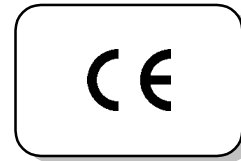


Pressure Reference Type P

USER MANUAL



Operating Manual
Reference Type P
Version 2.2
Date: 11/05

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PRELIMINARY

The new generation of digital manometers consist of a long term particularly steady analog section and of A/D 16 bit converter, which guarantees a max of 65000 internal divisions.

The various versions are proposed for the different applications such as instruments for metrological laboratories to be used as first or second line samples, for industrial applications for data monitoring and transmission, for processes control or for testing material equipment, presses, test benches etc..

The pressure gauge are equipped with internal batteries with 1 year autonomy, wich is also guaranteed by the AUTO POWER OFF function which activates if within 30 minutes any pressure variations is detected. The user can select different engineering units (mbar, bar, kPa, MPa, psi), the needed resolution and the digital filter parameters according to the application. The LCD display includes a pressure bar analog indication, always active also inside the programming menu.

The sensor is executed in Stainless Steel 17-4 PH with a monolithic structure free of any O-RING tight or gaskets.

These features guarantee a long-term high stability and strength, even with highly dynamic pressures or in vacuum measurements. Thanks to the most advanced strain gauges technologies the manometers ensure a long term marginal drift.

Main characteristics:

- 1 YEAR AUTONOMY WITHOUT RECHARGE
- PROGRAMMABLE RESOLUTION
- PROGRAMMABLE DIGITAL FILTER
- PROGRAMMABLE BAUD RATE
- ZERO FUNCTION
- PEAK FUNCTION (positive and negative)
- RS232C SERIAL OUTPUT (on request)

TECHNICAL DATA

TYPE	Model B (LabDMM)	Model A (Bit02)
RELATIVE PRESSURE (R)	1 - 2.5 - 5 - 10 - 20 bar 50 - 100 - 250 - 350 - 500 bar 700 - 1000 - 1500 - 2000 bar	
LINEARITY and HYSTERESIS	≤± 0.05 %	≤± 0.20 %
TEMPERATURE EFFECT 1°C		
a) on zero	≤±0.002%	
b) on sensitivity	≤±0.002%	
POWER SUPPLY	BATTERY	
AUTONOMY	1 YEAR	
ALKALINE BATTERIES	n° 4 to 1,5v size AA	
INTERNAL RESOLUTION	65.000 divs.	
PROGRAMM. MEASURE UNITS	mbar, bar, MPa, kPa, psi	
PROGRAMM. RESOLUTION	1, 2, 5, 10	
PROGRAMM. BAUD RATE	19200, 9600, 4800	
ZERO FUNCTION	~ 50% F.S.	
PEAK FUNCTION	positive and negative	
READINGS PER SEC.	10 (100 msec)	
DISPLAY	custom LCD	
MECHANICAL LIMIT VALUES:		
a) service pressure	100% F.S.	
b) max. permissible pressure	150% F.S.	
c) breaking pressure	>300% F.S.	
d) highly dynamic pressure	75% F.S.	
REFERENCE TEMPERATURE	+23°C	
SERVICE TEMPERATURE	0/+50°C	
STORAGE TEMPERATURE	-10/+60°C	
PROCESS COUPLING	1/2" BSP MALE	
TIGHTENING WRENCH	27mm	
TIGHTENING TORQUE	28Nm	
PROTECTION CLASS (EN 60529)	IP40 (IP65 front panel)	
SENSOR EXECUTION	INOX 17-4 pH	
CASE EXECUTION	Aluminium (Model B ABS case)	

OPTIONALS	
SERIAL OUTPUT	RS232C (Tank SUB D 9 pole FEMALE)
VACUUM (V) range	(-1/+1) (-1/+2.5) (-1/+5) bar

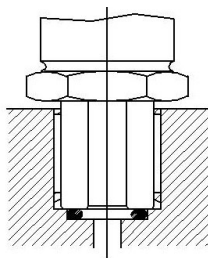
STANDARD FULL SCALE and RESOLUTION

Nominal Pressure	Model B (LabDMM)			Model A (Bit02)		
	Pressure	Resol.	Vacuum	Pressure	Resol.	Vacuum
bar	bar	bar	bar	bar	bar	bar
1	1,0000	0,0001	-1,0000	1,000	0,001	-1,000
2,5	2,5000	0,0005	-1,0000	2,500	0,001	-1,000
5	5,0000	0,0005	-1,0000	5,000	0,001	-1,000
10	10,000	0,001	/	10,00	0,01	/
20	20,000	0,002	/	20,00	0,01	/
50	50,000	0,005	/	50,00	0,01	/
100	100,00	0,01	/	100,0	0,1	/
250	250,00	0,02	/	250,0	0,1	/
350	350,00	0,05	/	350,0	0,1	/
500	500,00	0,05	/	500,0	0,1	/
700	700,00	0,05	/	700,0	0,1	/
1000	1000,0	0,1	/	1000	1	/
1500	1500,0	0,2	/	1500	1	/
2000	2000,0	0,5	/	2000	1	/

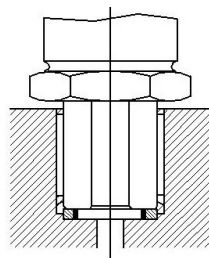
RECOMMENDED MECHANICAL MOUNTING



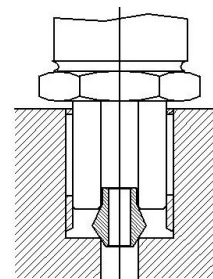
During the gauge mounting **DO NOT** force the case but tight with the wrench.



O-RING tight:
for pressures
<1000bar



USIT RING
12.70X18X1.5:
for pressures
<1000bar



Double cone tight:
for pressures
≥1000bar

INSTALLATION

For a fast instrument installation please follow the instructions listed below:

- a) PRELIMINARY CHECKS
- b) Instrument POWER-ON and control of display functioning during the TEST phase.
- c) PROGRAMMING (measurement unit, digital filter, etc.)

a) PRELIMINARY CHECK

Be sure that pressure provided is not higher than the instrument full scale.

Mount the manometer as suggested.

If the manometer is installed in a oil-pressure circuit, please perform the bleeding before starting to work.

b) INSTRUMENT POWER ON:

At power on, the instruments execute a test cycle:

- Verify the lighting of display, with software release indication (3 secs).

After this test it's displayed the input pressure:

- If a "LLLLL" (lower limit reached) or a "UUUUU" message are displayed, it's recommended to conduce immediately the pressure into the correct range.

c) PROGRAMMING:

Functions and parameters are grouped in this SETTING MENU:

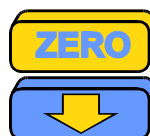
- 1) Measurement unit
- 2) Digital Filter
- 3) Resolution
- 4) Power Off Time
- 5) Baud Rate

KEYS GENERAL DESCRIPTION



Key with 2 different functions:

- 1) **ON** to switch on the manometer.
- 2) **SET** to enter into the setting menu (keep it pressed for about 3 seconds)



This key has 3 different functions:

- 1) During the measurement it performs the ZERO of the display in the first ~50% of manometer range. ZERO does not have any effect on graphic-bar indication of the pressure.
- 2) If kept pressed for 5 seconds it deactivates the ZERO function by showing the manometer offset.
- 3) Inside the setting menu it allows the operator to decrease (▼) the values of defined step.



This Key has 4 different functions:

- 1) During the measurement, if pressed for 1 second it activates the PEAK+ function, which allows the display of the **Highest pressure** measured after the activation of the function
- 2) During the measurement, if pressed for 5 seconds it activates the PEAK- function, which allows the display of the **Lowest pressure** measured after the activation of the function.
- 3) In the setting menu, it increases (▲) the values of a given parameter.
- 4) During the measurement, if pressed for 5 sec. it switches off the manometer in manual mode (OFF).

SETTING MENU

To enter into the setting menu keep pressed the **SET** key for approx. 3 seconds, until the first parameter appears on the display (**Unit** to choose the measurement unit).

Press always **SET** to move to next parameter, and then to exit from the setting menu.

After the last parameter the **SET** key saves the parameters, then comes back to the measurement mode.

The new values, eventually set, becomes therefore active at the exit from setting menu.

MEASUREMENT UNIT

Unit	In this step it is possible to change the measurement unit through the keys ▼ and ▲ .
-------------	--

DIGITAL FILTER

FL XX	In this step the operator can change the Digital Filter effect. By increasing the XX value the filter effect increases enabling the operator to find out the average value of unsteady or pulsating pressures. Selectable values go from 0 up to 99. This function also acts on display conversion speed, therefore if peaks shall be detected it is recommendable to decrease the filter effect at its minimum.
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RESOLUTION

r XX	In this step it is possible to set the Resolution used by the manometer to display the pressure. Selectable values 1, 2, 5 and 10
-------------	--

TIME OF AUTO POWER OFF

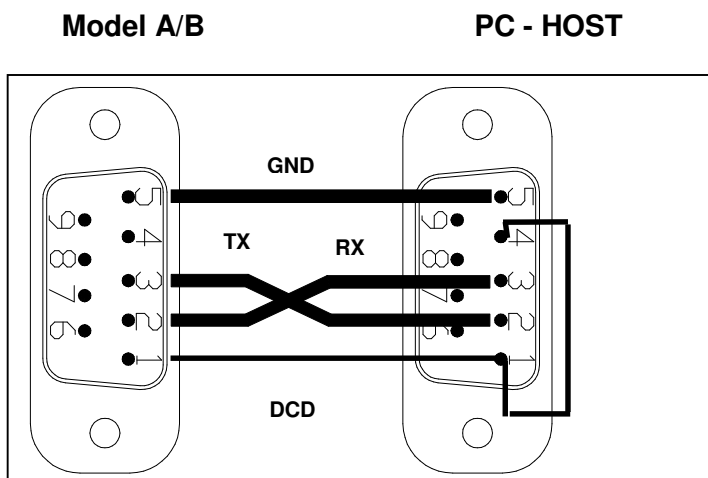
oFFXX	This parameter defines the time in minutes (from 1 up to 30) before the auto-power off activates in case of constant pressure. The auto-power off time starts working if the manometer does'nt detect pressure changes higher than 10% of the rate.
--------------	--

RS232 BAUD RATE

bAUdX	In this step it is possible to program the transmission speed of RS232C serial output (if the gauge is equipped with it). Selectable values are: 1=4800; 2=9600; 3=19200; 0=RS232 disabled. Note: We reccomend to disable of the RS232 if it is not used (Baud-rate=0).
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RS232C CONNECTION:

Canon 9 pin SUB D female



Pin 1) ØDCD
Pin 2) ØRX
Pin 3) ØTX
Pin 5) ØGND

COMMUNICATION PROTOCOL

The communication protocol is:

8 bit data, 1 bit stop, NO parity

CTS / RTS / DCD are not handled.

The format of the cyclicly transmitted is data:

s XX.XXX um z py LB

s	sign (ascii character + or -)
XX.XXX	measurement value with decimal point
um	measurement unit from 0 up to 04
Z	if z is present, the measurement is correct with ZERO function (value after offset reset).
Py	if in these two positions the optional chars p+ or p- appear, it means that peak function is active, and precisely: p+ = positive peak, p- = negative peak.
LB	The string is followed by the message LB if the battery is exhausted.

Command Strings Format and parameters programming

p n XX cr

p	the parameter strings starts with this character.
n	parameter number from 1 up to 8.
XX	decimal value to be assigned to the parameter.
cr	Carriage Return (13).

1) MEASUREMENT UNIT:

p1xxcr	00=psi	01=MPa	02=kPa	03=bar	04=mbar
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2) DIGITAL FILTER:

p2xxcr	xx = values from 00 up to 99
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3) RESOLUTION:

p3xxcr	00 = 1	01 = 2	02 = 5	03 = 10
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4) AUTO POWER OFF TIME:

p4xxcr	xx = values from 01 up to 30 minutes
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5) BAUD RATE:

p5xxcr	00=OFF	01=4800	02=9600	03=19200
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OFF disables the serial output

6) ZERO:

p6xxcr	00 = ZERO OFF	01 = ZERO ON
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7) POSITIVE PEAK:

p7xxcr	00 = PEAK+ OFF	01 = PEAK+ ON
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8) NEGATIVE PEAK:

p8xxcr	00 = PEAK- OFF	01 = PEAK- ON
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BATTERY REPLACEMENT

The digital manometer is fed by four batteries (type AA 1,5V), which allow an autonomy of about 1 year. The battery consumption is notified by the LOW BAT message, the measurement performed from that moment could be altered, it is therefore necessary to immediately replace the battery.



ALKALINE battery pack must be recycled or disposed properly.

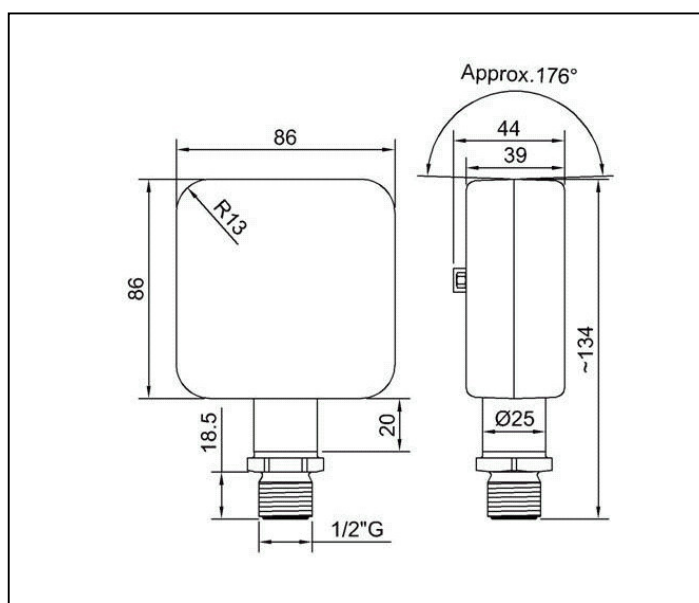
DISPOSAL

Delivery the instrument to company specialised in the waster according to the laws in force in the countries where the instrument is commercialised.

OPTIONS

- SERIAL OUTPUT RS232C
- STANDARD SERIAL CABLE
- VACUUM OPTION (max. F.S. from -1 to +5 Bar)

DIMENSIONI (mm)



FULL SCALE ADJUSTABLE



This procedure is described in the manual by way of documentation only but it shall be performed by authorised calibration centres only and in case of real need.

SIKA declines any responsibility for measurement errors or bad functioning which should be caused by adjustment performed not properly. In this case the validity of manometer certification would lose.

The adjustment procedure allows correction of up to $\pm 30\%$ of the F.S.

NOTE: the full scale adjustment shall be performed with the measurement unit programmed in bar.

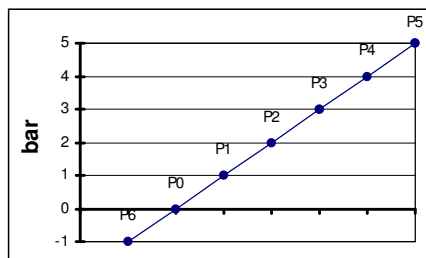
Model B (LabDMM)

The full scale is adjusted through a procedure of calibration by points which also allows linearisation of the pressure sensor.

On the positive scale (pressure reading) the manometer has to autolearn all the points: P0=0%, P1=20%, P2=40%, P3=60%, P4=80%, P5=100% of the full scale.

On the negative scale (vacuum readings) the manometer has to autolearn only point P6 at -1bar (the negative scale is an optional feature).

Example: Reference P having full scale 5 bar



PROCEDURE: (positive full scale adjustment)

8.8.8.8.8 Switch on the manometer (ON) and keep the **SET** and **PEAK** keys pressed together during the TEST phase.

P0000 Set the password **3124** using the **▲** and **▼** keys, then confirm with the **SET** key.

Per X **Set at 1** if the full scale to be programmed does not exceed 65000 div.
Set at 2 if the full scale to be programmed exceeds 65000 div.
Since the manometer is supplied calibrated, adjustment of this parameter is not necessary.
Vary with the **▲** and **▼** keys and confirm with the **SET** key.

P 0 Bring the manometer to zero pressure by opening the hydraulic circuit and confirm with the **SET** key.
The manometer displays an internal offset, reset using the **ZERO** key and confirm with the **SET** key.

P 1 Bring the manometer to **20% F.S.** of the pressure and confirm with the **SET** key.
Adjust the measurement using the **▲** and **▼** keys and confirm with the **SET** key

P 2	Bring the manometer to 40% F.S. of the pressure and confirm with the SET key. Adjust the measurement using the ▲ and ▼ keys and confirm with the SET key
P 3	Bring the manometer to 60% F.S. of the pressure and confirm with the SET key. Adjust the measurement using the ▲ and ▼ keys and confirm with the SET key.
P 4	Bring the manometer to 80% F.S. of the pressure and confirm with the SET key. Adjust the measurement using the ▲ and ▼ keys and confirm with the SET key.
P 5	Bring the manometer to 100% F.S. of the pressure and confirm with the SET key. Adjust the measurement using the ▲ and ▼ keys and confirm with the SET key.
P 6	To complete the adjustment of the positive measuring range, confirm with the SET key without performing any correction on point P6.
dP	In this phase the decimal point has to be set. Confirm with the SET key, move the decimal point using the ▲ and ▼ keys and confirm with the SET key.

PROCEDURE: (negative full scale adjustment)

Enter into the menu protected by the password as for positive full scale calibration. Confirm with the **SET** key until point **P6** is reached, without modifying **Per X** points **P0, P1, P2, P3, P4, P5**.

Bring the manometer to **-1 bar** and confirm with the **SET** key.
Adjust the reading with the ▲ and ▼ keys, and confirm with the **SET** key.

Model A (Bit02)

PROCEDURE: (positive full scale adjustment)

Full scale adjustment is performed through the procedure previously described for the Model B the gauge will acquire points P0=0% and P5=100% only. Intermediate points P1, P2, P3, P4 are not memorized, it is therefore necessary to go ahead by pressing set key without pressing ▲ and ▼ keys.

PROCEDURE: (negative full scale adjustment)

Enter into the menu protected by the password as for positive full scale calibration. Confirm with the **SET** key until point **P6** is reached, without modifying Per X points P0, P1, P2, P3, P4, P5.

Bring the manometer to **-1 bar** and confirm with the **SET** key.
Adjust the reading with the **▲** and **▼** keys, and confirm with the **SET** key.

ERROR MESSAGES

UUUUU	POSITIVE OVERLOAD: the manometer is measuring a pressure higher than its nominal rate. Pay attention: after that high overloads occurred, the calibration could have been altered.
-LLLLL	NEGATIVE OVERLOAD: the manometer is measuring a vacuum higher than -1 bar.
HHHHH	OFF SCALE: when the unit of measurement is changed, the reading may exceed the numerical limit of the scale, 99999. Change scale.
Low Bat	EXHAUSTED BATTERIES: Measurements performed during this period could be altered, it is therefore necessary to replace the battery quickly.

SIKA holds the right to make any change when necessary, without notice. The data contained in this manual are just indicative and the manufacturer declines any responsibility for errors or discrepancies with respect to this manual.