

Industrial Controls

Soft starters and solid-state switching devices SIRIUS 3RW52 Soft Starter




Manual

| | |
|---------------------------|----|
| Description | 1 |
| Safety information | 2 |
| Mounting and dismantling | 3 |
| Wiring | 4 |
| Parameter assignment | 5 |
| Commissioning | 6 |
| Functions | 7 |
| Messages and diagnostics | 8 |
| Maintenance and servicing | 9 |
| Technical specifications | 10 |
| Dimension drawings | 11 |
| Circuit diagrams | 12 |
| Example circuits | A |
| Third-party software | B |

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| |
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|  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. |


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| |
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Table of contents

| | | |
|----------|---|-----------|
| 1 | Description..... | 7 |
| 1.1 | Target group | 7 |
| 1.2 | Device design | 8 |
| 1.3 | Operating principle..... | 9 |
| 1.4 | Interaction interfaces..... | 11 |
| 1.5 | Operating modes and master control function..... | 12 |
| 1.6 | Device versions..... | 14 |
| 1.7 | Areas of application / load types..... | 16 |
| 1.8 | Selection of the soft starter using the Simulation Tool for Soft Starters | 17 |
| 1.9 | Structure of the article number | 18 |
| 1.10 | Accessories..... | 20 |
| 1.10.1 | Accessories for 3RW52 soft starter | 20 |
| 1.10.2 | 3RW5 communication module | 22 |
| 1.10.3 | SIRIUS Soft Starter ES (TIA Portal) | 23 |
| 1.10.4 | 3RW5 HMI | 24 |
| 1.11 | Additional documentation | 27 |
| 1.12 | Siemens Industry Online Support..... | 29 |
| 1.13 | Support Request..... | 31 |
| 1.14 | Siemens Industry Online Support app..... | 31 |
| 2 | Safety information | 33 |
| 2.1 | ESD Guidelines..... | 33 |
| 2.2 | Reactive power compensation..... | 35 |
| 2.3 | Electromagnetic compatibility (EMC) according to IEC 60947-4-1 | 35 |
| 2.4 | Security information | 35 |
| 2.5 | Recycling and disposal | 36 |
| 3 | Mounting and dismantling | 37 |
| 3.1 | Installing the 3RW52 soft starter..... | 37 |
| 3.2 | Mounting the fan cover | 38 |
| 3.3 | Mounting the 3RW52 soft starter on a level surface..... | 40 |
| 3.4 | Installing / mounting / removing 3RW5 HMI | 42 |
| 3.4.1 | Installing the Standard 3RW5 HMI in 3RW52 soft starter | 42 |
| 3.4.2 | Removing Standard 3RW5 HMI | 43 |
| 3.4.3 | Installing the High Feature 3RW5 HMI in the 3RW52 soft starter | 44 |
| 3.4.4 | Removing the High Feature 3RW5 HMI | 45 |

| | | |
|----------|--|-----------|
| 3.4.5 | Installing the Standard 3RW5 HMI into the control cabinet door | 46 |
| 3.4.6 | Installing the High Feature 3RW5 HMI in the control cabinet door..... | 49 |
| 3.4.7 | Installing the Standard 3RW5 HMI on a flat surface..... | 53 |
| 3.4.8 | Installing the High Feature 3RW5 HMI on a flat surface..... | 55 |
| 3.4.9 | Cut out the hinged cover for 3RW5 HMI | 57 |
| 3.4.10 | Replacing the hinged cover of the 3RW52 soft starter | 58 |
| 4 | Wiring | 59 |
| 4.1 | Connections | 59 |
| 4.1.1 | Overview of all connections | 59 |
| 4.1.2 | State diagrams of the inputs and outputs | 61 |
| 4.2 | Connecting the 3RW52 soft starter..... | 63 |
| 4.3 | Connect the 3RW52 soft starter to the main circuit connection (line side / motor side) | 64 |
| 4.4 | Mounting terminal covers on main circuit connections | 66 |
| 4.5 | Replacing the terminals on size 2 devices..... | 67 |
| 4.6 | Connecting the control terminals (screw terminals)..... | 69 |
| 4.7 | Disconnecting the control current form the screw-type terminals..... | 70 |
| 4.8 | Connecting the control terminals (spring-type terminals) | 71 |
| 4.9 | Disconnecting the control current from the spring-loaded terminals | 72 |
| 4.10 | Replacing the control terminals..... | 73 |
| 4.11 | Installing the cover for the control cable duct | 75 |
| 4.12 | Removing the cover of the control cable duct..... | 76 |
| 5 | Parameter assignment..... | 77 |
| 5.1 | Setting elements on the 3RW52 soft starter | 77 |
| 5.2 | Overview of parameters..... | 80 |
| 5.3 | Suggested settings | 81 |
| 5.4 | Parameterizing the 3RW52 soft starter..... | 82 |
| 5.5 | Setting RESET MODE and Soft Torque | 83 |
| 5.6 | RESET MODES | 85 |
| 5.7 | Parameterizing output 13 / 14 (output signal ON or RUN) | 86 |
| 6 | Commissioning | 89 |
| 6.1 | Commissioning the 3RW52 soft starter | 89 |
| 6.2 | Sealing the 3RW52 soft starter | 90 |
| 6.3 | First commissioning of the High Feature 3RW5 HMI..... | 91 |
| 7 | Functions..... | 93 |
| 7.1 | Soft starting | 93 |
| 7.2 | Current limiting function | 96 |
| 7.3 | Soft stopping | 98 |

| | | |
|----------|--|------------|
| 7.4 | Motor protection | 99 |
| 7.4.1 | Electronic motor overload protection | 99 |
| 7.4.2 | Thermistor motor protection with temperature sensor (optional)..... | 100 |
| 7.5 | Intrinsic device protection | 101 |
| 7.6 | Soft Torque | 102 |
| 7.7 | Additional parameters | 104 |
| 7.8 | Standard 3RW5 HMI..... | 105 |
| 7.8.1 | Design of the Standard 3RW5 HMI | 105 |
| 7.8.2 | Standard 3RW5 HMI menu..... | 107 |
| 7.9 | High Feature 3RW5 HMI..... | 110 |
| 7.9.1 | Design and operator controls of the High Feature 3RW5 HMI | 110 |
| 7.9.2 | Main menu of the High Feature 3RW5 HMI with the 3RW52 soft starter..... | 112 |
| 7.9.3 | Parameterizing the High Feature 3RW5 HMI | 116 |
| 7.9.4 | Monitoring | 117 |
| 7.9.4.1 | Monitoring the measured values of the 3RW52 soft starter with the High Feature 3RW5 HMI | 117 |
| 7.9.4.2 | Monitoring the process image of the 3RW52 soft starter with the High Feature 3RW5 HMI..... | 118 |
| 7.9.5 | Parameterizing analog output AQ via the High Feature 3RW5 HMI | 119 |
| 7.9.6 | Overview | 121 |
| 7.9.7 | Defining the local access protection (PIN)..... | 122 |
| 7.9.8 | Micro SD card | 124 |
| 8 | Messages and diagnostics | 127 |
| 8.1 | Diagnostics options..... | 127 |
| 8.2 | LED display..... | 128 |
| 8.2.1 | Overview of the device LEDs of the 3RW52 soft starter | 128 |
| 8.2.2 | Status and error displays | 129 |
| 8.2.3 | LED STATE / OVERLOAD | 130 |
| 8.2.4 | Overview of LEDs on Standard 3RW5 HMI..... | 131 |
| 8.2.5 | Overview of LEDs on High Feature 3RW5 HMI | 132 |
| 8.3 | Warnings and remedial measures | 133 |
| 8.4 | Faults and remedial actions of the 3RW52 soft starter..... | 134 |
| 8.5 | Faults and remedial actions on the 3RW5 HMI High Feature | 138 |
| 8.6 | RESET MODES..... | 139 |
| 8.7 | Diagnostics of the 3RW52 soft starter with the 3RW5 HMI High Feature | 140 |
| 8.8 | Diagnostics of communication with the High Feature 3RW5 HMI | 142 |
| 8.9 | Execute HMI diagnostics with the 3RW5 HMI High Feature | 142 |
| 8.10 | Logbooks | 143 |
| 9 | Maintenance and servicing..... | 145 |
| 9.1 | Maintenance and repairs | 145 |
| 9.2 | User test..... | 146 |
| 9.3 | Firmware update | 149 |

| | | |
|-----------|---|------------|
| 9.4 | Performing firmware update with micro SD card (3RW5 HMI High Feature) | 150 |
| 9.5 | Restore factory setting | 151 |
| 9.5.1 | Restoring the factory settings via High Feature 3RW5 HMI | 152 |
| 9.5.2 | Restoring the factory settings with the Master RESET button via 3RW5 HMI High Feature | 153 |
| 10 | Technical specifications | 155 |
| 10.1 | Technical data in Siemens Industry Online Support..... | 155 |
| 11 | Dimension drawings..... | 157 |
| 11.1 | CAX data | 157 |
| 12 | Circuit diagrams..... | 159 |
| 12.1 | CAX data | 159 |
| A | Example circuits..... | 161 |
| A.1 | Main circuit connection | 161 |
| A.1.1 | Feeder assembly, type of coordination 1 fuseless..... | 161 |
| A.1.2 | Feeder assembly, type of coordination 1 with fuses..... | 162 |
| A.1.3 | Feeder assembly, type of coordination 2..... | 163 |
| A.1.4 | Inside-delta circuit | 164 |
| A.2 | Control circuit connection..... | 167 |
| A.2.1 | Control by pushbutton..... | 167 |
| A.2.2 | Control by switch..... | 168 |
| A.2.3 | Switching with the control supply voltage | 169 |
| A.2.4 | Control by PLC..... | 171 |
| A.2.5 | Actuation of a line contactor..... | 172 |
| A.2.6 | Wiring for remote RESET | 174 |
| A.2.7 | Connecting the temperature sensor | 175 |
| A.2.8 | Connecting the evaluation unit to the analog output..... | 176 |
| A.3 | Special applications | 177 |
| A.3.1 | Controlling a motor with a magnetic parking brake..... | 177 |
| A.3.2 | EMERGENCY STOP shutdown to SIL 1 or PL c with a 3SK1 safety relay..... | 179 |
| A.3.2.1 | Wiring of the 3SK1 safety relay SIL 1 with line contactor | 181 |
| A.3.2.2 | Wiring of the 3SK1 safety relay SIL 1 without line contactor | 182 |
| A.3.3 | EMERGENCY STOP shutdown to SIL 3 or PL e with a 3SK1 safety relay..... | 183 |
| A.3.3.1 | Wiring of the 3SK1 safety relay SIL 3 with line contactor | 185 |
| A.3.3.2 | Wiring of the 3SK1 safety relay SIL 3 without line contactor | 186 |
| A.3.4 | Contactors for emergency start | 187 |
| B | Third-party software | 189 |
| B.1 | Information about third-party software | 189 |
| | Glossary | 193 |
| | Index | 195 |

Description

1.1 Target group

Target group

The manual is intended for everyone involved in the following tasks:

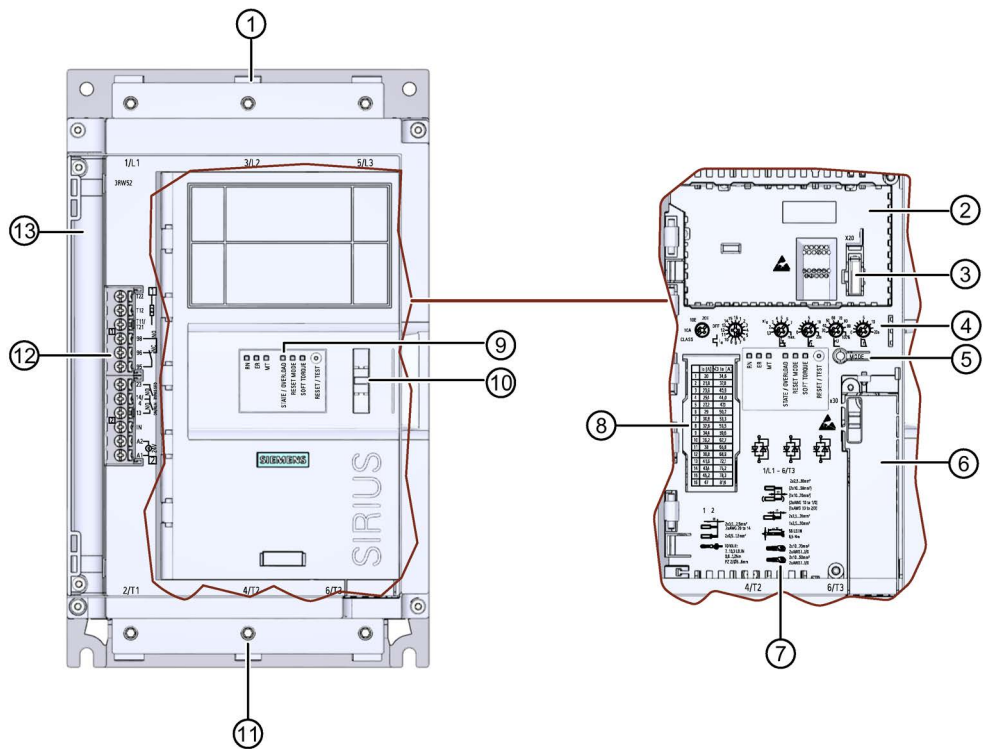
- Planning and configuring systems
- Installation
- Commissioning
- Service and maintenance

Requirements for use of 3RW5 soft starters

Basic knowledge of the following areas:

- General electrical engineering
- Drive technology
- Automation technology
- Handling the automation system and the software used

1.2 Device design



- ① Main circuit connection (mains supply)
- ② Slot for 3RW5 HMI Standard or 3RW5 HMI High Feature (accessories)
- ③ Interface for 3RW5 HMI Standard or 3RW5 HMI High Feature (accessories)
- ④ Setting elements for parameter assignment
- ⑤ MODE key
- ⑥ Slot for 3RW5 communication module (accessory)
- ⑦ Connectable conductor cross sections
- ⑧ Scale of the setting element I_e
- ⑨ Diagnostics LEDs and RESET key
- ⑩ Eye for lead seal
- ⑪ Main circuit connection (motor)
- ⑫ Control terminals (inputs / outputs)
- ⑬ Control cable duct

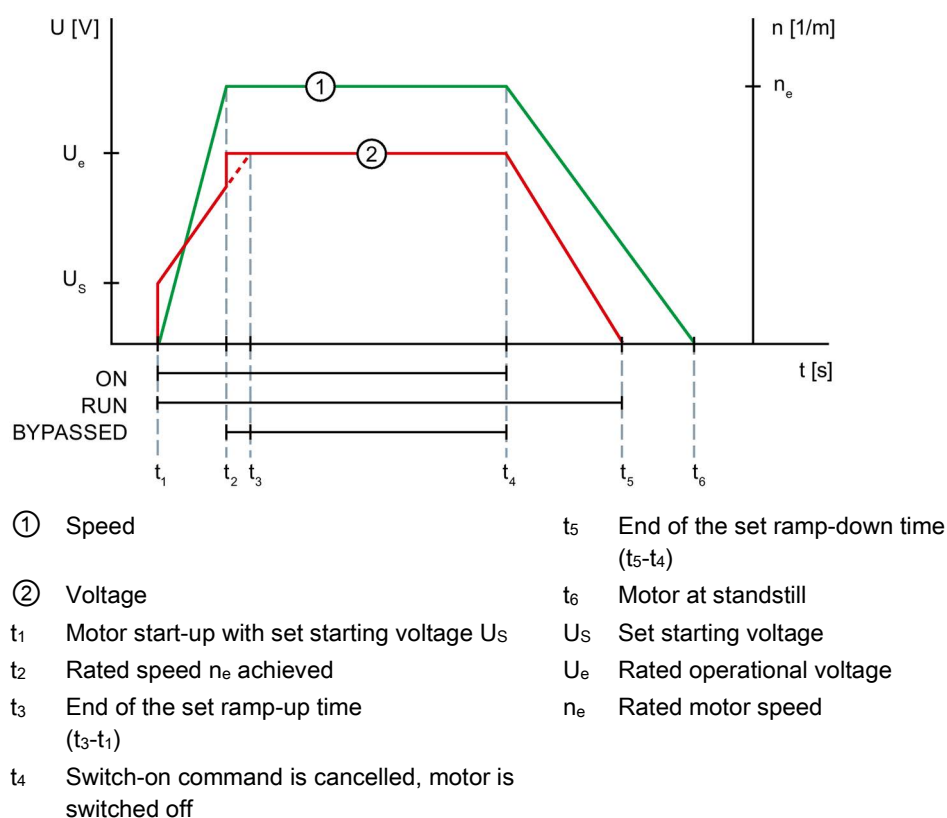
1.3 Operating principle

Soft starters are used to start three-phase induction motors with reduced torque and reduced starting current.

The 3RW52 soft starter starts the motor as soon as the switch-on command is issued (t_1). During the ramp-up time (t_1 to t_3), the current is conducted via power semiconductors which start the motor up smoothly.

The 3RW52 soft starter features internal run-up recognition. If it detects that the motor has reached its rated operating speed before the ramp-up time expires, the motor voltage is immediately increased to 100 % of the line voltage (t_2). The internal bypass contacts close and the power semiconductors are bypassed. The 3RW52 soft starter is then in bypass operation.

Coast-down to zero speed is activated when the switch-on command is cancelled (t_4) and the motor is shut down. The power semiconductors also ensure that the motor coasts down smoothly to a stop. The power supply to the motor is maintained (t_5) until the end of the ramp-down time is reached (t_4 to t_5). It may take longer for the motor to actually coast down to a standstill (t_6).

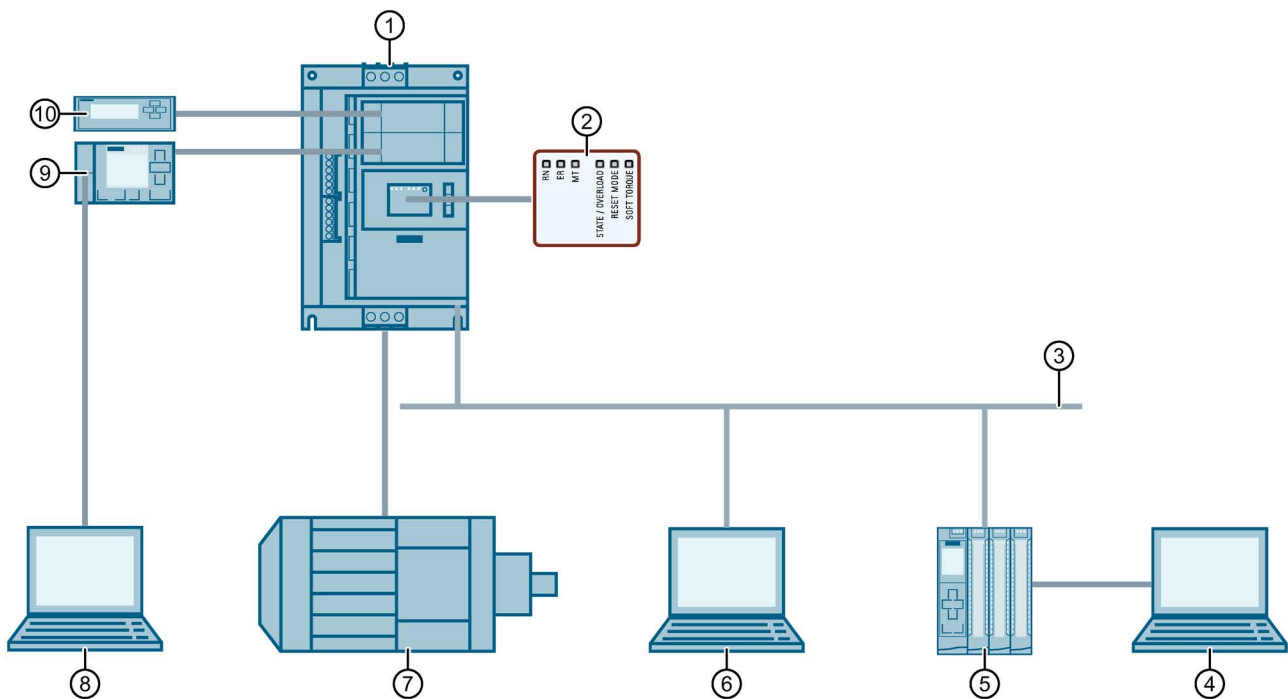


Functions

- **Soft starting** with parameterizable starting voltage and starting ramp time
- **Soft stopping** with parameterizable ramp-down time
- Parameterizable **current limiting function**
- **Soft torque** for smooth ramp-up and ramp-down (avoiding torque peaks by means of torque limitation)
- **Integrated motor overload protection** with adjustable trip class (Off, Class 10A, 10E, 20E)
- The **intrinsic device protection** protects the 3RW52 soft starter against overload.
- **Ramp-up detection**
- Extended operating and diagnostic functions provided by the optional **3RW5 HMI Standard** or **3RW5 HMI High-Feature**
- Connection to motor in **inline circuit** or **inside-delta circuit**
- Adjustable **RESET MODE** (manual RESET, remote RESET, auto RESET) for the functions of motor protection
- Extended full motor protection via optional **thermistor motor protection** for connection of a temperature switch (e.g. Thermoclick) or a thermistor (e.g. PTC type A) (alternative to analog output)
- Optional **analog output** for output of a measured value (alternative to thermistor motor protection)
- Optional **3RW5 communication module** for integration into bus systems
- **Firmware updates** upgrade the firmware of the respective device.

Further details can be found in Chapter Functions (Page 93).

1.4 Interaction interfaces



- ① SIRIUS 3RW52 soft starter
- ② LED display on 3RW52 soft starter
- ③ Fieldbus (via optional communication module)
- ④ PC or programming device with configuring software of controller (e.g. STEP 7)
- ⑤ Programmable logic controller (e.g. SIMATIC S7-1500)
- ⑥ PC with SIRIUS Soft Starter ES (TIA Portal) Premium via 3RW5 communication module
- ⑦ Motor
- ⑧ PC with SIRIUS Soft Starter ES (TIA Portal) via local interface on 3RW5 HMI High Feature
- ⑨ 3RW5 HMI High Feature (accessories)
- ⑩ 3RW5 HMI Standard (accessories)

| | 3RW5 HMI High Feature | 3RW5 HMI Standard | SIRIUS Soft Starter ES (TIA Portal) ¹⁾ | Fieldbus via 3RW5 communication module | 3RW52 soft starter |
|----------------------|-----------------------|-------------------|---|--|--------------------|
| Monitoring | ✓ | ✓ | ✓ | ✓ (via user program) | LEDs |
| Diagnostics | ✓ | ✓ | ✓ | ✓ | LEDs |
| Control | ✓ | ✓ | ✓ | ✓ | Via input IN |
| Parameter assignment | -2), 3) | -3) | - | - | Setting elements |

1) Via local interface on 3RW5 HMI High Feature or via 3RW5 communication module.

2) Analog output (for device version with analog output only) and ON / RUN relay output parameterizable.

3) Station address for PROFIBUS is adjustable.

1.5 Operating modes and master control function

The following modes are available (in ascending order of priority):

| Mode | Control source | Control of the 3RW5 soft starter | Priority | |
|--|-------------------|---|--|---------|
| Automatic | Fieldbus | PROFINET and PROFIBUS: PLC controls | Lowest | |
| | | Modbus: Modbus client (e.g. PLC) controls | | |
| Manual operation bus (depending on the 3RW5 communication module) | - | - | Connection abort | ↓ |
| | PC controlled | Fieldbus | SIRIUS Soft Starter ES (TIA Portal) Premium controls | ↓ |
| Manual operation local | Input controlled | Digital inputs | Input actions control | ↓ |
| | 3RW5 HMI controls | 3RW5 HMI | 3RW5 HMI controls | ↓ |
| | PC controlled | Local interface | SIRIUS Soft Starter ES (TIA Portal) controls | Highest |

If the connection to the control source is aborted, the control priority automatically switches back to the lowest priority of the current mode.

Sets the operating mode

A higher-priority mode can actively take over as master control from a lower-priority mode at any time; the reverse is not possible.

The master control function can only be returned to the mode with the lowest priority. Control sources with higher priority must take the master control function from the mode with the lowest priority.

A mode with lower priority can only take the master control function back while the motor is switched off.

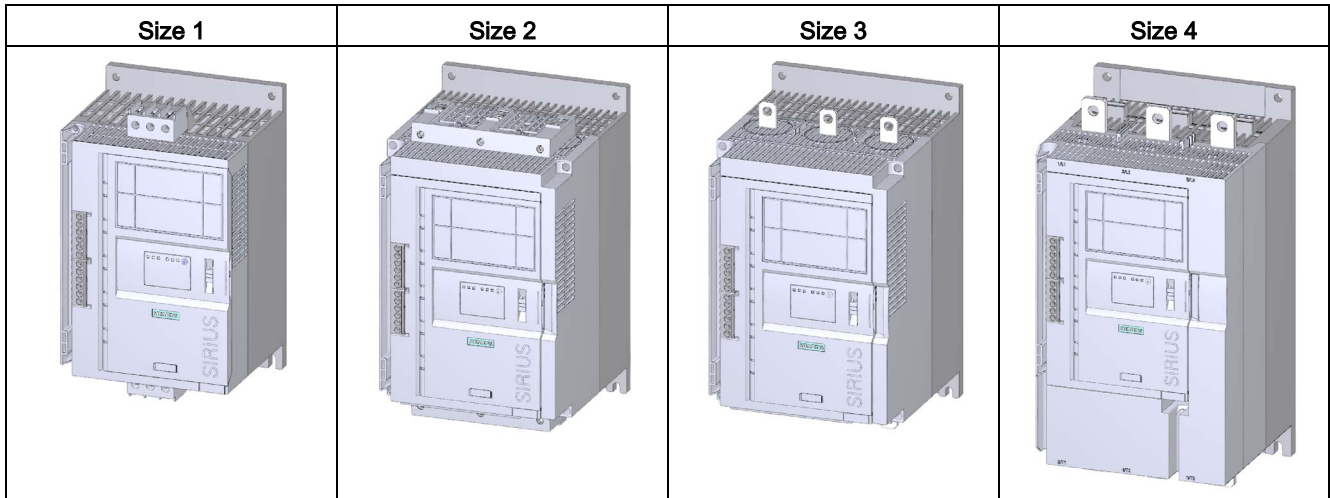
The mode with higher priority takes over or receives the master control function from the current mode in the following ways:

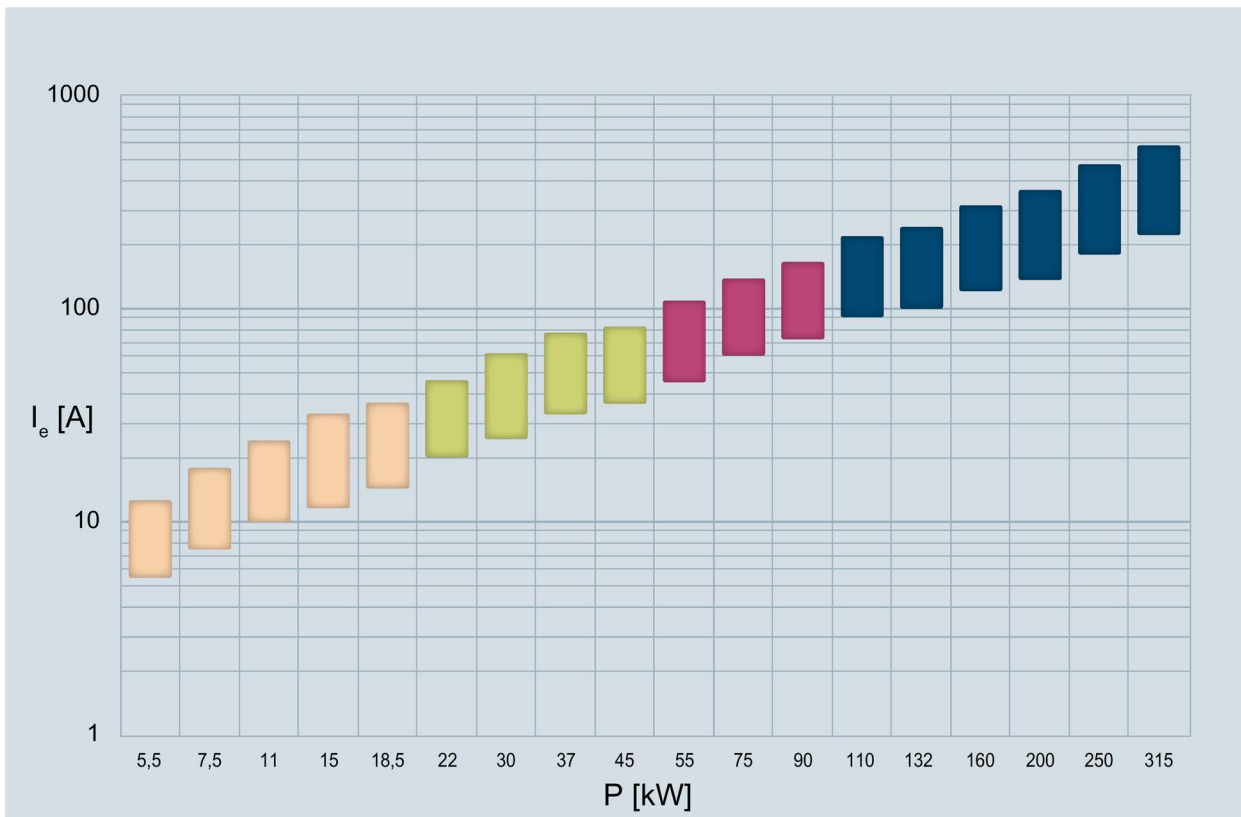
- The mode with higher priority actively takes over the master control function:
 - 3RW5 HMI: With the action "LOCAL / REMOTE"
 - SIRIUS Soft Starter ES (TIA Portal)
- The digital inputs receive the control priority from an operating mode with lower priority via the following options:
 - Via the "Manual operation local - input controlled" bit in the process image output (PIQ) or in the data table "process image output (PIQ)" (depending on the 3RW5 communication module). You will find more information on the process images and data tables in the manual for the 3RW5 communication module in question.
 - SIRIUS Soft Starter ES (TIA Portal) (depending on the 3RW5 communication module)

The mode with the lowest priority receives or takes over the master control function from the current mode in the following ways:

- The mode with higher priority actively returns the master control function:
 - 3RW5 HMI: With the action "LOCAL / REMOTE"
 - SIRIUS Soft Starter ES (TIA Portal)
- With control priority of the digital inputs or in the event of a connection abort, the operating mode with the lower priority can actively retrieve the control priority:
 - Via the "Manual operation local - input controlled" bit in the process image output (PIQ) or in the data table "process image output (PIQ)" (depending on the 3RW5 communication module). You will find more information on the process images and data tables in the manual for the 3RW5 communication module in question.
 - SIRIUS Soft Starter ES (TIA Portal) (depending on the 3RW5 communication module)

1.6 Device versions





Size 1

Size 2

Size 3

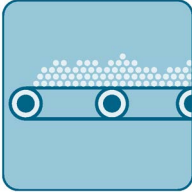
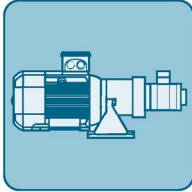


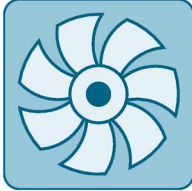
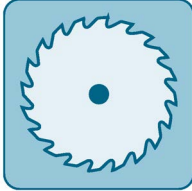
Size 4

I_e Rated operational current

P Rated power

The stated power ratings apply to a rated operational voltage of $U_e = 400$ V in a standard circuit.

1.7 Areas of application / load types

| | | |
|---|---|---|
|  |  |  |
| Conveyor belts | Pumps | Compressors |
|  |  |  |
| Agitators | Fans | Saws |

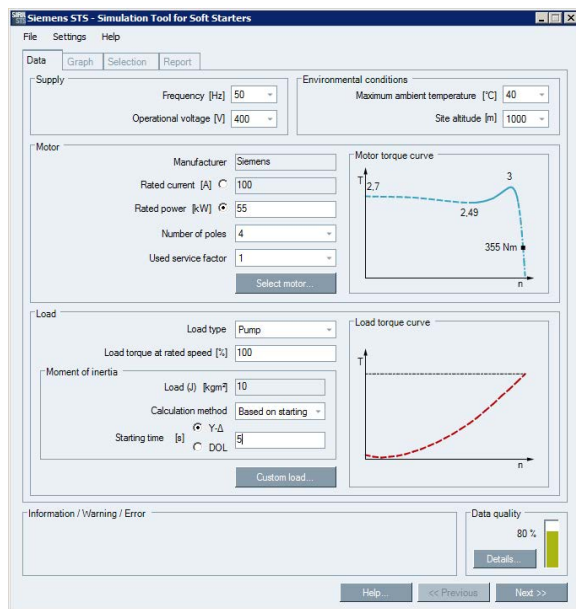
Starting of a motor causes a rapid change in the load current. The resulting torque impulses place severe stresses on the mechanical parts of a machine or plant. Moreover, voltage dips can occur in the power supply system which can have a negative influence on other devices:

- Flicker in lights
- Influence on computer systems
- Contactors and relays dropping out

The 3RW52 soft starter controls the voltage continuously. The torque and the current are thus also increased continuously. The power supply system is safeguarded against peak loads and the drive train is protected against damage:

- Smooth starting / stopping, e.g. for conveyor belts
- No pressure surges, e.g. for pumps
- Increased service life of the pipe system, e.g. for compressors
- Reduced starting current, e.g. for agitators
- Reduced stress on gearbox and V belt, e.g. for saws

1.8 Selection of the soft starter using the Simulation Tool for Soft Starters



The soft starter can be configured with the STS (Simulation Tool for Soft Starters) software. The STS suggests suitable soft starters for the respective application based on the entered motor and load data and application requirements, as well as providing information on the parameterization.

The Simulation Tool for Soft Starters (STS) can be downloaded from the Internet (<https://support.industry.siemens.com/cs/ww/en/view/101494917>).

1.9 Structure of the article number

| Digit of the article number | 1st-4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th |
|--|---|-----|-----|-----|------------------|-----|----------------|------|------|
| SIRIUS 3RW soft starter | 3RW5 | 2 | | | | | C | | |
| Size and rated operational current I_e of the soft starter | | | x* | x** | | | | | |
| Connection system | <ul style="list-style-type: none"> Applies to sizes 1 / 2 Main circuit: Screw terminals Control circuit: Screw terminals | | | | 1 | | | | |
| | <ul style="list-style-type: none"> Applies to sizes 3 / 4 Main circuit: Bus connection Control circuit: Spring-type terminals | | | | 2 | | | | |
| | <ul style="list-style-type: none"> Applies to sizes 1 / 2 Main circuit: Screw terminals Control circuit: Spring-type terminals | | | | 3 | | | | |
| | <ul style="list-style-type: none"> Applies to sizes 3 / 4 Main circuit: Bus connection Control circuit: Screw terminals | | | | 6 | | | | |
| Control terminals with | Analog output | | | | | A | | | |
| | Thermistor motor protection | | | | | T | | | |
| Rated control supply voltage U_s | | | | | 24 V AC / DC | | 0 | | |
| | | | | | 110 V - 250 V AC | | 1 | | |
| Rated operational voltage U_e | | | | | | | 200 - 480 V AC | | 4 |
| | | | | | | | 200 - 600 V AC | | 5 |

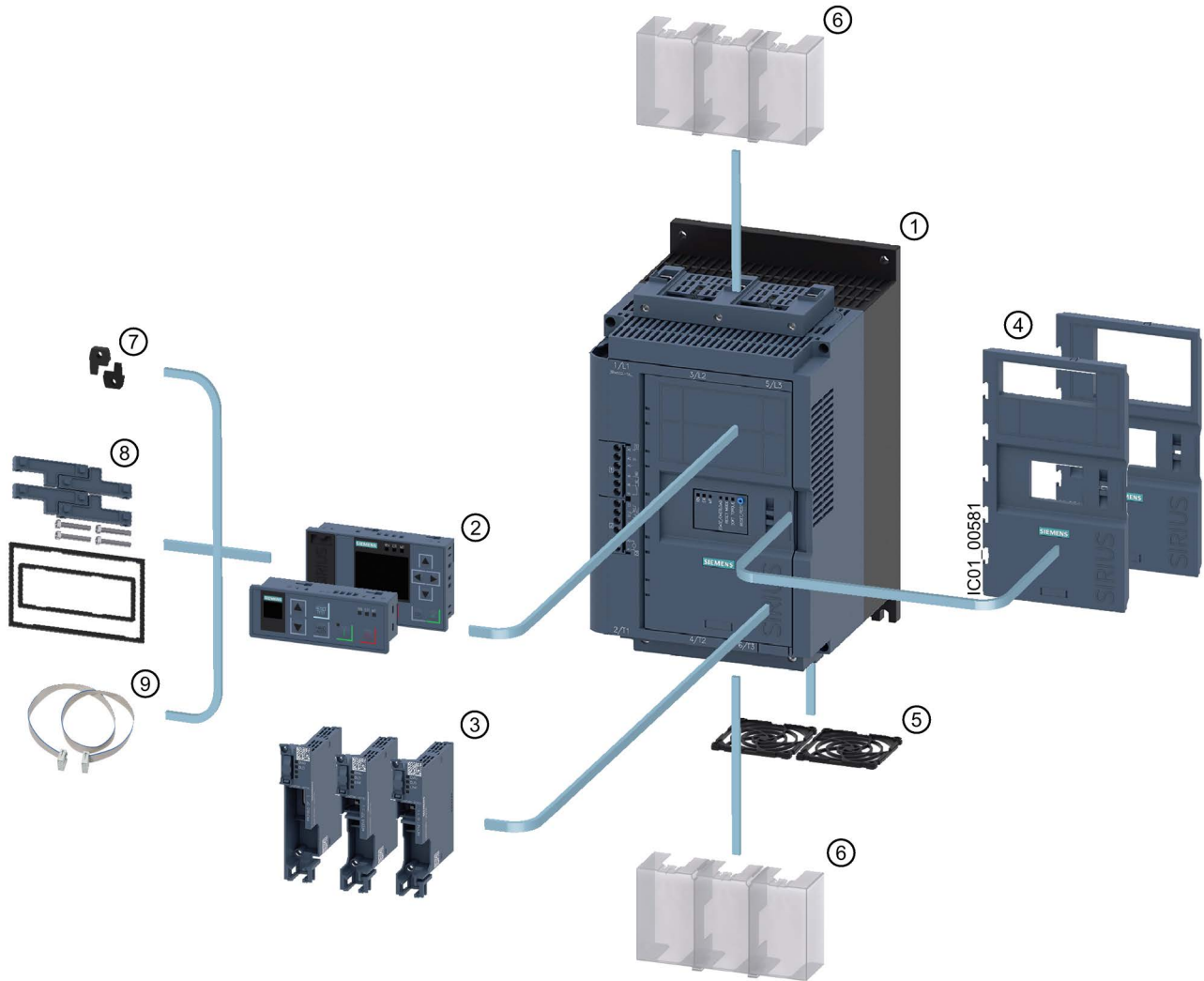
*see table below.

Table 1- 1 Size and rated operational current at $U_e = 400$ V and $TU = 40^\circ\text{C}$ and in a standard circuit

| | Rated operational current I_e of the soft starter | Rated operating power P_e of the soft starter | x^* | x^{**} |
|--------|---|---|-------|----------|
| Size 1 | $I_e = 13$ A | $P_e = 5.5$ kW | 1 | 3 |
| | $I_e = 18$ A | $P_e = 7.5$ kW | 1 | 4 |
| | $I_e = 25$ A | $P_e = 11$ kW | 1 | 5 |
| | $I_e = 32$ A | $P_e = 15$ kW | 1 | 6 |
| | $I_e = 38$ A | $P_e = 18.5$ kW | 1 | 7 |
| Size 2 | $I_e = 47$ A | $P_e = 22$ kW | 2 | 4 |
| | $I_e = 63$ A | $P_e = 30$ kW | 2 | 5 |
| | $I_e = 77$ A | $P_e = 37$ kW | 2 | 6 |
| | $I_e = 93$ A | $P_e = 45$ kW | 2 | 7 |
| Size 3 | $I_e = 113$ A | $P_e = 55$ kW | 3 | 4 |
| | $I_e = 143$ A | $P_e = 75$ kW | 3 | 5 |
| | $I_e = 171$ A | $P_e = 90$ kW | 3 | 6 |
| Size 4 | $I_e = 210$ A | $P_e = 110$ kW | 4 | 3 |
| | $I_e = 250$ A | $P_e = 132$ kW | 4 | 4 |
| | $I_e = 315$ A | $P_e = 160$ kW | 4 | 5 |
| | $I_e = 370$ A | $P_e = 200$ kW | 4 | 6 |
| | $I_e = 470$ A | $P_e = 250$ kW | 4 | 7 |
| | $I_e = 570$ A | $P_e = 315$ kW | 4 | 8 |

1.10 Accessories

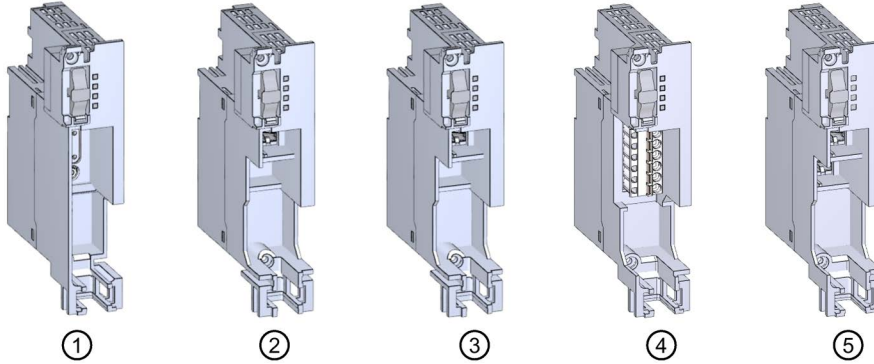
1.10.1 Accessories for 3RW52 soft starter



- ① 3RW52 soft starter
- ② 3RW5 HMI modules
 - 3RW5 HMI Standard (3RW5980-0HS00)
 - 3RW5 HMI High Feature (3RW5980-0HF00)
- ③ 3RW5 communication modules
 - PROFIBUS (3RW5980-0CP00)
 - PROFINET Standard (3RW5980-0CS00)
 - Modbus TCP (3RW5980-0CT00)
- ④ Hinged cover
 - Hinged cover with cutout for 3RW5 HMI Standard (3RW5950-0GL40)
 - Hinged cover with cutout for 3RW5 HMI High Feature (3RW5950-0GL30)
- ⑤ Fan cover:
 - Sizes 1, 2 and 3 (3RW5983-0FC00)
 - Size 4 (3RW5984-0FC00)
- ⑥ Terminal cover, top and bottom:
 - Sizes 2 and 3 (3RW5983-0TC20)
 - Size 4 (3RW5984-0TC20)
- ⑦ Push-in lugs for wall mounting (3ZY1311-0AA00)
- ⑧ IP65 door mounting kit (3RW5980-0HD00)
- ⑨ HMI connecting cable:
 - 0.1 m (3UF7931-0AA00-0)
 - 0.5 m (3UF7932-0BA00-0)
 - 1 m (3UF7937-0BA00-0)
 - 2.5 m (3UF7933-0BA00-0)
 - 5 m (3RW5980-0HC60)

1.10.2 3RW5 communication module

The following 3RW5 communication modules are available for integration of the 3RW52 soft starters in fieldbus systems:



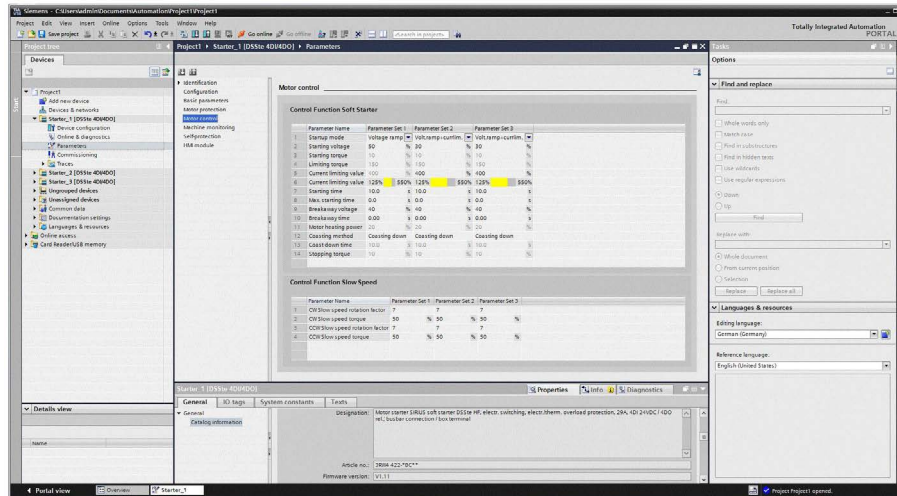
- ① 3RW5 PROFIBUS communication module
- ② 3RW5 PROFINET Standard communication module
- ③ 3RW5 Modbus TCP communication module
- ④ 3RW5 Modbus RTU communication module
- ⑤ 3RW5 Ethernet IP communication module

Integration into the automation software

The 3RW52 soft starter can be integrated in an automation software, e.g. STEP 7 (TIA Portal) via GSD / GSDML or HSP.

You will find further information on operation of the 3RW5 communication module in the equipment manual for the 3RW5 communication module in question.

1.10.3 SIRIUS Soft Starter ES (TIA Portal)



SIRIUS Soft Starter ES (TIA Portal) is the central software for configuring, commissioning, operation, and diagnostics of 3RW5 soft starters.

You connect your PC / programming device to the soft starter via the local interface on the optional 3RW5 HMI High Feature.

By displaying all operating data, service data and diagnostics data, SIRIUS Soft Starter ES supplies reliable information, helping to avoid faults, or quickly locating and eliminating them if they occur.

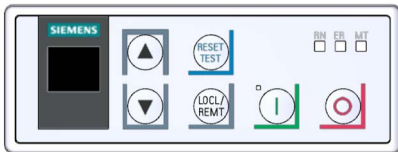
With the premium license, soft starters can also be parameterized and diagnosed from a central location via PROFIBUS DP or PROFINET on the optional communication module.

SIRIUS Soft Starter ES (TIA Portal) can be downloaded from the Internet (<https://support.industry.siemens.com/cs/ww/en/ps/24231/dl>).

1.10.4 3RW5 HMI

3RW5 HMI Standard

The 3RW5 HMI Standard can be used to monitor and control (motor ON / OFF) the 3RW52 soft starter and acknowledge faults. The 3RW5 HMI Standard can either be installed in the 3RW52 soft starter or in the control cabinet door (using accessories) or mounted on a wall (using accessories). It features an LCD with red display illumination and LEDs for status display, as well as function and control keys.

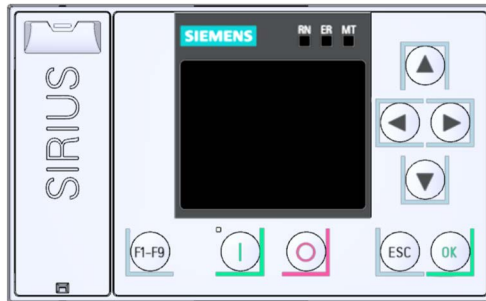


Functions

- Any changes of setting elements will be indicated immediately in the display.
- Error diagnostics are output as error numbers (Faults and remedial actions of the 3RW52 soft starter (Page 134)).
- Acknowledgment of faults and execution of user tests via the RESET / TEST key
- Starting and stopping the motor via control keys
- Mode change with the LOCAL / REMOTE key.
- Setting the PROFIBUS station address.
- Display of the device LEDs of the 3RW5 HMI Standard shows the messages of the following devices:
 - 3RW52 soft starter
 - 3RW5 HMI Standard
 - Communication module (if there is one)

3RW5 HMI High Feature (HF)

The 3RW5 HMI High Feature can be used to parameterize, monitor and control (motor ON / OFF) the 3RW52 soft starter. The HMI High Feature module can either be installed in the 3RW52 soft starter or in the control cabinet door (using accessories) or mounted on a wall (using accessories). It can be connected to the SIRIUS Soft Starter ES software (TIA Portal) via the local interface. It has a TFT color display, LEDs for displaying the system status as well as function and control keys.



Functions

- Editable Favorites key F1 - F9
- Language selection
- Starting and stopping the motor via control keys
- Local interface
- Display of error diagnoses as plain-text messages
- Display of up to 5 measured values at the same time
- Analog output and ON / RUN relay output can be parameterized with the 3RW5 HMI High Feature.
- Setting communication parameters of 3RW5 communication modules:
 - PROFINET (device names and the IP parameters)
 - PROFIBUS (station address)
 - Modbus TCP (IP parameters)
 - Modbus RTU (server address)
 - Ethernet IP (IP parameters)
- Backup of parameterization data

1.10 Accessories

- Display of the device LEDs of the 3RW5 HMI High Feature shows the messages of the following devices:
 - 3RW52 soft starter
 - 3RW5 HMI High Feature
 - Communication module (if there is one)
- Firmware update can be performed using the High Feature 3RW5 HMI and a memory card for the following devices (Performing firmware update with micro SD card (3RW5 HMI High Feature) (Page 150)):
 - 3RW52 soft starter
 - 3RW5 HMI High Feature
 - Communication module

1.11 Additional documentation

Manuals / online help

At this point, you will find further manuals and online help that may be of interest to you for your automation system. They are available to download from the Internet free of charge. You can create your own individual system documentation in mySupport.

- 3RW5 topic page (<https://support.industry.siemens.com/cs/ww/en/view/109747404>)
- Equipment Manual for the 3RW52 soft starter (<https://support.industry.siemens.com/cs/ww/en/view/109753751>)
- Equipment Manual for the 3RW55 soft starter (<https://support.industry.siemens.com/cs/ww/en/view/109753752>)
- Equipment Manuals for the 3RW5 soft starter (<https://support.industry.siemens.com/cs/ww/en/ps/16212/man>)
- Equipment Manual for the 3RW5 PROFINET communication modules (<https://support.industry.siemens.com/cs/ww/en/view/109753754>)
- Equipment Manual for the 3RW5 PROFIBUS communication module (<https://support.industry.siemens.com/cs/ww/en/view/109753753>)
- Equipment Manual for the 3RW5 Modbus communication modules (<https://support.industry.siemens.com/cs/ww/en/view/109753755>)
- Equipment Manual for the 3RW5 Ethernet IP communication module (<https://support.industry.siemens.com/cs/ww/en/view/109758201>)
- Online help for SIRIUS Soft Starter ES (TIA Portal)
- Online help for STEP 7
- The EMC Directive 2014/30/EU in practice (<http://www.siemens.com/emc-guideline>)
- Industrial Control Panels and Electronic Equipment of Industrial Machinery for North America (<http://www.siemens.com/UL508A>)
- Control Panels compliant with IEC Standards and European Directives (<http://www.siemens.com/iec60204>)

Interesting links

- FAQs for soft starters 3RW5
(<https://support.industry.siemens.com/cs/ww/en/ps/16212/faq>)
- Downloads for soft starters 3RW5
(<https://support.industry.siemens.com/cs/ww/en/ps/16212/dl>)
- Manuals in Siemens Industry Online Support
(<https://support.industry.siemens.com/cs/ww/en/ps/man>)
- Product support for STEP 7 (TIA Portal)
(<https://support.industry.siemens.com/cs/ww/en/ps/14672>)
- Further information on PROFINET
(<https://www.siemens.com/global/en/home/products/automation/industrial-communication/profinet.html>)
- SIMATIC Modbus/TCP - The easy way to interface SIMATIC controllers to multi-vendor systems (<http://w3.siemens.com/mcms/human-machine-interface/en/customized-products/customized-software/Pages/default.aspx?tabcardname=simatic%20modbus/tcp>)
- Premium Efficiency - Efficiency class IE3
(<http://w3.siemens.com/mcms/topics/en/application-consulting/ie3ready/Pages/Default.aspx>)

1.12 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database quickly and simply. To accompany our products and systems, we offer a wealth of information and services that provide support in every phase of the lifecycle of your machine or plant – from planning and implementation and commissioning, right through to maintenance and modernization:

- Product support
- Application examples
- Services
- Forum
- mySupport

Link: Siemens Industry Online Support (<https://support.industry.siemens.com/cs/de/en>)

Product support

Here you will find all the information and comprehensive know-how for your product:

- **FAQs**
Our replies to frequently asked questions.
- **Manuals/operating instructions**
Read online or download, available as PDF or individually configurable.
- **Certificates**
Clearly sorted according to approving authority, type and country.
- **Characteristics**
For support in planning and configuring your system.
- **Product announcements**
The latest information and news concerning our products.
- **Downloads**
Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
Technical product data for support in planning and implementing your project.

Link: Product support (<https://support.industry.siemens.com/cs/ww/en/ps>)

mySupport

With "mySupport", your personal work area, you get the very best out of your Industry Online Support experience. Everything enables you to find the right information - every time.

The following functions are now available:

- **Personal Messages**

Your personal mailbox for exchanging information and managing your contacts

- **Requests**

Use our online form for specific solution suggestions, or send your technical inquiry directly to a specialist in Technical Support

- **Notifications**

Make sure you always have the latest information - individually tailored to your needs

- **Filter**

Simple management and re-use of your filter settings from Product Support and the Technical Forum

- **Favorites / Tagging**

Create your own knowledge database by assigning "Favorites" and "Tags" to documents – simply and efficiently

- **Entries last viewed**

Clear presentation of your last viewed entries

- **Documentation**

Configure your individual documentation from different manuals – quickly and without complications

- **Personal data**

Change personal data and contact information here

- **CAX data**

Simple access to thousands of items of CAX data such as 3D models, 2D dimension drawings, EPLAN macros, and much more

1.13 Support Request

Using the Support Request form in Online Support you can send your query directly to our Technical Assistance. After describing your query in a few guided steps, you will immediately be provided with possible suggestions for solving the problem.

| | |
|-------------------------|--|
| Support Request: | Internet (https://support.industry.siemens.com/My/ww/en/requests) |
|-------------------------|--|

1.14 Siemens Industry Online Support app

Siemens Industry Online Support app

You can use the Siemens Industry Online Support app to access all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, including operating instructions, manuals, datasheets, FAQs etc.

The Siemens Industry Online Support app is available for iOS, Android or Windows Phone devices. You can download the app from the following links:



Link for Android



Link for iOS



Link for Windows Phone

Description

1.14 Siemens Industry Online Support app

Safety information

2.1 ESD Guidelines

ESD

All electronic devices are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The acronym ESD has become the established designation for such electrostatic sensitive components/devices. This is also the international abbreviation for such devices.

ESD devices are identified by the following symbol:



NOTICE

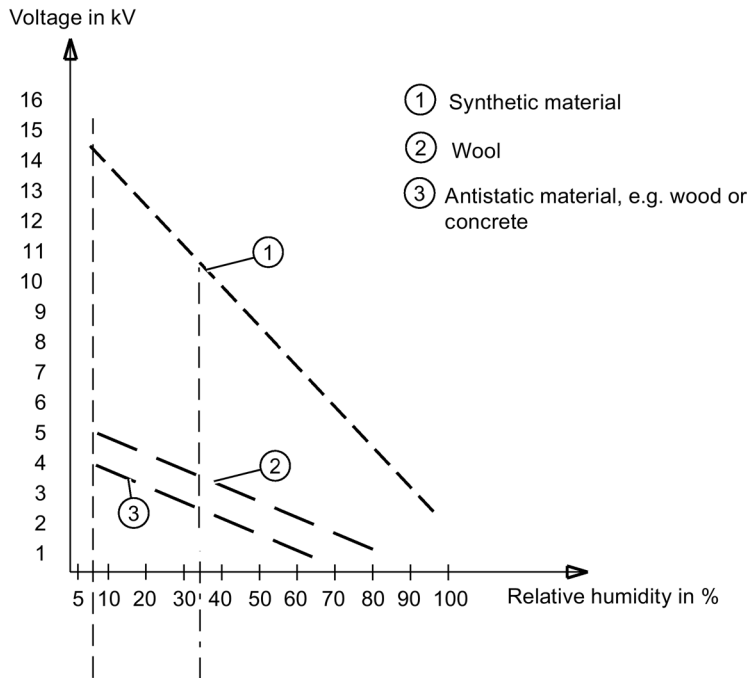
Electrostatic discharge

ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The damage caused to a device by overvoltage is usually not immediately evident and is only noticed after an extended period of operation.

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The diagram below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials specified in the diagram. These values correspond to IEC 801-2 specifications.



Basic protective measures against electrostatic discharge

- Make sure the grounding is good:

When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. In this way, you can avoid becoming electrostatically charged.

- Avoid direct contact:

As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the devices without touching any chip pins or PCB traces. In this way, the discharged energy cannot reach or damage sensitive devices.

Discharge your body before taking any necessary measurements on a device. Do so by touching grounded metallic parts. Use only grounded measuring instruments.

2.2 Reactive power compensation

Capacitors for improving the power factor (reactive power compensation)

Capacitors may not be connected to the output terminals of the 3RW52 soft starter. Connecting capacitors to the output terminals will damage the 3RW52 soft starter.

Active filters, e.g. for reactive power compensation, must not be operated parallel to the motor control device.

If capacitors are to be used to correct the power factor (actively or passively), they must be connected on the line side of the device. They must not actively control the power factor during the starting and coasting down phases. If a contactor disconnect or main contactor are used together with the electronic 3RW52 soft starter, the capacitors must be disconnected from the 3RW52 soft starter when the contactor is open.

2.3 Electromagnetic compatibility (EMC) according to IEC 60947-4-1

This product is designed for Environment A. It may produce radio interference in domestic environments, in which case the user may be required to take adequate mitigation measures.

2.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

<https://www.siemens.com/industrialsecurity>

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

<https://www.siemens.com/industrialsecurity>.

2.5 Recycling and disposal

For environmentally friendly recycling and disposal of your old device, please contact a company certified for the disposal of electronic waste and dispose of the device in accordance with the regulations in your country.

Mounting and dismantling

3.1 Installing the 3RW52 soft starter

Procedure

1. Mount the 3RW52 soft starter on a level surface. (Page 40)
2. Ensure that the permissible temperature range and the necessary distances are complied with.
Technical data in Siemens Industry Online Support (Page 155)
3. Optionally mount the fan cover. (Page 38)
4. Optionally install the Standard or High Feature 3RW5 HMI.
 - Installing the Standard 3RW5 HMI in 3RW52 soft starter (Page 42).
 - Installing the High Feature 3RW5 HMI in the 3RW52 soft starter (Page 44).
 - Installing the Standard 3RW5 HMI into the control cabinet door (Page 46).
 - Installing the High Feature 3RW5 HMI in the control cabinet door (Page 49).
 - Installing the Standard 3RW5 HMI on a flat surface (Page 53).
 - Installing the High Feature 3RW5 HMI on a flat surface (Page 55).
5. Optionally install the 3RW5 communication module.
You will find more details in the equipment manual for the 3RW5 communication module in question.

Result

The 3RW52 soft starter is installed and ready for connection.

3.2 Mounting the fan cover

Requirements

- Screwdriver T20
- Fan cover that matches the size

| Size | Article number of the soft starter | Article number of the fan cover | Number of required fan covers |
|--------|------------------------------------|---------------------------------|-------------------------------|
| Size 1 | 3RW521.-..... | 3RW5983-0FC00 | 1 ¹⁾ |
| Size 2 | 3RW522.-..... | | 2 ¹⁾ |
| Size 3 | 3RW523.-..... | | 2 |
| Size 4 | 3RW524.-..... | 3RW5984-0FC00 | 1 |

1) See note.

Note

Soft starters without fan.

The following soft starters do not require a fan cover:

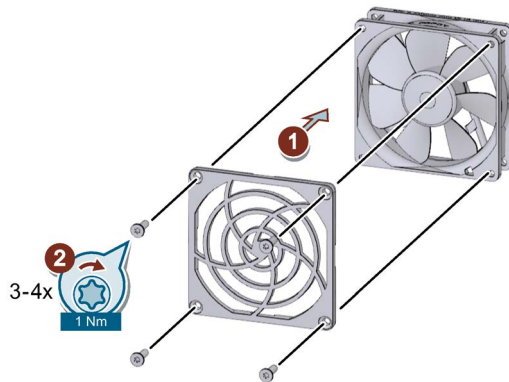
- 3RW5213-.....
 - 3RW5214-.....
 - 3RW5215-.....
 - 3RW5224-.....
 - 3RW5225-.....
-

Procedure

NOTICE

Material damage due to mechanical load.

Avoid a mechanical load on the fan hub when mounting the fan cover.



- Place the fan cover on the fan ① and fasten the fan cover ②.
 - Size 1: You require 1 fan cover and 4 screws.
 - Sizes 2 and 3: You require 2 fan covers and 3 screws for each fan cover.
 - Size 4: You require 1 fan cover and 4 screws.

Result

The fan cover provides enhanced touch protection and prevents the fan from being blocked by foreign objects.

3.3 Mounting the 3RW52 soft starter on a level surface

Requirements

- Note the mounting positions, minimum clearances and ambient conditions stated on the data sheet.
 - Level surface, e.g. sufficiently strong mounting plate
 - 4 correctly implemented bore holes
 - 4 screws of suitable size and with regular thread for insertion into the selected mounting plate or wall
- Use an additional 4 washers if the head of the screw is smaller than the specified diameter.
- Screwdriver (depending on the drive of the screws)

Note

If necessary, use shims and snap rings.

| Size | Article number | Screws | Tightening torque |
|--------|----------------|--------|-------------------|
| Size 1 | 3RW521.-..... | M6 | 5 Nm |
| Size 2 | 3RW522.-..... | | |
| Size 3 | 3RW523.-..... | | |
| Size 4 | 3RW524.-..... | M8 | 8 Nm |

Procedure

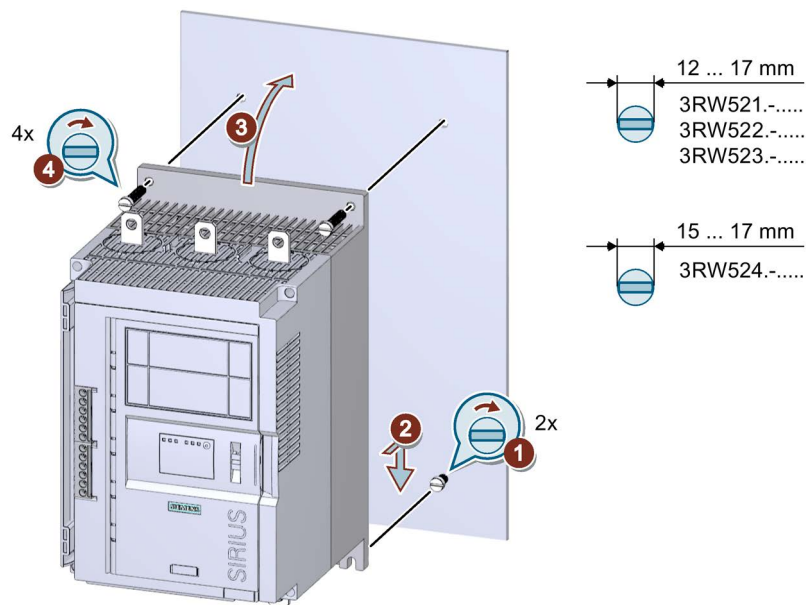
! CAUTION

Heavy device.

Device can cause injury if it is dropped.

Always ask a second person to help you transport, install and dismantle a heavy device.

Use suitable lifting equipment and wear personnel protective equipment.



- Screw the lower 2 screws into the mounting plate ①. Ensure that both screws of min. 1.5 cm (min. 2 cm for size 4) are protruding and then place the 3RW52 soft starter onto the 2 lowermost screws ② from above.
- Tilt the 3RW52 soft starter up so that it is resting level against the mounting plate ③ and tighten all 4 screws ④.

3.4 Installing / mounting / removing 3RW5 HMI

3.4.1 Installing the Standard 3RW5 HMI in 3RW52 soft starter

Requirements

- 3RW5 HMI Standard (accessories)
- HMI connecting cable, 0.1 m (accessory)
- Hinged cover for 3RW52 with cutout for 3RW5 HMI Standard (accessory) or Cut out the hinged cover for 3RW5 HMI (Page 57)

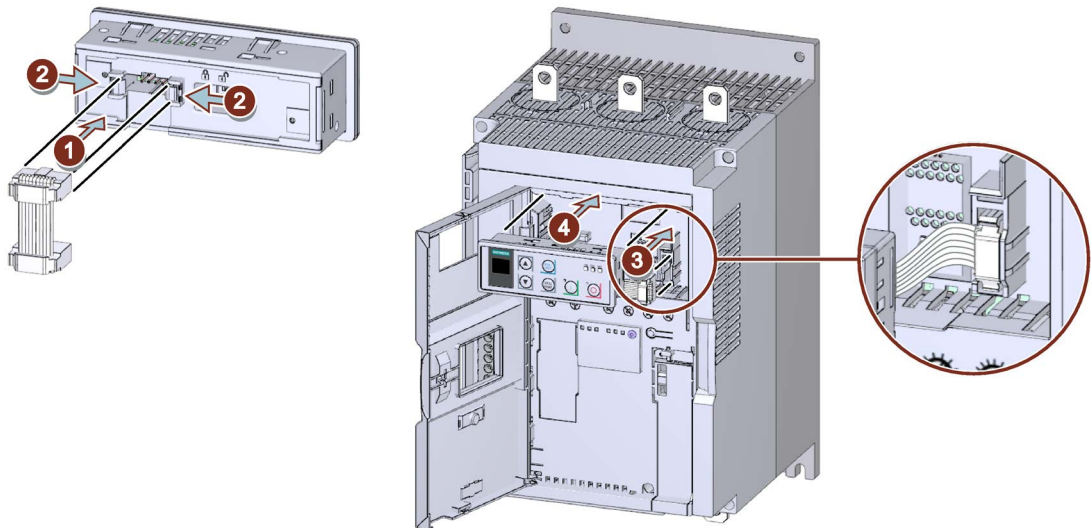
Procedure



NOTICE

Material damage caused by electrostatic charge.

ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having discharged your own body. The electrostatic discharge current may result in latent failure of a module, that is, this damage may not be apparent immediately, but may cause malfunction after a lengthy period of operation.



Note**Locking switch**

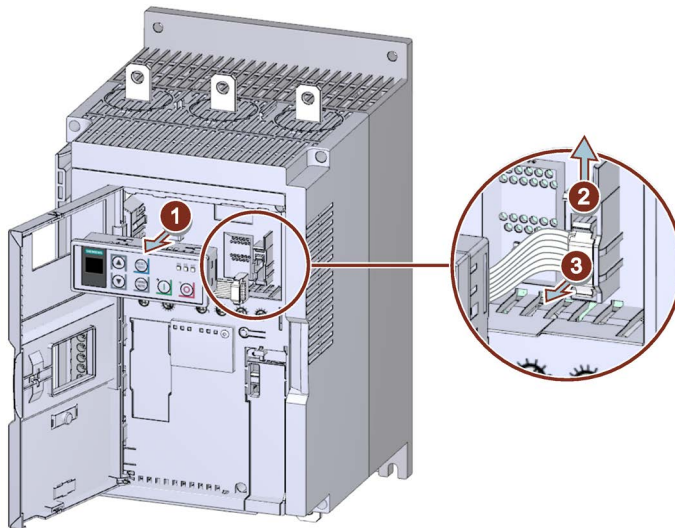
Make sure that the locking switch on the rear of the 3RW5 HMI Standard is in the required position.

For more information, see Chapter Standard 3RW5 HMI (Page 105).

- Observe the coding of the plug and socket ① + ③.
- Lock the connector in the socket ②.
- Observe the cable routing:
 - ① Cable routing to the bottom
 - ③ Cable routing to the left
- Replace the hinged cover of the 3RW52 soft starter as required. (Page 58)

3.4.2 Removing Standard 3RW5 HMI

Procedure



- Pull the 3RW5 HMI Standard far enough out of the 3RW52 soft starter ① to gain access to the HMI connecting cable.
- Unfasten the retaining elements of the HMI connecting cable ② and pull the HMI connecting cable out of the 3RW52 soft starter ③.

3.4.3 Installing the High Feature 3RW5 HMI in the 3RW52 soft starter

Requirements

- 3RW5 HMI High Feature (accessory)
- HMI connecting cable, 0.1 m (accessory)
- Hinged cover for 3RW52 with cutout for 3RW5 HMI High Feature (accessory) or Cut out the hinged cover for 3RW5 HMI (Page 57)

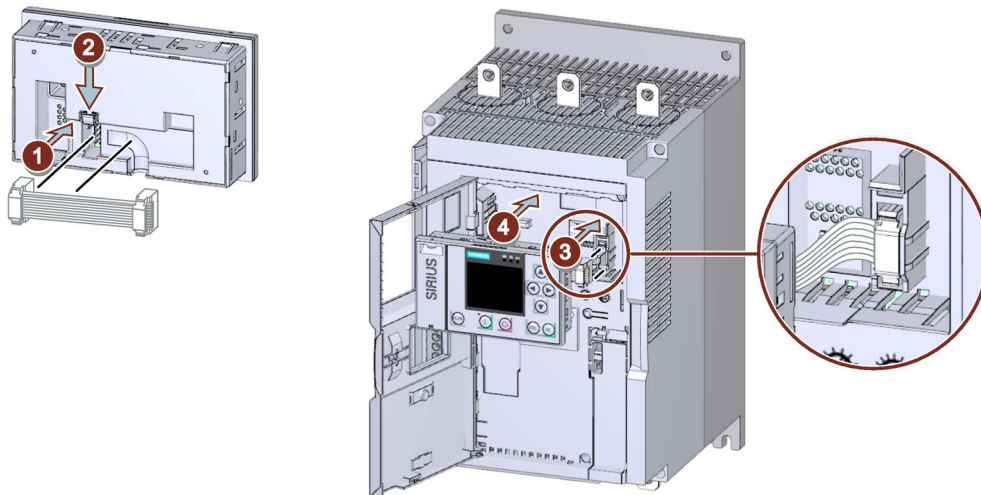
Procedure



NOTICE

Material damage caused by electrostatic charge.

ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having discharged your own body. The electrostatic discharge current may result in latent failure of a module, that is, this damage may not be apparent immediately, but may cause malfunction after a lengthy period of operation.



- Observe the coding of the plug and socket ① + ③.
- Lock the connector in the socket ②.
- Observe the cable routing:
 - ① Cable routing to the right
 - ③ Cable routing to the left
- Replace the hinged cover of the 3RW52 soft starter as required. (Page 58)

3.4.4 Removing the High Feature 3RW5 HMI

Requirements

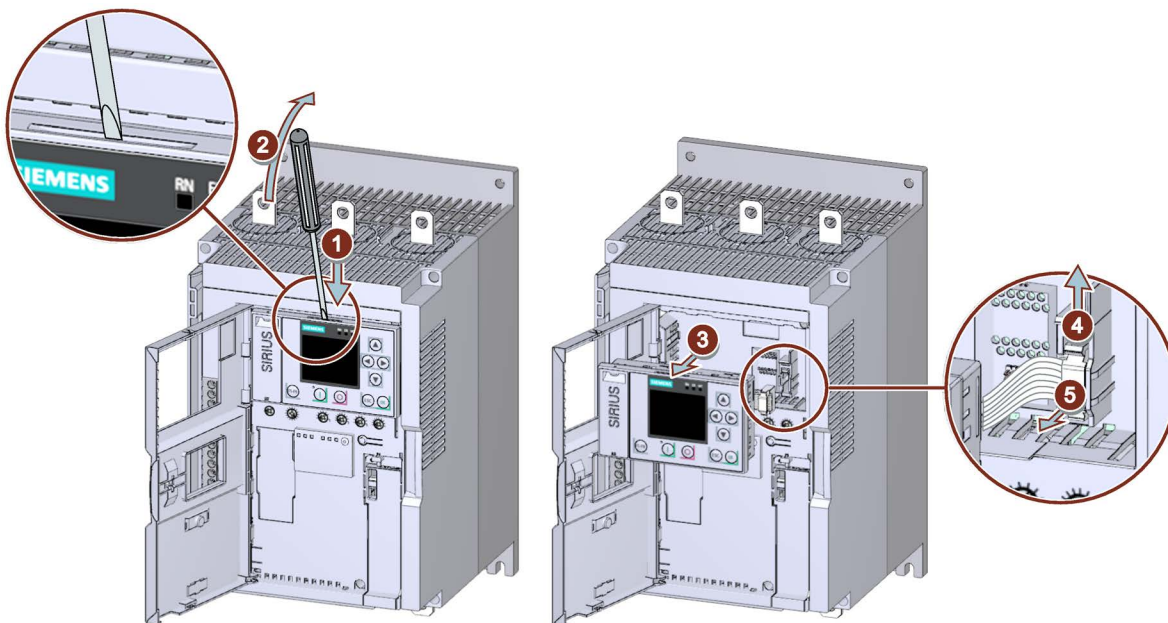
- Cross-tip screwdriver

Procedure

NOTICE

Damage to sealing surfaces.

Make sure that the sealing surfaces are not damaged by the screwdriver.



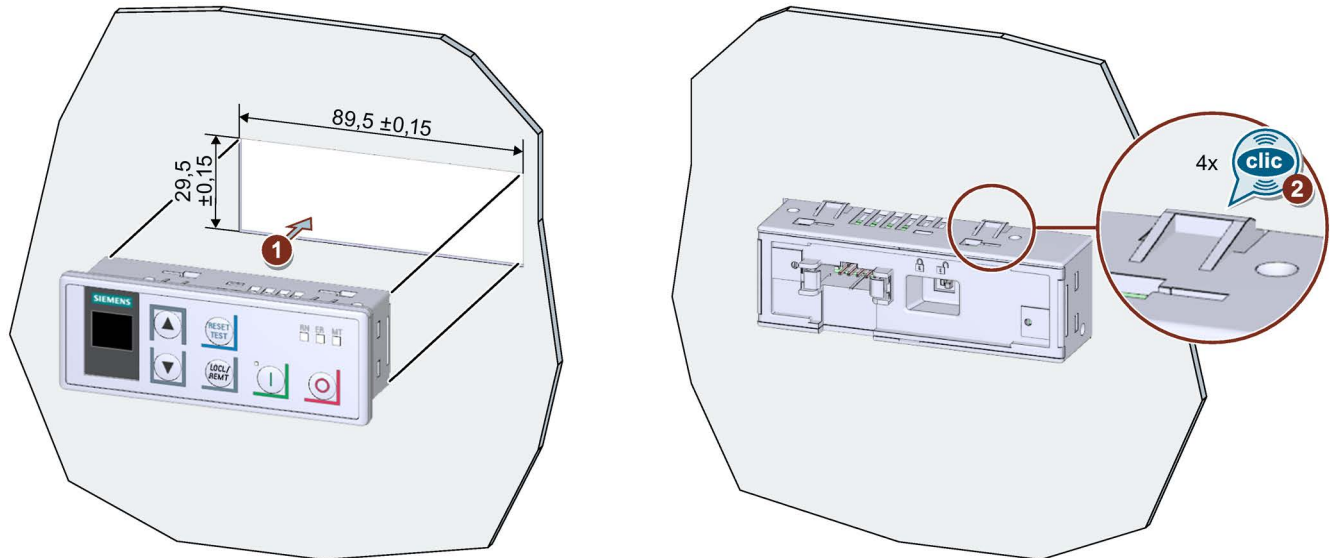
- Release the 3RW5 HMI High Feature using a flat-bladed screwdriver in the groove provided ① + ②.
- Pull the 3RW5 HMI High Feature far enough out of the 3RW52 soft starter ③ to gain access to the HMI connecting cable.
- Unfasten the retaining elements of the HMI connecting cable ④ and pull the HMI connecting cable out of the 3RW52 soft starter ⑤.

3.4.5 Installing the Standard 3RW5 HMI into the control cabinet door

Requirements

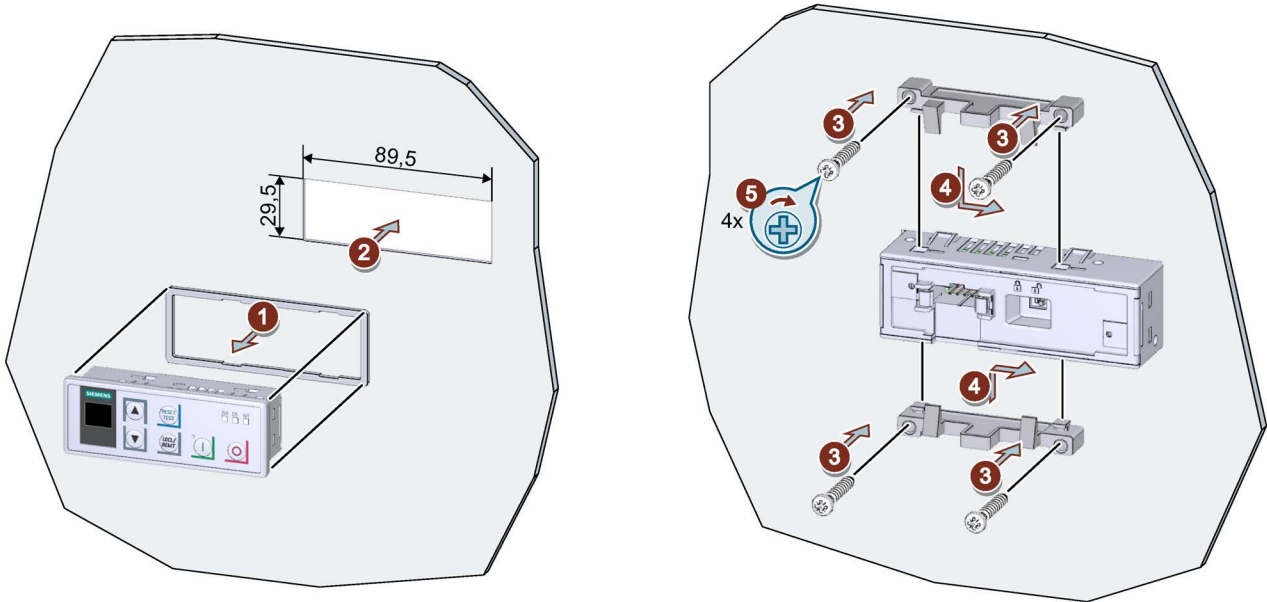
- Note the mounting positions, minimum clearances and ambient conditions stated on the data sheet.
- 3RW5 HMI Standard (accessories)
- An HMI connecting cable (accessory) of suitable length
- Cutout of suitable size in the control cabinet door
- PZ2 screwdriver in installation with door mounting kit IP65
- Device depth of the Standard 3RW5 HMI:
 - Total depth: 32 mm
 - Embedded depth: 29 mm
- Permissible wall thickness of the cabinet door:
 - Without IP65 door mounting kit: 1.5 to 3.0 mm
 - With IP65 door mounting kit: 1.0 to 7.0 mm
- Optional accessories:
 - IP65 door mounting kit

Procedure without door mounting kit IP65



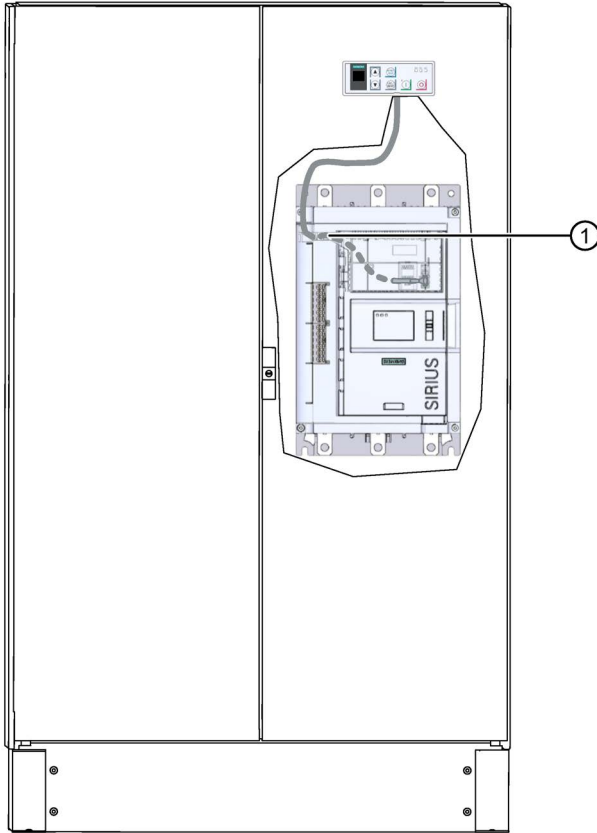
Place the 3RW5 HMI Standard in the cutout of the control cabinet door ①. Ensure that the 3RW5 HMI Standard engages audibly in the 4 fixtures ②.

Procedure with door mounting kit IP65



- Remove the protective film from the adhesive tape on the seal and secure the seal on the rear side of the 3RW5 HMI Standard ①.
Ensure that the seal does not overlap.
- Place the 3RW5 HMI Standard in the cutout of the control cabinet door ②.
- Continue to screw the screws into the fixing brackets ③ until they protrude approx. 10 mm at the front. Fasten the fixing brackets onto the 3RW5 HMI Standard ④.
- Tighten the 3RW5 HMI Standard with a tightening torque of 0.3 ... 0.35 Nm ⑤.
Ensure that all of the screw heads are in contact with the fixing bracket.
Ensure that the fixing brackets with marking "001" are used.

Procedure for installing the cable



- Connect the connecting cable of the 3RW5 HMI Standard to the 3RW52 soft starter. Pay attention to the coding of the plug and socket.
- Use the opening to the cable duct ① to install the cable in the 3RW52 soft starter.
- It is possible to route the cable up or down in the cable duct.

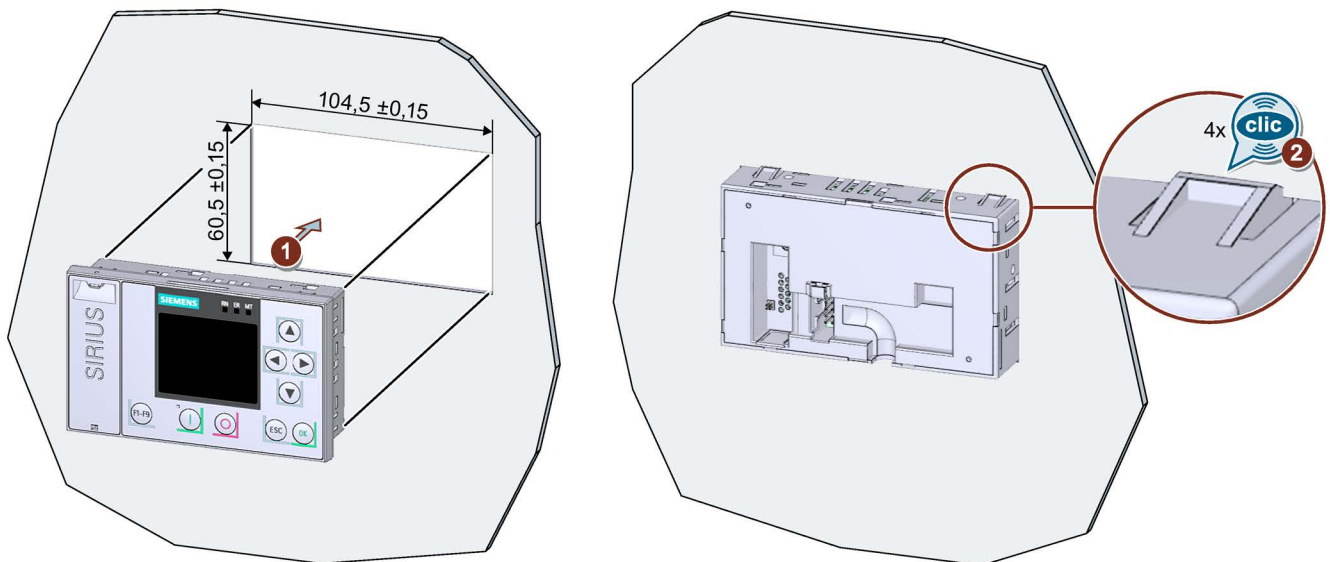
Make sure that you install the cable in accordance with EMC requirements. For example, route data cables separately from the motor cable. Connect both sides of shielded cables over a large surface area.

3.4.6 Installing the High Feature 3RW5 HMI in the control cabinet door

Requirements

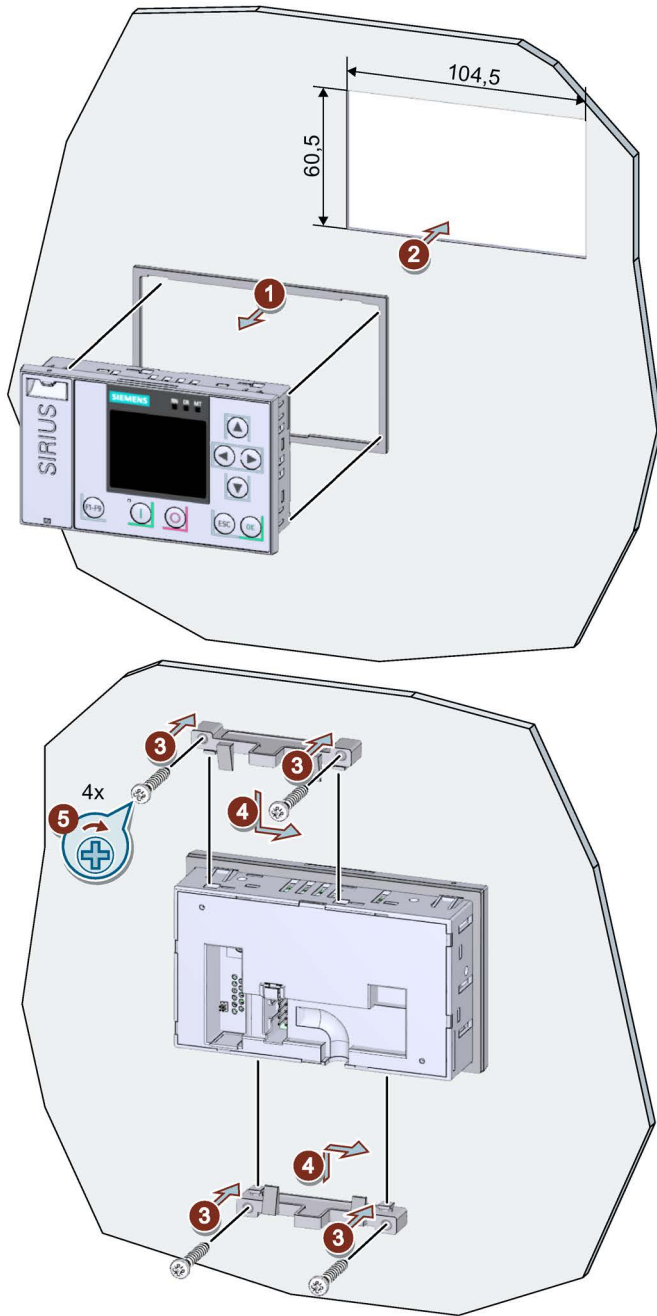
- Note the mounting positions, minimum clearances and ambient conditions stated on the data sheet.
- 3RW5 HMI High Feature (accessories)
- An HMI connecting cable (accessory) of suitable length
- Cutout of suitable size in the control cabinet door
- PZ2 screwdriver in installation with door mounting kit IP65
- Device depth of the High Feature 3RW5 HMI:
 - Total depth: 32 mm
 - Embedded depth: 26 mm
- Permissible wall thickness of the cabinet door:
 - Without IP65 door mounting kit: 1.5 to 3.0 mm
 - With IP65 door mounting kit: 1.0 to 7.0 mm
- Optional accessories:
 - IP65 door mounting kit

Procedure without door mounting kit IP65



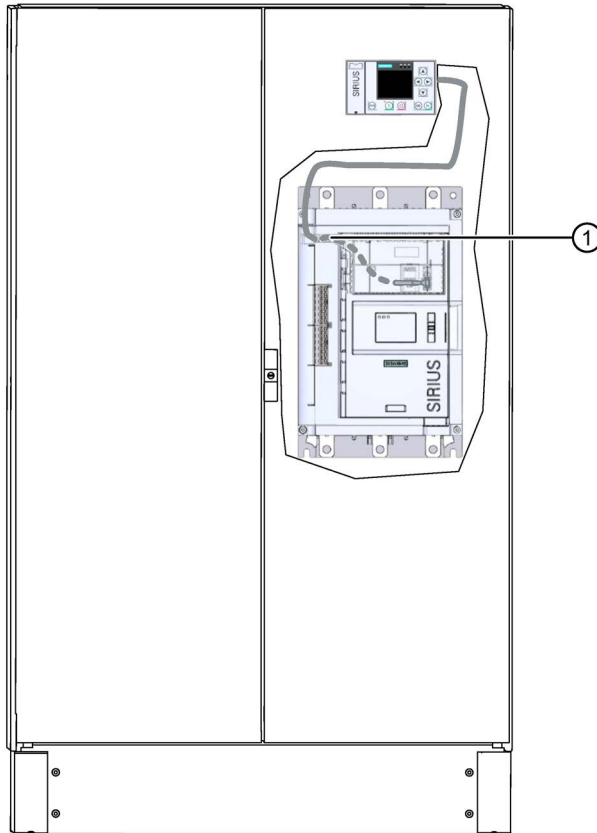
Place the 3RW5 HMI High Feature in the cutout of the control cabinet door ①. Ensure that the 3RW5 HMI High Feature engages audibly in the 4 fixtures ②.

Procedure with door mounting kit IP65



- Remove the protective film from the adhesive tape on the seal and secure the seal on the rear side of the 3RW5 HMI High Feature ①.
Ensure that the seal does not overlap.
- Place the 3RW5 HMI High Feature in the cutout of the control cabinet door ②.
- Continue to screw the screws into the fixing brackets ③ until they protrude approx. 8 mm at the front. Fasten the fixing brackets onto the 3RW5 HMI High Feature ④.
- Tighten the 3RW5 HMI High Feature with a tightening torque of 0.3 ... 0.35 Nm ⑤.
Ensure that all of the screw heads are in contact with the fixing bracket.
Ensure that the fixing brackets with marking "002" are used.

Procedure for installing the cable



- Connect the connecting cable of the 3RW5 HMI High Feature to the 3RW52 soft starter. Pay attention to the coding of the plug and socket.
- Use the opening to the cable duct ① to install the cable in the 3RW52 soft starter.
- It is possible to route the cable up or down in the cable duct.

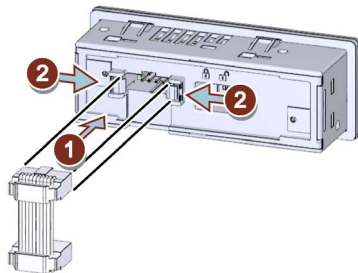
Make sure that you install the cable in accordance with EMC requirements. For example, route data cables separately from the motor cable. Connect both sides of shielded cables over a large surface area.

3.4.7 Installing the Standard 3RW5 HMI on a flat surface

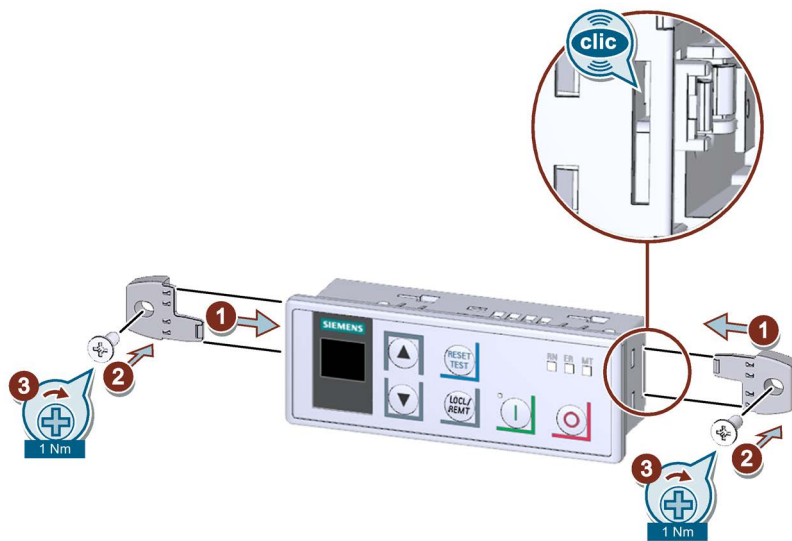
Requirements

- Note the mounting positions, minimum clearances and ambient conditions stated on the data sheet.
- 3RW5 HMI Standard (accessories)
- Level surface, e.g. sufficiently strong mounting plate
- 2 correctly implemented bore holes
- 2 cap screws M4 x 12 DIN ISO 7045 to fit the bore holes
- Screwdriver (depending on the drive of the screws)
- Push-in lugs for wall mounting (accessories)
- Connected HMI connecting cable of suitable length (accessories)

Procedure



- Observe the coding of the plug and socket ①.
- Lock the connector in the socket ②.
- Observe the cable routing in the cable duct
 - Cable routing to the bottom



Note

Locking switch.

Make sure that the locking switch on the rear of the 3RW5 HMI Standard is in the required position.

For more information, see Chapter Standard 3RW5 HMI (Page 105).

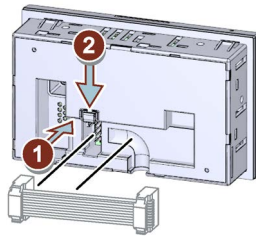
- Connect the connecting cable of the 3RW5 HMI Standard to the 3RW52 soft starter.
- Insert the push-in lugs into each side of the enclosure until you hear them engage ① and fix the 3RW5 HMI Standard on the wall ② + ③.

3.4.8 Installing the High Feature 3RW5 HMI on a flat surface

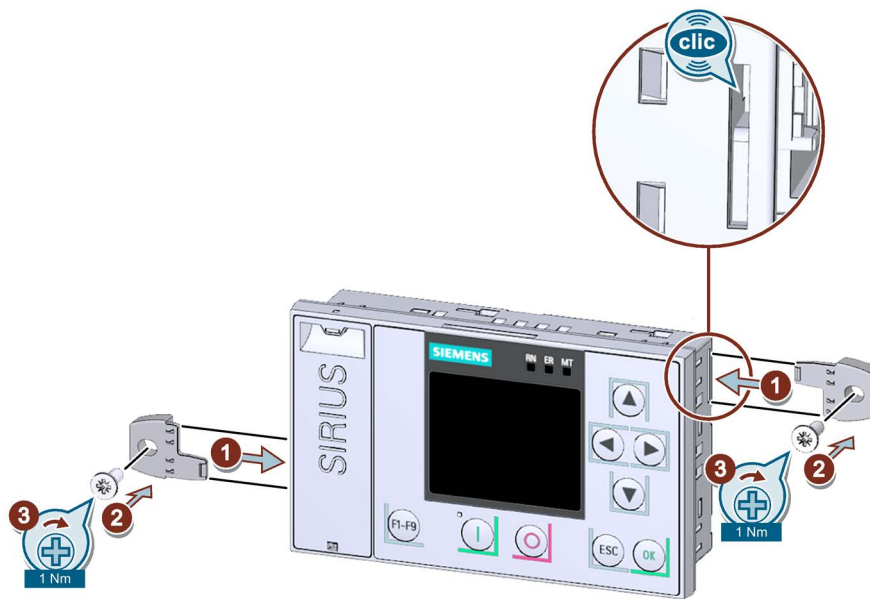
Requirements

- Note the mounting positions, minimum clearances and ambient conditions stated on the data sheet.
- 3RW5 HMI High Feature (accessories)
- Level surface, e.g. sufficiently strong mounting plate
- 2 correctly implemented bore holes
- 2 cap screws M4 x 12 DIN ISO 7045 to fit the bore holes
- Screwdriver (depending on the drive of the screws)
- Push-in lugs for wall mounting (accessories)
- Connected HMI connecting cable of suitable length (accessories)

Procedure



- Observe the coding of the plug and socket ①.
- Lock the connector in the socket ②.
- Observe the cable routing in the cable duct
 - Cable routing to the bottom



- Connect the connecting cable of the 3RW5 HMI High Feature to the 3RW52 soft starter. Pay attention to the coding of the plug and socket.
- Insert the push-in lugs into each side of the enclosure until you hear them engage ① and fix the 3RW5 HMI High Feature on the wall ② + ③.

3.4.9 Cut out the hinged cover for 3RW5 HMI

Requirements

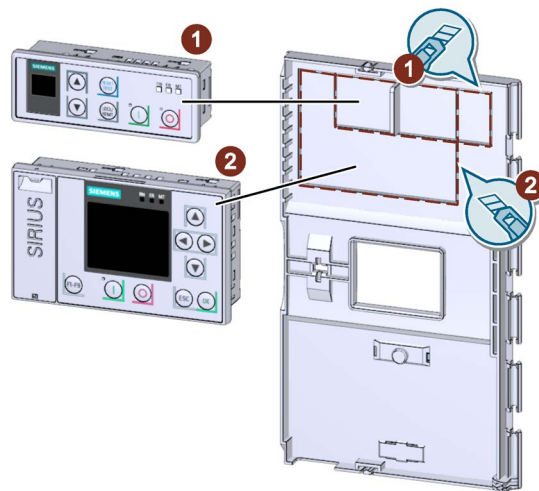
Note

Accessories.

Hinged covers with correctly sized cutout can be ordered as an accessory.

- Detached hinged cover without cutout
Replacing the hinged cover of the 3RW52 soft starter (Page 58)
- Solid, sharp knife

Procedure



- Make sure that you know which 3RW5 HMI you require the cutout for.
Cutout 1: 3RW5 HMI Standard
Cutout 2: 3RW5 HMI High Feature
- Cut out the required cutout along the perforated line on the rear of the hinged cover using a solid, sharp knife.
- Deburr the cut edges of the hinged cover.

3.4.10 Replacing the hinged cover of the 3RW52 soft starter

Requirements

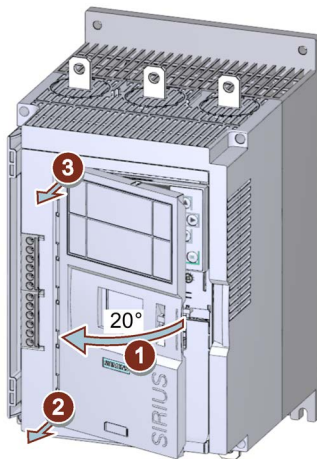
- Optional accessories:
 - Hinged cover with cutout for Standard 3RW5 HMI
 - Hinged cover with cutout for High Feature 3RW5 HMI

Procedure

NOTICE

Damage to the HMI display.

Ensure that the display of the HMI does not sustain damage when replacing the hinged cover.

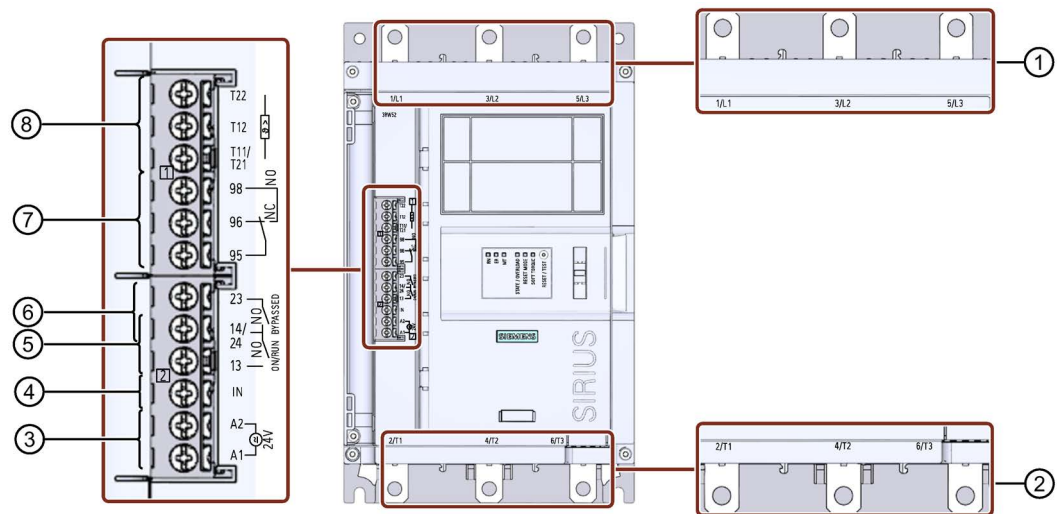


- Open the hinged cover ① at an angle of approx. 20°.
- Loosen the hinges vertical to the soft starter surface ② + ③ starting from the bottom.
- Take the cover off the 3RW52 soft starter.
- Follow the steps in reverse order to install the replacement hinged cover.

Wiring

4.1 Connections

4.1.1 Overview of all connections



- ① Main circuit connection network 1 / L1, 3 / L2, 5 / L3
- ② Main circuit connection load (motor) 2 / T1, 4 / T2, 6 / T3
- ③ A1 / A2: Supply voltage for control terminals
- ④ Input IN to switch the motor on and off
- ⑤ Output 13, 14: To signal operating state ON or RUN (parameterizable)
- ⑥ Output 23, 24: To signal operating state BYPASSED
- ⑦ Output 95, 96, and 98 to signal faults
- ⑧ Dependent on the 3RW52 soft starter variant:
 - Thermistor motor protection T11 / 21, T12, and T22: Connection of a temperature sensor (optional)
 - T11 / T21 - T22: Connection for Thermoclick
 - T11 / T21 - T12: Connection for PTC Type A
 - Analog output AQ-, AQ I+ and AQ U+: Connection of an evaluation unit to display the motor current (optional, average phase current in %)
 - AQ- / AQ U+: For evaluation units with output signal type **Voltage**:
Signal range 0 - 10 V
 - AQ- / AQ I+: For evaluation units with output signal type **Current**:
Signal range 4 - 20 mA (factory setting)

Note

Parameterizing output 13 / 14

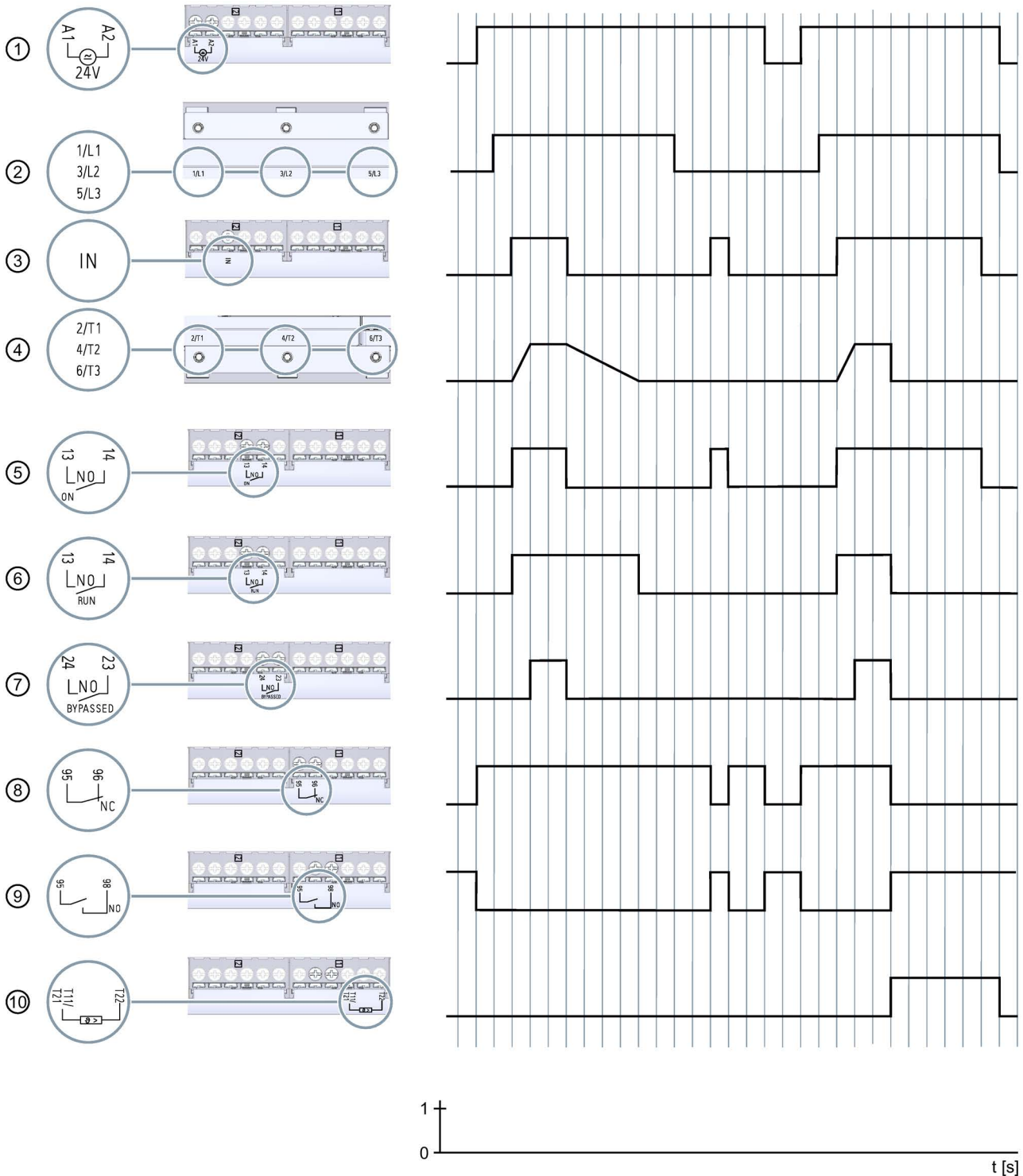
You will find more information on parameterization in Chapter Parameterizing output 13 / 14 (output signal ON or RUN) (Page 86).

Note

Parameterizing the analog output

You can parameterize the output of the analog output with the 3RW5 HMI High Feature. (Page 119)

4.1.2 State diagrams of the inputs and outputs



4.1 Connections

- ① Supply voltage for control terminals A1 and A2 (example model: 24 V)
- ② Main circuit connection network 1 / L1, 3 / L2, 5 / L3
- ③ Input IN to switch the motor on and off
- ④ Main circuit connection load (motor) 2 / T1, 4 / T2, 6 / T3
- ⑤ Output 13, 14: Parameterized to signal operating state ON
- ⑥ Output 13, 14: Parameterized to signal operating state RUN
- ⑦ Output 23, 24: To signal operating state BYPASSED
- ⑧ Output 95, 96 (NC) to signal faults
- ⑨ Output 95 / 98 (NO) to signal faults
- ⑩ Temperature sensor (thermoclick)

4.2 Connecting the 3RW52 soft starter

Requirements

- Observe the conductor cross-sections and tightening torques in the data sheet or on the front beneath the hinged cover.
- Pay attention to the required tools indicated on the front beneath the hinged cover.
- Optional accessories:
 - Terminal cover for 3RW52 soft starter with sizes 2, 3, and 4

Procedure



| |
|--|
| ! DANGER |
| Hazardous voltage. |
| Will cause death or serious injury. |
| Turn off and lock out all power supplying this device before working on this device. |

1. Connect the main circuit connections (line side / motor side) of the 3RW52 soft starter. (Page 64)
2. Optionally mount the terminal covers for sizes 2 / 3 / 4. (Page 66)
3. Connect up the control terminals of the 3RW52 soft starter.
 - Connecting the control terminals (screw terminals) (Page 69)
 - Connecting the control terminals (spring-type terminals) (Page 71)
4. Mount the cover for the control cable channel. (Page 75)

Result

The 3RW52 soft starter is connected and ready to operate.

4.3 Connect the 3RW52 soft starter to the main circuit connection (line side / motor side)

Requirements

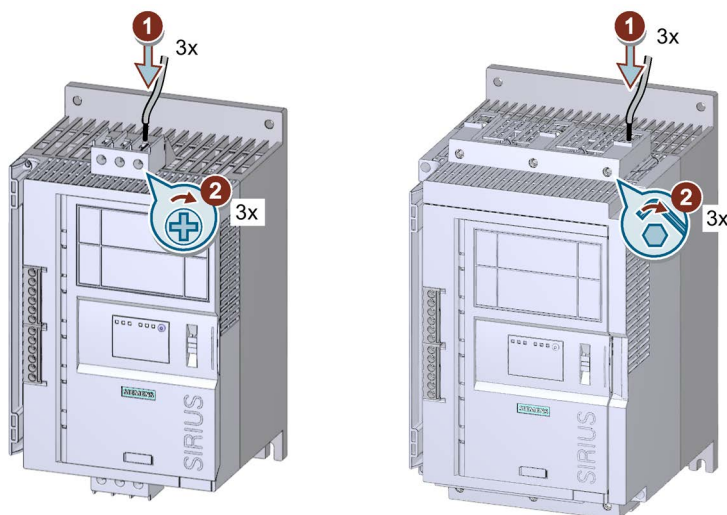
- Observe the conductor cross-sections and tightening torques in the data sheet or on the front beneath the hinged cover.
- Pay attention to the required tools indicated on the front beneath the hinged cover.
- When using a busbar connection (sizes 3 and 4), you require wrenches of width A/F of 13 and 17.

| Size | Article number | Tightening torque |
|--------|----------------|-------------------|
| Size 1 | 3RW5.1.-.... | 2 ... 2.5 Nm |
| Size 2 | 3RW5.2.-.... | 4.5 ... 6 Nm |
| Size 3 | 3RW5.3.-.... | 10 ... 14 Nm |
| Size 4 | 3RW5.4.-.... | 14 ... 24 Nm |

Procedure for screw connection - sizes 1 and 2



! DANGER
Hazardous voltage.
Will cause death or serious injury.
 Turn off and lock out all power supplying this device before working on this device.



- Connect connection 1 / L1, 3 / L2, 5 / L3 to the supply system ① and tighten the screws ②.
- Repeat steps ① + ② for connection 2 / T1, 4 / T2, 6 / T3 with the motor.

4.3 Connect the 3RW52 soft starter to the main circuit connection (line side / motor side)

Procedure for bar connection - sizes 3 and 4

Pay attention to the diagram on the packaging of the enclosed connection set.

- Connect connection 1 / L1, 3 / L2, 5 / L3 to the supply network.
- Connect connection 2 / T1, 4 / T2, 6 / T3 to the motor.

Example circuits

- Feeder assembly, type of coordination 1 fuseless (Page 161)
- Feeder assembly, type of coordination 1 with fuses (Page 162)
- Feeder assembly, type of coordination 2 (Page 163)
- Inside-delta circuit (Page 164)

4.4 Mounting terminal covers on main circuit connections

Requirements

- Terminal cover for 3RW55/52

Note

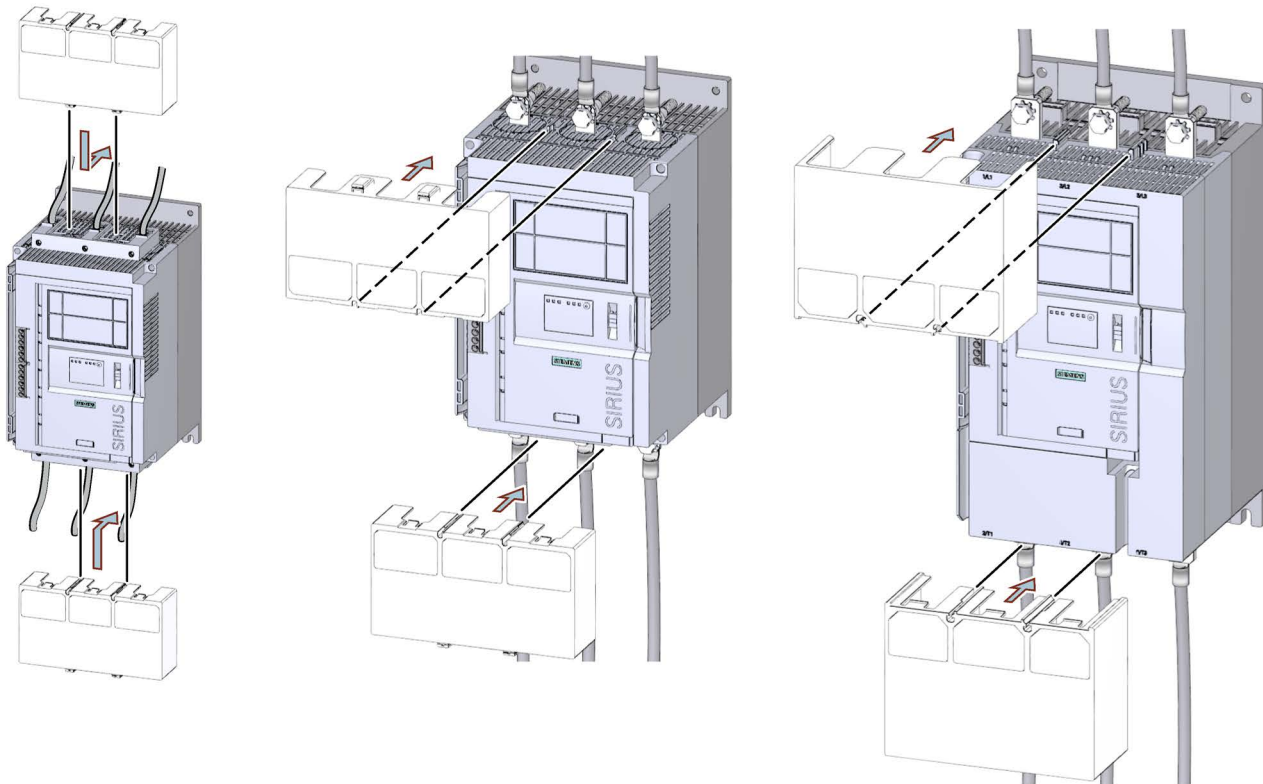
Touch protection by terminal cover.

Touch protection according to EN 50274 finger-safe only for vertical contact from the front.

Procedure



! DANGER
Hazardous voltage.
Will cause death or serious injury.
Turn off and lock out all power supplying this device before working on this device.



- Make sure that you mount the terminal cover the right way round on the connecting terminal, as shown in the diagram.

4.5 Replacing the terminals on size 2 devices

Requirements

- Pay attention to the required tools indicated on the front beneath the hinged cover.

Dismantling procedure

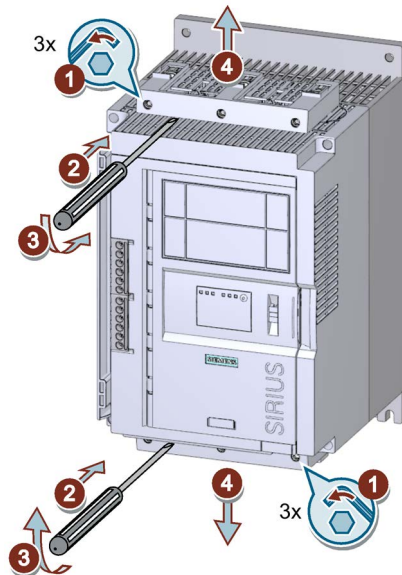


! DANGER

Hazardous voltage.

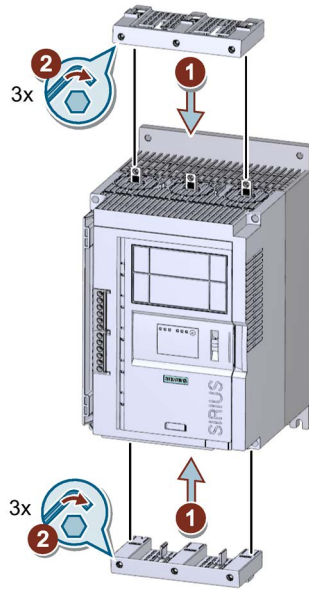
Will cause death or serious injury.

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



- Unscrew the 3 screws on the two connecting terminals ① and lever the terminal off the main circuit connections ② + ③.
- Remove the connecting terminal from the main circuit connection ④.

Assembly procedure



- Plug the new terminal into the main circuit connections ① and tighten the screws with a tightening torque of 4.5 ... 6 Nm ②.

4.6 Connecting the control terminals (screw terminals)

Requirements

- Observe the conductor cross-sections and tightening torques in the data sheet or on the front beneath the hinged cover.
- Pay attention to the required tools indicated on the front beneath the hinged cover.

Procedure

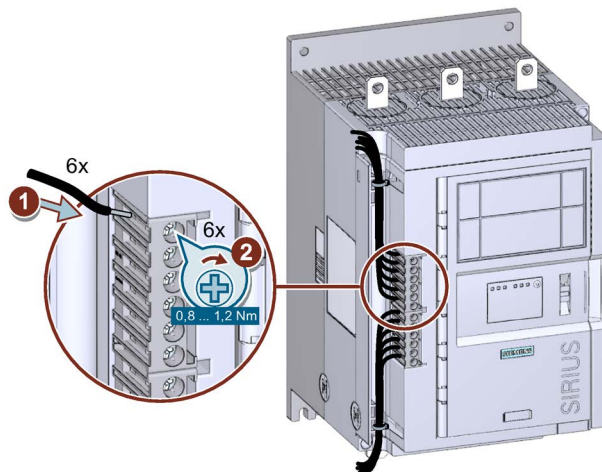


! DANGER

Hazardous voltage.

Will cause death or serious injury.

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



Example circuits

- Control by pushbutton (Page 167)
- Control by switch (Page 168)
- Switching with the control supply voltage (Page 169)
- Control by PLC (Page 171)
- Actuation of a line contactor (Page 172)
- Wiring for remote RESET (Page 174)
- Connecting the temperature sensor (Page 175)
- Connecting the evaluation unit to the analog output (Page 176)

4.7 Disconnecting the control current form the screw-type terminals

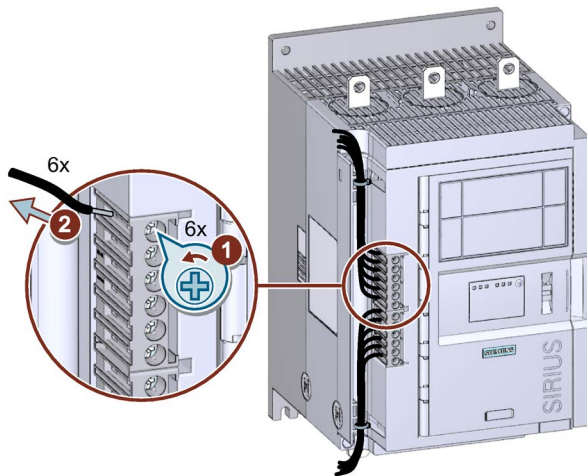
Requirements

- Pay attention to the required tools indicated on the front beneath the hinged cover.

Procedure



! DANGER
Hazardous voltage.
Will cause death or serious injury.
Turn off and lock out all power supplying this device before working on this device.



4.8 Connecting the control terminals (spring-type terminals)

Requirements

- Observe the conductor cross-sections and tightening torques in the data sheet or on the front beneath the hinged cover.
- Pay attention to the required tools indicated on the front beneath the hinged cover.

Procedure

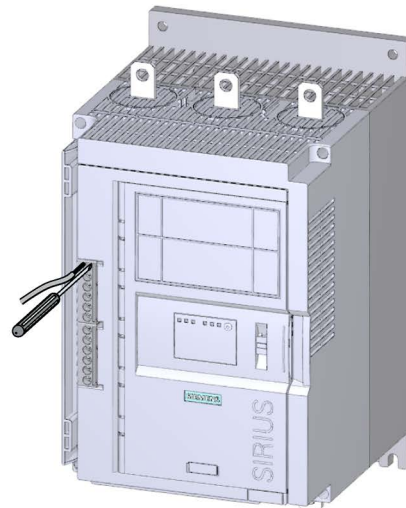
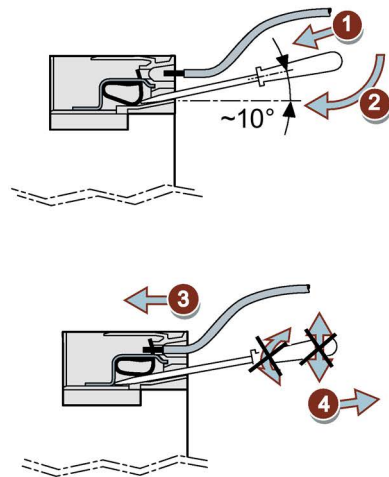


! DANGER

Hazardous voltage.

Will cause death or serious injury.

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



Example circuits

- Control by pushbutton (Page 167)
- Control by switch (Page 168)
- Switching with the control supply voltage (Page 169)
- Control by PLC (Page 171)
- Actuation of a line contactor (Page 172)
- Wiring for remote RESET (Page 174)
- Connecting the temperature sensor (Page 175)
- Connecting the evaluation unit to the analog output (Page 176)

4.9 Disconnecting the control current from the spring-loaded terminals

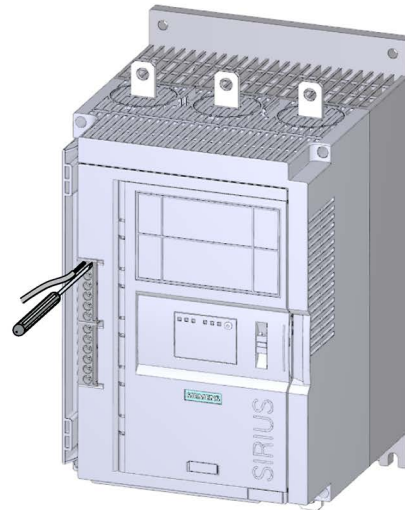
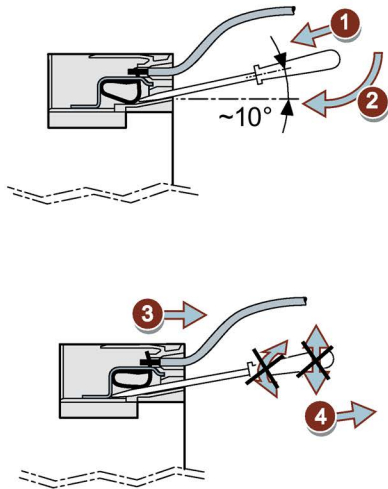
Requirements

- Pay attention to the required tools indicated on the front beneath the hinged cover.

Procedure



! DANGER
Hazardous voltage.
Will cause death or serious injury.
Turn off and lock out all power supplying this device before working on this device.



4.10 Replacing the control terminals

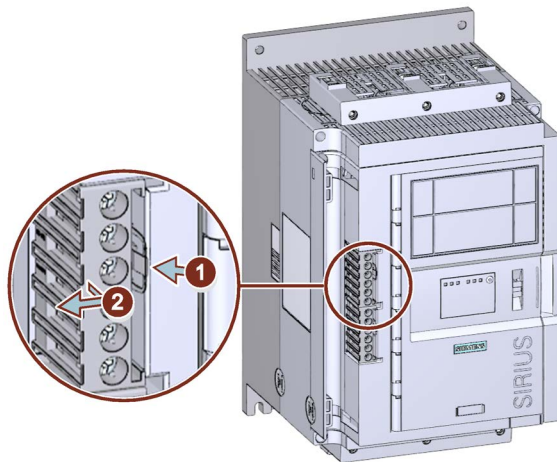
Requirements

- Remove the cover over the control cable duct.
- Control terminal as spare part (screw terminal: 3RW5980-1TR00, spring-type: 3RW5980-2TR00)

Dismantling procedure

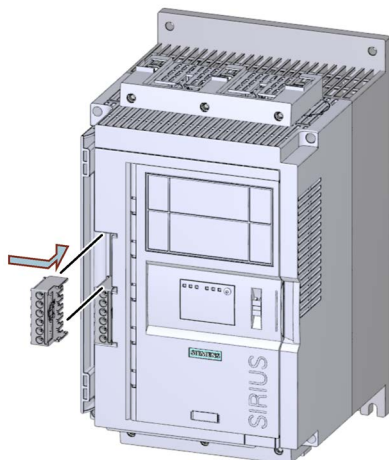


! DANGER
Hazardous voltage.
Will cause death or serious injury.
Turn off and lock out all power supplying this device before working on this device.



- Press against the lock ① and pull the control terminal out ②.

Assembly procedure



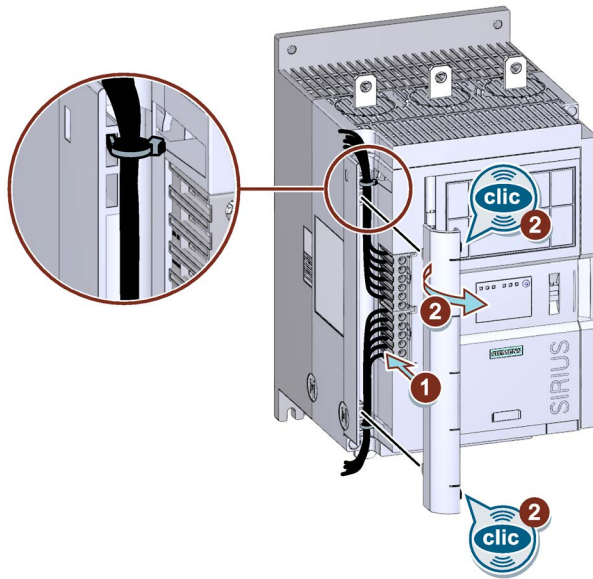
- Place the control terminal onto the intended connection until the terminal engages.

4.11 Installing the cover for the control cable duct

Requirements

- 1-2 cable ties
- Cover for control cable channel (spare part: 3RW5950-0GD20)

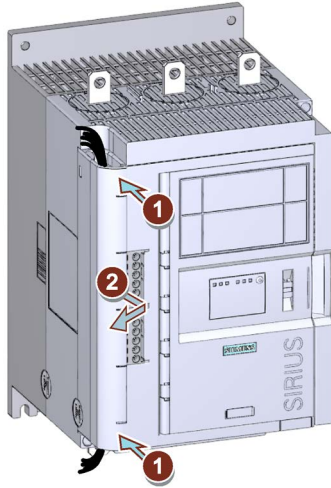
Procedure



- Lay the control cables in the control cable ducts and fix the control cables in place with cable ties.
- Press the cover for the control cable duct into the openings ① provided until it audibly engages ②.

4.12 Removing the cover of the control cable duct

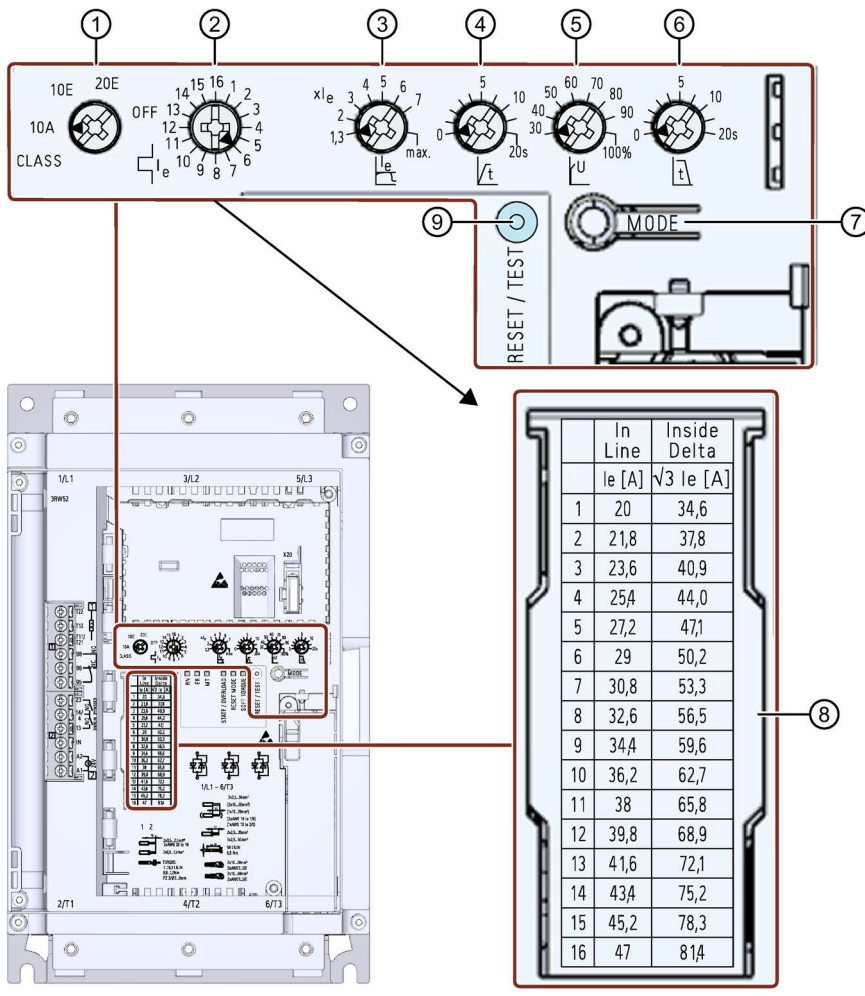
Procedure



- Press the cover of the control cable channel at top and bottom ① from the front and remove the cover for the control cable channel of the 3RW52 soft starter ②.

Parameter assignment

5.1 Setting elements on the 3RW52 soft starter



5.1 Setting elements on the 3RW52 soft starter

- ① CLASS setting for motor overload protection
- ② Rated operational current I_e of the motor
- ③ Current limiting factor as a multiple of the set rated operational current I_e of the motor
- ④ Ramp-up time
- ⑤ Starting voltage
- ⑥ Ramp-down time
- ⑦ MODE key
 - Parameterization of RESET MODE
 - Deactivation / activation of Soft Torque
 - Parameterization of ON / RUN relay output
- ⑧ Scale of rated operational current I_e of the motor
- ⑨ RESET / TEST key
 - Acknowledges faults
 - Performs the user test
 - Parameterization of ON / RUN relay output

Prerequisite for adjusting the setting elements

- Slotted screwdriver or cross-tip screwdriver PZ1

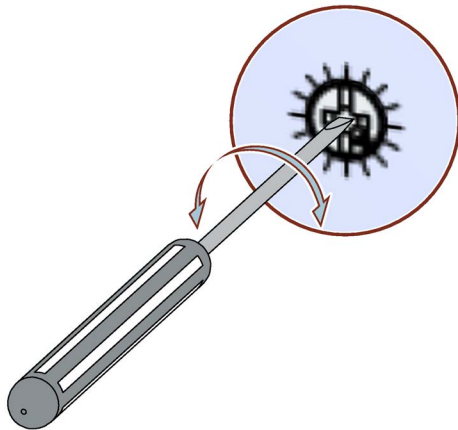
Procedure

Note

Display of setting elements.

Please note that the displays on the setting elements are approximate values which are subject to production engineering tolerances.

To perform a detailed setting, a 3RW5 HMI should be used.



- Insert the slotted screwdriver in the opening of the setting element.
- Turn the slotted screwdriver until the arrow of the setting element points to the required parameter setting.

Tip

Display of the parameter value in the 3RW5 HMI (accessories)

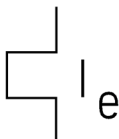
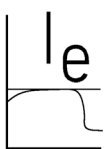
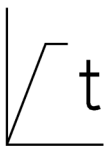
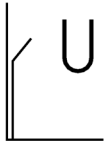
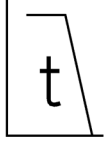


- 3RW5 HMI Standard

During the setting of parameters at the setting elements, the current value is indicated on the display of the 3RW5 HMI Standard and undergoes cyclic updating.

- 3RW5 HMI High Feature

During the setting of parameters at the setting elements, the current value is indicated in the "Parameters > Parameter list" menu on the display of the 3RW5 HMI High Feature and undergoes cyclic updating.

5.2 Overview of parameters

| Parameters | Symbol | Setting range | Factory setting |
|--|---|--|-----------------|
| Trip class for motor overload protection | CLASS | 10A, 10E, 20E, OFF | 10A |
| Rated operational current I_e of the motor ¹⁾ |  | 1 ... 16 ²⁾ | 16 |
| Current limiting value as a multiple of the set rated operational current I_e of the motor |  | <ul style="list-style-type: none"> • 1.3 ... 7 x I_e • Max. | 4 x I_e |
| Ramp-up time |  | <ul style="list-style-type: none"> • 0 ... 20 s • If parameter value "0" is set, the motor is switched on with a ramp-up time of approx. 100 ms. | 10 s |
| Starting voltage |  | 30 ... 100 % | 30 % |
| Ramp-down time |  | 0 ... 20 s | 0 s |
| Soft Torque | SOFT TORQUE <input type="checkbox"/>  | <ul style="list-style-type: none"> • Off (LED off) • On (LED on) | Off |
| RESET MODE | RESET MODE <input type="checkbox"/>  | <ul style="list-style-type: none"> • Manual RESET (LED off) • Remote RESET (LED flashes green) • Auto RESET (LED lit green) | Manual RESET |

1) The rated operational current I_e of the motor may, according to the standard, deviate by 20% from the rating plate specification of the manufacturer.

2) For meaning of scale, refer to laser-cut table on front panel of device.

5.3 Suggested settings

| Application | Starting voltage [%] | Ramp-up time [s] | Current limiting function | Ramp-down time [s] |
|-------------------------------|----------------------|------------------|---------------------------|--------------------|
| Conveyor belt (full) | 70 | 5 | $7 \times I_e$ | 10 |
| Roller conveyor (full) | 60 | 5 | $7 \times I_e$ | 10 |
| Compressor (without pressure) | 50 | 4 | $4 \times I_e$ | Not relevant |
| Small fan | 40 | 2 | $4 \times I_e$ | Not relevant |
| Pump ¹⁾ | 40 | 3 | $4 \times I_e$ | 10 |
| Hydraulic pump | 40 | 2 | $4 \times I_e$ | Not relevant |
| Agitator | 40 | 2 | $4 \times I_e$ | Not relevant |
| Milling machine | 40 | 4 | $4 \times I_e$ | Not relevant |

¹⁾ It is recommended that the Soft Torque function is activated.

5.4 Parameterizing the 3RW52 soft starter

Requirements

- The 3RW52 soft starter is installed and connected.
- Rated control voltage and rated operational voltage have been applied.
- Suggested settings (Page 81)

Note

Tips for parameterizing the 3RW52 soft starter.

Entering the motor and load data in the STS software (Page 17) will simulate the application and a suitable soft starter will be suggested. In addition, information regarding parameterization is also provided.

Procedure

1. You set the parameters on the setting elements of the 3RW52 soft starter.
Setting elements on the 3RW52 soft starter (Page 77)
2. Set the motor overload protection on setting elements "CLASS" and "I_e". The scale for rated operational current I_e is listed for each connection type in the table on the front of the 3RW52 soft starter.
Make sure that the arrow of the "CLASS" setting element points to the required setting.
Setting the Electronic motor overload protection (Page 99)
3. Set soft starting at the setting elements "t" and "U". (Page 93)
4. Set the current limit at the setting element "Current limiting value x I_e".
Setting the Current limiting function (Page 96) of I_e
5. Set soft stopping at setting element "t". (Page 98)
6. Activate the Soft Torque function, if required.
Setting RESET MODE and Soft Torque (Page 83)
Soft Torque (Page 102)
7. Set the required RESET MODE. (Page 83)
8. Set the signal of your choice at the ON / RUN relay output. (Page 86)

Result

The 3RW52 soft starter has been parameterized and is ready to operate. You can parameterize the signal of the analog output via an optional 3RW5 HMI High Feature. (Page 119)

5.5 Setting RESET MODE and Soft Torque

RESET MODE and Soft Torque

With the MODE key, set the functions RESET MODE and Soft Torque at the same time.

Procedure

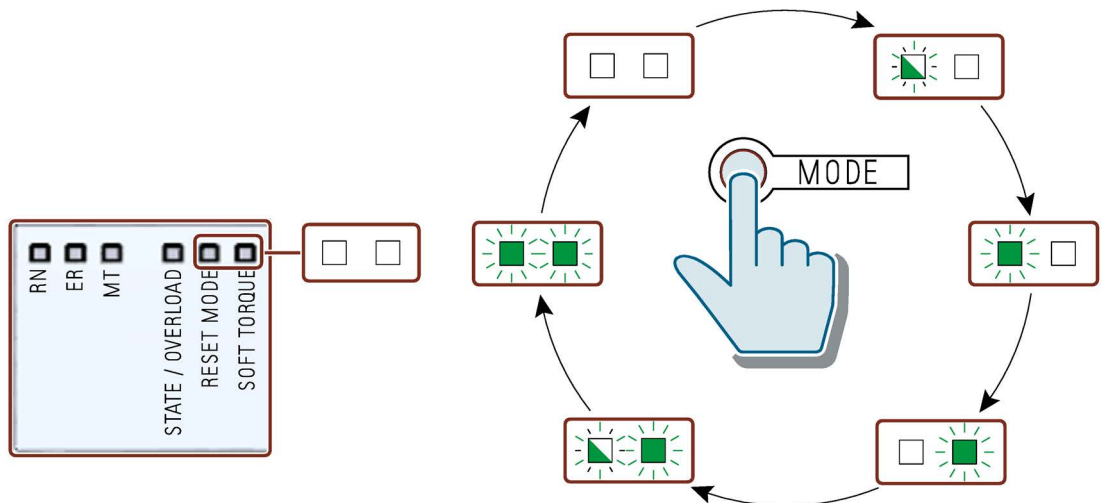
⚠ WARNING

**Automatic restart.
Can cause death or serious injury.**

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

To do this, for example, link the group error output (terminals 95 and 96) into the control.





RESET MODE

Note

Effects of RESET MODE.

Setting of the RESET MODE will only affect acknowledgment response of the motor overload protection.

You will find more information in Chapter Faults and remedial actions of the 3RW52 soft starter (Page 134) with the comment "Depends on parameter RESET MODE".


| LED RESET MODE | RESET MODE set |
|--|----------------|
| <input type="checkbox"/> Off | Manual RESET |
|  Flashes green | Remote RESET |
|  Lights up green | Auto RESET |

Soft Torque

Note

Effects of Soft Torque

For more information, see Chapter Soft Torque (Page 102).

| LED Soft Torque | Soft Torque set |
|--|-----------------|
| <input type="checkbox"/> Off | Off |
|  Lights up green | On |

5.6 RESET MODES

Note

Note**Effects of RESET MODE.**

Setting of the RESET MODE will only affect acknowledgment response of the motor overload protection.

You will find more information in Chapter Faults and remedial actions of the 3RW52 soft starter (Page 134) with the comment "Depends on parameter RESET MODE".

Manual RESET

"Manual RESET" means that the following options are available for acknowledging faults:

- RESET / TEST key on 3RW52 soft starter
- RESET / TEST key on 3RW5 HMI Standard
- Reset via bus interface
- Reset via F key on 3RW5 HMI High Feature
- Reset via 3RW5 HMI High Feature

Remote RESET

"Remote RESET" means that faults are acknowledged by switching the control supply voltage off and on again. The control supply voltage on the 3RW52 soft starter must be switched off for at least 4 s.

Auto RESET

"Auto RESET" means that faults are automatically reset as soon as the cause is eliminated.

5.7 Parameterizing output 13 / 14 (output signal ON or RUN)

Application

One of these two states is output at output 13 / 14:

- ON
- RUN

State diagrams of the inputs and outputs (Page 61)

Use the **output function ON**, for instance, to implement latching if you selected pushbutton control.

Use the **Output function RUN** in order, for instance, to control a line contactor connected upstream.

Requirements

- Control supply voltage is connected.
- The 3RW52 soft starter does not signal any faults, the LED STATE / OVERLOAD is off.



Procedure

1. Activate the programming mode by holding the MODE key down for longer than 2 s until the LED STATE / OVERLOAD flickers green.

Hold the MODE key down.

2. Simultaneously press the RESET / TEST key down for longer than 1 s until the LED STATE / OVERLOAD on the device lights up red.

The set state of relay output ON / RUN is displayed on the Soft Torque LED:

| LED Soft Torque | Signal set on output 13 / 14 |
|---|------------------------------|
|  Flashes green | ON (factory setting) |
|  Flickers green | RUN |

3. Release the MODE and RESET / TEST keys.
4. Switch to the other mode by pressing the MODE key briefly. The Soft Torque LED switches between flickering green and flashing green.
You can switch between the modes at the output as often as you want.
5. Terminate programming mode by pressing the RESET / TEST key for longer than 1 s until LED STATE / OVERLOAD no longer shines red.

Note

If you do not press any key at all for more than 10 seconds in programming mode, the device automatically terminates programming mode and reverts to normal operation.

Tip

Alternatively, output 13 / 14 may also be set in the "Parameters > Soft Starter > ON / RUN relay output" menu of the 3RW5 HMI High Feature (accessories).

Commissioning

6.1 Commissioning the 3RW52 soft starter

Procedure

1. Install the 3RW52 soft starter. (Page 37)
2. Connect the 3RW52 soft starter. (Page 63)
3. Parameterize the 3RW52 soft starter according to the application with the setting suggestions. (Page 82)

If necessary, optimize the setting suggestions step by step. (Page 81)

For example, you can continually adjust the current limiting factor while the motor is starting up.

4. Perform the user test. (Page 146)
5. Optionally seal the 3RW52 soft starter with a lead seal. (Page 90)

Result

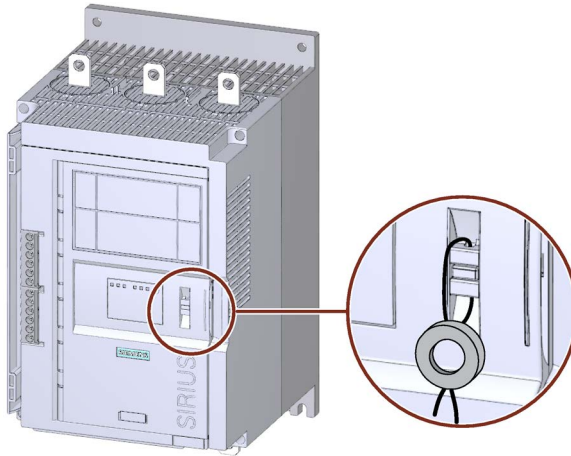
The 3RW52 soft starter is ready for operation.

6.2 Sealing the 3RW52 soft starter

Requirements

- Seal, sealing wire and a suitable sealing tool.

Procedure



- Push the wire through the openings provided.

Result

By sealing the hinged cover, you protect the operator controls of the 3RW52 soft starter from unauthorized access. It is nevertheless still possible to operate a 3RW5 HMI and acknowledge messages.

Tip

The Local Interface and the memory module interface of the 3RW5 HMI High Feature can be protected from unauthorized access by sealing the interface cover. Proceed in the same sequence as for sealing the hinged cover.

For more information, see Chapter Design and operator controls of the High Feature 3RW5 HMI (Page 110).

6.3 First commissioning of the High Feature 3RW5 HMI

Requirements

- Control supply voltage is connected for the first time or the factory settings have been restored on the 3RW5 HMI High Feature.

Procedure

- Set the desired language.

Result

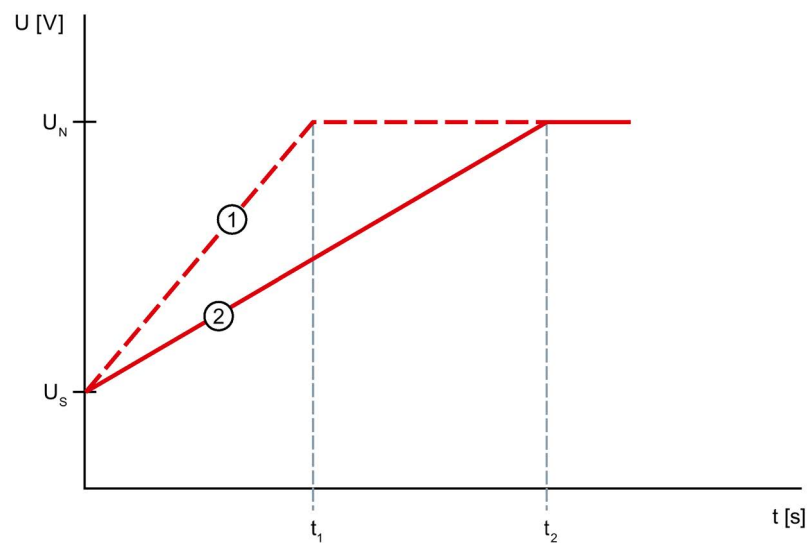
The 3RW5 HMI High Feature is ready to use. It is now possible to modify the parameters of the 3RW5 HMI High Feature, the 3RW52 soft starter, and any connected 3RW5 communication module.

Functions

7.1 Soft starting

Operating principle

A voltage ramp is used to implement soft starting. The 3RW52 soft starter increases the motor voltage from a parameterizable starting voltage to the line voltage within a definable ramp-up time.



- ① Voltage ramp with short ramp-up time t_1
- ② Voltage ramp with long ramp-up time t_2

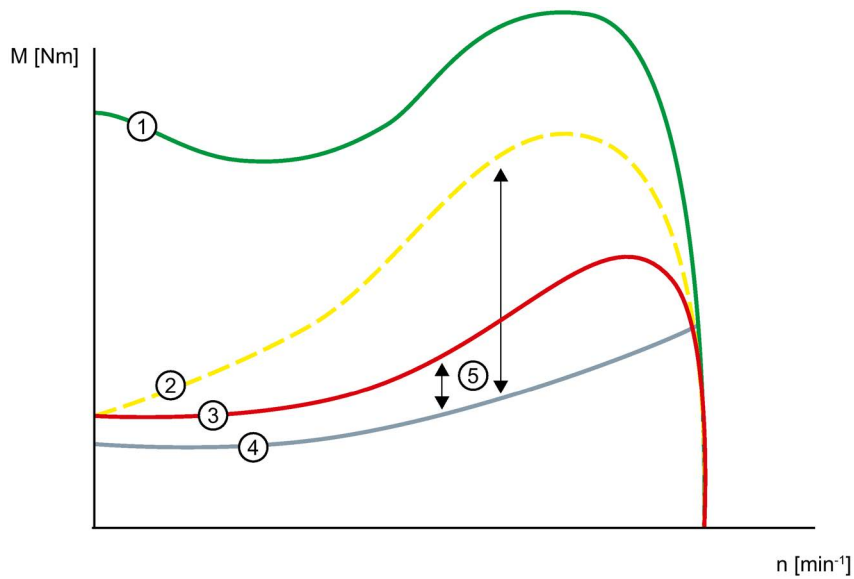
U_{rated} Line voltage

U_S Parameterizable starting voltage

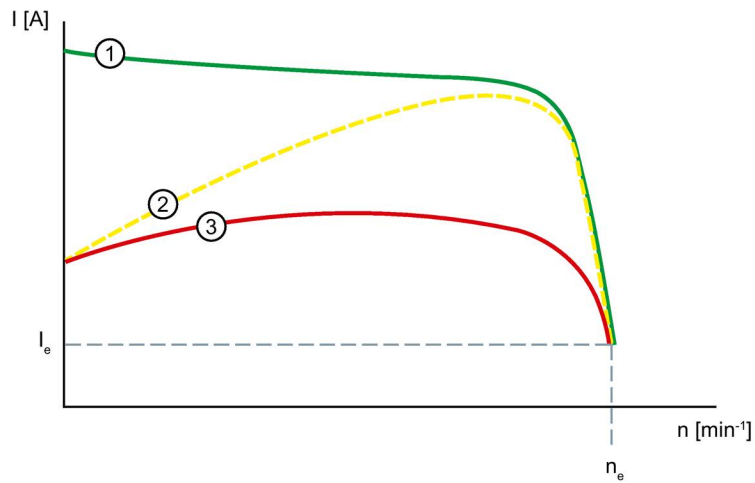
t_1 Short ramp-up time

t_2 Long ramp-up time

7.1 Soft starting



- ① Torque with direct-on-line starting without 3RW52 soft starter
- ② Torque with short ramp-up time
- ③ Torque with long ramp-up time
- ④ Torque of the load
- ⑤ Acceleration torque = Difference of activation torque and torque of load



- ① Current characteristic with direct-on-line starting without 3RW52 soft starter
- ② Current characteristic with short ramp-up time
- ③ Current characteristic with long ramp-up time
- I_e Rated operational current
- n_e Rated motor speed

Parameters

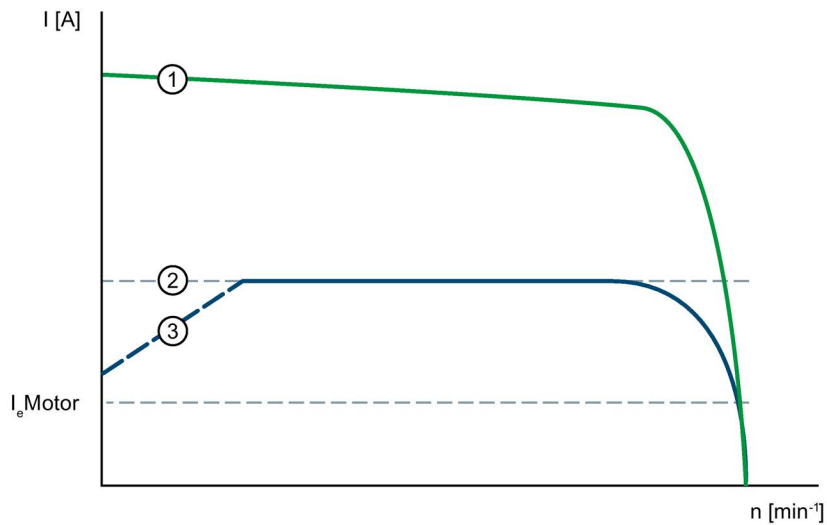
| Parameter | Description |
|------------------|---|
| Starting voltage | The starting voltage determines the starting torque of the motor. A lower starting voltage results in a lower switch-on torque and a lower starting current. Set the starting voltage to a value that ensures that the motor starts up immediately and smoothly once the start command reaches the 3RW52 soft starter. |
| Ramp-up time | <p>The ramp-up time determines the time taken to increase the motor voltage from the parameterized starting voltage to the line voltage. This has an influence on the motor's acceleration torque which drives the load during the ramp-up operation. A longer ramp-up time results in a shorter acceleration torque across the motor ramp-up time. The motor therefore runs up more slowly and smoothly.</p> <p>Set the length of the ramp-up time such that the motor can reach its rated speed by the time the end of the ramp is reached. The actual motor starting time is load-dependent and can differ from the parameterized ramp-up time.</p> <p>If you choose a time that is too short, the ramp-up time ends before the motor has accelerated to speed. If the time selected is too short, a very high starting current that equals the direct starting current at the same speed will occur. In this case, the 3RW52 soft starter can switch itself off via the internal overload protection function and signal a fault.</p> <p>If parameter value "0" is set, the motor is switched on with a ramp-up time of approx. 100 ms.</p> |

7.2 Current limiting function

Operating principle

Activate the current limiting function if you want to ensure that a specific current value is not exceeded during motor starting.

The motor is always started up with the voltage ramp. Before the current exceeds the parameterized current limit $\times I_e$, the voltage ramp function is aborted and the current limitation function starts. If the motor current drops below the limit value again, the voltage ramp function takes over control again until the motor has finished starting up.

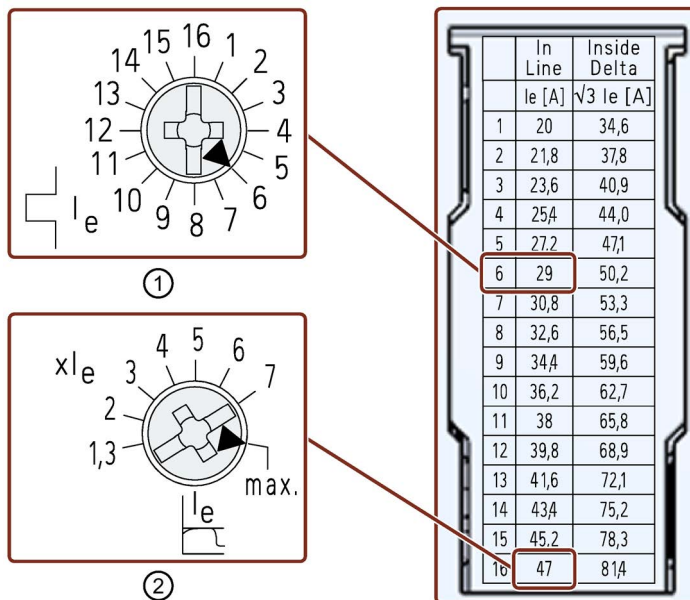


- ① $I_{\text{direct starting motor}}$
- ② $I_{\text{soft starter: Adjustable current limiting value}}$
- ③ Voltage ramp

Parameters

| Parameter | Description |
|------------------------|--|
| Current limiting value | <p>In order to ensure that the drive can reach its rated speed, the minimum current limiting value that you select must be high enough to generate sufficient torque in the motor.</p> <p>A typical value is 3 to 4 times the rated operational current (I_e).</p> <p>As soon as the current limiting value is reached, the motor is started with this value until it has reached its rated operating speed. In this case, the motor starting times may be longer than the maximum parameterizable ramp-up time.</p> <p>The maximum possible current limiting value for the 3RW52 soft starter ("max." position) is 7x the value of the maximum rated operational current for the 3RW52 soft starter, where this value is identical to 7x the value of the maximum rated operational current I_e which can be set.</p> <p>This value is independent of the actual rated operational current I_e of the motor set at the 3RW52 soft starter.</p> |

Example

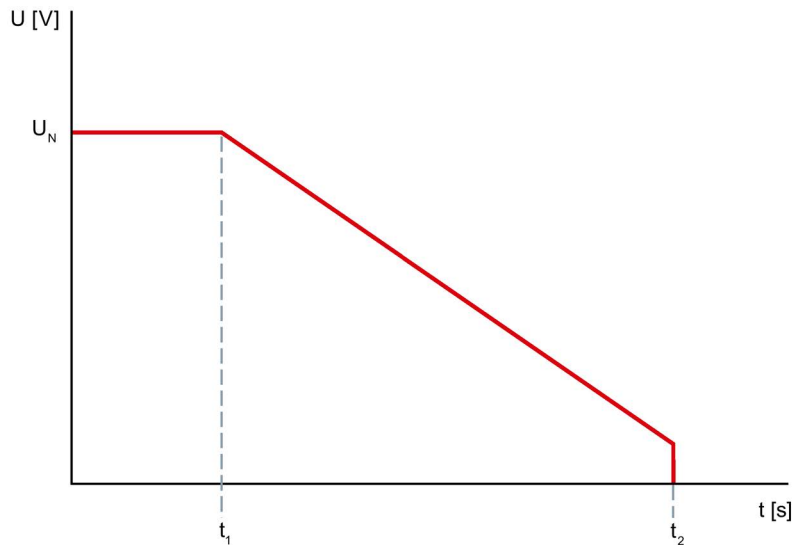


- ① Rated operational current I_e of the motor
 - $I_{e \text{ motor}} = 29 \text{ A}$
- ② Maximum current limiting which can be set at this soft starter: $I_{\text{max}} = 7 \times 47 \text{ A} = 329 \text{ A}$

7.3 Soft stopping

Operating principle

A voltage ramp is used to implement soft stopping. With the ramp-based stopping function, the motor voltage is decreased along a linear, negative voltage ramp.



$t_1 \dots t_2$ Ramp-down time

2

U_{rated} Line voltage

Parameters

| Parameter | Description |
|----------------|---|
| Ramp-down time | The length of the ramp-down time defines the time within which the motor voltage is reduced from line voltage to 0 V. It may take longer for the motor to actually coast down to a standstill. |

7.4 Motor protection

The 3RW52 soft starter has 2 functions for protecting the motor:

- Electronic motor overload protection
- Thermistor motor protection with temperature sensor (optional)

Use a combination of both of these functions to implement full motor protection.

7.4.1 Electronic motor overload protection

Operating principle

The approximate temperature of the motor is calculated using the measured motor currents and the parameter settings "Rated operational current I_e " and "CLASS (trip class)". This indicates whether the motor is overloaded or is functioning in the normal operating range. When overload is detected, the 3RW52 soft starter shuts the motor down. The setting for RESET MODE determines how the motor is restarted.

Parameters

| | |
|---|--|
| NOTICE | |
| Property damage due to overload. | |
| If the motor is not monitored by a temperature sensor and if the trip class is set to CLASS OFF, the motor will not have any protection at all. | |

| Parameter | Description |
|---------------------------------|---|
| Trip class | The trip class specifies the maximum time within which a protective device must trip from a cold state at 7.2 x the rated operational current I_e (motor protection to IEC 60947). <ul style="list-style-type: none"> • CLASS OFF: Deactivates the electronic motor overload protection • CLASS 10A / 10E / 20E: Tripping times according to the trip class |
| Rated operational current I_e | The rated operational current I_e is the current that can be continuously conducted by the feeder (switchgear and motor). This is normally the rated operational current I_e of the motor and depends on whether the motor is connected in an inline or an inside-delta circuit. |

Recovery time following motor overload protection tripping

When the motor overload protection is tripped and Auto RESET MODE is set, the fault will be reset automatically after a recovery time of 5 minutes. With selection of manual RESET or remote RESET, a RESET is only possible following completion of the recovery time of 5 minutes.

7.4.2 Thermistor motor protection with temperature sensor (optional)

Operating principle

The temperature sensor of a motor can be connected to the soft starter and evaluated. If a specific motor-dependent temperature is exceeded, the soft starter recognizes this and reacts accordingly. The sensor cables can be monitored for open-circuit and short-circuit.

Two different types of measuring sensor can be connected to the soft starter:

- PTC thermistors type A

This type of sensor describes a temperature-dependent switch.

- Thermoclick

This type of sensor describes a temperature-dependent resistor.

When the thermistor motor protection has tripped, the 3RW52 soft starter cannot be restarted until the sensor installed in the motor has cooled down. The recovery time varies according to the temperature state of the sensor.

You will find more information on the connection of the temperature sensor in Chapter Connecting the temperature sensor (Page 175).

7.5 Intrinsic device protection

Operating principle

The integrated intrinsic device protection protects the power semiconductors as well as the bypass contacts against impermissible overload. A message is generated on the 3RW52 soft starter if the warning threshold is exceeded. If the fault threshold is exceeded, the 3RW52 soft starter will switch off automatically.

NOTICE

Property damage due to short circuits.

The intrinsic device protection system does not protect against irreparable equipment damage caused by short circuits.

Connect semiconductor fuses upstream in order to protect the power semiconductors against irreparable damage by short circuits (e.g. in case of cable damage or an interturn fault in the motor).

Recovery time after device protection is triggered

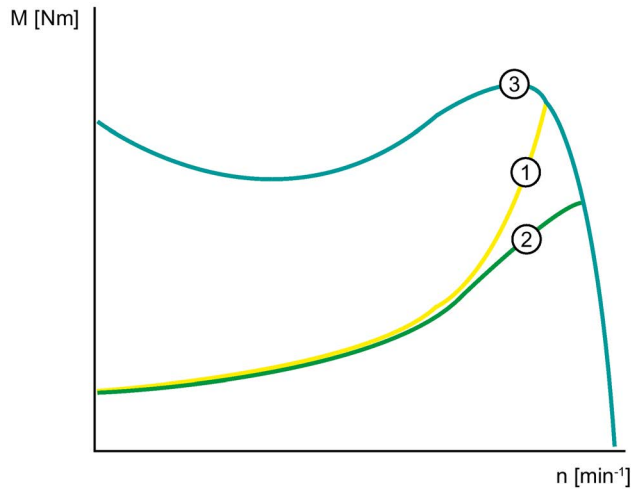
If the 3RW52 soft starter shuts down because the motor overload protection or the intrinsic device protection trips, you must wait a defined cooling time (recovery time) prior to acknowledging the fault or restarting the motor.

- In the event of power semiconductor overload: 30 s
- In the case of bypass overload: 60 s

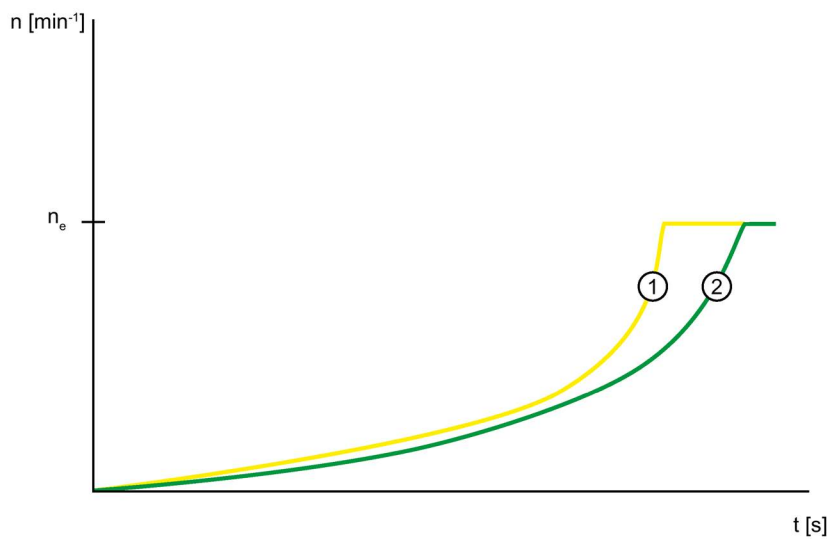
7.6 Soft Torque

Principle of operation of Soft Torque during starting

The Soft Torque function reduces the drive acceleration rate shortly before the motor reaches its rated speed. This produces an almost linear speed curve. This helps to ensure smooth movement of a conveyor belt, for example, and so prevent fragile goods on the belt from tipping over.



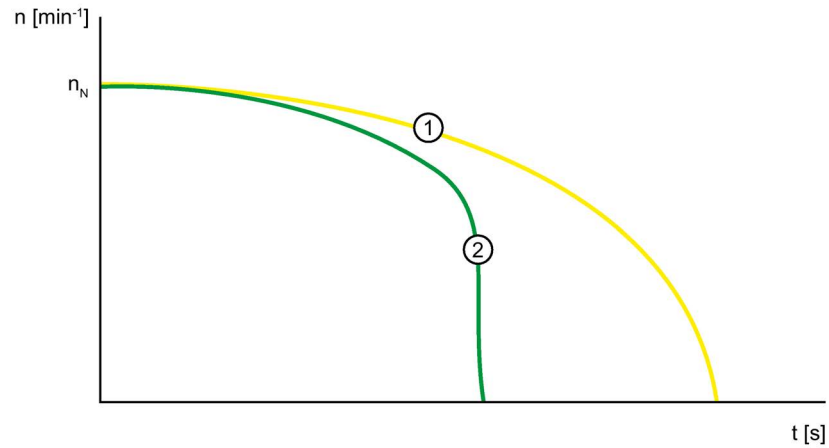
- ① Torque without Soft Torque
- ② Torque with Soft Torque
- ③ Torque with direct start



- n_e Rated motor speed
- ① Motor speed without Soft Torque
- ② Motor speed with Soft Torque

Principle of operation of Soft Torque during stopping

The Soft Torque function enables the motor to coast down smoothly at an almost constant rate of deceleration. Ensuring that the motor coasts down smoothly is particularly useful for stopping pumps in order to prevent water hammers in the connected piping. The Soft Torque function for stopping can only be activated when a stopping time of more than 3 s is set.



- n_{rated} Rated motor speed
① Motor speed with Soft Torque
② Motor speed without Soft Torque

7.7 Additional parameters

Operating principle

The soft starter has additional parameters.

Requirements

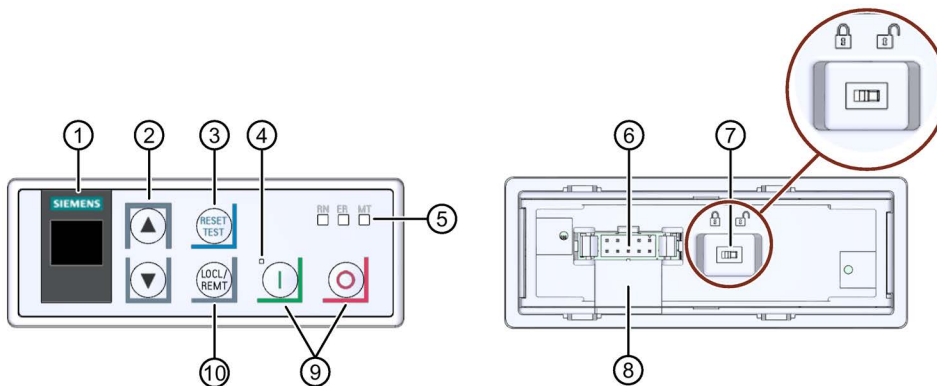
- Access protection to HMI module High Feature is not active or has been reset.
- You are in menu "Parameters > Soft Starter > Additional parameters".

Parameters

| Parameters | Description |
|-----------------------------|---|
| Typical ambient temperature | The 3RW52 soft starter is set to the predominant, typical ambient temperature actually present in the system. Specific to functions, this parameter is processed further by the individual device functions that are based on this parameter value. |
| | <ul style="list-style-type: none"> • 40°C • 50°C • 60°C (factory setting) |
| Bypass mode | <ul style="list-style-type: none"> • Internal bypass (factory setting) |
| | <ul style="list-style-type: none"> • External bypass Contact Technical Support (Support Request (Page 31)) for operating with an external bypass. |
| | <ul style="list-style-type: none"> • No bypass Use the "No bypass" setting for applications with high switching frequency. Please note that the "No bypass" setting is not suitable for applications in continuous duty. Contact Technical Support (Support Request (Page 31)) for operating without a bypass. |
| Test with small load | <p>The auxiliary and main circuit wiring is tested using a small load. A direction of rotation test can be performed by visually monitoring the motor shaft or the load connected to it.</p> <ul style="list-style-type: none"> • Activate • Deactivate |

7.8 Standard 3RW5 HMI








7.8.1 Design of the Standard 3RW5 HMI



- ① Display
- ② Navigation keys
- ③ RESET / TEST
- ④ Status LED (Page 131)
- ⑤ Device LEDs (Page 131)
- ⑥ Plug-in connection for HMI connecting cable
- ⑦ Locking switch
- ⑧ Cable duct
- ⑨ Start key
Stop key
- ⑩ LOCL / REMT

Navigating and setting

The keys are used for navigation, for selecting and setting menu items and for executing predefined actions.

| Key | Actions |
|--|--|
|  | <ul style="list-style-type: none"> • Jump to next menu item • Set digit |
|  | <ul style="list-style-type: none"> • Jump to previous menu item • Set digit |
|  | <ul style="list-style-type: none"> • Identical to RESET key on 3RW52 soft starter |
|  | <ul style="list-style-type: none"> • Motor stops as parameterized if the 3RW5 HMI Standard is the master control. |
|  | <ul style="list-style-type: none"> • Motor starts as parameterized if the 3RW5 HMI Standard is the master control. |
|  | <ul style="list-style-type: none"> • Changes master control LOCL means that the 3RW5 HMI Standard is the master control. REMT means that the 3RW5 HMI Standard is not the master control. |
|  | <ul style="list-style-type: none"> • Locking switch Locked / Unlocked: To be able to operate the 3RW52 soft starter with the 3RW5 HMI Standard, the locking switch on the rear of the 3RW5 HMI Standard must be unlocked. If the locking switch on the rear of the 3RW5 HMI Standard is in the "Locked" switch position, the "RESET / TEST", "LOCL / REMT", "Start" and "Stop" keys are disabled. Navigation through the menu using the navigation keys, however, is still possible. |

7.8.2 Standard 3RW5 HMI menu

The following information is shown on the display of the 3RW5 HMI Standard:

- Operating state
- Measured values
- Parameters

While you are setting the parameters, the actual value is shown in the display.

- Diagnostics

Operating state

| Display | Explanation |
|---|--|
| STATE | |
| ON STATE | The ramp-up time comes to an end and the motor is running. |
| RAMP STATE | The ramp-up time or the ramp-down time is active. |
| OFF STATE | The motor is switched off. |
| ER O STATE | The motor is not ready to start because there is a fault. Additional information is provided by the diagnostics display. |
| OVLD (OVERLOAD) | |
| WN I OVLD | The motor is switched on. A motor overload protection warning is pending. |
| WN O OVLD | The motor is switched off. A motor overload protection warning is pending. |
| ER O OVLD | The motor is switched off. There is a fault at the motor overload protection. |
| ---- OVLD | No motor overload exists. |
| OVLD% (OVERLOAD as a percentage) | |
| ...% OVLD% | Status of the electronic motor overload protection as a percentage. |
| SCR % (silicon-controlled rectifier, power semiconductor temperature rise) | |
| ...% SCR % | Status of the intrinsic device protection as a percentage. This measured value reflects the temperature rise of the power semiconductor. It comprises the measurement of the heat sink temperature and the calculated temperature rise of the junction (thermal model of the semiconductor). |
| S-TRQ (Soft Torque) | |
| ON S-TRQ | The Soft Torque function is activated. |
| OFF S-TRQ | The Soft Torque function is deactivated. |

| Display | Explanation | |
|------------------------|----------------|---|
| CNTRL (CONTROL) | | |
| LOCL CNTRL | Manual mode | Manual mode means that the 3RW5 HMI Standard is the master control. |
| REMT CNTRL | Automatic mode | Automatic mode means that the 3RW5 HMI Standard is not the master control. To make the unit the master control, press the LOCAL / REMOTE key. |

Measured values

| Display | Explanation |
|---------------|---|
| ...A I AVG | The average of the 3 phase currents is displayed in amps. |
| ...A I L1 | Current measured value phase L1 is displayed in amps. |
| ...A I L2 | Current measured value phase L2 is displayed in amps. |
| ...A I L3 | Current measured value phase L3 is displayed in amps. |

Parameter display

| Display | Explanation | |
|---------------|--|--------------|
| .. xIe | Current limiting value as a multiple of the set rated operational current I_e of the motor. | |
| ...% U ON | Starting voltage | |
| ...s t ON | Ramp-up time | |
| ...s t OFF | Ramp-down time | |
| ... CLASS | Trip class for motor overload protection | |
| ...A Ie | Rated operational current I_e of the motor | |
| RMode | AUTO | Auto RESET |
| | MAN | Manual RESET |
| | REMT | Remote RESET |
| ... PBADR | Station address for PROFIBUS (only displayed if a "PROFIBUS" communication module is being used) | |
| ... MODBS | Station address for Modbus (only displayed if a "Modbus RTU" communication module is being used) | |

Diagnostics display

| Display | Explanation |
|---------------|---|
| ERROR | Standard 3RW5 HMI menu (Page 107) Faults and remedial actions of the 3RW52 soft starter (Page 134) |
| NO COMM | No connection between the 3RW52 soft starter and the 3RW5 HMI Standard. |

Display of the error number with 3RW5 HMI Standard

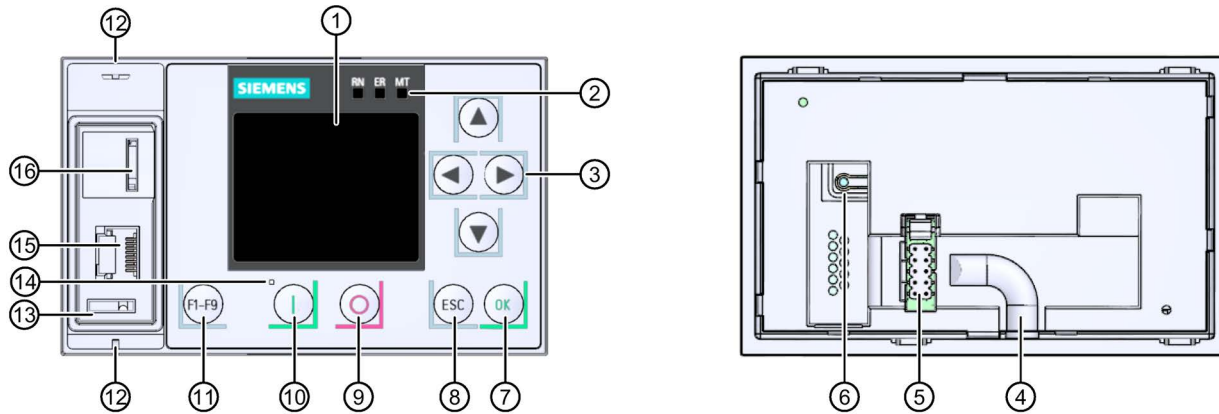
The 3RW5 HMI Standard can display up to 10 active errors (ER 0 ... 9) in the menu item "ERROR".

Procedure

1. Select the menu item "ERROR".
2. Press and hold a navigation key until the entry "ER 0" appears on the display.
3. Select the desired entry (ER 0 ... 9) using the navigation key.
 - If an entry contains an active error, the associated error number will appear above it.
 - If an entry contains no errors, the error number "0000" will appear.
4. To exit the menu, press and hold a navigation key until the entry "ERROR" appears on the display.
 - Alternatively, the 3RW5 HMI Standard automatically exits after 5 seconds of inactivity.

7.9 High Feature 3RW5 HMI

7.9.1 Design and operator controls of the High Feature 3RW5 HMI



- ① Display
- ② Device LEDs (Page 129)
- ③ Navigation keys
- ④ Cable duct
- ⑤ Plug-in connection for HMI connecting cable
- ⑥ Master RESET key
- ⑦ OK key
- ⑧ ESC key
- ⑨ Motor stop key
- ⑩ Motor start key
- ⑪ Favorites key
- ⑫ Eyes for lead seals
- ⑬ Hole for mounting the interface cover
- ⑭ Status LED (Page 132)
- ⑮ Local interface (point-to-point connection between PC and 3RW5 HMI High Feature)
- ⑯ Slot for Micro SD card (Page 124)











Navigating and setting

The keys are used for navigation, for selecting and setting menu items and for executing predefined actions.

Note








Setting parameters.

Please note that parameters which are set manually using the 6 setting elements cannot be parameterized via the 3RW5 HMI High Feature.

| Key | Actions |
|---|--|
|  | <ul style="list-style-type: none"> Move one position to the right in the input field |
|  | <ul style="list-style-type: none"> Move one position to the left in the input field |
|  | <ul style="list-style-type: none"> Jump to next menu item Set number or letter |
|  | <ul style="list-style-type: none"> Jump to previous menu item Set number or letter |
|  | <ul style="list-style-type: none"> To confirm To open the menu Jump to selected menu item |
|  | <ul style="list-style-type: none"> To exit the menu |
|  | <ul style="list-style-type: none"> Motor stops as parameterized if the 3RW5 HMI High Feature is the master control |
|  | <ul style="list-style-type: none"> Motor starts as parameterized if the 3RW5 HMI High Feature is the master control <p>After an error has been acknowledged when using the 3RW5 HMI High Feature, you must repeat the ON command by pressing the "Motor Start" key.</p> |
|  | <ul style="list-style-type: none"> F1: LOCAL / REMOTE: Changes master control F2: Reset F3-F9: Can be freely parameterized (only available for 3RW55 soft starter) |
|  | <p>Master RESET key for restoring the factory settings:</p> <ul style="list-style-type: none"> Soft starter¹⁾ Communication 3RW5 HMI High Feature All¹⁾ |

¹⁾ All parameters that have not been set by means of the setting elements are reset.

Menus

| Symbol | Menu |
|---|--|
|  | Monitoring |
|  | Diagnostics |
|  | Control (only available for 3RW55 soft starter) |
|  | Parameters |
|  | Overview |
|  | Security |
|  | Memory card (only visible if a memory card is inserted.) |

7.9.2 Main menu of the High Feature 3RW5 HMI with the 3RW52 soft starter

Monitoring



| Menu | Content |
|-----------------|--|
| Measured values | <ul style="list-style-type: none"> • Phase currents [%] • Phase currents (rms) • Motor temperature rise (%) • Remaining motor cooling time [s] • Remaining switching element cooling time [s] • Switching element heating (°C) |
| Process image | <ul style="list-style-type: none"> • Process image input (PII) • Process image output (PIQ) |

For more information, see Chapter:

- Monitoring (Page 117)

Diagnostics



| Menu | Content |
|---------------|---|
| Soft starter | <ul style="list-style-type: none"> • Diagnosis state • Device state • Statistic data • Maximum pointer • Self-test (user-test) • Logbooks |
| Communication | This menu item is only displayed if a 3RW5 communication module is used. <ul style="list-style-type: none"> • Diagnosis state |
| HMI | <ul style="list-style-type: none"> • Diagnosis state • Self-test |

You can find additional information in Chapters:

- Diagnostics of the 3RW52 soft starter with the 3RW5 HMI High Feature (Page 140)
- Diagnostics of communication with the High Feature 3RW5 HMI (Page 142)
- Execute HMI diagnostics with the 3RW5 HMI High Feature (Page 142)

Parameters



| Menu | Content |
|---------------|---|
| Soft starter | <ul style="list-style-type: none"> • Parameter display • Analog output (only displayed if a device version with analog output is being used.) • ON / RUN relay output • Spare part management (only visible if a control unit has been replaced.) |
| Communication | This menu item is only displayed if a 3RW5 communication module is used. <ul style="list-style-type: none"> • PROFINET • Modbus TCP • Modbus RTU • PROFIBUS DP • Ethernet IP |
| HMI | <ul style="list-style-type: none"> • Local interface • Timer Lighting Dark • Do Control After Logoff • Message display • Operation display • Language |

| Menu | Content |
|------------------|---|
| Factory settings | <ul style="list-style-type: none"> • Soft starter¹⁾ • Communication • HMI • All devices¹⁾ |

1) All parameters that have not been set by means of the setting elements are reset.

You can find additional information in Chapters:

- Functions (Page 93)
- Parameterizing the High Feature 3RW5 HMI (Page 116)
- Restore factory setting (Page 151)

Overview



| Menu | Content |
|---------------|--|
| Soft starter | <ul style="list-style-type: none"> • Article number • Hardware • Firmware • Tag function • Tag location • Installation date • Additional information • Manufacturer • Serial number |
| Communication | <ul style="list-style-type: none"> • Article number • Hardware • Firmware • Manufacturer • Serial number |
| HMI | <ul style="list-style-type: none"> • Article number • Hardware • Firmware • Manufacturer • Serial number |

For more information, see Chapter:

- Overview (Page 121)

Security



| Menu | Content |
|-------------------------|--|
| Local access protection | <ul style="list-style-type: none"> • Define PIN • Change PIN • Delete PIN • Auto Log Off time • Log in • Log out |

For more information, see Chapter:

- Defining the local access protection (PIN) (Page 122)

Micro SD card



This menu is only displayed if a micro SD card is inserted.

| Menu | Content |
|--|--|
| Uploading / downloading of communication and HMI parameters on memory card | - |
| Device change | <ul style="list-style-type: none"> • Back up the configuration data on the micro SD card • Transfer configuration data to soft starter |
| Save logbooks to micro SD card | - |
| FW update | This menu item is only displayed if a valid FW file is stored on the micro SD card. |
| Memory space | <ul style="list-style-type: none"> • Complete memory • Free memory • Used memory |

For more information, see Chapter:

- Micro SD card (Page 124)

7.9.3 Parameterizing the High Feature 3RW5 HMI

Requirements

- Access protection to 3RW5 HMI High Feature is not active or has been reset
- You are in menu "Parameters > HMI".

Procedure

Select a parameter.

The menus "Response after Logoff" and "Message Display" and "Status Display" contain further menu items, which you can switch to with "OK".

| Parameters | Setting range | Explanation |
|-------------------------|---|--|
| Local interface | <ul style="list-style-type: none"> • Local interface enabled (factory setting) • Local interface disabled | The local interface of the 3RW5 HMIs High Feature is enabled or disabled. Before you can connect a PC with SIRIUS Soft Starter ES (TIA Portal) to the 3RW52 soft starter via the local interface, the local interface must be enabled. |
| Timer Lighting Dark | <ul style="list-style-type: none"> • 5 min (factory setting) • Setting range: 0 ... 60 min • 0 min = deactivated | If no key is pressed on the 3RW5 HMI High Feature, the brightness of the background lighting switches off after a specified time has elapsed. |
| Do Control After Logoff | Continue with motor control (factory setting) | 3RW5 HMI High Feature is still the master control. |
| | Stop motor and give back control | The motor stops and the 3RW5 HMI High Feature is no longer the master control. |
| Message display | Fault <ul style="list-style-type: none"> • Enable (factory setting) • Disable | The settings of the message display define which messages will be displayed as a pop-up window on the display of the 3RW5 HMI High Feature. |
| | Warnings <ul style="list-style-type: none"> • Enable (factory setting) • Disable | |
| Operation display | Measured value 1 | Up to 5 different measured values can be selected from a list of measured values. These measured values are then shown in the status display. |
| | Measured value 2 | |
| | Measured value 3 | |
| | Measured value 4 | |
| | Measured value 5 | |

7.9.4 Monitoring

7.9.4.1 Monitoring the measured values of the 3RW52 soft starter with the High Feature 3RW5 HMI

Requirements

- You are in menu "Monitoring > Measured Values".

Procedure

Select a measuring value.

The menus "Phase Currents [%]" and "Phase Currents (rms)" contain further menu items, which you can switch to with "OK".

| Measured value | Setting range | Explanation |
|--|--|--|
| Phase currents [%] | <ul style="list-style-type: none"> IL1 IL2 IL3 Average | The phase currents are displayed as a percentage. You can monitor each phase (L1/L2/L3) individually, or the average of all 3 phases. |
| Phase currents (r.m.s.) [A] | | The phase currents are displayed in amperes. You can monitor each phase (L1/L2/L3) individually, or the average of all 3 phases. |
| Motor temperature rise [%] | | Current value of motor temperature rise in %. This value shows the relative temperature rise of the motor. |
| Remaining motor cooling time [s] | | Remaining recovery time (minimum cooling time of motor) still to be observed following activation of motor overload protection until the 3RW52 soft starter is once again ready for operation. |
| Remaining contact block cooling time [s] | | The remaining cooling time of the contact block is dependent on the thermal capacity of the power unit and the ambient conditions (temperature, air circulation, installation location etc.) |
| Contact block heating [°C] | | The currently calculated contact block temperature rise is continuously compared with the previously stored contact block temperature rise. |

7.9.4.2 Monitoring the process image of the 3RW52 soft starter with the High Feature 3RW5 HMI

Requirements

- You are in menu "Monitoring > Process Image".

Procedure

In the process image of the inputs (PII) and outputs (PIQ), you can see which bits of the process image are active or inactive.

| Checkbox | Status | Bit |
|-------------------------------------|----------|-----|
| <input type="checkbox"/> | inactive | 0 |
| <input checked="" type="checkbox"/> | active | 1 |

7.9.5 Parameterizing analog output AQ via the High Feature 3RW5 HMI

You can re-parameterize the output of the analog output with the 3RW5 HMI High Feature.

The actual average phase current L1 - L3 of the motor is displayed in % at the evaluation unit via the analog output. Depending on the respective connecting terminal being used, the signal can be displayed either as current or voltage.

- Terminals: AQ- / AQ I+
Measuring range of current output: 4 - 20 mA
- Terminals: AQ- / AQ U+
Measuring range of voltage output: 0 - 10 V

Requirements

- Access protection to 3RW5 HMI High Feature is not active or has been reset
- Device version with analog output
- Evaluation unit is connected properly. (Page 176)
- You are in menu "Parameters > Soft Starter > Analog Output".

Procedure

| Parameters | Setting range | Explanation |
|--------------------|--|---|
| Output signal type | <ul style="list-style-type: none"> • Deactivated • 4 - 20 mA (factory setting) • 0 ... 10 mA | Via the "Output signal type" parameter you can define with what type of signal the analog value is to be output. |
| Range start value | <ul style="list-style-type: none"> • 0 (factory setting) | With parameters "Range start value" and "Range end value" you can define which value of the analog value to be output corresponds to the lower output signal value and which to the upper output signal value. <ul style="list-style-type: none"> • Setting of the analog range, e.g. 4 mA = 0 • Setting of the analog range, e.g. 20 mA = 96 |
| Range end value | <ul style="list-style-type: none"> • 96 (factory setting) Corresponds to 300% of the average phase current (%). | |

Factor for calculating the output measured value

| Measured value | Factor | Unit |
|---------------------------|--------|------|
| Phase current average (%) | 3.125 | % |

Example for calculating the parameters for the range start value and range end value

The following measured values and parameters are given as an example:

- Output signal type: 4 ... 20 mA
- Measured value: Phase current average (%)
- Range start value = desired start value (e.g. 50%) / factor of the measured value
- Range end value = desired end value (e.g. 200%) / factor of the measured value

Procedure

1. Parameterize the output signal type, e.g. 4 ... 20 mA.
2. Parameterize the range start value and the range end value taking the following factor into account:
 - Range start value (e.g. 50% / 3.125%) → 16
 - Range end value (e.g. 200% / 3.125%) → 64

In this example, a pointer instrument indicates 50% (start value) at the left stop and 200% (end value) at the right stop. You can divide the scale of the pointer instrument between the left stop and the right stop, depending on the desired resolution.

Result

The output signal of the analog output has been adjusted.

7.9.6 Overview

Operating principle

The "Overview" function displays the connected components and their device-related information.

Requirements

- You are in the "Overview" menu.

Procedure

Select one of the following menus and click "OK" to confirm:

- Soft starter
- Communication module
- HMI

Depending on the selected menu item, the following device-related information is available to the respective component:

| Overview | Content | |
|---------------------------------------|--------------------------|---|
| Soft starter | Module | <ul style="list-style-type: none"> • Article number • Hardware • Firmware |
| | Module information | <ul style="list-style-type: none"> • Tag function • Tag location • Installation date • Additional information |
| | Manufacturer information | <ul style="list-style-type: none"> • Manufacturer • Serial number |
| HMI | Module | <ul style="list-style-type: none"> • Article number • Hardware • Firmware |
| | Manufacturer information | <ul style="list-style-type: none"> • Manufacturer • Serial number |
| Communication module (if existing) | Module | <ul style="list-style-type: none"> • Article number • Hardware • Firmware |
| | Manufacturer information | <ul style="list-style-type: none"> • Manufacturer • Serial number |

Note

I&M data

Please note that it is not possible to process the displayed information of the 3RW5 HMI High Feature.

7.9.7 Defining the local access protection (PIN)

Requirements

- Access protection to the 3RW5 HMI High Feature is not active or has been reset.
- You are in menu "Security > Local Access Protection".

"Define PIN" procedure

1. Choose menu "Define PIN".
In the factory setting, no PIN is active.
2. Using the navigation keys, define a 4-digit PIN and confirm your entry with "OK".
After confirmation of the entry, the PIN returns the 3RW5 HMI High Feature to the "Local access protection" menu.
The set PIN is now active.

"Change PIN" procedure

1. Select the "Change PIN" menu.
2. Log in using the current 4-digit PIN and confirm your entry with "OK".
If the entry is correct, the display of the 3RW5 HMI High Feature will show the user information "Log in was successful". Confirm with "OK".
3. Using the navigation keys, define a 4-digit PIN and confirm your entry with "OK".
The display of the 3RW5 HMI High Feature shows the user information "Log out was successful". Confirm with "OK".
After confirmation, the 3RW5 HMI High Feature returns to the "Local access protection" menu.
The changed PIN is now active.

"Delete PIN" procedure

1. Select the "Delete PIN" menu.
2. Log in using the current 4-digit PIN and confirm your entry with "OK".

If the entry is correct, the display of the 3RW5 HMI High Feature will show the user information "Log in was successful". Confirm with "OK".

After confirmation, the 3RW5 HMI High Feature returns to the "Local access protection" menu.

The current PIN has been deactivated and deleted. Define a new PIN.

Parameters

| Parameter | | Description |
|-------------------------|---------------------------------|--|
| Local access protection | Define PIN | PIN is set up and active. <ul style="list-style-type: none"> • Empty (factory setting) • 4-digit PIN |
| | Change PIN ¹⁾ | Existing PIN is changed. |
| | Delete PIN ¹⁾ | PIN is deactivated and deleted. |
| | Auto Log Off time ¹⁾ | <ul style="list-style-type: none"> • 0 min = deactivated (factory setting) • Setting range: 0 ... 60 min |
| | Log on ¹⁾ | Remove the local access protection by logging on with your 4-digit PIN. If you issue a control command or want to change a parameter when access protection is enabled, you will receive an entry prompt for the current PIN. |
| | Log out ²⁾ | Log out of your current session. Access protection is activated again. |

¹⁾ This menu can only be displayed if a PIN has been defined.

²⁾ This menu can only be seen after logging in with an active PIN.

Result

With the PIN, you can protect the 3RW5 HMI High Feature from unauthorized access. The menus of the 3RW5 HMI High Feature can still be viewed, but parameters cannot be changed with local access protection activated.

The PIN remains even after the power supply has been interrupted.

Note**Reset PIN.**

You can reset the access protection to the factory setting with the master RESET key on the rear of the 3RW5 HMI High Feature.

Protect the master RESET key from unauthorized access.

7.9.8 Micro SD card

Operating principle

In combination with a micro SD card, the 3RW5 HMI High Feature can perform firmware updates, exchange configuration files and service data, and store logbooks.

Requirements

- Access protection to the 3RW5 HMI High Feature is not active or has been reset.
- Inserted micro SD card, e.g. micro SDHC Class 10
 - File format: FAT32
 - Capacity: max. 32 GB
- You are in the "Micro SD Card" menu.

Observe the following regarding the "device replacement" procedure:

- Make sure that there is only one folder with configuration data on the micro SD card.
- Rename the folder as follows: "1P3RW5 xxx-xxx" (specify the article number instead of the placeholder "x".)

Example: When you use a soft starter of size 3 with article number "3RW5234-2AC04", name the folder as follows: "1P3RW5 234-2AC".

Parameters

The "Micro SD Card" menu appears after you have inserted a micro SD card into the 3RW5 HMI High Feature.

| Action | Description |
|--|--|
| Load communication and HMI parameters to soft starter | <p>The parameters of the communication and the 3RW5 HMI High Feature are transferred from the micro SD card to the 3RW52 soft starter. The following data is transferred:</p> <ul style="list-style-type: none"> • Device parameters of the 3RW5 HMI High Feature • Communication parameters |
| Load communication and HMI parameters to micro SD card | <p>The parameters of the communication and the 3RW5 HMI High Feature are transferred from the 3RW52 soft starter to the micro SD card. The data is saved in an automatically generated folder. The following data is transferred:</p> <ul style="list-style-type: none"> • Device parameters of the 3RW5 HMI High Feature • Communication parameters |
| Device change | <p>When a device is replaced, the configuration data and communication parameters can be transferred to the new device. The following data is transferred:</p> <ul style="list-style-type: none"> • I&M 1 data • I&M 3 data • Device parameters of the 3RW5 HMI High Feature • Communication parameters |
| Save logbooks to micro SD card | <p>The logbooks are backed up on the micro SD card. For more information, see Chapter Logbooks (Page 143).</p> |
| FW update | <ul style="list-style-type: none"> • Soft starter • Communication module • HMI • All devices <p>The firmware update is carried out if a valid firmware file is stored on the micro SD card. The 3RW5 HMI High Feature automatically detects which firmware file the micro SD card contains:</p> <p>The firmware update is documented in the device logbook.</p> <p>You can find more information on the firmware update in Chapter Performing firmware update with micro SD card (3RW5 HMI High Feature) (Page 150).</p> |
| Memory space | <ul style="list-style-type: none"> • Complete memory • Free memory • Used memory <p>The memory capacity is displayed.</p> |

Messages and diagnostics

8.1 Diagnostics options

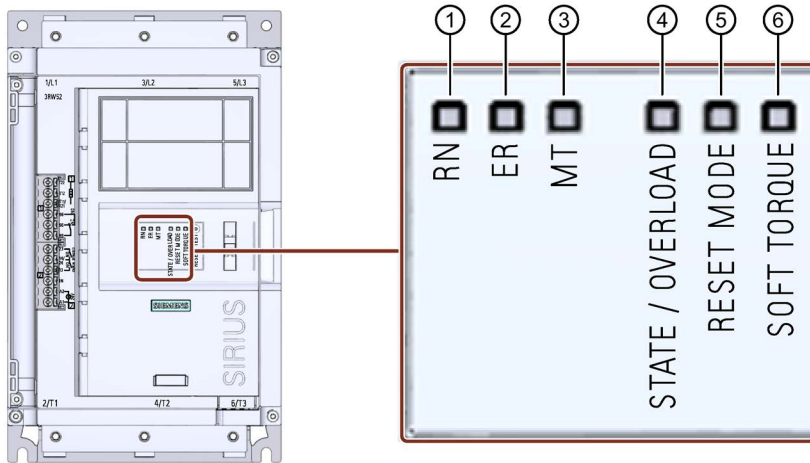
The 3RW52 soft starter offers the following diagnostics options:

- LEDs on the 3RW52 soft starter
- 3RW5 HMI Standard (accessories)
- 3RW5 HMI High Feature (accessories)
- SIRIUS Soft Starter ES (TIA Portal) (accessories) via 3RW5 communication module or 3RW5 HMI High Feature (local interface)

You will find more details in the equipment manual for the 3RW5 communication module in question.

8.2 LED display



8.2.1 Overview of the device LEDs of the 3RW52 soft starter




- | | |
|--|--|
| ① RUN (green) | Indicates whether the 3RW52 soft starter is ready for operation. |
| ② ERROR (red) | Indicates whether there is an error. |
| ③ MAINTAINANCE (amber) | Indicates whether a message is present. |
| ④ STATE / OVERLOAD with LED (green / yellow / red) | Indicates the motor operating state. |
| ⑤ RESET MODE with LED (green) | Indicates the selected RESET MODE (Page 83). |
| ⑥ Soft Torque with LED (green) | Indicates whether Soft Torque (Page 83) is activated or deactivated. |

8.2.2 Status and error displays


LED "RN" - RUN

| State | Meaning |
|--|--|
|  Lights up green | The 3RW52 soft starter is ready for operation. |
|  Flashes green | The 3RW52 soft starter is not ready, e.g. due to: <ul style="list-style-type: none"> • System startup • Device factory settings are being restored. • Self-test active • Firmware update |




LED "ER" - ERROR

| State | Meaning |
|--|------------------------------|
| <input type="checkbox"/> Off | No errors are present. |
|  Flashes red | There is at least one error. |








LED "MT" - MAINTENANCE / WARNING

| State | Meaning |
|---|---|
| <input type="checkbox"/> Off | No alarm is active. |
|  Lights up yellow | At least one warning exists. The cause has not been eliminated. |

LED combinations

| State | | | Meaning |
|--|--|---|--|
| RN | ER | MT | |
|  Flashes green |  Flashes red |  Flashes yellow | <ul style="list-style-type: none"> • The 3RW52 soft starter is not ready for operation. • Device error detected. |

8.2.3 LED STATE / OVERLOAD



| LED ST/OL | Status of the 3RW52 soft starter | Motor operating state |
|--|---------------------------------------|--|
|  Lights up green | Operation | The ramp-up time comes to an end and the motor is running. |
|  Flashes green | Ramp-up or ramp-down time active | <ul style="list-style-type: none"> Motor is ramping up or ramping down. |
|  Off | Stop | <ul style="list-style-type: none"> Motor is switched off but might still be rotating. Motor is ready to start. |
|  Flashes yellow | Stop - not ready to start | <ul style="list-style-type: none"> Motor is switched off but might still be rotating. Motor is not ready to start. An ON command will cause an error while at least one of the starting conditions is not fulfilled, e.g.: <ul style="list-style-type: none"> Supply voltage of motor missing. |
|  Flashing green / yellow | Operation with motor overload warning | <p>Motor has started up and is running. A motor overload warning exists, e.g.:</p> <ul style="list-style-type: none"> Motor is too hot Temperature sensor wire break Temperature sensor short circuit |
|  Lights up yellow | Stop with motor overload warning | <p>Motor has decelerated to zero speed and shut down. A motor overload warning exists, e.g.:</p> <ul style="list-style-type: none"> Motor is too hot |
|  Flashes red | Stop with motor overload error | <p>Motor has decelerated to zero speed and shut down due to an overload error. A motor overload error exists, e.g.:</p> <ul style="list-style-type: none"> Motor is too hot Temperature sensor wire break Temperature sensor short circuit |

8.2.4 Overview of LEDs on Standard 3RW5 HMI

Display of the device LEDs of the 3RW5 HMI Standard shows the messages of the following devices:

- 3RW5 soft starter
- 3RW5 communication module (if there is one)

Status LED

| Status LED | Status of the soft starter | Motor operating state |
|--|----------------------------------|---|
|  Lights up green | Operation | The ramp-up time is over, the motor is running, and the soft starter is in bypass mode. |
|  Flashes green | Ramp-up or ramp-down time active | Motor is ramping up or ramping down. |

Reference

You will find more information on the messages of the soft starter in the Chapter Status and error displays (Page 129).

You will find more information on the messages of the 3RW5 communication module in the equipment manual for the 3RW5 communication module in question.

The display on the status LEDs of the Standard 3RW5 HMI indicates the state of the soft starter and the operating state of the motor.

8.2.5 Overview of LEDs on High Feature 3RW5 HMI

The display of the device LEDs of the 3RW5 HMI High Feature shows the messages of the following devices:



- 3RW5 soft starter
- 3RW5 communication module (if there is one)
- 3RW5 HMI High Feature

Note

Display of device LEDs.

Please note that the display of the device LEDs of the 3RW5 HMI High Feature does not have to correlate with the display of the device LEDs of the 3RW5 soft starter.

Status LED

| Status LED | Status of the soft starter | Motor operating state |
|---|----------------------------------|---|
|  Lights up green | Operation | The ramp-up time is over, the motor is running, and the soft starter is in bypass mode. |
|  Flashes green | Ramp-up or ramp-down time active | Motor is ramping up or ramping down. |

Reference

You will find more information on soft starter messages in the Chapter "Status and error displays (Page 129)".

You will find more information on the messages of the 3RW5 communication module in the manual for the 3RW5 communication module in question.

8.3 Warnings and remedial measures

| Warning | Cause | Remedy |
|---------------------------------|---|--|
| Connection abort in manual mode | Connection to a local control station (e.g. device HMI) has been interrupted. | <ul style="list-style-type: none"> • Check the connection between the HMI and the device. • Check the connection between the PC and the local device interface. |
| Contact block overload | Contact block (switching contact, power semiconductor) too hot | <ul style="list-style-type: none"> • Check the ambient conditions linked to cooling. You might have to take derating into consideration. • Check the number of switching operations. |
| Therm. motor model overload | <ul style="list-style-type: none"> • The motor feeder has been overloaded. • The motor temperature rise has exceeded a limit. | <ul style="list-style-type: none"> • Please check the motor and the applications that are being driven by the motor. • After tripping, you can switch on the motor again after the cooling time has expired or after clearing the thermal memory of the motor. |
| Internal fan fault | <ul style="list-style-type: none"> • Internal fan is dirty (not rotating freely). • Connecting cable has fallen off or is defective. • Internal fan faulty | <ul style="list-style-type: none"> • Check the function of the fan. • Clean the fan. • Check the wiring. • Replace the fan. |

8.4 Faults and remedial actions of the 3RW52 soft starter

| Error No. ¹⁾ | Fault | Cause | Remedy | Manual RESET | Remote RESET | Auto RESET |
|-------------------------|------------------------------------|--|---|-----------------|-----------------|-----------------|
| 303 | Bus fault | - | <ul style="list-style-type: none"> Acknowledgment via Auto RESET | - | - | x |
| 308 | Switching element defective | - | <ul style="list-style-type: none"> Check switching elements L1, L2, and L3. Replace the defective devices. | - | - | - |
| 309 | Switching element overload | Switching element (switching contact, power semiconductor) too hot. | <ul style="list-style-type: none"> Check the ambient conditions linked to cooling. You might have to take derating into consideration. Check the number of switching operations. Acknowledgment after cooling down | x | x | - |
| 317 | Electronics supply voltage too low | The supply voltage is below the permissible value. | <ul style="list-style-type: none"> Check the power supply (load dimensioning, voltage range). | - | - | x |
| 319 | No supply voltage | <ul style="list-style-type: none"> The power switch is open or the power supply is not correctly connected. No current | <ul style="list-style-type: none"> Inspect the cables and the cable connections and replace any faulty components. | x | x | - |
| 324 | Temperature sensor overload | The temperature of the motor is too high. | <ul style="list-style-type: none"> Check the motor and the application that is driven by the motor. After tripping, you cannot switch on the motor again until the temperature has reached the switching point of the temperature sensor. | x ²⁾ | x ²⁾ | x ²⁾ |

| Error No. 1) | Fault | Cause | Remedy | Manual RESET | Remote RESET | Auto RESET |
|--------------|--|---|--|-----------------|-----------------|-----------------|
| 325 | Temperature sensor wire break | A wire has broken in the sensor cable of the temperature sensor. | <ul style="list-style-type: none"> Check the sensor cable and the temperature sensor. | x ²⁾ | x ²⁾ | x ²⁾ |
| 326 | Temperature sensor short circuit | A short circuit has occurred in the temperature sensor cable. | <ul style="list-style-type: none"> Check the sensor cable and the temperature sensor. | x ²⁾ | x ²⁾ | x ²⁾ |
| 327 | Therm. motor model overload | <ul style="list-style-type: none"> The motor feeder has been overloaded. The motor temperature rise has exceeded a limit. | <ul style="list-style-type: none"> Please check the motor and the applications that are being driven by the motor. After tripping, you can switch on the motor again after the cooling time has expired or after clearing the thermal memory of the motor. | x ²⁾ | x ²⁾ | x ²⁾ |
| 328 | Motor overload tripping | <ul style="list-style-type: none"> The motor feeder has been overloaded The temperature rise of the motor has exceeded a limit value. | <ul style="list-style-type: none"> Please check the motor and the applications that are being driven by the motor. After tripping, you can switch on the motor again after the cooling time has expired or after clearing the thermal memory of the motor. | x ²⁾ | x ²⁾ | x ²⁾ |
| 378 | Installed firmware is invalid / inconsistent | The firmware is incomplete and / or the firmware expansions are incomplete or incompatible. | <ul style="list-style-type: none"> Execute a complete firmware update. Check any occurring error messages. Check to see whether the firmware update has been interrupted. | - | - | x |

8.4 Faults and remedial actions of the 3RW52 soft starter

| Error No. ¹⁾ | Fault | Cause | Remedy | Manual RESET | Remote RESET | Auto RESET |
|-------------------------|---|--|--|--------------|--------------|------------|
| 381 | Device error | Irrecoverable fault detected following self-diagnostics (self-test, contactor contacts, switching element, etc.). | <ul style="list-style-type: none"> Replace the device. Please contact Technical Support (Support Request (Page 31)). | - | - | - |
| 1408 | Zero current after ON command | <p>No current flow is detected in the motor feeder after an ON command. Possible causes:</p> <ul style="list-style-type: none"> Main circuit is interrupted (fuse, motor starter protector) Motor contactor or contactor control is defective No load | <ul style="list-style-type: none"> Acknowledgment once the cause has been rectified. | x | x | - |
| 1409 | Phase failure L1 | The main energy monitoring system has detected a phase failure. | <ul style="list-style-type: none"> Acknowledgment once the cause has been rectified. | x | x | - |
| 1410 | Phase failure L2 | | | | | |
| 1411 | Phase failure L3 | | | | | |
| 1417 | Bypass defective | <ul style="list-style-type: none"> Bypass defective The error can also be generated by successive, brief interruptions of the control supply voltage. | <ul style="list-style-type: none"> Check the bypasses for L1, L2 and L3 and replace any that are defective. Please contact Technical Support (Support Request (Page 31)). | - | - | - |
| 1418 | Bypass protective trip | An excessively high current has occurred in bypass mode. | <ul style="list-style-type: none"> Check the motor. Check the dimensioning of the soft starter. Acknowledgment after cooling down | x | x | - |
| 1454 | Incorrect module slot or faulty configuration | There is a difference between a real slot and a slot configured in the SIRIUS Soft Starter ES (TIA Portal). | <ul style="list-style-type: none"> Ensure consistency between plugged and configured module. A wiring error may also exist at the referenced module. After the cause is eliminated, the error self-acknowledges. | - | - | - |

| Error No. ¹⁾ | Fault | Cause | Remedy | Manual RESET | Remote RESET | Auto RESET |
|-------------------------|--|--|--|--------------|--------------|------------|
| 1466 | Contact 1 failed | Switching element defective | <ul style="list-style-type: none"> • Check the switching elements for L1, L2, and L3 and replace any that are defective. • Please contact Technical Support (Support Request (Page 31)). | - | - | - |
| 1467 | Contact 2 failed | | | | | |
| 1468 | Contact 3 failed | | | | | |
| 1479 | Phase angle control failure | <ul style="list-style-type: none"> • Error occurs without motor starting: <ul style="list-style-type: none"> - Motor terminals are incorrectly connected. - Error in configuration of inside-delta circuit. - There is a ground fault. • Fault occurs during starting: <ul style="list-style-type: none"> - Chosen starting voltage too high | <ul style="list-style-type: none"> • Check and correct the wiring. • Adapt parameters. | x | x | - |
| 1482 | Current measuring range overshoot | <ul style="list-style-type: none"> • With sensors: The measured value has exceeded the range limits. • With actuators: The output value has exceeded an upper limit value. | <ul style="list-style-type: none"> • Check the interaction between the module and the sensor or actuator. | x | x | - |
| 1523 | Device error | Irrecoverable fault detected following self-diagnostics (self-test, contactor contacts, switching element, etc.). | <ul style="list-style-type: none"> • Replace the device. • Please contact Technical Support (Support Request (Page 31)). | - | - | - |
| 1755 | Overtemperature of electronic components | The temperature in the components has exceeded the maximum limit. | Check the ambient temperature or the control cabinet cooling. | | | |

1) Visible on the display of the 3RW5 HMI Standard.

2) Acknowledgment depends on parameter RESET MODE.

8.5 Faults and remedial actions on the 3RW5 HMI High Feature

| Faults | Cause | Remedy |
|--|---|--|
| HMI Fault | Unrecoverable error detected after internal diagnostics (self-test, etc.). | Replace the device. |
| FWUpdateUnsuccessful | The firmware is incomplete and/or the firmware expansions are incomplete or incompatible. | <ul style="list-style-type: none"> • Run a complete firmware update. • Check any occurring error messages. • Check to see whether or not the firmware update was aborted. |
| FWUpdateInvalidSignature | | |
| Error during self-test | Unrecoverable error detected after internal diagnostics (self-test, etc.). | Replace the device. |
| LIDefective | | |
| Local interface disabled due to flooding | Too many requests to the local device interface | The interface remains disabled until it is no longer flooded with requests. |
| Write Error | File cannot be written to the micro SD card. | <ul style="list-style-type: none"> • Check whether the micro SD card is inserted. • Check whether the micro SD card is write-protected. |
| ReadError | File cannot be read from the micro SD card. | <ul style="list-style-type: none"> • Check whether the micro SD card is inserted. • Create and copy a new file onto the micro SD card. |
| File system error | Micro SD card cannot be read. | Format the micro SD card using FAT32 file format. |
| No device answer | The connection to the connected basic unit has been interrupted. | Check the connection between the HMI and the device. |

8.6 RESET MODES

Note

Note**Effects of RESET MODE.**

Setting of the RESET MODE will only affect acknowledgment response of the motor overload protection.

You will find more information in Chapter Faults and remedial actions of the 3RW52 soft starter (Page 134) with the comment "Depends on parameter RESET MODE".

Manual RESET

"Manual RESET" means that the following options are available for acknowledging faults:

- RESET / TEST key on 3RW52 soft starter
- RESET / TEST key on 3RW5 HMI Standard
- Reset via bus interface
- Reset via F key on 3RW5 HMI High Feature
- Reset via 3RW5 HMI High Feature

Remote RESET

"Remote RESET" means that faults are acknowledged by switching the control supply voltage off and on again. The control supply voltage on the 3RW52 soft starter must be switched off for at least 4 s.

Auto RESET

"Auto RESET" means that faults are automatically reset as soon as the cause is eliminated.

8.7 Diagnostics of the 3RW52 soft starter with the 3RW5 HMI High Feature

Requirements

- You are in the "Diagnosis > Soft Starter" menu.

Parameters

| Diagnostic value | | Comment |
|------------------------------|---|---|
| Diagnosis state | | Shows all active warnings and faults. You can acknowledge faults here (manual RESET). |
| Device state | Type of connection | If the 3RW52 soft starter is supplied with primary voltage and a motor is connected, the type of connection is automatically detected. <ul style="list-style-type: none"> Type of motor connection unknown Type of motor connection inline Type of motor connection inside delta |
| | Rotation direction | <ul style="list-style-type: none"> Unknown (direction of phase rotation of the power system at terminals L1/L2/L3 not detected) CW CCW |
| Statistic data ¹⁾ | Phase current max (%) | The statistic data is based primarily on operating states relating to operating hours and operating frequency of the 3RW52 soft starter in the past. |
| | Last tripping current I _A (%) | |
| | Operating hours – device | |
| | Number of starts motor CW | |
| | Number of motor overload trips | |
| | Phase current max (rms) | |
| | Last tripping current I _A (rms) | |
| | Operating hours - motor | |
| | Operating hours - motor current = 18 ... 49.9% x I _e max | |
| | Operating hours - motor current = 50 ... 89.9% x I _e max | |
| | Operating hours - motor current = 90...119.9% x I _e max | |
| | Operating hours - motor current = 120...1000% x I _e max | |
| | Number of switching element overload trips | |
| | Number of bypass overload trips | |

8.7 Diagnostics of the 3RW52 soft starter with the 3RW5 HMI High Feature

| | | |
|---|---|---|
| Maximum pointer ¹⁾ | Minimum phase current I L1 (%) | Maximum pointers are based on measured values and represent the highest or smallest measured value that occurred in the past. |
| | Phase current I L2 min (%) | |
| | Phase current I L3 min (%) | |
| | Maximum phase current I L1 (%) | |
| | Phase current I L2 max (%) | |
| | Phase current I L3 max (%) | |
| | Maximum trigger current | |
| | Number of motor overload trips | |
| | Maximum trigger current | |
| | Minimum phase current I L1 (rms) | |
| | Phase current I L2 min (rms) | |
| | Phase current I L3 min (rms) | |
| | Maximum phase current I L1 (rms) | |
| | Phase current I L2 max (rms) | |
| | Phase current I L3 max (rms) | |
| | Maximum switching element heating | |
| | Operating hours - motor current = 18 ... 49.9% x I _e | |
| | Operating hours - motor current = 50 ... 89.9% x I _e | |
| | Operating hours - motor current = 90 ... 119.9% x I _e | |
| | Operating hours - motor current = 120 ... 1000% x I _e | |
| | Operating hours - device | |
| | Starting current I max (rms) | |
| | Starting current I L1 max (rms) | |
| Starting current I L2 max (rms) | | |
| Starting current I L3 max (rms) | | |
| Number of starts with ext. bypass ¹⁾ | | |
| Self-test (user-test) | Initiate here the self-test functions of the 3RW52 soft starter. For more information, see Chapter User test (Page 146). | |
| Logbooks | The logbook is a history memory in which events, warnings and faults are shown with a real-time stamp and stored in a list. The communication and HMI device logbook are also displayed here. The logbook can be stored on a micro SD card. <ul style="list-style-type: none"> • Application • Device • Delete <ul style="list-style-type: none"> – Application | |

¹⁾ From 3RW52 V2.0.0

8.8 Diagnostics of communication with the High Feature 3RW5 HMI

Requirements

- You are in the "Diagnosis > Communication" menu.

Parameters

| Diagnostic value | Comment |
|------------------|---|
| Diagnosis state | Shows all active warnings and faults. You can acknowledge faults here. |

8.9 Execute HMI diagnostics with the 3RW5 HMI High Feature

Requirements

- You are in the "Diagnosis > HMI" menu.

Parameters

| Diagnostic value | Comment | |
|------------------|---------------------------------------|--|
| Diagnosis state | Shows all active diagnostic messages. | |
| Self-test | Test LEDs | The device LEDs of the 3RW5 HMI High Feature are tested one after the other. The display of the 3RW5 HMI High Feature shows which device LED is currently being controlled. You can navigate through the test operation with the "OK" key. |
| | Test buttons | The 3RW5 HMI High Feature keys/buttons are tested one after the other. The display of the 3RW5 HMI High Feature indicates what key has to be pressed. |
| | Test display | The 3RW5 HMI High Feature runs a color program on the display. Navigate through the test operation with the "OK" key. |

8.10 Logbooks

Operating principle

The logbook lists events, warnings, and faults in chronological order. Each entry is stamped with the real time. The following logbooks are used for the 3RW52 soft starter:

- Logbook application
- Logbook device

The logbook is designed as a circular buffer.

Logbook application

The logbook application contains all messages relating to functions and parameters. This logbook is only present in the basic unit. The logbook application can be deleted with the command "Delete logbook application – xy".

Logbook device

The following messages are recorded in the device logbook:

- Device fault
- Device prewarning
- Device warnings
- Device events

The device logbook is available in every module and cannot be deleted.

More information

You can find additional information on the contents and read-out of the logbooks in the "Diagnosis > Soft starter > Logbook" menu.

You can find additional information on saving the logbooks to a micro SD card in the "Micro SD card > Save logbooks to micro SD card" menu.

Maintenance and servicing

9.1 Maintenance and repairs

Maintenance and repairs

 WARNING**Danger to life when live parts are touched**

The present device / part conducts hazardous voltages.

Touching live components can result in death or severe injury.

Installation, commissioning, and maintenance only by qualified specialist personnel.

Observe the notes included in the operating instructions and manuals of the soft starter in question.

Note

Repair of the devices is only permissible by qualified personnel. Please contact the authorized Siemens service partner for this.

9.2 User test

Requirements

- 3RW52 soft starter is in a fault-free condition.

Procedure

Depending on how long the RESET / TEST keys are held pressed, the following tests are performed in the specified sequence. Thus, if the key is held pressed for longer than 5 s, all 3 tests are performed:

| Operating time | Explanation |
|----------------|--|
| 0.15 s ... 2 s | LED test All 6 LEDs are activated. |
| 2 s ... 5 s | Current detection test Current measuring is tested in all 3 phases. The thermistor motor protection can be optionally tested for short circuits and overload. |
| > 5 s | Motor overload protection test The entire control circuit is tested, including the contact blocks and the error signaling output. If the device responds as intended, tripping on overload occurs. This can be reset immediately without a cooling time by pressing the TEST / RESET key again. |







You can also start the user test via the "Diagnosis > Self-test" menu of the 3RW5 HMI High Feature. Here the user test is run through completely.

Note


To avoid faults, perform the tests with the motor switched off.

If the 3RW52 soft starter does not respond as shown in the tables during the function test, check the connections and the supply to the 3RW52 soft starter. If the fault persists even though the connections are correct, the device must be replaced.



LED test

| LED | Display of test result | |
|--------------------|---|---------------------------------|
| | pass | fail |
| "RN" |  Lights up green | <input type="checkbox"/> Off |
| "ER" |  Lights up red | <input type="checkbox"/> Off |
| "MT" |  Lights up yellow | <input type="checkbox"/> Off |
| "STATE / OVERLOAD" |  Lights up yellow | <input type="checkbox"/> Off |
| "RESET MODE" |  Lights up green | <input type="checkbox"/> Off |
| "Soft Torque" |  Lights up green | <input type="checkbox"/> Off |

Current detection test

| LED | Display of test result | |
|--------------------|---|--|
| | pass | fail |
| "STATE / OVERLOAD" |  Flickers red | <input type="checkbox"/> Off In case of error: System LEDs (RN, ER, MT) flashing. Device fault, replace device. |

Motor overload protection test

| LED | Display of test result | |
|------------------------|--|--|
| | pass | fail |
| "STATE / OVERLOAD" |  Flashes red | <input type="checkbox"/> Off In case of error: System LEDs (RN, ER, MT) flashing. Device fault, replace device. |
| "ER" |  Flashes red | In case of error: System LEDs (RN, ER, MT) flashing. Device fault, replace device. |
| Error signaling output | Active | Not active |
| Contact blocks/motor | Off | Unchanged |

Self-test of the 3RW5 HMI High Feature

You will find more information on the self-test of the 3RW5 HMI High Feature in Chapter Execute HMI diagnostics with the 3RW5 HMI High Feature (Page 142).

9.3 Firmware update

During operation, it may be necessary to update the firmware (e.g. to extend the available functions). You update the firmware of the device with the help of firmware files. The retentive data is retained after the firmware has been updated.

Firmware updates are provided to you on the Internet. Depending on what firmware updates are available, you can update the devices individually or together.

You can perform a firmware update for the following devices:

- 3RW5 soft starter
- 3RW5 HMI High Feature (not possible via fieldbus)
- 3RW5 communication modules

Requirements

- Valid firmware update
Link (<https://support.industry.siemens.com/cs/ww/en/ps/16212/dl>)

Procedure

1. Make sure that the motor is switched off and you do not start the motor during the firmware update.

A control command for starting the motor is not supported during the firmware update. Make sure that the main voltage is only applied to the 3RW5 soft starter when it is necessary.

To ensure the quickest and most fault-free firmware update, it is recommended that you disconnect the main voltage of the 3RW5 soft starter and set the CPU / PLC to STOP state.

2. Perform the update of the device firmware.

The following procedures are possible:

- Via the local interface of the 3RW5 HMI High Feature with SIRIUS Soft Starter ES (TIA Portal)
- With a fieldbus via a 3RW5 communication module with SIRIUS Soft Starter ES (TIA Portal) Premium or the configuration software of the controller (e.g. STEP 7 with corresponding HSP) (depending on the 3RW5 communication module)
- With a micro SD card via the 3RW5 HMI High Feature (Page 150)

Result

You have performed a firmware update for the selected device. The selected device automatically restarts.

Note

Firmware update of the 3RW5 HMI High Feature:

Please note that the display switches off for about 30 seconds when the firmware is activated.

9.4 Performing firmware update with micro SD card (3RW5 HMI High Feature)

Requirements

- Micro SD card with valid firmware file (*.upd)
- The valid firmware file is located in the root directory (topmost level)
- You are in the "Micro SD card > FW Update" menu.

Procedure

Note

Access to micro SD card.

Please note that the micro SD card is inserted in the 3RW5 HMI High Feature during updating of the firmware.

Premature removal of the micro SD card from the 3RW5 HMI High Feature is not permissible and will terminate updating of the firmware. Data could also be lost.

- Select the folder of the respective device.
- Select the firmware file of the device and confirm with "OK".

You can see the firmware update is being performed from the progress bar on the display.

Following successful updating of the firmware, the respective device then restarts automatically.

Note

Firmware update of the 3RW5 HMI High Feature:

Please note that the display switches off for about 30 seconds when the firmware is activated.

- Check the new firmware version in the "Overview" menu.

Result

You have performed a firmware update for the selected device using the micro SD card.

9.5 Restore factory setting

Effects of the factory setting

The following devices can be reset to the factory setting:

- 3RW52 soft starter
 - The parameters of the 3RW52 soft starter that were not set via the setting elements are reset.
- 3RW5 communication module
 - The parameters of the 3RW5 communication module are reset.
- 3RW5 HMI High Feature
 - The parameters of the 3RW5 HMI High Feature and the PIN for access protection are reset to the factory setting.
- All devices
 - The 3RW52 soft starter, the 3RW5 communication module, and the 3RW5 HMI High Feature are reset to the factory settings, as described above.

Procedure

1. Make sure that the motor is switched off and you do not start the motor while restoring the factory settings.

Make sure that the main voltage is only applied to the 3RW5 soft starter when it is necessary.

2. Restore the factory settings.

The following procedures are possible:

- Via the local interface on the 3RW5 HMI High Feature with SIRIUS Soft Starter ES (TIA Portal)
- With a fieldbus via a 3RW5 communication module (depending on the respective 3RW5 communication module) with SIRIUS Soft Starter ES (TIA Portal) Premium
- With a fieldbus via a 3RW5 communication module (depending on the respective 3RW5 communication module) with the configuration software of the controller (e.g. STEP 7). Only the communication parameters are reset here.
- Via the 3RW5 HMI High Feature

Restoring the factory settings via High Feature 3RW5 HMI (Page 152)

Restoring the factory settings with the Master RESET button via 3RW5 HMI High Feature (Page 153)

Result

The factory setting of the selected device or all devices is restored.

9.5.1 Restoring the factory settings via High Feature 3RW5 HMI

Requirements

- Access protection to 3RW5 HMI High Feature is not active or has been removed.
- You are in menu "Parameters > Factory Settings"
- The 3RW5 HMI High Feature (LOCAL) has control priority.

Procedure

1. Select the desired menu item.
 - 3RW5 soft starter
 - Communication module
 - 3RW5 HMI High Feature
 - All
2. Confirm the menu item.

Result

The factory setting of the selected device or all devices is restored.

Note the effects of the factory settings described in Chapter Restore factory setting (Page 151).

9.5.2 Restoring the factory settings with the Master RESET button via 3RW5 HMI High Feature

Requirements

- Free access to the Master RESET key of the 3RW5 HMI High Feature
Removing the High Feature 3RW5 HMI (Page 45)
- 3RW5 HMI High Feature is connected to the soft starter via the HMI connecting cable.

Procedure

1. Press the Master RESET key on the rear of the 3RW5 HMI High Feature.
The menu for restoring the factory setting appears on the display.
2. Select the desired menu item.
 - 3RW5 soft starter
 - Communication module
 - 3RW5 HMI High Feature
 - All
3. Confirm the menu item with "OK".

Result

The factory setting of the selected device or all devices is restored.

Note the effects of the factory settings described in Chapter Restore factory setting (Page 151).

Technical specifications

10.1 Technical data in Siemens Industry Online Support

Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/16212/td>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data link."

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a search bar with the text "Enter keyword...". Below it, there are three input fields: "Product" containing "3RW2011-4BA10", "Entry type" containing "Technical data (1)", and "Date" with "From" and "To" sub-fields. Below the search bar, there is a "Search product" button. The search results section shows a product card for "3RW2011-4BA10" with a description: "CIRCUIT BREAKER, SCREW TYPE, 20 A CIRCUIT BREAKER SIZE S2, FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14, 20A, N-RELEASE 20DA, SCREW TERMINAL, STANDARD BREAKING CAPACITY". Below the description, there are navigation links: "> Product details", "Technical data", and "> CAx data".

Overview tables technical data

You will find overview tables with technical data in the "Product information" tab in our online ordering system (<https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/10024029?tree=CatalogTree>).

Dimension drawings

11.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/16212/td>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link."

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a search bar with the text "Enter keyword...". Below the search bar, there are three filters: "Product" with the value "3RW2021-4DA10", "Entry type" with the value "Technical data (1)", and "Date" with "From" and "To" fields. Below the filters, there is a search button labeled "> Search product". The search results are displayed in a list, with the first result being "3RW2021-4DA10" with a description: "CIRCUIT BREAKER, SCREW TYPE, 20 A, CIRCUIT BREAKER SIZE S2, FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14, 20A, N-RELEASE 20DA, SCREW TERMINAL, STANDARD BREAKING CAPACITY". Below the description, there are three links: "> Product details", "> Technical data", and "> CAx data".

Circuit diagrams

12.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/16212/td>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link."

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a search bar with the text "Enter keyword..." and a magnifying glass icon. Below the search bar, there are three filters: "Product" with the value "3RV2021-4BA10", "Entry type" with the value "Technical data (1)", and "Date" with "From" and "To" fields. Below the filters, there is a search button labeled "> Search product". The search results are displayed in a list. The first result is for the product "3RV2021-4BA10", which is a circuit breaker. The description of the product is: "CIRCUIT BREAKER, SCREW TYPE, 20 A, CIRCUIT BREAKER SIZE S2, FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14, 20A, N-RELEASE 20DA, SCREW TERMINAL, STANDARD BREAKING CAPACITY". Below the description, there are three navigation links: "> Product details", "> Technical data", and "> CAx data". The "CAx data" link is highlighted with a red box.

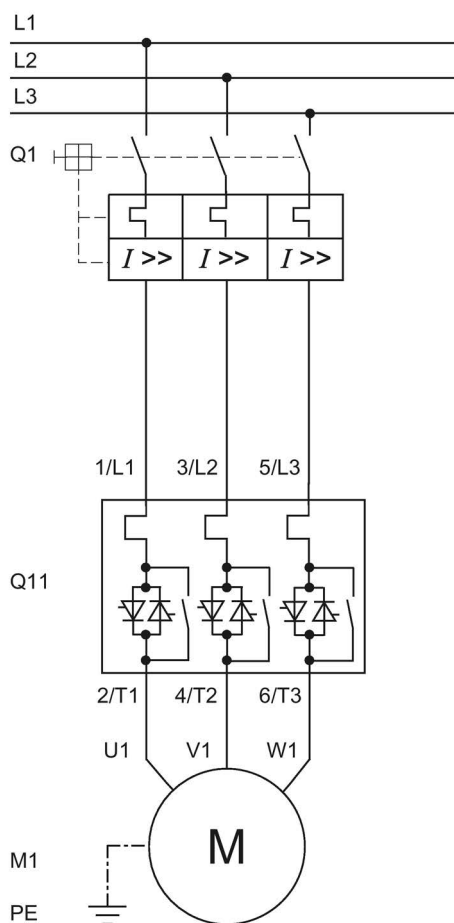
Example circuits

A.1 Main circuit connection

A.1.1 Feeder assembly, type of coordination 1 fuseless

Feeder assembly, type of coordination 1 fuseless

The connections of the SIRIUS soft starter are wired into the motor feeder between the motor starter protector and the motor. This achieves type of coordination 1.



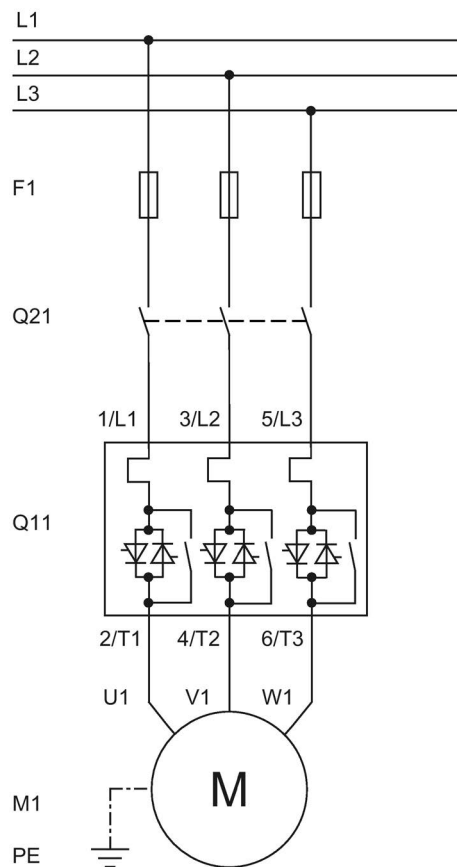
- Q1 Motor starter protector (e.g. 3RV2 or 3VA)
- Q11 Soft starter
- M1 Motor
- PE Protective conductor

A.1.2 Feeder assembly, type of coordination 1 with fuses

If a main or line contactor is used, it should not be connected between the soft starter and the motor. The soft starter could otherwise indicate a "Missing load voltage" fault in case of a start command and delayed connection of the contactor.

Feeder assembly, type of coordination 1 with fuses

If galvanic isolation is required, install a main or line contactor between the soft starter and the fuses.

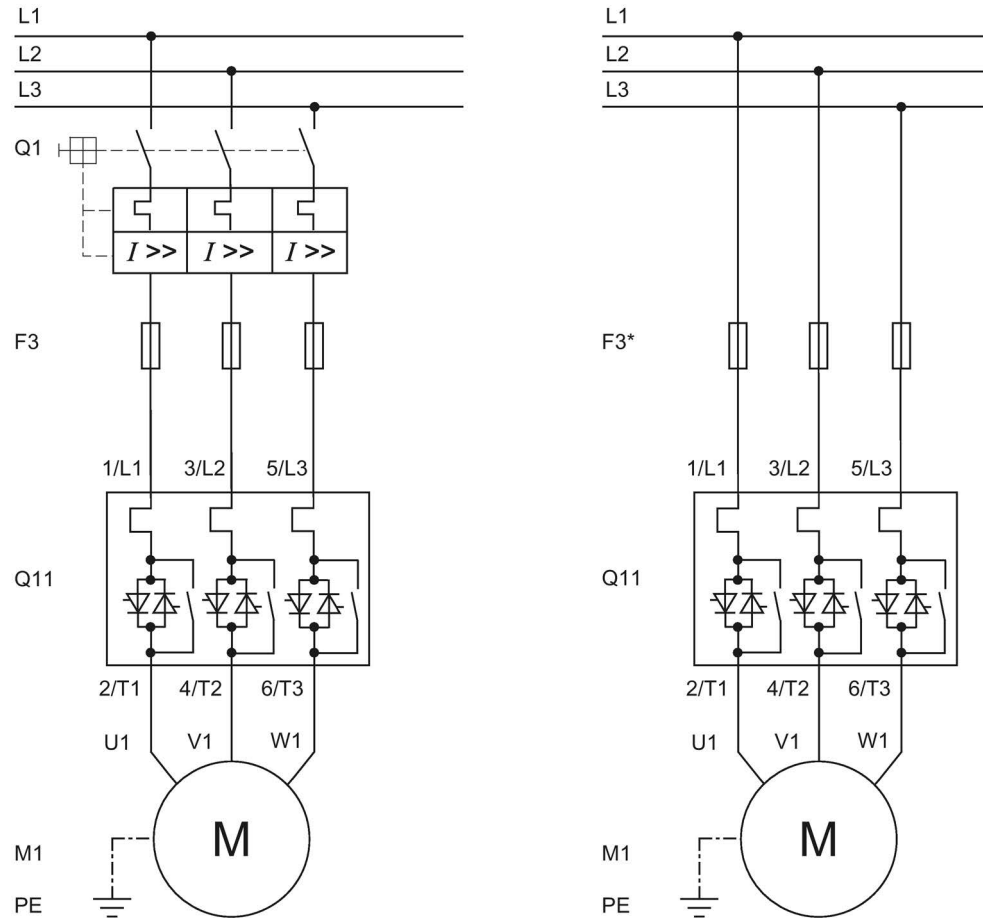


- F1 gG full-range fuse for cable and line protection (e.g. 3NA3)
- Q21 Main or line contactor for galvanic isolation
- Q11 Soft starter
- M1 Motor
- PE Protective conductor

A.1.3 Feeder assembly, type of coordination 2

Feeder assembly, type of coordination 2

In order to achieve type of coordination 2, you must provide protection for all thyristors against short circuits by means of special semiconductor fuses (e.g. SITOR fuses from Siemens). A short circuit can occur, for instance, as a result of a defect in the motor windings or in the motor's power supply cable.



- Q1 Motor starter protector
- F3 aR partial-range fuse for protection of semiconductors (e.g. SITOR 3NE3/4 or 3NC3)
- F3* gR full-range fuse for protection of semiconductors (e.g. SITOR 3NE1)
- Q11 Soft starter
- M1 Motor
- PE Protective conductor

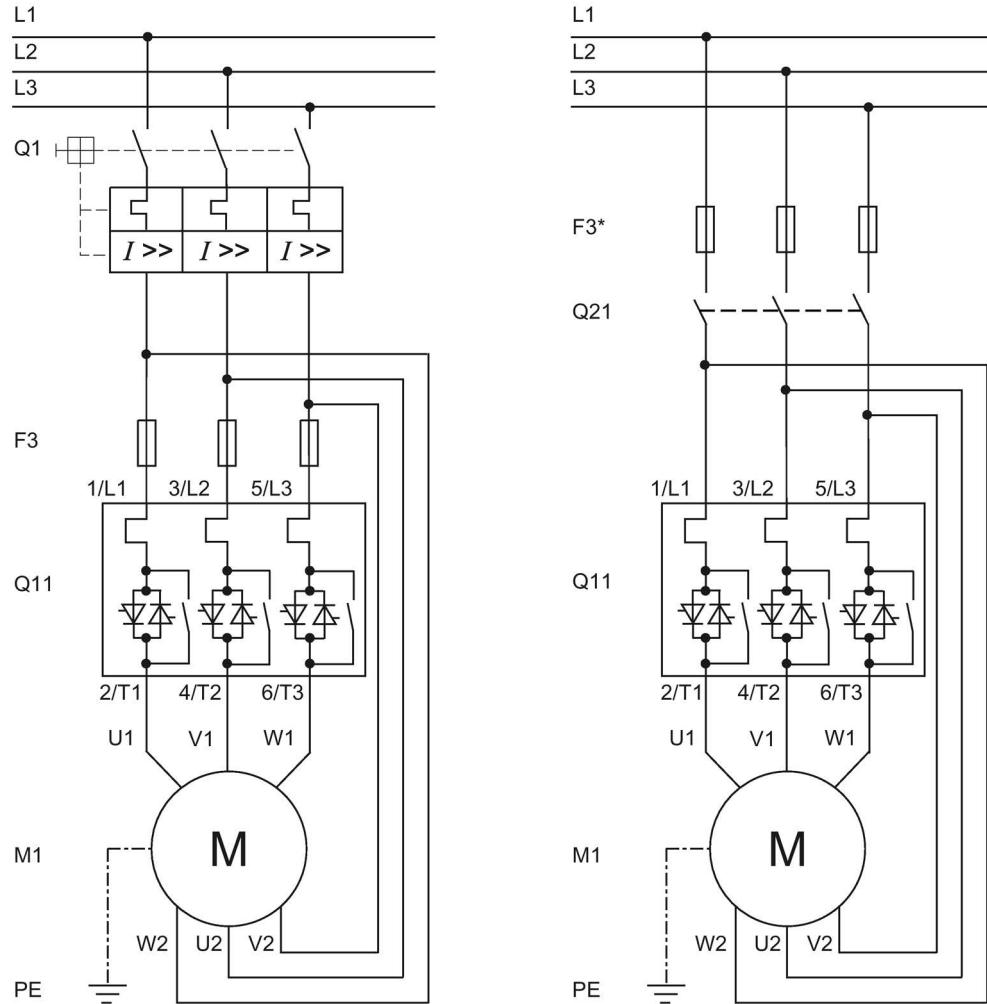
A.1.4 Inside-delta circuit

The inside-delta circuit requires a motor with windings that can be connected in a delta circuit where a line voltage prevails.

If the soft starter is operated in an inside-delta circuit, the motor power output of the individual devices is increased by a factor of root 3. On the front of the device behind the hinged cover, you will find a value table with increased current values for an inside-delta circuit.

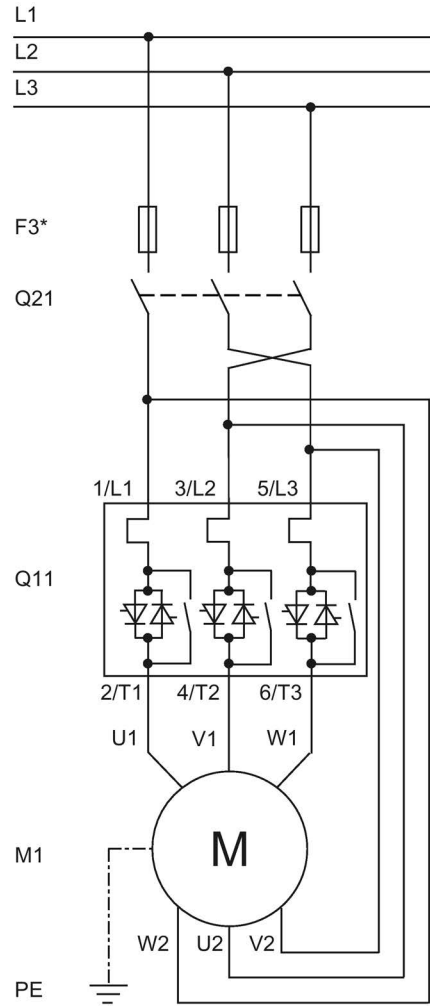
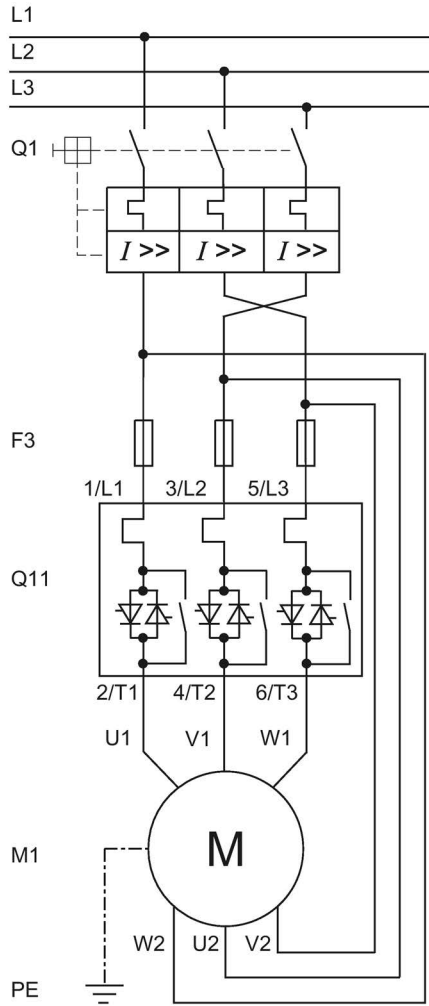
If the load voltage is present and the motor is connected to the device, the soft starter automatically detects the type of connection.

Motor rotation in line phase direction



- Q1 Motor starter protector
- F3 aR partial-range fuse for protection of semiconductors (e.g. SITOR 3NE3/4 or 3NC)
- F3* gR full-range fuse for protection of semiconductors (e.g. SITOR 3NE1)
- Q11 Soft starter
- Q21 Main or line contactor for galvanic isolation
- M1 Motor
- PE Protective conductor

Motor rotation contrary to the line phase direction



- Q1 Motor starter protector
- F3 aR partial-range fuse for protection of semiconductors (e.g. SITOR 3NE3/4 or 3NC)
- F3* gR full-range fuse for protection of semiconductors (e.g. SITOR 3NE1)
- Q11 Soft starter
- Q21 Main or line contactor for galvanic isolation
- M1 Motor
- PE Protective conductor

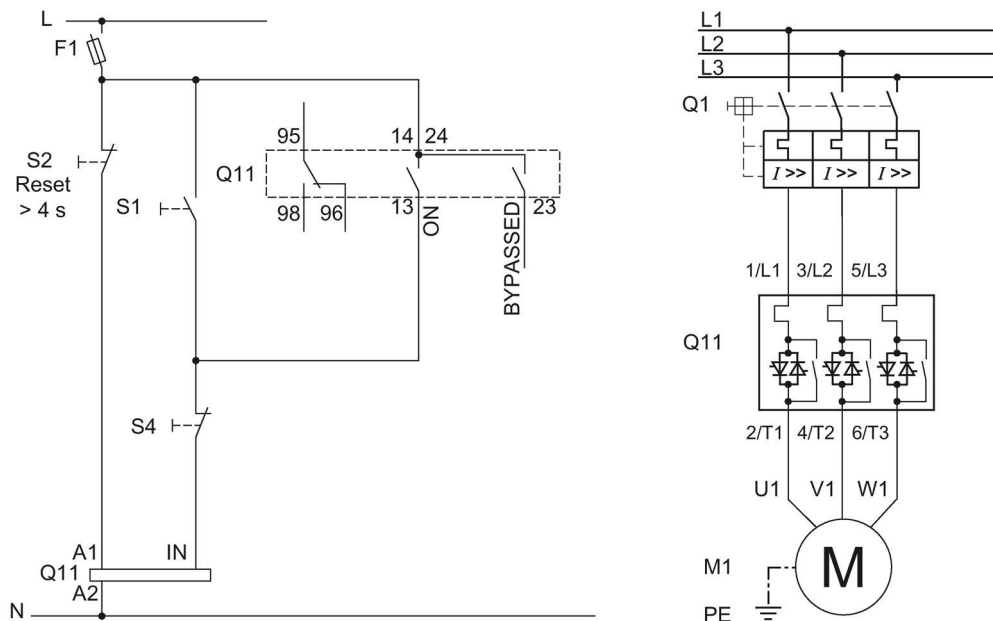
A.2 Control circuit connection

A.2.1 Control by pushbutton

Requirements

- ON / RUN relay output was parameterized to ON

Wiring of control circuit for control by pushbutton



| | |
|-----|-------------------------|
| F1 | Fuse |
| S1 | Pushbutton: Start motor |
| S2 | Pushbutton: Reset > 4 s |
| S4 | Pushbutton: Stop motor |
| Q1 | Motor starter protector |
| Q11 | 3RW52 soft starter |
| M1 | Motor |
| PE | Protective conductor |

Alternatively, the motor feeder can be assembled as a fuseless or fused version with type of coordination 1 or 2.

A.2.2 Control by switch

! WARNING

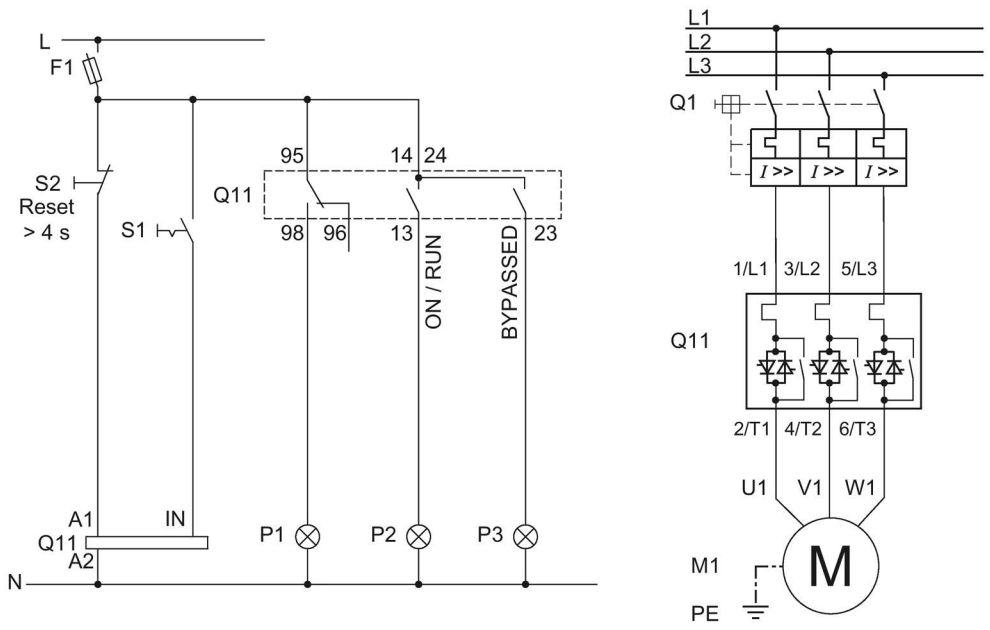
**Automatic restart.
Can cause death or serious injury.**

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

To do this, for example, link the group error output (terminals 95 and 96) into the control.

Wiring of control circuit for control by switch

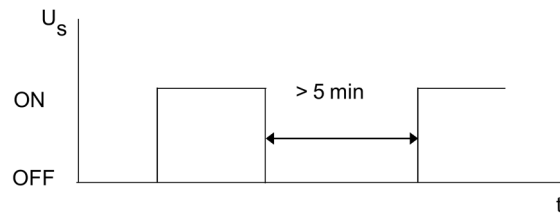


- F1 Fuse
- S1 Switch
- S2 Pushbutton: Reset > 4 s
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- M1 Motor
- P1 Indicator light
- P2 Indicator light
- P3 Indicator light

A.2.3 Switching with the control supply voltage

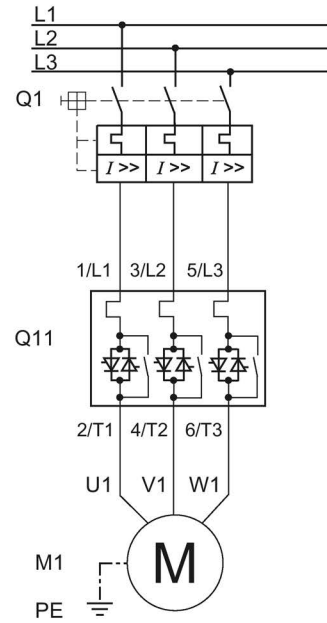
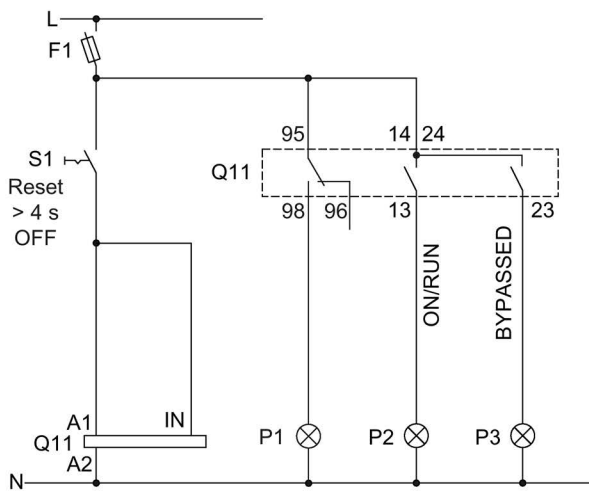
Requirements

- Owing to the intrinsic protection, an interval of at least 5 minutes must be allowed to elapse before the device is restarted if the device is switched on and off in normal operation by means of the control supply voltage.



| |
|---|
| <p>! WARNING</p> <p>Automatic restart. Can cause death or serious injury.</p> <p>If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.</p> <p>Reset the start command (e.g. via the PLC or switch) before performing a reset.</p> <p>To do this, for example, link the group error output (terminals 95 and 96) into the control.</p> |
|---|

Wiring control circuit on switching with the control supply voltage



- F1 Fuse
- S1 Switch: Reset > 4 s OFF
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- M1 Motor
- P1 Indicator light
- P2 Indicator light
- P3 Indicator light
- PE Protective conductor

A.2.4 Control by PLC

Requirements

- Utilization of a 3RW52 soft starter...4 (24 V) and power supply with DC voltage.

! WARNING

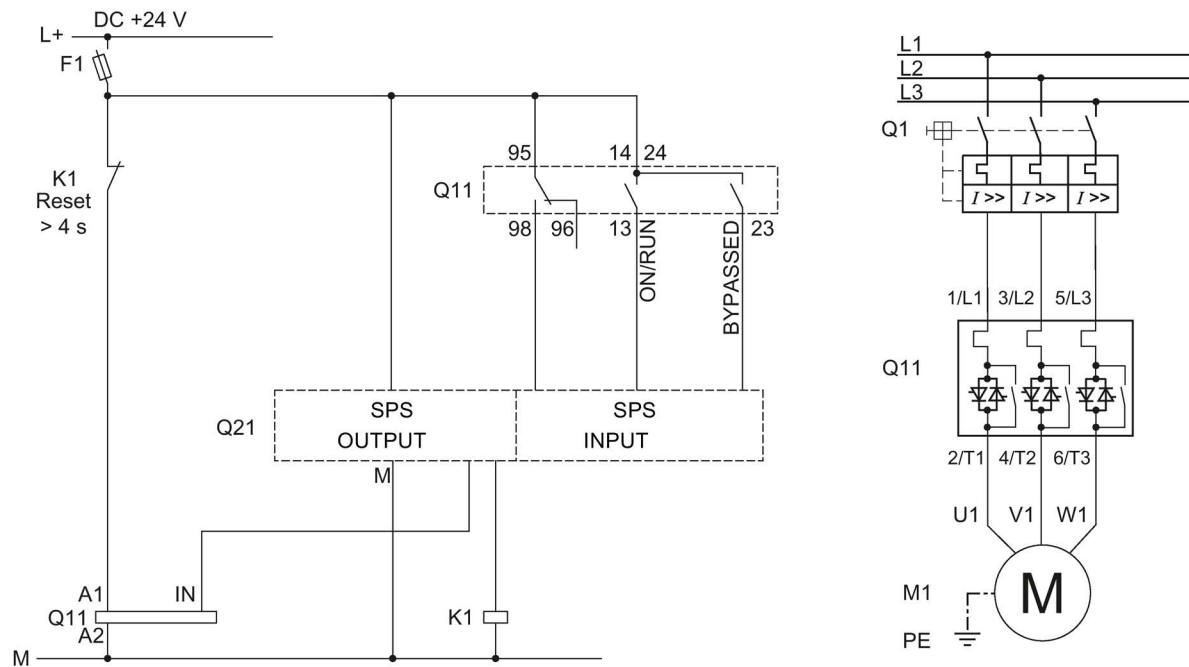
Automatic restart.
Can cause death or serious injury.

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

To do this, for example, link the group error output (terminals 95 and 96) into the control.

Wiring of control circuit for control by PLC



| | |
|-----|--|
| F1 | Fuse |
| K1 | Coupling relay control for reset > 4 s |
| Q1 | Motor starter protector |
| Q11 | 3RW52 soft starter |
| Q21 | PLC |
| M1 | Motor |
| PE | Protective conductor |

A.2.5 Actuation of a line contactor

Requirements

- ON / RUN relay output was parameterized to RUN.

| |
|--|
|  WARNING |
|--|

Automatic restart.

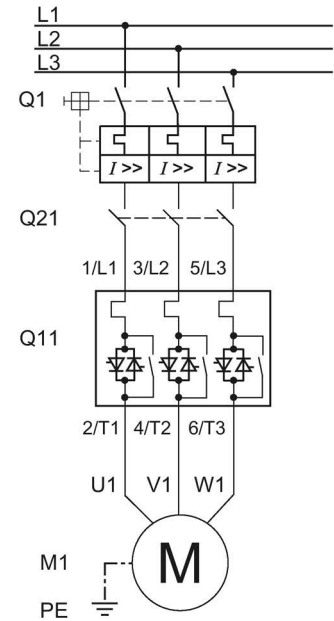
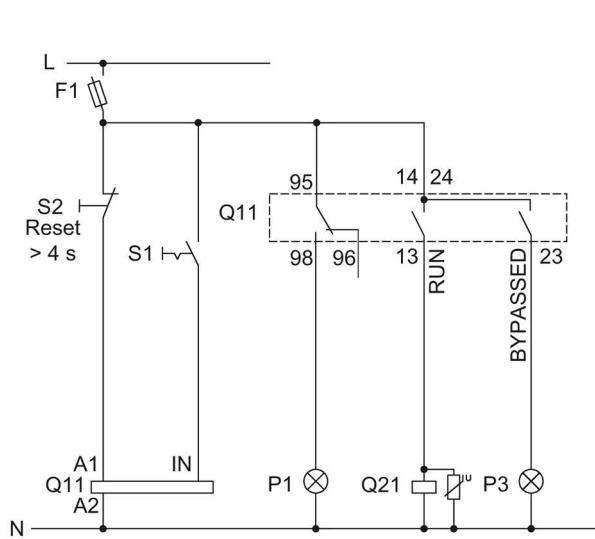
Can cause death or serious injury.

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

To do this, for example, link the group error output (terminals 95 and 96) into the control.

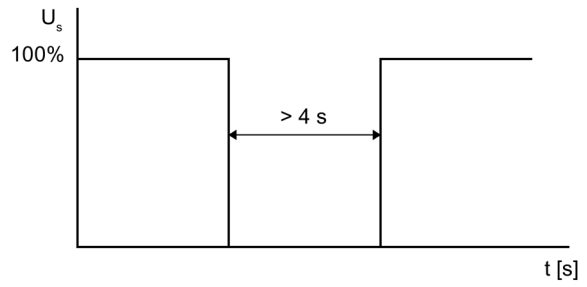
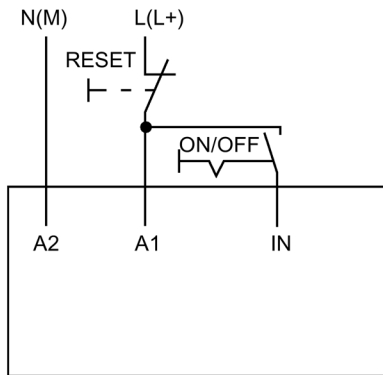
Wiring of control circuit for controlling a line contactor



- F1 Fuse
- S1 Switch
- S2 Pushbutton: Reset > 4 s
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- Q21 Line contactor
- M1 Motor
- P1 Indicator light
- P3 Indicator light
- PE Protective conductor

A.2.6 Wiring for remote RESET

Procedure



Result

You can reset a pending error message by operating the reset button for > 4 s.

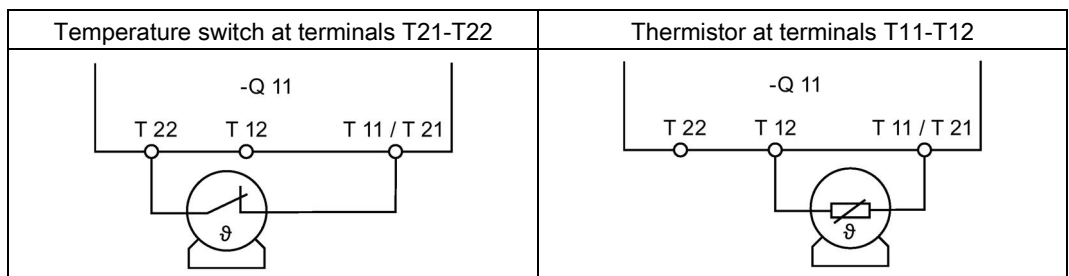
A.2.7 Connecting the temperature sensor

Requirements

- 3RW52 soft starter with thermistor motor protection
- Motor with temperature switch (e.g. Thermoclick) or thermistor (e.g. PTC type A)

Procedure

1. Remove the copper link between terminals T11 / T21 and T22.
2. Connect the temperature sensor:



Result

The 3RW52 soft starter monitors the motor for excessive temperature. The motor is shut down if the maximum temperature limit is exceeded. The setting for RESET MODE determines how the motor is restarted.

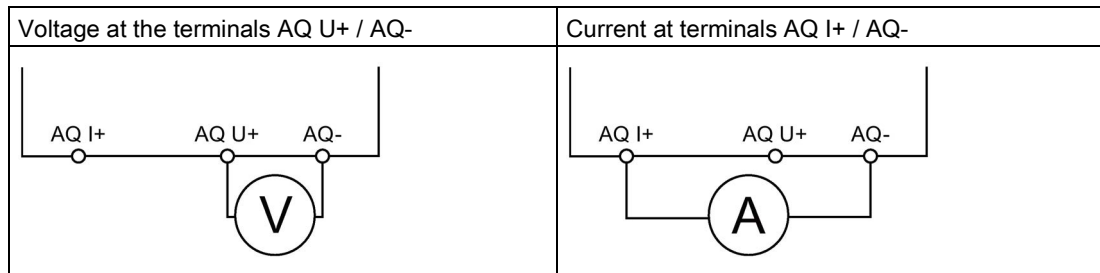
A.2.8 Connecting the evaluation unit to the analog output

Requirements

- 3RW52 soft starter with analog output
- Evaluation unit for displaying the analog output signal
- Parameterized analog output
Parameterizing analog output AQ via the High Feature 3RW5 HMI (Page 119)

Procedure

Connect the evaluation unit:



Result


The actual average phase current of the motor is displayed in % at the evaluation unit via the analog output.

A.3 Special applications

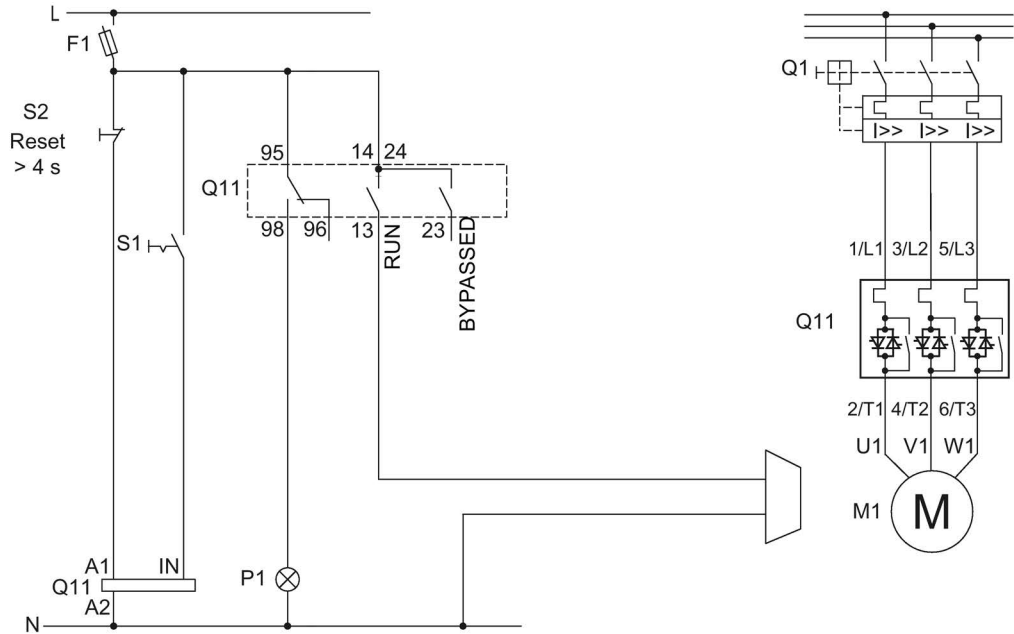
A.3.1 Controlling a motor with a magnetic parking brake

Requirements

- ON / RUN relay output was parameterized to RUN.

| |
|---|
|  WARNING |
| Automatic restart. Can cause death or serious injury. If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result. Reset the start command (e.g. via the PLC or switch) before performing a reset. To do this, for example, link the group error output (terminals 95 and 96) into the control. |

Wiring



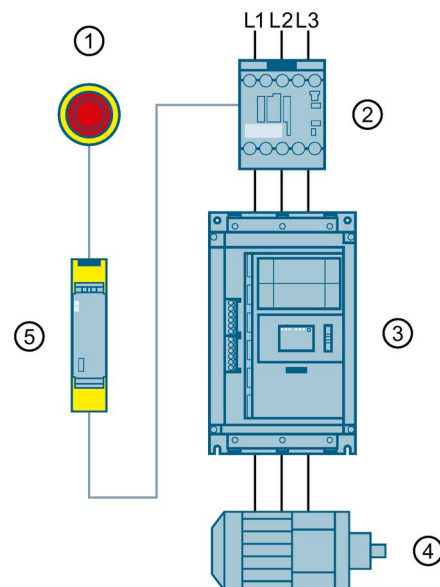
- F1 Fuse
- S1 Switch
- S2 Pushbutton: Reset > 4 s
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- P1 Indicator light, fault
- M1 Motor

A.3.2 EMERGENCY STOP shutdown to SIL 1 or PL c with a 3SK1 safety relay

The 3RW52 soft starter has no effect or influence on the safety function of the application. For this reason, it is neither positively nor negatively considered in the safety application, and also does not have to be included in the calculation for proof according to the standards.

If achievement of SILCL 1 according to IEC 62061:2005 / PL c according to EN ISO 13849-1:2015 is required, the series connection of an additional contactor with the 3RW52 soft starter, in conjunction with a suitable safety relay (e.g.: 3SK1111), is required, as well as monitoring of the contactor's auxiliary contacts.

Basic configuration



- ① Emergency stop
- ② 3RT20 contactor
- ③ 3RW52 soft starter
- ④ Motor
- ⑤ 3SK1 safety relay

Requirements

- If the soft stop function is set (ramp-down time setting element set to > 0 s) and the emergency stop circuit is tripped, a "Missing load voltage, phase failure / missing load" fault may be indicated on the soft starter. In this case, the soft starter must be reset according to the selected RESET MODE.

! WARNING

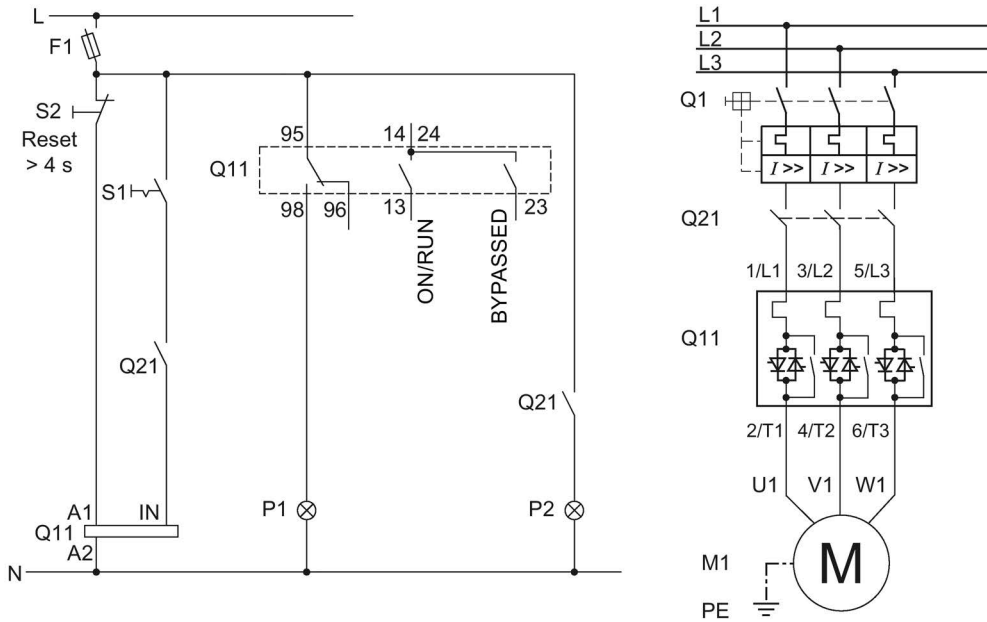
**Automatic restart.
 Can cause death or serious injury.**

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

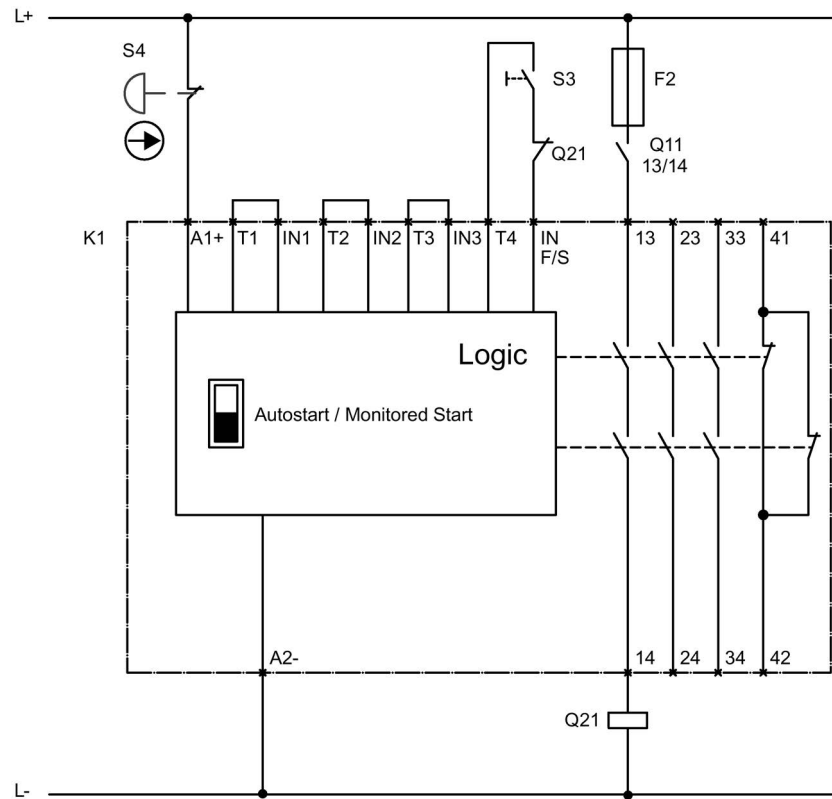
To do this, for example, link the group error output (terminals 95 and 96) into the control.

Wiring of the 3RW52 soft starter



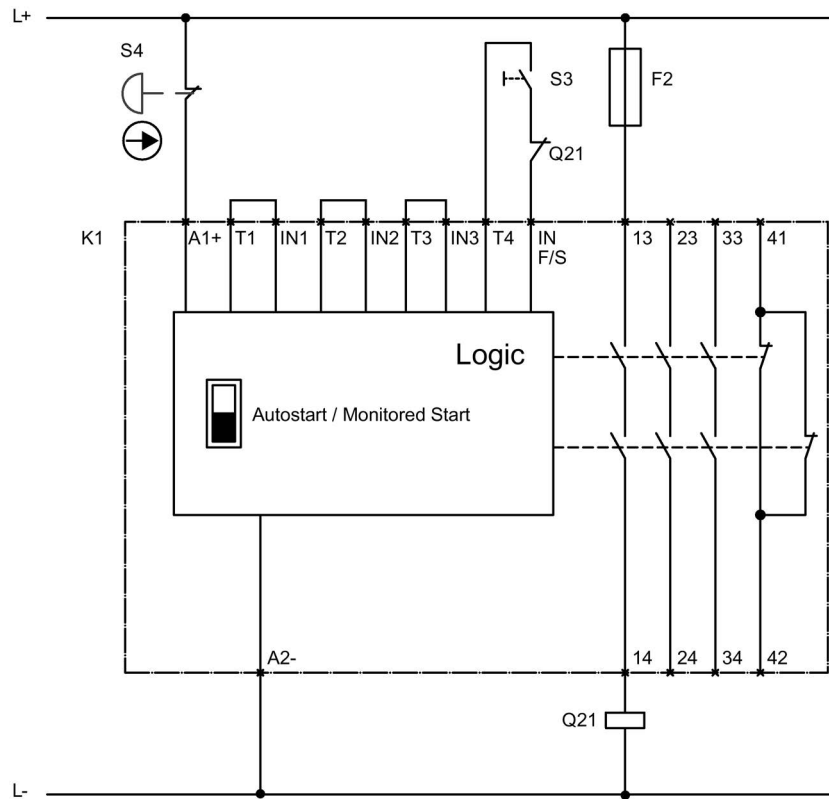
- F1 Fuse
- S1 Switch: Start / stop
- S2 Pushbutton: Reset > 4 s
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- Q21 Contactor
- P1 Indicator light
- P2 Indicator light
- M1 Motor

A.3.2.1 Wiring of the 3SK1 safety relay SIL 1 with line contactor



- F2 Fuse
- Q11 Line contactor
- Q21 Contactor
- S3 Start button
- S4 Emergency stop
- K1 3SK1111 safety relay

A.3.2.2 Wiring of the 3SK1 safety relay SIL 1 without line contactor



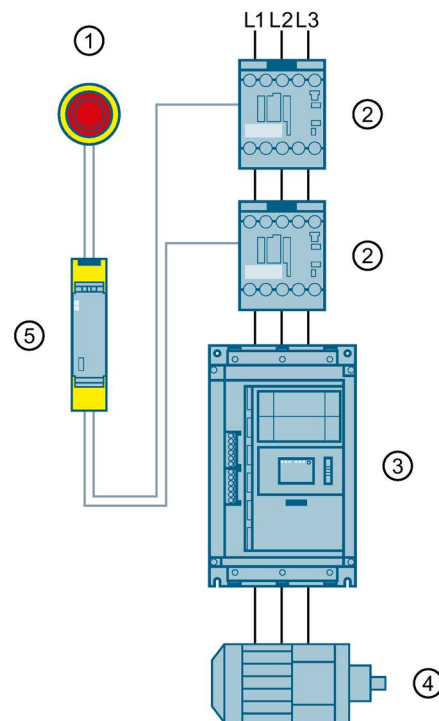
- F2 Fuse
- Q21 Contactor
- S3 Start button
- S4 Emergency stop
- K1 3SK1111 safety relay

A.3.3 EMERGENCY STOP shutdown to SIL 3 or PL e with a 3SK1 safety relay

The 3RW52 soft starter has no effect or influence on the safety function of the application. For this reason, it is neither positively nor negatively considered in the safety application, and also does not have to be included in the calculation for proof according to the standards.

Safe shutdown up to SILCL 3 according to IEC 62061:2005 / PL e according to EN ISO 13849-1:2015 requires the use of 2 redundant contactors and monitoring of the auxiliary contacts of both contactors. Two-channel monitoring of the EMERGENCY STOP is also required here.

Basic configuration



- ① Emergency stop
- ② 3RT20 contactors
- ③ 3RW52 soft starter
- ④ Motor
- ⑤ 3SK1 safety relay

Requirements

- If the soft stop function is set (ramp-down time setting element set to > 0 s) and the emergency stop circuit is tripped, a "Missing load voltage, phase failure / missing load" fault may be indicated on the soft starter. In this case, the soft starter must be reset according to the selected RESET MODE.

! WARNING

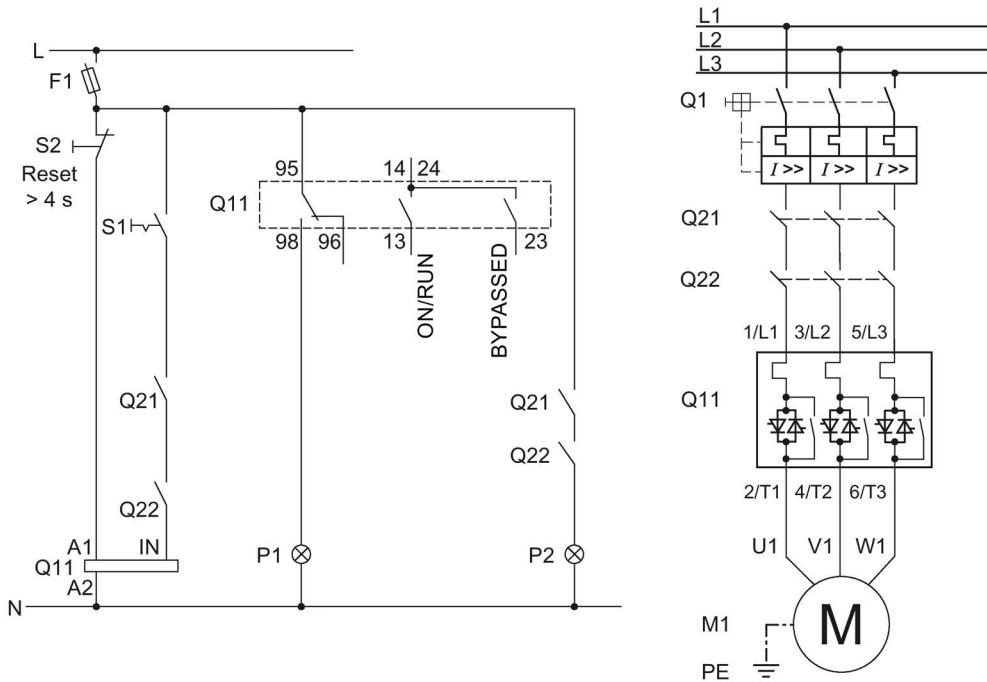
Automatic restart.
Can cause death or serious injury.

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

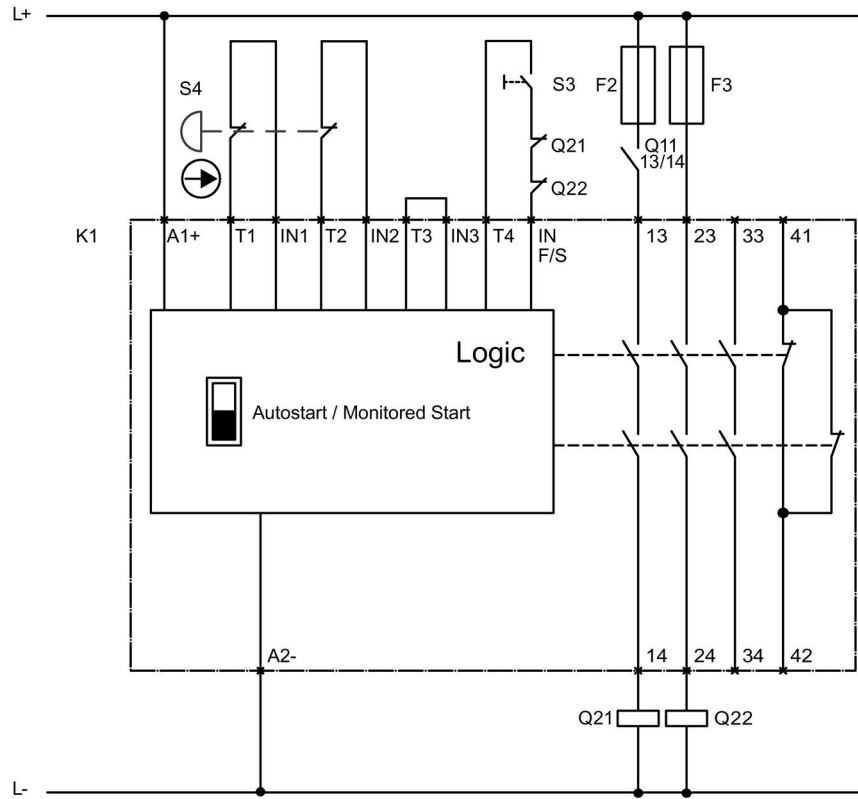
To do this, for example, link the group error output (terminals 95 and 96) into the control.

Wiring of the 3RW52 soft starter



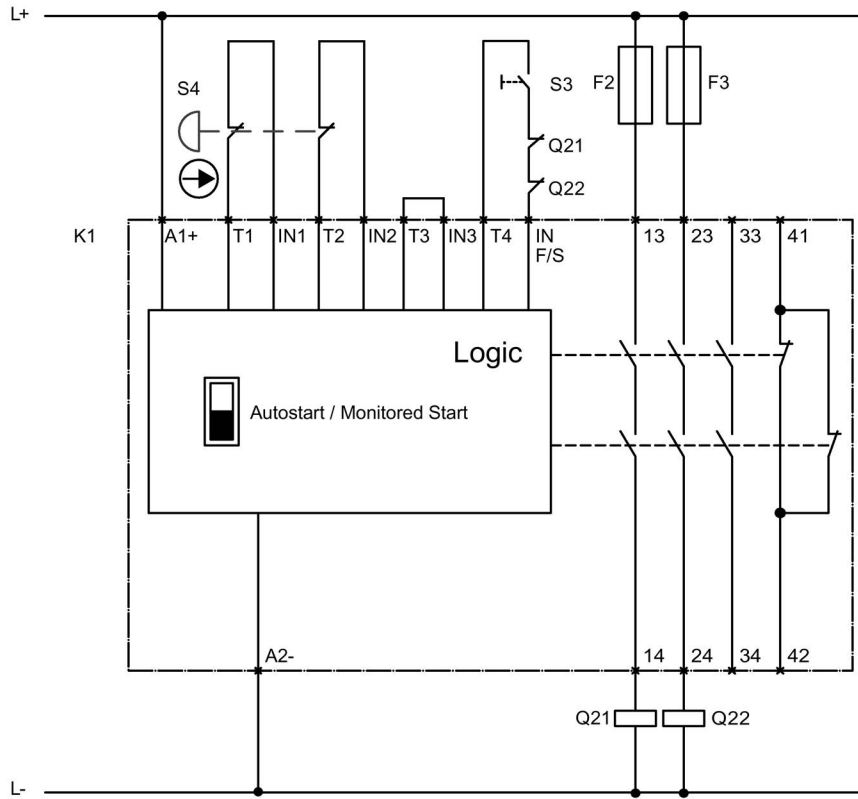
- F1 Fuse
- S1 Switch: Start / stop
- S2 Pushbutton: Reset > 4 s
- Q1 Motor starter protector
- Q11 3RW52 soft starter
- Q21 Contactor
- Q22 Contactor
- P1 Indicator light
- P2 Indicator light
- M1 Motor

A.3.3.1 Wiring of the 3SK1 safety relay SIL 3 with line contactor



- F2 Fuse
- F3 Fuse
- Q11 Line contactor
- Q21 Contactor
- Q22 Contactor
- S3 Start button
- S4 Emergency stop
- K1 3SK1111 safety relay

A.3.3.2 Wiring of the 3SK1 safety relay SIL 3 without line contactor



- F2 Fuse
- F3 Fuse
- Q21 Contactor
- Q22 Contactor
- S3 Start button
- S4 Emergency stop
- K1 3SK1111 safety relay

A.3.4 Contactor for emergency start

Wiring

 **WARNING**

Automatic restart.

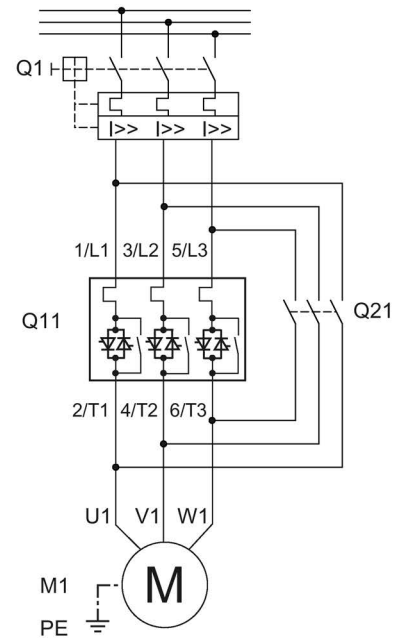
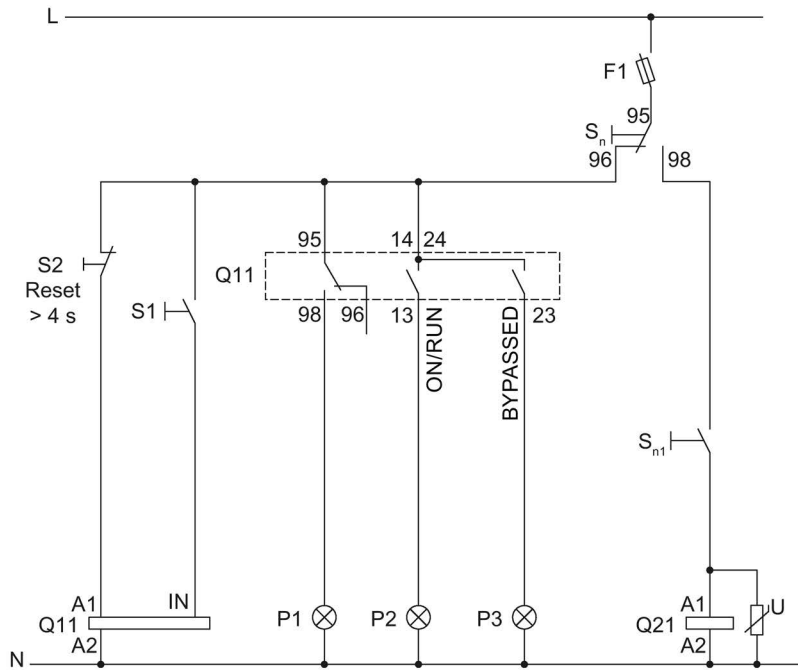
Can cause death or serious injury.

If a starting command is pending, a restart will be triggered automatically after the reset. This particularly applies if the motor protection has tripped. Dangerous states of the system can result.

Reset the start command (e.g. via the PLC or switch) before performing a reset.

To do this, for example, link the group error output (terminals 95 and 96) into the control.

A.3 Special applications



- F1 Fuse
- S1 Switch
- S2 Pushbutton: Reset > 4 s
- S_{rated} Soft start selector button
- S_{n1} Start / stop (direct-on-line starting)
- Q1 Motor starter protector
- Q11 Soft starter
- Q21 Direct-on-line starting contactor
- P1 Indicator light, fault
- P2 Indicator light
- P3 Indicator light
- M1 Motor

Third-party software

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```


Glossary

Auto RESET

"Auto RESET" means that faults are automatically reset as soon as the cause is eliminated.

Ground fault

Fault whereby an external conductor comes into contact with ground or the grounded neutral point.

GSD

Device master file

This file is required to be able to configure a device as a DP standard slave in the HW Config of a Siemens or external system.

GSDML

Device master file

This file is required to be able to configure a device as a DN device in the HW Config of a Siemens or external system.

HSP

Hardware support package

The hardware support packages allow you to configure modules that are not listed in the hardware catalog of your TIA Portal installation.

Manual RESET

"Manual RESET" means that the following options are available for acknowledging faults:

- RESET / TEST key on 3RW52 soft starter
- RESET / TEST key on 3RW5 HMI Standard
- Reset via bus interface
- Reset via F key on 3RW5 HMI High Feature
- Reset via 3RW5 HMI High Feature

PII/PIQ

Process image input/process image output

Process image

Image of the signal states of the digital inputs and outputs in the memory of a controller.

The process images can be transferred as follows:

- Cyclically in the fieldbus protocol
- Acyclically using data sets

Remote RESET

"Remote RESET" means that faults are acknowledged by switching the control supply voltage off and on again. The control supply voltage on the 3RW52 soft starter must be switched off for at least 4 s.

STS

Simulation Tool for Soft Starters

The soft starter can be configured with the STS (Simulation Tool for Soft Starters) software. The STS suggests suitable soft starters for the application based on the motor and load data and application requirements that you enter.

Index

3

- 3D model, 30
- 3RW5 HMI, 57
- 3RW5 HMI High Feature, 25
 - Communication diagnostics, 142
 - Diagnostics of the soft starter, 140
 - Diagnostics on the 3RW5 HMIs High Feature, 142
 - Disassembling, 45
 - Factory setting, 152
 - Faults and remedial actions, 138
 - Firmware update, 150
 - First commissioning, 91
 - Installing, (3RW52 soft starter), (Control cabinet door), 46
 - Logbooks, 143
 - Main menu, 112
 - Micro SD card, 124
 - Mounting, (Level surface), 53
 - Overview, 121
 - Parameter assignment, 116
 - Status LED, 132
- 3RW5 HMI Standard, 24
 - Device LEDs, 131
 - Disassembling, 43
 - Hardware configuration, 105
 - Installing, (3RW52 soft starter), (Control cabinet door), 49
 - Menu, 107
 - Mounting, (Level surface), 55
- 3RW5 HMIs High Feature
 - Device design and controls, 110
- 3RW52 soft starter, 58, 64
 - Connecting, 63
 - Device LEDs, 128
 - First commissioning, 89
 - Logbooks, 143
 - Maintenance and repairs, 145
 - Mounting, 37, (3RW52 soft starter)
 - Parameter assignment, 82
 - Sealing, 90
 - Setting elements, 78

A

- Accessories, 21
 - 3RW5 HMI High Feature, 25
 - 3RW5 HMI Standard, 24
- Additional parameters, 104
- Analog output AQ
 - Parameter assignment, 119
- App
 - Siemens Industry Online Support, 31
- Applications, 16
- Auto RESET, 85, 139

C

- CAX data, 30, 157, 159
- Circuit diagram
 - example, 161, 163, 167, 168, 169, 171, 172, 174, 175, 176, 177, 179, 183, 187
 - Feeder assembly, type of coordination 1 with fuses, 162
- Communication modules, 22
- Connections
 - Overview, 59
- Cover for control cable duct
 - Mounting, 75

D

- Device versions, 14
- Diagnostics options, 127
- Dimension drawings, 30
- Disassembling
 - Cover for control cable duct, 76
- Disposal, 36

E

- Electronic motor overload protection, 99
- EPLAN macros, 30
- ESD guidelines, 33
- Example circuits
 - Inside-delta circuit, 165

F

- Factory setting, 151
 - Options, 151
- Factory setting
 - Restore, 153
- Fan cover
 - Mounting, 38
- FAQs, 28
- Faults and remedial actions, 134
 - 3RW5 HMI High Feature, 138
- Feeder assembly, type of coordination 1 with fuses, 162
- Firmware update, 149
- Function test, 146
- Functions, 10
 - Additional parameters, 104
 - Current limiting function, 96
 - Soft starting, 93, 98
 - Thermistor motor protection with temperature sensor, 100

G

- Guidelines
 - ESD guidelines, 33

H

- Hardware configuration, 8
- Hinged cover
 - Cut, 57
 - Replacing, 58

I

- Inside-delta circuit, 165
- Interaction interfaces, 11
- Intrinsic device protection, 101

K

- Knowledge, 7

L

- LED STATE / OVERLOAD, 130
- LED test, 146
- LEDs
 - Status LED, 132

LICENSE CONDITIONS AND COPYRIGHT

- NOTICES, 191
- Local access protection (PIN)
 - Defining, 122
- Logbooks, 143

M

- Main circuit connection (mains supply / motor)
 - Connecting, 64
- Main circuit connections
 - Mounting, 66
- Main menu, 112
 - Micro SD card, 124
 - Overview, 121
- Maintenance, 145
- Manual RESET, 85, 139
- Manuals, 27
- Measured values
 - Monitoring, 117
- Messages and diagnosis
 - Communication diagnostics, 142
 - Diagnostics on the 3RW5 HMIs High Feature, 142
 - Faults and remedial actions on the 3RW5 HMI High Feature, 138
 - Logbooks, 143
- Micro SD card, 124, 150
- Mode, 12
- Motor protection
 - Full motor protection, 99
 - Motor overload protection, 99
 - Thermistor motor protection with temperature sensor, 100

O

- Online help, 27
- Output 13 / 14
 - Parameter assignment, 86, (Output signal ON or RUN)
- Overview
 - I&M data, 121

P

- Parameter
 - Overview, 80
- Parameters
 - Additional parameters, 104
- Process image
 - Monitoring, 118

Product data sheet, 157, 159

R

Reactive power compensation, 35
Recycling, 36
References, 27
Remote RESET, 85, 139
Repairs, 145
Replacing
 Control terminals, 73
 Terminals, 67
RESET MODE, 83

S

Screw terminals
 Connecting, 69
 Control current, 70
Sets the operating mode, 12
Simulation Tool for Soft Starters, 17
SIRIUS Soft Starter ES (TIA Portal), 23
Soft Torque, 83, 102
Spring-type terminal
 Connecting, 71
Spring-type terminals
 Control current, 72
Status and error displays, 129
Status graphs, 62
Structure of the article number, 18
Suggested settings, 81
Support Request, 31

T

Target group, 7
Terminal covers, 66
Test
 Current measurement, 146
 Motor overload protection, 146
Thermistor motor protection with temperature sensor, 100
Third-party software information, 189

W

Warnings and remedial measures, 133

