rexroth
A Bosch Company

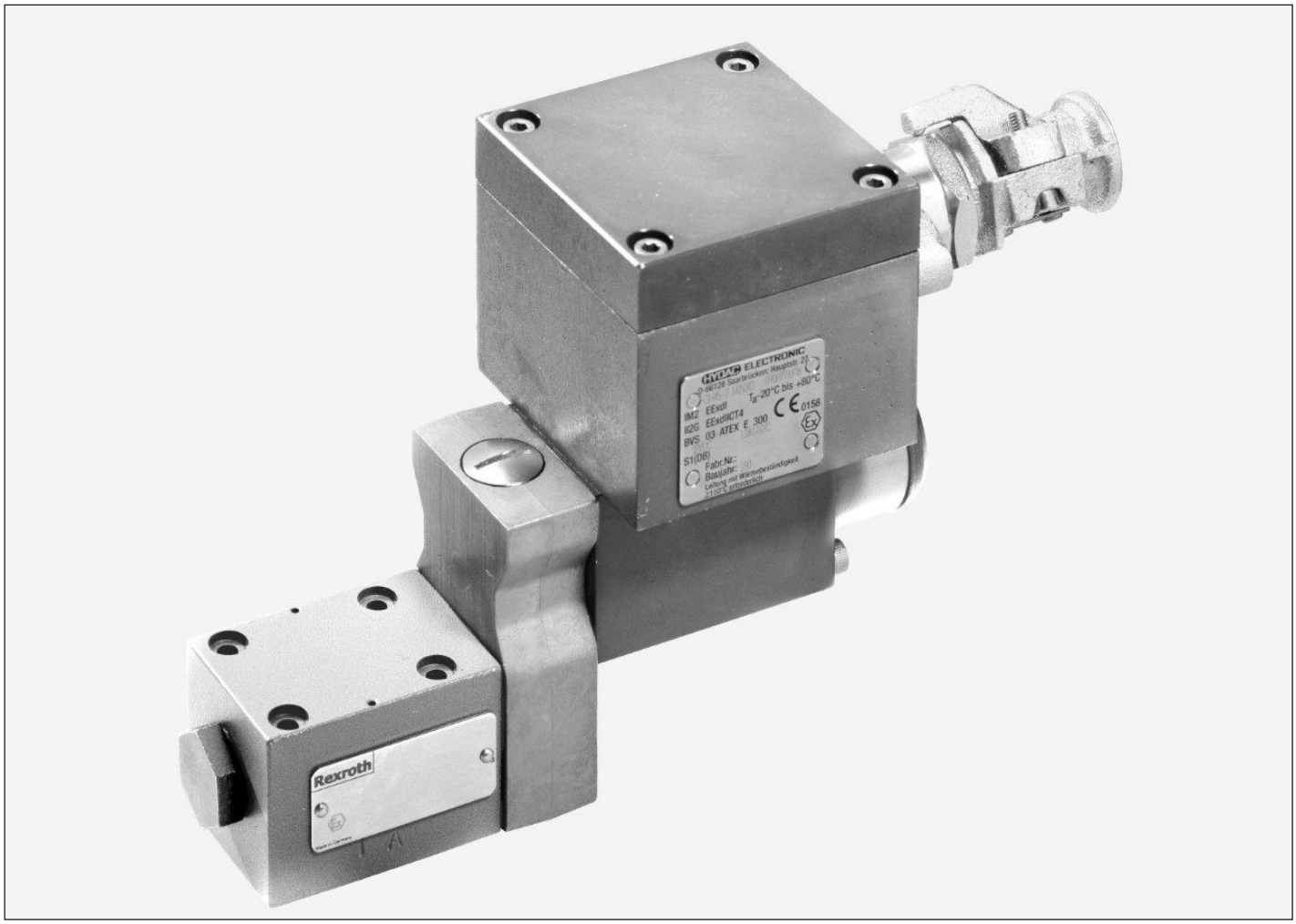
Directional seat valves, direct operated, with solenoid actuation

(Area of application according to ATEX directive 2014/34/EU and technical rules EAC TR CU 012/2011)

Type M-.SE 6 ...XD...

Operating instructions
RE22047-XD-B/02.19

Replaces: 12.17
Mat. No. R901503117
English



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EN: This product may only be commissioned if these operating instructions are available to you in an official EU language that you understand and you have understood the contents. If this is not the case, please contact your Bosch Rexroth contact partner or the responsible service point. You can also find them at www.boschrexroth.com.

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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.

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

The original operating instructions were prepared in German.

Contents

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- M-.SE 6 ...XD...

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.

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 seat valves, direct operated, with solenoid actuation	22047-XD	Data sheet
🕮	General product information on hydraulic products	07008	Data sheet
	Subplates	45100	Data sheet
	EC/EU Declaration of conformity for M-.SE 6 ...XD... according to ATEX directive 2014/34/EU	Document	refer to chapter 17
	Declaration of conformity according to technical rules EAC TR CU 012/2011	Document	refer to 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 measures described for the prevention of dangers must be observed.

Safety instructions are structured as follows:

⚠ SIGNAL WORD

Type and source of danger!
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
- **Avoidance:** specifies how the danger can be prevented

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

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

1.3.2 Symbols

The following symbols indicate notes 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. 2. 3.	Numbered instruction: The numbers indicate that the actions must be carried out one after the other.

1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations

Abbreviation	Meaning
ATEX	EU Explosion Protection Directive *(Atmosphère explosible)*
EN	European Standard
ISO	International Organization for Standardization

Abbreviation	Meaning
IEC	International Electrotechnical Commission
RD	Rexroth document
IP	Ingress protection rating of electric operating equipment
A, B	Hydraulic connections (actuators)
T	Hydraulic connection (tank)
P	Hydraulic connection (pump)
ANSI	American National Standards Institute
EAC	Eurasian Conformity
TR	Technical rules

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 the 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 direct operated directional seat valve with solenoid actuation for intended use in explosive atmospheres.

The product is only intended for professional use and not for private use.
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 and technical rules EAC TR CU 012/2011.
For information about device group, category and temperature class according to ATEX directive 2014/34/EU, refer to *"Data sheet 22047-XD"* under *"Information on explosion protection"* and to the name plates 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 conditions when being used which in turn could cause personal injuries and/or damage to property. Therefore please only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product. For example, in explosion-protected areas or in safety-related control components (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 on 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 and 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.

Expert knowledge means for example for hydraulic products:

- 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 installation and commissioning of valves in an explosion-proof area

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

- Understanding of the general principles of explosion protection, protection classes and device identification
- Understanding of 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 authorization systems and safe electrical isolation with regards to the 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.
- Exclusively use Rexroth products in technically perfect condition.
- Observe all notes on the product.
- Persons assembling, operating, disassembling or maintaining Rexroth products must not be under the influence of alcohol, other drugs or medications influencing the ability to react.
- Only use original Rexroth accessories and spare parts in order to exclude hazards 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), in which the Rexroth product is 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 explosive atmosphere during assembly!

During assembly, there must not be an explosive atmosphere. During works at the valve, this condition could trigger an ignition that may lead to an explosion.

- Ensure before working with the valve that no explosive atmosphere may occur during the work.

Easily inflammable hydraulic fluid!

In connection with an explosive atmosphere or other warm heat sources, leaking hydraulic fluid mist due to defective or incompletely assembled valves and their connections may lead to explosions.

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

Exceedance of the maximum temperatures!

Use of the valve outside the approved temperature ranges may lead to functional failures like overheating of the valve solenoid. Explosion protection is therefore no longer ensured.

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

Valve solenoid has hot surface!

Risk of burning!

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

Modifications at the gaps of the pressure-tight enclosure will create an explosion hazard!

Explosion hazard! The terminal box with its cover and cable and line entry will create a pressure-tight gap.

- To ensure explosion protection, these gaps may not be modified.
- The gaps must remain free of dirt and damage.
- The mounting screws of the cover and the cable and line entry must be assembled as specified.

⚠ WARNING

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 fly around and cause personal injuries and/or damage to property. Furthermore, there is the danger of serious injury caused by a powerful leaking hydraulic fluid jet.

- Ensure before working at the hydraulic product that the hydraulic system is depressurized and the electrical control de-energized.
- Completely unload the pressure at machines and systems before working at the valve.

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.

Penetrating water and humidity!
In case of use in humid or wet environments, water or humidity may penetrate electrical connections or the valve electronics. This case may lead to malfunctions at the valve and to unexpected movements in the hydraulic system which may result in personal injury and damage to property.

- Only use the valve within the intended IP protection class or lower.
- Ensure before the assembly that all seals and caps of the plug-in connections are tight and intact.

⚠ 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 adequate hydraulic fluid cleanliness according to the cleanliness classes of the valve over the entire operating range.

Leakage in case of incorrect working temperatures!
Use of the valve outside the approved temperature ranges 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 a surface protection (refer to *"Data sheet 22047-XD"*). 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 avoid loosening of the valve and mitigate the associated risk:

- Exchange the valves with corrosion damages as soon as possible.
- Check the surface protection at the valve and the valve mounting screws at regular intervals.

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

2.7 Notices on the valve use

Observe the following information during the project planning:

- In case of bank assembly, only one solenoid of all valves may be energized at a time.
- When operating 4/2 directional seat valves to control differential cylinders, the annulus area of the cylinder must only be connected with connection A of the valve. Otherwise, pressure peaks will be created while switching, which will exceed the maximum operating pressure.
- If due to the operating conditions to be expected during the switching processes, flows have to be anticipated that exceed the valve's performance limits that can be seen from the characteristic curve, a valve with throttle insert must be used in channel P for flow limitation.
- In order to switch the valve safely or maintain it in its spool position, the pressure at the respective ports must satisfy the following condition: P ≧ A ≧ T for the 3/2 directional seat valve, and/or P ≧ A ≧ B ≧ T for the 4/2 directional seat valve.

- With a 4/2 directional seat valve with Plus-1 subplate, the minimum pressure must be 8 bar and the minimum flow must be 3 l/min.
- Ports P, A, and T with a 3/2 directional seat valve and/or P, A, B, and T with a 4/2 directional seat valve are clearly assigned according to their function and must not be arbitrarily exchanged or closed. The flow is only admissible in the direction of arrow specified in the *"Data sheet 22047-XD"*
- Switching off the valve solenoid results in a voltage peak due to the inductive effect. The valve solenoid already contains a interference protection circuit dampening this voltage peak. However, additional external switching measures have to be taken if required, in order to avoid connected electric circuits being influenced by the residual voltage peak. The values for the residual voltage peak depend on the valve solenoid used, see *"Data sheet 22047-XD"*.

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.
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 the *"Data sheet 22047-XD"*, in particular that the limit values indicated in the *"Data sheet 22047-XD"* 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 assembled, commissioned and operated incorrectly, 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. Safe function of the valve can no longer be ensured. ▶ During assembly, 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 and caps of the plug-in connections 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 seat valves, direct operated, with solenoid actuation Type M-.SE 6 ...XD...
- Operating instructions including declaration of conformity according to ATEX directive 2014/34/EU and technical rules EAC TR CU 012/2011.

- ▶ 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 subplates and valve mounting screws (only for valve type M-3SE6...XD...) 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 22047-XD"* of your valve.

5.1 Product identification

5.1.1 Information on the name plate and the valve solenoid housing

The meaning of the information on the name plates applicable to the non-electrical part of the valve can be seen from the numbered fields of the following tables.

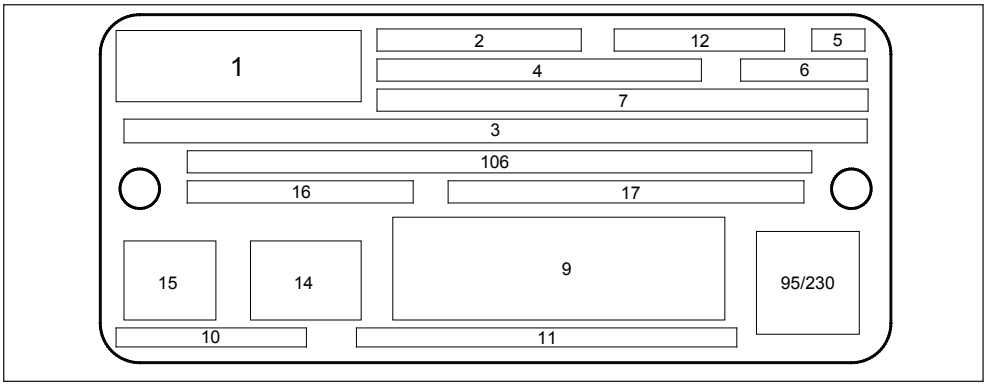

Fig. 1: Name plate 1 complete valve

Table 5: Information on the name plate 1

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
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
14	CE mark
15	ATEX mark
16	Mark - according to ATEX directive 2014/34/EU - for the type of protection of the mechanical part according to EN 13463-5
17	Other mark - according to ATEX directive 2014/34/EU - for the type of protection of the mechanical part according to EN 13463-5
95	Rexroth Data matrix code
106	Mark for customer/factory specific information
230	Rexroth QR code

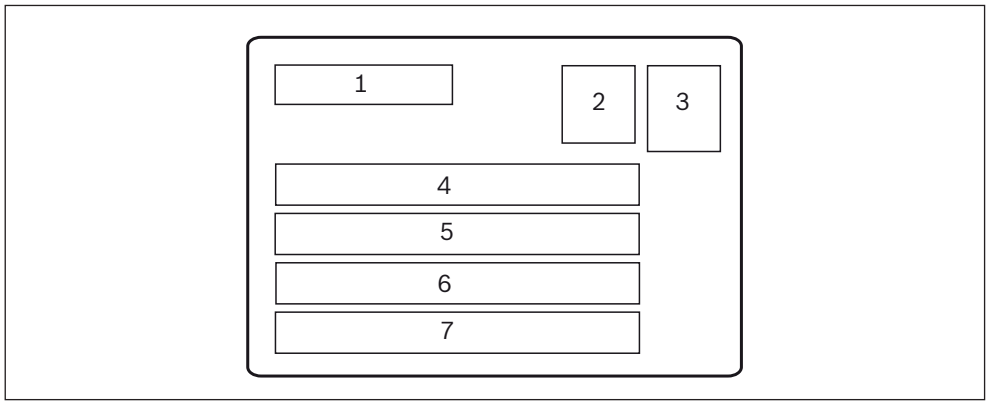

Fig. 2: Name plate 2 complete valve

Table 6: Information on the name plate 2

No.	Type of information
1	Manufacturer's logo
2	EAC mark
3	Explosion protection mark (according to technical rules EAC TR CU 012/2011)
4	Marking according to technical rules EAC TR CU 012/2011
5	Other marking according to technical rules EAC TR CU 012/2011
6	Approved certification body
7	Certificate number

With the 4/2 directional seat valve, another name plate is attached to the Plus-1 subplate. It only contains an identification number internally used by Rexroth.

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

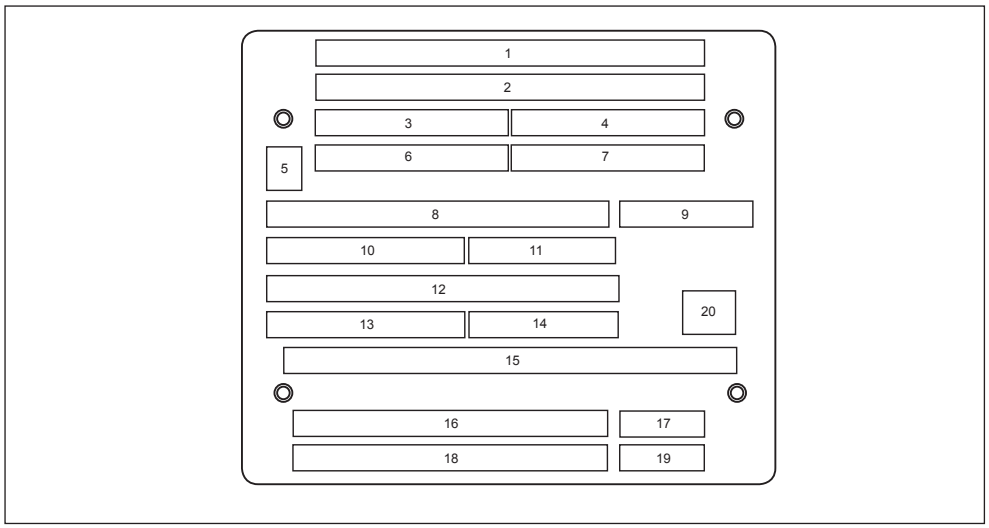

Fig. 3: Name plate solenoid

Table 7: Information on the name plate

No.	Type of information
1	Name/logo of the valve solenoid manufacturer
2	Address of the valve solenoid manufacturer
3	Internal identification number
4	Bosch Rexroth material number
5	Explosion protection mark
6	Nominal input voltage
7	Nominal input current
8	EC type examination certificate number for the valve solenoids
9	CE mark and identification of notified body
10	Mark according to ATEX directive 2014/34/EU and mark for the type of protection according to EN 60079-0 - group I
11	Mark according to ATEX directive 2014/34/EU and mark for the type of protection according to EN 60079-0 - group II
12	IEC Certificate of Conformity
13	Ex marking according to IECEx
14	Ex marking according to IECEx
15	Serial number
16	Admissible ambient temperature range of the solenoid
17	Electrical characteristic: Duty cycle according to IEC 34-1 (VDE 0580)
18	Notice about the required temperature rating of the cable
19	Threaded connection for cable and line entry
20	Hydac Data matrix code

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. The table below lists zones with device groups and categories.
The valve must only be used in the areas and zones corresponding to the device group and category. During use, also observe the other information on explosion protection in the *"Data sheet 22047-XD"*.

Table 8: Device group and categories

Device group acc. to 2014/34/EU	Category acc. 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 areas where explosive gases, mists or vapors (= device group II) are continually, long-term or often present. 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 areas where explosive gases, mists or vapors (= device group II) are normally not present or occur only rarely or 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

Categorization of gases, mists and vapors in explosion groups

The classification (see table 9) is based on the experimentally determined boundary gap width or the minimum ignition current ratio for the explosive atmosphere for which a device may be installed (see IEC 60079-20-1). The explosion group IIA includes less hazardous substances, explosion group IIC includes the most hazardous substances. Products for a certain explosion group may always be used in areas with a lower hazardousness.

Table 9: Examples for the categorization of gases, mists and vapors in explosion groups

Explosion group	Examples for gases, mists and vapors	Hazardousness
IIA	Acetone, ammonia, petrol, benzene, carbon monoxide, ethylene alcohol, methane, hydrogen sulfide, propane	medium
IIB	Ethylene, city gas, acetaldehyde	high
IIC	Hydrogen, carbon sulfide, acetylene	very high

Temperature class for device group II

In areas potentially explosive due to explosive gases, mists or vapors (zone 0, 1, 2; provided: device group II, categories 1G, 2G and 3G) make sure that the maximum surface temperature of the valve is below the ignition temperature of the explosive gas, mist or vapor in the environment.
According to its maximum surface temperature, these hydraulic products are divided into the temperature classes T1 to T6 according to EN 13463-1 and EN 60079-0. For hydraulic products of the device group II and the categories 1G, 2G and 3G, the temperature class is part of the explosion protection mark, refer to *"Data sheet 22047-XD"*. It provides information about the suitability of a hydraulic product for the use in a certain area potentially explosive due to explosive gases, mists or vapors.

Table 10: Temperature class for device group II

Temperature class	Maximum permissible surface temperature
T1	450 °C
T2	300 °C
T3	200 °C
T4	135 °C
T5	100 °C
T6	85 °C

Type of protection The type of protection describes the type of measures taken to prevent an ignition in the surrounding explosive atmosphere.

Table 11: Types of protection

Type of protection	Meaning	relevant for	
		non-electric devices	electric operating equipment
b	Ignition source monitoring	X	-
c	Structural safety	X	-
d	Flameproof enclosure	X	X
e	Increased safety	-	X
fr	Plume-inhibiting enclosure	X	-
i	Intrinsic safety	-	X
k	Liquid immersion	X	-
o	Oil enclosure	-	X
p	Overpressure enclosure	X	X
q	Sand enclosure	-	X
m	Encapsulation enclosure	-	X
n	non-sparking	-	X

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 low stability, e.g. solenoids, connectors or cables.

Sharp edges!
Danger of cut injuries!

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

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

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

6.2 Storing the hydraulic valve

Hydraulic valves are delivered in an unobjectionable state.

For transport and storage of the product, always observe the environmental conditions specified in the *"Data sheet 22047-XD"*. Improper storage may damage the valve.

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

- Ensure a storage temperature range of +5...+40 °C.
- 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.
- Do not store the valve outdoors but in a well-ventilated room.
- The storage facilities must be free from etching substances and gases.
- 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 hydraulic 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 the expiration 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 Rexroth service. In case of questions regarding spare parts, please contact the Rexroth service responsible for your valve, see chapter 10.6 "Spare parts".

Following disassembly

If a dismounted 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 air-tightly.
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 carry out 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 at the surface protection of the valve

⚠ WARNING

Explosion hazard due to modifications on the valve!
Any change at the surface protection of the valve solenoid will lead to loss of the explosion protection!
- The valve solenoid must not be painted or otherwise coated with non-conductive substances.
- Only apply painting on the valve housing according to the provisions of EN 13463-1: 2009, section 6.7; otherwise, explosion protection can no longer be ensured.

7.3 Installation conditions

- For installation of the product always observe the environmental conditions specified in the *"Data sheet 22047-XD"*.
- 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 the *"Data sheet 22047-XD"*.

7.3.1 Requirements on the valve subplate

WARNING

Explosion hazard caused by overheating!
Non-compliance with the requirements for the valve subplate will void the explosion protection.
- Observe the prescribed minimum distance in case of assembly of several valves to a valve battery.
- Observe the prescribed minimum size and minimum thermal conductivity of the valve connection surface.

Recommended subplates, see chapter 7.6 "Required accessories".

The following minimum values for valve subplates must be observed:

Table 12: Minimum value for valve subplates

Position	Minimum value
Thermal conductivity	at least 38 W/mK
Minimum size L x W x H for individual assembly	64 x 58 x 25 mm
Minimum cross-section W x H of the manifold in case of bank assembly of several valves	85 x 60 mm
Minimum distance between the longitudinal valve axes in case of the bank assembly of several valves	refer to *"Data sheet 22047-XD, Installation conditions"*

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 can cause explosions!
- Check whether 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 whether 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".

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:

Valve mounting screws

For the valve type M-4SE 6...XD..., valve mounting screws are included in the scope of delivery.

Table 13: Valve mounting screws for valve type M-3SE 6...XD...

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
Hexagon socket head cap screw ISO 4762-M5x50-10.9 (corrosion-protected)	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`
and in appendix 16.1 "List of addresses".

7.7 Assemble the valve

7.7.1 Installing the valve in the system

⚠ WARNING

Faulty installation of plug screws and lines!
Improperly fastened plug screws and lines may become loose during subsequent operation and fly around due to the pressure. This may cause serious 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.

⚠ 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, adjustment elements and plug-in connectors 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".

With the 4/2 directional seat valve, assemble the supplied Plus-1 subplate between valve and mounting surface.

To ensure proper functioning, care must be taken that the pressure chamber of the solenoid is always filled with hydraulic fluid.

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 22047-XD"*). 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 and, if applicable, at the Plus-1 subplate 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. If applicable, assemble the Plus-1 subplate between valve and connection surface.

Only use valve mounting screws with the thread diameters and strength properties listed in chapter 7.6 "Required accessories". Observe the minimum length of the valve mounting screw of 50 mm!
For the valve type M-4SE 6...XD..., valve mounting screws are included in the scope of delivery.
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 Nm ± 0.7 Nm (with a friction coefficient of μ_{total} = 0.09...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 mounting surfaces of a different material, it might be necessary to use a lower tightening torque in order to exclude any damage.

7.7.2 Hydraulic connection of the valve

CAUTION

Damage of the valve

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

- Assemble lines and hoses 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.

7.7.3 Connecting the power supply

⚠ WARNING

High electrical voltage!
Danger to life, risk of injury caused by electric shock due to incorrect connection and faulty pin assignment.

- The valve may only be connected by or under the supervision of a specialized electrician.
- De-energize the system before the assembly, pulling and connecting plug-in connectors and all other installation works. Secure the electrical equipment against restarting.
- Provide for proper, safe PE connection.
- Before switching on, check whether the protective grounding conductors at all electric devices are firmly connected according to the connection diagram.
- Close the terminal box according to the guidelines in these operating instructions.
- Don’t operate the valve with AC voltage.

Explosion hazard due to missing equipotential bonding!
Electrostatic processes, an incorrect grounding concept or 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 and/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.

Explosion hazard caused by overheating!
A wrongly dimensioned fuse protection may lead to overheating and thus explosion during operation!

- A fuse appropriate for the valve solenoid's rated current (max. 3 x $I_{nom.}$ according to DIN 41571 or IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping must be connected to each valve solenoid as short-circuit protection. The shut-off threshold of this fuse must match or exceed the short-circuit current of the supply voltage source.
- This fuse or a protective motor switch may only be fitted outside the potentially explosive area or must be of an explosion-proof design.
- The fuse can be accommodated in the related supply unit or must be separately connected upstream.

Explosion hazard due to improper installation!
No precautions are taken for safe connection of the shielding or sheathing in the terminal box of the valve solenoid and on the cable and line entry. The use of connection lines with shielding or sheathing can lead to potential backfeeding and is thus an explosion hazard!

- Only use connection lines without shielding or sheathing.

For information on the prescribed pre-fuse, see *"Data sheet 22047-XD"*.

⚠ CAUTION

Danger of damage to property and personal injuries!
Faulty energy supply may lead to uncontrolled valve movements. These could result in possible malfunctions or failure of the valve and cause injuries.
- Only use a power supply unit with safe separation.
- Always comply with the country-specific regulations.

Danger of short circuit due to missing seals and caps!
Fluids may enter the valve and cause a short-circuit.
- Before commissioning, ensure that all seals and caps of the plug-in connections are leak-proof.

- The maximum temperature of the surface of the valve solenoid is 115 °C. When selecting the connection line, please observe the requirements regarding the temperature rating and/or avoid contact of the connection line with the surface of the valve solenoid. For selection and installation, observe the requirements of EN 60079-14.
- Only a properly installed connection line will ensure the type of protection "flameproof enclosure".
- Ensure that there are no bends in the connection line and braided wires to avoid short-circuits and interruptions.
- Only assemble the cable and line entries according to the assembly instructions. Before assembly, check whether the individual components of the cable and line entry are complete and that the sealing elements are undamaged.
- Use finely stranded conductors only if they have pressed-on wire end ferrules.
- Use only lines satisfying the requirements on the terminal areas of the connection terminals and the cable and line entry, refer to *"Data sheet 22047-XD"*.
- During the assembly, ensure leak-tightness between cable and line entry and terminal box. Route the connection line in a strain-relieved form. The first mounting point must be within 15 cm of the cable and line entry.

Connection of the valve solenoid is polarity-independent.

Connecting connection lines to valve solenoids with terminal box

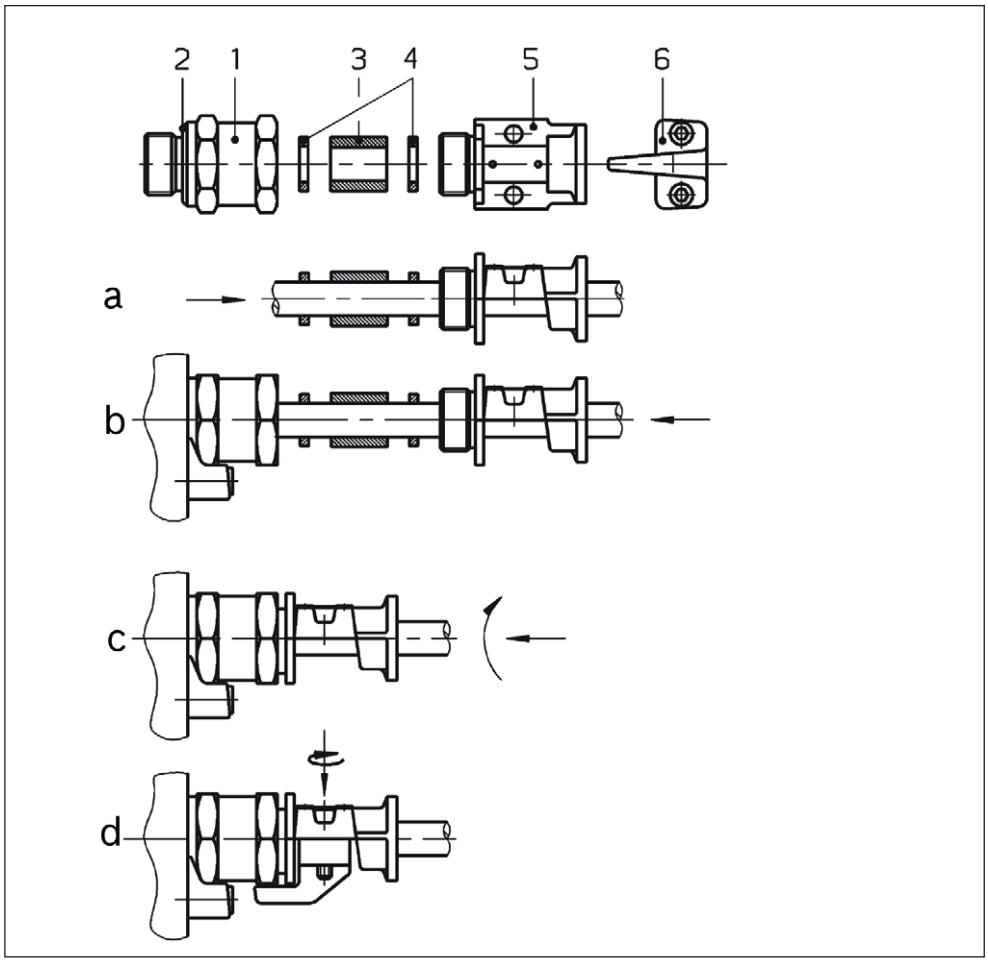

Fig. 4: Cable and line entry

1. De-energize the relevant system part.
2. Open the terminal box.
3. Remove the outer sheath of the connection line and the insulation of the individual conductors. Press the wire end ferrules to the individual conductors.

Stripping length individual conductors for operating voltage connection 6...8 mm
Stripping length individual conductor protective grounding conductor (inside) 5...6 mm
Stripping length connection for potential equalization conductor (outside) 9...10 mm
Stripping length outer sheath of the connection line ≧ 55 mm

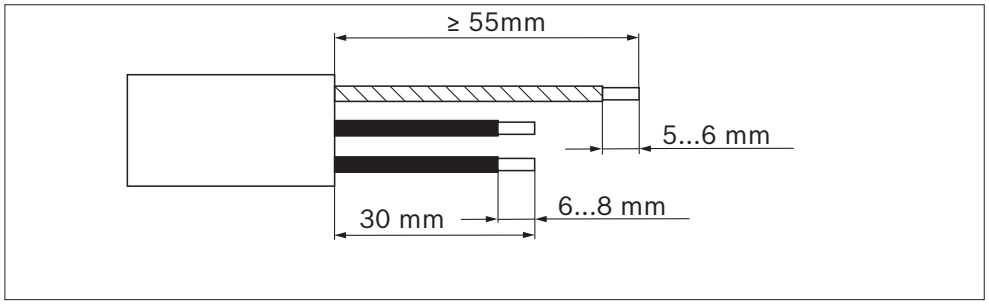

Fig. 5: Stripping lengths

4. Assemble the cable and line entry as displayed in figure 4 "Cable and line entry".

The adapter **(1)** must **not** be removed for connection of the connection lines.

- Slide the screw-in bushing **(5)**, seal ring **(3)** and pressure rings **(4)** onto the line **(a)**, insert it via the adapter **(1)** into the terminal box **(b)** and firmly tighten **(c)** the screw-in bushing **(5)**.
- Assemble the clamping collar **(6)** for strain relief of the connection line and firmly tighten it all **(d)**.

5. Screw in the clamping screws to fix the line ends.
   Tightening torques for the clamping screws:

Table 14: Tightening torques

Operating voltage connection	0.4...0.45 Nm
Connection for protective grounding conductor (inside)	1.0...1.2 Nm
Connection for potential equalization conductor (outside)	2.0...2.4 Nm

6. Place the O-ring into the groove of the terminal box and assemble the cover. Tighten the mounting screws with the spring washers diagonally, one after the other. Tightening torque of the cover screws: 2...2.2 Nm.

When replacing the cover mounting screws, only the screws supplied in the spare parts kit (seal kit terminal box) may be used, see chapter 10.6 "Spare parts".

8 Commissioning

⚠ WARNING

Faulty assembly!
If the valve is not correctly mounted, persons might be injured, or the product or system could be damaged when commissioning the valve.

- Only commission your system after all hydraulic 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.
- The solenoid coil may only be put into operation in combination with a pole tube and mounting nut assembled at the valve connected to a protective grounding conductor and connection for potential equalization conductor.

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 fly around and cause serious injuries.

- Ensure before the commissioning of the hydraulic system that the maximum admissible pressure of the hydraulic 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 limitation element.

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.

NOTICE

Risk of short-circuit!
Condensed water can build up in the terminal box and cause a short-circuit!

- Allow the valve to acclimatize for some hours prior to commissioning as the electronics might be damaged by the generation of condensed water.

In order to commission the valve, proceed as described in the sections below:

Check electrical connections

- Check electrical connections for proper condition by or under the guidance and supervision of a specialized electrician before the initial or any re-commissioning.

Bleeding the hydraulic system

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 expel 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 manually actuating the manual override. For further information, refer to chapter 9.2 "Operating the manual override".

Performing the 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.

- Seals are subject to a natural process of aging and for this reason, check seals of the terminal box for damage every time it is opened, and replace them if required. This check has to be carried out at least **every 3 years from the date of manufacture of the valve**. Order details for seal kits are available in chapter 10.6 "Spare parts".

9 Operation

9.1 General Information

⚠ WARNING

Explosion hazard caused by overheating!
Loss of explosion protection due to overheating.
- In case of bank assembly, only one solenoid of all valves may be energized at a time.

⚠ CAUTION

Loud noise!
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 the *"Data sheet 22047-XD"*. The machine and/or system manufacturer is responsible for the correct project planning of the hydraulic system and its control.
Modifications of settings on the valve are 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".

9.2 Operating the manual override

NOTICE

Danger of damage to property!
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.

The valves are equipped with a manual override. Using this manual override, the switching function of the valve can also be triggered if the solenoid is not energized. The manual override is only intended for manual operation. It is not suitable for frequently recurring manual operations!
The manual override is located on the side of the valve solenoid facing away from the valve.

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 cleaning agents!
Aggressive cleaning agents may damage the seals and the surface of the valve and let them age faster.
- Do not use solvents or aggressive 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 hydraulic fluid from the hydraulic system and seals.
- Do not use a high-pressure washer for cleaning.

For cleaning and care of the valve, observe the following:
- Close all openings with appropriate protective caps/devices.
- Check that all seals and caps of the plug-in connections are firmly fitted so that no humidity can penetrate the valve during cleaning.
- Remove external coarse dirt and keep sensitive and important parts like valve solenoids 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 works.

The following inspection, testing and maintenance works are to be carried out regularly. The intervals for the same have to be selected in a way - also dependent on the operating conditions - that deficiencies that have to be anticipated are identified timely. 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 seen on the name plate, see chapter 5.1.1 "Information on the name plate and the valve solenoid housing".

Before 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 the connection line.
2. Remove coarse dirt from the exterior.

CAUTION! Damage to persons and property caused by electrostatic charging!

- In order to avoid electrostatic charging, clean the valve using a damp cloth only.

3. Check all external fittings for completeness and tight seat.
4. Check cable and line entry, plug screw, external grounding connection and connection line for tight seat.
   For works at the cable and line entry:
   Check the gap areas (pressure-tight gap) between the terminal box and cable and line entry for damage and contamination. Remove dirt, if required. If threads of intermediate sockets and solenoid housings are damaged, replace the valve. Repairs are not admissible.
5. Check valve for external leakage. Replace seals, if required, see chapter 10.5 "Rectifying external leakages".
6. Open the terminal box and replace any damaged seals.
7. Check the inside of the terminal box for corrosion. Corrosion is an indication of leakage. In case of visible corrosion, remove the valve and have it repaired.
8. Check the gap areas (pressure-tight gap) between the terminal box and cover for damage and contamination. If those parts are damaged, replace the valve. Repairs are not admissible.
9. Check the potting compound and internal lines and braided wires of the valve solenoid for visible damage. In case of visible damage, remove the valve and have it repaired.
10. Check all screws and connections for tight seat.
11. Check all connection lines for damage. Replace the connection lines if there is any visible damage.
12. Replace all the associated sealing elements each time the cable or line entry is released. The sealing elements are only intended for single use.
13. Re-assemble the cover of the terminal box with the inserted O-ring. Tighten the mounting screws with the spring washers diagonally, one after the other. Tightening torque of the cover screws: 2...2.2 Nm.

When replacing the cover mounting screws, only the screws supplied in the spare parts kit (seal kit terminal box) may be used, see chapter 10.6 "Spare parts".

10.3 Maintenance schedule

Valves require low maintenance when you use them as intended.
For a long and reliable operation of the valve, Rexroth recommends to regularly check the hydraulic system and the valve.

10.3.1 Checking for leakage

Check the Valve for leakage. Early detection of hydraulic fluid loss may help you to identify and remedy errors. Rexroth therefore recommends keeping 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 the mounting elements for tight seat. All mounting elements are to be checked with the system being switched off, depressurized and cooled down.

10.4 Repair

⚠ WARNING

Explosion hazard due to 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, tested 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 kit for the valve connection surface

Table 15: Spare seal kit for the valve connection surface

Spare part	Material number
FKM seal kit for the valve connection surface	**R900075700**

Make sure the sealing materials are suitable for the hydraulic fluid used! Refer to *"Data sheet 22047-XD"*.

Seal kit terminal box

Table 16: Spare part seal kit terminal box

Spare part	Material number
Seal kit terminal box contains: 1 x O-ring for terminal box 1 x Seal kit for cable and line entry 4 x Spring washers for terminal box 4 x Hexagon socket head cap screws for cover fastening	**R961007877**

Valve mounting screws

Table 17: Valve mounting screws for valve type M-3SE 6...XD...

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
Hexagon socket head cap screw ISO 4762-M5x50-10.9 (corrosion-protected)	4	0.09...0.14	**R913043758**

Table 18: Valve mounting screws for valve type M-4SE 6...XD...

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
Hexagon socket head cap screw ISO 4762-M5x95-10.9 (corrosion-protected)	4	0.09...0.14	**R913051579**

In case of questions about spare parts, please contact your responsible Rexroth-Service:
Bosch Rexroth AG
Service Hydraulics
Bürgermeister-Dr.-Nebel-Str. 8
97816 Lohr am Main
Tel: +49 (0) 9352/40 50 60
service@boschrexroth.de

For the addresses of our sales and service network please refer to:
`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 hydraulic system is depressurized, and the electrical control is de-energized.

Risk of explosion and/or risk of fire due to ignition of an existing explosive atmosphere!
It may cause serious injury due to explosion pressure and fire.
- During disassembly or replacement works, there must not be an explosive atmosphere.
- The machine end-user must ensure correct environmental conditions.

⚠ CAUTION

Falling of an incompletely disassembled valve!
An incompletely disassembled valve may fall 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. Disconnect the electrical connections professionally.
3. Prepare a container for collecting leaking hydraulic fluid.
4. Use suitable tools to loosen the valve mounting screws of the valve.
5. Remove the valve mounting screws and remove the valve from the mounting surface.
6. Collect escaping hydraulic fluid in the provided container and dispose of it properly.
7. If the valve is to be returned to the manufacturer for repair, please close the valve connection surface using the supplied protective plate or protect it using equivalent packaging in order to avoid contamination and damage.
8. Close the 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 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 free of charge. There must be no inappropriate foreign substances or third-party components when products are returned. Hydraulic valves have to 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. Due to ecological 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 negative effects on human beings and on the environment have to be expected.
The hydraulic valves essentially consist of:

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

12.5 Recycling

Due to the high metal share, 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 due to inadmissible modification!

Every non-permitted modification will void the explosion protection.

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

14 Troubleshooting

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 of 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 of 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 works been made 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 19: Fault table

Error	Possible cause(s)	Remedy
Valve does not switch	Electrical connection interrupted, no current continuity	
	• Cable break	Replace connection line
	• Electrical defect in valve solenoid	Remove valve and have it repaired
	• 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. Refer to chapter 9.2 "Operating the manual override". In case of failure: Remove valve and replace it with a new one.
	Contact problems at the connection terminal	Check the mounting screws of the connection terminal and tighten using a manual torque wrench. Observe the instructions in chapter 7 "Assembly".
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, it is - in addition to the repair - essential to check the oil quality and improve it, if necessary, by 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 22047-XD"*.

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

Headquarters

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

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

The addresses of our sales and service network and sales organizations can be found at `www.boschrexroth.com/adressen`

17 Declaration of conformity

17.1 EC/EU declaration of conformity according to ATEX directive 2014/34/EU

Rexroth
Bosch Group

EC/EU declaration of conformity - *Original*

Doc. No.: DCTC 31001-006
Date: 28.11.2017

- ☐ in accordance with Machinery Directive 2006/42/EC
- ☐ in accordance with Low Voltage Directive 2014/35/EU
- ☐ in accordance with EMC Directive 2014/30/EU
- ☐ in accordance with Pressure Equipment Directive 2014/68/EU
- ☒ in accordance with ATEX Directive 2014/34/EU
- ☐ in accordance with RoHS Directive 2011/65/EU
- ☐

The manufacturer

Bosch Rexroth AG
Aurel Vlaicu Str. 2
515400 Blaj
ROMANIA

hereby declares that the product below

Name:	**Directional seat valve, direct operated, solenoid actuated**
Type:	**M-.SE 6..6X/...XD...**
Marking:	**I M2 c X**
	II 2G c T4X

was developed, designed and manufactured in compliance with the above-mentioned directive(s).

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Harmonized Standards applied:

Electrical part	**EN 60079-0: 2012 + A11: 2013, EN 60079-1: 2014**
Non-electrical part	**EN 13463-1: 2009, EN 13463-5: 2011**

National Standards and Technical Specifications applied:

EC-/EU type examination certificate no. of the valve solenoid: **BVS 03 ATEX E 300 X**
Notified body: **DEKRA EXAM GmbH**
Dinnendahlstraße 9
44809 Bochum
Deutschland

IECEx Certificate of Conformity of the valve solenoid: **IECEx BVS 11.0091 X**
Notified body: **DEKRA EXAM GmbH**
Dinnendahlstraße 9
44809 Bochum
Deutschland

Further explanations:
Observe the installation notes according to product documentation 22047-XD-B.

Lohr am Main / Blaj (Place), 28.11.2017 (Date)

pp. Achim Richartz, DC-IH/EHC
Head of Development

pp. Dirk Arnold, BIjP/PT
Technical Plant Manager

We reserve the right to make changes to the content of the EC/EU Declaration of Conformity. Current issue on request.

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17.2 Declaration of conformity according to technical rules EAC TR CU 012/2011 (excerpt)

ТАМОЖЕННЫЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

EAC

№ ТС RU C-DE.ГБ08.В.02161

Серия RU № 0408501

ОРГАН ПО СЕРТИФИКАЦИИ ВЗРЫВОЗАЩИЩЕННОГО ОБОРУДОВАНИЯ ЗАКРЫТОГО АКЦИОНЕРНОГО ОБЩЕСТВА ТЕХНИЧЕСКИХ ИЗМЕРЕНИЙ, БЕЗОПАСНОСТИ И РАЗРАБОТОК (ОС ВО ЗАО ТИБР). Адрес места нахождения: 105082, город Москва, улица Фридриха Энгельса, дом 75, строение 11, офис 204, Россия. Фактический адрес органа по сертификации: 301668, Россия, Тульская область, город Новомосковск, улица Орджоникидзе, 8; 301760; Россия, Тульская область, город Донской, улица Горноспасательная, дом 1, строение А. Телефон/факс: 8 (495) 280-16-56, адрес электронной почты: pmv@tiber.ru, info@tiber.ru. Регистрационный номер RA.RU.11ГБ08, дата регистрации аттестата аккредитации органа по сертификации 01.04.2016. Орган по аккредитации, выдавший аттестат аккредитации - Федеральная служба по аккредитации (Росаккредитация).

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Бош Рекрот».
ОГРН 1027700531451.
Место нахождения в том числе фактический адрес: 141400, город Химки, Вашутинское шоссе, Владение 24, Россия. Телефон: +74955609595, факс: +74955609996. адрес электронной почты: info@boschrexroth.ru.

ИЗГОТОВИТЕЛЬ Bosch Rexroth AG, Lohr

Место нахождения в том числе фактический адрес: Zum Eisengiesser 1, 97816, Lohr am Main, Германия.

ПРОДУКЦИЯ Распределители клапанного типа, прямого действия, с электромагнитным управлением; золотниковые клапаны, прямого действия, с электромагнитным управлением типы согласно Приложения бланк № 0327471. Изготовленные в соответствии с «Directive 2014/34/EU».
Серийный выпуск.

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СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ Технического регламента Таможенного союза «О безопасности оборудования для работы во взрывоопасных средах» (ТР ТС 012/2011).

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ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Условия и сроки хранения – 1(Л) по ГОСТ 15150 12 месяцев, срок службы – не менее 10 лет. Информация по идентификации продукции приведена в приложении к настоящему сертификату. Сертификат действителен только с приложением (бланки № 0327471, № 0327472, №0327473, № 0327474).

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