

# User Manual

## for the

### Multi-Test 4010

part-no.: L3160-00-51.00E

and

### Multi-Test 4020

part-no.: L3160-00-52.00E

Version 2.8



# Preface

The user manual in hand is a brief description of the handheld measuring instrument Multi-Test 4010 and Multi-Test 4020, standard type, with the following measuring inputs:

- 3 analog measuring inputs for pressure sensors with standardised input signal of 0 to 20 mA or 4 to 20 mA. It is possible to measure pressure (p1, p2 and p3) and pressure differential from p1 - p2. Instead of the pressure channel p3, the measurement of direct current or direct voltage can be selected. Additionally all extreme values can be shown separately in the display.
- 2 separated frequency measuring inputs for pulse signals between 2 mV and 10 V for volume flow rate- and rev. speed sensors. It is possible to measure volume flow rate and rev. speed.
- Additionally in the Multi-Test 4020: RS 232 interface for the connection to a PC.  
Real time clock for the printout with date and time.

Should you have any difficulties in understanding nevertheless, please do not hesitate to contact us, we will do our best to help you.

We reserve the right to make modifications, necessary for the technical progress.

We wish you a lot of success for the usage of our handheld measuring instrument

## Multi-Test 4010 and 4020

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## General

The measuring instruments Multi-Test 4010 and Multi-Test 4020 of company HYDROTECHNIK GmbH, Limburg are efficient handheld measuring instruments for the measurement of pressure, pressure peaks, pressure differential, volume flow rate, rev. speed, temperature, direct current and direct voltage.

Both instruments are equal in their technical data, except a serial interface (RS 232) in the Multi-Test 4020 for the connection to a PC and a real time clock. The stored measuring values are equipped with date and time, what you can see later at the printout.

Furthermore, the instruments dispose of 2 separated frequency inputs and 4 analog inputs. You can connect sensors with an output signal between 2 mV and 10 V to the frequency inputs and sensors with a standardised output signal of 0 to 20 mA or 4 to 20 mA to the analog inputs.

Therefore, sensors that were not produced by HYDROTECHNIK can also be connected, you only have to pay attention to the above-mentioned output signals of the sensors.

The sensor supply voltage from the measuring instrument is between 14,4 and 30 VDC (please see technical annex on page 16).

Besides this an external measuring adapter for the measurement of direct current or direct voltage can be connected instead of the pressure measuring input p3.

The fourth analog measuring input serves for the measurement of temperature with a Pt 100 resistor sensor in 4-wire technique.

Furthermore the measuring instrument has two independent memories, which acquire the extreme values of the six measuring channels independently and store them afterwards.

Another measuring value memory with a capacity of 60.000 measuring values allows the storage of a complete series of measurements.

The stored series of measurements can be printed out completely as a graph or as a table.

The printout of a series of measurements is possible with a manual or an automatic scaling.

The instrument supports the following printer types:

- Epson 9-pin
- Epson 24-pin
- IBM-Proprinter
- DPU 411
- HP-Inkjet black/white
- HP-Inkjet colour

# 1. User manual

## Multi-Test 4010/4020

### 1.1 Examples for a display

```
initialisation
version 2.8
```

```
p1= 143.2 bar
p2= 123.7 bar
p3=  98.0 bar
Q =  64.2 l/min
```

```
p1= 143.2 bar
p2= 123.7 bar
p3=  98.0 bar
p1^ 25.3 | 198.5
```

```
p1= 143.2 bar
p2= 123.7 bar
p3=  98.0 bar
Q =  64.2 l/min
```

```
p2= 123.7 bar
p3=  98.0 bar
Q =  64.2 l/min
T1=  23.6 °C
```

### 1.2 Initialisation

It can happen, that the information in digital storage systems is distorted, due to very heavy electromagnetic interferences, which still can occur today in industrial plants.

This shows itself in an amount of data that the user must consider unrealistic after a printout.

For this case the instrument has the possibility to set all data back to a given state by a so-called re-initialisation. However all data like calibration value, syntax, units of measurement, output signal of the pressure sensors and all parameters, entered previously by the user, are deleted.

```
initialisation
version 2.8
```

On the keyboard you will find several keys, which you can only press in connection with another key. These are the keys min/max., Clear, Prog., Memory and Printer.

In doing so you have to take into consideration that the period between pressing the first and the second key must not be longer than three seconds. After three seconds the key pressed first will be ignored. If the user works in the input mode, that means in the mode for the input of calibration values (sensor end value, calibration value for pulses/teeth per revolution, etc.), the figure values need to be entered with the number keyboard. You have to finish all inputs with "ENT".

After having switched on the instrument, this menu will appear for approx. three seconds.

In this period the instrument can be re-initialised by pressing the keys 1, 2 and 3 (the adjustment of standard values is described later in this manual).

When switching the display on again, it will automatically show the last adjustment before having switched off: simultaneous measurement and display of four measuring values, e.g. p1, p2, p3 and Q.

If the extreme values (min/max.) of for example p1 min. and p1 max. shall be shown, the lowest line will be exchanged, i.e. the min/max. values of pressure channel p1 are shown instead of volume flow rate Q.

If the previous display with Q shall be shown again, the key "min/max." must be pressed and the lowest line will be exchanged another time. The volume flow rate measurement Q is shown again.

If for example the temperature measurement T is selected additionally to p1, p2, p3, and Q, the displayed measurable variables will move upwards, so that p1 disappears and the selected measurable variable "T" is displayed in the lowest line.

You can start the re-initialisation by switching the measuring instrument on and by entering the numbers 1, 2 and 3.

new initialisation  
all parameters?  
ENT -> yes  
22.05.95

unit	language
*1 : SI	*3 :Germ.
2 : US	4 : Engl.
	5 : French

Special functions only  
at Multi-Test 4020

\* PROG DATE \*  
13.06.95  
  
ENT -> confirm

\* PROG TIME \*  
09 : 15  
  
ENT -> confirm

p1= cal ? bar  
p2= cal ? bar  
p3= cal ? bar  
Q = cal ? l/min

By pressing key  all data like calibration value, syntax, units of measurement, output signal of the pressure sensors, entered previously by the user, is deleted or reset to a work's adjustment. At the Multi-Test 4020 date and time are deleted additionally. The invocation into the menu point unit/syntax will follow immediately, where for example the SI-units and the German language are selected previously. In this menu you can already select your language as well as the requested units of measurement by pressing the corresponding number keys and by confirming your selection with key .

The date and the time can additionally be entered into the Multi-Test 4020. When storing measuring values and printing them out later, all reports will bear the date and time. First of all you need to enter the date always with two digits (day/month/year), and confirm it with key "ENT".

Immediately afterwards the menu for entering the time will be displayed. Please do this always with two digits, too. The clock is started as soon as key "ENT" is pressed.

This display is shown, in which the user can see that a calibration value, for example for the pressure sensors and the volume flow rate, needs to be entered. We generally deliver our measuring instruments with deleted calibration values. The input and modification of the necessary parameters is described later on. Please follow the further operation steps in this manual.



Should you have invoked a re-initialisation by mistake, you can leave this program by pressing any key, except key ENT, without having executed a re-initialisation.

## 2. Programming of syntax and unit of measurement

```
*** PROG ***
1-> Unit/ Language
2-> Date
3-> Clock
```

```
unit      language
*1-> SI   * 3-> Germ.
2-> US    4-> Engl.
          5-> French
```

The stroke of key  and key  causes this menu to appear.

To select the unit/syntax you have to press key 1.

You can choose between SI- and US-units.



The SI-units are for example bar, °C, l/min., etc.. After the switch-over to US-units, the usual units like psi, °F, gal/min. are used.

The languages German, English and French can be selected, the selection must be confirmed with key ENT. The star marks the actual selection.

### 2.1 Addition to Multi-Test 4020, programming of date and time

```
** PROG DATE **
  19/06/95

ENT-> confirm
```

With key 2 the menu "Prog. date" is invoked, into which you can enter the actual date, always with two digits: day-month-year.

```
* PROG Clock *
  11 : 16

ENT-> confirm
```

With key 3 the menu "Prog. time" is invoked, into which you can enter the actual time, always with two digits: hours-minutes.



When pressing key "ENT" after this, the clock is started. The clock can be adjusted exactly by putting it forward by one minute and starting it with key "ENT", whilst comparing it with another exact clock.

### 3. Programming of single measuring channels

#### 3.1 Programming of p1, p2 or p3

```
**** PROG P1****
1: -> type of sensor
2: -> calibration val.
3: -> zero point
```

#### 3.2 Selection of pressure sensor

```
**** PROG P1****
*1-> 0 - 20 mA
2-> 4 - 20 mA
ENT-> confirm
```

By pressing the keys  and  you will invoke the following selection menu.

As there is the possibility to connect pressure sensors with an output signal of 0 to 20 mA and 4 to 20 mA to the instrument, it is absolutely necessary to indicate the requested type of signal. For this, you have to select number 1 "Selection sensor type" out of the menu "programming p1".

The following display is shown. In the example the signal type 0 to 20 mA is chosen, number "1" is entered (have a look at the star-symbol!) and key "ENT" is pressed for confirmation.

#### Error signal at 4 to 20 mA sensor

```
P1 : = - - - - - bar
P2 : = 0.0 bar
P3 : = 0.000 l/min
```



If horizontal lines are shown in the display, (e.g. **P1 : = - - - - - bar**) this can have the following reasons:

For example, the connections to the pressure sensors are missing (measuring cable between sensor and measuring input is missing), a parting of a cable or a defect of a sensor occurred, or the sensor isn't connected to the measuring input, that means the measuring input isn't provided with a current signal.

Here the life-zero-detection is used to inform the user about the above-mentioned error possibilities. If the sensor works correctly, the measuring value display is shown without the horizontal lines.

#### Measuring value display when 4 to 20 mA sensors work correctly

```
P1 : = 0.0 bar
P2 : = 0.0 bar
P3 : = 0.0 bar
Q : = 0.000 l/min
```

This optical signal is only valid for the current signals from 4 to 20 mA.

Please take into consideration, that different current signals can be adjusted for pressure sensors (p1, p2 and p3)

e. g.: **p1 = 4 to 20 mA**  
**p2 = 0 to 20 mA**

### 3.3 Input of calibration value

```
*** PROG P1 ***
calibr. value: 600.0
                (bar)
ENT-> confirm
```

If you enter the figure "2", the menu for the input of calibration values will be opened.

The corresponding measuring range end value, in this case 600 (pressure measuring range end value of the pressure sensor), needs to be entered. Confirmation of the input with key "ENT". You can see the end value of the pressure measuring range from the label of the pressure sensor.



Please take into account, that, when measuring negative pressure with a pressure sensor from -1 to 6 bar, not the calibration value, referring to the pressure measuring range end value is entered, but the **span of the pressure measuring range** from -1 to 6 = **7 bar**. That means, the number **7** must be entered as a calibration value.

### 3.4 Zero point alignment

```
*** PROG P1 ***
sensor must be
depressurized
ENT-> confirm
```

```
*** PROG P1 ***
alignment 2 sec.
```

```
*** PROG P1 ***
zero point : 0.184
                (bar)
ENT-> confirm
```

For measurements of negative pressure and for precise measurements of pressure differential the user needs to execute a zero point alignment for the connected pressure sensor.

For doing this, you have to enter the number "3" in the above menu.

The hint, that the sensor must be pressure free, is shown. Due to this it is sensible to take the sensor from the plant. Press key "ENT".

The alignment of the zero point correction is carried out. The display, shown on the left, is active for approx. 2 seconds, after this the instrument will show another menu point.

In this display you can see the zero point deviation of the pressure sensor. With its confirmation by a stroke of key "ENT", it will be taken into account as a correction value for all further pressure measurements by the internal software.

With another stroke of key "ENT" you will come back into the usual measuring value display.

The measuring inputs p2 and p3 are programmed in the same way as described above.

#### 4. Programming of current- or voltage measurement

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
Q = 64.2 l/min
```

##### 4.1 Selection of current- or voltage measurement

```
*** PROG U / I ***
1-> current DC
2-> voltage DC
```

##### 4.2 Input of calibration value

```
*** PROG U ***
calibr. value: 100.
                (V)
ENT-> confirm
```

##### 4.3 Zero point alignment

```
*** PROG U ***
adapter must be
without signal
ENT-> confirm
```

```
*** PROG U ***
alignment 2 sec.
ENT-> confirm
```

```
*** PROG U / I ***
1-> current DC
2-> voltage DC
```

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
Q = 64.2 l/min
```

It is possible to measure current and voltage with the Multi-Test 4010/4020.

The adapters, necessary for this, have to be connected externally to the measuring input p3. The following current- or voltage adapters can be applied:

- Current adapter 1-channel,  
measuring range: 0 to + 2 A (direct current)  
calibration value to be entered: 4.0
- Voltage adapter 1-channel,  
measuring range: 0 to + 48 V (direct voltage)  
calibration value to be entered: 100.0

After having connected the corresponding current- or voltage adapter to the measuring input p3, you have to enter the calibration value and to activate measuring channel p3.

This is the already known measuring value display, from which the necessary steps are made.

By pressing the keys  and  you will invoke the following program routine.

With the input of either "1" or "2" you can choose between the measurement of current or of voltage. In the example, the measurement of voltage is chosen with number "2". The following display appears.

Now, the user is requested to enter the calibration value of the connected voltage adapter. In this example the value is "100" and the figures 1 0 0 need to be entered one after the other without any comma. Afterwards, confirmation with key "ENT".

You may not connect the adapter with the voltage source to be measured, yet. The corresponding hint is shown in the display. Please press key "ENT".

An automatic alignment will be carried out for approx. 2 seconds and afterwards the instrument will jump back into the first menu.

The user can redefine the instrument for a measurement of current in the same way.



Please take into account, that you can not measure current and voltage at the same time, as only the measuring input p3 is available for this !

Another stroke of key "ENT" leads back to the measuring value display.

#### 4.4 Selection of direct voltage measurement

p1= 143.2 bar  
p2= 123.7 bar  
U1= 0.00 V  
Q = 64.2 l/min



p1= 143.2 bar  
p2= 123.7 bar  
p3= 98.0 bar  
Q = 64.2 l/min

To finally carry out a direct voltage measurement, you have to press key .

The third line of the display for the measurement of voltage is activated. In doing so you have prepared the voltage adapter for measuring voltage with help of the pressure channel p3.

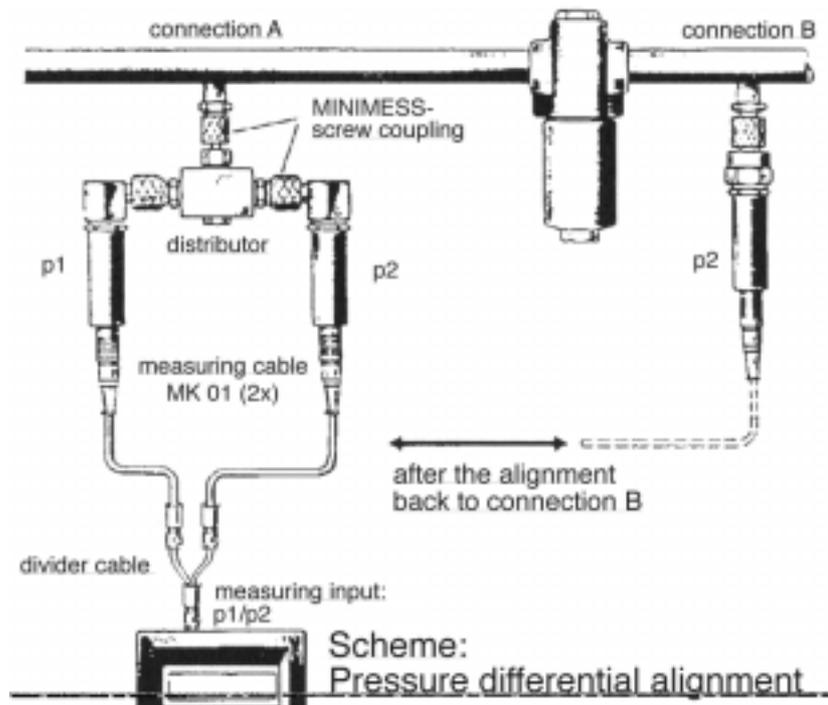


Remark:  
By pressing either key or you can select between pressure- and voltage measurement. Only the corresponding pressure sensor or adapter needs to be connected to the measuring input p3. The calibration values entered previously, remain in the instrument.

If you request a measurement of current, you will have to act in the same way as for the measurement of voltage.

#### 5. Programming of pressure differential measurement

Precise pressure differential measurements are only possible, if both pressure sensors have been aligned before, on one pressure level, at which the later measurement shall be made. For this, both pressure sensors p1 and p2 have to be mechanically connected to the same pressure level via a distributor (see scheme: pressure differential alignment).



\*\*\* PROG DP \*\*\*  
alignment P1/P2 with  
the same pressure!  
ENT-> confirm

You can invoke the alignment of the pressure sensors by the stroke of key and key .

The following display appears. The alignment is started by the confirmation with "ENT".

```
*** PROG DP ***  
balancing
```

```
*** PROG DP ***  
dP-correction: -0.19  
                  (bar)  
ENT-> confirm
```

The word "alignment" will be displayed for approx. 3 seconds.

The display will show the correction value, which will be taken into account at all later measurements of pressure differential. To get back into the measuring value display, you have to press key "ENT". After the alignment the pressure sensor p2 needs to be mechanically connected to connection B (see scheme: pressure differential alignment, page 10).

Now you can carry out precise pressure differential measurements without influencing the sensor deviations, temperature drifts and offsets.



Please take into consideration, that the pressure differential is only displayed with correct signs, when the higher pressure is at the pressure sensor p1 (delta-p = p1-p2).

## 6. Programming of volume flow rate "Q"

```
*** PROG Q ***  
1-> turbine/GFM  
2-> orifice gauge
```

```
*** PROG Q ***  
(turbine/GFM)  
calibr. value: 24.85  
ENT-> confirm
```

```
*** PROG Q ***  
1-> turbine/GFM  
2-> orifice gauge
```

```
*** PROG Q ***  
1-> A3    2-> B3  
*3-> C3  
ENT-> confirm
```

Before volume flow rate sensors can be connected, their specific calibration value must be entered. This enables the measuring instrument to correctly calculate, for example l/min.

With a stroke of the keys  and  the following display is shown.

The invocation for a turbine and for a gear flow meter is the same. In the example "Turbine" is selected with the input of figure "1".

Another menu is displayed immediately, which requests the input of a calibration value. You can see this value either from the label of the turbine or from the calibration certificate, belonging to the turbine. You always have to enter the complete value with decimal point, in this example it is the value 24,85. The input needs to be confirmed with key "ENT".

The instrument jumps back into the first menu. If an orifice gauge shall be used, you will have to enter the figure "2" in this menu.

The following display will appear, in which you can select between three flow ranges and three types respectively. You can see the type of the orifice gauge from its label. In the example type C3 is selected by the input of figure "3". The "star"-symbol will appear in front of the figure. Please press key "ENT" for confirmation.

## 7. Programming of rev. speed "n"

```
*** PROG n ***
pulses/revolution
I : 60
ENT-> confirm
```

After a stroke of the keys  and  , you will see

the following menu, in which the adjusted value for pulses per revolution is shown.

Here it is possible to enter several pulses per revolution, for example up to 60 pulses for gear rings. The desired number of pulses is entered as usual as a number and confirmed with key "ENT".

## 8. Programming of temperature "T"



A programming of the temperature is not necessary, as temperatures between -50 and +200 C can be measured.

Now, you have entered all needed calibration values for the sensors and after a corresponding selection of the measurable variables you can execute measurements.

## 9. Working with the min/max. memory

### 9.1 Measuring value display

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
Q = 64.2 l/min
```

Generally all measuring values are stored as extreme values (min/max. values) in the background and displayed, if requested.

All extreme values can be displayed in the fourth line, but only one after the other.

Starting at the well-known measuring value display, shown on the left side, you can have the min/max. values of for example

p1 be displayed by pressing the keys  and  .

In the fourth line the min/max. value of p1 is shown.

The activation of key  removes the display of the min/max. values and shows the previous measuring value display with the measuring value display Q = 46,2 l/min.

### 9.2 Disply of min/max. values from p1

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
p1^ 25.3 | 198.5
```

min.- value      max.- value

### 9.3 Deletion of all min/max. values in memory

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
*DEL ALL MIN/MAX*
```

By pressing key  and  you can delete the

complete content of the min/max. memory. The display shows the following message for approx. 3 seconds.

### 9.4 Deletion of single min/max. values

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
* DEL MIN/MAX P1**
```

The min/max. value of for example p1 can be deleted with a

stroke of the keys  and  . The message on the

left appears for approx. 3 seconds in the lowest line of the display.

After this, the display will automatically jump back into the min/max. value display of p1.

```
p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
p1^ 0.00 | 143.2
```

## 10. Programming of memory

### 10.1 Storage of measuring values

```
scan. rate
1 : 1    4 : 500
*2 : 10  5 : 1000
3 : 100  6 : 10000
```

```
*** storage time ***
10 : 00 min
```

Before you can carry out a storage, you need to adjust the scanning rate. If the signals to be measured are very fast, like for example at the acquisition of pressure peaks, a scanning rate between 1 and 10 ms is recommended.

However the volume flow rate can still be measured with a scanning rate of 100 ms.

A stroke on the keys  and  leads directly into

the menu for selecting the scanning rate. In the example a scanning rate of 10 ms was selected (star-symbol in front of figure 2).

Please confirm your selection with key "ENT".

Directly afterwards the instrument will show how long the measurement may take.



Please take into account, that a storage time is indicated which is still existing from a previous selection, in this case of the measurable variable p1.

### 10.2 Selection of measurable variables to be stored

```
PROG MEMORY
* p1  p2  p3  T
* Q   n   dp
ENT-> confirm
```

```
*** storage time ***
3 : 20 min
```

If you press the keys  and , the menu for selecting the measurable variable to be stored will appear.

In this example we have chosen p1 and Q (star !).

You select the two measuring channels by a stroke

of key  and  of key and activate them by

pressing key "ENT". A new message concerning the maximal possible duration of the storage is displayed.

### 10.3 Start of storage

```
* p1= 143.2 bar
p2= 123.7 bar
p3= 98.0 bar
* Q = 64.2 l/min
```



After having selected the scanning rate (ms) and the measurable variables (p1 and Q) the storage is started directly

with the keys  and .

The following display with optical memory status display is shown. Please pay attention to the star-symbols in front of the measurable variables, too.

You can interrupt the storage any time with key  or it is

automatically stopped when the memory is full.

## 11. Programming or selection of a printer

```
* PRINTERTYPE *
1:EPSON- 9   4:DPU
2:EPSON-24  5:HPs/w
3:IBM-PRO   6:HP col
```



As the connected printer needs to be tuned to the measuring instrument, the correct printer type needs to be selected before the printout is made.

When selecting a Hewlett-Packard printer, you should take the following into consideration:

Due to the variety of HP-printers of series Deskjet, you should indicate first of all, if the printout shall be in black/white or in colour.

Afterwards you should select the corresponding printer type (only valid for HP-printers).

In the following example, the printer selection is described in more detail:

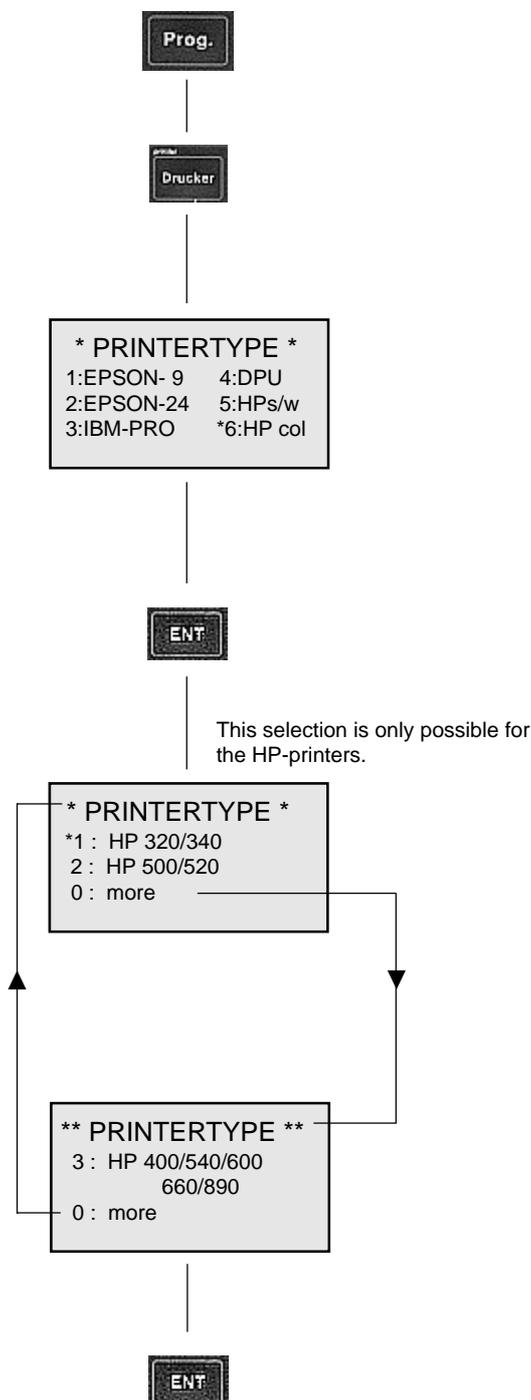
By pressing the keys  and , the printer drivers that are supported in the measuring system are displayed:

1. Epson 9-pin printer
2. Epson 24-pin printer
3. IBM-Proprinter
4. DPU 411
5. HP-Deskjet black/white
6. HP-Deskjet colour

As an example, the printer type no.: **6 = HP col.** (colour) is selected by an input of the number 6.

In the display the star-symbol is shown in front of the number (**\*6**).

By pressing key  you will automatically get into the display for the selection of the printer type (**HP-printer type**).



In the example, type „**HP 320/340**“ is selected by entering the number „**1**“. The star-symbol will appear in front of the number (**\*1**).

With key  the selection will be finished and the requested printer will be activated.

Please enter "0", if you require the display of further HP-printer types: " 3 : HP 400/540/600/660/890 ". With a stroke of key "3", these printer types are selected.

By pressing key "0" you will return to the previous menu.

## 11.1 Tabular and graphical measuring value printout

```
print mode   Scal.  
1: Table    3: AUTO  
2: Graphic  4: MAN  
            ENT-> confirm
```

With a stroke of the keys  and  you can select the print mode, either as a table or as a graph, as well as the automatic or manual scaling of the measuring values.



At the automatic scaling it can happen, in the most unfavourable case however, **that several curves superpose each other (congruence) in the graphical display.**

Therefore we recommend to select manual scaling in this case.

If you choose the tabular format, all selected measurable variables are printed out in number columns.

## 11.2 Selection with graph with manual scaling

```
** Scaling P1 **  
Minval.:   10 bar  
Maxval.:  150 bar  
            ENT-> confirm
```

```
** Scaling Q **  
Minval.:   20 l/min  
Maxval.:   70 l/min  
            ENT-> confirm
```

After having entered the figure 2 for graph and 4 for manual scaling and after confirmation with key "ENT", you will see the following display.

In the former example the measurable variables p1 and Q were selected during the storage. Now, the instrument automatically requests the input for scaling p1.

As an example, the min. value 10 bar and the max. value 150 bar are entered and confirmed with key "ENT".

The instrument automatically requests now the input for the scaling of Q.

We have chosen 20 l/min. as a min. value and 70 l/min. as a max. value and confirmed the input with key "ENT".

```
** PRINTING **  
(DPU 411)  
  
ENT-> confirm
```

```
** PRINTING **  
(DPU 411)  
  
0%
```

```
**PRINTING **  
(DPU 411)  
  
PRN_ERROR
```

The hint, that the printer is ready, is displayed immediately afterwards.  
Furthermore the selected printer is shown again: (DPU 411).

With a stroke of key ENT you will start the printer.

In the lowest line of the display the measuring data, already transferred to the printer, are shown in %. All measuring data were transferred to the printer, when the display shows "100%".



If the printer cable between printer and measuring instrument is not connected, the warning "PRN ERROR" will appear in the display.

If then the connection between printer and measuring instrument is made, the printout will be started again with a stroke of key "ENT".

A printout can always be interrupted with key  !

## 12. Special functions in Multi-Test 4020

### 12.1 Printout with date and time

At the Multi-Test 4020 the date and the time of the actual storage are added to the printout.

This guarantees an additional security for the user by confirming the date and time when the measurement was executed.

### 12.2 Measuring value transfer to PC and adjustment of the Baudrate

At the Multi-Test 4020 all stored measuring values can directly be transferred to a PC via the serial interface. For this, the software HYDROcomsys, developed by HYDROTECHNIK, is available. It serves for the processing of large amounts of data with graphical and tabular preparation and measuring value analysis and their presentation directly on the PC.

Adjustment of the Baudrate

```
** PROG RS232 **  
1-> 9600 Baud  
2-> 19200 Baud  
3-> 38400 Baud
```

By pressing the key combination:



the corresponding Baudrate can be adjusted as a speed of the data transmission from the measuring instrument to the PC.

The modification is made by pressing one of the keys from 1 to 3.

After having selected the Baudrate you should press

key  for confirmation.

Baud (Bd)  
Unit for speed of data  
transmission  
1 Baud = 1 bit/s

## **13. Technical annex**

### 13.1 Connection of pressure sensor (no HYDROTECHNIK sensor)

Generally, each pressure sensor that was not produced by HYDROTECHNIK can be connected to the Multi-Test 4010/4020 instruments, if:

- the supply voltage of the sensor is between 10 and 30 VDC.
- the necessary current output signal of the pressure sensor is 0 to 20 mA or 4 to 20 mA, where 20 mA must correspond to the pressure measuring range end value.
- the correct polarity or the connection of the sensor is made to the signal measuring inputs p1, p2 and p3 of the measuring instrument.
- the power supply of the sensor can drive the internal load resistance of 100 Ohm of the measuring instrument.

### 13.2 Advice for mechanical connection of a pressure sensor

As HYDROTECHNIK's pressure sensors are usually mechanically connected via direct adapters to the MINIMESS couplings of the system and as, due to this, an easy separation is always possible, even under pressure, this method is absolutely ideal for pressure sensors up to 630 bar.

When using pressure sensors with a measuring range that is larger than 630 bar, you can not connect them via MINIMESS couplings, but you have to connect them directly to the system.

### 13.3 Contrast adjustment of a display

Under certain circumstances it can happen, that the display of the measuring instrument is not readable any more.

This exceptional state could be caused by extreme temperatures, e.g. insolation directly on the instrument, storage in the car or influences by very low temperatures.

Please try to make the display readable again by constantly pressing the contrast key.

### 13.4 Charging of internal battery

If you use the measuring instrument only from time to time it is sensible to charge the internal battery before measuring. It is completely charged after a charging time of 14 to 16 hours.

## 14. Technical data of Multi-Test 4010 and 4020

(reference of the specified data 20 °C ±3 °C)

<b>Measuring inputs:</b>	4 input jacks (Amphenol-Tuchel) 2 x 8 poles for pressure (signal input: 0 to 20 mA, changeable to 4 to 20 mA by internal software) and temperature (Pt 100, 4-wire technique) 2 x 5 poles for volume flow rate or rev. speed automatic change-over of the sensitivity: 1 to 5000 Hz (low sensitivity 5 to 10 V) 50 to 5000 Hz (high sensitivity 2 to 300 mV)
<b>Measuring ranges:</b>	Pressure: -1 to 1000 bar Temperature: -50 C to +200 C Volume flow rate: 5-digit display with floating decimal point (depending on the measuring range of the volume flow rate sensor) Rev. speed: from 60 min <sup>-1</sup> on, display 5-digits (referring to one scanning marking)
<b>Measuring rate:</b>	Analog inputs: pressure and temperature 1 ms Digital inputs: between 1 Hz and 60 Hz a single measurement of the period duration is carried out. From 60 Hz on the measuring time is constant = 16 ms.
<b>Resolution A/D-converter:</b>	12 bit
<b>Extreme value memory:</b>	Min/max. value storage of all measuring channels in the background, display by a keystroke.
<b>Measuring value memory:</b>	Max. 60.000 measuring values (depending on the selected measurable variable) with selectable scanning rate 1, 10, 100, 500, 1000 and 10000 ms.
<b>Data protection:</b>	Battery-buffered RAM-memory against data loss
<b>Display:</b>	4 lines LCD, height of the digits: 4,24 mm, display of measuring values: 4 lines
<b>Interfaces:</b>	Centronics für Drucker (4010 und 4020) RS 232 für PC-Anbindung (nur 4020)
<b>Power supply:</b>	Internal 14,4 V NiCd-battery, 0,7 Ah for approx. 5 hours continuous operation with integrated battery-charger and battery warning device. External voltage supply via power supply unit 230 VAC/24 VDC or via any external voltage supply unit (stabilised 24 to 30 VDC)
<b>Ambient conditions:</b>	Operational temperature: 0 C to +50 C, relative humidity: < 80%
<b>Generally:</b>	Housing material: ABS-plastic Dimensions: 252x121x50 mm (LxWxH) Weight: 0,95 kg

Technical modifications are subject to change without notice.

## 15. Information on guarantee

Within the framework of our guarantee conditions we guarantee the unobjectionable manufacture of our technical instruments.

The guarantee is valid for 6 months.

In principle, the general terms of business are valid.

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

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

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

Instruments, for which you want to claim under guarantee, have to be sent carriage paid to:

**HYDROTECHNIK - Kundendienststelle**

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## 16. Maintenance

Your measuring instrument is a precision instrument, which guarantees an unobjectionable operation for many years, when treating it correspondingly.

However, in the case that interferences occur nevertheless, please do not try to repair the instrument by yourself!

Leave the maintenance or the reparation up to our

**HYDROTECHNIK - Kundendienststelle**

Address: HYDROTECHNIK GmbH  
Holzheimer Straße 94 - 96  
D-65549 Limburg  
Tel.: 0 64 31 - 40 04 · 0  
Fax 0 64 31 - 4 53 08

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

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

Company:	
Department:	
Name:	
Telephone:	
Fax:	

Please tick the appropriate answer:

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

How to describe an error:

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

Your description:

# Order data for the Multi-Test 4010 and 4020

						Part-number
- Handheld measuring instrument Multi-Test 4010						3160-00-51.00
- Handheld measuring instrument Multi-Test 4020						3160-00-52.00
Adapter 230 VAC / 24 VDC / 340 mA						8812-00-00.19
Adapter 115 VAC / 24 VDC						8812-00-00.20
Alternating battery 14,4 VDC / 700 mAh						8873-02-00.02
<b>Sensors</b>						
- Pressure (output signal: 4 to 20 mA)						3403-21-A4.37
Pressure sensor type HD						3403-10-A4.37
Measuring range 0 to 60 (... 870)						3403-15-A4.37
in bar (psi) 0 to 200 (... 2900)						3403-18-A4.37
0 to 400 (... 5800)						3403-32-71.37
0 to 600 (... 8700)						3403-29-71.37
Pressure sensor type PR 15 _____ -1 to +6 (-14,5... 87)						3403-29-71.37
0 to 1000 (... 14500)						3403-xx-xx.33
To select pressure sensors with 0 to 20 mA, the last two numbers of the order-no. need to be changed from <b>37</b> into <b>33</b> e. g.						3403-xx-xx.33
- Pressure (output signal: 0 to 20 mA)						3152-04-34.61
p/T-dual sensor for the simultaneous measurement of pressure and temperature (signal output T = 4-wire technique)						3152-03-34.61
with integrated direct connection for p/T-measuring coupling screw series 1620 - M 16 x 2 (ident.-no. 04)						
- Volume flow rate						31V7-21-35.00
Measuring turbine RE 3						31V7-30-35.00
Output signal (square wave)						31V7-40-35.00
with MINIMESS and p/T-coupling (series 1620)						
(Please see our brochure "Measuring turbines RE 3 / RE 4" for further technical details)						
- Volume flow rate						31V7-01-35.00
Measuring turbine RE 4						31V7-70-35.00
Output signal (square wave)						31V7-71-35.00
with MINIMESS and p/T-coupling (series 1620)						31V7-72-35.00
(Please see our brochure "Measuring turbines RE 3 / RE 4" for further technical details)						
- Volume flow rate						3143-01-35.00
Gear flow meter type GFM						3143-02-35.00
Output signal (square wave)						3143-03-35.00
with MINIMESS and p/T-coupling (series 1620)						3143-04-35.00
(Please see our brochure "Gear flow meter GFM" for further technical details)						3143-05-35.00
- Volume flow rate						3125-03-03.00
Orifice gauge with MINIMESS screw coupling series 1620						3125-03-06.00
Acquisition of the volume flow rate through measurement of the pressure differential with two pressure sensors and evaluation software in the Multi-Test 4010/4020						3125-03-09.00
(Please see our data sheet "Orifice gauge" for further technical details)						
- Temperature, Pt 100-4-wire technique for p/T-coupling series 1620 (ident.-no. 04)						3949-04-01.00
- Surface sensor, Pt 100-4-wire technique						3170-01-02.00
- Rev. Speed, infrared-sensor type DS 03 with 25 pieces of reflective foil						3130-02-01.00
- Reflective foil (spare parts, 50 pieces)						8840-02-01.01
- Inductive transducer with amplifier, output signal: square wave (measurement of rev. speed on gear wheels)						3107-00-09.00

Accessories	Part-number
- Measuring cable MK 01 (length 2,5 m) for the connection to pressure-, rev. speed-, temperature- and volume flow rate sensors	8824-91-02.50
- Divider cable TK 07 (length 20 cm) always necessary for the measurement of pressure and temperature, max. 2pcs.	8824-A1-00.20
- Measuring cable MK 13 (length 2,5 m) for the direct connection between measuring input and p/T-dual sensor	8824-A2-02.50
- Connection cable (length 5 m) for external batteries	8824-64-05.00
- Transport case (plastic box)	3160-00-16.01
- Transport case I	3160-00-17.01
- Transport case II (with additional cover and space for printer)	3160-00-18.07
- Leather shoulder strap for Multi-Test 4010/4020	8875-03-00.01
- Inkjet colour printer battery operation with ink cartridges and adapter (100 to 240 VAC - 50/60 Hz)	8865-01-13.00
- Spare part ink cartridge in black	8865-01-09.01
- Spare part ink cartridge in colour	8865-01-10.01
- Data communication cable Centronics 36-poles/25-poles	8824-36-02.00
- Direct connection for pressure sensor type HD - straight (series 1620 - M 16 x 2)	2103-07-08.62
- Direct connection for pressure sensor type HD - 90° (series 1620 - M 16 x 2)	2146-13-05.00
- Direct connection for pressure sensor type PR 15 - straight (series 1620 - M 16 x 2)	2146-05-30.00
- Direct connection for pressure sensor type PR 15 - 90° (series 1620 - M 16 x 2)	2146-54-19.40
- p/T-measuring coupling 1620 (ident.-no. 04) screw-in thread M 10 x 1	2149-04-19.13
- p/T-measuring coupling 1620 (ident.-no. 04) screw-in thread ISO 228-G 1/4	2149-04-15.13
- additional measurement of direct voltage or direct current possible	
- Voltage (external connection adapter) with signal output 0 to 20 mA	Measuring range 0 to $\pm 48$ VDC 3160-00-00.22
- Current (external connection adapter) with signal output 0 to 20 mA	Measuring range 0 to $\pm 2$ ADC 3160-00-00.23
- Software support for Multi-Test 4020 for the display and evaluation of measuring values on PC-XT/AT/PS/2	
- HYDRocomsys/DOS software package (from DOS 4.0 on) included in the delivery range	diskette 3 1/2" German 8874-01-01.02
	diskette 3 1/2" English 8874-01-01.05
- HYDRocomsys/Win software package (windows version) included in the delivery range	diskette 3 1/2" German 8874-01-01.19
	diskette 3 1/2" English 8874-01-01.20
- Data communication cable for RS 232	9-poles / 9-poles 8824-43-02.00
	9-poles / 25-poles 8824-44-02.00