

## SIPART

### Electropneumatic positioners SIPART PS2 (6DR5...)

#### Compact Operating Instructions

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6DR5...  
With and without HART  
With PROFIBUS PA  
With FOUNDATION Fieldbus

## 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.

### Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

### Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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# 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. 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 install and commission the device.

To realize optimum performance from the device, read the complete operating instructions.

### See also

SIPART PS2 product information (<http://www.siemens.com/sipartps2>)

## 1.2 Product compatibility

The following table describes the compatibility between the edition of the document, device revision, engineering system and associated Electronic Device Description (EDD).

### HART

Manual edition	Comments	Device revision	Compatible version of device integration package	
09/2020	New device features	FW: 5.02.00 or higher Device revision 7 or higher	SIMATIC PDM V9.0	EDD: 24.00.00 or higher
			SIMATIC PDM V8.2 SP1	EDD: 24.00.00 or higher
			AMS Device Manager V12.5	EDD: 24.00.00 or higher
			SITRANS DTM V4.1	EDD: 24.00.00 or higher
			Field communicator	EDD: 24.00.00 or higher
09/2019	New device features	FW: 5.01.00 or higher Device revision 6 or higher	SIMATIC PDM V9.0	EDD: 23.00.00 or higher
			SIMATIC PDM V8.2 SP1	EDD: 23.00.00 or higher
			AMS Device Manager V12.5	EDD: 23.00.00 or higher
			SITRANS DTM V4.1	EDD: 23.00.00 or higher
			Field communicator	EDD: 23.00.00 or higher

1.4 Checking the consignment

## PROFIBUS PA

Manual edition	Comments	Device revision	Compatible version of device integration package	
09/2020	New device features	PROFIBUS PA FW: 6.01.00 or higher	SIMATIC PDM V9.0	EDD: 23.00.00 or higher
			SIMATIC PDM V8.2 SP1	EDD: 23.00.00 or higher
			SITRANS DTM V4.1	EDD: 23.00.00 or higher
09/2019	New device features	PROFIBUS PA FW: 6.00.00 or higher	SIMATIC PDM V9.0	EDD: 22.00.00 or higher
			SIMATIC PDM V8.2 SP1	EDD: 22.00.00 or higher
			SITRANS DTM V4.1	EDD: 22.00.01 or higher

## FOUNDATION Fieldbus

Manual edition	Comments	Device revision	Compatible version of device integration package	
09/2020	New device features	FW: 3.01.00 or higher Device revision 3	SITRANS DTM V4.1	EDD: 4.00.00 or higher
			AMS Device Manager V12.5	EDD: 4.00.00 or higher
			Field communicator	EDD: 4.00.00 or higher
09/2019	New device features	FW: 3.00.00 or higher Device revision 3	SITRANS DTM V4.1	EDD: 3.00.00 or higher
			AMS Device Manager V12.5	EDD: 3.00.00 or higher
			Field communicator	EDD: 3.00.00 or higher

## 1.3 Designated use

Use the device in accordance with the information on the nameplate and in the Technical data (Page 59).

## 1.4 Checking the consignment

1. Check the packaging and the delivered items for visible damages.
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

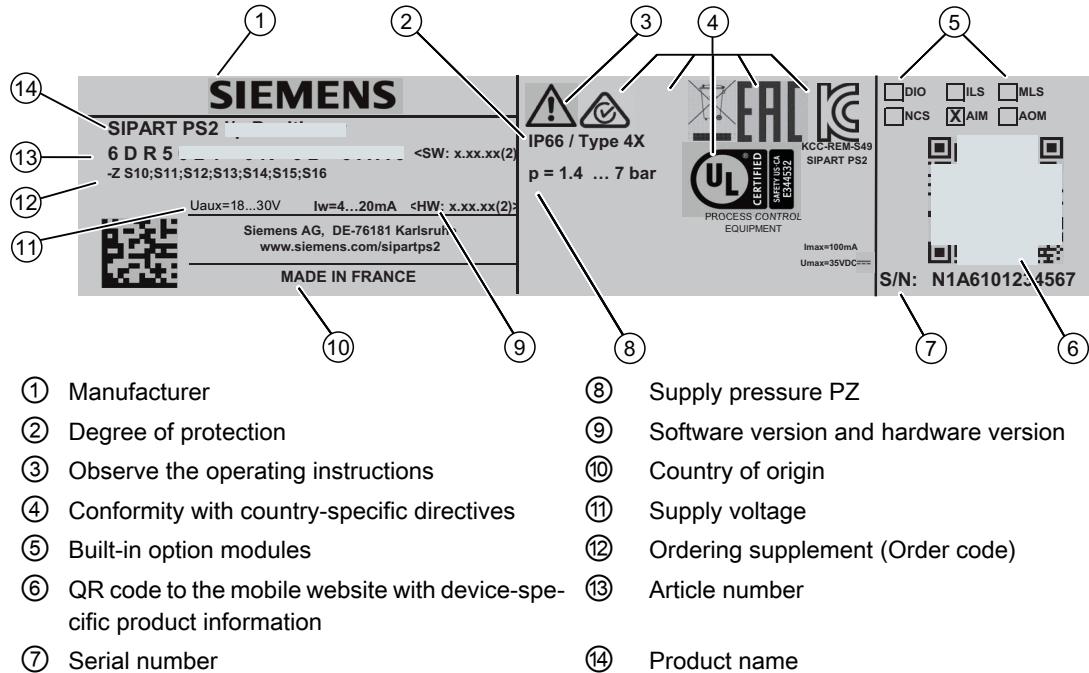
#### Using a damaged or incomplete device

Risk of explosion in hazardous areas.

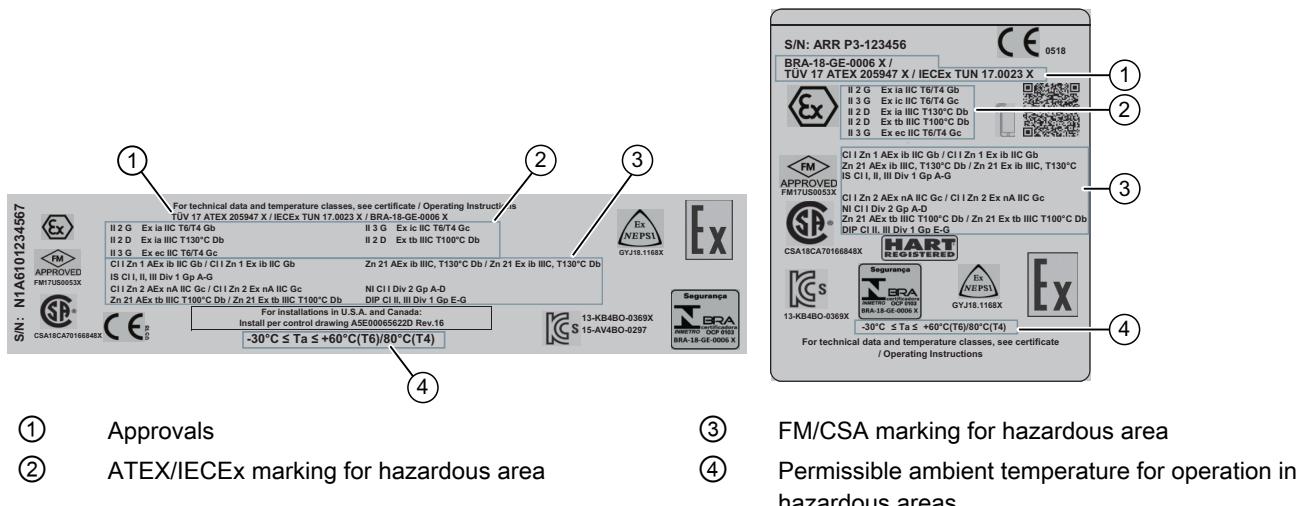
- Do not use damaged or incomplete devices.

## 1.5 Nameplates

## Example of manufacturer nameplate



## Example of explosion protection nameplate



## 1.6

## Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit  
<https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under  
<https://www.siemens.com/industrialsecurity>.

## 1.7

## 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.

### NOTICE

#### 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 59).

## 1.8 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

## 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.

## 2.2 Warning symbols on the device

Symbol	Explanation
	Consult operating instructions

## 2.3 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 (EU)
- For Korea only:

이 기기는 업무용(A 급) 전자파 적합기기로서 판매자  
또는 사용자는 이 점을 주의하시기 바라며 가정 외의

지역에서 사용하는 것을 목적으로 합니다

## 2.4 Conformity with European directives

The CE marking on the device shows conformity with the regulations of the following European guidelines:

Electromagnetic compatibility EMC 2014/30/EU	Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility.
Atmosphère explosive ATEX 2014/34/EU	Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.
2011/65/EU RoHS	Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The directives applied can be found in the EU declaration of conformity for the associated device.

## 2.5 Product approval and UL compliance

Classification according to pressure equipment directive (PED 2014/68/EU) For fluid group 1 gases; fulfills requirements according to article 4, paragraph 3 (good engineering practice SEP)

CE conformity The applicable directives and applied standards with their revision levels can be found in the EU declaration of conformity on the Internet.

UL conformity You can find the appropriate "Standard(s) for Safety", including the relevant versions, in the UL-CERTIFICATE OF COMPLIANCE on the Internet.

## 2.6 Improper modifications

### **WARNING**

#### **Improper device modifications**

Risk 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.

**⚠ WARNING****Improper modification on positioner 6DR5...6**

Danger of explosion. The pneumatic terminal plate on the SIPART PS2 positioner 6DR5..6 is a safety-related component of the flameproof enclosure.

- Never loosen the screws ① of the pneumatic terminal plate.

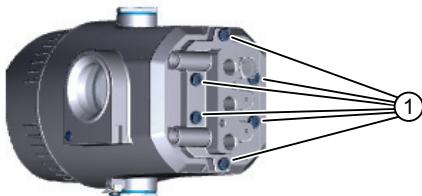


Figure 2-1 Screws of the pneumatic terminal plate on the positioner 6DR5..6

## 2.7

## Use in areas subject to explosion hazard

**Qualified personnel for hazardous area applications**

Persons who install, connect, 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****Use in hazardous area**

Risk of explosion.

- Only use equipment that is approved for use in the intended hazardous area and labeled accordingly.
- Do not use devices that have been operated outside the conditions specified for hazardous areas. If you have used the device outside the conditions for hazardous areas, make all Ex markings unrecognizable on the nameplate.

**⚠ WARNING**

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

If the device or its components have 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 risk 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/or in Technical data (Page 59).

# Installing/mounting

## 3.1 Basic safety instructions

### **WARNING**

#### **High operating force with pneumatic actuators**

Risk of injury when working on control valves due to the high operating force of the pneumatic actuator.

- Please observe the corresponding safety instructions for the pneumatic actuator in use.

### **WARNING**

#### **It is possible to damage the cover gasket**

If the cover gasket is not positioned correctly in the groove of the base plate, it could be damaged when the cover is mounted and screwed tight.

- Therefore make sure that the gasket is seated correctly.

### **WARNING**

#### **Exceeded maximum permissible operating pressure**

Risk of injury or poisoning.

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

Ensure that maximum permissible operating pressure of the device is not exceeded. Refer to the information on the nameplate and/or in Technical data (Page 59).

### **WARNING**

#### **Electrostatic charging of nameplates**

The nameplates used on the device can reach a charging capacity of 5 pF.

- Keep the device and the cables at a distance from strong electromagnetic fields.

**⚠ CAUTION**

**Unsuitable compressed air**

Device damage. As a general rule, the positioner must only be operated with dry and clean compressed air.

- Use the customary water separators and filters. An additional dryer is required in extreme cases.
- Use dryers, especially if you operate the positioner at low ambient temperatures.

**⚠ CAUTION**

**Adhere to the following instructions before working on the control valve and when attaching the positioner**

Danger of injury.

- Prior to working on the control valve, you must move the actuator and the process valve into a completely pressureless state. Proceed as follows:
  - Depressurize the actuator chambers.
  - Switch off the supply pressure PZ.
  - Secure the process valve.
- Make sure that the actuator has reached the pressureless state.
- If you interrupt the supply pressure PZ to the positioner, the pressureless position can only be reached after a certain waiting time.
- When mounting, adhere strictly to the following order to avoid injuries or mechanical damage to the positioner/mounting kit:
  - Mount the positioner mechanically.
  - Electric connection.
  - Connect supply pressure PZ.
  - Commission the positioner.

**⚠ WARNING**

**Mechanical impact energy**

In order to ensure the degree of protection of the housing (IP66), protect the housing versions of the positioners listed here from mechanical impact energy:

- 6DR5..3; not greater than 2 Joule
- 6DR5..0; not greater than 1 Joule
- 6DR5..1 with inspection window; not greater than 1 Joule

**NOTICE****Torque with NPT screwed gland**

Device damage. The maximum torque of the cable gland must not be exceeded.

- To avoid damage to the device, the NPT adapter must be held in place while the NPT gland is screwed into the NPT adapter. Refer to the section "Technical specifications > Construction (Page 61)" for the torque value.

### 3.1.1 Proper mounting

**NOTICE****Incorrect mounting**

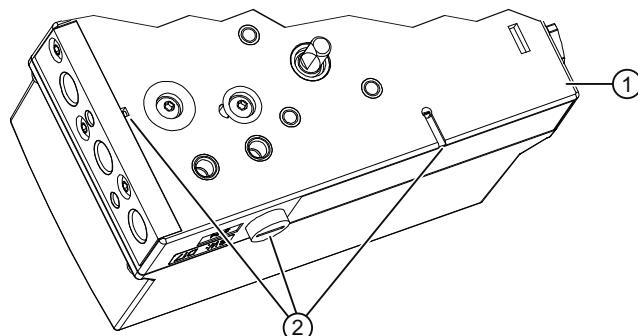
The device can be damaged, destroyed, or its functionality impaired through improper mounting.

- 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 Construction (Page 61).

**NOTICE****Freezing of the exhaust air outlets**

When devices of the type 6DR5..0/1/2/3 are used, the exhaust air outlets ② may freeze. The function of the device is impaired.

- Do **not** install the positioner with the base plate ① pointing up.



- ① Base plate
- ② Exhaust air outlets

Figure 3-1 Exhaust air outlets, base plate

## **3.2 Mounting to linear actuator**

For linear actuators, use the "linear actuator" mounting kit 6DR4004-8V or the integrated attachment.

You require different installation parts depending on the selected actuator type. The mounting kit is suitable for a stroke of 3 to 35 mm. For a larger stroke range, you require a separately ordered lever 6DR4004-8L. Refer to the detailed operating instructions for further information on mounting.

## **3.3 Mounting to part-turn actuator**

You require an actuator-specific VDI/VDE 3845 mount to install the positioner on a part-turn actuator. You receive the mount and screws from the actuator manufacturer. Ensure that the mount has a sheet metal thickness of > 4 mm and reinforcements. You also need the mounting kit 6DR4004-8D or the stainless steel coupling TGX: 16300-1556. Refer to the detailed operating instructions for further information on mounting.

## **3.4 Installing option modules**

Depending on the version of the positioner, the following option modules are available:

- Digital I/O Module (DIO) 6DR4004-6A / -8A
- Analog Input Module (AIM) 6DR4004-6F / -8F
- Inductive Limit Switches (ILS) 6DR4004-6G / -8G
- Analog Output Module (AOM) 6DR4004-6J / -8J
- Mechanic Limit Switches (MLS) 6DR4004-6K / -8K
- Internal NCS module 6DR4004-5L / -5LE
- NCS sensor 6DR4004-6N / -8N

For additional information and the corresponding safety notes to be observed when installing the option modules, refer to the detailed operating instructions for your respective device version.

### **3.4.1 Internal NCS module**

The internal NCS module is used for wear-free position detection and is an optional equipment version in the positioner. The internal NCS module is installed as an alternative to the Analog Output Module (AOM) at the same slot in the positioner.

# Connecting

## 4.1 Basic safety instructions

### **WARNING**

#### **Lever for position detection**

Danger of crushing and shearing with mounting kits which use a lever for position detection. During commissioning and ongoing operation, severing or squeezing of limbs could occur as a result of the lever. Risk of injury when working on control valves due to the high operating force of the pneumatic actuator.

- Do not reach into the range of motion of the lever following mounting of the positioner and mounting kit.

### **WARNING**

#### **With intrinsically device version (Ex i)**

Risk of explosion in hazardous areas.

For intrinsically safe device versions only the certified circuits may be connected as auxiliary power supply, control and signal circuits.

- Make sure that the power source of the used circuits is marked as intrinsically safe.

### **WARNING**

#### **Unsuitable cables, cable glands and/or plugs**

Risk of explosion in hazardous areas.

- Use only cable glands/plugs that comply with the requirements for the relevant type of protection.
- Tighten the cable glands in accordance with the torques specified in Construction (Page 61).
- Close unused cable inlets for the electrical connections.
- When replacing cable glands, only use cable glands of the same type.
- After installation, check that the cables are seated firmly.

**NOTICE**

**Condensation in the device**

Damage to device through formation of condensation if the temperature difference between transportation or storage and the mounting location exceeds 20 °C (36 °F).

- Before taking the device into operation, let the device adapt for several hours in the new environment.

**NOTICE**

**Ambient temperature too high**

Damage to cable sheath.

- At an ambient temperature  $\geq 60$  °C (140 °F), use heat-resistant cables suitable for an ambient temperature at least 20 °C (36 °F) higher.

**⚠ WARNING**

**Improper power supply**

Risk of explosion in hazardous areas as result of incorrect power supply.

- Connect the device in accordance with the specified power supply and signal circuits. The relevant specifications can be found in the certificates, in Technical data (Page 59) or on the nameplate.

**⚠ WARNING**

**Lack of equipotential bonding**

Risk 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**

Risk 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**

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

- Shielded cables that cross into hazardous areas should be grounded only at one end.
- If grounding is required at both ends, use an equipotential bonding conductor.

**⚠ WARNING****Connecting device in energized state**

Risk of explosion in hazardous areas.

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

**Exceptions:**

- Devices having the type of protection "Intrinsic safety Ex i" may also be connected in energized state in hazardous areas.
- Exceptions for type of protection "Increased safety ec" (Zone 2) are regulated in the relevant certificate.

**⚠ WARNING****Incorrect selection of type of protection**

Risk 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****Standard cable gland/torque**

Device damage.

- Owing the reasons pertaining to tightness (IP enclosure rating) and the required tensile strength, only use the cables having a diameter  $\geq 8$  mm for standard M20x1.5 cable gland, or use a suitable seal insert in case of smaller diameters.
- In the NPT version, the positioner is delivered with a coupling. When inserting a counter piece in the coupling, ensure that the maximum permissible torque of 10 Nm is not exceeded.

**⚠ CAUTION**

**Maximum AC/DC switching voltage with UL approval E344532**

Mechanic Limit Switches (MLS) 6DR4004-6K/-8K are approved for use with positioners with UL approval. The maximum switching voltage in this case is  $\leq 30$  V AC/DC.

If switching voltages greater than 30 V are connected, the UL approval for the positioner becomes invalid.

**Two-wire mode**

**NOTICE**

**Connection of voltage source to current input**

Device damage if a voltage source is connected to the current input  $I_w$  (terminals 6 and 7).

- Never connect the current input  $I_w$  to a low-resistance voltage source, otherwise the positioner may be destroyed.
- Always use a high-impedance power source.
- Observe the static destruction limit specified in the "Electrical data (Page 68)".

**Note**

**Improvement of interference immunity**

- Lay signal cables separate from cables with voltages  $> 60$  V.
- Use cables with twisted wires.
- Keep device and cables at a distance from strong electromagnetic fields.
- Take account of the conditions for communication specified in the Technical data (Page 59).
- Use shielded cables to guarantee the full specification according to HART/PA/FF/Modbus/EIA-485/Profibus DP.

#### 4.1.1 Additional safety notes for PA and FF

If the bus shield is fully effective, the interference immunity and the interference emission conform to the specifications. The following measures ensure that the bus shield is fully effective:

- The shields have been connected to the metallic connections of the positioner.
- The shields have been laid up to the terminal boxes, the distributor and the transceiver.

---

##### Note

###### Dissipation of glitch impulses/equipotential bonding

In order to dissipate glitch impulses, the positioner must be connected to an equipotential bonding cable (earth potential) using a low resistance. The positioner in the polycarbonate enclosure is therefore equipped with an additional cable. Connect this cable to the shield of the bus cable and the equipotential bonding cable using a cable clamp.

Devices in the stainless steel or aluminum enclosure have a corresponding terminal on the outer side of the enclosure. This terminal must also be connected to the equipotential bonding cable.

For applications in hazardous areas, ensure an adequately suitable equipotential bonding between the hazardous and non-hazardous areas.

---

The positioner is equipped with an additional input (terminal 81 [+]) and terminal 82 [-]) to approach the safety position. After activating this function, this input must be continuously supplied with +24 V in order to retain the normal control function.

If the 24-V signal is interrupted, the safety position is set as described in chapter "Pneumatic connection (Page 36)".

Communication with the master is still possible. The "Jumper" on the basic electronics is used to activate this function. It can be accessed after removing the module cover, and must be switched from the right position (delivery state) to the left position.

## 4.2 Electrical connection

### 4.2.1 SIPART PS2 with 4 to 20 mA/HART

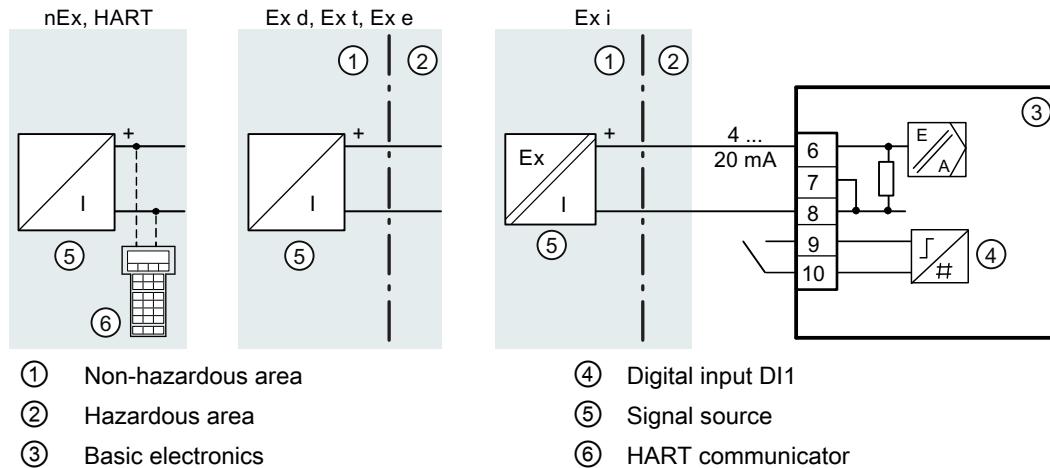


Figure 4-1 Device version 2-wire

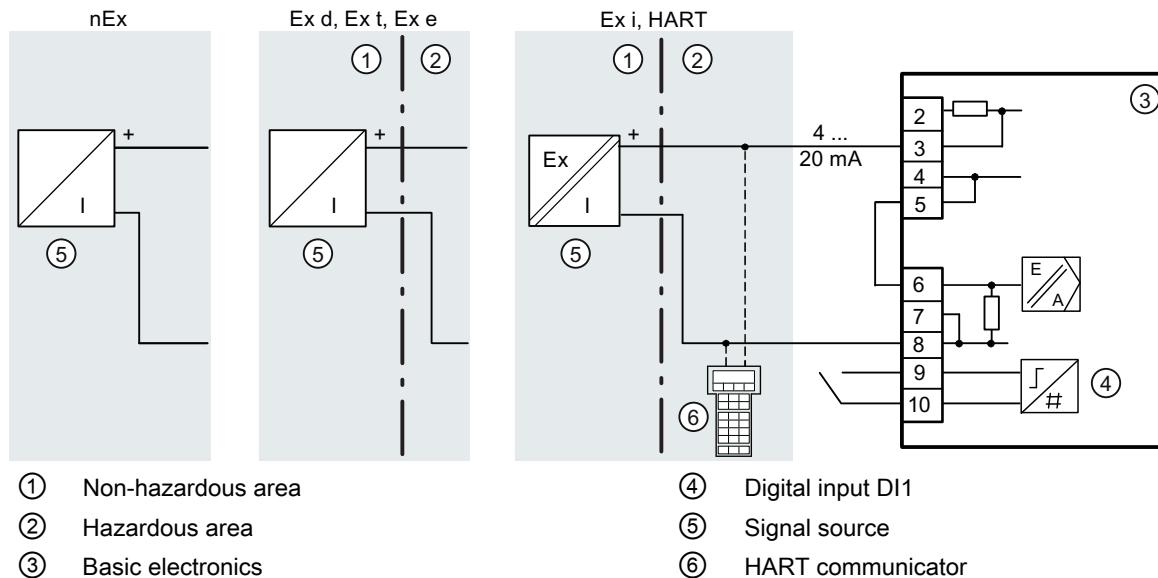


Figure 4-2 Device version 2-/3-/4-wire, with wiring configuration 2-wire

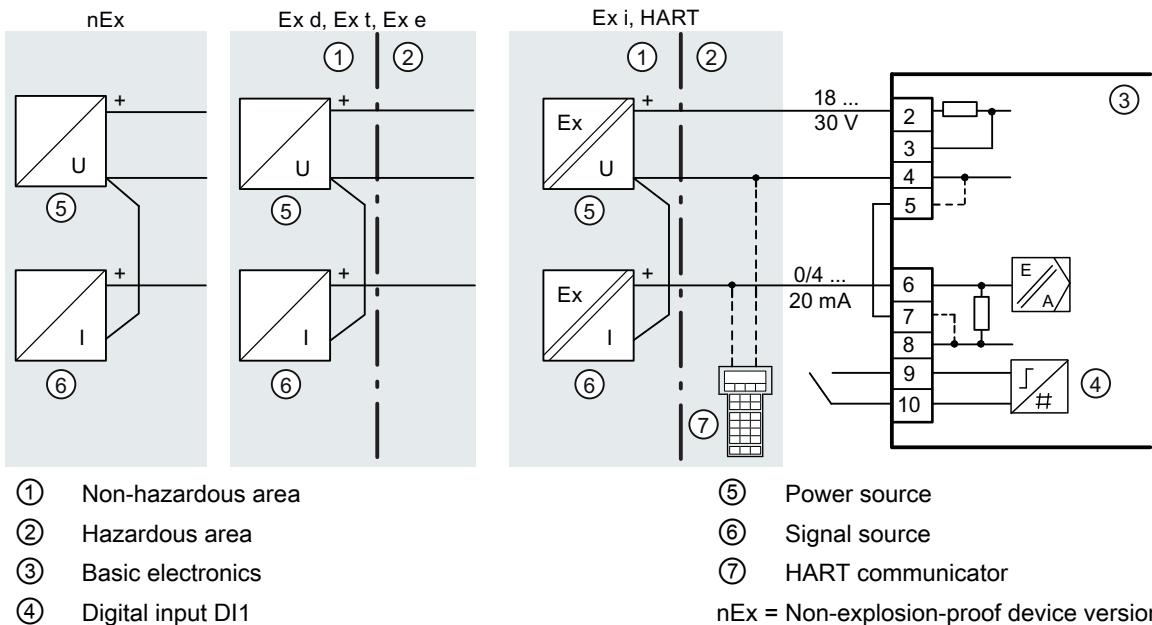


Figure 4-3 Device version 2/3/4-wire, with connection type 3-wire

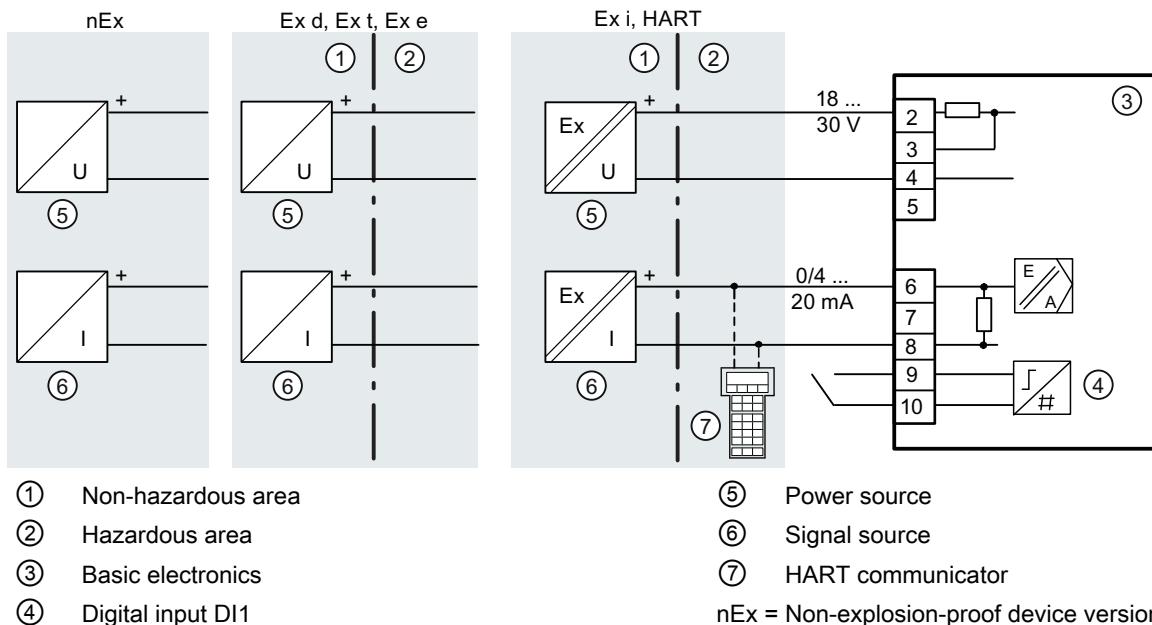


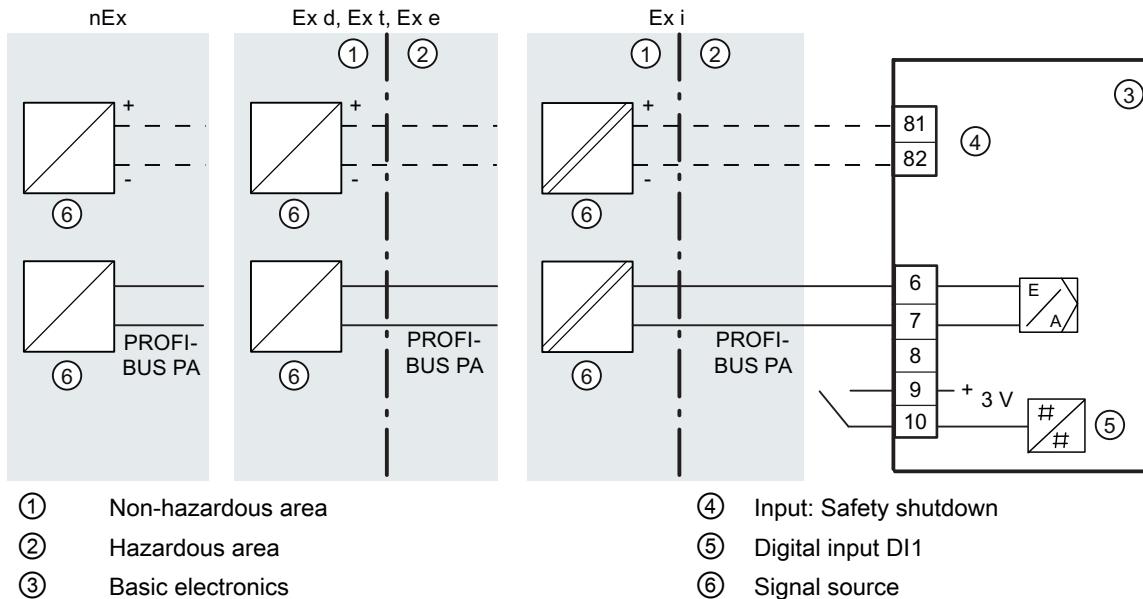
Figure 4-4 Device version 2/3/4-wire, with connection type 4-wire

## See also

Electrical data (Page 68)

Technical data (Page 59)

## 4.2.2 SIPART PS2 with PROFIBUS PA



① Non-hazardous area

② Hazardous area

③ Basic electronics

④ Input: Safety shutdown

⑤ Digital input DI1

⑥ Signal source

nEx = Non-explosion-proof device version

Figure 4-5 Device version with PROFIBUS PA

## See also

Electrical data (Page 71)

Technical data (Page 59)

### 4.2.3 SIPART PS2 with FOUNDATION Fieldbus

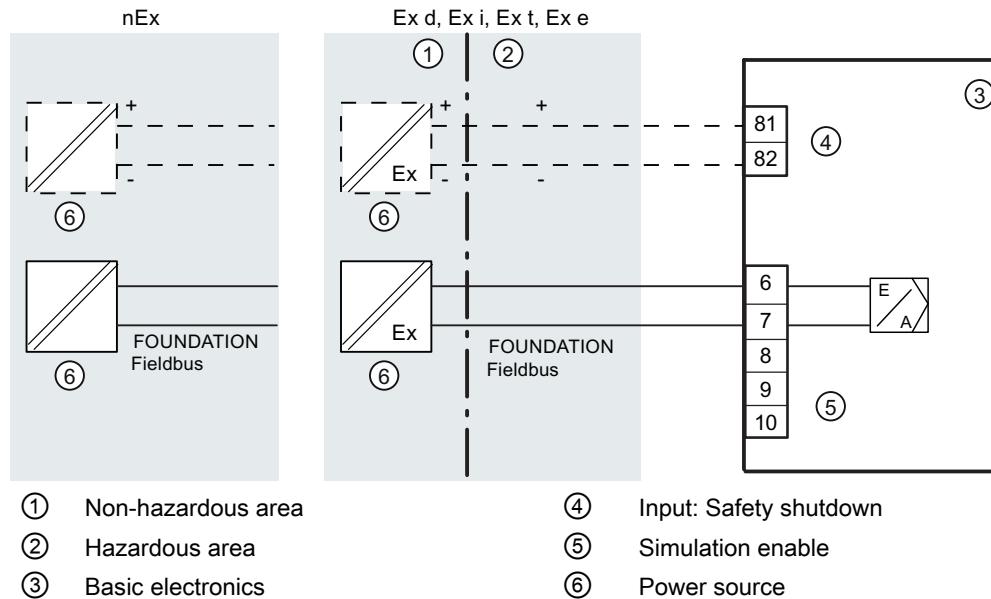


Figure 4-6 Device version with FOUNDATION Fieldbus

#### See also

Electrical data (Page 71)

Technical data (Page 59)

### 4.2.4 Split range

For further information about "Split-range" operation, refer to the detailed operating instructions for your respective device version.

## 4.2.5 Option modules

## 4.2.5.1 Digital I/O Module (DIO) 6DR4004-6A / -8A

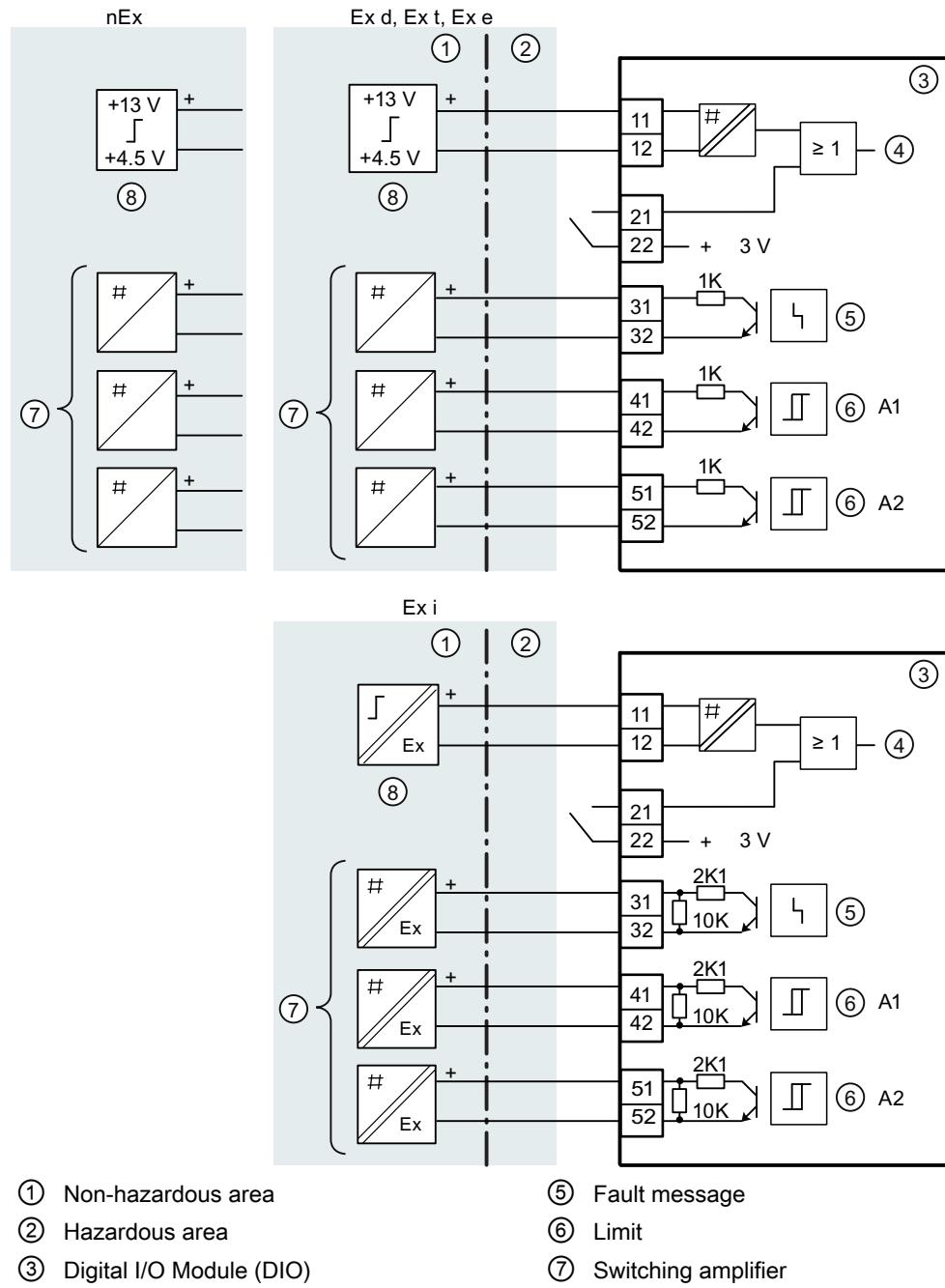


Figure 4-7 Digital I/O Module (DIO)

#### 4.2.5.2 Analog Output Module (AOM) 6DR4004-6J / -8J

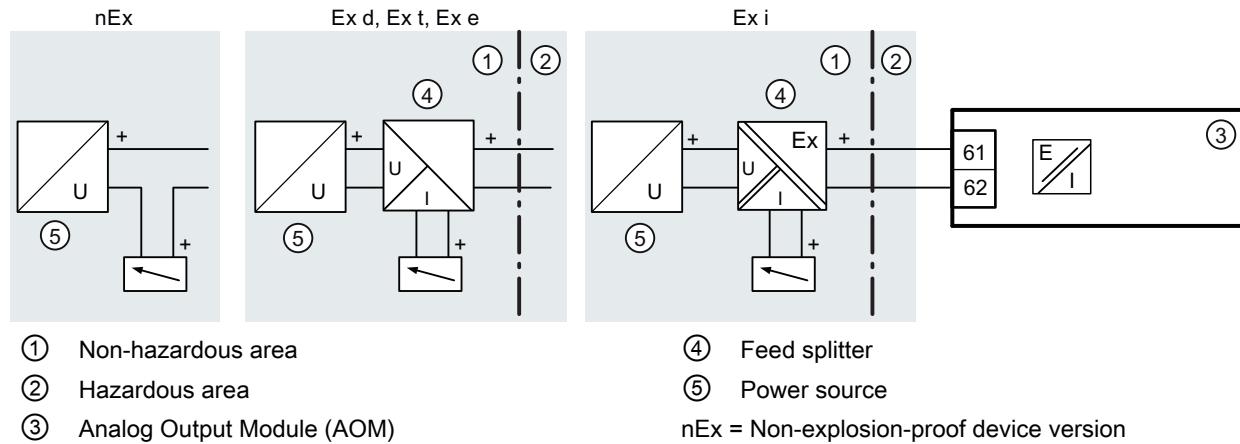
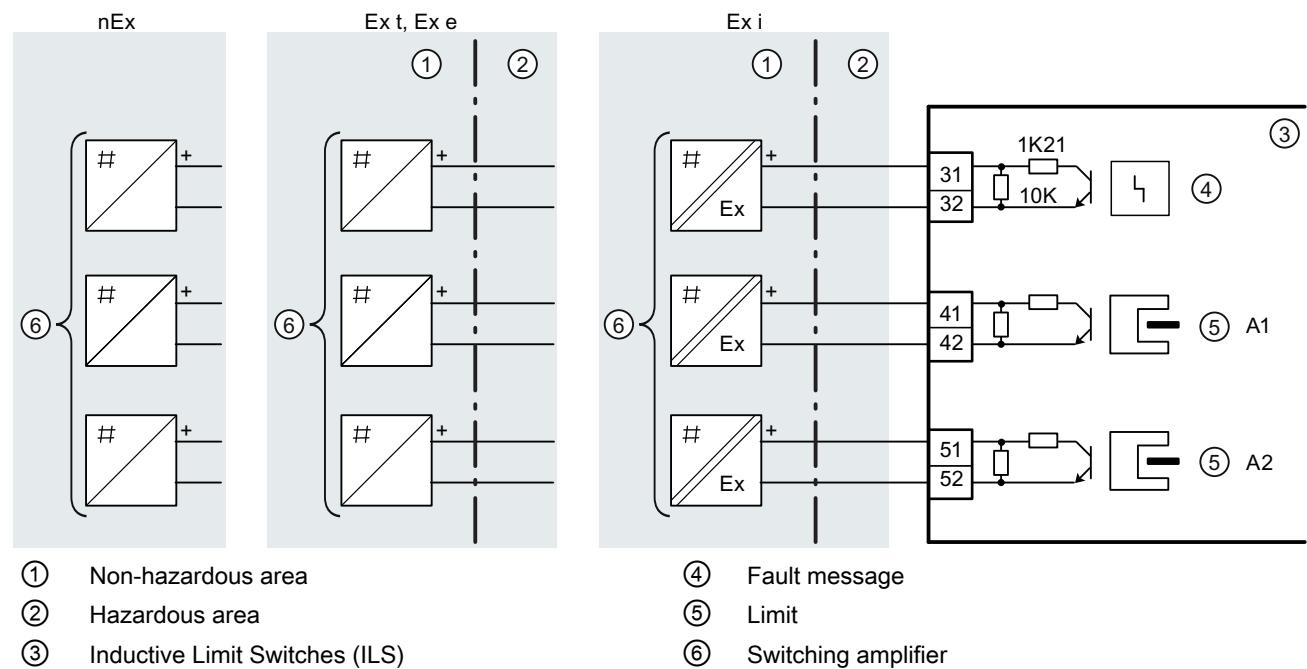


Figure 4-8 Analog Output Module (AOM)

#### 4.2.5.3 Inductive Limit Switches (ILS) 6DR4004-6G / -8G



nEx = Non-explosion-proof device version  
Figure 4-9 Inductive Limit Switches (ILS)

#### See also

[Inductive Limit Switches \(ILS\) 6DR4004-6G / -8G \(Page 75\)](#)

## 4.2.5.4 Mechanic Limit Switches (MLS) 6DR4004-6K / -8K

**DANGER****Supply with hazardous voltage**

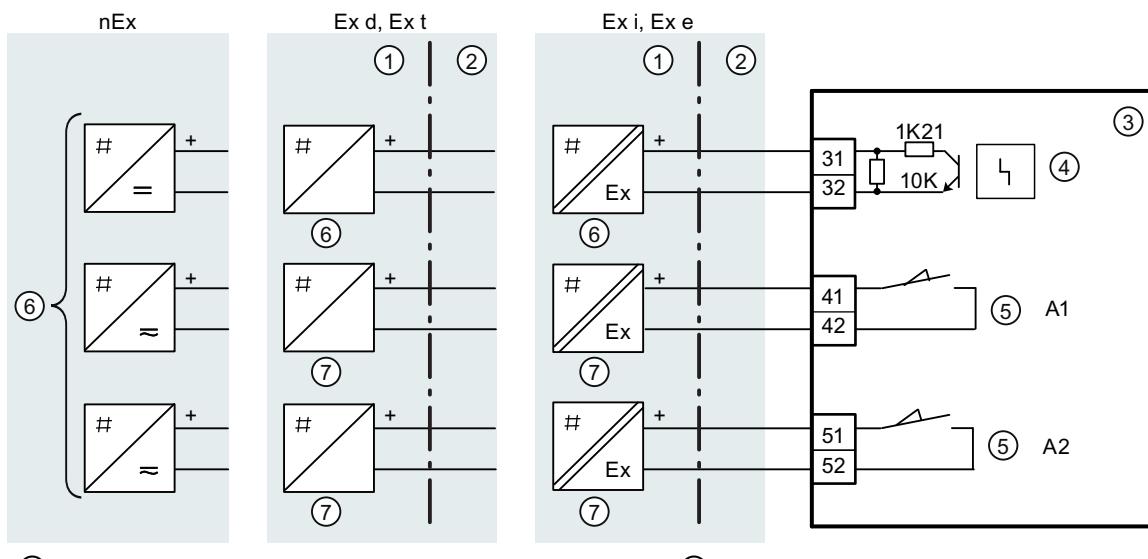
If you connect the switching contacts of the 6DR4004-8K module to a hazardous voltage, observe the following safety rules:

1. Isolate the device from power. Use a circuit breaker positioned near the device to do this.
2. Make sure that the device cannot be switched back on inadvertently.
3. Make sure the device is truly isolated from power.

**CAUTION****Maximum AC/DC switching voltage with UL approval E344532**

Mechanic Limit Switches (MLS) 6DR4004-**6K/-8K** are approved for use with positioners with UL approval. The maximum switching voltage in this case is  $\leq 30$  V AC/DC.

If switching voltages greater than 30 V are connected, the UL approval for the positioner becomes invalid.



① Non-hazardous area

② Hazardous area

③ Mechanic Limit Switches (MLS)

④ Fault message

⑤ Limit

⑥ Switching amplifier

⑦ Switching output

nEx = Non-explosion-proof device version

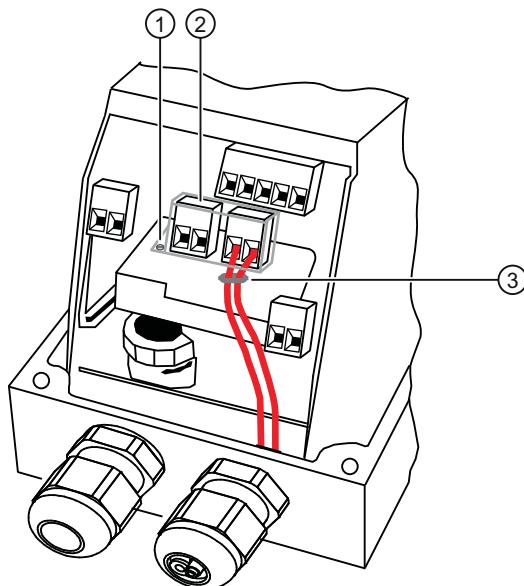
Figure 4-10 Mechanic Limit Switches (MLS)

**See also**

Mechanic Limit Switches (MLS) 6DR4004-6K / -8K (Page 77)

## Procedure

1. Loosen the screw ① on the transparent cover ②.
2. Pull the transparent cover ② up to the front end stop.
3. Tighten every cable in the corresponding terminal.
4. Slide the transparent cover ② up to the end stop of the basic electronics.
5. Tighten the screw ① of the transparent cover ②.
6. Connect the cables of each switch to the lug of the printed circuit board in pairs. Use the provided cable ties ③ for this purpose.



- ① Screw
- ② Cover
- ③ Cable tie

Figure 4-11 Connecting the cables

### 4.2.6 Option device version M12 connector

This section describes which terminal of the devices and option modules listed below is connected with the respective pole of the M12 connector.

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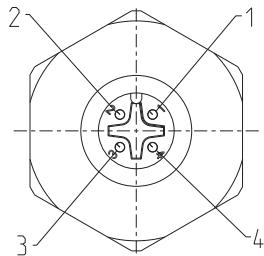
#### Note

#### Technical specifications

Observe the specifications for the electrical data in the certificate and/or in section "Technical data (Page 59)".

---

## View of the mating side pole pattern



Pole designation	Wire color of M12 basic connector socket
1	Brown
4	Black
3	Blue
2	White

## 4.2.6.1 In the basic unit with 4 to 20 mA/HART

You have a positioner 6DR50/1..-0.R.. or 6DR50/1..-0.S. In this version of the positioner, the current input  $I_w$  4 to 20 mA of the basic electronics is connected via the M12 connector.

Table 4-1 Assignment diagram

Current input terminal	Pole designation
6 (+)	1 - Brown
Shield support of enclosure	4 - Black
7 and 8 (-)	3 - Blue

## 4.2.6.2 In the basic unit with PROFIBUS PA

You have a positioner 6DR55..-0.R.. or 6DR55..-0.S. In this case the M12 connector is connected to the bus circuit of the basic electronics.

Table 4-2 Assignment diagram

Bus circuit terminal	Pole designation
7	1 - Brown
Shield support of enclosure	4 - Black
6	3 - Blue

## 4.2.6.3 In the basic unit with FOUNDATION Fieldbus

You have a positioner 6DR56..-0.R.. or 6DR56..-0.S.. In this case the M12 connector is connected to the bus circuit of the basic electronics.

Table 4-3 Assignment diagram

Bus circuit terminal	Pole designation
7	1 - Brown
Shield support of enclosure	4 - Black
6	3 - Blue

#### 4.2.6.4 In the basic unit with Analog Output Module (AOM) 6DR4004-6J / -8J (-Z D53)

You have a positioner with order suffix -Z order code D53. In this version of the positioner, the current output of Analog Output Module (AOM) is electrically connected to the M12 connector.

Table 4-4 Assignment diagram

Current output terminal	Pole designation
61 (+)	1 - Brown
Shield support of enclosure	4 - Black
62 (-)	3 - Blue

#### 4.2.6.5 In the basic unit with Position Transmitter (-Z D54)

You have a positioner with order suffix -Z order code D54. In this version of the positioner, the installed Analog Input Module (AIM) 6DR4004-6F/-8F is electrically connected to the M12 connector. You connect the Position Transmitter 6DR4004-1ES/-2ES using the M12 connector.

Table 4-5 Assignment diagram

Terminal	Pole designation
REF	2 - White
POS	3 - Blue
GND	4 - Black
VCC	1 - Brown

#### 4.2.6.6 In the basic unit with Digital I/O Module (DIO) 6DR4004-6A / -8A (-Z D55)

You have a positioner with order suffix -Z order code D55. In this version of the positioner, the current output of Digital I/O Module (DIO) is electrically connected to the M12 connector.

Table 4-6 Assignment diagram

Terminal of digital outputs A1 and A2	Pole designation
41 (+)	1 - Brown
52 (-)	4 - Black
42 (-)	3 - Blue
51 (+)	2 - White

## 4.2.6.7 In the basic unit with Inductive Limit Switches (ILS) 6DR4004-6G /-8G (-Z D56)

You have a positioner with order suffix -Z order code D56. In this version of the positioner, the digital outputs A1 and A2 of the Inductive Limit Switches (ILS) are electrically connected to the M12 device plug.

Table 4-7 Assignment diagram

Terminal of digital outputs A1 and A2	Pole designation
41 (+)	1 - Brown
52 (-)	4 - Black
42 (-)	3 - Blue
51 (+)	2 - White

## 4.2.6.8 In the basic unit with Mechanic Limit Switches (MLS) 6DR4004-6K (-Z D57)

You have a positioner with order suffix -Z order code D57. In this version of the positioner, the digital outputs A1 and A2 of the Mechanic Limit Switches (MLS) are electrically connected to the M12 connector.

Table 4-8 Assignment diagram

Terminal of digital outputs A1 and A2	Pole designation
41 (+)	1 - Brown
52 (-)	4 - Black
42 (-)	3 - Blue
51 (+)	2 - White

## 4.3 Pneumatic connection

 **WARNING**

**Supply pressure PZ**

For safety reasons, the supply pressure PZ can be fed after installation only if the positioner is switched to "P-Manual mode" when an electrical signal is present. This operating mode is preset in the delivery state.

**Note**

**Specifications regarding air quality**

Observe the specifications regarding the air quality in section "Technical specifications > Pneumatic data (Page 60)".

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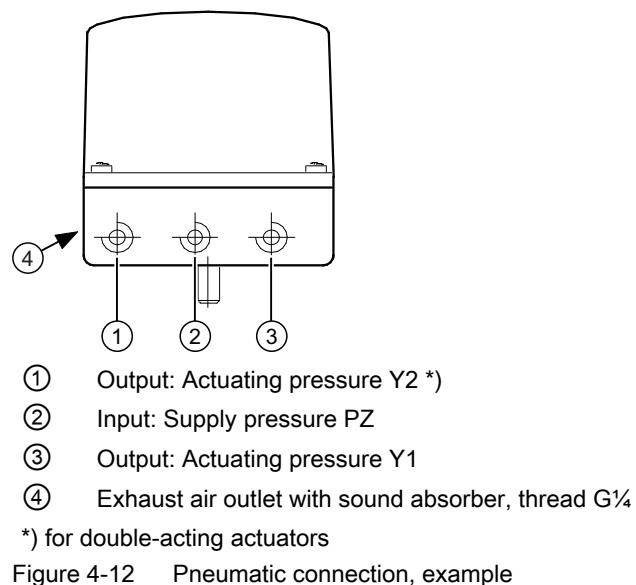
**Note****Leakage**

Besides continuous air consumption, a leakage can cause the positioner to try to compensate the position deviation. This will result in premature wear in the entire control device.

- Check offline for leakage using the "11.LEAK" diagnostic parameter.
- If there is leakage, check the pneumatic connections for leaks.

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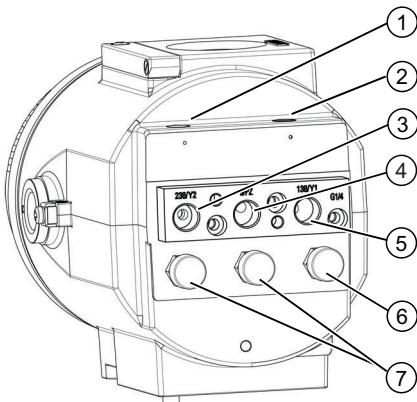
### 4.3.1 Pneumatic connection for 6DR5..0/1/2/3



## 4.3.2 Pneumatic connection for 6DR5..5 and 6DR5..6

## Structure

The pneumatic connections are provided on the right side of the positioner.



① Restrictor Y2 *)	⑤ Output: Actuating pressure Y1
② Restrictor Y1	⑦ Enclosure ventilation (2x)
③ Output: Actuating pressure Y2 *)	⑥ Exhaust air outlet
④ Input: Supply pressure PZ	

\*) for double-acting actuators

Figure 4-13 Pneumatic connection in the flameproof enclosure

## 4.4

## Restrictors

- Reduce the air output to achieve travel times of  $T > 1.5$  s for small actuators. Use restrictors Y1 ① and Y2 ② for this purpose.
- When turned clockwise, they reduce the air output and finally shut it off.

- In order to set the restrictors, we recommend closing them and then opening slowly.
- In case of double-acting valves, ensure that both restrictors have approximately the same setting.

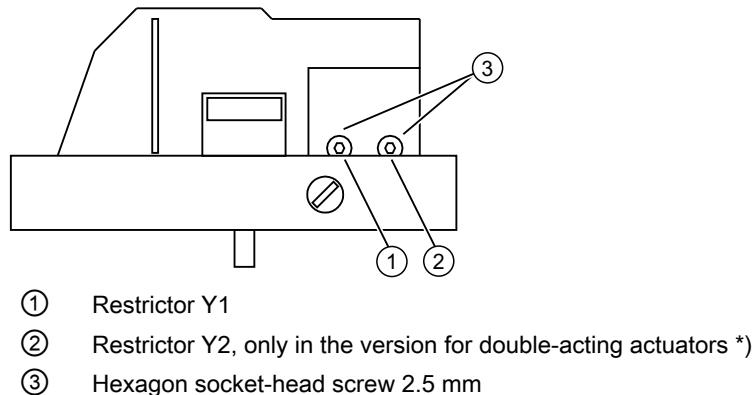


Figure 4-14 Restrictors

\*) Restrictor Y2 ② is not active for single-acting Fail in Place F01



# Commissioning

## 5.1 Basic safety instructions

### **WARNING**

#### **Lever for position detection**

Danger of crushing and shearing with mounting kits which use a lever for position detection. During commissioning and ongoing operation, severing or squeezing of limbs could occur as a result of the lever. Risk of injury when working on control valves due to the high operating force of the pneumatic actuator.

- Do not reach into the range of motion of the lever following mounting of the positioner and mounting kit.

### **WARNING**

#### **Improper commissioning in hazardous areas**

Device failure or risk of explosion in hazardous areas.

- Do not commission the device until it has been mounted completely and connected in accordance with the information in *Installing/mounting* (Page 17).
- Before commissioning take the effect on other devices in the system into account.

### **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 error still exists:
  - Take the device out of operation.
  - Prevent renewed commissioning.

### **WARNING**

#### **Loss of explosion protection**

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

- Close the device as described in *Installing/mounting* (Page 17).

**⚠ WARNING**

**Opening device in energized state**

Risk of explosion in hazardous areas

- 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.

**⚠ WARNING**

**Water in compressed air line**

Device damage and possibly loss of type of protection. The factory setting for the purging air selector is "IN". In the "IN" position, water from the compressed air line may enter the device from the pneumatics during initial commissioning.

- Before commissioning, make sure that no water is present in the compressed air line.

If you cannot be sure that there is no water in the compressed air line:

- Set the purging air selector to "OUT". In this way, you prevent water from the compressed air line from penetrating the device.
- Only set the purging air selector to "IN" again when all water has been discharged from the compressed air line.

**⚠ CAUTION**

**Increased sound pressure level**

Changes to the sound absorber of the positioner or the mounting of pneumatic components or pneumatic options on the positioner can cause a sound pressure with a level of 80 dBA to be exceeded.

- Wear suitable hearing protection to protect yourself against hearing damage.

When operating the positioner with natural gas, you must follow and adhere to the following safety notes:

**⚠️ WARNING****Operation with natural gas**

1. Only positioners and option modules which are connected to power supplies with type of protection "Intrinsic safety, protection level [ia]" may be operated with natural gas.
2. Do not operate the positioner with natural gas in closed spaces.
3. Natural gas is continuously blown off, depending on the model. Special care must therefore be taken during maintenance activities near the positioner. Always ensure that the immediate surroundings of the positioner are adequately ventilated. The maximum values for ventilation are listed in section "Natural gas as actuator medium (Page 67)".
4. If you operate the positioner with natural gas, it is not permitted to use Mechanic Limit Switches (MLS).
5. Depressurize the devices operated with natural gas adequately during maintenance activities. Open the cover in an explosion-free atmosphere and depressurize the device for at least two minutes.

---

**Note****Quality of natural gas**

Only use natural gas which is clean, dry and free from additives.

---

## 5.2 Overview

---

**Note**

- During the initialization process, the operating pressure must be at least one bar more than that required to close or open the valve. However, the operating pressure should not be greater than the maximum permissible operating pressure for the actuator.

---

### General information about commissioning

1. After installing the positioner on a pneumatic actuator, you must supply electric and pneumatic auxiliary power to it.
2. The positioner is in the "P manual mode" before initialization. At the same time, "NOINI" blinks in the lower line of the display.
3. Position feedback: You can adjust the range of position detection using the friction clutch if necessary.
4. Adjust the positioner as per the respective actuator with the help of the initialization process and by setting the parameters. If required, use the "PRST" parameter to cancel the adjustment of the positioner on the actuator. The positioner is again in the "P manual mode" after this process.

## Types of initialization

You can initialize the positioner as follows:

- Automatic initialization:  
during automatic initialization, the positioner determines the following one after the other:
  - The direction of action
  - The actuator travel and angle of rotation
  - The travel time of the actuator

The positioner also adjusts the control parameters as per the dynamic response of the actuator.

- Manual initialization:  
the actuator travel and the angle of rotation of the actuator are set manually. The remaining parameters are automatically determined. This function is useful for valves which are lined, for example, with PTFE.
- Copying the initialization data when replacing a positioner:  
the initialization data of a positioner can be read and copied into another positioner. A defective device can thus be replaced without interrupting an ongoing process through initialization.

You have to define a few parameters for the positioner before initialization. Owing to the preset values, you cannot adjust further parameters for initialization.

With a suitable parameter assignment of the parameter "BIN1" and enabled digital input "DI1", you protect the configured settings against accidental adjustment.

## 5.3 Sequence of automatic initialization

See detailed operating instructions for information on sequence of automatic initialization.

## 5.4 Parameter

### Introduction

Parameters 1 to 5 are the same for all versions of the positioner. These parameters are used to adjust the positioner to the actuator. Normally, setting these parameters is sufficient to be able to operate the positioner on an actuator.

If you want to get to know all details of the positioner, gradually try out the effects of the remaining parameters by systematic testing.

---

#### Note

Factory-set parameter values are printed in bold in the following table.

## Overview

Parameter	Function	Parameter values		Unit	
1.YFCT	Type of actuator	Normal	Inverted		
	Part-turn actuator	turn	-turn		
	Linear actuator	WAY	-WAY		
	Linear actuator - carrier pin on actuator spindle	FWAY	-FWAY		
	Linear actuator - external linear potentiometer (e.g. with cylinder drives)	LWAY	-LWAY		
	Part-turn actuator with NCS/iNCS	ncSt	-ncSt		
	Linear actuator with NCS	ncSL	-ncSL		
	Linear actuator with NCS/iNCS and lever	ncSLL	-ncLL		
2.YAGL	Rated angle of rotation of positioner shaft <sup>1)</sup>	33°		Degrees	
		90°			
3.YWAY <sup>2)</sup>	Range of stroke (optional setting) <sup>3)</sup>	OFF		mm	
		5   10   15   20 (Short lever 33°, range of stroke 5 mm to 20 mm)			
		25   30   35 (Short lever 90°, range of stroke 25 mm to 35 mm)			
		40   50   60   70   90   110   130 (Long lever 90°, range of stroke 40 mm to 130 mm)			
4.INITA	Initialization (automatic)	NOINI   no / ###.#   Strt			
5.INITM	Initialization (manual)	NOINI   no / ###.#   Strt			

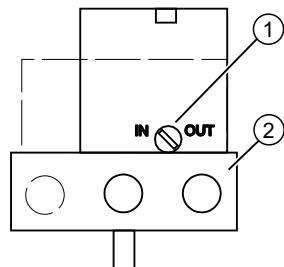
1)	Set the transmission ratio selector accordingly.
2)	Parameter only appears with "WAY", "-WAY", "ncSLL", and "-ncLL"
3)	If used, the value on the actuator must correspond to the set range of stroke on the lever arm. Carrier must be set to the value of the actuator travel or, if this value is not scaled, to the next larger scale value.

## 5.5

### Purge air switching

When the enclosure is open, the purge air switch above the pneumatic terminal strip on the valve block can be accessed.

- In the IN position, the enclosure is flushed from inside with a small volume of clean and dry instrument air.
- In the OUT position, the purge air is directly directed towards outside.



① Purging air selector  
② Pneumatic connections Y1, PZ and Y2

Figure 5-1 Purge air switch on the valve block; view of the positioner on the pneumatic connection side when the cover is open

The factory setting is the "IN" position.

## 5.6

### Commissioning linear actuators

#### 5.6.1

#### Preparing linear actuators for commissioning

##### Requirement

You have already installed the positioner using the suitable mounting kit.

##### Setting the transmission ratio selector

###### Commissioning

The setting of the transmission ratio selector is extremely important to commission the positioner.

Stroke [mm]	Position of the transmission ratio selector
5 ... 20	33°
25 ... 35	90°
40 ... 130	90°

## Connecting the positioner

1. Connect a suitable power supply. The positioner is now in the "P manual mode". The current potentiometer voltage (P) in percent is shown in the upper line of the display, e.g. "P37.5", and "NOINI" flashes in the bottom line:



2. Connect the actuator and the positioner to the pneumatic lines.
3. Supply the pneumatic auxiliary power to the positioner.

## Setting the actuator

1. Check whether the mechanical unit can be moved freely in the entire travel range. Move the actuator to the respective end position for this purpose using the  $\triangle$  or  $\nabla$  button.
2. Now move the actuator to the horizontal position of the lever.
3. A value between "P48.0" and "P52.0" is shown on the display.
4. If a value beyond this range is shown on the display, you must move the friction clutch. Move the friction clutch until a value between "P48.0" and "P52.0" is reached. The closer this value is to "P50.0", the more accurately the positioner determines the stroke travel.

**The following applies to the flameproof enclosure version:**

The inner friction clutch is fixed. Therefore, only move the outer friction clutch. This also applies when using an internal NCS module.

**The following applies to device versions without flameproof enclosure with internal NCS module 6DR4004-5L.:**

The inner friction clutch has no function. This means you should only adjust the adjustment wheel of the magnet clamp. Requirement: 'YFCT (Page 44)' parameter is set.

## 5.6.2 Automatic initialization of linear actuators

### Requirements

The following conditions must be fulfilled before activating the automatic initialization:

1. The actuator spindle can be moved completely.
2. The actuator spindle is at a central position after travel.

## Initializing the linear actuator automatically

### Note

#### Interrupting initialization

An ongoing initialization can be interrupted at any time. To do this, press . The settings configured until then are retained.

All parameters are reset to factory settings only if you have explicitly activated the preset settings in the "PRST" parameter.

### Note

#### Commissioning of a tight-closing valve

If the valve is tight-closing, set the "YCLS" parameter before commissioning. This ensures that the end positions are approached for at least 15 seconds during initialization.

1. Switch to the "Configuration" mode. To do this, keep the  button pressed for at least 5 seconds. The display shows the following:



2. Call the "2.YAGL" parameter. To do this, press . The following is shown on the display depending on the setting:



3. Check whether the value displayed in the "2.YAGL" parameter matches the setting of the transmission ratio selector. If required, change the setting of the transmission ratio selector to 33° or 90°.

4. Set the "3.YWAY" parameter to determine the total stroke in mm. The setting of parameter 3 is optional. The display shows the determined total stroke at the end of the initialization phase.
  - Press the  button if you do not require any information about the total stroke in mm. You then reach parameter 4.
  - Call the "3.YWAY" parameter. To do this, press . The display shows the following:



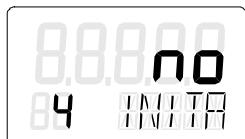

---

#### Note

##### Set the "3.YWAY" parameter

1. On the scale of the lever, read the value marked by the carrier pin.
2. Set the parameter with the buttons  and  to the read value.

5. Call the "4.INITA" parameter. To do this, briefly press the  button. The display shows the following:



6. Start the initialization process. To do this, keep the  button pressed for at least 5 seconds until the display shows the following:



The positioner runs through five initialization steps during the automatic initialization process. The displays for the initialization steps from "RUN 1" to "RUN 5" are located in the lower line of the display. The initialization process depends on the actuator used, and takes up to 15 minutes.

7. The following display indicates that the automatic initialization is complete:



### 5.6.3

### Manual initialization of linear actuators

See detailed operating instructions for information on manual initialization of linear actuators.

## 5.7 Commissioning part-turn actuators

### 5.7.1 Preparing part-turn actuators for commissioning

---

#### Note

##### Setting of the adjustment angle

The usual adjustment angle for part-turn actuators is 90°.

- Set the transmission ratio selector in the positioner to 90°.

---

#### Condition

The following conditions must be fulfilled before activating the initialization:

1. You have installed the positioner for the part-turn actuators using the suitable mounting kit.
2. You have connected the actuator and the positioner to the pneumatic lines.
3. Supplying the positioner with the supply pressure PZ.
4. The positioner has been connected to a suitable power supply.

#### Setting the actuator

1. The positioner is in the "P manual mode". The current potentiometer voltage P in percent is shown on the upper line in the display. "NOINI" blinks in the lower line of the display. Examples of corresponding displays are given below:



2. Check whether the mechanical unit can be moved freely in the entire travel range. Move the drive to the respective end position for this purpose using the  $\triangle$  or  $\nabla$  button.

---

#### Note

##### End position

By simultaneously pressing the  $\triangle$  and  $\nabla$  buttons, you reach the end position faster.

3. After checking, move the actuator to a central position. This accelerates the initialization process.

## 5.7.2 Automatic initialization of part-turn actuators

### Requirement

The following conditions must be fulfilled before activating the automatic initialization:

1. The travel range of the actuator can be passed through completely.
2. The actuator shaft is at a central position.

### Initializing the part-turn actuator automatically

---

#### Note

#### Interrupting initialization

An ongoing initialization can be interrupted at any time. To do this, press . The settings configured until then are retained.

All parameters are reset to factory settings only if you have explicitly activated the preset settings in the "PRST" parameter.

---

---

#### Note

#### Commissioning of a tight-closing valve

If the valve is tight-closing, set the "YCLS" parameter before commissioning. This ensures that the end positions are approached for at least 15 seconds during initialization.

---

1. Switch to the "Configuration" mode. To do this, press the  button for at least 5 seconds until the display shows the following:



2. Use the  button to change from linear actuator to part-turn actuator until the display shows the following:

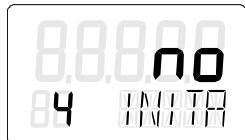


3. Call the "2.YAGL" parameter. To do this, briefly press the  button. This parameter has already been set to 90° automatically. The display shows the following:



## 5.8 Canceling initialization

4. Call the "4.INITA" parameter. To do this, briefly press the  button. The display shows the following:



5. Start the initialization process. To do this, press the  button for at least 5 seconds until the display shows the following:



The positioner runs through five initialization steps during the automatic initialization process. The displays for the initialization steps from "RUN 1" to "RUN 5" are located in the lower line of the display. The initialization process depends on the actuator used, and takes up to 15 minutes.

6. The following display indicates that the automatic initialization is complete. The total angle of rotation of the actuator is shown on the upper line on the display:



### 5.7.3

### Manual initialization of part-turn actuators

See detailed operating instructions for information on manual initialization of part-turn actuators.

## 5.8

## Canceling initialization

1. Press the  button.
  - Canceling automatic initialization: the display shows "INITA".
  - Canceling manual initialization: the display shows "INITM".The positioner is in the "Configuration" mode.
2. Exit the "Configuration" mode. To do this, press the  button for at least 5 seconds.  
The software version is displayed.  
After releasing the  button, the positioner is in "P manual mode". The positioner is not initialized.

# Service and maintenance

## 6.1 Basic safety instructions

### 6.1.1 Maintenance

The device is maintenance-free. However, a periodic inspection according to pertinent directives and regulations must be carried out.

An inspection can include, for example, check of:

- Ambient conditions
- Seal integrity of the process connections, cable entries, and cover
- Reliability of power supply, lightning protection, and grounds

#### **WARNING**

##### **Dust layers above 5 mm**

Risk of explosion in hazardous areas.

Device may overheat due to dust build up.

- Remove dust layers in excess of 5 mm.

#### **CAUTION**

##### **Releasing button lock**

Improper modification of parameters could influence process safety.

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

#### **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.

## 6.2 Cleaning

The positioner is maintenance-free to a large extent. Screens are installed in the pneumatic connections of the positioners to protect them from rough dirt particles. If there are dirt particles in the supply air (PZ), they damage the screens and hamper the function of the positioner. Clean the screens as described in the following two chapters.

### 6.2.1 Positioners 6DR5..0, 6DR5..3 and 6DR5..5

#### Procedure for removal and cleaning of the screens

1. Switch off the supply pressure PZ.
2. Remove the pneumatic pipelines.
3. Unscrew the cover of the 6DR5..0 or 6DR5..3 enclosure.
4. Remove the three screws on the pneumatic terminal strip.
5. Remove the screens and O-rings behind the terminal strip.
6. Clean the screens, e.g. using compressed air.

#### Procedure for installation of the screens

##### CAUTION

###### Damage to the polycarbonate enclosure 6DR5..0

- The enclosure is damaged due to screwing in the self-tapping screws improperly.
- Ensure that the available thread pitches are used.
- Turn the screws anticlockwise until they engage noticeably in the thread pitch.
- Tighten the self-tapping screws only after they have engaged.

1. Insert the screens into the recesses of the enclosure.
2. Place the O-rings on the screens.
3. Insert the pneumatic terminal strip.
4. Tighten the three screws. Note: With the polycarbonate enclosure, the screws are self-tapping.
5. Place the cover and tighten it.
6. Connect the pneumatic pipelines again.

## 6.2.2 Positioners 6DR5..1, 6DR5..2 and 6DR5..6

### Removal, cleaning and installation of the screens

1. Switch off the supply pressure PZ.
2. Remove the pneumatic connecting cables.
3. Remove the metal screen from the bores carefully.
4. Clean the metal screens, e.g. using compressed air.
5. Insert the screens.
6. Connect the pneumatic pipelines again.

### Cleaning the enclosure

- Clean the outside of the enclosure with the inscriptions and the display window using a cloth moistened with water or a mild detergent.
- Do not use any aggressive cleansing agents or solvents, e.g. acetone. Plastic parts or the painted surface could be damaged. The inscriptions could become unreadable.

#### **WARNING**

#### **Electrostatic charge**

Risk of explosion in hazardous areas if electrostatic charges develop, for example, when cleaning plastic surfaces with a dry cloth.

- Prevent electrostatic charging in hazardous areas.

## 6.3 Maintenance and repair work

Send defective devices to the repairs department, together with information on the malfunction and the cause of the malfunction. When ordering replacement devices, please provide the serial number of the original device. You can find the serial number on the nameplate.

#### **WARNING**

#### **Impermissible repair of the device**

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

**⚠ WARNING**

**Maintenance during continued operation in a hazardous area**

There is a risk 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**

**Impermissible accessories and spare parts**

Risk 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**

**Improper connection after maintenance**

Risk of explosion in areas subject to explosion hazard.

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

Refer to Electrical connection (Page 26).

## 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

Return document (<http://www.siemens.com/processinstrumentation/returngoodsnote>)

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

## 6.5 Disposal



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE). Devices can be returned to the supplier within the EC, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Further information about devices containing batteries can be found at:  
Information on battery/product return (WEEE) (<https://support.industry.siemens.com/cs/document/109479891/>)



# Technical data

## 7.1 All device versions

### 7.1.1 Rated conditions

Rated conditions	
Ambient conditions	For use indoors and outdoors.
Ambient temperature	In hazardous areas, observe the maximum permissible ambient temperature corresponding to the temperature class.
• Permissible ambient temperature for operation <sup>2)<sup>3)</sup></sup>	-30 ... +80 °C (-22 ... +176 °F)
• Height	2000 m above sea level. At altitudes greater than 2000 m above sea level, use a suitable power supply.
• Relative humidity	0 ... 100%
Degree of pollution	2
Overvoltage category	II
Degree of protection <sup>1)</sup>	IP66 / Type 4X to UL 50E
Mounting position	Any; pneumatic connections and exhaust air outlet not facing up in wet environment, Proper mounting (Page 19)
Vibration resistance	
• Harmonic oscillations (sine) according to EN 60068-2-6/10.2008	3.5 mm (0.14"), 2 ... 27 Hz, 3 cycles/axis 98.1 m/s <sup>2</sup> (321.84 ft/s <sup>2</sup> ), 27 ... 300 Hz, 3 cycles/axis
• Bumping (half-sine) according to EN 60068-2-27/02.2010	150 m/s <sup>2</sup> (492 ft/s <sup>2</sup> ), 6 ms, 1000 shocks/axis
• Noise (digitally controlled) according to EN 60068-2-64/04.2009	10 ... 200 Hz; 1 (m/s <sup>2</sup> ) <sup>2</sup> /Hz (3.28 (ft/s <sup>2</sup> ) <sup>2</sup> /Hz) 200 ... 500 Hz; 0.3 (m/s <sup>2</sup> ) <sup>2</sup> /Hz (0.98 (ft/s <sup>2</sup> ) <sup>2</sup> /Hz) 4 hours/axis
• Recommended range of continuous operation of the entire control valve	≤ 30 m/s <sup>2</sup> (98.4 ft/s <sup>2</sup> ) without resonance peak
Climate class	According to IEC/EN 60721-3
• Storage	1K5, but -40 ... +80°C (1K5, but -40 ... +176°F)
• Transport	2K4, but -40 ... +80°C (2K4, but -40 ... +176°F)

<sup>1)</sup> Max. impact energy 1 Joule for enclosure with inspection window 6DR5..0 and 6DR5..1 or max. 2 Joule for 6DR5..3

<sup>2)</sup> At ≤ -10 °C (≤ 14 °F) the display refresh rate of the indicator is limited.

<sup>3)</sup> The following applies to order suffix (order code) **-Z M40**: -40 ... +80 °C (-40 ... +176°F)

## 7.1.2 Pneumatic data

## Pneumatic data

Auxiliary power (air supply)	Compressed air, carbon dioxide (CO <sub>2</sub> ), nitrogen (N), noble gases or cleaned natural gas
• Pressure <sup>1)</sup>	1.4 ... 7 bar (20.3 ... 101.5 psi)
Air quality to ISO 8573-1	
• Solid particulate size and density	Class 3
• Pressure dew point	Class 3 (min. 20 K (36 °F) below ambient temperature)
• Oil content	Class 3
Unrestricted flow (DIN 1945)	
• Pressurize actuator <sup>2)</sup>	
2 bar; 0.1 KV (29 psi; 0.116 CV)	4.1 Nm <sup>3</sup> /h (18.1 USgpm)
4 bar; 0.1 KV (58 psi; 0.116 CV)	7.1 Nm <sup>3</sup> /h (31.3 USgpm)
6 bar; 0.1 KV (87 psi; 0.116 CV)	9.8 Nm <sup>3</sup> /h (43.1 USgpm)
• Depressurize actuator for all versions except fail in place <sup>2)</sup>	
2 bar; 0.2 KV (29 psi; 0.232 CV)	8.2 Nm <sup>3</sup> /h (36.1 USgpm)
4 bar; 0.2 KV (58 psi; 0.232 CV)	13.7 Nm <sup>3</sup> /h (60.3 USgpm)
6 bar; 0.2 KV (87 psi; 0.232 CV)	19.2 Nm <sup>3</sup> /h (84.5 USgpm)
• Depressurize actuator for fail in place version	
2 bar; 0.1 KV (29 psi; 0.116 CV)	4.3 Nm <sup>3</sup> /h (19.0 USgpm)
4 bar; 0.1 KV (58 psi; 0.116 CV)	7.3 Nm <sup>3</sup> /h (32.2 USgpm)
6 bar; 0.1 KV (87 psi; 0.116 CV)	9.8 Nm <sup>3</sup> /h (43.3 USgpm)
Valve leakage	< 6·10 <sup>-4</sup> Nm <sup>3</sup> /h (0.0026 USgpm)
Throttle ratio	Adjustable up to ∞: 1
Auxiliary power consumption in the controlled state	< 3.6·10 <sup>-2</sup> Nm <sup>3</sup> /h (0.158 USgpm)
Sound pressure level	$L_{A\ eq} < 75$ dB $L_{A\ max} < 80$ dB
Sound pressure with installed booster <sup>3)</sup>	$L_{A\ eq} < 95.2$ dB $L_{A\ max} < 98.5$ dB

<sup>1)</sup> The following applies to fail in place double acting: 3 ... 7 bar (43.5 ... 101.5 psi)

<sup>2)</sup> When using device versions Ex d (6DR5..5-... and 6DR5..6-...), values are reduced by approximately 20%.

<sup>3)</sup> Read the warning notice "Increased sound pressure level".

## See also

Basic safety instructions (Page 41)

### 7.1.3 Construction

#### Construction

##### How does it work?

• Range of stroke (linear actuator)	3 ... 130 mm (0.12 ... 5.12") (angle of rotation of the positioner shaft 16 ... 90°)
• Angle of rotation (part-turn actuator)	30 to 100°

##### Mounting method

• On the linear actuator	Using mounting kit 6DR4004-8V and, where necessary, an additional lever arm 6DR4004-8L on actuators according to IEC 60534-6-1 (NAMUR) with a fin, columns, or a plane surface.
• On the part-turn actuator	Using mounting kit 6DR4004-8D or TGX:16300-1556 on actuators with mounting plane according to VDI/VDE 3845 and IEC 60534-6-2: The required mount must be provided on the actuator-side.

##### Weight, positioner without option modules or accessories

• 6DR5..0 Glass-fiber reinforced polycarbonate enclosure	Approx. 0.9 kg (1.98 lb)
• 6DR5.11 aluminum enclosure, only single-acting	Approx. 1.3 kg (2.86 lb)
• 6DR5..2 stainless steel enclosure	Approx. 3.9 kg (8.6 lb)
• 6DR5..3 aluminum enclosure	Approx. 1.6 kg (3.53 lb)
• 6DR5..5 aluminum enclosure, flameproof, rugged	Approx. 5.2 kg (11.46 lb)
• 6DR5..6 stainless steel enclosure, flameproof, rugged	Approx. 8.4 kg (18.5 lb)

##### Material

• Enclosure	
6DR5..0 polycarbonate	Glass-fiber reinforced polycarbonate (PC)
6DR5.11 aluminum, only single-acting	GD AISi12
6DR5..2 stainless steel	Austenitic stainless steel 316Cb, mat. No. 1.4581
6DR5..3 aluminum	GD AISi12
6DR5..5 aluminum, flameproof, rugged	GK AISi12
6DR5..6 stainless steel enclosure, flameproof, rugged	Austenitic stainless steel 316L, mat. No. 1.4409
• Pressure gauge block	Aluminum AlMgSi, anodized or stainless steel 316

##### Versions

• In the polycarbonate enclosure 6DR5..0	Single-acting and double-acting
• In aluminum enclosure 6DR5.11	Single-acting
• In aluminum enclosures 6DR5..3 and 6DR5..5	Single-acting and double-acting
• In stainless steel enclosures 6DR5..2 and 6DR5..6	Single-acting and double-acting

##### Torques

• Part-turn actuator fixing screws DIN 933 M6x12-A2	5 Nm (3.7 ft lb)
• Linear actuator fixing screws DIN 933 M8x16-A2	12 Nm (8.9 ft lb)
• Gland pneumatic G $\frac{1}{4}$	15 Nm (11.1 ft lb)
• Pneumatic gland 1/4-18 NPT	
Without sealant	12 Nm (8.9 ft lb)

## Technical data

### 7.1 All device versions

#### Construction

With sealant	6 Nm (4.4 ft lb)
<ul style="list-style-type: none"><li>• Cable glands</li></ul>	
Screw-in torque for plastic gland in all enclosures	4 Nm (3 ft lb)
Screw-in torque for cable gland made of metal/stainless steel in polycarbonate enclosure	6 Nm (4.4 ft lb)
Screw-in torque for metal/stainless steel glands in aluminum/stainless steel enclosure	6 Nm (4.4 ft lb)
Screw-in torque for NPT adapter made of metal/stainless steel in polycarbonate enclosure	8 Nm (5.9 ft lb)
Screw-in torque for NPT adapter made of metal/stainless steel in aluminum/stainless steel enclosure	15 Nm (11.1 ft lb)
Screw-in torque for NPT gland in the NPT adapter	68 Nm (50 ft lb)
NOTE: To avoid damage to the device, the NPT adapter must be held in place while the NPT gland is screwed into the NPT adapter.	
Tightening torque for union nut made of plastic	2.5 Nm (1.8 ft lb)
Tightening torque for union nut made of metal/stainless steel	4 Nm (3 ft lb)
<ul style="list-style-type: none"><li>• Pressure gauge block fixing screws</li></ul>	
Manometer	
<ul style="list-style-type: none"><li>• Degree of protection</li></ul>	
Manometer made of plastic	IP31
Manometer, steel	IP44
Manometer made of stainless steel 316	IP54
<ul style="list-style-type: none"><li>• Vibration resistance</li></ul>	
Connections, electrical	
<ul style="list-style-type: none"><li>• Screw terminals</li></ul>	
2.5 mm <sup>2</sup> AWG30-14	
<ul style="list-style-type: none"><li>• Cable gland</li></ul>	
Without Ex protection as well as with Ex i	M20 x 1.5 or 1/2-14 NPT
With explosion protection Ex d	Ex d-certified M20 x 1.5; 1/2-14 NPT or M25 x 1.5
Connections, pneumatic	
Female thread G <sup>1</sup> / <sub>2</sub> or 1/4-18 NPT	

### 7.1.4 Controller

#### Controller

##### Control unit

<ul style="list-style-type: none"><li>• Five-point controller</li></ul>	Adaptive
<ul style="list-style-type: none"><li>• Dead zone</li></ul>	
dEbA = auto	Adaptive
dEbA = 0.1 ... 10 %	Can be set as fixed value
Analog-to-digital converter	

**Controller**

• Scanning time	10 ms
• Resolution	≤ 0,05 %
• Transmission error	≤ 0,2 %
• Temperature influence	≤ 0,1 %/10 K (≤ 0,1 %/18 °F)

**7.1.5 Certificates and approvals****7.1.5.1 Type key basic unit**

Each device has a nameplate. This nameplate shows a specific article number for the device. Lower-case letters are used and explained in the tables below for the variable digits in the article number. Each variable that is used stands for a different order version. You will find the order data in the FI 01 catalog on the Internet.

Table 7-1 Article number

1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	-				
6	D	R	5	a	*	b	-	0	c	d	e	f	-	g	*	*	h	-	Z	j	j	j

6DR5 (b = 0)	6DR5 (b = 1)	6DR5 (b = 2)	6DR5 (b = 3)	6DR5 (b = 5)	6DR5 (b = 6)
Polycarbonate	Aluminum single-acting	Stainless steel	Aluminum	Aluminum	Stainless steel
					

6DR5a*b-0cdef-g**h-Zjjj	If enclosure b =	If explosion protection c =	If order code Z =	
<b>Electronics: a =</b>				
• 0, 2, 5, 6	0	E	-	or
	1, 2, 3	D, E, F, G, K	-	or
	5, 6	E, F, G, K, P	K50	or
• 0, 1, 2, 3, 5, 6	5, 6	E	-	or
• 1, 5, 6	5, 6	F, G, K, P	P01 ... P02	or
	2, 3	D, E, F, G, K	P01 ... P02	or
	5, 6	E	P01 ... P02	or
	5, 6	E	P01 ... P02 + K50	

## 7.1 All device versions

6DR5a*b-0cdef-g**h-Zjjj	If enclosure b =	If explosion protection c =	If order code Z =	
<b>Enclosure b =</b> 0, 1, 2, 3, 5, 6				
<b>Explosion protection c =</b> D, E, F, G, K				
<b>Connection thread d =</b>				
• G, N, M, P, R, S	0, 1, 2, 3			
• G, N, M, P, Q	5, 6			
<b>Limit monitor e =</b> 0, 1, 2, 3, 9				
<b>Option modules f =</b> 0, 1, 2, 3				
<b>Custom design g =</b> 0, 3, 7				
<b>Pneumatic accessories h =</b> 0, 1, 2, 3, 4, 9R**				
<b>Order code Z =</b> 0, 1, 2, 3, 5, 9R**	A**, C**, D53...D57, F**, K**, L1A, M40, P01...P02, R**, S**, Y**			

## 7.1.5.2 Ex markings

## Basic unit: ATEX-IECEx / CSA / FM

1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	-	
6	D	R	5	a	*	b	-	0	C	d	e	f	-	g	*	*	h	-	Z j j j

a =	b =	c =	Z =	ATEX 205947X IECEx TUN 17.0023X	CSA 18CA70166848X	FM 17US0053X
0, 2, 5, 6	1, 2, 3	D	-	II3G Ex ec IIC T6/T4 Gc II2D Ex tb IIIC T100°C Db	Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D	CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D
1, 5, 6	2, 3, 5, 6		P01, P02		Ex tb IIIC T100°C Db CI II, III Div 1 Gp E-G	Zn 21 AEx tb IIIC T100°C Db DIP CI II, III Div 1 Gp E-G
0, 2, 5, 6	0	E	-	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1 Gp A-D
0, 2, 5, 6	1, 2, 3	E	-	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1 Gp A-D
1, 5, 6	2, 3, 5, 6		P01, P02	II2D Ex ia IIC T130°C Db	Ex ia IIIC T130°C Db CI II, III Div 1 Gp E-G	Zn 21 AEx ib IIIC Db T130°C IS CI I, II, III Div 1 Gp A-G
0, 1, 2, 3, 5, 6	5, 6	E	-	II2G Ex db IIC T6/T4 Gb II2D tb IIIC T100°C Db	CI I Zn 1 Ex db IIC T6/T4 Gb CI I Div 1 Gp C-D Ex tb IIIC T100°C Db CI II, III Div 1 Gp E-G	CI I Zn 1 AEx db IIC T6/T4 Gb XP CI I Div 1 Gp A-D Zn 21 AEx tb IIIC T100°C Db DIP CI II, III Div 1 Gp E-G

a =	b =	c =	Z =	Ex ATEX 205947X IECEx TUN 17.0023X	CSA 18CA70166848X	FM 17US0053X
0, 2, 5, 6	0, 1, 2, 3, 5, 6	F	-	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1, Gp A-D
1, 5, 6	2, 3, 5, 6		P01, P02	II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db	Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D Ex ia IIIC T130°C Db CI II, III Div 1 Gp E-G	CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D Zn 21 AEx ib IIIC Db T130°C IS CI I, II, III Div 1 Gp A-G
0, 2, 5, 6	1, 2, 3, 5, 6	G	-	II3G Ex ec IIC T6/T4 Gc	Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D	CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D
1, 5, 6	2, 3, 5, 6		P01, P02			
0, 2, 5, 6	1, 2, 3, 5, 6	K	-	II2G Ex db ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1, Gp A-D
1, 5, 6	2, 3, 5, 6		P01, P02	II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db II2D Ex tb IIIC T100°C Db	Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D Ex ia IIIC T130°C Db CI II, III Div 1 Gp E-G Ex tb IIIC T100°C Db CI II, III Div 1 Gp E-G	CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D Zn 21 AEx ib IIIC Db T130°C IS CI I, II, III Div 1 Gp A-G Zn 21 AEx tb IIIC T100°C Db DIP CI II, III Div 1 Gp E-G
0, 2, 5, 6	5, 6	P	-	II2G Ex db ia IIC T6/T4 Gb	Ex db ia IIC T6/T4 IS CI I Div 1 Gp C-D	CI I Zn 1 AEx db ia IIC T6/T4 XP IS CI I Div 1 Gp A-D
1, 5, 6			P01, P02			

## Basic unit: ATEX-IECEx / EACEx (Eurasian Economic Union)

1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	-				
6	D	R	5	a	*	b	-	0	c	d	e	f	-	g	*	*	h	-	Z	j	j	j

a =	b =	c =	Z =	Ex ATEX 205947X IECEx TUN 17.0023X	EACEx	
0, 2, 5, 6	1, 2, 3	D	-	II3G Ex ec IIC T6/T4 Gc II2D Ex tb IIIC T100°C Db	2Ex nA IIC T6/T4 Gc X Ex tb IIIC T100°C Db X	
1, 5, 6	2, 3, 5, 6		P01, P02			
0, 2, 5, 6	0	E	-	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc	1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X	
0, 2, 5, 6	1, 2, 3		E		1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X	
1, 5, 6	2, 3, 5, 6		P01, P02		Ex ia IIIC T130°C Db X	
0, 1, 2, 3, 5, 6	5, 6	E	-	II2G Ex db IIC T6/T4 Gb II2D Ex tb IIIC T100°C Db	1Ex d IIC T6/T4 Gb X Ex tb IIIC T100°C Db X	
0, 2, 5, 6	0, 1, 2, 3, 5, 6		F		1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X	
1, 5, 6	2, 3, 5, 6		P01, P02		2Ex nA IIC T6/T4 Gc X Ex ia IIIC T130°C Db X	

## 7.1 All device versions

a =	b =	c =	z =	Ex ATEX 205947X IECEx TUN 17.0023X	EACEx
0, 2, 5, 6	1, 2, 3, 5, 6	G	-	II3G Ex ec IIC T6/T4 Gc P01, P02	2Ex nA IIC T6/T4 Gc X
1, 5, 6	2, 3, 5, 6		P01, P02		
0, 2, 5, 6	1, 2, 3, 5, 6	K	-	II2G Ex db ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db II2D Ex tb IIIC T100°C Db	1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X 2Ex nA IIC T6/T4 Gc X Ex ia IIIC T130°C Db X Ex tb IIIC T100°C Db X
1, 5, 6	2, 3, 5, 6		P01, P02		
0, 2, 5, 6	5, 6	P	-	II2G Ex db ia IIC T6/T4 Gb P01, P02	1Ex db ia IIC T6/T4 X
1, 5, 6			P01, P02		

## Position Transmitter and NCS: ATEX-IECEx / CSA / FM

	Ex ATEX 205947X IECEx TUN 17.0023X	CSA 18CA70166848X	FM 17US0053X
<b>Position Transmitter option</b> • 6DR4004-1ES / -2ES / -3ES / -4ES	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db II2D Ex tb IIIC T100°C Db	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D Ex ia IIIC T130°C Db CI II, III Div 1 Gp E-G Ex tb IIIC T100°C Db CI II, III Div 1 Gp E-G	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1, Gp A-D CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D Zn 21 AEx ib IIIC Db T130°C IS CI I, II, III Div 1 Gp A-G Zn 21 AEx tb IIIC T100°C Db DIP CI II, III Div 1 Gp E-G
<b>Non-Contacting Sensor (NCS) option</b> • 6DR4004-6N	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db	Ex ia IIC T6/T4 Gb Ex ic IIC T6/T4 Gc IS CI I Div 1, 2 Gp A-D Ex ec IIC T6/T4 Gc CI I Div 2 Gp A-D Ex ia IIIC T130°C Db CI II, III Div 1 Gp E-G	CI I Zn 1 AEx ib IIC T6/T4 Gb IS CI I Div 1, Gp A-D CI I Zn 2 AEx nA IIC T6/T4 Gb NI CI I Div 2 Gp A-D Zn 21 AEx ib IIIC Db T130°C IS CI I, II, III Div 1 Gp A-G

## Position Transmitter and NCS: ATEX-IECEx / EACEx (Eurasian Economic Union)

	Ex ATEX 205947X IECEx TUN 17.0023X	EACEx
<b>Position Transmitter option</b> • 6DR4004-1ES / -2ES / -3ES / -4ES	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db II2D Ex tb IIIC T100°C Db	1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X Ex nA IIC T6/T4 Gc X Ex ia IIIC T130°C Db X Ex tb IIIC T100°C Db X
<b>Non-Contacting Sensor (NCS) option</b> • 6DR4004-6N	II2G Ex ia IIC T6/T4 Gb II3G Ex ic IIC T6/T4 Gc II3G Ex ec IIC T6/T4 Gc II2D Ex ia IIIC T130°C Db	1Ex ia IIC T6/T4 Gb X 2Ex ic IIC T6/T4 Gc X 2Ex nA IIC T6/T4 Gc X Ex ia IIIC T130°C Db X

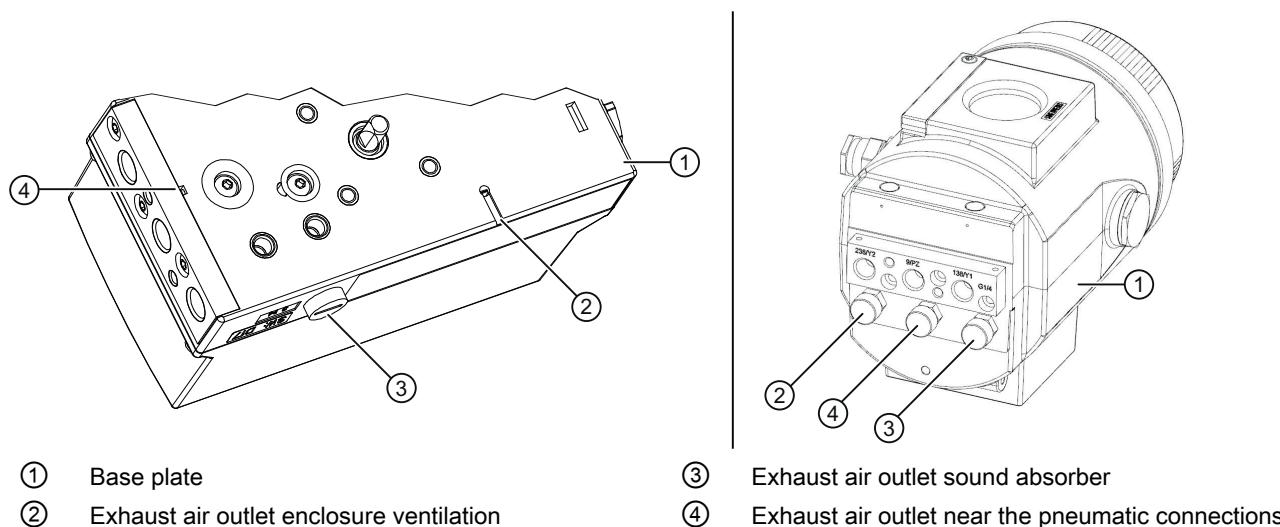
### 7.1.5.3 Maximal permissible ambient temperature ranges

Positioner and option modules	Temperature class T4	Temperature class T6
Positioner		
• 6DR5ayb-0cdef-g*Ah-Z jjj	-30 °C ≤ Ta ≤ +80 °C	-30 °C ≤ Ta ≤ +50 °C
• 6DR5ayb-0cdef-g*Ah-Z M40	-40 °C ≤ Ta ≤ +80 °C	-40 °C ≤ Ta ≤ +50 °C
• 6DR5ayb-0cdef-g*Ah-Z jjj for a = 0, 1, 2 and f = 0, 2	-30 °C ≤ Ta ≤ +80 °C	-30 °C ≤ Ta ≤ +60 °C
• 6DR5ayb-0cdef-g*Ah-Z M40 for a = 0, 1, 2 and f = 0, 2	-40 °C ≤ Ta ≤ +80 °C	-40 °C ≤ Ta ≤ +60 °C
Option modules		
• Non-Contacting Sensor (NCS) 6DR4004-6N	-40 °C ≤ Ta ≤ +90 °C	-40 °C ≤ Ta ≤ +70 °C
• Position Transmitter (Potentiometer) 6DR4004-1ES	-40 °C ≤ Ta ≤ +90 °C	-40 °C ≤ Ta ≤ +60 °C
• Position Transmitter (NCS) 6DR4004-2ES	-40 °C ≤ Ta ≤ +90 °C	-40 °C ≤ Ta ≤ +50 °C
• Position Transmitter (NCS, ILS) 6DR4004-3ES		
• Position Transmitter (NCS, MLS) 6DR4004-4ES		

### 7.1.6 Natural gas as actuator medium

#### Introduction

For operation with natural gas, note that used natural gas escapes at the exhaust air outlets.



**Note**

**The following applies for exhaust air outlet with sound absorber ③:**

The positioner is supplied as standard with a sound absorber. To provide an outlet for the exhaust air, replace the sound absorber by a G $\frac{1}{4}$  pipe coupling.

**The following applies for enclosure ventilation ② and control air outlet ④:**

1. With the "flameproof enclosure" device version in an aluminum enclosure with order suffix -Z K50 "Operation with natural gas", you can completely collect and discharge the escaping natural gas.
2. In all other device versions, the escaping natural gas is released into the environment.

**Maximum values for escaping natural gas**

- The quantity of escaping natural gas is negligible during regulated operation.
- If a control error occurs, a maximum of 30 NI/min of natural gas will escape at the enclosure vent ② and a maximum of 89 NI/min at the control air outlet ④.

## 7.2 With 4 to 20 mA/HART

### 7.2.1 Electrical data

	Basic electronics without explosion protection	Basic electronics with explosion pro- tection Ex "db"	Basic electronics with explosion pro- tection Ex "ia", "db ia"	Basic electronics with explosion pro- tection Ex "ic", "ec", "tb"
<b>Current input I<sub>W</sub></b>				
• Rated signal range			4 ... 20 mA	
• Test voltage			840 V DC, 1 s	
• Digital input DI1 (terminals 9/10; galvanically connec- ted to basic device)		Suitable only for floating contact; max. contact load < 5 $\mu$ A with 3 V		

**2-wire connection**

6DR50.. and 6DR53.. 4 ... 20 mA

6DR51.. and 6DR52.. HART

Current to maintain the auxiliary power	$\geq 3.6$ mA
--	---------------

Required load voltage U<sub>B</sub> (cor-  
responds to  $\Omega$  at 20 mA)

- 4 to 20 mA 6DR50..

Typical	6.36 V (= 318 $\Omega$ )	6.36 V (= 318 $\Omega$ )	7.8 V (= 390 $\Omega$ )	7.8 V (= 390 $\Omega$ )
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	Basic electronics without explosion protection	Basic electronics with explosion pro- tection Ex "db"	Basic electronics with explosion pro- tection Ex "ia", "db ia"	Basic electronics with explosion pro- tection Ex "ic", "ec", "tb"
Max.	6.48 V (= 324 Ω)	6.48 V (= 324 Ω)	8.3 V (= 415 Ω)	8.3 V (= 415 Ω)
• 4 to 20 mA 6DR53..				
Typical	7.9 V (= 395 Ω)	-	-	-
Max.	8.4 V (= 420 Ω)	-	-	-
• HART 6DR51..				
Typical	6.6 V (= 330 Ω)	6.6 V (= 330 Ω)	-	-
Max.	6.72 V (= 336 Ω)	6.72 V (= 336 Ω)	-	-
HART 6DR52..				
Typical	-	8.4 V (= 420 Ω)	8.4 V (= 420 Ω)	8.4 V (= 420 Ω)
Max.	-	8.8 V (= 440 Ω)	8.8 V (= 440 Ω)	8.8 V (= 440 Ω)
• Static destruction limit	± 40 mA	± 40 mA	-	-
Effective inner capacitance $C_i$	-	-		
• 4 to 20 mA	-	-	11 nF	"ic": 11 nF
• HART	-	-	11 nF	"ic": 11 nF
Effective inner inductance $L_i$	-	-		
• 4 to 20 mA	-	-	209 μH	"ic": 209 μH
• HART	-	-	312 μH	"ic": 312 μH
For connecting to circuits with the following peak values	-	-	$U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$ $P_i \leq 1 \text{ W}$	"ic": $U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$  "ec"/"tb": $U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$

**3-/4-wire connection**

6DR52.. HART, explosion proof

6DR53.. 4 ... 20 mA, non-explosion-proof

Load voltage at 20 mA	≤ 0.2 V (= 10 Ω)	≤ 0.2 V (= 10 Ω)	≤ 1 V (= 50 Ω)	≤ 1 V (= 50 Ω)
Auxiliary power $U_{\text{Aux}}$	18 ... 35 V DC	18 ... 35 V DC	18 ... 30 V DC	18 ... 30 V DC
• Current consumption $I_{\text{Aux}}$		$(U_{\text{Aux}} - 7.5 \text{ V}) / 2.4 \text{ kΩ}$ [mA]		
For connecting to circuits with the following peak values	-	-	$U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$ $P_i \leq 1 \text{ W}$	"ic": $U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$  "ec"/"tb": $U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$
Effective inner capacitance $C_i$	-	-	22 nF	22 nF
Effective inner inductance $L_i$	-	-	0.12 mH	0.12 mH
Galvanic isolation	Between $U_{\text{Aux}}$ and $I_W$	Between $U_{\text{Aux}}$ and $I_W$	Between $U_{\text{Aux}}$ and $I_W$ (2 intrinsically safe circuits)	Between $U_{\text{Aux}}$ and $I_W$

## 7.2.2 Electrical data for pressure sensor module

	Basic electronics without explosion protection	Basic electronics with explosion pro- tection Ex "db"	Basic electronics with explosion pro- tection Ex "ia", Ex "db ia"	Basic electronics with explosion pro- tection Ex "ic", "ec", "tb"
Basic electronics for the pressure sensor module				
6DR51.. -Z P01 und -Z P02 HART, non-Ex				
6DR51.. -Z P01 und -Z P02 HART, Ex				
Current input $I_W$				
• Rated signal range		4 ... 20 mA		
• Test voltage		840 V DC, 1 s		
• Digital input DI1 (terminals 9/10; galvanically connected to basic device)		Suitable only for floating contact; max. contact load < 5 $\mu$ A with 3 V		
Current to maintain the auxiliary power			$\geq 3.6$ mA	
Required load voltage $U_B$ (cor- responds to $\Omega$ at 20 mA)	9.4 V (= 470 $\Omega$ )	9.4 V (= 470 $\Omega$ )	9 V (= 450 $\Omega$ )	9 V (= 450 $\Omega$ )
Static destruction limit	$\pm 30$ V	$\pm 30$ V	-	-
Effective inner capacitance $C_i$	-	-	12.2 nF	"ic": 12.2 nF
Effective inner inductance $L_i$	-	-	105 $\mu$ H	"ic": 105 $\mu$ H
For connecting to circuits with the following peak values	-	-	$U_i \leq 30$ V $I_i \leq 100$ mA $P_i \leq 1$ W	"ic": $U_i \leq 30$ V $I_i \leq 100$ mA "ec"/"tb": $U_n \leq 30$ V $I_n \leq 100$ mA

## 7.2.3 Communication (HART)

HART communication	
HART version	7
PC parameter assignment soft- ware	SIMATIC PDM; supports all device objects. The software is not included in the scope of delivery.

## 7.3 With PROFIBUS PA / with FOUNDATION Fieldbus

### 7.3.1 Electrical data

#### Note

##### Pressure sensor module

The following electrical data also apply to electronics with pressure sensor module.

	Basic device without explosion protection	Basic device with explosion protection Ex "db"	Basic device with explosion protection Ex "ia", Ex "db ia"	Basic device with explosion protection Ex "ic", "ec", "tb"
<b>Auxiliary power supply bus circuit (terminals 6 and 7)</b>	Bus-powered			
Bus voltage	9 ... 32 V	9 ... 32 V	9 ... 24 V	9 ... 32 V
For connecting to circuits with the following peak values				
• Bus connector with FISCO supply unit	-	-	$U_i \leq 17.5 \text{ V}$ $I_i \leq 380 \text{ mA}$ $P_i \leq 5.32 \text{ W}$	"ic": $U_i \leq 17.5 \text{ V}$ $I_i \leq 570 \text{ mA}$  "ec"/"tb": $U_n \leq 32 \text{ V}$
• Bus connector with barrier			$U_i \leq 24 \text{ V}$ $I_i \leq 250 \text{ mA}$ $P_i \leq 1.2 \text{ W}$	"ic": $U_i \leq 32 \text{ V}$  "ec"/"tb": $U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$
Effective inner capacitance $C_i$	-	-	Negligible	Negligible
Effective inner inductance $L_i$	-	-	8 $\mu\text{H}$	"ic": 8 $\mu\text{H}$
Current consumption	$11.5 \text{ mA} \pm 10 \%$			
Additional fault current	0 mA			
<b>Safety shutdown can be activated using "Jumper" (terminals 81 and 82)</b>	Electrically isolated from bus circuit and digital input			
• Input resistance	$> 20 \text{ k}\Omega$			
• Signal status "0" (shutdown active)	0 ... 4.5 V or unused			
• Signal status "1" (shutdown not active)	13 ... 30 V			

## 7.3 With PROFIBUS PA / with FOUNDATION Fieldbus

	Basic device without explosion protection	Basic device with explosion protection Ex "db"	Basic device with explosion protection Ex "ia", Ex "db ia"	Basic device with explosion protection Ex "ic", "ec", "tb"			
• For connecting to power source with the following peak values	-	-	$U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$ $P_i \leq 1 \text{ W}$	"ic": $U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$ "ec"/"tb": $U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$			
• Effective internal capacitance and inductance	-	-	Negligible	Negligible			
<b>Digital input DI1</b> (terminals 9 and 10) electrically connected to the bus circuit		Jumpered or connection to switch contact. Suitable only for floating contact; max. contact load $< 5 \mu\text{A}$ with 3 V					
Galvanic isolation							
• For basic device without explosion protection and for basic device with Ex "db"	Galvanic isolation between the basic device and the input for safety shutdown and the outputs of option modules.						
• For basic device Ex "ia"	The basic device, the input for safety shutdown, and the outputs of option modules are individual intrinsically safe circuits.						
• For basic device Ex "ic", "ec", "tb"	Galvanic isolation between the basic device and the input for safety shutdown and the outputs of option modules.						
Test voltage	DC 840 V, 1 s						

## 7.3.2 PROFIBUS PA communication

Communication	Layers 1 + 2 as per PROFIBUS PA, transmission technique as per IEC 1158-2; slave function layer 7 (protocol layer) as per PROFIBUS DP, standard EN 50170 with the extended PROFIBUS functionality (all data is acyclic, manipulated variable, feedbacks and statuses are additionally cyclic)
C2 connections	Four connections with the master class 2 are supported; automatic connection termination 60 s after interruption in communication
Device profile	PROFIBUS PA profile B, version 3.0; over 150 objects
Response time for a master telegram	Typically, 10 ms
Device address	126 (in the as-delivered condition)
PC parameter assignment software	SIMATIC PDM; supports all device objects. The software is not included in the scope of delivery.

### 7.3.3 FOUNDATION Fieldbus communication

Communication group and class	
According to the technical specification of the Fieldbus Foundation for H1 communication	
Function blocks	Group 3, Class 31PS (Publisher Subscriber) 1 resource block (RB2) 1 analog output function block (AO) 1 PID function block (PID) 1 transducer block (standard advanced positioner valve)
Execution times of the blocks	AO: 60 ms PID: 80 ms
Physical layer profile	123, 511
FF registration	Tested with ITK 5.0
Device address	22 (when delivered)

## 7.4 Option modules

### 7.4.1 Digital I/O Module (DIO) 6DR4004-6A / -8A

	Without explosion protection or suitable for use in Ex "db" version	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
6DR4004-8A	6DR4004-6A	6DR4004-6A	6DR4004-6A
3 digital output current circuits			
• Digital output A1: Terminals 41 and 42			
• Digital output A2: Terminals 51 and 52			
• Fault message output: Terminals 31 and 32			
• Auxiliary power supply $U_{Aux}$	$\leq 35$ V and the current consumption is to be limited to $< 25$ mA	-	-
• Signal status			
High (not addressed)	Conductive, $R = 1 \text{ k}\Omega$ , $\pm 3/-1\%$ *)	$\geq 2.1$ mA	$\geq 2.1$ mA
Low *) (addressed)	Deactivated, $I_R < 60 \mu\text{A}$	$\leq 1.2$ mA	$\leq 1.2$ mA
*) The status is also Low if the basic device is faulty or without a auxiliary power.		*) When using in the flame-proof enclosure, the current consumption must be restricted to 10 mA per digital output.	Switching threshold for supply according to EN 60947-5-6: $U_{Aux} = 8.2$ V, $R_i = 1 \text{ k}\Omega$
• For connecting to circuits with the following peak values	-	$U_i \leq 15$ V DC $I_i \leq 25$ mA $P_i \leq 64$ mW	"ic": $U_i \leq 15$ V DC $I_i \leq 25$ mA "ec"/"tb": $U_n \leq 15$ V DC

## 7.4 Option modules

	Without explosion protection or suitable for use in Ex "db" version	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
	6DR4004-8A	6DR4004-6A	6DR4004-6A
Effective internal capacitance	-	$C_i \leq 5.2 \text{ nF}$	$C_i \leq 5.2 \text{ nF}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
1 digital input current circuit			
• Digital input DI2: Terminals 11 and 12, terminals 21 and 22 (jumper)			
• Galvanically connected with the basic device			
Signal status 0		Floating contact, open	
Signal status 1		Floating contact, closed	
Contact load		3 V, 5 $\mu\text{A}$	
• Electrically isolated from the basic device			
Signal status 0		$\leq 4.5 \text{ V}$ or open	
Signal status 1		$\geq 13 \text{ V}$	
Internal resistance		$\geq 25 \text{ k}\Omega$	
• Static destruction limit	$\pm 35 \text{ V}$	-	-
• Connecting to circuits with the following peak values	-	$U_i \leq 25.2 \text{ V DC}$	"ic": $U_i \leq 25.2 \text{ V DC}$ "ec"/"tb": $U_n \leq 25.2 \text{ V DC}$
Effective internal capacitance	-	$C_i = \text{negligibly small}$	$C_i = \text{negligibly small}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Galvanic isolation	The three digital outputs, the DI1 digital input and the basic device are galvanically isolated from each other.		
Test voltage	DC 840 V, 1 s		

## 7.4.2 Analog Input Module (AIM) 6DR4004-6F / -8F

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
	6DR4004-8F	6DR4004-6F	6DR4004-6F

The Analog Input Module (AIM) 6DR4004-6F and -8F is required to connect a Non-Contacting Sensor (NCS) or Position Transmitter 6DR4004-1ES to -4ES.

For devices without explosion protection, other types of potentiometers with resistance values between 3 and 20 K $\Omega$  can be connected.

## R-potentiometer

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
6DR4004-8F	6DR4004-6F	6DR4004-6F	6DR4004-6F
• Peak values when supplied by other basic devices (6DR50/1/2/3/9)	$U_{max} = 5 \text{ V}$	$U_o \leq 5 \text{ V}$ $I_o \leq 100 \text{ mA}$ $P_o \leq 33 \text{ mW}$ $C_o \leq 1 \mu\text{F}$ $L_o \leq 1 \text{ mH}$	$U_{max} = 5 \text{ V}$
• Maximum values when powered by the base unit with PA (6DR55) or FF communication (6DR56)	$U_{max} = 5 \text{ V}$	$U_o \leq 5 \text{ V}$ $I_o \leq 75 \text{ mA static}$ $I_o \leq 160 \text{ mA transient}$ $P_o \leq 120 \text{ mW}$ $C_o \leq 1 \mu\text{F}$ $L_o \leq 1 \text{ mH}$	$U_{max} = 5 \text{ V}$
<b>Signal 20 mA</b>			
• Rated signal range	0 ... 20 mA	-	-
• Internal load $R_B$	200 $\Omega$	-	-
• Static destruction limit	40 mA	-	-
<b>Signal 10 V</b>			
• Rated signal range	0 ... 10 V	-	-
• Internal resistance $R_i$	25 k $\Omega$	-	-
• Static destruction limit	20 V	-	-
Supply and signal power circuits	Galvanically connected with the basic device		

### 7.4.3 Inductive Limit Switches (ILS) 6DR4004-6G / -8G

	Without explosion protection	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
6DR4004-8G	6DR4004-6G	6DR4004-6G	6DR4004-6G
Limit encoder with slotted initiators and fault message output			
2 slotted initiators			
• Digital output (limit monitor) A1: Terminals 41 and 42			
• Digital output (limit monitor) A2: Terminals 51 and 52			
• Connection	2-wire technology in accordance with EN 60947-5-6 (NAMUR), for switching amplifiers connected on load side		
• Signal state High (not triggered)	> 2.1 mA		
• Signal state Low (triggered)	< 1.2 mA		
• 2 slotted initiators	Type SJ2-SN		
• Function	NC contact (NC, normally closed)		

## 7.4 Option modules

	Without explosion protection	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
	<b>6DR4004-8G</b>	<b>6DR4004-6G</b>	<b>6DR4004-6G</b>
• Connecting to circuits with the following peak values	Rated voltage 8 V, power consumption: ≥ 3 mA (limit not activated), ≤ 1 mA (limit activated)	$U_i \leq DC 15 V$ $I_i \leq 25 mA$ $P_i \leq 64 mW$	"ic": $U_i \leq DC 15 V$ $I_i \leq 25 mA$ "ec"/"tb": $U_n \leq DC 15 V$ $P_n \leq 64 mW$
Effective internal capacitance	-	$C_i \leq 161 nF$	$C_i \leq 161 nF$
Effective internal inductance	-	$L_i \leq 120 \mu H$	$L_i \leq 120 \mu H$
<hr/>			
1 fault message output			
• Digital output: Terminals 31 and 32			
• Connection	At switching amplifier in accordance with EN 60947-5-6: (NAMUR), $U_{Aux} = 8.2 V$ , $R_i = 1 k\Omega$ .		
• Signal state High (not triggered)	$R = 1.1 k\Omega$	> 2.1 mA	> 2.1 mA
• Signal state Low (triggered)	$R = 10 k\Omega$	< 1.2 mA	< 1.2 mA
• Auxiliary power $U_{Aux}$	$U_{Aux} \leq DC 35 V$ $I \leq 20 mA$	-	-
• Connecting to circuits with the following peak values	-	$U_i \leq DC 15 V$ $I_i \leq 25 mA$ $P_i \leq 64 mW$	"ic": $U_i \leq DC 15 V$ $I_i \leq 25 mA$ "ec"/"tb": $U_n \leq DC 15 V$ $P_n \leq 64 mW$
Effective internal capacitance	-	$C_i \leq 5.2 nF$	$C_i \leq 5.2 nF$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Galvanic isolation	The 3 outputs are galvanically isolated from the basic device.		
Test voltage	DC 840 V, 1 s		

## 7.4.4 Analog Output Module (AOM) 6DR4004-6J / -8J

	Without explosion protection or suitable for use in Ex d version	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
	<b>6DR4004-8J</b>	<b>6DR4004-6J</b>	<b>6DR4004-6J</b>
Direct current output for position feedback			
1 current output, terminals 61 and 62	2-wire connection		
• Rated signal range	4 ... 20 mA, short-circuit proof		
• Dynamic range	3.6 ... 20.5 mA		
• Auxiliary power supply $U_{Aux}$	+12 ... +35 V	+12 ... +30 V	+12 ... +30 V

	Without explosion protection or suitable for use in Ex d version	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
	6DR4004-8J	6DR4004-6J	6DR4004-6J
• External load $R_B$ [ $k\Omega$ ]		$\leq (U_{Aux} [V] - 12 V)/I$ [mA]	
• Transmission error		$\leq 0.3\%$	
• Temperature influence		$\leq 0.1\%/10$ K ( $\leq 0.1\%/18$ °F)	
• Resolution		$\leq 0.1\%$	
• Residual ripple		$\leq 1\%$	
• For connecting to circuits with the following peak values		$U_i \leq DC 30 V$ $I_i \leq 100 mA$ $P_i \leq 1 W$	"ic": $U_i \leq DC 30 V$ $I_i \leq 100 mA$ "ec"/"tb": $U_n \leq DC 30 V$ $I_n \leq 100 mA$ $P_n \leq 1 W$
Effective internal capacitance	-	$C_i \leq 2 nF$	$C_i \leq 2 nF$
Effective internal inductance	-	$L_i \leq 3 \mu H$	$L_i \leq 3 \mu H$
Galvanic isolation		Electrically isolated from the alarm option and safely isolated from the basic device	
Test voltage		DC 840 V, 1 s	

#### 7.4.5 Mechanic Limit Switches (MLS) 6DR4004-6K / -8K

	Without explosion protection	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "tb"
	6DR4004-8K	6DR4004-6K	6DR4004-6K
Limit encoder with mechanical switching contacts			
2 limit contacts			
• Digital output DO1: Terminals 41 and 42			
• Digital output DO2: Terminals 51 and 52			
• Max. switching current AC/DC	4 A	-	-
• For connecting to circuits with the following peak values		$U_i \leq 30 V$ $I_i \leq 100 mA$ $P_i \leq 750 mW$	"ic": $U_i \leq 30 V$ $I_i \leq 100 mA$ "tb": $U_n \leq 30 V$ $I_n \leq 100 mA$
Effective internal capacitance	-	$C_i = \text{negligibly small}$	$C_i = \text{negligibly small}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
• Max. switching voltage AC/DC	250 V/24 V	DC 30 V	DC 30 V

## 7.4 Option modules

	Without explosion protection	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "tb"
6DR4004-8K	6DR4004-6K	6DR4004-6K	
1 fault message output			
• Digital output: Terminals 31 and 32			
• Connection	On switching amplifier according to EN 60947-5-6: (NAMUR), $U_{Aux} = 8.2 \text{ V}$ , $R_i = 1 \text{ k}\Omega$ .		
• Signal state High (not triggered)	$R = 1.1 \text{ k}\Omega$	$> 2.1 \text{ mA}$	$> 2.1 \text{ mA}$
• Signal state Low (triggered)	$R = 10 \text{ k}\Omega$	$< 1.2 \text{ mA}$	$< 1.2 \text{ mA}$
• Auxiliary power	$U_{Aux} \leq \text{DC } 35 \text{ V}$ $I \leq 20 \text{ mA}$	-	-
• Connecting to circuits with the following peak values	-	$U_i \leq 15 \text{ V}$ $I_i \leq 25 \text{ mA}$ $P_i \leq 64 \text{ mW}$	"ic" : $U_i \leq 15 \text{ V}$ $I_i \leq 25 \text{ mA}$ "tb": $U_n \leq 15 \text{ V}$ $I_n \leq 25 \text{ mA}$
Effective internal capacitance	-	$C_i \leq 5.2 \text{ nF}$	$C_i \leq 5.2 \text{ nF}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Galvanic isolation	The 3 outputs are galvanically isolated from the basic device		
Test voltage	3150 V DC, 2 s		
Rated condition height	Max. 2 000 m above sea level. Use a suitable power supply at an altitude of more than 2 000 m above sea level.	-	-

## 7.4.6 Internal NCS module 6DR4004-5L / 6DR4004-5LE

Additional modules	Without explosion protection	With explosion protection Ex "ia", "db ia"	With explosion protection Ex "ic", "ec", "tb"
6DR4004-5L	6DR4004-5LE	6DR4004-5LE	6DR4004-5LE
Linearity (after corrections made by positioner)		$\pm 1 \text{ %}$	
Hysteresis		$\pm 0.2 \text{ %}$	
For connecting to circuits with the following peak values	-	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	$U_i \leq 5 \text{ V}$
Effective internal capacitance	-	$C_i = 110 \text{ nF} + 110 \text{ nF per meter of connecting cable}$	
Effective internal inductance	-	$L_i = 270 \mu\text{H} + 6.53 \mu\text{H per meter of connecting cable}$	

## 7.4.7 External position detection

### 7.4.7.1 Rated conditions for external position detection

Rated conditions	
Ambient temperature	In hazardous areas, observe the maximum permissible ambient temperature corresponding to the temperature class.
• Permissible ambient temperature for operation	-40 ... +90 °C (-40 ... +194 °F)
Degree of protection <sup>1)</sup>	IP66 / Type 4X to UL 50E
Climate class	According to IEC/EN 60721-3
• Storage	1K5, but -40 ... +90 °C (1K5, but -40 ... +194 °F)
• Transport	2K4, but -40 ... +90 °C (2K4, but -40 ... +194 °F)
• Operation	4K3, but -40 ... +90 °C (4K3, but -40 ... +194 °F)

<sup>1</sup> ) Impact energy max. 1 joule.

### See also

Construction (Page 61)

### 7.4.7.2 External NCS sensors 6DR4004-6N / -8N

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec"
6DR4004-8N	6DR4004-6N	6DR4004-6N	6DR4004-6N
Travel range			
• Linear actuator 6DR4004-6/-8N.20		3 to 14 mm (0.12 to 0.55")	
• Linear actuator 6DR4004-6/-8N.30		10 to 130 mm (0.39 to 5.12"); up to 200 mm (7.87") on request	
• Part-turn actuator		30 to 100°	
Linearity (after corrections made by positioner)		± 1 %	
Hysteresis		± 0.2 %	
Temperature influence (range: rotation angle 120° or stroke 14 mm)		≤ 0.1 %/10 K (≤ 0.1 %/18 °F) for -20 to +90 °C (-4 to +194 °F) ≤ 0.2%/10 K (≤ 0.2%/18 °F) for -40 to -20 °C (-40 to -4 °F)	
Climate class		According to IEC/EN 60721-3	
• Storage		1K5, but -40 to +90 °C (-40 to +194 °F)	
• Transport		2K4, but -40 to +90 °C (-40 to +194 °F)	
Vibration resistance			
• Harmonic oscillations (sine) according to IEC 60068-2-6		3.5 mm (0.14"), 2 to 27 Hz, 3 cycles/axis 98.1 m/s <sup>2</sup> (321.84 ft/s <sup>2</sup> ), 27 to 300 Hz, 3 cycles/axis	

## Technical data

### 7.4 Option modules

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec"
6DR4004-8N	6DR4004-6N	6DR4004-6N	
• Bumping according to IEC 60068-2-29	300 m/s <sup>2</sup> (984 ft/s <sup>2</sup> ), 6 ms, 4000 shocks/axis		
Torque for cable gland nut made of	Plastic	Metal	
	2.5 Nm (1.8 ft lb)	4.2 Nm (3.1 ft lb)	
Torque of hexagon socket-head screw M6x12 (shaft end or mounting bracket)		4 Nm (3 ft lb)	
Torque of hexagon socket head screw M6x25 (mounting console or mounting plate)		4 Nm (3 ft lb)	
Torque of hexagon socket head screw M3x12 (clamping ring)		1 Nm (0.7 ft lb)	
Degree of protection	IP68 according to IEC/EN 60529; Type 4X according to UL 50E		
For connecting to circuits with the following peak values	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	$U_i \leq 5 \text{ V}$	
Effective internal capacitance	-	$C_i = 110 \text{ nF} + 110 \text{ nF}$ per meter of connecting cable	
Effective internal inductance	-	$L_i = 270 \mu\text{H} + 6.53 \mu\text{H}$ per meter of connecting cable	

### 7.4.7.3 Position Transmitter (Potentiometer) 6DR4004-1ES

Additional modules	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
Degree of protection	IP66 according to IEC/EN 60529; Type 4X according to UL 50E	
For connecting to circuits with the following peak values	$U_i \leq 5 \text{ V}$	$U_i \leq 5 \text{ V}$
Effective internal capacitance	$C_i \leq 10 \text{ nF}$	-
Effective internal inductance	$L_i \leq 240 \mu\text{H}$	-

### 7.4.7.4 Position Transmitter (NCS) 6DR4004-2ES

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
Travel range			
• Linear actuator	3 to 14 mm (0.12 to 0.55")		
	10 to 130 mm (0.39 to 5.12"); up to 200 mm (7.87") on request		
• Part-turn actuator		30 to 100°	
Linearity (after corrections made by positioner)		± 1 %	
Hysteresis		± 0.2 %	

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
Temperature influence (range: rotation angle 120° or stroke 14 mm)	$\leq 0.1\% / 10 \text{ K} (\leq 0.1\% / 18 \text{ }^{\circ}\text{F})$ for -20 to +90 °C (-4 to +194 °F) $\leq 0.2\% / 10 \text{ K} (\leq 0.2\% / 18 \text{ }^{\circ}\text{F})$ for -40 to -20 °C (-40 to -4 °F)		
Climate class		According to IEC/EN 60721-3	
• Storage		1K5, but -40 to +90 °C (-40 to +194 °F)	
• Transport		2K4, but -40 to +90 °C (-40 to +194 °F)	
Vibration resistance			
• Harmonic oscillations (sine) according to IEC 60068-2-6	3.5 mm (0.14"), 2 to 27 Hz, 3 cycles/axis 98.1 m/s <sup>2</sup> (321.84 ft/s <sup>2</sup> ), 27 to 300 Hz, 3 cycles/axis		
• Bumping according to IEC 60068-2-29	300 m/s <sup>2</sup> (984 ft/s <sup>2</sup> ), 6 ms, 4000 shocks/axis		
Torque for cable gland nut made of	Plastic 2.5 Nm (1.8 ft lb)	Metal 4.2 Nm (3.1 ft lb)	
Torque of hexagon socket-head screw M6x12 (shaft end or mounting bracket)		4 Nm (3 ft lb)	
Torque of hexagon socket head screw M6x25 (mounting console or mounting plate)		4 Nm (3 ft lb)	
Torque of hexagon socket head screw M3x12 (clamping ring)		1 Nm (0.7 ft lb)	
Degree of protection provided by enclosure		IP66 according to IEC/EN 60529; Type 4X according to UL 50E	
For connecting to circuits with the following peak values	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	
Effective internal capacitance	-	$C_i = 110 \text{ nF} + 110 \text{ nF}$ per meter of connecting cable	
Effective internal inductance	-	$L_i = 270 \text{ } \mu\text{H} + 6.53 \text{ } \mu\text{H}$ per meter of connecting cable	

#### 7.4.7.5 Position Transmitter (NCS, ILS) 6DR4004-3ES

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
Degree of protection provided by enclosure		IP66 according to IEC/EN 60529; type 4X according to UL 50E	
<b>NCS module (NCS)</b>	<b>6DR4004-5L</b>	<b>6DR4004-5LE</b>	<b>6DR4004-5LE</b>
• For connecting to circuits with the following peak values	-	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$
• Effective internal capacitance	-	$C_i = 110 \text{ nF} + 690 \text{ pF/m}$ Connecting cable	-
• Effective internal inductance	-	$L_i = 270 \text{ } \mu\text{H} + 6.53 \text{ } \mu\text{H/m}$ Connecting cable	-
<b>Inductive Limit Switches (ILS)</b>	<b>6DR4004-8G</b>	<b>6DR4004-6G</b>	<b>6DR4004-6G</b>

## 7.4 Option modules

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
<b>2 slotted initiators</b>			
• Digital output (slot-type initiators) A1: Terminals 41 and 42			
• Digital output (slot-type initiators) A2: Terminals 51 and 52			
• Connection	2-wire system according to EN 60947-5-6 (NAMUR), for switching amplifier connected on load side		
• Signal state High (not triggered)		> 2.1 mA	
• Signal state Low (triggered)		< 1.2 mA	
• 2 slotted initiators		Type SJ2-SN	
• Function		NC (normally closed)	
• Connecting to circuits with the following peak values	Rated voltage 8 V, power consumption: ≥ 3 mA (limit not activated), ≤ 1 mA (limit activated)	$U_i \leq DC 15 V$ $I_i \leq 25 mA$ $P_i \leq 64 mW$	$U_n \leq DC 15 V$ $I_n \leq 25 mA$
Effective internal capacitance	-	$C_i \leq 161 nF$	-
Effective internal inductance	-	$L_i \leq 120 \mu H$	-
<b>1 fault message output</b>			
• Digital output: Terminals 31 and 32			
• Connection	At switching amplifier in accordance with EN 60947-5-6: (NAMUR), $U_{Aux} = 8.2 V$ , $R_i = 1 k\Omega$		
• Signal state High (not triggered)	$R = 1.1 k\Omega$	> 2.1 mA	> 2.1 mA
• Signal state Low (triggered)	$R = 10 k\Omega$	< 1.2 mA	< 1.2 mA
• Auxiliary power $U_{Aux}$	$U_{Aux} \leq DC 35 V$ $I \leq 20 mA$	-	-
• Connecting to circuits with the following peak values	-	$U_i \leq DC 15 V$ $I_i \leq 25 mA$ $P_i \leq 64 mW$	$U_i \leq 15 V$ $I_i \leq 25 mA$
Effective internal capacitance	-	$C_i = 5.2 nF$	-
Effective internal inductance	-	$L_i = \text{negligibly small}$	$L_i = \text{negligibly small}$
Galvanic isolation	The 3 digital outputs are galvanically isolated from the basic unit.		
Test voltage	DC 840 V, 1 s		

## 7.4.7.6 Position Transmitter (NCS, MLS) 6DR4004-4ES

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
Degree of protection provided by enclosure	IP66 according to IEC/EN 60529; type 4X according to UL 50E		
NCS module (NCS)	6DR4004-5L	6DR4004-5LE	6DR4004-5LE

	Without explosion protection	With explosion protection Ex "ia", "db ia", "ic"	With explosion protection Ex "ec", "tb"
• For connecting to circuits with the following peak values	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$ $P_i \leq 120 \text{ mW}$	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$	$U_i \leq 5 \text{ V}$ $I_i \leq 160 \text{ mA}$
• Effective internal capacitance	$C_i = 110 \text{ nF} + 690 \text{ pF/m}$ Connecting cable	-	-
• Effective internal inductance	$L_i = 270 \mu\text{H} + 6,53 \mu\text{H/m}$ Connecting cable	-	-
<b>Mechanic Limit Switches (MLS)</b>	<b>6DR4004-8K</b>	<b>6DR4004-6K</b>	<b>6DR4004-6K</b>
<b>2 limit contacts</b>			
• Digital output (switching contact) A1: Terminals 41 and 42			
• Digital output (switching contact) A2: Terminals 51 and 52			
• Max. switching current AC/DC	4 A	-	-
• For connecting to circuits with the following peak values	-	$U_i \leq 30 \text{ V}$ $I_i \leq 100 \text{ mA}$ $P_i \leq 750 \text{ mW}$	$U_n \leq 30 \text{ V}$ $I_n \leq 100 \text{ mA}$
Effective internal capacitance	-	$C_i = \text{negligibly small}$	-
Effective internal inductance	-	$L_i = \text{negligibly small}$	-
• Max. switching voltage AC/DC	250 V/24 V	DC 30 V	DC 30 V
<b>1 fault message output</b>			
• Digital output: Terminals 31 and 32			
• Connection	On switching amplifier according to EN 60947-5-6: (NAMUR), $U_{\text{Aux}} = 8.2 \text{ V}$ , $R_i = 1 \text{ k}\Omega$		
• Signal state High (not triggered)	$R = 1.1 \text{ k}\Omega$	$> 2.1 \text{ mA}$	$> 2.1 \text{ mA}$
• Signal state Low (triggered)	$R = 10 \text{ k}\Omega$	$< 1.2 \text{ mA}$	$< 1.2 \text{ mA}$
• Auxiliary power	$U_{\text{Aux}} \leq \text{DC } 35 \text{ V}$ $I \leq 20 \text{ mA}$	-	-
• Connecting to circuits with the following peak values	-	$U_i \leq 15 \text{ V}$ $I_i \leq 25 \text{ mA}$ $P_i \leq 64 \text{ mW}$	$U_n \leq 15 \text{ V}$ $I_n \leq 25 \text{ mA}$
Effective internal capacitance	-	$C_i = 5.2 \text{ nF}$	$C_i = 5.2 \text{ nF}$
Effective internal inductance	-	$L_i = \text{negligibly small}$	
Galvanic isolation	The 3 digital outputs are galvanically isolated from the basic unit		
Test voltage	3150 V DC, 2 s		
Rated condition height	Max. 2 000 m above sea level. Use a suitable power supply at an altitude of more than 2 000 m above sea level.	-	-



# Product documentation and support

## A.1 Product documentation

Process instrumentation product documentation is available in the following formats:

- Certificates (<http://www.siemens.com/processinstrumentation/certificates>)
- Downloads (firmware, EDDs, software) (<http://www.siemens.com/processinstrumentation/downloads>)
- Catalog and catalog sheets (<http://www.siemens.com/processinstrumentation/catalogs>)
- Manuals (<http://www.siemens.com/processinstrumentation/documentation>)  
You have the option to show, open, save, or configure the manual.
  - "Display": Open the manual in HTML5 format
  - "Configure": Register and configure the documentation specific to your plant
  - "Download": Open or save the manual in PDF format
  - "Download as html5, only PC": Open or save the manual in the HTML5 view on your PC

You can also find manuals with the Mobile app at Industry Online Support (<https://support.industry.siemens.com/cs/ww/de/sc/2067>). Download the app to your mobile device and scan the device QR code.

### Product documentation by serial number

Using the PIA Life Cycle Portal, you can access the serial number-specific product information including technical specifications, spare parts, calibration data, or factory certificates.

#### Entering a serial number

1. Open the PIA Life Cycle Portal (<https://www.pia-portal.automation.siemens.com>).
2. Select the desired language.
3. Enter the serial number of your device. The product documentation relevant for your device is displayed and can be downloaded.

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

#### Scanning a QR code

1. Scan the QR code on your device with a mobile device.
2. Click "PIA Portal".

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

## A.2 Technical support

### Technical support

If this documentation does not completely answer your technical questions, you can enter a Support Request (<http://www.siemens.com/automation/support-request>).

Additional information on our technical support can be found at Technical Support (<http://www.siemens.com/automation/csi/service>).

### Service & support on the Internet

In addition to our technical support, Siemens offers comprehensive online services at Service & Support (<http://www.siemens.com/automation/serviceandsupport>).

### Contact

If you have further questions about the device, contact your local Siemens representative at Personal Contact (<http://www.automation.siemens.com/partner>).

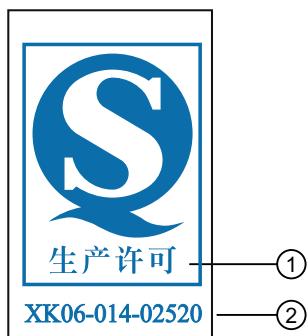
To find the contact for your product, go to "all products and branches" and select "Products & Services > Industrial automation > Process instrumentation".

Contact address for business unit:

Siemens AG  
Digital Industries  
Process Automation  
Östliche Rheinbrückenstr. 50  
76187 Karlsruhe, Germany

## A.3 Chinese production license for explosion proof electrical products

### 防爆电气产品生产许可证标志



① 生产许可

② 生产许可证证书编号

## A.4 Приложение: Технические характеристики

### Приложение: Технические характеристики > классы взрывозащиты



1Ex ia IIC T6/T4 Gb X      или 1Ex ia IIC T4 Gb X      или Ex ia IIIC T130°C Db X  
1Ex d IIC T6/T4 Gb X      или 1Ex d IIC T4 Gb X      или Ex tb IIIC T100°C Db X  
2Ex ic IIC T6/T4 Gc X      или 2Ex ic IIC T4 Gc X      или 2Ex nA IIC T6/T4 Gc X  
2Ex nA IIC T4 Gc X



№ TC RU C-DE.AA87.B.00976  
НАИО ЦСВЭ

*A.4 Приложение: Технические характеристики*

# Accessory part sealing plug / thread adapter

## B.1 Intended use of accessory part

The sealing plug and the thread adapter (components) can be used for installation in electrical equipment of flameproof "Ex d" type of protection of groups IIA, IIB, IIC as well as dust protection by enclosure "Ex t" type of protection.

## B.2 Safety instructions for accessory part

### **WARNING**

#### **Incorrect assembly**

- The component can be damaged or destroyed or its functionality impaired through incorrect assembly.
  - Mount the component using a suitable tool. Refer to the information in Chapter "Technical specifications of accessory part (Page 90)", for example, torques for installation.
- For "Explosion-proof Ex d" type of protection: To ensure an engagement depth of 8 mm, the enclosure must have a wall thickness of at least 10 mm.

#### **Improper modifications**

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

- Any modification which deviates from the delivery state is not permitted.

#### **Loss of enclosure type of protection**

IP protection is not guaranteed without sealant.

- Use a suitable thread sealant.
- If you are using the component in type of protection dust protection by enclosure "Ex t", use the supplied sealing ring (①, figure in Chapter "Dimensional drawings of accessory part (Page 91)").

#### **Unsuitable fluids in the environment**

Danger of injury or damage to device.

Aggressive media in the environment can damage the sealing ring. Type of protection and device protection may no longer be guaranteed.

- Make sure that the sealing material is suitable for the area of use.

---

**Note**

**Loss of type of protection**

Changes in the ambient conditions can loosen the component.

- As part of the recommended maintenance intervals: Check the compression fitting for tight fit and tighten, if necessary.

---

## B.3 Technical specifications of accessory part

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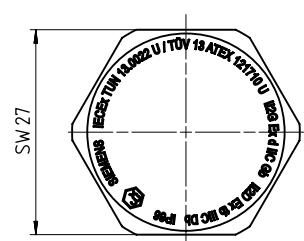
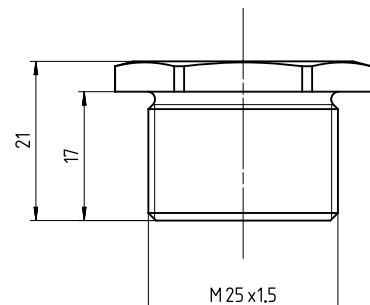
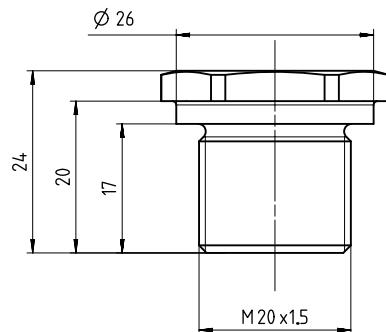
**Technical specifications sealing plug and thread adapter**

---

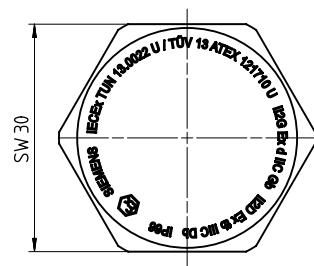
Sealing plug suitable for types of protection	Explosion-proof enclosure "d" of groups IIA, IIB, IIC
	Dust protection by enclosure "t"
Standard compliance	The components meet Directive 94/9. They meet the requirements of standards IEC/EN 60079-0; IEC/EN 60079-1; IEC/EN 60079-31.
Explosion protection	
• Gas explosion protection	II2G Ex d IIC
• Dust explosion protection	II1D Ex t IIIC
Certificates	IECEx TUN 13.0022 U TÜV 13 ATEX 121710 U
Material for sealing plug / thread adapter	Stainless steel
Material for seal	Vulcanized fiber or Victor Reinz AFM 30
Ambient temperature range	-40 ... +100 °C (-40 ... +212 °F)
For "Ex d" type of protection:	
Required wall thickness for tappings	10 mm
Torque	
• For thread size M20 x 1.5	65 Nm
• For thread size M25 x 1.5	95 Nm
• For thread size 1/2-14 NPT	65 Nm
Width A/F for thread size M20 x 1.5	27
Width A/F for thread size M25 x 1.5	30
Key size for thread size 1/2-14 NPT	10

---

## B.4 Dimensional drawings of accessory part

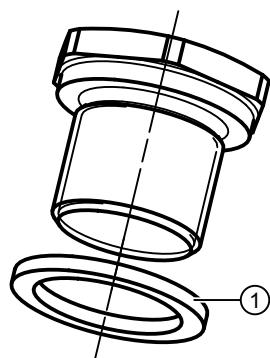
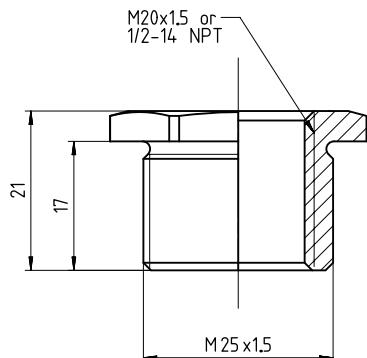


Sealing plug Ex d, M20 x 1.5, dimensions in mm

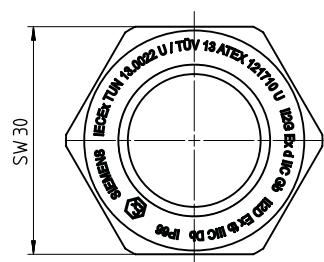


Sealing plug Ex d, M25 x 1.5, dimensions in mm

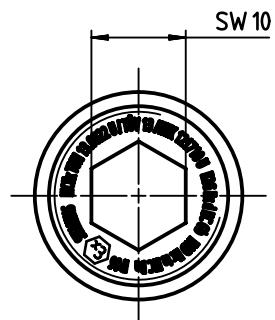
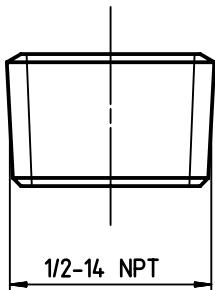
B.4 Dimensional drawings of accessory part



① Sealing ring: Use for dust protection "Ex t" type of protection.



Thread adapter Ex d, M25 x 1.5 on M20 x 1.5 and M25 x 1.5 on 1/2-14 NPT, dimensions in mm



Sealing plug Ex d 1/2 -14 NPT

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