# Pressure transmitter SITRANS P300

Compact Operating Instructions · 08/2011



**SITRANS** 

**SIEMENS** 

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# SIEMENS

# **SITRANS**

# Pressure transmitter SITRANS P300 (7MF8.23.. 7MF8.24.. 7MF8.25..)

**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.

# **A** DANGER

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

# **A** WARNING

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

## **A**CAUTION

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

## CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

#### NOTICE

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

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:

#### **A** 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.

# Introduction

# 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 on the electronic data medium.

#### See also

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

# **History**

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

Currently released versions of these instructions:

Edition	Firmware identifier nameplate	System integration	Installation path for PDM
08/2011	HART: FW: 29.03.07	PDM 6.0 <sup>1)</sup> ; Dev. Rev. 3	SITRANS P300
	PA/FF: FW: 0300.01.08	DD Rev. 2	

<sup>1)</sup> up to SP05 Hotfix 5

# 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

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

The output signal is a load-independent direct current of 4 to 20 mA which is linearly proportional to the input pressure.

The "Intrinsically-safe" version of the transmitter can be installed in hazardous areas (zone 1). The devices have an EC type examination certificate and comply with the appropriate harmonized European CENELEC directives.

Operate the device in accordance with the specifications in Section Technical data (Page 25).

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

# 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 the shipping documents with your order for correctness and completeness.



Using a damaged or incomplete device

Danger of explosion in hazardous areas.

· Do not use any damaged or incomplete devices.

# Nameplate layout

## Overview

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

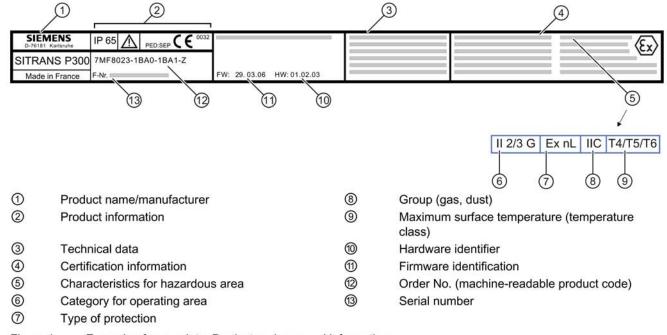


Figure 1 Example of nameplate: Product and approval information

FW:		aa.bb.	CC	Firmware for HART
		aa.		Device type
		bb.		Document revision
			CC	FW edition
FW:	aa	aaa.bb.	CC	Firmware for PROFIBUS
	aa	aaa.		Profile revision (0300 = 3.00)
		bb.		Document revision
			CC	FW edition
HW:	XX.	уу.	ZZ	Hardware
	XX			Serial number
		yy.		Connection board product version
			ZZ	Compatibility mark

# 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.



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 25).

# 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.

# Safety instructions

# Prerequisites for safe 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.

# Warning symbols on the device

Symbol	Explanation
À	Consult operating instructions

# 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)

# Conformity with European directives

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

**Electromagnetic Compatibility** Directive of the European Parliament and of the Council on the

**EMC** approximation of the laws of the Member States relating to electromagnetic

2004/108/EC compatibility and repealing Directive 89/336/EEC.

Directive of the European Parliament and the Council on the approximation Atmosphère explosible ATEX 94/9/EC

of the laws of the Member States concerning equipment and protective

systems intended for use in potentially explosive atmospheres.

Directive of the European Parliament and of the Council on the Pressure Equipment Directive

approximation of the laws of the Member States concerning pressure

97/23/EC equipment.

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

# Incorrect device modifications



PED

#### 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.

# 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.

# 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 and aggressive as well as 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.



## 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 data (Page 25)



## 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 in the certificate and in Technical data (Page 25).



# 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.

# Installing/mounting

# 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 25).



# 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 data (Page 25)".



# 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 Chapter "Technical data (Page 25)".



# WARNING

## Exceeded maximum ambient or process media temperature

Danger of explosion in areas subject to explosion hazard.

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 data (Page 25).



## 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 data (Page 25)



## WARNING

#### Incorrect mounting at Zone 0

Danger of explosion in areas subject to explosion hazard.

- Ensure sufficient tightness at the process connection.
- Observe the standard IEC/EN 60079-26.



## 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 16)".



#### 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 data (Page 25).



#### 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.

# Installation location requirements



# 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 data (Page 25)".



## Aggressive atmospheres

Damage to device through penetration of aggressive vapors.

Ensure that the device is suitable for the application.

## CAUTION

## 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 data (Page 25).

# Proper mounting

## CAUTION

#### Incorrect assembly

The device can be damaged or destroyed or its functionality impaired through incorrect assembly.

- Make sure before installing the device that there is no visible damage.
- Check that the process connections are clean and the right seals and cable glands have been used.
- Assemble the device using suitable tools, observing the torques specified in the technical specifications.

## NOTICE

## 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 25) is no longer guaranteed.

Make sure that the device is securely closed.

#### See also

Connecting the device (Page 16)

# Uninstalling



## 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.

# Installation (except level)

# Installation mounting (except for level)

# Requirements

#### NOTICE

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

## **NOTICE**

The housing may only be opened for maintenance, local operation or to make electrical connections.

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 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 condensate 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.

#### See also

Introduction to commissioning (Page 19)

# Installation (except level)

#### NOTICE

#### 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 19)

# "Level" installation

# Information for installing level variant

## Requirements

# **NOTICE**

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

## **NOTICE**

The enclosure may only be opened for maintenance, local operation or to make electrical connections.

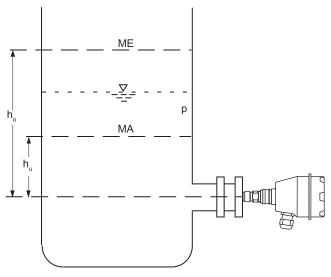
The installation location is to be as follows:

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

# Installation configuration

The transmitter can only be used in non-pressurized vessels for level.

## Installation height



Formula:

Zero point:  $p_{MA} = \rho \cdot g \cdot H_U$ 

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

Level of non-pressurized vessel

MA Zero point

 $\Delta p_{MA}$  Limit point to be adjusted

ME	Limit point	$\Delta p_{ME}$	Limit point to be adjusted
p	Pressure	ρ	Density of the measured medium in the container
$h_{\text{U}}$	Start-of-scale value	g	Acceleration due to gravity
$h_{O}$	Full-scale value		

#### Note

Select the height of the container flange for recording of the transmitter (measuring point) such that the lowest level to be measured is always over the flange or at its upper edge.

# 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.

# Connecting

# Basic safety instructions



# WARNING

# Unsuitable cables and/or cable glands

Danger of explosion in hazardous areas if you connect cables and/or cable glands which do not match one another or do not comply with the technical requirements.

- Only use cables and cable glands complying with the requirements specified in the section Technical data (Page 25).
- Tighten the cable glands in accordance with the specified torques.
- When replacing cable glands use only cable glands of the same type.
- After installation check that the cables are seated firmly.



#### 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 data (Page 25)" or on the nameplate.



# 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.

#### CAUTION

# 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.

## CAUTION

# 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 section "Connecting the device (Page 16)".

#### 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.
- Connect a load resistor of at least 230 Ω in series in the signal circuit in order to guarantee fault-free HART communication. When power supply isolators are used for HART transmitters, e.g. SITRANS I, a load resistor is already installed in the device.

# Connecting the device

## Opening the device

- 1. Unscrew the cover of the electrical cable compartment.
- 2. Unscrew the cable gland cover and remove the plastic seal.

## Connecting the device

# Note

The following values can be set for the load:

- 230 to 1100 Ω for the HART communicator
- 230 to 500 Ω for the HART modem

1. Strip approximately 15 cm from the outer sheath of the cable.



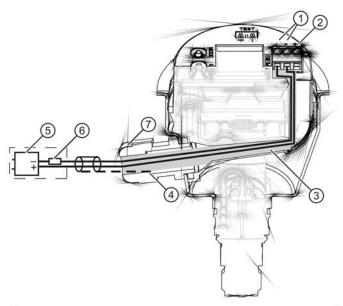
- 2. Insert the wires of the connecting cable through the cable gland and lead them through the guide channel. The guide channel connects the cable gland to the connecting terminals.
- 3. If you have a plastic cable gland, connect the shield to the ground terminal ②. The ground terminal is electrically connected to the enclosure.
- 4. If you have a metal cable gland, ground the shield to the cable gland ground terminal ③ as follows:
  - Leave approx. 2 cm of extra shield.
  - Turn the shield over the insulation. See Fig.



- Firmly press in the plastic seal. The O-ring will in turn press the shield against the enclosure.
- 5. Screw on the cable gland cover with a 23 mm open end wrench until strain relief is ensured.



- 6. Strip the wires.
- 7. Connect the wires to the terminals ① "+" and "-".
  Ensure correct polarity! If necessary, ground the device using the
- 8. "-" connection by connecting the "-" connection to the ground terminal ②.



- Connecting terminals
- ② Ground terminal with plastic cable gland
- 3 Guide channel
- Ground terminal for cable gland with metal cable gland
- Figure 2 Electrical connection, power supply
- Auxiliary power U<sub>H</sub>
- 6 Load
- Cable gland

## Closing the device

- 1. Screw on the cover of the electrical cable compartment.
- 2. Check the tightness of the cable gland in accordance with the degree of protection.

# Commissioning

# Basic safety instructions



#### WARNING

Device failure or danger of explosion in hazardous areas.

Improper commissioning in hazardous areas

- Do not commission the device until it has been mounted completely and connected in accordance with the information in Chapter "Technical data (Page 25)".
- Before commissioning take the effect on other devices in the system into account.



## 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.



## 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.

#### NOTICE

#### 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.

# Introduction to commissioning

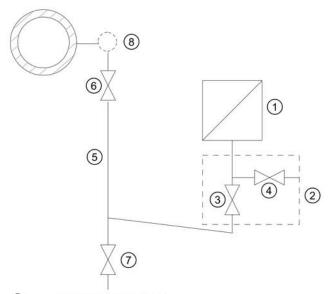
Following commissioning, the transmitter is immediately ready for use.

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.

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.

# Commissioning with steam or liquid



- 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

- Blow-out valve
- 8 Compensation vessel (steam only)

Figure 3 Measuring steam

# Requirement

All valves are closed.

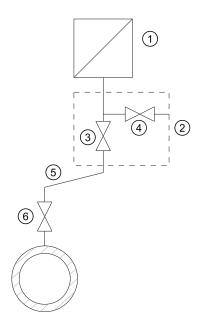
## **Procedure**

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

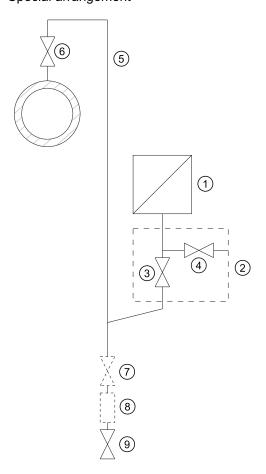
- 1. Open the shut-off valve for the test connection ④.
- 2. Via the test connection of the shut-off module ②, apply the pressure corresponding to the start of scale value to the pressure transmitter ①.
- 3. Check the start of scale value.
- 4. If the start of scale value differs from the value desired,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

# Commissioning for gases

Usual arrangement



# Special arrangement



Measuring gases above the pressure tapping point

Measuring gases below the pressure tapping point

1	Pressure transmitter	(5)	Pressure line
2	Shut-off module	6	Shut-off valve
3	Shut-off valve to process	7	Shut-off valve (optional)
4	Shut-off valve for test connection or for bleed	8	Condensate vessel (optional)
	screw	<u>@</u>	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.

# Maintenance and service

# 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).



# 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.



## 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 (Page 14)".



# 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).



# 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.



#### 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.

# Maintenance and repair work

# 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.

# Checking the gaskets

Inspect the seals at regular intervals

#### NOTICE

#### 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.

#### NOTICE

# 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.

# 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</li>

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

# 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.

#### CAUTION

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.

# 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 e.g. when cleaning plastic enclosures with a dry cloth.

Prevent electrostatic charging in hazardous areas.

# 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.

## CAUTION

# Improper cleaning of diaphragm

Device damage. The diaphragm can be damaged.

Do not use sharp or hard objects to clean the diaphragm.

# 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)

# **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.

# NOTICE

# Special disposal required

The device includes components that require special disposal.

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

# Technical data

# Input

Gauge pressure input						
	HART			PROFIBUS P	A or Foundation	Fieldbus
Measured variable	Gauge pressu	re				
Span (continuously adjustable) or measuring range, max. operating pressure (in accordance	Measuring span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum permissible operating pressure	Maximum test pressure
with 97/23/EC Pressure Equipment Directive) and max. test pressure (in accordance with	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)
accordance with DIN 16086) (max. 120 bar for oxygen measurement)	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 (23.2 2321 psi g)	167 bar g (2422 psi g)	250 bar g (3526 psi g)	160 bar g (2321 psi g)	167 bar g (2422 psi g)	250 bar g (3626 psi g)
	4.0 400 bar g (58 5802 psi g)	400 bar g (5802 psi g)	600 bar g (8400 psi g)	400 bar g (5802 psi g)	400 bar g (5802 psi g)	600 bar g (8702 psi g)
		the process cor er from these val			the process con nge may differ fro	nnection, the om these values

Absolute pressure input						
	HART			PROFIBUS P	A or Foundatior	n Fieldbus
Measured variable	Absolute press	ure				
Span (continuously adjustable) or measuring range, max. operating pressure (in accordance	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
with 97/23/EC Pressure Equipment Directive) and max. test pressure (in	8 250 mbar a (3 100 inH <sub>2</sub> O)	1.5 (22 psi a)	6 bar a (87 psi a)	250 mbar a (3.6 psi a)	1.5 bar a (22 psi a)	6 bar a (87 psi a)
accordance with DIN 16086)	43 1300 mbar a (17 525 inH <sub>2</sub> O)	2,6 bar a (38 psi a)	10 bar a (145 psi a)	1.30 bar a (19 psi a)	2.6 bar a (38 psi a)	10 bar a (145 psi a)
	0.16 5 bar a (2.3 73 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)	5 bar a (73 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)
Gauge pressure input, with	flush-mounted o	diaphragm				
	HART			PROFIBUS P	A or Foundation	n Fieldbus
Measured variable	Gauge pressur	е				
Span (continuously 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)
	0.63 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)
	Depending on	the process con	nection, the spa	n may deviate f	rom these value	es.
Absolute pressure input, w	ith flush-mounted	d diaphragm				
	HART			PROFIBUS P	A or Foundatior	n Fieldbus
Measured variable	Absolute press	ure				
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	Span	Maximum operating pressure MAWP (PS)	Maximum test pressure	Measuring range	Maximum operating pressure	Maximum test pressure
	43 1300 mbar a (17 522 inH <sub>2</sub> O)	2.6 bar a (38 psi a)	10 bar a (145 psi a)	1300 mbar a (522 inH <sub>2</sub> O)	2.6 bar a (38 psi a)	10 bar a (145 psi a)

Absolute pressure input, with flush-mounted diaphragm							
	HART	HART			PROFIBUS PA or Foundation Fieldbus		
DIN 16086)	0.16 5 bar a (2.3 73 psi a)	10 bar a (145 psi a)	30 bar a (435 psi a)	5 bar a (73 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)	
	-	the process co er from these va			n the process co	onnection, the rom these values	

# Output

Output		
	HART	PROFIBUS PA or Foundation Fieldbus
Output signal	4 20 mA	Digital PROFIBUS-PA or Foundation Fieldbus signal

# Conditions of use

Conditions of use	
Installation conditions	
Ambient temperature	
Note	Observe the temperature class in areas subject to explosion hazard.
Measuring cell with silicone oil	-40 +85 °C (-40 +185 °F)
Measuring cell with inert liquid (not with flush-mounted diaphragm) <sup>1)</sup>	-20 +85 °C (-4 +185 °F)
Measuring cell with Neobee oil (FDA-compliant, flush-mounted diaphragm) <sup>1)</sup>	-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: -50 +85 °C (-58 +185 °F))
Climate class	
Condensation	Permitted
Degree of protection in accordance with EN 60 529	IP65, IP68, enclosure cleaning, resistant to alkalis, steam up to 150° C
Degree of protection in accordance with NEMA 250	NEMA 4X, enclosure cleaning, resistant to alkalis, steam up to 150 °C
Electromagnetic Compatibility	
Emission and resistance to interference	As per EN 61 326 and NAMUR NE 21
Medium conditions	
Process temperature	
Measuring cell with silicone oil	-40 +100 °C (-40 +212 °F)
Measuring cell with silicone oil (flush-mounted diaphragm) <sup>1)</sup>	-40 +150 °C (-40 +302 °F)

Conditions of use	
Measuring cell with Neobee oil (FDA-compliant, flush-mounted diaphragm) <sup>1)</sup>	-10 +150 °C (14 302 °F)
Measuring cell with silicone oil and cooling extension (flush-mounted diaphragm) <sup>1)</sup>	-40 +200 °C (-40 +392 °F)
Measuring cell with inert liquid	-20 +100 °C (-4 +212 °F)
Measuring cell with high-temperature oil	-10 +250 °C (14 482 °F)

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

# Construction

Design (standard version)		
Weight (without options)	Approx. 800 g (1.8 lb)	
Enclosure material	Stainless steel, mat. no. 1.4301/304	
Wetted parts materials		
Connection pins	Stainless steel, mat. no. 1.4404/316L	
	Hastelloy C276, mat. No. 2.4819	
Oval flange	Stainless steel, mat. no. 1.4404/316L	
Seal diaphragm	Stainless steel, mat. no. 1.4404/316L	
	Hastelloy C276, mat. no. 2.4819	
Measurement cell filling	Silicone oil	
-	Inert filling liquid	
Process connection	<ul> <li>Connection pins G½B in accordance with DIN EN 837-1</li> </ul>	
	<ul> <li>Internal thread ½-14 NPT</li> </ul>	
	<ul> <li>Oval flange PN 160 (MAWP (PS) 2320 psi) with fastening screw thread:</li> </ul>	
	<ul> <li>½16-20 UNF as per IEC 61518</li> </ul>	
	<ul> <li>M10 as per DIN 19213</li> </ul>	
	<ul> <li>Male thread M20 x 1.5 and ½-14 NPT</li> </ul>	
Electrical connection	Cable inlet using the following glands:	
	• M20 x 1.5 (plastic)	
	<ul> <li>M20 x 1.5 (metal with shield support)</li> </ul>	
Design with flush-mounted diaphragm		
Weight (without options)	Approx. 1 13 kg (2.2 29 lb)	
Enclosure material	Stainless steel, mat. no. 1.4301/304	
Wetted parts material		
Process connection	Stainless steel, mat. no. 1.4404/316L	
Seal diaphragm	Stainless steel, mat. no. 1.4404/316L	
	Hastelloy C276, mat. no. 2.4819	
Measuring cell filling	Silicone oil	
	Inert filling liquid	
	FDA-compliant oil (Neobee)	
Process connection	Flanges in accordance with EN and ASME	
	F&B and Pharma flange	
	Bioconnect/Biocontrol	
	PMC style	

Design with flush-mounted diaphragm	
Electrical connection	Cable inlet via the following glands:
	<ul> <li>M20 x 1.5 (plastic)</li> </ul>
	<ul> <li>M20 x 1.5 (metal with shield support)</li> </ul>
Wetted parts surface quality	$R_a$ values $\leq 0.8$ μm (32 μ-inch)/welded seams $R_a \leq 1.6$ μm (64 μ-inch) (process connections in accordance with 3A; $R_a$ values $\leq 0.8$ μm (32 μ-inch)/ welded seams $R_a \leq 0.8$ μm (32 μ-inch))

# Display, keyboard and auxiliary power

Display and user interface	
Keys	3 for on-site programming on the device itself
Display	With or without integrated display (optional)
	<ul> <li>Cover with inspection window (optional)</li> </ul>

Auxiliary power U <sub>H</sub>		
	HART	PROFIBUS PA or Foundation Fieldbus
Terminal voltage at transmitter	• 10.5 V 42 V DC	_
-	<ul> <li>In the case of intrinsically safe operation 10.5 V 30 V DC</li> </ul>	
Ripple	U <sub>SS</sub> ≤ 0,2 V (47 125 Hz)	_
Noise	U <sub>eff</sub> ≤ 1.2 V (0.5 10 Hz)	_
Auxiliary power	-	Bus-powered
Separate supply voltage	-	Not necessary
Bus voltage		
Without	-	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) fitted	-	Yes

# Certificates and approvals

	HART	PROFIBUS PA or Foundation Fieldbus
Classification according to Pressure Equipment Directive (PED 97/23/EC)	<ul> <li>For gases of Fluid Group 1 and liquids of Fluid Group 1; meets requirements of Article 3 Para. 3 (good engineering practice)</li> </ul>	
Water, waste water	In preparation	
Explosion protection		
Intrinsic safety "i"	PTB 05 ATEX 2048	
Identifier	( II 1/2 G Ex ia/ib IIB/IIC T4, T5, T6	
Permissible ambient temperature	-40 +85°C (-40 +185°F) tempera -40 +70°C (-40 +158°F) tempera -40 +60°C (-40 +140°F) tempera	ture class T5

	HART	PROFIBUS PA or Foundation Fieldbus
Connections	To certified intrinsically safe circuits with the following maximum values: $U_i = 30 \text{ V}$ , $I_i = 100 \text{ mA}$	FISCO supply unit U <sub>i</sub> = 17.5 V, I <sub>i</sub> = 380 mA P <sub>i</sub> = 5.32 W
	$O_i = 30 \text{ V}, I_i = 100 \text{ mA}$ $P_i = 750 \text{ mW}, R_i = 300 \Omega$	Linear barrier $U_i = 24 \text{ V}, I_i = 250 \text{ mA}$ $P_i = 1.2 \text{ W}$
Effective inner capacitance:	C <sub>i</sub> = 6 nF	C <sub>i</sub> = 1.1 nF
Effective inner inductance:	L <sub>i</sub> = 0.4 mH	$L_i = 7 \mu H$
FM explosion protection for USA and Canada (cFM <sub>US</sub> )		
Designation (DIP) or (IS); (NI)	Certificate of Compliance 3025099 CL I, DIV 1, GP ABCD T4 T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEX IIC T4 T6; CL I, DIV 2, GP ABCD T4 T6; CL II, DIV 2, GP FG; CL III	
Designation (DIP) or (IS)	Certificate of Compliance 3025099C  CL I, DIV 1, GP ABCD T4 T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC 4 T6; CL I, DIV 2, GP ABCD T4 T6; CL II, DIV 2, GP FG; CL III	
Dust ignition protection for Zone 20/21/22	PTB 05 ATEX 2048	
Designation	Ex II 1D Ex ia D 20 T 120 °C Ex II 2D Ex ib D 21 T 120 °C Ex II 3D Ex ib D 21 T 120 °C	
Permissible ambient temperature	-40 +85 °C (-40 +185 °F) (for mineral glass windows only -20 +85 °C (-4 +185 °F)) temperature class T4 -40 +70 °C (-40 +158 °F) (for mineral glass windows only -20 +70 °C (-4 +158 °F)) temperature class T5 -40 +60 °C (-40 +140 °F) (for mineral glass windows only -20 +60 °C (-4 +140 °F)) temperature class T6	
Connection	To certificated intrinsically safe circuits with maximum values:	To certified intrinsically safe circuits wi the following maximum values:
	Ui = 30 V, Ii = 100 mA, Pi = 750 mW	Ui = 24 V, Ii = 380 mA, Pi = 5.32 mW
Effective inner capacitance	Ci = 6 nF	Ci = 5 nF
Effective inner inductance	Li = 0.4 μH	Li = 10 μH
Ex nA/nL/ic protection (Zone 2)	PTB 05 ATEX 2048	
Designation	II 2/3 G Ex ic IIB/IIC T4/T5/T6 II 2/3 G Ex nA T4/T5/T6 II 2/3 G Ex nL IIB/IIC T4/T5/T6	
Permissible ambient temperature	-40 +85 °C (-40 +185 °F) (for mineral glass windows only -20 +85 °C (-4 +185 °F)) temperature class T4 -40 +70 °C (-40 +158 °F) (for mineral glass windows only -20 +70 °C (-4 +158 °F)) temperature class T5 -40 +60 °C (-40 +140 °F) (for mineral glass windows only -20 +60 °C (-4 +140 °F)) temperature class T6	
Ex nA connection	To certified intrinsically safe circuits with the following maximum values:	the following maximum values:
	Um = 45 V	Um = 32 V
	To certified intrinsically safe circuits with	To certified intrinsically safe circuits w
Ex ic/nL connection	the following maximum values:  Ui = 45 V	the following maximum values: Ui = 32 V