SIEMENS

SIMATIC

ET 200SP

Motor Starter (3RK1308-0**00-0CP0)

Manual

Edition 04/2016

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SIEMENS

Industrial Controls

SIMATIC ET 200SP Motor starter (3RK1308-0**00-0CP0)

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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.

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

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Preface

Purpose of the documentation

This manual supplements the System Manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) and the System Manual "ET 200SP motor starters".

Functions affecting the system in general are described in this System Manual.

The information provided in this manual, the system manual and the function manuals enables you to commission the ET 200SP distributed I/O system.

Basic knowledge required

A general knowledge of the following areas is needed in order to understand this manual:

- Industrial controls
- Digital circuit logic
- Automation technology

Definition

In this manual, "SIMATIC ET 200SP motor starter" is used as a synonym for all variants of the SIMATIC ET 200SP motor starter.

Conventions

In this manual, STEP 7 is used as a synonym for all versions of STEP 7 and TIA Portal when referring to the configuring and programming software.

Reference to the System Manual "ET 200SP motor starters"

You access the System Manual "ET 200SP motor starters" as follows:

1. Open the Link (https://support.industry.siemens.com/cs/us/en/).
2. Enter the following article number in the Search window: A5E35582704001A/RS
3. Confirm your entry with Enter.
4. Click on the name of the manual.
5. In the next screen, the manual is available to you for free downloading.

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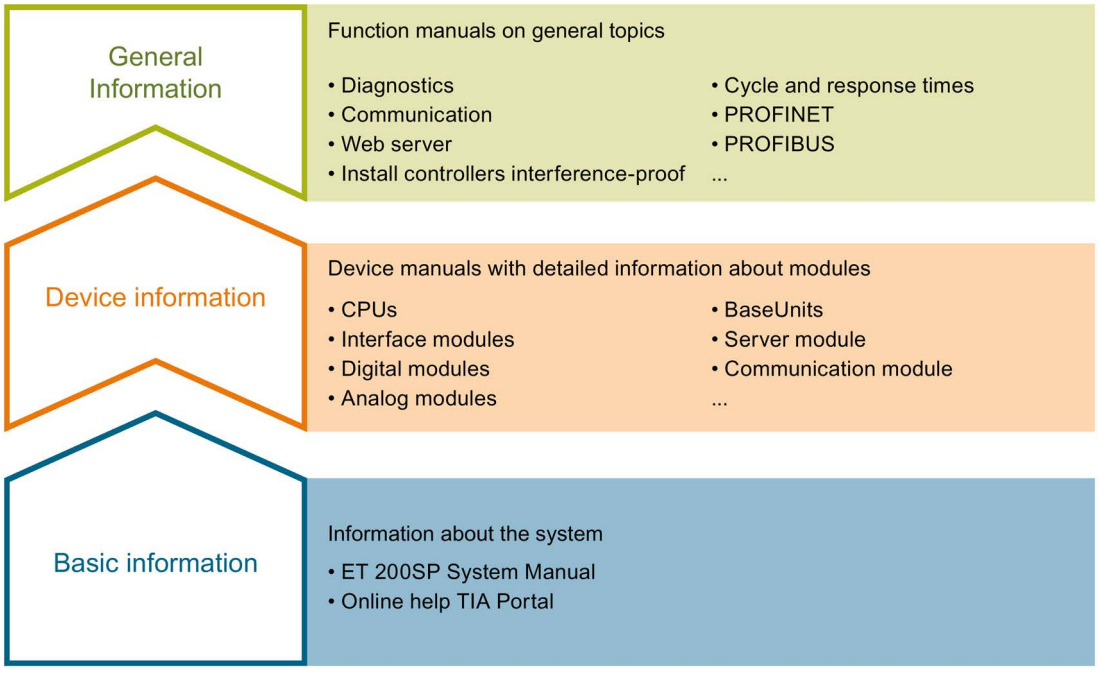
To stay informed about product updates as they occur, sign up for a product-specific newsletter. You can find more information on the Internet (http://support.automation.siemens.com).

Table of contents

Documentation guide

1

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



Basic information

The system manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP. distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, terminal diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, designing interference-free controllers.

You can download the documentation free of charge from the Internet (http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-et200/Pages/Default.aspx).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (https://support.industry.siemens.com/cs/us/en/view/73021864).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (http://support.automation.siemens.com/WW/view/en/84133942).

"mySupport"

With "mySupport", your personal workspace, you make the most of your Industry Online Support.

In "mySupport" you can store filters, favorites and tags, request CAx data and put together your personal library in the Documentation area. Furthermore, your data is automatically filled into support requests and you always have an overview of your current requests.

You need to register once to use the full functionality of "mySupport".

You can find "mySupport" in the Internet (https://support.industry.siemens.com/My/ww/en).

"mySupport" - Documentation

In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.
You can export the manual in PDF format or in an editable format.

You can find "mySupport" - Documentation in the Internet (http://support.industry.siemens.com/My/ww/en/documentation).

"mySupport" - CAx Data

In the CAx Data area of "mySupport", you can have access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx Data in the Internet (http://support.industry.siemens.com/my/ww/en/CAxOnline).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus in individual products.

You can find the application examples on the Internet (https://support.industry.siemens.com/sc/ww/en/sc/2054).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).
This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.
With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool).

Product overview

2

2.1 Properties

Article numbers

Short code	Article number
Direct-on-line starter	
DS 0.3 - 1 A	3RK1308-0AB00-0CP0
DS 0.9 - 3 A	3RK1308-0AC00-0CP0
DS 2.8 - 9 A	3RK1308-0AD00-0CP0
Reversing starter	
RS 0.3 - 1 A	3RK1308-0BB00-0CP0
RS 0.9 - 3 A	3RK1308-0BC00-0CP0
RS 2.8 - 9 A	3RK1308-0BD00-0CP0

View of the SIMATIC ET 200SP motor starter

The SIMATIC ET 200SP motor starter is a 30-mm-wide compact device with hybrid technology. The SIMATIC ET 200SP motor starter has electronic overload protection for switching of three-phase asynchronous motors, single-phase AC motors and single-phase asynchronous motor up to 4 kW (at 500 V) during normal operating conditions.

The figure below shows a SIMATIC ET 200SP motor starter.

Image 2-1 View of the SIMATIC ET 200SP motor starter with mounted 3DI/LC module

Properties

The SIMATIC ET 200SP motor starter has the following technical properties.

- Switching and protection device for three-phase asynchronous motors, single-phase AC motors and single-phase asynchronous motors
- Integrated short-circuit and overload protection
- Direct-on-line and reversing start function

You can find the functions supported by the SIMATIC ET 200SP motor starter in Chapter Functions (Page 21).

The following system functions of the ET 200SP family remain supported:

- I&M data
- Firmware update
- Maintenance
- Parameterize in RUN

You will find the descriptions of these functions in the System Manual of the ET 200SP.

Accessories

You can order the following accessories separately:

- Labeling strips in various versions:
  - 500 units light-gray on a roll (6ES7193-6LR10-0AA0)
  - 500 units yellow on a roll (6ES7193-6LR10-0AA0)
  - 1000 units light-gray on DIN A4 sheets (6ES7193-6LA10-0AG0)
  - 1000 units light-gray on DIN A4 sheets (6ES7193-6LA10-0AG0)
- Reference identification label (6ES7193-6LF30-0AW0)
- 3DI/LC module (3RK1908-1AA00-0BP0)
- Fan (3RW4928-8VB00)
- Mechanical bracket for BaseUnit (3RK1908-1EA00-1BP0)
- Cover for an empty BaseUnit (3RK1908-1CA00-0BP0)
- Touch protection cover for infeed bus (3RK1908-1DA00-2BP0)

Reference

You can find information on accessories in the Appendix "Accessories/spare parts" of the System Manual.

The Preface (Page 5) describes how to access the system manual.

2.2 Hybrid technology

The SIMATIC ET 200SP motor starter combines the advantages of semiconductor technology and relay technology.

This combination is known as hybrid technology. Hybrid technology in the SIMATIC ET 200SP motor starter is characterized by the following properties:

Switching on

The inrush current in the case of motorized loads is conducted briefly via the semiconductors.

Advantage: The relay contacts are protected. Longer service life is achieved thanks to reduced wear and tear.

Current conducting

The continuous current is conducted via relay contacts.

Advantage: Relay contacts cause less thermal losses than semiconductors.

Switching off

Switching off is implemented via the semiconductors.

Advantage: The contacts are not stressed with arcs when switching via the semiconductors. This results in increased service life.

Circuit diagram

The SIMATIC ET 200SP motor starter switches the load ON/OFF/reverse in 3 phases.

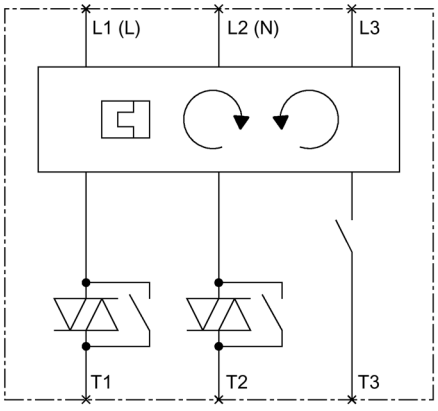


Image 2-2 Circuit diagram

2.3 Applications

You can use the SIMATIC ET 200SP motor starters wherever you want to switch and protect drives up to 4 kW with an ET 200SP system.

The SIMATIC ET 200SP motor starters are used in the following areas, for example:

- Conveyor technology
- Logistics systems
- Production machines
- Machine tools
- Gas discharge lamps

2.4 Device versions

Push-in connections

The SIMATIC ET 200SP motor starter system is available only with push-in connections.

Push-in connections are a form of spring-loaded terminals allowing fast wiring without tools for rigid conductors or conductors equipped with end sleeves. For wiring and disconnecting finely-stranded or stranded conductors without end sleeves on push-in connections, a screwdriver (blade width 3 to 3.5 mm) is required.

The advantages of the push-in terminals are found, as with all spring-loaded terminals, in speed of assembly and disassembly and vibration-proof connection. There is no need for the checking and tightening required with screw connections.

Cable cross-sections and end sleeves

Use end sleeves according to DIN 46 228/1.

You can use the following cable cross-sections on the connections of the infeed (L1(L), L2(N), L3 and PE):

- 1 to 6 mm² with flexible cables without end sleeve and rigid cables
- 1 to 4 mm² with flexible cables with end sleeve

Strip 15 mm of insulation from the wires.

You can use the following cable cross-sections on the connections for the motor as well as the supply voltage (T1, T2, T3, PE, 24 V DC, M):

- 0.5 to 2.5 mm² with flexible cables without end sleeve and rigid cables
- 0.5 to 1.5 mm² with flexible cables with end sleeve

Strip 10 mm of insulation from the wires.

You can use the following cable cross-sections on the connections of the DI module:

- 0.2 to 1.5 mm² with flexible cables without end sleeve, and rigid cables
- 0.25 to 1.5 mm² with flexible cables with end sleeve

Use plastic end sleeves with a diameter of up to 0.75 mm on the DI module.

Current ranges

The table below shows the switchable motor powers depending on the primary voltage, according to DIN EN 60947-4-1: Table G.1. The stated current ranges are valid for the hybrid starters.

	0.3 ... 1 A		0.9 ... 3 A		2.8 ... 9 A	
	0.3 A	1 A	0.9 A	3 A	2.8 A	9 A
230 V AC	< 0.06 kW	0.18 kW	0.18 kW	0.55 kW	0.55 kW	2.20 kW
400 V AC	< 0.09 kW	0.25 kW	0.37 kW	1.10 kW	1.50 kW	4.00 kW
500 V AC	< 0.12 kW	0.37 kW	0.55 kW	1.50 kW	1.50 kW	4.00 kW

The assignments of the motor currents to the motor powers are recommended values. Due to the introduction of energy-efficient motors (IE3, IE4) to the market, rated currents are falling for any given power.

Control supply voltages

To specifically shut down the load with the semiconductors in the event of failure or disconnection of the control supply voltage, the control circuit (the SIMATIC ET 200SP motor starter for 24 V DC) is buffered.

2.5 Functions

2.5.1 Overview of functions

The table below reflects the subsequent chapters:

	Direct-on-line starter	Reversing starter
Basic function/basic parameter (Page 24)		
• Rated operational current (Page 24)	x	x
• Load type (Page 25)	x	---
Motor control (Page 26)		
• Solid-state switching technology (Page 26)	x	x
• Reversing starter control function (Page 27)	---	x
• Operating modes (Page 27)	x	x
Motor protection thermal motor model (Page 28)	x	x
Monitoring functions (Page 31)		
• Response to residual current detection (Page 32)	x	x
• Upper/lower current warning limit (Page 32)	x	x
• Upper/lower current limit (Page 33)	x	x
• Blocking protection (Page 33)	x	x
- Blocking time (Page 33)	x	x
- Blocking current (Page 34)	x	x
• Asymmetry monitoring (Page 36)	x	x
• Short-circuit protection (fuses) (Page 37)	x	x
Response to CPU STOP (Page 37)	x	x
Group diagnostics/warning (Page 38)	x	x
Waiting for start-up parameter datasets	x	x
RESET button (Page 74)	x	x
Emergency start (Page 47)	x	x
Trip RESET (Page 50)	x	x
Cold start (Page 51)	x	x
PROFIenergy (Page 53)	x	x
Logbook (Page 52)	x	x
Maintenance (Page 77)	x	x

The following functions are available when using the 3DI/LC module via the inputs:

	Direct-on-line starter	Reversing starter
Inputs (Page 38)	x	x
Manual local (local control) (Page 43)	x	x
Trip without restart (Page 43)	x	x
Trip with restart (Page 43)	x	x
Trip emergency end position CW (Page 44)	x	x
Trip emergency end position CCW (Page 46)	x	x
Group warning (Page 46)	x	x
Emergency start (Page 47)	x	x
Motor CW (Page 47)	x	x
Motor CCW (Page 48)	---	x
Quick Stop (direction-independent) (Page 48)	x	x
Quick Stop clockwise (Page 49)	x	x
Quick Stop counter-clockwise (Page 50)	---	x
Trip RESET (Page 50)	x	x
Cold start (Page 51)	x	x
Operational trip end position CW (Page 51)	x	x
Operational trip end position CCW (Page 52)	x	x

See also

Blocking current monitoring (Page 33)

Blocking protection in run-up phase (Page 35)

2.5.2 Introduction

Intrinsic protection

The SIMATIC ET 200SP motor starter protects itself against overload. Intrinsic device protection cannot be parameterized or switched off.

If the intrinsic protection becomes active, the follow responses occur:

- The motor trips.
- Emergency starting is not possible in the case of tripping due to intrinsic device protection.
- The diagnostics message "Switching element overload" is output in data set 92.
- The entry "Number of switching element overload trips" in data set 95 is incremented by 1.

If intrinsic device protection becomes active, the motor may be defective. Replace the motor starter in this case.

Warnings

Note

Normal switching duty

Observe the minimum loads in the case of SIMATIC ET 200SP motor starters.

You will find further information in Chapter "Minimum load current" of the System Manual "Motor starters". The Preface (Page 5) describes how to access the system manual.

NOTICE
Damage from operating capacitive loads When using capacitive loads, the switching components in the SIMATIC ET 200SP motor starter can be damaged by excessively high making currents. The operation of capacitive loads such as frequency converters is not permissible. Operation of single-phase capacitor motors is admissible.

NOTICE
Damage during operation on non-sinusoidal voltages When operating frequency converters, the switching components (capacitors) in the SIMATIC ET 200SP motor starter can be damaged by non-sinusoidal voltages. Operation between the frequency converter and the motor is not permissible.

See also

System Manual "ET 200SP motor starters"
(https://support.industry.siemens.com/cs/ww/en/view/109479973)

2.5.3 Basic function/basic parameter

2.5.3.1 Rated operational current

This parameter is used to set the rated operational current that the feeder can carry without interruption. This is usually the rated operational current of the motor that is specified on the nameplate of the motor. The setting range depends on the rating class of the SIMATIC ET 200SP motor starter.

Note

Rated operational current

The rated operational current is one of the key parameters.

You cannot disable motor protection completely. However, you can prevent tripping of the motor by selecting the parameter Response to overload (Page 28).

In this case, motor protection must be ensured by other measures (e.g. a thermistor in the motor).

Current motor current

The latest current in the motor starter is returned via the process image for analysis. In addition, you can read out the latest current with phase precision in data set 94.

The current is measured in all 3 phases and the highest value is calculated. The returned 6-bit value specifies the motor current ratio I_{curr} / I_{rated} (I_{rated} = parameterized rated operational current).
The value is represented by one digit before the decimal point (DI 1.5) and five digits after the point (DI 1.0 to DI 1.4). This results in a maximum ratio for I_{curr} / I_{rated} of 1.96875 (approx. 197 %).
The resolution is 1/32 per bit (3.125 %).

DI 1.5	DI 1.4	DI 1.3	DI 1.2	DI 1.1	DI 1.0	
2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	
1	0.5	0.25	0.125	0.0625	0.03125	Sum = 1.96875
0	0	0	0	0	0	I_{curr} = 0
1	0	0	0	0	0	I_{curr} = I_{rated} x 1
1	0	1	1	0	0	I_{curr} = I_{rated} x 1.375
1	1	1	1	1	1	I_{curr} = I_{rated} x 1.96875

I_{curr} = rated operational current I_{rated} x value (DI 1.0 to DI 1.5)

I_{rated} = rated current of the motor

Default setting

- In the SIMATIC ET 200SP motor starter, the rated operational current is preset at the factory to the maximum value (for test purposes during commissioning without previous parameterization).
- Due to the engineering systems, the rated operational current is preset to the minimum value for safety reasons. You must therefore parameterize this value when you configure the system. The SIMATIC ET 200SP motor starter can otherwise trip due to overload on first starting.

Settings

Table 2- 1 Settings for actual motor current

Device parameters	Default settings	Setting range
Rated operational current	• In the motor starter: Maximum value • In engineering systems: Minimum value	• 0.3 A … 1 A • 0.9 A … 3 A • 2.8 A … 9 A Increment: 10 mA

The setting range depends on the device type. The maximum current in continuous operation on the infeed bus is dimensioned for 25 A.

2.5.3.2 Load type

In this parameter, you specify whether the motor starter is connected to a 1-phase or 3-phase load.

Note

Reversing starter

Do not connect any 1-phase load to a reversing starter.

Settings

Table 2- 2 Settings for load type

Device parameters	Default setting	Setting range
Load type	3-phase	• 3-phase • 1-phase

3-phase operation

In 3-phase operation, you can operate a 3-phase asynchronous motor at the connections of the motor starter.

To ensure motor protection, do not connect more than one motor to one motor starter.

1-phase operation

In 1-phase operation, you can operate a 1-phase asynchronous motor at the connections of the motor starter. 1-phase operation is only possible when using a direct-on-line starter.

Operate 1-phase motors only at the connections L1 (L) and L2 (N). Always run the neutral conductor via the motor starter because otherwise checking of the current measurement will fail.

2.5.4 Motor control

2.5.4.1 Electronic switching technology (hybrid switching technology)

The SIMATIC ET 200SP motor starter combines the advantages of semiconductor technology and relay technology.

The SIMATIC ET 200SP motor starter switches with phases L1 and L2 via semiconductors and bypass relays. Phase L3 is always switched via a relay.

⚠ DANGER

Hazardous Voltage
Can Cause Death or Serious Injury

If the line voltage is applied at the 500-V power connection of the motor starter, a hazardous voltage may be active at the output of the motor starter even without a start command. When working on the feeder, you must ensure disconnection from the power, e.g. by the position "Parking position/OFF".

For more information on the position "Parking position/OFF", refer to the chapter "Assembling/disassembling motor starters" in the System Manual SIMATIC ET 200SP motor starters. The Preface (Page 5) describes how to access the system manual.

This combination is known as hybrid technology. Hybrid technology in the SIMATIC ET 200SP motor starter is characterized by the following properties:

Switching on

The inrush current is routed briefly via the semiconductors.

Advantage: The relay contacts are protected. Longer service life is achieved thanks to reduced wear and tear.

Current routing

The continuous current is routed via relay contacts.

Advantage: Relay contacts cause lower thermal losses than semiconductors.

Switching off

Switching off is implemented via the semiconductors.

Advantage: The contacts are not stressed with arcs when switching via the semiconductors. This results in increased service life.

Principle

The SIMATIC ET 200SP motor starter switches the load in 3 phases.

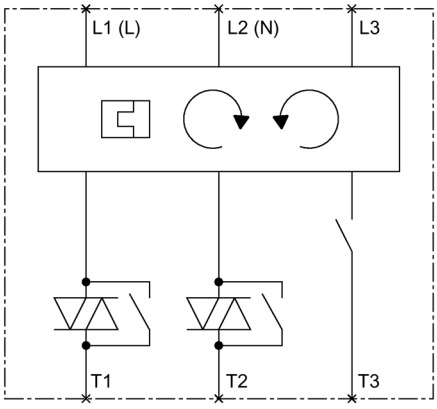


Image 2-3 Schematic circuit diagram

2.5.4.2 Reversing starter control function

This control function allows the motor starter to control the direction of rotation of motors. Internal logic prevents you from activating both directions of rotation simultaneously.

Delayed switching from one direction of rotation to the other is implemented by means of the lock-out time. This function only applies to reversing starters. The lock-out time is approx. 170 ms.

You can find further information on the lock-out time in Chapter "Technical data (Page 79)"

2.5.4.3 Operating modes

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

- Operating mode: Automatic (lowest priority)

  The motor starter can only be controlled with the PLC via the fieldbus.

- Operating mode: Manual local via the 3DI/LC module

  The motor starter can be controlled as follows:

  – Set the input "Local Control" (LC) to activate manual local mode.

  – Set also a digital input (1, 2 or 3, depending on the parameterization) to "Motor CW" or "Motor CCW".

Using the LED "MAN", the message bits in the PII (Page 68), and the diagnostics data set DS92 (Page 88), you detect which control source currently has control priority:

- Operating mode: Automatic
- Operating mode: Manual local

Table 2- 3 Control priority of the operating modes

Automatic	Manual local	Control priority
0	1	Digital input
1	0	Controller (PLC)

2.5.5 Motor protection - thermal motor model

Description

The approximate temperature of the motor is calculated using the measured motor currents and device parameters "Rated operating current" and "Tripping class". This indicates whether the motor is overloaded or is functioning in the normal operating range.

Note

To ensure motor protection, do not connect more than one motor to one motor starter.

Response of the thermal motor model to voltage failure

The response can be set via the parameter "Retention of the thermal motor model at restart" in data record 201.

If the motor starter has been disconnected from the 24 V power supply, the thermal motor model is at the same state of charge when the power supply is restored as it was before disconnection. This behavior protects the motor against overload in the case of brief failures of the 24 V power supply. For this purpose, set the value at position 1.2 in data record 201 to 0.

If the motor starter has been disconnected from the 24 V power supply for a longer period, for maintenance purposes, for example, the saved values can result in an incorrect interpretation of the motor state. You can therefore specify that the motor starter deletes the thermal motor model when the power supply is restored. To do so, set the value at position 1.2 in data record 201 to 1.

Principle of operation

The electronics continuously calculate a model of the thermal load on the motor dependent on the operating time and the current load. The motor model charges when the motor is switched on. The motor model discharges after the motor is switched off.

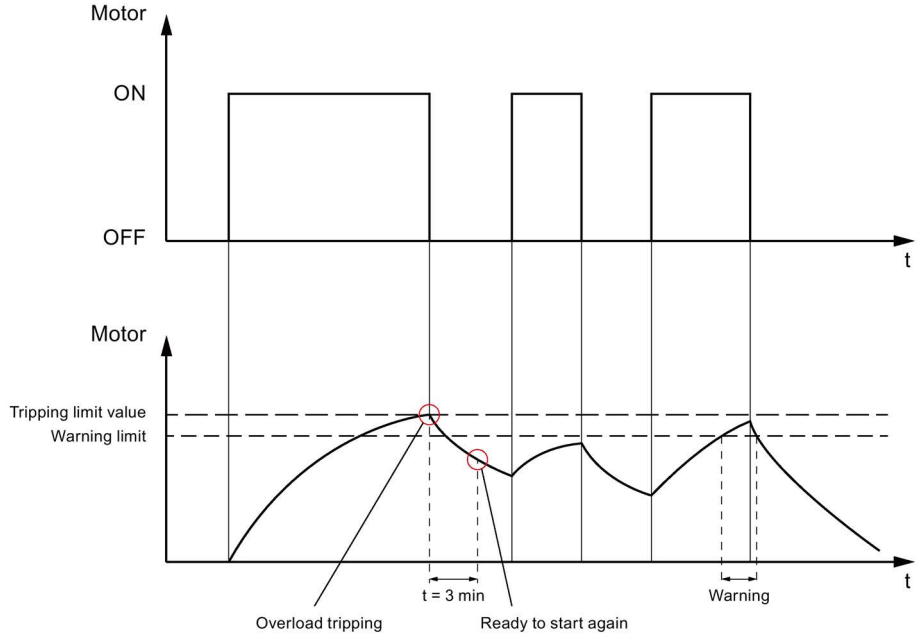


Image 2-4 Principle of operation

Following an overload tripping operation, the motor model is fully discharged after approximately three minutes. You must wait for this cooling time to elapse before you can acknowledge the fault. If the control supply voltage fails, the motor starter can store the remaining cooling time if the relevant parameters have been set. When the control supply voltage is restored, the remaining cooling time elapses before the load can be switched on again.

If you initiate a restart within a very short time after switching off the motor, it may be that the motor model has not yet fully discharged. This can result in an extremely fast overload trip after the restart. In continuous operation (partially charged motor model), the tripping times are reduced depending on the pre-charge.

Response to overload - thermal motor model

You use this device parameter to specify how the motor starter is to respond to overload:

- Trip without restart
- Trip with restart

> **WARNING**
>
> **Hazardous Voltage.**
> **Can Cause Death, Serious Injury, or Property Damage.**
>
> Health hazard from automatic hot restart
>
> When the cooling time has expired following an overload trip, and a RESET takes place, or automatic restart has been parameterized, the machine starts up immediately if a control command is active. People in the danger area may be injured.
>
> Make sure that the danger area of the machine is kept clear of people.

- Warning
  A group warning Is set.

Trip class

The trip class (CLASS) specifies the maximum trip time in which a protective device must trip from the cold state at 6 times the current setting (motor protection according to IEC 60947). The tripping characteristics represent the time to trip as a function of the tripping current.

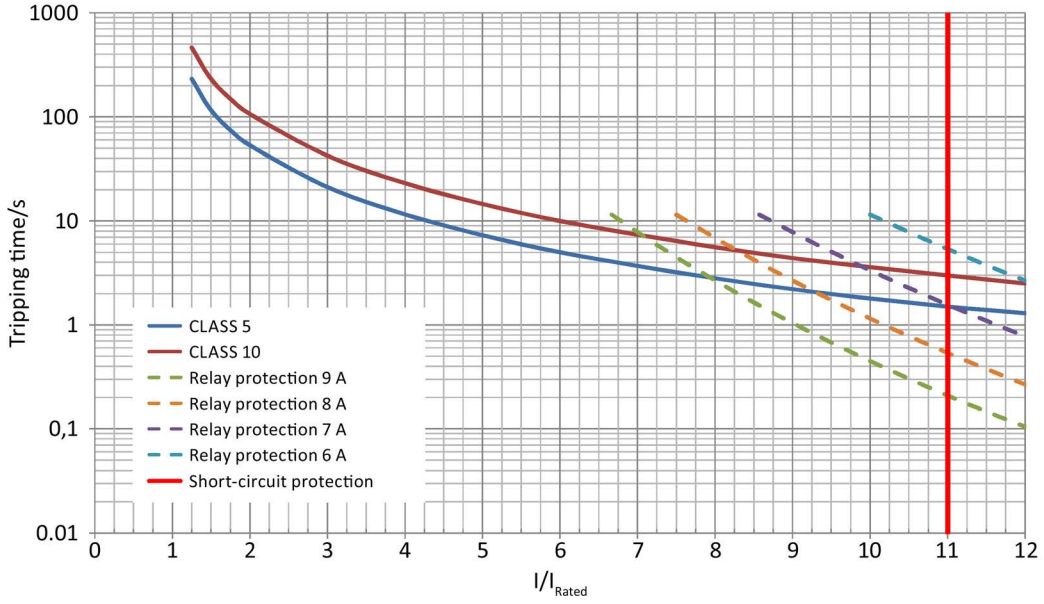


Image 2-5 Time to trip depending on the relative current flow

Note

The setting options of the trip classes are dependent on the motor starter and the current range.

The following trip classes can be parameterized according to IEC 60947-4-2:

- CLASS 5
- CLASS 10

To protect the relays in the main circuit against impermissible operating states, an integrated intrinsic device protection is provided upstream. At current settings >6 A, shutdown becomes effective earlier than with the motor protection function (intrinsic device protection model).

The setting range of the overload protection is 1:3.

Warning limit motor heating

The motor starter also assumes a prewarning role, that is, it issues a warning if the motor temperature limit is exceeded. You use this parameter to preset a motor heating value in percent as a warning limit.

This function is deactivated with a warning limit for motor temperature rise of 0 %.

If the warning limit for motor heating is exceeded, a group warning and the diagnostics message "Thermal motor model overload" are output.

2.5.6 Substation monitoring

You can determine various system states with the help of the motor current and the current limits.

System state	Current value	Protection by:
Motor operates more sluggishly, e. g. due to bearing damage	Current is higher than normal	Current limits
Motor operates more smoothly, e. g. because the system has run out of processing material.	Current is lower than normal	Current warning limit
Motor blocked	Very high current flowing	Blocking protection
• Open circuit • Defective fuse	Very low current flowing (<20 % of I_e)	Residual current detection

2.5.6.1 Response to residual current detection

If the motor current drops below 20 % of the set operational current in one of the phases, residual current detection responds. You can acknowledge residual current detection as soon as the current in all three phases rises above 25 % of the set rated motor current. You use this device parameter to specify how the motor starter is to behave in the event of residual current being detected:

- Warn
- Tripping

Note

When the motor is switched on, residual current detection is suppressed for approximately 1 s.

2.5.6.2 Upper/lower current warning limit

You can enter an upper and/or a lower current warning limit value. If the current warning values are exceeded or undershot, the motor starter responds with a warning message. The warning message is acknowledged as soon as the warning threshold is exceeded or undershot by 5 %.

Note

You can deactivate the current warning limits. The current warning limits are not activated for startup override until the CLASS time expires, e.g. after 10 seconds for CLASS 10.

Setting ranges

The table below shows the possible setting range for the lower and upper current warning limits:

Device parameters	Default setting	Setting range
Lower current warning limit	21.875 %	• 18.75 ... 100 % of I_e • 0 % (= deactivated) Increment: 3.125 %
Upper current warning limit	112.5 %	• 50 to 400 % of I_e • 0 % (= deactivated) Increment: 3.125 %

2.5.6.3 Upper/lower current limit

You can enter an upper and/or a lower current limit. If the current limits are overshot or undershot, the motor starter responds by tripping.

Example

The following example shows an application for the upper and lower current limit:

- The viscosity of the mixed mass is too high, that is, the upper current limit has been overshot.
- "No load because drive belt is broken", that is, the lower current limit has been violated.

Note

The current limits are not activated for startup override until the CLASS time expires, e.g. after 10 seconds for CLASS 10.

Setting ranges

The table below shows the possible setting range for the lower and upper current warning limits:

Device parameters	Default setting	Setting range
Lower current limit	Deactivated	• 18.75 ... 100 % of I_e • 0 % (= deactivated) Increment: 3.125 %
Upper current limit	Deactivated	• 50 to 400 % of I_e • 0 % (= deactivated) Increment: 3.125 %

2.5.6.4 Blocking protection

Blocking current monitoring

The blocking current specifies how much current is consumed by the motor (at rated voltage) when the drive is blocked.

If the motor current exceeds the parameterized value for the blocking current, the motor starter detects a blockage. Blocking time monitoring is activated from the point where the blocking current is exceeded. If the blocking current flows for longer than the parameterized blocking time, the motor starter automatically generates a trip command.

Blocking time

The blocking time is the time a block can be present before the motor shuts down. If the blocking time expires and the system is still stalled, the motor starter is switched off.

Blocking current

The blocking current and blocking time can be parameterized. Run-up corresponds to the parameterized blocking time after switching on the motor.

Blocking protection in run-up phase

If the motor current exceeds the parameterized value for the blocking current, the motor starter detects a blockage.

- Blocking time monitoring is activated from the point where the blocking current is exceeded.
- If the blocking current flows for longer than the parameterized blocking time, the motor starter automatically generates a trip command.

You can parameterize the response threshold of the blocking current and the blocking time up to tripping so that starting the motor does not lead to erroneous tripping due to motor blocking.

Blocking protection after run-up phase

After the parameterized blocking time, blocking protection behaves as follows during continuous operation:

- The blocking time is reduced to 1 s regardless of the parameterized value.
- The blocking current is limited to a maximum of 400 %. The parameter value is valid if the parameterized blocking current is < 400 %.
- When the blocking protection responds, the motor starter itself generates a trip command.
- The diagnosis "Tripping due to motor blocking" and "Group fault" are generated.
- The statistic "Number of motor overload trips" is incremented by 1.

If the parameter "Group fault diagnostics" is set to "Enabled", a corresponding diagnostic interrupt is set if blocking protection responds.

Setting ranges

The table below shows the possible setting range for the blocking current and the blocking time:

Device parameters	Default setting	Setting range
Blocking current	800 %	150 ... 1000 % of I_e Increment: 50 %
Blocking time	1 s	1 ... 5 s Increment: 0.5 s

Blocking protection in run-up phase

The figure below shows the principle of blocking protection during the run-up phase, that is, the interaction of blocking current and blocking time:

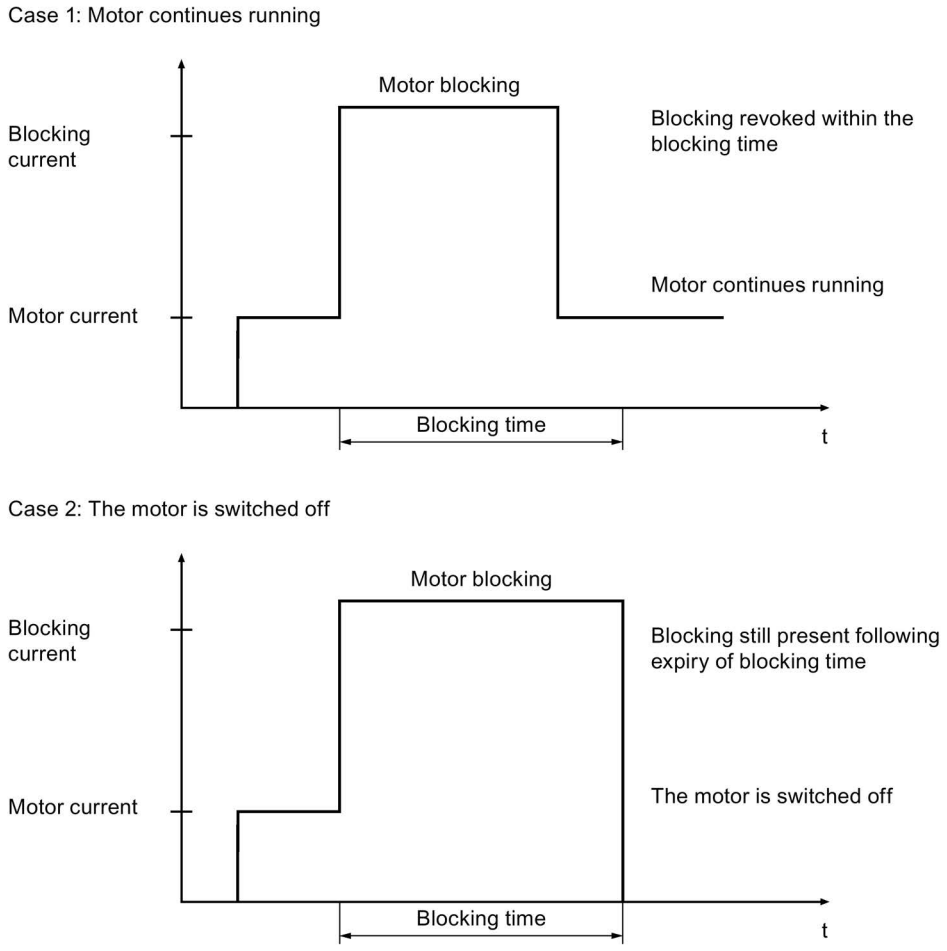


Image 2-6 Blocking protection principle in run-up phase:

2.5.6.5 Asymmetry monitoring

Description

Three-phase asynchronous motors respond to slight asymmetries in the supply voltage with a higher asymmetric current consumption. As a result, the temperature in the stator and rotor windings increases. The SIMATIC ET 200SP motor starter protects the load against overload by issuing a warning or by tripping. You can parameterize whether a warning is output or tripping occurs.

Note

When the motor is switched on, asymmetry evaluation is suppressed for approx. 0.5 s.

Asymmetry limit

The asymmetry limit is a percentage value by which the motor current is allowed to deviate in each phase.

Asymmetry occurs when the difference between the lowest and highest phase current is greater than 40 %. The asymmetry limit cannot be changed. You can acknowledge the asymmetry as soon as it drops below 35 %.

Response to asymmetry

You use this device parameter to determine the behavior of the motor starter in the event of asymmetry:

- Warn
- Tripping

Settings

Table 2- 4 Settings for asymmetry monitoring

Device parameters	Default setting	Setting range
Response to asymmetry	Tripping	• Warn • Tripping

2.5.6.6 Short-circuit protection (fuses)

Description

The SIMATIC ET 200SP motor starter is equipped with an integrated fuse as short-circuit protection. Short-circuit protection is implemented both between a phase and ground (= ground fault), and between two phases.

Switching performance

The SIMATIC ET 200SP motor starter switches off short-circuits in the motor or in the cables. The SIMATIC ET 200SP motor starter complies with the requirements of type of coordination 1 (IEC 60947-4-2).

Messages and actions

After the fuse responds, the message "residual current detection" is output. Then replace the starter.

2.5.7 Response to CPU STOP

With this parameter, you set the response of the PIQ following a CPU STOP:

- Retain last value
- Switch substitute value (value = 0)

Note

The response to CPU/master STOP is only relevant in "Automatic" mode.

Substitute values

The substitute values are not parameterizable and have the value 0 for all bits in the PIQ.

2.5.8 Group fault diagnostics/group warning diagnostics

You can use these parameters to determine whether diagnostics are enabled or disabled. If you set the group diagnostics parameter to "Disable", no error messages are output. If you set the group warning diagnostics parameter to "Disable", no maintenance alarms are output.

Settings

Table 2- 5 Settings for group warning diagnostics

Device parameters	Default setting	Setting range
Group fault diagnostics	Enable	• Disable • Enable
Group warning diagnostics	Disable	• Disable • Enable

2.5.9 Inputs

Using the "Inputs" device function, the motor starter can carry out different actions that you can parameterize The signals are evaluated on the 3DI/LC module for this purpose. Inputs 1 to 3 (DI 0.4 to 0.6) can be connected directly with contact elements or sensors.

The signal states are transferred in parallel via the process image. In addition, the signal states in data set 92 can be read out. The input actions of the individual digital inputs affect the motor starter functions independently of one another.

The input LC (local control) switches over to manual local mode. You cannot change the parameterization of the input. This input is always implemented as an NO contact. You can detect whether or not manual local is active if bits 0.7 and 1.6 are active in the process image input.

Input signal delay

The input signal delay is fixed at 10 ms.

Input n signal

You can use this device parameter to determine whether or not the input level of the diagnostics inputs is to be saved.

- Retentive, i.e. latching mode (edge evaluation)

  Regardless of the input signal present, the action can only be deactivated again by a further event.

- Non-retentive, that is, jog (level evaluation)

  This input action is active as long as the input is active.

Input n level

You use this device parameter to specify the input logic:

- NC contact
- NO contact

Note

Parameterization only as NO contact.

For "Input n action": "Emergency start", "Motor CW", "Motor CCW", "Cold start" and "Trip reset", "Input n level" can only be parameterized as an NO contact.

Note

Change from NC contact to NO contact

If "Input n level" is changed from a normally closed contact to a normally open contact and the associated "Input n action" is parameterized as "Trip without restart", the "Input tripping" message bit is set and shut down accordingly in the case of an open input due to the input delay!

Note

Applied input voltage

If input voltage is applied (input active), a 1 is transferred to the controller regardless of the "Input n level".

Input n action

Different actions can be triggered when an input signal is present. You can parameterize the following actions dependent on "Input n level", "Input n signal" and "Mode".

Note

If "Input n signal" = retentive, and "Input n action" = Motor CW/CCW, at least one input must always be parameterized with input action "Tripping ... " or "Quick Stop". If this rule is violated, the motor starter will reject the parameters with the relevant diagnostics message.

Input n action	n level	n signal	Operating mode	Description
No action	NO/NC	n. ret./ret.	All	No direct action on the motor starter. Evaluation und further processing possible using the process image.
Trip without restart	NO/NC	n. ret.	All	• Results in tripping of the motor. • Must be acknowledged once the cause of the tripping has been rectified (initial status).
Trip with restart (AUTO RESET)	NO/NC	n. ret.	All	• Results in tripping of the motor. • Acknowledged automatically after the cause of the trip has been rectified (initial status).
Trip end position CW	NO/NC	n. ret.	All	• The motor is switched off regardless of the direction of rotation. • A fault is generated and reported. • The motor can only be switched on with "Motor CCW"
Trip end position CCW	NO/NC	n. ret.	All	• The motor is switched off regardless of the direction of rotation. • A fault is generated and reported. • The motor can only be switched on with "Motor CW"
Group warning	NO/NC	n. ret./ret.	All	• The diagnosis "Group warning" is output. • The motor starter is not switched off.

Input n action	n level	n signal	Operating mode	Description
Emergency start	NO	n. ret.	All	• Starts the load when an ON command is issued despite the fact that an internal trip command is present. • Intrinsic device protection of the motor starter remains active and prevents the device from being destroyed. • Only allowed as an NO contact
Motor CW Motor CCW (with reversing starters only)	NO	n. ret./ret.	Manual mode local	• The motor starter must be in "manual local" mode for these actions. • Motor CW: Switching the motor on or off • Motor CCW: Switching the motor on or off • Only allowed as an NO contact • The input action is active while the active level of the input signal is pending. The action is reset by the input action "Quick Stop" or group fault.
Quick Stop	NO/NC	n. ret./ret.	All	• Motor is switched off direction-independently without group fault. • "Quick Stop" takes priority over "Motor CW" and "Motor CCW"
Quick Stop clockwise	NO/NC	n. ret./ret.	All	• Motor is switched off with "Motor CW" without group fault. • "Quick Stop" takes priority over "Motor CW"
Quick Stop counter-clockwise	NO/NC	n. ret./ret.	All	• Motor is switched off with "Motor CCW" without group fault. • "Quick Stop" takes priority over "Motor CCW" • The action is only available for reversing starters.
Trip RESET	NO	n. ret.	All	• "Trip RESET" is triggered once. • "Trip RESET" is only possible as NO contact.

Input n action	n level	n signal	Operating mode	Description
Cold start	NO	n. ret.	All	Enables switch-on without main power. If the main power supply is nevertheless present (current flowing), an internal trip command is generated.
NO: NO contact NC: NC contact ret.: retentive n. ret.: non-retentive (activation and deactivation of the input action follows the status of the input signal (= jog))				

Settings

Table 2- 6 Settings for inputs

Device parameters	Default setting	Setting range
Input signal delay	• 10 ms	-
Input 1 level Input 2 level Input 3 level	• NO contact	• NC contact • NO contact
Input 1 action	• Motor CW	• No action • Trip without restart • Trip with restart • Trip end position CW • Trip end position CCW • Group warning • Emergency start • Motor CW • Motor CCW • Quick Stop (direction-independent) • Quick Stop clockwise • Quick Stop counter-clockwise • Trip RESET • Cold start • Operational trip end position CW • Operational trip end position CCW
Input 2 action	• Motor CCW (RS) • No action (DS)	
Input 3 action	• Cold start	
Input 1 signal Input 2 signal Input 3 signal	• Non-retentive	• Retentive • Non-retentive

2.5.10 Manual local (local control)

Manual local control with the SIMATIC ET 200SP motor starter is only possible when the 3DI/LC module is inserted. A digital input is permanently assigned the function "Manual local" (LC connection). If the digital input is active, that is, "manual local" is requested, the SIMATIC ET 200SP motor starter changes to manual local mode even in the case of motor ON. To exit manual local mode, the manual local input must be inactive and the motor must be switched off via the DI module. That is, with active input action "Motor CCW" or "Motor CW", the SIMATIC ET 200SP motor starter remains in manual local mode and thus in the "Motor ON" state as long as the input action is not interrupted.

Note

Removal during operation

If the 3DI/LC module is removed from the SIMATIC ET 200SP motor starter during manual local mode, this results immediately in shutdown of the running motor and then to exiting of manual local mode.

If a removed 3DI/LC module is plugged onto the SIMATIC ET 200SP motor starter while "manual local" is active, a changeover is made to manual local mode.

2.5.11 Trip without restart

The action "Trip without restart" results in the following behavior:

- The motor is tripped. Switching on again is only possible after the cause of the trip has been rectified and acknowledged.
- The parameter can only be implemented as "non-retentive".
- A group fault is generated and a diagnostics entry created.

2.5.12 Trip with restart

The action "Trip with restart" results in the following behavior:

- The motor is tripped.
- Acknowledged automatically after the cause of the trip has been rectified (input status).
- The parameter can only be implemented as "non-retentive".
- A group fault is generated and a diagnostics entry created.

2.5.13 Trip end position CW

If the motor control command is not equal to "Motor OFF", an incoming error message "Trip end position CW responded" is triggered when a 0 → 1 edge at the trip end position CW DI is detected. This error message results in internal tripping of the motor (emergency start deactivated). The fault message "Trip end position CW responded" is reported as outgoing (deleted), if the motor control command is "Motor OFF" or if all parameterized trip end position CW DIs are "0" when emergency start is active. If the motor control command "Motor CW" is issued in the case of trip end position CW DI static "1", an incoming error message "trip end position CW responded" is triggered (only if the error message was already outgoing or has been deleted). This error message prevents renewed switch-on of the motor in the CW direction of rotation (emergency start deactivated).

The action "Trip end position CW" results in the following behavior:

- The motor is tripped regardless of the direction of rotation (CW or CCW).
- You can switch the motor back on again after deletion of the control command "Motor CW/CCW".
- The motor can only be switched on with "Motor CCW".
- The parameter can only be implemented as "non-retentive".
- A group fault is generated and a diagnostics entry created.

Example

The following example shows the "trip end position CW" with digital input 1 parameterized to "Trip end position CW":

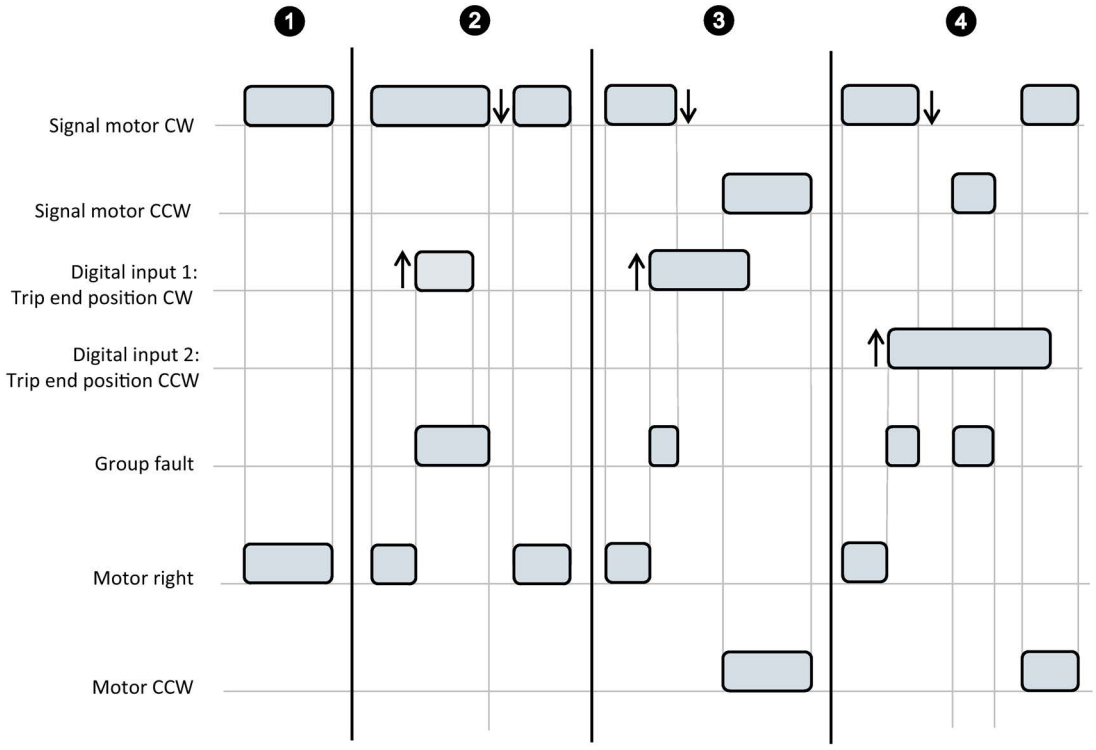


Image 2-7 Example of trip end position CW

① You switch the motor on by means of "Motor CW". The motor is running.

② You switch the motor on by means of "Motor CW". The motor is running. The motor is switched off by setting the digital input 1 (parameterized to input action 1 = Trip end position CW). A group fault is generated at the same time by the starter. To switch the motor back on again, digital input 1 and the signal "Motor CW" must be reset again. Thereafter you can start the motor again via the signal "Motor CW". The group fault is deleted when the signal "Motor CW" is canceled.

③ You switch the motor on by means of "Motor CW". The motor is switched off by setting the digital input 1 (parameterized to input action 1 = Trip end position CW). A group fault is generated at the same time by the starter. While digital input 1 is set, you can only run the motor counter-clockwise. The group fault is deleted when the signal "Motor CW" is canceled.

④ You switch the motor on by means of "Motor CW". The motor is also switched off by setting the digital input 2 (parameterized to input action 1 = Trip end position CCW). A group fault is generated at the same time by the starter. While digital input 2 is set, you can only run the motor clockwise. To switch the motor back on again, digital input 2 and the signal "Motor CW" or "Motor CCW" must be reset again. Thereafter you can start the motor again via the signal "Motor CW". The group fault is deleted when the signal "Motor CW" is canceled.

In the case of "Operational trip end position CW" or "Operational trip end position CCW", a group fault is not generated. Trip end position CW can be overridden by emergency starting. Operational trip end position CW cannot be overridden by emergency start.

2.5.14 Trip end position CCW

If the motor control command is not equal to "Motor OFF", an incoming error message "Trip end position CCW responded" is triggered when a 0 → 1 edge at the trip end position CCW DI is detected. This error message results in internal tripping of the motor (emergency start deactivated). The fault message "Trip end position CCW responded" is reported as outgoing (deleted) if the motor control command is "Motor OFF" or if all parameterized trip end position CCW DIs are "0" when emergency start is active. If the motor control command "Motor CCW" is issued in the case of trip limit CCW DI static "1", an incoming error message "trip end position CCW responded" is triggered (only if the error message was already outgoing or has been deleted). This error message prevents renewed switch-on of the motor in the CCW direction of rotation (emergency start deactivated).

The action "Trip end position CCW" results in the following behavior:

- The motor is tripped regardless of the direction of rotation (CW or CCW).
- You can switch the motor back on again after deletion of the control command "Motor CW/CCW".
- The motor can only be switched on with "Motor CW".
- The parameter can only be implemented as "non-retentive".
- A group fault is generated and a diagnostics entry created.

2.5.15 Group warning

The action "Group warning" results in the following behavior:

- A "group warning" is generated.
- The motor is not tripped.

2.5.16 Emergency start

Description

In the case of an emergency start, the ON command is accepted even if an OFF command is active.

Emergency starting is not possible in the following situations:

- If a device fault is active
- If there is no switched/unswitched 24 V DC supply voltage, or if the supply voltage is outside the specified range.
- The blocking protection has responded
- If a process image error is active

You can activate the function "Emergency start" as follows:

- PIQ 0.4 "Emergency start"
- Via the 3LC/DI module

Messages and actions

Table 2- 7 Messages and actions emergency start

Message	Action
Emergency start active	Remains pending while emergency start is active, even if the motor is switched off.

2.5.17 Motor CW

The motor is switched on or off clockwise with the help of the PIQ. If you would like to control the motor via the 3DI/LC module, activate the LC input on the 3DI/LC module (manual local mode). The parameter can only be implemented as an "NO contact".

If "Input n signal" = retentive, and "Input n action" = Motor CW/CCW, at least one input must always be parameterized with input action "Tripping ... " or "Quick Stop".
If this rule is violated, the motor starter will reject the parameters with the relevant diagnostics message.

2.5.18 Motor CCW

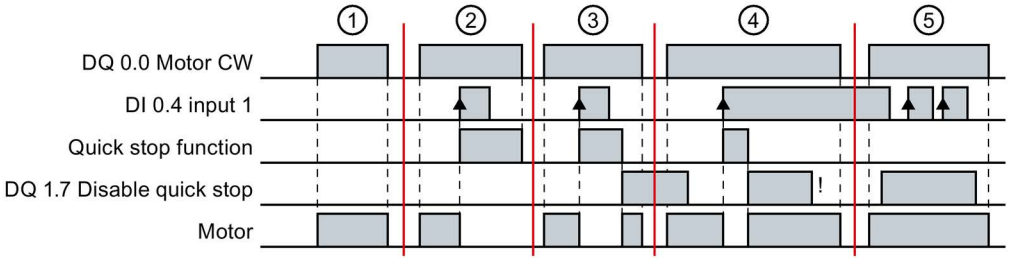
The motor is switched on or off counter-clockwise with the help of the PIQ. If you would like to control the motor via the 3DI/LC module, activate the LC input on the 3DI/LC module (manual local mode). The parameter can only be implemented as an "NO contact".

If "Input n signal" = retentive, and "Input n action" = Motor CW/CCW, at least one input must always be parameterized with input action "Tripping ... " or "Quick Stop".
If this rule is violated, the motor starter will reject the parameters with the relevant diagnostics message.

2.5.19 Quick Stop direction-independent

- Motor is tripped without group fault.
- "Quick Stop" takes priority over "Motor CW" and "Motor CCW"
- The input action responds to the active edge of the input signal, which means that deactivation is possible when the static input signal "Quick stop" is present.
- The input trigger is reset through cancelation of the "Motor CW" and "Motor CCW" control commands, or by means of "Disable quick stop" (in the process image). This applies only in the case of control via manual local mode or in the case of a retentive Quick Stop signal.
- The motor is switched off regardless of the direction of rotation.

Example 1: Input 1 signal = retentive/edge-triggered



① The motor is switched on by "Motor CW".

② Motor is switched on by "Motor CW", then switched off by the rising edge at digital input 1 (parameterized to input action 1 = Quick Stop). By revoking the "Motor CW" command, the Quick Stop function is reset.

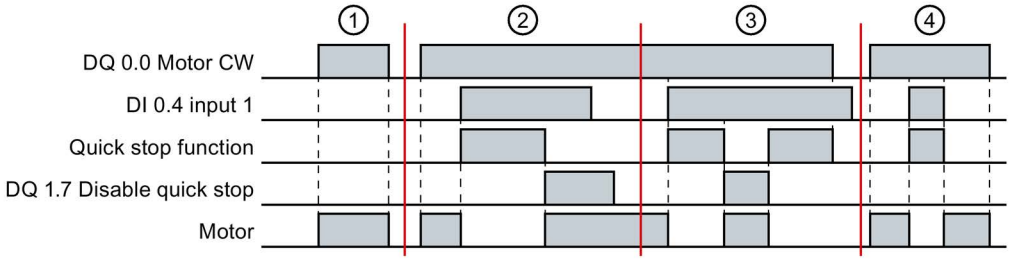
③ Motor is switched on by "Motor CW", then switched off by the rising edge at digital input 1. By setting Disable quick stop, the Quick Stop function is reset and the motor runs "CW" again until the "Motor CW" command is revoked.

④ Motor is switched on by "Motor CW", then switched off by the rising edge at digital input 1. By setting Disable quick stop, the Quick Stop function is reset and the motor runs "CW" again. Although the static digital input signal 1 (DI2) is still present, the motor continues to run and is only reset by revoking the "Motor CW" command.

Reason: The input action is edge-triggered.

⑤ Motor is switched on by "Motor CW" and continues to run uninterrupted since Disable quick stop continuously overwrites the edges of the signal of digital input 1 (DI2).

Example 2: Input 1 signal = non-retentive



① The motor is switched on and off by "Motor CW".

② The motor is switched on by "Motor CW", then switched off by the level at digital input 1 (parameterized with input action 1 = Quick Stop). The Quick Stop function is reset by Disable quick stop. The motor is switched on again since "Motor CW" is still active.

③ Motor is switched off by the level at digital input 1. By setting "Disable quick stop", the Quick Stop function is reset and since the level "Motor CW" is still active, the motor runs "CW" again until the "Disable quick stop" command is revoked.

④ Motor is switched on by "Motor CW", then switched off by the level at digital input 1. While the "Quick Stop" function is active, the motor remains switched off and starts up again when "Quick Stop" is revoked until "Motor CW" is switched off.

2.5.20 Quick Stop clockwise

The action "Quick Stop CW" results in the following behavior:

- The motor is switched off with pending signal "Motor CW" without group fault
- The motor is not switched off with pending signal "Motor CCW"
- "Quick Stop CW" takes priority over "Motor CW"
- The input action responds to the active edge of the input signal, which means deactivation is possible when the static input signal "Quick Stop" is present.
- The input trigger is reset through cancelation of the control commands "Motor CW" or "Disable quick stop" (in the process image). This applies only in the case of control via manual local mode or in the case of a retentive Quick Stop signal.

2.5.21 Quick Stop counter-clockwise

The action "Quick Stop CCW" results in the following behavior:

- The motor is switched off with pending signal "Motor CCW" without group fault
- The motor is not switched off with pending signal "Motor CW"
- "Quick Stop CCW" takes priority over "Motor CCW"
- The input action responds to the active edge of the input signal, Deactivation is possible when the static input signal "Quick Stop" is present.
- The input trigger is reset through cancelation of the commands "Motor CCW" or "Disable quick stop" (in the process image). This applies only in the case of control via manual local mode or in the case of a retentive Quick Stop signal.

2.5.22 Trip RESET

"Trip RESET" acknowledges all the errors/faults that are currently active and that can be acknowledged. An error/fault can be acknowledged if its cause has been rectified or if it is no longer present.

Trip RESET is triggered by:

- When loading a valid parameterization
- Remote RESET via PLC (PIQ bit 0.3 Trip RESET)
- Remote RESET via input actions (if parameterized)
- TEST/RESET button on the SIMATIC ET 200SP motor starter
- Power-On-RESET (switching off and on again of one or both 24 V supply voltages)

2.5.23 Cold start

Description

This function enables activation of the motor without main power supply. The motor starter responds here as if the main power supply were connected to the system. Thus, in the commissioning phase, for example, the relevant control commands are accepted from the controller and the relevant messages are sent.

Note

If the main power supply is nevertheless present (current flowing), an internal trip command is generated.

You can activate the "cold start" function as follows:

- PIQ 0.7 "Cold start"
- Via the 3LC/DI module

Messages and actions

Table 2- 8 Messages and actions inputs

Message	Action
Cold start active	-
Cold start tripping	Tripping

2.5.24 Operational trip end position CW

If the motor control command is not equal to "Motor OFF", an operational trip of the motor is triggered when a 0 → 1 edge at the operational trip end position CW DI is detected. This motor tripping triggered by the operational trip end position is revoked by the motor control command "Motor OFF". If the motor control command "Motor CW" is issued in the case of operational trip end position CW DI static "1", an operational trip is triggered again. This motor tripping triggered by the operational trip end position prevents renewed switch-on of the motor in the CW direction of rotation.

The action "Operational trip end position CW" results in the following behavior:

- The motor is tripped regardless of the direction of rotation (CW or CCW).
- The motor can only be switched on with "Motor CCW".
- The parameter can only be implemented as "non-retentive".
- A group fault is not generated, but a diagnostics message is set in data set 92.

2.5.25 Operational trip end position CCW

If the motor control command is not equal to "Motor OFF", an operational trip of the motor is triggered when a 0 → 1 edge at the operational trip end position CCW DI is detected. This motor tripping triggered by the operational trip end position is revoked by the motor control command "Motor OFF". If the motor control command "Motor CCW" is issued in the case of operational trip end position CW DI static "1", an operational trip is triggered again. This motor tripping triggered by the operational trip end position prevents renewed switch-on of the motor in the CCW direction of rotation.

The action "Operational trip end position CCW" results in the following behavior:

- The motor is tripped regardless of the direction of rotation (CW or CCW).
- The motor can only be switched on with "Motor CW".
- The parameter can only be implemented as "non-retentive".
- A group fault is not generated, but a diagnostics message is set in data set 92.

2.5.26 Logbook

Description

The logbooks contain a chronological list of trips, device faults, and events that are assigned a time stamp, thus creating a log. The log is stored internally so that the causes can be evaluated at a later stage.

Logbooks

Three logbooks that can be read as a data set are available:

- DS72: Logbook - Read device errors (Page 82)
- DS73: Logbook - Read trips (Page 84)
- DS75: Logbook - Read events (Page 86)

The current value "Operating hours - device" is entered as the time stamp. You can find the object numbers of the relevant messages in the relevant data sets. The last 21 entries are stored in the logbooks. You can read out the entries with the relevant data sets. The logbook is designed as a circular buffer. After 21 entries, the oldest entry is overwritten. The latest entry is at the first location.

Logbook - Read device errors

The logbook "Read device errors" contains all device errors/faults. The object numbers of the actual fault causes are entered, e.g. "Current measurement defective".

Logbook - Read trips

The logbook "Read trips" contains all group faults. The object numbers of the actual fault causes are entered, e.g. "Switching element defective".

Logbook - Read events

The logbook "Read events" contains all warnings as well as certain actions. Incoming events are reported. In addition, some events are also reported as outgoing. Incoming entries are marked "+". Outgoing events are marked "-".

2.5.27 PROFIenergy

2.5.27.1 What is PROFIenergy?

PROFIenergy supports the following two functions:

- Energy saving function

  Supports targeted shutdown of loads during idle times.

- Measured value function

  Energy management is an instrument which is ideally suited to reducing energy consumption and thereby energy costs within a company both systematically and on a long term basis. The aim of energy management is to optimize the use of energy in a company - from the purchasing of energy through to the consumption of energy - economically and ecologically. The measured value function provides the measured values required for optimization.

2.5.27.2 PROFIenergy in the motor starter

The SIMATIC ET 200SP motor starter supports the "Energy saving function" and "Measured value function" for the motor current. These are identified as commands, since they trigger reactions in the SIMATIC ET 200SP motor starter.

In addition, the SIMATIC ET 200SP motor starter also provides so-called services that provide information on the status of the motor starter as defined in PROFIenergy. These can then be evaluated and further processed in the user program.

Using PROFIenergy with the SIMATIC ET 200SP motor starters

SIEMENS provides two function blocks for using PROFIenergy:

- PE_START_END (FB815) supports the switch to an energy-saving mode.
- PE_CMD (FB816) supports the reading out of measured values and the switch to an energy-saving mode

You will find an application example for PROFIenergy in the Siemens Industry Online Support (https://support.industry.siemens.com).

You will find more information on PROFIenergy in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127).

Commands

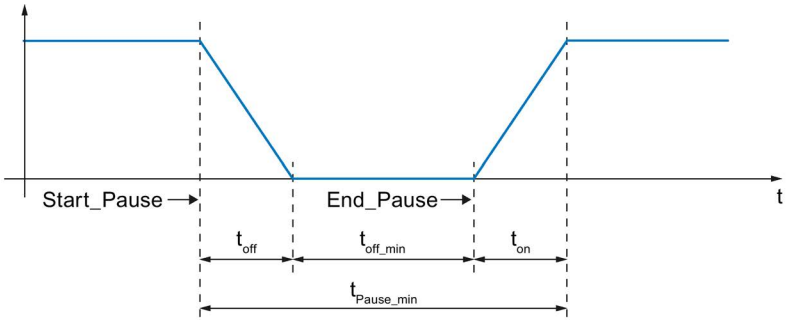
The following tables show the supported commands:

Control commands	
Start_Pause	The starter switches to energy-saving mode.
Start_Pause_with_time_response	
End_Pause	The starter switches back to operating mode.

Status commands	
PE_Identify	Provides a list of supported PROFIenergy commands/functions.
PEM_Status	Provides the status of the current mode.
PEM_Status_with_time_response	
Query_Modes	
List_Energy_Saving_Modes	Provides a list of supported energy-saving modes.
Get_Mode	Provides the parameter values with which the energy-saving function works.
Query_Version	
Query_Measurement	
Get_Measurement_List	Provides a list of supported measured values.
Get_Measurement_List_with_object_number	Provides a list of supported measured values and the associated object number.
Get_Measurement_Values	Provides the requested measured values.
Get_Measurement_Values_with_object_number	Provides the requested measured values together with the object number.

For data transfer, a distinction is made in the case of the SIMATIC ET 200SP motor starter between two ProfiEnergy modes (PE modes):

PE_Mode_ID = 255	Ready to operate
PE_Mode_ID = 01	Energy-saving mode



t_{off}	Time_to_Pause	Time the starter requires in order to change to energy saving mode. With the SIMATIC ET 200SP motor starter, this time is always 100 ms.
t_{off_min}	Time_min_length_of_stay	Minimum time that the device spends or should spend in saving mode. With the SIMATIC ET 200SP motor starter: 100 ms (due to the lock-out time of the reversing starter on change of direction before/after pause)
t_{on}	Time_to_operate	Time that will elapse before the starter changes back to the operating state. With the SIMATIC ET 200SP motor starter: 150 ms (due to startup sequence)
t_{Pause_min}	Time_min_Pause	Time that is compared with t_{Pause} (is transferred together with the "Start_Pause" command to the motor starter); if $t_{Pause} \geq t_{Pause\_min}$, the device switches to saving mode.

"Measured value function" command

Measured values for energy need to be supplied for efficient energy management.
The PROFIenergy specification offers various measured values from which to choose, each of which is assigned a measured value ID. The SIMATIC ET 200SP motor starter supports the instantaneous values of the phase current and the mean value of the phase currents as measured values.

The measured values are uniquely identified by IDs. The following measured value IDs 7, 8, 9, and 33 are supported:

- ID = 7: Instantaneous value of the phase current a (L1)
- ID = 8: Instantaneous value of the phase current b (L2)
- ID = 9: Instantaneous value of the phase current c (L3)
- ID = 33: Mean value of the three phase currents (a+b+c)/3

The current values are transferred with the following tolerances:

- Domain = 0x03 → IEC 61557-12
- Class = 0x0B → 5 %

The result is that the measured values are transferred with an accuracy of 5 % relative to the maximum configurable rated operational current I_e.

Reaction of the starter when energy-saving mode is activated

Shutdown of the motor by suppression of the PIQ bits (Motor CW, Motor CCW). The other PIQ bits (e.g. Trip RESET) remain active.

Interactions with the various operating modes

- PROFIenergy is operative only in Automatic mode
- Manual mode is not influenced by PROFIenergy; → it is still possible to switch to manual mode and thereby to control the motor manually.
- Both cyclic and acyclic data transmission (PIQ, PII, data sets, diagnostics, alarms, etc.) to and from the motor starter are still possible.

Prerequisites for the starter to switch to energy-saving mode (min. idle time, etc.)

The changeover to "Pause" energy-saving mode only becomes effective when the idle time sent is greater than the device-specific minimum idle time. This means that a switch is only performed when the pause is longer than the motor starter requires in order to switch off the main energy for the load.

The switch to energy-saving mode is recorded in the "Events" logbook.
Entry: "Energy saving mode active"

2.5.28 Firmware update

Introduction

During operation it may be necessary to update the firmware (e.g. to extend the available functions).

You update the firmware of the motor starter with the help of firmware files. The retentive data is retained after the firmware has been updated.

Requirements

- You have downloaded the file(s) for the firmware update from the Product Support (https://support.industry.siemens.com/) web page.

  On this web page, select:

  – Automation Technology > Automation Systems > Industrial Automation Systems SIMATIC > SIMATIC ET 200 I/O Systems > ET 200 systems for the cabinet > ET 200SP.

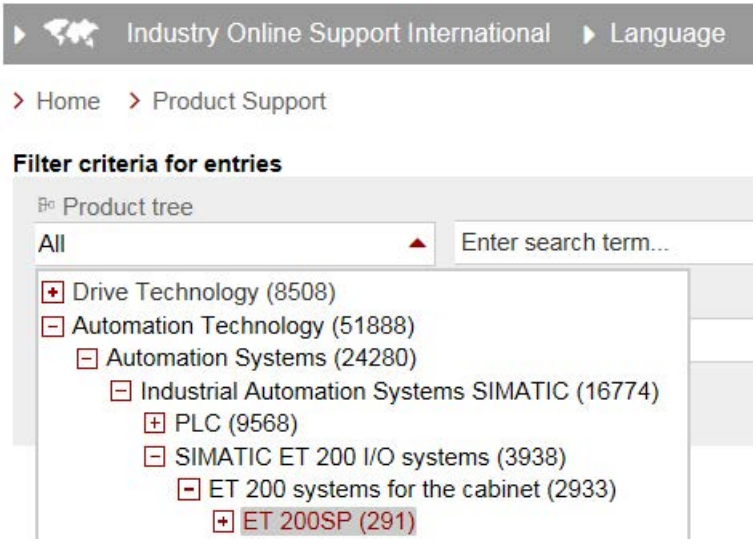


Image 2-8 ET 200SP in the product tree

From there, navigate to the specific type of module that you want to update. To continue, click on the "Software downloads" link under "Support". Save the desired firmware update files.

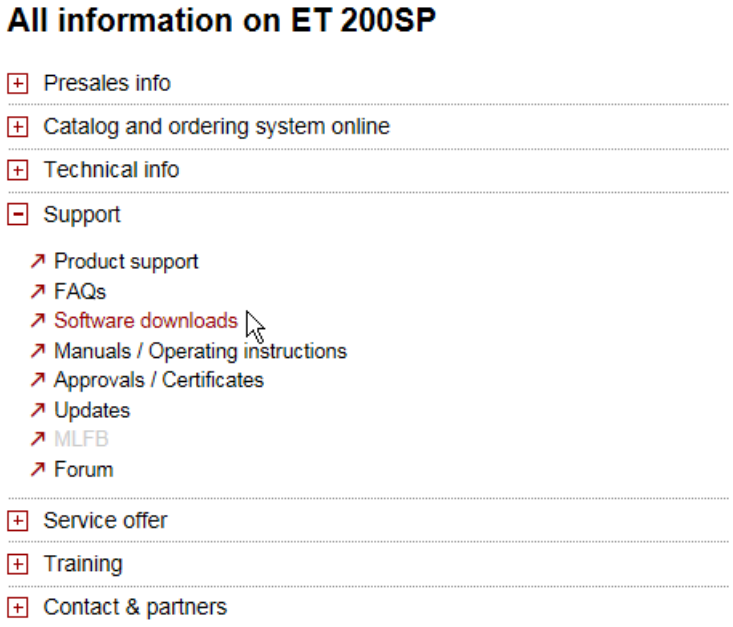


Image 2-9 Selecting the software downloads

- Before installing the firmware update, make sure that the modules are not being used.

Note

Securing the supply voltage

On starting, and during the firmware update, the 24 V supply voltages must be applied at the header module and the motor starter.

Note

Interrupted firmware update

If a firmware update has been interrupted, remove and reconnect the affected module before a renewed firmware update.

Options for the firmware update

The following options are available for updating firmware:

- Online via PROFINET IO/PROFIBUS DP (with STEP 7)
- Via the integrated Web server (possible for CPU as well as centralized and distributed I/O modules)
- With the TIA Portal, Version V13 SP1 or higher, with installed HSP for the ET 200SP motor starter
- With SIMATIC STEP 7 Version V5.5 SP4 or higher

Installation of the firmware update

⚠ WARNING

Risk of impermissible system states

The CPU switches to STOP mode or the interface module to "station failure" as a result of the firmware update being installed. STOP or station failure due to a firmware update can cause an unpredictable motor starter state. After completion of the update, the current PIO and the input actions take effect again.

Unexpected operation of a process or a machine can lead to fatal or severe injuries and/or to property damage.

Before installing the firmware update, ensure that the motor starter, the CPU and the interface module do not execute an active process.

Procedure using STEP 7

Proceed as follows to perform an online firmware update with STEP 7:

1. Select the module in the device view.
2. Select the "Online & diagnostics" command from the shortcut menu.
3. Select the "Firmware update" group in the "Functions" folder.
4. Click the "Browse" button to select the path to the firmware update files in the "Firmware update" area.
5. Select the suitable firmware file. The table in the firmware update area lists all modules for which an update is possible with the selected firmware file.
6. Click the "Run update" button. If the module can interpret the selected file, the file is downloaded to the module.

Note

If a firmware update is interrupted, you need to remove and insert the module before starting the firmware update again.

Procedure using the Web server

The procedure is described in the Web server (http://support.automation.siemens.com/WW/view/en/59193560) function manual.

Behavior during the firmware update

Note the following behavior during the firmware update of the motor starter:

- RUN and ERR flash.
- ST/OT and Manual flash.
- The motor starter powers up after completion of the firmware update. Diagnoses are reset. The firmware update does not affect the TMM and the cooling time.
- The sensor supply of the DI module remains active.

Behavior after the firmware update

After the firmware update, check the firmware version of the updated module. A successfully loaded firmware update is activated immediately.

Reference

You can find more information on the procedure in the STEP 7 online help.

Parameters/address space

3

3.1 Parameter assignment

When configuring a SIMATIC ET 200SP motor starter, the full parameterization scope is set and automatically transferred to the motor starter. When parameterizing in the user program, the parameters are transferred to the module via the data sets with the statement "WRREC".

The modules of the ET 200SP distributed I/O system support the full parameterization scope of the SIMATIC ET 200SP motor starters.

Note

List of the supported ET 200SP header modules

You will find a list of the compatible ET 200SP header modules in the Siemens Industry Online Support (https://support.industry.siemens.com/).

Note

Reduction to standard parameters

In the following cases, the full scope of parameterization is reduced by the configuring tool to the standard parameters (DS201) for system reasons:

- Activated DPV0 alarm mode (in the case of PROFIBUS IMs)
- Activated option handling (in the case of PROFIBUS IMs)
- When configuring using a GSD (for parameters, see data set 201 (Page 93))

Note

Trip RESET

When you send valid parameters to the motor starter, a trip RESET is triggered. Acknowledgeable active faults are deleted.

3.2 Parameterization with a GSD or GSDML file

For the SIMATIC ET 200SP motor starter, there are two different GSD files, one for operation with PROFINET, and one for operation with PROFIBUS. The GSD and GSDML files can be used with STEP 7 V5.5 SP4 and higher, and TIA Portal V13 SP1 and higher.

If you configure the SIMATIC ET 200SP motor starter in the PROFIBUS environment with GSD, and the standard values in data set 202 have to be changed, then you create data set 202 via the user program on initial commissioning of the starter. Transfer the data set to the PLC.

Parameterization with the PROFINET GSDML file

With the GSDML file for PROFINET, the SIMATIC ET 200SP motor starter can be fully configured with all parameters.

Parameterization with the PROFIBUS GSD file

Two parameter data sets (DS201 and DS202) are used for configuring the SIMATIC ET200SP motor starter.

Only data set DS 201 is ever transferred as the startup data set in the case of PROFIBUS GSD. The valid parameters are stored in data set 203 and 204.

3.3 Slot rules

Note the following slot rules:

- A motor starter BaseUnit may only be followed by a light BaseUnit of another type.
- Only a light motor starter BaseUnit may follow an AS-i module.
- A dark motor starter BaseUnit may only follow an empty slot if a motor starter or a 24 V standard I/O module is plugged in to the left of the empty slot.
- A light motor starter BaseUnit can always be plugged in after an empty slot.
- The empty slot adopts the potential of the BaseUnit to the left.

3.4 Data plausibility check

Checking incoming parameters in "Automatic" mode

The motor starter checks all incoming parameters for validity and plausibility, provided manual local mode is not active.

In the case of incorrect parameters during startup (after power ON):

- The diagnoses "Group fault" and "Invalid parameter value" are set.
- The motor remains shut down.
- A logbook entry is created
- The currently valid parameter values are retained and can be read via data set 203. Incorrect parameters can be read back and verified in data set 201.

In the case of incorrect parameters from the user program and when the motor is switched off:

- The diagnosis "Invalid parameter value" is set, and the number of the invalid parameter is entered in data set DS92.
- The diagnosis "Group warning" is set.
- A logbook entry is created
- The currently valid parameter values are retained and can be read via data set 203. Incorrect parameters can be read back and verified in data set 201.

For parameters when the motor is running:

- The parameters are not accepted by the starter.
- The diagnosis "Parameters cannot be changed in ON state" is set.
- The diagnosis "Group warning" is set.
- The motor is not switched off.
- A logbook entry is created
- The currently valid parameter values are retained and can be read via data set 203. Incorrect parameters can be read back and verified in data set 201.

Checking incoming parameters in "Manual local" mode

The incoming parameters are checked as follows in "Manual local" mode:

- When the motor is switched off:

  The motor starter saves the parameter and accepts it only when the motor starter has switched over to "Automatic" mode again. Only after changing to "Automatic" are the parameters checked.

- When the motor is running:
  - The parameters are not accepted by the starter, even if the motor starter changes later to "Automatic" mode.
  - The diagnosis "Parameters cannot be changed in ON state" is set.
  - The diagnosis "Group warning" is set.
  - The motor is not switched off.
  - A logbook entry is created
  - The currently valid parameter values are retained.

3.5 Parameters

Parameters for SIMATIC ET 200SP motor starters

The efficiency range of the adjustable parameters depends on the type of configuration. The following configurations are possible:

- Centralized operation with an ET 200SP CPU and the ET 200SP Open Controller
- Distributed operation on the PROFINET IO in an ET 200SP system
- Distributed operation on the PROFIBUS IO in an ET 200SP system

When parameterizing in the user program, the parameters are transferred to the module via the data sets with the statement "WRREC".

The parameters that can be set can be found in the Appendix in Data set 201 (Page 93).

You will find an explanation of the parameters in Chapter Explanation of the parameters (Page 65).

3.6 Declaration of parameters

Load type

Here, you can specify whether the motor starter must protect a 1-phase load (direct-on-line starters only) or a 3-phase load.

You will find more information in Chapter Load type (Page 25).

Trip class

The trip class (CLASS) specifies the maximum trip time in which a protective device must trip from the cold state at 6 times the current setting (motor protection according to IEC 60947).

Thermal motor model (response to overload)

You use this device parameter to determine how the motor starter is to respond to overload.

You will find further information in Chapter Motor protection - Thermal motor model (Page 28).

Response to CPU STOP

Determines the module's response to CPU STOP.

You will find more information in Chapter Response to CPU STOP (Page 37).

Response to residual current detection

You use this device parameter to specify how the motor starter is to respond to residual current detection.

You will find more information in Chapter Response to residual current detection (Page 32).

Response to asymmetry

You use this device parameter to determine how the motor starter is to behave in the event of asymmetry.

You will find more information in Chapter Asymmetry monitoring (Page 36).

Input n level

You use this device parameter to specify the input logic.

You will find more information in Chapter Inputs (Page 38).

Group fault diagnostics

You use this parameter to determine whether diagnostics via PROFINET or PROFIBUS DP (fault type) are enabled or disabled.

Input n signal

You use this device parameter to determine whether or not the input level of the digital inputs is to be saved.

You will find more information in Chapter Inputs (Page 38).

Group warning diagnostics

You use this device parameter to determine whether or not a maintenance alarm is forwarded to the higher-level CPU.

Input n action

Different actions can be triggered when an input signal is present.

You can find out which actions you can parameterize depending on "Input n level", "Input n signal" and "Mode" in Chapter Inputs (Page 38).

Rated operational current I_e

This is where you can enter the rated operational current that the branch (switchgear and motor) can carry without interruption. The setting range depends on the rating class.

You will find further information in Chapter Rated operational current (Page 24).

Upper/lower current warning limit

You can enter a lower and/or an upper current warning limit value.

Note

The current limits are not activated for startup override until the CLASS time expires, e.g. after 10 seconds for CLASS 10.

You will find more information in Chapter Upper/lower current warning limit (Page 32).

Upper/lower current limit

You can enter a lower and/or an upper current limit value.

Note

The current limits are not activated for startup override until the CLASS time expires, e.g. after 10 seconds for CLASS 10.

You will find more information in Chapter Upper/lower current limit (Page 33).

Blocking current

If the blocking current is overshot, the motor starter detects stalling.

You will find further information in Chapter Blocking current (Page 34).

Blocking time

The blocking time is the time a motor block can be permitted without tripping the motor. If the blocking time expires and the system is still stalled, the motor starter switches off.

You will find more information in Chapter Blocking time (Page 33).

Warning limit motor heating

The motor starter displays a warning if the motor heating limit is overshot. You use this parameter to preset a motor heating value in percent as a warning limit. At a warning limit of 0 %, the function is deactivated.

You will find more information in Chapter Motor protection - thermal motor model (Page 28).

See also

Parameterization with a GSD or GSDML file (Page 62)

3.7 Address space

Process image of the outputs

Note

Note that the values of the outputs are overwritten in Automatic mode by the cyclic process image!

Table 3- 1 Content of process image of the outputs (in bytes 4 and 5)

Process data	Meaning	Relevant for
DQ 0.0	Motor CW	All
DQ 0.1	Motor CCW	Reversing starters only
DQ 0.2	-	-
DQ 0.3	Trip RESET	All
DQ 0.4	Emergency start	All
DQ 0.5	-	All
DQ 0.6	-	-
DQ 0.7	Cold start	All
DQ 1.0	-	-
DQ 1.1	-	-
DQ 1.2	-	-
DQ 1.3	-	-
DQ 1.4	-	-
DQ 1.5	-	-
DQ 1.6	-	-
DQ 1.7	Disable quick stop	All

Process image of the inputs

Table 3- 2 Process image input (in bytes 0 and 3)

Process data	Meaning	Relevant for
DI 0.0	Ready (automatic)	All
DI 0.1	Motor ON	All
DI 0.2	Group fault	All
DI 0.3	Group warning	All
DI 0.4	Input 1	All (with 3DI/LC module)
DI 0.5	Input 2	All (with 3DI/LC module)
DI 0.6	Input 3	All (with 3DI/LC module)
DI 0.7	Input LC	All (with 3DI/LC module)
DI 1.0	Current motor current I_{curr} [%] bit 0	All
DI 1.1	Current motor current I_{curr} [%] bit 1	All
DI 1.2	Current motor current I_{curr} [%] bit 2	All
DI 1.3	Current motor current I_{curr} [%] bit 3	All
DI 1.4	Current motor current I_{curr} [%] bit 4	All
DI 1.5	Current motor current I_{curr} [%] bit 5	All
DI 1.6	Manual local mode	All (with 3DI/LC module)
DI 1.7	-	-
DI 2.0	Ready to start for motor ON	All
DI 2.1	Motor CW	All
DI 2.2	Motor CCW	Reversing starters only
DI 2.3	Quick stop active	All
DI 2.4	Energy saving mode active	All
DI 2.5	-	-
DI 2.6	-	-
DI 2.7	-	-
DI 3.0	Thermal motor model overload	All
DI 3.1	-	-
DI 3.2	I_e current limit tripping	All
DI 3.3	-	-
DI 3.4	Residual current detected	All
DI 3.5	Asymmetry detected	All
DI 3.6	Overtemperature	All
DI 3.7	-	-

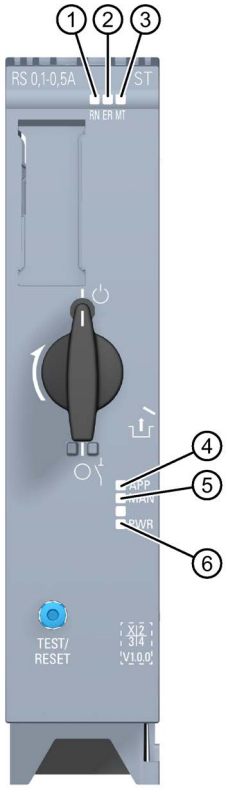
Alarms/diagnostic messages

4

4.1 Status and error displays

LED display

The figure below shows the LED display on the SIMATIC ET 200SP motor starter:



①	RN	(green)	- Run
②	ER	(red)	- Error
③	MT	(yellow)	- Maintenance
④	ST/OL	(red/green)	- State/overload
⑤	MAN	(yellow)	- Manual (manual local mode)
⑥	PWR	(green)	- Power

Image 4-1 LED display on the SIMATIC ET 200SP motor starter

Meaning of the LEDs

The tables below give the meanings of the status and fault displays:

RN/ER/MT LED

Table 4- 1 RN/ER/MT status and error displays

LEDs			Meaning	Explanation
RN (RUN)	ER (ERROR)	MT (MAINT)		
■ On	Not relevant	Not relevant	Operating state "RUN", the SIMATIC ET 200SP motor starter is in a "normal" application and executes the control commands. The current operating mode is not relevant.	-
☼ Flashes	Not relevant	Not relevant	Start (Cfg + Par.) Self-test Module deactivated Parameterization error Firmware update	System operating state "System startup" A parameterization fault during startup prevents exiting of this state. The SIMATIC ET 200SP motor starter reports a fault.
				You have to wait until the SIMATIC ET 200SP motor starter is ready.
				Firmware update
Not relevant	Not relevant	■ On	Maintenance demanded (warning)	Group warning At least one Maintenance demanded alarm has been transferred to the controller. Possible causes: • Motor model has exceeded warning limit • Current value has exceeded/ undershot warning limit • Start disabled, SIMATIC ET 200SP motor starter too warm (without ON command)
Not relevant	☼ Flashes at ≥ 3 s	Not relevant	Error	Group fault At least one Error alarm has been transferred to the controller. Possible causes: • Electronics supply voltage too low or too high • Impermissible I_e/CLASS setting and IN (0 → 1) • Motor protection trip overload relay • Thermal overload of the SIMATIC ET 200SP motor starter • Missing load voltage, phase failure/missing load • The mechanical rotary interlock is not in the READY position.

LEDs			Meaning	Explanation
RN (RUN)	ER (ERROR)	MT (MAINT)		
LED combinations				
Lights up for 4 s	Lights up for 4 s	Lights up for 4 s	LED/fan test	All LEDs are switched on for 4 s (triggered by pressing the blue button).
Flashes	Flashes	Not relevant	Firmware update active	-
OFF	OFF	OFF	No supply voltage	No supply voltage available A detected undervoltage (in the case of still functioning electronics) is not reported as power OFF, but as a fault.

ST/OL (STATE/OVERLOAD) LED

Table 4- 2 Status display ST/OL

ST/OL LED	Motor operating state	Meaning
■ On	Operation	ON command for motor active
□ Off	STOP	The motor is switched off. It is not known whether the motor is still rotating or not.
Flashes at 3 s	Overload	The thermal motor model or device protection model has tripped.

MAN (MANUAL) LED

Table 4- 3 Status display MAN

MAN LED	Meaning	Remedy
□ Off	Manual local mode deactivated	-
■ On	Manual local mode activated	-

PWR (POWER) LED

Table 4- 4 Status display PWR

PWR LED	Meaning	Remedy
☐ Off	Supply voltage not present or too low	Check the supply voltage.
■ On	Supply voltage present	-

LED combinations

Table 4- 5 Status displays ST/OL/MAN/PWR

LEDs			Meaning	Explanation
ST/OL (State/Overload)	MAN (Manual)	PWR (Power)		
☼ Lights up for 4 s	☼ Lights up for 4 s	☼ Lights up for 4 s	LED/fan test	All LEDs are switched on for 4 s (triggered by pressing the blue button).
☼ Flashes	☼ Flashes	■ Lights up	Firmware update active or canceled	-
OFF	OFF	OFF	No supply voltage	No supply voltage available A detected undervoltage (in the case of still functioning electronics) is not reported as power OFF, but as a fault.

4.2 RESET button

The RESET button has the following functions:

Designation	Tripping	Description
LED/fan test	Press of a button for less than two seconds	The LED/fan test is activated. All LEDs (ST/OL, MAN, PWR) light up and the fan is switched on for 4 s.
RESET function	Press of a button	If a group fault is active, you can acknowledge this fault using the blue button. You can acknowledge device faults in principle only via ON/OFF of the control voltage. Note: If a fault is active, you cannot execute the LED/fan test.

4.3 Interrupts

The SIMATIC ET 200SP motor starter supports diagnostic interrupts and maintenance. You can read out the diagnoses of the motor starter in the following data sets:

- Data set 72: Read device faults (Page 82)
- Data set 73: Read trips (Page 84)
- Data set 75: Read events (Page 86)
- Data set 92: Read device diagnosis (Page 88)

A diagnostics message is output for each diagnostics event and the ER LED flashes on the module when group fault diagnostics are enabled. You can read out the diagnostic messages in the diagnostics buffer of the CPU, for example. You can evaluate the error codes via the user program. The following table shows the individual diagnostic messages:

Error type channel diagnostics	Fault text	Remedial measures
0003_h	Overvoltage	The supply voltage is above the tolerance limit.
$001F_h$	Channel temporarily unavailable	Wait until the firmware update is completed.
$011B_h$	Invalid/inconsistent firmware present	The firmware is incomplete and/or the firmware expansions are incomplete or incompatible. Execute a complete firmware update. Check all fault messages that may arise. Check to see if the firmware update has been interrupted.
$100A_h$	Test mode current flow	Current is flowing in the motor feeder although the motor feeder is in test mode or the test position (TPF). Possible causes: The main circuit is not interrupted in test operation.
1021_h	Phase unbalance	The limit value for phase unbalance has been exceeded. Phase unbalance can cause an overload. Possible causes: Failure of the phase, fault in the motor windings Remedy: Check the motor feeder and the motor.
1022_h	Thermal motor model overload	The motor feeder has been overloaded. The motor temperature rise has exceeded a limit. Remedy: Please check the motor and the applications that are being driven by the motor. After a trip, you can switch the motor on again after the cooling time has expired, or after the thermal motor model has been deleted.
1040_h	Threshold I exceeded	The current has exceeded a limit. Remedy: Please check the application that is being driven by the motor.
1041_h	Threshold I undershot	The current has undershot a limit. Remedy: Please check the application that is being driven by the motor.

Error type channel diagnostics	Fault text	Remedial measures
104C$_h$	Motor blocking	The maximum motor current has exceeded a limit for blocking protection. Possible cause: The motor is blocked. Remedy: Please check the application that is being driven by the motor.
1080$_h$	Device fault	Non-correctable fault detected following self-diagnostics (contactor contacts, switching element, etc.). Remedy: Replace the device.
1083$_h$	Switching element overload	Switching element (switching contact, power semi-conductor) too hot. Check the ambient conditions linked to cooling. You might have to take derating into consideration. Check the number of switching operations.
1084$_h$	Electronics supply voltage too low	The supply voltage is below the permissible value. Remedy: Check the power supply (load measurement, voltage range)
1088$_h$	No switching element supply voltage	No supply voltage detected. Remedy: Check the power supply to the switching elements and the cabling.
1095$_h$	Parameterization error	Module has not been parameterized or has been incorrectly parameterized. Remedy: Correct the parameterization.
1096$_h$	Process image error	The process image output (PIQ) contains invalid control bit combinations (e.g. control bits for clockwise and counter-clockwise set simultaneously). Remedy: Check and correct the process image output (PIQ).
109D$_h$	Input Action	A warning or trip signal is active on at least one input. Remedy: Check the application.
109E$_h$	Emergency end position CW	The emergency end position has been passed. Remedy: Check the sensors for the operational trip end position.
109F$_h$	Emergency trip end position CCW	The emergency end position has been passed. Remedy: Check the sensors for the operational trip end position.
10A5$_h$	Phase failure or fuse defective	Possible causes: Phase failure, fault in the motor winding, fuse in the device defective Remedy: Check the motor feeder (main circuit) and the motor. Clear the short-circuit in the system and then replace the fuse or the device.

4.4 Maintenance

A maintenance alarm is output for each group warning and the MT LED lights up on the module when group warning diagnostics are enabled. You can read out the diagnostic messages in the diagnostics buffer of the CPU, for example.

You will find information on maintenance in the System Manual of the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) in Chapter "Commissioning - Identification and maintenance data".

Extended maintenance

You will find general information on extended maintenance in the Function Manual "SIMATIC PROFINET with STEP 7 V13 (https://support.industry.siemens.com/cs/ww/en/view/49948856)" in Chapter "Diagnostics".

The PROFINET interfaces of the interface module support the diagnostics concept and maintenance concept in PROFINET according to the standard IEC 61158-6-10. The aim is early detection and correction of potential faults.

The maintenance information is generated in STEP 7 with the following system messages:

- Maintenance request - symbolized by a yellow screwdriver.
- Faults (bad) - symbolized by a red screwdriver

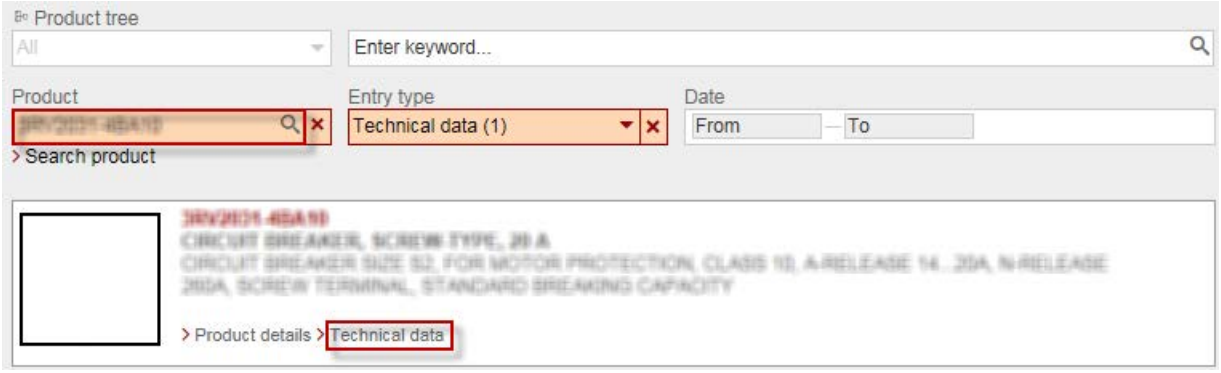
Technical data

5

5.1 Data sheet

You can find all the technical data of the product in the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/).

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.



5.2 Technical data

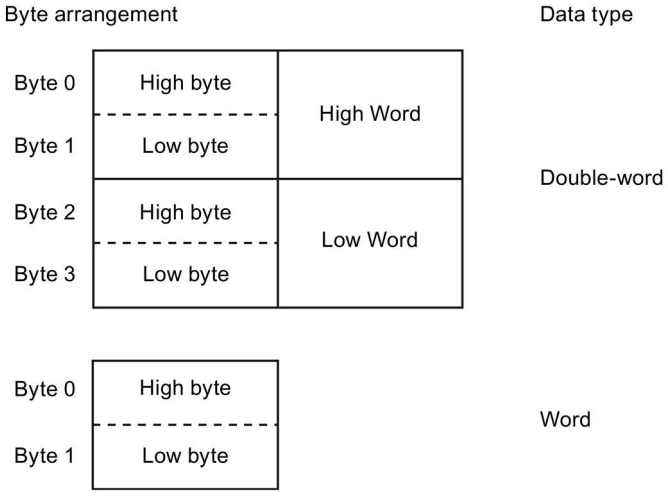
Properties	Values
Product name	SIMATIC
Product name	Motor starter
IP degree of protection	IP20
Pollution degree	2
Operational voltage rated value	500 V
Ambient temperature	
• During operation	-25 … +60 °C
• During storage	-40 … +70 °C
• During transport	-40 … +70 °C

Data sets

A

A.1 Byte arrangements

When data longer than one byte is stored, the bytes are arranged as follows ("big endian"):



A.2 DS72 logbook - Read device error

Byte	Data type	Meaning	Range of values	Increment
Entry 1 (= latest entry)				
0 … 3	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
4 … 5	Signed 16	Object number	0 … ±32767	1
Entry 2				
6 … 9	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
10 - 11	Signed 16	Object number	0 … ±32767	1
… …				
Entry 21				
120 … 123	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
124 … 125	Signed 16	Object number	0 … ±32767	1

The data set call "Logbook device fault" returns the operating hour of the event that has occurred and an associated object number for each entry. This data set can accommodate 21 entries. When all locations have been overwritten, the oldest entry is overwritten again.

Note

The latest entry is entered at the first location of the data set. The remaining entries are moved one entry down. You cannot delete logbooks yourself.

The supported object numbers and their meaning are shown in the table below:

Table A- 1 Assignment of object number to device fault message

Object No.	Device fault messages
308	Switching element defective
417	Stack overflow
418	Stack underflow
423	Invalid command
434	Error in system software
437	Watchdog overflow
456	EEPROM: memory defective
458	EEPROM: CRC error "Device parameter"
460	EEPROM: Contains invalid data
462	EEPROM: Invalid pointer for device parameter buffer
464	ROM error
465	RAM error
476	Current measuring defective
478	Bypass element does not close
479	Bypass element does not open
480	Bypass element protection has opened unintentionally during operation
486	Program execution check: Sequential program execution error
487	Program execution check: Logical programming error
1414	Switching element short-circuited
1466	Contact 1 failed
1467	Contact 2 failed
381	Self-test error

A.3 DS73 logbook - Read triggering operations

Byte	Data type	Meaning	Range of values	Increment
Entry 1 (latest entry)				
0 ... 3	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
4 ... 5	Signed 16	Object number	0 … ±32767	
Entry 2 (second-latest entry)				
6 ... 9	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
10 ... 11	Signed 16	Object number	0 … ±32767	
… …				
Entry 21 (oldest entry)				
120 ... 123	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
124 ... 125	Signed 16	Object number	0 … ±32767	

The data set call "Logbook trips" returns the operating hour of the event that has occurred and an associated object number for each entry. This data set can accommodate 21 entries. When all locations have been overwritten, the oldest entry is overwritten again.

Note

The latest entry is entered at the first location of the data set. The remaining entries are moved one entry down. You cannot delete the logbook.

The supported object numbers and their meaning are shown in the table below:

Table A- 2 Assignment of object number to trips message

Object No.	Trips message	Comment
309	Switching element overload	-
317	Electronics supply voltage too low	-
328	Motor overload trip	Tripping of the thermal motor model
333	Mechanical rotary interlock is not in the READY position	-
334	I_e upper limit violation	-
335	I_e lower limit violation	-
338	Residual current tripping	-
339	Tripping due to motor blocking	-
341	Asymmetry tripping	-
348	Input tripping	-
349	Input trip CW	-
350	Input trip CCW	-
355	Process image error	-
365	Invalid parameter value	→ Group fault only on startup
378	Firmware update has errors	-
384	No external startup parameters received	-
1406	Cold start tripping	-
1407	Electronics supply voltage too high	-
1482	Current measuring range overshot	-

A.4 DS75 logbook - Read events

Byte	Data type	Meaning	Range of values	Increment
User data (technology data)				
Entry 1 (latest entry)				
0 ... 3	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
4 ... 5	Signed 16	Object number	0 … ±32767	
Entry 2 (second-latest entry)				
6 ... 9	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
10 ... 11	Signed 16	Object number	0 … ±32767	
… …				
Entry 21 (oldest entry)				
120 .. 123	Unsigned 32	Operating hours - device	0 … 2^{32}	1 s
124 ... 125	Signed 16	Object number	0 … ±32767	

The data set call "Logbook events" returns the operating hour of the event that has occurred and an associated object number for each entry. This data set can accommodate 21 entries. When all locations have been overwritten, the oldest entry is overwritten again.

Note

The latest entry is entered at the first location of the data set. The remaining entries are moved one entry down. You cannot delete the logbook.

The supported object numbers and their meaning are shown in the table below:

Table A- 3 Assignment of object number to event message

Object No.	Event messages	Comment
	Warnings	
327	Thermal motor model overload	In the case of a group fault, the message "Motor overload trip" is also queued.
337	Residual current detected	
340	± Asymmetry detected	
351	Input warning	
365	Invalid parameter value	Not in the case of startup since it is a group fault
366	Parameters cannot be changed in ON state	
1539	Warning limit - motor heating exceeded	
1541	± I_e-warning limit exceeded	
1542	± I_e-warning limit undershot	
	Actions	
310	± Emergency start active	
357	Automatic mode	Enter at the time of changeover
359	Manual local mode	Enter at the time of changeover
376	Firmware update successful	
454	Internal communication fault	
1520	± Energy-saving mode active	
1580	Switching element hot	

±: Event is entered as "incoming" (+) and "outgoing" (-) event. Other messages are entered only as "incoming" messages

A.5 DS92 Read device diagnostics

Object number	Byte.Bit	Meaning	Relevant for
User data (technology data) Switching/controlling			
301	0.0	Ready (automatic) The device is ready for operation via the controller. There is no connection to the mechanical rotary interlock.	All
306	0.1	Motor CW	All
307	0.2	Motor CCW	Reversing starters only
309	0.3	Switching element overload	All
308	0.4	Switching element defective	All
310	0.5	Emergency start active	All
302	0.6	Group fault	All
304	0.7	Group warning	All
318	1.0	No switching element supply voltage	All
	1.1-4	Reserved	-
315	1.5	Reserved	-
	1.6-7	Reserved	-
Protection function (motor, cable, short-circuit)			
-	2.0-2	Reserved	
327	2.3	Thermal motor model overload	All
328	2.4	Overload tripping	All
-	2.5	Reserved	-
330	2.6	Cooling time active	All
305	2.7	Safety-related disconnection	All
-	3.0-1	Reserved	-
333	3.2	Mechanical rotary interlock is not in the READY position	All
-	3.3-6	Reserved	-
352	3.7	Input control	All
340	4.0	Asymmetry detected	All
341	4.1	Asymmetry tripping	All
334	4.2	I_e upper limit violation	All
335	4.3	I_e lower limit violation	All
-	4.4	-	-
337	4.5	Residual current detected	All
338	4.6	Residual current tripping	All
339	4.7	Tripping due to motor blocking	All
344	5.0	Input 1	All
345	5.1	Input 2	All
346	5.2	Input 3	All

Object number	Byte.Bit	Meaning	Relevant for
347	5.3	Input LC	All
348	5.4	Input tripping	All
349	5.5	Input trip CW	All
351	5.6	Input warning	All
350	5.7	Input trip CCW	All
-	6.0-1	Reserved	-
353	6.2	Quick stop active	All
-	6.3-6	Reserved	-
317	6.7	Electronics supply voltage too low	All
Communication			
-	7.0	Reserved	-
356	7.1	CPU or master STOP	All
357	7.2	Automatic mode	All
-	7.3	Reserved	-
359	7.4	Manual local (local control) (no connection to the mechanical rotary interlock)	All
-	7.5-6	Reserved	-
355	7.7	Process image error	All
-	8.0	Reserved	-
365	8.1	Invalid parameter value • During operation • During starting	All
366	8.2	Parameters cannot be changed in ON state	All
-	8.3	Reserved	-
384	8.4	No external startup parameters received	All
-	9	Reserved	-
367	10-11	Incorrect parameter number (as word)	All
	12-13	Reserved	All
Device functions			
1405	14.0	Cold start active	All
1406	14.1	Cold start tripping	All
-	14.2-7	Reserved	-
-	15.0-4	Reserved	-
-	15.5-7	Reserved	-
-	16-18	Reserved	-
Switching/controlling			
1407	19.0	Electronics supply voltage too high	All
1470	19.1	Ready for motor ON	All
1414	19.2	Switching element short-circuited	All
1417	19.3	Bypass element defective	All

Object number	Byte.Bit	Meaning	Relevant for
Protection function			
1482	21.2	Current measuring range overshot	All
-	21.3-7	Reserved	-
Communication (operating modes)			
357	22.0	Automatic mode (redundant to Bit 7.2, no connection to the mechanical rotary interlock)	All
-	22.1-2	Reserved	-
359	22.3	Manual local mode (redundant to Bit 7.4, no connection to the mechanical rotary interlock)	All
-	22.4-7	Reserved	-
-	23	Reserved	-
Prewarnings			
-	24-25	Reserved	-
Maintenance			
-	26-31	Reserved	-
Quick Stop			
1508	32.0	Quick Stop 1 - direction-independent	All
1509	32.1	Quick Stop 1 - clockwise	All
1510	32.2	Quick Stop 1 - counter-clockwise	Reversing starter
-	32.3-7	Reserved	-
-	33	Reserved	-
End position			
1507	34.0	Input operational trip - end position CW	All
1506	34.1	Input operational trip - end position CCW	All
-	34.2-7	Reserved	-
-	35	Reserved	-
Energy saving function			
-	360-5	Reserved	-
1522	36.6	Start_Pause command is pending	All
1520	35.7	Energy saving mode active	All
-	37	Reserved	-
Operating states			
-	38-51	Reserved	-
Warnings			
-	52.0-3	Reserved	-
1541	52.4	I_e warning limit exceeded	All
1542	52.5	I_e warning limit undershot	All
-	52.6-7	Reserved	-
-	53	Reserved	-

A.6 DS94 Read measured values

Object number	Byte.Bit	Coding	Meaning	Range of values	Increment
	User data (technology data)				
	Measured values (volatile)				
504	0	Unsigned 8	Phase current $I_{L1(\%)}$	0 ... 796 %	3.125 %
505	1	Unsigned 8	Phase current $I_{L2(\%)}$	0 ... 796 %	3.125 %
506	2	Unsigned 8	Phase current $I_{L3(\%)}$	0 ... 796 %	3.125 %
-	3 ... 6	0x00	Reserved	-	-
503	7	Unsigned 8	Unbalance	0 ... 255 %	1 %
502	8 ... 9	Unsigned 16	Motor heating	0 ... 1.000 %	-
-	10 ... 27	0x00	Reserved	-	-
513	28 ... 31	Signed 32	Phase current $I_{L1(rms)}$	±0 ... 20.000 A	0.01 A
514	32 ... 35	Signed 32	Phase current $I_{L2(rms)}$	±0 ... 20.000 A	0.01 A
515	36 ... 39	Signed 32	Phase current $I_{L3(rms)}$	±0 ... 20.000 A	0.01 A
516	40 ... 41	Unsigned 16	Electronics supply voltage	0 ... 1.500 V	0.1 V
-	42 ... 63	0x00	Reserved	-	-

A.7 DS95 Read statistics

Object number	Byte.Bit	Coding	Meaning	Range of values	Increment
	User data (technology data)				
-	0	0	Reserved	-	-
-	1.0-5	0	Reserved	-	-
-	1.6-7	11_B	Bit 6 operating hours resolution 1 second Bit 7 operating hours selection 1 operating hour - device	11 (fixed)	1
-	2 ... 3	0x00	Reserved	-	-
682	4 ... 7	Unsigned 32	Device operating hours in seconds	0 ... (2^{32}-1)	1 s
603	8 ... 11	Unsigned 32	Number of motor CW starts	0 ... (2^{32}-1)	1
604	12 ... 15	Unsigned 32	Number of starts motor CCW	0 ... (2^{32}-1)	1
605	16 ... 17	Unsigned 16	Number of motor overload trips Is incremented on tripping by: • Blocking current monitoring • Thermal motor model	0 ... (2^{16}-1)	1
-	18 ... 19	0x00	Reserved	-	-
609	20 ... 23	Signed 32	Motor current $I_{max\ (rms)}$	±0 ... 20.000	0.01 A
608	24 ... 27	Signed 32	Last tripping current $I_{A\ (rms)}$	±0 ... 20.000	0.01 A
602	28 ... 31	Unsigned 32	Motor operating hours in seconds	0 ... (2^{32}-1)	1 s
615	32 ... 49	0x00	Reserved	-	-
616	50 ... 51	Unsigned 16	Number of switching element overload trips	0 ... (2^{16}-1)	1
	52 ... 53	Unsigned 16	Number of hard switching operations of the relay	0 ... (2^{16}-1)	-
-	54 ... 89	0x00	Reserved	-	-

A.8 Read/write DS201 device parameter 1

DS201 contains the second part of the device parameters.

If incorrect parameters are sent to the motor starter in DS201, these incorrect parameters will also be reported back when reading DS201. In the case of incorrect parameters, the object number of the first incorrect parameter is output in WORD 10 of DS92.

The defaults for factory settings of the motor starter appear in italics in the Value range column. In the engineering system, a distinction is made between the default values of the input actions and the current range of the defaults of the motor starter.

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
-	0.0	[0]	Reserved	-
3	0.1	*[0]: 3-phase* [1]: 1-phase	Load type (only for direct-on-line starters)	Load type (Page 25)
-	0.2-0.3	[0]	Reserved	-
6	0.4 - 0.7	[3]: CLASS 5 (10a) *[0]: CLASS 10*	Trip class	Motor protection - thermal motor model (Page 28)
5	1.0 - 1.1	*[0]: Trip without restart* [1]: Trip with restart [2]: Warn only	Response to overload - TMM	Trip without restart (Page 43) Trip with restart (Page 43)
4	1.2	*[0]: Retention of the thermal motor model on restart* [1]: Deletion of the thermal motor model on restart	The charge state of the thermal motor model is deleted at run-up. In this way, unintentional early trips can be prevented if the motor starter has been switched off for an extended period.	
-	1.3	[0]	Reserved	-
34	1.4	*[0]: Switch substitute value* [1]: Retain last value	Response to CPU STOP	Response to CPU STOP (Page 37)
19	1.5	[0]: Warn *[1]: Tripping*	Response to residual current detection	Response to residual current detection (Page 32)
20	1.6	[0]: Warn *[1]: Tripping*	Response to asymmetry	Asymmetry monitoring (Page 36)
-	1.7	[0]	Reserved	-
25	2.0	[0]: NC contact *[1]: NO contact*	Input 1 level	Inputs (Page 38)
27	2.1	See input 1 level	Input 2 level	Inputs (Page 38)
29	2.2	See input 1 level	Input 3 level	Inputs (Page 38)
193	2.3	*[0]: Enable* [1]: Disable	Group fault diagnostics	Group diagnostics/warnings (Page 38)
80	2.4	*[0]: Non-retentive* [1]: Retentive	Input 1 signal	Inputs (Page 38)
81	2.5	See input 1 signal	Input 2 signal	Inputs (Page 38)
82	2.6	See input 1 signal	Input 3 signal	Inputs (Page 38)

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
191	2.7	[0]: Enable *[1]: Disable*	Group warning diagnostics	
194	3	[0]: No action [1]: Trip without restart [2]: Trip with restart [3]: Trip end position CW [4]: Trip end position CCW [5]: Group warning [7]: Emergency start *[8]: Motor CW* [9]: Motor CCW [11]: Quick Stop (direction-independent) [12]: Trip RESET [13]: Cold start [14]: Quick Stop clockwise [15]: Quick Stop counter-clockwise [37]: Operational trip end position CW [38]: Operational trip end position CCW	Input 1 action	Inputs (Page 38)
195	4	See input 1 - action *[9]: Motor CCW (default)*	Input 2 action	Inputs (Page 38)
196	5	See input 1 - action *[13]: Cold start (default)*	Input 3 action	Inputs (Page 38)
2	6 - 7	0.3 … 9 A/10 mA *The maximum current is preset.*	Rated operational current I_e The rated operational current is MLFB-dependent, and thus also the maximum setting range.	
15	8	18.75 … 100 %/3.125 % [6 … 32] *[0]: Deactivated*	Lower current limit	Upper/lower current limit (Page 33)
16	9	50 … 400 %/3.125 % [16 … 128] *[0]: Deactivated*	Upper current limit	Upper/lower current limit (Page 33)

A.9 Read/write DS202 device parameter 2

DS202 contains the second part of the device parameters.

If incorrect parameters are sent to the motor starter in DS202, these incorrect parameters will also be reported back when reading DS202. In the case of incorrect parameters, the object number of the first incorrect parameter is output in WORD 10 of DS92.

The defaults appear in italics in the Value range column.

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
18	0.0 - 0.3	*1* … 5s/0.5 s [2 … 10] *Default value is [2]: 1 s.*	Blocking time	Blocking time (Page 33)
-	0.4 - 0.7	[0]: Reserved	Reserved	
2210	1	0 … 99 %/1 % [0 … 99] [0]: *Deactivated*	Warning limit - motor heating	
-	2 - 3	[0]: Reserved	Reserved	
-	4 - 5	[0]: Reserved	Reserved	
17	6	150 ... 1000 %/50 % [3 ... 20] *Default value is [16]: 800 %*	Blocking current	
-	7	[0]: Reserved	Reserved	
2213	8	18.75 … 100 %/3.125 % [6 … 32] [0]: Deactivated *Default value is [7]: 21.875 %*	Lower current warning limit	Upper/lower current warning limit (Page 32)
2214	9	50 … 400 %/3.125 % [16 … 128] [0]: Deactivated *Default value is [36]: 112.5 %*	Upper current warning limit	Upper/lower current warning limit (Page 32)

A.10 Read DS203 device parameter 1

DS203 contains the second part of the incorrect parameter with which the motor starter is working. The defaults appear in italics in the Value range column.

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
-	0.0	[0]	Reserved	-
3	0.1	*[0]: 3-phase* [1]: 1-phase	Load type (only for direct-on-line starters)	Load type (Page 25)
-	0.2 - 0.3	[0]	Reserved	-
6	0.4 - 0.7	[3]: CLASS 5 (10a) *[0]: CLASS 10*	Trip class	Motor protection - thermal motor model (Page 28)
5	1.0 - 1.1	*[0]: Trip without restart* [1]: Trip with restart [2]: Warn only	Response to overload - TMM	Trip without restart (Page 43) Trip with restart (Page 43)
4	1.2	*[0]: Retention of the thermal motor model on restart* [1]: Deletion of the thermal motor model on restart	The charge state of the thermal motor model is deleted at run-up. In this way, unintentional early trips can be prevented if the motor starter has been switched off for an extended period.	
-	1.3	[0]	Reserved	-
34	1.4	*[0]: Switch substitute value* [1]: Retain last value	Response to CPU STOP	Response to CPU STOP (Page 37)
19	1.5	[0]: Warn *[1]: Tripping*	Response to residual current detection	Response to residual current detection (Page 32)
20	1.6	[0]: Warn *[1]: Tripping*	Response to asymmetry	Asymmetry monitoring (Page 36)
-	1.7	[0]	Reserved	-
25	2.0	[0]: NC contact *[1]: NO contact*	Input 1 level	Inputs (Page 38)
27	2.1	See input 1 level	Input 2 level	Inputs (Page 38)
29	2.2	See input 1 level	Input 3 level	Inputs (Page 38)
193	2.3	*[0]: Enable* [1]: Disable	Group fault diagnostics	Group diagnostics/warnings (Page 46)
80	2.4	*[0]: Non-retentive* [1]: Retentive	Input 1 signal	Inputs (Page 38)
81	2.5	See input 1 signal	Input 2 signal	Inputs (Page 38)
82	2.6	See input 1 signal	Input 3 signal	Inputs (Page 38)
191	2.7	[0]: Enable *[1]: Disable*	Group warning diagnostics	

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
194	3	[0]: No action [1]: Trip without restart [2]: Trip with restart [3]: Trip end position CW [4]: Trip end position CCW [5]: Group warning [7]: Emergency start *[8]: Motor CW* [9]: Motor CCW [11]: Quick Stop (direction-independent) [12]: Trip RESET [13]: Cold start [14]: Quick Stop clockwise [15]: Quick Stop counter-clockwise [37]: Operational trip end position CW [38]: Operational trip end position CCW	Input 1 action	Inputs (Page 38)
195	4	See input 1 - action *[9]: Motor CCW (default)*	Input 2 action	Inputs (Page 38)
196	5	See input 1 - action *[13]: Cold start (default)*	Input 3 action	Inputs (Page 38)
2	6 - 7	0.3 … 9 A/10 mA *The maximum current is preset.*	Rated operational current I_e The rated operational current is MLFB-dependent, and thus also the maximum setting range.	
15	8	18.75 … 100 %/3.125 % [6 … 32] *[0]: Deactivated*	Lower current limit	Upper/lower current limit (Page 33)
16	9	50 … 400 %/3.125 % [16 … 128] *[0]: Deactivated*	Upper current limit	Upper/lower current limit (Page 33)

A.11 Read DS204 device parameter 2

DS204 contains the second part of the incorrect parameters with which the motor starter is working.

The defaults appear in italics in the Value range column.

Object number	Byte.Bit	Range of values	Meaning	See Chapter ...
18	0.0 - 0.3	*1* … 5s/0.5 s [2 … 10] *Default value is [2]: 1 s.*	Blocking time	Blocking time (Page 33)
-	0.4 - 0.7	[0]: Reserved	Reserved	
2210	1	0 … 99 %/1 % [0 … 99] [0]: *Deactivated*	Warning limit - motor heating	
-	2 - 3	[0]: Reserved	Reserved	
-	4 - 5	[0]: Reserved	Reserved	
17	6	150 ... 1000 %/50 % [3 ... 20] *Default value is [16]: 800 %*	Blocking current	
-	7	[0]: Reserved	Reserved	
2213	8	18.75 … 100 %/3.125 % [6 … 32] [0]: Deactivated *Default value is [7]: 21.875 %*	Lower current warning limit	Upper/lower current warning value (Page 32)
2214	9	50 … 400 %/3.125 % [16 … 128] [0]: Deactivated *Default value is [36]: 112.5 %*	Upper current warning limit	Upper/lower current warning value (Page 32)

A.12 I&M data

A.12.1 I&M data

The following I&M data (Identification & Maintenance function) are supported by all ET 200SP motor starters:

Number	Name	Comment
I&M 0	Device identification	This is stored in the device on initialization
I&M 1	Equipment identifier	These are entered in the engineering system.
I&M 2	Installation	
I&M 3	Description	

Note

With PROFINET, the I&M data can be accessed via data sets 0xAFF0 - 0xAFF3 (PNO).

With PROFIBUS, the I&M data can be accessed via data set 255.

A.12.2 I&M 0: Read device identification

The following data are saved:

Byte	Data type	Content	Meaning
I&M header			
0 ... 5	-	Reserved	-
I&M0 data block 0			
6 ... 7	Unsigned16	MANUFACTURER_ID	42 = Manufacturer ID SIEMENS
8 ... 27	Char[20]	ORDER_ID	Order No. (MLFB)
28 ... 43	Char[16]	SERIAL_NUMBER	Serial number
44 ... 45	Unsigned16	HARDWARE REVISION	Hardware revision or product version
46 ... 49	Char	SOFTWARE_REVISION	Firmware version
50 ... 51	Unsigned16	REV_COUNTER	Provides information about the parameterized changes on the module. The "REV_COUNTER" is incremented after each change.
52 ... 53	Unsigned16	PROFILE_ID	Gives information about the PROFIBUS profile supported by the device and the line of products belonging to the device.
54 ... 55	Unsigned16	PROFILE_SPECIFIC_TYPE	Used to supplement the object "PROFILE_ID" and contains further information on the profile.
56 ... 57	Unsigned16	IM_VERSION	Provides information about the version of the identification data (01 01hex = Version 1.1).
58 ... 59	Unsigned16	IM_SUPPORTED	Provides information about the available identification data (Index 2 to 4).

A.12.3 I&M 1: Read/write equipment identifier

The following data are saved:

Byte	Length	Content	Meaning
I&M header			
0 ... 1	Unsigned16	0x0021	Block type
2 ... 3	Unsigned16	0x0038	Block length = 56
4 ... 5	Unsigned16	0x0100	Block version = 1.0
I&M data block 1			
6 ... 37	Char[32]	TAG FUNCTION	Plant identifier Fill unused positions with blanks (0x20)
38 ... 59	Char[22]	TAG LOCATION	Location designation Fill unused positions with blanks (0x20)

A.12.4 I&M 2: Read/write installation

The following data are saved:

Byte	Data type	Content	Meaning
I&M header			
0 ... 1	Unsigned16	0x0022	Block type
2 ... 3	Unsigned16	0x0012	Block length = 18
4 ... 5	Unsigned16	0x0100	Block version = 1.0
I&M data block 2			
6 ... 21	Char[16]	IM_DATE	Specification of an input date (YYYY-MM-DD HH:MM)

A.12.5 I&M 3: Read/write description

The following data are saved:

Byte	Data type	Content	Meaning
I&M header			
0 ... 1	Unsigned16	0x0023	Block type
2 ... 3	Unsigned16	0x0038	Block length = 56
4 ... 5	Unsigned16	0x0100	Block version = 1.0
I&M data block 3			
6 ... 59	Char[54]	IM_DESCRIPTOR	Comment Fill unused positions with blanks (0x20)

Circuit examples

B

B.1 Elevating table

Direct-on-line starter

Article numbers:

- BaseUnit: 3RK1908-0AP00-0AP0
- Motor starter: 3RK1308-0A*00-0CP0
- Digital input module: 3RK1908-1AA00-0B00

Parameterization of DI inputs:

- DI.1 Quick Stop
- DI 2: Quick Stop

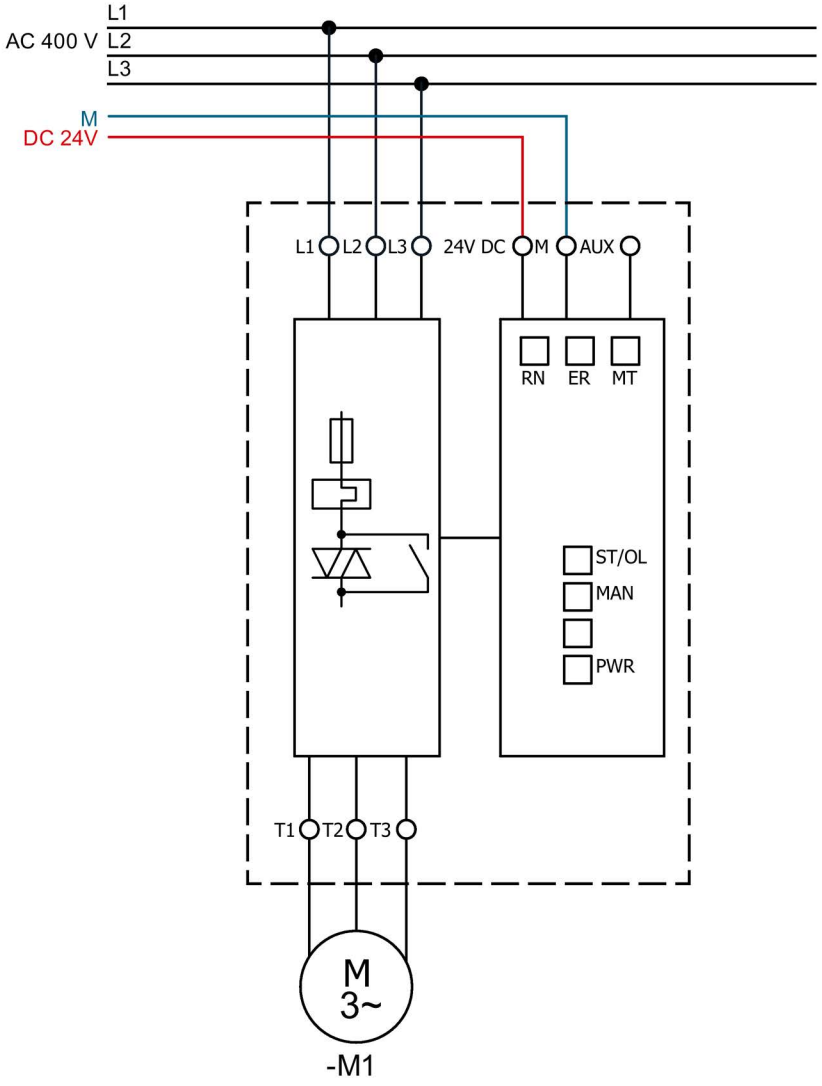
Reversing starter

Article numbers:

- BaseUnit: 3RK1908-0AP00-0AP0
- Motor starter: 3RK1308-0B*00-0CP0
- Digital input module: 3RK1908-1AA00-0B00

Parameterization of DI inputs:

- DI.1 Operational trip end position CW
- DI 2: Operational trip end position CCW

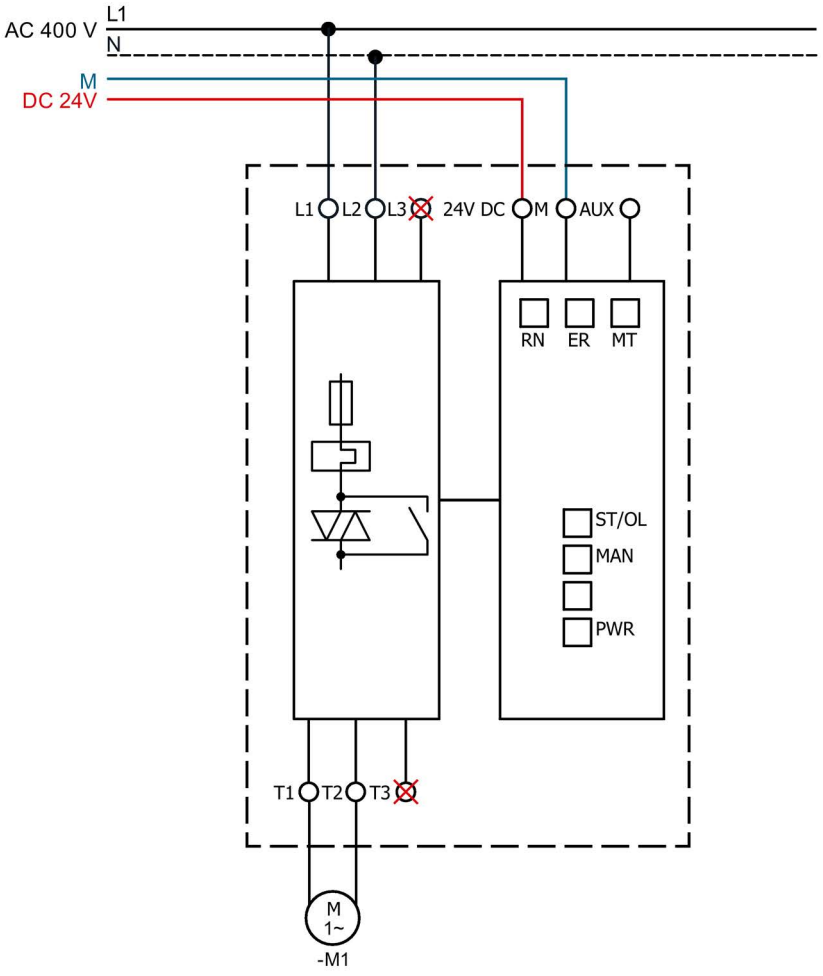


In the multi-pole representation, the N and PE conductors are not shown separately.

B.2 Single-phase motor

Article numbers:

- BaseUnit: 3RK1908-0AP00-0AP0
- Motor starters: 3RK1308-0A*00-0CP0



In the multi-pole representation, the PE conductor is not shown separately.

B.3 Resistive load

Star connection

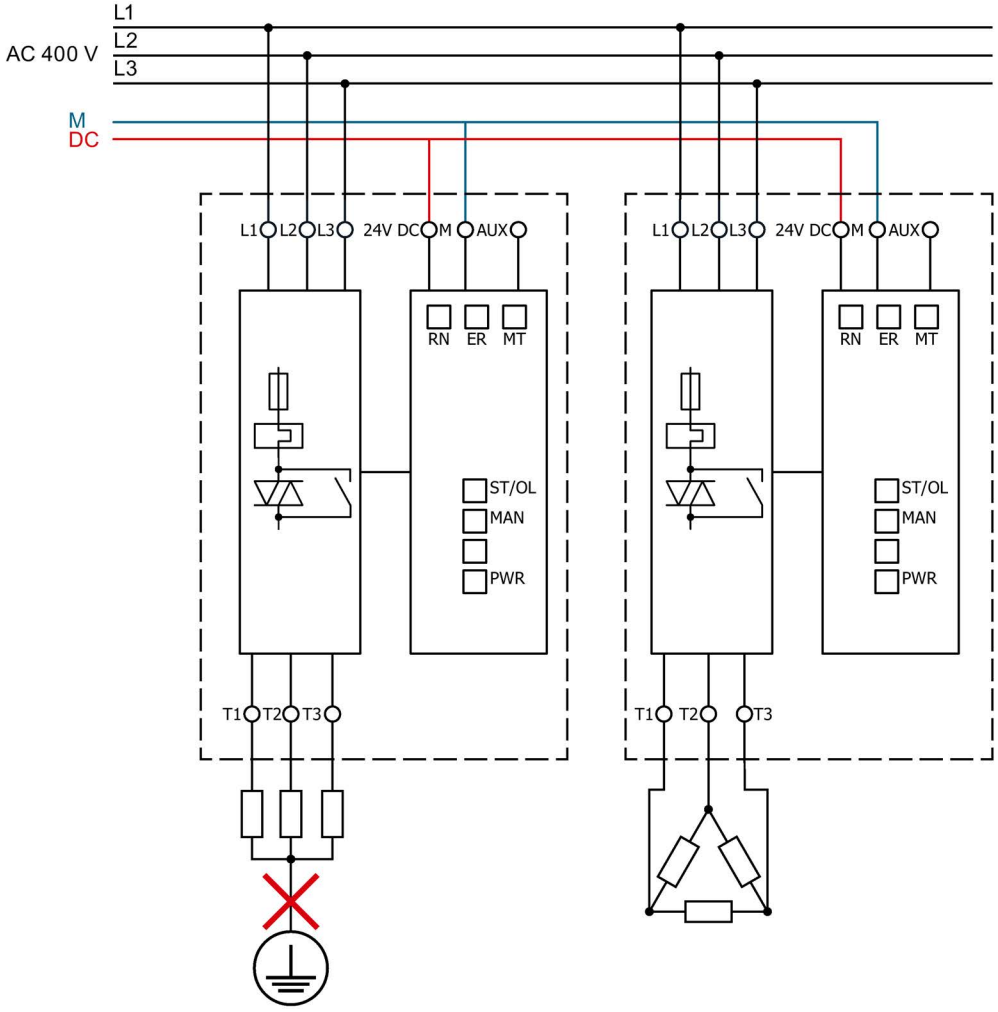
Article numbers:

- BaseUnit: 3RK1908-0AP00-0AP0
- Motor starters: 3RK1308-0A*00-0CP0

Delta connection:

Article numbers:

- BaseUnit: 3RK1908-0CP00-0AP0
- Motor starters: 3RK1308-0A*00-0CP0



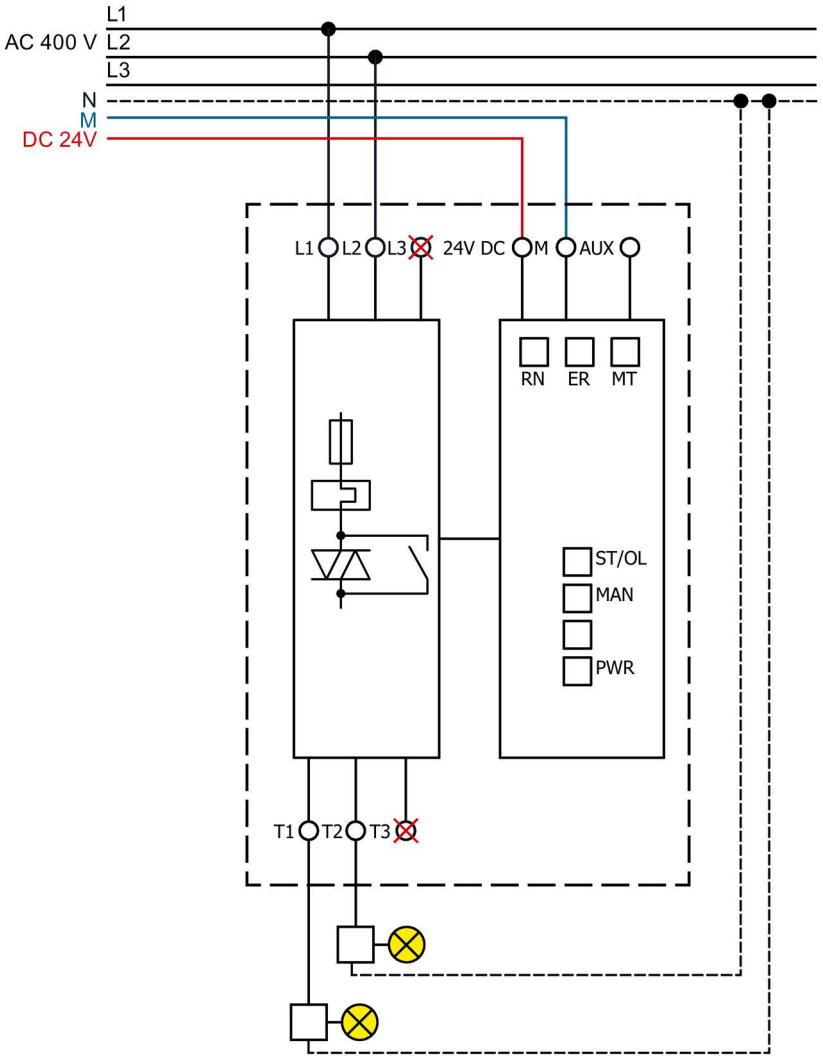
Do not connect PE or N to the neutral point.

In the multi-pole representation, the N and PE conductors are not shown separately.

B.4 Gas discharge lamps

Article numbers:

- BaseUnit: 3RK1908-0AP00-0AP0
- Motor starters: 3RK1308-0A*00-0CP0



In the multi-pole representation, the PE conductor is not shown separately.

Note

Motor model und response to overload of the gas discharge lamp

Observe the set motor model and the overload response of the gas discharge lamp for the parameterization of the motor starter.