HYDROTECHNIK
MESSEN MIT SYSTEM

MultiHandy 3050

Please read this manual before putting the measuring instrument into operation.

ISDS Intelligent Sensor Detection System

USB UNIVERSAL SERIAL BUS

User Manual

TKZ L3160-00-63.00E
Version 1.2 • April-30-2008

Contents

1 Safety

Please obtain the following regulations when operating the instrument.

1.1 General safety and warning hints

- Never cut, damage or modify the connection cables of the power pack and do not place things on it.
- Never touch the power pack with wet or moist hands.
- Only connect the power pack to power supplies for which it is suited (see technical data).
- Unplug the mains cable during a thunderstorm.
- Unplug the mains cable if you determine smoke or smell, or if the mains cable is damaged.
- Assure sufficient grounding of your installations. Inadequate grounding may lead to measuring peaks.

1.2 Hints for the use of the MultiHandy

- Never expose the instrument to excessive heat or moisture; obtain the technical data.
- Do not store the instrument in humid or dusty locations or at temperatures below freezing point.
- Never dip the instrument into water or other liquids. Never let liquids come into the instrument.
- Never open the instrument.
- Do not use the instrument after it fell down or the housing is damaged.
- Avoid strong magnetic fields. Keep distance of electric motors or other instruments that generate electro-magnetic fields. Strong magnetic fields may cause malfunctions and influence measuring values.
- Avoid the formation of condensed water. If condensed water has formated you should let the instrument acclimate before you switch it on. Otherwise it could be damaged.

1.3 Hints for the treatment of sensors and wires

- Protect the sensors from exceeding the allowed power range, mechnical overload and wrong pin assignment.
- Assure to enter the sensor parameters correctly when using sensors without ISDS (Intelligent Sensor Detection System).
- The measuring cables MK 01 and TKS may not be lengthened. Otherwise the shielding will be interrupted.
- The data of an ISDS sensor are read into the measuring instrument during switch-on procedure. If you connect new sensors, you will have to switch the instrument off and on.

1.4 Hints for the treatment of storage batteries

- Keep batteries away from heat sources and open fire.
- Never dip batteries into water.
- Never short-circuit the contacts of batteries.
- Never dismount, repair or modify batteries.
- Use only batteries that are mounted or delivered by Hydrotechnik.
- Load only the battery while it is mounted in the instrument.
- Dispose used batteries as special waste. Cover the contacts with insulation tape.

2 Introduction

This chapter contains information on several legal issues. Please read this chapter completely to maintain possible rights.

2.1 Range of validity

The manual on hand is valid for measuring instruments named "MultiHandy 3050". It adresses to the operator of this instrument, that means the person, who works with the instrument.

The manual is not a technical manual. Please contact our service staff for questions, that exceed the contents of this manual.

2.2 Copyright

The measuring instrument and this manual are protected on copyright. Manufacture without license will be prosecuted by law. All rights reserved on this manual, even the reproduction and/or duplication in any thinkable form, e.g. by photocopying, printing, on any data recording media or translated. Reproduction of this manual is only permitted with a written approval of Hydrotechnik GmbH.

The technical state by the time of delivery of instrument and manual is decisive, if no other information is given. Technical changes without special announcements are reserved. Earlier manuals are no longer valid.

The general conditions of sale and delivery of Hydrotechnik GmbH are valid.

2.3 Limitation of liability

We guarantee the faultless functioning of our product in accordance with our advertising, the product information edited by Hydrotechnik GmbH and this manual. Further product features are not guaranteed. We take no liability for the economy and faultless function if the product is used for a different purpose than that, described in the chapter „Use as agreed“.

Compensation claims are generally impossible, except if intention or culpable negligence by Hydrotechnik GmbH is proved, or if assured product features are not provided. If the product is used in environments, for which it is not suited or which do not represent the technical standard, we are not responsible for the consequences.

We are not responsible for damages at installations and systems in the surroundings of the product, which are caused by a fault of the product or an error in this manual.

We are not responsible for the violation of patents and/or other rights of third persons outside the Federal Republic of Germany.

We are not liable for damages, which result from improper operation according to this manual. We are not liable for missed profit and for consecuting damages due to non regardance of safety advice and warning hints. We don't accept liability for damages which result from the use of accessoires which are not delivered and/or approved by Hydrotechnik GmbH.

The products of Hydrotechnik GmbH are designed for a long life. They represent the standard of technique and science and were checked on all functions individually before delivery. The electrical and mechanical construction corresponds to the current norms and regulations. Hydrotechnik GmbH is doing product and market research for the further development and permanent improvement of their products.

In case of faults and/or technical trouble please contact the Hydrotechnik GmbH service staff. We assure that suitable measures will be taken immediately. Hydrotechnik GmbH guarantee regulations are valid, which we will send to you on demand.

2.4 Use as agreed

The measuring instrument "MultiHandy 3050" is a hand-held instrument for the recording, storage and evaluation of measuring data, recorded by sensors connected to the measuring instrument.

You can connect a great variety of different sensors to the measuring instrument if they meet the requirements defined in the section "Technical data". The instrument is preferably used for the recording of measuring data like pressure, temperature and volume flow rates.

Any other use of the product is considered as not agreed.

If you have any question or want to use the measuring instrument for a different purpose, please do not hesitate to contact our service staff. We are pleased to help you.

2.5 Warranty regulations

In accordance to our warranty regulations we guarantee the condition without defects for this measuring instrument for a duration of six months. Wearing parts and storage batteries are excepted from this warranty. The warranty is spoiled if repair work or interventions are executed by unauthorized persons.

Within the warranty period we repair damage or defects which are caused by a manufacturing fault. We only accept warranty claims if they are reported to us immediately after their discovery, but latest six months after delivery. The warranty benefit is by our choice through repair of defective parts or replacement by intact parts.

Send your instrument with an invoice copy or delivery note copy to Hydrotechnik. The adress is mentioned in section 6.2.

2.6 Obligations of the customer

The operating authority of this product has to assure, that only persons who

- know the regulations on working safety and accident prevention
- have been instructed in the operation of this product
- have read and understood this manual

can operate this product. Persons who operate this instrument are obliged to

- obey all regulations on working safety and accident prevention
- read this manual completely, especially the safety instructions in the first chapter.

2.7 Authorized staff

Persons are authorized if they have a professional education, technical experience, knowledge of the important norms and regulations and if they are able to estimate their duties and recognize possible danger at an early time.

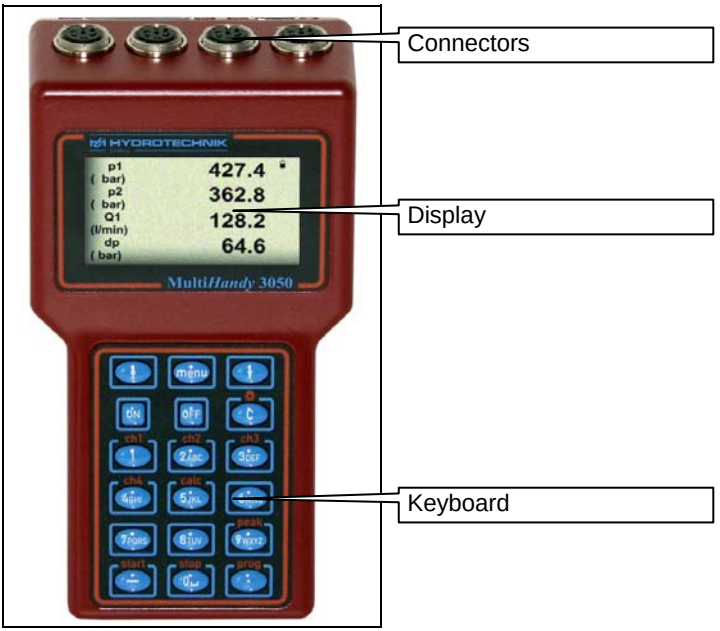
Operator of the instrument

Persons are authorized if they are trained in the operation of the instrument and have read and understood this manual completely.

Personell for installation and maintenance

Persons are authorized if they are trained in all aspects of the instrument and have read and understood this manual completely.

3 Description of the measuring instrument



Pic. 1: Components of the measuring instrument

3.1 Features of the MultiHandy 3050

The MultiHandy 3050 is a suitable, user-friendly hand-held measuring instrument supporting the user in his daily measuring jobs.

When using ISDS sensors the MultiHandy detects the connected sensors automatically during initialization and takes over all parameters: measuring range, physical measured variable, units, signal output and characteristic curve (linearization). A confusion of the sensor is avoided and the entry of specific special characteristic data is no longer necessary.

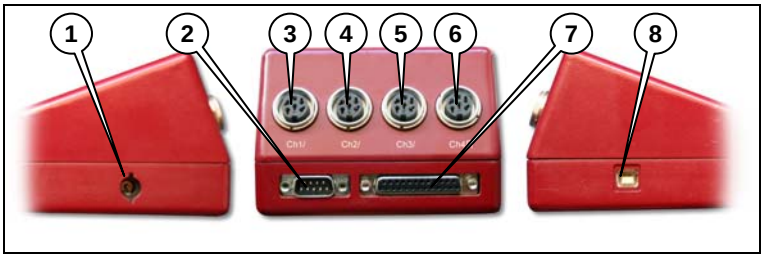
Of course you can also connect sensors without ISDS designation to your MultiHandy. Then you enter the sensor parameters in the operation menus.

All measurements can be transferred via an USB connection to a PC. The software "HydroComSys" delivered free of charge offers comprehensive support with functions for evaluation, presentation and printing of the measured values.

You can connect up to four sensors and store all measured values. Calculations with the values as difference, sum and performance, and a first differentiation (e.g. speed out of distance) are available as a fifth channel (pseudo measuring channel) for display and storage.

An extreme value buffer of the minimal and maximal measured variables is active all the time and can be displayed by pressing the corresponding key combination.

3.2 Connectors



Pic. 2: Connectors of the measuring instrument

1 Power supply (power pack)
2 RS 232
3 Ch1 (channel 1, analog)
4 Ch2 (channel 2, analog)
5 Ch3 (channel 3, analog)
6 Ch4 (channel 4, frequency)
7 parallel (Centronics)
8 USB

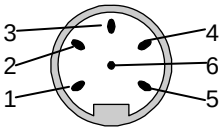
3.2.1 Sensor connectors

All inputs and outputs are not isolated. They are connected with the negative pole of the power supply, respectively with the measuring connection of the sensors.

3.2.2 Channels 1–3 analog inputs

Signal input	0–20 mA switchable per software to 4–20 mA R_i = 105 Ω, C_i = 10 nF
Measuring rate	1 ms
Measuring accuracy	± 0,2 % of end value
Resolution	12 Bit
Temperature range	± 0,1 % of end value at 10° C
Crosstalk	into neighbour channel at max. resolution 1 digit
Exceeding of end value	> 10 % of end value (max. 82 mA)
Plug connector	6 pol. instrument socket
ISDS	company-specific, serial data transmission
Sensor supply	with battery power 14 – 17 VDC with external power supply 24 VDC - 2 V max. 100 mA both

Pin assignment

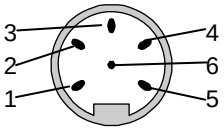


1 20mA signal – Ri = 105 Ω – Ci = 10 nF – limitation: 5,6 VDC – protection type: VDR, transile diode
2 Ground
3 Sensor supply – limitation: 100 mA – protection type: current limitation PTC
4 –
5 Shield
6 ISDS – limitation: 5,6 VDC – protection type: transile diode

3.2.3 Channel 4 frequency input

Frequency signal	> 0,5 Hz – 5 kHz
Input level	> 4,5 – 30 VDC rectangle
Measuring accuracy	± 0,2 %
Connector	6 pol. instrument socket
ISDS	company-specific, serial data transmission
Power supply	with battery power 14 – 17 VDC with external power supply 24 VDC - 2 V max. 100 mA both

Pin assignment



1 Frequency signal – Ri = 4,7 kΩ – Ci = 10o pF – limitation: 30 VDC – protection type: VDR, Zener diode
2 Ground
3 Sensor supply – limitation: 100 mA – protection type: current limitation PTC
4 –
5 Shield
6 ISDS – limitation: 5,6 VDC – protection type: transile diode

3.2.4 USB / RS 232

The data exchange between PC and measuring instrument is done via the USB or the RS 232 interface.

- Data exchange: the online data transmission via USB is supported up to a scan rate of ≥ 10ms.
- Firmware update: RS 232 interface programmable to 9,600, 19,200, 38,400 and 57,600 Baud.

3.2.5 Centronics

To connect a printer with parallel interface.

Several needle and ink jet printers are pre-set: Epson 9- and 24-needle-printers, Epson Color, HP mono-chrome and color, Canon.

3.3 Display

The measuring instrument is equipped with a mono-chrome 3.2"-display, where all information and measuring values are displayed alpha-numerically. The display of curves is not supported.

3.4 Keyboard

The measuring instrument is equipped with a membrane keyboard. The keys have the following occupations:

Pic. 3: Keyboard

[↑]	one level up or increase a value
[menu]	open operation menues or accept modified values or settings
[↓]	one level down or decrease a value
[ON]	switch on the instrument
[OFF]	switch off the instrument off (keep pressed for two seconds)
[C]	delete displayed value or cancel entry without storing the modifications
[1] ... [9]	entry of numbers and letters
[–]	entry of a stroke
[0]	entry of a zero or a space
[.]	entry of a point or open sensor parameters of a channel (see further below)

Some keys have a second assignment that is printed in red color above the key. These functions can be used during the measuring display is active.

[C]	☼	switches the illumination of the display on and off
[1]	ch1	display of measured value of channel 1 on and off
[2]	ch2	display of measured value of channel 2 on and off
[3]	ch3	display of measured value of channel 3 on and off
[4]	ch4	display of measured value of channel 4 on and off
[5]	calc	display of the calculation channel 5 on and off
[9]	peak	press [9] + [ch*n*], to switch on/off the peak display of the selected channel
[–]	start	starts the storing of a series of measurement
[0]	stop	stopps the storing of a series of measurement
[.]	prog	press [.] + [ch*n*], to program/display the sensor parameters of the selected channel *n* stands for the number of a channel (e.g. ch1)

3.5 Evaluation software

The measurement data evaluation software "HydroComsys Win32" is part of the delivery. After transferring the measurement data via the USB interface to a PC, you can evaluate, process and display them graphically with this software.

3.6 Technical data

Hardware	
Housing	ABS plastic
Weight (incl. batteries)	0.8 kg
Dimensions (H x W x D)	203 x 107 x 76 mm
Display	3,2" LCD with background illumination
Measurement display	4-digit, 2 or 4 lines
Menu display	8 lines
Interfaces	USB for data transmission
	RS 232 for Flash-update
	parallel as printer connector
Protective installations	reverse polarity protection, overvoltage protection, self-reversive fuse resistors (PTC)
Battery	230 VAC / 24 VDC, 340 mA
Connector	power pack socket 6.3 mm
Real-time clock	internal, battery-buffered
Operation conditions	
Ambient temperature	0° ... 50° C
Relative humidity	0 ... 80 %, not condensing
Storage temperature	-20° ... 70° C

Performance data	
Measured variables	e.g. pressure, temperature, volumetric flow, rotational speed, current, voltage, power, rotation moment, speed
Measuring value memory	0.9 MB, max. 450,000 measuring val. frequency max. 150,000 meas. val.
Program memory	512 kB Flash memory
Trigger	programmable: channel 1, 2, 3, 4, none or key
Scanning rate	1 ms ... 10 min. (programmable)
Measuring rate analog inputs	1 ms
Measuring rate frequency input	period measurement from 0.5 Hz to 56 Hz; measurement time from 56 Hz = 17.7 ms
Series of measurement	max. 14
Peak value buffering	min./max.-values of all analog channels in background 1 ms
Error limit analog	± 0.2 % of end value
Error limit digital	± 0.2 % of measured value
Internal power supply	battery max. 17.5 V / 2 Ah

4 Startup

4.1 Check delivery

The measuring instrument is delivered by Hydrotechnik and transported by suited shipping companies. At the time of delivery you should check:

- Does the number of delivered items corresponds with the Hydrotechnik delivery note?
- Is the packing free of visible damage?
- Are measuring instrument and accessories free of visible damage?
- Are there any indications of rough treatment during transportation (e.g. burn marks, scratches, color)?

To maintain all demands against the shipping company you should document all possible transportation damage (e.g. by taking photos and signing a written protocol), before you put the instrument into operation.

Hydrotechnik is not responsible for transportation damage and will take no liability.

4.2 Range of delivery

Carefully remove the transportation packing. Please obtain all rules and regulations for the disposal of packing materials. After unpacking you should find the following parts:

• Measuring instrument MultiHandy 3050	3160-00-63.00
• Battery, 14.4 VDC, 1,100 mAh	
• CD with software HydroComsys Win32	8874-16-00.01

Due to your order you could optionally find:

• Table power supply, 230 VAC / 24 VDC, 340 mAh	8812-00-00.28
• Car charging cable	8824-64-05.00
• Measuring cable MKS (ISDS)	8824-S1-02.50z
• USB data transmission cable	8824-F4-02.00
• Boot loader cable	8874-00-06.01
• CD with boot loader software	–

Check the range of delivery in accordance to the delivery note and the order documents. Report differences instantly to Hydrotechnik. Later claims on incomplete delivery cannot be accepted.

4.3 Charge batteries

Attention

Battery performance endangered!

Charge the instrument batteries for 14 to 16 hours before you put the instrument into operation. Otherwise there is the danger of excessive discharge, which would influence the battery performance negatively.

Hint

The battery integrated in the measuring instrument will be charged, as soon as the instrument is supplied by a Hydrotechnik power pack.

The instrument is equipped with an internal battery. This is pre-charged by Hydrotechnik and must be charged for at least 14 to 16 hours, before the instrument can be used.

Hints for the treatment of the batteries

The life cycle of NiCd cells can be very long, but it depends on the conditions of use.

Avoid a complete discharge, continuous charging and immediate re-charging after every use. This triggers the memory effect with a minimization of the battery capacity and possible remanent damage. You can regenerate the battery by several discharge and charge cycles.

In case of low battery power a hint "Load batteries" will be displayed. In this case you should maintain a 16 hour charging time. In case of longer periods without use you should discharge and charge the batteries monthly.

5 Operation

In this section you get all information on the daily use of the measuring instrument. The following operations are explained:

- Switch the instrument on and off
- Select operation language
- Connect sensors
- Program sensor parameters
- Collect measurement data
- Connect a PC
- Delete measurement data
- Reset instrument

At the end of this chapter you will find a complete description of the instrument software with a chronological explanation of all menues.

Hint

The software HydroComsys which is part of delivery will not be explained in this manual. Please refer to the online help and the separate software documentation.

Hint

In the following sections we will often mention keys of the measuring instrument in the text. They can be recognized since they are printed in [square] brackets. [menu] means the menu key.

5.1 Switch the instrument on and off

1. Assure that the desired sensors are connected correctly (see 5.2).
2. Press the key [ON] to switch the instrument on. After a short self-test you will see the display of the measured values.
3. Program the required settings and execute the required measurements.
4. Press the key [OFF] for more than 2 seconds to switch off the instrument.

Hint

If you use ISDS sensors, the sensor parameters will be set automatically. If you use other sensors, you have to program the sensor parameters before you can carry out measurements.

5.2 Select language

1. Switch the instrument on.
2. Press the key [menu].
3. Press the key [↓] three times, until the "Device menu" is highlighted.
4. Press the key [menu].
5. The entry "Language" is highlighted in the device menu. Press [menu].
6. Press the keys [↑] or [↓] (repeatedly), until the desired operation language is highlighted.
7. Press the key [menu]. A * will be displayed beside the selected language.
8. Press the key [C] three times, to return to the measurement display.

5.3 Connect sensors

Pic. 4: Sensor connectors

1. Switch off the instrument.
2. Connect the desired sensors to the inputs.
3. Switch on the instrument.

Hint

The channels 1 to 3 (positions Ch1, Ch2 and Ch3) are analog inputs. Channel 4 (position Ch4) is a frequency input.

5.4 Program sensor parameters

If you have connected ISDS sensors, the sensor parameters will be detected automatically when the instrument is switched on. Then you can skip this section.

If you have connected sensors without ISDS function, you will have to program the sensor parameters manually. You find the required information e.g. on the type plate of the calibration protocol of your sensor.

1. Press [menu]. The main menu will be displayed, the entry "Channel menu" is highlighted.
2. Press [menu] to open the channel menu. A list of the five measuring channels will be displayed.
3. Press [↑] or [↓] to highlight the desired measuring channel.
4. Press [menu] to select the highlighted measuring channel. A list of the sensor parameters will be displayed.
5. Highlight the parameter you want to modify.
6. Press [menu] to select the parameter. The set value will be highlighted.
7. Enter the new value with the numeric key pad (e.g. [2] [5] [.] [5] [0] for 25.50) or press [↑] or [↓] to select a setting.
8. Press [menu] to accept the entered/selected value. If you press [C], you cancel the programming, the prior value will be restored.
9. Repeat this for all parameters and measuring channels.
10. Press [C] repeatedly to return to the measurement display.

5.5 Record measurement data

The recording of measurement data is caried out by a series of measurement. These can be configured in the memory menu.

1. Press [menu], the main menu will be displayed.
2. Press [↓] twice, the entry "Memory menu" will be highlighted.
3. Press [menu] to open the memory menu.
4. Press [↓] three times to highlight the entry "View parameter".
5. Press [menu] to display the memory parameters.

Hint

Please see section 5.11 for further information on the meaning and modification of the memory parameters.

6. Press [C] to display the memory menu.
7. Press [↑] three times to highlight the entry "Start memory".
8. Press [menu] to display the name of the series of measurement.
9. Press [↓] twice to highlight the item "Start".
10. Press [menu] to start the recording of the series of measurement.
11. Press [0] (stop) during the display of the measurement data to stop the recording of measurement data.

5.6 Connect a PC

Pic. 4: PC connection (USB)

Important

The software HydroComsys has to be installed on your PC, before you can transfer measuring data from the instrument.

1. Switch measurement instrument and PC on.
2. Connect the USB cable to socket (1) at the left side of the instrument.
3. Connect the USB cable to a USB socket at your PC.
4. Wait until the measurement instrument has been detected by the PC.
5. Carry out the data transfer as described in the software documentation.

5.7 Delete measurement data

1. Press [menu] to display the main menu.
2. Press [↓] twice to highlight the entry "Memory menu".
3. Press [menu] to display the memory menu.
4. Press [↓] to highlight the entry "Delete memory".
5. Press [menu] to display the delete memory menu.
6. If you want to delete all series of measurement, press [menu] while the item "All" is highlighted. Continue with step 9.
7. If you want to delete a single series of measurement, press [↓] repeatedly, until the desired series of measurement is highlighted.
8. Press [menu].
9. Press [menu] to delete the selected data. If you press [C], the deletion will be cancelled.
10. You are back in the delete memory menu.

5.8 Set date and time

1. Press [menu] to display the main menu.
2. Press [↓] three times to highlight the entry "Device menu".
3. Press [menu] to display the device menu.
4. Press [↓] to highlight the entry "Date/Time".
5. Press [menu] to display date and time in two lines.
6. Press [menu] to edit the date.
7. Enter the day (e.g. [2] [5]) and confirm with [menu].
8. Enter the month (e.g. [0] [8]) and confirm with [menu].
10. Enter the year (e.g. [2] [0] [0] [5]) and confirm with [menu].
11. Press [↓] to highlight the line "Time".
12. Press [menu].
13. Enter the hour (e.g. [1] [2]) and confirm with [menu].
14. Enter the minutes (e.g. [2] [0]) and confirm with [menu].
15. Press [C] three times to return to the display of measured values.

In this example you have set August, 25, 2005 at 12:20.

5.9 Print measuring data

Important

You have to connect and select a printer before you can print measuring data.

1. Press [menu] to display the main menu.
2. Press [↓] four times to highlight the entry "Presentation menu".
3. Press [menu] to display the presentation menu; the line "Series" will be highlighted.
5. Highlight the desired series of measurement and press [menu].
6. Press [C] to return to the presentation menu.
7. Select the desired settings in the menu entries "Presentation" (Graph or Table", "Channels" (selection of the channels to be printed), "Scaling" (Auto or Manual) and "Size" (Total or Part).
8. Highlight the menu entry "Start print".
9. Press [menu] to print the measuring data.

5.10 Reset instrument

Attention

Possible loss of data!

All user-programmed settings and all measured values are deleted by resetting the instrument. This cannot be undone.

It is possible to reset the instrument to the factory settings. This deletes all user-programmed settings and adaptions. All measuring data are deleted, too.

1. Press [OFF] to switch off the instrument.
2. Press [ON] and immediately [1] [2] and [3]. You will see a confirmation inquiry "init complete – yes/no".
3. Press [menu] to reset the instrument, or press [C] to cancel the resetting. After cancelling, data remain undeleted and the measurement display appears.
4. After reset, a list of the possible languages will be displayed. Press [↑] or [↓] to highlight the desired language and confirm with [menu]. Then the measurement display will appear.

5.11 Operation software

5.11.1 Short command keys

The operation of the measuring instrument can be done completely with the operation menues explained in section 5.11.2. Experienced users can benefit from several short command keys.

Quick access to operation menus

All screens of the operation menues contain a number in the second line. The four numbers are separated by strokes. After opening the main menu with [menu], you can enter these numbers to access a certain function quickly.

Example: if you enter [3] [3] [4] [2], you can instantly select the desired trigger type with [↑] or [↓].

Hint

This function is also active, if the display of the chapter numbers has been disabled in the device menu.

Keyboard

Please refer to section 3.4 where the keyboard is explained.

Hint

In the following sections we will often mention keys of the measuring instrument in the text. They can be recognized since they are printed in [square] brackets. [menu] means the menu key.

5.11.2 Operation menues

Switch on

[ON]

```
   MultiHandy 3050

 (450  256  Measuring val
          Init

          1.1e
         SN: 66
  Hydrotechnik GmbH
```

... after initialization

the look of the measurement display may differ, due to the number of selected channels and whether peak values shall be displayed.

```
 p1
[bar]          0.0

 p2
[bar]          0.0
```

[menu] to open the main menu

```
***** MAIN-MENU *****
                1-0-0-0
Channel menu            >
Display menu
Memory menu
Device menu
Presentation menu
```

1-0-0 Channel menu

menu for the programming of the sensor parameters (sensors without ISDS)

[↑] / [↓] until "Channel menu" is highlighted
[menu]
[↑] / [↓] until channel is highlighted
[menu]

```
*** CHANNEL MENU ***
                1-1-0-0
K1: p1    (bar)         >
K2: p2    (bar)
K3: p3    (bar)
K4: n1    (U/min)
K5: dp1   (bar)
```

1-1-0 For channels 1 to 3

[↑] / [↓] until parameter is highlighted
[menu]

```
**** CHANNEL  1 ****
              1-1-1-0
Meas.var.: p1 (bar)
Sens.Type: (0-20mA)
M.Rng.min: 0.000
M.Rng.max: 200.0
Zero Point 0.000
```

[menu]
[↑] / [↓] until setting is displayed
... or ...
[2] [0] [0] [.] [0] entry of a value
... then ...
[menu] to save the value or
[C] to cancel

```
**** CHANNEL  1 ****
              1-1-1-0
Meas.var.: p(bar)
Sens.Type: (0-20mA)
M.Rng.min: 0.000
M.Rng.max: 200.0
Zero Point 0.000
```

Measured variables

Pressure:	p(mbar), p(bar), p(psi), p(Pa)
Temperature:	T(°C), T(°F)
Volume flow rate:	Q(l/min), Q(GPM)
Rotational speed:	n(U/min), n(rpm)
Voltage:	U(mV), U(V)
Current:	I(mA), I(A)
Power:	F(kN)
Mass:	M(Nm)
Distance:	s(mm)
Speed:	v(m/s), v(°/s)
Weight:	m(kg), m(t)

Sensor types

0-20 mA:	Minimal value of the sensor measuring range at a current of 0 mA
4-20 mA:	Minimal value of the sensor measuring range at a current of 4 mA

Measuring range

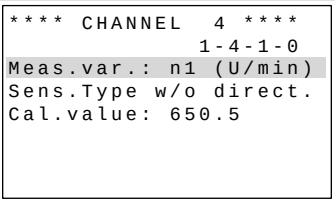
min:	Measuring value to be displayed at minimal current (0 or 4 mA)
max:	Measuring value to be displayed at maximal current (20 mA)

Zero point

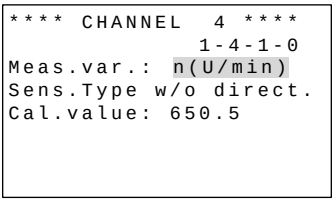
Highlight this item and press [menu] to carry out an automatic zero point alignment of the connected sensor

1-4-0 For channel 4

[↑] / [↓] until parameter is highlighted
[menu]



[menu]
[↑] / [↓] until setting is displayed
... then ...
[menu] to save the value or
[C] to cancel



Measured variables

Volume flow rate:	Q(l/min), Q(GPM)
Rotational speed:	n(U/min), n(RPM)
Frequency:	f(Hz)

Sensor type

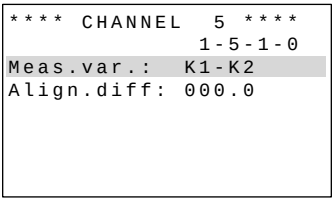
w/o direct.:	fixed setting that cannot be modified

Cal. value

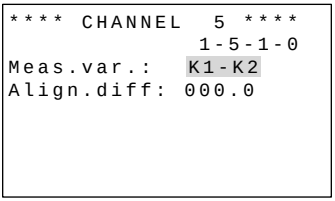
Volume flow rate:	enter calibration value in accordance to measuring record; calibration value contained on type plate (Q-sensor Hydrotechnik)
Rotational speed:	enter impulses per turn
Frequency:	enter always 1

1-5-0 For channel 5

[↑] / [↓] until parameter highlighted
[menu]



[menu]
[↑] / [↓] until setting is displayed
... then ...
[menu] to save the value or
[C] to cancel



Measured variables (Calculation channel)
K1-K2, K1+K2, dk1/dt, dk4/dt, K1*K4/600, K2-K3, K2+K3, UNDEF

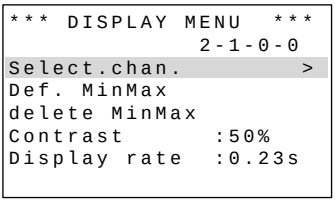
Difference alignment
Menu item to align two sensors (e.g. measuring of pressure difference):

1. Connect both sensors to the measuring instrument (e.g. K1 and K2) and the location to be measured (equal pressure for both sensors required).
2. Program the measured variables for K1 and K2.
3. Program for K5 e.g. the measured variable K1-K2.
4. Highlight the item "Align.diff".
5. Press [menu]; possible measuring differences between the two sensors will be compensated during the following automatic measuring.

2-0-0 Display menu

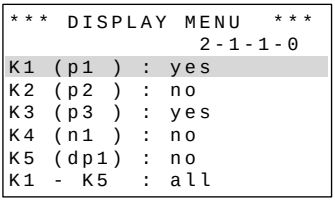
Selection for the measuring value display: channels and peak values

[↑] / [↓] until "Display menu" is highlighted
[menu]

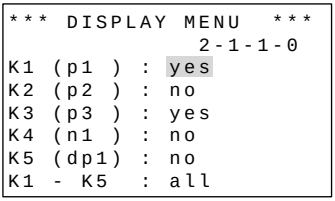


2-1-0 Select channels

[↑] / [↓] until "Select chan." is highlighted
[menu]
[↑] / [↓] until channel is highlighted
[menu]



[menu]
[↑] / [↓] changes between yes and no
... then ...
[menu] to save or
[C] to cancel
all channels with "yes" are shown in the display



2-2-0 Define MinMax values

[↑] / [↓] until "Def. MinMax" is highlighted
[menu]
[↑] / [↓] until channel is highlighted
[menu]

```
**** DEF. MINMAX ****
              2-2-1-0
K1 (p1 ) : yes
K2 (p2 ) : no
K3 (p3 ) : no
K4 (n1 ) : no
K5 (dp1) : no
K1 - K5  : all
```

[menu]
[↑] / [↓] changes between yes and no
... then ...
[menu] to save or
[C] to cancel
the MinMax values of all channels with "yes" will be displayed

```
**** DEF. MINMAX ****
              2-2-1-0
K1 (p1 ) : yes
K2 (p2 ) : no
K3 (p3 ) : no
K4 (n1 ) : no
K5 (dp1) : no
K1 - K5  : all
```

2-3-0 Delete MinMax values

[↑] / [↓] until "Delete MinMax" is highlighted
[menu]

```
*** DISPLAY MENU  ***
              2-3-0-0
Select.chan.
Def. MinMax
delete MinMax
Contrast       :50%
Display rate   :0.23s
```

during the deletion process the line "Delete MinMax" is replaced by strokes
then the display menu will be shown

```
*** DISPLAY MENU  ***
              2-3-0-0
Select.chan.
Def. MinMax
------------x
Contrast       :50%
Display rate   :0.23s
```

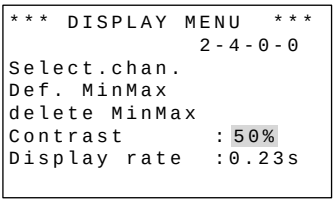
2-4-0 Change contrast

useful in poor light conditions

[↑] / [↓] until "Contrast" is highlighted
[menu]

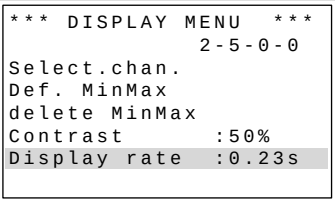
```
*** DISPLAY MENU  ***
              2-4-0-0
Select.chan.
Def. MinMax
delete MinMax
Contrast       :50%
Display rate   :0.23s
```

[↑] / [↓] until contrast is set properly
[menu] to save the setting or
[C] to cancel

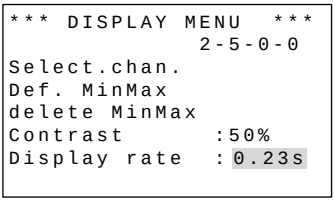


2-5-0 Modify display rate
time between the actualisations of the measurement display

[↑] / [↓] until "Display rate" is highlighted
[menu]

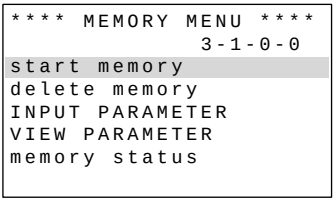


[↑] / [↓] until display rate is set properly
[menu] to save the setting or
[C] to cancel



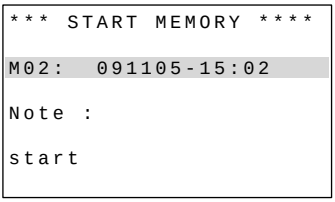
3-0-0 Memory menu
start series of measurement, delete memory, define/view memory parameters

[↑] / [↓] until "Memory menu" is highlighted
[menu]



3-1-0 Start data recording
starts the recording of the measuring values of the selected channels

[↑] / [↓] until "Start memory" is highlighted
[menu]



M02: name of the series of measurement; date and time are proposed; press [menu] and enter a description (letters and numbers)

Note: press [menu] and enter a short text (numbers and letters)

start press [menu] to start the data recording

3-2-0 Delete memory

delete a single or all series of measurement

[↑] / [↓] until "Delete memory" is highlighted

[menu]

```
*** DELETE MEMORY  **
                3-2-1-0
all
M01: 091105-14:08
M02: 091105-15:02
M03: ------------
M04: ------------
M05: ------------   |
```

[↑] / [↓] until "all" or a single series of measurement is highlighted

[menu]

[menu] to delete the data or

[C] to cancel

the screen "Delete memory" will be displayed

```
 Delete Memory ?

YES      --> Key MENU
NO       --> Key C
```

3-3-0 Program memory parameters

select channels for data recording and program memory parameters

[↑] / [↓] until "Input parameters" is highlighted

[menu]

```
* MEMORY PARAMETERS *
                3-3-1-0
Memory channel       >
Scanning rate
Storing time
Trigger
```

3-3-1 Select memory channels

determines the channels to be recorded in series of measurement

[↑] / [↓] until "Memory channel" is highlighted

[menu]

[↑] / [↓] until desired channel is highlighted

[menu]

```
* MEMORY PARAMETERS *
                3-3-1-1
K1 (p1 ) : yes
K2 (p2 ) : yes
K3 (p3 ) : no
K4 (n1 ) : no
K5 (dp1) : yes
K1 - K5  : all
```

[↑] / [↓] to change between yes and no
[menu]

```
* MEMORY PARAMETERS *
              3-3-1-1
K1 (p1 ) : yes
K2 (p2 ) : yes
K3 (p3 ) : no
K4 (n1 ) : no
K5 (dp1) : yes
K1 - K5  : all
```

3-3-2 Set scan rate

determines the time intervals between the measuring value recordings

[↑] / [↓] until "Scanning rate" is highlighted
[menu]

```
* MEMORY PARAMETERS *
              3-3-2-0
Memory channel
Scanning rate          >
Storing time
Trigger
```

[↑] / [↓] to highlight "Time base" – [menu]
[↑] / [↓] to select unit (ms/sec/min)
[menu]
[↓] to highlight "Value" – [menu]
[0] [5] [0] enter time value – [menu]

```
* MEMORY PARAMETERS *
              3-3-2-1
Time base :   ms
Value     :   001
```

3-3-3 Set storing time

defines how long values shall be recorded

[↑] / [↓] to highlight "Storing time"
[menu]

```
* MEMORY PARAMETERS *
              3-3-3-0
Memory channel
Scanning rate
Storing time           >
Trigger
```

[↑] / [↓] to highlight "Time base" – [menu]
[↑] / [↓] to select unit (sec/min/h)
[menu]
[↓] to highlight "Value" – [menu]
[0] [5] [0] enter time value – [menu]

```
*** STORING TIME ****
              3-3-3-1
Time base :   sec
Value     :   001
Max-time with
printing  :   43
Max time without
printing  :   74
```

"Max time with/without printing" shows the available memory time; if this is too short, you have to delete series of measurement to increase free memory

3-3-4 Select trigger

allows the selection of a condition, after that the storing starts

[↑] / [↓] to highlight "Trigger"
[menu]

```
* MEMORY PARAMETERS *
              3-3-4-0
Memory channel
Scanning rate
Storing time
Trigger                >
```

[↑] / [↓] to highlight "Trigger" – [menu]
[↑] / [↓] to select trigger – [menu]
[↓] to highlight "Type trig." – [menu]
[↑] / [↓] to select trigger type – [menu]
[↓] to highlight "Trig. value" – [menu]
[1] [5] [0] [.] [0] enter trigger value – [menu]
[↓] to highlight "Pretrigger" – [menu]
[0] [7] [5] enter percentage – [menu]

```
****** TRIGGER ******
              3-3-4-1
Trigger     : p1
Type trig.  : LOWER
Trig. value: 050.0
Pretrigger :   0%
```

Available trigger:
NONE: no trigger selected, data recording starts without percondition
TASTE: data recording starts after pressing a key
p1/p2/...: measurement channels 1 to 4; data recording starts, if measuring value of the channel is lower/greater than the trigger value

Trigger types:
Lower: recording starts if measuring value is smaller than trigger value
Greater: recording starts is measuring value is greater than trigger value

Trigger value:
threshold value; data recording starts if measuring values are lower/greater

Pretrigger:
possibility to store measuring values which appeared before fulfilling the trigger condition; percentage of the maximal available memory that shall be used for pre-triggering

3-4-0 View memory parameters
display of the programmed memory parameters

[↑] / [↓] to highlight "View parameter"
[menu]

```
**** MEMORY MENU ****
              3-4-0-0
Start memory
Delete memory
Input parameter
View parameter
Memory status
```

Programmed memory parameters are displayed and cannot be modified.
[↓] switched to the second page

```
* MEMORY PARAMETERS *
              3-4-1-0
Channels: p1 p2 p3
          n1
Scanning rate 1 ms
Stor. time :  1 sec
Trigger    :  p1
                     >
```

Second page of memory parameters.
[↑] back to the first page
[C] back to the memory menu

```
* MEMORY PARAMETERS *
              3-4-1-0
Trigger      : p1
Type trig.   : LOWER
Trig. value  : 050.0
Pretrigger   : 0%

<
```

3-5-0 View memory status
display of the available memory

[↑] / [↓] to highlight "Memory status"
[menu]

```
**** MEMORY MENU ****
              3-5-0-0
Start memory
Delete memory
Input parameter
View parameter
Memory status
```

Display of the required and available storage capacity for the recording of the desired series of measurement.
[C] back to the memory menu

```
*** MEMORY STATUS ***
              3-5-1-0
required    : 1000
free        : 74042
printing?   : yes
```

4-0-0 Device menu

display and modify several instrument settings

[↑] / [↓] to highlight "Device menu"
[menu]

```
**** DEVICE MENU ****
              4-1-0-0
Language              >
Date / Time
ISDS
Printer
Company Name
RS 232                |
```

[↓] repeatedly to display two more menu items

```
**** DEVICE MENU ****
              4-8-0-0
ISDS                  |
Printer
Company Name
RS 232
Illumination
Chapter number: yes
```

4-1-0 Select language

selection of the language

[↑] / [↓] to highlight "Language"
[menu]
[↑] / [↓] until desired language is highlighted
[menu]
[C] to return to the device menu

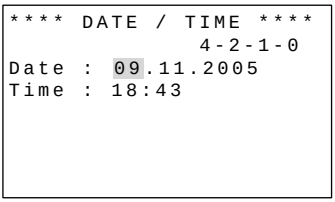
```
****** LANGUAGE *****
              4-1-1-0
  deutsch
* english
  francais
  espanol
  italiano
  nederlands          |
```

4-2-0 Set date and time

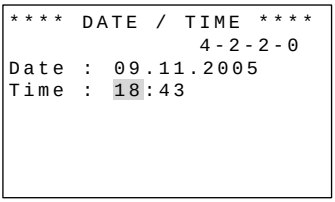
[↑] / [↓] to highlight "Date/Time"
[menu]

```
**** DATE / TIME ****
              4-2-1-0
Date : 09.11.2005
Time : 18:43
```

[↑] / [↓] to highlight "Date"
[menu]
[0] [8] enter day – [menu]
[1] [0] enter month – [menu]
[2] [0] [0] [5] enter year – [menu]



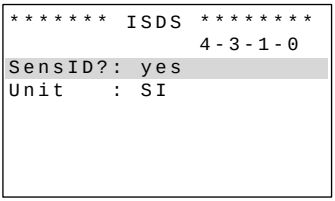
[↑] / [↓] to highlight "Time"
[menu]
[1] [2] enter hour – [menu]
[2] [5] enter minutes – [menu]



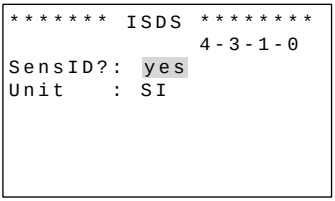
4-3-0 ISDS settings

activate ISDS and select unit

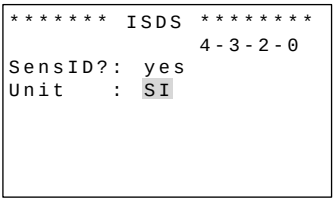
[↑] / [↓] to highlight "ISDS"
[menu]



[↑] / [↓] to highlight "SensID"
[menu]
[↓] select "yes" (ISDS activated) or "no"
[menu]



[↑] / [↓] to highlight "Unit"
[menu]
[↓] select "SI" or "US"
[menu]



4-4-0 Printer settings
select a printer

[↑] / [↓] to highlight "Printer"
[menu]
[↑] / [↓] to highlight printer type
[menu]

```
***** PRINTER *******
              4-4-1-0
  EPSON 9 pin       >
* EPSON 24 pin
  EPSON color
  HP mono
  HP color
  Canon
```

[↑] / [↓] to highlight printer modell
[menu]
[C] back to printer menu

```
***** PRINTER *******
              4-4-1-1
* DPU_414
  NEC P2X
  EPSON LQ500
  other
```

4-5-0 Company name

[↑] / [↓] to highlight "Company name"
[menu]
You can use three lines with 17 digits each.

```
*** COMPANY NAME ****
              4-5-1-0
Company
 Hydrotechnik GmbH
 65549 Limburg
 Holzheimerstr. 94
```

[↓] to highlight first line – [menu]
[M] [u] [s] [t] [e] [r] enter name – [menu]
[↓] to highlight second line – [menu]
[G] [m] [b] [H] enter name – [menu]
[↓] to highlight third line – [menu]
[B] [e] [r] [l] [i] [n] enter name – [menu]
[C] back to device menu

```
*** COMPANY NAME ****
              4-5-2-0
Company
 Hydrotechnik GmbH
 65549 Limburg
 Holzheimerstr. 94
```

4-6-0 RS 232
set transmission rate for RS 232 interface

[↑] / [↓] to highlight "RS 232"
[menu]
[↑] / [↓] to highlight transmission rate
[menu]
[C] back to the device menu

```
******* RS 232 ******
              4-6-1-0
  9600
* 19200
  38400
  57600
```

4-7-0 Illumination

select the display illumination settings

[↑] / [↓] to highlight "Illumination" – [menu]
[↓] to highlight "Mode" – [menu]
[↑] / [↓] to select mode – [menu]
[↓] to highlight "Deceleration" – [menu]
[1] [5] enter delay time – [menu]
[C] back to device menu

```
**** ILLUMINATION ***
                4-7-1-0
Mode          : KEY
Deceleration: 15 sec
```

You can choose from the illumination modes "On", "Off" and "Key". The delay time is only displayed for the mode "Key". Here the illumination is switched on with every key pressure and lights until delay time has run out.

4-8-0 Chapter number

activate or disable the display of the chapter number

[↑] / [↓] to highlight "Chapter number"
[menu]
[↑] / [↓] to change between "Yes" and "No"
[menu]

If "No" is selected, the chapter number in the second line is not displayed.

```
**** DEVICE MENU ****
                4-8-0-0
ISDS                    |
Printer
Company Name
RS 232
Illumination
Chapter number: yes
```

5-0-0 Presentation menu

several settings for the printing of series of measurement

[↑] / [↓] to highlight "Presentation menu"
[menu]

```
* PRESENTATION MENU *
                5-1-0-0
Series: 071005-18:38>
Presentation:GRAPH
Channels p1p2p3Q1
Scaling      :AUTO
Size         :TOTAL
Start print
```

5-1-0 Select series of measurement

select last series of measurement directly or choose from a list

Last series of measurement is displayed and selected for printing; or select another one:
[menu]
[↑] / [↓] to highlight series of measurement
[menu]
[C] back to presentation menu

```
*** SELECT SERIES ***
                5-1-1-0
M01:*071005-18:38
M02: 071005-18:55
M03: 071005-19:42
M04: ------------
M05: ------------
M06: ------------
```

5-2-0 Select presentation
choose between table and graphical presentation

[↑] / [↓] to highlight "Presentation"
[menu]
[↑] / [↓] changes between "Table" and "Graph"
[menu]

```
* PRESENTATION MENU *
              5-2-0-0
Series: 071005-18:38
Presentation:GRAPH
Channels p1p2p3Q1
Scaling      :AUTO
Size         :TOTAL
Start print
```

5-3-0 Select channels
selection of one or several channels for printing

[↑] / [↓] to highlight "Channels"; the channels selected for printing are displayed; to change:
[menu]

```
* PRESENTATION MENU *
              5-3-0-0
Series: 071005-18:38
Presentation:GRAPH
Channels p1p2p3Q1    >
Scaling      :AUTO
Size         :TOTAL
Start print
```

[↑] / [↓] to highlight a channel
[menu]
[↑] / [↓] changes between "Yes" and "No"
[menu]
[C] back to presentation menu

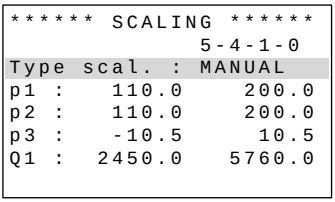
```
***** CHANNELS ******
              5-3-1-0
 (p1 )  : yes
 (p2 )  : yes
 (p3 )  : yes
 (p4 )  : yes
```

5-4-0 Set scaling
use the automatic scaling or define your own scalings

[↑] / [↓] to highlight "Scaling"
[menu]
[menu]
[↑] / [↓] changes between Auto and Manual
with Manual, four more lines will be displayed:

```
****** SCALING ******
              5-4-1-0
Type scal. : AUTO
```

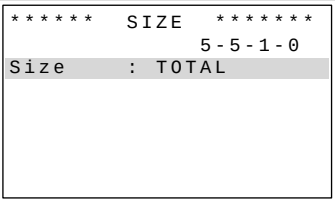
[↑] / [↓] to highlight a line – [menu]
[1] [1] [0] [.] [0] enter lower value – [menu]
[2] [0] [0] [.] [0] enter upper value – [menu]
repeat for all desired lines
[C] back to the presentation menu



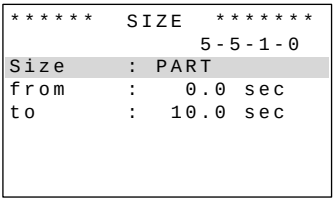
5-5-0 Define size

print complete series of measurement or limited period only

[↑] / [↓] to highlight "Size"
[menu]
[menu]
[↑] / [↓] changes between Total and Part
with Part, two more lines will be displayed:

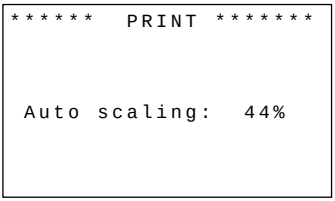


[↑] / [↓] to highlight a line – [menu]
[1] [2] [.] [3] enter start time – [menu]
[2] [1] [.] [0] enter end time – [menu]
[C] back to presentation menu

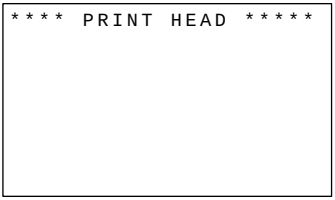


5-5-0 Print

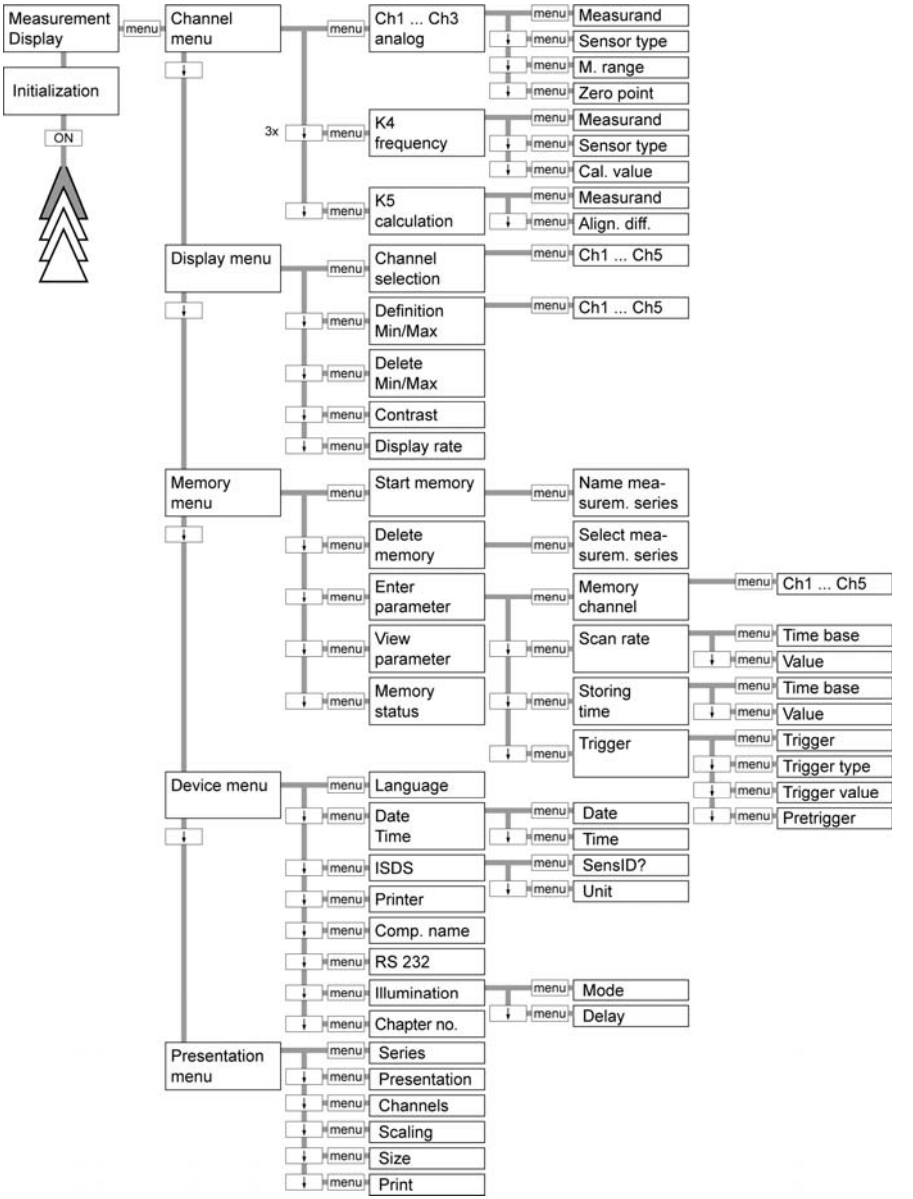
[↑] / [↓] to highlight "Start print"
[menu]



after auto-scaling (if activated)



5.12 Menu tree



6 Cleaning and maintenance

6.1 Cleaning

Attention

Possible damage to the measurement instrument!

Switch off the instrument and disconnect the power supply before you start with cleaning. Otherwise a short-circuit could happen, which could damage the instrument.

Attention

Possible damage to the measurement instrument!

Never use aggressive cleaners, solvents or similar chemicals for the cleaning of the instrument. This would damage the casing and make the display opaque.

Clean the housing with a soft cloth which is slightly dampened with a mild household cleaner.

6.2 Maintenance

This measurement instrument works maintenance-free. But it is required to calibrate it regularly. In the case of frequent use we recommend a calibration every two years.

Hydrotechnik has an efficient calibration laboratory. Please contact us:

Hydrotechnik GmbH

Holzheimer Straße 94-96 • 65549 Limburg • Germany
Phone: +49 (0) 6431 400 40 • Fax: +49 (0) 6431 453 08
E-Mail: info@hydrotechnik.com • Internet: www.hydrotechnik.com

6.3 Repair

Please contact our service staff in case of a repair. Please keep the following information ready before you contact us. If you send in the instrument, the information should be given in written form:

- Company
- Department
- Contact person
- Address
- Phone and fax number
- E-mail address
- Defective assembly (measuring instrument, sensor, cable, power supply unit)
- Used PC (Pentium 1, Pentium 2, Pentium 3, Pentium 4, other)
- Operation system (Windows 95/98/SE/2000/NT/XP, other)
- HydroComsys software version
- Fault description (please leave the settings of the measuring instrument like they were when the fault ocurred; describe the measurement duty, sensor connection, instrument settings: like e.g. memory parameter, trigger, how many values recorded, printer type, a.s.o.)

Adress of customer service

Contact the Hydrotechnik customer service with the following adress:

Hydrotechnik GmbH

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