Manual

UFM
NC module

PROMESS

TABLE OF CONTENTS

1 Introduction

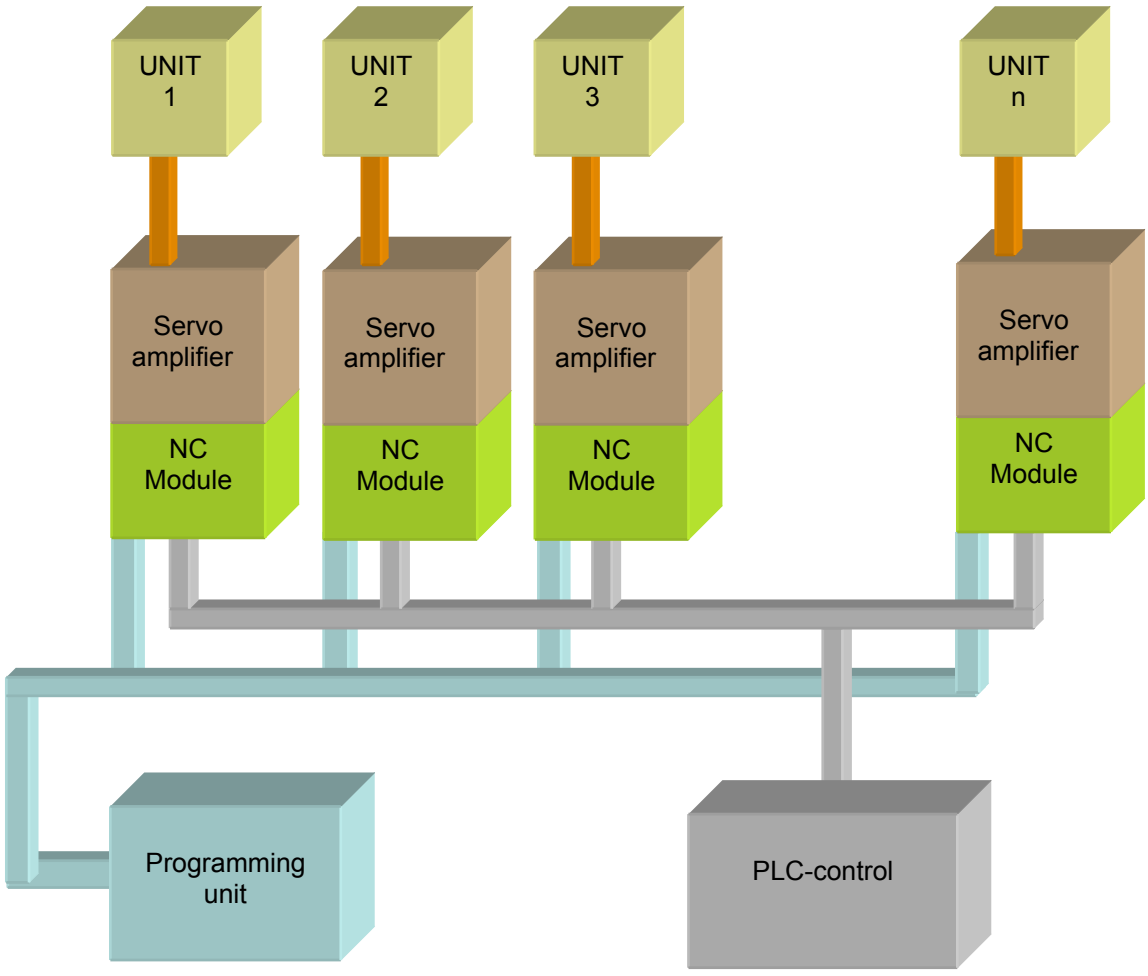
The UFM-NC-MODULE system is a powerful tool to rapidly setup, alter, optimize and adapt press and positioning tasks.

The basic element is the electro-mechanical assembly unit from PROMESS, consisting of:

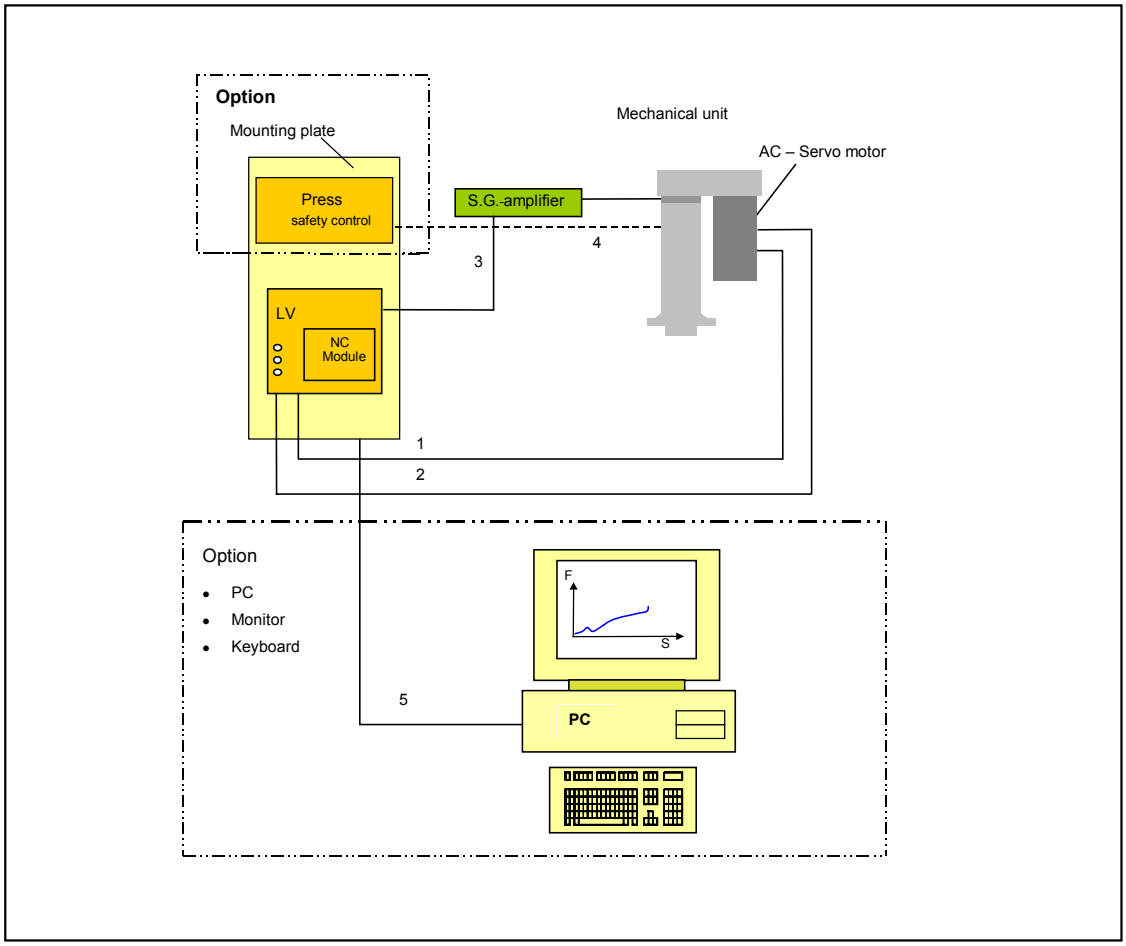
- assembly unit with motor, transducer and distance measuring device,
- motor power amplifier,
- NC module for NC control of the assembly program,
- programming and user software.

Several press units can be connected via a network and programmed from a single programming device.

The following figure shows a block schematic:



1.1 Contents of supply



- **Electro-mechanical press unit,**
- **SG–amplifier in diecast aluminium housing (SG = Strain Gauge)**
- **Power module**
- **NC module**
- **PLC interface (basic function)**

- **Optional mounting plate** for the installation of the control cabinet, including Emergency Stop circuitry according to EN 4181, Stop Cat. Dimensions H * W * D = 773 * 492 * 300 mm (Units > 60 kN: H * W = 1896 * 499 mm)
- **Connection cable, confectioned:**
  1. Connection cable motor – power amplifier (power cable), length 5 m
  2. Connection cable motor – power unit (resolver), length 5 m
  3. Connection cable SG amplifier – control unit, length 5 m
  4. Connection cable proximity switch in OT – SG amplifier, length = 2 m
  5. Interface cable (RS 485, RS232)

- **Optional PC with monitor + keyboard**

1.2. Transport

The units are supplied packaged in standard cases. The belt drive protection is not mounted to facilitate the use of lifting equipment when unpacking the unit. Please follow the instructions below to remove the unit:

Use a broad double belt, placed under the motor plate and around the mounting flange, to unload the press unit.

ATTENTION:
Do not put any loads on the proximity and limit switches when attaching the lifting device!

There is also the possibility of using an eyebolt, attached to the thread of the ball screw, to unload the press unit.

After the unit has been unloaded, inspect it for visible transport damages.

The press unit and related servo amplifier may only be installed in appropriate and suitable locations. In particular, please observe all protection regulations. Should you require information concerning requirements about the admissible locations, please contact the manufacturer.

After the installation of the press unit, please make sure you comply with the manufacturer's specific measures before operation:

Mount the belt protection, prior to connecting the power cable.
Only use the power cables supplied.
Assemble the power amplifier with the supplied filters and choking coils according to the power amplifier manual instructions.
Make sure all cables are correctly installed. Avoid laying power and data cables next to each other.

2 Correct usage

The press unit is designed and built for assembly operation tasks, e. g. for pressing in bearings, absorbers and shafts or to press in and caulk seals.

Operations, other than the above, may not be performed on the machine.

The permissible loads are determined by the performance data of the unit and must not be exceeded by any larger extent.
Avoid the following situations in particular:
Abrupt loads at high positioning velocities - “collisions”,
Forces under normal operations that exceed the nominal load by more than 110%,
Excessive loads through unpredicted operational conditions, exceeding the nominal load by 100%.

3 Safety precautions

The press unit may only be used to perform the operations it is intended for. The use in other operations or for other purposes may lead to operator injuries and damages to the unit.

If you have acquired the unit as “components“ without the optional mounting plate, you are responsible for the installation of the Emergency Stop chain according to EN 418 Cat. 1. PROMESS is not liable for damages resulting from incorrect installation.

The power amplifier may only be connected and operated by competent personnel.

It is strictly forbidden to disconnect, bridge or remove any safety equipment!

The belt protection may only be removed once the unit is completely electrically disconnected from the power amplifier.
If it is not possible to start the unit because of a technical disturbance or functional problem of the protective equipment, then the faulty part or equipment must be repaired or exchanged.
It is strictly forbidden to operate the press unit without the proper function of the safety equipment, e. g. through manipulation of the safety devices!

The press unit may only be operated by personnel who have been fully instructed in its proper operation.

If problems occur during normal operation and they can not be resolved through known and recommended strategies, specialist personnel from the responsible department must be informed.

The press unit must be completely disconnected from any electrical power supply before any service, repair work or problem solving can start! Proceed as follows:

- Set main switch to “OFF“ position,
- If necessary, pull out the power plug.

IMPORTANT: The switch, in the “0” or “OFF” position, must be marked with a sign:

WARNING !
UNIT UNDER MAINTENANCE, REPAIR OR SERVICE - DO NOT SWITCH ON!

If the unit has to be disassembled, you must first undo all electrical connections.

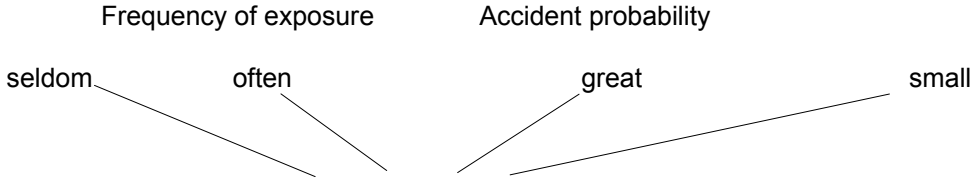
The PROMESS electro-mechanical press unit can harm the operator, if used incorrectly. Please comply with the following directions:

1. Do NOT attempt to undertake any internal system configurations without prior consultation with PROMESS,
2. Do NOT keep your hands in the working area,
3. The safety chain must be closed when operating the press unit,
4. Do NOT operate the unit in areas for which it was not designed,
5. Only authorised personnel may operate the press unit.

PROMESS

3.1 Risk analysis

Risk estimation



Possible injuries	1 A	2 B	3 C	1 D	2 E	3 F	Countermeasures
Category 1 Minor injuries, crushing of the hand and fingers							
Category 2 Major injuries, loss of fingers, severe crushing of the hand							
Category 3 Death Severe crushing of the head							

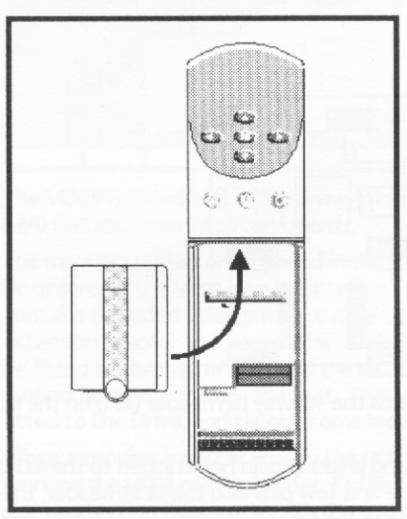
Dangers through mechanical malfunctions

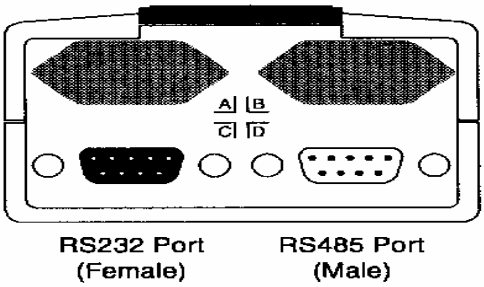
Type of malfunction			Possible injuries	Countermeasures
Guides: wear, blocking after being damaged			None	
Thrust bearing: wear, damage			None	
Ball screw: wear, damage			None	
Broken drive belt: No brake function after the belt is ruptured	1A	3F	Category 1 and 2	10-fold safety level against rupture under normal working conditions
Cog-belt coupling loosened	1A	3F	Category 1 and 2	The couplings are self-retaining, loose screws can only result in the coupling loosening itself when the press unit is exerted to extremely strong vibrations or shocks.
Slippage of the cog-wheel on the axle, wrong positioning, force exceeded			None	
Transducer, destroyed through excessive load			None	
Cable breakage, force transducer			None	
Cable breakage, limit switches			None	
Cable breakage, motor resolver			None	
Cable breakage, power cable			None	

4 Software installation

Place the disk or CD-ROM in the appropriate drive. Go to the Windows start button (bottom far left), select 'Execute' and then type “Setup”. Follow the on-screen instructions to install the program. Connect your PC with the press unit NC module via the serial interface RS 232 or RS 485 (a separate board is needed in your PC). If you connect via RS 485, you must bridge pins 4 and 9.

- Position of the NC module in the power amplifier





RS 485

Pin	
1	0V
2	/TX
3	/RX
4	NC
5	NC
6	TX
7	RX
8	NC
9	0V

RS 232

Pin	
1	Schirm
2	TXD
3	RXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	NC

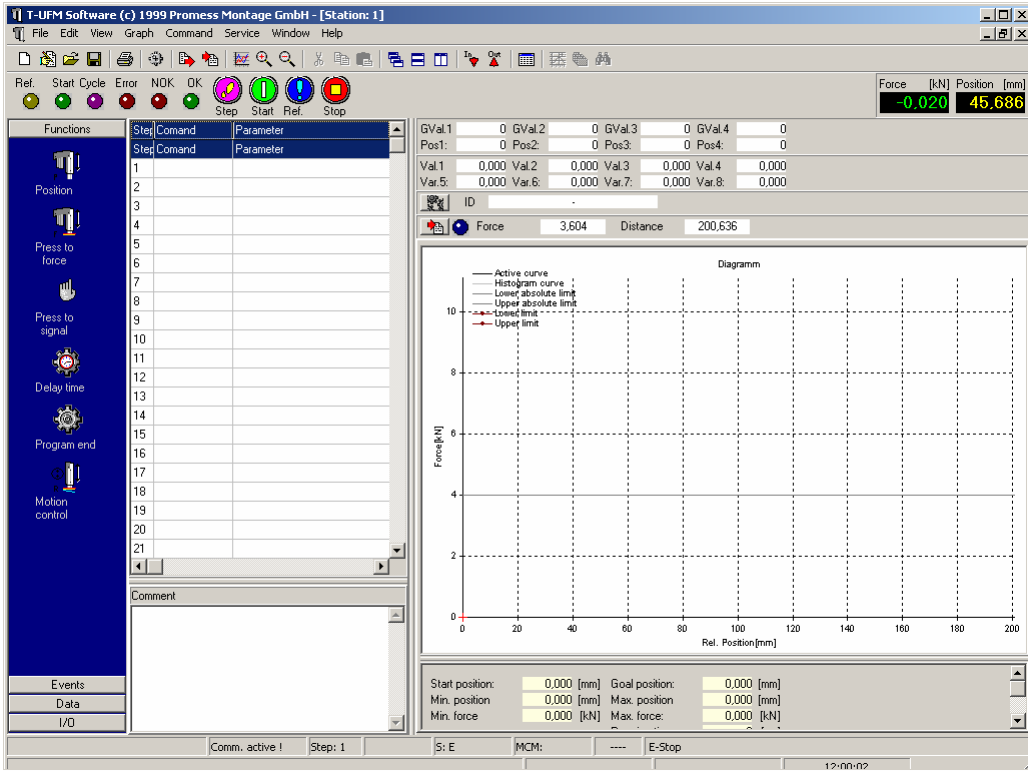
5 Program start

Start the program with the help of the icon installed.

During start up, the program scans the whole system to determine which modules are connected. This scanning takes place provided the option "automatic" has been selected under “polling of the stations” (*new or substitute modules are always supplied with the station number 31 set*). The station number desired must be entered in parameter 20.29 of the Unidrive. For details on how to enter parameters, please see the Unidrive manual, page 5-5 (parameterisation).

If you only want to establish a connection to a specific station, you should select “manual”.

Once a station has been detected, the following station window is opened:



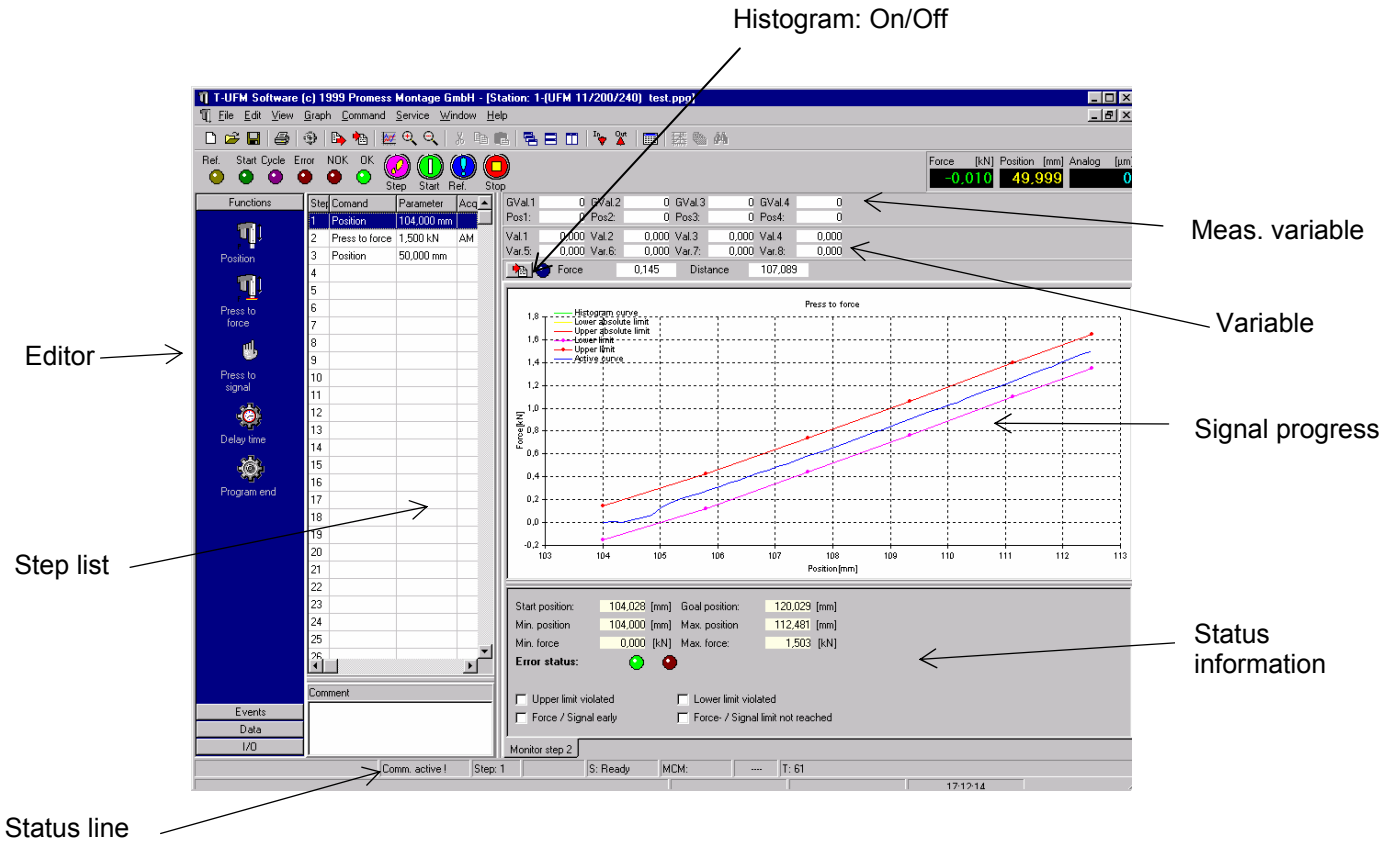
The program stored in the NC module is automatically loaded and displayed.

If there are any communication problems, check the configuration of the interface first.

! ! !
Before you start the unit for the first time, please check whether the calibration factor is correct. To do this, open „program parameter“ in the menu „service“ and check under „calibration“. You will find the right calibration factor in the „Proprietary Calibration Certificate“, you have got with the UFM and on the mechanical unit.

6 Program window

The main window:



7 Screen settings

Various windows may be displayed on the screen. The windows can easily be opened, closed or toggled, so that any combination is possible. The windows can be selected or de-selected via the menu “View”.

- LEDs

The LEDs show the status of the I/Os of the PLC – interface (basic function):

The following conditions are displayed:

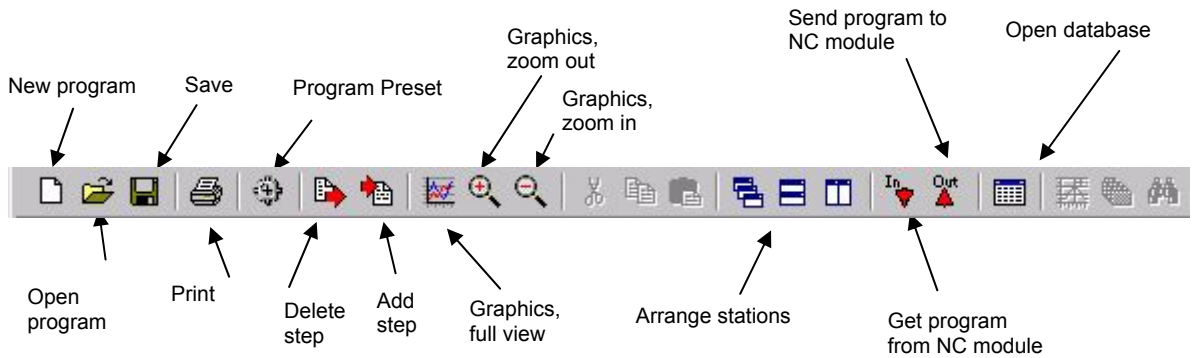
- Start reference positioning (I)
- Start (I)
- Confirmation (O)
- Ref. (Error / reference request) (O)
- NOK (O)
- OK (O)

- Pushbuttons NC module

The buttons are used to initiate the following functions:

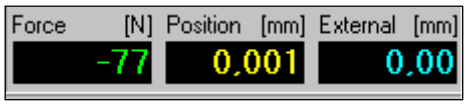
- E-Stop: The program can only be resumed after a reference positioning.
- Stop: The program execution is interrupted. Resume with “Start”.
- Step: The next step in the program cycle is executed.
- Start: The complete program cycle is started.
- Ref..: A reference positioning is executed.

- **Program pushbuttons**



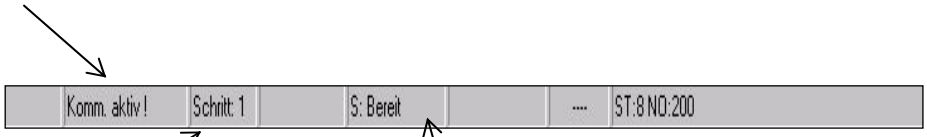
- **Analog inputs**

The values for force, distance and the external analog signal are displayed here.



- **Status line**

Status of communication between the PC and NC module



113

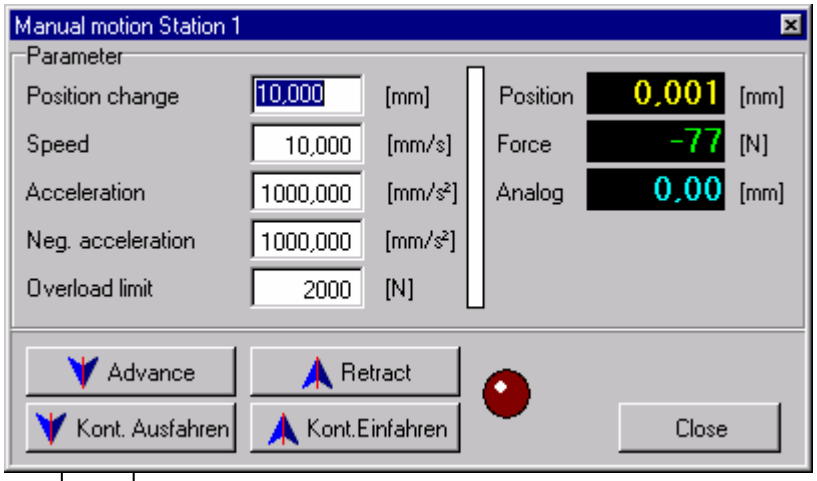
Step counter

Status
Error messages

8 Manual positioning

You will find the item “Manual positioning” in the service menu.

Use this window to control the axis in manual mode.
Enter the values required for position, speed, acceleration and excessive load limit.



Jogging - press and hold down the respective button to move the axis in the direction desired at the speed programmed. As soon as you let go of the button the axis stops.

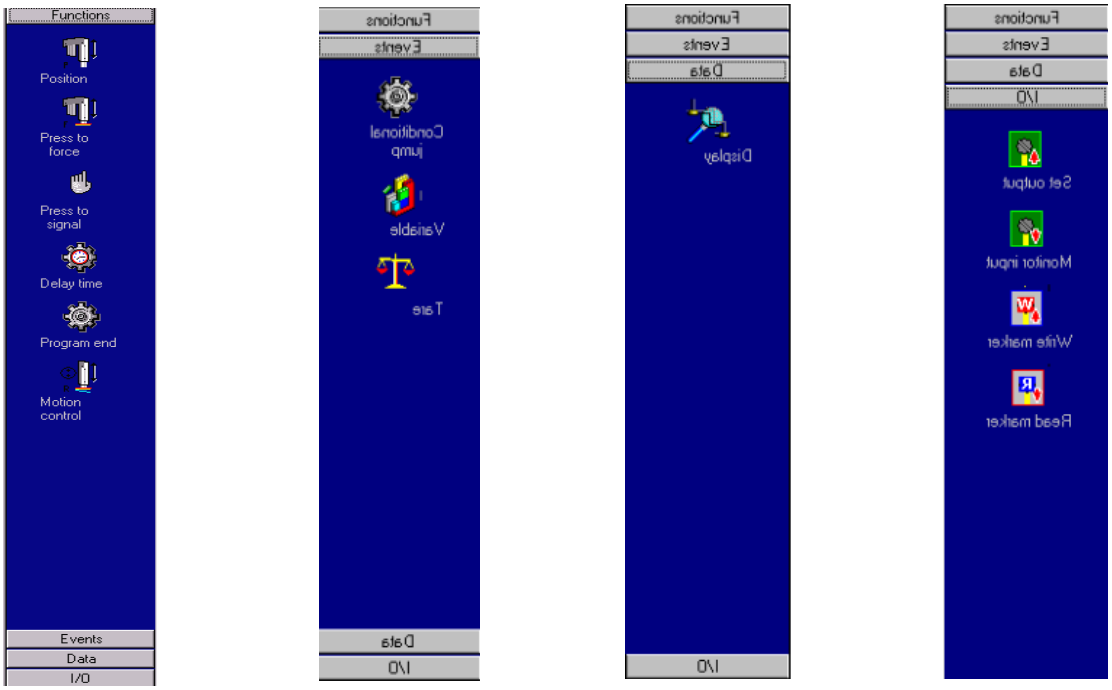
Continuous motion, the axis is positioned the equivalent distance you have entered. The axis moves along the programmed distance. If the button is released the press will stop. To continue moving along the distance, press the button again.

9 Programming

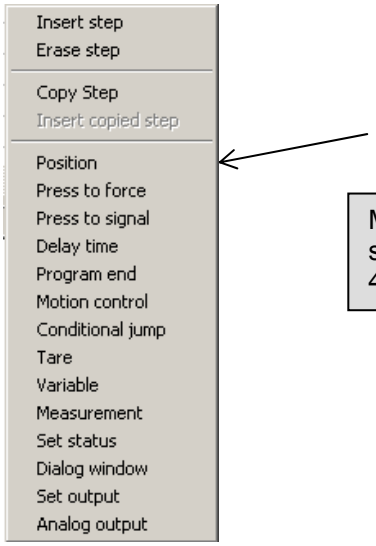
To generate a new program, first select “New” from the drop down menu “File” or click on the corresponding button in the toolbar.

Select the function required before you start generating your press program:

All functions for the generation can also be selected with the right mouse button, if you click in the step list. With the help of the right mouse button, it is also possible to copy and paste program steps.



All generation functions can also be called up via the right mouse button if you click within the step list. It is also possible, using the right mouse button, to copy and insert program steps.



Menu by clicking the right mouse button

Memory requirement of the individual program steps
see: Program parameter (Standard parameter) page 48

Saved programs can be reopened under “Open Program”.
If you want to delete a program, please click with the right mouse button on the chosen program and on the menu that is opened then, on the function “Delete”.

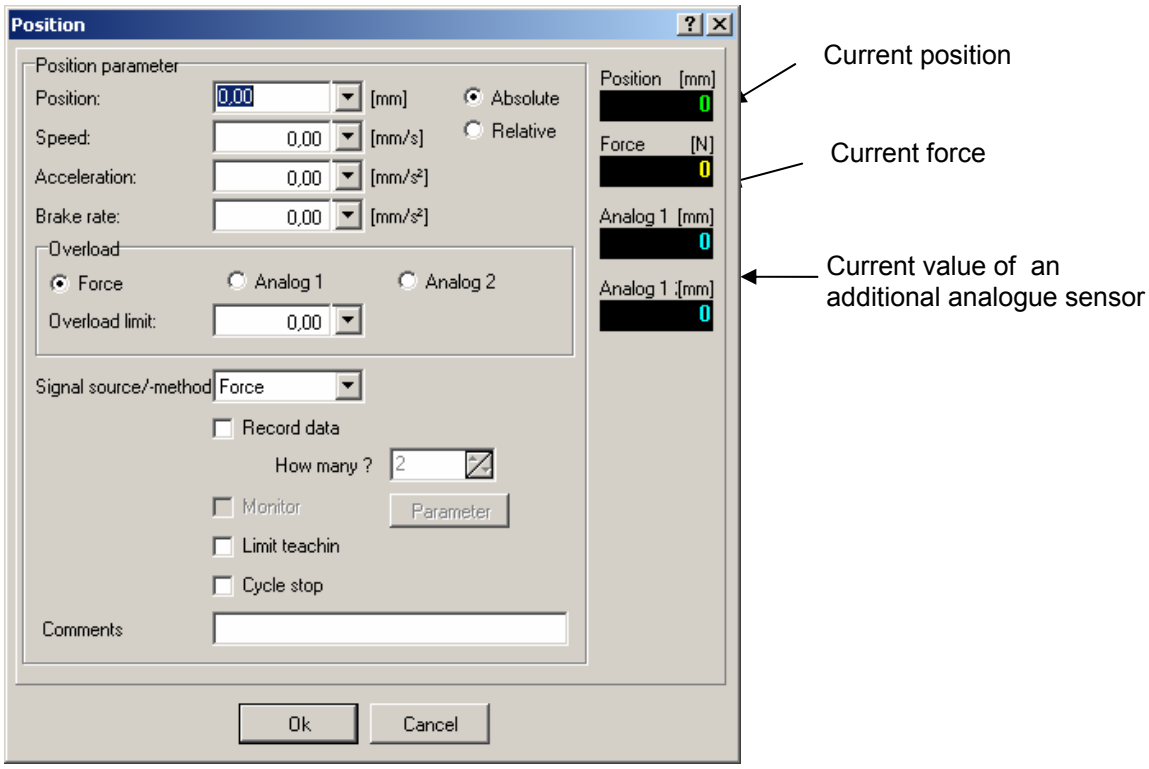
9.1 Positioning

This function block is used to move the press ram to any position, both in absolute and relative mode. The actual motion curve can be registered, but in addition also the force – distance – development can be monitored (see monitoring). It is also possible to position according to any variable value. (Working with variables, please refer to the chapter *Variable*).

Click the button “Positioning” in the drop-down menu **Function**.

The following window is opened:

Enter the values required in the following fields :



- **Position** (positions may be reached in either relative or absolute mode).
- **Speed**
- **Acceleration**
- **Brake ramp**
- **Overload limit** (Please choose the input for overload)
- **Signal source** (Please choose the input for monitoring)
- **Limit curve teach-in**: A teach-in curve for this function is established, when the next teach-in cycle is started. Existing limit curves are overwritten. The distance of the limit curves relative the actual curve may be set in the service menu under configuration => control parameters => parameters in field, teach-in strategy.

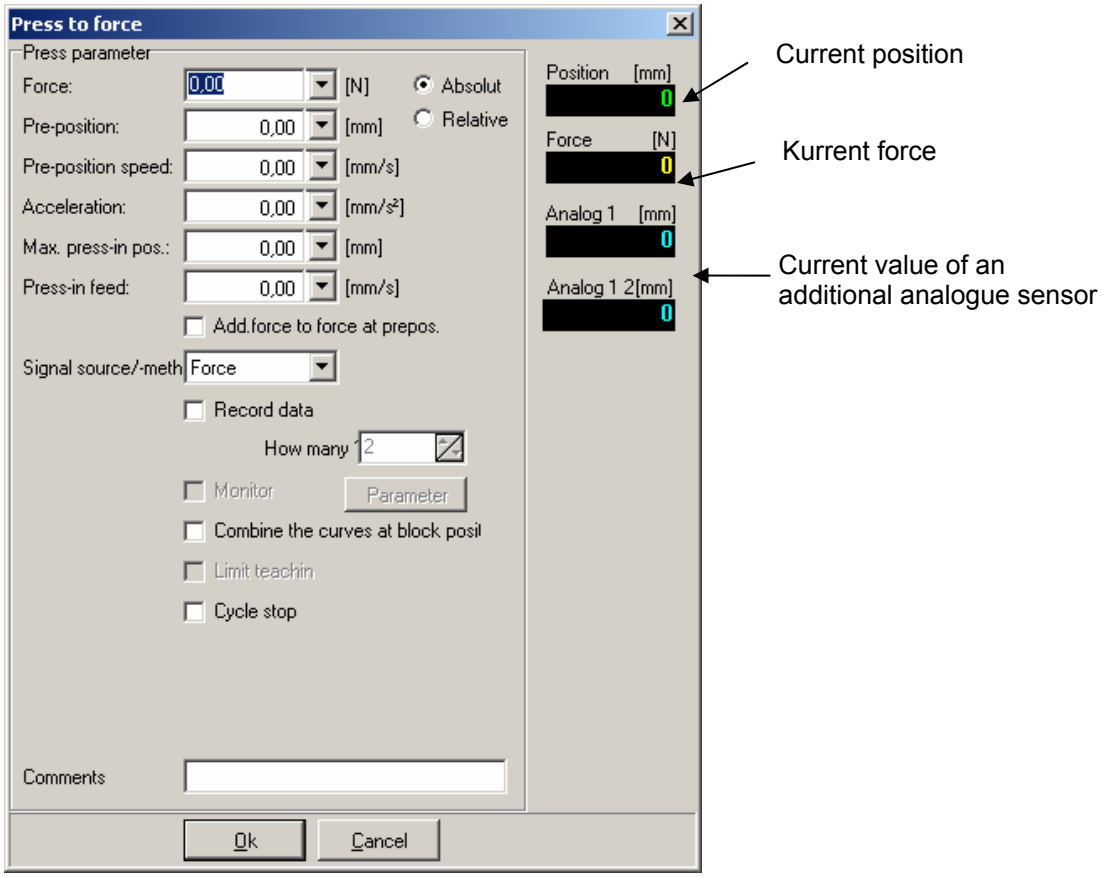
- **Cycle stop**: Select this point, when you want to stop the cycle after having executed the active function.

9.2 Press to Force

This function block is used to press to a given force, the distance may be expressed as absolute or relative values. The actual motion curve can be registered, but in addition also the force – distance development can be monitored (see monitoring).

Click the button “Press on block“ in the drop-down menu **Function**.

The following window is opened:



In the following fields enter the values needed:

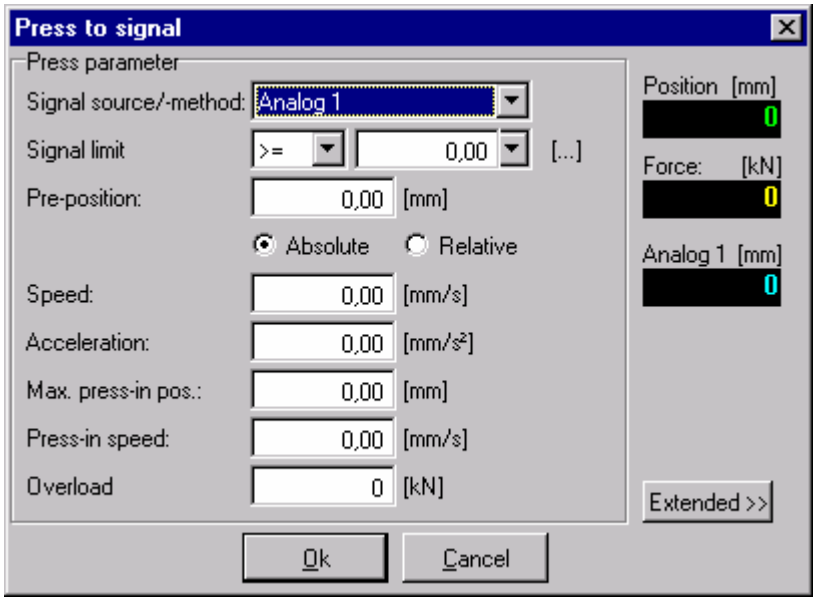
- **Force**: the required switch off force can be entered directly or via a variable
- **Pre-position**: Up to this position, positioning is done at the speed value entered (the position can be reached in relative or absolute mode),
- **Speed**: Speed up until the force level is reached,
- **Acceleration**: Positioning acceleration,
- **Max. press-in position**: This is the max. position of the press ram,

- **Press-in speed** (feed): Speed at the beginning of the force level. With increasing force, the speed is reduced to 10 % of the press force entered. The change of speed is executed via a brake ramp of 1000 mm/s^2,

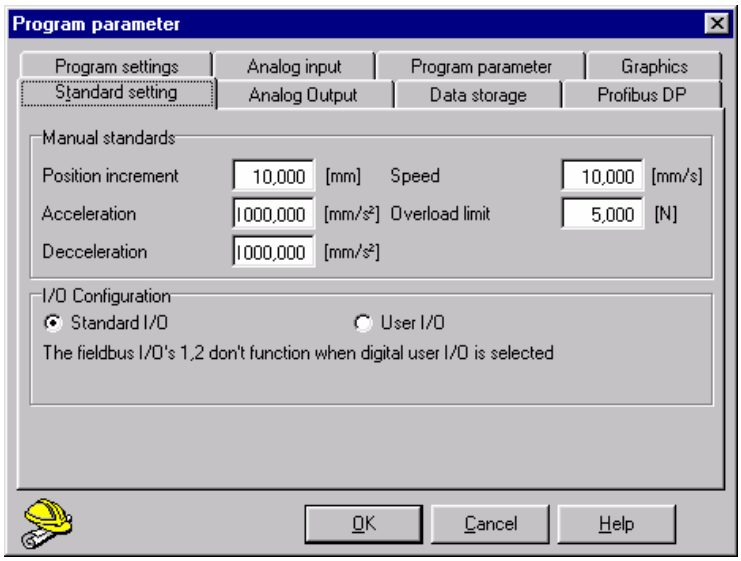
- ***Add limit force to the current force at pre-position:*** If this function is activiated, the switch-off criterion from the force at reaching the pre-position plus the value entered under force is determined. Up to the pre-position, the movement with the nominal load is monitored for collision.
- **Signal source** (Please choose the input for monitoring)
- ***Recording of values***: The force-way-course is recorded for the movement. Enter the desired number of reading points (maximum 200).
- **Teach-in of limit curves**: A teach-in curve for this function is established, when the next teach-in cycle is started. Existing limit curves are overwritten. The distance of the limit curves relative to the actual curve may be set in the service menu under configuration => control parameters => parameters in field, teach-in strategy,
- **Cycle stop**: Select this point, if you want to stop the cycle after having executed the active function.

9.3 Press to signal

This function is very similar to the press on force block, however in this case you press to an external signal that you can select from the signal source. You can select between an external analog signal of a switch signal. If you want to set the switch signal via the bus, you can use the freely programmable inputs 1 and 2.



If you do not set the switch signal via the bus, but as a 24 VDC signal, you must first select the option “User I/O“ in the standard settings under “Program Parameter“. The reference input then becomes input PLC 1 and the start input becomes input PLC 2. The start and reference run can then only be executed via the bus system.

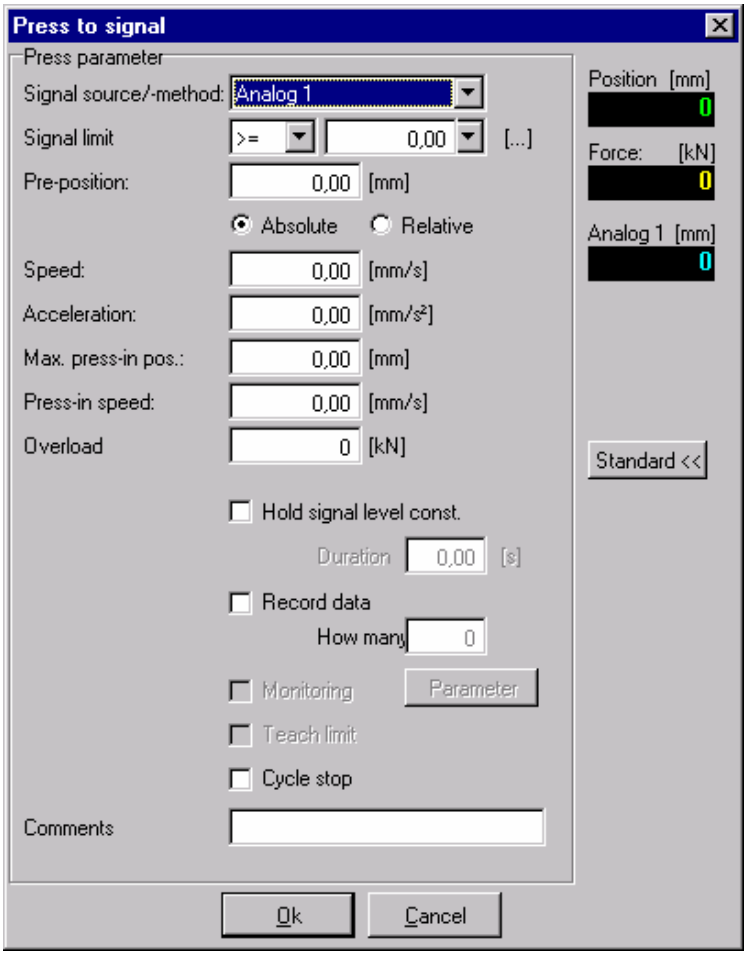


Once you have selected one of the switch signals, define the threshold or switching limit that should trigger the movement end using the signal limits. (On = Stop, when level is "high", Off = Stop, when level is "low")

Enter the pre-position, speed, acceleration and overload value for the force. Also define the maximum position and the pressing speed.

- *Extension*

Use this extension to configure the monitoring and, if necessary, a control once the switch-off criteria are reached.



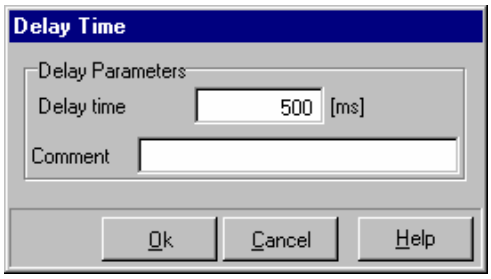
- **Hold signal**
  If you select this point, you can regulate the external input values; i.e. the module changes its position so that the signal remains constant for the given time.

- **Teach-in of limit curves**: A teach-in curve for this function is established, when the next teach-in cycle is started. Existing limit curves are overwritten. The distance of the limit curves relative the actual curve may be set in the service menu under configuration => control parameters => parameters in field, teach-in strategy,

- **Cycle stop**: Select this point, if you want to stop the cycle after having executed the active function

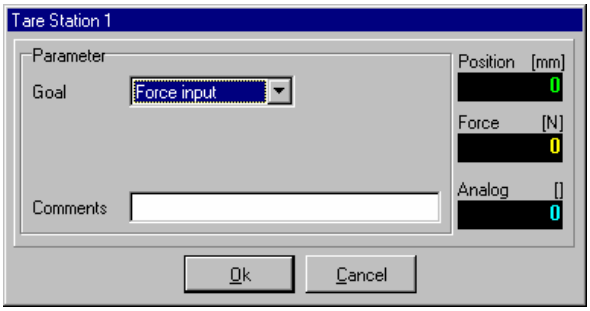
9.4 Delay time

Programming of delay times during the execution of the program cycle. The delay time is entered in milliseconds.



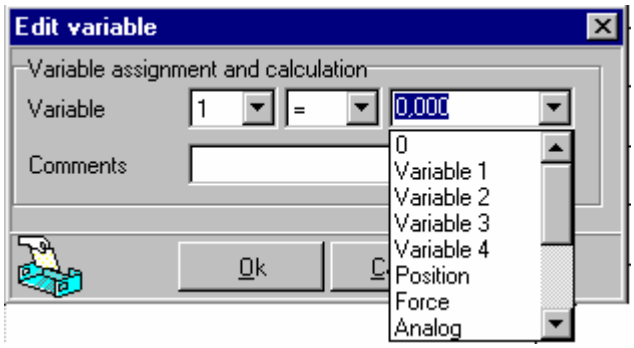
9.5 Calibration

This function is used to calibrate the input of force or additional analog input values. Select the input desired by using the arrow.



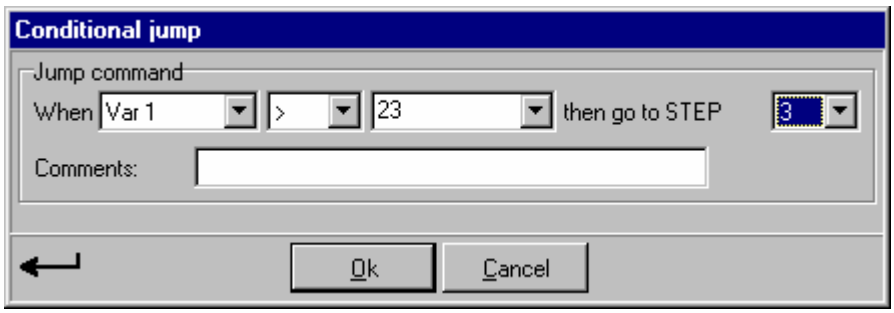
9.6 Variables

There are 12 variables available in the process. By the use of this function you can assign a numerical value, or the value of an external sensor via the analog input, to a variable of your choice.
In addition, you can execute calculations by means of the variable.



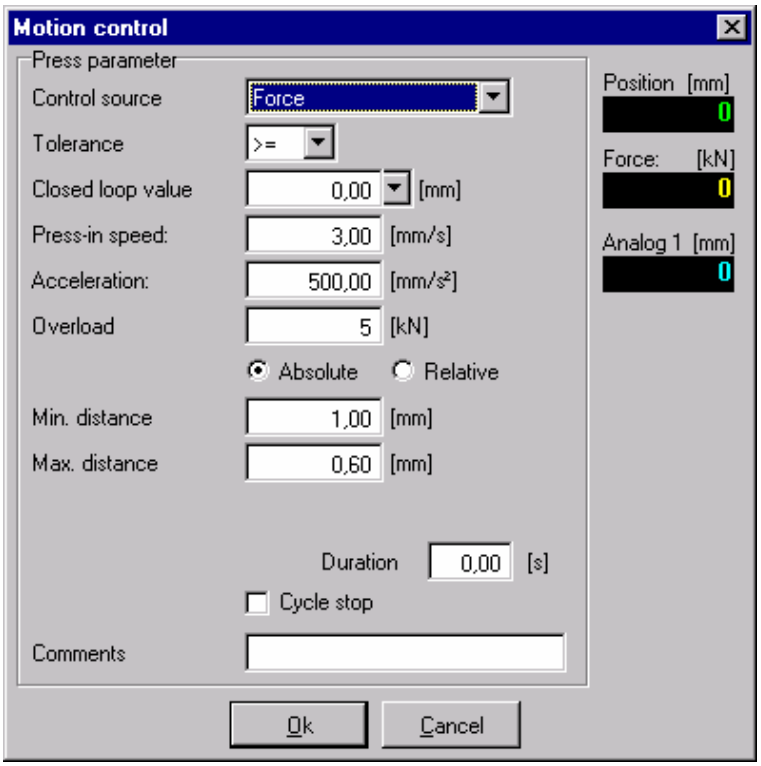
9.7 Conditional jump

Use this function to program jumps in your program.



9.8 Motion Control

This component makes it possible to keep the force or any other connected signal constant over a certain period of time. This means, the joining unit moves back and (or) forth within a range that has to be determined, in order to eliminate the deviations from the control size. This process is also monitored by a overload limit for the force, to avoid destruction of components.



- **Control Size**

  First, select the size to be controlled. You can choose between the force input and the defined virtual analog inputs under “Program Parameters / Analog Inputs”.

- **Control Deviation**

  Here, you set, how the unit should react to deviations from the control size.

+ A positive control deviation leads to a forward movement of the spindle.

(Example: Control value = 200, actual value = 202 => move forward; actual value = 199 => move backward)

- A negative control deviation leads to a forward movement of the spindle.

(Example: Control value = 200, actual value = 202 => move backward; actual value = 199 => move forward)

- **Control Speed**

  Enter the speed, by which the control deviation should be moved out.

- **Acceleration**

  Enter the acceleration, by which the control deviation should be moved out.

- **Overload**

  This force monitors the control process.

- **Min. Control Position / Max. Control Position**

  Enter here the range, within which the control may be performed. The entry can be made absolute or relative. Basis of the relative way is the position at the entry into the control component.

!!! If the permitted positioning range is exceeded, the part is declared NIO. The program continues the cycle. No reference run is requested.

- ***Duration***

  Please enter here the time, for which the control process should be performed. The time starts with the first reaching of the control value.

- ***Cycle Stop***

  Choose this option, if the cycle should be stopped after this function has been executed.

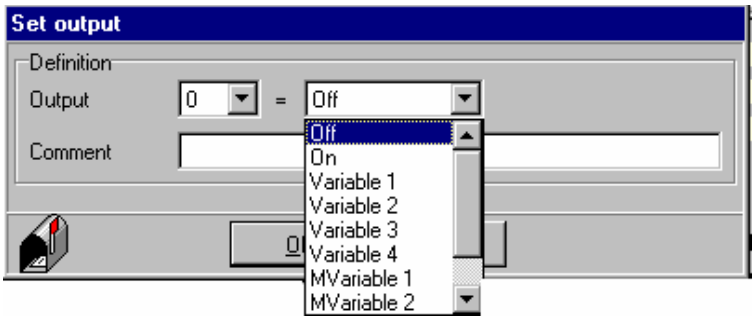
9.9 Program end

With this function you can define the end of your program cycle. Mandatory in program structures using conditional jumps. This input is not necessary in simple cycles without conditional jumps. The program returns to the first step and awaits a new **Start** after the last step has been executed.

9.10 Set outputs

Using Profibus DP you can set or reset 8 freely programmable outputs in the program process.

When program control is implemented via the Profibus, it is possible to define 2 standard inputs and outputs as freely programmable outputs. Outputs or inputs 1 and 2 are then no longer available in the Profibus.

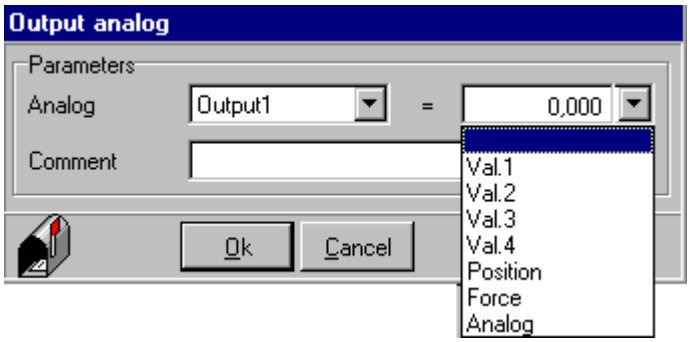


The outputs can be set directly or linked with variables.

In the above example, output 2 is set when the value of variable 1 is greater than 200.

9.11 Analog output

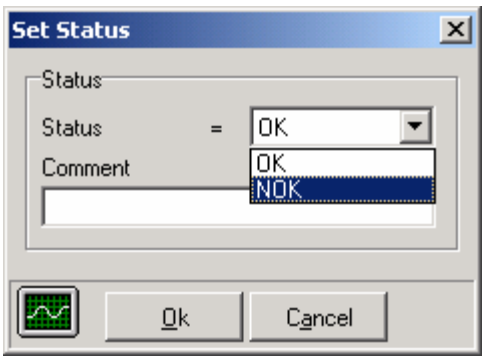
It is possible, using this function, to output the value of a variable, the actual position, the actual force or the actual analog input signal via the two analog outputs.



You must first define the analog output (see Chapter 14.1.8 Analog output)

9.12 Set status

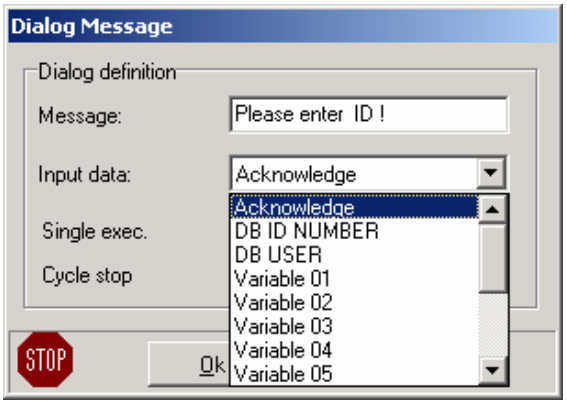
With the help of these function you can influence the total status, if necassary. To characterize the “manipulatet” status in the database, the bit 15 (16384) is set in the stored status



9.13 Dialog window

With the help of this function you can generate a user dialog.

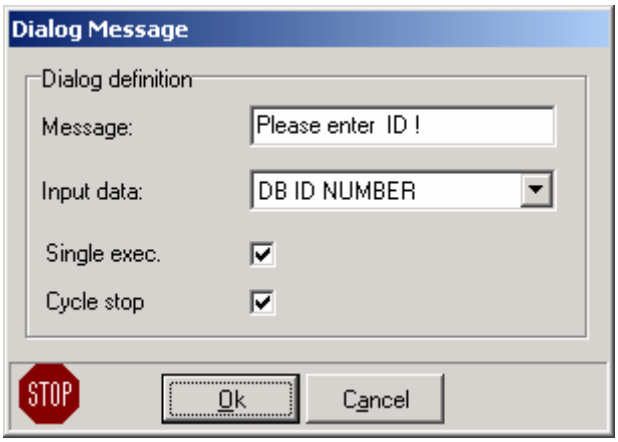
The following inputs are possible:



- **Acknowledge:** Choose this if you only want to display a message, the user has to confirm. The message can consist of max 30 characters.

- **DB Ident Number:** Input of the Ident number, to store to part in the database.

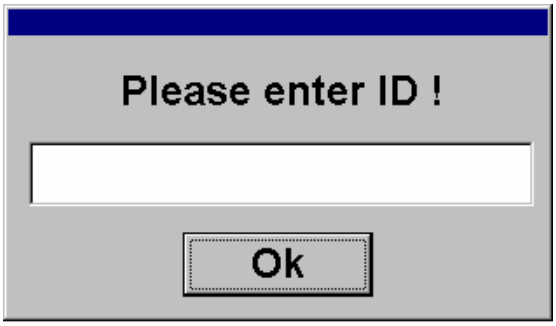
- **DB User:** Input of the username, to store in the database.
- **Variable 1-12:** Input of the value for a variable via the keyboard.



- **Single execution**: With this switch you decide whether the window is opened in every cycle, or only once. When the switch is not set, the window pops up every cycle. When the switch is set, the window pops up once, after loading a part program or homing. up every cycle.

- **Cycle Stop:** If you choose this switch, the unit has to be started again, when you have finished the dialog.

When you run the cycle, the following window pops up:

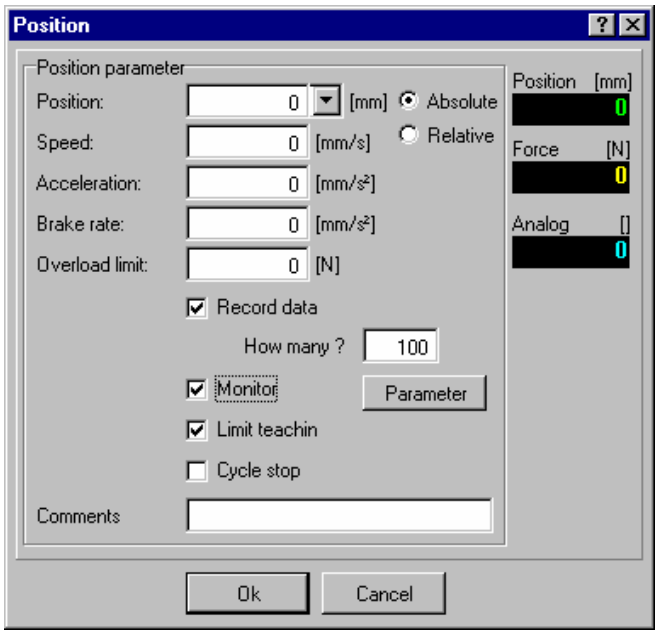


!!! Every input has to be confirmed with „OK“ The cycle stops until you confirm the input, or if you have chosen “Cycle stop” until cycle start is set again.

10 Force - Distance - Development

In order to register and monitor the force – distance – development of the press process, please proceed as follows:

In the desired motion mode activate the following functions:



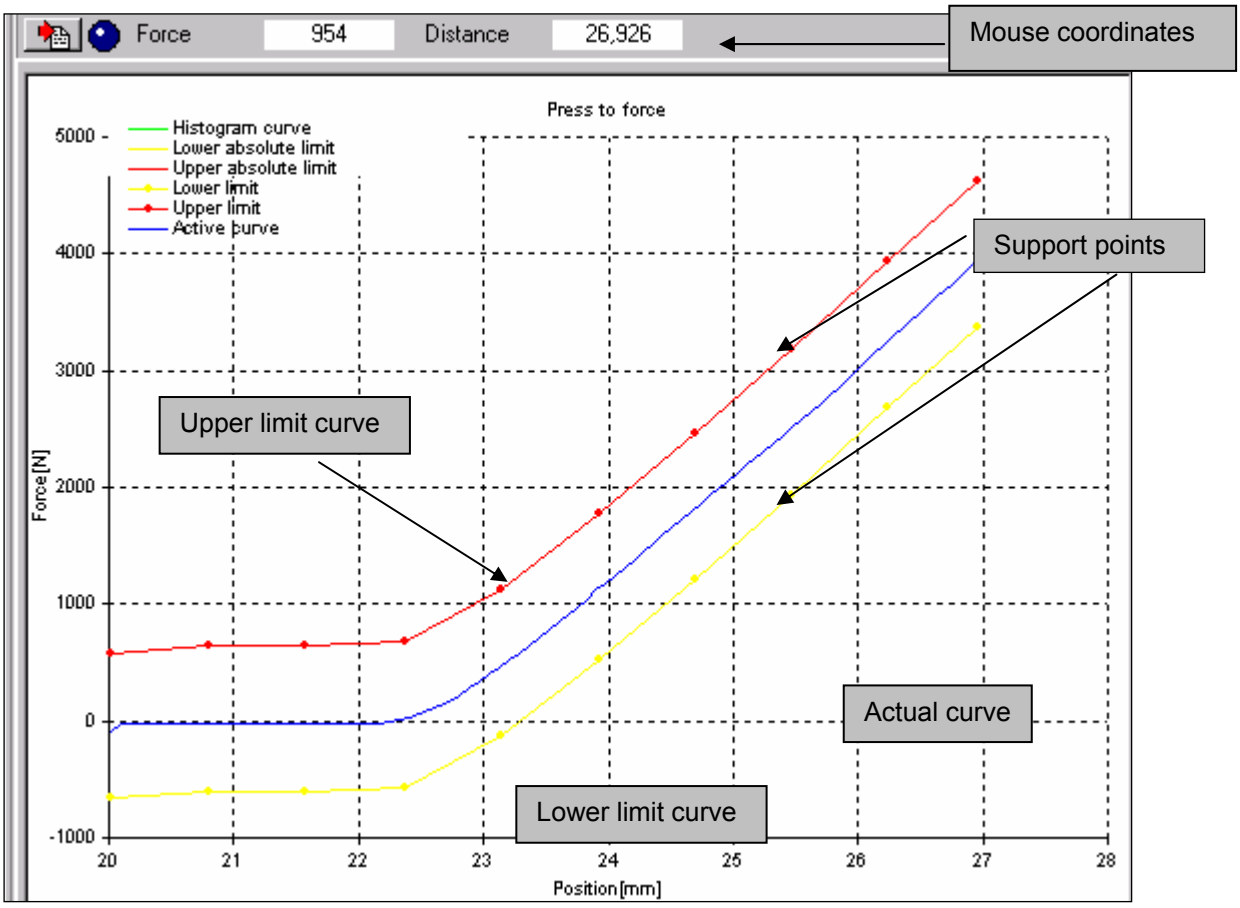
10.1 Register measuring values

All measuring values are registered for this motion if this option has been activated.
Under *How many* you should enter the number of supporting points. The points are evenly dispersed over the entire distance. An “A“ is entered in the function list to earmark this step. The development for this particular step is displayed in the graphics window in the form of a sub-window.

10.2 Monitoring

When this function is activated, the force-distance-development is monitored by means of limit curves.

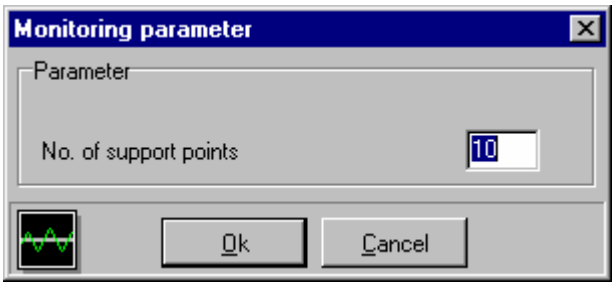
The limit curves consist of a chain of connected straight lines.



- Teach-in limit curve
  When this function is selected, limit-curves are recorded of the actual curve after the next step.

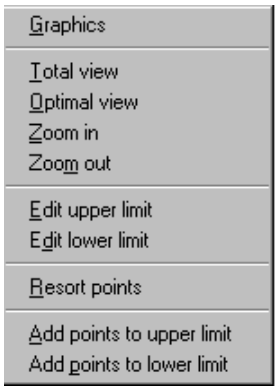
The number of supporting points may be determined via the button “Parameters“

(Max. 20 supporting points).



The distance of the limit curve during the learning process from the actual curve can be defined globally via the register card “Program parameter“ in the service menu for all programs.

10.3 Edit limit curves



Right-click in the graphics to edit the path of the force-distance curve. You can also open the menu “Graphics“ and select one of the edit functions from the drop-down menu.

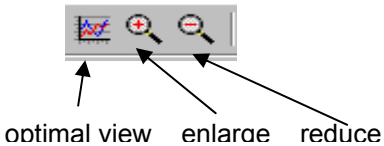
If you want to edit an existing support point you must first select the upper or lower limit curve. Then click with the cursor on the point you want to edit. Press and hold down the left mouse button and pull the point to the new position.

In a similar way, click on either the upper or lower limit curve if you want to add or delete support points. Subsequently with the cursor on the point where you want to add a support point, click the left mouse button. Press and hold down the left mouse button and pull the point to the position where you want to insert a new point. Existing points in between will be deleted.

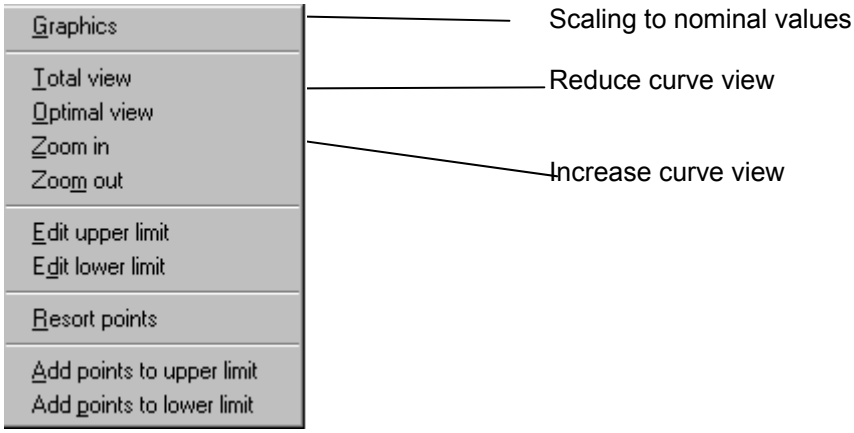
11 Zoom graphics

There are several options to zoom graphics:

- via the buttons



- via the menu “Graphics“ or right-clicking in the graphics window



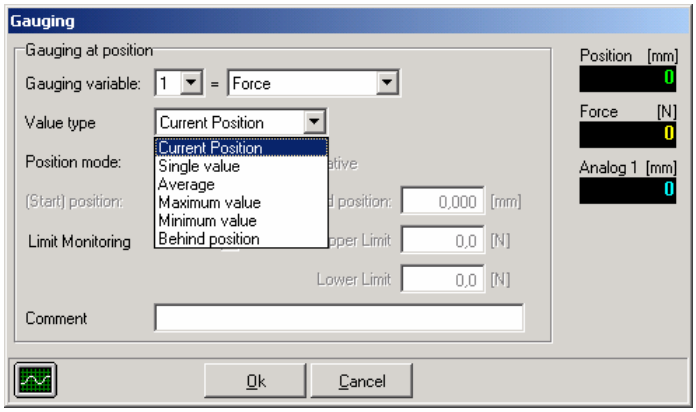
- by using the mouse

Press and keep the shift button pressed, then with the left mouse button pressed draw a rectangle corresponding to the view required.

12 Data

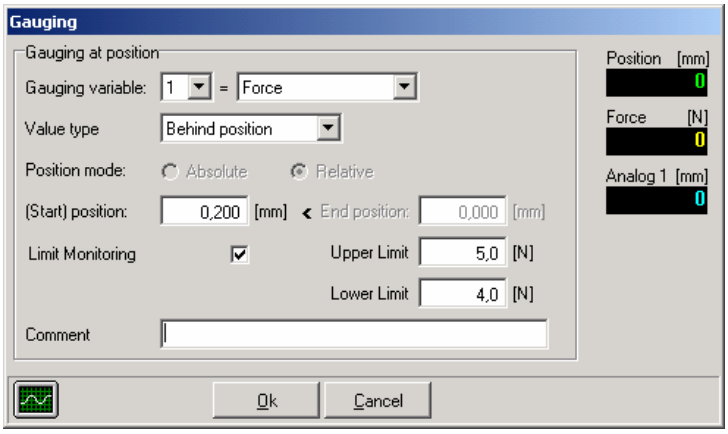
12.1 Record measurement values

Use this function to record and monitor force measurement values or external signals at any position required. In addition, the max value, min value or middle value between specific positions can be determined. Up to a maximum of 4 measurement variables can be saved. It is also possible record a variable relative to the end of a movement.



Select the variable and the required type of measurement value recording. Then define the required position or start and end point of the measurement value recording. The measurement values can be recorded as “absolute” or “relative”. If relative measurement value recording is selected, the reference measurement is taken as the position the press module is located in when the function is called.

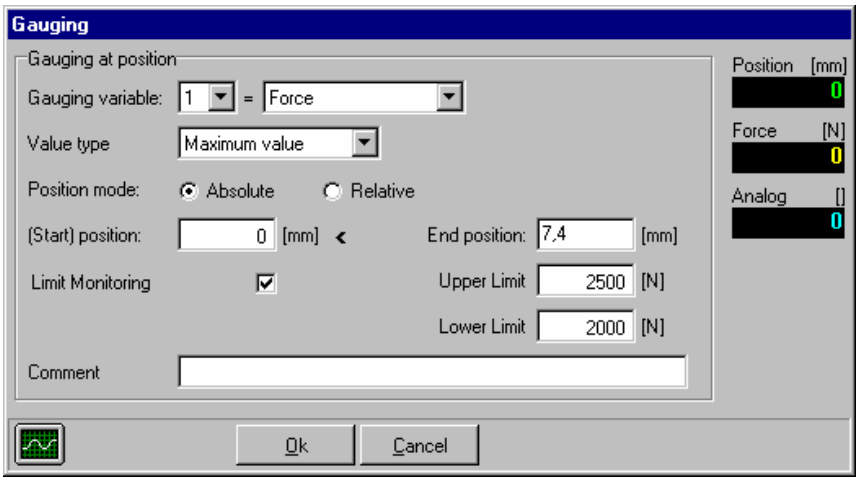
To record a value relative to the end of a movement, please choose “Behind position”. Enter the distance as a positive relative number. When the end of the next movement is reached, the value will be recorded relative to the postion of these step. If you choose “Behind position” you have to program these step always just before the movement you want to gauge the value.



The recorded measurement variables can be monitored using upper and lower limit values. The “OK“ or “NOK“ evaluation occurs independently of any limit curve monitoring. In the “NOK” case, the display of the measurement variable has an orange background.

The values are, if the step is monitored, saved together with the relevant limits from the limit curve.

You can transmit the values as follows:



- In an ASCII text file (the values are overwritten after every cycle)
- Via the fieldbus system (Profibus DP, CAN Open, Interbus - S)
- In the program-internal database

12.1.1 Save measurement values as ASCII data

To save the ASCII data, please activate the data export under "Configuration / file settings"

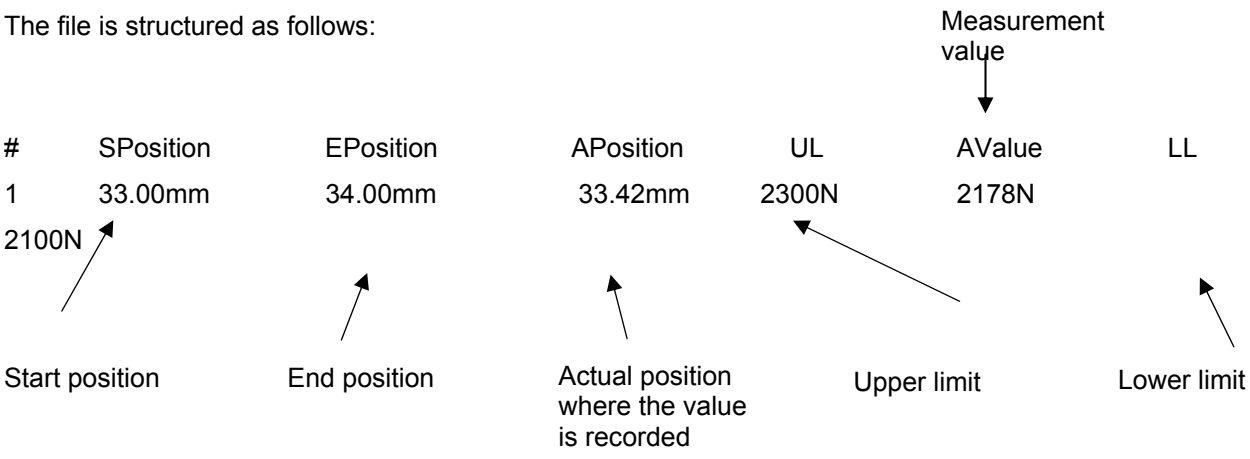
The data are saved in the selected directory under the following name:

Sn_Programname_Gn

Sn = Station number n

Gn = Measurement variable n

The file is structured as follows:



12.1.2 Save measurement values via Profibus DP, CAN Open, Interbus - S .

The data within the Promess program are saved in Microsoft Access format and can be edited/evaluated at any time with the Access program.

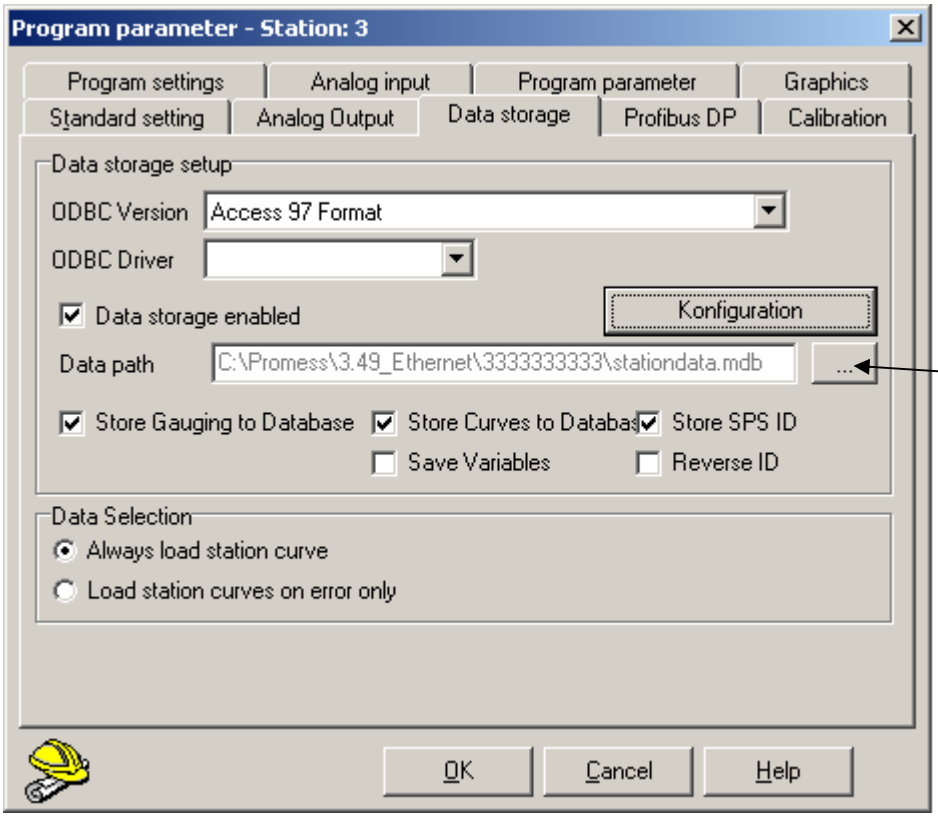
The values recorded using the function “Measure“ can also be transmitted as measurement variables via the bus systems (for further details, see bus system manuals)

12.1.3 Save measurement values in database

The requirements for data storage are as follows:

Pentium class PC.
MS Access or DAO 3.5 / 3.6 driver installed (available from Promess).
Data storage facility to hold the database, or
LAN network installed with relevant server.
At least one press module actively connected with the PC.

To store measurement values in the database, you must activate data storage under the Service / Program parameter in the register card “Data storage”.



Selection of data path

The data path for the data to be stored can be set using the buttons. This gives you the choice of saving the data locally or decentrally in a network (LAN). For decentralised data storage, the connected PC must have the relevant network card. It can also be specified at this point whether each station (if more than one present) should write to a central file or to an individual database. It must be noted, however, that the data may be stored and distributed across the local hard drive and than one must save several files. The database itself offers the opportunity of being used by many stations simultaneously.

The measurement values are saved with the data, time, actual position, force value or signal value. If the movement to the selected position is also monitored then the limit values are also written to the database.

- The data volume to be transmitted or saved can be influenced by using the following switches:

- **Save measurement values:** The values recorded with the function “Measure“ are saved in the database

- **Save curves:** The curves recorded with the function “Monitor“ are saved in the database

- **Always load curve from station:** The transmission of the curves from the station always occurs. The switch “Curves” determines whether the curve is only displayed graphically or also saved in the database.

- **Only load curve from station in case of error:** The curves are only transmitted from the station if an “NOK” occurs

If the database is activated, the status data of the cycle are <u>always</u> saved.

Leave the window with “OK“

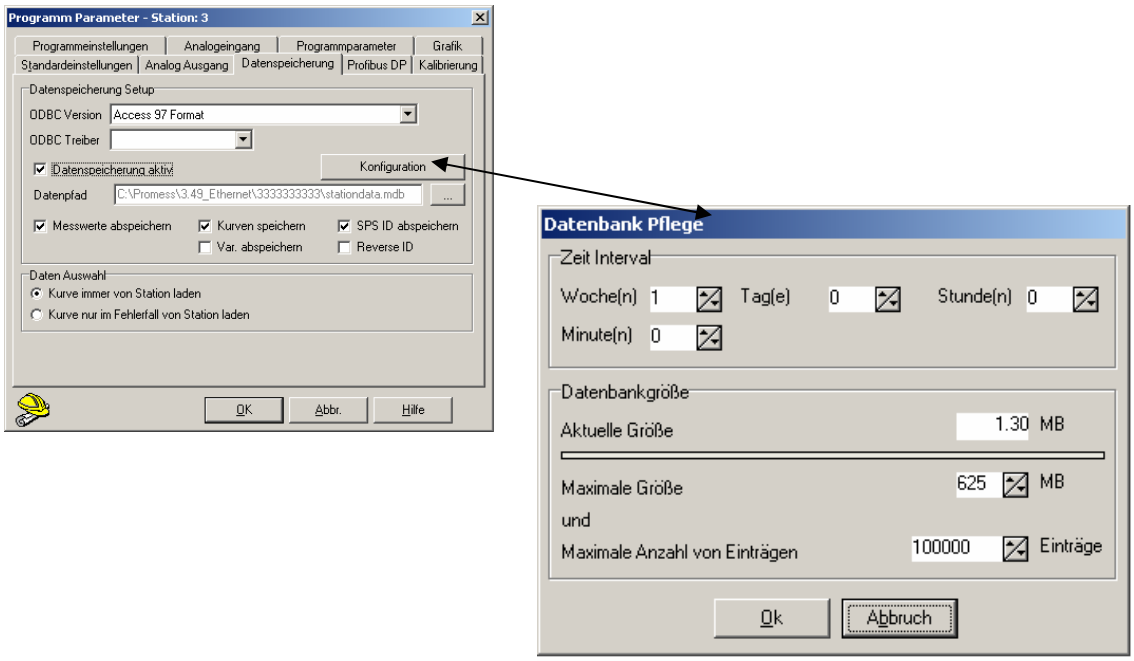
If a database is not present, the following message appears:

Reply with “OK“ to create a database.

12.1.4 Database maintenance

The size of the database is generally limited to 650 MByte. Further on you can limit the size by time and by number of entrees. When a limit is reached, a new database is produced. The name is of the

database is extended by a counter. The data are always a stored in the datbase with the highest number. Please enter a zero to stop a creating databases by time or number.



12.1.5 Database Structure

The database is divided into three tables:

1. Data
2. Curves
3. Measurement Values

The tables are linked by the cycle ID.

Daten

Name	Typ	Description
Cycle ID	AutoInc	
Prg ID	Text	
Program name	Text	
Station ID	Text	Serial number NC Module
Station	Number	Station number
Date	Date / Time	
Time	Date / Time	
Status	Zahl	**
Aux	Text	
Operator	Text	Ident-number
NOK	Number	
OK	Number	
Force or Signal early	Number	
No Force oder Signal	Number	
Upper limit fault	Number	
Lower limit fault	Number	
Overload	Number	

Messwerte		
Name	Typ	Description
Count	Auto Inc	
Cycle ID	Number	
ID	Text	Serial number NC Module
Station	Number	Station number
Date	Date / Time	
Time	Date / Time	
Gauging Type	Number	
Requested position	Number	Position start gauging
Acquired position	Number	
Requested position 2	Number	Position end gauging
Upper limit	Number	
Actual force/Actual analog	Number	
Lower limit	Number	
Position unit	Text	
Force unit	Text	
Status	Number	internal use
Aux	Text	not used

Kurvendaten		
Name	Typ	Description
Count	Auto Inc	
Cycle ID	Number	
ID	Text	Serial number NC Module
Station	Number	Station number
Date	Date / Time	
Time	Date / Time	
Curve Type	Number	*
Number	Number	
Unit	Text	
Mode	Text	Not used
Step	Number	
Min Position	Number	
Max Position	Number	
Min Force	Number	
Max Force	Number	
Status	Number	**
Aux	Text	Not used
Val 1	Number	X / Y value of the curve, and of oder
Val 2	Number	signature
Val 3	Number	Labeled by datatyp
Val 4	Number	
Val 5	Number	
Val 6	Number	
Val 7	Number	
Val 8	Number	
Val 9	Number	

*** Data type:**
0 = X-value upper limit
1 = Y-value upper limit
2 = X-value lower limit
3 = Y-value lower limit
4 = X-value actual value
5 = Y-value actual value

****** Status binary codes:

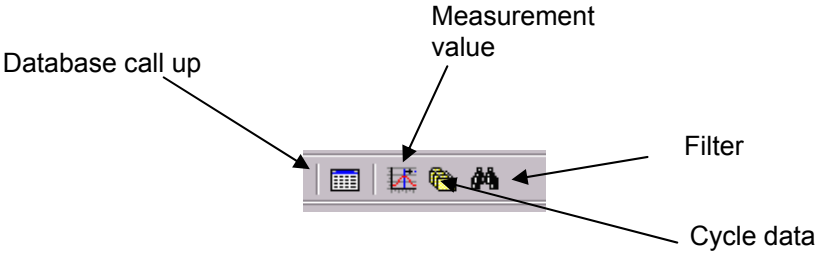
Bit 1 (1)	=	Overload
Bit 2 (2)	=	Reference Error
Bit 3 (4)	=	Force or signal too early (i.e. the switch-off force was exceeded during the pre-positioning)
Bit 4 (8)	=	No force and/or signal within the set range
Bit 5 (16)	=	Emergency-off
Bit 6 (32)	=	Upper limit of the envelope curve exceeded
Bit 7 (64)	=	Lower limit of the envelope curve exceeded
Bit 8 (128)	=	Tracking error
Bit 9 (256)	=	Force transducer outside the permitted offset area

(This message means that the zero point of the force transducer was shifted by more than 10%. This was probably caused by an overload. The joining module cannot be loaded anymore to the nominal load. Please perform an immediate re-calibration of the transducer).

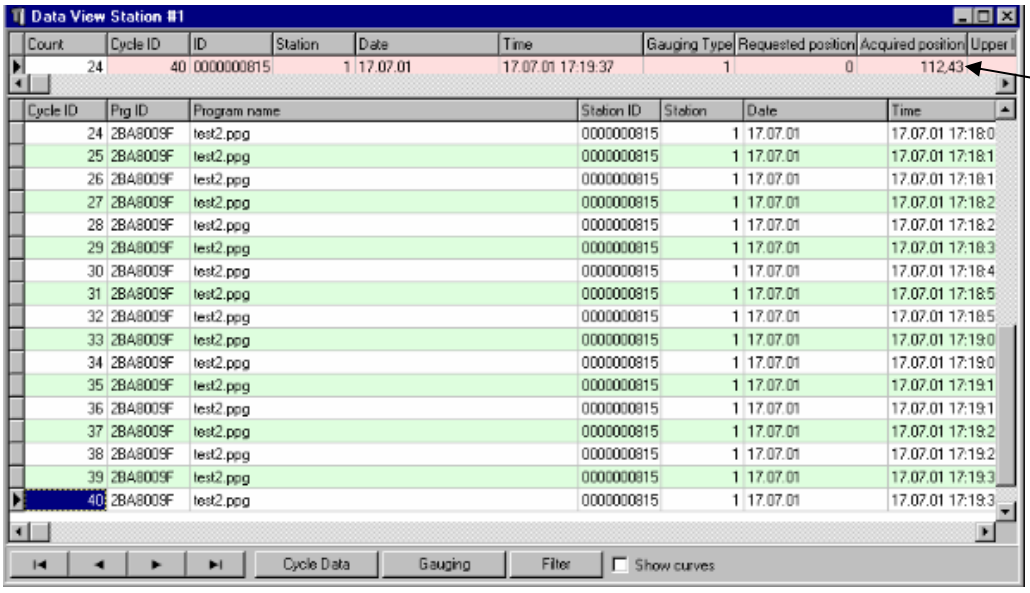
Bit 10 (512) = Maximum travel range exceeded
Bit 11 (1024) = Not used
Bit 12 (2048) = AD converter has reached maximum value
Bit 13 (4096) = Start signal was cancelled during the movement
Bit 14 (8192) = Not used
Bit 15 (16283) = Not used
Bit 16 (32768) = Status manual set

12.2 Call up saved measurement values

To recall saved values, select “Data call” in the “File” menu or actuate the corresponding button.



The following database view is opened.



The data from all connected stations are stored in the sequence of their occurrence in time. The window that displays the measurement values only opens if you have used the function “Measure“ in your program. To update the values, actuate the “Cycle data“ button. Use the “Measure“ button to show all values that have been collected using the “Measure” function.

To navigate within the database, you can either use the scroll bars on the side and at the bottom, or use the navigator buttons (arrow keys) at the bottom of the PC screen.

Previous record Next record Cycle data

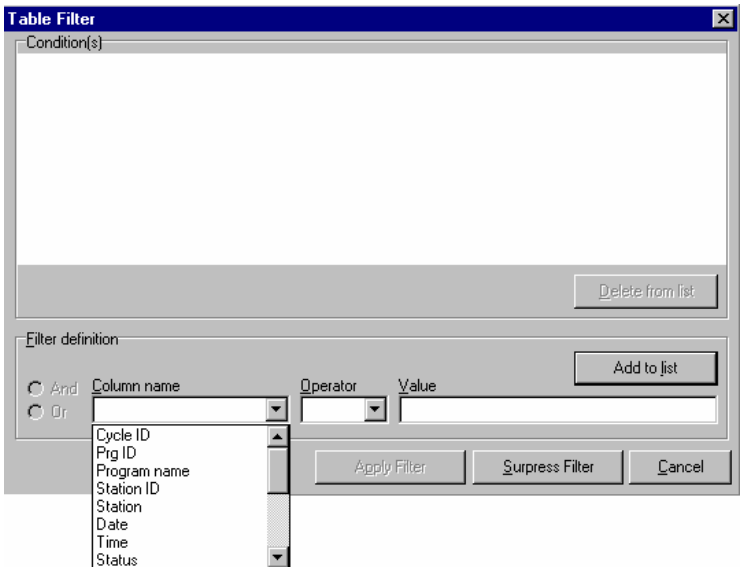
Jump to end of database.

Jump to start of database

- **Database filters**

To display a reduced amount of data from a station or program you must define filters.

To define a database filter, use the button in the top symbol bar or in the footer bar. In the new window, you can set filters to specific values in specific columns.



You can filter according to the following criteria:

- Counter
- Cycle ID
- Program ID
- Program name
- Stations ID
- Station
- Date
- Time
- Status
- Identifier
- User

- NOK
- OK
- Force or signal too early
- No force or signal not reached
- Upper limit broken
- Lower limit broken
- Overload

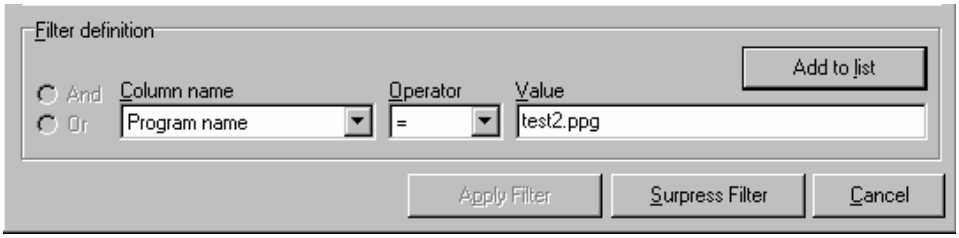
The filters can be linked with “and” or “or” conditions.

Example:

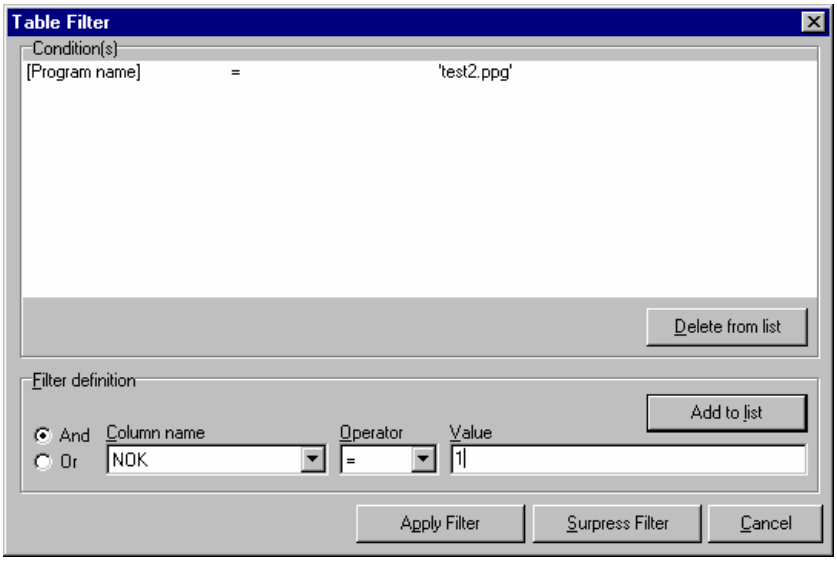
You want to define the NOK components for a specific program (test2.ppg).

First define the following filter with the program name.

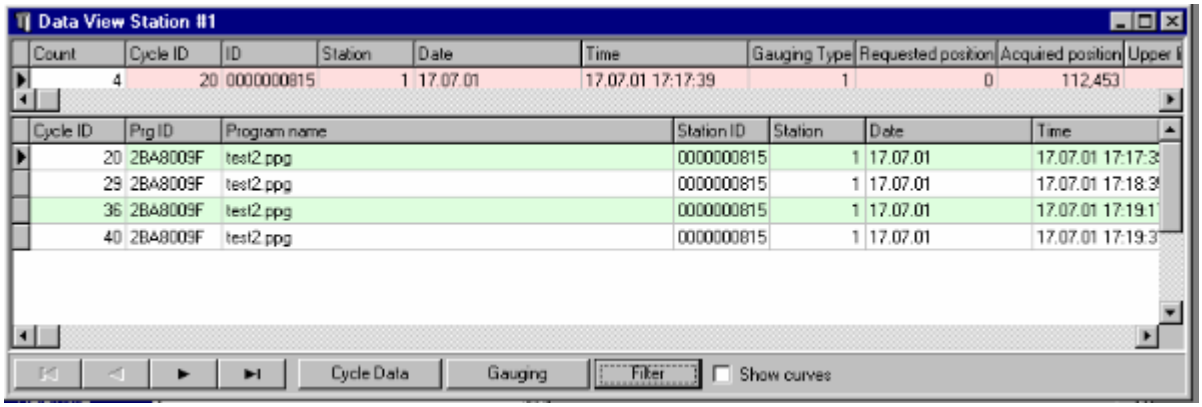
Activate the condition with the “Add” button.



In order to filter with the NOK component of the program test2, select the link “and“ and enter the condition “NOK = 1“. (You could also filter using “OK = 0 „. 1 stands for the condition “True“, while 0 stands for the condition “Not true“)

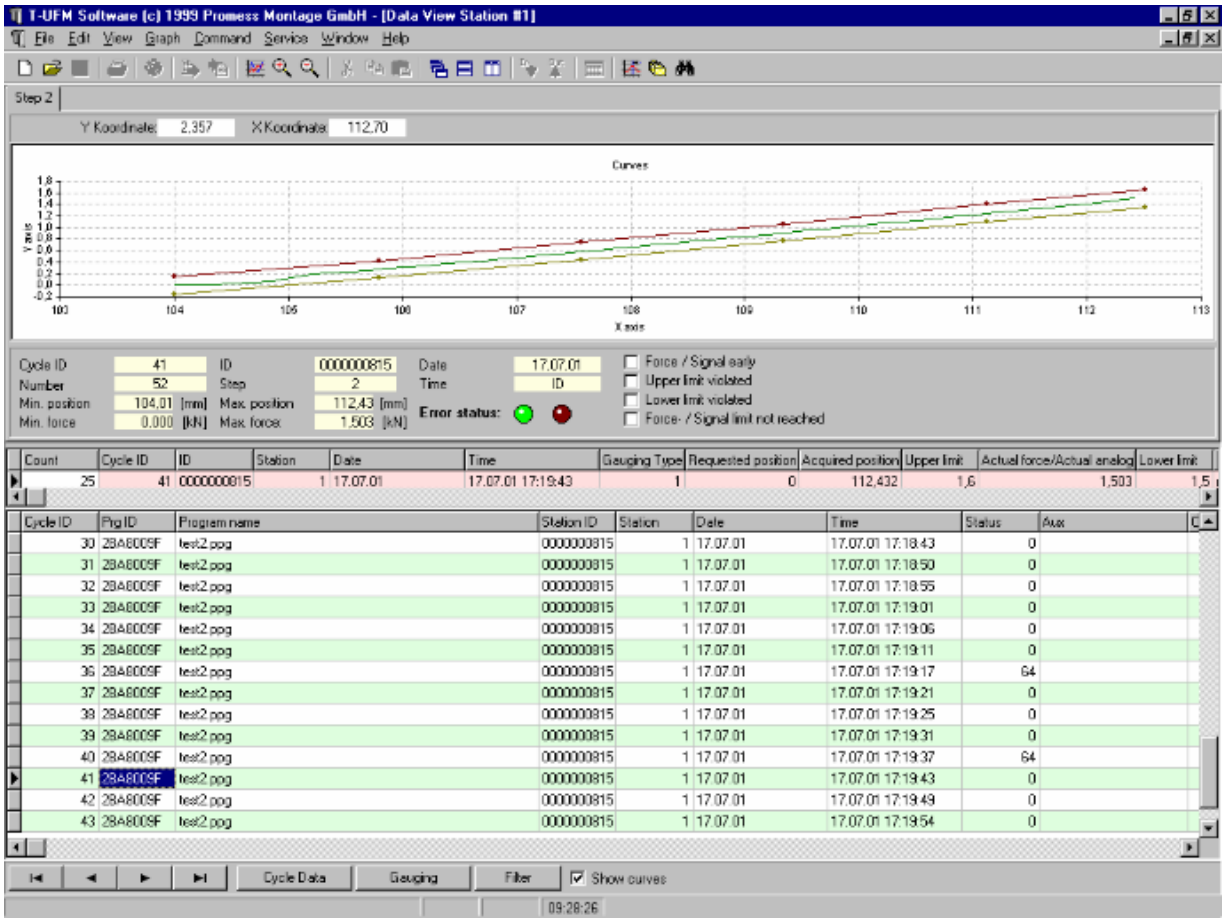


Add the condition and then apply the filter. All the NOK components in program test2 are displayed.



- **Show curves**

  By activating the appropriate control button, the database view also displays the curves and status information.



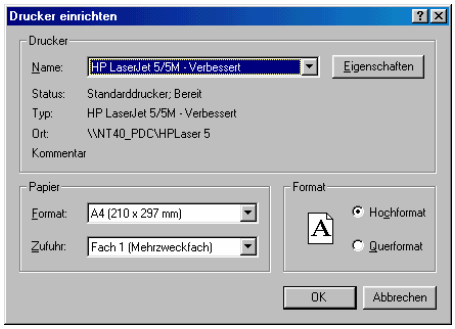
13 Printing

The following print options can be selected:

- Curves report: Printout of graphic with status messages for the displayed step
- Program listing: CNC program
- Stations window: Screenshot

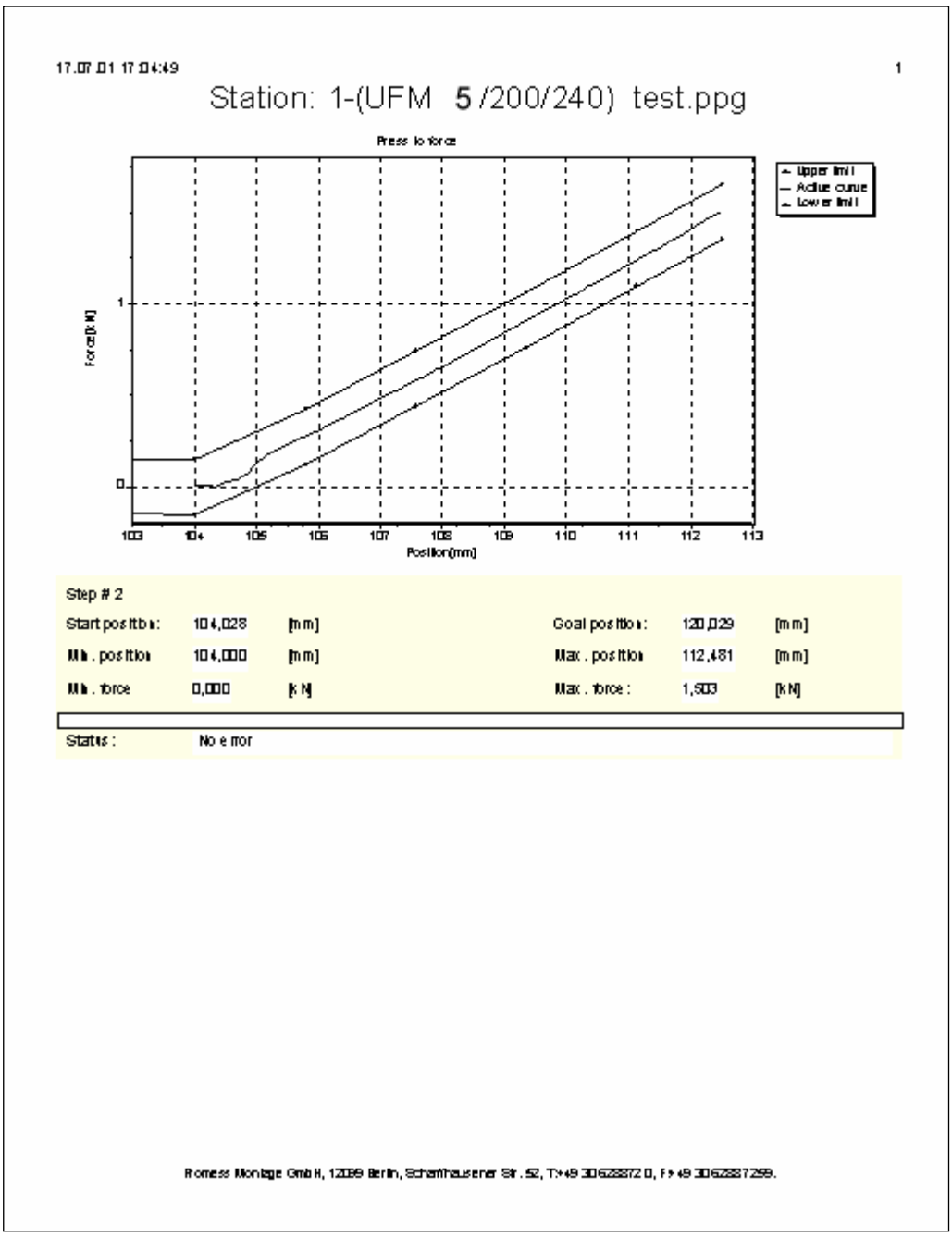
13.1 Printer settings

This menu item for configuring your printer can be reached from the file menu.



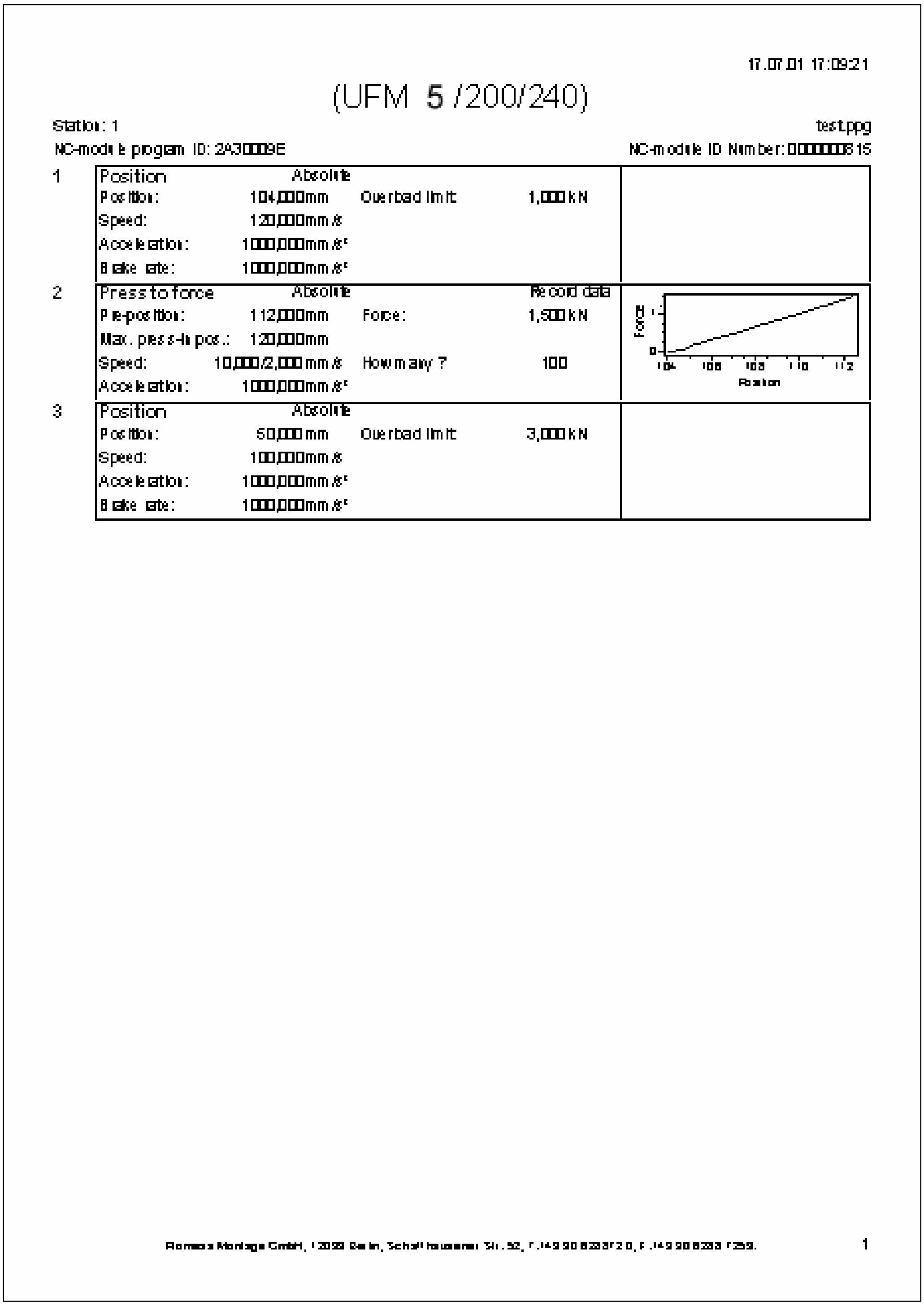
13.2 Printing graphics

The graphic of the currently displayed curve, together with the status of the press operation, are available using the function “Report“ in the file menu.



13.3 Printing the CNC program

Use the button “Print“ or the file menu item “Print“ to print out the CNC program.



17.07.01 17:09:21

(UFM 5 /200/240)

Station: 1 — test.ppg

NC-module program ID: 2A30009E — NC-module ID Number: 0000000815

1	Position	Absolute			
	Position:	104,000mm	Overload limit	1,000 kN	
	Speed:	120,000mm/s			
	Acceleration:	1000,000mm/s²			
	Brake rate:	1000,000mm/s²			
2	Press to force	Absolute		Record data	
	Pre-position:	112,000mm	Force:	1,500 kN	
	Max. press-in pos.:	120,000mm			
	Speed:	10,000/2,000 mm/s	How many ?	100	
	Acceleration:	1000,000mm/s²			
3	Position	Absolute			
	Position:	50,000 mm	Overload limit	3,000 kN	
	Speed:	100,000mm/s			
	Acceleration:	1000,000mm/s²			
	Brake rate:	1000,000mm/s²			

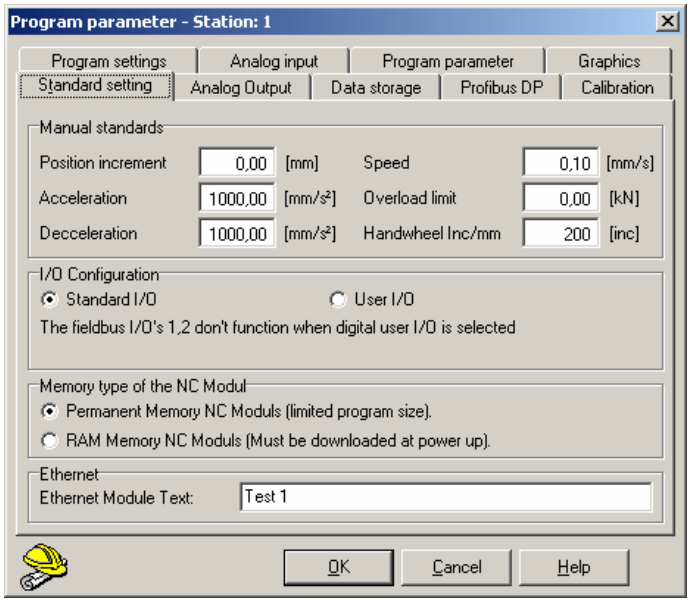
1

14 Service

14.1 Program parameters

The program parameters are retrieved via the menu "Service".

14.1.1 Standard settings



Manual Motion

The standard values for manual mode can be set here.

You can also decide whether inputs/outputs 1 and 2 should be used as standard inputs or as freely definable inputs/outputs. This selection is only useful if the module is controlled via the Profibus. Inputs and outputs 1 and 2 are then no longer available in Profibus.

Input "Start Reference run"	**=**	**Freely prog. input I1**
Input "Cycle Start"	**=**	**Freely prog. input I2**
Output "OK"	**=**	**Freely prog. output O1**
Output "NOK"	**=**	**Freely prog. output O2**

You have different options to save the program in the NC module:

1. In the non-volatile storage (fixed-digit storage: The programs remain stored after the power is switched off. Storage size: 154 Words).

2. In the volatile storage: The programs are lost after the power is switched off and have to be reloaded from the PC or the link module after system is switched back on (storage size: 722 words).

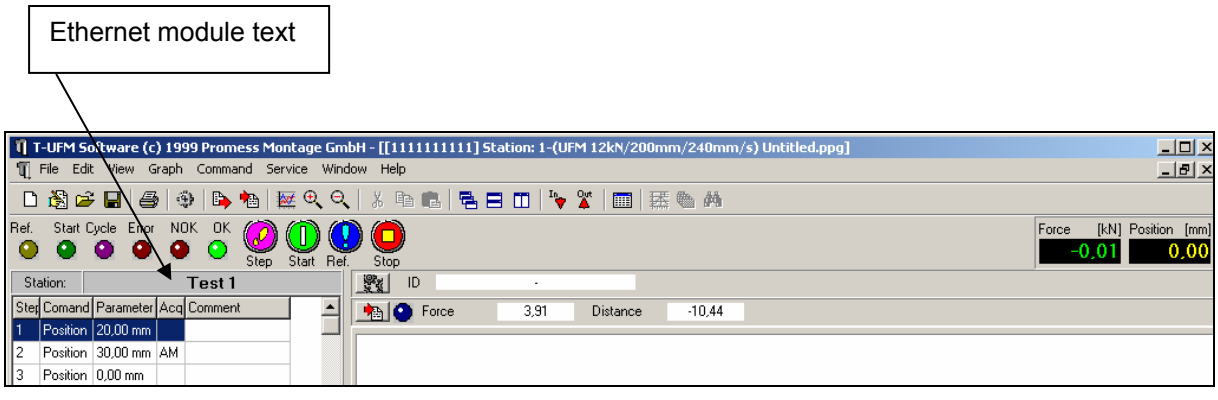
Required storage of the individual program steps:

Command	No. Of Words	Controlled Words
• Positioning	7	1 *
• Press to Force	8	1 *
• Delay Period	2	
• Program End	1	
• Variable	2	
• Conditional Jump	2	
• Taring	1	
• Joining on Signal	9	1 *
• Measuring		
Individual Value on Actual Position	*1*	2
Individual Value on Position X	2	2
Min, Max, Mean Value	3	2
• Output	2	
• Input	2	
• Analog Output	2	
• Status	1	

*** every point of the upper / lower envelope curve needs one additional word**

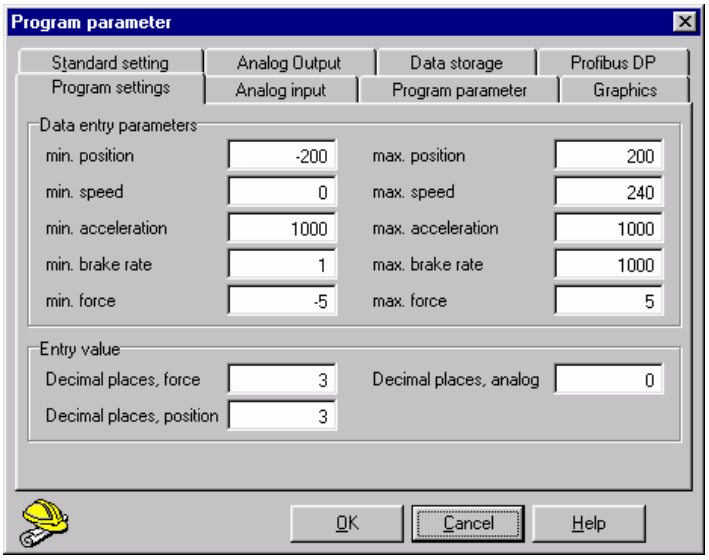
- **Ethernet module text**

To describe a station, please enter the text here. This text is shown in the respective station window.

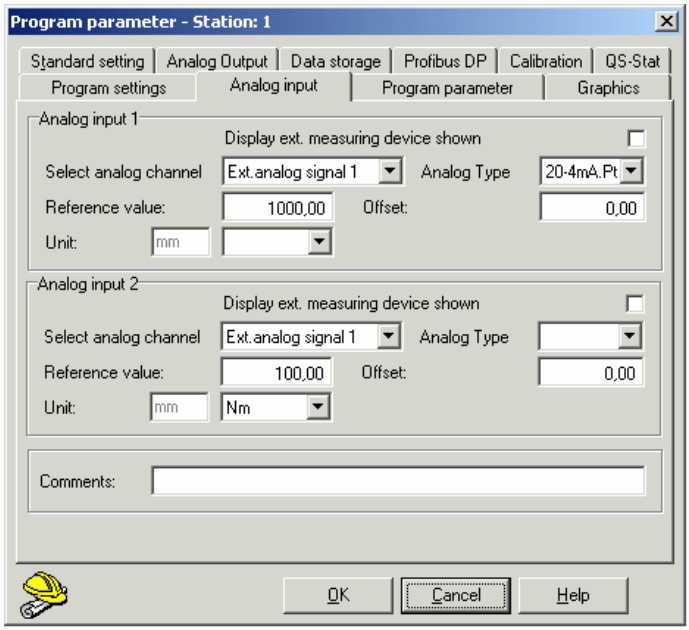


14.1.2 Program settings

Use this register card to set the press unit nominal values for position, acceleration, speed and force. You can also determine the number of decimal places to display force, distance and additional analog input values.



14.1.3 Analog Input



In this register card you can define additional virtual analog inputs, which you can use in the function „Join upon Signal“ and in the „control component“. You can choose between external analog input 1, external analog input 2, the power input, an incremental transducer and the engine power. You can

set the physical interface via analog type. Enter also the nominal value and, if necessary, the offset of your analog source.

14.1.4 Program parameters

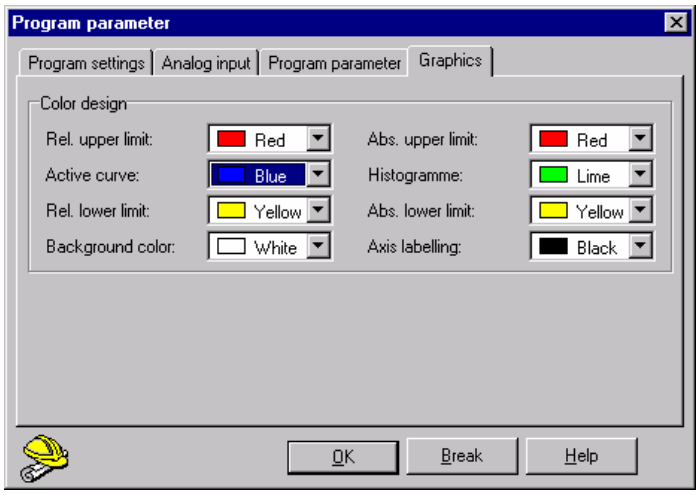
On the register card "Program parameters" you enter the offset value of the actual force during teach-in. The data entry is expressed as a percentage of the nominal load.

- Expansion parameter

This is used to compensate for the expansion of the press frame caused by the force produced during the positioning process. Input is based on the nominal load. The value is stored related to the active part program, so you can store different values for different part programs. The compensation is linear.

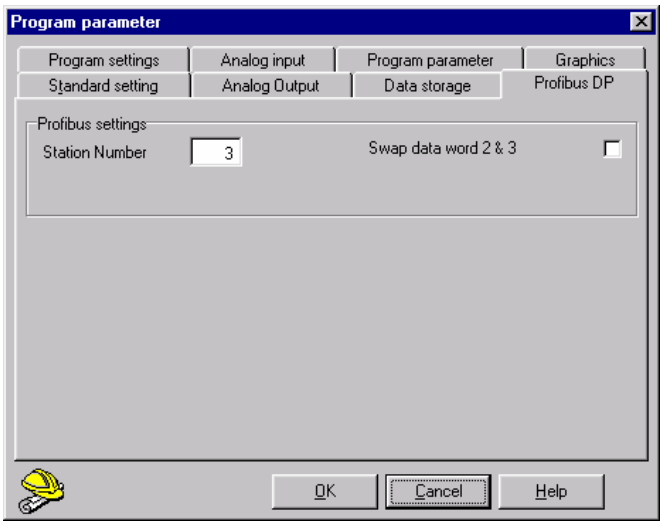
14.1.5 Graphics

In this menu you can set the colors of the various curves that are going to be displayed.



14.1.6 Profibus DB participant address

Enter the address you wish to assign to the station.



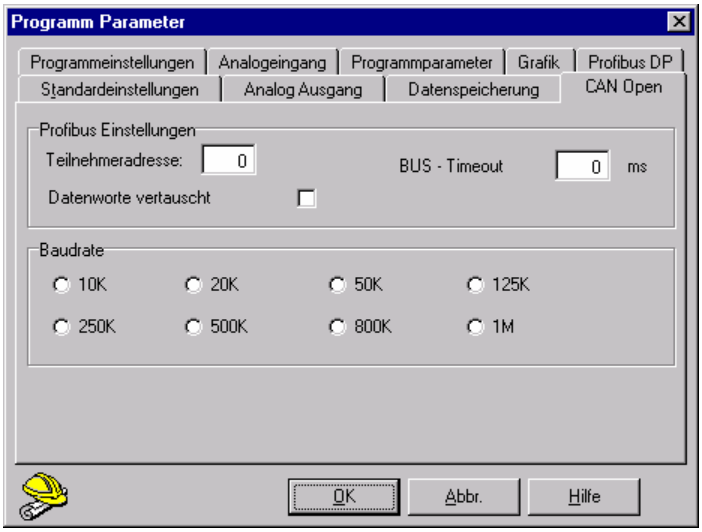
- Exchange data words

Data word 1 on the Profibus is exchanged with data word 3.

14.1.7 CAN Open

Enter the participant address and the timeout time for the bus.

Select the required baud rate.



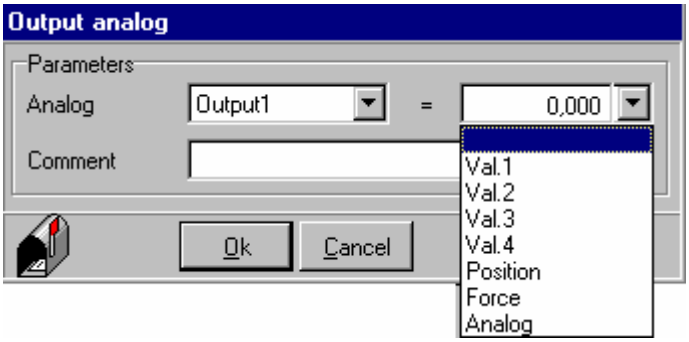
- Exchange data words

Use this switch to exchange data word 1 transmitted to the bus with data word 3.

14.1.8 Analog output

The system has two analog outputs that can be used to output the following values:

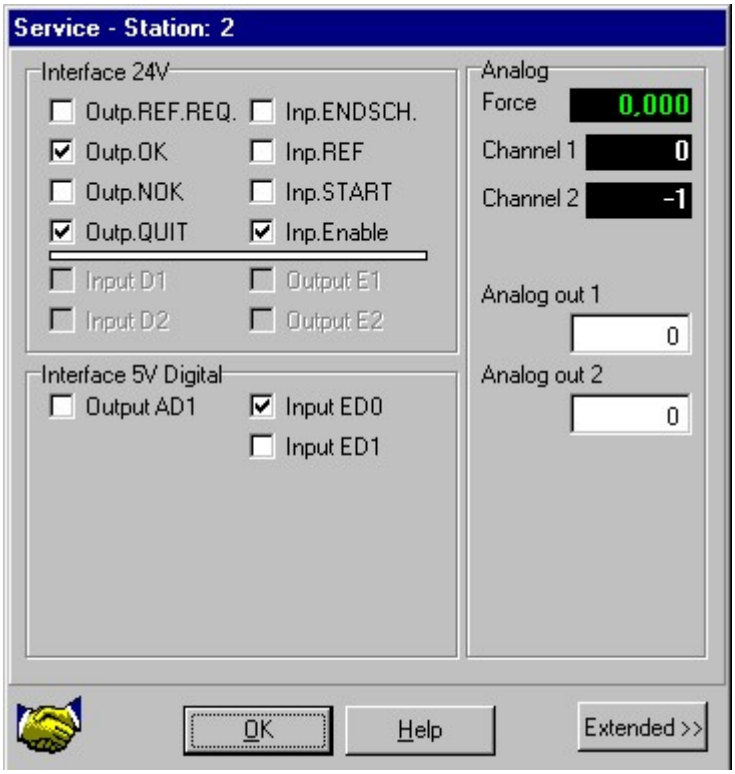
- Variables 1 - 4
- Position
- Force
- Analog input



Define the nominal value or the physical output for the respective outputs. Assign these using the function "Analog output", see Chapter 9.11 Analog output.

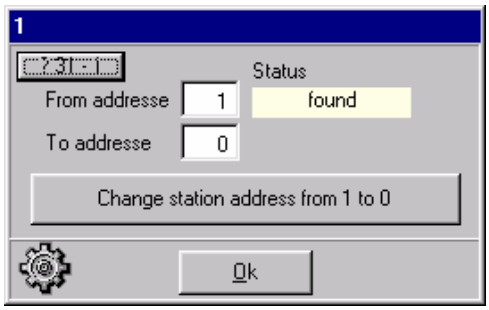
14.2 In / outputs

Use this menu to check the digital inputs and outputs as well as the analog inputs.



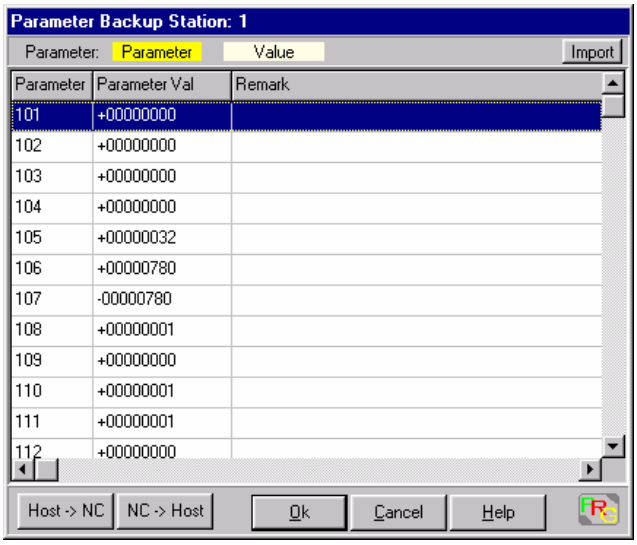
14.3 Change station address

If you do not know the station address of the connected unit, you can search for it using the buttons “? 31-1“. Once you have entered the new station address, you can implement changes using the button “Change station address from n to m“.

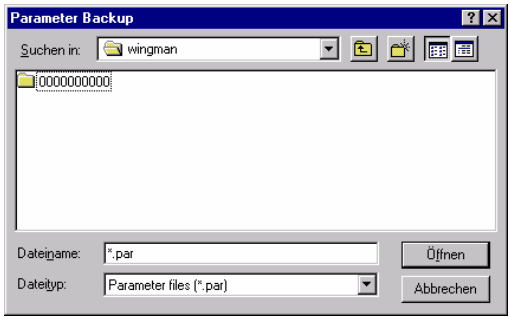


14.4 Parameter NC module

Once the press module is successfully installed, we recommend that the parameter sets of the unit be backed up. To do this, open the item “Unidrive parameter” in the service menu, then click on the button “NC->Host“ in the new window to load the NC module values onto the PC.



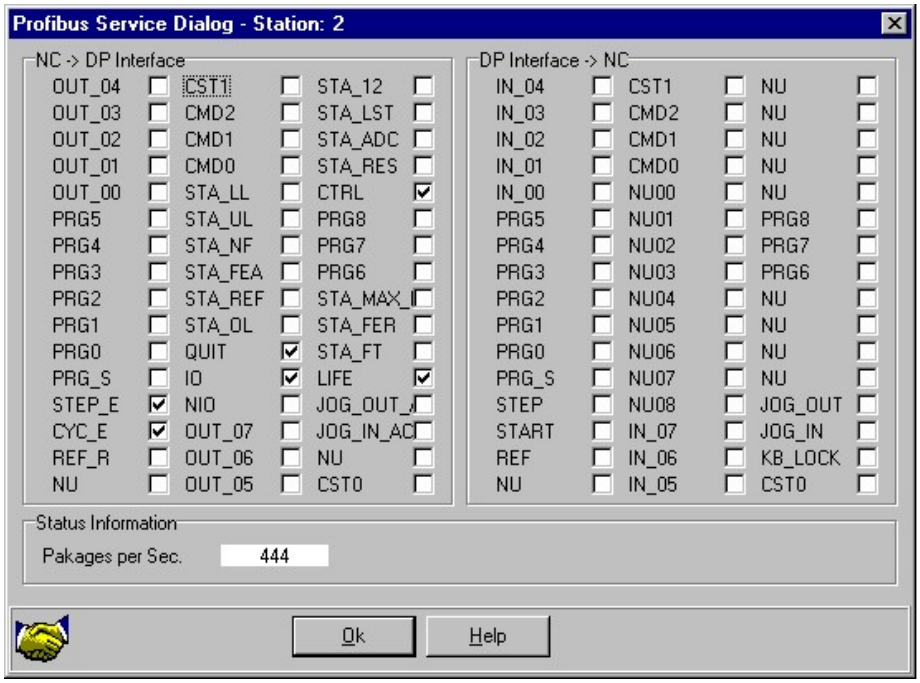
Then back up the values on floppy disk. Use the “Host->NC“ button to send saved values to the NC module after the power unit is changed. It is possible to load parameter sets for download to the NC module using the “Import“ button.



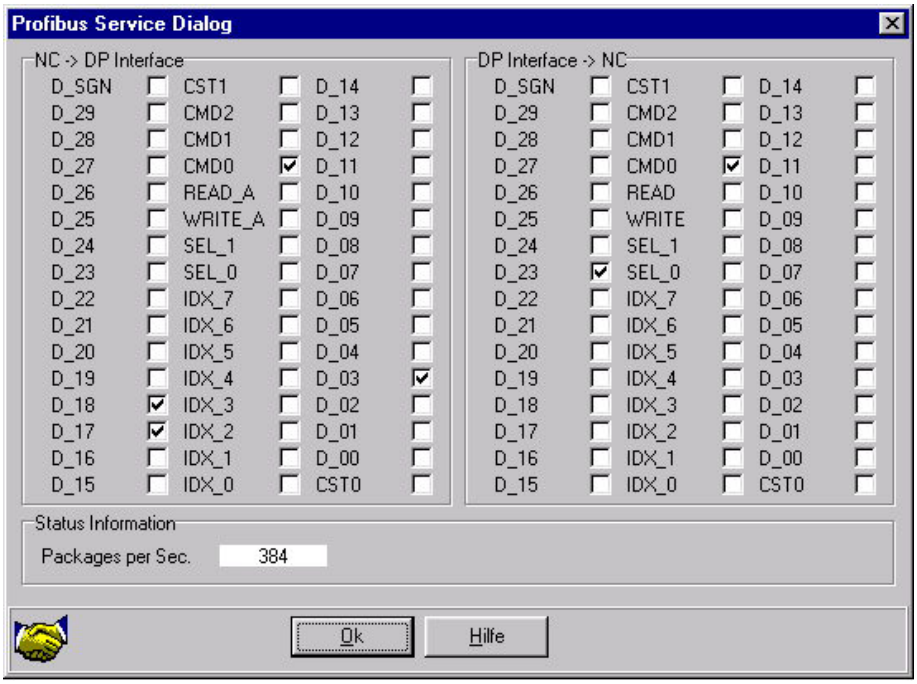
14.4.1 Service Window Bus Systems

Use this window to check the entered bits or the output bits that are transmitted via the Profibus. Depending on the levels selected by the PLC, either I/O or variable information is displayed. For further information regarding the Profibus module, please refer to the Profibus manual.

I/O level

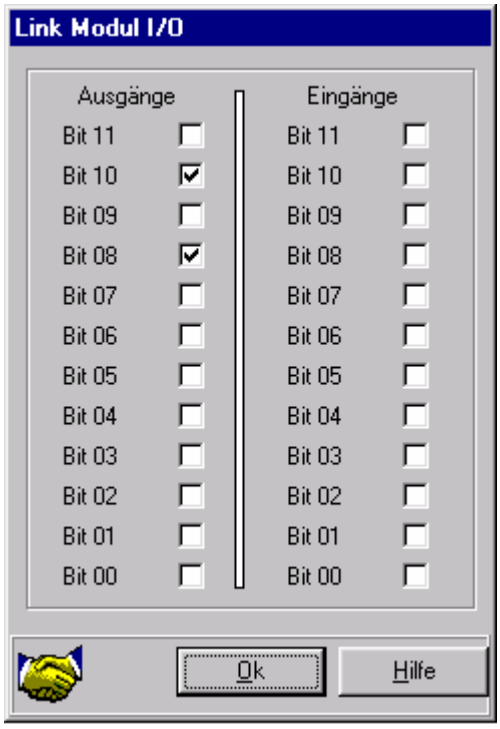


Variable level



14.4.2 Link Module Inputs / Outputs

Here, you can have the condition of the inputs and/or outputs of the link module displayed. If you want to set an output, please click on the button.

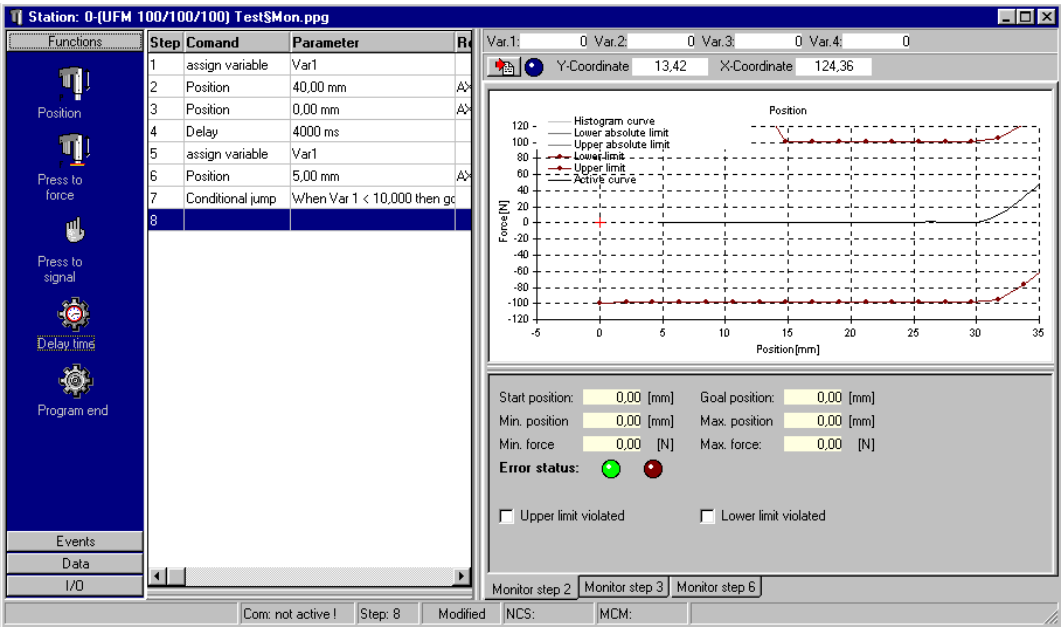


15 Register an NC module to the PC

When started, the program scans to determine which modules are connected. This scanning takes place provided the option “Automatic" has been selected under “Polling of the stations“. (*New or substitute modules are always supplied with station number 31*). If you only want to establish a communication with a single station, you should select “Manual“ in stead of “Automatic".

When a station has been detected, the following station window is opened:

The program stored in the NC module is automatically loaded and displayed.



No communication?

Proceed to configure the communication via the menu option “Configuration" in the menu “File“ (please refer to Chapter 13 "Configuration")

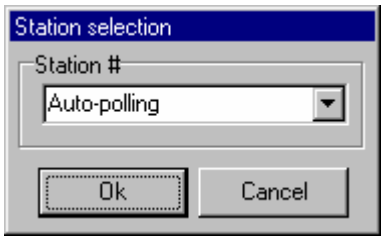
- Select the COM-port number of the interface you are using (baud rate = 19200 Baud)
- Polling error: Check if you have selected the proper COM-port.

15.1 Register a new station

!!! This is only active, if you use the RS232 or RS485. Using the Ethernet module you have to register the module under „configuration“ (17.1.1 and 18.4.1)

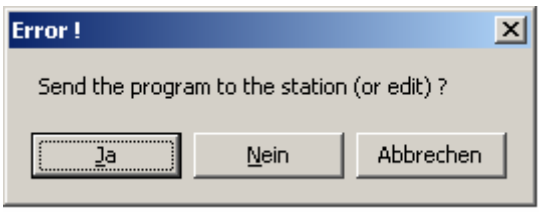
Open this point in the menu “File“

Select the station number you want to open, or select “Auto Poll".



15.2 Switching Programs

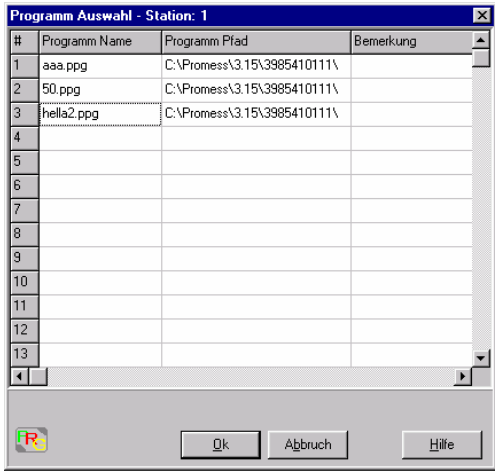
The programs in the NC-module can be switched manually via the PC or via the PLC. If you use the PC, please open the program, which you would like to send to the NC-module and confirm it in the following window with „Yes“.



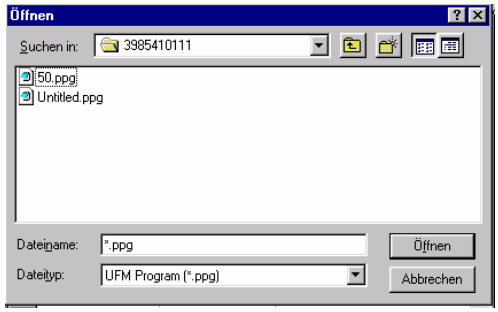
If you want to switch programs via the PLC, you first have to enter the programs in an allocation table, because the program call via the PLC can only be performed binary code figures.

Program Pre-selection

You can reach the allocation table via the file menu. Select the menu item „Program Pre-selection“, or the respective button on the task bar.



The allocation is executed by a „double click“ in the column Program Name. Choose the desired program in the Explorer window that pops up.

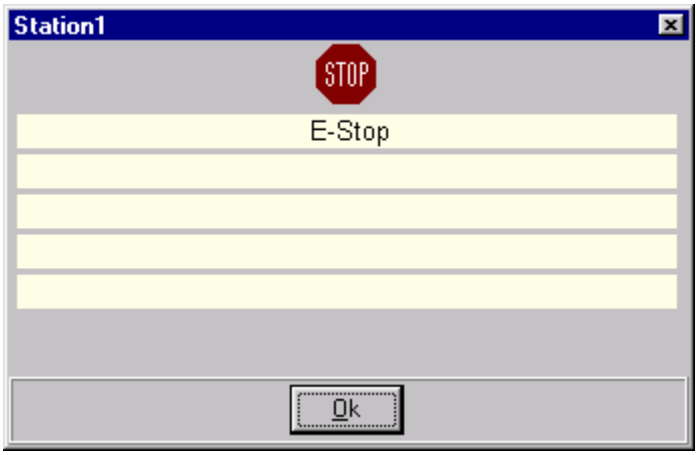


For the process for the program change via the PLC see Chapter 20.7 Transfer of program number, and/or in the description of the used bus system.

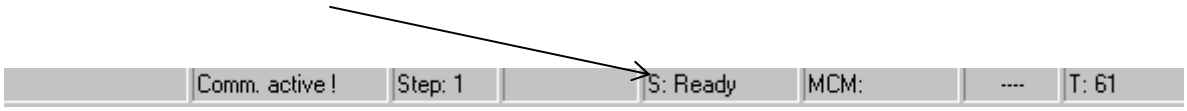
16 Error messages

The following error messages may be displayed in a message window:

- Overload
- Emergency stop
- Reference switch defective



The following coded errors can be displayed in the status bar:



- U = Overload
- R = Reference error
- F = Force or signal too early (i.e. the switch-off force was exceeded during the pre-positioning)
- N = No force or signal within the set path window
- E = Emergency Stop
- UL = Upper limit of generating curve exceeded
- LL = Lower limit of generating curve exceeded
- FE = Contouring error
- T = Force transducer outside permissible offset range.
  (This message means that the zero point of the force transducer is displaced by more than 10%. This is probably due to an overload. The press module can no longer be loaded up to the nominal load. The transducer should be recalibrated immediately)

These messages will also be output via any connected bus systems or the Link-Module.

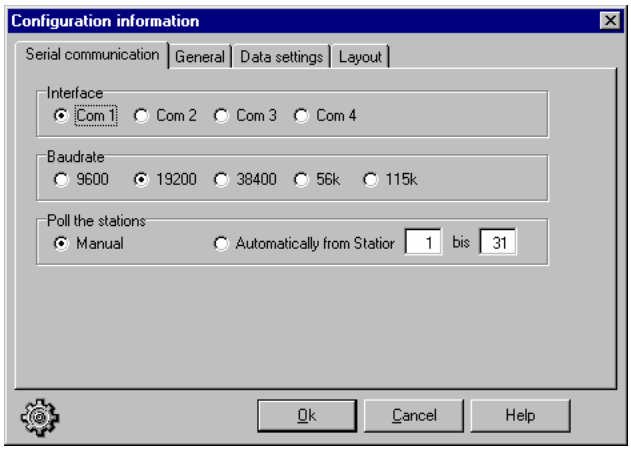
17 Configuration

17.1 Serial communication RS232/RS485

You can set the COM-port and baud rate used on your PC here.

- Polling of the stations

You can also determine whether the stations connected should be automatically registered to the PC during the program start or if you want to carry out the registration manually. Enter the numbers of the stations, which will be automatically registered, in the corresponding fields in the registry card.

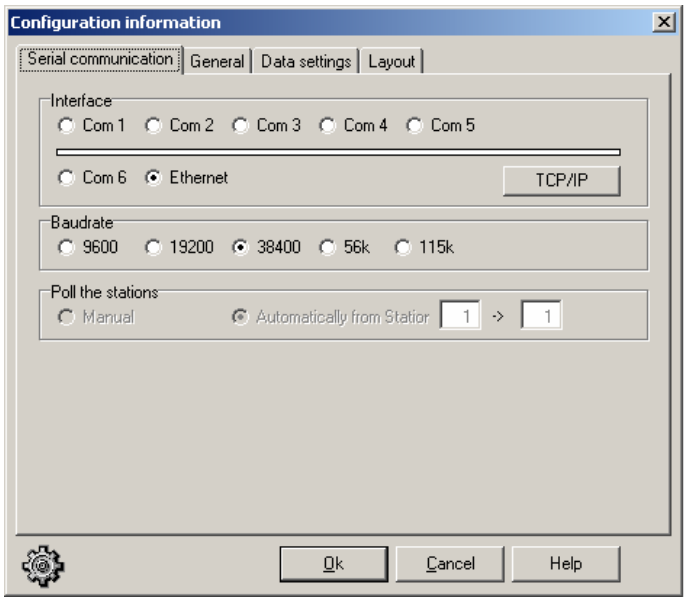


The following Baud rates are available:

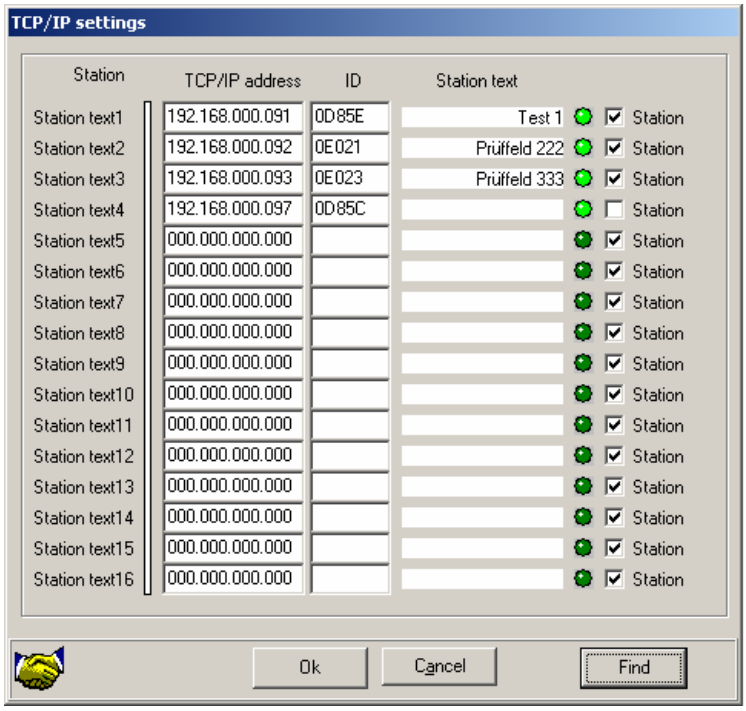
- RS 232 19200 Baud
- RS 485 max. 38400
- Link Module 115kBaud

17.1.1 Serial communication Ethernet module

Please choose Ethernet for communication.



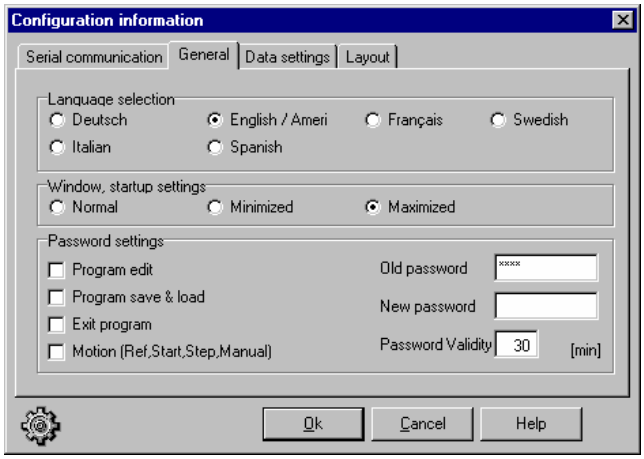
The connected Ethernet modules are shown, by clicking on the „Find" button. Active modules are marked by the green LED. Modules which have been connected are still shown, but marked as inactive. You can choose the stations you want to connect. Only chosen modules are polled by the software. If you want to delete a station please enter zero as IP address.



The station text is entered in program parameter in the service menu. (chapter 14.1.1)

17.2 General

Select the language for the UFM software here.



In addition, you can also specify the start settings of the window and the password settings.

17.2.1 Password protection

The following program functions can be password protected:

- Edit program
- Load, save program
- Quit program
- Start movement (reference move, start , step, manual moving)

Call up the password settings in the file menu using “Configuration”. Select the register card “General“.

Default delivery password is “*Bach*”

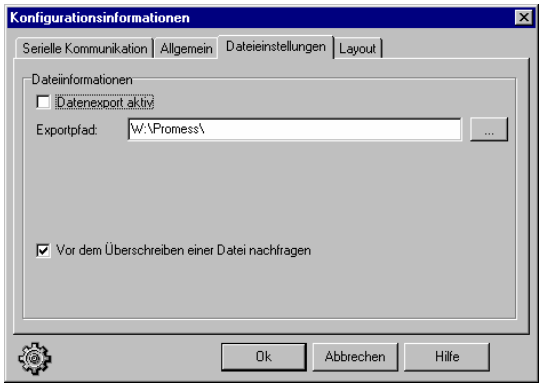
Under validity period, enter the period in minutes for which the protected functions are enabled after the password is entered. Once this period is expired, the password must be entered again.

17.3 ASCII Data export

- File settings

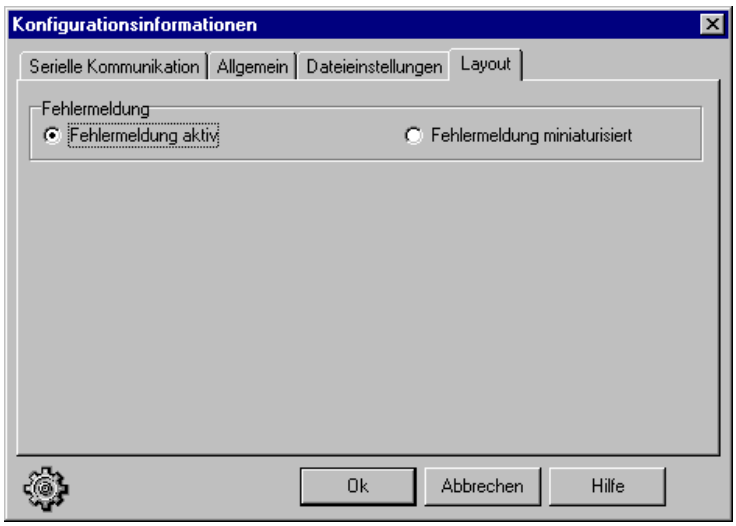
Data path for ASCII data export

Define the file path of the ASCII data export via the RS232 in the register card “File settings” using the “File/Configuration” menu. If a warning before the overwriting of data, you have to activate the respective button.



17.4 Layout (Display Error Messages)

Here, you can minimize the display of the error messages, if you are bothered by the pop-ups. Error messages are then only displayed in the status line.



18 Link Module

18.1 Functions Link Module

- 12 Inputs / 12 Outputs
  (DC-separated, max. Switching capacity of the outputs: 50mA)
- Storage for 128 NC - Programs
- Connectivity of Joining Modules

!!! The link module cannot be used at the same time as a bus system!

- ***Inputs / Outputs***

The following functionalities can be assigned to the 12 inputs and outputs: A maximum of 8 freeliy programable inputs and/or outputs for controlling the process within programs for the UFM NC-module and the transfer of process-specific messages to the superordinate control.

Function Inputs:

- 8 freely defined inputs
- 7 Inputs for the transfer of a maximum of
- program numbers
- Transfer interval program No. (Strobe)
- Reference run
- Start
- Writing
- Stop
- Jog + Move stamp out
- Jog – Move stamp back
- PC key-lock

Function Outputs:

- 8 freely defined outputs
  7 inputs for the transfer of a maximum of 128 program numbers
- Transfer interval receipt program No. Strobe Cycle end
- Cycle stop
- PC Life (Connection PC - NC Modul = OK)
- IO
- NIO
- Quit
- Overload limit exceeded (E overloaded)
- Reference run not successful (E reference)
- Block force before block window (E force early)
- Block force not reached (E no force)
- Emergency-off (E EmergencyOff)
- Upper envelope curve or upper limit measurement variable exceeded (E U limit)
- Lower envelope curve or lower limit measurement variable exceeded (L O limit)
- Nominal force of the joining unit exceeded (E force error)
- Fuel set outside the permitted range of 10% (E sensor error)
- Route exceeded the max. permitted position (E Max position)
- Axis is being adjusted (Being adjusted)

- **Linking of NC-Modules**

The link module can speed up the communication, when several terminals are connected to a PC, because the connection to the PC can be run at a higher Baud rate than the connection PC – NC-module. Furthermore, data that is transferred in several sets can be buffered by the link module, which accelerated the transfer, as there are no waiting periods due to the slower communication with the NC-module.

The Baud rate selected in the PC is automatically recognized by the link module.
The following Baud rates link module – PC are available:

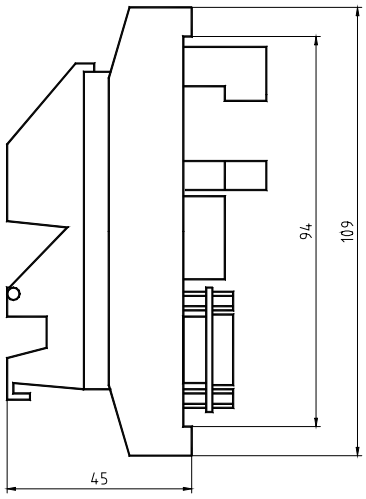
9600 Baud, 19200 Baud, 38400 Baud, 57600 Baud, 115200 Baud
(Max. Baud Rate NC-Module 38400 Baud)

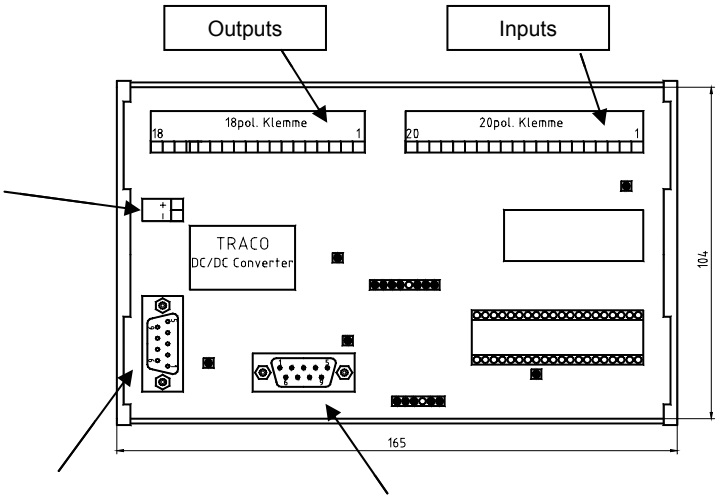
- **Program Storage**

The program storage serves as storage for a maximum of 128 NC-programs for the UFM NC-module, which can be submitted by the superordinate control. The assignment of the programs is performed via the allocation table, which is stored in the link module.

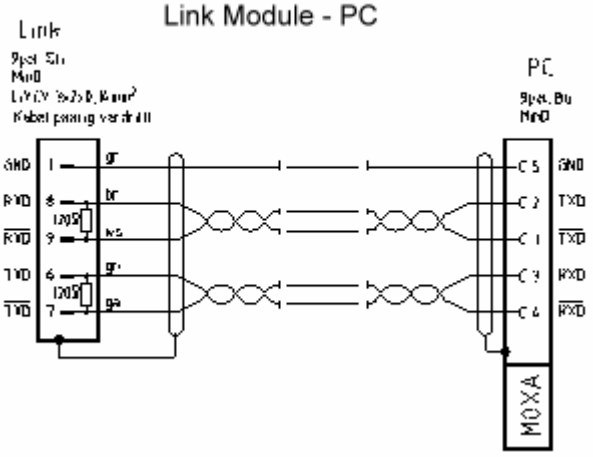
Measurements and Terminal Assignment

Pin	Inputs	Outputs
1	nc	A1
2	nc	24 VDC
3	E1	A2
4	GND	A3
5	E2	24 VDC
6	E3	A4
7	GND	A5
8	E4	24 VDC
9	E5	A6
10	GND	A7
11	E6	24 VDC
12	E7	A8
13	GND	A9
14	E8	24 VDC
15	E9	A10
16	GND	A11
17	E10	24 VDC
18	E11	A12
19	GND	
20	E12	

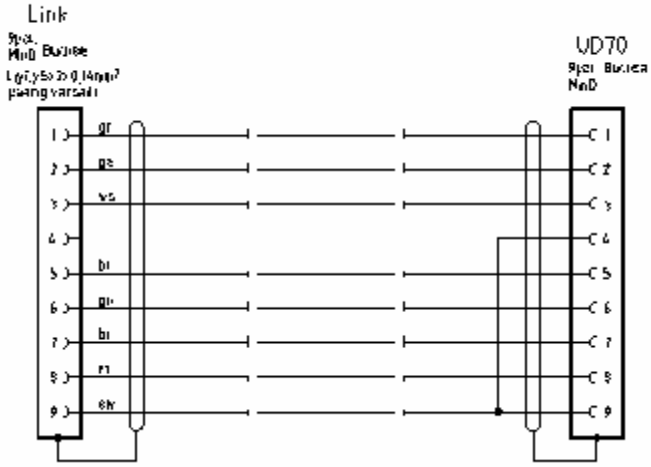




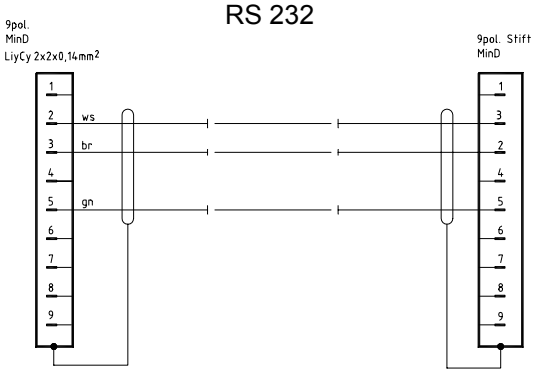
Link Module - PC



Link Module - NC Module



RS 232

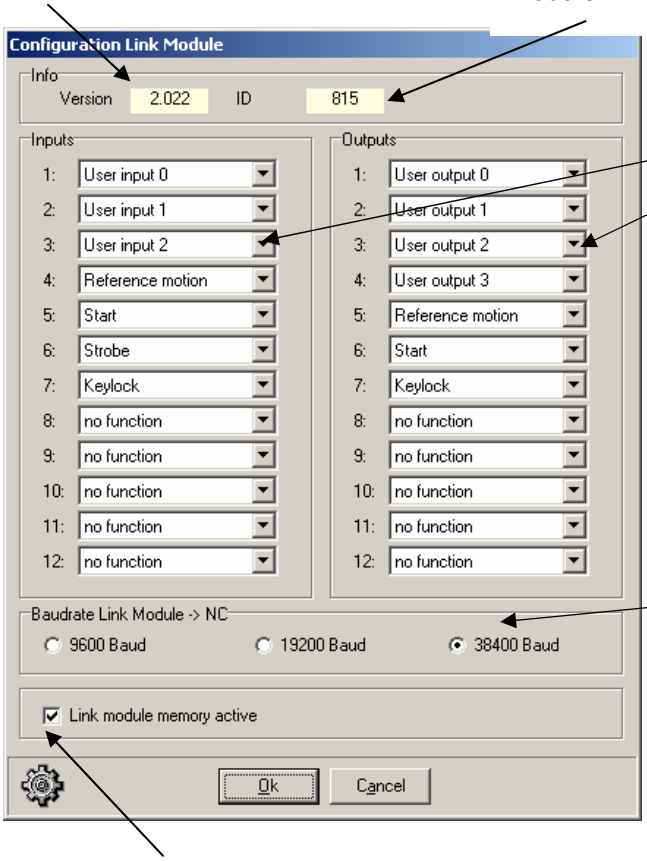


18.2 Configuration Link Module

Please select the respective item in the service menu for the configuration of the inputs / outputs of the link module.

Firmware Version of the Link Module

Serial Number Link Module



Please choose here the function, which you would like to assign to the respective outputs and/or inputs.

Please set here the desired Baud rate between link module and NC-module.

If this button is activated, the compiled process programs are loaded during a program change from the link module and not from a possibly connected PC, after they were loaded into the link module (see 18.3)

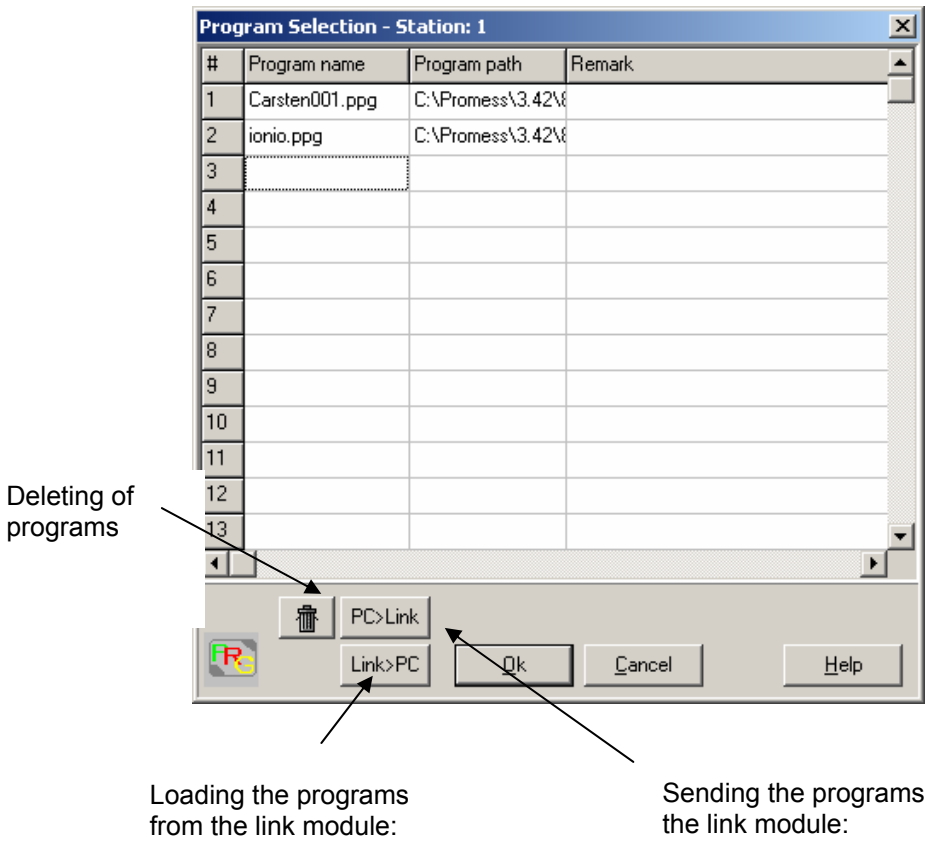
18.3 Link Module Sending and Loading of Programs

To send a compiled program from the PC to the link module or to load the programs stored in the link module to toe PC, you have to complete the following steps:

Open the item “Program Pre-select” in the file menu. Assign the set-up programs to the program numbers. This is performed by double-clicking on the corresponding field in the column program name. In the next window, choose the file, which you would like to allocate.

The sending (PC>link) and reading (link>PC) of the programs to the link module or from the link module is performed via the respective buttons.

To delete a program, please mark it and activate the button to delete the program.



❖ **If you edit a program on the PC, it is crucial that you re-enter it into the allocation table.**

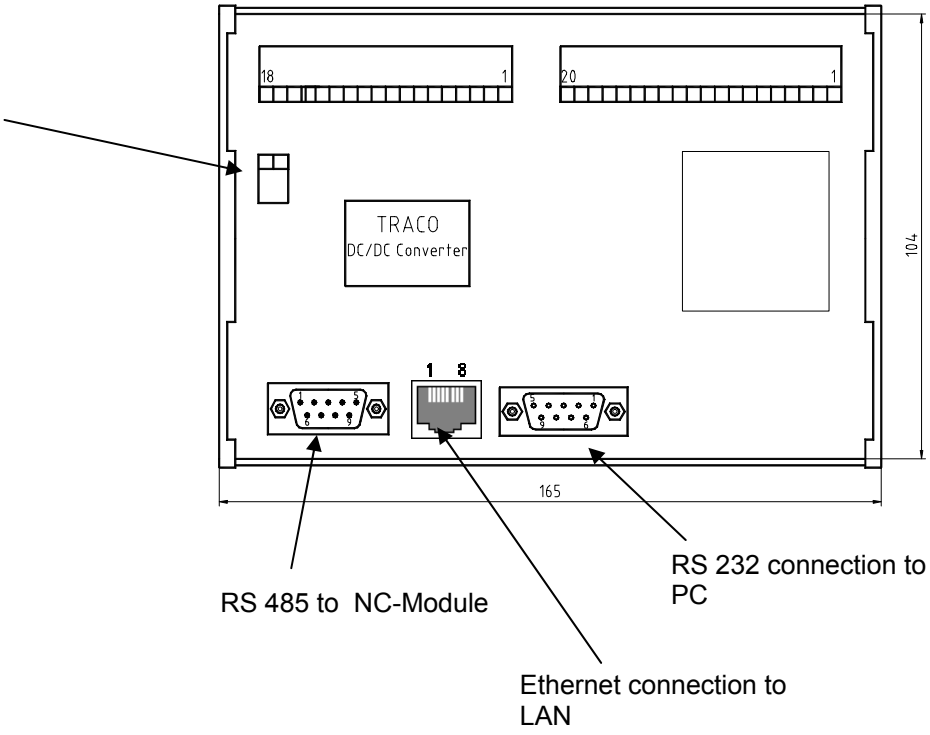
18.4 Ethernet-Module

Functions:

- Networking of NC modules
- 12 In-- / 12 Outputs (in preparation)
- Storage of NC – programs (in preparation)

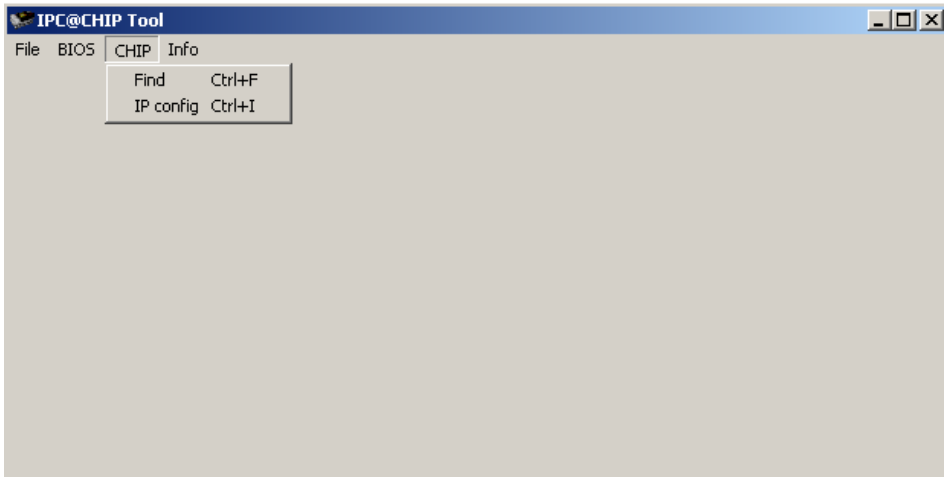
power supply

Pin 1 = 0 VDC
Pin 2 = 24 VDC

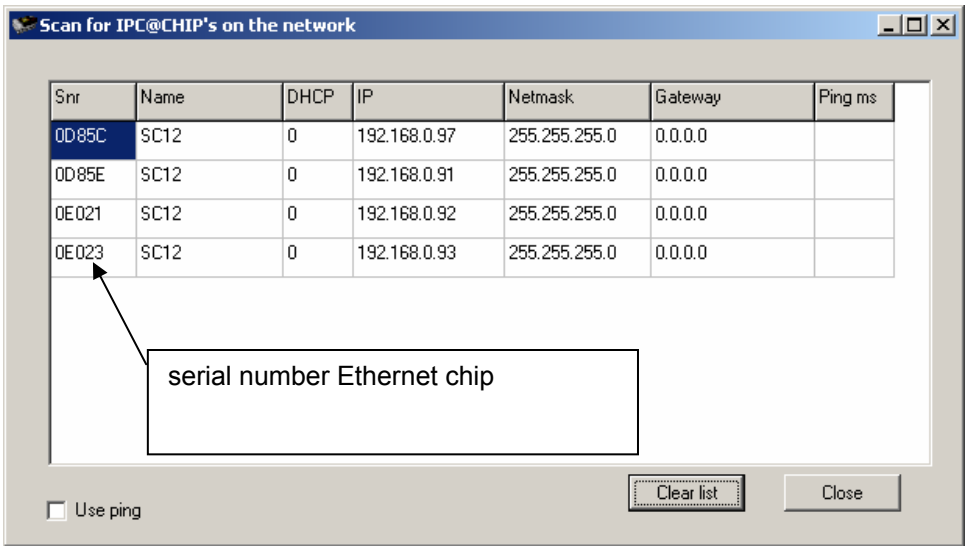


18.4.1 IP Address Ethernet module

To enter the IP address please load the utility „Chip Tool“ that was delivered by PROMESS.

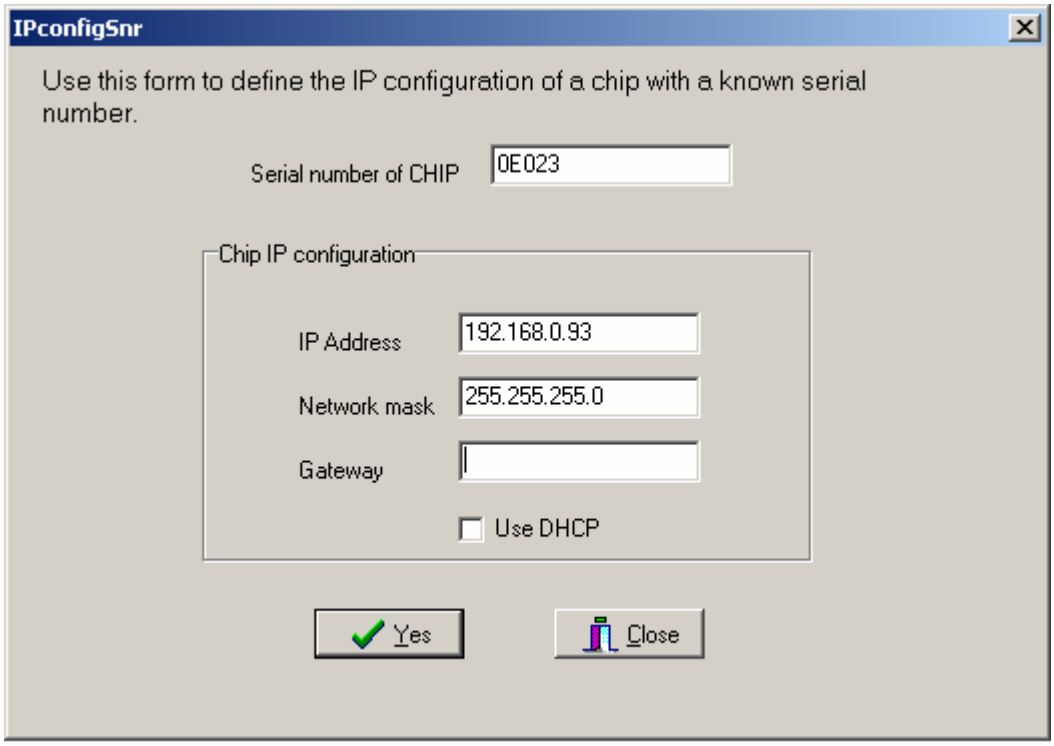


To scan for connected Ethernet modules please call „Find“ at the menu „Chip“.



Please note the serial numbers.

Now please call „IP config“ in menu „Chip“ and enter the serial number of the Ethernet chip, IP address and the net mask.



19 Technical appendix

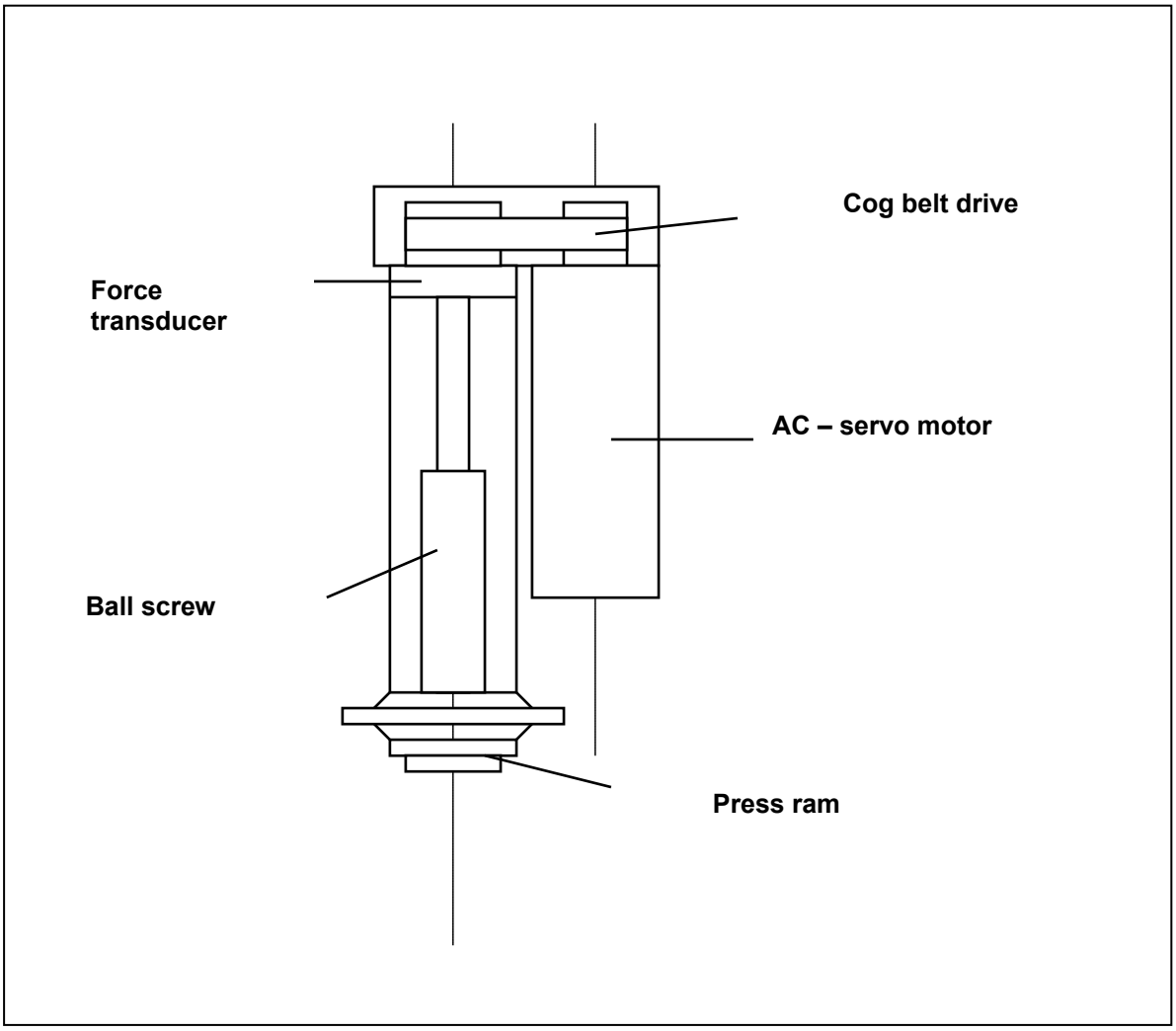
19.1. General description and design

The mechanical parts

Determining features are:

- robust construction designed for a long life even under the most severe operational conditions,
- simple design through the realization of the principle “transparent engineering”.

The following figure shows the design of the unit:



19.1.2 Weights Mechanics

Artikelnr.	Bezeichnung	[kg]
64020	UFM 01/100/400	8,2
74003	UFM 03/100/120	14,4
74005	UFM 05/200/240	27,2
74012	UFM 12/200/240	38,6
74020	UFM 20/180/150	72
74023	UFM 20/350/230	80,6
74040	UFM 40/175/150	141
74043	UFM 40/330/240	158
74060	UFM 60/175/150	141
74065	UFM 60/330/240	178,5
74080	UFM 80/330/240	212,6
74101	UFM 100/330/200	220,6
74151	UFM 150/400/145	370
74243	UFM 240/350/120	395

19.2 Specifications and technical features

Specification	Value
Rapid traverse	v_{max} = 150 - 240 mm/s
Time that reference force is kept	T_{halte} > at least 5s.
Repeatability	without load: < 0.005 mm, under constant load: < 0.010 mm,
Play-free ball screw (omits stick-slip and reduces load peaks)	Springing of the press ram under nominal load: 50 – 80 µm, Spring stiffness: 150 N/µm - 250 N/µm
Capacity of the screw spindle and the thrust bearing	C_{dyn} = 2,5 - 3* nominal load C_{stat} = 5 - 6 * nominal load
Useful life	At least 25000 operating hours, Verification through a spindle life calculation is supplied on request
Safety standard	Certificate of compliance
EMC – immunity	Motor, choking coil, net filter
Axis control	The unit is equipped with a resolver and resolver interface, the amplifier delivers the usual incremental signals for NC-axis-controls with the 3 lines A, B, Z
Force measuring	Strain-gauges integrated in the press unit Precision: 0.5 %
Drive unit	AC servo motor

19.3 The drive

AC servo motor with resolver, digital servo amplifier, with 380 – 480 VAC / 48 - 62 Hz.

Capacity reserves through ample system dimensioning.

19.4 Power amplifier

NAME	UFM01/100/400	UFM03/100/150	UFM05/200/240	UFM12/200/240	UFM20/180/150	UFM20/350/230	UFM40/175/150	UFM40/330/240
Servo amplifier	Unidrive 1401	Unidrive 1402	Unidrive 1403	Unidrive 1405	Unidrive 1404	Unidrive 1405	Unidrive 2402	Unidrive 2402
Construction size	1					2		

NAME	UFM60/175/150	UFM60/330/240	UFM80/330/240	UFM100/330/200	UFM150/400/145	UFM100/330/200
Servo amplifier	Unidrive 2402	Unidrive 2403	Unidrive 3401	Unidrive 3401	Unidrive 3401	Unidrive 3404
Construction size	2		3			

Size 1:

Unidrive Type	1401	1402	1403	1404	1405
Article number:	0121	0122	0123	0124	0125
Nominal unit capacity / kVA *)	1.4	1.9	2.6	4.0	6.6
Max. motor nominal capacity / kW	0.75	1.1	1.5	2.2	4.0
Max. motor nominal capacity / HP	1.0	1.5	2.0	3.0	5.0
Nominal unit current / A	2.1	2.8	3.8	5.6	9.5
Max. unit current during 60 sec. / A	3.2	4.2	5.7	8.4	14.3
Max. unit current during 4 sec. / A (closed loop only)	3.7	4.9	6.7	9.8	16.6
Unit input current / A	5.4	5.9	6.3	7.1	9.5
Recommended cable cross-section / mm^2	2.5				
Usable cable cross-section / mm^2	2.5				
Mains voltage 50 / 60 Hz	3 AC 380V to 480V +/- 10%, 48 – 62 Hz				
Unit output voltage	3 AC 0V .... U_{net}				
Recommended mains fuse (slow) / A	6	10	10	10	16
Losses / W at 12 kHz frequency	70	90	100	150	250
Ventilation	integrated fan				
Weight	4 kg				
Protection class	IP 40				

Size 2:

Unidrive Type	2401	2402	2403
Article number: **9642 - ...**	0126	0127	0128
Nominal unit capacity / kVA *)	8.3	11.0	17.0
Max. motor nominal capacity / kW	5.5	7.5	11.0
Max. motor nominal capacity / HP	7.5	10.0	15.0
Nominal unit current / A	12.0	16.0	25.0
Max. unit current during 60 sec. / A	18.0	24.0	37.5
Max. unit current during 4 sec. / A (closed loop only)	21.0	28.0	43.8
Unit input current / A	13.7	16.8	27.0
Recommended cable cross-section / mm^2	2.5	4.0	4.0
Usable cable cross-section / mm^2	4.0		
Mains voltage 50 / 60 Hz	3 AC 380V to 480V +/- 10%, 48 – 62 Hz		
Unit output voltage	3 AC 0V .... U_{net}		
Recommended mains fuse (slow) / A	16	20	35
Losses / W at 12 kHz frequency	300	390	470
Ventilation	integrated fan		
Weight	8 kg		
Protection class	IP 40		

Size 3:

Unidrive Type	3401	3402	3403	3404	3405
Article number: **9642 - ...**	0131	0132	0133	0134	0135
Nominal unit capacity / kVA *)	23.0	27.0	32.0	41.0	53.0
Max. motor nominal capacity / kW	15.0	18.5	22.0	30.0	37.0
Max. motor nominal capacity / HP	20.0	25.0	30.0	40.0	50.0
Nominal unit current / A	34.0	40.0	46.0	60.0	77.0

Max. unit current during 60 sec. / A	51.0	60.0	69.0	90.0	115.5
Max. unit current during 4 sec. / A (closed loop only)	59.5	70.0	80.5	105.0	134.8
Unit input current / A	34.0	39.0	49.0	59.0	74.0
Recommended cable cross-section / mm^2	6.0	10.0	10.0	16.0	25.0
Cable connection	M8 - screws				
Mains voltage 50 / 60 Hz	3 AC 380V to 480V +/- 10%, 48 – 62 Hz				
Unit output voltage	3 AC 0V .... U_{net}				
Recommended mains fuse (slow) / A	35	50	60	70	80
Losses / W at 12 kHz frequency	500 *)	620 *)	730 *)	890 *)	940 **)
Ventilation	integrated fan				
Weight	22 kg				
Protection class	IP 40				

*) at 6 kHz frequency
**) at 3 kHz frequency

19.5 Force measuring

Force measuring is done using strain gauges integrated in the press unit. The advantage of this arrangement is that there are no moving cables and the connection cables can be placed outside of the operating area.

The nominal values of the force transducers may change, due to the mounting conditions, therefore each transducer is calibrated after assembly. The calibration result is documented in a test protocol.

Technical data of the force transducer:

Precision class:	0.5 %*
Input voltage:	10 V
Bridge resistance:	352 Ω
Reference temperature:	23 °C
Nominal temperature range:	-20 ...+60 °C
Zero signal:	< 3%*
Limit load:	150 %
Burst load:	500 %

* all percentages stated are related to the nominal load

- **Pin assignment:**

Input voltage +	brown
Input voltage -	yellow
Data +	+green
Data -	white
Shield	black

19.6 Distance measuring

Distance measured with resolver on motor.

The resolver transmits a sine-formed signal, which is transformed into an incremental signal in the power amplifier. This signal is in turn output from the power amplifier in the form of a differential signal i.e. the usual tracks A, B and C and their inverted signals are available.

Alternatively, distance measuring may be done by means of an integrated scale (magnetic or optical).

Resolution with resolver: 2.5 µm, magnetic scale: 5µm, optical scale: < 1µm.

19.7 Electrical connections

If you have acquired the press unit in the form of components without the mounting plate, please refer to the user manual of the Unidrive power supply for data on the electrical connections.

The optionally supplied connection cable set must be connected according to the numbering key.
!! Preferably install the motor cable in a conduit, separated from the data cables.

- Input voltage 380 – 480 VAC / 48 - 62 Hz

Fuses:

Press modules	Fuses	Cable cross-section
UFM 01/100/400	6 A / K	1,5 mm^2
UFM 03/100/120	10 A / K	2,5 mm^2
UFM 05/200/240	10 A / K	2,5 mm^2
UFM 12/200/240	16 A / K	2,5 mm^2
UFM 20/180/150	10 A / K	2,5 mm^2
UFM 20/350/230	16 A / K	2,5 mm^2
UFM 40/175/150	20 A / K	4 mm^2
UFM 40/330/240	20 A / K	4 mm^2
UFM 60/175/150	20 A / K	4 mm^2
UFM 60/330/240	35 A / K	4 mm^2
UFM 80/330/240	35 A / K	6 mm^2
UFM 100/330/200	35 A / K	6 mm^2
UFM 150/400/245	35 A / K	6 mm^2
UFM 240/350/120	70 A / K	16 mm^2

Connection 220 VAC

Fuse: 4A

Cable cross-section: 1.5 mm^2

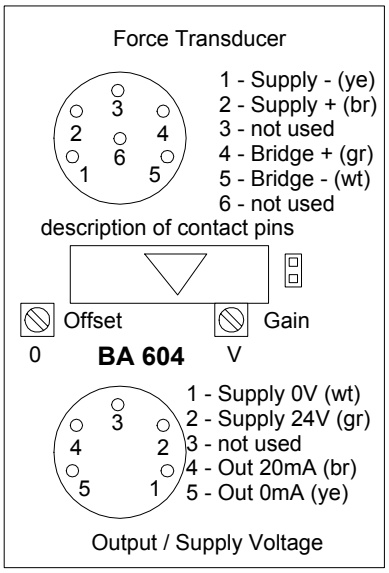
19.8 SG pre-amplifier

The force transducer is driven by an analog SG pre-amplifier.

Technical data:

Precision class	0.2%
Nominal resolution	1 mV/V
Fine-tuning range of the nominal resolution	±20 %
Input voltage for the SG bridge	10 VDC
Signal output	0 - 20 mA
Temperature coefficient:	
- of the zero point	< 0.07 %
- of the amplification	< 0.07 %
Power supply:	
- Voltage range	19 ... 28 VDC
- Current consumption	ca. 35 mA
Operating temperature range	-25 ...+60 °C
Storage temperature range	-40 ...+70 °C
Protection class according to DIN 40050:	IP 40

Pin assignment



19.9 Transducer calibration

The integrated SG transducer can be calibrated in various ways. You can use a reference transducer or a spring with known and constant spring characteristics. You can calibrate the electronics using a calibration resistor connected to the system.

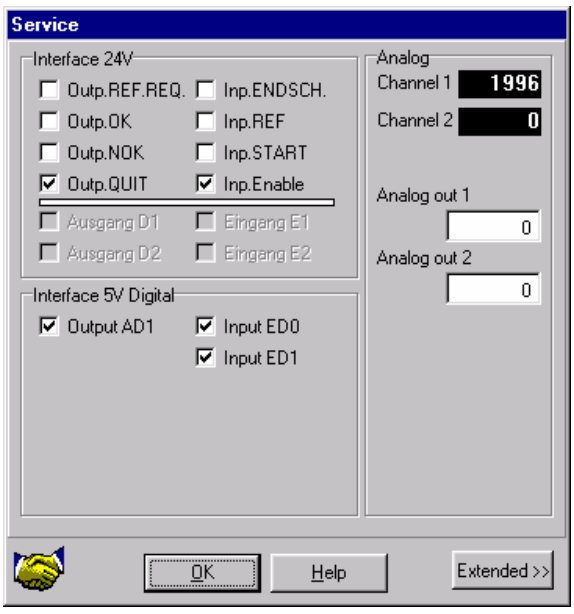
Sequence of operations to calibrate the system:

Note: The hints, concerning the calibration, are kept very general and must be understood as an aid only. The sequence of operations described may cause damage to the press unit, the adapters or parts, depending on the offset of the reference point, the type of tool and part adapters used.

PROMESS accepts no responsibility for damages occurring during calibration.

- Press the Emergency Stop,
- Install the reference transducer in the adapter. Ensure that the nominal load of the reference unit corresponds to the permissible load of the press unit,
- Release the Emergency Stop,
- Make a reference positioning,
- Select the register card "Sensor input" in the *system configuration* to verify the permissible load,
- Exit from the menu and select the *manual mode* of the press unit (F5),
- Position the unit close to the reference transducer,

Verify the zero point of the analog signal. To do this, toggle to the service menu and select the point Inputs/Outputs.



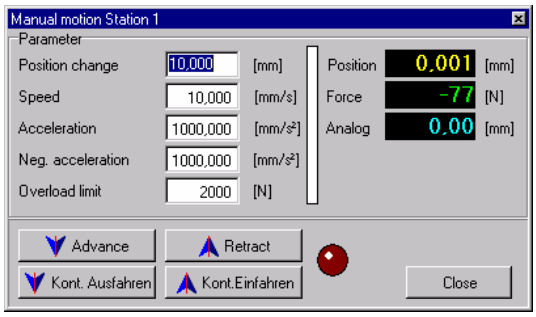
Digital display force (Channel 1): 0 – 4000

!! Zero point = 2000

Adjust if necessary to the value 2000 with the potentiometer P2 (zero point displacement). (See diagram of amplifier)

Change to manual travel (F5)

Before applying a load, set the speed to a very low value (e.g. 0.5 mm/s)
Travel in small steps to ca. 80 % of the nominal load. Keep an eye on the force display in the right half of the window.



Warning! If you reach the overload limit, an Emergency Stop is triggered.

Adjust the amplifier using the potentiometer P1 (amplification) until the display of the press unit is the same as the display of the reference transducer. Move the unit back.

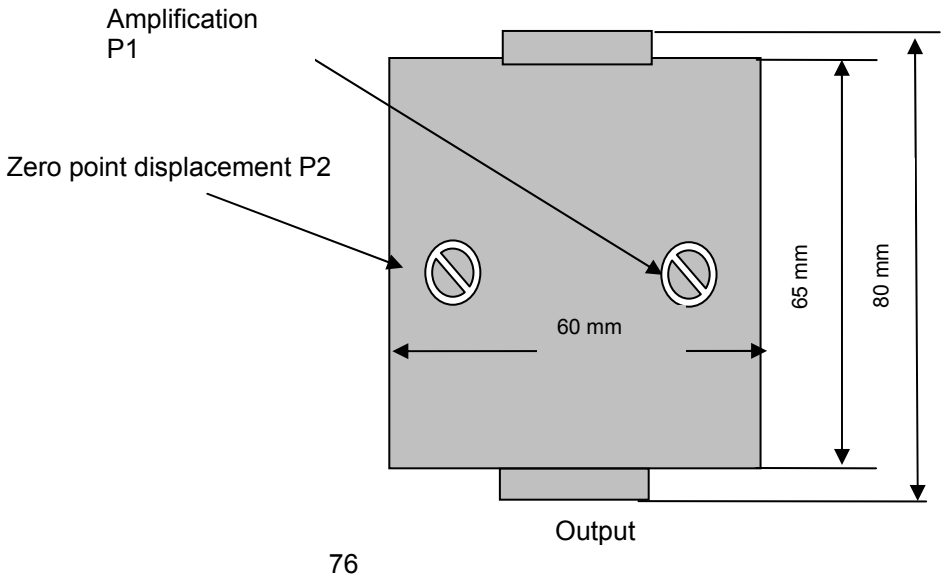
Warning: Please avoid staying in this position for too long at higher loads.
Relieve the unit during the adjustment procedure.

Repeat this step until you are certain that the system is correctly calibrated.
Move the unit to the reference position.
Disengage the Emergency Stop and remove the reference transducer.

To calibrate the unit on a regular basis, PROMESS recommends that a calibration program be created.
This program could appear as follows:

Program step	Function	Description
1	Positioning	Position just before reference transducer
2	Press to block	Application of specific force
3	Holding period 2 s	Recording of applied force
4	Positioning	Return of unit

Location of the adjustment potentiometer



19.10 Wheight of toools

The maximal allowable weight for the assembly units can be taken from the table below:

Artikelnr.	Bezeichnung	Nennlast (kN)	Gewicht (kg)
64002	UFM01	1	0,5
74003	UFM03	3	2
74005	UFM05	5	5
74012	UFM12	12	8
7402X	UFM20	20	20
7404X	UFM40	40	20
7406X	UFM60	60	50
7408X	UFM80	80	80
741XX	UFM100	100 and higher	100

If the weights are higher, you have to to add a holding brake to the unit, to avoid the bagging of the ram in case of lost power. Stempel

19.11 Integration of a holding break into the control

The break must be integrated into the control due to the function. The holding break should only be used, when heavy tools are needed for the assembly operation. Tools with extreme weight might cause the ram, to move downwards in case, the axis is not in control-loop (disabled).

Precaution:
The holding break cannot be used to reach higher safety demands, e.g. due to EN954-1, cat. 4. In these cases, a mechanical safety break with integrated monitoring functions must be used.

When must the break be activated?

The break must hold the ram of the assembly unit in position, when:

- The emergency-circuit is opened (e.g. when the protecting door with safety switches is opened or the red emergency button is pressed down),
- The drive is disabled or switched off,
- The drive has an internal fault and is disabled (control-loop is off).

PROMESS provides a PROFIBUS-output for these cases:

"DRIVE-DISABLE"

When this output is set, the break can be activated.

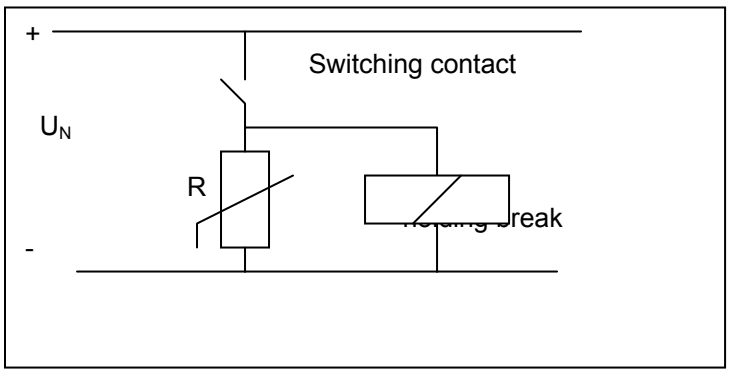
Technical data of the break

The break is a permanently-exitated single-disk-break, which is operated with direct current.

Nominal current: 0,75A.

Protecting circuit:

Due toe the inductivity of the break voltage preaks will be occur, when the break is disactivated (current is switched off). The voltage can reach 1000 V. To avoid these peaks, a protecting circuit should be used.
PROMESS recommends to use a Varistor R - type 069-X3022.



Precaution: As the holding break is a permanent-magnet-break, the right polarity has to be regarded, when the break is wired.

20 PLC Interface

1. Remarks

The interface is designed to ensure a complete handshake, so that times do not have to be programmed or considered for the signal transmission.

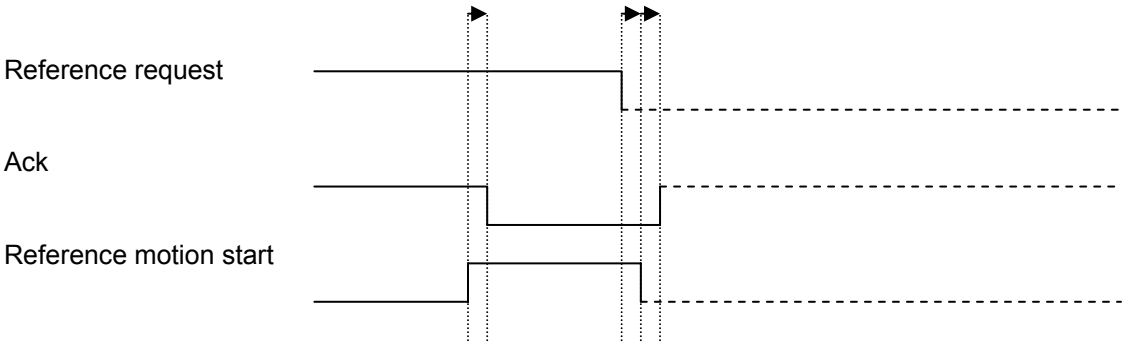
2. Acknowledgement

The output signal "Ack." is used to confirm "System ready" and to acknowledge the detection of a PLC signal.

3. Signal description

Signal	Function	Meaning
Reference motion	Input	Start of reference motion
Cycle start	Input	Cycle start
OK	Output	Part OK and cycle end
NOK	Output	Part NOK and cycle end
Ack	Output	Acknowledgement signal
Reference request	Output	Reference request from the NC module
OK/NOK	Outputs	Program interruption / cycle stop

20.1 Reference motion after start-up

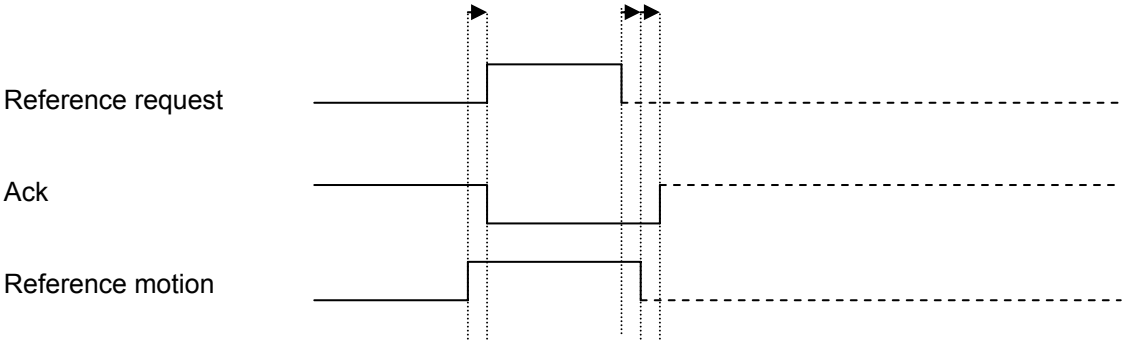


Description

- After a start-up of the NC module, the reference request and Ack are set
- The PLC sets the signal reference motion,
- The NC module acknowledges the signal by resetting the Ack signal,
- The PLC resets the signal *start reference motion*, when the signal *reference request* has been reset by the NC module,
- The NC module confirms that the signal *start reference motion* has been reset, by setting the Ack signal.

If the signal *start reference motion* is cancelled during execution of the command, the PC stops the reference motion and the signal reference request remains set.

20.2 Reference motion without a request



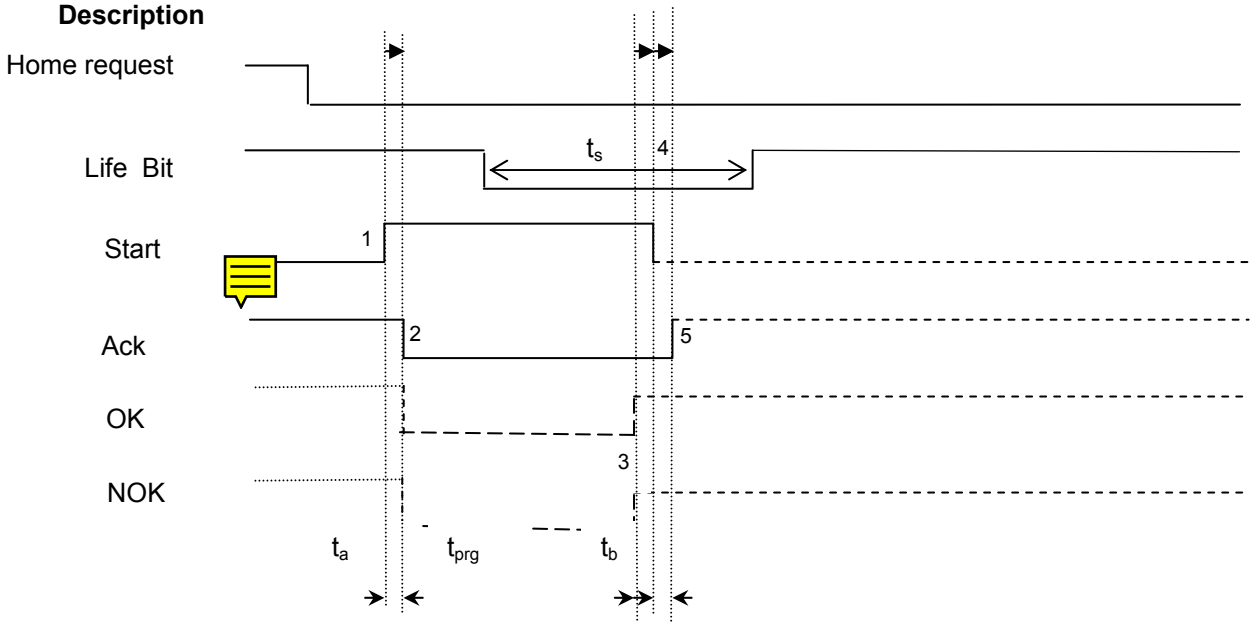
Description

- The PLC sets the signal reference motion,
- The NC module confirms the signal by resetting the *Ack signal* and setting the signal *reference request*,
- The PLC resets the signal *start reference motion*, when the signal *reference request* has been reset,
- The NC module confirms that the signal *start reference motion* has been reset by setting the Ack signal.

If the signal *start reference motion* is cancelled during execution of the command, the PC stops the reference motion and the signal *reference request* remains set.

20.3 Cycle start

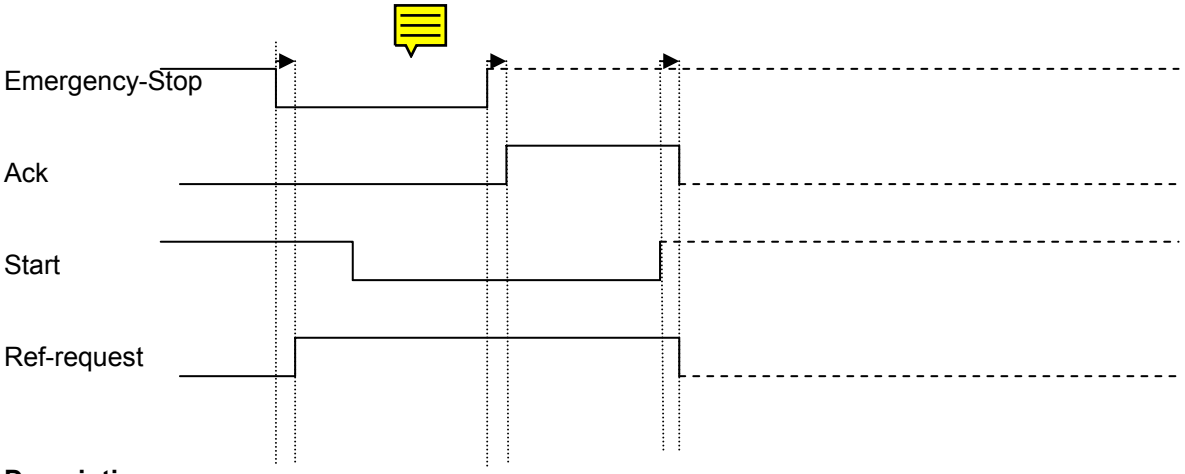
Description



- The PLC sets the start signal
- The NC module confirms the signal by resetting the Ack signal and resetting OK or NOK
- The PLC detects the cycle end through the signal OK or NOK
- The NC module confirms the start-signal reset, by setting the Ack signal

If the signal *start* is cancelled during the program cycle, the NC module stops the motion and the signals *Ack*, *OK* and *NOK* are set.

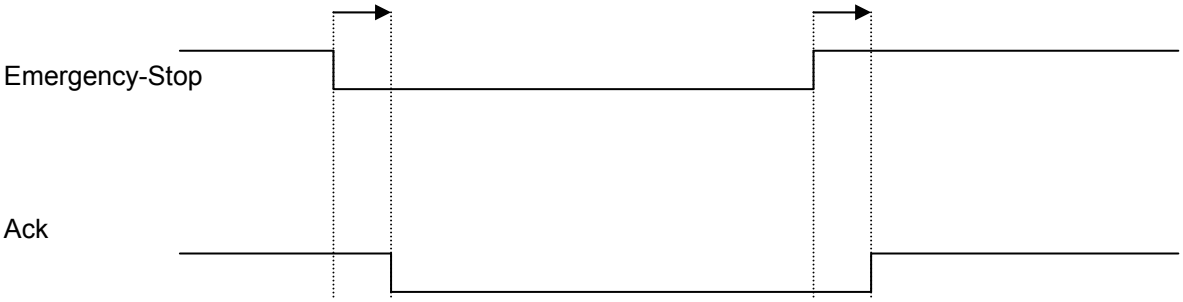
20.4 Emergency Stop during a motion



Description

- In the case of an Emergency Stop, the Emergency Stop chain is opened,
- The press unit reacts by stopping the motion,
- The PLC resets the start signal, when an Emergency Stop situation is detected,
- After clearing the Emergency Stop situation, the PC confirms the flank change of the Emergency Stop signal after the start-signal has been reset,

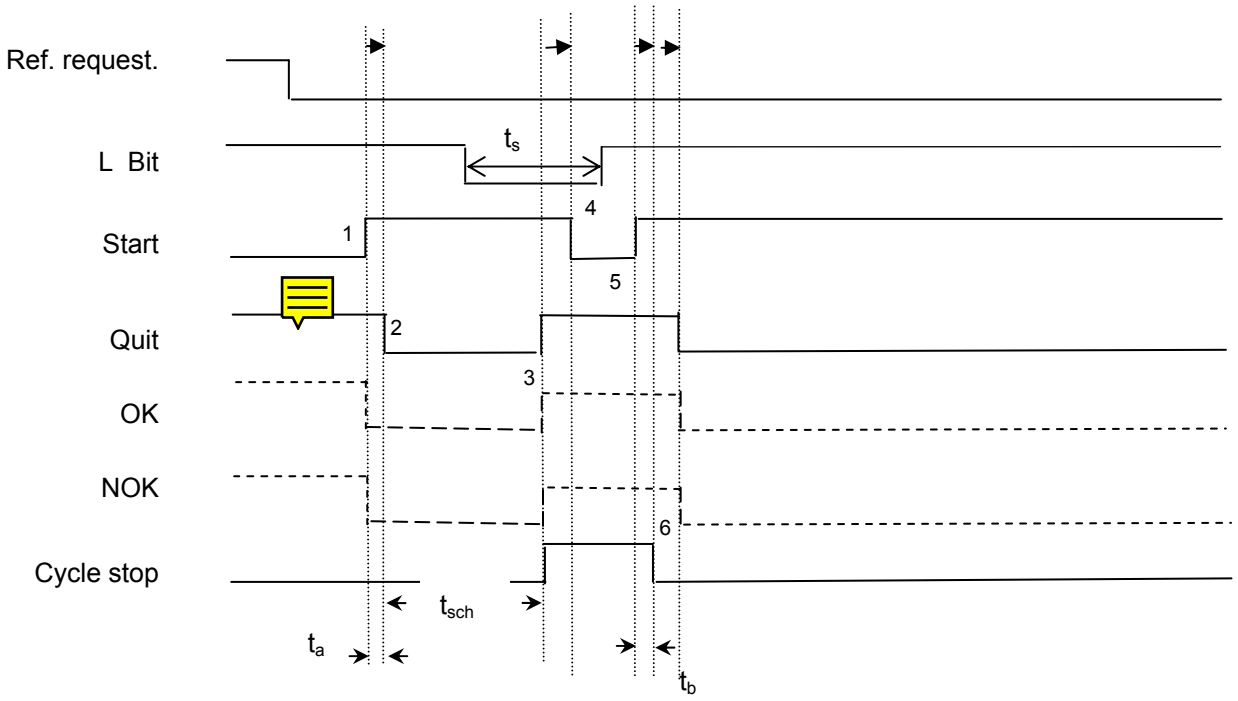
20.5 Emergency Stop during standstill



Description

- In the case of an Emergency Stop, the Emergency Stop chain is opened,
- The NC module confirms by resetting the Ack,
- Closing of the Emergency Stop chain is responded to by setting the Ack.

20.6 Cycle Stop

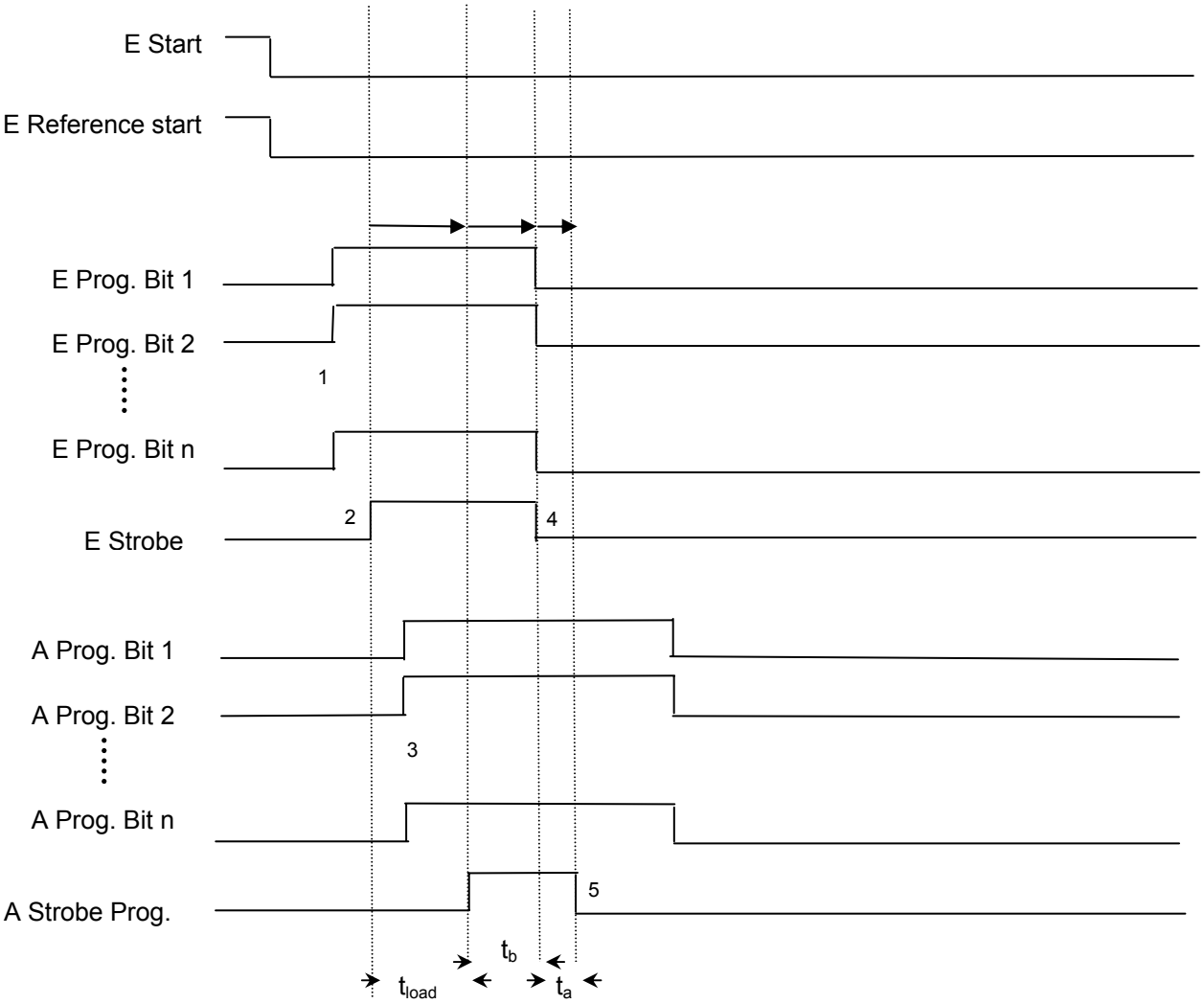


t_a >= 10ms, t_b >= 20ms, t_{sch} = Duration of program step to cycle stop

ts = Save data in database

Description
The PLC sets the start signal when live bits are present and no reference request is present.
The NC module acknowledges the signal by resetting the acknowledgement.
The PLC recognizes the cycle stop from the OK or NOK signal plus Quit or from the signal cycle stop.
(This signal is only available via the bus system or the expansion module)
The PLC resets the start signal.
Setting the start signal again continues the cycle.
The outputs OK or NOK plus Quit are reset.

20.7 Transfer of program number



t_a >= 10ms, t_b >= 20ms, t_{load} = Program load time

Description:
Assignment of binary coded program number
Set strobe for transfer
Reflection of program number
Strobe acknowledgement after program loaded
Reset strobe of PLC and NC module

PROMESS

21 Lubrication advice

Preliminary Remarks

All electro-mechanical presses from PROMESS must be re-lubricated. Over-lubrication should be avoided, however, damage to the bearings due to overheating caused by over-lubrication is not to be expected. Over-lubrication as no negative consequences.

Lubrication Points

The following components are lubricated ex works:

- The gliding guides: Lubrication Points A and B,
- The ball screw: Lubrication Point C,
- The thrust bearing: Lubrication Point D.

AMOUNT OF LUBRICANT FOR LUBRICATION POINTS A AND B: Approx. 1 sq cm

The lubrication points A and B consist of two opposite lubrication fittings in the centre of the press casing.

AMOUNT OF LUBRICANT FOR LUBRICATION POINT C:

Lubrication point C is located behind the seal cap M20*1,5. To re-lubricate the ball screw nut, complete the following steps:

-
- Remove the cover flap,
- manually move the spindle slowly downwards, until you see the lubrication opening on the now open drill hole.
- Please screw in the lubrication fitting

Type	threat
UFM 3 - 12	M6
UFM20-150	M8 × 1
UFM 240	mounted

- Now you can be re-lubricate with a lubrication press.

AMOUNT OF LUBRICANT FOR LUBRICATION POINT D:

The thrust bearing – especially on the units starting at 20kN nominal load – must be lubricated very carefully. As from the lubrication fitting to the rolling body running path also hollow spaces have to be filled, the following lubricant amounts are necessary:

Type	C [sq cm]	D [sq cm]	Interval [strokes]
UFM 01	0,15 *		2 000 000
UFM 03 – UFM 05	0.3	0.3	2 000 000
UFM 12	0.6	0.8	2 000 000
UFM 20 / 30	1	1	700 000
UFM 40 – UFM 100	1.8	2	700 000

*** Lubrication fitting behind the front cover**

Thread for lubrication fitting

Type	**Thread**	**Thread extension**
UFM 03 / 05/ 12 / 20 / 30	M6	
UFM 40 / 60 / 80 / 175 /150	M8 * 1	
UFM 40 / 60 / 80 / 330 /240	M8 * 1	M6
UFM 100 / 330 /200	M8 * 1	M6
UFM 150 / 400 / 145	M8 * 1	
UFM 240 / 350 /120	M8 * 1	

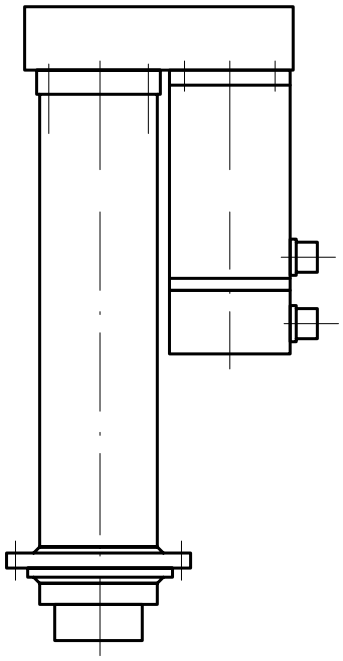
Lubricant

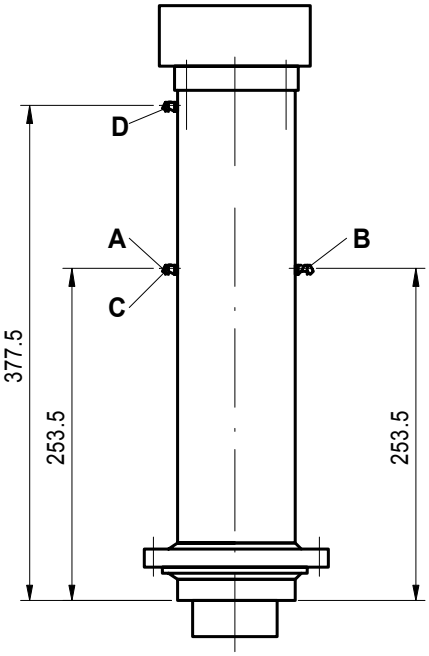
A high-quality roll bearing lubricant must be used.

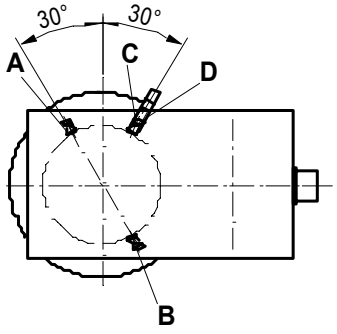
PROMESS recommends the following lubricant brands:

Klüber - ISOFLEX NBU 15, Klüber - ISOFLEX NCA 15, FAG ARCANOL and comparable types.

PROMESS

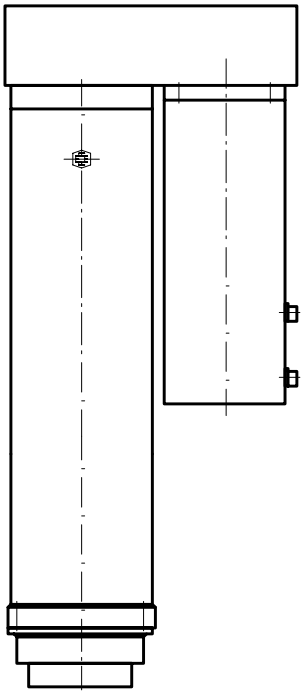


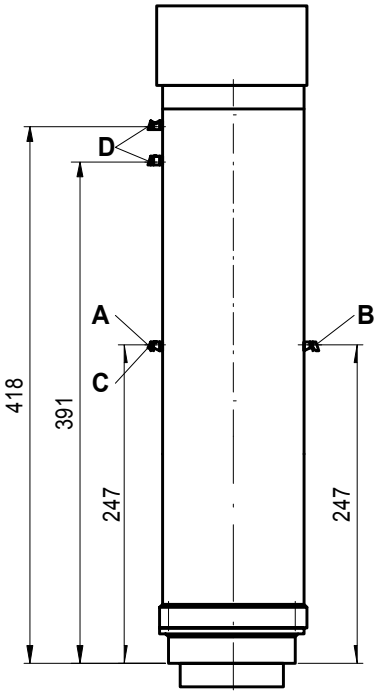


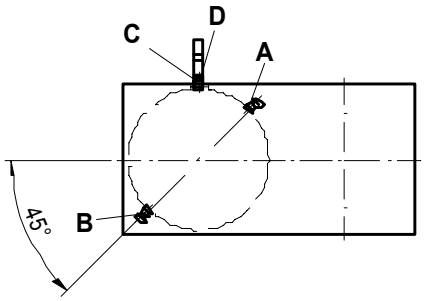


Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

			mittel DIN 7168			PROMESS Ges. für Montage- und Prüfsysteme mbH
						Schaffhausener Str. 52 D-12099 Berlin Telefon 030/628872-0
			Bearb.	12.02.04	Paulsen	Schmiermöglichkeiten UFM 05/200 — Maástab 1:5
			Gepr.	10.02.04	Lechler	
			Norm			
			Werkstoff, Halbzeug			74005
Maß	A_O	A_U				74005







Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

			mittel DIN 7168		
			Bearb.	14.10.03	Paulsen
			Gepr.	14.10.03	Lechler
			Norm		
			Werkstoff, Halbzeug		
Maß	A_O	A_U			

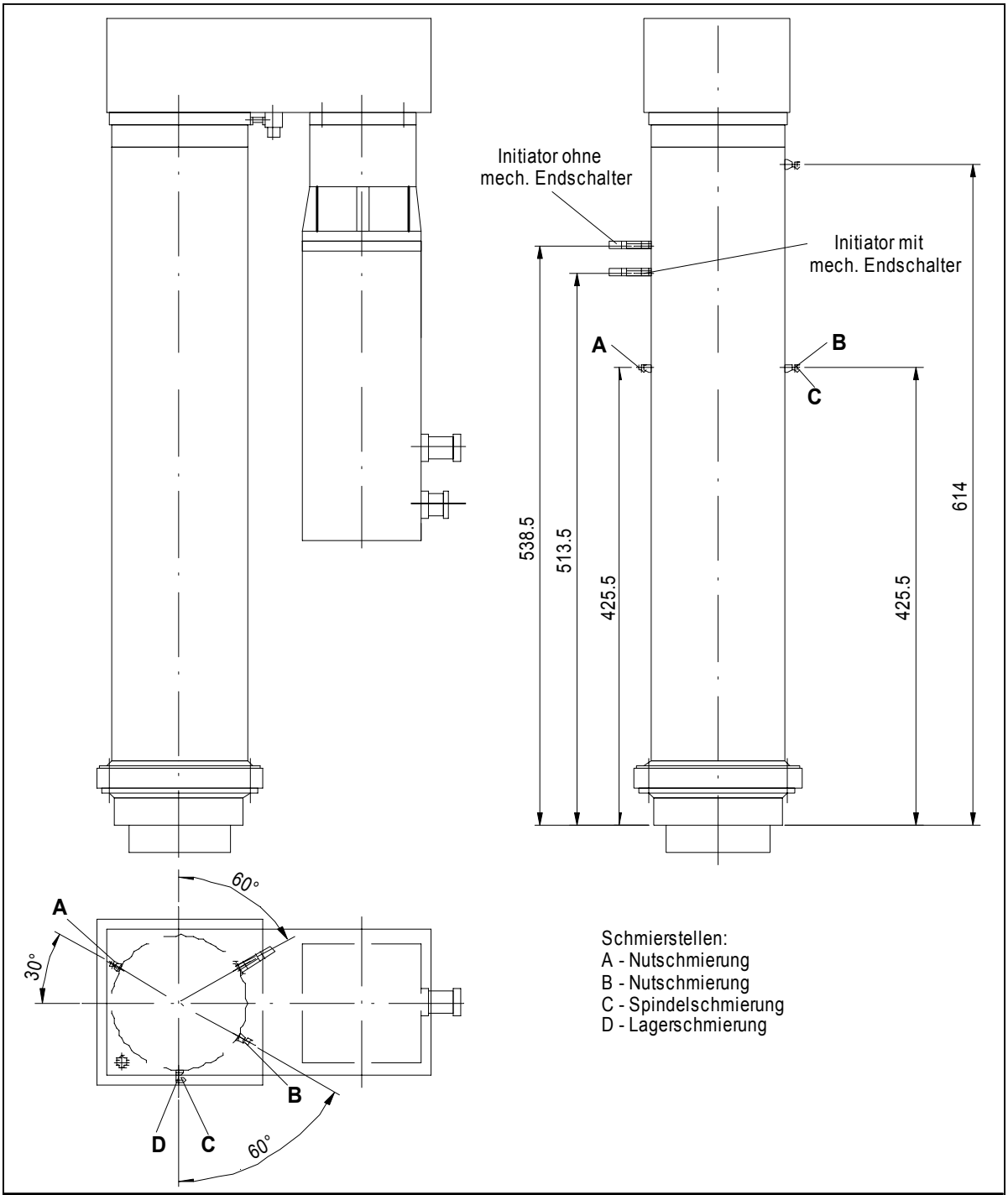
PROMESS Ges. für Montage- und Prüfsysteme mbH
Schaffhausener Str. 52 D-12099 Berlin Telefon 030/628872-0

Schmiermöglichkeiten
UFM 12/200

Maástab 1:5

74012

74012



Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

			DIN-ISO 2768-m		
			Bearb.	03.03.05	Paulsen
			Gepr.	03.03.05	Lechler
			Norm		
			Werkstoff, Halbzeug		
Maß	A_O	A_U			

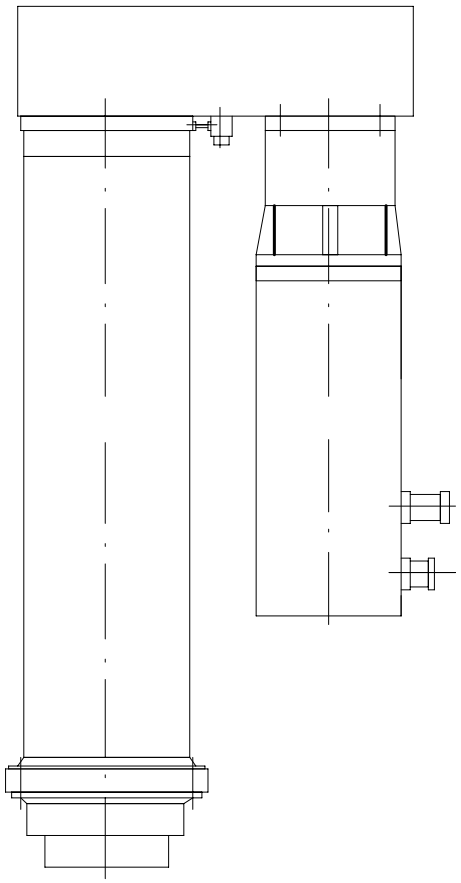
PROMESS Ges. für Montage- und Prüfsysteme mbH
Nunsdorfer Ring 29 D-12277 Berlin Telefon 030/628872-0

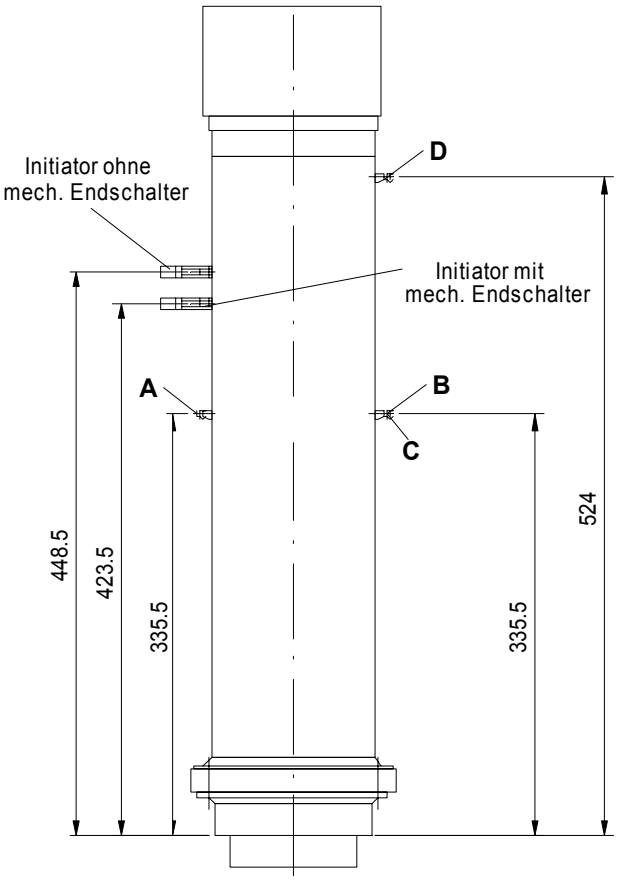
Schmiermöglichkeiten
UFM 20/350/230

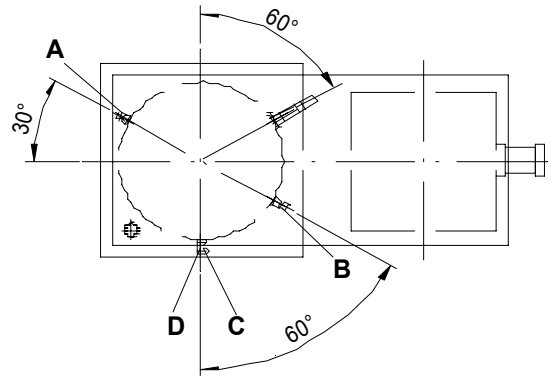
Maßstab 1:5

74023

74023

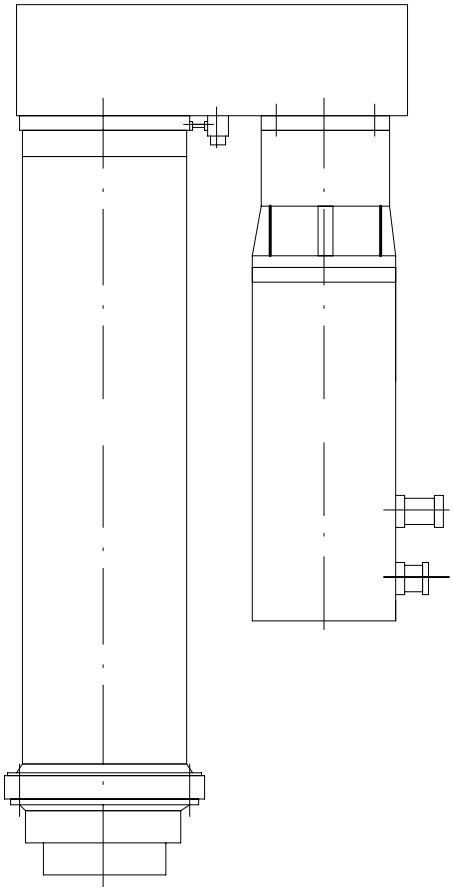


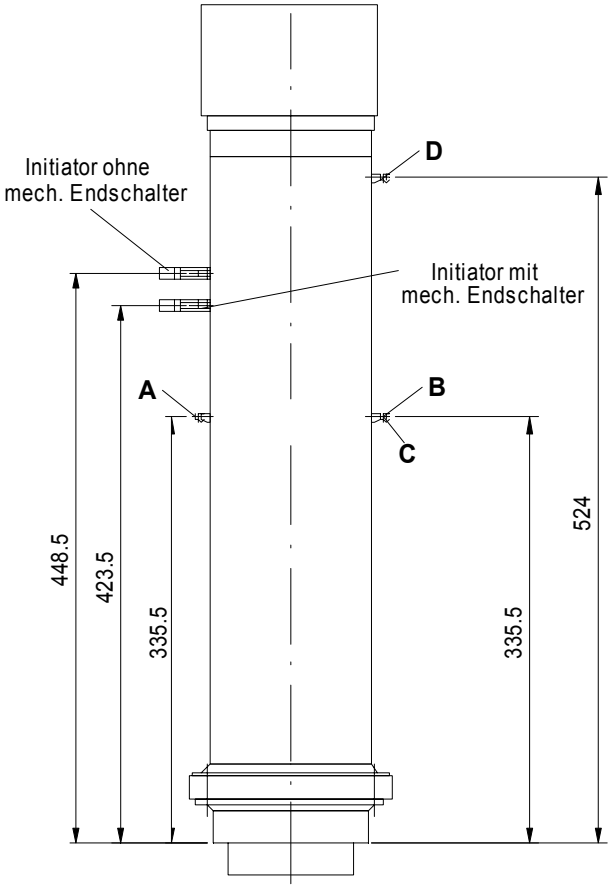


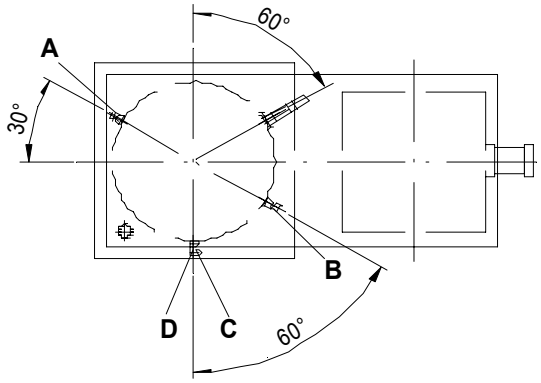


Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

			DIN-ISO 2768-m			PROMESS Ges. für Montage- und Prüfsysteme mbH Nunsdorfer Ring 29 D-12277 Berlin Telefon 030/628872-0
			Bearb.	09.02.06	Paulsen	Schmiermöglichkeiten UFM 20/180/150 — Maßstab 1:5
			Gepr.	09.02.06	Lechler	
			Norm			
			Werkstoff, Halbzeug			74020
Maß	A_O	A_U				74020







Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

			DIN-ISO 2768-m		
			Bearb.	09.02.06	Paulsen
			Gepr.	09.02.06	Lechler
			Norm		
			Werkstoff, Halbzeug		
Maß	A_O	A_U			

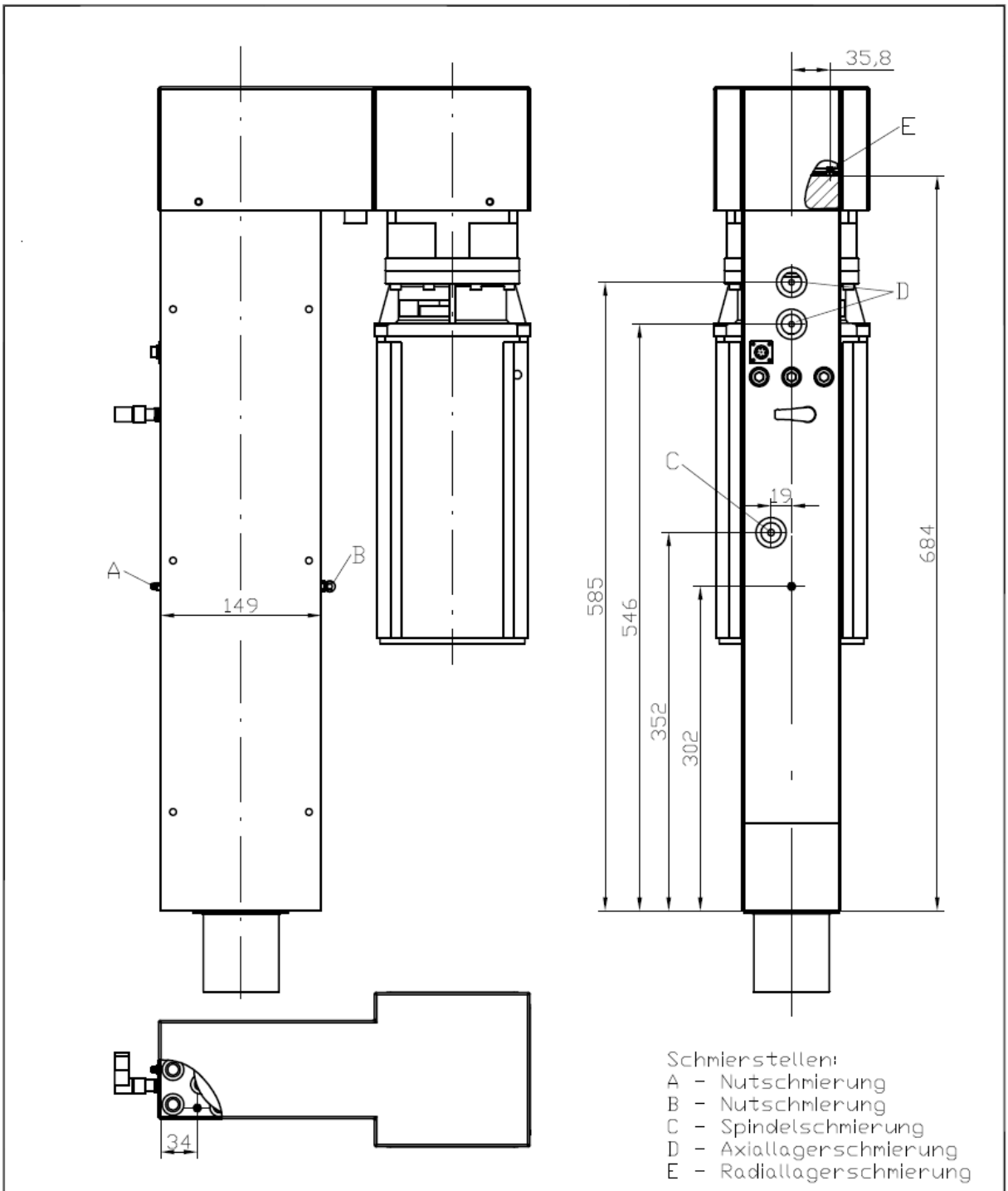
PROMESS Ges. für Montage- und Prüfsysteme mbH
Nunsdorfer Ring 29 D-12277 Berlin Telefon 030/628872-0

Schmiermöglichkeiten
UFM 30/180/230

Maßstab 1:5

74021

74021



			DIN-ISO 2768-m		
			Bearb.	21.10.05	Paulsen
			Gepr.	21.10.05	Lechler
			Geänd.		
			Gepr.		
			Werkstoff, Halbzeug		
Maß	A_O	A_U			

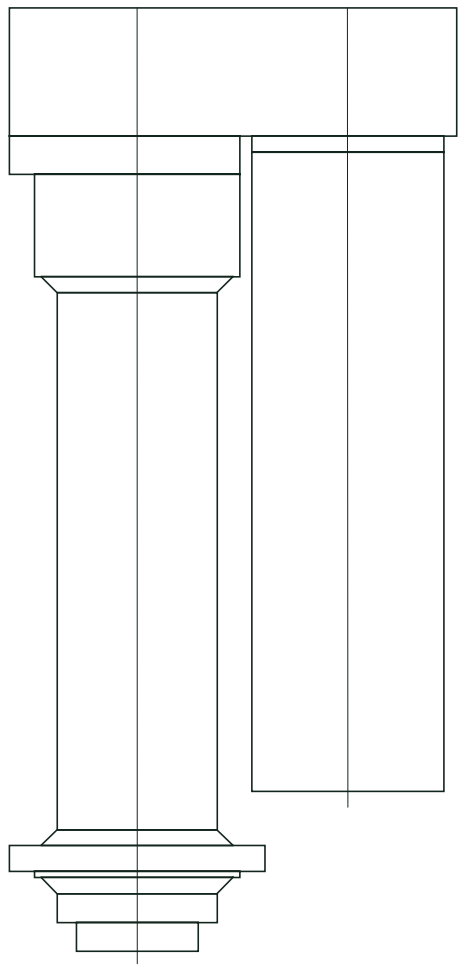
PROMESS Ges. für Montage- und Prüfsysteme mbH
Nunsdorfer Ring 29 D-12277 Berlin Telefon 030/628872-0

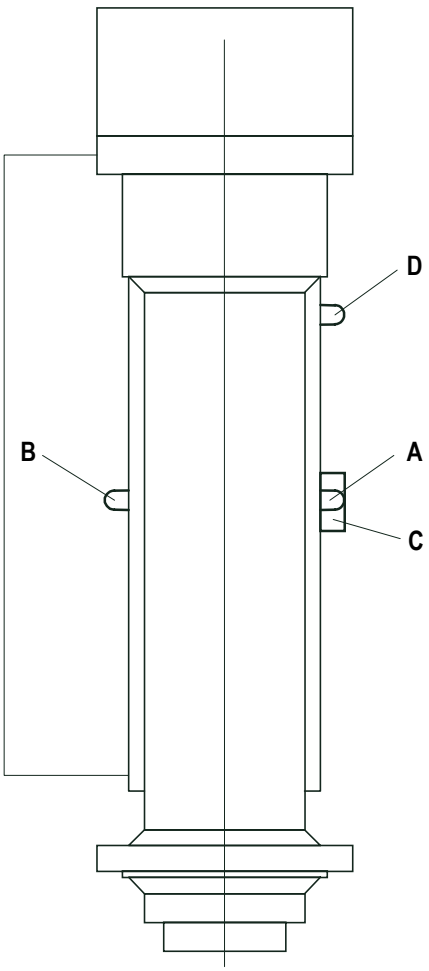
Schmiermöglichkeiten
UFM 50/250

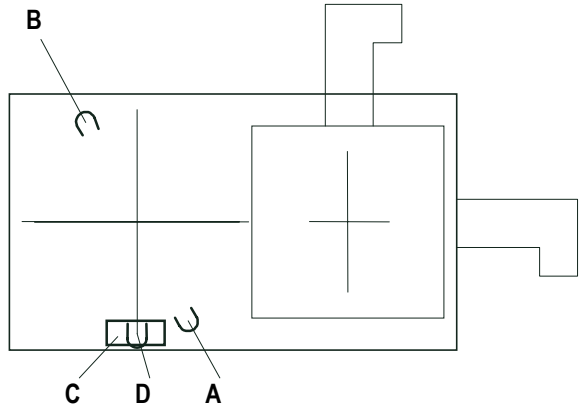
Maßstab 1:5

78050 / 78055

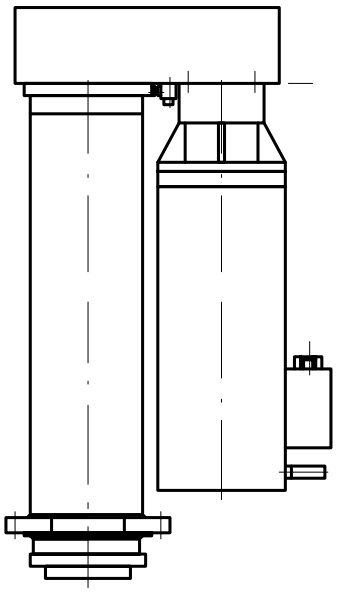
78050/78055

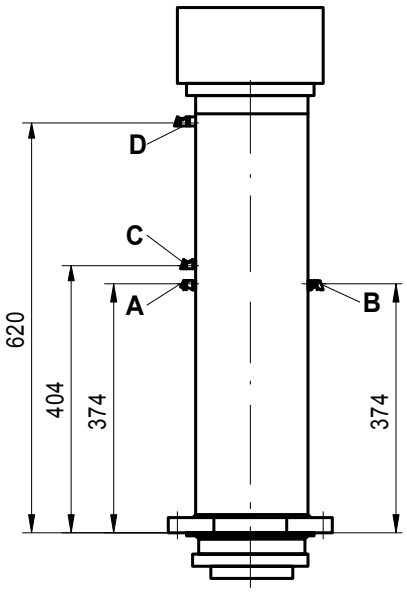


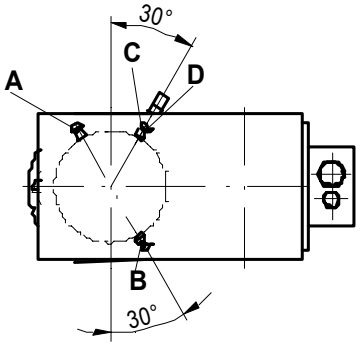




					PROMESS	Gesellschaft für produktions-techn. Messen GmbH	
					Schaffhausener Str. 44-50	D-12099 Berlin	Tel.: (030) 628935-0
			Bearb.	23.6.97	Kreibich	**Fügeeinheit 40 / 60kN**	Maßstab
			Gepr.			**180mm Hub**	**1:2**
			Norm			**Schmiermöglichkeiten**	
			Werkstoff, Halbzeug			74040 / 74060	
Maß	A o	A u					98500503







Schmierstellen:
A - Nutschmierung
B - Nutschmierung
C - Spindelschmierung
D - Lagerschmierung

Um die Spindel zu schmieren, muß die Presse um ca. 117 mm ausgefahren werden. Dieser Wert kann um ± 3 mm variieren, da der Näherungsschalter nicht bei jeder Presse an der gleichen Stelle vom Stempel bedämpft wird.

			mittel DIN 7168		PROMESS Ges. für Montage- und Prüfsysteme mbH
					Schaffhausener Str. 52 D-12099 Berlin Telefon 030/628872-0
			Bearb. 06.11.03 Paulsen		Schiermöglichkeiten UFM 80/330 — Maástab 1:10
			Gepr. 06.11.03 Lechler		
			Norm		
			Werkstoff, Halbzeug		74080
Maß	A_O	A_U			74080

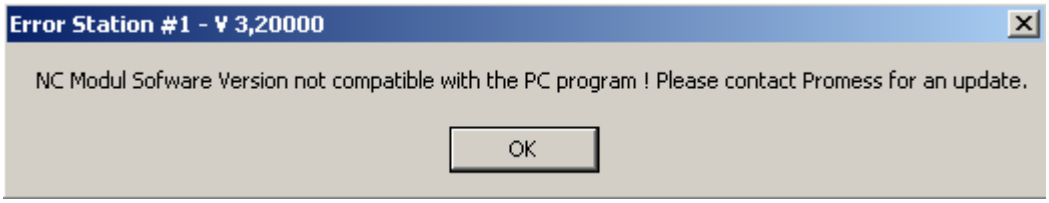
21.1 Gear box oil

For those press modules containing a gearbox, the oil must be changed after 5,000 operating hours or at latest after 4 years.

Type of gear box	Typ UFM	Quantity	Oil
MPS 0	UFM 20/180/150	40 ml	Klüber, D68EP
MPS 1	UFM 40/175/150 UFM 60/175/150	125 ml	Klüber, D68EP
MPS 2	UFM 80 UFM 100	300 ml	Klüber, D68EP

22 Software Update

If you update the software in the PC, it will also be necessary to overwrite the firmware in the NC-module with a newer version. This will be necessary if the PC software displays the following message after restarting:



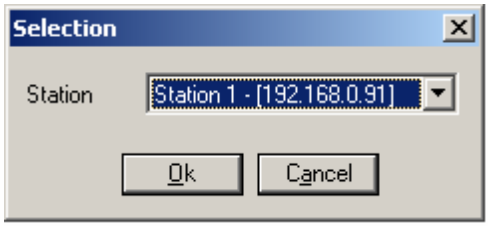
!!! The firmware can only be updated using the RS 232 interface (Com 1 - 4).
If the PC and the module are connected via the RS 485, you will also require connection via the RS 232.

Start the program "UFM_UPDATE.EXE" in the installation directory "UFM_NC.EXE". You will see the following start window.

Create the connection to the NC module by clicking on the "Find" button. Once the program has found the station, the "UPDATE" button is activated.

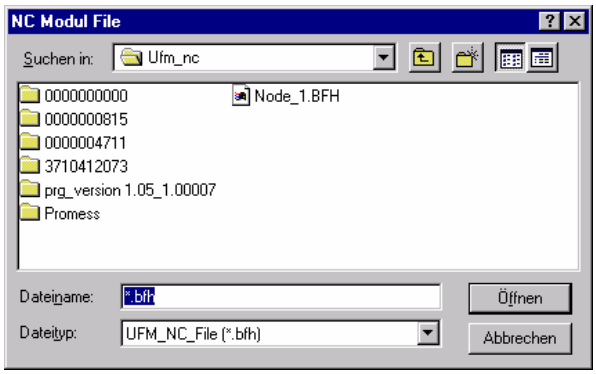
!!! Please shut down the UFM NC Module software, or disconnect the station you want to update.

If you use the Ethernetmodule please choose the IP adress of the station you like to update.



Before continuing with "Update", please press the Emergency Stop button to disconnect the motor from the power component.

Select the file "Node_1.BFH“ in the following dialog box to download the firmware to the NC module.



Once selected, the software will initiate the download of the system files or binary coded firmware.

Once download is successfully completed, close the program.

! After the successful update, it is essential to back up your parameter set.

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