Operating Instruction
IM/265D/V-EN-04

Differential Pressure Transmitter 265Dx, 265VS

Models 265DS, 265DC, 265DR
Model 265VS

ABB

Differential Pressure Transmitter
265Dx, 265VS

Operating Instruction

IM/265D/V-EN-04

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Translation of the original instruction

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1 Safety

1.1 General information and notes for the reader

You must read these instructions carefully prior to installing and commissioning the device.

These instructions are an important part of the product and must be kept for future reference.

These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.

For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.

This product is built based on state-of-the-art technology and is operationally safe. It has been tested and left the factory in perfect working order from a safety perspective. The information in the manual must be observed and followed in order to maintain this state throughout the period of operation.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Only by observing all of the safety instructions and all safety/warning symbols in these instructions can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured.

Information and symbols directly on the product must be observed. They may not be removed and must be fully legible at all times.

1.2 Intended use

Measuring tasks

Type 265Dx:	Differential pressure, flowrate, or level of gases, vapors, and liquids
Type 265VS:	Absolute pressure of gases, vapors, and liquids

Measuring ranges

Type 265Dx:	10 mbar to 100 bar (staggered), for nominal pressure ratings PN 6 (sensor code A only), PN 160, PN 250, or PN 410
Type 265VS:	400 mbar abs to 20 bar abs (staggered), for nominal pressure ratings PN 160, PN 250, or PN 410

The transmitters can be overloaded on one side.

Using these products as intended involves observing the following points:

- Read and follow the instructions in this manual.
- Observe the technical ratings (refer to the section "Technical data").

1.3 Technical limit values

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

The following technical limit values must be observed:

- The permitted pressure may not be exceeded.
- The maximum operating temperature may not be exceeded.
- The permitted operating temperature may not be exceeded.
- The housing protection type must be observed.

1.4 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, etc.
- Adding material, e.g., by painting over the name plate or welding/soldering on parts
- Removing material, e.g., by drilling the housing.

1.5 Target groups and qualifications

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

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 Automation Products GmbH 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 regards to installation, function tests, repairs, and maintenance of electrical products.

1.6 Warranty provisions

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

1.7 Plates and symbols

1.7.1 Safety-/ warning symbols, note symbols

DANGER – <Serious damage to health / risk to life>
This symbol in conjunction with the signal word "Danger" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

DANGER – <Serious damage to health / risk to life>
This symbol in conjunction with the signal word "Danger" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – <Bodily injury>
This symbol in conjunction with the signal word “Warning“ indicates a possibly dangerous situation. Failure to observe this safety information may result in death or severe injury.

WARNING – <Bodily injury>
This symbol in conjunction with the signal word "Warning" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.

CAUTION – <Minor injury>
This symbol in conjunction with the signal word “Caution“ indicates a possibly dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This may also be used for property damage warnings.

NOTICE – <Property damage>!
The symbol indicates a potentially damaging situation.

Failure to observe this safety information may result in damage to or destruction of the product and/or other system components.

IMPORTANT (NOTE)
This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. It does not indicate a dangerous or damaging situation.

1.8 Name plate

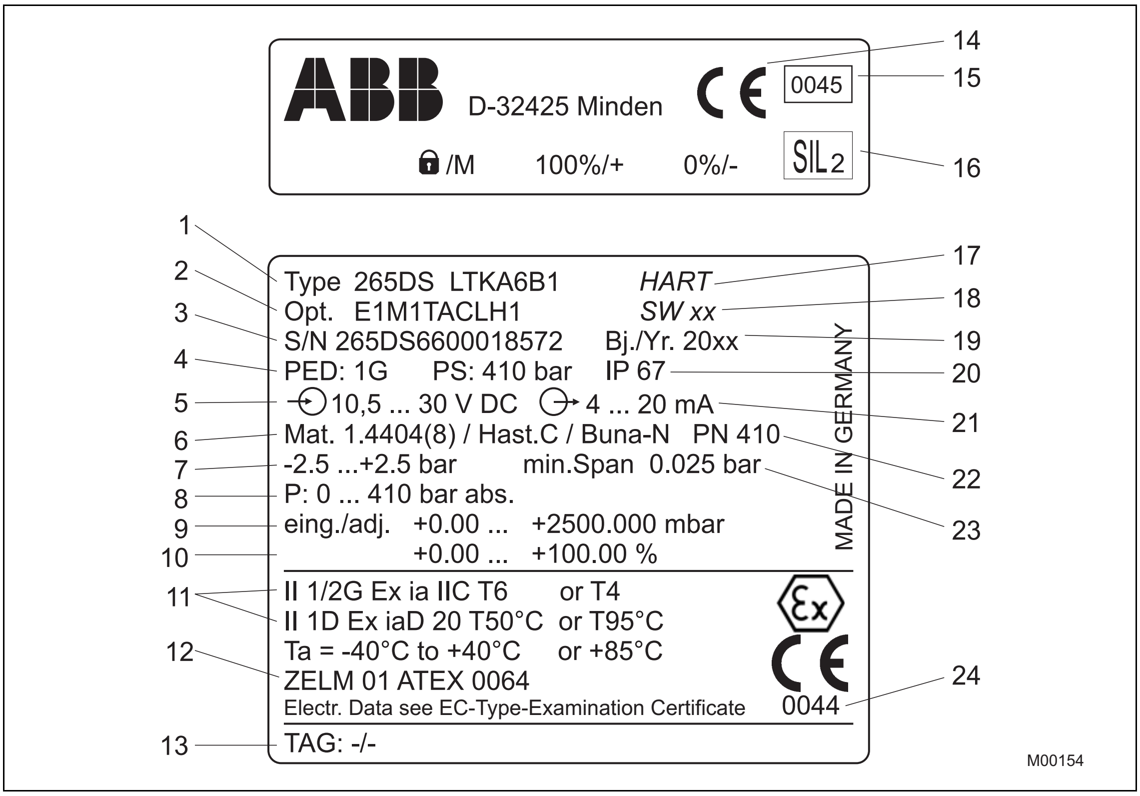

Fig. 1: Example: Name plate for 265Dx transmitter

1 Device type / order code (for information on the individual letters/numbers, refer to the information on the order confirmation or device data sheet)
2 Options – additional information on the order code
3 Device serial number (factory no.)
4 Identification code with reference to the Pressure Equipment Directive (SEP or 1G). See the section "Compliance with the Pressure Equipment Directive (97/23/EC)".
5 Supply power
6 Parts that come into contact with medium
7 Lower to upper range limit (LRL to URL)
8 Static pressure sensor range
9 Set span
10 HART output (process variable)
11 Ex design designation (optional)
12 No. of EC-type-examination certificate
13 Tag (max. 32 characters)
14 EC conformity mark
15 Identification number of the notified body with reference to the Pressure Equipment Directive. See the section "Compliance with the Pressure Equipment Directive (97/23/EC)".
16 "SIL2" identification code (optional)
17 Device communication type
18 Software version
19 Year of manufacture
20 Protection type
21 Output signal
22 Permissible pressure (static)
23 Minimum span
24 Identification number of the notified body with reference to ATEX certification (optional)

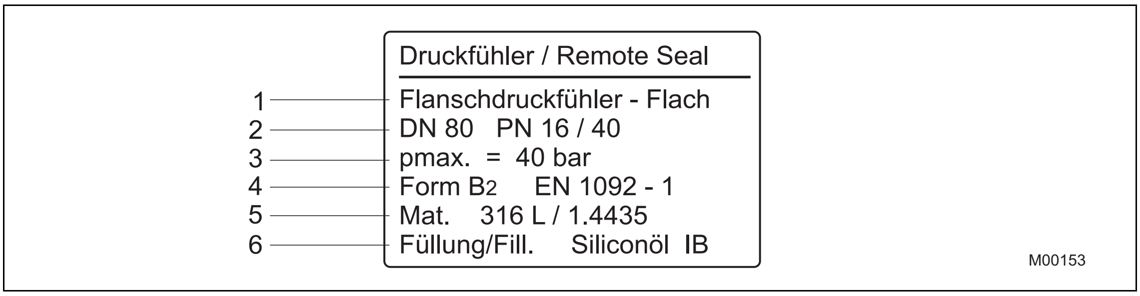

Fig. 2: Example: Additional name plate for devices with direct mount remote seals (optional)

1 Remote seal type
2 Meter size and nominal pressure
3 Max. working pressure
4 Sealing surface form
5 Materials that come into contact with medium
6 Filling liquid in the remote seal system; ID letters for filling liquid

1.8.1 Compliance with Pressure Equipment Directive (97/23/EC)

Devices with PS > 200 bar (20 MPa)

Devices with a permissible pressure of PS > 200 bar (20 MPa) have been tested for conformity by the Technical Supervisory Association TÜV NORD (0045) in accordance with module H and can be used for fluids of group 1 (PED: 1G).

The name plate bears the following identification codes:

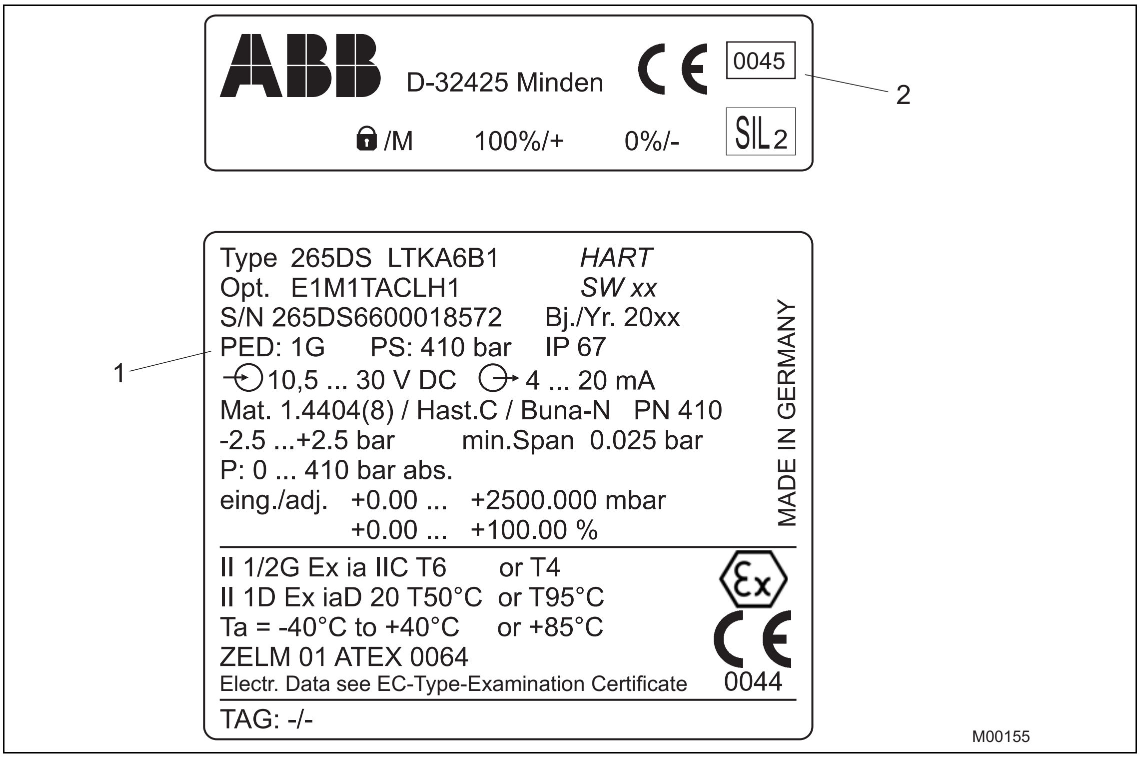

Fig. 3

1 PED: 1G

2 CE 0045: Identification number of the notified body with reference to the Pressure Equipment Directive (for PS > 20 MPa only)

Devices with PS ≤ 200 bar (20 MPa)

Devices with a permissible pressure of PS ≤ 200 bar (20 MPa) conform to Sec. 3 Para. (3) and have not been tested for conformity. The devices have been constructed and manufactured according to sound engineering practice (SEP).

The CE marking on the device does not refer to the Pressure Equipment Directive.

The name plate thus bears the identification code PED: SEP.

1.9 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 in the order confirmation from the supplier still apply.

1.10 Safety instructions for electrical installation

The electrical connection may only be made by authorized specialist personnel according to the electrical plans.

The electrical connection information in the manual must be observed; otherwise, the electrical protection type may be adversely affected.

Ground the measurement system according to requirements.

1.11 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 supply power must be switched off before opening the housing cover.

WARNING – Risk to persons

The device can be operated at high pressure and with aggressive media. Any medium that squirts out can cause severe injuries.
Depressurize the pipeline / tank before opening the transmitter connection.

Corrective maintenance work may only be performed by trained personnel.

- Before removing the device, depressurize it and any adjacent lines or containers.
- Check whether hazardous materials have been used as materials to be measured before opening the device. Residual amounts of hazardous material 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
  - Leaktightness
  - Wear (corrosion)

1.12 Returning devices

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

According to EC guidelines for hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

All devices delivered to ABB Automation Products GmbH must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 2 for nearest service location.

1.13 Integrated management system

ABB Automation Products GmbH operates an integrated management system, consisting of:

- Quality management system to ISO 9001:2008
- Environmental management system to ISO 14001:2004
- Occupational health and safety management system to BS OHSAS 18001:2007 and
- Data and information protection management system

Environmental awareness is an important part of our company policy.

Our products and solutions are intended to have a minimal impact on the environment and on people during manufacturing, storage, transport, use, and disposal.

This includes the environmentally-friendly use of natural resources. We conducts an open dialog with the public through our publications.

1.14 Disposal

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

1.14.1 Information on WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product is not subject to WEEE Directive 2002/96/EC or relevant national laws (e.g., ElektroG in Germany).

The product must be disposed of at a specialist recycling facility. Do not use municipal garbage collection points. According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage facilities. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.

If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

1.14.2 RoHS Directive 2002/95/EC

With the Electrical and Electronic Equipment Act (ElektroG) in Germany, the European Directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS) are translated into national law. ElektroG defines the products that are subject to regulated collection and disposal or reuse in the event of disposal or at the end of their service life. ElektroG also prohibits the marketing of electrical and electronic equipment that contains certain amounts of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) (also known as hazardous substances with restricted uses).

The products provided by ABB Automation Products GmbH do not fall within the current scope of the directive on waste from electrical and electronic equipment according to ElektroG. If the necessary components are available on the market at the right time, in the future these substances will no longer be used in new product development.

2 Use in potentially explosive atmospheres

According to Directive 94/9/EC (ATEX):

When installing explosion-proof transmitters (electrical connection, grounding / equipotential bonding, etc.), national regulations, DIN / VDE standards, explosion protection directives, and the Ex test certificate of the device must be observed. The certified explosion-proof designation for the transmitter is provided on the name plate.

2.1 Type-examination certificate/Declaration of conformity

For explosion-proof transmitter models, the EC-type-examination certificate or declaration of conformity forms an integral part of these operating instructions.

2.2 Type of protection "intrinsic safety Ex i"

- Only intrinsically safe devices may be installed in the transmitter signal circuit. The signal circuit can be interrupted while the transmitter is in operation (e.g., clamping/unclamping signal lines).
- The housing may be opened during operation.
- Transmitters with and without remote seals and featuring type of protection "intrinsic safety Ex i" may be directly integrated into the partition separating Zone 0 and Zone 1 (sensor diaphragm in Zone 0, transmitter in Zone1), provided that the power is supplied via an intrinsically safe circuit (Ex ia or Ex ib).
- Test circuit (terminals "TEST +/-"): With type of protection "intrinsic safety", connections should only be established to passive, intrinsically safe circuits. The category, explosion group, and maximum values for U_o, I_o, and P_o of the intrinsically safe test circuit can be determined on the basis of the intrinsically safe signal circuit connected.

IMPORTANT (NOTE)
Please observe the rules governing interconnection.

2.3 Use in areas with combustible dust

Installation must be performed in accordance with EN 61241-14:2004.

- Transmitters can only be connected using cable glands certified in accordance with Directive 94/9/EC (ATEX) (not included in scope of delivery). The cable gland must conform to IP 67 degree of protection. The smoldering temperature of the dust must be at least 75 K above the max. surface temperature of the transmitter. The max. surface temperature is 95 °C and is obtained by adding together the max. ambient temperature (85 °C) and max. self-heating (10 K).

CAUTION - Risk
When using separating sensors with an anti-stick coating, be aware of the risk of electrostatic discharge (with consideration given to the medium and transport speed).

2.4 Category 3 for use in "Zone 2"

- The transmitter must be connected using a certified cable gland (not included in scope of delivery). The cable gland must satisfy the requirements of type of protection "increased safety Ex e" in accordance with Directive 94/9/EC (ATEX). Additionally, the conditions stipulated in the type-examination certificate for the cable gland must be observed.

WARNING - Risk of explosion!
Opening the cover presents a risk of spark formation and, therefore, explosion.

Opening the housing during operation (with the operating voltage switched on) is not permitted.

2.5 Type of protection "flameproof enclosure Ex d"

Please observe the following installation information:

- The transmitter must be connected using suitable cable and wire entries or pipeline systems, which satisfy the requirements of EN 60079-1:2007, Section 13.1 or 13.2, and for which a separate examination certificate exists.
- Openings in the housing that are not being used must be closed in accordance with EN 60079-1:2007, Section 11.9.
- Cable and wire entries, as well as plugs, which do not comply with the points stipulated above may not be used.

To align the transmitter at the measuring point (by turning by a maximum of 360°), the rotatable housing may be loosened on the shaft between the measuring equipment and housing:

1. Loosen the locking screw by a maximum of 1 rotation.
2. Align the housing.
3. Retighten the locking screw.

Before switching on the operating voltage:

1. Close the housing.
2. Secure the housing cover by turning the locking screws (hex-head socket screws) counterclockwise.
3. Secure the housing against rotating by turning the locking screw clockwise.
4. The housing cover, electronics housing, and measuring equipment may only be replaced with components that have been approved for this purpose.

CAUTION - Risk
Opening the housing during operation (with the operating voltage switched on) is not permitted.

2.6 Type of protection "intrinsic safety i", "flameproof enclosure d", "protection by enclosure tD", and "non-sparking nA"

Certificate with alternative types of protection:

A	Intrinsic safety	(Category 1/2G or 1D, Ex i)
B	Flameproof enclosure	(Category 1/2G, Ex d)
	Protection by enclosure	(Category 2D, Ex tD)
	Non-sparking	(Category 3G, Ex nA)

IMPORTANT (NOTE)

Prior to final installation, the operator must decide whether the device is to be used

(A) as a device featuring type of protection "Ex ia" or "Ex iaD" (intrinsic safety) or

(B) as a device featuring any of the other types of protection ("Ex d", "Ex tD", "Ex nA"). The operator must then permanently mark the selected type of usage in the appropriate box on the name plate.

Once selected, the type of protection may not be changed.

The information provided previously on the selected type of protection must be observed.

CAUTION - Risk

Failure to observe this information will have an adverse effect on explosion protection.

2.7 Canadian Standards Association (CSA): "Explosion-proof"

CAUTION - Potential damage to parts

Transmitters with LCD displays must not be used in etherized atmospheres.

2.8 Aspects of "Ex safety" and "IP protection" for Australian applications

TestSafe certificate number
ANZEx 06.3056

Ingress protection
Ex d IIC T6 IP 66 / IP 67
Ex tD A21 IP 66 / IP 67 T85 deg C
T_{amb} = -20 ... 75 °C (-4 ... 167 °F)

Symbol	Meaning
Ex d	Flameproof enclosure (gas)
IIC	Gas group
T6	Transmitter temperature class (corresponds to max. 85 °C (185 °F) at an ambient temperature T_{amb} of 75 °C (167 °F).
Ex tD	Dust (dangerous medium)
A21	Suitable for "Zone 21"
IP 66 / IP 67	Protection type
T85 deg C	Maximum surface temperature of the transmitter at an ambient temperature T_{amb} of 75 °C (167 °F), for dust layers of up to 5 mm (0.20 inch) in thickness.

The transmitters have been certified in accordance with the following standards:

IEC 60079-0:2004 AS/NZS 60079.0:2005	Electrical apparatus for explosive gas atmospheres. Part 0: General requirements
IEC 60079-1:2003 AS/NZS 60079.1:2005	Electrical apparatus for explosive gas atmospheres. Part 1: Flameproof enclosure "d"
IEC 61241-0:2004 AS/NZS 61241.0:2005	Electrical apparatus for use in the presence of combustible dust. Part 0: General requirements
IEC 61241-1:2004 AS/NZS 61241.1:2005	Electrical apparatus for use in the presence of combustible dust. Part 1: Protection by enclosure "tD"

Notes

- Opening the housing during operation (i.e., while the operating voltage is switched on) is not permitted.
- The transmitter must be connected using a suitable cable, cable glands, or pipeline systems, which satisfy the requirements of the standards listed above and for which a separate test certificate is available.

CAUTION - Risk
Only use cables and cable glands that are approved for temperatures of 80 °C (176 °F).

- Openings in the housing that are not being used must be closed in accordance with the standards listed above.
- Before switching on the operating voltage:
  - The housing must be closed.
  - Secure the housing cover by turning the locking screws (hex-head socket screws) counterclockwise.
  - Secure the housing against rotating by turning the locking screw clockwise.
- The housing cover, electronics housing, and measuring equipment may only be replaced with components that have been approved for this purpose.

3 Design and function

The 265Dx and 265VS digital transmitters are communication-ready field devices featuring microprocessor-controlled electronics with multisensor technology.

For bidirectional communication, the devices have an FSK signal superimposed on the 4 … 20 mA output signal (depending on their design) in accordance with the HART protocol; in the case of devices that operate on a fully digital basis, communication takes place via the PROFIBUS PA or FOUNDATION Fieldbus protocols, depending on their design.

The graphical user interface (DTM) can be used to configure, poll, and test the transmitter using a PC, depending on the relevant protocol. Communication using a handheld terminal [1)] is also possible, provided that the devices operate in accordance with the HART protocol.

A control unit, consisting of two buttons for setting the "lower range limit value" and "upper range limit value" parameters and a write protection switch, is available for "local" operation.

IMPORTANT (NOTE)

It is not possible to activate the write protection function via the control unit with the FOUNDATION Fieldbus communication type.

The "local control unit" can be used in conjunction with a built-in LCD display for external configuration and parameterization of the transmitter, regardless of the selected communication protocol.

As standard, the electronics housing features a finish that is resistant to aggressive atmospheres. The process connection is made from stainless steel; another standard feature. The housing cover and button unit may be leaded.

The name plate contains information about the design of the transmitter. A full list of the information on the name plate can be found in the "Safety" section.

When making enquiries, always remember to quote the universally valid serial number (S/N) and year of manufacture (Year).

IMPORTANT (NOTE)

In the case of explosion-proof designs, a description of the Ex design is also provided.

Barrel housings: On the name plate

DIN housings: On a separate plate

Another separate plate, located in front of the "local" control unit, describes the functions of the three control elements using easily comprehensible symbols. In addition, a tag indicating the measuring points may be attached (as an option).

1) Communication / configuration / parameterization via handheld terminal / PC where type of protection "intrinsic safety" applies:
In this case, the HHT / PC must be appropriately certified; this applies even if it is only connected for a short period of time.
This proof of "intrinsic safety" must be supplied in addition to the transmitter.
With type of protection "flameproof enclosure Ex d", the handheld terminal must not be connected in a potentially explosive atmosphere. The HHT battery must not be replaced in a potentially explosive atmosphere.

3.1 Principle of operation and construction

The transmitter has a modular structure and consists of measuring equipment with integrated adjustment electronics, as well as electronics with a control unit.

265Dx

The fully welded measuring cell is a two-chamber system with an interior overload diaphragm, interior silicon differential pressure sensor, and silicon absolute pressure sensor. The absolute pressure sensor, which is only pressurized from the positive side (⊕), is used as a command variable for compensating static pressure. A capillary tube is used to connect the differential pressure sensor and the negative side of the measuring cell. The existing differential pressure (dp) and static pressure are transferred to the measuring diaphragm of the silicon differential pressure sensor and of the absolute pressure sensor via the isolating diaphragms and filling liquid.

265VS

The fully welded measuring cell is a two-chamber system with an interior overload diaphragm and interior silicon absolute pressure sensor. The existing absolute pressure (pabs) is transferred to the measuring diaphragm of the silicon absolute pressure sensor via the isolating diaphragm and filling liquid.

Even a very slight deflection of the silicon diaphragm will change the output voltage of the pick-up system. This output voltage, which is proportionate to the pressure, is transformed into an electrical signal by the matching electronics and main electronics.

Depending on its design, the transmitter is connected to the process by means of an oval flange with a fastening screw thread (7/16-20 UNF or to DIN 19213 (M10/M12)), a 1/4-18 NPT female thread, or a remote seal.

The transmitter operates on the basis of two-wire technology. The same wires are used for the operating voltage (device-specific) and the output signal (4 ... 20 mA or digital). The electrical connection is established via a cable entry or plug.

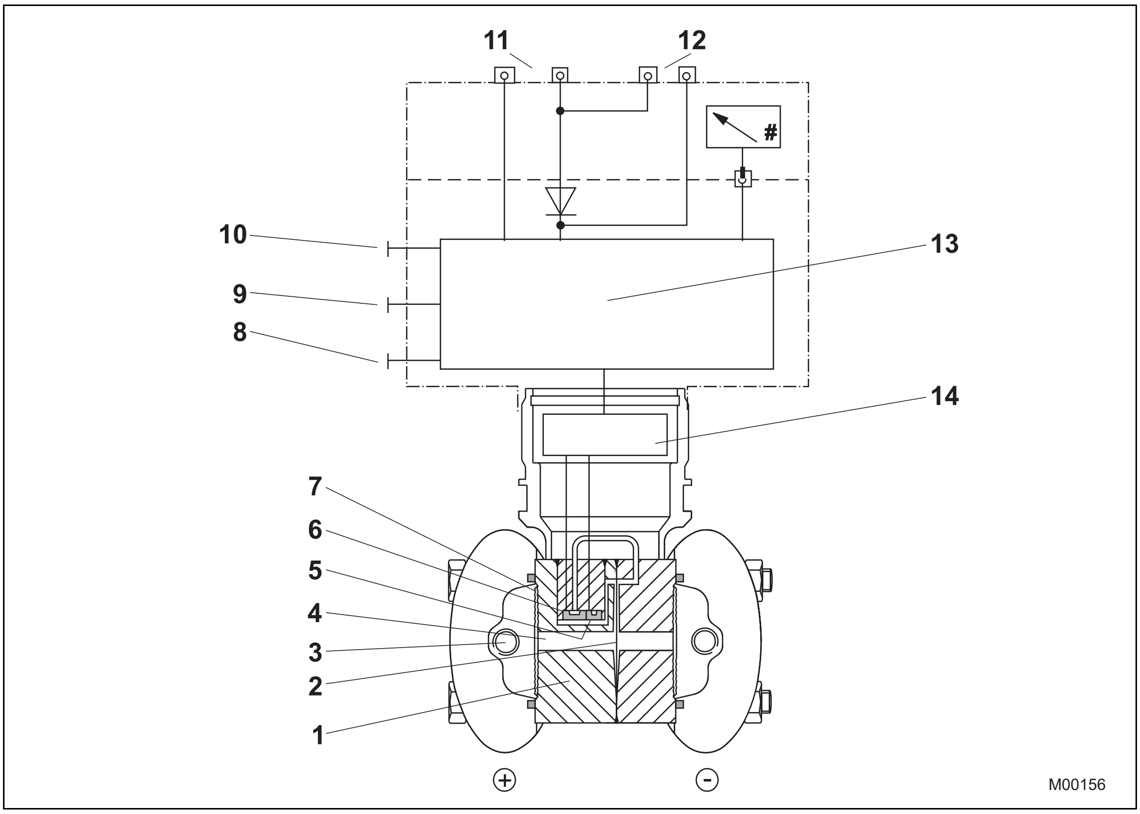

Fig. 4: 265Dx transmitter

1	Measuring cell	8	Write protection
2	Overload diaphragm	9	Span
3	Process connection	10	Lower range value
4	Filling liquid	11	Output / Supply power
5	pabs sensor	12	Test instrument
6	dp sensor	13	Microprocessor-based electronics
7	Isolating diaphragm	14	Matching electronics

With HART devices, the 4 … 20 mA output signal can be tested at the "TEST" terminals without interrupting the signal circuit (this does not apply to fieldbus devices).

Use an ammeter with an internal resistance of < 10 Ω for this purpose. To ensure maximum possible accuracy, we recommend switching the measuring device directly into the output circuit for the purpose of configuring or calibrating the transmitter (measuring the current).

It is possible to attach a tag plate in order to indicate the measuring points.

The "lower range value" and "upper range value" parameters can be set using "local" buttons. If required, the buttons can be locked using the write protection switch.

The transmitter may be equipped with an LCD display that can be read from the front (optional, can also be retrofitted).

The most important transmitter functions or data can be externally parameterized and configured using the "local" control unit in conjunction with the LCD display (see the section "Configuration").

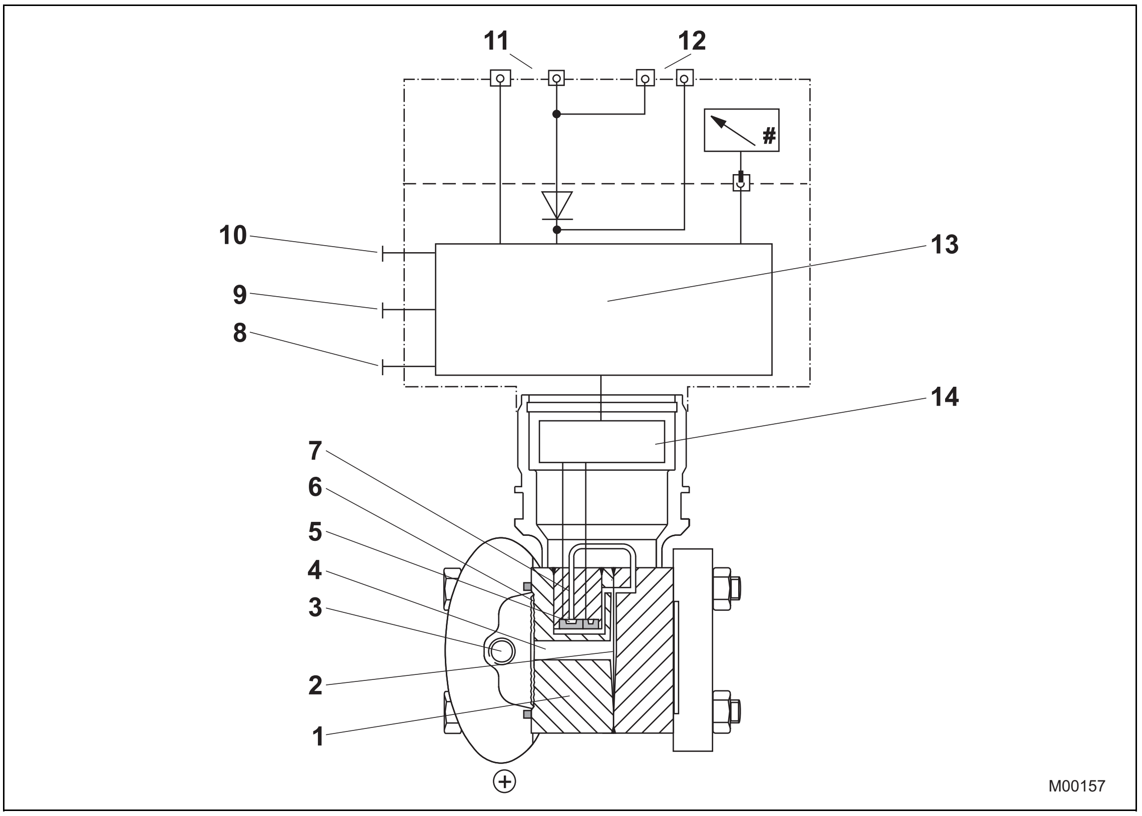

Fig. 5: 265VS transmitter for absolute pressure

1 Measuring cell
2 Overload diaphragm
3 Process connection
4 Filling liquid
5 pabs sensor
6 Isolating diaphragm
7 Reference vacuum
8 Write protection
9 Span
10 Lower range value
11 Output / Supply power
12 Test instrument
13 Microprocessor-based electronics
14 Matching electronics

4 Mounting

4.1 General

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:

- Measuring range
- Gauge pressure stability
- Temperature
- Explosion protection
- Operating voltage

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

- Seal
- Process connection, separation diaphragm, etc.

In addition, the relevant directives, regulations, standards, and accident prevention regulations must be observed (e.g., VDE/VDI 3512, DIN 19210, VBG, Elex V, etc.).

Measurement accuracy is largely dependent on correct installation of the pressure transmitter and, if applicable, the associated measuring pipe(s). As far as possible, the measuring setup should be free from critical ambient conditions such as large variations in temperature, vibrations, or shocks.

IMPORTANT (NOTE)
If unfavorable ambient conditions cannot be avoided for reasons relating to building structure, measurement technology, or other issues, the measurement quality may be affected. (See “Specifications”).

If a remote seal with capillary tube is installed on the transmitter, the additional operating instructions for remote seals and the related data sheets must be observed.

4.2 IP designation

The housings for 265 .. / 267 .. / 269 .. transmitters have been tested for conformity to IP 67 degree of protection in accordance with the IEC 60529 standard.

The first number indicates the type of protection the integrated electronics have against the ingress of foreign bodies, including dust. "6" means that the housing is dust-proof (i.e., no ingress of dust). The second number indicates the type of protection the integrated electronics have against the ingress of water. "6" means that the housing is protected against water; specifically, powerful jets of water under standardized conditions. "7" means that the housing is protected against water; specifically, against the effects of temporary immersion in water under standardized water pressure and temporal conditions.

4.3 Differential pressure transmitter

The pressure transmitter can be mounted directly on the shut-off valves. 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 (NOTE)
If the transmitter is installed at an angle, the filling liquid exerts hydrostatic pressure on the measuring diaphragm, resulting in a zero shift. In such an event, the zero position will need to be corrected.

However, generally speaking the pressure transmitter can be used in any mounting position. It is mounted by following the same guidelines as for a manometer.

For mounting options with a bracket, see the section "Technical data".

4.4 Moisture

Use suitable cables and tighten cable glands securely. The transmitter can also be protected against the ingress of moisture by routing the connecting cable downward before securing it. This allows rain and condensation to drip down. This is especially important for installation in outdoor areas and rooms that are exposed to moisture (e.g., due to cleaning processes) or on cooled or heated tanks.

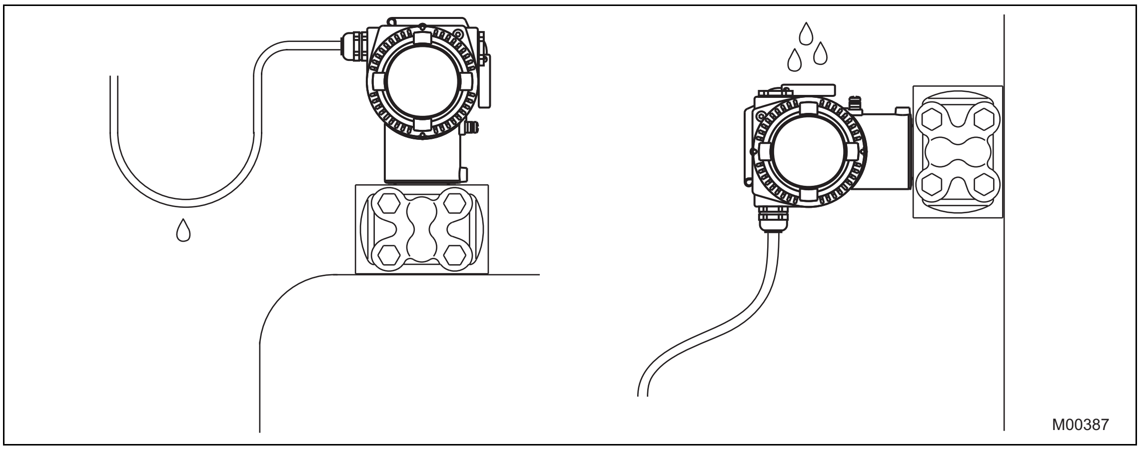

Fig. 6: Steps for preventing the ingress of moisture

4.5 Impulse lines

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

- The impulse lines must be as short as possible and free from sharp bends.
- Lay the impulse lines in such a way that no deposits can accumulate in them. Gradients should not be less than approx. 8 % (ascending or descending).
- The impulse lines 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 impulse lines must be at the same level. If a separating liquid is being used, both impulse lines must be filled to the same level (265Dx).
- 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 (265Dx).
- It may be necessary to use condensate vessels, etc., with small spans and vaporous measuring media (265Dx).
- If using condensate vessels (steam measurement), you should ensure that the vessels are at the same height in the differential pressure lines (265Dx).
- As far as possible, keep both impulse lines at the same temperature (265Dx).
- 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 (+ and - pressure sides connected to measuring equipment, seals, etc.).
- Make sure the connection is tight.
- Lay the impulse lines in such a way that prevents the medium from being blown out over the measuring equipment.

5 Electrical connections

WARNING - General risks

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 supply power and output signal.

5.1 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 mm^2 (AWG 14).

IMPORTANT (NOTE)

With Category 3 transmitters for use in "Zone 2", the cable gland must be installed by the customer (see the section titled "Use in potentially explosive atmospheres"). An M20 x 1.5 thread is located in the electronics housing for this purpose.

For transmitters with type of protection "flameproof enclosure" (Ex d), the housing cover must be secured using the locking screw (Fig. 14).

For transmitters that conform to the "Canadian Standards Association (CSA) Explosion-Proof" type of design, the following should be noted when establishing an electrical connection via a cable thermowell:

The cable thermowell must be screwed in using a suitable sealing medium in order to ensure the applicable type of protection (type 4X, IP 67). The screw plug that is already screwed in 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.

5.2 Electrical connection in the cable connection area

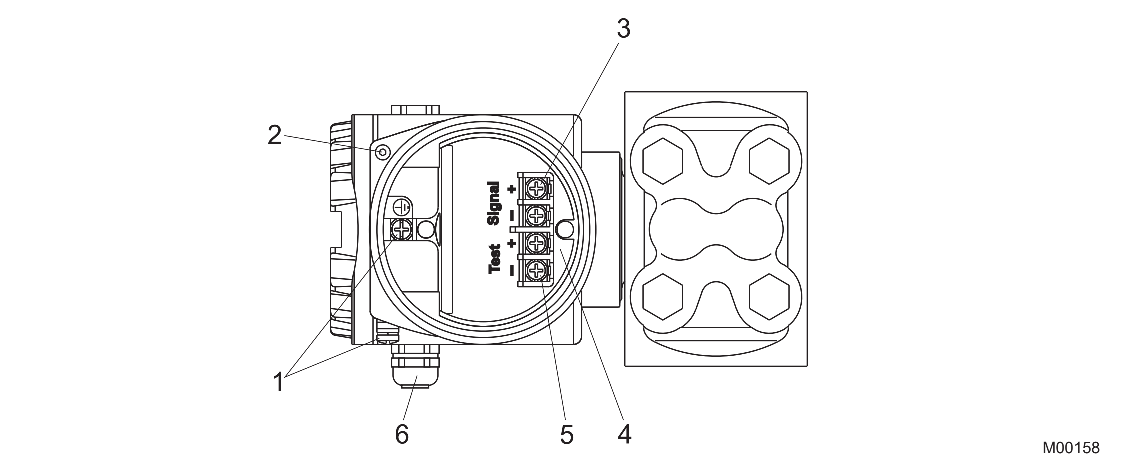

Fig. 7: Cable connection area (depiction of DIN housing)

1 Ground / equipotential bonding terminals
2 "Ex d" locking screw
3 Output signal, supply power
4 Screw terminals for 0.5 ... 2.5 mm^2 (AWG 20 … AWG 14)
5 Test terminals for 4 ... 20 mA (not available with fieldbus transmitters)
6 Cable entry (e.g., via M20 x 1.5)

The electrical connection is established in the connection area. The housing cover must be unscrewed for this purpose.

The M20 x 1.5 cable glands, which are supplied by the manufacturer, are screwed only loosely into the electronics housing. In order to achieve protection type IP 67, the glands must be screwed in using a suitable tool (hexagon head, SW 22) until they are hand-tight.

Delivery scope

HART devices	Gland/mating plug
M20 x 1.5 cable entry	Plastic cable gland (6 … 12 mm clamping area)
1/2 - 14 NPT	Not included in delivery scope
Han 8D (8U) device plug	Socket connector

Bus devices (PA/FF)	Gland/mating plug
M20 x 1.5 cable entry	Metal cable gland (6 … 12 mm clamping area)
1/2 - 14 NPT	Not included in delivery scope
M12 x 1 connector	Not included in delivery scope
7/8" connector	Not included in delivery scope

Terminal assignment

Terminals	Description
SIGNAL (+) and (-)	Operating voltage
TEST (+) and (-)	Test terminals for 4 ... 20 mA (HART); not available with fieldbus transmitters

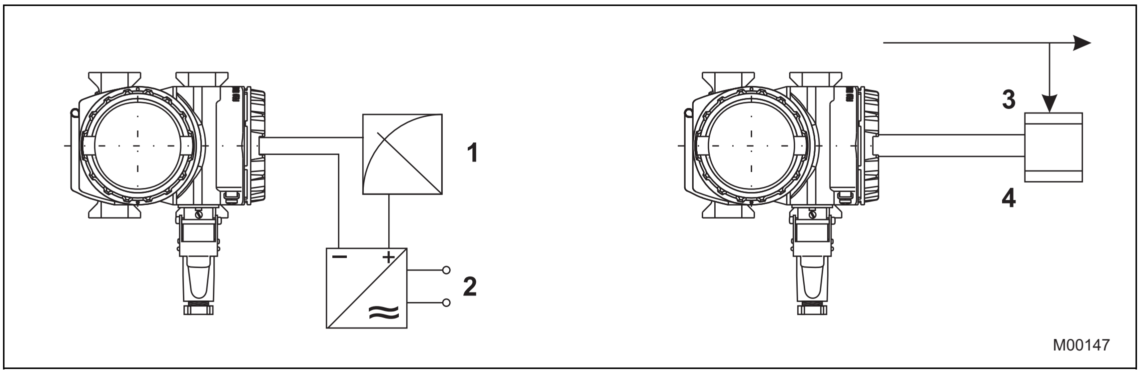

Fig. 8: Connection diagram, left: 4 … 20 mA current output with HART communication protocol and supply power; right: PROFIBUS PA or FOUNDATION Fieldbus

1 E.g., ammeter in 4 ... 20 mA circuit
2 Supply power / Supply power unit:
Non-Ex applications: 10.5 (14) ... 45 V
Ex applications [1]: 10.5 (14) ... max. 30 V (intrinsically safe)
3 PROFIBUS PA or FOUNDATION Fieldbus
4 PROFIBUS PA:
Connection to PLC or PC via segment coupler / linking device
FOUNDATION Fieldbus:
Connection to PLC or PC via FF supply unit

[1] Important: If, when using transmitters with type of protection "intrinsic safety", an ammeter is connected to the output circuit or a modem is connected in parallel while there is a risk of explosion, the sums of the capacitances and inductances of all circuits, including the transmitter (see EC-type-examination certificate) must be equal to or less than the permissible capacitances and inductances of the intrinsically safe signal circuit (see EC-type-examination certificate for the supply unit). Only passive or explosion-proof devices or indicators may be connected.

5.3 Electrical connection with plug

Fig. 9: Fieldbus connector

IMPORTANT (NOTE)
Mating plugs (sockets) are not included in the delivery scope.

Pin assignment		
Pin number	FOUNDATION Fieldbus	PROFIBUS PA
1	FF-	PA+
2	FF+	Ground
3	Shield	PA-
4	Ground	Shield

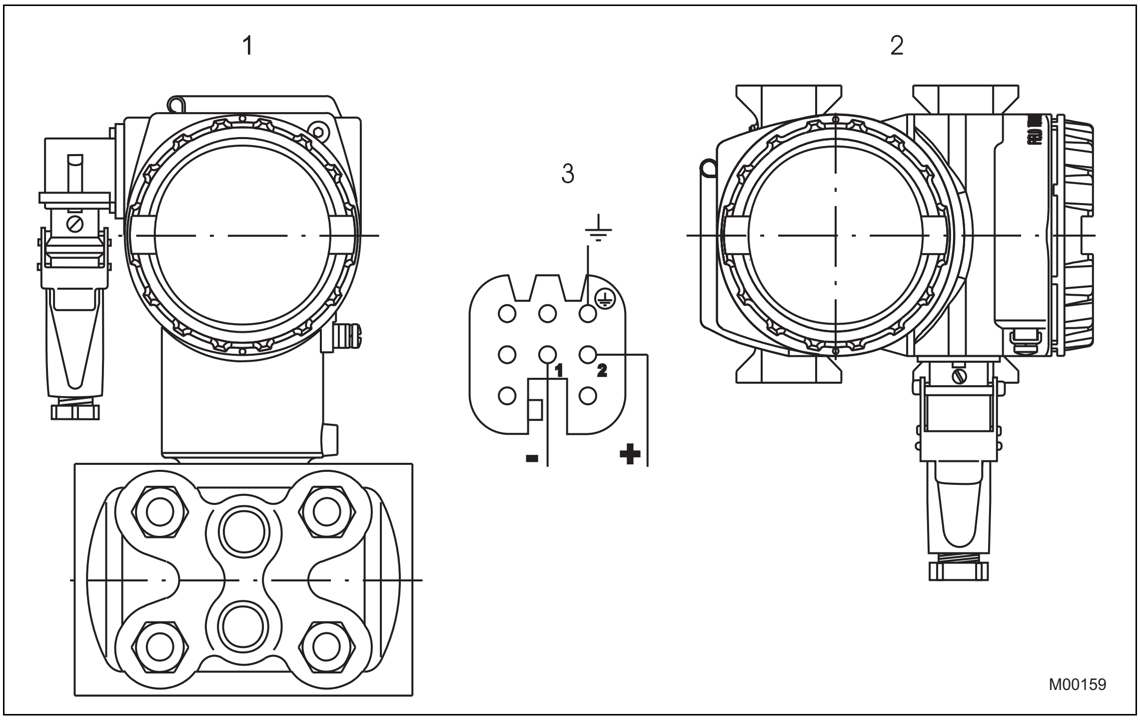

Fig. 10: (HART) Han 8D (8U) plug connector

1 Barrel type
2 DIN type
3 Harting Han 8D (8U) socket insert for mating plug supplied (view of sockets)

5.4 Assembling and connecting the socket connector

The socket connector for connecting the cable is supplied unassembled as an accessory for the transmitter.

IMPORTANT (NOTE)
Please observe the specifications for the electrical connection that have been supplied with the connector.

Assembly is depicted in the figure below.

1. The contacts (2) are crimped or soldered onto the cable ends (wire cross-section of 0.75 … 1 mm^2 (AWG 18 … AWG 17)), from which approx. 1.5 … 2 cm (0.59 … 0.79 inch) of the sleeve and approx. 8 mm (0.32 inch) of the insulation have been stripped; they are then inserted into the socket (1) from the rear.
2. Slide the set screw (6), clamping ring (5), gasket (4), and housing (3) onto the cable in the order indicated before assembly (you may have to adjust the gasket (4) to fit the cable diameter).

IMPORTANT (NOTE)
Before you press the contacts completely into the socket, check the connection points again. Incorrectly inserted contacts can be removed by using a press-out tool (part no.: 0949 813), or a standard ballpoint pen as a makeshift tool.

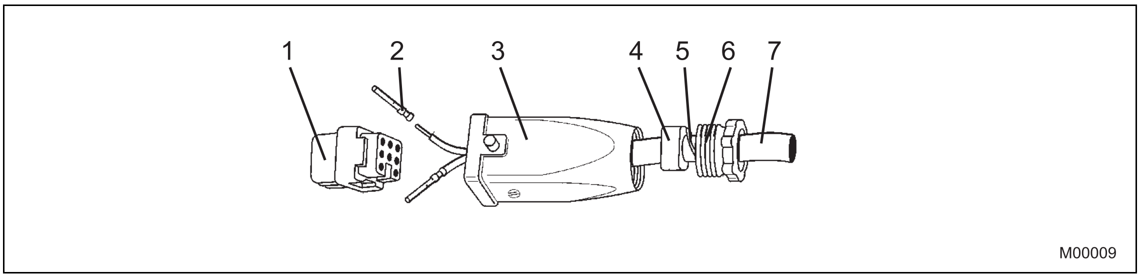

Fig. 11: Assembly of Han 8D (8U) socket connector

1 Socket
2 Contact
3 Housing
4 Gasket (can be cut)
5 Clamping ring
6 PG 11 set screw
7 Cable (diameter 5 … 11 mm (0.20 ... 0.43 inch))

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.

5.5 Protective conductor / Grounding

The transmitter operates within the specified levels of accuracy for common-mode voltages of up to 250 V between signal lines and housings.

As a general rule, the transmitter must be supplied by a voltage source with a maximum output voltage of 60 V DC, which is safely isolated from the line supply. To ensure that the safety objectives of the Low Voltage Directive are achieved, and the corresponding EN 61010 regulations governing installation of electrical equipment are observed, the housing must have a protective system (e.g., grounding, protective conductor) that is activated if voltages > 60 V DC occur.

5.6 Integrated lightning protection (optional)

The transmitter housing must be connected using the grounding terminal (PA), by means of a short connection with the equipotential bonding. Equipotential bonding (minimum diameter: 4 mm^2 (AWG 12)) is required throughout the cable routing area.

In the case of transmitters with integrated lightning protection (optional), the intrinsically safe circuit is connected to the equipotential bonding for safety reasons.

IMPORTANT (NOTE)
Test voltage withstand capability can no longer be ensured when this protective circuit is used.

5.7 Communication setup

(4 … 20 mA; HART protocol)

The transmitter can be operated via a modem, using a PC or laptop. The modem can be connected to the transmitter in parallel at any point in the signal circuit. Communication between the transmitter and modem occurs via AC signals that are superimposed on the analog 4 ... 20 mA output signal. This modulation occurs without averaging and does not, therefore, affect the measuring signal.

Communication between the transmitter and PC or laptop is only possible if the signal circuit is set up as shown in Fig. 12. The resistance between the connection point for the FSK modem and the supply unit must be at least 250 Ω (including internal resistance of the supply unit). If this value is not achieved within the context of normal installation, an additional resistor must be used.

In the case of supply modules with HART communication, the additional resistor is often installed permanently by the manufacturer. Some of these modules offer the option of communicating directly over the supply module in the operating mode "FSK bus".

Power can be supplied by supply units, batteries, or power supplies; these must be designed to ensure that the operating voltage U_B of the transmitter always remains between 10.5 V DC and 45 V DC (for LCD displays with backlighting: 14 … 45 V DC).

In addition, the maximum current of 20 … 22.5 mA resulting from overranging must be considered, depending on the corresponding parameterization. This yields the minimum value for U_S. If additional signal receivers (e.g., displays) are looped into the signal circuit, their resistance must also be considered.

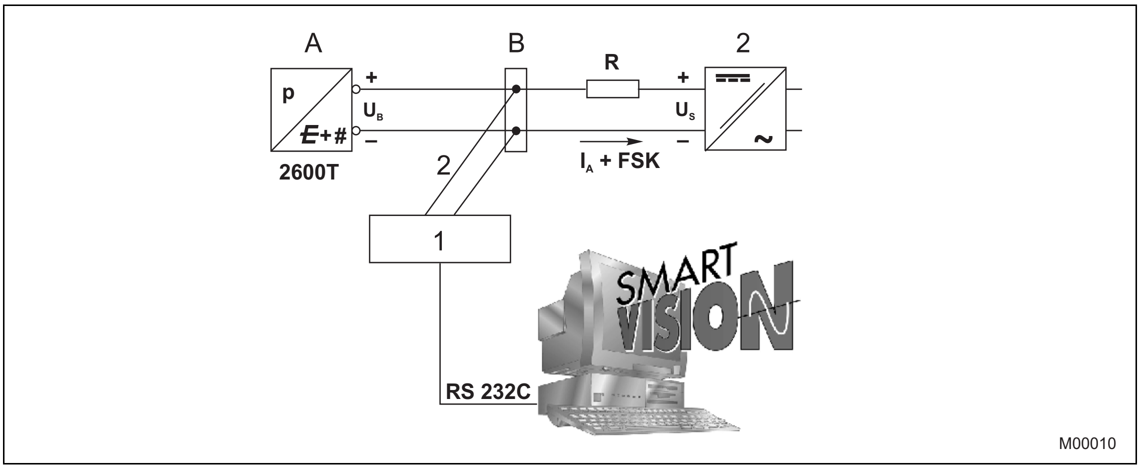

Fig. 12: Communication mode: Point-to-point

A Pressure transmitter
2 Supply unit
1 FSK modem
2 Possible connection points for a modem between A and B

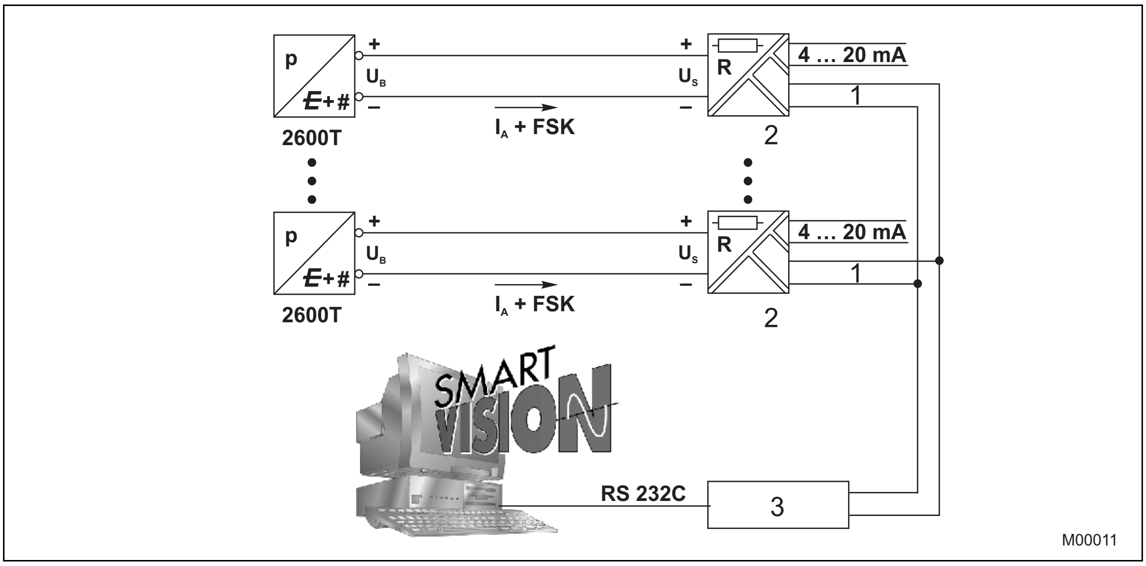

Fig. 13: Communication mode: FSK bus

1 FSK bus
2 Supply module with HART isolation
3 FSK modem

5.8 Connecting cable

Communication between the transmitter and PC or laptop is only possible if the cabling meets the following requirements:

It is recommended that shielded, twisted pair cables are used.

The minimum wire diameter depends on the line length.

Line lengths up to 1,500 m (4,921 ft): 0.51 mm (0.02 inch)

Line lengths above 1,500 m (4,921 ft): 0.81 mm (0.03 inch)

The maximum line length is limited.

Dual-core cable: 3,000 m (9,842 ft)

Multi-core cable: 1,500 m (4,921 ft)

The actual possible line length of the electrical circuit depends on the total capacitance and resistance, and can be estimated using the following formula:

$$L = \frac{65 \times 10^6}{R \times C} - \frac{C_f + 10000}{C}$$

L = Line length in meters

R = Total resistance in Ω (ohms)

C = Line capacitance in pF/m

C_f = Maximum internal capacitance of the HART field devices located in the circuit, in pF

Avoid routing cables with other electrical cables (with inductive load, etc.) or near large electrical equipment.

IMPORTANT (NOTE)

The shielding for the connecting cable should only be grounded at one side.

5.9 PROFIBUS PA differential pressure transmitter

PROFIBUS PA transmitters are designed to be connected to the DP / PA segment coupler / linking device. The permissible terminal voltage is within the range of 10.2 … 32 VDC.

Use of a shielded cable is recommended. The shielding is bonded by means of the metal cable gland.

IMPORTANT (NOTE)

The transmitter must be grounded.

The switch-on behavior corresponds to Draft DIN IEC 65C/155/CDV of June 1996. If the transmitter is operated on an Ex segment coupler / linking device in accordance with DIN EN 61 158-2 of October 1994, time-dependent current limiting may cause the maximum number of devices to be reduced.

The "OUT" variable is transmitted cyclically. This consists of the output value and 1 byte of status information. The output value is transmitted with 4 bytes as an IEEE 754 floating-point type.

For additional information on PROFIBUS PA - including the subject "Identification numbers" - please refer to "Additional notes 41/15-110" and the data sheet "Installation suggestions 10/63-0.40". These can be obtained from the Internet site www.abb.com; additional information is also available at www.profibus.com.

6 Commissioning

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

Check the following before switching on the operating voltage:

- Process connections
- Electrical connection
- The impulse line and measuring chamber of the measuring equipment must be completely filled with the measuring medium.

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

265Dx

1. Open the shut-off valves on the pressure tap connection (if present).
2. Open the pressure equalization valve of the shut-off valve.
3. Open the positive shut-off valve.
4. Close the pressure equalization valve.
5. Open the negative shut-off valve.

265VS

1. Open the discharge shut-off valve, if present.
2. Open the pressure equalization valve for the shut-off valves.

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

IMPORTANT (NOTE)

In the case of the 265VS pressure transmitter for absolute pressure with a measuring range of 400 mbar abs., please be aware that the measuring equipment will have been overloaded by the atmospheric pressure due to the long periods of transport and storage involved. For this reason, you will need to allow a starting time of approx. 30 min. after commissioning, until the sensor has stabilized to such an extent that the specified accuracy can be maintained.

If, when using transmitters with type of protection "intrinsic safety", an ammeter is connected to the output circuit or a modem is connected in parallel while there is a risk of explosion, the sums of the capacitances and inductances of all circuits, including the transmitter (see EC-type-examination certificate) must be equal to or less than the permissible capacitances and inductances of the intrinsically safe signal circuit (see EC-type-examination certificate for the power supply unit). Only passive or explosion-proof devices or indicators may be connected.

If the output signal stabilizes only slowly, it is likely that a large damping time constant has been set on the transmitter.

6.1 Output signal

If the applied pressure is within the values indicated on the name plate, the output current ranges between 4 und 20 mA.

If the pressure applied falls outside the set range, the output current will be between 3.5 mA and 4 mA if the range is undershot or between 20 mA and 22.5 mA if the range is overshot (depending on the respective configuration).

Standard setting for normal operation

3.8 mA / 20.5 mA

In order to prevent errors in flowrate measurements (265Dx) in the lower range, it is possible to set a "low flow cut off" and/or a "lin./sq. root transition point" by means of the graphical user interface (DTM). Unless otherwise specified, the "lin./sq. root transition point" is set to 5 % and the "low flow cut off" to 6 % of the flowrate end value by the manufacturer; in other words, the 265Dx transmitter only operates with the "low flow cut off".

A current that is < 4 mA or > 20 mA may also indicate that the microprocessor has detected an internal error.

Standard setting for error detection

21 mA

The graphical user interface (DTM) can be used to diagnose the error.

IMPORTANT (NOTE)
A brief interruption in the power supply results in initialization of the electronics (program restarts).

6.2 Write protection

Write protection prevents the configuration data from being overwritten by unauthorized users. If write protection is enabled, the "0 %" and "100 %" buttons are disabled.

However, it is still possible to read out the configuration data using the graphical user interface (DTM) or another, similar communication tool.

The control unit may be leaded if required.

Write protection is activated as follows (also refer to the symbols on the plate):

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

IMPORTANT (NOTE)
To deactivate the switch, push it down slightly and then turn counterclockwise by 90°.

6.3 Correcting the lower range value / zero shift

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

IMPORTANT (NOTE)
The transmitter must have reached its operating temperature (approx. 5 min. after startup, if the transmitter has already reached the ambient temperature) in order to perform zero shift correction. The correction must be made at dp = 0.

There are two options (points A or B) for correcting the 4 … 20 mA output signal directly on the pressure transmitter:

IMPORTANT (NOTE)
The button unit must be available for this purpose. Operating the buttons using a magnetic screwdriver is not permitted.

A. Set lower range value

1. Apply the lower range value pressure (4 mA) from the process or from a pressure transducer. The pressure must be stable and applied with a high level of accuracy << 0.05 % (observing the set damping value).
2. Press the "0 %" button on the pressure transmitter. The output signal is set to 4 mA. The span remains unchanged.

IMPORTANT (NOTE)
A lower range value set using this method will be stored in the non-volatile memory < 25 s (HART), < 110 s (PROFIBUS PA), and < 15 s (FOUNDATION Fieldbus) when the "0 %" button is pressed for the final time.

B. Correct the zero shift

1. Use the control buttons "M" and "+", together with the LCD display (installed as an option), to call up the "SHIFTZERO" menu item.
2. The correction is made by pressing the "M" button (refer to the section "Configuration with the LCD display").
3. Put the transmitter into operation as described at the beginning of this section.

IMPORTANT (NOTE)
The procedure described in "A" above does not affect the physical pressure shown; it only corrects the analog output signal. For this reason, the analog output signal may differ from the physical pressure shown on the digital display or the communication tool.

To avoid this discrepancy, correct the zero position shift (zero shift) via the graphical user interface (DTM).

Menu path: "Configure_Differential Pressure Measurement_Process Variable"

However, the lower range value must not have been corrected already using the "0 %" button.

6.4 Turning the housing in relation to the measuring equipment

The electronics housing can be rotated 360° and fixed in any position; a stop is provided to prevent it from rotating past this point.

- To activate this, slacken the housing stop screw on the neck of the housing (hex-head socket screw SW 2.5) by approx. 1 rotation (do not pull it out) and, once the desired position has been reached, retighten it until hand-tight.

6.5 Installing / Removing the button unit

1. Slacken the screw on the protective cap and move the cap to one side.
2. Using a suitable screwdriver, for example, push the lock bar all the way out of the button unit.
3. This releases the square nut; remove this from the button unit.
4. Use a Torx screwdriver (size T10) to slacken the fixing screw for the button unit, and then remove the unit from the electronics housing.
5. If necessary, insert a filler piece and secure it using the screw supplied.

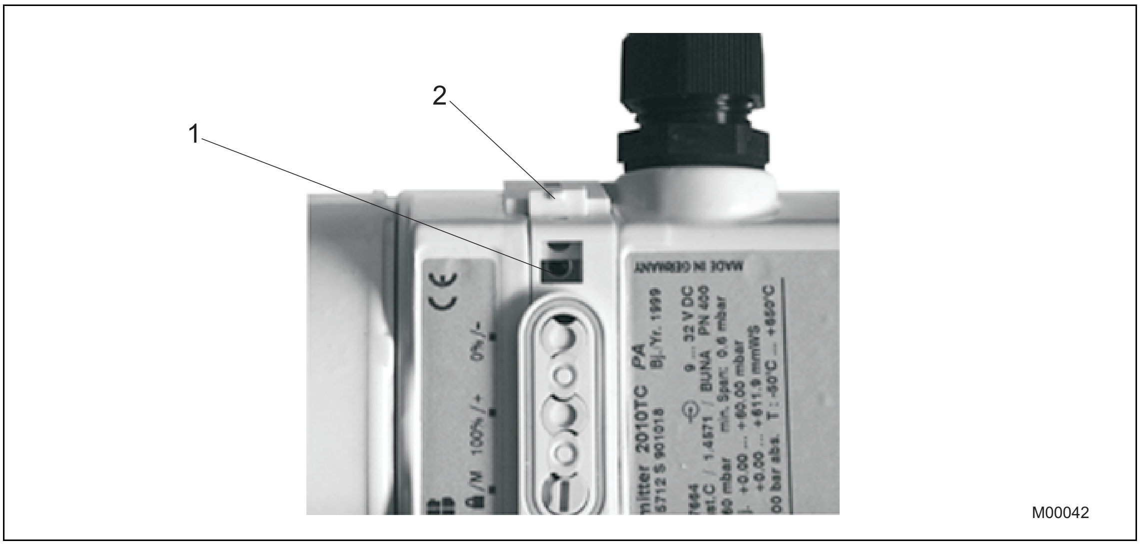

Fig. 14: Installing/removing the button unit

1 Fixing screw
2 Lock bar

IMPORTANT (NOTE)

The fixing screw is located underneath the button unit.

6.6 Installing / Removing the LCD display

1. Unscrew the housing cover of the electronics area (refer to the figure "Securing the housing cover" in the next section).

IMPORTANT (NOTE)
The optional LCD indicator is designed with type of protection "intrinsic safety" and has been included for the purpose of the transmitter's EC type-examination certificate.
With an Ex d design, please refer to the section titled "Securing the housing cover with Ex d".

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

IMPORTANT (NOTE)
In the case of LCD displays with backlighting (optional), a 3-wire cable with a plug is located at the rear of the LCD display. Connect this plug to the 3-pin terminal in the electronics area before attaching the display (see Fig. 15).

3. If the 3-pin terminal strip is equipped with a jumper (fieldbus transmitters do not have jumpers), remove this and insert it in the "jumper holder".
4. Screw the LCD display in place using the two screws.
5. Retighten the housing cover until it is hand-tight.

IMPORTANT (NOTE)
If necessary, refer to the section titled "Securing the housing cover with Ex d".

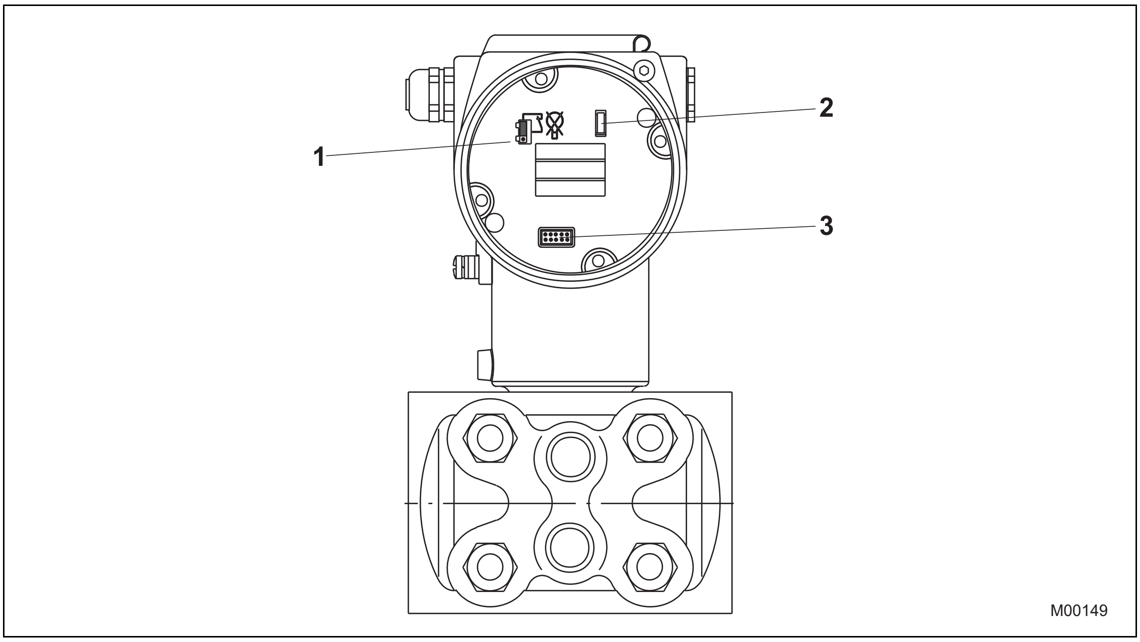

Fig. 15: Electronics area - Installing the LCD display

1 Position of the jumper or cable connector for an LCD display with backlighting
2 Jumper holder for an LCD display with backlighting
3 10-pin terminal strip for the LCD display

IMPORTANT (NOTE)

The jumper (item 1) must be present if the backlighting option has not been selected for the LCD display.

6.7 Securing the housing cover with Ex d

Each of the front faces of the electronics housing features a locking screw (hex-head socket screw SW 3) on the top right-hand side.

1. Attach the housing cover to the housing by hand-tightening the screws.
2. Turn the locking screw counterclockwise to secure the housing cover. This involves unscrewing the screw until the screw head stops at the housing cover.

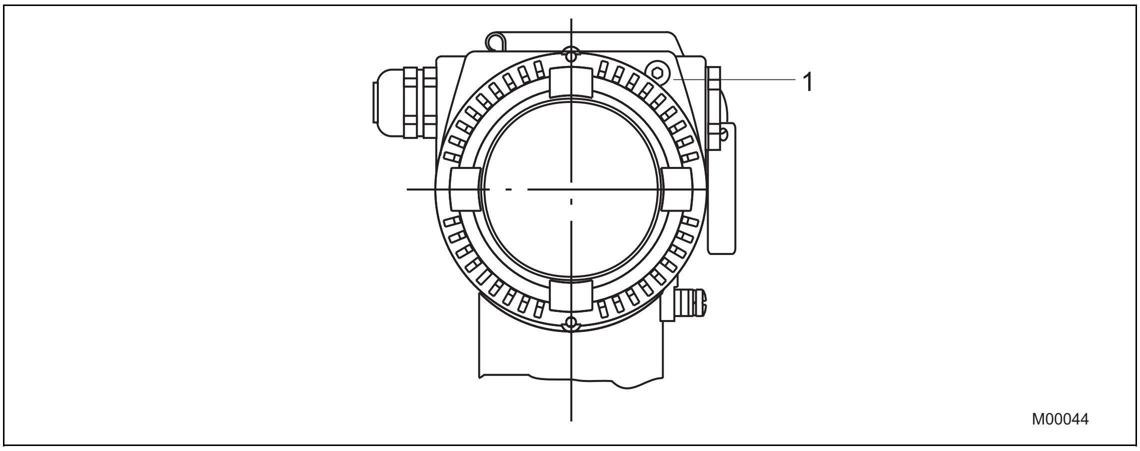

Fig. 16: Securing the housing cover

1 Locking screw

6.8 Operation

6.8.1 Operation using the control buttons on the transmitter

The control unit on the transmitter consists of 2 pushbuttons for setting the "Lower Range Value" (0 %) and "Upper Range Value" (100 %) parameters, as well as a write protection switch.

IMPORTANT (NOTE)
No housing entries are required for the pushbuttons or switch.

To access the pushbuttons, the screw must be slackened and the protective cap moved to one side (see Fig. 17).

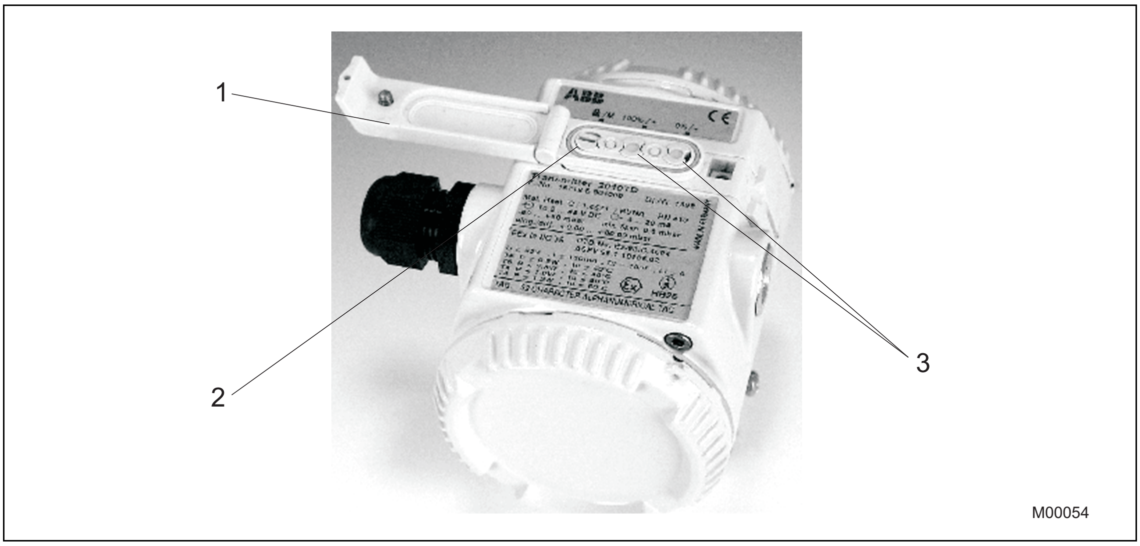

Fig. 17: Operating elements

1 Protective cap
2 Mode pushbutton (M)
3 Control buttons

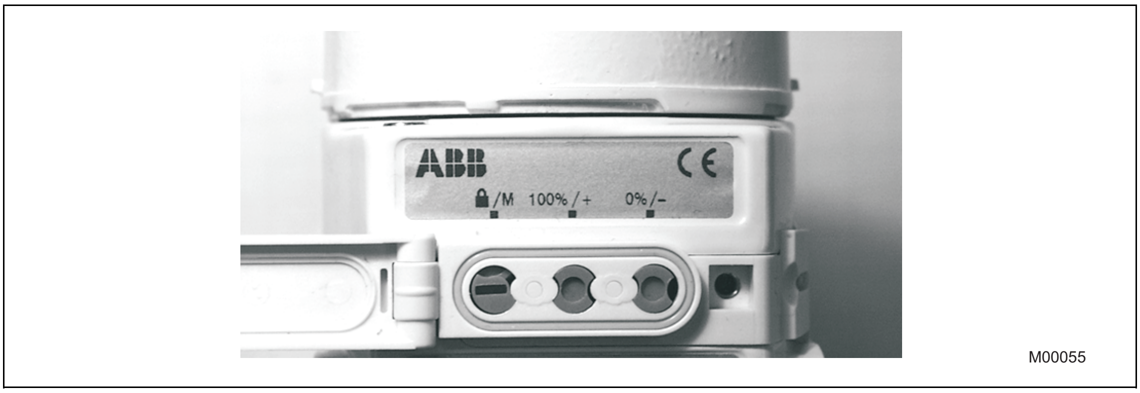

Fig. 18: Plate with button legend, etc.

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

7 Configuration

WARNING - Potential property damage as a result of electrostatic charging!
There is no protection against accidental contact when the housing cover is open.
Do not touch conductive parts.

7.1 Factory settings

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

7.1.1 Transmitter with HART communication and 4 … 20 mA output current

Parameter	Factory settings
4 mA	Zero position
20 mA	Measuring range upper limit (URL)
Output	Linear
Damping	0.125 s
Transmitter failure mode	21 mA
Optional LCD display	0 … 100 %, linear

Any or all of the configurable parameters listed above - including the “Lower Range Value” and “Upper Range Value” - can easily be changed using a portable HART handheld terminal or the PC operation software SMART VISION with DTM for 2600T. Data regarding flange type and material, O-ring materials, and type of filling liquid is stored in the device.

7.1.2 Transmitter with PROFIBUS PA communication

Parameter	Factory settings
Measuring profile	Pressure
Physical unit	mbar/bar
Output scale 0%	Measuring range lower limit (LRL)
Output scale 100%	Measuring range upper limit (URL)
Output	Linear
Upper alarm limit	Measuring range upper limit (URL)
Upper warning limit	Measuring range upper limit (URL)
Lower warning limit	Measuring range lower limit (LRL)
Lower alarm limit	Measuring range lower limit (LRL)
Hysteresis limit value	0.5 % of output scaling
PV filter	0.125 s
Address	126

Any or all of the configurable parameters listed above - including the “Lower Range Value” and “Upper Range Value” - can easily be changed using the PC operation software SMART VISION with DTM for 2600T. Data regarding flange type and material, O-ring materials, and type of filling liquid is stored in the device.

7.1.3 Transmitter with FOUNDATION Fieldbus communication

Parameter	Factory settings
Measuring profile	Pressure
Physical unit	mbar/bar
Output scale 0%	Measuring range lower limit (LRL)
Output scale 100%	Measuring range upper limit (URL)
Output	Linear
Upper alarm limit	Measuring range upper limit (URL)
Upper warning limit	Measuring range upper limit (URL)
Lower warning limit	Measuring range lower limit (LRL)
Lower alarm limit	Measuring range lower limit (LRL)
Hysteresis limit value	0.5 % of output scaling
PV filter	0.125 s
Address	Not required

Any or all of the configurable parameters listed above - including the “Lower Range Value” and “Upper Range Value” - can be changed using any FOUNDATION Fieldbus-compatible configuration tool. Data regarding flange type and material, O-ring materials, and type of filling liquid is stored in the device.

7.2 Configuration types

Pressure transmitters can be configured as follows:

- Configuration of the parameters for the “Lower Range Value” and “Upper Range Value”, without an LCD display
- Configuration of the pressure transmitter using the LCD display (menu-controlled)
- Configuration with a handheld terminal
- Configuration using a PC/laptop via the graphical user interface (DTM)

7.3 Configuring the parameters without an LCD display

The "Lower Range Value" and "Process Variable" parameters can be set directly on the transmitter using the buttons. The transmitter has been calibrated by the manufacturer based on the order information. The name plate contains information on the "Lower Range Value" and "Upper Range Value" set.

In general, the following applies:

The 1st pressure value (e.g., 0 mbar) is always assigned to the 4 mA signal, while the 2nd pressure value (e.g., 400 mbar) is always assigned to the 20 mA signal.

To reset the transmitter, apply the pressure for the "lower range value" and "upper range value" to the measuring equipment. Make sure that the measuring limits are not exceeded.

IMPORTANT (NOTE)
Reducing stations with adjustable pressure and reference displays can be used as pressure generators.

When making the connection, please ensure that there are no residual fluids (for gaseous testing materials) or air bubbles (for fluid testing materials) in the connection lines, since these can lead to errors during inspection.

Any potential measuring error for the pressure generator should be at least three times smaller than the desired measuring error for the transmitter.

It is recommended that the damping is set to zero using the button and LCD display, or the graphical user interface (DTM). The set time constant must be known for this purpose.

IMPORTANT (NOTE)
In the case of the 265VS transmitter for absolute pressure with a measuring range of 400 mbar abs., please be aware that the measuring equipment will have been overloaded by the atmospheric pressure due to the long periods of transport and storage involved. For this reason, you will need to allow a starting time of approx. 30 minutes after commissioning, until the sensor has stabilized to such an extent that the specified accuracy can be maintained.

Configuring the parameters

1. Apply the pressure for the "Lower Range Value" and wait approx. 30 s until it has stabilized.
2. Press the 0 % button. This sets the output current to 4 mA.
3. Apply the pressure for the "Upper Range Value" and wait approx. 30 s until it has stabilized.
4. Press the 100 % button. This sets the output current to 20 mA.
5. If required, reset the damping to its original value.
6. Record the new settings. The respective parameter will be stored in the non-volatile memory 10 s after the 0 % or 100 % button is last pressed.

NOTICE - Potential damage to parts!

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

IMPORTANT (NOTE)

This configuration procedure only changes the **4 … 20 mA** current signal; it does not affect the physical process pressure shown on the digital display or user interface. To avoid potential discrepancies, you can make corrections by following the menu path "Calibrate_Differential Pressure Measurement_Adjust input" in the user interface.

After performing a correction, you must check the device configuration.

7.4 Configuration with the LCD display

The LCD display can be used to configure the transmitter by means of the (-/+/M) pushbuttons, as follows:

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

IMPORTANT (NOTE)
The information in parentheses refers to the relevant menu item. The menu items are displayed in the 1st and 2nd lines of the LCD display. The full menu structure can be found in the section "Menu structure".

- (EXIT) Exit the menu
- (VIEW) View selected measured values and calculation values
- (GET 0 %) Lower range limit value with applied pressure
- (GET 100 %) Upper range limit value with applied pressure
- (SET 0 %) Lower range limit value without applied pressure
- (SET 100 %) Upper range limit value without applied pressure
- (SHIFTZERO) Correct zero position drift (e.g., zero shift)
- (OFFSET SHIFT) Offset shift
- (OUT 0 %) Scaling of output variable start value
- (OUT 100 %) Scaling of output variable end value
- (DAMPING) Damping
- (ALARM CURRENT) Output current in the event of an error; only available for 4 … 20 mA devices with HART protocol
- (DISPLAY) Display value
- (UNIT) "p" and "OUT" units
- (FUNCTION) Characteristic
- (ADDRESS) Fieldbus address; only available for devices with PROFIBUS PA or FOUNDATION Fieldbus protocol

The sections that follow contain explanations for some of the menu items listed above.

7.4.1 Offset shift (OFFSET SHIFT)

This function performs an offset shift of the characteristic so that it travels through a point specified by the user. This makes it possible to set the output signal of several measuring devices that measure the same process variable to the same value, without the need to perform calibration with applied pressure.

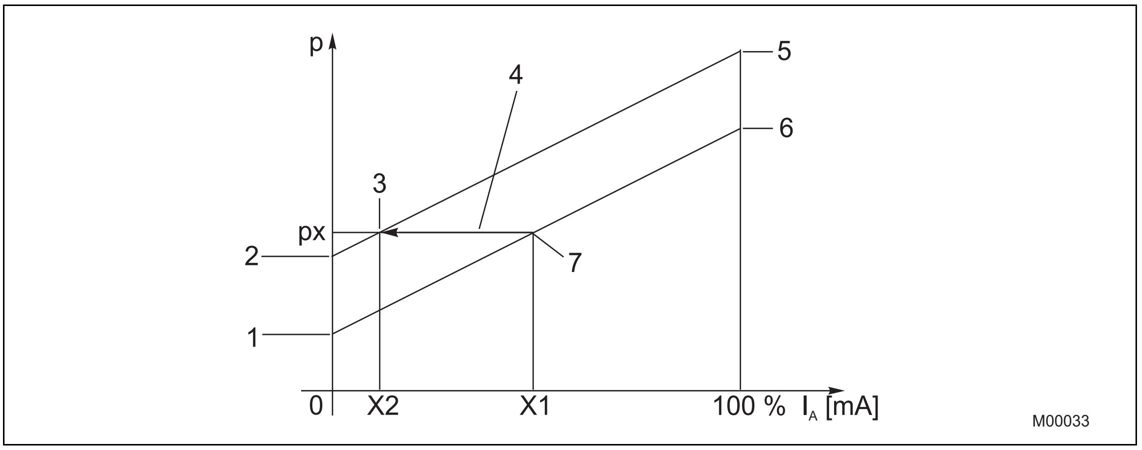

Fig. 19: Offset shift

1 Old zero position
2 New zero position
3 New balance point
4 Offset shift
5 New end value
6 Old end value
7 Old balance point

This function can be performed at any point on the characteristic, provided that the following circumstances apply:

- The process variable is within the set measuring range. The pressure transmitter has a linear transmission characteristic.
- Entering the desired output current as a percentage performs an offset shift for the measuring range.
- When a pressure px is applied, the pressure transmitter displays the standardized output value x1 as a percentage. Based on the current application, however, the value x2 should be displayed. The value x2 is now set via the local control unit/LCD. The transmitter calculates the new zero position and the new end value, and adopts these settings (see Fig. 19, Offset shift).

7.4.2 Damping (DAMPING)

When the output signal for the transmitter is noisy as a result of the process, the signal can be smoothed (damped) electrically.

The additional time constant can be set between 0 s and 60 s in increments of 0.001 s.

Damping does not affect the value shown on the digital display as a physical unit. It only affects the parameters derived from this, such as the analog output current, free process variable, input signal for the controller, and so on.

7.4.3 Characteristic (FUNCTION)

This menu item enables you to switch between the "linear", "square root", and "freely programmable" functions.

The parameters, such as "zero reset", "lin./sq. root transition point", or "individual values of the freely programmable characteristic", cannot be changed here. A handheld terminal or graphical user interface (DTM) must be used in order to make changes.

7.4.4 Fieldbus address (ADDRESS)

This menu item enables you to change the fieldbus slave address. A number between 0 and 126 must be entered for the selected pressure transmitter.

All new devices receive the factory setting "126". The pressure transmitters should be assigned different addresses; this is the only way to ensure targeted addressing. If, for example, the device data is loaded via the graphical user interface (DTM) after the address has been changed, a new connection will be established and an error message may appear. This error message must be acknowledged with "Repeat". The data will then be loaded without any problems.

7.5 Layout and contents of the LCD display

The display is a 2-line, 7-character, 19-segment alphanumeric display with an additional bar display. As an option, the display can be equipped with backlighting.

7.5.1 Displaying a physical value

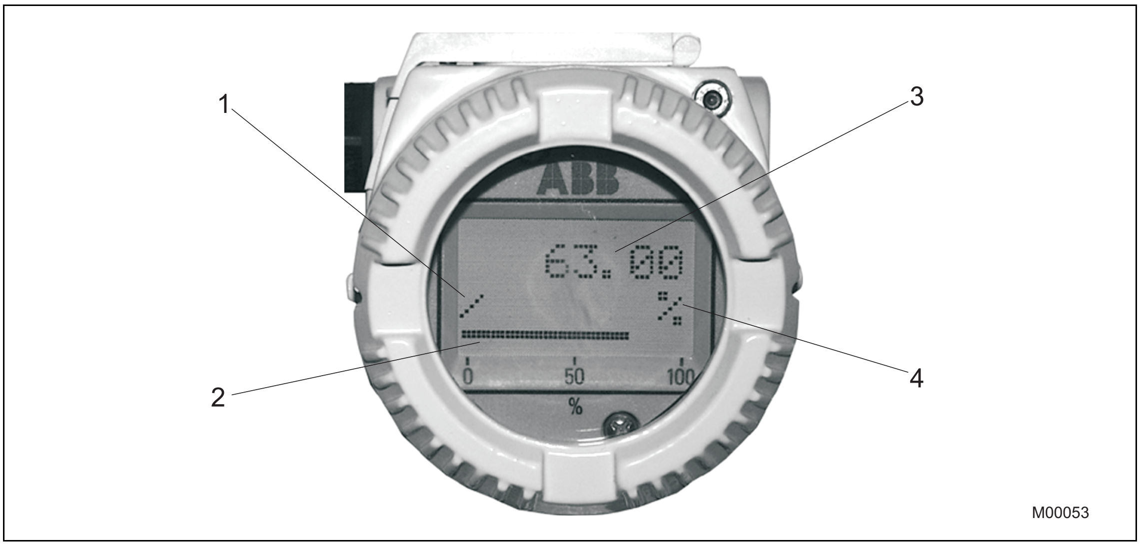

Fig. 20

1 Symbol for
- Transmission function (e.g., linear)
- Mode
- Status / code

2 Bar for displaying the process value in %
3 Current measured value (1st line)
4 Unit (2nd line)

First line

In the first line, the first column indicates the sign, and the next six digits display the measured value amount.

Decimal point display

The position of the decimal point is determined by the unit selected and cannot be changed. The decimal point is positioned so that the maximum value can be displayed with six digits. Decimal points are not displayed at the sixth place. Therefore, a maximum of +/- 999999 can be displayed. If this value is exceeded, "Overflow" is displayed.

Second line

In the second line, the unit is displayed in the last five columns. The first column shows the symbols listed below. If necessary, these symbols can also be displayed one after the other. The symbol displayed is changed in cycles of one second.

Explanation of the symbols

Display for	Symbol	Comment
Transmission function	/, √, or ∫	One of these symbols is always displayed.
Write protection		Only when write protection is set
Cyclic communication	. . . .	Only with PROFIBUS PA
Status available (e.g., measuring range exceeded or hardware error)		Only when a status is available
Display value code	1 … 9	Menu display (see the section "Menu structure")
The transmitter is busy.		This symbol overrides other symbols.

Transmission function symbols

Symbol	Description
/	Linear
√	Square root
∫	Freely programmable characteristic

How the percentage value is shown on the LCD display

Position	Display
1st line	Percentage value, limits: -25 … 125 %, 2 decimal places
2nd line	**1st digit:** Transmission function (see previous table) **2nd digit:** Write protection (see previous table) **7th digit:** %
Bar	2 % increments, from -2 … 100 %, no hysteresis

7.5.2 Menu structure

The parameters are structured in the form of a menu. The menu consists of a maximum of three levels.

The menu is called up using the mode button "M".

Main menu	**Submenu** (other parameters/explanations)
EXIT	
VIEW (Temporary display of display values 1 to 9)	Output signal in physical unit (265Dx: Current measured value for differential pressure, or measured value derived from this, such as flowrate / level. 265VS Current measured value for absolute pressure, with customized unit in each case). Corresponds to "OUT" parameter with PROFIBUS PA 1.
	Percentage value of output signal 2.
	Output current (not with fieldbus transmitters) 3.
	Static pressure 6.
	Pressure/differential pressure 8.
	Sensor temperature 9.
GET 0 %	Setting with applied pressure
GET 100 %	Setting with applied pressure
SET 0 %	Setting without applied pressure
SET 100 %	Setting without applied pressure
SHIFT ZERO	Zero shift / zero correction (e.g. oblique sensor)
OFFSET SHIFT	Offset shift (parallel shift)
OUT 0 %	Setting for output variables
OUT 100 %	Setting for output variables
DAMPING	
ALARM CURRENT (not with fieldbus transmitters)	HIGH ALARM Setting for alarm current value
	LOW ALARM (setting for alarm current value)
	LAST VALUE
DISPLAY (select LCD display value [non-volatile])	Output signal in physical unit (see "VIEW" parameter above)
	Percentage value of output signal 2.
	Output current (not with fieldbus transmitters) 3.
UNIT	p/dp (select units for display code no. 8)
	OUT (select units) (for output variables, e.g., kg/h, m [display code no. 1])
FUNCTION	Linear (linear characteristic ∕)
	Square root (square root characteristic √)
	Custom (activate/deactivate a freely programmable characteristic ∫)
ADDRESS (only with fieldbus transmitters)	

The numbers displayed inversely (1 to 9) specify the code for the display value. These numbers are shown on the 2nd line of the display, on the left-hand side.

Units of the parameter „UNIT -> p/dp“

Pa
GPa
MPa
KPa
mPa
uPa
HPa
bar
mbar
Torr
Atm
Psi
g/cm^2
kg/cm^2
in H_2O
mm H_2O
ft H_2O
in Hg
mm Hg

7.6 Menu-controlled pressure transmitter programming

Function	Description
Start	Menu-controlled programming is started with the mode pushbutton "M".
Next menu item	The next menu item is called up by pressing the "+" pushbutton.
Previous menu item	Press the "-" pushbutton to return to the previous menu item.
Activate submenu items/selection lists	Submenu items and selection lists are activated by pressing the mode pushbutton "M".
Change a numerical value	A numerical value can only be changed by means of the "+" and "-" pushbuttons. Please note that the "+" pushbutton changes the value (each time the button is pressed, the value increases by 1), while the "-" button is used to go to the position of the value to be changed.
Acknowledge changes	Changes are acknowledged by pressing the mode pushbutton "M". Confirming this (by pressing "OK") writes the value to the non-volatile memory.
Exit	Once setting is complete, the program can be exited via the "EXIT" menu item (acknowledge with the mode pushbutton "M").

The next section contains the full menu structure, which provides an overview of the selection and programming options.

IMPORTANT (NOTE)
The button unit must be available for this purpose. Operating the buttons using a magnetic screwdriver is not permitted.

7.6.1 Parameter description

7.6.1.1 "VIEW" parameter

Temporary display of display values 1 to 9 (setting is volatile)

The following measured values can be set:

- Output signal in physical unit

  265Dx: Current measured value for differential pressure, or variable derived from this, such as flowrate / level, with customized unit in each case

  265VS: Current measured value for absolute pressure; corresponds to "OUT" with PROFIBUS PA

  Setting changes under "OUT 0 %" and "OUT 100 %"; desired unit under "UNIT_OUT"
- Percentage value of output signal
- Output current (not with fieldbus transmitters)
- Static pressure
- Pressure/differential pressure

  Current pressure/differential pressure value in range between lower and upper range limit values set

  Setting changes under "GET 0 % / 100 %" or "SET 0 % / 100 %"; desired unit under "UNIT_p/dp"
- Sensor temperature

7.6.1.2 "GET 0 %" and "GET 100 %" parameters

Setting with applied pressure

7.6.1.3 "SET 0%" and "SET 100 %" parameters

Setting without applied pressure

7.6.1.4 "SHIFT ZERO" parameter

Zero correction (e. g. oblique sensor)

7.6.1.5 "SHIFT OFFSET" parameter

Offset shift (parallel shift) (see also "Configuration")

7.6.1.6 "OUT 0 %" and "OUT 100 %" parameters

Setting for output variables (including "VIEW", display code no.1, and "DISPLAY", display code no. 1)

7.6.1.7 (Damping) parameter

Setting for an additional time constant, between 0 s and 60 s, in increments of 0.001 s.

7.6.1.8 "ALARM CURRENT" parameter

Not with fieldbus transmitters

7.6.1.9 "DISPLAY" parameter

Selection (non-volatile) for LCD display values 1, 2, or 3 (permanent display)

The following measured values can be set:

- Output signal in physical unit

  265Dx: Current measured value for differential pressure, or variable derived from this, such as flowrate / level, with customized unit in each case

  265VS: Current measured value for absolute pressure; corresponds to "OUT" with PROFIBUS PA

  Setting changes under "OUT 0 %" and "OUT 100 %"; desired unit under "UNIT_OUT"
- Percentage value of output signal
- Output current (not with fieldbus transmitters)

7.6.1.10 "UNIT - p/dp" parameter

Selection list of pressure units for the pressure/differential pressure detected by the sensor, for LCD display code no. 8 under "VIEW"

7.6.1.11 "UNIT - OUT" parameter

"Selection list" of "OUT" units (for output variables, e.g., kg/h, m, l/h, mbar), for LCD display code no. 1 under "VIEW" or "DISPLAY"

7.6.1.12 "FUNCTION" parameter

In this menu item, you can choose from the functions "linear", "square root", and "freely programmable". The parameters, such as "zero reset", "lin./sq. root transition point", or "individual values of the freely programmable characteristic", cannot be changed here. A handheld terminal or graphical user interface (DTM) must be used in order to make changes.

7.6.1.13 "ADDRESS" parameter

Only with fieldbus transmitters

7.7 Configuration with the PC / laptop or handheld terminal

A graphical user interface (DTM) is required for configuration of the transmitter via PC or laptop. For operating instructions, please refer to the software description.

Additional information	Data sheet for the SMART VISION/DTM
Communication protocol	HART® PROFIBUS PA® FOUNDATION Fieldbus
Hardware (for HART®)	FSK modem for PC or laptop
HART handheld terminal (HHT)	e.g., 691HT, HHT275/375, DHH800-MFC

You can use a handheld terminal to read out or configure/calibrate the transmitter. If a communication resistor is installed in the connected supply unit, you can clamp the handheld terminal directly along the 4 ... 20 mA line.

If no communication resistor is present (min. 250 Ω), you will need to install one in the line. The handheld terminal is connected between the resistor and transmitter, not between the resistor and supply unit.

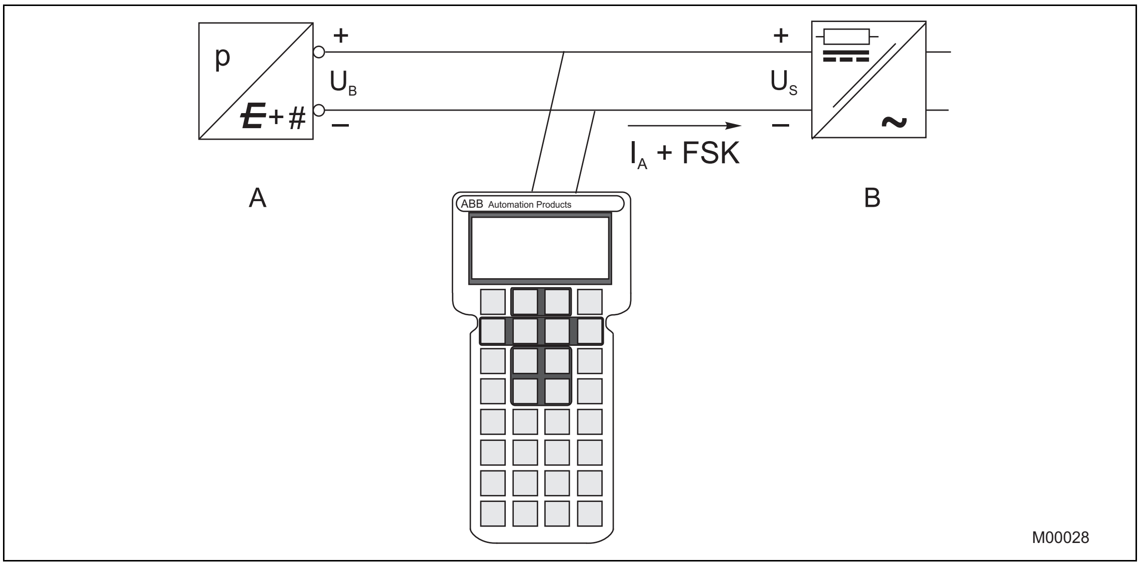

Fig. 21: Communication setup with handheld terminal

A Transmitter

B Supply unit (communication resistor provided in supply unit)

IMPORTANT (NOTE)

Communication / configuration / parameterization via handheld terminal / PC where type of protection "intrinsic safety" applies: In this case, the HHT / PC must be appropriately certified; this applies even if it is only connected for a short period of time. This proof of "intrinsic safety" must be supplied in addition to the transmitter.
With type of protection "flameproof enclosure Ex d", the handheld terminal must not be connected in a potentially explosive atmosphere.
The HHT battery must not be replaced in a potentially explosive atmosphere.

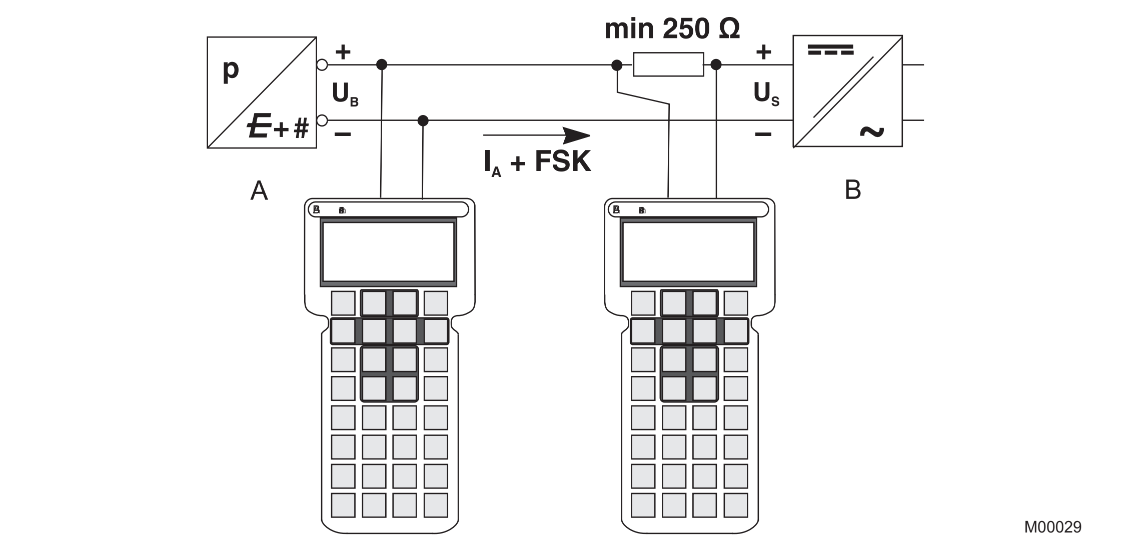

Fig. 22: Connection examples with communication resistor in the connection line

A Transmitter

B Supply unit (communication resistor not provided in supply unit)

For additional information, refer to the operating instructions included with the handheld terminal.

If the transmitter has been configured in the factory according to customer specifications for the measuring point, all you have to do is mount the transmitter as prescribed (to correct potential zero shifts, refer to the section "Correcting the zero shift"), and switch it on. The measuring point will now be ready for use.

If the transmitter is equipped with an LCD display, the current pressure/absolute pressure is displayed in % (factory setting, unless otherwise specified).

If, however, you wish to make changes to the configuration, a handheld terminal or - preferably - a graphical user interface (DTM) is required. This DTM tool renders the device fully configurable. It supports both the HART protocol and PROFIBUS PA fieldbus protocol, and can be run on a PC or laptop, or as part of an automation system. Where FOUNDATION Fieldbus is concerned, the device description (DD), which can be loaded onto various configuration tools, is required for configuration purposes.

Refer to the installation manual provided with the software for the steps required to install the operating tool. The most important parameters can be set via the path "Configure_Differential Pressure Measurement".

The program offers the option of configuring, polling, and testing the transmitter. In addition, offline configuration can be performed by means of an internal database. Each configuration step is subject to a plausibility check. You can call up context-sensitive help at any time by pressing the "F1" key.

Immediately after you have received the transmitter or before you change the configuration, we recommend that you save the existing configuration data to a separate data storage medium, via the path "File_Save".

7.8 Configuration with the graphical user interface (DTM)

7.8.1 System requirements

- Operating control program (e.g., SMART VISION version 4.01 or higher)
- DTM (Device Type Manager; graphical user interface)
- Operating system (depending on the respective control program)

The DTM is started in three stages, either using the right mouse button or via the menu item "Device".

1. "More"
2. "Edit"
3. "Connect"

When you select "Connect" the full transmitter data should be loaded. Modified data will be underlined in blue. To send this data to the device, select "Save to device".

IMPORTANT (NOTE)

Saving the data in the transmitter automatically saves it to the non-volatile memory.

For this purpose, the transmitter must be supplied with supply power for two minutes. Failure to observe this will cause the transmitter to revert to the previous data the next time it is used.

With PROFIBUS devices, "Local Operation" can only be switched off during cyclical communication. If write protection is set using the DTM, it will no longer be possible to change the transmitter setting using the control buttons.

For PROFIBUS devices, the slave address in the user interface project tree must be specified correctly. The communication name and the description are updated automatically when the data is loaded from the device.

The most important calibration and parameterization operations within the user interface are listed in brief below. For additional information on the menu items, refer to the context-sensitive help. Before making any settings, you must ensure that write protection has not been activated, whether on the transmitter itself (button with lock symbol) or within the user interface (menu path: "Configure_Basic Parameters_General_Local Operation").

7.8.2 Setting the damping value

Menu path:
"Configure Differential Pressure Measurement_Output"
Enter the desired value in the "Damping" line of the "Output parameter" field.

7.8.3 Correcting the zero shift / oblique sensor

Menu path:
"Configure Differential Pressure Measurement_Process Variable"
Press the "Adjust" button in the "Zero Shift" field.
Calibration is performed immediately and saved to the transmitter's non-volatile memory.

7.8.4 Setting the lower and upper range values

Menu path:
"Configure_Differential Pressure Measurement_Process Variable"
The "Scaling" field offers two setting options:

1. Enter value (Value Input)

Enter the desired values in the "Lower range value" and / or "Upper range value" input fields.

2. Apply PV (Process Pressure Transfer)

For setting purposes, apply the pressure for the "Lower Range Value" and "Upper Range Value" to the device. Make sure that the measuring limits are not exceeded.

Reducing stations with adjustable pressure and reference displays can be used as pressure transducers.

When making the connection, please ensure that there are no residual fluids (for gaseous testing materials) or air bubbles (for fluid testing materials) in the connection lines, since these can lead to errors during inspection.

The measuring error for the pressure transducer should be at least three times smaller than the desired measuring error for the pressure transmitter.

8 Ex relevant specifications

8.1 Potentially explosive atmospheres

ATEX - Transmitter with type of protection "Intrinsic Safety Ex ia" in accordance with Directive 94/9/EC

Transmitter with 4 ... 20 mA output signal and HART communication:

Certificate no.	ZELM 01 ATEX 0064		
Designation:	II 1/2G	Ex ia IIC T6	or T4
	II 1D	Ex iaD 20 T50°C	or T95°C
	Ta	-40°C... 40°C	or 85°C

Supply power and signal circuit with type of protection "Intrinsic Safety Ex ib IIB/IIC" or "Intrinsic Safety Ex ia IIB/IIC", for connection to supply units with the following maximum values:

U_i = 30 V

I_i = 200 mA

Temperature class T4 or T95°C:

P_i = 0.8 W for T4 where Ta = -40 ... 85 °C

P_i = 1.0 W for T4 where Ta = -40 ... 70 °C

For temperature class T6 or T50°C:

P_i = 0.7 W for T6 where Ta = -40 ... 40 °C

Effective internal capacitance: C_i = 10 nF

Effective internal inductance: $L_i \approx 0$

Fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus):

Certificate no.: ZELM 01 ATEX 0063

Designation: FISCO field device

II 1/2G Ex ia IIC T6 or T4

II 1/2D Ex iaD 20 T50 °C or T95 °C

Supply power and signal circuit with type of protection "intrinsic safety", only for connection to supply units certified according to the FISCO concept and with the following maximum values:

U_i = 17.5 V

I_i = 500 mA

P_i = 8.75 W

or connection to supply units or barriers with linear characteristics.

Maximum values:

U_i = 24 V

I_i = 250 mA

P_i = 1.2 W

Effective internal inductance: L_i = 10 µH,

Effective internal capacitance: C_i = 5 nF

Permissible ambient temperature range according to temperature class:

Temperature class	Lower limit of ambient temperature	Upper limit of ambient temperature
T4	-40 °C (-40 °F)	85 °C (185 °F)
T5, T6	-40 °C (-40 °F)	40 °C (104 °F)

ATEX - Category 3 transmitter for use in "Zone 2" as defined by Directive 94/9/EC

Transmitter with 4 ... 20 mA output signal and HART communication:

Certificate no.:	ZELM 01 ATEX 3059		
Designation:	II 3G	Ex nA [nL] IIC T6	or T4
	II 3D	Ex tD A22 T50°C	or T95°C IP6x

Operating conditions:

Supply and signal circuit (terminal signal ±):

U ≤ 45 V DC

I ≤ 22.5 mA

Permissible ambient temperature ranges:

Type of protection "non-sparking nA"

II 3G Ex nA [nL] IIC T6 or T4:

Ambient temperature	Temperature class
-40 ... +40 °C	T6
-40 ... +85 °C	T4

Type of protection "protection by enclosure tD"

II 3D Ex tD A22 T50°C or T95°C IP6x:

Ambient temperature	Surface temperature
-40 ... +40 °C	T50°C
-40 ... +85 °C	T95°C

ATEX - Transmitter with type of protection "flameproof enclosure Ex d" in accordance with Directive 94/9/EC

Transmitter with 4 … 20 mA output signal and HART communication, and fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus / MODBUS 232 / MODBUS 485):

Certificate no.: PTB 00 ATEX 1018

Designation: II 1/2 G Ex d IIC T6

Operating conditions:

Supply and signal circuit (terminal signal ±)

Operating values:

HART	Fieldbus PA/FF	Modbus 232 / 485
U ≤ 45 V DC	U ≤ 36 V DC	U ≤ 30 V DC
I ≤ 22.5 mA	I ≤ 14 mA	I ≤ 25 mA

Ambient temperature range: -40 ... 75 °C

ATEX - Transmitter conforming to 94/9/EC, with type of protection "Intrinsic Safety i"

or

type of protection "flameproof enclosure d" or
type of protection "protection by enclosure tD", or
type of protection "non-sparking nA"

(Certificate with alternative types of protection)

Certificate no.: ZELM 04 ATEX 0227 X
Transmitter with 4 ... 20 mA output signal and HART communication:

Designation: II 1/2G Ex ia IIC T6 or T4
II 1D Ex iaD 20 T50°C or T95°C IP6x
(refer to "ATEX Ex ia" previously for additional data)

or

II 1/2 G Ex d IIC T6
(refer to "ATEX Ex d" previously for additional data) or
II 2D Ex tD A21 T50°C or T95°C IP6x
(refer to "ATEX category 3" previously for additional data) or
II 3G Ex nA [nL] IIC T6 or T4
(refer to "ATEX category 3" previously for additional data)

IECEx - Transmitter with the following types of protection: "intrinsic safety i", "non sparking nA", "protection by enclosure tD"

Transmitter with 4 … 20 mA output signal and HART communication
Certificate no.: IECEx ZLM 09.0005X
Designation: Ex ia IIC T6 or T4 Ga/Gb
Ex iaD 20 T50°C or T95°C
Ex tD A21 T50°C or T 95°C IP6x
Ex nA [nL] IIC T6 or T4
Ta = -40°C to +40°C or + 85°C

Maximum permissible ambient temperature range according to temperature class:

Ambient temperature	Temperature cl.	Surface temp.
-40 … 85 °C (-40 … 185 °F)	T4	95 °C (203 °F)
-40 … 40 °C (-40 … 104 °F)	T6	50 °C (122 °F)

The following electrical data applies according to designation Ex ia IIC T6 or T4 Ga/Gb, or Ex iaD 20 T50°C or T95°C IP6x

Supply and signal circuit with type of protection "intrinsic safety" Ex ia IIC or Ex ib IIC, or Ex iaD or Ex ibD, for connection to supply units with the following maximum values:

(terminal signal ±): U_i = 30 V
I_i = 200 mA

Temperature class T4 or T95°C:
Pi = 0.8 W for T4 where Ta = -40 ... 85 °C
Pi = 1.0 W for T4 where Ta = -40 ... 70 °C

For temperature class T6 or T50°C:
Pi = 0.7 W for T6 where Ta = -40 ... 40 °C
Effective internal capacitance: C_i = 10 nF
Effective internal inductance: $L_i \approx 0$

The following electrical data applies according to designation Ex nA [nL] IIC T6 or T4:
Supply and signal circuit (terminal signal ±)
Operating voltage U ≤ 45 V
Operating current I ≤ 22.5 mA

The following electrical data applies according to designation Ex tD A21 T50°C or T95°C IP6x:
Supply and signal circuit
(terminal signal ±)
Operating voltage U ≤ 45 V
Operating current I ≤ 22.5 mA

IECEx - Transmitter with the following types of protection: "intrinsic safety i", "limited energy"
Fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus):
Certificate no.: IECEx ZLM 09.0004X
Designation: Ex ia IIC T6 or T4 Ga/Gb
Ex iaD 20 T50°C or T95°C
Ex nL IIC T6 or T4
Ta = -40°C to +40°C or + 85°C

Maximum permissible ambient temperature range according to temperature class:

Ambient temperature	Temperature cl.	Surface temp.
-40 … 85 °C (-40 … 185 °F)	T4	95 °C (203 °F)
-40 … 40 °C (-40 … 104 °F)	T6	50 °C (122 °F)

The following electrical data applies according to designation Ex ia IIC T6 or T4 Ga/Gb, or Ex iaD 20 T50°C or T95°C IP6x
Supply and signal circuit with type of protection "intrinsic safety", only for connection to certified supply units in accordance with the FISCO concept, with the following maximum values:

(terminal signal ±): U_i = 17.5 V
I_i = 500 mA
P_i = 8.75 W

Effective internal capacitance: C_i = 5 nF
Effective internal inductance: L_i =10 µH

or connection to supply units or barriers with linear characteristics.
Maximum values:
U_i = 24 V
I_i = 250 mA
P_i = 1.2 W

Effective internal capacitance: C_i = 5 nF
Effective internal inductance: L_i =10 µH

The following electrical data applies according to designation Ex nL IIC T6 or T4:
Supply and signal circuit with type of protection "limited energy Ex nL IIC", only for connection to certified supply units in accordance with the FNICO concept, with the following maximum values:

(terminal signal ±): U_i = 17.5 V
I_i = 666 mA
P_i = 11.65 W

Effective internal capacitance: C_i = 5 nF
Effective internal inductance: L_i =10 µH

IECEx - Transmitter with the following types of protection: "flameproof enclosure "d" and "protection by enclosure tD"

Transmitter with 4 … 20 mA output signal and HART communication, and fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus / MODBUS 232 / MODBUS 485):

Certificate no.: IECEx ZLM 09.0003X
Designation: Ex d IIC T6
Ex tD A21 T85°C IP6x
Ta = -40°C to +75°C

The following electrical data applies according to designation Ex d IIC T6 or Ex tD A21 T85°C IP6x:
Supply and signal circuit (terminal signal ±)
Operating values:

HART	Fieldbus PA/FF	Modbus 232 / 485
U ≤ 45 V DC	U ≤ 36 V DC	U ≤ 30 V DC
I ≤ 22.5 mA	I ≤ 14 mA	I ≤ 25 mA

Ambient temperature range: -40 ... 75 °C

Factory Mutual (FM)

Transmitter with 4 ... 20 mA output signal and HART communication:
Intrinsic Safety: Class I; Division 1; Groups A, B, C, D;
Class I; Zone 0; Group IIC; AEx ia IIC
Degree of protection: NEMA type 4X (indoor or outdoor installation)

Permissible ambient temperature range according to temperature class:

U_{max} = 30 V, C_i = 10.5 nF, L_i = 10 µH			
Ambient temperature	**Temperature class**	**I_{max}**	**Pi**
-40 ...85 °C (-40 ... 185 °F)	T4	200 mA	0.8 W
-40 ...70 °C (-40 ... 158 °F)			1 W
-40 ... 40 °C (-40 ... 104 °F)	T5	25 mA	0.75 W
	T6		0.5 W

Fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus):
Intrinsic Safety: Class I, II, and III; Division 1;
Groups A, B, C, D, E, F, G;
Class I; Zone 0; AEx ia Group IIC T6, T4;
Non-incendive Class I, II, and III; Division 2;
Groups A, B, C, D, F, G

Transmitter with 4 … 20 mA output signal, HART communication, and fieldbus transmitter (PROFIBUS PA / FOUNDATION fieldbus):
Explosion-proof: Class I, Division 1, Groups A, B, C, D;
Class II/III, Division 1, Groups E, F, G
Degree of protection: NEMA type 4X (indoor or outdoor installation)

Canadian Standards Association (CSA)

Transmitter with 4 … 20 mA output signal, HART communication, and fieldbus transmitter (PROFIBUS PA/FOUNDATION fieldbus)
Explosionproof: Class I, Division 1, Groups B, C, D;
Class II, Division 1, Groups E, F, G
Degree of protection: NEMA type 4X (indoor or outdoor installation)

Standards Association of Australia (SAA)
Transmitter with type of protection "flameproof enclosure Ex d"

Transmitter with 4 … 20 mA output signal, HART communication, and fieldbus transmitter (PROFIBUS PA/FOUNDATION fieldbus, Modbus):

Designation:
Zone 1: Ex d IIC T6 (Tamb +75 °C) IP 66 / IP 67
Zone A21: Ex tD A21 T85 (Tamb +75 °C) IP 66 / IP 67

NEPSI (China)
Intrinsic safety

Transmitter with 4 ... 20 mA output signal and HART communication:

Designation: Ex ia IIC T4/T6

Permissible ambient temperature range according to temperature class:

Temperature class	Ambient temperature	Pi
T4	-40 … 85 °C (-40 ... 185 °F)	0.8
T4	-40 … 70 ° C (-40 ... 158 °F)	1.0
T6	-40 … 40 ° C (-40 ... 104 °F)	0.7

Supply and signal circuit for connection to supply units with the following maximum values:

Ui_{max} = 30 V, Ii_{max} = 200 mA			
Temperature class	Pi_{max}	Max. internal parameters	
		Ci (nF)	Li (μH)
T6	0.7	47	10
T4	0.8	47	10
T4	1.0	47	10

Fieldbus transmitter (PROFIBUS PA / FOUNDATION Fieldbus)

Designation: Ex ia IIB/IIC T4 … T6

Permissible ambient temperature range according to temperature class:

Temperature class	Ambient temperature
T4	-40 … 85 °C (-40 ... 185 °F)
T5	-40 … 50 °C (-40 ... 122 °F)
T6	-40 … 40 °C (-40 ... 104 °F)

Supply and signal circuit for connection to supply units with the following maximum values:

Ex mark	Characteristic curve Supply unit	Ui_{max} (V)	Ii_{max} (mA)	Pi_{max} (W)
Ex ia IIC T4 … T6	Rectangular or trapezoidal	17.5	360	2.52
Ex ia IIB T4 … T6	Rectangular or trapezoidal	17.5	380	5.32
Ex ia IIC T4 … T6	Linear	24	250	1.2
Ci_{max} (nF)		Li_{max} (μH)		
0		10		

Explosion-proof

Transmitter with 4 … 20 mA output signal and HART communication, and fieldbus transmitter (PROFIBUS PA/FOUNDATION Fieldbus):

Designation: Ex d IIC T6

Operating conditions
Ambient temperature range: -40 … 75 °C (-40 … 167 °F)

Overfill protection

Model 265Dx as part of overfill protection on containers used for storing flammable or non-flammable liquids that are hazardous to water

Flammable liquids	Only in conjunction with Ex ia approval
Total pressure	Up to 4 MPa, 40 bar, 580 psi
Sensor code	C, F, or L
Filling liquid	Silicone oil
Process temperature limits	-40 ... 85 °C (-40 ... 185 °F)
Approval	Z-65.11-271

9 Specifications

9.1 Functional specifications

Measured variable
265Dx: Differential pressure, negative pressure, gauge pressure
265VS: Absolute pressure

Measuring range and span limits

Sensor code	Upper range limit (URL)	Lower range limit (LRL)	Minimum measuring span	
			265Dx	265VS
A	1 kPa 10 mbar 4 in H_2O	-1 kPa -10 mbar -4 in H_2O	0.05 kPa 0.5 mbar 0.2 in H_2O	
C	6 kPa 60 mbar 24 in H_2O	-6 kPa -60 mbar -24 in H_2O	0.2 kPa 2 mbar 0.8 in H_2O	
F	40 kPa 400 mbar 160 in H_2O	-40 kPa -400 mbar -160 in H_2O	0.4 kPa 4 mbar 1.6 in H_2O	2 kPa 20 mbar 15 mmHg
L	250 kPa 2,500 mbar 1,000 in H_2O	-250 kPa -2,500 mbar -1,000 in H_2O	2.5 kPa 25 mbar 10 in H_2O	12.5 kPa 125 mbar 93.76 mmHg
N	2,000 kPa 20 bar 290 psi	-2,000 kPa -20 bar -290 psi	20 kPa 0.2 bar 2.9 psi	100 kPa 1 bar 14.5 psi
R	10,000 kPa 100 bar 1,450 psi	-10,000 kPa -100 bar -1,450 psi	100 kPa 1 bar 14.5 psi	

IMPORTANT (NOTE)
The lower range limit (LRL) for 265VS is absolute 0 for all measuring ranges.

Span limits
Maximum span = URL = Upper range limit
265Dx
Linear/freely programmable characteristic: Within the range limits, may be adjusted up to ± upper range limit
Sample setting: -400 ... 400 mbar
Square root characteristic: Sample setting: 0 ... 400 mbar
(Recommendation for square root function: At least 10 % of upper range limit (URL)).
265VS
Linear/freely programmable characteristic: Sample setting: 0 … 400 mbar abs.

To optimize performance characteristics, it is recommended that you select the transmitter sensor with the lowest turndown ratio.

Zero position suppression and elevation
(265VS: Zero position suppression only)
The zero position and span can be set to any value within the range limits listed in the table if:
- Set span ≥ minimum span

Damping
Adjustable time constant: 0 … 60 s
This is in addition to the sensor response time.

Second sensor for absolute pressure measurement (265Dx)
Measuring range: 41 MPa, 410 bar, 5,945 psi
(0.6 MPa, 6 bar, 87 psi for sensor code A)

Warm-up time
According to technical data, ready for operation in ≤ 2.5 s after switching on the transmitter, with minimum damping.

Insulation resistance
>100 MΩ at 500 V DC (between terminals and ground)

9.2 Operating limits

9.2.1 Temperature limits in °C (°F)

	Ambient temperature range
Operating temperature	-40 … 85 °C (-40 … 185 °F)
LCD display	-20 … 70 °C (-4 … 158 °F)
Viton seals	-20 ... 85 °C (-4 ... 185 °F)
PTFE seals	-20 ... 85 °C (-4 ... 185 °F)

IMPORTANT (NOTE)
In the case of applications in potentially explosive atmospheres, the temperature range specified on the relevant certificate/approval must be observed.

	Process temperature range
Silicone oil	-40 ... 120 °C (-40 ... 248 °F) 1) For operating pressures ≥ 10 kPa abs., 100 mbar abs., 1.45 psia
Carbon fluoride (265Dx only)	-40 ... 120 °C (-40 ... 248 °F) 2) For operating pressures ≥ atmospheric pressure
Viton seals	-20 ... 120°C (-4 ... 248 °F)
PTFE seals	-20 ... 85°C (-4 ... 185 °F)

1) ≤ 85 °C (185 °F) for operating pressures below 10 kPa, 100 mbar abs., 1.45 psia up to 3.5 kPa abs., 35 mbar abs., 0.5 psia
2) ≤ 85 °C (185 °F) for operating pressures below atmospheric pressure up to 40 kPa abs., 400 mbar abs., 5.8 psia

	Storage temperature range
Storage temperature	-50 ... 85 °C (-58 ... 185 °F)
LCD display	-40 ... 85 °C (-40 ... 185 °F)

	Humidity during storage
Relative humidity	Up to 75 %

9.2.2 Pressure limits

IMPORTANT (NOTE)
When testing pressure on the pressure transmitter, please ensure that you observe the overpressure limits.

Overpressure limits
(without damage to the transmitter)

265Dx transmitter	Overpressure limits
Silicone oil for sensor code A	0.5 kPa abs., 5 mbar abs., 0.07 psia up to 0.6 MPa, 6 bar, 87 psi
Carbon fluoride for sensor code A	40 kPa abs., 400 mbar abs., 5.8 psia up to 0.6 MPa, 6 bar, 87 psi
Silicone oil for sensor code C ... R	0.5 kPa abs., 5 mbar abs., 0.07 psia up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected
Carbon fluoride for sensor code C ... R	40 kPa abs., 400 mbar abs., 5.8 psia up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected

265VS transmitter	Overpressure limits
Sensor code F ... N	Absolute 0 up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected

Static pressure

The 265Dx transmitter operates within the specifications with the following limits:

265Dx transmitter	Static pressure
Silicone oil for sensor code A	3.5 kPa abs., 35 mbar abs., 0.5 psia up to 0.6 MPa, 6 bar, 87 psi
Carbon fluoride for sensor code A	40 kPa abs., 400 mbar abs., 5.8 psia up to 0.6 MPa, 6 bar, 87 psi
Silicone oil for sensor code C ... R	3.5 kPa abs., 35 mbar abs., 0.5 psia up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected
Carbon fluoride for sensor code C ... R	40 kPa abs., 400 mbar abs., 5.8 psia up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected

265VS transmitter	Static pressure
Sensor code F ... N	Absolute 0 up to 16 MPa, 160 bar, 2320 psi, or 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi depending on code variant selected

Test pressure

For pressure testing purposes, the 265Dx transmitter can withstand a pressure test (applied simultaneously at both sides) of up to 1.5 times the nominal pressure (static pressure range) of the transmitter (265VS up to max. 1.0 x nominal pressure).

9.3 Environmental limits

Electromagnetic compatibility (EMC)

Conforms to the requirements and tests for EMC Directive 2004/108/EC, as well as to EN 61000-6-3 concerning emitted interference and EN 61000-6-1. EN 61000-6-2 concerning interference immunity.
Meets NAMUR recommendations.

Low Voltage Directive

Complies with 2006/95/EC.

Pressure Equipment Directive (PED)

Instruments with a maximum operating pressure of 25 MPa, 250 bar, 3,625 psi, or 41 MPa, 410 bar, 5,945 psi, comply with Directive 97/23/EC Category III, module H.

Humidity

Relative humidity:	Up to 100 %
Condensation, icing:	Permissible

Vibration resistance

Acceleration up to 2 g at frequencies up to 1,000 Hz (according to IEC 60068-2-6).

Shock resistance (acc. to IEC 60068-2-27)

Acceleration:	50 g
Duration:	11 ms

Protection type (humid and dusty atmospheres)

The transmitter is dust and sand-tight, and is protected against immersion effects as defined by the following standards:

- IEC EN 60529 (1989) with IP 67 (with IP 68 on request)
- NEMA 4X
- JIS C0920

9.4 Electrical data and options

9.4.1 HART digital communication and 4 ... 20 mA output current

Power supply
The transmitter operates from 10.5 ... 45 V DC with no load and is protected against reverse polarity connection (additional load allows operations over 45 V DC).
With a backlit LCD display, the minimum voltage is 14 V DC.
For Ex ia and other intrinsically safe approved versions, the supply voltage must not exceed 30 V DC.

Ripple
Maximum permissible supply voltage ripple during communication: Complies with HART FSK "Physical Layer" specification rev. 8.1.

Load limitations
Total loop resistance at 4 ... 20 mA and HART:

$$R(k\Omega)\ \frac{\text{Voltage supply} - \text{Minimum operating voltage (VDC)}}{22{,}5\ \text{mA}}$$

IMPORTANT (NOTE)
A minimum resistance of 250 Ω is required for HART communication.

LCD display (optional)
19-segment alphanumeric display (two lines, six characters) with additional bar chart display; option of backlighting for customized display of:
- Output current in percent
- Output current in mA
- Freely selectable process variable

Diagnostic messages, alarms, measuring range upper limit violations, and changes to the configuration are also displayed.

Output signal
4 … 20 mA two-wire output, linear output signal,
horizontal cylindrical container, spherical vessel, or freely programmable characteristic with 20 reference points.
Additionally, the following can be selected for the 265Dx:
Square root output signal or exponents 3/2 or 5/2
HART® communication provides digital process variables (%, mA or engineering units) superimposed on the 4 ... 20 mA signal (protocol according to Bell 202 FSK standard).

Output current limits (according to NAMUR standard)
Overload condition:
– Lower limit: 3.8 mA (configurable up to 3.5 mA)
– Upper limit: 20.5 mA (configurable up to 22.5 mA)

Alarm current

Minimum alarm current:	Can be configured from 3.5 ... 4 mA; Default setting: 3.6 mA
Maximum alarm current:	Can be configured from 20 ... 22.5 mA; Default setting: 21 mA
Default setting:	Maximum alarm current

SIL: Functional safety (optional)
According to IEC 61 508/61 511
Device with certificate of conformity for use in safety-related applications, up to and including SIL 2.

9.4.2 PROFIBUS PA output

Model
Pressure transmitter conforming to Profile 3.0, Class A and B;
ID number 04C2 HEX

Supply power
The transmitter is operated at 10.2 … 32 V DC (no polarity).
The supply voltage must not exceed 17.5 V DC when used in Ex ia zones.
Intrinsically safe installation in accordance with FISCO model.

Current consumption

Operating (quiescent):	11.7 mA
Fault current limit value:	Maximum 17.3 mA

Output signal
Physical layer in accordance with IEC 1158-2/EN 61158-2; transmission using Manchester II modulation at 31.25 kbit/sec.

Output interface
PROFIBUS PA communication according to Profibus DP50170 Part 2/DIN 19245 Part 1-3

Output cycle time
40 ms

Function blocks
265Dx: 2 standard analog input function blocks
265VS: 1 standard analog input function block
1 transducer block
1 physical block

LCD display (optional)
19-segment alphanumeric display (two lines, six characters) with additional bar chart display; option of backlighting.
Customized display:
Output value in percent or OUT (analog input)
Diagnostic messages, alarms, measuring range upper limit violations, and changes to the configuration are also displayed.

Transmitter interference mode
Permanent self-diagnosis; potential errors indicated in diagnostic parameters and in the status of process values.

9.4.3 FOUNDATION Fieldbus output

Supply power
The transmitter is operated at 10.2 … 32 V DC (no polarity).
The supply voltage must not exceed 17.5 V DC when used in Ex ia zones.
Intrinsically safe installation in accordance with FISCO model.

Current consumption

Operating (quiescent):	11.7 mA
Fault current limit value:	Maximum 17.3 mA

Output signal
Physical layer in accordance with IEC 1158-2/EN 61158-2; transmission using Manchester II modulation at 31.25 kbit/sec.

Function blocks/execution time
265Dx: 2 standard analog input function blocks/maximum 25 ms
265VS: 1 standard analog input function block/maximum 25 ms
1 standard PID function block

Additional blocks
1 manufacturer-specific pressure with calibration transducer block
1 enhanced resource block

Number of link objects
10

Number of VCRs
16

Output interface
FOUNDATION Fieldbus digital communication protocol in accordance with standard H1; complies with specification V. 1.5.
FF registration no.: IT023600

LCD display (optional)
19-segment alphanumeric display (two lines, six characters) with additional bar chart display; option of backlighting.
Customized display:
Output value in percent or OUT (analog input)
Diagnostic messages, alarms, measuring range upper limit violations, and changes to the configuration are also displayed.

Transmitter interference mode
Permanent self-diagnosis; potential errors indicated in diagnostic parameters and in the status of process values.

9.5 Measuring accuracy

Reference conditions according to IEC 60770

- Ambient temperature T_U = constant, in range: 18 ... 30 °C (64 ... 86 °F)
- Relative humidity = constant, in range: 30 ... 80 %
- Atmospheric pressure P_U = constant, in range: 950 ... 1,060 mbar
- Position of measuring cell (isolating diaphragm areas): vertical ±1 °
- Span based on zero position
- Isolating diaphragm material: Hastelloy C276TM
- Filling liquid: Silicone oil
- Supply voltage: 24 V DC
- Load with HART: 250 Ω
- Transmitter not grounded
- Characteristic setting: linear, 4 ... 20 mA

Unless otherwise specified:
- The reference conditions apply for the following performance characteristics.
- Errors are given as a percentage of the span value.

The accuracy of the measurement in relation to the upper range limit (URL) is affected by the turndown (TD); i.e., the ratio of the upper range limit (URL) to the set span (URL/span).

IMPORTANT (NOTE)
Select the transmitter sensor with the smallest possible turndown. This optimizes the accuracy of the measurement.

Dynamic response (according to IEC 61298-1)
Devices with standard configurations and a turndown of up to 30:1, plus linear output characteristics.

Reaction time:	30 ms
Time constant (63 %)	150 ms (sensors F to R) 400 ms (sensor C) 1,000 ms (sensor A)

Measuring error (for setting cut-off point)
Percentage of set span, consisting of non-linearity, hysteresis, and non-reproducibility.
In the case of fieldbus devices, SPAN refers to the analog input function block output scale range.

Measurement deviation for differential pressure sensor (265Dx / 265VS)

Turndown	Measuring error
1:1 to 10:1	± 0.04 %
>10:1	±(0.04 + 0.005 x TD - 0.05) %

Measurement deviation for absolute pressure sensor (265Dx)

	Measuring error
-	80 kPa, 800 mbar, 321 in H_2O
For sensor code A with absolute pressure sensor 0.6 kPa, 6 bar, 87 psi	1.2 kPa, 12 mbar, 4.8 in H_2O

9.6 Operating influences

9.6.1 Operating influences 265Dx

Thermal change in ambient temperature on the zero signal and span (turndown up to 15:1), in relation to the set span.
Differential pressure sensor:

Range	Maximum effect on zero signal and span
-10 ... 60 °C (14 ... 140 °F)	± (0.06 % x TD + 0.05 %)
-40 ... -10 °C (-40 ... 14 °F) and 60 ... 80 °C (140 ... 176 °F)	± (0.025 % / 10 K x TD + 0.03 % / 10 K)

Absolute pressure sensor
For the entire temperature range of 120 K
- **Zero signal**
  For sensors C, F, L, N, R:
  40 kPa, 400 mbar, 160 in H_2O
  (absolute pressure sensor 41 MPa, 410 bar, 5,945 psi)
  For sensor A:
  0.6 kPa, 6 mbar, 2.4 in H_2O
  (absolute pressure sensor 0.6 MPa, 6 bar, 87 psi)
- **Span**
  For sensors C, F, L, N, R:
  0.3 kPa, 3 bar, 43.5 psi
  (absolute pressure sensor 41 MPa, 410 bar, 5,945 psi)
  For sensor A:
  4.5 kPa, 45 mbar, 18 in H_2O
  (absolute pressure sensor 0.6 MPa, 6 bar, 87 psi)

Static pressure (zero signal errors may be calibrated out at operating pressure)

Measuring range	Sensor A	Sensor C, F, L, N	Sensor R
Zero signal	Up to 2 bar: 0.05 % URL	Up to 100 bar: 0.05 % URL	Up to 100 bar: 0.1 % URL
	> 2 bar: 0.05 % URL/bar	> 100 bar: 0.05 % URL/100 bar	> 100 bar: 0.1 % URL/100 bar
Span	Up to 2 bar: 0.05 % span	Up to 100 bar: 0.05 % span	Up to 100 bar: 0.1 % span
	> 2 bar: 0.05 span/bar	> 100 bar: 0.05 % span/100 bar	> 100 bar: 0.1 % span/100 bar

Supply power
Within the specified limits for the voltage/load, the total effect is less than 0.001 % of the upper range limit per volt.

Load
Within the specified load/voltage limits, the total effect is negligible.

Electromagnetic fields
Total effect: Less than 0.05 % of span between 80 and 1,000 MHz and at field strengths of up to 10 V/m, when tested with unshielded cables, and either with or without a display.

Installation position
Rotations in the plane of the diaphragm have a negligible effect. A tilt from the vertical causes a zero shift of sin a x 0.35 kPa (3.5 mbar, 1.4 in H_2O) of the upper range limit, which can be corrected using an appropriate zero position adjustment. There is no effect on the span.

Long-term stability
Sensor code C … R:
± (0.05 x TD) % / year
± (0.15 x TD) % / 5 years

Sensor code A:
± (0.2 x TD) % / year
± (0.3 x TD) % / 5 years

Vibration effect
± 0.10 % of upper range limit (according to IEC 61298-3)

Total performance
similar to DIN 16086
Temperature change in the range -10 ... 60 °C (14 ... 140 °F), up to 10 MPa, 100 bar, 1,450 psi static pressure (sensors C ... R):
± 0.13 % of the set span (TD 1:1)

The Total performance includes the measuring deviation (non-linearity including hysteresis and non-reproducibility), the thermal change in the ambient temperature on the zero signal and span, as well as the effect of the static pressure on the zero signal and span.

$$E_{perf} = \sqrt{(E_{\Delta\vartheta 1} + E_{\Delta\vartheta 2})^2 + E_{Pstat1}{}^2 + E_{Pstat2}{}^2 + E_{lin}{}^2}$$

E_{perf} = Base accuracy
$E_{\Delta\vartheta 1}$ = Effect of the ambient temperature on the zero signal
$E_{\Delta\vartheta 2}$ = Effect of the ambient temperature on the span
E_{Pstat1} = Effect of the static pressure on the zero signal
E_{Pstat2} = Effect of the static pressure on the span
E_{lin} = Measuring deviation (for terminal-based conformity)

9.6.2 Effects on 265VS operation

Thermal change in ambient temperature on the zero signal and span (turndown to 15:1) in relation to the set span

Range	Maximum effect on zero signal and span
-10 … 60 °C (14 … 140 °F)	± (0.1 % x TD + 0.1 %)
-40 … -10 □ (-40 … 14 °F) and 60 … 80 °C (140 … 176 °F)	± (0.05 % / 10 K x TD + 0.05 % / 10 K)

Supply power
Within the specified limits for the voltage / load, the total effect is less than 0.001 % of the upper range limit per volt.

Load
Within the specified load / voltage limits, the total effect is negligible.

Electromagnetic fields
Total effect: less than 0.05 % of span from 80 … 1000 MHz and for field strengths up to 10 V/m when tested with unshielded conduit, with or without meter.

Installation position
Rotations in the plane of the diaphragm have a negligible effect.
A tilt from the vertical causes a zero shift of sin α x 0.35 kPa (3.5 mbar, 1.4 in H_2O) of the upper range limit, which can be corrected using an appropriate zero position adjustment. There is no effect on the span.

Long-term stability
±(0.05 x TD) % / year
±(0.15 x TD) % / 5 years

Vibration effect
±(0.10 x TD) % acc. to IEC 61298-3.

Total performance
similar to DIN 16086
Temperature change in the range -10 … 60 °C (14 … 140 °F):
±0.2 % of the set span (TD 1:1)

The Total performance accuracy includes the measurement deviation (non-linearity including hysteresis and non-reproducibility), as well as the thermal change in the ambient temperature on the zero signal and span.

$$E_{perf} = \sqrt{(E_{\Delta\vartheta 1} + E_{\Delta\vartheta 2})^2 + E_{lin}{}^2}$$

E_{perf} = Base accuracy
$E_{\Delta\vartheta 1}$ = Effect of the ambient temperature on the zero signal
$E_{\Delta\vartheta 2}$ = Effect of the ambient temperature on the span
E_{lin} = Measurement deviation (for terminal based conformity))

9.7 Technical specification

IMPORTANT (NOTE)
Please refer to the ordering information to check the availability of different versions of the relevant model.

Materials

Isolating diaphragms 1)	Hastelloy C276™; stainless steel (1.4435); Monel 400™; Tantal
Process flange, adapter, plugs, and drain / vent valves 1)	Hastelloy C276™; stainless steel (1.4404); Monel 400™; Kynar (PVDF)
Sensor filling liquid	Silicone oil, inert filling (carbon fluoride)
Sensor housing	Stainless steel (316L / 1.4404)
Mounting bracket	Stainless steel
Seals 1)	Viton™ (FPM) color: Green; Buna (NBR): Color: Black; EPDM color: Black; PTFE color: White (for sensors C, F, L, N, R) or PEP-coated Viton™ Color: Gray (for sensor A)
Screws and nuts	Stainless steel, Class A4-70 screws and nuts to ISO 3506, in compliance with NACE MR0175 Class II
Electronics housing and cover	Barrel design • Aluminum alloy with low copper content (< 0.1 %), baked epoxy finish • Stainless steel (316L/1.4404) DIN design • Aluminum alloy with low copper content (< 0.1 %), baked epoxy finish
O-ring cover	Viton™
Local zero and span adjustments	Fiber glass-reinforced polycarbonate plastic (removable), no adjustment options for stainless steel housings
Name plate	Stainless steel (304 / 1.4301) or plastic data plate attached to the electronics housing

TM Hastelloy is a Cabot Corporation trademark
TM Monel is an International Nickel Co. trademark
TM Viton is a DuPont de Nemours trademark

1) Transmitter wetted parts

Calibration

Standard:	0 to upper range limit (URL) for ambient temperature and atmospheric pressure
Optional:	To specified span

Optional accessories

Mounting bracket	For vertical and horizontal 60 mm (2") pipes or wall mounting
LCD display	Pluggable and rotatable design
Additional tag, e.g., for indicating measuring points	Tag with wire (both stainless steel) attached to the transmitter, with a maximum of 30 characters including spaces.
Lightning protection	Up to 4 kV • Voltage pulses: 1.2 µs rise time; 50 µs delay time at half value • Current pulses: 8 µs rise time; 20 µs delay time at half value Not available for devices with ATEX-Ex nA or PROFIBUS PA / FOUNDATION Fieldbus featuring ATEX-Ex i or FM intrinsically safe designs.

Oil- and grease-free for oxygen applications
Preparation for hydrogen applications
Certificates (test, design, characteristics, material traceability)

Process connections
Flange:
1/4-18 NPT on the process axis; can be selected with 7/16- 20 UNF fastening screw thread, DIN 19213 connection with M10 fastening screw thread for operating pressures of up to 16 MPa, 160 bar, 2320 psi or M12 fastening screw thread for higher operating pressures of up to 41 MPa, 410 bar, 6000 psi
Adapter:
1/2-14 NPT on the process axis. Center distance between flanges: 54 mm (2.13 inch); 51, 54, or 57 mm (2.01, 2.13, or 2.24 inch) for adapter fittings.

Electrical connections
Two 1/2 - 14 NPT or M20 x 1.5 threaded bores for cable glands directly on housing, or plug connector
- HART: Straight or angled Harting Han 8D (8U) connector and one mating plug.
- FOUNDATION Fieldbus/PROFIBUS PA; 7/8" plug/M12 x 1

Terminals
HART version: Four terminals for signal/external display, for wire cross sections of up to 2.5 mm^2 (14 AWG), and four connection points for testing and communication purposes.
Fieldbus versions: Two signal terminals (bus connection) for wire cross sections of up to 2.5 mm^2 (14 AWG)

Grounding
Internal and external ground terminals for wire cross sections of up to 4 mm^2 (12 AWG) are provided.

Installation position
The transmitter can be installed in any position. The electronics housing may be rotated 360 °. A stop is provided to prevent overturning.

Weight (without options)
Approx. 3.5 kg (7.72 lb), additional 1.5 kg (3.31 lb) for stainless steel housing
Additional 0.65 kg (1.43 lb) for packaging

Packaging
Carton with dimensions of approx. 230 x 250 x 270 mm (9.06 x 9.84 x 10.63 inch)

9.8 Mounting dimensions (not design data)

9.8.1 Differential pressure transmitter with barrel housing

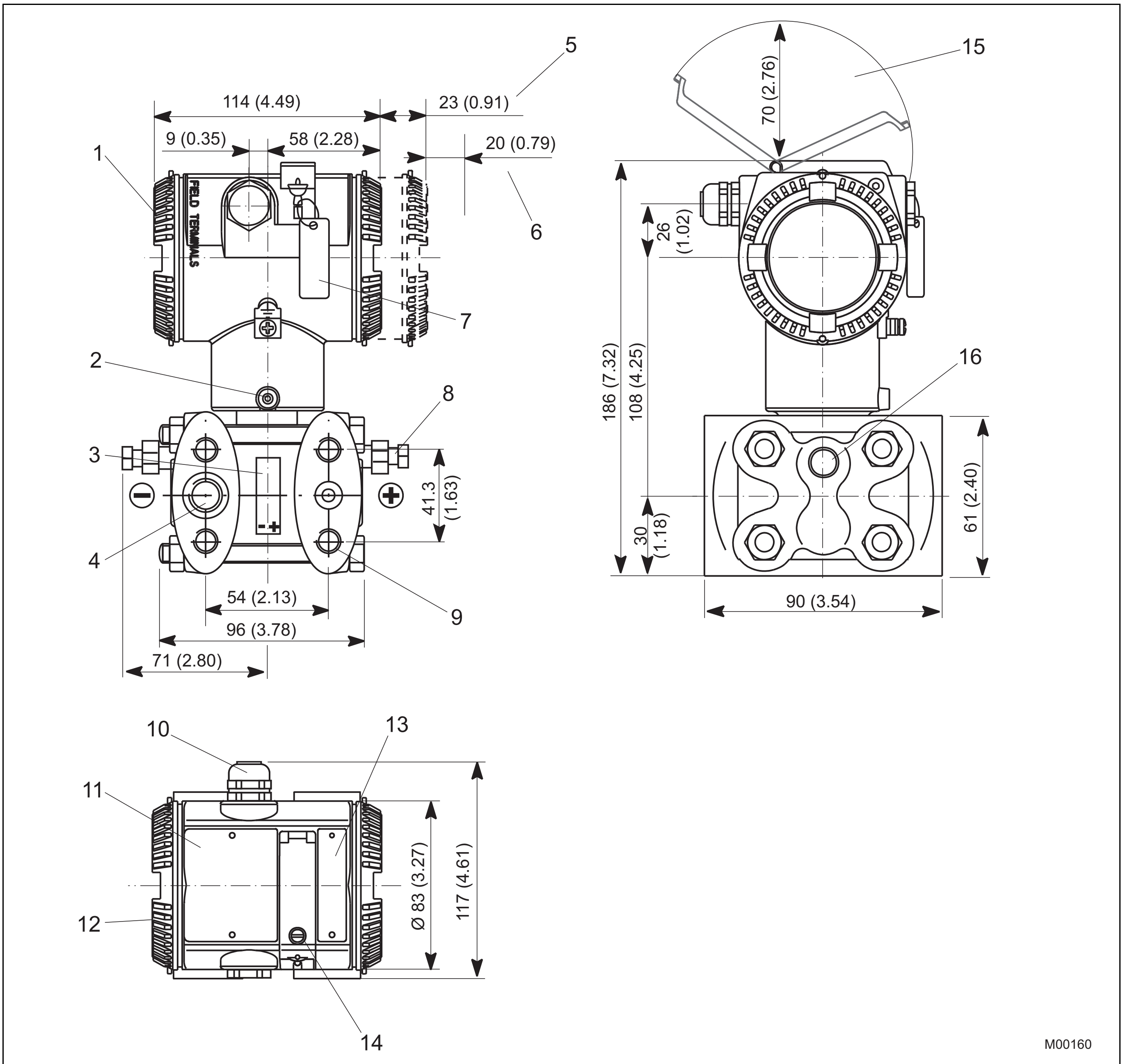

Fig. 23: Dimensions in mm (inches), deviations in the drawing are possible

1 Terminal side
2 Housing stop-screw
3 Sensor plate
4 Process connection (conforms to IEC 61518)
5 With LCD display
6 Space for removing the cover required
7 Additional tag plate, e. g. for marking measuring points (optional)
8 Drain / vent valve (optional)
9 Thread for fixing screws
(see "Process connections" data)
10 Electrical connection
11 Name plate
12 Housing cover
13 Plate with key legend, etc.
14 Captive fixing screw for keyboard cover
15 Space for rotating the keyboard cover required
16 Upper or lower threaded bore (optional); 1/4-18 NPT for drain/vent valve

9.8.2 Differential pressure transmitter with DIN housing

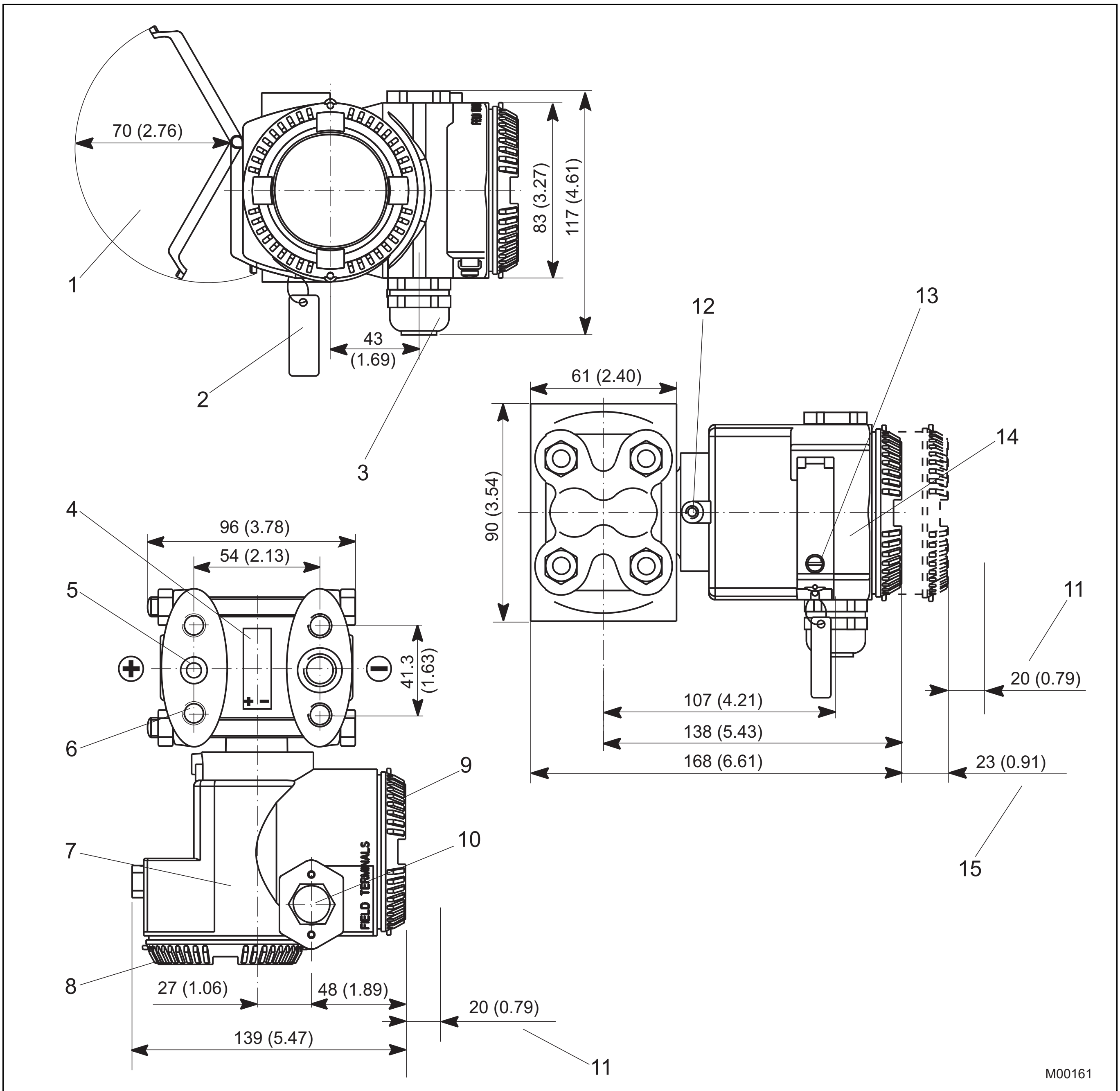

Fig. 24: Dimensions in mm (inches), deviations in the drawing are possible

1 Space for rotating the keyboard cover required
2 Additional tag plate, e. g. for marking measuring points (optional)
3 Electrical connection
4 Sensor plate
5 Process connection (conforms to IEC 61518)
6 Thread for fixing screws (see "Process connections" data)
7 Name plate
8 Housing cover
9 Terminal side
10 Electrical connection (blind plug)
11 Space for removing the cover required
12 Housing stop-screw
13 Captive fixing screw for keyboard cover
14 Plate with key legend, etc.
15 With LCD display

9.9 Mounting options with bracket

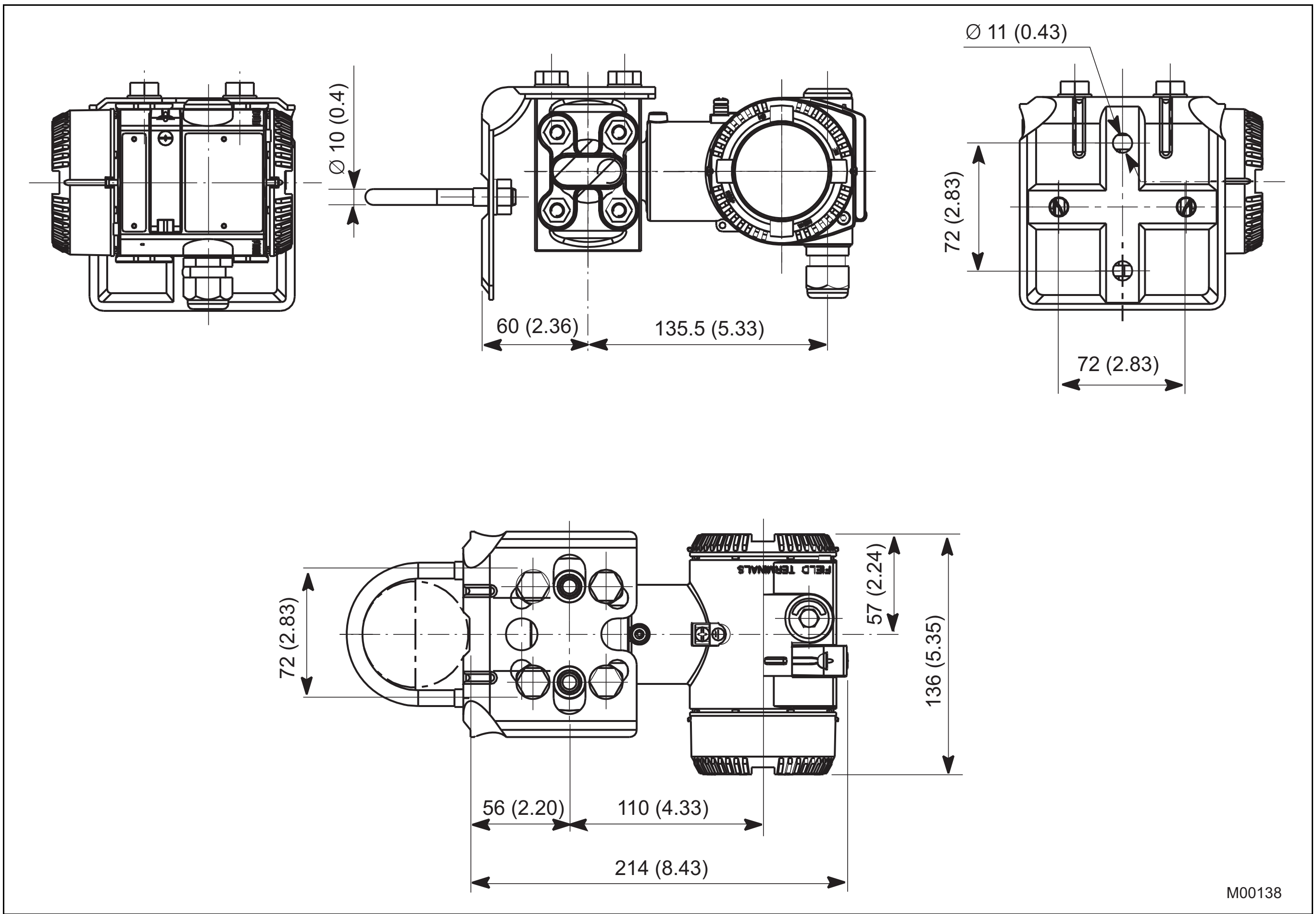

Fig. 25: Dimensions in mm (inches), deviations in the drawing are possible

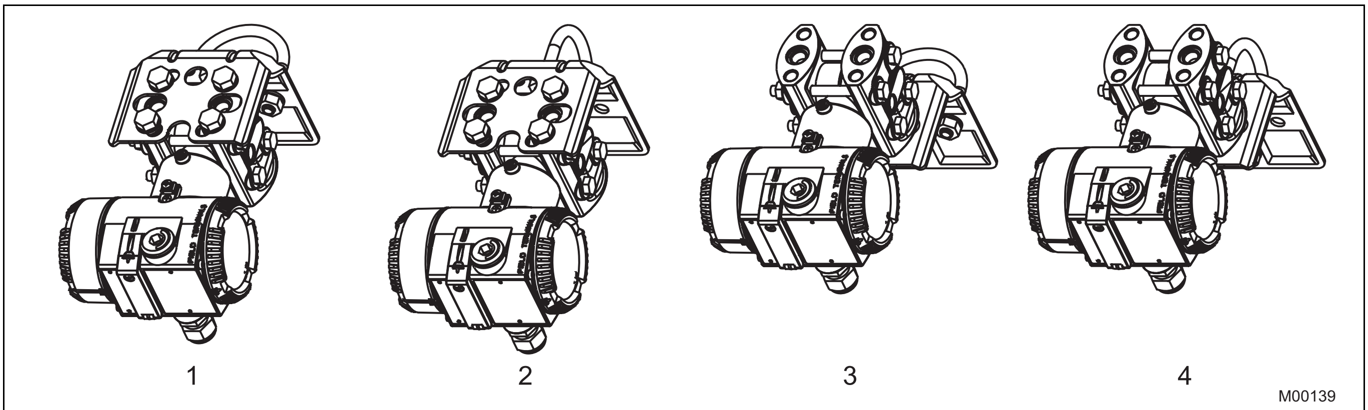

Fig. 26: Deviations in the drawing are possible

1 Vertical pipe mounting
2 Horizontal pipe mounting
3 Vertical pipe mounting and transmitter above the mounting bracket
4 Horizontal pipe mounting and transmitter above the mounting bracket

10 Maintenance / Repair

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". 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.

NOTICE - Potential damage to parts

If a remote seal is mounted on the measuring equipment, it must not be removed.

WARNING - General risks!

Explosion-proof transmitters must be either repaired by the manufacturer or approved by a certified expert following repair work. The relevant safety precautions must be taken before, during, and after repair work.

Only disassemble the transmitter to the extent necessary for cleaning, inspection, repairs, and replacement of damaged components.

Returns

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

IMPORTANT (NOTE)

Please use the form for returned products, provided in the Appendix.

This helps us to perform repairs quickly and without the need to contact you for further details. Before you return the device, please clean it and pack it safely and securely. When ordering spare parts or replacement devices, please quote the serial number (S/N) of the original device as well as the year of manufacture (Yr.).

10.1 Removal

WARNING - General dangers!
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.

10.1.1 Removing/Installing the process flange

NOTICE - Risk of irreparable damage to measuring system!
If remote seals are mounted on the measuring cell, the process flanges must not be removed.

1. Slacken the process flange screws by working on each in a crosswise manner (hexagon head, SW 13 mm (0.51 inch)).
2. Carefully remove the process flange, making sure that the isolating diaphragms are not damaged in the process.
3. Use a soft brush and suitable solvent to clean the isolating diaphragms and - if necessary - the process flange.

NOTICE - Potential damage to parts!
Do not use sharp or pointed tools.

4. Insert the new process flange O-rings in the process flange.
5. Attach the process flange to the measuring cell.

NOTICE - Potential damage to parts!
Do not damage the isolating diaphragms.

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

6. Check that the process flange screw thread can move freely: Manually turn the nut until it reaches the screw head. If this is not possible, use new screws and nuts.
7. Lubricate the screw thread and seats of the screw connection using, for example, "Anti-Seize AS 040 P" (supplier: P.W. Weidling & Sohn GmbH & Co. KG, Münster, Germany).

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

8. Screw torques

The following procedures apply to process flange screws and nuts:

- 265Dx / 265VS transmitters; all measuring ranges [1]:

  Pretightening to 2 Nm (working crosswise).

  Pretightening to 10 Nm / 1.0 kpm (working crosswise) and then tightening by the tightening angle αA = 180°, working in two stages of 90° (in the case of M10: 3 x 90°) for each screw, and working crosswise.
- Adapter flange / Nozzle traverse / valve block attachment

  Pretightening, hand-tight (working crosswise).

  Pretightening to 10 Nm / 1.0 kpm (working crosswise).

  Final tightening to 50 Nm / 5.0 kpm (working crosswise).

9. Check the tightness of the connection:

Apply a maximum pressure of 1.3 x PN (nominal pressure) to the 265Dx; pressure should be applied to both sides of the measuring equipment at the same time.

Apply a maximum pressure of 1.0 x PN (nominal pressure) to the 265VS.

10. Checking the lower and upper range limit values

Use the buttons on the control unit or, if available, an LCD display or graphical user interface (DTM) to check the "lower range limit value" and "upper range limit value" as outlined in the paragraph "Configuration".

1) 265Dx transmitter, PN 6, measuring range 10 mbar, up to and including Nov. 2007 (can be recognized by central measuring equipment weld seam):
Pretightening to 2 Nm (working crosswise).
Final tightening to 10 Nm / 1.0 kpm (working crosswise).

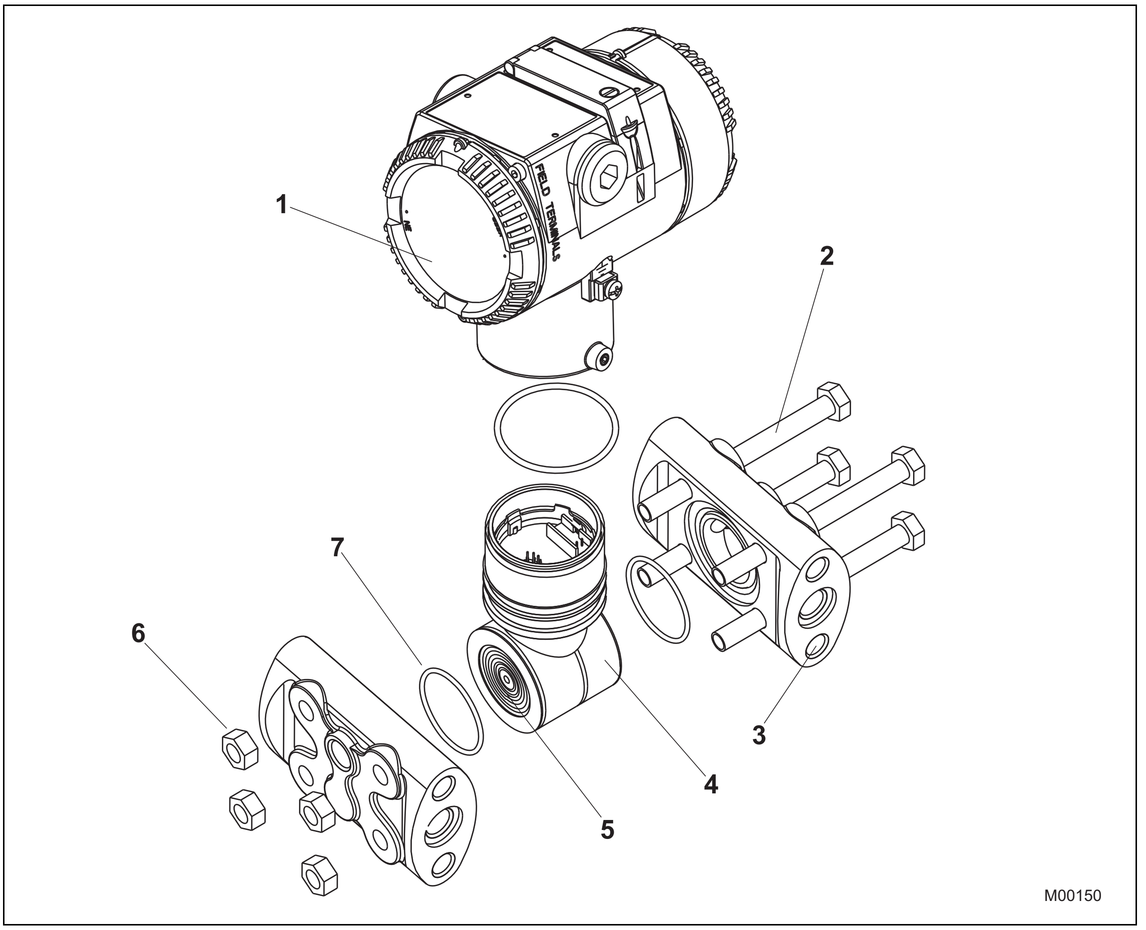

Fig. 27: Exploded view

1 Housing
2 Process flange screws
3 Process flange
4 Measuring cell
5 Isolating diaphragm
6 Nuts
7 Process flange O-rings

10.1.2 Removing the electronics

If the electronics housing needs to be unscrewed from the measuring equipment/measuring cell, the electronics must first be removed from their housing to prevent them from being damaged.

1. First, unscrew the housing cover.

IMPORTANT (NOTE)
Please note that a locking screw is used (see "Securing the housing cover with Ex d").

2. Following this, remove the LCD display (if present) from the electronics. To do this, slacken the two screws.
3. Slacken the two fixing screws for the electronics and carefully remove the electronics from their housing.
4. Remove both plugs from the electronics. Both plugs feature mechanical polarity protection, and the smaller of the two also has a mechanical locking device.
5. Grasp the two plugs from the front between your thumb and forefinger, and push them together. This opens the locking device.
6. Pull the plug out of the socket. Place the electronics on a suitable surface.
7. Unscrew the electronics housing from the measuring equipment / measuring cell.

11 Appendix

11.1 Approvals and certifications

	Symbol	Description
CE mark		The CE mark indicates that the device complies with the following directives and their basic safety requirements: • CE mark on the name plate of the pressure transmitter – Conforms to EMC Directive 2004/108/EC – Conforms to Low Voltage Directive 2006/95/EC – Conforms to Pressure Equipment Directive (PED) 97/23/EC By placing the CE mark on its devices, ABB Automation Products GmbH declares that they conform to these directives.
Explosion protection approvals		This symbol indicates devices with an explosion-proof design. With Ex designs, if this symbol appears on an additional name plate it means that the following also applies: – Conformity to ATEX Directive 94/9/EC By placing the Ex mark on its devices, ABB Automation Products GmbH declares that they conform to this directive.

IMPORTANT (NOTE)

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/pressure

ABB

EG-KONFORMITÄTSERKLÄRUNG

EC DECLARATION OF CONFORMITY
ATTESTATION DE CONFORMITE C.E.

Hersteller: *Manufacturer / Fabricant:*	**ABB Automation Products GmbH** **Minden**
Anschrift: *Address / Adresse:*	**Schillerstraße 72** **D-32425 Minden**
Produktbezeichnung: *Product name:* *Désignation du produit:*	**Druck-Messumformer - 265A, 265D, 265G, 265J, 265V, 267/269C, 267/269J** *Pressure Transmitter – 265A, 265D, 265G, 265J, 265V, 267/269C, 267/269J* *Transmetteur de Pression – 265A, 265D, 265G, 265J, 265V, 267/269C, 267/269J*

Das Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:
This product meets the requirements of the following European directives:
Les produits répondent aux exigences des Directives C.E. suivantes:

2004/108/EG *2004/108/EC* *2004/108/CE*	**EMV-Richtlinie *** *Electromagnetic Compatibility Directive ** *Directives concernant la compatibilité électromagnétique **	
2006/95/EG *2006/95/EC* *2006/95/CE*	**Niederspannungsrichtlinie *** *EC-Low-Voltage Directive ** *Directives concernant la basse tension **	
97/23/EG *97/23/EEC* *97/23/C.E.E.*	**Druckgeräterichtlinie, Kategorie III Modul H** *Pressure Equipment Directive, Category III Module H* *Directive Equipements sous Pression, Catégorie III Module H*	**(für Druck PS > 200bar)** *(for pressure PS > 200 bar)* *(pour pression PS > 200 bar)*
	Druck/*Pressure/Pression* **PS ≤ 200bar: SEP**	

CE 0045

Für Geräte in Ex-Ausführung gemäß Kennzeichnung auf Typschild gilt zusätzlich:
For products in Ex design according to identification on nameplate the following is additionally applicable:
Pour des produits en exécution Ex selon marque sur plaque signalétique le suivant est aussi applicable:

Ex

94/9/EG *94/9/EEC* *94/9/C.E.E.*	**ATEX-Richtlinie** *ATEX Directive* *ATEX Directive*

* **einschließlich Änderungen und deutscher Umsetzung durch das EMVG und Gerätesicherheitsgesetz**
* *including alterations and German realization by the EMC law and the instruments safety law*
* *y compris les modifications et la réalisation allemande par la loi cocernant la compatibilité électromagnétique et la sécurité d'appareils*

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:
Conformity with the requirements of these Directives is proven by complete adherence to the following standards:
La conformité avec les exigences de ces directives est prouvée par l'observation complète des normes suivantes:

EN 61 000-6-1 / EN 61 000-6-2 / EN 61 000-6-3 / EN 61 000-6-4 / EN 61 010-1

Ex: **Es gelten die Normen der entsprechenden EG-Baumusterprüfbescheinigungen**
The standards of the relevant type-examination certificates shall apply
Il convient d'appliquer les normes des certificats d'homologation CE

15.02.2011	*Scholz*	*M. Klüppel*
Datum *Date* *Date*	**Dr. Wolfgang Scholz** **Leiter R&D** Head of R&D Responsable R&D	**Manfred Klüppel** **Leiter Qualitätssicherung** Head of Quality Assurance Responsable Assurance de la Qualité

Statement on the contamination of devices and components

Repair and / or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device / component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:	
Address:	
Contact person:	Telephone:
Fax:	E-mail:

Device details:

Type:	Serial no.:
Reason for the return/description of the defect:	

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items)?

Biological	☐	Corrosive / irritating	☐	Combustible (highly / extremely combustible)	☐
Toxic	☐	Explosive	☐	Other toxic substances	☐
Radioactive	☐				

Which substances have come into contact with the device?

1.
2.
3.

We hereby state that the devices / components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date	Signature and company stamp

12 Index

ABB has Sales & Customer Support
expertise in over 100 countries worldwide.

www.abb.com/pressure

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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