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Tips for using this handbook

Dear reader,

this screen-guided document is provided with jump labels so that individual items of information can be found easily.

All jump labels are highlighted in colour:

Passages marked in red
refer to information within this document.

Passages marked in blue
refer to information not in this document.

By clicking on the marked passage with the mouse you go directly to the page in the reference.

Please note!
The passages marked blue are not active in this document at present.

CUSTOMER SERVICES ADRESS

ferrocontrol
Steuerungssysteme GmbH & Co.
Postfach 1653
D-32006 Herford
Bodelschwinghstraße 20
D-32049 Herford
Fon +49(0)5221 | 966-0
Fax +49(0)5221 | 66347
E-Mail Info@ferrocontrol.de
Internet http://www.ferrocontrol.de

Trouble-shooting and Spare parts

Fon +49(0)5221 | 966-200
Fax +49(0)5221 | 966-173
E-Mail service@ferrocontrol.de

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Quick-reference manual

for the ferrocontrol Fieldbus system

1st edition, October 98
Document no.: 96-032 000 / English

Target group:

Service technicians, commissioning personnel, skilled workers familiar with the basic functions of automation equipment.

Range of application of this documentation:

This document should serve as a practical guide for the service technician on location when locating and remedying faults.

Complememtary documentation:

You can find a current list of our documentation in the appendix of this manual.

Contents

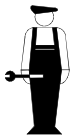
4 What do the individual messages mean?

Meaning of the messages / Tips for trouble-shooting

5 Operating the screen masks

6 Functional modules in the CNC Fieldbus system

Board images, pin configurations, technical data, address settings, DIP switches



7 Cable and connector configuration

Illustrations:

8 Cable length and baud rate in the CNC Fieldbus system

Method of measuring the installed cable length

9 The ferrocontrol industrial PC

9.1 Model range 1.4 (3.4) and 1.3 (3.3)

9 The ferrocontrol industrial PC / continued

Appendix

1.1 Safety information
Instructions you must follow when doing repairs!

Must read!

1. **Interference and repairs carried out improperly can impair the integrated safety and protection functions of an automation system and can, in certain circumstances, cause risk to life and health of persons as well as damage to machinery and plant parts!**

2. **For this reason repairs to our automation systems may only be carried out by suitably qualified skilled workers!**

3. The qualified skilled worker is familiar with the risks and the appropriate safety measures to be taken when dealing with electrical currents.

4. The qualified skilled worker is familiar with the safety and protective measures common to all automation equipment - and in particular with the measures of the relevant machine (plant).

5. The qualified skilled worker can evaluate the damage and risks (caused by incorrect operaion or by failure of a protective function) properly.

6. **Only use original spare parts specified by ferrocontrol**
   Alterations and conversions to our components are not permitted. To do this you need our express permission.

7. **Please observe the valid accident prevention regulations!**
   See VBG 4 and DIN VDE 015.

8. **After servicing or repairs:**
   Before returning the machine to the production process, make absolutely certain that all integrated safety and protective devices are ready to function again. You are obliged to do this. See VBG 4.

9. **Please observe the safety conditions of the machine manufacturer!**

1.2 Password information

Important input masks are protected by a password system against unauthorized access. Our password system permits a classification into a maximum of 9 access levels.

A password status is assigned to every access level. Status 9 has the highest priority. Status 9 gives you access to all levels, status 8 to the levels 1 to 8 and status 7 to the levels 1 to 7 and so on.

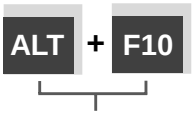
In agreement with the machine manufacturer, ferrocontrol allocates the input masks to a certain access level.

If you wish to obtain access entitlement to a particular level, as a user or service technician, you have to have the required status. You receive the status assignment by entering the appropriate password.

The assignment of passwords for the status 1 to 8 is carried out in the mask: Passwords / assigning (see Quick overview 2.2)
Access to this mask is only possible with status 9!
The password for status 9 is assigned by ferrocontrol.

Notice!
If you wish to alter the configuration data or the controller parameters in the Service menu, you need the password for status 8.

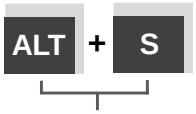
Enter password:



Password entry takes place in the mask: Password / enter
You can call this entry mask from all menu levels using the key combination [ALT] + [F10].
The entry mask appears on the screen.
Enter the appropriate password.
Confirm your entry with the key [F10].

If you have entered a valid password, the status assigned to you is displayed. If the password is invalid, an appropriate message is displayed.

Switching languages:

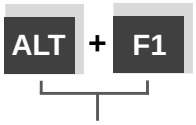


Using the key combination [ALT] + [S] you can switch between two national languages for the menu functions, e.g.:

German <-> English
German <-> French etc.

You can activate this function from every menu level. A prerequisite is, however, that a second language has been integrated for menu functions.

Direct access for test and diagnostic purposes (ATEST)

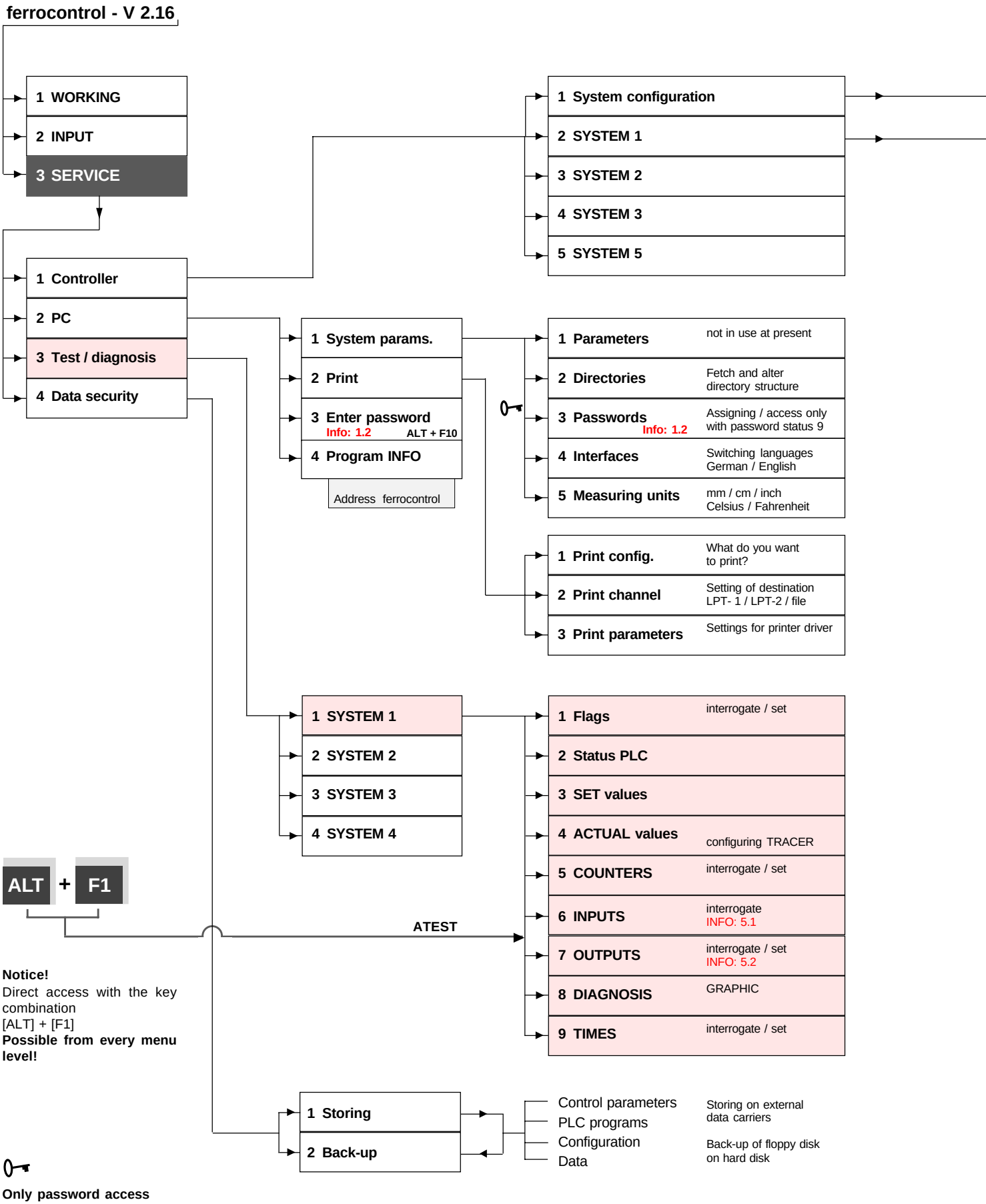


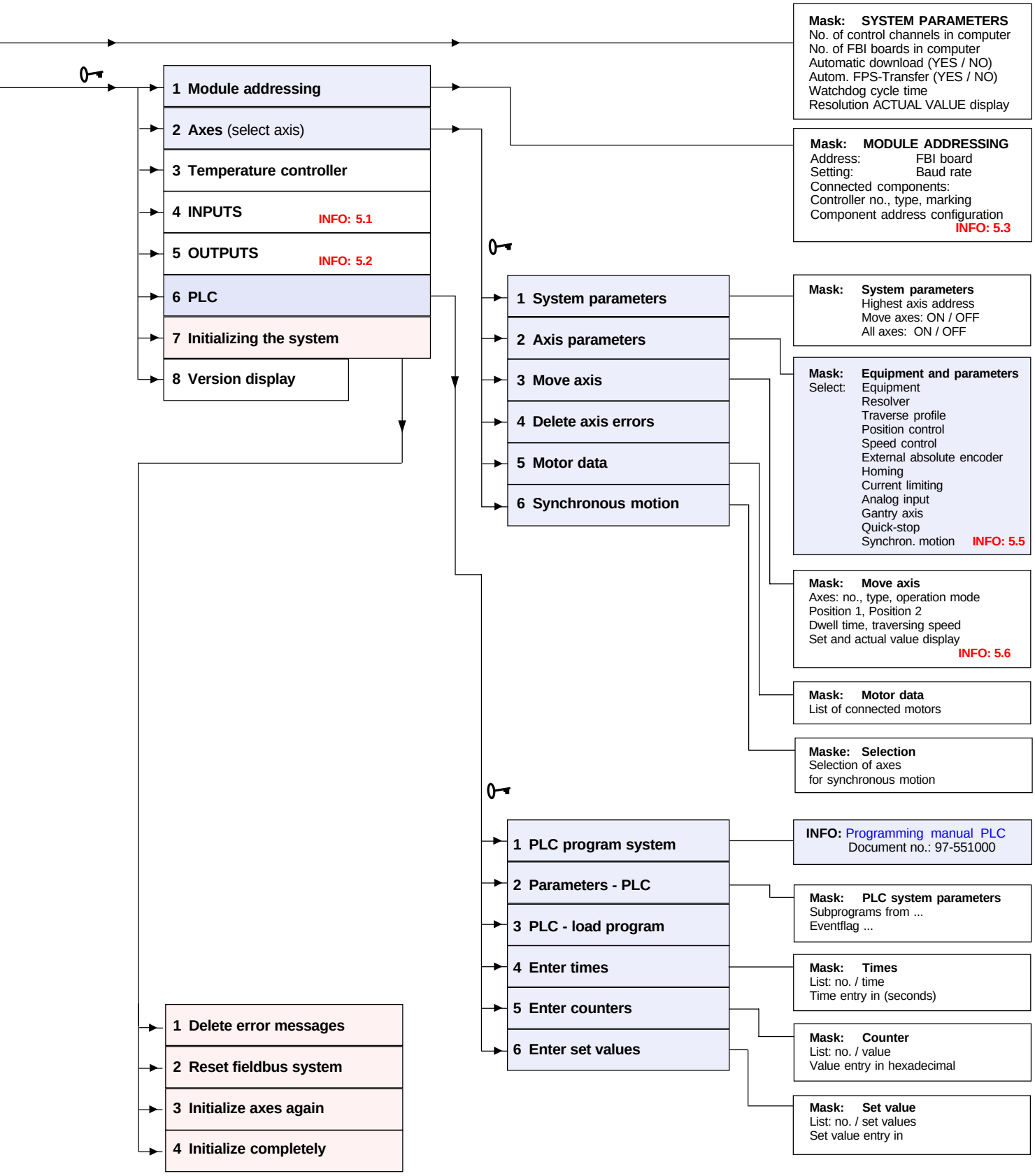
Direct access to the ATEST function is achieved by pressing the [ALT] + [F1] key combination.**This function enables you to inquire current actual values from the controller.**

You can activate this function from every menu level!
With this function you cannot alter configuration data or parameter settings!

2 Functional overview: Service menu

2.2 All functions at a glance




Mask: SYSTEM PARAMETERS
No. of control channels in computer
No. of FBI boards in computer
Automatic download (YES / NO)
Autom. FPS-Transfer (YES / NO)
Watchdog cycle time
Resolution ACTUAL VALUE display
1 Module addressing
2 Axes (select axis)
3 Temperature controller
4 INPUTS
INFO: 5.1
5 OUTPUTS
INFO: 5.2
6 PLC
7 Initializing the system
8 Version display
Mask: MODULE ADDRESSING
Address: FBI board
Setting: Baud rate
Connected components:
Controller no., type, marking
Component address configuration
INFO: 5.3
1 System parameters
2 Axis parameters
3 Move axis
4 Delete axis errors
5 Motor data
6 Synchronous motion
Mask: System parameters
Highest axis address
Move axes: ON / OFF
All axes: ON / OFF
Mask: Equipment and parameters
Select: Equipment
Resolver
Traverse profile
Position control
Speed control
External absolute encoder
Homing
Current limiting
Analog input
Gantry axis
Quick-stop
Synchron. motion
INFO: 5.5
Mask: Move axis
Axes: no., type, operation mode
Position 1, Position 2
Dwell time, traversing speed
Set and actual value display
INFO: 5.6
Mask: Motor data
List of connected motors
Maske: Selection
Selection of axes
for synchronous motion
1 PLC program system
2 Parameters - PLC
3 PLC - load program
4 Enter times
5 Enter counters
6 Enter set values
INFO: Programming manual PLC
Document no.: 97-551000
Mask: PLC system parameters
Subprograms from ...
Eventflag ...
Mask: Times
List: no. / time
Time entry in (seconds)
Mask: Counter
List: no. / value
Value entry in hexadecimal
Mask: Set value
List: no. / set values
Set value entry in
1 Delete error messages
2 Reset fieldbus system
3 Initialize axes again
4 Initialize completely

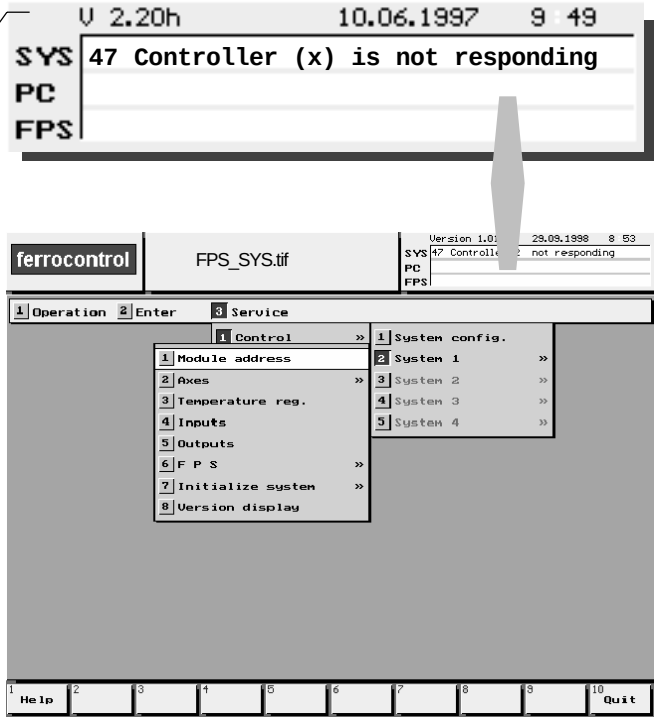
Space for your own notes

The ferrocontrol automation system is equipped with a powerful information and message unit. This aid shows you the current operating status of the plant on the screen.

This effective diagnostic tool is especially useful in determining the cause of a malfunction.

On the following pages you will be shown how this aid can be used effectively.

This display field appears on every screen mask.



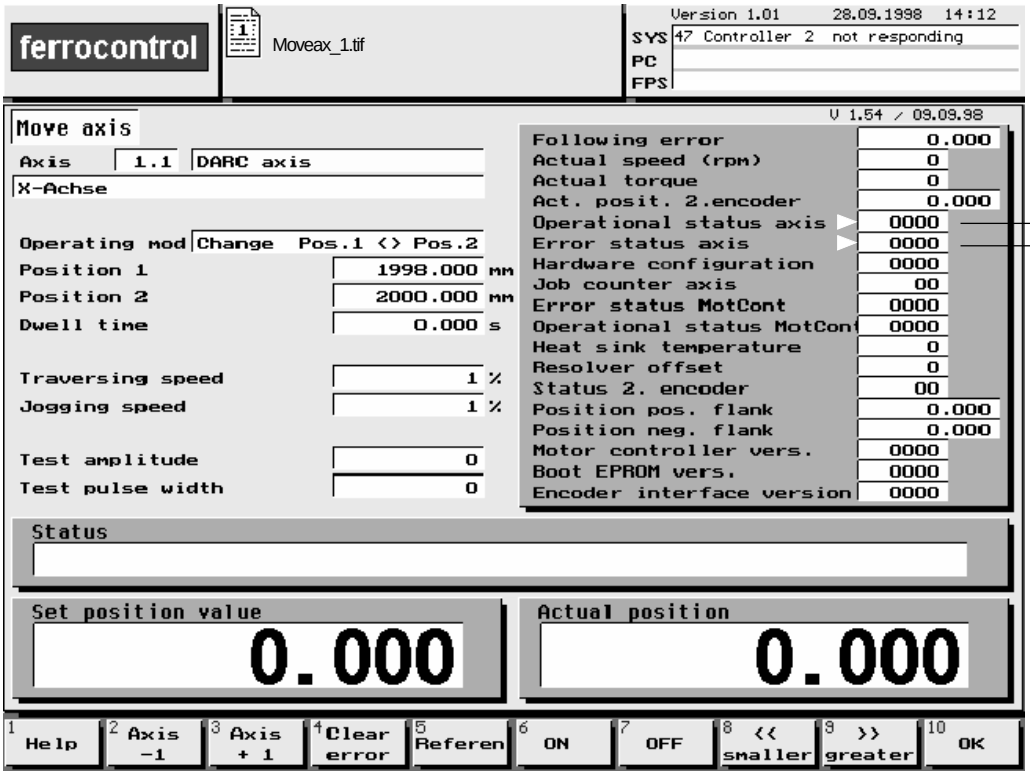
3.1 FPS
This line shows the messages from the **P**rogrammable **L**ogic **C**ontrol section. (PLC)

3.2 PC
This line shows the messages from the industial **PC** section

3.3 SYS
This line shows the complete messages from the Fieldbus **SYS**tem section, including DARC.
The meaning of these messages along with tips for trouble-shooting can be found in this manual in Pos. 4.1

3.3.1 Messages from the axis controller

Screen mask: "Move axis"



Selection of the relevant axis

C 8 4 2
- **lower byte (1st group)**
- **upper byte (2nd group)**

Example:

upper byte
C 8 = Interpolation active

lower byte
4 x = Axis is referenced
x 2 = Temperature monitoring
(x = any status)

Access to this screen mask:

1. Press the key combination **[ALT] + [F1]** -> ATEST
2. Select Position 4 **-SET VALUES-**
3. Select the required axis
4. Press the **[F4]** key for details

Further information about this screen mask
See Pos. 5.6

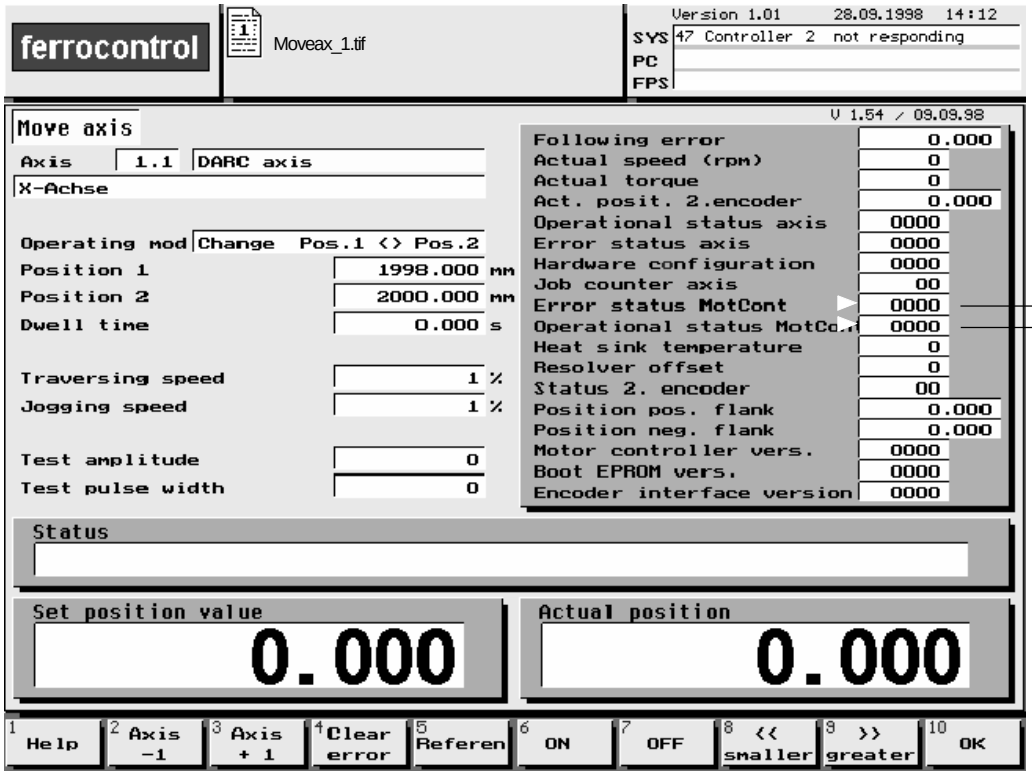
Display: operating status - axis
In older software versions this entry is also called **Axis status** or **Operating status 1**.
These labels are identical!

This display is shown in a hexadecimal numerical system.
The four-digit display is divided into two groups (lower and upper byte).
In 4.2.1 you can see in plain text which operating status lies concealed behind the character combination displayed.

Display: Error status - axis
In older software versions this entry is also called **Error profile generator** or **Error status 1.**
These labels are identical!

This display is shown in a hexadecimal numerical system. In 4.2.2 the plain text shows you which operating status lies concealed behind the character combination displayed.

Screen mask: "Move axis"



Selection of the relevant axis

0 0 0 2
- **Bit - 0...3**
- **Bit - 4...7**
- **Bit - 8...11**
- **Bit - 12...15**

Example: 0002
5-volt voltage error

Example 0200
Stack error

Display: Operating status - motor controller
In older software versions this entry is called
Status motor controller or **Operating status 2.**
These labels are identical!

This display is shown in a hexadecimal numerical system. In 4.3.2 you can see in plain text which operating status lies concealed behind the character combination displayed.

Display: Error status - motor controller
In older software versions this entry is called
Error motor controller or error status 2.
These labels are identical!

This display is shown in a hexadecimal numerical system. In 4.3.1 the plain text shows you which operating status lies concealed behind the character combination displayed.

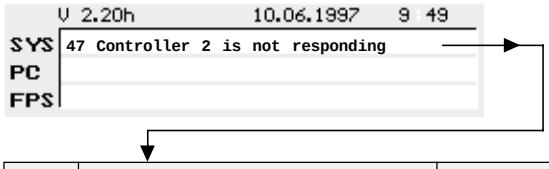
Access to this screen mask:

1. Press the key combination **[ALT] + [F1]** -> ATEST
2. Select position 4 **-ACTUAL VALUES-**
3. Select the required axis
4. Press the **[F4]** key for details

Further information about this screen mask:
See Pos. 5.6

Space for your own notes

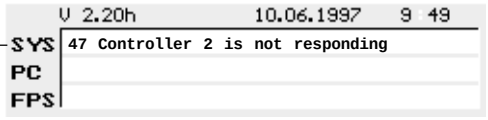
4.1 System messages from the fieldbus system
Message no. 1 to 6



No.:	Message text / English	Tips for fault clearance	Additional information
1	**No encoder value axis no.**	The axis listed is not receiving any actual position value (encoder value). This axis is not started but is stopped immediately! **Check the encoder signal for this axis!** For fault clearance aid see also: **4.2.1 Operating status axis** Message:**D8xx; No encoder value** Check encoder cables!	This message also appears in the mask: **Move axis** **Operating status axis** **Display: D8xx** **The pin configuration of the encoder cables can be found in Chapter 7**
2	**Sluggish axis**	**Following error** During positioning the given set value is constantly compared with the encoder signal (position ACTUAL value). If an inadmissible deviation occurs, the axis is stopped immediately. For fault remedy see also: **4.2.1 Operating status axis** Message: **D9xx Axis sluggish**	This message also appears in the mask: **Move axis** Operating status axis Display: D9xx (Hex) Error status axis Display: 4000
4	**Set value error axis no.:**	**Error in given set value / measuring unit** Your current set value is not within the permitted limits for axis positioning. The axis won't start. **Check your set value setting / measuring unit**	This message also appears in the mask: **Move axis** **Operating status axis** Display: DCxx **Error status axis** Display: 0080
5	**Axis no.: not initialized**	There are no valid axis parameters for this axis. **Remedy:** Reset the the fieldbus system! See also Pos. 2.2 Quick overview service menu: **Initializing the system**	
6	**Profile error axis no.:**	Message from the interpolator. The given contour can't be traversed with these parameters. **Check your set speed value** **Entering the speed is performed in the user program**	See also Position: **4.2.1 Operating status axis** Display: DDxx (hex) **4.2.2 Error status axis** Display: 0800 (hex) Mask: Move axis

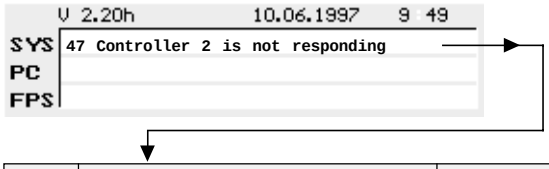
4 What the system and error messages mean

4.1 System messages from the fieldbus system
Message no. 7 to 25



No.:	Message text / English	Tips for fault clearance	Additional information
7	**Argument error axis no.:**	Incorrect interpolation data (e.g. radius = 0). **The axis switches off immediately!** The interpolation could not be performed because the speed at non-constant transitions was too high (negative circle radii). **Remedy:** 1. Check the interpolation data! 2. Exchange the interpolator board!	This message also appears in the mask: **Move axis** **4.2.2 Error status axis** Display: 2000
8	**System error FBIR axis no.:**	**Axis switches off immediately!** **Remedy:** Exchange interpolator for DARC or FBIR	
9	**Error current controller axis no.:**	Message from DARC controller (Current control processor)) **Remedy on location: exchange DARC**	
11	**Quick-stop, positive axis no.:**	The quick-stop (+) input is set at zero. (Limit switch in positive direction) -> clockwise rotation	**See Pos. 6.20** Pin configuration Axis regulation controller (X 1) See also circuit diagram in the appendix (last page) Pos. 22 / KL. X1 / 2 Pos. 23 / KL. X1 / 3
12	**Quick-stop, negative axis no.:**	The quick-stop (-) input is set at zero. (Limit switch in negative direction) -> anticlockwise rotation	
13	**Interpolation error group no.:**	Interpolation error message. You will find information about the cause of the error in the status message of the relevant interpolation group.	
25	**Axis no. inadmissible**	**Check the axis number entry** Your entry exceeds the max. permissible value. **Maximum 63 axes!**	

4.1 System messages from the fieldbus system
Message no. 26 to 51



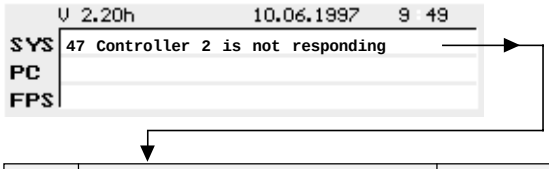
No.:	Message text / English	Tips for error clearance	Additional information
26	**Error in axis parameter transmission**	Configuration error, axis number possibly not entered.	
27	**PLC start refused**	PLC (Programmable Logic Control) has not been loaded. Possibly a file cannot be found when starting the PC program.	
28	**Interpolation error controller**	Erroneous transmission of the interpolation data from the PC to the FBIR board.	
34	**PC; error not defined**	Not defined	
47	**Controller (x) is not responding**	Proceed as follows: 1. Check the power supply to the controller. Check the fuse (F) on the controller board. If the green LED is on = OK. 2. Check the cable connection to the fieldbus system. If the red LED is not on = OK.	**See Pos. 6.2 ...** Fieldbus controller
48 **49**	**Input does not exist** **Output does not exist**	The input address does not exist in the system. The output address does not exist in the system.	
50	**Axis no.: does not exist**	This axis does not exist in this configuration. The configuration data have not been loaded yet.	
51	**No transmission enabling**	**Possible error causes:** 1. Fieldbus not connected 2. Terminating resistor (terminator) is missing 3. No supply voltage at the fieldbus end 4. Fieldbus cable defective	Check supply voltage: **See Pos. 6.1 ...** Connector configuration Fieldbus cable: **See Pos. 7.5**

4 What the system and error messages mean

4.1 System messages from the fieldbus system
Message no. 52 to 58

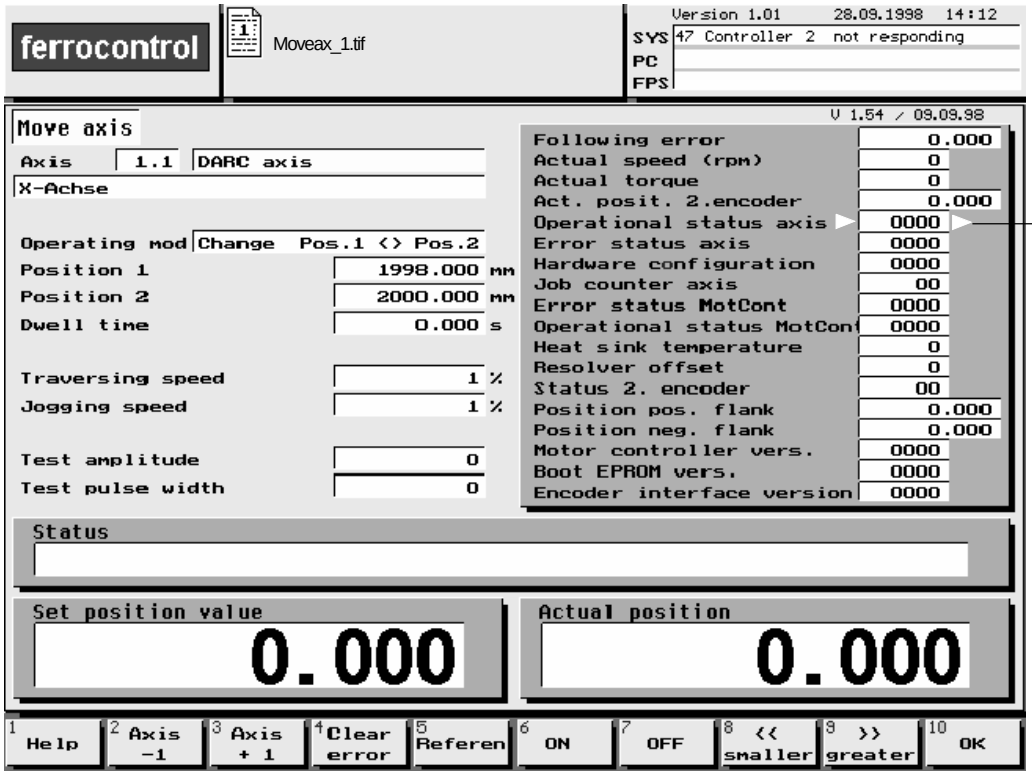
No.:	Message text / English	Tips for error clearance	Additional information
52	**Status error**	Possible causes of error: 1. Fieldbus not connected 2. Terminator is missing 3. No power voltage at the fieldbus end 4. Fieldbus cable defective	Check supply voltage: See Pos. 6.2 ... etc. Connector configuration Fieldbus cables: See Pos. 7.5
54	**Handshake error**	Software versions controller - FBI do not match.	
55	**Configuration error controller**	Error on Parallel bus **Possible causes of error:** 1. The controller has not received any configuration data yet. 2. The voltage supply to the controller was briefly interrupted. 3. Error in the parallel connector	Info: Pos. 6.2 ... etc.
56	**Controller not ready to receive**	Check the configuration in the mask: Module addressing. **Which DARC has not been entered?** **(**Key **F2** = Read configuration)	Mask: Module addressing See Pos. 5.3
57	**No acknowledge controller**	Check your configuration! **Which controller has not been entered?** No confirmation received for axis command. Error on the fieldbus, poss. incorrect software version.	
58	**Fieldbus error on controller**	**Erroneous protocols, too many errors during data transfer!** 1. Make sure that the cable lengths in the field-bus system have not been exceeded. **Max. cable length = See Pos. 8.1 and 8.2** 2. Make sure that the fieldbus cables are not damaged. Pay special attention to earthing and screen cables. 3. Hardware error controller board Exchange the controller board.	**Notice! EMC** If earthing and screen cables are defective or improperly connected, it can lead to EMC irradiation (and thus to de-fective data transfer)! **Info EMC:** **See Manual** **CNC-Fieldbus** **Section: Commissioning**

4.1 System messages from the fieldbus system
Message no. 59 to 64



No.:	Message text / English	Tips for error clearance	Additional information
59	**No interpolator**	Your axis controller module does not have an interpolating function	
60	**Timeout on controller**	Erroneous data transfer on the fieldbus: **1.** Check the cable and plug connectors. **2.** Exchange the FBI board.	Connector configuratiuon fieldbus cable **See Pos. 8.1 and 8.2**
61	**No digital controller**	A special command for the digital axis controller was sent to another controller.	
62	**Axis still has a job**	The axis is still occupied and so no new job can be taken on at the moment. **Notice!** If necessary correct the positioning window in the parameter "Position control"	**Info:** Position control mask **See Pos. 5.5.4** and manual **DARC System** Commissioning and Service Chapter 6.3.5.6
63	**Incorrect interpolation group**	This message appears: 1. if an incorrect interpolation group has been defined in the PLC. 2. if there is no interpolator.	
64	**Watchdog elapsed**	This message appears if the watchdog function has elapsed and the contact on the FBI board is open. Notice! Problems with the mains connection can also cause this message to be sent. If necessary exchange the FBI board.	**Info:** **See Pos. 6.1**

4.2 Messages from the axis controller
Mask: Select Move axis



Display: Operating status axis
In older software versions this entry is also called
Axis status or **Operating status 1. These labels are identical!**

This display is shown in a hexadecimal numerical system.
The four-digit display is divided into two groups (lower and upper byte).

Please note!
The four-digit display allows 2 to a maximum of 3 independent items of information to be displayed simultaneously

Example:

C 8 4 2
lower byte (1st group)
upper byte (2nd group)

The display C 8 4 2 contains the following information:

C 8 X X = 1. Interpolation active
X X 4 X = 2. Axis has been referenced
X X X 2 = 3. Temperature monitoring / excess temperature

(X = any status)

Error display	Description of error	Tips for error clearance	Additional information
xxx2	**TM (Temperature Monitoring) responds after 20 seconds** Temperature monitoring is carried out in the power output of the power supply. This message is sent if the temperature measured is > 100 °C.	**Possible causes of error** a) Dimensional error, power requirement of the axis drive is too high. b) Ambient temperature too high. c) Current flow too high, possible short circuit, fine fault, earth fault **Also check the messages:** **0004 Error status motor controller** Short circuit, earth fault, excess current in the power circuit **0001 Error status axis** Heat sink temperature too high	**Manual** **DARC System** **Pos. 4-7.14**
xxx4 **xxx8**	**Axis is interpolating** **Axis stopped**	**Axis is interpolating** **Axis has been stopped** (e.g. PLC).	
xx1x **xx2x** **xx4x**	**Referencing is performed in this cycle** **Master referencing complete** **Axis referenced**	Information about master referencing see ->	**Manual** **DARC System** Pos. 6-3.5.1
xx8x	**Automatic resolver adjustment complete**		
BBxx	**Positioning is active**		
C7xx	**Gearing active** This axis is being led by a master axis. You can find the allocation to a master axis in the mask: Equipment and parameters Selection: Equipment		
C8xx	**Interpolation active**		
C9xx	**Test mode active**		
CAxx	**Automatic resolver adjustment active**		
CBxx	**Torque control is active**		
CCxx	**Position control is active**	**You can switch on or off position control** Mask: Move axis **Softkeys: ON / OFF**	**Pos. 5.6.2** Mask: **Move axis**
CDxx	**Axis is in defined window**		

4.2.1 Operating status axis

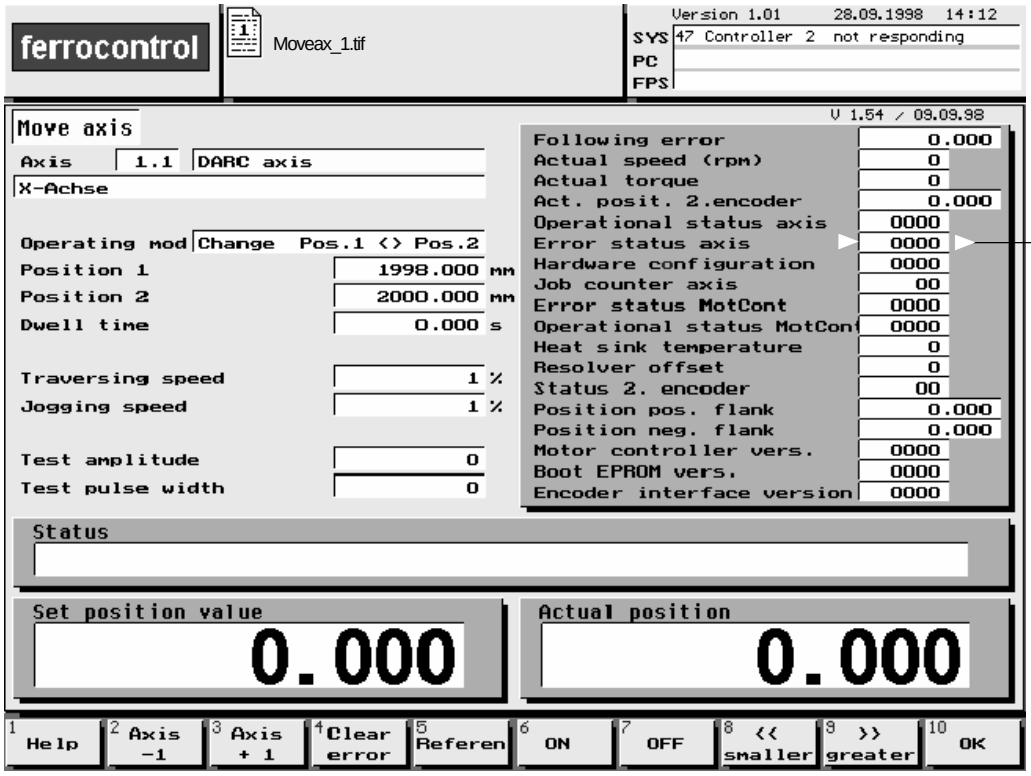
Error display	Description of error	Tips for error clearance	Additional information
CExx	**Synchronous start has been prepared**	only message	
CFxx	**Position control inactive (disabled)** (See also Message CCxx)	only message	
D1xx	**Transmission error on DARC parallel bus**		
D2xx	**Temperature switch-off controller-**		
D3xx	**Temperature switch-off motor-**		
D4xx	**Motor controller error** This message basically appears if an error message has been sent by the motor controller. You can find more detailed information about the state of the motor controller in: **Error status - motor controller** **Operating status - motor controller**	***Notice!*** *In older software versions you will find the expression **Error profile generator** or **Error status 1** instead of **Error status axis**.* *These messages are identical!*	
D5xx **D6xx**	**Quick-stop positive** **Quick-stop negative**		**Pos. A.3** Circuit diagram in the appendix **Pos. 6.20** X1 / Peripheral devices and holding brake
D7xx	**Inadmissible nominal speed**		
D8xx	**No encoder value**	**Proceed as follows to remedy the cause:** 1. Determine the encoder type in operation with this axis. You will find the allocation in the mask: Equipment and parameters Selection: Equipment a/ Resolver b/ Absolute position encoder DARC c/ Absolute position encoder Fieldbus SAE-IN d/ Incremental encoder DARC e/ Incremental encoder Fieldbus-INC 2. Proceed as follows depending on the encoder type: **a/ Resolver** Check the power connection between the DARC module and the resolver. Check that the plug-in connections are fixed firmly. -> Continued on next page...	**Pos. 7.1** Pin configuration Resolver connection

Error display	Description of error	Tips for error clearance	Additional information
D8xx	**No encoder value** /continued	If it is possible, take a second resolver signal and plug it into the "faulty" DARC input. If you now get an encoder signal, the cause of the error can be found in the resolver or in its line terminal. Check the line connection to the "faulty" resolver with a resistance meter (ohmmeter).	
		b/ **Absolute position encoder / DARC system** Check the line connection between the DARC module and the absolute position en-coder. Make sure the plug-in connections are firmly fixed. If it is possible, take a second encoder signal (of the same type) and plug it into the "faulty" DARC input. If there now is an encoder signal, the error is to be found in the first encoder or its line terminal. Check the line connection to the "faulty" absolute position encoder with a resistance meter (ohmmeter).	**Pos. 7.2** Pin configuration Absolute position encoder DARC input
		c/ **Absolute position encoder** **Fieldbus system** Check the following on the FB-SAE-IN module: 1. The operating voltage display LED 4 / green / U_{OP} = 24 V 2. The fusible cutout = 1 A (time-lag) 3. Check LED 1, 2 and 3 for the encoder signal. If the line connection to the encoder = OK, the relevant LED glows a weak red. 4. Exchange the SAE-IN module	**Pos. 6.10** Card diagram FB-SAE-IN
		d/ **Incremental encoder / DARC system** Check the line connection between the DARC module and the incremental en-coder. Check that the pin connections are properly fixed. If it is possible, take a second encoder signal (of the same type) and plug it into the "faulty" DARC input. If there now is an encoder signal, the error is to be found in the first encoder or its line terminal. Check the line connection to the "faulty" incremental encoder with a resistance meter (ohmmeter).	**Pos. 7.3** Pin configuration Incremental encoder -> DARC input

Error dsplay	Description of error	Tips for error clearance	Additional information
D8xx	**No encoder value** /continued	**e/ Incremental encoder / Fieldbus system** **Check:** The operating voltage display on the FB-INC-1 module = LED 3 (green), U_{OP} = 24 V. The fuse for operating voltage = 1 A (time-lag). If possible, take a second encoder signal (of the same type) and plug it into the "faulty" input of the INC-1 module. If you now have an encoder signal, the cause of the error can be found in the first encoder or in its line terminal. Check the line connection to the "faulty" incremental encoder with a resistance meter (ohmmeter).	**Pos. 6.11** Card diagram FB-INC-1 Modul **Pos. 7.3** Pin configuration Incremental encoder -> fieldbus system
D9xx	**Sluggish axis** During positioning the given set value is constantly compared with the encoder signal (actual position value). If an inadmissible deviation occurs here, it leads to this error message. ⚠ **Important notice** This error message only appears if the monitoring function of the appropriate axis is switched on! Info: see preceding column **Possible causes of this error are:** **1.** Incorrect commissioning Incorrect setting-up of the controller Axis regulator parameters not correctly adjusted. **2.** Interface connection to actual value encoder not O.K. Ageing / wear and tear of gears / slip Bearing play/ friction Servo-motor running with too great a load Servo-motor running with too small a load	**Proceed as follows to determine the cause:** Move the axis by hand in Service mode **1.** Select the Service mode **2.** Select the mask: Move axis **Assistance:** See also Menu overview, Pos. 2.2 See also Mask display, Pos. 5.6.1	**Switch ON or OFF monitoring function** **1.** Select mask: Equipment and parameters **2.** Select: Position controller **3.** Select position: Axis monitoring See also Pos. 5.5.4

Error display	Description of error	Tips for error clearance	Additional information
DAxx	**No axis parameters loaded**		
DBxx	**Axis not referenced**		
DCxx	**Set value limits exceeded** Your set value input is outside the permissible limits for axis positioning.	**Check your set value input**	
DDxx	**Axis profile error** The stated contour can't be executed with these parameters **This message also appears under Error status : 0800**	**See Error status axis:** **Message 0800** ***Notice!*** *In older software versions you will find the expression Error profile generator or also Error status 1 instead of the message line Error status axis.* *These messages are identical!*	
DExx	**Internal error in the interpolator**		
DFxx	**Incorrect interpolation data**		
E0xx	**Error message from the supply controller** (No enabling from the supply module)	**Cause:** D.c. link voltage not available! 1. Check the LED display: Uz on the DARC supply module. 2. Check the voltage supply L1 / L2 / L3 from the supply module Check the fuse!	**Pos. 6.21** Diagram DARC supply module **Pos. A.3** Circuit diagram in the appendix
E1xx	**External enabling signal is missing**	Check the **(+ 24 volts)** power supply for the enabling signal! Measuring point: **DARC supply module** **Terminal X6 / No. 3**	**Pos. 6.21** Diagram DARC supply module

Screen mask:
Move axis



Display: Error status - axis
In older software versions this entry is also called:
Error profile generator or **Error status 1. These labels are identical!**

This display is represented in a hexadecimal numerical system.

Error display	Description of error	Tips for error clearance	Additional information
0001	**Heat sink temperature too high**	Power output (in the power supply) too hot.	
0002	**Motor temperature too high** Axis is switched off after 30 seconds due to too high motor temperature. (Bimetallic contact -> motor)	Bimetallic contact, see Circuit diagram in the appendix (last page) Position 18. See also axis regulation controller diagram Pos. 6.20 (Terminal X1-1).	**Pos. 6.20**
0004	**Error motor controller** Causes the axis to be switched off immediately! **This message also appears under Error status axis: 0800**	**You can find a detailed error description under Error status motor controller** ***Notice!*** *In older software versions you will find the expression **Error profile generator** or also **Error status 1** instead of **Error status axis.** These messages are identical!*	

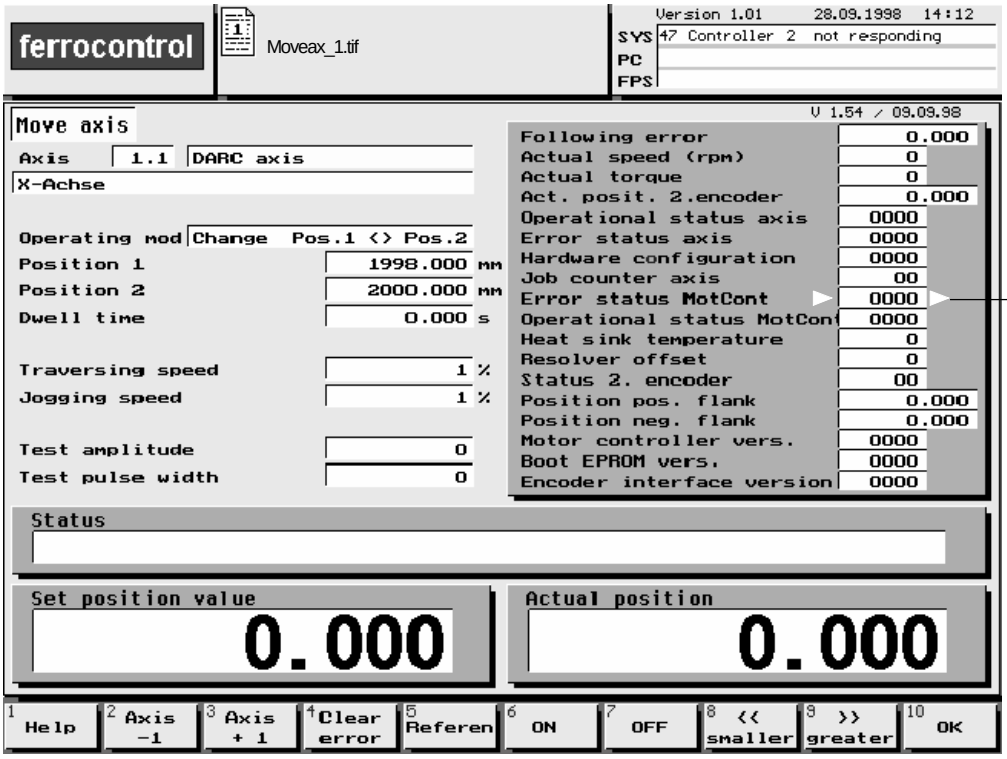
Error display	Description of error	Tips for error clearance	Additional information
0008 **0010**	**Quick-stop, negative** **Quick-stop, positive** Causes immediate halt Can only be moved on in enabled direction.	See circuit diagram in the appendix (last page)	**Pos. 6.20** DARC. X1 (Terminal 2 and 3)
0020	**No parameters exist in axis module** Effect: axis cannot be switched on.		
0040	**Axis not referenced** Thus only jogging, referencing and gearing are possible.		
0080	**Set value error** Axis switches off immediately.		
0200	**Data errror on the Parallel bus**		
0400	**No enabling from supply module**		
0800	**Profile error** Axis switches off immediately. The stated contour can't be executed with these parameters.	**Cause:** **1.** The speed selected for this profile is not possible. Check your speed setting. **2.** Incorrect interpolation data. Exchange the axis controller card.	
1000	**Internal error** Axis switches off immediately.	**Remedy:** Exchange axis regulation controller.	**Pos. 6.20**
2000	**Argument error** Axis switches off immediately. Error in the interpolator.	**Remedy:** Exchange card with interpolator.	
4000	**Following error (sluggish axis)** Axis switches off immediately if the preset following error value has been exceeded. ⚠ **Important notice** This error message only appears if following error monitoring for this axis is turned on. Info: see preceding column.	See also Operating status - axis **Message: D9xx Sluggish axis**	Switch on and off following error monitoring: **See Pos. 4.2.1** Operating status - axis Error message **Sluggish axis**
8000	**Encoder error** Axis switches off immediately. If an error "external encoder" occurs, only jogging is possible! See also Operating status - axis: **D8xx No encoder value**		

4.3 Messages from the motor controller
4.3.1 Error status motor controller

Screen mask:
Move axis

Display:
Error status
motor controller

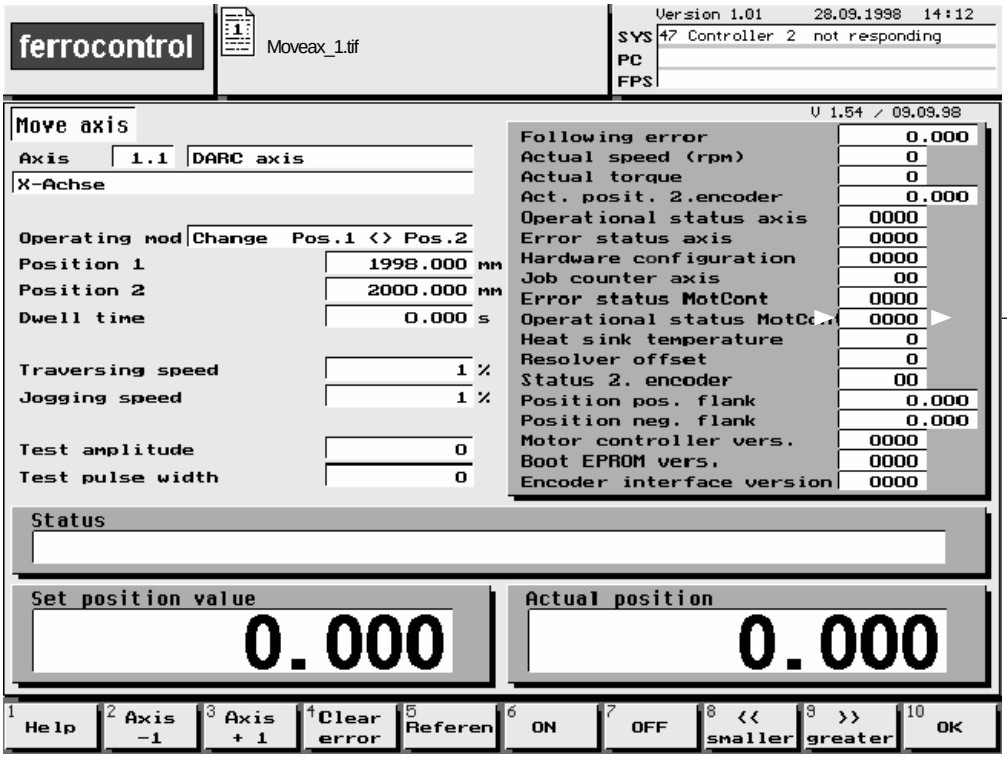
This display is shown in a hexadecimal numerical system



Error display	Description of error	Tips for error clearance	Additional information
0001	**Run-time / interrupt error** If the program structure is disturbed, the axis is switched off.		
0002	**5 Volt voltage error** This causes immediate switch-off if the 5 volts operating voltage is not within the nominal range.	On location: exchange motor controller	
0004	**Short circuit / earth contact / overcurrent in the power circuit** Causes immediate switch-off to protect the power outputs.	If this error message occurs very frequently, the cause can also be an incorrect parameter input (gain-current controller). In this case reduce the gain by 10 %. 1. Select the mask: **Equipment and parameters** (see 2.2). 2. Press the key combination **[Contr.] + [F4]** (motor data). This mask appears: **Motor / controller combination** 3. Reduce the parameter: **Current regulator: gain**	
0008	**Resolver error** The axis module does not switch on if e.g. the resolver feedback is missing. The resolver feedback is checked after every first-time axis enabling (after reset).	**Check:** Cable and plug connections	**Pos. 7.1** Pin configuration Resolver cable

Error display	Description of error	Tips for error clearance	Additional information
0010	**Heat sink temperature in the controller exceeded**	**1.** Axis drive dimensioning correct? **2.** Switching cabinet ventilation OK? Fan filter dirty? **3.** Ambient temperature too high?	
0020	**Motor temperature exceeded Bimetallic contact in the motor has triggered.**	x-1 terminal (motor temperature)	**Pos. A.3** / Circuit diagram in the appendix: (18)
0080	**Current measuring adjustment error** Causes immediate switch-off.	Diagnostic aid for ferrocontrol testing station	
0100	**IGBT - Output switch-off** Causes immediate switch-off.	IGBT excess current, e.g. due to incorrect motor parameters **Remedy on location:** Exchange motor controller module	
0200	**Stack error** Causes immediate switch-off.	Stack overflow in the motor controller **Remedy on location:** Exchange motor controller module	
0400	**The permissible speed deviation has been exceeded** Causes immediate switch-off.	Correct the preset value for the permitted speed deviation. In the axis parameters select the mask: **Equipment and parameters**. Press the key combination **[Ctrl] + [F4]** = Motor data. This mask appears on the screen: **Motor controller combination.** Set the parameter: **Switch-off threshold - speed monitoring** to the value = **0**.	
0800	**Run-time error in the speed controller**		
1000	**RAM test error** After every reset the communication RAM in the axis module is checked. If the result is negative, the axis controller cannot be switched on.	**Remedy on location:** Exchange motor controller module	
2000	**Error in digital transformer -> resolver** After every reset the digital converter in the resolver is checked. If the result is negative, the axis controller cannot be switched on.		
4000	**Bit checking error in the resolver** After every reset the microcontroller databus is checked by the resolver in the axis module. If the result is negative, the axis controller cannot be switched on.	The digital transformer can be found on the motor controller module **Remedy on location:** Exchange motor controller module	
8000	**Synchronous error** Causes immediate switch-off. Signal transmission error on the internal Parallel bus.	Check the plug-in connector (X30) on the top side of the DARC.	**Pos. 6.20** **Pos. 6.21** DARC diagram

Screen mask:
Move axis



Display: Operating status - motor controller
In older software versions this entry is called
Status motor controller or **Operating status 2.**
These labels are identical!

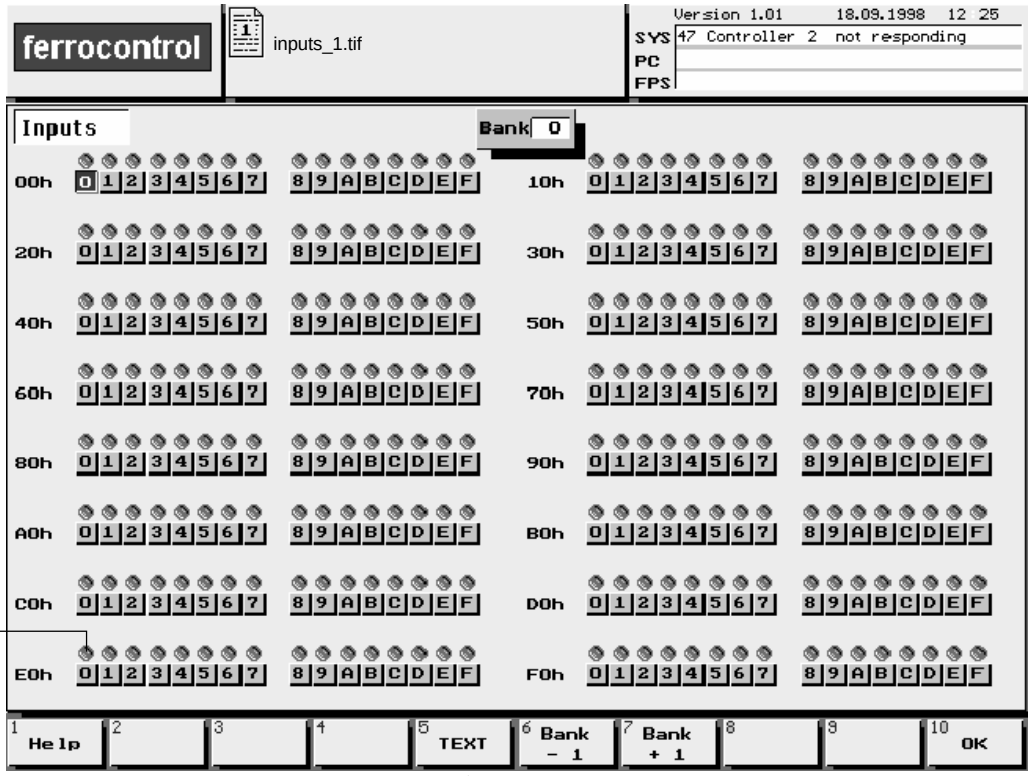
This display is shown in a hexadecimal numerical system

Error display	Description of error	Tips for error clearance	Additional information
0000	**Output is switched off (disabled)** See also Message 0040 = Output is switched on.		
0001	**In the last position control cycle a negative measuring edge was detected.**	You can find more information in the DARC system manual Pos. 4.4.15 Control in- and outputs	**DARC System Manual** **Pos. 4.4.15**
0002	**In the last position control cycle a positive measuring edge was detected.**		
0008	**Level at measuring input** Diagnostic aid for ferrocontrol testing station		
0010	**Warning!** **Heat sink temperature exceeded**	Power supply temperature too high	
0020	**Warning!** **Motor temperature exceeded**	Check motor bimetallic conatct	See circuit diagram in the appendix: A.3
0040	**Output is switched on (enabled)** See also message 0000 = Output is switched off		
0080	**Only for ferrocntrol testing station** Causes immediate switch-off		
0100	**Peak current limiting is active** (only status message)		
0200	**Nominal current limiting is active** (only status message)		
1000	**Enable-PIN input is set**	Contact X6 (Terminal 3) is set. DARC power supply **See Pos. 6.21**	DARC system manual Pos. 4.4.15
2000	**Only for ferrocontrol testing station**		
8000	**Automatic resolver adjustment** (only status message)	Enable software in the communication RAM is set.	

Space for your own notes

Access to this mask:

See under 2.2
Overview service menu



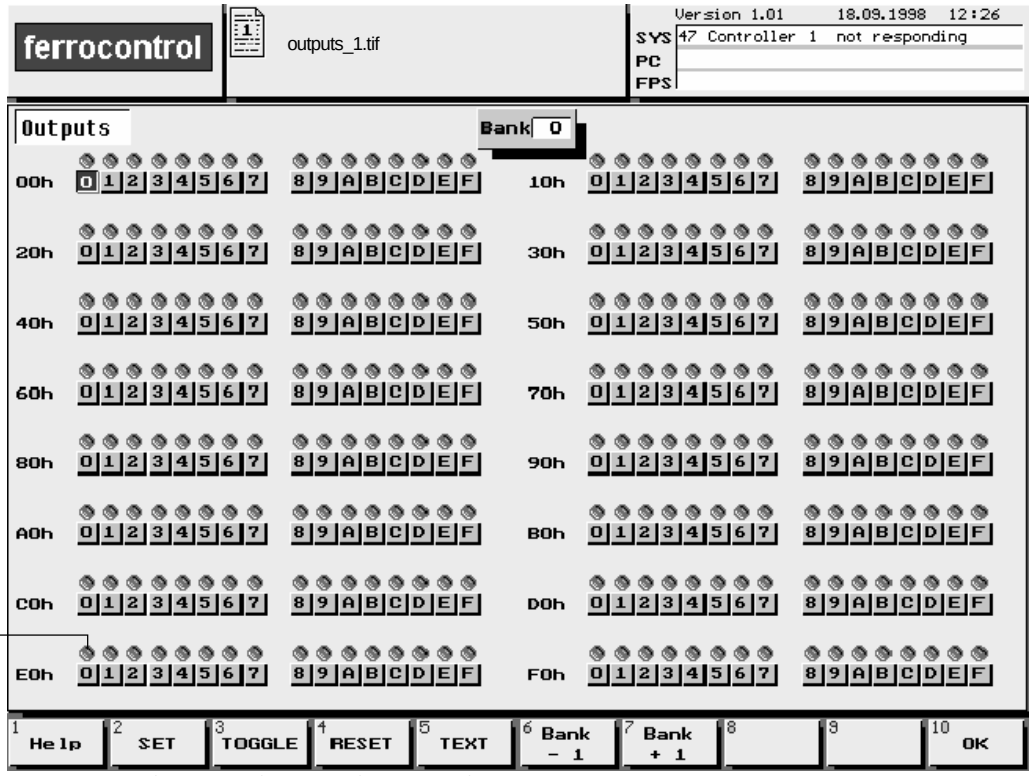
Text
Filed application-related commentary (allocation in plain text) for this input

Status display - input
Green = logical **ON**
Grey = logical **OFF**

Hardware:
Input module / 16 inputs / binary
see Pos. 6.4

Access to this mask:

See under 2.2
Overview service menu



Status display - output
Red = logical **ON**
Grey = logical **OFF**

Text
Filed application-relevant commentary (allocation in plain text) for this output.

Reset
Reset output

TOGGLE
When the key is pressed the switching status changes: SET-RESET

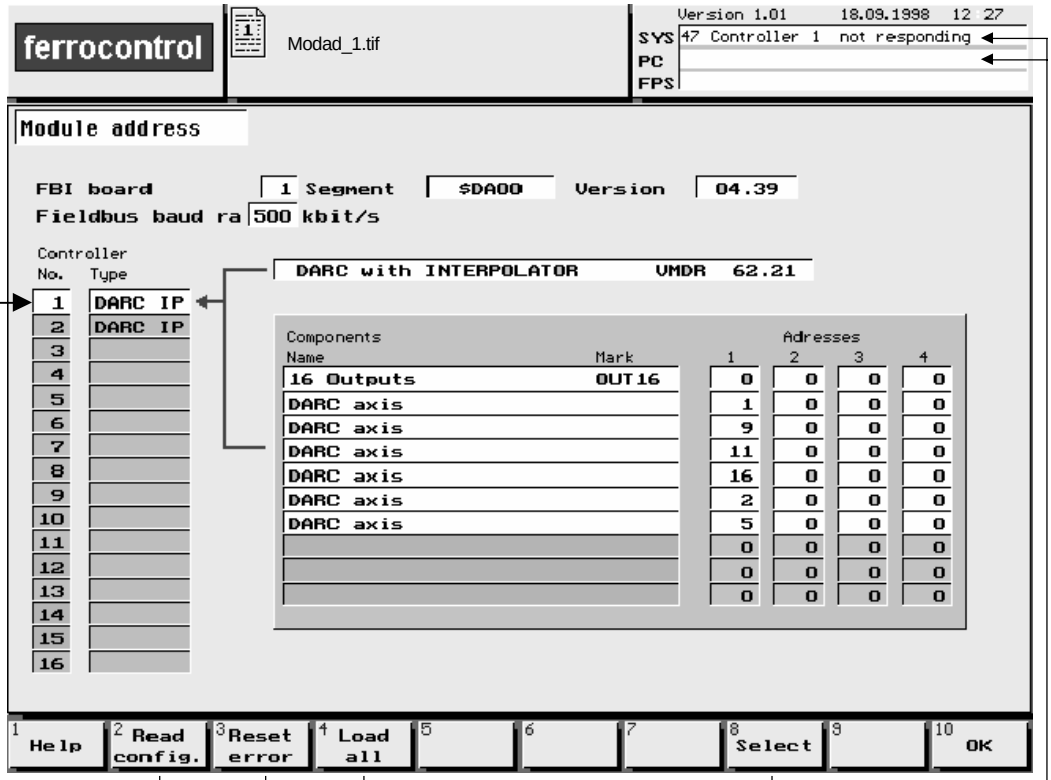
SET
Here you can switch (set) a certain output to active for **test and diagnostic purposes**. Select the desired output with the cursor and press the **key F2** to SET.

Voltage output driver: + 24 Volt / 1 A.

Hardware:
Output module / 16 outputs / binary
see Pos. 6.5

Access to this mask:

See under 2.2
Overview service menu



Select
Here you can enter your configuration data manually.

Load all
The displayed configuration data are taken over as valid.
The previously valid data record (on the hard disk) is overwritten!!

Attention!
Do not activate the function "LOAD ALL" (Key F4) rashly then ...

Reset - error
Resets the error display.

Read configuration (key F2)
A) Key not yet pressed:
The device configuration displayed is based on a filed data record (hard disk)

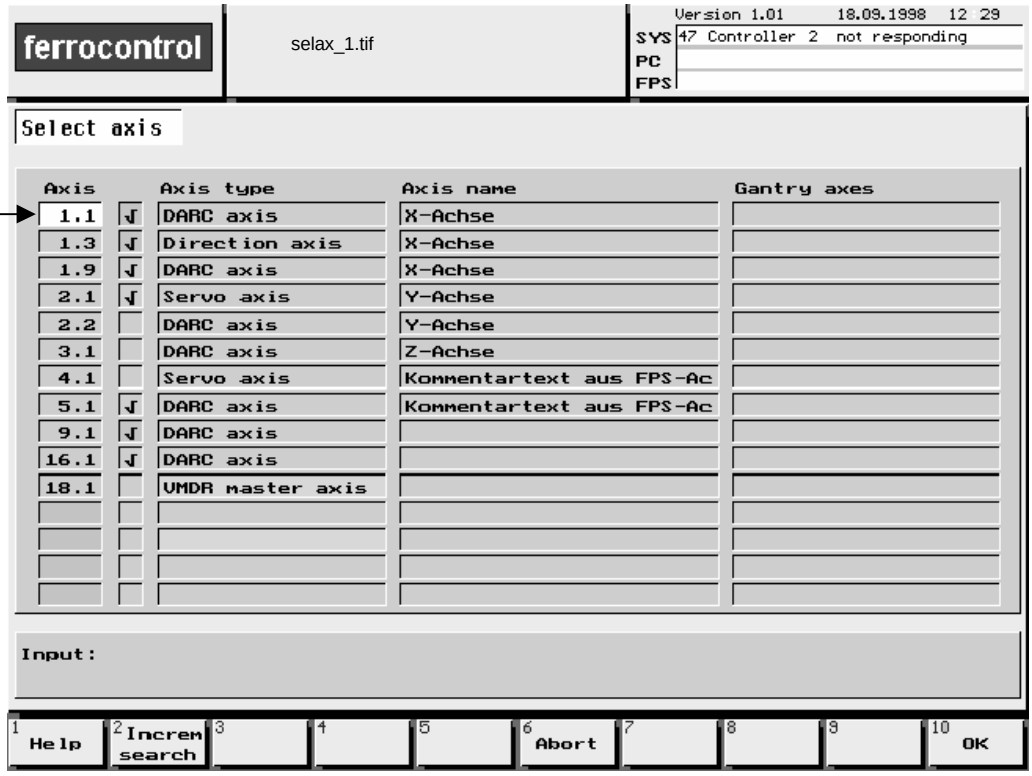
B) Press key:
The **current operating status** is **read again** and updated on the screen. **A possible functionally disturbed bus participant (controller) will no longer be listed in the updated diplay!**

Proceed as follows when looking for the malfunction:
1. Before you press [F2] make a note of the device configuration displayed.
2. Press **[F2]**. Compare the **updated display** with your notes.
3. A defective bus participant **does not appear** in the current display.

5.4 Select axis

Access to this mask:

See under 2.2
Overview service menu



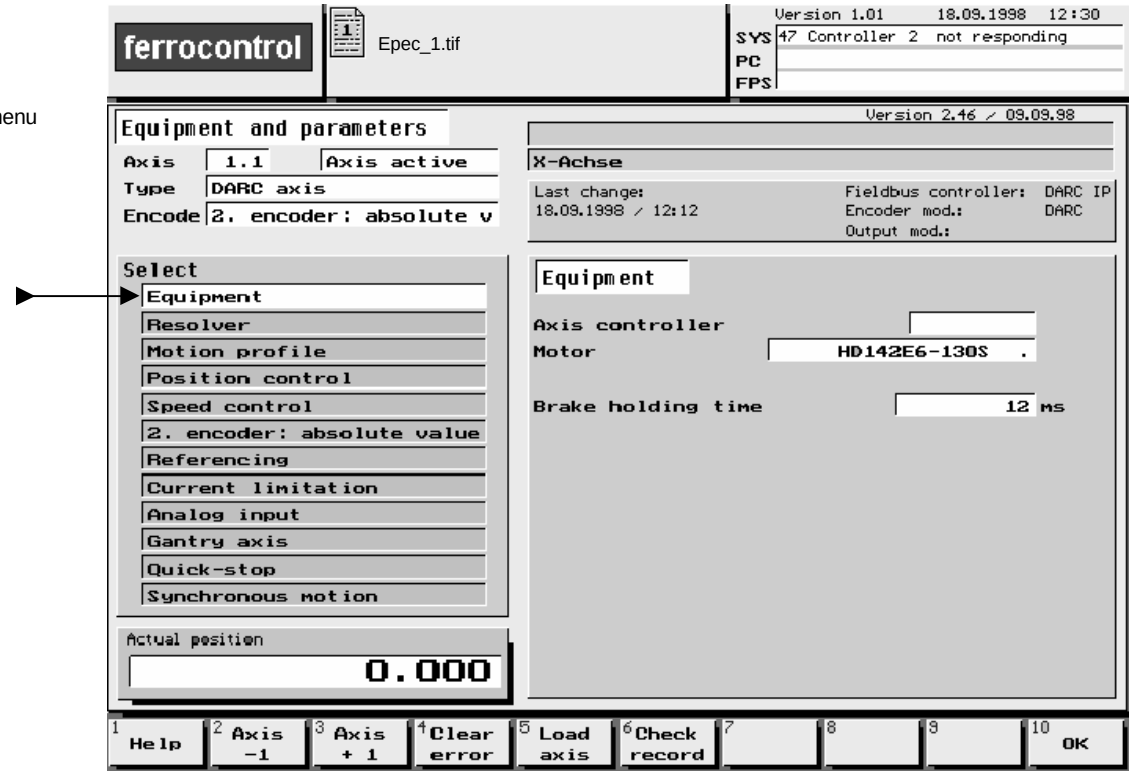
Select axis

If you want to alter the configuration of a particular axis, you receive access via this mask.

Use the cursor to select the desired mask.

Access to this mask:

See under 2.2
Overview service menu



Select: Equipment

Allocation between the axis regulation controller and a motor type is made in this mask.

Notice!
Configuration parameters for determining the control characteristics for the individual motor types are filed by ferrocontrol. These configuration data are adopted and applied by the axis regulation controller.

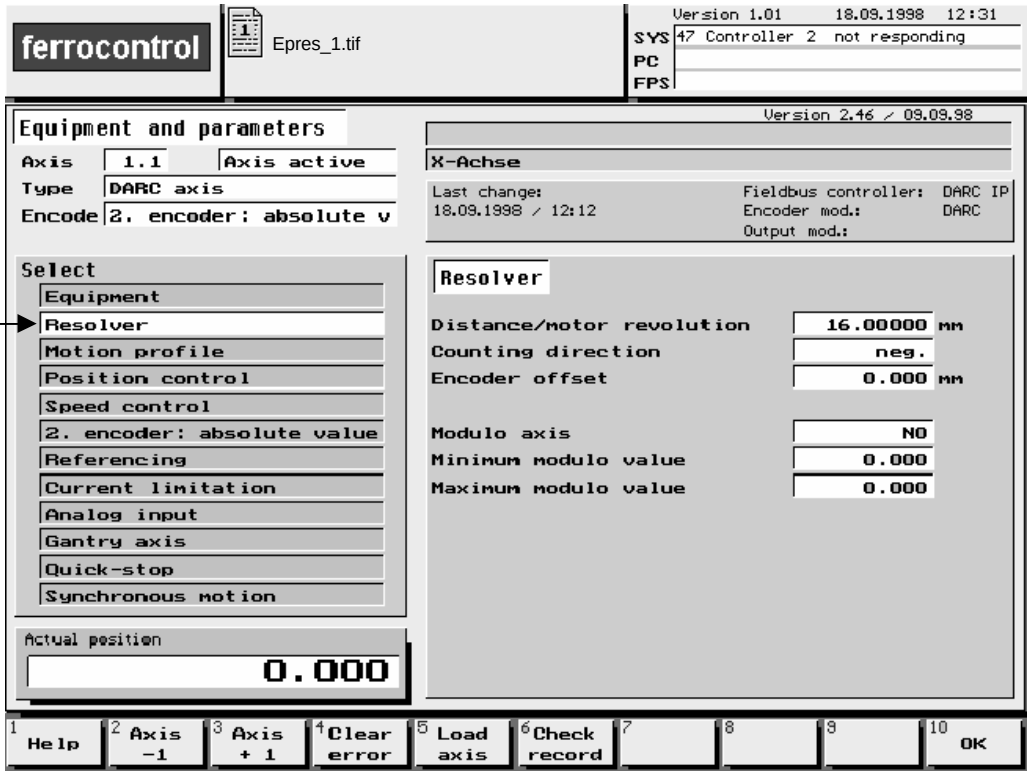
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5

Brake holding time:
The brake holding time is the time between the brake contact opening and the switch-off moment of the motor current. It must correspond to the switch-off delay time of the brake release coil. This ensures that hanging axes do not sag.
Enter **0 ms** without a holding brake, and with a holding brake enter **50 ms** as the application time of standard holding brakes is about 50 ms.

5.5 Axis equipment and parameters
5.5.2 Select: Resolver

Access to this mask:

See under 2.2
Overview service menu



Select: Resolver

The selection of the resolver settings is made in this mask

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.4

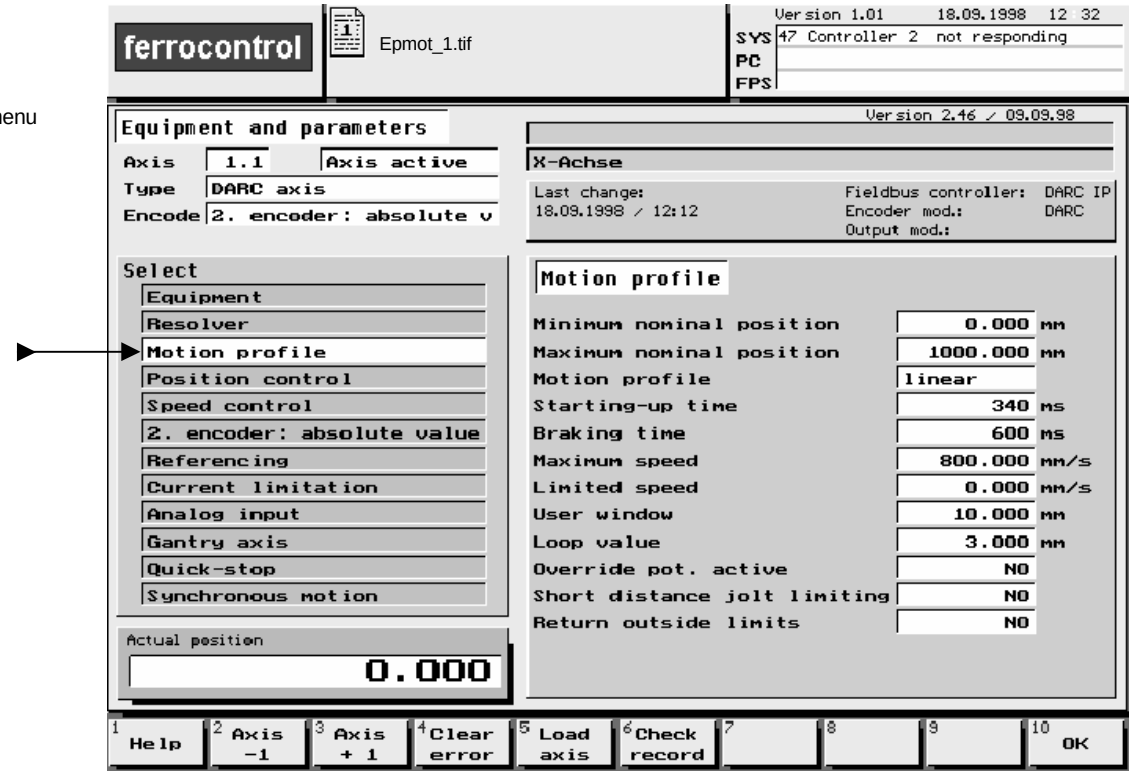
Encoder offset:
In this input field you are able to set a new absolute value (desired actual value).

Proceed as follows:
1. Place the cursor on the field: **Encoder offset.**
2. Press the **Enter key.**
   This mask appears: **Input absolute value**
3. Enter your desired value.

When the [F10] key is pressed, the value entered is adopted and stored as the new absolute actual value.

Access to this mask:

See under 2.2
Overview service menu

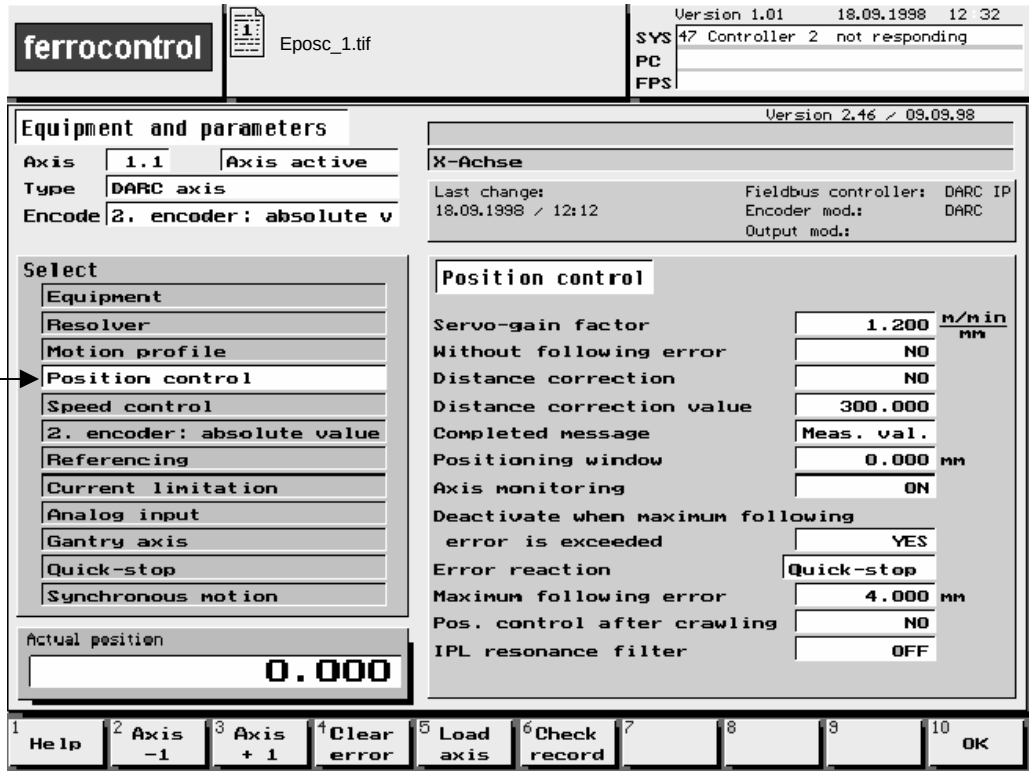


Select: Motion profile

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.5

Access to this mask:

See under 2.2
Overview service menu

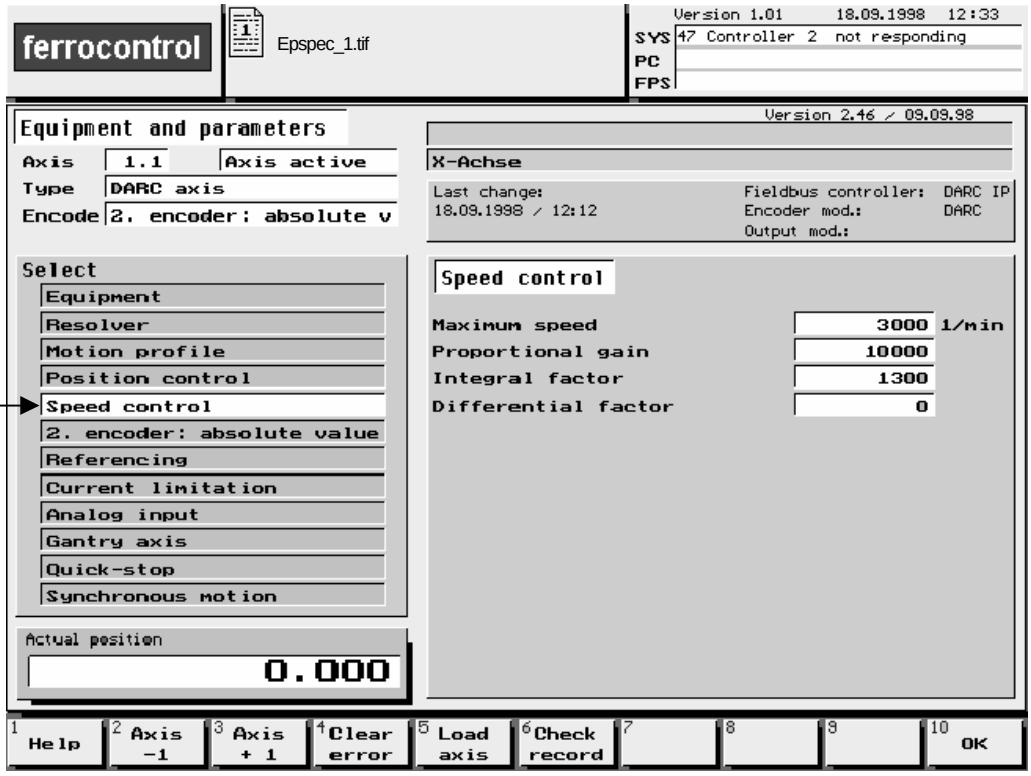


Select: Position control

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.6

Access to this mask:

See under 2.2
Overview service menu



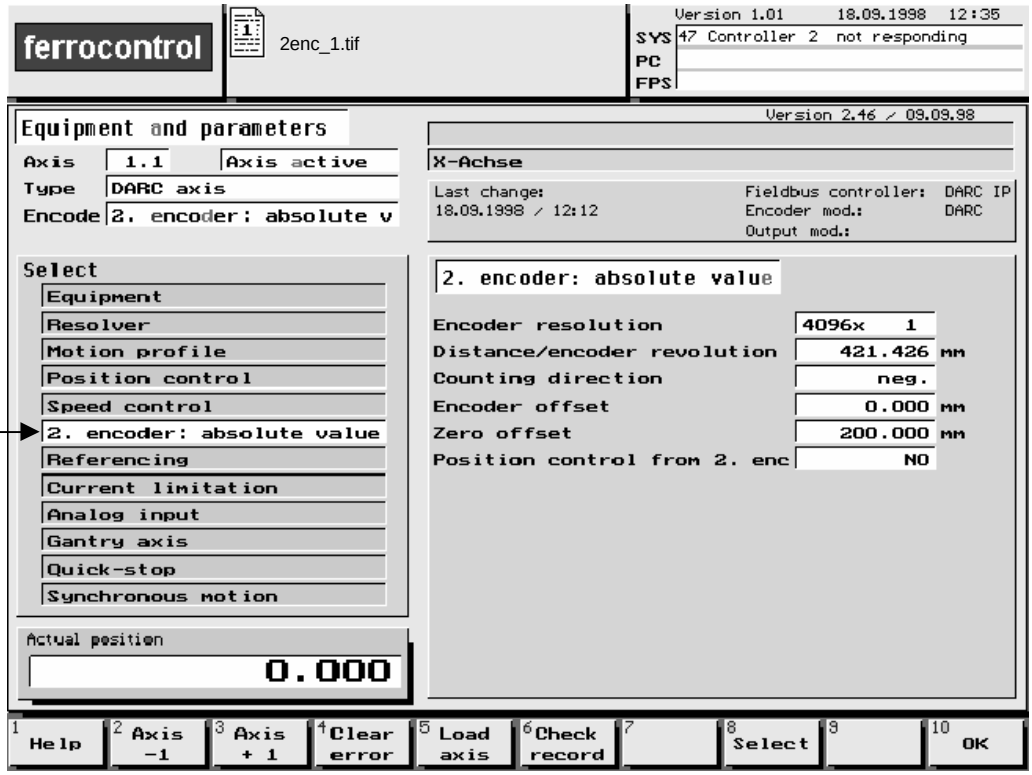
Select: Speed control

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.7

5.5 Axis equipment and parameters
5.5.6 Select: External absolute position encoder

Access to this mask:

See under 2.2
Overview service menu

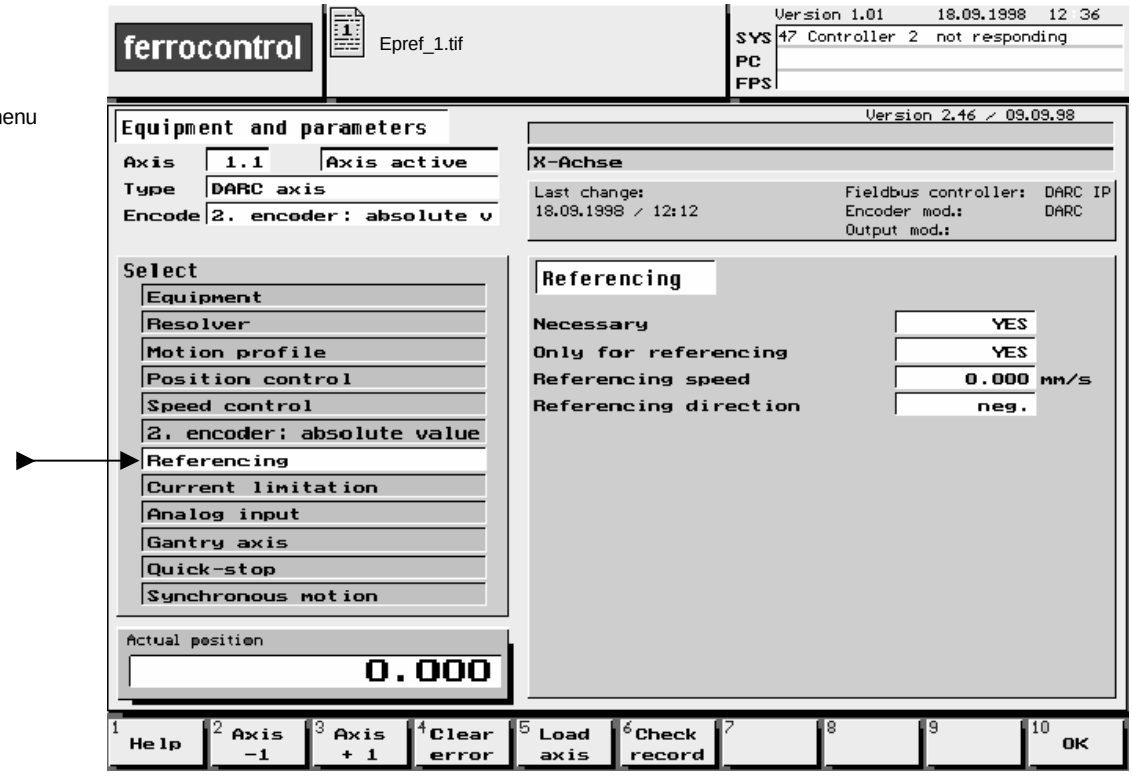


Select: External absolute position encoder

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.8

Access to this mask:

See under 2.2
Overview service menu

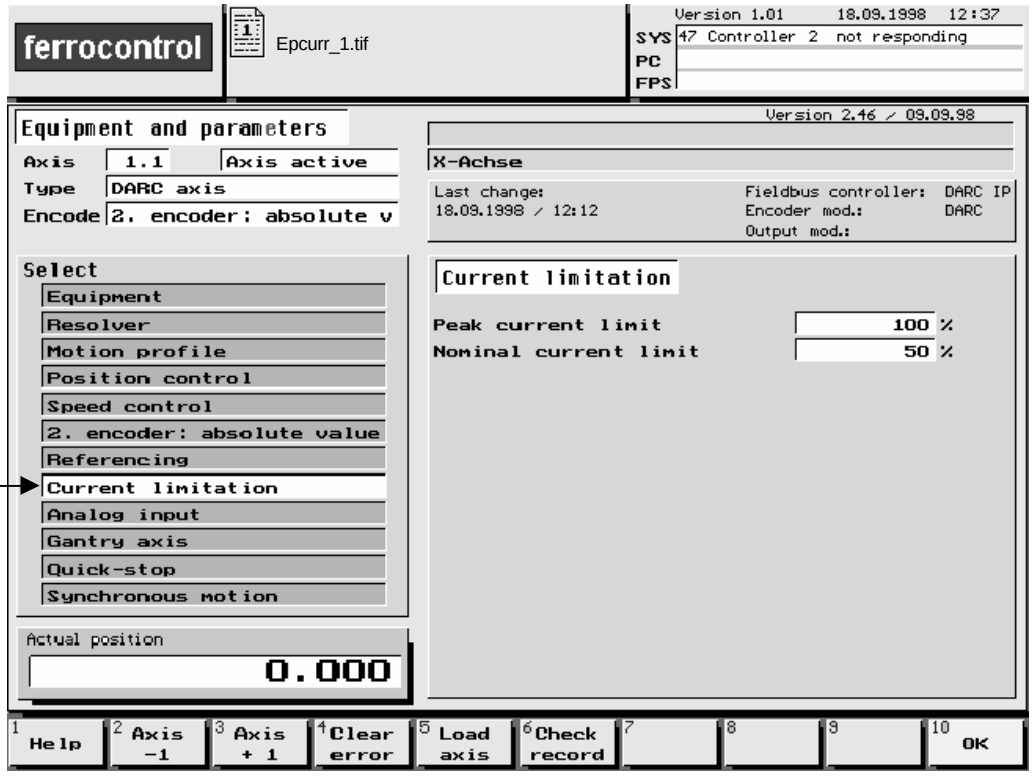


Select: Referencing

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.9

Access to this mask:

See under 2.2
Overview service menu

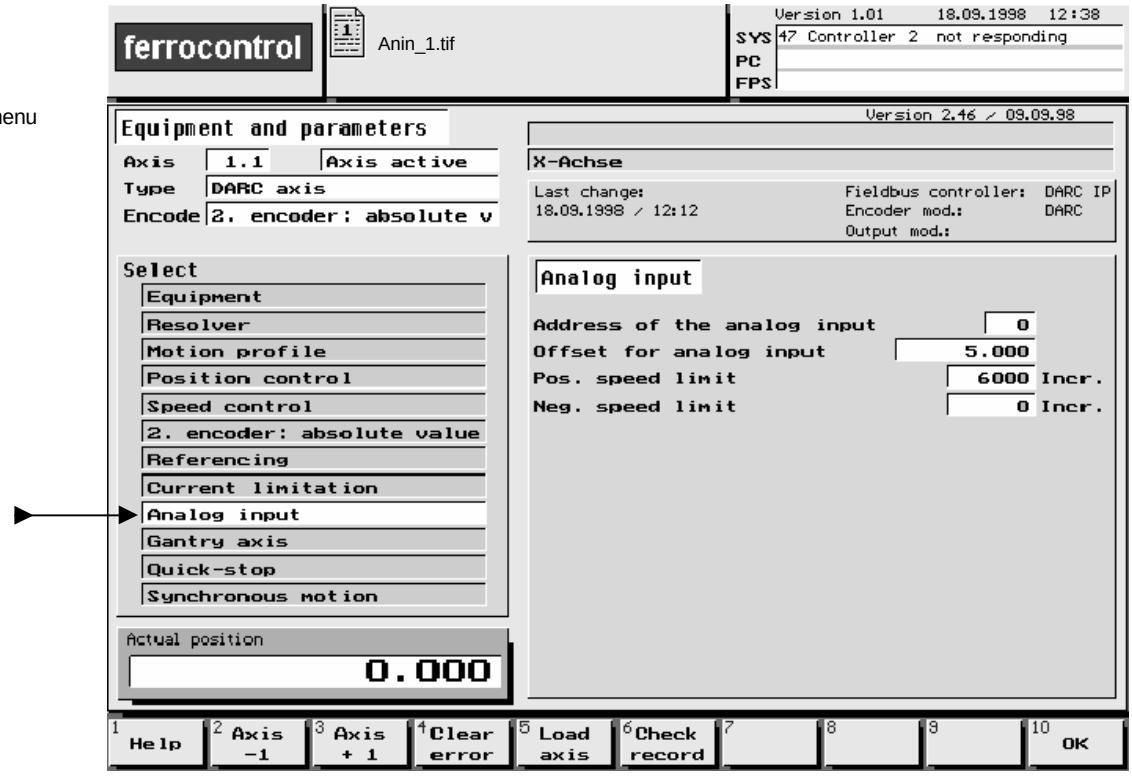


Select: Current limitation

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.10

Access to this mask:

See under 2.2
Overview service menu

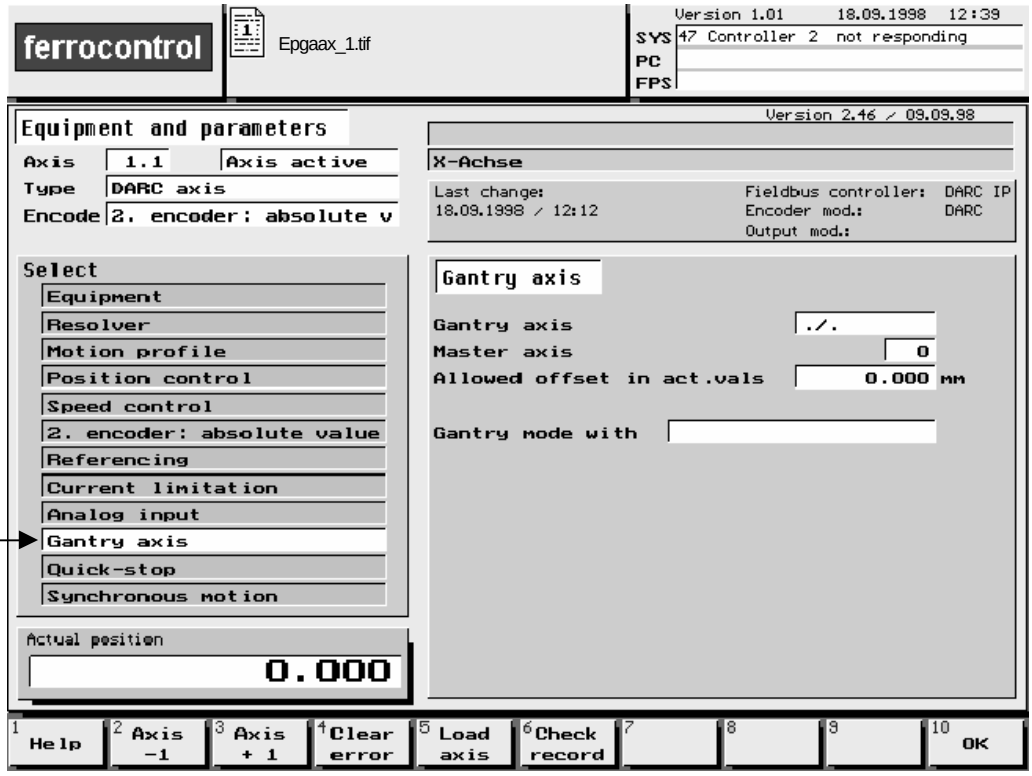


Select: Analog input

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.11

Access to this mask:

See under 2.2
Overview service menu

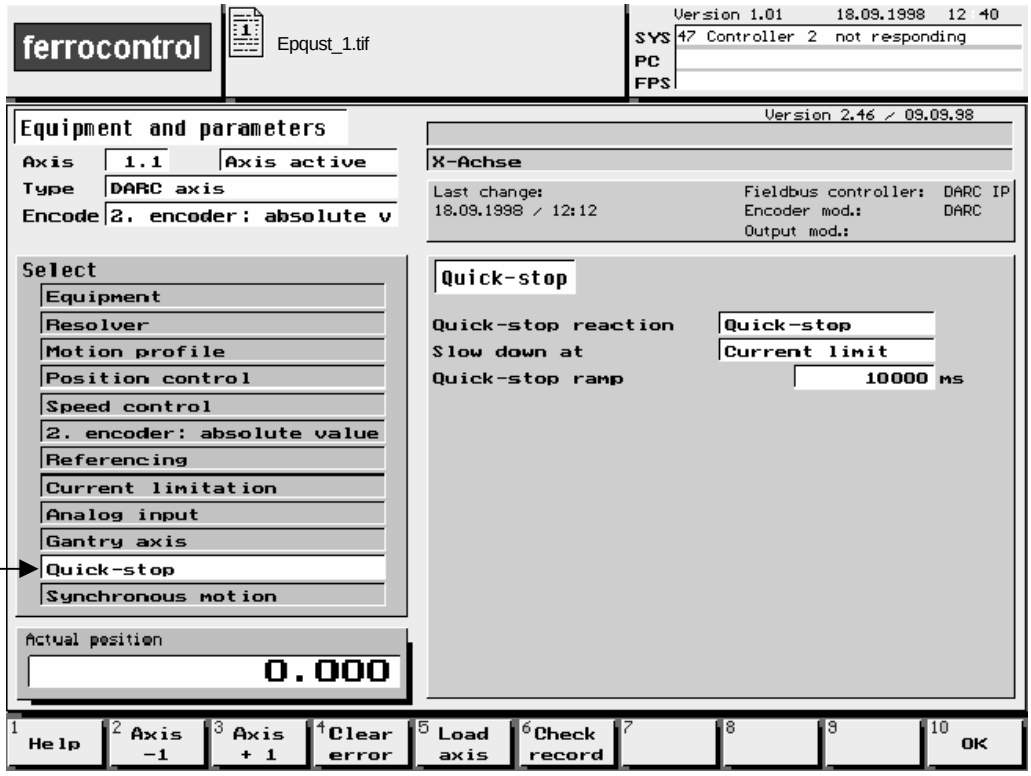


Select: Gantry axis

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.12

Access to this mask:

See under 2.2
Overview service menu

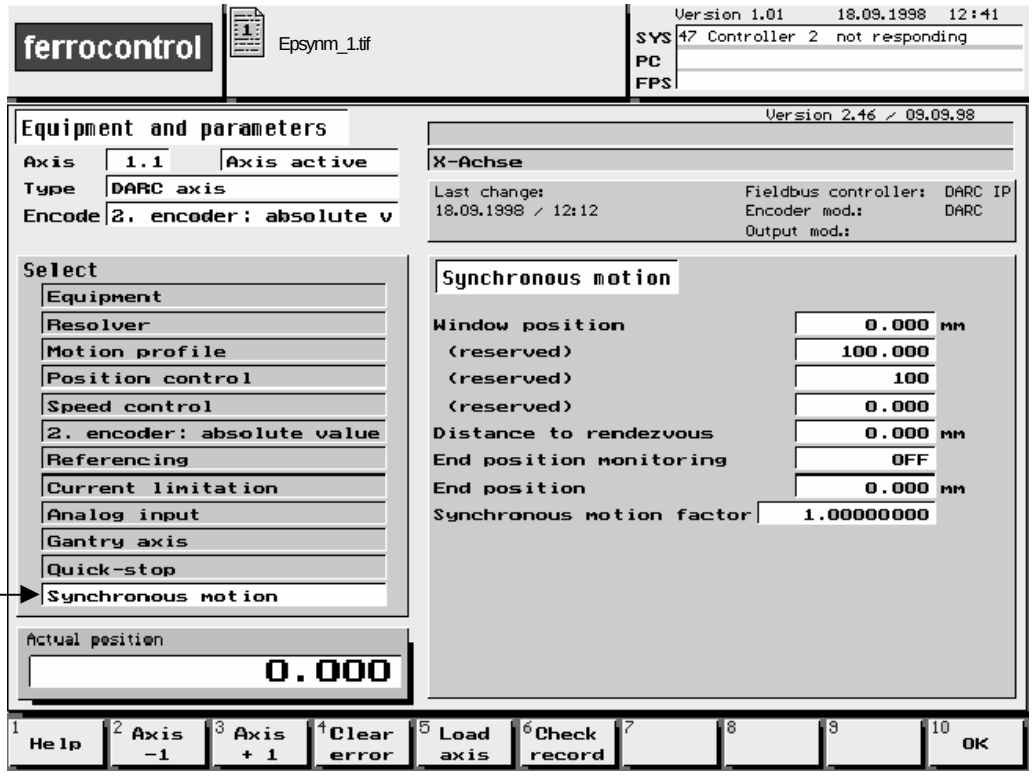


Select: Quick-stop

Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.13

Access to this mask:

See under 2.2
Overview service menu

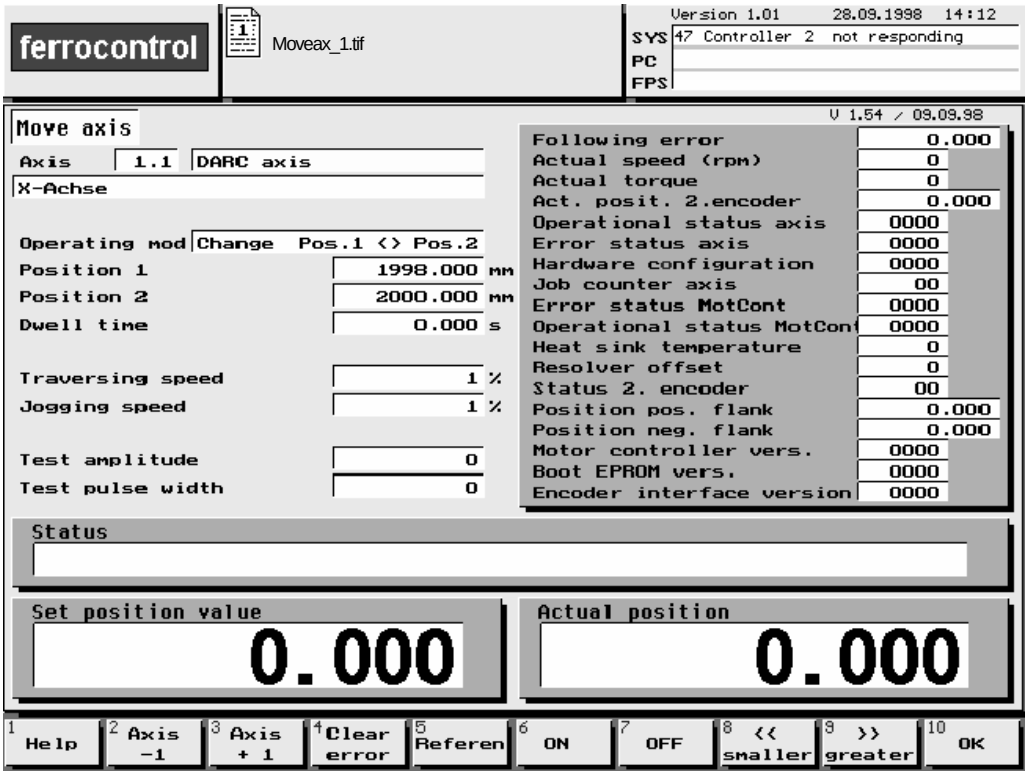


Select: Synchronous motion

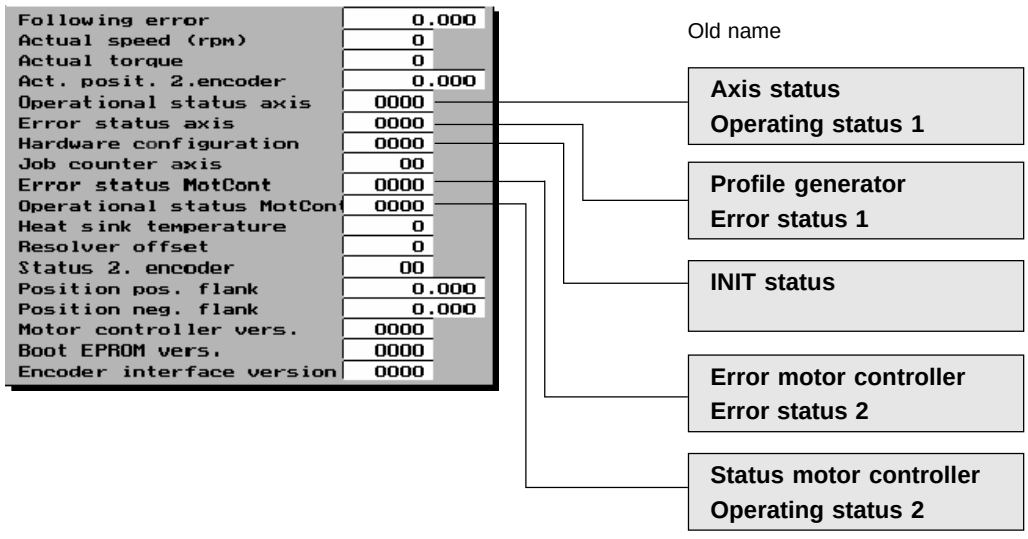
Notice!
You can find more information in the ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.3.5.14

Access to this mask:

See under 2.2
Overview service menu



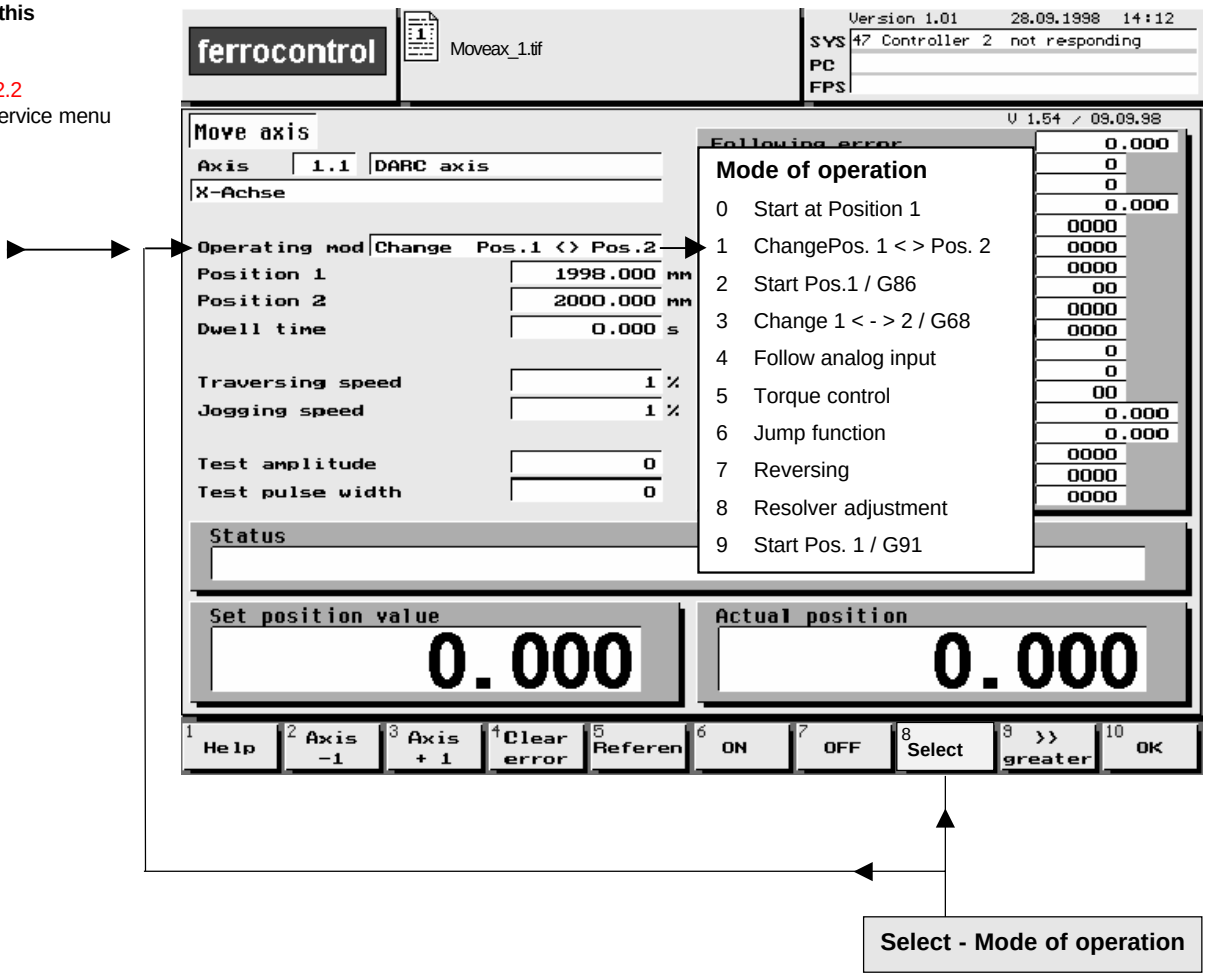
In older software versions you will come across variant names for the following data fields:



5.6 Move axis
5.6.1 Select: Mode of operation

Access to this mask:

See under 2.2
Overview service menu



Select: Mode of operation

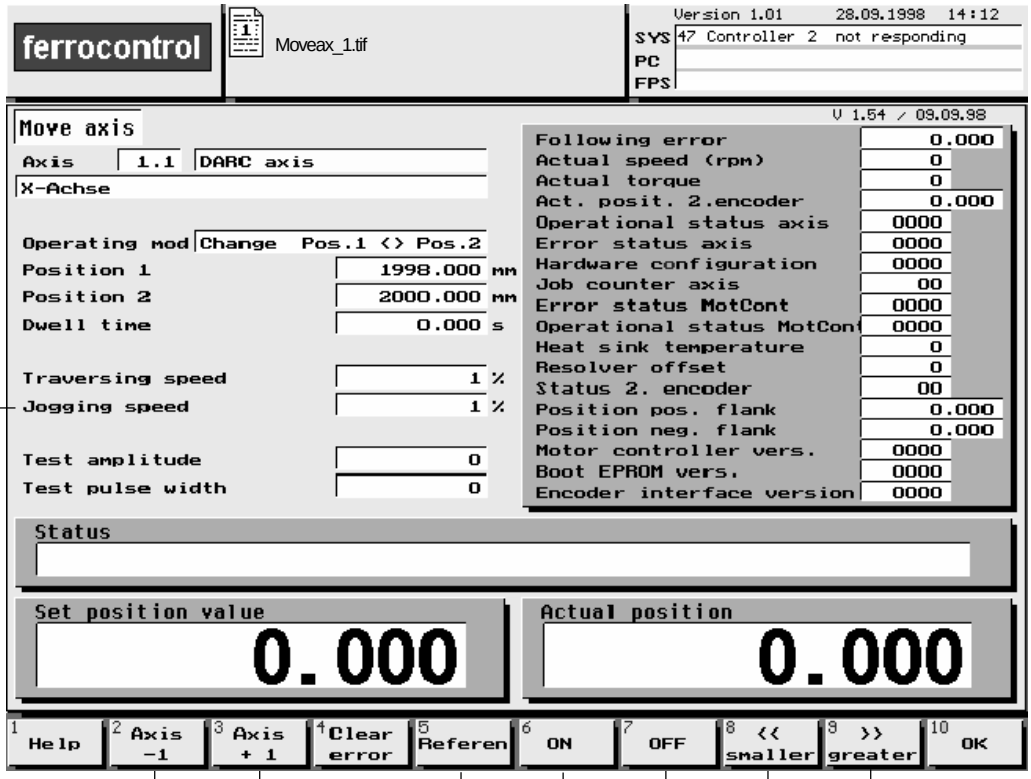
Start auf Position 1
If the **START** key is pressed, the axis moves at the preset traversing speed to the set value in the input window of Position 1.

Change Pos 1 < > Pos 2
If the **START** key is pressed, the axis moves at the preset traversing speed between the set values in the input window of Position 1 and Position 2.

Resolver adjustment
See ferrocontrol manual:
DARC System - Commissioning and Service / Chapter 6.4.7

Access to this mask:

See under 2.2
Overview service menu



Inching mode,
only in jogging mode

Position control
ON - enable
OFF - disable

INFO: Position control DARC - System Commissioning and Service 6.3.5.6

Perform referencing

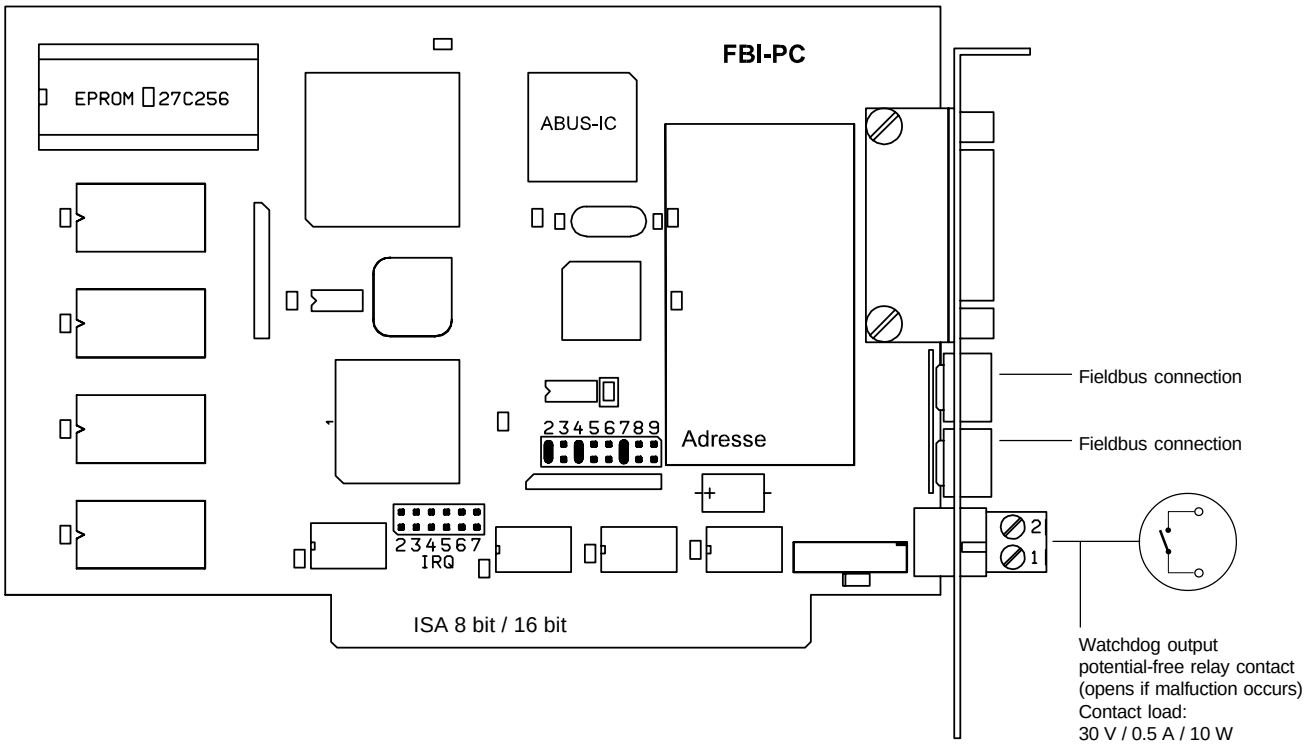
STOP

The function can be aborted with STOP.

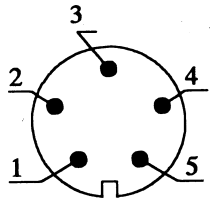
Select axis

Traversing speed in inching mode
The axis traverses at the preset reduced (by percentage) speed shown in the **Jogging speed** window.

Space for your own notes



CNC-Fieldbus connection



1 Rt + / terminator
Differential signal - positive

2 Fieldbus signal
Differential signal - negative

3 Screening

4 Fieldbus signal
Differential signal - positive

5 Rt - / terminator
Differential signal - negative

Addressing:
Possible segment addresses in PC: C000 h - EF00 h
Settable via jumper field: address

Address	Jumper:	9	8	7	6	5	4	3	2
0C000 h	=	0	0	X	X	X	X	X	X
0C100 h	=	0	0	X	X	X	X	X	0
0C200 h	=	0	0	X	X	X	X	0	X
0C300 h	=	0	0	X	X	X	X	0	0
0C400 h	=	0	0	X	X	X	0	X	X
... ...									
FD00 h	=	0	0	0	0	0	0	X	0
FE00 h	=	0	0	0	0	0	0	0	X
FF00 h	=	0	0	0	0	0	0	0	0
DA00 h	**=**	**0**	**0**	**X**	**0**	**0**	**X**	**0**	**X**

X = Jumper plugged in
0 = Jumper open

Jumper 8 and 9
remain open!

/ Factory setting

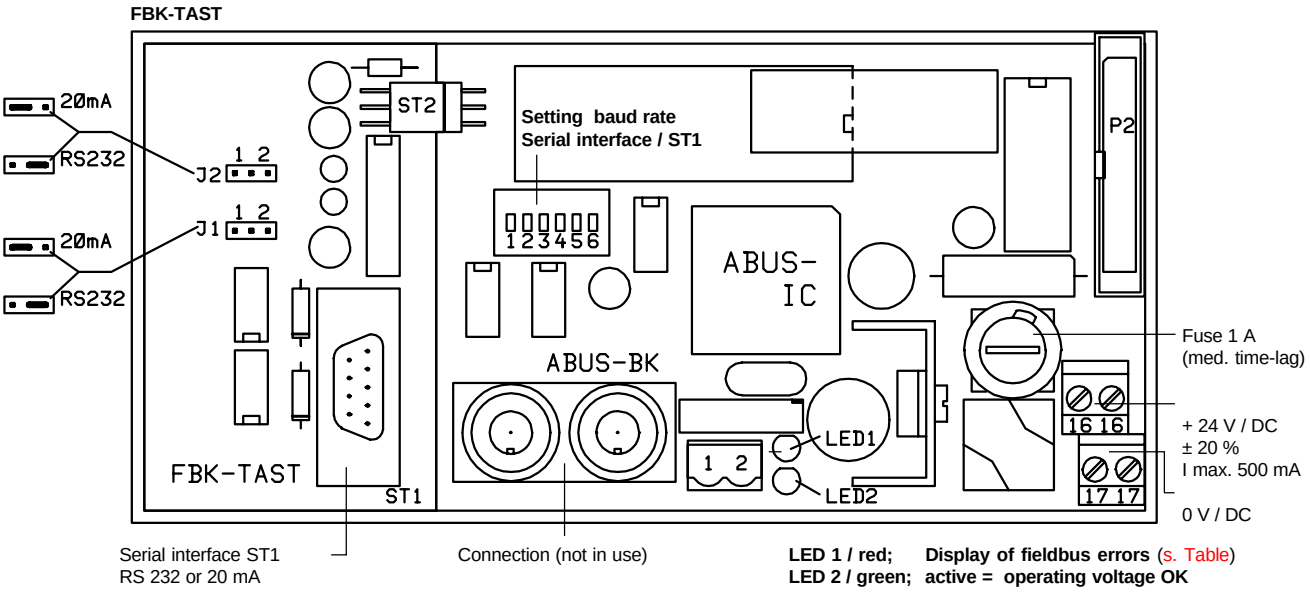
Select Interrupt (IRQ) :
Settable via jumper field: IRQ

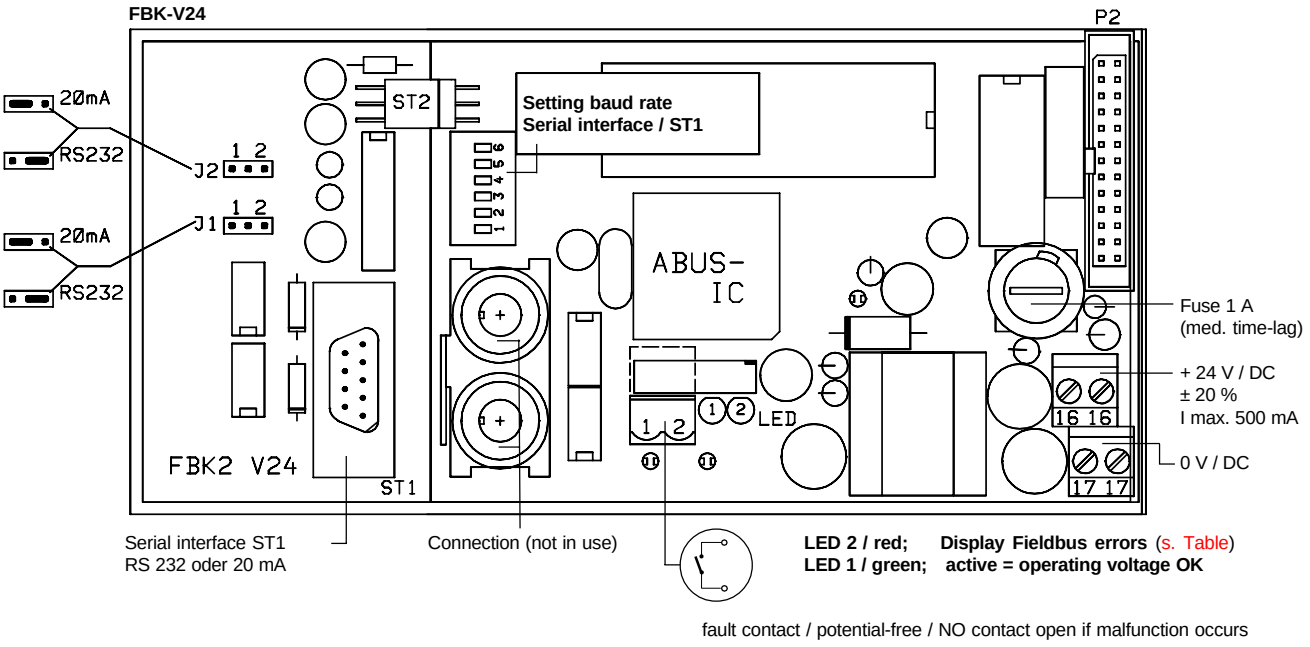
IRQ	Jumper:	2	3	4	5	6	7
IRQ-2	=	X	0	0	0	0	0
IRQ-3	=	0	X	0	0	0	0
IRQ-4	=	0	0	X	0	0	0
IRQ-5	=	0	0	0	X	0	0
IRQ-6	=	0	0	0	0	X	0
IRQ-7	=	0	0	0	0	0	X

X = Jumper plugged in
0 = Jumper open

Only max. one jumper may
be plugged in!

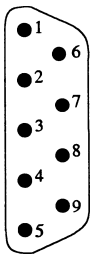
6.2 FBK / Fieldbus nodes



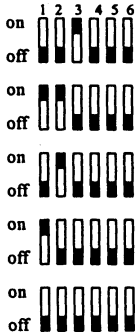


Pin configuration ST1 (9-pole)
RS 232/20 mA

1	RX-
2	RXD
3	TXD
4	TX-
5	0 V / Screening
6	RX+
7	not in use
8	not in use
9	TX+



Setting baud rate
Serial interface ST1



19 200 Baud
9 600 Baud
4 800 Baud
2 400 Baud
1 200 Baud

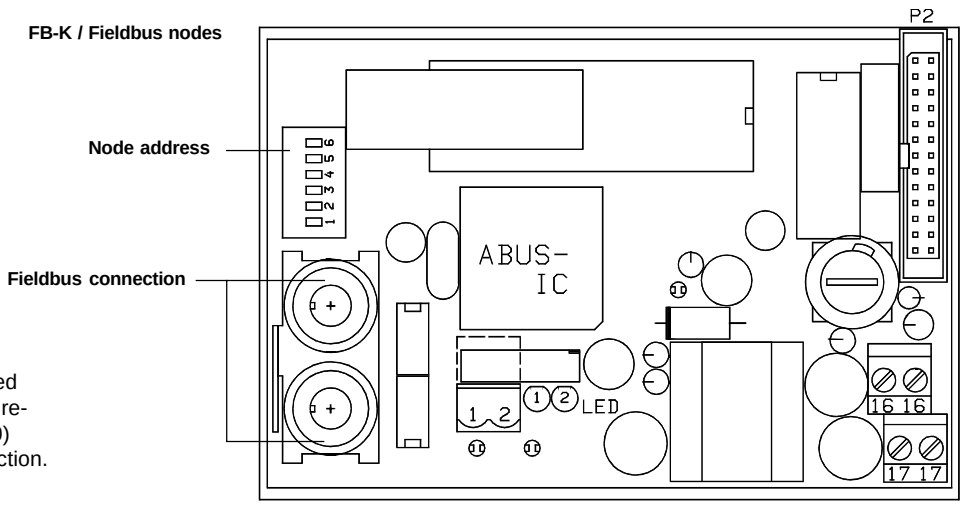
What the LED display means: Fieldbus errors

Display:	**possible causes of error:**
off	- No error
on with short pauses	- Short circuit on the fieldbus - Driver board not available or faulty
regular blinking	- Operating system on the fieldbus interface card in the PC not started yet. - No connection via fieldbus cable - No terminating resistor connectors
4 x blinking	- Configuration does not match the connected modules. - Parallel bus cable not connected or faulty. - Parallel bus cable too long (malfunctions)

Addressing:
Setting the node addresses via DIP switches / address 0 - 63

Address	DIP switch no. **1 2 3 4 5 6**
0	0 0 0 0 0 0
1	X 0 0 0 0 0
2	0 X 0 0 0 0
3	X X 0 0 0 0
4	0 0 X 0 0 0
5	X 0 X 0 0 0
6	0 X X 0 0 0
7	X X X 0 0 0
...	
60	0 0 X X X X
61	X 0 X X X X
62	0 X X X X X
63	X X X X X X

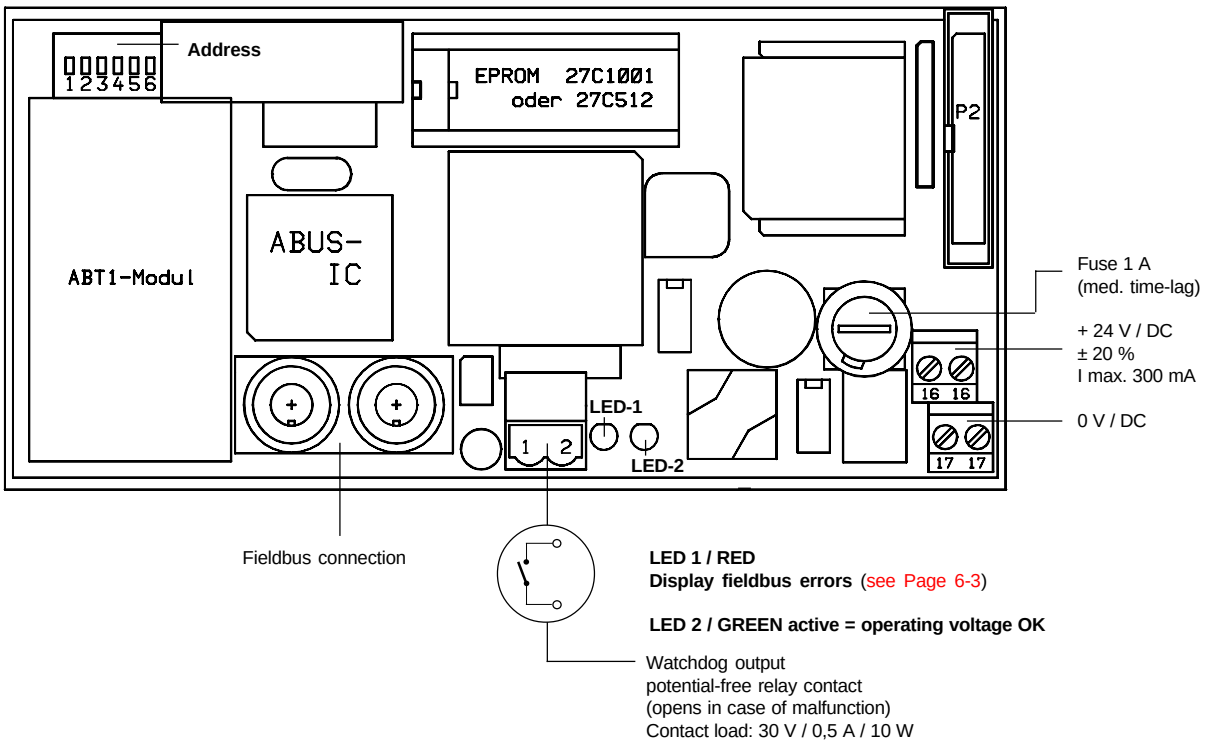
X = DIP switch closed
0 = DIP switch open



Please note!

If only one fieldbus cable is connected to the fieldbus node, the terminating resistor connector (Art. no. 70-042 500) must be plugged into the free connection.

6.3 FBUR / FBRR
Fieldbus universal controller / Fieldbus directional controller



FBUR:

With this version a maximum of 3 servo-drive or contolled fixed-speed axes can be traversed. (See Label EPROM)

FBRR:

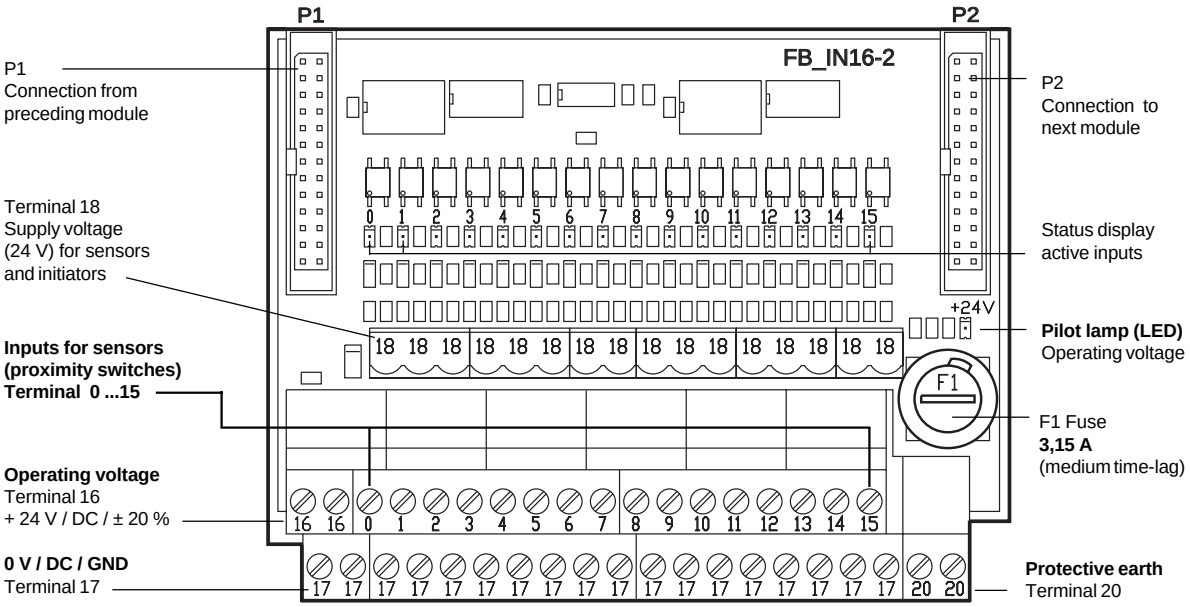
With this version a maximum of 6 contolled fixed-speed axes can be traversed. (See Label EPROM)

Addressing:
Setting the node addres via DIP switches / address 0 - 63

Address	DIP switch no.					
	1	**2**	**3**	**4**	**5**	**6**
0	0	0	0	0	0	0
1	X	0	0	0	0	0
2	0	X	0	0	0	0
3	X	X	0	0	0	0
4	0	0	X	0	0	0
5	X	0	X	0	0	0
6	0	X	X	0	0	0
7	X	X	X	0	0	0
...						
60	0	0	X	X	X	X
61	X	0	X	X	X	X
62	0	X	X	X	X	X
63	X	X	X	X	X	X

X = DIP switch closed
0 = DIP switch open

6.4 FB-IN 16-2
Input module with 16 inputs (binary)



Technical data

Inputs:

All inputs metallically separated	
Maximum input voltage	30 V DC
Current consumption per input	c. 18 mA / 24 V

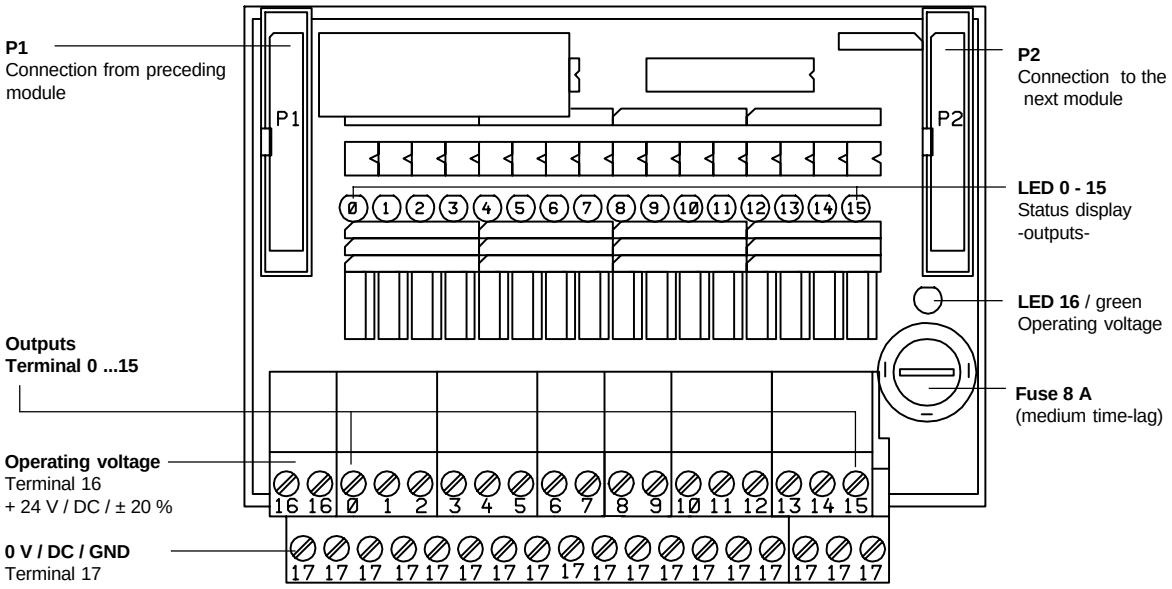
Input level:

High level	> 19 V
Low level	< 3 V
Time until input signal valid	100 µs

If the input voltage is between 3 and 19 volts, the value read is not defined.

AC voltage may not be connected!

6.5 FBOUT-16
Output module with 16 outputs (binary)



Notice!

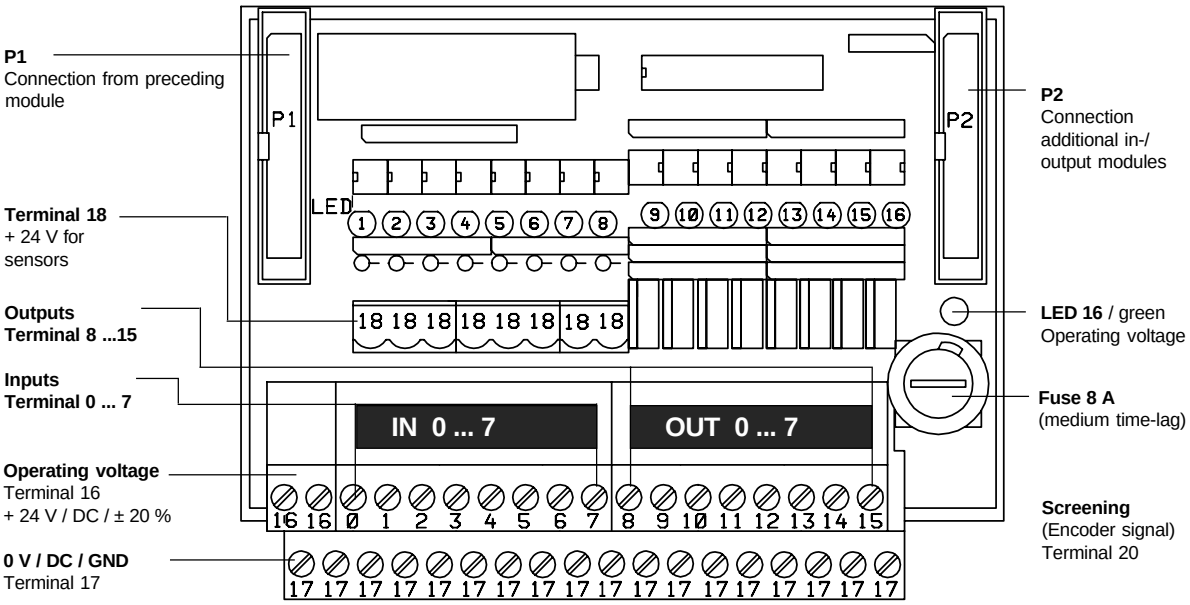
Every output is fitted with protection against short circuit and excess temperature. After a short circuit the control of the appropriate output must be reset. Only then is the output ready for operation again.

Technical data

Outputs:

Maximum switching voltage:	30 V DC
Minimum switching voltage:	19 V DC
Constant load per output:	1 A
Total constant load of board:	8 A
Peak load per output:	3 A / 10 sec. / 45° C ambient temperature

6.6 FB-IOT8
Combi module / 8 inputs und 8 outputs (binary)



Description

The FB-IOT8 is a combined input/output module. The module has 8 inputs and 8 outputs at its disposal. All in- and outputs are metallically separated by optical isolators.
The outputs are short-circuit proof and protected against excess temperature.
After remedying a short circuit the output can only work normally again once the control has been reset.

The LEDs 1 ... 8
signal the status of the inputs.
The LEDs 9 ... 16
signal the status of the outputs.
ON = in-/outputs active

Technical data

Outputs:

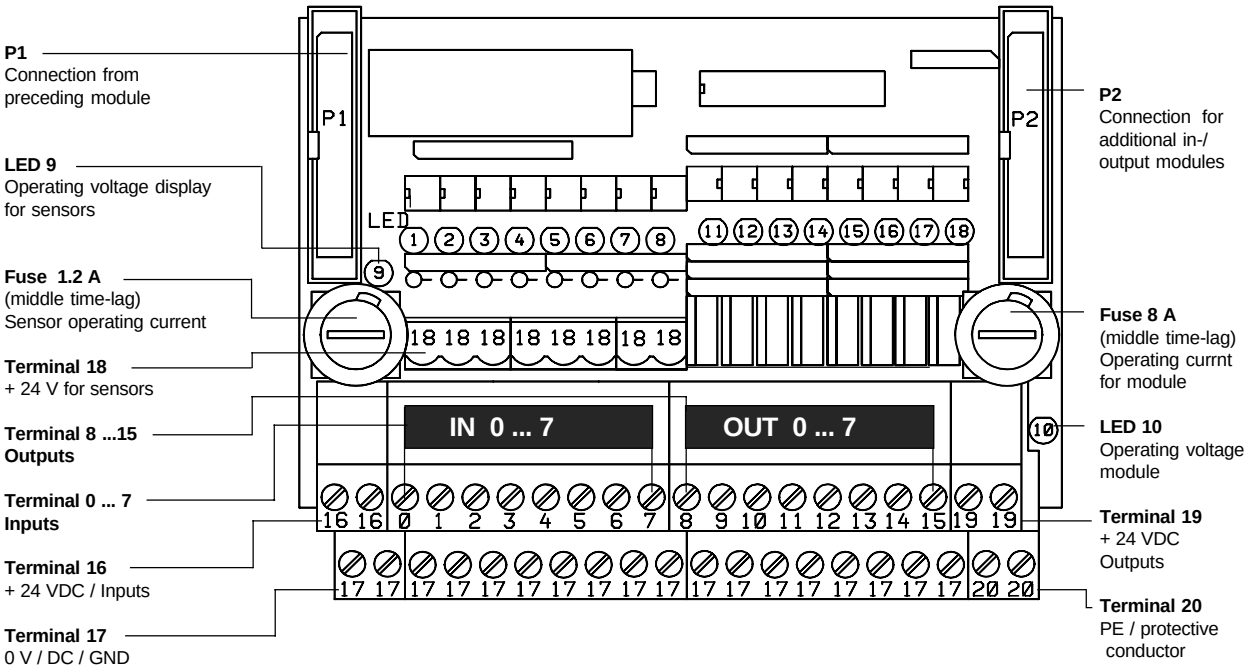
Maximum switching voltage:	30 V DC
Minimum switching voltage:	19 V DC
Constant load per output:	1 A
Total constant load of card	8 A
Peak load per output:	3 A / 10 sec. / 45° C ambient temperature

Input level:

High level	> 19 V
Low level	< 3 V
Time until input signal is valid	100 µs

If the input voltage is between 3 and 19 volts, the value read is not defined.
AC voltage may not be connected!

6.7 FB-INOUT
Combi module / 8 inputs and 8 outputs (binary)



Description

The FB-INOUT is a combined input/output module. The module has 8 inputs and 8 outputs at its disposal. All in- and outputs are metallically separated by optical isolators
The outputs are short-circuit proof and protected against excess temperature.
After remedying a short circuit the output can only work normally again once the control has been reset.

The LEDs 1 ... 8
signal the status of the inputs.
The LEDs 9 ... 16
signal the status of the outputs.
ON = in-/outputs active

Technical data

Outputs:

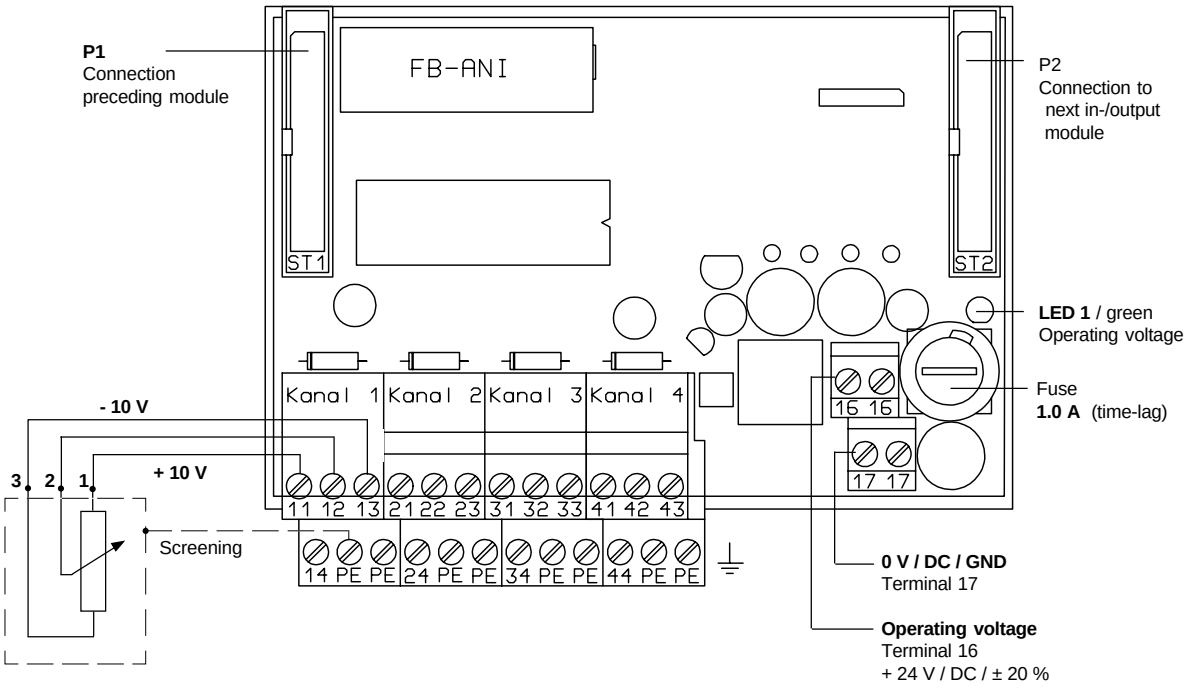
Maximum switching voltage:	30 V DC
Minimum switching voltage:	19 V DC
Constant load per output:	1 A
Total constant load of card	8 A
Peak load per output:	3 A / 10 sec. / 45° C ambient temperature

Input level:

High level	> 19 V
Low level	< 3 V
Time until input signal is valid	100 µs

If the input voltage is between 3 and 19 volts, the value read is not defined.
AC voltage may not be connected!

6.8 FB-ANI
Module for 4 analog inputs



Input 1

Ter. 11	+ 10 V / Output
Ter. 12	Analog input 1 / - 10 V ... + 10 V
Ter. 13	- 10 V / output
Ter. 14	0 V / earth for input 1
Ter. PE	Screening for input 1

Input 2

Ter. 21	+ 10 V / output
Ter. 22	Analog input 2 / - 10 V ... + 10 V
Ter. 23	- 10 V / output
Ter. 24	0 V / Earth for input 2
Ter. PE	Screening for input 2

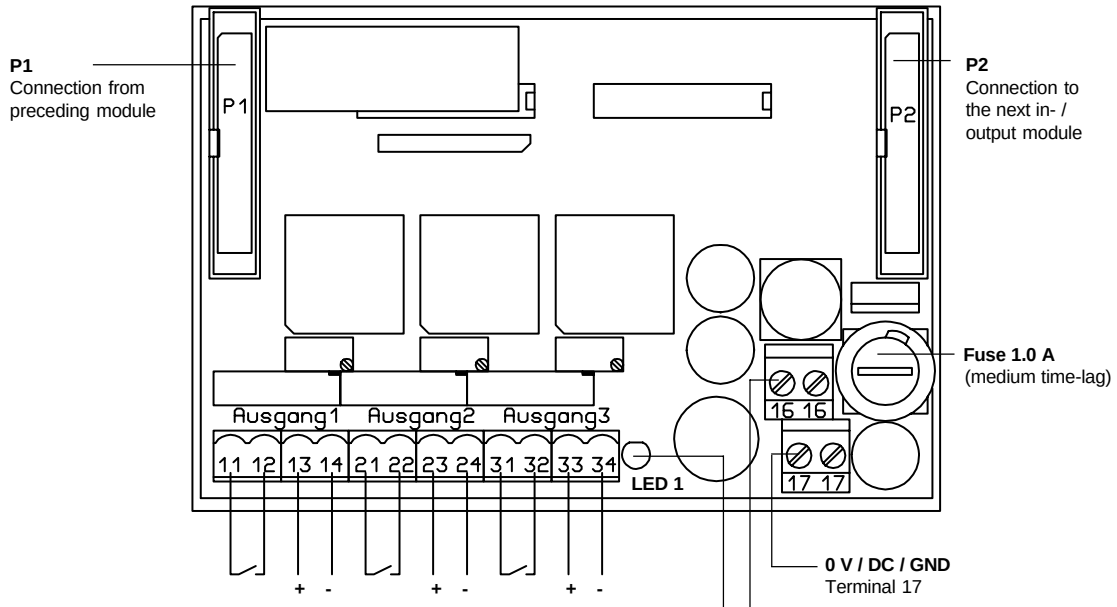
Input 3 **...**
Input 4 **...**

Technical data

Analog inputs:	**4 channels**
Input voltage range:	(- 10 V) to (+ 10 V)
Input resistance:	20 KOhm
Analog converter:	12 bit resolution / 4096 values = c. 5 mV

The inputs are protected against overvoltage!

6.9 FB-ANO
Module for 3 analog outputs



Output 1
Ter. 11 and 12: NO relay contact / enabling channel 1
Ter. 13 and 14: Analog output 1
Output 2
Ter. 21 and 22: NO relay contact / enabling channel 2
Ter. 23 and 24: Analog output 2
Output 3
Ter. 31 and 32: NO relay contact / enabling channel 1
Ter. 33 and 34: Analog output 3

Technical data

The analog output module FB-ANO has 3 analog outputs at its disposal for controlling servo-controllers. The set values determined by the axis controller are output as analog voltages (-10 V to +10 V).
In addition, one potential-free relay contact (controller enabling) is available for every channel.

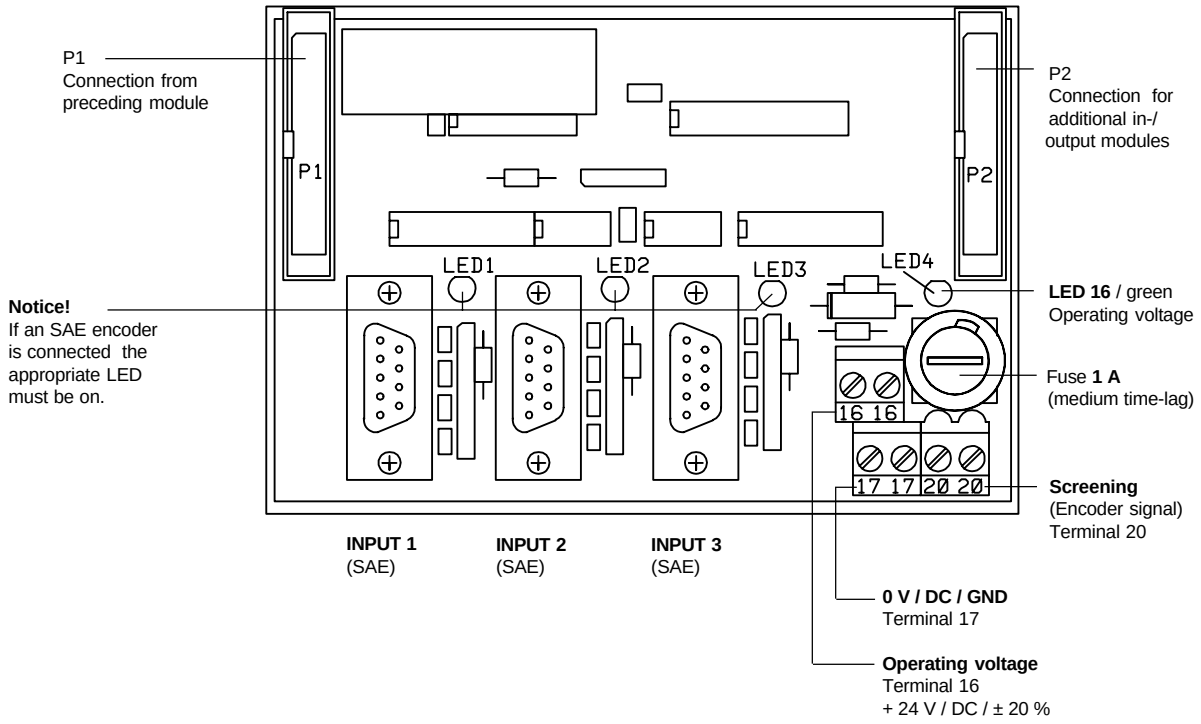
Analog outputs

Output voltage range:	(- 10 V) to (+ 10 V)
D/A converter:	12 bit resolution / 4096 values = c. 5 mV
Output current:	5 mA
Short-circuit current:	40 mA

Relay contact

Switching power:	max. 10 Watt
Switching voltage:	max. 30 V
Switching current:	max. 0.5 A

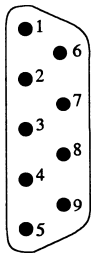
6.10 FB-SAE
Module for serial absolute encoders (SSI interface)



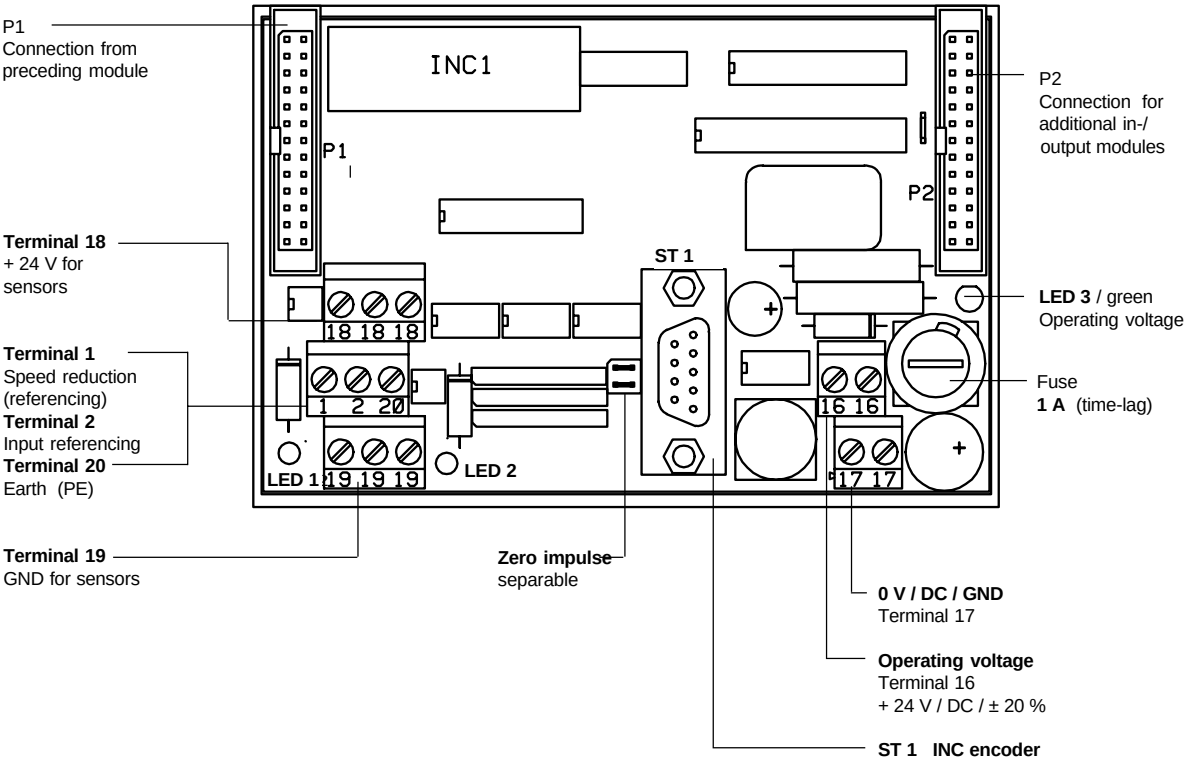
Description

The FB-SAE module is responsible for reading a maximum of 3 serial absolute encoders with SSI interface simultaneously.

1 Data input -
2 Data input +
3 Screening
4 Clock output -
5 Clock output +
6 + 24 V - Operating voltage for encoder
7 + 24 V - Operating voltage for encoder
8 0 V / GND
9 0 V / GND

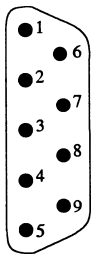


6.11 FB-INC-1
Module for reading an incremental encoder



ST 1: Incremental encoder

1 UA 2 / K2
2 UA 1 / K1
3 UA 0 / K0
4 0 V / GND
5 Screening
6 UA 2 / K2 / negative
7 UA 1 / K1 / negative
8 UA 0 / K0 / negative
9 + 5 V

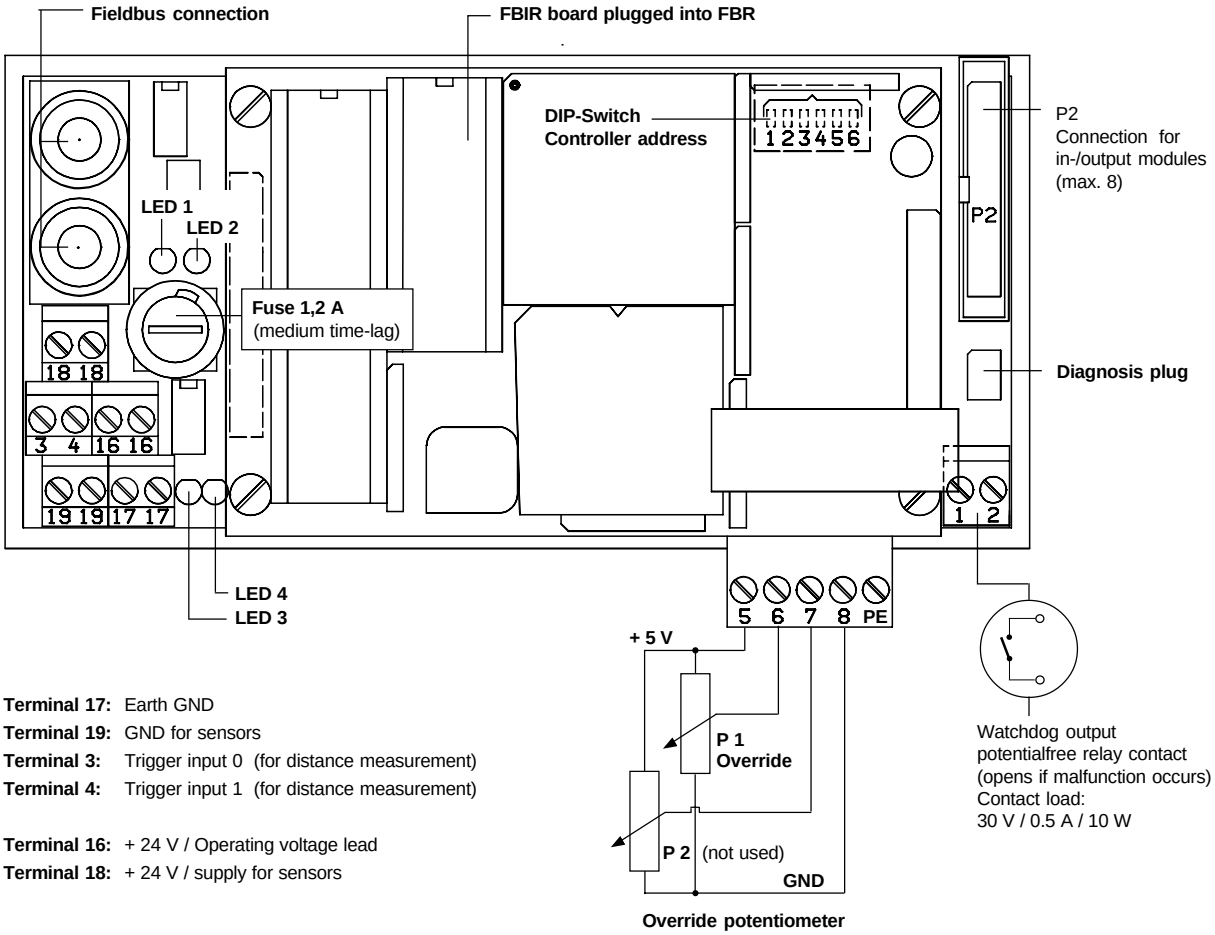


LED 1 (green) signals: Speed reduction for referencing switched on.
LED 2 (green) signals: Referencing = active

Jumper zero impulse
The zero impulse of the encoder can be interrupted by the two jumpers.
Both jumpers must always be opened or closed!

Both jumpers open: The counter is reset for every negative edge of the referencing input.

6.12 FBIR / Interpolator for the CNC-Fieldbus system
Module for connecting max. 6 controlled servo-axes



Terminal 17: Earth GND
Terminal 19: GND for sensors
Terminal 3: Trigger input 0 (for distance measurement)
Terminal 4: Trigger input 1 (for distance measurement)

Terminal 16: + 24 V / Operating voltage lead
Terminal 18: + 24 V / supply for sensors

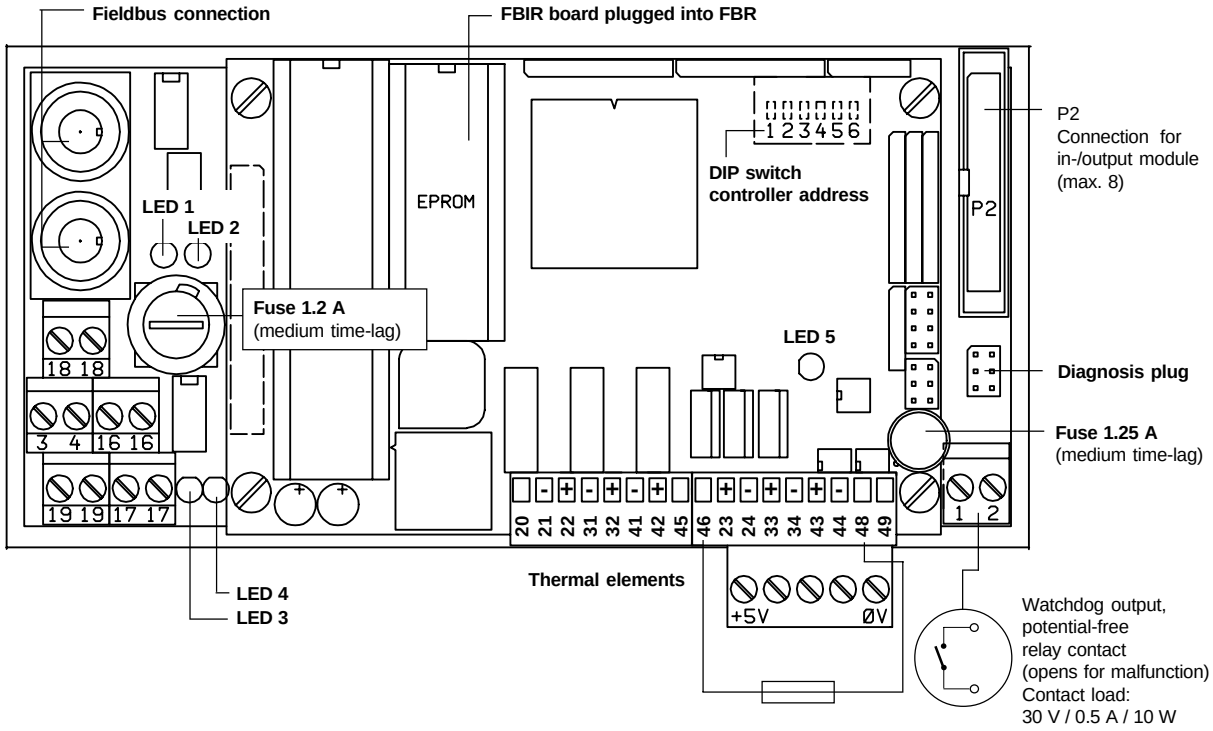
LED 1 (red)	**Display fieldbus errors** (see page 6-15)
LED 2 (green)	**Operating voltage**
LED 3	**Trigger input 0 /** Terminal 3
LED 4	**Trigger input 1 /** Terminal 4

Addressing:
Setting of node address via DIP switch / address 0 - 63

Address	DIP switch no. 1	2	3	4	5	6
0	0	0	0	0	0	0
1	X	0	0	0	0	0
2	0	X	0	0	0	0
3	X	X	0	0	0	0
4	0	0	X	0	0	0
5	X	0	X	0	0	0
6	0	X	X	0	0	0
7	X	X	X	0	0	0
...						
60	0	0	X	X	X	X
61	X	0	X	X	X	X
62	0	X	X	X	X	X
63	X	X	X	X	X	X

X = DIP switch closed
0 = DIP switch open

6.13 FBTRG
CNC-Fieldbus interface with 3 temperature control systems



Technical data

3 control systems for FeCuNi - Thermal elements

Effective range:	0 to 409.6° C
Correcting variable outputs:	24V / DC / 500 mA
Signal resolution:	12 Bit / 0.1°C / 10 mV for each °C

Card power consumption **max. 600 mA**

Terminal configuration

Terminal 3:	+ 24 V	Input temperature increase
Terminal 4:	+ 24 V	Input temperature decrease
Terminal 16:	+ 24 V	Operating voltage module
Terminal 17:	GND	Operating voltage
Terminal 18:	+ 24 V	Operating voltage pick-off for sensors
Terminal 19	GND	For sensors

LED 1 (red)
Display fieldbus errors
(see page 6-15)

LED 2 (green)
Operating voltage

LED 3
Enable,
temperature increase
Terminal 3

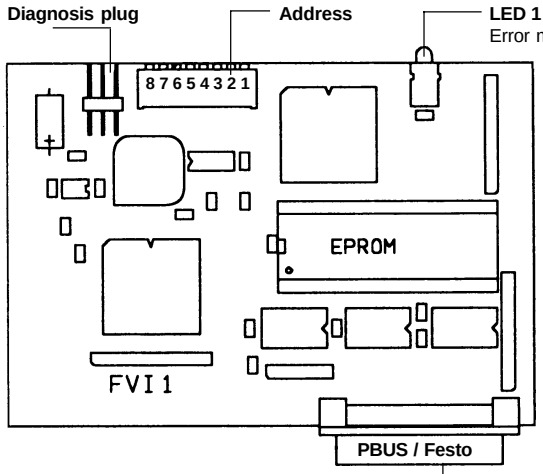
LED 4
Enable,
temperature decrease
Terminal 4

LED 5
Operating voltage
for controller enabling

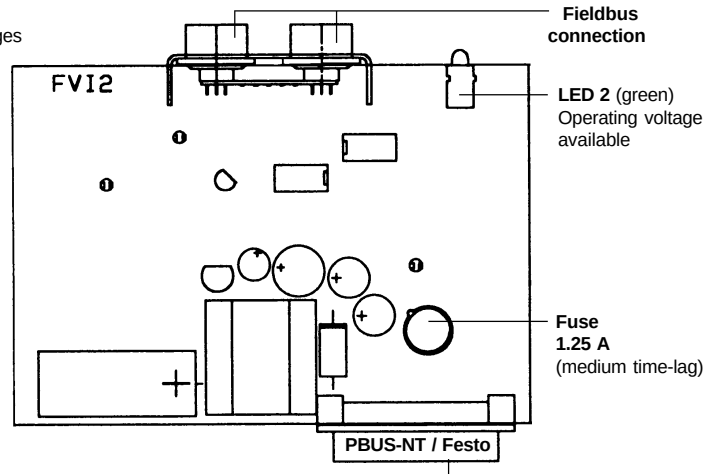
Connection FeCuNi - Thermal elements:

Terminal 20	PE bar connection / PE	
Terminal 21 / 22	Thermal element 1	Terminal 21 (-)
Terminal 31 / 32	Thermal element 2	Terminal 31 (-)
Terminal 41 / 42	Thermal element 3	Terminal 41 (-)
Terminal 45	Input controller enabling	
Terminal 46	+ 24 V for controller enabling	
Terminal 23 / 24	Corr. variable Th-1	Terminal 23 (+)
Terminal 33 / 34	Corr. variable Th-2	Terminal 33 (+)
Terminal 43 / 44	Corr. variable Th-3	Terminal 43 (+)
Terminal 48	+ 24 V / Operating voltage pick-off for controller enabling	
Terminal 49	GND	

6.14 FVI
Activation of Festo valve units with fieldbus connection



FVI-1



FVI-2

Addressing:
Setting the node address via DIP switch / address 0 - 63

Address	DIP switch no.					
	1	**2**	**3**	**4**	**5**	**6**
0	0	0	0	0	0	0
1	X	0	0	0	0	0
2	0	X	0	0	0	0
3	X	X	0	0	0	0
4	0	0	X	0	0	0
5	X	0	X	0	0	0
6	0	X	X	0	0	0
7	X	X	X	0	0	0
...						
60	0	0	X	X	X	X
61	X	0	X	X	X	X

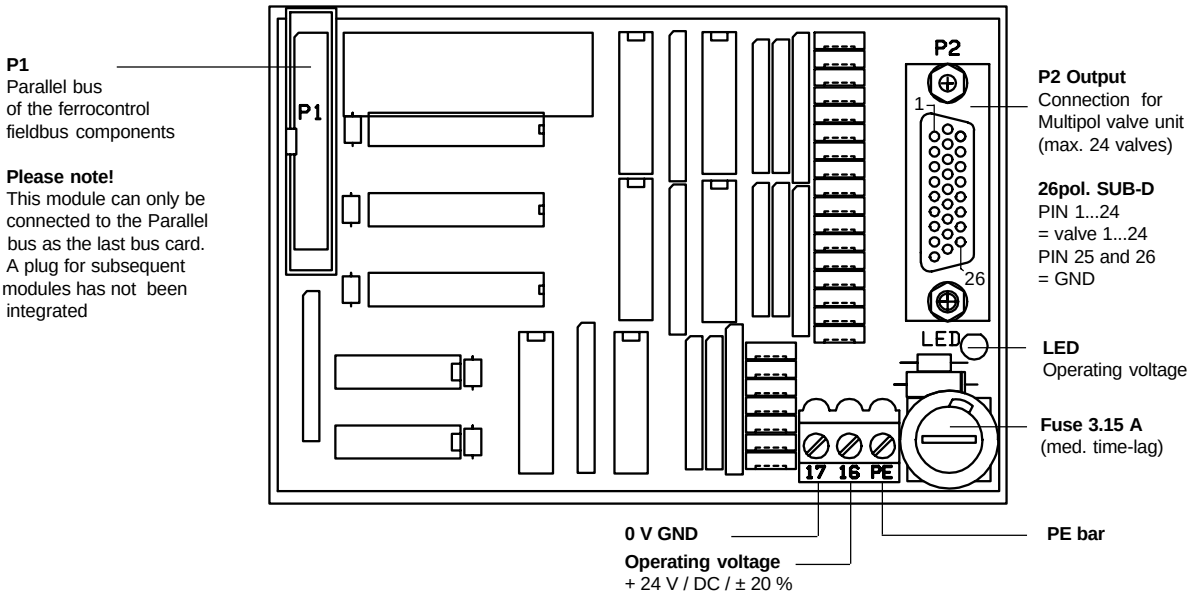
X = DIP switch closed
0 = DIP switch open

Notice!
DIP switch 7 and DIP switch 8 are always set to 0!

What the fieldbus error display means (LED 1 red)

Display:	**Possible causes of error:**
Off	- No error
Steady flashing	- Operating system on the fieldbus interface card in the PC has not been started yet. - No connection via fieldbus cable - No terminator
flashes 4 x	- Configuration does not match the connected modules. - Parallel bus not connected or faulty. - Parallel bus cable too long (malfunctions)
flashes 7 x	- Error in initializing valve units type 03.
flashes 9 x	- Error in initializing valve units type 02.

6.15 MPLI
Interface for connecting the Festo Multipol valve unit



Description

This module makes 24 switching outputs available.
These outputs are reserved especially as drivers for the Festo valve units.
These outputs do not have any internal protection against short circuit, excess temperature, overvoltage or switching peaks.

Special feature
In the fieldbus configuration this module is registered **twice with the ID number 6** (as FB-OUT 16). This module has two logical addresses in the fieldbus configuration. Exception: the module is in operation as the last parallel bus participant.

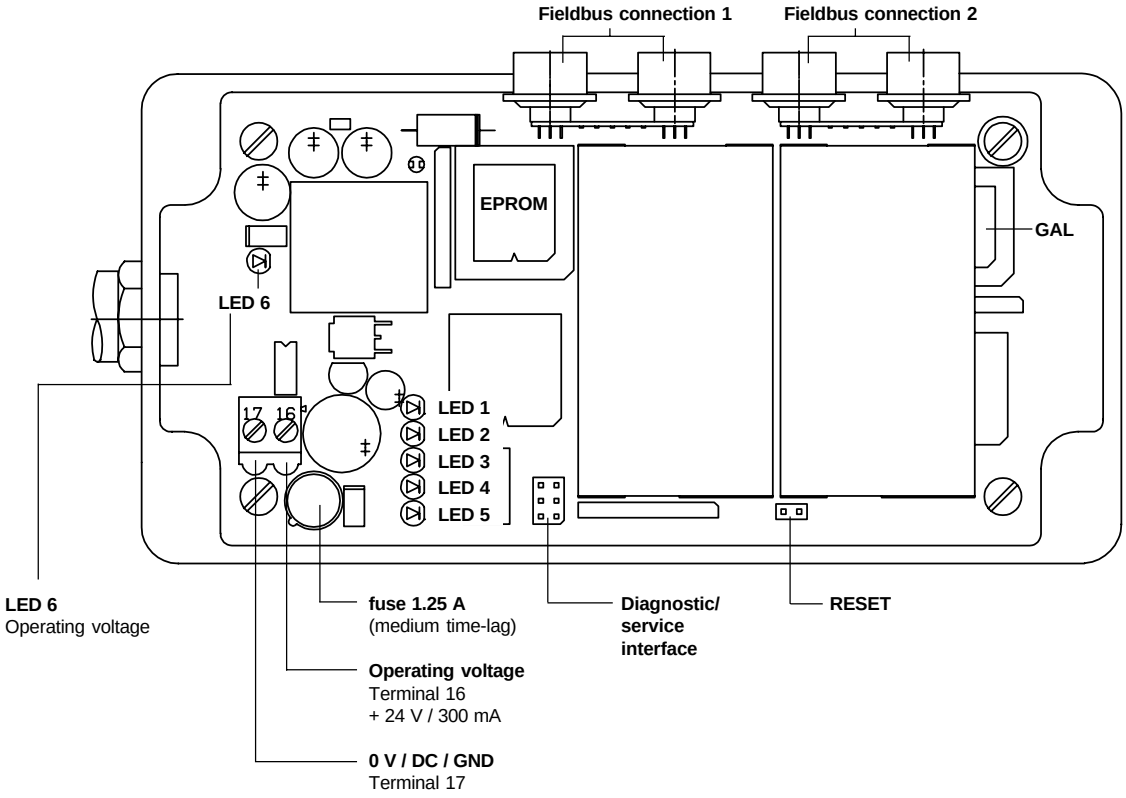
Please note!
If all 24 outputs are in operation, this module may only be connected to the Parallel bus as the 7th participant at the highest!

Technical data:

Max. switching voltage	30 V / DC
Min. switching voltage:	5 V / DC
Constant load per output:	120 mA
Peak load per output:	200 mA / 10 sec / 45° C ambient temperature
Total constant load of module:	**2.4 A**

The total constant load of 2.4 A may not be exceeded!
20 Outputs at 120 mA each = 2.4 A.

6.16 FB-REP
Fieldbus repeater



Description

With the repeater it is possible to realize a tree-shaped fieldbus topology. (see figure on the next page). The purpose of the fieldbus repeater is to branch and enlarge the maximum permitted cable lengths.

Max. cable lengths (for each fieldbus phase)

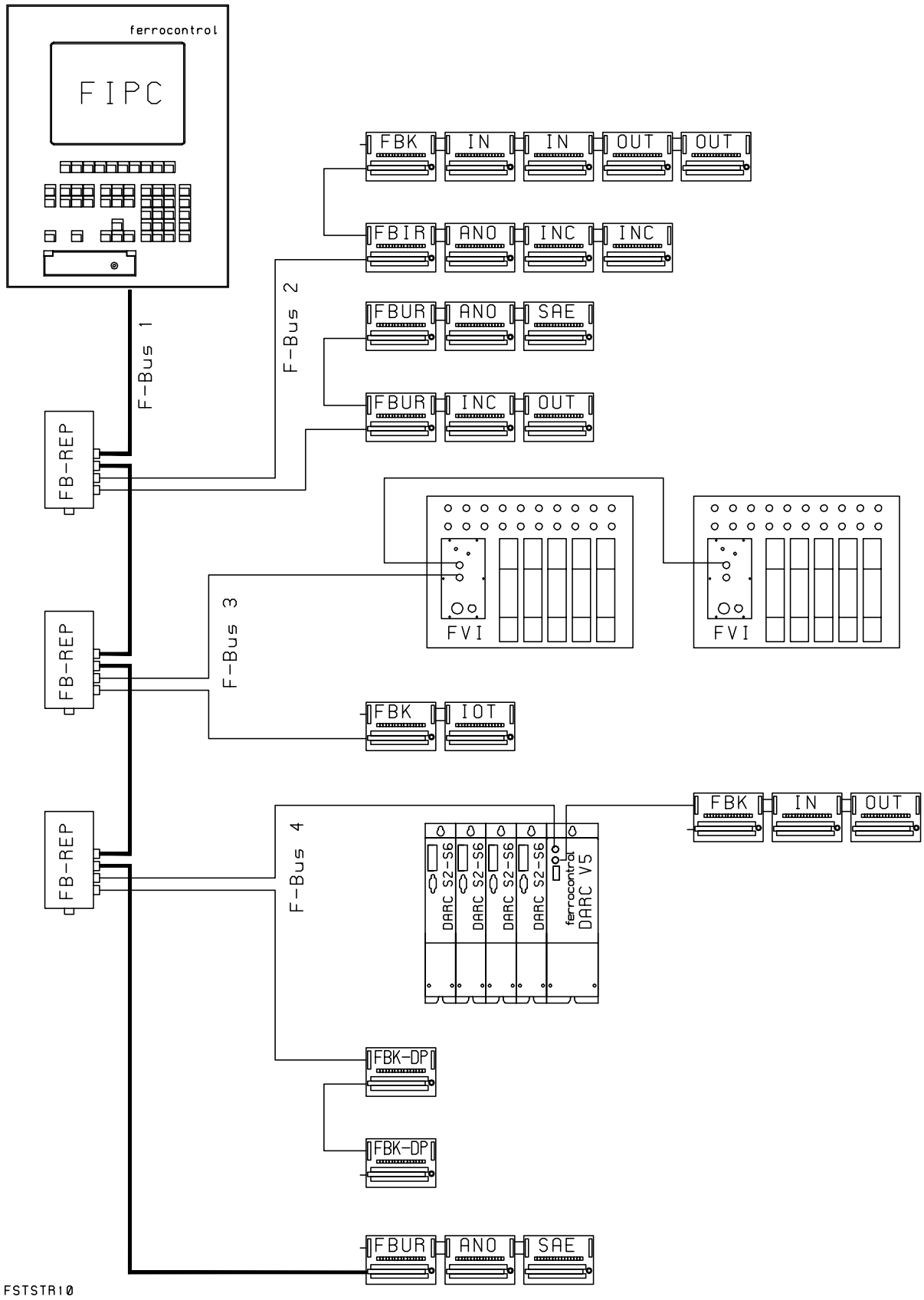
Baud rate:	
500 Kbit/sec.	70 Meter
250 Kbit/sec.	170 Meter
125 Kbit/sec.	350 Meter
62,5 Kbit/sec.	650 Meter

LED 1 ... 5	**Error status display**
LED 1 is on	Error on fieldbus connection 1
LED 2 is on	Error on fieldbus connection 2

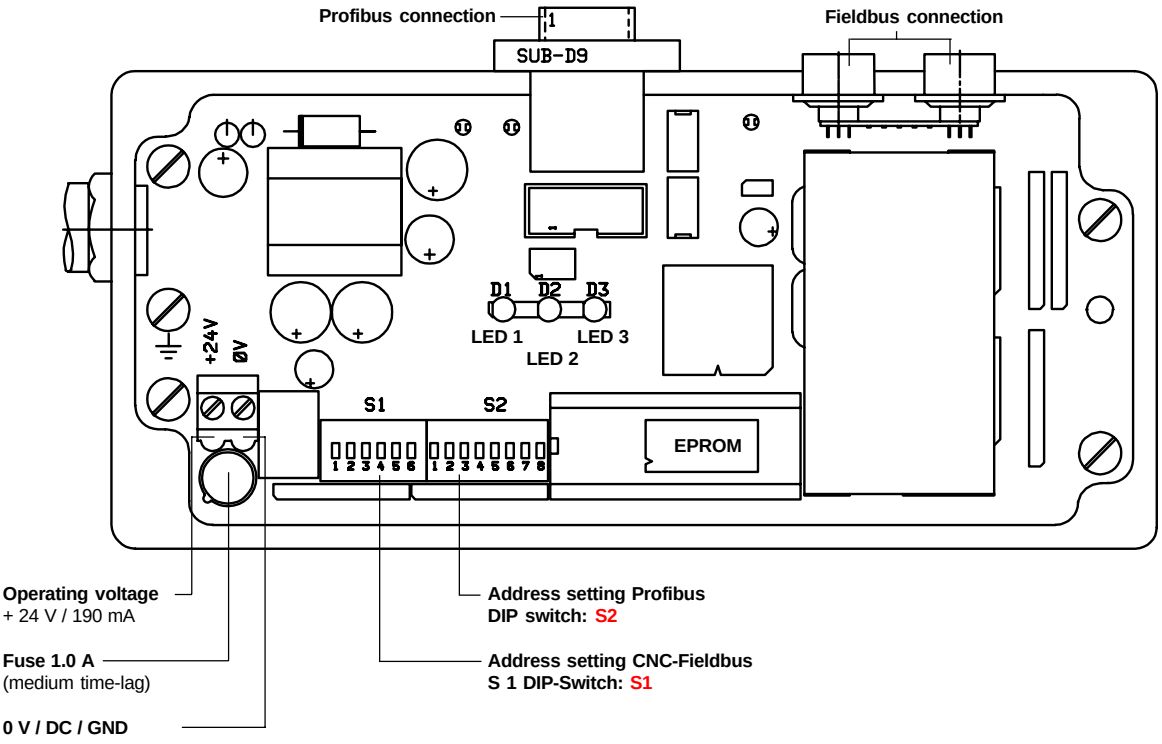
The following table is valid only if LED 1 or LED 2 is on:

LED 3	**LED 4**	**LED 5**	
off	off	off	—— Short circuit in the fieldbus cables after 5 V
off	off	on	—— More than 32 telegrams with transmission error
off	on	off	—— More than 32 telegrams with transmission error
off	on	on	—— Short circuit in the fieldbus cables after 0 V
on	off	on	—— ABUS not synchronized

6.17 Diagram: Fieldbus system
Bus topology with repeater



6.18 FBK-DP
Fieldbus bridge: CNC-Fieldbus - Profibus-DP



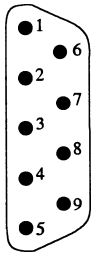
LED 1 / green	**Operating voltage available**
LED 2 / red	Error diagnosis / CNC-Fieldbus see Table card FVI = LED 1 (red)
LED 3 / red	Error diagnosis / is on if a profibus error occurs

Description

The fieldbus bridge FBK_DP allows the exchange of information between the CNC-Fieldbus and the Profibus (Process-Field-Bus).
The configuration of this module is carried out via the Profibus-Master.
The address allocation for the CNC-Fieldbus is carried out via DIP switch S1.
The address allocation for the CNC-Fieldbus is carried out via DIP switch S2.

Pin configuration Profibus connection cable

1 NC / not connected
2 NC / not connected
3 RS 485 -B
4 RTS (TTL level)
5 GND (metallically separated)
6 + 5 V (metallically separated)
7 NC / not connected
8 RS 485 -A
9 NC / not connected



6.18 FBK-DP
Fieldbus bridge: continued

Setting the address via DIP switches

DIP switch S1
Addresses in the CNC-Fieldbus system / settable address range: 0 - 63

Address	DIP switch no.					
	1	**2**	**3**	**4**	**5**	**6**
0	0	0	0	0	0	0
1	X	0	0	0	0	0
2	0	X	0	0	0	0
3	X	X	0	0	0	0
4	0	0	X	0	0	0
5	X	0	X	0	0	0
6	0	X	X	0	0	0
7	X	X	X	0	0	0
...						
60	0	0	X	X	X	X
61	X	0	X	X	X	X

X = DIP switch closed
0 = DIP switch open

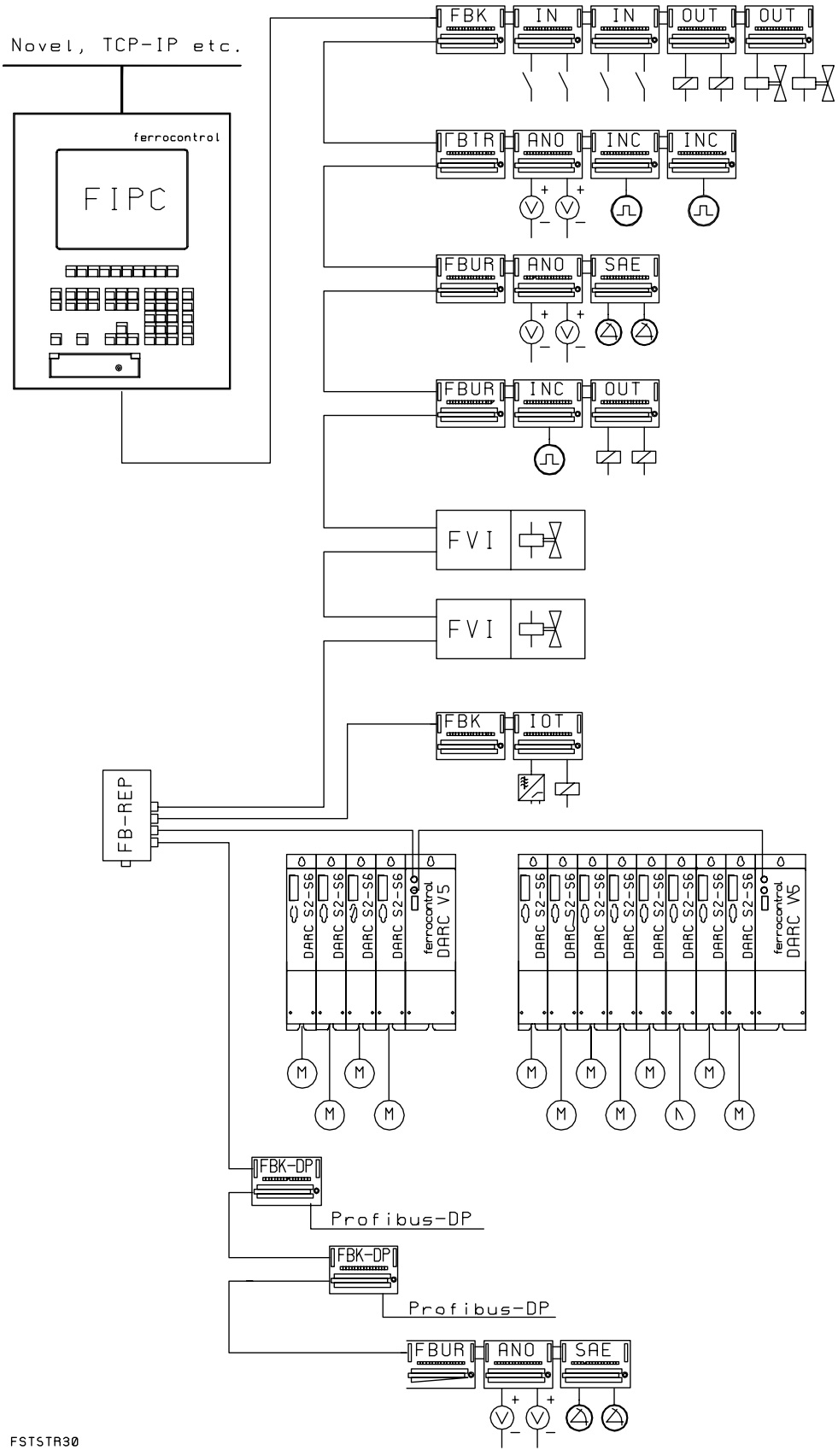
DIP switch S2
Addresses in the Profibus system / settable address range: 0 - 127

Address	DIP switch no.							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0	0	0	0	0	0	0	0
1	X	0	0	0	0	0	0	0
2	0	X	0	0	0	0	0	0
3	X	X	0	0	0	0	0	0
4	0	0	X	0	0	0	0	0
5	X	0	X	0	0	0	0	0
6	0	X	X	0	0	0	0	0
7	X	X	X	0	0	0	0	0
...								
124	0	0	X	X	X	X	X	0
125	0	X	X	X	X	X	X	0
126	X	0	X	X	X	X	X	0
127	X	X	X	X	X	X	X	0

X = DIP switch closed
0 = DIP switch open

Notice!
DIP switch 8 is always set to 0!

6.19 Bus topology with a bridge to the Profibus



6.20 Connection configuration: DARC axis regulation controller

1 X 20
24 V power supply

2 X 30
Parallel bus

3 X 1
Peripheral devices and holding brake
1 Temperature contact - motor
2 Quick-stop - right
3 Quick-stop - left
4 Input - reference switch
5 Input - trigger
6 0 V - potential (24 V)
7 + 24 V / line entry
8 Holding brake - motor
Protective circuit see Appendix A.3

4 X 2
Input resolver
Input protective circuit
see Appendix A.3

5 X 3
Input - OPTIONAL
for absolute position encoders
or incremental encoders

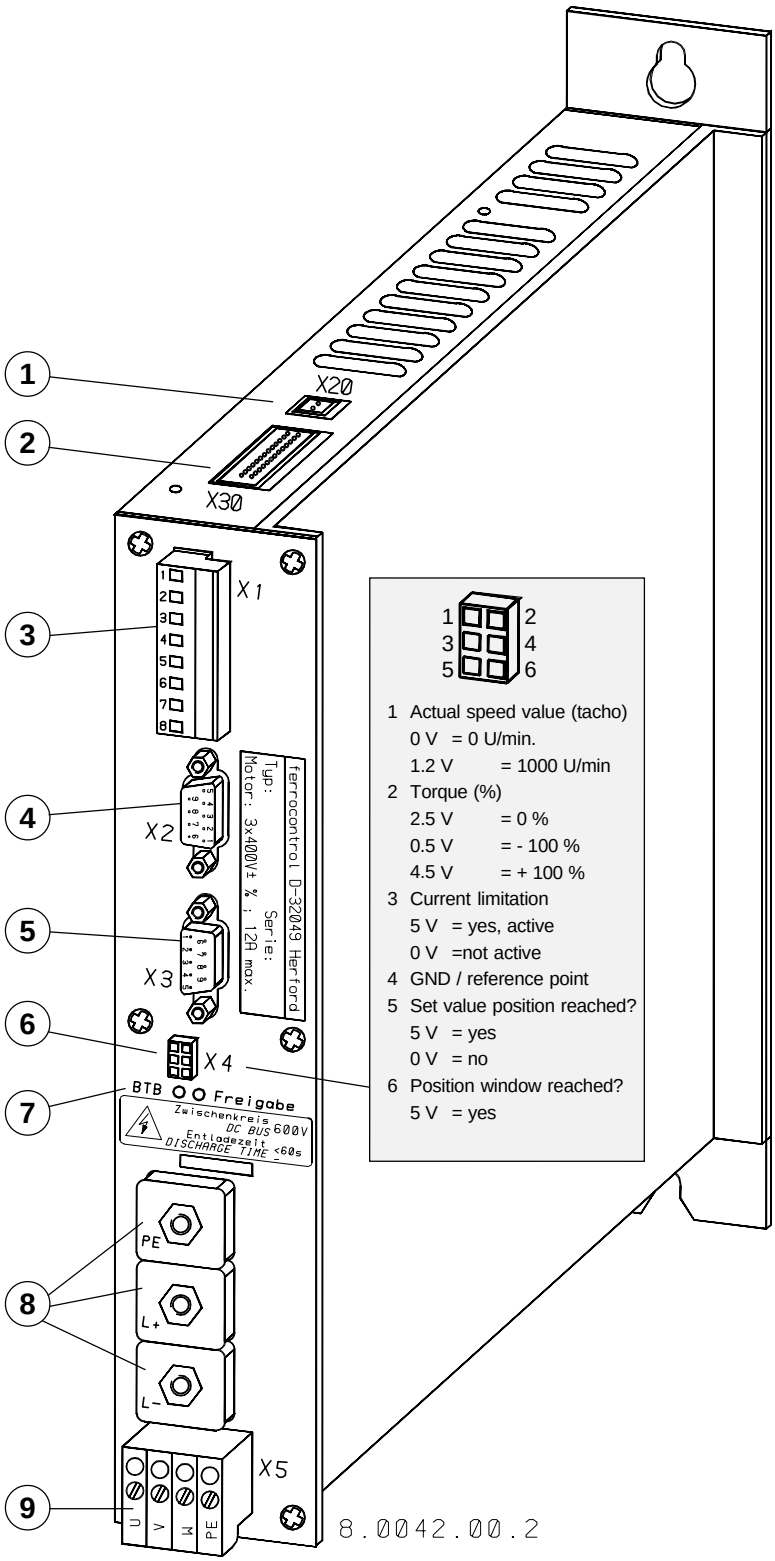
6 X 4
Test and diagnosis measuring point

7 BTB: Operational display
LED = ON
Axis reg. controller ready for operation
LED = OFF
Axis reg. controller not ready for operation

Enabling: Operational display
LED = ON
Pulse-controlled inverter = ON
Axis enabled
LED = OFF / axis disabled

8 D.c. link
PE / L+ / L-
Connection diagram see Appendix A.3

9 X 5
Motor connection
Connection diagram see Appendix A.3



1 **X 20**
24 V power supply / DC
1 + 24 V
2 0 V

2 **X 30**
Parallel bus

3 **X 6**
Control in- and outputs
1 + 24 V / input
2 Ready for operation (BTB)
BTB output
3 External enabling signal (+ 24 V)
4 Trigger signal (+ 24 V)
5 0 V / earth
Protetive circuit see Appendix A.3

4 **Fieldbus LED**
Info about LED display
see next page

5 **X 7**
Service-interface
RS-232
Override potentiometer

6 **X 8** / OPTIONAL
Input for absolute position encoder
or incremental encoder

7 **X 9 Measuring points**
Only for ferrocontrol service

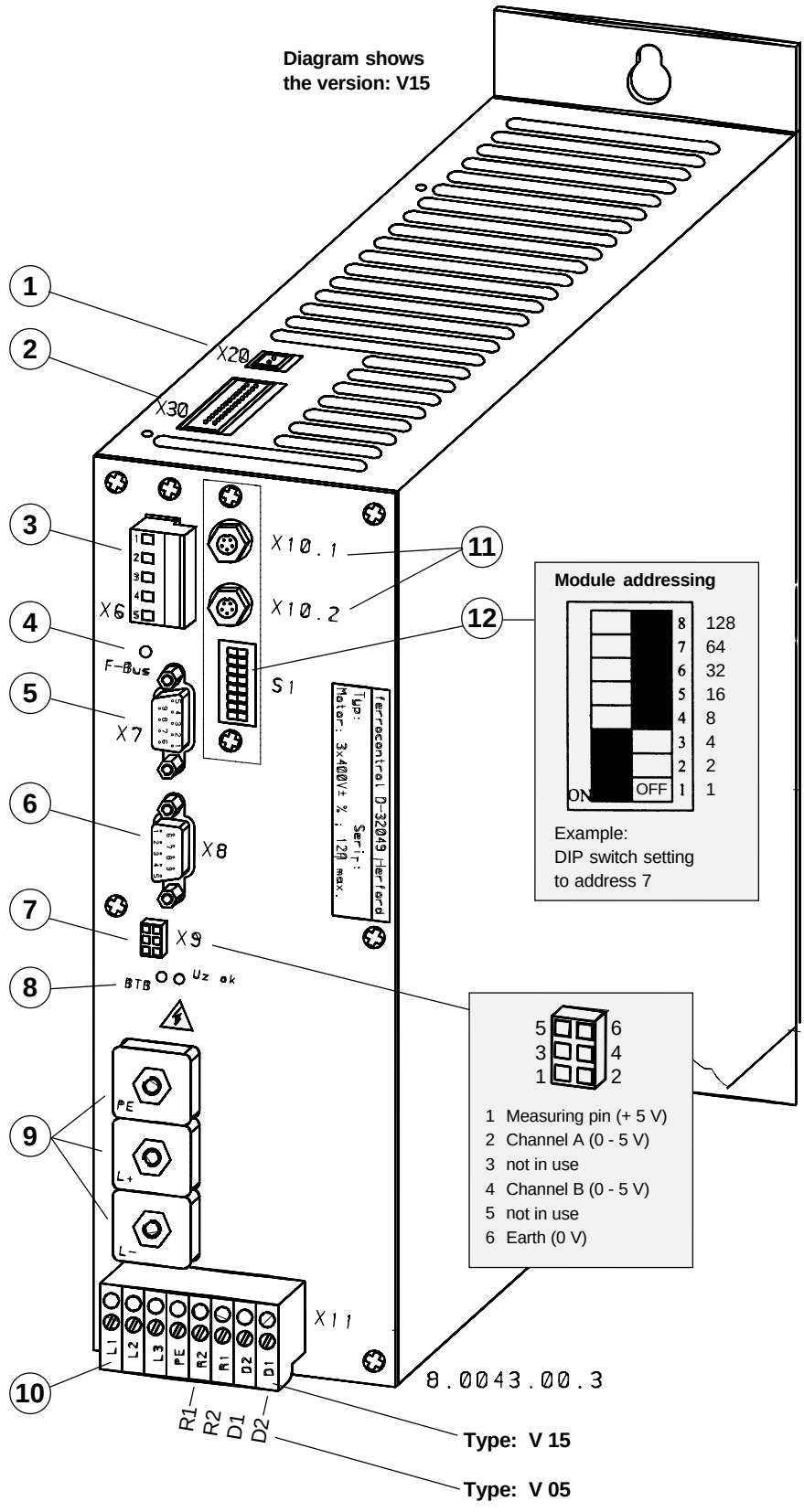
8 **BTB; operational display**
LED - ON = ready for operation
LED - OFF = not ready
Uz; operational display
LED - ON =
D.c. link voltage im
set range
LED - OFF =
Over- or undervoltage

9 **D.c. link**
PE / L+ / L-
Connection diagram see Appendix A.3

10 **X 11**
Power connection
R1 - R2 = Braking resistance
D1 - D2 = D.c. link choke
Connection diagram see Appendix A.3

11 **X 10.1 / X 10.2**
CNC - Fieldbus connection

12 **S1- Module address**
DIP switch for setting
the module address

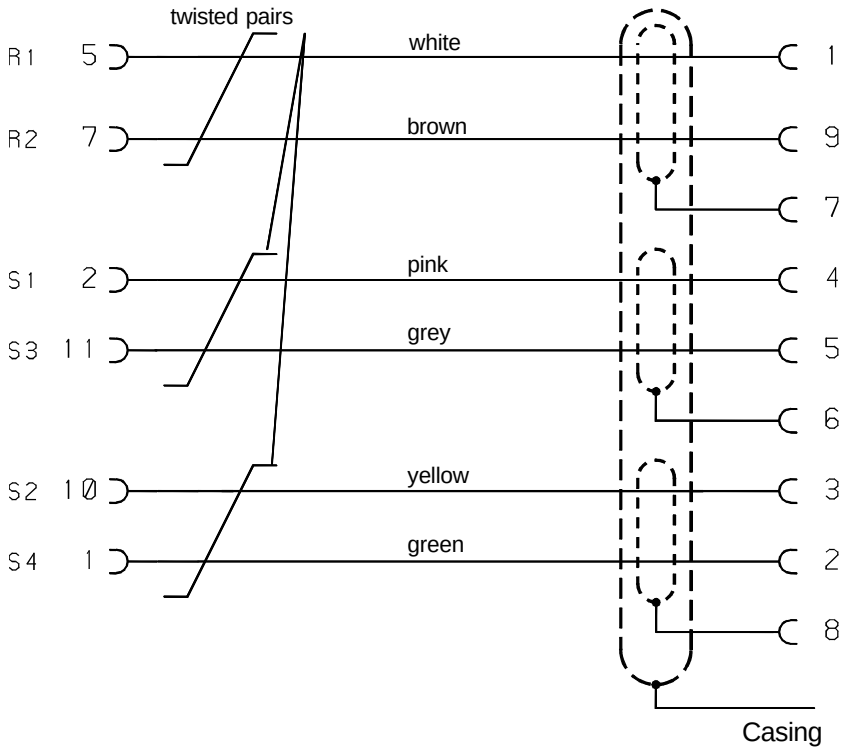


Notice! Altered marking sequence!

6.21 DARC supply module
Operating display F-Bus (LED)

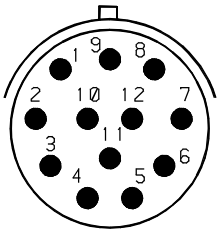
Operational display: Fieldbus LED	Status	Cause / Meaning
	ON	The operating software is being transferred to the axis regulation controller. If the LED doesn't go out, possibly a download error.
	OFF	No error, everything OK.
	ON (with short pauses)	a) Fieldbus transfer error b) Short circuit in the fieldbus c) Terminating resistor connector is missing
	Steady flashing	Fieldbus system not started yet. no connection via fieldbus cable
	4 x flashing, 1 x pause	Error in the parallel bus connector

7.1 Encoder signal resolver - DARC input

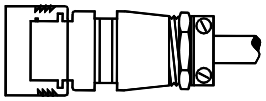


Resolver **DARC input**

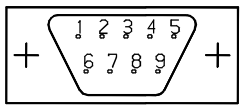
View = solder side



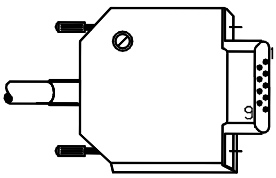
Jack insert 12-pin
Type: IN92



View = crimp side

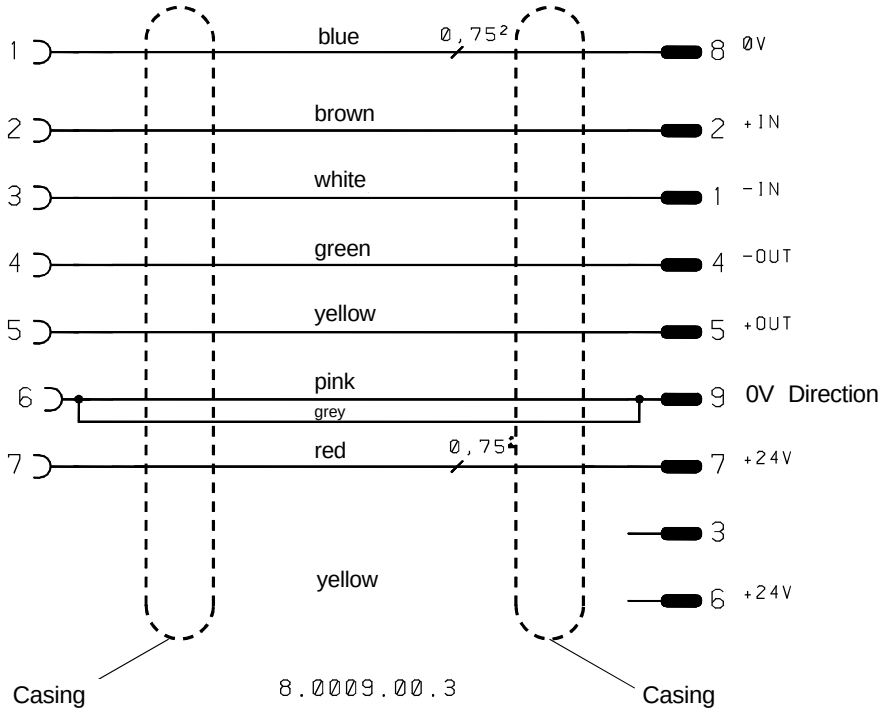


Jack insert sub-D 9-pin



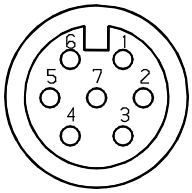
Metallic casing
Screws = UNC thread

7.2 Absolute position encoder - DARC input

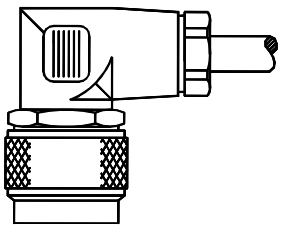


Absolute position encoder

View = solder side

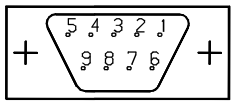


Jack contact unit
7-pin

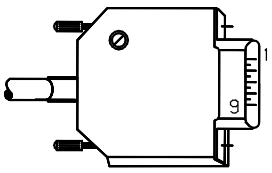


DARC input

View = solder side

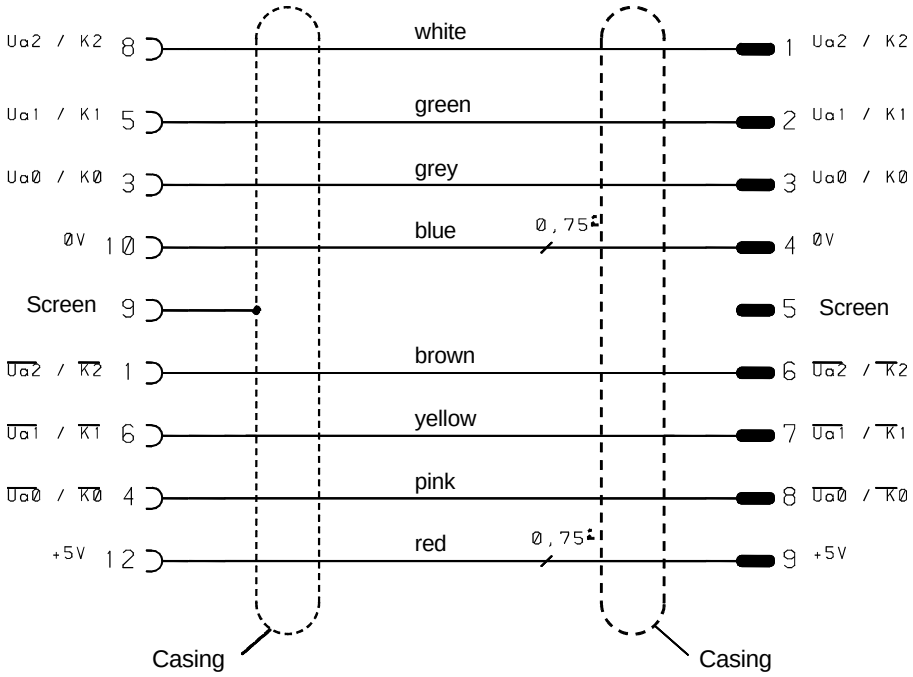


Pin contact unit
sub-D 9-pin



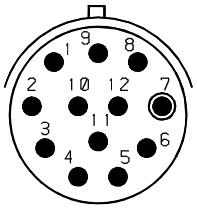
Metallic casing
Screws = UNC thread

7.3 Incremental encoder -> DARC input
Incremental encoder -> FB-INC

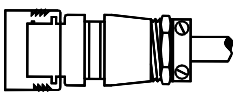


Incremental encoder

View = solder side

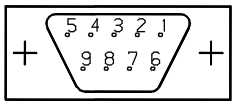


Jack contact unit 12-pin
Type: IN 101

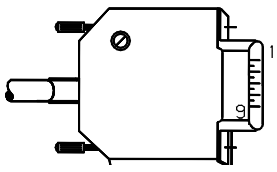


DARC input and FB - INC

View = solder side

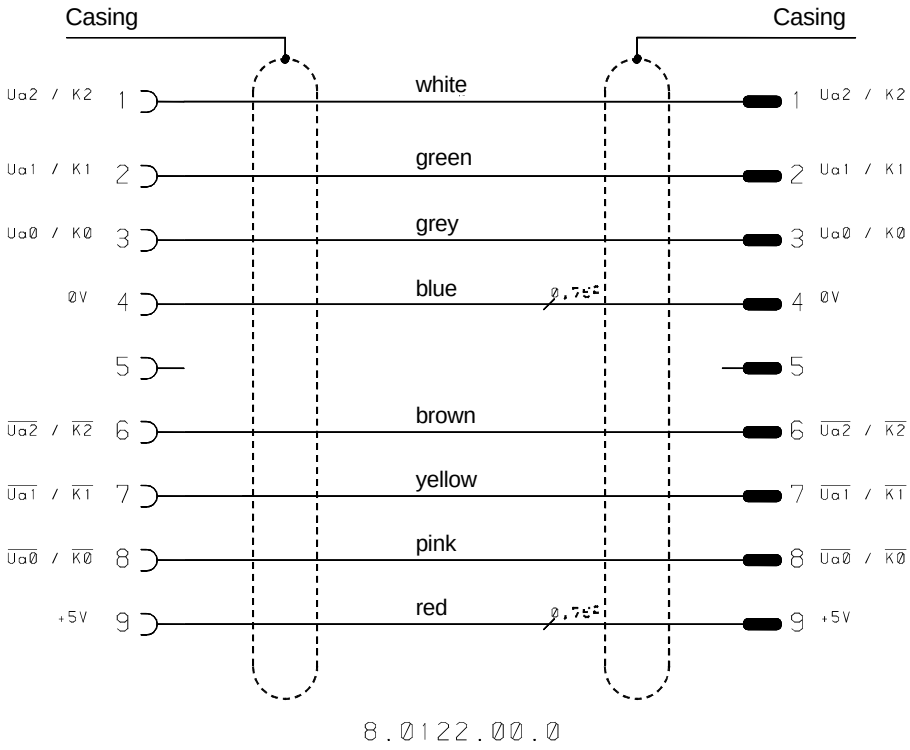


Pin contact unit
sub-D 9-pin



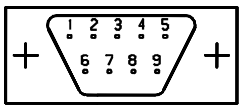
Metallic casing
Screws = UNC thread

7.4 Incremental encoder distribution board -> DARC supply module



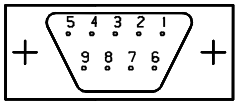
View = crimp side

View = crimp side

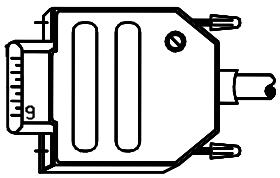


Sub-D 9-pin socket

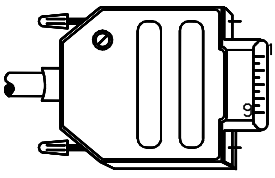
View = solder side



Male connector

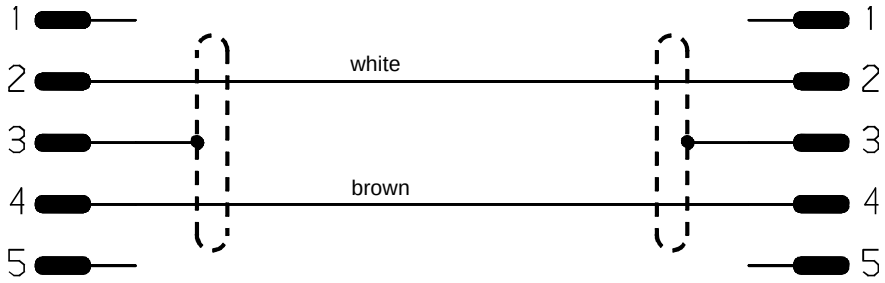


Metallic casing
Screws = UNC thread



Metallic casing
Screws = UNC thread

7.5 Fieldbus cable ferrocontrol - CNC Fieldbus



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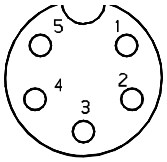
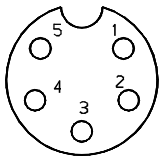
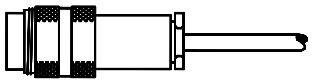
View of solder side

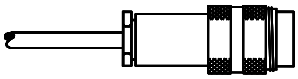


View of solder side



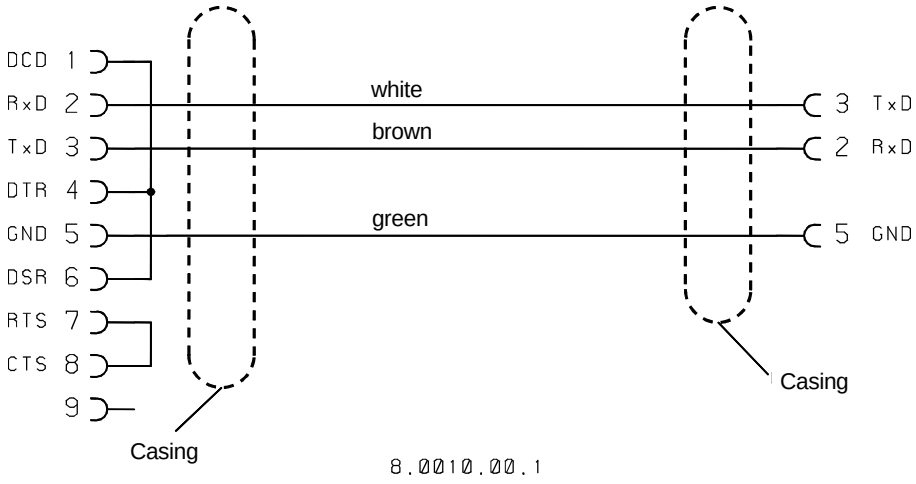


Male connector 5-pin



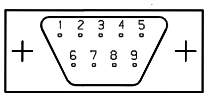
Pin contact unit
sub-D 9-pin

7.6 RS-232 interface cable / PC -> DARC supply module

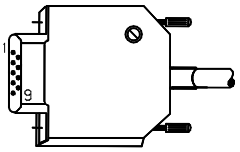


PC

View = crimp side



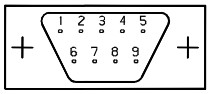
Sub-D 9-pin socket



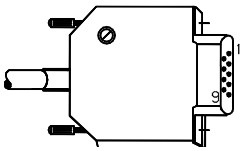
Metallic casing
Screws = UNC thread

DARC supply module

View = crimp side

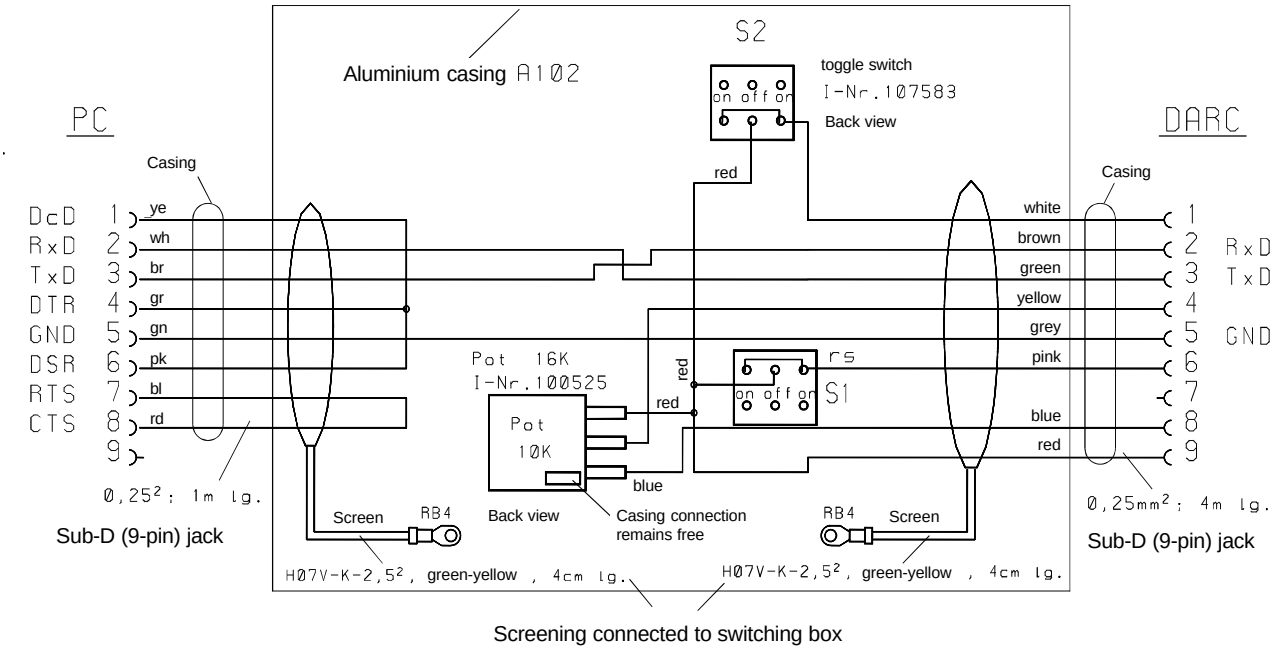


Sub-D 9-pin socket

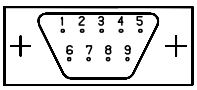


Metallic casing
Screws = UNC thread

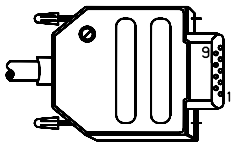
7.7 Connection: Override potentiometer
Service cable: V24 for DARC supply module



View = crimp side

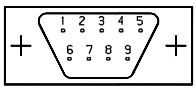


Sub-D 9-pin socket

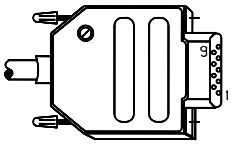


Metallic casing
Screws = UNC thread

View = crimp side



Sub-D 9-pin socket



Metallic casing
Screws = UNC thread

Space for your own notes

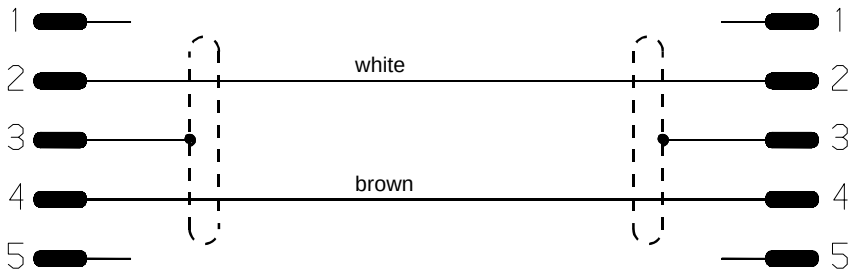
Baud rate:	Cable length (for each fieldbus phase)
500 Kbit/sec.	70 metres
250 Kbit/sec.	170 metres
125 Kbit/sec.	350 metres
62.5 Kbit/sec.	650 metres

By using an amplifier (repeater) you can increase the cable lengths!

2 Fieldbus signal
Diffenential signal - negative

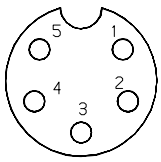
3 Screening / GND

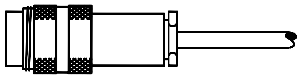
4 Fieldbus signal
Differential - positive



8.0121.00.0

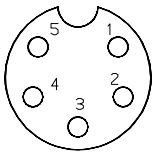
View of solder side

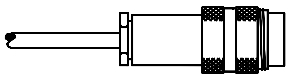




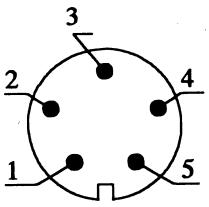
Male connector 5-pin

View of solder side





Male connector 5-pin



Pinconfiguration: CNC-Fieldbus connection

1 Rt + / terminator
Differential signal - positive
2 Fieldbus signal
Differential signal - negative
3 Screening
4 Fieldbus signal
Differential signal - positive
5 Rt - / terminator
Differential signal - negative

8 Cable lengths and transmission rate in the CNC-Fieldbus

8.2 Determining the length of the installed cables via the d.c. link resistance

Warning!

Only carry out this measurement when the power current (+ 24 V) is switched off!

If the error message
"58 fieldbus error in controller"
occurs very frequently in your system or transmission errors occur very often, you should definitely check the reliability performance of the fieldbus cables.

Frequent causes of malfunction are e.g.:
Line interruptions or short circuits on mobile (incorporated) cable routes, whereby the error can only appear briefly (according to the cable position)

"Cold junction", e.g. at plug-in connectors

Transmission rate too high for the appropriate cable length
(see Table 8.1).

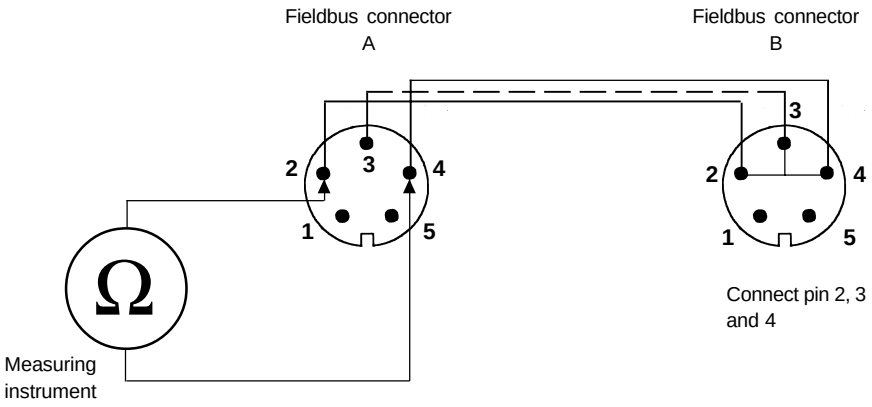
In many cases determining the d.c. link resistance to a restriction of the cause of the fault.

The following figures refer to the fieldbus with the ferrocontrol article no.: 70-041 000. The specific d.c. link resistance of this cable is 0.077 ohms/ metre.

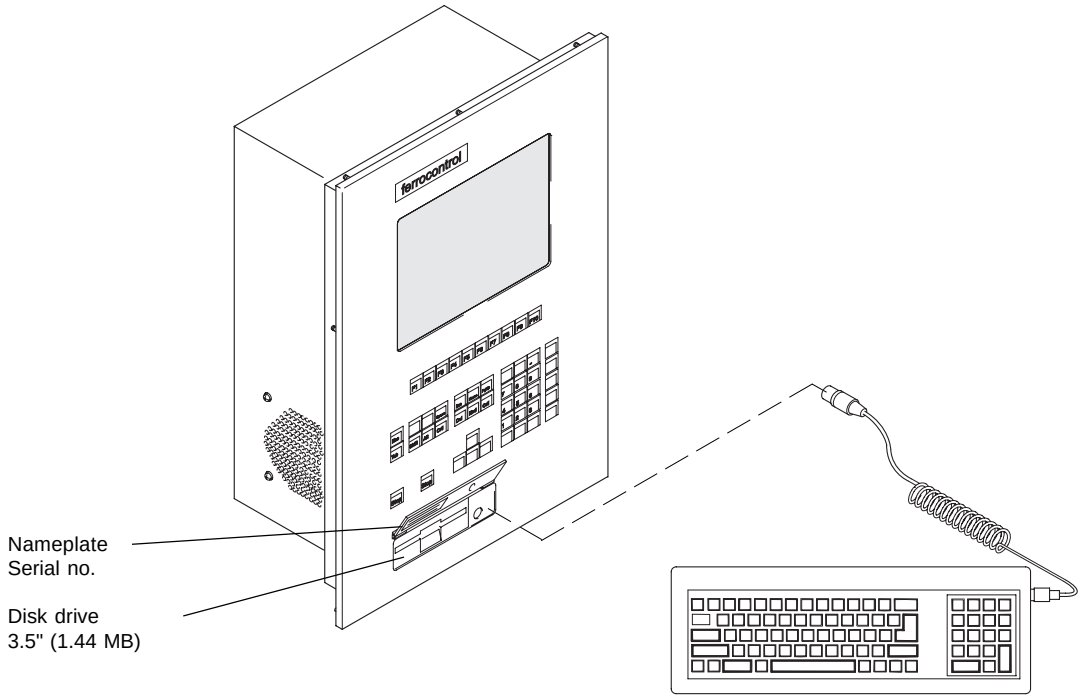
Cable length	**D.c. link resistance**
70 metres	c. 11 ohms / pin 2 - 4
170 metres	c. 26 ohms / pin 2 - 4
350 metres	c. 54 ohms / pin 2 - 4

These figures refer to the return journey. Between pin 2 and 3 or pin 4 and 3 check the connections to the screen conductor.

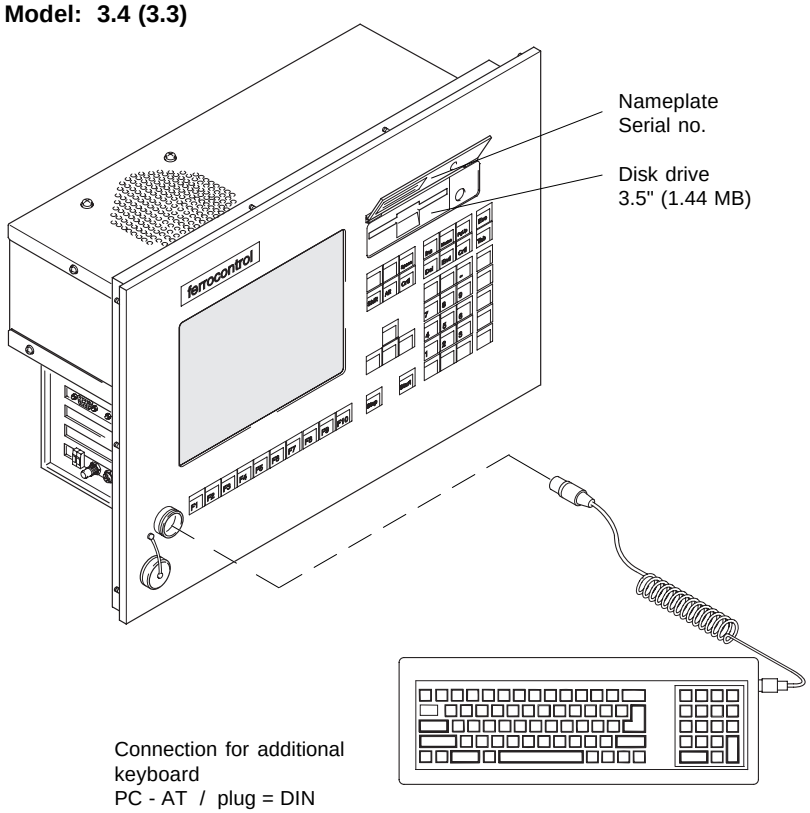
This measurement can be made between the two ends of the complete fieldbus phase.



Model: 1.4 (1.3)

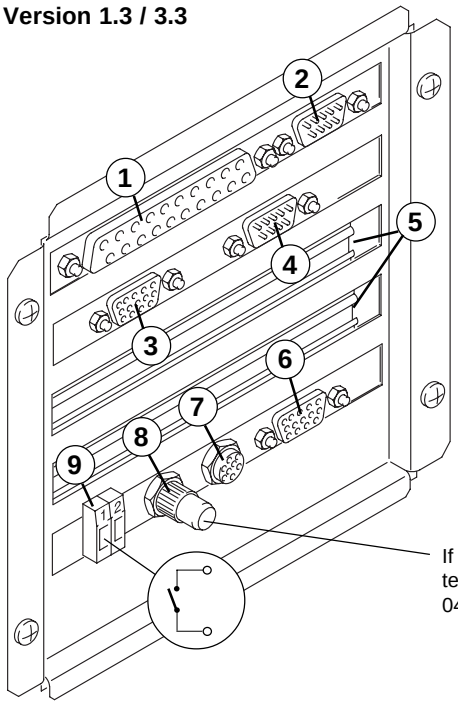


Model: 3.4 (3.3)



9.1 Model range 1.4 (3.4) and 1.3 (3.3)
9.1.2 External pin configuration

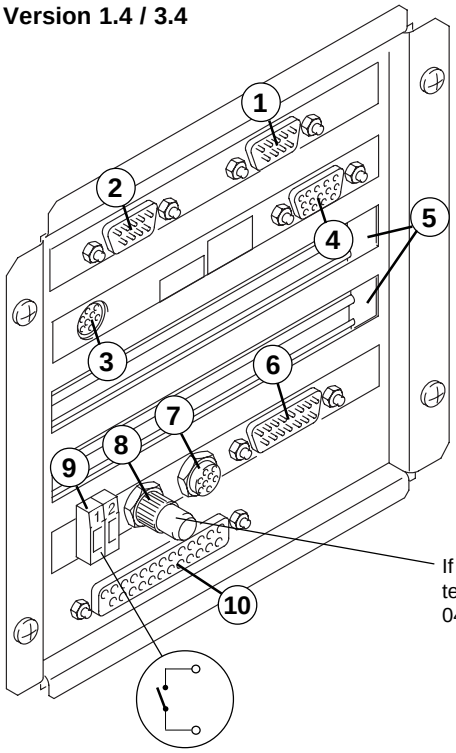
Version 1.3 / 3.3



If only one fieldbus channel is in use, a terminating resistor connector (Art. no. 70-042500) must be plugged into the free channel!

1 **LPT 1**
Parallel interface for printer connection
2 **Com 2 / RS 232**
Serial interface for e.g. modem
3 **External monitor (VGA)**
4 **Com 1 / RS 232**
for e.g. mouse
5 **2 free plug-in stations** for additional functions
e.g. interface RS 485
6 **OPTION** / not in use
7 **Fieldbus connection / channel 1**
8 **Fieldbus connection / channel 2**
(with terminating resistor connector)
9 **Watchdog output**
potential-free contact,
max. contact load: 30 Volt/0.5 A/ 10 W

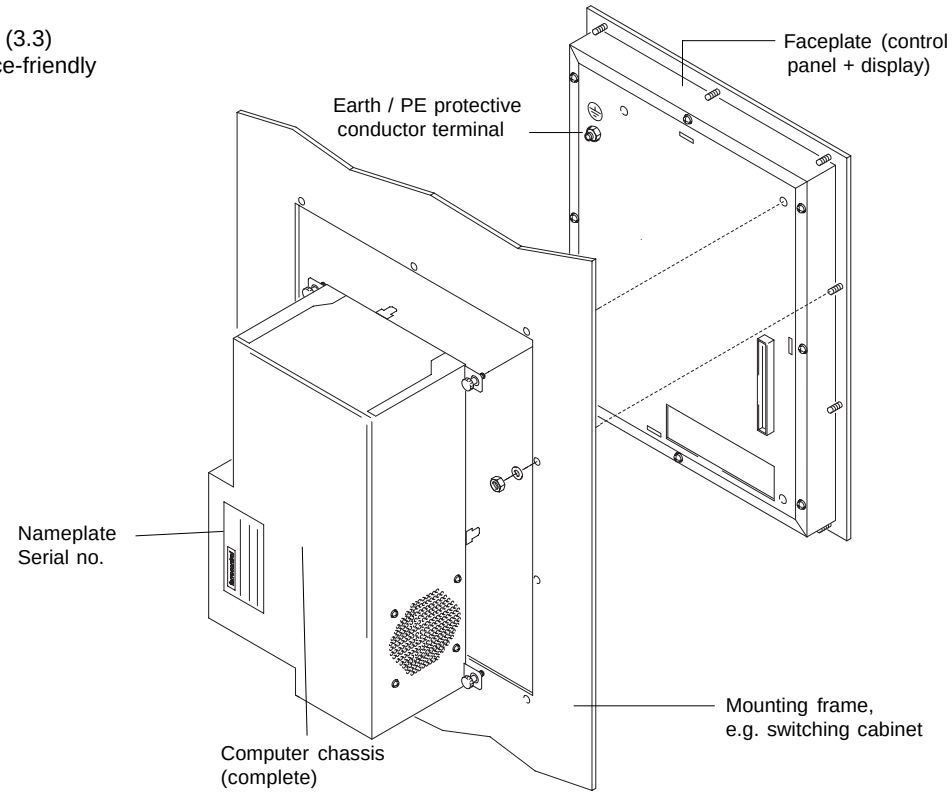
Version 1.4 / 3.4



If only one fieldbus channel is in use, a terminating resistor connector (Art. no. 70-042500) must be plugged into the free channel!

1 **COM 1 / RS 232**
Serial interface
2 **COM 2 / RS 232**
Serial interface for e.g. modem
3 **PS/2 Mouse**
4 **External monitor (VGA)**
5 **2 free plug-in stations** for additional functions
e.g. interface RS 485
6 **OPTION** / not in use
7 **Fieldbus connection / channel 1**
8 **Fieldbus connection / channel 2**
(with terminating resistor connector)
9 **Watchdog output**
potential-free contact,
max. contact load: 30 Volt/0.5 A/ 10 W
10 **LPT 1**
Parallel interface for printer connection

The model range 1.4 (1.3) / 3.4 (3.3) is based on a particularly service-friendly concept.



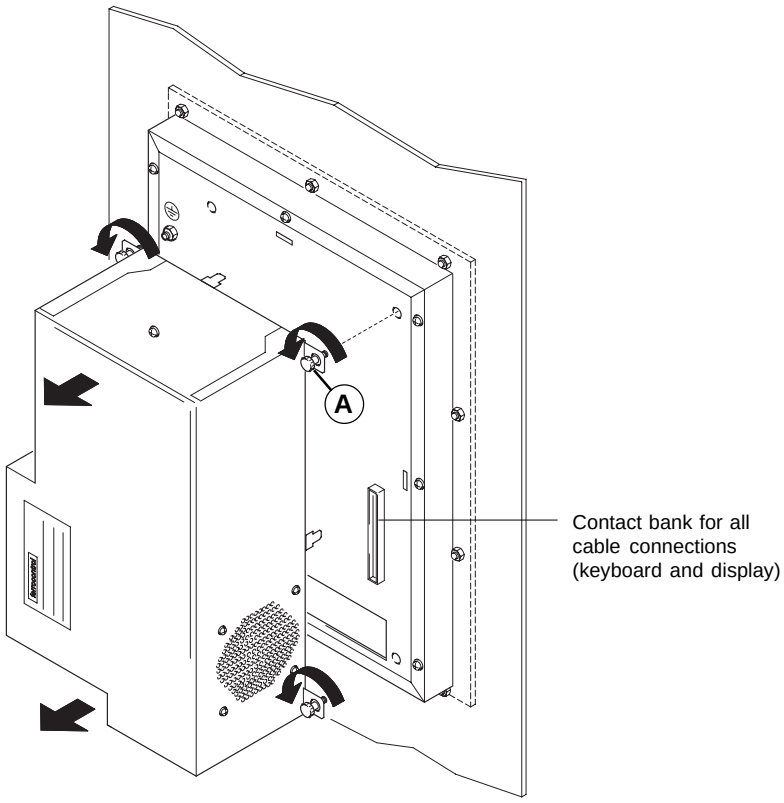
For servicing the computer chassis can be easily removed from the faceplate.

The faceplate does not have to be dismantled.

Dismantling the computer chassis:

1. Unsrew the 4 knurled screws (A)

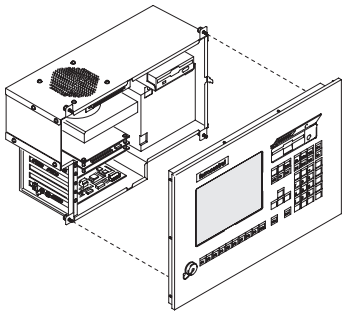
2. Carefully remove the chassis from its locking element with both hands.

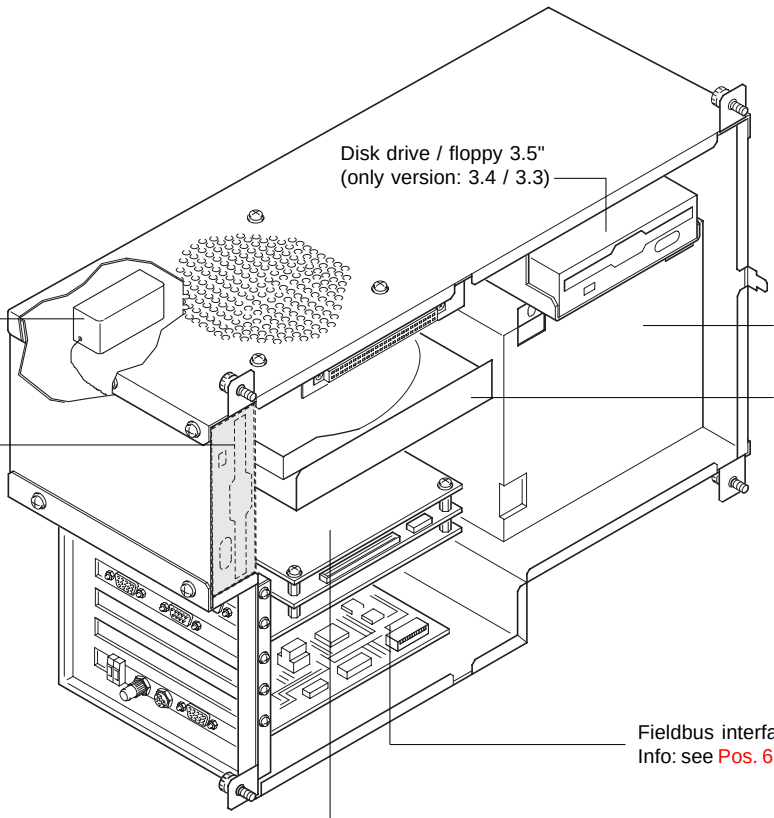


Notice!

In case of malfunctions in the input keyboard or in the display, the complete faceplate is exchanged!

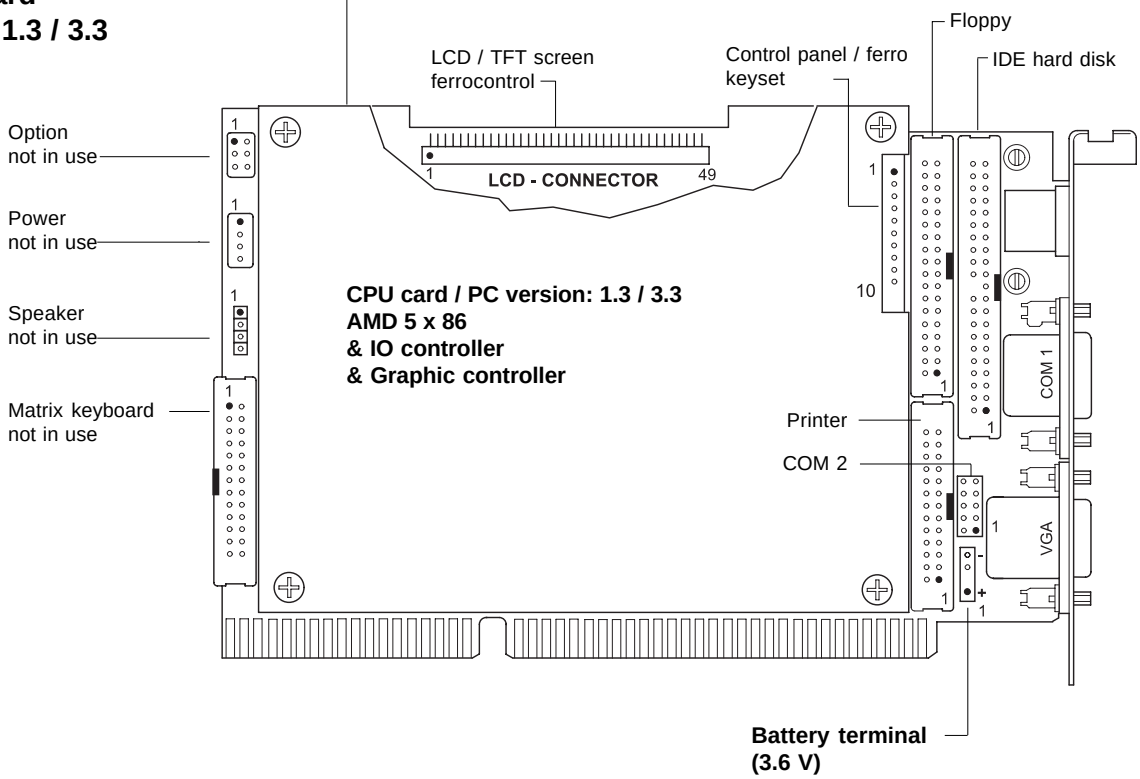
9.1 Model range 1.4 (1.3) / 3.4 (3.3)
9.1.4 Interior view



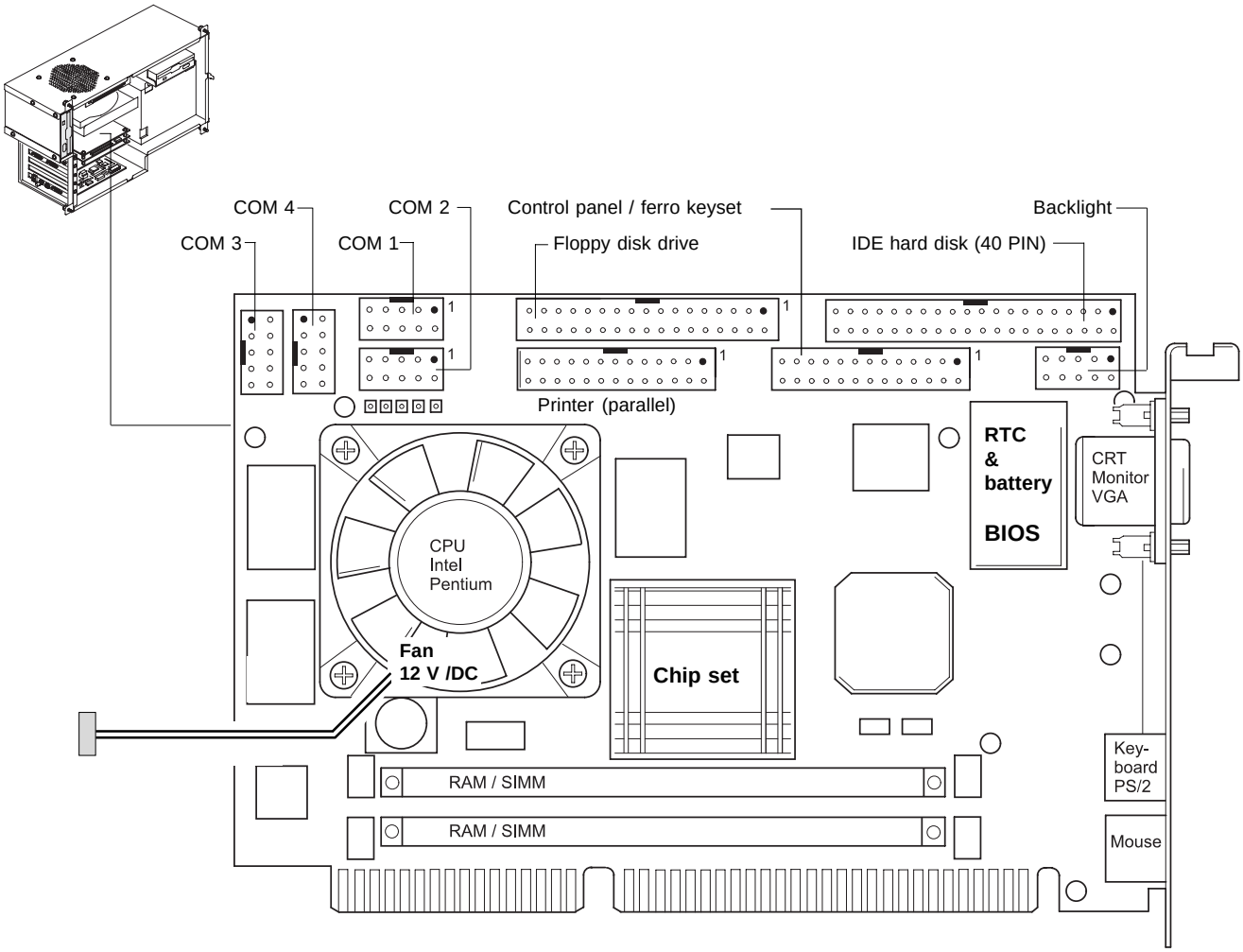


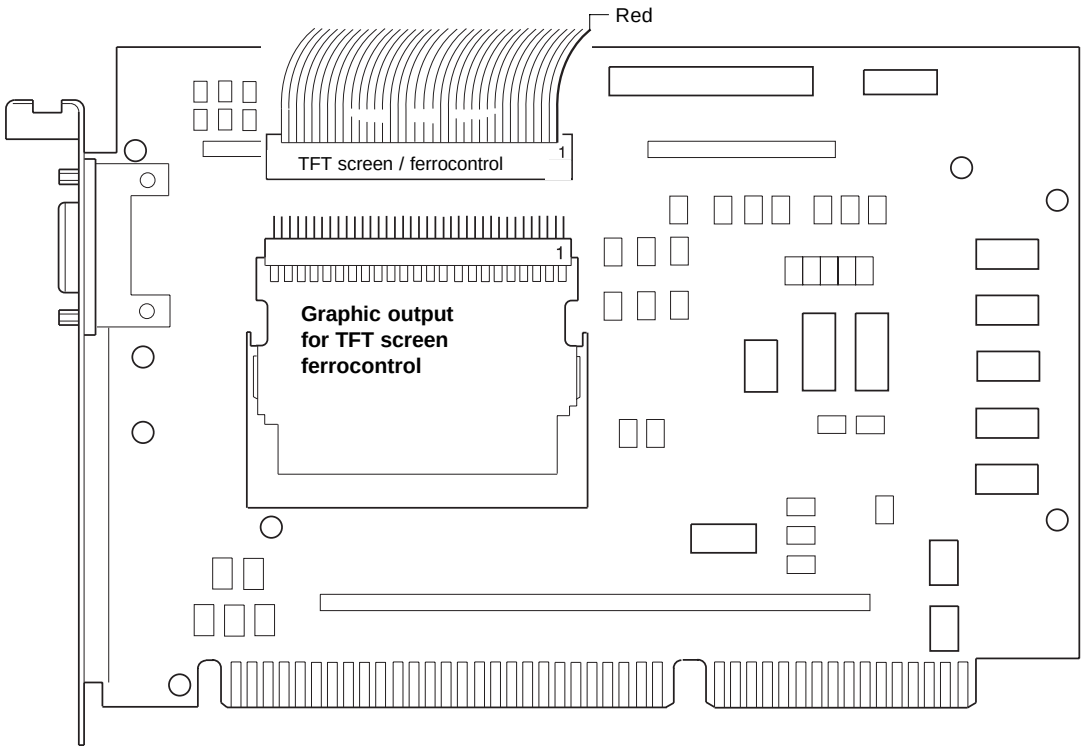
Notice!
In version 1.4 / 3.4 changing the battery is not necessary.

9.1.5 CPU card
PC version: 1.3 / 3.3



9.1 Model range 1.4 (1.3) / 3.4 (3.3)
9.1.6 CPU card / Intel-Pentium / PC version: 1.4 (3.4)



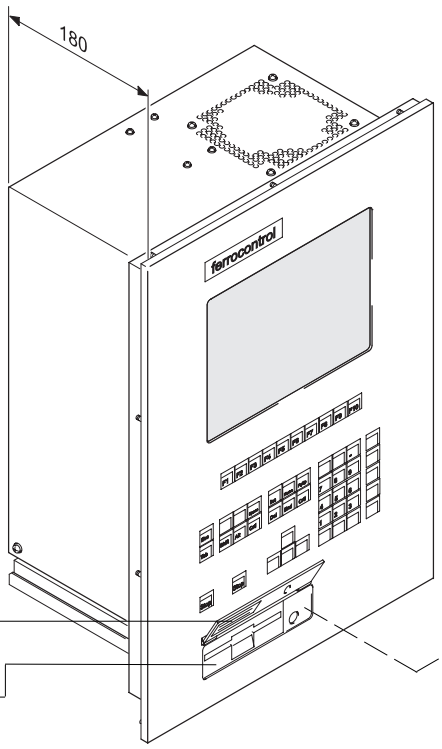


CPU card
rear view

9.2 Model range 1.2
9.2.1 Device view

Model: 1.2
Front view

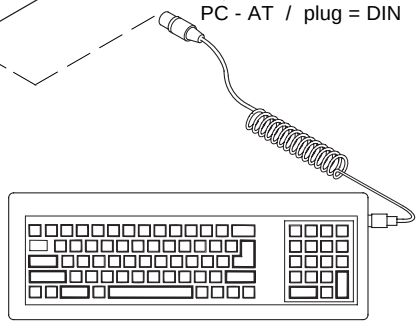
Mounting depth: 180 mm



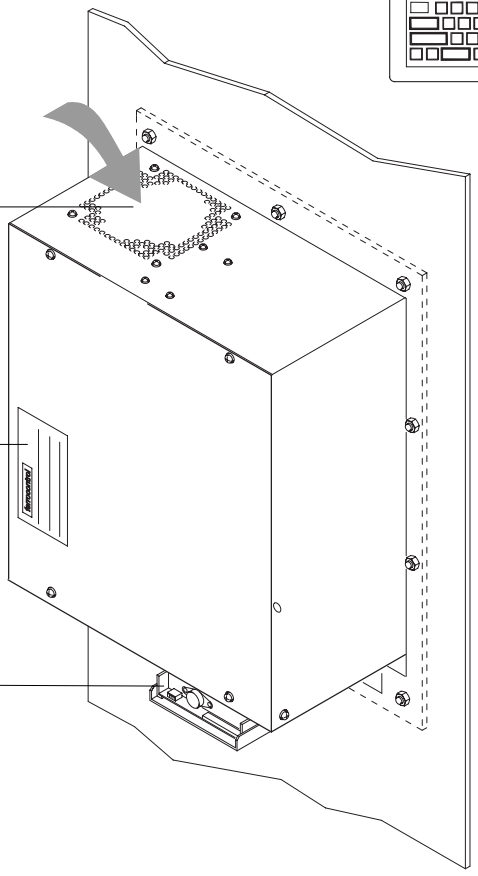
Nameplate
Serial no.

Disk drive
3.5" (1.44 MB)

Connection for additional keyboard
PC - AT / plug = DIN



Model: 1.2
rear view



Fan

Nameplate
Serial no.

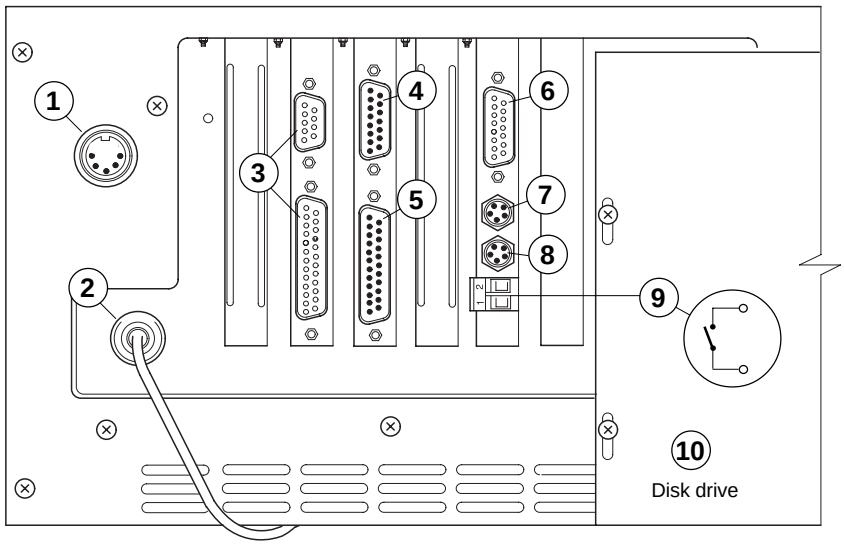
Disk drive
3.5" (1.44 MB)

When making service enquiries or ordering spare parts please state the full type designation and serial number.

9.2.2 External pin configuration

Device view from below:

1 Keyboard connection (external)
PC-AT / DIN plug
2 Connection for internal keyboard
DIN plug
3 COM 2
Serial interface / RS-232
Plug depending on version
SUB-D 25-pin or SUB-D 9-pin
Application:
e.g.: modem or printer (serial)
4 COM 1
Serial interface / RS-232
Plug depending on version
SUB-D 25-pin or SUB-D 9-pin
Application:
mouse or printer (serial)
5 LPT1
Parallel interface
Standard printer connection
6 OPTION / not in use
7 Fieldbus connection / channel 1
8 Fieldbus connection / channel 2
9 Watchdog output
potential-free contact

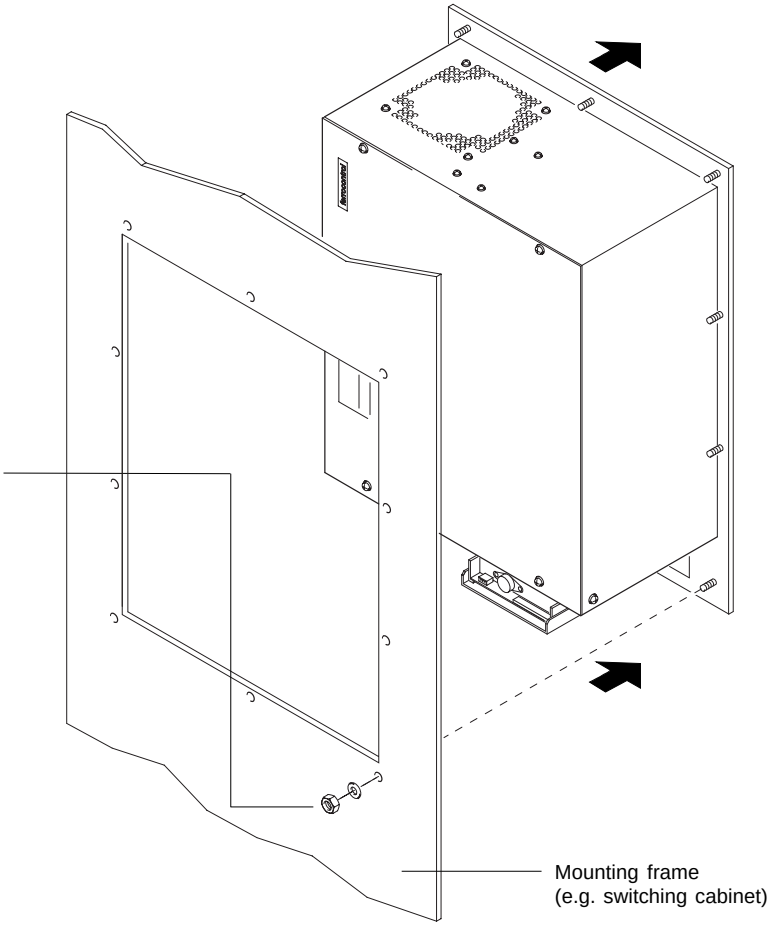


9.2.3 Industrial PC: removing

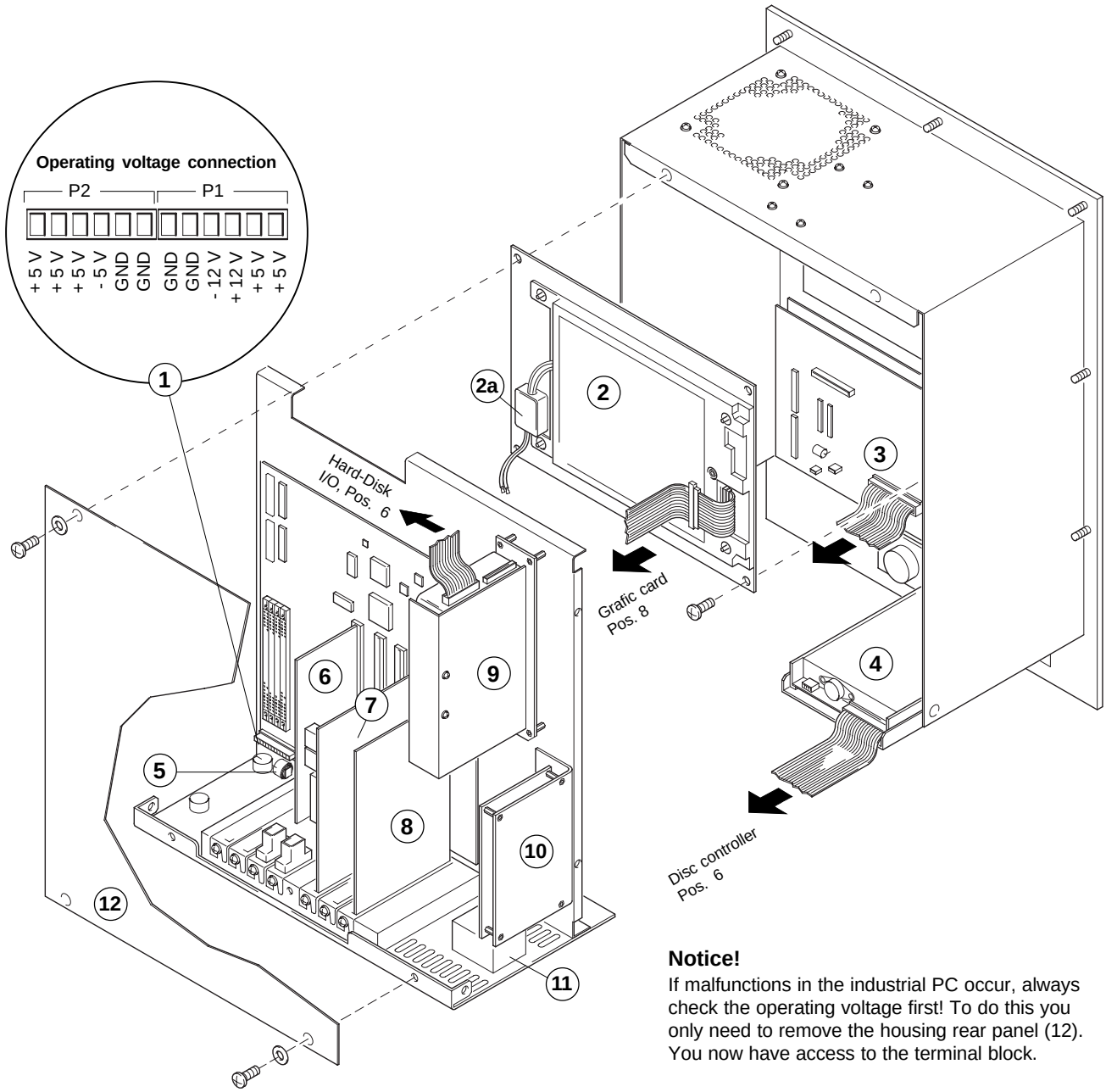
When repairing the industrial PC (version1.2), the complete device must be removed from the mounting frame.

Proceed as follows:
1. Switch the device off.
2. Disconnect all connecting cables:
- mains power supply
- interface cables
- fieldbus connection
- protective conductor terminal

3. Unscrew the 10 fixing screws.
4. Pull the device carefully out of the mounting frame to the front.



9.2 Model range 1.2
9.2.4 Interior view



Notice!
If malfunctions in the industrial PC occur, always check the operating voltage first! To do this you only need to remove the housing rear panel (12). You now have access to the terminal block.

1 Operational voltage connection
for the mother board

2 Display:
if malfunctions occur the complete unit is exchanged

2a Voltage transformer for display

3 Controller unit
for the internal keyboard

4 Disk drive
3.5" / 1.44 MByte

5 Accumulator 3.6 V / soldered in

6 I/O card
IDE hard disk controller
Controller for disk drive
RS 232: COM 1/Com 2
Parallel interface: LPT 1

7 Fieldbus interface card / FBI_PC

8 Graphic card
Connection for LCD / TFT screen
Connection VGA monitor (external)

9 Hard disk drive / IDE

10 Power supply unit module
+/- 5 Volt; +/- 12 Volt
see also **Pos. 1**
Operational voltage connection

11 Mains power supply

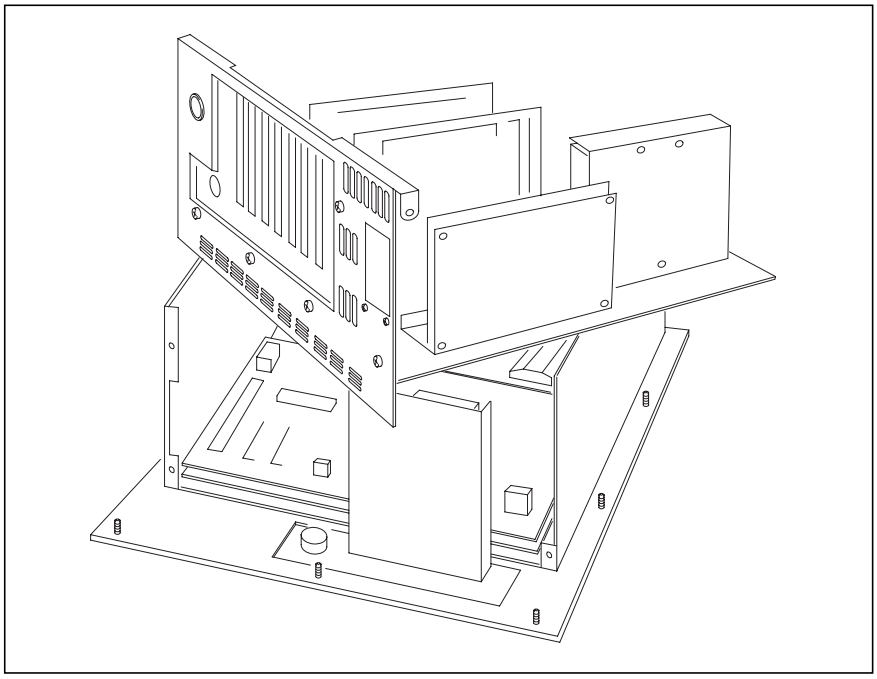
12 Housing rear panel
(can be removed separately)

9.2.5 Dismantling PC chassis

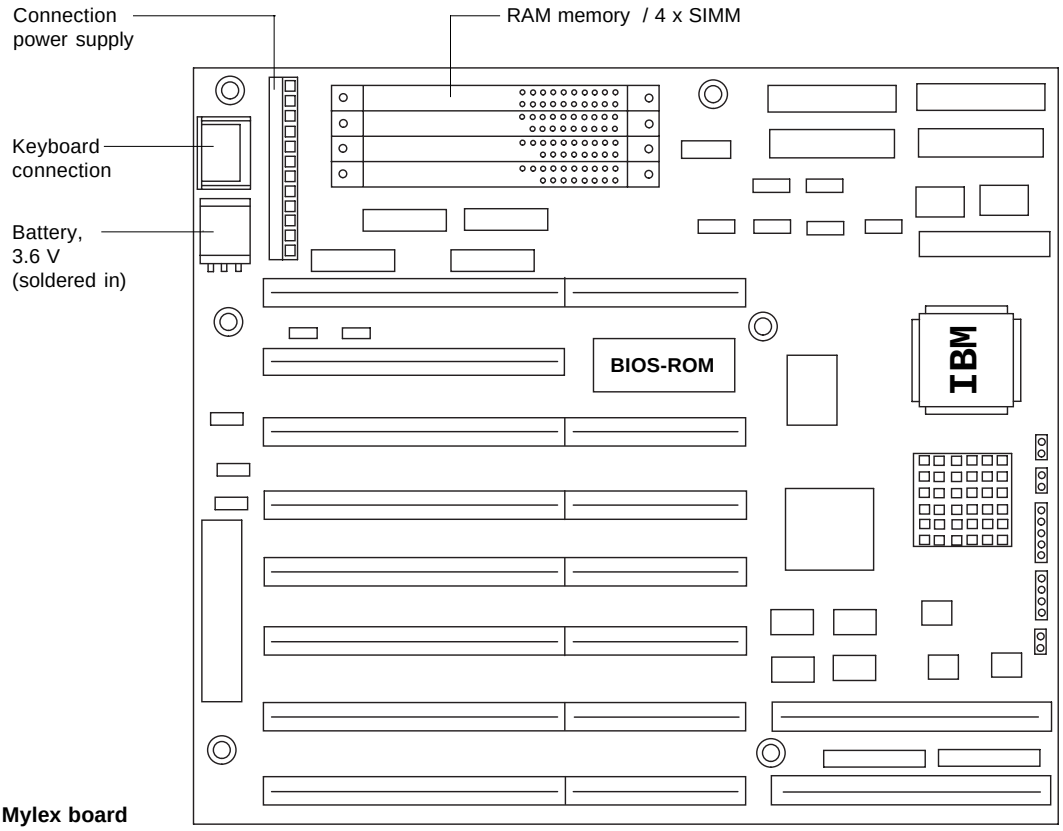
If you want to exchange components in the PC, proceed as follows:

1. Place the PC unit (with the front panel) carefully on a fixed base (table-top). In order to avoid scratches on the front of the device, use a piece of cardboard or a woollen blanket as a mat.

2. Carefully remove the PC chassis and place it on the device frame (as shown in the diagram opposite).



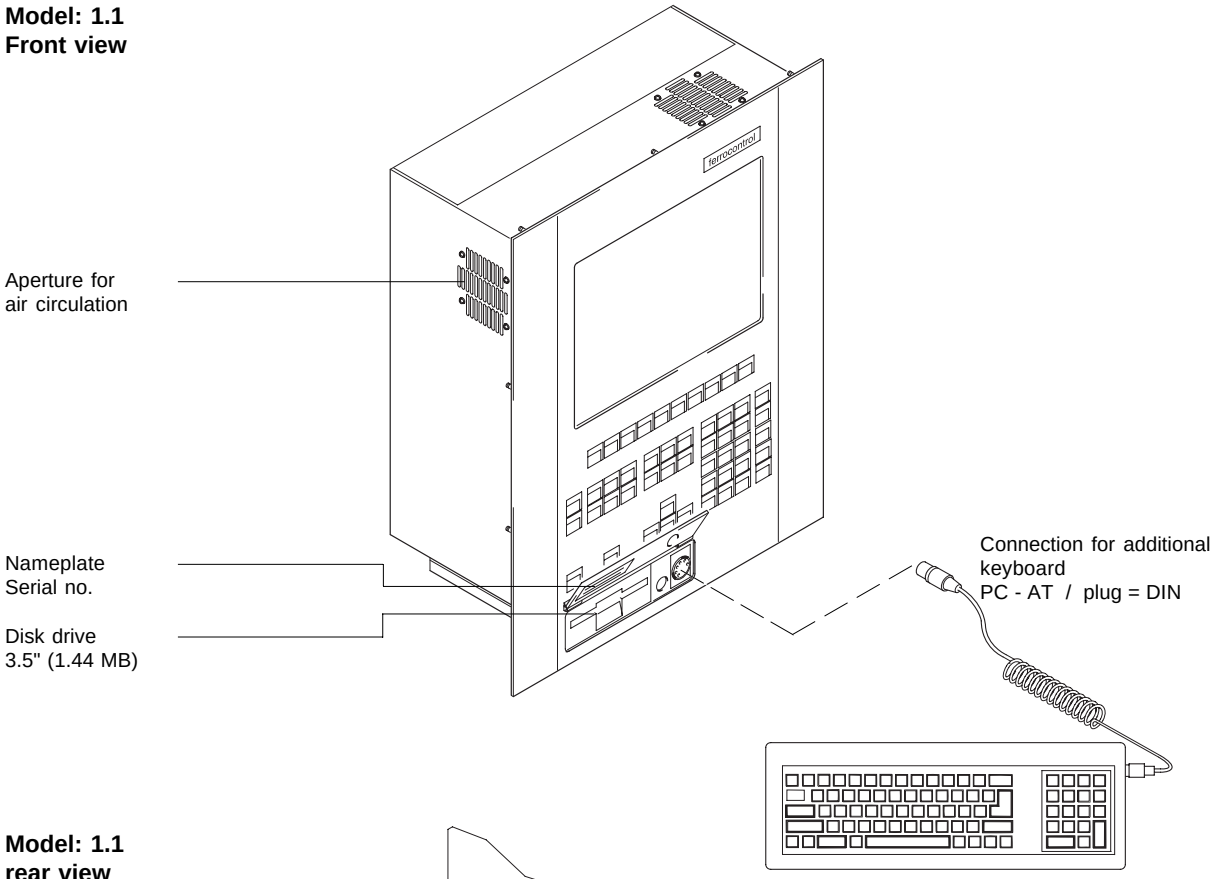
9.2.6 PC main board



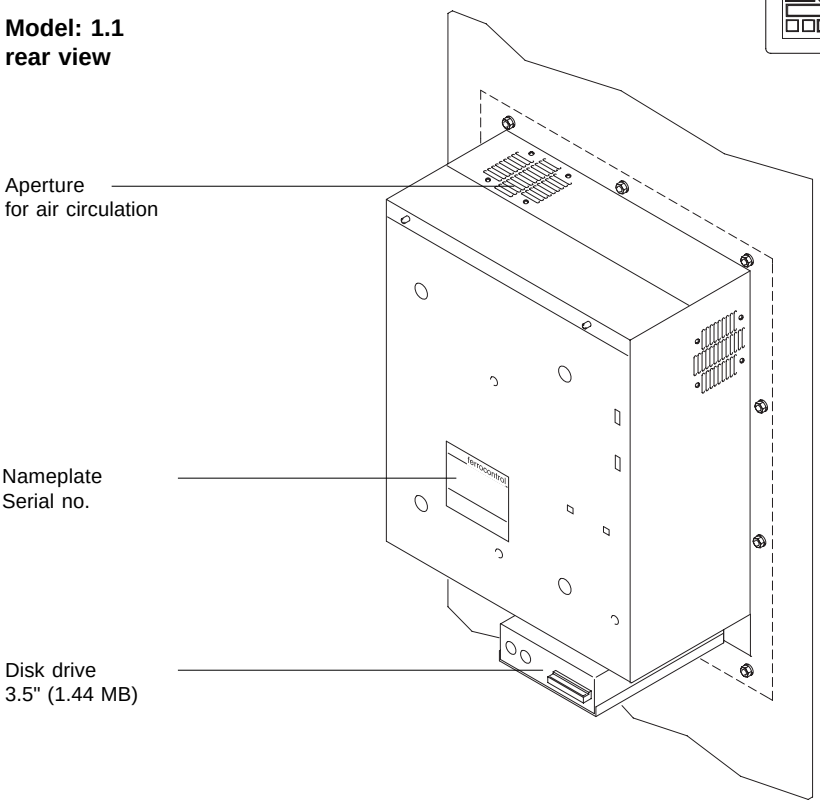
View: Mylex board

9.3 Model range 1.1
9.3.1 Device view

Model: 1.1
Front view



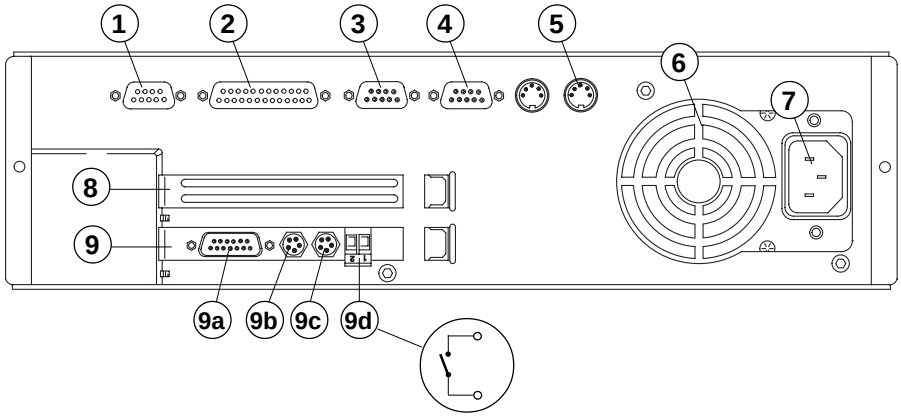
Model: 1.1
rear view



When making service enquiries or ordering spare parts please state the full type designation and serial number.

9.3.2 External pin configuration

Device view from below:



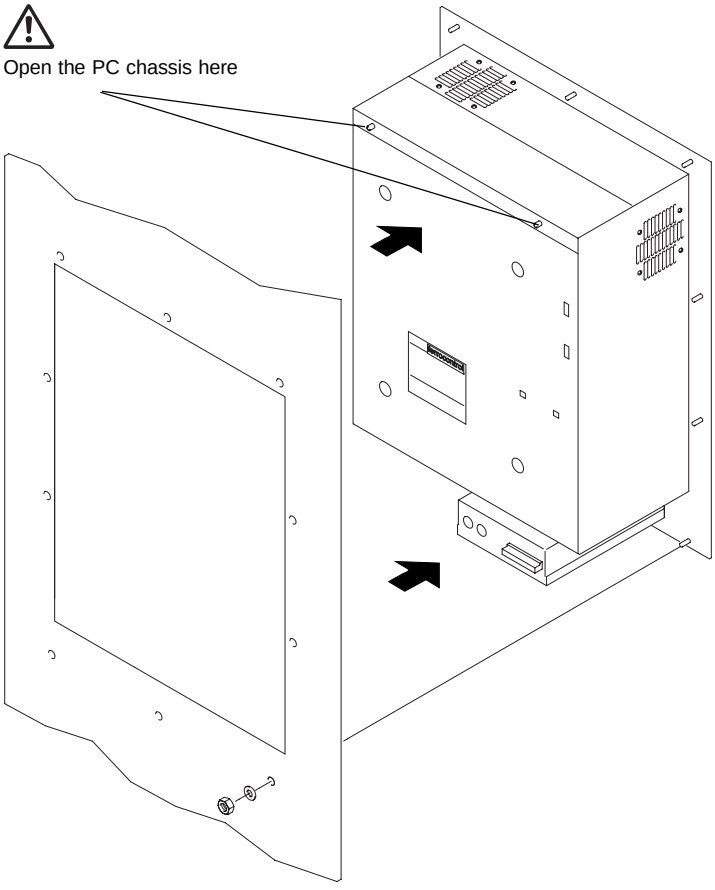
1 VGA monitor / external
2 LPT1
Parallel interface
Standard printer connection
3 COM 2
Serial interface RS-232
Plug: SUB-D 9-pin
Application:
modem or printer (serial)
4 COM 1
Serial interface RS-232
Plug SUB-D 9-pin
Application:
mouse or printer (serial)
5 Connection for the internal keyboard
Mini-DIN plug (6-pin)
6 Fan
7 Mains power supply
8 Free plug-in station/ ISA-AT
9 Fieldbus controller
9a OPTION / not in use
9b Fieldbus connection / channel 2
9c Fieldbus connection/ channel 1
9d Watchdog output
potential-free contact

9.3.3 Industrial PC: removing

When repairing the industrial PC (version1.2), the complete device must be removed from the mounting frame.

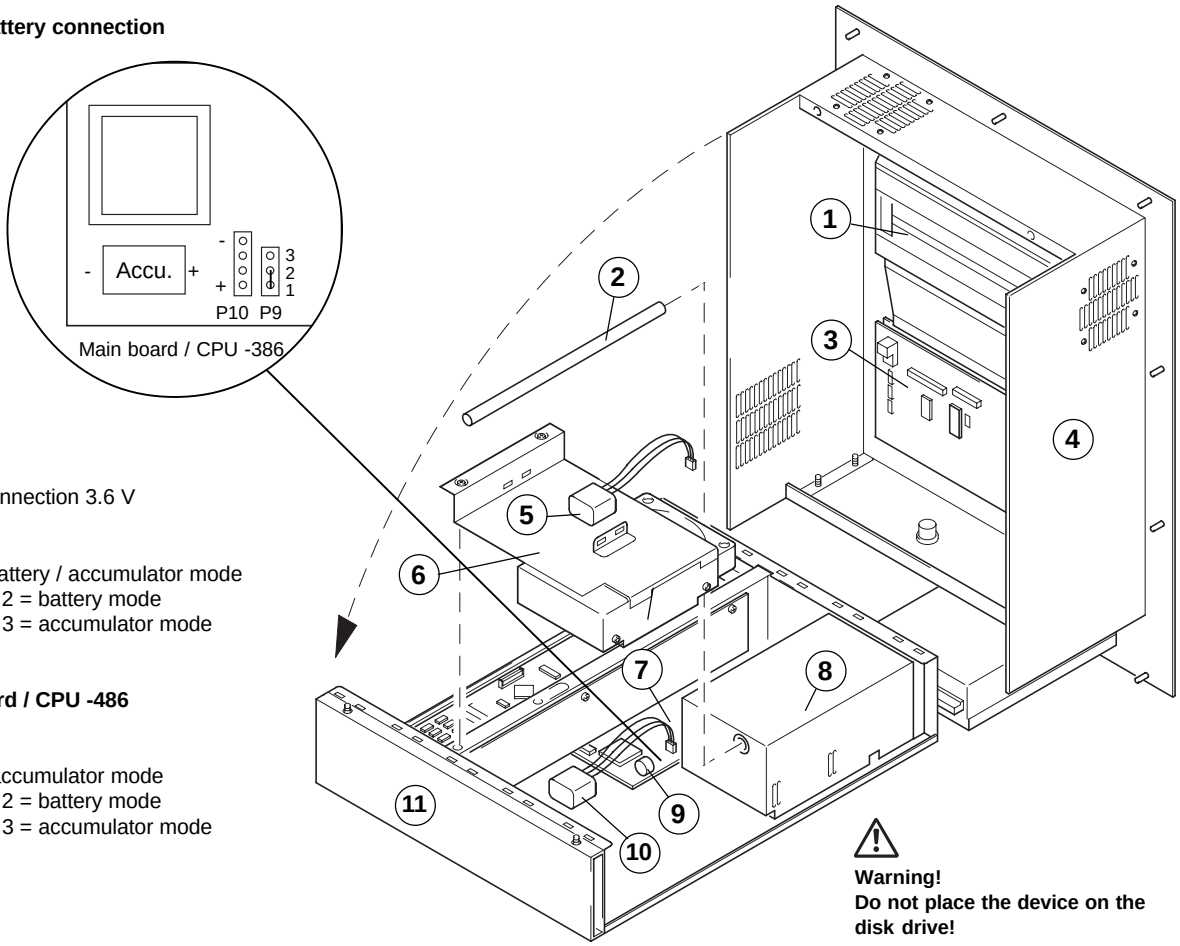
Proceed as follows:
1. Switch the device off.
2. Disconnect all connecting cables:
- mains power suppy
- interface cables
- fieldbus connection
- protective conductor terminal

3. Unscrew the 10 fixing screws.
4. Pull the device carefully out of the mounting frame to the front.



9.3 Model range 1.1
9.3.4 Interior view

Fig. 1: Battery connection



P 10
Battery connection 3.6 V
P 9
Switching:
external battery / accumulator mode
Bridge 1 - 2 = battery mode
Bridge 2 - 3 = accumulator mode

Main board / CPU -486
J 52
Switching:
Battery / accumulator mode
Bridge 1 - 2 = battery mode
Bridge 2 - 3 = accumulator mode

1 **Display unit /** complete
2 **Coupling rod**
switching - power supply unit
3 **Electronics for internal key set**
4 **Casing shell**
5 **Mounting location / new for spare battery**
(see also 9.3.6 Battery change)
6 **Hard disk (IDE)**
including mounting bracket
7 **Main board /** Compac
8 **Power supply unit /** Compac
9 **Battery / or accumulator**
soldered to main board
(see also 9.3.6 Battery change)
10 **Mounting location for the battery**
(first fitting)
11 **PC chassis** / complete

9.3.5 Opening the device, dismantling the PC chassis:

If you want to exchange components in the PC, proceed as follows:

1. Place the whole PC unit on a suitable pad.
2. Unscrew the screws on the rear side of the PC chassis (11).
3. Carefully rotate the chassis out to the rear (see diagram).
Be careful of cable connections!

9.3.6 Battery change

Notice!
The PC version 1.1 was delivered with different main boards.
Some of these boards are fitted with an NC accumulator (soldered in). If an error occurs the soldered-in accumulator can be switched off via a plug-in jumper (see Fig. 1). Switching to battery or accumulator mode. **The appropriate spare battery (3.6 V) is plugged in via a lead.**

When carrying out repairs (on location) never do any soldering on the main board! Consult our customer services!

Access to the battery is blocked by the hard disk mounting bracket.

When changing the battery proceed in the following way:

1. Remove the coupling rod from its locking element **(Pos. 2)**.
2. Unscrew the **two** screws holding the hard disk mounting bracket **(Pos. 6)**.
3. Before removing the hard disk, disconnect the two plug-in connectors for the data line and the power supply from the hard disk.
4. Remove the hard disk together with the mounting bracket. The main board is now accessible.

5. **Before connecting the new battery:**

   Check ...
   whether the main board is switched to battery or accumulator mode.

   Correct, if necessary...
   the plug-in jumper on the contact bank **P9** (only main board with 386-CPU) or the plug-in jumper **J 52** (only for the main board with 486-CPU).
   Info: see Fig. 1 / Battery connection.

6. Connect the battery connector to the contact bank **(P-10)** **(red = +).**
7. Fix the new battery (with a Velcro fastening) to the hard disk mounting bracket **(Pos. 5).**

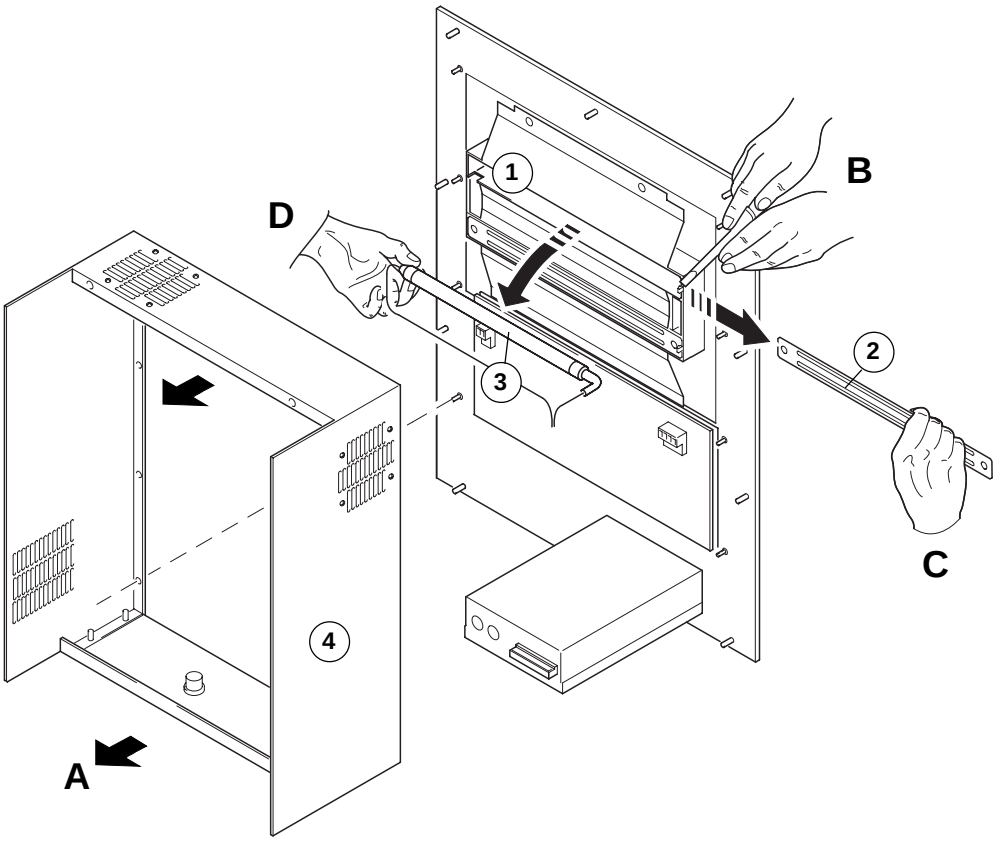
After changing the battery, check:

- **the entries in the BIOS-Setup (configuration - hard disk etc.)**
- **the system time**

⚠

Only use lithium batteries with 3.6 V nominal voltage.

9.3 Model range 1.1
9.3.7 Replacing bulbs in the display unit



1 Display unit / complete
2 Lead strips covering the fluorescent tube
3 Bulb / fluorescent tube
4 Casing shell

Proceed as follows:

A Undo the screws of the casing shell.
Pull the casing shell a few centimetres to the front.
Be careful of the cable connections!
B Open the locking element of the lead strip with a screwdriver (Pos. 2).
C Pull the lead strip (Pos. 2) sideways out of its guides.
D Carefully remove the bulb (fluorescent tube).
Carefully disconnect the electrical connection.

Insert the new bulb in reverse order.

When making service enquiries or ordering spare parts please state the full type designation and serial number.

A

B

C

D

E

F

R

S

T

V

W

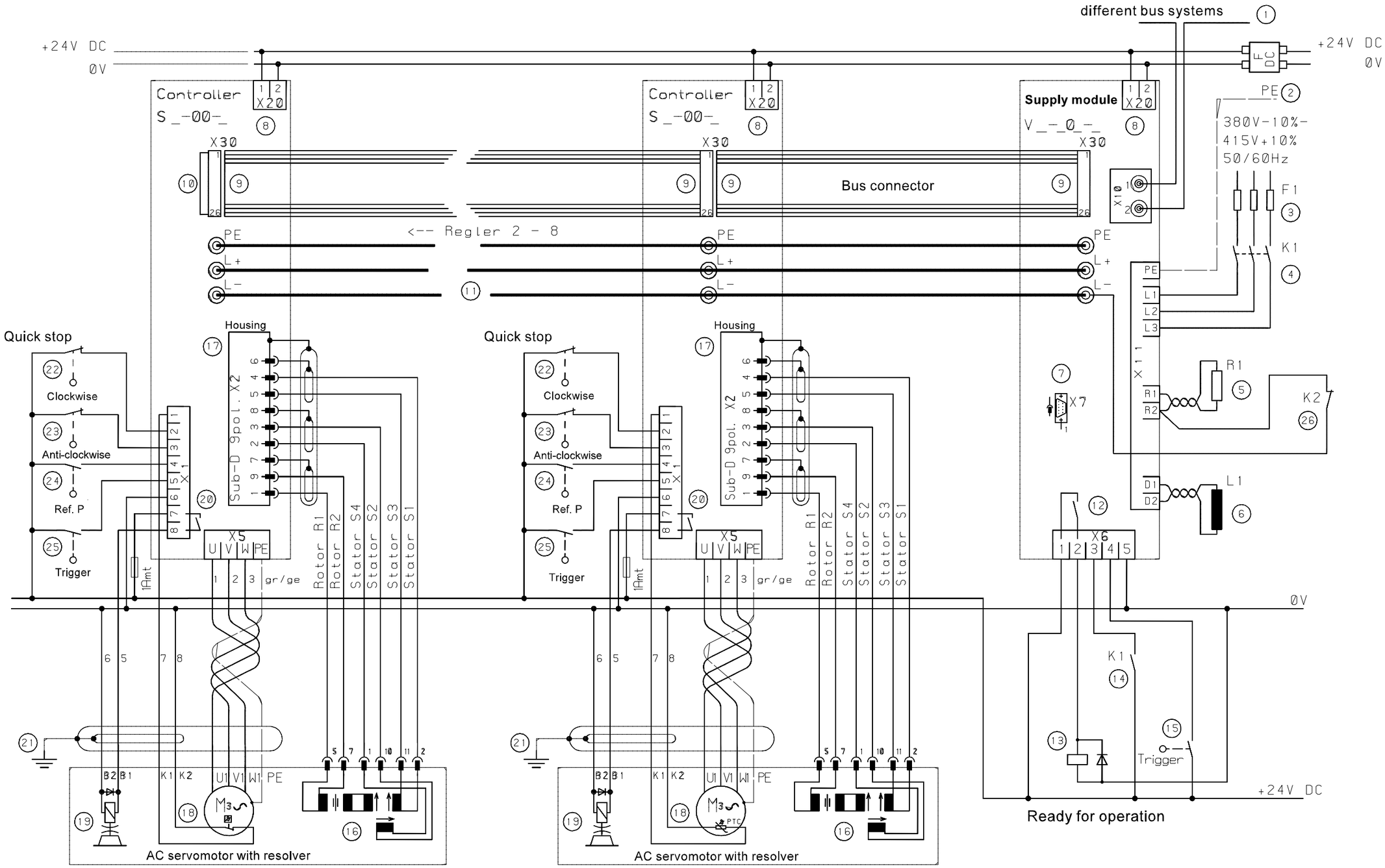
Appendix

A.2 Overview of ferrocontrol documentation

Curr. no	Document no.	Description	Language	Status
1	96-050 500	CNC-Feldbus: Gerätebeschreibung	German	3/95
2	96-100 500	DARC Handbuch: Inbetriebnahme / Service	German	9/97
3	96-101 000	DARC Service Manual	English	9/97
4	96-102 000	RS-232-Schnittstellenbeschreibung / DARC Protokoll RS 232	German	
5	96-100 501	DARC Produktdokumentation	German	
6	96-401 000	DARC-System, Inbetriebnahme- Hardware	German	
7	96-510 000	ferrocontrol CNC-Feldbus / Teil: Gerätebeschreibung	German	
8	96-511 000	ferrocontrol CNC-Fieldbus / Appliance Description	English	
9	96-520 500	ferrocontrol CNC-Feldbus / Teil: Inbetriebnahme/ Service	German	3/95
10	96-521 000	ferrocontrol CNC-Fieldbus: Commissioning / Service	English	3/95
11	96-600 500	ferrocontrol Industrie-PC 1.2 (FIPC-1.2)	German	10/94
12	96-601 000	The ferrocontrol Industrial PC 1.2 (FIPC-1.2)	English	
13	96-700 500	Bedienfeld mit Anzeige TSED-RS485	German	
14	97-400 500	Einführung ferrocontrol-Bedienoberflächen	German	
15	97-400 600	Description of PC-Software (ferrocontrol User Interfaces)	English	
16	97-400 700	Introduction: InterfacesUtilsateur ferrocontrol	French	
17	97-500 500	Benutzer- u. Referenzhandbuch / Applikationsgenerator	German	
18	97-501 000	User and Reference Manual / Application Generator	English	
19	97-550 500	Programmierhandbuch FPS	German	
20	97-551 000	Programming Manual PLC	English	
21	97-880 500	Doppeldiagonalsäge mit DARC	German	
22	97-881 000	Tandem Diagonal Saw with DARC	English	
23		DARC mit Verbundachsen	German	
24	96-051 000	ferrocontrol MAS: Systemhandbuch-Hardware	German	
25	97-053 500	ferrocontrol MAS: Systemhandbuch-Software	German	
26	96-800 500	MAG-System: Inbetriebnahme/Service	German	
27	96-801 000	MAG-System: Gerätebeschreibung	German	
28	97-051 000	DARC-System: Software SeleCAN	German	
29	97-051 500	DARC-System: Software CANopen	German	
30	97-052 000	DARC-System: Software Profibus-DP	German	
31	97-052 500	DARC-System: Programmierung	German	
32	97-053 000	DARC-System: Inbetriebnahme DARCTOOL	German	
33	96-031 000	Quick-Referenzhandbuch für das ferrocontrol Feldbussystem (Hilfestellung zur Störungsbeseitigung)	German	8/98
34	96-032 000	Quick-reference Manual for the ferrocontrol Fieldbus System (Tips for Trouble-shooting)	English	9/98

(1)	Fieldbus connection	Terminal 10
(2)	PE terminal power supply	Terminal X 11
(3)	Mains supply / fusing	Terminal X 11
(4)	Mains contactor	Terminal X 11
(5)	Braking resistor	Terminal X 11
(6)	D.c. link filter choke	Terminal X 11
(7)	Service connector, 9-pin sub-D socket	Terminal X 7
(8)	24 V / DC power supply for internal signal processing	Terminal X 20
(9)	Parallel bus connector	Terminal X 30
(10)	Terminating resistor connector, bus connector	Terminal X 30
(11)	D.C. link bridges	Terminal L+, L-, PE
(12)	Control in- and outputs	Terminal X 6
(13)	Auxiliary relay, power BTB (ready for operation)	Terminal X 6
(14)	Enabling	Terminal X 6
(15)	24 V DC (trigger signal)	Terminal X 6
(16)	Resolver	Terminal X 2
(17)	Resolver connector, resolver cable	Terminal X 2
(18)	Servo-motor temperature monitoring	Terminal X 1 /1
(19)	Holding brake	Terminal X 1 /8
(20)	Peripheral devices and holding brake	Terminal X 1
(21)	Motor cable screening	Terminal X 1
(22)	Quick-stop switch - clockwise rotation	Terminal X 1 /2
(23)	Quick-stop switch - anticlockwise rotation	Terminal X 1 /3
(24)	Reference point switch	Terminal X 1 /4
(25)	Trigger switch	Terminal X 1 /5

A.3 Connection diagram: DARC system



Attention!
For brake release current > 1A use coupling- or contactor relay!
Connect a medium time-lag fuse = 1 A in series.

8.0011.00.1

hier abtrennen