PM105
PRESSURE METER

USER'S MANUAL

Manual revision: 15 March, 2001
SCSMANP015

Thank you

for purchasing a Tek Know pressure meter.
The Tek Know products are manufactured by Scan-Sense AS in accordance with our high quality standards in design, choice of components and workmanship in order to achieve maximum customer satisfaction and to fulfil our vision to be our customers "First Choice".

The PM105 is designed and manufactured by :

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Safety

Severe damage may result if the PM105 is installed on a "Dead-End" hydraulic system with a shut-off valve in close line proximity.
Certain valves on operation may cause small «Dead-End» volumetric changes which combined with the low compliance PM105 sensor, can generate high pressure overload. Make sure that the system is not under pressure when the connection is made up.

Certification

Scan-Sense certifies that this product meets its published specifications at the time of shipment from the factory.
Scan-Sense further certifies that its calibration measurements are traceable to accredited international standards.

PM105 is tested and approved according to the following standards:

Imunity:	EN 50082-2
Emission:	EN 50081-1
EEx/IS certification:	EEx ia IIC T5

Warranty

These Tek Know products are warranted against defects in material and workman-ship for a period of one year from date of shipment. During the warranty period, Scan-Sense will repair products that prove to be defective. The product must be returned to a service facility designated by Scan-Sense for warranty service or repair.
The foregoing warranty will not apply to defects resulting from improper or inadequate maintenance by buyer, buyer supplied software or interfacing, unauthorised modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. No other warranty is expressed or implied. Scan-Sense shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.
The warranty does not cover the internal rechargeable battery.

The manual

This Manual is for reference only. Specifications may change at any time.

Introduction

The PM105 is a series of digital portable pressure meters for commissioning, service, calibration and maintenance applications.
The unit is light weight and ergonomically designed for on-site applications. PM105 gauge is completely self-contained with integral pressure sensor (precision thin-film strain gauge), CPU-based signal conditioning surface mount electronics, 4-digit LCD display and internal battery power supply. An internal temperature sensor compensates for thermal zero and sensitivity errors which combined with an optimised autorange facility ensures excellent accuracy over a wide pressure range.

Unpacking

On receipt, please check all received parts. A standard PM105 system includes the following:

Pressure meter
Battery charger
Calibration report
User's manual
Optional EEx-certificate

PM105 is equiped with a 7,2V NiCad rechargeable battery.

Operational hints

When a closed volumetric system is subjected to a change in temperature, the pressure in the system will change as a function of the expansion of the liquid media. The smaller the volume in the system, the larger this effect will be. Likewise, when a system is put under pressure, the tubes, cavity etc., will expand somewhat over time, and hence the volume will increase and the pressure will drop as a function of the increased volume.

When pressure is introduced into the PM105 system by the pump, a large amount of energy is stored in the unit. When doing so, the temperature of the oil will increase slightly, as part of the introduced energy. For this reason, and the reasons listed above, the indicated pressure will drop slightly over time, as the system stabilises its increased temperature and the expansion of the tubes etc. Depending on the applied this will normally take a few minutes.
If a pressure is generated, e.g. 200 Bar, and then dropped quickly down to e.g. 100 Bar, the reverse function, a slight increase in the pressure will occur, for the same reasons.

If the ambient temperature changes over time, and the unit is set to a fixed pressure, the reading will change as a function of the change in temperature.

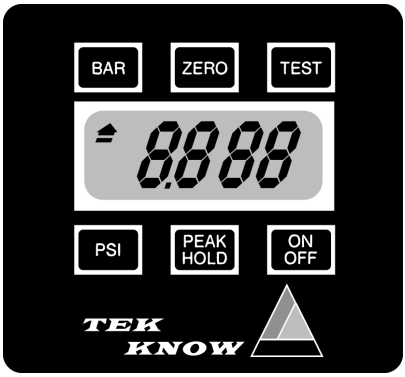
The above is a normal physical behaviour, and should be taken into account in the operational procedures.

PM105 is temperature compensated over the entire temperature range, and as such can be used with the listed accuracy. In order to obtain full accuracy it is important to let the PM105 obtain the ambient temperature in the actual measuring environment. This process may take approximently 3 hours.

Particular attention should be made to the pressure gaskets fitted between the PM105 and the measurement pressure source. Ensure that the correct size gasket is fitted for the selected pressure inlet adaptor, and that the pressure gasket faces are undamaged and free from contamination (e.g. sand, grit etc.).

Basic functions

The various functions are selected from the key panel.



ON/OFF Switches the unit on or off. When switched on the PM105 is initialised and starts to measure in the unit "Bar" as default.

ZERO Sets the displayed pressure value to zero. (+/- 0.000) within the limit of 0 to 125% of full scale. If the pressure exceeds this limit, the display will show "HI HI". The pressure must then be relieved to prevent damage.

TEST Simulates applied pressure, The value on the display should be in accordance with the value indicated on rear panel as «test value». The unit must not be pressurised during this test.

PEAK-HOLD Toggles the device between normal operation and peak hold. Peak hold is capturing transient pressure peak changes with a duration of at least 50 msec. The display will show " PH" when Peak Hold is engaged.

BAR/PSI Toggles between measuring units "Bar or "PSI". The display indicates the unit selected with an pointing arrow.

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Operating supplies

The PM105 is a complete self-contained instrument and does not require additional supplies (i.e. replaceable battery, hydraulic oil etc), for normal operation.

Trouble shooting

Key	Problem	Remedy
ON/OFF	Nothing in the display.	Re-charge the battery.
ZERO	The display does not read "0000" when the "ZERO" button is pressed.	Pressure applied to the inlet port exceeds "zero offset" range. Reduce the pressure at the inlet and repeat the zeroing operation.
TEST	The displayed value is not in accordance with the stated test value when the test button is pressed.	Perform a zero adjustment prior to pressing the test button.
PEAK HOLD	No transient pressure peaks are recorded.	Transients may be less than 50msec in duration and therefore not stored. Confirm if the peak-hold function is toggled on.
BAR PSI	Displayed value does not seem to be in accordance with the applied pressure.	Make sure that the correct measuring unit is selected with the bar/PSI buttons.

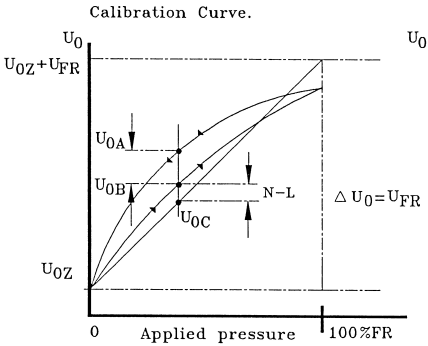
If these remedy's don't solve the problem, the PM105 probably needs to be serviced. Please send it to your supplier. Please include an accurate description of the problem.

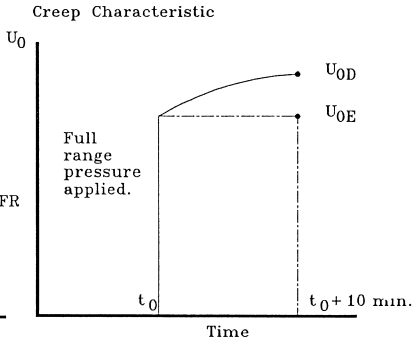
Service and recalibration

Any instrument requires periodical recalibration to comply with the stated accuracy. Please refer to the enclosed test report for recalibration date. Please return your instrument to your supplier on the given recalibration date for recalibration if you need to maintain a valid calibration of the PM105.

This instrument is fully digital, without any trimmers. The unit must be serviced and recalibrated by authorised distributors with calibration equipment and software.

Definition of terminology





Residial output P=0 = U_{oz}

Test Temperature=Ambient=T1

$N\text{-}L_{(BSL)} \quad \frac{U_{0B} - U_{0C}}{U_{FR}} \cdot 100 \quad \%FRO$

$\text{Hysteresis} = \frac{U_{0A} - U_{0B}}{U_{FR}} \cdot 100 \quad \%FRO$

$\text{Creep}_{(10\ min)} = \frac{U_{0D} - U_{0E}}{U_{FR}} \cdot 100 \quad \%FRO$

Due to various standards and to variations in the understanding of those, the above list is a definition of terms, used for the calibration and certification of our products.

Notice

Systems with digital display
(i.e. PC400, PC700, PM105)

If the system is specified as 0.05% FS BSL accuracy, this means that the maximum deviation on a 400 Bar unit can be:

(+/- 0.05% FS) + (+/- 1 resolution unit) = 0.2 + 0.1 = 0.3 Bar above 100 Bar and:
0.2 + 0.05 = 0.25 Bar below 100 bar.

FS always means the full range of the unit, independent of any auto-range on the instrument, since this is related to the transducer, and should be used in the calculations.

Specifications

Display:	12,5mm LCD, 4 digit
Physical dimensions:	92x98x33 mm (WxHxD
Weight:	550g
Pressure ranges: (Bar G)	2 x 0,001 10 x 0,001 20 x 0,001 50 x 0,01 100 x 0,01 200 x 0,1 450 x 0,1 700 x 0,1
Pressure overload:	FS x 1,5
Accuracy:	Better than 0.1% (or 0,05%) combined error FS (Includes non-linearity, repeatability, zero and sensitivity temperature effects)
Pressure element construction:	Wetted parts, 15-5-PH, stainless steel.
Housing constr.:	Extruded aluminium (Anodised).
Units of measurement:	Bar or PSI (selectable).
Dynamic response:	(Peak hold) 50 mS.
Pressure inlet:	1/4" BSP Female.
Process temperature:	-10°C to +60°C
Operating temp.:	(environmental) -10°C to +50°C.
Process media:	All liquids or gases compatible with 15-5-PH stainless steel.

Display refresh rate:	4 times per second.
Power:	Internal 7,2V rechargeable NiCad battery. Approximently 20 hours operation between each recharging.
Charger:	10mA constant current. 12-14 hours charging time.
Calibration:	Traceable to international standards. Refer to the enclosed calibrationcetificate for the specific unit.
EEx/IS certification:	EEx ia IIC T5