

MultiHandy 3020



Operating Instructions

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TKZ L3160-00-72.00EN



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1 Safety

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.
- Connect the power pack to suited power supplies, only (see technical data).
- Unplug the mains cord during a thunderstorm.
- Unplug the mains cord if you detect smoke or smell, or if it is damaged.
- Assure sufficient grounding of your installations. Inadequate grounding may lead to measuring peaks.

1.2 Hints for the Operation of the Instrument

- Never expose the instrument to excessive heat or moisture; obtain the requirements as stated in the technical data.
- Do not store the instrument at 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.
- Never use the instrument, if the casing 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 measured values.
- Avoid the condensation of water. If there is condensed water, the instrument must acclimate before you switch it on. Otherwise it could be damaged.

1.3 Hints for the Use of Sensors and Cables

- Protect the sensors from exceeding the allowed power range, mechanical 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 MKS may not be lengthened. Otherwise the shielding will be interrupted.
- The data of an ISDS sensor are transferred to the measuring instrument when it is switched on. If you connect new sensors, you will have to switch the instrument off and on.



1.4 Hints for the Use of Batteries

- Keep batteries away from heat sources and open fire at any time.
- Never dip batteries into water.
- Never dismantle, repair or modify batteries.
- Never short-circuit the contacts of a battery.
- Only use the batteries installed or delivered by Hydrotechnik.
- Only charge a battery when it is installed in the measuring instrument.
- Dispose defective batteries as hazardous waste. Cover the contacts with insulation tape.

2 Introduction

The information contained in this section is important. If you neglect them, you might lose possible warranty claims.

2.1 Range of Validity

The operating instruction manual on hand is valid for measuring instruments named „MultiHandy 3020“. It addresses 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 instruments of the family „MultiHandy 3020“ are mobile hand-held devices for the collection and storage of measuring data. These are detected by sensors connected to the instrument. A large variety of different sensors can be connected to the instrument, but they must correspond with the requirements given in the section „Technical Data“.

Any other use of the measuring instrument 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 will be 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:

Hydrotechnik GmbH

Holzheimer Str. 94-96 • D-65558 Limburg • Tel. +49 6431 4004-0

2.6 Obligations to the Customer

The operating authority of this product has to assure, that only authorised persons may use and operate this product. Persons are regarded as authorised, who have a qualified education, technical experience, and knowledge of the current norms and regulations, what enables them to estimate their duties and detect possible danger at an early time.

Operator of the Instrument

Persons are regarded as authorised that have been trained in the operation of the instrument and have read and understood this manual completely.

Persons for Installation and Maintenance

Persons are regarded as authorised that have been trained in all aspects of the instrument and have read and understood this manual completely.



3 Delivery

The measuring instrument is dispatched by Hydrotechnik and carried and delivered by a transport company. Since Hydrotechnik cannot take liability for a proper transportation, you should check the following items when the product is delivered.

If the answer to one or several questions differs from the give must-answer, you should complain about the delivery and write a damage report. There you should document all claims and make additional photos. Let the representative of the transport company sign the damage report. This is a good way to obtain all compensation rights against the transport company.

- Is the transport packaging undamaged? >>> **YES**
- Does the transport packaging show any damage that suggests damage of the contained goods? >>> **NO**
- Does the transport packaging show any indication of humidity, burn marks or other damage? >>> **NO**
- Are all transport labels existent and readable? >>> **YES**

Range of Delivery

Unpack the measuring instrument and check the complete delivery according to the delivery note. Normally the delivery comprises:

- Measuring Instrument MultiHandy 3020
- Power Pack 230 VAC, 50/60 Hz
- USB-cable
- Data-CD

If things are missing that should have been delivered according to the delivery note, you should contact Hydrotechnik directly (address on the last page), or with your local Hydrotechnik partner.

4 Description of the Measuring Instrument

4.1 Qualities of the MultiHandy 3020

The MultiHandy 3020 is a valuable 3-channel measuring instrument that provides all functions the user needs and expects to solve demanding tasks in the range of professional measuring technology.



When using HySense® sensors with ISDS signal, the measuring instrument automatically detects the connected sensors during boot-up and takes over all parameters: measuring range, physical measurand, units, output signal and characteristic curve (linearisation). Mixed-up sensors are avoided, the manual input of numerous data is superfluous.

Of course you can also connect sensors without ISDS signal to the MultiHandy 3020. Then the input of the sensor parameters is done in a clear operation menu.

The operation is done with a membrane keypad with 18 keys that you can use to execute all required configurations in logically structured operation menus. Additionally you can program recordings and setup the display of measured values.

You may connect up to three sensors at a time to the MultiHandy 3020, a fourth pseudo channel is available for online calculations. The instrument is equipped with an internal memory that can record up to one million measured values. You can connect the instrument with a PC using the USB interface. The software **HYDROcom** (delivered free of charge together with the instrument) allows the download of the measuring data and their comfortable evaluation and presentation.

4.2 Connectors



Pic. 1 Connectors of the MultiHandy 3020

1. Measuring channel 3 (digital / frequency)
2. Measuring channel 2 (analog)
3. Measuring channel 1 (analog)
4. Power supply jack
5. USB interface



5 Putting into Operation



Important

Charge the battery of the instrument completely, before you use the device without power pack. This assures the complete performance of the battery.

- Plug the round connector of the power pack into the power supply jack of the MultiHandy 3020 (see section 4.2).
- Plug the mains connector of the power pack into a socket.
- Charge the battery of the instrument at least 10 hours without interruption.
- Cut all connections of the power pack.

6 Switch On and Off



Information

Charge the battery at least 10 hours without interruption, before you use the instrument without power pack. This assures the complete performance of the battery.

6.1 Switch On

1. Press the key [ON] for about 0.5 seconds.
2. After two seconds this screen will be displayed:

```
MultiHandy 3020
(1045772 values)
  Init
    1.0a
    SN: 1
Hydrotechnik GmbH
```

3. After a few seconds the measured value display appears:

```
p1      236.40
[bar]
p2      55.90
[bar]
Q1      213.40
[l/min]
dp1     180.50
[bar]
```


Explanations to the measured value display and possible settings are contained in the following sections.

6.2 Switch Off



Important

Do not switch the instrument off while a recording is executed or data are transferred to the computer. This would result in data losses, lost data cannot be restored.

Press the key [OFF] for est. three seconds. The instrument will be switched off.

7 Execute Measurements

In this chapter we will describe, how you execute measurements with the MultiHandy 3020. The chapter is divided in sections:

- connect sensors
- setup measuring instrument
- configure channels
- configure display

7.1 Connect Sensors



Information

The occupations of the input jacks is printed on the bottom of the instrument.



Pic. 2 Connect sensors

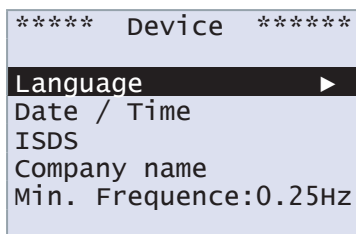
1. Connect the desired sensors to the instrument. Be sure to have the centering bar in upright position. Connect analog sensors only to channels 1 and 2, sensors with digital (frequency) output signal may be connected to channel 3, only.
2. Connect the power pack to the power supply jack and a socket.



7.2 Setup Instrument

The menu „Device“ offers several functions for the adaption of the instrument:

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“.
3. Press [Enter]:



7.2.1 Select Language

You can choose from several languages for the operation menus:

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“ [Enter].
3. [▼] [▲] Highlight „Language“ [Enter]:



4. [▼] [▲] Highlight the desired language [Enter]. More languages below.
5. Press [C].

7.2.2 Set Date and Time

Date and time are stored together with the measuring data. This is way you should enter correct values here:

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“ [Enter].
3. [▼] [▲] Highlight „Date / Time“ [Enter]:

```
**** Date / Time ****  
Date : 28.05.2009  
Time : 08:23
```

4. [▼] [▲] Highlight „Date“ [Enter].
5. Enter the day, e.g. [2] [8] [Enter].
6. Enter the month, e.g. [0] [5] [Enter].
7. Enter the year, e.g. [2] [0] [0] [9] [Enter].
8. [▼] [▲] Highlight „Time“ [Enter].
9. Enter the hour, e.g. [0] [8] [Enter].
10. Enter the minutes, e.g. [2] [3] [Enter].
11. Press [C].

7.2.3 ISDS Settings

The use of the Hydrotechnik ISDS system (Intelligent **S**ensor **D**etection **S**ystem) for the automatic detection of connected sensors brings many advantages for the user. Here you can select whether you want to use ISDS and which units shall be used:

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“ [Enter].
3. [▼] [▲] Highlight „ISDS“ [Enter]:

```
***** ISDS *****  
SensID?: yes  
Unit : SI
```

4. [▼] [▲] Highlight „SensID?“.
5. Select whether you want to use ISDS („yes“) or not („no“) [Enter].
6. If you use ISDS, you may choose the desired units:
7. [▼] [▲] Highlight „Unit“.
8. Select whether you want to use international standard units („SI“) or US-american units („US“) [Enter].
9. Press [C].



7.2.4 **Enter Company Name**

You may enter information that will be written into the series of measurements generated by the instrument. This can be a company name, as example.

Characters are entered in the same way like at a cellphone. For an „N“ press [6] twice, for an „Y“ three times [9]. Pressing [Menu] alters between capital and small letters. Press [C] to abort the input and use [▼] [▲] to jump to the prior / next digit. The special characters @, © and & can be entered by pressing [-].

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“ [Enter].
3. [▼] [▲] Highlight „Company name“ [Enter]:

```
***** Company *****  
Company:  
© Hydrotechnik GmbH  
info@  
hydrotechnik.com
```

4. [▼] [▲] Highlight the first line [Enter].
5. Enter letters and other characters, confirm with [Enter].
6. [▼] [▲] Highlight the second line [Enter].
7. Enter letters and other characters, confirm with [Enter].
8. [▼] [▲] Highlight the third line [Enter].
9. Enter letters and other characters, confirm with [Enter].
10. Press [C].

7.2.5 **Set Minimum Frequency**

For the frequency input you may set the minimum frequency that shall be measured. All smaller frequencies will be displayed as zero.

When using turbines for the measuring of volume flow rates, we recommend to set the minimum frequency to „100 Hz“. When the system comes to idleness, the decay to zero will be displayed with just a small time delay (10 ms). With a minimum frequency of 0.25 Hz, „Zero“ would be displayed after four seconds.

For rotational speed measurements over 60 rpm with sensor and **one** reflection mark we recommend a minimum frequency set to 1 Hz. Then all rotational speeds between 0 and 59 rpm will be displayed as „Zero“.

For rotational speeds over 14 rpm you will have to set the minimum frequency to 0.25 Hz. Then all rotational speeds between 0 and 14 rpm will be displayed as „Zero“. If rotational speeds below 14 rpm shall be measured, you will have to use multiple reflection marks.

The setting of the minimum frequency is a compromise between the required measuring range and the desired dynamic in the detection of the measured value „Zero“.

1. Press [Menu].
2. [▼] [▲] Highlight „Measuring device“ [Enter].
3. [▼] [▲] Highlight „Min. Frequency“ [Enter]:

```
** Measuring device **  
  
Language  
Date / Time  
ISDS  
Company name  
  
Min.Frequency: 0.25Hz
```

4. [▼] [▲] Select the desired value [Enter].
5. Press [C].

7.3 Configure Channels



Information

No channel configurations are required when using sensors with Hydrotechnik ISDS. All sensor parameters will be set automatically when the instrument is switched on.

Open the menu „Channels“ to configure the measuring and the calculated channels:

1. Press [Menu].
2. Highlight „Channels“.
3. Press [Enter]:

```
***** Channels *****  
  
C1: p1 (bar) ▶  
C2: p2 (bar)  
C3: Q1 (l/min)  
C4: dp1 (bar)
```

You get an overview over all channels with the current measurands and units.

7.3.1 Configure Analog Input Channels (C1 / C2)

1. Press [Menu].
2. [▼] [▲] Highlight „Channels“ [Enter].
3. [▼] [▲] Highlight „C1“ or „C2“ [Enter]:



```
***** Channel 1 *****  
Variable : p1 (bar)  
Sens.type: 0-20 mA  
Measure Range  
from      : 0.000  
to        : 300.0  
Zero point 0.000
```

4. [▼] [▲] Highlight „Variable“ [Enter].
5. [▼] [▲] Select the desired variable and units [Enter].
6. [▼] [▲] Highlight „Sens.type“ [Enter].
7. [▼] [▲] Select the output signal of the sensor [Enter].
8. [▼] [▲] Highlight „from“ [Enter].
9. Enter the lower limit of the measuring range of the sensor, e.g. [0] [Enter].
10. [▼] [▲] Highlight „to“ [Enter].
11. Enter the upper limit of the measuring range of the sensor, e.g. [3] [0] [0] [Enter].
12. [▼] [▲] Highlight „Zero point“ [Enter].
13. If you want to execute a zero point equalisation, you have to be sure that the sensor receives the value „0“, e.g. that there is no pressure. Then press [Enter]. Horizontal dashes are displayed in this line of the display, while the equalisation is in execution. Then the equalised value will be displayed.
14. Press [C].

7.3.2 *Configure Digital Input Channel (Frequency / K3)*

1. Press [Menu].
2. [▼] [▲] Highlight „Channels“ [Enter].
3. [▼] [▲] Highlight „C3“ [Enter]:

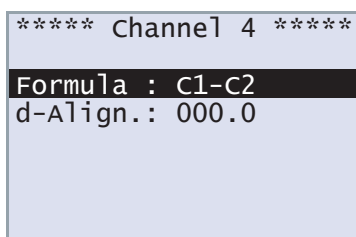
```
***** Channel 3 *****  
Variable : Q1 (l/min)  
Value    : 100.
```

4. [▼] [▲] Highlight „Variable“ [Enter].
5. [▼] [▲] Select the desired variable and units [Enter].
6. [▼] [▲] Highlight „Value“ [Enter].
7. [▼] [▲] Enter the calibration value of the sensor, e.g. [1] [0] [0] [Enter].
8. Press [C].

The calibration value is contained in the documentation of the sensor.

7.3.3 Configure Calculated Channel (C4)

1. Press [Menu].
2. [▼] [▲] Highlight „Channels“ [Enter].
3. [▼] [▲] Highlight „C4“ [Enter]:



4. [▼] [▲] Highlight „Formula“ [Enter].
5. [▼] [▲] Select the formula for the desired calculation [Enter].
6. [▼] [▲] Highlight „d-Align.“. This function automatically determines the measured value difference between the channels used in the formula and takes it as Offset.
7. Assure that both sensors are exposed to the same measured value (e.g. the same pressure). Then press [Enter] to align the sensors.
8. Press [C].

Available formulas

UNDEF	no calculation will be executed
C1-C2	difference of the measured values from channel 1 and 2 (e.g. delta-P)
C1+C2	sum of the measured values from channels 1 and 2
dC1/dT	calculated the first differentiation of the measured values from channel 1
dC3/dT	calculated the first differentiation of the measured values from channel 3
C1*C3/600	calculated the hydraulic capacity; the pressure p in bar must be measured on channel 1 and the volume flow rate Q in l/min on channel 3

7.4 Configure Display

In the „Display“ menu you can decide, which channels are displayed. Additionally you can define some other parameters:

1. Press [Menu].
2. [▼] [▲] Highlight „Anzeige“ [Enter]:



```
***** Anzeige *****
Kanäle auswählen ►
MinMax aktivieren
MinMax löschen
Kontrast :50%
Anzeigerate :1.00s
Beleuchtung :50%
```

7.4.1 **Kanäle auswählen**

Mit dieser Funktion legen Sie fest, welche Kanäle während der Messung angezeigt werden sollen:

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Select channels“ [Enter]:

```
** select channels **
c1 (p1 ) : yes
c2 (p2 ) : no
c3 (Q1 ) : yes
c4 (dp1) : yes
c1 - c4 : none
```

4. [▼] [▲] Highlight a channel.
5. Press [Enter] to toggle between „yes“ (channel will be displayed) and „no“ (channel will not be displayed).
6. Repeat steps 4. and 5. for all desired channels.
7. [▼] [▲] Highlight „C1 – C4“ and press [Enter] to toggle all channels simultaneously.
8. Press [C].

7.4.2 **Enable MinMax**

During measuring it is possible to display the measured minimal and maximal values of a channel together with the current measured value. With this function you can enable this for a single or all channels:

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Enable MinMax“ [Enter]:


```
*** Enable MinMax ***  
C1 (p1 ) : no  
C2 (p2 ) : no  
C3 (Q1 ) : no  
C4 (dp1) : no  
C1 - C4 : all
```

4. [▼] [▲] Highlight a channel.
5. Press [Enter] to toggle between „yes“ (MinMax is displayed) and „no“ (MinMax is not displayed).
6. Repeat steps 4. and 5. for all desired channels.
7. [▼] [▲] Highlight „C1 – C4“ and press [Enter] to toggle the MinMax display for all channels simultaneously.
8. Press [C].

7.4.3 **Delete MinMax**

Use this command to delete the MinMax buffer. After deleting, the measuring instrument will start instantly to store the new minimal and maximal values.

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Delete MinMax“.
4. Press [Enter] to delete the MinMax buffer. Dashes „-----“ will be displayed in this line of the display during the deletion process.

7.4.4 **Set Contrast**

Use this command to tune the contrast of the display.

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Contrast“ [Enter].
4. [▼] [▲] Set the desired contrast level [Enter].

7.4.5 **Set Display Rate**

This function defines, how often the display is updated with new measured values.

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Display rate“ [Enter].
4. [▼] [▲] Select the desired display rate [Enter].



7.4.6 Set Illumination

With this command you can modify the illumination of the display.

1. Press [Menu].
2. [▼] [▲] Highlight „Display“ [Enter].
3. [▼] [▲] Highlight „Illumination“ [Enter].
4. [▼] [▲] Select the desired illumination level [Enter].

7.5 Display Measured Values

After terminating the definition of the parameters, press [C] (repeatedly), to leave the operation menus. Then the current measured values will be displayed:

Four channels with MinMax values

p1 [^]	83.5/ 135.7 ϕ	Measurand p1, [^] indicates MinMax values 83.5 resp. 135.7
122.2	[bar]	current measured value of p1. units in []
p2 [^]	37.3/ 148.6	Measurand p2, [^] indicates MinMax values 37.3 resp. 148.6
51.1	[bar]	current measured value of p2. units in []
Q1 [^]	254.7/ 339.3	Measurand Q1, [^] indicates MinMax values 254.7 resp. 339.3
301.4	[l/min]	current measured value of Q1. units in []
dp1 [^]	-23.8/ 84.89	Calculated variable dp1, [^] indicates MinMax values -23.8 resp. 84.89
71.11	[bar]	current value of dp1. units in []

The icon ϕ indicates that the power supply is achieved from the power pack.

Four channels without MinMax values

p1	122.4 ϕ	Measurand p1, current measured value of p1
[bar]		units in []
p2	51.1	Measurand p2, current measured value of p2
[bar]		units in []
Q1	338.2	Measurand Q1, current measured value of Q1
[l/min]		units in []
dp1	71.22	Calculated variable dp1, current value of dp1
[bar]		units in []

The icon ϕ indicates that the instrument is supplied by battery. Here the battery charging level is approximately 50 %.

Two channels without MinMax

p1	122.4 ϕ
[bar]	
p2	51.1
[bar]	

7.6 Shortcut Keys

During the measured values are displayed, some keys are occupied with shortcuts:

[1]	toggles the display of channel 1
[2]	toggles the display of channel 2
[3]	toggles the display of channel 3
[5]	toggles the display of the calculated channel (C4)
[9] [1]	toggles the MinMax display of channel 1
[9] [2]	toggles the MinMax display of channel 2
[9] [3]	toggles the MinMax display of channel 3
[9] [5]	toggles the MinMax display of channel 4
[- .]	starts recording (see section 8.2.1)
[0]	stops recording (see section 8.2.3)
[Enter] [1]	opens the parameters of channel 1
[Enter] [2]	opens the parameters of channel 2
[Enter] [3]	opens the parameters of channel 3
[Enter] [5]	opens the parameters of channel 4

8 Record Measured Values

The MultiHandy 3020 is equipped with an internal memory with a capacity of est. 1 million measured values. The measured values are combined into series of measurements.

To be able to execute recordings in the intended way, the instrument required information here denominated as „Recording Parameters“. These are:

- Recording channels – the values of which channels shall be recorded?
- Scan rate – which time intervals shall be between the recording of two values?
- Recording time – how long shall values be recorded?
- Trigger – is there a condition that shall be waited for, before the recording is started?

In this chapter we will explain the definition of the recording parameters, first. The execution of recordings will be shown, then.



8.1 Define Recording Parameters

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter]:

```
***** Recording *****
Start recording
Delete meas. data
Define parameters
View parameters
Available memory
```

3. [▼] [▲] Highlight „Define parameters“ [Enter]:

```
* Define parameters **
Select channels ▶
Scan rate
Recording time
Trigger
```

8.1.1 Select Channels

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Define parameters“ [Enter].
4. [▼] [▲] Highlight „Select channels“ [Enter].

```
* Define parameters **
C1 (p1 ) : yes
C2 (p2 ) : yes
C3 (Q1 ) : yes
C4 (dp1) : no
C1 - C4 : none
```

5. [▼] [▲] Highlight a channel.
6. Press [Enter] to toggle between „yes“ (channel will be recorded) and „no“ (channel will not be recorded).
7. Repeat steps 5. and 6. for all desired channels.
8. [▼] [▲] Highlight „C1 – C4“ and press [Enter] to toggle between „yes“ and „no“ for all channels simultaneously.
9. Press [C].

8.1.2 Set Scan Rate

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Define parameters“ [Enter].
4. [▼] [▲] Highlight „Scan rate“ [Enter].

```
***** Scan rate *****  
Unit      : ms  
Value     : 050
```

5. [▼] [▲] Highlight „Unit“ [Enter].
6. [▼] [▲] Select between the units „ms“ (milliseconds), „sec“ (seconds) and „min“ (minutes).
7. Confirm the selection with [Enter].
8. [▼] [▲] Highlight „Value“ [Enter].
9. Enter the desired scan rate value, e.g. [5] [0] [Enter].
10. Press [C].

8.1.3 Set Recording Time

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Define parameters“ [Enter].
4. [▼] [▲] Highlight „Recording time“ [Enter].

```
** Recording time **  
Unit      : sec  
Value     : 010  
Available : 209
```

5. [▼] [▲] Highlight „Unit“ [Enter].
6. [▼] [▲] Select between the units „sec“ (seconds), „min“ (minutes) and „h“ (hours).
7. Confirm the selection with [Enter].
8. [▼] [▲] Highlight „Value“ [Enter].
9. Enter the desired recording time value, e.g. [1] [0] [Enter].
10. Press [C].



The line „Available“ shows which recording time can be executed with the available memory. This value will always be updated with the number of selected channels, the scan rate and the recording time.

How to fight the Data Flood

The size of the MultiHandy 3020 memory may seduce the operator to record series of measurements with low scan rate and long recording time. This results in huge amounts of data that needlessly complicate the later evaluation at a PC.

For instance if you record four channels with a scan rate of 1 ms for three minutes, you will get $4 \times 1000 \times 180 = 720,000$ measured values. If you increase the scan rate to 5 ms and reduce the recording time to one minute, you will get $4 \times 200 \times 60 = 48,000$ measured values, only.

A good way to limit the data flood is the use of triggers. They allow to start the recording at the moment, when a certain condition is fulfilled. Triggers will be explained in the following section.

8.1.4 How to use Triggers

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Define parameters“ [Enter].
4. [▼] [▲] Highlight „Trigger“ [Enter].

```
***** Trigger *****  
Trigger      : none
```

5. [▼] [▲] Highlight „Trigger“ [Enter].
6. [▼] [▲] Select the desired trigger: „none“ (trigger switched off), „Key“ (recording is started by pressing a key), „p1/p2/...“ (channel is supervised for the trigger incident).
7. Confirm the selection with [Enter]. If you have selected a channel of „Key“, further options will be displayed:

```
***** Trigger *****  
Trigger      : p1  
Trig. type   : lower  
Trig. value  : 200.0  
Pretrigger   : 20%
```

```
***** Trigger *****  
Trigger      : Key  
Pretrigger   : 20%
```

8. [▼] [▲] Highlight „Trig. type“ [Enter].

9. Press [Enter] to select, whether the recording shall be started, if the trigger value is fallen below („lower“) or exceeded („greater“).
10. [▼] [▲] Highlight „Trig. value“ [Enter].
11. Enter the value where the recording shall be started, e.g. [2] [0] [0] [Enter].
12. [▼] [▲] Highlight „Pretrigger“ [Enter].
13. Enter the desired pretrigger value (see below), e.g. [2] [0] [Enter].
14. Press [C].

In the shown example, the recording will be started, when the measured value „p1“ falls below the value „200“. A pretrigger of 20 % will be recorded.

Pretrigger

The pretrigger allows to record values received BEFORE the defined trigger incident.

The pretrigger is a percentage of the recording time. If the recording time is set to „1 min.“ and the pretrigger is „20 %“, the series of measurements starts 12 seconds (20 % of 1 minute) before the trigger incident and is then continued for 48 seconds (12 + 48 sec. = 1 minute recording time).

If the pretrigger buffer could not be filled completely before the measurement starts, the recording time will be shortened. For instance if the trigger incident comes in this example five seconds after activating the recording, only these five seconds will be recorded as pretrigger and then the rest of the defined recording time (48 sec). The recording time is reduced to 5 + 48 = 53 seconds.

Key as trigger

This function allows to start the defined recording during the measuring by pressing a key. Select „Key“ as trigger, set the desired pretrigger and then leave the operation menus.

8.2 Record Measured Values

To initiate the recording of measured values, you will first have to start the recording. Then it either begins immediately, or after the trigger incident has happened.



8.2.1 Start Recording

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter]:

```
***** Speichern *****
Start recording
Delete meas. data
Define parameters
View parameters
Available memory
```

3. [▼] [▲] Highlight „Start recording“ [Enter]:



```
** Start recording **
M01: 290509-10:34
Note :
Start
```

With the next recording, the series of measurements „M01“ will be created. The file will be automatically named with current date and time.




4. If you want to enter a different name, highlight the line „M01: ...“ and press [Enter].
5. Enter a name. Characters are entered in the same way like at a cellphone. For an „N“ press [6] twice, for an „Y“ three times [9]. Pressing [Menu] alters between capital and small letters. Press [C] to abort the input and use [▼] [▲] to jump to the prior / next digit. The special characters @, © and & can be entered by pressing [-].
6. Confirm the name with [Enter].
7. [▼] [▲] Highlight „Note“ [Enter].
8. Press [▼] [Enter].
9. Enter a note, if desired. This will be saved in the measuring data file and is available when evaluating the data at the PC. Confirm the note with [Enter].
10. [▼] [▲] Highlight „Start“.
11. Press [Enter] to start the recording.

If no trigger has been defined, the recording with the programmed parameters starts instantly. If a channel has been defined as trigger, the recording starts, after the trigger value has been exceeded or fallen below. If „Key“ has been defined as trigger, the recording starts after you have pressed [-].




8.2.2 *Displays during Recording*

p1	122.4	
[bar]		
p2	51.1	
[bar]		
Q1	338.2	
[l/min]		
dp1	71.22	
[bar]		

Recording has been started, trigger has not actuated, yet

p1	106.9	
[bar]		
p2	22.7	
[bar]		
Q1	255.0	
[l/min]		
dp1	84.18	
[bar]		

Recording in execution, progress est. 35 %

p1	180.3	
[bar]		
p2	15.1	
[bar]		
Q1	209.4	
[l/min]		
dp1	165.2	
[bar]		

Recording in execution, progress nearly 100 %

8.2.3 *Stop Recording*

If the recording shall be executed completely, you will have to do nothing since it will be stopped automatically after the recording time has run out. If you want to abort the recording during execution, press [0]. The recording will be terminated, the collected measured values will be stored.

8.3 Further Recording Functions

The recording menu offers three functions that you do not know, yet:

***** Recording *****
Start recording
Delete meas. data
Define parameters
View parameters
Available memory



8.3.1 Delete Measuring Data

With this function you can delete series of measurements from the memory.

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Delete meas. data“ [Enter]:

```
* Delete meas. data *
all
M01: 290509-09:33
M02: 290509-09:38
M03: 290509-10:01
M04: -----
M05: ----- ▼
```

4. [▼] [▲] Highlight „All“ if you want to delete all series of measurements.
5. [▼] [▲] Highlight the corresponding line if you want to delete a single series of measurements.
6. Confirm the selection with [Enter]:

```
Delete meas. data?
Yes  -> Enter
No   -> C
```

7. Press [Enter] to delete the selected series of measurement, or [C] to cancel the deletion and keep the measuring data.
8. Press [C] to leave the delete function.

8.3.2 View Parameters

This functions allows you to view the current recording parameters.

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „View parameters“ [Enter]:

```
** view parameters **
Channels: p1 p2 Q1
          dp1
Scan rate : 50 ms
Record time : 2 sec
Trigger   : p1
>
```

```
** view parameters **
Trigger   : p1
Trig. type : lower
Trig. value: 200.0
Pretrigger : 25%
<
```

4. At the left you see the first parameter page. If a channel is defined as trigger, further parameters are available.
5. Press [▼] to display the second page.
6. Press [▲] to return to the first page.
7. Press [C] to leave the function.

8.3.3 **Display available Memory**

This function displays the available memory and you can see, whether a planned recording can be executed, or not.

1. Press [Menu].
2. [▼] [▲] Highlight „Recording“ [Enter].
3. [▼] [▲] Highlight „Available memory“ [Enter]:

```
* Available memory **
Required      : 40
Free         : 209060
data sets
```

At „Required“ you can see the number of data sets that will be recorded for a recording with the programmed parameters. At „Free“ you can see the number of data sets that can be recorded to the instrument memory.

4. Press [C] to leave the function.

8.4 **Transfer Measuring Data to the PC**

For this function you will need **HYDROcom**, the software for evaluation and presentation of measured values that is delivered with the instrument. More information is contained in the operating instructions manual of the software.



9 Maintenance

9.1 Care and Cleaning of the MultiHandy 3020



Important

Always mind during care and cleaning of the instrument that no water comes inside the device. This is especially valid for the connectors of the MultiHandy 3020. Incoming water will destroy the device. If water has come in, do not connect the instrument to the power supply and send it to our customer service.

1. Switch off the MultiHandy.
2. Disconnect the instrument from the power supply, before you start the cleaning. Otherwise you could cause a short-circuit that would destroy the device.
3. Wipe the casing with a clean, soft and slightly dampened cloth to remove dust and dirt.
4. Use a mild household detergent to remove tenacious dirt.
5. **Never use aggressive detergents, solvents, washing benzene or similar chemicals to clean the instrument. This would damage the casing.**

9.2 Reset MultiHandy 3020



Important

All customer-specific settings and all recorded measuring data will be definitely lost by resetting the instrument. The reset cannot be undone.

It is possible to reset the MultiHandy 3020 to factory settings. All customer-specific settings and recorded measuring data will be lost during the reset.

1. Switch the instrument on.
2. The start screen will be displayed after a few seconds:

```
MultiHandy 3020
(1045772 Messwerte)
Init

1.0a
SN: 1
Hydrotechnik GmbH
```

3. Press [1] [2] [3] during the start screen is displayed. A confirmation dialog will be displayed:

```
Init - Complete  
Yes -> Enter  
No  -> C
```

4. Press [Enter] to reset the instrument, or [C] to abort the reset.

9.3 Calibration • Maintenance • Repair

This measuring instrument works maintenance-free. But it is required to calibrate it regularly. If the device is in normal use, we recommend a re-calibration every two years. Hydrotechnik runs an efficient calibration laboratory. Please contact us:

Hydrotechnik GmbH

Holzheimer Straße 94-96 • D-65549 Limburg
Tel.: +49 – 6431 – 4004 0 • Fax: +49 – 6431 – 45308
E-Mail: info@hydrotechnik.com • Internet: www.hydrotechnik.com



10 Technical Data

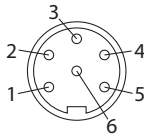
10.1 Measuring Instrument

Technical Data	
Analog inputs	2x (with ISDS)
... input signal	0 ... 20 mA / 4 ... 20 mA
... resolution A/D-converter	12 bit
... measuring rate	1 ms
... error limit	± 0.2 % of final value
Frequency input	1x (with ISDS)
... input frequency	0.25 Hz ... 5 kHz
... error limit	± 0.2 % of measured value
Sensor connectors	6-pole, M16 x 0.75
Internal data memory	1 million analog measured values or 0.5 million frequency values
... series of measurements	14
... scan rate	1 ms ... 10 min
... trigger	yes, with pretrigger
Display	2.2"-LCD, 8 lines, illuminated
Keypad	membrane keypad
Interface	USB
Power supply	power pack or NiCd-battery 14.4 V, 700 mAh
... battery operation	max. 8h
Operation temperature	0 ... 50 °C at < 80% relative humidity
Storage temperature	-20 ... +70 °C
Protection type	IP 40
Dimensions (L x W x H)	160 x 80 x 40 mm
Weight	~ 661 g
Order number	3160-00-72.00

10.2 Pin Assignment of the Signal Inputs

Analog inputs (C1 and C2)

Pin	Function	Ri	Ci	Limitation	Protection
1	signal	105 Ω	10 nF	5.6 VDC	VDR, transile diode
2	ground				
3	Ub			100 mA	current limitation PTC
4	free				
5	shield				
6	ISDS	1 kΩ	100 pF	5.6 VDC	transile diode



Digital (Frequency-) input (C3)

Pin	Function	Ri	Ci	Limitation	Protection
1	signal	4.7 kΩ	100 pF	30 VDC	VDR, Zener diode
2	ground				
3	Ub			100 mA	current limitation PTC
4	free				
5	shield				
6	ISDS	1 kΩ	100 pF	5.6 VDC	transile diode



11 Accessories

Accessories		
Table-top power pack	230 VAC – 24 VDC, 340 mA	8812-00-00.28
Car adaptor		8824-64-05.00
Measuring cable MKS	ISDS, 2.5 m	8824-S1-02.50Z
Software HYDROboot	Firmware update	8874-00-06.01
Nylon canvas case		8875-01-02.00

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