Digital Pressure Gauge
Type P

Model 0.5
Model 0.2
Model 0.05

OPERATING MANUAL

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Introduction

The digital gauges are made according to the more modern technologies in order to assure a high level of reliability, versatility and inexpensiveness at the same time.

Its main applications develop in industrial fields where it is necessary to check processes or in field, with a precision class better than up to 0.05%.

To increase the practicality and make the instrument completely autonomous, the pressure gauge is fed by internal batteries which ensure round 1 year.

In the programming menu, reachable through the keyboard, it is possible to adjust different functions such as:

- AUTO POWER OFF function which activates if within 30 minutes any pressure variations is detected,
- digital filter that allows to maintain the measurement steady even in presence of unsteady pressures,
- the display resolution which allows to increase the measurement at fixed steps (2, 5, 10) and
- the measurement unit which can be changed into mbar, bar, kPa, MPa and psi.

The sensor, entirely executed in stainless steel, is monolithic to ensure a long term high stability even in presence of highly dynamic pressures.

By selecting the reading of the TEMPERATURE (model 0.5 and model 0.2) you can see, on display, the temperature of the fluid that is in contact with the pressure sensor.

The new generation of digital manometers consists 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 LCD display includes a pressure bar analog indication, always active also inside the programming menu.

Main characteristics:

- 1 YEAR AUTONOMY WITHOUT RECHARGE
- PROGRAMMABLE RESOLUTION
- PROGRAMMABLE DIGITAL FILTER
- ZERO FUNCTION
- PEAK FUNCTION (positive and negative)
- Temperature display (model 0.5, model 0.2)
- PROGRAMMABLE BAUD RATE (option)
- RS232C SERIAL OUTPUT (option)

Technical Data

TYPE	Model 0.05	Model 0.2	Model 0.5
RELATIVE PRESSURE (R)	1 - 2.5 - 5 - 10 – 20 – 40 – 60 bar 100 -250 - 350 - 500 bar 700 -1000 - 1500 – 2000- 2500 bar		
LINEARITY and HYSTERESIS	**≤± 0.05 %**	**≤± 0.2 %**	**≤± 0.5 %**
TEMPERATURE indication a) Resolution b) accuracy		0.1 °C ≤ ±1 °C	
TEMPERATURE EFFECT per 1°C a) on zero b) on sensitivity	 ≤±0.002% ≤±0.002%		
POWER SUPPLY AUTONOMY ALKALINE BATTERIES	Battery 1 year 4x 1.5V (AAA)	BATTERY 1 YEAR 2x 1.5V (AAA)	
INTERNAL RESOLUTION	65.000 divs.		
PROG. 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. Sampling rate	10 100 msec		
DISPLAY	16 mm custom LCD		
MECHANICAL LIMIT VALUES a) service pressure b) max. permissible pressure c) breaking pressure d) highly dynamic pressure	 100% F.S. 150% F.S. >300% F.S. 75% F.S.		
REFERENCE TEMPERATURE SERVICE TEMPERATURE STORAGE TEMPERATURE	+23°C 0...50°C / -10...70°C (on request) -10...60°C / -10...80°C (on request)		
PROCESS COUPLING TIGHTENING WRENCH TIGHTENING TORQUE PROTECTION CLASS (EN 60529) SENSOR EXECUTION	1/2" BSP MALE 27 mm 28 Nm IP40 (IP65 front panel) INOX 17-4 PH		
CASE EXECUTION	Aluminium		

OPTIONS	
SERIAL OUTPUT	RS232C - SUB D 9 pole FEMALE
VACUUM (**V**) range	(**-1**/+1) (**-1**/+2.5) (**-1**/+5) bar (**-1**/+10) (**-1**/+20) (**-1**/+40) bar (**-1**/+60) bar

Standard Full Scale and Resolution

Nominal Pressure	Model 0.05			Model 0.2 Model 0.5		
	Pressure	Resol.	Vacuum	Pressure	Resol.	Vacuum
bar	bar	bar	bar	bar	bar	bar
0.5	0.5000	0.0001		0.500	**0.2:** 0.0001 **0.5:** 0.001	
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	-1.0000	10.00	0.01	-1.000
20	20.000	0.002	-1.0000	20.00	0.01	-1.000
40	40.000	0.002	-1.0000	40.00	0.01	-1.000
60	60.000	0.005	-1.0000	60.00	0.01	-1.000
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	
2500				2500	1	

Pressure Units

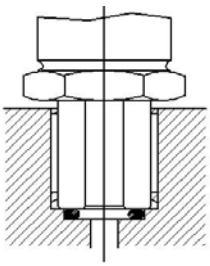
Model 0.05					
Nominal Pressure	Pressure unit / digits after decimal point				
bar	bar	mbar	kPa	MPa	PSI
0.5	0.5000	500.0	50.00	0.0500	7.251
1	1.0000	1000.0	100.00	0.1000	14.503
2.5	2.5000	2500.0	250.00	0.2500	36.259
5	5.0000	5000.0	500.00	0.5000	72.518
10	10.000	10000	1000.0	1.0000	145.03
20	20.000	20000	2000.0	2.0000	290.07
40	40.000	40000	4000.0	4.0000	580.15
60	60.000	60000	6000.0	6.0000	870.23
100	100.00		10000	10.000	1450.4
250	250.00		25000	25.000	3625.9
350	350.00		35000	35.000	5076.3
500	500.00		50000	50.000	7251.9
700	700.00		70000	70.000	10152
1000	1000.0			100.00	14503
1500	1500.0			150.00	21755
2000	2000.0			200.00	29007
2500					

Model 0.2 (4 digit) Model 0.5 (4 digit)					
Nominal Pressure	Pressure unit / digits after decimal point				
bar	bar	mbar	kPa	MPa	PSI
0.5	0.500	500.0	50.00	0.050	7.25
1	1.000	1000	100.0	0.100	14.50
2.5	2.500	2500	250.0	0.250	36.26
5	5.000	5000	500.0	0.500	72.52
10	10.00		1000	1.000	145.0
20	20.00		2000	2.000	290.1
40	40.00		4000	4.000	580.2
50	50.00		5000	5.000	725.2
60	60.00		6000	6.000	870.2
100	100.0			10.00	1450
250	250.0			25.00	3626
350	350.0			35.00	5076
500	500.0			50.00	7252
700	700.0			70.00	
1000	1000			100.0	
1500	1500			150.0	
2000	2000			200.0	
2500	2500			250.0	

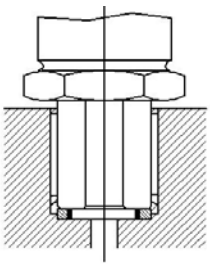
Mechanical Mounting

⚠ WARNING ⚠

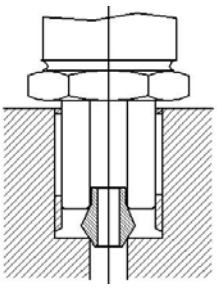
During the gauge mounting DO NOT force the case but tight with the wrench.



O-RING tight:
for pressures
<1000bar



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



Double cone tight:
for pressures
≥1000bar

Installation

Installation shall be done by authorized personnel only; for a fast installation follows 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 display test cycle:

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

After this test it's displayed the input pressure:

- If a "LLLL" (lower limit reached) or a "UUUU" 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

ON to switch on the manometer

OFF Pressed for 5 sec. it performs the manual switching off of the pressure gauge
Note: only for model 0.5 and model 0.2

SET to enter into the setting menu (keep it pressed for about 3 seconds)

ZERO on If kept pressed for 3 sec. 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.

ZERO off If kept pressed for 6 seconds it deactivates the ZERO function by showing the manometer offset.

⬇ Inside the setting menu it allows the operator to decrease (⬇) the values of defined step.

PEAK+ If kept pressed for 2 sec. during the measurement, it activates the PEAK+ function, which allows the display of the **Highest pressure** measured after the activation of the function

PEAK- If kept pressed for 4 sec. during the measurement, it activates the PEAK- function, which allows the display of the **Lowest pressure** measured after the activation of the function.

⬆ In the setting menu, it increases (⬆) the values of a given parameter.

°C Pressed for 6 sec. it displays the **temperature** in °C, to come back to pressure press the same key again.
Note: only for model 0.5 and model 0.2

OFF If kept pressed for 5 sec. during the measurement, it switches off the manometer in manual mode (OFF)
Note: only for model 0.05

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.

Press **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.

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 detect 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.

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

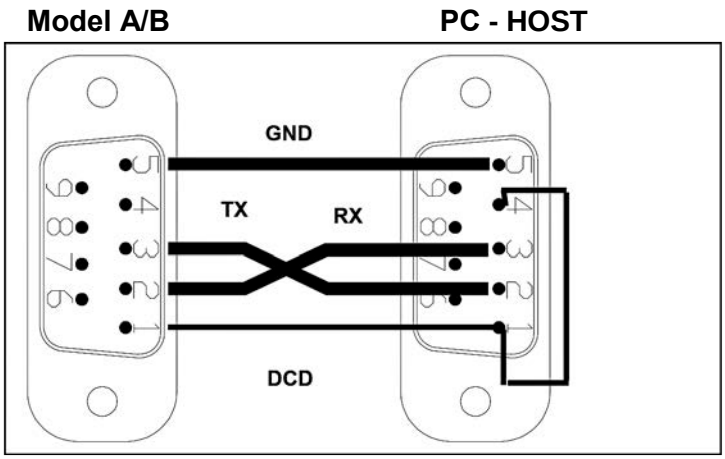
oFFXX	This parameter defines the time in minutes (from 1 up to 30) before the **auto-power off** activates in case of constant pressure. The auto-power off time starts working if the manometer does not detect pressure changes higher than +/-10%.

RS232 BAUD RATE (option)

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

RS232C connection (option)

Canon 9 pin SUB D female



Pin 1) ➡DCD
Pin 2) ➡RX
Pin 3) ➡TX
Pin 5) ➡GND

COMMUNICATION PROTOCOL (optional)

The communication protocol is **8 bit data, 1 bit stop, NO parity**
CTS / RTS / DCD are not handled.

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

2) DIGITAL FILTER:

p2xxcr	xx = values from 00 up to 99

3) RESOLUTION:

p3xxcr	00 = 1	01 = 2	02 = 5	03 = 10

4) AUTO POWER OFF TIME:

p4xxcr	xx = values from 01 up to 30 minutes

5) BAUD RATE:

p5xxcr	00=OFF	01=4800	02=9600	03=19200

OFF disables the serial output

6) ZERO:

p6xxcr	00 = ZERO OFF	01 = ZERO ON

7) POSITIVE PEAK:

p7xxcr	00 = PEAK+ OFF	01 = PEAK+ ON

8) NEGATIVE PEAK:

p8xxcr	00 = PEAK- OFF	01 = PEAK- ON

To read the manometer pressure send the following string:

p 0 00 cr

The answer will be the following string

s XX.XXX um z py LB cr

s	sign (ASCII character **+** or **-**)
XX.XXX	measurement value with decimal point
um	measurement unit from 00 up to 04
z	if **z** is present, the it indicates that ZERO function is active
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	If present indicates a low battery condition

Battery Replacement

The instrument is supplied with 2 (model 05 and model 0.2) or 4 (model 0.05) not rechargeable Alkaline batteries (AAA type 1.5V), with an average autonomy of 1 year.
Batteries consumption is signaled by the LO BAT icon, the measurements performed during this phase could be altered: replace therefore the batteries. During this operation clean up the clips contacts from possible oxydation and check the pressure exerted by external flaps on each battery: please increase it if necessary.
Verify the electrical contact also in presence of malfunctions

ALKALINE battery pack must be recycled or disposed properly.

WARNING:
If the instrument won't be used for long time it is suggested to REMOVE batteries from manometer.

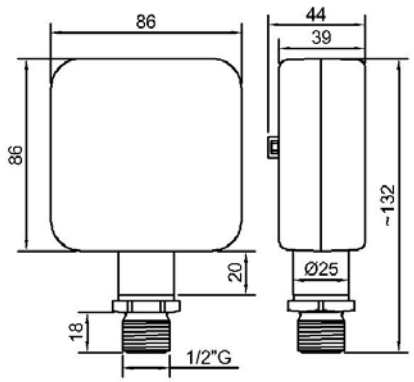
Disposal

Delivery the instrument to company specialised in scrapping 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 +60 Bar)

Dimensions (mm)



Standard case dimensions

Full Scale Adjustment

⚠ WARNING ⚠

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 ±**30%** of the F.S.

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

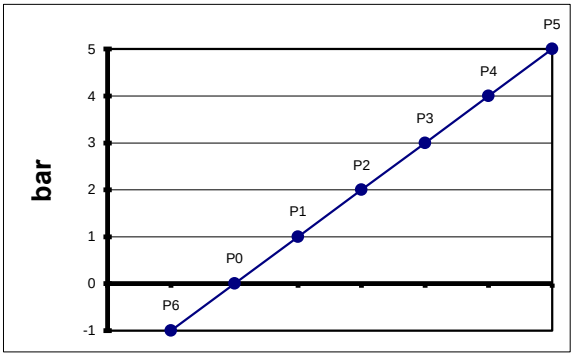
The full scale is adjusted through a procedure of calibration by points which also allows linearisation of the pressure sensor.

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 a pressure range from -1…5 bar



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 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. ***Note: Since the manometer is supplied calibrated, adjustment of this parameter is not necessary.*** Vary with the ▲ and ▼ keys confirm with the **SET** key
P0	Bring the manometer to **0 bar** by opening the pressure circuit confirm the pressure setting with the **SET** key If the manometer displays an offset, then make a reset by using the **ZERO** key confirm with the **SET** key
P1	Bring the manometer to **20% F.S.** of the pressure confirm the pressure setting with the **SET** key Adjust the reading by using the ▲ and ▼ keys confirm with the **SET** key
P2	Bring the manometer to **40% F.S**. of the pressure confirm the pressure setting with the **SET** key Adjust the reading by using the ▲ and ▼ keys confirm with the **SET** key
P3	Bring the manometer to **60% F.S.** of the pressure confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
P4	Bring the manometer to **80% F.S.** of the pressure confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
P5	Bring the manometer to **100% F.S.** of the pressure confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
P6	To complete the adjustment of the positive measuring range confirm with the **SET** key without performing any correction on point P6. ***Note: only available at model 0.05*** **Negative Full Scale adjustment procedure** Bring the manometer to **–1 bar** and confirm with the **SET** key. Adjust the reading with the ▲ and ▼ keys confirm with the **SET** key
dP	In this phase the decimal point has to be set. Confirm with the **SET** key, move the decimal point using the ▲ and ▼ keys confirm with the **SET** key

Positive Full Scale Adjustment for Model 0.5 and Model 0.2

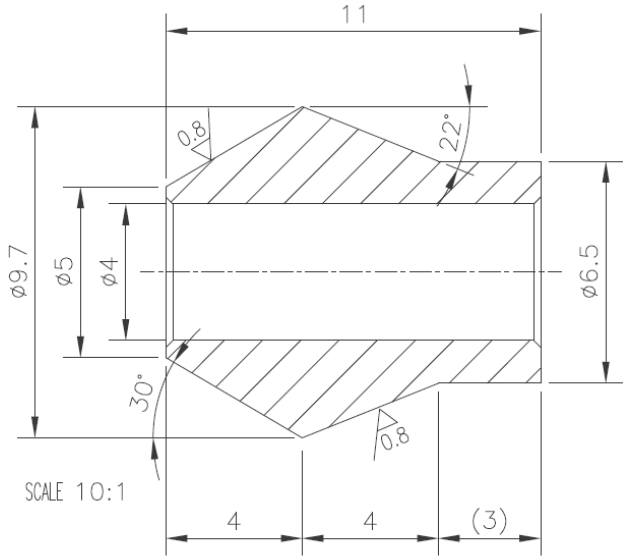
8.8.8.8.8	Switch on the manometer (ON) and keep the **SET** and **PEAK** keys pressed together (during the TEST phase)
P0000	Set the password **2124** using the ▲ and ▼ keys confirm with the **SET** key
Per X	**~ Set at 1** if the full scale to be programmed does not exceed 65000 div. **~ Set at 2** if the full scale to be programmed exceeds 65000 div. ***Note: Since the manometer is supplied calibrated, adjustment of this parameter is not necessary.*** Vary with the ▲ and ▼ keys confirm with the **SET** key
-P0	Bring the manometer to **0 bar** by opening the pressure circuit confirm the pressure setting with the **SET** key If the manometer displays an offset, then make a reset by using the **ZERO** key confirm with the **SET** key
-P1	Bring the manometer to **-0.2 bar (20% F.S.)** confirm the pressure setting with the **SET** key Adjust the reading by using the ▲ and ▼ keys confirm with the **SET** key
-P2	Bring the manometer to **-0.4 bar (40% F.S.)** confirm the pressure setting with the **SET** key Adjust the reading by using the ▲ and ▼ keys confirm with the **SET** key
-P3	Bring the manometer to **-0.6 bar (60% F.S.)** confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
-P4	Bring the manometer to **-0.8 bar (80% F.S.)** confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
-P5	Bring the manometer to **-1 bar (100% F.S.)** confirm the pressure setting with the **SET** key Adjust the reading by using the ▲and ▼keys confirm with the **SET** key
dP	In this phase the decimal point has to be set. Confirm with the **SET** key, move the decimal point using the ▲ and ▼ keys confirm with the **SET** key

Error Messages

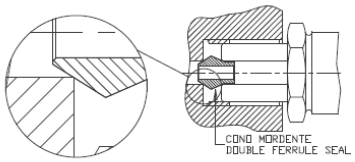
UUUU	**Positive Overload** the manometer is measuring a pressure higher than its nominal rate.
-LLLL	**Negative Overload** the manometer is measuring a vacuum higher than –1 bar

Warning
if an overload occurs, check if calibration has been altered.

HHHH	**Out of the Scale** the instrument shows the overflow of display physical limit (9999 or 99999).
LbAt	**Low Battery** batteries level is low. Please change batteries



You need to use the cone In the picture above on a hole of about Ø6 - Ø7 with sharp edge, place on the same axis of the transducers hole, i.e. of the fillet



Recommended Calibration Procedure

a) Carry out three cycles to the Full Scale of the manometer for checking (preloading cycles).

b) Take the zero measurements at atmospheric pressure with the discharge valve open.

c) Generate the pressure, taking the sample manometer as reference, and take the two readings simultaneously.

d) Record the measurements at increasing pressures (e.g. 5 points) to evaluate the linearity and reading errors.

e) Record the measurements at decreasing pressures (e.g. 5 points) to evaluate the hysteresis errors.

Discharge the system by opening the discharge valve and take the manometer readings on return to zero.

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.