HYDROTECHNIK
Limburg

Messen mit System

User manual

for

Multi-System 8000

and

Multi-Control 8000

Version 1.7
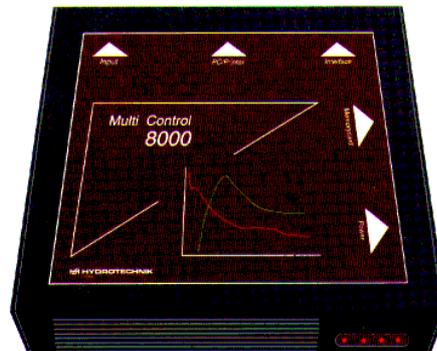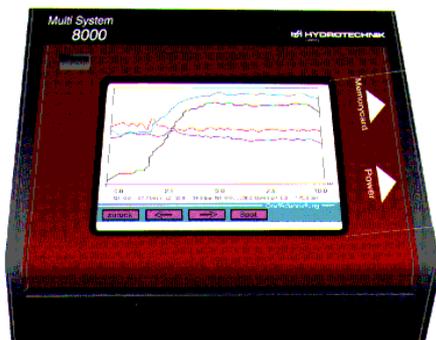
HYDROTECHNIK GmbH edition 03/99

Preface

After receipt of the instrument, please check the outer condition of the transport and storage receptacle, as well as if the instrument has been damaged.
The accessories, delivered in a second receptacle, should be checked too, and compared with the enclosed list of parts.

The user manual contains all information, necessary for the operation of the measuring instruments. Only when taking this manual into consideration, the continuous and optimal use is guaranteed.

Both instruments have a nearly identical user surface, so that you can change between both instruments without problems. Therefore, the user manual mainly describes the function of the Multi-System 8000. If the operation of the Multi-Control 8000 deviates from that, we will ask you to have a look at part 2 of this user manual.

Notes for the Multi System 8000

The Multi-System 8000 is equipped with a 10,4"-VGA-colour display (640 x 480 dpi), which can be adjusted to different angles of slope. You can operate the instrument by touching the different windows displayed in the integrated touchpanel.
The instrument can, like the Multi-Control 8000, be connected to a PC or a notebook and operated correspondingly. In this case the display will show „Black Box Mode".

Notes for the Multi Control 8000

To operate the Multi-Control 8000, you have to connect it with a PC or a notebook via the EPP-interface. In doing so, the PC res. the notebook acts as a screen and a keyboard.
You have to start the software „MC8000.EXE" on your system, which needs to have the following conditions:
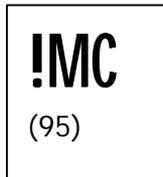PC or Notebook from 486 on or Pentium with EPP-adjustment via operating system BIOS for printer interface (LPT 1).

Should you encounter unexpected problems, please ask for our support.
Alterations are subject to technical progress.

Explanations

Numbers of pictures and the part of the user manual are set in brackets.
For example (1.12) means: chapter 1, picture 12.

!MC
(95)

This symbol indicates, that the operation of the Multi-Control 8000 differs. The number written in brackets indicates the corresponding page in this user manual (in this case page 95).
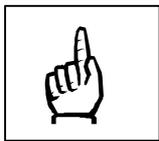
This symbol means: *"ATTENTION: Important note "*

Index

1. Technical description

1.1. Design

10,4" VGA-
colour-display
(640*480 dpi)

Picture 1.1   Multi-System 8000
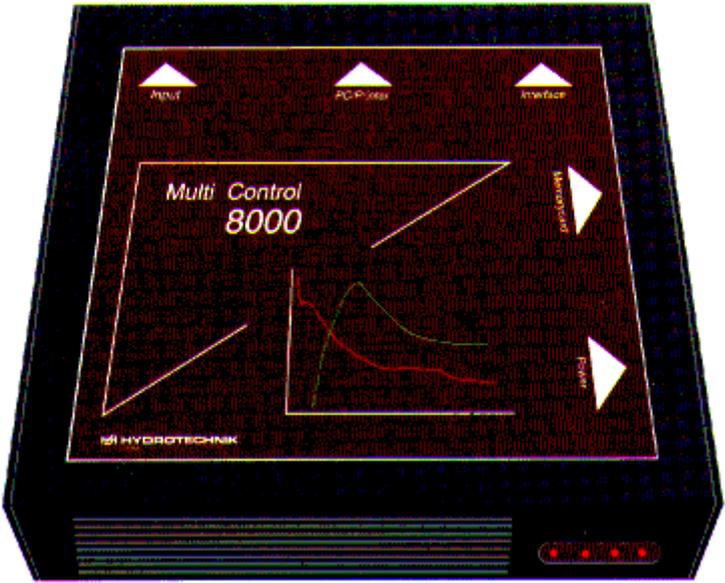
Picture 1.2   Multi-Control 8000

1.2. Contour / dimensions
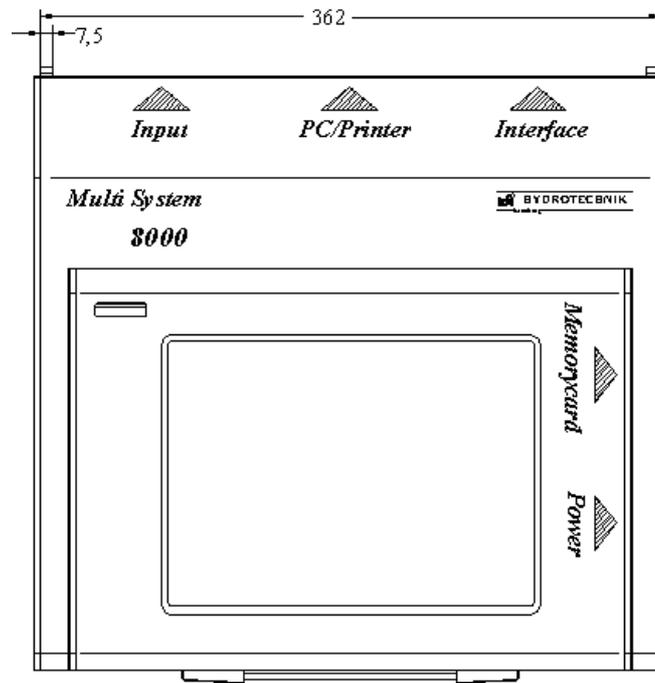
Picture 1.3   Multi-System 8000, top view
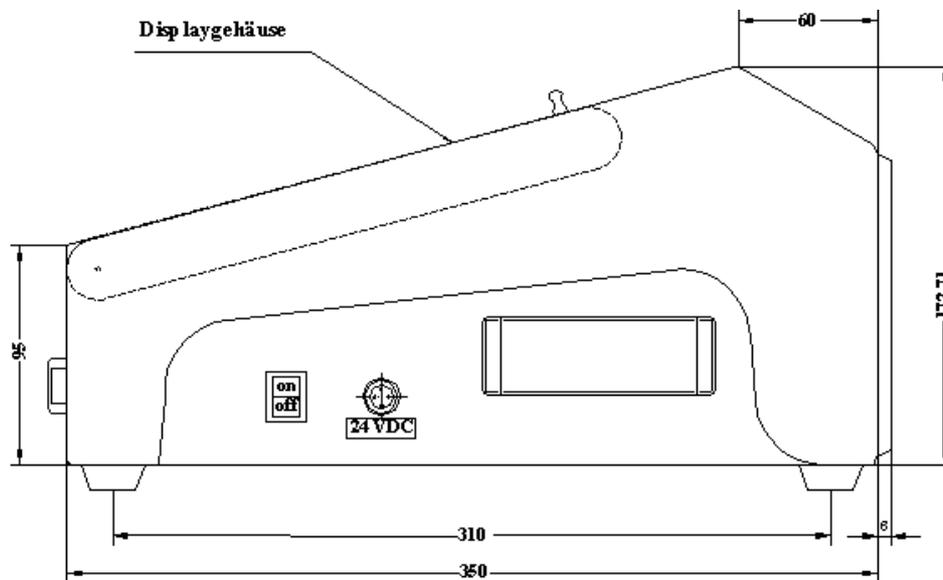
Picture 1.4   Multi-System 8000, side view
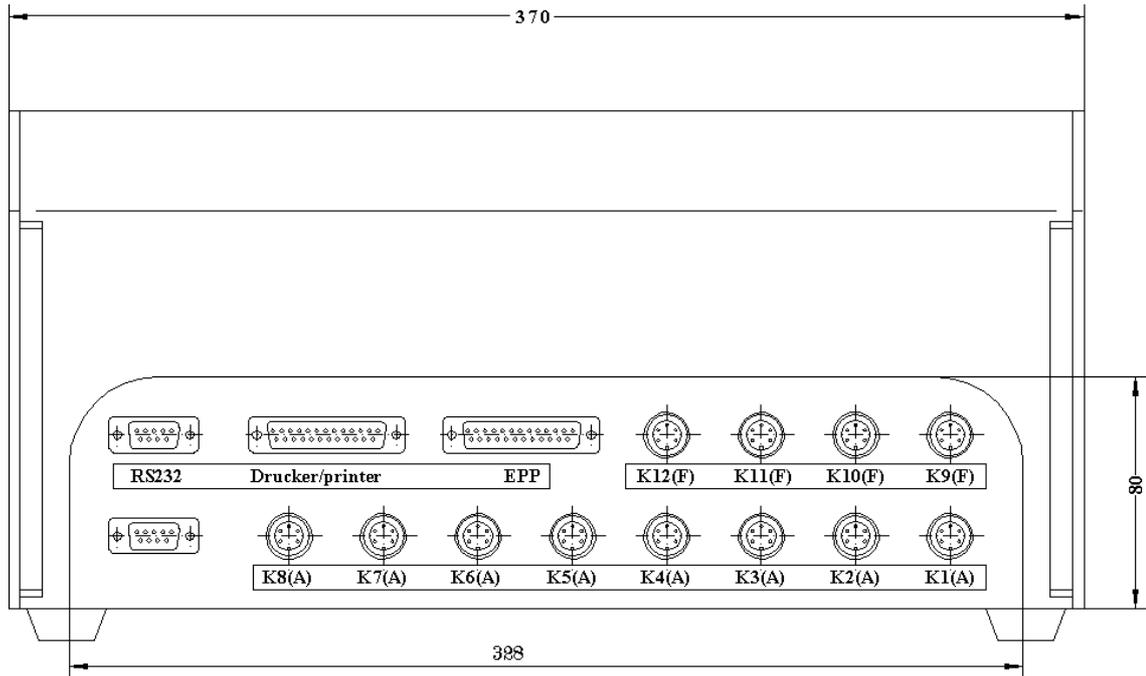
Picture 1.5   Multi-System 8000, rear view
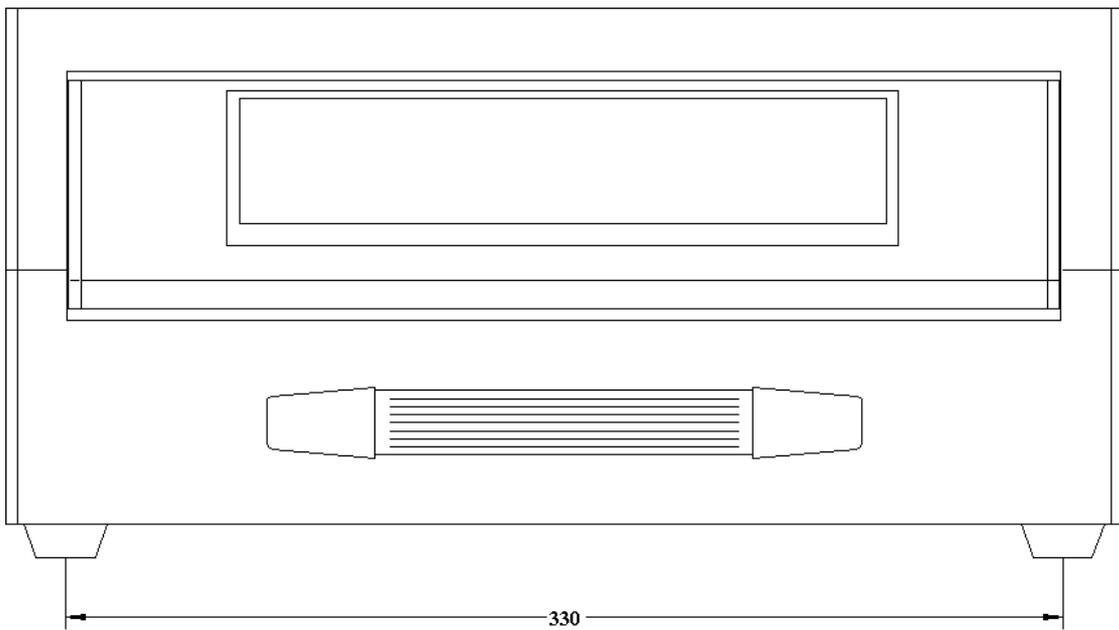
Picture 1.6   Multi-System 8000, front view
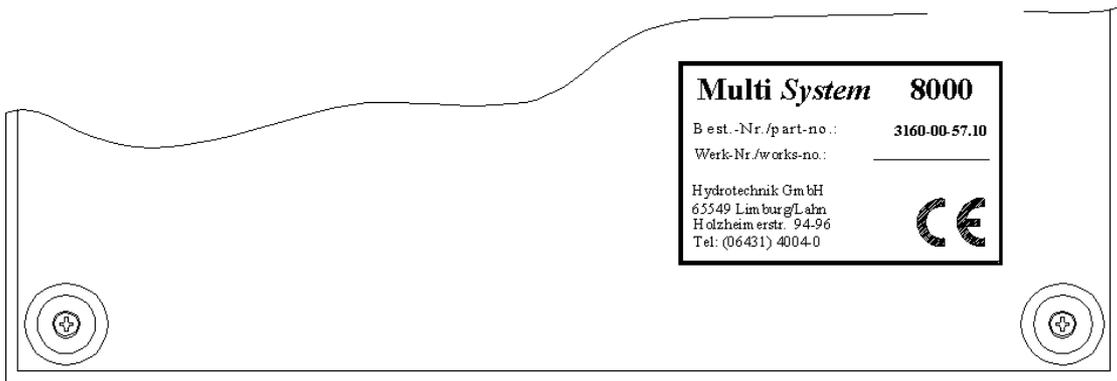
Picture 1.7   Multi-System 8000, view from below
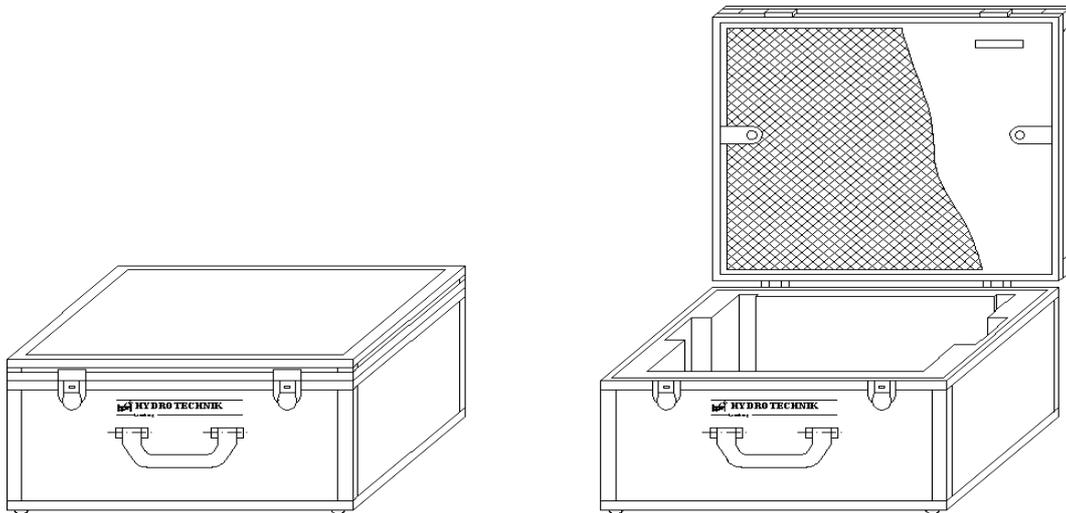
Picture 1.8   Transport- and storage case

1.3. Technical details

Housing:	lower part: stainless steel upper part: plastic, shock-resistant
Weight:	Multi-System 8000: approx. 8,2 kg Multi-Control 8000: approx. 5,8 kg transport- and storage case: approx. 3,5 kg
Environmental protection:	front of instrument: IP 60 housing: IP 60 measuring inputs: IP 40
CE-Marking:	fulfills EN 50 081-1 and EN 50 082-1
Power supply:	24 VDC, with reverse battery- and overload protection. The instrument is protected with self-reversing fuse resistors (PTC).
Dimensions:	Multi-System 8000: 370 x 185 x 350 mm (WxHxD) Multi-Control 8000: 370 x 122 x 350 mm (WxHxD)
Interfaces:	- Centronics - EPP - RS 232
Ambient temperature:	0°C to 40°C
Relative humidity:	0% to 85% (not condensing)
Storage temperature:	- 20°C to 60°C
Measuring value display:	5-digit
Trigger:	2 channels as Start/Stop or with the linking AND or OR, automatic storage of several data files (cyclic storage)
Basic scanning rate:	can be adjusted from 1 ms to 10 min.
Individual scanning rate:	can be selected for each channel with multiplication factor up to 100
Measuring rate:	analogue inputs: 1 ms frequency inputs: measurement of period with measuring cycle 16 ms (frequency range approx. 1 Hz to 5 kHz)
Measuring value memory:	1 MB RAM (battery buffered) for max. 50 storages
Min./max.-value storage:	all 12 channels in the background
Error limit:	analogue: ±0,06% of full scale digital: ± 1 digit
Measurable variables:	different measurable variables, for example pressure, temperature, RPM, voltage, current, force, torque, speed, etc., can be acquired

1.3.1. Instrument's options

Extension of the main memory to max. 8MB RAM by Memory Card (PCMCIA – SRAM type II). Further technical possibilities on request.

1.4.   Pin connections
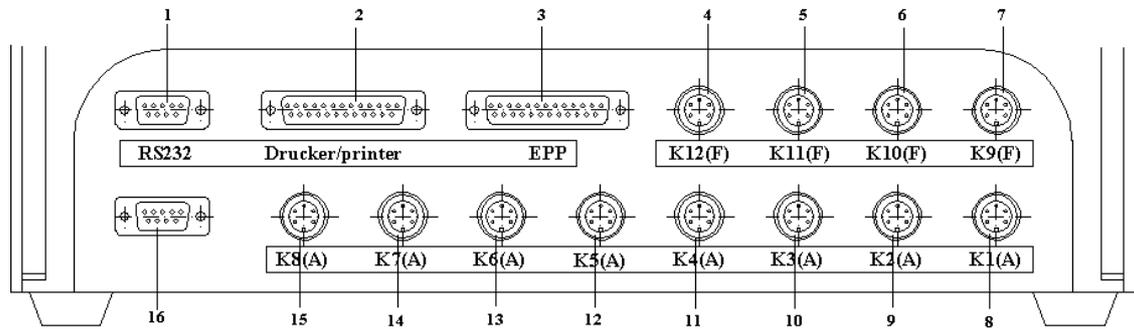
Picture 1.9   Plugs/pins Multi-System 8000

Plug	Use
1	RS 232, connection for data transimission to PC/notebook
2	Printer connection or transfer to the next EPP-input
3	EPP-connection to operate the instrument and to transfer data to PC/notebook or EPP-input from previous measuring instrument
4 to 7	Connections K9 – K12 for digital measuring signals
8 to 15	Connections K1 – K8 for analogue measuring signals
16	not connected

View of the plugs on rear side of instrument as in picture (1.9)

Connection 1 (9-poles SUB–D–plug)

Picture 1.10   Pin connection
            RS 232 connection
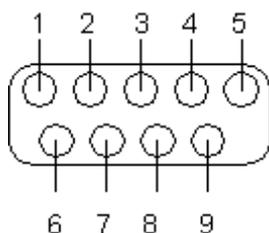
Pin	Connection
1,4,6,9	not connected
2	RxD
3	TxD
5	Mass
7	CTS
8	RTS

Connections 2 and 3 (25-poles SUB–D–plug)
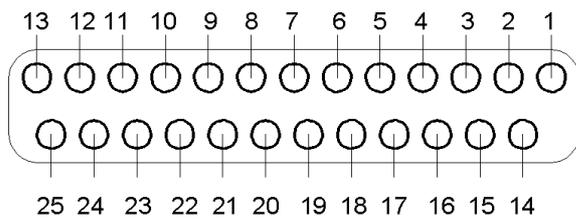
Picture 1.11 Pin connection printer
and EPP-connection

Pin	Connection
1	Strobe
2 to 9	D0 to D7
10	ACK
11	BUSY
12	PE
13	SELECT
14	Data Strobe
14	ERROR
16	INIT
17	Adress Strobe
18 to 25	Mass

Connections 4 to 15 (5-poles mounting plug)
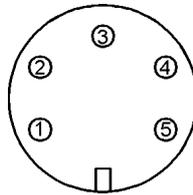
Picture 1.12   Pin connection measuring inputs

Frequency inputs (connection 4 to 7)

pin no.	function	Ri.	Ci.	limit	environm. protection
1	frequency signal	4,75 k Ω	1 nF	33 VDC	VDR transil diode
2	mass				
3	Ub – 1 VDC			100 mA	VDR transil diode
4	direction signal	4,75 k Ω	1 nF	33 VDC	PTC
5	screening				

Analogue inputs (connection 8 to 15)

pin no.	function	Ri.	Ci.	limit	environm. protection
1	20 mA signal	100 Ω	0,23 uF	5,6 VDC	transil diode
2	mass				
3	18 VDC			100 mA	current limitation
4	±10 V signal	10 k Ω	15 nF	± 20 VDC	transil diode
5	screening				

Connection for power supply (3-pole mounting plug)

pin no.	function	limit	environm. protection
1	minus	2,5 A	PTC
2	free		
3	plus 24 VDC	33 VDC 1,8 A	transil diode BTC
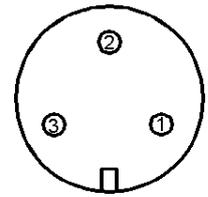
Picture 1.13

Picture 1.13: Pin connection power supply

1.5. Technical data

Analogue measuring inputs
There are eight analogue inputs available that can be adjusted for a full scale of
+ 20 mA or of ± 10 VDC. The reserved display is 10% to 20% and has a resolution of
13 Bit plus mathematical signs. The measuring rate is 1 ms. For external sensors a
supply voltage of 18 VDC is provided at the measuring input.

Frequency measuring inputs
Four frequency inputs are provided and an additional detection of direction for
each measuring input is possible. The inputs are designed for PNP-signals and push-
pull signals.
The input level is between 4 and 30 VDC, square-wave. The normal frequency range
is between 1 Hz and 5 kHz, with detection of direction up to 4 kHz. For external sen-
sors a supply voltage of Ub-1VDC is provided at the measuring input.

Display and operation
The display is made either graphically or digitally with 5 digits. To identify the measu-
ring values, an additional text can be displayed for each channel.
Twelve measuring values can be displayed simultaneously. To be able to distinguish
between the curves, you can chose different colours and symbols for each curve.
The operation is carried out with several selection- and input keys.

Storage- and trigger possibilities
Twelve measuring values can be stored at the same time. To identify the storage,
you can enter different parameters like date/time or names of the channels.
The smallest possible scanning rate is 1 ms.
The storage can be started and stopped with several trigger possibilities.
Two trigger channels are provided that can be linked with each other.

1.6. Application

The measuring instrument Multi-System/-Control 8000 has been developed and
designed for all measuring tasks in a modern hydraulic plant.
It is designed for the mobile and the stationary use, in test stand construction as well
as in laboratories.
This type of instrument can acquire and store measuring values, display them
graphically (only Multi-System 8000) and transfer the data to a PC or a notebook.

1.7.   Extension of measuring channels

If the number of measuring inputs isn't sufficient for your purposes, you can combine a maximum of four instruments. In doing so, you always have to operate them via a PC or a notebook, no matter if Multi-System or Multi-Control instruments or both of them are combined. The instruments are linked as follows:

1.   Switch off all the instruments.

2.   Connect one instrument to the PC/notebook via the EPP-interface.

3.   Switch-on the instrument and start the software MC8000.EXE.

4.   Configure the instrument and adjust measuring instrument address 1 (description see part 2)

5.   Finish the PC software and separate the measuring instrument from the EPP-interface. In contrary to a Multi-Control 8000 the Multi-System 8000 must not be switched off, in doing so.

6.   Repeat the steps 2 to 5 for all instruments and use the instrument addresses 2, 3 and, if necessary, 4.

7.   Connect all the instruments according to the order of their addresses with each other. The instrument with address 1 is directly connected with the PC or note book. The connections should be made according to the following scheme: LPT 1 of the PC/notebook to the EPP-input of instrument 1, printer output of instrument 1 to EPP-input of instrument 2, etc.
The printer is connected to the printer output of the last instrument.

8.   Check, if all instruments are switched on.

9.   Check, if a possibly connected printer is switched on and online.

10. Start the software MC8000.EXE.

You will need a special EPP-cable (part-no.: 8824-C9-02.00) for the connection of the measuring instruments with each other and to the PC/notebook.

1.8.   Mechanic structure

In the state-of-the-art bottom part of the instrument, made from sheet steel, printed boards and other electrical components are situated shock and shakeproof.
On the back, the measuring connections for the different functions (picture 1.4) are screwed firmly with the bottom part. On the right side of the housing there is the ON/OFF-switch, the power supply plug and the plug-in unit for the memory (picture 1.3), which are screwed with the bottom part, too. For the safe placing of the instrument, the bottom side has four changeable bases. The upper part is made from shock-resistant plastic and contains the hinged display (can be fixed) including input- and selection keys. The carrying handle is on the front and screwed firmly with both parts of the housing. To lay down the instrument after having carried it, ledges are mounted on the back.

The mechanic structure of the Multi-System 8000 is identical with the Multi-Control 8000, but without display.

1.9. Accessories, packaging

The accessories, mentioned in the following list, are imperative for the use of the Multi-System 8000 and the Multi-Control 8000. It was our intention to do without a set of accessories, as the single parts should be selected according to your requirements. Our service department will be quite willing to help you with that.
The following equipments are available:

Part	Features	Part-no.
Multi-System 8000	VGA-colour display, software HYDRO comsys/ WIN	3160-00-57.00
Multi-Control 8000	without display, with software HYDRO-comsys/WIN and software MC8000.EXE	3160-00-58.00
Desk top instrument	100 to 240 VAC / 24 VDC / 1,8 A	8812-00-00.27
Measuring cable MK01	length: 2,5 m, to connect pressure-, temperature-, PRM- and volume flow rate sensors	8824-91-02.50
Divider cable TK10	length: 2,5 m, to connect a p/T-dual sensor to the inputs for pressure and temperature	8824-03-02.50
Connection cable	length: 5 m, for external battery supply	8824-79-05.00
EPP cable	length: 2,5 m, to connect a PC or several instruments	8824-C9-02.00
Printer cable	to connect a printer with parallel interface	8824-36-02.00
RS232 cable	to transfer data from Multi-System 8000 to PC or notebook	
Transport case	only for measuring instrument and desk top instrument	3160-00-18.12
Battery-inkjet-colour-printer with plug-in power supply unit and ink cartridges (100 to 240 VAC -50/60 Hz)		8865-01-13.00
Replacement cartridge in black		8865-01-09.01
Replacement cartridge in colour		8865-01-10.01

Please take into consideration, that you can't use the measuring cable MK01 as an extension, by connecting one cable after another, as the screening is interrupted at this type of cable.
You should use its complete length to connect the sensor.

Sensors			
Pressure (signal output 4 to 20 mA)	measuring range in bar or (psi)	-1 to +6 (-14,5....87) 0 to 60 (....870) 0 to 200 (.....2900) 0 to 400 (.....5800) 0 to 600 (.....8700) 0 to 1000 (..14500)	3403-32-71.37 3403-21-71.37 3403-10-71.37 3403-15-71.37 3403-18-71.37 3403-29-71.37
To select pressure sensors of 0 to 20 mA, you only have to modify the last two numbers of the part-number from „.37" into „.33", for example: 3403-xx-xx.33.			
Pressure/Temperature (signal outputs separately 4 to 20 mA) p/T-dual sensor to measure temperature and pressure simultaneously, with integrated direct connection for p/T-test point series 1620, M16x2 (ident.-no. 04)	measuring range in bar or (psi) temperature measuring range in °C or (°F) for both types	0 to 60 (.......870) 0 to 600 (....8700) -50 to +200 (-58....+392)	3163-04-34.00 3163-03-34.00
Volume flow rate Measuring turbine RE3 (inductive transducer with amplifier) square wave output signal, with MINIMESS and p/T-test point series 1620	measuring range in l/min or (gal/min)	7,5 to 75 (2........20,0) 15,0 to 300 (4........79,0) 25,0 to 600 (6,6...158,5)	31V7-21-35.00 31V7-30-35.00 31V7-40-35.00
Volume flow rate Measuring turbine RE4 (inductive transducer with amplifier) square wave output signal, with MINIMESS and p/T-test point series 1620	measuring range in l/min or (gal/min)	1,0 to 10 (0,26....2,6) 7,5 to 75 (2........20,0) 15,0 to 300 (4........79,0) 25,0 to 600 (6,6...158,5)	31V7-01-35.00 31V7-70-35.00 31V7-71-35.00 31V7-72-35.00
Volume flow rate Gear flow meter GFM square wave output signal, with MINIMESS and p/T-test point series 1620	measuring range in l/min or (gal/min)	0,005 to 1 (0,0013..0,25) 0,05 to 5 (0,013......1,3) 0,2 to 30 (0,05..........8) 0,7 to 70 (0,18.......8,5) 3,0 to 300 (0,79..79,25)	3143-01-35.00 3143-02-35.00 3143-03-35.00 3143-04-35.00 3143-05-35.00
Temperature screw-in sensor Pt100 (3-wire technique) signal output 0 to 20 mA **Temperature screw-in sensor Pt100** (2-wire technique) signal output 4 to 20 mA, both for p/T-test point series 1620 (ident.-no. 04) **Temperature surface sensor Pt100** (2-wire technique) signal output 4 to 20 mA, helix cable connection 1,2 m **Temperature immersion sensor Pt100** (2-wire technique) signal output 4 to 20 mA, helix cable connection 1,2 m	for all temperature sensors: measuring range in °C or (°F)	-50 to +200 (-58...+392)	3973-04-01.00 3969-04-01.00 3170-01-03.00 3170-02-06.00
RPM Infrared sensor type DS 03 with 25 pcs. reflective foil **Reflective foil** (for replacement, 50 pcs.) **Inductive transducer with amplifier** to measure RPM at gear wheels	measuring range in min[1] or rpm	1 to 9999	3130-02-01.00 8840-02-01.01 3107-00-09.00

☞ You can use other sensors, too, but only if they correspond to the given specifications.

2. Description of function

2.1. General

All operating steps are shown on the VGA-colour display as a table or a graphic.
To provide a user-friendly menu guide, we installed an interactive touchpanel in the display. The blue menu part with four function keys, the pressing of which causes further operating steps, will be shown in the lower part of the screen after switching-on of the instrument. The keys have different colours and can be pressed by fingertip.

yellow = keys can be pressed
green = keys are already pressed
red = keys are blocked

The content and the look of the menus, shown in this manual, may vary from those in your instrument. This depends on the system adjustments, made by you. The menus, shown in the following, are based on the adjustment of the instrument after a reset.

2.2. Operation- and display elements

For the better understanding of this user manual, certain designations need to be fixed:

The screen is divided into two parts: a) the menu part
                                        b) the input- and display part

2.2.1. Menu part

The menu part always shows the next operating steps, which are possible in the currently displayed menu. With the keys „OK", „Cancel" and „return" you will always return to the previous menu.

Only when pressing key „OK", modifications are taken over !

2.2.2. Display and input....

2.2.2.1. Text display

measuring value display
with min/max-value

screen

45.34
43.73   55.93
P1 (bar)
room 1   B1.1

-5.92
-8.67   -7.45
U1 (V)
valve 1   B1.2

49.61
47.71   53.82
P2 (bar)   B1.3

61.04
57.99   64.09
P3 (bar)   B1.4

display and
designation of
channel

channel number
when using seve-
ral instruments
(only MC8000.EXE)

meas.display

Config. F2   Prog. F3   Memory F4   print F5

function key

key symbol for operation with
PC (only MC8000.EXE)

menu part

menu name

Picture 2.1   Text display of four values

2.2.2.2. Graphic display

graphic course
of measuring
curve

symbols to mark
the curve

0.00   14.25   28.50   42.75   57.00   sec
× P1 (bar)   -150.0/80.0   room 1   ○ P2 (bar)   -100.0/100.0   valve 1
△ Q1 (l/min)   -10.0/200.0   h. pump 1

name of channel
and scaling

meas.display

Config. F2   Prog. F3   Memory F4   print F5
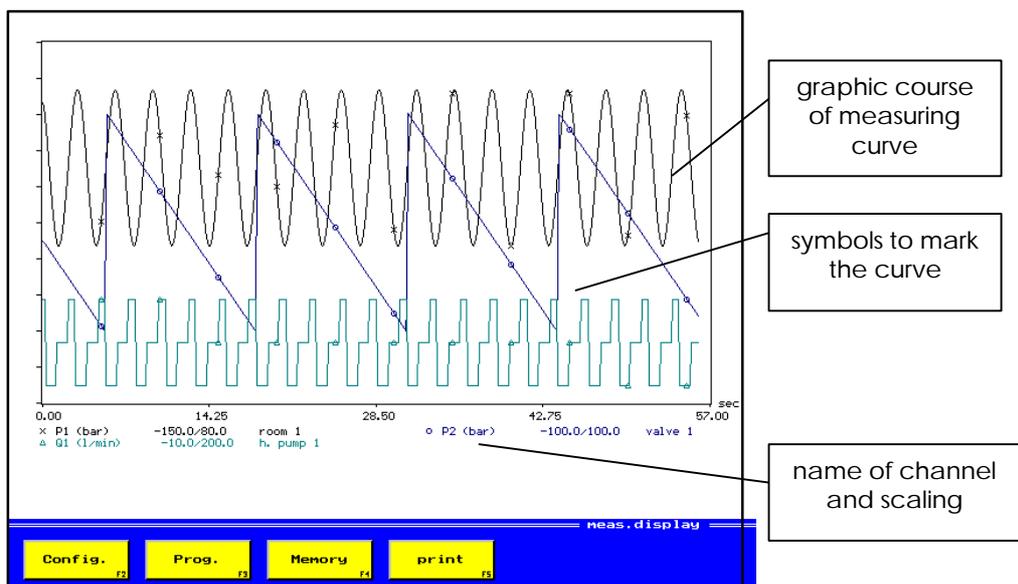
Picture 2.2   Graphic display of three measuring values

2.3. Input panels

For operations that are repeated during configuration, programming and storage, the numeric input panel (see chapter 2.3.1) and the alphanumeric input panel (see chapter 2.3.2) are shown, corresponding to the tasks.

2.3.1. Numeric input panel

1 = input field
2 = number field
3 = function key
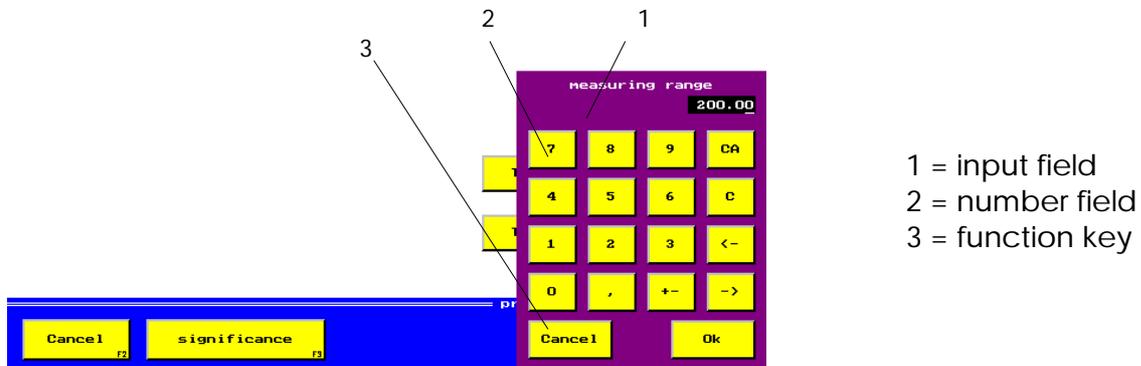
Picture 2.3   Numeric input panel

After you have invoked the input of values, the instrument will show a number keypad with special keys. As long as this keypad is shown, only the keys of the panel can be used. In this case, the use of the mouse is restricted to the panel.
The panel is automatically displayed in the left- or right hand corner of the screen.
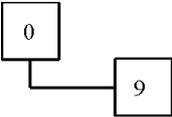
0 ... 9	Number keys, the value of the keys pressed will be transferred to the current position in the input field.
← →	Moves cursor
C	Deletes the characters in the input field, one after another.
CA	Deletes all characters in the input field.
,	Inserts decimal point
+−	Inverts the mathematical signs
Cancel	Cancels the input, the panel disappears
OK	Finishes the input, the values are transferred and the panel disappears
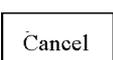
All inputs are displayed during the writing into the input field and transferred into the menu after a stroke of key „OK". The input panel remains active, until the input is confirmed with key „OK" or cancelled with key „CANCEL".
All inputs are made right-aligned and are moved to the left side.
The first place of the input is reserved for the mathematical sign.

2.3.2. Alphanumeric input panel
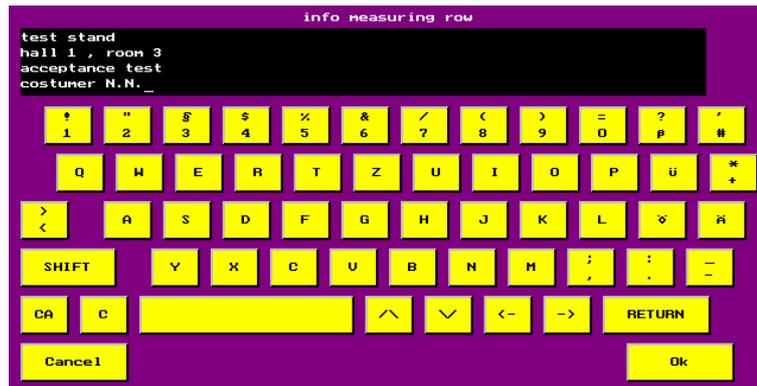
Picture 2.4   Alphanumeric input panel

The alphanumeric input panel corresponds to the usual alphanumeric PC-keyboard, used for the input of texts.
"Texts" means all inputs containing numbers, letters and special signs.

In the measuring instrument you can specify for example data files or enter names of tables with texts, which can consist of several lines, too.

The input is always left-aligned into the input field of the panel.

With a stroke of key „OK" the input is confirmed and taken over into the menu and the panel disappears. If the text, written into the input field of the panel, should not be taken over into the menu, you can leave the procedure with key „Cancel" and the panel will disappear.

2.4. System reset

With help of the system reset you can set back your measuring instrument to a fixed state. In doing so, all variables are deleted or set back to a special starting value.

☞ The measuring value memory will be deleted, too. !

To carry out the reset, please plug the LPT-key, delivered together with the instrument, onto the printer interface (picture 1.8), before switching on your instrument. Please take care that the EPP-cable is not connected with the measuring instrument.

2.4.1. Reset Multi-System 8000

During the reset, the Multi-System 8000 will show „Re-initialisation of all parameters"
and at the same time a countdown is shown in the middle of the screen.
After 10 seconds the software checks, if the LPT-key is still plugged-in.
As long as the LPT-key is plugged-in, the system reset can be interrupted by switching the instrument off. If the LPT-key is removed, the reset is started.

```
Multi System 8000
Version 1.7
EPROM: 29.03.1999

at 1st:10,9,9,...   after this: Remove Dongle



    new initialisation
    all parameters?
```
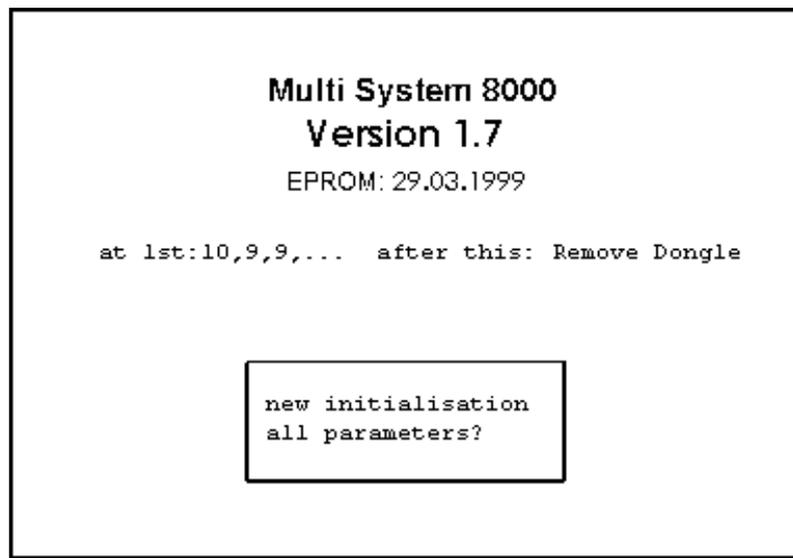
Picture 2.5   Carry out reset

2.4.2. Reset Multi-Control 8000

You can follow up the course of the reset event owing to the emitting diode at the front of the MC 8000.
Wait until the LED "Error" flashs and the LED's "Online+Reset" become dark. At this time you can break off the reset by switching off the instrument and after that remove the Dongle.
If you remove the Dongle when the instrument is switched on, the reset will be executed. Immediately after removing the Dongle, the error message is shown for approx. 2 seconds: "Blackbox Mode with address 0" (LED "Error" flashs, LED "Online" is dark, LED "Reset" shines, see chapter 8.1.2 error messages).
Afterwards the LED's go out and the instrument is ready for operation.
Due to the reset, the address of the instrument is automatically erased. The address must be configured again with the PC software "MC 8000.EXE".

2.5. Self test

When the instrument is switched-on, it shows „Multi-System 8000", the current version, the adjusted date and time as well as the programmed company's name (see picture 2.3).
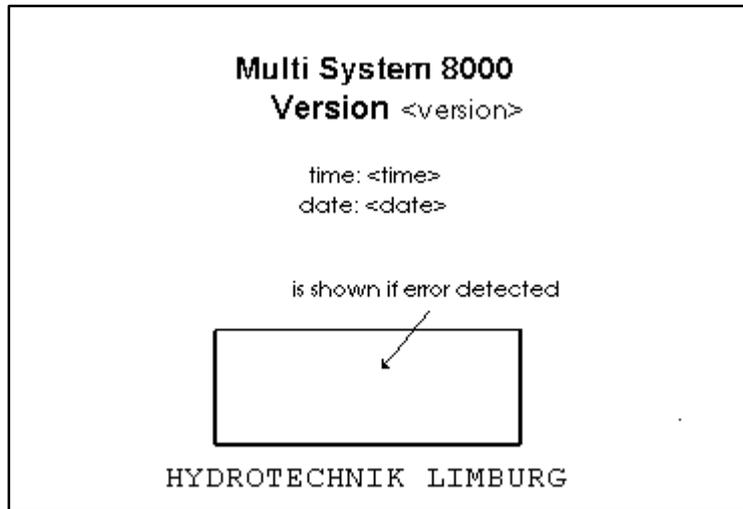
As long as this switching-on menu is displayed, the instrument carries out a self test to check different hardware components in the order of the tested components.
If an error is detected, it will be shown in the marked window.

Picture 2.6   Switching-on menu

The following two types of an error window can be shown:

| Window (white) |

This window consists of a frame, only, and when this window type is displayed, one of the following errors occurred:

- SUB board inactive   (connection to measuring unit is missing)
- DUAL port RAM inactive   (data exchange with memory component „DPR" defective)
- EEPROM inactive   (memory components with calibration values of measuring inputs defective)

☞ The programme can't be used any more and the window will remain in the display until the instrument is switched off !

| Window (grey) |

This window has a grey background and indicates the following errors:

- Analogue converter inactive   „Analogue channels locked"
- SUB-CPU inactive   „Only evaluation possible"
- Real time clock   „No date/time-function"

☞ With these errors, the programme can be used with restricted functions. You have to invoke the error window, which will get dark for a moment, and then the programme run can be continued.

3.   Configuration of the measuring instrument
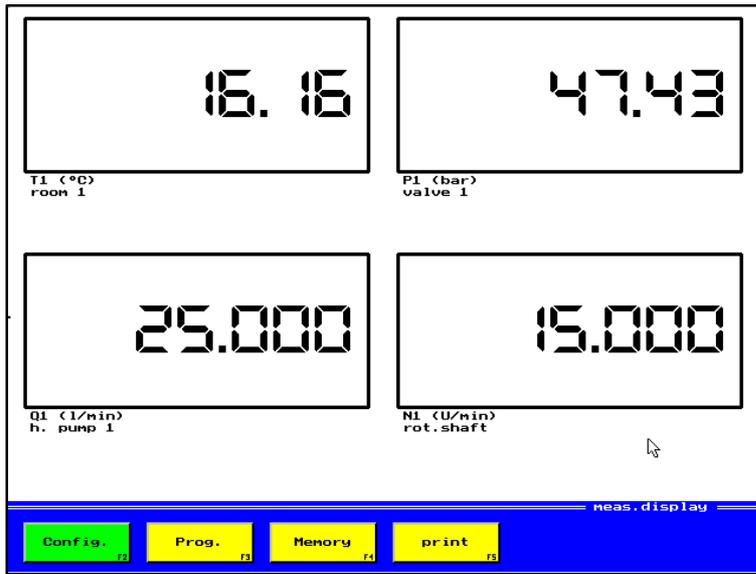
To configure the measuring instrument, it needs to show menu „measuring value display", which is displayed automatically after the switching-on of the instrument. The values selected at last are shown on the screen. They can be shown either as a graphic or as a text with 4, 6 or 12 windows.

Picture 3.1   Menu: Measuring value display

Adjustment possibilities after activation of key „Config.":
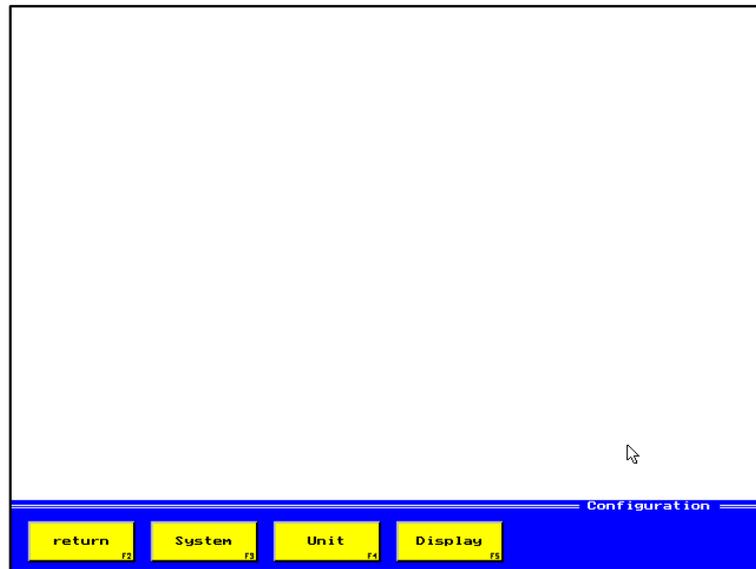
Picture 3.2   Menu: Configuration

!MC
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Function key „System" only in MC8000.EXE

return F2	The previous menu (picture 3.1) is displayed.
Unit F4	Adjustment of the „instrument parameters" (3.1.1). Contrast, language, baudrate, date/time, company's name
Display F5	Adjustment of display (3.1.2). Selection of channel, actualisation of display, measuring value display, significance, scaling, curve definition

3.1. Function key „Unit"
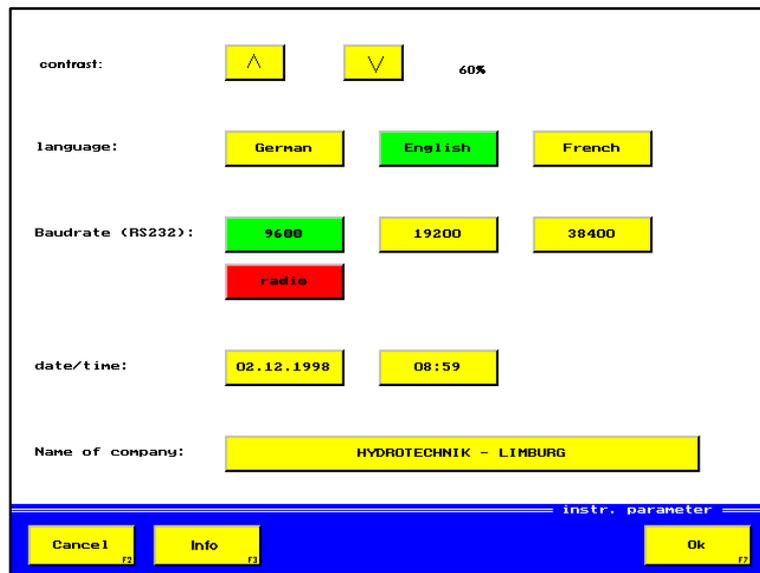
Picture 3.3   Menu: Instrument parameters

Cancel F2	Menu „Configuration" (picture 3.2) is displayed. Modifications won't be taken over.
info F5	Information on system and state of the software.
Ok	Menu „Configuration" (picture 3.2) is displayed. Modifications will be taken over.

Input possibilities

Contrast
To obtain the requested brightness of the screen, you can adjust the contrast from 0 to 100% by pressing the corresponding keys several times.

∧ increases the contrast   ∨ reduces the contrast

<u>Language</u>
The language is chosen by pressing the corresponding key (German, English, French).

<u>Baudrate</u>
The baudrate refers to the interface RS 232 of the instrument and needs to have the same adjustment as in the PC/notebook, when data is transferred via this interface.

<u>Date/Time</u>
Here the date and the time can be entered as follows: Day / Month / Year (for example: 17,11,1998) and Hours / Minutes (for example: 16,45). The numbers should be separated by decimal points. Should you have selected „English" as a language, the input of the date and the time remains the same, nevertheless.

<u>Name of company</u>
The name of the company is displayed in the switching-on menu and will be printed out on the fileheader. It may consist of 40 digits. After a reset the name will be set to „HYDROTECHNIK – LIMBURG" automatically.

3.2.   Function key „Display"
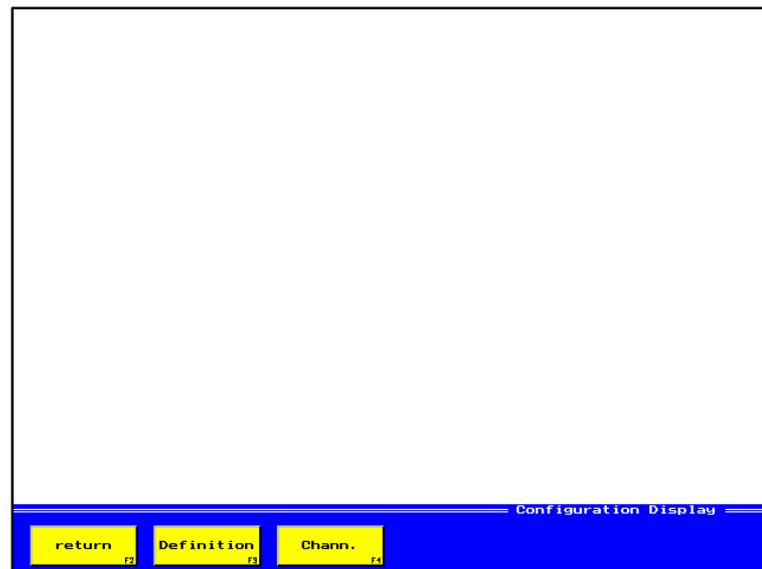
Picture 3.4   Menu: Configuration display

| return F2 | Menu „Configuration" (picture 3.2) is displayed. |

Adjustments for the display of measuring values (3.1.2.1). Selection of measuring value display, actualisation of display, text- or graphic display, name of channels and possibilities to adjust the graphic display of curves.

Selection of the measuring channels that can be displayed (3.1.2.2).

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3.2.1. Function key „Definition"
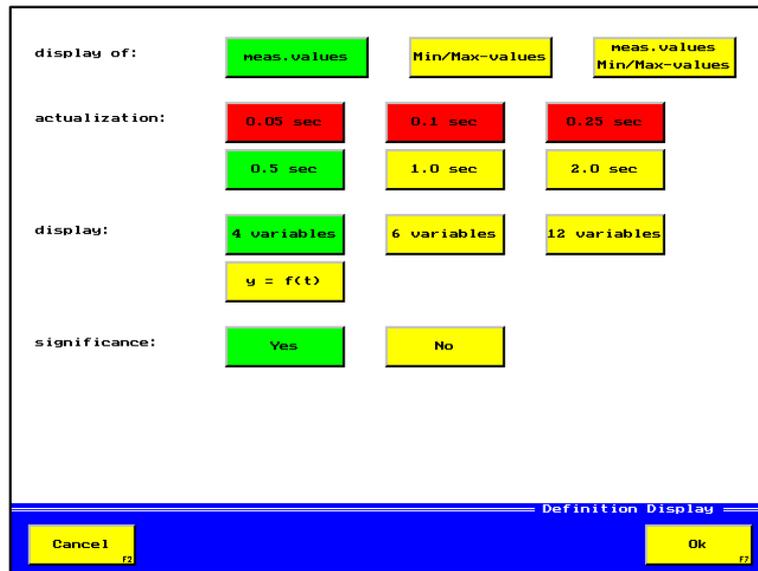
Picture 3.5   Menu: Definition display (text mode)

In the graphic mode „Y=f(t)" additional function keys are available !
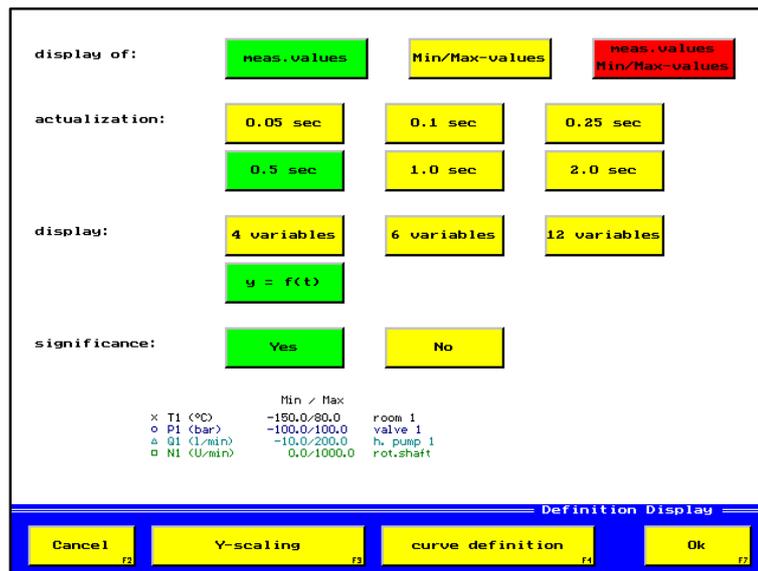
Picture 3.6   Menu: Definition display (graphic mode)
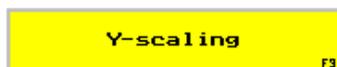
Cancel F2	Menu „Configuration" (picture 3.4) is displayed. Modifications won't be taken over.
Y-scaling F3	Adjustment of the y-scaling for the graphic display of measuring values. For the graphic analysis, this scaling is used as a manual pre-setting, too.
curve definition F4	Adjustment of the colours and symbols for the marking of measuring value curves. For the graphic measuring value display, this adjustment is used as a manual pre-setting, too.
Ok	Menu part „Configuration" (picture 3.4) is displayed. Modifications will be taken over.

Input possibilities

<u>Display of ...</u>

<u>Measuring values:</u>
In the text and graphic mode the arithmetic mean of the measuring values is displayed. The period in which the mean value is calculated, is fixed in field „Actualisation".

<u>Min./max.-values:</u>
In the text mode, the display window for each measuring channel is divided into two fields. In the upper field the min., in the lower field the max. measuring value is displayed. The min./max.-values can be deleted by switching off/on the measuring instrument or by deleting them intentionally in menu „Delete min./max.-memory", only. Then, the displayed min./max.-values are overwritten by current measuring values. In the graphic mode a line is drawn, the width of which depends on the min./max.-values. For each dot in x-direction the min./max.-values are calculated again. At analogue channels, the min./max.-values are acquired every 1 ms.

<u>Measuring value - min./max.-value: (only in text mode)</u>
The display contains the minimum value in the left corner, the maximum value in the right corner and the measuring value large. This display combines the two possibilities mentioned-above.

<u>Actualisation</u>
With this parameter you can fix, how often the display shall be actualised.
The instrument displays a mean value, calculated within the time, adjusted here.

<u>Display</u>
The text mode is selected by pressing the keys „4", „6" or „12", the graphic mode with key „y=f(t)". The keys „4", „6" and „12" fix the maximum number of measurable variables that can be displayed simultaneously on the screen.
The size of the windows also depends on the selected number, if „4" is selected, the windows will be bigger, if „12" is selected the windows will be smaller.
However, you only fix the maximum number of windows to be shown, not the number of windows that are shown. The real displayed number of windows depends on the number of the selected channels, which are fixed in menu „Config-display-channels". In the graphic mode the measuring values are displayed online as a curve. If the screen is filled, the drawing of the curve starts at the beginning.
With help of „Actualisation" you can fix the time, within which the screen is filled.

<u>Significance</u>
If key „Yes" is pressed, an additional text can be freely defined for the each measuring channel (10 digits). This additional text will be displayed in the menu and stored.In the graphic display of a curve (see menu: „memory-display-graphic-curve definition") there is another key, that makes the additional text possible for the evaluation. If you press key „No" no additional text can be entered.

3.2.1.1. Function key „Y-scaling"
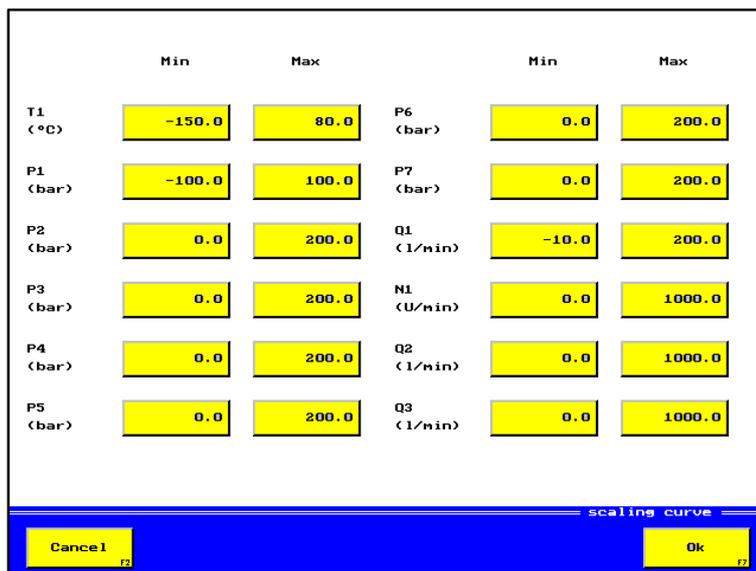
Picture 3.7   Menu: Scaling graphics

 Menu „Configuration" (picture 3.6) is displayed.
Modifications won't be taken over.

 Menu „Configuration" (picture 3.6) is displayed.
Modifications will be taken over.

For each channel an extra scaling is possible. This scaling is used for the graphical measuring value display and as a proposal in the graphical evaluation of curves. To modify the scaling, please invoke the requested selection key to open the input panel.

3.2.1.2. Function key „Curve definition"
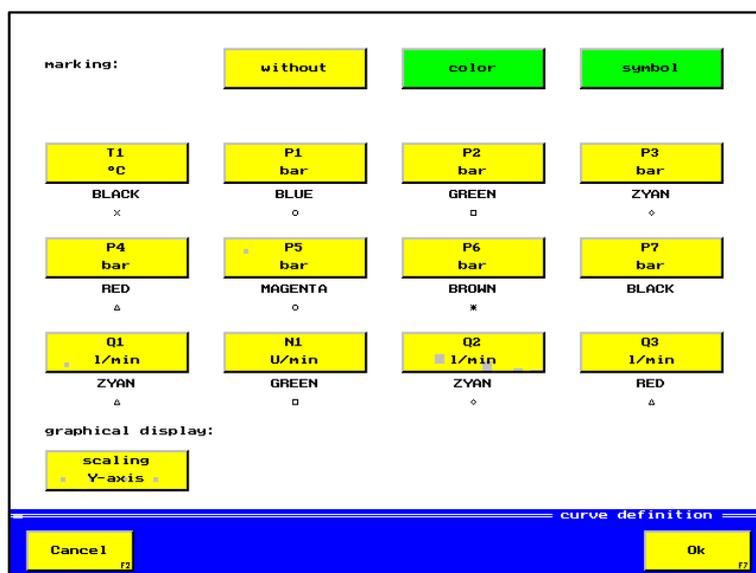
Picture 3.8   Menu: Curve definition (without scaling Y-axis)
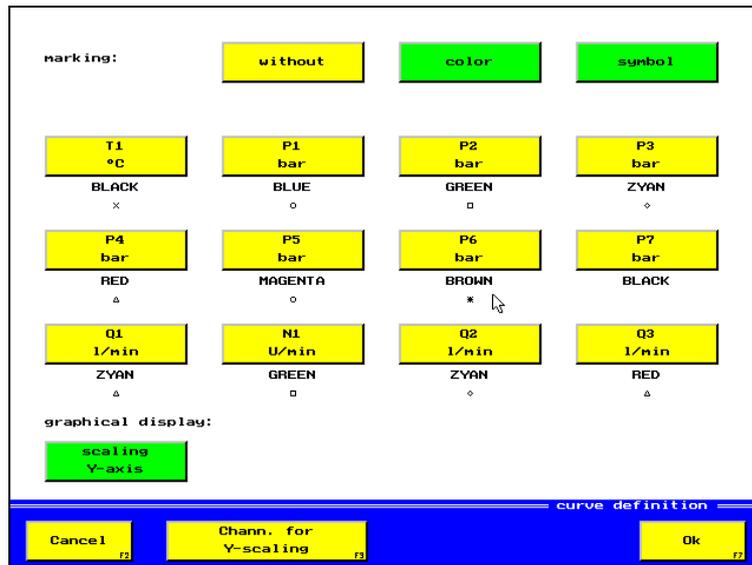
Picture 3.9   Menu: Curve definition (with scaling Y-axis)

Cancel F2	Menu „Configuration" (picture 3.6) is displayed. Modifications won't be taken over.
Chann. for Y-scaling F3	Activates the menu for selection of the variables, that shall be scaled at the y-axis (see chapter 5.3.2.2.1, picture 5.16)
Ok	Menu „Configuration" (picture 3.6) is displayed. Modifications will be taken over.

Input possibilities

Marking

Color/Symbol
To carry out modifications of the colours or the symbols, you have to activate either the input field „color" or the input field „symbol".
After you have adjusted colour and symbols, you can activate both keys for the display.

Without
All curves are drawn in black and have no symbols for identification.

3.2.2.   Function key „Channels"
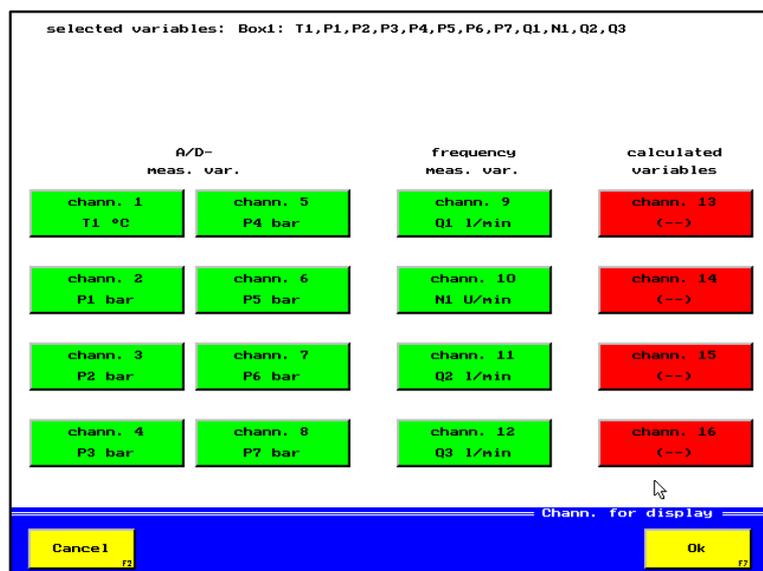
Picture 3.10   Menu: Channels for display

!MC
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When using the software MC8000.EXE and having connected more than one measuring instrument, you can also select channels from other instruments.

Cancel `F2`   Back to menu „Configuration display" (picture 3.5)

Ok   Back to menu „Configuration display" (picture 3.5) and adjusted channels are taken over.

All channels are measured generally, with the selection keys you only fix the channels that shall be displayed on the screen. A maximum of 12 channels can be selected. However in the text mode you can limit them to 4 or 6 channels (see menu „Definition display").

Input possibilities

AD-variables
Eight analogue measuring channels are directly at your disposal.

Frequency-variables
You can dispose of four frequency channels directly.

Calculated variables
A maximum of four calculated variables are possible, which need to be defined in menu „Programming" first.

4.   Programming

In menu „Programming" you can carry out the following:

- Fix the measurable variables, for example: p (pressure), T (temperature), N (RPM)
- Fix the units of measurement, for example: bar, mbar, °C, °F, l/min, l/h, etc.
- Input of any significance, for example: cylinder 1, motor 2, oil pressure, etc.
- Selection of the used sensor type, for example: 0 to 20 mA, 4 to 20 mA, etc.
- Adjustment of measuring range, for example: 0 to 400 bar, -50 to 200°C, etc.
- Zero point adjustment
- Input of linearisation tables
- Definition of calculated variables, for example: dP, dT, ∑P, etc.
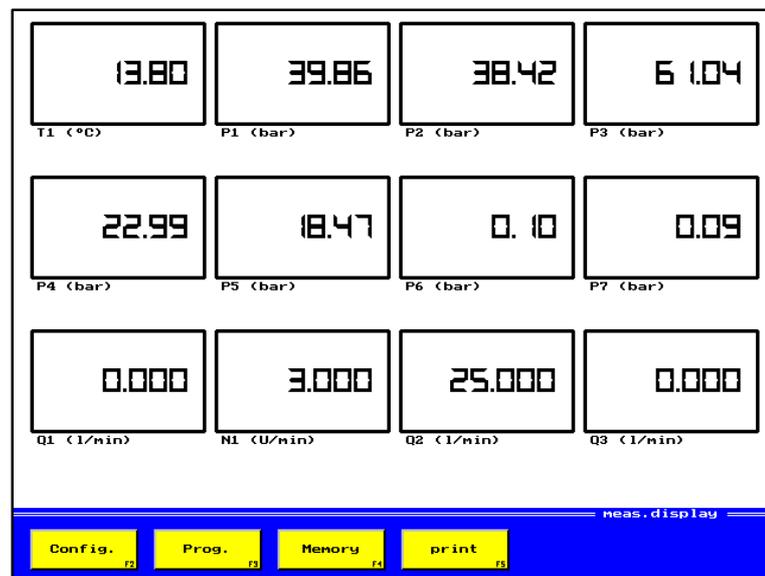
Picture 4.1   Menu: Measuring value display (12 variables)

Example of a measuring display with the adjustment „12 variables" and 12 activated channels.

After having activated function key „Prog.", you have the following possibilities for selection:


```
                A/D-              frequency        calculated
              meas. var.        meas. var.        variables
 chann. 1       T1   chann. 5      P4   chann. 9      Q1   chann. 13
 0/20       -50/200  0/20         200   n.d         1000      (--)

 chann. 2       P1   chann. 6      P5   chann. 10     N1   chann. 14
 0/20          200   0/10         200   n.d         1000      (--)

 chann. 3       P2   chann. 7      P6   chann. 11     Q2   chann. 15
 0/20          200   0/20         200   n.d         1000      (--)

 chann. 4       P3   chann. 8      P7   chann. 12     Q3   chann. 16
 0/20          200   4/20         200   n.d         1000      (--)

                                                    programme Chann.
    return
       F2
```

Picture 4.2   Menu: Programming channels

return F2   Switches back to the measuring value display (picture 4.1)

The menu shows 16 keys for selection of the programmable measuring channels:

- 8 channels for A/D – measurable variables (see 4.1)
- 4 channels for frequency measurable variables (see 4.2)
- 4 channels for calculated variables (see 4.3)

Besides the designation of the channel, the selection keys contain the following information:

- sensor type (analogue) 0 to 20 mA, 4 to 20 mA, 0 to 10 V
- sensor type (frequency) with and without detection of direction (w.d. / w.o.d.)
- calibration value
- „Lin." if you work with linearisation table
- correction value of the alignment for calculated variables

Every channel may be programmed individually.

4.1. Selection key „Configuration AD-variable"

As an example for the manual, AD-channel 1 is programmed. The channels 2 to 8 are programmed in the same way, too. After having activated channel 1, you will see one of the following two menus:

(Instead of „P1" another variable can be selected, too.)

No linearisation activated !

Configuration	meas. var.: P
	unit meas.: bar
	significance: cylind. 1A

sensor type: [0-20 mA] [4-20 mA] [0-10 V]

measuring range [bar]: [-50.00] [200.00]

[Zero point]

[No] [Tab.1] [Tab.2]

[Tab.3] [Tab.4] [Tab.5]

programme Box1 chann.1

[Cancel F2] [significance F3] [Ok F7]
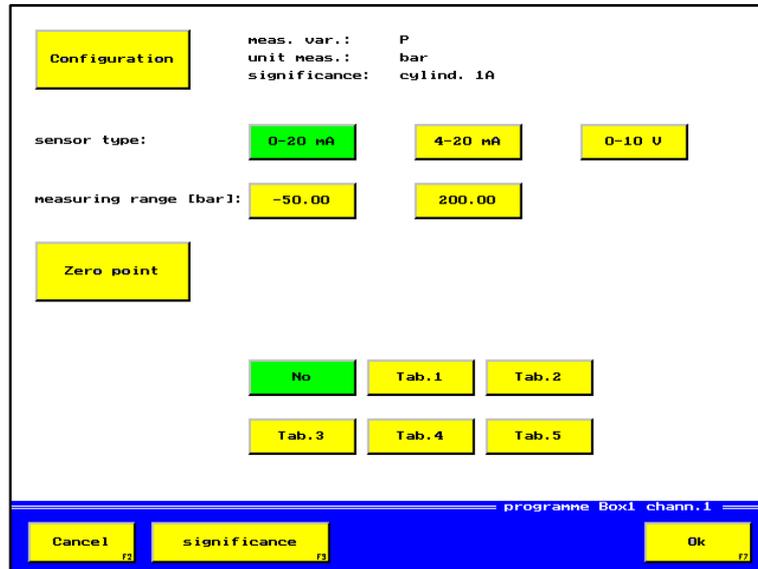
Picture 4.3   Menu: Programming channel 1 without linearisation

Linearisation activated with table 1.

Configuration	meas. var.: P
	unit meas.: bar
	significance: cylind. 1A

sensor type: [0-20 mA] [4-20 mA] [0-10 V]

measuring range [bar]: [-50.00] [200.00]

table: [   ]

linearisation: [No] [Tab.1] [Tab.2]

[Tab.3] [Tab.4] [Tab.5]

programme Box1 chann.1

[Cancel F2] [significance F3] [Ok F7]
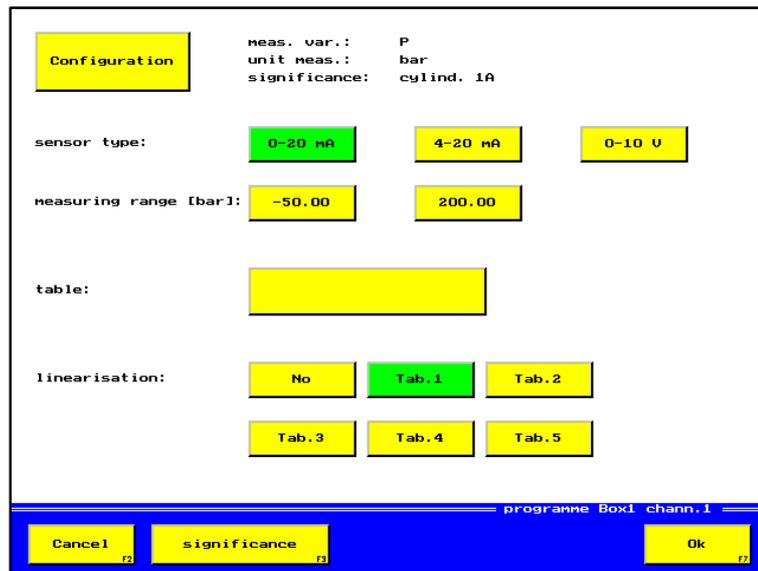
Picture 4.4   Menu: Programming channel 1 with linearisation

Cancel F2	Menu „Programming channels" (picture 4.2) is displayed. Modifications won't be taken over.
significance F3	The significance is a text with 10 digits that can be chosen freely and that describes the measuring channel.
Ok F7	Menu „Programming channels" (picture 4.2) is displayed. Modifications will be taken over.

Input possibilities

Configuration
With this selection key you can modify the unit of measurement and the significance of the measurable variable. All parameters for variables and units can be programmed, as shown in picture 4.5. The current adjustment of this channel is shown besides the selection key. Usually the adjusted programming data for this channel isn't deleted at a modification, only when switching from SI- into US-units, all programming data is recalculated (see chapter 4.2).

Sensor type
With this selection key the measuring channels are adjusted to the connected sensors.

Measuring range
To enter the measuring range you have to use two keys. The left key for the starting value, the right key for the final value. You can see the measuring range of the sensor from its label, stuck-on. If the measuring range of a channel is modified, the correction value from the zero point correction will be deleted automatically.

Interpretation of measuring range:

Sensor type	Starting value	Final value	Calculation of measuring value display
0 to 20 mA	measuring value for sensor signal 0 mA	measuring value for sensor signal 20 mA	linear over the range
4 to 20 mA	measuring value for sensor signal 4 mA	measuring value for sensor signal 20 mA	linear over the range
0 to 10 V	measuring value for sensor signal 0 V	measuring value for sensor signal 10 V	linear over the range

Zero point alignment
The zero point alignment serves for the correction of the measuring value display and is only possible, if no table has been invoked in selection field „Linearisation".
With the zero point alignment it is possible to correct a measuring value deviation, caused by a sensor. If for example a pressure sensor of 0 to 10 bar shows 0,05 bar without being pressurised, this deviation can be corrected to 0,00 bar by this alignment (see 4.1.2)

Table
With this key you can enter the linearisation values and a name for the activated linearisation table, but only, if one of the five possible tables is invoked in selection field „Linearisation" (see 4.1.3).

Linearisation
With help of a linearisation it is possible to use non-linear sensors for precise measurements. Usually, a calibration certificate is enclosed to each sensor when it is delivered. In this certificate measuring deviations are recorded and can be corrected automatically through subsequent calculations.

No:
No linearisation table is used for the calculation of the measuring value.

However, the table remains stored and can be used later.

<u>Tab. 1 to Tab. 5:</u>
With one of the keys „Tab. 1" to „Tab. 2" you fix, which linearisation tables shall be used for the calculation of the measuring values. A maximum of five different linearisation tables can be defined per channel (4.1.3). In doing so, you can measure at one measuring channel with five different sensors, without having to enter the corresponding linearisation tables again and again. The input / correction of the linearisation values is made in field „Table".

4.1.1. Selection key „Configuration"
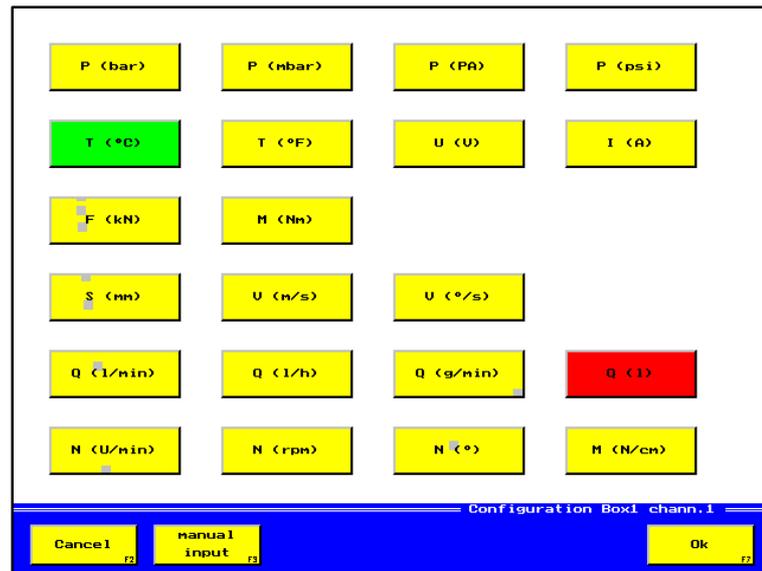
Picture 4.5   Menu: Configure channel 1

Cancel F2	Menu „Programming channel 1" (picture 4.3) is displayed. Modifications won't be taken over.
manual input F3	Input of a measurable variable, defined by you, possible.
Ok F7	Menu „Programming channel 1" (picture 4.3) is displayed. Modifications will be taken over.

To fix measuring variable and unit of measurement, one channel has 19 direct selection keys and one input key for a manual input. The units are calculated automatically, for example from bar into psi.

Input possibility

<u>AD-variables</u>
Here you can select the requested measurable variable and unit of measurement for the measuring channel. If the requested variable or unit isn't included in the list, please use key „manual input".

4.1.2.   Function key „Manual input"

Here you have to enter the requested letter for the identification of the selected variable and the corresponding unit of measurement.

The display „Info" shows, that you shall enter a new designation for an analogue measuring channel.
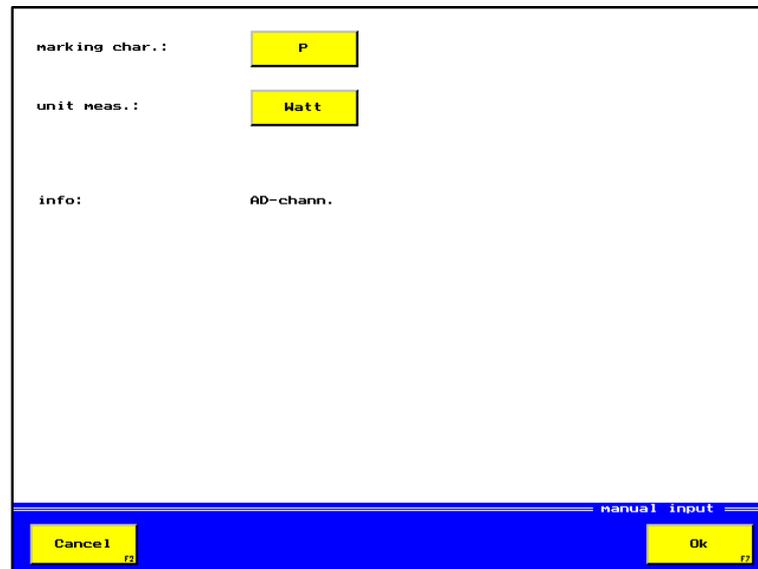
marking char.:   P

unit meas.:   Watt

info: AD-chann.

Manual input

Cancel   Ok

Picture 4.6   Menu: Manual input

Cancel
F2

Menu „Configure channel 1" (picture 4.5) is displayed. Modifications won't be taken over.

Ok
F7

Menu „Configure channel 1" (picture 4.5) is displayed. Modifications will be taken over.

Input possibilities

Marking character
The marking character indicates the type of measuring signal. You can select any letter as an marking character, for example „P" for the electric performance but „VA" (Watt) as a measuring unit.

☞ The marking character for the measurable variable is always written in capitals.

Unit of measurements
The input of the unit of measurements is carried out in the same way as already described in chapter „Marking character".

4.1.3. Selection key „Zero point alignment"

```
┌─────────────────────────────────────────────────┐
│                                                 │
│                                                 │
│                                                 │
│    The zero point error of the sensor is        │
│                                                 │
│    corrected.                                    │
│                                                 │
│    Therefore, the sensor must not have any signal!│
│                                                 │
│                                                 │
│                                                 │
│    zero point correct.:  0.00 bar               │
│                                                 │
│                                                 │
│                                                 │
│                                                 │
│═══════════════════════════ Zero point chann. 1 ═│
│  ┌────────┐         ┌────────┐        ┌────────┐ │
│  │Cancel  │         │alignm. │        │  Ok    │ │
│  │     F2 │         │     F4 │        │     F7 │ │
│  └────────┘         └────────┘        └────────┘ │
└─────────────────────────────────────────────────┘
```

Picture 4.7   Menu: Zero point alignment channel 1

Cancel F2 Menu „Programming channel 1" (picture 4.3) is displayed. Modifications won't be taken over.

alignm. F4 Zero point alignment is carried out.

Ok F7 Menu „Programming channel 1" (picture 4.3) is displayed. Modifications will be taken over.

4.1.3.1.   Function key „Alignment"

```
┌─────────────────────────────────────────────────┐
│                                                 │
│                                                 │
│    The zero point error of the sensor is        │
│                                                 │
│    corrected.                                    │
│                                                 │
│    Therefore, the sensor must not have any signal!│
│                                                 │
│                                                 │
│                                                 │
│    zero point correct.:  0.00 bar               │
│                                                 │
│                                                 │
│            ┌──────────────────────┐             │
│            │    please wait        │             │
│            └──────────────────────┘             │
│═══════════════════════════ Zero point chann. 1 ═│
│  ┌────────┐         ┌────────┐        ┌────────┐ │
│  │Cancel  │         │alignm. │        │  Ok    │ │
│  │     F2 │         │     F4 │        │     F7 │ │
│  └────────┘         └────────┘        └────────┘ │
└─────────────────────────────────────────────────┘
```

After the zero point alignment is carried out, the correction value will be shown.
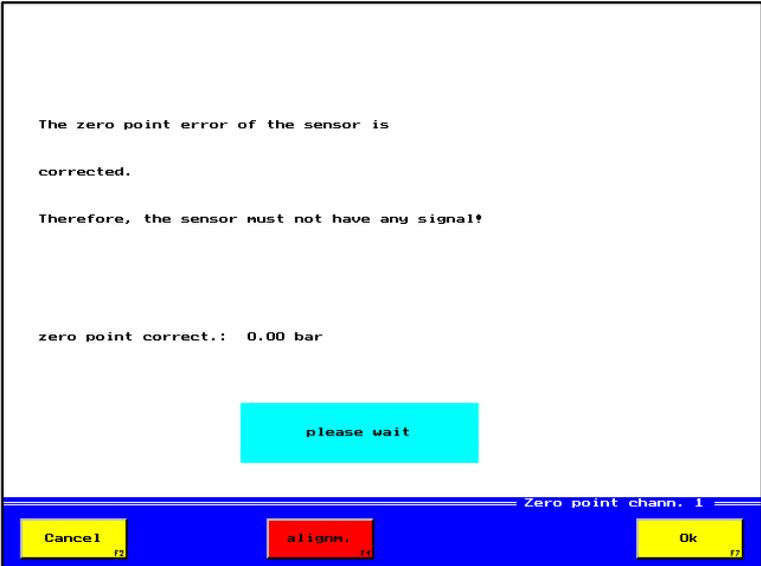
Picture 4.8   Menu: Carry out Zero point alignment channel 1

4.1.4. Selection key „Table"

<u>After activation of key „Table" (picture 4.4) the following menu is displayed:</u>

As an example, the data of a pressure sensor, 4 to 20 mA, with a measuring range of 0 to 400 bar (part-no.: 3403-15-71.37) is shown.

```
name of table:            0 - 400 bar


                Ref.        Act.                  Ref.        Act.
                (bar)       (bar)                 (bar)       (bar)

        1:    3.9000      3.9000          6:    199.70      199.40

        2:    40.400      40.300          7:    239.70      239.40

        3:    80.100      80.000          8:    279.80      279.50

        4:    120.00      119.80          9:    319.80      319.70

        5:    160.00      159.80         10:    400.00      400.30

                                               linearisation chann. 1
     Cancel                                                      Ok
           F2                                                       F7
```

Picture 4.9   Menu: Linearisation channel 1

Cancel (F2)   Menu „Programming channel 1" (picture 4.4) is displayed. Modifications won't be taken over.

Ok (F7)   Menu „Programming channel 1" (picture 4.4) is displayed. Modifications will be taken over.

Input possibilities

<u>Name of table</u>
For the name of the table a maximum of 12 digits can be used. Here you can enter the part-number of the sensor, for example, or, if several sensors with the same part number are used, their work's number.

<u>Setpoint-/actual values</u>
You can enter max. 10 pairs of linearisation values into the table. The setpoint- and actual values are entered in the unit, indicated in (...). The pairs of values are listed up according to the size of the setpoint value, when this selection key is invoked. Therefore you don't have to pay attention to the order of the entered values, as the pairs of values are automatically sorted when the menu is finished with OK. New linearisation values can simply be written at the end of the list.

> The input of 0,0 as a setpoint- or an actual value is not allowed.
> Should you require this value, nevertheless, please enter 0,0001 instead.

4.2. Selection key „Configuration frequency measurable variable"

As an example for the manual, the programming is described for frequency channel 9. The channels 10 to 12 are programmed in the same way, too.
After having activated channel 9, you will see one of the following two menus:

Instead of „Q1" another variable can be selected, too.

No linearisation activated !

Picture 4.10   Menu: Programming channel 9 without linearisation

Linearisation activated with table 1 .

Picture 4.11   Menu: Programming channel 9 with linearisation
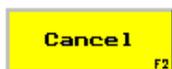
Cancel F2	Menu „Programming channels" (picture 4.2) is displayed. Modifications won't be taken over.
significance F3	The significance describes the measuring channel in more detail and may have 10 digits.
Ok F7	Menu „Programming channels" (picture 4.2) is displayed. Modifications will be taken over.

Input possibilities

Configuration
With this selection the user can modify measuring unit and significance of measurable variable. All parameters for measurable variables and units of measurement can be programmed, as shown in picture 4.12. The current adjustment of this channel is displayed besides the selection key. Usually the adjusted programming data for this channel isn't deleted at a modification, only when switching from SI- into US-units, all programming data is recalculated (see chapter 4.2.1).

Sensor type
If the sensor, connected to this channel, gives a corresponding signal, the detection of direction can be switched on with this selection key.

Calibration value
For the input of the calibration value, you only need the calibration certificate of the sensor, where the exact value for your sensor is mentioned.
This function will only be possible, if no table is selected in field „Linearisation".

Interpretation of calibration value:

Measuring principle	Calculation of measuring value display
Counter	Each pulse increases or lowers the measuring value display by the indicated calibration value.
Volume flow rate	At a frequency of 1000 Hz the measuring value display corresponds to the calibration value.
RPM	The measuring value display is calculated as follows: Input frequency * 60 / calibration value.

Table
With this key you can enter a name for the activated linearisation table as well as the linearisation values (see 4.2.2), but only if one of the five possible tables is invoked in selection field „Linearisation".

Linearisation
With help of a linearisation it is possible to use non-linear sensors for precise measurements. Usually, a calibration certificate is enclosed to each sensor when it is delivered.
In this certificate measuring deviations are recorded and can be corrected automatically through subsequent calculations.

No:
No linearisation table is used for the calculation of the measuring value.

Tab. 1 to Tab. 5:
With one of the keys „Tab. 1" to „Tab. 5" you fix, which linearisation tables shall be used for the calculation of the measuring values. A maximum of five different linearisation tables can be defined per channel (4.2.2). In doing so, you can measure at one measuring channel with five different sensors, without having to enter the corresponding linearisation tables again and again.

4.2.1. Selection key „Configure"
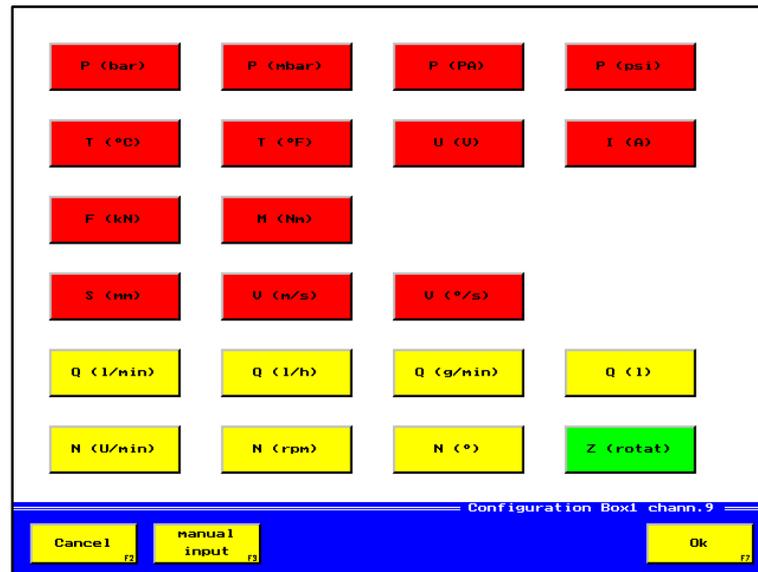
Picture 4.12   Menu: Configuration channel 9

	Menu „Programming channel 9" (picture 4.10) is displayed. Modifications won't be taken over.
Cancel F2	
manual input F3	Possibility to enter any measurable variable.
Ok F7	Menu „Programming channel 9" (picture 4.10) is displayed. Modifications will be taken over.

To fix the measurable variable and unit of measurement, one channel has seven direct selection keys and one key for a manual input.
The units are calculated automatically, for example from bar into psi.

Input possibility

<u>Frequency-variables</u>
Here you can select the requested measurable variable and unit of measurement for the measuring channel. If the requested variable or unit isn't included in the list, please use key „manual input".

4.2.1.1. Function key „Manual input"

Here you have to enter the requested letter for the identification of the selected variable and the corresponding unit of measurement.

The display „Info" shows, that you shall enter a new designation for a frequency measuring channel.

marking char.:	F
unit meas.:	Hz
info:	F-chann.
frequency-type:	counter	discharge
	number of revolutions	

Cancel   manual input   Ok

Picture 4.13   Menu: Manual input

Cancel   Menu „Configure channel 9" (picture 4.12) is displayed. Modifications won't be taken over.

Ok   Menu „Configure channel 9" (picture 4.12) is displayed. Modifications will be taken over.

Input possibilities

Marking character
The marking character indicates the type of measuring signal.
You can select any letter as an marking character, for example „F" for frequency with „Hz" (Hertz) as a measuring unit.

☞   The marking character for the measurable variable is always written in capitals.

Unit of measurements
The input of the unit of measurements is carried out in the same way as already described in chapter „Marking character".

Frequency type
The frequency type indicates, how the measuring signal is processed.
Counter   -   The input pulses of the sensor are counted.
Volume flow rate   -   The input frequency is interpreted as a volume flow rate.
RPM   -   The input frequency is interpreted as a rev. speed.

4.2.2. Selection key „Table"

If you press the input key „Table" (picture 4.11) the following menu will be displayed:

As an example, the data of a turbine RE4-10 with a measuring range of 1 to 10 l (part-no.: 3107-01-35.00) is mentioned.

name of table:			RE4-10		

	frequency (Hz)	value (l/min)		frequency (Hz)	value (l/min)
1:	192.00	1.0200	6:	2965.8	15.370
2:	234.40	1.2200	7:	0.0000	0.0000
3:	492.20	2.5500	8:	0.0000	0.0000
4:	1179.9	6.1200	9:	0.0000	0.0000
5:	1961.6	10.240	10:	0.0000	0.0000

linearisation chann. 9

Cancel F2   Ok F7

Picture 4.14   Menu: Linearisation channel 9

Abbruch F2	Menu „Programming channel 9" (picture 4.11) is displayed. Modifications won't be taken over.
Ok F7	Menu „Programming channel 9" (picture 4.11) is displayed. Modifications will be taken over.

Input possibilities

<u>Name of table</u>
For the name of the table a maximum of 12 digits can be used. Here you can enter the part-number of the sensor, for example, or, if several sensors with the same part number are used, their work's number.

<u>Actual frequency / setpoint value</u>
You can enter max. 10 pairs of linearisation values into the table.
The actual frequency is entered in Hz, the setpoint value in the unit, indicated in (...).
The pairs of values are listed up according to the size of the actual frequency, when this selection key is invoked. Therefore you don't have to pay attention to the order of the entered values, as the pairs of values are automatically sorted when the menu is finished with OK. New linearisation values can simply be written at the end of the list.

☞ The input of 0,0 as an actual frequency or a setpoint value is not allowed. Should you require this value, nevertheless, please enter 0,0001 instead.

4.3.   Selection key „Calculated variables"

As an example for the manual, the programming is described for channel 13.
The channels 14 to 16 are programmed in the same way, too.
After having activated channel 13, you will see one of the following two menus:

You can select
another variable
instead of „dP".

```
┌─────────────────────────────────────────────────────┐
│ ┌───────────────┐   meas. var.:      dP              │
│ │ Configuration │   unit meas.:      bar             │
│ └───────────────┘   significance:    P4-P5           │
│                                                      │
│                                                      │
│ ┌───────────────┐                                    │
│ │ diff. alignment│           0.00                    │
│ └───────────────┘                                    │
│                                                      │
│                          programme Box1 chann.13     │
│ ┌────────┐ ┌─────────────┐                ┌──────┐   │
│ │ Cancel │ │ significance │               │  Ok  │   │
│ │     F2 │ │           F3 │               │   F7 │   │
│ └────────┘ └─────────────┘                └──────┘   │
└─────────────────────────────────────────────────────┘
```
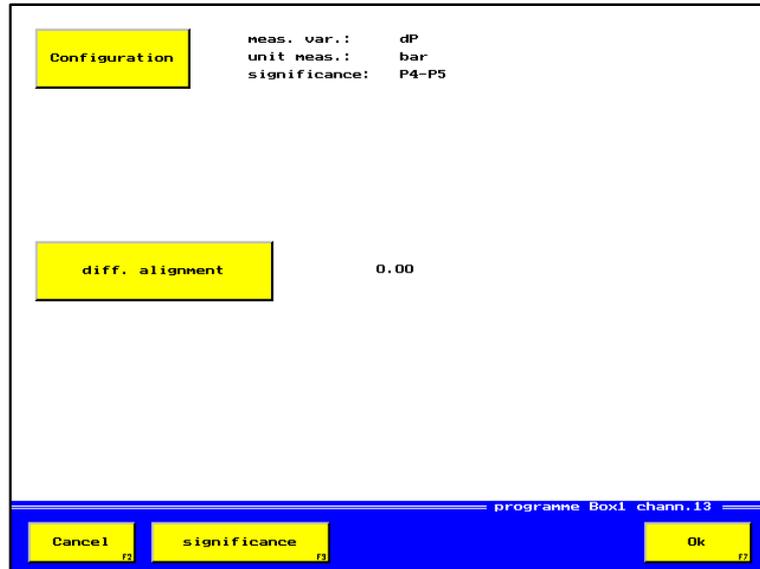
Picture 4.15   Menu: Programming channel 13 (pressure differential)

```
┌─────────────────────────────────────────────────────┐
│ ┌───────────────┐   meas. var.:      ΣP              │
│ │ Configuration │   unit meas.:      bar             │
│ └───────────────┘   significance:                    │
│                                                      │
│                                                      │
│ ┌───────────────┐                                    │
│ │ diff. alignment│           0.00                    │
│ └───────────────┘                                    │
│                                                      │
│                          programme Box1 chann.13     │
│ ┌────────┐ ┌─────────────┐                ┌──────┐   │
│ │ Cancel │ │ significance │               │  Ok  │   │
│ │     F2 │ │           F3 │               │   F7 │   │
│ └────────┘ └─────────────┘                └──────┘   │
└─────────────────────────────────────────────────────┘
```
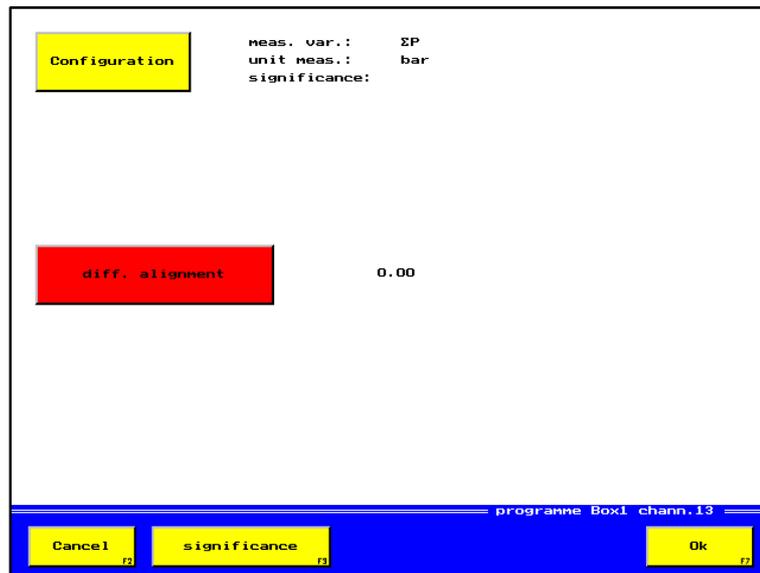
Picture 4.16   Menu: Programming channel 13 (sum pressure)

Cancel F2	Menu „Programming channels" (picture 4.2) is displayed. Modifications won't be taken over.
significance F3	As a significance a text with 10 digits can be chosen, to describe the measuring channel in more detail.
Ok F7	Menu „Programming channels" (picture 4.2) is displayed. Modifications will be taken over.

Input possibilities

<u>Configuration</u>
With this key you can adjust a new assignment for a calculated channel.
The calculated channel is a linkage of two channels, calculated variables may be differences or sums. For the linking of the measuring channels there are fixed rules, it is not possible to combine every measuring channel with each other (see 4.3.1)

<u>Differential alignment</u>
The activation of the differential alignment sets the displayed value to 0,0.
This programming step is only possible for calculated variables that are configured as a difference of two measuring channels. In this case, the two connected sensors can be aligned with any operational level (pressure, etc.) (see 4.3.2).

Please pay attention, that the connected sensors aren't overloaded. Although the differential display may show 0,0, one of the two measuring inputs can work with maximum pressure !

4.3.1. Selection key „Configure"

Depending on the definition of the other channels, some selection keys may be blocked (displayed in red).
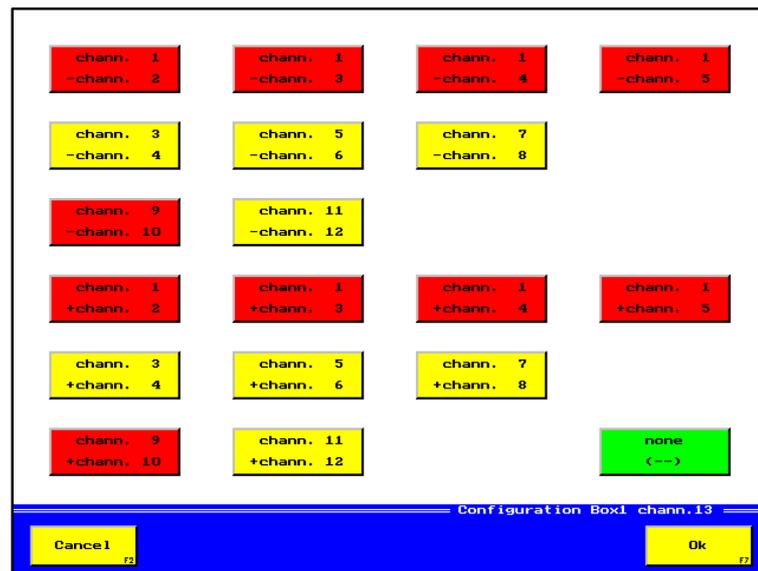
Picture 4.17   Menu: Configure channel 13

Abbruch F2 — Menu „Configure" (picture 4.2) is displayed.
Modifications won't be taken over.

Ok F7 — Menu „Configure" (picture 4.2) is displayed.
Modifications will be taken over.

In the menu there are windows for the various linking of different measuring channels. You can see the current adjustment by the active windows. You can only link channels with the same measurable variable or unit of measurement.

If you modify the configuration (linking of two channels), a stored differential alignment for this channel will automatically be deleted.

4.3.2. Selection key „Differential alignment"


```
Both sensors are aligned and for this, they

need to be connected to the same working

level




diff. correction:  0.00 bar



                                    diff. alignment chann. 13
   Cancel              alignm.                          Ok
```

Picture 4.18   Menu: Differential alignment

   Menu „Programming channel 13" (picture 4.15) is displayed. Modifications won't be taken over.

   Differential alignment is carried out.

   Menu „Programming channel 13" (picture 4.15) is displayed. Modifications will be taken over.

4.3.2.1. Function key „Alignment"

The mean value of the difference of both sensor signals is calculated for approx. two seconds. This mean value will be displayed as a differential correction value.

After the differential alignment the correction value is displayed.

```
Both sensors are aligned and for this, they

need to be connected to the same working

level




diff. correction:  0.00 bar



                  please wait



                                    diff. alignment chann. 13
   Cancel              alignm.                          Ok
```
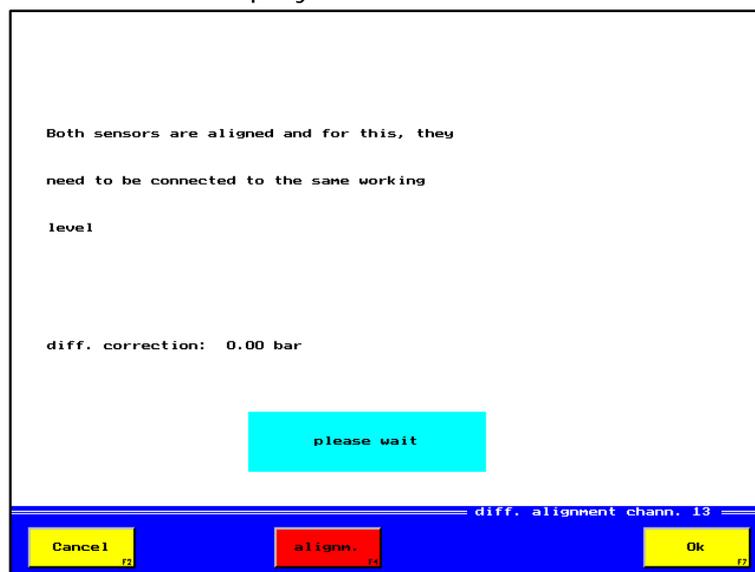
Picture 4.19   Menu: Carry out differential alignment channel 1

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5.   Memory

In menu „Memory" you can carry out the following:

- Fix parameters for storage, for example: channel P1, 1 min. with scanning rate 5 ms, etc.

- Activate a storage

- Display stored data files graphically

- Delete data files out of memory

- Delete min./max.-value memory
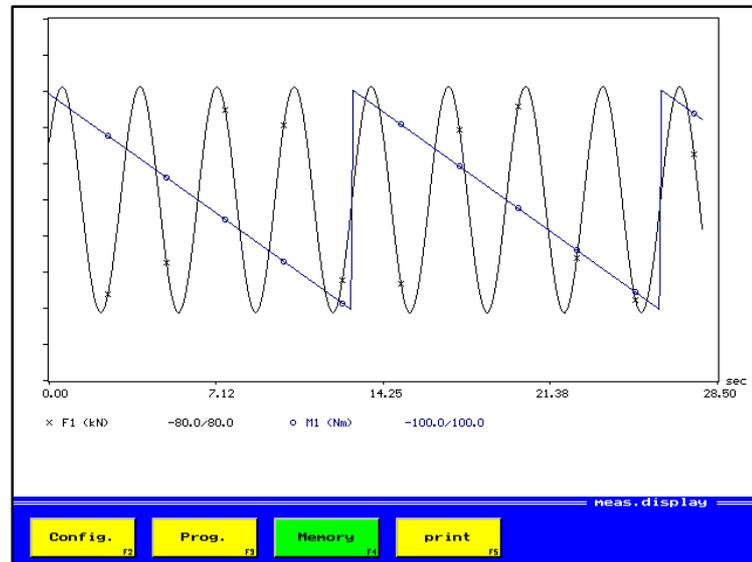
Picture 5.1   Menu: Display y=f(t)

Example for a display with adjustment: „y=f(t)" and two activated channels.

Possibilities for selection after activation of function key „Memory" :
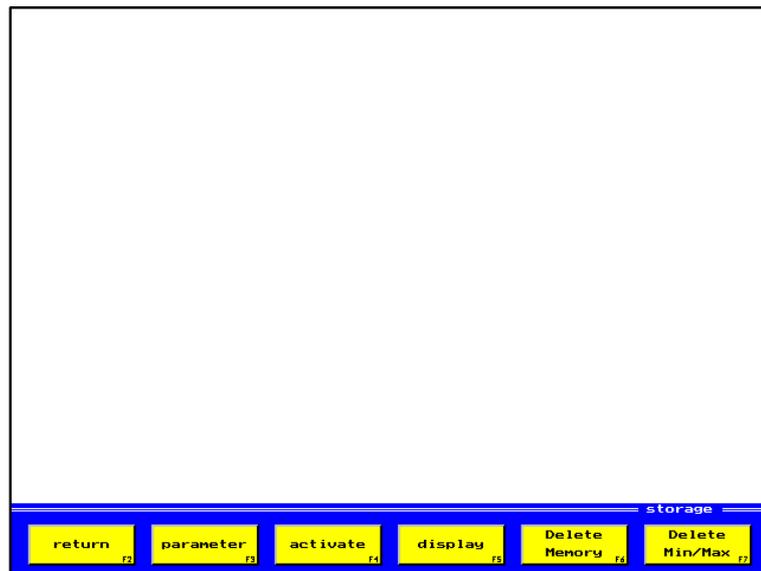
Picture 5.2   Menu: Memory

return F2	Switches back to measuring value display (picture 5.1).
parameter F3	Adjusts „Memory parameters" (see chapter 5.1, picture 5.3). Memory channels, storage time, scanning rate, trigger adjustment
activate F4	Activates a storage with the adjusted memory parameters (see chapter 5.2, picture 5.8)
display F5	Displays stored data files (see chapter 5.3, picture 5.10)
Delete Memory F6	Deletes stored data files (see chapter 5.4, picture 5.22)
Delete Min/Max F7	Deletes min./max.-values (see chapter 5.5, picture 5.23)

5.1. Function key „Parameter"

The current adjustment of the memory parameters is displayed on the screen.
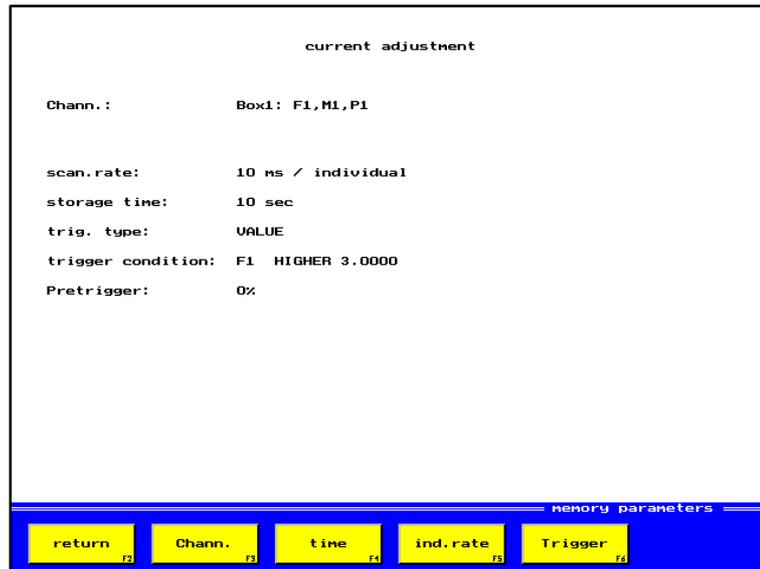
```
                    current adjustment

  Chann.:           Box1: F1,M1,P1


  scan.rate:        10 ms / individual
  storage time:     10 sec
  trig. type:       VALUE
  trigger condition: F1  HIGHER 3.0000
  Pretrigger:       0%




                                    memory parameters
  [ return ]  [ Chann. ]  [ time ]  [ ind.rate ]  [ Trigger ]
        F2          F3        F4          F5           F6
```

Picture 5.3   Menu: Memory parameters

return F2 — Menu „Memory" (picture 5.2) is displayed.

Chann. F3 — The menu „Channels for storage" is displayed and the menu for the selection of the channels to be stored is activated (see chapter 5.1.1, picture 5.4).

time F4 — Activation of the menu for the input of the basic scanning rate and the memory time (see chapter 5.1.2, picture 5.5).

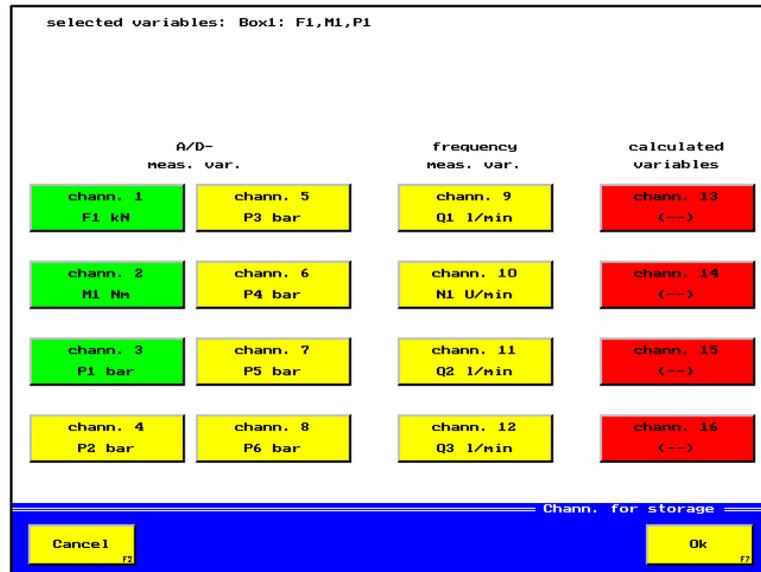**ind.rate** F5 — Activation of the menu for the individual adjustment of scanning rates for different memory channels (see chapter 5.1.3, picture 5.6).

Trigger F6 — Activation of the menu for the fixing of the trigger adjustment (see chapter 5.1.4, picture 5.7).

5.1.1. Function key „Channels"


```
selected variables: Box1: F1,M1,P1


                A/D-                frequency          calculated
              meas. var.          meas. var.          variables

          chann.  1      chann.  5      chann.  9      chann. 13
           F1 kN          P3 bar         Q1 l/min        (--)

          chann.  2      chann.  6      chann. 10      chann. 14
           M1 Nm          P4 bar         N1 U/min        (--)

          chann.  3      chann.  7      chann. 11      chann. 15
           P1 bar         P5 bar         Q2 l/min        (--)

          chann.  4      chann.  8      chann. 12      chann. 16
           P2 bar         P6 bar         Q3 l/min        (--)

                                              Chann. for storage
          Cancel                                        Ok
              F2                                         F7
```

Picture 5.4   Menu: Channels for storage

Menu „Memory parameters" (picture 5.3) is displayed. Modifications won't be taken over.

Menu „Memory parameters" (picture 5.3) is displayed. Modifications will be taken over.
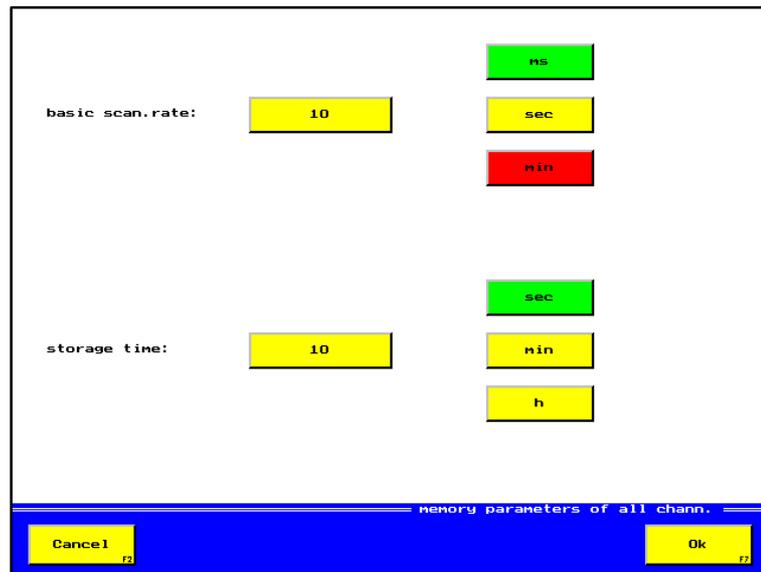
Input possibility

Memory channels

Here you can activate all channels that shall be stored. Channels that are already activated but shall not be stored, can be deactivated by touching the corresponding key. To be able to activate the channels 13 to 16 you have to programme them first (see chapter 4.1 and 4.3).

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In the display field „Selected variables" all selected variables of the max. four instrument Multi-Control 8000 are displayed. In doing so, for each Multi-Control 8000 instrument one line is reserved. You can select a maximum of 12 variables, if more variables are selected, an error will be displayed.

5.1.2. Function key „Time"

Picture 5.5 Menu: Memory parameters of all channels

 Menu „Memory parameters" (picture 5.3) is displayed.
Modifications won't be taken over.

 Menu „Memory parameters" (picture 5.3) is displayed.
Modifications will be taken over.

Input possibilities

Basic scanning rate

With this input key, the values for the scanning rate are entered.
The basic scanning rate is the minimum scanning rate for a storage.
With the „individual scanning rate", single channels can work with a multitude of the basic scanning rate. For the time unit of the basic scanning rate, the selection keys „ms", „sec" and „min" are at your disposal.
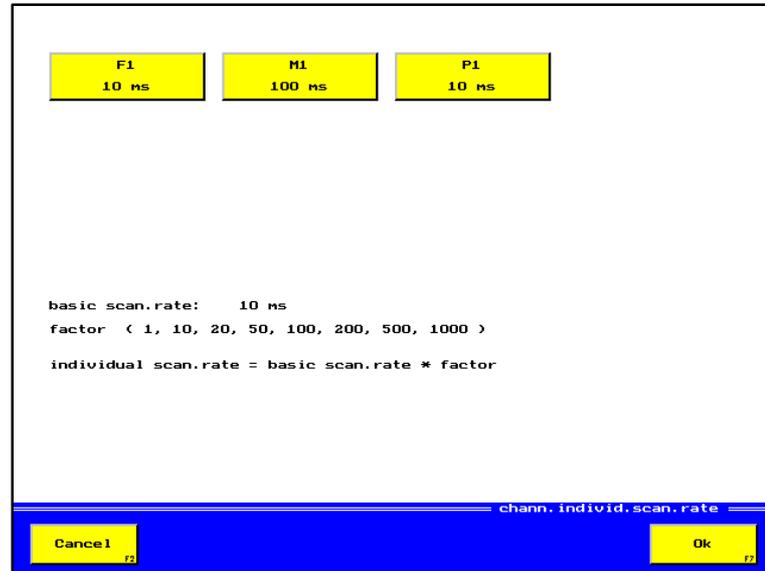
Storage time

The storage time fixes the max. duration of the storage. It starts either when a „manual start" is carried out with key „Start" or when the trigger is reached. Besides the window to enter the storage time, there are selection keys for the time units: „sec", „min" and „h".

5.1.3. Function key „Individual scanning rate"

When pressing one of these selection keys, the individual scanning rate is changed by the following steps (factors): 1, 10, 20, 50, 100, 500, 1000

Example for four memory channels with a basic scanning rate of 5 ms.

F1	M1	P1
10 ms	100 ms	10 ms

```
basic scan.rate:    10 ms
factor  ( 1, 10, 20, 50, 100, 200, 500, 1000 )

individual scan.rate = basic scan.rate * factor
```

chann.individ.scan.rate

Cancel   F2   Ok   F7

Picture 5.6   Menu: Channels individual scanning rate

Cancel F2   Menu „Memory parameters" (picture 5.3) is displayed.
Modifications won't be taken over.

Ok F7   Menu „Memory parameters" (picture 5.3) is displayed.
Modifications will be taken over.

The adjustment of an individual scanning rate is only possible with a pretrigger of 0% (see chapter 5.1.4)

5.1.4. Function key „Trigger"

As long as the adjusted trigger event doesn't occur, the activated storage won't be finished (so-called ring memory). After the trigger event occurred, the rest of the time will be stored and the storage will be stopped automatically. The rest of the storage time is fixed by the complete storage time and by the adjustment of the pretrigger, which indicates the time before the trigger event occurs.

When the pretrigger is adjusted to > 0% it can happen that the trigger event occurs, before the pretrigger time has expired. Then, the complete storage time will be shortened correspondingly. In this case, however, an evaluation with for example 10% of the storage time before and 90% after the trigger event, isn't possible.

Example for a triggering on channel U1, with rising flank to 3 V, no linkage and pretrigger 0%.
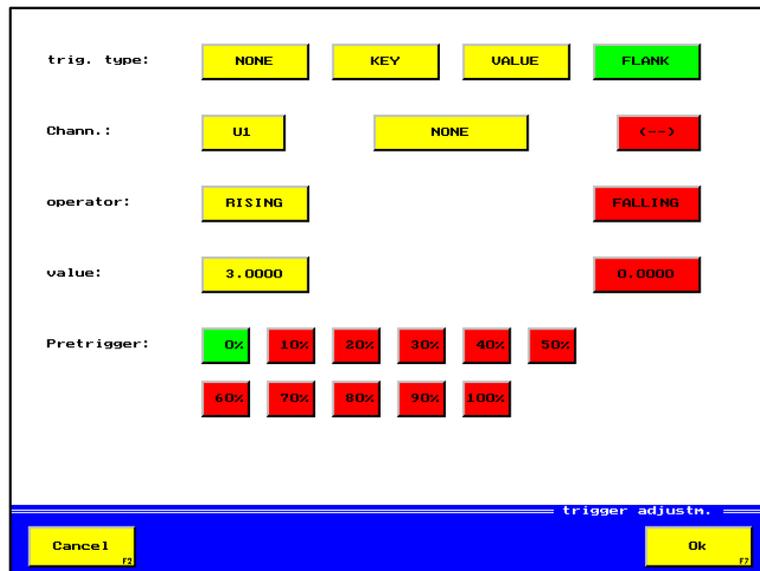
Picture 5.7   Menu: Trigger adjustment

Menu „Memory parameters" (picture 5.3) is displayed. Modifications won't be taken over.

Menu „Memory parameters" (picture 5.3) is displayed. Modifications will be taken over.

Input possibilities

Trigger type
The trigger type fixes, which type the start of the trigger event shall be.
None:
The storage is carried out without trigger. It is started manually with a keystroke and stopped after the adjusted storage time.
Key:
The trigger event is started with a keystroke.
Value:
The trigger event is directly started by the measuring value of the trigger channel,

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depending on the trigger operator. That means, if the measuring value is larger or smaller than the adjusted trigger, the trigger event will be started immediately.

Flank:
The trigger event is started only, if the measuring value passes the trigger value according to the flank. If, for example at the trigger operator „rising", the storage begins and the measuring value is already larger than the trigger value, the measuring value first has to fall below the trigger value and afterwards it must exceed it, to start the trigger event.

Channels

Here, you can select the trigger channel res. the two trigger channels, if they are linked. A linking is only possible when the trigger type is adjusted to „Value" and „Flank".

Linking „None" :
Only one channel is used for the triggering. The measuring value of this channel is used for the testing of the trigger value.

Linking „AND" :
To start the trigger event, both channels need to fulfil the adjusted trigger condition simultaneously.

Linking „OR" :
To start the trigger event, it is sufficient, if one of both channels fulfils the trigger condition.

Linking „START/STOP" :
To start the trigger event, the first trigger channel is used, the second trigger channel can finish the storage early.

Operator

Depending on the trigger type, the options larger/smaller (for „Value") or rising/falling (for „Flank") are available.

Larger/smaller:
After activation of the storage, the measuring value needs to be larger/smaller than the trigger value, to start the trigger event.

Rising/falling:
To start the trigger event, the measuring value needs to be larger/smaller than the trigger value, first, to be able to pass the trigger value rising/falling afterwards.
The recognition if the measuring is smaller or larger than the trigger value has a slight hysteresis to guarantee, that the value really is above or below the trigger value.
The actual trigger value is the really programmed trigger value.

Value

Here you can enter the trigger value that is compared to the measuring value to start the trigger event.

Pretrigger

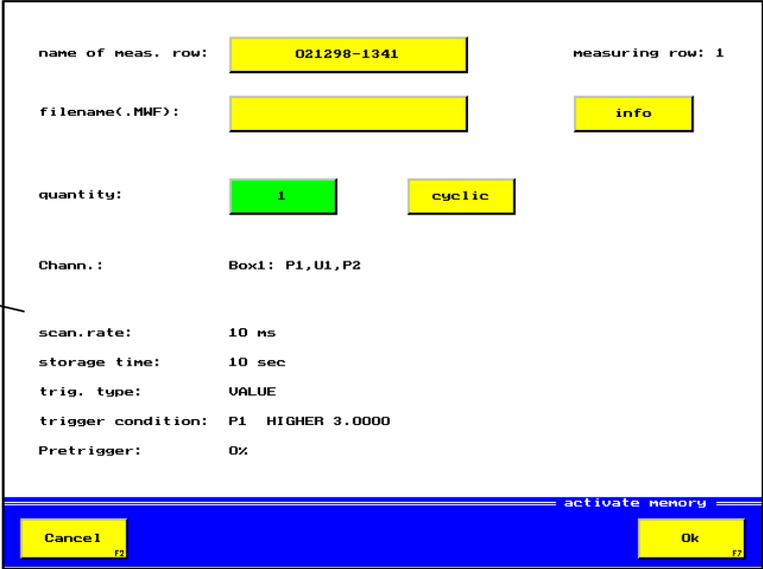The pretrigger fixes the time, that shall be stored before the trigger event is started. In doing so 0% means no storage before the trigger event and 100% storage only until the trigger event. With help of the programmed storage time, you can calculate the percentage into time.

A storage with an individual scanning rate can be carried out with a pretrigger of 0%, only.

5.2. Function key „Activate"

```
name of meas. row:        021298-1341              measuring row: 1

filename(.MWF):                                         info

quantity:            1              cyclic

Chann.:          Box1: P1,U1,P2

scan.rate:       10 ms
storage time:    10 sec
trig. type:      VALUE
trigger condition: P1  HIGHER 3.0000
Pretrigger:      0%

                                          activate memory
 Cancel                                                    Ok
    F2                                                       F7
```

Display of stored memory parameters

Picture 5.8   Menu: Activate memory

Cancel `F2`

Menu „Memory" (picture 5.2) is displayed.
Modifications won't be taken over.

Ok `F7`

Menu „Memory" (picture 5.2) is displayed. Modifications will be taken over.

> If function key „OK" is pressed after activation of a storage, the measuring value display will be shown, again and function key „Print" will be inactive. With key „Stop" the key „Print" is activated again.

Input possibilities

<u>Name of data file</u>
After invocation of this menu, the instrument will name the data file automatically. The name consists of date and time and can be overwritten manually with max. 12 digits.

<u>File name</u>
Here you can enter a file name with a maximum of eight digits, that has to correspond to the conditions for file names in operating system MS-DOS. If a name was entered here, it will be used for the storage of the data file on the PC, when it is transferred to HYDROcomsys/WIN. The file type „MWF" is given automatically.

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When using the PC-software for the Multi-Control 8000 a file name is imperative.

Info
After this input key has been pressed, the alphanumeric keyboard is displayed, with which you can enter an information for the data file, which may have four lines.

Quantity
With this parameter you can fix, if the storage shall be carried out unique or in cycles.

1:
A storage is started and finished afterwards.

Cyclic:
A cyclic storage means, that, after a storage is finished, it is started automatically with the same parameters again. A file name needs to be entered for a cyclic storage, which, however, may consist of 6 digits, only. The complete file name consists of 10 digits, but the last two digits are entered by the system. A cyclic storage can be interrupted with key „Stop cycle" but that doesn't influence an already started storage. After max. 50 storages the memory will be full and the cyclic storage will be finished automatically.

5.3.   Function key „Display"

As an example, a measuring value memory consisting of one data file dated 24.11.1998 and one cyclic data file with five cycles is mentioned.

After the switching on of the instrument no storage is selected and the function keys „Min/Max", „Graphic" and „Info" are inactive.
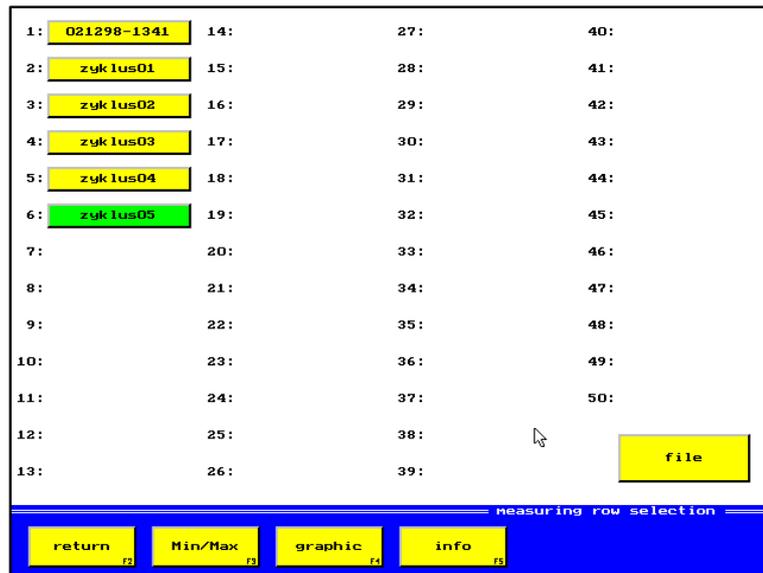
Display of the file name
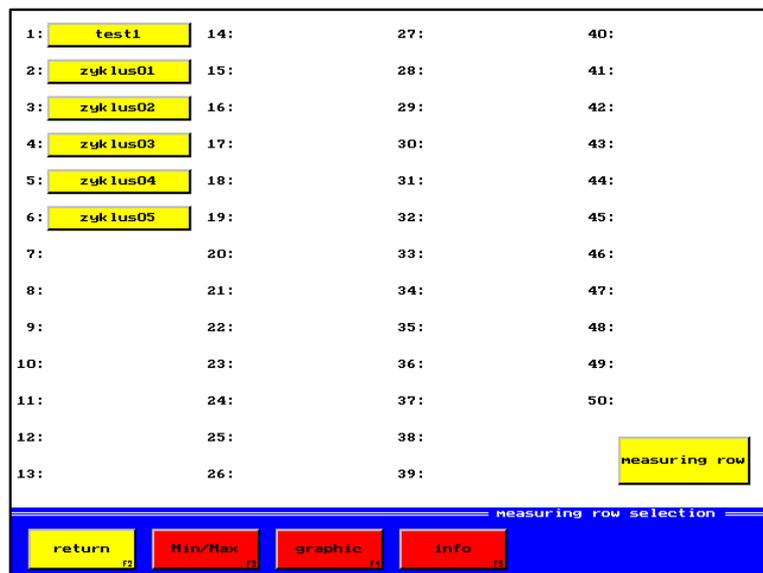
Picture 5.9   Menu: Selection of data file (no data file selected)

During the operation of the instrument, the last storage or selection is activated automatically.

Display of data file name

1:	021298-1341	14:	27:	40:
2:	zyklus01	15:	28:	41:
3:	zyklus02	16:	29:	42:
4:	zyklus03	17:	30:	43:
5:	zyklus04	18:	31:	44:
6:	zyklus05	19:	32:	45:
7:		20:	33:	46:
8:		21:	34:	47:
9:		22:	35:	48:
10:		23:	36:	49:
11:		24:	37:	50:
12:		25:	38:	
13:		26:	39:	file

measuring row selection

return F2   Min/Max F3   graphic F4   info F5

Picture 5.10   Menu: Data file selection

return F2   Switches back to menu „Storage" (picture 5.2).

Min/Max F3   Starts the calculation and display of the min./max.-values of a stored data file (see chapter 5.3.1, picture 5.11).

graphic F4   Invokes the graphic display of a stored data file (see chapter 5.3.2, picture 5.12).

info F5   Displays the menu „Info data file", where the information texts with max. four lines can be displayed and processed (see chapter 5.3.3, picture 5.13).

Input possibilities

Selection keys data files
Here you can select the requested data file from the memory.

Data file

File:
Here you can switch between file name and data file name.
The file name will be used for the data transfer with HYDROcomsys/WIN.

☞ If no file name was entered for a storage, an empty space will be shown in the display of the filename.

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5.3.1. Function key „Min/Max"

If the min./max.-values of this storage were already stored once, they can by displayed directly. New storages have to be calculated first. As this takes some time, the message, „Calculation" is displayed.
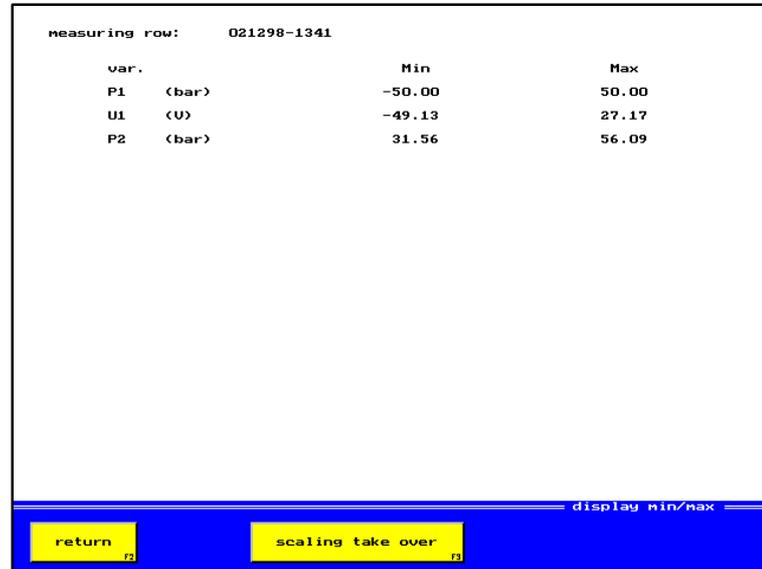
measuring row:	021298-1341		
var.		Min	Max
P1 (bar)		-50.00	50.00
U1 (U)		-49.13	27.17
P2 (bar)		31.56	56.09

display min/max

return F2   scaling take over F3

Picture 5.11   Menu: Display min./max.

Switches back to menu „Selection data file" (picture 5.10).

With this key the displayed values are rounded-off and used for the scaling of the graphic. Afterwards it switches-back to menu „Selection data file" (picture 5.10).

5.3.2.   Function key „Graphic"

The time range, shown on the right side besides the input keys, indicates the storage time of the complete data file. With the input files you can select the range that shall be displayed. It can be selected larger than the storage time. In doing so, you can scale different data files equal, to be able to compare them graphically.
Furthermore all channels, stored in the data file, as well as the scaling belonging to them are displayed.
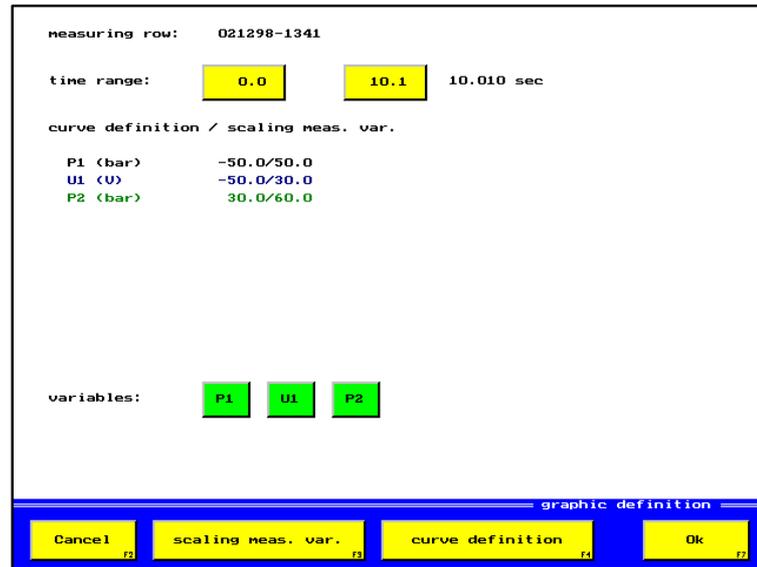
Picture 5.12   Menu: Graphic display

Menu „Selection data files" (picture 5.10) is displayed. Modifications won't be taken over.

Modifies the scaling for the graphic display of measuring values (see chapter 5.3.2.1, picture 5.13).

Adjusts the type of graphic display (see 5.3.2.2, picture 5.14), colour, symbols, significance, scaling, form

Menu „Display" (picture 5.12) is displayed.

Input possibilities

<u>Time range</u>
Here, the time range to be displayed is fixed. The input keys specify the time from „Beginning" to „End" of the requested range. As a help, the complete storage time of the data file is shown on the right side besides the input keys.

It can be sensible to define the „End"-time larger than the complete storage time, to receive a clearer x-scaling, for example.

<u>Variables</u>
All memory channels, existing in the data file, are displayed. By selection of single variables, you can have special curves displayed. However, only a maximum of six curves can be selected at the same time.

5.3.2.1. Function key „Scaling measuring variables"
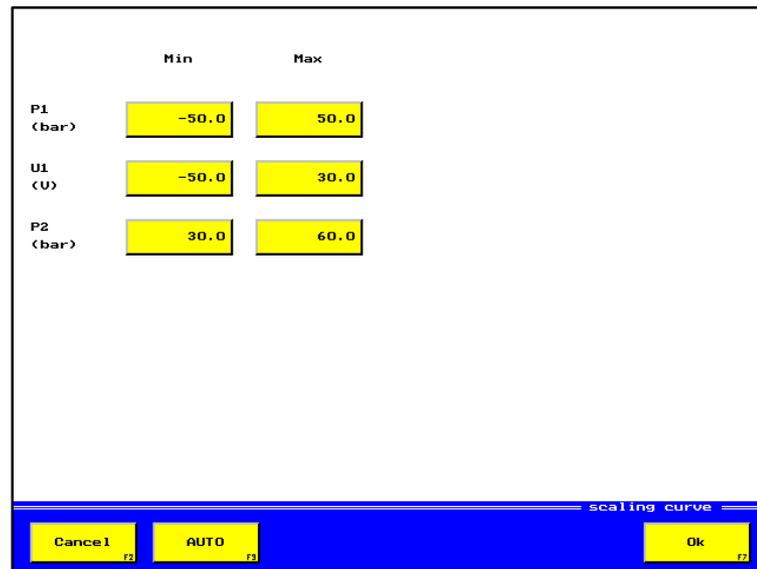
Picture 5.13   Menu: Scaling curve

Cancel F2	Menu „Selection data file" (picture 5.12) is displayed. Modifications won't be taken over.
AUTO F3	Sets-back the scaling to the calculated min./max.-values of the data file. If these haven't been calculated yet, they will be calculated now. During that, the message „Calculation" is shown.
Ok F7	Takes-over the parameters and displays the menu „Graphic display" (picture 5.12) afterwards.

Input possibility
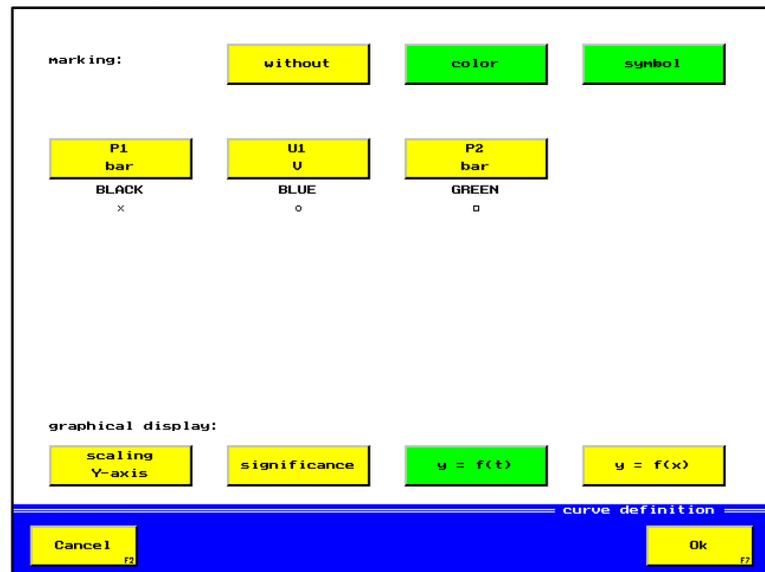
Selection keys „scaling min./max."
With these selection keys you can enter new scaling values or correct the old ones.

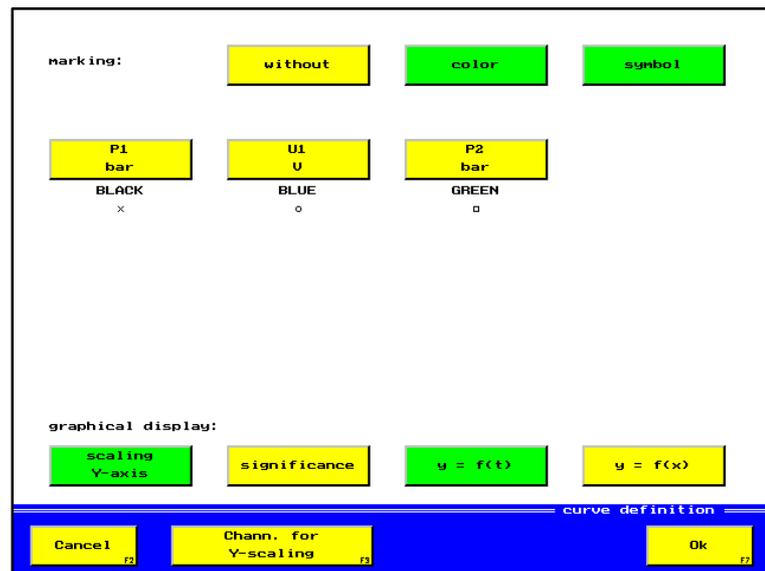## 5.3.2.2. Function key „Curve definition"

The activation of function key „Curve definition" shows one of the following menus:

No scaling Y-axis
activated

Picture 5.14   Menu: Curve definition without scaling Y-axis

Scaling Y-axis
activated.

Picture 5.15   Menu: Curve definition without scaling Y-axis

Cancel F2	Menu „Graphic display" (picture 5.12) is displayed. Modifications won't be taken over.
Chann. for Y-scaling F3	Activates the menu for selection of storage variables, that shall be scaled at the y-axis (see 5.3.2.2.1, picture 5.16)
Ok F7	Modifications will be taken over and the menu „Graphic display" (picture 5.12) will be shown.

Input possibilities

Marking

To be able to identify the curves clearly, you can mark them by choosing a colour and/or a symbol. The following markings are possible:

None	Black
Cross	Blue
Rectangle	Green
Rhombus	Cyan
Triangle	Red
Circle	Magenta
Star	Yellow

For the display of more than seven curves it is recommendable to use a combination of colour and symbols to be able to distinguish.

Without:
All curves will be displayed in black and no symbols will be shown.

Color:
If the colours of the different curves shall be changed, the key „color" should be activated and key „symbols" deactivated. You can assign a certain colour to a variable by pressing the channel key until the requested colour is shown.

Symbol:
If the symbols for the different curves shall be changed, the key „symbol" should be activated and key „color" deactivated. You can assign a certain symbol to a variable by pressing the channel key until the requested symbol is shown.

Scaling y-axis

When this selection key is activated, measuring channels can directly be scaled at the y-axis. If the key is inactive, the scaling will be displayed below the graphic, only. The direct scaling causes a larger graphic display, what is especially useful if many storage variables are shown. Please consider that max. six variables can be scaled at the y-axis.

Significance

With this key you can activate/deactivate the display of the additional text for the graphic display, stored in the data file. This text needs to be entered in „Programming measuring channel" before the storage is carried out.

y = f (t)

The graphic is displayed with the time on the x-axis, for example: P1 = f (t) display of a pressure run P1 depending on the time t.

y = f (x)

With this key one variable is shown on the x-axis, the other variables on the y-axis, for example: P1 = f (Q1) display of a pressure run P1 depending on the flow rate Q1.
If this function is activated, the variable f(...) is blocked as it doesn't need to have colours or symbols. Besides that, the menu part will show function key „Channel x-axis", with which a submenu for selection of another variable for the x-axis can be activated.

> If only one variable shall be stored and key „y = f (x)" is pressed, the display of the memory will automatically be switched back to y = f (t), after a stroke of key OK.

5.3.2.2.1.   Function key „Scaling Y-axis"
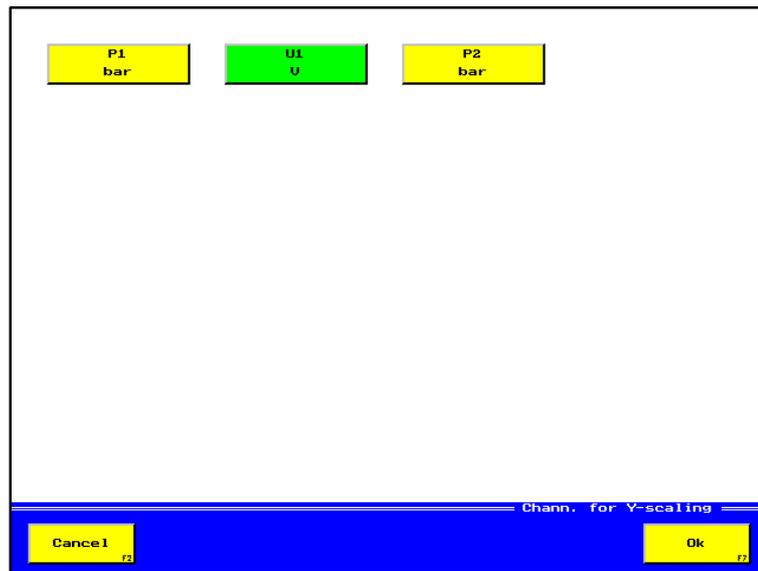
Picture 5.16   Menu: Channels for y-scaling

 Menu „Graphic display" (picture 5.15) is displayed.
Modifications won't be taken over.

 Modifications/Adjustments will be taken over and the menu
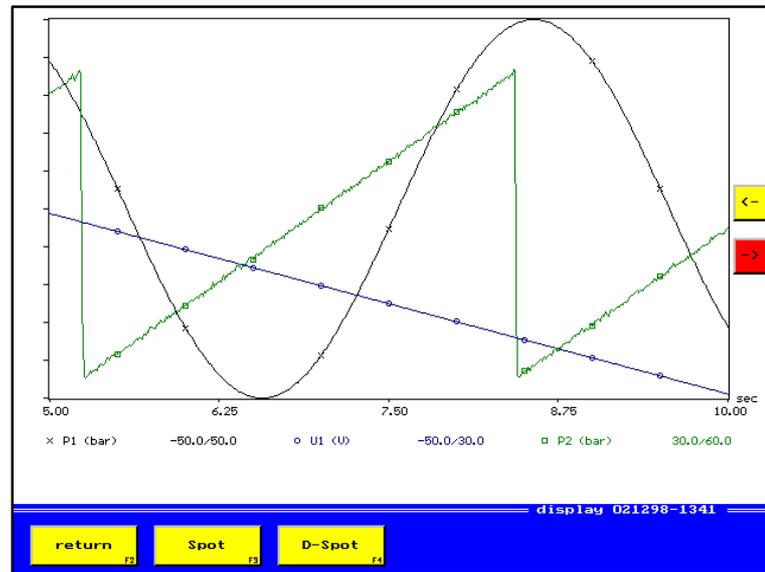„Display" (picture 5.15) is displayed.

Input possibility

Selection keys channels for y-scaling

With this key you can activate the channels that shall be scaled at the y-axis.
All other channels are displayed and scaled below the graphic.

A maximum of six channels can be scaled at the y-axis.

5.3.2.2.2.   Function key „OK" (display graphic)

Picture 5.17   Menu: Display

return Switches back to menu „Graphic display" (picture 5.12).

Spot Displays menu „Spot", a so-called spot-line is displayed in y-direction, in which the exact size of every single measuring value is listed up (see chapter 5.3.2.2.2.1, picture 5.18).

D-Spot Displays menu „D-Spot", two spot-lines are displayed in Y-direction and two spot-lines in y-direction. The differences of the measuring values between the spot-lines will be listed up (see chapter 5.3.2.2.2.2, picture 5.19).

## Input possibilities

<- **->** If the complete curve can't be displayed, these cursor keys will be active. A stroke of such a key will move half of the screen (half a time unit of the displayed time on x-axis) into the corresponding direction. In doing so, you can have the complete curve displayed with a higher x-resolution.

5.3.2.2.2.1.   Function key „Spot"

Example for a spot
display with the
measuring values
on position
t = 14.380 sec.
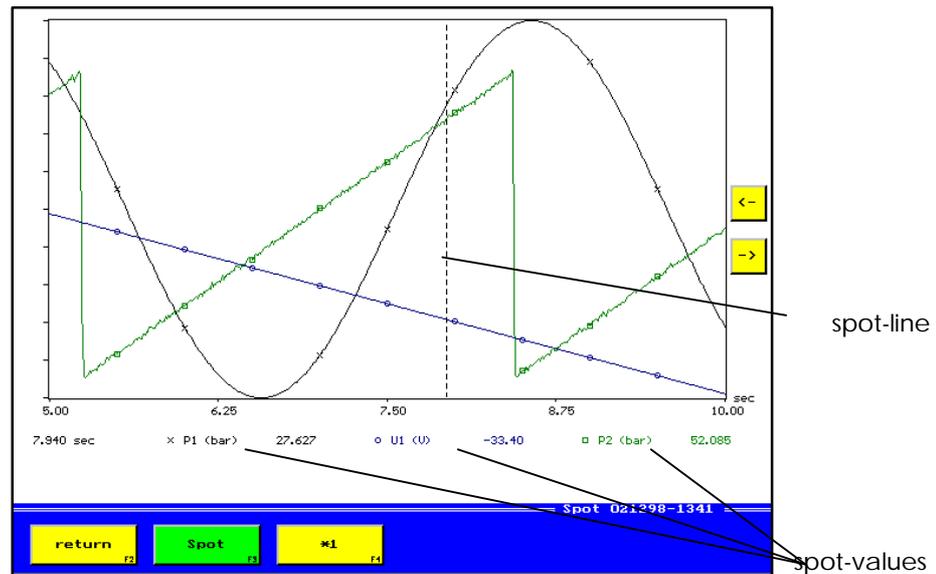
Picture 5.18   Menu: Display spot-values

Switches back to menu „Graphic display" (picture 5.12).

Finishes the spot-display and switches back to menu „Display"
(picture 5.17).

Modifies the width of the steps in the spot-line when pressing the
cursor keys. The cursor keys will automatically become inactive,
if you have reached the beginning or the end of the curve.
The width of the steps can be modified by the factors *1, *10, *100
and *1000. Every step corresponds to one data file in the memory.

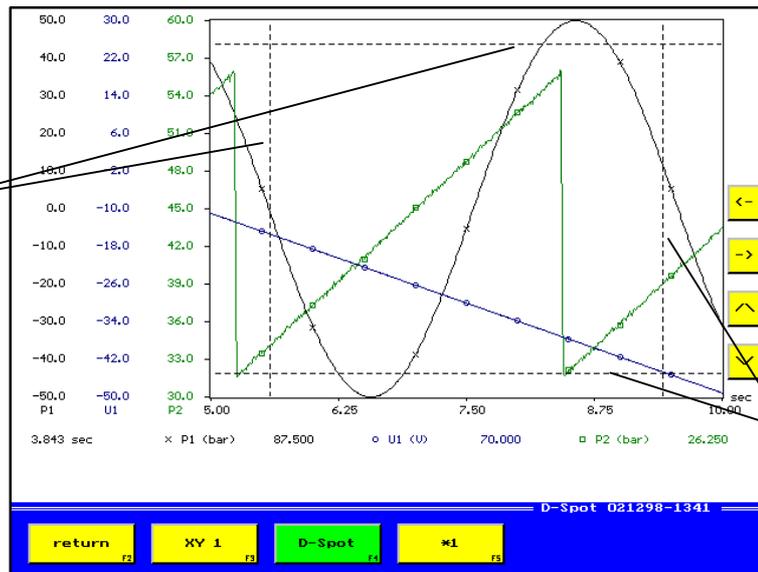### Input possibilities

Moves the spot-line to the left side.

Moves the spot-line to the right side.

5.3.2.2.2.2. Function key „D-Spot"

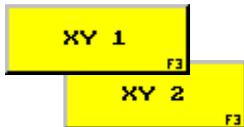Example for a D-spot display with scaling at the y-axis.

xy1 spot-lines
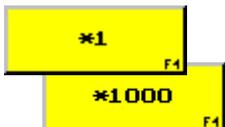

Picture 5.19   Menu: Display D-spot

xy2 spot-lines

Switches back to menu „Graphic display" (picture 5.12).

Switches between the spot-lines xy1 and xy2.
The cursor keys are active for the spot-lines, adjusted here.

Finishes the D-spot display. Switches back to menu „Display" (picture 5.17).

Modifies the width of the steps in the spot-line when pressing the cursor keys. The cursor keys will automatically become inactive, if you have reached the upper or the lower edge of the screen. The width of the steps can be modified by the factors *1, *10, *100 and *1000. Every step corresponds to one pixel on the screen.

Input possibilities

Moves the x1 or the x2 line to the left side.

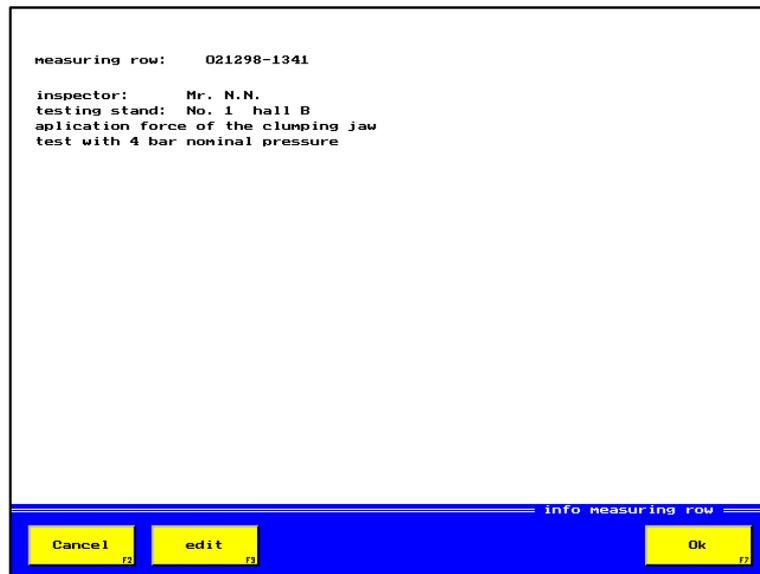Moves the x1 or the x2 line to the right side.

Moves the y1 or y2 line up.

Moves the y1 or y2 line down.

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5.3.3. Function key „Info"

Example of a data
file information


```
measuring row:      021298-1341

inspector:       Mr. N.N.
testing stand:   No. 1  hall B
aplication force of the clumping jaw
test with 4 bar nominal pressure




                                              info measuring row
   Cancel        edit                                            Ok
```

Picture 5.20   Menu: Info data file

   Menu „Selection data file" (picture 5.10) is displayed.
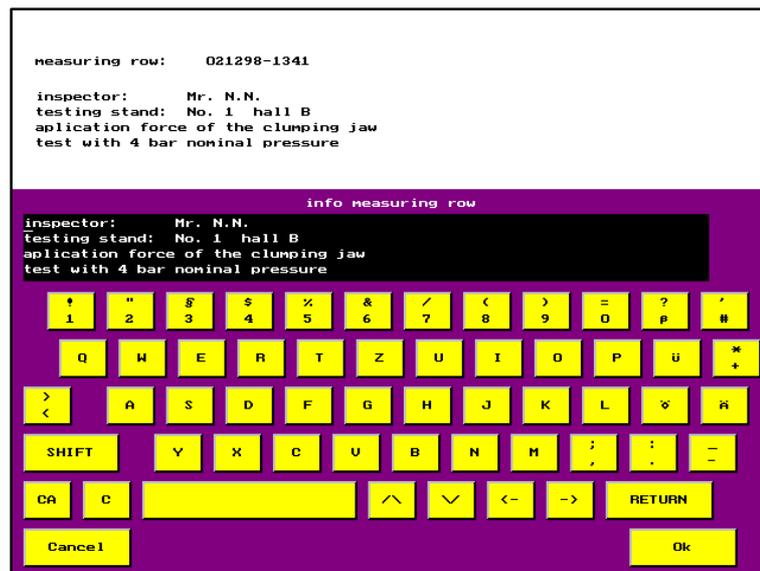Modifications won't be taken over.

   Opens the input panel for input/correction of the information text
(see chapter 5.3.3.1, picture 5.21)

   Modifications will be taken over, afterwards, the menu „Selection of
data files" (picture 5.10) is displayed.

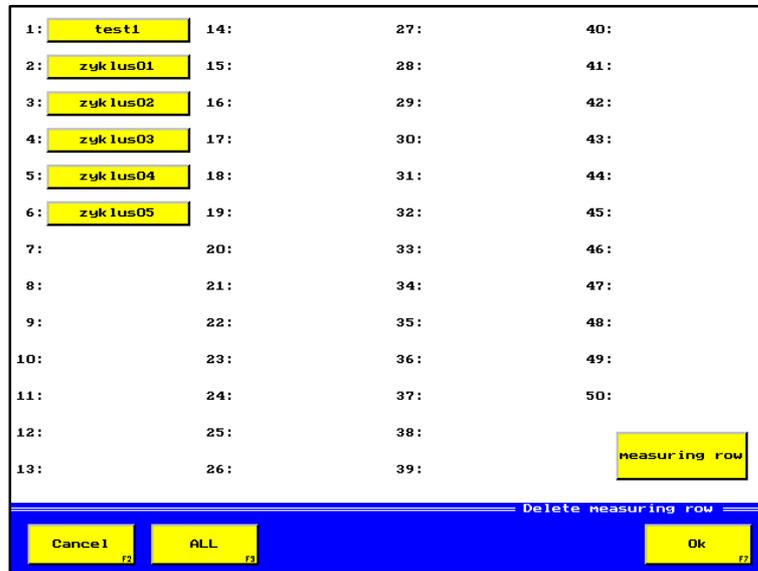### 5.3.3.1. Function key „Processing"

Picture 5.21   Menu: Info process data file

Enter any text for description of the data file.

5.4.   Function key „Delete Memory"

With help of this menu, you can delete single, several or all data files. The data files stored in the instrument are displayed.

Picture 5.22   Delete data file

    Switches back to menu „Memory" (picture 5.2).

    Selects all existing data files.

    Deletes the selected data files and switches back to menu „Memory" (picture 5.2), afterwards.

Input possibilities

Selection keys data files
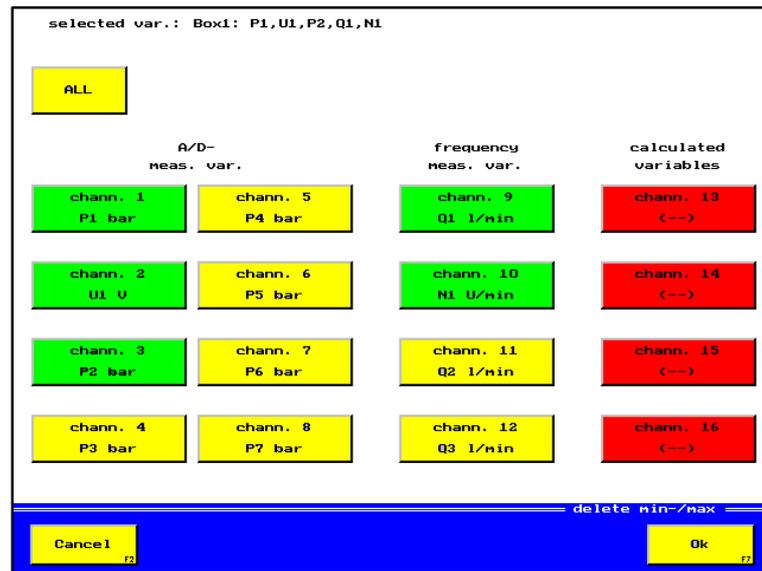Here, the data file to be deleted is activated.

Data file

File
Here you can select, how the file- or data file name shall be displayed.

    If no file name was chosen during the storage, an empty space will be shown in the display for the file name.

5.5. Function key „Delete min./max.-memory"


```
selected var.: Box1: P1,U1,P2,Q1,N1

 ALL

            A/D-                   frequency          calculated
          meas. var.             meas. var.           variables

    chann. 1      chann. 5      chann. 9      chann. 13
     P1 bar        P4 bar        Q1 l/min       (--)

    chann. 2      chann. 6      chann. 10     chann. 14
     U1 U          P5 bar        N1 U/min       (--)

    chann. 3      chann. 7      chann. 11     chann. 15
     P2 bar        P6 bar        Q2 l/min       (--)

    chann. 4      chann. 8      chann. 12     chann. 16
     P3 bar        P7 bar        Q3 l/min       (--)

                                          delete min-/max
   Cancel                                      Ok
```

Picture 5.23   Menu: Delete min./max.-values

Cancel (F2)   Menu „Memory" (picture 5.2) is displayed.
Modifications won't be taken over.

Ok (F7)   Overwrites the min./max.-values of the activated channels by the current measuring values and switches back to menu „Memory" (picture 5.2), afterwards.

Input possibilities

All
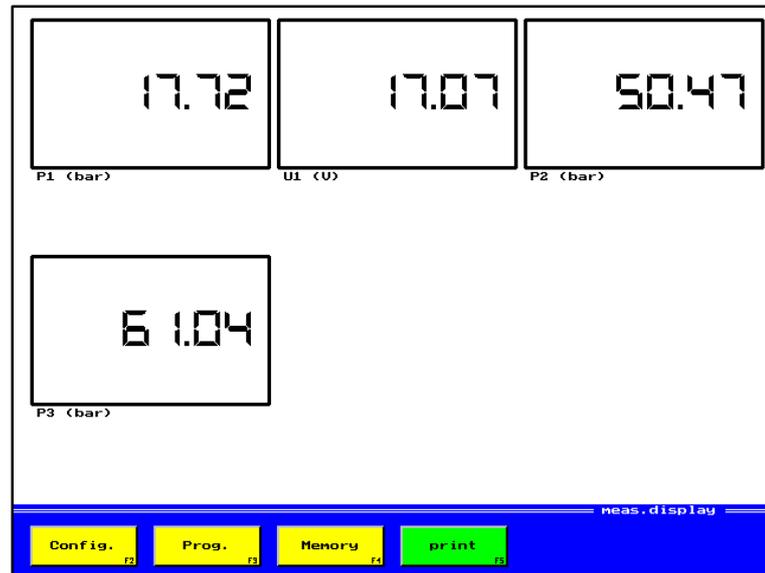All measuring channels are activated for the deletion of the min./max.-values.

Selection keys data files
Activate those channels, the min./max.-values of which shall be deleted.

6.   Print

With menu „Print" you can carry out the following functions:

- Selection and adjustment of printer, for example: HP340, presentation printout,etc.
- Printout of tables
- Printout of graphics

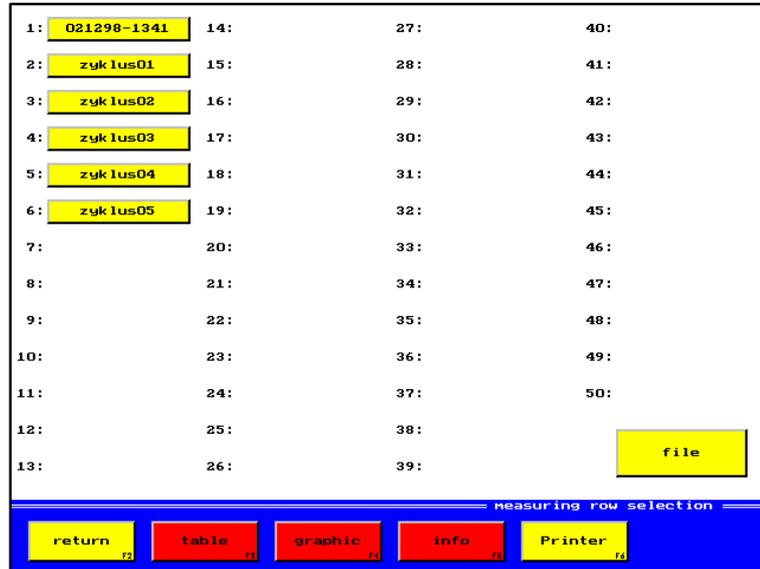

Picture 6.1   Menu: Measuring value display (6 variables)

(Example for a measuring value display with adjustment „6 variables" and 4 acti-
vated display channels.)

Selection possibilities after activation of function key „Print" :

Example of a measuring value memory, consisting of four single data files from 18.11.98 to 24.11.1998 and one cyclic data file with 7 cycles.
After switching on of the measuring instrument no storage is selected and the function keys „Table", „Graphic" and „Info" are inactive.
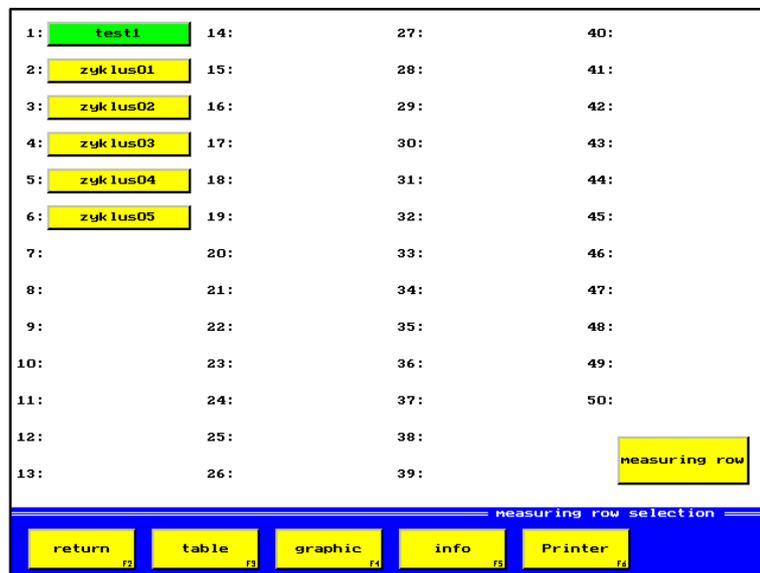
Display of the
file name.

Picture 6.2   Menu: Print (no data file selected)

When the instrument is operated, the last storage or selection will automatically be activated.

Display of data
file name

Picture 6.3   Menu: Print

return F2	Switches back to menu measuring value display (picture 6.1)
table F3	Activates menu „Table printout" (see chapter 6.1, picture 6.4) Selection of print size, print format, print range.
graphic F4	Activates menu „Graphic printout" (see chapter 6.2, picture 6.5) Selection of print sizes, scaling, print format, print range.
info F5	Activates menu „Info data file", where information about a data file can be entered and processed. The text may have max. four lines (see chapter 6.3, picture 6.8).
Printer F6	Activates menu „Printer adjustment" (see chapter 6.4, picture 6.10)

Input possibilities

Selection keys data files
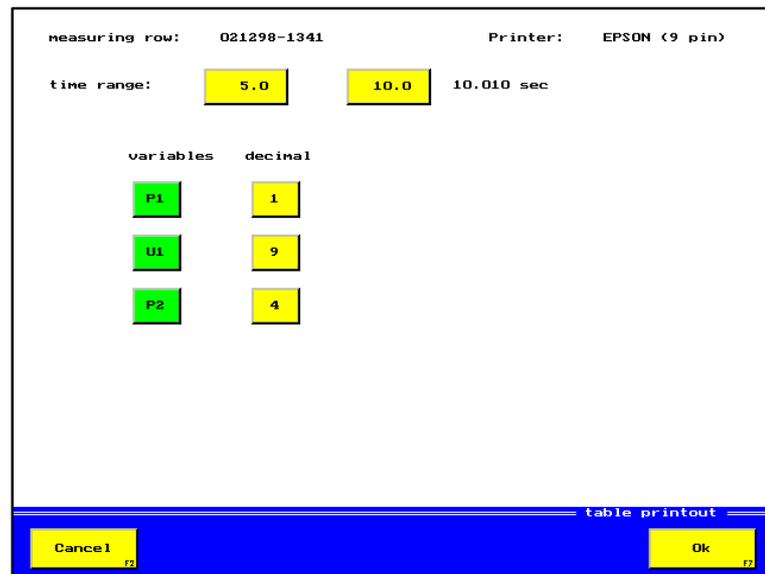Here you can select the requested data file, stored in the instrument.

Data file

File
With this key you can switch between name of data file and name of file.
The file name will be used for the data transfer with HYDROcomsys/WIN.

☞ If no file name was entered during the storage, an empty space will be shown in the display of the file names.

6.1. Function key „Table"

Picture 6.4   Menu: Table printout

Menu „Print" (picture 6.3) is displayed.
Modifications won't be taken over.

Menu „Print" (see chapter 6.4.1, picture 6.11) is displayed and the printout of tables will be started.

Input possibilities

Time range
With help of the two input keys, the starting- and stopping time of the printout can be fixed. The max. storage time is shown on the right side besides the input keys.
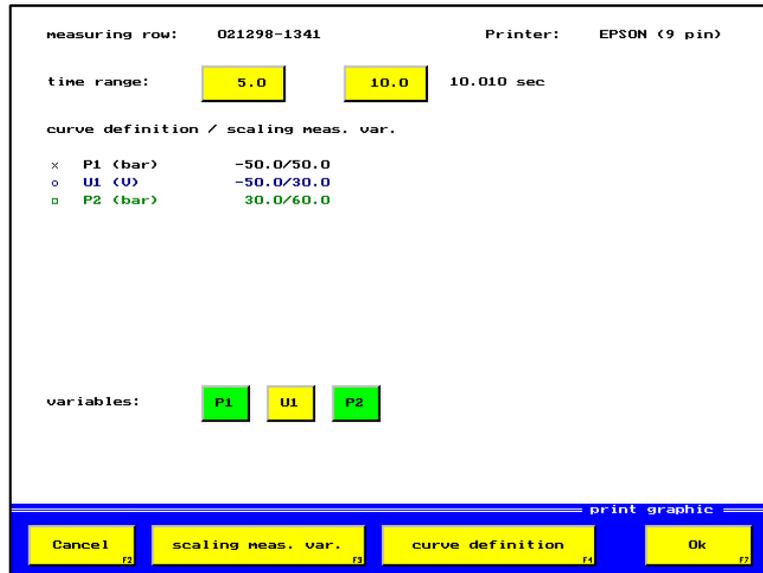
Variables
Here you have to activate the stored variables that shall be printed out as a table.

Decimal
Here you can enter the number of places after the decimal point that shall be printed out.

6.2. Function key „Graphic"


```
measuring row:      021298-1341              Printer:     EPSON (9 pin)

time range:           5.0          10.0      10.010 sec

curve definition / scaling meas. var.

    x   P1 (bar)        -50.0/50.0
    o   U1 (V)          -50.0/30.0
    □   P2 (bar)         30.0/60.0




variables:         P1    U1    P2

                                                            print graphic
    Cancel        scaling meas. var.      curve definition          Ok
            F2                       F3                      F4              F7
```

Picture 6.5   Menu: Graphic printout

Cancel F2	Menu „Selection of data files for printout" (picture 6.3) is displayed. Modifications won't be taken over.
scaling meas. var. F3	Modifies the scaling for the graphic printout (see chapter 6.2.1, picture 6.6).
curve definition F4	Adjusts the type of printout (see chapter 6.2.2, picture 6.7) colour, symbols, designation, scaling.
Ok F7	Menu „Print" (see chapter 6.4.1, picture 6.11) is displayed and the graphic printout will be started.

Input possibilities

Time range
Here, the time range to be printed is fixed. The input keys specify the time from „Beginning" to „End" of the requested range. As a help, the complete storage time of the data file is shown on the right side besides the input keys.

It can be sensible to define the „End"-time larger than the complete time of the data file, to receive a clearer x-scaling, for example.

Variables
All stored variables, existing in the data file, are displayed. By selection of single variables, you can have special curves printed.

6.2.1. Function key „Scaling variables"

	Min	Max
P1 (bar)	-50.0	50.0
U1 (V)	-50.0	30.0
P2 (bar)	30.0	60.0

scaling curve

Cancel   AUTO   Ok
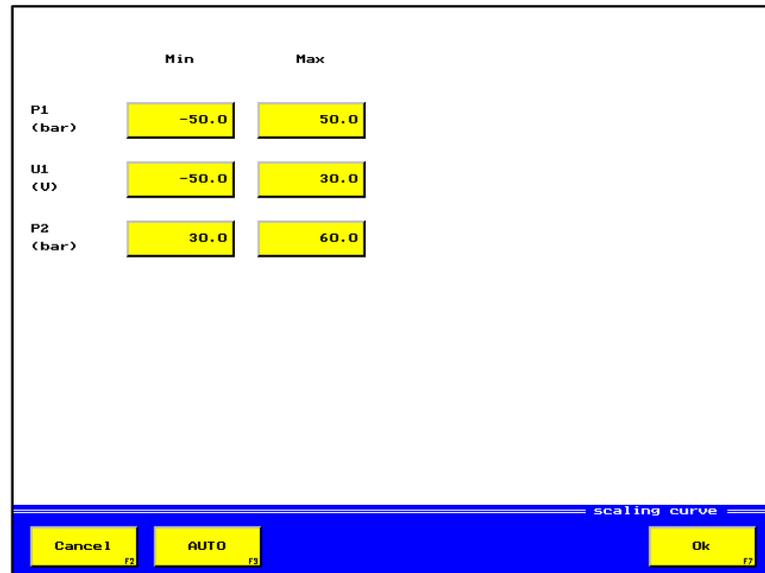
Picture 6.6   Menu: Scaling graphics

Cancel F2
Menu „Graphic printout" (picture 6.5) is displayed.
Modifications won't be taken over.

AUTO F3
Sets back the scaling to the calculated min./max.-values of the data file. If they haven't been calculated yet, this will be done now.
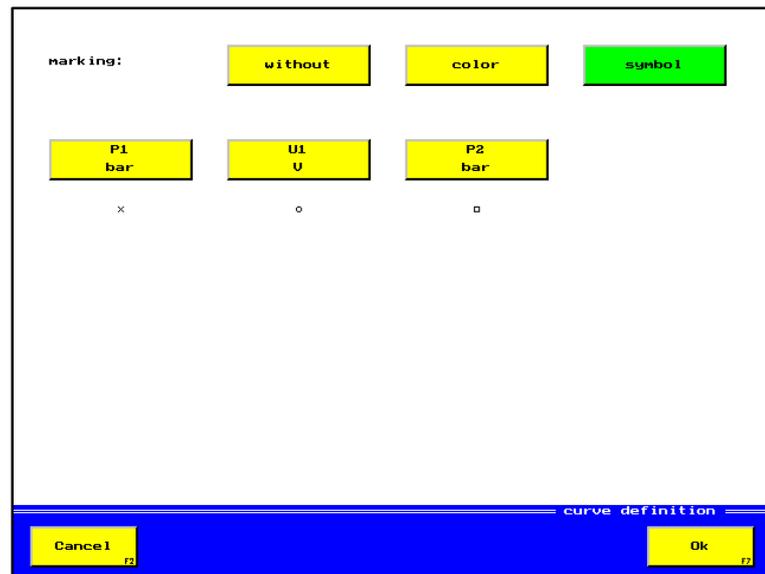During the calculation, the message „calculation" will be displayed.

Ok F7
Modifications are taken over and menu „Graphic printout" (picture 6.5) will be displayed afterwards.

Input possibility

Selection keys scaling min./max.
With the selection keys you can enter new scaling values or correct the old ones.

6.2.2.   Function key „Curve definition"

Picture 6.7   Menu: Curve definition

   Menu „Graphic printout" (picture 6.5) is displayed.
Modifications won't be taken over.

   Modifications are taken over and menu „Graphic printout" (picture 6.5) will be displayed afterwards.

Input possibilities

Marking
To be able to identify the curves clearly, you can mark them curves by choosing a colour and/or a symbol. The following markings are possible:

None	Black
Cross	Blue
Rectangle	Green
Rhombus	Cyan
Triangle	Red
Circle	Magenta
Star	Yellow

For the display of more than seven curves it is recommendable to use a combination of colour and symbols to be able to distinguish.

Without:
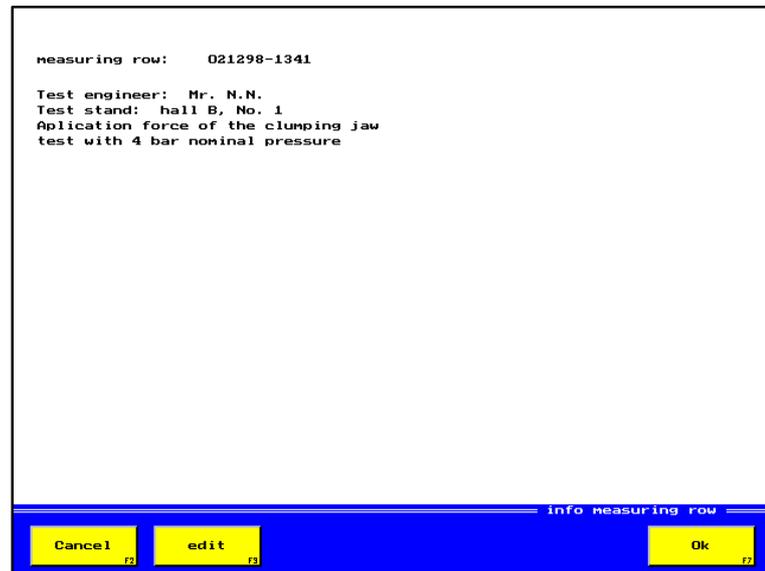All curves will be displayed in black and no symbols will be shown.

Color:
If the colours of the different curves shall be changed, the key „colour" should be activated and key „symbols" deactivated. You can assign a certain colour to a variable by pressing the corresponding key until the requested colour is shown.

<u>Symbol:</u>

If the symbols for the different curves shall be changed, the key „symbol" should be activated and key „colour" deactivated. You can assign a certain symbol to a variable by pressing the corresponding key until the requested symbol is shown.

6.3. Function key „Info"

Example for a data file information

```
measuring row:      021298-1341

Test engineer:  Mr. N.N.
Test stand:  hall B, No. 1
Aplication force of the clumping jaw
test with 4 bar nominal pressure




                                              info measuring row
   Cancel          edit                                      Ok
        F2               F3                                     F7
```

Picture 6.8   Menu: Info data file

Cancel F2   Menu „Data file selection" (picture 6.3) is displayed. Modifications won't be taken over.
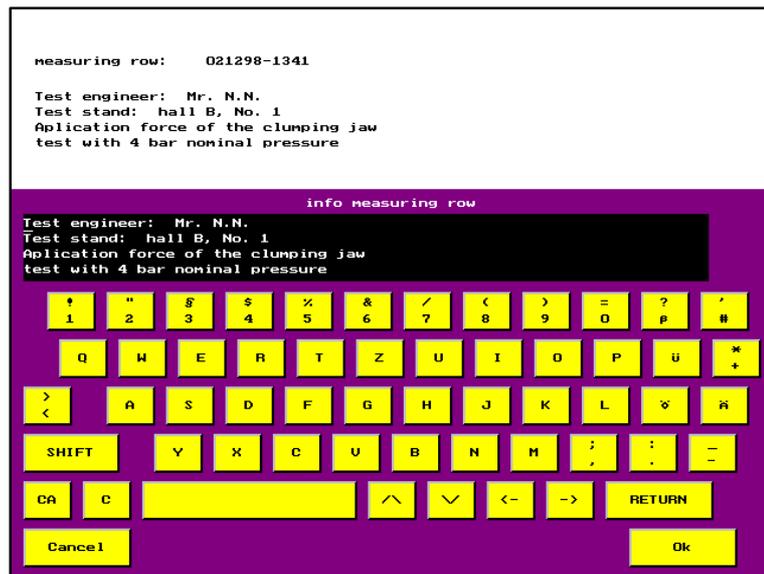
edit F3   Opens the input panel to enter / correct the information text (see chapter 6.3.1, picture 6.9).

Ok F7   Modifications are taken over and menu „Data file selection" (picture 6.3) will be displayed afterwards.
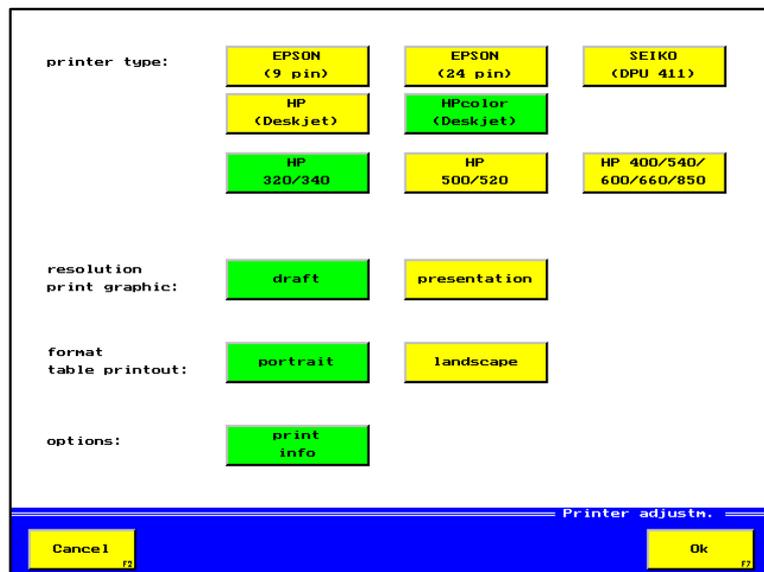
6.3.1. Function key „Process“

Picture 6.9 Menu: Process info data file

Enter any text for description of data file.

6.4. Function key „Printer“

Picture 6.10 Menu: Printer adjustment

Menu „Selection data file“ (picture 6.3) is displayed. Modifications won't be taken over.

Modifications are taken over and menu „Selection data file“ (picture 6.3) will be displayed afterwards.

Input possibilities

Printer type
With the selection key „Epson 9 pin", all 9-pin printers with the Epson printer mode or the Cannon ink jet printers (BJ 10, BJ 20 etc.) can be adjusted.
The HP colour printers should be selected for the graphic printout only.
A table is always printed in black, independent on the type of printer.
If the „Epson 24-pin" or the „Seiko DPU 411" is selected, the resolution and the format will be inactive.

HP-printer types
These printer types will be displayed after activation of the selection keys „HP-DeskJet" or „HP color DeskJet", only. With these keys, you have to specify the printer type exactly.

Resolution / Graphic printout
These keys will be displayed after selection of HP-printers.
Sketch (75 DPI), presentation (150 DPI)

Format for printout of tables
In portrait format max. seven table columns can be printed out. That means, that the time and six stored variables can be displayed. If seven or more stored variables shall be printed out as a table, you should select the landscape format.
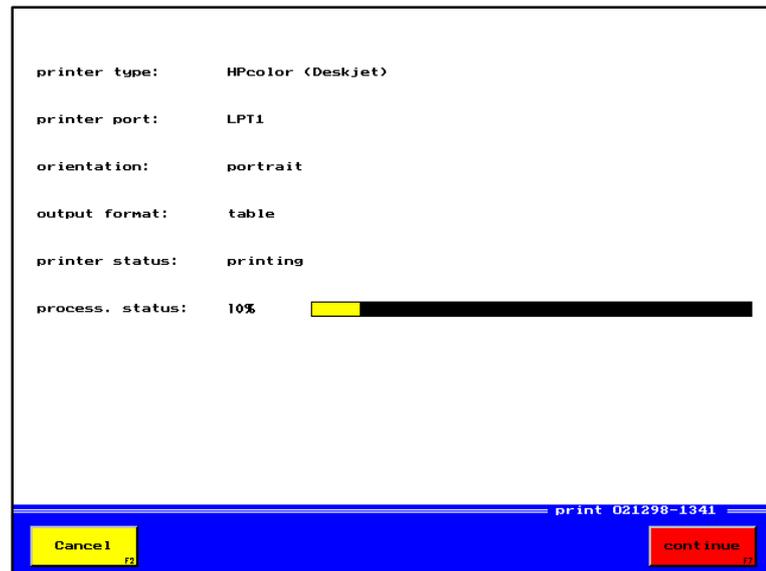
Options
When this key is activated, an existing data file information will be printed out (see chapter 6.3, picture 6.8)

6.4.1. Function key „OK" (table- or graphic printout)

During the printout of a graphic or a table, a menu is shown that shows the state of the printout.
The printout is started, when a graphic or a table is selected with all values and function key „OK" is pressed. If no error occurs during the printout, function key „Continue" can't be invoked.
When an error occurs, the reason for the error is displayed in a special field.


```
printer type:        HPcolor (Deskjet)

printer port:        LPT1

orientation:         portrait

output format:       table

printer status:      printing

process. status:     10%
```

Picture 6.11   Menu: Print

Cancel   Interrupts the printout and finishes this menu.

continue   After an error the printout can be continued, if the reason for the error was removed, for example, if the printer has no paper.

Possible errors:

- Printer offline

- Paper missing

- General error

7. Multi System 8000, option Memorycard (MC)

7.1. General

The measured value memory in the Multi System 8000 can be extended to a maximum of 8 MB RAM with the help of a Memorycard. By that, the different data files can be recorded in a larger extent, but the number of possible data files(50 pcs.) remains.

The data on the Memorycard is battery buffered and remain stored even after having switched off the Multi System 8000.
When using several cards, you can use the first card completely to store data files on it. Then you should change the Memorycard and continue with your storage, etc...

For the evaluation of the stored data files you should always use the Multi System 8000, with which the data has been stored or the programme " CARD 8000/Win".

New Memorycards or Memorycards, where the battery needs to be changed, should be formatted before the first application. The formatting is carried-out in the Multi System 8000.

7.2. Installing and removing of the Memorycard

Installing:
Open the cover of the PCMCIA-disk drive on the right side of the instrument, by pulling the flap up. Please pay attention to the direction of the Memorycard (connection pins in direction to the instrument side) and insert the card against the limit stop. With pressing the card slightly, it should audebly engage. Close the cover.

Removing:
Open the cover of the PCMCIA-disk drive and press the ejection switch on the right side beside the Memorycard and close the cover.
The exchange should be in menu „display" or switched off, for the exchange of the Memorycard.
When installing a Memorycard, the data, already stored in the Multi System 8000 won't be deleated. But only after having removed the Memorycard you have access again.

7.3. Starting the Multi System 8000 with Memorycard (MC)

When you have started your instrument with an inserted and formatted Memorycard you see this on the supplementary text in the switching-on menu.
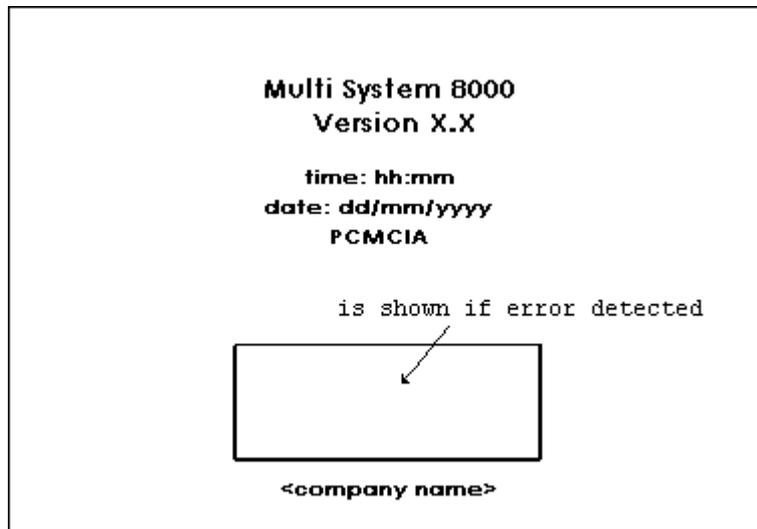
Picture 7.1   Menu: Switching-on menu with the Memorycard

When you insert a formatted Memorycard and you are in the menu „measuring display", the indication „PCMCIA activated" appears on the information window.
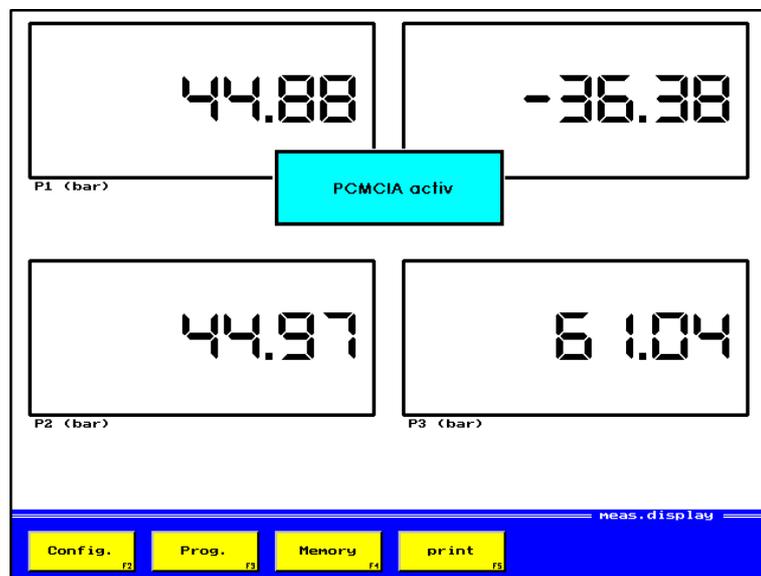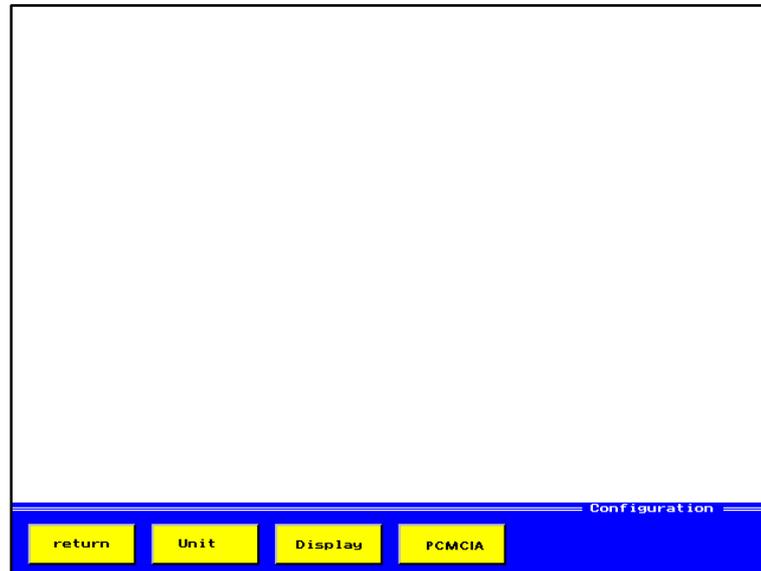

Picture 7.2   Menu: Activation Memorycard

Is the Memorycard not formatted, the information window indicats simply „Error". The storage will not be transfered to the Memorycard.

7.4. Operation control key „Conv."

For all commands, which are in connection with the Memorycard, the menu „Convert" has an additional operate key.

Picture 7.3   Menu: Configuration with Memorycard

return — The previous menu (Bild 3.1) appears.

Unit — Adjustment of the „instrument parameters" (3.1.1), like contrast, language, baud-rate/time, company name, etc...

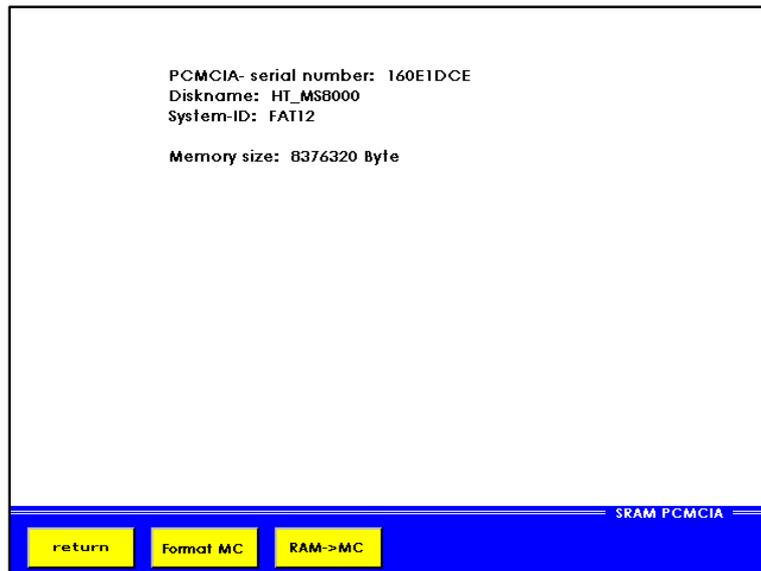**Display** — Adjustment of the display (3.1.2), like chanel choice, display up-date, measured value display, description, scaling, curve definition.

PCMCIA — Invocation of the menus for all functions of the Memorycard. Formatting of the Memorycard, to take data files from the Multi-System 8000 onto the Memorycard.

## 7.4.1.	Operation control key „PCMCIA"

Example for a format-
ted Memorycard with
8 MB memory capaci-
ty.

```
PCMCIA- serial number:  160E1DCE
Diskname:  HT_MS8000
System-ID:  FAT12

Memory size:  8376320 Byte
```

SRAM PCMCIA

[return]   [Format MC]   [RAM->MC]

Picture 7.4   Menu: SRAM PCMCIA

[return]   The previous menu (picture 7.3) appears.
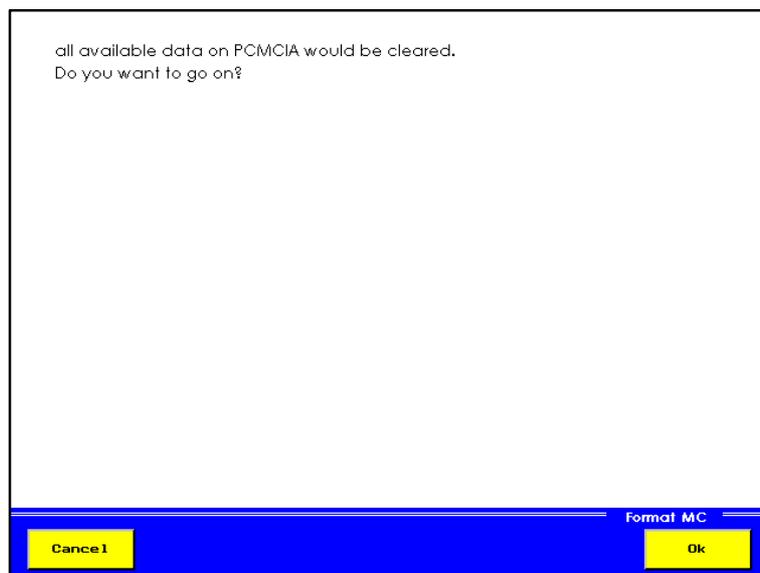
[Format MC]   Formatting of the Memorycard (see 7.4.1.1).

[RAM->MC]   Transmission of the storage fill of the Multi-System 8000 onto the Me-
morycard (see 7.4.1.2).

## 7.4.1.1.	Operation control key „Format MC"

```
all available data on PCMCIA would be cleared.
Do you want to go on?
```

Format MC

[Cancel]   [Ok]

Picture 7.4   Menu: SRAM PCMCIA

Cancel	The previous menu (picture 7.4) appears. A formatting will not been implemented.
Ok	Start of the formatting process. Afterwards the picture 7.4 appears again.

7.4.1.2.   Operation control key „RAM >MC"

The storage fill with all the data files will be transfered onto the Memorycard 1:1.

copy memory->PCMCIA

copy->PCMCIA

Cancel   Ok

Picture 7.6   Menu: Transcribe->PCMCIA
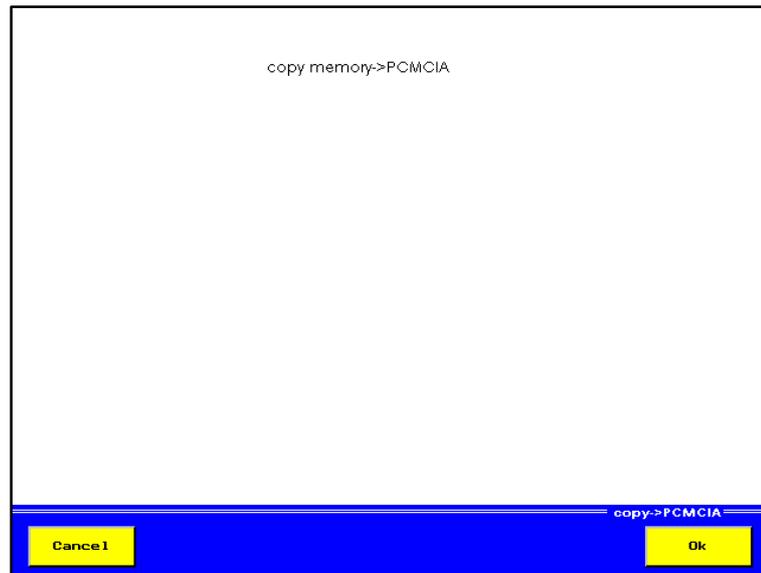
return	The previous menu (picture 7.4) appears. A formatting will not been implemented.
Ok	Start of the formatting process. Afterwards the picture 7.4 appears again.

8.   Multi Control 8000

8.1.   General

The Multi-Control 8000 is technical identical to the Multi-System 8000.
In contrast to the Multi-System 8000 it hasn't an own display. For this reason the Multi-Control 8000 must operate via a PC or a notebook. All in- and outputs must be effected via his keyboard and display.
The needed PC-programme is delivered in connection with the Multi-Control 8000 and his name is „MC8000.EXE".
The operation of the Multi-Control 8000 is almost identical to the operation of the Multi-System 8000.
For making the inputs easier you can additionally use a mouse.
eine Mausunterstützung verfügbar.

After switching-on the Multi-Control 8000, all display elements light up for control of her operateability.

8.1.1.   Display elements

Picture 8.1…Multi Control 8000, front view

The Multi-Control has four LED's, which show the status display of the measuring instrument.

8.1.1.1.   Power
The LED „Power" indicates the reception of an instruction via the EPP-interface.

8.1.1.2.   Error
A flashing LED signalizes an error message of the measuring instrument.
With the help of the LED's „Online" and „Reset" an assign is possible (see error messages).

8.1.1.3.   Online
The LED „Online" shows the receipt of an instruction via the EPP-interface. Each received instruction changes the state of the LED.

8.1.1.4.   Reset
The LED „Reset" indicates the state of an active storage.
The LED flashes: The storage is active and is waiting for the trigger event.
The LED is iluminated: The storage is active, the trigger event already occured.
The LED is off: The storage is finished.

After switching on the Multi-Control 8000, the LED's indicate shortly the address of the instrument.

<u>Symbolexplanation:</u>

0: LED off
1: LED on
*: LED is flashing

Error	Online	Reset	Adresse
1	0	0	1
1	0	*	2
1	*	0	3
1	*	*	4

8.1.2.　Error messages

By an error on the Multi-Control 8000 the LED „Error" is flashing.
From the indicated error(state of the LED „Online" und „Reset") a limited error recognition is possible.

Online	Reset	Error message
0	0	With the help of the „Dongle" carry-out a reset.
0	1	Black-Box Mode with Address 0. (display for 2 seconds) Give the Multi Control 8000 with the help of the software MC8000.EXE a new system address.
0	*	Error analog input
*	0	Error Dual Port RAM
*	*	Error SUB-Board

Directly after switching-on, the error messages would be displayed during the selftest (see 2.5 selftest).
For working on with the instrument the reason for the error must be eliminated.

8.2.　　Connection on PC or Notebook

For the normal measuring work the Multi-Control 8000 must be connected on a PC or a Notebook. The connection is made via a special EPP-data cable. Connect, the with EPP-signed interface of your Multi-Control 8000 with the EPP-interface of the PC or Notebook and now you switch-on your Multi-Control 8000. **After that**, you start the software „MC8000.EXE".

If you want to effect a system-reset for the Multi-Control 8000, please see page 23, chapter 2.4.4.

9. Operation via PC-Software „MC8000.EXE"

9.1. General

For the remote control of the instrument, two in the operating function identical, pro-grammes at your disposal.

a) MC8000.EXE   For PC's with EPP – interface
b) MC8000B.EXE   For PC's with ECP – interface

The software versions are identical, so that we refer on further descriptions only to software MC8000.EXE .

The software „MC8000.EXE" is a PC-programme for remote control of the Multi-System 8000 or the Multi-Control 8000. With the help of this programme you could use all the possibilities of the two measuring instruments. The operation of the Multi-System 8000 is simplified through the mouse on the PC/ Notebook.
The two programmes produces a setup-data: „MC8000.Set". In this data the last adjustment of the measuring instrument is stored, which could automaticly be loaded, when starting the programme the next time.
With the setup-data you could store different adjustments without a manual reprogramming of the measuring instrument (see chapter 9.5).

☞ For the running of the software „MC8000.EXE" there should not be any error in the selftest of the measuring instrument (see chapter 2.5).

The programme MC8000.EXE is to close with ALT-X.

9.2. Systemprecondition

• IBM compatible PC 486 / with at least 100 MHz or more.

• PC-BIOS should support the EPP-Modus for the parallel hard copy interface LPT1.

• Operation system MS-DOS 6.0 or more, or WINDOWS 95 on the DOS-TASK- Modus ($\Rightarrow$ Ikon „MS-DOS- input statement").

• 1MB hard disk capacity free.

• 550 KB working storage free.

• Limitation: **No Windows NT operation system.**
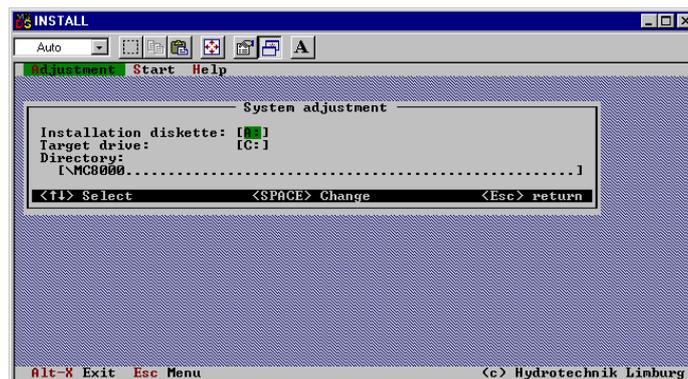
9.3.   Installation MC8000.EXE

9.3.1. PC-Software

Start the programme „INSTALL.EXE" on the disk. In the installation programme you could select the path and the disk drive, under which the software shall be stored.
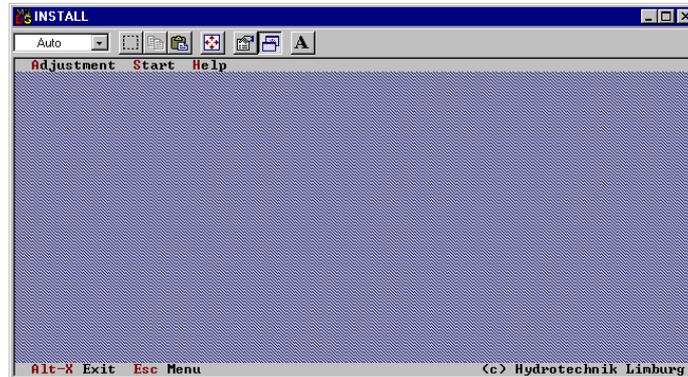
Picture 9.1   Menu: Installation MC8000.EXE

Press „Escape" and then „A" for getting into the menu set-up.

Picture 9.2   Menu: Set-up

Indicate your path and disk drive for the installation.
Call the Menu: „Start".

Picture 9.3   Menu: Set-up

After that the installation is finished and you could leave the programme with the button combination „ALT-X".

9.3.2. PC BIOS-adjustments

For the comunication between the Multi-Control 8000 programme and the Multi-System 8000 or the Multi-Control 8000, the interface LPT1 of the PC/ Notebook must be adjusted in the EPP (or ECP) mode.

- Inspect on the PC set-up the adjustment for the interface LPT1.
  The labels are dependent of your PC-keyboard overlay and can therefore have a different look.
  For reaching into the BIOS set-up press, after switching on the PC, the button „ENTF" or reboot-up your PC via the button combination: „STRG"+"ALT"+"ENTF" and then press the button „ENTF".
  The further adjustments depend from your PC-BIOS and could have a different look. The indications refer to a BIOS: ROM PCI/ ISA BIOS „A59GF2C".
  Select the sub menu with the adjustments for the interface configuration „INTE GRATED PERIPHERALS".
  Adjust the „ONBOARD PARALLEL PORT" onto the address: 378, IRQ7.
  Adjust the „ONBOARD PARALLEL MODE" onto „EPP" or „ECP".
  Leave the BIOS and store the adjustment with „EXIT AND SAVE CMOS".
  Notice, that the confirmation (Yes/ No) should be closed as a rule with the letter „z" for „yes" (only at german or rather europeen keyboard).

- **Notice**: For the connection of the Multi-System 8000 on your PC, please switch-off the PC and the Multi-Control.
  Connect the printer interface LPT1 via a corresponding cable with the Multi-Control 8000 and then switch-on the two instruments.

- Start the PC-programme with the order: „MC8000". Make sure, that the index Mul ti-Control 8000 is the actual index.
  After the above mentioned installation, this is at any rate guaranteed.

- A previous connected printer on the PC will be connected on the printer interface of the Multi-Control 8000 (For a data transfer with the Multi-Control 8000, the prin ter need to be switched-on and online.).

9.3.3. Printer adjustment

ATTENTION WINDOWS 95 users!
DOS print jobs shall not be buffered.
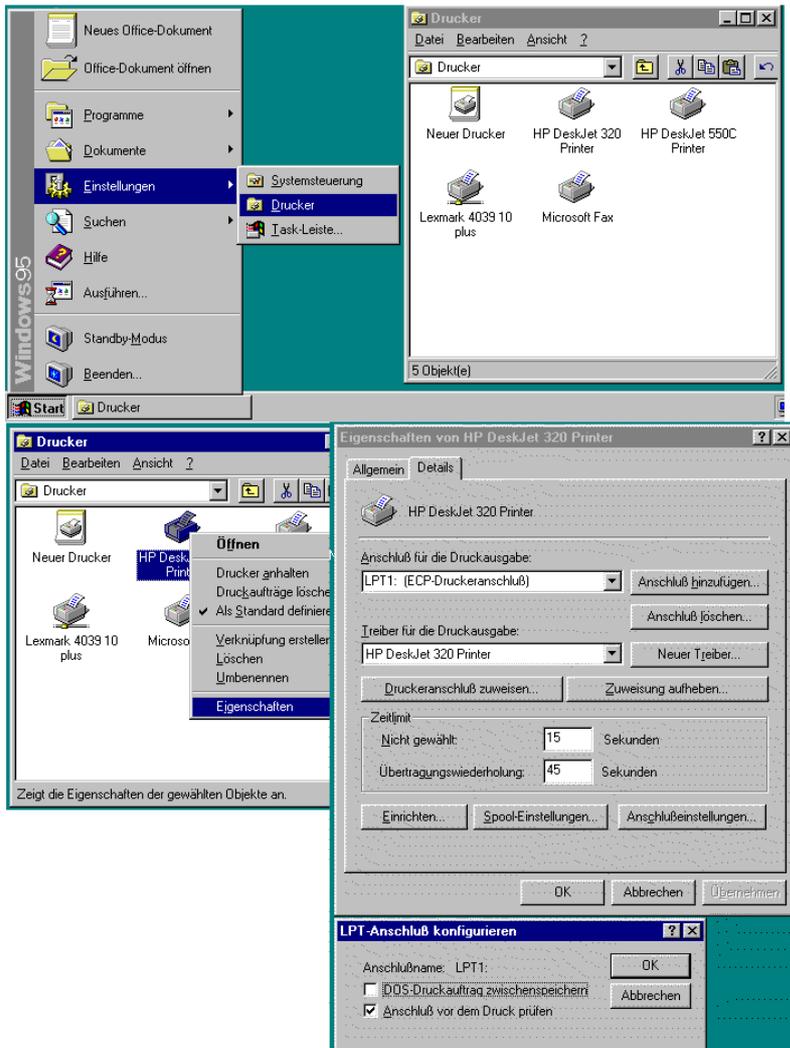
Picture 9.4   Menu: Printer adjustment

9.4. Operation phase

9.4.1. General

When connecting one or several blackboxes or when using a Multi-System 8000 as blackbox, an address must be allocated for the instruments. Connect just **one** instrument with the EPP-interface, switch it on and start the programme MC8000.EXE. It displays „no blackbox connected". In the menu „Configuration-System" you must first fixe how much measuring instruments should be connected. Then you give the measuring instrument in the menu „Configuration-Instrument" an address (1 to maximum 4, begin with 1).
When using just one instrument the process of the configuration is finished. In any case the programme is to close with ALT/X.
If several instruments should be connected, the already configured instrument is to detach from the EPP-interface and the process is to repeat with the next instrument. You must consecutively number the addresses during this process.
The blackboxes keep their address even after switching-off the instrument, so that this process is just to take once. The following address must consecutively be numbered.

After switching-off, the measuring instrument the Multi-System 8000 change automaticly from the blackbox modus (Multi-Control 8000-Modus) to the dis-play-modus (Multi-System 8000-Modus). Don't switch-off the Multi-System 8000 in the meantime.
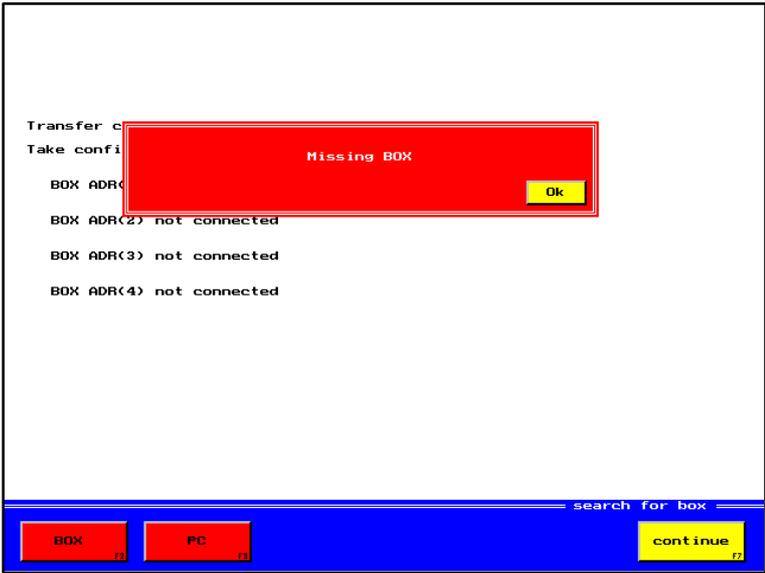
9.4.2. Configuration

After starting the software MC8000.EXE the system searchs for connected measuring instruments.
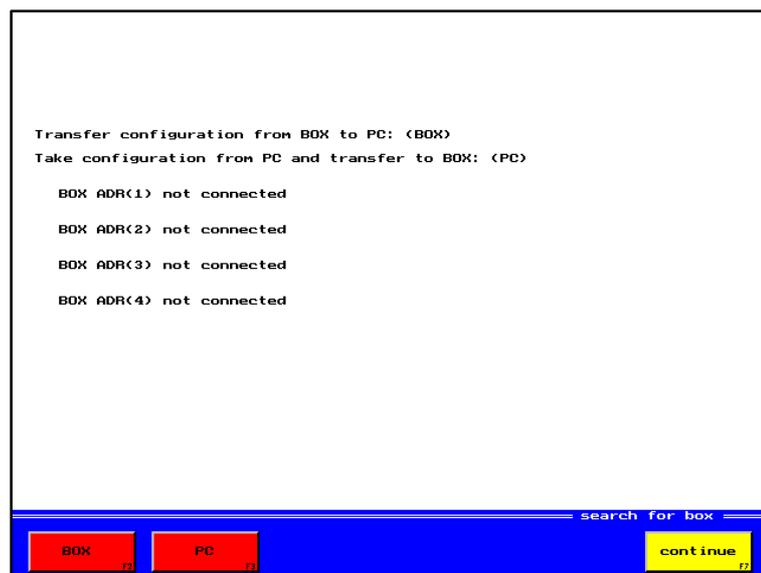
Picture 9.5   Menu: Searching for a box

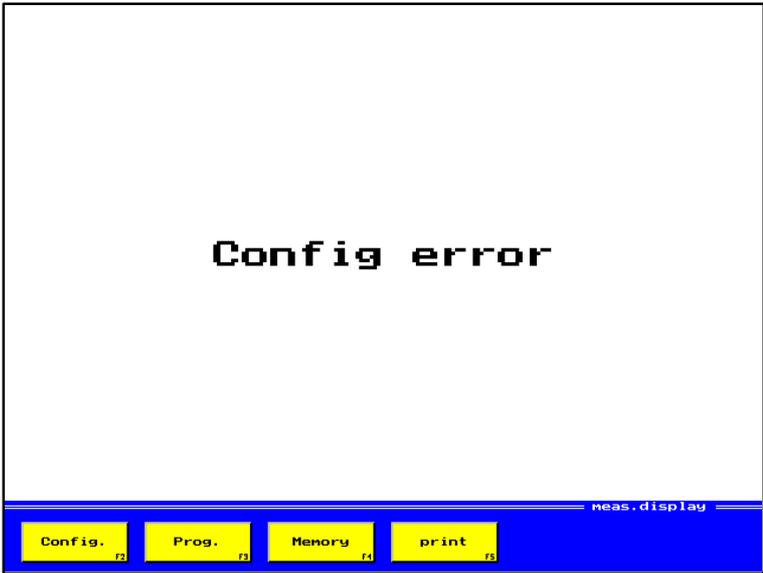Provided that the connected Multi-Control 8000 is not configured or a Multi-System 8000 has not been connected, the instrument indicate an error message.

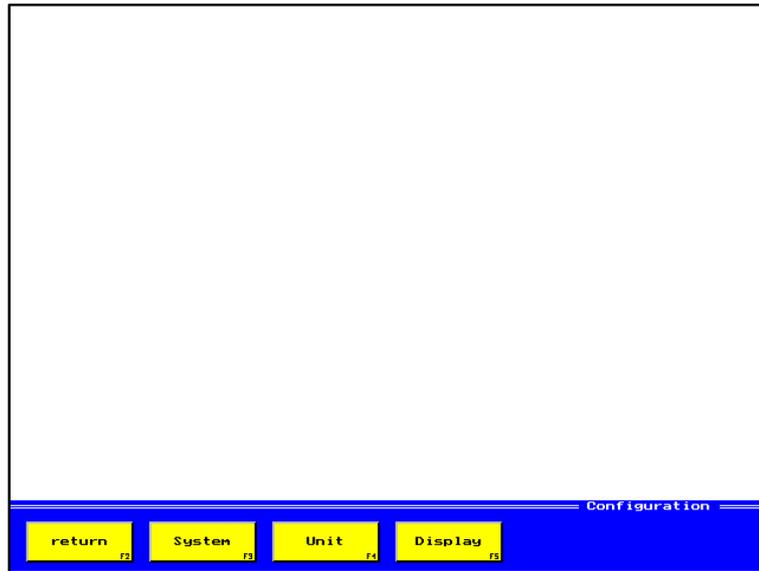Picture 9.6   Menu: Surching for a box (box missing)

Confirm with **Ok** and than click the function key **continue**.

In the menu: „Dial indicator" choose the function key **Config.**.

Picture 9.7   Menu: Dial indicator (error configuration)

Picture 9.8 Menu: Configuration

For the configuration of the measuring instrument adjustments in the menu „System" and „Instrument" are necessary.

The first adjustment is absolutely to carry out in the menu System.
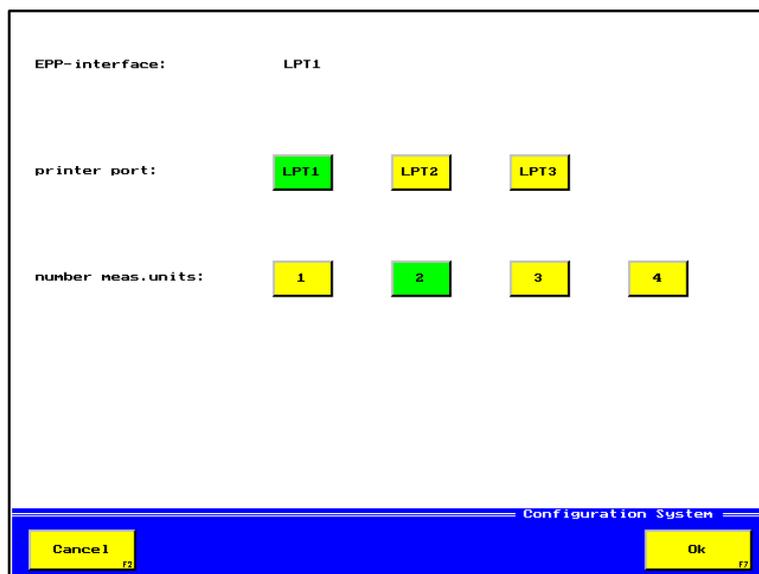
Picture 9.9 Menu: Configuration system

Input possibilities

Printer connections

Choose the interface for your printer. It can be the same interface, on which the measuring instrument is connected.
In this case the printer is to connect on the measuring instrument and not directly on the PC or the Notebook.

Choose the number of the measuring instruments, which will later be used at the same time (see chapter cascading).

☞ During the configuration always one measuring instrument must be connected.

Confirm afterwards your choice with $\boxed{\text{Ok}}$.

The next adjustment is to carry out in the menu $\boxed{\text{Gerät}_{\text{F4}}}$.

The number of the return keys for the possible address selection depends of your choice in the menu: Configuration System (number of measuring systems).

Here only the input of the address is of interest. The other adjustments would therefore not be taken into consideration.

☞ When calling this menu, all input keys for the address must be deactivated (yellow) or activated (green). Should an address be displayed in red, close the programme MC8000.EXE and restart it, after having checked all the connections.

Picture 9.10   Menu: Instrument parameter (Address)

Input possibilities

Address

Adjust the address for your measuring instrument.

☞ When using several instruments:
Please remember, which instrument you have given which address.
The measuring instruments must be connected in the order of the address on the PC or the Notebook.

Confirm your choice with **Ok**.
Then the configuration for this measuring instrument is finished.

End of the configuration
Close the programme with ALT-X and restart it, also when working with one measuring instrument.
Configurate the further possible measuring instruments, by repeating the steps mentioned in chapter 9.1.2 (compare: Pictures for two connecting systems).

9.4.3. Error messages

This error picture appears after the confirmation with the function button „OK", when the PC can not send data to the connected measuring instrument.
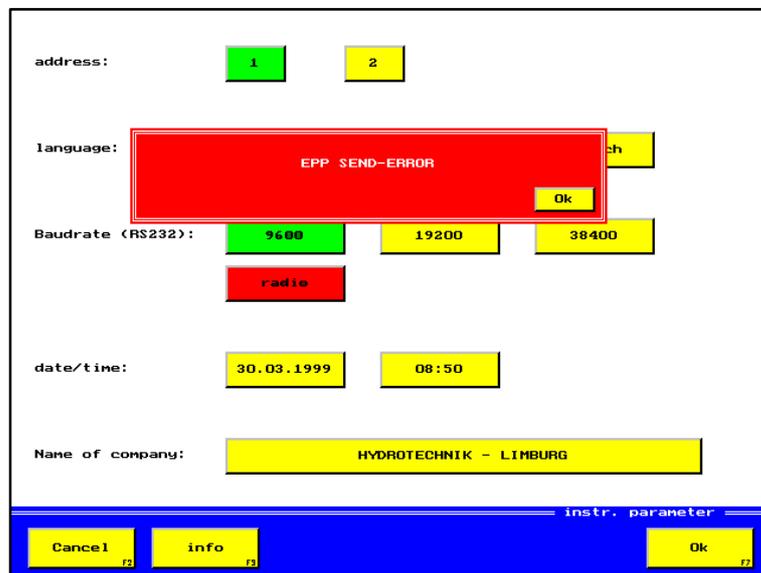
Picture 9.11   Menu: instrument parameter (Error message)

Possible error reasons:

• The measuring instrument is switched-off or connected on the assumed interface

• The EPP-Modus in BIOS is not adjusted

• The memory in the Multi-System 8000 is not deleated
  (Parallel corresponding error message to Multi-System 8000)

• Measuring instrument indicates the error in the self-test

• The printer is connected, but switched-off

9.5. Starting the software MC8000.EXE

9.5.1. Measuring operating

You can start the programme MC 8000.EXE with different setup-data, in which all adjustments for the measuring instrument are indicated. Therefore you must program the different 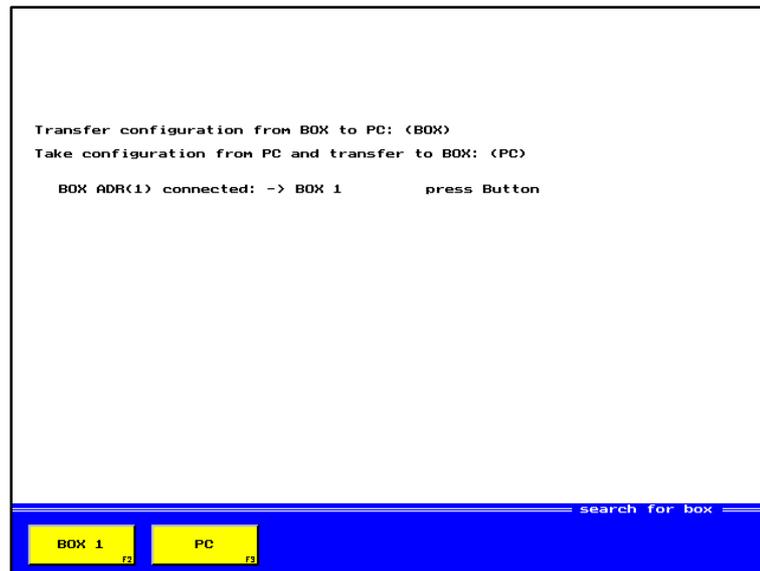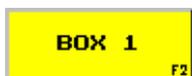measuring tasks just once, so that you can go back to it. When you leave the programme the actual adjustements will be stored on the used setup-data.

Start the programme with the instruction MC8000.EXE /<name>. The name specificates your special setup-data. For example: MC8000.EXE /test.
If you didn't indicate a name, automaticly the name „MC8000.SET" will be assumed.

The software checks with the help of the used setup-data MC8000.SET, with how much measuring instruments it should work via the EPP-interface.
In sequence the PC ask all instruments, if the connection can be set-up.
Has the addressed instrument be recogniced, the following menu appears:

```
Transfer configuration from BOX to PC: (BOX)
Take configuration from PC and transfer to BOX: (PC)

   BOX ADR(1) connected: -> BOX 1        press Button



                                                  search for box
  BOX 1        PC
        F2          F3
```

Picture 9.12   Menu: Searching for Box1

BOX 1 (F2) — Use the instrument adjustments of the connected measuring instrument for BOX1.

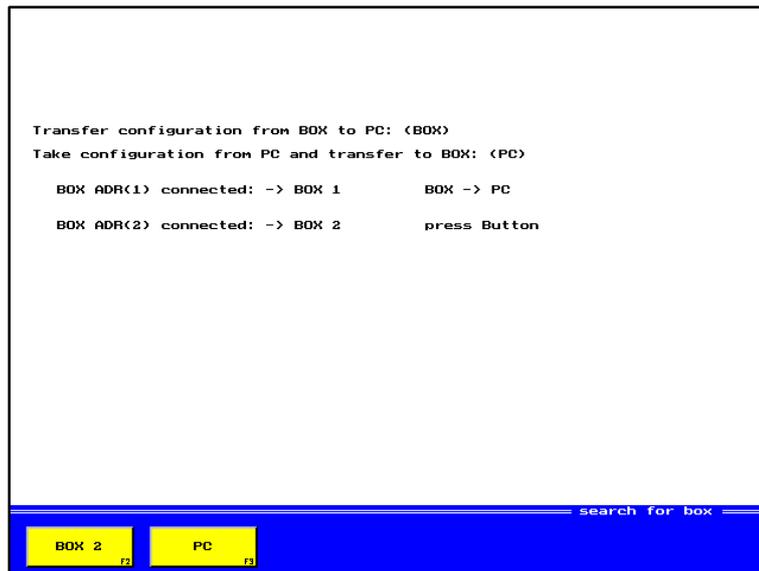**PC** (F3) — Use the instrument adjustments of the setup-data for BOX1 and transfer it onto the measuring instrument.

Choose the instrument adjustment, which shall be applicated for BOX1. The instrument adjustments contains also the programmation and the adjustment for the measuring channels.

Afterwards the choice for the Box is indicated on the display.
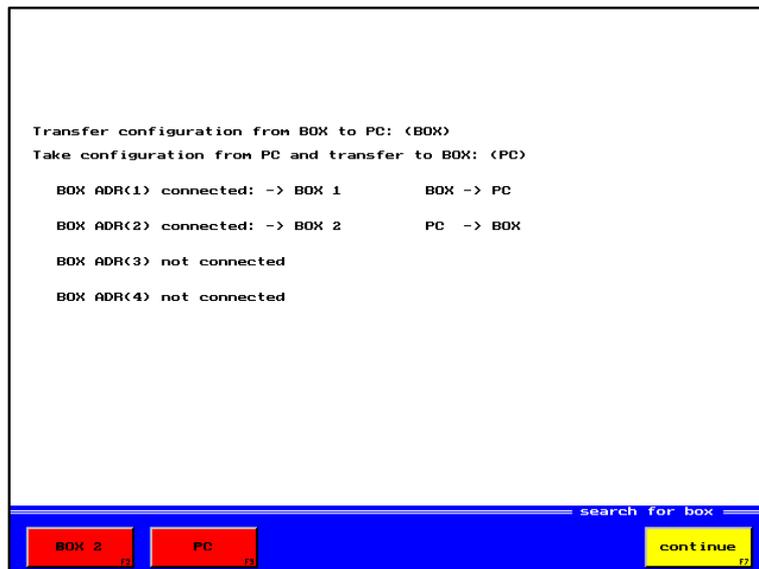(BOX -> PC) or (PC -> BOX)
In this way Box 2, Box 3 and Box 4 will be searched.

```
Transfer configuration from BOX to PC: (BOX)
Take configuration from PC and transfer to BOX: (PC)

   BOX ADR(1) connected: -> BOX 1          BOX -> PC

   BOX ADR(2) connected: -> BOX 2          press Button




                                          = search for box =
  BOX 2        PC
       F2          F3
```

Picture 9.13   Menu: Search for Box2

When the 4 Boxadress have been asked the following menu appears:

Exampel for two
connected Boxes,
with the transmission
of the configuration
from the Box to the
PC or from the Pc to
the Box.

```
Transfer configuration from BOX to PC: (BOX)
Take configuration from PC and transfer to BOX: (PC)

   BOX ADR(1) connected: -> BOX 1          BOX -> PC

   BOX ADR(2) connected: -> BOX 2          PC  -> BOX

   BOX ADR(3) not connected

   BOX ADR(4) not connected




                                          = search for box =
  BOX 2        PC                                   continue
       F2          F3                                     F7
```

Picture 9.14   Menu: Surch for the Boxes finished

After the confirmation with the function button `continue` you are in the measuring menu.
Starting out from this menu you have all the possibilities as described on chapter 3 to 6 (to configurat, to program, to store and to print).

### 9.5.2.   Analysis of the data files (without measuring instruments)

You can use the software even when you have no measuring instrument on your workplace. All functions for analysing and printing the already existing data files on your PC or Notebook are at your disposal. On the measuring menu appears the picture 9.7.

9.6. Menudifference between MC8000.EXE and Multi - System 8000

9.6.1. Function buttons „Box1, Box2, Box 3 and Box4"

In the menus, which concerns the individual measuring channels, you have, in dependence on the connected measuring instruments, further function buttons at your disposal (for Multi-System 8000 see chapter 3.2.2).

Example: Display channels for systemconfiguration with 2 measuring instruments.
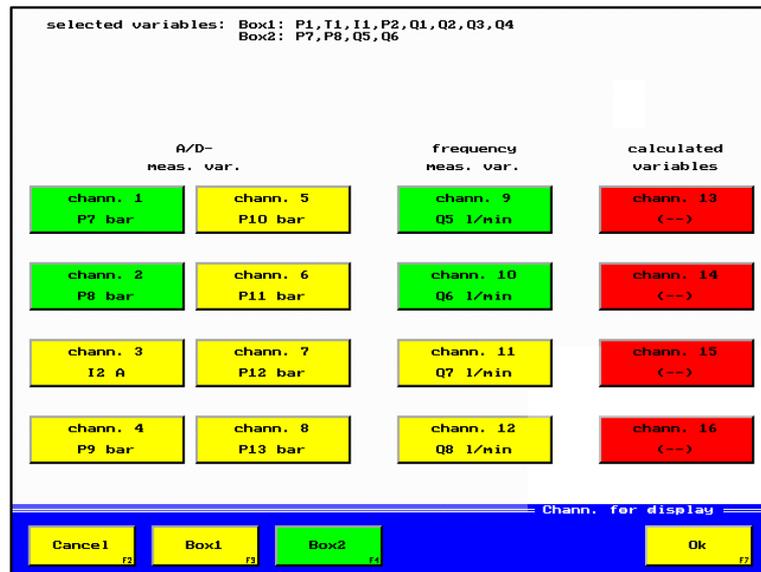
Picture 9.15   Menu: Channels for display (Box 1)
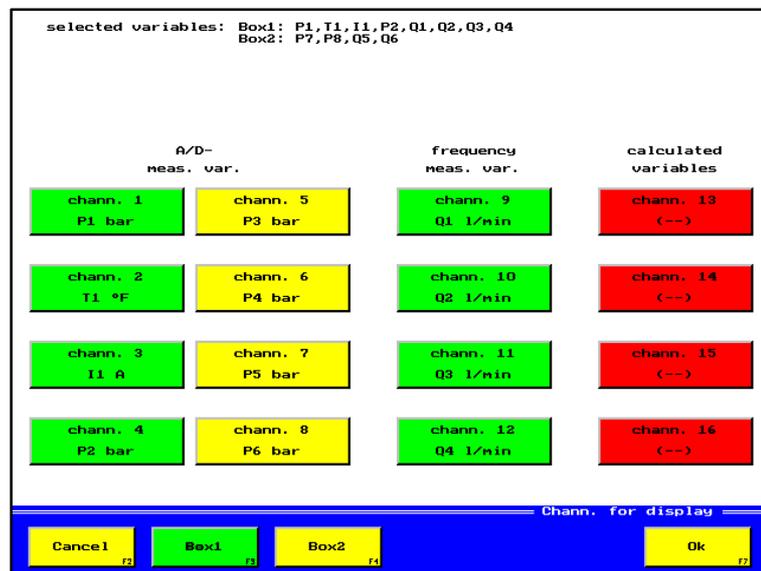
Picture 9.16   Menu: Channels for display (Box 2)

 Changes to menu: „Channels for display" of Box 1.

 Changes to menu: „ Channels for display" Box 2.

On the top of the screen all choosen channels of each Box are indicated.

9.6.2. Function button „Activation"

When activating the storage a data name must be awarded (for Multi-System 8000 see chapter 5.2).
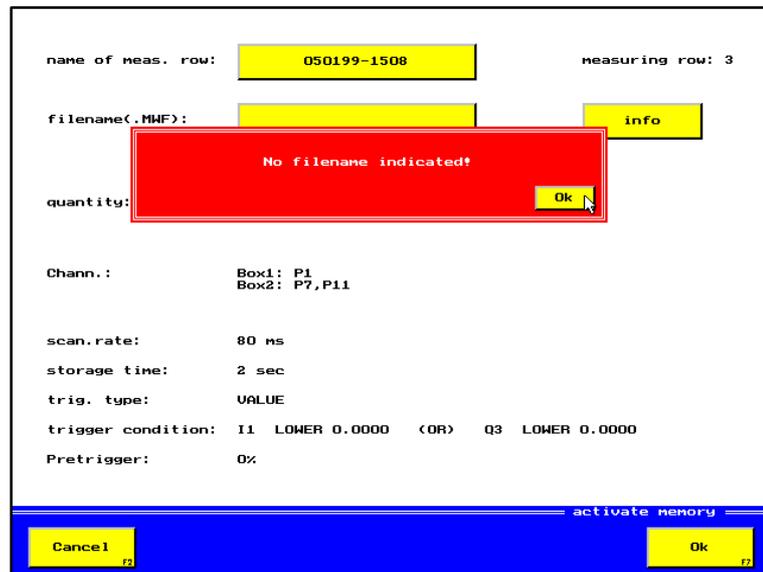
Picture 9.17   Menu: „Activation of the storage (Error message)"

The storage of the individual measuring channels is effected in each box, which is concerned of the storage. When the storage is finished, all measured values are transfered to the PC. During this time the menu: „EPP-Transfer" appears.
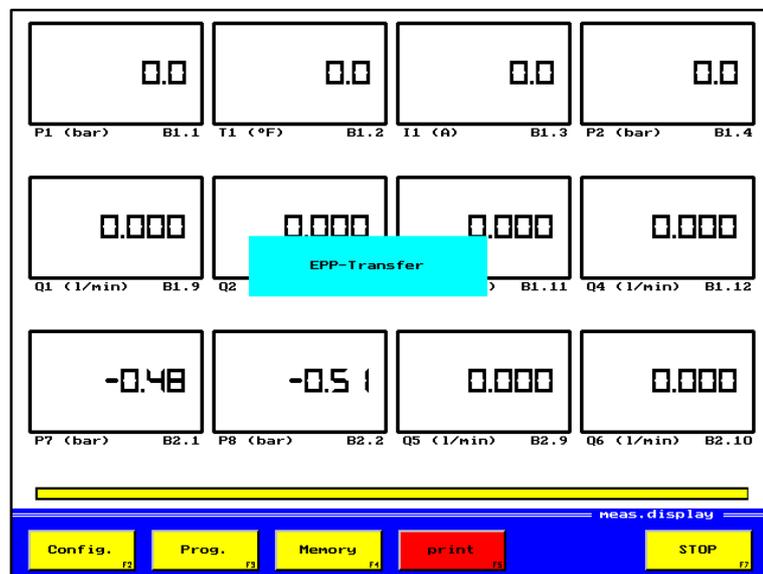
Picture 9.18   Menu: „Measured value display (EPP-Transfer)"

10.   Information on guarantee

Within the framework of our guarantee conditions we guarantee the unobjection-nable manufacture of our technical instruments.

The guarantee is valid for 6 months.

In principle, the general terms of business are valid.

The right to claim under guarantee becomes invalid, when repairs or interventions are executed by persons, who were not authorised by us.

Within the six months of the guarantee, we will remove free of charge damages or defects, which can be proved to be based on a works mistake, as far as the customer informs us immediately after having detected it, but within six months at the latest.

The fulfilling of the guarantee is done in a way, that defective parts are repaired or replaced by unobjectionable parts at our choice, free of charge.

Instruments, for which you want to claim under guarantee, have to be sent carriage paid together with the corresponding copy of the invoice or the delivery note to:

HYDROTECHNIK-SERVICE

11.   Maintenance

Your measuring instrument is a precision instrument, which will work without trouble for many years, if it is treated correspondingly.

However, in the case that interference occurs nevertheless, please do not try to repair the instrument yourself!

Leave the maintenance or the repair up to our HYDROTECHNIK-SERVICE.

Address: HYDROTECHNIK GmbH
                D - 65549 Limburg
                Holzheimer Straße 94-96

                Tel.:   06431 - 4004-0
                Fax: 06431 - 45 308

                Internet: http:\\www.hydrotechnik.com
                e-mail: hydrotechnik@t-online.de

HYDROTECHNIK
Limburg
Messen mit System

Should your Multi-System 5000 require repair, we depend on your support.
Please describe your complaint as precisely as possible. That enable us to locate the error more easily and you will profit from shorter repair times.

If we have any additional queries, please state the person to contact:

Company:	
Department:	
Name:	
Telephone:	
Fax:	

☒ Please tick the appropriate answer:

Part to repaired:	Your PC	operating system	software
Measuring instr. Sensor Cable Supply unit	386 486 Pentium P 2	DOS Windows 3.1x or Windows 95 NT	HYDROcomsys/DOS: version HYDROcomsys/Windows: version

How to describe an error:

Please leave all parameters etc. unchanged after an error occurs.
Briefly describe your measuring task, connection of sensor, parameter adjustments (for example memory parameters, trigger, how many measuring values are acquired, type of printer, etc.

Your description:

Order data for the instrument group 8000

Instruments	Part-number
- Multi-System 8000 (VGA-graphic-colour-display) with software HYDROcomsys/Win	3160-00-57.00
- Multi-Control 8000 (without colour-display) with software HYDROcomsys/Win	3160-00-58.00
- Power supply adaptor 100 to 240 VAC / 24 VDC / 1,8 A	8812-00-00.27

Sensors			Part-number
- Pressure (output signal: 4 to 20 mA) Pressure sensor type PR 15	measuring range in bar (psi)	-1 to +6 (-14,5... 87) 0 to 60 (... 870) 0 to 200 (... 2900) 0 to 400 (... 5800) 0 to 600 (... 8700) 0 to 1000 (... 14500)	3403-32-71.37 3403-21-71.37 3403-10-71.37 3403-15-71.37 3403-18-71.37 3403-29-71.37
To select pressure sensor with 0 to 20 mA, the last two numbers of the order-no. need to be changed from .37 into .33 e. g.:			3403-xx-xx.33
- Pressure/temperature (output signal separate: 2 x 4 to 20 mA) p/T-dual sensor for the simultaneous measurement of pressure and temperature with integrated direct connection for p/T-test point series 1620 M 16x2 (ident.-no. 04)	measuring range in bar (psi) temperature measuring range in °C (°F) for both types:	0 to 60 (... 870) 0 to 600 (... 8700) -50 to +200 (-58... +392)	3163-04-34.00 3163-03-34.00
- Volume flow rate Measuring turbine RE 3 (inductive transducer with amplifier) output signal (square wave) with MINIMESS und p/T-test points (series 1620) (Please see our brochure "Volume flow rate sensors" for further technical details)	measuring range in l/min (gal/min)	7,5 to 75 (2... 20) 15,0 to 300 (4... 79) 25,0 to 600 (6,6...158,5)	31V7-21-35.00 31V7-30-35.00 31V7-40-35.00
- Volume flow rate Measuring turbine RE 4 (inductive transducer with amplifier) output signal (square wave) with MINIMESS und p/T-test points (series 1620) (Please see our brochure "Volume flow rate sensors" for further technical details)	measuring range in l/min (gal/min)	1,0 to 10 (0,26... 2,6) 7,5 to 75 (2... 20) 15,0 to 300 (4... 79) 25,0 to 600 (6,6...158,5)	31V7-01-35.00 31V7-70-35.00 31V7-71-35.00 31V7-72-35.00
- Volume flow rate Gear flow meter type GFM output signal (square wave) with MINIMESS und p/T-test points (series 1620) (Please see our brochure "Volume flow rate sensors" for further technical details)	measuring range in l/min (gal/min)	0,005 to 1 (0,0013... 0,25) 0,05 to 5 (0,013... 1,3) 0,2 to 30 (0,05... 8) 0,7 to 70 (0,18... 18,5) 3,0 to 300 (0,79... 79,25)	3143-01-35.00 3143-02-35.00 3143-03-35.00 3143-04-35.00 3143-05-35.00
- Temperature- screw-in sensor Pt 100 (3-wire technique) output signal 0 to 20 mA - Temperature- screw-in sensor Pt 100 (2-wire technique) output signal 4 to 20 mA both for p/T-test points series 1620 (ident.-no. 04) - Temperature -surface sensor Pt 100 (2-wire technique) output signal 4 to 20 mA helix cable connection approx. 1,2 m stretched - Temperature-immersion sensor Pt 100 (2-wire technique) output signal 4 to 20 mA helix cable connection approx. 1,2 m stretched	measuring range in °C (°F) valid for all temperature sensors	-50 to +200 (-58... +392)	3973-04-01.00 3969-04-01.00 3170-01-03.00 3170-02-06.00
- Rev. speed, infrared-sensor typ DS 03 with 25 pieces of reflective foil - Reflective foil (spare parts, 50 pieces) - Inductive tarnsducer with amplifier output signal (square wave) measurement of rev. speed on gear wheels	measuring range in min⁻¹ (rpm)	1 to 9999 (1... 9999)	3130-02-01.00 8840-02-01.01 3107-00-09.00

Accessories	Part-number
- Measuring cable MK 01 (length 2,5 m) for the connection to pressure-, rev. speed-, temperature- and volume flow rate sensors	8824-91-02.50
- Measuring cable TK 10 (length 2,5 m) for the direct connection between the two inputs temp./pressure and the p/T-dual sensor	8824-D3-02.50
- Connection cable (length 5 m) for external batteries	8824-64-05.00
- Transport case for the instrument group 8000 (valid for the measuring instrument and the power supply adaptor)	3160-00-18.12

		Part-number
- Inkjet colour printer battery operation with ink cartridges and power supply adaptor (100 to 240 VAC - 50/60 Hz) - Spare part ink cartridge in black - Spare part ink cartridge in colour - Data communication cable Centronics 36-poles / 25-poles		8865-01-13.00 8865-01-09.01 8865-01-10.01 8824-36-02.00
- Direct connection for pressure sensor type PR 15 - straight - Direct connection for pressure sensor type PR 15 - 90° - p/T-test point 1620 (ident.-no. 04) screw-in thread M 10x1 - p/T-test point 1620 (ident.-no. 04) screw-in thread ISO 228-G 1/4	(series 1620 - M 16x2) (series 1620 - M 16x2)	2146-05-30.00 2146-54-19.40 2149-04-19.13 2149-04-15.13
additional measurement of direct voltage or direct current possible - Voltage (external connection adaptor) signal output 0 to 20 mA - Current (external connection adaptor) signal output 0 to 20 mA	measuring range 0 to ±48 V DC measuring range 0 to ±2 A DC	3160-00-00.22 3160-00-00.23

- Software for instrument group 8000 to display and evaluate measuring values on PC and notebook:
 	
- Software: HYDROcomsysWin (Windows-version) is included in the delivery
  range of the instrument group 8000
 	
- RS 232- Connection cable, necessary for the transfer of measuring data
  between the instrument group 8000 and the computer
  (evaluation of measuring data with the software HYDROcomsys on PC or notebook)
 	
- Software: MC 8000 is included in the delivery range of the Multi-Control 8000
  Operating software to control the Multi-Control externally via PC or notebook
 	
- EPP- connection cable, necessary for the direct operation of the
  Multi-Control 8000 with the software MC 8000 via PC or notebook
	
	diskette 3 1/2" german
	diskette 3 1/2" english
	
	9-poles / 9-poles
	9-poles / 25-poles
	
	25-poles / 25-poles (plug/plug)
		
		8874-01-01.19
		8874-01-01.20
		
		8824-43-02.00
		8824-44-02.00
		
		8874-01-03.00
		
		8824-C9-02.00