SIEMENS

System Manual

SIDOOR

Automatic Door Control

ATE530S COATED/ATE531S

Edition 06/2020

support.industry.siemens.com

SIEMENS

Automatic door control unit

SIDOOR
ATE530S COATED/ATE531S

System Manual

06/2020

A5E36155002-AE

Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠ WARNING

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

Trademarks

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

Disclaimer of Liability

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

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E36155002-AE
Ⓟ 09/2021 Subject to change

Table of contents

Introduction

1

Content of the System Manual

This System Manual describes the SIDOOR ATE530S COATED and SIDOOR ATE531S door drives. A SIDOOR door drive consists of at least the following components:

- Controller
- Motor
- Power supply unit (optional)

In addition, you can connect optional accessory devices (for example SIDOOR SERVICE TOOL).

The individual products and their interactions are described in this System Manual.

Target group

The System Manual is intended for fitters, commissioning technicians, owner-operators, service engineers and project engineers.

Firmware versions

This System Manual applies to controllers **as from** the following firmware version:

Controller	From firmware version
SIDOOR ATE530S COATED	V2.0
SIDOOR ATE531S	V2.0

Figures

The figures in this System Manual show the control device SIDOOR ATE530S COATED Version 1.0. The illustrations for other versions may differ slightly.

Information on the Internet

You will find more detailed information about the SIDOOR door drive and its applications on the Internet (https://new.siemens.com/global/en/products/automation/products-for-specific-requirements/sidoor-automatic-door-controls.html).

Parameter documentation

Note the determined optimal parameter settings in the settings record (see the appendix Settings record (Page 237)).

Have this record to hand when you call the Hotline.

Recycling and disposal

The products are low in pollutants and are recyclable. To ensure eco-friendly recycling and to dispose of your old device, contact a certified disposal company for electronic waste.

History

Version	Change
09/2015	First edition
05/2016	Support of the SIDOOR ATE531Sdoor control and the SIDOOR MEG251 motor
11/2019	Support of the nudge function

General safety instructions

2

Qualified personnel

Qualified personnel have the following qualifications:

- Training, instruction or authorization to switch on and off electric circuits and devices/systems in compliance with safety engineering standards.
- Training or instruction in the maintenance and use of appropriate safety equipment in compliance with safety engineering standards.
- First aid training.

Working on the door drive

⚠ WARNING

Risk of injury due to dangerous electrical voltages and moving mechanical parts

Disconnect the door drive by unplugging the power plug from the power supply before you start work on the door drive.

⚠ WARNING

Risk of injury due to moving mechanical parts

If power-operated guards are used, ensure that they have been tested prior to initial commissioning. Power-operated guards must also be tested annually.

⚠ CAUTION

Risk of injury due to moving mechanical parts

If required by the drive application, suitable protective equipment must be installed for safe door interlocking.

Parameter assignment and configuration

⚠ WARNING

Risk of injury and material damage due to excessive closing force of the door

Exceeding the maximum static closing force may lead to injuries to persons or damage to the door drive and mechanical components of the door.

After commissioning, have the maximum static closing force checked by the service personnel, and adjusted to the limit value if it is excessive. Limit the opening force for glass doors to 150 N.

⚠ WARNING

Access protection to the controllers/parameters

Protect the controller and the parameter assignment of the controller against unauthorized access. Appropriate measures must be taken for specific applications, e.g. installation in a closed control cabinet, to ensure access only by authorized personnel.

Note

Application-specific measures for emergency operation

In the event of a controller failure, measures must be taken for emergency operation according to the application.

Modifications to the door drive

⚠ CAUTION

Loss of liability for defects and material damage

Changes to the door drive lead to the loss of liability for defects and compensation rights, and the correct function of the door drive is no longer guaranteed.

Note the following rules:

- Do not make any modifications to the door drive (motor, controller, power supply).
- Do not make a permanent connection as this does not ensure a proper and required necessary disconnection from the mains.
- Do not remove the protective Schuko-type socket under any circumstances (for example by cutting it off).
- The power supply cord of the power supply (SIDOOR TRANSFORMER, for example SITOP) cannot be replaced. Scrap the power supply if the supply cable is damaged.

2.1 Notes for servicing

The SIDOOR system should be included in the maintenance schedule for the door system as a whole, and inspected in the course of the maintenance cycles stated in the schedule.

Note

According to the ambient conditions and the stress on the system, recommended maintenance cycles provided in the table below may vary.

Object	Recommended warning interval
Drive/motor MED280, MEG251	Maintenance-free
SIDOOR ATE530S COATED control unit	Maintenance-free
Visible inspection of the control unit, attachment of the motor holder, deflector pulley and mounting bracket for dirt, damage and proper installation. In addition, an inspection of the door function is recommended for running or grinding noises.	1 year
SIDOOR ATE531S control unit Visual inspection of the fan on the control unit for contamination and damage.	1 year
The belt tension should be checked according to specifications, see Tension (Page 193).	1 year
In addition to the specified minimum test interval, a manual test of the safety-related ERM function is recommended as part of the recommended maintenance cycle, see Safety function specifications (Page 90).	1 year
With mechanical changes to the system, for example, due to maintenance or wear (friction, dirt, engine replacement, belt replacement or modification of the general door mechanism), an inspection is recommended for the commissioning parameters regarding the safety-related settings for forces and energies/velocities.	

Maximum service life:

- The maximum service life for the SIDOOR ATE530S COATED (see Key figures for safety functions (Page 90)) is 20 years.
- It is recommended to replace the motor MED280, MEG251 after 10 years.

⚠ WARNING

Verification of safety-relevant functions

The SIDOOR controller is only a subsystem (incomplete machine). In general, the correct parameter assignment of the SIDOOR controller and the effectiveness of the safety-relevant functions must be checked at regular intervals by testing the safety-relevant functions during commissioning and depending on the application.

Security information

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

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

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

For additional information on industrial security measures that can be implemented, please visit (http://www.siemens.com/industrialsecurity).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (http://www.siemens.com/industrialsecurity).

Information on disposal

Ensure that all the packagings are disposed of environmentally correctly.

Product family

3

3.1 Overview

SIDOOR

Door control unit is the general term for a controller of an access system.

The SIDOOR product family is primarily intended for operating sliding doors.

Door control units are characterized by the fact that there are always two defined states: namely for the open and closed positions of the door. The door is always controlled between these two positions in accordance with the guidelines.

In a defined learn run via "one-button operation" the door control unit automatically determines the values for the door width, the dynamic door mass, the inhibiting force in the opening direction, the restraining force in the closing direction and the control direction of the motor and saves these in a non-volatile parameter memory.

System structure - platform screen doors

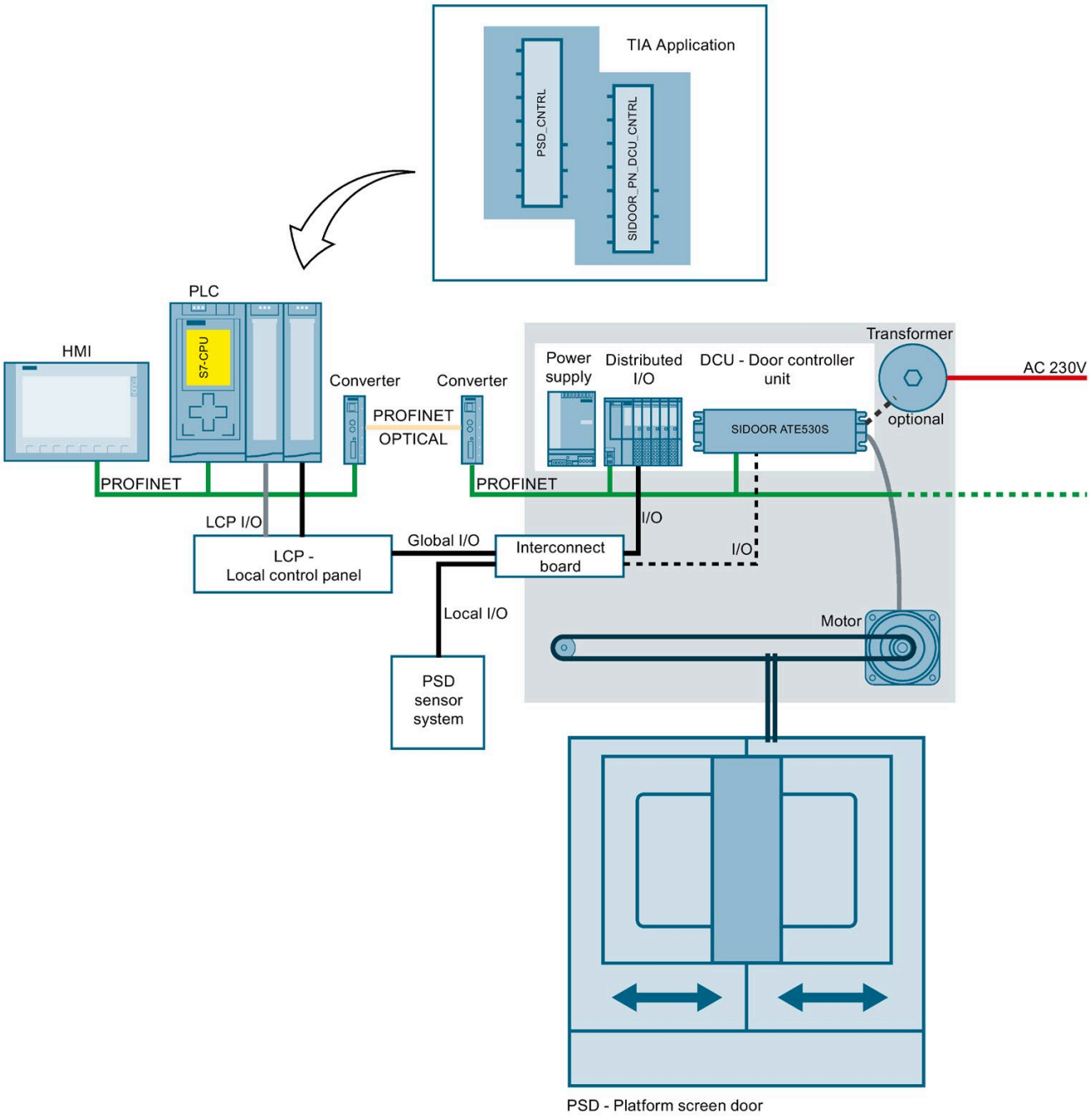


Figure 3-1 System structure platform screen doors

EC technology

The ATE530S COATED and ATE531S control units support the three-phase EC motors SIDOOR MED280 and SIDOOR MEG251.

3.2 Products

3.2.1 Controllers

Control devices are electronic control systems that are connected with the power supply unit through an external power supply unit (see Power supply unit (Page 20)). They are generally connected to the higher-level controller via digital or fieldbus interfaces, and can be configured via a user interface.

The controllers are designed for different areas of application. The following table provides an overview of the available controllers.

Versions

Product	Article number	Description
SIDOOR ATE530S COATED	6FB1231-3BM12-7AT0	• Control unit for platform screen doors, horizontal • The SIDOOR MED280 motor can be used to move dynamic door masses up to 280 kg. • The SIDOOR MEG251 motor can be used to move dynamic door masses up to 250 kg. • PROFINET IO interface to the higher-level control system (PROFINET module) • Printed circuit board coated.
SIDOOR ATE531S	6FB1231-3BM11-7AT0	• Control unit for platform screen doors, horizontal • The SIDOOR MED280 motor can be used to move dynamic door masses up to 280 kg. • The SIDOOR MEG251 motor can be used to move dynamic door masses up to 250 kg. • PROFINET IO interface to the higher-level control system (PROFINET module) • Printed circuit board coated. • Fan module for extended temperature range.

3.2.2 Motors

EC flat motor SIDOOR MED280 EC geared motor SIDOOR MEG251

The SIDOOR MED280 and SIDOOR MEG251 motors form the maintenance-free drive units of the door drive. The motors are operated speed-controlled by the control unit. The set force and speed limits are not exceeded. The power is transmitted by a toothed belt. The toothed belt passes over a deflector pulley, and can be fitted with 2 clutch holders. This enables both single-sided and centrally-opening doors to be driven.

Product	Article number	Description
SIDOOR MED280	6FB1203-0AT12-7DA0	• EC flat motor, gearless • Max. door weight of 280 kg • Cable length 1.5 m
SIDOOR MEG251 L	6FB1203-5AT00-7MP0	• EC geared motor • Left-hand mounting • Max. door weight of 250 kg • Cable length 1.5 m
SIDOOR MEG251 R	6FB1203-5AT01-7MP0	• EC geared motor • Right-hand mounting • Max. door weight of 250 kg • Cable length 1.5 m

3.2.3 SIDOOR MED280 accessories

① SIDOOR mounting bracket, **large**, with tensioning device
② SIDOOR mounting bracket, **small**, with tensioning device
③ SIDOOR belt lock with door clutch holder
④ SIDOOR deflector unit with deflector pulley

Product	Article No.	Description
SIDOOR motor holder	6FB1104-0AT03-0AD0	Motor holder for mounting the motor
SIDOOR motor mounting bracket	6FB1104-0AT01-0AS0	Mounting bracket for mounting the SIDOOR motor holder
SIDOOR door clutch holder	6FB1104-0AT05-0AS1	• Belt lock with door clutch holder • Door clutch holder for 20-mm-wide toothed belt • For attaching both ends of the toothed belt, and for connecting the respective door panel to the toothed belt
SIDOOR deflector unit	6FB1104-0AT07-0AS0	• Deflector unit with deflector pulley • For deflecting the SIDOOR toothed belt in the same height and depth, aligned with motor drive pinion
SIDOOR mounting bracket	6FB1104-0AT05-0AS4	• Mounting bracket, **large**, with tensioning device • For mounting the SIDOOR deflector unit and for tensioning the SIDOOR toothed belt
	6FB1104-0AT05-0AS5	• Mounting bracket, **small**, with tensioning device • For mounting the SIDOOR deflector unit and for tensioning the SIDOOR toothed belt
SIDOOR toothed belt	6FB1104-0AT05-0AB0	• STD S5M toothed belt • Length 4 m, width 20 mm
	6FB1104-0AT06-0AB1	• STD S5M toothed belt • Length 45 m, width 20 mm

Additional accessories are available in the Industry Mall (https://mall.industry.siemens.com/).

3.2.4 SIDOOR MEG251 accessories

① SIDOOR mounting bracket with tensioning device
② SIDOOR belt lock with door clutch holder
③ SIDOOR deflector unit with deflector pulley

Product	Article number	Description
SIDOOR rubber-metal anti-vibration mount	6FB1104-0AT02-0AD0	Rubber-metal anti-vibration mount for geared motors
SIDOOR door clutch holder	6FB1104-0AT01-0CP0	• Belt lock with door clutch holder • Door clutch holder for 12 mm-wide toothed belt • For attaching both ends of the toothed belt, and for connecting the respective door panel to the toothed belt
	6FB1104-0AT02-0CP0	• Belt lock with door clutch holder • Door clutch holder for 14 mm-wide toothed belt • For attaching both ends of the toothed belt, and for connecting the respective door panel to the toothed belt
SIDOOR deflector unit	6FB1104-0AT03-0AS0	• Deflector unit with deflector pulley • For deflecting the SIDOOR toothed belt in the same height and depth, aligned with motor drive pinion
SIDOOR mounting bracket	6FB1104-0AT01-0AS0	• Mounting bracket with tensioning device • For mounting the SIDOOR deflector unit and for tensioning the SIDOOR toothed belt
SIDOOR toothed belt	6FB1104-0AT01-0AB0	• STS-S8M toothed belt • Length 4 m, width 12 mm
	6FB1104-0AT02-0AB0	• STS-S8M toothed belt • Length 45 m, width 12 mm
	6FB1104-0AT03-0AB0	• STS-S8M toothed belt • Length 4 m, width 14 mm
	6FB1104-0AT04-0AB0	• STS-S8M toothed belt • Length 55 m, width 14 mm

Additional accessories are available in the Industry Mall (https://mall.industry.siemens.com/).

3.2.5 Power supply

① SIDOOR TRANSFORMER
② SIDOOR TRANSFORMER UL
③ Customer-provided DC voltage supply (for example SITOP PSU300S 20A)

SIDOOR power supplies connect the controllers to the respective application-specific power supply.

The use of the SIDOOR TRANSFORMER/SIDOOR TRANSFORMER UL is only permitted up to an ambient temperature of 55°C. Above a temperature of 55 °C in the direct vicinity an external direct-current supply has to be connected.

Device selection

Product	Article number	Description
SIDOOR TRANSFORMER	6FB1112-0AT20-2TR0	Power supply for controllers without an integrated power supply unit.
SIDOOR TRANSFORMER UL	6FB1112-0AT21-2TR0	
Customer-provided DC voltage supply, see 7.1 (Page 204) (for example SITOP PSU300S 20A)	6EP1436-2BA10	

3.2.6 Optional additional units

Figure 3-2 SIDOOR SERVICE TOOL

① D-SUB connecting cable (9-pin, socket/socket)
② D-SUB connecting cable (9-pin, plug/socket)
③ USB connecting cable
④ USB adapter
⑤ Installation CD

Figure 3-3 SIDOOR SOFTWARE KIT

Additional units meet a range of customer requirements in order to ensure the universal implementation and maintenance of the system.

The additional units are easy to connect to a deenergized controller via the interfaces provided – and are available for use as soon as the power supply is connected.

Product	Article No.	Description
SIDOOR SERVICE TOOL	6FB1105-0AT01-6ST0	The SIDOOR SERVICE TOOL can be used to enter door commands, to change the drive parameters and to read out the taught parameters, the door states, the input and output signals of the service and error log data and the current firmware version. The following connecting cables are included in the scope of supply: • 1x D-SUB connecting cable (9-pin, plug/socket), length 2 m • 1x D-SUB connecting cable (9-pin, socket/socket), length 2 m
SIDOOR SOFTWARE KIT	6FB1105-0AT01-6SW0	The optional SIDOOR SOFTWARE KIT facilitates user-friendly operation and detailed diagnostics via a PC. The package includes the following components: • Installation CD (Software Kit) – SIDOOR User Software – Siemens HCS12 Firmware Loader – SIDOOR USB to UART Bridge driver – SIDOOR Manager – License provisions – SIDOOR SOFTWARE KIT Operating Instructions • 1x USB adapter • 1x USB connecting cable • 1x D-SUB connecting cable (9-pin, plug/socket) • 1x D-SUB connecting cable (9-pin, socket/socket)

All the contents of the installation CD from the SIDOOR SOFTWARE KIT are also available as installation package (https://support.industry.siemens.com/cs/ww/en/view/109481599) in the Industry Online Support.

You can find additional information about the SIDOOR SOFTWARE KIT in the SIDOOR SOFTWARE KIT Operating Instructions (https://support.industry.siemens.com/cs/ww/en/view/92711247).

3.3 Product combinations

The following table shows which products can be combined with the SIDOOR control units.

Table 3- 1 Overview of product combinations

	SIDOOR ATE530S COATED	SIDOOR ATE531S
Motor		
SIDOOR MED280	✓	✓
SIDOOR MEG251	✓	✓
Power supply		
SIDOOR TRANSFORMER	✓	✓
SIDOOR TRANSFORMER UL	✓	✓
DC power supply unit in accordance with 7.1 (Page 204)	✓	✓
Additional units		
SIDOOR SOFTWARE KIT	✓	✓
SIDOOR SERVICE TOOL	✓	✓

3.4 Version overview

The following overview lists the FW changes of the ATE530S COATED control unit:

Table 3- 2 Version overview FW ATE530S

Software version	Description
1.00-392	Initial release of the firmware.
1.01-411	**Modifications:** 1. New p1225 parameter for configuration of the unlocking function. 2. The p1220 parameter is extended with an option to dynamically unlock in LEARN mode. 3. Unit conversion of the p4616 parameter from [ms] to [s] and corresponding adjustment of the factory setting. 4. Extension of the remote command interface with the DCMD extension bit "BLKSync". **Troubleshooting:** 1. Fixed a general failure in which the WAITCMD signal becomes active for one cycle under certain circumstances.
2.0	**Modifications:** 1. Support of new motor SIDOOR MEG251. 2. Process for energy recuperation protection improved. 3. Process for overload protection of the brake resistor improved. 4. Process for mass determination improved. 5. Emergency stop is not carried out after an overcurrent fault or an output stage fault. The motor is deenergized immediately. **Troubleshooting:** 1. Initial learn run was not started correctly. 2. Factory setting for parameters p3679, p3680, p3681 corrected. 3. Correction of the internal parameters for controlling the EC motor.
2.4	**Modifications:** 1. Support of the nudge function 2. BLKDETECTEDCLS and BLKDETECTEDOP signals added to the remote interface **Troubleshooting:** 1. Parameters p3864 and p3881 corrected

Application

4

The SIDOOR ATE530S COATED/ATE531S door control device is an "intelligent" door drive with which platform screen doors can be operated with adjustable speeds, accelerations and forces.

Platforms on the one hand form a potential danger for passengers and train drivers and on the other hand act as restrictors to the logistic flows in rail transportation. These and further problems can be solved by means of partitions between the platform and the track bed. The corresponding platform screen doors then ensure safe and rapid boarding and alighting of the passengers. Siemens has presented a new control and drive solution that can be realized without great engineering effort.

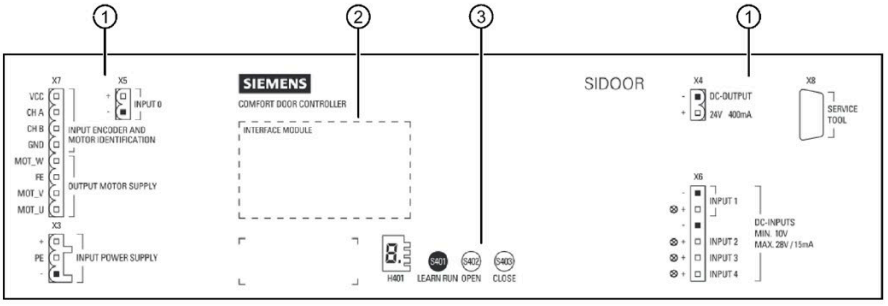
The central component is the ATE530S COATED/ATE531S door control unit with PROFINET communications. This can be integrated without problems in the overall automation system and thus be included rapidly in the control technology of the rail operation. MED280 and MEG251 EC motors from Siemens provide the movement, and are able to quickly and precisely open and close doors weighing up to 280 kg or 250 kg respectively as standard. The highlight: The controller and motor form an overall system that match each other perfectly and that can be automated, parameterized and diagnosed via the "TIA Portal" engineering framework.

Controller

5

5.1 Description

Overview



① Connecting terminals
② PROFINET module
③ Service buttons / Minimal editor

5.2 Drive functions

Overview

This section describes the complete range of drive functions of the SIDOOR ATE530S COATED/ATE531S control units.

Overview of the available drive functions:

- Restart after power failure (Page 28)
- Control unit (Page 28)
- Unlocking (Page 32)
- Drive orders (Page 35)
- Driving curve profiles (Page 41)
- Learn run (Page 45)
- Obstruction recognition and behavior (Page 48)
- Door closed / opened position sensor (Page 53)
- DRS - reversing (Page 55)
- Continuous door monitoring (vandalism protection) (Page 55)
- Overload protection and system load (Page 56)
- Speed and force monitoring (Page 62)
- Force and energy limitation (Page 63)
- Friction and mass analysis (Page 65)
- Master monitoring (Page 66)
- Broken belt monitoring (Page 67)
- FBLOCK - free function blocks (Page 68)
- Local / master mode (Page 82)
- Door command discrepancy "Open" (Page 83)
- Idle torque (Page 83)
- Oscillation protection (Page 84)

5.2.1 Restart after power failure

Description of function

After a mains voltage failure or cold restart the control system is in initial mode. In initial mode the taught end positions of the door have to be verified because an absolute value encoder is not used. The speed is reduced automatically (initial speed) until both end positions have been reached by the controller. The system subsequently changes to the normal mode and travels in accordance with the configured velocity. The controller can change directly to the normal mode if a DCOPS is used.

After the POWER ON the control unit is in the state "S1: SWITCH_ON_DISABLED" (see Sequential control system (Page 28)).

At POWER ON the door mode (DMODE) and the door status (DSTAT) have the status "undefined". The status changes when the system has completed initialization. The door mode then changes to the initial mode. When the end positions have been determined, the door mode changes from the initial mode to the normal mode. After POWER ON the door status depends on the active door command.

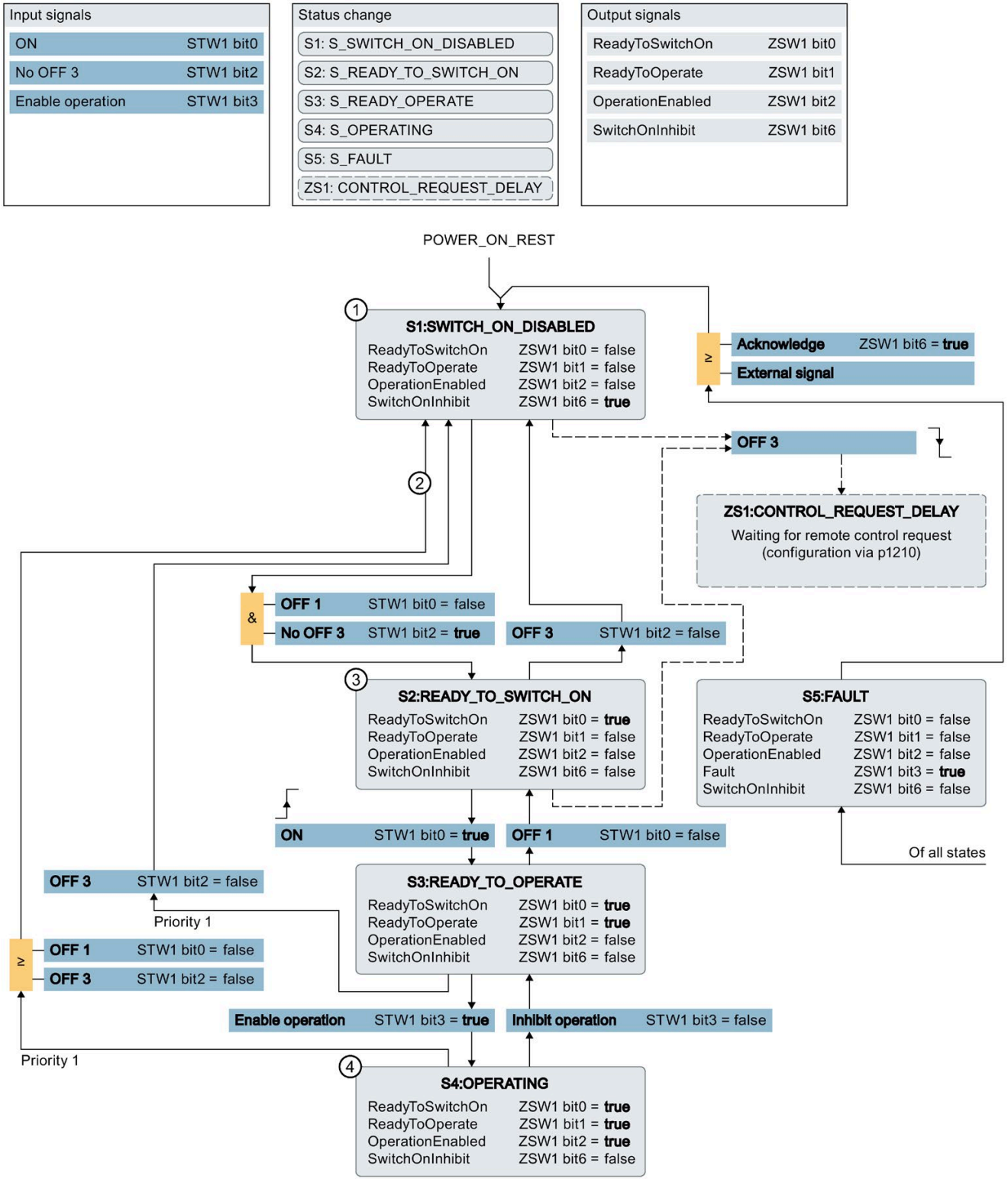
The safety-oriented signals SDIN and SAND are secured against being switched back on. The status of the safe input signals SDIN and SAND is at first faulty after POWER ON. The safe state has to be redetermined. (See SAND state machine in the section Safety blocks (Page 74)).

5.2.2 Control unit

5.2.2.1 Control unit

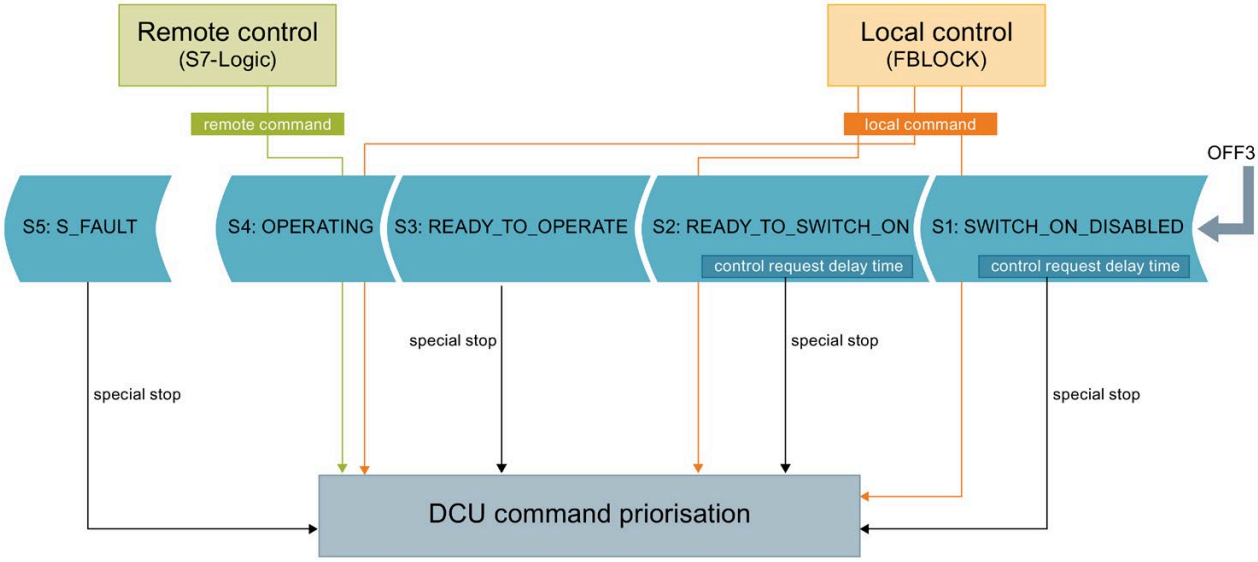
The control unit regulates the interaction between the local controller (local DCMD of FBLOCK system) and the remote controller (remote DCMD of the higher-level IO controller via field bus). The statuses of the control unit are controlled and influenced by the STW1 controller (CtrlW). An exception is the status S5:FAULT. This status becomes active automatically at a system fault, see Faults (Page 144), and can only be exited through a fault acknowledgement edge or POR of the controller. Signaling of the current status of the control unit is effected through the ZSW1 status word (StatW).

The following figure shows the sequential control system of the SIDOOR ATE530S COATED/ATE531S controllers in the form of a state diagram.



The local and the remote command always depends on the current status of the control unit. Depending on the status, local or remote drive orders are combined or suppressed. The structure of the control unit ensures protection against being switched back on. The following graphic shows that both the remote and the local commands are only possible unrestrictedly in the status S4:OPERATING. In this status the travel orders are combined, see Local and remote command combination (Page 31).

The local command is furthermore valid in the statuses S2:READY_TO_SWITCH_ON and S1:SWITCH_ON_DISABLED, in as far as the control request delay of the intermediate status ZS1:CONTROL_REQUEST_DELAY has expired.



The following table describes the properties of the statuses of the control unit and their system effects with regard to the IO device.

Table 5- 1 Sequential control system statuses

Status	Remote DCMD	System effect (internal door command)	Comment / note
S1:SWITCH_ON_DISABLED S2:READY_TO_SWITCH_ON	Suppressed	ZS1:CONTROL_REQUEST_DELAY active: → Door command: Special stop	Motor coasting forced
		ZS1:CONTROL_REQUEST_DELAY inactive: → Door command: Deenergize	Local controller
S3:READY_TO_OPERATE	Suppressed	Door command: Special stop	Remote isolation (decoupling) → Motor coasting forced
S4:OPERATING	Valid	Remote and local controller	Remote DCMD and local DCMD combined
S5:S_FAULT	Suppressed	Door command: Special stop	Motor coasting forced

5.2.2.2 Control request delay - local control request delay

The "control request delay" is a wait time for a remote control request. To this purpose the local command (local DCMD) is suppressed for the period configured with p1210. The command suppression serves to compensate the response time of the higher-level system when, for example, the door is to be set into remote isolation (status S3:READY_TO_OPERATE) after the deactivation of the local disable (EN signal). The delay can be configured and deactivated with the value 0 by using the parameter p1210 "ActiveX Control request delay". The virtual intermediate state ZS1:CONTROL_REQUEST_DELAY triggers the temporary command suppression and only becomes active during a falling edge of the OFF3 signal in the statuses S1:SWITCH_ON_DISABLED and S2:READY_TO_SWITCH_ON. The control unit can also be controlled and influenced by the STW1 controller (CtrlW) during the local control request delay. A status change in S3:READ_TO_OPERATE, S4:OPERATING or S5:FAULT directly cancels the control request delay.

5.2.2.3 Local and remote command combination

The following table describes the combination logic of the local and remote drive orders in the status S4:OPERATING.

Remote DCMD / Local DCMD	Deenergize	Open	Close	Learn run	Stop
Deenergize	Deen.+Ex(r)+Ex(l)	Open+Ex(r)+Ex(l)	Close+Ex(r)+Ex(l)	Learn run+Ex(r)+Ex(l)	Stop+Ex(r)+Ex(l)
Open	Open+Ex(r)+Ex(l)	Open+Ex(r)+Ex(l)	Close+Ex(r)	Learn run+Ex(r)	Stop+Ex(r)
Close	Close+Ex(r)+Ex(l)	Close+Ex(l)	Close+Ex(r)+Ex(l)	Learn run+Ex(r)	Stop+Ex(r)
Learn run	Learn run+Ex(r)+Ex(l)	Learn run+Ex(l)	Learn run+Ex(l)	Learn run+Ex(r)+Ex(l)	Stop+Ex(r)
Stop	Stop+Ex(r)+Ex(l)	Stop+Ex(l)	Stop+Ex(l)	Stop+Ex(l)	Stop+Ex(r)+Ex(l)

Ex(r) = Remote DCMD door command extension

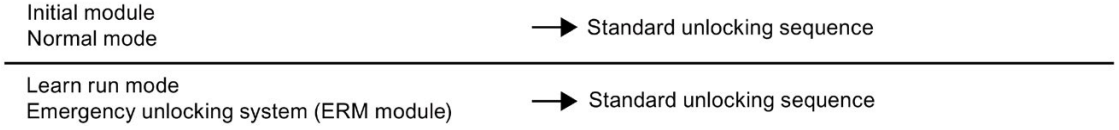
Ex(l) = Local DCMD door command extension

5.2.2.4 Remote isolation

In the status S3:READY_TO_OPERATE both the local and the remote command are suppressed and motor coasting is forced through the internal drive order Special stop. This status can be used to specifically isolate or decouple individual doors from platform operation.

5.2.3 Unlocking

In order to control a multitude of different unlocking mechanisms, the unlocking sequence of the SIDOOR controller can be configured flexibly and individually. Two different unlocking sequences are required to carry out unlocking depending on the operating mode of the controller.



The unlocking function controls the two signals UNLOCK0 and UNLOCK1 and delays the Open door command in accordance with the configuration. The interconnection of the UNLOCK signals is effected via the FBLOCK logic, see FBLOCK - free function blocks (Page 68).

Configuration

Time sequences	Parameter assignment	Designation	Note
T1	p1224	On delay UNLOCK 1	UNLOCK1 is deactivated when T3=0 → p1223 = 0
T2	p1222	On period UNLOCK0	UNLOCK0 is deactivated when T2=0 → p1222 = 0
T3	p1223	On period UNLOCK1	UNLOCK1 is deactivated when T3=0 → p1223 = 0 Parameter is inoperative at the special unlock sequence Is influenced additionally via the configuration option "T3_CLOSED" and "T3_OPENED".
T4	p1221	Open door command request delay	Parameter is inoperative in the emergency unlocking mode

The parameter p1220 is used, for example to suppress the unlocking sequence in specific statuses of the controller.

- Unlocking sequence in normal mode (p1220: Bit 0)
- Unlocking sequence in initial mode (p1220: Bit 1)
- Unlocking sequence in learn run mode (p1220: Bit 2)
- Unlocking sequence in the emergency unlocking mode "ERM mode" (p1220: Bit 3)

In addition the interruptibility of the unlocking sequence can be set by using the parameter p1220. If the interruptible unlocking sequence option is deactivated, a door command change does not end the unlocking sequence.

- Interruptible unlocking sequence (p1220: Bit 7)

The ON period T3 of the UNLOCK1 signal can also be controlled optionally via the door status. In this case the UNLOCK1 signal does not become inactive after the time T3, but rather when the door status has reached closed or opened.

- UNLOCK1 active until DSTAT = "closed" (p1220: Bit 8 "T3_CLOSED")
- UNLOCK1 active until DSTAT = "opened" (p1220: Bit 9 "T3_OPENED")

During a learn run, the door automatically goes through two complete travel cycles. With the dynamic unlocking option in the LEARN mode (p1220: bit 10), the unlocking sequence is started for each movement control in the opening direction within the learning run. The option only has an effect when the unlocking sequence is enabled in the learning cycle mode (p1220: bit 2).

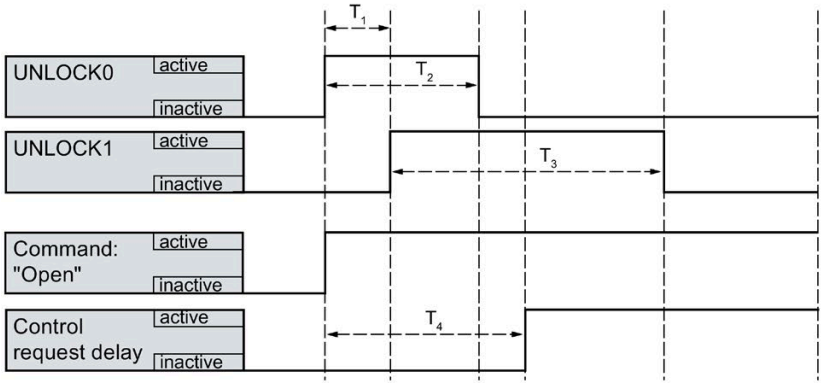
5.2.3.1 Standard unlocking

Initial mode

In initial mode the current door position is unknown. Therefore the unlocking sequence starts as soon as the "Open" door command is applied.

Normal mode

In normal mode, the unlocking sequence starts when the door is closed to the end stop within the range specified by the parameter p1225 and the "Open" door command is applied.



Information

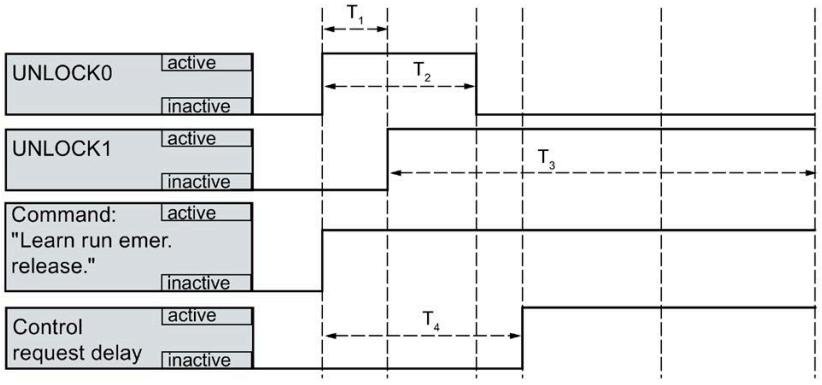
T1, T2, T3 and T4 times are specified via parameters.

T1: On delay of "UNLOCK1"
T2: On period of "UNLOCK0"
T3: On period of "UNLOCK1"
T4: Command delay time

5.2.3.2 Special unlocking

A special unlocking sequence is executed in the **learn run** and in the **emergency unlocking mode (ERM mode)**. In the case the UNLOCK1 remains active until the respective mode has been terminated, in contrast to the standard unlocking sequence (T3 ineffective).

In the emergency unlocking mode (ERM mode) a control request delay time does not exist (T4 ineffective)



Information

T1, T2 and T4 times are specified via parameters.

T1: On delay of "UNLOCK1"
T2: On period of "UNLOCK0"
T3: "UNLOCK1" continuously activated until mode terminated.
T4: Command delay

5.2.4 Drive orders

The motor is controlled via drive orders. A drive order consists of the following:

Drive order = Door command + drive order extension

Combinations

The following table shows the generally available combinations of door command and drive order extension that results in a modification of the corresponding drive order. At combinations / fields that are not marked only the door command is effective (some drive orders additionally depend on the normal, initial or learn run mode).

Table 5- 2 Combinations of door command and door command extension

Travel command / Travel command extension	**Deenergize (No door command)**	**Stop**	**Open** (5.2.5.1) (Page 41)	**Close** (5.2.5.2) (Page 42)	**Learn run** (5.2.6) (Page 45)
Slow (5.2.5.3) (Page 44)			x	x	
Special		*Corresponds to deenergize (EMF brake inactive)*			*Learn run with standard travel curve parameters*(5.2.6.6) (Page 48)
NDG				*Nudge* (5.2.5.3) (Page 44)	
DCOPS (5.2.8) (Page 53)			x	x	
DRS (5.2.9) (Page 55)			x	x	
BLKSync (5.2.7.7 (Page 51))			x	x	

No door command (deenergize)

The system evaluates the deenergized (no current) door command as "inactive" or "no door command".

"Special stop" drive order

The door command with the highest priority is Stop. The follow-up status after the ramp down can be defined through the door command extension "Special": Holding torque or free running (which corresponds to coast down or deenergized).

"Nudge" drive order

The door command "Close" with drive command extension "NDG" leads to a "Nudge" command.

5.2.4.1 Switch-off / braking functions

In an unlimited system the switch-off and deceleration functions are differentiated between quick stop, ramp down and coast down. These definitions do not apply in a door system since these are to be considered as limited systems.

Table 5- 3 Switch-off / braking functions unlimited system

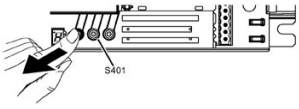
Function	Description
Quick stop	Brakes the drive with the maximum brake ramp (under consideration of technical and safety-relevant limit ranges) down to a standstill.
Ramp down	Same meaning such as quick stop. However a configured ramp is used to brake the drive down to a standstill.
Coasting down	There is no active braking of the drive, it can run freely and is only braked by the system-specific friction (for example gearing).

In the SIDOOR system coasting down is equivalent to the door command Deenergize or Special stop. Direct coasting down may not however take place due to the limits existing in a door system (safety reasons). Therefore the following definitions apply for the SIDOOR door drive:

Table 5- 4 Switch-off / braking functions SIDOOR door drive (limited system)

Function	Description
No drive command / deenergize Special stop	Brakes the drive with a configured ramp (p3674 - deceleration ramp OPEN or p3677 - deceleration ramp CLOSED) down to a standstill and subsequently goes in freewheeling mode. Door command with the highest priority, forces the freewheeling mode.
Stop	Brakes the drive with a configured ramp (p3674 - deceleration ramp OPEN or p3677 - deceleration ramp CLOSED) down to a standstill with subsequent active holding torque.
Reversing	Mover direction reversal through drive order change Open to Close or respectively Close to Open Brakes the drive with a configured ramp (p3675 - reversing ramp OPEN / CLOSED or p3678 - Reversal ramp CLOSED / OPEN) down to standstill and follows the currently applied drive order

5.2.4.2 Drive order sources

<table>
<tr><th>Drive order source</th><th colspan="2">Description</th></tr>
<tr><td rowspan="2">Service</td><td>Service button
 
</td><td>The activation of a service button effects the immediate changeover to the local mode. If no button is pressed, no drive order is active.

S401 (learn run)
If S401 is pressed for approx. 3 s during operation, the Learn run drive order is activated. In the process a door width and mass determination and a force and energy limitation adaptation are carried out.

If S401 is pressed for approx. 5 s at Power ON, the Special learn run drive order (learn run with standard driving curve parameter set) is activated. Additional information is available in the section Learn run (Page 45).

After the respective Learn run has been started correctly the button can be released. The Learn run can be aborted at any time (see Learn run (Page 45)).

S402
As long as the button is pressed, the Open drive order is activated.

S403
As long as the button is pressed, the Close drive order is activated.</td></tr>
<tr><td>Software Kit (PC) and Service Tool or local terminal
  </td><td>Service Tool or local terminal
Some menu areas of the terminal are classified as safety-oriented. The instructions and notes from the section Local / master mode (Page 82) are to be observed. Within this area the Stop drive order is activated.
In addition the travel orders Open, Close, Close (reduced) and Learn run (Main menu → General setup or Quick setup) can be activated by using the terminal.

Software Kit (PC)
 
</td><td>Drive orders can be issued by using the "Door commands" window:
Open → Open drive order
Close → Close drive order
Nudge → Close (reduced) drive order
Hold → Stop drive order</td></tr>
<tr><td>Remote</td><td colspan="2">Fieldbus (process data)
Drive orders can be transferred through the process image. To this purpose the signal DCMD (door command) and DCMD extension (door command extension) is defined in TSW1 – Technology control word 1.
The drive orders are part of the control words and are therefore dependent on the control unit.</td></tr>
<tr><td>Local</td><td colspan="2">FBLOCK system
The digital input signals of the SIDOOR controller can be linked with drive orders by using die parameterizable FBLOCK logic operation (see section FBLOCK (Page 68)).</td></tr>
</table>

5.2.4.3 Prioritizing by drive order sources

Door commands can be given through various sources. A drive order with higher priority overwrites any drive order with lower priority. The service interfaces always have the highest priority since they are provided for commissioning and servicing purposes.

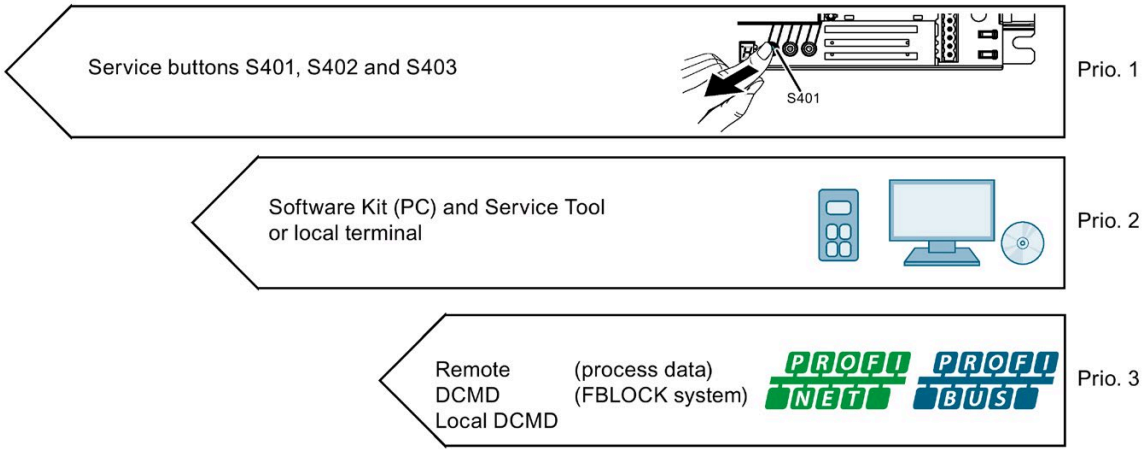


Figure 5-1 Prioritizing of the drive order sources

Table 5- 5 Prioritizing by drive order sources

Priority		Drive order source	Comment
High priority	1.	Service buttons S401, S402 and S403	Local command at the controller
↑	2.	Software Kit (PC) and Service Tool or local terminal	Command local via service terminal or PC tool
	3.	Remote DMCD and local DCMD	Drive orders are prioritized among each other
Low priority			

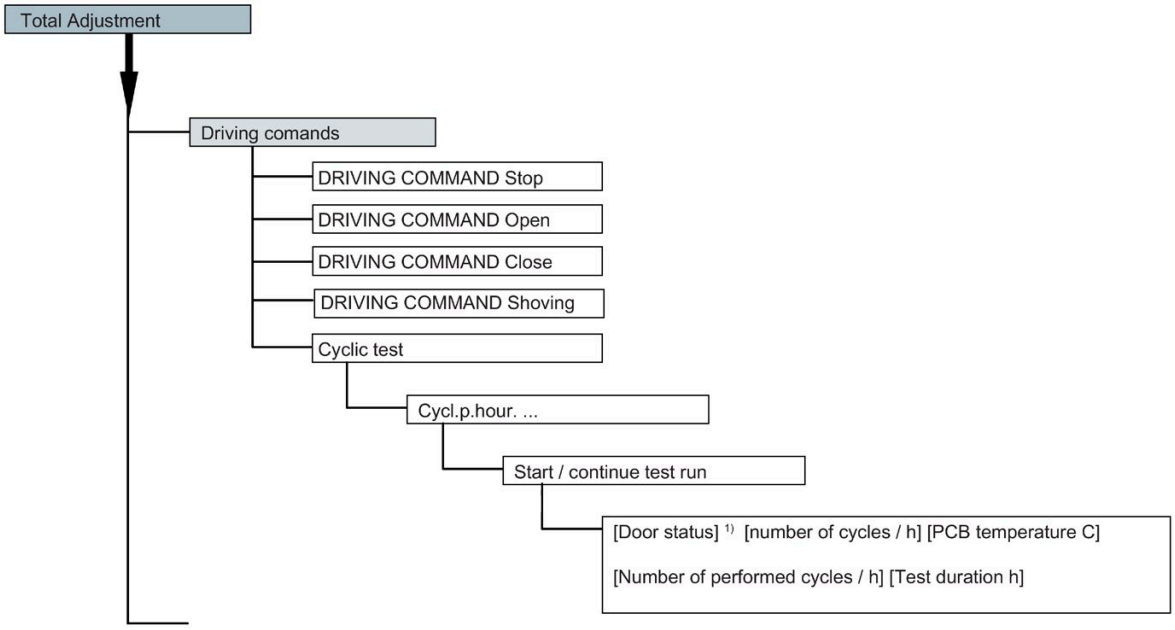
5.2.4.4 Prioritization of the door commands amongst each other

Table 5- 6 Prioritization of the door commands

Priority		Door command	Comment
High priority	1.	Stop	The hold torque is deactivated after the ramp down via the "Special" extension → Freewheeling / Deenergized with the highest priority
↑	2.	Learn run	The learn run can be interrupted
	3.	Close	Close overwrites Open
	4.	Open	
	5.	Deenergize / No door command	Neutral door command, corresponds to the idle state, synonymous with inactive → Coast down / Deenergized with priority via "Special stop" travel order
Low priority			

5.2.4.5 Cyclic test

A cyclic test can be started for service and commissioning purposes in the "General setup" via the terminal. To this purpose not only the test period, door status and current temperature can be specified and monitored, but also the setpoint and actual move cycles (unlocking is carried out before each opening).



Displayed door statuses

[] Opened

][Closed

<> Open

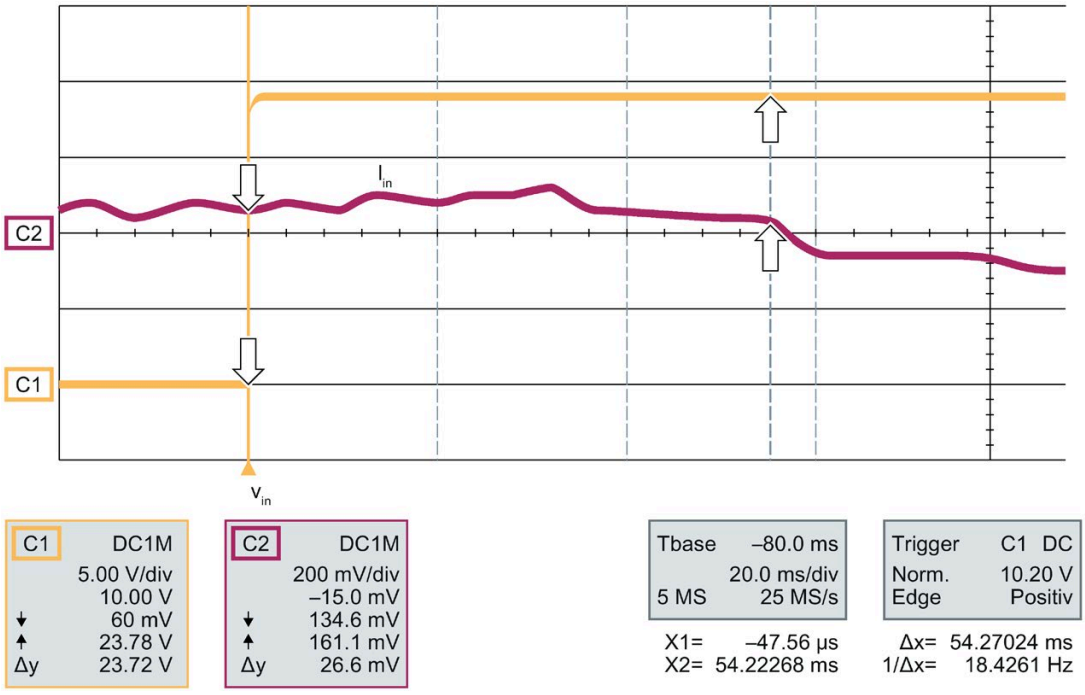
>< Close

— Test stopped

5.2.4.6 Response time

The response time is the time after which the SIDOOR controller responds to a drive order. The change in the motor current is used as an indicator for determining the response moment.

As an example of the response time measurement, the disable is activated at full speed. As a result, the "Special stop" drive order is triggered. The motor current is shown in red and disable in yellow in the following graphic.



Response time evaluation

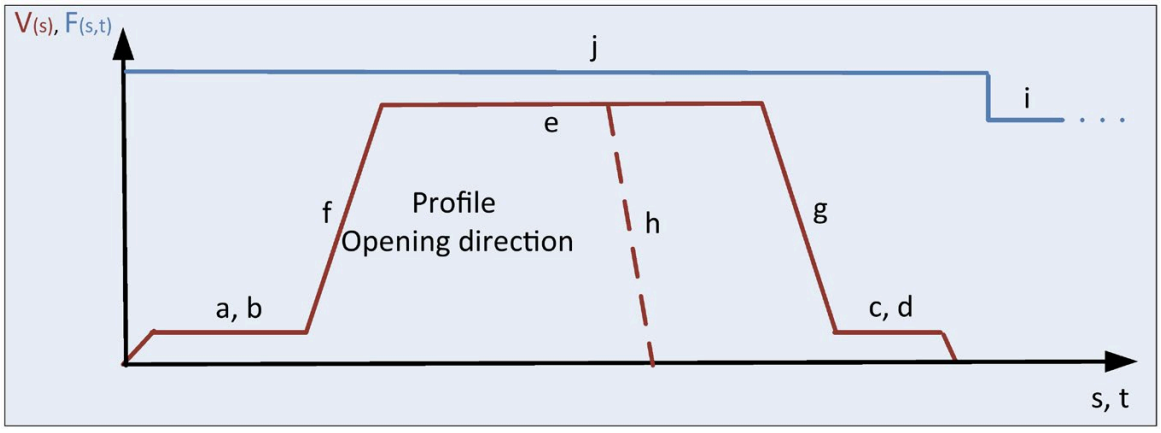
A maximum response time of 60 ms is determined across several test series.

5.2.5 Driving curve profiles

Before the door control unit begins to close or open the door, a driving profile is calculated for each direction. The drive profiles for opening and closing consist of a respective parameter record.

While the door is being opened and closed the setpoint speed in the driving curve profile is determined depending on the door position. During each door movement the force limitation is also determined depending on the door position. At a door standstill the force limitation is determined via the time.

5.2.5.1 Profile in opening direction



a. Cutter distance OPEN (p3661)
This parameter specifies the distance in the opening direction (relative to the Closed position) in which a door interlocking mechanism is used. A distance that is too small can cause the interlocking mechanism to block!

b. Slow start speed open (p3666)
This parameter specifies the speed in the opening direction required to overcome a door interlocking mechanism.

c. Creep distance OPEN (p3660)
This parameter specifies the distance in which the door moves with reduced speed before the Open position is reached. A distance that is too short results in the door "slamming" into the Open position!

d. Slow end speed open (p3665)
This parameter specifies the speed used before the Open position is reached. A speed that is too high results in the door "slamming" into the Open position!

e. Maximum speed OPEN (p3664)
This parameter specifies the maximum speed in the opening direction. The effective speed can be lower depending on the power supply, the door mass, the energy limitation and the force limitation in the OPEN direction.

f. Acceleration ramp OPEN (p3673)
This parameter specifies the maximum acceleration in the opening direction. The effective acceleration can be lower depending on the power supply, the door mass, the energy limitation and the force limitation in the OPEN direction.

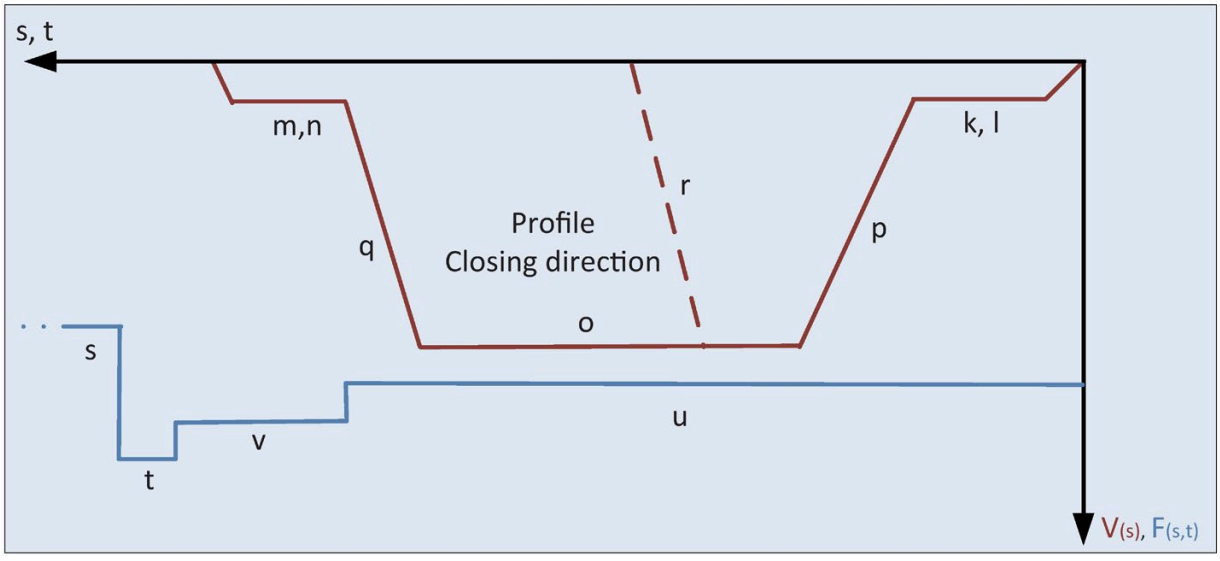
g. Deceleration ramp OPEN (p3674)
This parameter specifies the maximum deceleration ramp in the opening direction.

h. Reversal ramp OPEN / CLOSE (p3675)
This parameter specifies the maximum reversal ramp in the opening direction. This must be greater than or equal to the maximum deceleration ramp in the opening direction!

i. Idle torque (power) OPEN (p3679)
This parameter is active when the "Open" door command is active and the door is pressed into the Open position. This function is used to hold the door continuously in the Open position.

j. Static force limit open (p3682)
This parameter is active while the door is being opened. It is the maximum force limitation in the opening direction. The parameter has to be set across the entire door width so that no unwanted obstruction through increased friction of the door occurs!

5.2.5.2 Profile in closing direction



k. Slow start distance close (p3662)
This parameter specifies the distance during which the door moves with reduced speed after the Open position has been left.

l. Slow start speed close (p3669)
This parameter specifies the speed used after the Open position has been left.

m. Slow end distance close (p3663)
This parameter specifies the distance in the closing direction (relative to the Closed position) in which an interlocking mechanism is installed. A distance that is too short results in the door "slamming" into the Closed position!

n. Slow end speed close (p3670)
This parameter specifies the speed in the closing direction required to overcome an interlocking mechanism. Excess speed results in the door "slamming" in the Closed position or in blocking during door interlocking.

o. Maximum speed CLOSE (p3668)
This parameter specifies the maximum speed in the closing direction. The effective speed can be lower depending on the power supply, the door mass, the energy limitation and the force limitation in the CLOSE direction.

p. Acceleration ramp CLOSE (p3676)
This parameter specifies the maximum acceleration in the closing direction. The effective acceleration can be lower depending on the power supply, the door mass, the energy limitation and the force limitation in the CLOSE direction.

q. Deceleration ramp CLOSE (p3677)
This parameter specifies the maximum deceleration ramp in the closing direction.

r. Reversal ramp CLOSE / OPEN (p3678)
This parameter specifies the maximum reversal ramp in the closing direction. This must be greater than or equal to the maximum deceleration ramp in the closing direction!

s. Idle torque (power) CLOSE (p3680)
This parameter is active when the "Closed" door command is active and the door is pressed into the Open position. This function is used to hold the door continuously in the Closed position.

t. Peak torque close (p3681)
This parameter is active for 2 s after the Closed position has been reached. This parameter is used to press with increased force against an interlock mechanism.

u. Static closing force (p3683)
This parameter is active while the door is being closed. It is the maximum force limitation in the closing direction. The parameter has to be set across the entire door width so that no unwanted obstruction through increased friction of the door occurs!

v. Limit force end static close (p3684)
This parameter is active within the cutter distance. This torque is used to overcome higher frictions of an interlock mechanism.

5.2.5.3 Nudge

If a "Nudge" command is present, the reversing unit is deactivated and the door is closed with the set nudge speed and nudge force.

The input signals CLOSE and Nudge must be active so that the Nudge operating state is only effective in the closing direction. If an obstacle is detected, the torque is reduced to the rated torque of the motor after 1 second.

5.2.5.4 Slow door profile

The controller supports a parameterizable (speed-reduced) speed profile (slow profile) to which a changeover can be carried out flexibly.

Table 5- 7 Slow profile parameter overview

Normal profile	Slow profile
Energy limitation	p3667 - Initial speed OPEN p3671 - Initial speed CLOSE
p3686 - Kinetic energy limitation CLOSE p3687 - Kinetic energy limitation OPEN p3688 - Kinetic energy limitation NDG	
Speed parameters *(influenced by energy limitation)*	
p3664 - Maximum speed OPEN p3668 - Maximum speed CLOSE p3672 - NDG speed (reduced)	

Drive order for profile changeover

The DCMD extension bit "slow" has to be set in order to change over to the Slow profile (see Drive orders (Page 35)). The drive changes over to the Slow profile in combination with a corresponding Open or Close door command.

Profile changeover

The drive switches over to the Slow profile if the corresponding drive order with extension is active and the controller is in normal mode. The Slow profile can be activated and deactivated dynamically during the travel. The system accelerates or brakes the drive automatically to the speed of the Slow profile in accordance with the configured ramp.

In initial or learn run mode, independent values that are not influenced by the speed parameters describe here apply for the speed.

5.2.6 Learn run

A learn run serves to determine and store the system characteristics of the door. The learn run determines the door direction (Open and Closed position), the door width, the door mass and the door friction. The maximum speeds for opening and closing are specified on the basis of the determined door mass and the set energy limitation. The learned door parameters are stored in the door controller retentively.

During the learn run the force is limited in accordance with the parameters p3682 "Static force limit open" and p3683 "Static force limit close". The parameters have to be adapted in accordance with the friction of the door system, so that the learn run can be completed error-free. (Note: The force parameters can be configured by using the minimum editor in addition to the parameter and the service interface, see Minimum editor (Page 115).)

Before the learn run is started, the door is to be positioned in a range of 10 cm before the end stop closed. This can be done manually or with the OPEN (S402) or CLOSE (S403) service buttons on the controller.

5.2.6.1 Course of the learn run

The learn run is divided into the three main stages:

- **Direction recognition / door positions (Open and Closed)**:

  The door is moved with reduced speed up to 10 cm in one direction until an obstacle has been recognized. In no obstacle was recognized, the door is moved up to 20 cm in the opposite direction until an obstacle has been recognized. The recognized obstacle is evaluated as the Closed position. If an obstacle was not recognized in either direction, an error is generated (error "P") and the learn run is aborted.

- **Determination of the door width**

  The determination of the door width begins at the Closed position determined beforehand. The door is moved with reduced speed in the opening direction until an obstacle has been recognized. The recognized obstacle is evaluated as the Open position. If an Open position was not recognized, an error is generated (error "P") and the learn run is aborted. After recognition of the Open position the door is moved back to the Closed position with reduced speed.

- **Determination of the door mass and the inhibiting force (friction)**

  The door mass and the inhibiting force are determined by moving the door with increased speed from the Closed to the Open position and vice versa. The door mass and the inhibiting force are calculated by using the energy required for acceleration and deceleration. If a door mass was determined that is too high, an error is generated (error "U") and the learn run is aborted. If an obstacle is recognized apart from the end stops while the door mass and the inhibiting force are being determined, the learn run is also aborted and an error (error "U") is generated.

After the learn run has been terminated, the door is in the Closed position and in normal mode.

Tolerances

The tolerance ranges of the two end stops can be configured individually by using the parameters p1230 "CLS_POS_CFG" and p1231 "OPN_POS_CFG". The tolerances result from the mechanical properties of the door. During the configuration a difference is made between the recognition and the leaving of the respective end position. The configuration also influences the area of the obstruction detection.

5.2.6.2 Starting the learn run

Various options are available for starting a learn run:

- Learn run button (S401)
- Service terminal menu
- Local DCMD (FBLOCK)
- Remote DCMD (fieldbus)

Starting a learn run via the Service button

- Deactivated door command for the Service buttons, see p90
- Learn run button (S401) is pressed for longer than 3 s.
- Learn run button (S401) is pressed during Power ON
  → Caution: A special learn run is started in which all the driving curve parameters are reset to the factory settings beforehand.

Starting a learn run via the Service menu

- Service terminal menu entry for starting a learn run (under "General setup")
- Service terminal menu entry for starting a learn run with standard parameters (under "General setup")

Starting a learn run via remote DCMD

- Control unit in the status "S4: OPERATING" (disable and emergency unlocking mechanism are inactive)
- Door command "Learn run" must be active for at least 3 s

Starting a learn run via local DCMD

- Inactive disable and inactive emergency unlocking mechanism
- Wait time for a remote control demand (see Sequential control system (Page 28) p1210) expired
- Door command "Learn run" must be active for at least 3 s

5.2.6.3 Faulty learn run

The learn run fails under the following conditions:

- The current door position is more than 10 cm away from an end stop.
- The door width is greater than the maximum permissible door width of 5 m.
- The door width is smaller than the minimum permissible door width of 0.35 m.
- Obstruction during the door width determination.
- The door mass is greater than the maximum permissible door mass of 280 kg.
- Determining the door mass is system-specifically not possible.

The system signals a faulty learn run through the following statuses:

- Signal DMODE = Learn run mode
- Signal DSTAT = Error
- System warning "P" (parameter error) or "U" (door mass too high)

5.2.6.4 Interrupting the learn run

An active learn run can be interrupted at any time by the user. The learn run process can be interrupted as follows:

- Repeated operation of the learn run button (S401)
- Changing to a door command with higher priority

The system signals a learn run that has been interrupted by the user through the following statuses:

- Signal DMODE = Learn run mode
- Signal DSTAT = Error
- System warning "_" (controller waiting for learn run)

Note

If the learn run has been interrupted by a door command or an error, it is possible to move the door by using the service buttons (S402 and S403). The direction of movement for the service buttons is undetermined because in this case the Closed position has not yet been determined.

5.2.6.5 Querying determined values

The following values determined during the learn run can be queried by using the service menu "Service → Special" or by using the field bus interface and serve as a support during the commissioning process:

- Effective door mass (see r2101 (Page 131))
- Learned door width (see r2103 (Page 131))
- Inhibiting force in opening direction (see r2104 (Page 131))
- Inhibiting force in closing direction (see r2105 (Page 131))

5.2.6.6 Learn run with default profile

It is possible to carry out a learn run with default profile for commissioning purposes.

NOTICE
Before the learn run with standard parameters is started, all the travel curve, force and energy limitation parameters are reset irrevocably to the factory settings.

5.2.7 Obstruction recognition and behavior

An obstacle recognized with the obstruction recognition function is signaled via the direction-specific status signal DBLK. The obstruction status in the signal DBLK remains active until the obstacle has been overcome. The subsequent response to a recognized obstruction depends on the user-defined parameter assignment. The obstruction recognition, the response and the subsequent behavior after obstruction can be configured separately by the user for the opening and closing directions. The same parameter scope is available for both directions of travel, so that it is possible to configure the same or differing obstruction behavior depending on the direction.

In case of an obstruction a corresponding system warning is displayed and logged ("6" or "c", see Operating status display (Page 143)).

5.2.7.1 Preconfigured obstruction behavior

If the controller recognizes an obstacle in the opening or closing direction, it reverses 20 cm, waits 2 s and then starts a renewed attempt to overcome the obstacle. The controller repeats this procedure 3 times. If the obstacle could not be overcome, the controller changes to the waiting mode (WAITCMD) after the last reversing.

The obstruction recognition during opening is preconfigured so that a 10 mm wide obstacle before the learned end stop opened is recognized (p3874 „BLK_OP_DIS_DIST_OP").

The obstruction recognition during closing is preconfigured so that a 5 mm wide obstacle before the learned end stop closed is recognized (p3857 "BLK_CLS_DIS_DIST_CLS").

5.2.7.2 Obstruction recognition procedure

The obstruction recognition is based on two non-direction-dependent procedures, the force obstruction recognition and the stop obstruction recognition.

The following definitions are based on the speeds and are thus independent of the direction. The obstruction recognitions require the the system is being moved actively (drive order)

Force obstruction recognition is defined as follows:

The current speed is greater than 90 mm/s and drops by more than 90 mm/s (→ "speed drop") against the maximum speed reached during the current travel.

If the system subsequently moves at the upper force limitation for the set duration (p3854 "BLK_CLS_FRC_DET_TIM", or p3871 "BLK_OP_FRC_DET_TIM"), force obstruction is recognized in accordance with the current direction of travel.

Stop obstruction recognition is defined as follows:

If the current speed is lower than 10 mm/s for the set duration (p3853 "BLK_CLS_STP_DET_TIM", or p3870 "BLK_OP_STP_DET_TIM"), stop obstruction is recognized in accordance with the current direction of travel.

Behavior depending on the door mode

The obstruction recognition generally acts only in normal mode in all statuses in which the door system is moved actively (for example Open, Close and Reverse).

5.2.7.3 Overcoming behavior

The obstruction overcoming behavior can be used to overcome an obstacle by pressing several times. This behavior is also called simply "Retries" or "Retry". The behavior remains active until the initial drive order is changed.

Example:

Close drive order is active

→ System closes

→ Obstruction is recognized before the end stop is reached

→ The 2nd of 4 overcome attempts takes place

→ The Close drive order is overwritten by any other one

→ The Retry system is terminated directly

→ The system responds in accordance with the new drive order

The number of attempts to overcome the obstruction point can be set via the parameter p3860 "BLK_CLS_RETRY_CNT" or p3877 "BLK_OP_RETRY_CNT". If the number is set to 0, the obstruction overcoming system is deactivated in the corresponding direction.

Before each attempt a variable wait time can be configured (p3861 "BLK_CLS_RETRY_TIM" or p3878 "BLK_OP_RETRY_TIM").

The type of drive control during the wait time can be "Stop" or "Deenergize" (p3862 "BLK_CLS_CMD_WAIT" or p3879 "BLK_OP_CMD_WAIT").

After the configured number of attempts has been carried out, the wait mode is activate (WAITCMD). In addition a follow-up drive order can be configured that is activated simultaneously with the changeover to the wait mode (p3863 "BLK_CLS_RETRY_CMD_AFTER" or p3880 "BLK_OP_RETRY_CMD_AFTER").

While the overcoming behavior is active, every external drive order change effects an immediate termination / aborting of all the overcoming attempts still open (including the cancellation of the wait mode).

5.2.7.4 Reversing behavior

The reversing behavior can be used in order to induce a full or partial reversing after an obstacle has been recognized. This behavior is also called simply "Reverse".

The reversing behavior is active as long as the initial drive order is not changed actively (a corresponding example is available in the Overcoming behavior (Page 49) section).

The number of reversings can be set by using the parameters p3864 "BLK_CLS_REVERS_CNT" or p3881 "BLK_OP_REVERS_CNT". If the number is set to 0, reversing is not carried out in the corresponding direction.

After every reversing (when the corresponding reversing target position has been reached), a variable wait time can be configured (p3865 "BLK_CLS_REVERS_TIM" or p3882 "BLK_OP_REVERS_TIM"). The type of drive control during the wait time can be "Stop" or "Deenergize" (p3862 "BLK_CLS _CMD_WAIT" or p3879 "BLK_OP_CMD_WAIT").

The reversing distance or type (full or partial reversing) can be configured with a precision of +-2 cm by using the parameter p3866 "BLK_CLS_REVERS_DIST" or p3883 "BLK_OP_REVERS_DIST".

If the drive is blocked during reversing, all the reversing processes still open are terminated / aborted immediately and the wait mode is activated (WAITCMD). In addition a follow-up drive order can be configured that is activated simultaneously with the changeover to the wait mode by means of the parameters p3867 "BLK_CLS_REVERS_CMD_BOTH_BLK" or p3884 "BLK_OP_REVERS_CMD_BOTH_BLK"

After the configured number of reversings has been carried out and obstruction still exists, the wait mode is activate (WAITCMD). In addition a follow-up drive order can be configured that is activated simultaneously with the changeover to the wait mode (p3868 "BLK_CLS_REVERS_CMD_AFTER" or p3885 "BLK_OP_REVERS_CMD_AFTER").

While the reversing behavior is active, every external drive order change effects an immediate termination / aborting of all the reversing procedures still possible (including the cancellation of the wait mode).

Special case

If the door is pulled manually from the end stop Opened or Closed while a door command Open or Close is active, the controller recognizes this as normal obstruction. The response is effected in accordance with the configured blocking behavior. If a reversing behavior is configured, these are carried out with a slowed-down driving profile.

5.2.7.5 Combination overcoming - reversing

The obstruction overcoming behavior and the reversing behavior can be combined via the user configuration. The combination is subject to the following rules:

- After the configured overcoming attempts have been executed, reversing is carried out. → This process is repeated for the number of configured reversings.
- During active reversings the parameter p3863 "BLK_CLS_RETRY_CMD_AFTER" or p3880 "BLK_OP_RETRY_CMD_AFTER" is ineffective.
- The waiting mode is active after the last reversing has been terminated.
- If the number of overcoming attempts and reversings is configured to 0, the Retry follow-up drive order has a higher priority than the Reverse follow-up drive order.

5.2.7.6 Slow obstruction point approach

The position of the last obstruction, referenced to the direction of travel, is saved automatically in the system. When this point is approached, the speed is reduced automatically to the corresponding Slow end speed (p3670 "SlowEndSpdCls" or p3666 "SlowStrtSpdOp"). In the process the system calculates a brake ramp so that the reduced speed is reached from the set distance (parameter p3855 "BLK_CLS_DIST_SLOW_SPEED" or p3872 "BLK_OP_DIST_SLOW_SPEED") from the stored obstruction point. If the obstruction point can be overcome, the system restores the speed to the "normal" driving curve after the same distance.

The slow obstruction point approach can be activated or deactivated depending on the direction of travel by using the parameter p3850 "BLK_Control".

5.2.7.7 Waiting mode

In accordance with the configuration of the blocking behavior, waiting mode is activated when all configured retries and/or reversals have been performed. If the controller is in waiting mode, an external drive order change terminates it. The waiting mode is signaled with the process data signal WAITCMD in combination with a DBLK blocking status, signal description WAITCMD with DBLK:

An obstruction was recognized, the initial drive order continues to be applied, the obstruction point overcoming behavior has been completed or is inactive and the reversing behavior has been completed or is inactive.

Note

If the parameters p3860 and p3864 or respectively p3877 and p3881 are set to 0, the WAITCMD signal becomes active directly after a recognized obstruction.

The controller can be set directly to waiting mode (WAITCMD) using the BLKSync extension bit (see DCMD extension). If the controller is set to waiting mode using the BLKSync extension bit, the follow door command configured with the parameters p3868 "BLK_CLS_REVERS_CMD_AFTER" or p3885 "BLK_OP_REVERS_CMD_AFTER" is performed. The direction is determined in accordance with the current door command, Open or Close .

Note

The status of the sequential control system must be considered when using the BLKSync extension bit (process image). The process data is only valid in the "S4: OPERATING" state (see Sequential control system (Page 28)).

5.2.7.8 Expert configuration

The dynamic SIDOOR obstruction recognition system responds position- and time-specifically. Detailed information is available in this section.

The obstruction recognition system was conceived so that it can be adapted to a wide variety of system environments, types of construction and properties. The following parameters are mainly intended for such adaptations and have to be changed at standard systems.

Function configuration

Through the parameter p3850 „BLK_Control" the stop and force obstruction recognition can generally be deactivated depending on the direction of travel (Bit 0 and 1 or respectively 4 and 5). In addition the counting of the obstructions can be suppressed in accordance with the direction of travel (Bit 2 or 5).

Bias times

After a drive order change or reversal of the movement direction, the obstruction recognition is activated after an On delay (p3852 "BLK_CLS_DET_DIS_TIM" or p3869 "BLK_OP_DET_DIS_TIM").

Area limitation

The obstruction recognition is suppressed in a variable area **before the respective end stop is reached** (p3857 "BLK_CLS_DIS_DIST_CLS" or p3873 "BLK_OP_DIS_DIST_OP"). In addition it is suppressed **after the respective end stop has been left** (p3858 "BLK_CLS_DIS_DIST_OP" or p3874 "BLK_OP_DIS_DIST_CLS").

In particular the force block recognition is suppressed in a variable area **before** the creep distance (p3859 "BLK_CLS_FRC_DIS_DIST_SLOW_END" or p3875 "BLK_OP_FRC_DIS_DIST_SLOW_END"). In addition it is suppressed in a variable area **after** the last obstruction point (p3855 "BLK_CLS_FRC_DIS_STP_DIST" or p3876 "BLK_OP_FRC_DIS_STP_DIST").

5.2.8 DCOPS - end position sensor

DCOPS (Door Closed / Opened Position Sensor) generally stands for an end position sensor that signals the reaching of the end position to the SIDOOR system. In the process such a sensor can be used for only one end position or also for both end positions.

The DCOPS extension bit can be transferred via the process image (see remote DCMD extension) and / or via the FBLOCK logic (see local DCMD extension). This means that it is possible to also derive the DCOPS signal from a possibly existing interlocking mechanism.

Note

The status of the control unit is to be considered when the DCOPS extension bit (process image) used. The process data are only valid in the status "S4: OPERATING" (see Sequential control system (Page 28)).

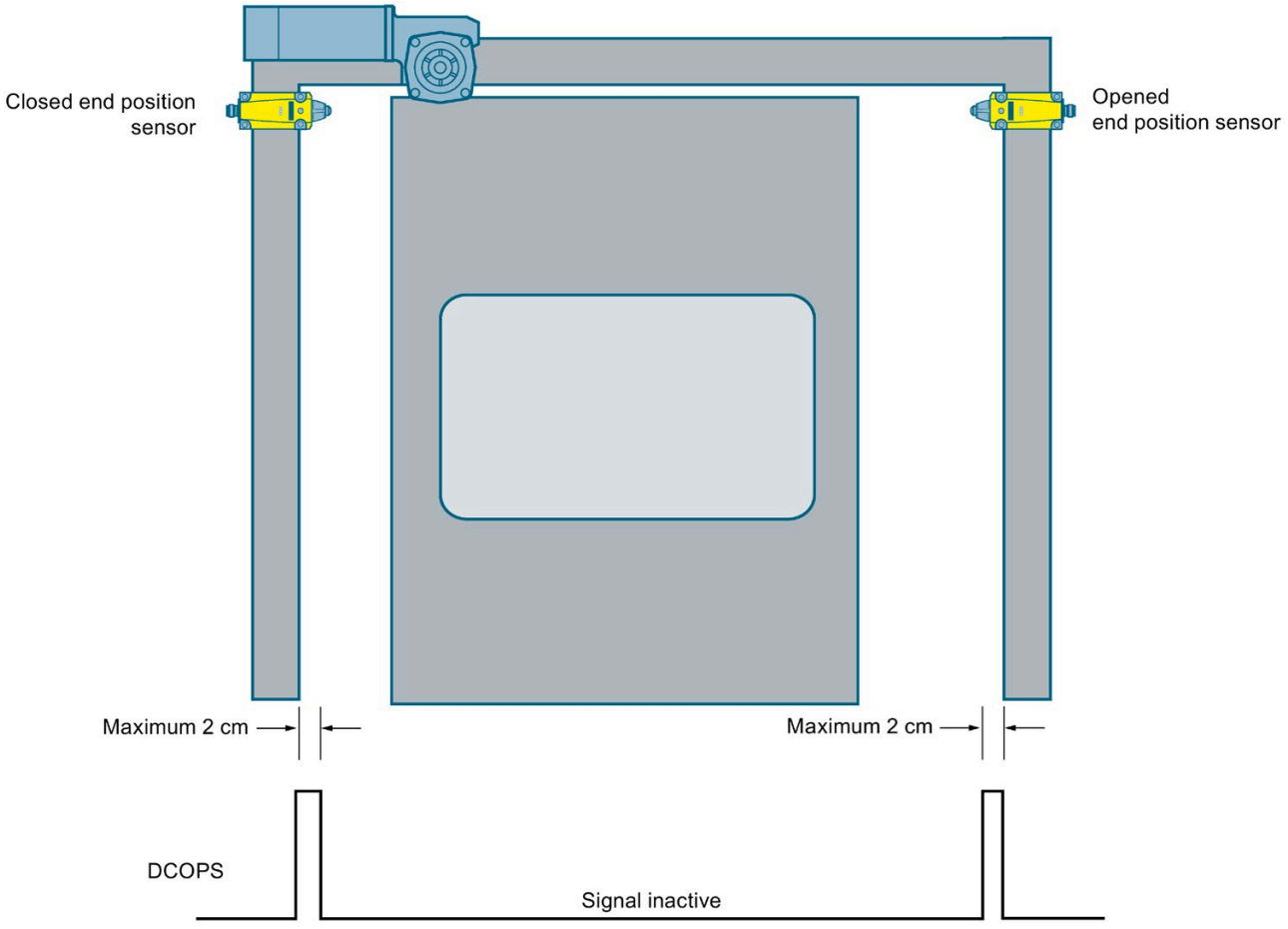
After a mains voltage failure or cold restart the control system is in initial mode. A DCOPS allows immediate moving of the door in normal operation after the supply voltage has been applied without initialization operation.

Functionality:

If the SIDOOR controller recognizes a obstruction (end stop) in the initial mode, at an active DCOPS extension bit through a corresponding door command "Open" or "Close", this is evaluated as an end stop and the controller changes back directly into the normal mode. In order to ensure that a blocking obstacle is recognized incorrectly as an end stop, the DCOPS extension bit should only be activated in an area of 1 to 2 cm around the respective end stop.

Example of procedure when DCOPS is used

1. Power ON
2. Controller is in initial mode. No fault is present. The system is located at any position in traverse.
3. A door command "Open" or "Close" is applied (no disable active!).
4. The system opens or closes.
5. The DCOPS signal becomes active before the end stop.
6. The system reaches the end stop and is blocked by it.
7. The system changes to the normal mode and changes to the corresponding status "opened" or "closed".



Signal monitoring

If the DCOPS remains active although the end position has been left, the controller changes back into initial operation after 10 cm and continues the move with the initial speed. Not until both end positions have been reached, with correct DCOPS signal, does the door travel again with normal speed. In case of a faulty DCOPS signal a corresponding system warning is displayed and logged ("DCOPS error").

After both end positions have been reached at least once in normal mode, the DCOPS signal monitoring is deactivated.

5.2.9 DRS - reversing

DRS (Door Reversing Signal) is a signal that reverses the current direction of travel of the door. An active Close command can be converted into an Open command via the DRS extension bit and vice versa. The DRS can be activated on the one hand via the process image (see remote DCMD extension) and / or via the FBLOCK logic (see local DCMD extension).

For example, it is thus possible to change a local Close command with the highest priority (of FBLOCK logic) into an Open command by means of the remote DCMD extension DRS (process data).

The system information message "J" is displayed as long as an active drive order is reversed by the DRS extension bit. In addition this status is transferred by the process data signal DREVERSE in TZW0 to the higher-level controller.

In special application cases the DR signal ensures the required flexibility at the fixed prioritization of the drive orders between each other.

Note

If the remote DRSignal (process image) is used, the status of the control unit has to be considered. The process data are only valid in the status "S4: OPERATING" (see Sequential control system (Page 28)).

5.2.10 Continuous door monitoring (vandalism protection)

Description of function

The continuous door monitoring (vandalism protection) function provides protection against undesired external system movements for sensitive door systems (for example at glass elements) at mechanical components. If the motor is freewheeling, the motor speed is monitored by the SIDOOR controller and is limited in accordance with the configuration. The operating status display shows die warning "i" when the door monitoring response (braking) is active.

Parameter assignment

The door monitoring mode is configured via the parameter p1207.

- p1207=0 → Continuous door monitoring mode
- p1207=1 → Profile-based door monitoring mode

If required, the door monitoring can be deactivated completely by setting the parameter p1208=0.

Continuous door monitoring mode

When the continuous door monitoring mode is activated, the behavior of the door monitoring depends on the door mode and status.

- **Waiting for learn run, Initial mode or Error status:**

  If the maximum speed set in the parameter p1208 was exceeded, the door control unit brakes the door to 50 mm/s. After an interruption time of 300 ms the motor is switched to de-energized (freewheeling).

- **Normal mode:**

  Within 20 cm of the respective end stops the door control unit brakes the door to the value set in the driving profile. If the door position lies 20 cm away from the end stop, the door is not influenced (braked).

Profile-based door monitoring mode

If the maximum speed of parameter p1208 was exceeded, the door control unit brakes to 50 mm/s. After an interruption time of 300 ms the motor is switched to de-energized (freewheeling).

Factory setting

Profile-based door monitoring is activated in the factory.

5.2.11 Overload protection and system load

Description of function

When the drive motor or the controller is subject to high loads, an automatic overload protection becomes active depending on the temperature of the motor and of the controller. This dynamically ensures the adjustment of the following properties:

- Speed reduction
- Flattening of all the acceleration and deceleration ramps
- Extension of the hold-open time
- Extension of the pause times at oscillation protection (see Oscillation protection (Page 84))
- Deactivation of the controller

Relation between temperature und load

The load on the controller and the motor is calculated as a percentage on the basis of the temperature data. The following diagram shows the dependency between the temperature and the controller or motor load.

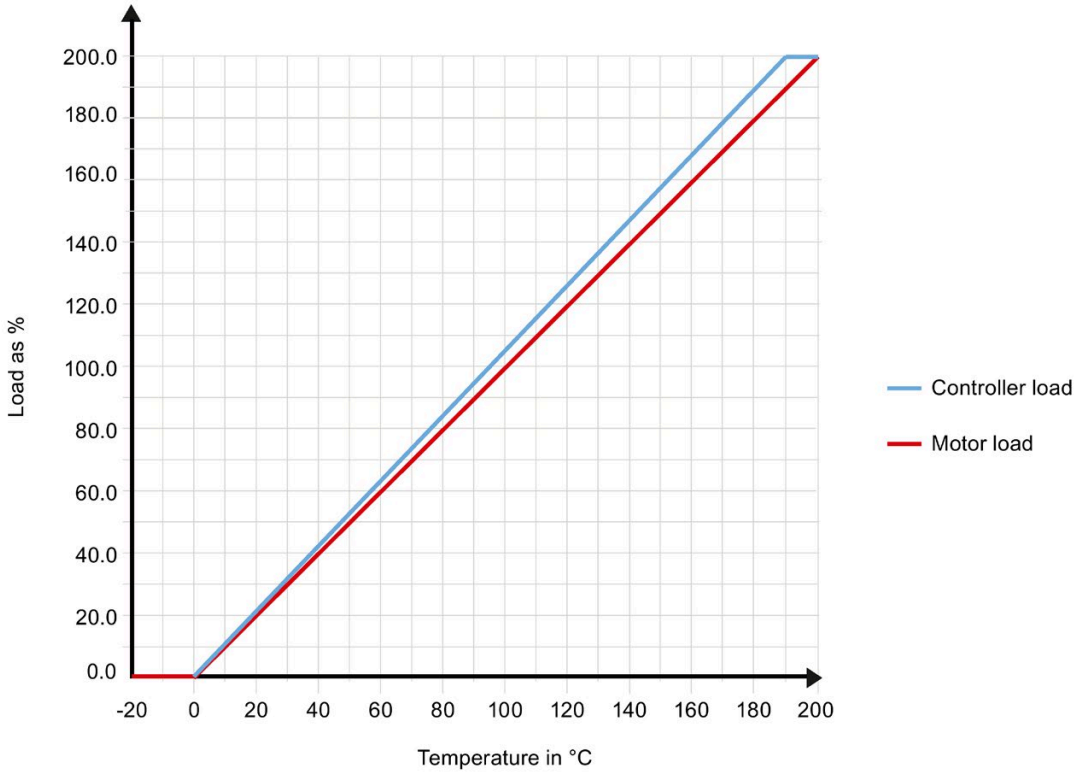


Figure 5-2 Dependency between the temperature and the controller or motor load

Determining the system load (SysLOAD)

The controller load and the motor load are combined into the system load (SysLOAD). The system load is determined solely by the larger of the two values and is specified as a %. The following table illustrates the dependency:

System load	Motor load	Controller load
0%	0%	0%
25%	0%	**25%**
25%	**25%**	12%
50%	**50%**	49%
75%	**75%**	70%
100%	88%	**100%**

Signaling

Only when the currently configured driving curve profile is influenced by the automatic overload protection, the warning "4" is issued via the operating status display and stored in the event list (see Diagnostics and service (Page 143)).

Speed reduction

As of a system load of ≥75% a linear reduction of the upper limit of the maximum opening and closing speed is carried out (see p3664 or p3668). The reduction is carried out within the parameter limits from a maximum of 800 mm/s to a minimum of 90 mm/s. If the maximum speed configured by the user lies below the speed limit reduced in accordance with the system load, the driving curve profile is not influenced by the overload protection and therefore no warning "4" is output via the operating status display either.

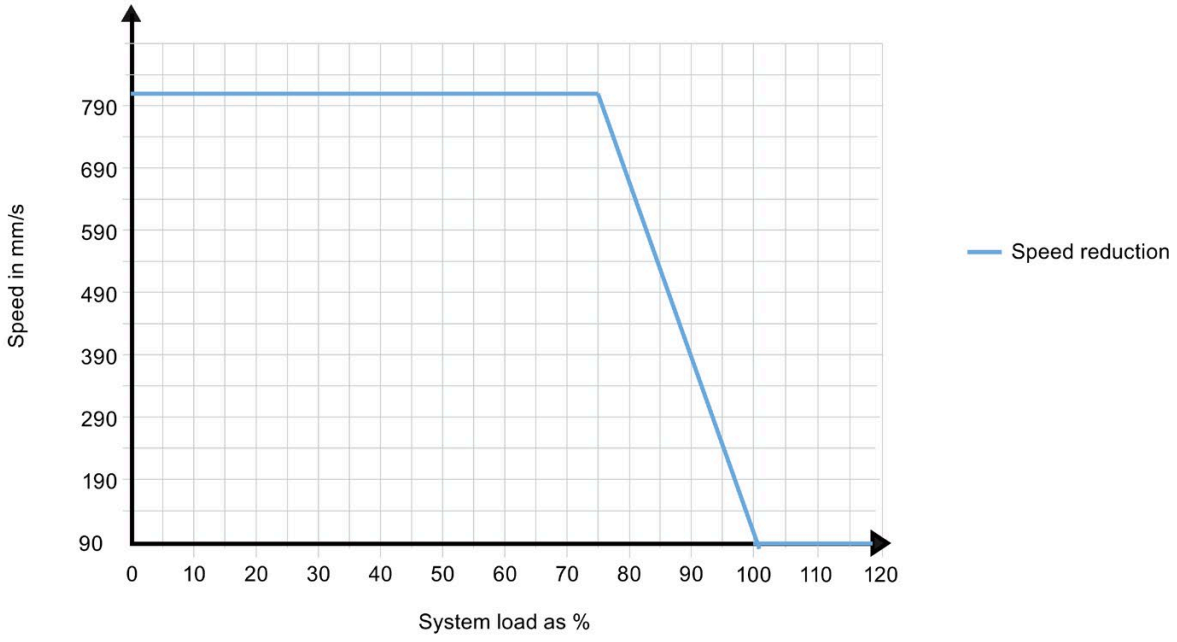


Figure 5-3 Overload protection - speed reduction

Flattening of all the acceleration and deceleration ramps

As of a system load of ≥85% a linear reduction of the high limit of the acceleration and decelerations is carried out (see p3673/p3676 Acceleration ramp OPEN / CLOSE, p3674/ p3677 Deceleration ramp OPEN / CLOSE and p3675/ p3678 Reversal ramp OPEN / CLOSE). The reduction s carried out within the corresponding parameter limits. If the acceleration and deceleration ramp configured respectively by the user lies below the maximum ramp reduced in accordance with the system load, the driving curve profile is not influenced by the overload protection and therefore no warning "4" is output via the operating status display either.

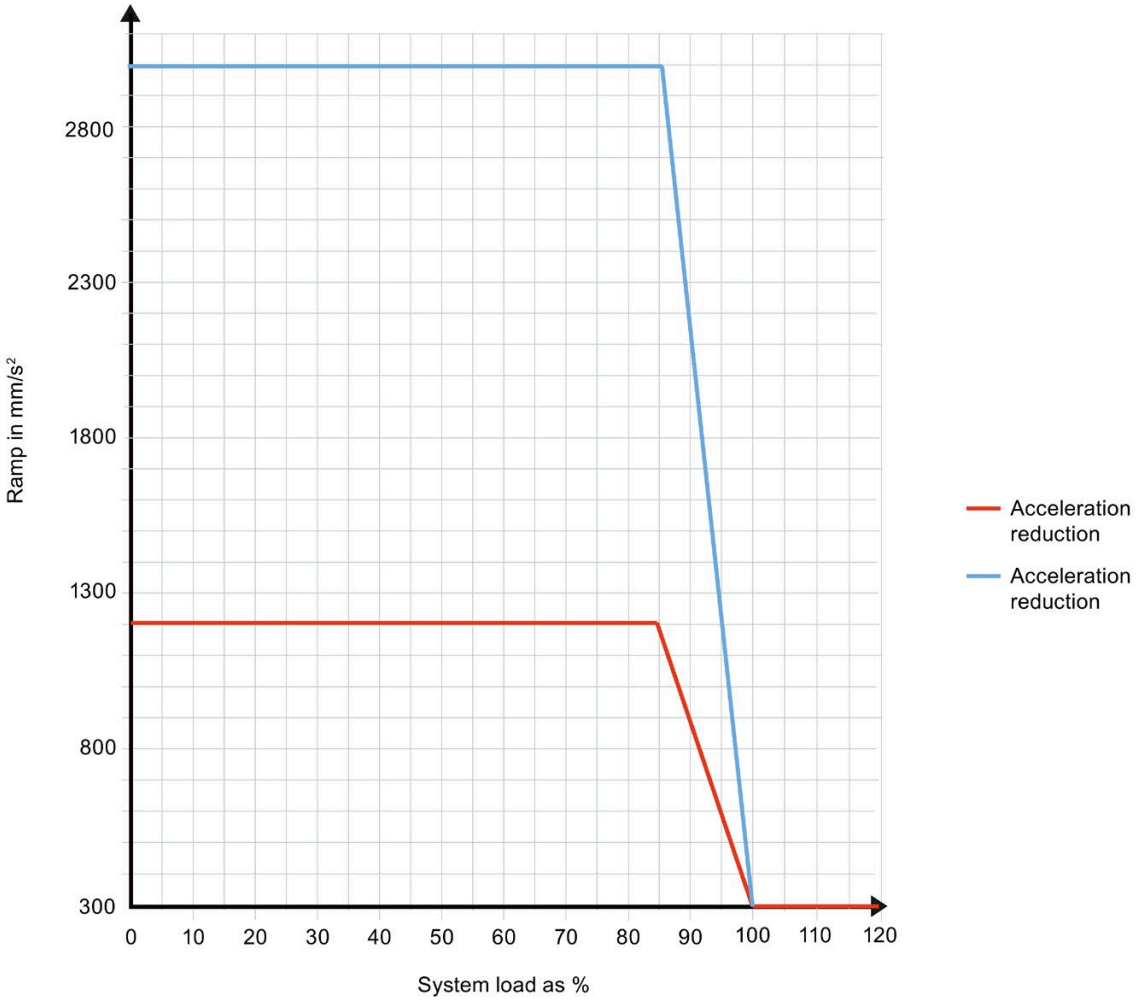


Figure 5-4 Overload protection – reduction of the acceleration and deceleration

Comment: The reversal ramps are defined as deceleration ramps.

Extension of the hold-open time

As of a system load of ≥90% an automatic extension of the hold-open time is effected for 1 s to a maximum of 10 s. The hold-open time extension only acts in normal mode as soon as the controller is in the status Opened. A Close command is suppressed during the hold-open time (motor freewheeling - de-energized).

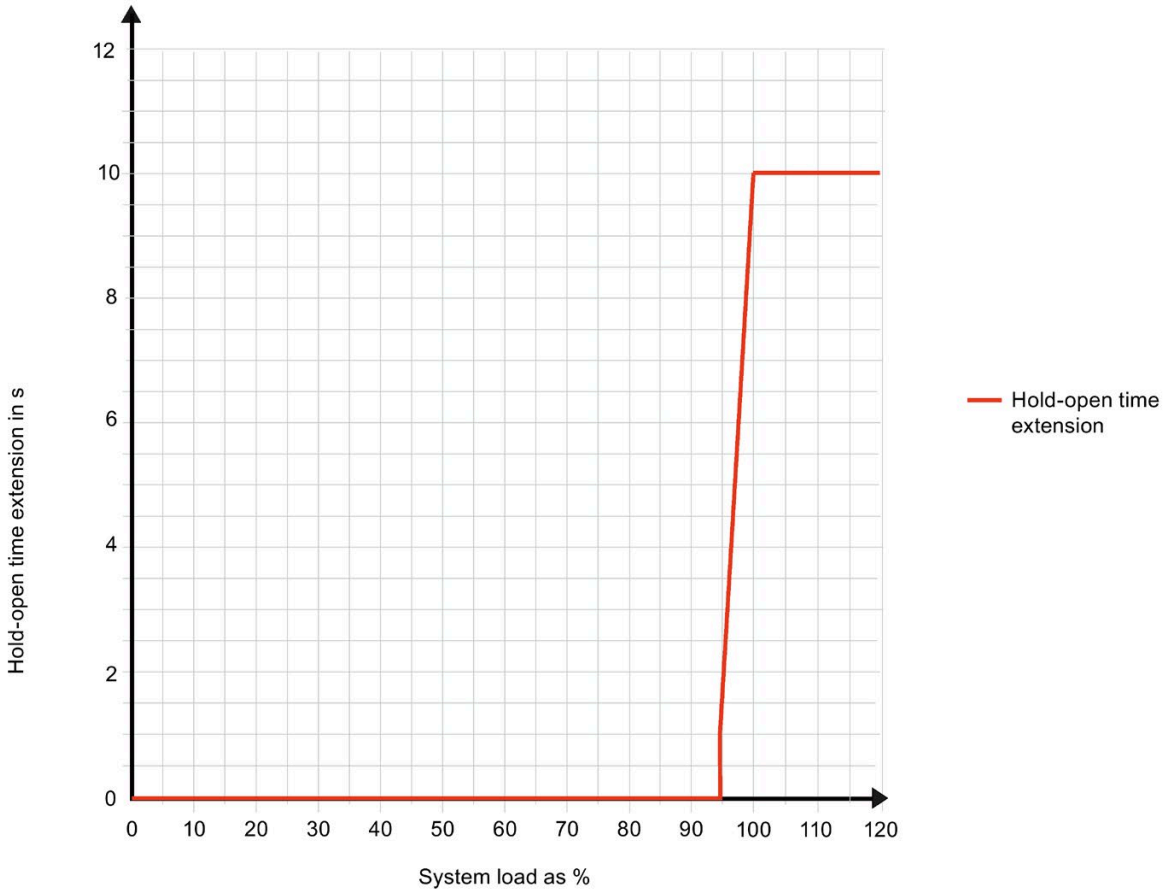


Figure 5-5 Overload protection - hold-open time extension

Deactivation of the controller

As of a system load ≥100% the drive is switched freewheeling (de-energized). Deactivation of the drive is effected as soon as the drive operationally enters the standstill state. The drive remains freewheeling until the system load has been reduced to ≤97%.

Information interface

Evaluation of the data of the overload protection can be effected via both the service and the fieldbus interface. To this purpose all the current temperatures of the controller and motor, as well as the system load can be called up in the service menu in the section "Service" → "Special". In the process image the system load is transferred cyclically in the SysLOAD signal (TZW3 - technology status word 3 (Page 175)). The motor load, motor temperature, controller load, controller temperature or the system load (16-bit) can be projected application-specifically into the process image via the variable signals VMON1 and VMON2 (see TZW4 - technology status word 4 (Page 176) and TZW5 - technology status word 5 (Page 177)). This information can alternatively also be read out via the parameter interface using the parameter r2100[x] (see Other parameters (Page 131)).

Summary / overview

The overload protection response of the system results as follows:

System load	Response
0% ≥ x ≤ 60%	No response
60% ≥ x < 100%	Oscillation protection time extension
75% ≥ x < 100%	Reduction of the high limit of the maximum speeds (warning "4")
85% ≥ x < 100%	Reduction of the high limit of all the accelerations and decelerations (warning "4").
90% ≥ x < 100%	Automatic extension of the hold-open time (warning "4")
x >= 100%	The motor is switched freewheeling until the system load ≤ 97% (Warning „4“)

5.2.12 Speed and force monitoring

The speed and force monitoring is controlled via a control loop that sets the speed and force limitation to the specified values. In addition, the current speed and force values are monitored in the control loop.

Monitoring of the opening and closing speed:

The maximum speed may not exceed the set maximum values. The following parameter values can be set:

- p3664 – maximum speed OPEN
- p3668 – maximum speed CLOSE
- p3672 – maximum speed NDG (reduced)

The limitation of the speed monitoring has a tolerance of 5% downwards. If the current speed is exceeded for more than 200 ms, a warning ("time") is displayed on the operating status display and stored in the log. Monitoring is not active during the learn run.

Monitoring of the opening and closing forces:

The current force is calculated from the motor current. The maximum force may not exceed the set maximum values. The following parameter values can be set:

- p3682 – Static force limit open
- p3683 – Static force limit close
- p3684 – Limit force end static close
- p3685 – static NDG force (reduced)

These parameter values are used as force monitoring limits. The limitation of the force monitoring has a tolerance of 10 N downwards. If the current force is exceeded for more than 100 ms, a warning ("t") is displayed on the operating status display and stored in the event list (see Diagnostics and service (Page 143)). Monitoring is not active during the learn run.

Force monitoring is active under the following conditions:

- In the closing direction -> in the last third of the door width
- In the opening direction -> complete door width
- The motor is controlled in the opening or closing direction

5.2.13 Force and energy limitation

Force limitation

All the static forces defined by the user act on the belt wheel. Limiting of the static force is ensured by the force limitation safety function. The following parameters are used to configure the force profile.

- p3682 – Static force limit open
- p3683 – Static force limit close
- p3684 – Limit force end static close
- p3685 – static NDG force (reduced)

An overview of the section assignment is available in the "drive curve profile". During the learn run and in initial mode the force is limited in accordance with the parameters p3682 "Static force limit open" and p3683 "Static force limit close".

Automatic energy limitation

The controller includes a system for automatic limitation of the kinetic energy. The specification of the values of the energy limitation is effected via the corresponding energy limitation parameters:

- p3686 - Limit energy CLOSE
- p3687 - Limit energy OPEN
- p3688 - Limit energy NDG (reduced)

Calculation is carried out in accordance with the following formula and references the door mass r2101 "EffDoorMass" determined during the learn run:

$$W_{kin} = \frac{m_{Door\ mass}}{2} \cdot v_{max}^{2}$$

$$v_{max} = \sqrt{\frac{2 \cdot W_{kin}}{m_{Door\ mass}}}$$

If the respective energy limitation is activated, the following speed parameters are determined automatically by SIDOOR on the basis of the learned door mass (any write protection has no effect):

- p3668 "Maximum speed CLOSE"
- p3664 "Maximum speed OPEN"
- p3672 "NDG speed (reduced)"

The respective automatic energy limitation can be suppressed by setting the corresponding energy limitation parameter to 0. Suppressed energy limitation means that the respective speed can be configured directly by the user.

The maximum physical energy limit of the controller amounts to 75 Joule.

⚠ WARNING

Risk of injury due to moving mechanical parts

Independently of the maximum speed automatically determined during the learn run, the kinetic energy of the door has to be checked by the commissioning engineer after a learn run.

The table below shows the maximum speeds depending on door weight and energy limiting:

Table 5- 8 Maximum speeds [mm/s] depending on door weight and energy limiting

Door weight [kg]	Energy [J]					
	4	**10**	**25**	**50**	**75**	**100**
50	400	632	1000	1414	1732	2000
100	283	447	707	1000	1225	1414
150	231	365	577	816	1000	1155
200	200	316	500	707	866	1000
250	179	283	447	632	775	894
300	163	258	408	577	707	816

5.2.14 Friction and mass analysis

The SIDOOR controller determines the current system friction and mass during each complete opening and closing move. The friction and mass data determined during the last travel can be called up in the Service menu under "Main menu" → "Service" → "Special" under "Inhibiting force last drive" and "Dynamic mass last travel". In addition the reference data determined during the last learn run for the dynamic door mass and friction can be called up ("Dynamic mass" and "Inhibiting force Open / Close") in this menu section.

The friction and mass data of the last opening and closing moves can, amongst others, be called up via the parameter r2100[x] "Monitoring data". These data can optionally also be projected as a variable monitoring value into the process image, see p4700 and p4701.

The reference data of the last learn run are available via the following parameters:

- r2104 Inhibiting force in opening direction
- r2105 Inhibiting force in closing direction
- r2101 Effective door mass

Maintenance analysis

The SIDOOR controller disposes of an automatic maintenance algorithm that determines, analyzes and signals changes to the system friction. To this purpose the trend of the friction change is calculated, based on the last 10 travels. The percentage evaluation always references those reference data that were determined during the last learn run. The maintenance data are transferred via the signals FINHIBCLS and FINHIBOPN to the process image, see TZW1 - technology status word 1 (Page 171).

The maintenance data are not available directly after Power ON (FINHIBCLS=0 and FINHIBOPN=0). After the first complete move cycle the analysis begins and maintenance data are available. The longer the analysis is running, the more precise the resulting trend and the higher the precision of an estimation of the soiling, damage or wear.

5.2.15 Master monitoring

The master monitoring is a system that monitors error-free fieldbus communication and the logical functionality of the higher-level system. To this purpose the process / user data exchanged via the fieldbus system are monitored in time and logically via the provider-consumer model.

Through the master monitoring a defined response to the following situations is ensured:

- Cable break (or bus interruption respectively)
- Hardware fault in the transmission / reception unit
- Faulty communication configuration (for example baud rate, circulation list / slave addresses)
- Failure of the master system
- IO controller stopped (output data of the IO controller invalid)

The master monitoring becomes active via the fieldbus system as of the first error-free process / user data exchange. The parameter p2040 specifies the time interval in which at least one error-free and valid user data exchange via the fieldbus system is expected. If no or invalid user data are received from the IO Controller during this period, the warning "y" becomes active and the control unit is reset to the status "S1: SWITCH_ON_DISABLED" (see the image status graph control unit in the section Control unit (Page 28)). For diagnostics purposes the warning "y" has a switch-off delay of 2 s.

Master monitoring ca be deactivated by using the parameter setting p2040=0. The configured minimum scan cycle time of the SIDOOR-internal bus is decisive at the configuration of the master monitoring time P2040, see Parameter assignment / startup record (Page 106).

5.2.16 Broken belt monitoring

Description of function

The function detects a torn belt. The belt break monitoring function is active in normal mode, initial mode and during the learn run.

A torn belt is recognized when a specified distance is exceeded during the door movement (in the opening or closing direction).

The distance is defined as follows:

DMODE – door mode	Distance
Special	Maximum door width + parameter value p1201
Learn run	
Fault	
Initial	Learned door width + parameter value p1201
Normal	

The belt break monitoring function is deactivated with the parameter value p1201 = 0. In this case no faults, errors and responses of the controller are generated or triggered.

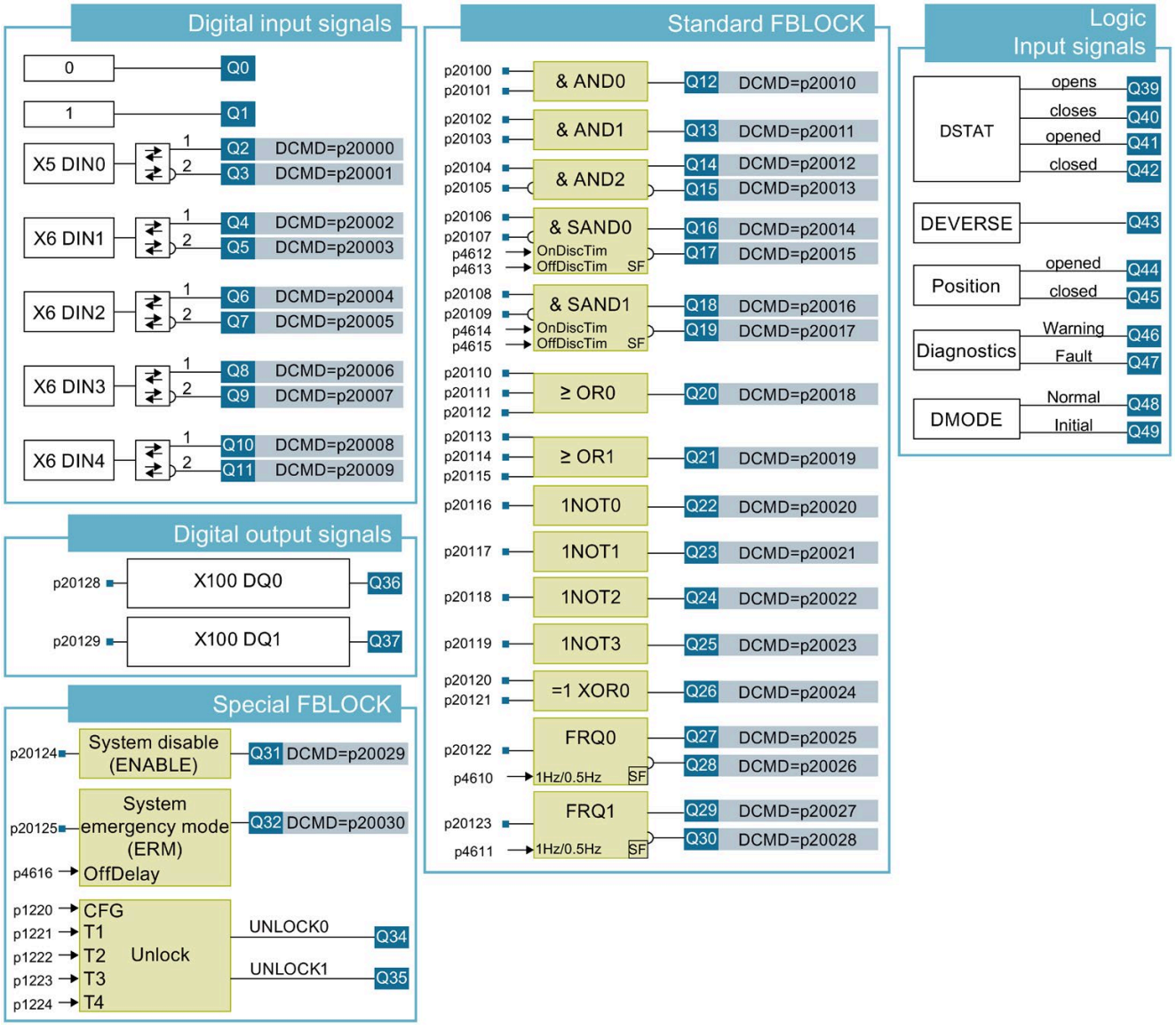
The operating status display shows the display code "t" and the controller changes to the status "S6: FAULT".

If an invalid parameter value (p1201) is defined, the maximum door width of 5 m is used.

5.2.17 FBLOCK - free function blocks

5.2.17.1 Overview

In some applications it is necessary to control the drive via digital signals. To this purpose an individual logic operation can be configured by using the logic elements shown in the following figure.



5.2.17.2 Logic operation configuration

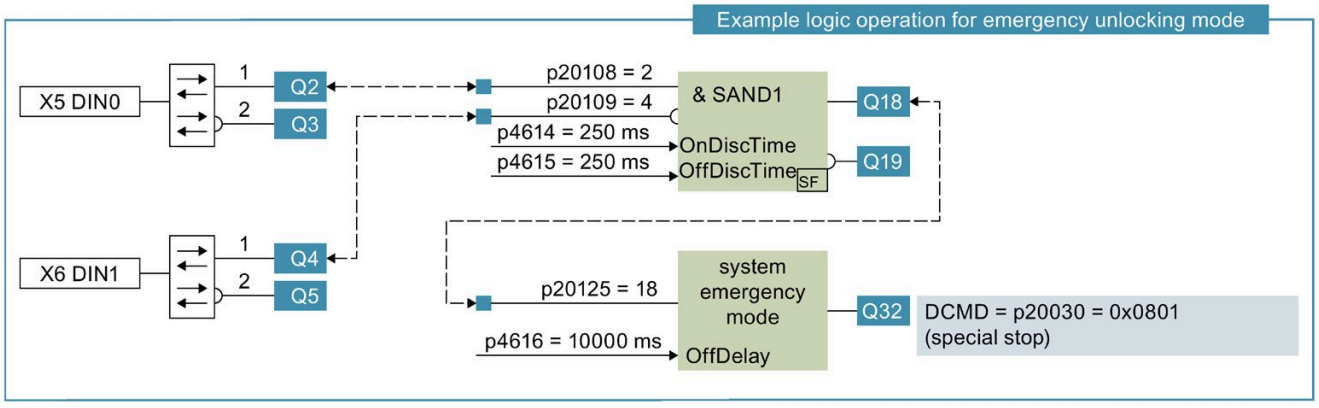
The free function blocks are configured on the parameter level. The input of a function block is linked with any output by entering the Q-number of the output in the REF parameter of the input. (See FBLOCK parameter (Page 139))

Factory setting

The function blocks "Emergency unlocking mechanism", "Disable", and "Open / Close" are already linked in the factory setting with the digital inputs DIN0-4 and the function block "Unlock" with the digital outputs DQ0-1. To this purpose the Q-numbers are entered in the REF parameters of the inputs as shown in the following figures.

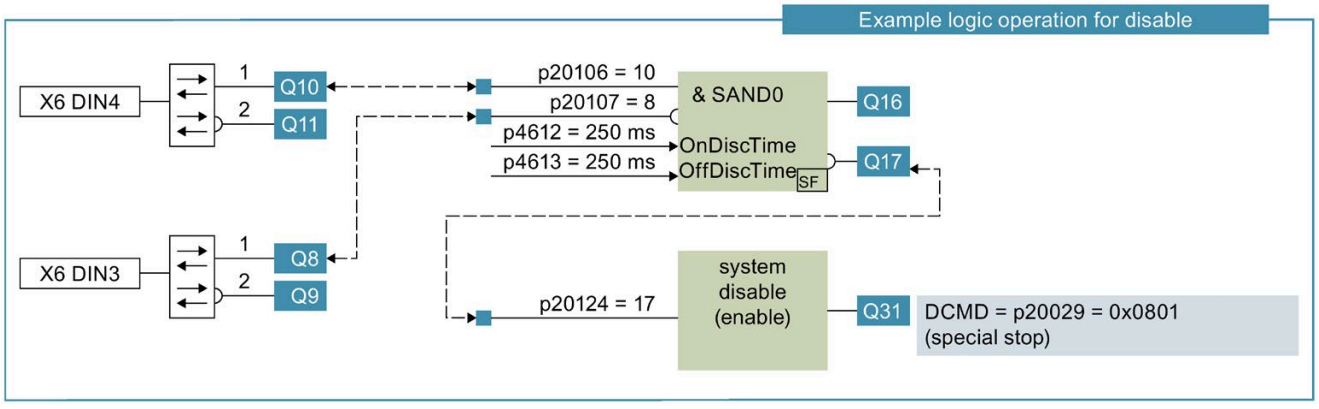
Factory setting / Example link "emergency unlocking mechanism"

The following figure shows an example link. In the example link the level-controlled outputs of the digital inputs DIN0 and DIN1 are linked via the FBLOCK "SAND1" with the FBLOCK "System emergency mode".



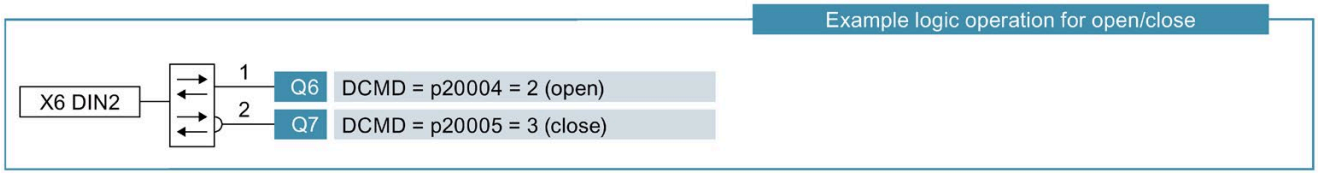
Factory setting / Example link "Disable"

The following figure shows an additional example link. In the example link the level-controlled outputs of the digital inputs DIN3 and DIN4 are linked via the FBLOCK "SAND0" with the FBLOCK "System disable".

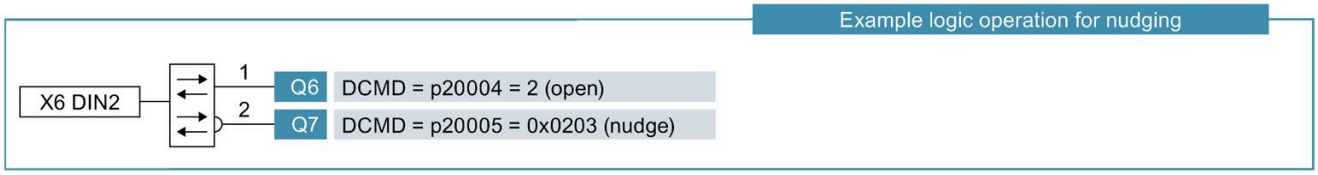


Factory setting / Example link "Open / Close"

The following figure shows an additional example link. In the example link the level-controlled outputs of the input DIN2 are linked directly with the Open and Close door commands.

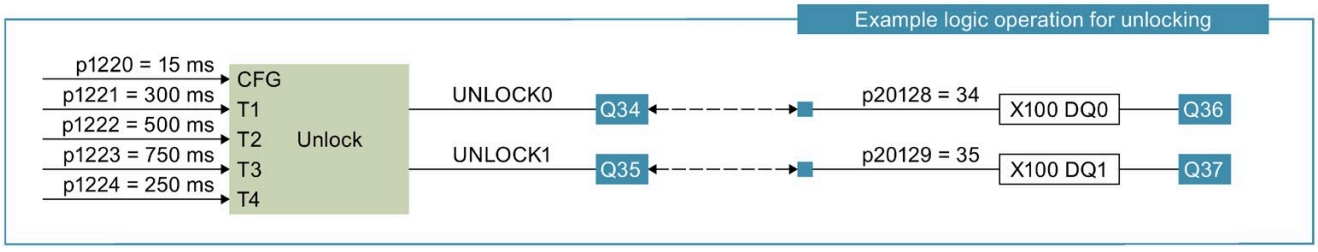


Nudging via FBLOCK



Factory setting / Example link "Unlocking"

The following figure shows an additional example link. In the example link the inputs of the special FBLOCK "Unlock" are linked with parameter values. The outputs of the FBLOCK are linked with the inputs of the digital outputs DQ0 and DQ1 so that, for example, the digital outputs also become active when "Unlock" signals are activated.



Drive order

Parallel to the signal link a drive order can be assigned to the outputs Q. Drive orders that are assigned to the outputs are only effective as long as the assigned output is active. A drive order consists of a local door command "local DCMD" and an optional local drive order extension "local DCMD extension".

Drive order = local DCMD + local DCMD extension

Both commands are expressed as 16-bit values. The structure of the fields local DCMD and local DCMD extension corresponds to the remote DCMD signals o the technology control word 0 (TSW0), see table Technology control word 0 (TSW0) (Page 169).

Table 5- 9 Local drive order

Local drive order	
15 ... 4	3 ... 0
local DCMD extension	**local DCMD**

Table 5- 10 Local DCMD signal

DCMD signal value	**Meaning**	**Description**
0	No door command / Deenergize)	Motor coasts down, deenergized. (motor freewheeling)
1	Stop	The door system is stopped. The winding is short-circuited (EMC brake) (motor NOT freewheeling)
2	Open	Drive moves in learned opening direction
3	Close	Drive moves in learned closing direction
4	Start learn run	Learn run with active parameter record
...		
15	*Reserved*	

Table 5- 11 local DCMD extension bits

Bit	**Meaning**
8	Slow (see the section Slow door profile (Page 44))
9	Nudging (see section Nudging (Page 44)) (FW V2.4 or higher)
11	Special (see the section Learn run (Page 45))
14	DCOPS sensor (see the section DCOPS - end position sensor (Page 53))
15	DRS (see the section DRS - reversing (Page 55))

Example

- The value 0x0103hex corresponds to the drive order "Slow close".
- The value 0x0801hex corresponds to the drive order "Special stop".
- The value 0x0203hex corresponds to the drive order "Nudge".

Parallel drive orders

The door commands active during a processing cycle are prioritized as follows:

- Stop > Learn run > Close > Open

All further door commands are determined on the basis of the signal processing order.

Parallel drive order extension

The door command extensions active during a processing cycle are combined (logic OR operation).

Signal processing

All the outputs are recalculated in every processing cycle (10 ms) on the basis of the current input signal statuses. The output signals of the cycle are calculated exactly in the order of the Q-numbers (beginning with Q0). If the output Q22 ("NOT0") is used as the input signal of "AND0", its output Q12 is not recalculated until the next cycle.

5.2.17.3 Digital input and output signals

Digital input signals

The controller disposes of 5 digital inputs (with 30 ms debounce time) that can be linked with any function blocks and / or directly with drive orders. Drive orders that are assigned to the level-controlled input signals are only effective as long as the assigned digital input is active (inching mode).

Table 5- 12 Overview of Q-numbers of digital input signals

Q-number	Meaning
Q0	Logic 0 "low"
Q1	Logic 1 "high"
Q2	Level-controlled Q-output of DIN0
Q3	Negated level-controlled Q-output of DIN0
Q4	Level-controlled Q-output of DIN1
Q5	Negated level-controlled Q-output of DIN1
Q6	Level-controlled Q-output of DIN2
Q7	Negated level-controlled Q-output of DIN2
Q8	Level-controlled Q-output of DIN3
Q9	Negated level-controlled Q-output of DIN3
Q10	Level-controlled Q-output of DIN4
Q11	Negated level-controlled Q-output of DIN4

Digital output signals

The controller disposes of 2 digital relay outputs that can be linked with any outputs (Q-numbers) of function blocks or input signals.

Table 5- 13 Overview of Q-numbers of digital output signals

Q-number	Meaning
Q36	Logic Q-output of DQ0
Q37	Logic Q-output of DQ1

5.2.17.4 Logic input signals

In order to map internal interdependencies in the logic operations, selected system status signals or statuses are made available as input signals.

Table 5- 14 Overview of Q-numbers of status signals

Q-number	Meaning
Q39	System is opening
Q40	System is closing
Q41	System opened
Q42	System closed
Q43	Reversing active
Q44	Position opened
Q45	Position closed
Q46	Diagnostics warning active
Q47	Diagnostics error active
Q48	System in normal mode
Q49	System in initial mode

5.2.17.5 Standard function blocks

In order to map fundamental logic operations the basic functions "AND", "OR", "NOT" and "XOR" are provided.

Table 5- 15 Overview of Q-numbers of logic signals

Q-number	Meaning
Q12	Logic Q-output of AND0
Q13	Logic Q-output of AND1
Q14	Logic Q-output of AND2
Q15	Negated logic Q-output of AND2
Q20	Logic Q-output of OR0
Q21	Logic Q-output of OR1
Q22	Logic Q-output of NOT0
Q23	Logic Q-output of NOT1
Q24	Logic Q-output of NOT2
Q25	Logic Q-output of NOT3
Q26	Logic Q-output of XOR0

5.2.17.6 Safety blocks

Safety blocks

Safety-oriented signals can be read in via the digital inputs of the controller. The concept in this section describes the implementation of safe inputs in accordance with PLd (Performance Level d) and in accordance with SIL2 the recognition and revelation of the following malfunctions, faults and errors:

- Interruption of an individual connection
- Short-circuit between any two connections
- Stuck-at fault (short-circuit to 1 and 0 at isolated input or interrupted output)
- Static signal 0 and 1 at all inputs and outputs, individually or simultaneously
- Spurious oscillation of the outputs
- Change in characteristic values (for example input- / output voltage of analog devices)

Table 5- 16 Overview of Q-numbers of safety blocks

Q-number	Meaning
Q16	Logic Q-output of SAND0
Q17	Negated logic Q-output of SAND0
Q18	Logic Q-output of SAND1
Q19	Negated logic Q-output of SAND1
Q27	Logic Q-output of FREQ0 (1 Hz)
Q28	Logic Q-output of FREQ0 (0.5 Hz)
Q29	Logic Q-output of FREQ1 (1 Hz)
Q30	Logic Q-output of FREQ1 (0.5 Hz)

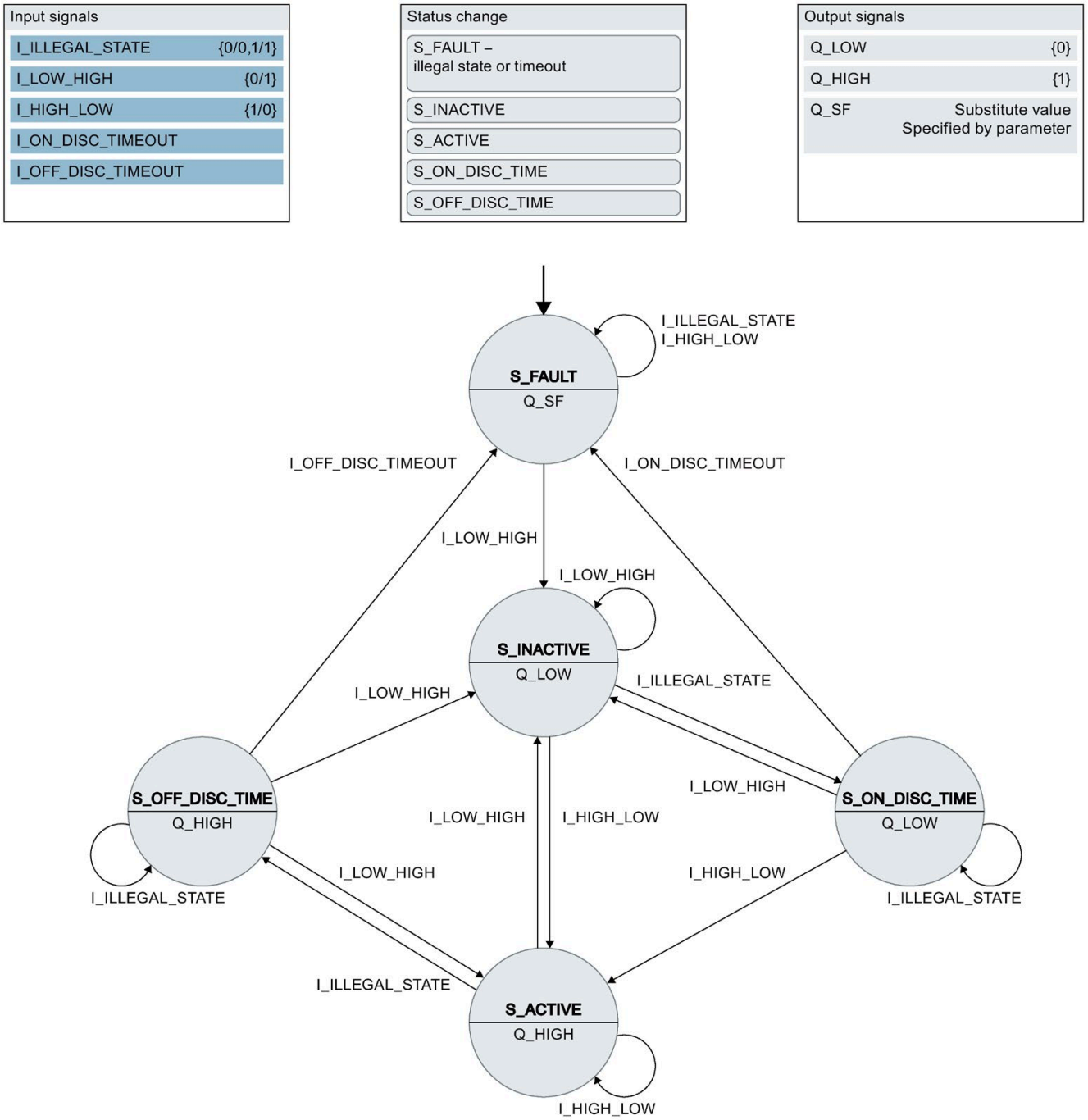
Redundant antivalent signal logic with discrepancy analysis

At a 1oo2 evaluation the encoder is laid on two different channels that are mutually antivalent and is therefore evaluated twice by the controller. The discrepancy analysis between the two channels of the 1oo2 evaluation is carried out in the controller. If the input signals do not match after the parameterized discrepancy time has expired, for example due to a wire break in an encoder line, the internal signal is set to "0". This particular type of signal management fulfils PLd/SIL2 and ensures high availability as well as error discovery.

SAND output signal conditions

- The output signal becomes active if all the inputs are activated simultaneously within the discrepancy time.
- The output signal immediately becomes inactive as soon as one input signal becomes inactive.
- The output signal can only become active again if all the input signals have been inactive once.

SAND state machine



States ↘	I_ILLEGAL_STATE	I_LOW_HIGH	I_HIGH_LOW	I_ON_DISC_TIMEOUT	I_ON_DISC_TIMEOUT	Output
S_FAULT	S_FAULT	S_INACTIVE	S_FAULT	-	-	Q_SF
S_INACTIVE	S_ON_DISC_TIME	S_INACTIVE	S_ACTIVE	-	-	Q_LOW
S_ACTIVE	S_OFF_DISC_TIME	S_INACTIVE	S_ACTIVE	-	-	Q_HIGH
S_ON_DISC_TIME	S_ON_DISC_TIME	S_INACTIVE	S_ACTIVE	S_FAULT	-	Q_LOW
S_OFF_DISC_TIME	S_OFF_DISC_TIME	S_INACTIVE	S_ACTIVE	-	S_FAULT	Q_HIGH

S_FAULT

In accordance with the signal logic a fault state of the input signals is signaled by an SF – fault output. The fault outputs of SAND0 and SAND1 are part of the process image signal SDINFAULT.

Substitute value

Specification of the output values in case of a fault (S_FAULT) is effected by using the parameter p4630 "SIn_Subst_CFG". Here one bit each stands for the substitute value of the corresponding SAND FBLOCK.

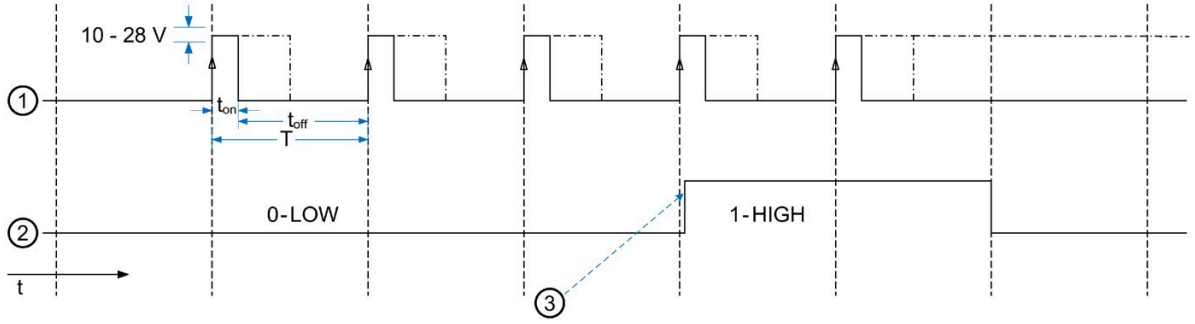
Output values

The non-inverted output signals Q16 and Q18 of the SAND F-blocks are part of the process image signal SDIN, see TZW2 - technology status word 2 (Page 173).

Frequency analysis blocks

An input signal can be analyzed for specific frequencies and duty cycles by using the "FRQ" frequency blocks. Two equivalent frequency analysis blocks are available that can respectively recognize frequencies of 1 Hz and 0.5 Hz with a duty cycle of 20%.

The following figure describes the recognition criteria and the valid tolerances in detail.



① Input signal
② Output signal
③ After 3 recognized signal periods, after the 4th edge, the output signal changes.

- An input tolerance of (±)40 ms is assumed.
- Duty cycle 20% (17% to 23%)
- At 1 Hz frequency recognition
  - T = 1000 ms (±2%)
  - ton = 200 ms
  - toff = 800 ms
  - Pulse / Pulse ratio V = 25%
- At 0.5 Hz frequency recognition
  - T = 2000 ms (±2%)
  - ton = 400 ms
  - toff = 1600 ms
  - Pulse / Pulse ratio V = 25%

Figure 5-6 Frequency-based input signal recognition

The outputs Q27 or Q29 respectively become active when the analysis algorithm in the input signal has recognized the selected frequency with 20% duty factor.

Parameter p4610 is used to select the input frequency of FBLOCK FRQ0.

Parameter p4611 is used to select the input frequency of FBLOCK FRQ1.

The maximum response time at the output, meaning the time after which the system can determine an error or a deviation in the input signal frequency, corresponds to the cycle duration of the frequency to be recognized. At a frequency of 1 this therefore results in a maximum response time of 1 s and at 0.5 Hz in a maximum response time of 2 s.

SF - group error

The SF becomes active if no edge change is recognized within the duration of a signal period. The SF fault outputs of FRQ0 and FRQ1 are part of the process image signal SFINFAULT.

Substitute value

Specification of the output values in case of a fault (SF) is effected by using the parameter p4630 "SIn_Subst_CFG". Here one bit each stands for the substitute value of the corresponding FBLOCK, see Parameters (Page 125).

Output values

The non-inverted output signals Q27 and Q29 of the FRQ F-blocks are part of the process image signal SFIN.

System warning – SF "illegal signal"

The safety blocks have a fault output SF for signaling invalid input signals. The error statuses of the frequency analysis blocks and the discrepancy analysis blocks are signaled in the process image via the signals SFINFAULT and SDINFAULT. In addition, these error statuses can be included in the operating status display.

The output of the system warning a – "SF illegal signal" is controlled via the parameter p4630 "SIn_Subst_CFG". The error output via the operating status display is activated at Bit x=1 and deactivated at Bit x=0.

Parameter p4630 "SIn_Subst_CFG":

- Bit 8 = SF – error output of SAND0
- Bit 9 = SF – error output of SAND1
- Bit 10 = SF – error output of FRQ0
- Bit 11 = SF – error output of FRQ1

5.2.17.7 Special function blocks

Table 5- 17 Overview of Q-numbers of special function blocks

Q-number	Meaning
Q31	Logic Q-output of disable
Q32	Logic Q-output of emergency unlocking mechanism
Q34	Logic Q-output of UNLOCK0
Q35	Logic Q-output of UNLOCK1

Disable

The disable is used to activate and deactivate the local and remote control. When the disable is activated, the control of the motor is suppressed and the system is freewheeling. This behavior is set by using the parameter p20030 (factory setting is "Special stop"). The operating status display shows die warning "N" when the disable is active. In addition the disable forces the "OFF3" condition of the control unit. The control unit changes to the status "S1: SWITCH_ON_DISABLED".

For the **standard configuration** (factory setting) for the disable, see the example link "System lock". The SAND0 has not set a substitute value.

Digital input		SAND0 **SafeEN**	SAND0 - SF **SafeEN fault**	**OFF3** (control unit)	**Motor**
DIN4 **Enable**	**DIN3** $\overline{\text{Enable}}$				
0	0	Illegal state	1	1	Error → System free-wheeling
0	1	0	0	1	System freewheeling
1	0	1 (observe preconditions!)	0	0	Depending on the control unit and the Open signal at the digital input.
1	1	Illegal state	1	1	Error → System free-wheeling

Emergency unlocking mechanism (ERM)

Digital input		SAND0 **SafeERM**	SAND1 - SF **SafeERM fault**	**OFF3** (control unit)	**Motor**
DIN0 **ERM**	**DIN1** $\overline{\textbf{ERM}}$				
0	0	Illegal state	1	1	Error → System free-wheeling
0	1	0	0	1	System freewheeling
1	0	1 (observe preconditions!)	0	0	Depending on the control unit and the Open signal at the digital input.
1	1	Illegal state	1	1	Error → System free-wheeling

The FBLOCK for the emergency unlocking mechanism is used to set the control device into the so-called ERM mode. In the ERM mode all the door commands (local and remote) are suppressed, the door or the motor respectively becomes freewheeling in this mode, or the behavior can be set by using the parameter p20023 (factory setting is "Special stop"). Deactivation of the ERM mode is linked to an OFF delay. This means that the ERM mode remains active for a parameterizable time after its deactivation (parameter p4616, factory setting 10 s). The operating status display shows the display code "A" (warning) while the ERM mode is active. The ERM mode forces the OFF3 condition, meaning that the controller changes to the status "S1: SWITCH_ON_DISABLED".

For the **standard configuration** (factory setting) for the ERM mode, see the example link "Emergency unlocking mechanism". The so-called substitute value for SAND1 is 1 (p4630 Bit 1).

Unlocking

The signals UNLOCK0 and UNLOCK1 of the unlocking system, see the section Unlocking (Page 32), can be linked dynamically via the FBLOCK logic.

5.2.18 Local / master mode

In principle the slave signals via the ZSW1 (Bit 9 = 1 "Master required") that the master / PLC system should take over the master role. If the PLC signals via the STW1 (Bit 10 = 1 "Master by programmable controller") that is is taking over the master role, the process data are considered valid and have to be processed accordingly. See the figure state diagram control unit in the section Control unit (Page 28).

If the PLC does not take over the master role (Bit 10 = 0 "No master") or if the slave does not request the master role (ZSW1 Bit 9 = 0 "Local operation"), the process data are rejected and the control unit is fixed in the status "S1:Z_Einschaltsperre" (switch-on disabled) (see the figure state diagram control unit in the section Control unit (Page 28))

Under the following conditions the controller switches automatically to local operation for safety reasons:

- Service button S402 (Open), S403 (Close) or S401 (Learn run) pressed
- An external door command is active via the Service interface (X8, Connector for Service Tool and USB adapter)
- The local commissioning terminal module (H1, terminal module with S1 to S4, control keys for terminal module) is in a safety-oriented state through the use of the control keys

Note

Protected area

Some areas of the navigation are classified as safety-oriented. These include, amongst others, all those areas that deal with the processing of the driving curve parameters. Local operation is not terminated until the protected area is exited and the master role by the PLC is requested again.

5.2.19 Door command discrepancy "Open"

The command device monitors the command issuance at the door command Open (local DCMD). If the door command remote DCMD = "Open" is not active in addition to the door command local DCMD = "Open" within the time that can be configured via the parameter p1211, a door command discrepancy is recognized. This discrepancy is signaled with the "Command discrepancy" bit in the status word ZSW1 (Bit 10) of the process data.

A remote DCMD is only valid in the status "S4: OPERATING" of the control unit. This fact results in the following conditions for a door command discrepancy:

- Control unit in the status "S4: OPERATING"
- Door command local DCMD = "Open"

Configuration

The door command discrepancy "Open" has a tripping delay time that can be configured via the parameter p1211. Monitoring can be deactivated by setting the delay time to p1211=0.

Response

If a door command discrepancy was recognized, the door closes automatically under the following conditions:

- Inactive disable
- Inactive emergency unlocking mechanism
- Inactive learn run
- Control unit in the status "S4: OPERATING"
- Local DCMD = "Open"
- Remote DCMD = "Close" or "No door command / Deenergized"
- Door is not in the Closed position

5.2.20 Idle torque

The idle torque serves mainly to avoid unwanted door movements.

The command device changes automatically to a idle torque against the corresponding end position of the door in the opening or closing direction when the door command Open or Close is active and the door is in the corresponding end position.

The idle torque for the end position in the opening direction can be configured by using the parameter p3679 and the idle torque for the end position in the closing direction by using the parameter p3680.

5.2.21 Oscillation protection

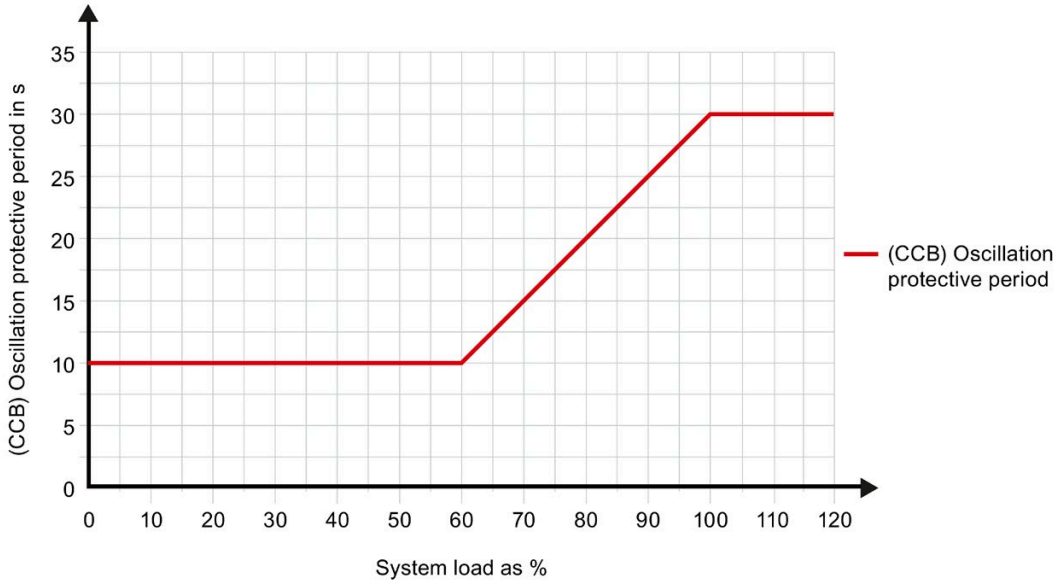
The oscillation protection prevents a permanent end stop oscillation of the door.

End position "open"

If the system is pressed approx. two centimeters out of the end position while an Open drive order is active, the controller recognizes that the Opened position has been left and tries to move back to the end stop with the set static opening force (p3682 "Static force limit open"). After the end stop has been reached, the set idle torque (p3679 "Idle torque (power) OPEN") is applied to the drive. The behavior described may be repeated five times (oscillation). After the fifth repetition, the oscillation is interrupted by an idle time. During this time the set idle torque (p3679 "Idle torque (power) OPEN") is effective. After expiry of the idle time, the system responds to corresponding oscillations again. The duration of the idle time lies between 10 s and 30 s and depends directly on the system load, see Overload protection and system load (Page 56).

End position "closed"

If the system is pressed 50 mm out of the end position while a Close drive order is active, the controller recognizes that the Closed position has been left and tries to move back to the end stop with the set static cam force (p3684 "Limit force end static close"). After the end stop has been reached, the set peak torque close (p3681 "Peak torque close") is applied to the drive. After 2 s the Peak torque close is limited to the set idle torque p3680 "Idle torque (power) CLOSE". The behavior described may be repeated five times (oscillation). After the fifth repetition, the oscillation is interrupted by an idle time. During this time the set idle torque is effective (p3680 "Idle torque (power) CLOSE"). After expiry of the idle time, the system responds to corresponding oscillations again. The duration of the idle time lies between 10 s and 30 s and depends directly on the system load, see Overload protection and system load (Page 56).



5.3 Safety concept

The SIDOOR controller ATE530S/ATE531S has an extensive safety package. The safety functions fulfill the requirements to EN 62061 for use up to and including SIL 2 (Safety Integrity Level) as well as to DIN EN ISO 13849-1 Cat 2 PL d (Performance Level). This allows the main requirements for functional safety to be implemented simply and economically.

The scope of the safety functions includes:

- Safe stopping process
- Safe force output
- Safe speed observance
- Safe monitoring of the rotor position
- Safe reading in of digital control signals

The safety concept of the controller is integrated into the diagnostics and error management system. Through it the error signaling, error prioritization as well as error response are, amongst others, defined clearly.

5.3.1 System validation - self-tests

Execution of the mentioned safety-oriented functions is only possible if the controller carries out automatic self-tests in order to recognize possible execution malfunctions, reveal them and respond accordingly. In accordance with EN 62061 "Safety Integrity Level 2" is applied in the present case. The following cyclic self-tests are carried out automatically by the SIDOOR system:

- RAM function test
- System memory is checked on CRC basis for consistency
- Command set check of the CPU
- Interrupt vector table test
- Parameter memory monitoring on the basis of double checksum
- Program execution monitoring - software watchdog

In addition to the software watchdog the general operation of the system is monitored by a hardware watchdog.

5.3.2 Safe force output

The maximum forces configured by the user must always be observed for safety reasons. The safe force output of the SIDOOR systems ensures that the torque output by the motor does not increase in case of an error. Unintentional increases in the torque are recognized and result in a defined error response.

The emitted force is proportional to the motor current at the EC motors (permanent-magnet synchronous motor). The force at the front edge of the door is generated by means of a belt wheel of the motor axis.

The functionality of the safety-oriented current measuring units is tested automatically before each move. During the travel, each of the three phase currents is measured individually and the current sum monitored. Due to the measurement of all 3 phase currents a redundancy results that allows fault detection.

In addition the following error influences on the torque development are considered functionally by the SIDOOR system:

- Change in the number of pole pairs of the motor
- Change in the concatenated rotor flow
- Changes in the inductances
- Changes in the currents
- Error in the rotor position

Additional information about the setpoint force and force monitoring is available in the section on force and energy limitation.

5.3.3 Safe rotor position

Fail-safe determination of the rotor position forms the required basis to determine the output motor torque and thus for safe force output. Exact determination of the rotor position is ensured by the SIDOOR system through the following monitoring function:

- Comparison of the real rotational speed with a rotational speed calculated using the fundamental wave model of the EC motor
- Regular exchange of synchronization telegrams with the rotary encoder
- Algorithm that ensures frequent status transitions on the rotary encoder interface

In case of a short-circuit or interruption the line monitoring recognizes a malfunction, signals an error and induces an emergency stop (short-circuit identification 30 ms).

5.3.4 Safe speed observance

The fact that the EC motors used are permanent-magnet synchronous motors has the systemic advantage that the rotor always synchronizes automatically to the rotary field in the stator since the optimal torque can only be generated through the correct position between the two of them. This means that the speed and position are always coupled fixed. Thanks to the fixed coupling of speed and position errors in the speed signal can only occur if deviations in the time measurement occur.

Therefore the time basis of the SIDOOR controller is always designed redundant. In addition to the quartz-generated clock frequency of the processor a second independent quartz oscillator is used for error discovery. The rotational speed signal of the encoders is furthermore monitored functionally by a mathematical model of the EC motor. This allows angle and rotational speed errors to be recognized as well.

In order to recognize systemic interconnection loops and respond correspondingly to them, the SIDOOR system uses the motor signals to calculate a mathematical model that dynamically supplies a lower and an upper speed limit. The real speed must lie within this calculated speed range. Changes to the motor parameters / components and in particular to the rotor position result in corresponding deviations of the mathematical model and are thus discovered.

Additional information about the setpoint speed and speed monitoring is available in the section on force and energy limitation.

5.3.5 Safe stopping process

The SIDOOR system disposes of a cyclically tested and monitored second switch-off function in order to switch the motor output stage to high impedance (in this case the drive is freewheeling). This means that safety-oriented switching off of the motor is ensured. To this purpose the following two combined protective mechanisms is used:

- **TTL**
  Each command to the internal motor controller has a TTL value assigned to it (TTL: Time To Live) and must therefore be renewed by the application regularly. If this is not done, an Alive signal is no longer output.
- **Alive signal**
  If the Alive signal is absent, the SIDOOR hardware logic automatically switches the motor output stage to high impedance → second switch-off function.

Error-free functioning of the Alive signal is tested automatically by the SIDOOR system before every travel.

In accordance with EN ISO 13850:2008 or EN 60204-1 the system fulfills the stop category 0 (uncontrolled stop through immediate switching off of the energy to the motor).

5.3.6 Emergency stop

The emergency stop is a special brake function that is used to brake the drive reliably time-controlled even when a sensor (current, voltage or rotor position sensor) fails. In the process the energy of the system is reduced within a defined time via the back EMF of the motor. To this purpose a correspondingly rising PWM signal (short-circuit) is generated via the motor phases.

5.3.7 Obstruction recognition

The obstruction recognition of the SIDOOR system consists of a force and a stop obstruction recognition. Both processes are based mainly on the evaluation of the actual speed signal, see the section Obstruction recognition and behavior (Page 48). Correspondingly the recognition of an obstruction by means of the specified methods is a function derivation of the safety functions "Safe force output", "Safe speed observance" and "Safe monitoring of the rotor position".

5.3.8 Safe reading in of digital control signals

The SIDOOR control unit dispose of 5 digital inputs. Separate reference potentials can be specified respectively for Input 2, 3, 4 as well as for Input 1 and Input 0 via the external circuit. The input signals have internal pull-ups and there are no components capable of oscillation between the input terminals and the CPU.

The SIDOOR system makes 2 variants available for realizing fail-safe inputs. This ensures that safety-related signals can be transferred to the SIDOOR controller:

- Redundant antivalent signal logic
- Frequency-based signal logic

These special types of signal management allow, in accordance with Pld (DIN EN ISO 13849-1 Cat 2) and SIL 2 (EN 62061) in combination with the FBLOCK logic, safe stopping of the motor (emergency stop of the stop category 0 in accordance with EN ISO 13850:2008) and offer high availability as well as error discovery.

The safety concept for digital signal maintenance is realized via the FBLOCK system. The configurable FBLOCK logic provides a flexible matrix for logic operations between input signals and drive orders. The logic operation data of the FBLOCK logic are stored in the retentive parameter memory of the SIDOOR system. The consistency of this memory is checked cyclically using double checksums and thus ensured.

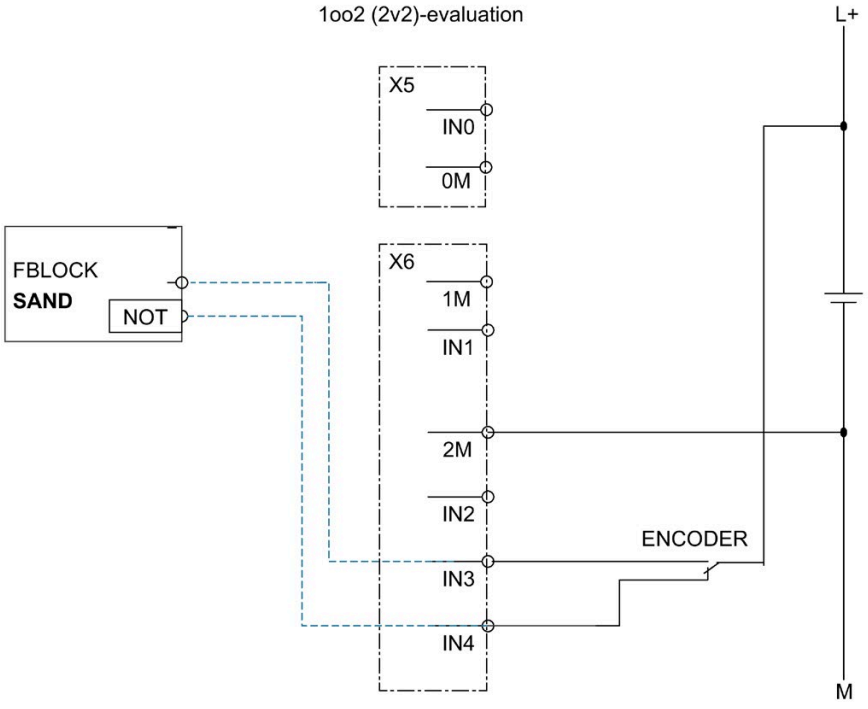
Limitation

The FBLOCK system only offers limited protection again configuration errors caused by the user (observance of all the limits defined in the system is ensured).

Redundant antivalent signal logic

At a 1oo2 evaluation the encoder is laid on two different channels that are mutually antivalent and is therefore evaluated twice by the controller. The discrepancy analysis between the two channels of the 1oo2 evaluation is carried out by the SIDOOR system.

The following figures show as an example a two channel antivalent wiring of an encoder (antivalent).



The internal evaluation unit "SAND" FBLOCK prevents unintended restarting in accordance with ISO 13850, for example after deactivation of the system or a change in the operating mode.

Frequency-based signal logic

In addition to a 1oo2 evaluation with antivalent channels a frequency-based system can be used for realizing fail-safe inputs. To this purpose frequency analysis blocks are available via the FBLOCK system that can be linked with any input, see the section FBLOCK - free function blocks (Page 68).

5.3.9 Safety function characteristics

Duration of use for the SIDOOR control unit:

- (Mission Time) 20 years

Minimum test interval of the antivalent safe digital input signal:

- T1 (ERM function) 20 years
- T1 (ENABLE function) 24 hours

PFH_D (Probability of dangerous Failure per Hour PFH_D):

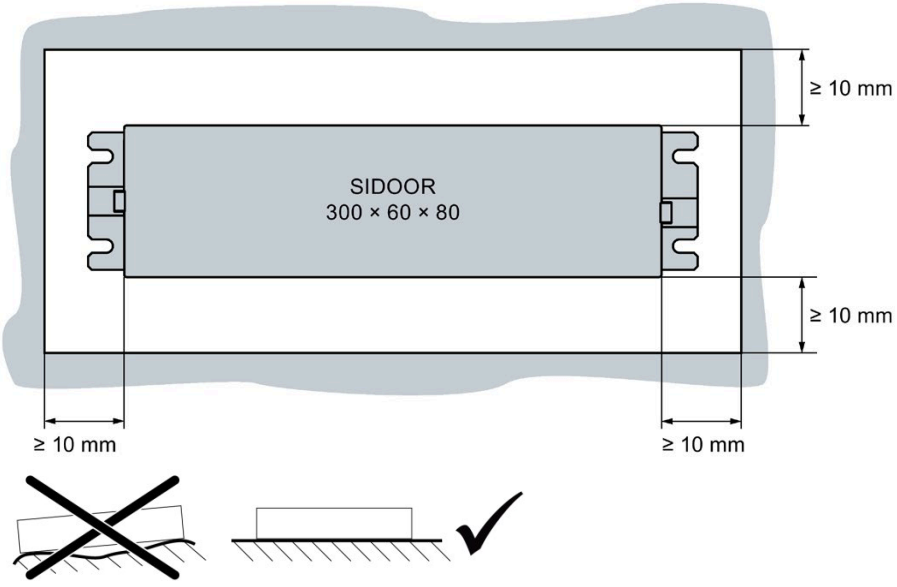
- Safe standstill (Safe Torque Off, hardwired ERM and ENABLE function):
  PFH_D **<2*10-**$^{-7}$
- Force limitation:
  PFH_D **< 2.5*10**$^{-7}$
- Speed / Energy limitation:
  PFH_D **< 2*10**$^{-7}$

5.4 Installation

Requirements

The installation site must fulfill the following requirements:

- Minimum distance to surrounding parts 1 cm
- Even mounting surface
- Maximum distance from the power supply on account of the cable length:
  - SIDOOR TRANSFORMER
- Maximum distance from the motor on account of the cable length:
  - SIDOOR MED280: 1.5 m

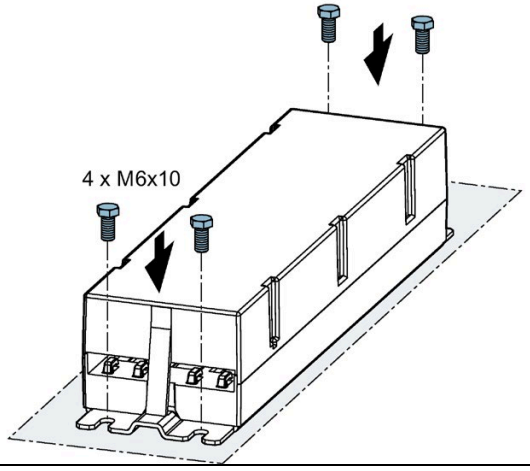


Installation

Proceed as follows to install the controller:

Note

Screw the SIDOOR ATE531S control unit thermally conductive to a metal mounting surface or use top-hat rail mounting. Otherwise the maximum permissible operating temperature lies at 40 °C.

Steps		Figure
1.	Drill the holes for the screws as shown in the dimension drawing.	
2.	Screw the controller tight with 4 screws (M6x10).	

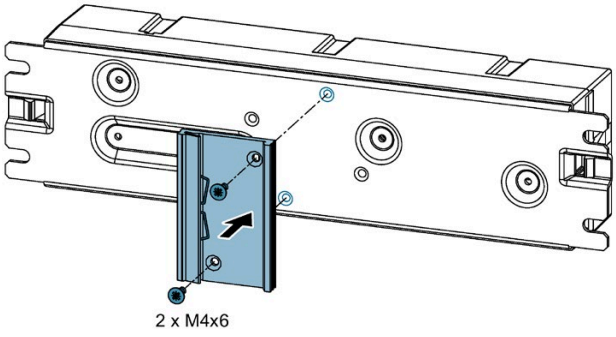
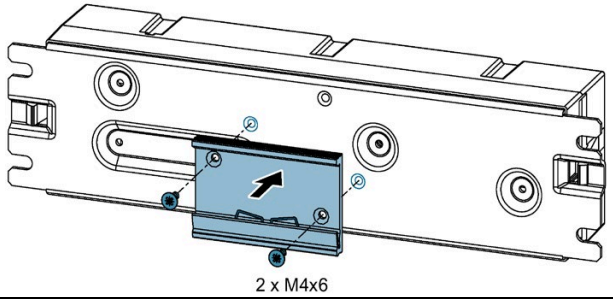
Installation on standard mounting rail

In order to install the SIDOOR controller on a standard mounting rail you require the SIDOOR standard rail mounting.

The SIDOOR standard rail mounting can be installed by two different methods to the controller. This means that both vertical and horizontal installation of the controller on a standard mounting rail is possible.

NOTICE
Material damage The maximum screw-in depth for the screws used to fasten the SIDOOR standard rail mounting fastening to the controller amounts to 2.5 mm. The use of longer screws can result in damage to the controller. Therefore use solely the supplied fastening screws to install the SIDOOR standard rail mounting.

Proceed as follows to install the standard rail mounting:

Steps		**Figure**
1.	Select the direction (vertical, horizontal) for the installation of the controller on the standard mounting rail.	**Vertical**  **Horizontal** 
2.	Screw the SIDOOR standard rail mounting to the controller with 2 screws (M4x6). Use the pre-drilled holes on the controller.	

5.5 Connecting terminals and interfaces

5.5.1 Wiring instructions

Table 5- 18 Properties of slots and interfaces

Slot	Name	Maximum cable length	Type
X3	Power supply	< 30 m	Not shielded, supply
X4	24 V voltage output	< 30 m	Not shielded, supply
X5	Digital input	< 30 m	Not shielded, asymmetric data cable
X6	Digital inputs	> 30 m	Not shielded, asymmetric data cable
X8	Service interface	< 2 m	Shielded, symmetric and asymmetric data cable
X100	Digital outputs	> 30 m	Not shielded, asymmetric data cable
X1000	PROFINET interface	< 100 m	Shielded, symmetric data cable

Table 5- 19 Properties of slots and interfaces

Slot	X3	X4	X5	X6	X100	X1000 Port1, 2
Connector	WAGO 721-103/026-045	PHOENIX 1792757	PHOENIX 1792249	PHOENIX 1792799	PHOENIX 1803594	SIEMENS GK1901-1BB11-2AB0
	SZS 0.6x3.5	SZS 0.6x3.5	SZS 0.6x3.5	SZS 0.6x3.5	SZS 0.4x2.5	SIEMENS 6GK1901-1GA00
	1x1.5 - 2.5mm²	1x0.2 - 2.5mm²	1x0.2 - 2.5mm²	1x0.2 - 2.5mm²	1x0.14 - 1.5mm²	SIEMENS 6XV1878-2A
	1x1.5 - 2.5mm²	1x0.2 - 2.5mm²	1x0.2 - 2.5mm²	1x0.2 - 2.5mm²	1x0.14 - 1.5mm²	
AWG	15 - 12	30 - 12	30 - 12	30 - 12	30 - 14	-
Nm	–	0.5 - 0.6	0.5 - 0.6	0.5 - 0.6	0.22 - 0.25	-
	8 - 9 mm	7 mm	7 mm	7 mm	7 mm	-
	L < 30 m	L < 30 m	L < 30 m	-	-	L < 100 m

5.5.2 Digital input signals

Slot X5/X6

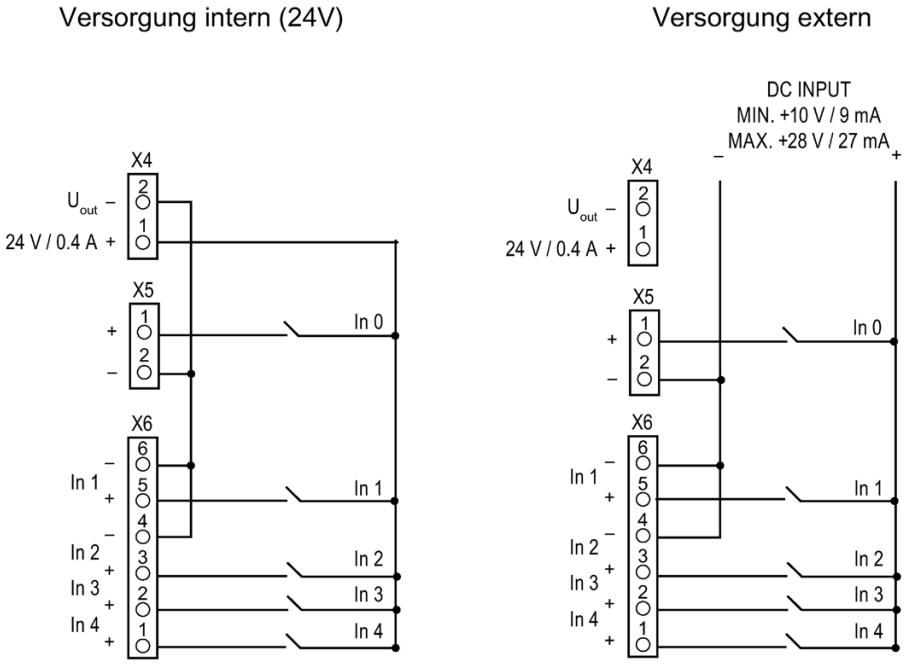
5 digital inputs are located at the slots X5 and X6. These are configured via the FBLOCK system (free function blocks). This allows individual logic operations to be realized, as well as drive and special functions to be addressed. The following table describes the factory functional assignment of the digital inputs:

Table 5- 20 Overview of input signals at the slot X5/X6

Slot	Input	FBLOCK operation factory setting
X5	Input 0 / DIN0	ERM (FBLOCK - emergency unlocking mechanism)
X6	Input 1 / DIN1	/ERM (FBLOCK - emergency unlocking mechanism)
	Input 2 / DIN2	OPEN (FBLOCK – Open / Close)
	Input 3 / DIN3	/ENABLE (FBLOCK – disable)
	Input 4 / DIN4	/ENABLE (FBLOCK – disable)

Terminal circuit diagrams for digital input signals

X4 may not be applied to an external voltage potential.



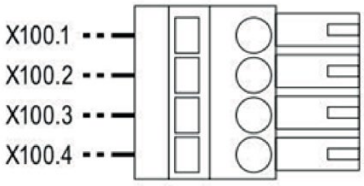
5.5.3 Digital output signals

Slot X100

There are 2 relay outputs at the slot X100. These are configured via the FBLOCK system (free function blocks). Various status signals of the controller can be output depending on the application. The following table describes the factory functional assignment of the digital outputs:

Table 5- 21 Overview of output signals at the slot X100

Slot	Output	FBLOCK operation factory setting	
X100.1 X100.2	Output 1 / DQ1	UNLOCK1	See sectionUnlocking (Page 32).
X100.3 X100.4	Output 0 / DQ0	UNLOCK0	



5.5.4 Voltage output

Note

The 24 V output (X4) is a control voltage for supplying the control inputs.

Use shielded leads with shield applied at customer when the output is used within the door system in the sense of DIN EN 12015:2014 supply output in accordance with Section 6.3 and the cable length exceeds 2 m.

Note

Do not connect this output to other supply networks. Do not ground the supply output.

Slot X4	Function
DC OUTPUT	24 V ±10 %, max. 400 mA

5.5.5 Motor plug

Conductor allocation of the motor plug

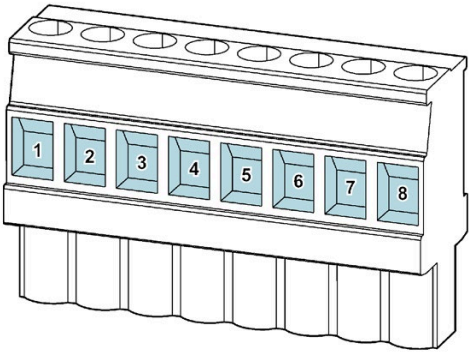


Figure 5-7 Conductor allocation of the motor plug

Table 5- 22 Motor plug (slot X7)

Terminal	Signal	Description	Cable color
1	VCC (+5 V)	Supply voltage for encoder	White, No. 1
2	CH A	Channel A	White, No. 2
3	CH B	Channel B	White, No. 3
4	GND	Ground 5 V voltage supply	White, No. 4
5	MOT_W	Phase W	Black, No. 5
6	FE	Functional grounding	Black, No. 6
7	MOT_V	Phase V	Black, No. 7
8	MOT_U	Phase U	Black, No. 8

An overview of the slots at the controller is available in the section Description (Page 26).

5.5.5.1 PROFINET connector

X1000 Port 1 (MDI-X) / Port 2 (MDI)

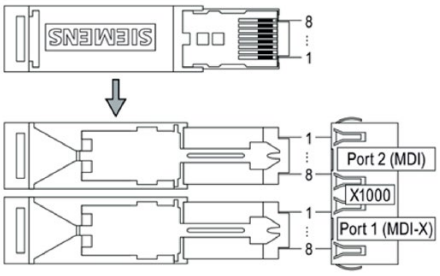


Table 5- 23 PROFINET connector (slot X1000)

1	TXP	O	Ethernet Transmit differential signal
2	TXN	O	
3	RXP	I	Ethernet Receive differential signal
4	TERM	Termination	
5	TERM		
6	RXN	I	Ethernet Receive differential signal
7	TERM	Termination	
8	TERM		

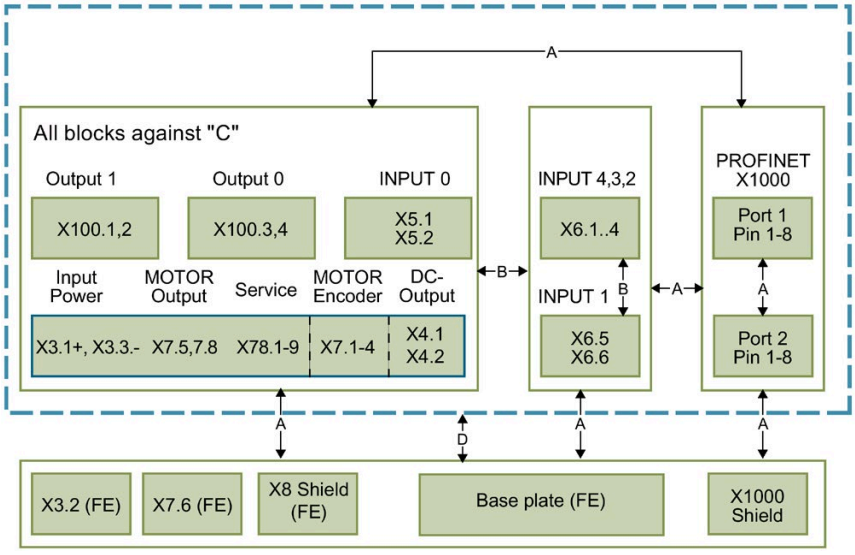
5.5.5.2 Insulation test

The type tests are carried out on prototype devices **at the manufacturer** in accordance with EN 61010 for 60 s. A further test may not be carried out with these voltages in the field!

Proof tests may be carried out by means of a suitable test generator with slow (< 250 V/s) rising an falling voltage ramps in the application. **All the poles** of the potential groups are to be connected with each other before the tests to avoid damage to the components.

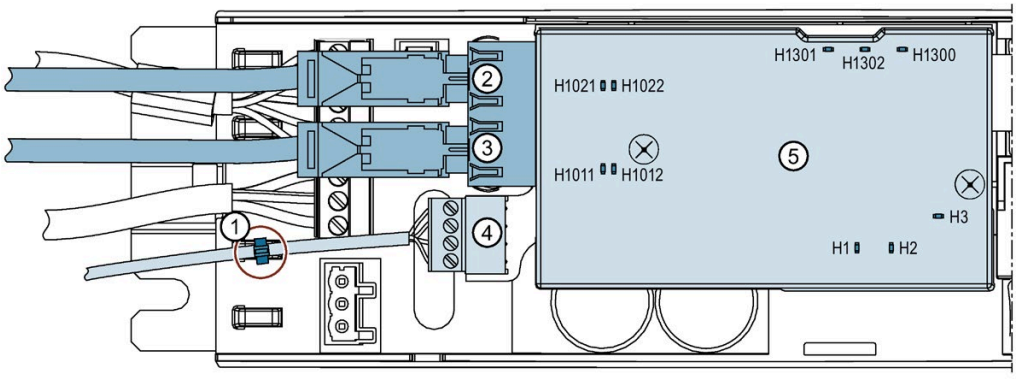
Table 5- 24 Insulation test

Test voltage	A	B	C
Type test 1 min	1500 VAC / 2260 VDC	1000 VAC / 1520 VDC	500 VAC / 780 VDC
Proof test	Max. 500 VDC, for 5 s	Max. 500 VDC, for 5 s	Max. 500 VDC, for 5 s
Insulation resistance at 500 VDC	>20 MOhm	>20 MOhm	>20 MOhm



5.6 PROFINET module

5.6.1 Overview



① Cable ties
② X1000 - Port 2
③ X1000 - Port 1
④ X100
⑤ Protective cover

The "ERTEC200P" type ASIC is used for the PROFINET connection Ethernet is used as the transfer technology. The SIDOOR ATE530S COATED/ATE531S controller supports the conformance class C (CC-C).

All further SIDOOR PROFINET IO device functionalities of the SIDOOR ATE530S COATED/ATE531S controller are described in the GSD file.

Task

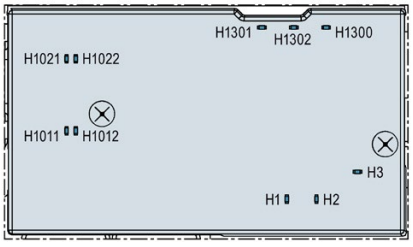
With the PROFINET module it is possible to connect the SIDOOR ATE530S COATED/ATE531S controller to a PROFINET fieldbus.

Interface

Communication between the basic module of the SIDOOR control unit and the PROFINET module takes place on an internal bus.

5.6.2 LED signals

The following five status LEDs are available on the PROFINET module:

LED	Color	Description	Position
H1	Green	**Digital output DQ0 (signal X200.11)** Linked via FBLOCK logic. The LED H1 is activated when the output DQ0 is active.	
H2	Green	**Digital output DQ1 (signal X200.9)** Linked via FBLOCK logic. The LED H2 is activated when the output DQ1 is active.	
H3	Green	**Incoming valid telegram (signal X200.12)** The LED H3 flashes during active communication on the SIDOOR internal bus.	
H1011	Green	Port1: LINK	
H1012	Orange	Port1: ACT	
H1021	Green	Port2: LINK	
H1022	Orange	Port2: ACT	
H1300	Green	Power ON	
H1301	Red	**"Bus error" PROFINET communication disrupted** The LED H1301 flashes at disrupted PROFINET communication, see Bus error (Page 110).	
H1302	Red	**"Group error" internal SIDOOR communications disrupted** The LED H1302 flashes at disrupted PROFINET communication, see Group error (Page 110).	

5.6.3 Network structure / topologies

The SIDOOR PROFINET IO device supports the star, line, tree and ring structure network topologies.

The PROFINET IO device has an integrated switch for the linear and ring structure. The redundancy process MRP is used for the ring structure. In this case the IO device is an MRP client and cannot be used as a redundancy manager (MRP manager). This has to be provided separately in the network structure.

5.6.4 GSD file

The characteristic communication features of the SIDOOR PROFINET IO device are specified in the form of an electronic device data sheet (device master data file, GSD file). The GSD file has been certified by the ComDeC test center for PROFINET field devices to DIN EN 61158 and IEC 61784.

In order to ensure compatibility with older engineering tools the GSD file is provided in different GSDML scheme versions:

Table 5- 25 GSD files

Scheme	GSD file
2.31	GSDML-V2.31-Siemens-SIDOOR-ATE530S-20150121.xml
2.3	GSDML-V2.3-Siemens-SIDOOR-ATE530S-20150121.xml
2.25	GSDML-V2.25-Siemens-SIDOOR-ATE530S-20150121.xml

The GSD files have the same scope of function with regard to the ATE530S COATED/ATE531S controller.

5.6.5 Assigning a device name

PROFINET uses a device name in addition to the MAC address and the IP address in order to identify the PROFINET devices. This device name must be unique within the PROFINET network.

During commissioning a device name is assigned to each PROFINET device by means of the ES (so-called node naming).

In the process the device name is written into the IO device via an IO Supervisor by using the DCP (Discovery and Configuration Protocol). The device name is stored retentively in the SIDOOR PROFINET IO device.

When a device is replaced, this process has to be repeated for the replacement device. Since the name is assigned with the standardized DCCP, this can be carried out with any tool (for example SIMATIC Manager or TIA Portal).

Topology-based naming

In addition the device name can be assigned by the IO Controller on the basis of the topology. Prerequisite is that the topology is structured as planned and that all the devices involved fulfill at least Class B (supporting of LLDP and SNMP). In addition the new device has to have the factory settings (IP address = 0.0.0.0 and device name = "").

5.6.6 Assigning an IP address

In order to establish an application relationship each PROFINET device must have an IP address. To ensure that the online access is carried to the right device, we recommend that an IP address be assigned to each PROFINET device at the beginning of commissioning. During the configuration of the PROFINET IO system an IP address is assigned to both the IO Controller and the IO Device through the configuration tool. The IO Controller has an IP assignment list assigned to it via the system configuration. The IP address is assigned to the IO Devices during the initialization of the application relationship.

The SIDOOR PROFINET IO device offers the possibility of having the IP address assigned by the IO controller. This function is activated by default at many design tools. Of course a PROFINET connection has to exist between the IO Device and the IO Controller to this purpose and the device name of the IO Device has to agree with the designed device name. If this function is used, a communication connection has to be established to the IO Controller so that an IP address can be assigned to the IO Device and so that TCP services (for example firmware update) are available.

When the device is used for the first time, it has the preconfigured IP address **192.168.0.1** (subnet 255.255.255.0).

Note

During a reset to factory settings the preconfigured IP address is deleted and is replaced by 0.0.0.0. If the IP address is assigned by the IO Controller in accordance with the system configuration, the retentive IP address is deleted in accordance with the PROFINET standard and is replaced by 0.0.0.0.

5.6.7 Identification flashing

Identification is effected through a flash test. The flash test can be initiated by the design tool. In this case the two LINK LEDs H1011 (Port1) and H1021 (Port2) flashes synchronously with a frequency of 2 Hz.

5.6.8 Resetting to factory settings

The "Reset to factory settings" function deletes the previously assigned settings and restores the default values.

- IP address: 0.0.0.0
- Device name: (empty)

In addition, the I&M 1 to 4 data are deleted during resetting to the factory settings.

5.6.9 MAC addresses

The SIDOOR PROFINET IO device uses a total of three MAC addresses. The IO Device itself has a MAC address and the two ports (Port1, Port2) each have an incremented MAC address. See the following example:

IO Device: 00-1B-1B-65-AC-61
Port1: 00-1B-1B-65-AC-62
Port2: 00-1B-1B-65-AC-63

5.6.10 Supported PROFINET functionalities

The SIDOOR PROFINET IO device supports the following functionality of conformance classes A, B and C (CC-A, CC-B, CC-C).

- Cyclic data exchange (RT)
- Acyclic parameter data (read / write record)
- Device diagnostics, alarms (alarm handling)
- Device identification (I&M 0)
- Extended device identification (I&M 1 to 4)
- Topology information (LLDP)
- Network diagnostics (SNMP)
- Port-specific statistics (PDEV)
- Automatic addressing (DCP)
- Media redundancy (MRP)
- Isochronous data exchange (IRT)

Cyclic data exchange

The contents of the cyclic data traffic encompasses those data that the central unit sends to the I/O devices so that they can be output at the outputs as well as those data e that an I/O device reads in at its inputs and sends to the central unit for processing. Data exchange without isochronous mode is called RT. The RT telegrams are transferred directly via Ethernet.

Acyclic parameter data

Acyclic data traffic is the sending of parameter assignment and configuration data during the start to the IO Device or the sending of a diagnostic message from the IO Device to the central unit during operation. The acyclic data use UDP/IP.

Device diagnostics, alarms

Alarms are special acyclic messages that are transferred as required from the IO Device to the Controller. These are time-critical and are therefore transferred directly via Ethernet like cyclic data. In contrast to cyclic data, however, these have to be confirmed by the receiver.

Besides generating standard alarms, the SIDOOR door control unit generates a diagnostic alarm (based on the GSD definition) in the event of disruptions on the internal SIDOOR bus.

I&M 0 and I&M 1 to 4

Device parameters can be read and written for device identification purposes.

The data record for the unique identification of the IO Device is the Identification and Maintenance data record 0 (I&M 0 - device identification). This data record can only be **read** .

The standardized data records I&M 1 to 4 are provided for the extended device identification. These can be **read** and **written** (to DAP).

The I&M data records consist of the parameters:

Table 5- 26 I&M 0 and I&M 1 to 4 data

I&M data record	Field (standardized)	Access authorization
I&M 0	MANUFACTURER_ID ORDER_ID SERIAL_NUMBER HARDWARE_REVISION SOFTWARE_REVISION REV_COUNTER PROFILE_ID PROFILE_SPECIFIC_TYPE IM_VERSION IM_SUPPORTED	Read
I&M 1	TAG_FUNCTION TAG_LOCATION	Read and write (to DAP)
I&M 2	INSTALLATION_DATE	
I&M 3	DESCRIPTOR	
I&M 4	SIGNATURE	

Topology information

The Link Layer Discovery Protocol (LLDP) is used for neighbor recognition and thus to determine the topology information. The status of the individual connections can be read out at any time.

Network diagnostics

The Simple Network Management Protocol (SNMP) is used to support the network diagnostics. The SIDOOR PROFINET IO device supports MIB-II for TCP/IP in accordance with RFC1213.

Port-specific statistics

The topology representation data are stored in the physical device of the SIDOOR PROFINET IO device. The data of the PDEV are addressed as of subslot 0x8000. From a communication perspective, the SIDOOR PROFINET IO device always consists of the interface and the ports 1 and 2.

The PDEV is represented by the following submodules of the Device Access Point (DAP):

- Submodule 0x8000 → Interface
- Submodule 0x8001 → Port1
- Submodule 0x8002 → Port2

Automatic addressing

The Discovery and basic Configuration Protocol (DCP) is used mandatorily for the automatic assignment of the IP addresses.

Media redundancy

The media redundancy at ring topologies in PROFINET is managed via the Media Redundancy Protocol (MRP). The SIDOOR IO device assumes the role of an MRP client. The MRP Manager function is not supported.

Isochronous data exchange

The SIDOOR PROFINET IO device also supports the IRT protocol and thus class C functionality (CC-C). Isochronous data exchange up to 250 µs is thus supported. The SIDOOR PROFINET IO device forwards all data isochronously. The application program on the SIDOOR door control unit does not operate isochronously.

5.6.11 Parameterization/startup record

When setting up a connection, the startup parameter record (Record 1) is sent from the IO controller to the SIDOOR door control unit as specified in the GSD file (see the table GSD files (Page 102)). Only the **cycle time** parameter is visible in the configuration tool.

The following section describes the structure of the 8-byte-sized startup parameter record 1 as information:

Table 5- 27 Startup parameter record byte 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Data exchange and baud rate parameter
							X	**Data communication** Data communication on the internal bus is deactivated if this bit is set to 0. Default = 1 (activated)
			X	X	X	X		**Baud rate** The baud rate is set with Bits 1 to 4. The following coding results: 9600 = 0000 19200 = 0001 38400 = 0010 57600 = 0011 115200 = 0100 187500 = 0101 250000 = 0110 300000 = 0111 375000 = 1000 500000 = 1001 750000 = 1010 Default = 11520
0	0	0						Reserved

Table 5- 28 Startup parameter record byte 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Slave address parameter
			X	X	X	X	X	**Slave address** The slave address on the internal bus is set via bits 0 to 4. The address range is from 0 to 31. Default = address 0
0	0	0						Reserved

Table 5- 29 Startup parameter record byte 3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Telegram type parameter
			X	X	X	X	X	**Telegram type** The telegram type on the internal bus is set via bits 0 to 2. The following coding results: Default telegram = 0000_b Mirror telegram = 0001_b Broadcast = 0010_b Special telegram = 0011_b Default = default telegram
0	0	0						Reserved

Table 5- 30 Startup parameter record bytes 4 and 5

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Cycle time parameter
0 to 234 (0x00 to 0xEA)								**Cycle time (high byte)**
0 to 96 (0x00 to 0x60)								**Cycle time (low byte)** The cycle time is given in [ms]. The time range is between 10 and 60000 ms. The cycle time specifies at what minimum intervals communication takes place on the internal bus. The default is 100 ms = 0064_{hex}

Table 5- 31 Startup parameter record bytes 6, 7 and 8

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Parameter
0	0	0	0	0	0	0	0	Reserved

5.6.12 Configuration

The configuration data result from the GSD file (see the table GSD files (Page 102)).

The structure expected by the PROFINET module is described below (for informational purposes only):

Table 5- 32 PROFINET configuration data

Slot	Api	Subslot	Module ID	Submodule ID	Description
0	0	0001hex	1	1	DAP (ATE530S COATED/ATE531S)
0	0	8000hex	1	2	Interface
0	0	8001hex	1	3	Port 1
0	0	8002hex	1	3	Port 2
1	0	0001hex	28hex	1	22 bytes IO (4 words of PKW and 7 words of PZD are mapped)

5.6.13 Diagnostics

The internal communication bus between the SIDOOR controller and the communication module is monitored by the master driver of the communication module (PROFINET module). A PROFINET diagnostic alarm is triggered if communication is interrupted or quality becomes too poor. This diagnostic alarm is then present for at least 5 seconds and is structured as follows:

Table 5- 33 Properties of diagnostic alarm

Property of diagnostic alarm	Value										
Slot	1										
Subslot	1										
Channel	1										
Error ID	1Bhex										
Extended channel error type	1										
Extended channel error value	**Bit**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
	Telegram length (LGE) false											X
	Remaining runtime exceeded										X	
	Block check character (BCC) false									X		
	Telegram start (STX) false								X			
	Telegram type unknown (ADR)							X				
	Slave address false						X					
	Memory overflow					X						
	Parity error				X							
	Internal error			X								
	Answer delay time exceeded		X									
	Telegram type not identical	X										
	Bits 15 to 11 are reserved.											
Maintenance	No											

5.6.14 Device roles and provider-consumer model

IO Controller

A PROFINET IO controller has control over the field devices. The process data and alarms arrive in the IO controller and are processed in the user program. In an automation system, an IO controller is normally a programmable logic controller (PLC). The communication channels are established by the IO controller during system startup.

IO supervisor

A PROFINET IO supervisor is an engineering station in a system, for example, that can have temporary access to the field devices for commissioning purposes.

IO device

The PROFINET IO device is a process-oriented field device that is connected in a distributed fashion. It expects the configuration from an IO controller/supervisor and cyclically transfers its process data to the IO controller.

Provider-consumer model

During data exchange, PROFINET IO operates according to the provider/consumer model. The provider provides the data and the consumer processes it. The SIDOOR controller is an IO Device. If the output data of the IO Controller are invalid (output data provider status "bad"), for example if the user program in the IO Controller is stopped, the communication on the SIDOOR internal bus is stopped. This allows the corresponding response to be carried out by the master monitoring of the SIDOOR controller (see the section Master monitoring (Page 66)).

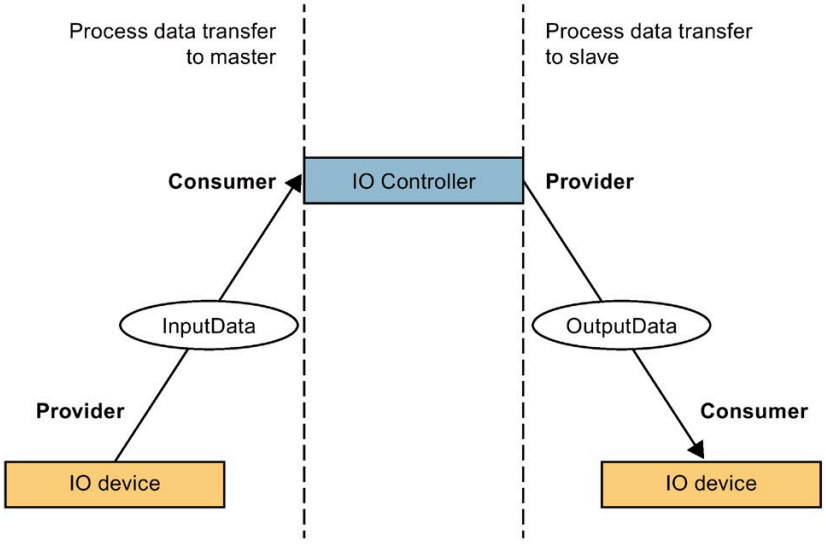


Figure 5-8 Provider-consumer model

5.6.15 Group error

The group error display (see LED signals (Page 101)) always flashes when the SIDOOR internal communication is interrupted, faulty or if valid PROFINET user data are not available.

Possible causes:

- Output data of the IO Controller invalid (in accordance with Provider-Consumer model), for example if the IO Controller / PLC is not in the "Run" operating state.
- Faulty or no PROFINET hardware configuration
- SIDOOR main controller in boot loader operation or system start
- Fieldbus parameters invalid, see Fieldbus parameters (Page 133)
- The PROFINET module was drawn virtually with the SIDOOR Manager

5.6.16 Bus error

The bus error display (see LED signals (Page 101)) always flashes when the Ethernet connection is disconnected or the PROFINET communication is invalid, failed, disturbed or faulty.

Possible causes:

- No Ethernet connection (check LINK LED and network cabling)
- Address conflict in the network (check IO Device name and / or IP address)
- Faulty or no PROFINET hardware configuration
- PLC or IO Controller failed / not accessible / disrupted

5.7 Operation and parameter assignment

The following interfaces are available in order to operate the controller:

- Fieldbus system
- Local service terminal
- Supplementary devices (SIDOOR SERVICE TOOL, SIDOOR SOFTWARE KIT)
- Service buttons

The following options are available to assign parameters to the controller:

- Fieldbus system
- Local service terminal
- Supplementary devices (SIDOOR SERVICE TOOL, SIDOOR SOFTWARE KIT)
- Minimal editor

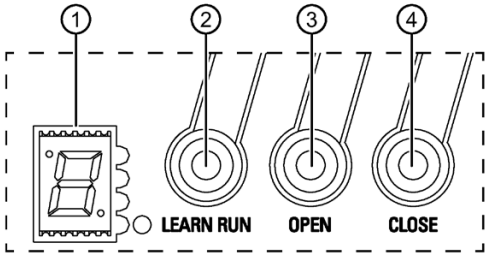
Note

Note the determined optimal parameter settings in the settings record (see the appendix Settings record (Page 237)). Have this record to hand when you call the Hotline.

Note

Parameter changes

The parameter changes should not be carried out during the learn run because parameter changes can only be accepted to a limited extent in this state.



① 7-segment display (H401)
② Learn run button (S401)
③ Service button OPEN (S402)
④ Service button CLOSE (S403)

Figure 5-9 Service elements

7-segment display "H401"

You can read the operating status on the 7-segment display "H401". The meanings of the 7-segment display are listed in the section Status display (Page 143).

5.7.1 Service buttons

Door command block

The door command block is used to block the functions of the service buttons (S401, S402 and S403) . This function is deactivated in the factory setting, meaning that the service buttons are not blocked.

The service buttons can be blocked and unblocked by using the parameter p90 and / or the service menu.

If a service button with activated door command block is pressed, the warning "Button blocked" is displayed in the service menu.

Learn run button

You can start a learn run with the learn run button (S401).

WARNING

Danger of injury during commissioning

Increased forces, speeds and energies arise in the closing and opening directions during the learn run.

Therefore, ensure that the door is secured with physical barriers prior to a learn run and during commissioning.

Note

Two types of learn run can be carried out. See the section Learn run (Page 45).

Note

Cancellation of the learn run

An active learn run is cancelled when the learn run button (S401), the service button OPEN (S402) or CLOSE (S403) is pressed.

After a cancelled learn run changing over to normal operation is only possible through a restart of the controller (disconnection of the power supply from the supply system) or a new completed learn run.

Learn run (when supply voltage is applied)

Table 5- 34 Starting a learn run when the supply voltage is applied

Procedure		Display H401
1.	Slide the door to the CLOSED position or use the service buttons OPEN (S402) / CLOSE (S403) to move to the CLOSED position.	
2.	Disconnect the power supply from the mains (230 V AC).	
3.	Press the learn run button (S401) and keep it pressed (up to 10 s).	
4.	Connect the power supply to the mains (230 V AC).	
5.	The learn run starts automatically and the learn run button can be released.	
6.	The learn run encompasses opening and closing the door approximately 10 cm at creep speed 1 to 2 times to determine the CLOSED position. Subsequently the door is opened and closed once at creep speed to determine the door width. Then the door opens and closes at a speed of up to 700 mm/s (complete travel) to determine the door mass.	
7.	In the CLOSED position the door parameters and the determined door width are stored. This means that the door width and mass are adapted and stored. In addition the default parameters for energy limitation, speed limitation and all other driving curve parameters are loaded.	
8.	Learn run completed. The door is in the CLOSED position.	

Learn run (during operation)

Table 5- 35 Starting a learn run during operation

Procedure		Display H401
1.	Slide the door to the CLOSED position or use the service buttons OPEN (S402) / CLOSE (S403) to move to the CLOSED position.	
2.	Press the learn run button (S401) and keep it pressed for 3 s.	
3.	The learn run starts automatically and the learn run button can be released.	
4.	The learn run encompasses opening and closing the door approximately 10 cm at creep speed 1 to 2 times to determine the CLOSED position. Subsequently the door is opened and closed once at creep speed to determine the door width. Then the door opens and closes at a speed of 700 mm/s (complete travel) to determine the door mass.	
5.	In the CLOSED position the door parameters and the determined door width are stored. This means that the door width, door mass, energy limitation and speed limitation are adapted and stored.	
6.	Learn run completed. The door is in the CLOSED position.	

Service buttons OPEN and CLOSE

The OPEN (S402) and CLOSE (S403) service buttons can be used for the following purposes:

- **Positioning the door before the learn run**

  If the status code "_" or "P" is shown on the 7-segment display (H401), the door can be positioned with the OPEN (S402) and CLOSE (S403) service buttons.

  Note

  Risk of injury during commissioning

  Prior to the learn run, the "closed" and "open" positions are unknown. For this reason, the direction of movement of the door resulting from pressing the OPEN (S402) or CLOSE (S403) service buttons is dependent on the way that the door and motor have been installed.

  Increased forces arise in the opening and closing directions when positioning the door using the OPEN (S402) and CLOSE (S403) service buttons, and before a learn run the 7-segment display (H401) shows the status code "_" or "P". You must therefore ensure that the door is safely cordoned off.

- **Cancelation of a learn run**

  If the status code "H" is shown on the 7-Segment display (H401), an active learn run can be canceled by pressing the OPEN (S402) or CLOSE (S403) service button.

  A learn run can also be canceled by pressing the learn run button (S401) again.

  Note

  After a cancelled learn run changing over to normal operation is only possible through a restart of the controller (disconnection of the power supply from the supply system) or a new completed learn run.

- **Using the minimal editor**

  See the section Using the minimal editor (Page 115).

- **Controlling the door**

  Door movements in the OPEN and CLOSE directions can also be made manually with the service buttons S402 (OPEN) and S403 (CLOSE).

  The service buttons OPEN and CLOSE have the highest command priority. Commands entered via the digital inputs, serial interfaces or menu control are overridden by the service buttons. Each of these service buttons has to be actuated until the door control unit has detected the respective end position of the door.

  If the OPEN and CLOSE buttons are pressed simultaneously or if the OPEN and CLOSE signals are applies simultaneously, the door always moves in the **CLOSE** direction.

  Note

  Operation with the SIDOOR SERVICE TOOL or the SIDOOR User Software

  The doors can also be controlled with the SIDOOR SERVICE TOOL or the SIDOOR User Software. In this case, the external input signals are disabled in some menus.

  Additional information is available in the section SIDOOR SERVICE TOOL (Page 233) and in the SIDOOR SOFTWARE KIT Operating Instructions (https://support.industry.siemens.com/cs/ww/en/view/92711247).

5.7.2 Minimal editor

Using the minimal editor

The SIDOOR control unit has a minimal editor.

The minimal editor is an aid for changing selected parameters at the controller when the SIDOOR SERVICE TOOL or the SIDOOR User Software is not available. In this case, the learn run button (S401) and the two service buttons (S402, S403) are assigned second functions. The LED display (H401) is used to visualize messages.

You can use the minimal editor to perform the following settings:

- Setting of the opening and closing forces (10 stages of 30 N each)

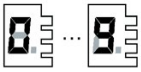
⚠ WARNING
Risk of injury due to moving mechanical parts

The minimal editor can only be activated by pressing the two service buttons S402 and S403 and simultaneously restarting the controller (disconnection of the power supply from the mains). After the minimal editor has been started, the character "F" is displayed on the LED display. The force can be increased or decreased in 30 N steps by pressing the service buttons S402 and S403. The set value is stored by pressing the learn run button (S401). Keep the learn run button pressed in this case until the dot in the LED display lights up.

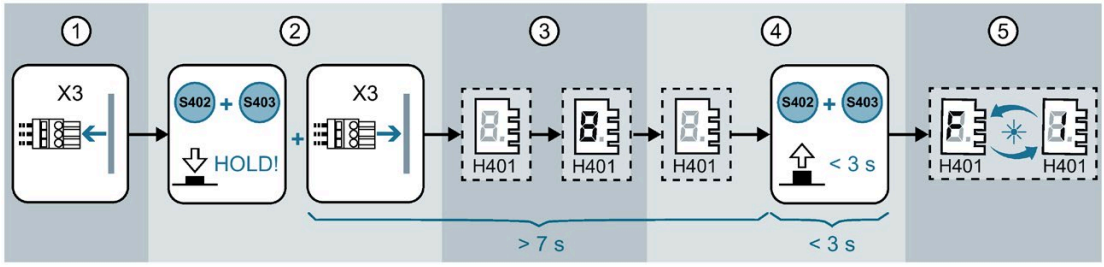
Display and buttons

You can use the minimal editor to perform the following settings:

Button	Function
 (LEARN RUN)	Pressing for a duration of: **> 2 s** = storing of the force setting carried out
 (OPEN)	Decrease in the force value
 (CLOSE)	Increase in the force value

Display	Description
	Setting of the opening and closing force
	x=0 ... 9 → force is: F = 70 N + x*30 N

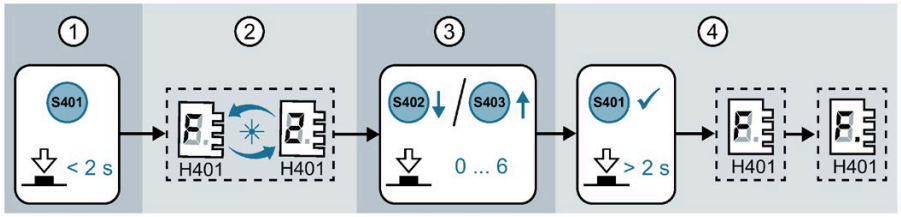
Activating the minimal editor



1. Disconnect the controller from the power supply by unplugging the power plug.

   The line voltage can alternatively be connected and disconnected with the X3 connector directly on the controller.
2. Press and hold down the S402 and S403 buttons simultaneously and reestablish the line voltage by plugging the power plug back in. Continue to hold down both buttons.
3. An "8" appears on the LED display for approximately 5 seconds as confirmation.
4. As soon as the display extinguishes, release the two buttons within approximately 3 s. Do not touch the buttons again during this time period.
5. As confirmation of the successful activation of the minimal editor the LED display alternatingly displays an "F" and the smallest opening or closing force currently set in the form of a number from 0 to 9 (70 N + x*30 N).

Setting the closing forces



1. Press the learn run button (S401) in order to carry out setting of the opening and closing forces.
2. The LED display alternatingly displays an "F" and the force currently set in the form of a number from 0 to 9 (70 N + x*30 N).
3. Set the desired force (0 to 9) by pressing the service button S402 (down) or S403 (up).
4. To confirm the set force press and keep pressed the learn run button (S401) (> 2 s) until a dot lights up in the LED display.

   The dot on the LED display indicates that the settings have been stored successfully.

Deactivating (exiting) the minimal editor

1. Disconnect the controller from the power supply by unplugging the power plug.
2. Connect the controller to the power supply by plugging in the power plug.

Note

The line voltage can alternatively be connected and disconnected with the X3 connector directly on the controller.

5.7.3 Operating options via additional units

Description

In addition to the parameter assignment options integrated in the controller, parameters can also be assigned to the SIDOOR controller via the following additional units.

- **SIDOOR SOFTWARE KIT**

  The SIDOOR SOFTWARE KIT contains, among other things, the tools SIDOOR User Software and SIDOOR Manager.

  You can find a detailed description of the SIDOOR SOFTWARE KIT in the SIDOOR SOFTWARE KIT Operating Instructions (http://support.automation.siemens.com/WW/view/en/92711247).

- **SIDOOR SERVICE TOOL**

  A detailed description of the SIDOOR SERVICE TOOL is available in the section SIDOOR SERVICE TOOL (Page 233).

5.7.4 Service terminal navigation structure

The menu structure of the local service terminal is divided into the following main levels:

- Main menu
- Quick setup
- General setup
- Monitor Service

5.7.4.1 Main menu

Table 5- 36 Main menu (German)

SIEMENS ATE530S Service Tool *(display duration = 1.5s / 5s)*	**Status display** *(operating status display)*	
SPRACH-MENUE Deutsch / English		
HAUPT-MENUE	Schnell-Justage	Tuerzustand
		Profilauswahl
		Fahrbefehle
		Parametereinst.
	Gesamt-Justage	Profilparameter
		Fahrbefehle
		Starte Lernfahrt mit Standardparameter
		Starte Lernfahrt
		Lade Standard-Parameter
		Spezialparameter
	Monitor	Tuerzustand
		Fahrauftrag
		FBLOCK-Signale
	Service	FW version
		Ereign.Statistik
		Wartungsdaten
		Special

Table 5- 37 Main menu (English)

SIEMENS ATE530S Service Tool *(display duration = 1.5s / 5s)*	**Status display** *(operating status display)*	
LANGUAGE MENU Deutsch / English		
MAIN MENU	quick setup	door state
		select profile
		drive commands
		parameter setup
	general setup	profile param.
		door commands
		start initial learn run
		start normal learn run
		set default parameter
		special param.
	monitor	door state
		drive command
		FBLOCK signals
	service	FW version
		event/statistics
		maintenance
		special

5.7.4.2 Quick setup menu

Table 5- 38 Quick setup menu (German)

Schnell-Justage	Tuerzustand	Tuerzustand = ... Position = ... cm	
	Profilauswahl	M6 Default Prof.	
	Fahrbefehle	Stopp	
		Oeffnen	
		Schliessen	
	.	redu. schliessen	
	Parametereinst	Schliesskraefte	alle Schliesskraefte ... N
		max. speed open	max. speed open ... mm/s
		max. speed close	max. speed close ... mm/s
		alle min. Geschw.	alle min. Geschw. ... mm/s
		alle Schwertstr.	alle Schwertstrecken ... mm
		Schleichstr. auf	Schleichstr. auf ... mm
		alle Rampen	alle Rampen ... mm/s²

Table 5- 39 Quick setup menu (English)

quick setup	door state	state = ... position = ... cm	
	select profile	M6 Default Prof.	
	door commands	stop door	
		open door	
		close door	
	.	reduced close	
	parameter setup	closing forces	all closing forces ... N
		max. speed open	max. speed open ... mm/s
		max. speed close	max. speed close ... mm/s
		all slow speeds	all slow speeds ... mm/s
		slow start dist.	all slow start distances ... mm
		slow end dist. op	slow end dist. open ... mm
		all ramps	all ramps ... mm/s²

5.7.4.3 General setup menu

Table 5- 40 **General setup menu (German)**

Gesamt-Justage	Profilparameter	Slow end distance open ... mm
		Schwertstrecke auf ... mm
		Schleichstrecke zu ... mm
		Schwertstrecke zu ... mm
		Max. speed open ... mm/s
		Schleichgeschw. auf ... mm/s
		Schwertgeschw. auf ... mm/s
		Initialgeschw. auf ... mm/s
		Max. speed close ... mm/s
		Schleichgeschw. zu ... mm/s
		Schwertgeschw. zu ... mm/s
		Initialgeschw. zu ... mm/s
		NDG-Geschw. (redu) ... mm/s
		Beschl. Rampe auf ... mm/s²
		Bremsrampe auf mm/s²
		Reversierrampe auf/zu ... mm/s²
		Beschl. Rampe zu ... mm/s²
		Bremsrampe zu mm/s²
		Reversierrampe zu/auf ... mm/s²
		Dauermoment Strom auf ... A
		Dauermoment Strom zu ... A
		Schwertandruckmoment zu ... A
		Oeffnungskraft statisch ... N
		Schliesskraft statisch ... N
		Schwertkraft statisch zu ... N
		NDG-Kraft (redu) statisch ... N
		Kin. Energiebegrenzung zu ... J
		Kin. Energiebegrenzung auf ... J
	Fahrbefehle	Stopp
		Oeffnen
		Schliessen
		redu. schliessen
		Testlauf
	Starte Lernfahrt mit Standardpara	
	Starte Lernfahrt	
	Lade Standard-Parameter	
	Spezialparameter	Modultyp
		Kommandogabe
		Slave-ID
		int. Baud rate
		PKW-Worte
		PZD-Worte
		Tastensperre

Table 5- 41 General setup menu (English)

general setup	profile param.	slow end open distance ... mm
		slow start open distance ... mm
		slow start close distance ... mm
		slow end close distance ... mm
		maximum speed open ... mm/s
		slow end speed open ... mm/s
		slow start speed open ... mm/s
		slow speed open initial ... mm/s
		maximum speed close ... mm/s
		slow start speed close ... mm/s
		slow end speed close ... mm/s
		slow speed close initial ... mm/s
		NDG speed (redu) ... mm/s
		acceler. ramp open ... mm/s²
		deceler. ramp open mm/s²
		reversal ramp op/cl ... mm/s²
		acceler. ramp close ... mm/s²
		deceler. ramp close mm/s²
		reversal ramp cl/op ... mm/s²
		idle torque open ... A
		idle torque close ... A
		peak torque close ... A
		limit force open ... N
		limit force close ... N
		limit force end close ... N
		NDG force (redu) ... N
		limit energy close ... J
		limit energy open ... J
	door commands	stop door
		open door
		close door
		reduced close
		test run
	start initial learn run	
	start normal learn run	
	set default parameter	
	special param.	module type
		command input
		slave-ID
		int. baudrate
		PKW-Words
		PZD-Words
		Service keylock

5.7.4.4 Monitor menu

Table 5- 42 Monitor menu (German)

Monitor	Tuerzustand	Tuerzustand = ...
		Position = ... cm
	Fahrauftrag	akt. Fahrauftrag
	FBLOCK-Signale	FBLOCK DI0+ Q002
		FBLOCK DI1+ Q004
		FBLOCK DI2+ Q006
		FBLOCK DI3+ Q008
		FBLOCK DI4+ Q010
		FBLOCK AND0 Q012
		FBLOCK AND1 Q013
		FBLOCK AND2+ Q014
		FBLOCK SAND0+ Q016
		FBLOCK SAND1+ Q018
		FBLOCK OR0 Q020
		FBLOCK OR1 Q021
		FBLOCK NOT0 Q022
		FBLOCK NOT1 Q023
		FBLOCK NOT2 Q024
		FBLOCK NOT3 Q025
		FBLOCK XOR0 Q026
		FBLOCK FRQ0+ Q027
		FBLOCK FRQ1+ Q029
		FBLOCK ERM Q031
		FBLOCK DIS Q032
		FBLOCK BATT Q033
		FBLOCK UNLOCK0 Q034
		FBLOCK UNLOCK1 Q035
		FBLOCK DQ0 Q036
		FBLOCK DQ1 Q037
		FBLOCK DQ2 Q038
		FBLOCK OPN Q039
		FBLOCK CLS Q040
		FBLOCK OPND Q041
		FBLOCK CLSD Q042
		FBLOCK DREVERSE Q043
		FBLOCK POS_OPND Q044
		FBLOCK POS_CLSD Q045
		FBLOCK FAULT Q046
		FBLOCK WARN Q047
		FBLOCK NORM Q048
		FBLOCK INIT Q049

Table 5- 43 Monitor menu (English)

monitor	door state	state = ...
		position = ... cm
	drive command	act. drive cmd
	FBLOCK signals	FBLOCK DI0+ Q002
		FBLOCK DI1+ Q004
		FBLOCK DI2+ Q006
		FBLOCK DI3+ Q008
		FBLOCK DI4+ Q010
		FBLOCK AND0 Q012
		FBLOCK AND1 Q013
		FBLOCK AND2+ Q014
		FBLOCK SAND0+ Q016
		FBLOCK SAND1+ Q018
		FBLOCK OR0 Q020
		FBLOCK OR1 Q021
		FBLOCK NOT0 Q022
		FBLOCK NOT1 Q023
		FBLOCK NOT2 Q024
		FBLOCK NOT3 Q025
		FBLOCK XOR0 Q026
		FBLOCK FRQ0+ Q027
		FBLOCK FRQ1+ Q029
		FBLOCK ERM Q031
		FBLOCK DIS Q032
		FBLOCK BATT Q033
		FBLOCK UNLOCK0 Q034
		FBLOCK UNLOCK1 Q035
		FBLOCK DQ0 Q036
		FBLOCK DQ1 Q037
		FBLOCK DQ2 Q038
		FBLOCK OPN Q039
		FBLOCK CLS Q040
		FBLOCK OPND Q041
		FBLOCK CLSD Q042
		FBLOCK DREVERSE Q043
		FBLOCK POS_OPND Q044
		FBLOCK POS_CLSD Q045
		FBLOCK FAULT Q046
		FBLOCK WARN Q047
		FBLOCK NORM Q048
		FBLOCK INIT Q049

5.7.4.5 Service menu

Table 5- 44 Servicemenü (deutsch)

Service	FW version		
	Ereign. Statistik	Ereignisspeicher	01 ... 24
		Statistik	Ereignis: ... Anzahl: ...
		Loeschen	
	Wartungsdaten	Betriebsdaten	Oeffnungen Anzahl
			Blockierungen Anzahl
			Lernfahrten Anzahl
			Netzausfaelle Anzahl
			Betriebsstunden Anzahl
		Loesche Betr.Dat.	
	Spezial	Motorkreisspannung ... V	
		Motorstrom ... A	
		Temperatur Motor ... C	
		Temperatur int. ... C	
		Motorbelastung ... %	
		dynamische Masse ... kg	
		Hemmkraft oeffnen ... N	
		Hemmkraft schliessen ... N	
		Tuerweite ... mm	
		Geschwindigkeit ... mm/s	
		Oeffnungszeit ... s	
		Schliesszeit ... s	
		dyn. Masse letzte Fahrt ... kg	
		Hemmkraft letzte Fahrt ... N	

Table 5- 45 Service menu (English)

service	FW version		
	event/statistics	event log	01 ... 24
		statistics	event: ... amount: ...
		clear event/stat	
	maintenance	read values	openings counter
			blockings counter
			learn runs counter
			start ups counter
			operating hours counter
		clear values	
	special	motor circuit voltage ... V	
		motor current ... A	
		temperature mot. ... C	
		temperature int. ... C	
		motor load ... %	
		dynamic mass ... kg	
		inhibiting force opening ... N	
		inhibiting force closing ... N	
		door width ... mm	
		door speed ... mm/s	
		opening time ... s	
		closing time ... s	
		dyn. door mass last dr. ... kg	

5.7.5 Parameters

Note

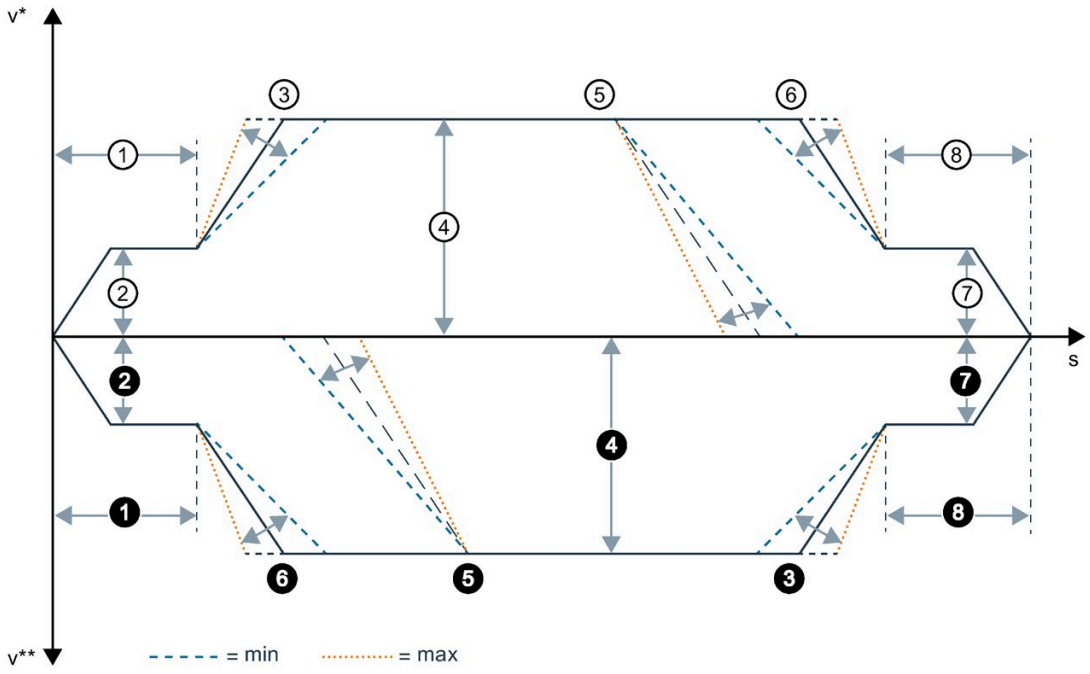
Write-protected parameters (read-only) are identified in the documentation by an "r" before the parameter.

Write / read parameters can be changed and are identified by a "p" before the parameter number.

5.7.5.1 Driving curve

The optimum travel characteristics of the door are calculated and maintained continuously.

The driving curve transitions are rounded off so that the door movement is smooth and jerk-free.



v*	Speed OPEN	v**	Speed CLOSE
①	Slow start distance open	❶	Slow end distance close
②	Slow start speed open	❷	Slow end speed close
③	Acceleration ramp OPEN	❸	Acceleration ramp CLOSE
④	Maximum speed OPEN	❹	Maximum speed CLOSE
⑤	Reversal ramp OPEN → CLOSE	❺	Reversal ramp CLOSE → OPEN
⑥	Deceleration ramp OPEN	❻	Deceleration ramp CLOSE
⑦	Slow end speed open	❼	Slow start speed close
⑧	Slow end distance open	❽	Slow start distance close

When reversing from the closing to the opening direction, the door is braked with the reversal ramp CLOSE_OPEN, and starts the opening travel with the acceleration ramp OPEN.

When reversing from the opening to the closing direction, the door is braked with the reversal ramp OPEN_CLOSE, and starts the closing travel with the acceleration ramp CLOSE.

The reversal ramps (OPEN_CLOSE / CLOSE_OPEN) can only be greater than or equal to the deceleration ramps (OPEN / CLOSE).

5.7.5.2 Forces

The following forces and currents can be configured for the driving curve.

See also Figure 5-10 Characteristic curve current – force – motor in opening and closing direction (Page 142).

Idle torque (power) OPEN / CLOSE

Parameter p3679 Idle torque in door position OPEN or p3680 Idle torque in door position CLOSED.

The respective idle torque is only effective if an open or close command is active and the door is in the Opened or Closed position respectively. With the set current the controller generates a corresponding press-on torque against the corresponding end position.

Setting ranges

The parameters are to be selected so that the door is held in the respective end position.

Peak torque close

The Peak torque close can be configured via the parameter p3681 and serves to press the door against a door cam.

If an obstruction is detected within a tolerance range of 1 cm around the "Closed" position, the cutter press-on torque is applied for approx. 2 seconds.

Setting ranges

The value of the parameter must be selected so that the cutter force opposing the door is overcome, and the door is closed completely.

Static closing and opening force

These forces are active during an active closing and opening drive order, at an active door command, and are configured via the parameter p3683 (closing force) or p3682 (opening force).

Setting ranges

The parameters are to be selected so that the entire door width can be traveled. A force that is too small can result in unwanted obstruction of the door. The specified forces refer to doors opening on one side. A load cell will only show half the value at centrally opening doors in the middle.

Limit force end static close

The static cutter force in the closing direction is configured via the parameter p3684 and serves to overcome any limit mechanism that may be present. A higher force than is required for the remaining distance is often required to overcome the limit distance. The configured static limit force is only effective in the closing direction and within the limit distance p3663.

Setting ranges

The parameter is to be selected so that any existing cam mechanism in the closing direction is overcome.

NDG force (reduced) static

The NDG force (reduced) static is configured via the parameter p3685 and is effective during the opening and closing movement, at an active NDG command.

Setting ranges

The parameter is to be selected so that the entire door width can be traveled when an NDG command is active. A force that is too small can result in obstruction of the door.

Characteristic curve current – force – motor

The following characteristic shows the typical values for the MED280 and MEG251 motor in the opening and closing directions. The actual forces at the door may deviate and have to be remeasured.

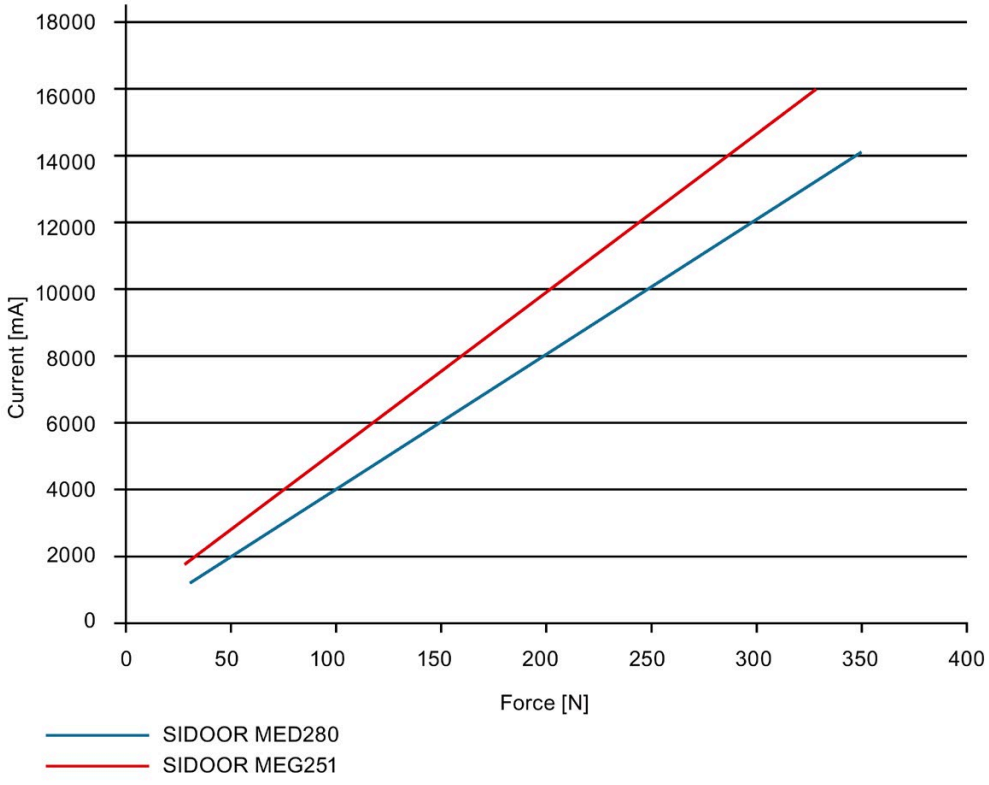


Figure 5-10 Characteristic curve current – force – motor in opening and closing direction

5.7.5.3 Driving curve parameters

Note

For safety reasons changes to the driving curve parameters do not become effective until the controller is standing still.

Table 5- 46 Driving curve parameters

Parameter ID	Setting range	Factory setting	Unit	Parameter designation	Description
Distances					
p3660	0 ... 100	10	mm	Slow end distance open	Creep distance in the opening direction
p3661	0 ... 150	0	mm	Slow start distance open	Cutter distance in opening direction
p3662	0 ... 100	0	mm	Slow start distance close	Creep distance in the closing direction
p3663	0 ... 200	50	mm	Slow end distance close	Cutter distance in closing direction
Speeds					
p3664	MED280: 90 ... 800 MEG251: 90 ... 750	500	mm/s	Maximum speed OPEN	Maximum speed in the opening direction
p3665	30 ... 90	40	mm/s	Slow end speed open	Creep speed in the opening direction
p3666	30 ... 90	60	mm/s	Slow start speed open	Slow start distance in open direction
p3667	30 ... 90	90	mm/s	Initial speed OPEN	Initial speed in the opening direction
p3668	MED280: 90 ... 800 MEG251: 90 ... 750	500	mm/s	Maximum speed CLOSE	Maximum speed in the closing direction
p3669	30 ... 90	60	mm/s	Slow start speed close	Creep speed in the closing direction
p3670	30 ... 90	90	mm/s	Slow end speed close	Slow end distance in close direction
p3671	30 ... 90	90	mm/s	Initial speed CLOSE	Initial speed in the closing direction
p3672	MED280: 90 ... 800 MEG251: 90 ... 750	150	mm/s	NDG speed (reduced)	Speed in NDG operation in the opening and closing direction
Accelerations and decelerations					
p3673	300 ... 3000	3000	mm/s^2	Acceleration ramp OPEN	Acceleration ramp in the opening direction
p3674	MED280: 300 ... 1200 MEG251: 300 ... 1000	MED280: 1200 MEG251: 1000	mm/s^2	Deceleration ramp OPEN	Deceleration ramp in the opening direction
p3675	MED280: 300 ... 1200 MEG251: 300 ... 1000	MED280: 1200 MEG251: 1000	mm/s^2	Reversal ramp OPEN/CLOSE	Reversal ramp OPEN → CLOSE
p3676	300 ... 3000	3000	mm/s^2	Acceleration ramp CLOSE	Acceleration ramp in the closing direction

Parameter ID	Setting range	Factory setting	Unit	Parameter designation	Description
p3677	MED280: 300 ... 1200 MEG251: 300 ... 1000	MED280: 1200 MEG251: 1000	mm/s²	Deceleration ramp CLOSE	Deceleration ramp in the closing direction
p3678	MED280: 300 ... 1200 MEG251: 300 ... 1000	MED280: 1200 MEG251: 1000	mm/s²	Reversal ramp CLOSE/OPEN	Reversal ramp CLOSE → OPEN
p3679	MED280: 0 ... 6000 MEG251: 0 ... 4500	MED280: 4000 MEG251: 2500	mA	Idle torque (power) OPEN	Idle torque (power) in opened position
p3680	MED280: 0 ... 6000 MEG251: 0 ... 4500	MED280: 4000 MEG251: 2500	mA	Idle torque (power) CLOSE	Idle torque (power) in Closed position
p3681	MED280: 0 ... 7000 MEG251: 0 ... 12800	MED280: 6000 MEG251: 4500	mA	Peak torque close	Peak torque close in closed position for approx. 2 s
Forces					
p3682	MED280: 7 0 ... 350 MEG251: 70 ... 300	150	N	Static force limit open	Static force limit open
p3683	MED280: 7 0 ... 350 MEG251: 70 ... 300	150	N	Static force limit close	Static force limit close
p3684	MED280: 7 0 ... 350 MEG251: 70 ... 300	150	N	Limit force end static close	Limit force end static close in closing direction
p3685	MED280: 7 0 ... 350 MEG251: 70 ... 300	150	N	NDG force (reduced) static	Force in NDG operation in the opening and closing direction
Energy					
p3686	MED280: 0 ... 75 MEG251: 0 ... 100	20	J	Kin. energy CLOSE	Limit energy in opening direction 0 ≙ no limitation on basis of energy
p3687	MED280: 0 ... 75 MEG251: 0 ... 100	20	J	Kin. energy OPEN	Limit energy in closing direction 0 ≙ no limitation on basis of energy
p3688	MED280: 0 ... 75 MEG251: 0 ... 100	4	J	Kin. energy NDG	Limit energy in NDG operation 0 ≙ no limitation on basis of energy

5.7.5.4 Other parameters

Table 5- 47 Other parameters

Parameter ID	Setting range	Factory setting	Unit	Description
Events lists				
r2030[x]	—	—	—	Events list faults. List with 8 event entries. Each entry is a 32-bit value. Accessing is read-only. (See List access)
r2031[x]	—	—	—	Events lists warnings. List with 8 event entries. Each entry is a 32-bit value. Accessing is read-only. (See List access)
Monitoring				
r2100[x]	—	—	—	List of monitor values
r2100[0]	—	—	mm	Current door position
r2100[1]	—	—	mm/s	Setpoint speed
r2100[2]	—	—	mm/s	Actual speed
r2100[3]	—	—	mA	Actual motor current
r2100[4]	—	—	N	Actual motor force
r2100[5]	—	—	N	Force limitation
r2100[14]	—	—	%	Current system load
r2100[15]	—	—	mm/s	Filtered actual closing speed of the monitoring unit
r2100[16]	—	—	N	Filtered actual closing force of the monitoring unit
r2100[17]	—	—	mm/s	Filtered actual opening speed of the monitoring unit
r2100[18]	—	—	N	Filtered actual opening force of the monitoring unit
r2100[21]	—	—	1/10 mV	Mean value motor voltage
r2100[22]	—	—	1/10°C	Motor temperature in 1/10 °C, e.g. 377 ≙ 37.7°C, -110 ≙ -11.0°C. In case of a fault or if no sensor value is available, the function supplies 999.9°C.
r2100[23]	—	—	1/10°C	Controller temperature in 1/10 °C, e.g. 377 ≙ 37.7°C, -110 ≙ -11.0°C. In case of a fault or if no sensor value is available, the function supplies 999.9°C.
r2100[24]	—	—	%	Motor load (0-200%)
r2100[25]	—	—	%	Controller load (0-200%)
r2100[26]	—	—	ms	Last measured valid closing time
r2100[27]	—	—	ms	Last measured valid opening time
r2100[28]	—	—	kg	Determined mass of the last opening move
r2100[29]	—	—	kg	Determined mass of the last closing move
r2100[30]	—	—	N	Determined friction of the last opening move
r2100[31]	—	—	N	Determined friction of the last closing move
Faults and warnings				
r2101	—	—	kg	Effective determined door mass
r2103	—	—	mm	Currently learned door width
r2104	—	—	N	[N] System friction in the closing direction determined during the learn run (the friction of the drive system is not included here)
r2105	—	—	N	[N] System friction in the opening direction determined during the learn run (the friction of the drive system is not included here)

Parameter ID	Setting range	Factory setting	Unit	Description
r2150[x]	—	—	—	Firmware version list with 3 entries. Each entry is a 16-bit value. Entry 0 ≙ Major version Entry 1 ≙ Minor version Entry 2 ≙ Build/revision number
r2151	—	—	—	Status code of the status display. (See Status display (Page 143))
Displaying and operating				
p90	0 ≙ inactive 1 ≙ active	0	—	Disable DCU service control buttons S402 (Open), S403 (Close) and S401 (Learn run).
p91	Write-only: 0 ≙ Default: no group 1 ≙ Driving curve parameters 2 ≙ FBLOCK parameters 3 ≙ Blocking and reversing parameters 4 ≙ Fieldbus parameters 0xFF ≙ Complete parameters to factory setting	—	—	Resetting of a parameter group to factory setting
p92	1 ≙ Delete events lists	—	—	Reset and delete the events lists for faults and warnings
p100	0 – 0xFFFF	0xFFFF	—	Free user tags, for example for setting a unique ID number
p101	0 – 0xFFFF	0xFFFF	—	
p102	0 – 0xFFFF	0xFFFF	—	
p103	0 – 0xFFFF	0xFFFF	—	

5.7.5.5 Fieldbus parameters

Table 5- 48 Fieldbus parameters

Parameter ID	Setting range	Factory setting	Unit	Description
Statistical data				
r2029[x]	0 ≙ Rejected telegrams 1 ≙ Character frame 2 ≙ Start character 3 ≙ Block check character 4 ≙ Telegram length 5 ≙ Residual duration 6 ≙ Telegram type 7 ≙ Buffer overflow	—	—	Lists of the error and fault statistics. List with 8 statistics entries. Each entry is a 16-bit value. Accessing is read-only.
Monitoring				
p2040	0 ... 65535 ms 0 ≙ Monitoring deactivated	1000	ms	Time interval in which at least one error-free user data exchange via the fieldbus system has to take place.

5.7.5.6 Calibration and function parameters

Table 5- 49 Calibration and function parameters

Parameter ID	Setting range	Factory setting	Unit	Description
Extended functions				
p1201	1 ... 4000 0 ≙ Deactivated	500	mm	Broken belt monitoring. Path after which a broken belt is recognized / reported.
p1207	0 ... 1	1	—	Mode for vandalism protection 0 ≙ Vandalism protection becomes active as of a speed that is set in the parameter p1208. 1 ≙ Vandalism protection becomes active as of the speed value that is set in the current door profile.
p1208	1 ... 800 0 ≙ Deactivated	250	mm/s	Maximum speed as of which the vandalism protection becomes active. 0≙ The vandalism protection is deactivated completely.
p1210	0 ... 5000	750	ms	Wait time for a remote control demand
p1211	0 ... 60000	2000	ms	Discrepancy time at door commands via digital Inputs (FBLOCK) and fieldbus

Parameter ID	Setting range	Factory setting	Unit	Description
p1220	Configuration bits Bit x=1 ≙ Option activated Bit x=0 ≙ Option deactivated	15	—	Configuration unlocking sequence Bit 0 ≙ Unlocking sequence in NORMAL mode Bit 1 ≙ Unlocking sequence in INITIAL mode Bit 2 ≙ Unlocking sequence in LEARN mode Bit 3 ≙ Unlocking sequence in ERM mode Bit 7 ≙ Interrupt at door command change Bit 8 ≙ T3_CLOSED (UNLOCK1 active until closed) Bit 9 ≙ T3_OPENED (UNLOCK1 active until opened) Bit 10 ≙ Dynamic unlocking in LEARN mode *1)
p1221	0 ... 60000	300	ms	On delay door command Open
p1222	0 ... 60000	500	ms	On period signal UNLOCK0
p1223	0 ... 60000	750	ms	On period signal UNLOCK1
p1224	0 ... 60000	250	ms	On delay signal UNLOCK1
p1225	0 ... 60000	20	mm	Range in proximity of Close end stop within which the unlocking sequence is started with the Open door command in normal mode. *1)
p1230	0 ... 0xFFFF	0x0404	—	CLS_POS_CFG: Position configuration for Close end stop (changes do not become effective until after restart of the controller and possibly new learn run required): • Tolerance at recognition of the Closed position → 8 bit value in [mm] Bit 0-7 (lower byte) • Tolerance at leaving of the Closed position → 8 bit value in [mm] Bit 8-15 (upper byte) (changes do not become effective until after restart of the controller and possibly new learn run required)
p1231	0 ... 0xFFFF	0x140A	—	OPN_POS_CFG: Position configuration for Opened end stop: • Tolerance at recognition of the Opened position → 8 bit value in [mm] Bit 0-7 (lower byte) • Tolerance at leaving of the Opened position → 8 bit value in [mm] Bit 8-15 (upper byte) (changes do not become effective until after restart of the controller and possibly new learn run required)
p4700		0x0304		Variable monitoring value 1: (see TZW4 - technology status word 4 (Page 176))
	0x0004 ≙ ActPos		mm	Current door position
	0x0104 ≙ NomVel		mm/s	Setpoint speed
	0x0204 ≙ ActVel		mm/s	Actual speed
	0x0304 ≙ ActMotCurrVal		mA	Actual motor current
	0x0404 ≙ ActMotForceVal		N	Actual motor force

Parameter ID	Setting range	Factory setting	Unit	Description
	0x0504 ≙ DbgForceLim		N	Force limitation
	0x0E04 ≙ SysLoadPerc		%	Current system load
	0x0F04 ≙ LpsActSup-SpeedCls		mm/s	Filtered actual closing speed of the monitoring unit
	0x1004 ≙ LpsActSupForceCls		N	Filtered actual closing force of the monitoring unit
	0x1104 ≙ LpsActSup-SpeedOpn		mm/s	Filtered actual opening speed of the monitoring unit
	0x1204 ≙ LpsActSupForceOpn		N	Filtered actual opening force of the monitoring unit
	0x1504 ≙ AvrMotVolt		1/10mV	Mean value motor voltage
	0x1604 ≙ MotorTemp		1/10°C	Motor temperature in 1/10 °C
	0x1704 ≙ BoardTemp		1/10°C	Controller temperature in 1/10 °C
	0x1804 ≙ MotLoadPerc		%	Motor load (0-200%)
	0x1904 ≙ BrdLoadPerc		%	Controller load (0-200%)
	0x1A04 ≙ FastClsTim		ms	Last measured valid closing time
	0x1B04 ≙ FastOpnTim		ms	Last measured valid opening time
	0x1C04 ≙ LstOpnMass_Kg		kg	Determined mass of the last opening move
	0x1D04 ≙ LstClsMass_Kg		kg	Determined mass of the last closing move
	0x1E04 ≙ LstOpnIn-hibFrc_N		N	Determined friction of the last opening move
	0x1F04 ≙ LstClsIn-hibFrc_N		N	Determined friction of the last closing move
p4701		0x0204		Variable monitoring value 2: (see TZW4 - technology status word 4 (Page 176))
			mm	Current door position
	0x0004 ≙ ActPos		mm/s	Setpoint speed
	0x0104 ≙ NomVel		mm/s	Actual speed
	0x0204 ≙ ActVel		mA	Actual motor current
	0x0304 ≙ ActMotCurrVal		N	Actual motor force
	0x0404 ≙ ActMotForce-Val		N	Force limitation
	0x0504 ≙ DbgForceLim		%	Current system load
	0x0E04 ≙ SysLoadPerc		mm/s	Filtered actual closing speed of the monitoring unit
	0x0F04 ≙ LpsActSup-SpeedCls		N	Filtered actual closing force of the monitoring unit
	0x1004 ≙ LpsActSupForceCls		mm/s	Filtered actual opening speed of the monitoring unit
	0x1104 ≙ LpsActSup-SpeedOpn		N	Filtered actual opening force of the monitoring unit
	0x1204 ≙ LpsActSupForceOpn		1/10mV	Mean value motor voltage
	0x1504 ≙ AvrMotVolt		1/10°C	Motor temperature in 1/10 °C
	0x1604 ≙ MotorTemp		1/10°C	Controller temperature in 1/10 °C
	0x1704 ≙ BoardTemp		%	Motor load (0-200%)
	0x1804 ≙ MotLoadPerc		%	Controller load (0-200%)
	0x1904 ≙ BrdLoadPerc		ms	Last measured valid closing time

Parameter ID	Setting range	Factory setting	Unit	Description
	0x1A04 ≙ FastClsTim		ms	Last measured valid opening time
	0x1B04 ≙ FastOpnTim		kg	Determined mass of the last opening move
	0x1C04 ≙ LstOpnMass_Kg		kg	Determined mass of the last closing move
	0x1D04 ≙ LstClsMass_Kg		N	Determined friction of the last opening move
	0x1E04 ≙ LstOpnInhibFrc_N		N	Determined friction of the last closing move

*[1)] This element was enhanced/modified as part of a firmware update, see section Version overview (Page 24)

5.7.5.7 Blocking and reversing parameters

Table 5- 50 Blocking and reversing parameters

Parameter ID	Setting range	Factory setting	Unit	Description
General				
p3850	Bit x = 1 ≙ Function activated Bit x = 0 ≙ Function deactivated	0x00FF	—	Obstruction recognition function control Bit 0 ≙ Stop obstruction recognition in closing direction Bit 1 ≙ Force obstruction recognition in closing direction Bit 2 ≙ Obstruction counter in closing direction Bit 3 ≙ Slow obstruction point approach in closing direction Bit 4 ≙ Stop obstruction recognition in opening direction Bit 5 ≙ Force obstruction recognition in opening direction Bit 6 ≙ Obstruction counter in opening direction Bit 7 ≙ Slow obstruction point approach in opening direction

The parameters in the following table refer only to the **closing direction**.

Parameter ID	Setting range	Factory setting	Unit	Description
General				
p3862	0 ≙ Deenergize 1 ≙ Stop	0	—	Drive control during the wait time (before attempts to overcome)
Timing				
p3852	0 ... 60000	1000	ms	On-delay of the obstruction recognition
p3853	0 ... 60000	300	ms	Minimum recognition time at stop obstruction
p3854	0 ... 60000	100	ms	Minimum recognition time at force obstruction
Areas				
p3856	0 ... 60000	20	mm	Distance before and after the obstruction point for slow obstruction point approaching
p3857	0 ... 60000	5	mm	Area of the obstruction recognition suppression before Closed end stop
p3858	0 ... 60000	10	mm	Area of the obstruction recognition suppression after Opened end stop
p3859	0 ... 60000	20	mm	Area of the force obstruction recognition suppression before creep distance
p3855	0 ... 60000	50	mm	Area of the force obstruction recognition suppression after the last obstruction point
Overcoming attempts				
p3860	0 ... 0xFFFF 0 ≙ No overcoming attempt 0xFFFF ≙ Unlimited attempts	0	—	Number of attempts to overcome the obstruction point
p3861	0 ... 60000	2000	ms	Wait time before each overcoming attempt
p3863	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control after all overcoming attempts have been carried out (if no reversings are configured)
Reversing				
p3864	0 ... 0xFFFF 0 ≙ Do not reverse 0xFFFF ≙ Unlimited reversings	2	—	Number of reversings **Note** FW 2.4 or higher: If the value is 1, reversing is carried out, i.e. the door reverses and stops. WAITCMD is then set.
p3865	0 ... 60000	2000	ms	Wait time before each reversing
p3866	0 ... 60000 0 ≙ Complete reversing	200	mm	Reversing distance
p3867	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control at obstruction during reversing
p3868	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control after all reversings have been carried out

The parameters in the following table refer only to the **opening direction**.

Parameter ID	Setting range	Factory setting	Unit	Description
General				
p3879	0 ≙ Deenergize 1 ≙ Stop	0	—	Drive control during the wait time (before attempts to overcome)
Timing				
p3869	0 ... 60000	1000	ms	On-delay of the obstruction recognition
p3870	0 ... 60000	500	ms	Minimum recognition time at stop obstruction
p3871	0 ... 60000	100	ms	Minimum recognition time at force obstruction
Areas				
p3872	0 ... 60000	20	mm	Distance before and after the obstruction point for slow obstruction point approaching
p3873	0 ... 60000	10	mm	Area of the obstruction recognition suppression before Closed end stop
p3874	0 ... 60000	10	mm	Area of the obstruction recognition suppression after Opened end stop
p3875	0 ... 60000	20	mm	Area of the force obstruction recognition suppression before creep distance
p3876	0 ... 60000	50	mm	Area of the force obstruction recognition suppression after the last obstruction point
Overcoming attempts				
p3877	0 ... 0xFFFF 0 ≙ No overcoming attempt 0xFFFF ≙ Unlimited attempts	0	—	Number of attempts to overcome the obstruction point
p3878	0 ... 60000	2000	ms	Wait time before each overcoming attempt
p3880	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control after all overcoming attempts have been carried out (if no reversings are configured)
Reversing				
p3881	0 ... 0xFFFF 0 ≙ Do not reverse 0xFFFF ≙ Unlimited reversings	2	—	Number of reversings *)
p3882	0 ... 60000	2000	ms	Wait time before each reversing
p3883	0 ... 60000 0 ≙ Complete reversing	200	mm	Reversing distance
p3884	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control at obstruction during reversing
p3885	0 ≙ Deenergize 1 ≙ Stop 2 ≙ Open 3 ≙ Close	0	—	Drive control after all reversings have been carried out

*) This element was changed/adjusted as part of an FW update see section Version overview (Page 24).

5.7.5.8 FBLOCK parameters

"Q" door commands can be assigned to the outputs by means of the FBLOCK DCMD parameters. In this case a door command only becomes active, if the assigned output "Q" is active (positive logic).

Details about the function and logic of the individual function blocks are available in the section Free function blocks (FBLOCK). (Page 68)

FBLOCK Q-outputs (door commands)

Table 5- 51 FBLOCK Q-outputs (drive commands)

Parameter ID	Setting range	Factory setting	Q-output	Description
Digital input signals				
p20000	0 ... 0xFFFF	0	Q2: DCMD_DI0_QP	DCMD_DIx_QP ≙ Level-controlled output, output follows the input directly DCMD_DIx_QN ≙ Negated level-controlled output, output follows the input directly
p20001	0 ... 0xFFFF	0	Q3: DCMD_DI0_QN	
p20002	0 ... 0xFFFF	0	Q4: DCMD_DI1_QP	
p20003	0 ... 0xFFFF	0	Q5: DCMD_DI1_QN	
p20004	0 ... 0xFFFF	0x0002 ≙ Open	Q6: DCMD_DI2_QP	
p20005	0 ... 0xFFFF	0x0003 ≙ Close	Q7: DCMD_DI2_QN	
p20006	0 ... 0xFFFF	0	Q8: DCMD_DI3_QP	
p20007	0 ... 0xFFFF	0	Q9: DCMD_DI3_QN	
p20008	0 ... 0xFFFF	0	Q10: DCMD_DI4_QP	
p20009	0 ... 0xFFFF	0	Q11: DCMD_DI4_QN	
AND				
p20010	0 ... 0xFFFF	0	Q12: DCMD_AND0_Q1	Output has logic AND operation to the inputs.
p20011	0 ... 0xFFFF	0	Q13: DCMD_AND1_Q1	
p20012	0 ... 0xFFFF	0	Q14: DCMD_AND2_QP	
p20013	0 ... 0xFFFF	0	Q15: DCMD_AND2_QN	
SAND – Safety AND				
p20014	0 ... 0xFFFF	0	Q16: DCMD_SAND0_QP	Output has logic AND operation to the inputs. In addition two times for discrepancy analysis of the status change (0->1 and 1->0) of the inputs can be activated. (See FBLOCK configuration) DCMD_SANDx_QP ≙ Level-controlled output DCMD_SANDx_QN ≙ Negated level-controlled output
p20015	0 ... 0xFFFF	0	Q17: DCMD_SAND0_QN	
p20016	0 ... 0xFFFF	0	Q18: DCMD_SAND1_QP	
p20017	0 ... 0xFFFF	0	Q19: DCMD_SAND1_QN	
OR				
p20018	0 ... 0xFFFF	0	Q20: DCMD_OR0_Q1	Output has logic OR operation to the inputs.
p20019	0 ... 0xFFFF	0	Q21: DCMD_OR1_Q1	
NOT				
p20020	0 ... 0xFFFF	0	Q22: DCMD_NOT0_Q1	Output has logic NOT operation to the inputs (negation).

Parameter ID	Setting range	Factory setting	Q-output	Description
p20021	0 ... 0xFFFF	0	Q23: DCMD_NOT1_Q1	
p20022	0 ... 0xFFFF	0	Q24: DCMD_NOT2_Q1	
p20023	0 ... 0xFFFF	0	Q25: DCMD_NOT3_Q1	
XOR				
p20024	0 ... 0xFFFF	0	Q26: DCMD_XOR0_Q1	Output has logic exclusive OR operation to the inputs.
FRQ				
p20025	0 ... 0xFFFF	0	Q27: DCMD_FRQ0_Q1	Output becomes active ass soon as the frequency is recognized.
p20026	0 ... 0xFFFF	0	Q28: DCMD_FRQ0_Q2	
p20027	0 ... 0xFFFF	0	Q29: DCMD_FRQ1_Q1	
p20028	0 ... 0xFFFF	0	Q30: DCMD_FRQ1_Q2	
SPECIAL				
p20029	0 ... 0xFFFF	0x0801 ≙ Special stop	Q31: DCMD_SysDIS_QP	Output follows the input directly. Meaning that at a positive signal level the system is locked.
p20030	0 ... 0xFFFF	0x0801 ≙ Special stop	Q32: DCMD_SysERM_QP	Output follows the input directly. This means that at a positive signal level the emergency unlocking mode is activated. In addition an OFF delay can be set by using parameter p4616. (See FBLOCK configuration)

FBLOCK Q-input references

The inputs of the various F-blocks can be interconnected or linked with any "Q"-outputs (signal sources) by using the following FBLOCK REF parameters. To this purpose the number of the Q-element has to be entered directly in the Q-REF parameter (Q{0 to n}).

Table 5- 52 FBLOCK Q-input references

Parameter ID	Setting range	Factory setting	Q-input reference	Description
AND				
p20100	0 ... n	0	Q_REF_AND0_IN1	Input 1 logic AND date 0
p20101	0 ... n	0	Q_REF_AND0_IN2	Input 2 logic AND gate 0
p20102	0 ... n	0	Q_REF_AND1_IN1	Input 1 logic AND gate 1
p20103	0 ... n	0	Q_REF_AND1_IN2	Input 2 logic AND gate 1
p20104	0 ... n	0	Q_REF_AND2_IN1	Input 1 logic AND gate 2
p20105	0 ... n	0	Q_REF_AND2_IN2	Input 2 logic AND gate 2
SAND – Safety AND				
p20106	0 ... n	10 ≙ Q10	Q_REF_SAND0_IN1	Input 1 safe logic AND gate 0
p20107	0 ... n	8 ≙ Q8	Q_REF_SAND0_IN2	Input 2 safe logic AND gate 0
p20108	0 ... n	2 ≙ Q2	Q_REF_SAND1_IN1	Input 1 safe logic AND gate 1
p20109	0 ... n	4 ≙ Q4	Q_REF_SAND1_IN2	Input 2 safe logic AND gate 1
OR				
p20110	0 ... n	0	Q_REF_OR0_IN1	Input 1 logic OR gate 0
p20111	0 ... n	0	Q_REF_OR0_IN2	Input 2 logic OR gate 0
p20112	0 ... n	0	Q_REF_OR0_IN3	Input 3 logic OR gate 0
p20113	0 ... n	0	Q_REF_OR1_IN1	Input 1 logic OR gate 1
p20114	0 ... n	0	Q_REF_OR1_IN2	Input 2 logic OR gate 1
p20115	0 ... n	0	Q_REF_OR1_IN3	Input 3 logic OR gate 1
NOT				
p20116	0 ... n	0	Q_REF_NOT0_IN1	Input logic NOT gate 0 (negation)
p20117	0 ... n	0	Q_REF_NOT1_IN1	Input logic NOT gate 1 (negation)
p20118	0 ... n	0	Q_REF_NOT2_IN1	Input logic NOT gate 2 (negation)
p20119	0 ... n	0	Q_REF_NOT3_IN1	Input logic NOT gate 3 (negation)
XOR				
p20120	0 ... n	0	Q_REF_XOR0_IN1	Input 1 logic exclusive OR (XOR)
p20121	0 ... n	0	Q_REF_XOR0_IN2	Input 2 logic exclusive OR (XOR)
FRQ				
p20122	0 ... n	0	Q_REF_FRQ0_IN1	Input frequency recognition 0
p20123	0 ... n	0	Q_REF_FRQ1_IN1	Input frequency recognition 1
SPECIAL				
p20124	0 ... n	17 ≙ Q17	Q_REF_SysDIS	Input disable
p20125	0 ... n	18 ≙ Q18	Q_REF_SysERM	Input emergency unlocking mechanism
Digital output signals				
p20128	0 ... n	34 ≙ Q34	Q_REF_DQ0	Input for digital output signal 1
p20129	0 ... n	35 ≙ Q35	Q_REF_DQ1	Input for digital output signal 2

FBLOCK configuration

Table 5- 53 FBLOCK configuration

Parameter ID	Setting range	Factory setting	Unit	Configuration name	Description
Configuration					
p4630	0 ... 0xFFFF	0x0302		SIn_Subst_CFG	Bit 0 = Substitute value of the SAND0 Bit 1 = Substitute value of the SAND1 Bit 2 = Substitute value of the FRQ0 Bit 3 = Substitute value of the FRQ1 *Output via operating status display activated (Bit x=1) or deactivated (Bit x=0)* Bit 8 = Local SF error output of SAND0 Bit 9 = Local SF error output of SAND1 Bit 10 = Local SF error output of FRQ0 Bit 11 = Local SF error output of FRQ1
p4610	0 ≙ 0.5 Hz 1 ≙ 1 Hz	0		ModeSelect_FRQ0	Selection of the frequency to be recognized by FBLOCK FRQx
p4611	0 ≙ 0.5 Hz 1 ≙ 1 Hz	0		ModeSelect_FRQ1	
p4612	0 ... 1000	250	ms	OnDiscTim_SAND0	ON- and OFF delays for recognizing signal discrepancies.
p4613	0 ... 1000	250	ms	OffDiscTim_SAND0	
p4614	0 ... 1000	250	ms	OnDiscTim_SAND1	
p4615	0 ... 1000	250	ms	OffDiscTim_SAND1	
p4616	0 ... 65535	10	s	ERM_OFF_DLY	OFF delay of the emergency release mechanism (ERM) *[1)]

*[1)] This element was enhanced/modified as part of a firmware update, see section Version overview (Page 24)

5.8 Diagnostics and service

5.8.1 Status display

All the operating states are divided into faults, warnings and information.

The current operating state of the SIDOOR controller can be accessed as follows:

- The current event code is displayed on the 7-segment display "H401" of the controller.
- The current operating state is displayed in plain text on the service terminal in the "Status display" menu area in two languages.
- The current event code is sent cyclically to the higher-level controller through the process data area in the STATCODE signal.

Prioritization

Several faults, warning and information can be active simultaneously. Only the message with the highest priority is always displayed or signaled. The respective priority is shown in the following overviews. In principle the operating state displays are prioritized as follows:

Faults > Warning > Information

Log

All the faults and warnings with activated log option (see the following overviews) are stored retentively in an events list in the controller so that all the events they can still be called up chronologically even after a power failure, see Events list (Page 152).

5.8.1.1 Faults

ONLINE control

In the case of an existing fieldbus connection (online control) all the active errors of the SIDOOR controller can be recognized by the higher-level system through the status word 1 (ZSW1) Bit 3 "Error" and have to be acknowledged correspondingly by the user. The Bit 7 "Fault acknowledge" is available to this purpose in the control word 1 (STW1) (see Structure of the user data / process data (Page 154)). If several faults are active simultaneously, all the faults are acknowledged during an acknowledgment.

Note

For commissioning or service purposes the current fault can be acknowledged via the local service terminal in the "Status display" menu item by using the confirmation key.

OFFLINE control

If a fieldbus connection does not exist (OFFLINE control), all the error acknowledgements are carried out **automatically** by the SIDOOR controller.

Fault acknowledgement

After successful fault acknowledgement the SIDOOR controller restarts automatically after the wait time that is defined fault-specifically . After a cold restart of the controller a complete internal system test of the hardware and software components, which serves to discover and eliminate faults, is carried out. If this does not eliminate the fault, the controller remains in this loop (please contact the Technical Support, see Service & Support (http://support.automation.siemens.com)). The motor is freewheeling during the complete procedure.

Overview of faults

The following faults are defined:

Table 5- 54 Event code faults

Event code		Log	Prio	Description	System response	Troubleshooting
	1	Yes	9	RAM, EEPROM, parameter, hardware time basis or CPU fault (system error)	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	Controller is defective. Replace the controller.
	3	Yes	12	Error in 2nd switch-off function	Activation of 2nd switch-off function Motor is freewheeling. 1 min. minimum wait time.	Controller is defective. Replace the controller.
	7	Yes	7	Fault motor incremental sensor	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	• Check the wiring between motor plug X7 and motor. • Motor is defective. Replace the motor. • Controller is defective. Replace the controller. • Transition resistance between controller and motor too high. Check motor plug X7 and motor connecting cable.
	b	Yes	1	15 V overvoltage	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	Controller is defective. Replace the controller.
	G	Yes	3	Broken belt	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	• Belt is broken. • Belt does not lie on the motor pinion. • No connection between door and belt. • Reduction of the belt tension.
	L	Yes	4	Current measurement error	Emergency stop. De-energized motor after stopping of the door. 5 s wait time.	• Check the wiring between motor plug X7 and motor. • Motor is defective. Replace the motor. • Controller is defective. Replace the controller.

Event code		Log	Prio	Description	System response	Troubleshooting
	2	Yes	10	Braking chopper defective	Activation of 2nd switch-off function Motor is freewheeling. 30 s minimum wait time.	• Check the input voltage of the controller at the power supply plug X3: The supply voltage of the controller may amount to a maximum of 36 V +3%. • Check the line voltage. • Check the power supply and replace it if necessary. • Door is driven by an external force in the direction of travel (for example door weight too high). Eliminate the external force. • Controller is defective. Replace the controller.
	5	Yes	8	Motor is unknown. Learn run not possible	Emergency stop. De-energized motor after stopping of the door. 10 s minimum wait time.	• Perform a new learn run with this motor. See the section Learn run (Page 45). • Motor type is unknown. Check the motor used. • Check the wiring between motor plug X7 and motor. • Update firmware with regard to new motor type.
	9	Yes	5	Motor overcurrent	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	• Check the wiring between motor plug X7 and motor. • Motor is defective. Replace the motor. • Controller is defective. Replace the controller.

Event code		Log	Prio	Description	System response	Troubleshooting
	E	Yes	11	Motor overvoltage	Activation of 2nd switch-off function Motor is freewheeling. 1 min. minimum wait time.	• Check the input voltage of the controller at the power supply plug X3: The supply voltage of the controller may amount to a maximum of 36 V +3%. • Check the line voltage. • Check the power supply and replace it if necessary. • Controller is defective. Replace the controller.
	h	Yes	2	15 V undervoltage	Emergency stop. De-energized motor after stopping of the door. 5 s minimum wait time.	• Check the output voltage at the power supply unit (minimum 20 V). • Check the line voltage. • Check the power supply and replace it if necessary. • Controller is defective. Replace the controller.
	n	Yes	6	Output stage defective	Emergency stop. De-energized motor after stopping of the door. 30 s minimum wait time.	Controller is defective. Replace the controller.

5.8.1.2 Warnings

Warnings are external problems such as wiring or faulty signals that the SIDOOR controller recognizes but cannot eliminate.

Active warnings of the SIDOOR controller are signaled during an existing fieldbus connection (online control) by the status word 1 (ZSW1) Bit 7 "Warning". Warnings do not have to be acknowledged. The system response is defined individually for each warning.

Table 5- 55 Event code warnings

Event code		Log	Prio	Description	System response	Troubleshooting
	–	Yes	8	Controller is waiting for learn run	The controller is waiting for a learn run.	• If a valid parameter record does not exist (for example at initial commissioning): Carry out a learn run with loading of the default parameter (see Table 6-29 Starting a learn run when the supply voltage is applied (Page 112) for additional information). • If a learn run was cancelled: Repeat the learn run or restart the controller.
	y	Yes	1	Internal bus error (OFFLINE)	The controller is offline. The control unit changes to the status "S1:Z_SWITCH_ON_DISABLED"	• Check the fieldbus connection. • Check the internal bus configuration. • Check the PROFINET module.
	t	Yes	15	Supervision error	A warning is only displayed for 2 s. No system response. A supervision error is only displayed once during an opening or closing procedure.	The controller monitors whether the measured forces and speeds are plausible. If large deviations are detected, a supervision error is triggered. Possible cause: Action of higher external forces on the door (for example closing weight too high or manual pushing of the door while moving).

Event code		Log	Prio	Description	System response	Troubleshooting
	0	Yes	13	DCOPS error	The controller changes to the initial mode status.	• Adjust the DCP sensor. The maximum distance of the DCP sensor to the OPEN / CLOSE position amounts to 10 cm. • The fault indication is deleted again when the door recognizes a plausible DCOPS status in both end positions or after a restart of the controller. • Check the wiring of the DCP sensor.
	6	Yes	5	Motor blocks in the closing direction	The response depends on the set reversing behavior in the closing direction. The warning remains active until the obstacle has been overcome or the door command has been changed.	• Remove obstacles in the drive path. • Increase the closing forces. (Parameter "Static force limit close" or parameter "Limit force end static close"). • The display can also occur in combination with other malfunctions (for example encoder error, monitoring error or overcurrent). In this case these faults have to be eliminated.
	8	No	19	System startup or start of the minimal editor (OPEN and CLOSE service buttons at the power system pressed simultaneously)	No door commands are accepted The door is freewheeling.	• Wait until the system and motor are recognized. • Connect the motor. • Check the motor cable and connection.
	A	Yes	9	Active emergency unlocking mechanism	The controller is deactivated per FBLOCK and remote.	• Apply an ERM signal. • Wait for the ERM OFF delay. • Check the FBLOCK configuration.

Event code		Log	Prio	Description	System response	Troubleshooting
	c	Yes	6	Motor blocks in the opening direction	The response depends on the set reversing behavior in the opening direction. The warning remains active until the obstacle has been overcome or the door command has been changed.	• Remove obstacles in the drive path. • Increase the opening force (parameter Static force limit open). • The display can also occur in combination with other malfunctions (for example encoder error, monitoring error or overcurrent). In this case these faults have to be eliminated.
	H	Yes	12	Learn run active.	Learn run is being executed.	Wait until the learn run has been completed.
	N	No	7	No enable signal, disable active	The controller is deactivated per FBLOCK and remote.	• Apply an enable signal. • Check the FBLOCK configuration.
	i	Yes	16	Continuous door monitoring (vandalism protection) active	The door is braked when the door is moved from the outside to prevent the door from crashing into the end positions. The event is displayed for an interval of at least 5 s.	Avoid or remove external forces.
	4	Yes	17, 3, 2	Overload protection active. The temperature of the motor or of the controller is too high.	Depending on the motor and / or system load, the maximum speed and the acceleration and deceleration are reduced. In addition the hold-open time is increased. When the maximum loads are reached, the motor is de-energized until the motor and the controller have cooled down.	• Allow the motor and controller to cool. • Observe the installation instructions, see the section Installation (Page 91). • Check the door mass and friction. • Do not exceed the closing and opening cycles per hour! • Check the mechanical door components.
	P	Yes	11	Parameter error (error during learn run)	The controller is waiting for a new learn run.	• The distance between the door and the CLOSED position must be smaller than 10 cm before the learn run is started. • The door width must lie between 35 cm and 5 m. • There must not be any obstructions during the learn run.

Event code		Log	Prio	Description	System response	Troubleshooting
	U	Yes	12	Door mass too high or door parameter determining failed (error during learn run)	The controller is waiting for a new learn run. The learn run is invalid and has to be repeated. The determined door parameters were not stored.	• Increase the opening and closing forces so that the required end speed can be reached during the learn run → repeat the learn run. • Check whether the door mass is suitable for the limit of the movable dynamic door masses specified for the motor.
	"	Yes	18	Door command block for service buttons active	Controlling of the door by using the service buttons is blocked.	If appropriate, remove the door command block via the service menu or via the parameter interface.
	F	Yes	14	Motor undervoltage	A warning is displayed for 2 s. No system response. The motor is not moved if the voltage is too low.	• Check the input voltage of the controller at the power supply plug X3: The supply voltage of the controller has to amount to at least 20 V. • Check the line voltage. • Check the power supply and replace it if necessary.
	a	Yes	10	SF – illegal signal	A waning is issued for 1 s. No system response. Invalid signal state of a safety FBLOCK	• Check the FBLOCK configuration. • Check the digital input signals. • Take the SAND state machine into consideration.

5.8.1.3 Information

Information units signal the current status of the controller.

The following information is displayed:

Table 5- 56 Event code information

Event code		Log	Prio	Description	System response	Troubleshooting
	o	No	1	Controller / function OK		
	u	No	4	Door is closed		
	d	No	3	Door stands still during initialization move (OPEN and CLOSE signals are not applied or end position of the door reached).		• Travel to OPEN and CLOSE position. • Lat Open and Close commands be applied until both OPEN and CLOSE positions have been recognized by the controller (at least 1 s after end positions have been reached). • Current door width does not agree with the learned door width. Repeat the learn run.
	J	No	5	The DRS signal is effective. The door reverses.	The controlled direction of movement is the opposite.	-

5.8.2 Events list

All the system faults and warnings are stored retentively in an events list in the controller so that all the events can still be called up chronologically even after a power failure. Each event has a time stamp based on the system start of the controller.

List access

List access is carried out on the one hand by using the parameter interface of the field bus connection (see 32-bit array parameters r2030[x] and r2031[x]) or via the service menu (Main menu -> Service -> Event/Statistics -> Event log).

Data structure of an event entry:

Table 5- 57 Event entry

32-bit event entry	
24 bits	8 bits
Seconds since the event entry was added. 0 s if the event entry was added before the last system start.	Event code

5.8.2.1 Firmware / Software update

2 tools "Siemens HCS Firmware Loader" and "SIDOOR Manager" are available for updating the operating software of the SIDOOR door control unit. With the Siemens HCS firmware loader the operating software is updated via the serial service interface, and with the SIDOOR Manager by using Ethernet (TCP/IP).

Both programs are part of the SIDOOR SOFTWARE KIT, see Optional supplementary devices (Page 21). The operating instructions of the SIDOOR SOFTWARE KIT (http://support.automation.siemens.com/WW/view/en/92711247) describes the steps required to update the firmware with the respective tool.

The SIDOOR Manager can be started in batch mode so that a multi-firmware update can be carried out on several controllers simultaneously.

5.9 Structure of the user data / process data

The structure of the user data block in the telegram is independent of the specification of the USS/PROFINET/PROFIBUS specification used for data transfer. The structure (contents and structure) of the user/process data largely corresponds to the specifications for the cyclic data exchange of the PROFIBUS "variable-speed drives" profile. This ensures that users can use the same mechanisms to access the process data (= control/status words and setpoints/actual values) and parameters of a device irrespective of whether this is done via USS, PROFIBUS DP or PROFINET IO.

Telegram data structure

The user data for cyclic data transfer are subdivided into two areas that can be transferred in every telegram:

- **Parameter area (PKW)**

  The PKW area handles the parameter transfer between two communication partners (for example SIMATIC and SIDOOR).

  This involves, for example, reading and writing parameter values and reading parameter descriptions.

  The PKW interface generally contains tasks for operation and display, maintenance and diagnostics.

- **Process data area (PZD)**

  The PZD area consists of signals that are required for automation:

  – Control words and setpoints from the master to the slave

  – Status words and actual values from the slave to the master

  The contents of the parameter area and the process data area are defined by the slave drives. You will find additional information about this in the drive documentation.

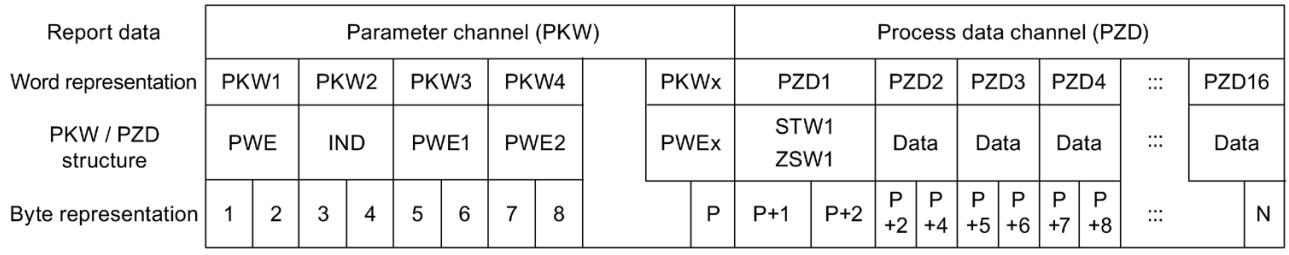


Figure 5-11 User data structure

Length of the PKW and PZD areas

The lengths of the PKW and PZD areas can be parameterized independently (p2023 (number of PZDs), p2022 (number of PKWs)). The master and slave communication partners have to agree on the lengths of the individual areas.

- **Constant number of user data**

  If telegrams are to be used only with a constant number of user data, the sum of the numbers of PKWs and PZDs must not exceed 126. According to the specification, a maximum of 252 bytes (126 words) of user data are permissible.

- **Variable PKW proportions**

  If telegrams with variable proportions of PKWs are to be used, the parameter for the number of PKWs (p2022) must be set to 127, irrespective of how the parameter for the number of PZDs is parameterized.

Additional information about the number of PKWs is available in the section Parameter value (PWE) (Page 161) and about the number of PZDs in the section Process data (Page 163).

5.9.1 Parameter interface

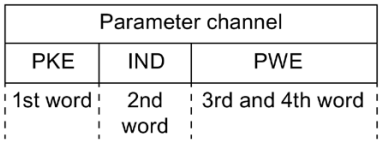
The PROFIBUS profile "Variable-speed drives" defines the user data structure with which an IO Controller can access the IO Devices.

The area for the parameter channel of the telegram can be used for monitoring and / or for modification of any parameters in the IO Device.

The parameter channel can be used to edit and monitor process data (read / write) as described below.

Parameter channel

The parameter channel comprises 3 or 4 words according to the channel type.



PKE Parameter ID

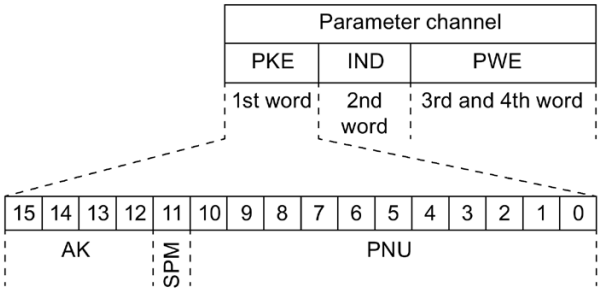
IND Parameter index

PWE Parameter value

Figure 5-12 Structure of the parameter channel in the telegram structure

5.9.1.1 Parameter ID (PKE)

Overview



Structure

Table 5- 58 Composition of the parameter ID (PKE)

Area	Bits	Description	Function
PNU	0 ... 10	Parameter number	Contains the rest of the parameter number Value range is defined from 0 to 1999. If parameter numbers ≥ 1999 are addressed, a parameter page must be selected from the high byte of the IND array (page index). Each parameter page contains 2000 parameter numbers
SPM	11	Spontaneous message	Function currently not supported
AK	12 ... 15	Task or response ID	Defines the task ID (master → slave) and the corresponding response ID (slave → master)

Task ID (AK)

In the following table, the abbreviation "W" is used for word (16 bits) and "DW" for double word (32 bits).

Table 5- 59 Task ID (master → slave)

Task ID					Description		Response ID			
Dec.	Bit 15	Bit 14	Bit 13	Bit 12			Positive			Negative
0	0	0	0	0	No PKW order		0	No response	–	7
1	0	0	0	1	Request PWE (parameter value)		1 / 2	Transfer PWE (parameter value)	W, DW	7
2	0	0	1	0	Change PWE (parameter value)	W	1	Transfer PWE (parameter value)	W	7
3	0	0	1	1	Change PWE (parameter value)	DW	2	Transfer PWE (parameter value)	DW	7
4	0	1	0	0	Request PBE (parameter description element) [1]		3	Transfer PBE element	–	7
5	0	1	0	1	Change PBE (parameter description element) [1]		3	Transfer PBE element	–	7
6	0	1	1	0	Request PWE (parameter value) [2]	Array	4 / 5	Transfer PWE (parameter value)	Array, W, DW	7
7	0	1	1	1	Change PWE (parameter value) [2]	Array, W	4	Transfer PWE (parameter value)	Array, W	7
8	1	0	0	0	Change PWE (parameter value) [2]	Array, DW	5	Transfer PWE (parameter value)	Array, DW	7
9	1	0	0	1	Request number of array elements	–	6	Transfer number of array elements	–	7
10	1	0	1	0	*Reserved*	–	–	–	–	7
11	1	0	1	1	*Reserved*	–	–	–	–	7
12	1	1	0	0	*Reserved*	–	–	–	–	7
13	1	1	0	1	*Reserved*	–	–	–	–	7
14	1	1	1	0	*Reserved*	–	–	–	–	7
15	1	1	1	1	*Reserved*	–	–	–	–	7

[1] The element number used is transferred in the IND array subindex.

[2] The position in the array is stated in the IND array subindex.

Response ID (AK)

Table 5- 60 Response ID (slave → master)

Response ID					Description	
Dec.	Bit 15	Bit 14	Bit 13	Bit 12		
0	0	0	0	0	No response	
1	0	0	0	1	Transfer PWE (parameter value)	Word
2	0	0	1	0	Transfer PWE (parameter value)	Double word
3	0	0	1	1	Transfer PBE (parameter description element) [1]	
4	0	1	0	0	Transfer PWE (parameter value) [2]	Array, word
5	0	1	0	1	Transfer PWE (parameter value) [2]	Array, double word
6	0	1	1	0	Transfer number of array elements	
7	0	1	1	1	Order not executable (with error number)	
8	1	0	0	0	*Reserved*	
9	1	0	0	1	*Reserved*	
10	1	0	1	0	*Reserved*	
11	1	0	1	1	*Reserved*	
12	1	1	0	0	*Reserved*	
13	1	1	0	1	*Reserved*	
14	1	1	1	0	*Reserved*	
15	1	1	1	1	*Reserved*	

[1] The element number used is transferred in the IND array subindex.

[2] The position in the array is stated in the IND array subindex.

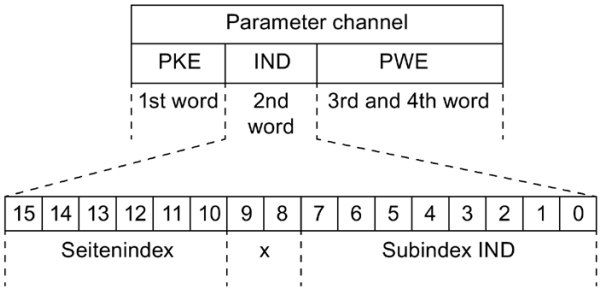
If orders cannot be executed, the order receiver sends the response ID "Order not executable", and transfers the corresponding error ID in the parameter value (PWE).

Table 5- 61 Error IDs for the response ID "Order not executable"

Error ID	Description
0	Impermissible parameter ID
1	Parameter value cannot be changed.
2	Parameter limits not observed
3	Subindex outside the array
4	Parameter is not an array
5	Parameter type is invalid (mismatch word and double word)
102	Communication channel too small for the required response
104	Invalid value, parameter allows only certain values
106	Request not observed or task not supported

5.9.1.2 Parameter index (IND)

Overview



Structure

The IND array (parameter index) is subdivided as follows:

Table 5- 62 IND structure

IND															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Page index						x	x	IND subindex							

IND subindex

The IND subindex array is an 8-bit value that is transferred in the low byte (bits 0 to 7) of the (IND) parameter index. In the PROFIBUS "variable-speed drives" profile, the subindex field is simply named "Subindex".

Parameter page index

The page index is used to select parameter pages. This enables the PNU value range to the extended (0 to 1999). The resulting parameter ID then has the value range from 0 to 65,999.

The page index is coded in bits 10 to 15 of the high byte of IND.

Bits 8 and 9 are reserved, and not used.

The page index is defined as multiple of 2000. The binary representation is also scrambled. The exact assignment of the bits is described below.

Table 5- 63 Parameter page index

IND															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
a	**d**	**c**	**b**	**f**	**e**										

Table 5- 64 Page index assignment

Value range of parameter ID		Bits for page index						Hex value	+ parameter number (PNU)
from	**to**	**a**	**d**	**c**	**b**	**f**	**e**		
0000	1999	0	0	0	0	0	0	0x00	0x0000 to 0x07CF
2000	3999	1	0	0	0	0	0	0x80	0x0000 to 0x07CF
4000	5999	0	0	0	1	0	0	0x10	0x0000 to 0x07CF
6000	7999	1	0	0	1	0	0	0x90	0x0000 to 0x07CF
8000	9999	0	0	1	0	0	0	0x20	0x0000 to 0x07CF
...	...	...	...	...	...	...	...	...	
32,000	33,999	0	0	0	0	0	1	0x04	0x0000 to 0x07CF
...	...	...	...	...	...	...	...	...	
64,000	65,999	0	0	0	0	1	0	0x08	0x0000 to 0x07CF

5.9.1.3 Parameter value (PWE)

The number of PWEs can vary according to the configuration. The number can be configured in parameter p2022 (Number of PKWs).

A PKW channel width of at least 3 words is required to transfer 16-bit values. This means that PWE1 is provided.

If 32-bit values are transferred, the PKW channel has to be expanded to 4 words. Correspondingly, PWE1 and PWE2 are then available.

Note

Variable PKW proportions and variable telegram lengths are not currently supported. This means that description texts, texts and complete arrays cannot be transferred.

Note

If a 16-bit value is transferred in a 32-bit channel in the PWE2, then the content of PWE1 is 0.

Structure

Table 5- 65 32-bit PKW channel

32-bit parameter channel (PKW)			
Word 1	Word 2	Word 3	Word 4
PKE	IND	**PWE1**	**PWE2**

Table 5- 66 16-bit PKW channel

16-bit parameter channel (PKW)		
Word 1	Word 2	Word 3
PKE	IND	**PWE1**

Table 5- 67 Variable PKW channel

Variable parameter channel (PKW)				
Word 1	Word 2	Word 3	...	Word x [1]
PKE	IND	**PWE1**		**PWEx** [1]

[1] 0 < x < (124 - "number of PZDs")

5.9.1.4 Parameter ID

The parameter ID comprises the PNU (array within PKE) and the page index (array within IND). In general, the parameter ID name is simplified to just PNU (parameter number).

The SIDOOR controller supports parameter numbers in the range of 0 to 65535. The exact assignment of the parameter numbers is described in the section Parameters (Page 125).

5.9.1.5 Parameter description (PBE)

The notation of the parameter description states the element number of the parameter description in the IND array subindex.

Table 5- 68 Elements of the parameter description

Element number	Meaning	Data type
0	*Reserved*	–
1	Designation ID	16 bit
2	Number of array elements	8 bit
3	*Reserved*	–
4	*Reserved*	–
5	*Reserved*	–
6	*Reserved*	–
7	Low limit value	16 bit
8	High limit value	16 bit
9	Default value (factory setting)	16 bit
10 ... 15	*Reserved*	–

The subindex 255 for transferring a complete parameter description or a complete array requires a variable telegram length which is not currently supported.

The designation ID (element number 1) consists of the following bits:

Bit	Meaning
0 ... 7	Data type of the parameter value
8	Scaling and major attribute relevant
9	Write-protected
10	Additional text available
11	*Reserved*
12	Parameter differs from factory settings
13	Parameter can only be reset
14	Parameter is an array
15	*Reserved*

5.9.2 Process data

Telegrams

The type of telegram on the drive side defines which process data is to be transferred between master and slave.

From the point of view of the slave, there are receive words and send words.

The receive and send words comprise the following elements:

- **Receive words:** Control words or setpoints
- **Send words:** Status words or actual values

Telegram type used

The supported telegram type is specific to the manufacturer, and structured according to internal company specifications. The internal process data connections are set automatically by the system.

Process data

The desired scope of the process data can be configured with parameter p2022 (number of PZDs). The assignment order is not additionally configurable.

The table below describes the structure of the process data and its subdivision into:

- Control word (STW) – status word (ZSW)
- Technology control words (TSW) – technology status words (TZW)

Table 5- 69 Overview of process data

PZD	1	2	3	4	5	6	7	...	16
IO Controller → IO Device	STW1 (Page 164)	TSW0 (Page 166)	TSW1	TSW2 (Page 173)	*Reserved*	*Reserved*	*Reserved*	...	*Reserved*
IO Device→ IO Controller	ZSW1 (Page 167)	TZW0 (Page 169)	TZW1 (Page 171)	TZW2 (Page 173)	TZW3 (Page 175)	TZW4 (Page 176)	TZW5 (Page 177)	...	*Reserved*

5.9.2.1 STW1 - control word (CtrlW)

Control word -1 (STW1) is identical to the specification in the PROFIBUS profile "Variable-speed drives".

Bits 0 to 10 correspond exactly to the specifications for the PROFIBUS profile "Variable-speed drives". The use and non-use of specific bits is marked accordingly.

The table below describes the assignments of the bits in control word 1.

Table 5- 70 Control word 1 (STW1)

Bit	Meaning
0	ON / OFF 1
1	*Reserved*
2	OFF 3 (Rapid stop of the drive)
3	Enable operation
4	*Reserved*
5	*Reserved*
6	*Reserved*
7	Fault acknowledge
8	*Reserved*
9	*Reserved*
10	Control via PLC
11 ... 15	*Reserved*

The following overview describes the relevant bits in control word 1. See the figure state diagram control unit in the section Control unit (Page 28).

Table 5- 71 Explanation of bits in STW1

Bit	Meaning	Value	Comment
0	ON / OFF 1	1	Switch drive ready for operation (master switched on and voltage ready)
		0	Not ready for switching on (master switched off and voltage off) Switching according to defined ramp → corresponds to stop
	Note: The positive edge is decisive here (0 → 1).		
2	OFF 3	1	OFF 3 commands are revoked
		0	Rapid stop of the drive, motor hold, i.e. stop
3	Enable operation	1	Enable operation, execution of the door commands (evaluation of technology control words)
		0	No execution of the drive orders
7	Fault acknowledge	1	Acknowledge fault
		0	No significance
	Note: The positive edge is decisive here (0 → 1).		
10	Control via PLC	1	Control via PLC (IO Controller) Process data are marked as valid, and are thus accepted and effective
		0	No control via PLC (IO Controller) Process data invalid Local operation is possible Signs of life are excluded from this (master monitoring)
	Note: First set to bit to 1 when control via the IO Controller has been requested (ZSW1 Bit 9 = true)		

5.9.2.2 TSW0 - technology control word 0

Table 5- 72 Technology control word 0 (TSW0)

TSW0	
15 ... 4	3 ... 0
Remote DCMD extension	**Remote DCMD**

Remote DCMD signal

The remote DCMD signal is located in the lower bits 0 to 3 of the TSW0. It has an enumerative structure and is assigned the door commands.

If a reserved value is transferred, it is rejected and the last valid value is retained.

Additional information about the door command is available in the section Door commands (Page 35).

Table 5- 73 Remote DCMD signal

Remote DCMD signal value	Meaning	Description
0	No door command / Deenergize	Motor coasts down, current is not supplied. (motor freewheeling)
1	Stop	The door system is stopped. The winding is short-circuited (EMC brake) (motor NOT freewheeling)
2	Open	Drive moves in learned opening direction
3	Close	Drive moves in learned closing direction
4	Start learn run	Learn run with active parameter record (see section Learn run (Page 45))
...		
15	*Reserved*	

Remote DCMD extension bits

The door command extension bits for the remote DCMD signal are located in the upper bits 4 to 15 of the TSW0.

Table 5- 74 Remote DCMD extension bits

Bit	Meaning
8	Slow (see the section Slow door profile (Page 44))
9	Nudging (Page 44) (FW V2.4 or higher)
11	Special (see section Learn run (Page 45))
13	BLKSync (see Waiting mode (Page 51))
14	DCOPS sensor (see the section DCOPS (Door Closed / Opened Position Sensor (Page 53))
15	DRS (see the section DRS - reversing unit (Page 50))

5.9.2.3 ZSW1 - status word (StatW)

Status word 1 (ZSW1) is identical to the specification in the PROFIBUS profile "Variable-speed drives".

Bits 0 to 10 correspond exactly to the specifications for the PROFIBUS profile "Variable-speed drives". The use and non-use of specific bits is marked accordingly.

The table below describes the assignments of the bits in status word 1.

Table 5- 75 Status word 1 (ZSW1)

Bit	Meaning
0	Ready to switch on
1	Ready to operate
2	Enable operating
3	Fault present
4	*Reserved*
5	No OFF3 (No rapid stop)
6	Switching on inhibited
7	Warning (warning active)
8	*Reserved*
9	PLC control requested
10	Command discrepancy (Door command discrepancy)
11 ... 15	*Reserved*

The following overview describes the relevant bits in status word 1. See the figure state diagram control unit in the section Control unit (Page 28).

Table 5- 76 Explanation of bits in ZSW1

Bit	Meaning	Value	Comment
0	Ready to switch on	1	Ready to start, power supply switched on and system initialized
		0	Not ready for switch on
1	Ready to operate	1	Ready to operate, system is switched on ("ON" command is applied), no fault is active, system can start up as soon as the "Enable operating" command is given (see also STW1 Bit 0).
		0	Not ready to run, no "ON" command
2	Enable operating	1	Operation enabled, door command is being executed (system follows the setpoint values) See also STW1 bit 3
		0	Door command is not executed, operation is blocked
3	Fault	1	System fault effective, drive faulty and therefore out of service (see Faults (Page 144)) After acknowledgment and successful elimination of the cause, the drive switches to switching on inhibited.
		0	No fault present
5	NO OFF 3	1	No OFF3 (No rapid stop) active
		0	Rapid stop (stop) active, an OFF3 command is present
6	Switch-on inhibit	1	Switching on inhibited, restart is only possible by means of OFF1 and then ON
		0	No switching on inhibited, switching on is possible
7	Warning	1	System warning effective (Warnings (Page 148))
		0	No warning effective
9	PLC control requested	1	PLC control requested, the PLC is requested to take over control
		0	Control is only possible on the device, the PLC is not the current controller
10	Command discrepancy	1	A discrepancy exists between the door commands via the fieldbus and the digital inputs (FBLOCK).
		0	No discrepancy exists between the door commands.
	Note: ON time of the discrepancy amounts to 2 seconds.		

Note

The operation is also conditional on the operating mode of the door control unit.

Initial mode is active in the event of a non-learnt or incorrectly learnt door. Normal mode is not attained until both end positions have been determined after power on, and these end positions match those that have been learnt.

5.9.2.4 TZW0 - Technology status word 0

Table 5- 77 Technology control word 0 (TSW0)

15 ... 12	11	10	9	8	7	6	5 ... 3	2 ... 0
Reserved	**BLKDETECTEDOP**	**BLKDETECTEDCLS**	**DREVERSE**	**ERM**	**MOTMODE**	**WAITCMD**	**DMODE**	**DSTAT**

DSTAT signal

The DSTAT signal is located in the lower nibble of the lower byte of the TZW0 (Bits 0 to 3). It has an enumerative structure and is assigned the door status (DSTAT).

Table 5- 78 DSTAT signal

DSTAT signal value	Meaning	Description
0	Undefined	Door status is unknown.
1	Motor de-energized	Motor de-energized
2	Closing	The door system is moving in the learnt closing direction
3	Opening	The door system is moving in the learnt opening direction
4	Stopped (EMF brake)	The door system has stopped, winding is short-circuited
5	Closed	The door system is completely closed.
6	Open	The door system is completely open.
7	Error	The door system is in an error state

DMODE signal

The DMODE signal is located in the lower byte of the TZW0 (Bits 3 to 5). It has an enumerative structure and is assigned the door mode (DMODE) .

Table 5- 79 DMODE signal

DMODE signal value	Meaning	Description
0	Undefined	The system mode is undefined (system shut down, system is being booted or storing of safety-oriented parameters)
1	Learn run mode	Both end positions and other door properties are determined
2	Initial mode	Both end positions after Power ON have to be determined
3	Normal mode	Both end positions after Power ON have been determined, ready to operate
4	Fault mode	The system is in a fault status.

WAITCMD signal

The WAITCMD signal is located in the lower byte of the TZW0 (Bit 6).

Table 5- 80 WAITCMD signal

WAITCMD signal value	Meaning	Description
0	Wait mode inactive	
1	Wait mode active	The system suppresses the existing door command and waits for a door command change.

MOTMODE signal

The MOTMODE signal is located in the lower byte of the TZW0 (Bit 7).

Table 5- 81 MOTMODE signal

MOTMODE signal value	Meaning	Description
0	Motor de-energized	Motor de-energized
1	Motor de-energized	Motor energized.

ERM signal

The ERM signal is located in the upper byte of the TZW0 (Bit 8).

Table 5- 82 ERM signal

ERM signal value	Meaning	Description
0	ERM inactive	Inactive system emergency unlocking system.
1	ERM inactive	Emergency unlocking mode active, system is freewheeling and motor de-energized.

DREVERSE signal

The DREVERSE signal is located in the upper byte of the TZW0 (Bit 9).

Table 5- 83 DREVERSE signal

DREVERSE signal	Meaning	Description
0	Reversing inactive	Door does not reverse, the controlled direction remains the same.
1	Reversing active	Door reverses, the controlled direction of movement is the opposite.

BLKDETECTEDCLS (FW V2.4 or higher)

The BLKDETECTEDCLS signal is located in the upper byte of the TZW0 (bit 10).

Table 5- 84 BLKDETECTEDCLS signal

DREVERSE signal	Meaning	Description
0	No obstruction	
1	Obstruction	The system has detected an obstacle during motion in the closing direction.

BLKDETECTEDOP (FW V2.4 or higher)

The BLKDETECTEDOP signal is located in the upper byte of the TZW0 (bit 11).

Table 5- 85 BLKDETECTEDOP signal

DREVERSE signal	Meaning	Description
0	No obstruction	
1	Obstruction	The system has detected an obstacle during motion in the opening direction.

5.9.2.5 TZW1 - Technology status word 1

Table 5- 86 Technology status word 1 (TZW1)

TZW1				
15 ... 9	8	7 ... 6	5 ... 3	2 ... 0
STATCODE	**BLKSTAT**	**DBLK**	**FINHIBOP**	**FINHIBCLS**

FINHIBCLS signal

The FINHIBCLS signal is located in the lower byte of the TZW1 (Bits 0 to 2).

Table 5- 87 FINHIBCLS signal

FINHIBCLS signal value	Meaning	Description
0	Not available	FINHIBCLS – "Force inhibiting in close direction" Deviation of the inhibiting force in the closing direction against the friction determined in the last learn run as a percentage. (Provision of the measured values of the last 10 complete door openings and closings.)
1	x <= -75%	
2	-75% < x <= -50%	
3	-50% < x <= -25%	
4	+25% > x > -25%	
5	+50% > x >= +25%	
6	+75% > x >= +50%	
7	x >= +75%	

FINHIBOP signal

The FINHIBOP signal is located in the lower byte of the TZW1 (Bits 3 to 5).

Table 5- 88 FINHIBOP signal

FINHIBOP signal value	Meaning	Description
0	Not available	FINHIBOP – "Force inhibiting in open direction" Deviation of the inhibiting force in the opening direction against the friction determined in the last learn run as a percentage. (Provision of the measured values of the last 10 complete door openings and closings.)
1	x <= -75%	
2	-75% < x <= -50%	
3	-50% < x <= -25%	
4	+25% > x > -25%	
5	+50% > x >= +25%	
6	+75% > x >= +50%	
7	x >= +75%	

DBLK signal

The DBLK signal is located in the lower byte of the TZW1 (Bits 6 to 7).

Table 5- 89 DBLK signal

Bit	Meaning	Value	Comment
6	Obstruction in the opening direction	1	Obstruction in the opening direction was recognized
	No obstruction	0	No obstruction is present.
7	Obstruction in the closing direction	1	Obstruction in the closing direction was recognized.
	No obstruction	0	No obstruction is present.

BLKSTAT signal

The BLKSTAT signal is located in the upper byte of the TZW1 (Bit 8).

Table 5- 90 BLKSTAT signal

BLKSTAT signal value	Name	Description
0	Response to obstruction inactive	No response to obstruction active.
1	Response to obstruction active	Response to obstruction is active, e.g. door reversed.

STATCODE signal

The STATCODE signal is located in the upper byte of the TZW1 (Bit 9 ... 15).

Table 5- 91 STATCODE signal

STATCODE signal value	Name	Description
0	No status	No information, fault or warning available.
1 ... 127	Status	Current status of the status display. (See Status display (Page 143))

5.9.2.6 TZW2 - Technology status word 2

Table 5- 92 Technology status word 2 (TZW2)

TZW2						
15 ... 14	13 ... 12	11 ... 10	9 ... 8	7	6 ... 5	4 ... 0
DOUT	**SFINFAULT**	**SFIN**	**SDINFAULT**	*Reserved*	**SDIN**	**DIN**

DIN signal

The DIN signal is located in the lower byte of the TZW2 (Bits 0 to 4).

Table 5- 93 DIN signal bits

Bit	Meaning	Value	Comment
0	Input 0 active	1	X5, INPUT 0
	Input 0 inactive	0	
1	Input 1 active	1	X6, INPUT 1
	Input 1 inactive	0	
2	Input 2 active	1	X6, INPUT 2
	Input 2 inactive	0	
3	Input 3 active	1	X6, INPUT 3
	Input 3 inactive	0	
4	Input 4 active	1	X6, INPUT 4
	Input 4 inactive	0	

SDIN signal

The SDIN signal is located in the lower byte of the TZW2 (Bits 5 to 6).

Table 5- 94 SDIN signal bits

Bit	Meaning	Value	Comment
5	SAFETY digital input 0 active	1	Status FBLOCK SAND0
	SAFETY digital input 0 inactive	0	
6	SAFETY digital input 1 active	1	Status FBLOCK SAND1
	SAFETY digital input 1 inactive	0	

SDINFAULT signal

The SDINFAULT signal is located in the upper byte of the TZW2 (Bits 8 and 9).

Table 5- 95 SDINFAULT signal bits

Bit	Meaning	Value	Comment
8	Error SAFETY digital input 0	1	Error status FBLOCK SAND0
	OK	0	
9	Error SAFETY digital input 1	1	Error status FBLOCK SAND1
	OK	0	

SFIN signal

The SFIN signal is located in the upper byte of the TZW2 (Bits 9 and 10).

Table 5- 96 SFIN signal bits

Bit	Meaning	Value	Comment
10	SAFETY frequency input 0 active	1	Status FBLOCK FREQ0
	SAFETY frequency input 0 inactive	0	
11	SAFETY frequency input 1 active	1	Status FBLOCK FREQ1
	SAFETY frequency input 1 inactive	0	

SFINFAULT signal

The SFINFAULT signal is located in the upper byte of the TZW2 (Bits 11 and 12).

Table 5- 97 SFINFAULT signal bits

Bit	Meaning	Value	Comment
12	Error SAFETY frequency input 0	1	Error status FBLOCK FREQ0
	OK	0	
13	Error SAFETY frequency input 1	1	Error status FBLOCK FREQ1
	OK	0	

DOUT signal

The DOUT signal is located in the upper byte of the TZW2 (Bits 13 and 14).

Table 5- 98 DIN signal bits

Bit	Meaning	Value	Comment
14	Digital output 0 active	1	Digital relay output OUTPUT 0
	Digital output 0 inactive	0	
15	Digital output 1 active	1	Digital relay output OUTPUT 1
	Digital output 1 inactive	0	

5.9.2.7 TZW3 - Technology status word 3

Table 5- 99 Technology status word 3 (TZW3)

TZW3			
15	14 .. 8	7	6 ... 0
Reserved	**DPOS**	*Reserved*	**SysLOAD**

SysLOAD signal

The SysLOAD signal is located in the lower byte of the TZW3 (Bits 0 to 6).

Table 5- 100 SysLOAD signal

SysLOAD signal value	Name	Description
0 ... 127%	System load	The controller load and the motor load are combined into the system load (SysLOAD). The system load is determined solely by the larger of the two values and is specified as a %, see Overload protection and system load (Page 56).

DPOS signal

The DPOS signal is located in the upper byte of the TZW3 (Bits 8 to 14). It has an enumerative structure and is assigned the current door position (DPOS) in %.

Table 5- 101 DPOS signal

DPOS signal value	Name	Description
0 ... 100	Door position	Door position in % Note: The value is only valid in normal mode. The door positions 100% and 0% can only be reached in combination with the "Open" and "Close" door commands. The door positions 99% and 1% correspond to fully open and fully closed without an active door command. Values between 99% and 1% specify the door position as a percentage. If a valid position value is not available, 127 or 7Fhex is transferred (> 100%). In partially open operation the door position continues to reference the real door width. The values 100 and 99% are not reached in partially open operation.

5.9.2.8 TZW4 - Technology status word 4

Table 5- 102 Technology status word 4 (TZW4)

TZW4	
15 ... 0	
VMON1	

Table 5- 103 Sensor

VMON1 value	Meaning	Description
0 ... 65535 (-32768 ... 32767)	Variable monitoring value 1	The value is monitored that is set in the parameter p4700. (Factory setting: "Actual motor current"). (See p4700 "Variable monitoring value 1")

5.9.2.9 TZW5 - Technology status word 5

Table 5- 104 Technology status word 5 (TZW5)

TZW5
15 ... 0
VMON2

Table 5- 105 VMON2

VMON2 value	Meaning	Description
0 ... 65535 (-32768 ... 32767)	Variable monitoring value 2	The value is monitored that is set in the parameter p4701. (Factory setting: "Actual speed"). (See p4701 "Variable monitoring value 2")

5.10 Technical specifications

5.10.1 Controllers

Article number	6FB1231-3BM12-7AT0	6FB1231-3BM11-7AT0
General information		
Product type designation	ATE530S COATED	ATE531S
Product version	With PROFINET interface and protective coating	With PROFINET interface, protective coating, and temperature extension
Optional product expansion	Standard mounting rail holder 6FB1144-0AT00-3AS0	
Manufacturer's article no. of the usable motor	6FB1203-0AT12-7DA0	
Manufacturer's article no. of the usable power supply unit	6FB1112-0AT20-2TR0	
Mean time between failures (MTBF)	13 y	
Installation type/mounting		
Installation and mounting instructions	No direct exposure to the sun	
Supply voltage		
Design of the power supply	Via SIDOOR TRANSFORMER or via DC	
Rated value (DC)	36 V; with MED280: at 24 V DC max. door speed of 500 mm/s, at 28.8 V DC max. door speed of 800 mm/s. With MEG251: at 24 V DC max. door speed of 500 mm/s, at 28.8 V DC max. door speed of 750 mm/s	
permissible range, lower limit (DC)	19.2 V	
permissible range, upper limit (DC)	37.1 V	
Protection in case of DC supply	Use of a circuit breaker in the supply path according to 60898-1, 8A, C-characteristic type SIEMENS: 5SY4108-7 or 5SY4108-7KK11	

Article number	6FB1231-3BM12-7AT0	6FB1231-3BM11-7AT0
Encoder supply		
Output voltage (DC)	24 V; Ensure correct polarity! CAUTION: Do not supply with external voltage!	
short-circuit proof	Yes	
Overload-proof	Yes	
Power		
Active power input	80 W	
Active power input, max.	540 W	
Active power input (standby mode)	7 W	
Digital inputs		
Control inputs isolated	Yes	
Control inputs p-switching	Yes	
Digital outputs		
Relay outputs		
Switching capacity of contacts		
– at 30 V DC, min.	0.01 A	
– at 30 V DC, max.	0.5 A	
Mechanical data		
Opening width of door, min.	0.35 m	
Opening width of door, max.	5 m	
Weight of door, max.	280 kg	
Operating cycle frequency of door, max.	180 1/h	
Kinetic energy, max.	75 J	
Interfaces		
Interfaces/bus type	PROFINET according to Conformance Class A, B, C; integrated switch for linear and ring structure	
Isolation		
Overvoltage category	2	
Degree and class of protection		
IP degree of protection	IP20	
Standards, approvals, certificates		
CE mark	Yes	No
UL approval	No	
China RoHS compliance	Yes	
Standard for EMC	EN 61000-6-2 / EN 61000-6-4 / EN 61326-3-1 / EN 50121-3-2 / EN50121-4 / EN50121-5	
Standard for safety	EN 60950-1 / EN 60335-1 / EN 14752 / EN ISO 13849-1 Cat. 2 PL d / IEC 62061: SIL 2	
Ambient conditions		
Ambient temperature during operation		
• min.	-25 °C	
• max.	50 °C	70 °C

Article number	6FB1231-3BM12-7AT0	6FB1231-3BM11-7AT0
• Remark	Screw control device thermally conductive onto a metallic mounting surface or standard rail mounting, otherwise the maximum operating temperature is only 40 °C	to ensure compliance with MTBF value, ensure that the ambient temperature is less than 50 °C for 90 % of operating time and screw the control unit onto a metallic mounting surface in a manner that ensures thermal conductivity or use standard rail mounting. At operating temperatures above 50 °C, the maximum output current of the 24 V DC output is a maximum of 0.1 A and the maximum number of cycles is 60/h
Ambient temperature during storage/transportation		
• Storage, min.	-40 °C	
• Storage, max.	85 °C	
Altitude during operation relating to sea level		
• Installation altitude above sea level, max.	2 000 m	
Relative humidity		
• No condensation, min.	10 %	
• No condensation, max.	93 %	
Dimensions		
Width	320 mm	
Height	60 mm	
Depth	80 mm	

5.10.2 Dimension drawing of the controller

Dimension drawing of the controller

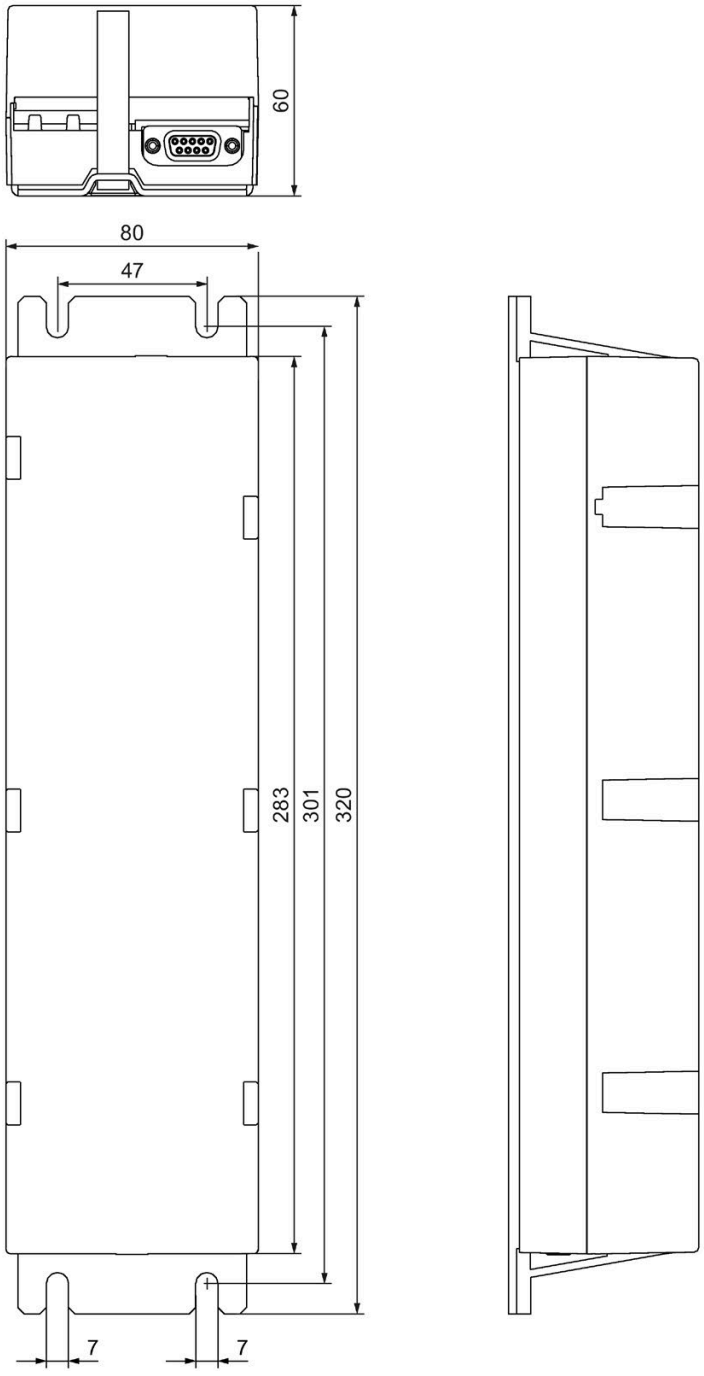


Figure 5-13 Controller dimensions

5.10.3 System load

A drive cycle encompasses a complete opening and closing of the door. Under the following conditions the SIDOOR control unit can be operated unrestrictedly with 3 travel cycles per minute:

Door property	Travel distance	1.2 m
	Friction	50 N
	Mass	240-280 kg
Driving curve parameters	Force limitation	300 N
	Energy limitation	20 J
	Acceleration	3000 mm/s^2
	Deceleration	1200 mm/s^2
Environment	Temperature	55 °C

5.10.4 Printed circuit board coating

Product	Article number	Main circuit board	PROFINET module	Fan module
ATE530S COATED	6FB1231-3BM12-7AT0	Coated	Coated	Not available
ATE531S	6FB1231-3BM11-7AT0	Coated	Coated	Coated

The gray hatched areas in the following coating diagrams are not coated.

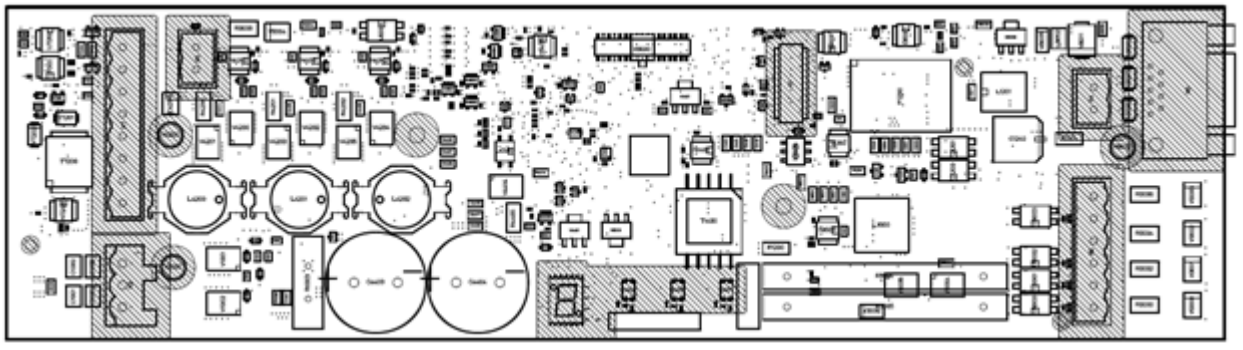


Figure 5-14 Main circuit board component side

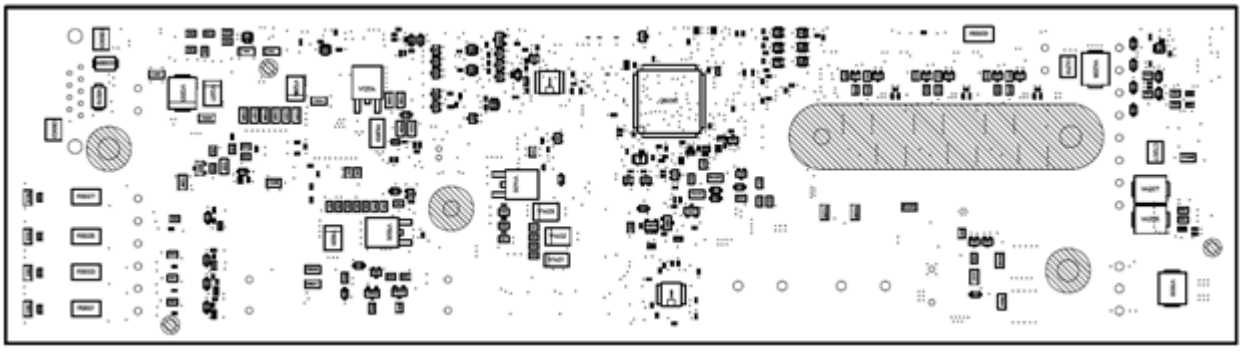


Figure 5-15 Main circuit board solder side

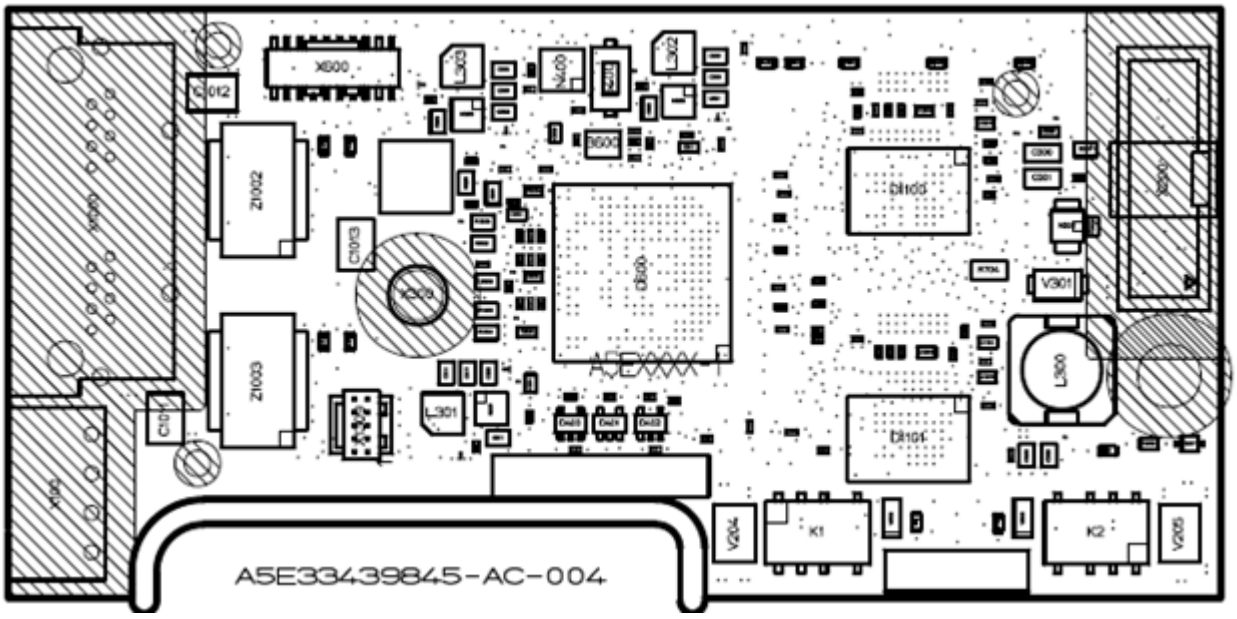


Figure 5-16 PROFINET module component side

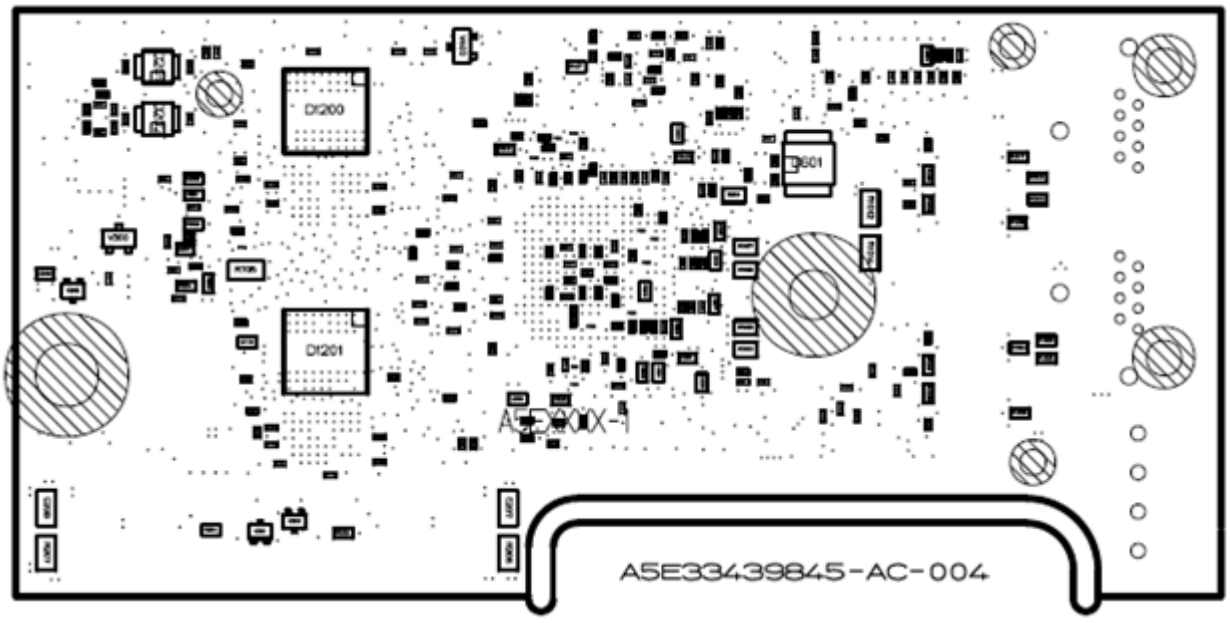


Figure 5-17 PROFINET module solder side

Motors

6

6.1 Description

Overview

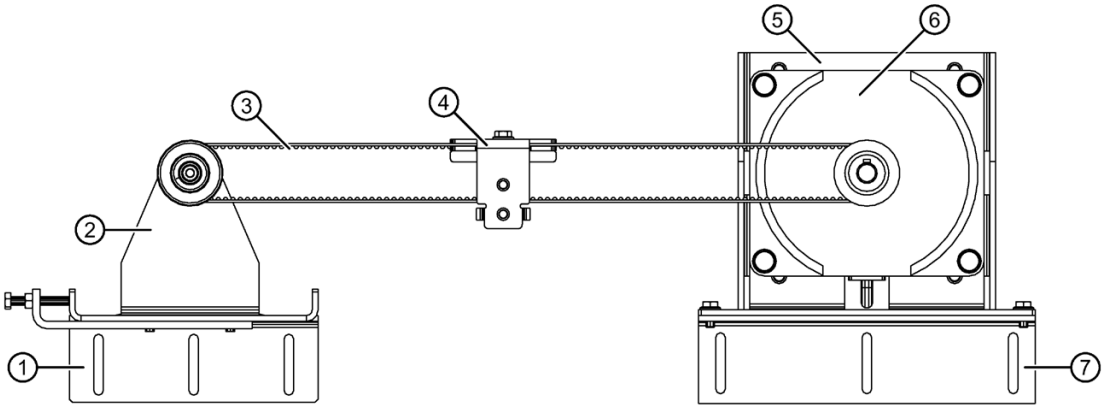
EC flat motor SIDOOR MED280 EC geared motor SIDOOR MEG251

This maintenance-free drive unit consists of an EC flat motor or of a speed-controlled EC geared motor. The motor is to be selected in accordance with the door mass and the mechanical structure.

The geared motor is equipped with a non-self-locking gear and is available with a gear outlet to the left or right. The gear outlet direction is defined when viewing the gear unit from the front.

6.2 Mounting of EC flat motor SIDOOR MED280

Overview



① Mounting bracket
② Deflector unit
③ Toothed belt
④ Door clutch holder
⑤ Motor holder
⑥ Motor
⑦ Motor mounting bracket

Note

Optional components

The following components are optional and can be obtained from Siemens:

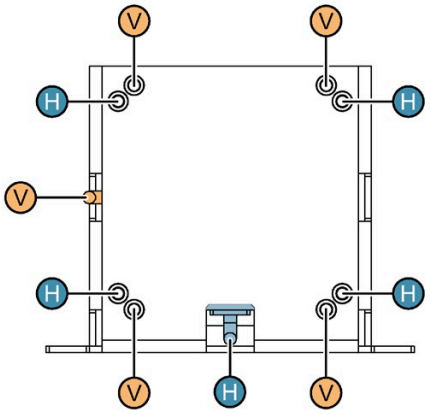
- Motor holder
- Mounting bracket
- Motor mounting bracket
- Deflector unit
- Door clutch holder

Additional information is available in the section Accessories (Page 18).

Mounting variants

Motor

The motor can be installed horizontally or vertically. Horizontal installation with the cable outlet at the bottom is recommend. The position of the axle of the belt pulley mounted on the motor remains the same in both mounting positions.



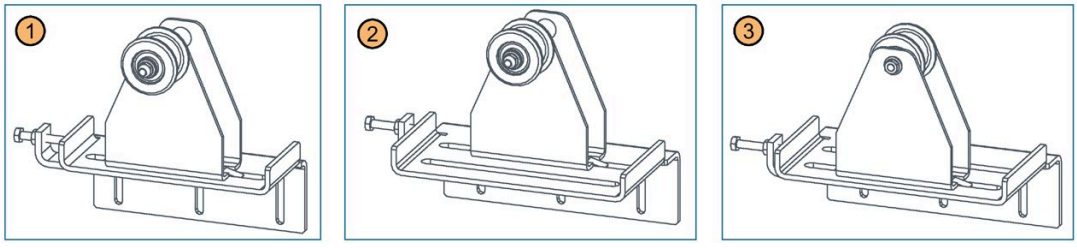
H Horizontal installation with the cable outlet at the bottom

V Vertical installation with the cable outlet at the side

Horizontal installation with the cable outlet at the bottom is shown in the following, generally applicable installation steps.

Deflector pulley

The deflector pulley can be mounted in the following three ways:



① Variant with **small** mounting bracket and deflector pulley mounted **externally**
② Variant with **large** mounting bracket and deflector pulley mounted **externally**
③ Variant with **large** mounting bracket and deflector pulley mounted **centrally**

Mounting variant 1 is shown in the following, generally applicable installation steps.

Procedure

WARNING

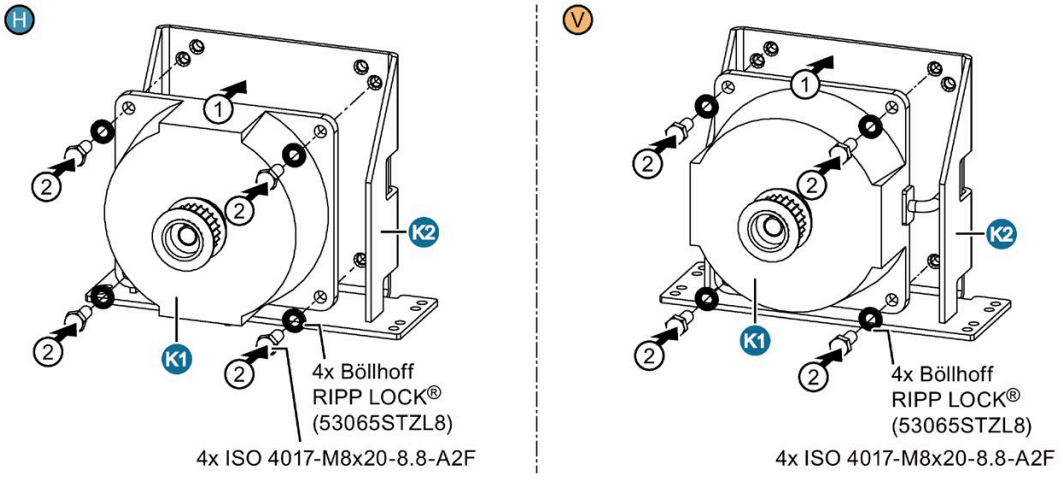
Risk of injury and damage to property as a result of incorrect installation

Improper and incorrect installation can lead to serious injuries.

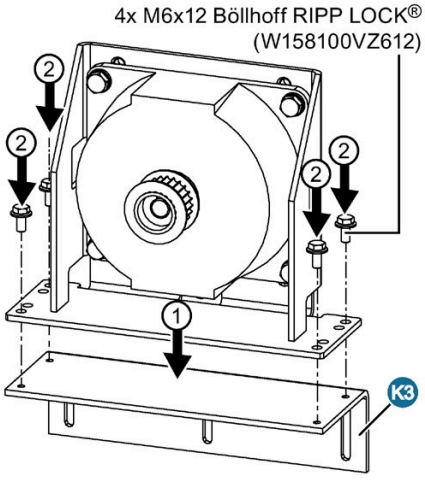
Observe the instructions for safe installation.

The mechanical installation of the motor is performed in the following steps:

1. Mount the motor (K1) on the motor holder (K2).

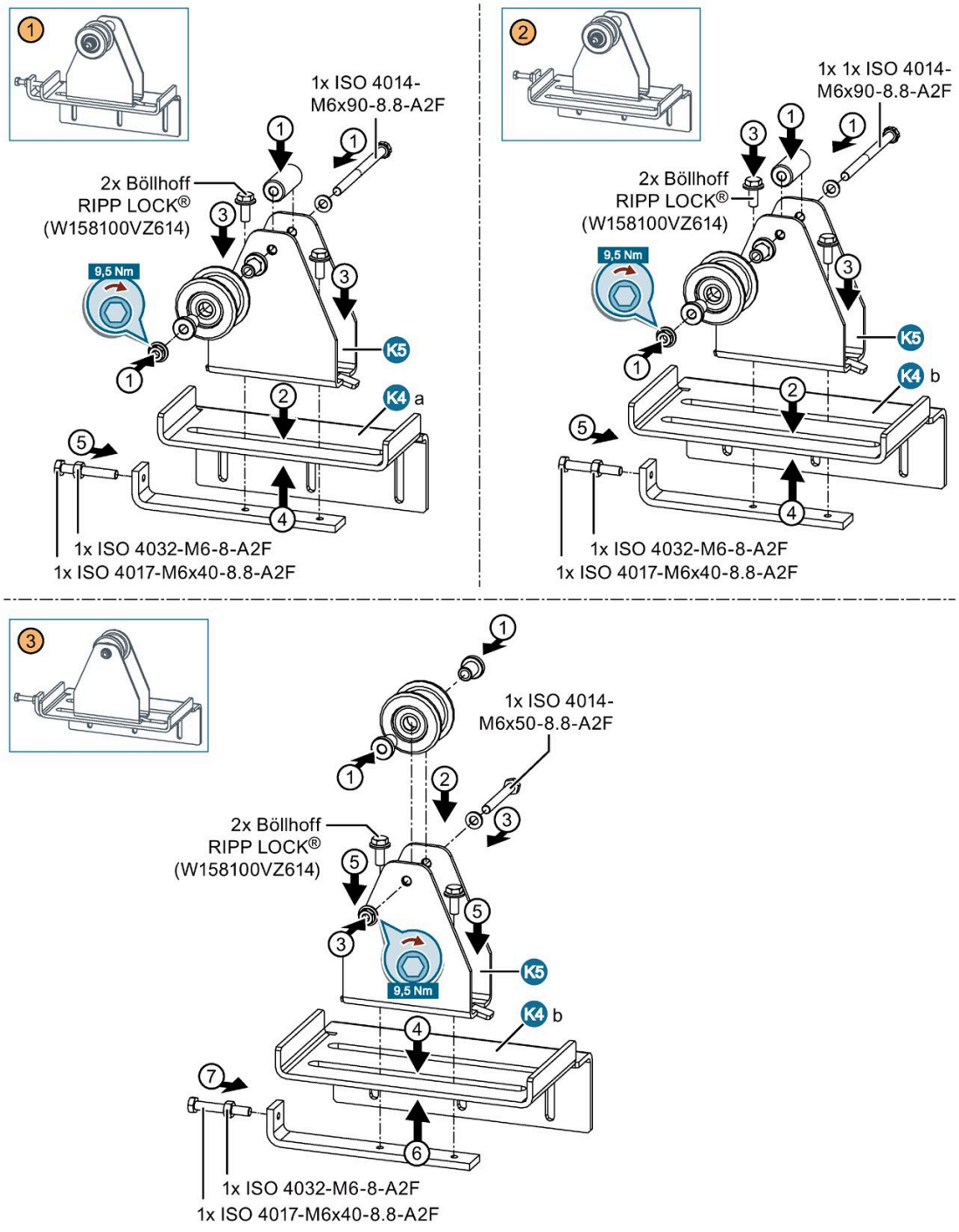


Then, if necessary, mount the motor on the mounting bracket (K3).



2. Mount the deflector unit (K5) with mounting bracket (K4 a/b*) if required.

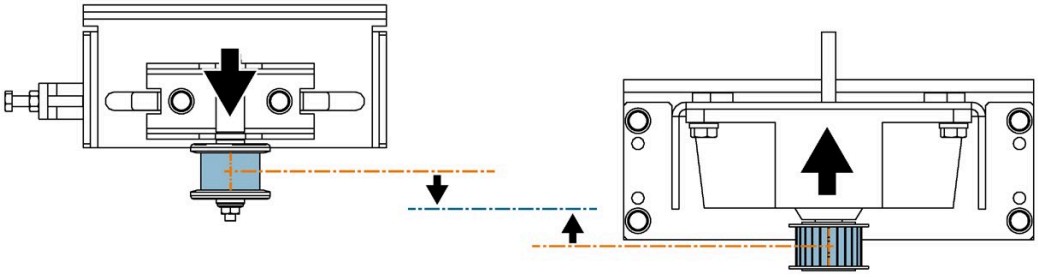
   * a = small mounting bracket, b = large mounting bracket



Tightening torque

Ensure that the tightening torque of 9.5 Nm is maintained when modifying the deflector unit with the ISO 4014 M6x50 or M6x90 nut and bolt combination.

Ensure that the drive pinion and deflector pulley are aligned when doing so. They have to be exactly aligned to ensure a long drive service life.

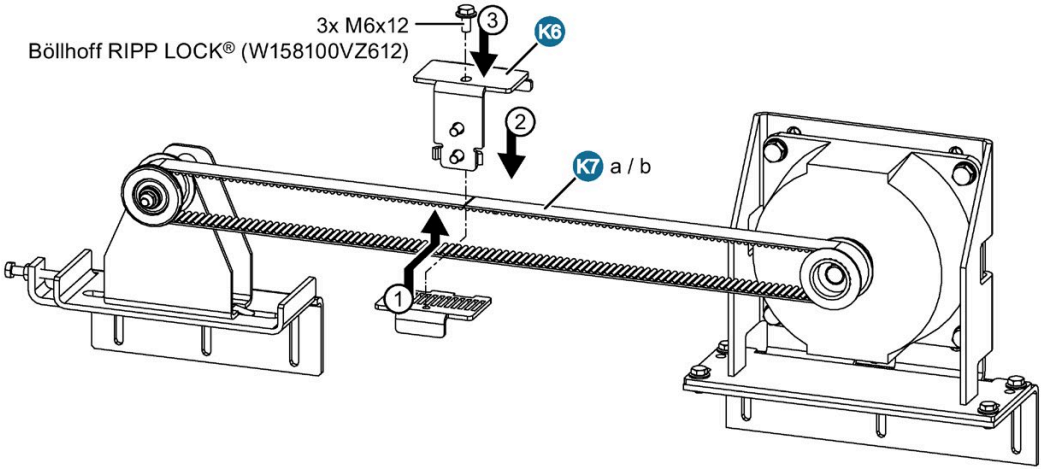


3. Pass the toothed belt (K7 a/b*) over the deflector pulley and drive pinion.

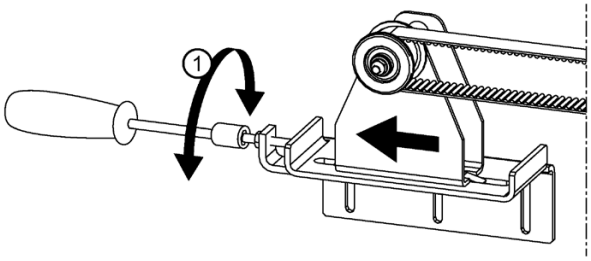
   Place both open ends of the toothed belt in the door clutch holder (K6).

   Screw the door clutch holder together.

   *a/b = toothed belt, length 4 m / toothed belt, length 45 m



4. Tension the toothed belt with the aid of the tensioning device.

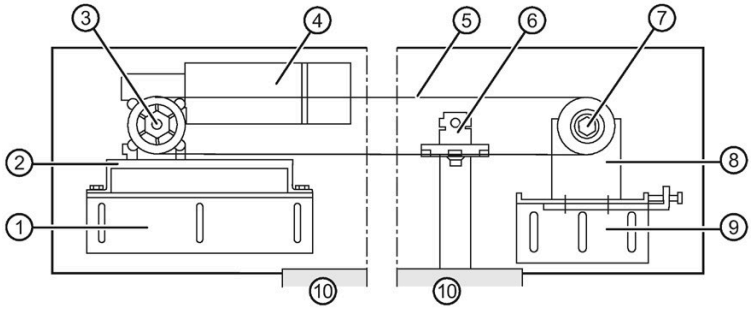


   Check the belt tension with a suitable measuring instrument. Ensure that the belt strand tension is 250 N per strand.

5. When the desired belt tension has been achieved, lock the M6x40 tightening bolt against the clamping piece with the M6 nut supplied to prevent unintentional loosening.

6.3 Mounting of EC geared motor SIDOOR MEG251

Overview



① Mounting bracket
② Motor mount
③ Drive pinion
④ Geared motor
⑤ Toothed belt
⑥ Door clutch holder
⑦ Deflector pulley
⑧ Deflector unit (with deflector pulley)
⑨ Tensioning device / mounting bracket
⑩ Door

Note

Optional components

The rubber-metal anti-vibration mount, mounting bracket, tensioning device / mounting bracket, deflector unit / deflector pulley, and door clutch holder are optional components and can be obtained from Siemens. You will find further information in the Section SIDOOR MEG251 accessories (Page 19).

Procedure

WARNING

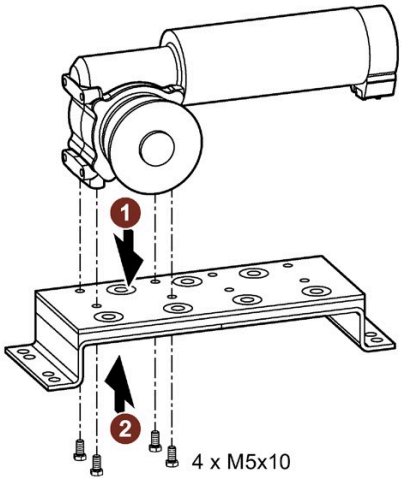
Risk of injury and damage to property as a result of incorrect installation

Improper and incorrect installation can lead to serious injuries.

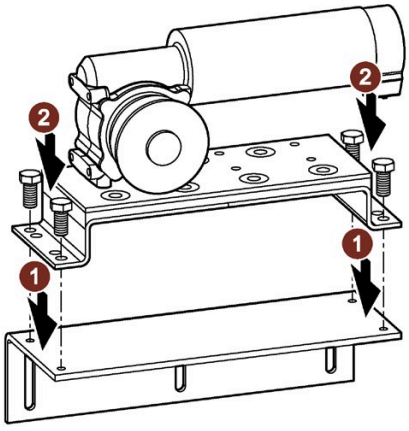
Observe the instructions for safe installation.

The mechanical installation of the geared motor is performed in the following steps:

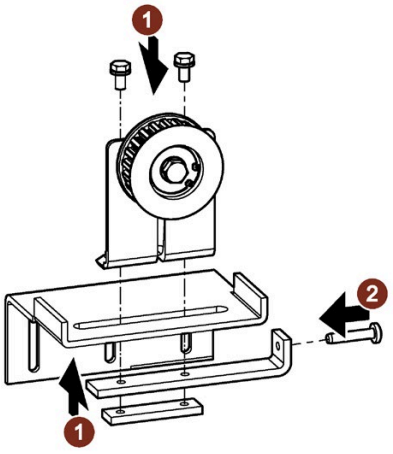
1. Mount the geared motor on the rubber-metal anti-vibration motor mounting.



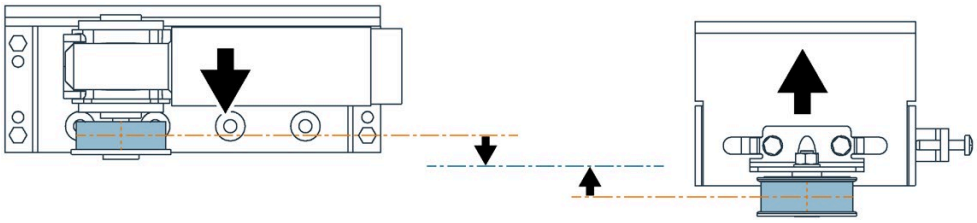
Then, if necessary, mount the geared motor on the mounting bracket.



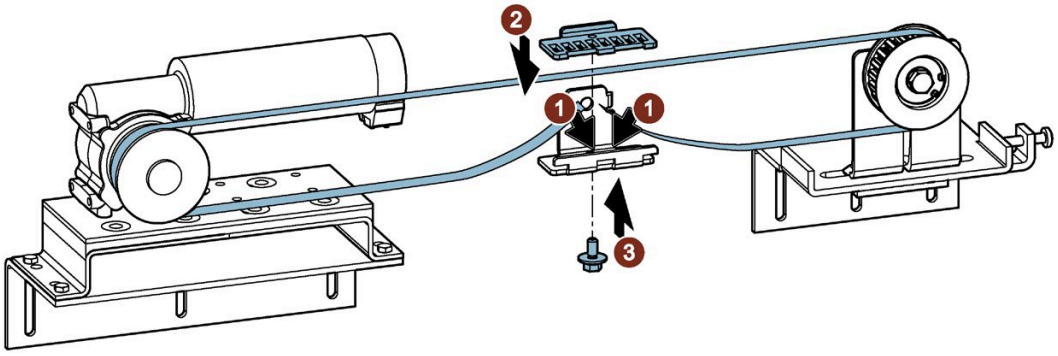
2. Mount the deflector unit, if necessary with a mounting bracket.



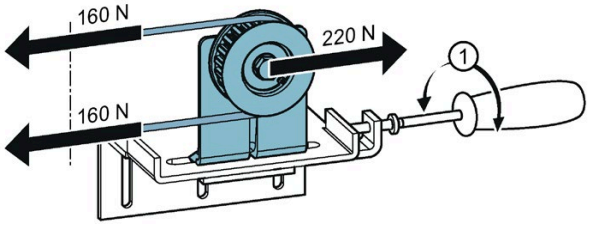
Ensure that the drive pinion and deflector pulley are aligned when doing so. They have to be exactly aligned to ensure a long drive service life.



3. Pass the toothed belt over the deflector pulley and drive pinion. Place both open ends of the toothed belt in the door clutch holder. Screw the door clutch holder together.



4. Tension the toothed belt with the aid of the tensioning device. Set the span tension of the toothed belt for the MEG251 motor to 160 N and for the MED280 motor to 220 N



6.4 Span tension

The span tension T of the belt is calculated as follows:

$$T = 4 \cdot k \cdot L^2 \cdot f^2$$

T: Span tension [N]
k: Meter weight [kg/m]
L: Belt length [m]
f: Frequency [Hz]

The following table shows the natural frequency (f) of the belt for the recommended span tension (T) at different belt lengths (L).

Motor	**SIDOOR MED280**	**SIDOOR MEG251**	**SIDOOR MEG251**
Belt system	**optibelt OMEGA HP 5M STD-55M, 20 mm**	**Conti SYNCHROLINE STS-S8M, 12 mm**	**CONTI SYNCHROLINE STS-S8M 14 mm**
Article number	6FB1104-0AT05-0AB0 6FB1104-0AT06-0AB1	6FB1104-0AT01-0AB0 6FB1104-0AT02-0AB0	6FB1104-0AT03-0AB0 6FB1104-0AT04-0AB0
Recommended span tension (T)	220 N ±20 N	160 N ±10 N	160 N ±10 N
Meter weight (k)	0.070 kg/m	0.062 kg/m	0.072 kg/m
Belt length (L)	**Frequency (f)**	**Frequency (f)**	**Frequency (f)**
0.3 m	93.4 Hz	84.7 Hz	78.6 Hz
0.5 m	56.1 Hz	50.8 Hz	47.1 Hz
1.0 m	28.0 Hz	25.4 Hz	23.5 Hz
1.5 m	18.7 Hz	16.9 Hz	15.7 Hz
2.0 m	14.0 Hz	12.7 Hz	11.8 Hz
2.5 m	11.2 Hz	10.2 Hz	9.4 Hz
3.0 m	9.3 Hz	8.5 Hz	7.9 Hz
3.5 m	8.0 Hz	7.2 Hz	6.7 Hz
4.0 m	7.0 Hz	6.3 Hz	5.9 Hz
4.5 m	6.2 Hz	5.6 Hz	5.2 Hz
5.0 m	5.6 Hz	5.0 Hz	4.7 Hz

6.5 Technical specifications

6.5.1 Technical specifications of motor

Motor

Article number	6FB1203-0AT12-7DA0	6FB1203-5AT00-7MP0	6FB1203-5AT01-7MP0
General information			
Product brand name	SIDOOR		
Product type designation	MED280	MEG251 L	MEG251 R
Product version	With driven gear	With driven gear on the left	With driven gear on the right
Supply voltage			
Rated value (DC)	24 V		
Input current			
Operational current (rated value)	9.7 A	6.8 A	
Power			
Active power input	233 W	163 W	
Mechanical data			
Torque of the rotary operating mechanism (rated value)	4.7 N·m	4.1 N·m	
Speed, max.	0.8 m/s	0.75 m/s	
Gear ratio		15	
Number of pulses per revolution, max.	1 024	100	
Weight of door, max.	280 kg	250 kg	
Breakaway force, max.		50 N	
Degree and class of protection			
IP degree of protection			
• of the motor	IP54	IP40	
• of the gear unit		IP40	
Ambient conditions			
Ambient temperature during operation			
• min.	-25 °C	-20 °C	
• max.	70 °C		
Ambient temperature during storage/transportation			
• Storage, min.	-40 °C		
• Storage, max.	85 °C		

Article number	6FB1203-0AT12-7DA0	6FB1203-5AT00-7MP0	6FB1203-5AT01-7MP0
Dimensions			
Width of motor	160 mm		
Height of motor	140 mm	100 mm	
Length of motor	56 mm	249 mm	
• including drive pinion	91 mm		
Diameter of motor		62 mm	
Width of gear unit, including drive pinion		86 mm	

6.5.2 Technical specifications of accessories

SIDOOR MED280 accessories

SIDOOR motor holder

Article number	6FB1104-0AT03-0AD0
General information	
Product brand name	SIDOOR
Product type designation	Motor support
Suitability for use	Motor MED280

SIDOOR motor mounting bracket

Article number	6FB1104-0AT01-0AS0
General information	
Product brand name	SIDOOR
Product type designation	mounting bracket
Dimensions	
Width of mounting bracket	90 mm
Height of mounting bracket	60 mm
Length of mounting bracket	230 mm

SIDOOR door clutch holder

Article number	6FB1104-0AT05-0AS1
General information	
Product brand name	SIDOOR
Product type designation	door clutch holder
Dimensions	
Width of door clutch holder	51 mm
Height of door clutch holder	61 mm
Length of door clutch holder	72 mm
Width of toothed belt	20 mm

SIDOOR deflector unit

Article number	6FB1104-0AT07-0AS0
General information	
Product brand name	SIDOOR
Product type designation	deflector unit
Product version	with deflector pulley
Dimensions	
Width of holder, including belt pulley	94 mm
Height of holder, including belt pulley	120 mm
Length of holder	94 mm
Width of belt pulley, including flanged pulley	31 mm
Diameter of belt pulley, including flanged pulley	45 mm

SIDOOR mounting bracket

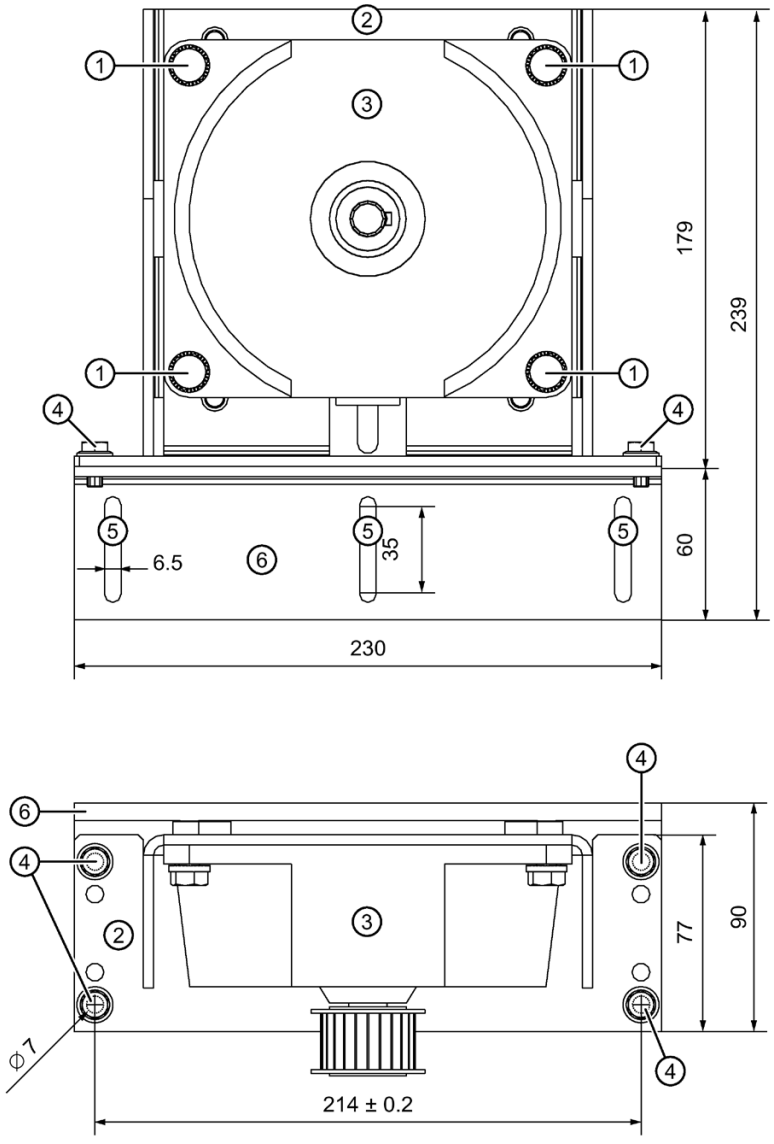
Article number	6FB1104-0AT05-0AS4	6FB1104-0AT05-0AS5
General information		
Product brand name	SIDOOR	
Product type designation	mounting bracket	
Product version	without tensioning device for deflector pulley	with tensioning device for deflector pulley
Dimensions		
Width of mounting bracket	120 mm	80 mm
Height of mounting bracket	60 mm	59 mm
Length of mounting bracket	190 mm	170 mm

SIDOOR toothed belt

Article number	6FB1104-0AT05-0AB0	6FB1104-0AT06-0AB1
General information		
Product brand name	SIDOOR	
Product type designation	toothed belt	
Product version	With STD tooth profile, 20 mm wide and 4 m long	With STD tooth profile, 20 mm wide and 45 m long
Type of toothed belt	STD-S5M	
Dimensions		
Width of toothed belt	20 mm	
Length of toothed belt	4 m	45 m

6.5.3 Dimension drawing of motor

Dimension drawing of SIDOOR MED280 motor with motor holder and mounting bracket



① • 4 x ISO 4017-M8x20-8.8-A2F hexagon bolts
• 4 x Böllhoff RIPP LOCK® lock washers (53065STZL8)

② Motor holder

③ Motor

④ 4 x M6x12 Böllhoff RIPP LOCK® hexagon bolts (W158100VZ612)

⑤ 3 x M6x16 safety hexagonal screws

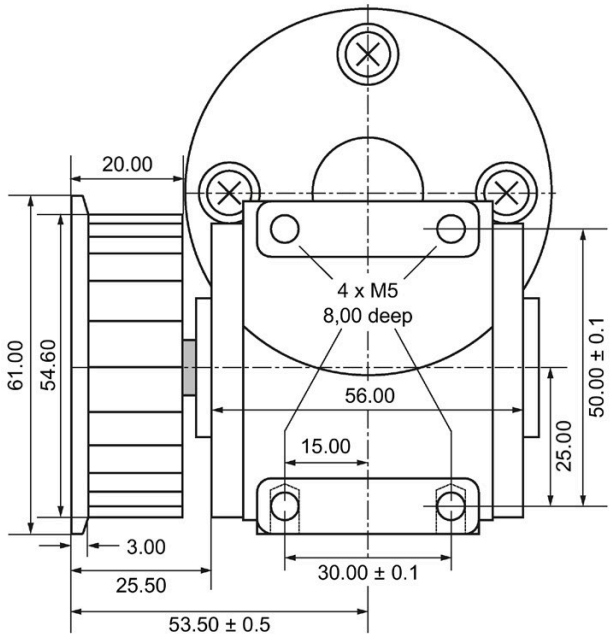
⑥ Mounting bracket

Figure 6-1 Dimensions of SIDOOR MED280 motor with motor holder and mounting bracket

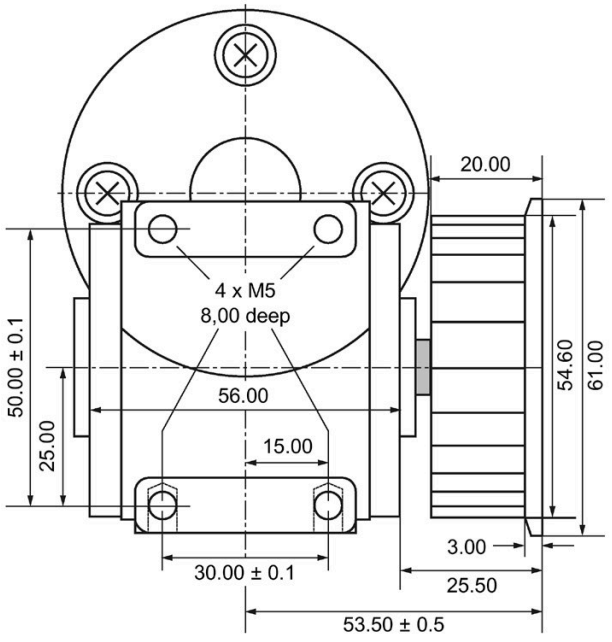
Dimension drawing SIDOOR MEG251 dimension drawing

Front view

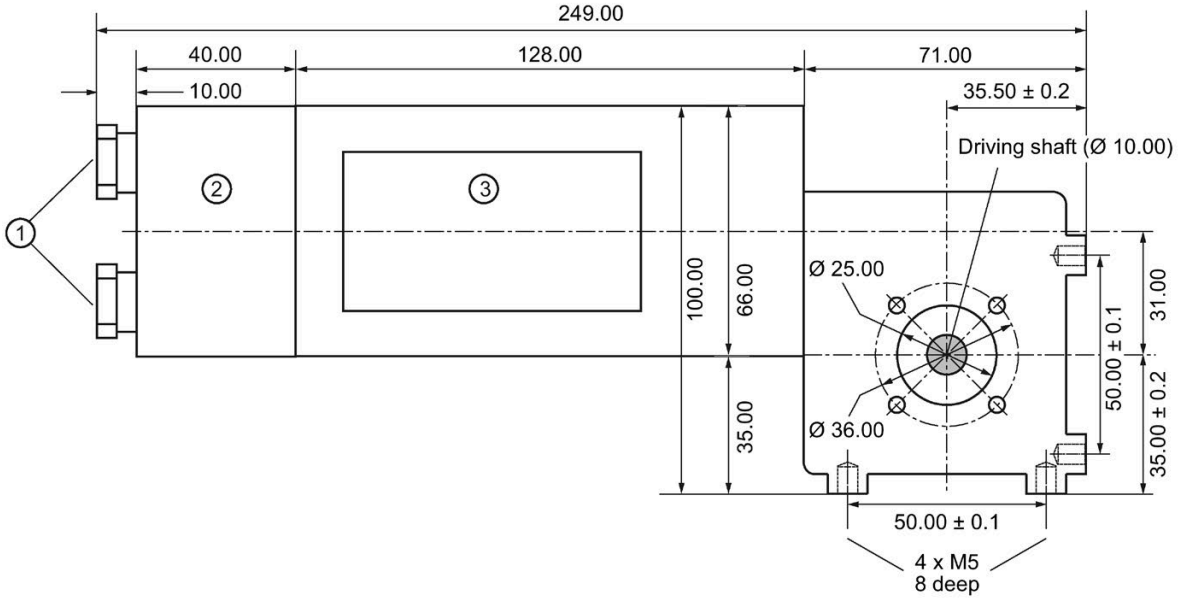
Motor on left



Motor on right



Side view



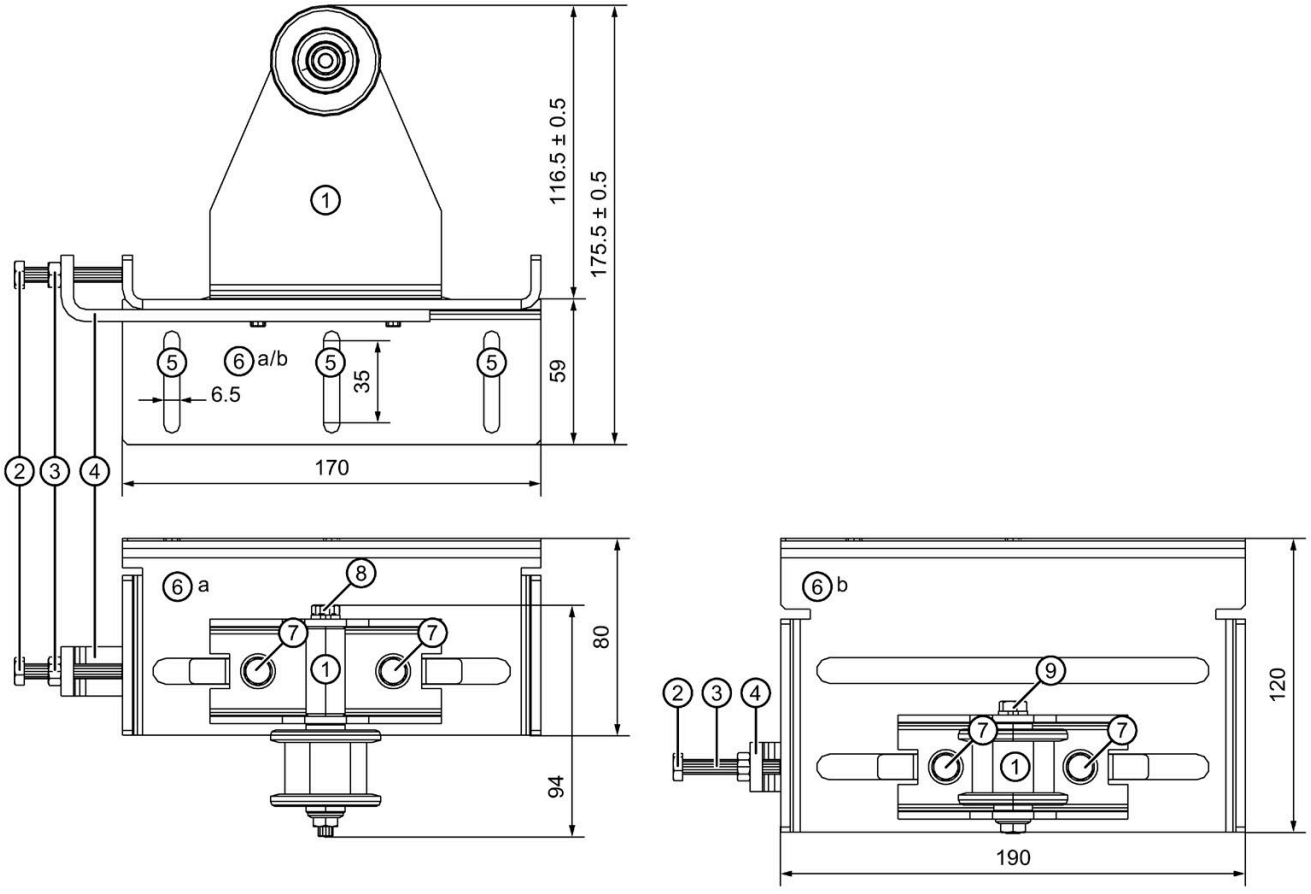
① Cable gland (IP54)
② Encoder housing
③ Rating plate

See also

SIDOOR MEG251 accessories (Page 19)

6.5.4 Dimension drawing of deflector unit

Dimension drawing of deflector unit with mounting bracket SIDOOR MED280



① Deflector unit
② 1 x ISO 4017-M6x40-8.8-A2F hexagon bolt
③ 1 x ISO 4032-M6-8-A2F hexagon nut
④ Clamping piece
⑤ 3 x M6x16 safety hexagonal bolts
⑥ a: small mounting bracket
b: large mounting bracket
⑦ 2 x Böllhoff RIPP LOCK® bolts (W158100VZ614)
⑧ 1 x ISO 4014-M6x90-8.8-A2F hexagon bolt
⑨ 1 x ISO 4014-M6x50-8.8-A2F hexagon bolt

Figure 6-2 Dimensions of deflector unit with mounting bracket

Dimension drawing of deflector unit with mounting bracket SIDOOR MEG251

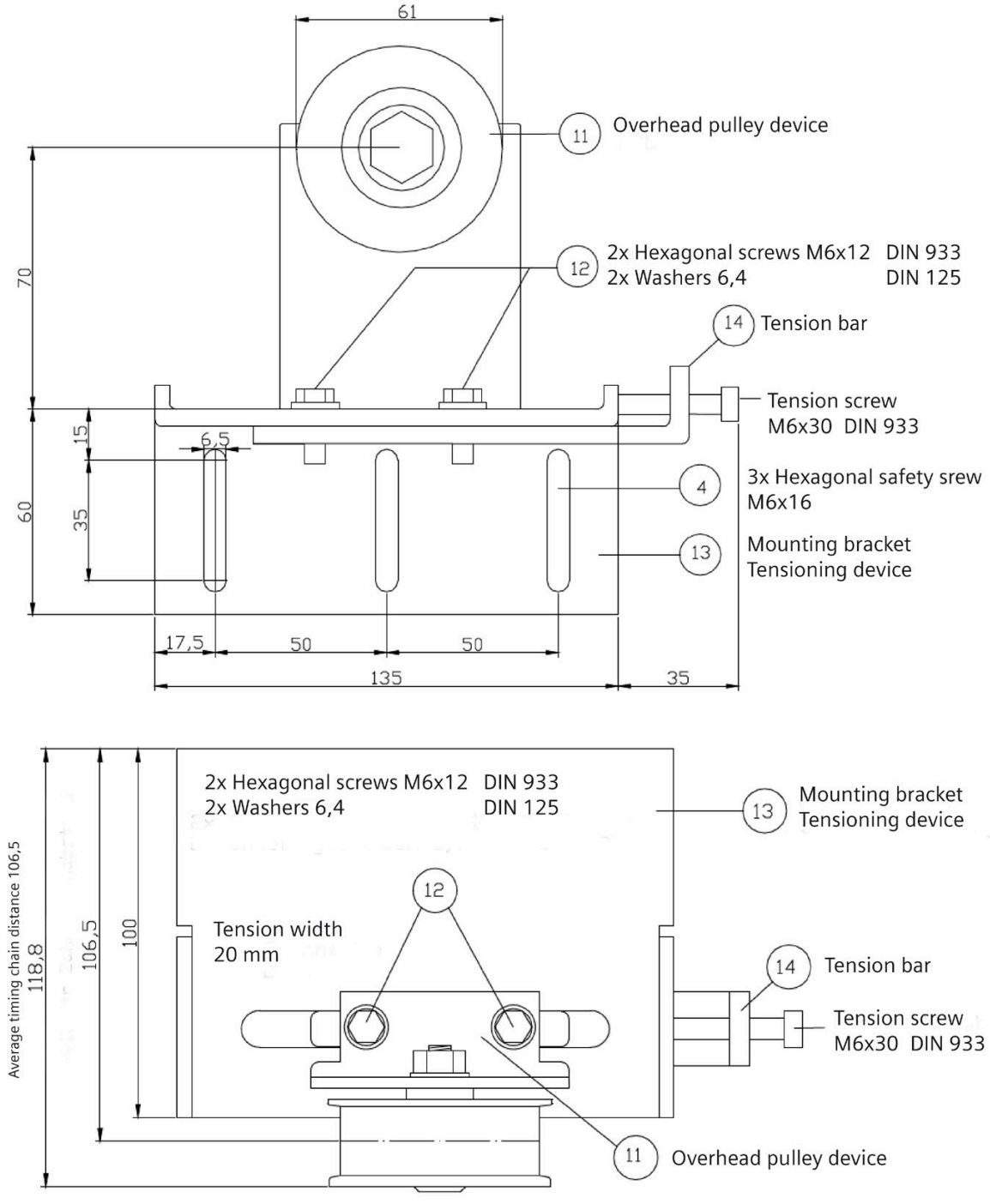
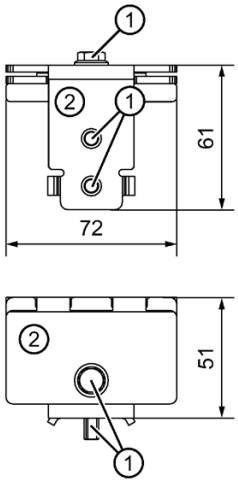


Figure 6-3 Deflector pulley with tensioning device and mounting bracket

6.5.5 Dimension drawing of door clutch holder

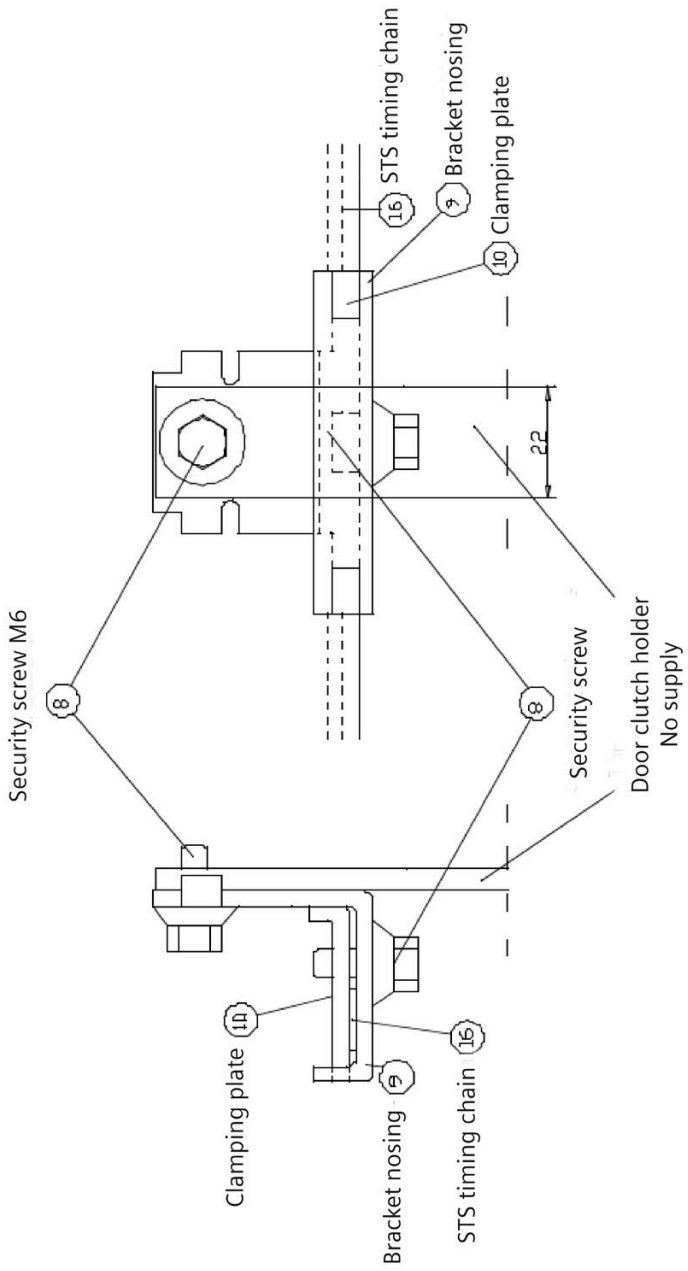
Dimension drawing door clutch holder SIDOOR MED280



① 3 x M6x12 Böllhoff RIPP LOCK® safety bolts (W158100VZ612)
② Door clutch holder

Figure 6-4 Dimensions of the door clutch holder

Dimension drawing door clutch holder SIDOOR MEG251



Power supply

7

The following 2 power supply variants are available for the SIDOOR ATE530S COATED und ATE531S:

- SIDOOR TRANSFORMER (6FB1112-0AT20-2TR0) for 220-240 V (10%), 50/60Hz power supply
  Usage of the transformer is only permitted up to an ambient temperature of 55 °C. Above a temperature of 55 °C in the direct vicinity an external direct-current supply has to be connected.
- SIDOOR TRANSFORMER UL (6FB1112-0AT21-2TR0)
- Direct voltage supply provided by customer

7.1 Direct voltage supply provided by customer

7.1.1 Requirements

The following requirements have to be fulfilled by a direct voltage supply provided by the customer:

Supply voltage

In **normal operation** a non-grounded SELV voltage according to EN 61010-2-201 with a typical voltage of 24 V.

The full performance, i.e. a maximum end speed of 800 mm/s, is achieved with the MED280 motor at a supply voltage of ≥28.8 V. In the process the maximum supply voltage of 37.1 V is to be observed.

At 80% of the typical supply voltage (≥ 24 V * 0.8=19.2V) only a maximum end speed of approx. 570 mm/s is achieved with the MED280 motor. Meaning that only limited performance is still available.

In case of a **fault scenario** of the **power supply unit** the output voltage of the power supply unit has to remain smaller than 60 V.

In case of a **fault** in the **SIDOOR controller** voltages of up to 60 V can occur.

Power supply

Normal operation requires an operational peak current of ≥14A for ≥3s as well as a continuous current of ≥9A. Smaller current values can result in operating faults, depending on the selected settings (ramps, end speeds, forces) and the door properties (friction, weight).

To ensure triggering of the automatic circuit breaker in case of a fault of the SIDOOR controller, the utilized power supply unit must have the following properties:

- ≥13A continuous current, even in case of a short-circuit

  - OR -

- Effective short-circuit current ≤8A$_{RMS}$, period duration ≤10s, peak current ≤55A

In the case of a fault on the part of the power supply unit or of the SIDOOR controller the current is limited by the miniature circuit breaker C8 Automat according to EN 60898-1.

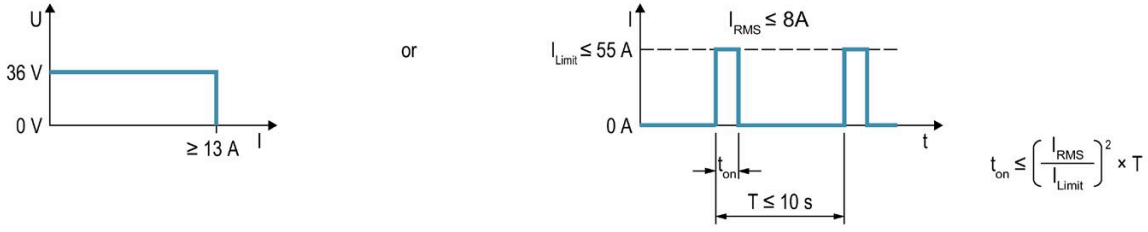


Figure 7-1 Definition of the power supply current in the event the SIDOOR control unit fails

Fusing

A miniature circuit breaker according to EN 60898-1, 8A, C-characteristic of the type SIEMENS: 5SY4108-7 or 5SY4108-7KK11 is to be inserted into the supply network by the customer. It must be ensured that the miniature circuit breaker is only operated within the permissible range. The miniature circuit breaker must be installed in the vicinity of the SIDOOR controller at a similar ambient air temperature.

Voltage immunity of the power supply unit at an energetic recovery system

No voltage overshoots are to be expected at an additional load of 40 mA with the feeding direct voltage supply of 24 V in **normal operation**.

In the case of a fault the SIDOOR controller will limit the energetic recovery voltage to < 42 V.

Topology specification

The spatial extent of the used supply current circuit must be smaller than 30 m, no DC power supply networks.

Requirements for the supplying mains

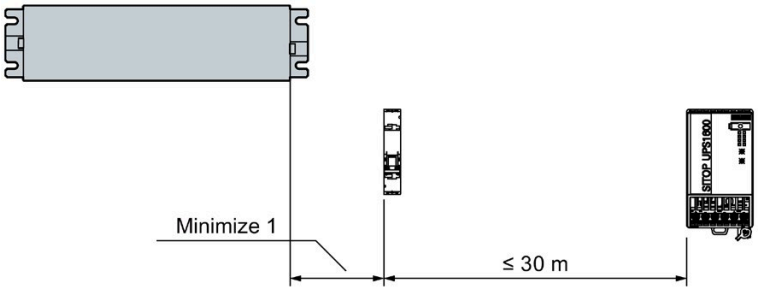
The supplied alternating current mains may have a maximum overvoltage category 2 according to EN 61010-1, EN 61010-2-201.

EMC

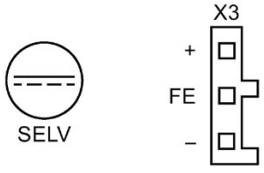
The interference immunity of supply input X3 was tested as signal input with respect to EN 61000-4-5 surge immunity. The limit values for the conducted interference emission according to EN 50121-3-2:2016 are observed without filter. Conducted interference emission is not defined for direct current supply according to EN 61000-6-4:2007+A1:2011. If, however, the limits of EN 61000-6-4:2007+A1:2011, Table 2 – Interference emission – low voltage alternating current supply are to be applied, a corresponding filter, e.g. of the type EPCOS (B84112-B-B110), is to be installed upstream.

7.1.2 Installation

A miniature circuit breaker (type SIEMENS: 5SY4108-7 or 5SY4108-7KK11) is mandatory at a direct voltage supply by the customer (for example SITOP PSU300S 20A).



[1] Install the miniature circuit breaker in the vicinity of the SIDOOR controller (similar ambient air temperature).

	X3.1	Connection of ungrounded SELV voltage typically 24 V	Plus
	X3.2	Functional grounding	
	X3.3	Connection of ungrounded SELV voltage typically 24 V	Minus

7.1.3 Wiring instructions

Observe the Wiring instructions (Page 94)

7.2 SIDOOR TRANSFORMER

7.2.1 Description

Intended use

The device is only intended for operation in combination with the controllers specified. Other loads must not be connected to the output connector.

Design

① Schuko plug
230 V AC (± 15 %) 50 / 60 Hz
② Length approx. 2 m
③ Connector for connection to the controller
④ Length approx. 1.5 m
⑤ Height of the mains transformer approx. 65 mm; diam. 126.2 mm
⑥ Diam. 6.1 mm, SW 10

Figure 7-2 SIDOOR TRANSFORMER

Function

The SIDOOR TRANSFORMER is a 220-240 V AC (± 10%) 50/60 Hz standard power supply unit for supplying SIDOOR controllers without an integrated power supply.

7.2.2 Installation

Requirements

The installation site must fulfill the following requirements:

- Minimum clearance to surrounding parts: 1 cm
- Even mounting surface
- Maximum distance from the power supply due to cable length:
  - Connecting cable input line (network ⇔ transformer): 200 cm
  - Connecting cable output line (transformer ⇔ controller): 150 cm

⚠ CAUTION

Risk of fire

The transformer housing temperature can rise to over 105 °C in the event of a fault in the controller or a short circuit in the output line of the transformer.

As a result, you should take the following safety measures:

- Only mount the transformer on surfaces with no risk of ignition, and which cannot be touched by unauthorized persons.
- Inform the service personnel about the risk of fire.

⚠ CAUTION

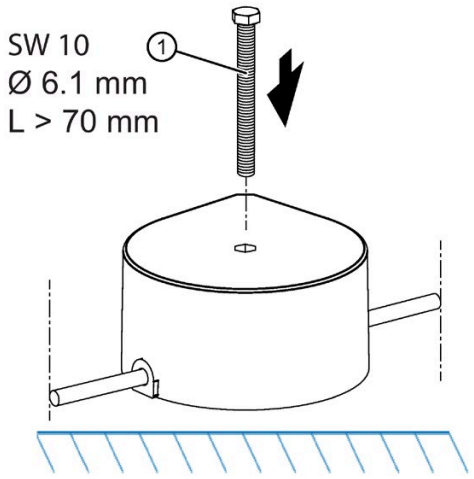
Material damage

The transformer power supply cable cannot be replaced.

If the cable is damaged, the device must be scrapped.

Procedure

Proceed as follows to install the transformer:



1. Drill the hole for the screw ① as shown in the dimension drawing.
2. Secure the transformer with 1 M6 screw (at least 70 mm long) ①.

7.2.3 Connection

Requirements

WARNING

Dangerous electrical voltage!

When electrical devices are operated, parts of these devices will necessarily carry dangerous voltages. Failure to observe the operating instructions can therefore lead to serious injuries or material damage.

Observe the operating instructions.

The description of the complete electrical setting and commissioning of the controller and of the associated components is available in the section Connection and commissioning (Page 224).

Procedure

Note

Risk of injury through moving mechanical parts.

The control system will become ready for operation after the supply line has been connected. If a control signal is present, the door will move in the set direction.

Always connect the supply lines last of all!

Carry out the following steps in the given order:

1. Connect the output line of the SIDOOR TRANSFORMER to slot X3 on the controller. Observe the polarity printed on the device.
2. Connect the supply line to the network.

See the section Connection and commissioning (Page 224) for additional information.

7.2.4 Technical specifications

7.2.4.1 SIDOOR TRANSFORMER

Article number		**6FB1112-0AT20-2TR0**
General technical data:		
Product brand name		SIDOOR
Design of the product		Power supply unit for SIDOOR controllers
Electical data:		
Relative symmetrical tolerance of the supply voltage	%	10
Operating current of fuse protection at input when installing		6 ... 10
Consumed current		
• maximum	A	1.6
Supplied active power		
• maximum	W	115
Overvoltage category		2
Output voltage with pulsating direct voltage RMS value		
• at full load	V	17.3
Output current		
• maximum rated value	A	14.3
Tripping characteristic class of fuse protection at input when installing		D6, C10
Connections:		
Type of electrical connection		
• at input		SCHUKO connector DIN 49.441, CEE7/VII
• at output		WAGO 721-103/026
Wire length		
• line-side	m	2
• Output side	m	1.5
Ambient conditions:		
Ambient temperature		
• during operation	°C	-20 ... +55
• during operation Note		No direct exposure to the sun
• during storage	°C	-20 ... +70
• during transport	°C	-40 ... +70
Relative humidity without condensation	%	10 ... 93
Installation altitude at height above sea level maximum	m	2 000
Protection class IP		IP54
Installation/ mounting/ dimensions:		
Mounting type		Hexagon head bolt M6, L > 70 mm
Width	mm	145
Height	mm	65

Article number		**6FB1112-0AT20-2TR0**
Depth	mm	126
Standards:		
Standard		
• for EMC		EN 12015 / EN 12016 / EN 61000-6-2 / EN 61000-6-3 / EN 61000-3-2 / EN 61000-3-3
• for safety		Low Voltage Directive (LVD) 2014/35/EU

7.2.4.2 Dimension drawing SIDOOR TRANSFORMER

Dimension drawing SIDOOR TRANSFORMER

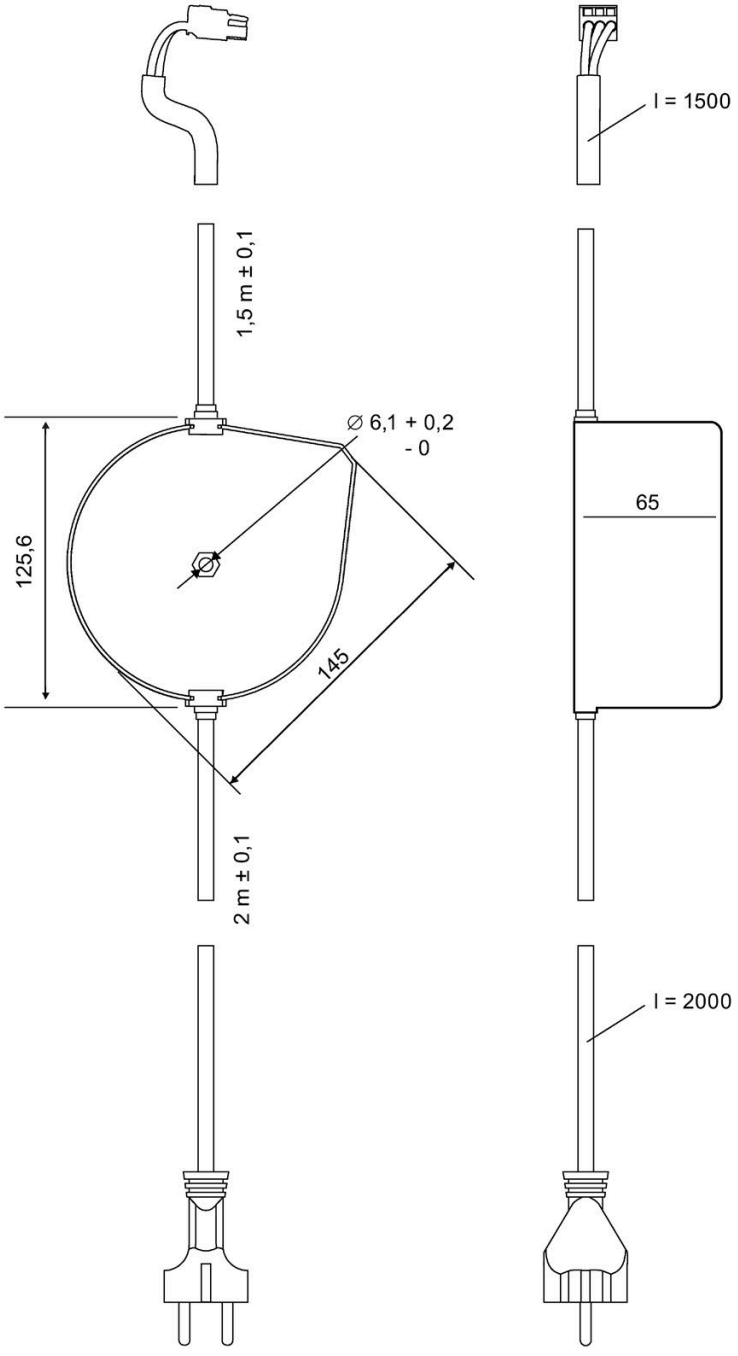


Figure 7-3 Dimensions of the SIDOOR TRANSFORMER

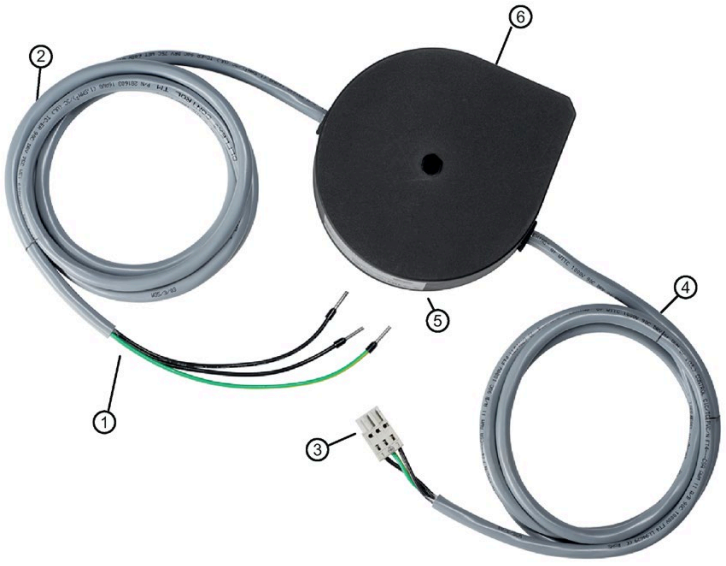
7.3 SIDOOR TRANSFORMER UL

7.3.1 Description

Intended use

The device is only intended for operation in combination with the controllers specified in 2.3.1. Other loads must not be connected to the output connector.

Design



① No mains connection 220-240 V AC +/-10% 50/60 Hz
② Length approx. 2 m
③ Connector for connection to the controller
④ Length approx. 1.5 m
⑤ Height of the mains transformer approx. 65 mm; width approx. 145 mm, depth approx. 126 mm
⑥ Diam. 6.1 mm, Size 10, L>70 mm

Figure 7-4 SIDOOR TRANSFORMER UL

Function

The SIDOOR TRANSFORMER UL is a 220-240 V AC (± 10%) 50/60 Hz standard power supply unit for supplying SIDOOR controllers without an integrated power supply.

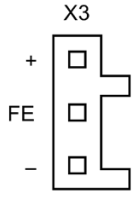
Note

When using the SIDOOR TRANSFORMER UL performance losses in force, acceleration and speed may occur depending on the output transmission, door mass and system friction.

Output line

The output line is connected to slot X3 of the SIDOOR controller.

The pin assignment at slot X3 is as follows:



7.3.2 Installation

Requirements

The installation site must fulfill the following requirements:

- Minimum clearance to surrounding parts: 1 cm
- Flat mounting surface made of metal
- Maximum distance from the power supply due to cable length:
  - Connecting cable input line (network ⇔ transformer): 200 cm
  - Connecting cable output line (transformer ⇔ controller): 150 cm

CAUTION

Risk of fire

The transformer housing temperature can rise to over 105 °C in the event of a fault in the controller or a short circuit in the output line of the transformer.

As a result, you should take the following safety measures:

- Only mount the transformer on surfaces with no risk of ignition, and which cannot be touched by unauthorized persons.
- Inform the service personnel about the risk of fire.

For indoor use only

CAUTION

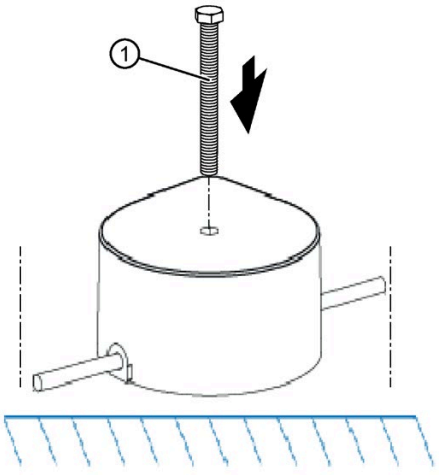
Material damage

The connection cables of the transformer cannot be replaced.

If the cable is damaged, the device must be scrapped.

Procedure

Proceed as follows to install the transformer:

Steps		Figure
1.	Drill the hole for the screw ① as shown in the dimension drawing.	
2.	Secure the transformer with 1 screw (M6, minimum length 70 mm) ① on a flat metal surface.	

7.3.3 Connection

Requirements

WARNING

Dangerous electrical voltage!

When electrical devices are operated, parts of these devices will necessarily carry dangerous voltages. Failure to observe the operating instructions can therefore lead to serious injuries or material damage.

Observe the operating instructions:

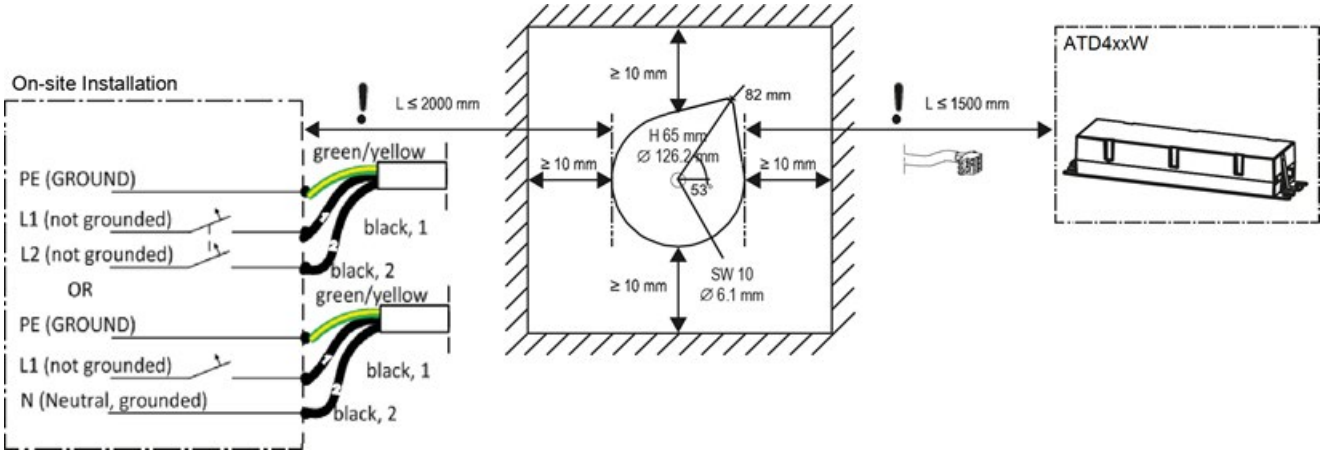
Before performing work on the device, all power sources must be switched off and secured with a switch-on guard.

Installation and maintenance work is to be performed by qualified personnel.

In addition, please adhere to national regulations.

- If the SIDOOR TRANSFORMER UL is supplied by two ungrounded wires (for example L1, L2), fusing has to be implemented by a 2-pole miniature circuit breaker with coupled switching element. When there is a connection between an ungrounded wire (L) and a grounded wire (N), only a 1-pole miniature circuit breaker in the L-branch is required.
- Make sure that the on-site (customer-provided) fuse meets these requirements:
  - For the CE setting with a miniature circuit breaker to IEC60898-1, 10 A tripping characteristic C or 6 A tripping characteristic D
    for example 1-pole miniature circuit breaker: 5SY4110-7 or 5SY4106-8
    e.g. 2-pole miniature circuit breakers: 5SY4210-7 or 5SY4206-8
  - For the NFPA setting miniature circuit breaker to UL489 listed, CCN DIVQ, UR≥240VAC, 10 A Class C or 6 A Class D
    e.g. 1-pole miniature circuit breaker: 5SJ4110-7HG41 or 5SJ4106-8HG41
    e.g. 2-pole miniature circuit breakers: 5SJ4210-7HG41 or 5SJ4206-8HG41

Procedure



- Connect the wires as shown in the drawing.
- Be sure to connect the protective ground (green-yellow) correctly.
- Ensure that there is a mains disconnecting device near the equipment that is easily accessible clearly marked (for example, using a suitable miniature circuit breaker).
- The description of the complete electrical setting and commissioning of the controller and of the associated components is available in the section Connecting and commissioning.

Note

Risk of injury through moving mechanical parts.

The control system will become ready for operation after the supply line has been connected. If a control signal is present, the door will move in the set direction.

Always connect the supply lines last of all!

Carry out the following steps in the given order:

1. Connect the output line of the SIDOOR TRANSFORMER UL to slot X3 on the controller. Observe the polarity printed on the device.
2. Connect the supply line to the network.

See the section Connecting and commissioning.

7.3.4 Test voltage

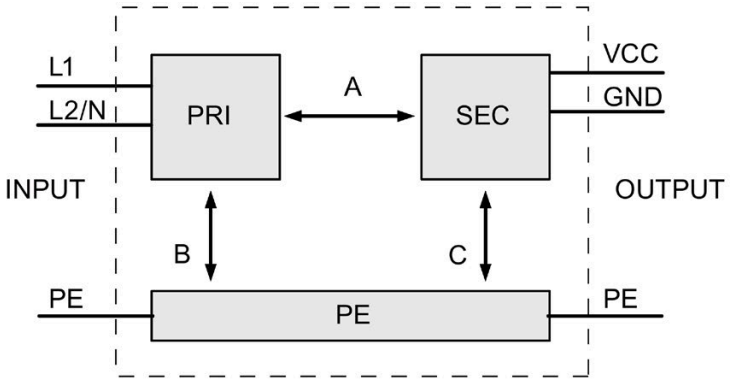


Figure 7-5 Diagram test voltage

The type test and the manufacturing test can only be performed by the manufacturer. The field can also be performed by the user.

Requirements for performing the field test:

General

Disconnecting SIDOOR TRANSFORMER UL

disconnect the connection to the SIDOOR control circuit device.

Inspection (A) & (B)

- Interconnecting input lines (PRI) L1 and L2/N
- Interconnecting output cables (SEC) VCC, GND and PE

Inspection (C)

- Interconnecting output cables (SEC) VCC and GND and measuring against PE

Table 7- 1 Test voltage

	Test time	**PRI<->SEC (A)**	**PRI<->PE (B)**	**SEC<->PE (C)**
Type test	60 s	4000 VAC	4000 VAC	1500 VAC
Manufacturing test	1 s	4000 VAC	4000 VAC	1500 VAC
Field test	1 s	1500 VAC	1500 VAC	350 VAC
	1 s	2250 VDC	2250 VDC	500 VDC

Remark:
Tripping current for measuring DC: 0 mA
tripping current for measuring AC: <100 mA

7.3.5 Technical specifications

7.3.5.1 SIDOOR TRANSFORMER UL

Article number	6FB1112-0AT21-2TR0
General information	
Product brand name	SIDOOR
Product designation	TRANSFORMER UL
Product version	Power supply unit for SIDOOR controllers
Installation type/mounting	
Mounting type	Hexagon head bolt M6, L > 70 mm
Supply voltage	
permissible range, lower limit (AC)	220 V
permissible range, upper limit (AC)	240 V
relative symmetrical tolerance of the supply voltage	10 %
Line frequency	
• permissible range, lower limit	50 Hz
• permissible range, upper limit	60 Hz
Mains filter	
• integrated	Yes
Input current	
Current consumption, max.	1.6 A
Operational current of fuse protection at input, min.	6 A
Operational current of fuse protection at input, max.	10 A
Tripping characteristic class of fuse protection at input	D6, C10
Output voltage	
RMS value (pulsating DC voltage at full load)	17.3 V; at 230 V AC
RMS value (pulsating DC voltage at full load), min.	16.5 V
RMS value (pulsating DC voltage at full load), max.	18 V
RMS value (pulsating DC voltage at 0.7 mA peak current), max.	27 V; At 264 V AC
Power	
Emitted active power, max.	115 W; Average value above 10 s
Isolation	
Overvoltage category	2
Degree of pollution	2
Degree and class of protection	
IP degree of protection	IP54

Article number	**6FB1112-0AT21-2TR0**
Standards, approvals, certificates	
CE mark	Yes
EAC (formerly Gost-R)	Yes
RoHS conformity	Yes
China RoHS compliance	Yes
Standard for EMC	EN 12015 / EN 12016 / EN 61000-6-2 / EN 61000-6-3 / EN 61000-3-2 / EN 61000-3-3
Standard for safety	UL 61010-1, CSA C22.2 No. 61010-1-12, Low Voltage Directive (LVD) 2014/35/EU
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	55 °C
• Remark	No direct exposure to the sun
Ambient temperature during storage/transportation	
• Storage, min.	-20 °C
• Storage, max.	70 °C
• Transportation, min.	-40 °C
• Transportation, max.	70 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m
Relative humidity	
• No condensation, min.	10 %
• No condensation, max.	93 %
Cables	
Cable length	
• Input side	2 m
• Output side	1.5 m
Connection method	
Design of electrical connection at input	equipped with ferrules
Design of electrical connection at output	WAGO 721-103/026
Dimensions	
Width	145 mm
Height	65 mm
Depth	126 mm

7.3.5.2 Dimension drawing SIDOOR TRANSFORMER UL

Dimension drawing SIDOOR TRANSFORMER UL

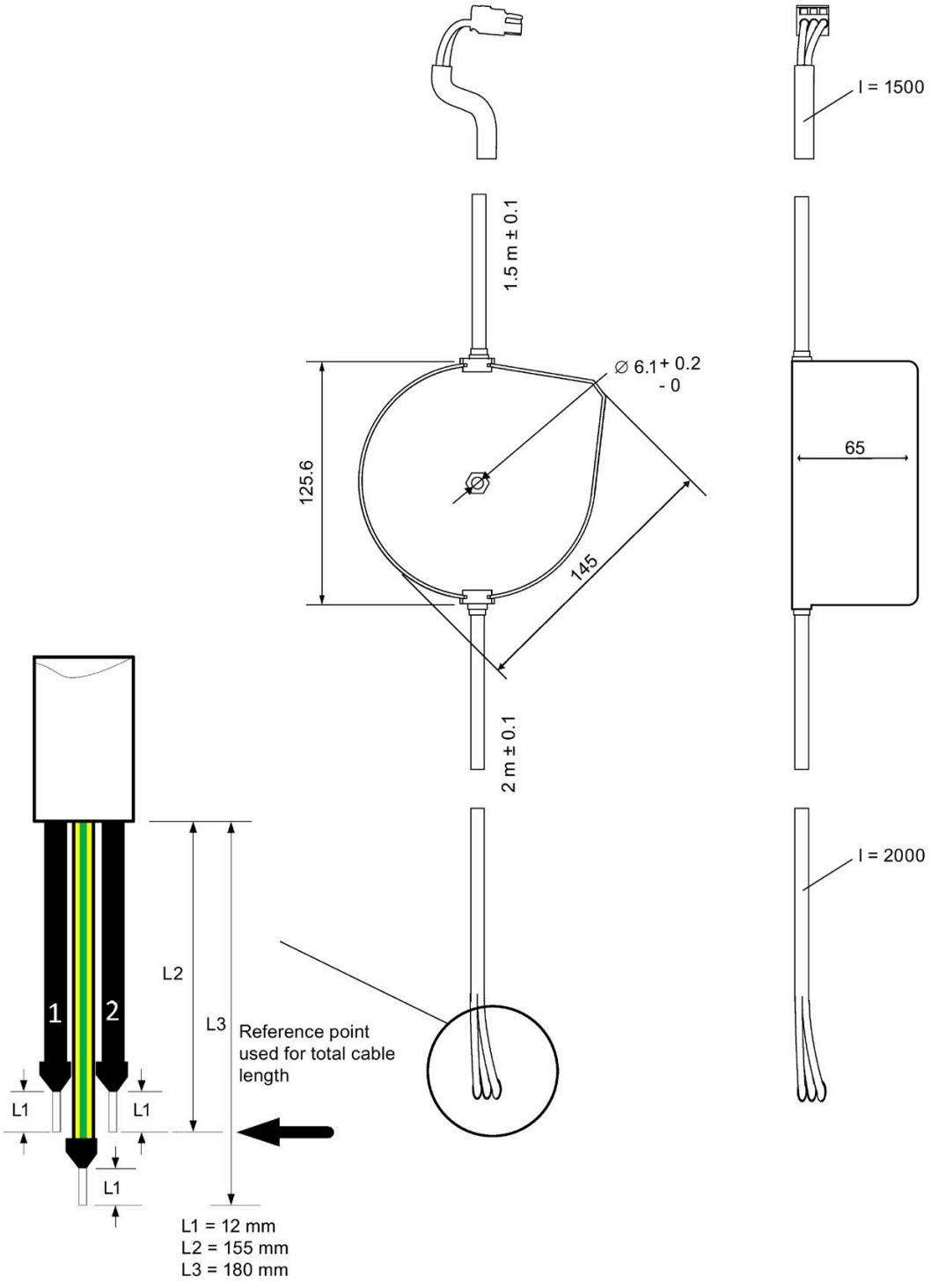


Figure 7-6 Dimension drawing TRANSFORMER UL

Connection and commissioning

8

8.1 Requirements

Procedure

WARNING

Dangerous electrical voltage!

When electrical devices are operated, parts of these devices will necessarily carry dangerous voltages. Failure to observe the operating instructions can lead to serious injuries or material damage.

Observe the operating instructions.

WARNING

Risk of injury due to dangerous electrical voltages and moving mechanical parts

Disconnect the door drive by unplugging the power plug from the power supply before you start work on the door drive.

Note

The motor temperature may not lie under 0 °C during the learn run, because the value for the door mass is otherwise determined incorrectly so that the opening and closing speeds could lie in impermissible ranges.

WARNING

Risk of injury during commissioning

- The door movements cannot always be externally controlled while the controller is being commissioned (in particular during the automatic determination of parameters).
- Increased forces, speeds and energies arise in the closing and opening directions during the learn run.

Therefore, ensure that the door is secured with physical barriers prior to a learn run and during commissioning.

WARNING

Risk of injury during commissioning

Prior to the learn run, the "closed" and "open" positions are unknown. For this reason, the direction of movement of the door resulting from pressing the OPEN (S402) or CLOSE (S403) service buttons is dependent on the way that the door and motor have been installed.

Increased forces arise in the opening and closing directions when positioning the door using the OPEN (S402) and CLOSE (S403) service buttons, and before a learn run the 7-segment display (H401) shows the status code "_" or "P". You must therefore ensure that the door is safely cordoned off.

WARNING

Verification of safety-relevant functions

The SIDOOR controller is only a subsystem (incomplete machine). In general, the correct parameter assignment of the SIDOOR controller and the effectiveness of the safety-relevant functions must be checked at regular intervals by testing the safety-relevant functions during commissioning and depending on the application.

WARNING

Access protection to the controllers/parameters

Access to the controller and the parameter assignment of the controller must be protected against unauthorized access. Appropriate measures must be taken for specific applications, e.g. installation in a closed control cabinet, to ensure access only by authorized personnel.

Note

Application-specific measures for emergency operation

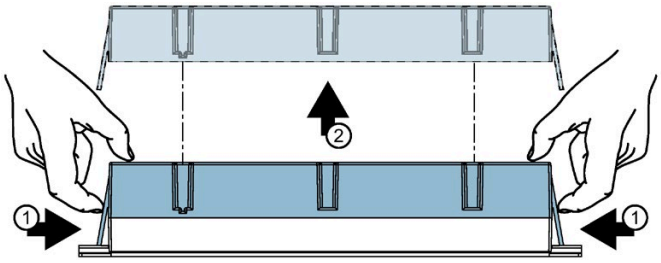
In the event of a controller failure, measures must be taken for emergency operation according to the application.

8.2 Procedure

Observe the Wiring instructions (Page 94).

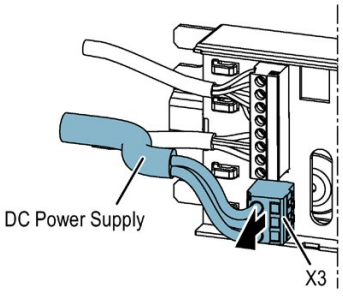
Preparing

- Slide the door to the OPEN position
- Open the case cover



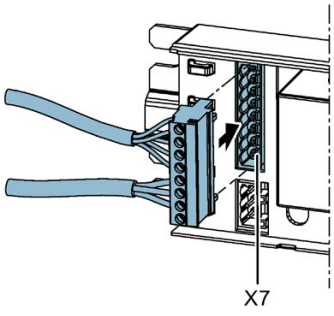
Disconnecting the power supply

- Disconnect the power supply at slot X3



Connecting the motor

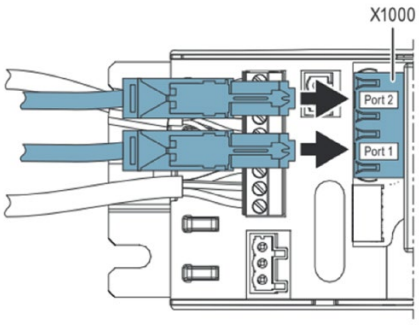
- Connect the motor plug with the slot X7, see Motor (Page 184).



Note

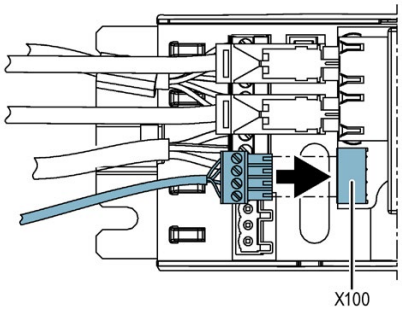
The X6 control inputs plug is not plugged in during commissioning in order to prevent uncontrolled travel.

- Network the controller with Profinet in slot X1000, see PROFINET module (Page 100).



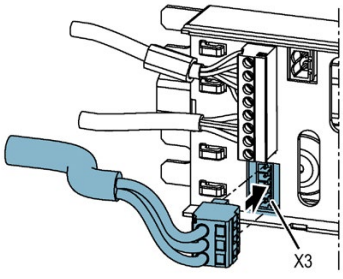
Connecting digital output signals

- Connect the digital output signals to X100. See the section Digital output signals (Page 96) for additional information.



Connecting the power supply to the network

- Connect the power supply to the network, take the Power supply (Page 204) into consideration.



Perform a learn run

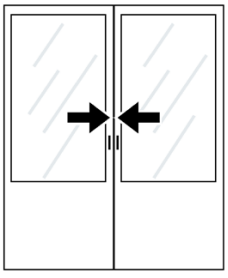
⚠ WARNING

Danger of injury through moving mechanical parts during a learn run

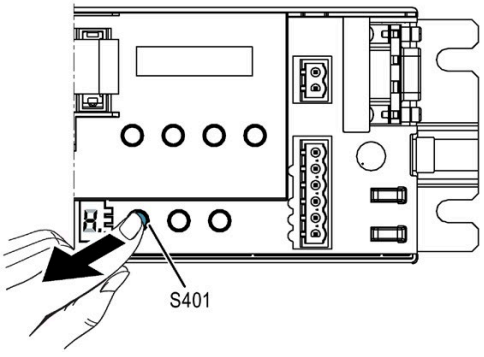
- Ensure that the door is in the CLOSED position.
- Ensure that the moving path 15 to 25 cm from the CLOSED position is free during the learn run.
- No force and energy limitations are effective during the learn run. Ensure that no persons are within the closing and opening area of the door during the learn run.
- Down-scaling or up-scaling of the transmission ratio at the belt are not permitted, because this would change the kinetic energy of the door system and the static forces at the door system. The door width is then no longer valid.

In the state of delivery the force and energy limitation parameters in the opening / closing direction are set to 20 J and 150 N.

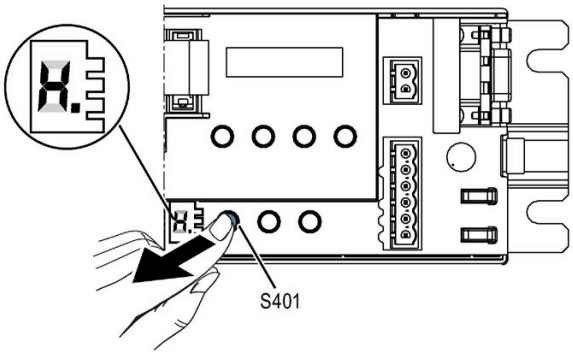
- Make sure that the door is in the CLOSED position.



- Press and hold down the learn run button (S401).



- The learn run starts automatically and the learn run button can be released, see Learn run (Page 45).

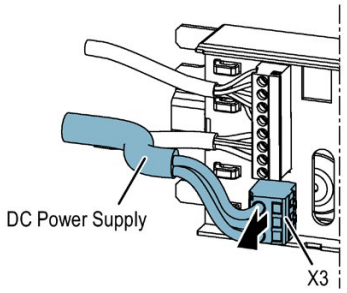


- The learn run has been completed successfully if the status display does NOT show "P", "U" or "_" (see Status display (Page 143)).

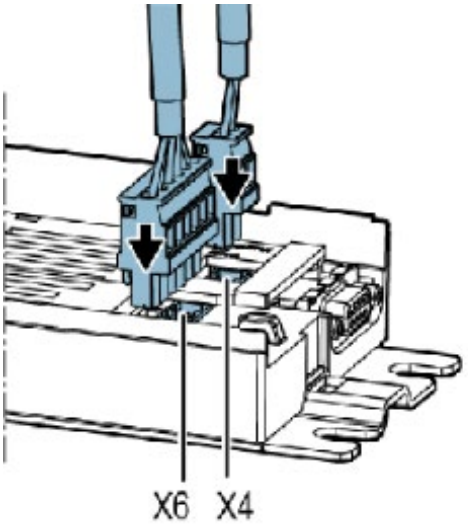
- At the end of the learn run the 7-segment display (H401) displays "A" because the digital input signals are not yet connected.

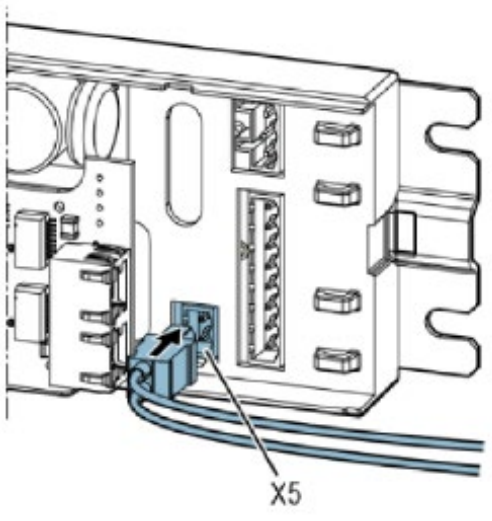
Connecting the digital input signals

- Switch off the controller by pulling out the power plug or the connector X3.



- Plug the terminal connectors of the digital control inputs into X5, X6 and X4. See the section Digital input signals (Page 95) for additional information.

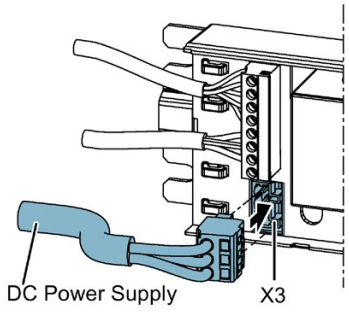




Final settings

- Switch the controller on by connecting the power supply to the controller and to the power system. The controller is now in the initial mode, see

  Restart after power failure (Page 28).



- The four LEDs next to the plug-in connector X6 or X5 show which control signal is currently active.

8.3 Final check

Final check of the permissible energies and forces.

⚠ WARNING

Risk of injury due to moving mechanical parts

Check the permissible forces and energies after commissioning of the door drive at the overall system and adapt these to the limits if they exceed them.

Take the respectively valid standards and directives into account as well as the following specification:

- The speed limiting curve is the characteristic curve for determining the maximum permissible door speed vmax as a function of the total door leaf mass.
- Down-scaling or up-scaling of the transmission ratio at the belt are not permitted, because this would change the kinetic energy or static forces at the door. The door width is then no longer valid.

⚠ WARNING

Danger of injury and damage to property through excessive closing force and opening force of the door.

Exceeding of the static closing force and of the static opening force can result in injuries, damage to the door drive and the mechanical parts of the door.

After commissioning, have the maximum static force checked by the service personnel, and adjusted to the limit value if it is excessive. Note the limits of the applicable standard and adjust the setting accordingly.

⚠ WARNING

All safety functions (e.g. forces, energies, configured safety-related input signals, emergency stop, two-hand control, light grid or pressure-sensitive safety edges) must be verified on commissioning or re-parameterization of the mounted drive.

⚠ WARNING

Verify parameters

In the case of parameter assignment via the SIDOOR SOFTWARE KIT, or via the PROFIdrive PKW interface, parameter values must be read back after modification and verified.

8.4 Parameter assignment for special applications

The drive curve and the control behavior can be adapted for special applications. Take the section Operation and parameter assignment (Page 111) into consideration.

Note

Note the determined optimal driving curve parameter settings in the settings record (Page 237).

This record should also be kept at hand when asking questions on the Hotline.

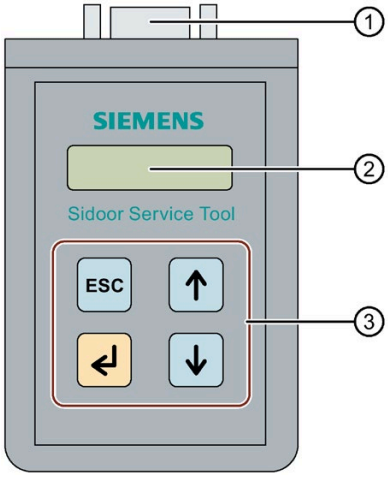
Additional units

9

9.1 SIDOOR SERVICE TOOL

9.1.1 Description

Overview



① Connection plug to connect the SIDOOR SERVICE TOOL to the controller
② Display
③ Control keys

9.1.2 Connection

Requirements

Connect the SIDOOR SERVICE TOOL using the supplied 9-pin D-SUB connecting cable that has the plug/socket connector types.

Note

- The second connecting cable supplied with the socket/socket connector types cannot be used to connect the SIDOOR SERVICE TOOL to the ATE500E controller.
- The cover of the controller does not have to be removed to connect the SIDOOR SERVICE TOOL.

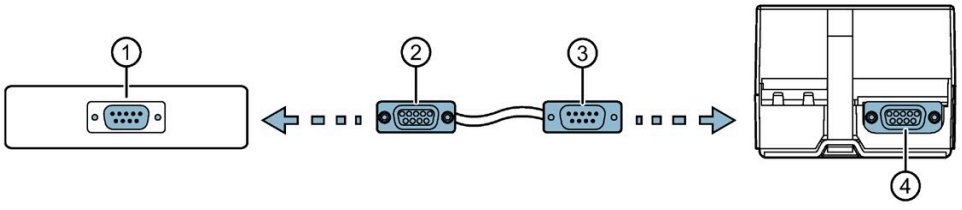
Procedure

CAUTION

Material damage resulting from improper use

A SIDOOR controller or the device it is connected to may be damaged by using slot X8 to connect to fieldbus systems such as CAN, PROFIBUS or Modbus.

You should, therefore, only connect suitable SIDOOR accessories to slot X8.



① SIDOOR SERVICE TOOL (plug-type connector)
② D-SUB connecting cable socket-type connector
③ D-SUB connecting cable plug-type connector
④ Slot X8 on the controller (socket-type connector)

1. Connect the socket-type connector ② of the connecting cable to the slot (plug) ① on the SIDOOR SERVICE TOOL.
2. Connect the plug-type connector ③ of the connecting cable to the slot X8 (socket) ④ on the controller.

9.1.3 Operation

Requirements

Parameters can be changed in both of the following menus:

- *MAIN MENU > Quick setup > Parameter setting*
- *MAIN MENU > General setup > Profile parameters*

Note

If the SIDOOR SERVICE TOOL is in the "Quick setup" or "General setup" menu, the door commands of the controller are blocked by the command inputs of the terminal strip X6.

Key functions

Key	Description	Function
↵	Return key	Jump to next menu below or accept a parameter value
ESC	Escape key	Jump back to menu above
↑	Menu selection key	Increases a parameter value
↓	Menu selection key	Decreases a parameter value

Operating principle

Action		Key	Comment
1	Select required parameter	↑ ↓	
2	Activate parameter for setting using the Return key	↵	Parameter value flashes
3	Increase or decrease parameter value	↑ ↓	
4	Accept parameter value by pressing Return key again	↵	Displayed parameter value stops flashing after acceptance.
5	• Select next parameter	(See step 1)	
	• Exit menu	ESC	

Parameter changes

Note

Parameter changes are accepted with the door at a complete stop.

WARNING

Risk of injury due to moving mechanical parts

After parameters have been changed, the permitted energies and forces have to be checked by service staff and adjusted if they exceed their limit values. This has to be done on the heaviest door in the entire system with the shaft door and cabin door coupled.

Menu navigation

The menu operation of the SIDOOR SERVICE TOOL is described in the section Navigation structure (Page 118).

9.1.4 Technical specifications

Article number	6FB1105-0AT01-6ST0
General information	
Product brand name	SIDOOR
Product designation	SIDOOR SERVICE TOOL
Product version	Diagnostic and parameterization tool
Cables	
Cable length	
• of the connection cable	2 m
Dimensions	
Width	65 mm
Height	100 mm
Depth	25 mm

Appendix

A

A.1 Configuration record

Commissioning engineer	
Date	

Controller

☐ SIDOOR ATE530S COATED

☐ SIDOOR ATE531S

FW version: _____

Motor

☐ SIDOOR MED280

☐ SIDOOR MED251

Power supply

☐ SIDOOR TRANSFORMER

☐ SIDOOR TRANSFORMER UL

☐ External direct current power supply (for example SITOP PSU300S 20A)

Parameter ID	Setting range	Factory setting	Unit	Parameter designation	Set value
Distances					
p3660	0 ... 100	10	mm	Slow end distance open	
p3661	0 ... 150	0	mm	Slow start distance open	
p3662	0 ... 100	0	mm	Slow start distance close	
p3663	0 ... 200	50	mm	Slow end distance close	
Speeds					
p3664	MED280: 90 ... 800 MEG251: 90 ... 750	500 500	mm/s	Maximum speed OPEN	
p3665	30 ... 90	40	mm/s	Slow end speed open	
p3666	30 ... 90	60	mm/s	Slow start speed open	
p3667	30 ... 90	90	mm/s	Initial speed OPEN	

Parameter ID	Setting range	Factory setting	Unit	Parameter designation	Set value
p3668	MED280: 90 ... 800 MEG251: 90 ... 750	500 500	mm/s	Maximum speed CLOSE	
p3669	30 ... 90	60	mm/s	Slow start speed close	
p3670	30 ... 90	90	mm/s	Slow end speed close	
p3671	30 ... 90	90	mm/s	Initial speed CLOSE	
p3672	MED280: 90 ... 800 MEG251: 90 ... 750	150 150	mm/s	NDG speed (reduced)	
Accelerations and decelerations					
p3673	300 ... 3000	3000	mm/s^2	Acceleration ramp OPEN	
p3674	MED280: 300 ... 1200 MEG251: 300 ... 1000	1200 1000	mm/s2	Deceleration ramp OPEN	
p3675	MED280: 300 ... 1200 MEG251: 300 ... 1000	1200 1000	mm/s^2	Reversal ramp OPEN/CLOSE	
p3676	300 ... 3000	3000	mm/s^2	Acceleration ramp CLOSE	
p3677	MED280: 300 ... 1200 MEG251: 300 ... 1000	1200 1000	mm/s^2	Deceleration ramp CLOSE	
p3678	MED280: 300 ... 1200 MEG251: 300 ... 1000	1200 1000	mm/s^2	Reversal ramp CLOSE/OPEN	
p3679	MED280: 0 ... 6000 MEG251: 0 ... 4500	4000 2500	mA	Idle torque (power) OPEN	
p3680	MED280: 0 ... 6000 MEG251: 0 ... 4500	4000 2500	mA	Idle torque (power) CLOSE	
p3681	MED280: 0 ... 7000 MEG251: 0 ... 12800	6000 4500	mA	Peak torque close	
Forces					
p3682	MED280: 70 ... 350 MEG251: 70 ... 300	150 150	N	Static force limit open	
p3683	MED280: 70 ... 350 MEG251: 70 ... 300	150 150	N	Static force limit close	

Parameter ID	Setting range	Factory setting	Unit	Parameter designation	Set value
p3684	MED280: 70 ... 350 MEG251: 70 ... 300	150 150	N	Limit force end static close	
p3685	MED280: 70 ... 350 MEG251: 70 ... 300	150 150	N	NDG force (reduced) static	
Energy					
p3686	MED280: 0 ... 75 MEG251: 0 ... 100	20 20	J	Kin. energy OPEN	
p3687	MED280: 0 ... 75 MEG251: 0 ... 100	20 20	J	Kin. energy CLOSE	
p3688	MED280: 0 ... 75 MEG251: 0 ... 100	4 4	J	Kin. energy NDG	

A.2 Service & support

Product information

Up-to-date product information and further links are available on the Product Page SIDOOR Automatic Door Control Units (http://www.siemens.com/sidoor).

Online catalog and ordering system

The online catalog and the online ordering system are available on the Industry Mall Homepage (https://mall.industry.siemens.com).

Online support

The Online Support (http://www.siemens.com/automation/service&support) provides direct access to information on the products, systems and services as well as a multitude of programming, configuration and application examples.

In addition, the Online Support provides central access to further Services and Contacts (http://www.siemens.com/automation/partner).

Technical Support

Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.

If you have any technical questions, contact Technical Support at:

- Phone: +49 (0)911 895 7 222
- Fax: +49 (0)911 895 7 223
- E-Mail Technical Support (mailto:support.automation@siemens.com)
- Support Request (http://www.siemens.com/automation/support-request)

Index

M

N

O

P

R

S

T

U

V

W