

## Directional spool valves, direct-operated, with fluidic actuation

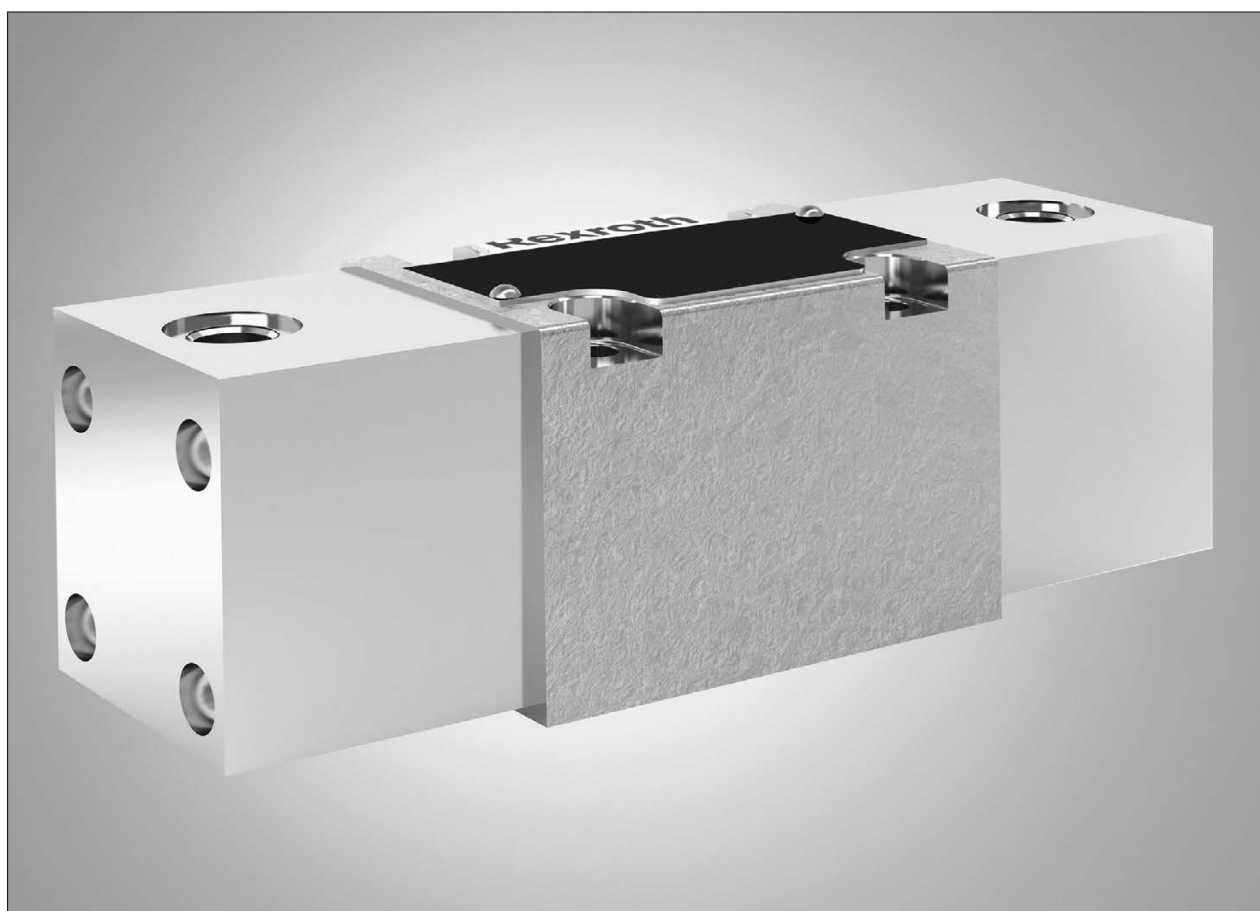
(Area of application in accordance with the explosion protection  
directive 2014/34/EU: **I M2, II 2G, II 2D**)

Type WP6..6X/...XC..., WH6..5X/...XC...



**Operating instructions**  
**RE22282-XC-B/09.19**

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English



2/40

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**Bosch Rexroth AG**, WP6..6X/...XC..., WH6..5X/...XC...; RE22282-XC-B/09.19

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The data specified serves to describe the product. If information on the use of the product is given, it is only to be regarded as application examples and recommendations. Catalog information does not constitute warranted properties. The information given does not release the user from the obligation of own judgment and verification. Our products are subject to a natural process of wear and aging.

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The cover shows an example configuration. The product supplied may therefore differ from the figure shown.

The original operating instructions were prepared in German.

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# 1 About this documentation

## 1.1 Validity of the documentation

This documentation applies to the following products:

- WP6..6X/...XC...
- WH6..5X/...XC...

This documentation is intended for assemblers, operators, service engineers, system end-users, machine and system manufacturers.

This documentation contains important information on the safe and proper assembly, transport, commissioning, operation, use, maintenance, disassembly and simple troubleshooting of the product.

- You should read this documentation thoroughly and in particular chapter 2 "Safety instructions" and chapter 3 "General information on damage to property and damage to product", before working with the product.



The documentation version with which the product was supplied is valid.

## 1.2 Required and amending documentation




- The product must not be commissioned until you have been provided with the documentation marked with the book symbol  and you have understood and observed it.

Table 1: Required and amending documentation

Title	Document number	Document type
 Directional spool valves, direct operated, with fluidic actuation	22282-XC	Data sheet
 General product information on hydraulic products	07008	Data sheet
Subplates	45100	Data sheet
Declaration of conformity WP6..6X/...XC..., WH6..5X/...XC...	Document	See chapter 17

## 1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used so that you can quickly and safely work with your product using this documentation. For a better understanding, they are explained in the following sections.

### 1.3.1 Safety instructions

In this documentation, safety instructions are included in chapter 2.6




"Product-specific safety instructions" and in chapter 3 "General information on damage to property and damage to product" and whenever a sequence of actions or instructions is explained which bear the danger of personal injury or damage to property. The hazard avoidance measures described must be observed.

Safety instructions are structured as follows:

 <b>SIGNAL WORD</b>
<b>Type and source of danger!</b> Consequences in case of non-compliance ► Hazard avoidance measures ► <Enumeration>

- **Warning sign:** draws attention to the danger
- **Signal word:** identifies the degree of danger
- **Type and source of danger!:** specifies the type and source of danger
- **Consequences:** describes the consequences in case of non-compliance
- **Precaution:** specifies how the danger can be prevented


Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 <b>DANGER</b>	Indicates a dangerous situation which will cause death or severe injury if not avoided.
 <b>WARNING</b>	Indicates a dangerous situation which may cause death or severe injury if not avoided.
 <b>CAUTION</b>	Indicates a dangerous situation which may cause minor or moderate (personal) injury if not avoided.
<b>NOTICE</b>	Damage to property: The product or the environment could be damaged.

### 1.3.2 Symbols

The following symbols indicate notices which are not safety-relevant but increase the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be used and/or operated optimally.
►	Individual, independent action
1.	Numbered instruction:
2.	The numbers indicate that the actions must be carried out one after the other.
3.	

### 1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations

Abbreviation	Meaning
ATEX	EU Directive for Explosion Protection ( <i>Atmosphère explosible</i> )
EN	European Standard
ISO	International Organization for Standardization



Abbreviation	Meaning
IEC	International Electrotechnical Commission
RE	Rexroth document
A, B	Hydraulic connections (actuators)
T	Hydraulic connection (tank)
P	Hydraulic connection (pump)
ANSI	American National Standards Institute

## 2 Safety instructions

### 2.1 General information on this chapter

The product has been manufactured according to the generally accepted codes of practice. However, there is still a danger of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- ▶ Read this documentation completely and thoroughly before working with the product.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when you pass the product on to third parties.

### 2.2 Intended use

The product is a hydraulic component.

You may use the product as follows:

- as a direct operated directional spool valve with fluidic actuation for intended use in explosive atmospheres.

The product is intended for professional use only; private use is excluded.

Intended use includes having read and understood this documentation completely, especially chapter 2 "Safety instructions".

The valve is designed and constructed for the control of oil flows. It complies with the requirements of the ATEX directive 2014/34/EU.

You can find details about the device group, category, temperature class/surface temperature and equipment protection level (EPL) in accordance with ATEX directive 2014/34/EU and the derived standards in "Data sheet 22282-XC" under "Information on explosion protection" and on the name plate of the valve.

The valve may only be operated in a technically perfect condition and used as described in these operating instructions. The connection conditions, application conditions and performance data defined in these operating instructions must not be changed.

If you intend to use the valve with other connection, application or performance data than those defined by Bosch Rexroth AG in these operating instructions, please contact Bosch Rexroth AG beforehand. The valve must not be used with other connection, application and performance data than those defined in these operating instructions without the written approval by Bosch Rexroth AG.

### 2.3 Improper use

Any use deviating from the intended use is improper and thus inadmissible. The installation or use of inappropriate products in safety-relevant applications could result in unintended operating states when being used which in turn could cause personal injuries and/or damage to property. Therefore, only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product, e.g. in explosion-protected areas or in safety-related parts of control systems (functional safety).

Improper use of the product includes:

- Faulty assembly
- Incorrect transport
- Lack of cleanliness during storage and assembly
- Incorrect installation
- Use of inappropriate/non-admissible hydraulic fluids
- Non-compliance with the specified performance limits

Changes and/or modifications to the valve are not admissible, refer to chapter 13 "Extension and modification".

Bosch Rexroth AG does not assume any liability for damage caused by improper use. The user assumes all risks involved with improper use.

## 2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics, electrics, hydraulics, pneumatics as well as knowledge of the appropriate technical terms. For transporting and handling the product, additional knowledge of how to handle lifting gear and the necessary attachment devices is required. In order to ensure safe use, these activities may only be carried out by an expert in the respective field or an instructed person under the direction and supervision of an expert.

Experts are those who are able to recognize potential dangers and apply the appropriate safety measures due to their professional training, knowledge and experience, as well as their understanding of the relevant conditions pertaining to the work to be undertaken. An expert must observe the relevant specific professional rules and have the necessary expert knowledge.

For example, for hydraulic products, the term expert knowledge refers to the following:

- Reading and completely understanding hydraulic schemes,
- In particular, completely understanding the correlations regarding the safety equipment and
- having knowledge of the function and set-up of hydraulic components.

### **Qualification of personnel for the installation and commissioning of valves in explosion-proof areas**

Personnel shall be qualified as follows to the extent necessary to fulfill their tasks:

- Understanding of the general principles of explosion protection, protection classes and device labeling
- Understanding of the corresponding aspects affecting the protection concept
- Understanding of the contents of certificates and relevant parts of this standard
- General understanding of the test, maintenance and repair requirements from IEC 60079-17
- Familiarity with the specific methods to be used for selection and construction of devices referenced in this standard
- Understanding of the additional importance of work permit systems and safe electrical separation regarding explosion protection.



Bosch Rexroth offers measures supporting training in specific fields. Please find an overview of the training contents on the Internet at:

<http://www.boschrexroth.de/didactic>

## 2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country in which the product is used/applied.
- Only use Bosch Rexroth products in a technically perfect condition.
- Observe all notes on the product.
- Persons assembling, operating, disassembling or maintaining Bosch Rexroth products must not be under the influence of alcohol, other drugs or medications influencing the ability to react.
- Only use original Bosch Rexroth accessories and spare parts in order to prevent any hazard to persons due to unsuitable spare parts.
- Comply with the technical data and environmental conditions specified in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating states when being used which in turn could cause personal injuries and/or damage to property. Therefore, only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product, e.g. in explosion protection zones or in safety-related parts of control systems (functional safety).
- Do not commission the product until you can be sure that the end product (for example a machine or system) where the Bosch Rexroth products are installed complies with the country-specific provisions, safety regulations and standards of the application.

## 2.6 Product-specific safety instructions

The following safety instructions apply to chapters 6 to 14.

### **WARNING**

#### **Explosion hazard due to ignitable atmosphere during all work on the valve!**

During all work on the valve (assembly, disassembly etc.), an explosive atmosphere must be avoided! Otherwise, an ignition may be triggered which may lead to an explosion.

- ▶ Before working with the valve, ensure that no explosive atmosphere can occur during the work.

#### **Easily inflammable liquid!**

In connection with an explosive atmosphere or other heat sources, the use of fluids (e.g. hydraulic fluids, coolants etc.) may lead to explosions.

- ▶ Only use the valve in the intended explosion protection area.
- ▶ The ignition temperature of the liquid used must be 50 K higher than the maximum surface temperature.

#### **Exceeding the maximum temperatures!**

The use of the valve outside the approved temperature ranges may lead to functional failures. Explosion protection is therefore no longer ensured.

- ▶ Only use the valve within the intended environmental and hydraulic fluid temperature range.

#### **Hot surface at the valve!**

Risk of burning!

- ▶ Provide for a suitable touch guard.
- ▶ During operation, only touch the valve using heat-protective gloves. Allow the valve to cool down to room temperature before touching it directly with your hands during maintenance work.

#### **Pressurized system parts and leaking hydraulic fluid!**

When working at hydraulic systems with stored energy (accumulator or cylinders working under gravity), valves may even be pressurized after switching off the pressure supply. During assembly and disassembly works, the valve or parts may be ejected and cause personal injury and/or damage to property. Furthermore, there is the danger of severe injury caused by a powerful leaking hydraulic fluid jet.

- ▶ Before working at the valve, ensure that the system is depressurized.
- ▶ Completely unload the pressure at machines and systems before working at the valve.

## WARNING

### **Non-compliance with functional safety!**

The valve controls movements in machines or systems. In case of mechanical and electric faults, e.g. failure of the energy supply, persons may be caught by the system, kicked away or bruised.

- ▶ During set-up of your circuit, observe functional safety e.g. according to EN ISO 13849.

## CAUTION

### **Contaminated hydraulic fluid!**

Contamination in the hydraulic fluid may cause functional failures e.g. jamming or blocking of nozzles of the valve. In the worst case, this may result in unexpected system movements and thus constitute a risk of injury for persons.

- ▶ Ensure an adequate hydraulic fluid cleanliness according to the details in the data sheet over the entire operating range.

### **Leakage in case of incorrect working temperatures!**

Use of the valve outside the approved temperature range may lead to permanent leakage at the valves. Thus, hydraulic fluid in the form of a leaking hydraulic fluid jet may injure persons, lead to damage to property and endanger the environment.

- ▶ Only use the valve within the intended environmental and hydraulic fluid temperature range.
- ▶ In case of leakage, immediately exchange damaged seal rings or the valve.

### **Corrosion!**

The valve described has surface protection (see "Data sheet 22282-XC"). Use of the valve in humid environments still holds the danger of corrosion on the valve and on the valve mounting screws and thus a reduction of the preload force of the screw connection. To prevent the valve from becoming loose and causing a risk of injury:

- ▶ Exchange the valves with corrosion damages as soon as possible.
- ▶ Regularly check the surface protection on the valve and the valve mounting screws.



Contact with salt water leads to increased corrosion on the valve. This can lead to chemical corrosion of individual valve components. So take suitable corrosion protection measures.

## 2.7 Notices on the valve use

- ▶ The valve must always be filled with hydraulic fluid.
- ▶ To ensure proper functioning, the valve must be vented.
- ▶ Pressure peaks in the joint return line of more than one valve may cause unintended spool movements and thus unintended switching processes. This particularly holds true when valves with detent are used. It is recommended to use separate return lines.
- ▶ If due to the operating conditions to be expected during the switching processes, flows have to be anticipated that exceed the performance limits of the valve that can be seen from the characteristic curve, a throttle insert must be used in channel P for flow limitation.
- ▶ With valves with the switching symbol A and B (see "*Data sheet 22282-XC*"), port T must be used as leakage oil connection if the operating pressure exceeds the admissible tank pressure.
- ▶ The tank has to be preloaded to at least 2 bar.

## 2.8 Personal protective equipment

The machine end-user must provide the personal protective equipment (such as gloves, working shoes, safety goggles, working clothes, etc...).

## 2.9 Obligations of the machine end-user

The machine end-user is obligated to check in the order confirmation whether the delivered valve corresponds to the required category and associated zone or equipment protection level .

The machine end-user of the Bosch Rexroth valve is responsible that

- the valve is only being used according to the intended use as defined in these operating instructions.
- the valve is only stored, operated and maintained according to the technical data, operating and environmental conditions indicated in "*Data sheet 22282-XC*", in particular that the limit values indicated in "*Data sheet 22282-XC*" are not exceeded.
- the applicable provisions, rules and directives on explosion protection are being complied with.
- the operating personnel are instructed at regular intervals.
- a danger zone is marked, if required.
- the safety measures for their specific area of application of the valve are complied with.

### 3 General information on damage to property and damage to product

The warranty only applies to the delivered configuration.

- The claim to warranty expires if the product is incorrectly assembled, commissioned and operated, not used as intended and/or handled improperly.
- The following safety instructions apply to chapters 6 to 14.

#### **NOTICE**

##### **Inadmissible mechanical load!**

Impact or shock forces on the valve may damage or even destroy it.

- ▶ Never use the valve as handle or step. Do not place/put any objects on top of it.

##### **Dirt and foreign particles in the valve!**

Penetrating dirt and foreign particles in the valve lead to wear and malfunctions. The safe function of the valve can no longer be ensured.

- ▶ During installation, ensure utmost cleanliness in order to prevent foreign particles, such as welding beads or metal chips, from getting into the hydraulic lines.
- ▶ Before commissioning, ensure that all hydraulic connections are tight and that all seals are correctly installed and undamaged.
- ▶ Do not use linting fabric for cleaning.
- ▶ Ensure that no cleaning agents are able to penetrate the hydraulic system.

##### **Environmentally harmful hydraulic fluid**

Leaking hydraulic fluid leads to environmental pollution.

- ▶ Immediately remedy possible leakage.
- ▶ Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country.



## 4 Scope of delivery

The scope of delivery includes:

- Directional spool valve, direct operated, with fluidic actuation  
Type WP6..6X/...XC... or WH6..5X/...XC...
  - Product documentation (operating instructions with declaration of conformity and data sheet)
- Check the scope of delivery for completeness.
- Check the scope of delivery for possible transport damage, see chapter 6 "Transport and storage".



In case of complaints, please contact Bosch Rexroth AG, see chapter 16.1 "List of addresses".

Accessories such as valve mounting screws are not included in the scope of delivery and must be ordered separately. See chapter 7.6 "Required accessories".

## 5 Product information



For information on the performance and product description please refer to "Data sheet 22282-XC" of your valve.

5.1 Product identification

5.1.1 Information on the name plate

The meaning of the information on the name plate can be read in the correspondingly numbered fields of the following table.

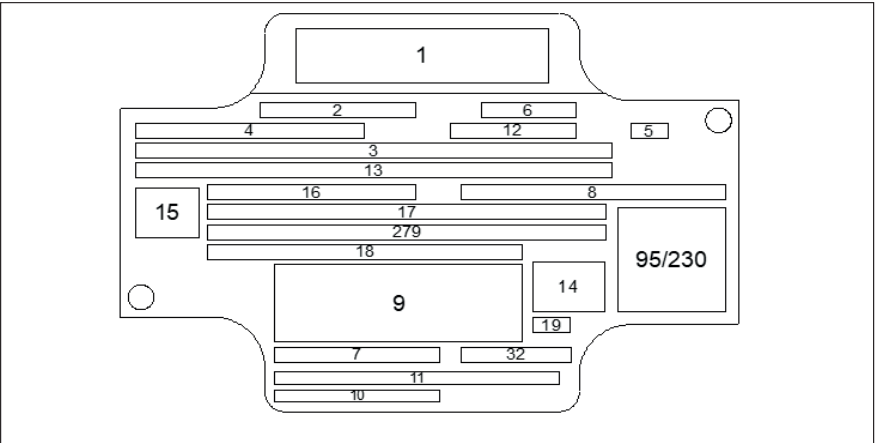


Fig. 1: Name plate

Table 5: Information on the name plate

No.	Type of information
1	Manufacturer's logo
2	Material no. of the valve
3	Type designation complete valve
4	Serial number of the valve
5	Manufacturer's factory number
6	Date of manufacture (year and week)
7	Maximum operating pressure
8	Ambient temperature range
9	Hydraulic symbol according to ISO 1219
10	Designation of origin
11	Name and address of the manufacturer
12	Customer's or production order number
13	Customer material number or additional information
14	CE mark
15	Explosion protection mark
16	Mark - according to ATEX directive 2014/34/EU - for the type of protection of the mechanical part according to EN 80079-38
17	Other mark - according to ATEX directive 2014/34/EU - for the type of protection of the mechanical part according to EN 80079-36
230	Bosch Rexroth QR code
279	Other mark - according to ATEX directive 2014/34/EU - for the type of protection of the mechanical part according to EN 80079-36

## 5.1.2 Explosion protection marking

### Zones, device groups and categories

The user/machine end-user has to classify potentially explosive areas according to EU directive 1999/92/EC into zones. In the following table, the corresponding zones for device groups and categories are shown. The valve may only be used in the areas and zones which correspond to the device group and category. During use, also observe the other information on explosion protection in "Data sheet 22282-XC".

**Table 6: Device groups and categories**

Device group according to 2014/34/EU	Category according to 2014/34/EU	Area of application, properties (excerpt from the directives)	Usable in zone according to 1999/92/EC
I	M1	Firedamp areas (= device group I), i.e. underground parts of mines and their overground systems. In case of an explosive atmosphere, further operation is possible. Very high safety level.	-
I	M2	Firedamp areas (= device group I), i.e. underground parts of mines and their overground systems. In case of an explosive atmosphere, it must be possible to deactivate the device. High safety level.	-
II	1G	Potentially explosive atmospheres in which explosive gases, mists or vapors (= device group II) occur permanently or for a long time or frequently. Corresponds to zone 0 according to directive 1999/92/EC. Very high safety level.	0, 1, 2
II	2G	Potentially explosive areas where explosive gases, mists or vapors (= device group II) are occasionally present. Corresponds to zone 1 according to directive 1999/92/EC. High safety level.	1, 2
II	3G	Potentially explosive atmospheres in which explosive gases, mists or vapors (= device group II) do not normally occur or only rarely or for a short time. Corresponds to zone 2 according to directive 1999/92/EC. Normal safety level.	2
II	1D	Potentially explosive areas where explosive dust/air mixtures (= device group II) are continually, long-term or often present. Corresponds to zone 20 according to directive 1999/92/EC. Very high safety level.	20, 21, 22
II	2D	Potentially explosive areas where explosive dust/air mixtures (= device group II) are occasionally present. Corresponds to zone 21 according to directive 1999/92/EC. High safety level.	21, 22
II	3D	Potentially explosive areas where an explosive atmosphere due to stirred dust (= device group II) is normally not present or occurs only rarely or short-time. Corresponds to zone 22 according to directive 1999/92/EC. Normal safety level.	22

## 6 Transport and storage

### 6.1 Valve transport



#### CAUTION

##### **Danger of damage to property and personal injuries!**

With improper transport, the valve can fall and lead to damages and/or injuries since the parts are e.g. sharp-edged, oily, instable, loose or bulky.

- ▶ Use the original packaging for transport.
- ▶ Use personal protective equipment (such as gloves, working shoes, safety goggles, working clothes, etc.).
- ▶ Comply with the national laws and regulations regarding occupational health and safety and transport.
- ▶ Do not transport the valve using components with little stability.

##### **Sharp edges!**

Danger of cut injuries!

- ▶ Wear suitable protective equipment for the transport of the valve.



Further information regarding transport is available from Bosch Rexroth, see chapter 16.1 "List of addresses".



Notify your responsible sales contact person any transport damage within one week. The addresses of the sales subsidiaries can be found on the Internet at:  
<http://www.boschrexroth.com/adressen>

### 6.2 Storing the hydraulic valve

Valves are delivered in a perfect state.



For transporting and storing the product, always observe the environmental conditions specified in "Data sheet 22282-XC". Improper storage may damage the valve.

Valves can be stored for up to 12 months under the following conditions:

- ▶ Comply with a storage temperature range as specified in "Data sheet 22282-XC".
- ▶ The relative air humidity must not exceed 65%.
- ▶ The storage rooms must provide 100% UV protection.
- ▶ No ozone formation may occur near the storage facility.
- ▶ The storage facilities must be free from etching substances and gases.
- ▶ Do not store the valve outdoors but in a well-ventilated room.
- ▶ Protect the valve against humidity, particularly ground humidity. Store the valve on a shelf or on a pallet.
- ▶ Store the valve protected against impacts and sliding and do not stack it.
- ▶ Store the valve in the original packaging or comparable packaging in order to protect it from dust and dirt.
- ▶ All connections at the valve must be closed with cap elements.
- ▶ After opening the transport packaging, it must be closed properly again for storage. Use the original packaging for storage.

**Procedure after expiry of  
the maximum storage time  
of 12 months**



1. Check the complete valve for damages and corrosion prior to installation.
2. In a test run, check the valve for correct function and leak-tightness.

After expiry of the maximum storage time, we recommend having the valve checked by your competent Bosch Rexroth service. In case of questions regarding spare parts, please contact the Bosch Rexroth service responsible for your valve, see chapter 10.6 "Spare parts".

**Following disassembly**

If a dismantled valve is to be stored, it has to be preserved for protection against corrosion for the duration of storage.

Bosch Rexroth recommends the following procedure:

1. Clean the valve; refer to chapter 10.1 "Cleaning and care".
  2. Close all connections so that they are airtight.
  3. Pack the valve with a desiccant air-tightly in corrosion protection film.
  4. Store the valve protected against shocks.
- ▶ In each case, please observe any applicable provisions and laws regarding the handling of substances hazardous to water or to health.

## 7 Assembly

### CAUTION

#### High pressure!

Risk of injury due to parts shooting out during works at hydraulic accumulators which have not been unloaded.

- ▶ Only work on the valve after the system has been depressurized.
- ▶ Unload accumulators which may have been mounted at the system.
- ▶ Check the system with test pressure according to ISO 4413.
- ▶ Assembly and commissioning may only be carried out by specialists.

### 7.1 Unpacking

### CAUTION

#### Falling parts!

Risk of injury! If the packaging is opened improperly, parts may fall out and cause injuries or damage of the parts.

- ▶ Put the packaging on level, bearing ground.
- ▶ Only open the packaging from the top.
- ▶ Dispose of the packaging in accordance with the national regulations of your country.

### 7.2 Changes to the surface protection of the valve

### WARNING

#### Explosion hazard due to modifications to the valve!

In the event of changes to the surface protection of the valve, the following must be observed:

- ▶ The valve housing may only be painted according to the provisions of EN 80079-36, section 6.7; otherwise, explosion protection can no longer be ensured.

### 7.3 Installation conditions

- ▶ For installing the product always observe the environmental conditions specified in "Data sheet 22282-XC".
- ▶ It is imperative to provide for absolute cleanliness. The valve must be protected from dirt during installation. Contamination of the hydraulic fluid may considerably reduce the life cycle of the valve.
- ▶ Observe the installation position specified in "Data sheet 22282-XC".

## 7.4 Prior to assembly

### WARNING

#### Explosion hazard due to wrong area of application!

A valve which is not approved for the area of application may cause an explosion!

- ▶ Check whether all the explosion protection marks on the name plate of the valve comply with the information in these operating instructions.
- ▶ Please check if you have the right valve type by means of the type designation on the name plate of the valve.
- ▶ Make sure that the zone and the temperature class correspond to the area of application of the valve.

- ▶ Check the scope of delivery for completeness and possible transport damage.
- ▶ Also observe the safety instructions in chapter 2.6 "Product-specific safety instructions".
- ▶ Transport protection elements (e.g. cover plates, protective plugs) must be removed prior to use in an explosive atmosphere.

## 7.5 Required tools

In order to assemble the valve, you need standard tools only.

## 7.6 Required accessories

The following accessories are recommended for the connection of the valve. These accessories are not included in the scope of delivery and can be ordered separately from Bosch Rexroth:

Table 7: Valve mounting screws

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
Hexagon socket head cap screw ISO 4762-M5×50-10.9 (protected against corrosion)	4	0.09...0.14	R913043758

### Subplates



Subplates with dimensions for valves with porting pattern according to ISO 4401 are listed in the "Data sheet 45100".

### Ordering address for accessories and valves

The address of our responsible sales organizations can be found on the Internet on [www.boschrexroth.com](http://www.boschrexroth.com) and in appendix 16.1 "List of addresses".

## 7.7 Assembling the valve

### 7.7.1 Installing the valve in the system



#### WARNING

##### Faulty assembly!

Faulty assembly may cause explosion!

- ▶ With valve type **WP6..6X/...XC**, the pneumatic bleed port must be connected and routed out of the explosive atmosphere!
- ▶ With valve type **WP6..6X/...XC...**, the pneumatic bleed port for the valve control must only be connected to a pressure supply with compressed air according to ISO 8573:2010 (7:4:4). For the generation of the compressed air, no air from the explosive area must be used.

##### Faulty installation of plug screws and lines!

Improperly fastened plug screws and lines may become loose during subsequent operation and may be ejected due to the pressure. This may cause severe injuries!

- ▶ Only pressurize your system after all plug screws and lines have been completely and properly mounted according to the specification.

##### Faulty mounting!

Mounting of the valve with valve mounting screws of reduced stability, insufficient mounting or fastening at blocks and plates with insufficient stability may lead to the valve becoming loose and falling down. Consequently, hydraulic fluid may leak and lead to personal injuries and/or damage to property. Particular caution applies to valves with suspended installation.

- ▶ Completely assemble the valve according to the assembly specifications by means of suitable assembly aids.
- ▶ Only assemble the valve at blocks or plates suitable for the weight of the valve.
- ▶ Observe the tightening torques, screw stability and the minimum length of the valve mounting screws.

##### Explosion hazard due to missing equipotential bonding!

Electrostatic processes or a missing equipotential bonding may lead to an explosion. Apart from this, malfunctions or uncontrolled movements at the machine may be caused.

- ▶ Provide for correct grounding and provide for proper equipotential bonding.
- ▶ The base plate or subplate on which the valve is fitted must be electrically conductive and included in the equipotential bonding according to EN 60079-14 and IEC 60364-4-41.



## CAUTION

### **Insufficient installation space!**

Insufficient installation space may lead to jamming or abrasions in case of actuation and adjustment work at the valve.

- ▶ Provide for sufficient installation space.
- ▶ Ensure that actuation and adjustment elements are easily accessible.

### **Leaking hydraulic fluid!**

Hydraulic fluid may leak during assembly and disassembly of the valve. This might cause persons to slip or fall.

- ▶ Do not remove the protective caps of the valve until assembly.
- ▶ After disassembly, seal the hydraulic fluid bores with suitable cap elements.
- ▶ Immediately remove hydraulic fluid that has leaked out.

## NOTICE

### **Wear, tear and malfunctions!**

The cleanliness of the hydraulic fluid has a considerable impact on the cleanliness and life cycle of the valve. Any contamination of the hydraulic fluid will result in wear and malfunctions. Particularly foreign particles may damage the valve.

- ▶ Always ensure absolute cleanliness.
- ▶ Install the valve in clean condition.
- ▶ Make sure that all connections, hydraulic lines and attachment parts are clean.
- ▶ Ensure that no cleaning agents are able to penetrate the hydraulic system.
- ▶ Only use seal kits as listed in chapter 10.6 "Spare parts".

1. Before any assembly and disassembly work starts, the environment must be cleaned so that no dirt can get into the oil circuit. Only fiber-free cloth or special paper may be used for cleaning.
2. Remove existing preservative agent.
3. Check the valve contact surface for the required surface quality (see "Data sheet 22282-XC"). Remove the protective plate from the valve and keep it safe for returns in case any repairs become necessary later.
4. Dry the valve connection surface using suitable cleaning materials.
5. Check the seal rings at the valve connection surface for completeness. Other sealants are not admissible.
6. Check whether the pressure connecting line is connected with P and the return line with T at the subplate.



Exchanging P and T may cause damage at the valve in case of pressurization.

7. Place the valve on the contact surface.



Only use valve mounting screws with the thread diameters, screw lengths and strength properties listed in chapter 7.6 "Required accessories".

Always fasten the valve with all 4 valve mounting screws as otherwise, leak-tightness is not guaranteed.

8. When using the subplates mentioned under 7.6 "Required accessories" or in case of assembly on comparable cast iron installation surfaces, tighten all four valve mounting screws with a tightening torque of  $7 \text{ Nm} \pm 0.7 \text{ Nm}$  (with a friction coefficient of  $\mu_{\text{total}} = 0.09 \dots 0.14$ ). This tightening torque refers to the maximum admissible operating pressure.



If the valve is to be used at a reduced maximum pressure and in this connection is to be mounted on connection surfaces of a different material, it might be necessary to use a lower tightening torque in order to exclude any damage.

## 7.7.2 Hydraulically and pneumatically connecting the valve



### CAUTION

#### Damage to the valve!

During operation, hydraulic lines and/or pneumatic lines installed under mechanical stress create additional mechanical forces, which reduce the life cycle of the valve and the complete machine or system.

- Assemble lines without stress.

1. Depressurize the relevant system part.
2. Establish all connections observing the operating instructions of the system.
3. Make sure that pipes and/or hoses are connected to all ports and/or that the ports are closed with plug screws.
4. Carry out a special check to make sure that the cap nuts and flanges are correctly tightened at the pipe fittings and flanges.



Mark all checked fittings, e.g. using a permanent marker.

5. Make sure that all pipes and hose lines and every combination of connection pieces, couplings or connection points with hoses or pipes are checked for their operational safety by a person with appropriate knowledge and experience.

## 8 Commissioning

### WARNING

#### Faulty assembly!

If the valve is not correctly mounted, persons might be injured and the valve or system could be damaged when commissioning the valve.

- ▶ Only commission your system after all hydraulic and/or pneumatic connections and the valve have been completely and properly mounted according to the specifications.
- ▶ Look out for defective sealing points and exchange defective seal rings immediately.
- ▶ Wear personal protective equipment during the initial commissioning.

#### Inadmissibly high operating pressure!

In hydraulic applications with different area ratios, the hydraulic pressure is fortified and may - in case of incorrect design - lead to exceedance of the maximum admissible operating pressure. Thus, valves may burst, or the cap elements may be ejected and cause personal injury.

- ▶ Before commissioning the hydraulic system, ensure that the maximum admissible pressure of the valve in the system is not exceeded by any means.
- ▶ Ensure that in your system, the maximum admissible operating pressure is secured by means of a pressure relief valve.

#### Damage to persons and property!

Commissioning of the valve requires basic hydraulic and electrical knowledge.

- ▶ Only qualified personnel (see chapter 2.4 "Qualification of personnel") is authorized to commission the valve.

#### Bleeding the hydraulic system



Proceed as described in the following sections to commission the valve:

Observe the operating instructions of the device and/or system into which the valve is installed.

- ▶ Before the actual operation, switch the valve several times with reduced pressure (50% operating pressure). This will press out any remaining air from the valve. Thus, mechanical damage being caused by inadmissibly high acceleration of the fluid and the valve control spool is avoided and the life cycle of the valve is extended.



Do not switch the valve under operating pressure as this may cause damage.

- ▶ You can also achieve the switching movement of the valve control spool necessary for the bleeding procedure by manual actuation of the manual override, see chapter 9.2 "Operating the manual override (only relevant for type WP6...NXC)".

## Performing a leak test

- ▶ Ensure that no hydraulic fluid leaks at the valve and the connections during operation.
- ▶ Check whether there is an internal leakage. The check must be carried out according to the possibilities present at the hydraulic system.



An internal leakage can be valve-specific but does not necessarily affect the functionality of the valve.

## 9 Operation

### 9.1 General information



### WARNING

#### Explosion hazard caused by overheating!

Loss of explosion protection due to overheating.

- ▶ If the maximum ambient and fluid temperature are adhered to, the surface temperature is 100 °C / temperature class T4.
- ▶ With an ambient and fluid temperature of 60 °C, the use in temperature class T6 (max. surface temperature 80 °C) is possible.

#### Explosion hazard caused by dust accumulations!

If the maximum dust layer thickness is exceeded, there is an explosion hazard!

- ▶ Ensure that according to DIN EN 60079-14 the maximum dust layer thickness is not exceeded.
- ▶ Regularly remove dust accumulations, if required.



### CAUTION

#### Loud noise!

An unfavorable arrangement of valves results in resonance or fluid noises, such as whistling. In continuous operation, these noises may cause hearing damage in persons or damage at the valves.

- ▶ In this case, contact a service engineer.

- ▶ Only use the valve within the performance range provided in "Data sheet 22282-XC". The machine and/or system manufacturer is responsible for the correct project planning of the hydraulic system and its control.
- ▶ Changing the settings at the valve is not admissible.



For information on the operation, please refer to the operating instructions for the hydraulic system into which the valve is installed.

If errors occur, refer to chapter 14 "Troubleshooting and fault correction".

## 9.2 Operating the manual override (only relevant for type WP6...NXC)

### **NOTICE**

#### **Danger of damage to property!**

An uncontrolled operation of the manual override bears the danger of damaging the system!

- ▶ Only operate the manual override if it is ensured that this will not trigger any dangerous working movement of the connected actuator.
- ▶ Only operate the manual override when the pressure in the tank channel does not exceed 50 bar. Above this pressure value, the actuating force to be applied is too large.
- ▶ Do not use sharp-edged tools to operate the manual override.

Valve types **WP6...NXC** are equipped with a manual override. Using this manual override, the switching function of the valve can also be triggered if there is no actuation pressure.

The manual override is only intended for manual operation. It is not suitable for frequently recurring manual operation.

The manual override is located at the front side of the valve cover.

- ▶ To actuate the manual override, push it in the direction of the valve housing using a rounded tool with a maximum diameter of 5 mm.

## 10 Maintenance and repair

### 10.1 Cleaning and care

#### NOTICE

##### **Penetrating dirt and fluids will cause faults!**

When dirt and fluids penetrate, safe function is no longer ensured.

- ▶ Always ensure absolute cleanliness when working at the valve.

##### **Solvents and aggressive, highly inflammable cleaning agents!**

Aggressive cleaning agents may damage the seals and the surface of the valve and let them age faster.

- ▶ Never use solvents or aggressive or highly inflammable cleaning agents.

##### **Damage to the hydraulic system and seals!**

A high-pressure washer's water pressure could damage the hydraulic system and the seals of the valve. The water displaces the oil from the hydraulic system and seals.

- ▶ Do not use high-pressure washers for cleaning.

For cleaning and care of the valve, please observe the following:

- ▶ Close all openings with appropriate protective caps/devices.
- ▶ Ensure that all seals are firmly attached so that no humidity can penetrate the valve during cleaning.
- ▶ Remove external dirt and keep sensitive and important parts clean.
- ▶ Remove dust and dirt accumulations on the valve at regular intervals.

### 10.2 Inspection and maintenance



#### WARNING

##### **Uncontrolled machine movements!**

Risk of injury due to maintenance work at an activated machine.

- ▶ Unless expressly prescribed otherwise, deactivate the machine via the main switch, lock it and remove the key before carrying out any work.

The following inspection, testing and maintenance work is to be carried out regularly. The intervals for the same have to be selected in a way that - also dependent on the operating conditions - expected deficiencies are identified in good time. The check must, however, at least be carried out every **three years from the date of manufacture of the valve**. The date of manufacture of the valve can be found on the name plate, see chapter 5.1.1 "Information on the name plate".



Before the initial commissioning or re-commissioning of the valve in a system, check whether the valve requires maintenance. If required, carry out maintenance.

For order details for seal kits, please refer to chapter 10.6 "Spare parts".

In order to ensure a long life cycle and functionality, include the following activities in your maintenance schedule for the overall system:

1. De-energize and de-pressurize the relevant system part.
2. Remove coarse dirt from the exterior.
3. Check all external fittings for completeness and firm seat.
4. Check the valve for external leakage; replace the sealing devices, if required (see chapter 10.5 "Rectifying external leakages").

### 10.3 Maintenance schedule

Valves require low maintenance if used as intended.

For a long and reliable operation of the valve, Bosch Rexroth recommends regularly checking the hydraulic system and the valve.

#### 10.3.1 Checking for leakage

Check the valve for leakage. An early detection of hydraulic fluid and/or compressed air loss may help you to identify and remedy errors. Bosch Rexroth therefore recommends that you keep the valve and/or the system permanently clean.

#### 10.3.2 Checking for noise development

Check the valve for noise development. Based on noise development or the increase of noise development, a possible failure of one or several components can be recognized in time and consequential damage can be avoided.

#### 10.3.3 Checking the mounting elements

Check that the mounting elements are attached firmly. All mounting elements are to be checked when the system is switched off, depressurized and has cooled down.

## 10.4 Repair



### WARNING

#### Explosion hazard caused by improper repair!

Improper repair will void the explosion protection!

- ▶ For repair works, the valve may only be disassembled to the extent described in these operating instructions.
- ▶ Defective parts may only be replaced by new, interchangeable components in original equipment quality.

## 10.5 Rectifying external leakages

External leakage at the valve connection surface can be rectified on site. Other leakages have to be rectified by specialists of the manufacturer.

### 10.5.1 Rectifying leakage at the valve connection surface

1. Remove the valve, see chapter 11 "Disassembly and removal".
2. Inspect the contact surfaces for seal rings at the valve for cleanliness and damage.
3. Inspect the seal rings and recesses on the connection flanges for cleanliness and damage.
4. Dry the mounting surface and the contact surface using suitable cleaning materials.
5. Assemble the new seals.
6. Re-assemble the valve at the contact surface, see chapter 7 "Assembly".

## 10.6 Spare parts

### Seal kits for the valve connection surface

Table 8: Spare part: seal kit for the valve connection surface

Spare part	Material number
FKM seal kit for the valve connection surface	R961000838
NBR seal kit for the valve connection surface	R961000837

### Valve mounting screws

Table 9: Valve mounting screws

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
Hexagon socket head cap screw ISO 4762-M5×50-10.9 (protected against corrosion)	4	0.09...0.14	R913043758



In case of questions about spare parts, please contact your responsible

Bosch Rexroth Service:

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Service Hydraulics

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97816 Lohr am Main

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service@boschrexroth.de

For the addresses of our sales and service network please refer to:

[www.boschrexroth.com/adressen](http://www.boschrexroth.com/adressen)

## 11 Disassembly and removal

### **WARNING**

**Danger of damage to property and personal injuries at energized or pressurized system parts!**

For works at pressurized or energized system parts, there is a danger of injury by escaping hydraulic fluid or electric energy.

- Before disassembly, ensure that the system is depressurized, and the electrical control is de-energized.

### **CAUTION**

**Falling of an incompletely disassembled valve!**

An incompletely disassembled valve may fall down and cause injuries.

- During disassembly, secure the valve against falling.

Have sufficiently dimensioned collecting containers, sufficient cleaning cloths and medium-binding materials ready in order to collect or bind leaking hydraulic fluid.

1. De-energize and de-pressurize the relevant system part.
2. Prepare a container for collecting leaking hydraulic fluid.
3. Use suitable tools to loosen the valve mounting screws of the valve.
4. Remove the valve mounting screws and remove the valve from the mounting surface.
5. Collect escaping hydraulic fluid in the provided container and dispose of it properly.
6. If the valve is to be returned to the manufacturer for repair, close the valve connection surface using the protective plate supplied or protect it using equivalent packaging in order to avoid contamination and damage.
7. Close the hydraulic channels of the subplate (on the customer side) to avoid contamination.

If the valve is exchanged, all further steps are analogous to mounting, see chapter 7 "Assembly".

## 12 Disposal

### 12.1 Environmental protection

Careless disposal of the valve and the hydraulic fluid could lead to environmental pollution.

- ▶ Thus, dispose of the product and the hydraulic fluid in accordance with the currently applicable national regulations in your country.
- ▶ Dispose of hydraulic fluid residues according to the applicable safety data sheets for these hydraulic fluids.
- ▶ Please observe the following information for the environmentally-friendly disposal of the valve.

### 12.2 Return to Bosch Rexroth AG

The hydraulic products manufactured by us can be returned to us for disposal purposes at no costs. There must be no inappropriate foreign substances or third-party components when products are returned. Valves must be drained before being returned. The components have to be delivered free to the following address:

Bosch Rexroth AG  
Service Industriehydraulik [Industrial Hydraulics Service]  
Bürgermeister-Dr.-Nebel-Straße 8  
97816 Lohr am Main  
Germany

### 12.3 Packaging

Upon request, reusable systems can be used for regular deliveries.

The materials for disposable packaging are mostly cardboard, wood, and expanded polystyrene. They can be recycled without any problems. For environmental reasons, disposable packaging should not be used for returning products to Bosch Rexroth.

## 12.4 Materials used

Hydraulic components from Bosch Rexroth do not contain any hazardous materials that could be released during intended use. Normally, no unfavorable effects on human beings and on the environment have to be expected.

The valves basically comprise of:

- Cast iron
- Steel
- Aluminum
- Copper
- Plastics
- Electronics components and assemblies
- Elastomers

## 12.5 Recycling

Due to the high metal content, hydraulic products can mostly be recycled. In order to achieve an ideal metal recovery, disassembly into individual assemblies is required. The metals contained in electric and electronic assemblies can be recovered by means of special separation procedures as well.

# 13 Extension and modification

## WARNING

### Explosion hazard caused by unauthorized modification!

Every non-permitted modification will void the explosion protection.

- Modifications exceeding the extent described in these operating instructions are not permitted.

## 14 Troubleshooting and fault correction

### 14.1 How to proceed for troubleshooting

- ▶ Always work systematically and purposefully, even when under time pressure.  
In the worst case, random, thoughtless disassembly and changing settings might result in the inability to identify the original cause of error.
- ▶ First, get an overview of the functions of the valve in conjunction with the overall system.
- ▶ Try to find out whether the valve has worked properly in conjunction with the overall system before the error occurred.
- ▶ Try to determine any changes to the overall system in which the valve is integrated:
  - Were there any changes to the application conditions or area of application of the valve?
  - Have changes (e.g. refitting) or repair work been carried out at the overall system (machine/system, electrical systems, control) or at the valve? If so: What were they?
  - Was the valve and/or the machine used as intended?
  - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of error. Ask the direct (machine) operator, if necessary.

**Fault table** The valve is not sensitive to faults as long as the specified application conditions are complied with, in particular the oil quality and the operating temperature.

**Table 10: Fault table**

Error	Possible cause(s)	Remedy
Valve does not react to control	No pressure at P	Check and/or reapply pressure at port P
	Control spool is jammed due to contamination	If possible, try to release the control spool by manually actuating the manual override. See chapter 9.2 "Operating the manual override (only relevant for type WP6...NXC)". In case of failure: Remove valve and replace it with a new one.
External leakage	Seal defective	
	• Seal at the connection surface is defective	Remove the valve and replace the seals
	• Other leakage	Remove valve and replace it with a new one

Following faults due to contamination, in addition to the repair, it is essential to check the oil quality and improve it, if necessary, with suitable measures such as flushing or the additional installation of filters.

## 15 Technical data

For the technical data of your valve please refer to "Data sheet 22282-XC".

## 16 Appendix

### 16.1 List of addresses

#### Contacts for service and spare parts

Bosch Rexroth AG  
Bürgermeister-Dr.-Nebel-Straße 8  
97816 Lohr am Main  
Germany

Phone +49 (0) 9352/40 50 60  
Email [service@boschrexroth.de](mailto:service@boschrexroth.de)

#### Headquarters

Bosch Rexroth AG  
Zum Eisengießer 1  
97816 Lohr am Main  
Germany

Phone +49 (0) 9352/40 30 20  
Email [my.support@boschrexroth.de](mailto:my.support@boschrexroth.de)

The addresses of our sales and service network and sales organizations can be found at [www.boschrexroth.com/adressen](http://www.boschrexroth.com/adressen)

38/40 Declaration of conformity

## 17 Declaration of conformity



### EU-Konformitätserklärung - Original EU declaration of conformity

Dok.-Nr. / Doc. No.: DCTC 31001-025

Datum / Date: 24.07.2019

- ☐ nach Maschinenrichtlinie 2006/42/EG / in accordance with Machinery Directive 2006/42/EC
- ☐ nach Niederspannungsrichtlinie 2014/35/EU / in accordance with Low Voltage Directive 2014/35/EU
- ☐ nach EMV-Richtlinie 2014/30/EU / in accordance with EMC Directive 2014/30/EU
- ☐ nach Druckgeräte-Richtlinie 2014/68/EU / in accordance with Pressure Equipment Directive 2014/68/EU
- ☒ nach ATEX-Richtlinie 2014/34/EU / in accordance with ATEX Directive 2014/34/EU
- ☐ nach RoHS-Richtlinie 2011/65/EU / in accordance with RoHS Directive 2011/65/EU

Hiermit erklärt der Hersteller, / The manufacturer

**Bosch Rexroth AG**  
**Zum Eisengießer 1**  
**97816 Lohr am Main**  
**DEUTSCHLAND**

dass das nachstehende Produkt / hereby declares that the product below

Bezeichnung / Name:

**Wege-Schieberventile, direktgesteuert, mit fluidischer Betätigung /**  
**Directional spool valves, direct operated, with fluidic actuation**

Typ / Type:

**WP6..6X/...XC..., WH6..5X/...XC...**

Kennzeichnung / Marking

**I M2, II 2G, II 2D**

in Übereinstimmung mit oben genannte(n) Richtlinie(n) entwickelt, konstruiert und gefertigt wurde. / was developed, designed and manufactured in compliance with the above-mentioned directive(s).

Die alleinige Verantwortung für die Ausstellung dieser EU-Konformitätserklärung trägt der Hersteller. / This EU declaration of conformity is issued under the sole responsibility of the manufacturer.

Angewandte harmonisierte Normen / Harmonized Standards applied:

Nicht elektrischer Teil / Non-electrical part **EN 80079-36:2016, EN 80079-37:2016, EN 80079-38:2016**

Weitere Erläuterungen / Further explanations:

Die Montage- und Installationshinweise gemäß Produktdokumentation 22282-XC sind zu beachten. / The assembling and installation instructions according to the manual 22282-XC have to be followed.

Lohr am Main  
Ort / Place

24.07.2019  
Datum / Date

i.V.   
Achim Rihartz, DC-IH/EHC  
Entwicklung Industriehydraulische  
Steuerungen  
Engineering Industrial Hydraulic  
Controls

i.V.   
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Technische Werkleitung  
Technical Plant Manager

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.  
We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.

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