

KLAY-INSTRUMENTS B.V.

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:

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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 therefore 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 processconnections can be delivered, such as Tri-Clamp, SMS, dairy milkcouplings, flanges and very sanitary weld-on nipples ϕ 62 and 85 mm.

1.2 DESCRIPTION SERIES 8000:

The SERIES 8000 code W 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 pipewall. Standard the wetted parts are made of SS 316 (AISI), a lot of other materials are available.

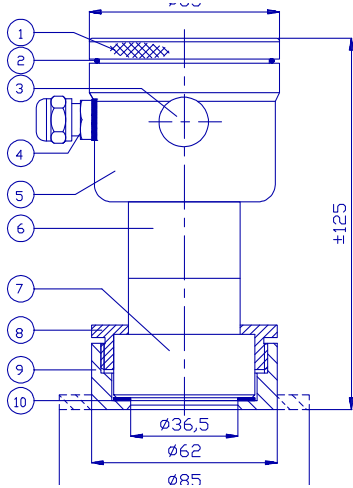
The SERIES 8000 and SERIES 8000-SAN are fully temperature compensated, which means that various process-temperatures have nearly no effect on the accuracy of the output signal. When a failure occurs, the transmitter is repairable. We keep record of all resistors that are used in a certain combination, 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 / 8000-SAN are in basic so called "relative transmitters" 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:

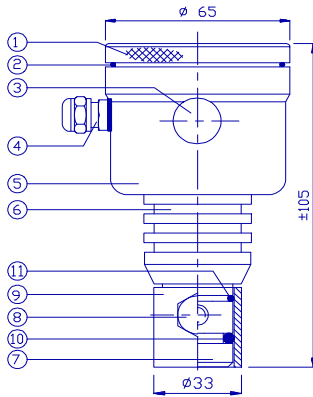


- | | |
|-----------------------|----------|
| 1. Cover | SS 304 |
| 2. O-ring | EPDM |
| 3. Venting | |
| 4. PG9 Cable Gland | |
| 5. Electronic Housing | SS 304 |
| 6. Foot | SS 304 |
| 7. Diaphragm and ring | SS 316 |
| 8. Lock ring | SS 304 |
| 9. Weld-on nipple | SS 316 L |
| 10. Packing | PTFE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

2.2 DIMENSIONAL DRAWING 8000:

PARTS DESCRIPTION:

MATERIAL:

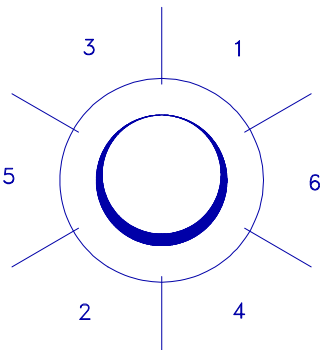


- | | |
|-----------------------|----------|
| 1. Cover | SS 304 |
| 2. O-ring | EPDM |
| 3. Venting | |
| 4. PG9 Cable Gland | |
| 5. Electronic Housing | SS 304 |
| 6. Cooling fins | SS 304 |
| 7. Diaphragm and ring | SS 316 |
| 8. M8 Bolt | SS 304 |
| 9. Weld-on nipple | SS 316 L |
| 10. O-ring |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

- 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.
- Prepare the vessel hole by bevelling the edge to accept filler material.
- Remove the weld-on nipple from the transmitter.
- 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.

- Position the weld-on nipple in the vessel hole and tack six places. The weld sequence is shown in the figure above.
- 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.
- 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.**

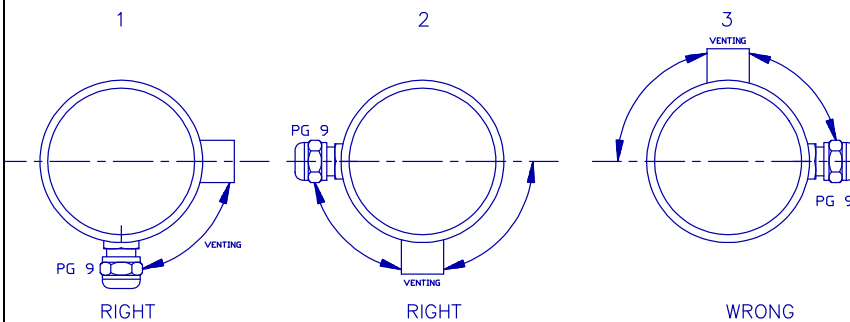
3.1 INSTALLING TRANSMITTER SERIES 8000-SAN:

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 optimize access to calibration adjustments, cable entry, and local indicator.
4. Once Lockring (8) has been hand tightened, snug an additional turn with adjustable pliers (1/8").

3.2 INSTALLING TRANSMITTER SERIES 8000 code W:

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.

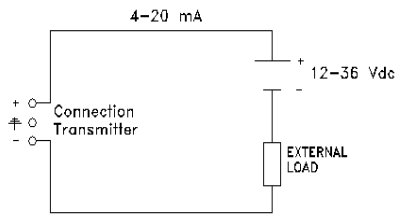
It may be adviseable to recalibrate the transmitter after shipment.

For wiring connection see next page.

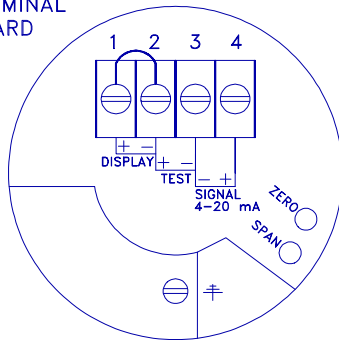
The calibration sequence is as follows:

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:**



TERMINAL BOARD



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.

The signal wiring must be shielded and twisted pair yield the best results. DO NOT run signal wiring in open trays with power wiring, or near "heavy" electrical equipment (E.g. Frequency controllers or heavy pumps).

Shielding must always be connected at the side of the power supply.

The transmitter ground (internal or external) must **NOT** be grounded when the mounting position is already grounded.

This is extremely important to prevent an "earth loop".

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. When the transmitter is used in such areas, use a certified power supply, from 13 - 26,5 Vdc. Installation of this device has to be carried out by a certified and qualified mechanic or a certified and qualified installer.

CERTIFICATION: CE 0344 KEMA 03ATEX1219 X II 1 G EX ia IIC T4 Ga:

$-30^{\circ}\text{C} < T_{amb} < 70^{\circ}\text{C}$ $U_i = 26,5 \text{ Vdc}$, $I_i = 110 \text{ mA}$, $C_i = 1 \text{ nF}$, $L_i = 1 \text{ mH}$, $P_i = 0,9 \text{ W}$

The X in the certificate number refers to a special condition only applicable for our submersible level transmitter "HYDROBAR" –cable and –FR. See for this conditions the ATEX-certificate.

4.3 **TRACEABILITY YEAR OF MANUFACTURING:**

The year of manufacturing of the transmitter can be traced as follows: take the first two numbers from the serial number that is engraved in the transmitter and add 1908.

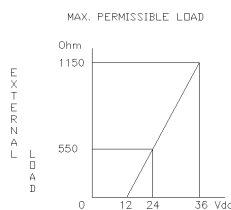
For example: if the serial number is 9302123. The year of manufacturing is 1908 + 93 = 2001.

4.4 **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 neglectable.

4.5 **EXTERNAL LOAD:**

The maximum permissible load ($R_i \text{ max.}$) in case of 24 Vdc is 550 Ω (Ohm).



By increasing the power supply, the external load can be increased to 1150 Ohm / 36 Vdc. (see figure left).

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

5.

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 advises:**
 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 distroy 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 B.V. does not accept liability for consequential damage of any kind due to use or misuse of the SERIES 8000 or SERIES 8000-SAN. Warranty will be given, to be decided by the manufacturer. Transmitter must be shipped prepaid to the factory on manufacturer's authorization.**
- **NOTE: Klay Instruments B.V. reserves the right to change its specifications at any time, without notice. Klay Instruments B.V. is not an expert in the customers'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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EC-DECLARATION OF CONFORMITY

Klay Instruments B.V.

Nijverheidsweg 5, 7991 CZ Dwingeloo, The Netherlands

Certify that the equipment intended for use in potentially explosive atmospheres, only new products, indicated here after:

Electronic Pressure- and Level Transmitters
Series 8000-SAN, Series 8000, Series CER-8000
Hydrobar-Cable, Hydrobar-EXTD, Hydrobar-FR

Are in accordance with:

- Directive 94/9/EC of 23 march 1994 (equipment and protective systems intended for use in potentially explosive atmospheres).
- Directive 89/336/EEC of 03 may 1989 (Electro Magnetic Compatibility).
- Harmonized standards:
 - EN 60079-0: 2009 (General rules)
 - EN 60079-11: 2007 (Intrinsic safety "i")
 - EN 60079-26:2007 (Group II cat. 1G requirements)
 - IEC 61000-6-2: 2001 (EMC, Immunity in industrial location)
 - IEC 61000-6-3: 2001 (EMC, Emission in industrial location)
 - IEC 61000-6-4: 2001 (EMC, Emission in industrial location)
 - NEN-EN 13980: 2007 (Potentially explosive atmospheres – Application of quality systems)

- The type (protection mode "ia") which has been the subject of;

EC-type Examination Certificate Numbers:

KEMA 03 ATEX1219 X

delivered by the KEMA, Utrechtseweg 310, 6812 AR Arnhem, The Netherlands, notified body Nr. 0344,

Manufacturing plant in Dwingeloo which has been the subject of;

Production Quality Assurance Notification Nr.:

KEMA 06 ATEX Q0188

delivered by the KEMA, Utrechtseweg 310, 6812 AR Arnhem, The Netherlands, notified body Nr. 0344

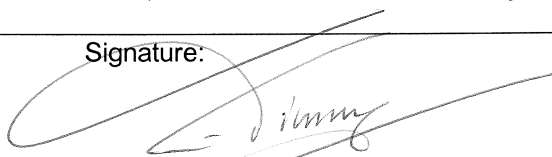
Date: April 1st 2011

E. Timmer

Managing Director

Klay Instruments B.V.

Signature:



The marking of the equipment is as follows:

II 1G Ex ia IIC T4 Ga

"II" means that the equipment has been built for use in surface industries (and not in mines endangered by firedamp).

"1" equipment for use in Zone 0 (if G)

"G" equipment for use with gas, vapours or mists

"Ex" equipment in compliance with European standards for explosive atmospheres

"ia" equipment in compliance with specific building rules for intrinsically safe equipment

"C" equipment for use with gas of subdivision C

"T4" equipment whose surface temperature does not exceed 135°C when used in an ambient temperature < 70 °C.

Protection Grade, Series 8000-SAN, 8000, CER-8000, **IP 66**

Protection Grade, Series Hydrobar-cable, Hydrobar-EXTD, **IP 66**

The Hydrobar-FR and all other submersible parts from the Series Hydrobar are IP 68.

Furthermore, whatever the protection mode, only use cable glands with a protection degree of at least IP 66.

Be sure the cable diameter complies with the selected cable gland. Tighten the cable gland in a proper way.

Never forget to mount the covers of the electronics housings in a proper way.

For other technical details, refer to the instruction manuals of the series transmitters.



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