SIEMENS

SITRANS

Pressure transmitter
SITRANS P DS III

Compact Operating Instructions

Edition 06/2013

Answers for industry.

SIEMENS

SITRANS
Pressure transmitter
SITRANS P DS III (7MF4.33.. 7MF4.34.. 7MF4.35..)
Compact Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

1 Introduction

1.1 Purpose of this documentation

These instructions are a brief summary of important features, functions and safety information, and contain all information required for safe use of the device. It is your responsibility to read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons who mechanically assemble the device, connect it electrically, and start it up.

To achieve optimum usage of the device, read the detailed version of the manual.

See also

Instructions and manuals (http://www.siemens.com/processinstrumentation/documentation)

1.2 History

This history establishes the correlation between the current documentation and the valid firmware of the device.

The documentation of this edition applies to the following firmware:

Edition	Firmware identifier nameplate	System integration	Installation path for PDM
06/2013	HART: FW: 11.03.03, FW: 11.03.04, FW: 11.03.05, FW: 11.03.06 PA: FW: 301.01.10 FF: FW: 11.01.01	SIMATIC PDM 8.x	SITRANS P DSIII.2

1.3 Purpose

Overview

Depending on the version, a transmitter measures corrosive, non-corrosive and hazardous gases, vapors and liquids.

You can use the transmitter for the following types of measurement:

- Gauge pressure
- Absolute pressure
- Differential pressure

With appropriate parameter settings and the necessary add-on parts (e.g. flow orifices and remote seals), the pressure transmitter can also be used for the following measurements:

- Level
- Volume
- Mass
- Volume of flow
- Mass flow rate

The output signal is always a load-independent direct current between 4 and 20 mA.

You can install the "intrinsically-safe" or "explosion-proof" version of the transmitter in hazardous areas. The devices have an EC type examination certificate and comply with the appropriate harmonized European CENELEC directives.

Transmitters with remote seals of different shapes can be delivered for special applications. For example, measuring high-viscosity substances is a special application.

Operate the device in accordance with the specifications in Section Technical specifications (Page 35).

For additional information, please refer to the operating instructions for the device.

1.4 Checking the consignment

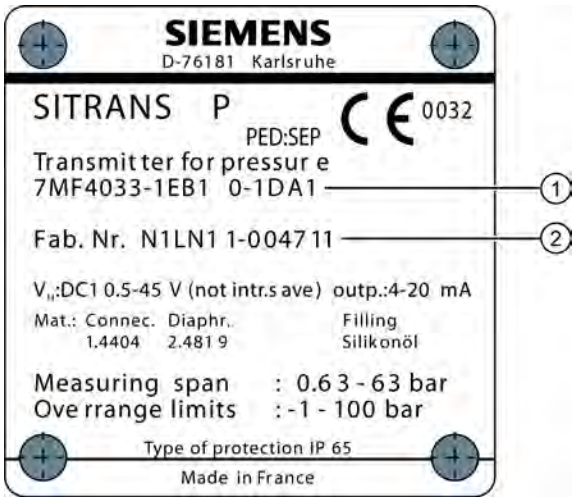
1. Check the packaging and the device for visible damage caused by inappropriate handling during shipping.
2. Report any claims for damages immediately to the shipping company.
3. Retain damaged parts for clarification.
4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

⚠ WARNING
Using a damaged or incomplete device Danger of explosion in hazardous areas. • Do not use damaged or incomplete devices.

1.5 Nameplate layout

Nameplate with general information

The nameplate bearing the Order No. and other important information, such as design details and technical data, is on the side of the enclosure.

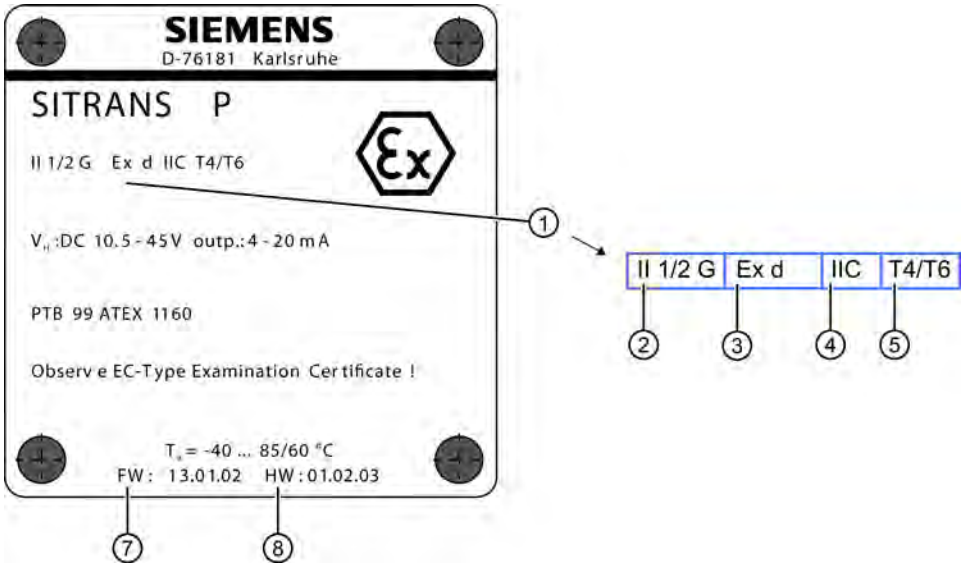


① Order number (machine-readable product code) ② Serial number

Figure 1-1 Example of a nameplate

Nameplate with approval information

On the opposite side is the nameplate with approval information. This nameplate shows e.g. the hardware and firmware versions. You must also observe the information in the relevant certificate for a transmitter version for use in hazardous areas.



	Characteristics for hazardous area	⑤	Maximum surface temperature (temperature class)
①			
②	Category for operating area	⑥	Device protection level
③	Type of protection	⑦	Firmware identifier
④	Group (gas, dust)	⑧	Hardware identifier

Figure 1-2 Example of a nameplate

1.6 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.
- Devices/replacement parts should be returned in their original packaging.
- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

CAUTION
Insufficient protection during storage The packaging only provides limited protection against moisture and infiltration. • Provide additional packaging as necessary.

Special conditions for storage and transportation of the device are listed in "Technical data" (Page 35).

1.7 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.

2 Safety instructions

2.1 Precondition for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.1.1 Warning symbols on the device

Symbol	Explanation
	Consult operating instructions

2.1.2 Laws and directives

Observe the test certification, provisions and laws applicable in your country during connection, assembly and operation. These include, for example:

- National Electrical Code (NEC - NFPA 70) (USA)
- Canadian Electrical Code (CEC) (Canada)

Further provisions for hazardous area applications are for example:

- IEC 60079-14 (international)
- EN 60079-14 (EC)

2.1.3 Conformity with European directives

The CE mark on the device is a sign of conformity with the following European directives:

Electromagnetic Compatibility EMC 2004/108/EC	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.
Atmosphère explosible ATEX 94/9/EC	Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
Pressure Equipment Directive PED 97/23/EC	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States concerning pressure equipment.

The standards applied can be found in the EC declaration of conformity for the device.

2.2 Improper device modifications

WARNING

Improper device modifications

Danger to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.

- Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

2.3 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

Operation under special ambient conditions

We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.

2.4 Use in hazardous areas

Qualified personnel for hazardous area applications

Persons who install, assemble, commission, operate and service the device in a hazardous area must have the following specific qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive and hazardous media.
- They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

WARNING

Unsuitable device for the hazardous area

Danger of explosion.

- Only use equipment that is approved for use in the intended hazardous area and labelled accordingly.

See also

Technical specifications (Page 35)

WARNING

Loss of safety of device with type of protection "Intrinsic safety Ex i"

If the device has already been operated in non-intrinsically safe circuits or the electrical specifications have not been observed, the safety of the device is no longer ensured for use in hazardous areas. There is a danger of explosion.

- Connect the device with type of protection "Intrinsic safety" solely to an intrinsically safe circuit.
- Observe the specifications for the electrical data on the certificate and in Chapter "Technical data (Page 35)".

WARNING

Use of incorrect device parts in potentially explosive environments

Devices and their associated device parts are either approved for different types of protection or they do not have explosion protection. There is a danger of explosion if device parts (such as covers) are used for devices with explosion protection that are not expressly suited for this type of protection. If you do not adhere to these guidelines, the test certificates and the manufacturer warranty will become null and void.

- Use only device parts that have been approved for the respective type of protection in the potentially explosive environment. Covers that are not suited for the "explosion-proof" type of protection are identified as such by a notice label attached to the inside of the cover with "Not Ex d Not SIL".
- Do not swap device parts unless the manufacturer specifically ensures compatibility of these parts.

WARNING

Risk of explosion due to electrostatic charge

To prevent the build-up of an electrostatic charge in a hazardous area, the key cover must be closed during operation and the screws tightened.

The key cover may be opened temporarily at any time for the purposes of operating the transmitter, even during plant operation; the screws should then be tightened again.

3 Installing/mounting

3.1 Basic safety instructions

WARNING

Wetted parts unsuitable for the process media

Danger of injury or damage to device.

Hot, toxic and corrosive media could be released if the process medium is unsuitable for the wetted parts.

- Ensure that the material of the device parts wetted by the process medium is suitable for the medium. Refer to the information in "Technical data" (Page 35).

WARNING

Incorrect material for the diaphragm in Zone 0

Danger of explosion in the hazardous area. In the case of operation with intrinsically safe supply units of category "ib" or devices of the flameproof enclosure version "Ex d" and simultaneous use in Zone 0, transmitter explosion protection depends on the tightness of the diaphragm.

- Ensure that the material used for the diaphragm is suitable for the process medium. Refer to the information in the section "Technical specifications (Page 35)".

WARNING

Unsuitable connecting parts

Danger of injury or poisoning.

In case of improper mounting hot, toxic and corrosive process media could be released at the connections.

- Ensure that connecting parts (such as flange gaskets and bolts) are suitable for connection and process media.

Note

Material compatibility

Siemens can provide you with support concerning selection of sensor components wetted by process media. However, you are responsible for the selection of components. Siemens accepts no liability for faults or failures resulting from incompatible materials.

WARNING

Exceeded maximum permissible operating pressure

Danger of injury or poisoning.

The maximum permissible operating pressure depends on the device version. The device can be damaged if the operating pressure is exceeded. Hot, toxic and corrosive process media could be released.

- Make sure that the device is suitable for the maximum permissible operating pressure of your system. Refer to the information on the nameplate and/or in "Technical specifications (Page 35)".

WARNING

Exceeded maximum ambient or process media temperature

Danger of explosion in hazardous areas.

Device damage.

- Make sure that the maximum permissible ambient and process media temperatures of the device are not exceeded. Refer to the information in Chapter "Technical specifications (Page 35)".

WARNING

Open cable inlet or incorrect cable gland

Danger of explosion in hazardous areas.

- Close the cable inlets for the electrical connections. Only use cable glands or plugs which are approved for the relevant type of protection.

WARNING

Incorrect conduit system

Danger of explosion in hazardous areas as result of open cable inlet or incorrect conduit system.

- In the case of a conduit system, mount a spark barrier at a defined distance from the device input. Observe national regulations and the requirements stated in the relevant approvals.

See also

Technical specifications (Page 35)

WARNING

Incorrect mounting at Zone 0

Danger of explosion in hazardous areas.

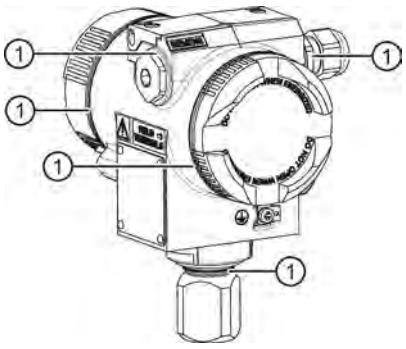
- Ensure sufficient tightness at the process connection.
- Observe the standard IEC/EN 60079-14.

WARNING

Danger with "flameproof enclosure" protection

Danger of explosion in hazardous areas. An explosion may be caused by hot gas escaping from the flameproof enclosure if there is too little space between it and the fixed parts.

- Ensure that there is a space of at least 40 mm between the flameproof joint and the fixed parts.



① Flameproof joint

WARNING

Loss of explosion protection

Danger of explosion in hazardous areas if the device is open or not properly closed.

- Close the device as described in Chapter "Connecting the device (Page 21)".

⚠ CAUTION

Hot surfaces resulting from hot process media

Danger of burns resulting from surface temperatures above 70 °C (155 °F).

- Take appropriate protective measures, for example contact protection.
- Make sure that protective measures do not cause the maximum permissible ambient temperature to be exceeded. Refer to the information in Chapter "Technical specifications (Page 35)".

⚠ CAUTION

External stresses and loads

Damage to device by severe external stresses and loads (e.g. thermal expansion or pipe tension). Process media can be released.

- Prevent severe external stresses and loads from acting on the device.

3.1.1 Installation location requirements

⚠ WARNING

Insufficient air supply

The device may overheat if there is an insufficient supply of air.

- Install the device so that there is sufficient air supply in the room.
- Observe the maximum permissible ambient temperature. Refer to the information in the section "Technical specifications (Page 35)".

⚠ CAUTION

Aggressive atmospheres

Damage to device through penetration of aggressive vapors.

- Ensure that the device is suitable for the application.

NOTICE

Direct sunlight

Increased measuring errors.

- Protect the device from direct sunlight.

Make sure that the maximum ambient temperature is not exceeded. Refer to the information in the section Technical specifications (Page 35).

3.1.2 Proper mounting

NOTICE

Incorrect mounting

The device can be damaged, destroyed, or its functionality impaired through improper mounting.

- Before installing ensure there is no visible damage to the device.
- Make sure that process connectors are clean, and suitable gaskets and glands are used.
- Mount the device using suitable tools. Refer to the information in Chapter "Technical specifications (Page 35)", for example installation torques requirements.

Note

Loss of degree of protection

Damage to device if the enclosure is open or not properly closed. The degree of protection specified on the nameplate or in "Technical data" (Page 35) is no longer guaranteed.

- Make sure that the device is securely closed.

See also

Connecting the device (Page 21)

3.2 Disassembly

WARNING

Incorrect disassembly

The following dangers may result through incorrect disassembly:

- Injury through electric shock
- Danger through emerging media when connected to the process
- Danger of explosion in hazardous area

In order to disassemble correctly, observe the following:

- Before starting work, make sure that you have switched off all physical variables such as pressure, temperature, electricity etc. or that they have a harmless value.
- If the device contains dangerous media, it must be emptied prior to disassembly. Make sure that no environmentally hazardous media are released.
- Secure the remaining connections so that no damage can result if the process is started unintentionally.

3.3 Installation (except level)

3.3.1 Instructions for installation (except level)

Conditions

Note

Compare the desired operating data with the data on the nameplate.

Please also refer to the information on the remote seal if this is fitted.

Note

Protect the transmitter against:

- Direct heat radiation
- Rapid temperature fluctuations
- Heavy contamination
- Mechanical damage
- Direct sunlight

The installation location is to be as follows:

- Easily accessible
- As close as possible to the measuring point
- Vibration-free
- Within the permitted ambient temperature values

Installation configuration

The transmitter may in principle be configured above or below the pressure tapping point. The recommended configuration depends on the aggregate state of the medium.

Installation configuration for gases

Install the transmitter above the pressure tapping point.

Lay the pressure tubing with a constant gradient to the pressure tapping point, so that any condensation produced can drain in the main line and thereby avoid corruption of the measured values.

Installation configuration for vapor and liquid

Install the transmitter below the pressure tapping point.

Lay the pressure tubing with a constant gradient to the pressure tapping point so that any gas pockets can escape in the main line.

3.3.2 Installation (except level)

Note

Damage to measuring cell

When installing the process connection of the pressure transmitter, do not rotate the housing. Rotating the housing may damage the measuring cell.

To avoid damage to the device, tighten the threaded nuts of the measuring cell using a wrench.

Procedure

Attach the transmitter to the process connection with an appropriate tool.

See also

Introduction to commissioning (Page 24)

3.3.3 Fastening

Fastening without the mounting bracket

You can fasten the transmitter directly on the process connection.

Fastening with the mounting bracket

You can fasten the mounting bracket as follows:

- On a wall or a mounting frame using two screws
- On a vertical or horizontal mounting tube (Ø 50 to 60 mm) using a tube bracket

Fasten the transmitter mounting bracket using the two screws provided.

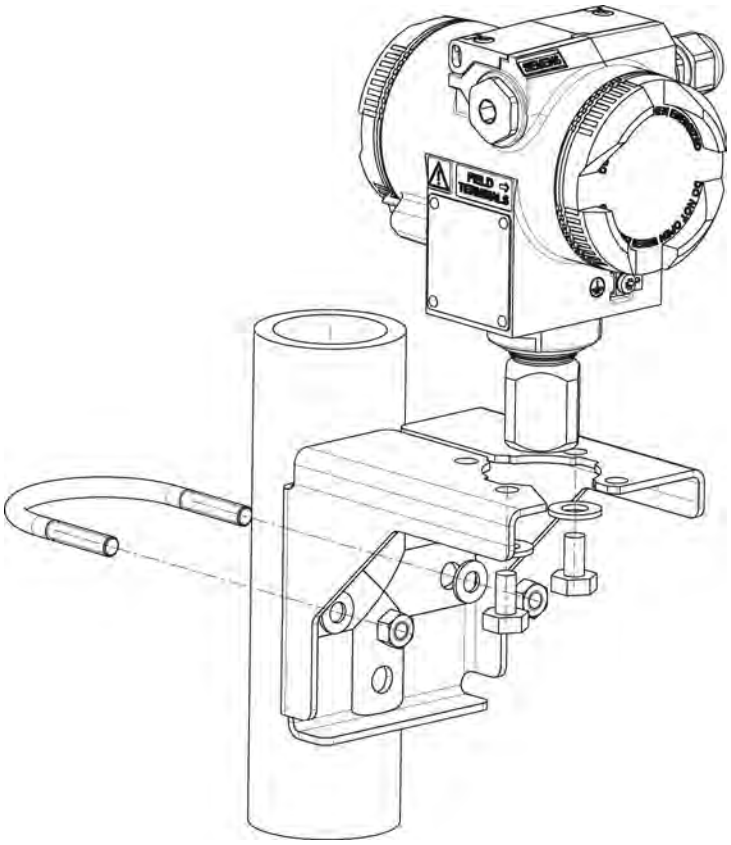


Figure 3-1 Fastening the transmitter on the mounting bracket

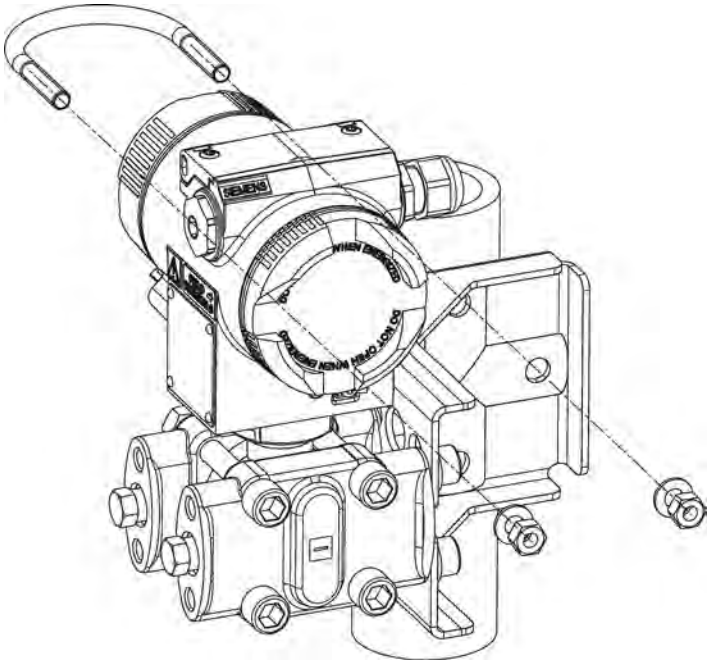


Figure 3-2 An example of fastening the transmitter on the mounting bracket in the case of differential pressure and horizontal differential pressure lines

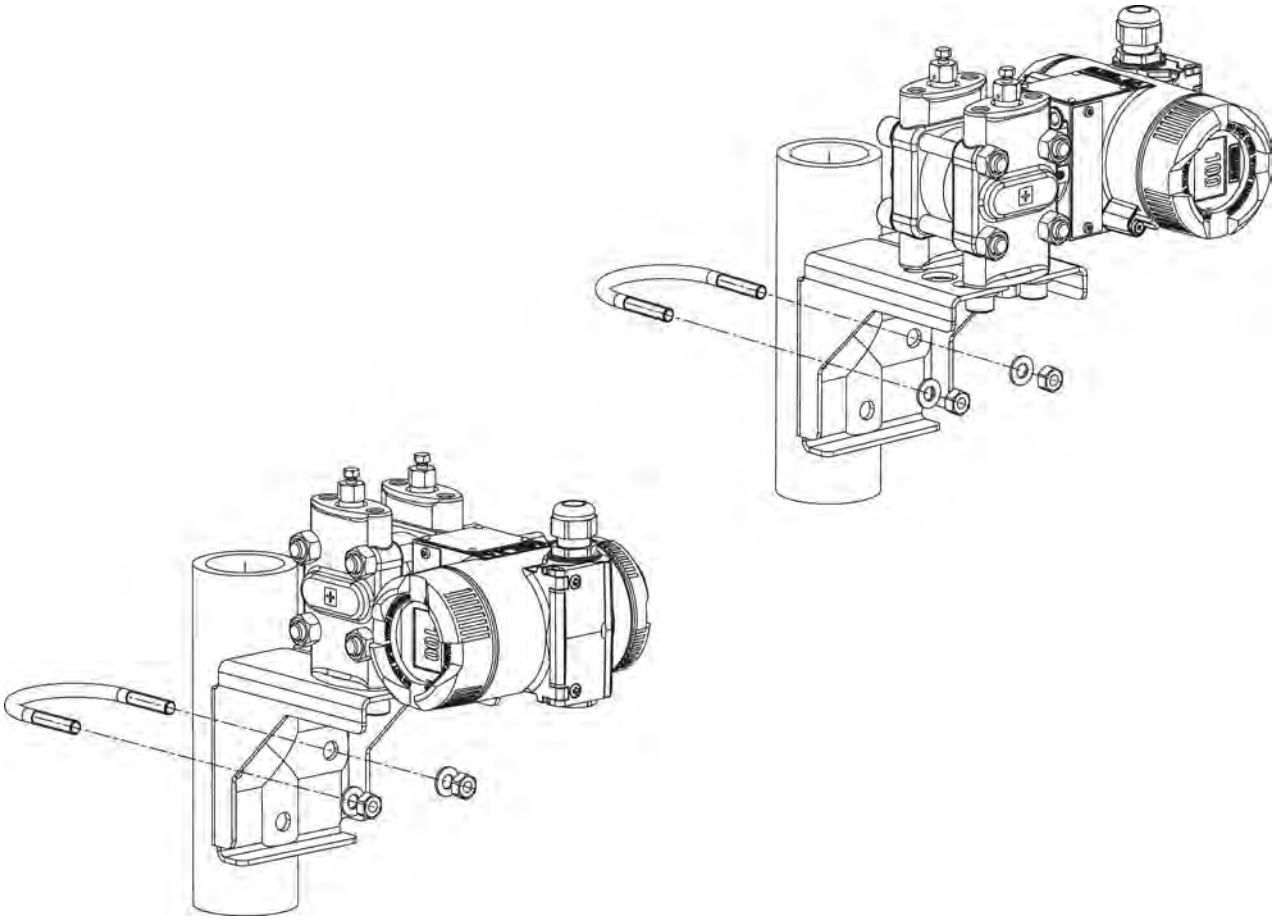


Figure 3-3 An example of fastening on the mounting bracket in the case of differential pressure and vertical differential pressure lines

3.4 "Level" installation

3.4.1 Instructions for level installation

Requirements

Note

Compare the desired operating data with the data on the nameplate.

Please also refer to the information on the remote seal if this is fitted.

Note

Protect the transmitter from:

- Direct heat
- Rapid temperature changes
- Severe soiling
- Mechanical damage
- Direct sunlight

Note

Select the height of the mounting flange such that the pressure transmitter is always mounted below the lowest fill height to be measured.

The installation location is to be as follows:

- Easily accessible

- The measuring point must be as close as possible
- Vibration-free
- Within the permitted ambient temperature values

3.4.2 Installation for level

Note

Seals are required for the installation. The seals must be compatible with the medium to be measured.
Seals are not included in the delivery.

Procedure

To install the transmitter for level, proceed as follows:

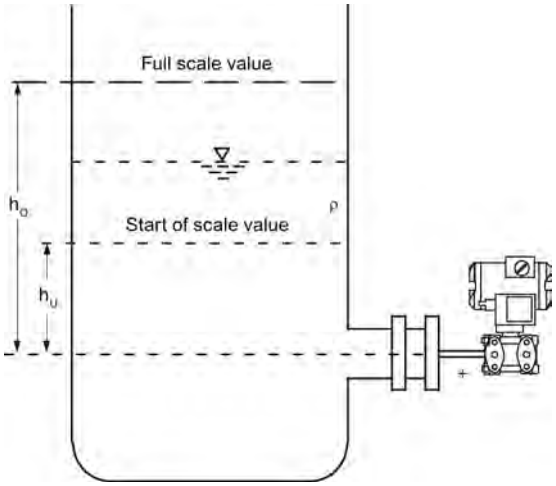
1. Attach the seal to the container's mating flange.
   Ensure that the seal is centrically positioned and that it does not restrict the movement of the flange's seal diaphragm in any way as otherwise the tightness of the process connection is not guaranteed.
2. Screw on the transmitter's flange.
3. Observe the installation position.

3.4.3 Connection of the negative pressure line

Assembly on an open container

A line is not required when taking measurements in an open container since the negative chamber is connected with the atmosphere.

Ensure that no dirt enters the open connection ports, for example by using connection screws with a 7MF4997-1CP bleed valve.



Measurement assembly on an open container

Formula:

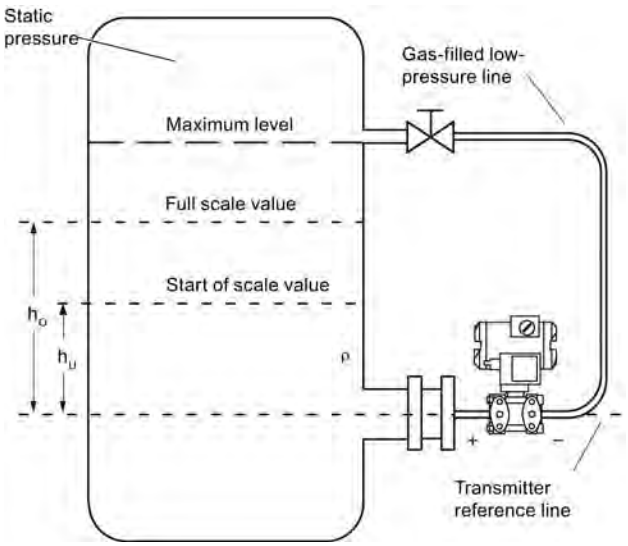
Start of scale value: $p_{MA} = \rho \cdot g \cdot h_U$

Full-scale value: $p_{ME} = \rho \cdot g \cdot h_O$

h_U	Lower filling level	Δp_{MA}	Start of scale value
h_O	Upper filling level	Δp_{ME}	Full-scale value
p	Pressure	ρ	Density of the measured medium in the container
		g	Acceleration due to gravity

Assembly on a closed container

When taking measurements in a closed container without or with little condensate formation, the negative pressure line is not filled. Lay the line in such a way that pockets of condensate do not form. Install a condensation container if required.



Measurement assembly on a closed container (no or little condensate separation)

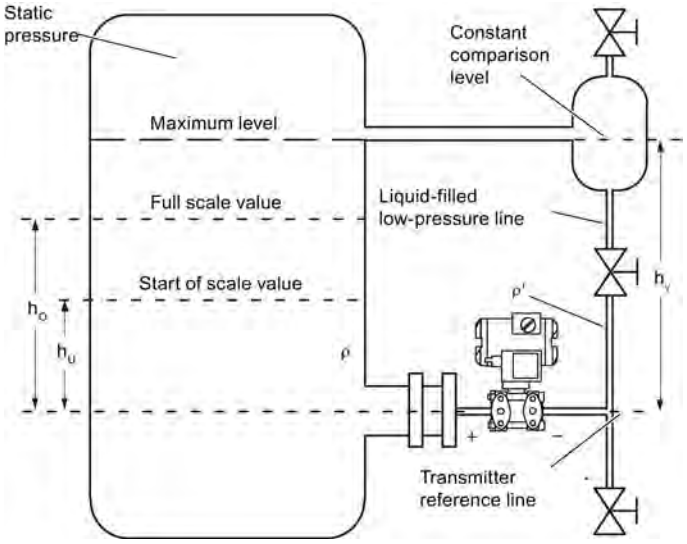
Formula:

Start-of-scale value: $\Delta p_{MA} = \rho \cdot g \cdot h_U$

Full-scale value: $\Delta p_{ME} = \rho \cdot g \cdot h_O$

h_U	Lower filling level	Δp_{MA}	Start of scale value
h_O	Upper filling level	Δp_{ME}	Full-scale value
p	Pressure	ρ	Density of the measured medium in the container
		g	Acceleration due to gravity

When taking measurements in a closed container with strong condensate formation, you must fill the negative pressure line (mostly with the condensate of the measured medium) and install a condensate pot. You can cut off the device using the dual pneumatic block 7MF9001-2.



Measurement assembly on a closed container (strong condensate formation)

Formula:

Start-of-scale value:
$\Delta p_{MA} = g \cdot (h_U \cdot \rho - h_V \cdot \rho')$

Full-scale value:
$\Delta p_{MA} = g \cdot (h_O \cdot \rho - h_V \cdot \rho')$

h_U	Lower filling level	Δp_{MA}	Start of scale value

h_O	Upper filling level	Δp_{ME}	Full-scale value
h_V	Gland distance	ρ	Density of the measured medium in the container
p	Pressure	ρ '	Density of fluid in the negative pressure line corresponds to the prevailing temperature there
		g	Acceleration due to gravity

The process connection on the negative side is a female thread 1/4-18 NPT or an oval flange.

Lay the line for the negative pressure using a seamless steel tube 12 mm x 1.5 mm.

4 Connecting

4.1 Basic safety instructions

WARNING

Unsuitable cables and/or cable glands

Danger of explosion in hazardous areas.

- Only use suitable cables and cable glands complying with the requirements specified in Chapter "Technical data (Page 35)".
- Tighten the cable glands in accordance with the torques specified in Chapter "Technical data (Page 35)".
- When replacing cable glands use only cable glands of the same type.
- After installation check that the cables are seated firmly.

WARNING

Hazardous contact voltage in versions with 4-conductor extension

Danger of electrocution in case of incorrect connection.

- Observe the instructions in the 4-conductor extension operating manual for the electrical connection.

See also

Technical specifications (Page 35)

WARNING

Improper power supply

Danger of explosion in hazardous areas as result of incorrect power supply, e.g. using direct current instead of alternating current.

- Connect the device in accordance with the specified power supply and signal circuits. The relevant specifications can be found in the certificates, in Chapter "Technical specifications (Page 35)" or on the nameplate.

WARNING

Unsafe extra-low voltage

Danger of explosion in hazardous areas due to voltage flashover.

- Connect the device to an extra-low voltage with safe isolation (SELV).

⚠ WARNING

Lack of equipotential bonding

Danger of explosion through compensating currents or ignition currents through lack of equipotential bonding.

- Ensure that the device is potentially equalized.

Exception: It may be permissible to omit connection of the equipotential bonding for devices with type of protection "Intrinsic safety Ex i".

⚠ WARNING

Unprotected cable ends

Danger of explosion through unprotected cable ends in hazardous areas.

- Protect unused cable ends in accordance with IEC/EN 60079-14.

⚠ WARNING

Improper laying of shielded cables

Danger of explosion through compensating currents between hazardous area and the non-hazardous area.

- Only ground shielded cables that run into the hazardous area at one end.
- If grounding is required at both ends, use an equipotential bonding conductor.

⚠ WARNING

Connecting device in energized state

Danger of explosion in hazardous areas.

- Connect devices in hazardous areas only in a de-energized state.

Exceptions:

- Circuits of limited energy may also be connected in the energized state in hazardous areas.
- Exceptions for type of protection "Non-sparking nA" (Zone 2) are regulated in the relevant certificate

⚠ WARNING

Incorrect selection of type of protection

Danger of explosion in areas subject to explosion hazard.

This device is approved for several types of protection.

1. Decide in favor of one type of protection.
2. Connect the device in accordance with the selected type of protection.
3. In order to avoid incorrect use at a later point, make the types of protection that are not used permanently unrecognizable on the nameplate.

NOTICE

Ambient temperature too high

Damage to cable sheath.

- At an ambient temperature ≥ 60 °C (140 °F), use heat-resistant cables suitable for an ambient temperature at least 20 °C (68 °F) higher.

NOTICE

Incorrect measured values with incorrect grounding

The device must not be grounded via the "+" connection. It may otherwise malfunction and be permanently damaged.

- If necessary, ground the device using the "-" connection.

Note

Electromagnetic compatibility (EMC)

You can use this device in industrial environments, households and small businesses.

For metal housings there is an increased electromagnetic compatibility compared to high-frequency radiation. This protection can be increased by grounding the housing, see Chapter "Connecting the device (Page 21)".

Note

Improvement of interference immunity

- Lay signal cables separate from cables with voltages > 60 V.
- Use cables with twisted wires.
- Keep device and cables in distance to strong electromagnetic fields.
- Use shielded cables to guarantee the full specification according to HART.
- Refer to HART communication information in Chapter "Technical specifications (Page 35)".

4.2 Connecting the device

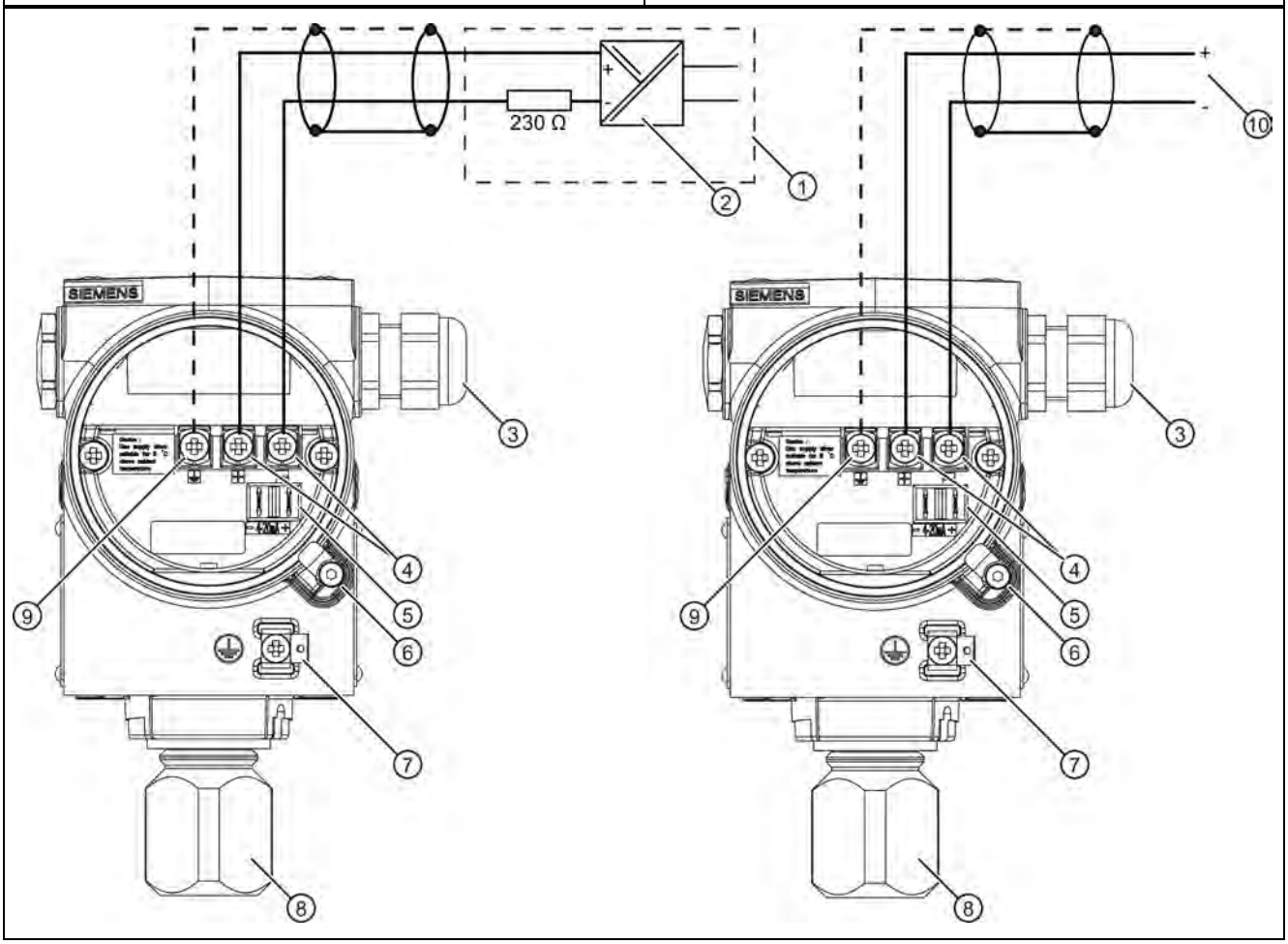
Opening the device

1. Unscrew the cover of the electrical cable compartment. An identification text "FIELD TERMINAL" is provided at the side of the housing.

Connecting the device

1. Lead the connecting cable through the cable gland ③.
2. Connect the device to the plant with the protective conductor connection ⑦.
3. Connect the wires to the connecting terminals ④ "+" and "-".
   Ensure the correct polarity! If necessary, ground the device using the "-" connection by connecting the "-" connection to the ground terminal ⑨.
4. If necessary, connect the shield to the screw of the ground terminal ⑨. This is electrically connected with the external protective conductor connection.

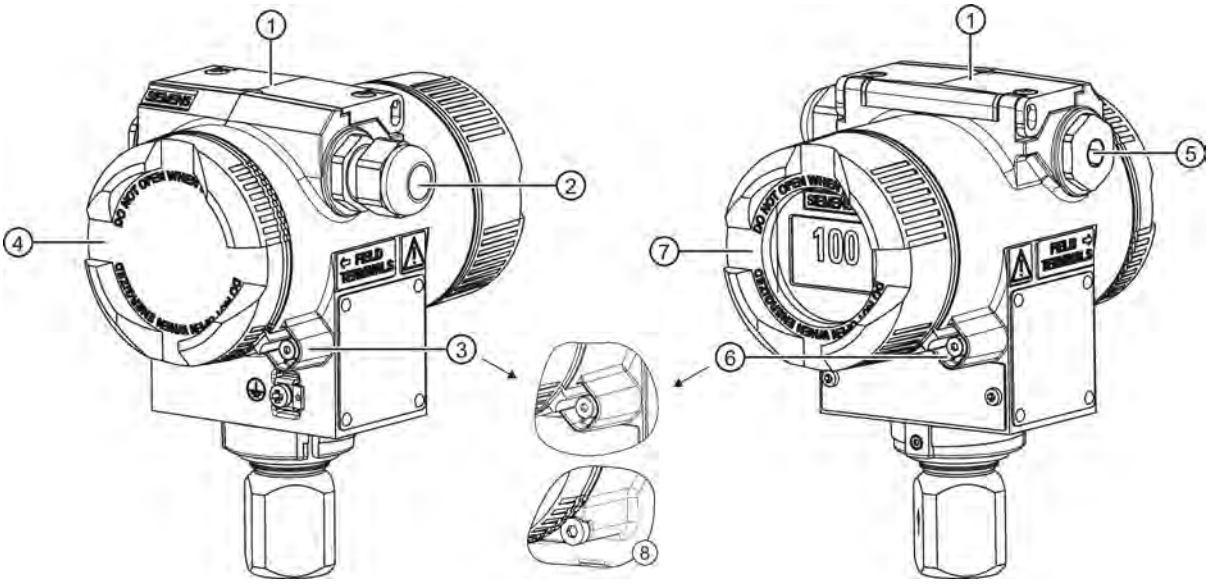
HART	PROFIBUS PA / Foundation™ Fieldbus FF



①	Feed separator with integrated load	⑥	Safety catch
②	Auxiliary power	⑦	Protective conductor connection/ equipotential bonding terminal
③	Cable entry for auxiliary power/analog output	⑧	Process connection
④	Connecting terminals	⑨	Ground terminal
⑤	Test connector for direct current measuring device or connection for external display	⑩	PROFIBUS PA / Foundation™ Fieldbus FF

Closing the device

1. Screw the covers ④⑦ back on as far as they will go.
2. Secure each cover with the cover catch ③⑥.
3. Close the key cover ①.
4. Tighten the screws in the key cover.
5. Check the tightness of the blanking plugs ⑤ and cable gland ② in accordance with the degree of protection.



①	Key cover	⑤	Blanking plug
②	Cable gland	⑥	Safety catch (front)
③	Safety catch (back)	⑦	Cover (front), optionally with inspection window
④	Cover (rear) for electrical terminal compartment	⑧	Safety catch for stainless steel enclosure

Figure 4-1 View of the transmitter: Left: Back right: Front view

5 Commissioning

5.1 Basic safety instructions

⚠ DANGER

Toxic gases and liquids

Danger of poisoning when the device is vented.

If toxic process media are measured, toxic gases and liquids can be released when the device is vented.

- Before venting ensure that there are no toxic gases and liquids in the device. Take the appropriate safety measures.

⚠ WARNING

Improper commissioning in hazardous areas

Device failure or danger of explosion in hazardous areas.

- Do not commission the device until it has been mounted completely and connected in accordance with the information in Chapter "Technical specifications (Page 35)".
- Before commissioning take the effect on other devices in the system into account.

WARNING

Opening device in energized state

Danger of explosion in areas subject to explosion hazard.

- Only open the device in a de-energized state.
- Check prior to commissioning that the cover, cover locks, and cable inlets are assembled in accordance with the directives.

Exception: Devices having the type of protection "Intrinsic safety Ex i" may also be opened in energized state in hazardous areas.

Note

Hot surfaces

Hot process medium and high ambient temperatures lead to hot surfaces which can cause burns.

- Take corresponding protective measures, for example wear protective gloves.

5.2 Introduction to commissioning

Following commissioning, the transmitter is immediately ready for use.

To obtain stable measured values, the transmitter needs to be allowed to warm up for five minutes or so after the power supply is switched on. Upon switch-on, the transmitter goes through an initialization routine (display at the end: "Init done"). If the transmitter initialization routine does not complete, check the auxiliary power.

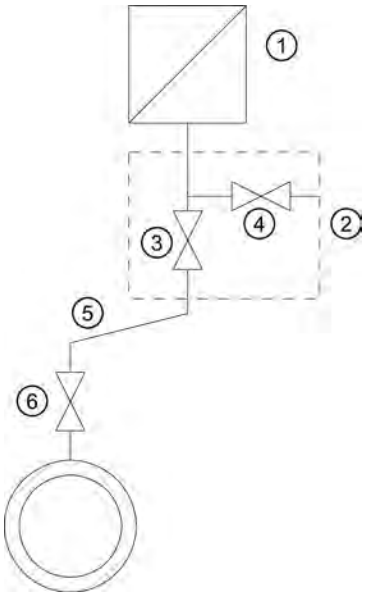
The operating data must correspond to the values specified on the nameplate. If you switch on the auxiliary power, the transmitter will operate.

The following commissioning cases are typical examples. Configurations different from those listed here may be meaningful depending on the system configuration.

5.3 gauge pressure, absolute pressure from the differential pressure series and absolute pressure from the gauge pressure series

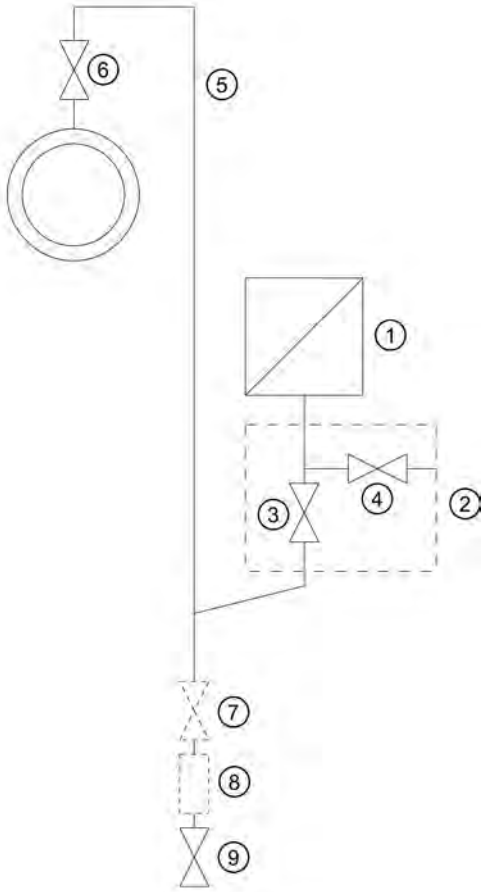
5.3.1 Commissioning for gases

Usual arrangement



Measuring gases above the pressure tapping point

Special arrangement



Measuring gases below the pressure tapping point

①	Pressure transmitter
②	Shut-off module
③	Shut-off valve to process
④	Shut-off valve for test connection or for bleed screw
⑤	Pressure line
⑥	Shut-off valve
⑦	Shut-off valve (optional)
⑧	Condensate vessel (optional)
⑨	Drain valve

Condition

All valves are closed.

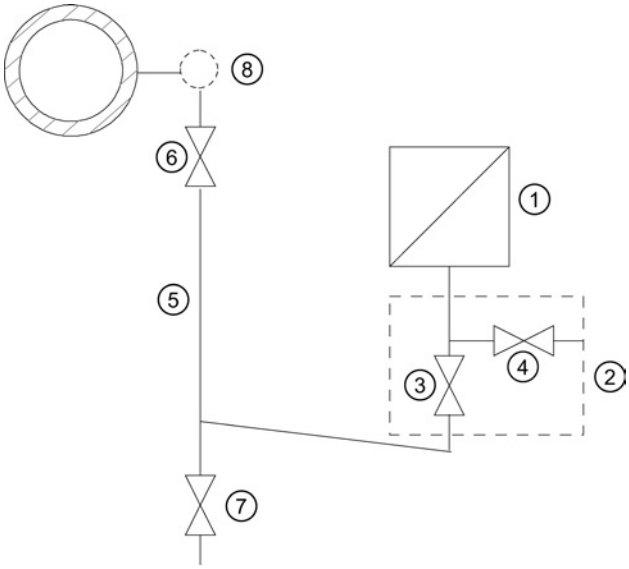
Procedure

To commission the transmitter for gases, proceed as follows:

1. Open the shut-off valve for the test connection ④.
2. Via the test connection of the shut-off fitting ②, apply the pressure corresponding to the start of scale value to the pressure transmitter ①.
3. Check the start of scale value.

4. If the start of scale value differs from the value desired, correct it.
5. Close the shut-off valve for the test connection ④.
6. Open the shut-off valve ⑥ at the pressure tapping point.
7. Open the shut-off valve for the process ③.

5.3.2 Commissioning with steam or liquid



① Pressure transmitter
② Shut-off fitting
③ Shut-off valve to process
④ Shut-off valve for test connection or for bleed screw
⑤ Pressure line
⑥ Shut-off valve
⑦ Blow-out valve
⑧ Compensation vessel (steam only)

Figure 5-1 Measuring steam

Requirement

All valves are closed.

Procedure

To commission the transmitter for steam or liquid, proceed as follows:

1. Open the shut-off valve for the test connection ④.
2. Via the test connection of the shut-off module ②, apply the pressure corresponding to the start of scale value to the pressure transmitter ①.
3. Check the start of scale value.
4. If the start of scale value differs from the value desired, correct it.
5. Close the shut-off valve for the test connection ④.
6. Open the shut-off valve ⑥ at the pressure tapping point.
7. Open the shut-off valve for the process ③.

5.4 Differential pressure and flow rate

5.4.1 Safety notes for commissioning with differential pressure and flow rate

⚠ WARNING

Incorrect or improper operation

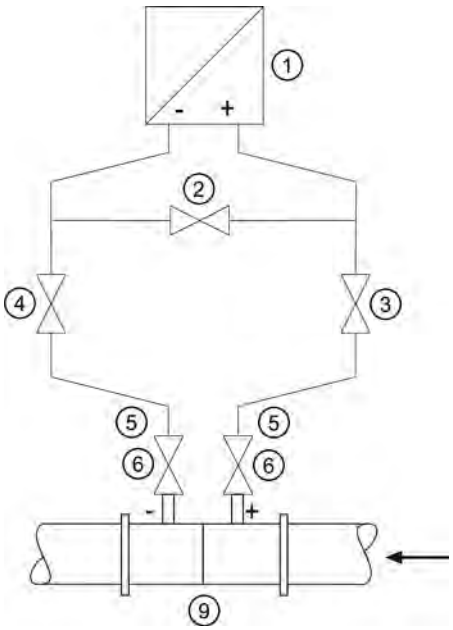
If the lock screws are missing or are not sufficiently tight, and/or if the valves are operated incorrectly or improperly, it could lead to serious physical injuries or considerable damage to property.

Measure

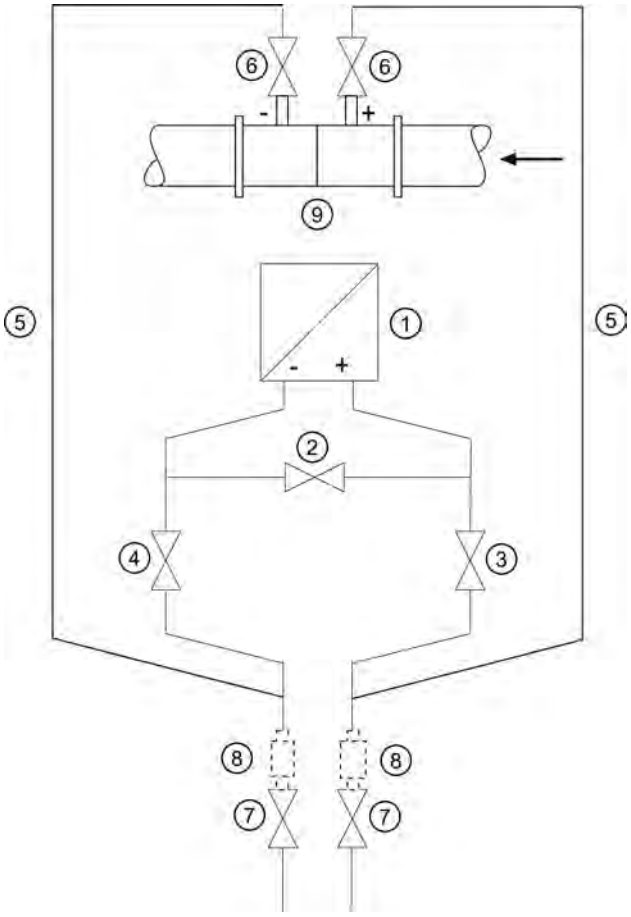
- Make sure the locking screw and/or the vent valve are screwed in and tightened.
- Ensure that the valves are operated correctly and properly.

5.4.2 Commissioning in gaseous environments

Usual arrangement



Special arrangement



①	Pressure transmitter	⑥	Shut-off valves
②	Stabilizing valve	⑦	Drain valves
③, ④	Differential pressure valves	⑧	Condensate vessels (optional)
⑤	Differential pressure lines	⑨	Differential pressure transducer

Transmitter **above** the differential pressure transducer

Transmitter **below** the differential pressure transducer

Condition

All shut-off valves are closed.

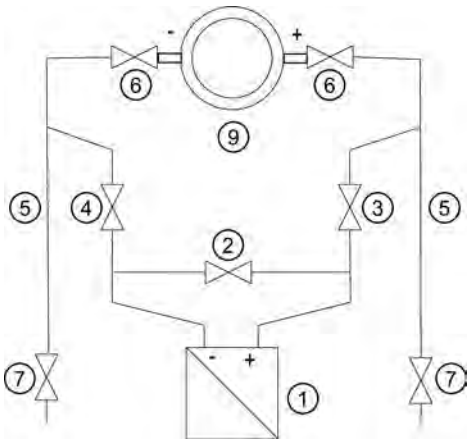
Procedure

To commission the transmitter for gases, proceed as follows:

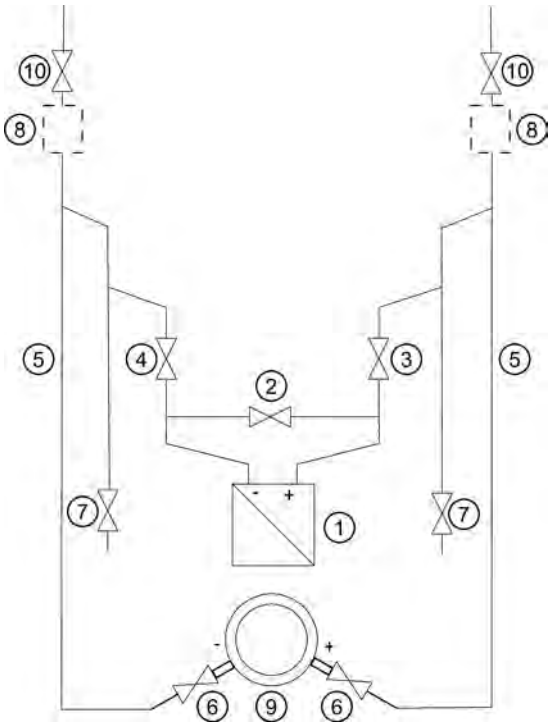
1. Open both the shut-off valves ⑥ at the pressure tapping point.
2. Open the stabilizing valve ②.
3. Open the differential pressure valve (③ or ④).
4. Check and if required correct the zero point when the start of scale value is 0 mbar (4 mA).
5. Close the stabilizing valve ②.
6. Open the other differential pressure valve (③ or ④).

5.4.3 Commissioning for liquids

Usual arrangement



Special arrangement



① Pressure transmitter
② Stabilizing valve
③, ④ Differential pressure valves
⑤ Differential pressure lines
⑥ Shut-off valves
⑦ Drain valves
⑧ Gas collector vessels (optional)
⑨ Differential pressure transducer
⑩ Vent valves

Transmitter **below** the differential pressure transducer

Transmitter **above** the differential pressure transducer

Condition

All valves are closed.

Procedure

DANGER

Toxic liquids

Danger of poisoning when the device is vented.

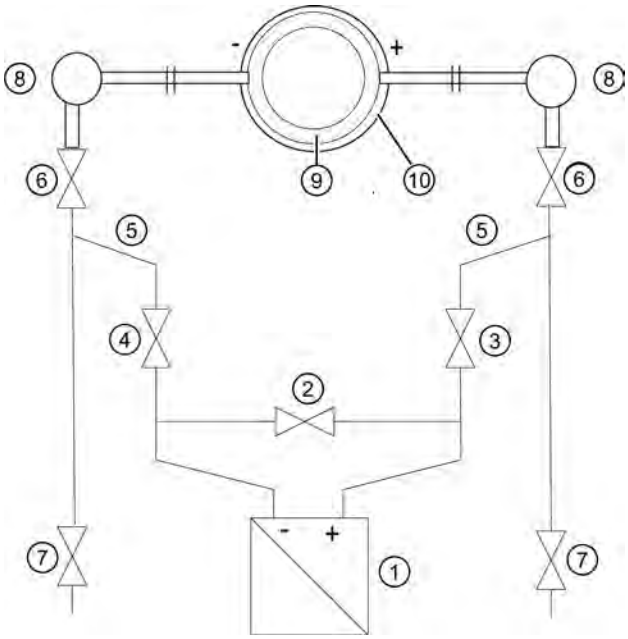
If toxic process media are measured with this device, toxic liquids can escape when the device is vented.

- Before venting, make sure there is no liquid in the device or take the necessary safety precautions.

To commission the transmitter with liquids, proceed as follows:

1. Open both the shut-off valves ⑥ at the pressure tapping point.
2. Open the stabilizing valve ②.
3. With **transmitters below the differential pressure transducer**, open both blowout valves ⑦ one after the other until the air-free liquid escapes.
   In the case of a **transmitter above the differential pressure transducer**, open both vent valves ⑩ one after the other until the air-free liquid escapes.
4. Close both drain valves ⑦ or vent valves ⑩.
5. Open the differential pressure valve ③ and the vent valve on the positive side of the transmitter ① slightly, until air-free liquid escapes.
6. Close the vent valve.
7. Open the vent valve on the negative side of the transmitter ① slightly, until air-free liquid escapes.
8. Close the differential pressure valve ③.
9. Open the differential pressure valve ④ until the liquid emerges and then close it.
10. Close the vent valve on the negative side of the transmitter ①.
11. Open the differential pressure valve ③ by rotating it in half a turn.
12. Check and if required adjust the zero point (4 mA) if the start of scale value is 0 bar.
13. Close the stabilizing valve ②.
14. Open the differential pressure valves (③ and ④) completely.

5.4.4 Commissioning with vapor



①	Pressure transmitter	⑦	Drain valves
②	Stabilizing valve	⑧	Condensate pots
③, ④	Differential pressure valves	⑨	Differential pressure transducer/Orifice plate
⑤	Differential pressure lines	⑩	Insulation
⑥	Shut-off valves		

Figure 5-2 Measuring steam

Condition

All valves are closed.

Procedure

⚠ WARNING

Hot vapor

Danger of injury or damage to device.

If the shut-off valves ⑥ and the differential pressure valve ③ are both open and the stabilizing valve ② is then opened, the transmitter ① can be damaged by the flow of vapor.

- Follow the specified procedure for commissioning.

⚠ WARNING

Hot vapor

Danger of injury.

You can briefly open the drain valves ⑦ to clean the line. Hot vapor can escape in the process.

- Only open the drain valves ⑦ briefly, and close them again before vapor escapes.

To commission the transmitter for vapor, proceed as follows:

1. Open both the shut-off valves ⑥ at the pressure tapping point.
2. Open the stabilizing valve ②.
3. Wait until the steam in the differential pressure lines ⑤ and in the equalizing vessels ⑧ has condensed.

4. Open the differential pressure valve ③ and the vent valve on the positive side of the transmitter ① slightly, until air-free condensate escapes.
5. Close the vent valve.
6. Open the vent valve on the negative side of the transmitter ① slightly, until air-free condensate escapes.
7. Close the differential pressure valve ③.
8. Open the differential pressure valve ④ slightly, until condensate escapes without bubbles, then close it.
9. Close the vent valve on the negative side ①.
10. Open the differential pressure valve ③ by rotating it in half a turn.
11. Check and if necessary correct the zero point (4 mA) with a start of scale value of 0 bar.
    The measuring result is only error-free if the differential pressure lines ⑤ have equally high condensate columns with the same temperature. The zero calibration must be repeated if required if these conditions are fulfilled.
12. Close the stabilizing valve ②.
13. Fully open the differential pressure valves ③ and ④.
14. You can briefly open the drain valves ⑦ to clean the line.
15. Close the drain valve ⑦ before vapor escapes.

6 Servicing and maintenance

6.1 Basic safety instructions

⚠ WARNING

Impermissible repair of explosion protected devices

Danger of explosion in areas subject to explosion hazard.

- Repair must be carried out by Siemens authorized personnel only.

⚠ WARNING

Impermissible accessories and spare parts

Danger of explosion in areas subject to explosion hazard.

- Only use original accessories or original spare parts.
- Observe all relevant installation and safety instructions described in the instructions for the device or enclosed with the accessory or spare part.

⚠ WARNING

Maintenance during continued operation in a hazardous area

There is a danger of explosion when carrying out repairs and maintenance on the device in a hazardous area.

- Isolate the device from power.

- or -

- Ensure that the atmosphere is explosion-free (hot work permit).

WARNING

Commissioning and operation with pending error

If an error message appears, correct operation in the process is no longer guaranteed.

- Check the gravity of the error
- Correct the error
- If the device is faulty:
  - Take the device out of operation.
  - Prevent renewed commissioning.

WARNING

Hot, toxic or corrosive process media

Danger of injury during maintenance work.

When working on the process connection, hot, toxic or corrosive process media could be released.

- As long as the device is under pressure, do not loosen process connections and do not remove any parts that are pressurized.
- Before opening or removing the device ensure that process media cannot be released.

WARNING

Improper connection after maintenance

Danger of explosion in areas subject to explosion hazard.

- Connect the device correctly after maintenance.
- Close the device after maintenance work.

Refer to Chapter "Connecting the device (Page 21)".

WARNING

Use of a computer in a hazardous area

If the interface to the computer is used in the hazardous area, there is a danger of explosion.

- Ensure that the atmosphere is explosion-free (hot work permit).

CAUTION

Releasing key lock

Improper modification of parameters could influence process safety.

- Make sure that only authorized personnel may cancel the key locking of devices for safety-related applications.

CAUTION

Hot surfaces

Danger of burns during maintenance work on parts having surface temperatures exceeding 70 °C (158 °F).

- Take corresponding protective measures, for example by wearing protective gloves.
- After carrying out maintenance, remount touch protection measures.

CAUTION

Hazardous voltage with open device in versions with 4-conductor extension

Danger of electrocution when the enclosure is opened or enclosure parts are removed.

- Disconnect the device before you open the enclosure or remove enclosure parts.
- Observe the special precautionary measures if maintenance is required while the device is live. Have maintenance work carried out by qualified personnel.

6.2 Maintenance and repair work

6.2.1 Defining the maintenance interval

⚠ WARNING

No maintenance interval has been defined

Device failure, device damage, and risk of injury.

- Define a maintenance interval for regular tests in line with device use and empirical values.
- The maintenance interval will vary from site to site depending on corrosion resistance.

6.2.2 Checking the gaskets

Inspect the seals at regular intervals

Note

Incorrect seal changes

Incorrect measured values will be displayed. Changing the seals in a process flange of a differential pressure measuring cell can alter the start-of-scale value.

- Changing seals in devices with differential pressure measuring cells may only be carried out by personnel authorized by Siemens.

Note

Using the wrong seals

Using the wrong seals with flush-mounted process connections can cause measuring errors and/or damage the diaphragm.

- Always use seals which comply with the process connection standards or are recommended by Siemens.

1. Clean the enclosure and seals.
2. Check the enclosure and seals for cracks and damage.
3. Grease the seals if necessary.
   - or -
4. Replace the seals.

6.2.3 Display in case of a fault

Check the start of scale value of the device from time to time.

Differentiate between the following in case of a fault:

- The internal self test has detected a fault, e.g. sensor break, hardware fault/Firmware fault.
  Displays:
  - Display: "ERROR" display and ticker with an error text
  - Analog output: Factory setting: Failure current 3.6 or 22.8 mA

  Or depending on the parameterization
  - HART: detailed error breakdown for display in the HART communicator or SIMATIC PDM
- Grave hardware faults, the processor is not functioning.
  Displays:
  - Display: no defined display
  - Analog output: failure current < 3.6 mA

In case of defect, you can replace the electronic unit by following the warning notes and the provided instruction manual.

6.3 Cleaning

WARNING
Dust layers above 5 mm Danger of explosion in hazardous areas. Device may overheat du to dust build up. • Remove any dust layers in excess of 5 mm.

NOTICE
Penetration of moisture into the device Device damage. • Make sure when carrying out cleaning and maintenance work that no moisture penetrates the inside of the device.

6.3.1 Cleaning the enclosure

Cleaning the enclosure

- Clean the outside of the enclosure and the display window using a cloth moistened with water or a mild detergent.
- Do not use aggressive cleaning agents or solvents. Plastic components or painted surfaces could be damaged.

WARNING
Electrostatic charge Danger of explosion in hazardous areas if electrostatic charges develop, for example, when cleaning plastic enclosures with a dry cloth. • Prevent electrostatic charging in hazardous areas.

6.3.2 Servicing the remote seal measuring system

The remote seal measuring system usually does not need servicing.

If the mediums are contaminated, viscous or crystallized, it could be necessary to clean the diaphragm from time to time. Use only a soft brush and a suitable solvent to remove the deposits from the diaphragm. Do not use corrosive cleaning agents. Prevent the diaphragm from getting damaged due to sharp-edged tools.

NOTICE
Improper cleaning of diaphragm Device damage. The diaphragm can be damaged. • Do not use sharp or hard objects to clean the diaphragm.

6.4 Return procedure

Enclose the bill of lading, return document and decontamination certificate in a clear plastic pouch and attach it firmly to the outside of the packaging. Any devices/replacement parts which are returned without a decontamination declaration will be cleaned at your expense before further processing. For further details refer to the operating instructions.

See also

Decontamination declaration (http://www.siemens.com/sc/declarationofdecontamination)

Return goods delivery note (http://www.siemens.com/processinstrumentation/returngoodsnote)

6.5 Disposal

Devices identified by this symbol may not be disposed of in the municipal waste disposal services under observance of the Directive 2002/96/EC on waste electronic and electrical equipment (WEEE).

They can be returned to the supplier within the EC or to a locally approved disposal service. Observe the specific regulations valid in your country.

Note

Special disposal required

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.

7 Technical specifications

7.1 Input and output

Gauge pressure input

	HART			PROFIBUS PA and FOUNDATION™ Fieldbus		
Measured variable	Gauge pressure					
Span (continuously adjustable) or measuring range, max. operating pressure (in accordance with 97/23/EC Pressure Equipment Directive) and max. test pressure (in accordance with DIN 16086) (max. 120 bar for oxygen measurement)	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	0.01 ... 1 bar g (0.15 … 14.5 psi g)	4 bar g (58 psi g)	6 bar g (87 psi g)	1 bar g (14.5 psi g)	4 bar g (58 psi g)	6 bar g (87 psi g)
	0.04 ... 4 bar g (0.58 … 58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)	4 bar g (58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)
	0.16 … 16 bar g (2.3 … 232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)	16 bar g (232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)
	0.63 ... 63 bar g (9.1 … 914 psi g)	67 bar g (972 psi g)	100 bar g (1450 psi g)	63 bar g (914 psi g)	67 bar g (972 psi g)	100 bar g (1450 psi g)
	1.6 … 160 bar g (23 … 2321 psi g)	167 bar g (2422 psi g)	250 bar g (3626 psi g)	160 bar g (2321 psi g)	167 bar g (2422 psi g)	250 bar g (3626 psi g)
	4 … 400 bar g (58 … 5802 psi g)	400 bar g (5802 psi g)	600 bar g (8702 psi g)	400 bar g (5802 psi g)	400 bar g (5802 psi g)	600 bar g (8702 psi g)
	7.0 ... 700 bar g (102 ... 10153 psi g)	800 bar g (11603 psi g)	800 bar g (11603 psi g)	700 bar g (10153 psi g)	800 bar g (11603 psi g)	800 bar g (11603 psi g)

Gauge pressure input, with flush-mounted diaphragm

	HART			PROFIBUS PA and FOUNDATION Fieldbus		
Measured variable	Gauge pressure					
Span (fully adjustable) or measuring range, max. operating pressure and max. test pressure	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	0.01 … 1 bar g (0.15 … 14.5 psi g)	4 bar g (58 psi g)	6 bar g (87 psi g)	1 bar g (14.5 psi g)	4 bar g (58 psi g)	6 bar g (87 psi g)
	0.04 … 4 bar g (0.58 … 58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)	4 bar g (58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)
	0.16 … 16 bar g (2.3 … 232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)	16 bar g (232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)
	0.6 … 63 bar g (9.1 … 914 psi g)	67 bar g (972 psi g)	100 bar g (1450 psi g)	63 bar g (914 psi g)	67 bar g (972 psi g)	100 bar g (1450 psi g)

Absolute pressure input, with flush-mounted diaphragm

	HART			PROFIBUS PA and FOUNDATION Fieldbus		
Measured variable	Absolute pressure					
Span (fully adjustable) or measuring range, max. operating pressure and max. test pressure	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	43 … 1300 mbar a (17 ... 525 inH_2O)	2.6 bar a (37.7 psi a)	10 bar a (145 psi a)	1.3 bar a (18.9 psi a)	2.6 bar a (37.7 psi a)	10 bar a (145 psi a)
	160 … 5000 mbar a (2.32 … 72.5 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)	5 bar a (72.5 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)
	1 … 30 bar a (14.5 … 435 psi a)	45 bar a (653 psi a)	100 bar a (1450 psi a)	30 bar a (435 psi a)	45 bar a (653 psi a)	100 bar a (1450 psi a)
	Depending on the process connection, the span may differ from these values			Depending on the process connection, the measuring range may differ from these values		

DS III input with PMC connection

	HART			PROFIBUS PA and FOUNDATION Fieldbus		
Measured variable	Gauge pressure					
Span (fully adjustable) or measuring range, max. operating pressure and max. test pressure	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	0.01 … 1 bar g (0.15 … 14.5 psi g) [1)]	4 bar g (58 psi g)	6 bar g (87 psi g)	1 bar g (14.5 psi g) [1)]	4 bar g (58 psi g)	6 bar g (87 psi g)
	0.04 … 4 bar g (0.58 … 58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)	4 bar g (58 psi g)	7 bar g (102 psi g)	10 bar g (145 psi g)

DS III input with PMC connection						
	HART			PROFIBUS PA and FOUNDATION Fieldbus		
	0.16 … 16 bar g (2.3 … 232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)	16 bar g (232 psi g)	21 bar g (305 psi g)	32 bar g (464 psi g)

1) 1 bar g (14.5 psi g) only in PMC Style Standard, not in Minibolt

Absolute pressure input (from the gauge pressure series)						
	HART			PROFIBUS PA and FOUNDATION Fieldbus		
Measured variable	Absolute pressure					
Span (continuously adjustable) or measuring range, max. operating pressure (in accordance with 97/23/EC Pressure Equipment Directive) and max. test pressure (in accordance with DIN 16086)	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	8.3 … 250 mbar a (3 ... 100 inH_2O)	1.5 bar a (21.8 psi a)	6 bar a (87 psi a)	250 mbar a (100 inH_2O)	1.5 bar a (21.8 psi a)	6 bar a (87 psi a)
	43 … 1300 mbar a (17 ... 525 inH_2O)	2.6 bar a (37.7 psi a)	10 bar a (145 psi a)	1.3 bar a (18.9 psi a)	2.6 bar a (37.7 psi a)	10 bar a (145 psi a)
	160 … 5000 bar a (2.32 … 72.5 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)	5 bar a (72.5 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)
	1 … 30 bar a (14.5 … 435 psi a)	45 bar a (653 psi a)	100 bar a (1450 psi a)	3 bar a (435 psi a)	45 bar a (653 psi a)	100 bar a (1450 psi a)

Absolute pressure input (from the differential pressure series)				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
Measured variable	Absolute pressure			
Span (continuously adjustable) or measuring range and max. operating pressure (in accordance with 97/23/EC Pressure Equipment Directive)	Span	Maximum operating pressure MAWP (PS)	Measuring range	Maximum operating pressure
	8.3 … 250 mbar a (3 … 100 inH_2O))	32 bar a (464 psi a)	250 mbar a (100 inH_2O)	32 bar a (464 psi a)
	43 … 1300 mbar a (17 ... 525 inH_2O)	32 bar a (464 psi a)	1300 mbar a (525 inH_2O)	32 bar a (464 psi a)
	160 … 5000 bar a (2.32 … 72.5 psi a)	32 bar a (464 psi a)	5 bar a (72.5 psi a)	32 bar a (464 psi a)
	1 … 30 bar a (14.5 … 435 psi a)	160 bar a (2320 psi a)	30 bar a (435 psi a)	160 bar a (2320 psi a)
	5.3 … 100 bar a (76.9 … 1450 psi a)	160 bar a (2320 psi a)	100 bar a (1450 psi a)	160 bar a (2320 psi a)

Differential pressure and flow rate input				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
Measured variable	Differential pressure and flow rate			
Span (continuously adjustable) or measuring range and max. operating pressure (in accordance	Span	Maximum operating pressure MAWP (PS)	Measuring range	Maximum operating pressure
	1 … 20 mbar (0.4015 … 8.031 inH_2O)	32 bar (464 psi)	20 mbar (8.031 inH_2O)	32 bar a (464 psi)

Differential pressure and flow rate input				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
with 97/23/EC Pressure Equipment Directive)	1 … 60 mbar (0.4015 … 24.09 inH_2O)	160 bar (2320 psi)	60 mbar (24.09 inH_2O)	160 bar (2320 psi)
	2.5 … 250 mbar (1.004 … 100.4 inH_2O)		250 mbar (100.4 inH_2O)	
	6 … 600 mbar (2.409 … 240.9 inH_2O)		600 mbar (240.9 inH_2O)	
	16 … 1600 mbar (6.424 … 642.4 inH_2O)		1600 mbar (642.4 inH_2O)	
	50 … 5000 mbar (20.08 … 2008 inH_2O)		5 bar (2008 inH_2O)	
	0.3 … 30 bar (4.35 … 435 psi)		30 bar (435 psi)	
	2.5 … 250 mbar (1.004 … 100.4 inH_2O)	420 bar (6091 psi)	250 mbar (100.4 inH_2O)	420 bar (6091 psi)
	6 … 600 mbar (2.409 … 240.9 inH_2O)		600 mbar (240.9 inH_2O)	
	16 … 1600 mbar (6.424 … 642.4 inH_2O)		1600 mbar (642.4 inH_2O)	
	50 … 5000 mbar (20.08 … 2008 inH_2O)		5 bar (2008 inH_2O)	
	0.3 … 30 bar (4.35 … 435 psi)		30 bar (435 psi)	

Level input				
	HART		PROFIBUS PA and FOUNDATION Fieldbus	
Measured variable	Level			
Span (fully adjustable) or measuring range and maximum operating pressure (pursuant to 97/23/EC Pressure Equipment Directive)	Span	Maximum operating pressure MAWP (PS)	Measuring range	Maximum operating pressure
	25 … 250 mbar (10 ... 100 inH_2O)	See mounting flange	250 mbar (100 inH_2O)	See mounting flange
	25 … 600 mbar (10 … 240 inH_2O)		600 mbar (240 inH_2O)	
	53 … 1600 mbar (021 … 640 inH_2O)		1600 mbar (640 inH_2O)	
	160 … 5000 mbar (2.32 … 72.5 psi)		5 bar (72.5 psi)	

Output		
	HART	PROFIBUS PA and FOUNDATION Fieldbus
Output signal	4 … 20 mA	Digital PROFIBUS PA or FOUNDATION Fieldbus signal

7.2 Operating conditions

Rated conditions for gauge pressure and absolute pressure (from the gauge pressure series)	
Installation conditions	
Ambient conditions	
• Ambient temperature	
Note	Observe the temperature class in hazardous areas.
Measuring cell with silicone oil filling	-40 … +85 °C (-40 … +185 °F)
Measuring cell with inert liquid	-20 … +85 °C (-4 … +185 °F)
Display	-30 … +85 °C (-22 … +185 °F)
Storage temperature	-50 … +85 °C (-58 … +185 °F)
• Climate class	
Condensation	Permitted
• Degree of protection in accordance with EN 60529	IP65, IP68
• Degree of protection in accordance with NEMA 250	NEMA 4X
• Electromagnetic compatibility	
Interference emission and interference immunity	In accordance with EN 61326 and NAMUR NE 21
Process medium conditions	
• Process temperature	
Measuring cell with silicone oil filling	-40 … +100 °C (-40 … +212 °F)
Measuring cell with inert liquid	-20 … +100 °C (-4 … +212 °F)
With extension to Zone 0	-20 … +60 °C (-4 … +140 °F)

Conditions of use for gauge pressure and absolute pressure with flush-mounted diaphragm	
Installation conditions	
Ambient temperature	
Note	Observe the temperature class in explosive atmospheres.
• Measuring cell with silicone oil filling	-40 … +85 °C (-40 … +185 °F)
• Measuring cell with inert liquid	-20 … +85 °C (-4 … +185 °F)
• Measuring cell with Neobee (FDA-compliant)	-10 … +85 °C (14 … 185 °F)
• Display	-30 … +85 °C (-22 … +185 °F)
• Storage temperature	-50 … +85 °C (-58 … +185 °F) (for Neobee: -20 ... + 85 °C (-4 ... +185 °F)) (for high-temperature oil: -10 ... + 85 °C (14 ... 185 °F))
Climate class	
Condensation	Permitted
• Degree of protection in accordance with EN 60 529	IP65, IP68
• Degree of protection in accordance with NEMA 250	NEMA 4X
Electromagnetic compatibility	
• Interference emission and interference immunity	In accordance with EN 61326 and NAMUR NE 21

Conditions of use for gauge pressure and absolute pressure with flush-mounted diaphragm	
Process medium conditions	
Process temperature[1)]	
• Measuring cell with silicone oil filling	-40 … +150°C (-40 … +302 °F) -40 … +200°C (-40 … +392 °F) with cooling extension
• Measuring cell with inert liquid	-20 … +100 °C (-4 … +212 °F) -20 … +200°C (-4 … +392 °F) with cooling extension
• Measuring cell with Neobee (FDA-compliant)	-10 … +150°C (14 … 302 °F) -10 … +200°C (14 … 392 °F) with cooling extension
• Measuring cell with high-temperature oil filling	-10 ... +250 °C (14 ... 482 °F) with cooling extension

1) Observe the temperature limits in the process connection standards (e.g. DIN 32676 and DIN 11851) for the maximum process temperature for flush-mounted process connections.

Rated conditions DS III with PMC connection	
Installation conditions	
Ambient temperature	
Note	Observe the temperature class in hazardous areas.
• Measuring cell with silicone oil filling	-40 … +85 °C (-40 … +185 °F)
• Display	-30 … +85 °C (-22 … +185 °F)
• Storage temperature	-50 … +85 °C (-58 … +185 °F)
Climate class	
Condensation	Permitted
• Degree of protection in accordance with EN 60529	IP65, IP68
• Degree of protection in accordance with NEMA 250	NEMA 4X
Electromagnetic compatibility	
• Interference emission and interference immunity	In accordance with EN 61326 and NAMUR NE 21
Process medium conditions	
• Process temperature	-40 … +100 °C (-40 … +212 °F)

Rated conditions for absolute pressure (from the differential pressure series), differential pressure and flow rate	
Installation conditions	
• Installation instruction	any
Ambient conditions	
• Ambient temperature	
Note	Observe the temperature class in hazardous areas.
Measuring cell with silicone oil filling	-40 … +85 °C (-40 … +185 °F)
• Measuring cell 30 bar (435 psi)	• -20 … +85 °C (-4 … +185 °F) • With flow: -20 … +85 °C (-4 … +185 °F)
Measuring cell with inert liquid	-20 … +85 °C (-4 … +185 °F)
Display	-30 … +85 °C (-22 … +185 °F)
Storage temperature	-50 … +85 °C (-58 … +185 °F)
• Climate class	
Condensation	Permitted

Rated conditions for absolute pressure (from the differential pressure series), differential pressure and flow rate	
• Degree of protection in accordance with EN 60529	IP65, IP68
• Degree of protection in accordance with NEMA 250	NEMA 4X
• Electromagnetic compatibility	
Interference emission and interference immunity	In accordance with EN 61326 and NAMUR NE 21
Process medium conditions	
• Process temperature	
Measuring cell with silicone oil filling	-40 … +100 °C (-40 … +212 °F)
• Measuring cell 30 bar (435 psi)	-20 … +85 °C (-4 … +185 °F)
Measuring cell with inert liquid	-20 … +100 °C (-4 … +212 °F)
• Measuring cell 30 bar (435 psi)	-20 … +85 °C (-4 … +185 °F)
In conjunction with dust explosion protection	-20 … +60°C (-4 … +140°F)

Rated conditions for level	
Installation conditions	
• Installation instruction	specified through the flange
Ambient conditions	
• Ambient temperature	
Note	Observe the allocation of the max. permissible operating temperature to the max. permissible operating pressure of the relevant flange connection.
Measuring cell with silicone oil filling	-40 … +85 °C (-40 … +185 °F)
Display	-30 … +85 °C (-22 ... +185 °F)
Storage temperature	-50 … +85 °C (-58 … +185 °F)
• Climate class	
Condensation	Permitted
• Degree of protection in accordance with EN 60529	IP65
• Degree of protection in accordance with NEMA 250	NEMA 4X
• Electromagnetic compatibility	
Interference emission and interference immunity	In accordance with EN 61326 and NAMUR NE 21
Process medium conditions	
• Process temperature	
Measuring cell with silicone oil filling	• Plus side: see the mounting flange • Minus side: -40 … +100 °C (-40 … +212 °F)

7.3 Construction

Construction for gauge pressure and absolute pressure (from the gauge pressure series)	
Weight	Approx. 1.5 kg (3.3 lb) for aluminum enclosure

Construction for gauge pressure and absolute pressure (from the gauge pressure series)	
Material	
• Wetted parts materials	
Process connection	Stainless steel, mat. no. 1.4404/316L or Hastelloy C4, mat. no. 2.4610
Oval flange	Stainless steel, mat. no. 1.4404/316L
Seal diaphragm	Stainless steel, material no. 1.4404/316L or Hastelloy C276, material no. 2.4819
• Non-wetted parts materials	
Electronics housing	• Non-copper aluminum die casting GD-AlSi 12 or stainless steel precision casting, mat. no. 1.4408 • Standard: Polyester-based paint Option: 2 coats: Coat 1: epoxy-based; coat 2: polyurethane • Stainless steel nameplate
Mounting bracket	Steel or stainless steel
Process connection	• Connection pin G1/2B in accordance with DIN EN 837-1 • Female thread 1/2-14 NPT • Oval flange (PN 160 (MWP 2320 psi g)) with fastening screw thread: – 7/16-20 UNF in accordance with EN 61518 – M10 in accordance with DIN 19213 • Oval flange (PN 420 (MWP 2320 psi g)) with fastening screw thread: – 7/16-20 UNF in accordance with EN 61518 – M12 in accordance with DIN 19213 • Male thread M20 x 1.5 and 1/2-14 NPT
Electrical connection	Cable inlet using the following screwed joints: • Pg 13.5 • M20 x 1.5 • ½-14 NPT or Han 7D/Han 8D connector[1)] • M12 connector

1) Han 8D is identical to Han 8U.

Construction for gauge pressure, with flush mounted diaphragm	
Weight	Approx 1.5 … 13.5 kg (3.3 … 30 lb) with aluminum enclosure
Material	
• Wetted parts material	
Process connection	Stainless steel, mat. no. 1.4404/316L
Seal diaphragm	Stainless steel, mat. no. 1.4404/316L
• Non-wetted parts materials	
Electronics housing	• Non-copper aluminum die casting GD-AlSi 12 or stainless steel precision casting, mat. no. 1.4408 • Standard: Polyester-based paint Option: 2 coats: Coat 1: epoxy-based; coat 2: polyurethane • Stainless steel nameplate
Mounting bracket	Steel or stainless steel
Process connection	• Flanges as per EN and ASME • F&B and Pharma flange • BioConnect/BioControl • PMC style

Construction for gauge pressure, with flush mounted diaphragm	
Electrical connection	Cable inlet using the following screwed joints: • Pg 13.5 • M20x1.5 • ½-14 NPT • Han 7D/Han 8D plug[1)] • M12 connector

1) Han 8D is identical to Han 8U.

DS III construction with PMC connection	
Weight	Approx. 1.5 kg (3.3 lb) for aluminum enclosure
Material	
• Wetted parts material	
Gasket (standard)	PTFE flat gasket
O-ring (minibolt)	• FPM (Viton) • FFPM or NBR (optional)
• Non-wetted parts materials	
Electronics housing	• Copper-free die cast aluminum GD-AlSi 12 or precision cast stainless steel, mat. no. 1.4408 • Standard: Polyester-based paint Option: 2 coats: Coat 1: epoxy-based; coat 2: polyurethane • Stainless steel nameplate
Mounting bracket	Steel or stainless steel
Measuring cell filling	• Silicone oil • Inert liquid
Process connection	
• Standard	• Flush mounted • $1^1/_2$" • PMC Standard design
• Minibolt	• Flush mounted • 1" • PMC Minibolt design
Electrical connection	Cable inlet using the following screwed joints: • Pg 13.5 • M20 x 1.5 • ½-14 NPT • Han 7D/Han 8D plug[1)] • M12 connector

1) Han 8D is identical to Han 8U.

Design for absolute pressure (from the differential pressure series), differential pressure and flow rate	
Weight	Approx. 4.5 kg (9.9 lb) for aluminum enclosure
Material	
• Wetted parts material	
Seal diaphragm	Stainless steel, mat. no. 1.4404/316L, Hastelloy C276, mat. no. 2.4819, Monel, mat. no. 2.4360, tantalum or gold
Pressure caps and locking screw	Stainless steel, mat. no. 1.4408 to PN 160, mat. no. 1.4571/316Ti for PN 420, Hastelloy C4, 2.4610 or Monel, mat. no. 2.4360
O-ring	FPM (Viton) or optionally: PTFE, FEP, FEPM and NBR

Design for absolute pressure (from the differential pressure series), differential pressure and flow rate	
• Non-wetted parts materials	
Electronics housing	• Non-copper aluminum die casting GD-AlSi 12 or stainless steel precision casting, mat. no. 1.4408 • Standard: Polyester-based paint Option: 2 coats: Coat 1: epoxy-based; coat 2: polyurethane • Stainless steel nameplate
Pressure cap screws	Stainless steel
Mounting bracket	Steel or stainless steel
Process connection	1/4-18 NPT female connection and flat connection with 7/16-20 UNF fastening screw thread in accordance with EN 61518 or M10 fastening screw thread in accordance with DIN 19213 (M12 for PN 420 (MWP 6092 psi))
Electrical connection	Screw terminals Cable inlet using the following screwed joints: • Pg 13.5 • M20 x 1.5 • ½-14 NPT or Han 7D/Han 8D connector[1)] • M12 connector

1) Han 8D is identical to Han 8U.

Construction for level	
Weight	
• as per EN (pressure transmitter with mounting flange, without tube)	approx 11 … 13 kg (24.2 … 28.7 lb)
• as per ASME (pressure transmitter with mounting flange, without tube)	approx 11 … 18 kg (24.2 … 39.7 lb)
Material	
• Wetted parts material	
Plus side	
• Seal diaphragm on the mounting flange	Stainless steel, mat. no. 1.4404/316L, Monel 400, mat. no. 2.4360, Hastelloy B2, mat. no. 2.4617, Hastelloy C276, mat. no. 2.4819, Hastelloy C4, mat. no. 2.4610, tantalum, PTFE, PFA, ECTFE
• Sealing surface	smooth as per EN 1092-1, form B1 or ASME B16.5 RF 125 … 250 AA for stainless steel 316L, EN 2092-1 form B2 or ASME B16.5 RFSF for the remaining materials
Sealing material in the pressure caps	
• for standard applications	Viton
• for underpressure applications on the mounting flange	Copper
Minus side	
• Seal diaphragm	Stainless steel, mat. no. 1.4404/316L
• Pressure caps and locking screws	Stainless steel, mat. no. 1.4408
• O-ring	FPM (Viton)
• Non-wetted parts materials	

Construction for level	
Electronics housing	• Copper-free die cast aluminum GD-AlSi 12 or precision cast stainless steel, mat. no. 1.4408 • Standard: Polyester-based paint Option: 2 coats: Coat 1: epoxy-based; coat 2: polyurethane • Stainless steel nameplate
Pressure cap screws	Stainless steel
Measuring cell filling	Silicone oil
• Mounting flange fill fluid	Silicon oil or a different design
Process connection	
• Plus side	Flange as per EN and ASME
• Minus side	Female thread $^1/_4$-18 NPT and flat connection with fastening screw thread M10 as per DIN 19213 (M12 for PN 420 (MWP 6092 psi)) or $^7/_{16}$-20 UNF as per EN 61518
Electrical connection	Screw terminals Cable inlet using the following screwed joints: • Pg 13.5 • M20 x 1.5 • ½-14 NPT or Han 7D/Han 8D connector[1)] • M12 connector

1) Han 8D is identical to Han 8U.

7.4 Display, keyboard and auxiliary power

Display and user interface	
Keys	3 for on-site programming directly at the device
Display	• With or without integrated display (optional) • Cover with inspection window (optional)

Auxiliary power U_H		
	HART	PROFIBUS PA or Foundation Fieldbus
Terminal voltage at transmitter	• DC 10.5 V … 45 V • In the case of intrinsically safe operation 10.5 V … 30 V DC	–
Ripple	U_{SS} ≤ 0.2 V (47 … 125 Hz)	–
Noise	U_{eff} ≤ 1.2 mV (0.5 … 10 kHz)	–
Auxiliary power	–	Bus-powered
Separate supply voltage	–	Not necessary
Bus voltage		
• Not 	–	9 … 32 V
• For intrinsically safe operation	–	9 … 24 V
Current consumption		
• Max. basic current	–	12.5 mA
• Starting current ≤ basic current	–	Yes
• Max. current in event of fault	–	15.5 mA
Error shut-down electronics (FDE) present	–	Yes

7.5 Certificates and approvals

Certificates and approvals		
	HART	**PROFIBUS PA and FOUNDATION Fieldbus**
Classification according to Pressure Equipment Directive (PED 97/23/EC)	• for gases of Fluid Group 1 and liquids of Fluid Group 1; meets requirements of Article 3 Para. 3 (good engineering practice) • only for flow rate: for gases of Fluid Group 1 and liquids of Fluid Group 1; fulfills the basic safety requirements as per article 3, Para 1 (appendix 1); classified as category III, module H conformity evaluation by TÜV Nord	
Drinking water	In preparation	
Explosion protection		
• Intrinsic safety "i"		
Designation	⟨Ex⟩ II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
Permissible ambient temperature	-40 … +85 °C (-40 … +185 °F) temperature class T4 -40 … +70 °C (-40 … +158 °F) temperature class T5 -40 … +60 °C (-40 … +140 °F) temperature class T6	
Connection	To a certified intrinsically safe circuit with the max. values: U_i = 30 V, I_i = 100 mA, P_i = 750 mW, R_i = 300 Ω	FISCO supply unit U_0 = 17.5 V, I_0 = 380 mA, P_0 = 5.32 W Linear barrier U_0 = 24 V, I_0 = 174 mA, P_0 = 1 W
Effective inner capacitance	C_i = 6 nF	C_i = 1.1 nF
Effective inner inductance	L_i = 0.4 mH	L_i = 7 µH
• Flameproof enclosure encapsulation "d"		
Designation	⟨Ex⟩ II 1/2 G Ex d IIC T4, T6 Ga/Gb	
Permissible ambient temperature	-40 … +85 °C (-40 … +185 °F) temperature class T4 -40 … +60 °C (-40 … +140 °F) temperature class T6	
Connection	To a circuit with the operating values: U_H = 10.5 … 45 V DC	To a circuit with the operating values: U_H = 9 … 32 V DC
• Dust explosion protection for Zone 20 and 20/21		
Designation	⟨Ex⟩ II 1 D Ex ta IIIC IP65 T120°C Da, ⟨Ex⟩ II 1/2 D Ex ta/tb IIIC IP65 T120°C Da/Db	
Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
max. surface temperature	120°C (248°F)	
Connection	To a certified intrinsically safe circuit with the max. values: U_i = 30 V, I_i = 100 mA, P_i = 750 mW, R_i = 300 Ω	FISCO supply unit U_0 = 17.5 V, I_0 = 380 mA, P_0 = 5.32 W Linear barrier U_0 = 24 V, I_0 = 250 mA, P_0 = 1.2 W
Effective inner capacitance	C_i = 6 nF	C_i = 1.1 nF
Effective inner inductance	L_i = 0.4 mH	L_i = 7 µH
• Dust explosion protection for Zone 22		
Designation	⟨Ex⟩ II 2 D Ex tb IIIC IP65 T120°C Db	
Connection	To a circuit with the operating values: U_H = 10.5 … 45 V DC; P_{max} = 1.2 W	To a circuit with the operating values: U_H = DC 9 … 32 V; P_{max} = 1.2 W
• Type of protection "n" (Zone 2)		

Certificates and approvals			
		HART	PROFIBUS PA and FOUNDATION Fieldbus
	Designation	II 2/3 G Ex nA II T4/T5/T6 Gc II 2/3 G Ex ic IIC T4/T5/T6 Gc	
	Connection "nA"	U_n = 45 V	U_m = 32 V
	Connection "ic"	To a circuit with the operating values: U_i = 45 V	FISCO supply unit U_O =17.5 V, I_O = 570 mA Linear barrier U_0 = 32 V, I_0 = 132 mA, P_0 = 1 W
	Effective inner capacitance	C_i = 6 nF	C_i = 1.1 nF
	Effective inner inductance	L_i = 0.4 mH	L_i = 7 µH
•	Explosion protection in accordance with FM	Certificate of Compliance 3008490	
	Designation (XP/DIP) or IS; NI; S	CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4 ... T6; CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	
	Permissible ambient temperature	T_a = T4: -40 ... +85 °C (-40 ... +185 °F) T_a = T5: -40 ... +70 °C (-40 ... +158 °F) T_a = T6: -40 ... +60 °C (-40 ... +140 °F)	
	Entity parameters	As per "control drawing" A5E00072770A: U_i = 30 V, I_i = 100 mA, P_i = 750 mW, R_i = 300 Ω, C_i = 6 nF, L_i = 0.4 mH	As per "control drawing" A5E00072770A: U_{max} = 17.5 V, I_{max} = 380 mA, P_{max} = 5.32 W, C_{max} = 6 nF, L_{max} = 0.4 mH
•	Explosion protection as per CSA	Certificate of Compliance 1153651	
	Designation (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4 ... T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4 ... T6: CL I, DIV 2, GP ABCD T4 ... T6; CL II, DIV 2, GP FG; CL III	
	Permissible ambient temperature	T_a = T4: -40 ... +85 °C (-40 ... +185 °F) T_a = T5: -40 ... +70 °C (-40 ... +158 °F) T_a = T6: -40 ... +60 °C (-40 ... +140 °F)	
	Entity parameters	As per "control drawing" A5E00072770A: U_i = 30 V, I_i = 100 mA, P_i = 750 mW, R_i = 300 Ω, L_i = 0.4 mH, C_i = 6 nF	

A Appendix A

A.1 Certificate

The certificates can be found on the enclosed CD and on the Internet under:

Certificates (http://www.siemens.com/processinstrumentation/certificates)

A.2 Technical support

Technical Support

You can contact Technical Support for all IA and DT products:

- Via the Internet using the **Support Request:**
  Support request (http://www.siemens.com/automation/support-request)
- E-mail (mailto:support.automation@siemens.com)
- **Phone:** +49 (0) 911 895 7 222
- **Fax:** +49 (0) 911 895 7 223

Further information about our technical support is available on the Internet at
Technical support (http://www.siemens.com/automation/csi/service)

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base on the Internet at:

Service&Support (http://www.siemens.com/automation/service&support)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter with the latest information about our products.
- A Knowledge Manager to find the right documents for you.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- Your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services."

Additional Support

Please contact your local Siemens representative and offices if you have any questions about the products described in this manual and do not find the right answers.

Find your contact partner at:

Partner (http://www.automation.siemens.com/partner)

Documentation for various products and systems is available at:

Instructions and manuals (http://www.siemens.com/processinstrumentation/documentation)

See also

Product information on SITRANS P in the Internet (http://www.siemens.com/sitransp)

Process instrumentation catalog (http://www.siemens.com/processinstrumentation/catalogs)

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SITRANS P DS III (7MF4.33.. 7MF4.34.. 7MF4.35..)
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