

*Servodyn-D*

# Servodyn-D with CANrho interface Commissioning with DSS



Edition

# 101



**BOSCH**  
Automation

*Servodyn-D*

# **Servodyn-D with CANrho interface Commissioning with DSS**

1070 066 037-101 (00.02) GB



© 2000

by Robert Bosch GmbH, Erbach, Germany  
All rights reserved, including applications for protective rights.  
Reproduction or distribution by any means subject to our prior written permission.

Discretionary charge DM 10.—

# Contents

|          | Page  |
|----------|---|
| <b>1</b> | <b>Safety Instructions . . . . . 1–1</b>                                  |
| 1.1      | Proper use . . . . . 1–1  |
| 1.2      | Qualified personnel . . . . . 1–2   |
| 1.3      | Safety markings on products . . . . . 1–3                                 |
| 1.4      | Safety instructions in this manual . . . . . 1–4                          |
| 1.5      | Safety instructions concerning the product described . . . . . 1–5        |
| 1.6      | Documentation, software release and trademarks . . . . . 1–7              |
| <b>2</b> | <b>Prerequisites for Commissioning . . . . . 2–1</b>                      |
| 2.1      | Checking the hardware . . . . . 2–2                                       |
| 2.2      | Configuring the CAN interfaces at the drive . . . . . 2–4                 |
| 2.3      | Establishing communication between the drive and DSS . . . . . 2–5        |
| 2.4      | Establishing communication between rho and the drives . . . . . 2–8       |
| <b>3</b> | <b>DSS user interface . . . . . 3–1</b>                                   |
| 3.1      | DSS basic image . . . . . 3–1   |
| 3.2      | DSS monitor . . . . . 3–3   |
| 3.3      | Selecting the language . . . . . 3–5                                      |
| 3.4      | Changing the user group (password) . . . . . 3–7                          |
| 3.5      | Important drive commands . . . . . 3–8                                    |
| 3.5.1    | Changing phases . . . . . 3–8   |
| 3.5.2    | Save main memory . . . . . 3–9  |
| 3.5.3    | Load main memory . . . . . 3–10   |
| 3.5.4    | Resetting errors (class 1) . . . . . 3–10                                 |
| <b>4</b> | <b>Initial commissioning . . . . . 4–1</b>                                |
| 4.1      | Creating a template file . . . . . 4–1                                    |
| 4.2      | Parameterizing the drive . . . . . 4–4                                    |
| 4.2.1    | Operating frequency of the power output stage . . . . . 4–5               |
| 4.2.2    | Main operating mode . . . . . 4–5   |
| 4.2.3    | Limit values . . . . . 4–6  |
| 4.2.4    | Behavior after "Drive off" or a fault . . . . . 4–7                       |
| 4.2.5    | Behavior after removal of the external drive enable signal: . . . . . 4–7 |
| 4.2.6    | Holding brake . . . . . 4–7   |
| 4.2.7    | Plug braking . . . . . 4–8  |
| 4.2.8    | Digital inputs and outputs (IN x, OUT x) . . . . . 4–8                    |
| 4.2.9    | Torque monitoring . . . . . 4–10  |
| 4.2.10   | Torque reduction via digital input signals . . . . . 4–11                 |
| 4.2.11   | Torque reduction via rho4 (automatic/manual mode) . . . . . 4–12          |
| 4.2.12   | Option OM4: Analog outputs . . . . . 4–13                                 |
| 4.3      | Optimizing the drive controller . . . . . 4–14                            |
| 4.3.1    | Optimization steps . . . . . 4–15   |
| 4.3.2    | DSS tools . . . . . 4–17  |
| 4.3.3    | Specifying setpoints . . . . . 4–19                                       |
| 4.4      | Save all parameter settings (data backup) . . . . . 4–20                  |
| 4.5      | Transmitting the parameters to the rho . . . . . 4–21                     |
| 4.6      | Editing *.scs files . . . . . 4–22  |

|          |  |            |
|----------|--|------------|
| <b>5</b> | <b>Series commissioning</b> .....                            | <b>5-1</b> |
| <b>6</b> | <b>Diagnoses</b> .....                                       | <b>6-1</b> |
| 6.1      | Drive configuration .....                                    | 6-1        |
| 6.2      | Drive status display .....                                   | 6-2        |
| 6.3      | Displaying I/O signals .....                                 | 6-4        |
| 6.4      | Displaying cyclic telegrams .....                            | 6-5        |
| 6.5      | Separate window for cyclic display .....                     | 6-6        |
| 6.6      | Reading parameter values into the template file .....        | 6-7        |
| <b>A</b> | <b>Appendix</b> .....  | <b>A-1</b> |
| A.1      | Pin assignment of the CAN interface at the drive (X51) ..... | A-1        |
| A.2      | Pin and terminal assignment of the T adapters .....          | A-1        |
| A.3      | CAN bus wiring: rho3 and 1 CAN bus .....                     | A-2        |
| A.4      | CAN bus wiring: rho3 and 2 CAN buses .....                   | A-3        |
| A.5      | CAN bus wiring: rho4 .....                                   | A-4        |
| A.6      | Index .....  | A-5        |

# 1 Safety Instructions


Please read this manual before commissioning the Servodyn-D drives with CANrho interface. Store this manual in a place to which all users have access at any time.

## 1.1 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 Directives (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 (emission class A), i.e.
  - no direct connection to public low-voltage power supply,
  - connection to the medium- or high-voltage system via a transformer.In residential environments, in trade and commerce as well as small enterprises class A equipment may only be used if it does not inadmissibly interfere with other equipment.

 **This is a class A device which may cause radio interference in residential environments. In this case, the operator may be required to take suitable countermeasures and to bear the cost of the same.**

Before putting the drive inverters into operation, ensure that the machine which the inverters are to be installed in meets the stipulations of the machinery directive (98/37/EEC, 98/79/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.

## 1.2 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**  
**60498 Frankfurt/Germany**

The present manual is designed for **drive technicians**. They need additional special knowledge on the rho3 or rho4.1 robot controls.

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 may result in serious bodily injury or material damage.

Only electrotechnicians as recognized under IEC 826-09-01 (modified) who are familiar with the contents of this manual may install and service the products described.

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.

With regard to the foregoing, 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.

### 1.3 Safety markings on products



Warning of dangerous electrical voltage!



Electrostatically sensitive components!



Lug for connecting PE conductor only!



Connection of shield conductor only

## 1.4 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 is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.

---



### **CAUTION**

This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

---

 This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.



## 1.5 Safety instructions concerning the product described

---

**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**

Danger for persons and equipment!  
Test every new program before starting up a system!

---

**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.

---

**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.

---

**DANGEROUS ELECTRICAL VOLTAGE**

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

Measuring or test activities on the live system are reserved to qualified electrical personnel!

---

**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!

**CAUTION**

Use only spare parts approved by Bosch!

**CAUTION**

**Danger to the module!**

**All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!**

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

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the 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 may come into 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 1 MΩ resistor.
- ESD-sensitive components may by no means come into 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.

## 1.6 Documentation, software release and trademarks

### Documentation

Overview of available manuals:

| Manuals  | Part no.                      |                               |                               |              |
|--|-------------------------------|-------------------------------|-------------------------------|--------------|
|  | German                        | English                       | French                        | Italian      |
| Configuration<br>– 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                  | –                             | –            |
| Interface conditions   | 1070 066 010                  | 1070 066 030                  | 1070 066 060                  | 1070 066 050 |
| Interface conditions<br>– Stand alone version                            | 1070 066 016                  | 1070 066 036                  | –                             | –            |
| Servodyn-D, all interfaces<br>Parameter manual                           | 1070 066 018                  | 1070 066 038                  | 1070 066 068                  | 1070 066 058 |
| Servodyn-D with SERCOS interface<br>– Parameter and commissioning manual | 1070 066 011                  | 1070 066 031                  | –                             | 1070 066 051 |
| Servodyn-D with analog interface<br>– Parameter description              | (replaced by<br>1070 066 018) | (replaced by<br>1070 066 038) | (replaced by<br>1070 066 068) | –            |
| Servodyn-D with analog interface<br>– Commissioning manual               | 1070 066 014                  | 1070 066 034                  | –                             | –            |
| Servodyn-D with CANrho interface<br>– Commissioning manual               | 1070 066 017                  | 1070 066 037                  | –                             | –            |
| Servodyn-D with motion control<br>– Commissioning manual                 | 1070 066 015                  | 1070 066 035                  | –                             | –            |
| Diagnostics, maintenance   | 1070 066 012                  | 1070 066 032                  | 1070 066 062                  | 1070 066 052 |
| Redundant safety monitoring RSU  | 1070 066 006                  | 1070 066 026                  | 1070 066 081                  | 1070 066 082 |
| 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 this manual the floppy disk drive is always drive A, the hard disk drive is always drive C:.**

Special keys or key combinations are shown enclosed in pointed brackets:

- Special keys: e.g. <Enter>, <PgUp>, <Del>
- Key combinations (pressed simultaneously): e.g. <Ctrl> + <PgUp>

### Release

 **The present manual applies to the following releases:**

**DM/DS software: 0.012**  
**DSS software: 1.01**  
**rho3 software: TO12A or higher**  
**rho4.1 software: all**

- The current inverter software release number can be viewed by selecting parameter S-0-0030 with the DSS-D Commissioning and Service System, or in the "Software" field of the module configuration display (DIAGNOSTICS ► MODULE CONFIGURATION).

- For the current DSS software release number, refer to HELP ► ABOUT ...
- The current VM software release can only be read from the 7-segment display during test operation. For this purpose, turn dip switch "T" on the VM's personality module "on".

The following appears in a running, flashing display:

**"Cxx.ZZ.ddmmyyyy"**

Where:    **xx**    = software release number  
          **ZZ**    = (internal)  
          **dd**    = software creation day  
          **mm**   = software creation month  
          **yyyy** = software creation year

## Modifications

Modifications in the present manual as compared to the previous edition are marked by black vertical bars in the margin.



This symbol is used in illustrations to call your attention to any modifications made.

## Trademarks

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

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.

MS-DOS® and Windows™ are registered trademarks of Microsoft Corporation.

## 2 Prerequisites for Commissioning

Drive inverters of the Servodyn-D series with CANrho interface are designed for connection to the rho3.0 or rho4.1 robot controls. The commissioning procedure comprises the following steps:

- parameterization of the CAN bus interface of the drive
- establishing communication between the DSS and the drive
- checking the telegram parameters in the drive and in rho and performing the necessary adjustment

 **Deactivate the parameter download from the rho to the drive!**

- connecting the drive to the CAN bus
- determining/optimizing all required drive parameter values
- transmission of drive parameter values to the rho machine parameter group 7xx; activating download from rho to drive

For parameter input and optimization in the drive, the DSS-D commissioning and diagnostics system has to be used.

The installation and operation of the DSS requires general knowledge of the Windows user interface (e.g. start/exit programs, open/save files, change program windows, etc.).

In the present manual, we suppose that this knowledge is available.




### 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!**
- **For systems comprising several drives, you should always optimize one drive at a time only.**
- **All motors have to be properly fastened.**

---

Our service department will be pleased to assist you with the commissioning. We may also train your personnel on request. For more information, please contact us (phone +49-(0)6062/78-0)

 **The description of all parameters, their mode of functioning and precise programming is included in the "Servodyn-D parameter description" manual. This description forms the basis of the present manual!**

**Since the drive and rho machine parameters have different numbering systems, you find the appropriate drive parameter for each rho parameter under "rho machine parameter" in the index of this description.**

## 2.1 Checking the hardware

- ★ First make sure that the system is switched off and de-energized.
- ★ Check the nameplates and the engineering documents for the proper inverter types and the correct motors installed.  
Do not continue the commissioning procedure unless the correct hardware has been completely installed!
- ★ Follow the instructions below step by step.

### Wiring



#### CAUTION

**Unless specified otherwise, never unplug or plug connectors/terminals on live systems!**

- ★ Check the complete wiring of the drive on the basis of the information provided in the "Servodyn-D interface conditions" manual and the "EMC manual" (including resistance measurement).
- ★ Remove all connectors/terminals including the CAN connector (X51) from all drive inverters.

### Power supply

- ★ Turn the 24 V supply on. Measure the voltage of the 24V supply at the connector.  
It must be between 20.8 ... 28.8 V.
- ★ Turn the power supply on and measure the voltage.  
It must be between 342 ... 510 V.
- ★ **Turn the power supply and the 24 V supply off.**  
Do not proceed unless all connectors/terminals are de-energized.
- ★ Plug in all connectors/terminals except the CAN connectors (X51) to the inverters. Check connectors for proper assignment.
- ☞ **Do not connect the CAN connectors except for the works described in section 2.4 and at the times indicated there in order to avoid an accidental data download to the drive.**
- ★ Turn the 24 V supply on.  
The 7-segment display at the inverter must display "0".  
**If error "F36" is displayed,**  
the 24V supply is outside the permissible tolerance, maybe because of a supply overload.  
For more information on other error messages, please refer to the diagnostics manual.
- ☞ **Additional information may be contained in drive parameter S-0-0095. Establish communication between the PC and the drive to display the parameter on the DSS monitor.**

### Plug braking of motors in the event of a power failure

- ★ Check logic for proper functioning according to planning engineer's data. 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 "Plug brake enable delay" must be disabled (=0) for this test. The contactor is driven by output "OUT4" of the inverter.
- ☞ **In order to avoid faults and overload, a relay must be connected in series.**

### Holding brake

- ★ Check holding brake for proper functioning if the motor is equipped with a holding brake. The holding brake is released when 24VDC are connected. The contactor is triggered by the "OUT3" output of the inverter.
- ☞ **In order to avoid faults and overload, a relay must be connected in series.**

### EMERGENCY-STOP circuit

- ★ Check for proper functioning according to planning 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.

## 2.2 Configuring the CAN interfaces at the drive

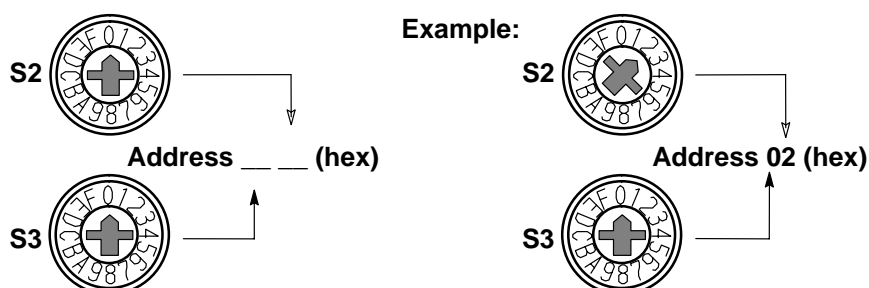
The following settings will not be effective unless the drives have been re-booted. Therefore, they should be made before proceeding with the commissioning process:

- CAN bus address
- CAN baud rate
- CAN mode

For pin assignments and wiring of the X51 CAN interface, please refer to the annex on page A-1 ff.

### Axis address

- ★ Rotary switches S2 and S3 on the individual inverters are used to set the axis address as a 2-digit hexadecimal value. Each axis address may appear only once on a CAN bus!



- ☞ The hexadecimal value set at these switches is entered as a decimal value under "CAN input" of rho machine parameter 401, thus defining the assignment between the inverter and the axes of the kinematics (cf. section 2.4).

### Baud rate

- ★ Set the desired baud rate on rotary switch S4.
  - rho3: 1000 kBaud (no other setting permitted)
  - rho4.1: admissible baud rates, depending on the length of the CAN bus:

| S4     | Baud rate  | CAN bus length |
|--------|------------|----------------|
| 0      | 1000 kBaud | 25 m           |
| 2      | 500 kBaud  | 100 m          |
| 3      | 250 kBaud  | 100 m          |
| 4      | 125 kBaud  | 100 m          |
| 9 to F | 1000 kBaud | 25 m           |

- ☞ In rho4, the baud rate is stored in machine parameter P30 (default value: 1000 kBaud).

### Mode

- ★ Set rotary switch S5 to the value "1".

| S5 | CAN mode |
|----|----------|
| 0  | CANopen  |
| 1  | CANrho   |



## 2.3 Establishing communication between the drive and DSS

### Connection between PC and drive

- ★ To avoid communication faults between the PC and the drive, please note the following:
  - We recommend using the pre-assembled Bosch connection cable, part no.: 1070 077 753, length 5 m
  - Distance between connection cable – power cables: at least 20 cm.
  - Do not permit inductive or capacitive coupling with live components.

☞ **If communication faults still occur, an annular core on the connection lead may be helpful. Use the folding ferrite coil, part no. 1070 918 766.**

- ★ Connect COM1 or COM2 of the PC to X99 of the first inverter in the drive chain and record the PC port used.

Cannon connector, 9-pole.

Type: RS-232

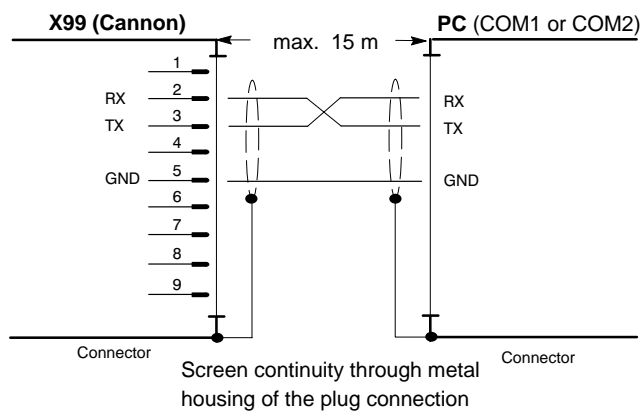
Cable length: max. 15 m

Cable type: screened, min. core cross-section 0.14 mm<sup>2</sup>

Transmission rate: 9600 bps

Parameters: even parity, 8 data bits, 2 stop bits

Handshake: software handshake (X<sub>ON</sub>, X<sub>OFF</sub>)



Assignment:

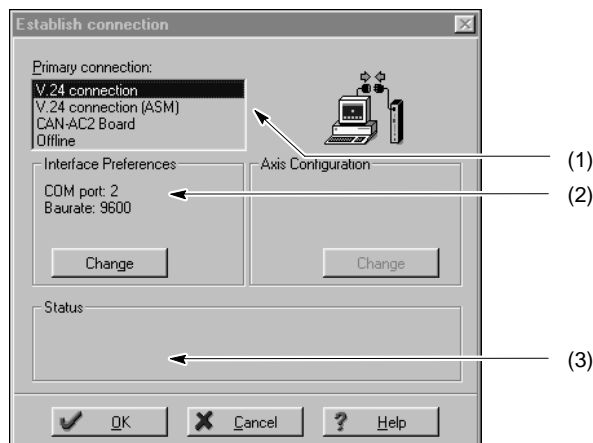
RX Receive Data

TX Transmit Data; data transmission to DSS

GND Signal Ground

## Configuring the interface

- ★ Switch on the 24V supply of the system.
- ★ Switch on the PC. Wait until the operating system has been fully booted and start the "DSS" commissioning and service system. The "Establish connection" dialog is automatically displayed:

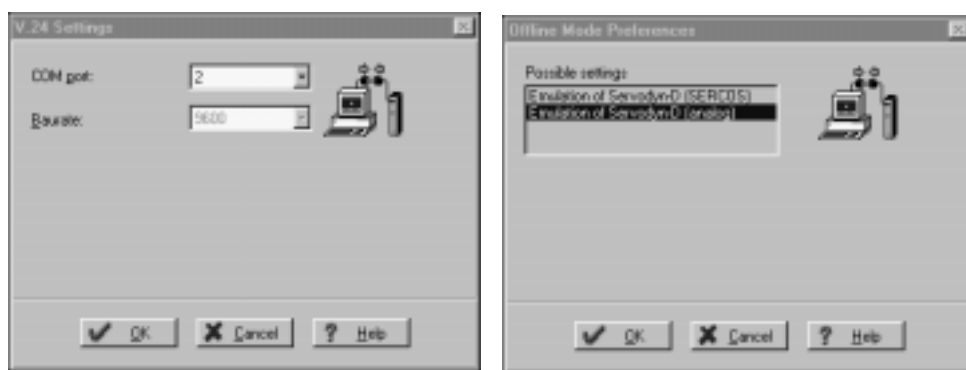


This dialog may also be invoked manually when the connection has been successfully established:

- menu sequence **OPTIONS ► PREFERENCES ► INTERFACE**
- or-
- by clicking on the  command button in the DSS basic image.

- ★ Selection in the "Primary connection" field (1): **V.24 connection**
- ☞ **If no inverter is connected, the DSS may also be operated "offline". In this case, it will simulate an inverter.**

- ★ Set the data in the "Interface Preferences" field (2) through one of the following dialogs:



Click on "OK" to return to the "Establish connection" dialog.

- ★ Clicking on "OK" in this dialog will cause the DSS to try and establish the desired connection.
  - In the event of a fault, the "Status" field (3) will contain more information. Check the connection between the PC and the drive and then click on the "Retry" command button.
  - If the connection can be established, the DSS will read information from the drive and then display the DSS basic image.

## Reinitializing DSS after module RESET or a module change

If, while DSS is running, you

- disconnect the connection cable from the inverter (e.g. for starting up a new drive), or
- press the RESET key of the currently connected inverter,

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, 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 sequence  
CONTROL ► RESET ► INIT. MODULE TYPE,  
-or-
- click on  in the icon bar.



## 2.4 Establishing communication between rho and the drives

- The 24V supply has been turned on.
- Communication between DSS and the first drive has been established.
- The 7-segment displays of all inverters shows "0".  
The drives do not boot completely, but rather remain in phase "0" because the CAN connectors have not been inserted.


### Checking and setting the cycle time of all drives

For proper communication between rho and the drives, the cycle times of all drives (drive parameter S-0-0002) and the "Clock Start time" of the rho (rho parameter P5) must be identical.

 **In the factory, S-0-0002 has been set to 20000  $\mu$ s and P5 has been set to 20 ms, i.e. these values are identical. If no changes have been made, you may skip the cycle time setting option.**

- ★ Start the DSS "Monitor":
  - with the menu sequence DISPLAY ► MONITOR, or
  - by clicking on  in the icon bar, or
  - by clicking on the  command button in the icon bar or the DSS basic image.
- ★ Enter the proper settings for S-0-0002:
  1. Enter the value 2 in the upper left field. Then press the Enter key or click on the "Get" button.  
In the "Date" field, the DSS will now display the current cycle time setting of the drive.
  2. Enter the desired value for the CAN cycle time in the "Date" field.
  3. Click on the "Set" button.  
The drive will initially accept the value to its RAM.
  4. Switch drive to phase 3 (for procedure, refer to page 3–8).
  5. Initiate the "Save main memory" command:  
by menu sequence  
CONTROL ► MAIN MEMORY ► SAVE
  6. Switch the drive back to phase 0.

The CAN interface of the drive connected to the DSS has now been completely parameterized.

- ★ In order to parameterize other inverters, remove the connection cable from X99 and connect it to X99 of the next inverter of the drive chain.
- ★ Initialize the new axis module:
  - by the menu sequence  
CONTROL ► RESET ► INIT. MODULE TYPE or
  - by clicking on  in the icon bar.

Then parameterize S-0-0002 as described above.

### Making the necessary settings in the rho (PHG: mode 7.8.2)

- ☞ **Use the PHG2000 to set and save parameters in the rho. For more information, please refer to the machine parameter manual of rho.**
  
- ★ Make sure that parameter **P5 ("clock start time")** matches the setting of drive parameter S-0-0002 in all drives!
- ★ For rho4: **P30 ("I/O Configuration CAN bus")**, item "**Baud rate**" of CAN bus 1 and CAN bus 2, if available, must correspond to the settings on the drive side (rotary switch S4; page 2-4).
- ★ Check whether the existing number of axes has been properly set in **P302 ("Number of axes of the kinematics")** and matches the number of inverters connected.
- ★ Make sure that **P401 ("Construction of measuring system board")** and its sub-queries have been properly set for each applied axis (cf. rho machine parameters).
  - The axis addresses of the inverters (rotary switches S2 and S3; page 2-4) must have been correctly assigned to the individual rho axes using the "CAN input" sub-parameter.
  - The "Drive type" sub-parameters must have been assigned the value "1" (Servodyn-D).
  - The "Number rotations" sub-parameters must be assigned as follows for the applied axes:
 

|   |              |
|---|--------------|
| when an SF motor with MTG is connected: | input "4096" |
| when an SF motor with an STG or         |              |
| an SR motor is connected:               | input "1"    |
- ☞ **For motors with an MTG, no settings have to be made for the absolute encoders at the drives because the rho assumes the handling of this encoder type.**
  - The "Pulses/Rotation" sub-parameters must be permanently set to "8192".
  - For the "Measuring system conversion factor" sub-parameter, the following applies for calculation:  $M_C = 8192 / \text{path}$ .
- ★ Assign the value "**0**" to **P701** for every applied axis. This **deactivates** the download of parameter group 7xx to the corresponding drive for the time being.
- ★ Save all modified data in the rho. After saving, rho automatically performs a shut-down with subsequent booting.

**Establishing the connection between the drive and rho**

- ★ Carry out the following for all inverters of the drive chain:
  1. Press Reset key, drives are stopped in phase "0".
  2. Plug in CAN lead (X51).
- ★ The drives are now initialized by the rho and completely booted.
  - The 7-segment display at the inverters must then show "4".
  - The CAN LED's are permanently on.

| CAN LED, green | Meaning                                      |
|----------------|--|
| off            | CAN bus interrupted                          |
| flashing       | only the synchronization message is received |
| on             | CAN bus in operation                         |

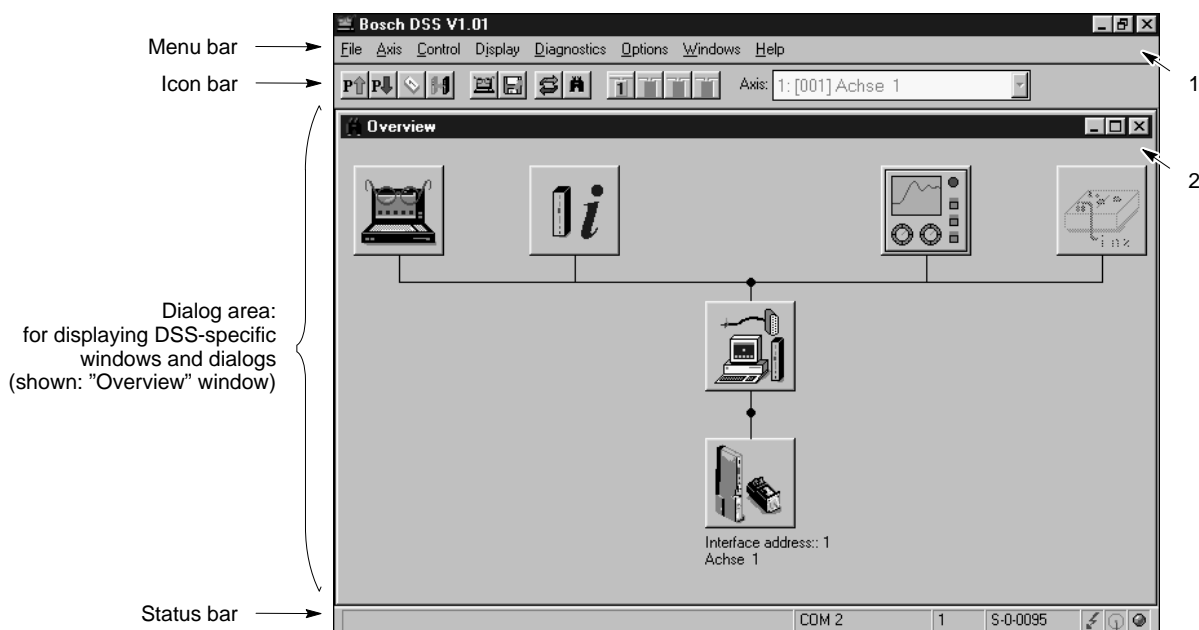
If the CAN LED's are not lighted, check the complete wiring of the CAN bus on the basis of the data in the annex from page A-1.

It should now be possible to traverse all axes of rho in setup mode (PHG, mode 2) for test purposes.

### 3 DSS user interface

#### 3.1 DSS basic image

The layout of the DSS user interface has been optimized for a screen resolution of 640 x 480 pixels in connection with a 14" color monitor. You should not use screen resolutions of more than 800 x 600 pixels unless you have at least a 17" monitor.



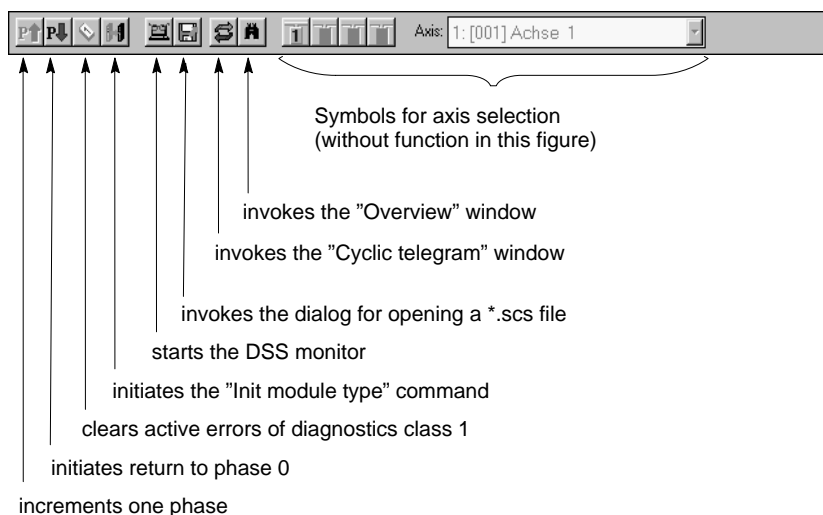
1 Changes the DSS program window and exits the program.

2 Changes a DSS-specific window

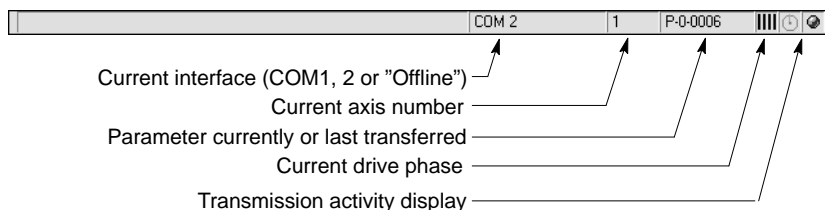
Please note that iconized window symbols may be covered by open windows. Covered windows can be displayed by selecting the "Windows" menu.

#### Icon bar

The meaning of the command buttons is also displayed when the mouse pointer is on the command button.

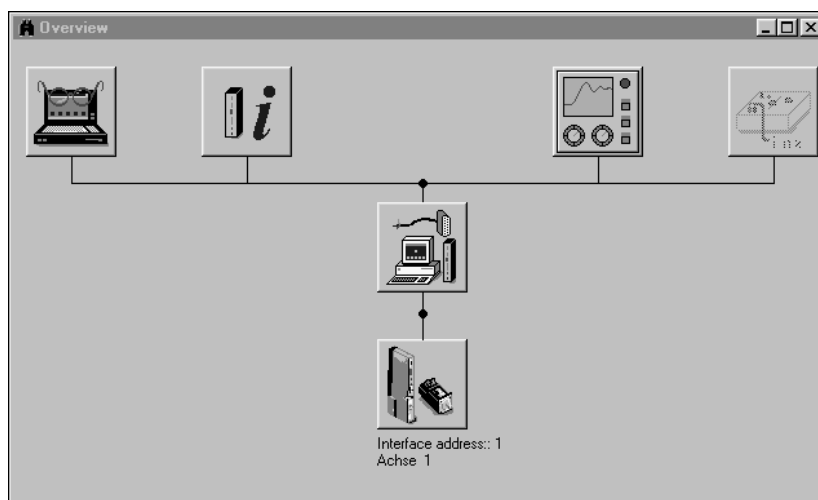


Status bar









"Overview" window

The "Overview" window shows a single-line diagram of the entire system. The meaning of the command buttons is also displayed when the mouse pointer is on the command button.



Command buttons and available functions

Selecting command buttons that have several functions will open up a pull-up menu.

- |   |   |   |  |
|---|---|---|--|
|  | (Parameterization)  | ⇒ | <ul style="list-style-type: none"> <li>- Monitor (edit parameter on-line)</li> <li>- Load file (edit parameter off-line)</li> <li>- DSS expert</li> <li>- DSS post office (not with CANrho interface)</li> </ul> |
|  | (Global information)  | ⇒ | <ul style="list-style-type: none"> <li>- Module configuration</li> <li>- Module status display</li> <li>- I/O signals</li> <li>- Cyclic telegram</li> <li>- Watch parameter numbers</li> </ul>                   |
|  | (Oscilloscope,<br>no function with analog interface)                  |   |  |
|  | (Setpoint generation,<br>only for user group of<br>"Service Level 2") | ⇒ | <ul style="list-style-type: none"> <li>- Setpoint box</li> <li>- Setpoint generator</li> </ul>   |
|  | (Interface)   | ⇒ | <ul style="list-style-type: none"> <li>- starts the "Establish connection" dialog</li> </ul>   |
|  | (Axis x)  | ⇒ | <ul style="list-style-type: none"> <li>- calls up predefined parameter lists</li> </ul>  |



### 3.2 DSS monitor


The DSS monitor offers direct **Online access** to all parameters stored in the drive.

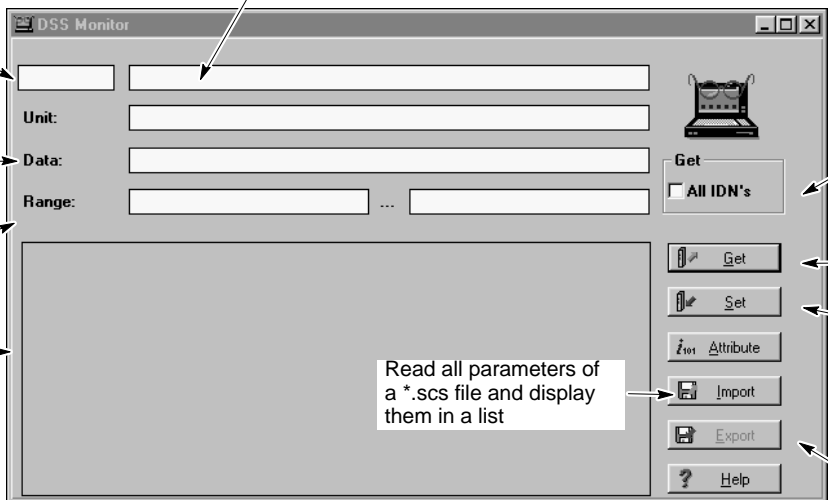
You may:

- edit parameters
- save a list of several parameters as initialization file (\*.scs) of the drive. For each drive, several \*.scs files can be created, e.g. for certain drive functions or commissioning steps
- transmit \*.scs files to the drive (cf. page 4-22)

★ Start the "Monitor"

- menu sequence DISPLAY ► MONITOR, or

- by clicking on the  command button in the icon bar or in the DSS basic image



"Parameter name" field (cannot be changed)

Current **changeable** parameter number

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

Input limits of the current parameter

Area for displaying the parameter list. Double-click on one of the parameters to display its information in the upper fields.

Read all parameters of a \*.scs file and display them in a list

If activated: 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 as \*.scs file.

**Loading a saved \*.scs file into the monitor:**

By clicking on the "Import" command button, all parameters of a \*.scs file are displayed in list format in the monitor. During this process, the parameter values are automatically replaced by the current values of the connected drive.

- ☞ **All parameters which may be displayed in the list area of the DSS monitor are deleted by this process.**

**Adding parameters:**


1. Click on the "Parameter number" field
2. Enter the parameter number to be edited.  
The following syntax options may be used:
  - complete, e.g. "S-0-0040" or "P-0-0100"
  - simplified, e.g. "s40" or "p100"
  - only the number of S parameters, e.g. "40" instead of "S-0-0040".
3. Press <RETURN> or click on the "Get" button to read the parameter from the drive and add it to the list.  
If the parameter has not been defined in the drive, a fault message will be displayed.

**Deleting parameters:**

Click on desired list line and press <Del> key.

**Changing parameter values:**

1. Double-click on the desired list line. The current parameter value will be read from the drive again.
2. Change the parameter value in the "Data" field.
3. After modification, transmit parameters back to the drive with "Set" where they will become immediately active.  
For this purpose, the drive must be switched to a phase in which the current parameter can be changed. Please refer to the "Changeable" field in the attributes bar shown in the "Servodyn-D parameter description" manual for this information. Otherwise, you will receive a fault message of the type "Date of parameter xy currently write-protected". "Unable to change date of ...", or "ID number xy is unknown".  
For phase switching, refer to page 3-8.

 **After transmission, parameters will remain active until you switch the drive off or press the RESET button on the DM module. If the parameters are to be permanently active in the drive, you have to perform the "Save main memory" command (cf. section 3.5.2).**


**Saving the current parameter list in a \*.scs file:**

Click on the "Export" command button and enter a file name. All parameters in the list will be saved in this file.

**CAUTION**

**Specifying an existing file will cause the old file contents to be completely destroyed when it is overwritten!**

---

 **During saving, the sequence of the individual parameters is automatically changed so that they are transmitted to the drive during the correct initialization phase.**

**Transmitting complete parameter list to the drive:**

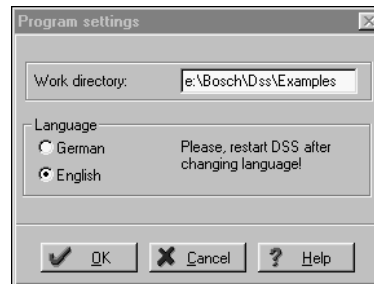
1. First save the parameter list in a \*.scs file (cf. above).
2. Transmit this \*.scs file to the drive (cf. page 4-22).

### 3.3 Selecting the language

The DSS user interface and the parameter and diagnostics texts from the drive have to be changed over separately in order to obtain a uniform language representation in the DSS.

#### Language of user interface

- ★ Select: OPTIONS ► PREFERENCES ► PROGRAM

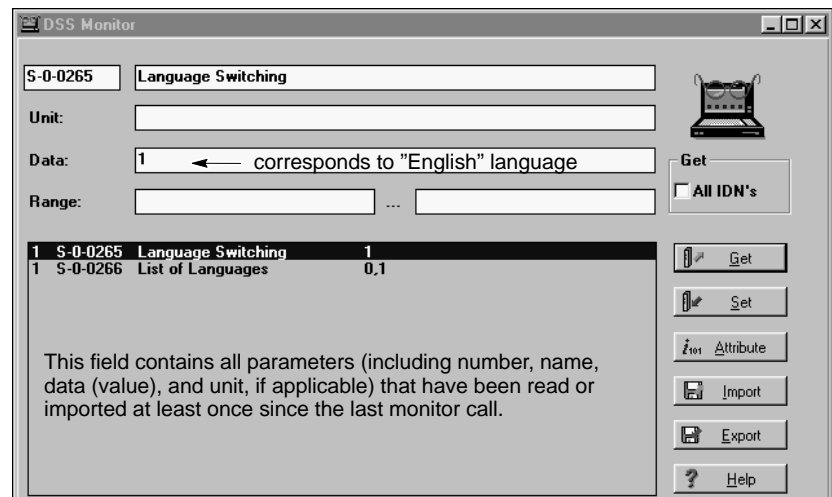


- ★ To activate the new language, you have to reboot.

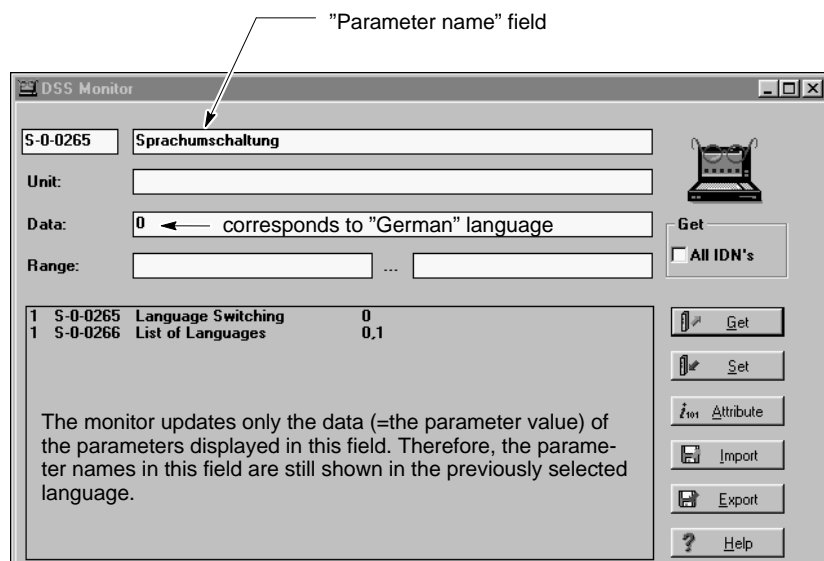
#### Language of the drive

The language of the drive is defined in parameter S-0-0265 via the DSS monitor. The languages listed in S-0-0266 may be selected:

- 0 : German
- 1 : English.



- ★ Enter the numerical value of the desired language in the "Data" field. Pressing <Return> or clicking on "Set" will immediately change over the language. This becomes obvious by the text in the "Parameter name" field.



The new setting will only remain active until you switch off the drive or press the RESET button on the inverter.

To switch the drive permanently to the new language, you have to perform the "Save main memory" command, cf. section 3.5.2.

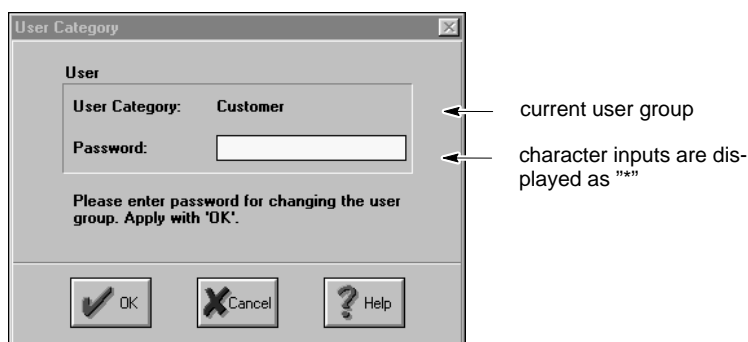
### 3.4 Changing the user group (password)

The DSS makes a distinction between different user groups in order to protect several program functions against unauthorized interventions:

| Function  | User group                  |                    |                    |
|---|-----------------------------|--------------------|--------------------|
|   | Customer<br>(always active) | Service<br>Level 1 | Service<br>Level 2 |
| Standard functions                              | •                           | •                  | •                  |
| Predefined parameter lists<br>on special issues |                             | •                  | •                  |

The "Service" user group is password-protected. The corresponding passwords are available on request.

- ★ For making changes, select the menu sequence:  
OPTIONS ► PREFERENCES ► USER

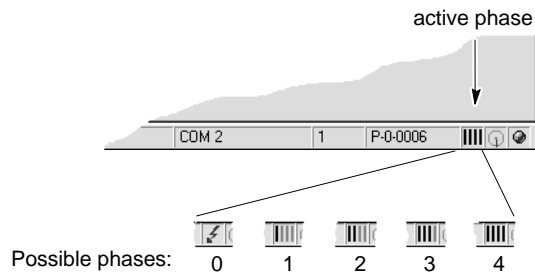


**CAUTION**  
**Unauthorized access to protected functions possible!**  
 If you have changed the user group to "Service" you should complete the necessary operations and restart the DSS or reset the system to the "Customer" group (password: koenig).  
 Otherwise, all protected functions can be accessed until the DSS program is exited!

## 3.5 Important drive commands

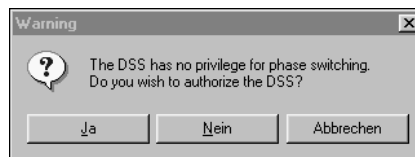
### 3.5.1 Changing phases

When a drive is switched on, the rho robot control makes sure that the drive passes 3 initialization phases until normal mode is reached in phase 4. When the bus link is missing, the drive stops in phase "0".




Various parameters can only be changed in certain initialization phases. Therefore, during commissioning, you first have to switch the drive to the required phase before changing such parameters. Otherwise, you will receive a fault message of the type "Date of parameter xy currently write-protected". "Unable to change date of ...", or "ID number xy is unknown".


When the drive has been booted, the DSS has to be given authority for phase change-over prior to the first phase change:



From this moment and until the drive is booted again, only the DSS can change the phases of this drive instead of the rho control! This condition is indicated in the "module configuration display" in the "DSS master" area by the checked "phase" field (cf. figure on page 6-1).

Changing to the higher next phase:


- menu sequence  
CONTROL ► PHASE ► INCREMENT, or
- click on  in the icon bar.

 **If you change the drive to phase 4 despite a rho communication fault, error message F10 (communication error) will be displayed at the inverter after a few seconds.**

**Clear the error message by specifying phase 0, 1, 2 or 3 again and executing the "Reset class 1 error" command (cf. page 3-10).**

**You should not plug in the CAN cable unless the parameter download on the rho has been deactivated, or after all parameters of the P7xx group have been determined and transmitted to rho!**

Changing back to phase 0:

- menu sequence  
CONTROL ► PHASE ► DECREMENT, or
- click on  in the icon bar.

### 3.5.2 Save main memory

When the inverter has been switched on or the "Reset" button has been pressed the original data will be active again.

Therefore, any parameters that have been modified first have to be permanently saved with the "Save main memory" command. By issuing this command, the drive will copy the data from the RAM to the FEPR0M.

- ☞ **The rho can also initiate the "Save main memory" function during a parameter download. For this purpose, the value "3" has to be entered in machine parameter P737.**



#### CAUTION

**FEPR0M will be deleted!**

All data contained in the FEPR0M 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 FEPR0M data, please contact your systems administrator before executing this command.

---

- ★ Change the drive to phase 3.
- ★ Select the menu sequence:  
CONTROL ► MAIN MEMORY ► SAVE

### 3.5.3 Load main memory

This command loads all data stored in the FEPRAM to the drive RAM. When the inverter has been switched on, or if the "Reset" button at the inverter has been depressed, the drive automatically copies 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 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.**

---

- ★ Change the drive to phase 0, 1, 2 or 3.
- ★ Select the menu sequence:  
CONTROL ► MAIN MEMORY ► LOAD

### 3.5.4 Resetting errors (class 1)

If errors of diagnostics class 1 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 6.1) 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 sequence  
CONTROL ► RESET ► RESET CLASS 1 ERROR, or
  - click on  in the icon bar.



## 4 Initial commissioning

- ★ Make sure that all works described in section 2 have been properly executed.

The following conditions now apply to the system:

- Only the 24V supply is active.
- All drives are connected to the rho control via the CAN bus; the green CAN LED's at the inverters are lit.
- The 7-segment-display of all inverters displays "4".
- The desired language has been set for the drive and the DSS.
- Communication between the DSS and the first drive has been established.

- ★ **Backup** the parameters currently stored in the FEPRM. Afterwards, you may restore the original status of all values whenever you like.

Select the menu sequence:


FILE ► IDN BACKUP



Enter a file name for the original data, e.g. "ORG\_PAR.SCS". The drive is changed to phase 4, reads all parameters contained in the FEPRM, and saves them in the previously specified file.

### 4.1 Creating a template file

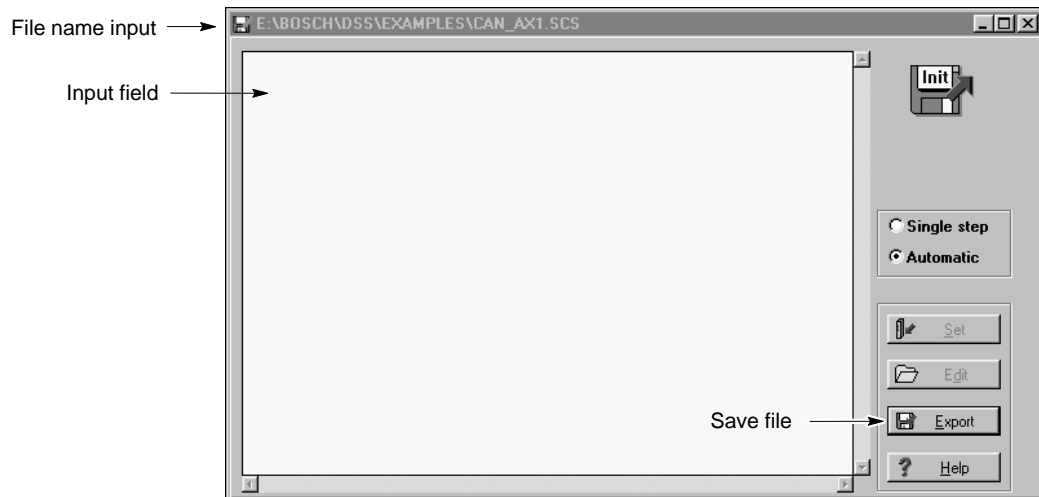
The template file contains all parameters required for startup. Especially the procedure for starting up several drives is facilitated by this file:

- For every drive to be started up, a parameter list containing all relevant parameters can be loaded into the DSS monitor.
- The template file can be completed with the current parameter values of the drive at any time by selecting FILE ► FILL & TEMPLATE (cf. section 6.6).
- The sequence of the parameters is not changed.  
In the sequence shown on the next page, the parameters are listed in the rho in the order of their numbers (cf. also page 4-3), so that they can be easily transmitted to the rho.

 **A list containing this parameter sequence cannot be prepared with the DSS monitor because the sequence is changed while being saved.**

- ★ Start the DSS editor in order to generate the template file: (alternatively, commercially available ASCII editors may be used.)
  - with the menu sequence FILE ► OPEN ► DSS FILE, or
  - by clicking on  in the icon bar, or
  - by clicking on the  command button in the DSS basic image and then selecting "Load file".
- ★ Enter a new file name, e.g. "PAR\_LIST.SCS".

The DSS editor is started:



- ★ Enter all of the subsequent parameter numbers including the equals sign line by line. Every line should be concluded with the <Return > key.

```
s2 =
s32 =
s100 =
s101 =
s106 =
s107 =
s119 =
s120 =
s200 =
s201 =
p1 =
p4 =
p13 =
p27 =
p120 =
p121 =
p122 =
p123 =
p125 =
p505 =
p2000 =
p2002 =
s91 =
s92 =
s-1-92=
s-2-92=
s-3-92=
s104 =
s126 =
s138 =
s159 =
s206 =
s207 =
s260 =
p500 =
p2010 =
p2014 =
p2015 =
p489 =
s264 =
s204 =
```

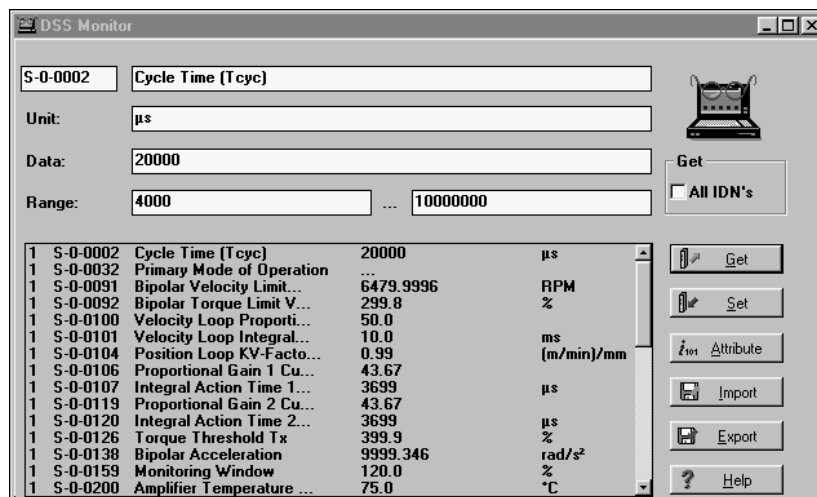
- ★ Save the new parameter list by clicking on "Export" and close the DSS editor.
- ★ Identical parameters may have different default values in the rho and are always indicated as a decimal number there, cf. list on page 4-3. Therefore, you should copy this list once for each axis and enter the final values in the course of parameterization. Then simply transmit these values to the rho.

Download parameter list for axis number \_\_\_\_ (drive address hex: \_\_\_\_):

| Parameter number / name |            | rho default value  | value to be set | Notes and other values to be set   |
|-------------------------|------------|--|-----------------|--|
| rho                     | Drive Name |  |                 |  |
| 5                       | S-0-0002   | CAN interface cycle time   | 20              | rho: data in ms<br>1: download ON; 0: download OFF<br>3: position control; 11: as 3+feed-forward control<br><br><b>Notes on rho parameters 705 through 709 and 723:</b><br>Since it is not known initially which motor is connected, the default values were selected large enough as a precaution to ensure that a fault message will be generated whenever parameters have been downloaded without previously adjusting the default values.<br><br>0: by S138; 1: by S260; 2: by rho |
| 701                     | -          | Turn parameter download on/off                                     | 0               |  |
| 702                     | S-0-0032   | Main operating mode  | 3               |  |
| 703                     | S-0-0100   | P-component of speed controller                                    | 50              |  |
| 704                     | S-0-0101   | Integral-action component, speed controller                        | 10              |  |
| 705                     | S-0-0106   | P-component 1, current controller                                  | 1000            |  |
| 706                     | S-0-0107   | Integral-action component 1, current controller                    | 100000          |  |
| 707                     | S-0-0119   | P-component 2, current controller                                  | 1000            |  |
| 708                     | S-0-0120   | Integral-action component 2, current controller                    | 100000          |  |
| 709                     | S-0-0200   | Amplifier warning temperature                                      | 75              |  |
| 710                     | S-0-0201   | Motor warning temperature  | 145             |  |
| 711                     | P-0-0001   | Operating frequency of the power output stage                      | 8000            |  |
| 712                     | P-0-0004   | Halting mode with drive off  | 0               |  |
| 713                     | P-0-0013   | Actual value smoothing interval of speed controller                | 250             |  |
| 714                     | P-0-0027   | Braking current limitation   | 100             |  |
| 715                     | P-0-0120   | Current setpoint filter: selection of filter type                  | all 4: 0        |  |
| 716                     | P-0-0121   | Current setpoint filter: Limit frequency of low pass filter        | all 4: 2000     |  |
| 717                     | P-0-0122   | Current setpoint filter: Quality of band rejection filter          | all 4: 1        |  |
| 718                     | P-0-0123   | Current setpoint filter: Center frequency of band rejection filter | all 4: 2000     |  |
| 719                     | P-0-0125   | Control word, external enable                                      | 0               | 0: drive stops without setpoint control; 1: acc. to P-0-0004   |
| 720                     | P-0-0505   | Plug brake enable delay  | 200             |  |
| 721                     | P-0-2000   | Inport: Configuration list   | all 4: 0        |  |
| 722                     | P-0-2002   | Outport: Configuration list  | 0               |  |
| 723                     | S-0-0091   | Bipolar speed limit value  | 100000          |  |
| 724                     | S-X-0092   | Bipolar torque limit value   | all 4: 300      |  |
| 725                     | S-0-0104   | Loop gain factor of position controller                            | 1               | <b>Notes on rho parameters 721, 722 and 733:</b><br>The parameters have to be entered in the form of values as follows:<br><b>P parameters:</b> Enter the appropriate number,<br>e.g. P-0-2551 ♦ enter "2551"<br><b>S parameters:</b> Subtract 32768 from the desired number and enter the result including the sign,<br>e.g. S-0-0331 ♦ enter "-32437".<br>Please note: the PHG does not display the negative sign!   |
| 726                     | S-0-0126   | Torque threshold Mdx   | 100             |  |
| 727                     | S-0-0138   | Acceleration bipolar   | 100000          |  |
| 728                     | S-0-0159   | Monitoring window  | 120             |  |
| 729                     | S-0-0206   | Waiting time drive on  | 0               |  |
| 730                     | S-0-0207   | Waiting time drive off   | 0               |  |
| 731                     | S-0-0260   | Positioning acceleration   | 1000            |  |
| 732                     | P-0-0500   | Feedrate feed-forward control                                      | 80              |  |
| 733                     | P-0-2010   | DAC channels: configuration list                                   | all 2: 0        |  |
| 734                     | P-0-2014   | DAC channel 3: Maximum value, offset                               | 0               |  |
| 735                     | P-0-2015   | DAC channel 4: Maximum value, offset                               | 0               |  |
| 736                     | P-0-0489   | Special function, brake  | 0               |  |
| 737                     | S-0-0264   | Command "Save working memory"                                      | 3               | 3: save; 0 do not save   |
| 745                     | S-0-0204   | Motor switch-off temperature                                       | 0               | 165  |

## 4.2 Parameterizing the drive

- ★ Start the DSS monitor.
- ★ Load the template file (page 4-2) into the monitor using "Import".  
For every specified parameter, the related value is read from the connected drive and shown as follows:



- ★ Adjust the individual parameter values to your requirements in the course of the parameterization procedure (for mode of functioning of the DSS monitor, cf. page 3-3).  
The following sections are not based on the parameter numbers, but rather on the higher-level function.
- ☞ **Please note that the current drive phase may have to be changed prior to a parameter change (cf. page 3-8).**
- ★ After having parameterized a function, test it for the proper drive behavior and signal sequence.  
If this is the case, perform the "Save main memory" command (cf. section 3.5.2).

### 4.2.1 Operating frequency of the power output stage

The operating frequency of the power output stage (P-0-0001) has to be set according to the selected motor-module combination. A reduced operating frequency increases the electrical output power available.

Possible settings: 4000 Hz or  
8000 Hz (factory setting)

 **Since this setting has consequences for other parameters, it must be entered first.**

★ Change parameter P-0-0001 according to your requirements. The drive must be in phase 2.

★ Execute the "Save main memory" command.

 **The new setting will not be active before the drive has been rebooted.**

★ To boot the drive, press the RESET key of the drive; after booting, activate the "Init. module type" command.

### 4.2.2 Main operating mode

The "main operating mode" (S-0-0032) defines the general behavior of the drive and the type of setpoint supplied.

Since the rho supplies cyclic position data changes to the drive, the drive must traverse the incremental path data in position control mode.

Possible settings:

Position control without feed forward control:

0b0000.0000.0000.0011 (dec.: 3)

Position control with feed forward control:

0b0000.0000.0000.1011 (dec.: 11)

★ Switch the drive to phase 2 in order to change S-0-0032.

★ Execute the "Save main memory" command.

### 4.2.3 Limit values

**S-0-0091 Bipolar speed limit value** (changeable in phase 3/4):

Maximum speed in both directions of rotation.

If the setpoint is higher than the value entered in this parameter, the drive will set the message  $n_{\text{set}} > n_{\text{limit}}$  (S-0-0013, bit 5)

**S-X-0092 Bipolar torque limit value** (changeable in phase 3/4):

Maximum admissible torque, symmetrical for both directions. If the actual torque value is higher than the value entered in this parameter, the drive sets the message  $M_d \geq M_{d\text{limit}}$  (S-0-0013, bit 4).

The drive offers 4 parameters which can be assigned different values (S-0-0092, S-1-0092, S-2-0092, S-3-0092).

One of these parameters can be activated via the hardware inputs by changing the parameter set (cf. page 4-11).

The rho is also capable of performing the parameter change by changing between automatic and manual mode. The following applies:

Automatic mode: value from S-0-0092 is active (rho parameter: 724.0)

Manual mode: value from S-1-0092 is active (rho parameter: 724.1)

**S-0-0138 Acceleration bipolar** (changeable in phase 3/4):

Maximum acceleration capacity, symmetrical for both directions

**S-0-0159 Monitoring window** (changeable in phase 3/4):

The monitoring window defines the maximum permissible speed setpoint of the drive by which differences between the position setpoint and the actual position can be corrected. Exceeding this value will shut down the drive with the fault message output "F13" (= excessive controller deviation).

Input as % of the maximum speed specified in S-0-0091.

**S-0-0200 Amplifier warning temperature** (changeable in phase 2/3/4):

Temperature warning for inverter monitoring.

No changes required.

**S-0-0201 Motor warning temperature** (changeable in phase 2/3/4):

Temperature warning for motor monitoring ("Motor overtemperature warning" message, S-0-0312). If the motor is frequently operated at its upper load limit, or if there is danger of mechanical stall, the default warning temperature of 145 °C should be reduced to protect the motor, and a suitable response to S-0-0312 should be implemented.

**S-0-0204 Motor switch-off temperature** (changeable in any phase):

When this temperature is reached, the motor is halted and a class 1 error (class 1 error) is output. The H1 diagnostics display will show error number "F08".

The default value of 165 °C must not be changed!

**S-0-0260 Positioning acceleration** (changeable in phase 3/4)

Ramp by which the drive can be braked to  $n=0$  after "Drive off", after a fault or when the external enable signal (FG) has been removed.

To be selected via P-0-0004.

#### 4.2.4 Behavior after "Drive off" or a fault

**P-0-0004 Halting mode with drive off** (changeable in phase 2)

You may choose between:

- "Halting in shortest possible time" (S-0-0138) (dec.: 0)
- "Halting with ramp" (S-0-0260) (dec.: 1)
- "Controlled halting by master" (dec.: 2).

The torque will remain active for the duration of the "Waiting time drive off" (S-0-0207).

#### 4.2.5 Behavior after removal of the external drive enable signal:

**P-0-0125 Control word, external enable** (changeable in phase 2)

You may choose between:

- "Halting without setpoint control" (dec.: 0)
- "Effect depends on P-0-0004" (dec.: 1)

The torque will remain active for the duration of the "Waiting time drive off" (S-0-0207).



#### CAUTION

**Uncontrolled halting of the motor!**

If you select the "halting without setpoint control" option for P-0-0125, the drive torque will be removed as soon as the "Drive on" signal or the external enable signal become low.

#### 4.2.6 Holding brake

**S-0-0206 Waiting time drive on** (changeable in phase 3/4)

**S-0-0207 Waiting time drive off** (changeable in phase 3/4)

"Waiting time drive on" accounts for the time required for releasing the brake, thus preventing excessive wear:

- The "Drive on" **and** "Drive enable" signals will first activate the torque, depending on P-0-0505 (Plug brake enable delay).
- The drive will not follow the setpoint input before the "Waiting time drive on" has elapsed.

"Waiting time drive off" prevents the axis from jerking caused by the removal of the torque while the holding brake has not yet engaged.



#### CAUTION

**Strong wear of the holding brake!**

The holding brake is not a service brake and may only be engaged when the motor has come to a stop. Therefore, the motor must reach a speed of  $n=0$  before S-0-0207 has elapsed.

## 4.2.7 Plug braking

**P-0-0505 Plug brake enable delay** (changeable in phase 2/3/4)  
 When the "Drive on" **and** "Drive enable" signals have been set, the torque will not become active unless P-0-0505 has elapsed.  
 This is to prevent that the motor power is connected although the braking resistors are still active on the motor line because of hardware-related delays when deactivating the braking resistors.

## 4.2.8 Digital inputs and outputs (IN x, OUT x)

For connecting external I/O peripherals,

- 4 digital inputs (IN1 to IN4) and
- 1 digital output (OUT1)

are available at the drive.

 **The digital I/O's require a power supply to X06. For technical data of the inputs and outputs, refer to "Interface conditions" manual.**

The parameters which may be assigned to the OUT1 output are shown by the "D → M" entry in the "Real-time bit" column of the attributes bar in the "Parameter description" manual.

Parameters that may be changed via an input are marked by the "M → D" entry in the "Real-time bit" column of the attributes bar.

Furthermore, the "Reset class 1 error" may be triggered via an input (command starts with rising edge, and stops with the falling edge).

 **Outputs OUT2 to OUT4 are permanently assigned to the following functions:**

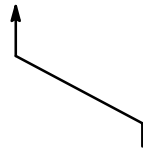
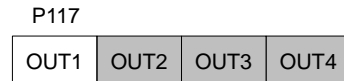
**OUT2:      Temperature warning**  
**OUT3:      Control of a holding brake**  
**OUT4:      Control of a plug brake**

- ★ In order to set the parameters of the digital inputs or outputs, switch the drive to phase 2.
- ★ Assign the value of P-0-2000 (inputs) and P-0-2002 (outputs) to a list containing the desired parameter numbers. The order of the parameter numbers is used to specify which parameter corresponds to which input/output. Separate the individual parameter numbers by commas.



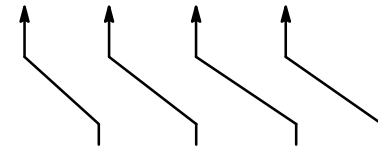
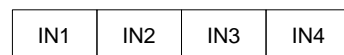
- ★ Please note for **P-0-2002 (outputs)**, that only OUT1 can be freely assigned parameters. Example:

- Parameters can be set for output
- Output is permanently assigned, no parameters can be set.



P-0-2002=<1 . Par>  
P-0-2002=S-0-0331

- ★ When designing the list in **P-0-2000 (inputs)**, please note the following assignments:



P-0-2000=<1 . Par>,<2 . Par>,<3 . Par>,<4 . Par>  
P-0-2000=S-0-0000,S-0-0000,S-0-0217,S-0-0217

- ☞ **Gaps in the signal configuration should be filled with S-0-0000.**

#### Example 1:

If only IN4 is to be assigned, program P-0-2000 as follows:  
P-0-2000=0,0,0,<Par . >

#### Example 2:

If only IN3 is to be assigned, program P-0-2000 as follows:  
P-0-2000=0,0,<Par . >

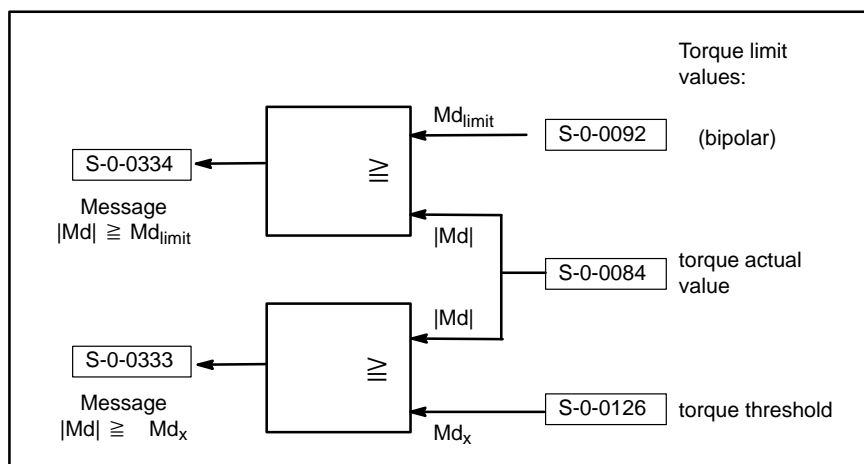
- ★ Execute the "Save main memory" command.

- ☞ **By entering P-0-2550 (CANrho control word) in P-0-2002 (outputs), the status of OUT1 is influenced by the rho. By entering P-0-2551 (CANrho diagnostics class) in P-0-2000 (inputs), the respective input is transmitted to the digital rho interface. rho parameter P36 is used to specify the addresses to which the outputs and inputs of the drives are mapped on the rho's internal PLC interface.**

## 4.2.9 Torque monitoring

Every drive is equipped with 2 monitoring features each of which can be configured independently.

Every monitoring feature compares the current torque value with its specific limit values and stores the result of the comparison in a separate parameter. Since both parameters have been implemented as real-time bits (signal status bits), one of them can be assigned to the hardware output OUT1 of the drive and evaluated, e.g. by the PLC.



If one of the monitoring features responds (= contents of S-0-0333 or S-0-0334 becomes HIGH), the drive internally responds by setting certain bits in parameter S-0-0013 (diagnostics class 3).

**Further reactions (such as reduction of torque or speed, retract movements, EMERGENCY-STOP) have to be initiated externally by the PLC!**

- ★ Adjust the limit values for torque monitoring to your requirements.
- ★ Assign parameters S-0-0333 or S-0-0334 to hardware output OUT1 of the drive in order to provide for evaluation (cf. page 4-8).
- ★ Execute the "Save main memory" command.

#### 4.2.10 Torque reduction via digital input signals


During operation, the drive can be changed over to a maximum of 4 different torque limit values via two digital input signals. If torque limits have been appropriately selected, this feature can be used to implement an internal adjustment of the max. active torque.

| Input signal |       | active torque limit value |
|--------------|-------|---------------------------|
| No. 2        | No. 1 |                           |
| 0 V          | 0 V   | S-0-0092                  |
| 0 V          | +24 V | S-1-0092                  |
| +24 V        | 0 V   | S-2-0092                  |
| +24 V        | +24 V | S-3-0092                  |

In order to use this function, you have to

- use P-0-2000 to assign 2 unused digital inputs to parameter S-0-0217 (parameter set selection)
- enter the desired torque limit values into parameters S-0-0092 to S-3-0092.
- drive the two digital inputs externally (e.g. by a PLC).

★ Assign suitable values to parameters S-0-0092, S-1-0092, S-2-0092 and S-3-0092 and transmit them to the drive.

 **We recommend assigning ascending torque limit values to S-0-0092 to S-3-0092. By this method, you ensure that no excessive torque is activated in the event of a cable break.**

★ Switch the drive to phase 2.

★ Assign the value "S-0-0217" to two unused list positions of parameter list P-0-2000.

- The first entry of "S-0-0217" assigns input signal no. 1 to the corresponding input.
- The second entry of "S-0-0217" assigns input signal no. 2 to the corresponding input (cf. table above).
- Gaps in the assignment should be filled with S-0-0000 (cf. page 4-9).

★ Transmit the values to the drive.

★ Switch the drive to phase 4 and test the function.

When both inputs are driven, the drive may only output the maximum torque set with the above parameters.

To display the statuses at the digital inputs, you may call up the "Display I/O signals" function with the menu sequence DIAGNOSE ► I/O SIGNALS.

To display the current torque output, you should cyclically display S-0-0084 (torque actual value) in a separate window (cf. section 6.5, page 6-6 ff.).

★ When the functions are o.k., execute the command "Save main memory".

**Example 1 on parameter setting**

A 4-step torque reduction with the following maximum torques is to be implemented via digital inputs **IN3** and **IN4**:

| Input signal   |                | active torque limit value<br>(weighting in percent) |
|----------------|----------------|---|
| No. 2<br>(IN4) | No. 1<br>(IN3) |   |
| 0 V            | 0 V            | 10% of $M_{\max}$                                   |
| 0 V            | +24 V          | 25% of $M_{\max}$                                   |
| +24 V          | 0 V            | 50% of $M_{\max}$                                   |
| +24 V          | +24 V          | 100% of $M_{\max}$                                  |

**Required parameters:**

S-0-0092: 10  
 S-1-0092: 25  
 S-2-0092: 50  
 S-3-0092: 100  
 P-0-2000: S-0-0000, S-0-0000, **S-0-0217**, **S-0-0217**

**Example 2 on parameter setting**

A 2-step torque reduction with the following maximum torques is to be implemented via digital input **IN1** alone:

| Input signal   | active torque limit value<br>(weighting in percent) |
|----------------|---|
| No. 1<br>(IN1) |   |
| 0 V            | 10% of $M_{\max}$                                   |
| +24 V          | 100% of $M_{\max}$                                  |

**Required parameters:**

S-0-0092: 10  
 S-1-0092: 100  
 P-0-2000: **S-0-0217...**  
 (1st entry for IN1)

**4.2.11 Torque reduction via rho4 (automatic/manual mode)**

Changing over from automatic to manual mode on rho4 will initiate a parameter set change-over in the drive.

- ★ For configuration, only the desired maximum torques are entered in the following parameters:

S-0-0092: maximum torque for automatic mode

S-1-0092: maximum torque for manual mode

- ☞ For values **S-1-0092 < S-0-0092**, the parameter set change-over will result in a torque reduction.

- ★ Execute the "Save main memory" command.

### 4.2.12 Option OM4: Analog outputs

The OM4 expansion board provides additional analog measuring outputs. Thus, current values of max. 2 parameters can be converted simultaneously to analog linear output signals (0...+10 V) and evaluated externally (e.g. by means of a storage oscilloscope for control unit optimization).



**CAUTION**

**Error message "F06" or undefined drive behavior through excessive processor load with OM4 possible if all outputs are used!  
Do not use more than 2 measuring outputs at a time. The high-speed outputs 3 and 4 may be used simultaneously.**

Parameter values that have been assigned to outputs 1 and 2, are read in 1 ms cycles.  
Parameter values that have been assigned to outputs 3 and 4, are read in 0.5 ms cycles.

**Outputs 3 and 4 may also be parameterized with P-0-2010, P-0-2014 and P-0-2015 within the scope of the parameter download!**

- ★ Select the menu sequence:
  - OPTIONS ► ANALOG I/O ► ANALOG OUTPUTS

★ Adjust the individual fields to your requirements. Modified values will be immediately transmitted to and activated in the connected drive when the field is exited (e.g. with the <Tab> key). If this is not desired, you have to cancel the dialog before leaving a field by clicking on "X" in the title bar.

★ Close the dialog and perform the "Save main memory" command.

**When startup has been completed, turn all measuring outputs off in order to reduce the relatively high processor load. Otherwise, error message "F06" (= real-time error) may be output.**

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

### 4.3 Optimizing the drive controller

As a rule, the drive performance is satisfactory when the parameter settings described above have been made, i.e. it is not necessary to make more adjustments at the control unit.

If necessary, however, the position controller, the speed controller and the filter can be modified within the servo system.

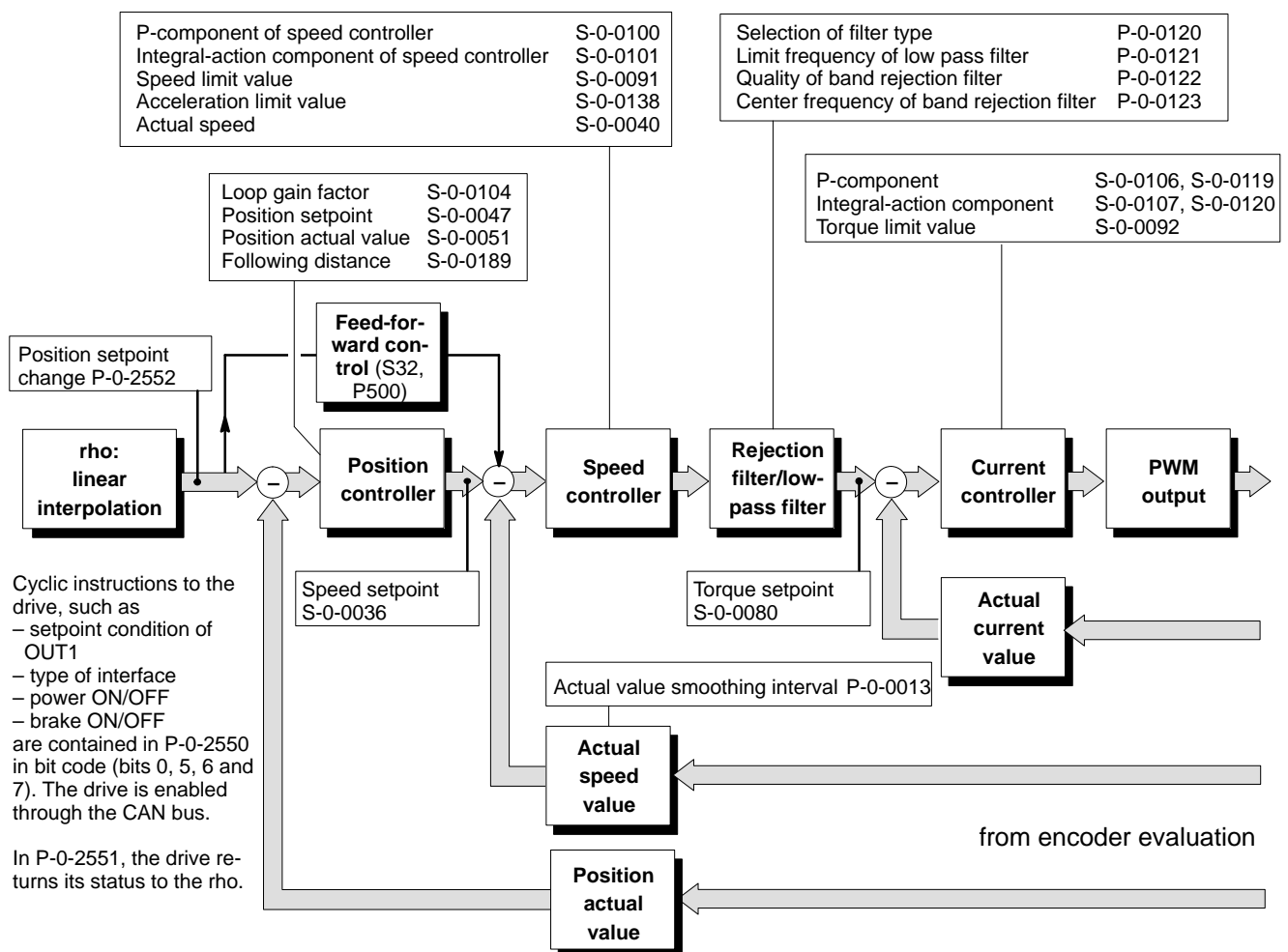
In order to visualize the effects of optimization on the control loop, a storage oscilloscope and the OM4 option module with suitably parameterized measuring outputs (cf. section 4.2.12, page 4-13) are absolutely necessary.



#### CAUTION

**Any interventions in the parameters of the control units are reserved to persons with profound knowledge of the individual control unit parameters and experience in the optimization of servo loops!**

The following block diagram is designed to give you an overview of the parameters of the servo loop:

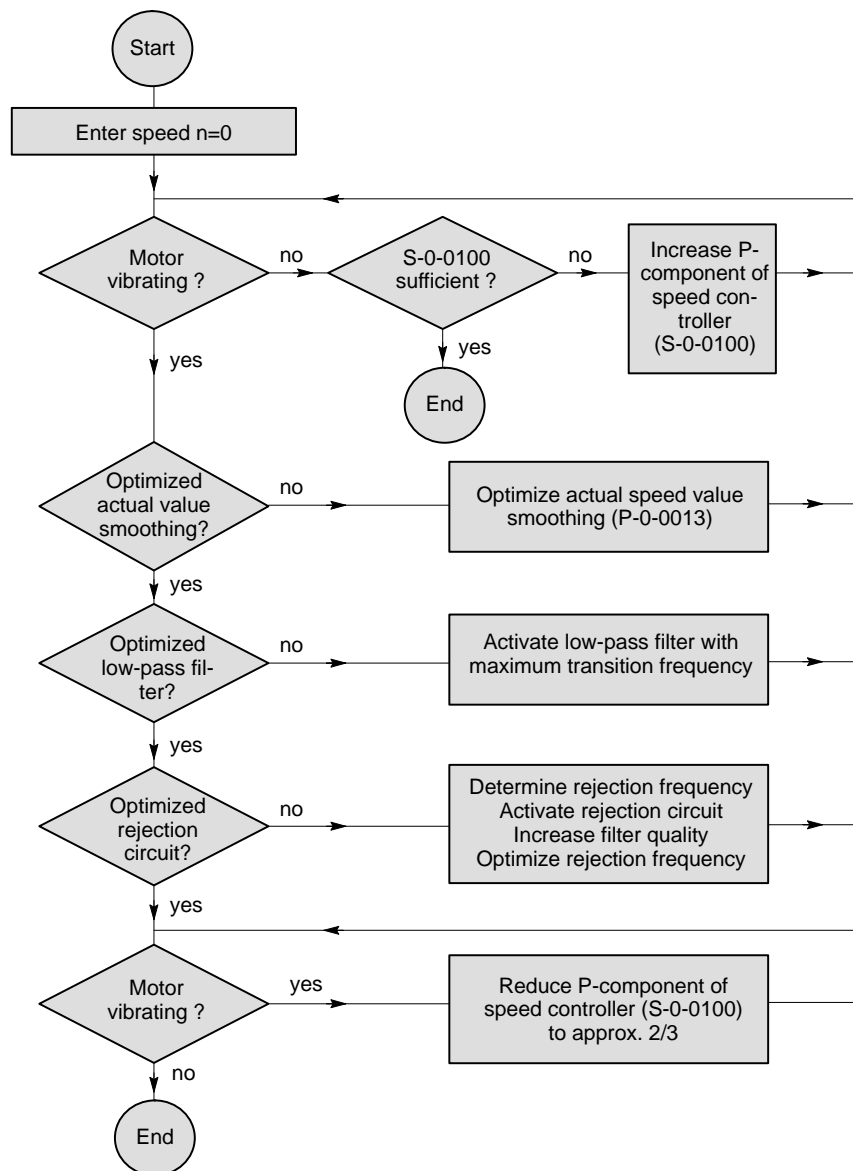


**The parameters of the current controller are critical for the drive behavior. They must not be changed without having consulted Bosch.**

### 4.3.1 Optimization steps

- ★ You should not optimize any settings unless the load is connected (axis mechanics).
- ★ Turn the power supply of the drive on. Enable the drive. The torque is active at the drive.
- ★ Specify a constant position for the optimization time.
- ★ Change the loop gain factor (S-0-0104) with the DSS to the value "0". This is to ensure that the subsequent settings are not influenced by position control.
- ★ Use the DSS monitor and the "block diagram" (cf. page 4-17), if necessary, for entering and testing parameters.
- ★ Start with the default value of S-0-0100 (approx. "50").

You may use the following sequence chart for optimizing the speed control:



**CAUTION**

If other position setpoints were specified in the course of optimization, the drive moves directly to the new position as soon as a  $K_v > 0$  becomes active!


- 
- ★ Now readjust the loop gain factor (S-0-0104) using the DSS.
  - ★ Remove the drive enable signal and turn the power supply to the drive off.
  - ★ Execute the "Save main memory" command.

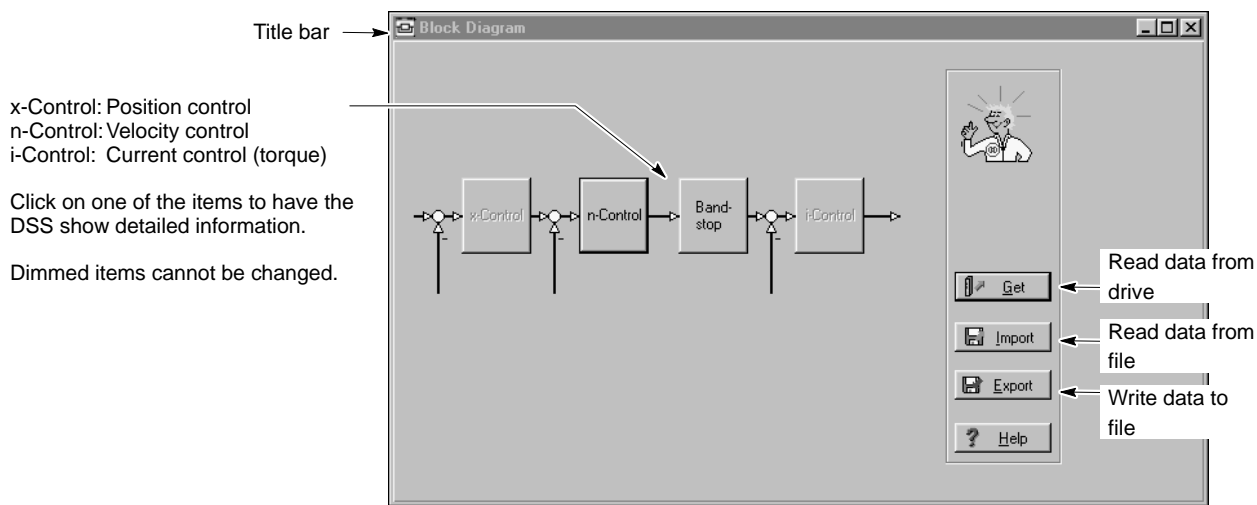


### 4.3.2 DSS tools

- ★ In order to change the parameters, you should use the DSS monitor **or**

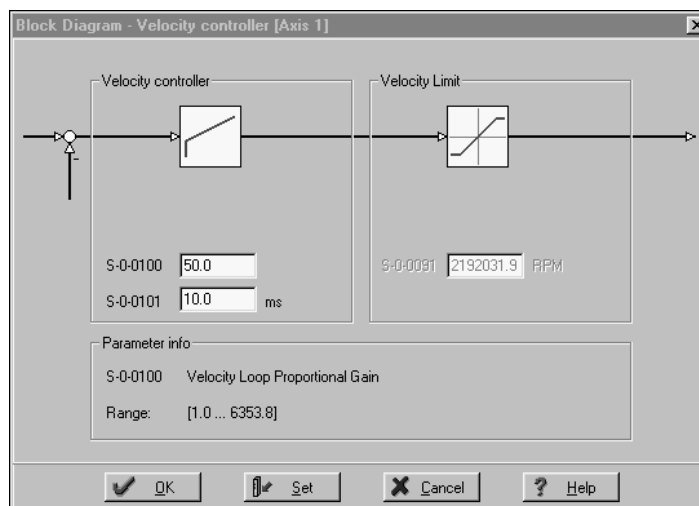
#### Block diagram

- ★ Select the menu sequence
  - DISPLAY ► CONTROL ► BLOCK DIAGRAM, or
  - click on the  command button in the DSS basic image and then select "Control ► Block diagram".



- Get:** The DSS reads all relevant parameters from the drive.
- Import:** The DSS reads all relevant parameters from a file. If the specified file does not contain all required parameters, the DSS will first use the current parameter values or system default values. In addition to the "Block diagram" text, the path and name of the specified file will be displayed in the title bar.
- Export:** If **only** the "Block diagram" text is displayed in the title bar, you may save the current settings in a new file. If the path and name of a file is displayed in the title bar **in addition**, the DSS will save the current settings in this file and replace the previous values.

## Detailed information velocity controller

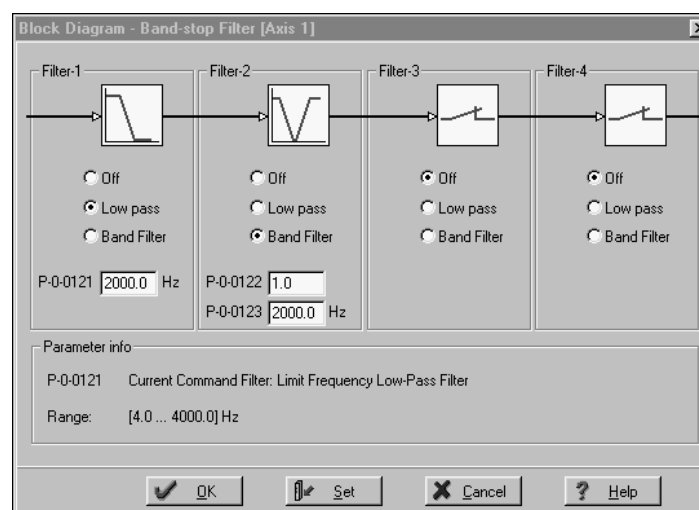


- ★ Click on the input field to be changed and enter the desired values. The "Parameter-Info" field then shows the parameter name and the admissible input range.

**Set:** transfers current values to the drive. They will become immediately active.

**OK:** as "Set". The dialog is closed.

## Detailed information band stop



Up to 4 filters connected in series can be activated. Depending on the selected filter type, input fields are displayed for configuration.

- ★ Click on the radio buttons in order to define the filter type or deactivate individual filters.
- ★ Click on the input field to be modified, and enter the desired values. The "Parameter info" field now shows the parameter name and the admissible input range.

**Set:** transfers the current values to the drive. They will become immediately active.

**OK:** as "Set". The dialog is closed.

### 4.3.3 Specifying setpoints

In order to test or optimize the drive behavior in the dynamic range, setpoints have to be specified for individual axes.

We recommend writing a rho test program for this purpose by which the axis to be optimized is controlled.

The step response of the axis can then be evaluated at the oscilloscope.



#### **CAUTION**

##### **Possibility of uncontrolled or accidental robot movements!**

When entering setpoints via the DSS setpoint box or setpoint generator, the safety-relevant functions of the rho control unit are not active.

Furthermore, with complicated mechanics, it is difficult to estimate the effects of direct axis control on the complex robot mechanics and the resulting hazard area.

- Therefore, you should only use test programs for the rho which traverse individual axes.  
For creating and processing programs in the rho, please refer to the rho documentation.
  - Bosch does not accept any liability for setpoint inputs by the DSS or consequential damages of any type.
-

## 4.4 Save all parameter settings (data backup)

It is urgently recommended to backup all relevant data in a \*.scs file when the parameters for a drive have been set.

This data backup will be required to

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

The default directory provided for data backup can be generally changed in the "Work directory" window of the "Program settings" dialog:

Menu sequence: OPTIONS ► PREFERENCES ► PROGRAM




- ★ Make sure that **no** drive enable command has been given.
- ★ Select the menu sequence:  
FILE ► IDN BACKUP  
Enter a new file name. The drive is switched to phase 4, then reads all parameters stored in the FEPR0M and saves them in the previously specified file. An exception are driver files and the data of the electronic rating plate.
- ★ When all drive data has been backed up, you may proceed to the parameterization of the next drive:
  1. Remove the connection cable from X99 and insert it to X99 of the next inverter of the drive chain.
  2. Initiate the "Init. module type" command at the DSS and start entering parameters as described in section 4.2.
- ☞ **Copy all files to a removable data carrier. Store this data carrier in a safe place.**
- ☞ **In order to transfer the backup back to the drive, if necessary, load the file into the DSS editor, click on the "Automatic" radio button and then select "Set" (cf. section 4.6).**

## 4.5 Transmitting the parameters to the rho

The complete download parameter list shown on page 4-3 must be available for each drive.

Please note that all parameters have to be entered as decimal numbers into the rho.



 **Use the PHG2000 or the ROPS4 machine parameter converter for setting and saving parameters in the rho. For more information, please refer to the rho machine parameter manual.**

- ★ Enter all parameters of the completed download parameter lists to the rho machine parameter group 7xx.
- ★ Assign the value "1" to P701 of all axes (to turn the parameter download to the drives on).
- ★ Make sure that all data is saved in the rho.
- ★ RESET all drives and reboot the rho. Due to the active parameter download, all drives are now being parameterized by the rho.

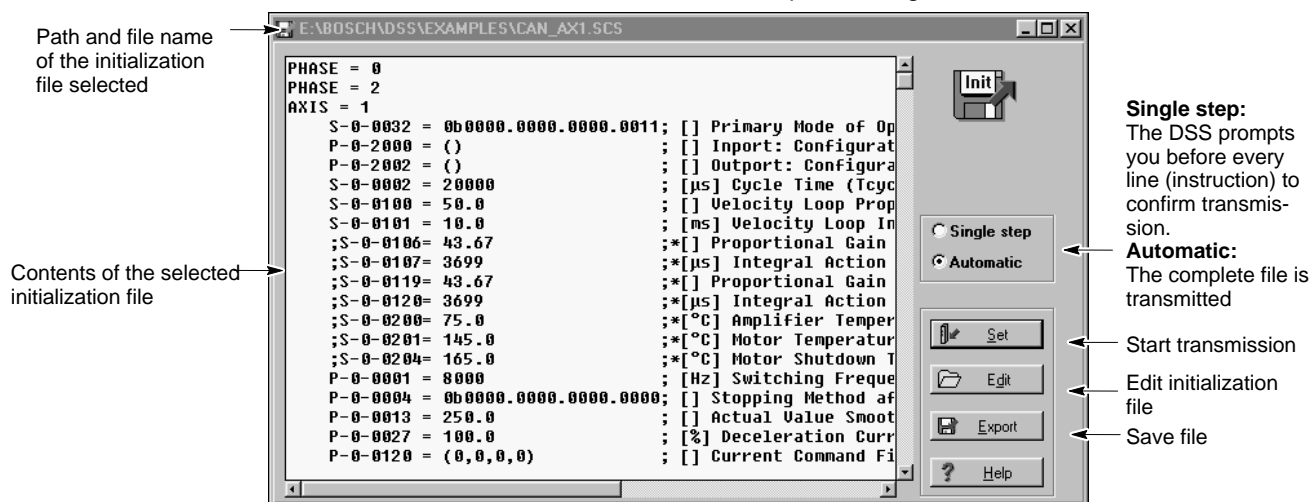
Initial commissioning has now been completed.

## 4.6 Editing \*.scs files


\*.scs files can be edited and saved in the integrated DSS editor and may be transmitted to the drive.

- Open the desired \*.scs file:
  - with menu sequence FILE ► OPEN ► DSS FILE, or
  - by clicking on  in the icon bar, or
  - by clicking on the  command button in the DSS basic image and then selecting "Load file"

Confirm "OK" in the "Open" dialog to start the DSS editor:



- Click on the "Edit" command button in order to edit the file as in a conventional text editor.


 **For more information on the structure and syntax of \*.scs files, please refer to the DSS help system which you may call up with HELP ► CONTENTS in the "DSS files" paragraph of the "Syntax" chapter.**

- Save any modifications with "Export". The previous file will be overwritten.

The modified file will not become active in the drive unless you transmit it to the drive by clicking on the "Set" command button.

**Automatic:** The whole file displayed is transmitted to the RAM.

**Single step:** The displayed file is transmitted to the RAM line by line.

 **In order to send the file to a drive, the parameters must be listed in a strictly defined order. Furthermore, a number of commands must be integrated (e.g. phase change).**

**If the initialization file has been created manually (e.g. by a sequential input of all parameters), these requirements are usually not met!**

After transmission, the 7-segment display on the axis module shows the value "4". Now the drive uses this data.

## 5 Series commissioning

Series commissioning is subject to the following conditions:


- the individual axes must be equipped with the same inverter/motor combinations as used for initial commissioning
- a fully completed download parameter list must be available for each drive.

Make sure that all of the hardware checks described in section 2 have been properly carried out.

The following conditions now apply to the system:

- The 24V supply is active. The power has not yet been connected, the system has not been enabled.
- All drives are connected to the rho control via the CAN bus; the green CAN LED's at the inverters are lit.
- The 7-segment-display of all inverters displays "4".
- The desired language has been set.

- ★ Transmit all parameters of the completed download parameter lists to the rho machine parameter group 7xx.

 **Use the PHG2000 or the ROPS4 machine parameter converter for setting and saving parameters in the rho. For more information, please refer to the rho machine parameter manual.**

- ★ Assign the value "1" to P701 of all axes (to turn the parameter download to the drives on).
- ★ Make sure that all data is saved in the rho.
- ★ RESET all drives and reboot the rho. Due to the active parameter download, all drives are now being parameterized by the rho.

Notes:



## 6 Diagnoses


### 6.1 Drive configuration

You will be shown **static** information on:

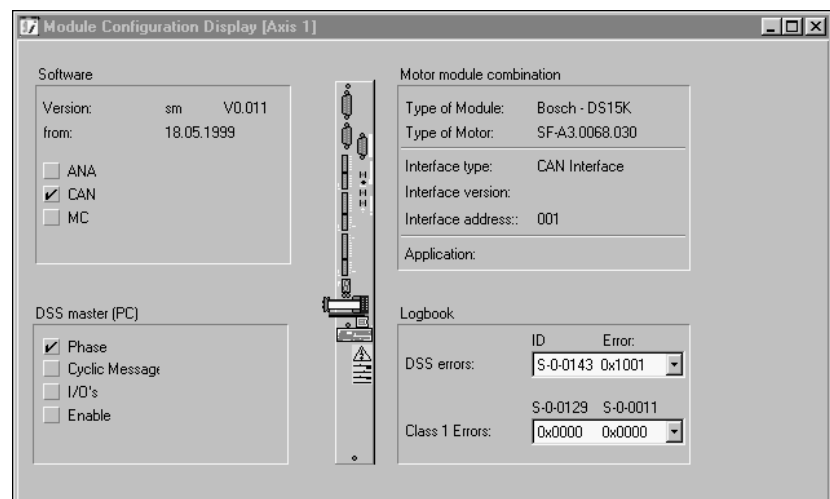
- software version (firmware version)
- module and motor type
- current DSS operation mode
- application
- interface type and version
- DSS errors
- Diagnostics class 1 errors

★ Select the menu sequence:

- DIAGNOSES ► MODULE CONFIGURATION, or

- click on the  command button in the DSS basic image and then select "Module configuration".

★ 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, this process may take a few seconds.




 **The Logbook area is not used for drives with a CANrho interface.**

## 6.2 Drive status display

The display will show **dynamic** information on

- drive status: diagnostics message in plain text
- values of max. 4 parameters
- binary status of parameter P-0-2003
- status of "Drive ON", "Drive enable", and "Drive start"
- current operation mode
- Changes in "diagnostics class 1" to "diagnostics class 3" parameters (S-0-0011 to S-0-0013)

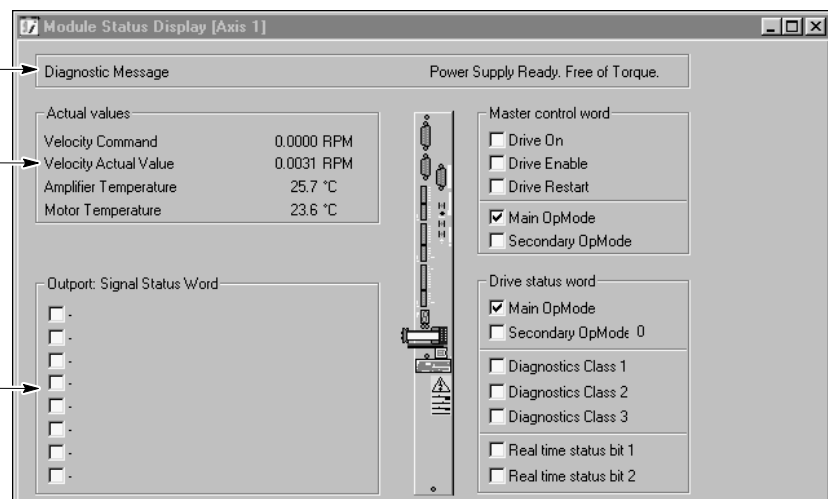
### Displaying cyclic data

- ★ Select the menu sequence:
  - DIAGNOSES ► MODULE STATUS DISPLAY, or
  - click on the  command button in the DSS basic image and then select "Module Status Display".

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

Display of max. 4 parameters.  
For configuration, cf. page 6-3.  
For displaying parameters in separate windows, refer to section 6.5 page 6-6.

Display of digital outputs OUTx (P-0-2003).  
For configuration, cf. P-0-2002 and section 4.2.8, page 4-8.  
Also refer to section 6.3.

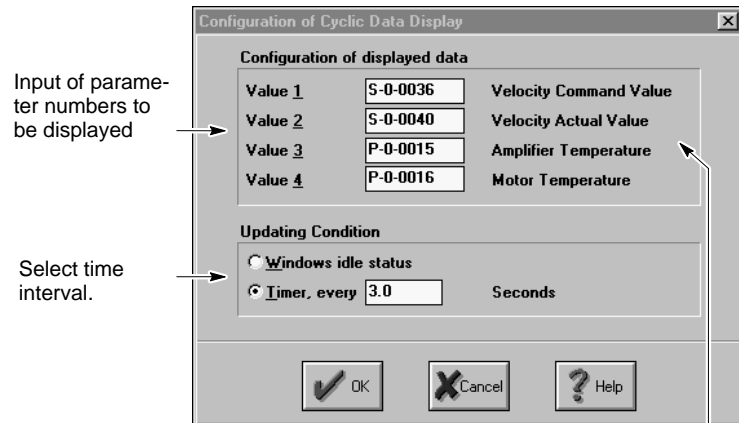


For updating frequency of the data, refer to page 6-3.

## Configuring cyclic data

- ★ In order to determine the parameter number and updating frequency of the cyclic display in the "Actual values" range of the module status display, select the menu sequence:

OPTIONS ► PREFERENCES ► CYCLIC DATA DISPLAY



Parameter names are displayed in the currently selected language (cf. section 3.4)

- ★ Enter the parameter numbers to be cyclically displayed in fields "Value 1" to "Value 4".  
Although you may enter any available parameter in the fields, only those parameters make sense whose value changes with time.
- ★ Click on the desired updating conditions:
  - **Windows idle status:**  
fastest possible updating method. Whenever the operating system is not busy performing other tasks, the data will be updated.
  - **Timer, every xx seconds:**  
fixed time interval for updating (default: 3 seconds).



### CAUTION

The PC may respond very slowly to user activities!

The "Windows idle status" setting provides the fastest updates, however, it may lead to quite "tough" response times, especially if slow computers are used.

You should only use this updating condition if frequent updates of the display are absolutely necessary.

- ★ Clicking on "OK" will activate all changes immediately.

☞ For displaying these or any other parameters cyclically in separate windows, refer to section 6.5, page 6-6.

## 6.3 Displaying I/O signals


The DSS shows you

- the signals assigned to the digital inputs and outputs of the inverter, and
- the current status of these signals.

For the assignment of individual signals to the digital inputs and outputs of the inverter, please refer to section 4.2.8 on page 4–8 ff.

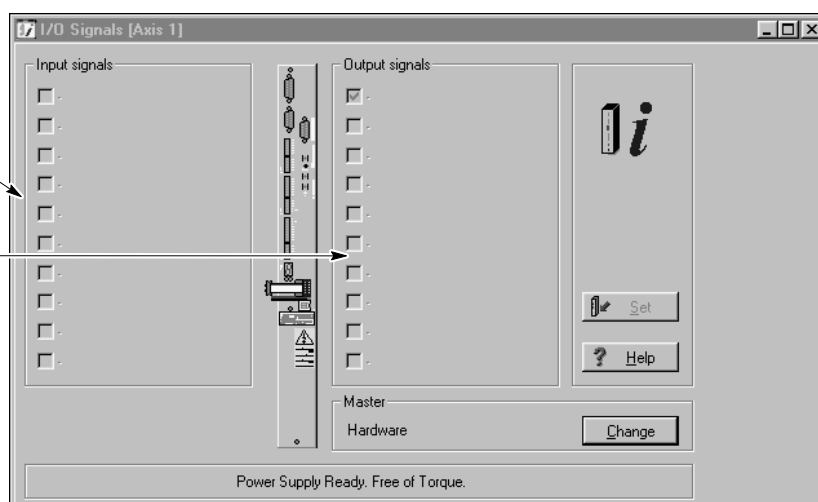
★ Select the menu sequence:

- DIAGNOSES ► I/O SIGNALS, or

- click on the  command button in the DSS basic image and then select "I/O Signals".

Display of all input signals configured in P-0-2000.  
The current status of the signals is derived from P-0-2001.

Display of all output signals configured in P-0-2002.  
The current status of the signals is derived from P-0-2003.



The DSS indicates a HIGH level by the "✓" character in the checkbox. Dimmed checkboxes indicate that the corresponding bit has not been assigned to a signal in P-0-2001.

The data display is updated in the intervals set for the "Module status display" (cf. page 6–3).


## 6.4 Displaying cyclic telegrams

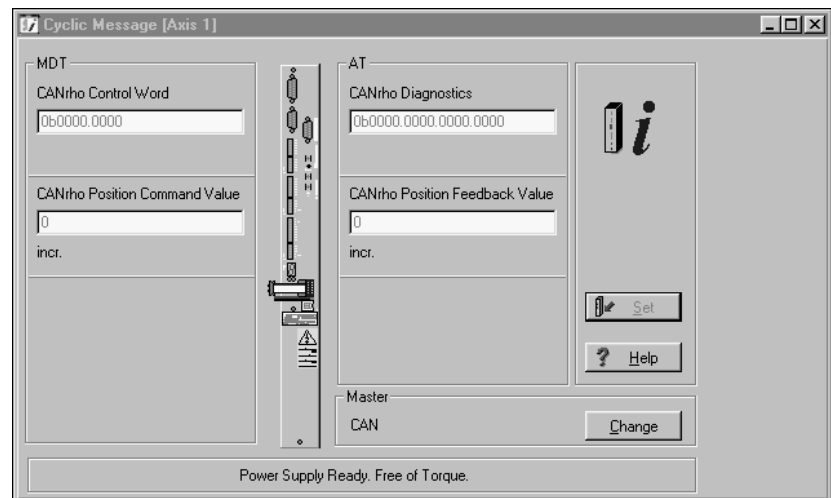
The DSS shows the following data cyclically:

- from the rho to the drive: control word and position setpoint
- from the drive to the rho: status word and actual position

★ Select the menu sequence:

- DIAGNOSES ► CYCLIC MESSAGE, or


- click on the  command button in the DSS basic image and then select "Cyclic Message".



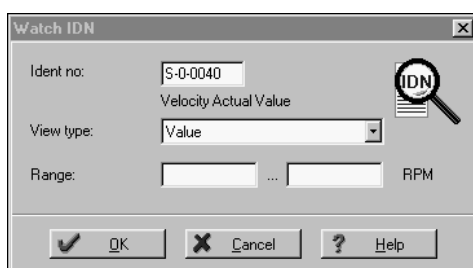
The data display is updated in the intervals set for the "Module status display" (cf. page 6-3).

## 6.5 Separate window for cyclic display

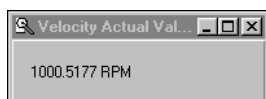
The DSS can display any parameters dynamically in separate windows. In addition to a pure text format, you may also choose a progress bar for display.

- ★ Select the menu sequence:
  - DIAGNOSES ► WATCH IDN, or
  - click on the  command button in the DSS basic image and then select "Watch IDN".

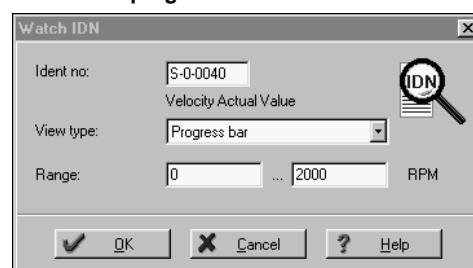
Display as value ...



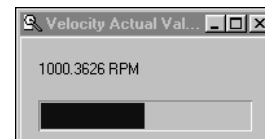
Result



Display as value and as progress bar ...



Result



- ★ Enter the parameter to be displayed in the "Ident no." field.
- ★ Select "Value" or "Progress bar" as View type, and the desired upper and lower limits for the "Progress bar" option.
- ★ Clicking on "OK" will close the DSS dialog and display the parameter cyclically in a separate window.

The data display is updated in the intervals set for the "Module status display" (cf. page 6-3).

- ☞ **Parameter values (e.g. setpoints and/or actual values) can also be output via max. 4 analog outputs (cf. section 4.2.12). Thus, it is possible to visualize the drive responses, e.g., using a storage oscilloscope.**

## 6.6 Reading parameter values into the template file

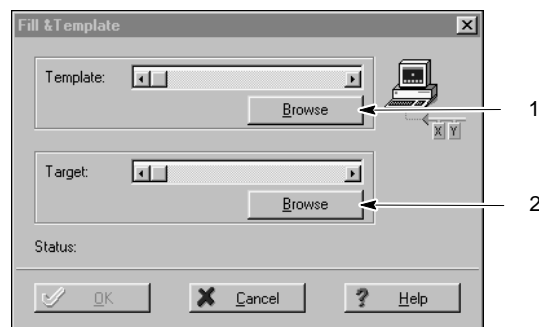
The template file created in section 4.1 is filled with the related current parameter values of the drive.

The system will not add any additional parameters or commands to the target file or change the sequence of the parameters stored.

This function can be used to

- document the parameters of a drive in a certain order of parameters (e.g. to input the rho machine parameter group 7xx)
- find out the differences between parameters of different drives.

- ★ Select the menu sequence:  
FILE ► FILL & TEMPLATE



- ★ Click on "1" in order to select the template file.  
Only the parameters contained in this file will be read from the drive.
- ★ Click on "2" to enter the path and name of the target file.
- ★ Click on "OK" to generate the target file.
- ★ Click on "OK" to start the function.  
After a successful reading, the target file has been generated and contains the current parameter values after the equals signs.

The target file may have the following contents, for example:

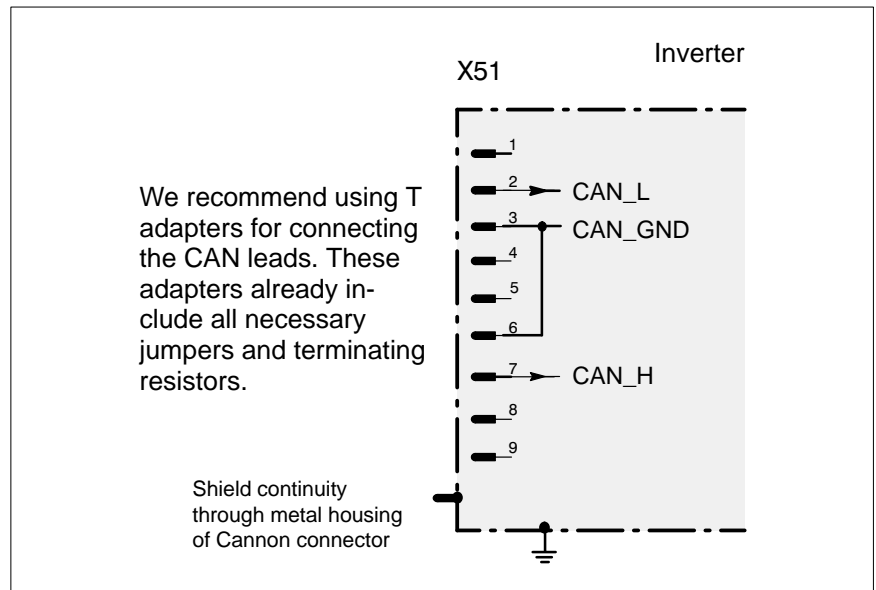
```
s2 =20000
s32 =0b0000.0000.0000.0011
s100 =50.0
.
.
.
```

Notes:

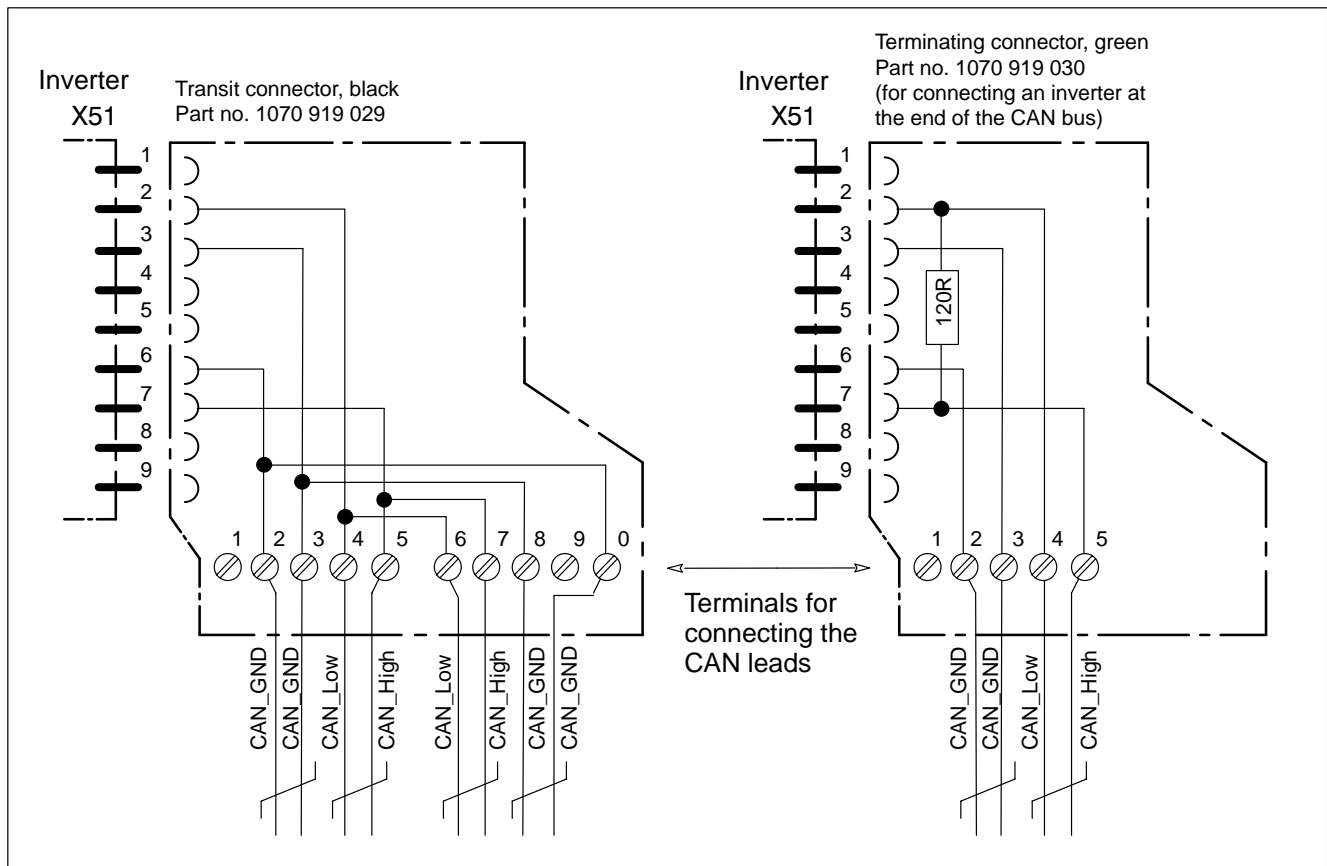


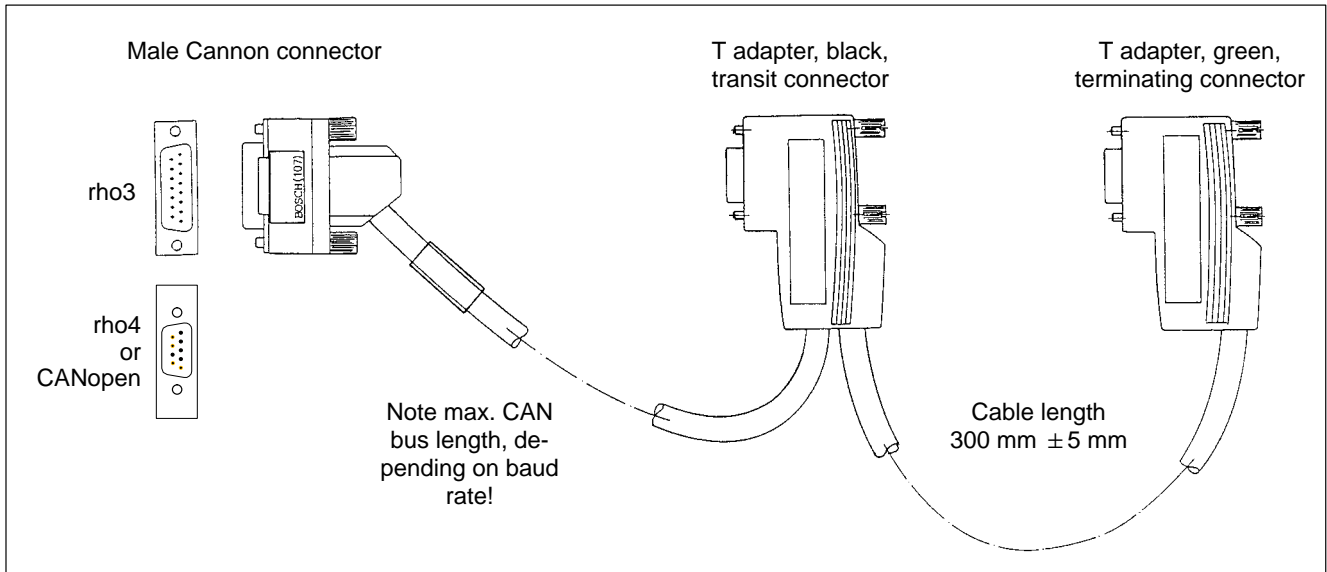
# A Appendix

## A.1 Pin assignment of the CAN interface at the drive (X51)

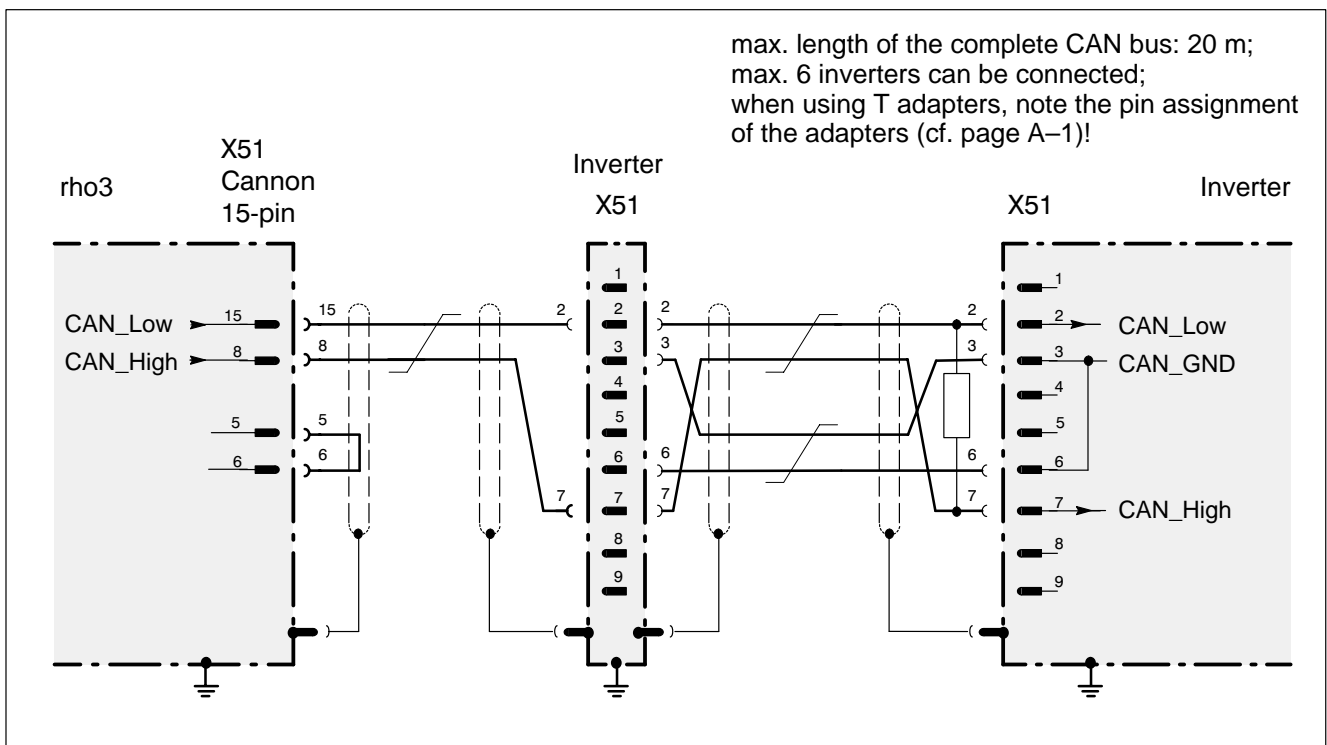


## A.2 Pin and terminal assignment of the T adapters



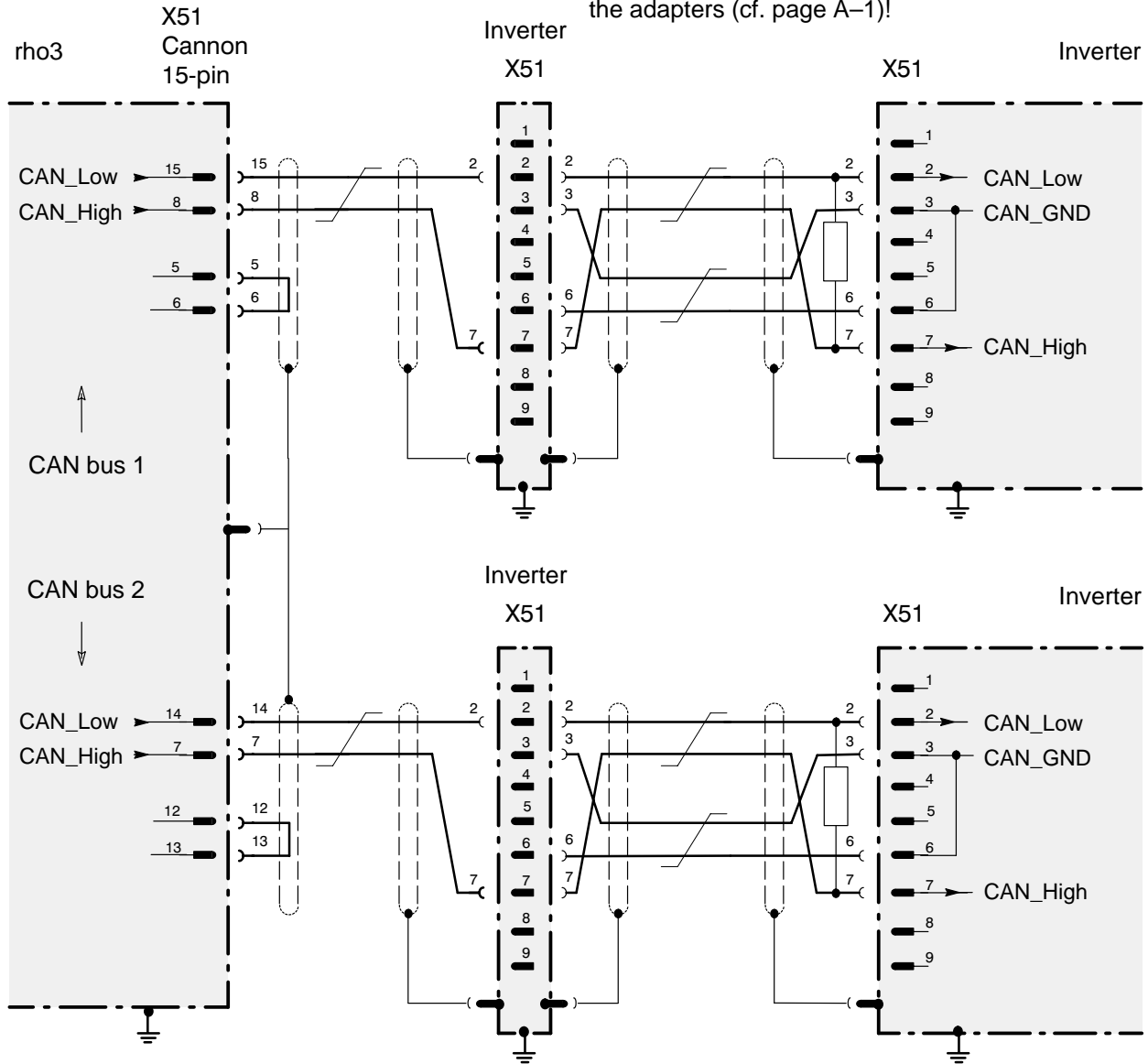


### A.3 CAN bus wiring: rho3 and 1 CAN bus

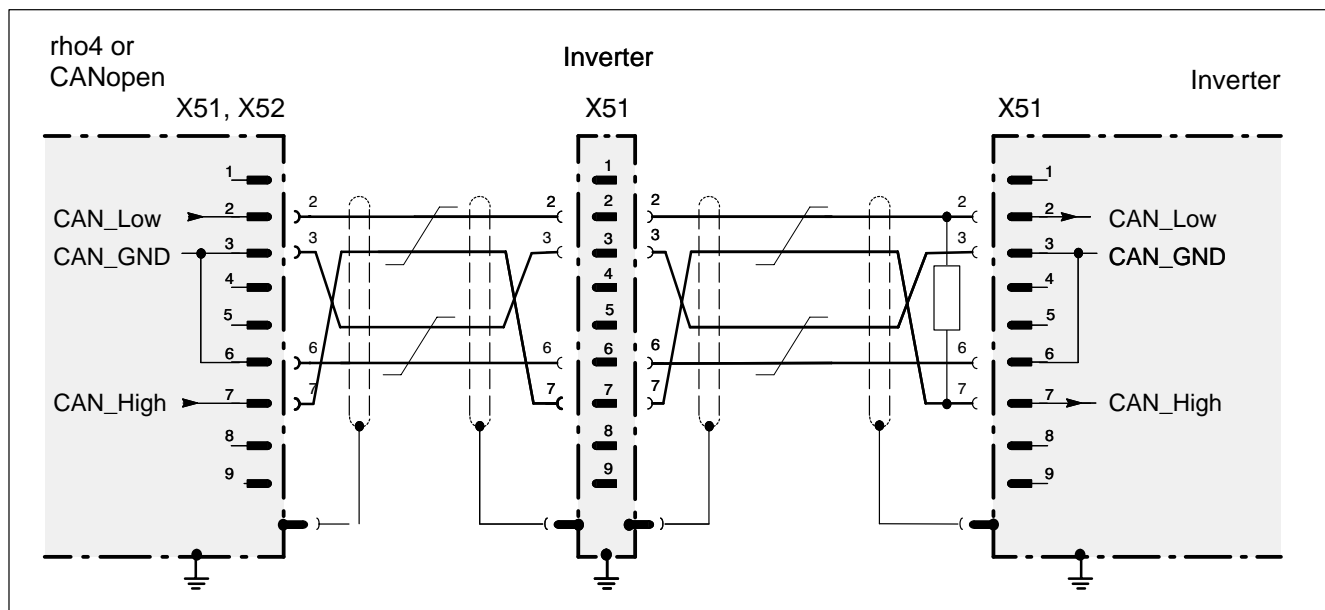


A.4 CAN bus wiring: rho3 and 2 CAN buses

max. length of every single CAN bus: 20 m;  
 max. 6 inverters can be connected to each CAN bus;  
 when using T adapters, note the pin assignment of  
 the adapters (cf. page A-1)!



## A.5 CAN bus wiring: rho4



One CAN bus can be connected to X51 and X52, each. The max. length of every single CAN bus depends on the baud rate used (cf. page 2–4)!

The rho4 control is capable of managing a maximum of 24 axes and 16 kinematics. Although in theory all axes can be addressed by 1 CAN bus, it is better to distribute all axes over both CAN buses. The maximum number of axes may be limited by the required clock frequency (rho parameter P5) and other equipment linked to the CAN bus (e.g. I/O modules).

When using T adapters, note the pin assignment of the adapters (cf. page A-1)!

On the rho side, no T adapter can be used for reasons of space!

## A.6 Index

### A

Acceleration bipolar, 4–6  
 Amplifier warning temperature, 4–6  
 Analog measuring outputs, 4–13  
 Analog output of parameter values, 4–13  
 Automatic/manual mode, 4–12

### B

Backup, 4–20  
 Band stop, 4–18  
 Band stop configuration, 4–18  
 Bipolar speed limit value, 4–6  
 Bipolar torque limit value, 4–6  
 Block diagram, 4–17  
 Braking resistors, 4–8

### C

CAN bus, connection, A–1  
 CAN LED, 2–10  
 Cannon connector, CAN bus, A–1  
 Changing over the parameter set, 4–11  
 Changing phases, 3–8  
 Checking the hardware, 2–2  
 Clock Start time, 2–8  
 Commissioning  
   Initial, 4–1  
   Series, 5–1  
 Communication, between the drive and DSS, 2–5  
 Communication between rho and drive, 2–8  
 Communication error F10, 3–8  
 Configuration of inputs, 4–8  
 Configuration of outputs, 4–8  
 Configuring the CAN interface, 2–4  
 Connection, DSS to drive, 2–5  
 Cycle time, 2–8

### D

Diagnoses, 6–1  
 Diagrams, cyclic, 6–5  
 Display control word CANrho, 6–5  
 Display status word CANrho, 6–5  
 Displaying data, cyclic, 6–2  
   in separate window, 6–6  
   parameter definition, 6–3  
   updating frequency, 6–3  
 Displaying I/O signals, 6–4  
 Documentation, 1–7  
 Documenting the parameters of a drive, 6–7  
 Download parameter list, 4–3  
 Drive  
   Display configuration, 6–1  
   Displaying the status, 6–2  
   ON, Enable, Start, 6–2  
 DSS, initialize, 2–7  
 DSS monitor, 3–3  
   Load file, 3–3  
   Save file, 3–4

### E

EMC Directive, 1–1  
 EMC product standard, 1–1  
 EMERGENCY–STOP circuit, Check functioning, 2–3  
 EMERGENCY–STOP devices, 1–5  
 Enable signal, external, 4–7  
 Errors, resetting, 3–10  
 ESD  
   Electrostatic discharge, 1–6  
   grounding, 1–6  
   workplace, 1–6  
 ESD–sensitive components, 1–6  
 Establish connection, Drive–DSS, 2–6  
 Establishing connection, Drive–rho, 2–10  
 Exit the DSS program, 3–1

### F

F06 error message on H1, 4–13  
 F10 error message on H1, 3–8  
 F13 fault message on H1, 4–6  
 FEPR0M  
   Backup, 4–1, 4–20  
   copy to the RAM, 3–10  
 Filling in a template, 6–7  
 Filter configuration, 4–18  
 Firmware version, 6–1  
 Floppy disk drive, 1–7

### G

Grounding bracelet, 1–6

### H

Halting mode, 4–7  
 Hard disk drive, 1–7  
 Holding brake  
   Check control logic, 2–3  
   Controlling via OUT3, 4–8

### I

IDN Backup, of the original parameters, 4–1  
 IDN backup, 4–20  
 Initial commissioning, 4–1  
 Initializing, DSS, 2–7  
 Inport, 4–8  
 Interface  
   Configuring CAN, 2–4  
   disconnect connection cable, 2–7  
   setting parameters for RS–232, 2–5  
   X51, 2–4

### L

LED "CAN", 2–10  
 Load file, into the DSS monitor, 3–3  
 Low pass, 4–18  
 Low–Voltage Directive, 1–1

**M**

Machinery directive, 1-1  
Main memory  
  load, 3-10  
  save, 3-9  
Main operating mode, 4-5  
Manual mode, 4-12  
Measuring activities, 1-5  
Modifications, 1-8  
Module change, 2-7  
Module configuration display, 6-1  
Module type, 6-1  
Modules sensitive to electrostatic discharge. *See* ESD-sensitive components  
Monitoring window, 4-6  
Motor switch-off temperature, 4-6  
Motor type, 6-1  
Motor warning temperature, 4-6

**O**

Offline, 2-6  
OM4 optional module, 4-13  
Operating frequency of the power output stage, 4-5  
Optimizing the drive controller, 4-14  
Optimizing the speed control, 4-15  
Output, 4-8

**P**

P5, 2-8  
Parameter lists, transmitting to the drive, 3-4  
Parameters, display cyclically, 6-6  
Password, 3-7  
Pin assignment, X99, 2-5  
Plug brake, Controlling via OUT4, 4-8  
Plug brake enable delay, 4-8  
Plug braking, 4-8  
Plug braking resistor, Check control logic, 2-3  
Positioning acceleration, 4-6  
Power output stage, Operating frequency, 4-5  
Proper use, 1-1  
Protection against unauthorized interventions, 3-7

**Q**

Qualified personnel, 1-2

**R**

Release, 1-7  
Reset, 2-7  
rho, parameter list, 4-3  
RS232, 2-5

**S**

S-0-0002, 2-8  
Safety instructions, 1-4  
Safety markings, 1-3  
Saving all data, 4-20  
scs file, offline editing, 4-22  
Selecting the language, 3-5  
Series commissioning, 5-1  
Signals, I/O, 6-4  
Software version, 6-1

Spare parts, 1-6

**T**

Telegrams, cyclic, 6-5  
Temperature warning, via OUT2, 4-8  
Template file, 4-1  
Torque monitoring, 4-10  
Torque reduction  
  via digital input signals, 4-11  
  via rho4, 4-12  
Trademarks, 1-8

**U**

User groups, 3-7

**V**

Velocity controller, 4-18

**W**

Waiting time drive off, 4-7  
Waiting time drive on, 4-7  
Work directory, 4-20

**X**

X51 connection, A-1

# Bosch Automation Technology

---

## Australia

Robert Bosch (Australia) Pty. Ltd.  
Head Office  
Cnr. Centre - McNaughton Roads  
P.O. Box 66  
AUS-3168 Clayton, Victoria  
Fax (03) 95 41 77 03

## Great Britain

Robert Bosch Limited  
Automation Technology Division  
Meridian South Meridian Business Park  
GB-LE3 2WY Braunstone  
Leicestershire  
Fax (01 16) 28-9 28 78

## Canada

Robert Bosch Corporation  
Automation Technology Division  
6811 Century Avenue  
CAN-Mississauga, Ontario L5N 1R1  
Fax (905) 5 42-42 81

## USA

Robert Bosch Corporation  
Automation Technology Division  
Fluid Power Products  
7505 Durand Avenue  
USA-Racine, Wisconsin 53406  
Fax (414) 5 54-81 03

Robert Bosch Corporation  
Automation Technology Division  
Factory Automation Products  
816 East Third Street  
USA-Buchanan, MI 49107  
Fax (616) 6 95-53 63

Robert Bosch Corporation  
Automation Technology Division  
Industrial Electronic Products  
40 Darling Drive  
USA-Avon, CT 0 60 01-42 17  
Fax (860) 4 09-70 80

We reserve the right to make technical alterations

Your concessionary

# BOSCH



Robert Bosch GmbH  
Geschäftsbereich  
Automationstechnik  
Antriebs- und Steuerungstechnik  
Postfach 11 62  
D-64701 Erbach  
Fax +49 (0) 60 62 78-4 28