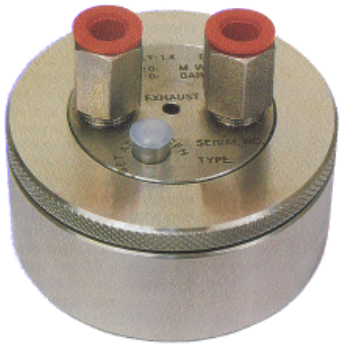
KLAY-INSTRUMENTS

INSTRUCTION MANUAL

1:1 PRESSURE- AND LEVEL TRANSMITTERS

**** WARNING ***
Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining the SERIES LT-SAN or PR.



SERIES LT-SAN

SERIES PR

MANUFACTURER:

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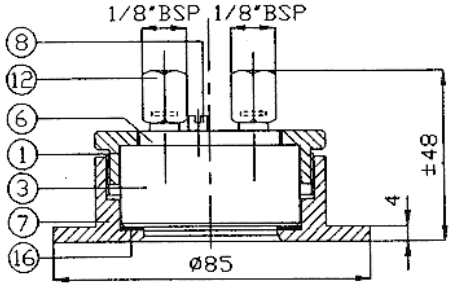
1 INTRODUCTION:

The Klay pneumatic 1:1 transmitters, series LT-SAN and PR, are pressure transmitters with a strong flush mounted diaphragm, which are often used for difficult applications in many industries.
They are often used as a seal with transmitting "air" capability. The accuracy is not effected by temperature changes which is in sealed (oil) systems often a problem.

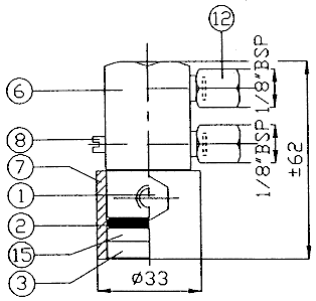
2.1 DIMENSIONAL DRAWING LT-SAN:



PARTS DESCRIPTION: / *MATERIAL:*

1. Lock ring	AISI 304
3. Diaphragm ring	AISI 316
6. Body	AISI 304
7. Weld-on nipple	AISI 316
8. Needle valve	AISI 316
12. Supply/gauge port	AISI 316
16. PTFE seal ring	PTFE

2.2 DIMENSIONAL DRAWING PR:



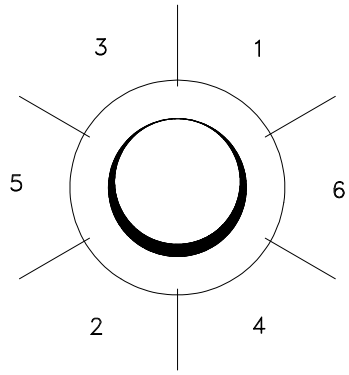
PARTS DESCRIPTION: / *MATERIAL:*

1. Set screw & washer	AISI 304
2. Outer O-ring	VITON
3. Diaphragm ring	AISI 316
6. Body	AISI 304
7. Weld-on nipple	AISI 316
8. Needle valve	AISI 316
12. Supply / gauge port	AISI 316
15. Rear lock ring	AISI 316

3. INSTALLING WELD-ON NIPPLE:

A skilled machinist or welder should perform installation of the weld-on nipple.
Weld Argon, MIG or TIG with the smallest welding pin.

1. Cut a hole in the process vessel/pipe to accept the weld-on nipple. The hole should produce a tight fit when coupled with the weld-on nipple.
2. Prepare the vessel hole by beveling the edge to accept filler material.
3. Remove the weld-on nipple from the transmitter.
4. Remove the PTFE packing of the SERIES LT-SAN.



WARNING:

Improper installation may result in distortion of the weld-on nipple. Excessive heat will distort the weld-on nipple. Weld in sections as shown in the figure left. Allow adequate cooling between passes. To reduce the chances of distortion to the weld-on nipple, use a mandrel.
(SERIES LT-SAN Part.nr. 1019)
(SERIES PR Part.nr. 1016)

5. Position the weld-on nipple in the vessel hole and tack six places.
   The weld sequence is shown in the figure above.
6. Weld the weld-on nipple in place using 0,03 to 0,045 in. (0,762 to 1,143 mm) stainless rod as filler material in the beveled area. Adjust amperage for penetration.
7. Remove mandrel after the welding operation.

4. INSTALLATION OF TRANSMITTER:

Specific information on the various executions of the LT-SAN and how the install and operate these types.

Bevel inside tank or pipe wall in sanitary applications. In all other cases you can make the welding on the outside. Nipple size 62 mm/2.44 inch. The wall of this type is very heavy, no special instructions are necessary for welding this type. Remove transmitter and PTFE packing ring before welding and screw rear lock ring in the 316L weld-on nipple, apply some Moly-kote to the thread. Thread size is M56 x 1.25.

Apply PTFE seal ring and transmitter in weld-on nipple, lock with rear lock ring. Do not over tighten the lock ring, lock by hand and at maximum 1/16 turn more by means of a spanner.

5. CONNECT SUPPLY AIR (ALL TYPES):

All types are marked with supply, gauge, exhaust, ranges and type. Connect the 1/8" BSP supply connector to dry filtered air. Transmitters between 0-10 mWC (14,5 psi) consume approximately 0.07 NM^3/hr (2.5 standard cubic feet/hour).
The air supply must be at least 1,4 bar (for low levels).
All other supply pressures: highest process pressure plus 0.7 bar (10 psi), exhaust always adjusted at 0.07 NM^3/hr, exhaust rate always adjusted with process pressure at zero. The air must be clean and dry, otherwise the flow control valve will become plugged and fail to operate.

6. MAKE GAUGE CONNECTION:

Connect a pressure gauge, (manometer) to the gauge port. If remote operation is desired without booster; up to 30 meters (100 feet). Use a 1:1 booster (Moore, Fairchild, Conoflow, etc.), for remote readings over 30 meters. It is extremely important that all connectors are tight. Use thread seal on all pipe connections between transmitter and remote instruments in order to avoid air leaks.

Klay 1:1 transmitters are for dead end service the slightest leak will (end user) give low reading.

7. TURN ON AIR SUPPLY:

Minimum supply pressure is indicated on the top of the instrument, air should exhaust at a slight rate from exhaust port.

8. LOW READINGS:

If gauge readings appear low, close needle valve, then re-open it to the same point. Please mark before, measure the flow or exhaust that must be by zero process 0.07 NM^3/hr (2.5 SCF/hr). Make sure that there is no leak on the gauge side. The action with the needle valve clears residual carbon and oil gum and restores proper air flow through the transmitter.

9. CONSTRUCTION DIFFERENCE:

There is no construction difference or principle difference between the LT-SAN and LT-SAN/C. Only the diaphragm is different, that means that all parts are interchangeable with the body. There is no difference between the different ranges, a transmitter for 0-500 mmWC (0-20 inch WC) is in construction the same as a unit for 0 -7 bar (0-100 psi) but the center exhaust hole will be smaller when the pressure range is increasing. Also the adjustment between nozzle and diaphragm is different, diaphragm ring/nozzle are screwed closer to each other.

10. SPECIFICATIONS:

RANGES:

LT-SAN: Ranges are available from 0,03 bar (300 mmWC) up to 10 bar, and must be specified at the order. Always mention the process temperature.

PR: Ranges are available from 1 bar up to 10 bar

ACCURACY: 0,3%

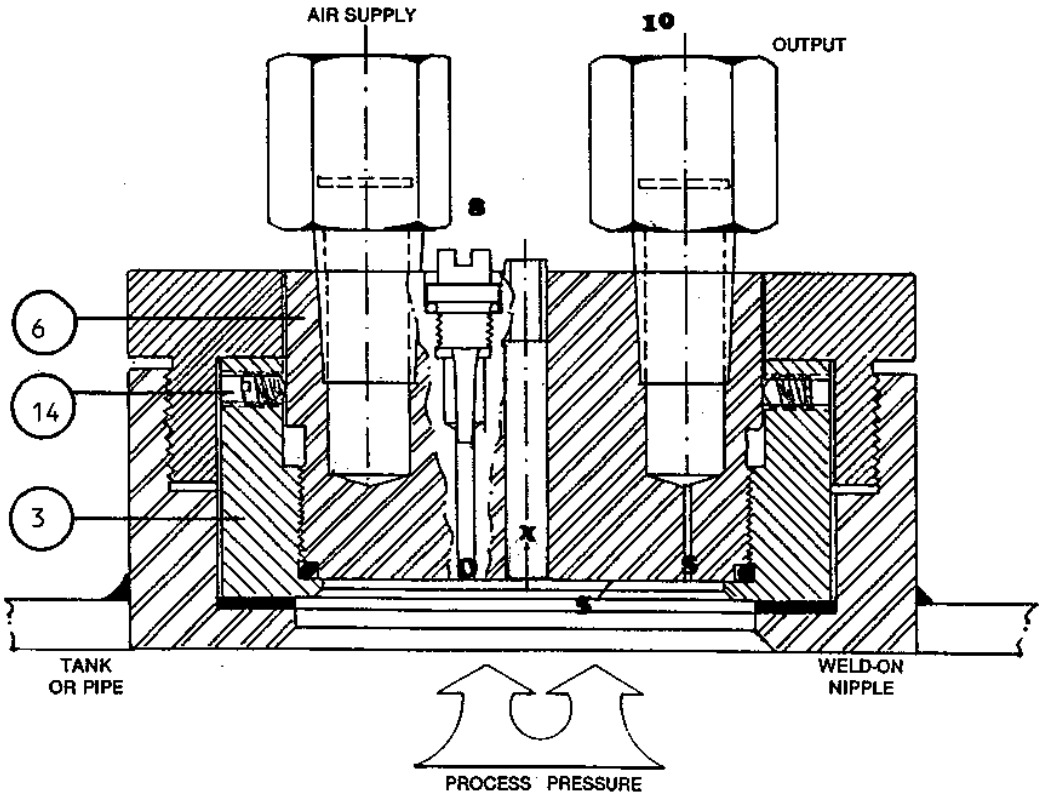
AIR CONSUMPTION: 0.07 NM^3/hr (2,5 standard cubic feet/hour)

AIR SUPPLY: Must be at least 1,4 bar, and always at least 0,7 bar higher than maximum process pressure. (Example: max. pressure 2 bar => air supply min. 2,7 bar)

11. PRINCIPLE OF OPERATION:

The 1:1 transmitters must be supplied with clean and dry instrument air.
The air output is always equal to the process pressure (1:1). The supplied air flows steadily past the needle valve (8) and lifts the diaphragm (inside) from the exhaust (x). When there is no process pressure, the air escapes via the exhaust (x).

An increase of process pressure against the diaphragm blocks the exhaust port (x), until back air pressure at (o) and (s) reaches a point of balance with the process pressure (1:1). The ouput (10) will than be equal to process pressure. The higher the process pressure, the higher the air output (10) (this is 1:1). The system acts reverse with decreasing pressure.



12. TROUBLE SHOOTING FOR LT-SAN:

Field function tests: the purpose of these tests is to determine whether installed and operating transmitters are yielding correct pressure readings.

A. Check the correct supply pressure to the transmitter. The operating range of the transmitter is marked on top of the transmitter. The standard range 0-7 mWC (300 inch WC) works well with 1,4 bar supply. Other ranges should be supplied with regulated supply 0,7 bar (10 psi) higher than the process pressure. In all cases also the supply pressure is indicated on top of the instrument.

B. Check the correct flow of air through transmitter. By zero process pressure, the flow must indicate 0,07 NM^3/hr. (2,5 SCF/hr). It can be measured in the supply line or from the central exhaust port.

C. Check for air line leaks between transmitter and remote instruments, make soap test.

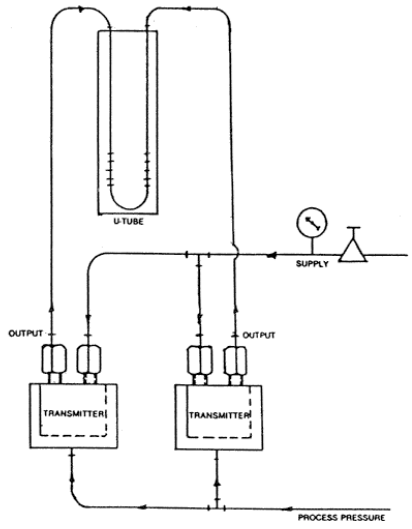
If tests A., B. and C. have been made and low readings are still suspected then all tubing connections between transmitter and remote gauge should be soap bubble tested for leaks. An alternate test is to mount a good gauge directly to the transmitter gauge port as an alternate to searching for and leak testing all the fittings. Do not forget to leak test also the stainless fitting on the instrument. Higher readings at the transmitter will confirm a fitting or line leak. Inspect for diaphragm damage.

Blown or ruptured diaphragms or foreign material trapped under the diaphragm may cause low readings. The suspected transmitter can be removed. Lock transmitter in test nipple, loose Hex set screws (14), turn body (6) anti clockwise, remove transmitter from test nipple and unscrew complete diaphragm. *Do not use high forces on diaphragm ring like pliers or lath head.* It will destroy the bounding.
Inspect bounding, diaphragm and nozzle. Transmitter body face, diaphragm and nozzle must be very smooth, by any damage to body face and nozzle please return to factory, diaphragm can be easily replaced.

13. MATCHED PAIRS FOR DIFFERENTIAL MEASUREMENT:

Levels, flow, Delta P across filters and many other applications can be handled with extreme accuracy. Better than any oil filled system on the market today especially when separation diaphragms are applied and when temperature cycling in the process is involved.

Follow recalibration and adjustments after overhaul for each instrument!



1 Apply one filter reducer to supply both instruments.
2 Make supply and gauge lines from the same size and length. Be sure there is no leakage!
3 Make test stand, so that you can apply same process pressure (air) or use Klay test nipple.
4 Connect gauge lines to a "U" tube (water filled).
5 Example:
A vessel has a pressure of 4 bar and a level of 3 mWC. Put supply on 4 + 0,3 + 0,7 = 5 bar. The vessel pressure can variate from 2 to maximal 4 bar.
6 The "U" tube gives over that range a difference of 40 mmWC when adjustment is 4 bar. If one of the instruments gives a lower output, than screw the diaphragm from that unit a little bit towards the body. Take the following steps:
- Unscrew the 3 hex. set-screws (14).
- Screw the diaphragm ring (3) a little bit to the right (clockwise), so that the diaphragm will go towards the body and nozzle.
- Now screw the 3 hex. set-screws carefully tight.

If the result is not enough, than repeat these steps.
(If the output is too high, than screw the diaphragm ring a little bit to the left (anti clock wise)

IMPORTANT: Make only adjustments on one instrument, the one who gives the lowest output.