

HPM 440 / 460 Operating Instructions English Version



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1. General remarks

The hand-held meters from the "HPM" series are primarily service and diagnostic instruments to measure pressure, flow, temperature, rotational speed (frequency), current and voltage. Depending on the instrument type, the user is able to operate with up to 6 channels (inputs). This allows an exact diagnosis of the hydraulic system. Measured values can be transferred to a PC or printer via an integrated interface (RS 232). The instrument has an internal memory that can hold up to 240 independent measurement values. Each individual data set holds all single measured values of each of the connected sensors or inputs. It is possible to store the entire data set as well as a single measurement (curve) under the identical name. This makes later measurement analysis easier. The HPM software for Windows 95 and Windows NT allows further measurement evaluation and processing using a PC.

The graphic LCD-display shows up to six channels in an easy-to-read form. Every measurement can be displayed as an actual, minimum and maximum value. In the optional line, any mathematical operations are displayed ("hydraulic power + volume"). It is also possible to present the measured values graphically as a curve.



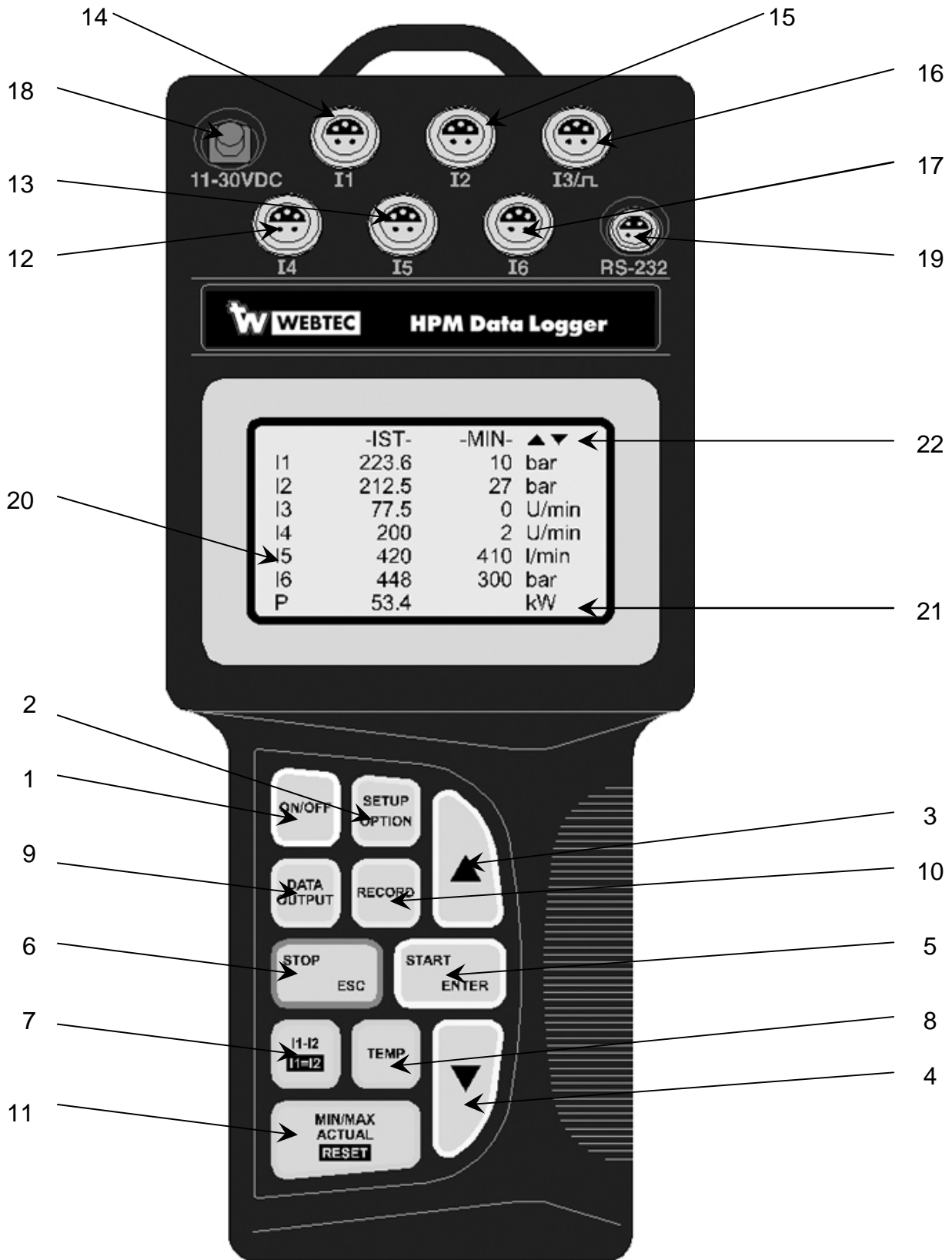
Before operating the first time, please charge the battery for a minimum 16 hours!

1.1 Instrument types

Depending on application, HPM Data Loggers are available as two different models:

HPM Data Logger Model	Inputs	Functions	Total Min / Max Memory Capacity
HPM-440	4	Online Recording Frequency Input	125,000 Points 30 Recordings max.
HPM-460	6	Online , Recordis Frequency Input	250,000 Points 60 Recordings max.

2. Functions and settings



- 1 The “**ON / OFF**” key is used to switch the instrument on and off.
- 2 The “**SETUP / OPTION**” key is used to change system settings.
- 3, 4 The “**arrow keys**” are used to select lines and functions.
- 5 “**START / ENTER**” key :
“**START**” is used to start data (measurement) recording.
“**ENTER**” is used to poll sub-functions and accept (memorise) changed function values.
- 6 “**STOP / ESC**” key :
“**STOP**” is used to stop data (measurement) recording.
“**ESC**” is used to stop the function value changing and to close sub-functions. The previous menu will be displayed. **Changed settings will not be recalled.**
- 7 The “**I1-I2 / I1=I2**” key is used for calculation of the differential between measurement channel 1 and measurement channel 2. The value displayed on channel 2 is the differential I1–I2. It is possible to align I2 to I1. The “I1=I2” key sets measurement channel 1 equal to measurement channel 2 (balancing function).
- 8 After pressing and holding the “**TEMP**” key the temperature data of all channels are shown.
- 9 The “**DATA OUTPUT**” key is used to start data output to a PC, printer or display.
- 10 The “**RECORD**” key is used to record and store measurements.
- 11 “**MIN/MAX / ACTUAL / RESET**” key :
“**MIN/MAX / ACTUAL**” switches the display to ACTUAL, MINIMUM and MAXIMUM.
“**RESET**” deletes MIN/MAX values.
- 12-17 Up to 6 sensors from the HPM series can be simultaneously connected to the “**SENSOR INPUTS**”. They are automatically recognised by the instrument. An adapter is necessary for auxiliary sensors, current and/or voltage measurements.
- 18 “**LOW VOLTAGE SOCKET**” enables external voltage supply and/or battery charging via a power supply unit.
- 19 External instruments like a PC, printer, etc. Should be connected to the “**DATA OUTPUT SOCKET**”.
- 20 “**Graphic LCD display**” shows measurement values, settings and graphics.
- 21 The “**Optional line**” shows calculated values I2*I3 and I3 alternatively.
- 22 “**Status line**” shows measurement name or menu name.

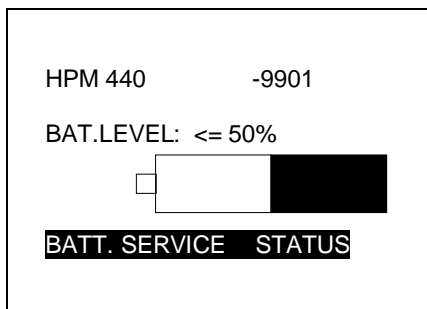
2.1 Operating the HPM Data Logger

The main functions of the instrument, i.e. measuring and displaying, recording measurements (RECORD), data output (DATA OUTPUT) and changing the instrument settings (SETUP / OPTION) are selected directly through the keyboard. The arrow keys select the desired menu. The "ENTER" key brings up the selected menu item. The menu item accompanying function value (parameter) is highlighted. Changing of the function values is done by the arrow keys. Pressing "ENTER" key confirms and stores the selected value.

2.1.1 Switching on the HPM Data Logger

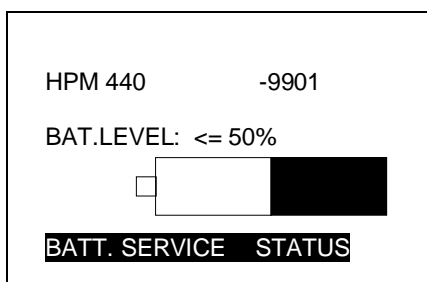


The "ON / OFF" key is used to switch on the instrument. The current charge state of the rechargeable battery is shown on the display for a short time.



The version number indicates the internal manufacturing key.

The current battery condition is given as a percentage and illustrated with the black section of the battery on the display. If the charge state is smaller than 40 % the message "BAT. SERVICE STATUS" appears on the display.



If the charge state is 0% an external voltage supply must be used. The rechargeable battery will then be charged automatically.

After approx. 8 seconds the display switches to simple measured value representation and shows the actual measurement values (ACT-values).

In	- ACT	t u
1	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW

2.1.2 Display

The graphic LCD display of the instrument has a maximum resolution of 128 x 64 pixels. The visible area is 72 x 40 mm². Using an 8 line representation (status, 6 channels (inputs), optional line) the digit height is 4,2 mm. Indicated values are adapted to the display size through an automatic digit height setting, for example if there are less than four channels for the actual values the numbers on the display will have double size.

The text mode is separated into 8 lines and 4 columns. The first column shows the selected channel. The second and third columns show the corresponding measured values. Here it is possible to choose between four different options:

ACT	→	actual reading
ACT – MIN	→	actual and minimum reading
ACT – MAX	→	actual and maximum reading
MIN – MAX	→	minimum and maximum reading

Column four shows the UNITS of the measured values.

Line 1 (Status Line)

(i.e. recording, saving), the type of reading (ACT, MIN, MAX) or the menu name.

Lines 2 – 7 (Display Line)

The readings with its engineering the units (e.g. bar)

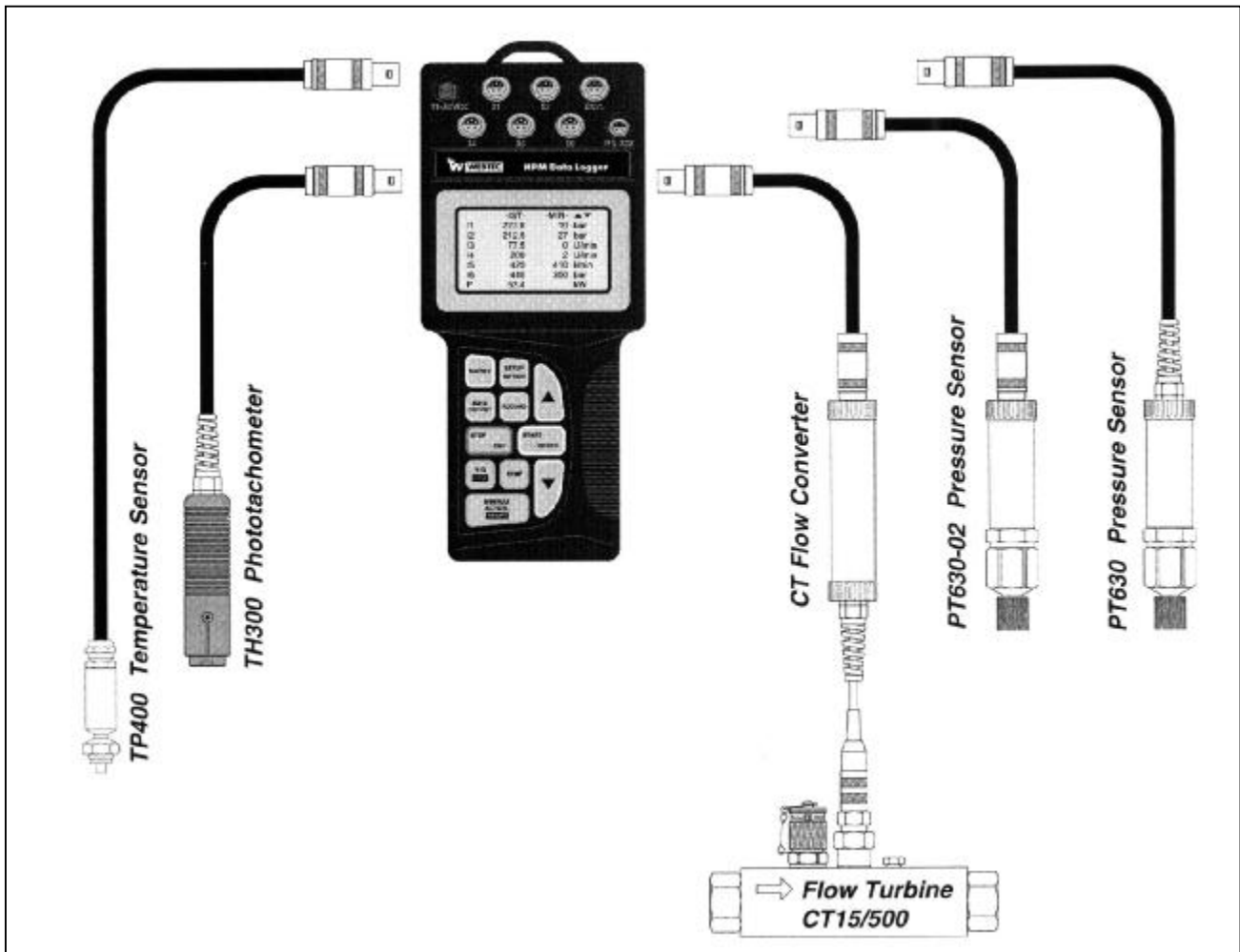
Line 8 (Calculation)

Hydraulic power (kW); Run out volume (Litres)

Curves can be displayed from recorded tests.

2.1.3 Connection of sensors

The sensors are connected to the input of the HPM Data Logger via an interconnection cable. The measuring range is scaled through automatic sensor recognition and the measured value will be shown on the display.



2.2 Measurement and display

The following chapters describe the different presentation options of measured values.

2.2.1 Display of readings (actual-minimum-maximum)

The measured values in the display can be shown as ACTual, MINimum and MAXimum values. There are several display options. The basic configuration shows the ACTual values.

In	- ACT	t u
1	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW

When pressing the “**MIN/MAX ACTUAL / RESET**” key the following values are shown:

This display shows the ACTual value and the MINimum value.



In	-ACT-	- MIN -	t u
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

The following display shows the ACTual and MAXimum value.



In	-ACT-	- MAX -	t u
1	223,6	320	bar
2	212,5	220	bar
3	77.5	80.0	RPM
4	200	400	RPM
5	420	420	l/min
6	448	555	bar
P	53.4		kW

The next display shows the MINimum and MAXimum value.



In	- MIN-	- MAX -	t u
1	10	320	bar
2	27	220	bar
3	0	80.0	RPM
4	2	400	RPM
5	410	420	l/min
6	300	555	bar
P			kW

By pressing the “MIN/MAX / ACTUAL / RESET” key once again all actual values of channel 1 are shown. The values of the other sensors are shown by using the **arrow keys**.



I2	t u
345.6	bar
Min=131	Max=434
T=55°C	



Select different sensor

I3	t u
345.6	bar
Min=131	Max=434
T=55°C	

By pressing the “STOP / ESC” key all channels can be shown on the display again.

The display of all actual measured values from one sensor can be obtained by selecting the corresponding input with the “ENTER” key.



Select Sensor/Input I2

In	- ACT -	t u
1	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW



Confirm sensor / input I2

I2	t u
345.6	bar
Min=131 Max=434	
T=55°C	

The values of the other sensors are shown by using the **arrow keys**.

By pressing the “STOP / ESC” key the values of all sensors return on the display.



Return to previous display

In	- ACT -	t u
1	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW

2.2.2 Deleting minimum/maximum memory

To delete the minimum and maximum values, the “**MIN/MAX / ACTUAL / RESET**” key has to be pressed for more than 4 seconds.



```
ESC - MIN - MAX RESET - t u
```

```
MIN-MAX VALUE  
CLEAR ?
```

```
ENTER = YES  
ESC = NO
```



Delete minimum / maximum readings and return to previous display

or



Return to previous display without deleting minimum / maximum values

2.2.3 Temperature

The temperature of all sensors/inputs is shown when pressing and holding the “**TEMP**” key.



Press and hold “TEMP” key

```
-- Temperature --
```

```
I1 22 °C  
I2 55 °C  
I6 99 °C  
I4 ----°C  
I5 ----°C  
I6 ----°C
```

By releasing the “TEMP” key the instrument will return to the previous display.

2.2.4 Differential values

In order to display the differential readout of Input 1 – Input2 the “I1-I2 / I1=I2” key has to be pressed. Both inputs must have the same sensor range in use. The result of the will be displayed in In 2, line 2 on the display.



Display and calculation of I1-I2

In	-ACT-	- MIN -	t u
1	223,6	10	bar
Δ	2,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

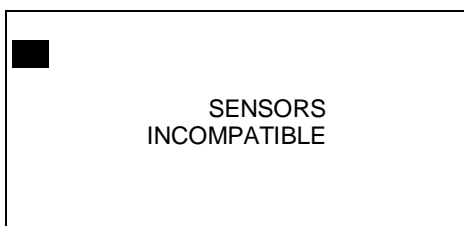
Pressing “I1-I2 / I1=I2” key again leads to display of channel 2.



Return to display of channel 2

In	-ACT-	- MIN -	t u
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

If the sensors are not compatible there is a message on the display: “SENSORS INCOMPATIBLE”.



2.2.5 Alignment of I1 and I2

Holding “I1-I2 / I1=I2” key for more than 4 seconds leads to alignment of channel 1 and channel 2. Channel 2 (I2) takes the actual measured value of channel 1 (I1) → **I2=I1**. If the measured value of channel 2 is changing, the difference Δ to channel 1 is measured. This function is like the tare-function of a scale.



Alignment
(press approx. 4s)

```
-- ALIGNMENT -- t u
I2 = I1 ?
ALIGNM. VALUE:
    9.2 bar

ENTER = YES
ESC = NO
```



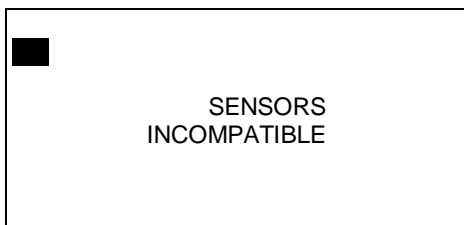
Carry out alignment;
measured values of
both sensors are “0”

In	-ACT-	-MIN-	t u
1	223,6	10	bar
Δ	0	0	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW



Stop alignment

If the sensors are not compatible there is a message on the display:
“SENSORS INCOMPATIBLE”.



2.2.6 Optional channel (connection)

The optional channel allows the calculation of volume (V in litres) and power (P in kW), which is shown in line 8 of the display.

In	- ACT	t u
1	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW

Optional channel

The setting for the optional setting channel can be done by pressing the "SETUP OPTION" key.



Press "SETUP / OPTION" key

ESC -- SETUP --	t u
CONTRAST %	50
AUX. SENSOR>	
COMBINATION :	
RECORD SETUP>	
DEVICE SETUP>	
BATT.SERVICE>	
SYSTEM SETUP>	



Select menu item "COMBINATION"

ESC -- SETUP --	t u
CONTRAST %	50
AUX. SENSOR>	
COMBINATION :	
RECORD SETUP>	
DEVICE SETUP>	
BATT.SERVICE>	
SYSTEM SETUP>	



Confirm menu item "COMBINATION"

ESC	- COMBINATION- t u
DISPLAY:	VOLUME
FORMULA:	
VOLUME (l)= t*	I3
P(kW)= (I1-I2)*	I3

For calculations there are the following formulae available:

1. **Run-out volume** (time * flow):

$$V = \text{Time [s]} * Q \text{ [l/min]}$$

Input channel for Q:

Configuration optional line: $V = t * I_x$ (Ix = I1 to I6)

2. **Power:**

- a) Hydraulic power (differential pressure * flow):

$$P \text{ (kW)} = \Delta P \text{ [bar]} * Q \text{ [l/min]} / 600 \text{ [s]}$$

$$P = \Delta P * Q$$

$$P = (I1-I2) * I_x \quad (Ix = I3 \text{ to } I6)$$

- b) Hydraulic power (pressure * flow):

$$P \text{ (kW)} = \Delta P \text{ [bar]} * Q \text{ [l/min]} / 600 \text{ [s]}$$

$$P = P * Q$$

$$P = I1 * I_x \quad (Ix = I2 \text{ to } I6)$$

Calculated and output values are set by the "DISPLAY" key:

(VOLUME, P(kW)=(I1-I2)*Ix, P(kW)=I1*I2, NO).



Select menu item
"DISPLAY"

ESC	- COMBINATION- t u
DISPLAY:	NO

FORMULA:

VOLUME(I)= t* I3

P(kW)= (I1-I2)* I3

P(kW)= I1* I2



Confirm menu item "DISPLAY"



Assign function key to measurement channel (I1, I2, I3, I4, I5, I6)

ESC	- COMBINATION- t u
DISPLAY:	VOLUME
FORMULA:	
VOLUME (I)= t*	I3
P(kW)= (I1-I2)*	I3
P(kW)= I1 *	I2



Confirm change

The input number for the volume formula is chosen in line “VOLUME (I) = t*”.



Select menu item “VOLUME (I) =t*”

ESC	- COMBINATION- t u
DISPLAY:	VOLUME
FORMULA:	
VOLUME (I) = t*	I3
P(kW)= (I1-I2)*	I3
P(kW)= I1 *	I2



Confirm menu item “VOLUME (I) = t*”



Assign function key to measurement channel (I1, I2, I3, I4, I5, I6)

ESC	- COMBINATION- t u
DISPLAY:	VOLUME
FORMULA:	
VOLUME (I) = t*	I4
P(kW)= (I1-I2)*	I3
P(kW)= I1 *	I2



Confirm change

The channel number for the equation of power is chosen in line “P(kW)=(I1-I2)*”.



Select menu item
"P(kW)=(I1-I2)*"

ESC	- COMBINATION- t u
DISPLAY:	P(KW)=(I1-I2)*Ix
FORMULA:	
VOLUME(1)= t*	I3
P(kW)= (I1-I2)*	I3
P(kW)= I1*	I2



Confirm menu item "P (kW) = (I1-I2)*"



Assign function key to
measurement channel
(I3, I4, I5, I6)

ESC	- COMBINATION- t u
DISPLAY:	P(KW)=(I1-I2)*Ix
FORMULA:	
VOLUME(1)= t*	I3
P(kW)= (I1-I2)*	I4
P(kW)= I1*	I2



Confirm change

The input number for the power equation is chosen in line "P (kW)=I1*"



Select menu item "P
(kW) = I1*"

ESC	- COMBINATION- t u
DISPLAY:	P(KW)=I1*Ix
FORMULA:	
VOLUME(1)= t*	I3
P(kW)= (I1-I2)*	I3
P(kW)= I1*	I2



Confirm menu item "P (kW) = I1 **"



Assign function key to measurement channel (I2, I3, I4, I5, I6)

```

ESC          - COMBINATION- t u
DISPLAY:     P(KW)=I1*Ix

FORMULA:
VOLUME(I)= t* I3
P(kW)= (I1-I2)* I3
P(kW)=      I1* I3
    
```



Confirm change

The data of the optional line are **not** transferred to the online and memory mode, respectively.

If display and sensors do not correspond, there is a message in the bottom line of the display "SENSORS INCOMPATIBLE".

In	- ACT -	t u
1	223,6	bar
2	212,5	bar
3	77.5	U/min
4	200	U/min
5	420	l/min
6	448	bar
SENSORS		
INCOMPATIBLE		

2.2.7 Number input

When configuring auxiliary sensors (see chapter 2.5) the measurement range (i.e. 0 ... 250 bar) and the corresponding initial and end value (i.e. 0 ... 20 mA) have to be programmed.

The next example shows the number input of an auxiliary sensor.

After selecting a number, this number is highlighted. By pressing the **arrow keys**, the former number is deleted; the first digit is highlighted and changed. The first digit of the number has to

be confirmed by pressing the “**START / ENTER**” key and the following digit is highlighted. The “**STOP / ESC**” key terminates the input and stores the new number.

Example

ESC – ANALOGUE	--t u
In1	
UNITS	BAR
FROM:	0
TO:	600
SIGNAL:	mA
FROM:	4
TO:	20



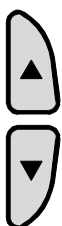
Select number

ESC -- ANALOGUE	--t u
In1	
UNITS	BAR
FROM:	0
TO:	600
SIGNAL:	mA
FROM:	4
TO:	20



Confirm number

ESC -- ANALOGUE	--t u
In1	
UNITS	BAR
FROM:	0
TO:	600
SIGNAL:	mA
FROM:	4
TO:	20



Change first digit

ESC -- ANALOGUE	--t u
In1	
UNITS	BAR
FROM:	5 _____
TO:	600
SIGNAL:	mA
FROM:	4
TO:	20



Confirm first digit

```
ESC -- ANALOGUE  --t u
In1
UNITS                BAR
  FROM:             5 0
  TO:               600
SIGNAL:             mA
  FROM:             4
  TO:               20
```



Change second digit

```
ESC -- ANALOGUE  --t u
In1
UNITS                BAR
  FROM:             5 5
  TO:               600
SIGNAL:             mA
  FROM:             4
  TO:               20
```



Confirm second digit

```
ESC -- ANALOGUE  --t u
In1
UNITS                BAR
  FROM:             5 5
  TO:               600
SIGNAL:             mA
  FROM:             4
  TO:               20
```



Complete number input

```
ESC -- ANALOGUE  --t u
In1
UNITS                BAR
  FROM:             55
  TO:               600
SIGNAL:             mA
  FROM:             4
  TO:               20
```

2.2.8 Text input

For functions like auxiliary sensors (see chapter 2.4), data recording (see chapters 3.2 to 3.3.4) and user ID (see chapter 4.4.3), text input is mandatory.

After selecting a text line, the menu “TEXT” is displayed.

```
ESC -- TEXT -- t u
AaBbCcDdEeFfGgHhIiJj
KkLlMmNnOoPpQqRrSsTt
UuVvWwXxYyZz%/_
0123456789.-+
STORE = STOP/ESC
15 CHARS MAX
TEXT: UNIT 3
```

“TEXT” shows the current text. The first character is displayed inverse and can be changed. A new character can be selected by pressing the **arrow keys**. By holding down the **arrow key** the cursor moves faster through the text input field. The “START / ENTER” key confirms the selected character and highlights the next character “_” represents a space. The text input can be completed by pressing the “STOP / ESC” key. The text displayed under the heading “TEXT” is stored and then the display returns to the previous active menu.



Select new character

```
ESC -- TEXT -- t u
AaBbCcDdEeFfGgHhIiJj
KkLlMmNnOoPpQqRrSsTt
UuVvWwXxYyZz%/_
0123456789.-+
STORE = STOP/ESC
15 CHARS MAX
TEXT: UNIT 3
```



Confirm new character



Select next character

```
ESC -- TEXT -- t u
AaBbCcDdEeFfGgHhIiJj
KkLlMmNnOoPpQqRrSsTt
UuVvWwXxYyZz%/_
0123456789.-+
STORE = STOP/ESC
15 CHARS MAX
TEXT: UNIT 3_ _ _ _
```



Confirm character



Terminate text input and store text

2.3 Frequency measurement (from type HPM 440)

The rotational speed [rpm] or the flow rate [l/min] can be measured directly within a pre-chosen frequency. Important settings:

Rotational speed: Details about impulses per revolution lpr and maximal rotational speed lmax.

Flow rate: Details about K-factors, Impulse / Litre (IMP/U) and maximum flow rate (Qmax [l/min])

By pressing the “SETUP” key the frequency settings can be adjusted. The frequency measurement is limited to channel 3.



Press “SETUP / OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION >
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item “AUX. SENSOR”

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION >
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item “AUX. SENSOR”

```
ESC -- INPUT --          t u
ANALOGUE>                 11
FREQUENCY>
```



Select menu item
"FREQUENCY"

```
ESC - INPUT --      t u
ANALOGUE>          II
FREQUENCY>
```



Confirm menu item
"FREQUENCY"

```
ESC -- FREQUENCY   --t u
In3
QUANTITY:          ROTAT.SPD
PULS/R:            123
RPM MAX:           3000
```

Choose menu item "QUANTITY" for selection of rotational speed and flow rate, respectively.



Select menu item
"QUANTITY"

```
ESC -- FREQUENCY   --t u
In3
QUANTITY:          ROTAT.SPD
PULS/R:            123
RPM MAX:           3000
```



Confirm menu item "QUANTITY"



Select function value
(ROTAT.SPD, FLOW)

```
ESC -- FREQUENCY   --t u
In3
QUANTITY:          ROTAT.SPD
PULS/R:            123
RPM MAX:           3000
```



Confirm function value

If “QUANTITY” = ROTAT.SPD :

“PULS/R” input for Impulse / rotation



Select menu item
“PULS/R”

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	ROTAT.SPD
PULS/R:	123
RPM MAX:	3000



Confirm menu item “PULS/R”

The number input is described in chapter 2.2.7. (Accepted range: 1 to 999).

“RPM max” is the maximum speed range for “PULS/R” (=teeth number).



Select menu item
“RPM max”

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	ROTAT.SPD
PULS/R:	123
RPM MAX	3000



Confirm menu item “RPM MAX”

The number input is described in chapter 2.2.7.

If PULS/R * RPM is exceeding 30,000 * 60, the error message “Values too big” is displayed.

If "QUANTITY" = FLOW RATE :



Select menu item
"QUANTITY"

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	ROTAT.SPD
PULS/R:	123
RPM MAX:	3000



Confirm menu item "QUANTITY"



Select function value
"FLOW"

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	FLOW
PULS/R:	123
RPM MAX:	3000



Confirm function value

The next step is the input of the CALIBR factor and the maximum flow rate:

"CALIBR." (=CALIBR. factor)

When using Webtec flow turbines, the given calibration factor has to be taken. For different flow turbines the CALIB. factor is stamped on the label or has to be calculated as follows:

I = Impulse / Litre

CALIBR._(1000 Hz) = 60.000 / I



Select menu item
"CALIBR."

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	Flow
CALIBR.:	123
Q MAX:	300



Confirm menu item "CALIBR"

The number input is described in chapter 2.2.7.

"Q MAX" defines the maximum flow rate



Select menu item
"Q MAX"

ESC -- FREQUENCY	--t u
In3	
QUANTITY:	Flow
PULS/R:	123
Q MAX:	300



Confirm menu item "Q MAX"

The number input is described in chapter 2.2.7.

2.4 Auxiliary sensors

For auxiliary sensor connection the aux sensor module is needed. Due to galvanic separation, the HPM Data Logger allows the reading of electronic signals in a range from 0/4 to 20 mA (current) and voltage from 0 to 10 VDC. The scaling of the output signal should be taken into consideration.

	Measurement range (scale)	Unit		Signal	Unit
Example	0 ... 250	bar	→	0 ... 20	mA
	0 ... 500	N	→	4 ... 20	mA
	0 ... 200	kg	→	0 ... 10	V
Current	0 ... 20	mA	→	0 ... 20	mA
Voltage	0 ... 10	V	→	0 ... 10	V

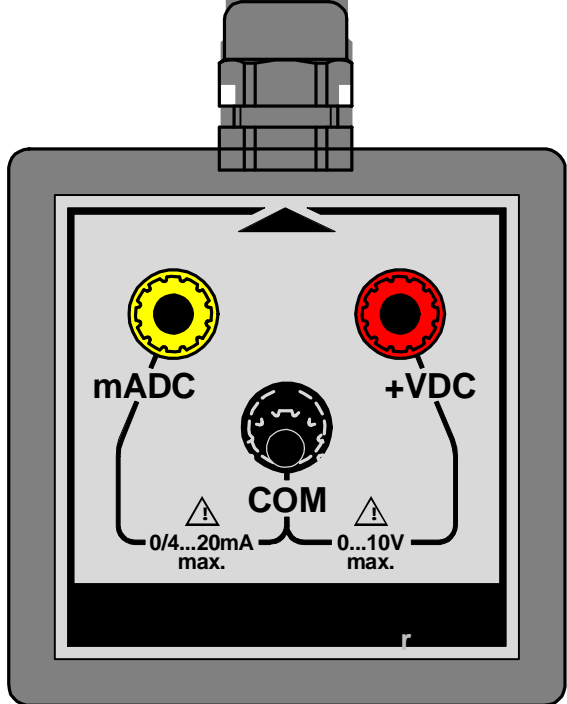
Application in order to measure Force (N) or Mass (kg). Any other parameter can be measured by using the aux sensor module.

After correct configuration the auxiliary sensors (see chapter 2.5) work like Webtec sensors. The sensor identification is valid for the corresponding input channel.

For starting auxiliary triggered measurement recording, the trigger module has to be used.

The trigger module starts the measurement recording via make- and break- device of a floating contact, that is connected to the trigger module.

**Attention: Use only floating contacts!! (e.g. relay contacts)
If not, the HPM Data Logger can be destroyed.**

<p>Input:</p> <p>Response Time:</p> <p>Accuracy:</p> <p>Galvanic Separation:</p> <p>Link to the HPM Data Logger:</p> <p>EM-Conformity:</p> <p>Ambient Temperature:</p> <p>Storage Temperature:</p>	<p>0. . 20 mA or 0. . 10 VDC</p> <p>< 1msec 0,25 %FS</p> <p>Fixed Cable 30 cm 5 pin push-pull</p> <p>EN 50081 – 1 EN 50082 – 2</p> <p>0. . 60°C -25. . +80°C</p>	 <p>The diagram shows a terminal block with three terminals: a yellow terminal labeled 'mADC', a red terminal labeled '+VDC', and a black terminal labeled 'COM'. Below the mADC terminal is a warning symbol and the text '0/4...20mA max.'. Below the +VDC terminal is a warning symbol and the text '0...10V max.'. A 5-pin push-pull connector is shown at the top of the terminal block.</p>
--	--	--

2.5 Configuration of auxiliary sensors

By pressing the "SETUP" key the settings for the configuration of auxiliary sensors can be achieved.



Press "SETUP / OPTION" key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item "AUX. SENSOR"

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item "AUX. SENSOR"

```
ESC -- INPUT --          t u
ANALOGUE>                11
FREQUENCY>
```



Select menu item "ANALOGUE"

```
ESC -- INPUT --          t u
ANALOGUE>                11
FREQUENCY>
```



Confirm menu item
"ANALOGUE"

```
ESC -- INPUT --      t u
ANALOGUE>           11
FREQUENCY>
```



Select channel
(11, 12, 13, 14, 15, 16)

```
ESC - INPUT --      t u
ANALOGUE>           12
FREQUENCY>
```



Confirm channel

```
ESC -- ANALOGUE    --t u
In2
UNITS BAR
FROM: 0
TO: 600
SIGNAL: mA
FROM: 4
TO: 20
```

"UNITS" describes the UNIT of the displayed data.



Select menu item
"UNITS"

```
ESC - ANALOGUE    --t u
In2
UNITS BAR
FROM: 0
TO: 600
SIGNAL: mA
FROM: 4
TO: 20
```



Confirm menu item "UNITS"

The input of the UNIT is similar to the text input which is described in chapter 2.2.8. The unit can have a maximum of 5 characters.

“FROM” (UNITS) represents the minimum measured value (smallest accepted value : -99,999).



Select “FROM” (UNITS)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	-10
TO:	800
SIGNAL:	mA
FROM:	4
TO:	20



Confirm “FROM” (UNITS)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	mA
FROM:	4
TO:	20

The number input is described in chapter 2.2.7.

“TO” (UNITS) defines the maximum measured value (largest accepted value : 999, 999)



Select “TO” (UNITS)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	mA
FROM:	4
TO:	20



Confirm “TO” (UNITS)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	mA
FROM:	4
TO:	20

The number input is described in chapter 2.2.7.

“SIGNAL” describes the unit of measured value given by the sensor.



Select menu item
"SIGNAL"

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	mA
FROM:	4
TO:	20



Confirm menu item "SIGNAL"



Select function value
(mA, V)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	V
FROM:	4
TO:	20



Select function value

"FROM" (SIGNAL) defines the minimum measured value (smallest accepted value : -20 mA or -10 V).



Select "FROM"
(SIGNAL)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	V
FROM:	4
TO:	20



Confirm "FROM"
(SIGNAL)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	V
FROM:	4
TO:	20

The number input is described in chapter 2.2.7.

"TO" (SIGNAL) defines the maximum measured value
(biggest accepted value : +20 mA or +10 V).



Select "TO" (SIGNAL)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	V
FROM:	4
TO:	20



Confirm "TO" (SIGNAL)

ESC – ANALOGUE	--t u
In2	
UNITS	BAR
FROM:	0
TO:	400
SIGNAL:	V
FROM:	4
TO:	20

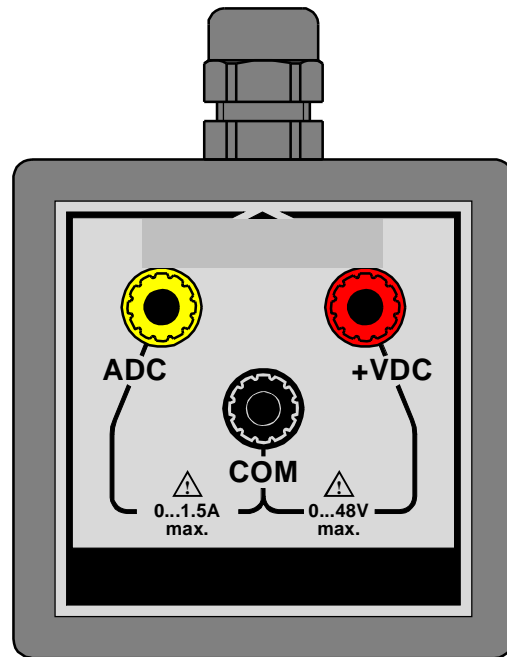
The number input is described in chapter 2.2.7.

2.6 Measuring Current or Voltage

Using the optional voltage module in order to read current or voltage signals from a proportional valve please pay attention to the instructions below:

Adjustment at the HPM Data Logger:	Adjustment at the HPM Data Logger:
<p>Voltage measurement 0..48 VDC</p> <p>SETUP OPTION AUXILLARY SENSOR ANALOGUE Ix UNITS: V FROM 0.0 TO 50.0 SIGNAL V FROM: 0.0 TO: 10.0</p>	<p>Current measurement 0..1,5 ADC</p> <p>SETUP OPTION AUXILLARY SENSOR ANALOGUE Ix UNITS: A FROM 0.0 TO 3.0 SIGNAL mA FROM: 0.0 TO: 20.0</p>

Input:	0..1,5ADC or 0. . 48 VDC
Response Time:	< 1msec
Accuracy:	0,25 %FS
Galvanic Separation:	
Link to the HPM Data Logger:	5 pin push-pull Festkabel 30 cm Fixed Cable 30 cm
EM-Conformity:	EN 50081 – 1 EN 50082 – 2
Ambient Temperature:	0. . 60°C
Storage Temperature:	-25. . +80°C



2.7 Online function

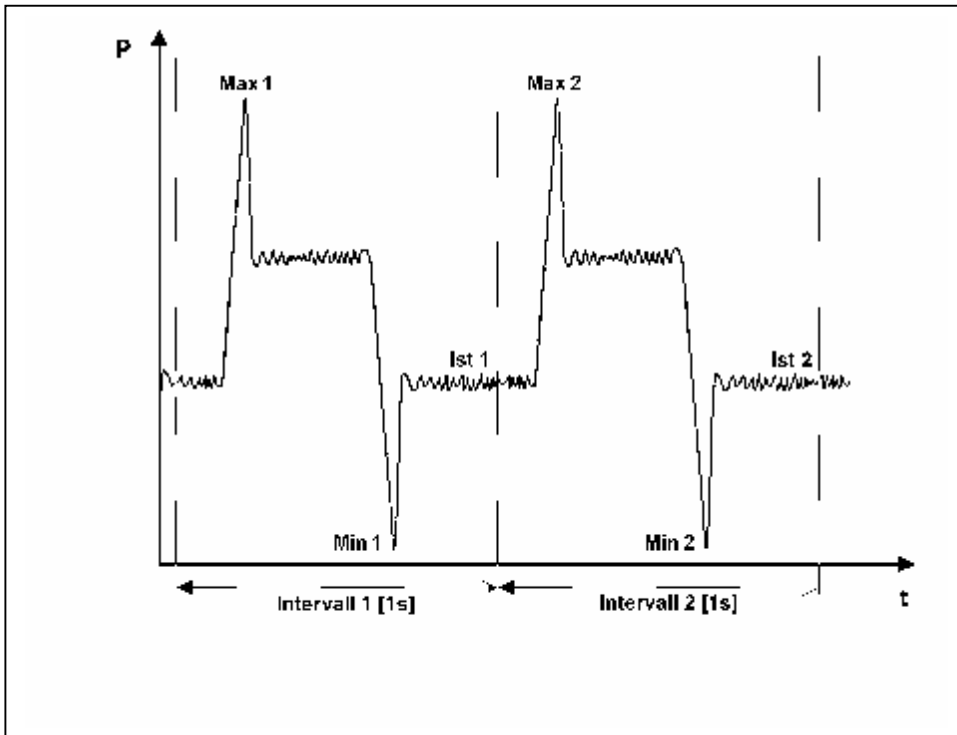
All HPM Data Logging handmeters utilise a serial interface (RS232 type).

The HPM Data Logger is able to transfer the displayed readings direct to the PC or to the portable printer.

- 1) Online Data print to printer
- 2) OnLine Data to PC

During the OnLine test, the HPM Data Logger transfers 3 readings.

The ACT, MIN and MAX are transferred within an short interval. This guarantees the transfer of all information during printing.



The readouts are printed in numeric format .

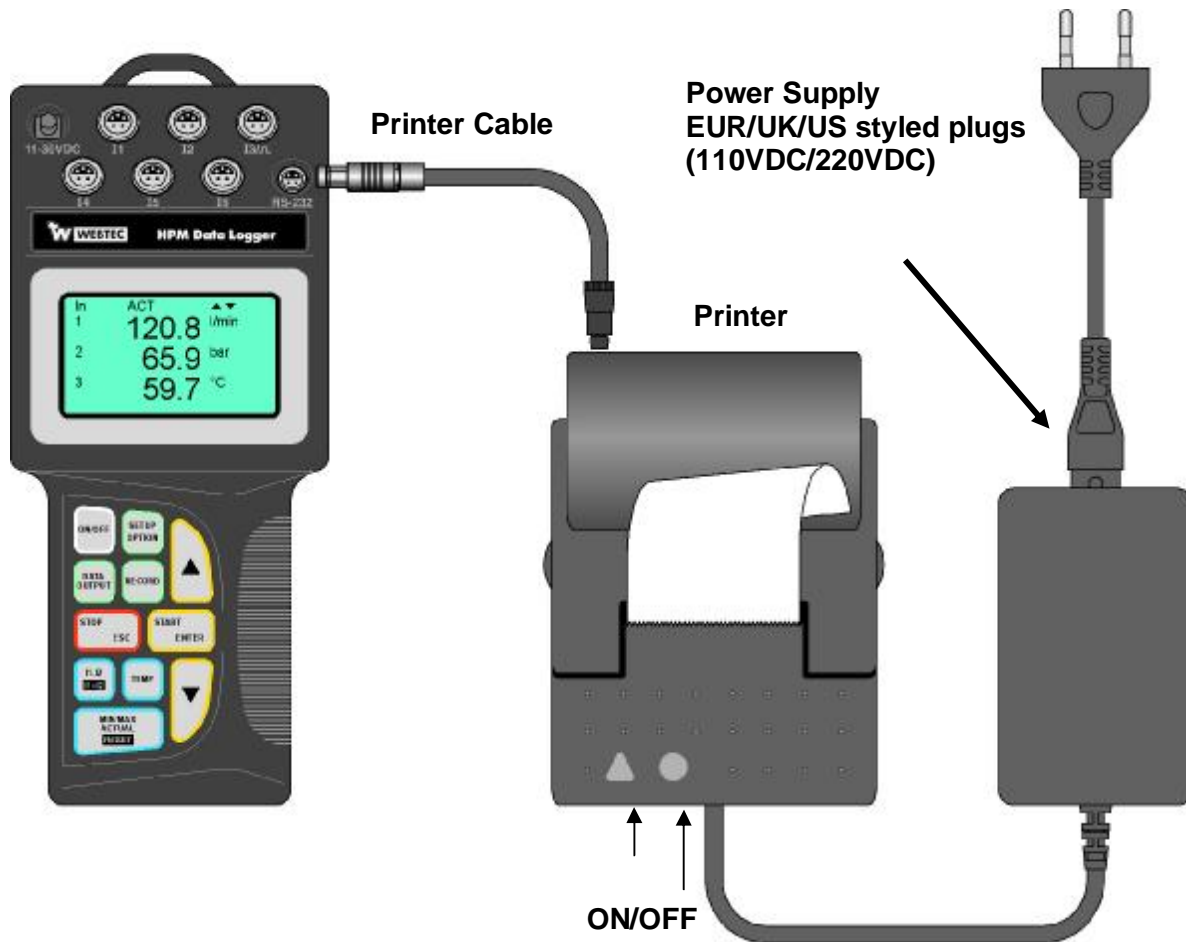
Recorded measured values at online measurement			
ACT 1	MIN 1	MAX 1	Interval 1
ACT 2	MIN 2	MAX 2	Interval 2
·

The data is numerically presented as a table when using a printer.

If the HPM Data Logger is connected to a PC in conjunction with dedicated software, it is possible to display the data as an OnLine graph.

2.8 OnLine Data Print (FT9273)

Connect the printer according to the following diagram:



Please follow the operating instruction delivered with the printer kit.

2.8.1 Online function with printer

It is not necessary to change the baud rate when using the optional hand-held printer. The given baud rate per default is 19,200 baud. When required the baud rate of the printer has to be adapted to the HPM Data Logger.

Online data transfer can be started by pressing the **“DATA OUTPUT”** key. The menu **“DATA OUT”** will be displayed.



Press **“DATA OUTPUT”** key

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PC
MEASUREMENT:  12
In:         1 2 3 4 5 6
DISPL. TYPE:  MIN-MAX
FORMAT:      NORMAL
START
```

“DATA FROM” shows the data source (MEMORY = measured value memory or ONLINE = actual measured value).



Select menu item **“DATA FROM”**

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PC
MEASUREMENT:  12
In:         1 2 3 4 5 6
DISPL. TYPE:  MIN-MAX
FORMAT:      NORMAL
START
```



Confirm menu item **“DATA FROM”**



Select function value
"ONLINE"

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
MEASUREMENT:  12
In:  1 2 3 4 5 6
DISPL. TYPE:  MIN-MAX
FORMAT:  NORMAL
START
```



Confirm change

Menu item "OUTPUT TO" selects the output instrument.



Select menu item
"OUTPUT TO"

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PRINTER
TRANSF.RATE:  5
PRINT/PC  START
CANCEL  STOP
```



Confirm item "OUTPUT TO"



Select function value

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PRINTER
TRANSF.RATE:  5
PRINT/PC  START
CANCEL  STOP
```



Confirm change

“TRANSF.RATE” defines the number of measured values per seconds :
 up to 3 channels → 1 to 3,600 seconds
 more than 4 channels → 2 to 3,600 seconds



Select menu item
 “TRANSF.RATE”

```
ESC  -- DATA OUT -- t u
DATA FROM:    ONLINE
OUTPUT TO:    PRINTER
TRANSF.RATE:  5
PRINT/PC     START
CANCEL:      STOP
```



Confirm menu item “TRANSF.RATE”



Select function value by
 scrolling (1 to 3,600
 seconds)

```
ESC  -- DATA OUT -- t u
DATA FROM:    ONLINE
OUTPUT TO:    PRINTER
TRANSF.RATE:  10
PRINT/PC     START
CANCEL:      STOP
```



Confirm change

Start online output by pressing the “PRINT/PC” key.



Select menu item
“PRINT/PC”

```
ESC  -- DATA OUT -- t u
DATA FROM:    ONLINE
OUTPUT TO:    PRINTER
TRANSF.RATE:  10
PRINT/PC     START
CANCEL:       STOP
```



Start transfer

In	-ACT-	- MIN -	P
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4	0	kW

The measured values are printed numerically in a table.

The online output can be terminated by pressing the “STOP / ESC” key.

2.8.2 Online function with PC / Laptop

For a correct data transfer, the baud rate for the PC to the HPM Data Logger has to be adapted to the latter (see chapter 4.2.6). This adaptation can be done by an interface test when using HPM software (see chapter 4.2.7).

When pressing the “DATA OUTPUT” key the online output will be activated. The menu “DATA OUT” is displayed.



Press “DATA OUTPUT”
key

```
ESC  -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PRINTER
MEASUREMENT: 12
In:          1 2 3 4 5 6
DISPL. TYPE: MIN-MAX
FORMAT:      NORMAL
START >
```

“DATA FROM” shows the data source (MEMORY = measured value memory or ONLINE = actual measured value).



Select menu item
"DATA FROM"

```

ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PRINTER
MEASUREMENT:  12
In:         1 2 3 4 5 6
DISPL. TYPE:  MIN-MAX
FORMAT:      NORMAL
START >
    
```



Confirm menu item "DATA FROM"



Select function value
"ONLINE"

```

ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PRINTER
MEASUREMENT:  12
In:         1 2 3 4 5 6
DISPL. TYPE:  MIN-MAX
FORMAT:      NORMAL
START >
    
```



Confirm change

"OUTPUT TO" key selects the output instrument.



Select menu item
"OUTPUT TO"

```

ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  A4
TRANSF.RATE:  5
PRINT/PC    START >
CANCEL =    STOP
    
```



Confirm menu item "OUTPUT TO"



Select function value
"PC"

```
ESC  -- DATA OUT -- t u
DATA FROM:    ONLINE
OUTPUT TO:    PC
TRANSF.RATE:  5
PRINT/PC     START >
CANCEL =     STOP
```



Confirm change

"TRANSF.RATE" shows the number of measured values per seconds :

up to 3 channels → 1 to 3,600 seconds
 more than 4 channels → 2 to 3,600 seconds



Select menu item
"TRANSF.RATE"

```
ESC  -- DATA OUT -- t u
DATA FROM:    ONLINE
OUTPUT TO:    PC
TRANSF.RATE:  5
PRINT/PC     START >
CANCEL =     STOP
```



Confirm menu item "TRANSF.RATE"



Select function value by scrolling (1 to 3,600 seconds)

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  10
PRINT/PC   START >
CANCEL =    STOP
```



Confirm change

“PRINT/PC” key starts online output.



Select menu item “PRINT/PC”

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  10
PRINT/PC   START >
CANCEL =    STOP
```



Start transfer

```
READY FOR
DATA TRANSFER

CANCEL = STOP
```

In	-ACT-	- MIN -	P
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4	0	kW

“STOP / ESC” key stops the online output.

3. Recording Function of the HPM Data Logger

The HPM Data Logger records and stores measured values (curves). The recorded data sets can be transferred to the printer or the PC (with Webtec HPM software).

For measurement recording and storing the user has two choices:

Manual recording and saving (“START/STOP”)

The manual recording is activated and stopped with the “START/STOP” key (see chapter 3.3).

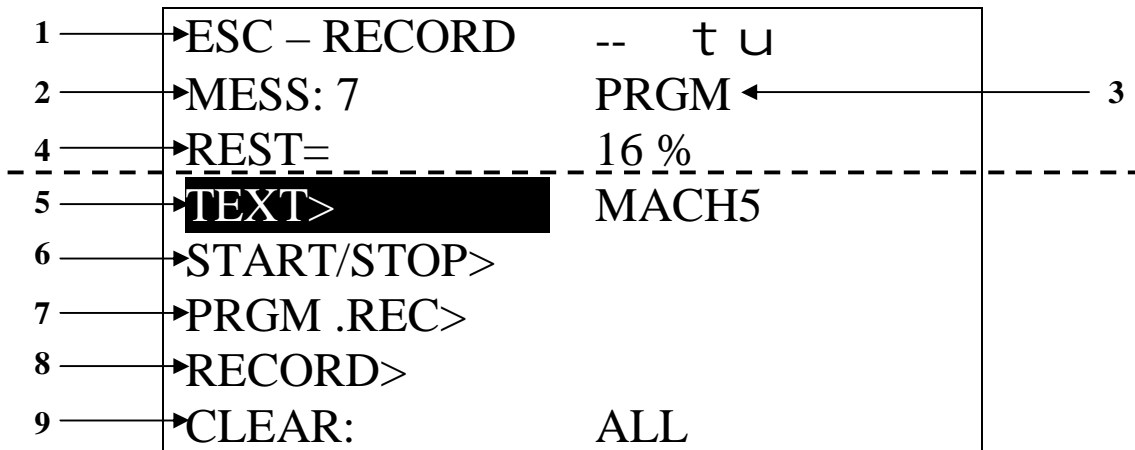
Software-driven recording and saving

With the software-driven recording, the HPM Data Logger controls the documentation of the data sets. Before starting the measurement, the user has to initialise the set up and measurement time (see chapter 4.4).

The “RECORD” key is pressed to start the recording. The menu “RECORD” is displayed.



Press “RECORD” key.



- 1 Menu line
- 2 “**MESS**” shows the number of the latest stored measurement.
- 3 “**PRGM**” shows the actual (record-) status of the measurement memory:

PRGM → Measurement memory will be programmed
FULL → Measurement memory is full
- 4 **REST =** shows the remaining memory in %.

The functions, which are described above are displayed only and can not be changed by the user.

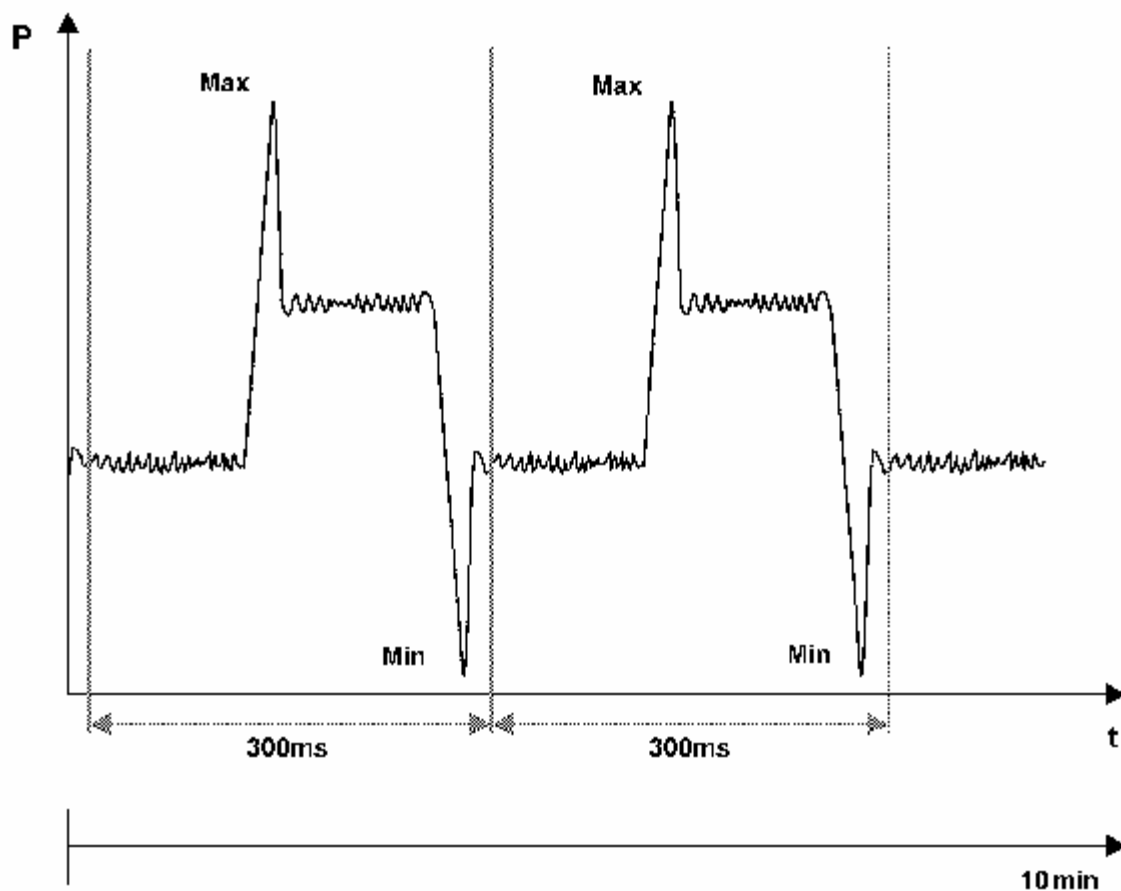
The following functions can be changed by the user:

- 5 “**TEXT**” can enter a name for every input (channel).
- 6 “**START/STOP**” prepares the manual recording.
- 7 “**PRGM REC**” defines the initial setting and the measurement time as well as the type of software-driven recording.
- 8 “**RECORD**” starts the software-driven recording.
- 9 “**CLEAR**” deletes single or all recorded measurements.

3.1 Memory capability

Dynamic memory capability of the HPM Data Loggers

The dynamic memory capability of the Min / Max values allows the user to select a memory rate of 1,000, 2,000 and 4,000 data points per channel. The Min / Max values for each recording interval are constantly recorded. Therefore, the recording of all pressure peaks is guaranteed.



The **period of one recording interval** depends on recording time and data points. The memory rate is constant during each single recording cycle.

$$\text{Interval time (Int)} = \frac{\text{Rec. Time (time)}}{\text{Intervals (Data points/channel)}}$$

The memory capability setting is described in chapter 3.1

In order to determine the performance of 10 min. recording time, with a setup of 4.000 intervals (data points/channel), the following calculation will be performed:

$$\text{Rec. Time} = 10 \text{ min} = 10\text{min} \times 60\text{sec} \times 1,000 \text{ msec} = 600.000 \text{ msec.}$$

In this case, the period of the recording interval is 150 msec. While the instrument samples all readings with a sampling rate of 1.000 readings per second, we will get 150 readings (data points) in that specific interval.

The HPM data logger enables the most flexible usage of memory capacity and ensures best test results. Based on a data reduction the internal data memory will remain the highest (MAX) and the lowest (MIN) data point within that recording interval. This will apply for each of the inputs connected with a sensor. Using a HPM-440/460 (4/6 Inputs/channels), you can run the instrument in different modes:

Intervals per Input/channel		1.000	2.000	4.000
		No. of Recordings	No. of Recordings	No. of Recordings
HPM 440 125.000	1 channel	125	60	30
	3 channel	40	20	10
HPM 460 250.000	1 channel	250	125	60
	3 channel	80	40	20
	6 channel	40	20	10

Total memory consumption

Depending on used inputs/channels we can expect to see

Memory rate = 2,000 MIN and MAX measurement points /channel

$$n = \frac{\text{number of MIN and MAX meas. points}}{\text{memory rate} * \text{number of channels}} = \frac{256,000 \text{ points}}{2,000 \text{ MIN and MAX meas. points/channel} * \text{channels}}$$

The maximum number of measurements is 240, when using a single channel and 1,000 MIN and MAX measurement points.

3.2 Start / Stop Recording

The user **starts and stops** the manual recording of measured values with the “START” and “STOP” key, respectively. (like programming a VCR).

To choose the manual recording options press the “RECORD” key. On the display the menu “RECORD” is shown.



Press “RECORD” key

```

ESC - RECORD    --  t u
MESS: 1         PRGM
REST=          16 %
TEXT>          ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR:         ALL
    
```

Settings:

Names (with a maximum of 15 characters) for the measurement and channels can be provided by the menu item “TEXT”.



Select menu item
“TEXT”

```

ESC - RECORD    --  t u
MESS: 1         PRGM
REST=          16 %
TEXT>          ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR:         ALL
    
```



Confirm menu item “TEXT”

The further text input is described in chapter 2.2.8.

Measurement :

“START/STOP” starts the manual recording mode.



Select menu item
“START/STOP”

```

ESC - RECORD    --  t u
MESS: 1         PRGM
REST=          16 %
TEXT>          ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR:         ALL
    
```



Confirm menu item
"START/STOP"

MES:1	RECORD>	START >
1	223,6	10 bar
2	212,5	27 bar
3	77.5	0 RPM
4	448	300 bar

"STOP / ESC" key stops the manual recording mode. On the display the menu "RECORD" is shown.

With the "MIN/MAX ACTUAL / RESET" key the different presentations of the measured values can be chosen on the display.

By pressing the "I1-I2 / I1=I2" key, the difference between I1 and I2 is shown in the second line of the display. The calculated value is recorded as measurement value I2.

Pressing "START / ENTER" key and "RECORD" key, respectively, starts the recording.



Start recording

MEAS:1	RECORD	
1	223,6	10 bar
2	212,5	27 bar
3	77.5	0 RPM
4	448	300 bar

Press "STOP / ESC" key to stop the recording.



Stop recording

RECORD	END
MEAS: 7	SAVE?
ENTER = YES	
ESC = NO	

At this point, the user has to decide whether the measurement will be stored by the HPM Data Logger.



Select function value (YES/NO).

```
RECORD  END
MEAS: 7  SAVE?

ENTER = YES
ESC = NO
```



Confirm function value

```
ESC - RECORD  -- t u
MESS: 2      PRGM
REST=       12
TEXT>      ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR:      ALL
```

The display returns to the menu "RECORD". Now, you can register further measurements. By pressing the "STOP / ESC" key you can exit the menu "RECORD".



Exit menu "RECORD"

```
In  - ACT -  t u
1   223,6   bar
2   212,5   bar
3   77.5    RPM
4   448     bar
```

The display shows the actual measurement values.

3.3 Automatic Recording

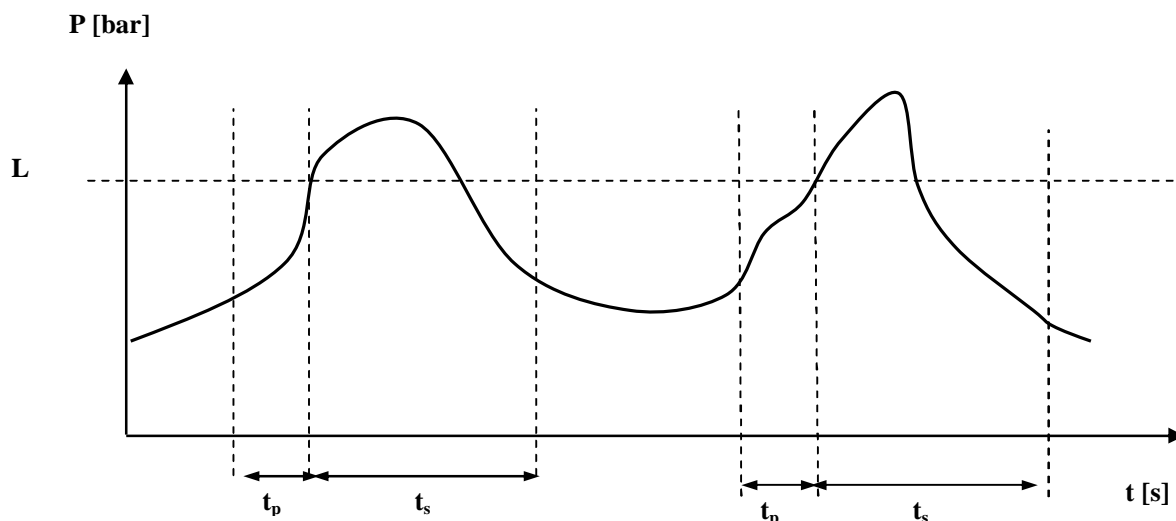
For automatic driven recording and saving of data, four different settings can be chosen:

Edge-triggered recording (increase/decrease)	(see chapter 3.3.1)
Externally triggered recording	(see chapter 3.3.2)
Manually triggered recording	(see chapter 3.3.3)
Date recording	(see chapter 3.3.4)

Edge-triggered recording (chapter 4.4.1)

The edge-triggered recording is initiated by rising above or falling below a threshold.

Scheme to edge-triggered recording



t_g	→	recording time
t_s	→	storage time
t_p	→	pre-trigger time
L	→	threshold

The **storage time** t_g defines the total recording time. $t_g = t_s + t_p$

In the **storage time** t_s the measured values will be recorded. The storage time is set by the user before recording ("DURATION").

The **pre-trigger time** t_p is the storage time **before** the measurement is initiated.

By passing (rise, fall) the **threshold** L the recording is initiated (see diagram → rising). The signal curve **before** crossing the threshold L will be recorded by the pre-trigger.

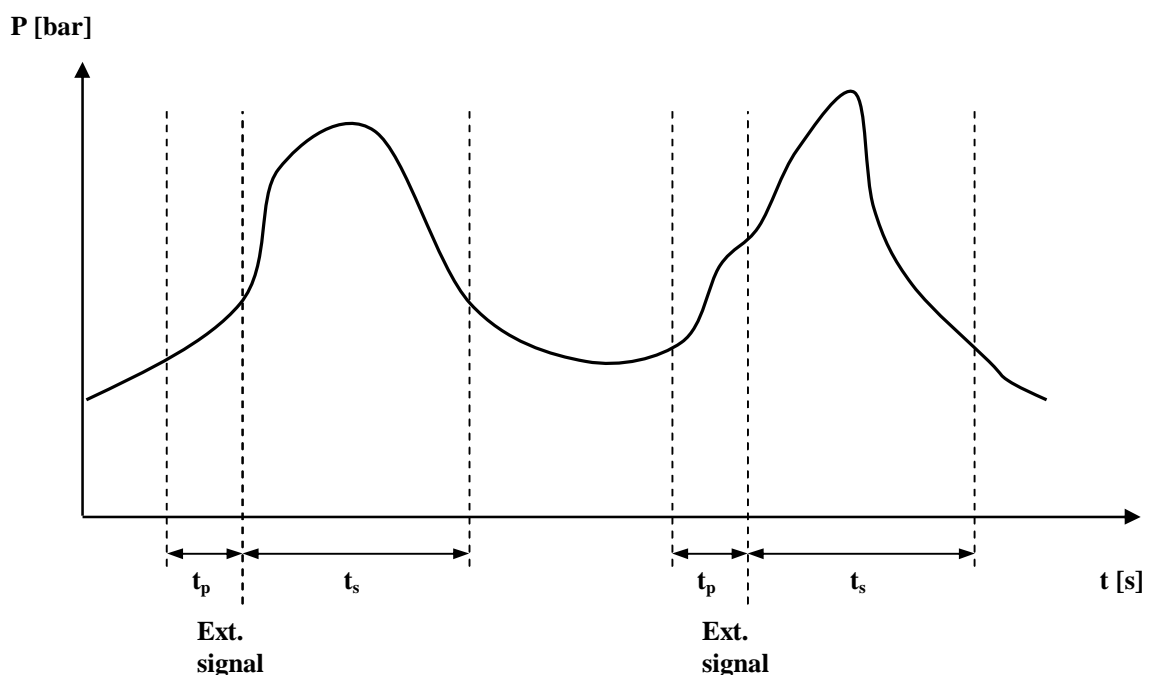
Externally triggered recording (chapter 3.3.2)

The **trigger adapter** is needed for the externally triggered recording. Please note that the electrical connection is a floating output type, for example by connecting to a relay or a galvanic separated element.

Please pay attention to the trigger adapter instructions.

The externally triggered recording will be started after an external signal (for example by opening or closing of a valve).

Scheme to externally triggered recording



- t_g → recording time
- t_s → storage time
- t_p → pre-trigger time
- L → threshold

The **storage time** t_g defines the total recording time. $t_g = t_s + t_p$

In the **storage time** t_s the measured values will be recorded. The storage time is adjusted by the user before recording ("DURATION").

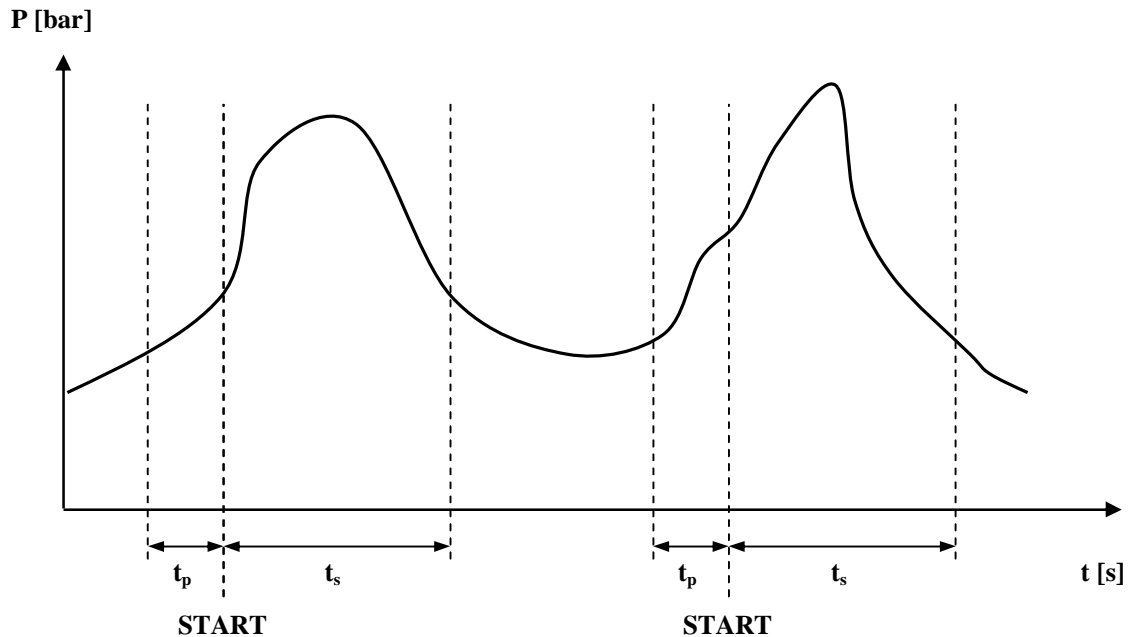
The **pre-trigger time** t_p is the storage time **before** the measurement recording is initiated.

The signal curve **prior to** the external signal will be recorded by the pre-trigger.

Manually triggered and time controlled recording (chapter 3.3.3)

Manually triggered and time controlled recording is started by pressing the “START” key.

Scheme to manually triggered and time controlled recording



- t_g → recording time
- t_s → storage time
- t_p → pre-trigger time
- L → threshold

The **storage time** t_g defines the total recording time. $t_g = t_s + t_p$

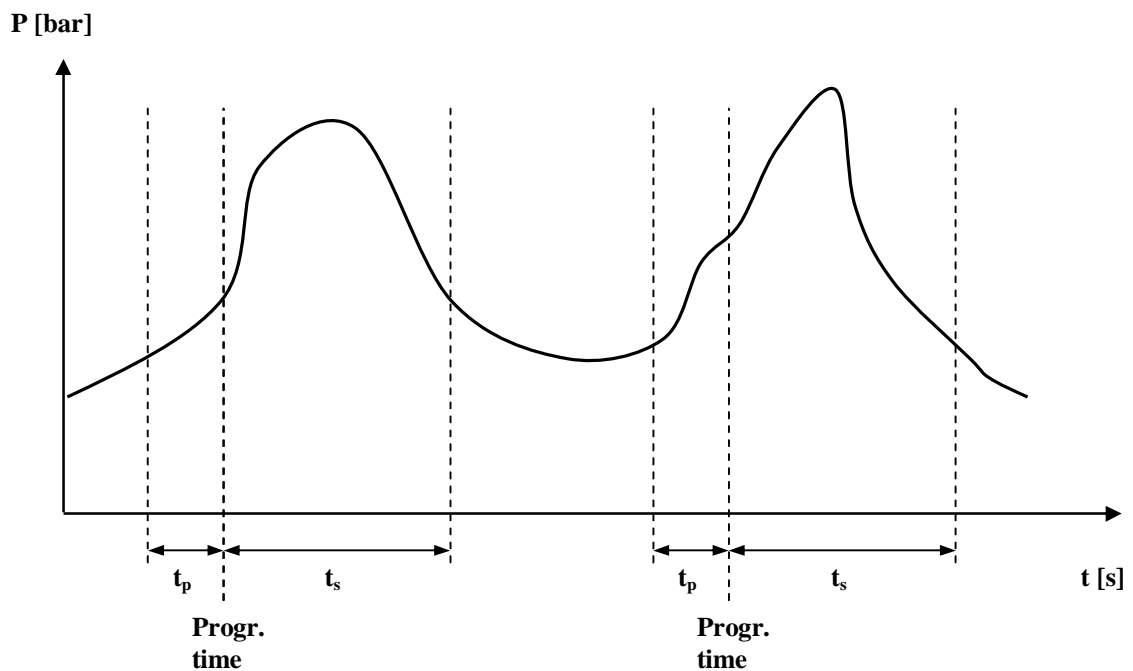
In the **storage time** t_s the measured values will be recorded. The storage time is given by the user before recording (“DURATION”).

The **pre-trigger time** t_p is the storage time **before** the measurement is initiated. The signal curve **before** pressing “**START**” key will be recorded by the pre-trigger.

Date recording (chapter 4.4.4)

The time controlled recording is initiated and stopped by a timer. The storage operation is similar to programming a VCR.

Scheme to date recording



- t_g → recording time
- t_s → storage time
- t_p → pre-trigger time
- L → threshold

The **storage time** t_g defines the total recording time. $t_g = t_s + t_p$

In the **storage time** t_s the measured values will be recorded. The storage time is given by the user before recording ("DURATION").

The **pre-trigger time** t_p is the storage time **before** the measurement is initiated. The signal curve **prior to** the timer signal will be recorded by the pre-trigger.

3.3.1 Automatic Slope Trigger Recording

This example shows the edge-triggered pressure / flow measurement. Input I1 measures the pressure, input I3 measures the flow. By automatic triggering the measurement of input I1 will be started. In this example the initiating flank is increasing, the threshold is 50 bar and the measured values are recorded for 10 seconds.

By pressing the "RECORD" key the menu "RECORD" is shown on the display.



Press RECORD-key

```
ESC - RECORD -- t u
MESS: 1 PRGM
REST= 16%
TEXT> MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```

Settings :

Names (with a maximum of 15 characters) for the measurements can be given by the menu item "TEXT".



Select menu item "TEXT"

```
ESC - RECORD -- t u
MESS: 1 PRGM
REST= 16%
TEXT> MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```



Confirm

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCD
In2: ABCD
In3: ABCD
In4: ABCD
In5:
In6:
```



Select line

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCD
In2: ABCD
In3: ABCD
In4: ABCD
In5:
In6:
```



Confirm

The further text input is described in chapter 2.2.8.

The start / stop parameters of the automatic recording are set up under the menu item "PRGM REC".



Select menu item "PRGM REC"

ESC - RECORD	-- t u
MESS: 1	PRGM
REST=	16%
TEXT>	ABCDE
START/STOP>	
PRGM REC>	
RECORD>	
CLEAR:	ALL



Confirm menu item "PRGM REC"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO

The menu item "START REC" defines the start parameter. When using the edge - triggered recording mode, the function value has to be set to "AUTO".



Select menu item "START REC"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm with "ENTER"



Select function value "AUTO"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

The menu item "DURATION" defines the recording time.



Select menu item "DURATION"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm with "ENTER"



Select "10 s" as measurement time

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

"PRE TRIGGER" is the storage time **before** the measurement is initiated.



Select menu item "PRE TRIGGER"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm menu item "PRE TRIGGER"



Select function value
"0,5 s"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	I3
LEVEL:	5
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

With menu item "In" you can choose the measurement channel, which initiates the storage when the defined settings are met (trigger channel).



Select menu item "In"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm menu item "In"



Select function value
"1"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	I1
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO

Start Slope indicates / determines whether the measured value recording is initiated during increase or decrease of values.



Confirm function value

LEVEL defines the threshold value. When reaching the threshold the recording will be initiated.



Select menu item
"LEVEL:"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	II
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm menu item "LEVEL/bar"



Select function value
"50 bar"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	II
LEVEL:	50 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

The "START SLOPE:" determines whether the measured value recording is initiated during increase or decrease of values.



Select menu item
"START SLOPE"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	II
LEVEL:	50
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

If "AUTO READY" is switched on, recording is repeated automatically. When **all** start criteria are complied, the recording starts again. The measurement will not continue when memory is full or if the "STOP / ESC" key is used.



Select menu item
"AUTO READY"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	II
LEVEL:	50
START SLOPE:	RISING
AUTO READY:	NO



Confirm menu item "AUTO READY"



Select function value
"YES"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	10 s
PRE TRIGGER:	0.5 s
In >	II
LEVEL:	50
START SLOPE:	RISING
AUTO READY:	YES



Confirm function value

"STOP/ESC" key finishes the setting and exits the menu.



Return to menu
"RECORD"

ESC - RECORD	-- t u
MESS: 1	PRGM
REST=	16%
TEXT>	ABCDE
START/STOP>	
PRGM .REC>	
RECORD>	
CLEAR:	ALL

Recording:

Menu "RECORD" starts the recording mode.



Select menu item
"RECORD"

ESC - RECORD	-- t u
MESS: 1	PRGM
REST=	16%
TEXT>	ABCDE
START/STOP>	
PRGM .REC>	
RECORD>	
CLEAR:	ALL



Confirm menu item
"RECORD"

MEAS:7	READY>	START >	
1	223,6	10	bar
2			bar
3	77.5	0	RPM
4			RPM
5			l/min
6			bar
P			kW

"STOP / ESC" key stops the recording mode. Then "RECORD" is displayed.

With the "MIN/MAX ACTUAL / RESET" key the different readings to display can be selected.

By pressing the "I1-I2 / I1=I2" key the difference between I1 and I2 is displayed.

The calculated read out will be recorded as reading I2.

Pressing "START / ENTER" key and "RECORD" key, respectively, starts the recording.



Start recording

MEAS:1	READY>		
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

The HPM Data Logger is in the stand-by mode.

The recording starts when all previously programmed settings are met.

By pressing the “STOP/ESC” key the measurement can be stopped prematurely. Nevertheless, the recorded measured values can be saved. If the measurement is terminated after the measurement time has expired with the menu item “AUTO READY” switched off, the same menu is displayed.



Stop current recording

```
-- RECORD --
RECORD END
MEAS:1 SAVE ?

ENTER =YES
ESC   = NO
```



Select function value (YES,NO).

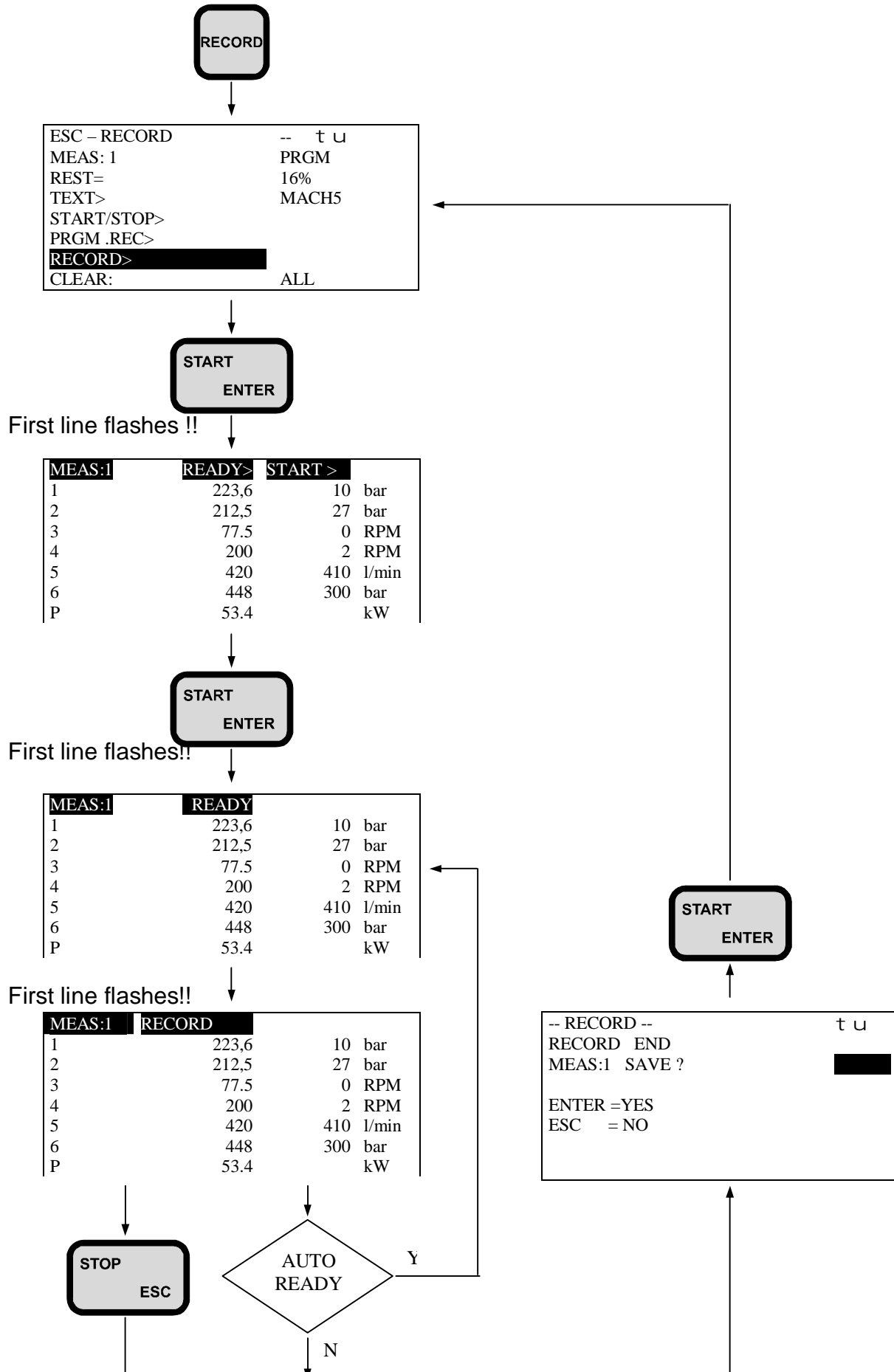


Confirm function value

The menu “RECORD” is displayed.

```
ESC - RECORD  --  t u
MESS: 1      PRGM
REST=       16%
TEXT>       ABCDE
START/STOP>
PRGM.REC>
RECORD>
CLEAR:      ALL
```

If “AUTO READY” is switched on, recording is repeated automatically. When **all** start conditions are met the recording starts again. The measurement will be concluded when memory is full or if the “STOP / ESC” key is used.



3.3.2 External Trigger Recording

The **trigger adapter** is needed for the externally triggered recording. Please note that the electrical connection is a floating output type, for example by connecting to a relay or a galvanic separated element.

Please pay attention to the instructions.

This example describes an externally triggered differential pressure measurement. The pressure is measured on input I1 and I2 , Before and after the valve. The measurement is initiated by an external signal (open valve). For 10 seconds the measured values will be recorded.

By pressing the “RECORD” key the menu “RECORD” is shown on the display.



Press RECORD-key

```

ESC - RECORD    --  t u
MESS: 1         PRGM
REST=           16%
TEXT>          MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR:         ALL
    
```

Settings :

Names (with a maximum of 15 characters) for the measurement can be entered by the menu item “TEXT”.



Select menu item
“TEXT”

```

ESC - RECORD    --  t u
MEAS: 1         PRGM
REST=           16%
TEXT>          MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR:         ALL
    
```



Confirm menu item
"TEXT"

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3:
In4:
In5:
In6:
```



Select line

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3:
In4:
In5:
In6:
```



Confirm with "ENTER"

The text input is described in chapter 2.2.8.

Menu item "PRGM REC" defines the start conditions for the software-driven measurements.



Select menu item
"PRGM REC"

```
ESC - RECORD -- t u
MEAS: 1 PRGM
REST= 16%
TEXT> ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```



Confirm menu item
"PRGM REC"

```
ESC -PRGM REC- t u
START REC: AUTO
DURATION: 1 s
PRE TRIGGER: 0.1 s
In > I3
LEVEL: 5
START SLOPE: FALLING
AUTO READY: NO
```

The menu item “START REC” selects the memory procedure. For the external initiated recording the function value “EXTERN” has to be chosen.



Select menu item
“START REC”

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5
START SLOPE:	FALLING
AUTO READY:	NO



Confirm with “ENTER”



Select function value
“EXTERN”

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

Menu item “DURATION” defines the period of the data recording.



Select menu item
“DURATION”

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	1 s
PRE TRIGGER:	0.1 s
START SLOPE:	CLOSING
AUTO READY:	NO



Confirm menu item "ENTER"



Select "10 s" for measurement time

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	10 s
PRE TRIGGER:	0.1 s
START SLOPE:	CLOSING
AUTO READY:	NO



Confirm function value

"PRE TRIGGER" is the storage time of the measurement values **before** the actual measurement is initiated.



Select menu item "PRE TRIGGER"

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	10 s
PRE TRIGGER:	0.1 s
START SLOPE:	CLOSING
AUTO READY:	NO



Confirm menu item "PRE TRIGGER"



Select function value "0,5 s"

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	10 s
PRE TRIGGER:	0.5 s
START SLOPE:	CLOSING
AUTO READY:	NO



Confirm function value

“START SLOPE” defines whether the recording is initiated by opening or closing valve.



Select menu item
“START SLOPE”

ESC	-PRGM REC-	t u
START REC:		EXTERN
DURATION:		10 s
PRE TRIGGER:		0.5 s
START SLOPE:		CLOSING
AUTO READY:		NO



Confirm menu item “START SLOPE”



Select function value
“OPEN”.

ESC	-PRGM REC-	t u
START REC:		EXTERN
DURATION:		10 s
PRE TRIGGER:		0.5 s
START SLOPE:		OPEN
AUTO READY:		NO



Confirm function value

If “AUTO READY” is switched on, recording is repeated automatically. When **all** start parameters are met, the recording starts again. The measurement will not continue when memory is full or if the “STOP / ESC” key is used.



Select menu item
"AUTO READY"

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	10 s
PRE TRIGGER:	0.5 s
START SLOPE:	OPEN
AUTO READY:	NO



Confirm menu item "AUTO READY"



Select function value
"YES"

ESC -PRGM REC-	t u
START REC:	EXTERN
DURATION:	10 s
PRE TRIGGER:	0.5 s
START SLOPE:	OPEN
AUTO READY:	YES



Confirm function value

“STOP/ESC” key finishes the setting and exits the menu.



Return to menu
“RECORD”

```
ESC - RECORD -- t u
MESS: 1 PRGM
REST= 16%
TEXT> ██████████ ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```

Recording:

Menu item “RECORD” starts the recording mode.



Select menu item
“RECORD”

```
ESC - RECORD -- t u
MEAS: 1 PRGM
REST= 16%
TEXT> ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```



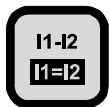
Confirm menu item
“RECORD”

```
MEAS:1 READY> START >
1 223,6 10 bar
2 bar
3 77.5 0 RPM
4 RPM
5 l/min
6 bar
P kW
```

“STOP / ESC” key stops the recording mode. The menu “RECORD” is displayed.

With the “MIN/MAX ACTUAL / RESET” key, different presentations of the measured values can be chosen on the display.

By pressing the “I1-I2 / I1=I2” key the differential reading is displayed. The calculated reading is recorded as measurement value I2.



Display and calculate
I1-I2

```
In -ACT- - MIN - t u
1 223,6 10 bar
Δ 212,5 27 bar
3 77.5 0 RPM
4 200 2 RPM
5 420 410 l/min
6 448 300 bar
P 53.4 kW
```

By pressing “START / ENTER” key and “RECORD” key, respectively, the recording is started.



Start recording
First line flashes !!

MEAS:1	READY		
1	223,6	10	bar
Δ	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

The measurement instrument is in the stand-by mode. The instrument starts the recording when the previously programmed setting (external signal → valve opens) is met.

By pressing the “STOP/ESC” key the measurement can be stopped prematurely. Nevertheless the recorded measured values can be saved. If the measurement is terminated after the measurement time has expired with the menu item “AUTO READY” switched off, the same menu is displayed.



Stop current measurement

```

-- RECORD --           t u
RECORD END
MEAS:1 SAVE ?
ENTER =YES
ESC   =NO
    
```



Select function value (YES, NO).



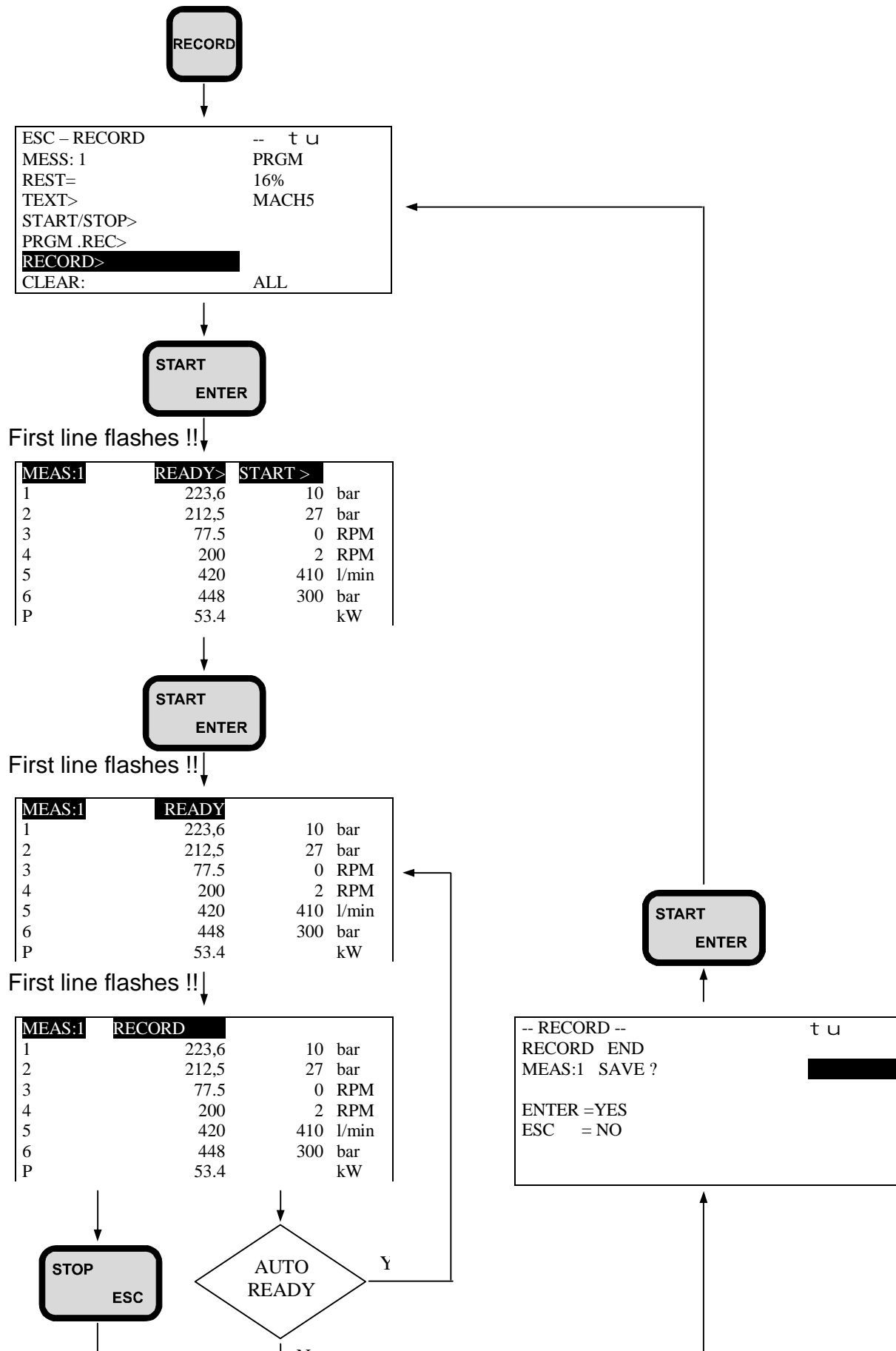
Confirm function value

The menu “RECORD” is displayed.

```

ESC - RECORD -- t u
MESS: 1      PRGM
REST=       16%
TEXT>      ABCDE
START/STOP>
PRGM.REC>
RECORD>
CLEAR:      ALL
    
```

If “AUTO READY” is switched on, recording is repeated automatically. The measurement will not continue when memory is full or if the “STOP / ESC” key is used.



3.3.3 Manual Trigger / Timer Recording

This example describes a manual and time controlled recording. The user starts the measurement with the “**START / ENTER**” key. After 10 seconds the measurement will be stopped automatically.

By pressing the “**RECORD**” key the menu “**RECORD**” is shown on the display.



Press RECORD key

```
ESC - RECORD -- t u
MESS: 1 PRGM
REST= 16%
TEXT> MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```

Settings :

Names (with a maximum of 15 characters) for the measurement can be given by the menu item “**TEXT**”.



Select menu item “**TEXT**”

```
ESC - RECORD -- t u
MESS: 1 PRGM
REST= 16%
TEXT> MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```



Confirm menu item “**TEXT**”

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3: ABCDE
In4: ABCDE
In5:
In6:
```



Choose line

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3: ABCDE
In4: ABCDE
In5:
In6:
```



Confirm with “**ENTER**”

The text input is described in chapter 2.2.8.

Menu item "PRGM REC" defines the start condition for the automatic measurement.



Select menu item
"PRGM REC"

ESC - RECORD	-- t u
MESS: 1	PRGM
REST=	16%
TEXT>	ABCDE
START/STOP>	
PRGM REC>	
RECORD>	
CLEAR:	ALL



Confirm menu item
"PRGM REC"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE	FALLING
AUTO READY:	NO

The menu item "START REC" selects the memory procedure. For the edge triggered recording the function value "MANU" has to be chosen.



Select menu item
"START REC"

ESC -PRGM REC-	t u
START REC:	AUTO
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE	FALLING
AUTO READY:	NO



Confirm with "ENTER"



Select function value
"MANU"

ESC -PRGM REC-	t u
START REC:	MANU
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE	FALLING
AUTO READY:	NO



Confirm function value

Menu item "DURATION" sets the period of the data recording.



Select menu item
"DURATION"

ESC	-PRGM REC-	t u
START REC:		MANU
DURATION:		1 s
PRE TRIGGER:		0.1 s



Confirm with "ENTER"



Select measurement
time "10 s"

ESC	-PRGM REC-	t u
START REC:		MANU
DURATION:		10 s
PRE TRIGGER:		0.1 s



Confirm function value

“PRE TRIGGER” defines the storage time **before** the measurement is initiated.



Select menu item
“PRE TRIGGER”

```
ESC -PRGM REC-   t u
START REC:      MANU
DURATION:       10 s
PRE TRIGGER:    0.1 s
```



Confirm menu item “PRE TRIGGER”



Select function value
“0,5 s”

```
ESC -PRGM REC-   t u
START REC:      MANU
DURATION:       10 s
PRE TRIGGER:    0.5 s
```



Confirm function value

„STOP/ESC”-key finishes the setting and exits the menu.



Return to menu
“RECORD”

```
ESC - RECORD    -- t u
MESS: 1        PRGM
REST=         16%
TEXT>         ABCDE
START/STOP>
PRGM.REC>
RECORD>
CLEAR:        ALL
```



Select menu item
“RECORD”

```
ESC - RECORD    -- t u
MESS: 1        PRGM
REST=         16%
TEXT>         ABCDE
START/STOP>
PRGM.REC>
RECORD>
CLEAR:        ALL
```

Recording :

Menu item "RECORD" starts the recording.



Confirm menu item
"RECORD"
First line flashes !

MEAS:7	READY>	START >	
1	223,6	10	bar
2			bar
3	77.5	0	RPM
4			RPM
5			l/min
6			bar
P			kW

"STOP / ESC" key stops the manual recording mode. On the display the menu "RECORD" is shown.

With the "MIN/MAX ACTUAL / RESET" key the different presentations of the measured values can be chosen on the display. If the key is pressed longer than 4 seconds the MIN and MAX values will be deleted (see chapter 2.2.2).

By pressing the "I1-I2 / I1=I2" key the difference between I1 and I2 is shown in the second line of the display. The calculated value is recorded as measurement value I2.

Pressing "START / ENTER" key and "RECORD" key, respectively, starts the recording.



Start recording
First line flashes !

MEAS:1	READY>		
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

The measurement instrument is in the stand-by mode. After pressing the "START / ENTER" key once again the measured values will be recorded.



Recording measured
values

MEAS:1	RECORD>		
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

By pressing the “STOP/ESC” key the measurement can be stopped prematurely. Nevertheless the recorded measured values can be saved. If the measurement is terminated after the measurement time has expired, the same menu is displayed.



Stop current measurement

```

-- RECORD --           t u
RECORD END
MEAS:1 SAVE ?
ENTER =YES
ESC   =NO
    
```



Select function value (YES,NO).



Confirm function value

The menu “RECORD” is displayed.

```

ESC - RECORD  -- t u
MEAS: 1      PRGM
REST=       16%
██████████  ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR:      ALL
    
```

RECORD

```

ESC - RECORD      -- t u
MESS: 1           PRGM
REST=            16%
TEXT>            MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR:           ALL
  
```

START
ENTER

First line flashes!!

```

MEAS:1  READY>  START
1        223,6   10 bar
2        212,5   27 bar
3         77.5    0 RPM
4         200     2 RPM
5         420    410 l/min
6         448    300 bar
P         53.4    kW
  
```

START
ENTER

First line flashes !!

```

MEAS:1  READY>
1        223,6   10 bar
2        212,5   27 bar
3         77.5    0 RPM
4         200     2 RPM
5         420    410 l/min
6         448    300 bar
P         53.4    kW
  
```

START
ENTER

First line flashes !!

```

MEAS:1  RECORD>
1        223,6   10 bar
2        212,5   27 bar
3         77.5    0 RPM
4         200     2 RPM
5         420    410 l/min
6         448    300 bar
P         53.4    kW
  
```

START
ENTER

```

-- RECORD --      t u
RECORD END
MEAS:1 SAVE ?
ENTER =YES
ESC   =NO
  
```

3.3.4 Clock Based Recording

This example shows a date recording. The recording operation is similar to programming a VCR. The recording starts when the timer reaches the user given starting hour. After 10 seconds the measurement will be stopped automatically.

After pressing the “RECORD” key the menu “RECORD” is displayed.



Press RECORD key

```
ESC - RECORD -- t u
MESS: 1      PRGM
REST=       16%
TEXT>       MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR:      ALL
```

Settings :

Names (with a maximum of 15 characters) for the measurement can be adjusted by the menu item “TEXT”.



Select menu item
“TEXT”

```
ESC - RECORD -- t u
MESS: 1      PRGM
REST=       16%
TEXT>       MACH5
START/STOP>
PRGM .REC>
RECORD>
CLEAR:      ALL
```



Confirm menu item
“TEXT”

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3: ABCDE
In4: ABCDE
In5:
In6:
```



Select line

```
ESC -- TEXT -- t u
MEAS: MACH5
In1: ABCDE
In2: ABCDE
In3: ABCDE
In4: ABCDE
In5:
In6:
```



Confirm with "ENTER"

Further text input is described in chapter 2.2.8.

Menu item "PRGM REC" defines the start conditions for the automatic measurement.



Select menu item "PRGM REC"

```
ESC - RECORD -- t u
MEAS: 1 PRGM
REST= 16%
TEXT> ABCDE
START/STOP>
PRGM REC>
RECORD>
CLEAR: ALL
```



Confirm menu item "PRGM REC"

```
ESC -PRGM REC- t u
START REC: AUTO
DURATION: 1 s
PRE TRIGGER: 0.1 s
In > I3
LEVEL: 5 bar
START SLOPE: FALLING
AUTO READY: NO
```

The menu item "START REC" selects the memory procedure. For the timer recording the function value "CLOCK" has to be defined.



Select menu item "START REC"

```
ESC -PRGM REC- t u
START REC: AUTO
DURATION: 1 s
PRE TRIGGER: 0.1 s
In > I3
LEVEL: 5 bar
START SLOPE: FALLING
AUTO READY: NO
```



Confirm with "ENTER"



Select function value
"CLOCK"

ESC -PRGM REC-	t u
START REC:	CLOCK
DURATION:	1 s
PRE TRIGGER:	0.1 s
In >	I3
LEVEL:	5 bar
START SLOPE:	FALLING
AUTO READY:	NO



Confirm function value

Menu item "DURATION" sets the period of the data recording.



Select menu item
"DURATION"

ESC -PRGM REC-	t u
START REC:	CLOCK
TIME	23:58
DURATION	10 s



Confirm with "ENTER"



Set Recording time
"30 s"

ESC -PRGM REC-	t u
START REC:	CLOCK
TIME	23:58
DURATION	30 s



Select function value

The menu item "TIME" sets the starting hour and minute for data recording.



Select menu item
"TIME"

```
ESC -PRGM REC- t u
START REC: CLOCK
TIME 23:58
DURATION 10 s
```



Confirm with "ENTER"



Set starting time

```
ESC -PRGM REC- t u
START REC: CLOCK
TIME 17:00
DURATION 30 s
```



Confirm function value

```
ESC SET STARTING TIME
HOUR : 23
MINUTE : 55
```

"STOP/ESC" key finishes the setting and exits the menu.



Return to menu
"RECORD"

```
ESC - RECORD -- t u
MEAS: 1 PRGM
REST= 16%
TEXT> ABCDE
START/STOP>
PRGM .REC>
RECORD>
CLEAR: ALL
```

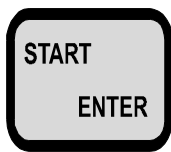
Recording :

Menu item "RECORD" starts the recording mode.



Select menu item
"RECORD"

ESC - RECORD	-- t u
MESS: 1	PRGM
REST=	16%
TEXT>	ABCDE
START/STOP>	
PRGM .REC>	
RECORD>	
CLEAR:	ALL



Confirm menu item
"RECORD"
First line flashes !

MEAS:7	READY>	START	
1	223,6	10	bar
2			bar
3	77.5	0	RPM
4			RPM
5			l/min
6			bar
P			kW

"STOP / ESC" key stops the recording mode. On the display the menu "RECORD" is shown.

With the "MIN/MAX ACTUAL / RESET" key the different presentations of the measured values can be chosen on the display. If the key is pressed longer than 4 seconds the MIN and MAX values will be deleted (see chapter 2.2.2).

By pressing the "I1-I2 / I1=I2" key the difference between I1 and I2 is shown in the second line of the display. The calculated value is recorded as measurement value I2.

Pressing "START / ENTER" key and "RECORD" key, respectively starts the recording.



Start recording
First line flashes !

MEAS:1	READY>		
1	223,6	10	bar
2	212,5	27	bar
3	77.5	0	RPM
4	200	2	RPM
5	420	410	l/min
6	448	300	bar
P	53.4		kW

The measurement instrument is in the stand-by mode. The instrument starts the recording when the previously programmed setting (starting time) is met.

By pressing the “STOP/ESC” key the measurement can be stopped prematurely. Nevertheless the recorded measured values can be saved. If the measurement is terminated after the measurement time has expired, the same menu is displayed.



Stop current measurement

```

-- RECORD --           t u
RECORD END
MEAS:1 SAVE ?
ENTER =YES
ESC   =NO
    
```



Select function value (YES, NO).

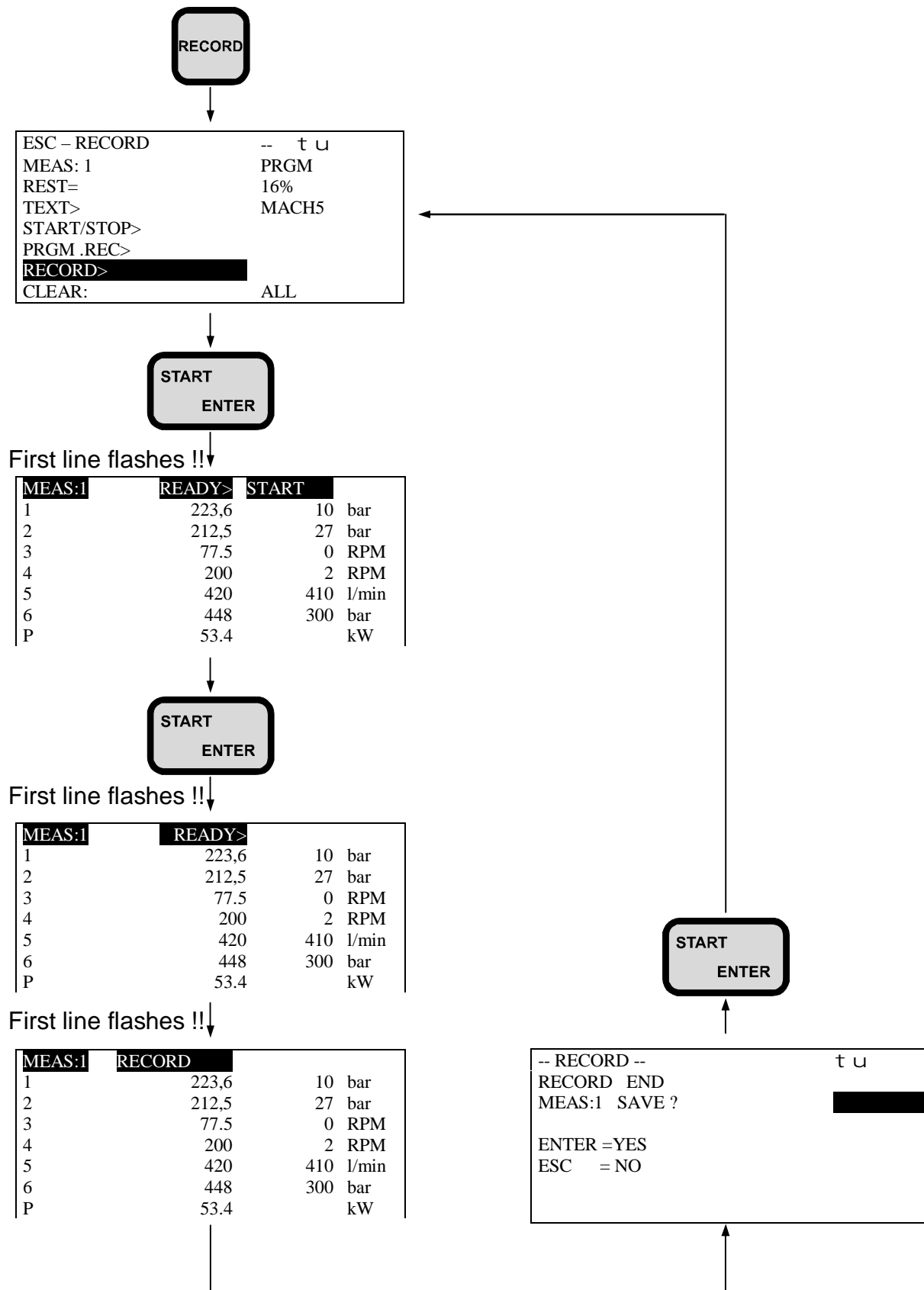


Confirm function value

The menu “RECORD” is shown on display.

```

ESC - RECORD  -- t u
MESS: 1      PRGM
REST=       16%
            ABCDE
START/STOP>
PRGM.REC>
RECORD>
CLEAR:      ALL
    
```



3.4 Print Out Graphs - Data Output to Printer

Recorded tests can be print out to the available portable printers.

When using the portable printer it is not necessary to change the baud rate. The setting will be done automatically by the HPM Data Logger.

Online data transfer can be started by pressing the “**DATA OUTPUT**” key. The menu “DATA OUT” will be displayed.



Press “DATA OUTPUT” key

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL=     STOP
```

“DATA FROM” defines whether the transferred data are taken from the memory or directly from the actual measured values (online).



Select menu item “DATA FROM”

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL=     STOP
```



Confirm menu item “DATA FROM”



Select function value “MEMORY”

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```



Confirm change

“OUTPUT TO” selects the output device:
(PC, PRINTER, DISPLAY).



Select menu item
“OUTPUT TO”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 12
In >
DISPL. TYPE: MIN-MAX
FORMAT: NORMAL
START
```



Confirm menu item “OUTPUT TO”



Select function value
“PRINTER”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PRINTER
MEASUREMENT: 12
In >
DISPL. TYPE: MIN-MAX
FORMAT: NORMAL
START
```



Confirm change

“MEASUREMENT” selects the desired individual measurement taken from the memory.



Select menu item
“MEASUREMENT”

```

ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    PRINTER
MEASUREMENT: 12
In >
DISPL. TYPE:  MIN-MAX
FORMAT:       NORMAL
START
    
```



Confirm menu item “MEASUREMENT”



Select “1”

```

ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    PRINTER
MEASUREMENT: 1
In >
DISPL. TYPE:  MIN-MAX
FORMAT:       NORMAL
START
    
```



Confirm change

“In” defines the output channels :

**PRINTER
DISPLAY**

**in one print 6 graphs
one graph / scroll function**



Select menu item “In”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PRINTER
MEASUREMENT: 1
In >
DISPL. TYPE: MIN-MAX
FORMAT: NORMAL
START
```



Confirm menu item “In”

```
In -INPUT SELECTION-
1
2
3
4
5
6
```



Select channel “3”

```
In -INPUT SELECTION-
1
2
3
4
5
6
```



Confirm channel “3”

```
In -INPUT SELECTION-
1
2
3 *
4
5
6
```



Select channel “4”

```
In -INPUT SELECTION-
1
2
3
4 *
5
6
```



Confirm menu item "In"

```
In      -INPUT SELECTION-
1
2
3      *
4      *
5
6
```



Stop selection

```
ESC  -- DATA OUT -- t u
DATA FROM:      MEMORY
OUTPUT TO:      PRINTER
MEASUREMENT:    1
In >
DISPL. TYPE:    MIN-MAX
FORMAT:         NORMAL
START
```

"DISPL. TYPE" selects the output of the curves. The function value "MIN-MAX" results in "MIN" and "MAX" curves from every channel. The function value "MEAN" calculates the average curve from the "MIN" and "MAX" curve and prints only this curve.



Select menu item "DISPL. TYPE"

```
ESC  -- DATA OUT -- t u
DATA FROM:      MEMORY
OUTPUT TO:      PRINTER
MEASUREMENT:    1
In >
DISPL. TYPE:    MIN-MAX
FORMAT:         NORMAL
START
```



Confirm menu item "DISPL. TYPE"



Select function value
"MEAN"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PRINTER
MEASUREMENT:  1
In >      3 4
DISPL. TYPE:  MEAN
FORMAT:     NORMAL
START
```



Confirm change

"FORMAT" selects the output format of the curves. With the function value "ZOOM" the curves are enlarged 3 times on the x-axis (3 fold length of the printout).



Select menu item
"FORMAT"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PRINTER
MEASUREMENT:  1
In >      3 4
DISPL. TYPE:  MEAN
FORMAT:     NORMAL
START
```



Confirm menu item "FORMAT"



Select function value
"ZOOM"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PRINTER
MEASUREMENT:  1
In >      3 4
DISPL. TYPE:  MEAN
FORMAT:     ZOOM
START
```



Confirm change

“START” starts the data transfer.



Select menu item
“START”

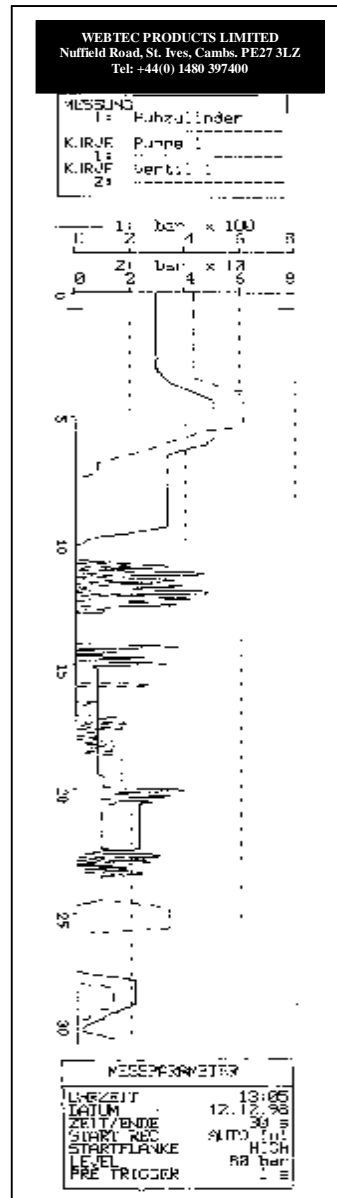
```

ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PRINTER
MEASUREMENT: 1
In > 3 4
DISPL. TYPE: MEAN
FORMAT: ZOOM
START
    
```



Start transfer

In	- ACT	t u
█	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW



3.4.1 Print Outs with Portable Colour printer kit (FT9273)

Colour print outs can be done with the printer kit (FT9273). This unit enables a coloured print out up to six channels simultaneously. Please follow the instructions delivered with the portable printer kit.

Please pay attention to chapter 2.8 in the operating instructions and select "PRINTER"

When using a Hewlett Packard Deskjet 340 select HPDJ340.

Please follow the same procedure as shown in previous chapter.
Select DataOutput to PRINTER.

3.4.2 DataOutput to Display (Graph)

The data output from the memory to the graphic display can be started by pressing the “**DATA OUTPUT**” key. The menu “**DATA OUT**” will be displayed.



Press “**DATA OUTPUT**” key

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```

“**DATA FROM**” shows the data source (MEMORY = measured value memory or ONLINE = actual measured value).



Select menu item “**DATA FROM**”

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```



Confirm menu item “**DATA FROM**”



Select function value “**MEMORY**”

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PC
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```



Confirm change

Menu item "OUTPUT TO" selects the output instrument (PC, A4, PRINTER, DISPLAY).



Select menu item "OUTPUT TO"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PC
MEASUREMENT:  12
In >
DISPL. TYPE:  MEAN
FORMAT:      NORMAL
START
```



Confirm menu item "OUTPUT TO"



Select function value "DISPLAY"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  DISPLAY
MEASUREMENT:  12
In >
DISPL. TYPE:  MEAN
FORMAT:      NORMAL
START
```



Confirm change

"MEASUREMENT" selects the desired individual measurement from the memory.



Select menu item "MEASUREMENT"

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  DISPLAY
MEASUREMENT:  12
In >
DISPL. TYPE:  MEAN
FORMAT:      NORMAL
START
```



Confirm menu item "MEASUREMENT"



Select "1"

```
ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    DISPLAY
MEASUREMENT:  1
In >
DISPL. TYPE:  MEAN
FORMAT:       NORMAL
START
```



Confirm change

Menu item "In" selects the output channels. The graphic display can only show one curve at the same time.



Select menu item "In"

```
ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    DISPLAY
MEASUREMENT:  1
In >
DISPL. TYPE:  MEAN
FORMAT:       NORMAL
START
```



Confirm menu item "In"

```
In  -INPUT SELECTION-
1
2
3
4
5
6
```



Select channel "3"

```
In      -INPUT SELECTION-
1
2
3
4
5
6
```



Confirm channel "3"

```
In      -INPUT SELECTION-
1
2
3 *
4
5
6
```



Stop selection

```
ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    DISPLAY
MEASUREMENT:  1
In >         3
DISPL. TYPE:  MEAN
FORMAT:       NORMAL
START
```

"START" starts the output on the display.



Select menu item "START"

```
ESC  -- DATA OUT -- t u
DATA FROM:    MEMORY
OUTPUT TO:    DISPLAY
MEASUREMENT:  1
In >         3 4
DISPL. TYPE:  MEAN
FORMAT:       NORMAL
START
```



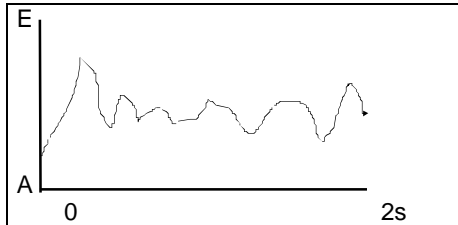
Start output on display

```
ESC          GRAFIC
            PARAMETER
GRAFIC      GRAPHIC START>
MEASUREMENT:  5
In >         3
END :        600 bar
START:       0 bar
TIME FROM :  0 s
```

Before output on the display, the parameter of the graphic must be described.



Show graphic



By pressing “**STOP / ESC**” key the menu “DATA OUT” is shown on display.

3.4.3 Data Output to PC / Laptop (Recordings)

For a correct data transfer the baud rate for the PC to the HPM Data Logger has to be adjusted (see chapter 4.2.6). This adjustment can be done by an interface test when using Webtec software (see chapter 4.2.7).

When pressing the **“DATA OUTPUT”** key the memory output will be activated. The menu **“DATA OUT”** is displayed.



Press **“DATA OUTPUT”** key

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PRINTER
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```

“DATA FROM” shows the data source (MEMORY = measured value memory or ONLINE = actual measured value).



Select menu item **“DATA FROM”**

```
ESC  -- DATA OUT -- t u
DATA FROM:  ONLINE
OUTPUT TO:  PRINTER
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```



Confirm menu item **“DATA FROM”**



Select function value **“MEMORY”**

```
ESC  -- DATA OUT -- t u
DATA FROM:  MEMORY
OUTPUT TO:  PRINTER
TRANSF.RATE:  5
PRINT/PC    START
CANCEL =     STOP
```



Confirm change

“OUTPUT TO” selects the output device



Select menu item
“OUTPUT TO”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PRINTER
MEASUREMENT: 12
In >
DISPL. TYPE: MIN-MAX
FORMAT: NORMAL
START
```



Confirm menu item “OUTPUT TO”



Select function value
“PC”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 12
In >
DISPL. TYPE: MIN-MAX
FORMAT: NORMAL
START
```



Confirm change

“MEASUREMENT” selects the desired individual measurement from the memory.



Select menu item
“MEASUREMENT”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 12
In >
START
```



Confirm menu item “MEASUREMENT”



Select measurement
“1”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 1
In >
START
```



Confirm change

Menu item "In" defines the output channels. By using a PC a maximum of 6 channels can be employed.



Select menu item "In"

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 1
In >
START
```



Confirm menu item "In"

```
In -INPUT SELECTION-
█
2
3
4
5
6
```



Select channel "2"

```
In -INPUT SELECTION-
1
2 █
3
4
5
6
```



Confirm channel "2"

```
In -INPUT SELECTION-
1
2 █ *
```



Select channel "3"

```
In -INPUT SELECTION-
1
2
3 █ *
```



Confirm channel "3"

```
In -INPUT SELECTION-
1
2
3 █ *
```



Stop selection

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 1
In > 2 3
START
```

“START” starts the data transfer.



Select menu item
“START”

```
ESC -- DATA OUT -- t u
DATA FROM: MEMORY
OUTPUT TO: PC
MEASUREMENT: 1
In > 2 3
START
```



Start transfer

DATA TRANSFER
PLEASE WAIT

CANCEL = STOP

After the data transfer the display shows the actual measured values.

In	- ACT	t u
	-	
	223,6	bar
2	212,5	bar
3	77.5	RPM
4	200	RPM
5	420	l/min
6	448	bar
P	53.4	kW

4. Instrument configuration

Instrument configuration can be changed by pressing the “**SETUP / OPTION**” key. The menu “SETUP” is shown on the display. It is possible to set and change contrast (see chapter 4.1), auxiliary sensors (see chapter 2.4), calculations in the optional line (see chapter 2.2.6), recording, instrument and system settings, as well as rechargeable battery service.



Press “SETUP /
OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT. SERVICE>
SYSTEM SETUP>
```

4.1 Contrast

Menu item “**CONTRAST**” chooses the brightness of the display.



Press “SETUP / OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %              50
AUX. SENSOR>
COMBINATION>
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item “CONTRAST”

```
ESC -- SETUP --          t u
CONTRAST                50
AUX. SENSOR>
COMBINATION>
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item “CONTRAST”



Change function value 0 - 100, in increments of 5

```
ESC -- SETUP --          t u
CONTRAST %              50
AUX. SENSOR>
COMBINATION>
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm change

4.2 Instrument settings

Menu item “**DEVICE SETUP**” defines the automatic instrument shut-off, language, units, time, output instrument for data output and the baud rate. In addition, a RS 232 interface test is also possible.



Press “SETUP / OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item “DEVICE SETUP”

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION>
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item “DEVICE SETUP”

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:      YES
LANGUAGE:                ENGLISH
UNIT>
SET CLOCK>
OUTPUT TO:               PC
BAUD RATE >
RS232 TEST                START
```

4.2.1 Automatic instrument shut-off

The “**AUTO POWER OFF**” function shuts the instrument off automatically when it is not used. The function is active, when “YES” is selected as function value.



Select menu item
“AUTO POWER OFF”

ESC -DEVICE SETUP-	t u
AUTO POWER OFF:	YES
LANGUAGE:	ENGLISH
UNITS>	
SET CLOCK>	
OUTPUT TO:	PC
BAUD RATE >	
RS232 TEST	START



Confirm menu item “AUTO POWER OFF”



Confirm function value
(YES/NO)

ESC -DEVICE SETUP-	t u
AUTO POWER OFF:	YES
LANGUAGE:	ENGLISH
UNITS>	
SET CLOCK>	
OUTPUT TO:	PC
BAUD RATE >	
RS232 TEST	START



Confirm change

4.2.2 Language

It is possible to choose between the languages German, English and French (Deutsch, English, Francais).



Select menu item
"LANGUAGE"

ESC -DEVICE SETUP-	t u
AUTO POWER OFF:	YES
LANGUAGE:	ENGLISH
UNITS>	
SET CLOCK>	
OUTPUT TO:	PC
BAUD RATE >	
RS232 TEST	START



Confirm menu item „LANGUAGE”



Change function value

ESC -DEVICE SETUP-	t u
AUTO POWER OFF:	YES
LANGUAGE:	ENGLISH
UNITS>	
SET CLOCK>	
OUTPUT TO:	PC
BAUD RATE >	
RS232 TEST	START



Confirm change

The instrument switches to the selected language immediately.

4.2.3 Units

The following units can be chosen under the menu item “UNITS” :

- Pressure** : bar, PSI
- Temperature** : °C, °F
- Flow rate** : l/min, GPM
- Rotational speed** : RPM, U/min



Select menu item
“UNITS”

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:                ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:              PC
BAUD RATE >
RS232 TEST              START
```



Confirm menu item
“UNITS”

```
ESC -- UNITS --        t u
DRUCK:                 bar
TEMPERATURE:           °C
FLOW:                  l/min
ROTAT.SPD:             RPM
```



Select menu item “PRESSURE, TEMPERATURE, FLOW or
ROTATIONAL SPD”



Confirm menu item



Select function value

```
ESC -- UNITS --        t u
PRESSURE:              bar
TEMPERATURE:           °C
FLOW:                  l/min
ROTAT.SPD:             U/min
```



Confirm change

4.2.4 Date and time

Time and date can be set by the menu item "SET CLOCK".



Select menu item "SET CLOCK"

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:               ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:              PC
BAUD RATE >
RS232 TEST
```



Confirm menu item "SET CLOCK"

```
ESC - SET CLOCK - t u
HOUR:                   23
MINUTE:                 59
SECONDS:                59
DAY:                    31
MONTH:                  12
YEAR:                   98
```

With the **arrow keys** the menu item can be changed within the menu. The menu item is selected by pressing the "**START / ENTER**" key. The function value can be changed by scrolling with **arrow keys**. The new function value is saved by pressing the "**START / ENTER**" key.

The following function values can be chosen by scrolling (accepted value range):

HOUR	00 to 23
MINUTE	00 to 59
SECOND	00 to 59
DAY	1 to 31
MONTH	1 to 12
YEAR	00 to 99

Example : Set "MINUTE"



Select menu item "MINUTE"

```
ESC - SET CLOCK - t u
HOUR:                   23
MINUTE:                 59
SECOND:                 59
DAY:                    31
MONTH:                  12
YEAR:                   98
```



Confirm menu item "MINUTE"



Select function value
"30"

```
ESC - SET CLOCK - t u
HOUR:                23
MINUTEN:             30
SECONDS:             59
DAY:                 31
MONTH:               12
YEAR:                98
```



Confirm change



Leave menu
"SET CLOCK"

```
ESC -DEVICE SETUP-  t u
AUTO POWER OFF  YES
LANGUAGE:           ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:          PC
BAUD RATE >
RS232 TEST
```

Example : Set "DAY"



Select menu item
"DAY"

```
ESC - SET CLOCK - t u
HOUR:                23
MINUTE:              59
SECOND:              59
DAY:               31
MONTH:               12
YEAR:                98
```



Confirm menu item "DAY"



Select function value
"10"

```
ESC - SET CLOCK - t u
HOUR:                23
MINUTE:              30
SECOND:              59
DAY:                 10
MONTH:               12
YEAR:                98
```



Confirm change



Leave menu
"SET CLOCK"

```
ESC -DEVICE SETUP-  t u
AUTO POWER OFF: YES
LANGUAGE:           ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:          PC
BAUD RATE >
RS232 TEST
```

4.2.5 Data output

The measured values can be transferred to the PC, the optional hand-held printer, as well as the optional printer and A4 printer.



Select menu item
"OUTPUT TO"

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:              ENGLISH
UNITS>
CLOCK: 15:28          23.06.97
OUTPUT TO:             PRINTER
BAUD RATE >
RS232 TEST
```



Confirm menu item "OUTPUT TO"



Change function value

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:              ENGLISH
UNITS>
CLOCK: 15:28          23.06.97
OUTPUT TO:             PC
BAUD RATE >
RS232 TEST
```



Confirm change

4.2.6 Baud rates

When using the PC and A4 printer it is possible to choose between the following baud rates:

1200, 2400, 4800, 9600, 19,200 and 38,400 baud.

When using optional printer the baud rates are set by default to: 2,400 baud



Press "SETUP / OPTION" key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION >
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item "DEVICE SETUP"

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item "DEVICE SETUP"

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:               ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:              PC
BAUD RATE >
RS232 TEST
```



Select menu item "BAUD RATE"

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:               ENGLISH
UNITS>
SET CLOCK
OUTPUT TO:              PC
BAUD RATE >
RS232 TEST
```



Confirm menu item
"BAUD RATE"

```
ESC - BAUD RATE -      t u
BAUD RATE PC:         19200
A4 PRINTER:           2400
```



Select menu item "BAUD RATE PC" or "A4 PRINTER"



Confirm menu item



Change function value



```
ESC - BAUD RATE -      t u
BAUD RATE PC:         19200
A4 PRINTER:           2400
```



Confirm change

4.2.7 Interface test

By the “RS232” test, the PC is adapted to the baud rate of the HPM Data Logger. The PC sends a signal with the smallest baud rate possible and increases it until the HPM Data Logger recognises the signal and then acknowledges the receipt. This test can only be used in connection with Webtec software.



Select menu item
“RS232 TEST”

```
ESC -DEVICE SETUP-      t u
AUTO POWER OFF:        YES
LANGUAGE:               ENGLISH
UNITS>
SET CLOCK>
OUTPUT TO:              PC
BAUD RATE >
RS232 TEST
```



Start test

RS232 TEST : RUNNING

Interface test ended successfully

RS232 TEST : OK

4.3 Battery service

The function “BATT.SERVICE” manages the actual charge rate of the rechargeable battery. If the main power supply is connected, the rechargeable batteries will be recharged. The instrument shuts off automatically when rechargeable batteries are empty. The rechargeable batteries are self-discharging when the function is turned off. If this function is active all keys are locked.

Note :

When charging and recharging the NiCd cells very often, a memory effect can appear. The capacity of the rechargeable battery is decreasing dramatically and leads to shorter operating times. The full capacity can be stored by a complete discharging followed by charging the batteries.



Press “SETUP / OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :            VOLUME I3
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item “BATT. SERVICE”

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :            VOLUME I3
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item “BATT.SERVICE”

```
ESC -- BATT.SERVICE --  t u
AUTO BATTERY
ON CHARGE:                YES
DONT INTERRUPT!
DISCHARGE
```



Change function value (YES/NO).



Confirm change

4.4 System settings

With the menu “SYSTEM SETUP” you can either reset your system or select the memory concept for the next measurement or sets the user identification.



Press “SETUP / OPTION” key

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Select menu item “SYSTEM SETUP”

```
ESC -- SETUP --          t u
CONTRAST %                50
AUX. SENSOR>
COMBINATION :              VOLUME I3
RECORD SETUP>
DEVICE SETUP>
BATT.SERVICE>
SYSTEM SETUP>
```



Confirm menu item “SYSTEM SETUP”

```
ESC -- SYSTEM SETUP --   t u
SYSTEM RESET>
CONCEPT:                MEAS.POINTS
POINTS/IN:                 2000
USER ID>
```

4.4.1 System reset

You can reset your system - with exception of language, units and time - to the default settings of the Webtec HPM by the menu item "SYSTEM RESET". After resetting your instrument the setting is set to default specifications.



Select menu item
"SYSTEM RESET"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
```

CONCEPT:	MEAS.POINTS
POINTS/IN:	2000
USER ID>	



Select menu item
"SYSTEM RESET"

```
ESC - SYSTEM RESET -      t u
```

SET PARAMETERS
EXCEPT LANGUAGE, UNITS,
CLOCK TO FACTORY SETTINGS **NO**



Change function value
(YES/NO).

```
ESC - SYSTEM RESET -      t u
```

SET PARAMETERS
EXCEPT LANGUAGE, UNITS,
CLOCK TO FACTORY SETTINGS **YES**



Confirm change

4.4.2 Memory Setting

With the menu item “CONCEPT” you can choose between the memory function values “MEAS.POINTS” and “MEM.RATE”.

By selecting the “MEAS.POINTS” you can make a choice between 1000, 2000 and 4000 measurement points/channel per measurement.

By selecting the function value “Mem.rate” you can select the measurement memory rate, which can be varied from 1 to 10,000 points / ms.



Select menu item
“CONCEPT”

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEAS.POINTS
POINTS/IN:                   2000
USER ID>
```



Confirm menu item
“CONCEPT”

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEAS.POINTS
POINTS/IN:                   2000
USER ID>
```



Confirm function value (MEAS.POINTS/MEM.RATE).



Confirm change

A) CONCEPT: MEASUREMENT POINTS



Select menu item
"POINTS/In"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEAS.POINTS
POINTS/IN: [REDACTED]       2000
USER ID>
```



Confirm menu item
"POINTS/In"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEAS.POINTS
POINTS/IN: [REDACTED]       2000
USER ID>
```



Select menu item
„POINTS/In"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEAS.POINTS
POINTS/IN: [REDACTED]       4000
USER ID>
```



Confirm change

B) CONCEPT: MEMORY RATE



Select menu item
"MEMORY/ms"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEMORY/ms.
MEMORY/ms: ██████████ 100
USER ID>
```



Confirm menu item
"MEMORY/ms"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                   MEMORY/ms.
MEMORY/ms: ██████████ 100
USER ID>
```



Change function value
(1, 2, 5, 10, 20, 50, 100, ..., 5,000, 10,000).



Confirm change

4.4.3 User identification

The menu item "USER ID" identifies the company and the user. These data are shown on any printout.



Select menu item
"USER ID"

```
ESC -- SYSTEM SETUP --      t u
SYSTEM RESET>
CONCEPT:                  MEAS.POINTS
POINTS/IN:                  2000
USER ID>
```



Confirm menu item
"USER ID"

```
ESC - USER ID - t u
INFO PRINTOUT
4 LINES max
1: Company: Webtec Products
2: HPM440/460
3: United Kingdom
4:
```



Select menu item
"USER ID"

```
ESC - USER ID - t u
INFO PRINTOUT
4 LINES max
1: Company: Webtec Products
2: HPM440/460
3: United Kingdom
4:
```



Confirm chosen line

Further text input is described in chapter 2.2.8.