Module Controller
SE-Power

Software Manual
SE-Commander

afag

Copyright

Table of Contents:

SE-Power- Software Manual 1.2 gb. 28.11.07

Table of Figures:

List of Tables:

Version of this

documentation: SE-Power- Softwarehandbuch 1.00d, 25.08.2004

1 General

1.1 Documentation

This manual helps to operate the Afag SE-Commander operator program in a safe and professional manner.

You will find more detailed information in the manuals listed hereafter:

- **Product manual "SE-Power Operating Instructions":** Description of the technical data and the device functionality as well as instructions regarding installation and operation of the servo-positioning controller SE-Power.

- **CANopen-Manual "SE-Power_CanOpen_Manual":** Description of the implemented CANopen protocol according to DSP402

- **PROFIBUS-Manual "SE-Power_Profibus_Manual":** Description of the implemented PROFIBUS-DP protocol

1.2 Scope of Supply

The following items are included in the scope of supply:

Table 1:   Scope of supply

1	CD-ROM with Afag SE-Commander installation program

2 Safety Instructions for Electrical Drives and Controllers

2.1 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 General Instructions

In case of damage owing to non-compliance with the warning notices in this operating manual, Afag will not accept any liability.

	Before commissioning please read the Safety **Instructions for Electrical Drives and Controllers**
	from page 9 onwards.

If the documentation in the language that has been supplied is not easily understood, please ask and inform the supplier.

The faultless and safe operation of the servo drive controller presupposes an appropriate and professional transport, storage, mounting and installation as well as careful operation and service. Only educated and trained personnel must be deployed for handling electrical equipment:

TRAINED AND QUALIFIED PERSONNEL

in the meaning of this product manual or the warning instructions on the product itself, are those persons who are familiar with the erection, the assembly, the commissioning and the operation of the product as well as with all the warnings and precautionary measures according to the operating instructions in this product manual and have the necessary qualifications corresponding to their activity:

SE-Power- Software Manual 1.2 gb. 28.11.07

- Training and instruction or authorization to switch on and off devices/systems in accordance with the standards of safety engineering, to ground them and to mark them meaningfully according to the work instructions.

- Training or instruction according to the standards of safety engineering in the maintenance and use of the proper safety equipment.

- Training in First Aid.

The following notes must be read before the first commissioning of the system for avoiding bodily injuries and/or damage to property:

> These safety instructions must be complied with at all times.

> Do not attempt to install or commission the servo drive controller before you have carefully read all the safety instructions for electrical drives and controllers in this document. These safety instructions and all other user instructions must be read through before any work on the servo drive controller.

> Should you not have access to any of the user instructions for the servo drive controller, please contact the responsible sales representative. Demand immediate dispatch of these documents to the person(s) responsible for the safe operation of the servo drive controller.

> In case of sale, lending and/or other form of transfer of the servo drive controller, these safety instructions must also be transferred.

> Opening of the servo drive controller by the owner/operator is not permitted for reasons of safety and warranty.

> The precondition for trouble-free working of the servo drive controller is a technically sound planning!

Danger!

Improper handling of the servo drive controller and non-compliance with the warning instructions given here or improper intervention in the safety devices can result in damage to property, bodily injury, electrical shocks or in extreme cases, in death.

3.1 Dangers from Wrong Use

Danger!

High electrical voltage and high operating current!

Danger to life or possibility of serious injury from electrical shock!

![afag logo]

	Danger!
	High electrical voltage owing to wrong connection!
	Danger to life or possibility of injury from electrical shock!

	Danger!
	The surfaces of the machine housing may be hot!
	Danger of injury! Danger of burns!

	Danger!
	Movements that cause danger!
	Danger to life, serious bodily injury or damage to property from unintentional movements of the motors!

3.2   Safety Instructions

3.2.1   General Safety Instructions

The servo drive controller corresponds to the protection class IP20, as well as the contamination class 1. Care must be taken that the ambience conforms to this protection class and degree of contamination.

Use only accessories and spare parts that have been approved by the manufacturer.

It must be possible to connect the servo drive controllers to the mains supply according to the EN-standards and VDE specifications in such a way that they can be isolated from the mains using suitable isolating devices (e.g. main switch, contactors, power circuit breakers).

The servo drive controller can be secured with an all-current sensitive FI-cut-off switch (RCD = Residual Current Protective Device) 300 mA.

Gold-plated contacts or contacts with a high contact pressure must be used for connecting the control contacts.

As a precaution, interference suppression measures must be taken for the switchgear, e.g. contactors and relays with RC-elements or diodes.

The safety specifications and regulations of the country in which the device is to be used must be complied with.

The ambient conditions specified in the product documentation must be complied with. Safety-critical applications are not allowed until they are

expressly approved by the manufacturer.

The notes for EMC-compliant installation can be taken from the respective product manual SE-Power. The compliance with the limiting values specified by the national specifications is the responsibility of the manufacturer of the system or machine.

The technical data, the connection and installation conditions for the servo drive controller can be obtained from this product manual and must be complied with by all means.

Danger!

The general erection and safety specifications for the work on power installations (e.g. DIN, VDE, EN, IEC or other national or international specifications) must be satisfied.

Non-compliance can result in death, bodily injuries or considerable damage to property.

Without any claims to completeness, the following specifications apply:

VDE 0100	Regulation for the erection of power installations up to 1000 volt
EN 60204	Electrical equipment of machines
EN 50178	Electronic equipment for use in power installations

3.2.2 Safety Instructions for Installation and Maintenance

For the installation and maintenance of the system, the relevant DIN, VDE, EN and IEC specifications, as well as all national and local safety and accident prevention regulations apply in any case. The system manufacturer or the owner/operator must ensure compliance with these specifications:

The operation, maintenance and/or repairs to the servo drive controller may only be carried out by personnel who are trained and qualified to work on electrical devices.

Avoiding accidents, bodily injuries and/or damage to property:

Additionally secure vertical axles against dropping or lowering after switching off the motor, such as by:

- mechanical interlocking of the vertical axle,

- external braking/ catching/ clamping device or

- sufficient weight counterbalance of the axle.

The standard motor brake that is supplied or an external motor brake controlled by the drive control unit alone is not suitable for personnel safety!

Render the electrical equipment free of voltage via the main switch and secure it against being switched on again, wait until the intermediate circuit has been discharged during:

- Maintenance work and repairs

- Cleaning work

- Long operational downtimes

Before carrying out any maintenance work, it must be ensured that the power supply has been switched off, locked and the intermediate circuit has been discharged.

The external or internal brake resistance is live in operation and can carry a dangerous intermediate circuit voltage for up to about 5 minutes after switching off the servo drive controller, this can result in death or serious bodily injuries if touched.

Care must be taken at the time of installation. It must be ensured that both at the time of installation as well as during the subsequent operation of the drive, no drilling chips, metal dust or parts from the assembly procedures (screws, nuts, bits of cable) fall into the servo drive controller.

So also, it must be ensured that the external voltage supply of the controller (24 V) is switched off.

The intermediate circuit or the mains voltage must always be switched off before the 24V voltage supply of the controller is switched off.

Work in the vicinity of the machine must always be carried out with the AC or DC voltage supply switched off and the switches locked. Output stages or controller releases that are switched off are no suitable locking devices. In case of a fault, this may result in an unintended movement of the drive.

The commissioning must be carried out with coasting motors, to avoid mechanical damage, e.g. owing to a wrong direction of rotation.

Electronic devices are basically not fail-safe. It is the responsibility of the user to ensure that upon failure of the electrical device, his system is taken into a safe state.

The servo drive controller and in particular the brake resistance, external or internal, can reach high temperatures, which can cause serious bodily burning upon touching them.

3.2.3 Protection Against Touching Electrical Parts

This section only pertains to devices and drive components with voltages above 50 V. If parts with voltages above 50 V are touched, this can become dangerous to persons and result in electrical shock. When operating electrical devices, certain parts of such devices are necessarily live and carry a dangerous voltage.

Danger!

High electrical voltage!

Danger to life, danger of injury from electrical shock, or serious bodily injury!

For normal operations, the relevant DIN, VDE, EN and IEC - specifications apply in any case, as well as all the national and local safety and accident prevention regulations. The system manufacturer or the owner/operator must ensure compliance with these regulations:

Before switching on, put on the covers and protective devices, which are intended to prevent touching, on the appliances. For installed devices, protection against direct touching of electrical parts must be provided by an external housing, such as a switch cabinet. The VGB4 specifications must be complied with!

Always connect the protective conductor of the electrical equipment and the devices firmly to the mains supply. Owing to the integrated mains filter, the leakage current is greater than 3.5 mA!

Keep in mind the minimum copper cross-section for the protective conductor connection over its entire length in accordance with the standard EN60617.

Before commissioning, even for a short time for measurement and testing purposes, always connect the protective conductor to all the electrical devices according to the circuit diagram, or connect it to the ground. Otherwise, there may be high voltages on the housing, which cause an electrical shock.

Do not touch electrical connection points of the components in the powered on state.

Before accessing electrical parts with voltages greater than 50 V, disconnect the device from the mains supply or the voltage source.

Secure against getting switched on.

At the time of installation, attention must be paid to the intermediate circuit voltage, particularly with reference to the insulation and protective measures. Care must be taken to ensure proper grounding, conductor dimensioning and the corresponding short circuit resistance.

The device has an intermediate circuit discharge circuit according to EN 60204 Section 6.2.4. In certain device configurations, especially with parallel connection of several servo drive controllers in the intermediate circuit, or in the case of a brake resistance that has not been connected, however, the fast discharge may be ineffective. The servo drive controllers can then carry a dangerous voltage for up to 5 minutes after switching off (capacitor residual charge).

3.2.4 Protection through Protective Low Voltage (PELV) from Electrical Shocks

All connections and terminals with voltages from 5 to 50 V at the servo drive controller are protective low voltages that are made with safe contacts according to the following standards:

International: IEC 60364-4-41

European countries in the EC: EN 50178/1998, Section 5.2.8.1

Danger!

High electrical voltage owing to wrong connection!

Danger to life, danger of injury from an electrical shock!

Only those devices, electrical components and cables, which have a protective low voltage (PELV = Protective Extra Low Voltage) may be connected to all connections and terminals with voltages from 0 to 50 volt.

Connect or apply only such voltages or electrical circuits that are safely isolated from dangerous voltages. Safe isolation is achieved, for example, by isolation transformers, safe opto-couplers or mains-free battery operation.

3.2.5 Protection from Dangerous Movements

Dangerous movements can be caused by erroneous control of the connected motors. The causes can be of the most varied kinds:

- untidy or faulty wiring or cabling
- error during the operation of the components
- error in the measuring and signal transmitters
- faulty or non-EMC-conformant components
- error in the software in the superset control system

SE-Power- Software Manual 1.2 gb. 28.11.07

These faults can occur immediately after switching on, or after an indefinite time during operation.

The monitoring devices in the drive components exclude the possibility of a malfunction in the connected drives to a great extent. With regard to the personnel protection, particularly the danger of bodily injury, and/or property damage, however, all trust must not be placed in this fact alone. Until such time as the built-in monitoring devices become active, however, faulty drive movements must be expected, the magnitude of which depends on the type of the controller and the operating state.

> **Danger!**
>
> Movements that cause danger!
>
> Danger to life, danger of injury, serious bodily injury or property damage!

Protection of persons must be ensured by means of monitoring devices or measures that are set up at the plant site. These are provided according to the specific conditions of the system and a danger and fault analysis by the system manufacturer. The safety regulations applicable for the system are also included thereby. Switching off, bypassing or wrong activation of safety devices can result in random unwanted movements of the machine or other malfunctions.

3.2.6 Protection against Touching Hot Parts

> **Danger!**
>
> The surfaces of the machine housing may be hot!
>
> Danger of injury! Danger of burns!

Do not touch the housing surface in the vicinity of hot heat sources! Danger of burns!

Before access, allow the devices to cool for 10 minutes after switching off.

If hot parts of the equipment, like machine housings, in which radiators and resistors are located are touched, burns may result!

3.2.7 Protection during Handling and Installation

The handling and installation of certain parts and components in an unsuitable manner can result in injury under certain circumstances.

> **Danger!**
>
> Danger of injury from improper handling!
>
> Bodily injury possible from crushing, shearing, cutting, impacts!

General safety instructions apply in this context:

Follow the general erection and safety specifications on handling and installation.

Use suitable installation and transportation equipment.

Prevent squeezing and crushing by taking suitable precautionary measures.

Only use suitable tools. If prescribed, use special tools.

Use hoists and tools in a technically sound manner.

If required, use suitable protective fittings (for example: safety goggles, safety shoes, protective gloves).

Do not wait under suspended loads.

If any liquids escape and run along the floor, immediately clean them, since there is a danger of slipping.

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 refer to the following firmware and hardware versions:

- Servo-positioning controller SE-Power-Firmware version 3.x
- Parameterization software Afag SE-Commander, version 2.1

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.

4.2 Features of the Afag SE-Commander

The operator program provides the following features:

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

4.3 Hard- and Software Requirements

Requirements for installing the operator program:

- PC with Pentium processor with min. 32 MB main memory and min. 10 MB free hard-disk storage
- Operating system Windows 95/98NT/2000/XP
- CD-ROM drive or disk drive
- Free serial RS-232 interface

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:
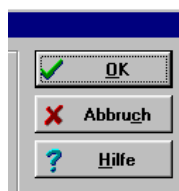
The individual buttons have the following functions:

`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 2:   Structure of directories

Directory	Contents
FIRMWARE	Firmware
PROFIBUS	Function and data modules, device data for Profibus
TXT	Default directory for plain text display of the parameter data
DCO	Default directory for parameter files

5   Installation, First Program Start and Communication

5.1   Installation from CD-ROM

To install from CD-ROM proceed as follows:

1. Insert the CD-ROM in the CD-ROM drive of your computer.
2. Start the Windows Explorer.
3. On the CD-ROM, change to the directory GERMAN or ENGLISH.
4. Start the SETUP.EXE program with a double click.

The installation program now creates a new program group named "SE-Commander". 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:
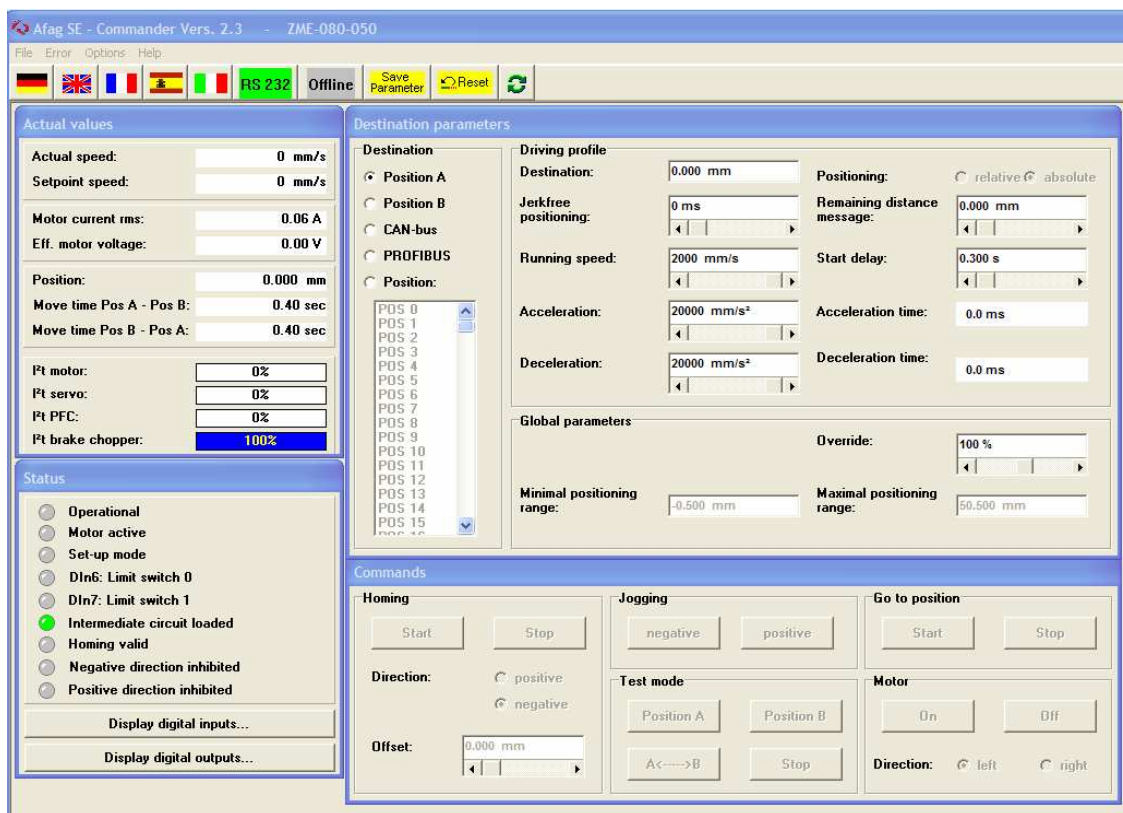
- Interface COM1
- Transmission speed 9600 baud (factory setting of the servo-positioning controller)
- 8 data bits, 1 stop bit, no parity check. These settings are fixed!

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***

(page 22)).

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

1. Connect the servo-positioning controller SE-Power completely.
2. Connect a free interface of the PC with the servo-positioning controller SE-Power via a zero-modem cable.
3. Switch on the servo-positioning controller SE-Power.
4. Start the Afag SE-Commander operator program.

If the "Online" button is highlighted green in the button menu (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***

(page 21) and *Chapter **5.4** Problem **Solving at Serial Communication***

(page 22).

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:

SE-Power- Software Manual 1.2 gb. 28.11.07
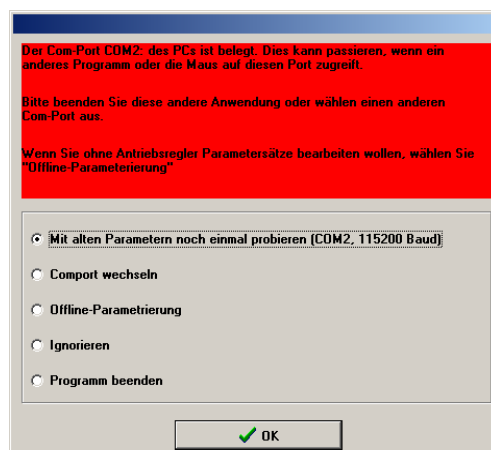
The cause of this fault are either a wrongly set interface (in most cases setting of the mouse driver) or another Windows or DOS program that accesses the serial interface.

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 3:   **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, then click **Try again with old parameters**.
Hardware fault: Servo-positioning controller SE-Power is not switched on	Eliminate error, then click **Try again with old parameters.**
Connection cable not connected	
Connection cable broken	
Connection 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 4:   **Online / Offline activation**

Online | Offline	Online parameterization active
Online | 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:

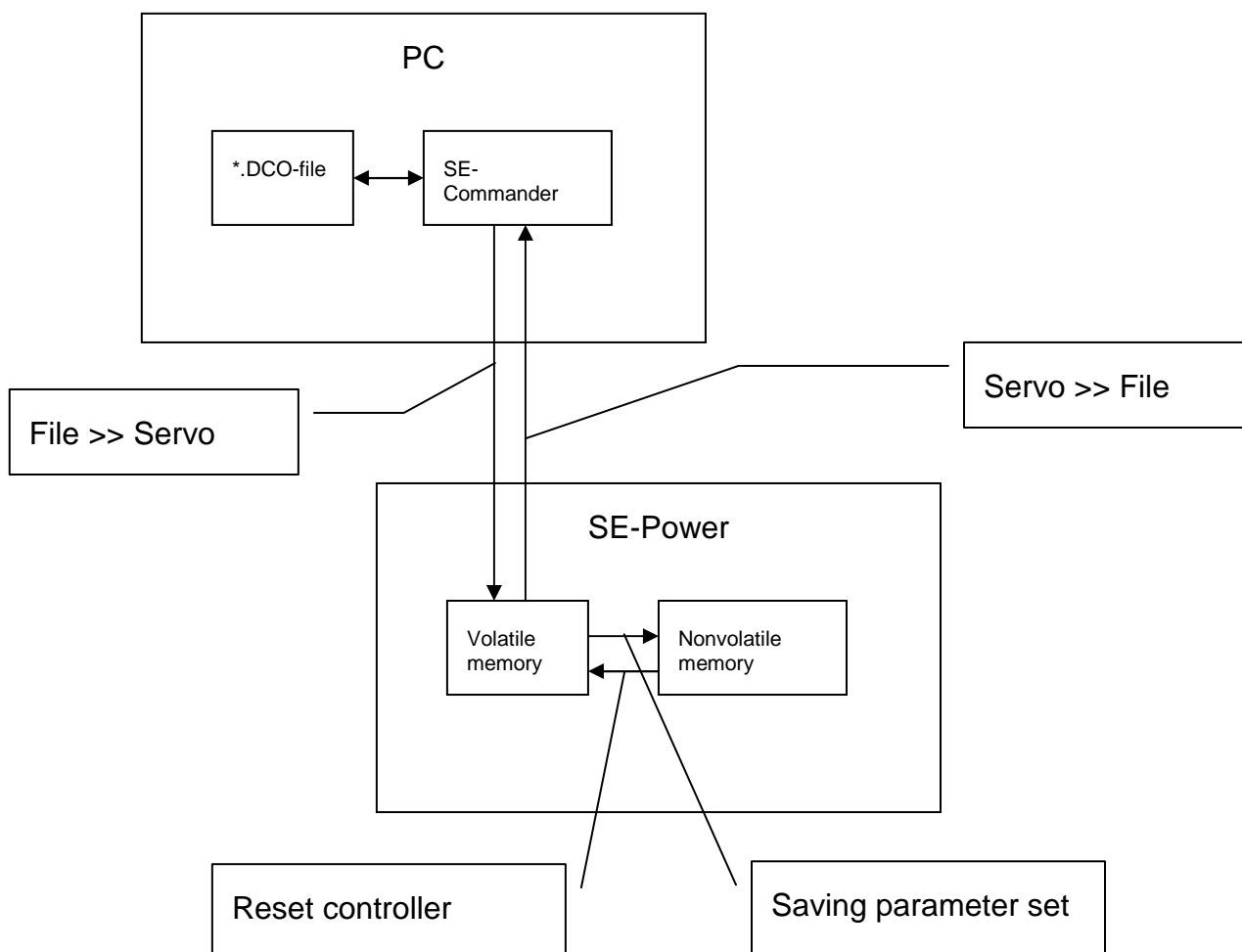**Figure 1: Online parameterization**

The active parameter set is stored in the volatile RAM memory (RAM = Random Access Memory). As soon as the supply voltage 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**.

SE-Power- Software Manual 1.2 gb. 28.11.07

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 (please see chapter 8) parameter sets can be stored externally (i.e. on hard disk or floppy disk) and loaded back again if required. The extension of the parameter files on PC side is ***.DCO**. The *.DCO files are read and written under the menu items:

- Reading a *.DCO file: **File/Parameter set/File >> Servo**

- Writing a *.DCO file: **File/Parameter set/Servo >> File**

Please note that you can fill in the fields **Motor type** and **Description** when you are writing 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 floppy disk, CD-ROM 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.
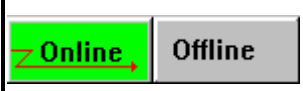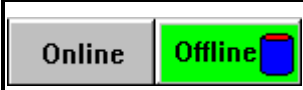
7   Offline Parameterization

The Afag SE-Commander operator program allows to access parameter sets (access level 2), 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 5:   Online / Offline activation

	Online parameterization active
	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***

(page 23)).

The Offline parameterization becomes active when you click the menu item **Options/Communcation/Offline parameterization**.

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.

![afag logo]

8   SE-Commander

8.1   User levels

The Afag SE-Commander has three user levels:

- 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 6:   Quick access via tool bar

Icon	Meaning
	Setting the German language
	Setting the English language
	Setting the French language
	Setting the Spanish language
	Setting the Italian language
	Searching communication
	Online parameterization
	Offline parameterization
	Reference run
	Saving parameters
	Resetting servo-positioning controller
	Refreshing all windows

8.3 Parameterizing Targets

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 "Parameterizing targets".

Figure 2: Parameterizing targets

Movement profile parameters	Access level	
Target position	1	Definition of the **target position**. The input value is interpreted differently depending on whether an absolute or a relative position was selected.
Jerk limitation	1	The positioning procedure is levigated by a filter so that a smooth positioning becomes possible.
Movement speed	1	**Speed** at which the device moves to the target position.
Acceleration Brake acceleration	1	Default of **acceleration** and **brake acceleration**.
Absolute	1	**Absolute** default related to the reference point.

Movement profile parameters	Access level	
positioning		
Relative positioning	1	**Relative** default related to the current position
Remaining path 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 Function of Digital Outputs* *(page 37)*.
Start-up delay	1	Delay after start signal until the movement profile is carried out.
Display of movement profile		
Acceleration time		Time during which the axle is accelerated.
Braking time		Time during which the axle is braked.

| Global parameters	Access level	
Minimum positioning range	2	In addition to the factory-set hardware and software limits, this parameter limits the minimum positioning range.
Maximum positioning range	2	In addition to the factory-set hardware and software limits, this parameter limits the maximum positioning range.
Override	1	This value reduces or increases the movement speed of the current positioning set. Range 0 .. 200 %

8.4 Commands
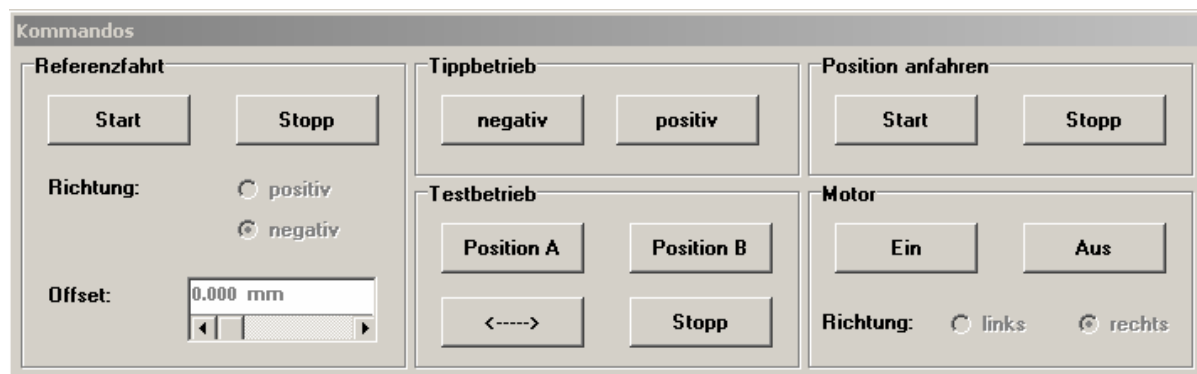
Figure 3: Commands

Reference run	Access level	
Start	1	Starts the reference run.
Stop	1	Stops the reference run.
Direction	2	The reference run can be executed in the positive or negative direction.
Offset	2	Offset position after the reference run.
Jog operation		
Negative	1	Stepwise movement of the axle in the negative direction. The increments can be changed with the override factor.
Positive	1	Stepwise movement of the axle in the positive direction. The increments can be changed with the override factor.
Test operation		
Position A	1	The appliance moves to test position A.
Position B	1	The appliance moves to test position B.
←→	1	The appliance moves continuously to test positions A and B.
Stop	1	Stops the continuous test run.
Move to position		
Start	1	The appliance moves to the current position.

SE-Power- Software Manual 1.2 gb. 28.11.07

Reference run	Access level	
Stop	1	The current positioning is stopped.
Motor		
On	1	Switches the motor on.
Off	1	Switches the motor off.
Direction	2	Changes the direction of rotation or the positive/negative direction of the motor.

8.5 Display of Actual Value

Figure 4: Actual values

Actual speed	Actual speed in mm/s.
Desired speed	Desired speed in mm/s.
Eff. motor current	This value displays the effective motor current that is required over the total motion-sequence. The maximum permissible effective motor current may never be exceeded.
Eff. motor voltage	This value displays the effective motor voltage that is required over the total motion-sequence.

Position	Current actual position
Movement time Pos A – Pos B	Movement time from position A to position B in seconds
Movement time Pos B – Pos A	Movement 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 axle is stopped and rendered currentless.
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 axle is stopped and rendered currentless.
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 axle is stopped and rendered currentless.
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 axle is stopped and rendered currentless.

![afag logo]

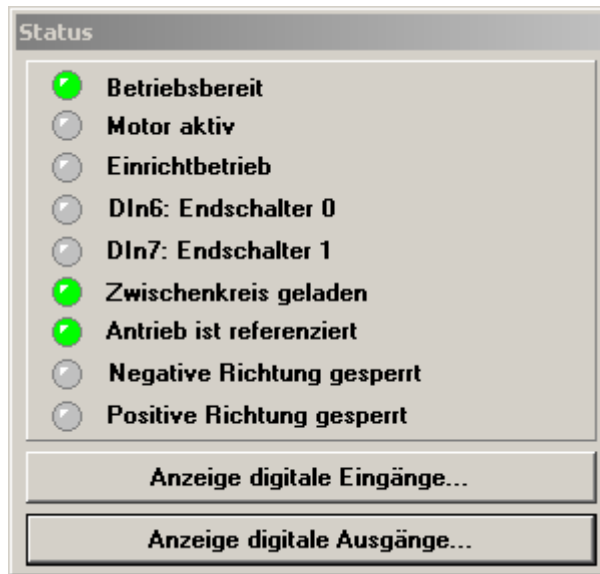## 8.6 Status Display

Figure 5: Status Display

Operational	The servo-positioning controller is ready-to-operate
Motor active	The motor is live and controlled
Set-up operation	Set-up operation is activated (all speeds are reduced to 10%)
DIN6: limit switch 0	Digital input No. 6: limit switch 0
DIN7: limit switch 1	Digital input No. 7: limit switch 1
Intermediate circuit loaded	The intermediate circuit is loaded (incl. PFC stage)
Reference run of drive carried out	Reference run was carried out. Origin position was defined.
Negative direction locked	The negative direction is locked since the limit sensor is activated
Positive direction locked	The positive direction is locked since the limit sensor is activated

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 **Restore button**
2. by clicking the menu item **Error/Error window**
3. by clicking the Error window (second field from the left in the bottom status bar)
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.
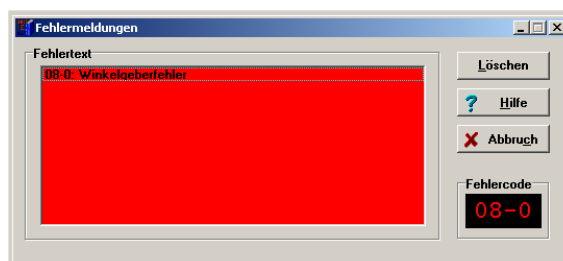
Carry out the following steps for trouble shooting:

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 **Delete** 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 **Abort** to minimize the window.Error messages that may be present (see *chapter **12.2** Error **Messages***

(page 44) are retained in the Error window of the status bar.

SE-Power- Software Manual 1.2 gb. 28.11.07

> The button **Abort** 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 left 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 Drive via Inputs / Outputs

9.1.1 Functions of the Digital Inputs

- DIN0:   Positional selector bit 0
- DIN1:   Positional selector bit 1
- DIN2:   Positional selector bit 2
- DIN3:   Positional selector bit 3
- DIN4:   Release of limit stage
- DIN5:   Release of controller
- DIN6:   Limit switch, left
- DIN7:   Limit switch, right
- DIN8:   Set-up operation
- DIN9:   Start positioning
- DIN AIN1:   Start reference run

When an EA88 technology module is used the number of digital inputs can be increased by further eight inputs.

Functions of the EA88 module

- DIN0:   Positional selector bit 4
- DIN1:   Positional selector bit 5
- DIN2:   Positional selector bit 6
- DIN3:   Positional selector bit 7
- DIN4:   --
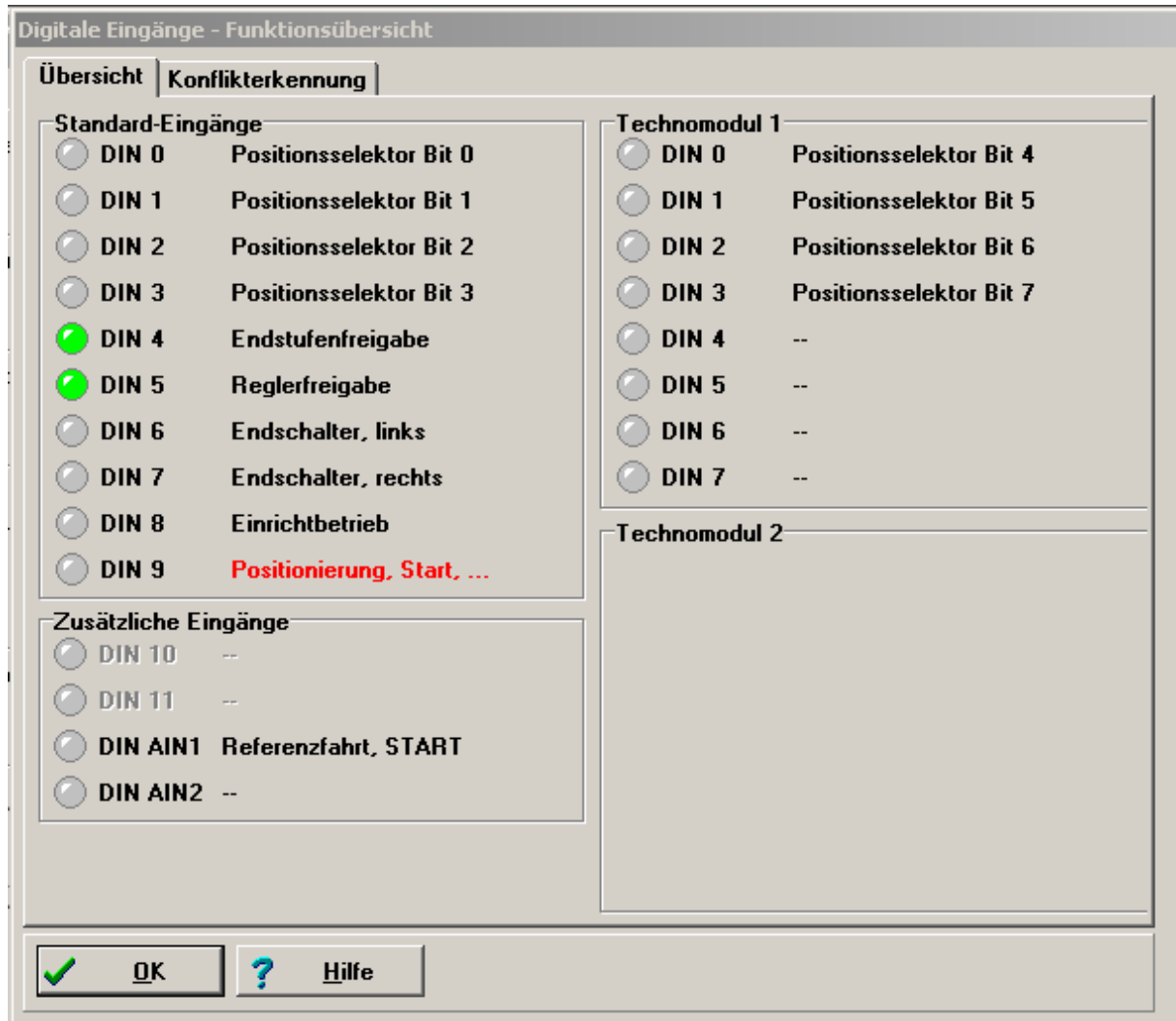- DIN5:   --
- DIN6:   --
- DIN7:   --

Figure 6: Display window of digital inputs

9.1.2 Function of Digital Outputs

- DOUT0: Controller ready-to-operate
- DOUT1: Reference run activated
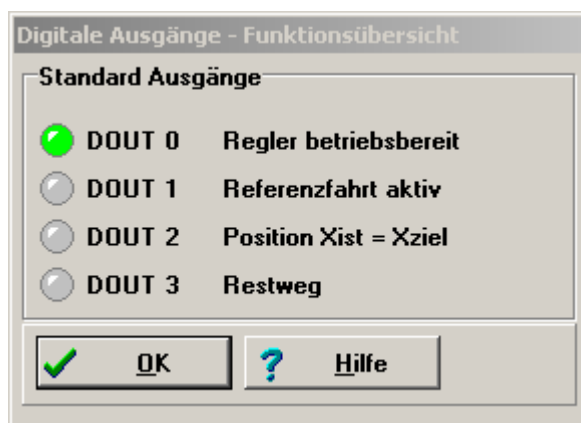- DOUT2: Xact=Xtarget
- DOUT3 : Remaining path

Figure 7: Display window of digital outputs

9.2 Drive via Fieldbus

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

- CANopen bus, integrated in the basic device of the SE-Power servo-positioning controller
- PROFIBUS-DP
- SERCOS (in preparation)

PROFIBUS and SERCOS 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 he implemented PROFIBUS-DP protocol.

- **SERCOS: in preparation**

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/Protocol**.
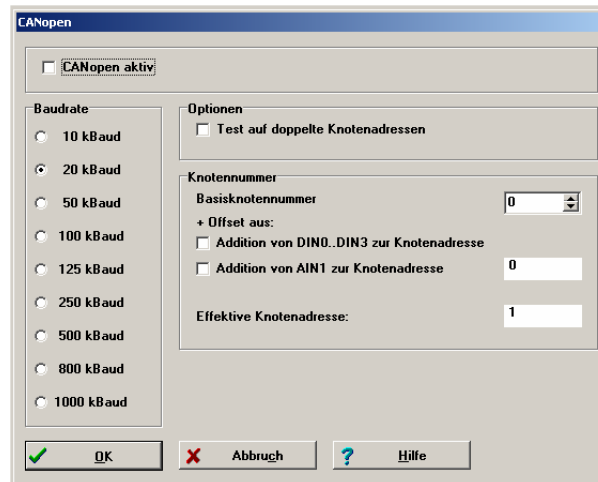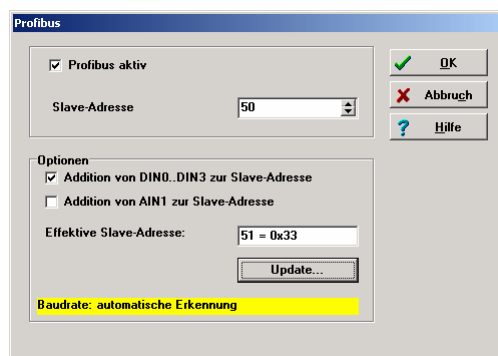
The following communication parameters can be defined:

- **Baud rate**: This parameter defines the baud rate used on the CANopen bus.

- Basic node address: This parameter comprises the basic node address of the corresponding device. The identifiers of the individual messages are based on the node address. Every node address may only be assigned once within the CANopen network. It is possible to include the digital inputs in the calculation of the node address (see below).

- Checking the existence of double node addresses: The servo-positioning controller SE-Power checks automatically whether a node address was assigned twice within the CANopen network. In this case an error message appears on the display of the servo-positioning controller SE-Power.

- **Adding DIN0...DIN3 to the node address:** The value of the digital inputs DIN0...DIN3 is added to the basic node 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.

- **Adding AIN1 to the node address:** The analog input AIN1 is included with a rating of 16 to generate the node address. For Low level it can remain blank, for High level this input must be bridged to V_{ref} = 10V.

Press the button **activate** or **deactivate** to activate or deactivate the fieldbus communication with the parameters set.

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/Protocol**.

The PROFIBUS-DP communication can be activated and deactivated via the field **Profibus active**.

In addition you can define the following parameters:

- **Basic 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).

- Adding DIN0...DIN3 to the slave address: The value of the digital inputs DIN0..DIN3 is added to the basic slave address. The input combination is only read out once directly after a reset of the device. Thus up to 16 different device addresses can be assigned by simple jumpers after 24V in the connector shell X1.

- **Adding AIN1 to the slave address:** The analog 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 $V_{ref} = 10V$.

The effective slave address can be determined by clicking the button **Update**. In this case the servo-positioning controller carries out a warm start.

9.2.2.1 Support of PROFIBUS-DP Functionality

The Afag SE-Commander subdirectory **PROFIBUS-DP** comprises:

- function and data modules (compressed)
- master data of the device

10 Commissioning the Axle

The axle 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 axle were connected according to the operating instructions

SE-Power- Software Manual 1.2 gb. 28.11.07

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 SE-Power servo-positioning controller is parameterized according to the application and the axle type and commissioned at the factory. A corresponding identification is to be found on the front plate (see arrow).
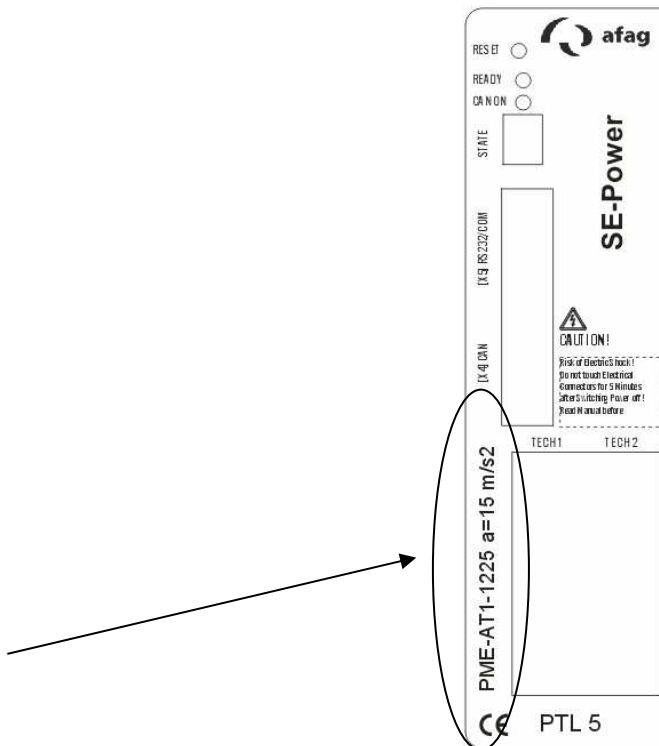

Figure 8: Axle-specific identification

PME: Portal module, electric

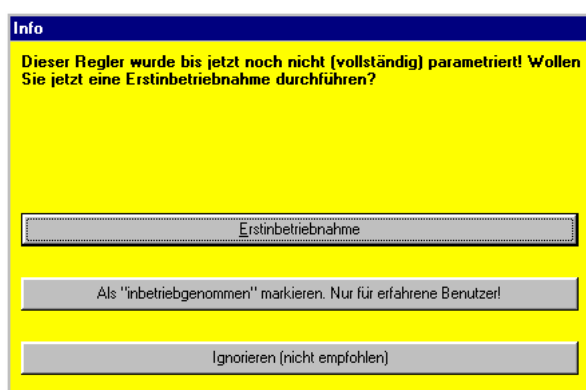AT1: Drive unit 1

1225: Stroke

a: maximum permissible acceleration according to application

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.

The Afag SE-Commander operator program recognizes whether a factory-parameterization was executed. If the following message is displayed:

Info

Dieser Regler wurde bis jetzt noch nicht (vollständig) parametriert! Wollen
Sie jetzt eine Erstinbetriebnahme durchführen?

Erstinbetriebnahme

Als "inbetriebgenommen" markieren. Nur für erfahrene Benutzer!

Ignorieren (nicht empfohlen)

or if the letter "A" appears in the 7-segment display the servo-positioning controller
SE-Power "was not commissioned". Contact your sales partner for trouble shooting.

11 First Movement of the Axle

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.

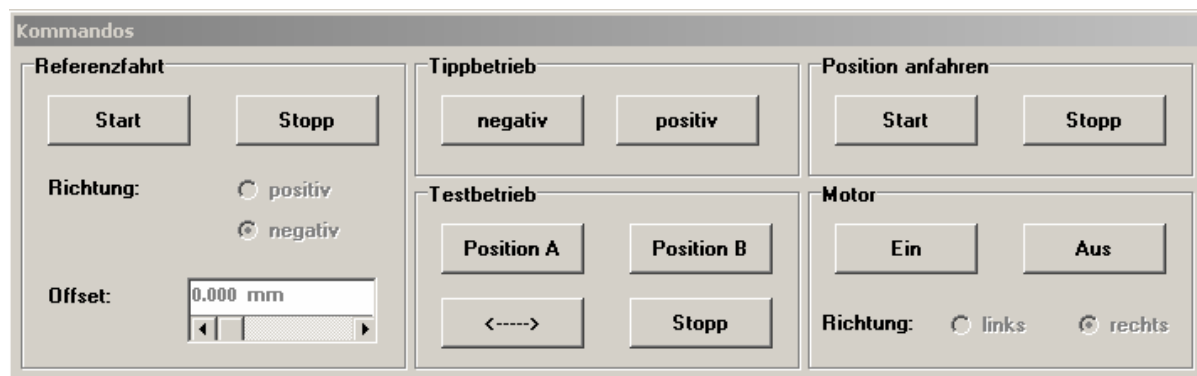| **Danger!** |
|---|
| Lock the controller release after every test and wait until the axle has come to a standstill! |

Figure 9: Commands

The following steps must be executed:

1. Test motor On   (motor is energized, axle remains at the position)
2. Start reference run
3. Positive / negative jog operation

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

Table 7:   Trouble shooting:

Fault	Fault clearance
No segment is displayed.	Check 24 V voltage supply, set logic of controller release
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** (page 44) 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 7.4 *X6 Motor connection* in the SE-Power operating instructions of the parking brake.
The motor develops a holding moment, it "engages" in different positions.	Contact your sales partner.
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

A seven-segment display is supported. The display and the meaning of the symbols displayed are explained in the following table:

Table 8:   **Operating mode and error display**

Display	Meaning
-	Middle bar of the seven-segment display: speed-controlled operation (in this operating mode an additional bar around the middle bar indicates the motor position)
A	The servo-positioning controller SE-Power still needs to be parameterized
P xxx	Positioning ("xxx" represents the position number) The digits are displayed one after the other
E xxy	Error message with index "xx" and subindex "y"

12.2 Error Messages

When an error occurs the SE-Power servo-positioning controller displays cyclically an error message in its seven-segment display. The error message is composed of an **E** (for error), a **main index** and a **subindex**, e.g.: **E 0 1 0**.

The meaning of the error messages and the corrective actions are compiled in the following table.

Table 9:   **Error messages**

Error message		Meaning of the error message	Corrective action
Main index	**Sub-index**		
01	0	Stack overflow	Wrong firmware? Inform the Technical Support
02	0	Undervoltage of intermediate circuit	Check the intermediate circuit voltage (measure)
03	0	Overtemperature of motor analog, load of axle too high	Reduce acceleration Increase idle times
	1	Overtemperature of motor digital, load of axle too high	Reduce acceleration Increase idle times

Error message		Meaning of the error message	Corrective action
Main index	**Sub-index**		
04	0	Overtemperature of power section	Temperature readout correct? Check installation conditions, filter mats of fan dirty? Ventilator of device defective?
	1	Overtemperature of intermediate circuit	
05	0	Internal voltage failure 1	Fault cannot be corrected by oneself. Return servo-positioning controller to sales partner.
	1	Internal voltage failure 2	
	2	Supply failure of driver	
	3	Undervoltage digital I/O	Check outputs for short circuit or specified load and contact the Technical Support if necessary.
	4	Overcurrent digital I/O	
06	0	Short circuit of output stage	Output stage faulty? Motor faulty? Short circuit in cable?
07	0	Overvoltage	Check connection to brake resistance (internal / external) Brake resistance overloaded? Check design.
08	0	Angle transmitter error, resolver	Angle transmitter connected? Angle transmitter cable defective? Angle transmitter faulty? Check configuration of angle transmitter interface
	2	Error track signals of Z0 incremental transmitter	Angle transmitter connected? Angle transmitter cable defective? Angle transmitter faulty? Check configuration of angle transmitter interface Transmitter signals disturbed: check whether installation corresponds to EMC recommendations.
	3	Error track signals of Z1 incremental transmitter	
	4	Error track signals of digital incremental transmitter	
	5	Error Hall transmitter signals of incremental transmitter	
16	0	Execution of program faulty	Please contact the Technical Support
	1	Illegal interrupt	
	2	Initialization error	

Error message		Meaning of the error message	Corrective action
Main index	**Sub-index**		
	3	Unexpected state	
17	0	Limit value of contouring error exceeded	Parameterization of acceleration too big
21	0	Error 1 measurement of current U	Fault cannot be corrected by oneself. Return servo-positioning controller to sales partner.
	1	Error 1 measurement of current V	
	2	Error 2 measurement of current U	
	3	Error 2 measurement of current V	
25	0	Invalid device type	Fault cannot be corrected by oneself. Return servo controller to sales partner.
26	0	User parameter set is missing	Return servo-positioning controller to sales partner.
	1	Check sum error	Fault cannot be corrected by oneself. Please contact the Technical Support
	2	Flash: error when writing	
	3	Flash: error when deleting	
	4	Flash: error in internal flash	
	5	Calibration data missing	
27	0	Warning threshold of contouring error	Motor blocked?
31	0	I²t motor	Reduce acceleration Increase idle times
	1	I²t servo-controller	Inform the Technical Support
32	0	Charging time for intermediate circuit exceeded	Please contact the Technical Support
	1	Undervoltage for active PFC	
	5	Overload of brake chopper?	

Error message		Meaning of the error message	Corrective action
Main index	Sub-index		
	6	Discharging time for intermediate circuit exceeded	
33	0	Contouring error of encoder emulation	Please contact the Technical Support
34	0	No synchronization via fieldbus	Synchronization messages from master missing?
	1	Synchronization error of fieldbus	Synchronization messages from master missing? Parameterization of synchronizing interval too small?
35	0	Protection against cranking of linear motor	Transmitter signals disturbed. Check installation for EMC recommendations.
80	0	Overflow current regulator IRQ	Please contact the Technical Support
	1	Overflow speed controller IRQ	
	2	Overflow position controller IRQ	
	3	Overflow interpolator IRQ	
81	0	Overflow Low level IRQ	Please contact the Technical Support
	1	Overflow MDC IRQ	
90	0	Unknown hardware component	Please contact the Technical Support
	1	Error upon booting FPGA	
	2	Error upon starting SD-ADUs	
	3	Synchronization error SD-ADU after start	
	4	SD-ADU not synchronous	

13 INDEX

Afag AG
Fiechtenstrasse 32
CH - 4950 Huttwil
13.1.1.1 Switzerland

Tel.:   +41 (0)62 959 86 86
Fax.:   +41 (0)62 959 87 87
e-mail: sales@afag.com
Internet: www.afag.com