ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION

266 with PROFIBUS PA Communication

Pressure transmitters

Engineered solutions for all applications

Measurement made easy

266 models

Introduction

The 2600T family provides comprehensive range of top quality pressure measurement products, specifically designed to meet the widest range of applications ranging from arduous conditions in offshore oil and gas to the laboratory environment of the pharmaceutical industry.

For more information

Further publications for 2600T series pressure products are available for free download from www.abb.com/pressure

The Company

We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with acontinuous program of innovative design and development to incorporate the latest technology.

Contents

1. Introduction

1.1 Instruction manual structure

The present manual provides information on installing, operating, troubleshooting the 266 pressure transmitter. Every section of the present manual is specifically dedicated to the specific phase of the transmitter lifecycle starting from the receipt of the transmitter and its identification, passing to the installation, to the electrical connections, to the configuration and to the troubleshooting and maintenance operations.

1.2 Models covered by this manual

The present manual can be used for all the 266 models with exception done for the 266C (multivariable version).

1.3 Product description

The pressure transmitters model 266 is a modular range of field mounted, microprocessor based electronic transmitters, multiple sensor technologies. Accurate and reliable measurement of differential pressure, gauge and absolute pressure, flow and liquid level is provided, in the even most difficult and hazardous industrial environments. Model 266 can be configured to provide specific industrial output signals according to the selected digital communication.

2 Safety

2.1 General safety information

The “Safety” section provides an overview of the safety aspects to be observed for operation of the device.

The device has been constructed in accordance with the state of the art and is operationally safe. It has been tested and left the factory in perfect working conditions. The information in the manual, as well as the applicable documentation and certificates, must be observed and followed in order to maintain this condition throughout the period of operation.

Full compliance with the general safety requirements must be observed during operation of the device. In addition to the general information, the individual sections in the manual contain descriptions of processes or procedural instructions with specific safety information.

Only by observing all of the safety information can you reduce to the minimum the risk of hazards for personnel and/or environment. These instructions are intended as an overview and do not contain detailed information on all available models or every conceivable event that may occur during setup, operation, and maintenance work.

For additional information, or in the event of specific problems not covered in detail by these operating instructions, please contact the manufacturer. In addition, ABB declares that the contents of this manual are not part of any prior or existing agreements, commitments, or legal relationships; nor are they intended to amend these.

All obligations of ABB arise from the conditions of the relevant sales agreement, which also contains the solely binding warranty regulations in full. These contractual warranty provisions are neither extended nor limited by the information provided in this manual.

Caution. Only qualified and authorized specialist personnel should be charged with installation, electrical connection, commissioning, and maintenance of the transmitter. Qualified personnel are persons who have experience in installation, electrical wiring connection, commissioning, and operation of the transmitter or similar devices, and hold the necessary qualifications such as:

- Training or instruction, i.e., authorization to operate and maintain devices or systems according to safety engineering standards for electrical circuits, high pressures, and aggressive media
- Training or instruction in accordance with safety engineering standards regarding maintenance and use of adequate safety systems.

For safety reasons, ABB draws your attention to the fact that only sufficiently insulated tools conforming to DIN EN 60900 may be used.
Since the transmitter may form part of a safety chain, we recommend replacing the device immediately if any defects are detected. In case of use in Hazardous Area non sparking tools only must be employed.

In addition, you must observe the relevant safety regulations regarding the installation and operation of electrical systems, and the relevant standards, regulations and guidelines about explosion protection.

Warning. The device can be operated at high levels of pressure and with aggressive media. As a result, serious injury or significant property damage may occur if this device is operated incorrectly.

2.2 Improper use

It is prohibited to use the device for the following purposes:

- As a climbing aid, e.g., for mounting purposes
- As a support for external loads, e.g., as a support for pipes.
- Adding material, e.g., by painting over the name plate or welding/soldering on parts
- Removing material, e.g., by drilling the housing.

Repairs, alterations, and enhancements, or the installation of replacement parts, are only permissible as far as these are described in the manual. Approval by ABB must be requested for any activities beyond this scope. Repairs performed by ABB-authorized centers are excluded from this.

2.3 Technical limit values

The device is designed for use exclusively within the values stated on the name plates and within the technical limit values specified on the data sheets.

The following technical limit values must be observed:

- The Maximum Working Pressure may not be exceeded.
- The Maximum ambient operating temperature may not be exceeded.
- The Maximum process temperature may not be exceeded.
- The housing protection type must be observed.

2.4 Warranty prevision

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, using underqualified personnel, or making unauthorized alterations, releases the manufacturer from any liability for any resulting damage. This makes the manufacturer’s warranty null and void.

2.5 Use of instruction

Danger – <Serious damage to health/risk to life>. This message indicates that an imminent risk is present. Failure to avoid this will result in death or serious injury.

Caution – <Minor injuries>. This message indicates a potentially dangerous situation. Failure to avoid this could result in minor injuries. This may also be used for property damage warnings.

Important. This message indicates indicates operator tips or particularly useful information. It does not indicate a dangerous or damaging situation.

Warning – <Bodily injury>. This message indicates a potentially dangerous situation. Failure to avoid this could result in death or serious injury

Attention – <Property damage>. This message indicates a potentially damaging situation. Failure to avoid this could result in damage to the product or its surrounding area.

2.6 Operator liability

Prior to using corrosive and abrasive materials for measurement purposes, the operator must check the level of resistance of all parts coming into contact with the materials to be measured.

ABB will gladly support you in selecting the materials, but cannot accept any liability in doing so.

The operators must strictly observe the applicable national regulations with regard to installation, function tests, repairs, and maintenance of electrical devices.

2.7 Qualified personnel

Installation, commissioning, and maintenance of the device may only be performed by trained specialist personnel who have been authorized by the plant operator. The specialist personnel must have read and understood the manual and comply with its instructions.

2.8 Returning devices

Use the original packaging or suitably secure shipping package if you need to return the device for repair or recalibration purposes. Fill out the return form (see the end of the document) and include this with the device.

According to EC guidelines and other local laws for hazardous materials, the owner of hazardous waste is responsible for its disposal. The owner must observe the proper regulations for shipping purposes.

All devices sent back to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

2.9 Disposal

ABB actively promotes environmental awareness and has an operational management system that meets the requirements of DIN EN ISO 9001:2000, EN ISO 14001:2004, and OHSAS 18001. Our products and solutions are intended to have minimum impact on the environment and persons during manufacturing, storage, transport, use and disposal.

This includes the environmentally friendly use of natural resources. ABB conducts an open dialog with the public through its publications.

This product/solution is manufactured from materials that can be reused by specialist recycling companies.

2.10 Information on WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment)

This product or solution is subject to the WEEE Directive 2012/19/EU or corresponding national laws. Starting from August 15th 2018, electrical and electronic equipment marked with the crossed-out wheeled bin symbol may not be disposed as unsorted municipal waste. Waste of electrical and electronic equipment (WEEE) shall be treated separately using the national collection framework available to customers for the return, recycling and treatment of WEEE.

Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials. ABB can accept and dispose of returns for a fee.

2.11 Transport and storage

— After unpacking the pressure transmitter, check the device for transport damage.

— Check the packaging material for accessories.

— During intermediate storage or transport, store the pressure transmitter in the original packaging only.

For information on permissible ambient conditions for storage and transport, see “Technical data”. Although there is no limit on the duration of storage, the warranty conditions stipulated on the order acknowledgment from the supplier still apply.

2.12 Safety information for electrical installation

Electrical connections may only be established by authorized specialist personnel in accordance with the electrical circuit diagrams. The electrical connection information in the manual must be observed; otherwise, the applicable protection type may be affected. Ground the measurement system according to requirements.

2.13 Safety information for inspection and maintenance

Warning – Risk to persons. There is no EMC protection or protection against accidental contact when the housing cover is open. There are electric circuits within the housing which are dangerous if touched. Therefore, the auxiliary power must be switched off before opening the housing cover.

Warning – Risk to persons The device can be operated at high pressure and with aggressive media. Any process media released may cause severe injuries. Depressurize the pipeline/tank before opening the transmitter connection.

Corrective maintenance work may only be performed by trained personnel.

— Before removing the device, depressurize it and any adjacent lines or containers.

— Check whether hazardous materials have been used as materials to be measured before opening the device. Residual amounts of hazardous substances may still be present in the device and could escape when the device is opened.

— Within the scope of operator responsibility, check the following as part of a regular inspection:

Pressure-bearing walls/lining of the pressure device

Measurement-related function

Leak-tightness

Wear (corrosion)

3 Transmitter overview

3.1 Transmitter components overview

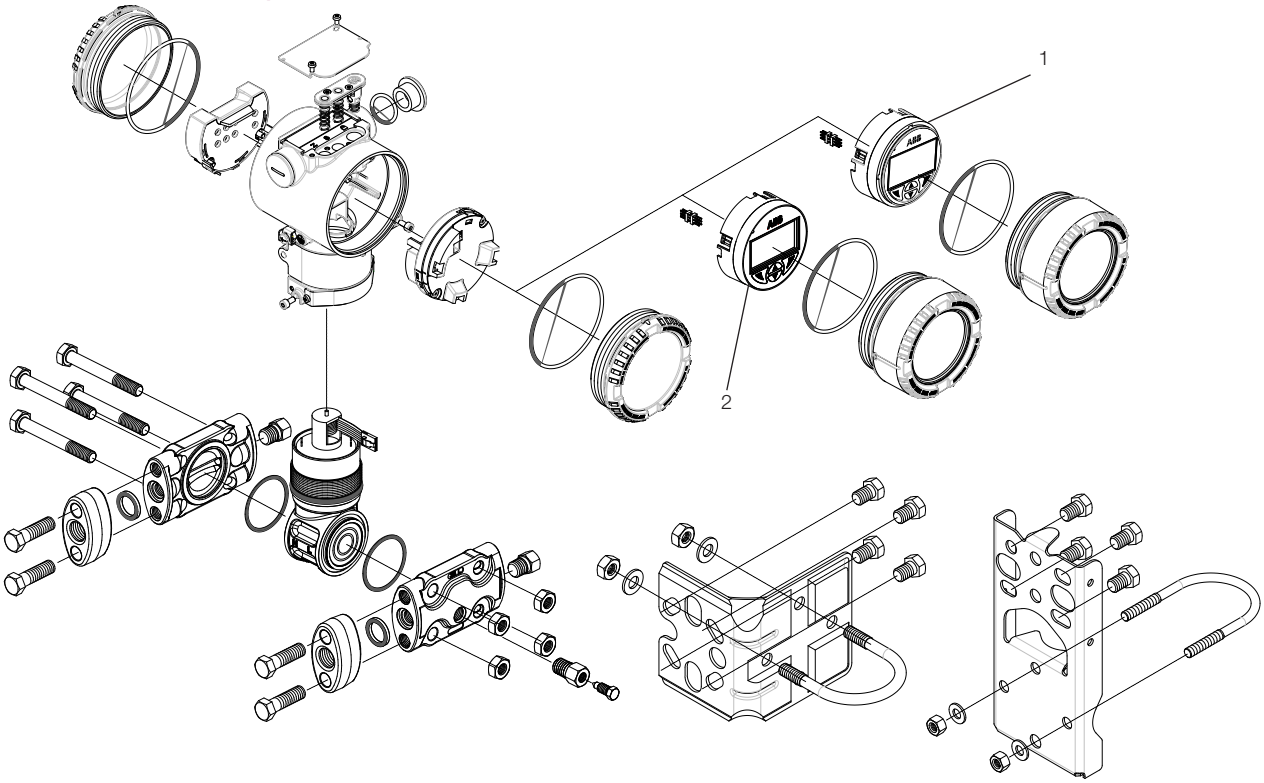
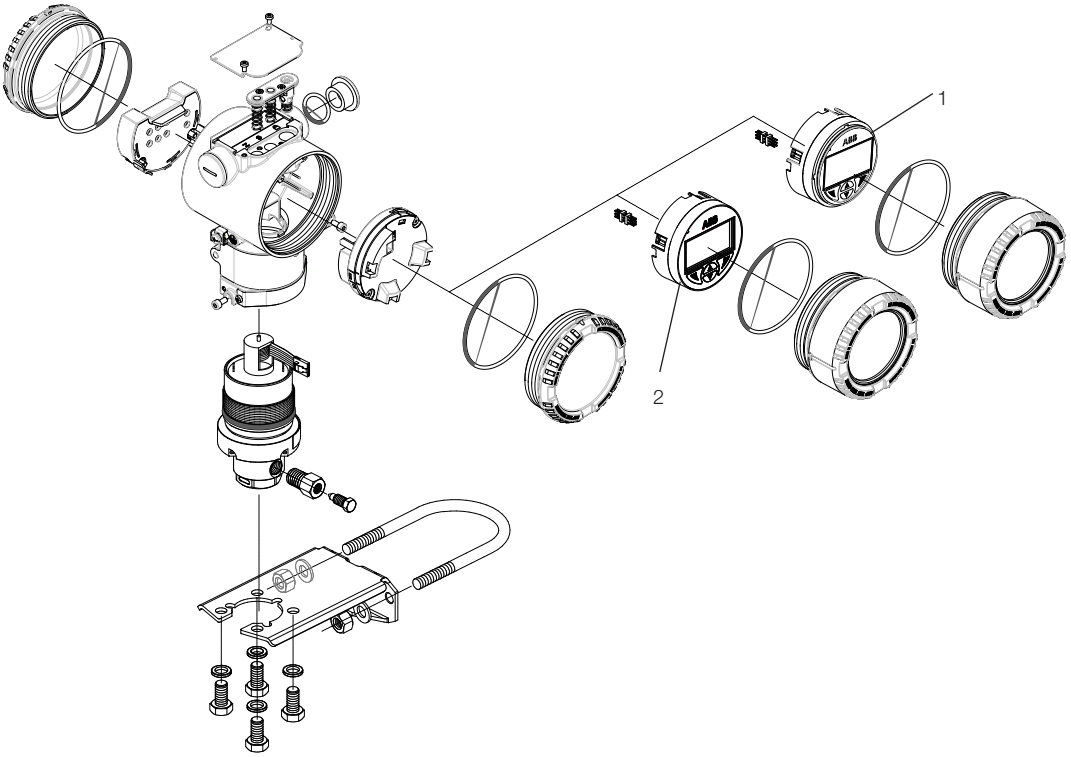


Figure 1: Differential pressure transmitter components



1 - TTG display (L5 option)
2 - LCD display (L1 option)

Figure 2: Gauge / absolute pressure transmitter components

Important. These two pictures show only two different kinds of transmitters equipped with Barrel type housing. Please consider that DIN housings are available.

3.2 Range & Span consideration

The 2600T Transmitter Specification Sheets provide all information concerning the Range and Span limits in relation to the model and the sensor code.

The terminology currently used to define the various parameters is as follows:

URL: Upper Range Limit of a specific sensor. The highest value of the measured value that the transmitter can be adjusted to measure.

LRL: Lower Range Limit of a specific sensor. The lowest value of the measured value that the transmitter can be adjusted to measure.

URV: Upper Range Value. The highest value of the measured value to which the transmitter is calibrated.

LRV: Lower Range Value. The lowest value of the measured value to which the transmitter is calibrated.

SPAN: The algebraic difference between the Upper and Lower Range Values. The minimum span is the minimum value that can be used without degradation of the specified performance.

TD: (or Turn Down Ratio)is the ratio between the maximum span and the calibrated span.

The transmitter can be calibrated with any range between the LRL and the URL with the following limitations:

$$LRL \leq LRV \leq (URL - CAL\ SPAN)$$

$$CAL\ SPAN \geq MIN\ SPAN$$

$$URV \leq URL$$

4 Opening the box

4.1 Identification

The instrument is identified by the data plates shown in Figure 3. The certification plate (ref. A): contains the certification related parameters for use in Hazardous area.

The Nameplate (ref. B), always made of AISI 316 ss, provides information concerning the model code, maximum working pressure, range and span limits, power supply, output signal, diaphragms material, fill fluid, range limit, serial number, maximum process working pressure (PS) and temperature (TS).

The Tag plate, instead, provides customer tag number and calibrated range.

Both certification and tag plates are supplied self-adhesive attached to the electronics housing, as standard. Option I2 allows to select these plates as metal AISI 316 ss fastened to the electronics housing with rivets.

The instrument may be used as a pressure accessory as defined by the Pressure Equipment Directive 2014/68/EU:
- category III module H for PS > 20 MPa, 200 bar
- art. 4, par. 3 Sound Engineering Practice (SEP) for PS < 20 MPa, 200 bar and for all PS values of 266xRx models.

In this case, near the CE mark, you will find the number of the notified body (0474) that has verified the compliance according to module H.

266 pressure transmitters comply with directive EMC 2014/30/EU.

The certification plate (ref.A) shown here is issued by ABB S.p.A, 22016 Tremezzina, Italy, with the numbers:

— FM09ATEX0023X or IECEx FME 16.0002X (Ex db, Ex tb)

— FM09ATEX0024X or IECEx FME 16.0003X (Ex ia)

— FM09ATEX0025X or IECEx FME 16.0004X (Ex ic) (Ex nA)

CE-Identification number of the notified bodies to Pressure Equipment Directive: 0474, to ATEX certification: 0722, to IECEx certification: IT/CES/QAR07.0001.

The certification plate may also be issued by
- ABB India Limited, 560058 Bangalore, India -
- ABB Engineering Limited, Shanghai 201319, P.R. China
- ABB Inc. Warminster PA 18974, USA

with the same certification numbers.

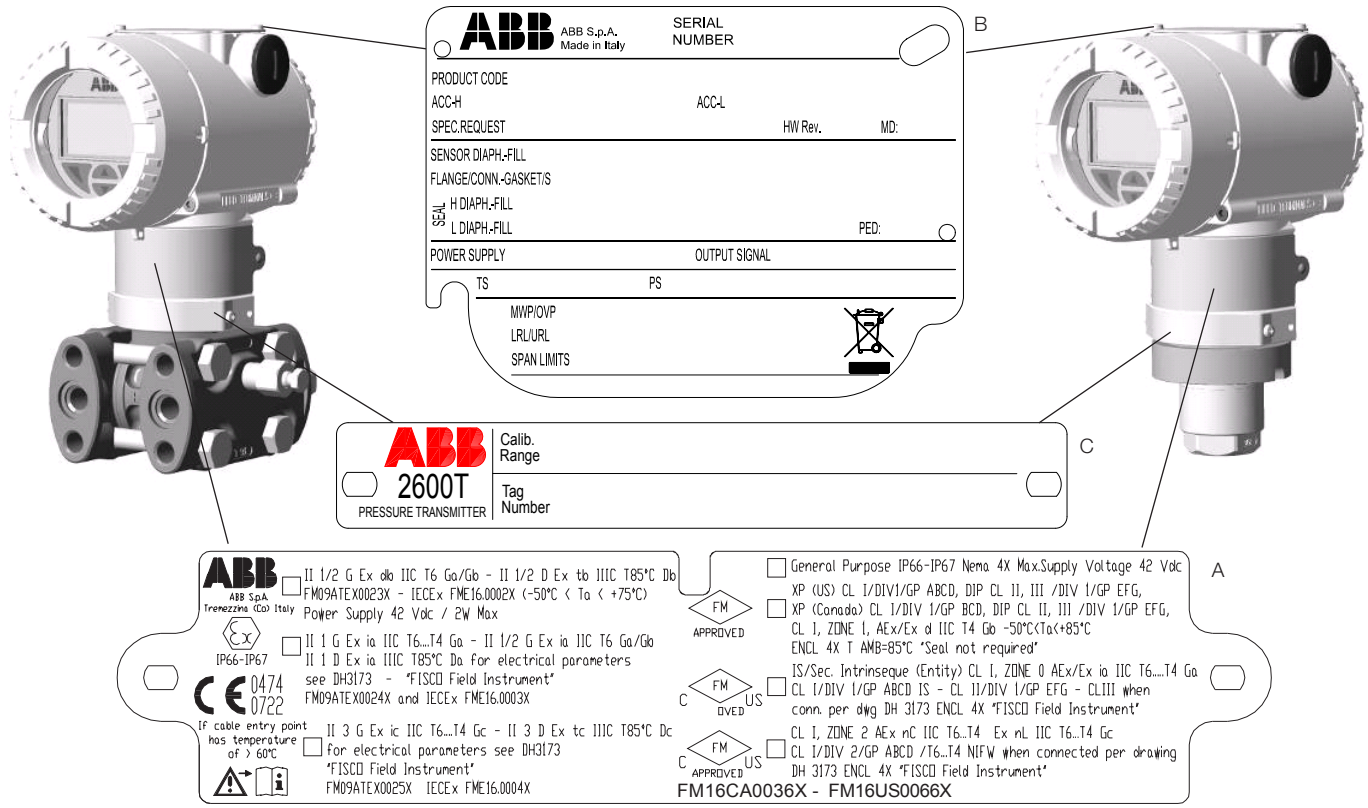


Figure 3: Product identification

4.2 Optional wired-on SST plate (I1)

The 266 transmitter can be supplied with the optional “Wired On Stainless Steel plate” (figure 4) which is permanently laser printed with a custom text specified in phase of order. The available space consists in 4 lines with 32 characters per line.

The plate will be connected to the transmitter with a Stainless Steel wire.

4.3 Handling

The instrument does not require any special precautions during handling although normal good practice should be observed.

4.4 Storage

The instrument does not require any special treatment if stored as dispatched and within the specified ambient conditions. There is no limit to the storage period, although the terms of guarantee remain as agreed with the Company and as given in the order acknowledgement.

Figure 4: 4-line layout of the optional wired-on Stainless Steel plate

5 Mounting

5.1 General

Study these installation instructions carefully before proceeding. Failure to observe the warnings and instructions may cause a malfunction or personal hazard. Before installing the transmitter, check whether the device design meets the requirements of the measuring point from a measurement technology and safety point of view.

This applies in respect of the explosion protection certification, measuring range, gauge pressure stability, temperature (Ambient and Process), operating voltage

The suitability of the materials must be checked as regards their resistance to the media. This applies in respect of the:

— Gasket

— Process connection, isolating diaphragm, etc.

In addition, the relevant directives, regulations, standards, and accident prevention regulations must be observed (e.g., VDE/VDI 3512, DIN 19210, VBG, Elex V, etc.). Measurement accuracy is largely dependent on correct installation of the pressure transmitter and, if applicable, the associated measuring pipe(s). As far as possible, the measuring setup should be free from critical ambient conditions such as large variations in temperature, vibrations, or shocks.

Important. If unfavorable ambient conditions cannot be avoided for reasons relating to building structure, measurement technology, or other issues, the measurement quality may be affected. If a remote seal with capillary tube is installed on the transmitter, the additional operating instructions for remote seals and the related data sheets must be observed.

5.2 IP protection & designation

The housings for 266 transmitters are certified as conforming to protection type IP66 / IP67 (according tonIEC 60529) or NEMA 4X (according to NEMA 250).

The first number indicates the type of protection the integrated electronics have against the entry of foreign bodies, including dust.

“6” means that housing is dust-proof (i.e., no ingress of dust).

The second number indicates the type of protection the housing has against the entry of water.

“6” means that housing is protected against water; specifically, powerful jets of water under standardized conditions.

“7” means that housing is protected against water; specifically, against the effects of temporary immersion in water under standardized water pressure and temporal conditions.

5.3 Mounting the transmitter

5.3.1 Transmitter factory configuration consideration

The 266 pressure transmitter in your hands has been factory calibrated to reflect the published declared performance specification; no further calibration is required in normal condition. ABB typically configures 266 pressure transmitters according to the user requirements. A typical configuration includes:

— TAG number
— Calibrated span
— Output linearization
— LCD display configuration

5.3.2 Hazardous area considerations

The transmitter must be installed in hazardous area only if it is properly certified. The certification plate is permanently fixed on the neck of the transmitter top housing. The 266 Pressure Transmitter Line can have the following certifications:

— INTRINSIC SAFETY Ex ia:
ATEX Europe (code E1) approval
II 1 G Ex ia IIC T6...T4 Ga, II 1/2 G Ex ia IIC T6...T4 Ga/Gb,
II 1 D Ex ia IIIC T85 °C Da, II 1/2 D Ex ia IIIC T85 °C Da;
IP66, IP67.

IECEx (code E8) approval
Ex ia IIC T6...T4 Ga/Gb, Ex ia IIIC T85 °C Da; IP66, IP67.

NEPSI China (code EY)
Ex ia IIC T4/T5/T6 Ga, Ex ia IIC T4/T5/T6 Ga/Gb,
Ex iaD 20 T85/T100/T135, Ex iaD 20/21 T85/T100/T135.

— EXPLOSION PROOF:
ATEX Europe (code E2) approval
II 1/2 G Ex db IIC T6 Ga/Gb Ta=–50 °C to +75 °C,
II 1/2 D Ex tb IIIC T85 °C Db Ta = –50 °C to +75 °C;
IP66, IP67.

IECEx (code E9) approval
Ex db IIC T6 Ga/Gb Ta=–50 °C to +75 °C,
Ex tb IIIC T85 °C Db Ta = –50 °C to +75 °C; IP66, IP67.

NEPSI China (code EZ)
Ex d IIC T6 Gb, Ex tD A21 IP67 T85 °C.

— INTRINSIC SAFETY Ex ic:
ATEX Europe (code E3) type examination
II 3 G Ex ic IIC T6...T4 Gc, II 3 D Ex tc IIIC T85 °C Dc;
IP66, IP67.

IECEx (code ER) type examination
Ex ic IIC T6...T4 Gc, Ex tc IIIC T85 °C Dc; IP66, IP67.

NEPSI China (code ES) type examination
Ex ic IIC T4~T6 Gc, Ex tD A22 IP67 T85 °C.

— FM Approvals US (code E6) and Canada (code E4)
Explosionproof (US): Class I, Division 1, Groups A, B, C, D; T5
Explosionproof (Canada): Class I, Division 1, Groups B, C, D;
T5 Dust-ignitionproof: Class II, Division 1, Groups E, F, G,
Class III, Division 1; T5
Flameproof (US): Class I, Zone 1 AEx d IIC T4 Gb
Flameproof (Canada): Class I, Zone 1 Ex d IIC T4 Gb
Nonincendive: Class I, Division 2, Groups A, B, C, D T6...T4
Energy limited (US): Class I, Zone 2 AEx nC IIC T6...T4
Energy limited (Canada): Class I, Zone 2 Ex nC IIC T6...T4
Intrinsically safe: Class I, II, III, Division 1,
Groups A, B, C, D, E, F, G T6...T4
Class I, Zone 0 AEx ia IIC T6...T4 (US)
Class I, Zone 0 Ex ia IIC T6...T4 (Canada)
Type 4X, IP66, IP67 for all above markings.

Technical Regulations Customs Union EAC (Russia, Kazakhstan, Belarus), Inmetro (Brazil).

Warning - General Risk for model 266 used in zone 0.
The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

5.4 Pressure Equipment Directive (PED) (2014/68/EU)

5.4.1 Devices with PS >200

Devices with a permissible pressure PS >200 bar have been subject to a conformity validation. The data label includes the following specifications:

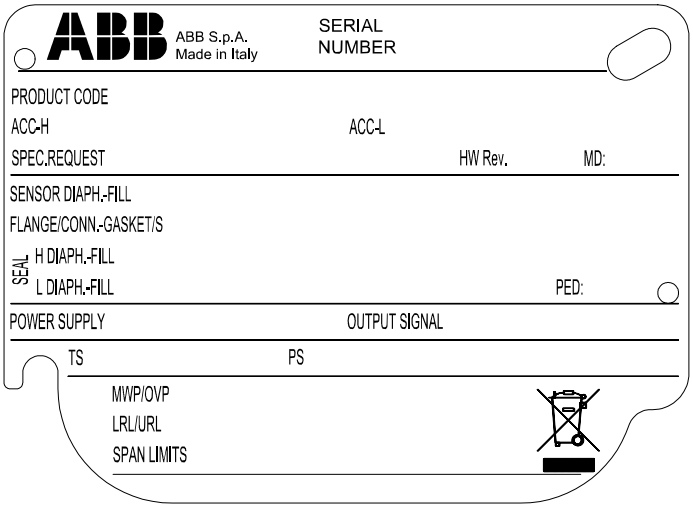


Figure 5: 266 nameplate with PED data

5.4.2 Devices with PS ≤200 bar

Devices with a permissible pressure PS ≤200 bar correspond to article 3 paragraph (3). They have not been subject to a conformity validation. These instruments were designed and manufactured acc. to SEP Sound Engineering Practices.

5.5 Mounting a DP sensor transmitter (266DSH/266 MST/266RST/266DRH/266MRT/266RRT)

The pressure transmitter models 266DSH, 266MST and 266RST can be mounted directly on the manifold. A mounting bracket for wall or pipe mounting (2” pipe) is also available as an accessory. For models 266DRH, 266MRT and 266RRT always mounting brackets should be used. Ideally, the pressure transmitter should be mounted in a vertical position to prevent subsequent zero shifts.

Important. If the transmitter is installed inclined with respect to the vertical, the filling liquid exerts hydrostatic pressure on the measuring diaphragm, resulting in a zero shift. In such an event, the zero point can be corrected via the zero push-button or via the “set PV to zero” command. Please refer to the [configuration section] for further details. For transmitters without diaphragm seals, please read the following considerations on the Vent/Drain.

Attention – Potential damage to transmitter. In case of a High Static differential pressure transmitter (266DSH.x.H) please always open the equalization valve of the manifold (if installed) before applying pressure to the transmitter. High Static pressure can damage the sensor causing a zero shift and a serious decrease of the total performance in terms of accuracy. In this case, please perform a full sensor trim.

It is important to mount the transmitter and to lay the process piping so that gas bubbles, when measuring liquids, or condensate when measuring gases, will flow back to the process and not enter the transmitter measuring chamber. Optional Vent/drain valves (code V1/V2/V3) on the transmitter are located on the sensor flanges.

The transmitter has to be positioned so that these drain/vent valves will be located higher than the taps on liquid service in order to allow the venting of entrapped gas or below the taps on gas service in order to allow the air to vent off or condensate to drain off. For safety reasons, take care of the drain/vent valves position so that when the process fluid is removed during the drain/vent operation it is directed down and away from technicians. It is recommended to mount the transmitter to prevent this possible source of damage for unskilled operators.

Figure 6: Drain/vent valves configuration (respectively V1, V2, V3)

Important. This message indicates indicates operator tips or particularly useful information. It does not indicate a dangerous or damaging situation.

Important. In case of a High Static differential pressure transmitter, please notice that the Vent/Drain valves can be configured only on the process axis (V1).

5.5.1 Bracket mounting (optional)

Different mounting brackets are available please refer to the relevant installation drawing below:

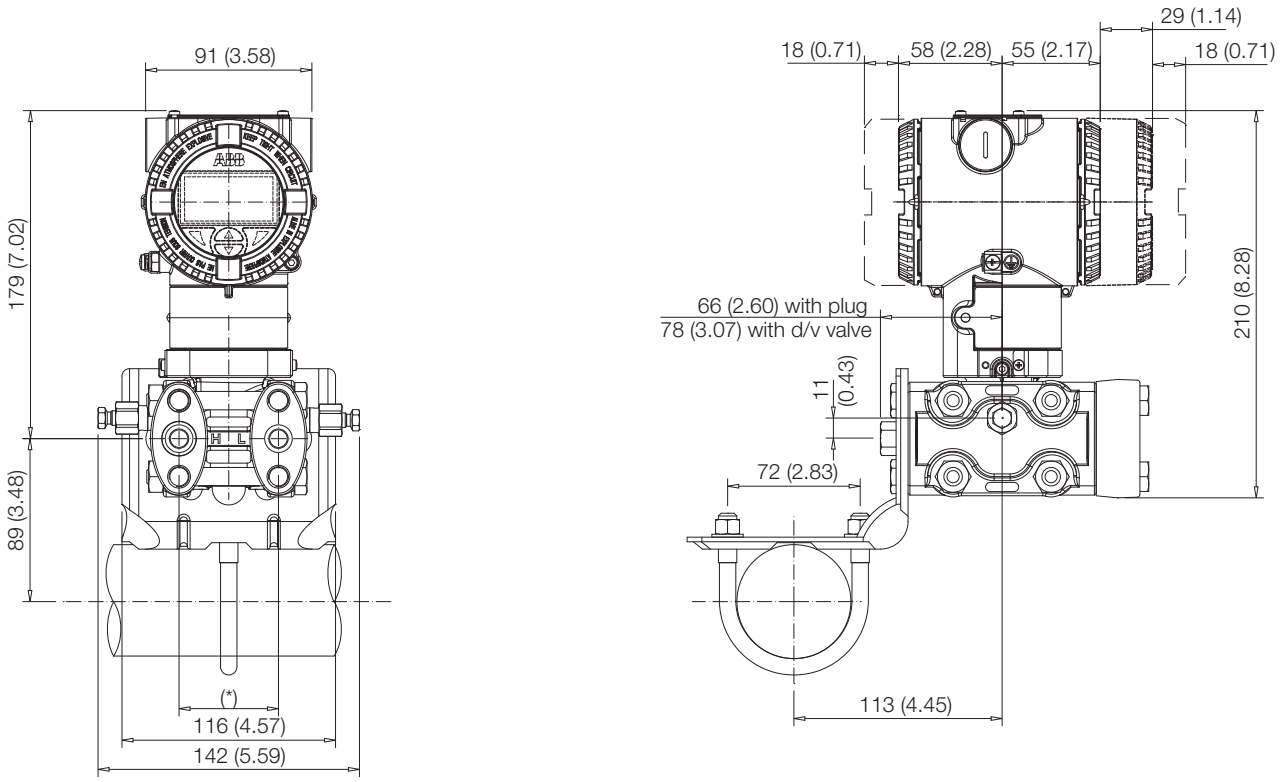


Figure 7: Differential Pressure Style transmitter with barrel housing installed on a horizontal pipe with optional bracket (B2)

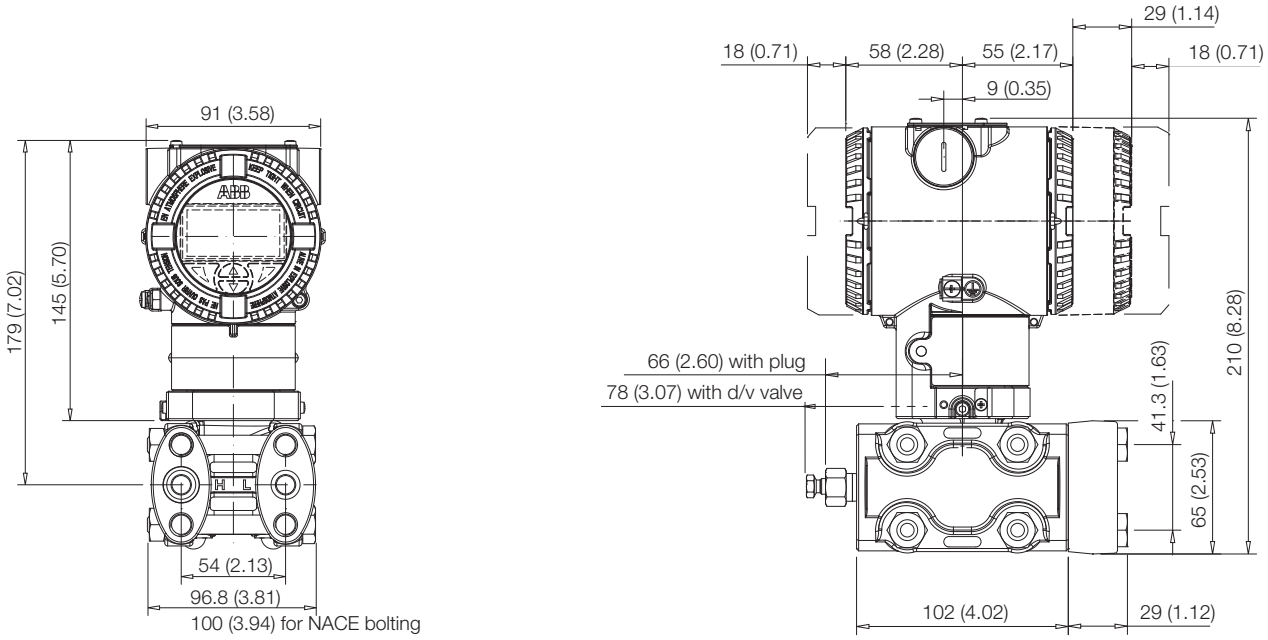


Figure 8: Differential Pressure Style transmitter (High Static option)

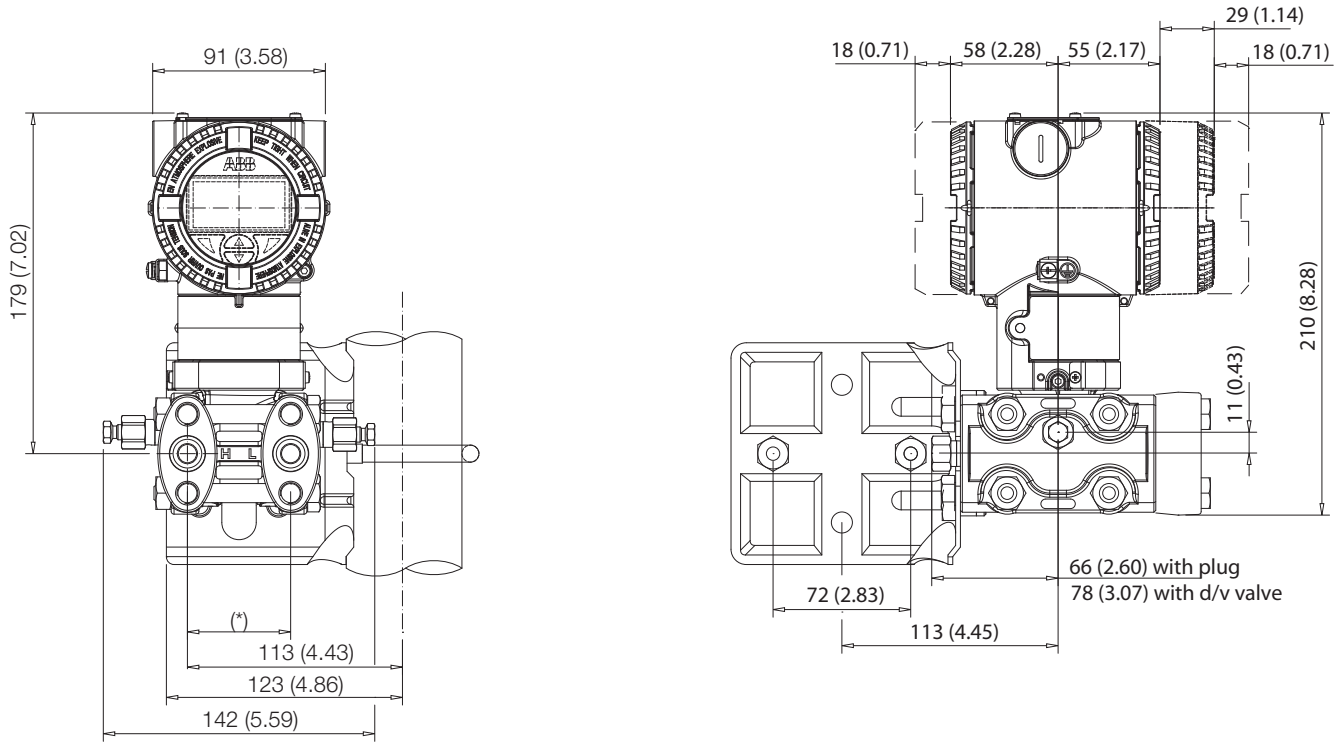


Figure 9: Differential Pressure Style transmitter with barrel housing installed on a vertical pipe with optional bracket (B2)

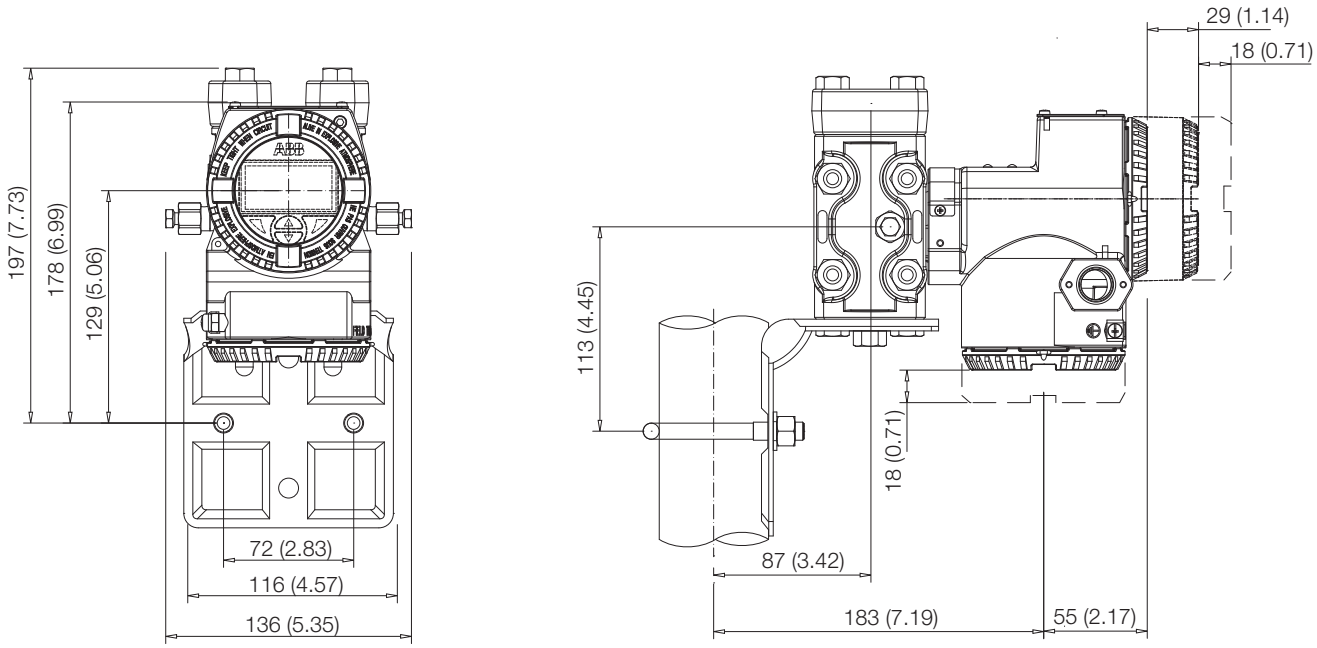


Figure 10: Differential Pressure Style transmitter with DIN housing installed on a Vertical pipe with optional bracket (B2) installation for AIR/GAS measurements

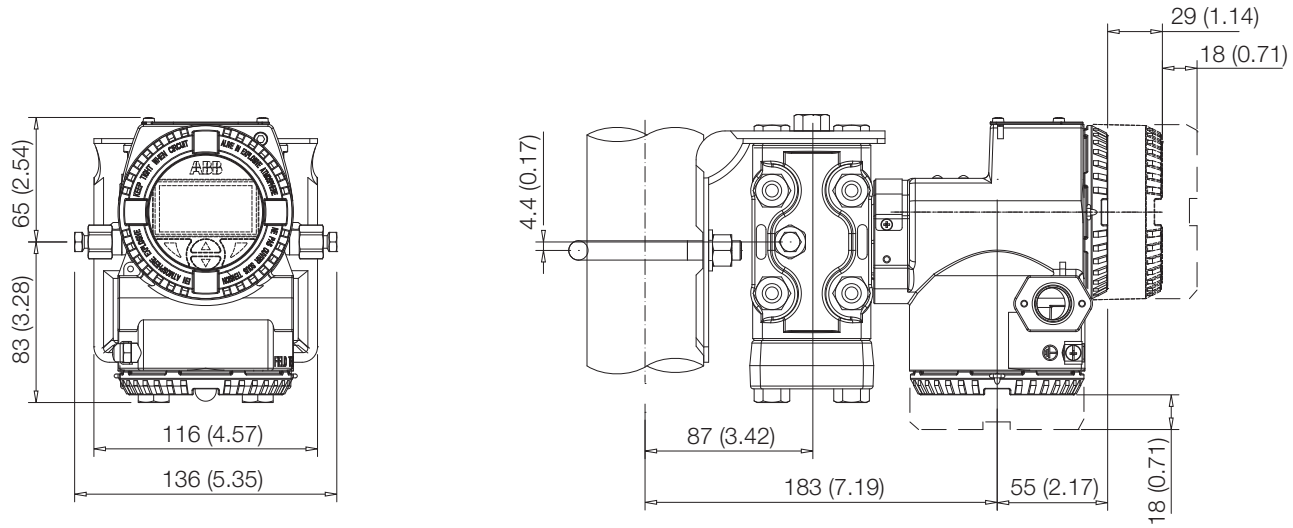


Figure 11: Differential Pressure Style transmitter with barrel housing and Kynar inserts installed on a horizontal pipe with optional bracket (B2)

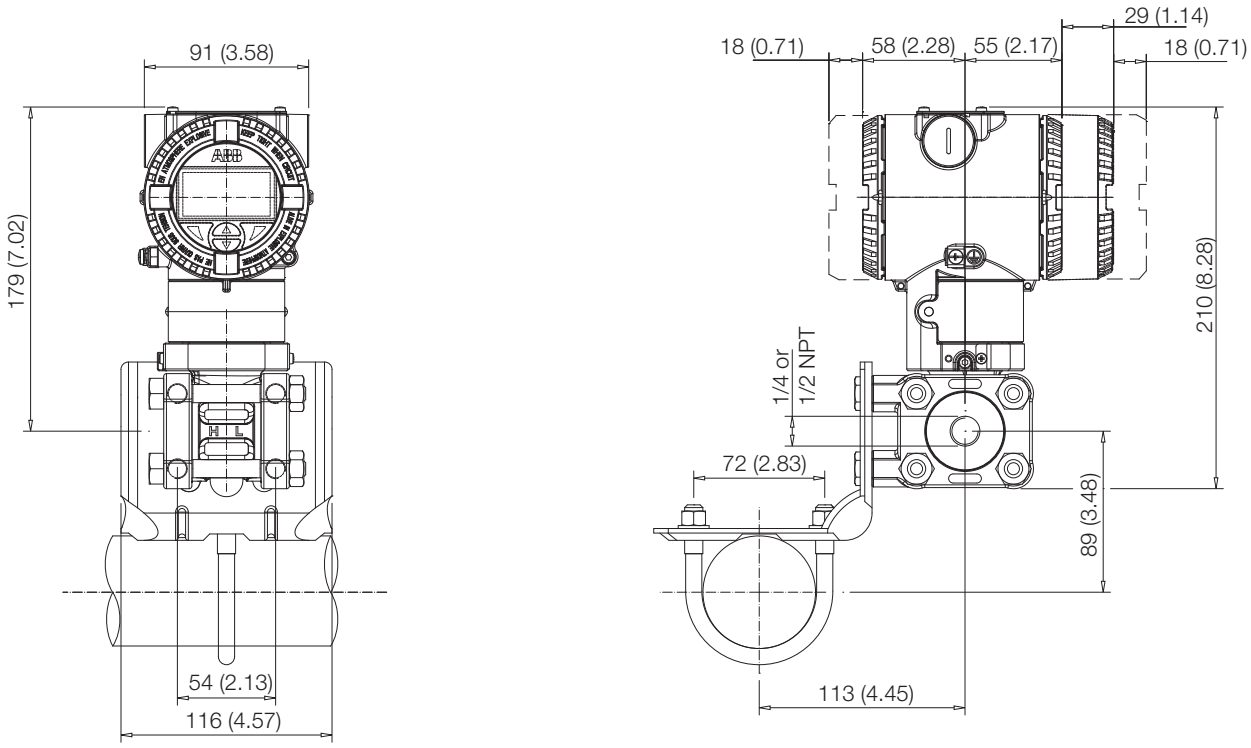


Figure 12: Differential Pressure Style transmitter with barrel housing and Kynar inserts installed on a vertical pipe with optional bracket (B2)

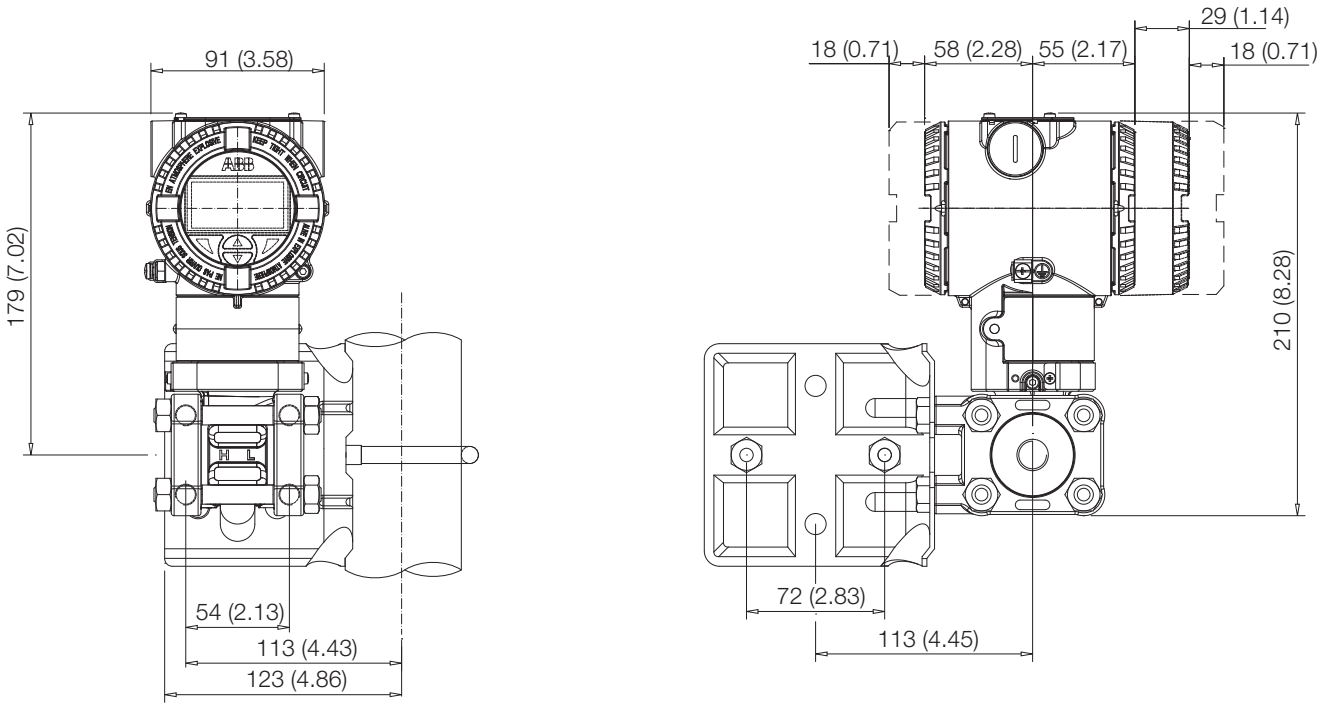
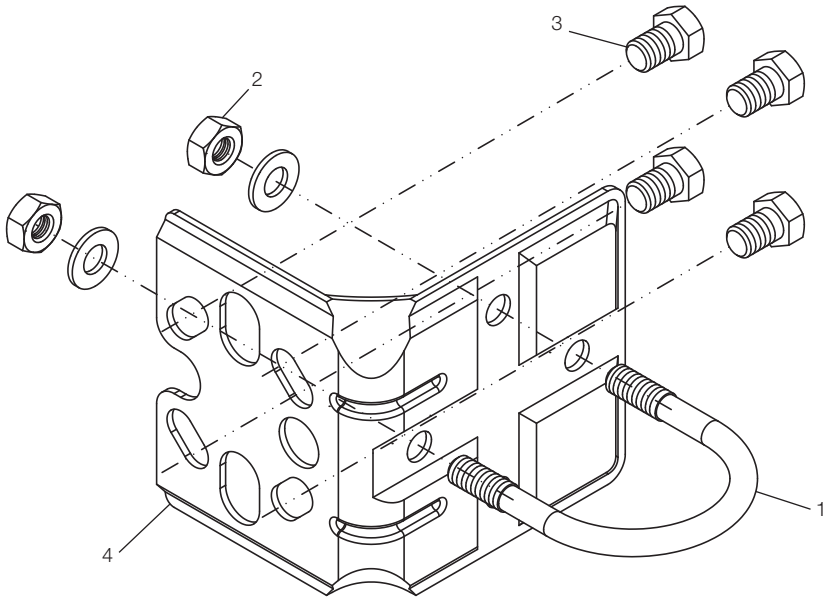


Figure 13: Differential Pressure Style transmitter with barrel housing and Kynar inserts installed on a vertical pipe with optional bracket (B2)

5.5.2 B2 Pipe and wall mounting bracket details

All the bolts and nuts supplied are necessary for the installation on pipe. In case of panel or wall installation, the U-bolt and the U-bolt nuts and washers will not have to be used.

The bolts for panel mounting are not within the scope of supply.



1 – U-bolt

2 – U-bolt fixing bolt and washer

3 – Transmitter fixing bolts

4 – B2 bracket

Figure 14: Pipe and wall mounting bracket kit (B2)

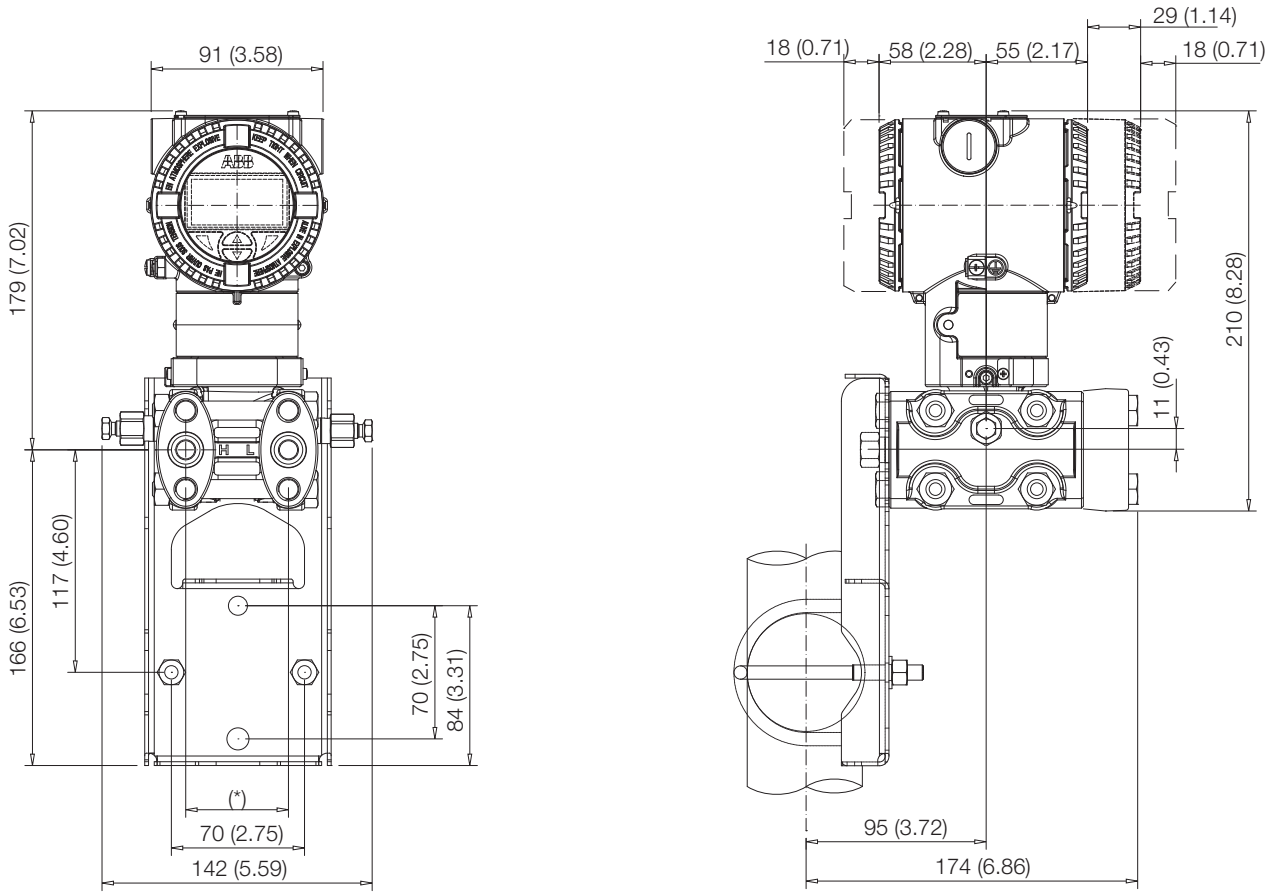
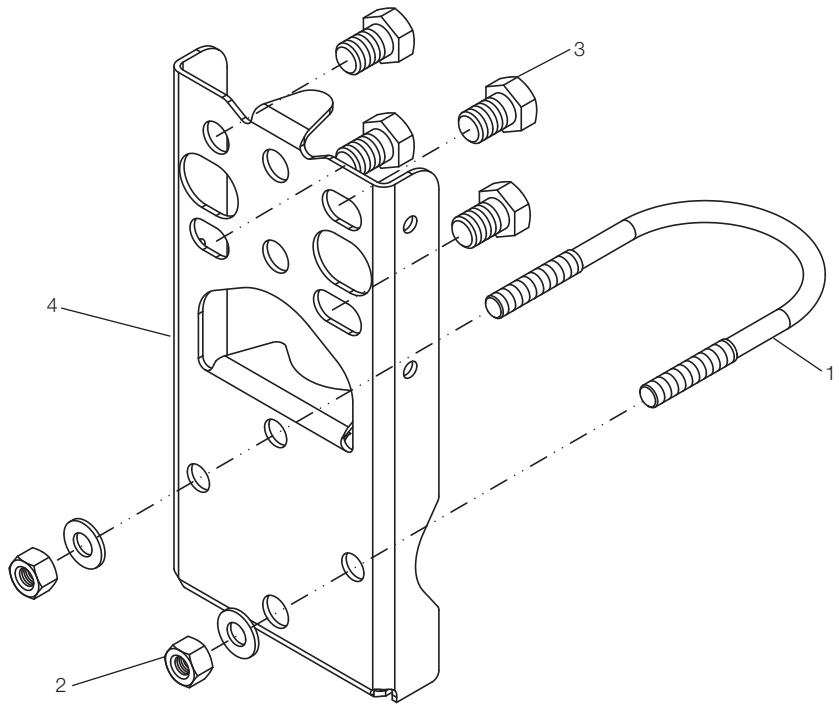


Figure 15: Differential Pressure Style transmitter with barrel housing installed on a box pipe with optional bracket for SST housing (B5)

5.5.3 B5 Flat type bracket details



1 – U-bolt

2 – U-bolt fixing bolt and washer

3 – Transmitter fixing bolts

4 – B5 bracket

Figure 16: Flat type mounting bracket kit (B5)

5.6 Mounting a P style pressure transmitter (266G, 266A, 266H, 266N)

The pressure transmitter can be mounted directly on the manifold.

A mounting bracket for wall or pipe mounting (2” pipe) is also available as an accessory.

Ideally, the pressure transmitter should be mounted in a vertical position to prevent subsequent zero shifts.

Important. If the transmitter is installed inclined with respect to the vertical, the filling liquid exerts hydrostatic pressure on the measuring diaphragm, resulting in a zero shift. In such an event, the zero point can be corrected via the zero push-button or via the “set PV to zero” command. Please refer to the [configuration section] for further details. For transmitters without diaphragm seals the Vent / Drain considerations below should be taken into consideration.

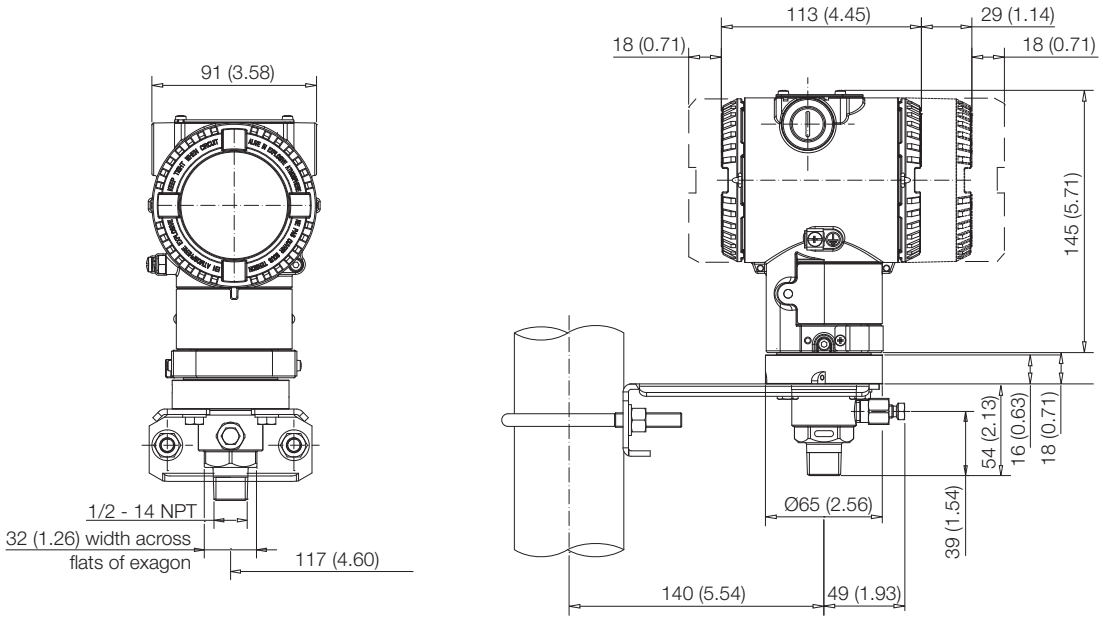


Figure 17: Model 266H or 266N Hi overload resistant P-Style transmitter with barrel housing installed on a 2”pipe with optional bracket (B1 carbon steel or B2 Stainless Steel 316L)

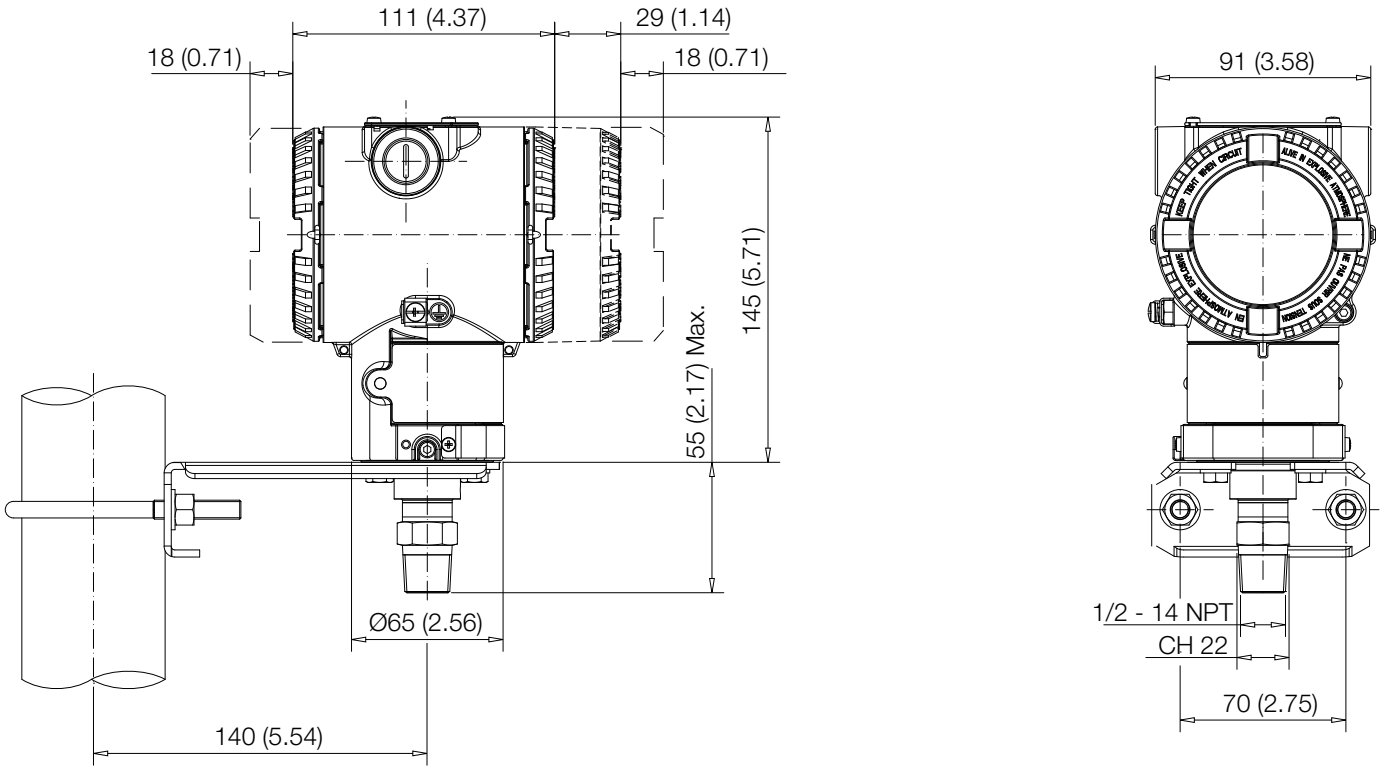
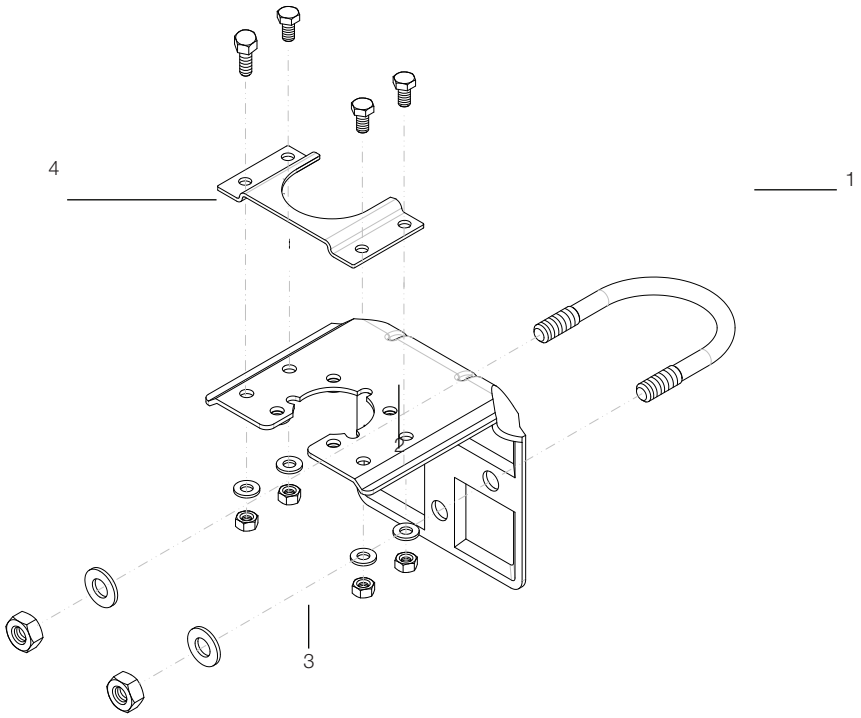


Figure 18: Model 266G or 266A P-Style transmitter with barrel housing installed on a 2”pipe with optional bracket (B1 carbon steel or B2 Stainless Steel 316L)

5.6.1 B6 and B7 Barrel housing bracket details



1 – U-bolt
2 – U-bolt fixing washers and nuts
3 – Transmitter fixing bolts
4 – B6 or B7 bracket
5 – Fitting adapter (supplied with 266HSH)

Figure 19: Pipe and wall mounting bracket kit (B1 and B2) for P style transmitter with Barrel housing

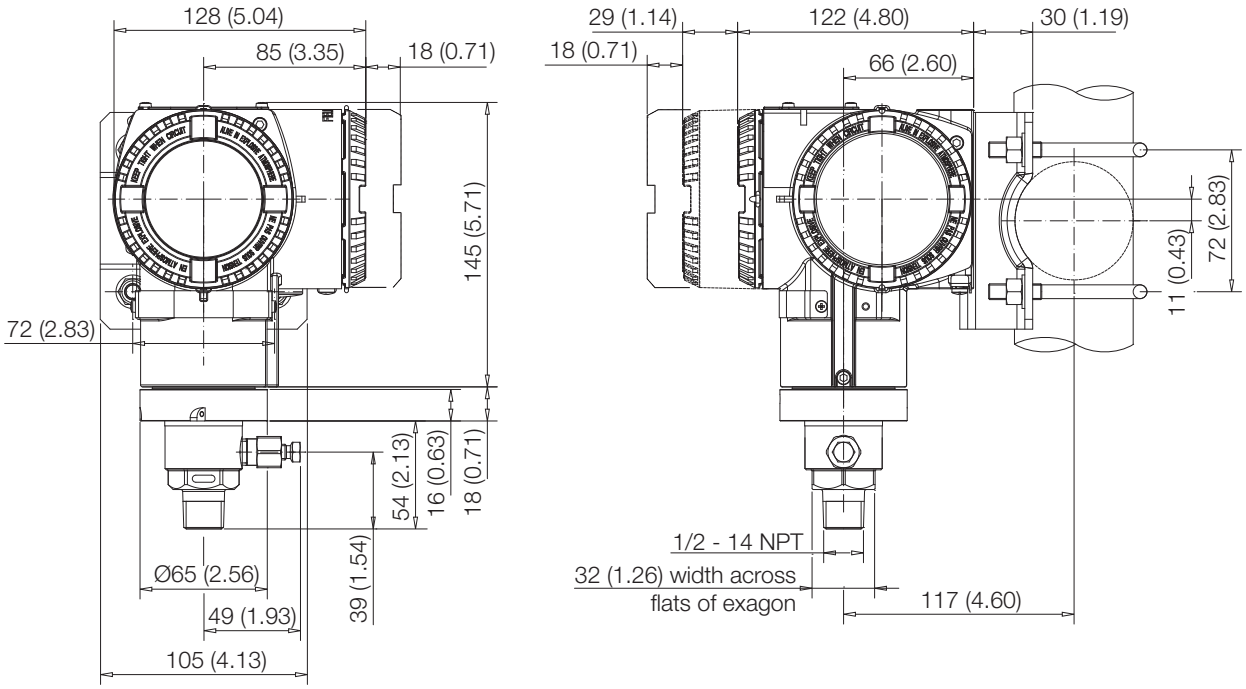


Figure 20: Model 266H or 266N Hi overload resistant P-Style transmitter with DIN housing installed on a 2"pipe with optional bracket (B2 Stainless Steel 316L)

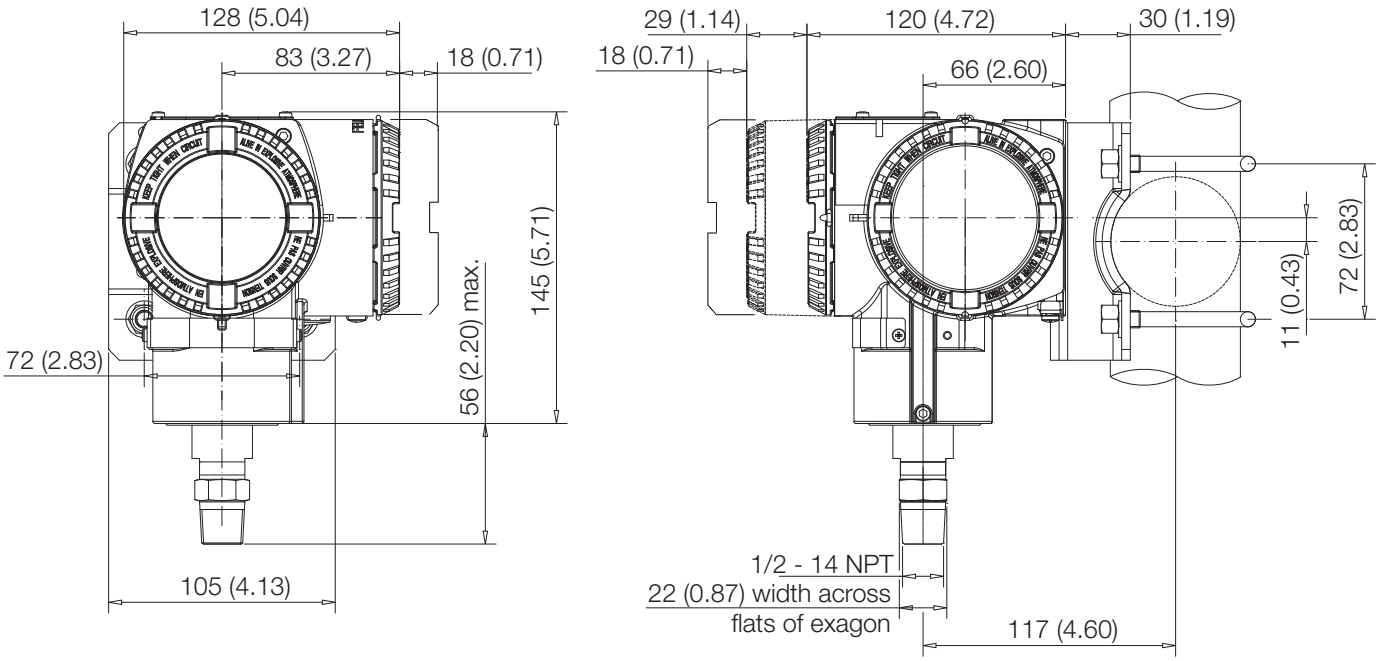
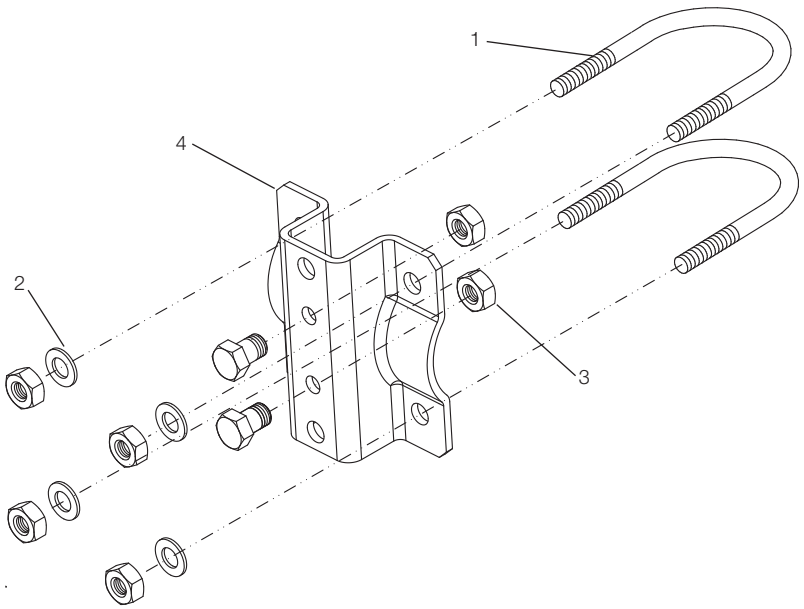


Figure 21: Model 266G or 266A P-Style transmitter with DIN housing installed on a 2”pipe with optional bracket (B2 Stainless Steel 316L)

5.6.2 B7 DIN Housing bracket details



1 – U-bolt

2 – U-bolt fixing bolt and washer

3 – Transmitter fixing bolts

4 – B7 bracket

Figure 22: Pipe and wall mounting bracket kit (B7) for P style transmitter with DIN housing

5.7 Transmitter housing rotation

To improve field access to the wiring or the visibility of the optional LCD meter, the transmitter housing may be rotated through 360° and fixed in any position. A stop prevents the housing from being turned too far. In order to proceed with housing rotation, the housing stop tang-screw has to be unscrewed by approximately 1 rotation (do not pull it out) and, once the desired position has been reached, retightened.

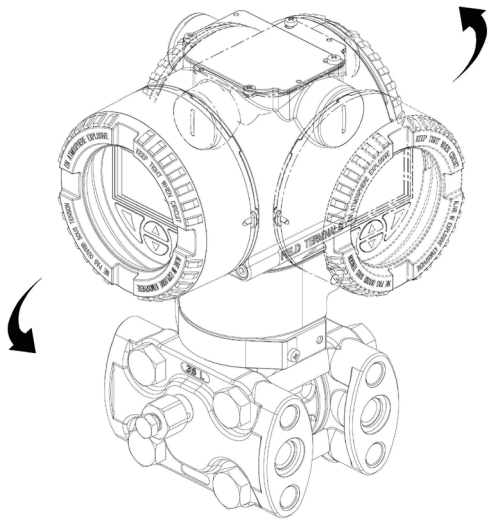
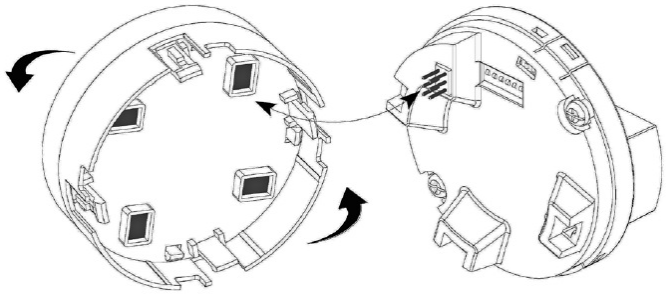


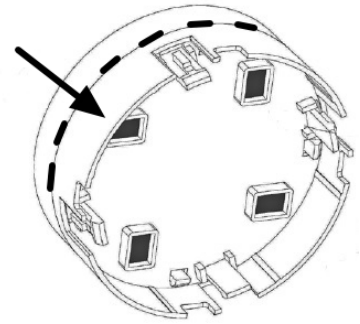
Figure 23: Housing rotation

5.8 Integral display rotation

In case an optional integral display meter is installed, it is possible to mount the display in four different positions rotated clockwise or counterclockwise with 90° steps. To rotate the LCD, simply open the windowed cover (Hazardous area prescriptions must be respected), pull-out the display housing from the communication board.. Reposition the LCD connector according to the new desired position. Push back the LCD module on the communication board. Be sure that the 4 plastic fixing locks are properly in place.



To remove the LCD it is necessary to gently grab the entire component from the lower plastic as shown by the picture here below.



5.9 Impulse piping connection for standard instruments

In order for the pipes to be laid correctly, the following points must be observed:

- The measuring pipes must be as short as possible and free from sharp bends.
- Lay the impulse piping in such a way that no deposits accumulate in them. Gradients should not be less than approx. 8% (ascending or descending).
- The measuring pipes should be blown through with compressed air or, better yet, flushed through with the measuring medium before connection.
- Where a fluid/vaporous measuring medium is being used, the liquid in both measuring pipes must be at the same level. If a separating liquid is being used, both measuring pipes must be filled to the same level (266Dx and 266Mx).
- Although it is not absolutely necessary to use balancing vessels with vaporous measuring media, measures must be taken to prevent steam entering the measuring chambers of the measuring equipment (266Dx and 266Mx).
- It may be necessary to use condensate vessels, etc., with small spans and vaporous measuring media (266Dx and 266Mx).
- If using condensate vessels (steam measurement), you should ensure that the vessels are at the same elevation in the differential pressure piping (266Dx and 266Mx).
- As far as possible, keep both impulse lines at the same temperature (266Dx and 266Mx).
- Completely depressurize the impulse lines if the medium is a fluid.
- Lay the impulse lines in such a way that gas bubbles (when measuring fluids) or condensate (when measuring gases) can flow back into the process line.
- Ensure that the impulse lines are connected correctly (High and Low pressure sides connected to measuring equipment, seals...).
- Make sure the connection is tight.
- Lay the impulse line in such a way that prevents the medium from being blown out over the measuring equipment.

Caution. Process leaks may cause harm or result in death. Install and tighten process connectors and all accessories (including manifolds) before applying pressure. In case of toxic or otherwise dangerous process fluid, take any precautions as recommended in the relevant Material Safety Data Sheet when draining or venting. Use only a 12 mm (15/32“) hexagonal spanner to tighten the bracket bolts.

5.10 Process connections considerations

266 differential pressure transmitter process connections on the transmitter flange are 1/4 - 18 NPT, with a centers distance of 54mm (2.13in) between the connections. The process connections on the transmitter flange are on centers to allow direct mounting to a three-valve or five-valve manifold.

Flange adapter unions with 1/2 - 14 NPT connections are available as an option. Rotate one or both of the flange adapters to attain connection centers of 51mm (2.01in), 54mm (2.13in) or 57mm (2.24in).

To install adapters, perform the following procedure:

1. Position the adapters with the O-ring in place.
2. Bolt the adapters to the transmitter using the bolts supplied.
3. Tighten the bolts to a torque value of 25Nm (stainless steel bolts) or 15Nm (for Stainless steel NACE bolts).

Deviations for models 266Mx, 266Rx and for PTFE O-rings: pretightening hand-tight. Pretightening to 10 Nm. Final tightening to 50 Nm.

For model 266PS, 266VS and 266RS, it is only possible to have one adapter, with low pressure side flange without process connection and drain/vent valve.

For high static model (266DSH.x.H) tighten the bolts to a torque value of 40 Nm (regardless of the material of the bolts used). In case of PTFE O-rings, pretightening to 10Nm and final tightening to 50 Nm.

Important. For 266MST with MWP 60MPa/600bar/8700psi (order-code A) the maximum allowable pressure for directly flanged-on shut-off devices (manifolds) and other directly flanged elements is limited to 41,3MPa (413 bar/5988,5 psi).

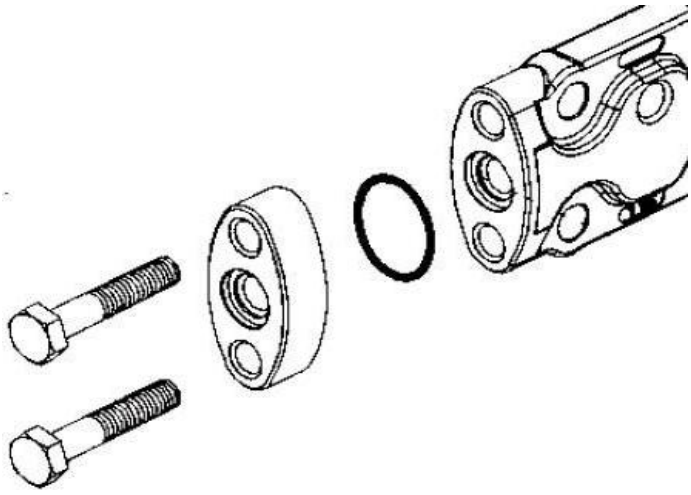


Figure 24: Adapter

5.11 Kynar inserts connection

When connecting Pressure transmitters equipped with kynar inserts tighten the bolts to 15 Nm max.

5.12 Screw torques for models 266MSx and 266RST with Kynar inserts

The following procedures apply to process flange screws and nuts:

Pretightening to 2 Nm (working crosswise).

Pretightening to 10 Nm (working crosswise) and then tightening by a tightening angle of 180°, working in two stages of 90° for each screw, and working crosswise.

Figure 25: Kynar insert

5.13 Installation recommendations

Impulse piping configuration depends on the specific measurement application.

5.13.1 Steam (condensable vapor) or clean liquids flow measurement

— Place taps to the side of the line.

— Mount beside or below the taps.

— Mount the drain/vent valve upward.

— In case of steam application fill the vertical section of the connecting lines with a compatible fluid through the filling tees.

The process fluid must enter the transmitter primary:

1. Open equalizing valve (C)
2. Close low pressure (B) and high pressure (A) valves .
3. Open gate valves
4. Slowly open high pressure (A) valve to admit process fluid to both sides of primary.
5. Vent or drain the primary unit and then close the valves.
6. Open the (B) valve and close the equalizing valve.

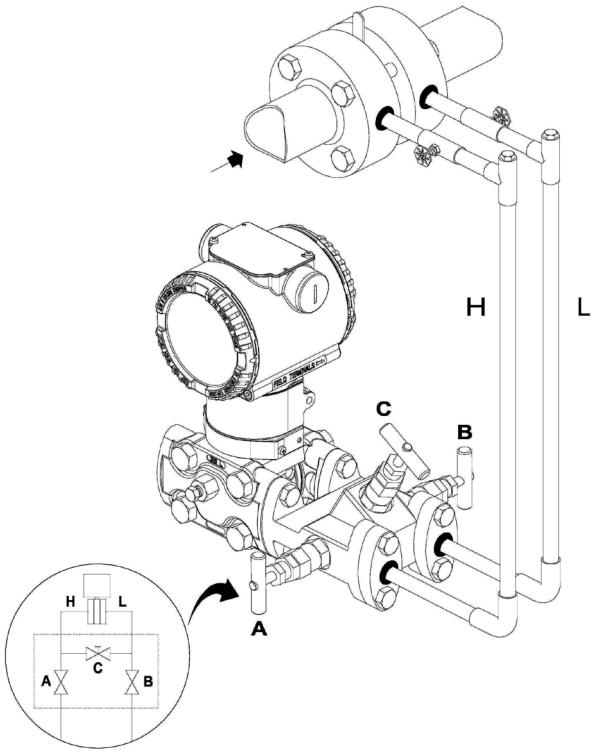


Figure 26: Steam or clean liquid flow measurement (transmitter and manifold)

5.13.2 Gas or liquid (with solids in suspension) flow measurement

— Place the taps to the top or side of the line.

— Mount the transmitter above the taps.

The process fluid must enter the transmitter primary:

1. Open equalizing valve (C)
2. Close low pressure (B) and high pressure (A) valves .
3. Open gate valves
4. Slowly open high pressure (A) valve to admit process fluid to both sides of primary.
5. Vent or drain the primary unit and then close the valves.
6. Open the (B) valve and close the equalizing valve.

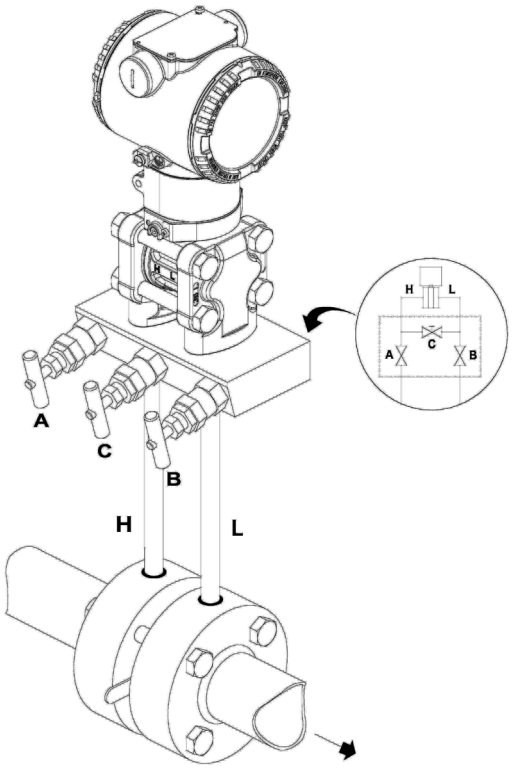


Figure 27: Gas or liquid flow measurement (transmitter and manifold)

5.13.3 Liquid level measurements on closed tanks and non condensable fluids (dry leg)

— Mount the transmitter at the same height or below the lowest level to be measured.

— Connect the + (H) side of the transmitter to the bottom of the tank.

— Connect the - (L) side of the transmitter to the upper part of the tank, above the maximum level of the tank.

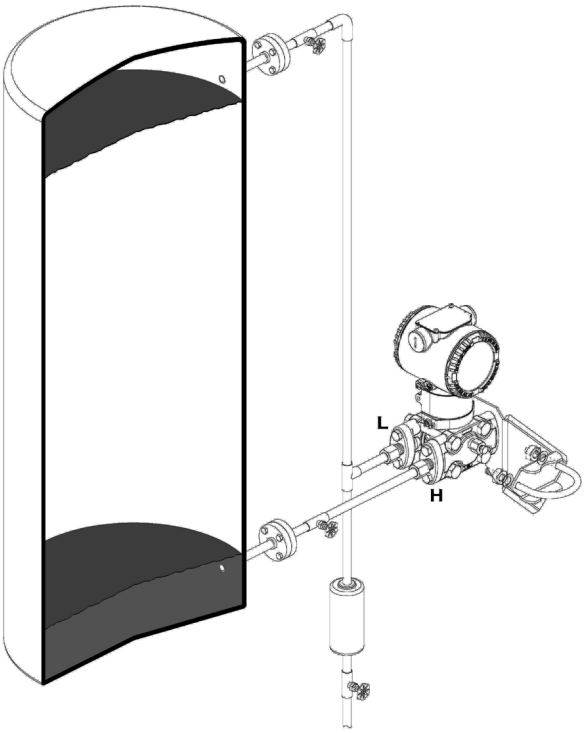


Figure 28: Level measurement on closed tank with dry leg

5.13.4 Liquid level measurement with closed tanks and condensable fluids (wet leg)

— Mount the transmitter at the same height or below the lowest level to be measured.

— Connect the + (H) side of the transmitter to the bottom of the tank.

— Connect the - (L) side of the transmitter to the upper part of the tank.

— Fill the vertical section of the connecting line to the upper part of the tank with a compatible liquid through the dedicated filling tee.

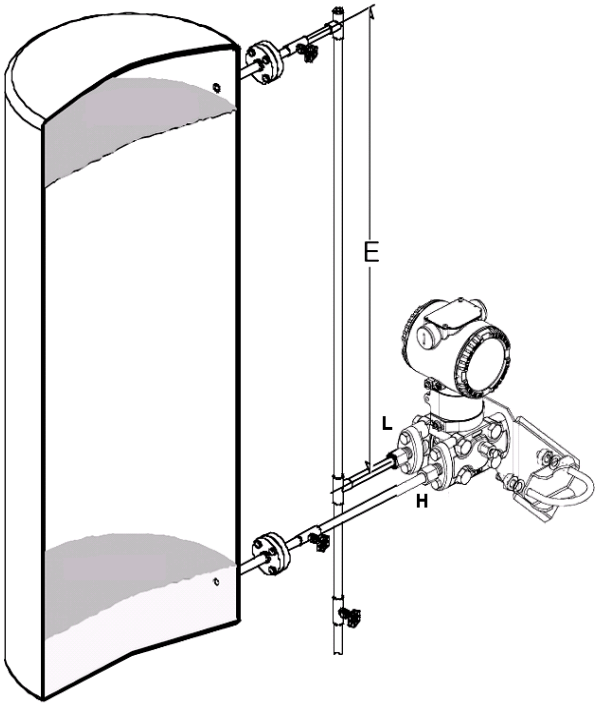


Figure 29: Level measurement on closed tank with wet leg

5.13.5 Liquid level measurement with open tanks

— Mount the transmitter at the same height or below the lowest level to be measured.

— Connect the + (H) side to the bottom of the tank.

— Vent the "–" (L) side of the transmitter to the atmosphere (in this case a gauge pressure is shown; the (L) side is already vented to the atmosphere).

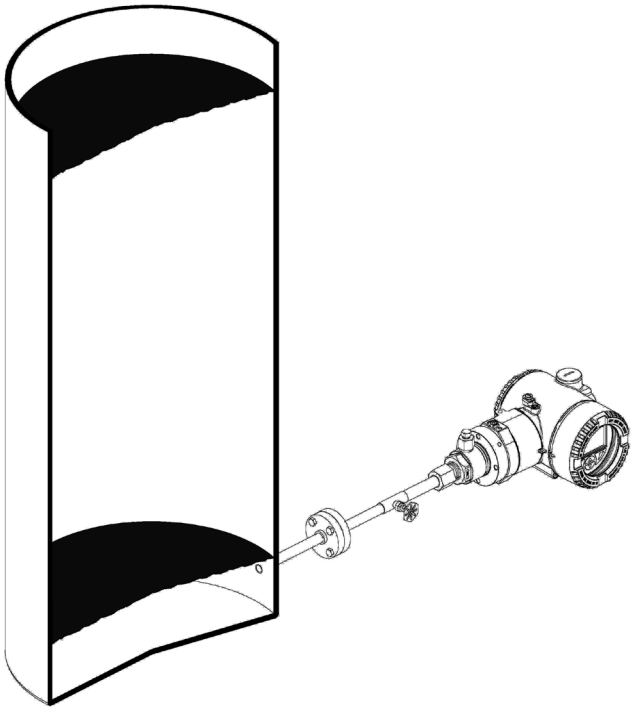


Figure 30: Level measurement on open tank with P style transmitter

5.13.6 Pressure or absolute pressure measurement of a tank

— Place the taps in the upper part of the tank.

— Mount the transmitter above the elevation of the process tap (both pressure and differential pressure transmitter can be used).

— Connect the transmitter to the tank.

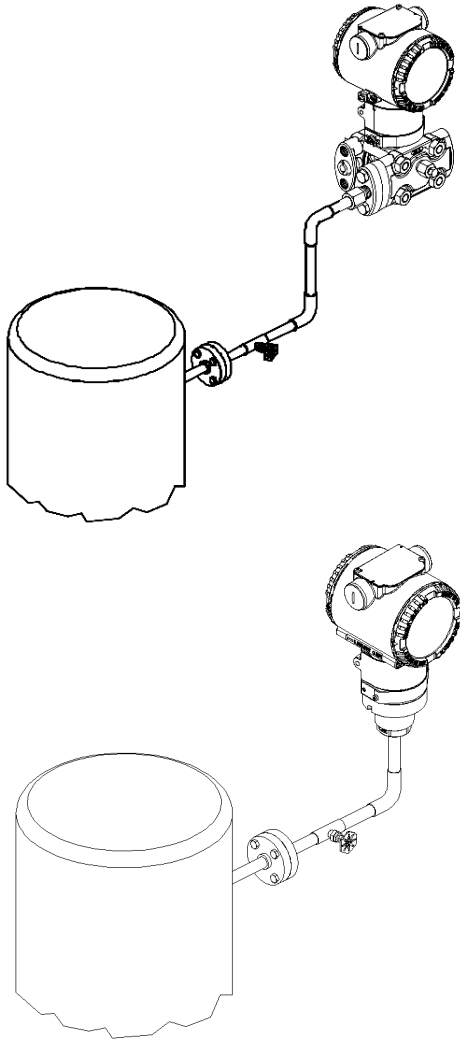


Figure 31: Gauge or absolute pressure measurement on a tank

5.13.7 Pressure or absolute pressure measurement of a liquid in a pipe

— Place the tap at the side of the line.

— Mount the transmitter (both pressure and differential pressure transmitters) beside or below the tap for clean fluids, above the tap for dirty fluids.

— Connect the + (H) side of the transmitter to the pipe.

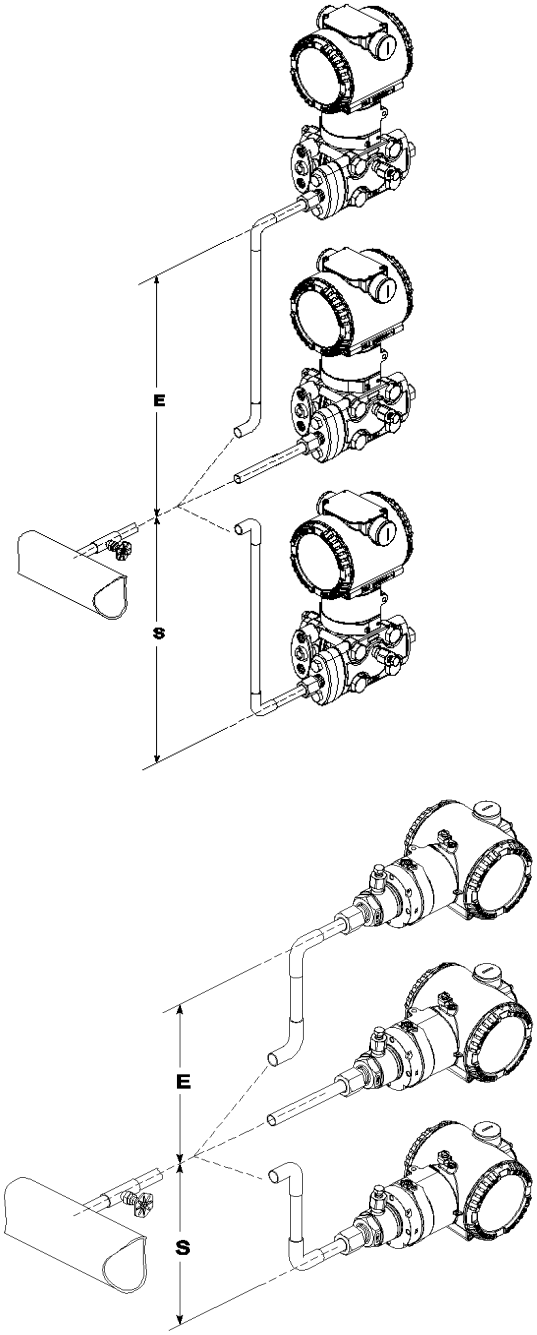


Figure 32: Gauge or absolute pressure measurement of a liquid in a pipe

5.13.8 Pressure or absolute pressure measurement of a condensable vapor in a pipe

- Place the tap at the side of the line.
- Mount the transmitter (both pressure and differential pressure transmitter) below the tap.
- Connect the + (H) side of the transmitter to the pipe.
- Fill the vertical section of the connecting line to the tap with a compatible liquid through the dedicated filling tee.

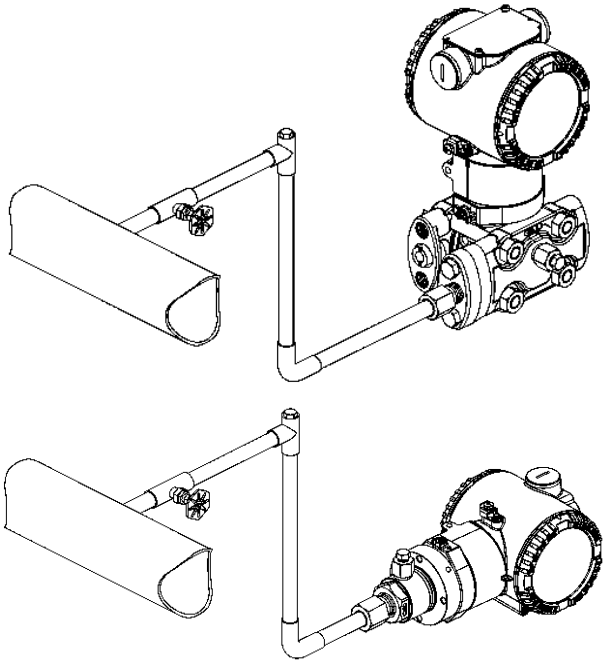


Figure 33: Gauge or absolute pressure measurement of condensable vapor

5.13.9 Pressure or absolute pressure measurement of a gas in a pipe

- Place the tap at the top or side of the line.
- Mount the transmitter (both pressure and differential pressure transmitter) beside or above the tap.
- Connect the transmitter to the pipe.

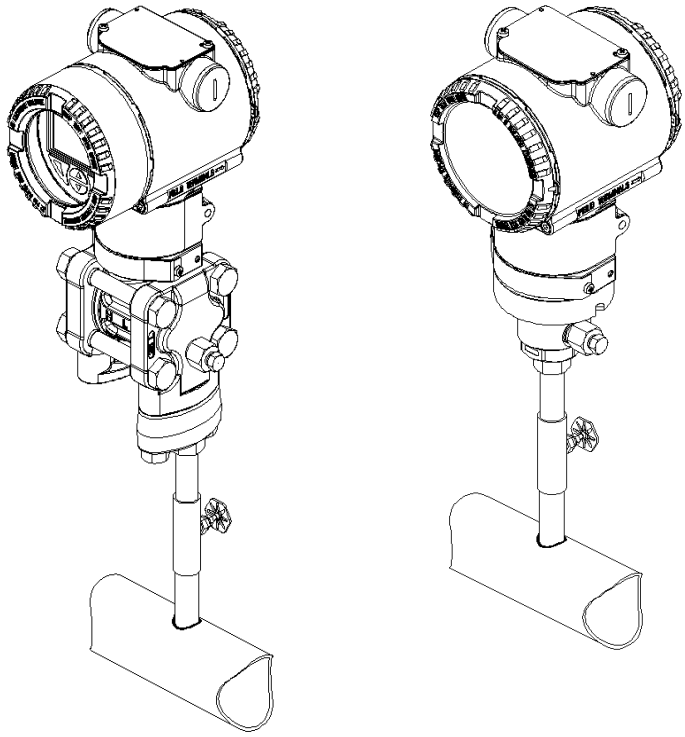


Figure 34: Gauge or absolute pressure measurement of gas in a pipe

6 PROFIBUS PA Communication Protocoll

6.1 Profibus® definition

PROFIBUS® is an all-digital, serial, two-way communication system that serves as a Local Area Network (LAN) for factory/plant instrumentation and control devices.

Important. Further information on PROFIBUS PA can be found in the PNO Guideline and standards IEC 61158, IEC 61784, EN 50170/DIN 19245 and EN 50020 (FISCO model) see in the Profibus PNO website www.profibus.com and/or from the ABB website www.abb.com

6.2 System architecture – ABB solution

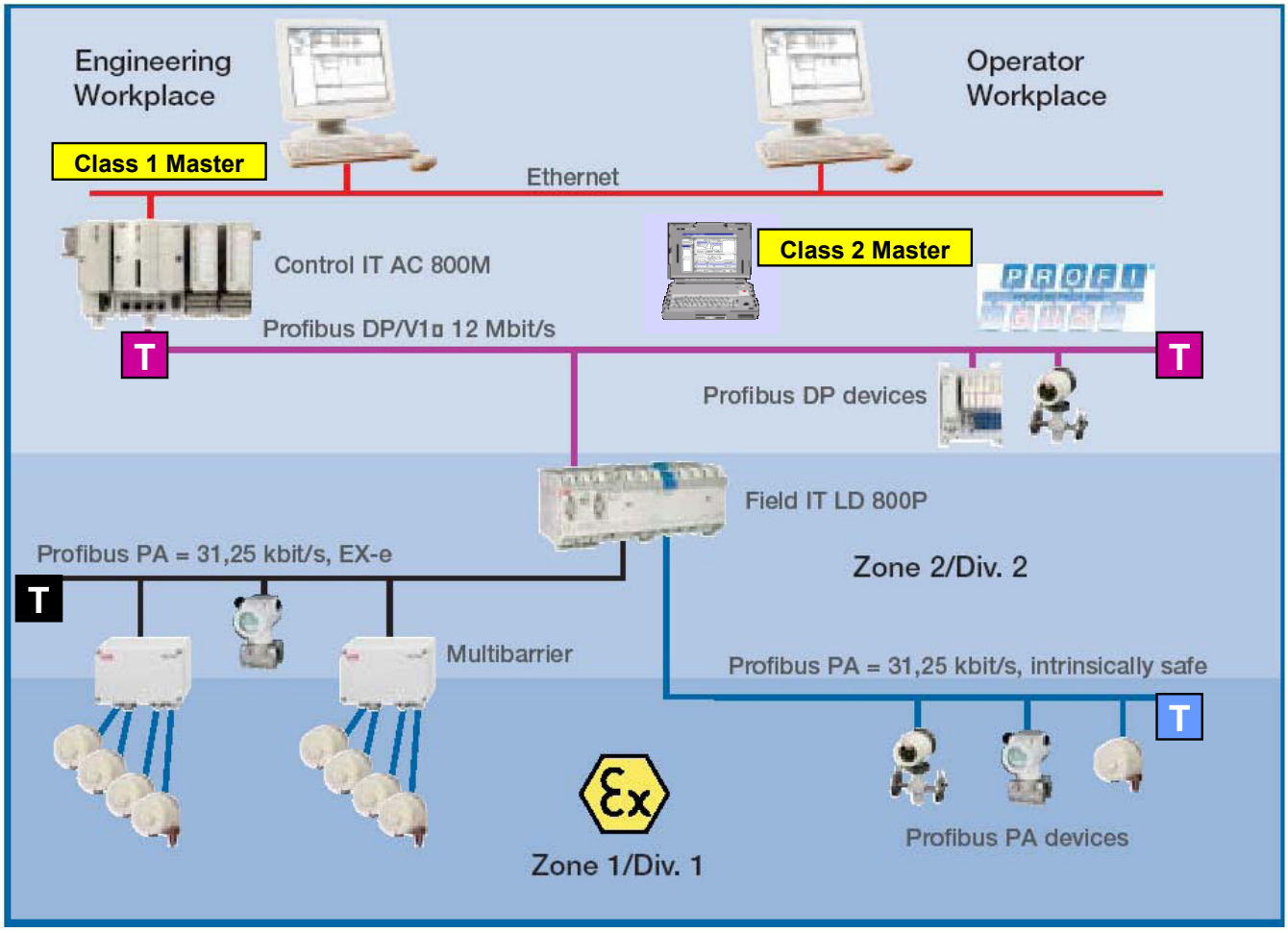


Figure 34: PROFIBUS architecture with bus termination (T)

7 Device introduction

7.1 Feature overview

The 2600T-266 PdP Profibus PA is compliant with the PNO Profile for Process Control Devices version 3.02 – Class B [Ref. 2].The 2600T-266 PdP PROFIBUS PA is a compact slave device implementing:

n° 1 Physical Block,

n° 3 Analog Input function blocks

n° 1 Pressure Transducer Block

n° 1 HMI Transducer Block

n° 1 Advanced Diagnostic Transducer Block with PILD algorithm (Plugged Impulse Line Detection)

Important. For convenience, all the device parameters mentioned in this document are written with the prefix indicating the block into where they are mapped:

- PB_ = Physical Block
- PRTB_ = Pressure Transducer Block
- ADTB_ = Advanced Diagnostic Transducer Block
- HMI_ = HMI Transducer Block
- AIx_ = Analog Input Function Blocks where the x is the number of the AI (1, 2, 3)

For all the complete details about the device parameters and their mapping refer to the APPENDIX A at the end of this manual

7.2 Transmitter wiring

Warning. Observe the applicable regulations governing electrical installation. Connections must only be established in a dead-voltage state. Since the transmitter has no switch-off elements, overvoltage protection devices, lightning protection, and voltage separation capacity must be provided at the plant (overvoltage/lightning protection is optional). Check that the existing operating voltage corresponds to the voltage indicated on the name plate. The same lines are used for both the power supply and output signal. In case the surge protection option is present and the transmitter is installed in a Hazardous area, the transmitter has to be power supplied from a voltage source isolated from mains (galvanic separation). Furthermore the potential equalization for the entire powering cable must be guaranteed since the intrinsic safety circuit of the transmitter is grounded.

Warning. Electrical shock can result in death or serious injury. Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Warning. Do NOT make electrical connections unless the electrical code designation stamped on the transmitter data plate agrees with the classification of the area in which the transmitter is to be installed. Failure to comply with this warning can result in fire or explosion.

7.2.1 Cable connection

Depending on the design supplied, the electrical connection is established via a cable entry, M20 x 1.5 or 1/2-14 NPT thread, or M12 x 1 or 7/8 plug. The screw terminals are suitable for wire cross sections of up to 2.5 mm2 (AWG 14).

Important. With Category 3 transmitters for use in “Zone 2”, a qualified cable gland for this type of protection must be installed by the customer (see the section “Hazardous Area Consideration”). An M20 x 1.5 threads is located in the electronics housing for this purpose. For transmitters with “Flameproof enclosure” (Ex d) type of protection, the housing cover must be secured using the locking screw. The screw plug that may have been supplied with the transmitter must be sealed at the plant using Molykote DX. The installer assumes responsibility for any other type of sealing medium used. At this point, we wish to draw your attention to the fact that increased force will be required to unscrew the housing cover after an interval of several weeks. This is not caused by the threads, but instead is due solely to the type of gasket.

7.2.2 PROFIBUS wiring procedure

The 2600T-266 PdP PA is a Bus Powered device with Profibus PA output.

Important. The 266 PdP PA is not Polarity consistency.

Warning. Cable, cable gland and unused port plug must be in accordance with the intended type of protection (e.g. intrinsically safe, explosion proof, etc.) and degree of protection (e.g. IP6x according to IEC EN 60529 or NEMA 4x). See also the addendum for “EX SAFETY” ASPECTS AND “IP” PROTECTION. In particular, for explosion proof installation, remove the red temporary plastic cap and plug the unused opening with a plug certified for explosion containment.

Follow these steps to wire the transmitter:

1. Remove the temporary plastic cap from one of the two electrical connection ports located at both sides in the upper part of the transmitter housing.
2. These connection ports may have a 1/2 inch internal NPT or M20 threads. Various adaptors and bushings can be fitted to these threads to comply with plant wiring (conduit) standards.
3. Remove the housing cover of the “field terminals” side. See the indication on the label on top of the housing. In an Explosion-Proof/Flame-Proof installation, do not remove the transmitter covers when power is applied to the unit.
4. Run the cable through the cable gland and the open port.
5. Connect the two bus wires to the + terminal, and the – terminal without take care of their polarity.

6. Plug and seal the electrical ports. Make sure that when the installation has been completed, the electrical ports are properly sealed against entry of rain and/or corrosive vapours and gases.
7. If applicable, install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.
8. Put back the housing cover, turn it to seat O-ring into the housing and then continue to hand tighten until the cover contacts the housing metal-to-metal. In Ex-d (Explosion Proof) installation, lock the cover rotation by turning the set nut (use the 2mm Allen key supplied with the instrument).

7.2.3 PROFIBUS wiring procedure

Special Fieldbus Connectors are also available as optional item for the easy connection of the transmitter to the bus. Below there are the pictures of the two selected models with different plugs.

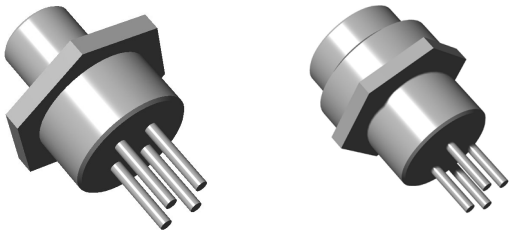


Figure 35: Connectors (respectively 7/8” and M12x1)

Important. The M12x1 PLUG model is considered the default version for the 266 PdP – PROFIBUS PA version. The connector thread will be in accordance with the selected housing model. By default the housing thread is 1/2 – 14 NPT.

The picture below shows the pin-out of the two different Profibus connector models.

— The Bus lines are polarity independent.
— The GROUND and SHIELD connections must be evaluated depending by the installation rules

If necessary the ground terminal could be also connected. For details about the installation and connections refers to specific documents in the Profibus website www.Profibus.com and in the ABB website www.abb.com.

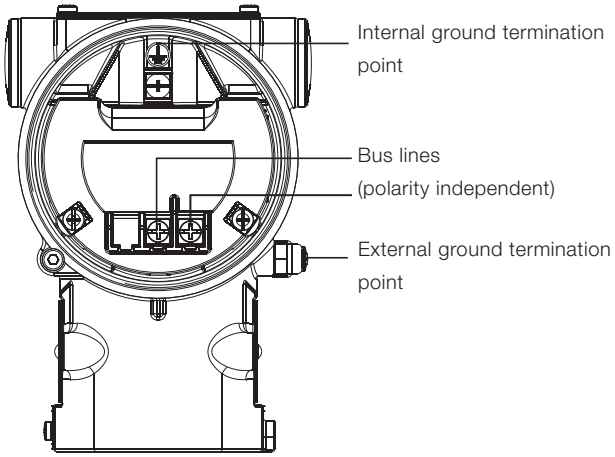
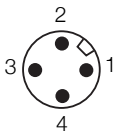


Figure 36: PROFIBUS terminal block scheme

7/8” connector

Mating female plug
NOT SUPPLIED



M12x1 connector

PIN (male) identification	
1	PA +
2	GROUND
3	PA –
4	SHIELD

7.2.4 Grounding

A terminal is available on both the outside of the housing and in the plug for grounding (PE) the transmitter. Both terminals are electrically connected to one another.

7.2.5 Protective grounding

All transmitters are supplied with an external ground connection for protective grounding. Wire this ground connection to a suitable earth ground. For a transmitter measuring loop an earth ground should maintain a resistance of 5 ohms or less. Use a heavy duty conductor, at least 15 AWG / 1,6 mm2 Ø.

Warning. A protective grounding connection is absolutely necessary to insure personnel protection, to protect against surge (in case of installation of this option) and to prevent explosions in potentially explosive environment.

7.2.6 Integrated lightning protection (optional)

The transmitter housing must be connected using the grounding terminal (PA), by means of a short connection with the equipotential bonding. Equipotential bonding (minimum diameter: 4 mm^2 (AWG 12) is required throughout the cable routing area. In the case of transmitters with integrated lightning protection (optional), the intrinsically safe circuit is connected to the equipotential bonding for safety reasons.

Important. Test voltage withstand capability can no longer be ensured when this protective circuit is used.

8 PROFIBUS electronics

8.1 Fault protection

The 266 PdP electronic implements the circuitry for the fault current protection. Whenever a fatal failure occurs and the current consumption increase over the 20 mA, this circuitry provides to disconnect the device from the bus, in order to save the rest of the bus that, otherwise, drops down with all the other connected devices.

8.2 On-board switches

On the electronic unit (behind the Local Display when installed) there are 3 switches with the following functionality:

SW 1 – Replace Mode

In UP position (1) it enables the Replacement operation. It must be used in combination with the SW 2 that selects which part of the Transmitter is going to be replaced.

SW 2 – Replace Detail

In UP position (1) it selects the Sensor Replacement. The entire transmitter's configuration data are kept valid in the electronics and copied into the memory of the new sensor once it is connected. In OFF position (0) it selects the Electronics Replacement. The entire transmitter's configuration data are kept valid in the sensor memory and copied into the memory of the new electronics once it is connected.

SW 3 – Push Buttons Mode

This switch selects the type of operation executed with the housing push buttons located under the type plate. In UP position (1) it enables the push buttons for the ranging operation. In OFF position (0) it enables the push buttons for the PV bias Set/Reset operations.

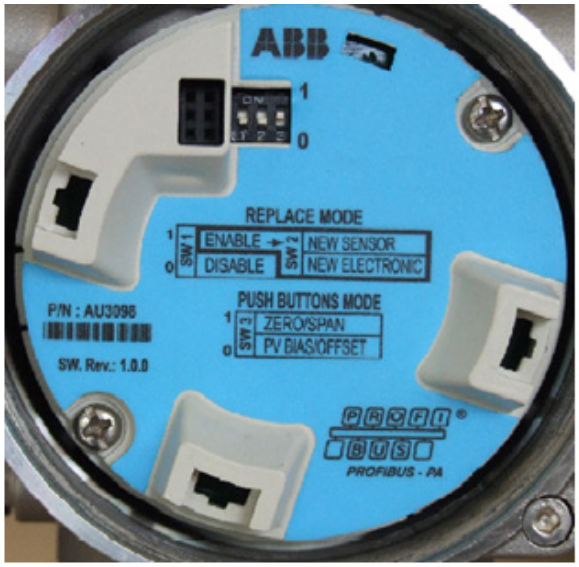


Figure 37: PROFIBUS communication board

8.3 Factory default configuration

The on-board switches are set by default in OFF position (0). Therefore:

SW 1 – Replace Mode is disabled

SW 2 – Replace Detail on New Electronic but with no effect since SW 1 is on OFF position.

SW 3 – Push Buttons Mode on OFF position (0). With this configuration, the external non-intrusive push buttons perform the PV Bias / Offset functions by default.

9 Local push buttons

Three push buttons (Zero, Span and Write Protection) are located under the identification nameplate.

To gain access to the local adjustments release the fixing screws of the nameplate and rotate clockwise the identification plate.

Warning. Operating the control buttons with a magnetic screwdriver is not permitted.

9.1 Installing/Removing the external pushbuttons

1. Loosen the screws that fix the nameplate plate and slide the plate to gain access to the local adjustments.
2. Loosen the pushbuttons assembly screws (1) holding down the plastic element which is spring loaded.
3. Remove the gasket (3) which is positioned below the pushbutton plastic cover (2)
4. The three pushbuttons (4) and the relevant springs (5) can now be removed from their seat.

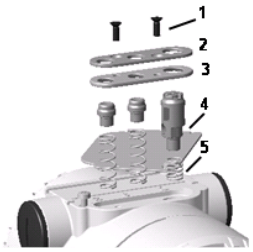


Figure 38: External pushbutton assembly components

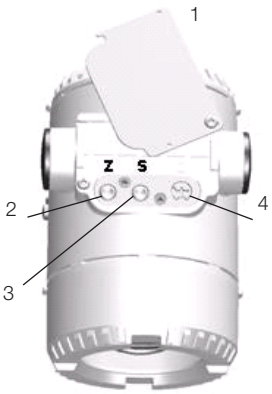
9.2 Operations

The Zero and Span buttons are enabled by default but can be disabled with the PB_LOCAL_OP_ENA parameter.

Write protection pushbutton (4) prevents the configuration data from being overwritten by unauthorized users.

If write protection is enabled, the Zero and Span buttons are disabled. However, it is still possible to read out the configuration data using the graphical user interface (DTM) or another, similar communication tool. The control unit may be leaded if required. Write protection is activated as follows (also refer to the symbols on the plate):

1. First, use a suitable screwdriver to press the switch down fully.
2. Then turn the switch clockwise by 90°.



1 – Identification nameplate
2 – Zero pushbutton
3 – Span pushbutton
4 – Write-protection pushbutton

Figure 39: Pushbutton functionalities

Important. To deactivate the switch, push it down slightly and then turn counter clockwise by 90°.

Important. The function of the Z and S buttons changes accordingly with the SW 3 selection.

9.2.1 Wet ranging operation (SW 3 = 1)

The Z button (2) performs the 'Lower Range Setting' operation and sets as 0% the actual measured pressure value. After the 'Z' button is kept pushed for more than 2 seconds, when released, the pressure value measured in input is written in the **PRTB_SCALE_IN_0%**. The **PRTB_SCALE_IN_100%** is shifted in order to keep the same SPAN

Before:

— SPAN = **(PRTB_SCALE_IN_100% - PRTB_SCALE_IN_0%)**

After:

— **PRTB_SCALE_IN_0% = PRTB_TRIMMED_VALUE**

— **PRTB_SCALE_IN_100% = SPAN + PRTB_SCALE_IN_0%**

The Span button performs the 'Upper Range Setting' operation and sets as 100% of the calibration scale the actual measured pressure value. After the Span button is kept pushed for more than 2 seconds, when released, the pressure value measured in input is written in the **PRTB_SCALE_IN_100%**. The SPAN changes as consequence.

— **PRTB_SCALE_IN_100% = PRTB_TRIMMED_VALUE**

9.2.2 PV Scaling operation (SW 3 = 0)

The Zero button performs the 'zero elevation/suppression' operation. After the Zero button is kept pushed for more than 2 second, when released, the **PTRB_SECONDARY_VALUE_1** is zeroed. The zeroing is achieved by an internal writing of 0.0 in the **PTRB_DESIRED_VALUE**. The difference between **PTRB_DESIRED_VALUE** and the **PTRB_TRIMMED_VALUE** is written in the **PTRB_BIAS_VALUE**.

— **PTRB_BIAS_VALUE =**

(PRTB_TRIMMED_VALUE - PRTB_DESIRED_VALUE)

The **PTRB_BIAS_VALUE** (positive or negative) is added in the calculation algorithm at the **PTRB_TRIMMED_VALUE** for the production of the PTRB_SECONDARY_VALUE_1.

— **PTRB_SECONDARY_VALUE_1 =**
(PRTB_TRIMMED_VALUE + PRTB_BIAS_VALUE)

The Span button performs the 'Reset zero elevation/suppression' operation. After the Span button is kept pushed for more than 1 second, when released, the **PTRB_BIAS_VALUE** is reset to Zero eliminating in this way any effect of elevation or suppression for the **PTRB_SECONDARY_VALUE_1** that, after this operation, returns to produce again the same value of the **PTRB_TRIMMED_VALUE**.

— **PTRB_BIAS_VALUE = 0.0**

— **PTRB_SECONDARY_VALUE_1 =**
PTRB_TRIMMED_VALUE

10 HMI Local Indicator

The 266 PdP is available with the integral HMI LCD local indicator with 4 buttons keypad as optionally item connected on the communication board. There are two types of available HMI:

— Conventional version (L1 option)

Gain access to the display by unscrewing the windowed cover. Please observe the Hazardous area prescription before proceeding with the cover removal. The keypad operability doesn't require any activation procedure.

— TTG (Trough The Glass) version (L5 option)

The TTG technology allows the user to operate on the keypad of the HMI without the need of opening the windowed cover of the transmitter. The capacitive pick-ups will detect the presence of your finger in front of the respective button activating the specific command. At the transmitter power-on the HMI automatically calibrate its sensitivity, it is mandatory for the proper functioning of the TTG HMI that the cover is properly tightened at power-on. In case the cover has been removed to access the communication board, it is recommended to power off and power-on again the transmitter once the windowed cover has been set in place and properly tightened. For safety reasons the keypad needs a specific activation procedure before to became usable.

10.1 Installing / Removing the LCD display

1. Unscrew the housing cover of the communication board/ LCD side.

Important. With an Ex d / Flameproof design, please refer to the section „Securing the housing cover with Ex d".

2. Attach the LCD display. Depending on the mounting position of the pressure transmitter, the LCD display may be attached in four different positions. This enables ± 90 ° or ± 180 ° rotations.

Important. Retighten the housing cover until it is hand-tight.

Important. If necessary, refer to the section „Securing the housing cover with Ex d".

10.2 Integral display rotation

In case an optional integral display meter is installed, it is possible to mount the display in four different positions rotated clockwise or counterclockwise with 90° steps.

To rotate the LCD, simply open the windowed cover (Hazardous area prescriptions must be respected), pull-out the display housing from the communication board.

Reposition the LCD connector according to the new desired position. Push back the LCD module on the communication board. Be sure that the 4 plastic fixing locks are properly in place.

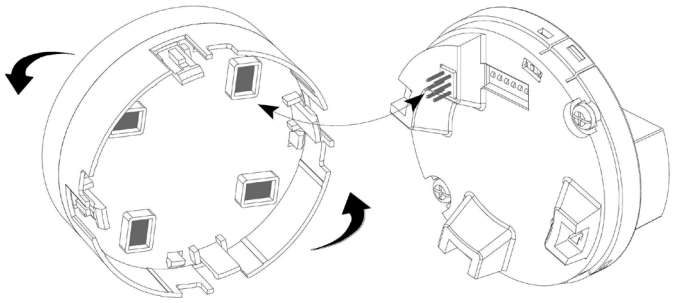


Figure 40: LCD display rotation

10.3 Operations

The HMI is a Dot matrix LCD with a keypad of 4 buttons usable for different purposes.

— Variable Indicator

— Diagnostic Indicator

— Feedback of the local push button operations

— Configuration tool

10.3.1 HMI as variable indicator

This is the normal way of how the HMI works. It is refreshed every 2 seconds and can visualize the process measured variables as well as other variables calculated every loop in the PTRB and AIs. The HMI can be set to four different operating Modes:

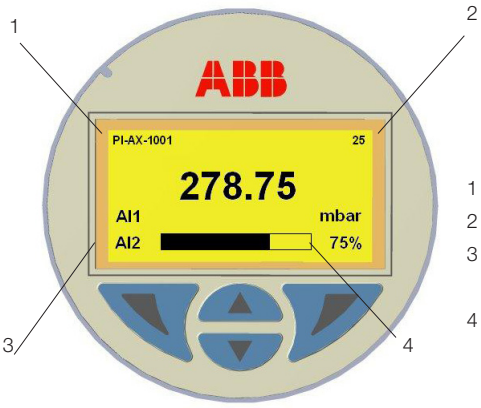
One line	Only one variable with its unit code is displayed
One Line and bar-graph	One variable with its unit code is displayed and another variable can be selected to be displayed in percentage by the bar-graph
Two Lines	Two variables with unit code are displayed together (one for each line)
Two Lines and bar-graph	Two variables with unit code are displayed together (one for each line) and another variable can be selected to be displayed in percentage by the bar-graph

The Mode selection can be done through the remote setting of the **HMI_MODE** parameter or locally from the HMI menu **"Display/Settings/Mode"**.

LCD structure

The Device TAG and Node Address are always visible in the top side of the LCD. The line/s and bar-graph view depends by the **HMI_MODE** Selection. The displayed variables are identified by a max of the three character strings visible on the left side of the value when two lines mode is selected or below the value when one line mode is selected.

The list of all the strings identifying the variable is available in the **HMI_VARIABLE_1**.



1 - Tag
2 - Node address
3 - Variable identification
4 - Bar-graph

Figure 41: Example of how the indicator looks with one and two lines plus bar-graph

LCD setting

The variables to be displayed can be selected in two ways:

- Locally using the optional LCD keypad from the menu “Display/settings/…”.
- From remote station via profibus communication writing in the HMITB.

In the HMITB there are up to 4 variables called **HMI_VARIABLE_x** (where x is from 1 to 4) and each of them can be set with one variable to be displayed selected from a list of 10 different variables. Then the **HMI_LINE_1, HMI_LINE_2** and **HMI_BARGRAPH** must be set to one of the **HMI_VARIABLE_x** depending by which variable the user wants see on the Line 1 or Line 2 or bar-graph. The parameter **HMI_SEQUENCE** allows the enabling of the automatic scrolling of the 4 **HMI_VARIABLE_x**.

Important. It is recommended to use the Auto-scrolling only with **HMI_MODE** set to **One Line**.

10.3.2 HMI as diagnostic indicator

While the HMI works as Variable Indicator, also diagnostic strings can be displayed. Whenever a failure or warning condition is detected within the transmitter, a message appears in the low side of the display below the bar-graph. The message is formed by the NAMUR NE107 icon and the string of the component where the problem occurred.

NAMUR icons	Description	Source of error
	Error / Failure	ELECTRONICS
	Functional check (e.g. during simulation)	SENSOR
	Out of Spec (e.g. Sensor temperature outside the specs limits)	PROCESS
	Maintenance required	CONFIGURATION

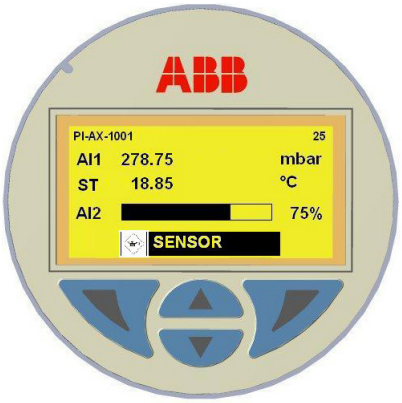


Figure 42: Example of “Maintenance / Sensor” and “Failure / Electronics” diagnostic

Detailed diagnostic info from HMI

When the above kind of diagnostic information is displayed, from the HMI it is also possible to see the details.

1. Press the (1) key for 4 seconds until a special symbol appears in the low left corner of the display

Important. This step is necessary only for the keypad activation of TTG HMI type. For conventional HMI start from step 2.

2. Press the key (2)
3. The HMI enter in the special menu with three items:

   Diagnostics

   Operator View 1

   Signals View
4. Select “Diagnostics” and the list of all the active error conditions appears with on top the worst condition.

The format of how the detailed diagnostic info are displayed is “XA.BBB” where:

X = NAMUR NE107 Categories	A = Priority. (Higher number = higher priority)	BBB = error code
F = Failure		
M = Maintenance		
O = Out of Specification		
C = Function Check		

10.3.3 HMI as feedback of the local push button operations

As consequence of the operations described in the section 8.2, when the Z or S buttons are released, the feedback of the executed operation is displayed in the bottom of the LCD (same position as per diagnostic messages):

Message	Description
! Oper Done	The push button operation has been successfully executed
! Proc Too Low	The Pressure measured in input is too low and not acceptable for the requested operation
! Proc Too High	The Pressure measured in input is too high and not acceptable for the requested operation
! New URV Error	The Zero (Z) operation cannot be accepted because the URV would be shifted outside the Upper Sensor limit
! Span Error	The Span (S) operation cannot be accepted because the new URV would be too close to the LRV and their difference lower than the Minimum Span value
! Oper Disabled	The push button operation has been refused because the Write Protection is enabled with the hardware button or in **PB_WRITE_LOCKING** or because the Local Operation is disabled in the **PB_LOCAL_OP_ENA**

10.3.4 HMI as configuration tool

The HMI can be used to read and change the display configuration through a dedicated menu accessible by using the 4 HMI buttons. To access the functionality of the HMI an activation procedure needs to be carried out.

LCD (L1 option) activation considerations

Gain access to the display by unscrewing the windowed cover. Please observe the Hazardous area prescription before proceeding with the cover removal. For activation, see following instructions.

TTG (L5 option) activation considerations

The TTG technology allows the user to activate the keypad on the HMI without the need of opening the windowed cover of the transmitter. The capacitive pick-ups will detect the presence of your finger in front of the respective button activating the specific command.

At the transmitter power-on the HMI automatically calibrate its sensitivity, it is mandatory for the proper functioning of the TTG HMI that the cover is properly tightened at power-on.

In case the cover has been removed to access the communication board, it is recommended to power off and power-on again the transmitter once the windowed cover has been set in place and properly tightened.

10.3.5 Activation procedure for TTG (L5) and LCD (L1)

1. Press the (2) and (3) keys together for 3 seconds until a special symbol appears in the low left corner of the display
2. Press the (4) key
3. The HMI enter in the configuration menus

The keys (1), (4), (2) and (3) are available for the menu-controlled configuration.

4. The menu/submenu name is displayed above in the LCD display.
5. The number/line of the currently selected menu item is displayed in the upper right of the LCD display.
6. A scroll bar is located on the right edge of the LCD display which shows the relative position of the currently selected menu item within the menu.
7. Both of the keys (1) and (4) can have various functions. The meaning of these buttons is displayed below in the LCD display above the respective button.
8. You can browse through the menu or select a number within a parameter value using both keys (2) and (3).

The button (4) selects the desired menu item.

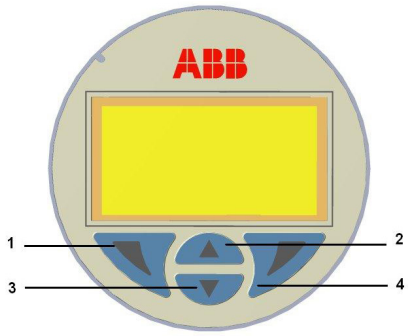


Figure 43: Display keypad

Button (1) functionalities	Meaning
Exit	Exit menu
Back	Back one submenu
Cancel	Exit without saving the selected parameter value
Next	Select next position for entering numerical values or letters

Button (4) functionalities	Meaning
Select	Select submenu/parameter
Edit	Edit parameter
Ok	Save selected parameter and display stored parameter value

11 Commissioning

Once the transmitter has been installed, it is put into operation by switching on the operating voltage. Check the following before switching on the operating voltage:

— Process and electrical connections

— The impulse line/s and the measuring chamber of the measuring equipment must be completely filled with the measuring medium.

The transmitter can then be put into operation. To do this, the shut-off valves must be actuated in the following sequence (in the default setting, all valves are closed):

(Differential models) 266Dx or 266Mx

Open the shut-off valves on the pressure tap connection (if present).

Open the pressure equalization valve of the manifold.

Open the positive shut-off valve (on the manifold)

Open the negative shut-off valve (on the manifold)

Close the pressure equalization valve.

(Gauge & Absolute models) 266Gx, 266Ax, 266Hx, 266Nx, 266Px, 266Vx

Open the shut-off valve on the pressure tap connection (if present).

Open the positive shut-off valve.

To put the transmitter out of operation, carry out the steps in reverse order.

Important. For the absolute pressure transmitters model 266AS or 266NS or 266VS with sensor range C,F or G, please be aware that the measuring equipment will have been overloaded by the atmospheric pressure due to the long periods of transport and storage involved. For this reason, you will need to allow a starting time of approx. 30 min. after commissioning, until the sensor has stabilized to such an extent that the specified accuracy can be maintained. If, when using „intrinsically safe“ transmitters, an ammeter is connected to the output circuit or a modem is connected in parallel while there is a risk of explosion, the sums of the capacitances and inductances of all circuits, including the transmitter (see EC-type-examination certificate) must be equal to or less than the permissible capacitances and inductances of the intrinsically safe signal circuit (see EC-type-examination certificate for the supply unit). Only passive or explosion-proof devices or indicators may be connected. If the output signal stabilizes only slowly, it is likely that a large damping time constant has been set on the transmitter.

11.1 Correction of the mounting position

During installation of the transmitter, zero shifts caused by mounting (e.g., a slightly oblique mounting position due to a remote seal, etc.) may occur; these must be corrected.

Important. The transmitter must have reached its operating temperature (approx. 5 min. after startup, if the transmitter has already reached the ambient temperature).

This correction can be executed only the Calibration Lower Range value is 0.0 and must be made with process (dp or p) = 0.

The correction consists in the Zero elevation/suppression operation and can be done in three ways:

— Locally by acting on the Z push button when the electronic switch SW 3 is raised up to 1, see section 9.2.1

— Locally using the optional LCD keypad from the menu **“Device Setup/Process Variable/PV Bias/Set PV to Zero”**

— From remote station via profibus communication writing 0.0 in the **PTRB_DESIRED_PRIMARY_VALUE**

In case the Calibration Lower Range value is not 0.0 then the correction cannot be made with the local Z push button but it can be done in the following two ways:

— Locally using the optional LCD keypad from the menu **“Device Setup/Process Variable/PV Bias/Set PV to Value”**

— From remote station via profibus communication writing the correct measure value in the **PTRB_DESIRED_PRIMARY_VALUE**.

Important. After the above operations the Calibration Range Values are not changed.

11.2 Configuration

The transmitter implements up to three Analog Input Blocks. Each AI produce in output a variable (**AIx_OUT**) suitable to be transmitted via Profibus Cyclic communication depending by how it has been configured in the Profibus Host (DCS or PLC).

— The Analog Input 1 (AI1) is demanded to produce the Process Variable that, depending by the transmitter configuration can be a Pressure (p or dp), Level, Flow or Volume measure.

— The Analog Input 2 (AI2) is demanded to produce the Static Pressure (p) and is relevant only for dp sensor types producing the Static Pressure.

— The Analog Input 3 (AI3) is demanded to produce the Sensor temperature or the Pressure (p or dp) depending by its Channel setting.

The definition of which of the three variables have to be transmitted with the cyclic telegram is performed during the network configuration from the Host selecting the correct combination of “Module” up to 3 modules max as specified in the GSD file.

The cyclic telegram can be formed by minimum 5 byte up to 15 bytes max. Structure of the input cyclic telegram from 2600T 266 PdP to Class 1 Master in Data_Exchange service. In this table is reported the max.configuration when all the three AI blocks output are transmitted to the Class 1 Master. Different combinations are also possible according the GSD module selections.

Function Blocks	Index input data	Variables	access	Data type
AI1_OUT	0, 1, 2, 3	Process Value: Pressure, Level, Flow, Volume	Read	32 bits Floating Point Format (IEEE 754)
	4	Status Byte for Process Value	Read	See Status Byte coding
AI2_OUT	5, 6, 7, 8	Static Pressure	Read	32 bits Floating Point Format (IEEE 754)
	9	Status Byte for Static Pressure	Read	See Status Byte coding
AI3_OUT	10, 11, 12, 13	Auxiliary Value: Sensor Temperature, Pressure	Read	32 bits Floating Point Format (IEEE 754)
	14	Status Byte for Auxiliary Value	Read	See Status Byte coding

11.2.1 Network configuration

When the 266 PdP transmitter has to be used in a profibus project, the first operation is to import in the Host (Class 1 Master) the GSD file of the device. The manufacturer specific GSD filename of the 2600T-266 PdP transmitter is AB013450. GSD The GSD file can be downloaded from the ABB website www.abb.com. When the GSD file has been imported in the Host then the transmitter can be used in a network design. In order to configure a Profibus Node for the 266 PdP: select the 266 PdP from the available GSD files list, assign a valid Address (1….125) and then select from the GSD file the Module with the required variables to be transmitted via cylcic telegram for that specific Node Address.

Cyclic communication

The output of each AI block is 5 bytes. The Variable is 32 bit in Floating Point format (4 bytes) plus a Status Byte (1 Byte).

Variable structure

The Floating Point format of each variable read by the Class 1 master is as follow:

Byte n								Byte n+1							
Bit 7	Bit 6							Bit 7	Bit 6						
S	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}
	EXPONENT								MANTISSA						

Byte n+2								Byte n+3							
Bit 7								Bit 7							
2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}
MANTISSA								MANTISSA							

Example:

40 F0 00 00 (hex) = 0100 000 111 000 000 000 000 000 (binary)

Calculation:

Value = (-1) S * 2 (Exponent – 127) * (1 + Mantissa)

Value = (-1) 0 * 2 (129 – 127) * (1 + 2-1 + 2-2 + 2-3)

Value = 1 * 4 * (1 + 0.5 + 0.25 + 0.125) = 7.5

Status byte

The Status byte is the fifth byte of any out value and represents the Quality of the variable. The 266 PdP supports both the Classic Status and Condensed Status conditions as allowed by the Profile 3.02. Depending by which of the two selections is active, the list of the possible Status in output of the AI blocks can be the following:

— Classic Status

Binary Code	Decimal Code	Quality	Sub-Status
0000 00xx	0-3	BAD	non specific
0000 11xx	12-15	BAD	Device Failure
0001 00xx	16-20	BAD	Sensor Failure
0001 1111	31	BAD	Out of Service
0100 0000	64	UNCERTAIN	non specific
0100 0100	68	UNCERTAIN	last usable value (LUV) – (FSAFE_TYPE = 1)
0100 1000	72	UNCERTAIN	substitute value – (FSAFE_TYPE = 0)
0100 1100	76	UNCERTAIN	initial value (FSAFE_TYPE = 0)
0101 00xx	80-83	UNCERTAIN	sensor conversion not accurate
0101 01xx	84-87	UNCERTAIN	engineering unit range violation
0110 00xx	96-99	UNCERTAIN	simulated value
1000 0000	128	GOOD_NC	ok
1000 0100	132	GOOD_NC	Update Event
1000 1010	138	GOOD_NC	Active Advisory Alarm high
1000 1110	142	GOOD_NC	Active Critical Alarm high
1000 1001	137	GOOD_NC	Active Advisory Alarm low
1000 1101	141	GOOD_NC	Active Critical Alarm low
1010 0100	164	GOOD_NC	Maintenance Required

— Condensed Status

Binary Code	Decimal Code	Quality	Sub-Status
0000 0000	0	BAD	non specific
0010 10xx	40-43	BAD	Process Related No Maintenance
0010 01xx	36-39	BAD	Maintenance Alarm More Diagnostic Available
0011 11xx	60-63	BAD	Function Check Local Override
0100 0000	64	UNCERTAIN	non specific
0111 10xx	120-123	UNCERTAIN	Process Related No Maintenance
0100 1011	75	UNCERTAIN	substitute value – (FSAFE_TYPE = 0)
0100 1111	79	UNCERTAIN	initial value (FSAFE_TYPE = 0)
0111 0011	115	UNCERTAIN	Simulated value start
0111 01xx	116-119	UNCERTAIN	Simulated value end
0110 00xx	96-99	UNCERTAIN	simulated value
1000 0000	128	GOOD_NC	ok
1000 0100	132	GOOD_NC	Update Event
1000 1010	138	GOOD_NC	Active Advisory Alarm high
1000 1110	142	GOOD_NC	Active Critical Alarm high
1000 1001	137	GOOD_NC	Active Advisory Alarm low
1000 1101	141	GOOD_NC	Active Critical Alarm low
1010 01xx	164-167	GOOD_NC	Maintenance Required
1010 10xx	168-171	GOOD_NC	Maintenance Demanded

11.2.2 Device configuration

Operations on the transmitter like configuration/ parameterization, maintenance, monitoring are executed by reading or writing the parameters mapped in the transmitter's blocks addressed as Slot/index. The Acyclic profibus communication is used .

The DTM 266 PdP-PA is conform to the specifications FDT 1.2.1 and can be used within any FDTframeapplication/ configuration tool. The fdtFrameapplication tool from ABB is the DAT200 (Asset Vision Basic) as freeware software tool. Both the DTM and the DAT200 can be downloaded from the ABB website www.abb.com.

Acyclic communication

The acyclic communications is executed only when a read or write access at the device parameters is requested by the operator from the Class 1 or Class 2 Masters. The device parameters are addressed via SLOT/INDEX mapping. Refer to the Appendix A to see the complete parameter mapping of the 266 PdP-PA.

11.3 Factory settings

Transmitters are calibrated at the factory to the customer's specified measuring range. The calibrated range and tag number are provided on the name plate. If this data has not been specified, the transmitter will be delivered with the following configuration:

Parameter	Factory setting
Node Address	126
TAG **PB_TAG_DESC**	"PI000"
Calibration Lower Range Value 0% **PRTB_SCALE_IN 0%**	0.0
Calibration Upper Range Value 100% **PRTB_SCALE_IN 100%**	**PTRB_SENSOR_LIM_HI**
Calibration Unit **PRTB_SECONDARY_VALUE_1_UNIT**	Kpa
Transfer function **PTRB_LIN_TYPE**	Linear
Display Mode **HMI_MODE**	One Line
Display Variable **HMI_LINE1**	**HMI_VARIABLE_1** = AI1_OUT

Analog Input 1 setting	
Damping **AI1_PV_FTIME**	0 second
Output scale 0% **AI1_OUT_SCALE 0%**	0.0
Output scale 100% **AI1_OUT_SCALE 100%**	**PTRB_SENSOR_LIM_HI**
Output Scale Unit **AI1_OUT_SCALE Unit Code**	Kpa
Critical Limit Low **AI1_LO_LO_LIM**	**AI1_OUT_SCALE 0%** – 10% of the SPAN
Advisory Limit Low **AI1_LO_LIM**	
Advisory Limit High **AI1_HI_LIM**	**AI1_OUT_SCALE 100%** + 10% of the SPAN
Critical Limit High **AI1_HI_HI_LIM**	
Alarm Hysteresis **AI1_ALARM_HYS**	0.5% of the SPAN
Fail Safe Type **AI1_FSAFE_TYPE**	Last Usable Out Value

Analog Input 2 setting (Applicable only for Differential Pressure Sensor types)	
Damping **AI2_PV_FTIME**	0 second
Output scale 0% **AI1_OUT_SCALE 0%**	0.0
Output scale 100% **AI2_OUT_SCALE 100%**	**PTRB_STATIC_P_SENSOR_HI_LIM**
Output Scale Unit **AI2_OUT_SCALE Unit Code**	MPa
Critical Alarm Low **AI2_LO_LO_LIM**	**AI1_OUT_SCALE 0%** – 10% of the SPAN
Advisory Alarm Low **AI2_LO_LIM**	
Advisory Alarm High **AI2_HI_LIM**	**AI2_OUT_SCALE 100%** + 10% of the SPAN
Critical Alarm High **AI2_HI_HI_LIM**	
Alarm Hysteresis **AI2_ALARM_HYS**	0.5% of the SPAN
Fail Safe Type **AI2_FSAFE_TYPE**	Last Usable Out Value

Analog Input 3 setting	
Damping **AI1_PV_FTIME**	0 second
Output scale 0% **AI1_OUT_SCALE 0%**	0.0
Output scale 100% **AI1_OUT_SCALE 100%**	**PTRB_SENSOR_LIM_HI**
Output Scale Unit **AI1_OUT_SCALE Unit Code**	Kpa
Critical Limit Low **AI1_LO_LO_LIM**	**AI1_OUT_SCALE 0%** – 10% of the SPAN
Advisory Limit Low **AI1_LO_LIM**	
Advisory Limit High **AI1_HI_LIM**	**AI1_OUT_SCALE 100%** + 10% of the SPAN
Critical Limit High **AI1_HI_HI_LIM**	
Alarm Hysteresis **AI1_ALARM_HYS**	0.5% of the SPAN
Fail Safe Type **AI1_FSAFE_TYPE**	Last Usable Out Value

All the configurable parameters listed above can be afterward modified either via the optional LCD HMI, or via software application tools using the ABB DTM 266 PdP PA or the EDD drivers.

Data regarding flange type and material, O-ring materials, and type of filling liquid is stored in the device.

11.4 User setting

Generally the 2600T pressure transmitters are delivered pre-configured as per purchase order request in order to measure Pressure, Level, Flow or Volume.

For the device configuration it is necessary to know at least the following process info as minimum:

- TAG
- Calibration Range/Scale and its engineering unit as range of pressure to be measured in input
- Linearization Type defining the type of linearization to be applied at the pressure measured in input in order to convert it to the output measure
- Output Range/Scale and its engineering unit.

Pressure and Level measurement setting		
Process Info	**Device parameter to be configured**	
TAG	**PB_TAG_DESC**	
Calibration LRV 0%	**PRTB_SCALE_IN 0%**	
Calibration URV 100%	**PRTB_SCALE_IN 100%**	
Calibration Unit	**PRTB_SECONDARY_VALUE_1_UNIT**	
Linearization Type	**PRTB_LIN_TYPE**	**Linear**
Output scale 0%	**AI1_OUT_SCALE 0%** **AI1_PV_SCALE 0%** **PRTB_SCALE_OUT 0%**	
Output scale 100%	**AI1_OUT_SCALE 100%** **AI1_PV_SCALE 100%** **PRTB_SCALE_OUT 100%**	
Output Scale Unit	**AI1_OUT_SCALE Unit Code** **PRTB_PRIMARY_VALUE_UNIT**	

Flow measurement setting		
Process Info	**Device parameter to be configured**	
TAG	**PB_TAG_DESC**	
Calibration LRV 0%	**PRTB_SCALE_IN 0%**	
Calibration URV 100%	**PRTB_SCALE_IN 100%**	
Calibration Unit	**PRTB_SECONDARY_VALUE_1_UNIT**	
Linearization Type	**PRTB_LIN_TYPE**	Square Root
		SQRT 3° pow
		SQRT 5° pow
		Bidirectional Flow
Output scale 0%	**AI1_OUT_SCALE 0%** **AI1_PV_SCALE 0%** **PRTB_SCALE_OUT 0%**	
Output scale 100%	**AI1_OUT_SCALE 100%** **AI1_PV_SCALE 100%** **PRTB_SCALE_OUT 100%**	
Output Scale Unit	**AI1_OUT_SCALE Unit Code** **PRTB_PRIMARY_VALUE_UNIT**	

Volume measurement setting		
Process Info	**Device parameter to be configured**	
TAG	**PB_TAG_DESC**	
Calibration LRV 0%	**PRTB_SCALE_IN 0%**	
Calibration URV 100%	**PRTB_SCALE_IN 100%**	
Calibration Unit	**PRTB_SECONDARY_VALUE_1_UNIT**	
Linearization Type	**PRTB_LIN_TYPE**	linearisation table
		cylindrical lying container
		spherical container
Output scale 0%	**AI1_OUT_SCALE 0%** **AI1_PV_SCALE 0%** **PRTB_SCALE_OUT 0%**	
Output scale 100%	**AI1_OUT_SCALE 100%** **AI1_PV_SCALE 100%** **PRTB_SCALE_OUT 100%**	
Output Scale Unit	**AI1_OUT_SCALE Unit Code** **PRTB_PRIMARY_VALUE_UNIT**	

Further common setting	
Process Info	**Device parameter to be configured**
Node Address	
Damping	**AI1_PV_FTIME**
Critical Limit Low	**AI1_LO_LO_LIM**
Advisory Limit Low	**AI1_LO_LIM**
Advisory Limit High	**AI1_HI_LIM**
Critical Limit High	**AI1_HI_HI_LIM**
Alarm Hysteresis	**AI1_ALARM_HYS**
Fail Safe Type	**AI1_FSAFE_TYPE**

No field calibration is normally requested, the transmitter has been trimmed to the calibration points (URV and LRV) to provide the best performances in the real operating range.

In case the calibrated range has to be changed, please refer to the section 12 in this manual

12 Operations

The transmitter makes available to the user some operations that can be useful during the device life cycle.

These operations are supported and can be executed with the DTM o EDD based configuration tools, or also by following the instructions / descriptions below.

12.1 Sensor trimming / calibration

The scope of the sensor trimming / calibration is to adjust and make accurate as much as possible the sensor conversion to a pressure value in digital format.

The sensors of the 266 are calibrated/trimmed in the factory to the customer's specified measuring range therefore it could be necessary change or correct the sensor calibration later on as maintenance operation. Two points are necessary to perform a sensor calibration. Low sensor calibration point (Zero) writing in **PRTB_CAL_POINT_LO** and High sensor calibration point (Span) writing in **PRTB_CAL_POINT_HI**.

The minimum distance from the two points must be greater than minimum span **PRTB_CAL_MIN_SPAN**.

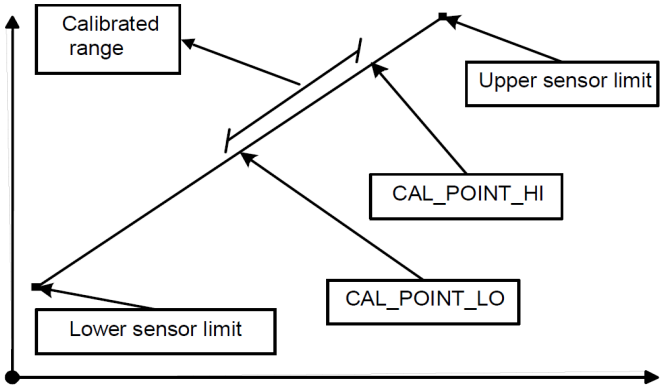


Figure 44: Sensor Trimming / Calibration

12.1.1 P-dP sensor low trimming

With this operation the **PRTB_TRIMMED_VALUE** is automatically adjusted, in order to match the real value of the pressure applied in input, in the low part of the working range. The following sequence of operations is required:

1. Apply a reference pressure in input using a reference pressure generator.
2. Select the engineering unit of the measure in the **PRTB_SENSOR_UNIT** (Pressure Unit Only)
3. Read the measure produced by the transmitter from the **PRTB_TRIMMED_VALUE**.
4. If this value doesn't match the pressure applied in input, enter the correct known applied pressure value in the **PRTB_CAL_POINT_LO** and write to the transmitter.

This writing executes an internal algorithm that produces the new correction coefficients.

5. Read again the **PRTB_TRIMMED_VALUE** and check if its value matches the applied pressure.

This operation can be executed also with the optional keypad from the menu **"Calibration/P-dP Sensor/Low Trimming"**.

12.1.2 P-dP sensor high trimming

With this operation the **PRTB_TRIMMED_VALUE** is automatically adjusted, in order to match the real value of the pressure applied in input, in the high part of the working range.

The following sequence of operations is required:

1. Apply a reference pressure in input using a reference pressure generator.
2. Select the engineering unit of the measure in the **PRTB_SENSOR_UNIT** (Pressure Unit Only)
3. Read the measure produced by the transmitter from the **PRTB_TRIMMED_VALUE**.
4. If this value doesn't match the pressure applied in input, enter the correct known applied pressure value in the **PRTB_CAL_POINT_HI** and write to the transmitter.

This writing executes an internal algorithm that produces the new correction coefficients.

5. Read again the **PRTB_TRIMMED_VALUE** and check if its value matches the applied pressure

This operation can be executed also with the optional keypad from the menu **"Calibration/P-dP Sensor/High Trimming"**.

12.1.3 Static pressure low trimming

With this operation the **PRTB_STATIC_P_TRIM_VALUE** is automatically adjusted, in order to match the real value of Static Pressure applied at the transducer in the lower part of the range. The following sequence of operations is required:

1. Select the engineering unit of the measure in the **PRTB_STATIC_P_SENSOR_UNIT** (Pressure Unit Only)
2. Read the Static Pressure value from the **PRTB_STATIC_P_TRIM_VALUE**.
3. If this value doesn't match the known Static Pressure applied in input at the transducer, enter the correct value in the **PRTB_STATIC_P_CAL_POINT_LO** and write to the transmitter. This writing executes an internal algorithm that produces the new correction coefficients.
4. Read again the **PRTB_STATIC_P_TRIM_VALUE** and check if its value matches the real Static Pressure value.

12.1.4 Static pressure high trimming (for piezo dP sensor only)

With this operation the **PRTB_STATIC_P_TRIM_VALUE** is automatically adjusted, in order to match the real value of Static Pressure applied at the transducer in the upper part of the range. The following sequence of operations is required:

1. Select the engineering unit of the measure in the **PRTB_STATIC_P_SENSOR_UNIT** (Pressure Unit Only)
2. Read the Static Pressure value from the **PRTB_STATIC_P_TRIM_VALUE**.
3. If this value doesn't match the known Static Pressure applied in input at the transducer, enter the correct value in the **PRTB_STATIC_P_CAL_POINT_HI** and write to the transmitter. This writing executes an internal algorithm that produces the new correction coefficients.
4. Read again the **PRTB_STATIC_P_TRIM_VALUE** and check if its value matches the real Static Pressure value.

12.1.5 Sensor temperature trimming

With this operation the **PRTB_TEMPERATURE** is automatically adjusted, in order to match the real value of the sensor temperature. The following sequence of operations is required:

1. Select the engineering unit of the temperature in the **PRTB_TEMPERATURE_UNIT** (Temperature Unit Only)
2. Read the Sensor Temperature value from the **PRTB_TEMPERATURE**.
3. If this value doesn't match the known Sensor Temperature of the transducer, enter the correct value in the **PRTB_SENSOR_TEMP_TRIM_VALUE** and write to the transmitter. This writing executes an internal algorithm that produces the new correction coefficients.
4. Read again the **PRTB_TEMPERATURE** and check if its value matches the real Sensor temperature value.

12.2 Parallel shift (P-dP)

In case the process (dp or p) cannot be led to 0 it is possible correct the measure performing the Parallel Shift operation. Typically this operation is applicable for Level measurements.

Having the possibility to see/read the actual measure in percent, if it is not what expected, enter the percent of what the process should measure. The correction consists in the shift of the calibration range values in order to produce in output the measure with the desired percentage. The parallel shift can be done in two ways:

— Locally using the optional LCD keypad from the menu **"Device Setup/Process Variable/Parallel Shift"**.

— From remote station via profibus communication writing the desired percent value in the **PTRB_PARALLEL_SHIFT_PV**

In this way the Calibration Range Values **PRTB_SCALE_IN 0%** and **PRTB_SCALE_IN 100%** are changed due to their shifting.

Important. After the parallel shift execution, the percent value of the **AI1_OUT** matches the desired percentage only if the **PRTB_LIN_TYPE** is set to Linear.

This makes it possible to set the output signal of several measuring devices that measure the same process variable to the same value without having to perform a calibration with applied pressure.

E.G. the transmitter output can be adjusted to gauge-glass for level measurement.

This function can - under the following circumstances - be carried out at any point on the characteristic:

— Process variable within the adjusted measuring range - transmitter with linear transfer function.

— Write protection on the transmitter must not be activated.

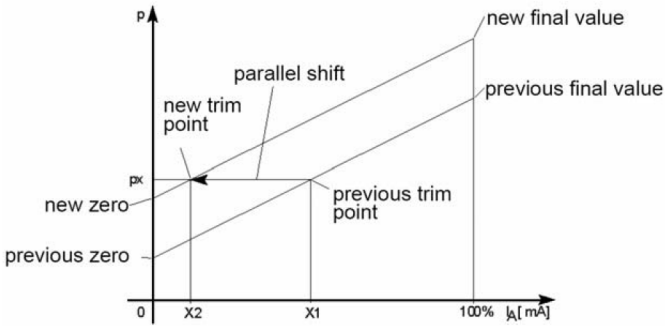


Figure 45: Parallel shift

When a pressure px is applied, the transmitter displays the standardized output value x1 in percent.

Due to the present application the value x2 should be displayed.

Enter this new value x2 in the line PRTB_PARALLEL_SHIFT_PV, the transmitter calculates the new zero and the new final value and adopts these new settings in the PRTB_SCALE_IN 0% and PRTB_SCALE_IN 100%

12.3 Parallel shift (Static Pressure)

This operation is same as for the P-dP above described but available for dP sensors only. It is executed by writing the desired output in percentage value in the **PRTB_PARALLEL_SHIFT_SP**. This function performs an offset shift of the measuring range so that the **PRTB_STATIC_P_SCALE_IN 0%** and **PRTB_STATIC_P_SCALE_IN 100%** are shifted in order to produce in output the desired value.

12.4 Transfer function

The 266 Pressure Transmitter provides a selection of output functions, as follows:

— Linear for differential, gauge and absolute pressure or level measurements

— Sq. Root (x) for flow measurements using restriction type primary element, like orifice plate, integral orifice, Venturi or Dall tube and similar.

— Sq. Root (x3) for open channel flow measurements using rectangular or trapezoidal weir

— Sq. Root (x5) for open channel flow measurements using V-notch (triangular) weir.

— Bidirectional Flow

— Custom linearization table

— Cylindrical lying tank

— Spherical tank

These output functions can be selected writing in PRTB_LIN_TYPE activated using a Configuration Tool (Digital LCD Integral Display,or PC based software as Asset Vision Basic). The transfer function can be applied to the Process Variable only or also to the indication (in engineering units).

12.4.1 Transfer functions description

Linear

Using this function, the relationship between the input (measured value), expressed in % of the calibrated span and the output is linear (i.e.: at 0% input, corresponds 0% output - 4mA, at 100% input corresponds 100% output - 20mA). No further settings are possible here.

Square root

Using the Square Root function, the output (in % of the span) is proportional to the square root of the input signal in percentage of the calibrated span (i.e.: the instrument gives an analog output proportional to the rate of flow).

The possibility to have the full Square Root function is given.

To avoid the extremely high gain error with the input approaching zero, the transmitter output is linear with the input up with a slope of 1 up to 0.5% and then still linear with the appropriated slope to a programmable percentage value between 10 % and 20%. This option is offer in order to ensure a more stable output when the signal is close to zero avoiding errors due to the high gain of the square root.

To neglect the values with the input approaching zero, the transmitter output is zero with the input up to a programmable percentage value between 0 % and 20%. This option is offer in order to ensure a more stable flow measure. This option is possible for all the listed output functions.).vant operating instruction.

Square root to the 3rd power

The x3 Square root Transfer function can be used for open channel (see figures on the right) flow measurement using ISO 1438 rectangular weirs (Hamilton Smith, Kindsvater-Carter, Rehbock formulas) or trapezoidal weirs (Cippoletti formulas) and ISO 1438 Venturi flumes. In these types of devices the relationship between the flow and the developed head h (the differential pressure measured by the transmitter) is proportional to h3/2 or square root of h3. Other types of Venturi or Parshall flume do not follow this relationship. Using this function, the output (in % of the span) is proportional to the square root of the third power of the input signal in % of the calibrated span: the instrument gives an output proportional to the rate of flow calculated using the above mentioned formulas.

Square root to the 5th power

The x5 Square root Transfer function can be used for open channel flow measurement using ISO 1438 Vnotch (triangular) weirs (see figure on the right) where the relationship between the flow and the developed head h (the differential pressure measured by the transmitter) is proportional to h5/2 or square root of h5.

Using this function, the output (in % of the span) is proportional to the square root of the fifth power of the input signal in % of the calibrated span: the instrument (it gives an output proportional to the rate of flow calculated using the Kingsvater-Shen formula).

Custom linearization curve

The custom linearization curve transfer function it is used typically for volumetric level measurement in tanks with an irregular shape. It can be registered to a freely identifiable transfer function with a maximum of 22 base points. The first point is always the zero point, the last is always the final value. Neither of these points can be altered.

A maximum of 20 points can be freely entered in between.

These points have to be defined by extrapolating the tank filling table data and reducing them to 22 points.Once identified the 22 points they will need to be uploaded into the device by either using an HART hand held terminal or a proper configuration software like Asset Vision Basic.

Bidirectional flow (to be used when the transmitter is connected to a bidirectional flow element)

Main characteristics

The bidirectional function, applied to the transmitter input (x) expressed in percentage of the calibrated span, has the following form:

Output = ½ + ½ sign (x) · x ½

where “x” and “Output” should be normalized in the range 0 to 1 for calculation purpose, with the following Output meaning:

- Output = 0 means Analog out 4 mA;
- Output = 1 means Analog out 20 mA.

This function can be used for flow measurement purpose when the flow is in both the directions and the primary elements are designed to perform this type of measure. As an example, if we have a bidirectional flow measurement application with the following data:

Max reverse flow rate: -100 l/h

Max flow rate: +100 l/h

The differential pressure generated by the flow primary is for the maximum flow rate 2500 mmH2O, for the max reverse flow rate 2500 mmH2O. The transmitter will have to be configured as follows:

Calibrated span:	4mA	= LRV = -2500mmH2O
	20mA	= URV = +2500mmH2O
Transfer function:	Bidirectional flow	

Once configured as above the transmitter will deliver:

flowrate 100 l/h reverse:	output= 4 mA
no flowrate:	output= 12 mA
Flow rate 100 l/h:	output= 20 mA

Cylindric lying tank

This function is used to measure the volumetric level into a cylindrical horizontal tank with flat ends. The transmitter calculates the volume from the measured filling level.

Spherical tank

This function is used to measure the volumetric level into a spherical tank. The transmitter calculates the volume from the measured filling level.

12.5 Savings

In order to keep a valid device setting to be used as reference when a valid condition has to be recovered in case of wrong operations, it is possible save all the above calibrations as Factory or User calibrations and the complete device configuration.

The possible savings are the following and are executed writing the proper code in the PB_SAVINGS, for details refer to the APPENDIX A - Device Mapping Tables.

Save Configuration as Default	When this operation is executed, the complete device configuration is saved as default configuration at which the device returns when the Reset to Default configuration is executed. After the device has been properly configured, the user can decide to save it as a default configuration in order to recover it if necessary
Save P-dP Sensor as Factory Calibration	The P-dP Sensor calibration/trimming is saved as Factory Calibration. This operation is typically executed in the Factory after the Sensor has been calibrated to the customer‘s specified measuring range or, in case the customer didn’t requested any measuring range, at the maximum sensor range
Save Static P Sensor as Factory Calibration	The Static P Sensor calibration/trimming is saved as Factory Calibration.
Save Sensor Temp as Factory Calibration	The Sensor Temp. calibration/trimming is saved as Factory Calibration
Save as User P-dP Sensor Trimming	The P-dP Sensor calibration/trimming is saved as User Calibration. This operation is typically executed by the user after the Sensor has been calibrated at the desired measuring range.
Save as User Static P Sensor Trimming	The Static P Sensor calibration/trimming is saved as User Calibration
Save as User Sensor Temp Trimming	The Sensor Temp. calibration/trimming is saved as User Calibration

12.6 Reset

The transmitter offers some reset operations executed by writing the proper code in the **PB_FACTORY_RESET**, for details refer to the APPENDIX A - Device Mapping Tables

Reset to Default Values	When this operation is executed, the complete device configuration returns to the configuration previously saved as default configuration.
Warm Start-up	This operation executes a S software restart
Reset Bus address to default (126)	Reset only the Device Address to the default address (126)
Reset P-dP Sensor to Factory Calibration	Return the P-dP Sensor calibration/trimming at the calibration previously saved as Factory Calibration This operation can be executed also with the optional keypad from the menu **“Calibration/ Reset/Factory Sens Trimming”**
Reset Static P Sensor to Factory Calibration	Return the Static Pressure Sensor calibration/ trimming at the calibration previously saved as Factory Calibration
Reset Sensor Temp to Factory Calibration	Return the Sensor temperature calibration/ trimming at the calibration previously saved as Factory Calibration
Reset to User P-dP Sensor Trimming	Return the P-dP Sensor calibration/trimming at the calibration previously saved as User Calibration. This operation can be executed also with the optional keypad from the menu **“Calibration/ Reset/User Sens Trimming”**
Reset to User Static P Sensor Trimming	Return the Static Pressure Sensor calibration/ trimming at the calibration previously saved as User Calibration
Reset to User Sensor Temp Trimming	Return the Sensor temperature calibration/ trimming at the calibration previously saved as User Calibration

13 PILD Algorithm

13.1 Overview

The advanced diagnostic transducer block contains all the parameters that related to the device diagnostic and all the parameters related with the PILD algorithm. The goal of this block is to supervise the device and set diagnostic alarms under transducer abnormal condition to the control system modifying the pressure transducer block primary value status and raising the proper alarm bit in the **PB_DIAGNOSIS_EXT.**

13.2 Block diagram

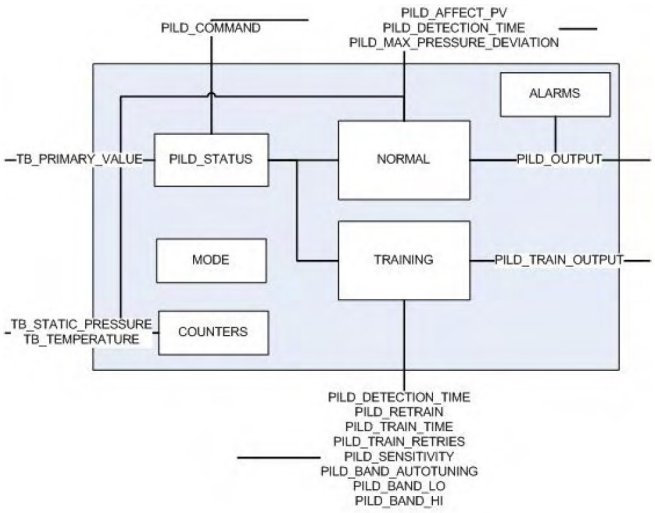


Figure 46: PILD block diagram

13.3 Description

The Plugged Impulse Line Detection (PILD) is a function aimed at detecting the blockage of the process connections of the instrument and any type of problem occurring at the sensor internal hydraulic circuit. The PILD algorithm is executed in two distinct phases:

13.3.1 Training phase

Selecting **ADTB_PILD_COMMAND = TRAIN** the training phase starts analyses and learns the process dynamics in term of noises of the primary signal detected when the process is working at its normal conditions. The Training Phase can take long time depending by the PILD settings of **ADTB_PILD_TRAIN_TIME**, **ADTB_PILD_RETRIES**, etc.., then if the training phase is successfully completed with good result, **ADTB_PILD_TRAINING_OUTPUT = PILD_TRAIN_OK** the PILD pass to the second phase of process monitoring otherwise it is possible read from the **ADTB_PILD_TRAINING_OUTPUT** the possible cause like:

- Process Instable during training
- Process not available during training
- Not good process condition for training
- Training not done

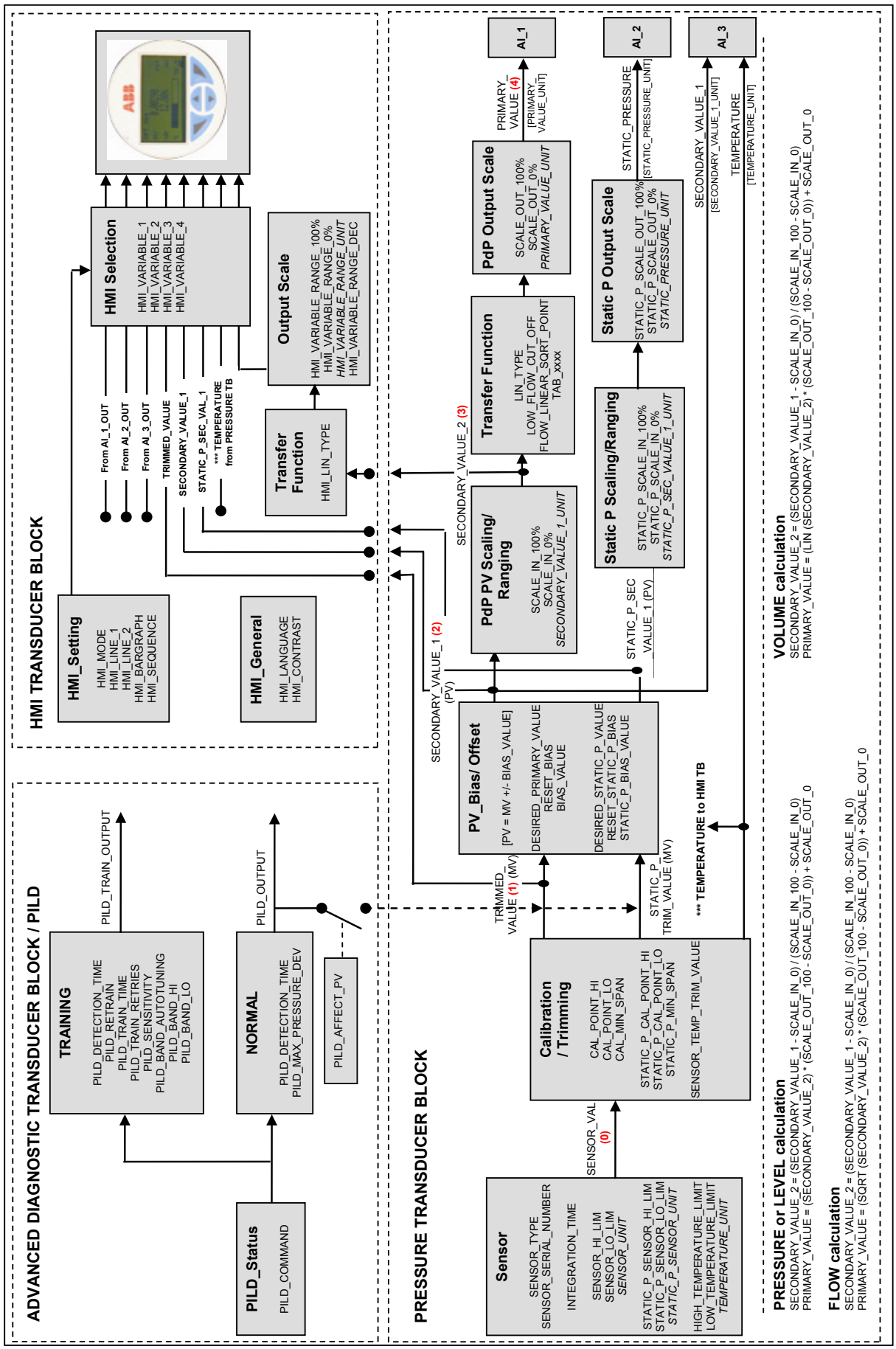
13.3.2 Monitoring phase

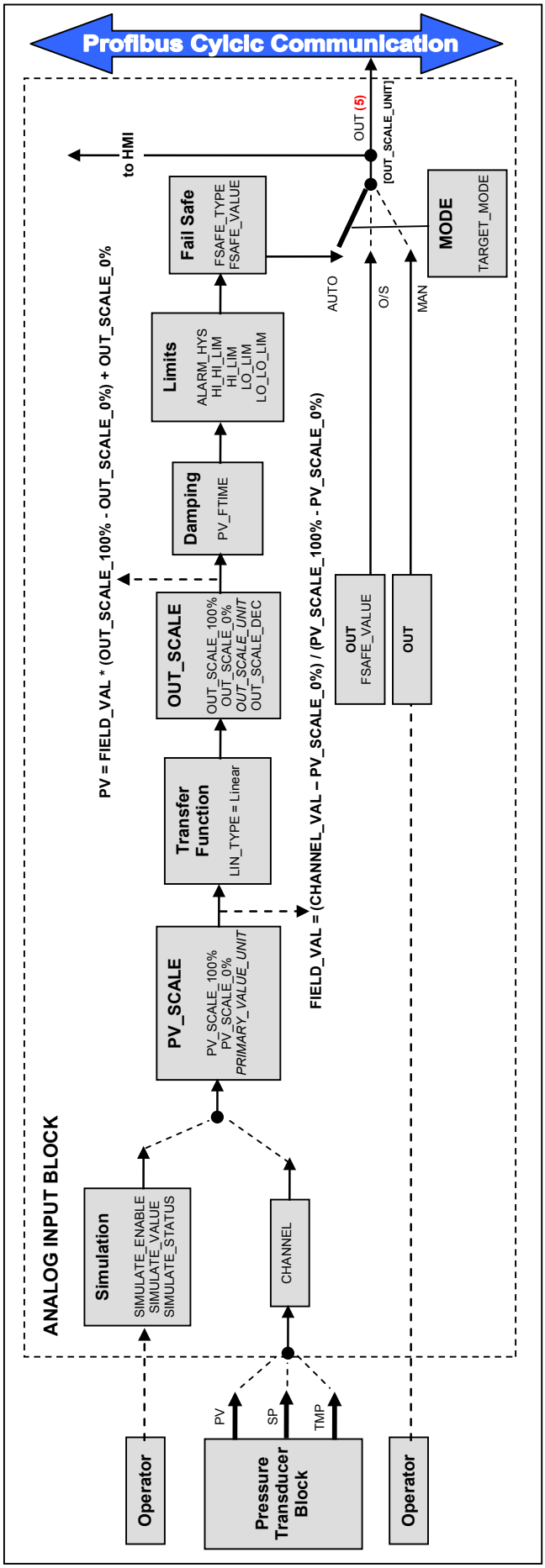
The algorithms perform a continuous sampling and comparison of the current process noises with what memorized during the training phase. Differences have been experienced being consequences of something bad in process connections to the sensor like dirty, ice and so on which tap/plug the pipe/s partially or totally.
Whenever a pipe plugging/tapping is detected, the **ADTB_PILD_OUTPUT** that was set to NORMAL during the monitoring phase changes to one of the following conditions as well as a correspondent diagnostic bit is raised in the **PB_DIAGNOSIS_EXT**:

- Line on side H plugged
- Line on side L plugged
- Both lines H and L plugged
- An undefined line plugged

When one of the above conditions has been detected, there is the possibility that the process variables in output from the PRTB continue to be produced with GOOD status. In this way the AI blocks receiving in input the variables from the PRTB works normally and the operator could have not evidence of the wrong conditions. For this reason it is possible make a choice in order to decide to affect or not the PRTB variables when the plugging conditions have been detected.
This selection is possible with the **ADTB_PILD_AFFECT_PV** variable. When it is selected to true, and the Plugging conditions are detected, the GOOD status that would be produced in output for the **PRTB_PRIMARY_VALUE**, **PRTB_STATIC_PRESSURE_VALUE**, **PRTB_TEMPERATURE** are forced to BAD status. The PILD algorithm loses the train every time it is switched off. The algorithm is switched off automatically for every error condition, except when the pressure violates the maximum pressure deviation and the retrain is selected.

14 Device Block Diagram




Profibus Cyclic Communication
ANALOG INPUT BLOCK
to HMI
OUT (5)
[OUT_SCALE_UNIT]
Fail Safe
FSAFE_TYPE
FSAFE_VALUE
MODE
TARGET_MODE
AUTO
O/S
MAN
Limits
ALARM_HYS
HI_HI_LIM
HI_LIM
LO_LIM
LO_LO_LIM
Damping
PV_FTIME
OUT_SCALE
OUT_SCALE_100%
OUT_SCALE_0%
OUT_SCALE_UNIT
OUT_SCALE_DEC
Transfer Function
LIN_TYPE = Linear
PV_SCALE
PV_SCALE_100%
PV_SCALE_0%
PRIMARY_VALUE_UNIT
OUT
FSAFE_VALUE
OUT
PV = FIELD_VAL * (OUT_SCALE_100% - OUT_SCALE_0%) + OUT_SCALE_0%
FIELD_VAL = (CHANNEL_VAL – PV_SCALE_0%) / (PV_SCALE_100% - PV_SCALE_0%)
Simulation
SIMULATE_ENABLE
SIMULATE_VALUE
SIMULATE_STATUS
CHANNEL
PV
SP
TMP
Operator
Pressure Transducer Block
Operator

15 Maintenance

If transmitters are used as intended under normal operating conditions, no maintenance is required. It is sufficient to check the output signal at regular intervals (in accordance with the operating conditions), as described in the instructions in the section “Operation resp. Configuration of the transmitter”. If deposits are expected to accumulate, the measuring equipment should be cleaned on a regular basis, in accordance with the operating conditions. Cleaning should ideally be carried out in a workshop.

Repair and maintenance activities may only be performed by authorized customer service personnel.

When replacing or repairing individual components, original spare parts must be used.

Attention. The electronic components of the printed circuit board can be damaged by static electricity (observe ESD guidelines). Make sure that the static electricity in your body is discharged when touching electronic components.
If a remote seal is mounted on the measuring equipment, it must not be removed (please refer to the dedicated document).

Warning. Explosion-proof transmitters must be either repaired by the manufacturer or approved by a certified expert following repair work Observe the relevant safety precautions before, during and after repair work. Only disassemble the transmitter to the extent necessary for cleaning, inspection, repairs, and replacement of damaged components.

15.1 Returns and removal

Defective transmitters sent to the repairs department must, wherever possible, be accompanied by your own description of the fault and its underlying cause.

Warning. Before removing or disassembling the device, check for hazardous process conditions such as pressure on the device, high temperatures, aggressive or toxic media, and so on. Read the instructions in the sections “Safety” and “Electrical connection”, and perform the steps outlined there in reverse order.

15.2 Pressure transmitter sensor

Essentially maintenance is not required for the transmitter sensor. Anyway the following items should be checked periodically:

— Check the integrity of the pressure boundary (no cracks should be visible on the process connection or on the process flanges.

— Check that there is no leakage from the sensor/flange interface or from the vent/drain valves.

— The process flanges bolts (for 266DS/MS/PS/VS/RS models) should not show excessive rust.

In case one of the check points above fails, please replace the damaged part with an original spare part.

Please contact your local ABB office for spare parts support information or refer to the spare part list. The use of non original spare parts makes the warranty void. In case you want ABB to perform the repair, please send back the transmitter to your local ABB office complete with the return form that you find in this manual appendix and include it with the device.

15.3 Removing / Installing the process flanges

1. Slacken the process flange screws by working on each in a crosswise manner (hexagon head, SW 17 mm (0.67 inch) for 266DS / 266PS / 266VS or SW 13 mm (0.51 inch) for 266MS / 266RS).
2. Carefully remove the process flange, making sure that the isolating diaphragms are not damaged in the process.
3. Use a soft brush and a suitable solvent to clean the isolating diaphragms and - if necessary - the process flange.
4. Insert the new process flange O-rings in the process flange.
5. Attach the process flange to the measuring cell.

The surfaces of both process flanges must be at the same level and at a right angle to the electronics housing (with the exception of vertical process flanges).

6. Check that the process flange screw thread can move freely: Manually turn the nut until it reaches the screw head. If this is not possible, use new screws and nuts.
7. Lubricate the screw thread and seats of the screw connection.
8. While performing the preliminary and final tightening of the bolts, please act in a crosswise manner.

Attention. Do not use sharp or pointed tools.

Attention. Do not damage the insolating diaphragms.

Attention. In the case of oil and grease-free designs, clean the measuring chambers again if necessary once the process flange has been installed.

— Respect the below table indications for reinstalling the process flanges.

Transmitter model and range			Procedure
266DSH / PSH / VSH	Viton Gaskets	All bolting	Use a torque wrench to tighten the bolts to a torque of 25 Nm.
	PTFE Gaskets	Carbon Steel NACE and Stainless Steel	Use a torque wrench to tighten the process flange nuts to a torque of 40 Nm, let the flange stabilize for an hour, unscrew the nuts and tighten again to 25 Nm.
		Stainless Steel NACE	Use a torque wrench to tighten the process flange nuts to a torque of 25 Nm, let the flange stabilize for an hour and perform the final tightening to 25 Nm.
266DSH.x.H (High static option)	Viton Gaskets	All bolting	Use a torque wrench to tighten the bolts to a torque of 31 Nm.
	PTFE Gaskets	All bolting	Use a torque wrench to tighten the process flange nuts to a torque of 40 Nm, let the flange stabilize for an hour, unscrew the nuts and tighten again to 31 Nm.
266DSH range A (1KPa)	All gaskets	All bolting	Use a torque wrench to tighten the process flange screws/nuts to a torque of 14 Nm. Please be aware that in case of bottom work disassembly and reassembly the original performances can not be guarantee anymore.
266DSH / 266PSH with Kynar inserts	All gaskets	All bolting	Use a torque wrench to tighten the process flange screws/nuts to a torque of 15 Nm
266MSx / 266RSx	All gaskets	All bolting	First, use a torque wrench to tighten the process flange screws/nuts to a joining torque of - MJ = 2 Nm (0.2 kpm), working in a crosswise manner. - Then tighten them with a torque MJ = 10 Nm (1.0 kpm), working in a crosswise manner - Then tighten them fully by turning each nut or screw again (in a crosswise manner) by the tightening angle A = 180°, working in two stages of 90° each. Some transmitter versions are using screws with size M10. If this screws are used the tightening angle A = 270°, working in three stages of 90° each.

15.4 Pressure transducer replacement

If the pressure transducer needs to be replaced proceed as follows:

1. Insulate the transmitter from the process by acting on the manifolds or on the insulation valves
2. Open the vent valves to allow sensor depressurization
3. Disconnect the power supply and disconnect the wiring to the transmitter
4. Disconnect the transmitter from its bracket by loosing on the fixing bolts.
5. You should now open the communication board housing compartment cover.
6. The communication board is connected to the sensor via a flat cable and a connector. Remove the communication board by releasing the two fixing screws and gently disconnect the connector from the communication board.
7. The transmitter housing needs now to be disconnected from the pressure transducer. To accomplish such operation, it is necessary to release the tang screw until you will be able to rotate easily the housing.
8. Continue to rotate the electronic housing counterclockwise until its complete removal.
9. Unscrew the fixing bolts from the transducer and remove the process flanges.
10. The orings placed between the diaphragm and the flange (Viton or PTFE) must be replaced after every disassembly.
11. Reassemble the flanges following the steps above in reverse order.
12. The 266 can reconfigure itself with the previous configured parameters thanks to the auto-configuration functionality.
13. Before powering on the transmitter raise dip-switches 1 and 2 in up position. Connect the transmitter to power supply, wait ten seconds and lower dip-switched 1 and 2 .
14. A PV zero bias operation is recommended to align the zero to the installation. This operation should be accomplished after the transmitter has been installed back to its bracket and connected to the manifold. See “Correcting the lower range value / zero shift”.

16 Hazardous Area considerations

16.1 Ex Safety aspects and IP Protection (Europe)

According to ATEX Directive (European Directive 2014/34/EU and relative European Standards which can assure compliance with Essential Safety Requirements, i.e., EN 60079-0 (General requirements) EN 60079-1 (Flameproof enclosures “d”), EN 60079-11 (Equipment protection by intrinsic safety “i”), the pressure transmitters of the 2600T SERIES have been certified for the following group, categories, media of dangerous atmosphere, temperature classes, types of protection. Examples of application are also shown below by simple sketches.

a) Certificate ATEX II 1 G Ex ia IIC T4/T5/T6 Ga - FISCO

FM Approvals certificate number FM09ATEX0024X (Tremezzina, Warminster, Bangalore and Shanghai products)

The meaning of ATEX code is as follows:

— II : Group for surface areas (not mines)

— 1 : Category

— G : Gas (dangerous media)

— D: Dust (dangerous media)

— T85°C: Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +40°C for Dust (not Gas) with a dust layer up to 50 mm depth.

Certificate IECEx Ex ia IIC T4/T5/T6 Ga/Gb and Ex ia IIIC T85°C Da - FISCO

IECEx certificate number IECEx FME 16.0003X (Tremezzina, Warminster, Bangalore, Shanghai products)

Important. The number close to the CE marking of the transmitter safety label identifies the Notified Body which has responsibility for the surveillance of the production.

The other marking refers to the protection type used according to relevant EN standards:

— Ex ia: Intrinsic safety, protection level “a”

— IIC: Gas group

— T4: Temperature class of the transmitter (corresponding to 135°C max) with a Ta from -50°C to +85°C

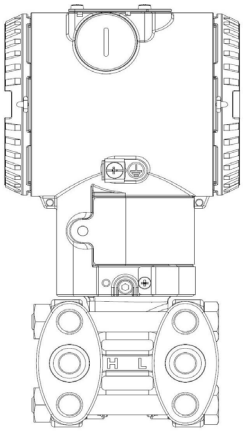
— T5: Temperature class of the transmitter (corresponding to 100°C max) with a Ta from -50°C to +40°C

— T6: Temperature class of the transmitter (corresponding to 85°C max) with a Ta from -50°C to +40°C

About the applications, this transmitter can be used in “Zone 0” (Gas) and “Zone 20” (Dust) classified areas (continuous hazard) as it is shown on the following sketches.

Application for pressure transmitter Ex ia categories 1 Ga and 1 Da

Application with Gas

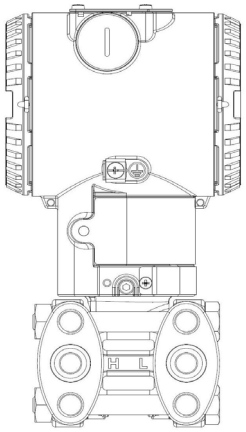


Zone 0

266 Tx Category 1 G Ex ia

Note: the transmitter must be connected to a supply (associated apparatus) certified [Ex ia]

Application with Dust



Zone 20

266 Tx Category 1 D IP6x Ex ia

Note: the protection is mainly assured by the “IP” degree associated to the low power from supply. This can either be [ia] or [ib] certified [Ex ia]

b) Certificate ATEX II 1/2 G Ex ia IIC T4/T5/T6 Ga/Gb and II 1/2 D Ex ia IIIC T85°C Da - FISCO

FM Approvals certificate number FM09ATEX0024X (Tremezzina, Warminster, Bangalore and Shanghai products)

Important. This ATEX Category depends on the application (see below) and also on the intrinsic safety level of the transmitter supply (associated apparatus) which can sometimes suitably be [ib] instead of [ia]. As it is well known, the level of an intrinsic safety system is determined by the lowest level of the various apparatus used, i.e., in the case of [ib] supply, the system takes over this level of protection.

The meaning of ATEX code is as follows:

— II: Group for surface areas (not mines)

— 1/2: Category - It means that only a part of the transmitter complies with category 1 and a second part complies with category 2 (see next application sketch).

— G: Gas (dangerous media)

— D: Dust (dangerous media)

— T85°C: Maximum surface temperature of the transmitter enclosure with a Ta from -50°C to +40°C for Dust (not Gas) with a dust layer up to 50 mm depth. T85°C: as before for Dust for a Ta +85°C.

Certificate IECEx Ex ia IIC T4/T5/T6 Ga/Gb and Ex ia IIIC T85°C Da - FISCO

IECEx certificate number IECEx FME 16.0003X (Tremezzina, Warminster, Bangalore, Shanghai products)

The other marking refers to the protection type used according to relevant EN standards:

— Ex ia: Intrinsic safety, protection level “a”

— IIC: Gas group

— T4: Temperature class of the transmitter (corresponding to 135°C max) with a Ta from -50°C to +85°C

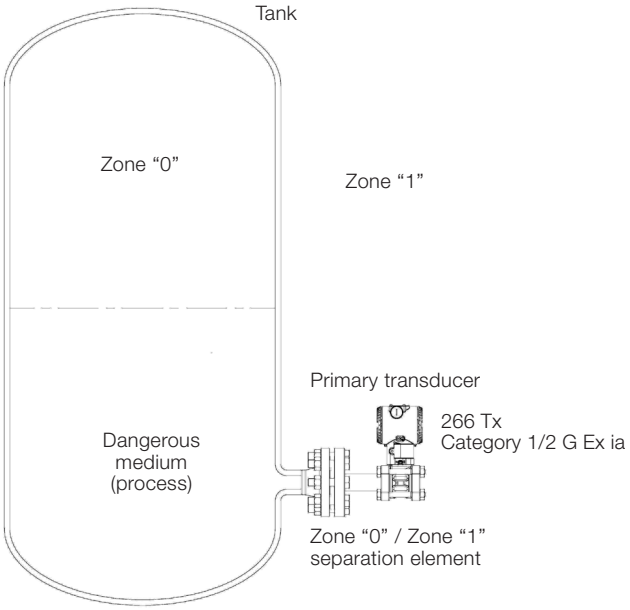
— T5: Temperature class of the transmitter (corresponding to 100°C max) with a Ta from -50°C to +40°C

— T6: Temperature class of the transmitter (corresponding to 85°C max) with a Ta from -50°C to +40°C

About the applications, this transmitter can be used in Zone “0” (Gas) classified areas (continuous hazard) with its “process part” only, whereas the remaining part of the transmitter, i.e. its enclosure, can be used in Zone 1 (Gas), only (see sketch below). Reason of this is the process part of the transmitter (normally called primary transducer) that provides inside separation elements to seal off the electrical sensor from the continuously hazardous process, according to the EN 60079-1. About Dust application, the transmitter is suitable for “Zone 21” according to the EN 60079-0 and EN 60079-11 as it is shown on the relevant part of the sketches.

Application for pressure transmitter Ex ia categories 1/2 Ga and 1/2 Da

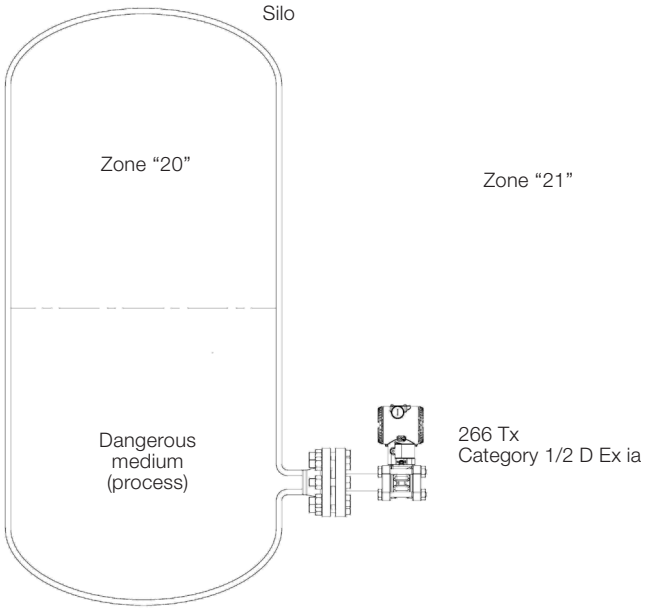
Application with Gas



Note: the transmitter can be connected to either [ib] or [ia] supply (associated apparatus)certified [Ex ia]

Note for “Primary transducer”: see the certification for exceptions

Application with Dust



Note: the protection is mainly assured by the “IP” degree associated to the low power from supply. This can either be [ia] or [ib]

c) Certificate ATEX II 1/2 G Ex db IIC T6 Ga/Gb and II 1/2 D Ex tb IIIC T85°C Db, Ta = -50°C to +75ºC

FM Approvals Certificate number FM09ATEX0023X (Tremezzina, Warminster, Bangalore and Shanghai products)

The meaning of ATEX code is as follows:

- II: Group for surface areas (not mines)
- 1/2: Category - It means that only a part of the transmitter complies with category 1 and a second part complies with category 2 (see next application sketch).
- G: Gas (dangerous media)
- D: Dust (dangerous media)
- T85°C: Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +75°C for Dust (not Gas) with a dust layer up to 50 mm depth.

Important. The number close to the CE marking of the transmitter safety label identifies the Notified Body which has responsibility for the surveillance of the production.

Certificate IECEx Ex db IIC T6 Ga/Gb and Ex tb IIIC T85°C Db, Ta= -50°C to +75°C

IECEx certificate number IECEx FME 16.0002X (Tremezzina, Warminster, Bangalore and Shanghai products)

The other marking refers to the protection type used according to relevant EN Standards:

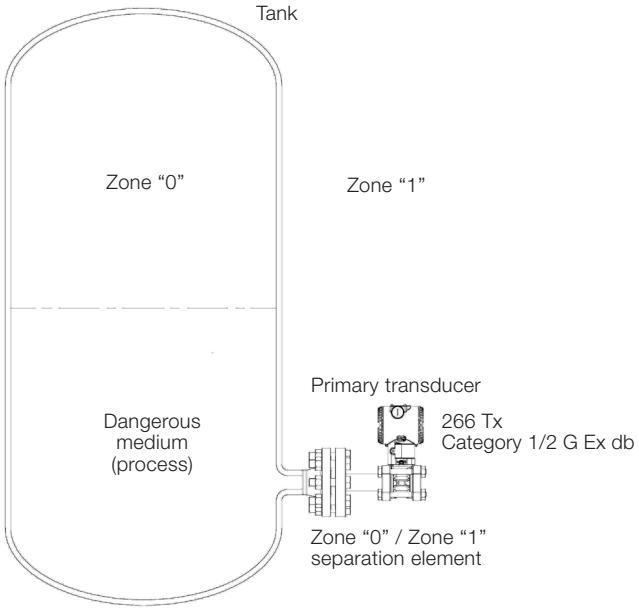
- Ex d: Explosion proof
- IIC: Gas group
- T6: Temperature class of the transmitter (corresponding to 85°C max) with a Ta from -50°C to +75°C

About the applications, this transmitter can be used in Zone “0” (Gas) classified areas (continuous hazard) with its “process part” only, whereas the remaining part of the transmitter, i.e. its enclosure, can be used in Zone 1 (Gas), only (see sketch below). Reason of this is the process part of the transmitter (normally called primary transducer) that provides inside separation elements to seal off the electrical sensor from the continuously hazardous process, according to the EN 60079-1.

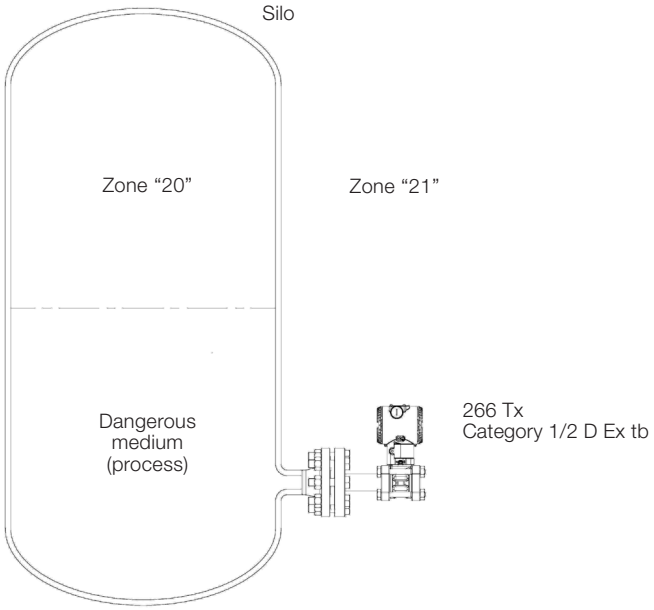
About Dust application, the transmitter is suitable for “Zone 21” according to the EN 60079-1 as it is shown on the relevant part of the sketches.

Application for pressure transmitter Ex d categories 1/2 G and 1/2 D

Application with Gas



Application with Dust



IP code

About the degree of protection provided by the enclosure of the pressure transmitter, the 2600T SERIES has been certified IP66 and IP67 according to EN 60529 standard. The first characteristic numeral indicates the protection of the inside electronics against ingress of solid foreign objects including dusts.

The assigned “6” means an enclosure dust-tight (no ingress of dust).

The second characteristic numeral indicates the protection of the inside electronics against ingress of water.

The assigned “6” means an enclosure water-protected against powerful jets projected in powerful jets towards the enclosure from any direction.

The assigned “7” means an enclosure water-protected against a temporary immersion in water under standardized conditions of pressure and time.

d) Certificate ATEX II 3 G Ex ic IIC T4/T5/T6 Gc
and II 3 D Ex tc IIIC T85°C Dc, Ta = -50°C to +75°C

FM Approvals Certificate number FM09ATEX0025X
(Tremezzina, Warminster, Bangalore and Shanghai products)

The meaning of Atex code is as follows :

- II: Group for surface areas (not mines)
- 3: Category of equipment
- G: Gas (dangerous media)
- D: Dust (dangerous media)
- T85°C: Maximum surface temperature of the transmitter enclosure with a Ta from -50°C to +40°C for Dust (not Gas)

Important. It is the technical support for the ABB Declaration of Conformity.

Important. When installed this transmitter must be supplied by a voltage limiting device which will prevent the rated voltage of 32 V d.c. being exceeded.

Certificate IECEx Ex ic IIC T4/T5/T6 Gc
and Ex tc IIIC T85°C Dc, Ta = -50°C to +75°C

IECEx certificate number IECEx FME 16.0004X
(Tremezzina, Warminster, Bangalore and Shanghai products)

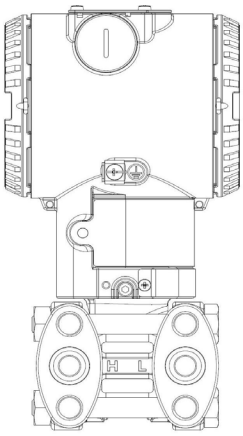
The other marking refers to the protection type used according to relevant EN standards:

- Ex ic: Intrinsic safety, protection level “c”
- IIC: gas group
- T4: Temperature class of the transmitter (which corresponds to 135°C max) with a Ta from -50°C to +85°C
- T5: Temperature class of the transmitter (which corresponds to 100°C max) with a Ta from -50°C to +40°C
- T6: Temperature class of the transmitter (which corresponds to 85°C max) with a Ta from -50°C to +40°C
- Ex tc: type of protection “tc” means protection by enclosure technique

About the applications, this transmitter can be used in Zone 2 (Gas) and in Zone 22 (Dust) (unlikely/infrequent hazard) as it shown on the following sketches.

Application for pressure transmitter Ex ic categories 3 Gc and 3 Dc

Application with Gas

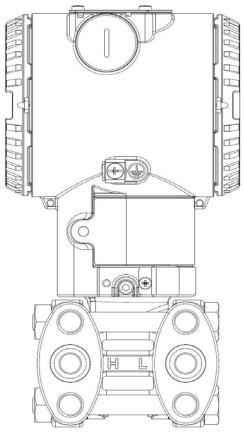


Zone 2

266 Tx Category 3 G Ex ic

Note: the transmitter must be connected to a supply with 32 V d.c. max output voltage as above indicated.

Application with Dust



Zone 22

266 Tx Category 3 D IP6x Ex tc

Note: the protection is mainly assured by the “IP” degree associated to the low power from supply.

Important - Note for pressure transmitter with combined approval. Before installation of the Transmitter, the customer should permanent mark his chosen Protection Concept on the safety label. The transmitter can only be used with according to this Protection Concept for the whole life. If two or more types of protection box (on safety label) are permanent marked, the pressure transmitter must be removed from hazardous classified locations. The selected Type of Protection is allowed to be changed only by manufacturer after a new satisfactory assessment.

16.1.1 Electrical parameters (entities)

Profibus Version with or without LCD option				
Ui= 17.5 Vdc Ii= 360 mA Pi= 2.5 W Ci= 5nF Li= 10 uH				
Temperature Class - Gas	Temperature Class - Dust	Minimum amb. °C	Maximum amb. °C option L1	Maximum amb. °C option L5
T4	T135°C	-50°C	+85°C	+60°C
T5	T100°C	-50°C	+40°C	+56°C
T6	T85°C	-50°C	+40°C	+44°C

16.2 Ex Safety aspects and IP Protection (North America)

16.2.1 Applicable standards

According to FM Approvals Standards which can assure compliance with Essential Safety Requirements

FM 3600: Electrical Equipment for use in Hazardous (Classified) Locations, General Requirements.

FM 3610: Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, and Class I, Zone 0 & 1 Hazardous (Classified) Locations.

FM 3611: Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III Division 1 and 2 Hazardous (Classified) Locations.

FM 3615: Explosionproof Electrical Equipment.

FM 3810: Electrical and Electronic Test, Measuring and Process Control Equipment.

NEMA 250: Enclosure for Electrical Equipment (1000 Volts Maximum)

16.2.2 Classifications

The 2600T Series pressure transmitters have been certified by FM Approvals for the following Class, Divisions and Gas groups, hazardous classified locations, temperature class and types of protection.

- Explosionproof (US) for Class I, Division 1, Groups A, B, C and D, hazardous (classified) locations.
- Explosionproof (Canada) for Class I, Division 1, Groups B, C and D; T5, hazardous (classified) locations.
- Flameproof (US): Class I, Zone 1 AEx d IIC T4 Gb, hazardous (classified) locations.
- Flameproof (Canada): Class I, Zone 1 Ex d IIC T4 Gb, hazardous (classified) locations.
- Dust Ignition proof for Class II, Division 1, Groups E, F, G, Class III Division 1; T5, hazardous (classified) locations.
- NonIncendive for Class I, Division 2, Groups A, B, C and D, in accordance with Nonincendive field wiring requirements for hazardous (classified) locations.
- Energy limited (US): Class I, Zone 2 AEx nC IIC T6...T4, in accordance with Nonincendive field wiring requirements for hazardous (classified) locations.
- Energy limited (Canada): Class I, Zone 2 Ex nC IIC T6...T4, in accordance with Nonincendive field wiring requirements for hazardous (classified) locations.
- Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G,
  Class I, Zone 0 AEx ia IIC T6...T4 (US)
  Class I, Zone 0 Ex ia IIC T6...T4 (Canada)
  in accordance with Entity requirements for hazardous (classified) locations.
- Temperature class T4 to T6 (dependent on the maximum input current and the maximum ambient temperature).
- Ambient Temperature range -40°C to +85°C (dependent on the maximum input current and the maximum temperature class).
- Electrical Supply range Minimum Volts, Maximum 32 Volts (dependent on the type of protection, maximum ambient temperature, maximum temperature class and communication protocol).
- Type 4X, IP66, IP67 applications Indoors/Outdoors.

For a correct installation in field of 2600T Series pressure transmitters please see the related control drawing.

Note that the associated apparatus must be FM approved.

Appendix A – Device mapping

The device parameters are listed in the following tables. You can access the parameters by means ofthe slot and index number.

The individual blocks each contain standard parameters, block parameters and manufacturer-specific parameters.

If you use the DAT200 (Asset Vision Basic) as an operating program, input screens are available as a user interface.

General explanatory remarks

Object type

- R = Record: contains data structure (DS)
- A = Array: group of a certain data type
- S = Simple: contains individual data types such as Float

Data type

- DS: data structure, contains data types such as Unsigned8, Octet String etc.
- Float: IEEE 754 format
- Integer:
  - Integer8: value range = –128...127
  - Integer16: value range = 327678...–327678
  - Integer32: value range =32 = –231...231
- Octet String: binary coded
- Visible String: ASCII coded
- Unsigned:
  - Unsigned8: value range = 0...255
  - Unsigned16: value range = 0...65535
  - Unsigned32: value range = 0...4294967295

Storage Class

- Cst: constant parameter
- D: dynamic parameter
- N: non-volatile parameter
- S: static parameter

Device Management

SLOT 1						
Idx	Parameter		Data	Type	Size	Storage Class
0	DIRECTORY_OBJECT_HEADER	R	R	Array U16	12	C
1	COMPOSITE_LIST_DIRECTORY_ENTRIES / COMPOSITE_DIRECTORY_ENTRIES	R	R	Array U16	40 (12 + 28)	C

DIRECTORY_OBJECT_HEADER

Dir_ID	Dir_Rev_Num	Num_Dir_Obj	Num_Dir_Entry	First_Comp_ List_Dir_Entry	Num_Comp_ List_Dir_Entry
0	1	1	10	1	3

COMPOSITE_LIST_DIRECTORY_ENTRIES

Begin_PB		Num_PB	Begin_TB		Num_TB	Begin_FB		Num_FB
Slot	Index		Slot	Index		Slot	Index	
1	4	1	1	5	3	1	8	3

COMPOSITE_DIRECTORY_ENTRIES

PB_ID = 1			TB_ID = 1			TB_ID = 2		
Start_PB		Num_PB parameters	Start_TB_1		Num_TB_1 parameters	Start_TB_2		Num_TB_2 parameters
Slot	Index		Slot	Index		Slot	Index	
0	16	82	4	16	128	5	16	25
TB_ID = 3			FB_ID = 1			FB_ID = 2		
Start_TB_3		Num_TB_3 parameters	Start_FB_1		Num_FB_1 parameters	Start_FB_2		Num_FB_2 parameters
Slot	Index		Slot	Index		Slot	Index	
6	16	23	1	16	45	2	16	45

FB_ID = 3		
Start_FB_3		Start_FB_3
Slot	Slot	Slot
3	3	3

PHYSICAL BLOCK (PB)

SLOT 0 ---- n = 16

STANDARD PARAMETERS

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+0	BLOCK_OBJECT	R	R	DS_32	20	Cst			
n+1	ST_REV	R	S	U16	2	N			
n+2	TAG_DESC	RW	S	O_STR	32	S			Default = “PI000”
n+3	STRATEGY	RW	S	U16	2	S			
n+4	ALERT_KEY	RW	S	U8	1	S			
n+5	TARGET_MODE	RW	S	U8	1	S	AUTO		AUTO Only
n+6	MODE_BLK	R	R	DS_37	3	D			
n+7	ALARM_SUM	R	R	DS_42	8	D			
n+8	SOFTWARE_REVISION	R	S	V_STR	16	Cst	01.00.00		
n+9	HARDWARE_REVISION	R	S	V_STR	16	Cst	01.00.00		
n+10	DEVICE_MAN_ID	R	S	U16	1	Cst	0x1A		ABB
n+11	DEVICE_ID	R	S	V_STR	16	Cst	0x07		2600T 266 PdP
n+12	DEVICE_SER_NUM	R	S	V_STR	16	Cst			
n+13	DIAGNOSIS	R	S	O_STR	4	D			
n+14	DIAGNOSIS_EXT	R	S	O_STR	6	D			
n+15	DIAGNOSIS_MASK	R	S	O_STR	4	Cst	0x00,0x98,0x0F,0x80		
n+16	DIAGNOSIS_MASK_EXT	R	S	O_STR	6	Cst	0x77,0x0C,0x97,0xC1,0xC1,0x04		
n+17	DEVICE_CERTIFICATION	R	S	V_STR	32	Cst			
n+18	WRITE_LOCKING	RW	S	U16	1	N	0	Write Locked	Software Write Locking
							2457	Write Unlocked	
n+19	FACTORY_RESET	RW	S	U16	1	S	1	Reset to Default Values	Reset the device configuration to the configuration previously saved with (idx 45) SAVINGS = 1
							2506	Warm Start-up	Standard profile Reset types
							2712	Reset Bus address to default (126)	
							32768	Reset P-dP Sensor to Factory Calibration	Reset Sensor calibrations at the calibration previously saved as Factory with SAVINGS (index 45)
							32769	Reset Static P Sensor to Factory Calibration	
							32770	Reset Sensor Temp to Factory Calibration	
							32771	Reset to User P-dP Sensor Trimming	Reset Sensor Calibration at the calibration previously saved by the User with SAVINGS (index 45)
							32772	Reset to User Static P Sensor Trimming	
							32773	Reset to User Sensor Temp Trimming	
n+20	DESCRIPTOR	RW	S	O_STR	32	S	Descriptor		
n+21	DEVICE_MESSAGE	RW	S	O_STR	32	S	Message		
n+22	DEVICE_INSTAL_DATE	RW	S	O_STR	16	S	Installation date		
n+23	LOCAL_OP_ENA	RW	S	U8	1	N	0:	disabled	Local operation not allowed
							1:	enabled (default)	Local operation allowed

Idx	Parameter		Data	Type	Size	Storage Class	Range / Selection			Note
n+24	IDENT_NUMBER_SELECT	RW	S	U8	1	S	0:	0x09700		profile specific one AI
							1:	0x3450		Device specific 2600T-266
							2:	0x009B		600T_EN Profile 2.0
							3:	0x09760		profile specific MultiVariable
							127:	Adaptation		Adaptation Mode
							128:	0x09701		profile specific two AIs
							129:	0x09702		profile specific three AIs
							130:	0x09653		AFK800
							131:	0x052B		2600T-264
								0x04C2		2000T / 2600T-265
n+25	HW_WRITE_PROTECTION	R	S	U8	1	D	0:	Unprotected (default)		Reflects the Push Button position
							1:	Protected		
n+26	FEATURE	R	R	DS-68	8	N	Supported	0-0-0-3 (hex)	Condensed Status	Condensed and Classic Status/Diagnostic both supported
									Classic Status	
							Enabled	0-0-0-1 (hex)	Condensed enabled	
								0-0-0-2 (hex)	Classic enabled	
n+27	COND_STATUS_DIAG	RW	S	U8	1	S	0:	Select Classic Status/Diagnostic		Default = Condensed Status/Diagnostic Enabled
							1:	Select Condensed Status/Diagnostic		
n+28	DIAG_EVENT_SWITCH	RW	R	Diag-switch	50	S	0x34,0x34,0x34,0x00,0x36,0x36,0x36,0x00,x00,0x00,0x57,0x57,0x00,0x00,0x00,0x00,0x34,0x34,0x02,0x00,0x01,0x00,0x00,0x34,0x02,0x00,0x00,0x00,0x00,0x00,0x57,0x01,0x34,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x01,0x00,0x00,0x02,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00			
29-32	NULL_ // reserved by PNO									

MANUFACTURER SPECIFIC PARAMETERS

Idx	Parameter			Data	Type	Size	Storage Class	Range / Selection	Note
n+33	CB_FW_REVISION		R	S	V_STR	8	Cst	Electronics Software Revision	xx.yy.zz
n+34	CB_HW_REVISION		R	S	V_STR	8	Cst	Electronics Hardware Revision	xx.yy.zz
n+35	FE_FW_REV		R	S	V_STR	8	Cst	Sensor Software Revision	xx.yy.zz
n+36	FE_HW_REV		R	S	V_STR	8	Cst	Sensor Hardware Revision	xx.yy.zz
n+37	DIAGNOSIS_WORST_COND		R	S	U16	2	D	cc.gggggg.dddddddd	
n+38	DIAGNOSIS_EXT_HISTORY		R	S	O_STR	6	D	Permanent copy of DIAGNOSIS_EXT (idx n+14). Error conditions becoming active in the DIAGNOSIS_EXT remain set in this parameter for Historical analysis	Only authorized personnel can reset this parameter
n+39	DIAGNOSIS_CONDITION_DETAILS_IDX		RW	S	U8	1	N	The writing of an Error code enables the firmware to update the DIAGNOSIS_DETAILS (idx n+ 40) with details	
n+40	DIAGNOSIS_DETAILS	COUNTER	R	S	U16	2	D	After the idx n+39 has been written with an error code, all their details are returned when this parameter is read.	Number of times the error is occurred during the device's life
		TIME_COUNTER	R	S	TIME_DIFF	6	D	ddd/hh/mm/ss (days, hours, minutes, seconds)	Period of time the error has been active
		LAST_TIME	R	S	DATE_S	6	D	ddd/hh/mm/ss (days, hours, minutes, seconds)	Time elapsed from last error activation
		ROOT_CAUSE_LIST	R	S	O_STR	8	D	Up to 8 details (codes) for each error condition. See Appendix B for the Diagnostic Table	All the active detailed root causes errors relating the err. condition code written in the idx n+39

Idx	Parameter		Data	Type	Size	Storage Class	Range / Selection		Note
n+41	DIAGNOSIS_SIMULATION_STATUS	RW	S	U8	1	N	0:	Simulation disabled (default)	
							1:	Simulation enabled	
n+42	DIAGNOSIS_EXT_SIMULATION	RW	S	O_STR	16	N	Error Root cause simulation		Simulation of any individual error condition
n+43	DIAGNOSIS_EXT_MASK	RW	S	O_STR	6	N	Error Root cause masking		Mapped as idx n+14
n+44	ASSEMBLY_DATE	R	S	O_STR	16	Cst	Date of when the transmitter has been assembled		
n+45	SAVINGS	RW	S	U16	2	N	1	Save actual device configuration as Default	Save the device configuration that can be recovered with (idx n+19) FACTORY_RESET = 1
							32768	Save P-dP Sensor as Factory Calibration	Save the Sensor calibrations as Factory calibration that can be recovered with (idx n+19) FACTORY_RESET
							32769	Save t Static P Sensor as Factory Calibration	
							32770	Save Sensor Temp as Factory Calibration	
							32771	Save as User P-dP Sensor Trimming	Save the Sensor calibrations as User calibration that can be recovered with (idx n+19) FACTORY_RESET
							32772	Save as User Static P Sensor Trimming	
							32773	Save as User Sensor Temp Trimming	
n+46	SERVICE	RW	S	U8	1	N	0:	Do nothing	Resets all the bits set in (idx n+38) DIAGNOSIS_EXT_HISTORY
							1:	Reset Diagnosis History and Details	
n+47-81	Reserved by ABB for internal use								
VIEWS									
n+134	VIEW_1	R			17	D			

ANALOG INPUT (AI)

AI1 = SLOT 1 --- AI2 =SLOT 2 --- AI3 = SLOT 3

n = 16

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+0	BLOCK_OBJECT	R	R	DS_32	20	Cst			
n+1	ST_REV	R	S	U16	2	N			
n+2	TAG_DESC	RW	S	O_STR	32	S			
n+3	STRATEGY	RW	S	U16	2	S			
n+4	ALERT_KEY	RW	S	U8	1	S			
n+5	TARGET_MODE	RW	S	U8	1	S	AUTO-MAN-OOS		
n+6	MODE_BLK	R	R	DS_37	3	D			
n+7	ALARM_SUM	R	R	DS_42	8	D			
n+8	BATCH	RW	R	DS-67	10				
n+10	OUT	RW	R	101	5	D	Output Value + Status (specified in the GSD modules for Cyclic comms)		Writeable only if MODE_BLK.ACTUAL = MAN
n+11	PV_SCALE	RW	A	FLT	8	S	Input Scale		Expr.in PRIMARY_VALUE_UNIT (idx n+19)
n+12	OUT_SCALE	RW	R	DS-36	11	S	Output scale		
n+13	LIN_TYPE	RW	S	U8	1	S	0-Linear		Not Used
n+14	CHANNEL	RW	S	U16	2	S	AI_1	1 = Process Value (Press. Lev, Flow, Vol)	Fixed channel for AI_1 & AI_2
							AI_2	2 = Static Pressure	
							AI_3	3 = Sensor temperature (default)	
								4 = Pressure	
n+16	PV_FTIME	RW	S	FLT	4	S	0….60 seconds		Damping
n+17	FSAFE_TYPE	RW	S	U8	1	S	0:	Fsave Value as OUT	Default FSAFE_TYPE = 1
							1:	OUT = Last usable OUT value	
							2:	OUT as calculated	
n+18	FSAFE_VALUE	RW	S	FLT	4	S	Fail Safe Value		Used only when FSAFE_TYPE = 0
n+19	ALARM_HYS	RW	S	FLT	4	S	Alarm Hysteresis [0.5%]		Expr. as % of the OUT_SCALE range (idx n+12)
n+21	HI_HI_LIM	RW	S	FLT	4	S	Critical Limit High		Expressed in OUT_SCALE unit Index lidx n+12)
n+23	HI_LIM	RW	S	FLT	4	S	Advisory Limit High		
n+25	LO_LIM	RW	S	FLT	4	S	Advisory Limit Low		
n+27	LO_LO_LIM	RW	S	FLT	4	S	Critical Limit Low		
n+30	HI_HI_ALM	R	R	DS-39	16	D	Critical High Alarm		
n+31	HI_ALM	R	R	DS-39	16	D	Advisory High Alarm		
n+32	LO_ALM	R	R	DS-39	16	D	Advisory Low Alarm		
n+33	LO_LO_ALM	R	R	DS-39	16	D	Critical Low Alarm		
n+34	SIMULATE	RW	R	DS-50	6	S	AI input Simulation		
n+35	OUT_UNIT_TEXT	RW	S	O_STR	16	S	Textual unit		
VIEWS									
n+134	VIEW_1	R			17	D			

PRESSURE TRANSDUCER BLOCK (PRTB)

SLOT 4 --- n = 16								
STANDARD PARAMETERS								
Idx	Parameter		Data	Type	Size	Storage Class	Range	Note
n+0	BLOCK_OBJECT	R	R	DS_32	20	Cst		
n+1	ST_REV	R	S	U16	2	N		
n+2	TAG_DESC	RW	S	O_STR	32	S		
n+3	STRATEGY	RW	S	U16	2	S		
n+4	ALERT_KEY	RW	S	U8	1	S		
n+5	TARGET_MODE	RW	S	U8	1	S	AUTO	
n+6	MODE_BLK	R	R	DS_37	3	D		
n+7	ALARM_SUM	R	R	DS_42	8	D		
n+8	SENSOR_VAL	R	S	FLT	4	D	Process Value before the Calibration (0)	Expr. in SENSOR_UNIT (idx n+14)
n+9	SENSOR_HI_LIM	R	S	FLT	4	N	Upper sensor limit	
n+10	SENSOR_LO_LIM	R	S	FLT	4	N	Lower Sensor limit	
n+11	CAL_POINT_HI	RW	S	FLT	4	S	Upper Calibration Point	
n+12	CAL_POINT_LO	R/W	S	FLT	4	S	Lower Calibration Point	
n+13	CAL_MIN_SPAN	R	S	FLT	4	N	Calibration Minimum Span	
n+14	SENSOR_UNIT	RW	S	U16	2	S	Pressure Units ONLY [Kpa]	
n+15	TRIMMED_VALUE	R	R	101	5	D	Process value after the Calibration (1)	Expr. in SENSOR_UNIT (idx n+14)
n+16	SENSOR_TYPE	R	S	U16	2	N	Sensor Type	
n+17	SENSOR_SERIAL_NUMBER	R	S	U32	4	N	Sensor Serial Number	
n+18	PRIMARY_VALUE	R	R	101	5	D	Proc. Val out of PRTB and input to the AI_1 (4)	Expr.in PRIMARY_VALUE_UNIT (idx n+19)
n+19	PRIMARY_VALUE_UNIT	RW	S	U16	2	S	Primary Value Unit [Kpa]	All Units available
n+20	PRIMARY_VALUE_TYPE	RW	S	U16	2	S	PV type = Press, Level, Flow, Volume	
n+21	SENSOR_DIAPHRAGM_MATERIAL	RW	S	U16	2	S	Sensor Diaphragm material	
n+22	SENSOR_FILL_FLUID	RW	S	U16	2	S	Sensor Fill Fluid	
n+23	SENSOR_MAX_STATIC_PRESSURE	R	S	FLT	4	N	Max Sensor Working Pressure	Expr. in SENSOR_UNIT (idx n+14)
n+24	SENSOR_O_RING_MATERIAL_HSP	RW	S	U16	2	S	Sensor O-Ring Material	High Side
n+25	PROCESS_CONNECTION_TYPE_HSP	RW	S	U16	2	S	Process connection type	
n+26	PROCESS_CONNECTION _MATERIAL_HSP	RW	S	U16	2	S	Process connection material	
n+27	TEMPERATURE	R	R	101	5	D	Sensor temperature	
n+28	TEMPERATURE_UNIT	RW	S	U16	6	S	Temperature Units [°C}	
n+29	SECONDARY_VALUE_1	R	R	101	16	D	Process value after Bias/Offset (2)	
n+30	SECONDARY_VALUE_1_UNIT	RW	S	U16	2	S	Pressure Units ONLY [Kpa]	
n+31	SECONDARY_VALUE_2	R	R	101	5	D	Process Value after the Input Scaling (3)	Expr.in SECONDARY_VALUE_2_UNIT (idx n+32)
n+32	SECONDARY_VALUE_2_UNIT	RW	S	U16	2	S	No unit	No unit = 1997

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+33	LIN_TYPE	RW	S	U8	1		0:	Linear (default)	
							1:	linearisation table	
							10:	Square root	
							20:	cylindrical lying container	
							21:	spherical container	
							240:	SQRT 3° pow	
							241:	SQRT 5° pow	
							242:	Bidirectional Flow	
n+34	SCALE_IN	R/W	A	FLT	8	S	Process Value Input/Calibration Scale		Expr.in SECONDARY_VALUE_1_UNIT (idx n+30)
n+35	SCALE_OUT	R/W	A	FLT	8	S	PRTB Output Scale		Expr.in PRIMARY_VALUE_UNIT (idx n+19)
n+36	LOW_FLOW_CUT_OFF	R/W	S	FLT	4	S	0% to 20% [6%]		Only for LIN_TYPE = Sqr.Root or Bidirectional Flow
n+37	FLOW_LINEAR_SQRT_POINT	R/W	S	FLT	4	S	0% or 5% to 20% [5%]		
n+38	TAB_ACT_NUM	R	S	U8	1		Number of valid points in the TABLE		
n+39	TAB_ENTRY	R/W	S	U8	1		Pointer to the TAB_X_Y_VAL Array		
n+40	TAB_MAX_NUM	R	S	U8	1		Max number of supported points = 22		
n+41	TAB_MIN_NUM	R	S	U8	1		Min number of supported points = 2		
n+42	TAB_OP_CODE	R/W	S	U8	1		0:	Not initialized	
							1:	New op. char., first value TAB_ENTRY=1 (Idx 39)	
							2:	Reserved	
							3:	Last value, End of transmission,	
n+43	TAB_STATUS	R	S	U8	1		Feed-back of the new TABLE writing/setting		
n+44	TAB_X_Y_VAL	R/W	A	FLT	8		TABLE values as couple of X, Y values		
n+45	MAX_SENSOR_VALUE	R/W	S	FLT	4	N	Max Historical Sensor value		Expressed in SENSOR_UNIT (idx n+14)
n+46	MIN_SENSOR_VALUE	R/W	S	FLT	4	N	Min Historical Sensor value		
n+47	MAX_TEMPERATURE	R/W	S	FLT	4	N	Max Historical temp. value		Expr. in TEMPERATURE_UNIT (idx n+28)
n+48	MIN_TEMPERATU/RE	R/W	S	FLT	4	N	Min Historical temp. value		
49-58	NULL_ // reserved by PNO								

MANUFACTURER SPECIFIC PARAMETERS

Idx	Parameter		Data	Type	Size	Storage Class	Range / Selection	Note
n+59	DRAIN_VENT_MATERIAL_HSP	R/W	S	U16	2	S	Drain vent Material	High Side
n+60	SENSOR_O_RING_MATERIAL_LSP	R/W	S	U16	2	S	Sensor O-Ring Material	Low Side
n+61	PROCESS_CONNECTION_TYPE_LSP	R/W	S	U16	2	S	Process connection type	
n+62	PROCESS_CONNECTION _MATERIAL_LSP	R/W	S	U16	2	S	Process connection material	
n+63	DRAIN_VENT_MATERIAL_LSP	R/W	S	U16	2	S	Drain vent Material	
n+64	GAUGE_ABS_PROC_CONNECT_MTL	R	S	U16	2	N	Process connection material for Gauge or Absolute sensor types	
n+65	REMOTE_SEALS_TYPE_HSP	R	S	U16	2	N	Remote Seal type	High Side
n+66	REMOTE_SEALS_FILL_FLUID_HSP	R	S	U16	2	N	Remote Seal Fill Fluid	
n+67	REMOTE_SEALS_ISOLATOR_HSP	R	S	U16	2	N	Remote Seal Isolator	
n+68	REMOTE_SEALS_TYPE_LSP	R	S	U16	2	N	Remote Seal type	Low Side
n+69	REMOTE_SEALS_FILL_FLUID_LSP	R	S	U16	2	N	Remote Seal Fill Fluid	

Idx	Parameter		Data	Type	Size	Storage Class	Range / Selection		Note
n+70	REMOTE_SEALS_ISOLATOR_LSP	R	S	U16	2	N	Remote Seal Isolator		Low Side
n+71	REMOTE_SEALS_NUMBER	R	S	U8	1	N	1	One	
							2	Two	
							3	One on low side	
							4	One on high side	
							251	None	
n+72	DESIRED_PRIMARY_VALUE	R/W	S	FLT	4	N	Force the Measured Pressure to a selected Value setting an offset between Measured and Process values: PV = MV +/- BIAS: SECONDARY_VALUE_1 = TRIMMED_VALUE +/- BIAS_VALUE		Expr. in SECONDARY_VALUE_1_UNIT (idx n+30)
n+73	RESET_BIAS	W	S	U8	1	N	Reset BIAS_VALUE to 0.0 so that SECONDARY_VALUE_1 = TRIMMED_VALUE		
n+74	BIAS_VALUE	R	S	FLT	4	N	Read the offset between the Measured and Process values: BIAS_ VALUE = TRIMMED_VALUE – SECONDARY_VALUE_1		Expr. in SECONDARY_VALUE_1_UNIT (idx n+30)
n+75	STATIC_P_SENSOR_HI_LIM	R	S	FLT	4	N	Static Pressure Sensor High Limit		Expr. in STATIC_P_SENSOR_UNIT (idx n+80)
n+76	STATIC_P_SENSOR_LO_LIM	R	S	FLT	4	N	Static Pressure Sensor Low Limit		
n+77	STATIC_P_CAL_POINT_HI	R/W	S	FLT	4	S	Static Pressure Calibration point High		
n+78	STATIC_P_CAL_POINT_LO	R/W	S	FLT	4	S	Static Pressure Calibration point Low		
n+79	STATIC_P_CAL_MIN_SPAN	R	S	FLT	4	N	Static Pressure Calibration minimum Span		
n+80	STATIC_ P_SENSOR_UNIT	R/W	S	U16	2	S	Pressure unit ONLY [Mpa]		
n+81	STATIC_P_TRIM_VALUE	R	R	101	5	D	Static Pressure value after the Calibration (1)		Expr. in STATIC_P_SENSOR_UNIT (idx n+80)
n+82	STATIC _P_SEC_VALUE_1	R	R	101	16	D	Static Pressure value after Bias/Offset c(2)		Expr.in STATIC_P_SEC_VALUE_1_UNIT idx n+83
n+83	STATIC_P_SEC_VALUE_1_UNIT	R/W	S	U16	2	S	Pressure Units ONLY [Mpa]		
n+84	STATIC_P_LIN_TYPE	R/W	S	U8	1	S	0-Linear		Fixed
n+85	STATIC_P_SCALE_IN	R/W	A	FLT	8	S	Static Pressure input scale		Expr.in STATIC_P_SEC_VALUE_1_UNIT idx n+83
n+86	STATIC_P_SCALE_OUT	R/W	A	FLT	8	S	Static Pressure output scale		Expr. in STATIC_PRESS_UNIT (idx n+88)
n+87	STATIC_PRESSURE_VALUE	R	R	101	5	D	Static Pressure Value		
n+88	STATIC_ PRESSURE_UNIT	R/W	S	U16	2	S	Static Pressure unit [Mpa]		All Units available
n+89	DESIRED_STATIC_P_VALUE	R/W	S	FLT	4	N	Force the Measured Pressure to a selected Value setting an offset between Measured and Process values: SP = MV +/- BIAS: STATIC_P_ SEC_VALUE_1 = STATIC_P_TRIM_VALUE +/- STATIC_P_BIAS_VALUE		Expr.in STATIC_P_SEC_VALUE_1_UNIT idx n+83
n+90	RESET_STATIC_P_BIAS	?W	S	U8	1	N	Reset BIAS_VALUE to 0.0 so that STATIC_P_SEC_VALUE_1 = STATIC_P_TRIM_VALUE		
n+91	STATIC_P_BIAS_VALUE	R	S	FLT	4	N	Read the offset between Measured and Process values: STATIC_P_ BIAS_VALUE = STATIC_P TRIM_VALUE – STATIC_P SEC_VALUE_1		Expr.in STATIC_P_SEC_VALUE_1_UNIT idx n+83
n+92	MAX_STATIC_PRESSURE_VALUE	R/W	S	FLT	4	S	Max Historical Static Press value		Expr.in STATIC_P_SENSOR_UNIT (idx n+80)
n+93	MIN_STATIC_PRESSURE_VALUE	R/W	S	FLT	4	S	Min Historical Static Press value		
n+94	SENSOR_TEMP_TRIM_VALUE	R/W	S	FLT	4	S	Sensor temperature calibration value		Expr. in TEMPERATURE_UNIT (idx n+28)
n+95	HIGH_TEMPERATURE_LIMIT	R	S	FLT	4	N	Max operating sensor temperature Limit		
n+96	LOW_TEMPERATURE_LIMIT	R	S	FLT	4	N	Min operating sensor temperature Limit		
n+97	SET_UPPER_RANGE_POINT_PV	R/W	S	U8	1	N	SPAN Button emulation for Process Value		Write the instant measured val as SCALE_IN 100%
n+98	SET_LOWER_RANGE_POINT_PV	R/W	S	U8	1	N	ZERO Button emulation for Process Value.		Write the instant measured value as SCALE_IN 0%

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+99	SET_UPPER_RANGE_POINT_SP	R/W	S	U8	1	N	SPAN Button emulation for Static Pressure		Writes the instant value in the STATIC_P_SCALE_IN 100%
n+100	SET_LOWER_RANGE_POINT_SP	R/W	S	U8	1	N	ZERO Button emulation for Static Pressure		Writes the instant value in the STATIC_P_SCALE_IN 0%
n+101	PARALLEL_SHIFT_PV	R/W	S	FLT	4	N	Shift the SCALE_IN range values in order to produce the desired percentage in output.		The SCALE_IN span remains unmodified
n+102	PARALLEL_SHIFT_STATIC	R/W	S	FLT	4	N	Shift the STATIC_P_SCALE_IN range values in order to produce the desired percentage in out		The STATIC_P_SCALE_IN span remains unmodified
n+103	PRESSURE_SIMULATION_ENABLE	R/W	S	U8	1	S	0:	Disabled/OFF	
							1:	Enabled/ON	
n+104	PRESSURE_SIMULATION_VALUE	R/W	S	FLT	4	S	Pressure Simulation Value		Expressed in SENSOR_UNIT (idx n+14)
n+105	STATIC_PR_SIMULATION_ENABLE	R/W	S	U8	1	S	0:	Disabled/OFF	
							1:	Enabled/ON	
n+106	STATIC_PR_SIMULATION_VALUE	R/W	S	FLT	4	S	Static Pressure Simulation Value		Expr.in STATIC_P_SENSOR_UNIT (idx n+80)
n+107	SENSOR_TEMP_SIMULATION_ENABLE	R/W	S	U8	1	S	0:	Disabled/OFF	
							1:	Enabled/ON	
n+108	SENSOR_TEMP_SIMULATION_VALUE	R/W	S	FLT	4	S	Sensor temperature Simulation value		Expr. in TEMPERATURE_UNIT (idx n+28)
n+109	INTEGRATION_TIME	R/W	S	U8	1	S	From 0.01 to 1.28 seconds [0.3 s]		For piezo sensor types only
n+120	RESET_MIN_MAX_VALUES	W	S	U8	1	N	1	Reset Sensor Values	Historical Resets for the User
							2	Reset Static P Values	
							3	Reset Temp Values	
n+121	SERVICE_MAX_SENSOR_VALUE	R/W	S	FLT	4	N	For Service use. Max Historical Sensor value		Expressed in SENSOR_UNIT (idx n+14)
n+122	SERVICE_MIN_SENSOR_VALUE	R/W	S	FLT	4	N	For Service use. Min Historical Sensor value		
n+123	SERVICE_MAX_TEMPERATURE	R/W	S	FLT	4	N	For Service Use. Max Historical temp.value		Expr. in TEMPERATURE_UNIT (idx n+28)
n+124	SERVICE_MIN_TEMPERATU/RE	R/W	S	FLT	4	N	For Service Use. Min Historical temp.value		
n+125	SERVICE_MAX_STATIC_PRESSURE_VALUE	R/W	S	FLT	4	N	For Service Use. Max Historical Static Press Val		Expr.in STATIC_P_SENSOR_UNIT (idx n+80)
n+126	SERVICE_MIN_STATIC_PRESSURE_VALUE	R/W	S	FLT	4	N	For Service Use. Min Historical Static Press Val		
n+127	RESET_SERVICE_MIN_MAX_VALUES	W	S	U8	1	N	1	Reset Sensor Values	Historical Resets for Service
							2	Reset Static P Values	
							3	Reset Temp Values	
VIEWS									
n+134	VIEW_1	R			18	D			

ADVANCED DIAGNOSTIC TRANSDUCER BLOCK (ADTB)

SLOT 6 --- n = 16										
Idx	Parameter		Data	Type	Size	Storage Class	Description	Range		Note
n+0	BLOCK_OBJECT	R	R	DS_32	20	Cst				
n+1	ST_REV	R	S	U16	2	N				
n+2	TAG_DESC	RW	S	O_STR	32	S				
n+3	STRATEGY	RW	S	U16	2	S				
n+4	ALERT_KEY	RW	S	U8	1	S				
n+5	TARGET_MODE	RW	S	U8	1	S		AUTO-OOS		
n+6	MODE_BLK	R	R	DS_37	3	D				
n+7	ALARM_SUM	R	R	DS_42	8	D				
n+8	PILD_COMMAND	RW	S	U8	1	N	Activation / deactivation of the PILD algorithms	0:	IDLE	default value
								1:	GO_OFF	Switch OFF the PILD algorithm
								2:	TRAIN	Start the training phase
									STOP TRAINING	Stop the training phase of the algorithm before its ending
n+9	PILD_STATUS	R	S	U8	1	D	Status of the PILD algorithm	0:	OFF	The algorithm is Inactive (Default value)
								1:	NORMAL	The algorithm is Active
									TRAINING	The algorithm is in training phase
n+10	PILD_OUTPUT	R	S	U8	1	D	Status of the Impulse Lines	Bit 0:	Normal	Lines Not Plugged
								Bit 1:	Not Valid	PILD algorithm is not working or if the training phase didn't produce a valid result
								Bit 2:	Max Pressure Deviation	The pressure value currently detected is too different from what used for the Training. New Training necessary
								Bit 3:	One Line Plugged	One undetected process connection is plugged.
								Bit 4:	Two Lines Plugged	Both Process connections are plugged
								Bit 5:	Line H Plugged	The Process connection on the high side (+) is plugged
								Bit 6:	Line L Plugged	The Process connection on the low side (-) is plugged
								Bit 7:	not used	
n+11	PILD_AFFECT_PV	RW	S	U8	1	S	This parameter indicates if the PILD algorithm must affect the transd. block process variables if YES and the PILD reveals an abnormal situation it drives the TB variables to BAD status	0 –	No	Doesn't affect primary value status (default value)
								1 –	Yes	Affect primary value status
n+12	PILD_DETECTION_TIME	RW	S	U8	1	S	This parameter represents the length of the algorithm slot. This is the time interval (minutes) over which the algorithm bases the decision on the plugging state of the impulse lines			
n+13	PILD_MAX_PRESSURE_DEV	RW	S	U8	1	S	Used in the normal operation checks. It is the maximum allowed deviation of the differential pressure from the value read in the training phase. If the deviation is greater, than the PILD output is set to OUTPUT NOT VALID, because the conditions are too different from the training phase			

Idx	Parameter		Data	Type	Size	Storage Class	Description	Range		Note
n+14	PILD_RETRAIN	RW	S	U8	1	S	If YES, the PILD algorithm is forced to train again when the process conditions pass the maximum allowed deviation.	0	No	
								1	Yes	
n+15	PILD_TRAIN_TIME	RW	S	U8	1	S	This parameter represents the duration of the training period			
n+17	PILD_TRAIN_OUTPUT	R	S	U8	1	D	This parameter gives information on the status of the training phase	Bit 0:	PILD TRAIN NOT DONE	Training not yet executed
								Bit 1:	PILD TRAIN OK	Training correct
								Bit 2:	PILD TRAIN FREQUENCY TUNING	The training phase is checking the signal frequency for its execution
								Bit 3:	PILD TRAIN POWER INSTABLE	Signal power has passed the maximum allowed deviation. This process condition is considered instable for a good training
								Bit 4:	PILD TRAIN PRESSURE INSTABLE	Pressure has passed the maximum allowed deviation. This process condition is considered instable for a good training
								Bit 5:	PILD TRAIN LOW NOISE	The Noise of the process is too low for allowing a good training
								Bit 6:	not used	
								Bit 7:	not used	
n+18	PILD_SENSITIVITY	RW	S	U8	1	S	Algorithm sensibility	1:	LOWEST	
								2:	VERY LOW	
								3:	LOW	
								4:	MEDIUM (Default)	
								5:	HIGH	
								6:	VERY HIGH	
								7:	HIGHEST	
n+19	PILD_BAND_ AUTOTUNING	RW	S	U8	1	S	PILD auto tuning enable/disable	0 –	No	Doesn't perform auto tune (default value)
								1 –	Yes	Performs Auto Tune
n+20	PILD_BAND_LO	RW	S	U8	1	S				Writable only if PILD_BAND_AUTOTUNING is set to 0
n+21	PILD_BAND_HI	RW	S	U8	1	S				
n+22	PWR_ON_CNT	R	S	U16	2	D	Power On Counter. Number of the device Power on			
n+23	TOT_WORK_TIME	R	R		6	D	Total Working hours. Time the transmitter has been kept switched on			
n+24	PAR_WORK_TIME	RW	R		6	D	Partial Working hours. Partial amount of time the transmitter has been switched on. An operator writing command can clear this counter.			
VIEWS										
n+134	VIEW_1	R			18	D				

HMI TRANSDUCER BLOCK (HMITB)

SLOT 6 --- n = 16

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+0	BLOCK_OBJECT	R	R	DS_32	20	Cst			
n+1	ST_REV	R	S	U16	2	N			
n+2	TAG_DESC	RW	S	O_STR	32	S			
n+3	STRATEGY	RW	S	U16	2	S			
n+4	ALERT_KEY	RW	S	U8	1	S			
n+5	TARGET_MODE	RW	S	U8	1	S	AUTO		
n+6	MODE_BLK	R	R	DS_37	3	D			
n+7	ALARM_SUM	R	R	DS_42	8	D			
n+8	CONTRAST	RW	S	U8	1		Display Contrast 0 ….100 [50]		
n+9	LANGUAGE	RW	S	U8	1	S	0:	English (default)	
							1:	German	
							2:	French	
							3:	Spanish	
							4:	Italian	
n+10	HMI_MODE	RW	S	U8	1	S	5:	One Line	
							6:	One Line with Bargraph (default)	
							9:	Two Lines	
							10:	Two Lines with Bargraph	
n+11	HMI_SW_REV	R	S	U8	1	N	0	Not Installed	
							xxx	Display SW Revision	
n+12	HMI_LIN_TYPE	RW	S	U8	1	S	0:	Linear (default)	Active only if one of the 4 HMI_Variable_x is set to HMI_Scaled_Output . In this case the PRTB_SECONDARY_VALUE_2 is calculated with the selected HMI_LIN_TYPE and the result ready to be scaled with the HMI_VARIABLE_RANGE.
							1:	linearisation table	
							10:	Square root	
							20:	cylindrical lying container	
							21:	spherical container	
							240:	SQRT 3° pow	
							241:	SQRT 5° pow	
							242:	Bidirectional Flow	
n+13	HMI_VARIABLE_RANGE	RW	R		11	S		EU100% , EU0%, Unitcode, n°decimals	Scaling applied at the linearized value of the PRTB_SECONDARY_VALUE_2. This value is for displaying purpose only and has not effect ont the real AIx_OUT available through the Profibus Communication.
n+14	HMI_VARIABLE_CUSTOM_UNIT	RW	S	V_STR	8	S	Textual custom unit		
n+15	HMI_LINE_1	RW	S	U8	1	S	1:	HMI_Variable 1 (default)	
							2:	HMI_Variable 2	
							3:	HMI_Variable 3	
							4:	HMI_Variable 4	
n+16	HMI_LINE_2	RW	S	U8	1	S	Same as HMI_LINE_1		
n+17	HMI_BARGRAPH	RW	S	U8	1	S	Same as HMI_LINE_1		

Idx	Parameter		Data	Type	Size	Storage Class	Range		Note
n+18	HMI_SEQUENCE	RW	S	U8	1	S	0	Sequence/Autoscrolling OFF	
							1	Sequence/Autoscrolling ON	
n+19	HMI_VARIABLE_1	RW	S	U8	1	S	In order to recognize the displayed variable among all those in this list, it appears a three character string in the left side of the value when two lines mode is selected and below the value when One Line Mode is selected. The strings for any variables are:		
							0:	Pressure (default)	‘PV ‘
							10:	AI_1 Output	‘AI1’
							11:	AI_1 O/P Percent	‘%1 ‘
							12:	AI_2 Output	‘AI2’
							13:	AI_2 O/P Percent	‘%2 ‘
							14:	AI_3 Output	‘AI3’
							15:	AI_3 O/P Percent	‘%3 ‘
							7:	Sensor Temp	‘ST ‘
							8:	Static Pressure	‘SP ‘
							9:	HMI Scaled Output	‘HMI’
							16:	Measured Value (Trimmed Value)	‘TPV ‘
n+20	HMI_VARIABLE_2	RW	S	U8	1	S	Same as HMI_VARIABLE_1		
n+21	HMI_VARIABLE_3	RW	S	U8	1	S	Same as HMI_VARIABLE_1		
n+22	HMI_VARIABLE_4	RW	S	U8	1	S	Same as HMI_VARIABLE_1		
VIEWS									
n+134	VIEW_1	R			18	D			

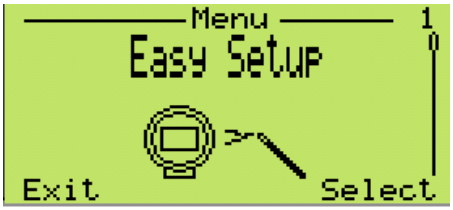
Sym	Error	HMI code	Description	Condensed Status Byte			Classic Status Byte		
Electronics errors				AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp	AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp
	Memory Failure	F116.023	The device data loaded at the start up are corrupted precluding the correct functionality of the device	BAD Maintenance Alarm More Diagnostic Available		GOOD- OK	BAD Device Failure		GOOD- OK
	Electronic Interface error	M030.020	Exchange of non-critical data between sensor and electronics is precluded due to problem in the transmitter circuit of the electronics or in receiver circuit of the sensor	GOOD Maintenance Required			GOOD Maintenance Required		
	Non-Volatile memory burn error	M026.024	Writings to the electronic Non-Volatile Memory were not successful. The device continue to work without problems but after the next power cycle the last configuration will be lost	GOOD Maintenance Demanded			GOOD Maintenance Required		
Pressure Sensor errors				AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp	AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp
	Sensor Invalid	F120.016	The transducer is not in condition to generate a valid signal due to one of the following conditions: - The primary signal of the sensor is no longer available - The sensor and the connected electronics are incompatible	BAD Maintenance Alarm More Diagnostic Available			BAD Sensor failure		
	Sensor Memory Fail	F118.017	The data in the sensor memory are corrupted precluding the correct functionality of the device	BAD Maintenance Alarm More Diagnostic Available			BAD Sensor failure		
	P-dP Sensor Fail	F114.000	The sensor signal value is incorrect due to a mechanical failure i.e. Loss of fill fluid from the cell; ruptured diaphragm, broken sensor….	BAD Maintenance Alarm More Diagnostic Available	GOOD- OK		BAD Sensor failure	GOOD- OK	
	Static Pressure Sensor Fail	F112.001	The sensor signal value is incorrect due to a mechanical failure i.e. The circuitry for the sampling of the static pressure has failed…… Valid for Differential pressure models	BAD Maintenance Alarm More Diagnostic Available		GOOD- OK	UNCERTAIN Sen Conv Not Accurate	BAD Sensor failure	GOOD- OK
	Sensor Temperature Fail	F110.002	The circuitry for the sampling of the temperature has failed. The accuracy is decreased more than the acceptable error	BAD Maintenance Alarm More Diagnostic Available			UNCERTAIN Sensor Conversion Not Accurate		BAD Sensor failure
	Non-Volatile memory burn error	M028.018	Writings to the Sensor non-Volatile Memory were not successful. The device continue to work without problems but any replacement operation is compromised because the back-up configuration is not updated	GOOD Maintenance Demanded			GOOD Maintenance Required		

Appendix B – Device diagnostic table

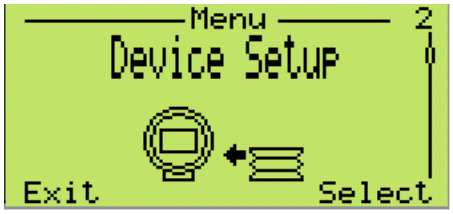
Installation/start-up errors					AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp	AI1_OUT Process Val	AI2_OUT Static Press	AI3_OUT Sensor temp
	Input Simulation Active	PdP simulation	C088.030	The Pressure Value produced in output is derived from a simulated input	BAD Function Check Local Override	GOOD- OK		UNCERTAIN Simulated Value	GOOD- OK	
		Static P simulation		The Static PressureValue produced in output is derived from a simulated input	GOOD-OK	BAD Function Check Local Override	GOOD-OK	GOOD-OK	UNCERTAIN Sim. Value	GOOD-OK
		Sensor Temp simulation		The Sensor Temperature Value produced in output is derived from a simulated input	GOOD-OK		BAD Function Check Override	GOOD-OK		UNCERTAIN Simulated Value
	Replace Info		M020.042	An element of the tx has been changed (sensor or electronics). Replacement operation must be executed.	GOOD Maintenance Demanded			GOOD Maintenance Required		
Process errors					**AI1_OUT Process Val**	**AI2_OUT Static Press**	**AI3_OUT Sensor temp**	**AI1_OUT Process Val**	**AI2_OUT Static Press**	**AI3_OUT Sensor temp**
	Pressure Overrange		F104.032	The Pressure is outside the overpressure limit and risk to damage the sensor	BAD Mainten Dia. Available	GOOD- OK		BAD Sensor failure	GOOD- OK	
	P-dP Out Of Limit		F102.004	The Process Pressure is outside the sensor limits and no longer representing the true applied process value	BAD Process Related No Maintenance	GOOD- OK		BAD Sensor failure	GOOD- OK	
	Static Pressure Out Of Limit		F100.005	The measured Static pressure is above its operational limit	UNCERTAIN No Maintenance	BAD Process Related No Maintenance	GOOD- OK	UNCERTAIN Sens Conv Not Accurate	BAD Sensor failure	GOOD-OK
	Sensor Temperature Out Of Limit		S054.006	The measured sensor temperature is outside of its operational limits	UNCERTAIN Process Related No Maintenance		BAD Mainten. Diag. Available	UNCERTAIN Sensor Conversion Not Accurate		BAD Sensor failure
	MWP Exceeded		M052.031	The Static Pressure is higher than the mechanical limit of process connection.	GOOD Maintenance Required			GOOD Maintenance Required		
	Primary Variable Out of Range		S050.010	Process value is outside its High or Low working range	UNCERTAIN No Maintenance	GOOD- OK		UNCERTAIN eng. unit range violation	GOOD- OK	
	Static Pressure Out of Range		S048.011	Static Pressure is outside its High or Low working range	GOOD-OK	UNCERTAIN No Maintenance	GOOD-OK	GOOD-OK	UNCERTAIN eng. unit violation	GOOD-OK
	PILD Output	PILD Affect PV = FALSE	M018.038	The PILD algorithm has detected impulse lines plugged. The Plugged Line can be one among: High Side / Low Side / Both Sides / One Undefined	GOOD Maintenance Required			GOOD Maintenance Required		
		PILD Affect PV = TRUE			BAD Maintenance Alarm More Diagnostic Available			BAD – Sensor failure		
	PILD Changed Operating Conditions	PILD Affect PV = FALSE	M016.039	The pressure value currently detected is too different from what used for the PILD Training	GOOD Maintenance Required			GOOD – Maintenance Required		
		PILD Affect PV = TRUE			BAD Maintenance Alarm More Diagnostic Available			BAD – Sensor failure		

Appendix C – HMI structure

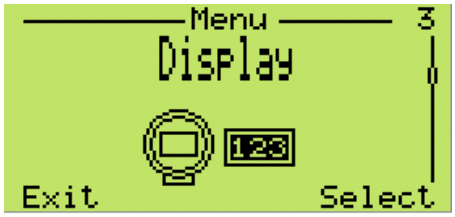
The HMI menu is divided in the following sections which can be selected by scrolling them acting on the buttons “2” (up) and “3” (down) buttons, once on the display the desired sub-menu icon will be visualized, confirm your selection with the [SELECT] BUTTON “4” (right). Follow the instruction on the screen to perform the configuration of the different parameters.



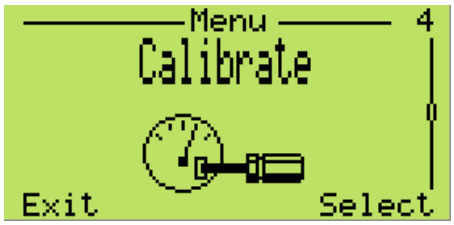
This menu allows the verification and the parameterization of the basic configuration of the 266 pressure transmitter. The menu driven structure will guide you to the choice of the interface language, the tag number configuration, the engineering units, the URV and LRV (Upper range value and lower range value), the transfer function (linear or square root) the damping time, the auto set zero (set the input measured value to 4 mA and the PV value to 0), the display visualization mode (the value that need to be visualized on the LCD).



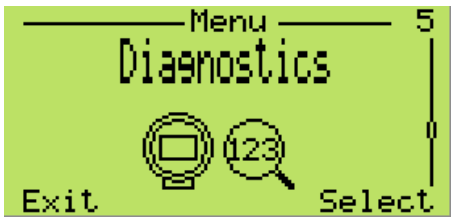
This menu allows the verification and the parameterization of the entire device The menu driven structure includes the write protection enabling, process variable settings (unit, LRV and URV), transfer function selection (linearization type and low flow cut-off) and output scaling (unit according to the measurement and LRV/URV). The last selectable sub-menu allows user to reset all the parameters to the default configuration.



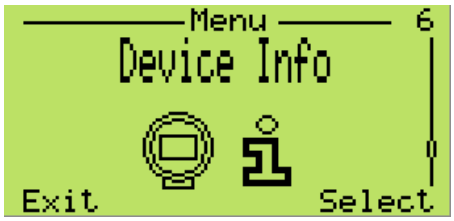
This menu allows the set-up of different functions relevant to the display itself. The menu driven structure will guide you through the choice of some functional aspects as the display language and contrast. Moreover, it is possible to choose in details what you want to see on the display: one or two lines with or without bargraph. Inside this menu there is the possibility of setting a protection password (security) and the display scaling (linearization type, unit, LRV, URV). Display revision number available.



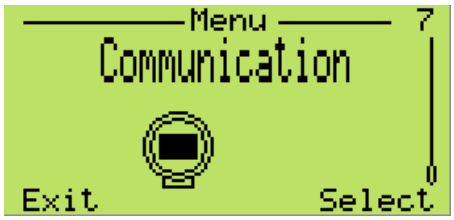
This menu allows the local calibration of the instrument. The menu driven structure will guide you through the choice of pressure sensor trimming (low or high) and at the end you can reset these parameters (to factory sensor trimming, to user sensor trimming).



This menu allows you to monitor diagnostics messages related to pressure variable, output percentage, scaled output, static and sensor pressure. The menu driven structure will also guide you through the simulation.

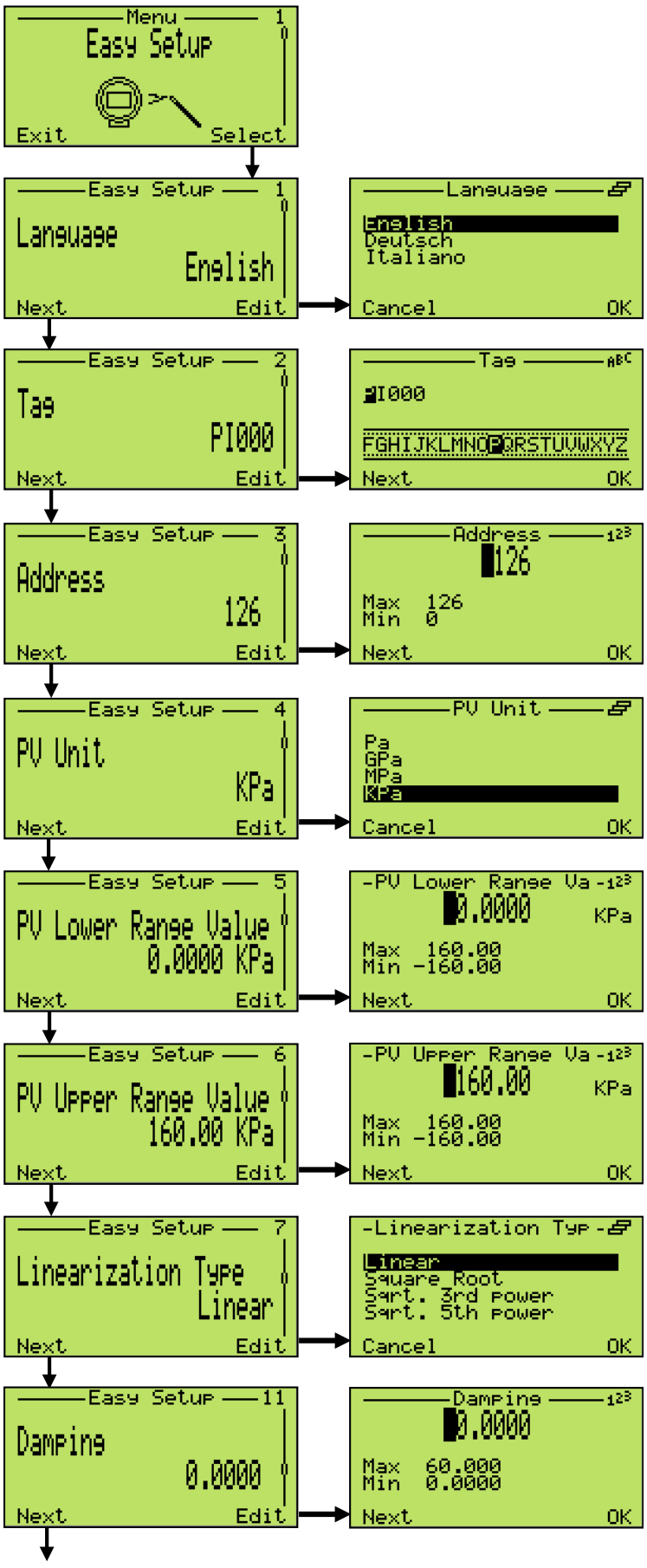


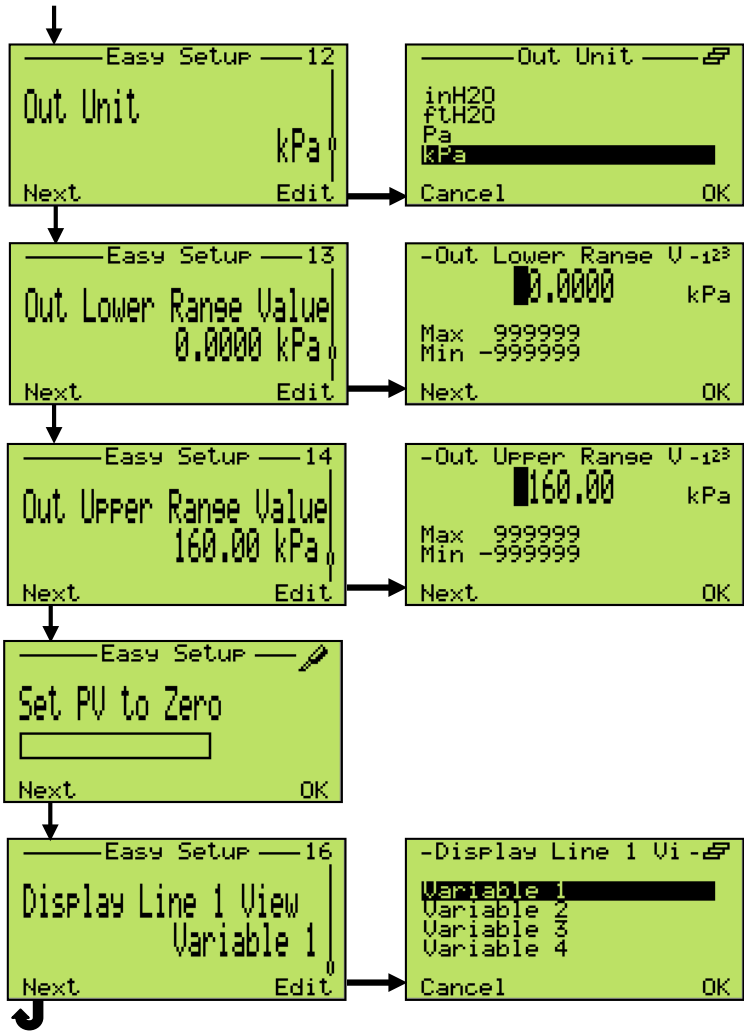
This menu gives you all information about the device. The menu driven structure will show you what is the sensor type, the hardware and software revisions, the high and low sensor limits as well as the minimum applicable span.



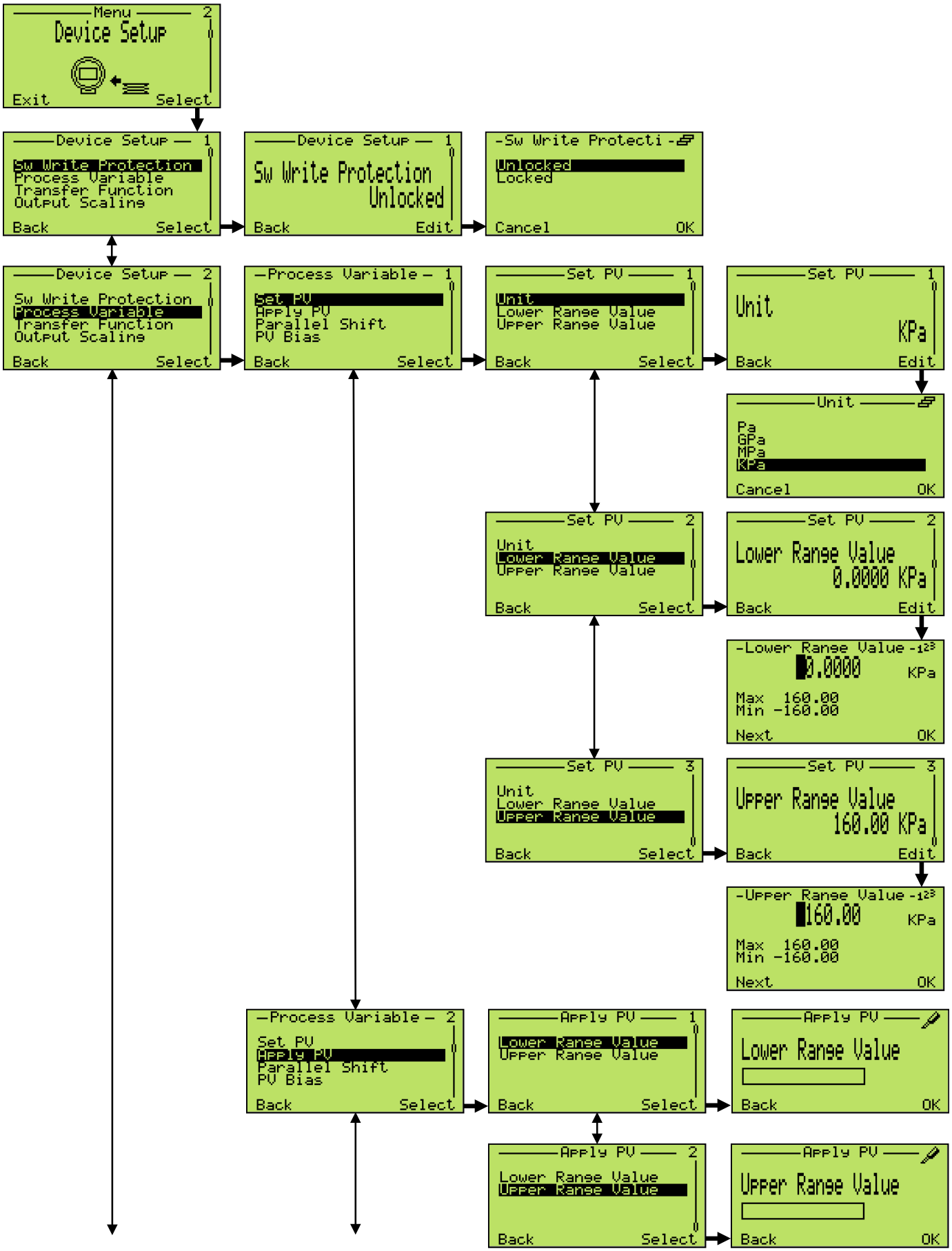
The last section of this structured and driven menu gives you the possibility of changing the Tag, the Address and the Ident Number of the device.

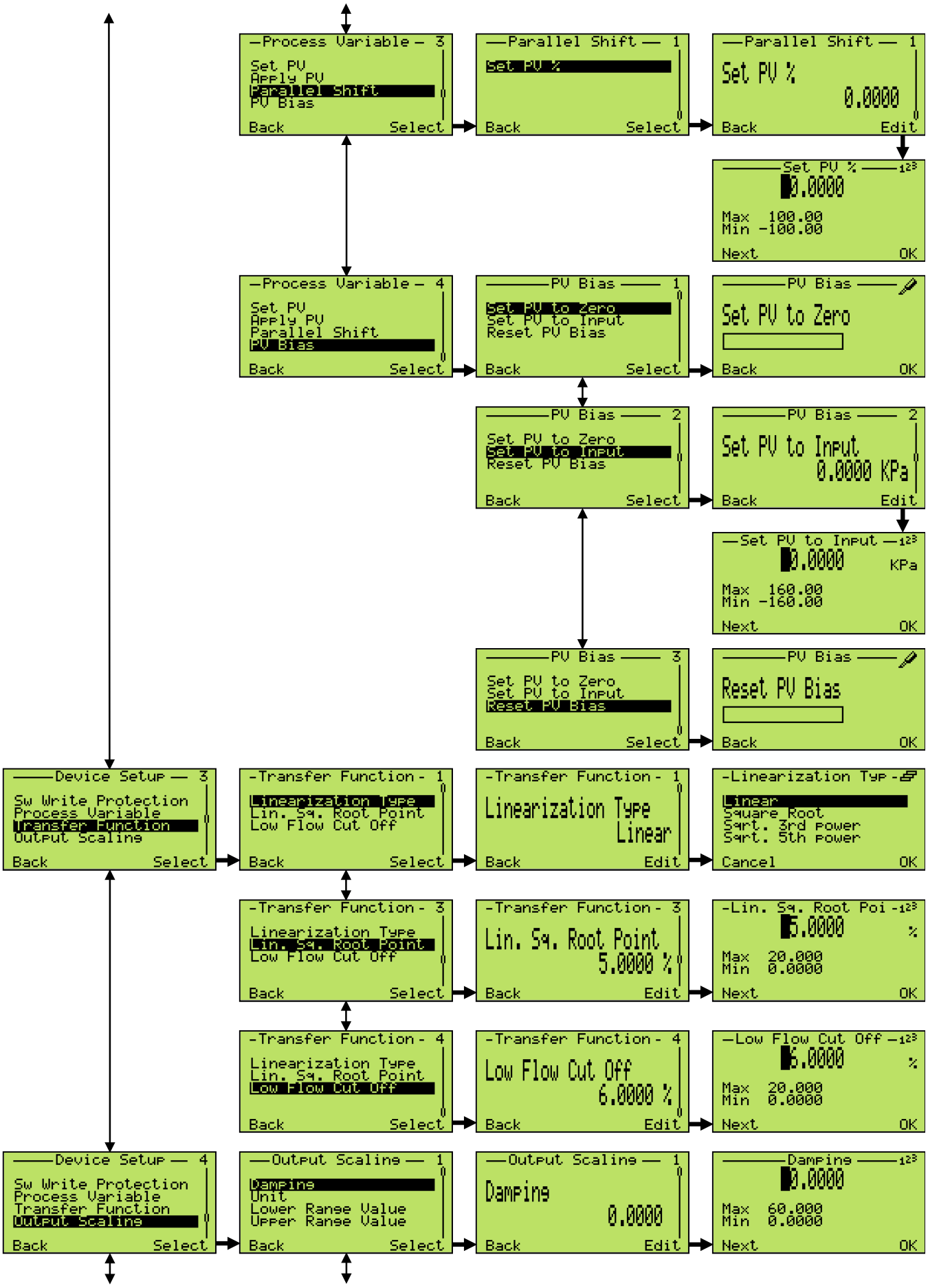
Easy Set-up

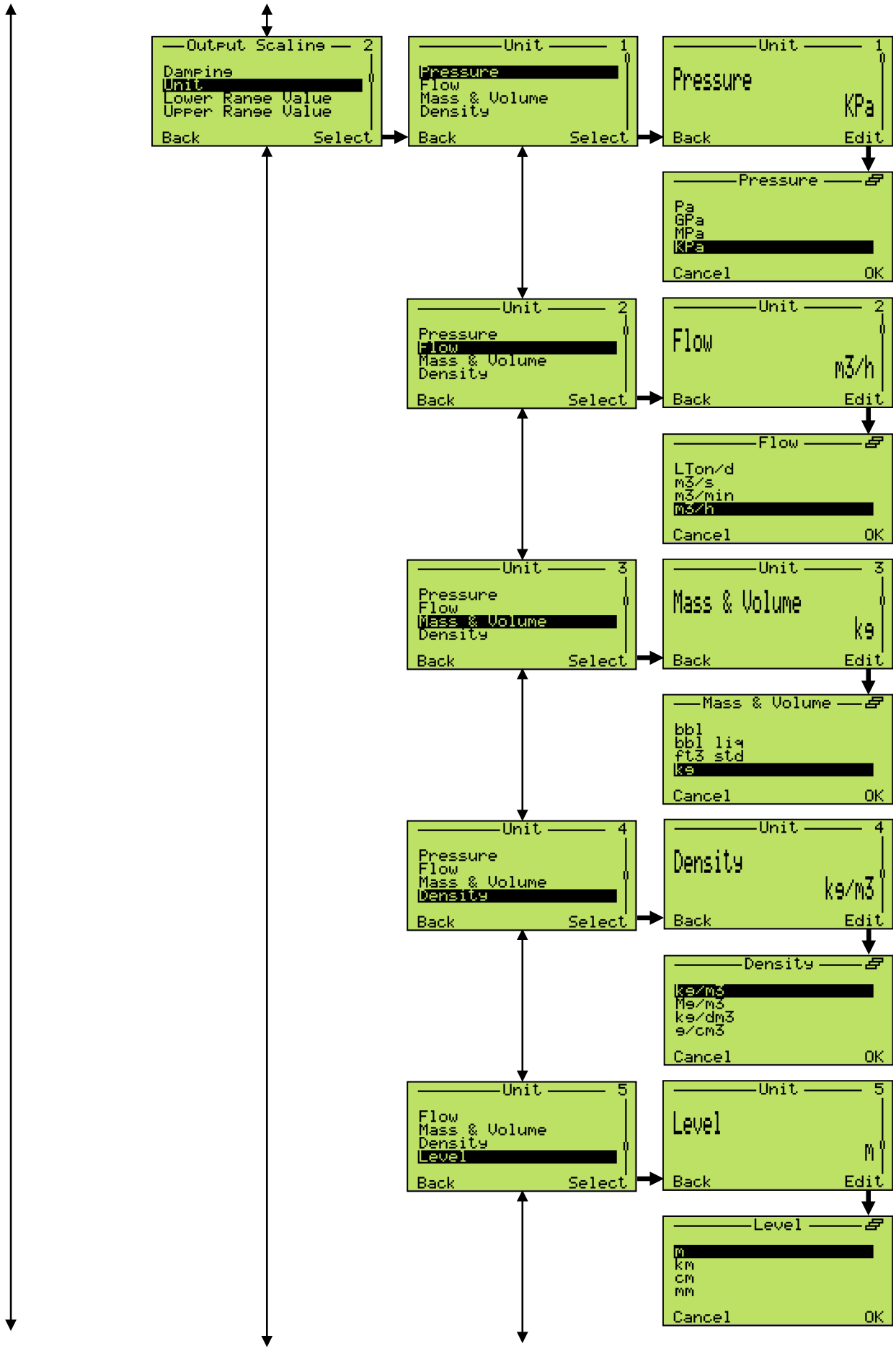

Menu 1
Easy Setup
Exit
Select
Easy Setup 1
Language
English
Next
Edit
Language
English
Deutsch
Italiano
Cancel
OK
Easy Setup 2
Tag
PI000
Next
Edit
Tag
PI000
FGHIJKLMNOPQRSTUVWXYZ
Next
OK
Easy Setup 3
Address
126
Next
Edit
Address
126
Max 126
Min 0
Next
OK
Easy Setup 4
PV Unit
KPa
Next
Edit
PV Unit
Pa
GPa
MPa
KPa
Cancel
OK
Easy Setup 5
PV Lower Range Value
0.0000 KPa
Next
Edit
-PV Lower Range Va-
0.0000 KPa
Max 160.00
Min -160.00
Next
OK
Easy Setup 6
PV Upper Range Value
160.00 KPa
Next
Edit
-PV Upper Range Va-
160.00 KPa
Max 160.00
Min -160.00
Next
OK
Easy Setup 7
Linearization Type
Linear
Next
Edit
-Linearization Typ-
Linear
Square Root
Sqrt. 3rd power
Sqrt. 5th power
Cancel
OK
Easy Setup 11
Damping
0.0000
Next
Edit
Damping
0.0000
Max 60.000
Min 0.0000
Next
OK

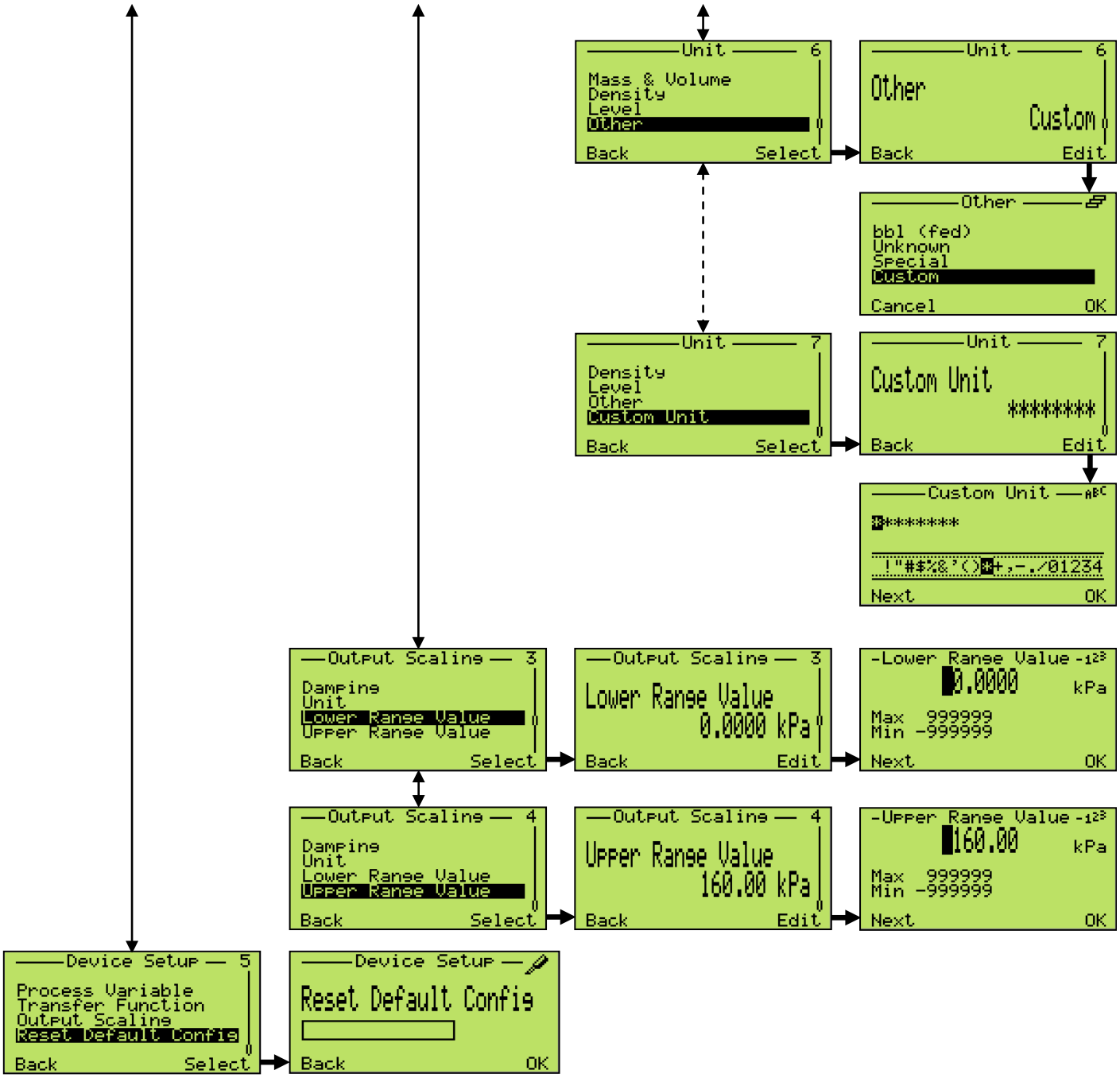

Easy Setup 12
Out Unit
kPa
Next
Edit
Out Unit
inH2O
ftH2O
Pa
kPa
Cancel
OK
Easy Setup 13
Out Lower Range Value
0.0000 kPa
Next
Edit
-Out Lower Range V-123
0.0000
kPa
Max 999999
Min -999999
Next
OK
Easy Setup 14
Out Upper Range Value
160.00 kPa
Next
Edit
-Out Upper Range V-123
160.00
kPa
Max 999999
Min -999999
Next
OK
Easy Setup
Set PV to Zero
Next
OK
Easy Setup 16
Display Line 1 View
Variable 1
Next
Edit
-Display Line 1 Vi-
Variable 1
Variable 2
Variable 3
Variable 4
Cancel
OK

Device Set-up

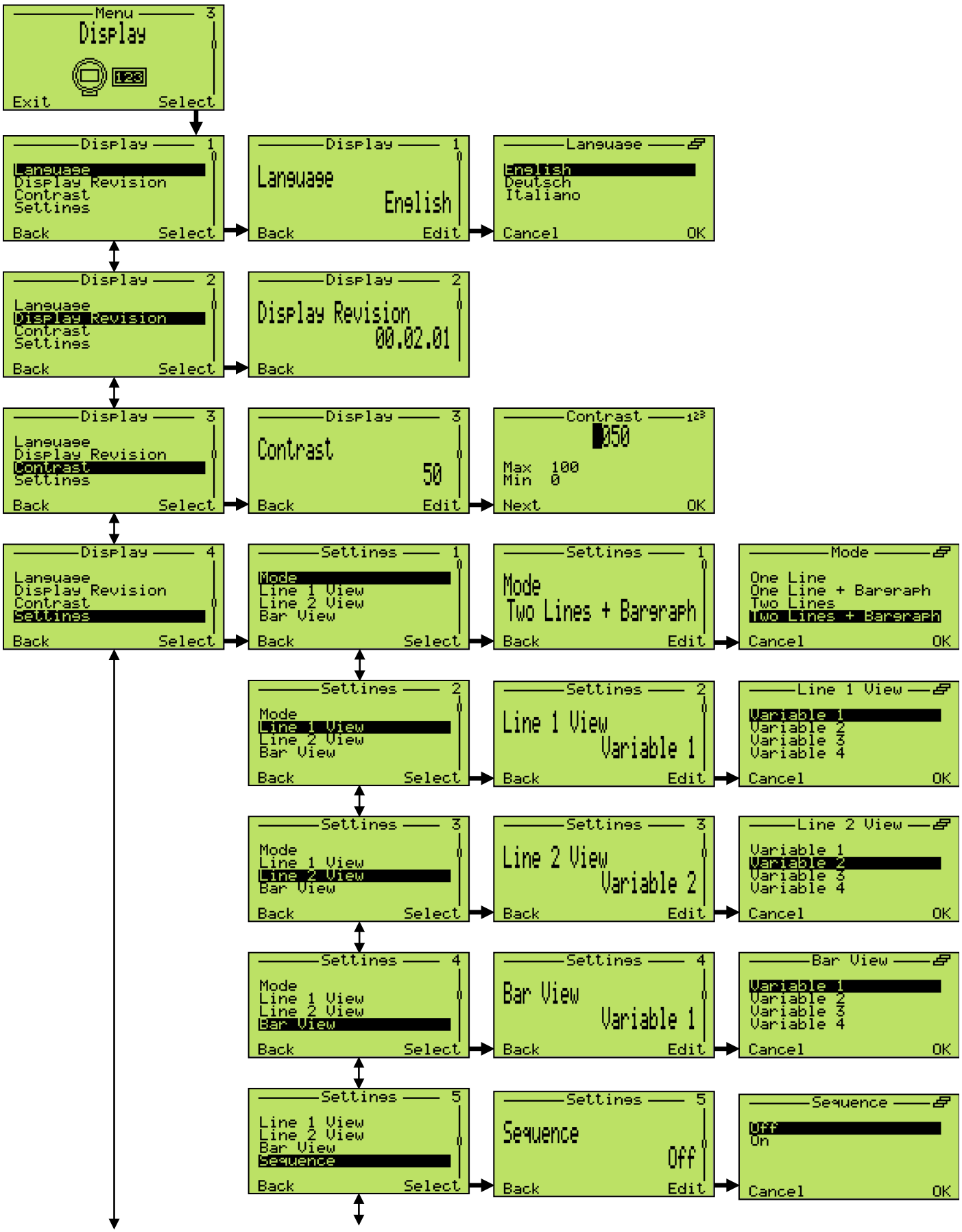


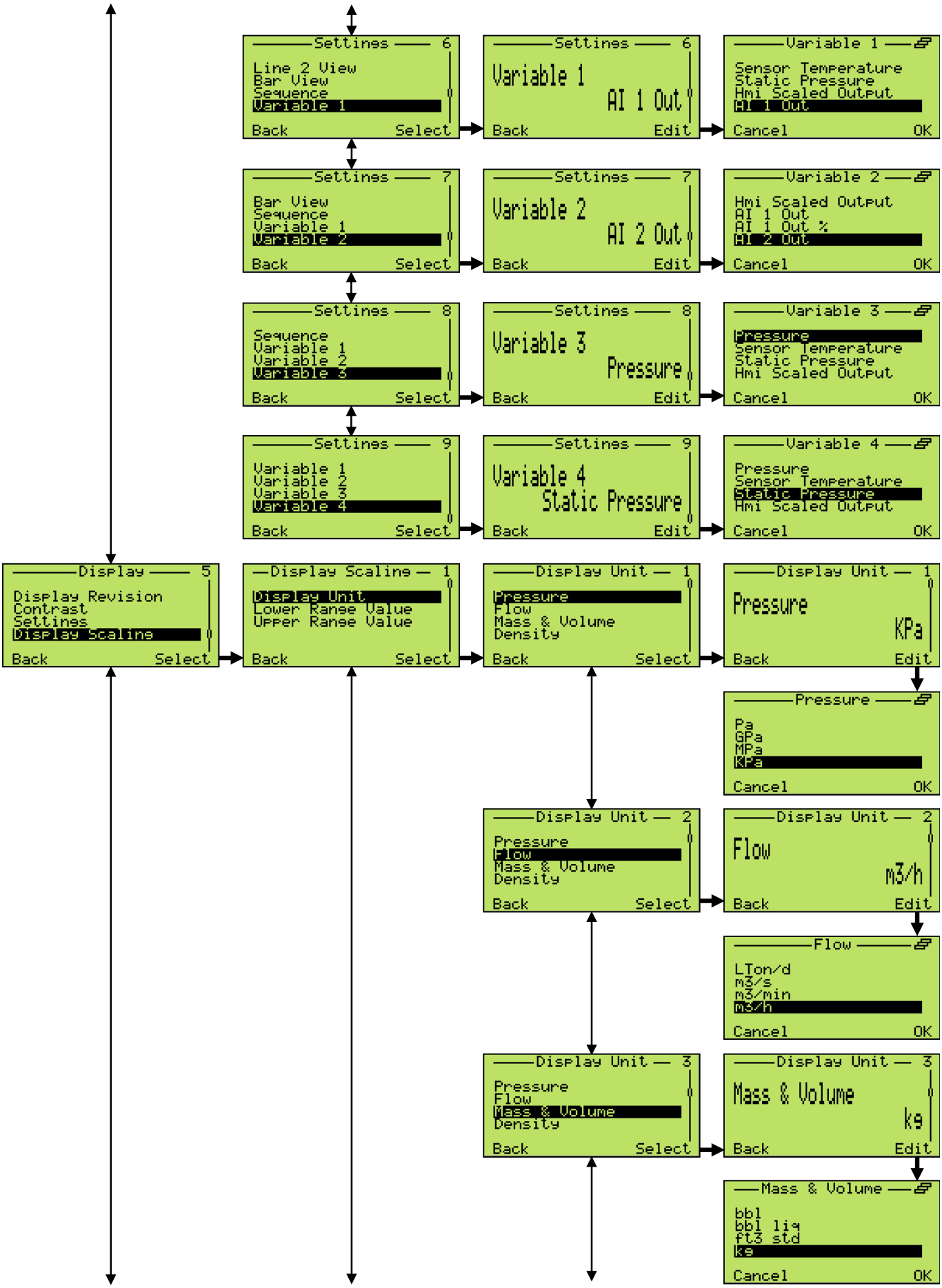

Process Variable 3
Set PV
Apply PV
Parallel Shift
PV Bias
Back
Select
Parallel Shift 1
Set PV %
Back
Select
Parallel Shift 1
Set PV %
0.0000
Back
Edit
Set PV %
0.0000
Max 100.00
Min -100.00
Next
OK
Process Variable 4
Set PV
Apply PV
Parallel Shift
PV Bias
Back
Select
PV Bias 1
Set PV to Zero
Set PV to Input
Reset PV Bias
Back
Select
PV Bias
Set PV to Zero
Back
OK
PV Bias 2
Set PV to Zero
Set PV to Input
Reset PV Bias
Back
Select
PV Bias 2
Set PV to Input
0.0000 KPa
Back
Edit
Set PV to Input
0.0000 KPa
Max 160.00
Min -160.00
Next
OK
PV Bias 3
Set PV to Zero
Set PV to Input
Reset PV Bias
Back
Select
PV Bias
Reset PV Bias
Back
OK
Device Setup 3
Sw Write Protection
Process Variable
Transfer Function
Output Scaling
Back
Select
Transfer Function 1
Linearization Type
Lin. Sq. Root Point
Low Flow Cut Off
Back
Select
Transfer Function 1
Linearization Type
Linear
Back
Edit
Linearization Typ
Linear
Square Root
Sqrt. 3rd power
Sqrt. 5th power
Cancel
OK
Transfer Function 3
Linearization Type
Lin. Sq. Root Point
Low Flow Cut Off
Back
Select
Transfer Function 3
Lin. Sq. Root Point
5.0000 %
Back
Edit
Lin. Sq. Root Poi
5.0000 %
Max 20.000
Min 0.0000
Next
OK
Transfer Function 4
Linearization Type
Lin. Sq. Root Point
Low Flow Cut Off
Back
Select
Transfer Function 4
Low Flow Cut Off
6.0000 %
Back
Edit
Low Flow Cut Off
6.0000 %
Max 20.000
Min 0.0000
Next
OK
Device Setup 4
Sw Write Protection
Process Variable
Transfer Function
Output Scaling
Back
Select
Output Scaling 1
Damping
Unit
Lower Range Value
Upper Range Value
Back
Select
Output Scaling 1
Damping
0.0000
Back
Edit
Damping
0.0000
Max 60.000
Min 0.0000
Next
OK

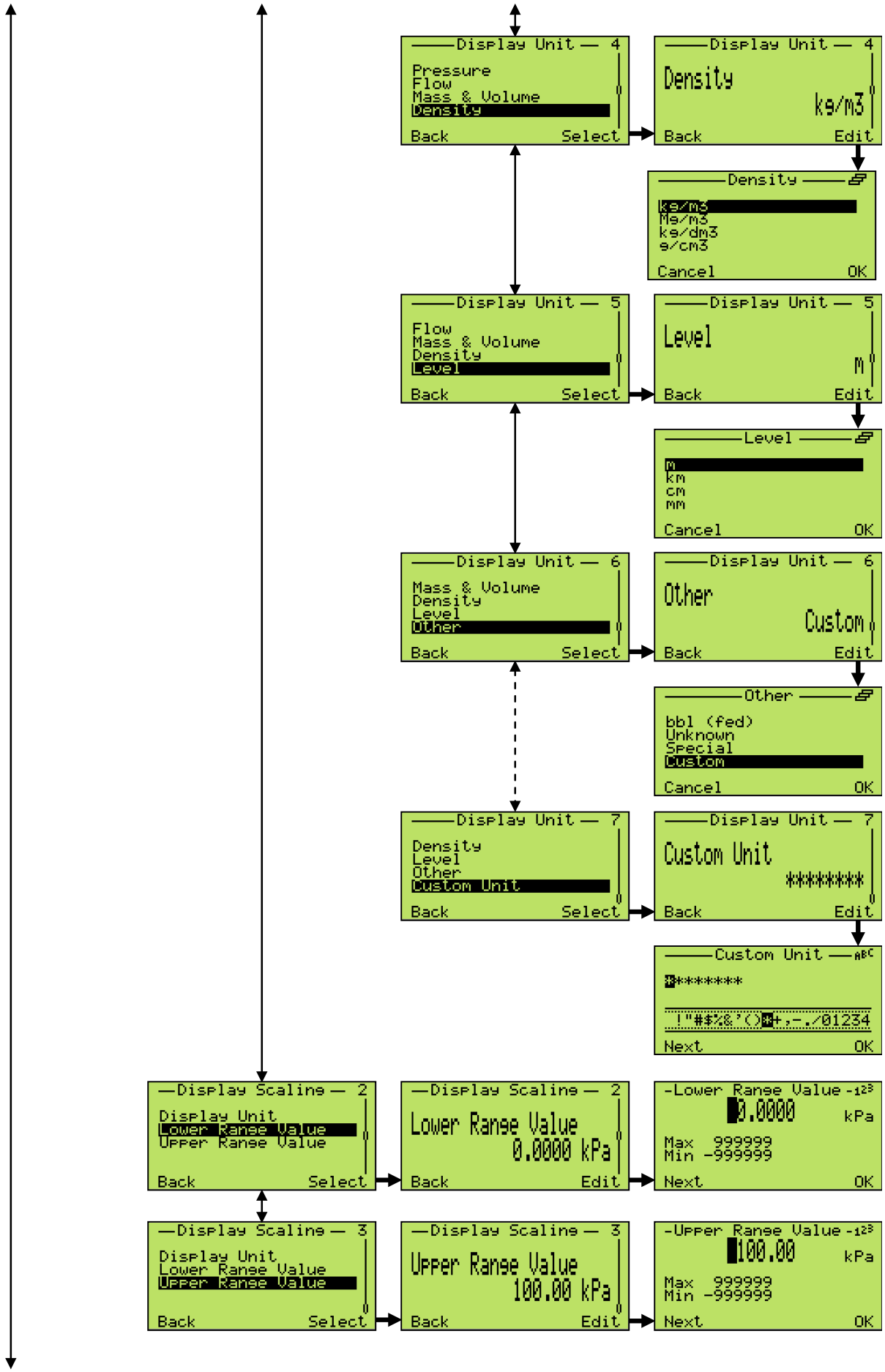

Output Scaling 2
Damping
Unit
Lower Range Value
Upper Range Value
Back
Select
Unit 1
Pressure
Flow
Mass & Volume
Density
Back
Select
Unit 1
Pressure
KPa
Back
Edit
Pressure
Pa
GPa
MPa
KPa
Cancel
OK
Unit 2
Pressure
Flow
Mass & Volume
Density
Back
Select
Unit 2
Flow
m3/h
Back
Edit
Flow
LTon/d
m3/s
m3/min
m3/h
Cancel
OK
Unit 3
Pressure
Flow
Mass & Volume
Density
Back
Select
Unit 3
Mass & Volume
kg
Back
Edit
Mass & Volume
bbl
bbl liq
ft3 std
kg
Cancel
OK
Unit 4
Pressure
Flow
Mass & Volume
Density
Back
Select
Unit 4
Density
kg/m3
Back
Edit
Density
kg/m3
Mg/m3
kg/dm3
g/cm3
Cancel
OK
Unit 5
Flow
Mass & Volume
Density
Level
Back
Select
Unit 5
Level
m
Back
Edit
Level
m
km
cm
mm
Cancel
OK

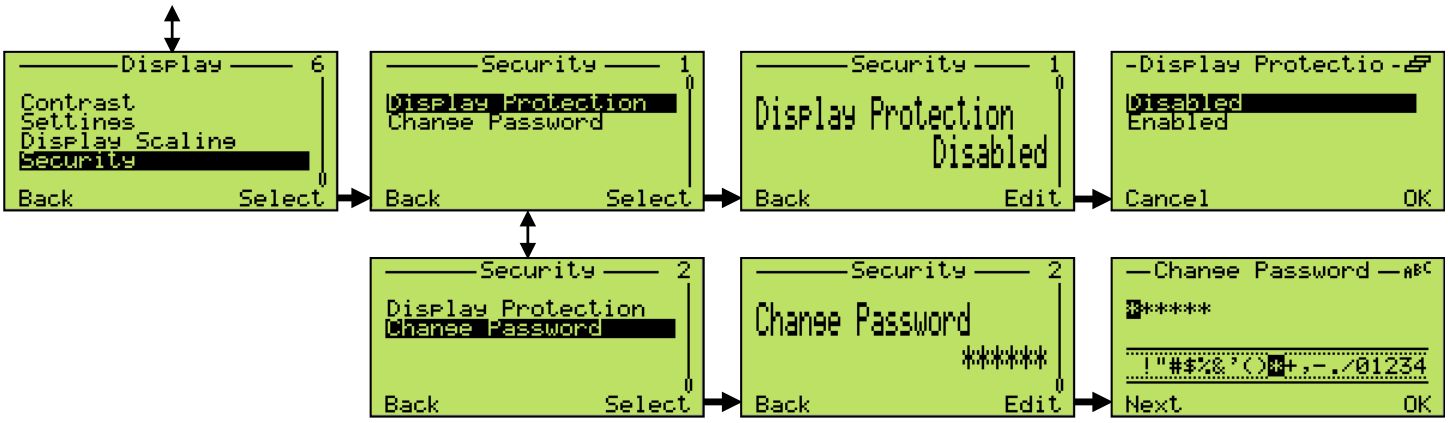

Unit 6
Mass & Volume
Density
Level
Other
Back Select
Unit 6
Other
Custom
Back Edit
Other
bbl (fed)
Unknown
Special
Custom
Cancel OK
Unit 7
Density
Level
Other
Custom Unit
Back Select
Unit 7
Custom Unit
****
Back Edit
Custom Unit
****
!"#$%&'()*+,-./01234
Next OK
Output Scaling 3
Damping
Unit
Lower Range Value
Upper Range Value
Back Select
Output Scaling 3
Lower Range Value
0.0000 kPa
Back Edit
Lower Range Value
0.0000 kPa
Max 999999
Min -999999
Next OK
Output Scaling 4
Damping
Unit
Lower Range Value
Upper Range Value
Back Select
Output Scaling 4
Upper Range Value
160.00 kPa
Back Edit
Upper Range Value
160.00 kPa
Max 999999
Min -999999
Next OK
Device Setup 5
Process Variable
Transfer Function
Output Scaling
Reset Default Config
Back Select
Device Setup
Reset Default Config
Back OK

Display

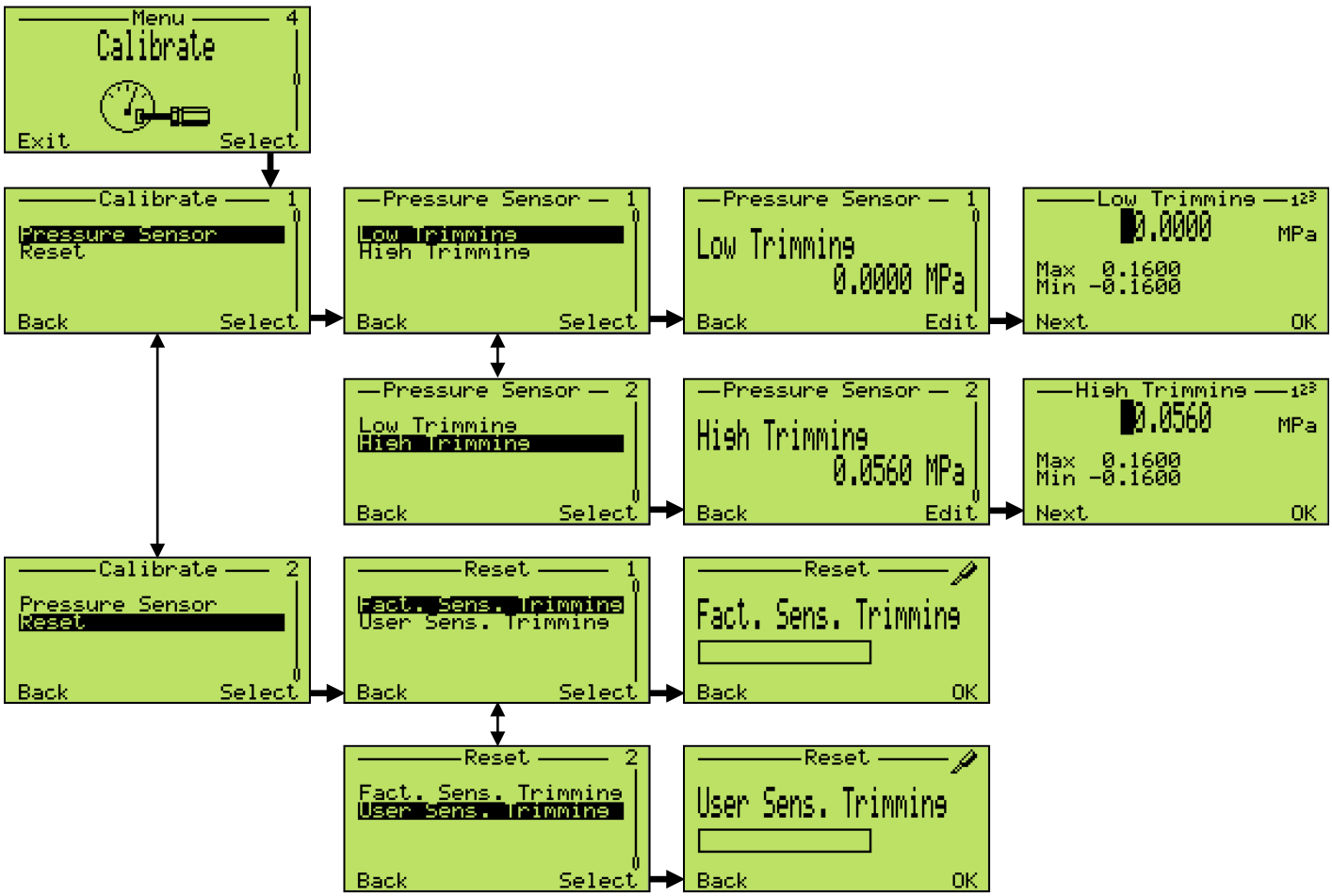

Menu 3
Display
Exit Select
Display 1
Language
Display Revision
Contrast
Settings
Back Select
Display 1
Language
English
Back Edit
Language
English
Deutsch
Italiano
Cancel OK
Display 2
Language
Display Revision
Contrast
Settings
Back Select
Display 2
Display Revision
00.02.01
Back
Display 3
Language
Display Revision
Contrast
Settings
Back Select
Display 3
Contrast
50
Back Edit
Contrast 123
050
Max 100
Min 0
Next OK
Display 4
Language
Display Revision
Contrast
Settings
Back Select
Settings 1
Mode
Line 1 View
Line 2 View
Bar View
Back Select
Settings 1
Mode
Two Lines + Bargraph
Back Edit
Mode
One Line
One Line + Bargraph
Two Lines
Two Lines + Bargraph
Cancel OK
Settings 2
Mode
Line 1 View
Line 2 View
Bar View
Back Select
Settings 2
Line 1 View
Variable 1
Back Edit
Line 1 View
Variable 1
Variable 2
Variable 3
Variable 4
Cancel OK
Settings 3
Mode
Line 1 View
Line 2 View
Bar View
Back Select
Settings 3
Line 2 View
Variable 2
Back Edit
Line 2 View
Variable 1
Variable 2
Variable 3
Variable 4
Cancel OK
Settings 4
Mode
Line 1 View
Line 2 View
Bar View
Back Select
Settings 4
Bar View
Variable 1
Back Edit
Bar View
Variable 1
Variable 2
Variable 3
Variable 4
Cancel OK
Settings 5
Line 1 View
Line 2 View
Bar View
Sequence
Back Select
Settings 5
Sequence
Off
Back Edit
Sequence
Off
On
Cancel OK


Settings 6
Line 2 View
Bar View
Sequence
Variable 1
Back Select
Settings 6
Variable 1
AI 1 Out
Back Edit
Variable 1
Sensor Temperature
Static Pressure
Hmi Scaled Output
AI 1 Out
Cancel OK
Settings 7
Bar View
Sequence
Variable 1
Variable 2
Back Select
Settings 7
Variable 2
AI 2 Out
Back Edit
Variable 2
Hmi Scaled Output
AI 1 Out
AI 1 Out %
AI 2 Out
Cancel OK
Settings 8
Sequence
Variable 1
Variable 2
Variable 3
Back Select
Settings 8
Variable 3
Pressure
Back Edit
Variable 3
Pressure
Sensor Temperature
Static Pressure
Hmi Scaled Output
Cancel OK
Settings 9
Variable 1
Variable 2
Variable 3
Variable 4
Back Select
Settings 9
Variable 4
Static Pressure
Back Edit
Variable 4
Pressure
Sensor Temperature
Static Pressure
Hmi Scaled Output
Cancel OK
Display 5
Display Revision
Contrast
Settings
Display Scaling
Back Select
Display Scaling 1
Display Unit
Lower Range Value
Upper Range Value
Back Select
Display Unit 1
Pressure
Flow
Mass & Volume
Density
Back Select
Display Unit 1
Pressure
KPa
Back Edit
Pressure
Pa
GPa
MPa
KPa
Cancel OK
Display Unit 2
Pressure
Flow
Mass & Volume
Density
Back Select
Display Unit 2
Flow
m3/h
Back Edit
Flow
LTon/d
m3/s
m3/min
m3/h
Cancel OK
Display Unit 3
Pressure
Flow
Mass & Volume
Density
Back Select
Display Unit 3
Mass & Volume
kg
Back Edit
Mass & Volume
bbl
bbl liq
ft3 std
kg
Cancel OK

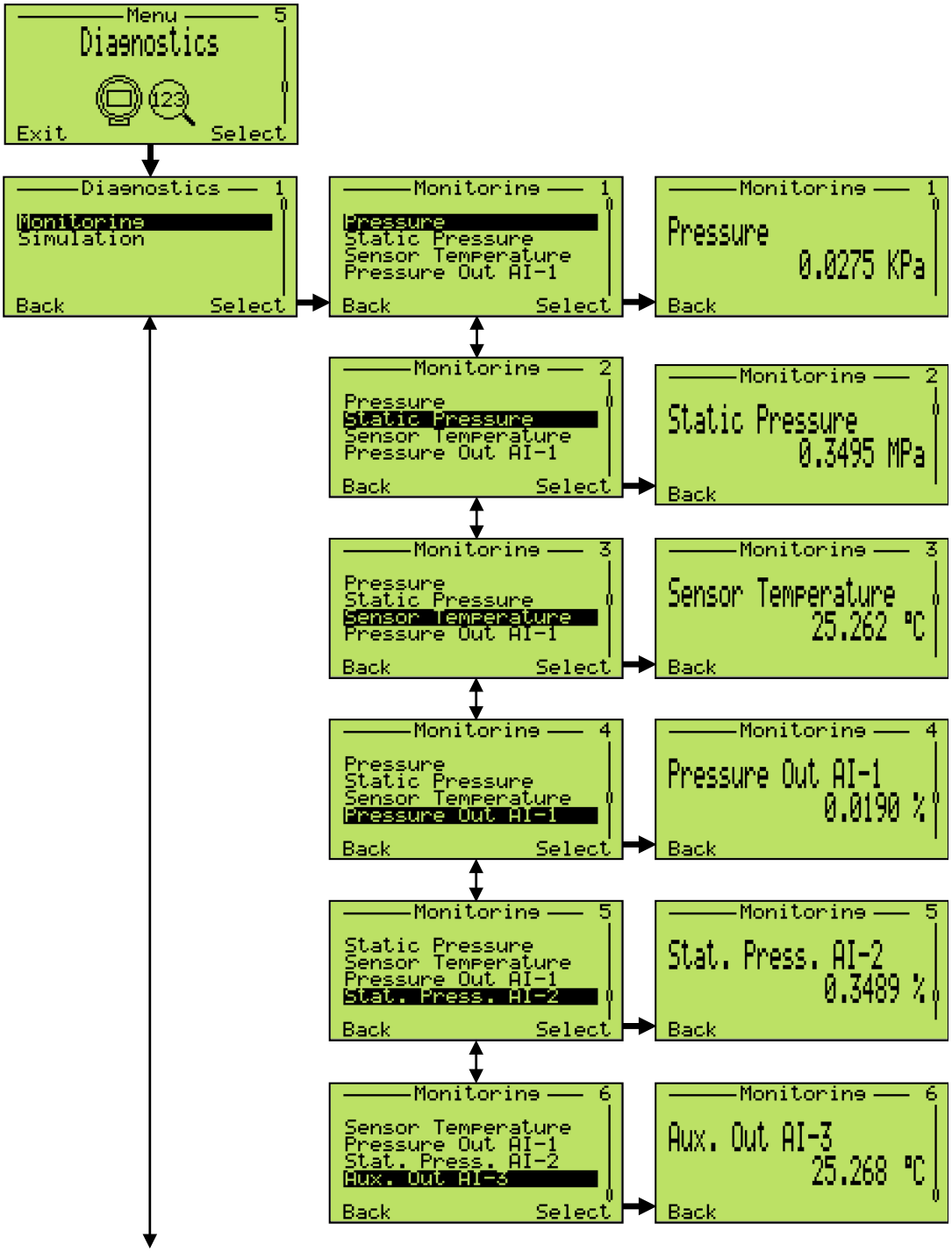

Display Unit — 4
Pressure
Flow
Mass & Volume
Density
Back
Select
Display Unit — 4
Density
kg/m3
Back
Edit
Density
kg/m3
Mg/m3
kg/dm3
g/cm3
Cancel
OK
Display Unit — 5
Flow
Mass & Volume
Density
Level
Back
Select
Display Unit — 5
Level
m
Back
Edit
Level
m
km
cm
mm
Cancel
OK
Display Unit — 6
Mass & Volume
Density
Level
Other
Back
Select
Display Unit — 6
Other
Custom
Back
Edit
Other
bbl (fed)
Unknown
Special
Custom
Cancel
OK
Display Unit — 7
Density
Level
Other
Custom Unit
Back
Select
Display Unit — 7
Custom Unit
****
Back
Edit
Custom Unit
****
!"#$%&'()*+,-./01234
Next
OK
Display Scaling — 2
Display Unit
Lower Range Value
Upper Range Value
Back
Select
Display Scaling — 2
Lower Range Value
0.0000 kPa
Back
Edit
Lower Range Value
0.0000
kPa
Max 999999
Min -999999
Next
OK
Display Scaling — 3
Display Unit
Lower Range Value
Upper Range Value
Back
Select
Display Scaling — 3
Upper Range Value
100.00 kPa
Back
Edit
Upper Range Value
100.00
kPa
Max 999999
Min -999999
Next
OK

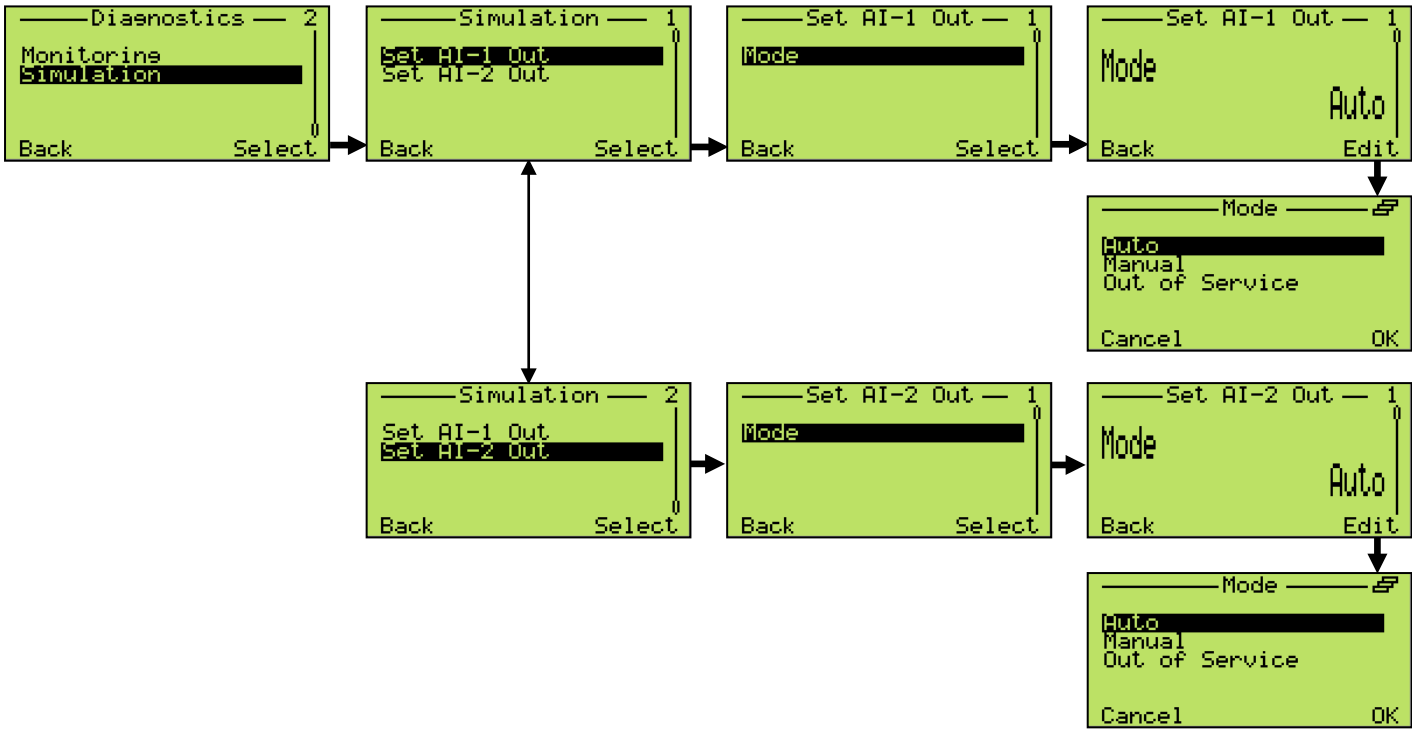

Display 6
Contrast
Settings
Display Scaling
Security
Back
Select
Security 1
Display Protection
Change Password
Back
Select
Security 1
Display Protection
Disabled
Back
Edit
-Display Protectio-
Disabled
Enabled
Cancel
OK
Security 2
Display Protection
Change Password
Back
Select
Security 2
Change Password
*****
Back
Edit
Change Password
*****
!"#$%&'()*+,-./01234
Next
OK

Calibrate

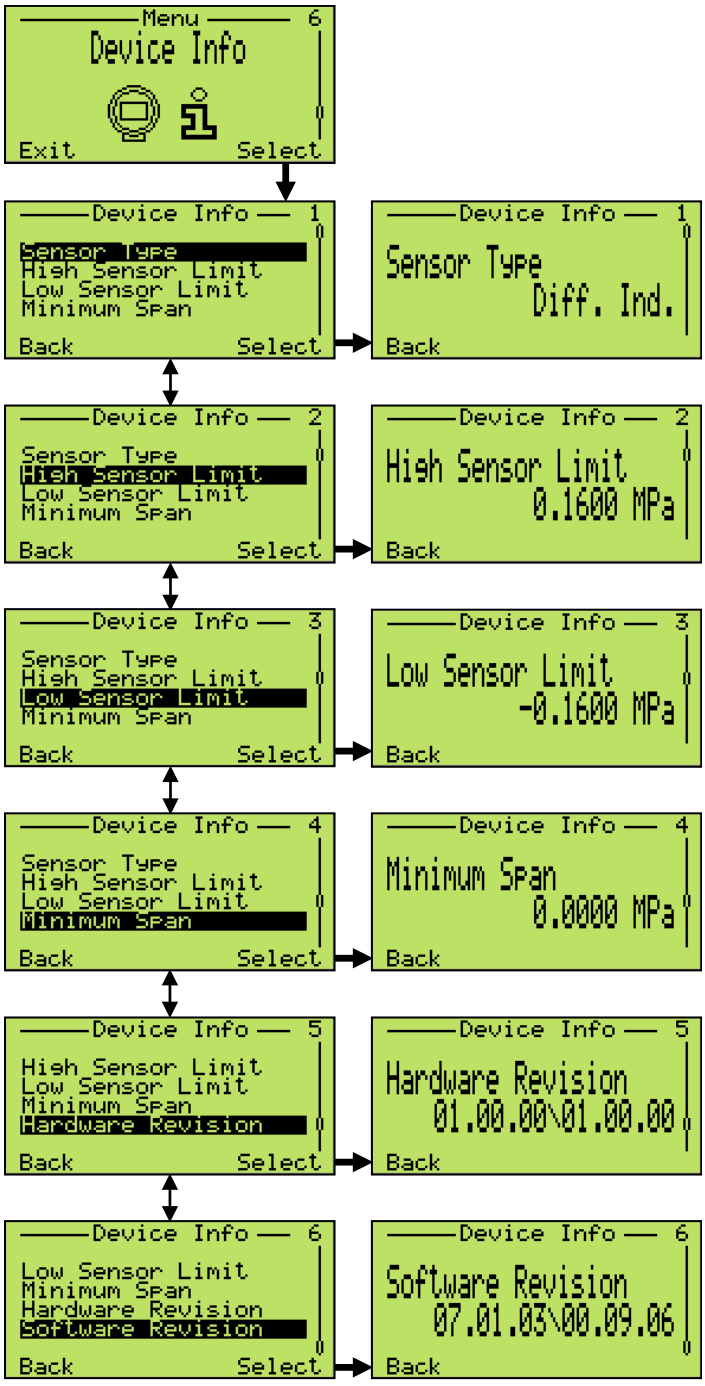

Menu 4
Calibrate
Exit Select
Calibrate 1
Pressure Sensor
Reset
Back Select
Pressure Sensor 1
Low Trimming
High Trimming
Back Select
Pressure Sensor 1
Low Trimming
0.0000 MPa
Back Edit
Low Trimming
0.0000 MPa
Max 0.1600
Min -0.1600
Next OK
Pressure Sensor 2
Low Trimming
High Trimming
Back Select
Pressure Sensor 2
High Trimming
0.0560 MPa
Back Edit
High Trimming
0.0560 MPa
Max 0.1600
Min -0.1600
Next OK
Calibrate 2
Pressure Sensor
Reset
Back Select
Reset 1
Fact. Sens. Trimming
User Sens. Trimming
Back Select
Reset
Fact. Sens. Trimming
Back OK
Reset 2
Fact. Sens. Trimming
User Sens. Trimming
Back Select
Reset
User Sens. Trimming
Back OK

Diagnostics

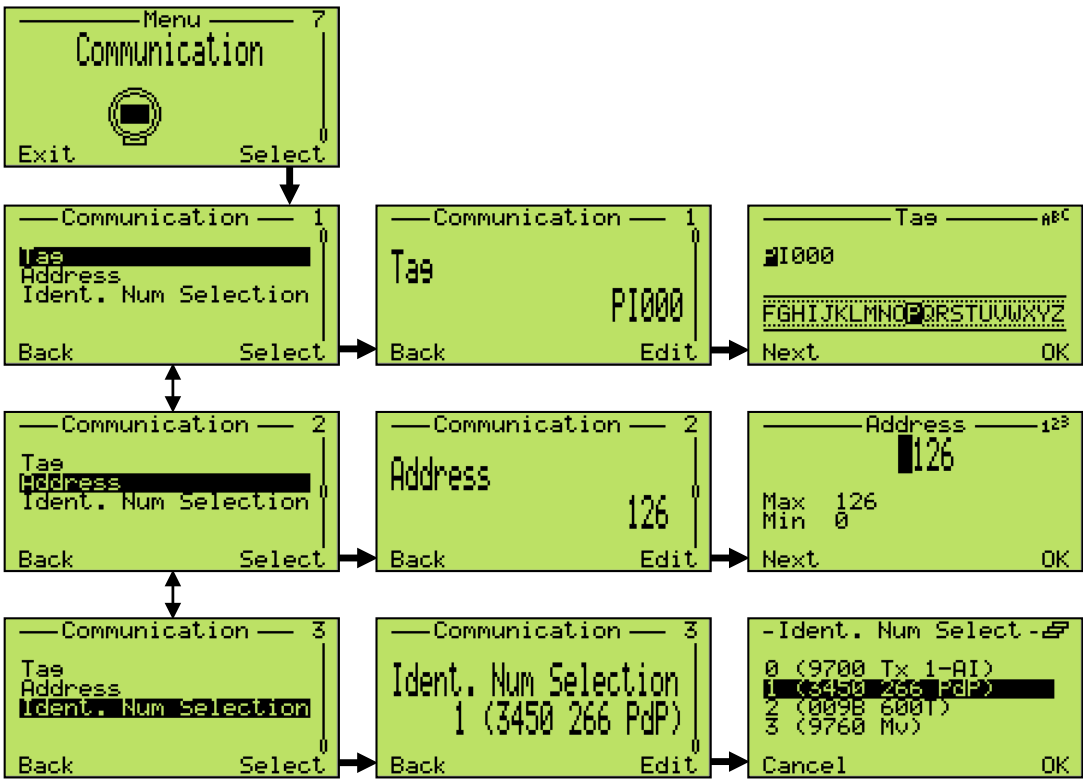



Diagnostics 2
Monitoring
Simulation
Back
Select
Simulation 1
Set AI-1 Out
Set AI-2 Out
Back
Select
Set AI-1 Out 1
Mode
Back
Select
Set AI-1 Out 1
Mode
Auto
Back
Edit
Mode
Auto
Manual
Out of Service
Cancel
OK
Simulation 2
Set AI-1 Out
Set AI-2 Out
Back
Select
Set AI-2 Out 1
Mode
Back
Select
Set AI-2 Out 1
Mode
Auto
Back
Edit
Mode
Auto
Manual
Out of Service
Cancel
OK

Device info


Menu 6
Device Info
Exit
Select
Device Info 1
Sensor Type
High Sensor Limit
Low Sensor Limit
Minimum Span
Back
Select
Device Info 1
Sensor Type
Diff. Ind.
Back
Device Info 2
Sensor Type
High Sensor Limit
Low Sensor Limit
Minimum Span
Back
Select
Device Info 2
High Sensor Limit
0.1600 MPa
Back
Device Info 3
Sensor Type
High Sensor Limit
Low Sensor Limit
Minimum Span
Back
Select
Device Info 3
Low Sensor Limit
-0.1600 MPa
Back
Device Info 4
Sensor Type
High Sensor Limit
Low Sensor Limit
Minimum Span
Back
Select
Device Info 4
Minimum Span
0.0000 MPa
Back
Device Info 5
High Sensor Limit
Low Sensor Limit
Minimum Span
Hardware Revision
Back
Select
Device Info 5
Hardware Revision
01.00.00\01.00.00
Back
Device Info 6
Low Sensor Limit
Minimum Span
Hardware Revision
Software Revision
Back
Select
Device Info 6
Software Revision
07.01.03\00.09.06
Back

Communication



sym	Error		HMI code	Description	Possible Cause	Suggested Actions
				Electronics errors		
	Memory Failure		F116.023	The device data loaded at the start up are corrupted precluding the correct functionality of the device	Electronic memory corrupted	The electronics must be replaced
	Electronic Interface error.		M030.020	Exchange of data between Electronics and Sensor have problems	Exchange of non-critical data between sensor and electronics is precluded due to problem in the electronic circuit or in receiver circuit of the sensor	Power the device and retry the operation, if the error persist the electronics should be replaced as soon as possible.
	Non-Volatile memory burn error		M026.024	The device continue to work without problems but at the next power cycle the new configuration will be lost	Writings to the electronic non-Volatile Memory was not successful	The electronics should be replaced as soon as possible.
				Pressure Sensor errors		
	Sensor Invalid	Missing Primary Signal	F120.016	The primary signal of the sensor is no longer available. The transducer is not in a condition to generate a valid signal.	The sensor signal is not being updated correctly as a result of an electronics failure, sensor error or a poorly connected sensor cable.	Check cable connection, check sensor and if problem persists, the sensor must be replaced.
		Invalid Sensor		Sensor and/or the connected electronics are incompatible	The sensor model/version is not longer compatible with the connected electronic version	The sensor must be replaced
	Sensor Memory Fail		F118.017	The data in the sensor memory are corrupted precluding the correct functionality of the device	Sensor memory corrupted	The Sensor must be replaced
	P-dP Sensor Fail		F114.000	The sensor signal value is incorrect due to a mechanical failure	Mechanical damage to the sensor. Loss of fill fluid; ruptured diaphragm, broken sensor….	The Sensor must be replaced
	Static Pressure Sensor Fail		F112.001	The sensor signal value is incorrect due to a mechanical failure …… Valid only for Differential pressure models	The circuitry for the sampling of the static pressure has failed.	The Sensor must be replaced
	Sensor Temperature Fail		F110.002	The measurement accuracy is decreased more than the acceptable error	The circuitry for the sampling of the temperature has failed.	The Sensor must be replaced
	Non-Volatile memory burn error		M028.018	The device continue to work without problems but any replacement operation is compromised because the back-up configuration is not updated	Writings to the Sensor non-Volatile Memory was not successful	The Sensor should be replaced as soon as possible.
				Installation/start-up errors		
	Input Simulation Active	PdP simulation	C088.030	The Process Value is simulated to became the P-dP value measured in input	The P-dP Value in output is calculated from a value simulated in input	Use a HART configurator (DTM - Hand held) to place device back into normal operating mode (Remove the input simulation)
		Static Pressure simulation		The Process Value is simulated to became the Static Pressure value measured in input	The Static Pressure Value in output is calculated from a value simulated in input	
		Sensor Temp simulation		The Sensor Temperature Value is simulated to became the measured Sensor Temperature value	The Sensor Temperature Value in output is calculated from a value simulated in input	

Appendix D – Troubleshooting

sym	Error		HMI code	Description	Possible Cause	Suggested Actions
				Installation/start-up errors		
	Replace Info	Replace required – Data directions valid	M020.042	The Replace operation is required after the changing of the electronics or of the sensor	The Electronics or the Sensor have been changed but the replacement operation has not been executed	The replacement operation must be executed: - Move the SW 1 of the electronics in position 1 = Enable replace mode -Select the SW 2 the element that has been changed between new Sensor or new electronics - Power Cycle the device - Move the SW 1 of the electronics in position 0
		Replace required – FE to CB not applicable		The Replace operation is required after the changing of the electronics or of the sensor	The Electronics or the Sensor has been changed and a replacement operation for a new sensor has to be executed.	The replacement operation must be executed: Only electronics data can be copied into the sensor - Move the SW 1 to Enable replace mode (1) - Select with the SW 2 to New Sensor (1) - Power Cycle the device - Move the SW 1 to Disable replace mode (0)
		Replace enabled – FE to CB not applicable		The Replace operation has been attempted but with wrong direction	The Electronics or the Sensor have been changed, The replacement has been enabled but with a wrong direction (SW 2 = 0)	Change the replacement direction (if possible) - The SW 1 is already set to Enable replace mode (1) - Select with the SW 2 to New Sensor (1) - Power Cycle the device - Move the SW 1 to Disable replace mode (0)
				Process errors		
	Pressure Overrange		F104.032	An overpressure has been detected	This effect could be produced by other equipment on the process, (valves…..). Exceeding the pressure range can cause reduced accuracy or mechanical damage to the diaphragm material and may require calibration/replacement.	The compatibility of pressure transmitter model and process conditions has to be checked. A different transmitter type could be required
	P-dP Out Of Limit		F102.004	The measured Process Pressure value is outside the sensor limits and no longer representing the true applied process value.	The measurement range has not been correctly calculated OR an incorrect transducer model has been selected.	The compatibility of pressure transmitter model and process conditions has to be checked. Probably a different transmitter type is required.
	Static Pressure Out Of Limit		F100.005	The measured Static pressure is above its operational limit	The static pressure of the process exceeds the limit of the sensor. Exceeding the Static Pressure can reduce accuracy, mechanically damage the diaphragm and may require calibration/replacement. An incorrect transducer model could have been selected.	The compatibility of pressure transmitter model and process conditions has to be checked. Probably a different transmitter type is required.
	Sensor Temperature Out Of Limit		S054.006	The measured sensor temperature is outside of its operational limits	The temperature of the process environment affects the pressure transmitter; Excess temperature can reduce accuracy, degrade device components and may require calibration/replacement.	The compatibility of pressure transmitter model and process conditions has to be checked. A different installation type could be required e.g. remote seals.
	Max. Working Pressure Exceeded		M052.031	The Static Pressure is higher than the acceptable mechanical limit for the process connection elements.	The static pressure of the process exceeds the MWP supported by the transmitter. Exceeding the MWP can mechanically damage the process connections (flanges, pipes….) and/or be dangerous	The compatibility of process connections and material with the process has to be checked. A different installation type could be required e.g. remote seals.

sym	Error		HMI code	Description	Possible Cause	Suggested Actions
	Primary Variable Out of Range		S050.010	Process value is outside its working range	The measured pressure value is beyond its Low or High scaling limits	Adjust the working range if possible.
	Static Pressure Out of Range		S048.011	Static Pressure is outside its working range	The Measured Static Pressure is beyond its Low or high scaling limits	Adjust the working range if possible.
	PILD Output	Both Impulse Lines Plugged	M018.038	PILD algorithm has detected both impulse lines plugged.	Both connections between the pressure sensor and the process are blocked either by plugging or closed valves.	Check valves and impulse line. Clean impulse line if necessary and initiate PILD training
		Impulse Line on High Side Plugged		PILD algorithm has detected a plugged impulse line on the HIGH side.	The connection between the pressure sensor and the process on the HIGH side is blocked either by plugging or closed valves.	
		Impulse Line on Low Side Plugged		PILD algorithm has detected a plugged impulse line on the LOW side.	The connection between the pressure sensor and the process on the LOW side is blocked either by plugging or closed valves	
		One Undefined impulse line plugged		PILD algorithm has detected one plugged impulse line.	One of the connections between the pressure sensor and the process is blocked either by plugging or closed valves.	
	PILD Changed Operating Conditions		M016.039	The pressure value currently detected is too different from what used for the PILD Training	Process conditions have changed to an extent that new settings for the PILD algorithm are needed.	A new Training is necessary for this new process condition

TROUBLE SHEET

WARRANTY REPAIR ☐ ☐ REPAIR ORDER

Rejection or discrepancy Reports *copy attached* ☐ *not available*

- **IDENTIFICATION**

Customer _____

Purchase order No _____

Plant _____

Name of person to contact _____

Instrument Tag No _____

Model _____

Serial Number _____

- **OPERATING CONDITIONS**

Specify location, environmental conditions, type of service and approximate number of opera date of installation if known

- **REASON FOR RETURN**

- **DANGEROUS FLUIDS**

In case of toxic or otherwise dangerous fluid, please attach the relevant Material Safety Data S

Trouble found during. Installation ☐ Commissioning ☐ Mainte
At start up ☐ On service ☐

Shipping information for the return of the equipment

Material returned for factory repair should be sent to the nearest ABB Service Center: transportation charges prepaid by

Please enclose this sheet duty completed to cover letter and packing list

RETURN REPORT – No.: _ _ _ _ _ _ _ _

***) Please always fill in. Otherwise the case will not be handled as return**

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (C.O.S.H.H.)

Decontamination declaration - EQUIPMENT RETURNED FOR REPAIR, CALIBRATION OR CREDIT

From _____

_____

_____

Description _____

Return authorization no. _____

Model number _____

Serial number _____

A)	*The above equipment has not been in contact with any material which is hazardous to health.*
B)	*The above equipment has been in contact with the material(s) noted below but that it has now been completely de-contaminated and is now safe to handle and dismantle without any special precautions. Material(s) which have been in contact with this equipment:*
C)	*If A) or B) are not applicable full instructions for the safe handling of this equipment **for disposal** must be supplied.*

***Please delete A), B) or C) above** as applicable, complete the signature section below, then send the completed declaration either with the returned items, or by fax for the attention of the Calibration & Repair Centre..*
Note – no action to examine or repair equipment will be undertaken until a valid COSHH declaration has been received, completed by an authorized officer of the end user company.

Signed _____

Name _____

Position _____

Date _____

ABB S.p.A
Industrial Automation
Via L. Vaccani 4, 22016 Tremezzina (CO) Italy
Tel. +39 0344 58 111

Note

Products and customer support

ABB's portfolio for valve automation:
– Continuous electrical actuators and pneumatic actuators
– Electro-pneumatic, pneumatic, and digital positioners
– I/P signal converters

ABB's pressure measurement:
– Absolute, gauge and differential pressure transmitters
– IEC 61508 SIL2/3 certified pressure transmitters and switches
– Multivariable transmitters
– Interface level/density transmitters
– Pressure measurement remote seals
– Pressure measurement accessories
– Pneumatic pressure transmitters

ABB's temperature measurement:
– Universal temperature sensors
– High-temperature sensors
– Temperature sensors for sanitary applications
– Mineral isolated temperature sensors
– Thermowells
– Temperature transmitters
– IEC 61508 SIL2/3 certified temperature sensors and transmitters

ABB's portfolio of recorders and controllers:
– Process controllers and indicators
– Videographic recorders
– Paper chart recorders
– Field mountable indicators and controllers

ABB's portfolio of level measurement:
– Magnetic level gauges
– Magnetostrictive and guided wave radar level transmitters
– Laser and scanner level transmitters
– Ultrasonic, capacitance and vibrating fork level transmitters and switches
– Rotating paddle and thermal dispersion level switches
– IEC 61508 SIL2/3 certified level transmitters

ABB's portfolio of device management:
– Fieldbus and wireless solutions
– Scalable asset & device management
– Asset vision software
– Mobility handhelds

Customer support
We provide a comprehensive after sales service via a Worldwide Service Organization.
Contact one of the following offices for details on your nearest Service and Repair Centre.

ABB S.p.A.
Via Vaccani, 4 Loc. Ossuccio
22016 Tremezzina (Co) – Italy
Tel: +39 0344 58111

ABB Automation Product GmbH
Schillerstrasse 72
D-32425 Minden – Germany
Tel: +49 551 905534
Fax: +49 551 905555

ABB Inc.
125 E. County Line Road
Warminster, PA 18974 – USA
Tel: +1 215 6746000
Fax: +1 215 6747183

ABB Inc.
3450 Harvester Road
Burlington, Ontario L7N 3W5 – Canada
Tel: +1 905 6810565
Fax: +1 905 6812810

ABB India Limited
Peenya Industrial Area, Peenya
Bangalore, Karnataka 560058 – India
Tel: +91 80 4206 9950
Fax: +91 80 2294 9389

ABB Engineering (Shanghai) Ltd.
No. 4528, Kangxin Highway, Pudong New District,
Shanghai 201319 - P.R. China
Tel: +86 21 6105 6666
Fax +86 21 6105 6677

Client Warranty
Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:
— A listing evidencing process operation and alarm logs at time of failure.
— Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

ABB Limited
Measurement & Analytics
Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK
Tel: +44 (0)870 600 6122
Fax: +44 (0)1480 213 339
Email: enquiries.mp.uk@gb.abb.com

ABB S.p.A.
Measurement & Analytics
Via Luigi Vaccani 4
22016 Tremezzina (CO)
Italy
Tel: +39 0344 58111

ABB Inc.
Measurement & Analytics
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

abb.com/pressure

3KXP000006R4201

OI/266/PB-EN Rev. F 06.2020