Servo Controller
SE-Power

- **Software-Manual**

Complementary document to the Operating Instruction

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This manual is a complementary document to the operating instructions and applies to:

Software	Version
SE-Power SE-Commander	From Version 4.0 KM-Release 1.2
Firmware	From Version 3.5 KM-Release 1.8
Servo Controller	**Order No.**
SE-Power FS STO 1kVA	50036337
SE-Power FS STO 3kVA	50162993
SE-Power FS STO 6kVA	50183996
Accessories	**Order No.**
Programming cable RS232 SE-Power, 3m	50038526
Programming cable USB SE-Power FS, 3m	50395197

Version of this documentation: SE-Power-Software-Manual vers. 4.3 de.01.06.2022

Assembly and initial start-up may be carried out by qualified personnel only and according to these operating instructions.

Caution!

As this manual is a complementary document to the operating instructions it alone is not sufficient to carry out installation and commissioning of the device.

Please pay attention to the notes in:

1.1 Documentation

1 General

1.1 Documentation

For the Servo Controllers of the SE-Power series are considerably documentations available.

There are main documents and complementary documents.

The documents contain safety instructions that must be followed.

Main document:

present	documentation / description
☐	▪ **SE-Power FS Operating manual** Description of the technical data and the functions of the device as well as notes on the plug assignment, installation and operation of the SE-Power FS servo controller series. It is meant for persons who want to get familiar with the SE-Power FS servo controller

Caution!
The operating manual is the main document and must be read by all means before installation and start-up of all devices of the SE-Power FS series.

Complementary documents to the operating manual:

present	documentation / description
☐	▪ **SE-Power FS mounting instructions** This manual is included during delivery of the SE-Power FS devices and provides an extract from the manual represents the installation instructions contained therein make sure that they can easily operate the servo drive.
☐	▪ **SE-Power FS STO-manual** Description of the technical data and the device functionality, installation, and operation of the safety module STO.
☐	▪ **SE-Power FS MOV-manual** Description of the technical data and the device functionality, installation, and operation of the safety module MOV.
☒	▪ **SE-Power Software-manual** Description of the software SE-Commander with the individual functions.
☐	▪ **SE-Power CANopen-manual** Description of the implemented CANopen protocol according to CiA DSP402 and DS301.

☐	▪ **SE-Power FS PROFIBUS/PROFINET-manual** Description of the implemented PROFIBUS-DP and PROFINET protocols, the technical data and the device functionality, installation, and operation of the fieldbus-modules „SE-Power Profibus Interface“ and „SE-Power Profinet Interface“.
☐	▪ **SE-Power EtherCAT-manual** Description of the fieldbus control by using the CoE (CANopen over EtherCAT) protocol, the technical data and the device functionality, installation, and operation of the fieldbus-module „SE-Power EtherCAT Interface“.
☐	▪ **SE-Power FS programming example Siemens S7 V5.5** Description of the configuration and program from the programming example for Siemens S7 V5.5.
☐	▪ **SE-Power FS programming example Siemens S7 TIA V12** Description of the configuration and program from the programming example for Siemens S7 TIA V12.
☐	▪ **SE-Power FS Programming example Profinet Siemens S7 TIA V13/V14** Description of the configuration and program to the programming example for Profinet for Siemens S7 TIA V13.1 and V14.0.

These documents are available for download on our homepage:

www.afag.com

2 Symbols used

Information

Important information and notes.

Caution!

Non-adherence can result in significant property damage.

Danger !

Non-adherence can cause **property damage** and **injuries to persons**.

Caution! Life-threatening voltages.
The safety instruction contains a pointer to the occurrence of a possibly life-threatening voltage.

3 Safety

3.1 General Instructions

Caution!

The safety instructions in the operating manual must be followed.

The operating manual is the main document and must be read by all means before installation and start-up of all devices of the SE-Power series independent of the respective model.

4 General Information on the Afag SE-Commander Operator Program

4.1 Basic Information

The Afag SE-Commander program allows simple operation of the servo-positioning controller SE-Power.

The information contained in this manual refers to the following firmware and hardware versions:

- Servo-positioning controller SE-Power Firmware from version 3.5
- Parameterization software Afag SE-Commander from version 4.0

> If not explicitly documented, functions available in older versions are also available in new versions.

The firmware of the servo-positioning controller SE-Power and the Afag SE-Power operator software must match each other, i.e. whenever the functions of the firmware are enlarged, a new version of the Afag SE-Commander is usually required.

> The parameterization program Afag SE-Power SE-Commander V4.0 **can't** be used to parameterize devices of the following series: SE-24 or SE-48.

4.2 Features of the Afag SE-Commander

The operator program provides the following features:

- Parameterization of all movement profiles via PC
- Tests and jog operation
- Loading and saving movement profile sets
- Offline- parameterization
- Display of operating data
- Supported languages: German, English, French, Spanish, Italian, Chinese, Polish, Czech, Dutch, Greek
- Windows-conformant operation
- Online help

4.3 Hard- und Software Requirements

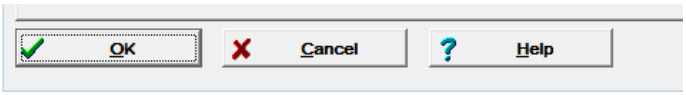
Requirements for installing the operator program:

- PC with Pentium processor with min. 32 MB main memory and min. 200 MB free hard-disk storage
- Operating system Windows 95/98NT/2000/XP/7
- Free serial RS-232 interface
- Or free USB slot

4.4 Operation

4.4.1 Standard Buttons

When you have opened a window while working with the Afag SE-Commander, a button bar is displayed which looks like follows:



The individual buttons have the following functions:

OK: All changes are accepted and the window is closed.

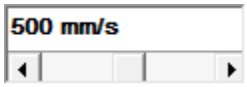
Cancel: All changes are reset, transmitted values are restored and the window is closed

Help: Invokes a help menu which provides information on the currently opened window.

You can actuate one of these buttons by clicking the left mouse button or by activating the button with the **Tab** key and confirming with **ENTER**. If the buttons in some menus should differ from the form described here, you will get more detailed information in the manual or the online help.

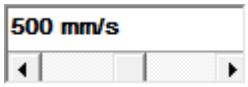
4.4.2 Numeric Input Fields

The windows of the Afag SE-Commander operator program always contain fields for numeric inputs according to the figure below:



You can enter data as follows:

- Directly with the keyboard: Enter the value directly in the input line. As long as the input is not terminated the text is displayed in thin fonts and is not retrieved by the operator program. Press the ENTER key when you have finished data entry or change to another input field with the TAB key. The value is then displayed in bold fonts. (see figure)



- Clicking the arrow keys: The value is changed in small steps (fine adjustment).
- Clicking the area between the grey box and the arrow keys: The value is changed in large steps (rough adjustment).
- Clicking the grey box and moving the mouse while keeping the left mouse button pressed: The value can be preset over the total value range.

4.4.3 Directories

The following subdirectories are available in the Afag SE-Commander:

Table 1: Structure of directories

Directory	Contents
CAN	EDS for the control over CAN Bus
DCO	Default directory for parameter files
Driver	USB Driver
EtherCAT	XML file for the control over EtherCAT (CoE CANopen over EtherCAT)
FIRMWARE	Firmware
PROFIBUS	GSD file and example project oür Siemens S7 incl. function- and Data blocs, for the control over Profibus
TXT	Default directory for plain text display of the parameter data

5 Installation, first Program Start and Communication

5.1 Installation

Since the program on the website Afag www.afag.com is available as compressed. ZIP file, the data must be extracted after downloading first before the program can be installed.

The complete process is as follows:

1. Download the software package under https://www.afag.com/en/products/detail/servoregler-se-power.html and save it.
2. Extract the data using an appropriate program such as WinZip, 7-Zip or similar.
3. Change to the directory ENGLISH.
4. Start the program SETUP.EXE by double click.
5. Follow the instructions in the installation.

The installation program now creates a new program group named „AFAG/SE-Power“ an. If the installation was terminated successfully you are informed about that in a corresponding window.

5.2 First Program Start

The Afag SE-Commander communicates with the servo-positioning controller SE-Power via the serial interface. To do so it needs to know which **serial interface** (COM-port number) and which **transmission speed** is used. When the system is delivered the operator program is set as follows:

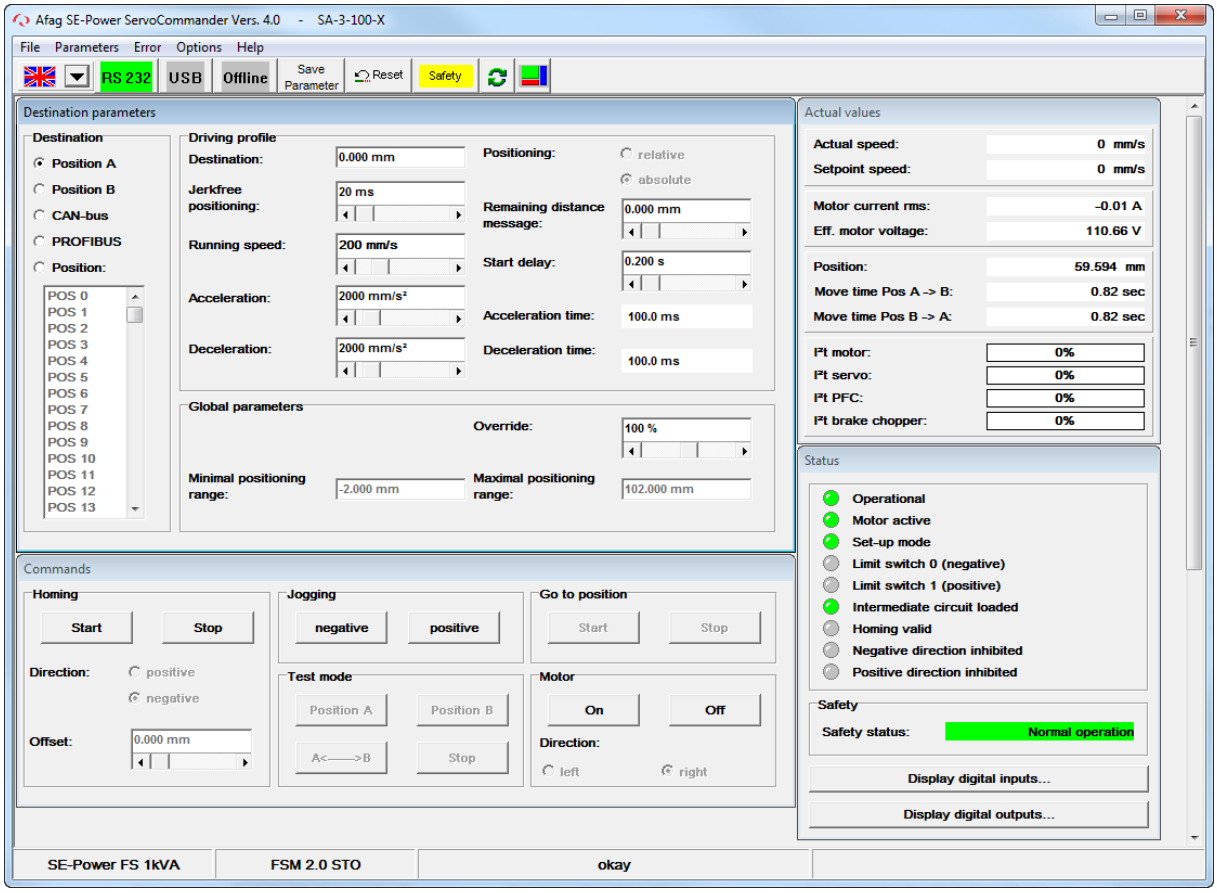
- Interface COM1
- Transmission speed 115200 baud (factory setting of the servo-positioning controller)
- 8 data bits, 1 stop bit, no parity check. These settings are fixed!

Upon program start the program tries to establish communication with the servo-positioning controller. If this fails an error message is displayed in the Afag SE-Commander (see chapter *5.4 Problem solving at serial Communication*).

To set the data for communication correctly the following steps must be carried out:

1. Schließen Sie den Servopositionierregler SE-Power komplett an.
2. Connect a free interface of the PC with the servo-positioning controller SE-Power via the Programing cable SE-Power.
3. Switch on the servo-positioning controller SE-Power.
4. Start the Afag SE-Commander operator program.

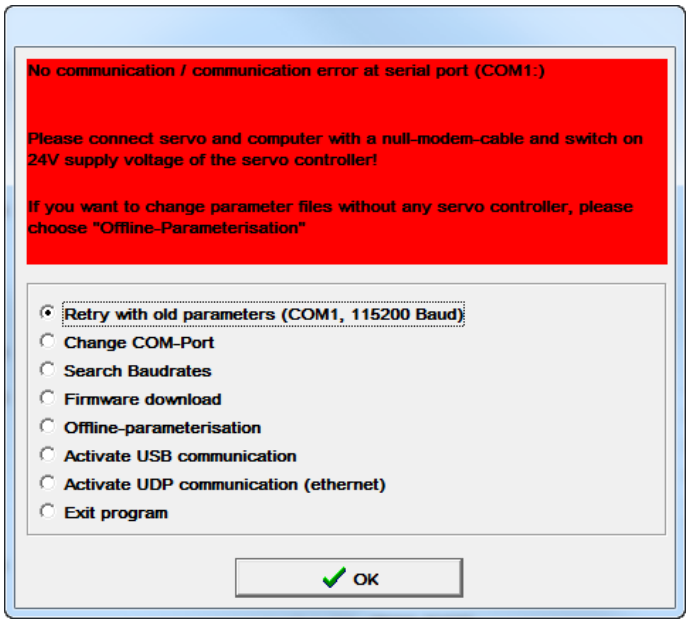
If the „RS 232“-Button is highlighted green (see figure), the communication parameters are already set correctly.



If an error message is displayed instead, please read chapter *5.3 Setting the serial Interface* and chapter *5.4 Problem solving at serial Communication*.

5.3 Setting the serial Interface

If the Afag SE-Commander operator program cannot open the serial interface, the following Error window is displayed on program start:



The cause of this fault are either a wrongly set interface (in most cases setting of the mouse driver) or another Windows or DOS program that accesses the serial interface.

To solve the access conflict with a program that uses the interface, exit the other program (in case of DOS programs DOS-Shell **must** be terminated!!) and click then the parameter **Try once again with old parameters**.

To correct an interface that is wrongly set, click the option button **Change Comport** and follow the instructions.

Offline parameterization is not a suitable option for first commissioning.

By clicking the option button **Ignore** the program is deactivated and does neither try to establish contact with the servo-positioning controller nor to carry out an offline parameterization. The existing error is not eliminated.

By clicking the option button **Exit program** the Afag SE-Commander is terminated immediately.

5.4 Problem solving at serial Communication

Possible error causes and corrective action are described in the following table:

Table 2: Problem solving at serial Communication

Cause	Corrective action
Communication has “choked“	Click the option **Try again with old parameters.**
Selected Comport is wrong	Click on **Change Comport** and follow the instructions.
Baud rates of the Afag SE-Commander operator program do not tally with those of the SE-Power servo-positioning controller	Click on **Search baud rates.**
Communication of the SE-Power servo-positioning controller faulty.	Execute **RESET** at the servo-positioning controller SE-Power, and then click **Try again with old parameters.**
Hardware fault: Servo-positioning controller SE-Power is not switched on	Eliminate error, and then click **Try again with old parameters.**
Programming cable not connected	
Programming cable broken	
Programming cable too long	Reduce baud rate or use shorter cable.

6 Online-Parameterization

The tool bar below the menu bar indicates whether the offline or the online parameterization is currently activated:

Table 3: Online /Offline-activation

RS 232 USB Offline	Online parameterization active (RS 232)
RS 232 USB Offline	Online parameterization active (USB)
RS 232 USB Offline	Offline parameterization active

The mode that is currently activated is highlighted green.

The following figure shows how parameter sets are managed in the online mode:

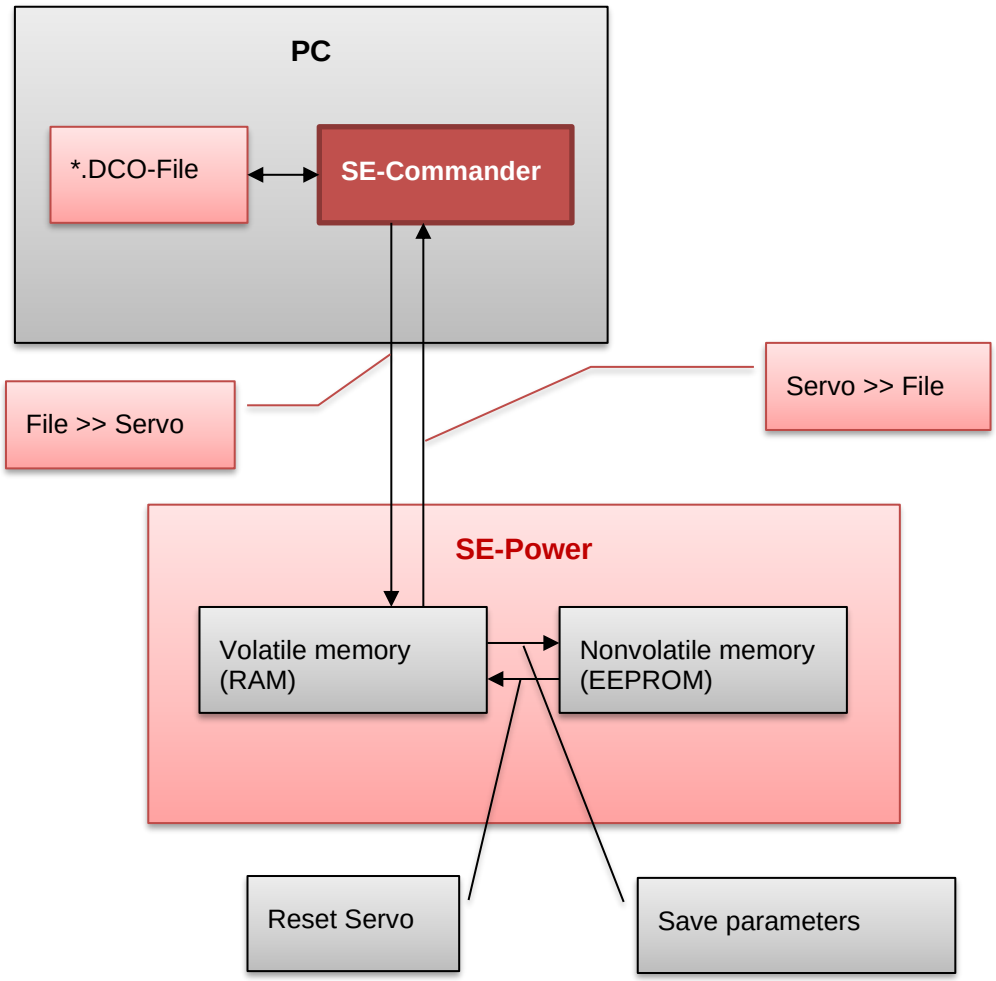


Figure 1: Online parameterization

The active parameter set is stored in the volatile RAM memory (RAM = Random Access Memory). As soon as the supply voltage (24V) is switched off the RAM memory contents is lost. To save the parameter set permanently copy the parameter set to the nonvolatile memory of the EEPROM using the command **../ Save parameter set** or by clicking the “Safe Parameter” button at the menu bar. The memory contents of the EEPROM (Electrical Erasable Programmable Read Only Memory) is not lost even when the supply voltage is switched off

When the servo-positioning controller is reset the contents of the EEPROM is copied to the RAM. A reset of the servo-positioning controller can be triggered by:

- Switching the supply voltage 24V off and on
- Pressing the Reset button at the casing of the SE-Power servo-positioning controller
- Activating the menu entry File/Reset Servo
- Clicking the Reset button in the menu bar

6.1 Loading and Saving Parameter sets

At user level 2 „Maintenance“ (see chapter *8.1 User levels*) parameter sets can be stored externally (i.e. on hard disk or other data storage medium) and loaded back again if required. The extension of the parameter files on PC side is ***.DCO**. The *.DCO files are loaded and saved under the menu items:

- Loading a *.DCO file: F**ile/Parameter set/File >> Servo**
- Saving a *.DCO file: F**ile/Parameter set/Servo >> File**

Please note that you can fill in the fields **Motor type** and **Description** when you are saving a parameter set to a file. Furthermore you can add up to 100 lines with a comment, if you select the register tab **Comment**. We recommend urgently to generate descriptions to prevent a later confusion of the parameter sets. In addition the name of the parameter set should be meaningful to facilitate a later search..

Please use the comment fields to save information.

*.DCO files can be sent on data storage medium and/or by e-mail.

Caution!

*.DCO files always refer to the axle. If a *.DCO file is not allocated correctly, this may result in considerable damage to property.

7 Offline Parameterization

The Afag SE-Commander operator program allows to access parameter sets (user level 2 „Maintenance“), even if there is no serial communication with the servo-positioning controller SE-Power. Precondition, however, is that a corresponding *.DCO file has been read in (see previous chapter *6 Online-Parameterization).*

The tool bar below the menu bar indicates whether the offline or the online parameterization is currently activated:

Table 4: Online / Offline activation

	Online parameterization active (RS 232)
	Online parameterization active (USB)
	Offline parameterization active

The mode that is currently activated is highlighted green.

It is possible

- to read parameter sets out of a *.DCO file.
- to change parameter sets.
- to save changed values in the same *.DCO file or another one.

To activate the changes the modified parameter set must be loaded in the servo-positioning controller SE-Power (see previous chapter *6 Online-Parameterization).*

The Offline parameterization becomes active when you click the menu item **Options/Communication/Offline parameterization** or the button Offline in the toolbar.

You are asked which *.DCO file is to be opened. Select a corresponding file.

Danger!

If a DCO file which was created for a specific Afag axle is used for another axle type the servo-positioning controller or the axle may be destroyed!

During Offline parameterization the behaviour of the Afag SE-Commander operator program differs partially from that of the Online parameterization.

8 SE-Commander

8.1 User levels

Der Afag SE-Commander hat drei Benutzerebenen:

- Operator: User with basic knowledge (without password)
- Maintenance: User with extended knowledge and rights
- System Integrator: Expert with all rights

You can select the desired user level in the **File/Enter password...** menu.

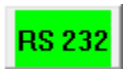
Password Maintenance: **profi**

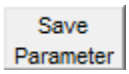
You can change to a lower user level without entering a password.

8.2 Quick Access via the Tool Bar

Some functions of the Afag SE-commander operator program can be called directly from the tool bar below the menu bar:

Table 5: Quick access via tool bar

Icon	User level	Meaning
	1	Select language Selectable languages: 
	1	Online parameterization active (RS 232)
	1	Online parameterization active (USB)
	2	Offline parameterization active
	2	Call up angle encoder settings

Icon	User level	Meaning
	1	Save Parameter
	1	Reset Servo positioning controller
	1	Call up safety module
	1	Update all windows
	1	Arrange all windows

8.3 Parameterizing destinations

The servo-positioning controller SE-Power has a table of 250 positions which can be used to parameterize targets in advance. The positions A and B are test positions which can only be called from the SE-Commander.

The target positions are parameterized in the window “Destination parameters”

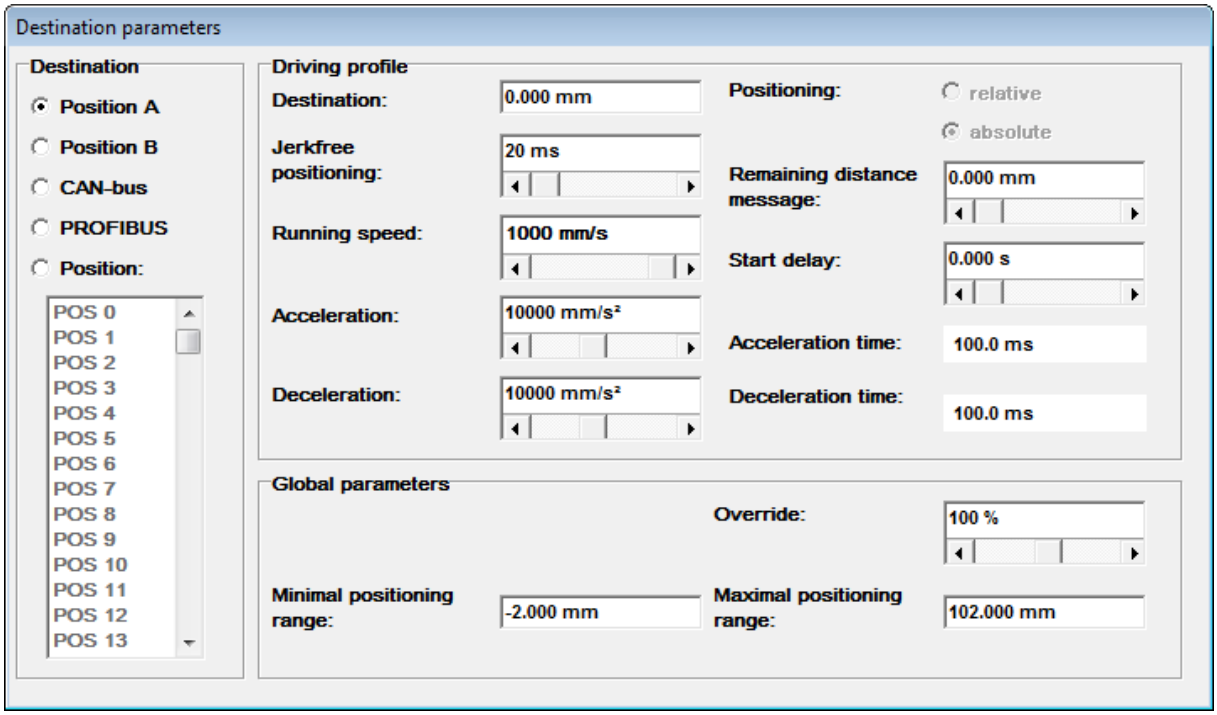


Figure 2: Destination parameters

Driving profil parameter	User level	Description
Destination	1	Definition of the **target position**. The input value is interpreted differently depending on whether an absolute or a relative position was selected.
Jerkfree positioning	1	The positioning procedure is levigated by a filter so that a smooth positioning becomes possible.
Running speed	1	**Speed** at which the device moves to the target position.
Acceleration Deceleration	1	Default of **acceleration** and **deceleration**.
Positioning absolute	1	**Absolute** default related to the reference point.
Positioning relative	1	**Relative** default related to the current position

Remaining distance message	1	This message which is triggered by the digital output “Remaining path” indicates that the defined **remaining path** up to the end of the current positioning is reached. The remaining path message can be used for the parallel movement of several axles. (Please see also chapter *9.1.2 Functions of the digital Outputs*).
Start delay	1	Delay after start signal until the movement profile is carried out.
Acceleration time		Time during which the axle is accelerated.
Deceleration time		Time during which the axle is decelerated.

Global parameters	User level	Description
Minimal positioning range	2	In addition to the factory-set hardware and software limits, this parameter limits the minimal positioning range.
Maximal positioning range	2	In addition to the factory-set hardware and software limits, this parameter limits the maximal positioning range.
Override	1	This value reduces or increases the movement speed of the current positioning set. Range 0 .. 200 %

8.4 Commands

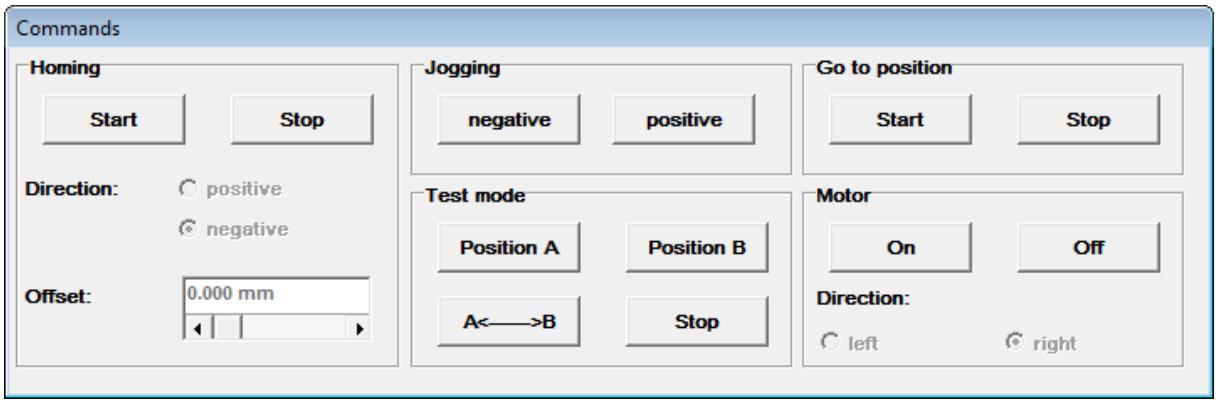


Figure 3: Commands

Homing	User level	Description
Start	1	Starts the home run.
Stopp	1	Stops the home run
Direction	2	The home run can be executed in the positive or negative direction (recommended is negative).
Offset	2	Offset position after the home run
Jogging		
negative	1	Stepwise movement of the axle in the negative direction.
positive	1	Stepwise movement of the axle in the positive direction.
Test mode		
Position A	1	Starts the movement to position A.
Position B	1	Starts the movement to position B.
A←→B	1	Starts the continuous reversing between position A and B
Stop	1	Stops the continuous reversing between position A and B
Go to position		
Start	1	Starts the movement to the position which is actually selected in the “Destination parameters” window.
Stop	1	The actual positioning will be stopped.
Motor		
On	1	Switches the motor on.
Off	1	Switches the motor off.
Direction	2	Changes the direction of rotation respective the positive/negative direction of the motor

8.5 Display of actual values

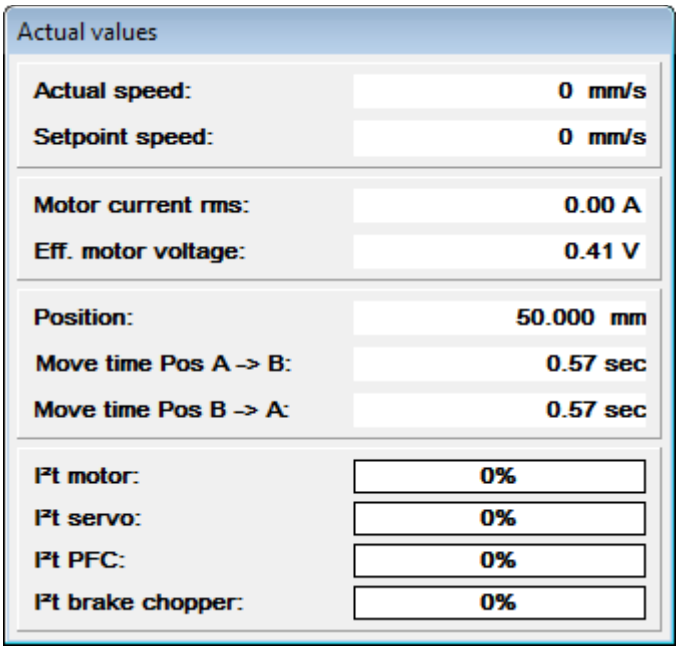


Figure 4: Actual values

Actual speed	Current actual speed
Setpoint speed	Current setpoint speed
Motor current rms	This value displays the effective motor current that is required over the total motion-sequence.
Eff. motor voltage	This value displays the effective motor voltage that is required over the total motion-sequence.
Position	Current actual position
Move time Pos A –> Pos B	Move time from position A to position B in seconds
Move time Pos B –> Pos A	Move time from position B to position A in seconds
I^2t motor	Displays the momentary load of the motor. If the limit of 100% is exceeded a corresponding error message appears in the Error window. The axis is stopped and rendered current less.
I^2t servo	Displays the momentary load of the servo. If the limit of 100% is exceeded a corresponding error message appears in the Error window. The axis is stopped and rendered current less.
I^2t PFC	Displays the momentary load of the PFC-stage. If the limit of 100% is exceeded a corresponding error message appears in the Error window. The axis is stopped and rendered current less.
I^2t brake chopper	Displays the momentary load of the brake chopper. If the limit of 100% is exceeded a corresponding error message appears in the Error window. The axis is stopped and rendered current less.

8.6 Status display

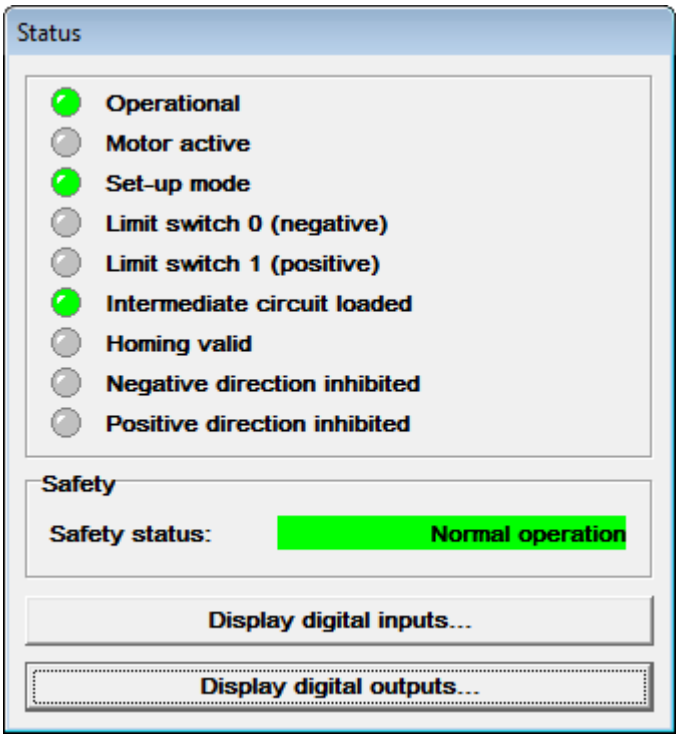


Figure 5: Status

Operational	The servo-positioning controller is ready-to-operate
Motor active	The motor is active and controlled
Set-up mode	Set-up mode is activated (all speeds are reduced to 10 % of the maximal speed)
Limit switch 0 (negative)	State Limit switch 0 (negative)
Limit switch 1 (positive)	State Limit switch 1 (positive)
Intermediate circuit loaded	The intermediate circuit is loaded
Homing valid	Home run was carried out. Origin position was defined.
Negative direction inhibited	The negative direction is inhibited since the limit sensor is activated, or the minimal positioning range is reached.
Positive direction inhibited	The negative direction is inhibited since the limit sensor is activated, or the maximal positioning range is reached.
Safety status	Display of the actual status of the safety module

8.7 Error Window

The **Error window** is a permanent window in the Afag SE-Commander operator program. If no error is present, the window is minimized (see figure).

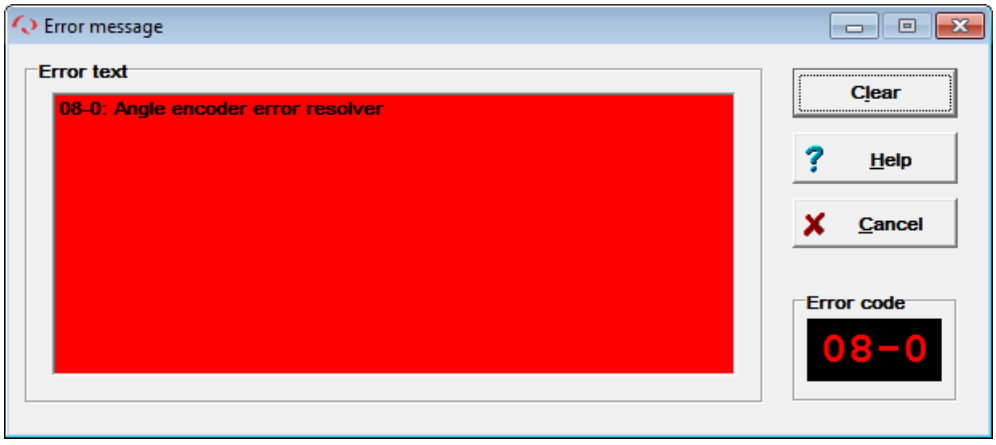
The **Error window** can be enlarged to its full size

1. by clicking the **update all windows** button.
2. by clicking the menu item **Error/Error window** (only when errors active)
3. by clicking the Error window (third field from the left in the bottom status bar) (only when errors active).
4. automatically when an error occurs in the servo-positioning controller SE-Power.
5. automatically upon a write- or read error of a communication object.

8.7.1 Behaviour in Case of a Controller Error

As soon as a controller error occurs, the Afag SE-Commander interface changes as follows:

1. the Error window is enlarged and is displayed in the foreground.



2. the error is displayed red in the bottom bar.

Carry out the following 3 steps for trouble shooting:

1. **Error analysis:** If the error message is not clear enough and you need more tips on trouble shooting, click on **Help** in the Error window. (In this example the error is caused by a broken/not plugged connection to the angle transmitter.)
2. **Trouble shooting:** Eliminate the cause of the fault. (Establish correct connection to the angle transmitter.)

3. **Error acknowledgement:** Click the button **Clear** in the Error window. If the error could be eliminated successfully, the window is minimized. If the error is still present the window reappears.

Click the button **Can** to minimize the window. Error messages that may be present (see chapter *12.2 Error messages*) are retained in the Error window of the bottom bar.

The button **Cancel** does not eliminate any errors!

8.8 Exiting the Program

The Afag SE-Commander program can be terminated as follows:

- by selecting the menu item **File/Exit**
- with the shortcut **<Alt>+F4**
- by clicking the cross in the top right corner of the main window.

9 System Integration

There are three different possibilities to select targets with superset controllers and to start positioning:

- via digital inputs and outputs
- via the serial interface
- via a fieldbus

9.1 Control via Inputs / Outputs

9.1.1 Functions of the Digital Inputs

- DIN0: Position selector Bit 0
- DIN1: Position selector Bit 1
- DIN2: Position selector Bit 2
- DIN3: Position selector Bit 3
- DIN4: Power stage enable
- DIN5: Controller enable
- DIN6: Limit switch 0 (negative)
- DIN7: Limit switch 1 (positive)
- DIN8: Homing Switch
- DIN9: Positioning Start
- DIN AIN1: Homing run START
- DIN AIN2: Set-up mode (active low)

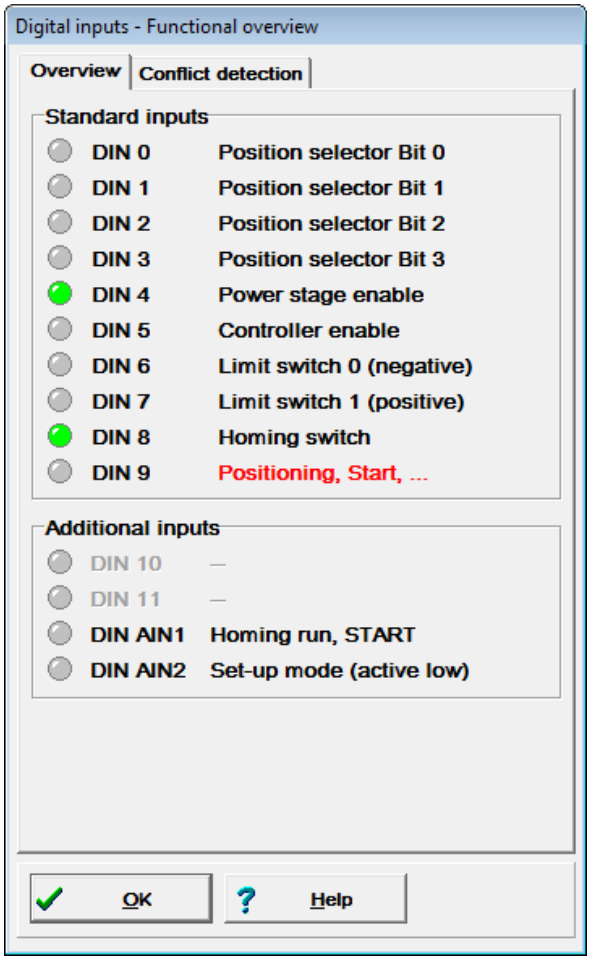


Figure 6: Display digital Inputs

When a „SE-Power I/O Interface“ is used, the number of digital inputs can be increased by further eight inputs.

Functions of the SE-Power I/O Interface:

- DIN1: Position selector Bit 4
- DIN2: Position selector Bit 5
- DIN3: Position selector Bit 6
- DIN4: Position selector Bit 7
- DIN5: --
- DIN6: --
- DIN7: --
- DIN8: --

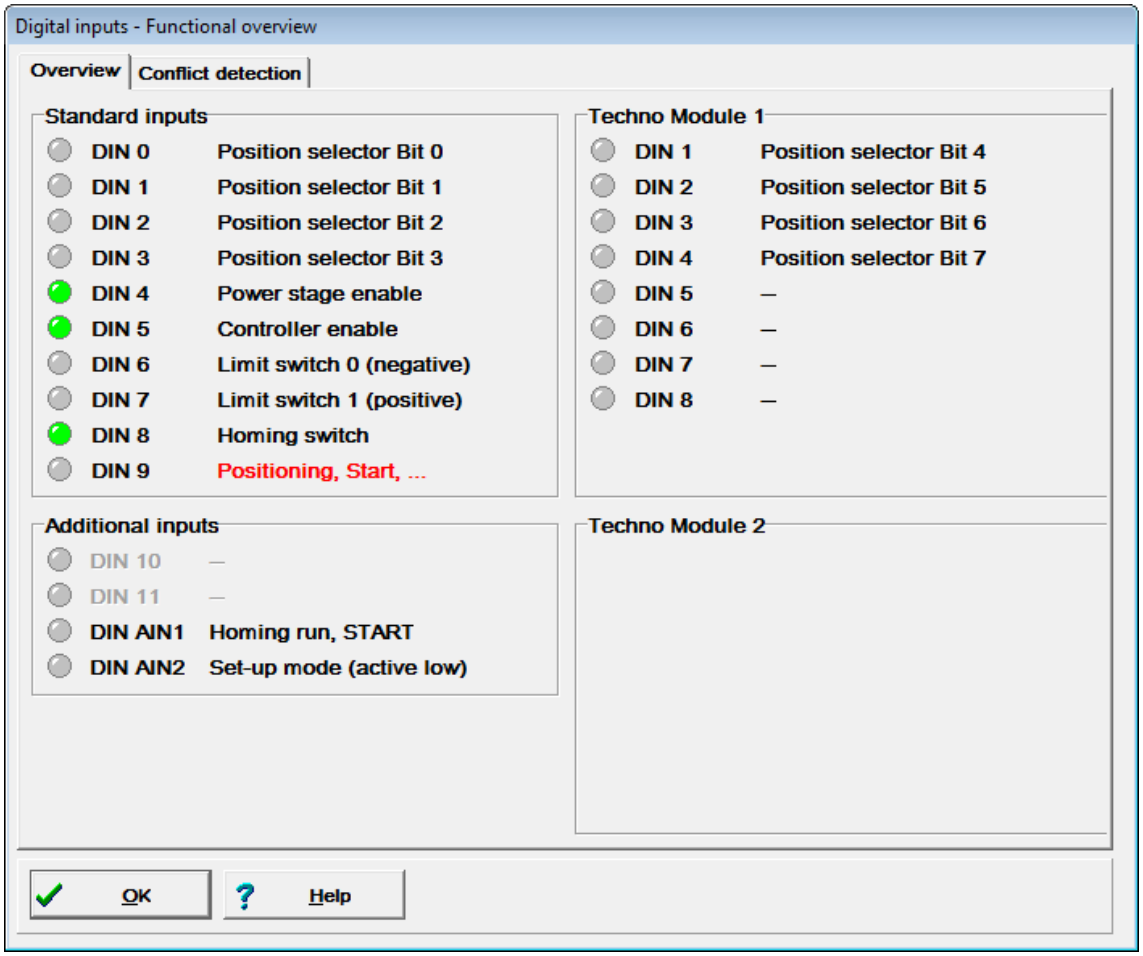


Figure 7: Display digital Inputs with SE-Power I/O Interface

9.1.2 Functions of the digital Outputs

- DOUT0: Servo controller operational
- DOUT1: Homing position valid
- DOUT2: Position Xact = Xdest
- DOUT3 : Remaining distance

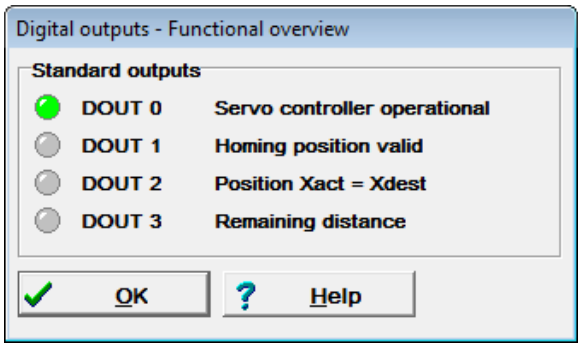


Figure 8: Display digital Outputs

9.2 Control via Fieldbus

The following fieldbuses were supported at the time when this manual was written:

- CANopen bus, integrated in the basic device SE-Power servo-positioning controller.
- PROFIBUS-DP
- EtherCAT CoE (in preparation)

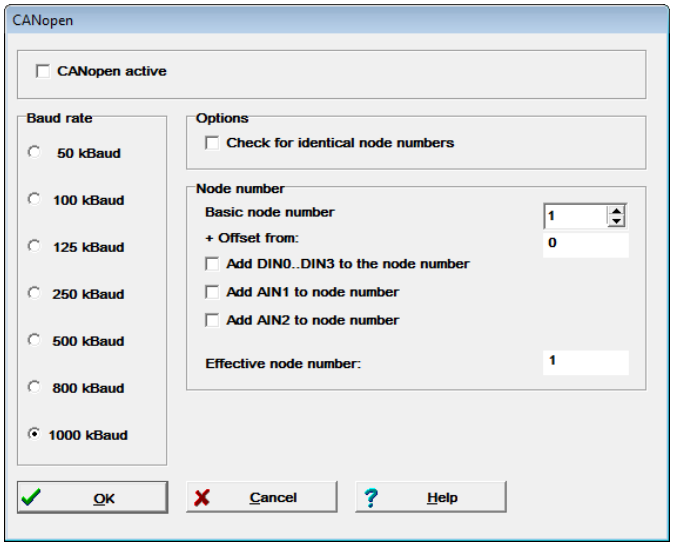
PROFIBUS and EtherCAT require an additional fieldbus card (technology plug-in module).

You can find further information on fieldbus protocols in the following manuals:

- **CANopen: „SE-Power CanOpen manual”**, description of the implemented CANopen protocol according to DSP402
- **PROFIBUS: „SE-Power Profibus manual”**, description of the implemented PROFIBUS-DP protocol.
- **EtherCAT: „SE-Power EtherCAT manual“**, Description of the EtherCAT fieldbus control by using the CoE (CANopen over EtherCAT) protocol.

9.2.1 Setting the CANopen communication parameters

The CANopen communication parameters of the servo-positioning controller SE-Power can be adapted to the CANopen bus network in the menu **Parameters/Fieldbus/CANopen/Operation parameters…**



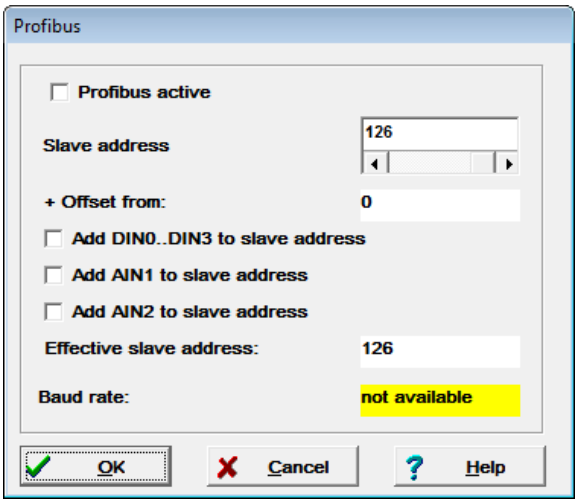
With the box **CANopen active** can the fieldbus communication be activated or deactivated with the adjusted parameters.

In addition you can define the following parameters:

- **Baud rate:** This parameter defines the baud rate used on the CANopen bus.
- **Basic node number:** This parameter comprises the basic node number of the corresponding device. The identifiers of the individual messages are based on the node number. Every node number may only be assigned once within the CANopen network. It is possible to include the digital inputs in the calculation of the node number (see below).
- **Check for identical node numbers:** The servo-positioning controller SE-Power checks automatically whether a node number was assigned twice within the CANopen network. In this case an error message appears on the display of the servo-positioning controller SE-Power.
- **Add DIN0...DIN3 to node number:** The value of the digital inputs DIN0...DIN3 is added to the basic node number. The input combination is only read out once directly after a reset at the SE-Power servo-positioning controller. Thus up to 16 different device addresses can be assigned by simple jumpers after 24V in the connector shell X1.
- **Add AIN1 to node number:** The analog input AIN1 is included with a rating of 16 to generate the node number. For Low level it can remain blank, for High level this input must be bridged to V_{ref} = 10V.
- **Add AIN2 to node number:** The analog input AIN2 is included with a rating of 32 to generate the node number. For Low level it can remain blank, for High level this input must be bridged to V_{ref} = 10V.

9.2.2 Setting the PROFIBUS-DP communication parameters

The PROFIBUS-DP communication parameters of the servo-positioning controller SE-Power with technology plug-in module PROFIBUS-DP can be adapted to the PROFIBUS-DP network in the menu **Parameters/Fieldbus/PROFIBUS/Operation parameters…**



With the box **Profibus active** can the fieldbus communication be activated or deactivated with the adjusted parameters.

In addition you can define the following parameters:

- **Slave address:** This parameter contains the basic slave address of the corresponding device. The identifiers of the individual messages are based on this address. Every address may only be assigned once within the network. It is possible to include the digital inputs in the calculation of the slave address (see below)
- **Add DIN0...DIN3 to Slave address:** The value of the digital inputs DIN0...DIN3 is added to the slave address. The input combination is only read out once directly after a reset at the SE-Power servo-positioning controller. Thus up to 16 different device addresses can be assigned by simple jumpers after 24V in the connector shell X1.
- **Add AIN1 to Slave address:** The analogue input AIN1 is included with a rating of 16 to generate the slave address. For Low level it can remain blank, for High level this input must be bridged to V_{ref} = 10V.
- **Add AIN2 to Slave address:** The analogue input AIN2 is included with a rating of 32 to generate the slave address. For Low level it can remain blank, for High level this input must be bridged to V_{ref} = 10V.

9.2.2.1 Support of PROFIBUS-DP-Functionality

The Afag SE-Commander subdirectory **Profibus** comprises:

- function and data blocks (compressed)
- master data of the device (gsd)

10 Commissioning of the axis

The axis can be commissioned, when

1. the Afag SE-Commander operator program was properly installed
2. communication with the SE-Power servo-positioning controller was established
3. the SE-Power servo-positioning controller and axis were connected according to the operating instructions

Danger!
Carry out all steps of the chapter “Commissioning“ of the operating instructions! Non-observance can result in a destruction of the motor and/or the SE-Power servo-positioning controller!

10.1 Factory-Parameterization

The Servo Controller SE-Power was pre-parameterized in the House of Afag with the corresponding parameters. There’s no further parameterization of regulator parameters required.

All regulator parameters was saved on the corresponding Servo Controller by Afag, there’s no further parameterization required.

If you have multiple controllers and axes in use, are they explicit identifiable by the labelling.

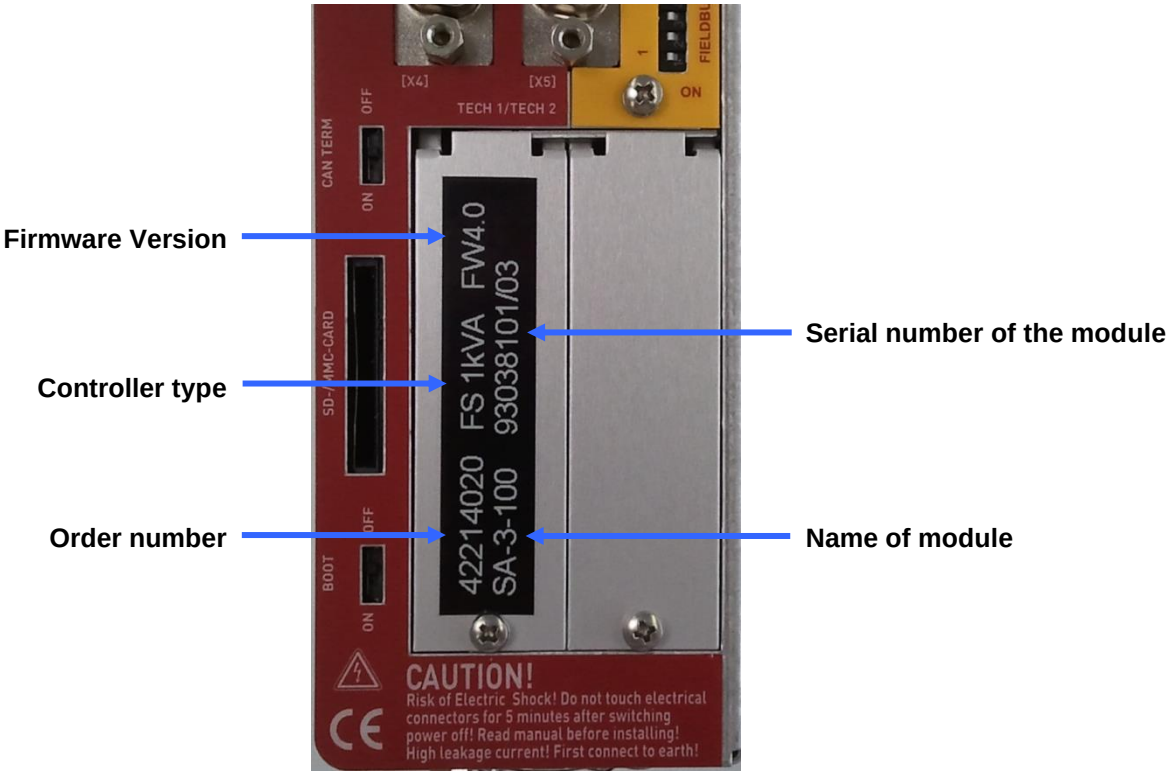


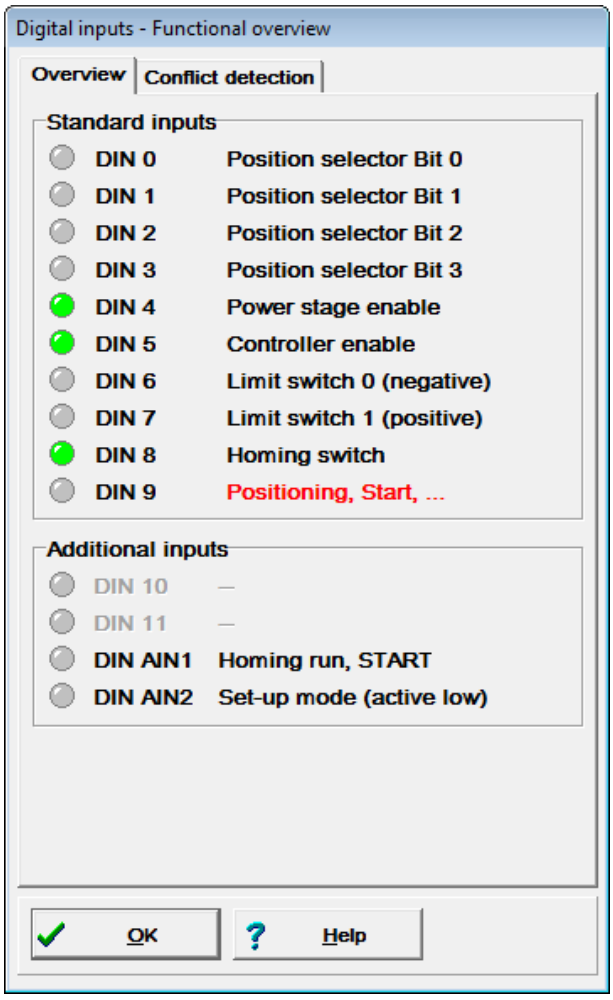
Figure 9: Axis specific labelling

Caution!

Always ensure that only axles are connected which correspond with the axle-specific identification on the control system. Non-adherence can result in significant damage to property.

11 First movement of the axis

In this chapter you find more detailed information on how to drive the axle for the first time with the servo-positioning controller. Connect the axle according to the SE-Power operating instructions. The inputs “controller release” and “final stage release” must be activated.



Danger!

Lock the controller release after every test and wait until the axis has come to a standstill!

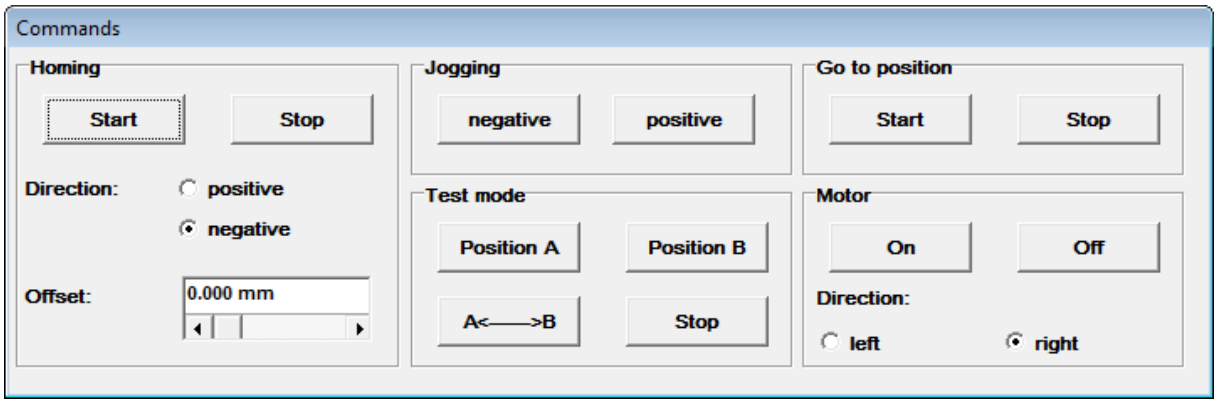


Figure 10: Commands

The following steps must be executed:

1. Motor On (motor is energized, axle remains at the position
2. Homing Start
3. Jogging positive / negative

If malfunctions occur these can be attributed to the following faults:

Table 6: Trouble shooting:

Fault	Fault clearance
No segment is displayed.	Check 24 V voltage supply, set controller enable logic
The letter “P“ is not displayed.	The operating mode **Position control** is not activated. Contact your sales partner.
A three-digit error code is flashing in the display.	Read chapter *12.2 Error messages* to remove this fault
The brake is not released.	Check the connector X6 and the motor plug as well as the cable. Does the power supply meet the specifications? See also chapter *Connection motor [X6] in the SE-Power Operating Instructions*.
The axle oscillates or runs eratically.	Contact your sales partner
The axle does not move.	No intermediate circuit voltage
	Limit switches activated

12 Error Display

12.1 Error Display Directly on the Device

The system supports a seven-segment display. The following table describes the display and the meaning of the symbols shown:

Table 7: Operating mode and error display

Display	Meaning
	In the operation mode speed control the outer bars “rotate”, depending on the actual speed resp. the actual position of the rotor.
	If the drive is enabled, the center bar of the seven-segment display is on, too.
	The servo positioning controller SE-Power FS still has to be parameterised (seven-segment display = “A”).
	Operating mode torque control, the two bars on the left hand of the display are on (seven-segment display = “I”).
P xxx	Positioning, “xxx” stands for the position number. The numbers are successively indicated.
PH x	Homing (“x“ stands for the currently active phase of the homing run). 0 : Search phase 1 : Crawling phase 2 : Positioning to zero position The numbers are successively indicated.
E xxy	Error message with index “xx” and subindex “y”. The numbers are successively indicated.
-xxy-	Warning message with Index “xx” and subindex “y”. A warning is displayed at least twice on the seven-segment-display. The numbers are successively indicated.
	Option “STO” (Safe Torque-Off) active for the SE-Power FS devices. (seven-segment display = “H”, blinking with a frequency of 2 Hz).

12.2 Error messages

If an error occurs, the servo positioning controller SE-Power FS will cyclically show an error message in its seven-segment display. The error message is comprised of an E (for Error), a main index (xx) and a sub index (y), for example **E 0 1 0**.

Warnings have the same code numbers as error messages. As a distinguishing feature, warnings have a centre bar before and after the number, for example **- 1 7 0 -**.

The following *Table 8 Error messages* summarize the meaning of the messages and the corresponding measures.

The error messages with the main index 00 do not reflect run time errors. They contain information and in general there are no measures required by the user. They occur in the error buffer only but will not be shown on the 7-segment display.

Table 8: Error messages

Error message		Meaning of the error message	Measures
Main index	Sub index		
00	0	Invalid error	Information: An invalid (corrupted) entry in the error buffer is marked by this error number. No measures required
	1	Invalid error detected and corrected	Information: An invalid (corrupted) error entry was detected and corrected. The Debug information stores the initially found error number. No measures required
	2	Error cleared	Information: The active errors have been cleared. No measures required
	4	Serial number/device type changed (change of modules)	Information: A flexible error buffer (service memory module) has been plugged into another device. No measures required
01	0	Stack overflow	Incorrect firmware? If necessary, reload the standard firmware again. Contact the Technical Support
02	0	Undervoltage of DC-bus	Error reaction set too high? Check power supply. Check (measure) the intermediate circuit voltage Check threshold limit of the DC-link Monitoring
03	0	Overtemperature analogue motor	Motor too hot? Check the parameterization (current controller, current limitation).

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	Overtemperature digital motor	Suitable sensor? Sensor defective? Check the parameterization of the sensor or the sensor characteristic curve. Error also occurs if sensor is bypassed: device defective. Please, send the servo positioning controller to our sales partner.
	2	Overtemperature motor analog: Wire break	Check cables of temperature sensor (broken wire). Check the parameterization of wire break monitoring (threshold value).
	3	Overtemperature motor analog: Short circuit	Check cables of temperature sensor (short circuit). Check the parameterization of short circuit monitoring (threshold value).
04	0	Overtemperature of the power stage	Plausible temperature display? Check the installation conditions, filter mats of fan dirty? Device fan defective?
	1	Overtemperature in the DC-bus	
05	0	Internal undervoltage supply 1	Disconnect the device from the entire periphery and check whether the error persists after a reset. If the error persists, please send the servo positioning controller to our sales partner.
	1	Internal undervoltage supply 2	
	2	Driver voltage failure	
	3	Undervoltage dig. I/O	Check the outputs for short-circuits or specific load. If necessary, contact the Technical Support.
	4	Overcurrent dig. I/O	
	5	Technology module supply voltage failure	Technology module defective? Replace the technology module. If necessary, contact the Technical Support.
	6	X10, X11 and RS232 supply voltage failure	Check the pin assignment of the connected peripheral equipment. Check the connected peripheral equipment for short-circuits.
	7	Safety module internal voltage failure	Safety module defective? Replace the safety module. If the error persists, please send the servo positioning controller to our sales partner.
	8	Internal undervoltage supply 3 (15V)	Please send the servo positioning controller to our sales partner.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	9	Encoder supply failure	
06	0	Short circuit in the power stage	Motor defective? Short-circuit in cable? Power stage defective?
	1	Overcurrent brake chopper	Check the external brake resistor: Short circuit or resistance value too low? Check braking chopper output of the device.
07	0	Overvoltage in the DC-bus	Check connection to braking resistor (internal / external). External braking resistor overloaded? Check rating.
08	0	Angle encoder error resolver	See measures 08-2 .. 08-8.
	1	Sense of rotation of the serial and incremental position evaluation is not identical	A and B-track are mixed up? Correct (check) the connection of the tracks.
	2	Error of track signals Z0 Incremental encoder	Angle encoder connected? Angle encoder cable defective? Angle encoder defective? Check the configuration of the angle encoder interface. The encoder signals are disturbed: check the installation for compliance with EMC recommendations
	3	Error of track signals Z1 Incremental encoder	
	4	Error of track signals of digital incremental encoder	
	5	Error of Hall signals incremental encoder	
	6	Communication error encoder	
	7	Signal amplitude incremental track erroneous	
	8	Internal encoder error	Internal monitoring of the angle encoder at [X2B] has identified an error. Communication error? Check the encoder type, contact the Technical Support if necessary.
	9	Encoder at X2B not supported	Please contact the Technical Support
09	0	Old encoder parameter set	Save data into the encoder EEPROM (new format)

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	Encoder parameter set cannot be decoded	Encoder defect? Check encoder interface configuration. The encoder signals are disturbed. Check the installation for compliance with EMC recommendations
	2	Unknown encoder parameter set version	Save the data into the encoder again.
	3	Corrupted data structure in encoder parameter set	If necessary, determine the data once more and save it into the encoder again.
	4	EEPROM data: Erroneous customer specific configuration	Motor repaired: perform a homing run and save to the angle encoder, and then save to the basic device. Motor replaced: parameterise the basic device, perform a homing run, save to the angle encoder and then save to the basic device.
	7	Write protected EEPROM angle encoder	Please contact the Technical Support.
	9	EEPROM angle encoder too small	
10	0	Overspeed (motor overspeed protection)	Encoder offset angle correct? Overspeed protection limit too small?
11	0	Error at start of homing run	No controller enabling.
	1	Error during homing run	Homing has been interrupted for example by disabling the controller.
	2	Homing run: No valid index pulse	The required index pulse is missing.
	3	Homing run: timeout	The maximum time parameterized for homing has been consummated before the homing run has been completed. Please check the time parameterisation.
	4	Homing run : Wrong or invalid limit switch	The associated limit switch is not connected. Limit switches mixed up? Move the limit switch so that it is not located in the area of the index pulse.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	5	Homing run: I²t / following error	Unsuitable parameterisation of acceleration ramps. Invalid stop reached, for example because no homing switch is connected. Check the connection of a home switch. Contact the Technical Support.
	6	Homing run: End of homing distance	The maximum homing distance has been travelled but the reference point or the destination of the homing run has not been reached.
12	0	CAN: Two nodes with the same ID	Check the configuration of the devices connected to the CAN bus.
	1	CAN: Communication error / bus OFF	Check the cabling (compliance with the cable specification, cable break, maximum cable length exceeded, correct terminating resistors, cable shield grounded, all signals applied?). Replace the device. If the error could be eliminated by replacing the device, please send the replaced device to our sales partner.
	2	CAN: Communication error on send	Check the cabling (compliance with the cable specification, cable break, maximum cable length exceeded, correct terminating resistors, cable shield grounded, all signals applied?). Check the start sequence of the application. Replace the device. If the error could be eliminated by replacing the device, please send the replaced device to our sales partner.
	3	CAN: Communication error on receive	
	4	CAN: Node Guarding	Equalize the cycle time of the remote frames with the PLC resp. failure of the PLC. Signals interfered?
	5	CAN: RPDO too short	Check the configuration.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	9	CAN: Protocol error	Check the command syntax of the control (record the data traffic). Please contact the Technical Support.
13	0	Timeout CAN-Bus	Check CAN parameterisation.
14	0	Insufficient supply for identification	Check the power supply. Check the motor resistor.
	1	Identification current controller: Measurement cycle insufficient	The automatic parameter identification process delivers a time constant beyond the parameterisation value range. The parameters must be optimized manually.
	2	Power stage could not be enabled	The power stage has not been enabled, check the connection of DIN 4.
	3	Power stage prematurely disabled	The power stage has been disabled while the identification process was running (for example via DIN 4).
	4	Identification does not support selected resolver	The identification cannot be performed with the present angle encoder settings. Check the configuration of the angle encoder. If necessary, contact the Technical Support.
	5	No index pulse detected	The index pulse could not be found after the maximum number of electrical rotations. Check the index pulse signal. Check the angle encoder settings.
	6	Invalid hall signals	Check the connection. Check the data sheet as to whether the encoder provides 3 Hall signals with 120° or 60° segments. If necessary, contact the Technical Support.
	7	Identification not possible	Check the DC bus circuit voltage. Check the wiring of the motor/encoder system. Motor blocked (for example holding brake not released)?
	8	Invalid number of pole pairs	The number of pole pairs calculated is beyond the parameterisation range. Check the motor data sheet. If necessary, contact the Technical Support
15	0	Division by zero	Please contact the Technical Support.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	Out of range error	
	2	Mathematical underflow	
16	0	Erroneous program execution	Please contact the Technical Support.
	1	Illegal interrupt	
	2	Initialization error	
	3	Unexpected state	
17	0	Max. following error exceeded	Increase error window. Acceleration parameterization too large.
	1	Encoder difference control	Check the connection of the encoders. Check the parameterized gear.
18	0	Warning level analogue motor temperature	Motor too hot? Check the parameterization (current controller, current limitation). Suitable sensor? Sensor defective? Check the parameterisation of the sensor and sensor characteristic. Error also occurs if sensor is bypassed: device defective. Please, send the servo positioning controller to our sales partner.
	1	Warning level temperature power stage	Plausible temperature display? Check the installation conditions, filter mats of fan dirty? Device fan defective?
19	0	Warning level I²t-Motor	Motor blocked?
21	0	Error 1 current measurement V	Please contact the Technical Support.
	1	Error 2 current measurement U	
	2	Error 2 current measurement V	
	3	Error 1 current measurement V	
22	0	PROFIBUS: Wrong initialization	Technology module defective? Replace the technology module. Contact the Technical Support
	1	PROFIBUS: reserved	Please contact the Technical Support.
	2	PROFIBUS: Communication error	Check the slave address. Check the bus terminators. Check the cabling.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	3	PROFIBUS: Invalid slave address	Incorrect slave address. Please select another slave address.
	4	PROFIBUS: Range overflow	Mathematical error during the conversion of physical units. The value range of the data and of the physical units do not match (fieldbus display units). Contact the Technical Support.
25	0	Invalid device type	Please send the servo positioning controller to our sales partner.
	1	Device type not supported	
	2	HW revision not supported	Check the firmware version. If necessary, request an update from the Technical Support.
	3	Device function restricted	Please send the servo positioning controller to our sales partner.
	4	Invalid power stage type	Check the firmware version. If necessary, request an update from the Technical Support.
26	0	No user parameter set	Load the default parameter set. If the error continues to occur, contact the Technical Support.
	1	Checksum error	
	2	Flash: Error during write-operation	Please send the servo positioning controller to our sales partner
	3	Flash: Error during erase-operation	
	4	Flash: Error in internal flash	Re-load the firmware. If the error continues to occur, contact the Technical Support
	5	No calibration data	
	6	Missing user position data sets	Simply perform save & reset. Load the default parameter set. If the error continues to occur, contact the Technical Support.
	7	Faulty data tables (CAM)	Load the default parameter set and commission the servo positioning controller. If necessary, reload parameter set. If the error continues, contact the Technical Support.
27	0	Following error warning level	Check the parameterisation of the following error. Motor blocked?

Error message		Meaning of the error message	Measures
Main index	Sub index		
28	0	Hours-run meter missing	Acknowledge the error. If the error occurs again, contact the Technical Support.
	1	Hours-run meter: write error	
	2	Hours-run meter corrected	
	3	Hours-run meter converted	
29	0	SD-Card not available	Please contact the Technical Support
	1	SD-Card: Initialization error	
	2	SD-Card: Data error	
	3	SD-Card: Write error	
	4	SD-Card: Firmware download error	
30	0	Internal calculation error	Please contact the Technical Support.
31	0	I^2t motor	Motor blocked? Check the power rating of the drive.
	1	I^2t servo positioning controller	Check the power rating of the drive package.
	2	I^2t-PFC	Check the power rating of the drive package. Select operation without PFC?
	3	I^2t-Break resistor	Braking resistor overloaded. Use external braking resistor?
	4	I^2t real power overload	Reduce the real power of the drive.
32	0	Loading period DC-bus exceeded	Bridge for the internal brake resistor installed? Check the connection of the external brake resistor. If necessary, contact the Technical Support.
	1	Undervoltage for active PFC	Check whether the power supply complies with the nominal data.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	5	Braking chopper overload. Intermediate circuit couldn't be discharged.	Check the ON/OFF cycles.
	6	Discharge period DC-bus exceeded	Bridge for the internal brake resistor installed? Check the connection of the external brake resistor. If necessary, contact the Technical Support.
	7	Failure of power supply for controller enable	No intermediate circuit voltage? Check the power supply. If necessary, contact the Technical Support.
	8	Supply power breakdown at controller enable	Check the power supply.
	9	Phase failure	
33	0	Following error encoder emulation	Check the settings of the incremental encoder emulation (number of lines). If necessary, contact the Technical Support.
34	0	No synchronisation via field bus	Failure of synchronization messages from master?
	1	Field bus synchronisation error	Failure of synchronization messages from master? Parameterization of synchronization interval too small?
35	0	Speed protection of Linear motor	The encoder signals are disturbed. Check the installation for compliance with EMC recommendations.
	1	Timeout during quick stop	Check the commutation angle.
	5	Error during the determination of the commutation position	For this motor an improper method has been chosen. Please contact the Technical Support.
36	0	Parameter limited	Check user parameter set.
	1	Parameter not accepted	
37	0	sercos: Excessive distortion	Check the sercos wiring (for example clean the optical fibre). Check settings for the luminous power. Check the baud rate.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	sercos: Ring not closed	Check the sercos wiring (optical fibre) for breaks. Check the connections.
	2	sercos: MST missing twice	Check the sercos wiring (optical fibre). Check the control system (are all of the MSTs being transmitted?)
	3	sercos: Illegal phase requested by master	Check the program in the sercos master
	4	sercos: MDT missing twice	Check the sercos wiring (optical fibre). Check the control system (are all of the MDTs being transmitted?)
	5	sercos: Unknown operation mode selected	Check the settings for the operating modes in IDN S-0-0032 to S-0-0035
	6	sercos: T3 invalid	Increase the baud rate. Shift the point of time T3 manually.
38	0	sercos: SERCON Status event	Technology module defective? Replace the technology module. If necessary, contact the Technical Support.
	1	sercos: No module	Technology module plugged-in correctly? Technology module defective? Replace the technology module. If necessary, contact the Technical Support.
	2	sercos: Defective module	Replace the technology module. If necessary, contact the Technical Support.
	3	sercos: S-0-0127: Invalid data in S-0-0021	Check the configuration (cyclic data for MDT and AT). Time slot calculation by the master.
	4	sercos: S-0-0127: Illegal IDNs in AT or MDT	Check the configuration (cyclic data transfer).
	5	sercos: S-0-0128: invalid data in S-0-0022	Check the weighting settings. Check the operating mode settings. Check the internal/external angle encoder settings.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	6	sercos: S-0-0128: Invalid scaling	Check the weighting settings.
	7	sercos: Invalid IDN in S-0-0026 / S-0-0027	Check the configuration of the signal status and signal control word (S-0-0026 / S-0-0027).
	8	sercos: Error at conversion	Check the weighting settings. If necessary, contact the Technical Support.
	9	sercos: SERCON 410b mode activated	Technology module defective? Replace the technology module.
39	0	sercos: List S-0-0370: Invalid configuration MDT-Data container	Please contact the Technical Support.
	1	sercos: List S-0-0371: Invalid configuration AT-Data container	
	2	sercos: Cyclic channel fault MDT	
	3	sercos: Cyclic channel fault AT	
	4	sercos: Cyclic data container fault MDT	
	5	sercos: Cyclic data container fault AT	
40	0	Negative SW limit switch reached	Check the negative range limit.
	1	Positive SW limit switch reached	Check the positive range limit.
	2	Target position behind the negative SW limit switch	The start of a positioning run was suppressed as the target lies beyond the respective software limit switch. Check the target data. Check the positioning range.
	3	Target position behind the positive SW limit switch	

Error message		Meaning of the error message	Measures
Main index	Sub index		
41	0	Course program: Synchronization error	Check the parameterization. If necessary, contact the Technical Support.
	8	Course program: unknown command	
	9	Course program: abnormal jump destination	
42	0	Positioning: Missing following position: Stop	The positioning target cannot be reached with the current positioning options or the current boundary conditions. Check the positioning parameters.
	1	Positioning: Reversing the direction not allowed: Stop	
	2	Positioning: Reversing the direction after stop not allowed	
	3	Start positioning rejected: wrong mode of operation	The change of the mode of operation could not be performed by the position set.
	4	Start positioning discarded: homing required	Reset the optional parameterisation “homing required”. Perform a new homing run.
	5	Rotary axis: direction of rotation is not allowed	According to the selected mode of the rotary axis the calculated direction of rotation is not allowed. Check the selected mode.
	9	Error at positioning start	Check speed parameters and acceleration
43	0	Limit switch: Negative setpoint inhibited	The drive has left the intended motion range. Technical defect in the system? Check the limit switches.
	1	Limit switch: Positive setpoint inhibited	
	2	Limit switch: Positioning suppressed	
	9	Limit switch: both limit switches are concurrently active	
44	0	CAM table error	Check whether the index has been assigned correctly. Check whether there are cam plates present in the device.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	CAM: drive not referenced	Ensure that the drive has been homed prior to the activation of the cam plate. Delete the “homing necessary” option. Ensure that a cam plate cannot be started during a homing run.
45	0	Supply voltage cannot be switched off	Please contact the Technical Support.
	1	Supply voltage cannot be switched on	
	2	Supply voltage has been activated	
	3	Power stage release (DIN 4) not plausible	
47	0	Error set-up mode: timeout expired	Check the processing of the request by the PLC. Speed threshold too low or timeout too small?
49	2	DCO file: Data error	Please contact the Technical Support.
50	0	CAN: Too many synchronous PDOs	Deactivate the PDOs or increase the SYNC interval. The maximum number of PDOs must not be greater than the factor tp between the position controller and IPO (menu: Parameters/Controller parameters/Cycle times)
	1	SDO error occurred	Please contact the Technical Support.
51	0	No or unknown FSM module	Replace the FSM-Module.
	1	FSM: faulty driver supply	Please contact the Technical Support.
	2	FSM: different module type	
	3	FSM: different module version	
	4	Fault: SSIO communication	
	5	Fault: FSM break control	
52	1	FSM: STO inputs have different levels	Please contact the Technical Support.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	2	FSM-STO: Failure of +5 V OS/US supply during the PWM was still active	
53 … 59	0	FSM 2.0	Please contact the Technical Support.
60	0	Ethernet user-specific (1)	Please contact the Technical Support.
61	0	Ethernet user-specific (2)	Please contact the Technical Support.
62	0	EtherCAT: General bus error	No EtherCAT bus available. Check the cabling.
	1	EtherCAT: Initialization error	Replace the technology module. If necessary, contact the Technical Support.
	2	EtherCAT: Protocol error	Wrong protocol (no CAN over EtherCAT)? Check the EtherCAT wiring.
	3	EtherCAT: Invalid RPDO length	Check the protocol. Check the RPDO configuration of the servo positioning controller and of the control system.
	4	EtherCAT: Invalid TPDO length	
	5	EtherCAT: Erroneous cyclic communication	Check the EtherCAT wiring. Check the configuration of the master system.
63	0	EtherCAT: Defective module	Technology module defective? Replace the technology module.
	1	EtherCAT: Invalid data	Check the protocol. Check the EtherCAT wiring.
	2	EtherCAT: TPDO data has not been read	Reduce the cycle time (EtherCAT bus).
	3	EtherCAT: No distributed clocks active	Check whether the master supports the “distributed clocks” feature. If necessary, contact the Technical Support.
	4	Missing SYNC message in IPO cycle	Check the cycle times of the servo positioning controller and of the control system.
64	0	DeviceNet: Duplicate MAC ID	Change the MAC ID.
	1	DeviceNet: Bus power lost	Check the DeviceNet wiring.
	2	DeviceNet: RX queue overrun	Reduce the number of messages per time unit during the transmission.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	3	DeviceNet: TX queue overrun	Reduce the number of message per time unit that are to be transmitted.
	4	DeviceNet: IO send error	Please contact the Technical Support.
	5	DeviceNet: Bus Off	Check the DeviceNet wiring.
	6	DeviceNet: CAN controller overrun	Please contact the Technical Support.
65	0	DeviceNet active, but no module	Technology module defective? Replace the technology module.
	1	Timeout I/O connection	Please contact the Technical Support.
80	0	IRQ: Time overflow current control	Please contact the Technical Support.
	1	IRQ: Time overflow speed control	
	2	IRQ: Time overflow position control	
	3	IRQ: Time overflow interpolator	
81	4	IRQ: Time overflow low-level	Please contact the Technical Support.
	5	IRQ: Time overflow MDC	
82	0	Sequence control: General	Normally just information. No measures required.
	1	Multiple-started CO write access	Please contact the Technical Support.
83	0	Invalid technology module or Technology module: (slot/combination)	Load the correct firmware. Please check the slot. If necessary, contact the Technical Support.
	1	Technology module not supported	Incorrect firmware? Load the correct firmware. If necessary, contact the Technical Support.
	2	Technology module: HW revision not supported	
	3	Service memory module: write error	Please contact the Technical Support.
	4	Technology module: MC2000 watchdog	
90	0	Missing hardware component (SRAM)	Please contact the Technical Support.

Error message		Meaning of the error message	Measures
Main index	Sub index		
	1	Missing hardware component (FLASH)	
	2	Error during booting of FPGA	
	3	Error during start of SD-ADUs	
	4	Synchronisation error SD-ADU after start	
	5	SD-ADU not in synchronism	
	6	IRQ 0 (current controller): Trigger error	
	7	CAN controller not available	
	8	Checksum Error in Device Parameters	
	9	DEBUG-Firmware loaded	
91	0	Internal initialisation error	Please contact the Technical Support.
	1	Memory error	
	2	Reading of the controller/power stage type failed	
	3	Internal software initialization error	
92	0	Error during firmware download	Incorrect firmware? Load the correct firmware. If necessary, contact the Technical Support

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