



INSTRUCTION MANUAL

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 8000 or SERIES 8000-SAN.

SERIES 8000-SAN



SERIES 8000



Made by:



KLAY INSTRUMENTS

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1 INTRODUCTION:

The SERIES 8000 and SERIES 8000-SAN are solid state pressure- and level transmitters based upon a piezoresistive monocrystalline silicon sensor, with a very high burst pressure.

The sensor element is mounted in a stainless steel foot. A very strong stainless steel “flush” diaphragm protects the sensor from the process medium. Silicone oil fills the chamber surrounding the sensor and transfers pressure from the flush mounted diaphragm to the sensor.

Pressure exerted on the sensor element creates a very small deflection of the silicon substrate and bridge network. The resulting strain in the silicon resistors causes a change in the bridge resistance that is proportional to the pressure applied. The transmitter electronics detects this change in bridge resistance and converts it into 4-20 mA. The amplifier system is based on a single Integrated Circuit, which ensures a perfect linearity in the 4-20 mA output. The electronics are fully encapsulated and are there for unaffected by vibrations and moisture.

1.1 DESCRIPTION SERIES 8000-SAN:

The SERIES 8000-SAN are specially designed to be non-clogging and capable of being cleaned inside, therefore they have a flush mounted diaphragm so they fully meet the needs of the food, chemical and pharmaceutical industries.

Standard the wetted parts are made of SS 316 (AISI), a lot of other materials are available. Various process connections can be delivered, such as Tri-Clamp, SMS, dairy milk couplings, flanges and very sanitary weld-on nipples ø 62 and 85 mm.

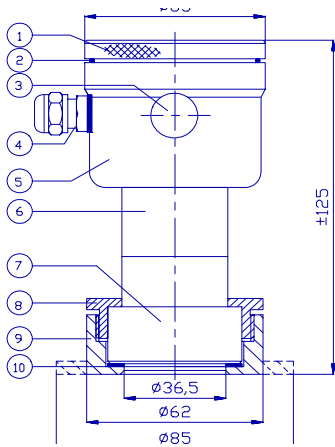
1.2 DESCRIPTION SERIES 8000:

The SERIES 8000 is specially designed for the pulp- and paper industry or similar, where clogging is a problem. The very compact construction of the SERIES 8000 permits flush installation with the tank- or pipe wall. Standard the wetted parts are made of SS 316 (AISI), a lot of other materials are available.

The SERIES 8000 and SERIES 8000-SAN are fully temperature compensated, which means that various process temperatures have nearly no effect on the accuracy of the output signal. When a failure occurs, the transmitter is repairable. We keep record of all resistors that are used in a certain combination, so that it's possible to change the sensor and diaphragm as one part, or the electronic circuit board. However, for optimum accuracy the transmitter has to be send back to the factory.

1.3 BAROMETRIC REFERENCE:

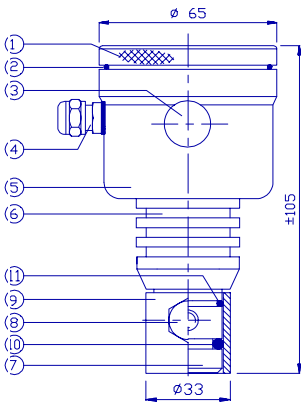
The SERIES 8000-SAN is in basic a so called “relative transmitter” which means that barometric changes will not affect the zero (4 mA). The venting hole (3) is placed at the side of the electronic housing and is the barometric reference to atmospheric. The venting hole must be kept clean.



2.1 DIMENSIONAL DRAWING 8000-SAN:

PARTS DESCRIPTION: MATERIAL:

1. Cover	SS 304
2. O-ring	EPDM
3. Venting	
4. PG9 Cable Gland	
5. Electronic Housing	SS 304
6. Foot	SS 304
7. Diaphragm and ring	SS 316
8. Lock-ring	SS 304
9. Weld-on nipple	SS 316 L
10. Packing	PTFE



2.2 DIMENSIONAL DRAWING 8000:

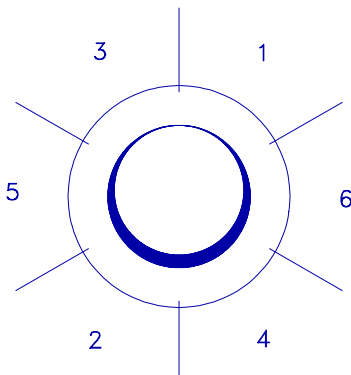
PARTS DESCRIPTION: MATERIAL:

1. Cover	SS 304
2. O-ring	EPDM
3. Venting	
4. PG9 Cable Gland	
5. Electronic Housing	SS 304
6. Cooling fins	SS 304
7. Diaphragm and ring	SS 316
8. M8 Bolt	SS 304
9. Weld-on nipple	SS 316 L
10. O-ring	VITON
11. O-ring	VITON

2.3 INSTALLING WELD-ON NIPPLE:

Installation of the weld-on nipple should be performed by a skilled machinist or welder. 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 bevelling the edge to accept filler material.
3. Remove the weld-on nipple from the transmitter.
4. Remove the PTFE packing of the SERIES 8000-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 8000-SAN Part. nr. 1019)
(SERIES 8000 Part. nr. 1016)

The position of the electronic housing (SERIES 8000) is fixed by the welding position of the weld-on nipple. Before welding, locate weld-on nipple so that the cable entry and the venting are in the right direction.

5. Position the weld-on nipple in the vessel hole and tack six places.
6. The weld sequence is shown in the figure above.
7. 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 bevelled area. Adjust amperage for penetration.
8. Remove mandrel after the welding operation.

3 INSTALLING TRANSMITTER:

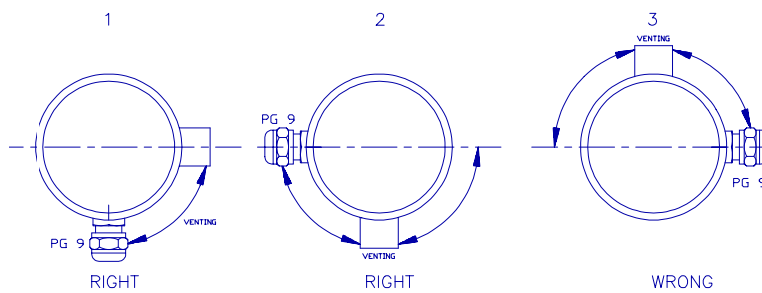
The diaphragm of the transmitter is protected with a special protection cap. Protect the diaphragm until installation takes place. DO NOT DAMAGE THE DIAPHRAGM.

3.1 INSTALLING TRANSMITTER SERIES 8000-SAN:

1. Improper installation at the packing can cause a process leak.
2. Make sure to correctly locate the packing within the weld-on nipple.
3. Position the transmitter into the weld-on nipple and begin engaging threads. The transmitter can be rotated prior to seating enabling the user to optimise access to calibration adjustments, cable entry, and local indicator.
4. Once Lock-ring (8) has been hand tightened, snug an additional turn with adjustable pliers (1/8").

3.2 INSTALLING TRANSMITTER SERIES 8000:

1. After welding, clean up edges, take care of the inside nipple wall.
2. Make sure the O-rings (10) and (11) are properly located. Improper installation at the O-ring can cause a process leak.
3. Apply silicone grease to the O-ring (10), diaphragm ring and the hole inside wall of the weld-on nipple, this prevents galvanic cell corrosion between transmitter and nipple inside.
4. Install the transmitter and fix it with the SS M8 bolt.



3.3 MOUNTING POSITION:

When the transmitter is mounted horizontal, the venting MUST be pointed horizontal to downwards. See figure left.

- 1 = Right (= Preferred Position)
- 2 = Right

All other mounting positions are NOT allowed (3 = Wrong).

3.4 MOUNTING POSITION EFFECT:

The transmitters are calibrated in horizontal position. If the transmitter is mounted vertical (up or down), there will be a zero shift. If the transmitter is mounted up there is a zero shift (< 4mA). If the transmitter is mounted down there is a zero shift (> 4mA). After installation of the transmitter the zero must be set at 4 mA with the zero potentiometer.

DO NOT change the span.

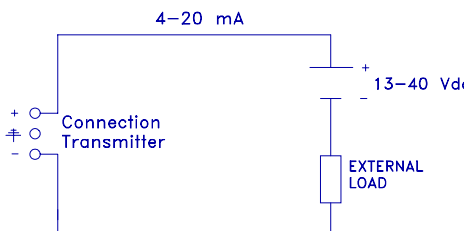
3.5 CALIBRATION:

All transmitters are fully calibrated at the factory, to the conditions stipulated in users order. When the buyer has not requested calibration, the transmitter will be calibrated at the lowest span. It may be advisable to recalibrate the transmitter after shipment. For wiring connection see next page.

The calibration sequence is as follows:

1. The output of the transmitter must be set at 4 mA (Zero-potentiometer).
2. Air pressure in accordance with the process pressure must be put on the test nipple.
3. The output of the transmitter must be set at 20 mA (Span-potentiometer).
4. Remove the air pressure.
5. Check if the output of the transmitter is 4 mA. (Otherwise repeat steps 1 till 4)
6. Install transmitter (See above).
7. The output must be set at 4 mA (dependable of mounting position).

4 **WIRING:**

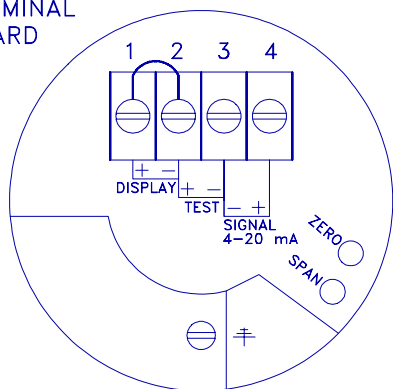


The connector, and **zero / span** potentiometers are under the cover. Test nipples for calibration of the SERIES 8000 and SERIES 8000-SAN are available on request.

In most circumstances the load should be placed in the negative leg of the 2-wire loop, although it is not necessary.

The figure left shows the wiring connection of the transmitter. The 2-wires must be connected to connectors 3(-) and 4 (+) of the terminal board.

TERMINAL BOARD



The signal wiring does not need to be shielded, but twisted pairs yield best results. DO NOT run signal wiring in open trays with power wiring, or near heavy electrical equipment. Signal wiring may be grounded at any point on the measurement loop, or it may be left ungrounded. We advise to choose the negative side of the power supply as a grounding point. The transmitter case may be grounded or left ungrounded.

Care must be taken to assure that the polarity of the power supply is correct, a reversal of wiring polarity will not damage the transmitter, but it will not function until the wiring is connected correctly.

4.1 **DIGITAL LOCAL INDICATOR:**

The local indicator displays a digital value that is proportional to the pressure measured by the transmitter. The full scale point may be set to any value between 0000 and 1999.

The local indicator can be mounted afterwards.

Remove the bridge which is placed between connector (1) and (2).

Connect the red (+) wire to (1) and the black (-) wire to (2).

When using a local indicator the minimum power supply must be **15,5 Vdc**.

4.2 **HAZARDOUS AREA:**

The SERIES 8000 and SERIES 8000-SAN can be certified for applications in hazardous areas.

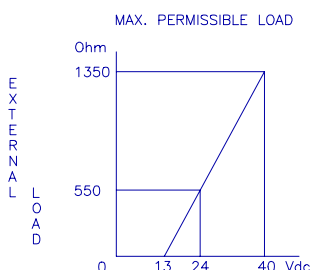
In that case a *blue cable gland* will be used.

Certification: EEx ia IIC T4. Intrinsically safe.

When the transmitter is used in such areas, use a certified power supply, from 17-28 Vdc.

4.3 **CE-rules:**

All our transmitters are manufactured according to the CE-rules. All transmitters are standard equipped with RFI filters. The influence on Radio Frequency Interference between 10 MHz to 10 GHz is negligible.



4.4 **EXTERNAL LOAD:**

The minimum power supply is based on the total circuit resistance. The maximum permissible load (Ri max.) in case of 24 Vdc is 550 Ohm.

By increasing the power supply, the external load can be increased to 1350 Ohm / 40 Vdc. (see figure left).

$$Ri \text{ max.} = \frac{\text{Power Supply} - 13 \text{ Vdc (min. power supply)}}{20 \text{ mA}}$$

PRECAUTIONS and WARNINGS:

- Check if the specifications of the transmitter meet the needs of the process conditions.
- When the SERIES 8000 or 8000-SAN is used as a level transmitter, be aware of the place where the transmitter is mounted. Here are some suggestions:
 1. DO NOT mount a level transmitter in- or near filling or discharging pipes.
 2. In case of automatic cleaning systems or hand cleaning: never point the water jets on the diaphragm, take necessary steps to avoid this. Guarantee will not be granted.
- When the SERIE 8000 or SERIES 8000-SAN is used as a pressure transmitter, be aware of the following points:
 1. Rapid closing valves in combination with high flow velocity will cause water hammer(spikes) and can destroy the transmitter. DO NOT mount a transmitter near such valves, always a few pipe bends away up or down stream (avoid suction).
 2. Install a pressure transmitter a few pipe bends away from pumps, as well on the suction or pressure side of the pump.
- **WELDING ADVISEMENT:**

When using the SERIES 8000 or 8000-SAN code "W" the welding advisements on page 3 must be followed exactly. This is very important to prevent distortion of the weld-on nipples. It also prevents the screw thread from the SERIES 8000-SAN (M56 x 1,25) from not get deformed.
- The diaphragm of the transmitter is protected with a special protection cap. Protect the diaphragm until installation takes place, to prevent damaging of the diaphragm.
- As soon as the wiring is brought inside through the PG9 cable gland and connected to the terminal board, make sure the cable gland is tightly fixed, so that moisture cannot enter into the electronic housing.
- NEVER unscrew the venting(3), because it is especially designed to prevent moisture from entering into the electronic housing. If the ambient conditions are very wet, we advise to use a venting through the cable. A special vented cable can be delivered on request.
- Avoid high pressure water-jets pointed at the venting.
- Turn the cover (1) hand-tight, so that moisture cannot enter into the electronic housing.
- **WARRANTY:** The warranty is 1 year from purchase date. Klay Instruments assumes no liability for consequential damage of any kind due to use or misuse of the SERIES 8000 or SERIES 8000-SAN. Decision regarding warranty claims is at the discretion of the manufacturer. Transmitter must be shipped prepaid to the factory on manufacturer's authorization.
- **NOTE:** Klay Instruments reserves the right to change its specifications at any time, without notice. Klay Instruments is not an expert in the customer's process (technical field) and therefore does not warrant the suitability of its product for the application selected by the customer.

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