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 a continuous program of innovative design and development to incorporate the latest technology.
Index

1. Introduction ........................................................... 5
   1.1 Instruction manual structure ...................................... 5
   1.2 Models covered by this manual .................................. 5
   1.3 Product description ................................................... 5

2. Safety .................................................................... 6
   2.1 General safety information ......................................... 6
   2.2 Improper use ............................................................ 6
   2.3 Technical limit values ................................................. 6
   2.4 Warranty prevision .................................................... 6
   2.5 Use of instruction ...................................................... 6
   2.6 Operator liability ........................................................ 7
   2.7 Qualified personnel ................................................... 7
   2.8 Returning devices ..................................................... 7
   2.9 Disposal ................................................................... 7
   2.10 Information on WEEE Directive 2012/19/EU ............. 7
   2.11 Transport and storage ............................................. 7
   2.12 Safety information for electrical installation ............... 7
   2.13 Safety information for inspection and maintenance ... 7

3. Transmitter overview ............................................. 8
   3.1 Transmitter components overview .............................. 8
   3.2 Range & Span consideration ....................................... 9

4. Opening the box .................................................. 10
   4.1 Identification ........................................................... 10
   4.2 Optional wired-on SST plate (I1) .............................. 11
   4.3 Handling ................................................................. 11
   4.4 Storage .................................................................. 11

5. Mounting ............................................................. 12
   5.1 General ................................................................. 12
   5.2 IP protection & designation ........................................ 12
   5.3 Mounting the transmitter .......................................... 12
       5.3.1 Transmitter factory configuration consideration 12
       5.3.2 Hazardous area considerations ............................. 12
   5.4 Pressure Equipment Directive (PED) (97/23/CE)........... 13
       5.4.1 Devices with PS >200 ...................................... 13
       5.4.2 Devices with PS ≤200 bar .................................. 13
   5.5 Mounting a DP sensor transmitter ............................ 13
       5.5.1 Bracket mounting (optional) ................................ 14
       5.5.2 B2 Pipe and wall mounting bracket details ........... 17
       5.5.3 B5 Flat type bracket details ............................... 18
   5.6 Mounting a P style pressure transmitter ................... 19
       5.6.1 B6 and B7 Barrel housing bracket details .......... 21
       5.6.2 DIN Housing bracket details ............................. 22
   5.7 Transmitter housing rotation .................................... 23
       5.8 Integral display rotation and removal ................. 23
   5.9 Impulse piping connection for standard instruments ... 23
   5.10 Process connections considerations ...................... 24
       5.11 Kynar inserts connection ..................................... 24
   5.12 Screw torques for models with Kynar inserts .......... 24
   5.13 Installation recommendations ............................... 25
       5.13.1 Steam or clean liquids flow measurement ......... 25
       5.13.2 Gas or liquid flow measurement ...................... 25
       5.13.3 Level measurements on closed tanks (dry leg) ... 26
       5.13.4 Level measurement on closed tanks (wet leg) ... 26
       5.13.5 Liquid level measurement with open tanks ....... 26
       5.13.6 Pressure measurement of a tank ..................... 27
       5.13.7 Pressure measurement of a liquid in a pipe ....... 27
       5.13.8 Pressure measurement of vapor in a pipe ...... 28
       5.13.9 Pressure measurement of a gas in a pipe ...... 28

6. Device introduction ............................................. 29
   6.1 Fieldbus Foundation communication protocol .......... 29
   6.2 Feature overview ..................................................... 29
   6.3 Registration details ............................................... 29
   6.4 FF device structure ............................................... 29
   6.5 Device Application Process (DAP) ............................ 29
   6.6 Control Application Process (CAP) .......................... 29
## Contents

7. Transmitter wiring ................................................ 30
   7.1 Cable connection ............................................. 30
   7.2 FOUNDATION Fieldbus wiring ............................ 30
   7.3 Simple FF network and system architecture .......... 31
   7.4 Wiring procedure ............................................ 31
   7.5 Electrical connection via connectors .................... 31
   7.6 Grounding .................................................... 32
   7.7 Protective Grounding ....................................... 32
   7.8 Integrated lightning protection (optional) .......... 32

8. Electronics ........................................................... 33
   8.1 Fault protection .............................................. 33
   8.2 On board switches ............................................ 33
   8.3 Factory default configuration ............................ 33

9. Local pushbuttons ............................................... 34
   9.1 Installing/Removing the external pushbuttons ....... 34
   9.2 Operations .................................................... 34
      9.2.1 Wet Ranging operation – SW 3 = 1 .......... 35
      9.2.2 PV Scaling operation – SW 3 = 0 .......... 35

10. HMI local indicator ............................................ 36
    10.1 Conventional version (L1 option) ................. 36
    10.2 TTG (Trough The Glass) version (L5 option) .... 36
    10.3 Installing/Removing the LCD display .............. 36
    10.4 Operations ................................................ 36
    10.5 HMI as Variable Indicator ............................. 36
    10.6 LCD structure ............................................. 37
    10.7 LCD setting ................................................ 37
    10.8 HMI as Diagnostic Indicator .......................... 37
      10.8.1 Detailed diagnostic info from HMI .......... 38
    10.9 Activation procedure .................................... 38
    10.10 HMI as Feedback of the local push button .... 38
    10.11 HMI as configuration tool ......................... 38
    10.12 LCD (L1 option) Activation considerations ...... 38
    10.13 TTG (L5 option) Activation considerations .... 38
    10.14 Activation procedure for TTG (L5) and LCD (L1) .. 38
    10.15 HMI menu structure ................................... 39

11. Maintenance ........................................................ 45
    11.1 Returns and removal ..................................... 45
    11.2 Pressure transmitter sensor ........................... 45
    11.3 Removing/Installing the process flanges .......... 45
    11.4 Pressure transducer replacement .................. 46

12. Hazardous Area considerations ......................... 47
    12.1 Ex Safety aspects and IP Protection (Europe) ... 47
      12.1.1 Electrical parameters (entities) .......... 51
      12.2 Ex Safety Aspects (North America) .......... 51
      12.2.1 Applicable standards ............................ 51
      12.2.2 Classifications ................................... 51

Trouble Sheet ....................................................... 52

Return Report ...................................................... 53

EC Declaration of Conformity ................................. 54
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 4...20mA with HART 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 contractual 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.
2 Safety notes

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.

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

- LCD display with keypad (L1 option)
- TTG display with keypad (L5 option)
- Standard LCD display (L9 option)

Figure 2: Gauge / absolute pressure transmitter components

- LCD display with keypad (L1 option)
- TTG display with keypad (L5 option)
- Standard LCD display (L9 option)

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:

\[
\text{LRL} \leq \text{LRV} \leq (\text{URL} - \text{CAL SPAN})
\]

\[
\text{CAL SPAN} \geq \text{MIN SPAN}
\]

\[
\text{URV} \leq \text{URL}
\]
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.

Figure 3: Product identification

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.
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.

![Figure 4: 4-line layout of the optional wired-on Stainless Steel plate](image)

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.
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, accuracy, and calibration.

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, Ex eV, 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.

5.2 IP protection & designation
The housings for 266 transmitters are certified as conforming to protection type IP66 / IP67 (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).
- “7” means that housing is protected against water; specifically, powerful jets of water under standardized conditions.

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.

5.3 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 IIC T85 °C Da, II 1/2 D Ex ia IIC T85 °C Da; IP66, IP67.

  - IECEx (code E8) approval
  - Ex ia IIC T6...T4 Ga/Gb, Ex ia IIC 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 IIC 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 IIC T85 °C Db Ta = –50 °C to +75 °C; IP66, IP67.

- NEPSI China (code EZ)
  - Ex d IIC T6 Gb, Ex dA21 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 IIC T85 °C Dc; IP66, IP67.

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

- NEPSI China (code ES) type examination
  - Ex ic IIC T4–T6 Gc, Ex tA22 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 A, 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 A
  - Flameproof (Canada): Class I, Zone 1 Ex d IIC T4 Gb
  - Nonincendive: Class I, Division 2, Groups A, B, C, D...T4
  - Energy limited (US): Class I, Zone 2 A
  - Energy limited (Canada): Class I, Zone 2 Ex n c 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 A
  - Class I, Zone 0 Ex 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).
5.4 Pressure Equipment Directive (PED) (2014/68/EU)

5.4.1 Devices with PS > 200 bar

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

- **PRODUCT CODE**: ACCN
- **SPECIFICATION**: ACC
- **SENSE GASKET**: HN Rev.
- **FLANGE GASKET**: MD
- **POWER SUPPLY**: OUTPUT SIGNAL

![Figure 5: 266 nameplate with PED data](image)

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

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 (266DS/266MS/266PS/266DR/266PR/266MR)

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)](image)
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)
5 Mounting

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

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

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

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.

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Figure 17: Model 266H or 266N High overload resistant P-Style transmitter with 1/2-14 NPT male process connection and barrel housing installed on a 2"pipe with optional bracket (B1 carbon steel or B2 Stainless Steel 316L)

Figure 18: Model 266H or 266N High overload resistant P-Style transmitter with 1/2-14 NPT female process connection and barrel housing installed on a 2"pipe with optional bracket (B1 carbon steel or B2 Stainless Steel 316L)
Figure 20: 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)

Figure 19: Model 266H or 266N High overload resistant P-Style transmitter with sensor Z with barrel housing installed on a 2" pipe with optional bracket (B1 carbon steel or B2 Stainless Steel 316L)

Attention – Potential damage to transmitter. In case of an HART gauge pressure transmitter with 1050 bar/15000 psi sensor range (266HSH.Z or 266GSH.Z) and 1/4" NPT process connection, please always perform sensor low trimming to remove possible zero shift and prevent serious decrease of the total performance in terms of accuracy. Sensor low trim can be performed via LCD, DTM or handheld terminals.
5.6.1 B6 and B7 Barrel housing bracket details

Figure 21: Pipe and wall mounting bracket kits for P style transmitter with Barrel housing

1 – U-bolt
2 – U-bolt fixing washers and nuts
3 – Transmitter fixing bolts
4 – B1 or B2 bracket
5 – Fitting adapter

Figure 22: 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)
5.6.2 DIN Housing bracket details

1 – U-bolt
2 – U-bolt fixing bolt and washer
3 – Transmitter fixing bolts
4 – B2 bracket

Figure 23: Model 266G or 266A P-Style transmitter with DIN housing installed on a 2” pipe with optional bracket (B2 Stainless Steel 316L)

Figure 24: Pipe and wall mounting bracket kit (B2) 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 25: Housing rotation](image)

5.8 Integral display rotation and removal
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 26: Display rotation](image)

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 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.

![Figure 27: Grabbing area for display removal](image)
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 (2.13 in) 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 (2.01 in), 54mm
(2.13 in) or 57mm (2.24 in).

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.

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 266MS and 266RS
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.
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.

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.
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.

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.

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).
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 33: 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 34: 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 (+) 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 35: 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 36: Gauge or absolute pressure measurement of gas in a pipe
6. Device introduction

6.1 Fieldbus Foundation communication protocol
Foundation Fieldbus™ 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 FOUNDATION Fieldbus can be found from the Fieldbus Foundation organization website www.fieldbus.org, from the ABB website www.abb.com/fieldbus and/or from standards IEC 61158, IEC 61784, EN 50170/DIN 19245 and EN 50020 (FISCO model).

6.2 Feature overview
The 2600T-266 PdP Foundation Fieldbus is compliant to the communication Protocol FOUNDATION™ Fieldbus specification version 1.8. The 2600T-266 PdP FF is a Link Master Device implementing the following Blocks:
- 1 Enhanced Resource Block
- 2 Enhanced Analog Input Function Blocks
- 1 Standard Analog Input Function Block
- 1 Enhanced PID Function Block
- 1 Standard Arithmetic Function Block
- 1 Standard Integrator Function Block
- 1 Standard Input Selector Function Block
- 1 Standard Control Selector Function Block
- 1 Standard Signal Characterizer Function Block
- 1 Enhanced Pressure with Calibration Transducer Block
- 1 Custom HMI Transducer Block
- 1 Custom Advanced Diagnostic Transducer Block with “Plugged Input Line Detection” algorithm.

6.3 Registration details
All the Registration details are available from the Fieldbus Foundation webpage at the following link:
http://www.fieldbus.org/index.php?option=com_mtree&task=viewlink&link_id=1565&ffstatus=Registered&Itemid=324

6.4 FF device structure
The Foundation Fieldbus devices can be divided into two parts under the point of view of technical competence who must take care of its configuration and use.
- The Device Application Process (DAP) is device specific and stays with the device wherever it is used.
- The Control Application Process (CAP) is configured for the specific plant location and may be spread over multiple devices.

Communication between the DAP and CAP takes place using channels. Each I/O function block in the CAP has exclusive use of exactly one channel. A channel may be bi-directional and it may have multiple values.

6.5 Device Application Process (DAP)
The DAP is used primarily by the instrumentation technician or maintenance personnel for configuring I/O when the instrument is going to be installed in the plant and/or during maintenance operations and for this reason mainly focused on the Resource Block and Transducer Blocks of the device.

6.6 Control Application Process (CAP)
The CAP is used by the control engineer for configuring the plant control strategy and for this reason mainly focused on the Function Blocks of the device.

**Important.** For convenience, all the device parameters mentioned in this document are written with the prefix indicating the block into where they are mapped:
- RB_ = Resource Block
- PRTB_ = Pressure Transducer Block
- ADTB_ = Advanced Diagnostic Transducer Block
- HMI_ = HMI Transducer Block
- Alx_ = Analog Input Function Blocks where the x is the number of the Al (1, 2, 3)

**Important.** For all the complete details about the device parameters and their block mapping refer to the APPENDIX A of the addendum of this manual.

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Figure 35: Device function block application

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7. Transmitter wiring

**Warning - General risk.** 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 - General risk.** 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 - General risk.** 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.

### 7.1 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 Han 8D plug (8U) (PROFIBUS PA and FOUNDATION Fieldbus: 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 FOUNDATION Fieldbus wiring

The 2600T-266 PdP FF is a Bus Powered device with Fieldbus Foundation output. The two wires of the bus have to be connected as in the picture.

**Important.** The 266 PdP FF is not Polarity Sensitive

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Figure 36: 266 Tx with FOUNDATION Fieldbus terminal block
### 7.4 Wiring procedure

Follow these steps to wire the transmitter:

— 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.

— 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.

— 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.

— Run the cable through the cable gland and the open port.

— Connect the positive lead to the “+” terminal, and the negative lead to the “–” terminal.

— 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 vapors and gases.

— 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.

— 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).

### 7.5 Electrical connection via connectors

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.

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**Warning - General risk.** 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 “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.

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**Important.** The 7/8” PLUG model is considered the default version for the 266 PdP – FF version. The connector thread will be in accordance with the selected housing model. By default the housing thread is 1/2 - 14 NPT.
7 Transmitter wiring

The picture below shows the pin-out of the two different Fieldbus 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 Fieldbus Foundation website www.fieldbus.org and in the ABB website www.abb.com

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Range Value (LRV) (4 mA)</td>
<td>Zero</td>
</tr>
<tr>
<td>Upper Range Value (URV) (20 mA)</td>
<td>Upper Range Limit (URL)</td>
</tr>
<tr>
<td>Output transfer function</td>
<td>Linear</td>
</tr>
<tr>
<td>Damping</td>
<td>1 second</td>
</tr>
<tr>
<td>Transmitter failure (alarm)</td>
<td>Upscale (21.8 mA)</td>
</tr>
<tr>
<td>Optional LCD HMI scale</td>
<td>1 line PV and output signal bargraph</td>
</tr>
</tbody>
</table>

### 7.6 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.

### 7.7 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.

### 7.8 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 of 4 mm² (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.

Warning - General risk. 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.

Warning - General risk. 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.

Important. Test voltage withstand capability can no longer be ensured when this protective circuit is used.
8. 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 4 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 Mode - details
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.

SW 4 – Simulation Mode
This switch in UP position (1) enables the Standard Simulation feature mandatory for FF devices.

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 Mode - 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.

SW 4 – Simulation Mode on OFF position (0). The Simulation mode is disabled. It can be performed only when the hardware dip-switch is aligned to the same software functionality.

Figure 41: FOUNDATION Fieldbus communication board
9. Local pushbuttons

Three push buttons Zero (Z), Span (S) and Write Protection (small Lock icon) are located under the identification nameplate, as shown by the figure.

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

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

Figure 42: Pushbutton

Warning - Potential damage to parts. Operating the control buttons with a magnetic screwdriver is not permitted.

9.1 Installing/Removing the external pushbuttons

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

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

9.2 Operations

The Z and S buttons are enabled by default but can be disabled with the RB_LOCAL_OPERATIONS parameter.

The Hardware Write Protection button (small Lock icon) works only if the RB_FEATURE_SEL.HW Write Lock Supported is set.

Write protection prevents the configuration data from being overwritten by unauthorized users. If write protection is enabled, the Z and S buttons are disabled.

However, it is still possible to read out the configuration data using graphical user interface or communication tools (DD or DTM based).

The control unit may be leaded if required.

Write protection is activated as follows (also refer to the symbols on the plate):
— First, use a suitable screwdriver to press the switch down.
— Then turn the switch clockwise by 90°.

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

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 (Zero) button 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 PR_TB_PRIMARY_VALUE_RANGE_0%.

The PR_TB_PRIMARY_VALUE_RANGE_100% is shifted in order to keep the same SPAN.

Before:
- Span = (PR_TB PRIMARY VALUE RANGE 100% - PR_TB PRIMARY VALUE RANGE 0%)

After:
- PR_TB PRIMARY VALUE RANGE 0% = PR_TB primary_value
- PR_TB PRIMARY VALUE RANGE 100% = SPAN + PR_TB PRIMARY VALUE RANGE 0%

The S button performs the ‘Upper Range Setting’ operation and sets as 100% of the calibration scale the actual measured pressure value. After the ‘S’ button is kept pushed for more than 2 seconds, when released, the pressure value measured in input is written in the PR_TB PRIMARY VALUE RANGE 100%. The SPAN changes as consequence.

- PR_TB PRIMARY VALUE RANGE 100% = PR_TB primary_value

9.2.2 PV Scaling operation – SW 3 = 0
The Z button performs the ‘ZERO elevation/suppression’ operation. After the ‘Z’ button is kept pushed for more than 2 seconds, when released, the PR_TB PRIMARY VALUE is zeroed.

The zeroing is achieved by an internal writing of 0.0 in the PR_TB DESIRED PRIMARY VALUE. The difference between PR_TB DESIRED PRIMARY VALUE and the PR_TB_CAL_VALUE is written in the PR_TB_BIAS_VALUE.

- PR_TB_BIAS_VALUE = (PR_TB_CAL_VALUE - PR_TB DESIRED PRIMARY VALUE)

The PR_TB_BIAS_VALUE (positive or negative) is added in the calculation algorithm at the PR_TB_CAL_VALUE for the production of the PR_TB PRIMARY VALUE.

- PR_TB PRIMARY VALUE = (PR_TB_CAL_VALUE + PR_TB_BIAS_VALUE)

The S button (3) performs the ‘Reset ZERO elevation/suppression’ operation. After the ‘S’ button is kept pushed for more than 1 second, when released, the PR_TB_BIAS_VALUE is reset to Zero eliminating in this way any effect of elevation or suppression for the PR_TB PRIMARY VALUE that, after this operation, returns to produce again the same value of the PR_TB_CAL_VALUE.

- PR_TB_BIAS_VALUE = 0.0
- PR_TB_PRIMARY_VALUE = PR_TB_CAL_VALUE

**Important.** Should you need more details about the above mentioned FF commands, please refer to the addendum of this manual, downloadable from ABB website www.abb.com/pressure.
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:

10.1 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.

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

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 become usable.

10.3 Installing/Removing the LCD display

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

— 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. If necessary, refer to the section “Securing the housing cover in flameproof areas”.

10.4 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

10.5 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 PRTB and in the several Function Blocks. The HMI can be set to four different operating Modes:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One line</td>
<td>Only one variable with its unit code is displayed</td>
</tr>
<tr>
<td>One line and bar-graph</td>
<td>One variable with its unit code is displayed and another variable can be selected to be displayed in percentage by the bar-graph</td>
</tr>
<tr>
<td>Two lines</td>
<td>Two variables with unit code are displayed together (one for each line)</td>
</tr>
<tr>
<td>Two lines and bar-graph</td>
<td>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</td>
</tr>
</tbody>
</table>

The Mode selection can be done through the remote setting of the HMI_MODE parameter or locally from the HMI menu “Display/Settings/Mode”.
10.6 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 within the HMITB table, see “APPENDIX A – Device Data Blocks”.

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

1 Tag | 2 Node address | 3 Variable identification | 4 Line 1 | 5 Line 2 | 6 Bar-graph

Figure 47: Display layout

10.7 LCD setting

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

— Locally using the optional LCD keypad from the menu “Display/settings/…” see APPENDIX B for further information.

— From remote station via Fieldbus 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.

10.8 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.

<table>
<thead>
<tr>
<th>NAMUR icons</th>
<th>Description</th>
<th>Source of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>Error / Failure</td>
<td>ELECTRONICS</td>
</tr>
<tr>
<td>♂</td>
<td>Functional check (e.g. during simulation)</td>
<td>SENSOR</td>
</tr>
<tr>
<td>?</td>
<td>Out of Spec (e.g. Sensor temperature outside the specs limits)</td>
<td>PROCESS</td>
</tr>
<tr>
<td>⚠</td>
<td>Maintenance required</td>
<td>CONFIGURATION</td>
</tr>
</tbody>
</table>

Example of “Maintenance / Sensor” and “Failure / Electronics” diagnostic

Figure 48: Diagnostic messages
10.8.1 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.

10.9 Activation procedure
— 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.

— Press the key (2)
— The HMI enter in the special menu with three items:
  Diagnostics
  Operator View 1
  Signals View
— 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:

<table>
<thead>
<tr>
<th>X = NAMUR NE107 Categories</th>
<th>A = Priority. (Higher number = higher priority)</th>
<th>BBB = error code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F = Failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O = Out of Specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = Function Check</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Important. The list and details of the possible HMI error code are described in the Appendix A – Device Data Block (Diagnostic, Block_err and Status Byte).

10.10 HMI as Feedback of the local push button operations
As consequence of the operations described in the apposite section, 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):

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>! Oper Done</td>
<td>The push button operation has been successfully executed</td>
</tr>
<tr>
<td>! Proc Too Low</td>
<td>The Pressure measured in input is too low and not acceptable for the requested operation</td>
</tr>
<tr>
<td>! Proc Too High</td>
<td>The Pressure measured in input is too high and not acceptable for the requested operation</td>
</tr>
<tr>
<td>! New URV Error</td>
<td>The Zero (Z) operation cannot be accepted because the URV would be shifted outside the Upper Sensor limit</td>
</tr>
<tr>
<td>! New Span Error</td>
<td>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</td>
</tr>
<tr>
<td>! Oper Disabled</td>
<td>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</td>
</tr>
</tbody>
</table>

10.11 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.

For details see APPENDIX B - HMI menu Structure

10.12 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 instructions below.

10.13 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.

10.14 Activation procedure for TTG (L5) and LCD (L1)
— Press the (2) and (3) keys together for 3 seconds until a special symbol appears in the low left corner of the display
— Press the (4) key
— The HMI enter in the configuration menus:

Figure 49: Display keypad
10 HMI local indicator

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

— The menu/submenu name is displayed above in the LCD display.
— The number/line of the currently selected menu item is displayed in the upper right of the LCD display.
— 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.
— 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.
— 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.

<table>
<thead>
<tr>
<th>Button (1) functionalities</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit</td>
<td>Exit menu</td>
</tr>
<tr>
<td>Back</td>
<td>Back one submenu</td>
</tr>
<tr>
<td>Cancel</td>
<td>Exit without saving the selected parameter value</td>
</tr>
<tr>
<td>Next</td>
<td>Select next position for entering numerical values or letters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Button (4) functionalities</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>Select submenu/parameter</td>
</tr>
<tr>
<td>Edit</td>
<td>Edit parameter</td>
</tr>
<tr>
<td>Ok</td>
<td>Save selected parameter and display stored parameter value</td>
</tr>
</tbody>
</table>

10.15 HMI menu structure

The HMI menu is divided in the following sections which can be selected by scrolling them acting on the central buttons (2) or (3), once on the display the desired sub-menu icon will be visualized, confirm your selection with the [Select] button.

Follow the instruction on the screen to perform the configuration of the different parameters.

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 under this structured menu.
11. 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.

**Warning – Potential damage to parts.** 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).

**Attention – <Bodily injury>.** 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.

### 11.1 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 – General risks.** 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.

### 11.2 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 at the end of this manual and include it with the device.

#### Figure 50: DP and P style pressure transmitter construction

11.3 Removing/Installing the process flanges

- 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).
- Carefully remove the process flange, making sure that the isolating diaphragms are not damaged in the process.
- Use a soft brush and a suitable solvent to clean the isolating diaphragms and - if necessary - the process flange.
- Insert the new process flange O-rings in the process flange.
- 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).

- 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.
- Lubricate the screw thread and seats of the screw connection.
- While performing the preliminary and final tightening of the bolts, please act in a crosswise manner.
– Respect the below table indications for reinstalling the process flanges.

<table>
<thead>
<tr>
<th>Transmitter model and range</th>
<th>Viton Gaskets</th>
<th>PTFE Gaskets</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>266DSH / PSH / VSH</td>
<td>Carbon Steel NACE and Stainless Steel</td>
<td>All bolting</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel NACE</td>
<td>All bolting</td>
<td>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.</td>
</tr>
<tr>
<td>266DSH.x.H (High static option)</td>
<td>Viton Gaskets</td>
<td>All bolting</td>
<td>Use a torque wrench to tighten the bolts to a torque of 31 Nm.</td>
</tr>
<tr>
<td></td>
<td>PTFE Gaskets</td>
<td>All bolting</td>
<td>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.</td>
</tr>
<tr>
<td>266DSH range A (1KPa)</td>
<td>All gaskets</td>
<td>All bolting</td>
<td>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.</td>
</tr>
<tr>
<td>266DSH / 266PSH with Kynar inserts</td>
<td>All gaskets</td>
<td>All bolting</td>
<td>Use a torque wrench to tighten the process flange screws/nuts to a torque of 15 Nm</td>
</tr>
<tr>
<td>266MSx / 266RSx</td>
<td>All gaskets</td>
<td>All bolting</td>
<td>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.</td>
</tr>
</tbody>
</table>

11.4 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 loosening 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”.


12. Hazardous Area considerations

12.1 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.

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.

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

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

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

Application with Gas

Application with Dust

Zone 0

266 Tx Category 1 G Ex ia

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

Zone 20

266 Tx Category 1 DIP6x 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]
### 12 Hazardous area considerations

**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.

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

<table>
<thead>
<tr>
<th>Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone “0”</td>
</tr>
<tr>
<td>Zone “1”</td>
</tr>
<tr>
<td>Primary transducer</td>
</tr>
<tr>
<td>Dangerous medium (process)</td>
</tr>
</tbody>
</table>

| 266 Tx Category 1/2 G Ex ia |

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

**Application with Dust**

<table>
<thead>
<tr>
<th>Silo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone “20”</td>
</tr>
<tr>
<td>Zone “21”</td>
</tr>
<tr>
<td>Primary transducer</td>
</tr>
<tr>
<td>Dangerous medium (process)</td>
</tr>
</tbody>
</table>

| 266 Tx Category 1/2 D 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].
12 Hazardous area considerations

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.

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

**Application with Gas**

![Diagram of pressure transmitter installation in a tank and silo.](image)

- **Zone “0”**
  - Dangerous medium (process)
  - Tank

- **Zone “1”**
  - Primary transducer
  - 266 Tx Category 1/2 G Ex db
  - Zone “0” / Zone “1” separation element

**Application with Dust**

- **Zone “20”**
  - Dangerous medium (process)

- **Zone “21”**
  - 266 Tx Category 1/2 D Ex tb

### 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 IIIC 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)

Certificate IECEx Ex ic IIIC 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”
- II: Group for surface areas
- G: Gas (dangerous media)
- D: Dust (dangerous media)
- 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.

**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.

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

**Application with Gas**

<table>
<thead>
<tr>
<th>Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>266 Tx Category 3 G Ex ic</td>
</tr>
</tbody>
</table>

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

**Application with Dust**

<table>
<thead>
<tr>
<th>Zone 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>266 Tx Category 3 D IP6x Ex tc</td>
</tr>
</tbody>
</table>

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 permanently 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.
## 12.1 Electrical parameters (entities)

<table>
<thead>
<tr>
<th>FF Version with or without LCD option</th>
<th>Temperature</th>
<th>Temperature</th>
<th>Minimum</th>
<th>Maximum amb. °C</th>
<th>Maximum amb. °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class - Gas</td>
<td>Class - Dust</td>
<td>amb. °C</td>
<td>option L1</td>
<td>option L5</td>
</tr>
<tr>
<td>T4</td>
<td>1135°C</td>
<td>-50°C</td>
<td>+8°C</td>
<td>+60°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>1100°C</td>
<td>-50°C</td>
<td>+4°C</td>
<td>+56°C</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>1085°C</td>
<td>-50°C</td>
<td>+4°C</td>
<td>+44°C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FISCO Version with or without LCD option</th>
<th>Temperature</th>
<th>Temperature</th>
<th>Minimum</th>
<th>Maximum amb. °C</th>
<th>Maximum amb. °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class - Gas</td>
<td>Class - Dust</td>
<td>amb. °C</td>
<td>option L1</td>
<td>option L5</td>
</tr>
<tr>
<td>T4</td>
<td>1135°C</td>
<td>-50°C</td>
<td>+8°C</td>
<td>+60°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>1100°C</td>
<td>-50°C</td>
<td>+4°C</td>
<td>+56°C</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>1085°C</td>
<td>-50°C</td>
<td>+4°C</td>
<td>+44°C</td>
<td></td>
</tr>
</tbody>
</table>

## 12.2 Ex Safety aspects and IP Protection (North America)

### 12.2.1 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)

### 12.2.2 Classifications

The 2600T Series pressure transmitter 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.
- NonIncendive (US): Class I, Zone 2 AEx nC IIC T6...T4, in accordance with Nonincendive field wiring requirements for hazardous (classified) locations.
- NonIncendive (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) in accordance with Entity requirements for hazardous (classified) locations.
- Intrinsically Safe (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.
TROUBLE SHEET

WARRANTY REPAIR □  REPAIR ORDER □

Rejection or discrepancy Reports

- 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 operating hours or 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 Sheet

Trouble found during.

Installation

Commissioning

Maintenance

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 the Purchaser

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

Date __________________ Signature __________________ Originator __________________
<table>
<thead>
<tr>
<th>Decontamination declaration - EQUIPMENT RETURNED FOR REPAIR, CALIBRATION OR CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>From: ____________________________</td>
</tr>
<tr>
<td>Description: ____________________</td>
</tr>
<tr>
<td>Return authorization no.: _______________</td>
</tr>
<tr>
<td>Model number: ____________________</td>
</tr>
<tr>
<td>Serial number: ____________________</td>
</tr>
</tbody>
</table>

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: ____________________________