			Please contact your local Siemens office for advice		

Table 9- 50 Technical data for 3RH21..-.MB40-0KT0, 3RH21..-.VB40, 3RH21..-.WB40 contactors

Type			**3RH21..-.MB40-0KT0**	**3RH21..-.VB40**	**3RH21..-.WB40**
Size			**S00**	**S00**	**S00**
Magnet coil operating range			0.85 to 1.85 x U_S		
Magnet coil power input (for cold coil) Switch-on power = holding power at U_S = 24 V		W	1.6		
Permissible residual current of electronics with 0 signal		mA	< 8 mA x (24 V/U_S)		
Magnet coil suppressor circuit			Diode, varistor or RC element attachable 	Built-in diode 	Suppressor diode 
Operating times for coupling relays					
Switching on at 20.5 V					
	- OFF-delay NC	ms	30 ... 120		
	- ON-delay NO	ms	20 ... 110		
At 24 V					
	- ON-delay NO	ms	25 ... 90		
	- OFF-delay NC	ms	15 ... 80		
At 44 V					
	- OFF-delay NC	ms	15 ... 60		
	- ON-delay NO	ms	10 ... 50		
Switching off at 17 to 30 V					
	- OFF-delay NO	ms	5 ... 20	20 ... 80	5 ... 20
	- ON-delay NC	ms	10 ... 30	30 ... 90	10 ... 30
Vertical mounting position			Please contact your local Siemens office for advice		

9.4.2.2 3RT20 coupling relays for switching motors

Technical data for 3RT20 coupling relays

Unless listed below, the technical data is the same as that for 3RT20 contactors for switching motors.

Table 9- 51 General data and actuation for coupling relays 3RT201.-..B4. and 3RT202.-..B4.

Type			**3RT201.-.HB4.**	**3RT201.-.JB4.**	**3RT201.-.KB4.**	**3RT202.-.KB4.**
Size			**S00**			**S0**
General data						
Mechanical durability		Operating cycles	30 million			10 million
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N		V	400			
Actuation						
Magnet coil operating range			0.7 to 1.25 x U_S			
Magnet coil power input (for cold coil) Switch-on power = holding power	At U_S 17 V	W	1.6			2.3
	24 V	W	2.8			4.5
	30 V	W	4.4			7
Permissible residual current of electronics (with 0 signal)		mA	< 6 mA x (24 V/U_S)			< 10 mA x (24 V/ U_S)
Magnet coil suppressor circuit			Without overvoltage attenuation 	With diode	Suppressor diode 	With varistor 
Operating times for coupling relays						
• Switching on						
- At 17 V	ON-delay NO	ms	40 ... 130			70 ... 270
	OFF-delay NC	ms	30 ... 80			60 ... 250
- At 24 V	ON-delay NO	ms	35 ... 60			65 ... 90
	OFF-delay NC	ms	25 ... 40			55 ... 80
- At 30 V	ON-delay NO	ms	25 ... 50			52 ... 65
	OFF-delay NC	ms	15 ... 30			43 ... 57
• Switching off at 17 to 30 V						
	OFF-delay NO	ms	7 ... 20	38 ... 65	7 ... 20	19 ... 21
	ON-delay NC	ms	20 ... 30	55 ... 75	20 ... 30	25 ... 31

Table 9- 52 General data and actuation (coupling relays 3RT201.-1MB4.-0KT0, 3RT201.-1VB4., 3RT201.-1WB4.)

Type			**3RT201.-1MB4.-0KT0**	**3RT201.-1VB4.**	**3RT201.-1WB4.**
Size			**S00**		
General data					
Mechanical durability		Operating cycles	30 million		
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N		V	400		
Actuation					
Magnet coil operating range			0.85 to 1.85 x U_S		
Magnet coil power input (for cold coil) Switch-on power = holding power	At U_S 24 V	W	1.6		
Permissible residual current, vertical mounting position			On request		
Magnet coil suppressor circuit			Without overvoltage attenuation 	With diode	Suppressor diode 
Operating times for coupling relays					
• Switching on					
- At 20.5 V	ON-delay NO	ms	30 ... 120		
	OFF-delay NC	ms	20 ... 110		
- At 24 V	ON-delay NO	ms	25 ... 90		
	OFF-delay NC	ms	15 ... 80		
- At 44 V	ON-delay NO	ms	15 ... 60		
	OFF-delay NC	ms	10 ... 50		
• Switching off at 17 to 30 V					
	OFF-delay NO	ms	5 ... 20	20 ... 80	5 ... 20
	ON-delay NC	ms	10 ... 30	30 ... 90	10 ... 30

9.5 3RH2 contactor relays

9.5.1 Permissible mounting position, positively driven operation of contacts and contact reliability of 3RH2 contactor relays (4- and 8-pole)

Table 9- 53 Permissible mounting position of 3RH2 contactor relays

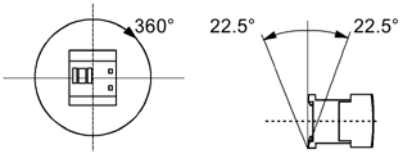
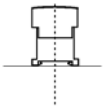
Type		**3RH2**
Size		**S00**
Permissible mounting position		
The contactors are dimensioned for operation on a vertical mounting plane.	• AC and DC operation	
Vertical mounting position:	• AC operation	
		Special version required.
	• DC operation	Special version required (please contact your local Siemens office for advice regarding 3RH2122-2K.40 coupling relays and contactor relays with extended operating range)

Table 9- 54 Positively driven operation of contacts in the case of 3RH2 contactor relays

Type	**3RH2**
Size	**S00**
Positively driven operation of contacts in the case of contactor relays	
3RH2: **Yes**, in the basic device and the auxiliary switch block as well as between the basic device and the snap-on auxiliary switch block (removable) in accordance with:	Explanation: There is positively driven operation if it is ensured that the NC contact and the NO contact cannot be closed at the same time.
• ZH 1/457	
• DIN EN 60947-5-1, Annex L	**ZH1/457** Safety rules for control units on power-operated presses in the metalworking industry.
3RH22: **Yes**, in the basic device and the auxiliary switch block as well as between the basic device and the snap-on auxiliary switch block (permanently mounted) in accordance with:	**DIN EN 60947-5-1, Annex L** Low-voltage switchgear and controlgear Specific requirements to be met by positively driven contacts.
• ZH 1/457	
• DIN EN 60947-5-1, Annex L	

Note

No positively driven operation for 3RH2911-.NF.. solid-state compatible auxiliary switch blocks

Table 9- 55 Contact reliability of 3RH2 contactor relays

Type	**3RH2**
Size	**S00**
Contact reliability	
Contact reliability at 17 V, 1 mA acc. to DIN EN 60947-5-4	Frequency of contact faults < 10-8, i.e. < 1 error per 100 million operating cycles

9.5.2 General data, rated data (CSA and UL), and data relating to short-circuit protection for 3RH2. contactor relays

Table 9- 56 General data – 3RH2. contactor relays

Type			**3RH21, 3RH22**	**3RH24**
Size			**S00**	
General data				
Mechanical durability	• Basic device	Operating cycles	30 million	5 million
	• Basic device with snap-on auxiliary switch block		10 million	
	• Solid-state compatible auxiliary switch block		5 million	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Rated impulse withstand voltage U_{imp}		kV	6	
Protective separation between coil and contacts in basic device acc. to DIN EN 60947-1, Annex N		V	400	
Permissible ambient temperature	• Operation	°C	-25 … + 60	
	• Storage	°C	-55 … + 80	
Degree of protection to EN 60947-1, Annex C			IP20	
Touch protection acc. to DIN EN 50274			Finger-safe	
Shock resistance				
• Rectangular pulse	AC operation/DC operation		7.3g/5 ms and 4.7g/10 ms	
			> 10g/5 ms and > 5g/10 ms	
• Sine pulse	AC operation/DC operation		11.4g/5 ms and 7.3g/10 ms	
			> 15g/5 ms and > 8g/10 ms	

Table 9- 57 Short-circuit protection for 3RH2. contactor relays

Type		**3RH21, 3RH22**	**3RH24**
Size		**S00**	**S00**
Short-circuit protection			
(weld-free fuse protection at I_k ≥1 kA)			
• Fuse links, operating class gL/gG			
- DIAZED, type 5SB	A	10	
- NEOZED, type 5SE	A	10	
• Or miniature circuit breakers with C characteristic	A	6	
(short-circuit current I_k < 400 A)			

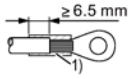
Table 9- 58 CSA and UL rated data (3RH2. contactor relays)

Type		**3RH21, 3RH22**	**3RH24**
Size		**S00**	**S00**
CSA and UL rated data			
Basic devices and auxiliary switch blocks			
• Rated control supply voltage	V AC	max. 600	
• Rated voltage	V AC	600	
• Switching capacity		A 600, Q 600	
• Continuous current at 240 V AC	A	10	

9.5.3 Conductor cross-sections - 3RH2. contactor relays

Table 9- 59 Conductor cross-sections - 3RH2. contactor relays

Type		**3RH21, 3RH22**	**3RH24**
Size		**S00**	**S00**
Conductor cross-sections (1-wire or 2-wire connection possible)			
Auxiliary conductor connections and coil terminals		**Screw connection**	
• Solid + stranded	mm^2	2 x (0.5 to 1.5); 2 x (0.75 to 2.5) acc. to IEC 60947; max. 2 x 4	
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5); 2 x (0.75 to 2.5)	
• AWG cables, solid or stranded	AWG	2 x (20 to 16); 2 x (18 to 14)	
• Connection screws		M3	
- Tightening torque	Nm (lb.in.)	0.8 to 1.2 (7 to 10.3 lb.in.)	
Auxiliary conductor connections and coil terminals (basic device)		**Spring-loaded connection**	
• Solid + stranded	mm^2	2 x (0.5 to 4)	
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 2.5)	
• Finely stranded without end sleeve	mm^2	2 x (0.5 to 2.5)	
• AWG cables, solid or stranded	AWG	2 x (20 to 12)	
Auxiliary conductor connections for auxiliary switch block mounted on the front			
• Solid	mm^2	2 x (0.5 to 2.5)	
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5)	
• Finely stranded without end sleeve	mm^2	2 x (0.5 to 1.5)	
• AWG cables, solid or stranded	AWG	2 x (20 to 14)	

Type		**3RH21, 3RH22**	**3RH24**
Size		**S00**	**S00**
Conductor cross-sections (1-wire or 2-wire connection possible)			
Auxiliary conductor connections and coil terminals		**Ring cable lug connection**	
Connection screw		M3 (Pozidriv size PZ 2)	
• Operating tool	mm	∅ 5 … 6	
• Tightening torque	Nm	0.8 … 1.2	
• Usable ring cable lugs	mm	d_2 = min. 3.2	
	mm	d_3 = max. 7.5	
- DIN 46237 with insulating sleeve			
- JIS C2805 type RAV with insulating sleeve			
- JIS C2805 type RAP with insulating sleeve			
- DIN 46234 without insulating sleeve			
- DIN 46225 without insulating sleeve			
- JIS C2805 type R without insulating sleeve		A shrink-on sleeve must be used to provide additional insulation for the ring cable lugs 1). • Application temperature: -55 °C/+155 °C • UL 224 approved • Flame-protected	

9.5.4 Actuation - 3RH2. contactor relays

Table 9- 60 Actuation - 3RH2. contactor relays

Type				**3RH2.**
Size				**S00**
Actuation				
Magnet coil operating range				
AC operation			At 50 Hz	0.8 to 1.1 x U_S
			At 60 Hz	0.85 to 1.1 x U_S
DC operation			At + 50 °C	0.8 to 1.1 x U_S
			At + 60 °C	0.85 to 1.1 x U_S
Magnet coil power input (for cold coil and 1.0 x U_S)				
• AC operation, 50 Hz, standard version				
	- Switch-on power		VA/cos ϕ	37 / 0.8
	- Holding power		VA/cos ϕ	5.7 / 0.25
• AC operation, 60 Hz				
	- Switch-on power		VA/cos ϕ	33 / 0.75
	- Holding power		VA/cos ϕ	4.4 / 0.25
• DC operation				
	- Switch-on power = holding power		W	4.0
Permissible residual current of electronics (with 0 signal)				
• AC operation[1)]			mA	< 4 mA (230 V/U_S)
• DC operation			mA	< 10 mA (24 V/U_S)
Switching times[2)]				
Total break time = opening delay + arcing time				
AC operation		Values apply with coil in cold state and at operating temperature for operating range		
• Switching on				
	- ON-delay NO contact	0.8 ... 1.1 x U_S	ms	8 ... 33
		1.0 x U_S	ms	9 ... 22
		Minimum operating time 3RH24	ms	≥ 35
	- OFF-delay NC contact	0.8 ... 1.1 x U_S	ms	6 ... 25
		1.0 x U_S	ms	6.5 ... 19
• Switching off				
	- OFF-delay NO contact	0.8 ... 1.1 x U_S	ms	4 ... 15
		1.0 x U_S	ms	4.5 ... 15
		Minimum operating time 3RH24	ms	≥ 30
	- ON-delay NC contact	0.8 ... 1.1 x U_S	ms	5 ... 15
		1.0 x U_S	ms	5 ... 15

Type			**3RH2.**
Size			**S00**
Actuation			
DC operation			
• Switching on			
- ON-delay NO contact	0.8 ... 1.1 x U_S	ms	30 ... 100
	1.0 x U_S	ms	35 ... 50
	Minimum operating time 3RH24	ms	≥ 100
- OFF-delay NC contact	0.8 ... 1.1 x U_S	ms	25 ... 90
	1.0 x U_S	ms	30 ... 45
• Switching off			
- OFF-delay NO contact	0.8 ... 1.1 x U_S	ms	7 ... 13
	1.0 x U_S	ms	7 ... 12
	Minimum operating time 3RH24	ms	≥ 30
- ON-delay NC contact	0.8 ... 1.1 x U_S	ms	13 ... 19
	1.0 x U_S	ms	13 ... 18
Arcing time		ms	10 ... 15
Dependency of switching frequency z' on operational current I' and operational voltage U' $z' = z \cdot I_e/I' \cdot (U_e/U')1.5 \cdot 1/h$			

1) The use of the additional load module 3RT2916-1GA00 is recommended at higher residual currents.

2) The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are attenuated against voltage peaks (suppression diode 6x to 10x; diode combination 2x to 6x; varistor +2 to 5 ms).

9.5.5 Load side of 3RH2. contactor relays

Table 9- 61 Load side - 3RH2. contactor relays

Type			**3RH2.**
Size			**S00**
Load side			
Rated operational currents I_e			
AC-12		A	10
AC-15/AC-14 at rated operational voltage U_S	Up to 230 V	A	10
	400 V	A	3
	500 V	A	2
	690 V	A	1
DC-12 at rated operational voltage U_S			
• 1 current path	24 V	A	10
	60 V	A	6
	110 V	A	3
	220 V	A	1
	440 V	A	0.3
	600 V	A	0.15
• 2 current paths in series	24 V	A	10
	60 V	A	10
	110 V	A	4
	220 V	A	2
	440 V	A	1.3
	600 V	A	0.65
• 3 current paths in series	24 V	A	10
	60 V	A	10
	110 V	A	10
	220 V	A	3.6
	440 V	A	2.5
	600 V	A	1.8

Type			**3RH2.**
Size			**S00**
Load side			
DC-13 at rated operational voltage U_S			
• 1 current path	24 V	A	10
	60 V	A	2
	110 V	A	1
	220 V	A	0.3
	440 V	A	0.14
	600 V	A	0.1
• 2 current paths in series	24 V	A	10
	60 V	A	3.5
	110 V	A	1.3
	220 V	A	0.9
	440 V	A	0.2
	600 V	A	0.1
• 3 current paths in series	24 V	A	10
	60 V	A	4.7
	110 V	A	3
	220 V	A	1.2
	440 V	A	0.5
	600 V	A	0.26
Switching frequency z			
• in operating cycles/hour during rated operation for utilization category	AC-12/DC-12	h^{-1}	1000
	AC-15/AC-14	h^{-1}	1000
	DC-13	h^{-1}	1000
• No-load switching frequency		h^{-1}	10000
Dependency of switching frequency z' on operational current I' and operational voltage U' $z' = z \cdot I_e/I' \cdot (U_e/U')1.5 \cdot 1/h$			

1) Snap-on auxiliary switch blocks: 6 A.

9.6 3RT26 capacitor contactors

9.6.1 Rated data for auxiliary contacts

Table 9- 62 Technical data for 3RT2 contactors - Rated data for auxiliary contacts

Type			3RT2617	3RT2625 3RT2626 3RT2627 3RT2628	3RT2636 3RT2637
Size			**S00**	**S0**	**S2**
Rated data for auxiliary contacts					
Acc. to IEC 60947-5-1/DIN EN 60947-5-1 (VDE 0660 Part 200) (Data applies to integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactors size S00 and S0.)					
Rated insulation voltage U_i (pollution degree 3)		V	690		
Conventional thermal current I_{th} =		A	10		
Rated operational current I_e/AC-12					
AC load					
Rated operational current I_e/AC-15/AC-14					
• at rated operational voltage U_e	Up to 125 V	A	10[2)]		
	220 V	A	10[2)]		
	230 V	A	10[2)]		
	380 V	A	3		
	400 V	A	3		
	500 V	A	2		
	660 V	A	1		
	690 V	A	1		
DC load					
Rated operational current I_e/DC-12					
• at rated operational voltage U_e	24 V	A	10		
	60 V	A	6		
	110 V	A	3		
	125 V	A	2		
	220 V	A	1		
	440 V	A	0,3		
	600 V	A	0,15		

Type			**3RT2617**	**3RT2625** **3RT2626** **3RT2627** **3RT2628**	**3RT2636** **3RT2637**
Size			**S00**	**S0**	**S2**
Rated data for auxiliary contacts					
Rated operational current I_e/DC-13					
• at rated operational voltage U_e	24 V	A	10[1]		
	60 V	A	2		
	110 V	A	1		
	125 V	A	0,9		
	220 V	A	0,3		
	440 V	A	0,14		
	600 V	A	0,1		
Contact reliability at 17 V, 1 mA acc. to DIN EN 60947-5-4			Frequency of contact faults $<10^{-8}$ i.e. < 1 fault per 100 million operating cycles		

1) Contacts in auxiliary switch blocks for contactors size S00 and S0: 6 A

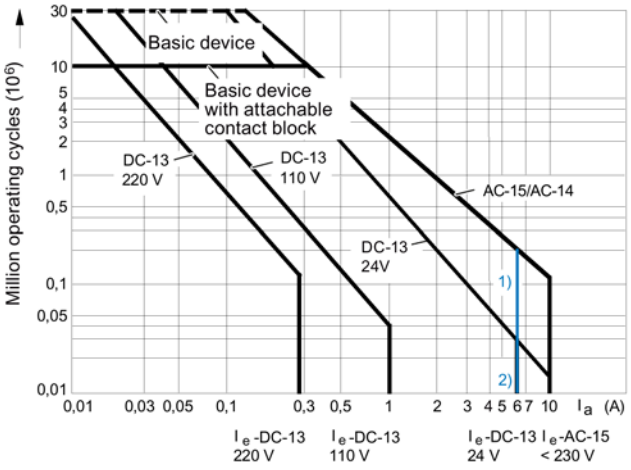
2) 3RH22, 3RH29, 3RT2...-....4: I_e = 6 A for AC-15/AC-14 and DC-13.

9.6.2 Contact service life of auxiliary and main contacts

Contact service life of auxiliary contacts

This requires operating mechanisms that switch at random, i.e. not synchronized with the phase angle of the supply system.
The contact service life is essentially dependent on the breaking current.
The characteristic curves apply to:

- Integrated auxiliary contacts for 3RT26.
  Integrated auxiliary contacts (size S0) and contacts in the auxiliary switch blocks for contactors (size S00 and S0): 6 A
- 3RH2911-., 3RH2921-. auxiliary switching blocks for contactors of sizes S00, S0 and S2.
  Contacts in the auxiliary switching blocks for contactors of sizes S00 und S0: 6 A

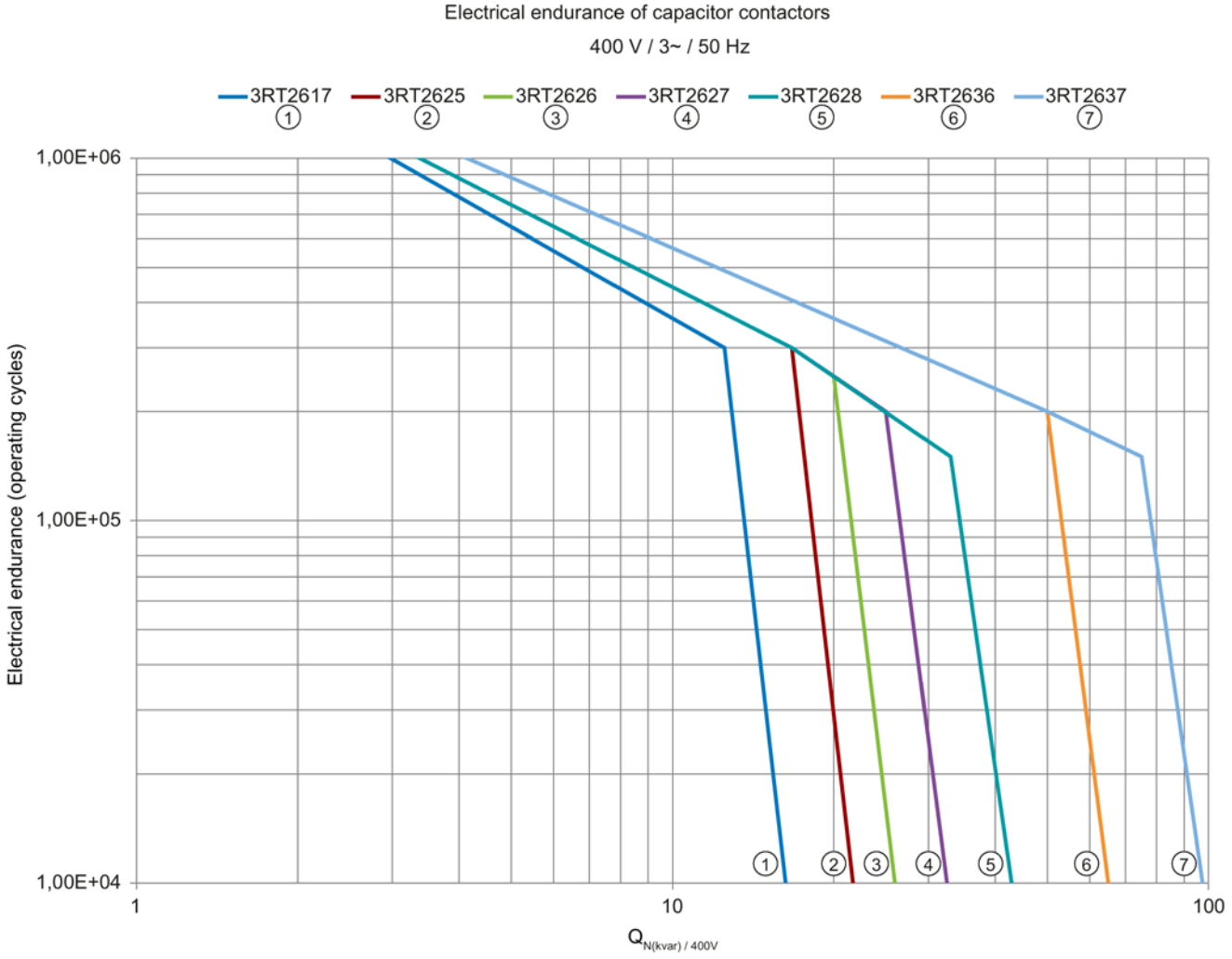


Legend for diagram:
I_a = Breaking current
I_e = Rated operational current

Contact endurance of main contacts

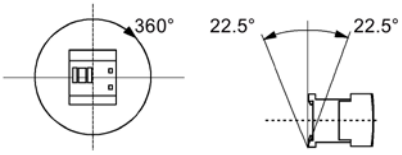
The characteristic curves show the contact endurance of the contactors when switching capacitive loads (AC-6b) depending on the reactive power Q_N and rated operational voltage.

The rated operational current I_e complies with utilization category AC-6b (breaking 1.35 times the rated operational current) and is intended for a contact endurance of at least 150 000 to 200 000 operating cycles.



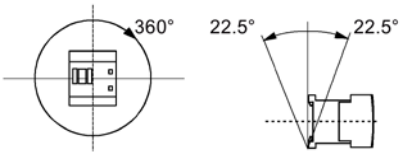
9.6.3 General data and short-circuit protection for 3RT26 contactors

Table 9- 63 General data - 3RT261.

Type		**3RT2617**
Size		**S00**
General data		
Permissible mounting position The contactors are dimensioned for operation on a vertical mounting plane.		
Mechanical endurance Basic units with snap-on auxiliary switching block		
	Operating cycles	3 million
Electrical endurance for apparent power at 400 V		
	kvar	12,5
	Operating cycles	300000
Rated insulation voltage U_i (pollution degree 3)	V	690
Rated impulse withstand voltage U_{imp}	kV	6
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N	V	400
Ambient temperature		
• Operation	°C	-25 ... + 60 [1]
• Storage	°C	-55 ... + 80
Degree of protection acc. to EN 60947-1, Annex C on the front		IP20 (IP00 terminal compartment)
Touch protection acc. to DIN EN 50274		Finger-safe
Shock resistance		
• Rectangular pulse	g / ms	6.7 / 5 and 4.2 / 10
• Sine pulse	g / ms	10.5 / 5 and 6.6 / 10

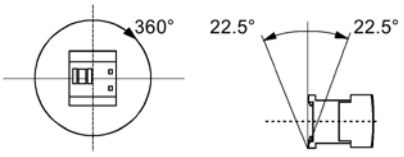
[1] A clearance of 10 mm is required for side-by-side mounting at ambient temperatures > 60 °C

Table 9- 64 General data - 3RT262.

Type		3RT2625	3RT2626	3RT2627	3RT2628
Size		**S0**			
General data					
Permissible mounting position The contactors are dimensioned for operation on a vertical mounting plane.					
Mechanical endurance Basic units with snap-on auxiliary switching block					
	Operating cycles	3 million			
Electrical endurance for apparent power at 400 V					
	kvar	16,7	20	25	33
	Operating cycles	200000	200000	200000	150000
Rated insulation voltage U_i (pollution degree 3)	V	690			
Rated impulse withstand voltage U_{imp}	kV	6			
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N	V	400			
Ambient temperature					
• Operation	°C	-25 ... + 60[1)]			
• Storage	°C	-55 ... + 80			
Degree of protection acc. to EN 60947-1, Annex C on the front		IP20			
Touch protection acc. to DIN EN 50274		Finger-safe			
Shock resistance					
• Rectangular pulse	g / ms	7.5 / 5 and 4.7 / 10	8.3 / 5 and 5.3 / 10		
• Sine pulse	g / ms	11.8 / 5 and 7.4 / 10	13.5 / 5 and 8.3 / 10		

1) A clearance of 10 mm is required for side-by-side mounting at ambient temperatures > 60 °C

Table 9- 65 General data - 3RT263.

Type		**3RT2636**	**3RT2637**
Size		**S2**	
General data			
Permissible mounting position The contactors are dimensioned for operation on a vertical mounting plane.			
Mechanical endurance Basic units with snap-on auxiliary switching block			
	Operating cycles	3 million	
Electrical endurance for apparent power at 400 V			
	kvar	50	75
	Operating cycles	200000	150000
Rated insulation voltage U_i (pollution degree 3)	V	690	
Rated impulse withstand voltage U_{imp}	kV	6	
Protective separation between coil and main contacts acc. to DIN EN 60947-1, Annex N	V	400	
Ambient temperature			
• Operation	°C	-25 ... + 60[1)]	
• Storage	°C	-55 ... + 80	
Degree of protection acc. to EN 60947-1, Annex C on the front		IP20	
Touch protection acc. to DIN EN 50274		Finger-safe	
Shock resistance			
• Rectangular pulse	g / ms	6.8 / 5 and 4 / 10	
• Sine pulse	g / ms	10.6 / 5 and 6.2 / 10	

1) A clearance of 10 mm is required for side-by-side mounting at ambient temperatures > 60 °C

Table 9- 66 Short-circuit protection for contactors without overload relay

Type	**3RT2617**
Size	**S00**
Short-circuit protection for contactors without overload relay	
Main circuit	
• Fuse links, operating class gG: LV HRC, type 3NA; DIAZED, type 5SB; NEOZED, type 5SE according to IEC 60947-4-1 / EN 60947-4-1	
- Type of coordination "1"	A 40
Auxiliary circuit	
• with fuse links of operational class gG: DIAZED, type 5SB; NEOZED, type 5SE with short-circuit current I_k = 1 kA acc. to IEC 60947-5-1	A 10
• with miniature circuit breakers with C characteristic with short-circuit current I_k = 400 A	A 10

Table 9- 67 Short-circuit protection for contactors without overload relay

Type		3RT2625	3RT2626	3RT2627	3RT2628
Size		**S0**			
Short-circuit protection for contactors without overload relay					
Main circuit					
• Fuse links, operating class gG: LV HRC, type 3NA; DIAZED, type 5SB; NEOZED, type 5SE according to IEC 60947-4-1 / EN 60947-4-1					
- Type of coordination "1"	A	50	63	80	100
Auxiliary circuit					
• with fuse links of operational class gG: DIAZED, type 5SB; NEOZED, type 5SE with short-circuit current I_k = 1 kA acc. to IEC 60947-5-1	A	10			
• with miniature circuit breakers with C characteristic with short-circuit current I_k = 400 A	A	10			

Table 9- 68 Short-circuit protection for contactors without overload relay

Type	3RT2636	3RT2637
Size	**S2**	
Short-circuit protection for contactors without overload relay		
Main circuit		
• Fuse links, operating class gG: LV HRC, type 3NA; DIAZED, type 5SB; NEOZED, type 5SE according to IEC 60947-4-1 / EN 60947-4-1		
- Type of coordination "1"	A 160	200
Auxiliary circuit		
• with fuse links of operational class gG: DIAZED, type 5SB; NEOZED, type 5SE with short-circuit current I_k = 1 kA acc. to IEC 60947-5-1	A 10	
• with miniature circuit breakers with C characteristic with short-circuit current I_k = 400 A	A 10	

9.6.4 Actuation - 3RT26 contactors

Table 9- 69 Actuation - 3RT261 contactors.

Type		**3RT2617**
Size		**S00**
Actuation		
Magnet coil operating range		
• AC operation	50 Hz	0.8 ... 1.1 x U_S
	60 Hz	0.85 ... 1.1 x U_S
• AC / DC operation	50 Hz	---
	60 Hz	---
• DC operation		0.8 ... 1.1 x U_S
Magnet coil power input (for cold coil and 1.0 x U_s)		
AC operation, 50 Hz, standard version		
• Closing power	VA	
• cos ϕ		---
• Holding power	VA	---
• cos ϕ		---
AC operation, 50/60 Hz, standard version		
• Closing power	VA	37
• cos ϕ		0,8
• Holding power	VA	5,7
• cos ϕ		0,25
AC/DC operation, 50/60 Hz, standard version		
• Closing power	VA	---
• cos ϕ		---
• Holding power	VA	---
• cos ϕ		---
• Closing power DC		---
• Holding power DC		---
DC operation		
• Closing power	W	4
• Holding power	W	4

Type		**3RT2617**
Size		**S00**
Actuation		
Maximum permissible residual current of the electronics (with 0 signal)		
• AC operation (230 V/U_s)[1]	mA	3
• DC operation (24 V/U_s)[1]	mA	10
Operating times for 0.8 ... 1.1 x U_s or at 60 Hz AC: 0,85 ... 1.1 x U_s Total break time = Opening delay + Arcing time		
AC operation		
• Closing delay	ms	8 ... 33
• Opening delay	ms	4 ... 15
AC/DC operation		
• Closing delay	ms	---
• Opening delay	ms	---
DC operation		
• Closing delay	ms	30 ... 100
• Opening delay	ms	7 ... 13
Arcing time	ms	10 ... 15

[1] Size S00: The 3RT2916-1GA00 additional load module is recommended for higher residual currents.

Table 9- 70 Actuation - 3RT262 contactors.

Type		**3RT2625**	**3RT2626**	**3RT2627**	**3RT2628**
Size		**S0**			
Actuation					
Magnet coil operating range					
• AC operation	50 Hz	0.8 ... 1.1 x U_S			
	60 Hz	0.85 ... 1.1 x U_S			
• AC / DC operation	50 Hz	0.7 ... 1.3 x U_S			
	60 Hz	0.7 ... 1.3 x U_S			
• DC operation		0.8 ... 1.1 x U_S			
Magnet coil power input (for cold coil and 1.0 x U_s)					
AC operation, 50 Hz, standard version					
• Closing power	VA	65	77		
• cos ϕ		0,82	0,82		
• Holding power	VA	7,6	9,8		
• cos ϕ		0,25	0,25		
AC operation, 50/60 Hz, standard version					
• Closing power	VA	81			
• cos ϕ		0,72			
• Holding power	VA	10,5			
• cos ϕ		0,25			
AC/DC operation, 50/60 Hz, standard version					
• Closing power	VA	13,6			
• cos ϕ		0,98			
• Holding power	VA	1,91			
• cos ϕ		0,25			
• Closing power DC		13,2			
• Holding power DC		1,56			
DC operation					
• Closing power	W	5,9			
• Holding power	W	5,9			

Type		**3RT2625**	**3RT2626**	**3RT2627**	**3RT2628**
Size		**S0**			
Actuation					
Maximum permissible residual current of the electronics (with 0 signal)					
• AC operation (230 V/U_s)[1)]	mA	6	7		
• DC operation (24 V/U_s)[1)]	mA	16	16		
Operating times for 0.8 ... 1.1 x U_s or at 60 Hz AC: 0,85 ... 1.1 x U_s Total break time = Opening delay + Arcing time					
AC operation					
• Closing delay	ms	9 ... 38	8 ... 40		
• Opening delay	ms	4 ... 16	4 ... 16		
AC/DC operation					
• Closing delay	ms	50 ... 70			
• Opening delay	ms	35 ... 45			
DC operation					
• Closing delay	ms	55 ... 80	50 ... 170		
• Opening delay	ms	16 ... 17	15 ... 18		
Arcing time	ms	10 ... 15			

Table 9- 71 Actuation - 3RT263 contactors.

Type		**3RT2636**	**3RT2637**
Size		**S2**	
Actuation			
Magnet coil operating range			
• AC operation	50 Hz	0.8 ... 1.1 x U_S	
	60 Hz	---	
• AC / DC operation	50 Hz	0.8 ... 1.1 x U_S	
	60 Hz	0.8 ... 1.1 x U_S	
• DC operation		---	
Magnet coil power input (for cold coil and 1.0 x U_S)			
AC operation, 50 Hz, standard version			
• Closing power	VA	190	
• cos ϕ		0,72	
• Holding power	VA	16	
• cos ϕ		0,37	
AC operation, 50/60 Hz, standard version			
• Closing power	VA	190	
• cos ϕ		0,72	
• Holding power	VA	16	
• cos ϕ		0,37	
AC/DC operation, 50/60 Hz, standard version			
• Closing power	VA	40	
• cos ϕ		0,71	
• Holding power	VA	On request	
• cos ϕ		1	
• Closing power DC		25	
• Holding power DC		On request	
DC operation			
• Closing power	W	---	
• Holding power	W	---	

Type		**3RT2636**	**3RT2637**
Size		**S2**	
Actuation			
Maximum permissible residual current of the electronics (with 0 signal)			
• AC operation (230 V/U_s)[1)]	mA	On request	
• DC operation (24 V/U_s)[1)]	mA	On request	
Operating times for 0.8 ... 1.1 x U_s or at 60 Hz AC: 0,85 ... 1.1 x U_s Total break time = Opening delay + Arcing time			
AC operation			
• Closing delay	ms	10 ... 80	
• Opening delay	ms	10 ... 18	
AC/DC operation			
• Closing delay	ms	50 ... 110	
• Opening delay	ms	35 ... 55	
DC operation			
• Closing delay	ms	---	
• Opening delay	ms	---	
Arcing time	ms	10 ... 15	

9.6.5 Main circuit - 3RT26 contactors (current carrying capacity for alternating current)

Table 9- 72 Main circuit - Current carrying capacity for alternating current

Type			**3RT2617**
Size			**S00**
Main circuit			
Current carrying capacity for alternating current			
Utilization category AC-6b, switching of AC capacitors			
Rated operational currents I_e for AC			
• At ambient temperature of 40 °C		A	18,9
• At ambient temperature of 60 °C		A	18
Rated operational reactive power at rated operational voltage			
	230 V 50/60 Hz	kvar	0 ... 7,2
	400 V 50/60 Hz	kvar	0 ... 12,5
	500 V 50/60 Hz	kvar	0 ... 15
	690 V 50/60 Hz	kvar	0 ... 21
Minimum conductor cross-sections for load with 1.3 x I_e			
	At 40 °C	mm^2	1 x 4
	At 60 °C	mm^2	2 x 4 1 x 6[1)]
Power loss per current path	At I_e/AC-6b	W	0,95
Switching frequency			
No-load switching frequency	AC operation	1/h	500
	DC operation	1/h	500
Max. switching frequency z in operating cycles/hour			
At I_e/AC-6b and at	230 V, 50/60 Hz	1/h	180
	400 V, 50/60 Hz	1/h	180
	480 V, 50/60 Hz	1/h	180
	500 V, 50/60 Hz	1/h	180
	600 V, 50/60 Hz	1/h	180
	690 V, 50/60 Hz	1/h	180

Type			**3RT2617**
Size			**S00**
Main circuit			
Current carrying capacity for alternating current			
UL and CSA rated data			
Rated insulation voltage		V AC	600
Operational reactive power at AC-6b, 3-phase, at operational voltage			
	110 ... 120 V	kvar	3,4
	200 ... 208 V	kvar	6,2
	220 ... 230 V	kvar	6,9
	460 ... 480 V	kvar	14
	575 ... 600 V	kvar	17
Short-circuit protection	At 600 V	kA	5
Fuse for main circuit	Class RK	A	40

1) 1 x 6 mm^2 only with pin-end connector.

Table 9- 73 Main circuit - Current carrying capacity for alternating current

Type			**3RT2625**	**3RT2626**	**3RT2627**	**3RT2628**
Size			**S0**			
Main circuit						
Current carrying capacity for alternating current						
Utilization category AC-6b, switching of AC capacitors						
Rated operational currents I_e for AC						
• At ambient temperature of 40 °C		A	25,3	30,2	37,8	50
• At ambient temperature of 60 °C		A	24	29	36	47,6
Rated operational reactive power at rated operational voltage						
	230 V 50/60 Hz	kvar	3 ... 9,6	4 ... 11,5	5 ... 14	6 ... 19
	400 V 50/60 Hz	kvar	6 ... 16,7	7 ... 20	8 ... 25	11 ... 33
	500 V 50/60 Hz	kvar	7 ... 21	8 ... 25	10 ... 31	14 ... 41
	690 V 50/60 Hz	kvar	10 ... 29	11 ... 34	14 ... 43	19 ... 57
Minimum conductor cross-sections for load with 1.3 x I_e						
	At 40 °C	mm^2	1 x 6	1 x 10	1 x 10	1 x 16
	At 60 °C	mm^2	1 x 10	1 x 10	2 x 10 1 x 16[1)]	1 x 25
Power loss per current path	At I_e/AC-6b	W	2,0	2,3	3,8	6,5
Switching frequency						
No-load switching frequency	AC operation	1/h	500			
	DC operation	1/h	500			
Max. switching frequency z in operating cycles/hour						
At I_e/AC-6b and at	230 V, 50/60 Hz	1/h	100	100	100	100
	400 V, 50/60 Hz	1/h	100	100	100	100
	480 V, 50/60 Hz	1/h	100	100	100	70
	500 V, 50/60 Hz	1/h	100	100	100	65
	600 V, 50/60 Hz	1/h	100	100	100	45
	690 V, 50/60 Hz	1/h	150	100	72	36
UL and CSA rated data						
Rated insulation voltage		V AC	600			
Operational reactive power at AC-6b, 3-phase, at operational voltage						
	110 ... 120 V	kvar	4,6	5,5	6,3	8,2
	200 ... 208 V	kvar	8,3	10	11	15
	220 ... 230 V	kvar	9,1	11	13	16
	460 ... 480 V	kvar	18	22	25	33
	575 ... 600 V	kvar	23	28	31	41
Short-circuit protection	At 600 V	kA	5			
Fuse for main circuit	Class RK	A	80	80	80	100

[1)] 1 x 16 mm^2 with pin-end connector or 3RV2925-5AB feeder terminal

Table 9- 74 Main circuit - Current carrying capacity for alternating current

Type			**3RT2636**	**3RT2637**	
Size			**S2**		
Main circuit					
Current carrying capacity for alternating current					
Utilization category AC-6b, switching of AC capacitors					
Rated operational currents I_e for AC					
• At ambient temperature of 40 °C		A	75,8	113,4	
• At ambient temperature of 60 °C		A	72,2	108	
Rated operational reactive power at rated operational voltage					
	230 V 50/60 Hz	kvar	10 ... 29	14 ... 43	
	400 V 50/60 Hz	kvar	17 ... 50	25 ... 75	
	500 V 50/60 Hz	kvar	21 ... 63	31 ... 94	
	690 V 50/60 Hz	kvar	29 ... 86	43 ... 129	
Minimum conductor cross-sections for load with					
				≤ 133 A	> 133 A
	At 40 °C	mm^2	1 x 35	1 x 50	2 x 35 1 x 70[1)]
	At 60 °C	mm^2	1 x 50	2 x 35 1 x 70[1)]	2 x 35 1 x 70[1)]
Power loss per current path	At I_e/AC-6b	W	5	11	
Switching frequency					
No-load switching frequency	AC operation	1/h	500		
	DC operation	1/h	500		
Max. switching frequency z in operating cycles/hour					
At I_e/AC-6b and at	230 V, 50/60 Hz	1/h	100	100	
	400 V, 50/60 Hz	1/h	100	100 / 80[2)]	
	480 V, 50/60 Hz	1/h	60	50	
	500 V, 50/60 Hz	1/h	55	45	
	600 V, 50/60 Hz	1/h	40	32	
	690 V, 50/60 Hz	1/h	30	25	

Type			**3RT2636**	**3RT2637**
Size			**S2**	
Main circuit				
Current carrying capacity for alternating current				
UL and CSA rated data				
Rated insulation voltage		V AC	600	
Operational reactive power at AC-6b, 3-phase, at operational voltage				
	110 ... 120 V	kvar	14	19
	200 ... 208 V	kvar	25	34
	220 ... 230 V	kvar	27	38
	460 ... 480 V	kvar	55	75
	575 ... 600 V	kvar	69	94
Short-circuit protection	At 600 V	kA	10	
Fuse for main circuit	Class RK	A	250	

1) 1 x 70 mm^2 only with 3RV2935-5A infeed terminal.

2) operating cycles/h: 100 with AC operation; 80 with AC/DC operation.

9.7 Accessories for 3RT2 contactors and 3RH2 contactor relays

9.7.1 General data - 3RT2926-2P pneumatically delayed auxiliary switch.

Table 9- 75 General data of the 3RT2926-2P pneumatically delayed auxiliary switch.

Type			**3RT2926-2P.**
			Pneumatically delayed auxiliary switch[1)]
General data			
Mechanical endurance		Operating cycles	5 million
Electrical durability at I_e		Operating cycles	1 million
Rated insulation voltage U_i (pollution degree 3)		V	690
Permissible ambient temperature	• Operation	°C	-25 … + 60
	• Storage	°C	-50 … + 80
Rated operational currents I_e acc. to DIN EN 60947 utilization categories			
• AC 12		A	10
• AC 15/AC 14 at U_e	Up to 230/220 V	A	6
	400/380 V	A	4
	500 V	A	2,5
	690/660 V	A	1,5
• DC 13 at U_e	24 V	A	4
	48 V	A	2
	110 V	A	0,7
	220 V	A	0,3
	440 V	A	0,15
Short-circuit test			
• with fuse links of operational class gG with short-circuit current I_k = 1 kA acc. to IEC 60947-5-1		A	10

Type		3RT2926-2P.
		Pneumatically delayed auxiliary switch[1]
General data		
Conductor cross-sections		
• Solid, stranded	mm^2	2 x (0.5 to 2.5)[2] or 2 x (2.5 to 4)[2]
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 2.5)
• AWG cables	AWG	2 x (20 ... 16)
		2 x (18 ... 14)
• Tightening torque of connection screws	Nm	0,8 … 1,1
Time delay		
• Accuracy		± 10 %
CSA and UL rated data		
• Rated voltage	V AC	600
• Switching capacity		A 600, Q 600

1) For size S0. No other auxiliary switch blocks are permitted in addition to the pneumatically delayed auxiliary switch.

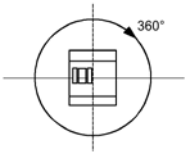
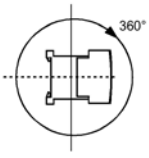
2) If two different conductor cross-sections are connected to one clamping point, both cross-sections must be located in the range specified. If identical cross-sections are used, this restriction does not apply.

Note

More information can be obtained about the TÜV-certified version of the pneumatically delayed auxiliary switch from Technical Assistance (http://www.siemens.com/sirius/technical-assistance) on request.

9.7.2 General data - OFF-delay device 3RT2916-2B.

Table 9- 76 OFF-delay device 3RT2916-2B.

Versions				**3RT2916-2BE01**	**3RT2916-2BK01**	**3RT2916-2BL01**
				OFF-delay device		
Connectable contactor sizes Notice! Only contactors and contactor relays with DC drive can be connected!						
• DC supply				S00/S0	S00/S0	S00/S0
• AC supply				---	S00/S0	S00/S0
	Type			• 3RT20..-1BB4. • 3RH2...-1BB40	• 3RT201.-1BF4. • 3RT202.-1BF4. • 3RH2...-1BF40	• 3RT201.-1BM4./ 1BP4. • 3RT202.-1BM4./ 1BP4. • 3RH2...-1BM40/ 1BP40
Permissible mounting position						
Rated control supply voltage U_S		V		24 (DC)	110 (DC)	220/230 (AC/DC)
Operating range				0.9 to 1.1 x U_S		
Rated frequency(cies) with AC supply	f	Hz	±5%	---	50 / 60	
Ambient temperature, permissible:						
• Operation						
	- Side-by-side mounting without clearance	T_u	°C	-25 … +50		
	- Side-by-side mounting with 5 mm clearance	T_u	°C	-25 … +60		
• Storage		T_u	°C	-40 … +80		

Versions			**3RT2916-2BE01**	**3RT2916-2BK01**	**3RT2916-2BL01**
			OFF-delay device		
OFF-delay[1] (minimum times at U_{sp} = 0.9 x U_S, T_{sp} = 20 °C)			Note: In practice the mean value is equal to 1.5 times the minimum time.		
S00	t_{OFF} >	ms	200	100	500
S0	t_{OFF} >	ms	100	80	300
Installed capacitance C					
3RT2916-2B.01		µF	2000	68	68
Capacitor voltage		V	35	180	350
ON-delay (maximum at U_{sp} = 0.9 x U_S, T_{sp} = 20 °C)			Note: Total ON-delay = contactor ON time + t_{ON}		
S00	t_{ON} >	ms	10	60	200
S0	t_{ON} >	ms	10	80	250
Mechanical durability		Operating cycles	30 million		
Electrical durability, approx.		Operating cycles	> 1 million		
Switching frequency z max. (at T_u = 60 °C)		h^{-1}	300		
Power loss P_v max. approx.		W	0.4	0.5	1
Surge suppression			With varistor, integrated		
Conductor cross-sections U_{sp} = coil voltage T_{sp} = coil temperature			[2]		

[1] Doubling the delay time can be achieved by doubling the capacitance. Commercially available capacitors which can be connected to terminals C+ and Z- can be used.

[2] See the table titled "Conductor cross-sections - 3RT201. contactors".

9.7.3 General data - Terminal module for contactors with screw connection

Table 9- 77 Terminal module for contactors with screw connection 3RT1900-4RE01, 3RT1916-4RD01, 3RT1926-4RD01

Versions Terminal module for contactors with screw connection		**3RT1900-4RE01** **plugs S00, S0**	**3RT1916-4RD01** **adapter S00**	**3RT1926-4RD01** **adapter S0**
General data				
Mechanical durability	Operating cycles	10 million		
Electrical durability at I_e	Operating cycles	1 million		
Rated operational voltage U_e	V	440		
Rated insulation voltage U_i (pollution degree 3)	V	690		
Rated impulse withstand voltage U_{imp} (pollution degree 3)	kV	6		
Protective separation acc. to DIN EN 60947-1 (pollution degree 3)	V	400		
Rated operational current I_eAC-3 at 400 V	A	25	20	25
Rated frequency f for AC operation	Hz	50 / 60		
Permissible ambient temperature				
• Operation	°C	-25 … + 60		
• Storage	°C	-40 … + 80		
Degree of protection in accordance with DIN EN 60529		IP20		
Conductor cross-sections Screw connection				
• Solid	mm^2	1 x (0.5 to 6)		
• Finely stranded without/with end sleeve	mm^2	1 x (0.5 to 6)		
• Stranded	mm^2	1 x (0.5 to 6)		
• AWG cables, solid or stranded	AWG	1 x (20 to 10)		
• Tightening torque	Nm	0.6 to 0.8		
• Corresponding opening tool		Cross-tip screwdriver PZ2		

Versions Terminal module for contactors with screw connection		**3RT1900-4RE01** **plugs S00, S0**	**3RT1916-4RD01** **adapter S00**	**3RT1926-4RD01** **adapter S0**
General data				
CSA and UL rated data				
• Rated operational voltage U_e	V	480		
• Rated insulation voltage U_i	V	600		
• Continuous current, at 40 °C	A	16 / 25	16	25
• Short-circuit protection [1]				
• At 600 V	kA	5		
• Fuse class RK5	A	100	60	100
• Circuit breakers with overload protection acc. to UL 489	A	100	60	100
[1] For more detailed information about short-circuit values, e.g. for protection against high short-circuit currents, see the UL reports (http://www.siemens.com/industrial-controls/support) for the individual devices.				
Combination motor controller type E to UL 508				
• At 480 V	Type	3RV202		
	A	22	---	22
	kA	65	---	65
• At 600 V	Type	3RV202		
	A	22	---	22
	kA	10	---	10

9.7.4 General data - Mechanical latch 3RT2926-3A

Table 9- 78 General data 3RT2926-3A

Contactor	**Type**		**3RT2926-3A**
Size			**Mechanical latch for 3RT2.2 contactors**
General data			
Rated insulation voltage U_i (pollution degree 3)		V	690
Mechanical durability (operating cycles)	With 3RT2.2	Operating cycles	3 million
Permissible ambient temperature			
• Operation		°C	-25 … + 60
• Storage		°C	-50 … + 80
Degree of protection to EN 60947-1, Annex C			IP20
Magnet coil operating range at AC 50/60 Hz and DC			0.85 to 1.1 x U_S
Release solenoid magnet coil power input (for cold coil and 1.0 x U_S) AC and DC operation		W	Approx. 4
Command duration for de-energizing			
• AC operation		ms	18 ... 31
• DC operation		ms	18 ... 26
Conductor cross-sections			
• Solid		mm2	2 x (0.5 to 2.5); 1 x 4
		AWG	2 x 14; 1 x 12
• Finely stranded with end sleeve		mm2	2 x (0.5 to 2.5); 1 x 2.5
		AWG	2 x 14; 1 x 12
Tightening torque of connection screws		Nm	0.8 to 1.1
		lb.in	7 to 9.5

9.7.5 General data - Control side and load side - coupling link 3RH2924-1GP11

Table 9- 79 General data - Coupling link 3RH2924-1GP11

Type		**3RH2924-1GP11**
Size		**Coupling link for mounting on contactors acc. to IEC 60947/DIN EN 60947**
General data		
Rated insulation voltage U_i (pollution degree 3)	V	300
Protective separation between coil and contacts acc. to DIN EN 60947-1, Annex N	V AC	Up to 300
Degree of protection to EN 60947-1, Annex C		
• Connections		IP20
• Enclosure		IP40
Permissible ambient temperature		
• Operation	°C	-25 … + 60
• Storage	°C	-40 … + 80
Conductor cross-section		
• Solid	mm^2	2 x (0.5 to 2.5)
• Finely stranded with end sleeve	mm^2	2 x (0.5 to 1.5)
Connection screws		M3

Table 9- 80 Control side - Coupling link 3RH2924-1GP11

Type		**3RH2924-1GP11**
Size		**Coupling link for mounting on contactors acc. to IEC 60947/DIN EN 60947**
Control side		
Rated control supply voltage U_S	V DC	24
Operating range	V DC	17 ... 30
Power input at U_S	W	0,5
Rated current consumption	mA	20
Release voltage	V	≥ 4
Function display		Yellow LED
Surge suppressor		Varistor

Table 9- 81 Load side - Coupling link 3RH2924-1GP11

Type			**3RH2924-1GP11**
Size			**Coupling link for mounting on contactors acc. to IEC 60947/DIN EN 60947**
Load side			
Mechanical durability	in million operating cycles		20
Electrical durability at I_e	in million operating cycles		0,1
Switching frequency	Operating cycles	h^{-1}	5000
ON time		ms	Approx. 7
OFF time		ms	Approx. 4
Bounce time		ms	Approx. 2
Contact material			AgSnO
Switching voltage		V AC/DC	24 … 250
Permissible residual current of electronics (with 0 signal)		mA	2,5

9.7.6 General data - 3-phase infeed terminal 3RA2913-3K

General data - 3-phase infeed terminal 3RA2913-3K

Type		3RA2913-3K
Size		S00
Installation dimensions (W / H / D)	mm	25,9 / 30,4 / 28,4
General data		
Rated insulation voltage U_i (pollution degree 3)	V DC	690
Degree of protection IP / front		IP20
Permissible ambient temperature		
• Operation	°C	-40 … +60
• Storage	°C	-50 … +80
Conductor cross-section		
• Solid	mm^2	2,5 … 6
• Finely stranded	mm^2	2,5 … 10
• Stranded	mm^2	2,5 … 6
AWG number		8 … 12

9.7.7 General data - 3-phase infeed terminal from above 3RV2925-5AB

3-phase infeed terminal from above 3RV29

Type		3RV2925-5AB	3RV2935-5A	3RV2935-5E
Certificate of suitability		CE/UL/CSA/CCC		
Size of the motor starter protector		S00/S0	S2	S2
Size of the contactor		S0	S2	S2
Installation dimensions (W / H / D)	mm	44,5 / 39 / 27,2	54,5 / 51 / 76,5	54,5 / 66 / 76,5
General data				
Rated insulation voltage U_i (pollution degree 3)	V	690		
Degree of protection IP / front		IP20		
Permissible ambient temperature				
• Operation	° C	-20 … +60		
• Storage	° C	-50 … +80		
Conductor cross-section				
• Solid / stranded	mm^2	1 x (2.5 ... 25)	1 x (2.5 … 70) 2 x (2.5 ... 50)	1 x (2.5 … 70) 2 x (2.5 ... 50)
• Finely stranded with end sleeve	mm^2	1 x (2.5 to 16)	1 x (2.5 ... 50) 2 x (2.5 ... 35)	1 x (2.5 ... 50) 2 x (2.5 ... 35)
AWG number		1 x (10 ... 4)	2 x (10 … 1/0) 1 x (10 … 2/0)	2 x (10 … 1/0) 1 x (10 … 2/0)

Note

The 3-phase infeed terminals from above do not enable configuration of self-protected combination motor controllers (type E) according to UL 508.

9.7.8 General data - 3RT19/3RT29 parallel switching connection

General data - 3RT19/3RT29 parallel switching connection

Type	3RT1916-4BB31	3RT1916-4BB41	3RT2926-4BB31	3RT1936-4BB31
Suitability for use	3RT101, 3RT201	3RT101, 3RT201	3RT202	3RT203
Version	3-pole, with connection terminal	4-pole, with connection terminal	3-pole, with connection terminal	3-pole, with connection terminal
Mounting type	Screw mounting	Screw mounting	Screw mounting	Screw mounting
Size of the contactor	S00	S00	S0	S2
Installation dimensions (W / H / D) [mm]	24.4 / 32.9 / 32.5	33 / 32.9 / 32.5	34.3 / 50 / 31.7	51.5 / 64.8 / 82

Circuit diagrams

10

Internal circuit diagrams

You can find the internal circuit diagrams for SIRIUS Innovations products online in the image database (https://www.automation.siemens.com/bilddb).

Enter the article number of the device in the "Article number" field and, in the "Type of object" selection menu on the left-hand side, select "Unit wiring diagram".

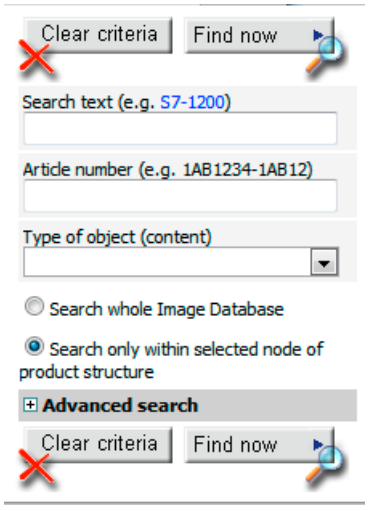
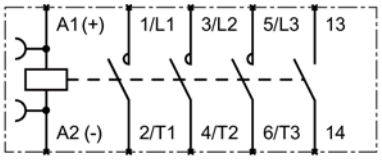


Figure 10-1 Image database

10.1 Contactors and contactor accessories

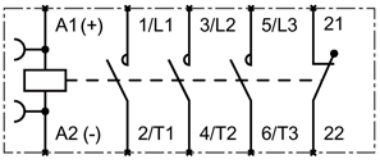
3RT2.1 motor contactors (size S00)

3RT201.-.A..1, 3RT201.-.B..1
3RT201.-.H..1, 3RT201.-.M..1



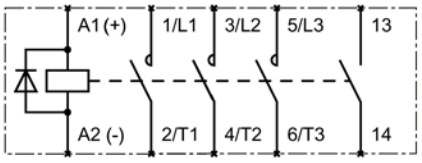
S00 contactor, without RC circuit, 1 NO contact

3RT201.-.A..2, 3RT201.-.B..2
3RT201.-.H..2, 3RT201.-.M..2



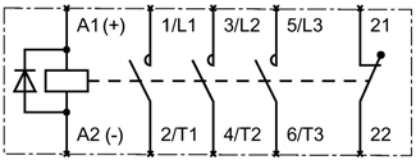
S00 contactor, without RC circuit, 1 NC contact

3RT201.-.F..1, 3RT201.-.J..1
3RT201.-.V..1



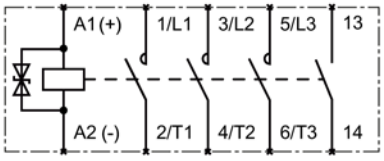
S00 contactor, with internal diode, 1 NO contact

3RT201.-.F..2, 3RT201.-.J..2
3RT201.-.V..2



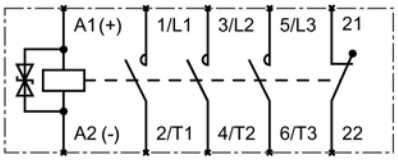
S00 contactor, with internal diode, 1 NC contact

3RT201.-.K..1



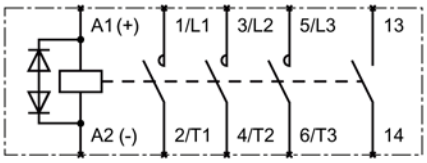
S00 contactor, with internal suppressor diode, 1 NO contact

3RT201.-.K..2



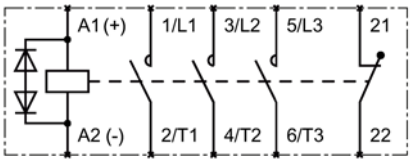
S00 contactor, with internal suppressor diode, 1 NC contact

3RT201.-.S..1



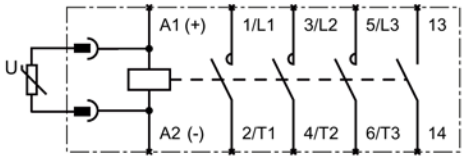
S00 contactor, with internal diode combination, 1 NO contact

3RT201.-.S..2



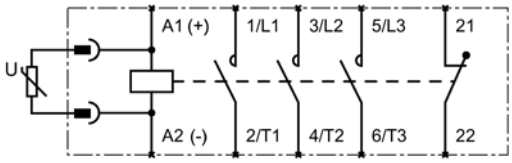
S00 contactor, with internal diode combination, 1 NC contact

3RT201.-.Q..1, 3RT201.-.W..1



S00 contactor, with varistor connected on the front, 1 NO contact

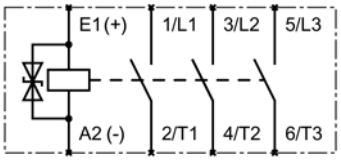
3RT201.-.Q..2, 3RT201.-.W..2



S00 contactor, with varistor connected on the front, 1 NC contact

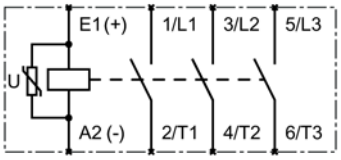
Traction contactor 3RT201.-2K..2-0LA0 (size S00)

3RT201.-2K..2-0LA0



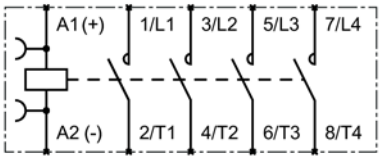
S00 traction contactor, with internal suppressor diode, 1 NC contact

3RT201.-2L.42-0LA0



Contactor with 4 main current paths 3RT23 (size S00)

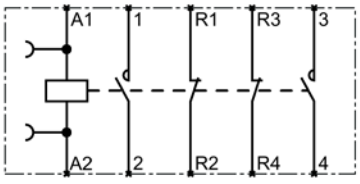
3RT231.-.A..0, 3RT231.-.B..0



Contactor with 4 main current paths for switching resistive loads

Pole-changing contactor 3RT25 (size S00)

3RT251.-.A..0, 3RT251.-.B..0

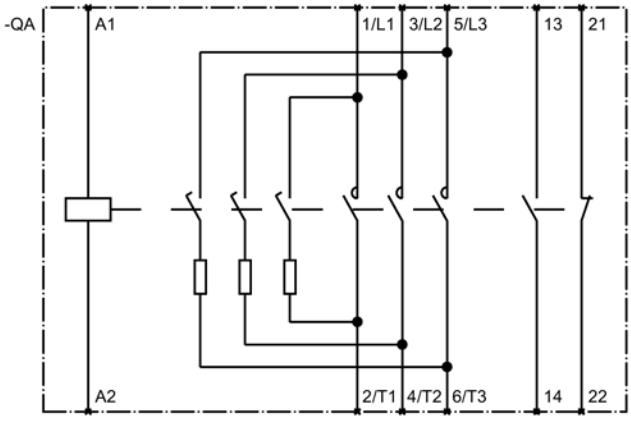


Pole-changing contactor S00, 4 main current paths, 2 NO contacts, 2 NC contacts

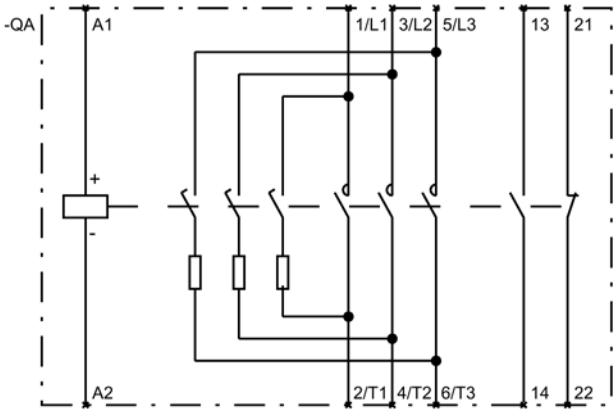
10.2 Capacitor contactors

Capacitor contactors

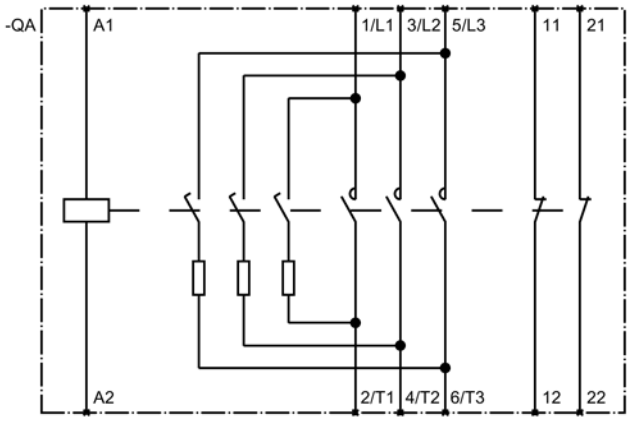
3RT261-.A..3



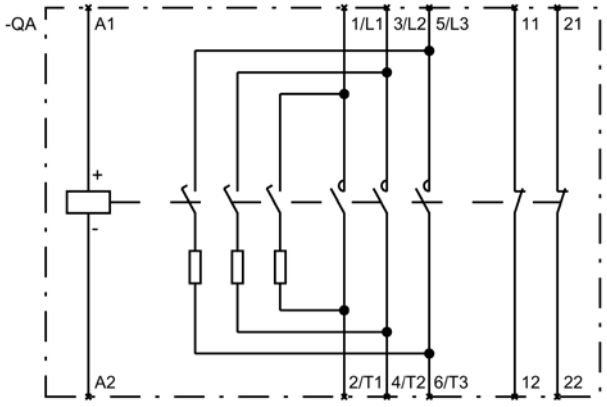
3RT261-.B..3



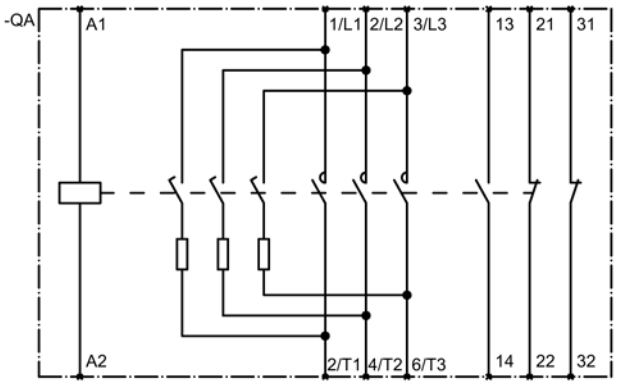
3RT261-.A..5



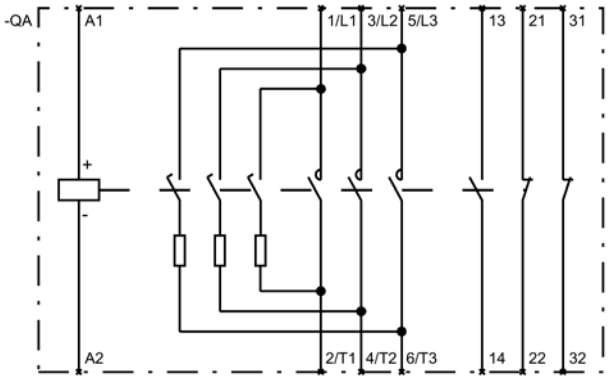
3RT261-.B..5



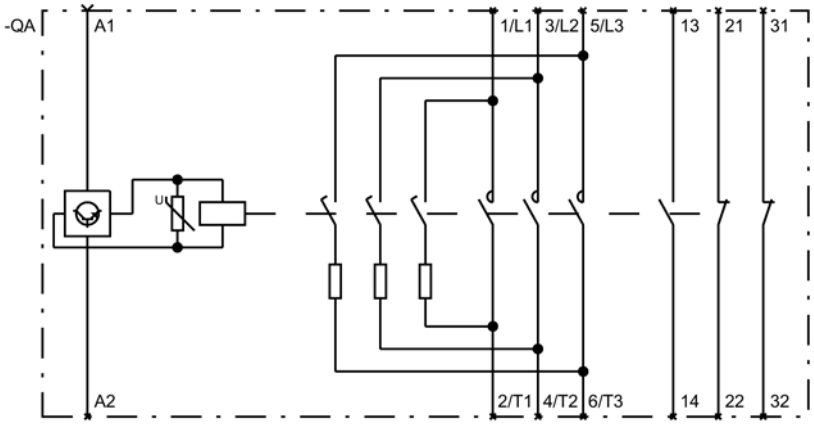
3RT262-.A..5



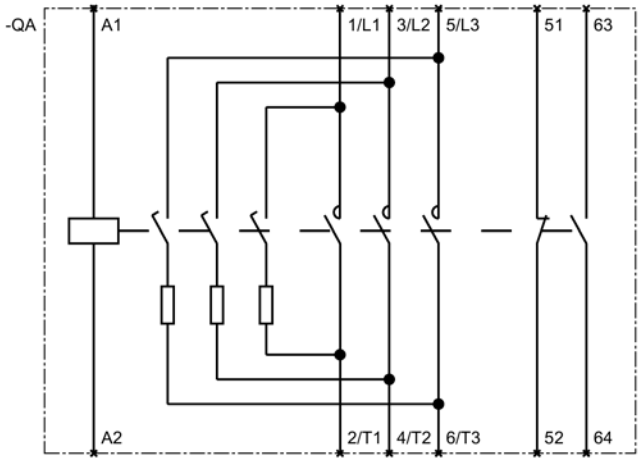
3RT262-..B..5



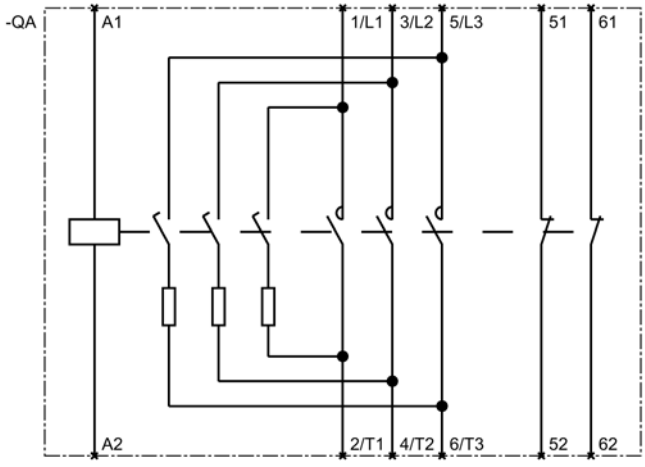
3RT262-.N..5



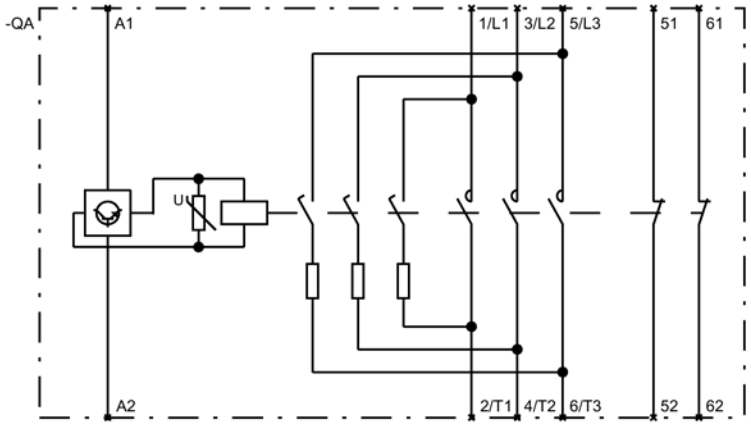
3RT263-.A..3



3RT263-.A..5

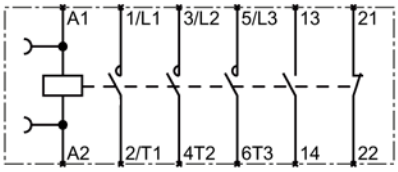


3RT263-.N..5



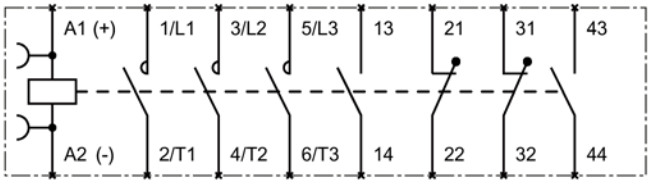
3RT2.2 (size S0) and 3RT2.3 (size S2) motor contactors

3RT202.-.A..0, 3RT202.-.B..0, 3RT203.-.A..0



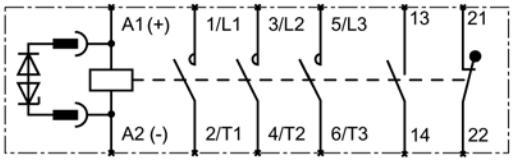
S0/S2 contactor, without RC circuit, 1 NO contact, 1 NC contact

3RT202.-.A..4, 3RT202.-.B..4, 3RT203.-.A..4



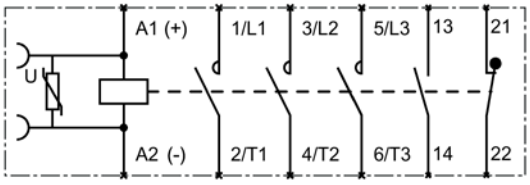
S0/S2 contactor, without RC circuit, 2 NO contacts, 2 NC contacts

3RT202.-.F..0



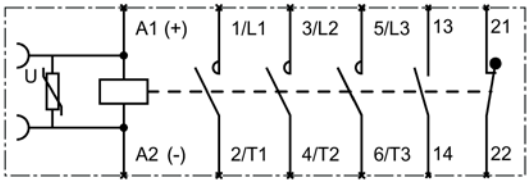
S0 contactor, with internal diode, 1 NO contact, 1 NC contact

3RT202.-.K..0



S0 contactor, with internal varistor, 1 NO contact, 1 NC contact

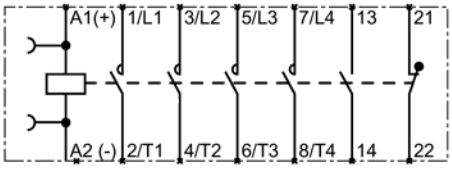
3RT202.-.N..0, 3RT202.-.X..0, 3RT203.-.N..0, 3RT203.-.X..0



S0 contactor, with electronic operating mechanism, 1 NO contact, 1 NC contact

Contactor with 4 main current paths 3RT23 (sizes S0 and S2)

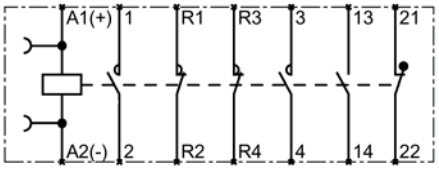
3RT232.-.A..0, 3RT232.-.B..0, 3RT233.-.A..0, 3RT233.-.N..0



S0 and S2 contactor, 4 main current paths for switching resistive loads, 4 NO contacts plus 1 NO contact, 1 NC contact

Pole-changing contactor 3RT25 (sizes S0 and S2)

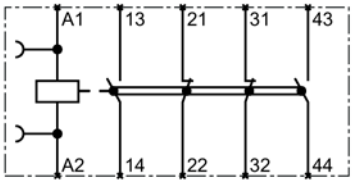
3RT252.-.A..0, 3RT252.-.B..0**, 3RT253.-.A..0**



Pole-changing contactor, S0 and S2, 4 main current paths, 2 NO contacts, 2 NC contacts, plus 1 NO contact, 1 NC contact

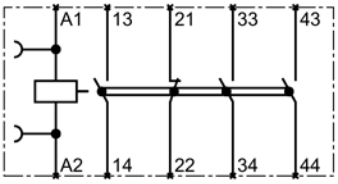
3RH2 contactor relays

3RH2122-.A..0, 3RH2122-.B..0, 3RH2122-.H..0, 3RH2122-.M..0



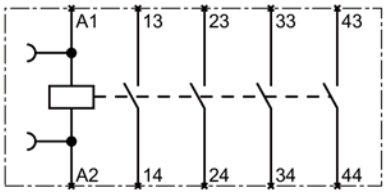
Contactor relay, without RC circuit, 2 NO contacts, 2 NC contacts

3RH2131-.A..0, 3RH2131-.B..0, 3RH2131-.H..0, 3RH2131-.M..0



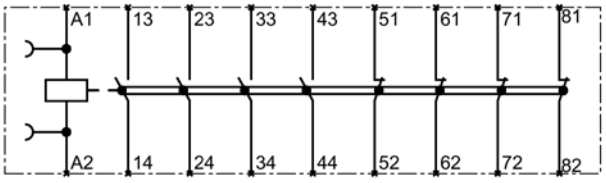
Contactor relay, without RC circuit, 3 NO contacts, 1 NC contact

3RH2140-.A..0, 3RH2140-.B..0, 3RH2140-.H..0, 3RH2140-.M..0



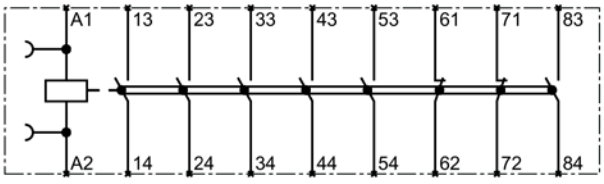
Contactor relay, without RC circuit, 4 NO contacts

3RH2244-.A..0, 3RH2244-.B..0, 3RH2344-.A..0, 3RH2344-.B..0



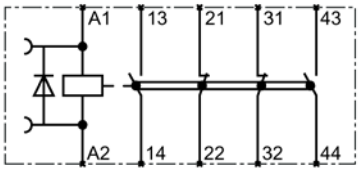
Contactor relay, without RC circuit, 4 NO contacts, 4 NC contacts

3RH2262-.A..0, 3RH2262-.B..0, 3RH2362-.A..0, 3RH2362-.B..0



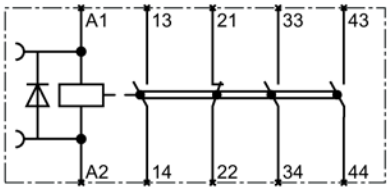
Contactor relay, without RC circuit, 6 NO contacts, 2 NC contacts

3RH2122-.F..0, 3RH2122-.J..0, 3RH2122-.V..0



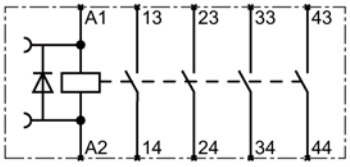
Contactor relay, with integrated diode, 2 NO contacts, 2 NC contacts

3RH2131-.F..0, 3RH2131-.J..0, 3RH2131-.V..0



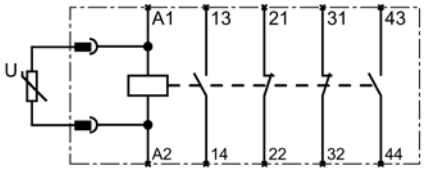
Contactor relay, with integrated diode, 3 NO contacts, 1 NC contact

3RH2140-.F..0, 3RH2140-.J..0, 3RH2140-.V..0



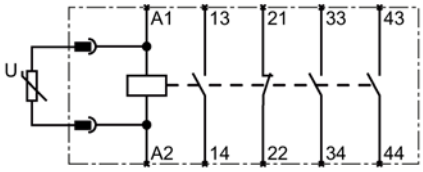
Contactor relay, with integrated diode, 4 NO contacts

3RH2122-.W..0, 3RH2122-.Q..0



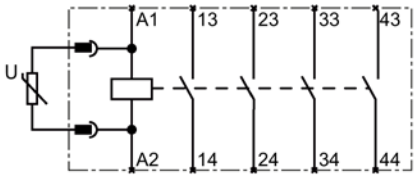
Contactor relay, with connected varistor, 2 NO contacts, 2 NC contacts

3RH2131-.W..0



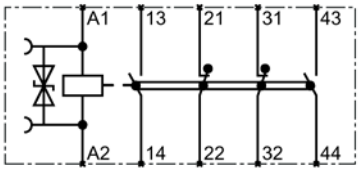
Contactor relay, with connected varistor, 3 NO contacts, 1 NC contact

3RH2140-.W..0



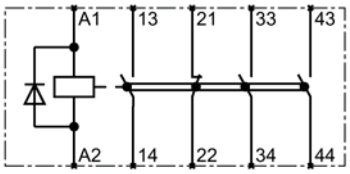
Contactor relay, with connected varistor, 4 NO contacts

3RH2122-.K..0, 3RH2122-.S..0



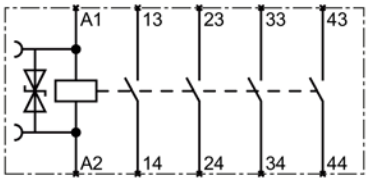
Contactor relay, with integrated suppressor diode, 2 NO contacts, 2 NC contacts

3RH2131-.K..0, 3RH2131-.S..0



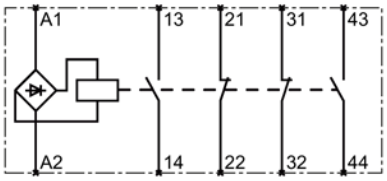
Contactor relay, with integrated suppressor diode, 3 NO contacts, 1 NC contact

3RH2140-.K..0, 3RH2140-.S..0



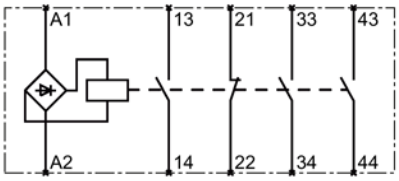
Contactor relay, with integrated suppressor diode, 4 NO contacts

3RH2122-.G..0



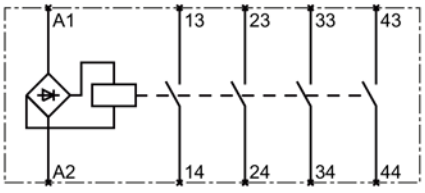
Contactor relay, with integrated full-wave rectifier, 2 NO contacts, 2 NC contacts

3RH2131-.G..0



Contactor relay, with integrated full-wave rectifier, 3 NO contacts, 1 NC contact

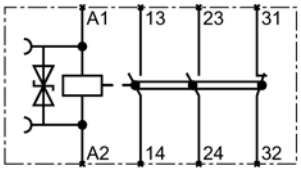
3RH2140-.G..0



Contactor relay, with integrated full-wave rectifier, 4 NO contacts

Traction contactor 3RH2122-.K...-0LA00

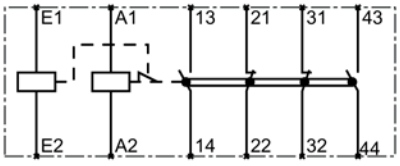
3RH2122-.K...-0LA00



Traction contactor, with integrated suppressor diode, 2 NO contacts, 2 NC contacts

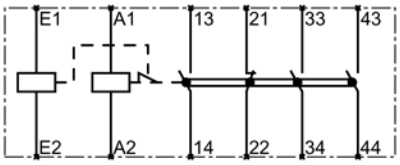
3RH24 latched contactor relays

3RH2422-.A..0, 3RH2422-.B..0



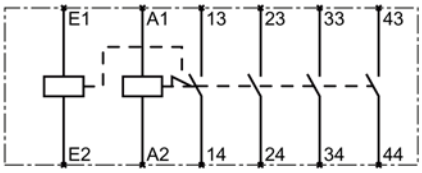
Latched contactor relay, without RC circuit, 2 NO contacts, 2 NC contacts

3RH2431-.A..0, 3RH2431-.B..0



Latched contactor relay, without RC circuit, 3 NO contacts, 1 NC contact

3RH2440-.A..0, 3RH2440-.B..0



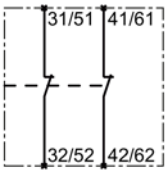
Latched contactor relay, without RC circuit,4 NO contacts

Lateral auxiliary switches

3RH2911-.DA02

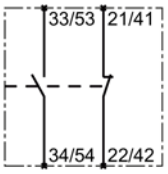
Auxiliary switch block, lateral, 2 NC contacts

3RH2921-.DA02



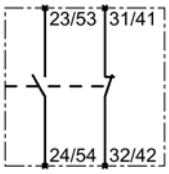
Auxiliary switch block, lateral, 2 NC contacts

3RH2911-.DA11



Auxiliary switch block, lateral, 1 NO contact, 1 NC contact

3RH2911-.DE11



Auxiliary switch block, lateral, 1 NO contact, 1 NC contact

3RH2921-.DA11

Auxiliary switch block, lateral, 1 NO contact, 1 NC contact

3RH2921-.DE11

Auxiliary switch block, lateral, 1 NO contact, 1 NC contact

3RH2911-.DA20

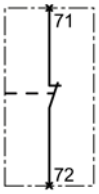
Auxiliary switch block, lateral, 2 NO contacts

3RH2921-.DA20

Auxiliary switch block, lateral, 2 NO contacts

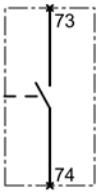
Auxiliary switch for mounting on the front, 1-pole

3RH2911-.AA01, 3RH2911-.BA01



Auxiliary switch block, for mounting on the front, 1-pole, 1 NC contact

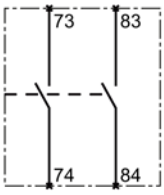
3RH2911-.AA10, 3RH2911-.BA10



Auxiliary switch block, for mounting on the front, 1-pole, 1 NO contact

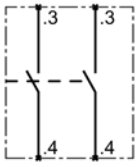
Auxiliary switch for mounting on the front, 2-pole

3RH2911-.LA20, 3RH2911-.MA20



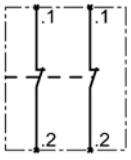
Auxiliary switch block, for mounting on the front, 2-pole, 2 NO contacts

3RH2911-.NF20



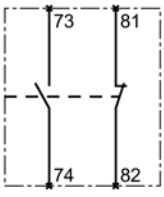
Auxiliary switch block, for mounting on the front, 2-pole, 2 NO contacts

3RH2911-.NF02



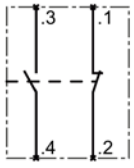
Auxiliary switch block, for mounting on the front, 2-pole, 2 NC contacts

3RH2911-.LA11, 3RH2911-.MA11



Auxiliary switch block, for mounting on the front, 2-pole, 1 NO contact, 1 NC contact

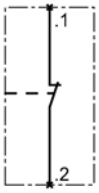
3RH2911-.NF11



Auxiliary switch block, for mounting on the front, 2-pole, 1 NO contact, 1 NC contact

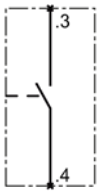
Auxiliary switches for mounting on the front, 4-pole

3RH2911-.HA01



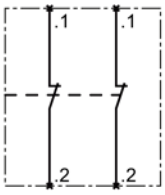
Auxiliary switch block, for mounting on the front, 4-pole, 1 NC contact

3RH2911-.HA10



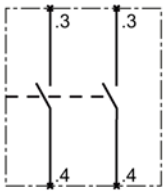
Auxiliary switch block, for mounting on the front, 4-pole, 1 NO contact

3RH2911-.HA02



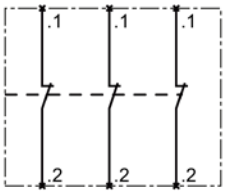
Auxiliary switch block, for mounting on the front, 4-pole, 2 NC contacts

3RH2911-.HA20



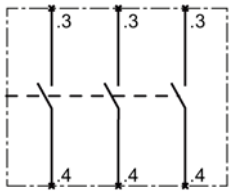
Auxiliary switch block, for mounting on the front, 4-pole, 2 NO contacts

3RH2911-.HA03



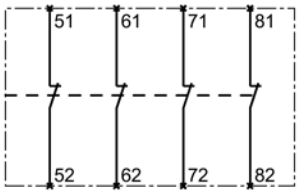
Auxiliary switch block, for mounting on the front, 4-pole, 3 NC contacts

3RH2911-.HA30



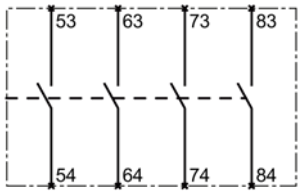
Auxiliary switch block, for mounting on the front, 4-pole, 3 NO contacts

3RH2911-.GA04



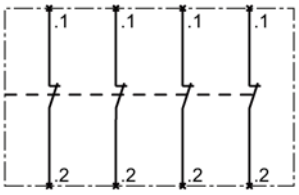
Auxiliary switch block, for mounting on the front, 4-pole, 4 NC contacts

3RH2911-.GA40



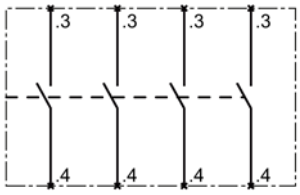
Auxiliary switch block, for mounting on the front, 4-pole, 4 NO contacts

3RH2911-.FA04



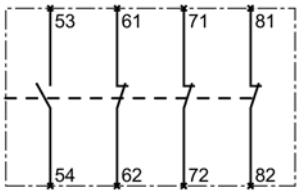
Auxiliary switch block, for mounting on the front, 4-pole, 4 NC contacts

3RH2911-.FA40



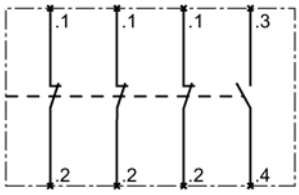
Auxiliary switch block, for mounting on the front, 4-pole, 4 NO contacts

3RH2911-.GA13



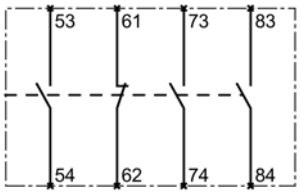
Auxiliary switch block, for mounting on the front, 4-pole, 1 NO contact, 3 NC contacts

3RH2911-.HA13



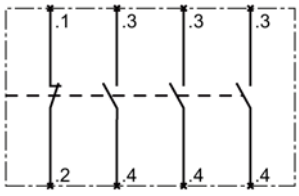
Auxiliary switch block, for mounting on the front, 4-pole, 1 NO contact, 3 NC contacts

3RH2911-.GA31



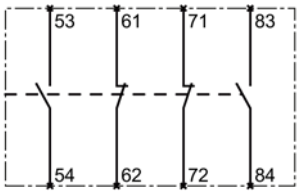
Auxiliary switch block, for mounting on the front, 4-pole, 3 NO contacts, 1 NC contact

3RH2911-.HA31



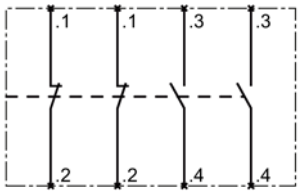
Auxiliary switch block, for mounting on the front, 4-pole, 3 NO contacts, 1 NC contact

3RH2911-.GA22



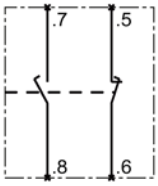
Auxiliary switch block, for mounting on the front, 4-pole, 2 NO contacts, 2 NC contacts

3RH2911-.HA22



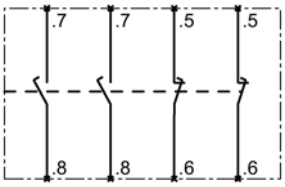
Auxiliary switch block, for mounting on the front, 4-pole, 2 NO contacts, 2 NC contacts

3RH2911-.FB11



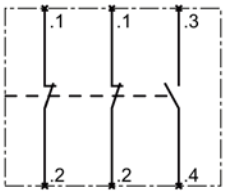
Auxiliary switch block, 1 x make-before-break, 1 NO contact, 1 NC contact

3RH2911-.FC22



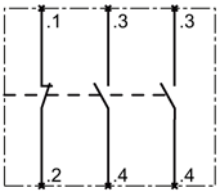
Auxiliary switch block, for mounting on the front, 4-pole, 2 x make-before-break, 2 NO contacts, 2 NC contacts

3RH2911-.HA12



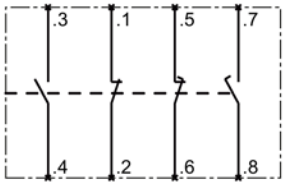
Auxiliary switch block, for mounting on the front, 4-pole, 1 NO contact, 2 NC contacts

3RH2911-.HA21



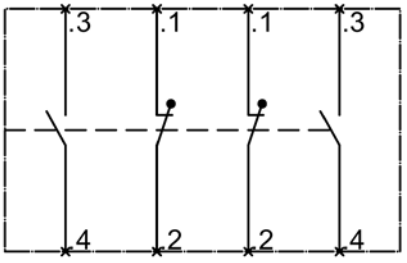
Auxiliary switch block, for mounting on the front, 4-pole, 2 NO contacts, 1 NC contact

3RH2911-.FB22



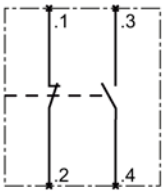
Auxiliary switch block, for mounting on the front, 4-pole, 1 x make-before-break, 2 NO contacts, 2 NC contacts

3RH2911-2FA22



Auxiliary switch block, for mounting on the front, 4-pole, 2 NO contacts, 2 NC contacts

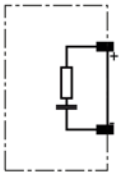
3RH2911-.HA11



Auxiliary switch block, for mounting on the front, 4-pole, 1 NO contacts, 1 NC contact

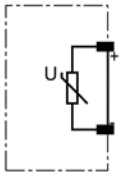
Surge suppressor

3RT29.6-1C...



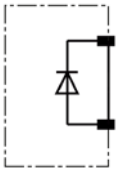
Surge suppressor, RC element

3RT29.6-.B...



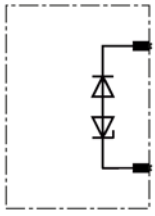
Surge suppressor, varistor

3RT29.6-1D...



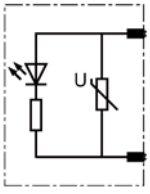
Surge suppressor, suppression diode

3RT2926-1E...



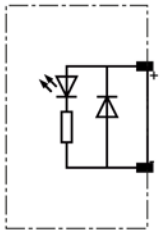
Surge suppressor, diode combination

3RT29.6-1J...



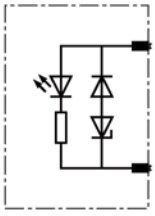
Surge suppressor, varistor with LED

3RT29.6-1L...



Surge suppressor, suppression diode with LED

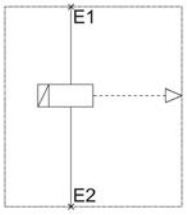
3RT2926-1M...



Surge suppressor, diode combination with LED

Mechanical latch

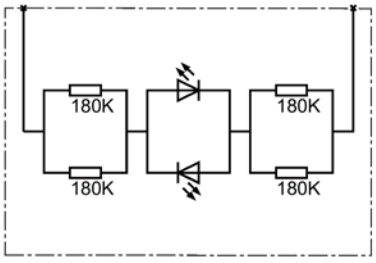
3RT2926-3A.31



Mechanical latch

LED display indicator module

3RT2926-1Q...



LED display indicator module for indicating the contactor function

10.3 Reversing contactor assemblies (S00 / S0 / S2)

Reversing contactor assembly, size S00

3RA231.-....

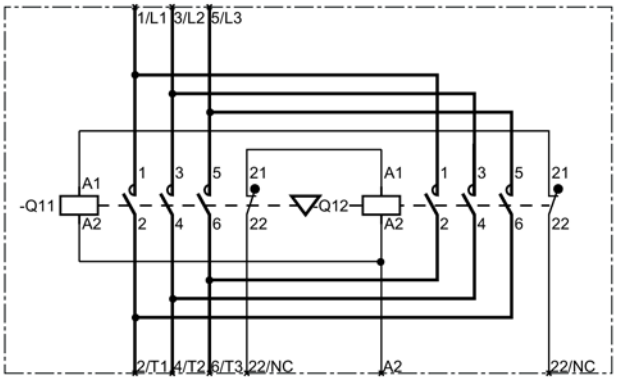


Figure 10-2 Reversing contactor assembly S00

Reversing contactor assembly, sizes S0 and S2

3RA232.-...., 3RA233.-....

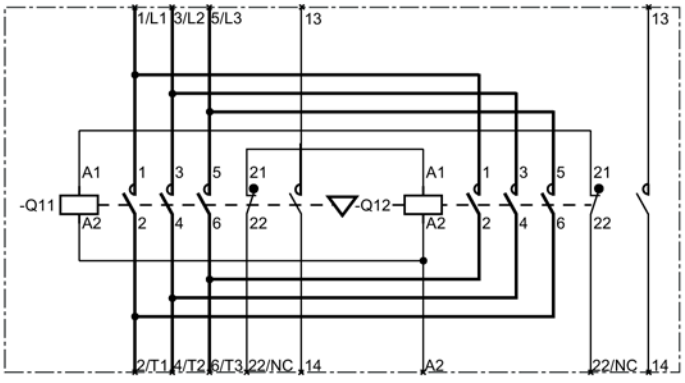


Figure 10-3 Reversing contactor assembly S0 and S2

10.4 Contactor assemblies for star-delta (wye-delta) start (S00 / S0 / S2)

Contactor assemblies for star-delta (wye-delta) start with 3RA28 function modules for star-delta (wye-delta) start

3RA241.-..F..

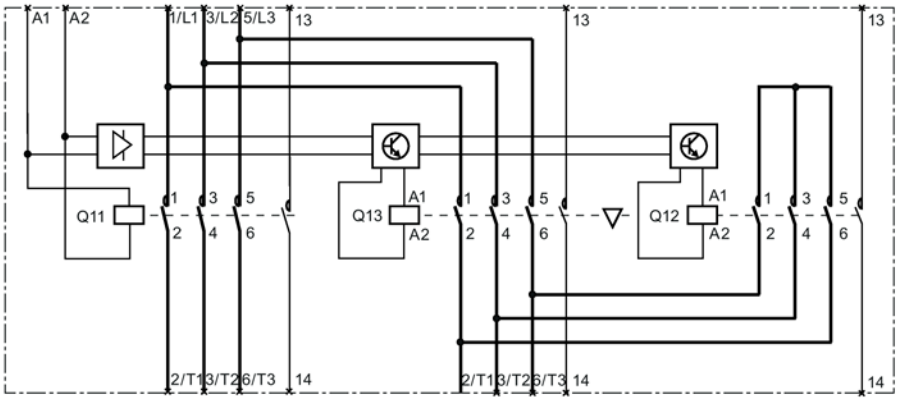


Figure 10-4 S00 contactor assemblies for star-delta (wye-delta) start, with 3RA28 function modules for star-delta (wye-delta) start

3RA242.-..F..

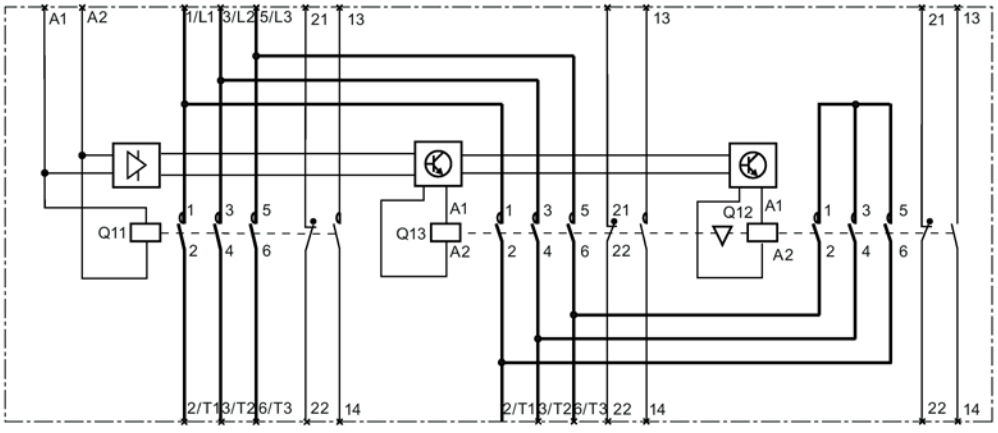


Figure 10-5 S0 and S2 contactor assemblies for star-delta (wye-delta) start, with 3RA28 function modules for star-delta (wye-delta) start

Contactor assemblies for star-delta (wye-delta) start with mounted function modules for AS-Interface

3RA241.-..H..

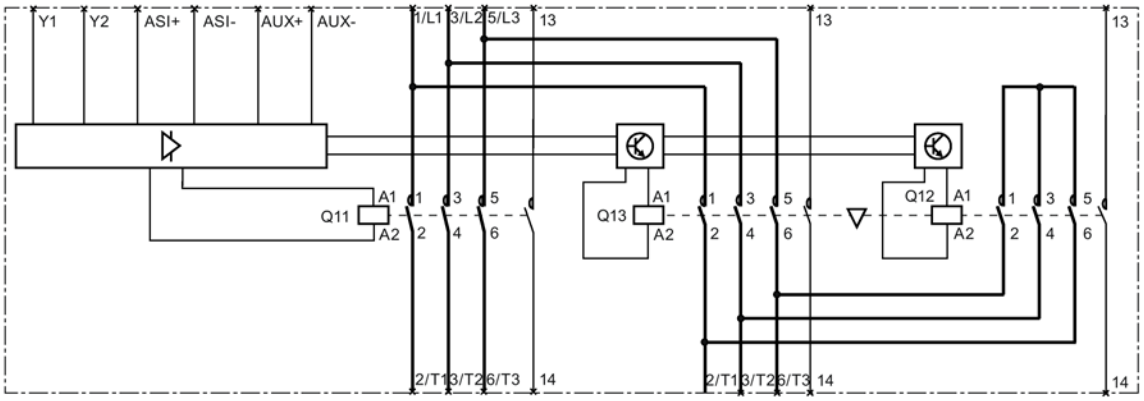


Figure 10-6 S00 contactor assemblies for star-delta (wye-delta) start, with mounted function modules for AS-Interface

3RA242.-..H..

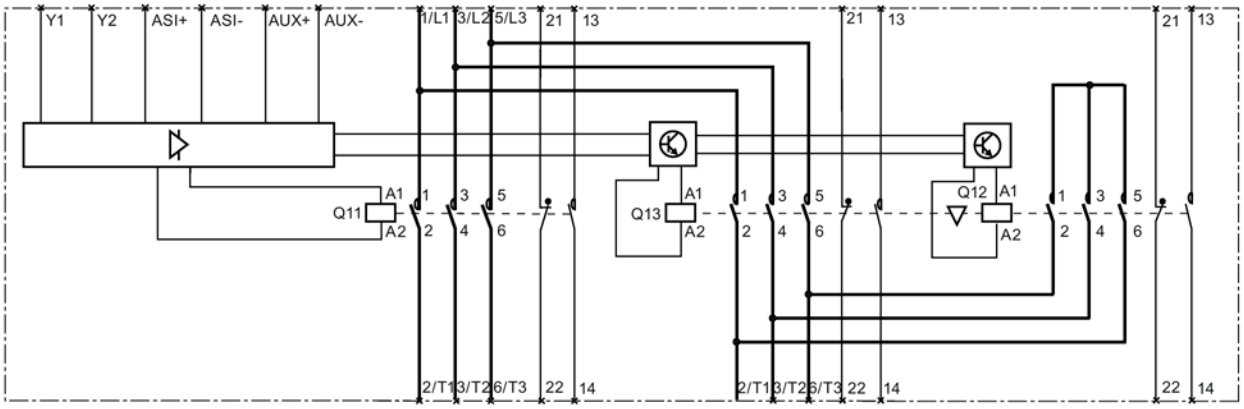


Figure 10-7 S0 and S2 contactor assemblies for star-delta (wye-delta) start, with mounted function modules for AS-Interface

Contactor assemblies for star-delta (wye-delta) start with mounted function modules for IO-Link

3RA241.-..E..

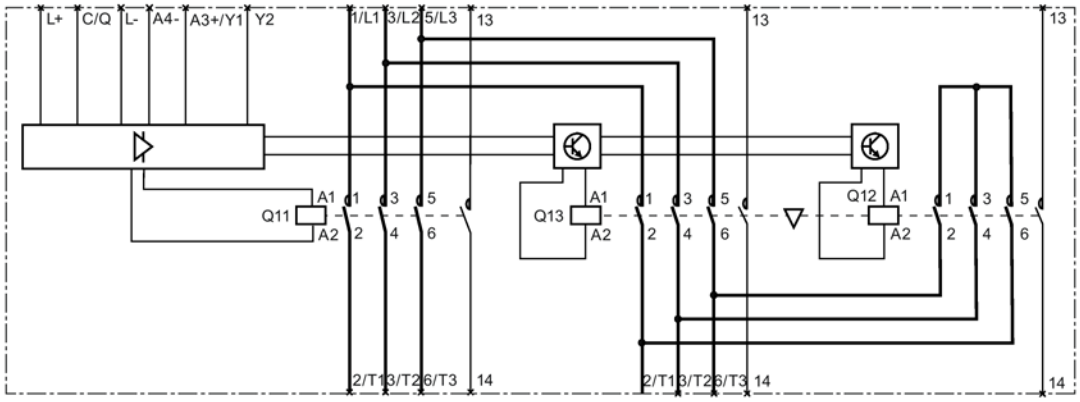


Figure 10-8 S00 contactor assembly for star-delta (wye-delta) start, with mounted function modules for IO-Link

3RA242.-..E..

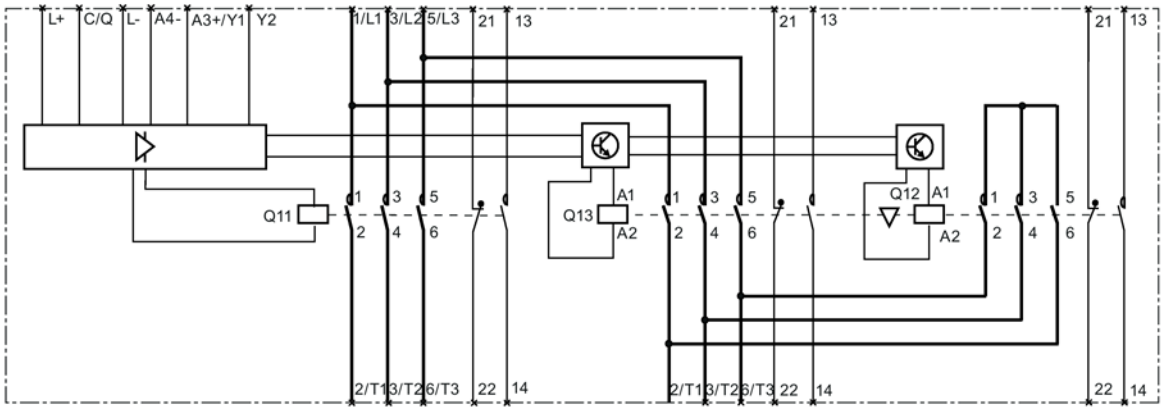


Figure 10-9 S0 and S2 contactor assembly for star-delta (wye-delta) start, with mounted function modules for IO-Link

Types of coordination

A

Types of coordination

Standard DIN EN 60947-4-1 (VDE 0660 Part 102) or IEC 60947-4-1 distinguishes between two types of coordination (type of coordination), which are referred to as coordination type "1" and coordination type "2". In the case of both types of coordination, the short-circuit is reliably mastered. the only differences are in the extent of the damage sustained by the device following a short circuit.

Type of coordination 1

The load feeder may be non-operational after a short circuit has been cleared. Damage to the contactor and the overload release is also permissible.

Type of coordination 2

After short-circuit disconnection, there must be no damage to the overload release or to any other part. The load feeder can resume operation without needing to be renewed. Welding of the contactor contacts only is permitted if these can be separated easily without significant deformation.

References

B

B.1 References

Further references

You will find more information about the 3RT2 contactors/contactor assemblies on the Internet (http://support.automation.siemens.com/WW/view/en/20358011/133300).

In addition to this manual, please refer to the operating instructions and manuals for any accessories. You can download the relevant documentation from the Internet (http://www.siemens.com/sirius/manuals). Simply enter the Article number of the relevant item into the search field.

Operating instructions

Title	Article number
SIRIUS contactor S00 (3RT2.1, 3RH21 and 3RH24)	3ZX1012-0RH21-1AA1
SIRIUS contactor S0 (3RT2.2)	3ZX1012-0RT22-1AA1
SIRIUS contactor S2 (3RT2.3)	3ZX1012-0RT20-3AA1
SIRIUS capacitor contactor S00 / S0 (3RT261.-1.... / 3RT262.-1....)	3ZX1012-0RT26-3BA1
SIRIUS capacitor contactor S2 (3RT263.-1....)	3ZX1012-0RT26-3AA1
SIRIUS reversing contactor assemblies S00 (3RA231.-8X.3.-1 and 3RA231.-8X.3.-2)	3ZX1012-0RA23-8AA1
SIRIUS reversing contactor assemblies S0 (3RA232.-8X.3.-1 and 3RA232.-8X.3.-2)	3ZX1012-0RA23-8BA1
SIRIUS reversing contactor assembly S2 (3RA233.-8X.30-1)	3ZX1012-0RA23-8CA1
SIRIUS assembly kit for reversing contactor assemblies S00 (3RA2913-2AA1 and 3RA2913-2AA2)	3ZX1012-0RA20-4AA1
SIRIUS assembly kit for reversing contactor assemblies S0 (3RA2923-2AA1 and 3RA2923-2AA2)	3ZX1012-0RA20-3AA1
SIRIUS assembly kit for reversing contactor assemblies S2 (3RA2933-2AA1 and 3RA2933-2AA2)	3ZX1012-0RA20-2AA1
SIRIUS contactor assembly for star-delta (wye-delta) start S00 (3RA241.-8X.3.-1 and 3RA241.-8X.3.-2)	3ZX1012-0RA24-8AA1
SIRIUS contactor assembly for star-delta (wye-delta) start S0 (3RA242.-8X.3.-1 and 3RA242.-8X.3.-2)	3ZX1012-0RA24-8BA1
SIRIUS contactor assembly for star-delta (wye-delta) start S2 (3RA243.-8X.32-1)	3ZX1012-0RA24-8CA1

Title	Article number
SIRIUS assembly kit for contactor assembly for star-delta (wye-delta) start S00 (3RA2913-2BB1 and 3RA2913-2BB2)	3ZX1012-0RA20-4BA1
SIRIUS assembly kit for contactor assembly for star-delta (wye-delta) start S0 (3RA2923-2BB1, 3RA2923-2BB2 and 3RA2924-2BB1)	3ZX1012-0RA20-3BA1
SIRIUS assembly kit for contactor assembly for star-delta (wye-delta) start S2 (3RA2933-2BB1, 3RA2933-2BB2 and 3RA2933-2C)	3ZX1012-0RA20-2BA1

B.2 SIRIUS Innovations manuals

SIRIUS Innovations manuals

You can download the SIRIUS Innovations manuals from the Internet (http://www.siemens.com/sirius/manuals).

Simply enter the Article number of the relevant item into the search field.

Information about ...	Is available in ...
• SIRIUS Innovations - system overview	• "SIRIUS Innovations - System Overview" (http://support.automation.siemens.com/WW/view/en/60311318) manual (Article number: 3ZX1012-0RA01-5AC1)
• 3RT2, 3RH2, and 3RA23/24 contactors and contactor assemblies	• "SIRIUS Innovations - SIRIUS 3RT2 Contactors / Contactor Assemblies" (http://support.automation.siemens.com/WW/view/en/60306557) manual (Article number: 3ZX1012-0RT20-5AC1)
• 3RF34 solid-state switching devices	• "SIRIUS Innovations - SIRIUS 3RF34 Solid-State Switching Devices" (http://support.automation.siemens.com/WW/view/en/60298187) manual (Article number: 3ZX1012-0RF34-5AC1)
• 3RW soft starters	• "SIRIUS 3RW30 / 3RW40 Soft Starters" (http://support.automation.siemens.com/WW/view/en/38752095) manual (Article number: 3ZX1012-0RW30-1AC1) • "SIRIUS 3RW44 Soft Starter" (http://support.automation.siemens.com/WW/view/en/21772518) manual (Article number: 3ZX1012-0RW30-1AC1)
• 3RV2 motor starter protectors	• "SIRIUS Innovations - SIRIUS 3RV2 Motor Starter Protector" (http://support.automation.siemens.com/WW/view/en/60279172) manual (Article number: 3ZX1012-0RV20-5AC1)
• 3RU2, 3RB30/31 overload relays	• "SIRIUS Innovations - SIRIUS 3RU2 / 3RB3 Overload Relays" (http://support.automation.siemens.com/WW/view/en/60298164) manual (Article number: 3ZX1012-0RU20-5AC1)

Information about ...	Is available in ...
• 3RB24 solid-state overload relays	• "3RB24 Solid-State Overload Relay for IO-Link" (http://support.automation.siemens.com/WW/view/en/46165627) manual (Article number: 3ZX1012-0RB24-0AC0)
• 3UG4 monitoring relays/3RR2 current monitoring relays	• "3UG4 / 3RR2 Monitoring Relays" (http://support.automation.siemens.com/WW/view/en/70210263) manual (Article number: 3ZX1012-0UG40-0AC0)
• 3RS1/3RS2 temperature monitoring relays	• "3RS1 / 3RS2 Temperature Monitoring Relays" (http://support.automation.siemens.com/WW/view/en/54999309) manual (Article number: 3ZX1012-0RS10-1AC1)
• 3UG48 monitoring relays	• "3UG48 Monitoring Relays for IO-Link" (http://support.automation.siemens.com/WW/view/en/68834040) manual (Article number: 3ZX1012-0UG48-0AC1)
• 3RS14/3RS15 temperature monitoring relays	• "3RS14 / 3RS15 Temperature Monitoring Relays for IO-Link" (http://support.automation.siemens.com/WW/view/en/54375463) manual (Article number: 3ZX1012-0RS14-0AC0)
• 3RA21/22 load feeders	• "SIRIUS Innovations - SIRIUS 3RA21 / 3RA22 Load Feeders" (http://support.automation.siemens.com/WW/view/en/60284351) manual (Article number: 3ZX1012-0RA21-5AC1)
• 3RA6 compact starters	• "SIRIUS 3RA6 Compact Starter" (http://support.automation.siemens.com/WW/view/en/27865747) manual (Article number: 3RA6992-0A)
• 3RA28 function modules for mounting on contactors	• Manual "SIRIUS Innovations - SIRIUS 3RA28 Function Modules for mounting on 3RT2 Contactors" (http://support.automation.siemens.com/WW/view/en/60279150) (Article number: 3ZX1012-0RA28-5AC1)
• 3RA27 function modules for connection to the higher-level control	• "Function Modules for AS-Interface" (http://support.automation.siemens.com/WW/view/en/39318922) manual (Article number: 3ZX1012-0RA27-0AC0) • "Function Modules for IO-Link" (http://support.automation.siemens.com/WW/view/en/39319600) manual (Article number: 3ZX1012-0RA27-1AC1)
• 4SI SIRIUS electronic module (3RK1005-0LB00-0AA0)"	• "4SI SIRIUS Electronic Module (3RK1005-0LB00-0AA0)" (http://support.automation.siemens.com/WW/view/en/37856470) manual (Article number: 3ZX1012-0LB00-0AA1)

B.3 More information

More information

More information is available from Siemens on the Internet via the following links.

- **Product documentation**
  You will find a list of manuals/operating instructions, characteristic curves, and certificates on the Internet (www.siemens.com/industrial-controls/support).
- **Product information**
  Catalogs and other informative documents can be obtained from the Information Center and Download Center (www.siemens.com/industrial-controls/infomaterial).
- **Online ordering system**
  You will find the online ordering system with all the latest data on the ordering and information platform (www.siemens.com/industrial-controls/mall).
- **Technical Assistance**
  Siemens supports you with all technical product and system enquiries – both before and after delivery. You can access our Service & Support Portal on the Internet (www.siemens.com/industrial-controls/technical-assistance). You can also submit your question directly to a technical consultant using our support request service.

Dimension drawings (dimensions in mm)

C

Note

All dimensions are specified in mm.

C.1 Contactors and contactor relays (size S00)

3RT2.1.-1 contactors (3-pole) and 3RH21..-1 contactor relays (4-pole) in screw-type connection system with accessories mounted

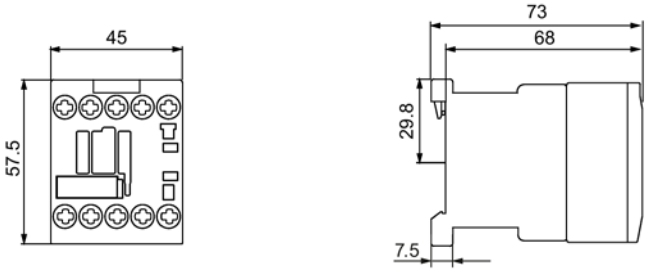
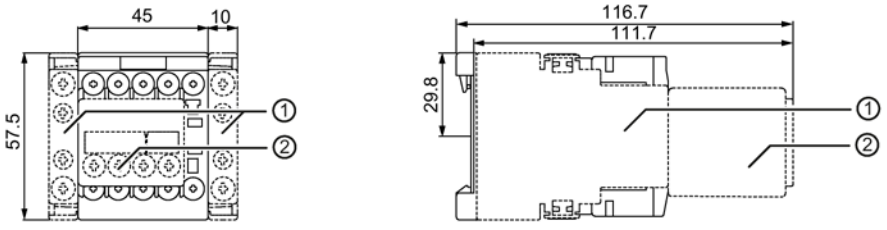


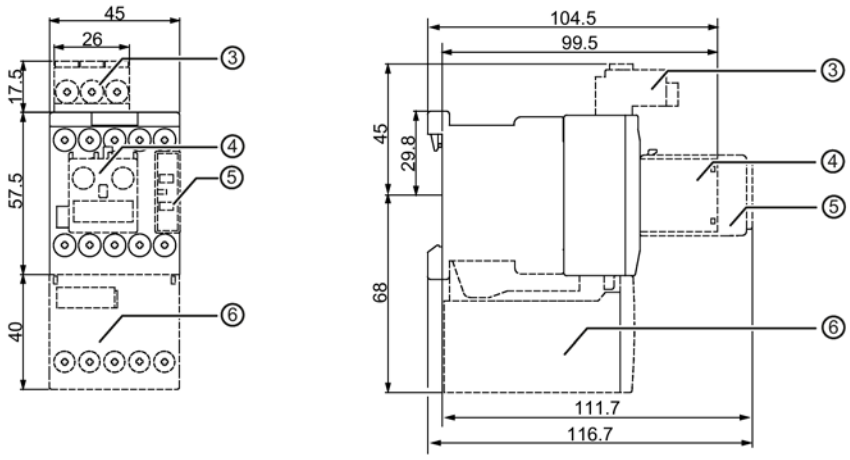
Figure C-1 3RT2.1.-1 contactor and 3RH21..-1 contactor relays (screw-type connection system)



1 Laterally mountable auxiliary switch block 3RH2911-1DA.. / -1DE.. / -1EE..

2 Auxiliary switch block for mounting on the front 3RH2911-1FA.. / -1GA.. / -1HA.. / -1NF..

Figure C-2 3RT2.1.-1 contactor and 3RH21..-1 contactor relays (screw-type connection system) with auxiliary switch blocks mounted



3	3-phase infeed terminal	3RA2913-3K
4	Surge suppressor	3RT2916-1...
5	Auxiliary switch block for mounting on the front	3RH2911-1AA.. / -1BA..
6	EMC suppression module	3RT2916-1P..

Figure C-3 3RT2.1.-1 contactors and 3RH21..-1 contactor relays (screw-type connection system) with accessories mounted

3RT2.1.-2 contactors and 3RH21..-2 contactor relays (4-pole) in spring-loaded connection system with accessories mounted

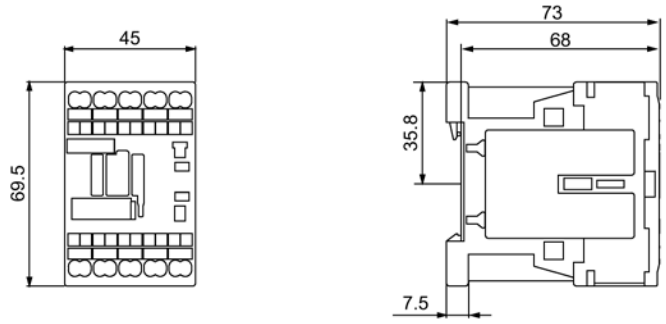
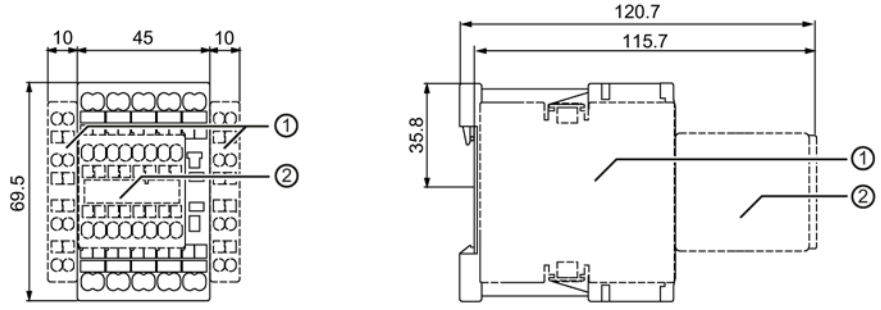
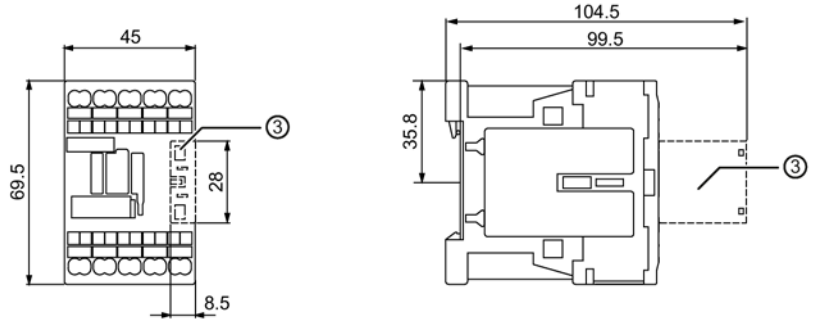


Figure C-4 3RT2.1.-2 contactor and 3RH21..-2 contactor relays (spring-loaded connection system)



1	Laterally mountable auxiliary switch block	3RH2911-2DA.. / -2DE.. / -2EE..
2	Auxiliary switch block for mounting on the front	3RH2911-2FA.. / -2GA.. / -2HA.. / -2NF..

Figure C-5 3RT2.1.-2 contactor and 3RH21..-2 contactor relay (spring-loaded connection system) with auxiliary switch blocks mounted



3	Surge suppressor	3RT2916-1...

Figure C-6 3RT2.1.-2 contactor and 3RH21..-2 contactor relay (spring-loaded connection system) with surge suppressor mounted

3RT2.1-4. contactors and 3RH21..-4 contactor relays (4-pole) with ring cable lug connection system and accessories mounted

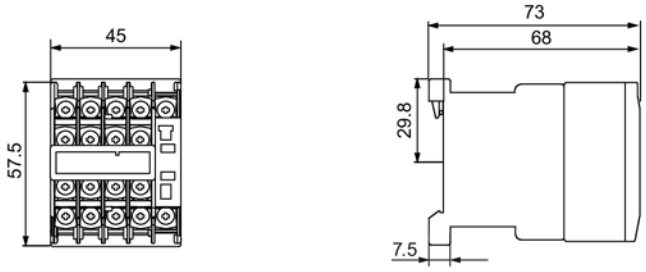
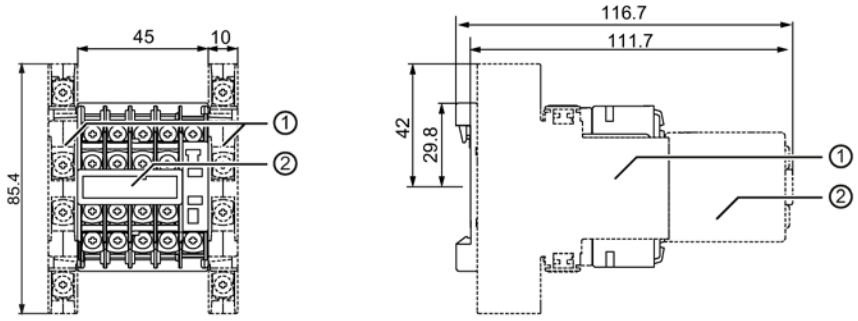


Figure C-7 3RT2.1.-4 contactor and 3RH21..-4 contactor relay (ring cable lug connection system)



1 Laterally mountable auxiliary switch block 3RH2911-4DA..

2 Auxiliary switch block for mounting on the front 3RH2911-4FA.. / -4GA.. / -4HA.. / -4NF..

Figure C-8 3RT2.1-4. contactor and 3RH21..-4 contactor relay (ring cable lug connection system) with auxiliary switch blocks mounted

Latched 4-pole contactor relay 3RH24..-1 in screw-type connection system

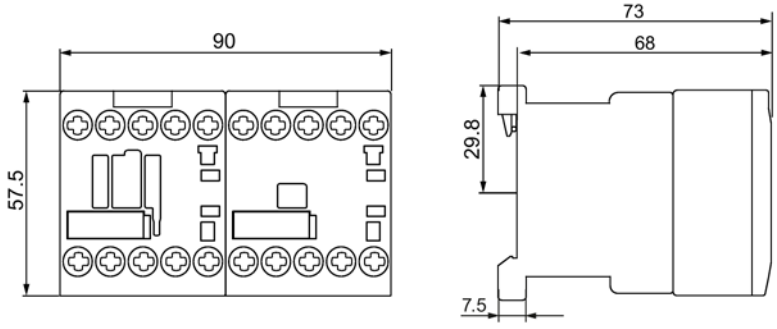


Figure C-9 Latched 4-pole contactor relay 3RH24..-1 (screw-type connection system)

3RH24..(0LA0) contactor relay with extended operating range in screw-type connection system

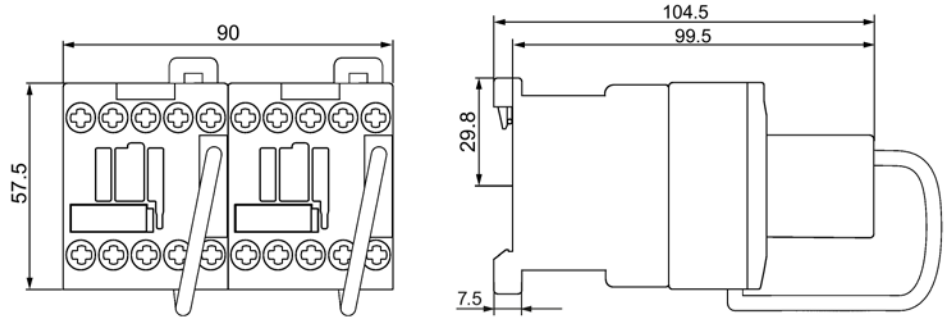


Figure C-10 3RH24.. contactor relay with extended operating range (screw-type connection system)

3RH201./3RH21..(0LA0) contactor relays with extended operating range in spring-loaded connection system

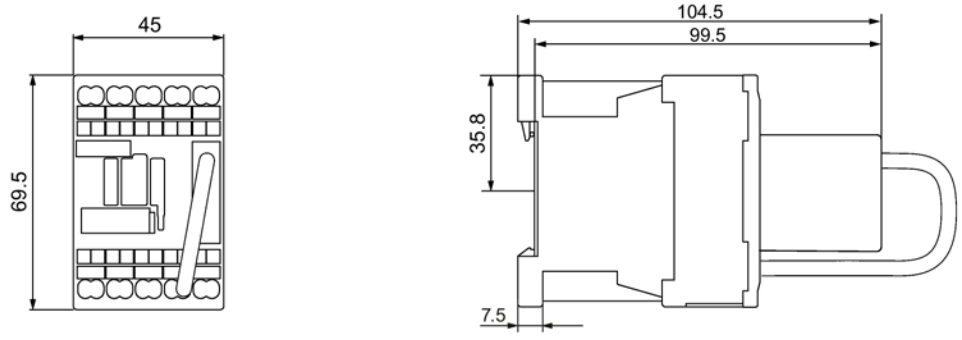


Figure C-11 3RH201. and 3RH21.. contactor relays with extended operating range (spring-loaded connection system)

Drilling plans for 3RT2.1.-1/3RT2.1-4./3RT2.1.-2 contactors and 3RH21.. 1/3RH21..-4/3RH21..-2 contactor relays

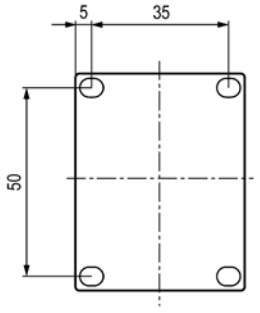


Figure C-12 Drilling plan for contactors and contactor relays with screw-type connections and ring cable lug connections (size S00)

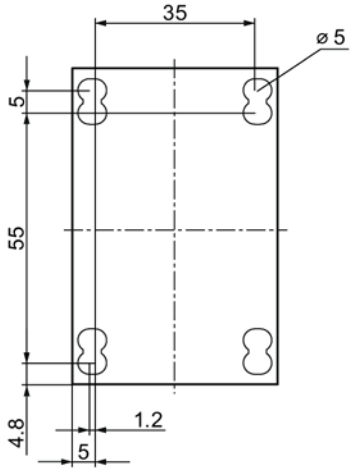


Figure C-13 Drilling plan for contactors and contactor relays with spring-loaded connections (size S00)

C.2 Contactors (size S0)

3RT2.2.-1 contactors (3-pole) in screw-type connection system with accessories mounted

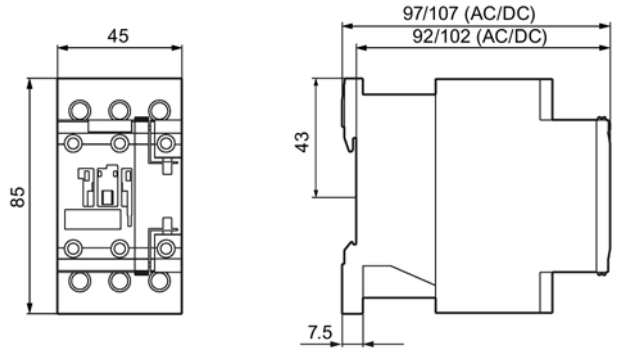
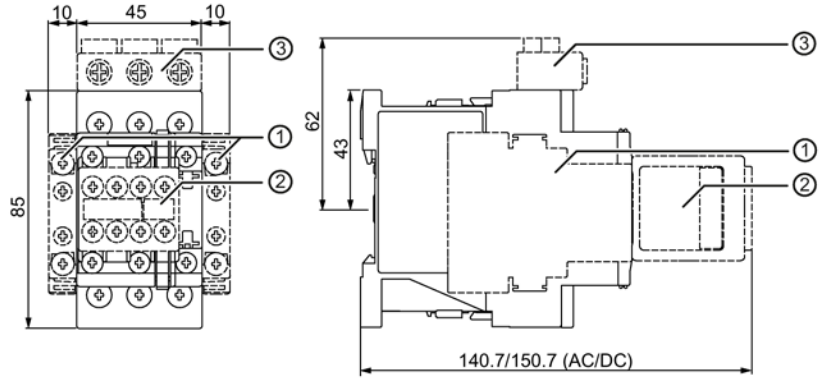
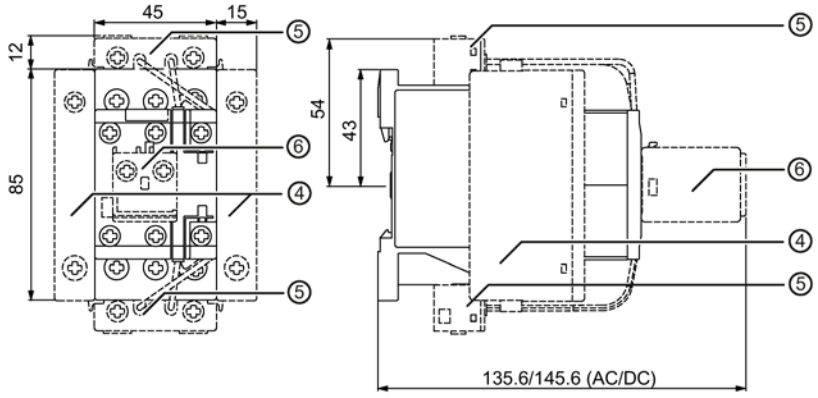


Figure C-14 3RT2.2.-1 contactors (screw-type connection system)



1	Laterally mountable auxiliary switch block	3RH2921-1DA.. / -1DE..
2	Auxiliary switch block for mounting on the front	3RH2911-1FA.. / -1GA.. / -1HA.. / -1NF..
3	3-phase infeed terminal	3RV2925-5AB

Figure C-15 3RT2.2.-1 contactors (screw-type connection system) with auxiliary switch blocks mounted and other accessories



4	4-pole contactor for switching resistive loads	3RT232.
	4-pole pole-changing contactor for changing the polarity of hoisting gear motors (2 NO contacts and 2 NC contacts)	3RT252.
5	Coil terminal module	3RT2926-4RA11/-4RB11
6	Auxiliary switch block for mounting on the front	3RH2911-1AA.. / -1BA

Figure C-16 3RT2.2.-1 contactors (screw-type connection system) with accessories mounted

3RT2.2.-2/3RT202.-.....-0LA2 contactors (3-pole) in spring-loaded connection system with accessories mounted

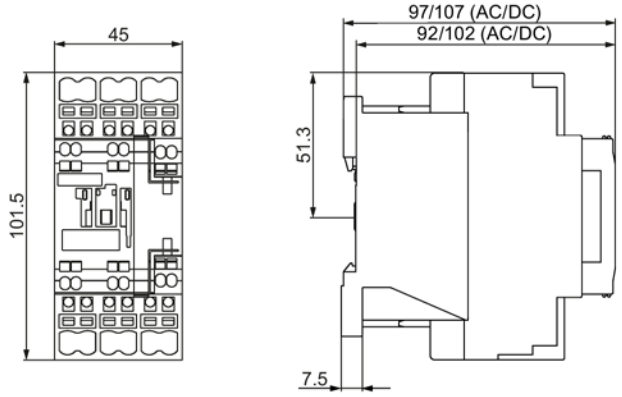
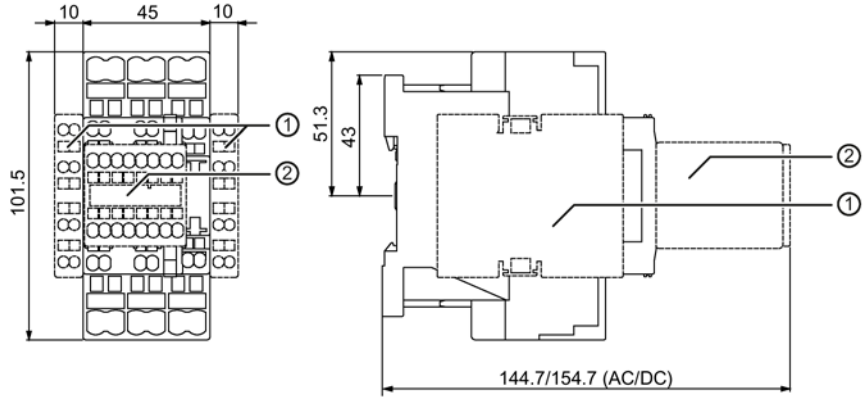


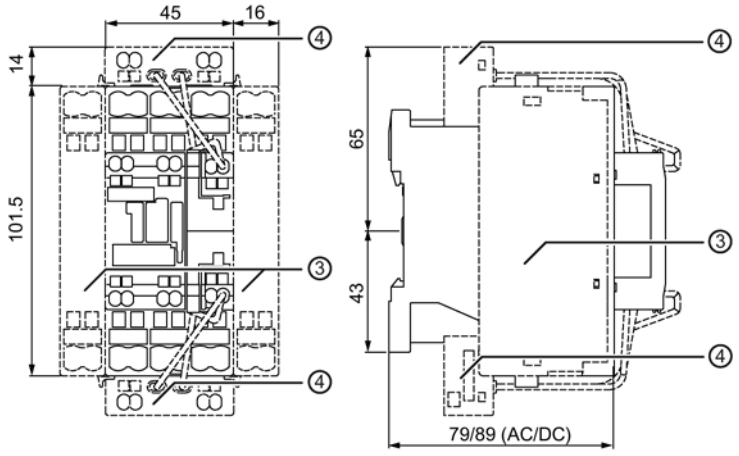
Figure C-17 3RT2.2.-2 and 3RT202.- ..... -0LA2 contactors (spring-loaded connection system)



1 Laterally mountable auxiliary switch block 3RH2921-2DA.. / -2DE..

2 Auxiliary switch block for mounting on the front 3RH2911-2FA.. / -2GA.. / -2HA.. / -2NF..

Figure C-18 3RT2.2.-2 and 3RT202.-.....-0LA2 contactors (spring-loaded connection system) with auxiliary switch blocks mounted



3	4-pole contactor for switching resistive loads	3RT232.
	4-pole pole-changing contactor for changing the polarity of hoisting gear motors (2 NO contacts and 2 NC contacts)	3RT252.
4	Coil terminal module (from above/from below)	3RT2926-4RA12/-4RB12

Figure C-19 3RT2.2.-2 and 3RT202.-.....-0LA2 contactors (spring-loaded connection system) with accessories mounted

3RT2.2.-4 contactors (3-pole) in ring cable lug connection system with accessories mounted

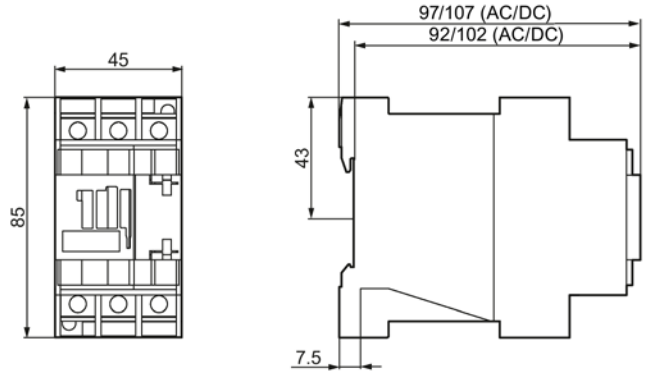
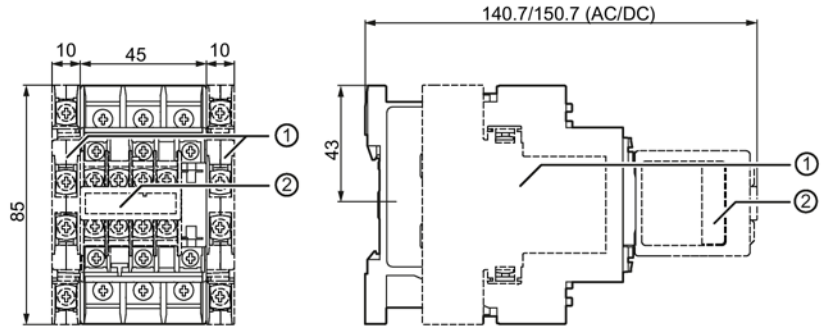


Figure C-20 3RT2.2.-4 contactors (ring cable lug connection system)



1	Laterally mountable auxiliary switch block	3RH2921-4DA..
2	Auxiliary switch block for mounting on the front	3RH2911-4FA.. / -4GA.. / -4HA.. / -4NF..

Figure C-21 3RT2.2.-4 contactors (ring cable lug connection system) with auxiliary switch blocks mounted

Drilling plan for 3RT2.2. contactors

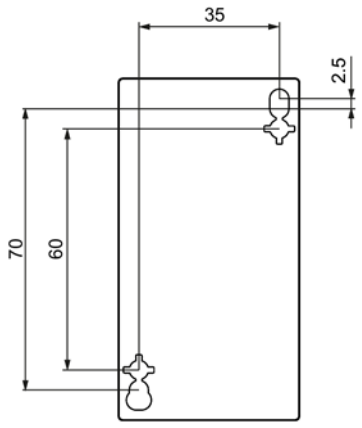


Figure C-22 Drilling plan for 3RT2.2. contactors (size S0)

C.3 Contactors (size S2)

3RT2.3.-1 contactors (3-pole) with accessories mounted

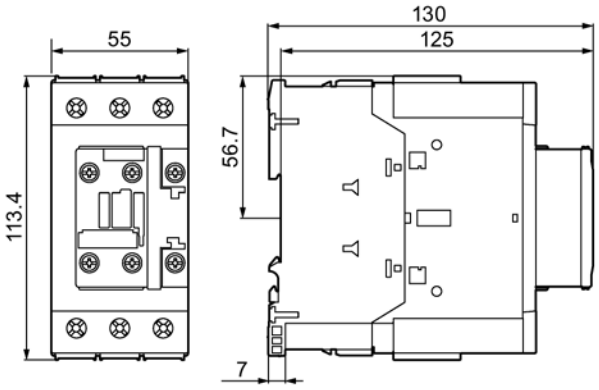


Figure C-23 3RT2.3.-1 contactor (screw-type connection system)

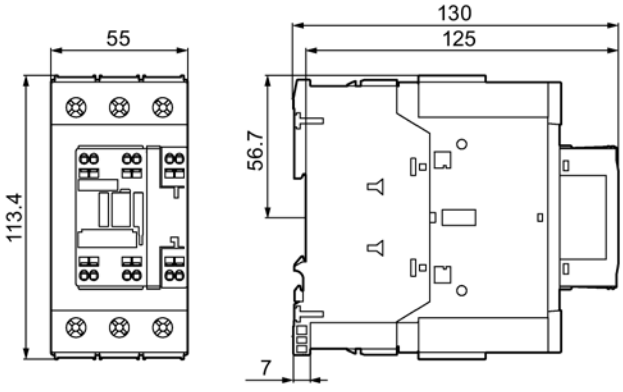
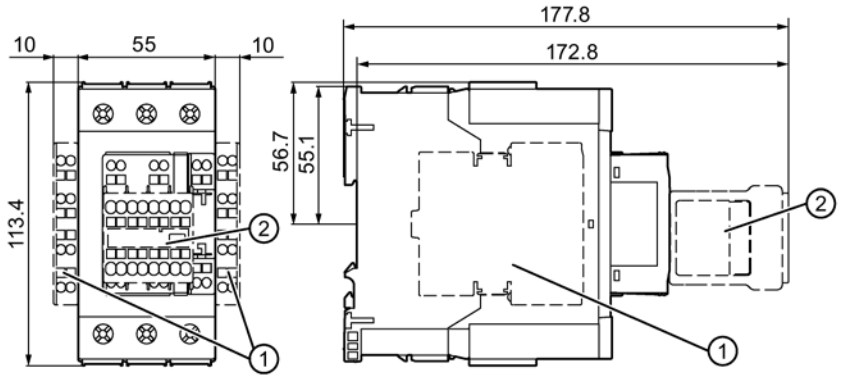
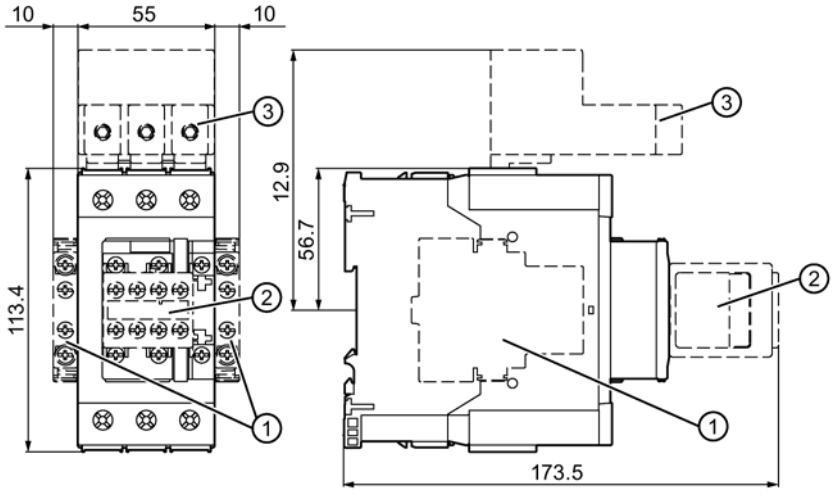


Figure C-24 3RT2.3.-1 contactor (spring-loaded connection system)



1	Laterally mountable auxiliary switch block	3RH2921-1DA.. / -1DE..
2	Auxiliary switch block for mounting on the front	3RH2911-1FA.. / -1GA.. / -1HA.. / -1NF..

Figure C-25 3RT2.3.-1 contactors (screw-type connection system) with auxiliary switch blocks mounted and other accessories



1	Laterally mountable auxiliary switch block	3RH2921-1DA.. / -1DE..
2	Auxiliary switch block for mounting on the front	3RH2911-1FA.. / -1GA.. / -1HA.. / -1NF..
3	3-phase infeed terminal	3RV2925-5AB

Figure C-26 3RT2.3.-1 contactors (screw-type connection system) with auxiliary switch blocks mounted and 3-phase infeed terminal

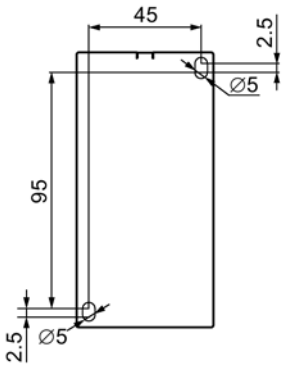
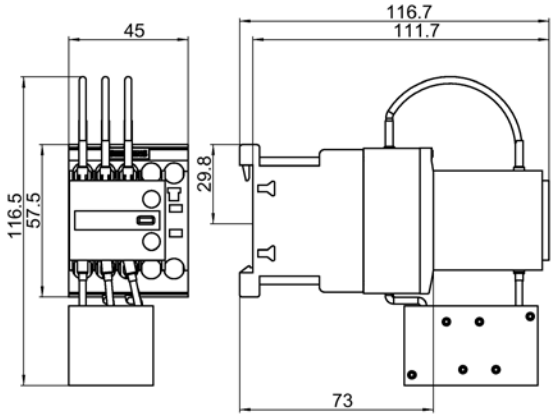


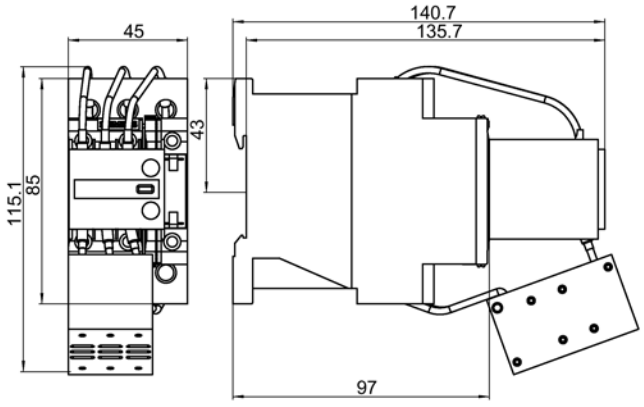
Figure C-27 Drilling plan

C.4 Capacitor contactors

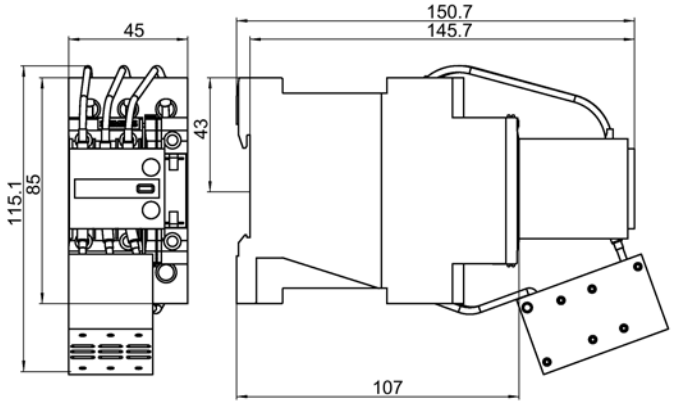
3RT261.-1....



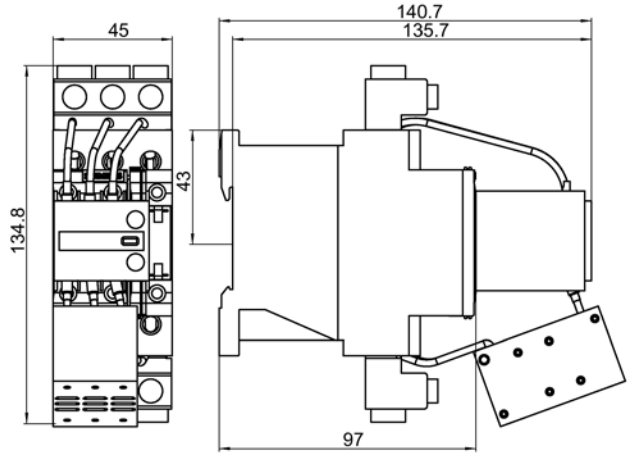
3RT2625-1A...



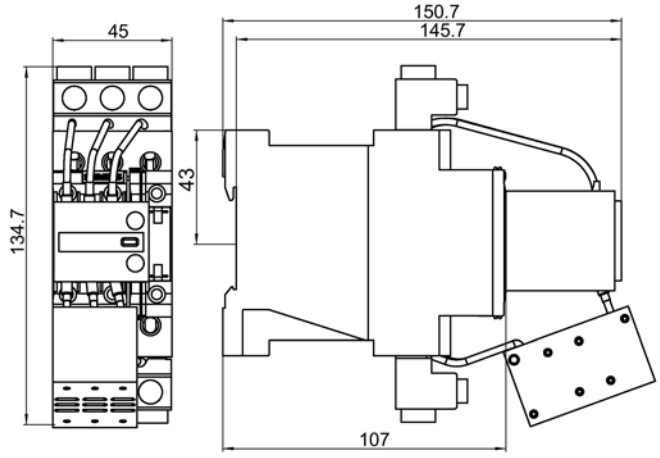
3RT2625-1B...



3RT2628-1A...



3RT2628-1B...



3RT263.-1A...

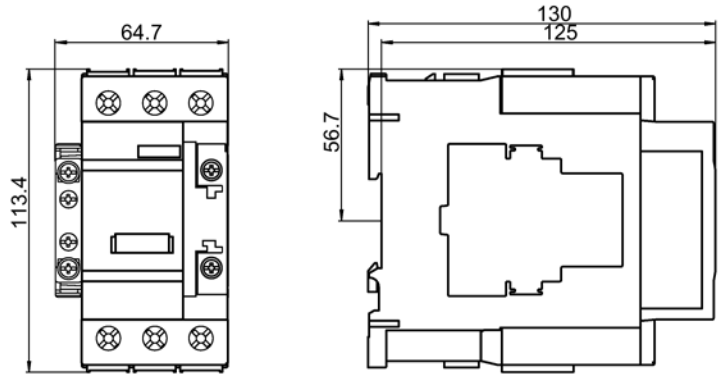
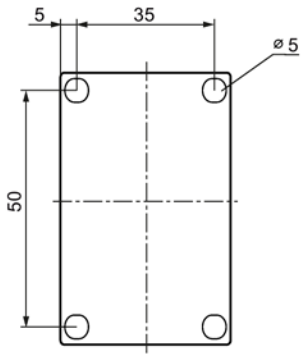
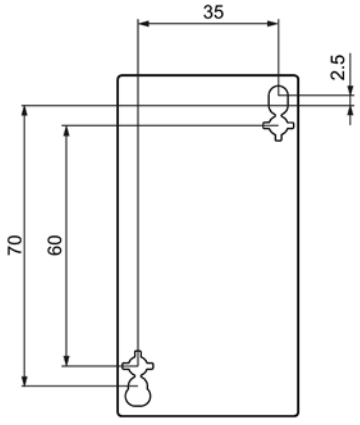


Figure C-28 3RT263.-1A..3_MB

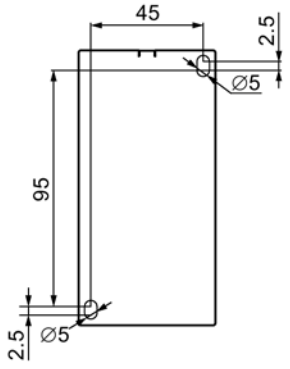
3RT261 drilling plan.



3RT262 drilling plan.



3RT263 drilling plan.



Reversing contactor assembly

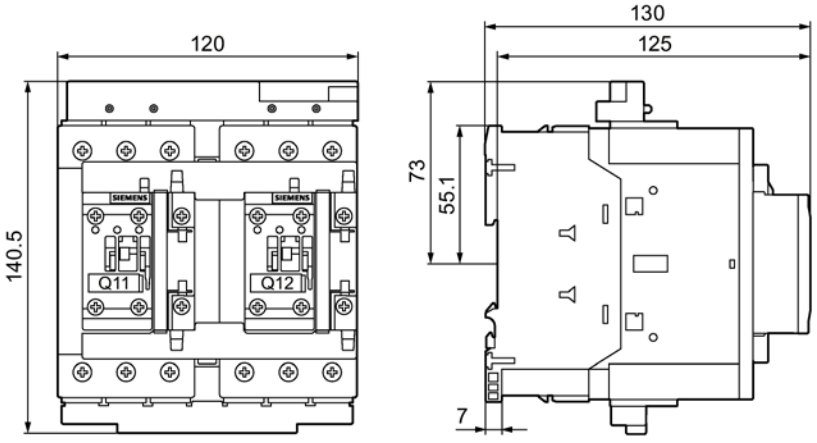


Figure C-29 3RA233 reversing contactor assembly

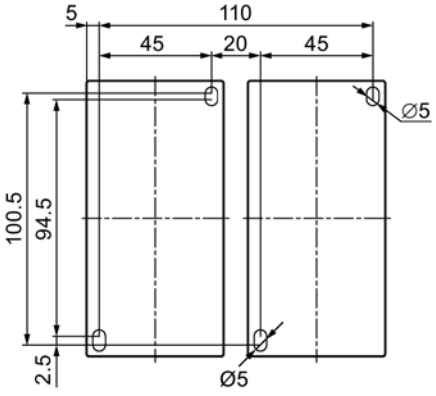


Figure C-30 Drillilng plan 3RA233 reversing contactor assembly

Contactor assembly for star-delta (wye-delta) start

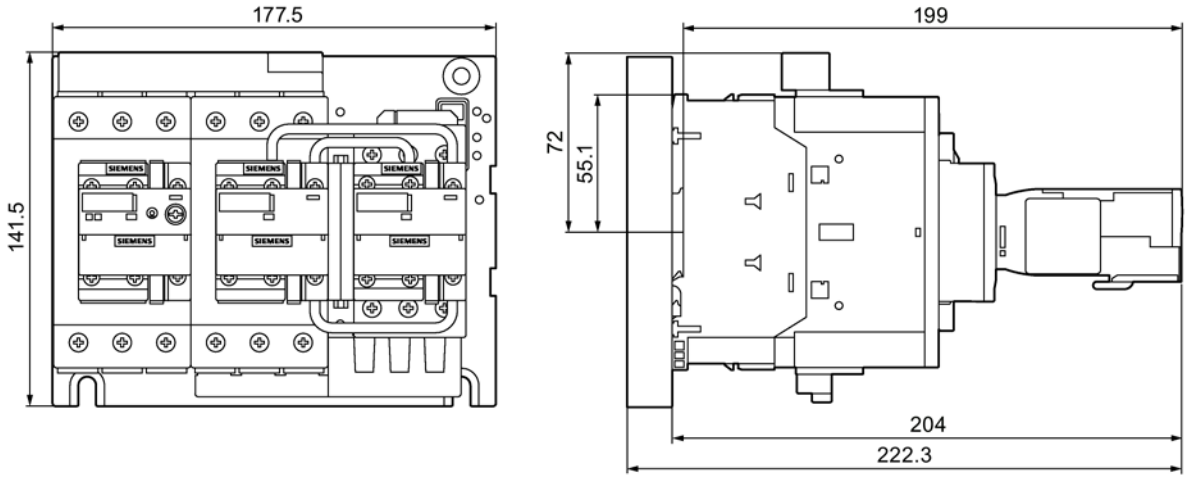


Figure C-31 Contactor assembly for star-delta (wye-delta) start S2-S2-S0 on mounting plate

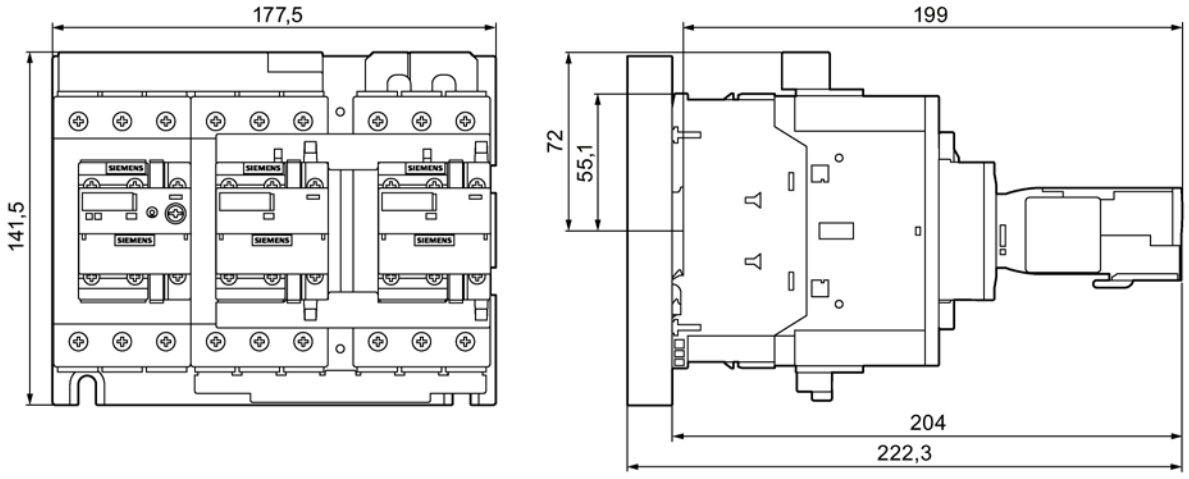


Figure C-32 Contactor assembly for star-delta (wye-delta) start S2-S2-S2 on mounting plate

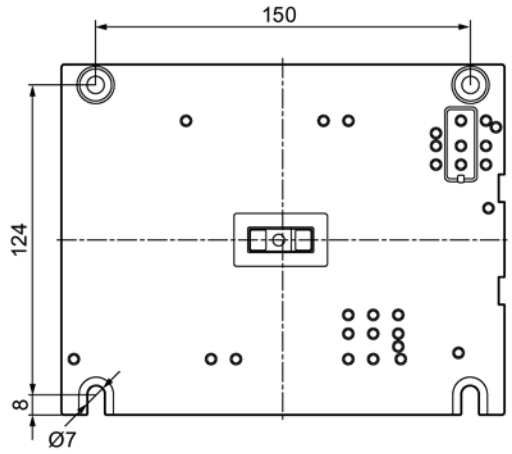


Figure C-33 Mounting plate drilling plan

Correction sheet

D

Correction sheet

Have you noticed any errors while reading this manual? If so, please use this form to tell us about them. We welcome comments and suggestions for improvement.

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Errors, comments, and suggestions for improvements

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