PSM INSTRUMENTATION LTD

Ultrameter 5, 7 & 10 user Manual

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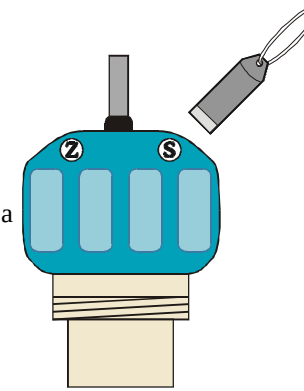
Doc Ref: Man 03

The Ultrameter is designed for measuring liquid levels in open and closed tanks.
There are intrinsically safe versions available in all ranges. These are approved for use in hazardous areas to EEXia IIC T6.

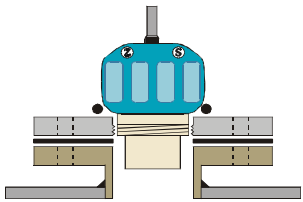


The nose section is manufactured from TEFLON[tm] a Dupont[tm] material resistant to most chemicals, and includes an integral temperature sensing element to ensure temperature compensation and correct level measurement at all temperatures. The electronics housing is manufactured from UPVC. The entire assembly is sealed and protected against accidental immersion.

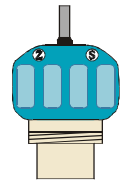
The transducer transmits a series of short, controlled, ultrasonic pulses towards a surface. The reflected echoes are intelligently conditioned remove any noise, and the time taken for the echoes to reach the sensor face are calculated and converted to distance for transmission as a mA current loop output.

The transmitter uses on-board LED's to confirm power is on and that the transmitter is operating correctly. To calibrate, the zero and span levels of the tank are entered into the transmitter by simply touching the 'Z' & 'S' targets, on the transmitter body, with the magnetic key provided.

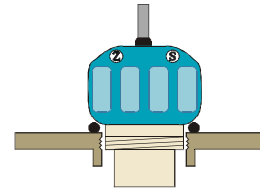
Tank Mounting



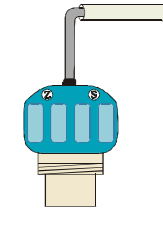
Flange Mount
When flange mounting, use a gasket to ensure acoustic de-coupling hand tighten only.
DN50 PN10, 2" ANSI, JIS10K2B



Suspended
From it's own cable



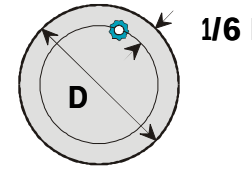
Threaded Pipe
Ensure acoustic de-coupling by hand tightening only



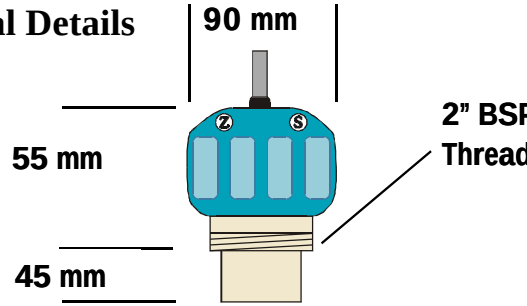
1/2" conduit pipe/hanging
Preferred for dam, filter beds and open channel application

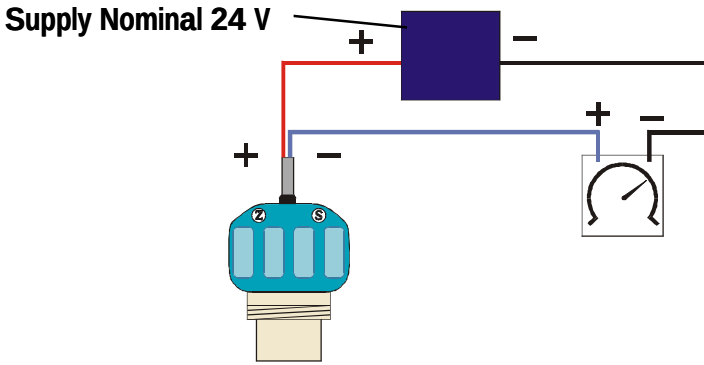
Transmitter Positioning on Tank Roofs

Avoid mounting the transmitter in the centre of the roof of the tank.
The recommended position for the transmitter is 1/6 of the diameter from the tank wall.



Dimensional Details



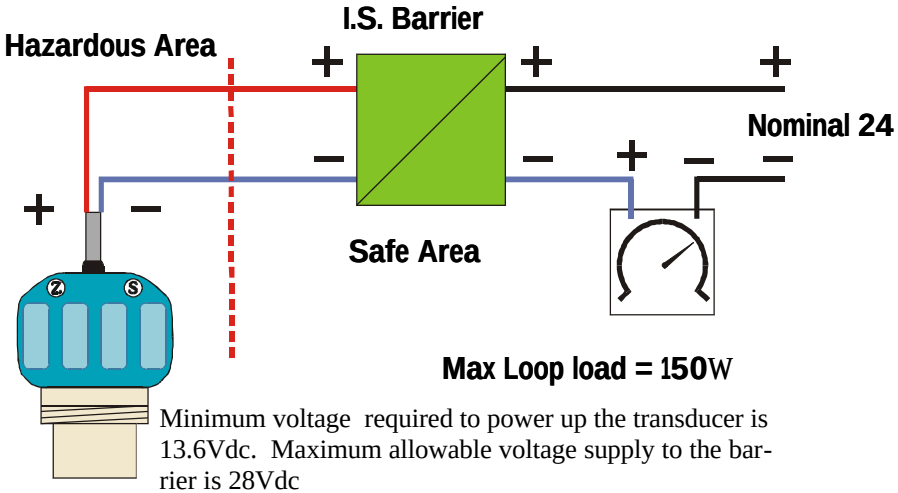


Intrinsically Safe EEx models only

The transmitter is certified intrinsically safe with barriers only.

Recommended barriers:	MTL 787S+, Elcon 1620-2D-P -R
Inspection Authority:	SABS S/R164X
Certification:	EEx is IIC T6 No. 5478/945979/R164

U–i	28 V dc	C-i	100 nano F
I-i	93 mA	I-0	4 to 20 mA
P-i	O.65 mW	L-0	0
L-i	4 micro H	C-0	0



Minimum voltage required to power up the transducer is 13.6Vdc. Maximum allowable voltage supply to the barrier is 28Vdc

The capacitance and inductance or inductance to resistance (L/R) ratio of the interconnecting cable between the transmitter and barrier will not be affected by the transmitter which has zero capacitance and zero inductance storage capacity making the transmitter a very intrinsically safe instrument.

Wiring

Wiring must conform to standard instrumentation practices and wiring codes. The transmitter is reverse polarity protected. It is also protected against indirect lightning strikes. The cable screen should be connected to earth at the power supply. It must not be connected to the + or - conductors.

Calibration

The Ultrameter is designed for measuring liquid or solid contents of a tank with the sensor mounted on the top of the tank. It can be calibrated for 'Level' or 'Ullage'.

Ultrameter's are normally delivered calibrated to their nominal ranges as follows:-

Model	Max Sensing Distance	Min Sensing Distance
Ultrameter 5	4mA set to 5 metres	20mA set to 0.2 metres
Ultrameter 7	4mA set to 7 metres	20mA set to 0.25 metres
Ultrameter 10	4mA set to 10 metres	20mA set to 0.4 metres

Calibration can be carried out 'in situ' at actual tank empty and full levels or by aiming the Ultrameter at a target at distances representing empty and full tank levels. During this procedure the Ultrameter must be firmly clamped for optimum results.

Calibration Procedure

1. Apply power to the Ultrameter. This is nominally 24vdc but must be >13.6Vdc. Insufficient supply voltage will cause both LED's to illuminate at 50% intensity.
2. Initially both LED's will illuminate for about 5secs and then flash while the unit validates the signal. After a further 5-10 seconds LED 1 will go off and LED 2 will begin to pulse, Green if the echo distance is within the Ultrameter's set range, Red if outside the set range.
   If LED 2 shows a constant red indication the signal could not be validated and calibration cannot be carried out.
3. To calibrate the output to 4mA hold the magnetic key against the Z target until both LED's illuminate, remove the key, both LED's will flash for about 5 to 45 seconds while the Ultrameter validates the signal. LED 1 will then turn off and LED 2 pulse Green indicating calibration is complete and the unit is operating in normal measuring mode.
4. To calibrate the output to 20mA hold the magnetic key against the S target and repeat the procedure for Z setting.

Notes-
Calibration of 4mA and 20mA are independent of each other meaning 3 and 4 above can be carried out in either order.

Whereas calibration for liquid level is carried out by setting 4mA at tank empty and 20 mA at tank full, for ullage it is the reverse, calibrating 4mA at full and 20mA at empty. The Ultrameter will operate correctly either way.

Calibration from factory

The transmitter is calibrated to it's maximum range and configured 5m per min response rate and 22mA default output current. The transmitter can be configured to suit exact application requirements. If you wish to change the configuration please contact your local agent or supplier for assistance.

Configuration possibilities:

Response rate 5m/min (averaging) default or immediate
Default current 3.8mA
4.0mA
22mA- default

The Various LED Combinations

L1	L2	
 Green solid	 Green solid	***Power up Mode & enter Calibrate Mode*** On initial power up both LED's illuminate for approximately 5 to 45 seconds whilst unit validates its signal. Both will also illuminate when the magnetic key is held to either 'Z' or 'S' targets to confirm unit has entered ***Calibrate Mode***.
 Off	 Green pulsing	***Normal Operation*** Following power up mode this indicates a valid echo is being received and unit is functioning normally. Where, in normal operation, there is a sudden step change in the echo distance the unit will automatically go to ***Validate Mode***. When it establishes that the new echo is valid the signal output will change accordingly and the LED's will return to ***Normal Operation*** status.
 Off	 Red pulsing	***Invalid Range*** This indicates that a valid echo is being received but that the distance it represents is outside of the calibration limits which have been set for the unit. If this distance is known to be valid the unit can be recalibrated to accept this new distance.
 Green flashing	 Green flashing	***Calibrate Mode / Validate Mode*** When calibrate mode is entered and the magnetic key is removed from the 'Z' or 'S' target both LED's will flash for approximately 5 to 45 seconds while the unit verifies the echo. Assuming echo is verified the LED's go to ***Normal Operation*** status. Note that when the magnetic key is held against the 'Z' or 'S' targets to set calibration the signal will immediately go to 4.00mA or 20mA as appropriate.
		***Low Power*** Both LED's are illuminated at 50% intensity indicating insufficient power to drive the circuit. The unit does not pulse.
 Off	 Red Solid	***No Echo / Echo Loss*** When, after ***Power Up*** mode no echo can be found for approximately 1 minute LED 2 will illuminate red indicating calibration cannot be undertaken. Also, where echo is lost in normal operation, the output signal initially freezes its value. If, after approximately 1 minute of searching a valid echo is not found the output signal goes to the fault condition level set for it and 'L2' goes to red.

Specifications

Range	0.25 to 7m, 0.15 to 5m, 0.4 to 10 m
mA Output	4 to 20mA / 20 to 4 mA
Accuracy	Better than 0.25% of max span
Resolution	3 mm
Display	Two visible surface mount LED's
Power	24 V dc nominal
Power	Maximum 0.44 watts
Power Surge	22 mA on start up
Loop current	4 to 20 mA
Fault current	Set to 22 mA
Loop Load	Rmax = 250 Ohms
Beam angel	8^{o} at –3 dB boundary
Response rate	5 metres per minute
Temp Comp	Built in PT100 for automatic compensation across whole range
Temp range	-20 to +75 deg C
Sensor temp	Max 100 deg C (220 deg F) for 30 minutes
Pressure (vessel)	200 Kpa (G) (2 bar or 30 PSI)
Enclosure rating	IP 68 submersible
Memory	Non-volatile EEPROM
Weight	1 Kg including integral 5 metres of cable
Mounting	2" BSP
Intrinsic safety	EEXia IIC T6 (EEx versions only)
Construction	Combined sensor and housing label cover clear acrylic
	Electronic housing UPVC
	Sensor face TEFZEL™

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