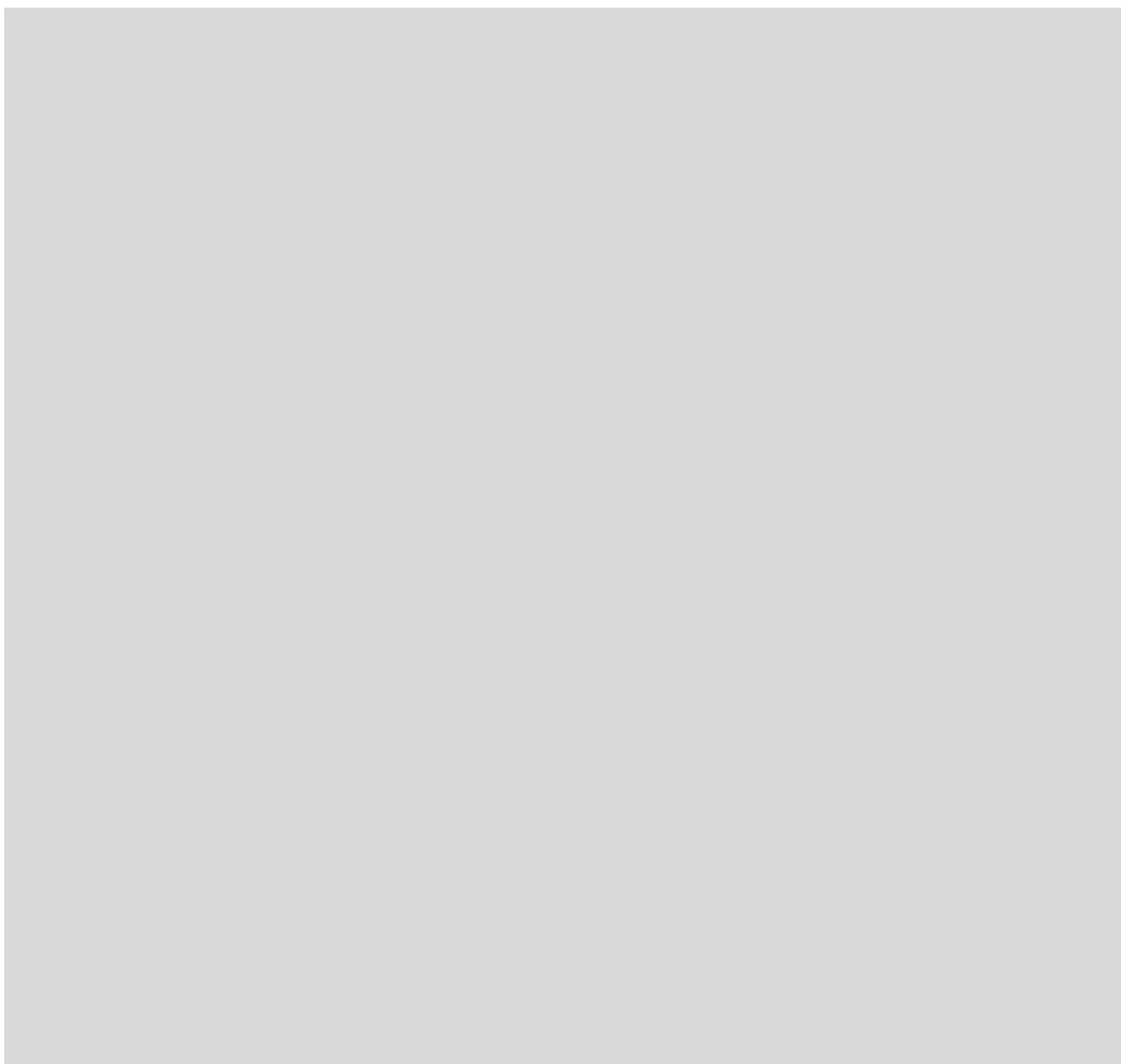


Servodyn-D

Motion Control Commissioning and Operation



Edition

101

Servodyn-D

Motion Control Commissioning and Operation

1070 066 035-101 (98.11) GB



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Safety Instructions

Please read this manual before commissioning the Servodyn-D inverters with Motion Control functionality. Store this manual in a place to which all users have access at any time.

Proper use

This manual contains all information required for the proper use of this product.

The drive inverters described

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- comply with the requirements of
 - the EMC Directive (89/336/EEC, 93/68/EEC and 93/44/EEC)
 - the EMC product standard EN 61800-3
 - the Low-Voltage Directive (73/23/EEC)
 - the harmonized standards EN 50178 (VDE 0160) and EN 60146-1-1 (VDE 0558-11)
- are designed for operation in industrial environments. For operation in residential environments, in trade and commercial applications and small enterprises, an individual permit of the national authority or test institution is required; in Germany, please contact the Bundesanstalt für Post und Telekommunikation or its local branch offices.

Before putting the drive inverters into operation, ensure that the machine which the inverters are to be installed in meets the stipulations of the machine directive (89/392/EEC) and the EMC directive (89/336/EEC).

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

Qualified personnel

The requirements as to qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders). Please refer to the following publication (in German language):

Weiterbildung in der Automatisierungstechnik

edited by: ZVEI and VDMA

MaschinenbauVerlag

Postfach 71 08 64

D-60498 Frankfurt

The present manual is designed for **drive technicians**. They need special knowledge on commissioning and optimization.

Programming, start and operation as well as the modification of program parameters is reserved to properly trained personnel! This personnel must be able to judge potential hazards arising from programming, program changes and in general from the mechanical, electrical, or electronic equipment.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to our specialized personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual can result in serious bodily injury or property damage.

Only electrotechnicians as recognized under VDE 1000-10 who are familiar with the contents of this manual may install and service the products described.

Furthermore, all existing accident prevention regulations (in Germany: UVV VBG4, VDE 100, VDE 105) and installation instructions (EN 60204-Part 1, EN 50178) must be observed.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyze the jobs being carried out and recognize any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

Please note our comprehensive range of training courses.

Our training center will be pleased to provide you with further information, telephone: ++49-6062-78-258.

Safety markings on components



Warning of dangerous electrical voltage!



Components subject to electrostatic induction!



Pin for connecting PE conductor only!



Connection of shield conductor only

Safety instructions in this manual



DANGEROUS ELECTRICAL VOLTAGE

This symbol is used to warn of a **dangerous electrical voltage**. The failure to observe the instructions in this manual in whole or in part may result in **personal injuries**.




DANGER

This symbol will be used if the failure to observe the instructions in this manual in whole or in part may result in **personal injuries**.



CAUTION

This symbol will be used if the failure to observe the instructions in this manual in whole or in part may result in **damages to equipment or data files**.

-  This symbol will be used to draw the user's attention to special circumstances.
- ★ This asterisk symbol refers to an activity to be performed by the user.

Key operation

Special keys or combinations of keys are represented by pointed brackets

- Special keys: e.g. <enter>, <pgup> ,
- Key combinations (pressed simultaneously): e.g. <ctrl>+<pgup>

Safety instructions

**DANGER**

Danger for persons and equipment!

Test every new program before starting up a system!

**DANGER**

Health hazards through destroyed electrical components!

Do not destroy any built-in components. Dispose of destroyed components in a proper manner.

**DANGER**

Please note your local, system-specific regulations and requirements as well as the proper use of tools, hoisting and transport equipment as well as the applicable standards, regulations, and accident prevention regulations.

**DANGER**

Danger of life through inadequate EMERGENCY-STOP devices!

EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system!

First check the EMERGENCY-STOP circuit, then switch the system on!

**DANGER**

Retrofits or modifications may adversely affect the safety of the products described!

The consequences may include severe injuries, damage to equipment, or environmental hazards. Possible retrofits or modifications to the system using third-party equipment therefore have to be approved by Bosch.

**DANGEROUS ELECTRICAL VOLTAGE**

Lethal voltages of up to 375 V DC against ground on all power connections and DC link connections!

The drives must not be switched on unless all covers have been fitted!

When the drive has been disconnected from mains, wait for up to 5 minutes until the system is de-energized before removing any covers.

The drive must always be examined for safe isolation from supply!

**DANGEROUS ELECTRICAL VOLTAGE**

Danger of life through electrical voltage!

Unless described otherwise, maintenance works must be performed on inactive systems! The system must be protected against unauthorized or accidental reclosing.

For measuring or test activities on the live system, the existing safety and accident prevention regulations must be observed in any case. Use suitable insulated tools for all types of work!

**CAUTION**

Repair/maintenance work is reserved to the Bosch service or repair/maintenance units authorized by Bosch! Only replacement/spare parts approved by Bosch may be used!

**CAUTION**

Observe all precautions for ESD protection when handling modules and components! Avoid electrostatic discharge!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge! (ESD)!

- The personnel responsible for storage, transport, and handling must have been trained for ESD protection.
- ESD-sensitive components must be stored and transported in their prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which get in contact with ESD-sensitive components must have the same potential (e.g., by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated resistor of 1 M Ω .
- ESD-sensitive components must by no means get in contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from equipment, the equipment must be de-energized.

Documentation and Software

The present manual provides information on the Servodyn-D series of drives with Motion Control functionality.

The following documentation is additionally available:

Servodyn-D documentation	Part no.			
	German	English	French	Italian
Configuration Manual for overview and rating	1070 066 009	1070 066 029	1070 066 059	1070 066 049
Servo motors SF, SR	1070 066 004	1070 066 024	1070 066 048	1070 066 046
Asynchronous motors DU	1070 066 007	1070 066 027	–	1070 –
Interface conditions	1070 066 010	1070 066 030	1070 066 060	1070 066 050
Servodyn-D with SERCOS interface Parameter and commissioning manual	1070 066 011	1070 066 031	–	1070 066 051
Servodyn-D with analog interface Parameter description	1070 066 013	(in preparation)	1070 066 063	–
Servodyn-D with analog interface Commissioning manual	1070 066 014	1070 066 034	–	–
Servodyn-D with Motion Control Commissioning manual	1070 066 015	1070 066 035	–	–
Diagnostics, maintenance	1070 066 012	1070 066 032	1070 066 062	1070 066 052
EMC manual	1070 066 072	1070 066 074	1070 066 075	1070 066 076
External load switching module	1070 066 077	1070 066 080	–	–

 **In the present manual, the floppy disk drive is always drive A, the fixed disk is drive C.**

 **The present manual applies to the following version:
Drive software MC: V 0.003**

All trademarks for software installed on Bosch products upon delivery are the property of the respective manufacturers.

Upon delivery, all installed software is copyright-protected. The software may only be reproduced with the approval of Bosch or in accordance with the license agreement of the respective manufacturer.

 **The current software release number can be viewed by selecting parameter S-0-0030 with the DSS-D Commissioning and Service System.**

1 Overview

This manual contains information on the

- functions of a drive with Motion Control (Drive-MC)
- commissioning of the drive-MC
- operation of the "Motion Control" software (BAMC).



CAUTION

Malfunctions and damages are possible!

An incorrect commissioning procedure may lead to unexpected or wrong drive reactions and thus to dangerous situations.

Therefore, the information given in the present manual should be strictly observed.

Follow all instructions given in this manual (instructions are marked "★"). They serve for your own safety and trouble-free commissioning.

Functions of the drive-MC

The Servodyn-D intelligent drive module contains a complete positioning control including position control functionality for one axis.

The following modes are available:

- **Manual mode** (jogging in positive and negative traversing direction)
- **Referencing**. If incremental transducers are used, a reference must be established with respect to the current axis position when the drive has run up. For this purpose, the drive evaluates the switching position of a reference cam when referencing has been started.
- **Automatic mode** (positioning). This mode serves to store a maximum of 32 traversing blocks (including traversing speed and acceleration values) in the drive in the course of commissioning. The individual blocks may be selected and started in any order (when the axis has been successfully referenced). A currently active block can be interrupted and canceled at any time.

Controlling the drive-MC

- Alternatively **via digital interface** (default application), or
- **with Diagnostics and Service System** (DSS) using the integrated "Motion Control" service tool (special application). Using this software, important data can be visualized, regardless of the type of control.

For more information on the digital interface and the mode of action of the individual signals, please refer to Section 2.

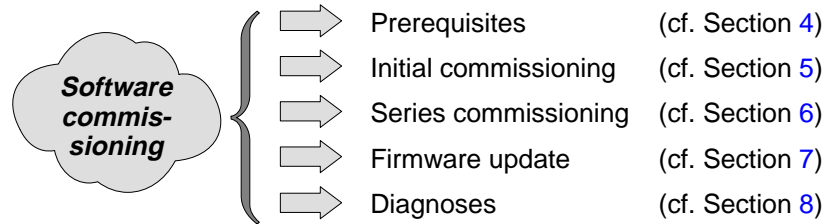
The "Motion Control" software operator interface is described in Section 3.

- ★ You should read both Sections, because you will need the information provided there for commissioning the system later on.

Commissioning the drive-MC

You should always use the DSS for commissioning, testing and optimizing your system.

Commissioning comprises the following steps:

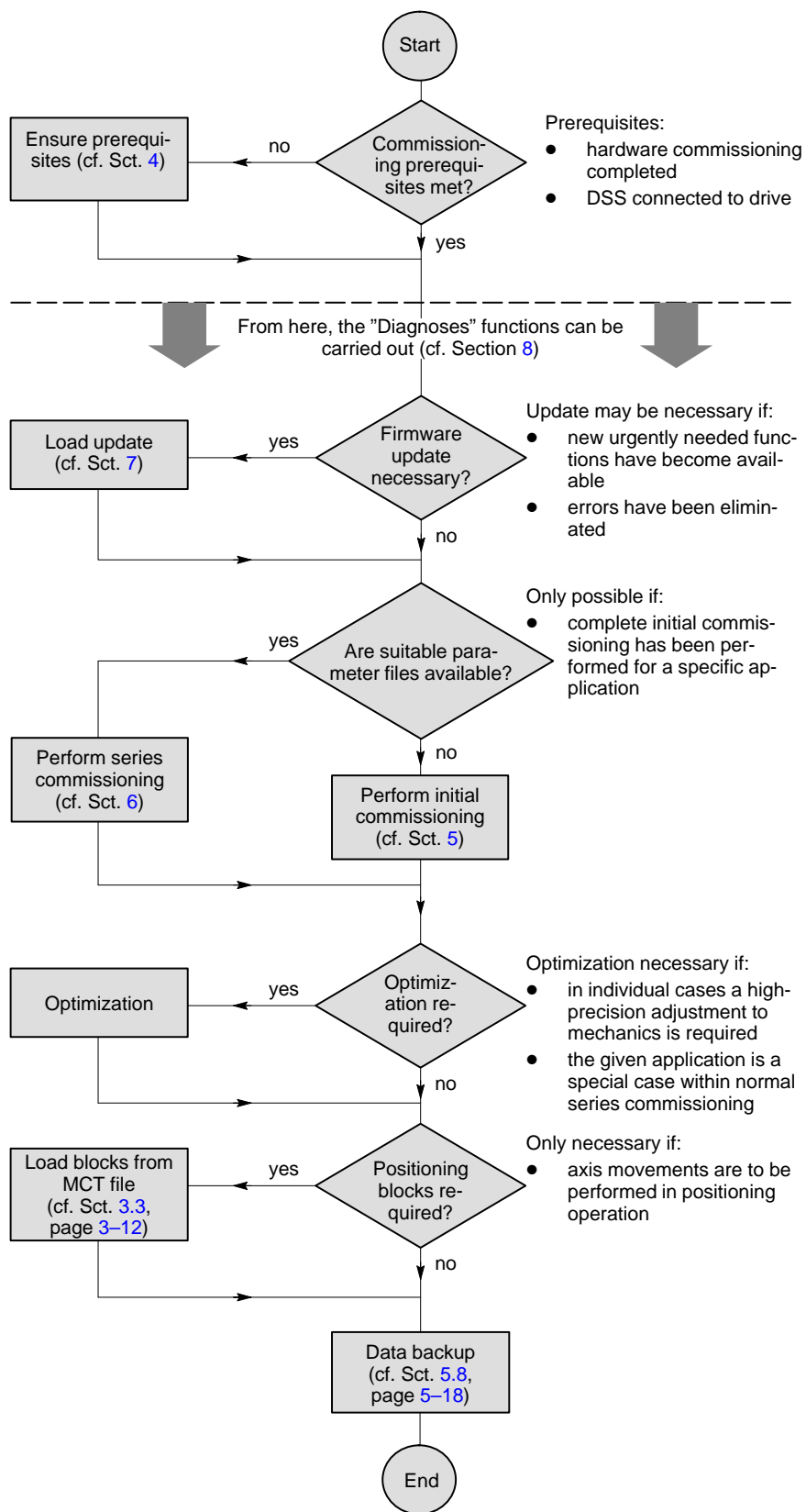


Section 5 is of vital importance: it provides an overview of the parameter settings and activation of fundamental drive functions of Motion Control by giving a practical example.

For a description of all individual parameters available, their way of functioning and exact encoding, please refer to the "Servodyn-D parameter description" manual which supplements the present manual!

For commissioning, certain prerequisites have to be observed, and a certain sequence of operations must be adhered to:

Procedure of software commissioning:



Your notes:

2 Digital Interface

In regular operation, a higher-level PLC has to control the drive, evaluate its messages and monitor it for safety functions.

The digital interface of the drive offers a number of input/output signals (terminals IN1 to IN10 and OUT1 to OUT10) for control and evaluation (+24V: logic HIGH; 0V: logic LOW).



DANGER

The digital interface will be deactivated as soon as the "Unlock ..." command is executed through the "Motion Control" software (BAMC)!

In this case, the drive no longer responds to the PLC signals, it is rather controlled by the DSS software or "Motion Control" (BAMC) on the connected PC.

Safety-relevant signals, such as the "Emergency-Stop", "Enable", or "Status-Contact" (STA) inputs, remain active.

When executing the "Unlock ..." command with the "Motion Control" software (BAMC), you must always make sure that no persons or objects are within the traversing range of the axis, and that the drive is not involved in an active production process within the system!

Input signals The following applies:

Input terminal	Function
IN 1 (X06, terminal 5)	Block select (value 2 ⁰)
IN 2 (X06, terminal 6)	Block select (value 2 ¹)
IN 3 (X06, terminal 7)	Block select (value 2 ²)
IN 4 (X06, terminal 8)	Block select (value 2 ³)
IN 5 (X22, terminal 1)	Block select (value 2 ⁴)
IN 6 (X22, terminal 2)	Start/Stop signal (1=Start; 0=Stop)
IN 7 (X22, terminal 3)	Mode selection (value 2 ⁰)
IN 8 (X22, terminal 4)	Mode selection (value 2 ¹)
IN 9 (X22, terminal 5)	Reference cam
IN 10 (X22, terminal 6)	Home position

	IN8	IN7	Mode
The following applies for mode selection via terminals IN7 and IN8:	1	1	Manual, jogging in positive direction
	1	0	Manual, jogging in negative direction
	0	1	Referencing
	0	0	Automatic (positioning mode)

 **In addition to the inputs described above, the enable inputs at X06 ("FG" and "FG 0V"; cf. "Interface conditions" manual) will be used.**

Output signals The following applies:

Output terminal	Function
OUT 1 (X34, terminal 5/6 5/4)	–
OUT 2 (X34, terminal 3)	"Temperature warning" message
OUT 3 (X34, terminal 2)	Holding brake control
OUT 4 (X34, terminal 1)	KSB (plug-braking contactor) control
OUT 5 (X12, terminal 1)	"Axis has been referenced" message (InRef)
OUT 6 (X12, terminal 2)	"Axis active" message
OUT 7 (X12, terminal 3)	"In position" message
OUT 8 (X12, terminal 4)	"End of program/block" message
OUT 9 (X12, terminal 5)	"Home position reached" message
OUT 10 (12, terminal 7/8 7/6)	"MC status" message

 **In addition to the outputs described above, the status contact at X06 ("STA"; relay output; cf. "Interface conditions" manual) will be used.**

2.1 Description of the MC-specific input signals

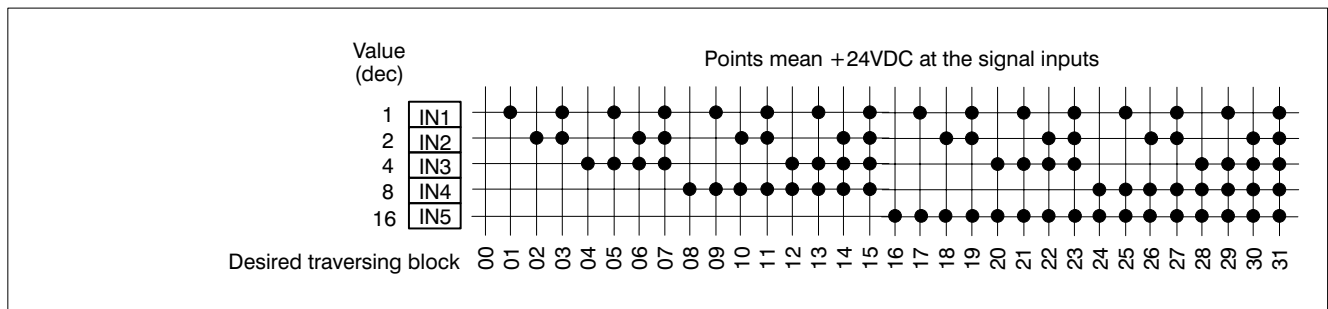
☞ The enable inputs at X06 ("FG" and "FG 0V") and Emergency-Stop at X312 are not MC-specific, therefore, they will not be described in this manual.

For more information on these inputs, please refer to Section "Electrical connection" of the "Servodyn-D interface conditions" manual.

2.1.1 Block selection (terminals IN1 to IN5)

Up to 32 traversing blocks can be stored in the drive. For every traversing block, the position setpoint, traversing speed, acceleration at the beginning of the block, and deceleration at the end of the block can be specified.

In "Automatic" mode (positioning mode), the input signals specify which block out of the total of 32 blocks (blocks 0 to 31) shall be traversed next. The following coding is used:



Examples:

Block no.	IN5	IN4	IN3	IN2	IN1
0	0	0	0	0	0
19	1	0	0	1	1
31	1	1	1	1	1

2.1.2 Start/Stop (terminal IN6)

Positive edge: Initiates an axis movement. If the axis movement was previously interrupted (by a negative edge), it is resumed.

Negative edge: Interrupts an axis movement. If the output signal "End of prog./block" is high, it will be reset.

☞ In "Automatic" mode (positioning mode), a positive edge will trigger the next block only if the drive has set the "Axis active" output signal (cf. Section 2.2.2).

If "Axis active" is not high, the drive-MC will traverse the currently selected block again.

2.1.3 Mode selection (terminals IN7 and IN8)

Selection of the desired mode of the drive MC. The following coding is used:

Mode	IN7	IN8
Manual, jogging in positive direction	1	1
Manual, jogging in negative direction	0	1
Referencing	1	0
Automatic (positioning mode)	0	0

Manual The axis can be traversed in positive or negative direction at any time. The "Start/Stop" input signal (IN6) starts and stops the axis movement. Changing the direction during the movement will not take effect until the axis has been stopped.




DANGER


The axis can be traversed even if the drive has not been referenced! In this case, the drive has no reference to the absolute axis position.

Before traversing axes manually, you have to make sure that there is no danger for persons or the machine!

Referenzieren If incremental measuring systems are used, the axis must be traversed to a known position when the drive has been switched on. A positive edge at the "Start/Stop" input (IN6) starts this process. The arrival at the – previously measured – absolute axis position is registered by the drive through the "Reference cam" (IN9) input signal. As soon as the drive recognizes the next zero marker of the measuring system, it replaces the current position value with the value stored in S-0-0052 (Actual Position Feedback 1 – Reference Dimension), stops the traversing movement and sets the output signal "Axis has been referenced (InRef)". For referencing, refer to Section 5.4.5, page 5–8.

 **If absolute encoder systems are used, referencing is not required whenever the drive has been switched on. The reference to the absolute axis position only has to be determined once during commissioning, or when the absolute axis position has been lost (e.g. after an encoder defect).**

Automatic mode (positioning mode) You first select the desired block out of the 32 predefined traversing blocks with the help of the "Block selection" input signals (IN1 to IN5). The traversing movement can be started, interrupted and resumed via the "Start/Stop" input (IN6). When the target position has been reached, the drive sets the output signal "End of prog./block".

 **"Automatic" mode is only active if the output signal "Axis has been referenced (InRef)" is high.**

2.1.4 Reference cam (IN9)

Informs the drive of the reference cam response.
Also refer to Section 2.1.3, "Referencing" paragraph.

2.1.5 Home position (IN10)

Cancels an active or currently interrupted traversing movement, clears the distance to go and sets the output signal "In position".

2.2 Description of the MC-specific output signals

Some outputs (such as the status contact at X06) are not MC-specific, therefore, they will not be described in this manual.

For more information on these signals/outputs, please refer to the "Electrical connection" section of the "Servodyn-D interface conditions" manual and the following parameter numbers in the "Servodyn-D parameter description" manual:

Group message "Overtemperature warning" (OUT2): S-0-0311,S-0-0312

Drive On/Off Delay Time (OUT3): S-0-0206,S-0-0207

Short Circuit Brake Enable Delay Time (OUT4): P-0-0505

2.2.1 Axis has been referenced (OUT5)

With absolute encoder systems: the output signal is always set in parallel to the "MC Ready" signal generated internally (the "MC Ready" signal must be high before the status contact STA can be closed).

With incremental encoder systems: the signal becomes high as soon as the drive has properly completed its programmed referencing cycle. For referencing, also refer to Section 5.4.5, page 5-8.

2.2.2 Axis active (OUT6)

Is automatically set as soon as an axis movement is initiated by a positive edge of "Start/Stop" while the controller is enabled.

The drive resets "Axis active" when the following conditions are met:

in Manual mode:	following a negative edge at "Start/Stop" (at the end of the downslope)
while Referencing:	referencing cycle has been completed
in Automatic mode:	after a positive edge of "End of prog./block"
always:	after a positive edge at the "Home position" output

2.2.3 In position (OUT7)

Becomes high if the controller is enabled and

- the axis' distance to go has reached or is below the value specified in parameter S-0-0057 (Position Window) and **no** encoder error is present
- the "Home position" output changes to HIGH level.

By linking "In position" (=0) and "Axis active" (=1), you can see whether a traversing movement in Automatic mode has been interrupted and can be resumed by a positive edge of "Start/Stop".

 **For as long as the controller is not enabled, the drive sets the "In position" signal permanently to HIGH level.**

2.2.4 End of prog./block (OUT8)

Becomes high as soon as a traversing movement selected and started in Automatic mode has been completed.

A negative edge at "Start/Stop" will reset "End of prog./block".

2.2.5 Home position (OUT9)

Becomes high as soon as the drive-MC has properly performed the internal "Home position" procedure (cf. Section 2.1.5) of the control unit. Afterwards, new instructions may be given.

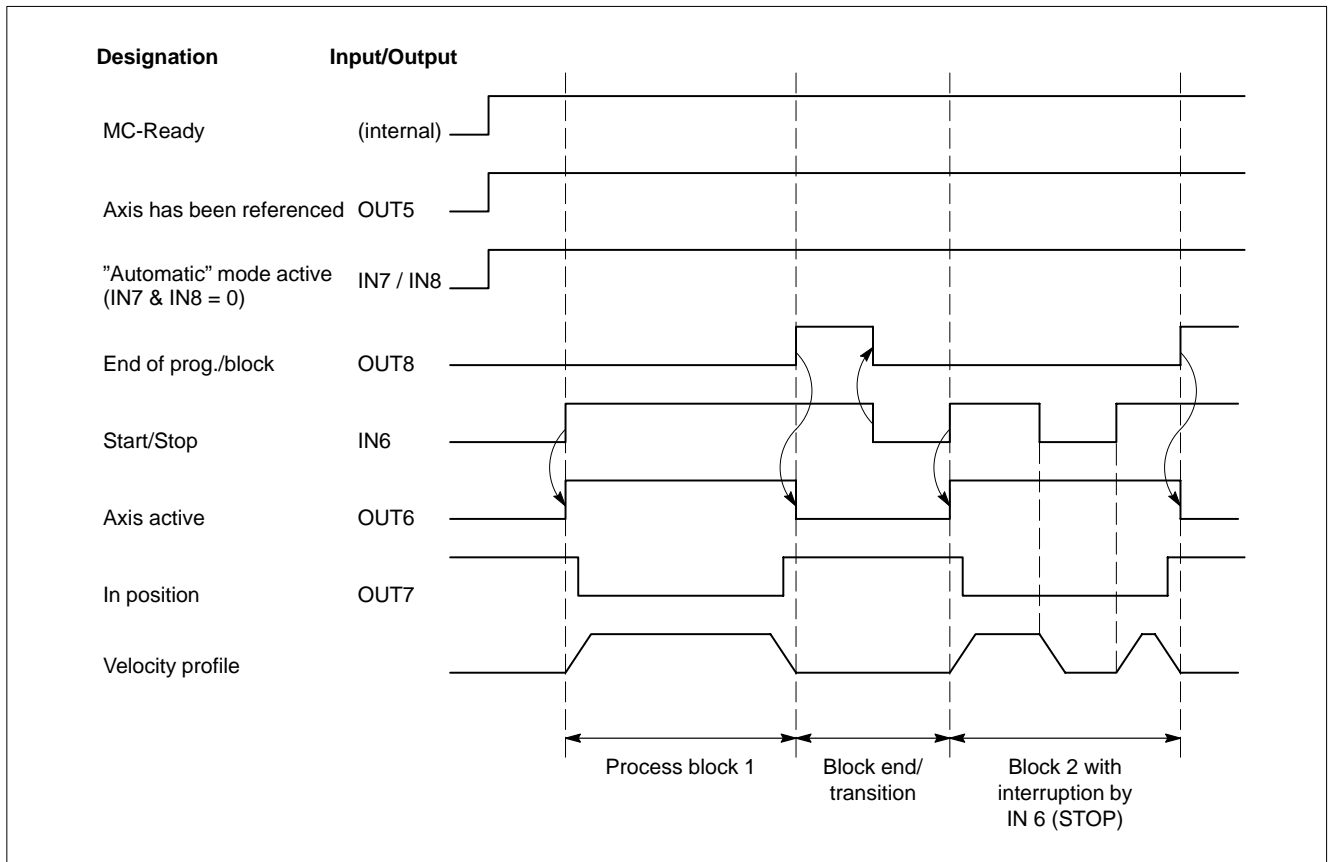
2.2.6 MC status (OUT10; relay contact)

Becomes high as soon as the drive-MC has recognized errors or warnings in the field of

- axis movement,
- mode selection,
- memory access, or
- cyclic signal recognition.

It depends on the type of error whether or not the drive can be reset by setting the "Home position" input signal (IN10) after an error has occurred, or whether it has to be run up again.


2.3 Signal diagram for "Automatic" mode (positioning mode)



Your notes:

3 "Motion Control" operator interface (BAMC)

The present Section contains a description of the functions offered by the software in connection with the drive-MC and the way in which these functions can be selected.

 **You should first familiarize yourself theoretically with the software description in this Section before you start commissioning the system (description in Section 4 ff.).**

Please note that some of the screen displays shown in this manual include functions which are not available until various steps have been performed in the course of commissioning.

Application range of BAMC

For convenient

- commissioning, or for
- visualization of various process data of the drive.

Overview of functions

- display of traversing block number selected
- display of position setpoint and actual position
- display of diagnostics and error messages
- display of the MC-specific digital I/O signals
- mode selection
- display and setting of feedrate override (0% to 120%)
- jogging (in positive or negative traversing direction)
- start, interrupt, cancel referencing
- definition of traversing blocks (target position, feedrate, acceleration)
- downloading and uploading defined traversing blocks to/from the drive
- traversing block selection (1 of 32)
- start, interrupt, resume, cancel traversing block

3.1 Starting the software

☞ For starting and working with the "Motion Control" operator interface, the following start-up sequence must be observed. Otherwise, there may be errors.


1. Turn on power supply of the drive
2. Apply external enable signal (FG and FGI are active)
3. Start DSS software
4. Establish communication via X99, drive is switched to phase 4 (display on H1 of the drive module: "4")
5. Start BAMC

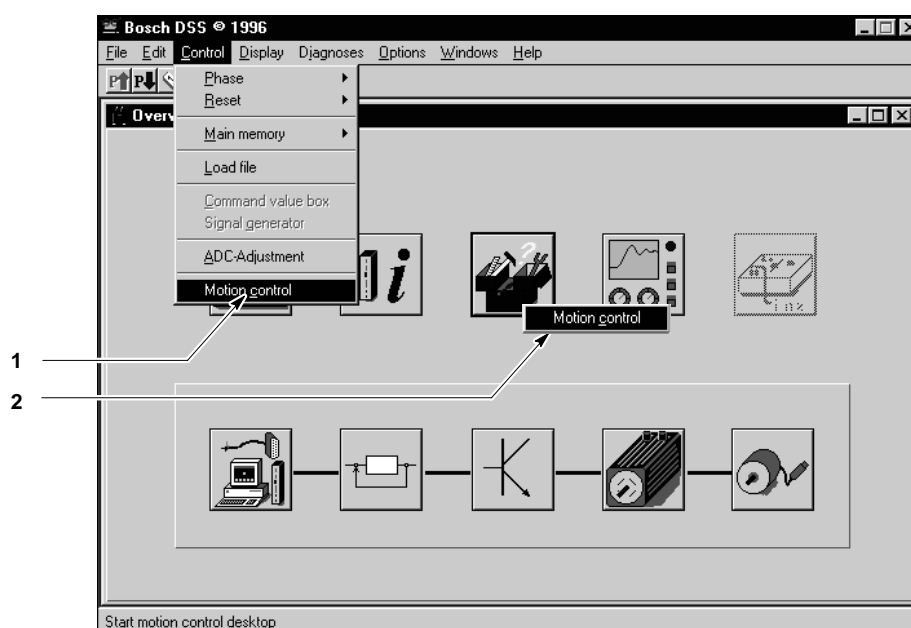
For basic information concerning the necessary requirements, start and important functions of the DSS software, please refer to Section 4.

You may start the "Motion Control" software (BAMC) in 2 different ways:

1. Via the DSS main menu, items
CONTROL ► MOTION CONTROL



2. Via the DSS basic image ("Overview" window) by clicking on  and selecting MOTION CONTROL

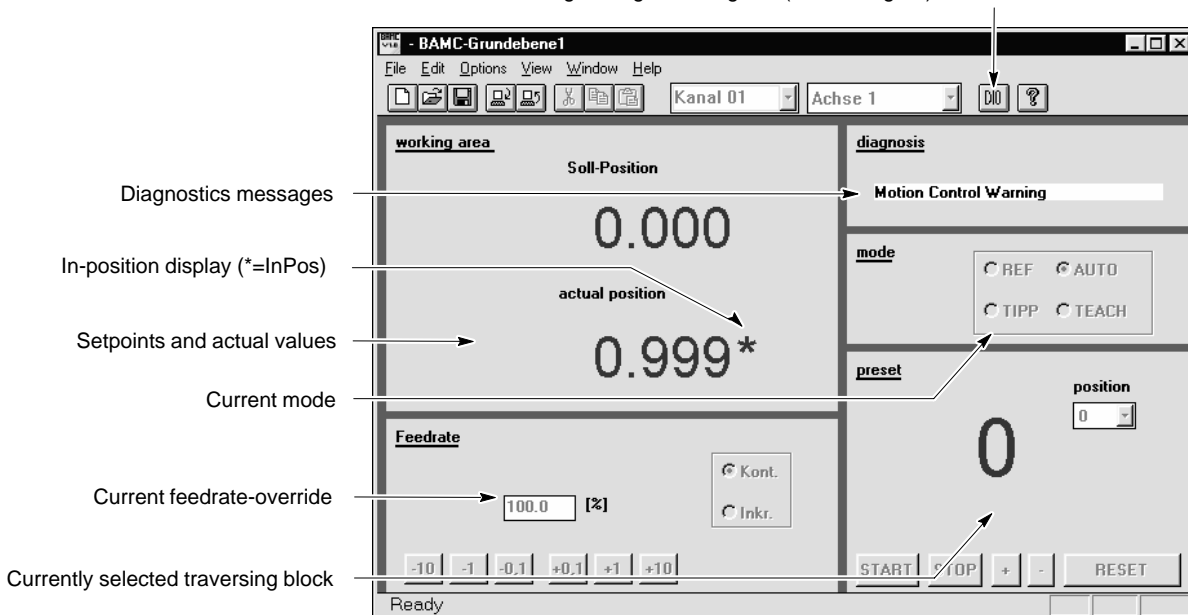


Starting the "Motion Control" software (BAMC)

The basic image will be displayed.
 The digital interface of the drive is active, the drive responds to the inputs by the higher-level PLC!

The process data of the drive-MC can be immediately visualized when the software has been started:

Click to toggle between the current display and the display showing the digital I/O signals (cf. next Figure).

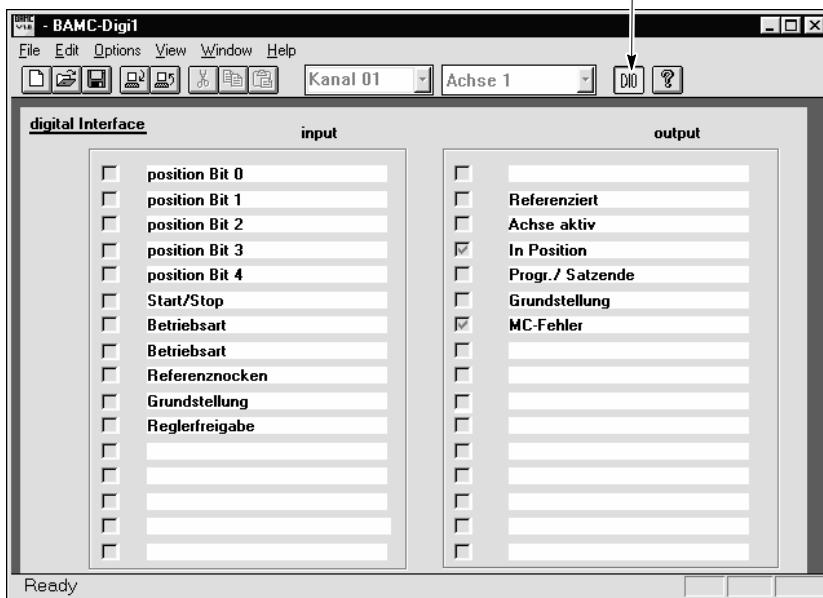


- Diagnostics messages
- In-position display (*=InPos)
- Setpoints and actual values
- Current mode
- Current feedrate-override
- Currently selected traversing block

Basic image of the "Motion Control" software (BAMC)

Click to return to the basic image

The checkboxes indicate the current logic signal status:
 ✓ = logic TRUE



Display: digital signals of the drive-MC

The functions initiated **via the inputs of the digital interface** cannot be immediately selected at the operator interface when the software has been started.

**CAUTION**

The data (target position, feedrate and acceleration) of all traversing blocks stored in the drive can already be modified at this stage!

While a production process is running, incorrect or arbitrary changes to setpoints may cause severe damages to the system or completely interrupt the production process!

Therefore, you should make sure that the drive is not involved in an active production process within the system.

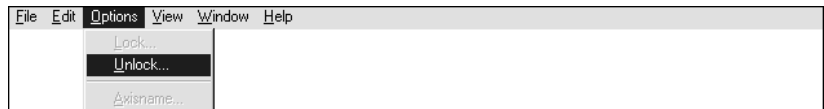
3.2 Controlling the drive-MC with the BAMC

For commissioning, the drive-MC is controlled via the "Motion Control" operator interface.

"Unlock ..." activates the software.

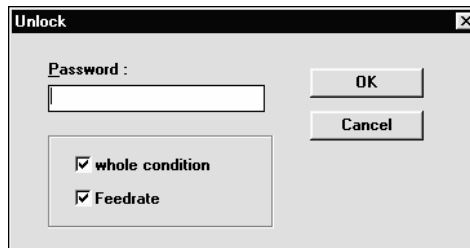
★ Initiate "Unlock ..." command

1. Select the following items from the main menu
OPTIONS ► UNLOCK



Menu sequence: *Unlock*

For safety reasons, the system first displays the "Unlock" dialogue:



"Unlock" dialogue

2. Select the functions to be unlocked by the software by checking (clicking on) the appropriate checkbox(es).
Unlocked functions appear with a check mark ✓. The following applies:
 - "whole condition" function unlocked: The software is given complete control over the drive-MC.
 - "Feedrate" function unlocked: The feedrate override can be changed.
3. Click on the "Password" input field and enter the appropriate password. If you do not know the password, please contact your systems administrator.



CAUTION

The digital interface will be deactivated as soon as you initiate the "Unlock" command with the "whole condition" checkbox activated (cf. step 2)! The drive will no longer respond to the PLC signals. Inappropriate operations may cause severe damages to the system or considerable disturbances of an active production process. Therefore, you should make sure that the drive is not involved in an active production process within the system.

Safety-relevant signals, such as the "Emergency-Stop" and "Enable" inputs and the output message with the "Status contact" (STA) will always remain active.

- Initiate "Unlock" command: Click on "OK"
Do not change current condition: Click on "Cancel".

3.2.1 Mode selection

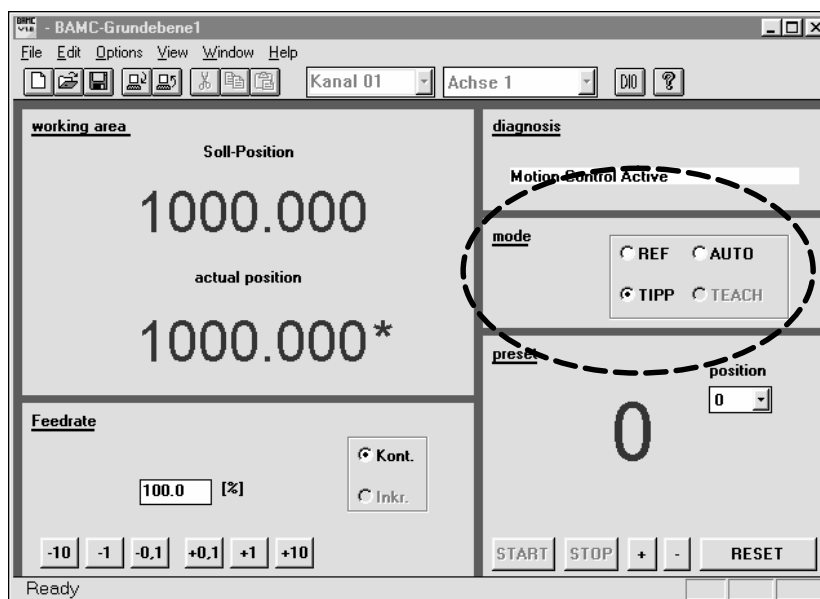
Conditions

- The "Unlock ..." command has been initiated with the "whole condition" checkbox activated (cf. Section 3.2, page 3-5).
- The BAMC basic image is displayed.

Procedure

- ★ Click on the appropriate radio button in the "Mode" field:

REF: Select referencing
 JOG: Select manual mode (jogging)
 AUTO: Select positioning mode
 TEACH: Select teach-in



Mode selection

Selection not possible ...

If the buttons appear in gray (dimmed), the mode in question cannot be activated in the current condition of the drive-MC.

This may be due to the following reasons:

- all** buttons appear dimmed: You have not yet initiated the "Unlock ..." command with the "whole condition" checkbox activated (cf. Section 3.2, page 3-5).
- "AUTO" button appears dimmed: the drive has not yet been referenced. Cf. Section 3.2.3, page 3-8.
- "TEACH" button appears dimmed: SW release 2 is not yet available ...

3.2.2 Jog axis



DANGER

Jogging (Manual mode) is possible even if the drive has not been referenced! In this case, there is no reference between the drive and the absolute axis position.

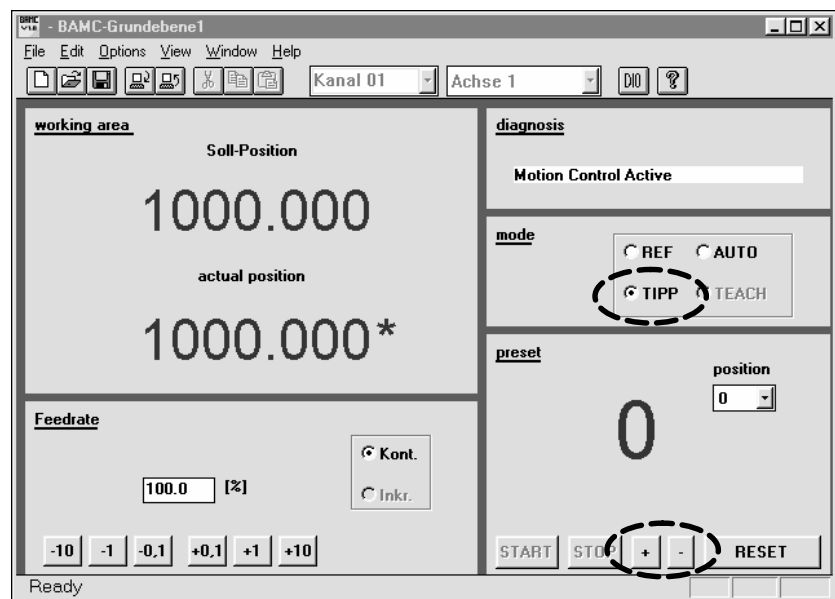
Before jogging axes, you should always make sure that the axis cannot be jogged beyond its maximum traversing range, and that there is no danger for man or machines!

Conditions

- The "Unlock ..." command has been initiated with the "whole condition" checkbox activated (cf. Section 3.2, page 3-5).
- The BAMC basic image is displayed.

Procedure

- ★ Click on the JOG radio button in the "Mode" field. Wait for the radio button to be activated (checked).



Jog axis

- ★ Command button + : jog in positive direction
Command button - : jog in negative direction

The current traversing speed used by the drive is the value stored in S-0-0259 (Positioning Velocity). If no value is stored in this parameter, the value of S-0-0091 (Bipolar Velocity Limit Value) will be applicable.

The "Cont." radio button in the "Feedrate" field is active:

The axis is traversed for as long as the corresponding command button ("+" or "-") is activated. The current feedrate override (for setting, refer to Section 3.2.5, page 3-10) is active.

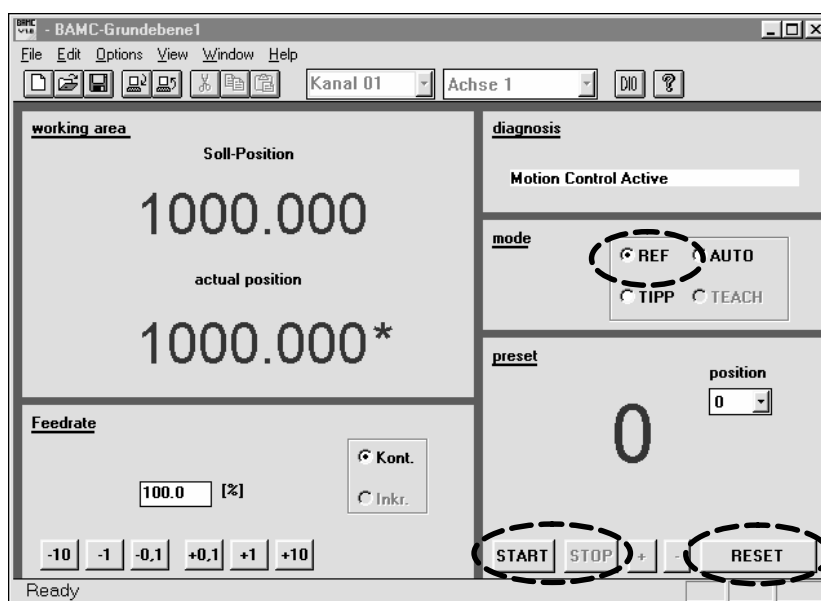
3.2.3 Axis referencing

Conditions

- The "Unlock ..." command has been initiated with the "whole condition" checkbox activated (cf. Section 3.2, page 3-5).
- The BAMC basic image is displayed.
- The drive or axis is equipped with an incremental encoder.
- The drive has not been referenced since the last run-up, reset or an error of diagnostics class 1.

Procedure

- ★ Click on the REF radio button in the "Mode" field. Wait until the radio button appears activated (checked).



Axis referencing

- ★ Click on START button.
Depending on the setting in S-0-0147 (Referencing Parameter), the drive traverses in positive or negative direction and expects the response of the reference cam at input IN9 (for conditions, cf. Section 5.4.5, page 5-8). The current traversing speed used by the drive is the value specified in S-0-0041 (Referencing Velocity). The traversing movement stops and the "Axis has been referenced (InRef)" output signal is set when the defined referencing cycle has been completed.
- ★ Interrupt referencing: Click on STOP. Restart with START.
- ★ Cancel referencing: Click on RESET.

3.2.4 Axis positioning (select and traverse blocks)

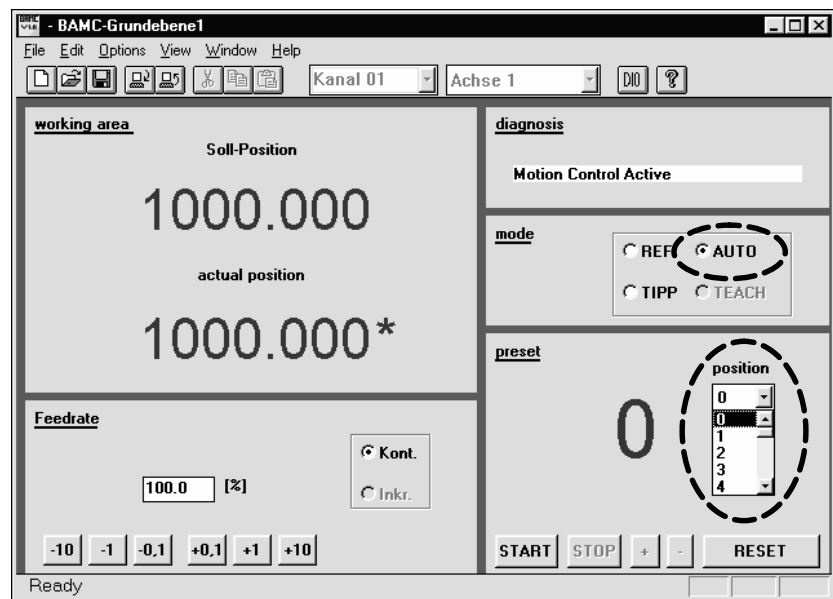
Conditions

- The "Unlock ..." command has been initiated with the "whole condition" checkbox activated (cf. Section 3.2, page 3-5).
- The BAMC basic image is displayed.
- The drive has been referenced (cf. Section 3.2.3, page 3-8).
- You have already defined traversing blocks (cf. Section 3.3, page 3-12).

Procedure

★ Select positioning mode

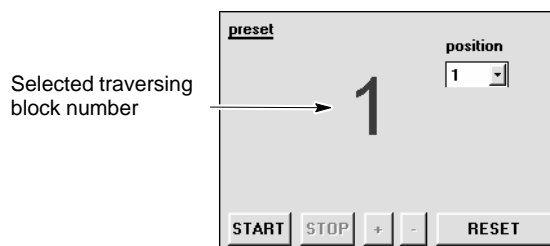
Click on the AUTO radio button in the "Mode" field. Wait until the radio button appears activated (checked).



Positioning mode / Select traversing blocks

★ Select traversing block number:

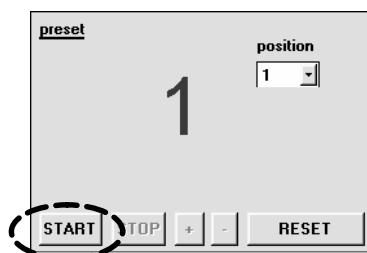
1. Press "▼" button in POSITION listbox. The listbox is opened.
2. Select the desired traversing block number (0-31). You may use the cursor keys ▲ and ▼ for this purpose. When the desired number is highlighted, press the Enter key. The software then displays the selected traversing block number.



Selected traversing block number

☞ For defining traversing blocks (target position, feedrate, acceleration), refer to Section 3.3 page 3-12.

- ★ Start traversing movement:
Click on START button. The drive traverses to the defined target position.
- ☞ **START can only be selected if the drive is currently not traversing.**



Starting the selected traversing block

- ★ Interrupting the traversing movement: Click on STOP. Resume with START.
- ★ Canceling the traversing movement: Click on RESET.

3.2.5 Changing the feedrate-override

Conditions

- The "Unlock ..." command has been initiated with the "whole condition" or "Feedrate" checkbox activated (cf. Section 3.2, page 3-5).
- The BAMC basic image is displayed.

Procedure

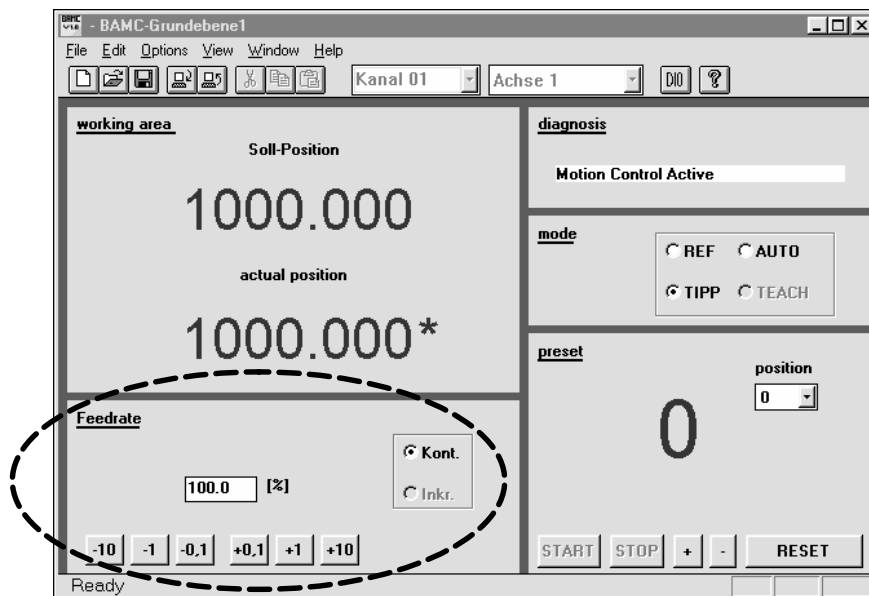
1. Click on the "Cont." radio button in the "Feedrate" field.
2. In the "Feedrate" field, click on buttons
 - 10: reduce current feedrate by 10%
 - 1: reduce current feedrate by 1%
 - 0.1: reduce current feedrate by 0.1%
 - +0.1: increase current feedrate by 0.1%
 - +1: increase current feedrate by 1%
 - +10: increase current feedrate by 10%

–or–

Click on the "%" input field and directly enter the desired percentage. Then press the Enter key.

A change in feedrate override will immediately take effect and will be saved with the "Save main memory" command!

- ☞ **Before leaving the BAMC operator interface, the feedrate override should always be reset to 100%.**



Changing the feedrate override

Extending the feedrate override range

- ★ Select the following items from the main menu
VIEW ► POTENTIOMETER–120%.
If the item is checked ✓, the range from 0 to 120% is available, otherwise it is limited to 0 to 100%.

Selection not possible ...

If objects appear in gray (dimmed), they cannot be activated in the current condition of the drive-MC. This may be due to the following reasons:

- You have not initiated the "Unlock ..." command with the "whole condition" or "Feedrate" checkbox activated (cf. Section 3.2, page 3-5).

3.3 Defining traversing blocks

The data of up to 32 traversing blocks can be stored in the drive. In positioning mode, the individual blocks are selected by their numbers (0 to 31) (cf. Section 3.2.4, page 3-9).

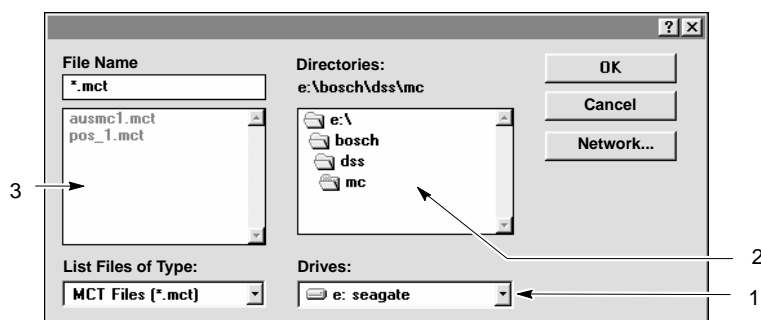
With the BAMC software, all data can be edited in a clearly structured table, saved on the PC and exchanged between the PC and the drive.

Uploading traversing blocks from the drive

1. Select menu items FILE ► UPLOAD... from the main menu
-or-
click on the "Upload" icon in the tool bar.



The "Data from drive-MC to PC" dialogue is displayed:



Uploading traversing blocks from the drive

2. Make sure that the path for the directory in which the traversing block data is to be stored is actually displayed below the "Directories:" heading. To change the directory:
 - a. Click on "1" (cf. Fig. above) and select the desired drive. In field "2" (cf. Fig. above), the system shows the directory structure of the selected drive.
 - b. Double-click on the desired directory in field "2". The system then displays the subdirectories of this directory and existing files containing traversing block data in field "3".
 - c. Repeat step b until the desired path is shown below the "Directories:" heading.
3. Delete the "*" character in the "File Name" field and enter a name for the file. The file extension (*.mct) need not be entered.
4. Click on the "OK" command button. If you enter the name of an existing file, the system prompts you whether you want to replace this file with the current traversing block data of the drive. You may confirm overwriting (OK) or cancel this operation (CANCEL).

The current traversing blocks are uploaded from the drive, saved on the PC, and can be edited.

Editing traversing blocks ...

Traversing blocks can be edited by creating a new file or selecting a file stored on the PC.

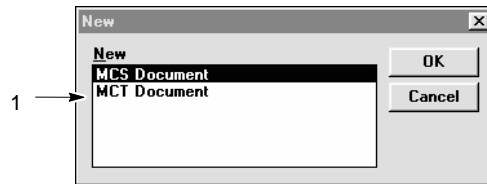
... in a new file

1. Select items FILE ► NEW from the main menu
 –or–
 click on the "New file" icon in the tool bar.



"New file" icon

The "New" dialogue will be displayed:



2. Click on "1" (MCT Document) and confirm by hitting OK.
 The system will open a new table where you may enter traversing block data. The table structure is shown in section "... in existing file", item 3.

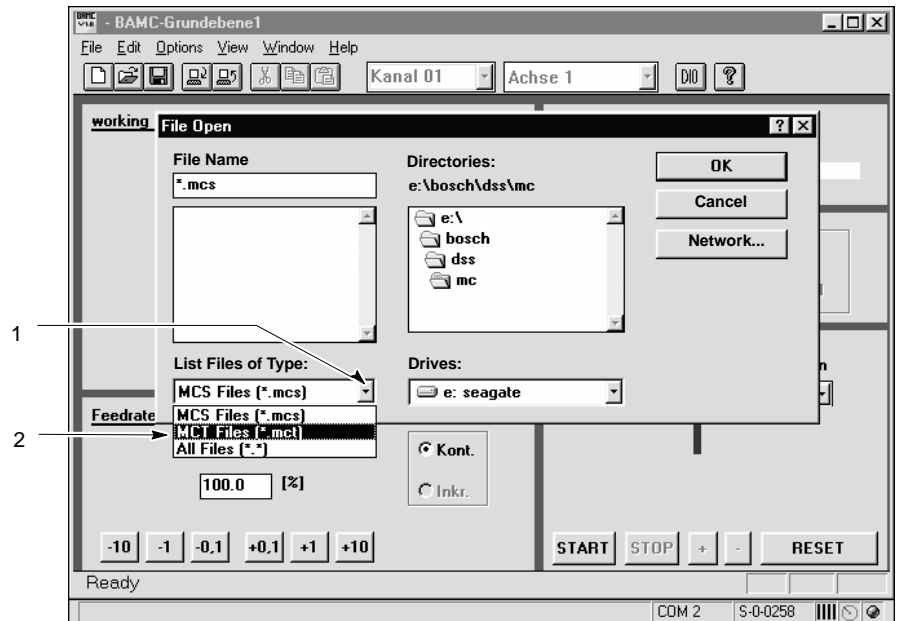
... in existing file

1. Select items FILE ► OPEN from the main menu
 –or–
 click on the "Open file" icon in the tool bar.



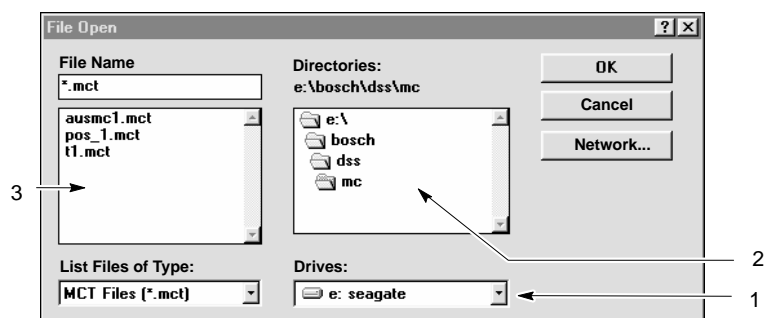
"Open file" icon

The "File Open" dialogue will be displayed:



File Open dialogue (1)

2. First click on "1" (cf. Fig. above), then on "2" ("MCT Files (*.mct)").
 The system will display all traversing block files stored in the current directory of the PC (cf. Fig. below, field 3).



File Open dialogue (2)

To change the directory on screen:

- a. Click on "1" (cf. Fig. above) and select the desired drive.
In field "2" (cf. Fig. above), the system shows the directory structure of the selected drive.
 - b. Double-click on the desired directory in field "2". The system then displays the subdirectories of this directory and existing files containing traversing block data in field "3".
 - c. Repeat step b until the desired path is shown below the "Directories:" heading.
3. Select the desired traversing block file in field 3 (cf. Fig. above) and click on the "OK" command button.
The traversing block data can now be edited in a table.

The following applies to the table data:

- "A" or "a" following position values denotes **absolute** position data, "I" or "i" designates **incremental** values.

If *no* sign has been programmed, the drive will interpret the data as absolute values.

If **only** position values are specified, the drive processes the traversing blocks with the stored Positioning Velocity (S-0-0259) and Positioning Acceleration (S-0-0260).

Click on icon and select item "Close" to finish editing.

	Position [mm]	Geschw. [mm/min]	Beschl. [mm/s ²]	Verzog. [mm/s ²]
0	0.0000 A	5000.000	0.000	0.000
1	50.0000 A	1000.000	200.000	200.000
2	-50.0000 A	1000.000	10.000	20.000
3	-40.0000 A	500.000	10.000	20.000
4	100.0000 A	10000.000	10.000	20.000
5	10.0000 A	3000.000	10.000	20.000
6	2.0000 A	100.000	10.000	20.000
7	0.0000 A	4000.000	10.000	20.000
8	1000.0000 A	4000.000	10.000	20.000
9				
10				
11				
12				
13				

Traversing block data: table structure

☞ If in the course of editing you "iconize" the table window (by clicking on "_" in the upper right corner of the table window)

–or–

click on an object outside the table window, the table will no longer be displayed on the screen although it is still open.

To display the table again, select WINDOW in the BAMC main menu and click on the name of the open traversing block file (*.MCT) displayed in the list.

★ Selecting a field:

– 1 field up:

Cursor-up key ▲

– 1 field down:

Cursor-down key ▼

– 1 field right:

Tab key <tab>

At the end of the line, the tab key will take you to the first field of the next line.

– 1 field left:

Press <shift> and <tab> keys simultaneously

At the beginning of the line, the tab key will take you to the last field of the previous line.

– by clicking on the desired field.

When a field is selected, its border is thicker **and** its contents are displayed in reverse video.

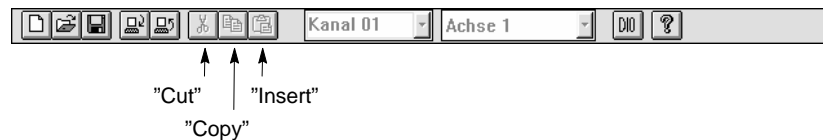
★ Cut, copy, insert field contents:

These functions have effect for the currently selected field!

Select EDIT from the BAMC main menu and click on the desired activity

–or–

click on the appropriate icons in the tool bar



–or–

click on the **right** mouse key while the mouse pointer is **on** the desired field, and then click on the desired activity with the left mouse key.

★ Save traversing block data on PC:

Select FILE ► SAVE from the main menu

–or–

click on the "Save file" icon in the tool bar.



★ Closing the editor

Click on the icon in the upper left corner of the table window's title bar and select CLOSE (cf. Fig. on page 3-14)

–or–

click on the "X" in the upper right corner of the table window's title bar.

If you have changed data since the file was last saved, the system will prompt you to confirm whether the file should be saved. You may confirm saving (YES), reject saving (NO), or CANCEL closing.

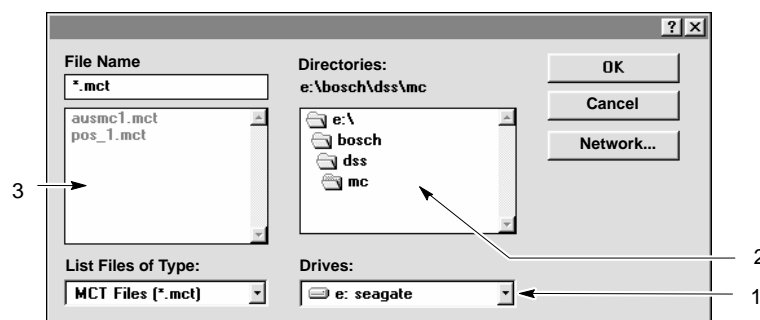
Downloading traversing blocks to the drive

1. Select menu items FILE ► DOWNLOAD... from the main menu
—or—
click on the "Download" icon in the tool bar.



"Download" icon

The "Data from PC to drive-MC" dialogue is displayed:



Downloading traversing blocks to the drive

2. Make sure that the path for the directory in which the traversing block data (files with the extension ".mct") is stored is actually displayed below the "Directories:" heading.
To change the directory:
 - a. Click on "1" (cf. Fig. above) and select the desired drive.
In field "2" (cf. Fig. above), the system shows the directory structure of the selected drive.
 - b. Double-click on the desired directory in field "2". The system then displays the subdirectories of this directory and existing files containing traversing block data in field "3".
 - c. Repeat step b until the desired path is shown below the "Directories:" heading.
3. Click on the file to be downloaded to the drive in field "3". Its name will then be displayed in the "File Name" field.



CAUTION

While a production process is running, incorrect or arbitrary changes to setpoints may cause severe damages to the system or completely interrupt the production process!

The new traversing block data will become immediately active. If a block had been active before, its data will be replaced by the new values: Activating START will cause the drive to traverse to the new target position!

Make sure that nothing can be damaged by modified traversing block data!

- 4. Download file: Click on "OK" button
- Do not download file: Click on "Cancel" button

3.4 Toggling between the basic image and the digital interface display

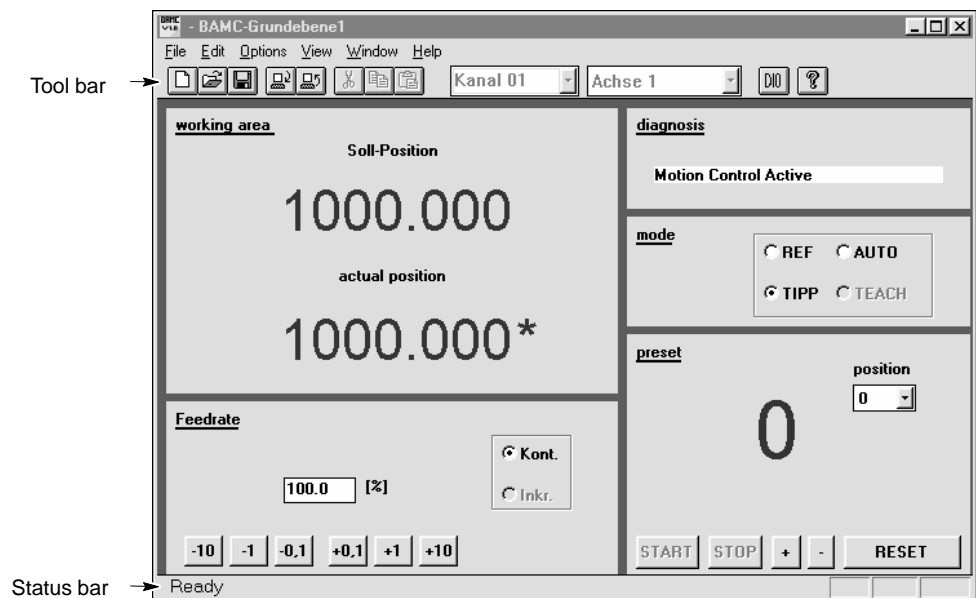
- ★ Select the following items from the main menu
WINDOW ► DIGITAL INTERFACE
or
WINDOW ► BASIC IMAGE.
- or**
- ★ Click on the "DIO" icon in the tool bar



3.5 Show/Hide tool bar / status bar

You may use the **tool bar** to select some functions of the BAMC software directly by clicking on an icon instead of menu items. If the tool bar is hidden, these functions can only be invoked via the main menu.

The **status bar** offers concise information concerning a currently selected software function.



Tool bar and status bar

Both bars can be shown and hidden independent from each other.

- ★ Select the following items from the main menu
VIEW ► TOOL BAR or VIEW ► STATUS BAR
to show or hide the tool and status bar.

3.6 Stop controlling drive-MC via BAMC / Exit BAMC

In the following cases, you have to stop controlling the drive-MC via the software:

- after commissioning,
- before exiting BAMC,
- before leaving an unlocked PC (cf. Section 3.2, page 3-5, "Unlock ..." command) unsupervised.

You may stop the software from controlling the drive-MC with the "Lock" command.

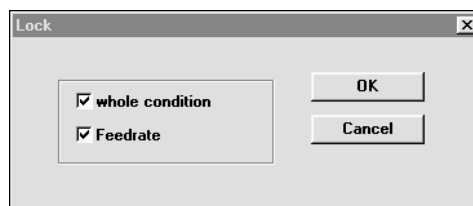
★ Initiate "Lock" command

1. Select the following items from the main menu
OPTIONS ► LOCK



Menu items: Lock

The system will first open the "Lock" dialogue:



"Lock" dialogue

2. Select the functions to be locked by clicking on the desired checkboxes. Locked functions are checked ✓. The following applies:
 - Lock "whole condition" function: The software is completely stopped from controlling the drive-MC.
 - Lock "Feedrate" function: The feedrate override can no longer be changed.

**CAUTION**

The digital interface is reactivated as soon as you initiate the "Lock" command with the "whole condition" checkbox activated (cf. step 2)! The drive will immediately react to PLC signals. This may lead to severe damages to the plant or considerable disturbances within an active production process.

Make sure that the PLC properly initializes and, if necessary, references the drive again when you have triggered the "Lock" command with the "whole condition" checkbox activated!

3. Initiate "Lock" command: Click on "OK".
Do not change current condition: Click on "Cancel".

★ Exiting BAMC

1. First stop the software completely from controlling the drive-MC by activating the "Lock" command (cf. above).
2. Select items FILE ► EXIT from the BAMC main menu
–or–
click on the "X" in the upper right corner of the BAMC title bar.

Your notes:

4 Conditions for commissioning

In this Section, you will find descriptions of

- activities to be performed **prior** to SW commissioning
- general activities you must be familiar with **in the course of** SW commissioning.

Despite careful research, however, we cannot totally exclude that inadvertent operations or a concatenation of unfortunate events may cause danger to man and machine.

Our service department will in any case be available for assistance with commissioning. On request, we also provide training for your personnel. For more information, please contact us (phone ++49-6062-78-0).



CAUTION

Commissioning by insufficiently qualified personnel may cause severe damages to the machine and drives or even personal injuries!

- **Commissioning is therefore reserved to appropriately trained technical personnel!**
 - **Please note the safety instructions at the beginning of this manual.**
 - **In the case of multi-drive systems, you should always commission a single drive at a time.**
 - **Make sure that the motor is properly fastened or flanged. If this is not yet possible, you must fix the motor, e.g. with the help of suitable screw clamps, so as to ensure that it cannot jerk even with maximum acceleration.**
 - **Make sure that all necessary power, supply and control voltages are within the specified tolerances. For more information, please refer to the "Servodyn-D Interface Conditions" manual.**
-

4.1 Checking the hardware

- ★ First make sure that the system is switched off and de-energized.

Wiring

- ★ Check the wiring of the complete drive on the basis of the figures and information contained in the "Servodyn-D Interface Conditions" manual and the "EMC Manual".
- ★ Switch on 24V supply.

Control logic for emergency braking of the motor

- ★ Check the drive for proper functioning in accordance with the project engineer's specifications.
If a plug braking resistor is used, an auxiliary contact of the contactor must be provided to ensure that the drive cannot be enabled unless the braking resistor has been deactivated. The enable delay must be turned off.
The contactor can be triggered by the "OUT 4" output of the inverter module.

Holding brake

- ★ Check the holding brake for proper functioning if the motor is equipped with a holding brake.
Normally, the voltage for the holding brake is connected via a contactor. The holding brake is released when 24VDC are connected.
The contactor is triggered by the "OUT 3" output of the inverter module. For loads $I > 0.5$ A, a relay must be connected in series.

Limit switches

- ★ Check the hardware limit switches for proper functioning.
- ★ Make sure that the distance to go between the limit switch response and the axis' fixed stop is large enough to halt the axis before the fixed stop is reached.

EMERGENCY-STOP circuit

- ★ Check for proper functioning according to project engineer's data.

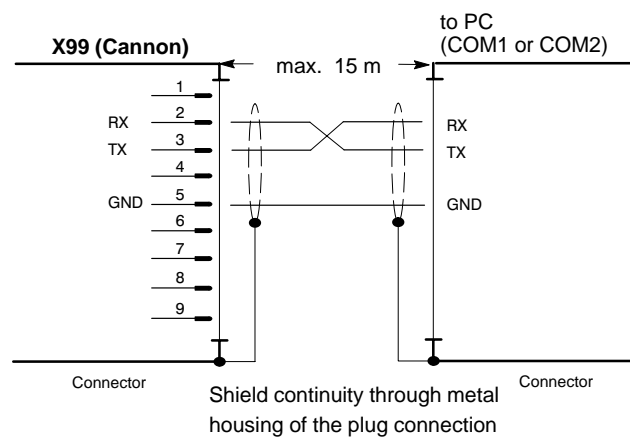
Finish checking

- ★ Switch off all voltages.
- ★ If all checks were completed successfully, proceed to the next Section. Otherwise, all faults that have occurred must be eliminated.

4.2 Connect PC with DSS installed to the drive


Use X99 of the inverter module in question.

Connection:	Cannon connector, 9-pole.
Type:	RS232
Cable length:	max. 15 m
Cable type:	shielded, min. core cross-section 0.14 mm ²
Transmission rate:	9600 bits/s
Parameters:	even parity, 8 data bits, 2 stop bits
Handshake:	software handshake (X _{ON} , X _{OFF})



Function of the individual leads (RS232):

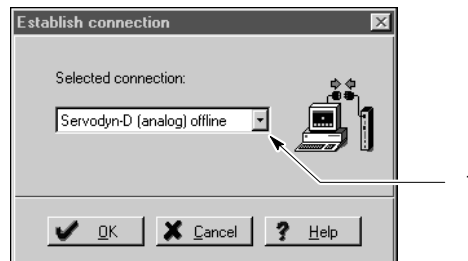
RX	Receive data
TX	Transmit data; data transmission to DSS
GND	Signal ground
Shield	Shielding; contact to equipment frame via metal housing of the Cannon connectors

 **In the event of interference problems during commissioning, an annular core on the connection lead may be helpful. Use the folding ferrite coil, part no. 1070 918 766.**

- ★ Connect X99 to COM1 or COM2 of your PC.
- ★ Remember which port you used (COM1 or COM2).

4.3 Establishing communication between the drive and DSS

- ★ Switch on the 24V supply of the system.
If display H1 of the inverter module does **not** show **any** of the values "0", "1", "2", "3", or "4", check the system as described in Section 4.1.
- ★ Switch on the PC. Wait until the operating system has been fully booted and start the "DSS" commissioning and service system.
The DSS will then query the desired type of connection:



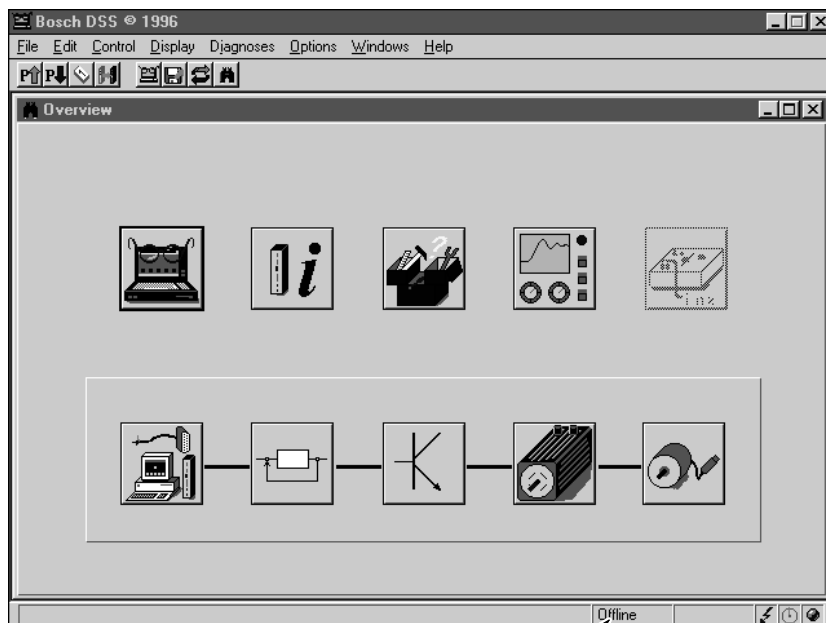
"Establish connection" dialogue (example)

- ☞ **An incorrect connection setting may cause the mouse pointer to become "frozen"!**
If the port is shown to which the mouse is connected at the PC, you must change the type of connection before clicking on the "OK" command button.

Changing the displayed connection

- ★ Click on "1" (cf. Figure above). Select one of the following modes:
 - V.24 connection at COM1
 - V.24 connection at COM2
 - Servodyn-D (analog) Offline:
No inverter module connected. The DSS must simulate an inverter module with Motion Control interface (special application).


If no entry is shown for your interface used, first select the "Servodyn-D (analog) Offline" mode.
In this case, you first have to set the interface parameters.
- ★ Accept the displayed type of connection by clicking on the "OK" command button.
The DSS basic image will appear ("Overview" window).



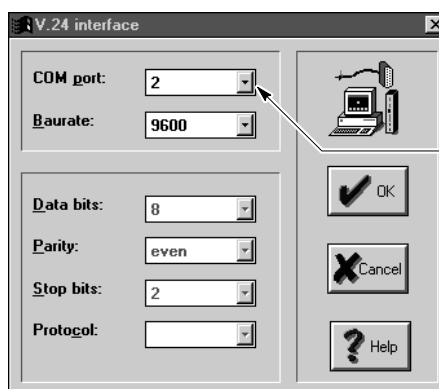
Indicates the interface currently in use (COM1, COM2, or "Offline")

DSS basic image ("Overview" window)


Setting the interface parameters

- ★ Select the interface dialogue:
 - menu items **OPTIONS ► V.24 INTERFACE**
 - or –
 - by clicking on the  command button.

The "COM port" and "Baudrate" parameters can be changed. We recommend a baudrate of "9600".




"V.24 interface" dialogue

 **An incorrect connection setting may cause the mouse pointer to become "frozen"!**
 If the port is shown to which the mouse is connected at the PC, you must change the type of connection before clicking on the "OK" command button.

- ★ To change the current interface, click on "1" (cf. Figure above). Then select connection "1" (COM1) or connection "2" (COM2).
- ★ Accept your settings by clicking on the "OK" command button. Click on the "Cancel" command button to cancel the dialogue. In this case, none of the previously changed parameters will become active.

When you have confirmed the "OK" command button, the DSS will try to establish a connection to the connected inverter module. During this process, the DSS reads important information from the drive. The same process is initiated by the function "Init. module type" (cf. Section 4.3.6).

Checking the data transmission

- ★ Start the "Module configuration" display
 - menu items **DIAGNOSES ► MODULE CONFIGURATION, or**
 - click on the  command button and then select "Module configuration" (only possible if DSS basic image is active).
- ★ Do not perform any operations (mouse click, keyboard entry, etc.) before the module configuration display appears. It may take about 15 seconds for the module configuration display to build up.

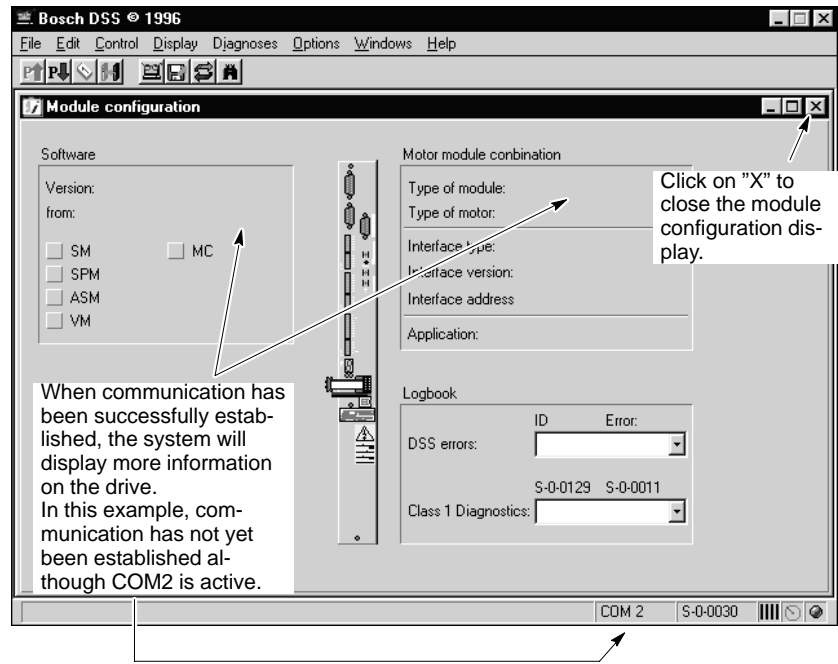
If the version and type data of the connected drive is shown in the "Software" and "Hardware" groups, communication between the drive and the DSS has been successfully established.

Close the module configuration display (cf. next Figure) and proceed to Section 4.3.1.

If the DSS does not show any version or type data, communication between the drive and the DSS has not yet been established.

Close the module configuration display.

Then return to Section 4.2 and check whether the connection cable has been properly wired and connected.



Module configuration display of the DSS

4.3.1 Changing the DSS default directory

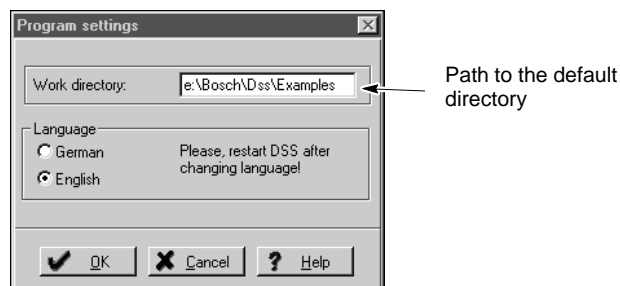
In the course of commissioning, you will have to open or save files on your PC in some DSS dialogues.

Therefore, you may define a default directory for these activities.

Normally, the DSS will use the "c : \Bosch\DSS\Examples\" subdirectory (if the DSS was installed on drive "C").

- ★ Select the "Program settings" dialogue:

Menu items: OPTIONS ► PROGRAM SETTINGS



"Program settings" dialogue

- ★ Enter the appropriate drive and path in the "Work directory" field.
- ★ Accept your setting by clicking on the "OK" command button. Click on the "Cancel" button to cancel the dialogue. In this case, none of the changes made in this dialogue will become effective.

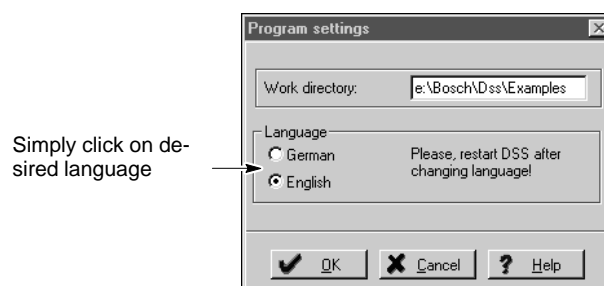
4.3.2 Selecting the language (DSS operator interface)

The operator interface or guidance of the DSS commissioning and service system can be set to different languages.

This function has **no** effect on parameter names, units of measure or diagnostics texts transmitted from the drive to the DSS and possibly displayed! If you want to display this data in a different language, please refer to Section 4.3.3.

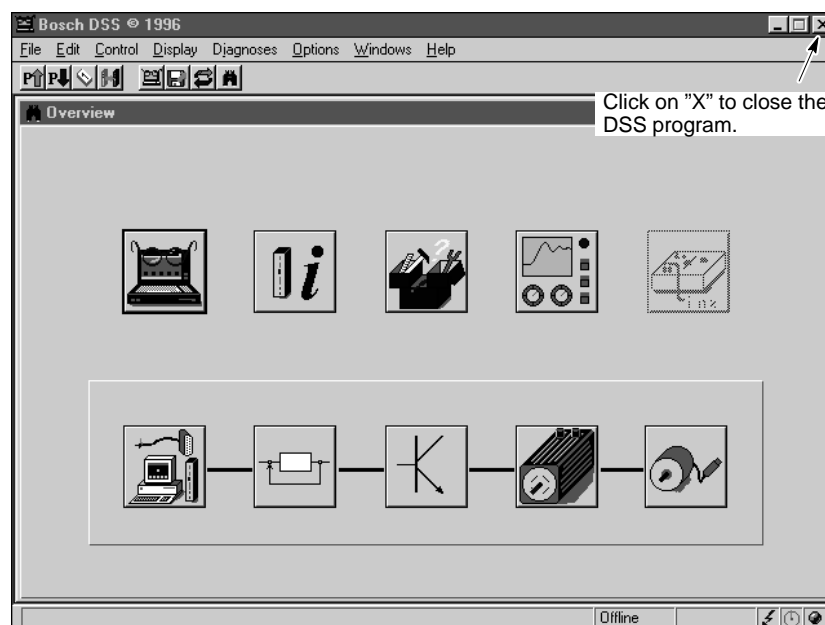
- ★ Select the "Program settings" dialogue:

Menu items: OPTIONS ► PROGRAM SETTINGS



"Program settings" dialogue

- ★ Mark the corresponding field.
- ★ Accept your setting by clicking on the "OK" button. Click on the "Cancel" button to cancel the dialogue. In this case, none of the changes made in this dialogue will become effective.
- ★ To activate the new language, you must first close the DSS commissioning and service system and then start it again.



Closing DSS (exit program)

4.3.3 Selecting the drive language

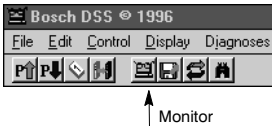
The language of the parameter names, units of measure and diagnostics texts transmitted by the drive to the DSS and possibly displayed there can be set with the following parameters:

- S-0-0265 Language selection
- S-0-0266 List of available languages


Please note that this language selection does **not** affect the operator interface or guidance of the commissioning and service system! For selecting a different language for the **DSS**, please refer to Section 4.3.2.

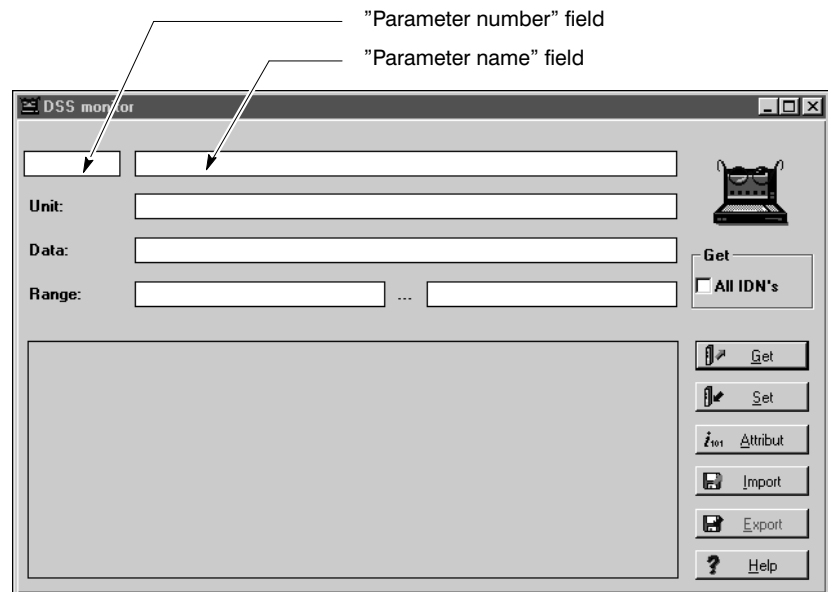
★ Start the "Monitor"

- Menu items DISPLAY ► MONITOR, or

- click on the  icon in the tool bar,

or

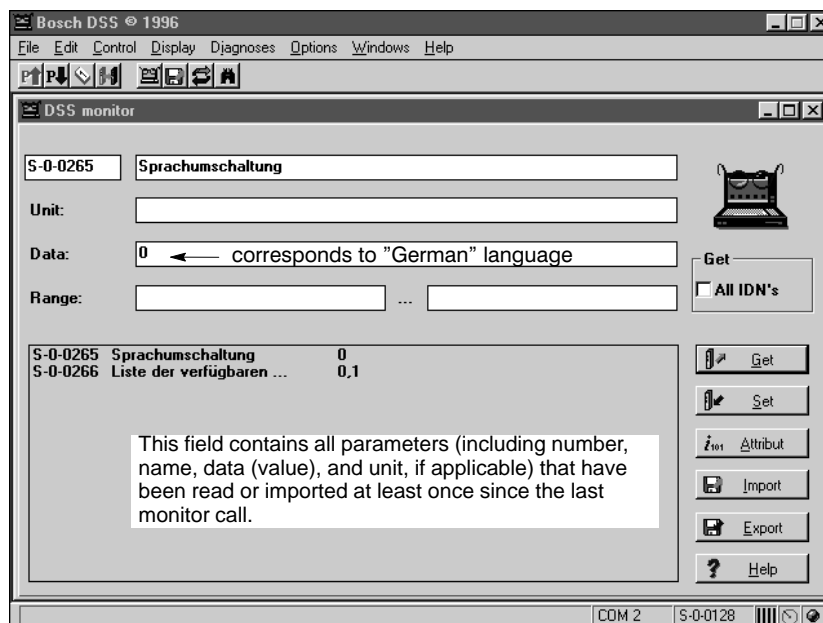
- click on the  command button and then select "Monitor" (only possible if DSS basic image is active).



Monitor; selecting the drive language

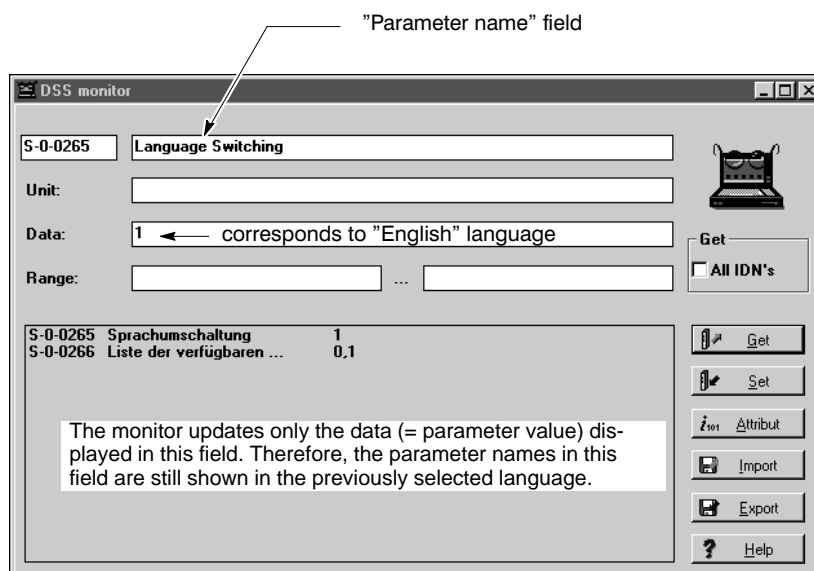
- ★ Enter the string 266 in the "parameter number" field. Press the Enter key or click on the "Get" command button.
In the "Data" field, the DSS shows a series of numbers separated by commas. Each of these numbers represents a language available in the drive (e.g. "0": German; "1": English).
For more assignments, please refer to the "Servodyn-D parameter description" manual.

- ★ Enter the string 265 in the "parameter number" field. Press the Enter key or click on the "Get" command button. In the "Data" field, the DSS now shows the numerical value of the currently active language:



Monitor; selecting the drive language

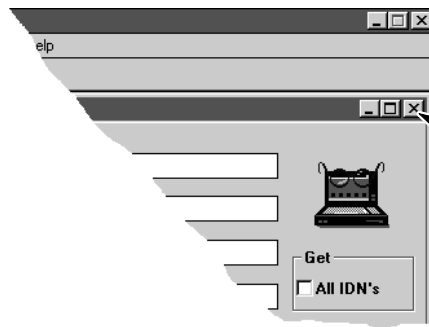
- ★ Replace the value in the "Data" field with the numerical value of the desired language. You should only use one of the values displayed in step 2. Then press the Enter key or click on the "Set" command button. The language is immediately changed over, which can be recognized by the text in the "parameter name" field.



Monitor; selecting the drive language

From now on, the new setting will remain active until you switch the drive off or press the "Reset" key at the inverter module. In order to permanently set the new language for the drive, you must perform the "Save main memory" command. Please refer to Section 4.5.

- ★ Exit the "Monitor".



Click on "X" to close the monitor.

Closing the monitor

4.3.4 Setting cyclic data display

In some dialogues, the DSS displays data cyclically (e.g. in the "Module state display" or "Command value box"). For this purpose, it reads this data in a certain time interval from the drive.

You may specify

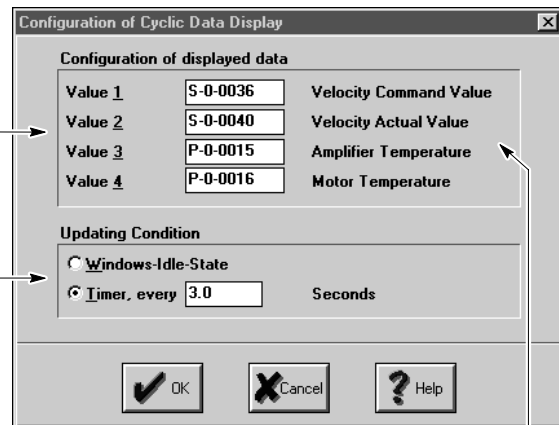
- the data (max. 4 parameter numbers), and
 - the time interval
- for the data display:

- ★ Select the "Configuration of cyclic data display" dialogue:

Menu items: OPTIONS ► MODULE DISPLAY

Definition of data to be displayed (input of parameter numbers)

Time interval. Simply click on desired interval for selection.




Parameter names will be displayed in the currently selected language (cf. Section 4.3.3) !

"Configuration of cyclic data display" dialogue

- ★ Enter the parameter numbers to be displayed cyclically in fields "Value 1" to "Value 4". Although you may enter any available parameter in these fields, only those parameters will be meaningful which change in value with time.

- ★ Click on the desired updating condition:
 - **Windows Idle State:**
Updating as fast as possible. The data will be updated whenever the operating system is not busy performing other tasks.
 - **Timer, every xx seconds:**
Fixed time interval for updating data (default: 3 seconds).

 **The computer may respond very slowly to user operations!**
Especially if slow PC's are used (< 66 MHz bus clock), the "Windows Idle State" or intervals of less than 2 seconds may lead to a fairly "tough" computer response.
Therefore, we recommend not to change the default setting.

**CAUTION****Updating of data is interrupted!****If you activate the "Windows Idle State" setting for cyclic data display, the data is updated very fast, but with a low priority (the operating system will first execute other pending tasks).****This behavior may have the effect that no data is updated in certain operating situations (e.g. during selection within a menu sequence)! Therefore, you should use this updating condition only if a particularly "smooth" data display is absolutely necessary.**

-
- ★ Accept your settings by clicking on the "OK" command button. All changes will become immediately active.
Click on the "Cancel" command button to cancel the dialogue. In this case, none of the changes made in the course of the dialogue will be accepted.

4.3.5 Changing the user group (password)

The DSS makes a distinction between the following user groups:

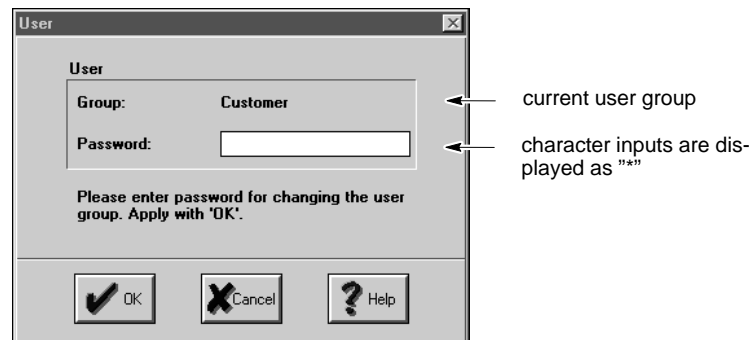
- customer (always active after program start),
- Bosch service (password-protected)

Thus, the following DSS functions are protected against unauthorized interventions, but can be accessed by our trained service personnel:

- Command value box
- Signal generator
- other selected parameter groups.

- ★ Select the "User" dialogue:

Menu items: OPTIONS ► USER



"User" dialogue

- ★ Enter your password.
- ★ Accept your input by clicking on the "OK" command button or pressing the Enter key.
Click on the "Cancel" command button to cancel the dialogue.



CAUTION

Unauthorized access to protected functions possible!

If you have changed the user group, you should complete the necessary operations and restart the DSS or reset the system to the "Customer" group.

Otherwise, all normally protected functions can be accessed until the DSS program is exited.

4.3.6 Reinitializing DSS after module reset or a module change

If, while DSS is running, you

- disconnect the connection cable from the inverter module (e.g. for starting up a new drive), or
- press the "Reset" key of the currently connected inverter module, you then have to re-initialize the DSS. This is the only way to ensure that the DSS does not work with invalid or outdated data.



CAUTION

Uncontrolled motor movements are possible!

For as long as the drive is enabled and a movement takes place, you must neither press the "Reset" key nor disconnect the cable between the DSS and the drive.

First stop the movement and disable the drive.

- ★ Initiate the "Initialize module type" command:

- menu items
CONTROL ► RESET ► INIT. MODULE TYPE,
or

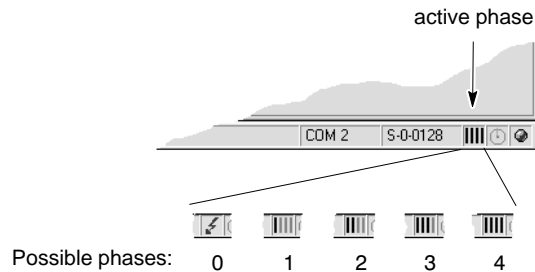
- click on  in the tool bar.

↑ Init. module type

4.4 Changing phases

When a drive is switched on, it first passes the initialization phases 0 through 3 until normal operation is reached in phase 4.

In the status line, the DSS shows the currently active phase:




Since various parameters can only be changed in certain initialization phases or specific drive statuses, you must first switch the drive to the required phase before changing such parameters. If you forget changing phases, an error message of the type "Data of parameter x-0-xxxx is write protected at this time!" will usually be output.

The phases can be easily changed over with the DSS.

★ changing to the **higher next** phase:


- menu items
CONTROL ► PHASE ► INCREMENT, or

- click on  in the tool bar.
- ↑ Increment phase

If the drive has already reached phase 4, this command button or menu sequence is not available for selection.

★ returning to **phase 0**:

- menu items
CONTROL ► PHASE ► DECREMENT, or

- click on  in the tool bar.
- ↑ Decrement to phase 0

4.5 Save main memory

When the inverter module has been switched on or the "Reset" button has been pressed, the drive automatically copies all data contained in the FEPRAM to the RAM (main memory). Only the RAM data is relevant for the behavior of the drive.

Any parameter change will initially affect the data contained in the RAM only. In order to permanently save parameters, you must initiate the "Save main memory" command. The drive will then copy the corresponding parameters from the RAM to the FEPRAM.

In the "Servodyn-D parameter description" manual, this type of parameters is marked with the "FEPRAM" entry in the "Recovery" field of the attributes bar.




CAUTION

FEPRAM will be deleted!

All data contained in the FEPRAM will be replaced with the data currently stored in the RAM by the "Save main memory" command. This process cannot be reversed.

If you are not sure whether you still need the old FEPRAM data, please contact your systems administrator before executing this command.

The "Save main memory" command is no alternative for a backup! For example, parameters that have been set and optimized during initial commissioning can be used for another drive only (series commissioning), if a backup was made (refer to Section 5.8, page 5-18).

 **The current feedrate override (cf. page 3-10) is also saved. If you have previously changed this value for testing purposes, you should reset it to 100%.**

- ★ Initiate the "Save main memory" command:
menu items
CONTROL ► MAIN MEMORY ► SAVE

4.6 Load main memory

Use this command to restore all parameters previously saved to the FEPRAM (cf. Section 4.5) to the drive's RAM.

In the "Servodyn-D parameter description" manual, this type of parameters is marked with the "FEPRAM" entry in the "Recovery" field of the attributes bar.

If you have never before saved the main memory, the factory settings of all drive parameters will be restored.

When the inverter module has been switched on or the "Reset" key has been pressed, the drive will automatically copy all data contained in the FEPRAM to the RAM.



CAUTION

The main memory of the drive is overwritten!

All data in the RAM will be replaced with the parameters currently contained in the FEPRAM by the "Load main memory" command. This process cannot be reversed.

If you are not sure whether you still need the old RAM data, please contact your systems administrator before executing this command.

-
- ★ Initiate the "Load main memory" command:
menu items
CONTROL ► MAIN MEMORY ► LOAD

Your notes:

5 Initial commissioning

Initial commissioning is performed with

- the "mc_init.scs" initialization file, and
- the DSS monitor.

For more information on the individual parameters, please refer to the "Servodyn-D parameter description" manual.



CAUTION

Danger of malfunctions and damages!

An incorrect commissioning procedure may lead to unexpected or wrong drive reactions and thus to dangerous situations.

- Follow all instructions given in this Section. They serve for your own safety and trouble-free commissioning.
- Work through this Section step by step.

"mc_init.scs" initialization file

This file contains fundamental settings for the drive-MC and must first be downloaded to the drive by the DSS.

When done, the drive has been sufficiently parameterized for the first traversing tests (jogging).

In order to adjust the drive to the specific features of your application, you must change the parameters contained in "mc_init.scs" accordingly and save the file under a different name. This new file will then form the "basis" of additional drive settings.

DSS monitor

The "DSS monitor" is used for other adjustments. Here, you may select the parameter to be edited from a list of available parameters.

A parameter list can be generated **manually** by sequential input of all desired parameter numbers or **automatically**.

To generate a parameter list automatically, the DSS basic image offers the command buttons



Position, speed or
current control



Amplifier



Motor



Encoder

A list thus generated will contain all relevant parameters of the corresponding subject area.

Parameter lists can be saved as files (*.scs) and downloaded to the drive.

5.1 Ensuring prerequisites

- ★ Make sure that all works described in Section 4 have been properly executed.

The system should now be in the following condition:

- 24V supply is switched on. The power supply is not yet switched on, the system has not been enabled.
 - H1 display at inverter module shows "4".
 - PC is properly connected to the inverter module and switched on. The DSS has been started. Communication between the drive and the DSS has been checked and is o.k.
 - The desired language has been set (for the drive and the DSS).
 - The DSS has been re-initialized.
- ★ Do not proceed to the next Section unless all these conditions are met and unless you are familiar with the contents of Sections 2 and 3.

5.2 Downloading the initialization file to the drive


- ★ Select the initialization file "mc_init.scs". This can be done in different ways:

- menu sequence CONTROL ► LOAD FILE, or

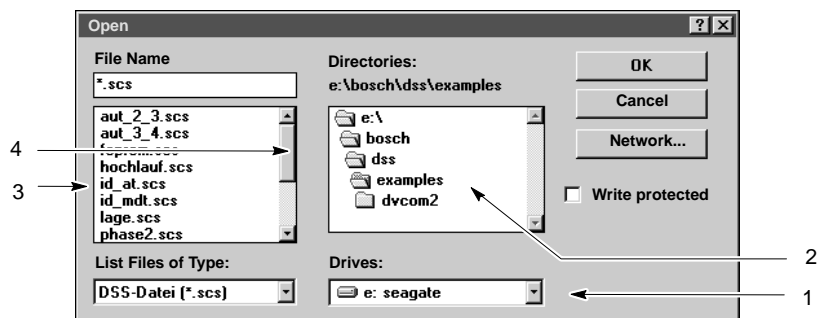
- click on  in the tool bar, or



↑ Load file

- click on the  command button and then select "Load file" (only possible if the DSS basic image is active).

The "Open" dialogue window will then be displayed:



"Open" dialogue (load file to drive)

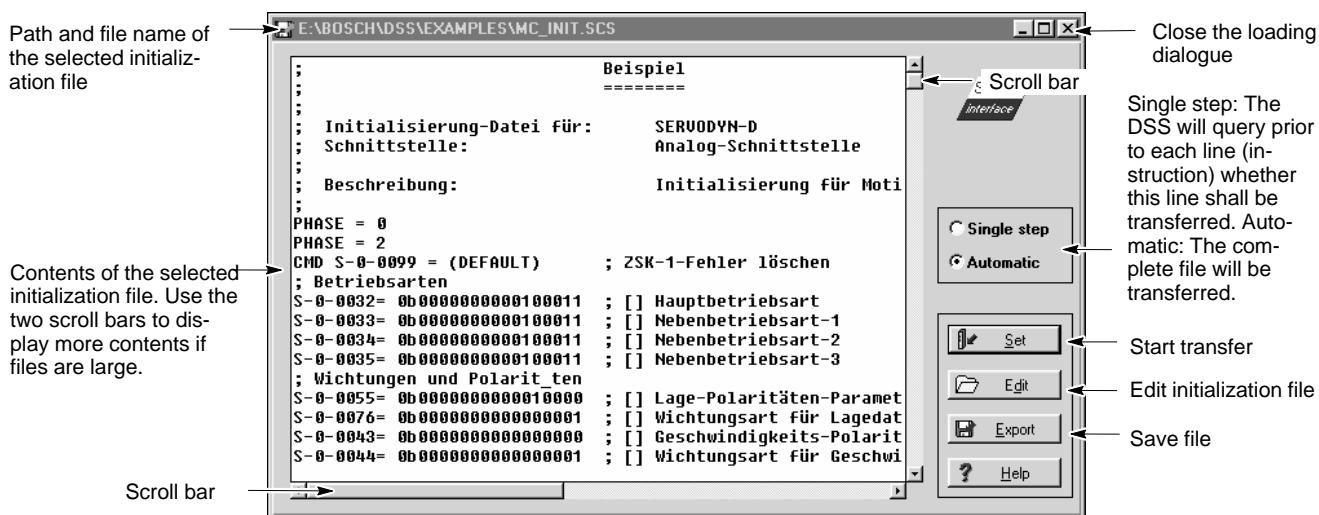
As a standard, the "mc_init.scs" file is stored in the "examples" subdirectory of the DSS software.

Make sure that the desired path to this directory is displayed below the "Directories:" heading.

Otherwise, you must change the directory :

1. Click on "1" (cf. Fig. above) and select the drive on which the DSS software has been installed. In field "2", the system shows the directory structure of the selected drive.
2. Double-click on the directory containing the DSS software in field "2". The system then displays the subdirectories of this directory and existing initialization files in field "3".
If there is not enough space to display all files in field "3", more files can be displayed using the scroll bar "4".
Click on "4" and hold down the left mouse button. Move the mouse pointer up or down. When the "mc_init.scs" initialization file appears in field "3", you may release the mouse button.
3. Click on the "mc_init.scs" initialization file in field "3". The DSS will now show its file name in the "File name" field.
4. Click on the "Ok" command button.

The loading dialogue will be started:



Loading dialogue (downloading file to drive)

- ★ Click on the "Export" command button.
Enter a new file name (that does not yet exist) in the "Save as" dialogue and click on "Ok".
This creates a copy of the "mc_init.scs" file. You will only use this copy as you proceed with commissioning.
- ★ Click on the "Set" command button.
"Automatic" active: the complete file displayed will be downloaded to the drive's RAM.
"Single step" active: The displayed file is downloaded to the drive's RAM line by line.
The drive will use this data for operation for the time being.
- ★ Close the loading dialogue (cf. Figure above, command button in upper right corner).

5.3 Starting the "Motion Control" software and jogging the drive



DANGER

The motor torque will become active from now on. In the event of malfunctions, the motor might accelerate without control.

- Make sure that there is no danger to man or machine before you continue commissioning the drive!
- Make sure that the Emergency-Stop button is within reach and can be operated quickly in the event of danger!

- ★ Turn the drive's power supply on and enable the drive.
- ★ Start the "Motion Control" software (cf. page 3-2).



DANGER

The digital interface will be deactivated! The drive no longer responds to PLC signals!

Make sure that the drive is not involved in an active production process within the system!

- ★ Initiate the "Unlock" command (cf. page 3-5).
For this purpose, both checkboxes in the "Unlock" dialogue must be checked ✓.
- ★ Select the "JOG" mode (cf. page 3-7).
In the "Feedrate" field, the "Cont." radio button must be active.



DANGER

Motor movement possible!

- Before jogging axes, you must make sure that there is no danger for man or machine!
- Make sure that the axis cannot be jogged beyond its maximum traversing range!

- ★ Jog the axis. For this purpose, **shortly** click on
Command button + : jogging in positive direction
Command button - : jogging in negative direction

The axis will traverse at positioning speed (S-0-0259 or S-0-0091) for as long as the corresponding command button is activated.

The current feedrate override will be active (for setting, refer to Section 3.2.5, page 3-10).

- ☞ **At the moment, the drive still uses the parameters of the copied model initialization file. Some parameters will have to be changed to adjust the drive to your application.**

5.4 Adjusting parameters

The currently active parameters of the copied model initialization file will have to be adjusted to your system features in the next step.

The contents of the initialization file are listed below. Sections not relevant for adjustment are marked by a slightly brighter text color. Please note that various groups (e.g. "Referencing") may be included several times: in such cases, the parameters of this group are initialized in different start-up phases of the drive (e.g. in phase 2 and phase 3).

```

;                               Beispiel
;                               =====
;
;   Initialisierung-Datei für:     SERVODYN-D
;   Schnittstelle:                 Analog-Schnittstelle
;
;   Beschreibung:                 Initialisierung für Motion Control
;
PHASE = 0
PHASE = 2
CMD S-0-0099 = (DEFAULT)         ; ZSK-1-Fehler löschen
; Modes of operation
S-0-0032= 0b0000000000100011   ; [] Primary Mode of Operation
S-0-0033= 0b0000000000100011   ; [] Secondary Operation Mode 1
S-0-0034= 0b0000000000100011   ; [] Secondary Operation Mode 2
S-0-0035= 0b0000000000100011   ; [] Secondary Operation Mode 3
; Scaling and polarities
S-0-0055= 0b000000000010000   ; [] Lage-Polaritäten-Parameter
S-0-0076= 0b0000000000000001   ; [] Position Data Scaling Method
S-0-0043= 0b0000000000000000   ; [] Geschwindigkeits-Polaritäten-Parameter
S-0-0044= 0b0000000000000001   ; [] Velocity Data Scaling Method
S-0-0160= 0b0000000000000001   ; [] Scaling Method for Acceleration Data
S-0-0086= 0b0000000000000010   ; [] Scaling Method for Torque-Force Data
S-0-0208= 0b0000000000000000   ; [] Wichtungsart für Temperaturdaten
; Telegramm
S-0-0016= ( )                   ; [] Konfigurations-Liste Antriebs-Telegramm
S-0-0024= ( )                   ; [] Konfigurations-Liste Master-Datentelegramm
; Signale
S-0-0026= ( )                   ; [] Konfigurations-Liste Signal-Statuswort
S-0-0027= ( )                   ; [] Konfigurations-Liste Signal-Steuerwort
; Drehzahlregler
S-0-0100= 100.0                 ; [] Drehzahlregler-Proportionalverstärkung
S-0-0101= 10.3                  ; [ms] Drehzahlregler-Nachstellzeit
P-0-0013= 250.0                 ; [] Istwertglättungsintervall-Drehzahlregler
; Stromregler
;S-0-0106= 252.66                ; [] Stromregler-Proportionalverstärkung-1
;S-0-0107= 1991                 ; [us] Stromregler-Nachstellzeit-1
;S-0-0115= 0b0000000000000000   ; [] Lagegeberart-Parameter
;S-0-0120= 1991                 ; [us] Stromregler-Nachstellzeit-2
; Stromsollwertfilter
P-0-0120= (0,0,0,0)            ; [] Stromsollwertfilter: Auswahl Filtertyp
P-0-0121= (2000.0,2000.0,2000.0,2000.0); [Hz] Stromsollwertfilter: Grenzfrequenz Tiefpaß
P-0-0122= (1.0,1.0,1.0,1.0)    ; [] Stromsollwertfilter: Güte Bandsperre
P-0-0123= (2000.0,2000.0,2000.0,2000.0); [Hz] Stromsollwertfilter: Mittenfrequenz Bandsperre
; Geber
S-0-0117= 2048                  ; [Strichzahl/Vorschubspindelumdrehung] Rotationsgeber-2
Auflösung(ext. Geber)
S-0-0256= 4                     ; [] Vervielfachung-1
S-0-0257= 1                     ; [] Vervielfachung-2
; Encodersimulation
P-0-0110= 0b0000000000000001   ; [] Encodersimulation: Steuerwort
P-0-0111= 1000                  ; [Strichzahl/Motorumdrehung] Encodersimulation: Strichzahl
P-0-0113= 0                     ; [Impulse] Encodersimulation: Nullpunktposition
P-0-0114= 0                     ; [Impulse] Encodersimulation: Nullpunktversatz
P-0-0118= 200                   ; [kHz] Encodersimulation: Maximalfrequenz der Übertragung
; Mechanics
S-0-0121= 1                     ; [Eingangsumdrehung] Lastgetriebe-Eingangsumdrehungen
S-0-0122= 1                     ; [Ausgangsumdrehung] Lastgetriebe-Ausgangsumdrehungen
S-0-0123= 1.0000                ; [mm/Udr] Vorschubkonstante

```

```

; Referencing
S-0-0147= 0b0000000010000100 ; [] Referencing Parameter
;S-0-0165= 0 ; [] Abstandskodiertes Referenzmaß-1
; Bremsen
P-0-0004= 0b0000000000000000 ; [] Art der Stillsetzung bei Antrieb-Aus
P-0-0125= 0b0000000000000000 ; [] Steuerwort ext. Freigabe
P-0-0505= 0 ; [ms] Freigabeverzögerung KSB
; Limit values
P-0-0027= 100.0 ; [%] Bremsstrombegrenzung
;S-0-0200= 75.0 ; [°C] Verstärker-Warntemperatur
;S-0-0201= 145.0 ; [°C] Motor-Warntemperatur
; ADC-Abgleich
;P-0-0103= 30.000000 ; [m/min ] ADC-Abgleich: Maximaldrehzahl
P-0-0105= 1.00 ; [] ADC-Abgleich: Skalierfaktor
P-0-0106= 0b0000000000000000 ; [] ADC-Abgleich: Steuerparameter Skalierung
P-0-0107= 0.06 ; [ms] ADC-Abgleich: Filterzeit
; DAC-Ausgabe
;P-0-2010= (S-0-0036,S-0-0040,S-0-0080,S-0-0084); [] DAC-Kanäle: Konfigurations-Liste
;P-0-2012= (5.000000,0.000000); [m/min ] DAC-Kanal 1: Maximalwert, Offset
;P-0-2013= (0.001000,0.000000); [m/min ] DAC-Kanal 2: Maximalwert, Offset
;P-0-2014= (1.00,0.00) ; [Nm ] DAC-Kanal 3: Maximalwert, Offset
;P-0-2015= (1.00,0.00) ; [Nm ] DAC-Kanal 4: Maximalwert, Offset
; ADC-Kanäle
;P-0-2016= ( ) ; [] ADC-Kanäle: Konfigurations-Liste
;P-0-2017= (0,0) ; [] ADC-Kanal 1: Maximalwert, Offset
;P-0-2018= (0,0) ; [] ADC-Kanal 2: Maximalwert, Offset
; MC-Parameter
S-0-0432= (Achse MC-1) ; [] Achsbezeichnung
P-0-2203= 0 ; [] MC-Satzanwahl
; Sonstiges
S-0-0265= 0 ; [] Sprachumschaltung
P-0-0001= 8000 ; [Hz] Schaltfrequenz der Leistungsendstufe

PHASE = 3
; Referencing
P-0-0031= 0 ; [Umdrehung] Absolutmaß Umdrehung Offset-1
S-0-0041= 1.994018 ; [m/min ] Referencing Velocity
S-0-0042= 2.517700 ; [m/s2 ] Referencing Acceleration
S-0-0052= 1.0000000 ; [m ] Referenzmaß Lage-Istwert 1
;S-0-0054= 0.0000000 ; [m ] Referenzmaß Lage-Istwert 2
;S-0-0150= 0.0000000 ; [m ] Referenzmaß Offset-1
;S-0-0151= 0.0000000 ; [m ] Referenzmaß Offset-2
;S-0-0177= 0.0000000 ; [m ] Absolutmaß Offset-1
;S-0-0178= 0.0000000 ; [m ] Absolutmaß Offset-2
; Limit values
S-0-0049= 1.56250000 ; [m ] Positive Position Limit Value
S-0-0050= -1.56250000 ; [m ] Negative Position Limit Value
S-0-0091= 6.480000 ; [m/min ] Bipolar Velocity Limit Value
S-0-0092= 3.99 ; [Nm ] Bipolar Torque Limit Value
S-0-0138= 99.999992 ; [m/s2 ] Bipolar Acceleration
; Position control
S-0-0104= 2.74 ; [(m/min)/mm] Position Loop KV-Factor (closed-loop control)
; Interpolation
;S-0-0103= 200.0000001 ; [m ] Modulowert
S-0-0057= 0.0001001 ; [m ] Position Window
S-0-0108= 100.00 ; [%] Feedrate Override
;S-0-0157= 0.014999 ; [m/min ] Geschwindigkeits-Fenster
S-0-0159= 300.0 ; [%] Monitoring Window
S-0-0259= 5.000000 ; [m/min ] Positioning Velocity
S-0-0260= 0.999992 ; [m/s2 ] Positioning Acceleration
S-0-0261= 0.0000096 ; [m ] Position Window grob
;S-0-0438= 4.998779 ; [m/min ] Tippsgeschwindigkeit (KONV/INCR Modus)
P-0-0500= 80.0 ; [%] Bewertung V-Vorsteuerung
; Sonstiges
;S-0-0206= 0 ; [ms] Wartezeit Antrieb Ein
;S-0-0207= 0 ; [ms] Wartezeit Antrieb Aus
;S-0-0058= 0.0000000 ; [m ] Umkehrspiel

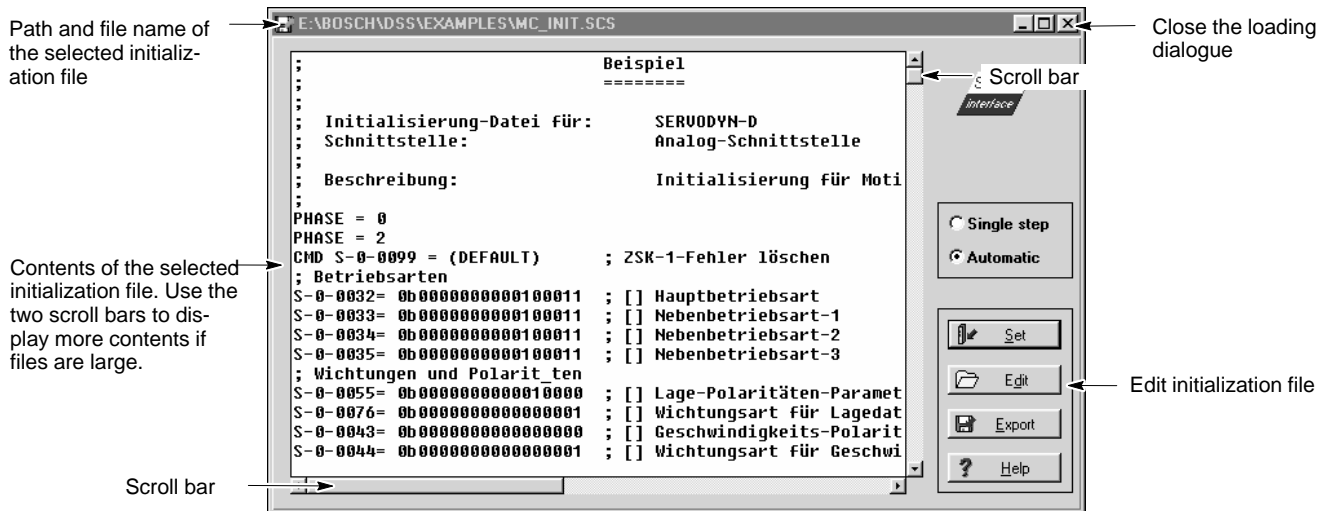
PHASE = 4

```

5.4.1 Editing the parameters of the initialization file

- ★ Select the **copied initialization file** (in this case: "mc_init1.scs"). The selection procedure is described in Section 5.2, pp. 5-2 ff., for the "mc_init.scs" file.

The loading dialogue will be started:



Loading dialogue (edit file)

- ★ Click on the "Edit" command button. The file is now opened for editing.

In the following paragraphs, you will find a description of important groups and their possible settings.

Every paragraph first lists the parameters to be set and the default values assigned to these parameters.

Then, you will find the parameter changes necessary for some alternative settings.

- ☞ **For a description of all parameters and their possible settings, please refer to the "Servodyn-D parameter description" manual.**

5.4.2 Setting the mode

Default:
Motion Control

```

; Modes of operation
S-0-0032= 0b0000000000100011 ; [] Primary Mode of Operation
S-0-0033= 0b0000000000100011 ; [] Secondary Operation Mode 1
S-0-0034= 0b0000000000100011 ; [] Secondary Operation Mode 2
S-0-0035= 0b0000000000100011 ; [] Secondary Operation Mode 3
    
```

5.4.3 Setting the data reference

Default:


referred to motor shaft, translatory scaling

```
; Scaling and polarities
S-0-0076= 0b00000000000000001 ; [] Position Data Scaling Method
S-0-0044= 0b00000000000000001 ; [] Velocity Data Scaling Method
S-0-0160= 0b00000000000000001 ; [] Scaling Method for Acceleration Data
S-0-0086= 0b0000000000000010 ; [] Scaling Method for Torque-Force Data
```

Alternative:

referred to load (geared drive), translatory scaling

```
; Scaling and polarities
S-0-0076= 0b00000000000000001 ; [] Position Data Scaling Method
S-0-0044= 0b0000000001000001 ; [] Velocity Data Scaling Method
S-0-0160= 0b0000000001000001 ; [] Scaling Method for Acceleration Data
S-0-0086= 0b0000000000000010 ; [] Scaling Method for Torque-Force Data
```

 For more setting options, refer to the individual parameter numbers described in the "Servodyn-D parameter description" manual.

5.4.4 Setting the mechanics (gearing, leadscrew pitch)

Default:

no gearing, leadscrew pitch: 1 mm/rev.

```
; Mechanics
S-0-0121= 1 ; [Input rpm] Input Revolutions of Load Gearing
S-0-0122= 1 ; [Output rpm] Output Revolutions of Load Gearing
S-0-0123= 1.0000 ; [mm/rev] Feed Constant
```

Please note the following for adjustment:

- only integers may be specified as input and output revolutions.
Example:
Ratio = 1 : 128,18 S-0-0121 = 50; S-0-0122 = 6409
- the data reference must be set "referred to load"

The necessary data must be obtained from your project manager or the mechanical department.

5.4.5 Setting correlations for referencing

Default:

Positive edge, clockwise rotation with view to the motor shaft.
Referencing using motor encoder. Reference cam signal at IN9.

```
; Referencing
S-0-0147= 0b0000000010000100 ; [] Referencing Parameter
```

Alternative:

Positive edge, counter-clockwise rotation with view to the motor shaft.
Otherwise as Default.


```
; Referencing
S-0-0147= 0b0000000010000101 ; [] Referencing Parameter
```

Alternative:
Negative edge, clockwise rotation with view to motor shaft.
Otherwise as Default.

```
; Referencing
S-0-0147= 0b0000000010000110 ; [] Referencing Parameter
```

Alternative:
Negative edge, counter-clockwise rotation with view to motor shaft.
Otherwise as Default.

```
; Referencing
S-0-0147= 0b0000000010000111 ; [] Referencing Parameter
```

 **For more correlations, refer to parameter S-0-0147 in the "Servodyn-D parameter description" manual.**

5.4.6 Other important application data

Default:

```
; Referencing
S-0-0041= 1.994018 ; [m/min ] Referencing Velocity
S-0-0042= 2.517700 ; [m/s2 ] Referencing Acceleration
S-0-0052= 1.0000000 ; [m ] Actual Position Feedback 1 - Reference Dimension

; Limit values
S-0-0049= 1.56250000 ; [m ] Positive Position Limit Value
S-0-0050= -1.56250000 ; [m ] Negative Position Limit Value
S-0-0091= 6.480000 ; [m/min ] Bipolar Velocity Limit Value
S-0-0092= 3.99 ; [Nm ] Bipolar Torque Limit Value
S-0-0138= 99.999992 ; [m/s2 ] Bipolar Acceleration

; Position control
S-0-0104= 2.74 ; [(m/min)/mm] Position Loop KV-Factor (closed-loop control)

; Interpolation
S-0-0057= 0.0001001 ; [m ] Position Window
S-0-0108= 100.00 ; [%] Feedrate Override
S-0-0159= 300.0 ; [%] Monitoring Window
S-0-0259= 5.000000 ; [m/min ] Positioning Velocity
S-0-0260= 0.999992 ; [m/s2 ] Positioning Acceleration
```

The necessary data must be obtained from your project manager or the mechanical department.

5.4.7 Saving parameters and downloading them to the drive

- ★ Click on the "Export" command button.
Click on "Ok".
The current file has been saved.
- ★ Click on the "Set" command button.
"Automatic" active: the complete file displayed will be downloaded to the drive's RAM.
"Single step" active: The displayed file is downloaded to the drive's RAM line by line.



Loading dialogue (saving and downloading file to drive)

Now the drive will use this data for operation.

- ★ Close the loading dialogue (cf. Figure above, command button in upper right corner).
- ☞ **Downloaded data will be lost by a RESET or when the drive is switched off!**
For saving the current RAM data permanently in the FEPRAM of the drive, please refer to Section 4.5 on page 4-16.
Before saving the data, you should first test the drive behavior with the new data.

5.5 Referencing the drive

☞ If the drive is equipped with an absolute encoder, the distance between the machine zero and the encoder zero must be entered as a parameter value in S-0-0177, "Absolute Dimension Offset 1" or in S-0-0178 "Absolute Dimension Offset 2".

The maximum encoder traversing range must cover the complete traversing range of the machine and must not be exceeded under any circumstances.

The following activities are not necessary if an absolute encoder is used.

For referencing the drive, the referencing parameters must have been adjusted to the current application and downloaded to the drive.

- ★ Select "REF" in the Mode field (cf. page 3-8).



DANGER

Motor movement possible!

Make sure that the axis movement does not pose any danger to man or machine!

-
- ★ Start the referencing process by clicking on the START button.

5.6 Defining and traversing to positions

☞ Positioning operation is not possible unless the drive has been referenced.

- ★ First define the necessary traversing blocks and download the movement file to the drive.
This procedure is described in Section 3.3, pp. 3-12 ff.

- ★ Select "AUTO" in the Mode field (cf. page 3-9).

- ★ Select the desired traversing block number (cf. page 3-9).



DANGER

Motor movement possible!

Make sure that the axis movement does not pose any danger to man or machine!

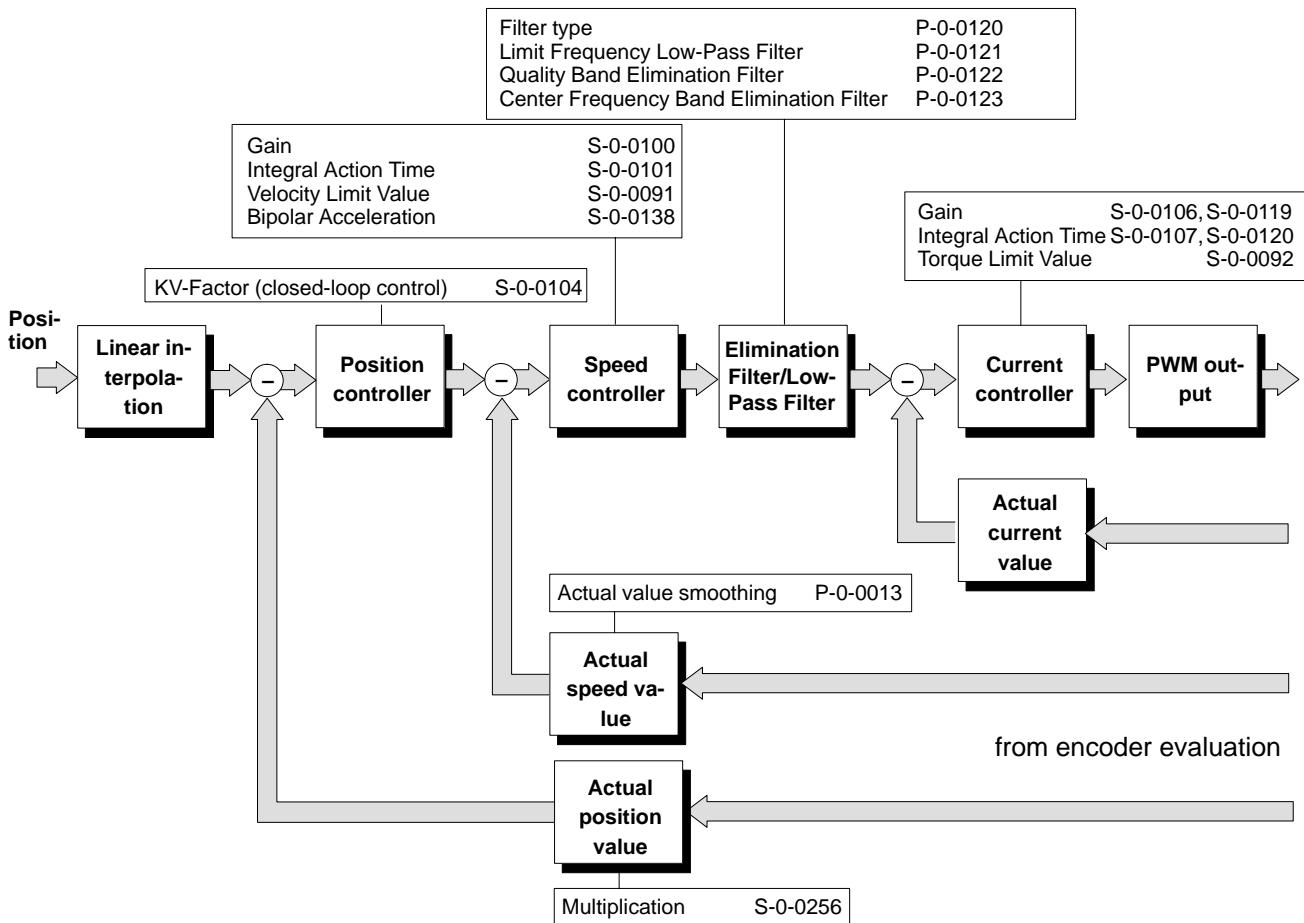
-
- ★ Start the traversing block by clicking on the START button.

5.7 Parameterization with the DSS monitor (optimization)

The DSS monitor offers direct access to all parameters stored in the drive via the parameter numbers. Thus, you may examine the effects of parameter changes without editing a complete initialization file and downloading it to the drive – an ideal feature for optimization tasks (e.g. for controller adjustments).

By combining several parameters in a "list" and saving this list as an *.scs file, any parameterization tasks can be adjusted extremely flexibly to your specific application. For example, it would be possible to save all parameters required for a certain drive function in a separate *.scs file and to transmit this file to the drive only when the corresponding function actually has to be activated.

The following block diagram offers you an overview of important parameters of the controlled variable:

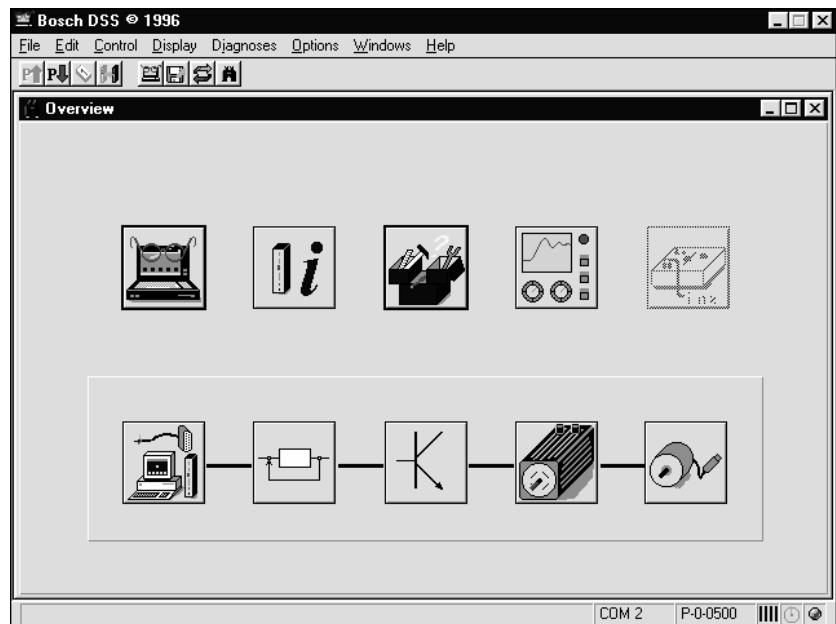


Block diagram of the controlled variable

facilitate initial commissioning, the parameters have been assigned to different subject areas (= groups) and can be called up in list format.

The following sections describe how to call up these lists, change parameters, and save them as files.

- ★ First bring the DSS basic image ("Overview" window) to the screen foreground with the DIAGNOSES ► OVERVIEW menu sequence:



DSS basic image ("Overview" window)

Use the following command buttons to call up the available lists:



Position, speed or current control



Amplifier




Motor

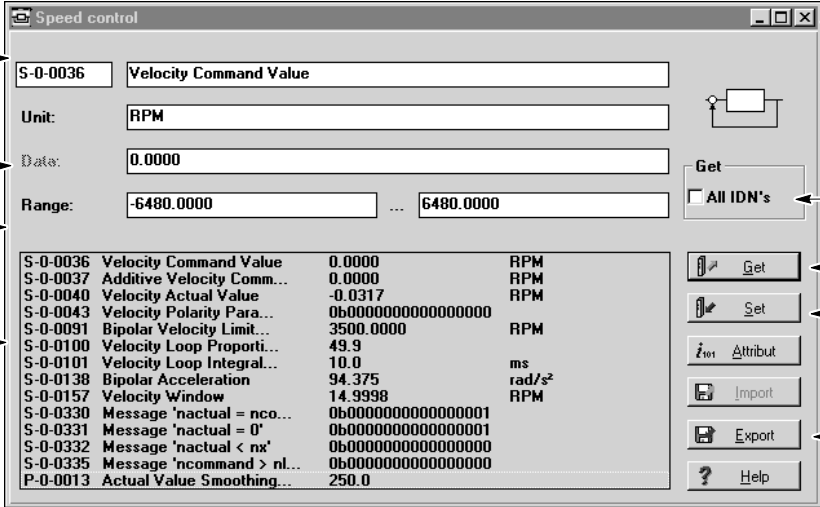


Encoder

5.7.1 Speed control

- ★ Click on the  command button in the DSS basic image and select "Speed control".

All parameters of the "Speed control" subject area will now be read into the DSS monitor:



Current parameter (number and name)

Current **changeable** parameter value. When the "Data" text appears dimmed, the data cannot be changed.

Input limits of the current parameter

List of all parameters of the subject area in ascending order. Double-click on one of the parameters to display its information in the upper fields.

Close the DSS monitor

If active: Clicking on "Get" command button will read **all** parameters of the list from the drive. Read current parameter from the drive

Transfer current parameter to the drive. Parameter change becomes immediately active.

Save all parameters in the list in a selectable *.scs file.


ID	Name	Value	Unit
S-0-0036	Velocity Command Value	0.0000	RPM
S-0-0037	Additive Velocity Comm...	0.0000	RPM
S-0-0040	Velocity Actual Value	-0.0317	RPM
S-0-0043	Velocity Polarity Para...	0b0000000000000000	
S-0-0091	Bipolar Velocity Limit...	3500.0000	RPM
S-0-0100	Velocity Loop Proporti...	49.9	
S-0-0101	Velocity Loop Integral...	10.0	ms
S-0-0138	Bipolar Acceleration	94.375	rad/s ²
S-0-0157	Velocity Window	14.9998	RPM
S-0-0330	Message 'nactual = nco...	0b0000000000000001	
S-0-0331	Message 'nactual = 0'	0b0000000000000001	
S-0-0332	Message 'nactual < nx'	0b0000000000000000	
S-0-0335	Message 'ncommand > nl...	0b0000000000000000	
P-0-0013	Actual Value Smoothing...	250.0	

DSS monitor; "Speed control" group

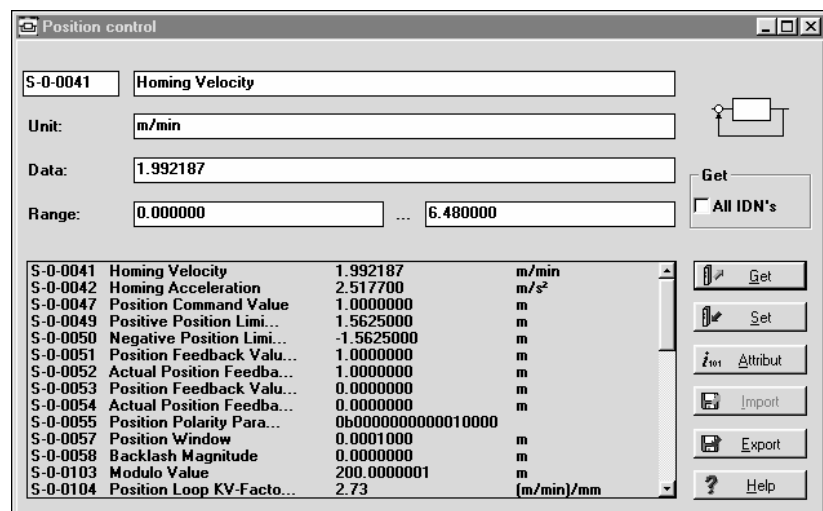
- ★ Changing parameters and transmitting them to the drive
 1. Double-click on the desired parameter in the list. The parameter is accepted to the upper fields as current parameter.
 2. Make sure that the "All IDN's" checkbox is not checked, and click on the "Get" command button. All information on the current parameter is read from the drive and displayed in the upper fields.
 3. Click on the "Data" input field and change the value according to your requirements. Please observe all specified input limits, if any. If the "Data" text appears dimmed, the parameter value cannot be changed.
 4. Switch the drive into a phase in which the current parameter can be changed. This information is contained in the "Changeable" field of the attributes bar for each parameter description in the "Servodyn-D parameter description" manual. Switching of phases is described in Section 4.4, page 4-15.
 5. Click on the "Set" command button. The current parameter is transferred to the drive's RAM where it becomes immediately active.
 6. If you wish to change several parameters and transfer them to the drive, repeat steps 1 through 5 for the appropriate number of times. Test the new settings for compliance with your requirements.

- ★ Saving current parameters in an *.scs file
 1. When all parameters have been set to meet your requirements, click on the "Export" command button and enter a file name. All parameters contained in the list will be saved in this file.
Specifying an **existing file** will **destroy all** contents of the old file.
 2. To transfer the file to the drive, please refer to Section 5.2, page 5-2 ff., where you will find a description of how to proceed for the "mc_init.scs" file.
The same applies analogously for all other "*.scs" files.

5.7.2 Position control

- ★ Click on the  command button in the DSS basic image and select "Position control".


All parameters of the "Position control" subject area will now be read into the DSS monitor:



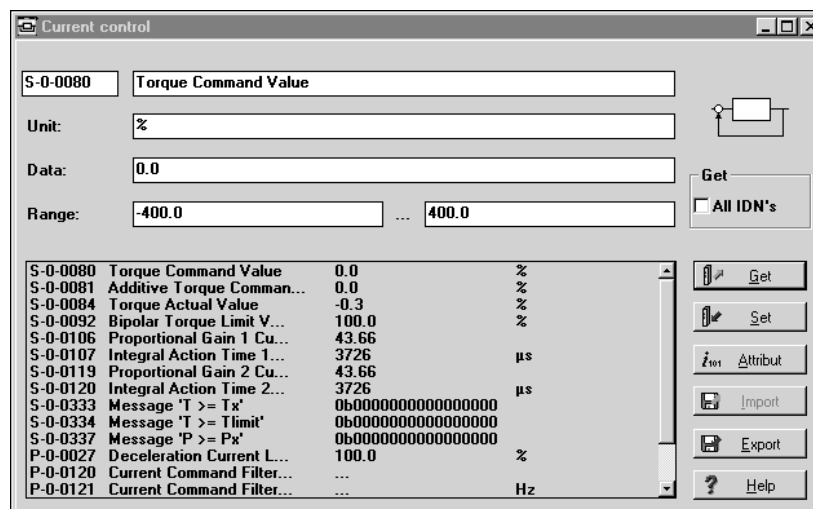
DSS monitor; "Position control" group

The procedure for changing and saving parameters is the same as described in Section 5.7.1 above.

5.7.3 Current control

- ★ Click on the  command button in the DSS basic image and select "Current control".


All parameters of the "Current control" subject area will now be read into the DSS monitor:



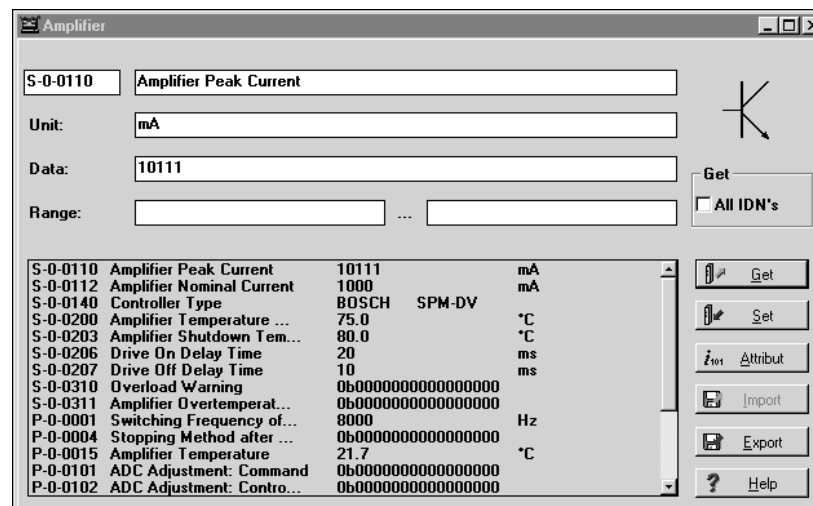
DSS monitor; "Current control" group

The procedure for changing and saving parameters is the same as described in Section 5.7.1 above.

5.7.4 Amplifier

- ★ Click on the  command button in the DSS basic image.


All parameters of the "Amplifier" subject area will now be read into the DSS monitor:



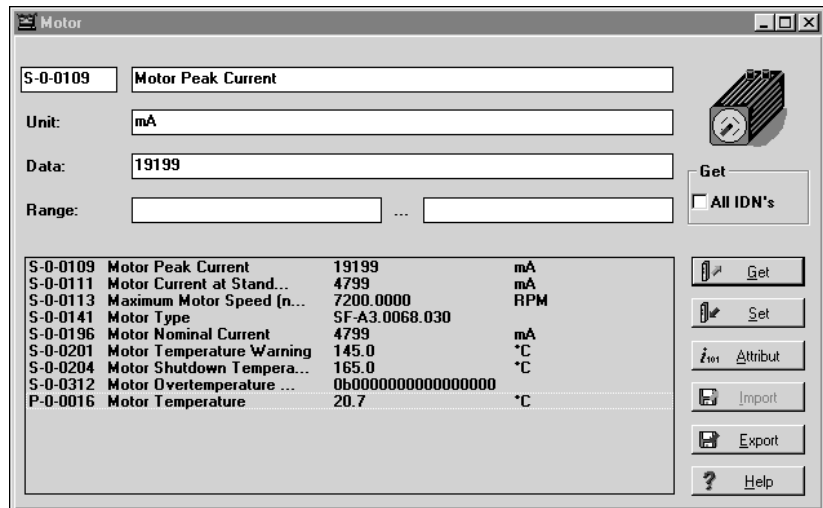
DSS monitor; "Amplifier" group

The procedure for changing and saving parameters is the same as described in Section 5.7.1 above.

5.7.5 Motor

- ★ Click on the  command button in the DSS basic image.


All parameters of the "Motor" subject area will now be read into the DSS monitor:



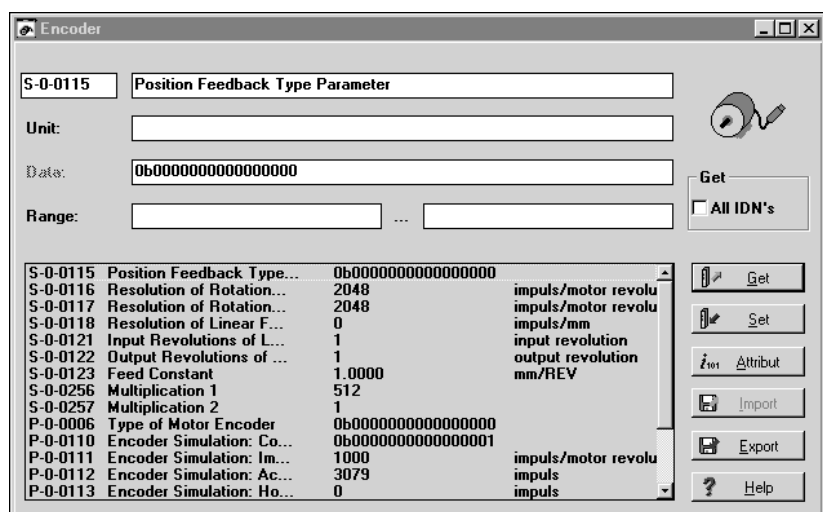
DSS monitor; "Motor" group

The procedure for changing and saving parameters is the same as described in Section 5.7.1 above.

5.7.6 Encoder

- ★ Click on the  command button in the DSS basic image.

All parameters of the "Encoder" subject area will now be read into the DSS monitor:



DSS monitor; "Encoder" group

The procedure for changing and saving parameters is the same as described in Section 5.7.1 above.

5.8 Saving data (backup)

It is urgently recommended to backup all relevant data when the parameters for a drive have been set.

This data backup will be required to

- efficiently perform series commissioning
- restore a precisely defined drive status (e.g. after a parameter loss or hardware replacement)
- document all parameters used for a drive.

In the course of initial commissioning, all files required for data backup have already been generated. This will considerably reduce the time necessary for producing the backups.

- ★ Create a suitable directory structure on the hard disk drive of your PC to which you can copy all parameter files of the drive. For example, you could establish a hierarchy that adequately represents a system and its drives.
- ★ Copy the following files into the respective subdirectory:
 - the adjusted initialization file for the drive (cf. Section 5.4.7, pp. 5-10 ff),
 - all *.scs files created with the help of the DSS monitor (cf. Section 5.7, pp. 5-12 ff),
 - *.scs files in which you may have saved the parameters necessary for possible options.
 - the *.mct file containing the traversing blocks required for positioning mode (cf. Section 3.3, pp. 3-12 ff.).
- ★ Copy the complete directory structure including all files to a removable data carrier. Store this data carrier in a safe place.
- ★ Before exiting the "Motion Control" software, please note the information provided in Section 3.6, pp. 3-18 ff.

Initial commissioning is now complete.

6 Series commissioning

 **If your application involves drives with different settings, initial commissioning has to be performed separately for each setting.**

For series commissioning of a drive, the following steps have to be performed:

1. Download all relevant data saved in the course of initial commissioning of a certain drive on the PC (cf. Section 5.8, page 5-18) to the drive in question.
2. Perform command "Save main memory" (cf. Section 4.5, page 4-16).

6.1 Ensuring prerequisites

- ★ Note the safety instructions in the beginning of Section 4.
- ★ Make sure that all works described in Section 4.1 have been properly executed for the drives in question.
- ★ Connect the first drive to be commissioned to the PC. Please note the relevant information given in Section 4.2 (page 4-3).
- ★ Establish communication between the drive and the DSS using the information provided in Section 4.3 (page 4-4).

The system should now be in the following condition:

- 24V supply is switched on. The power supply is not yet switched on, the system has not been enabled.
 - H1 display at inverter module shows "0", "1", "2", "3", or "4".
 - The PC screen shows the DSS basic image ("Overview" window, cf. page 4-5).
- ★ Do not proceed to the next Section unless all these conditions are met.


6.2 Downloading files

- ★ Make sure that the files necessary for the drive currently connected to the DSS are available:
 - the adjusted initialization file for the drive (cf. Section 5.4.7, pp. 5–10 ff.),
 - all *.scs files created with the help of the DSS monitor (cf. Section 5.7, pp. 5–12 ff),
 - *.scs files in which you may have saved the parameters necessary for possible options.

- ★ Load the necessary files one by one to the drive. The files must be loaded in the same order as they have been created.


1. Select the desired initialization file

- menu items CONTROL ► LOAD FILE, or

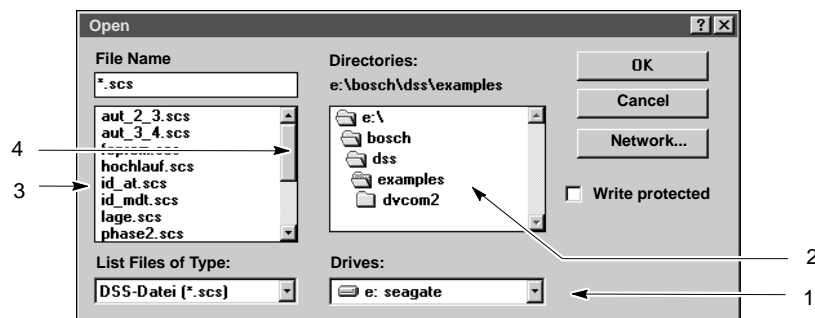
- click on  in the tool bar, or



↑ Load file

- click on the  command button and then select "Load file" (only possible if the DSS basic image is active).

The "Open" dialogue window will then be displayed:



"Open" dialogue (load file to drive)

Make sure that the desired path to the directory containing the relevant initialization file is displayed below the "Directories:" heading. The system automatically proposes the default directory (cf. Section 4.3.1, page 4–7).

Of course, you may change the proposed directory :

- Click on "1" (cf. Fig. above) and select the desired drive. In field "2", the system shows the directory structure of the selected drive.
- Double-click on the desired directory in field "2". The system then displays the subdirectories of this directory and existing initialization files in field "3".

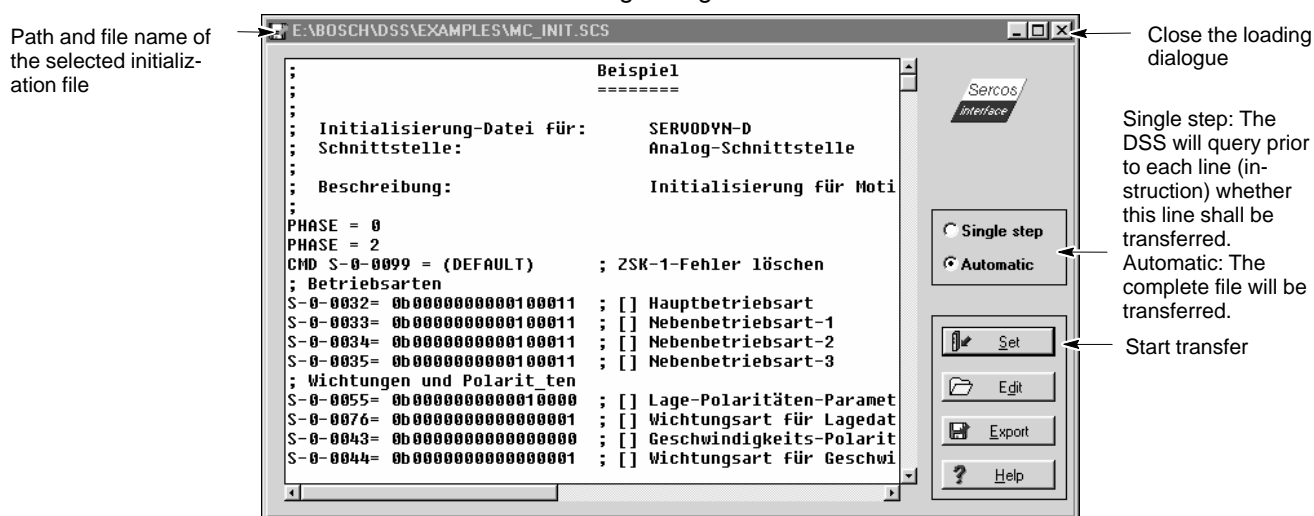
If there is not enough space to display all files in field "3", more files can be displayed using the scroll bar "4".

Click on "4" and hold down the left mouse button. Move the mouse pointer up or down. When the desired initialization file appears in field "3", you may release the mouse button.

- Repeat step b until the desired path is displayed below the "Directories:" heading.

- Click on the desired initialization file in field "3". The DSS will now show its file name in the "File name" field.
- Click on the "Ok" command button.

The loading dialogue will be started:



Loading dialogue (downloading file to drive)

2. Click on the "Set" command button.
 - "Automatic" active: the complete file displayed will be downloaded to the drive's RAM.
 - "Single step" active: The displayed file is downloaded to the drive's RAM line by line.

After transmission, H1 at the inverter displays the value "4". The drive will now use this data for operation.
3. Close the loading dialogue by clicking on the "X" in the upper right corner of the window's title bar.
4. Repeat steps 1 to 3 for all other necessary files.

⚠ If you activate RESET or switch off the drive, the loaded data will be lost! In this case, you have to:

- re-initialize the DSS (cf. page 4-14)
- re-load all necessary data.

5. Proceed to Section 6.3.

6.3 Save main memory

- ★ Initiate the "Save main memory" command:
 - menu items
 - CONTROL ► MAIN MEMORY ► SAVE

cf. also Section 4.5, page 4-16).

The current data is now permanently stored in drive's FEPRAM and will be loaded to the inverter RAM after power on or RESET.

- ★ If more drives are to be commissioned, proceed to Section 6.4.

6.4 Coupling the next drive

- ★ Remove the connection cable from X99 and connect it to X99 of the next module to be commissioned.
- ★ Initiate the "Initialize module type" command of the DSS:

- menu items
CONTROL ► RESET ► INIT. MODULE TYPE, or

- click on  in the tool bar.



↑ Init. module type

(cf. also Section 4.3.6, page 4-14).

- ★ Proceed to Section 6.2 (page 6-2).

7 Firmware update

Upon delivery, new drives are always equipped with the latest firmware version. A firmware update is not required.

For existing systems, a firmware update may be necessary in special cases. Your Bosch service will be pleased to assist you with information.



CAUTION

**The drive's FEPRM will be deleted by a firmware update!
Therefore, you should make sure that a backup of all relevant drive data is available before performing a firmware update!**

For a firmware update, please proceed in the sequence described in the paragraphs below.

7.1 Ensuring prerequisites

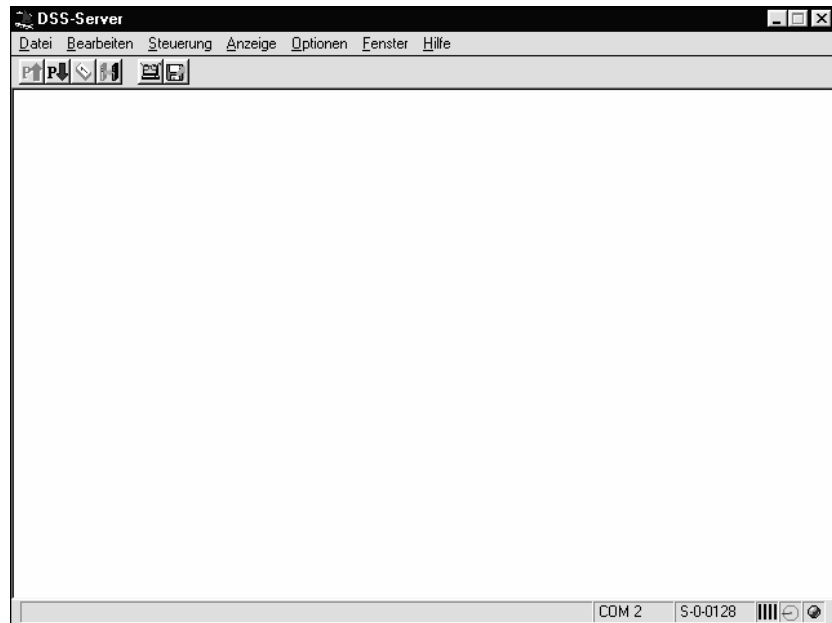
- ★ Connect the inverter in question to the PC. Please note the relevant information given in Section 4.2.
- ★ Establish communication between the inverter and the DSS using the information provided in Section 4.3.
- ★ Make sure that the floppy disk containing the new firmware is available. The floppy disk label shows the release number and date of the firmware. For checking the current firmware release of the drive, please refer to Section 8.1.
- ★ Make a working copy of the original floppy disk. For all further operations, you should only use this copy!

The system should now be in the following condition:

- 24V supply is switched on. The power supply is not yet switched on, the system has not been enabled.
 - H1 display at inverter module shows "0", "1", "2", "3", or "4".
 - The PC screen shows the DSS basic image ("Overview" window, cf. page 4-5).
- ★ Do not proceed to the next Section unless all these conditions are met.

7.2 Starting the DSS server and selecting the "Download" dialogue

- ★ Change the user group to "Bosch Service" (cf. Section 4.3.5, page 4-13) using the appropriate password.
When the correct password has been entered, the task bar of the PC operating system contains the "DSS-Server" command button.
- ★ Click on the "DSS-Server" command button. The basic image of the DSS server will be displayed:

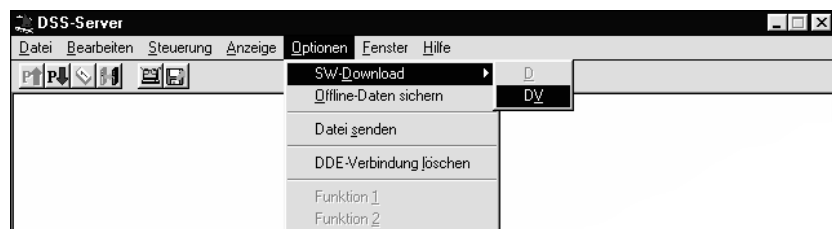


DSS server, basic image

☞ **Do not exit or close the DSS server manually!**

- ★ Select the "Download" dialogue:

menu items: **OPTIONS ► SW DOWNLOAD ► DV**

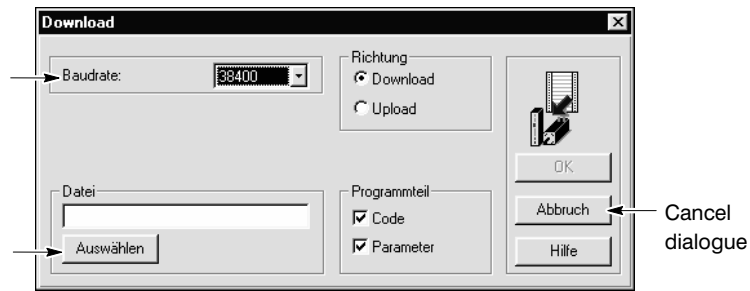


Selecting the "Download" dialogue

The "Download" dialogue will be displayed:

Transmission speed from/to drive. In the case of transmission problems, select the lower next value.

Click on the command button to select a file for the download.



"Download" dialogue

- ★ Make sure that the "Download" radio button is active in the "Direction"?? field.
- ★ Define the data to be transmitted in the checkboxes in the "Program part"?? field (cf. Figure above).

As a standard, both checkboxes are active:

"Code": transmission of firmware program

"Parameter": transmission of factory settings for parameters.

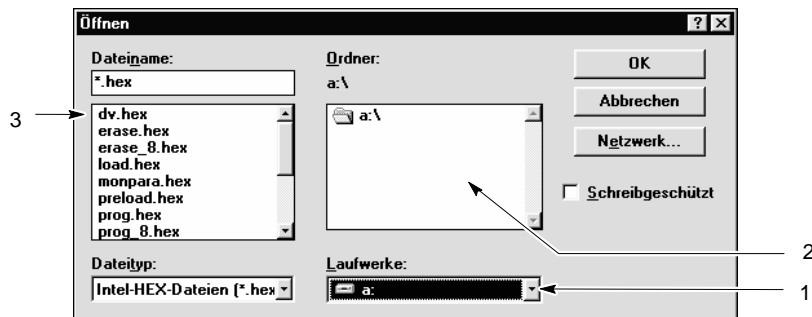
We recommend transmitting the factory settings for the parameters together with a new firmware release in order to avoid inconsistencies in the case of additional functions requiring new parameters.

At least the "Code" checkbox must be activated.

The "Ok" button cannot be activated unless a file has been selected for the download.

7.3 Selecting the file to be downloaded

- ★ Insert the floppy disk (working copy) containing the new firmware into drive "A:" of your PC.
- ★ Click on the "Select"?? button in the above Figure. The "Open" dialogue will be displayed:

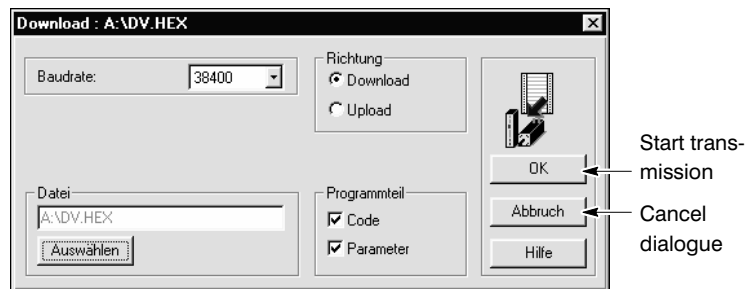


"Open" dialogue (firmware update)

- ★ Click on "1" (cf. Figure above) and select drive "a". In field "2", the system shows the directory structure of the selected drive.

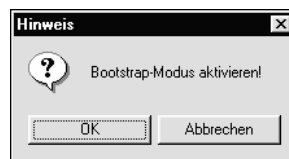
- ★ Click on the "dv.hex" file in field "3". The DSS then displays the name of this file in the "File name"?? area.
- ★ Click on the "Ok" button.
The "Open" dialog will be closed. The system returns to the "Download" dialogue and shows the path and name of the "dv.hex" file in the "File"?? area (cf. next Figure).

7.4 Starting the download



"Download" dialogue

- ★ Click on the "Ok" button.
The system then checks whether all hex files required for the download are available on the floppy disk. After this check, you will be prompted to activate the "Bootstrap mode"?? at the drive (cf. next Figure).
- ★ Activate the bootstrap mode at the drive (for this purpose, you need 2 pointed objects because the relevant keys can only be operated through openings in the front panel of the drive module):
 1. Press key below the two LED's (FG and FGI) **and hold it down**.
 2. Press RESET key (below X99) and release it again. Then, within 2 seconds:
 3. Release key below the two LED's (FG and FGI) and click on the "Ok" button in the dialogue on the screen.




"Bootstrap mode" dialogue

If the message "Bootstrap mode not active"?? is displayed, the required activities may not have been performed within the time-out span (2 seconds, cf. item 2).
In this case, confirm the message with "Ok" and repeat the procedure from item 1.

When the bootstrap mode has been successfully activated, the following processes will take place one by one inside the drive (depending on the checkbox settings in the "Program part"?? area, cf. "Download dialogue" Figure on page 7-3):

Clear code memory	Display on H1: "E."
Clear parameter memory	Display on H1: "E."
Program code memory	Display on H1: "P." ("." flashing)
Program parameter memory	Display on H1: "P." ("." flashing)

At the same time, the PC screen shows these processes and their execution progress.

 **While the memory is cleared and re-programmed, the supply voltages of the equipment in question and their connections must not be interrupted!**

★ When programming has been completed, you may verify the data. For this purpose, the system will open the "Check programmed data"?? dialogue.

- Click on the "Yes" command button.
While the data is being tested, only a point will flash on H1. The PC screen indicates the progress of this activity.
- If an error message is displayed, confirm the message with "Ok" and repeat the procedure from item 1.

★ When the system has returned to the "**Download**" dialogue, (display H1 is dark)

- click on the "Cancel" command button (Figure on page 7-1) and
- press the Reset key (below X99) or cycle 24V to the drive.

The drive will start up again.

7.5 Checking the firmware release and recover drive data

- ★ Click on the "Bosch-DSS" command button in the task bar of the operating system. The DSS basic image will be displayed on the screen.
- ★ Initiate the "Initialize module type" command with the menu sequence CONTROL ► RESET ► INIT. MODULE TYPE
- ★ Start the "Module configuration display" with the menu sequence DIAGNOSES ► MODULE CONFIGURATION and check whether the new firmware release number and date are displayed in the "Software" area.

If this is the case, the firmware update was performed successfully.

- ★ Load the required parameters back into the drive and save the main memory.
These processes are described in Sections 6.2 (pp. 6-2 ff) and 6.3 (pp. 6-3 ff) in connection with series commissioning.
The firmware update has now been completed.

8 Diagnoses

This Section describes the activities you may perform in the course of software commissioning with the help of the DSS software for diagnosis purposes or to obtain information on certain conditions of the connected drive. You may perform these activities at any time during initial commissioning.


8.1 Display drive configuration

You will be shown static information on:

- software version (firmware version)
- module and motor type
- current DSS operation mode
- application
- interface version, type and address

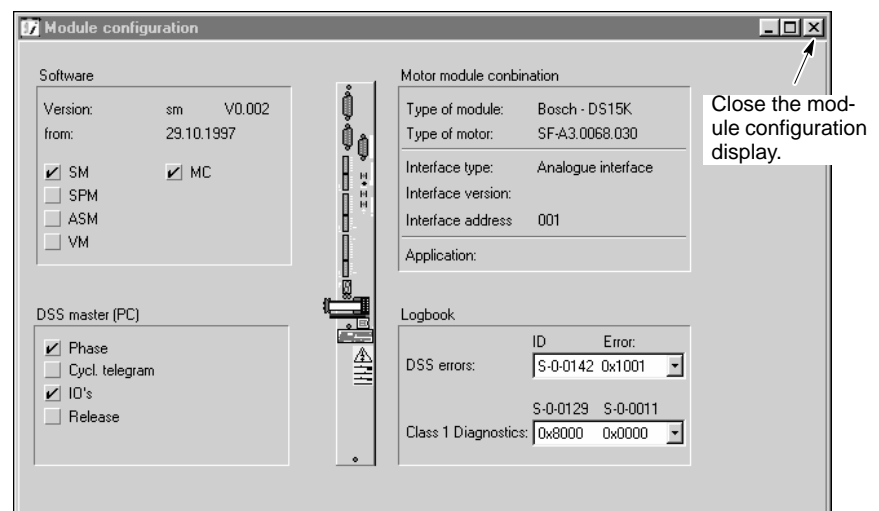
★ Start the "Module configuration" display

- menu items DIAGNOSES ► MODULE CONFIGURATION, or

- click on the  command button and then select "Module configuration" (only possible if the DSS basic image is active).

★ Do not perform any operations (mouse click, keyboard entry, etc.) before the module configuration display appears. The DSS will only read the necessary information from the drive when the module configuration display is called up.

It may take approx. 15 seconds for the display to appear:



Module configuration display


8.2 Displaying logbooks

Logbooks comprise a maximum of 16 entries each containing information on

- errors in the communication between the drive and the DSS (DSS errors), and
- errors of class 1 diagnostics (class 1 errors).

DSS errors are always shown by their parameter number (where the error has occurred) including an appropriate error code (for a description of error codes, refer to "Diagnostics Servodyn-D" manual).

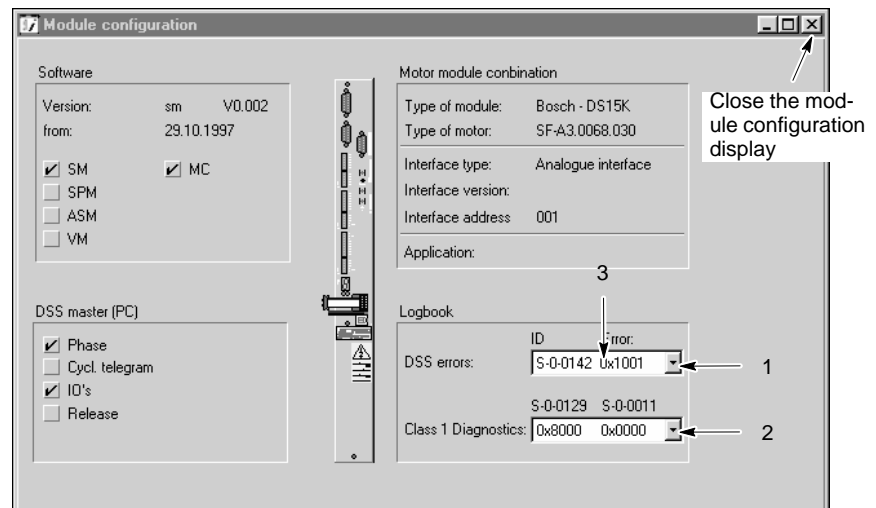
For **errors of class 1 diagnostics**, the contents of parameters S-0-0129 (Manufacturer Class 1 Diagnostics) and S-0-0011 (Class 1 Diagnostics) will be output in hexadecimal format. Every high bit is assigned a certain error (for error coding, refer to "Servodyn-D parameter description" manual).

- ★ Start the "Module configuration" display
 - menu items DIAGNOSES ► MODULE CONFIGURATION, or
 - click on the  command button and then select "Module configuration" (only possible if the DSS basic image is active).
- ★ Do not perform any operations (mouse click, keyboard entry, etc.) before the module configuration display appears. It may take approx. 15 seconds for the display to appear.

Then, the DSS offers you read access to the parameters

- P-0-0482 Error memory: DSS service channel errors, and
- P-0-0483 Error memory: Class 1 Diagnostics

in the "Logbook" listbox group and displays the latest new entry.



Logbooks

- To display previous **DSS errors** click on "1".
- To display **DSS errors in plain text** click on "3" and then press the F1 function key.
- To display previous **Class 1 Diagnostics errors** click on "2".

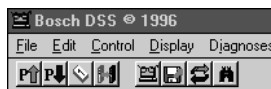
8.3 Resetting errors (class 1)

If errors of class 1 diagnostics have occurred, the drive will be interlocked (optimum shut-down with subsequent torque removal).

To enable the drive again, proceed as follows:

- ★ Open the logbook for class 1 errors (cf. Section 8.2) which contains a list of codes of the pending errors.
- ★ Locate the cause of the error and eliminate all errors.
- ★ Initiate the "Reset class 1 error" command:
 - menu items
CONTROL ► RESET ► RESET CLASS 1 ERROR, or

- click on  in the tool bar.




Reset class 1 error

8.4 Displaying the drive status

The display will show dynamic information on

- drive status: diagnostics message in plain text
- values of max. 4 parameters (e.g. actual values)
- status of the MC status word (OUTx)
- status of "Drive ON", "Drive enable", and "Drive start"
- current operation mode
- changes in "Class 1 Diagnostics" to "Class 3 Diagnostics" parameters (S-0-0011 to S-0-0013)

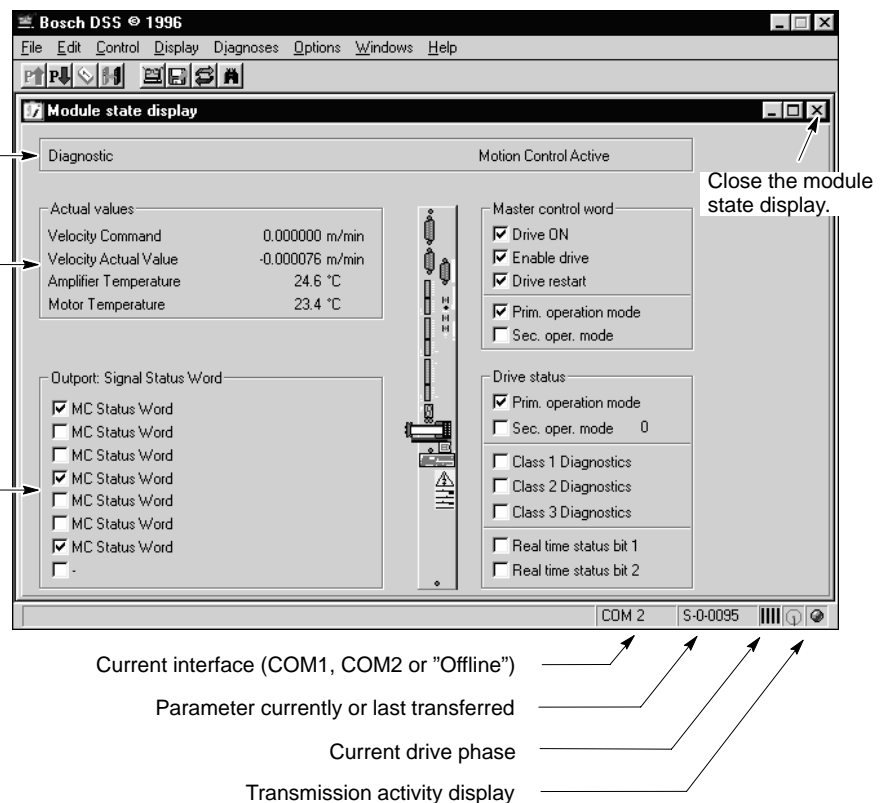
The DSS continuously updates the data display. For type and frequency of updating, refer to Section 4.3.4, page 4-11.

- ★ Start the "Module state display"
 - menu items DIAGNOSES ► MODULE STATE DISPLAY, or
 - click on the  command button and then select "Module state display" (only possible if the DSS basic image is active).

Drive status in plain text as per S-0-0095.

Display of max. 4 parameters. For configuration, cf. Section 4.3.4, page 4-11.

Display of the MC status word




Module state display

The DSS status line at the lower screen edge is displayed independent of the I/O display.

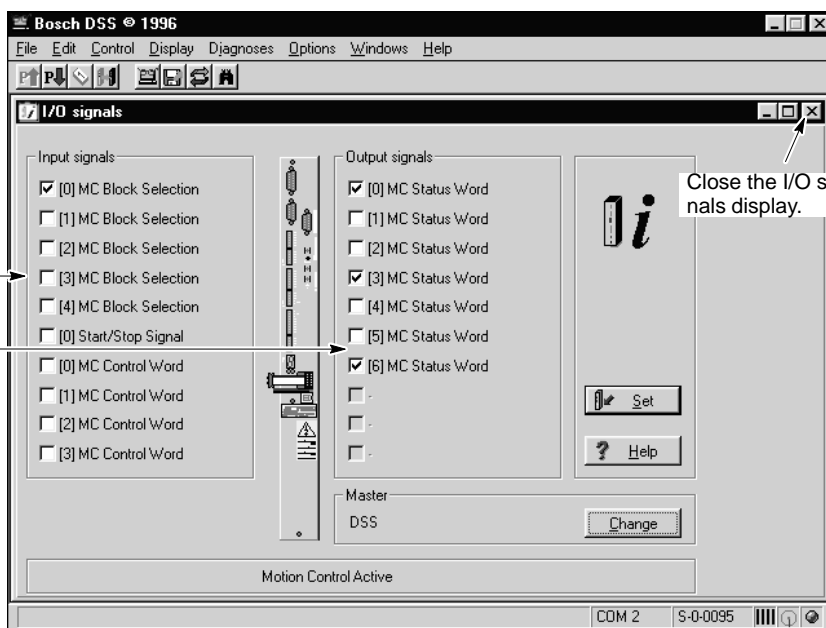
8.5 Displaying I/O signals

The DSS shows you the current status of the digital inputs and outputs. The DSS continuously updates the data display. For type and frequency of updating, refer to Section 4.3.4, page 4-11.

- ★ Start the "I/O signals" display
 - menu items DIAGNOSES ► I/O SIGNALS, or
 - click on the  command button and then select "I/O signals" (only possible if the DSS basic image is active).

Display of all input signals.
A HIGH level is indicated by the "H" character in the checkbox.
Dimmed checkboxes have no function.

Display of all output signals.
A HIGH level is indicated by the "H" character in the checkbox.
Dimmed checkboxes have no function.



Close the I/O signals display.

- Current interface (COM1, COM2 or "Offline")
- Parameter currently or last transferred
- Current drive phase
- Transmission activity display

I/O signal display

The DSS status line at the lower screen edge is displayed independent of the I/O signals display.

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