DIGITAL
PRESSURE INDICATOR
REF R

OPERATING MANUAL

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INTRODUCTION

Ref R is a digital manometer controlled by a microprocessor. It is a practical and economical solution to perform measures of pressure and temperature while maintaining a good accuracy and reliability.
The Ref R has set the **DATA LOGGER** function which allows you to store up to 60,000 measurement points in regular time steps from 1s to 10 hours per point.
The measurement system consists of an analog section **particularly stable** and an A /D converter with 16-bit resolution (65000 divisions).
To increase the level of integration of components has been used a mixed technology, traditional and SMT, that makes the indicator resistant to vibration and mechanical stress as well as ensuring the reliability of the circuit.
2 Internal batteries (size AAA - 1.5V) provide a range of 1 year, thanks to the function of **AUTO POWER OFF** which occurs when there are no changes in the measure for a time of 30 minutes.
By selecting the reading of the **TEMPERATURE** can be displayed on the display the temperature of the fluid in contact with the pressure sensor

The indicator has a setting menu which allows to choose the resolution and the digital filter according to the measurement to be calculated.

Main characteristics:

- PROGRAMMABLE RESOLUTION
- PROGRAMMABLE DIGITAL FILTER
- PROGRAMMABLE BAUD RATE
- ZERO FUNCTION
- PEAK FUNCTION (positive and negative)
- RS232C SERIAL OUTPUT (on request)
- DATA LOGGER FUNCTION
- TEMPERATURE DISPLAY

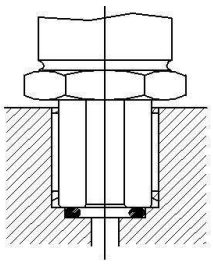
TECHNICAL DATA	Ref R (Idroscan)
RELATIVE PRESSURE (R)	1-2.5-5-10-20-40-50-60 bar 100-250-350-500 bar 700-1000-1500-2000 bar
LINEARITY and HYSTERESIS	≤ ± 0.20 % F.S.
TEMPERATURE INDICATION a) Resolution b) Class	 0.1 °C ± 1 °C
INTERNAL RESOLUTION READINGS PER SEC. (0 filter)	30.000 div. 10 (100ms)
REFERENCE TEMPERATURE SERVICE TEMPERATURE STORAGE TEMPERATURE	+23 °C -10 / +70 °C -10 / +80 °C
TEMPERATURE EFFECT (per 1°C) a) on zero b) on full scale	 ≤ ± 0.005% ≤ ± 0.005%
DISPLAY	16mm (custom LCD)
PROGRAMMABLE RESOLUTION PROGRAMMABLE BAUD RATE	1, 2, 5, 10 38400, 19200,9600
DATA LOGGER FUNCTION	60000 points in step from 1s to 10 hours
ZERO FUNCTION PEAK FUNCTION (Positive and Negative)	50% F.S. 125 Readings per sec. (8ms)
POWER SUPPLY AUTONOMY not rechargeable ALKALINE BATTERIES	BATTERIES ~ 1 year 2x 1,5V size AAA
PROTECTION CLASS (EN 60529) CASE DIMENSIONS (HxLxW)	IP65 ALUMINIUM 128 × 84 × 29 mm
PRESSURE CONNECTION	G ½'' st. st. 1.4542
OPTIONALS	
RUBBER COVER SERIAL OUTPUT RS232C CONNECTION VACUUM scale	PVC RS232C Tank SUB D 9 pole FEMALE -1/+1 -1/+2.5 -1/+5 bar

Pressure	*Positive*	*Vacuum*	*Resolution*
1 bar	1.000	-1.000	0.001
2.5 bar	2.500	-1.000	0.001
5 bar	5.000	-1.000	0.001
10 bar	10.00	-1.00	0.01
20 bar	20.00	-1.00	0.01
40 bar	40.00	-1.00	0.01
50 bar	50.00	-1.00	0.01
60 bar	60.00	-1.00	0.01
100 bar	100.0		0.1
250 bar	250.0		0.1
350 bar	350.0		0.1
500 bar	500.0		0.1
700 bar	700.0		0.1
1000 bar	1000		1
1500 bar	1500		1
2000 bar	2000		1

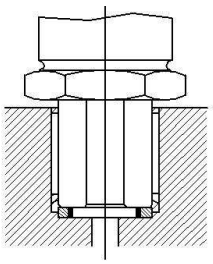
RECOMMENDED MECHANICAL MOUNTING

⚠ WARNING ⚠

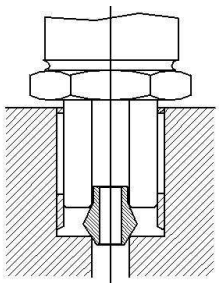
During the gauge mounting DO NOT force the case but tight with the wrench.



O-RING tight for pressures <1000bar



USIT RING 12.70X18X1.5
for pressures <1000bar



Double cone tight: pressures ≥1000bar

INSTALLATION

Installation shall be done by authorized personnel only; for a fast installation follows the instructions listed below:

- PRELIMINARY CHECKS
- SWITCH ON - check the display during the test phase
- PROGRAMMING (digital filter, resolution, etc.)

INSTRUMENT SWITCHING ON

When instrument switches on, it performs the display check with the switching on of all the segments, then it shows the release for a few second and finally the pressure measured; in case a series of “L” (negative full scale overload) or a series of "U" (positive full scale overload) appears, please act in order to bring the pressure back within its full scale value.

PROGRAMMING

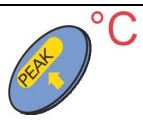
All the functions can be recalled through the following SETTING MENU

1) Digital Filter
2) Resolution
3) Power Off Time
4) DataLogger Parameters
5) Baud Rate RS232

KEYS DESCRIPTION

Key with three functions:
1) **ON** to switch on the indicator.
2) **SET** to enter into the configuration menu (keep the key pressed for approx. 3 seconds).
3) During the measurement, if pressed for 5 seconds it performs the manual indicator switching (OFF).

Key with 3 functions:
1) During the measurement it performs the display ZERO (max 50% FS);
2) If kept pressed for about 5 sec. it deactivates the ZERO function displaying the offset of the manometer.
3) Inside the setting menu it decreases (🡻) the value on the display.



Key with 4 functions:
1) During the measurement, if pressed for a second, it activates the **PEAK+** function, (it displays the highest pressure detected after having activated the function).
2) During the measurement, if pressed for 5 sec., it activates the **PEAK-** function (it displays the lowest pressure detected after having activated the function).
3) During the measurement, if pressed for 8 sec., it activates the **temperature** measure.
4) Inside the setting menu increases (⬆) the value on the display.

SETTING MENU
To enter into setting menu press the **SET** key (approx.3sec.) until the first parameter appears on display (**FL** digital filter). Press **SET** either to go to next parameters or to exit from setting menu. Press **SET** after the last parameter both to save data and to come back to measurement mode. New set values become active at the exit of setting menu.

FL XX	This parameter changes the effect of the **Digital Filter**. By increasing the XX value, filter effect increases, allowing the user to detect the average value of unsteady or pulsating pressures. Selectable values go from 0 to 99. This function also acts on display conversion speed, therefore if the operator wants to detect the peaks, it is recommendable to decrease at the minimum the filter effect.

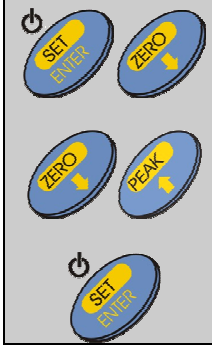
RESOLUTION	
r XX	In this step it is possible to set the resolution used to display the pressure, the selectable values are: 1, 2, 5 and 10.

AUTO-POWER OFF TIME	
oFFXX	It set the time in minutes (from 1 up to 30) before the Auto-power off function activates, in case of constant measurement; by setting 0(zero) the instrument never switches off. Auto power off function starts working if the indicator does not detect changes higher than ±10% of set pressure.

t1 **h.mm.ss** h = hours mm = minutes ss = seconds	Define the time between 2 point acquisition. The format of the field t1 is the following: Example: 0.00.05 : t1 = 5s 0.01.15 : t1 = 1min e 15s 2.00.00 : t1 = 2hours
t2 **hhh.mm** hhh = hours mm = minutes	Define how long the cycle will last. The format of the field t2 is the following: Example: 001.00 : t2 = 1 hour 000.30 : t2 = 30 minutes
t On **t OFF**	Enable/Disable the temperate acquisition. With the temperature acquisition the maximum number of points that can be stored is limited to 30.000

bAUd	This parameter set the baud rate of **RS232C** interface (if provided). values: 38400; 19200,9600 0=RS232 disabled.

DATALOGGER Management
The **DataLogger** can store up to **60,000** measurement points (30.000 if also the temperature is stored) in steps ranging from 1s to 10 hours according to the parameter **t1** defined in the **Setting Menu**. Cycle length is determined by the parameter **t2** always defined in the **Setting Menu**. Data stored during the last Datalogging are permanently saved in nonvolatile memory within the gauge so that the measures will always be accessible until the creation of a new cycle of measurement **Note**: The functionality of the **DataLogger** is fully manageable from the PC using the **AnalyzerLight** software through which you can: • View the status of the current cycle. • Download all the measurements. • Save all measurements on a file. • Display the test curve. • Print the test curve. • Export to Microsoft Excel the test curve. • Make the START / STOP of a cycle. • Set the parameters t1 and t2 and temperature ON/OFF.

CYCLE START: 	Press simultaneously and hold for a few seconds the keys ⬆ e ⬇. The acceptance of START will be shown on the display by the presence of the icon **SP1**. Each time a measurement point is saved, the icon **SP2** will flash for a one second.
CYCLE STOP: 	The cycle will stop automatically at the set time **t2**. Alternatively hold down simultaneously, for a few seconds, the keys ⬆ e ⬇. The icon **SP1** will be turned off.
VIEW DATA: 	Press and hold simultaneously for a few seconds, the **SET** and ⬇ keys. The acceptance of the setting will be displayed on the display by flashing **SP1** and **SP2**. It is possible now to see all points of measurement using the button ⬆. To go back of a measurement point use the key ⬇. To exit from the View Cycle page press the **SET** button

FULL SCALE CALIBRATION (PRESSURE)

WARNING: These procedures are included in this manual for documentation, but must be performed by authorized calibration centers and only if necessary.
SIKA disclaims any liability with respect to measurement errors or malfunctions that may result from not properly enforced regulations, which also invalidate any manometer certification .

Keep the **ON** and **PEAK** keys pressed for some seconds.

P0000	Select the password **3124** (⬆⬇), confirm with**SET**
P0	Open the pressure circuit to have zero pressure Press the **ZERO** key and confirm with **SET.**
P1…P5	Generate the pressure steps. Using the keys (⬆⬇), set the pressure values 20%(P1), 40%(P2), 60%(P3), 80%(P4) e 100%(P5) and confirm with **SET**
dp	Select the decimal point position (⬆⬇), confirm with **SET.**
VACUUM	For the **VACUUM** calibration set the password **2124** and repeat the above procedure from **-P0** to **-P5**

RS232C SERIAL COMMUNICATION PROTOCOL

Protocol: **8 bit data, 1 bit stop, NO parity**.
Note: The Baud Rate is set in the Setting Menu.

To read the manometer pressure send the following string:
p000cr
The answer will be the following string:
SXX.XXX UM Z PY LB cr

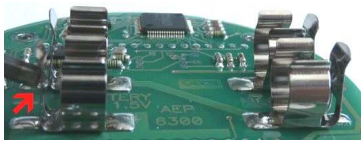
S sign + / -
XX.XXX Pressure with the decimal point
UM Unit code 03=bar
Z if presents indicates that the ZERO function is activate
PY if presents indicates that the PEAK function is activate positive(p+) or negative (p-).
LB if presents indicates a low battery condition

Command and programming string to send to the manometer.

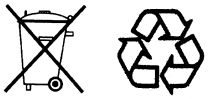
p2XXcr	Digital Filter. Select XX from 00 to 99
p3XXcr	Resolution. Select XX to 00=1, 01=2, 02=5, 03=10
p4XXcr	Auto Off Time. Select XX from 01 to 30
p6XXcr	ZERO. Select XX to 00 = OFF, 01=ON
p7XXcr	Positive Peak. Select XX to 00 = OFF, 01=ON
p8XXcr	Negative Peak. Select XX to 00 = OFF, 01=ON

BATTERIES REPLACEMENT

The instrument is supplied with 2 **not rechargeable Alkaline** batteries (AAA type 1,5V), with an average autonomy of 1 year. Batteries consumption is signaled by the **LbAtt** message, 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 batteries shall be either recycled or disposed properly.

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

DISPOSAL

Deliver the instrument to companies specialized in scrapping according to the laws in force in the country where intrument is sold.

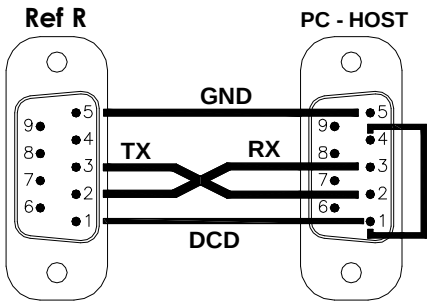
ERROR MESSAGES	
UUUUU	**Positive Overload:** the manometer is measuring a pressure higher than its nominal rate.
-LLLLL	**Negative Overload:** the manometer is measuring a vacuum higher than –1 bar

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

HHHHH	**Out of the Scale:** the instrument shows the overflow of display phisical limit (99999).
LbAtt	**Low Battery :** battery level is low. Please change batteries

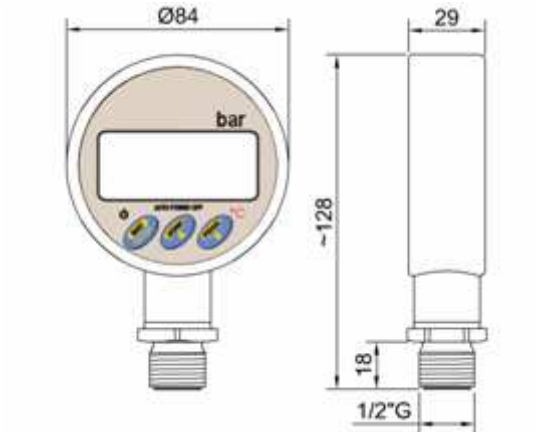
RS232C CONNECTION

9 poles SUB D female

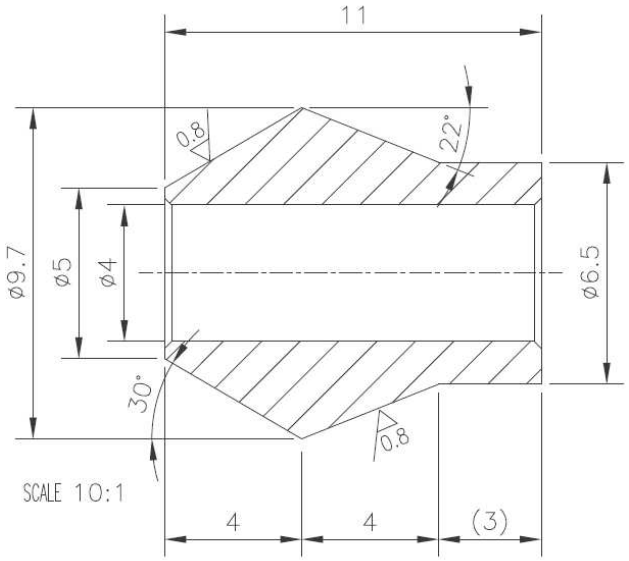


Pin 1) DCD
Pin 2) RX
Pin 3) TX
Pin 5) GND

DIMENSIONS (mm)



Double cone tight: pressures ≥1000bar



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