Directional seat valves, direct operated, with solenoid actuation

(Area of application according to the explosion protection directive 2014/34/EU: II 3G, II 3D)

Type M-.SED 6...XN...
The data specified serves to describe the product. If there is also information on the use, it is only to be regarded as application examples and proposals. 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:
• M-.SED 6...XN...

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.
▶ 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 valve.

1.2 Required and amending documentation
▶ The product may 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

<table>
<thead>
<tr>
<th>Title</th>
<th>Document number</th>
<th>Document type</th>
</tr>
</thead>
<tbody>
<tr>
<td>❦ Directional seat valves, direct operated,</td>
<td>22049-XN</td>
<td>Data sheet</td>
</tr>
<tr>
<td>with solenoid actuation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>❦ General product information on hydraulic products</td>
<td>07008</td>
<td>Data sheet</td>
</tr>
<tr>
<td>❦ Subplates</td>
<td>45100</td>
<td>Data sheet</td>
</tr>
<tr>
<td>Declaration of conformity</td>
<td>Document</td>
<td>Refer to the operating instructions 22049-XN</td>
</tr>
<tr>
<td>M-.SED 6...XN...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.3 Representation of information
Uniform safety instructions, symbols, terms and abbreviations are used to ensure
quick and safe working with the 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:

- **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

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

### 1.3.2 Symbols

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

- **Individual, independent action**
- **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>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX</td>
<td>EU Explosion Protection Directive <em>(Atmosphère explosive)</em></td>
</tr>
<tr>
<td>EN</td>
<td>European Standard</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
</tbody>
</table>
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 a 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 EU explosion protection directive 2014/34/EU. According to directive 2014/34/EU, the device group, category and temperature class/surface temperature to which the valve corresponds are indicated in the “Area of application” section of the data sheet.
For information on the device group, category and temperature class/surface temperature according to the explosion protection directive 2014/34/EU, please refer to “Data sheet 22049-XN” under “Information on the explosion protection” and to 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 not admissible.

The installation or use of inappropriate products in safety-relevant applications could result in unintended operating states during use 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 installation
• Incorrect transport
• Lack of cleanliness during storage and assembly
• Faulty installation
• Use of inappropriate/non-admissible hydraulic fluids
• Non-compliance with the specified performance limits

Changes and/or modification at the valve are not admissible, see 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.

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.

The personnel must have the following additional qualifications to the extent required to fulfill their tasks:
- Understanding of the general principles of explosion protection, protection classes and device labelling
- Understanding of those aspects of device design which influence the protection concept
- Understanding of the contents of certificates and of the relevant parts of this standard;
- General understanding of the testing, maintenance and repair requirements of IEC 60079-17
- Familiarity with the special methods which are to be applied during the selection and installation of devices to which this standard refers.
- 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. An overview over the training content can be found online at: [http://www.boschrexroth.de](http://www.boschrexroth.de)
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 notices on the product.
- Persons assembling, operating, disassembling or maintaining Rexroth products must not be under the influence of alcohol, other drugs or medication influencing the ability to react.
- Only use original Rexroth accessories and spare parts in order to exclude 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 during use 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 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 work at the valve, this condition could trigger an ignition which may lead to an explosion.
- Before working with the valve, ensure that no explosive atmosphere may occur during the work.

Easily inflammable hydraulic fluid!
In connection with an explosive atmosphere or other hot 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 e.g. overheating of the valve solenoid. This means that the explosion protection is no longer ensured.
- Only use the valve within the intended environmental and hydraulic fluid temperature range.

Hot surface at the valve solenoid!
Risk of burning!
- Provide for a suitable touch guard.
- During operation, only touch the valve solenoid using heat-protective gloves. Allow the valve solenoid 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 pressure energy (accumulator or cylinders working under gravity), the valve may even be pressurized after the pressure supply has been switched off. During assembly and disassembly work, the valve or parts may fly around and cause personal injuries and/or damage to property. There is moreover the danger of serious injury caused by a powerful leaking hydraulic fluid jet.
- Before working at the valve, ensure that the hydraulic system is depressurized and the electrical control is de-energized.
- 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.
- When setting up 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 at 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 directional valve 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 valve. 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 22049-XN). If the valve is used in a damp environment, the valve and the valve mounting screws may corrode, which may reduce the preload force of the screw connection. To prevent the valve from becoming loose and causing a risk of injury:
- Exchange valves with corrosion damage at an early stage.
- 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 may chemically corrode and damage individual components of the valve. So take suitable corrosion protection measures.

2.7 Notices on the valve use

Observe the following information during project planning:

▶ If the annulus area of differential cylinders is not connected to port A, a pressure peak is created in port B during the switching process due to the pressure intensification. This pressure peak may exceed the maximum operating pressure over the permissible limit.

▶ To ensure proper functioning, the valve must be bled.

▶ 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 valves that can be seen from the characteristic curve, a valve with throttle insert must be used in channel P for flow limitation. With a 4/2 directional seat valve with Plus-1 plate, the throttle insert for flow limitation does not have to be inserted in port P at the valve body but rather in port P of the Plus-1 plate.

▶ Ports P, A, and T of a 3/2 directional seat valve or P, A, B, and T of a 4/2 directional seat valve are clearly assigned according to their function and must not be exchanged or closed. The flow is only admissible in the direction of arrow specified in "Data sheet 22049-XN".

▶ 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:
  - $P \geq A \geq T$ for the 3/2 directional seat valve, and/or
  - $P \geq A \geq B \geq T$ for the 4/2 directional seat valve.

▶ With a 4/2 directional seat valve with Plus-1 plate, the minimum pressure must be 8 bar and the minimum flow must be 3 l/min.

▶ Switching off the valve solenoid results in a voltage peak due to the inductive effect. Additional switching measures have to be taken in order to avoid any influence of the residual voltage peak on connected operating media. The maximum residual voltage peak of 500 V must not be exceeded.
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 obliged to check in the order confirmation whether the
supplied valve complies with the required category and the corresponding zone.
The machine end-user of the Bosch Rexroth valve is responsible that
• the valve is only 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 22049-XN”, in
particular that the limit values indicated in “Data sheet 22049-XN” are not exceeded.
• the applicable provisions, regulations and directives on explosion protection are
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 a handle or a 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 is therefore no longer 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 and caps of the plug-in connections are correctly installed and undamaged.
▷ Do not use linting cleaning fabric for cleaning.
▷ Ensure that no cleaning agents are able to penetrate the hydraulic system.

**Hydraulic fluid harmful to the environment!**
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 valve, direct operated, with solenoid actuation
  Type M-.SED 6...XN...
• Operating instructions including declaration of conformity

▶ 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 mating connectors, valve subplates and 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 22049-XN" 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 plate applicable to the non-electrical part of the valve can be seen from the numbered fields of the following table.

Table 5: Information on the name plate

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of information</th>
<th>Information or example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer's logo</td>
<td>Rexroth</td>
</tr>
<tr>
<td>2</td>
<td>Material no. of the valve (= order number)</td>
<td>e.g.: MNR: R901234567</td>
</tr>
<tr>
<td>3</td>
<td>Type designation complete valve</td>
<td>e.g.: M-3SED6CK1X/350CG24N9XNK4/V</td>
</tr>
<tr>
<td>4</td>
<td>Serial number of the valve</td>
<td>e.g.: SN: 0002111</td>
</tr>
<tr>
<td>5</td>
<td>Manufacturer's factory number</td>
<td>e.g.: 708 F</td>
</tr>
<tr>
<td>6</td>
<td>Date of manufacture (year and week)</td>
<td>e.g.: FD: 03W01</td>
</tr>
<tr>
<td>7</td>
<td>Maximum operating pressure</td>
<td>e.g.: pmax 350 bar</td>
</tr>
<tr>
<td>8</td>
<td>Ambient temperature range</td>
<td>−20 °C ≤ Ta ≤ +50 °C</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic symbol according to ISO 1219</td>
<td>Graphic</td>
</tr>
<tr>
<td>10</td>
<td>Designation of origin</td>
<td>Made in Germany</td>
</tr>
<tr>
<td>11</td>
<td>Name and address of the manufacturer</td>
<td>Bosch Rexroth AG D-97816 Lohr</td>
</tr>
<tr>
<td>12</td>
<td>Customer's or production order number</td>
<td>e.g.: 123456789012345678</td>
</tr>
<tr>
<td>13</td>
<td>Customer material number or additional information</td>
<td>e.g.: CNR: 1234567890</td>
</tr>
<tr>
<td>14</td>
<td>CE mark</td>
<td>CE</td>
</tr>
<tr>
<td>15</td>
<td>Explosion protection mark</td>
<td>Ex</td>
</tr>
<tr>
<td>16</td>
<td>Mark for the protection class according to the explosion protection directive 2014/34/EU and mark for the type of protection of the mechanical part according to EN 13463-5</td>
<td>II 3G c T3 X</td>
</tr>
<tr>
<td>17</td>
<td>Additional mark according to the explosion protection directive 2014/34/EU and mark for the type of protection of the mechanical part according to EN 13463-5</td>
<td>II 3D c T140 °C IP65 X</td>
</tr>
<tr>
<td>18</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>19</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
With the 4/2 directional seat valve, another name plate is attached to the Plus-1 plate. It only shows 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. 2: Solenoid name plate](image)

**Table 6: Information on the name plate**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of information</th>
<th>Information or example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name and address of the manufacturer of the valve solenoid</td>
<td>ETO MAGNETIC Sp.z o.o 52-407 Wroclaw/PL</td>
</tr>
<tr>
<td>2</td>
<td>Type designation</td>
<td>nG6-45 (104918-02)</td>
</tr>
<tr>
<td>3</td>
<td>CE mark</td>
<td>CE</td>
</tr>
<tr>
<td>4</td>
<td>Explosion protection mark</td>
<td>Ex</td>
</tr>
<tr>
<td>5</td>
<td>Internal identification number</td>
<td>R901307006</td>
</tr>
<tr>
<td>6</td>
<td>Nominal voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>7</td>
<td>Rated current at 20 °C and nominal voltage</td>
<td>0.95 A</td>
</tr>
<tr>
<td>8</td>
<td>Mark according to the explosion protection directive 2014/34/EU and type of protection according to EN 60079-15 (gasses, mists, vapors)</td>
<td>II 3G Ex nA IIC T3 Gc</td>
</tr>
<tr>
<td>9</td>
<td>Additional mark according to the explosion protection directive 2014/34/EU, protection class and maximum surface temperature according to EN 60079-31 (dusts)</td>
<td>II 3D Ex tc IIIc T140 °C Dc</td>
</tr>
<tr>
<td>10</td>
<td>Type examination certificate number</td>
<td>BVS 12 ATEX E 062 X</td>
</tr>
</tbody>
</table>
### 5.1.2 Explosion protection marking

According to EU directive 1999/92/EC, the user/machine end-user has to classify explosive areas 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 the explosion protection in "Data sheet 22049-XN".

**Table 7: Device groups and categories**

<table>
<thead>
<tr>
<th>Device group according to 2014/34/EU</th>
<th>Category according to 2014/34/EU</th>
<th>Area of application, properties (excerpt from the directives)</th>
<th>Usable in zone according to 1999/92/EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>M1</td>
<td>Areas susceptible to firedamp (=device group I), i.e.: underground mines and their pitheads. If there is an explosive atmosphere, the operation can continue. Very high level of safety.</td>
<td>-</td>
</tr>
<tr>
<td>I</td>
<td>M2</td>
<td>Areas susceptible to firedamp (=device group I), i.e.: underground mines and their pitheads. If there is an explosive atmosphere, it must be possible to switch off the device. High level of safety.</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>1G</td>
<td>Explosive areas in which explosive gasses, 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 level of safety.</td>
<td>0, 1, 2</td>
</tr>
<tr>
<td>II</td>
<td>2G</td>
<td>Explosive areas in which explosive gasses, mists or vapors (=device group II) occur sometimes. Corresponds to zone 1 according to directive 1999/92/EC. High level of safety.</td>
<td>1, 2</td>
</tr>
<tr>
<td>II</td>
<td>3G</td>
<td>Explosive areas in which explosive gasses, 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. Standard level of safety.</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>1D</td>
<td>Explosive areas in which explosive dust/air mixtures (=device group II) occur permanently or for a long time or frequently. Corresponds to zone 20 according to directive 1999/92/EC. Very high level of safety.</td>
<td>20, 21, 22</td>
</tr>
<tr>
<td>II</td>
<td>2D</td>
<td>Explosive areas in which explosive dust/air mixtures (=device group II) occur sometimes. Corresponds to zone 21 according to directive 1999/92/EC. High level of safety.</td>
<td>21, 22</td>
</tr>
<tr>
<td>II</td>
<td>3D</td>
<td>Explosive areas in which an explosive atmosphere due to blown up dust (=device group II) does not normally occur or only rarely or for a short time. Corresponds to zone 22 according to directive 1999/92/EC. Standard level of safety.</td>
<td>22</td>
</tr>
</tbody>
</table>
Classification of gasses, mists and vapors into explosion groups

The classification (see Table 8) is based on the maximum gap width determined in experiments or on the minimum ignition current ratio for the explosive atmosphere in which a device may be installed (see IEC 60079-20-1).

Explosion group IIA contains less dangerous substances, explosion group IIC the most dangerous substances. Products intended for a particular explosion group may always also be used in less dangerous zones.

Table 8: Examples for the classification of gasses, mists and vapors into explosion groups

<table>
<thead>
<tr>
<th>Explosion group</th>
<th>Examples for gasses, mists and vapors</th>
<th>Dangerousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIA</td>
<td>Acetone, ammonia, gasoline, benzene, carbon dioxide, ethanol, methane, hydrogen sulfide, propane</td>
<td>medium</td>
</tr>
<tr>
<td>IIB</td>
<td>Ethylene, city gas, acetaldehyde</td>
<td>high</td>
</tr>
<tr>
<td>IIC</td>
<td>Hydrogen, carbon disulfide, acetylene</td>
<td>very high</td>
</tr>
</tbody>
</table>

Temperature classes for device group II

Please note that in areas which are explosive due to explosive gasses, mists or vapors (zone 0, 1, 2 for which device group II, categories 1G, 2G and 3G are intended), the maximum surface temperature of the directional valve must in addition be below the ignition temperature of the surrounding explosive gas, mist or vapor.

Based on their maximum surface temperature, these hydraulic products are classified according to EN 13463-1 and EN 60079-0 into temperature classes T1 to T6. With hydraulic products in device group II and in categories 1G, 2G and 3G, the temperature class is part of the explosion protection mark, see "Data sheet 22049-XN". It provides information on the suitability of the hydraulic product for the use in a particular area which is explosive due to explosive gasses, mists or vapors.

Table 9: Temperature classes for device group II

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum surface temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>450 °C</td>
</tr>
<tr>
<td>T2</td>
<td>300 °C</td>
</tr>
<tr>
<td>T3</td>
<td>200 °C</td>
</tr>
<tr>
<td>T4</td>
<td>135 °C</td>
</tr>
<tr>
<td>T5</td>
<td>100 °C</td>
</tr>
<tr>
<td>T6</td>
<td>85 °C</td>
</tr>
</tbody>
</table>
Type of protection

The type of protection describes the kind of measures taken to prevent the ignition of a surrounding explosive atmosphere.

<table>
<thead>
<tr>
<th>Type of protection</th>
<th>Meaning</th>
<th>Relevant for non-electrical devices</th>
<th>Electrical operating equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>ignition source monitoring</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>c</td>
<td>structural safety</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>d</td>
<td>flameproof enclosure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>e</td>
<td>increased safety</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>fr</td>
<td>flow restricting enclosure</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>g</td>
<td>intrinsic safety</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>k</td>
<td>liquid immersion</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>o</td>
<td>oil immersion</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>p</td>
<td>pressurized enclosure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>q</td>
<td>powder filling</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>m</td>
<td>encapsulation</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>i</td>
<td>intrinsic safety</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

6 Transport and storage

6.1 Transporting the valve

**CAUTION**

Danger of damage to property and personal injuries!

If transported improperly, the valve may fall down and cause damage and/or injuries since the parts may be e.g. sharp-edged, oily, unstable, 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, e.g. solenoids, connectors and cables.

Sharp edges!

Danger of cut injuries!

- Wear suitable protective equipment when transporting the valve.

More information regarding transport is available from Bosch Rexroth, see chapter [16.1] “List of addresses”.

Notify your responsible sales contact person about 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 an unobjectionable state.

For transporting and storing the product, always observe the environmental conditions specified in "Data sheet 22049-XN". Improper storage may damage the valve.

Valves can be stored for up to 12 months under the following conditions:
- Ensure a storage temperature range from +5...+40 °C.
- The relative air humidity may 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 hydraulic valve must be closed with closing 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 damage 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 the time of storage to protect it against corrosion.
Rexroth recommends the following procedure:
1. Clean the valve, see chapter 10.1 "Cleaning and care".
2. Close all connections air-tightly.
3. Moisten the unpainted external metal surfaces of the valve using an appropriate corrosion protection agent.
4. Pack the valve with a desiccant air-tightly in corrosion protection film.
5. Store the valve protected against impacts.

- 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.
- Carry out any work at the valve only 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 caused by changes at 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.
- Additional paintings at the valve housing may only be applied 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 installing the product always observe the environmental conditions specified in "Data sheet 22049-XN".
- 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 22049-XN".
7.3.1 Requirements on the valve subplate

**DANGER**

Explosion hazard caused by overheating!
In case of non-compliance with the requirements on the valve subplate, explosion protection is no longer ensured!
- Observe the prescribed minimum distance in case of the assembly of several valves in a valve battery.
- Observe the prescribed minimum size and minimum thermal conductivity of the valve connection surface.

For recommended subplates, refer to chapter 7.6 "Required accessories".

- The following minimum values of the valve subplates must be adhered to:

<table>
<thead>
<tr>
<th>Position</th>
<th>Minimum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal conductivity</td>
<td>at least 38 W/mK</td>
</tr>
<tr>
<td>Minimum size L x W x H for individual assembly</td>
<td>64 x 58 x 25 mm</td>
</tr>
<tr>
<td>Minimum cross-section W x H of the manifold in case of bank assembly of several valves</td>
<td>85 x 60 mm</td>
</tr>
<tr>
<td>Minimum distance between the longitudinal valve axes in case of the bank assembly of several valves</td>
<td>55 mm</td>
</tr>
</tbody>
</table>

7.4 Before the assembly

**WARNING**

Explosion hazard due to the wrong area of application!
A valve which is not approved for the area of application may cause an explosion!
- Check whether the explosion protection marks on the name plate of the valve comply with the information in these operating instructions.
- Check whether you have the correct valve type by means of the type designation on the name plate of the valve.
- Check whether the zone assignment and the temperature class/surface temperature 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 reasons of stability, exclusively use the following valve mounting screws.

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
<th>Friction coefficient according to VDA 235-101</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 4762-M5×50-10.9-flZn-240h-L</td>
<td>4</td>
<td>0.09...0.14</td>
<td>R913000064</td>
</tr>
</tbody>
</table>

Table 12: Valve mounting screws for valve type M-3SED 6...

Table 13: Valve mounting screws for valve type M-4SED 6...

Subplates

For subplates with dimensions for valves with porting pattern according to ISO 4401, refer to “Data sheet 45100”.

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
<th>Friction coefficient according to VDA 235-101</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 4762-M5×95-10.9-flZn-240h-L</td>
<td>4</td>
<td>0.09...0.14</td>
<td>R913000223</td>
</tr>
</tbody>
</table>

Table 14: Throttle inserts

<table>
<thead>
<tr>
<th>Throttle diameter</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 mm</td>
<td>R900542133</td>
</tr>
<tr>
<td>1.5 mm</td>
<td>R900542134</td>
</tr>
<tr>
<td>1.8 mm</td>
<td>R900542128</td>
</tr>
<tr>
<td>2.0 mm</td>
<td>R900542129</td>
</tr>
<tr>
<td>2.2 mm</td>
<td>R900542157</td>
</tr>
</tbody>
</table>

Table 15: Check valve insert

<table>
<thead>
<tr>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check valve insert</td>
</tr>
</tbody>
</table>

Table 16: Mating connector

<table>
<thead>
<tr>
<th>Length of the connection line of the mating connector</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 m</td>
<td>R901200418</td>
</tr>
<tr>
<td>5 m</td>
<td>R901200460</td>
</tr>
<tr>
<td>12 m</td>
<td>R901200582</td>
</tr>
</tbody>
</table>
Special tool

The special tool is intended for the actuation of the manual override.

Table 17: Special tool

<table>
<thead>
<tr>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special tool</td>
</tr>
<tr>
<td>R900024943</td>
</tr>
</tbody>
</table>

Ordering address for accessories and valves

The addresses of our responsible sales organizations can be found on the Internet at www.boschrexroth.com and in the appendix 16.1 "List of addresses".

7.7 Assembling the valve

7.7.1 Installing the valve in the system

WARNING

Faulty assembly 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 severe injuries!
▶ Only pressurize your system after all plug screws and lines have been completely and properly mounted according to the specification.

Faulty fastening!
Mounting of the valve using valve mounting screws of reduced stability, insufficient mounting or fastening at blocks and plates with insufficient stability may cause the valve to become loose and fall down. Consequently, hydraulic fluid may leak and lead to personal injuries and/or damage to property. Special care must be taken with valves with suspended installation.
▶ Completely assemble the valve according to the assembly specifications using 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.

Improper installation of the valve!
Improper installation of the valve causes an explosion hazard!
▶ The valve solenoid must not be installed close to charge generating processes.
▶ The valve is to be installed so that no impact stresses > 4 J can take effect.
**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. Consequently, persons may slip or fall.
- Only remove the protective caps of valve directly before the assembly.
- After the disassembly, provide the bores containing the hydraulic fluid with suitable closing elements.
- Immediately remove leaked hydraulic fluid.

**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 safety valve so that it is free from dirt.
- Make sure that all connections, hydraulic lines and attachment parts are clean.
- Ensure that no cleaning agents are able to penetrate the hydraulic system.
- Do not use hemp as a sealant under any circumstances.

With the 4/2 directional seat valve, you have to assemble the supplied Plus-1 plate between valve and valve mounting surface, with throttle insert or check valve insert, if necessary (see chapter 2.7 "Notes on the valve use").

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

1. Before any assembly and disassembly work starts, the surroundings must be cleaned so that no dirt can get into the oil circuit. Only fibre-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 22049-XN"). 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 plate for completeness. Other sealants are not admissible.
6. Check whether at the subplate, the pressure connecting line is connected to P and the return line to T.
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 plate between valve and connection surface.

For reasons of stability, exclusively use the valve mounting screws specified 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 in 7.6 "Required accessories" or in case of assembly on comparable cast iron installation surfaces, tighten all four valve mounting screws using a torque power screwdriver (tolerance ≤ 10 %) and a tightening torque of 7 Nm (5.2 ft-lbs) ± 10 %. 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 connecting the valve

**CAUTION**

*Damage to the valve!*
If you install hydraulic lines and hoses under pressure, they are exposed to additional mechanical forces during operation, which reduce 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; in this connection, observe 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.
- Check before switch-on whether the protective earthing conductors at all electric devices are firmly connected according to the connection diagram.

**Explosion hazard due to lack of equipotential bonding!**
Electrostatic processes, an incorrect earthing concept or a lack of equipotential bonding may lead to an explosion. Apart from this, malfunctions or uncontrolled movements at the machine may be caused!

- Provide for correct earthing 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.

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

- A fuse appropriate for the valve solenoid's rated current (max. 3 x I_{rated} according to DIN 41571 and/or IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping must be connected upstream of 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 protective motor switch may only be fitted outside the explosive area or must be of an explosion-proof design.
- The fuse can be accommodated in the related supply unit or must be switched separately upstream.

For information on the prescribed pre-fuse, refer to "Data sheet 22049-XN".
**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 observe country-specific regulations.

**Danger of short circuit caused by 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 mating connector is not included in the scope of delivery, but may be ordered separately; also refer to chapter 7.6 "Required accessories".
A mating connector suitable for category 3 G / 3 D is to be used for the connection. Together with the plug base of the solenoid coil, it has to comply with protection class IP 65. The required properties of the mating connector specified in "Data sheet 22049-XN, Information on the explosion protection" have to be fulfilled! Observe the assembly instructions supplied with the mating connector and the tightening torques and use of other sealing devices specified in the same.

**WARNING!** Improper installation! The protection class IP 65 of the mating connector, see chapter 7.6 "Required accessories" is not ensured if the sealing device included in the scope of delivery is not installed.
- The sealing device included in the scope of delivery must be installed.

- The maximum temperature of the valve solenoid surface is 110 °C. When selecting the connection line, please observe the requirements regarding the temperature rating and/or avoid contact of the connection line with the valve solenoid surface. For selection and installation, observe the provisions of EN 60079-14.
- Avoid bends in the connection lines and litz wires in order to avoid short-circuits and interruptions.
- Route the connection line in a pull-relieved form. The first mounting point must be within 15 cm of the cable entry.
- After the assembly, attach a permanently readable information sign with the following labeling in the immediate vicinity of the valve solenoid: **Do not disconnect when energized!**

The connection of the valve solenoid can be established in a polarity-independent manner.
The plug-in connection is not suitable for normal separation of the electric circuit.
7.7.4 Rotating the solenoid coil by ±90°

⚠️ WARNING

Explosion hazard caused by improper assembly!
Improper assembly will result in the loss of the explosion protection!
▶ Strictly observe the following modification instructions for turning the valve solenoid.
▶ When turning the valve solenoid, make sure that it does not project over the valve connection surface.
▶ Make sure that the valve solenoid moves freely and does under no circumstance rest on the base plate.
▶ A gap between valve housing and valve solenoid is not admissible.

Solenoid coils can be assembled in staggered assembly around the pole tube, i.e. the longitudinal axis of the valve, displaced by ± 90°.

The pole tube of the valve solenoid is completely sealed towards the oil circuit. The solenoid coil can therefore still be turned if the valve has already been installed.

1. Detach the mounting nut of the valve solenoid at the pole tube (hexagon nut, wrench size 32).
2. Remove the solenoid coil and the O-ring from the valve and rotate it by 90° in the desired direction.
3. Re-attach the solenoid coil in the desired position so that the locating pin of the solenoid coil engages in the corresponding locating hole of the valve housing.
4. Assemble the O-ring onto the pole tube and slide it forward up to the solenoid coil.
5. Re-tighten the mounting nut of the valve solenoid (hexagon nut, wrench size 32, tightening torque 8 + 1 Nm).
8 Commissioning

**WARNING**

**Faulty installation!**
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 when 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 commissioned if mounted to the valve including pole tube and mounting nut and if the protective earthing conductor and the connection for potential equalization conductor are connected.

**Inadmissibly high operating pressure!**
In hydraulic applications with different area ratios, the hydraulic pressure is increased and may - in case of incorrect design - lead to an exceedance of the maximum admissible operating pressure. Thus, the valve may burst or the closing 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 no 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 may form inside the electrical connection 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.
Proceed as described in the following sections to commission the valve:

**Checking electrical connections**

▶ Have the electrical connections checked 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 press out any remaining air from the valve. Thus, mechanical damage 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 M-.SED 6...N9...)".

**Performing a leak test**

▶ Ensure that during operation, no hydraulic fluid leaks at the valve or at the connections.

▶ Check whether there is internal leakage. This must be done according to the possibilities provided by the hydraulic system.

Internal leakage may be valve-specific and may have no influence on the functionality of the valve.

▶ Seals are subject to a natural aging process and for this reason, check seals for damage and replace them, if necessary, every time you remove the mating connector.
9 Operation

9.1 General information

**WARNING**

Explosion hazard caused by overheating!
Loss of explosion protection due to overheating.
▶ In case of bank assembly, as long as only one solenoid is energized at a time, and in case of individual assembly, a maximum hydraulic fluid temperature of +80 °C may not be exceeded.
▶ In case of bank assembly, if more than one solenoid is energized simultaneously, a maximum hydraulic fluid temperature of +65 °C may not be exceeded.
▶ If the mating connectors specified in chapter 7.6 “Required accessories” are used, a maximum ambient temperature of 40 °C may not be exceeded.

Explosion hazard caused by dust accumulations!
If the maximum dust layer thickness of > 50 mm is exceeded, there is an explosion hazard!
▶ Make sure that the maximum dust layer thickness is not exceeded.
▶ Regularly remove dust accumulations, if required.

**CAUTION**

Loud noise!
In case of an unfavorable disposition of valves, resonance or fluid noises, e.g. whistling, may result. 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 22049-XN". The machine 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".
9.2 Operating the manual override (only relevant for type M-.SED 6...N9...)

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger of damage to property!</td>
</tr>
<tr>
<td>If the manual override is operated in an uncontrolled manner, there is a danger of damage to the system!</td>
</tr>
<tr>
<td>▶ Only operate the manual override if it is ensured that this will not trigger any dangerous working movement of the connected actuator.</td>
</tr>
<tr>
<td>▶ Only operate the manual override if the pressure in the tank channel of the valve does not exceed 50 bar. Above this pressure value, the actuating force to be applied is too large.</td>
</tr>
<tr>
<td>▶ Do not use sharp-edged tools to operate the manual override.</td>
</tr>
</tbody>
</table>

Valve type M-.SED 6...N9... is 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 operation.

The manual override is located on the side of the valve solenoid facing away from the valve.

▶ For operation, push the manual override in the direction of the valve housing using a rounded tool with a maximum diameter of 5 mm or using a dedicated special tool (see chapter 7.6 “Required accessories”).
10 Maintenance and repair

10.1 Cleaning and care

**NOTICE**

**Penetrating dirt and fluids will cause faults!**
Safe function is no longer ensured due to the ingress of dirt and liquids.
- 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.
- Never 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 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 and caps of the plug-in connections are firmly attached so that no humidity can penetrate the valve during cleaning.
- Remove external coarse dirt and keep sensitive and important parts such as valve solenoids clean.
- Remove dust and dirt accumulations on the valve at regular intervals. Comply with the max. admissible dust layer thickness of 50 mm.

10.2 Inspection and maintenance

**WARNING**

**Uncontrolled machine movements!**
Risk of injury due to maintenance work at an activated machine.
- Unless expressly otherwise specified, switch off the machine using the main switch, lock the switch and remove the key prior to performing 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 - 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".
The check is to be carried out as well if the valve is only stored but not used! For order details of seal kits, 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 property and personal injury caused by electrostatic charging!

- In order to prevent electrostatic charging, only clean the coil and the mating connector using a damp cloth.

3. Check all external fittings for completeness and tight seat.
4. Check the connection line and the mating connector for tight seat and damage.
   - If there is visible damage, replace the connection line and the mating connector.
5. Check the valve for external leakage; replace the sealing devices, if required, see chapter 10.5 "Rectifying external leakages".

### 10.3 Maintenance schedule

Valves are low-maintenance provided that they are used as intended. To ensure that the valve functions reliably for a long time, Rexroth recommends checking the hydraulic system and the valve regularly.

#### 10.3.1 Checking for leakage

Check the valve for leakage. Early detection of hydraulic fluid loss may help you identify and remedy errors. Bosch Rexroth therefore recommends always keeping the valve and/or the system 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 when the system is switched off, depressurized and has cooled down.
10.4 Repair

**WARNING**

Explosion hazard caused by improper repair!

In case of improper repair, the explosion protection no longer applies in subsequent operation!

- For repair, 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 safety valve, see chapter 11 “Disassembly and removal”.
2. Check the contact surfaces for the seal rings at the valve for cleanliness und damage.
3. Check the recesses and seal rings of the connection flanges for cleanliness and damage.
4. Dry the valve connection surface and the valve contact surface using suitable cleaning materials.
5. Assemble the new sealing devices.
6. Assemble the valve at the contact surface, see chapter 7 "Assembly".

10.6 Spare parts

<table>
<thead>
<tr>
<th>Seal kit for the valve connection surface</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 18: Seal kit for the valve connection surface</strong></td>
</tr>
<tr>
<td><strong>Spare part</strong></td>
</tr>
<tr>
<td>NBR seal kit for the valve connection surface</td>
</tr>
<tr>
<td>FKM seal kit for the valve connection surface</td>
</tr>
</tbody>
</table>

Ensure suitability of the sealing materials for the hydraulic fluid used! See "Data sheet 22049-XN".

In case of questions regarding spare parts, please contact the competent Rexroth service.
Bosch Rexroth AG
Service Hydraulics
Bürgermeister-Dr.-Nebel-Str. 8
97816 Lohr am Main
Phone: +49 (0) 9352 - 40 50 60
spare.parts@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 pressurized or energized system parts!
When working at pressurized or energized system parts, there is the danger of injury by leaking hydraulic fluid or electric current.
▶ Before disassembly, ensure that the hydraulic system is depressurized and the electrical control is de-energized.

Explosion hazard and/or risk of fire due to the ignition of an existing explosive atmosphere!
Serious injuries caused by explosion pressure and fire may result.
▶ During disassembly and exchange work, there may be no explosive atmosphere.
▶ The machine end-user of the system must provide suitable environmental conditions.

⚠️ CAUTION

Falling of an incompletely disassembled valve!
An incompletely disassembled valve may fall down and cause injuries.
▶ During the disassembly, secure the valve against falling down.

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. Professionally remove the electrical connections.
3. Prepare a container for collecting the 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 flange 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, close the valve connection surface using the protective plate supplied or protect it using equivalent packaging in order to avoid contamination and damage.
8. Seal the subplate in order to avoid contamination.

If the valve is exchanged, all further steps are analogous to mounting, see chapter [chapter 7 “Assembly”].
12 Disposal

12.1 Environmental protection
Careless disposal of the valve and the hydraulic fluid may 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 are to be drained before being returned. The components have to be sent free to the door to the following address:
Bosch Rexroth AG
Service Industriehydraulik [Industrial Hydraulics]
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 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. In the normal case, no negative effects on human beings and on the environment have to be expected.
The valves are basically made of:
• Cast iron
• Steel
• Aluminum
• Copper
• Plastics
• Electronics 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 caused by unauthorized modification!**

Any unauthorized modification results in the loss of the explosion protection.

- Modifications exceeding the extent described in these operating instructions are not permitted.
- Particularly the solenoid coil must not be moved to the opposite side of the valve as this would interchange the switching positions and a definite assignment to the type designation would no longer be possible.

14 Troubleshooting

14.1 How to proceed for troubleshooting

- Always work systematically and purposefully, even when under time pressure. Random and imprudent disassembly and readjustment of settings can, in the worst-case scenario, result in the inability to determine the original cause of error.
- First get a general idea of the function of your valve in conjunction with the overall system.
- Try to find out whether the valve has functioned properly in conjunction with the overall system before the error occurred first.
- Try to determine any changes to the overall system in which the valve is integrated:
  - Were there any changes to the application conditions or to the area of application of the valve?
  - Have any changes (e.g. refittings) been made or have repair works been carried out at the overall system (machine/system, electrical systems, control) or at the valve? If so: What were they?
  - Was the valve or 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.
**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**

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible cause(s)</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve does not switch</td>
<td>Electrical connection interrupted, no current continuity</td>
<td>Replace the connection cable</td>
</tr>
<tr>
<td></td>
<td>• Cable break</td>
<td>Replace the connection cable</td>
</tr>
<tr>
<td></td>
<td>• Electrical defect in valve solenoid</td>
<td>Remove valve and have it repaired</td>
</tr>
<tr>
<td></td>
<td>• No pressure at P</td>
<td>Check and/or reapply pressure at port P</td>
</tr>
<tr>
<td></td>
<td>• Control spool is jammed due to contamination</td>
<td>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 M-.SED 6...N9...)”. If this fails: Remove valve and replace it with a new one.</td>
</tr>
<tr>
<td>External leakage</td>
<td>Seal defective</td>
<td>Remove the valve and replace the seals</td>
</tr>
<tr>
<td></td>
<td>• Seal at the connection surface is defective</td>
<td>Remove the valve and replace the seals</td>
</tr>
<tr>
<td></td>
<td>• Other leakage</td>
<td>Remove valve and replace it with a new one</td>
</tr>
</tbody>
</table>

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 22049-XN”.

16 Appendix

16.1 List of addresses

Contacts for transport damage, repair and spare parts
Bosch Rexroth AG
Service Industriehydraulik [Industrial Hydraulics]
Bürgermeister-Dr.-Nebel-Straße 8
97816 Lohr am Main
Germany

Phone +49 (93 52) 40 50 60
Email repair.hydraulics@boschrexroth.de

Ordering address for accessories and hydraulic valves
Headquarters:
Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

Phone +49 (93 52) 18 - 0
Email info@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

EC/EU declaration of conformity - Original

Doc. No.: DCTC 31001-010
Date: 04.04.2017

[Box with checkmarks indicating conformity with various directives]

The manufacturer
Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
GERMANY

hereby declares that the product below

Name: Directional seat valve, direct operated, solenoid actuated
Type: M-SED 6.1X...XN...
Marking: II 3G c T3X
II 3D c T140°C X

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

Harmonized Standards applied:

National Standards and Technical Specifications applied:
EC/EU type examination certificate no. of the valve solenoid: BVS 12 ATEX E 062 X
Issued by: DEKRA EXAM GmbH
Dinmedahlstraße 9
44809 Bochum
Deutschland

Further explanations:
Observe the installation notes according to product documentation 22049-XN-B.

Lohr am Main , 04.04.2017 
Place 
Date 
Head of Development
Signature

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

Bosch Rexroth AG, M-SED 6...XN..., RE 22049-XN-B/05.17
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