

# Directional spool valves, direct operated, with solenoid actuation

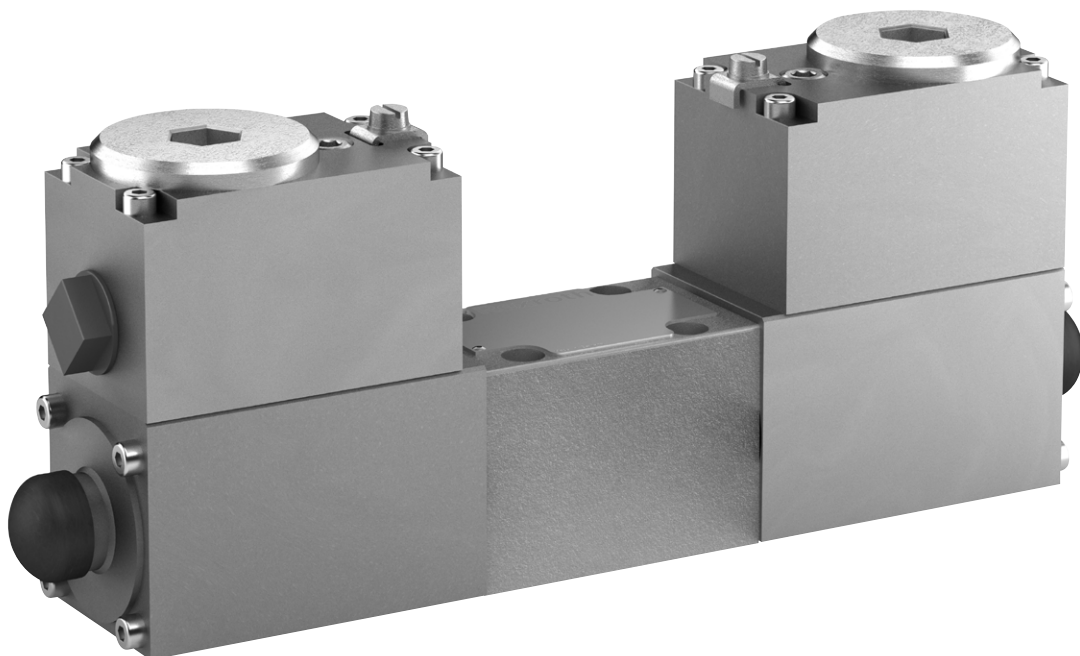
Area of application according to explosion protection directive:  
NEC500 and CEC appendix J: Class I, Division 1  
NEC502 and CEC Section 18: Class II/III, Division 1

Type WE6../.B..VP1...



**Operating instructions**  
**RE23178-VP1-B/06.16**

Replaces: ---  
English



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

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

The original operating instructions were prepared in German.

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# 1 About this documentation

## 1.1 Validity of the documentation

This documentation applies to the following products:


- WE6../B..VP1...

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




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

- Read this documentation thoroughly, especially Chapter 2 “Safety instructions” and Chapter 3 “General notes on damage to property and damage to the product“, before working with the valve.

## 1.2 Required and amending documentation

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

**Table 1: Required and amending documentation**

	Title	Document number	Document type
	Directional spool valves, direct operated, with solenoid actuation	23178-VP1	Data sheet
	General product information on hydraulic products	07008	Data sheet
	Subplates	45100	Data sheet

## 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




This documentation contains safety notes in chapter 2.6 “Product-specific safety instructions” and chapter 3 “General notes on damage to material and the product” as well as before a sequence of activities or instructions for action, which involve the risk of personal injury or damage to equipment. The measures described for averting the hazard have to be observed.

Safety instructions are structured as follows:

 <b>SIGNAL WORD</b>
<b>Type and source of danger!</b> Consequences in case of non-compliance <ul style="list-style-type: none"> <li>▶ Hazard avoidance measures</li> <li>▶ &lt;Enumeration&gt;</li> </ul>

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


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

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

### 1.3.2 Symbols

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

**Table 3: Meaning of the symbols**

Symbol	Meaning
	If this information is not observed, the product cannot be used and/or operated optimally.
▶	Individual, independent action
1. 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
NEC	<i>National Electrical Code</i>
EN	<i>European Standard</i>
ISO	<i>International Organization for Standardization</i>

Abbreviation	Meaning
IEC	<i>International Electrotechnical Commission</i>
RE	Rexroth document
IP	Ingress protection rating
A, B	Hydraulic ports (actuator)
T	Hydraulic port (tank)
P	Hydraulic port (pump)
ANSI	American National Standards Institute
FM	<i>Factory Mutual Research</i>
NPT	American standard pipe thread, tapered
NEMA	<i>National Electrical Manufacturers Association FM</i>

## 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 spool valve with solenoid actuation for intended use in explosive atmospheres.

The product is only intended for professional use and not for private use. Operation according to the intended use also implies that you have read and understood this documentation completely, especially chapter 2 "Safety instructions".

The valve is designed and constructed for the control of oil flows.

The electrical part (solenoid system) complies with NEC 500 and NEC 502 as well as CEC appendix J and section 18. Under "*Information on explosion protection*" in "*Data sheet 23178-VP1*", the area of application, hazardous substance group and temperature class met by the electrical part, are specified. This information can also be found in chapter 5.1.2 "Explosion protection marking" and on the nameplate of the valve solenoid.

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 mounting
- Incorrect transport
- Lack of cleanliness during storage and mounting
- 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.

### **Qualification of personnel for the installation and commissioning of valves in explosive areas**

The personnel must have the following additional qualifications to the extent required to fulfill their tasks:

- Understanding of general principles of explosion protection, types of protection and device marking
- 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. You can 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 notices on the product.
- Persons mounting, operating, demounting 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 mounting and demounting!**

During mounting and demounting work, there may be no explosive atmosphere. When working on 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 heat sources, leaking hydraulic fluid mist due to defective or incompletely installed 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 malfunction such as 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 on hydraulic systems with stored pressure energy (accumulators or cylinders working under gravity), the valve may even be pressurized after the pressure supply has been switched off. During mounting and demounting 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 according to, for example, 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 protection class NEMA 250 or lower.
- ▶ Before mounting, ensure that all seals and caps are 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 features surface protection (see *Data sheet "23178-VP1"*). 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. You should thus take suitable corrosion protection measures.

## 2.7 Notices on the valve use

Observe the following information during project planning:

- ▶ Special application conditions for safe use include that in case of valves with two solenoids, maximally one solenoid is operated at a time in all operating states. The simultaneous operation of both solenoids leads to malfunctions, excessive heating and will result in loss of explosion protection.
- ▶ Be aware of possible pressure intensification if the valve is connected to the chamber on the piston rod side of a differential cylinder. If the outflow of the hydraulic fluid from this chamber is obstructed, pressure on the cylinder may result in a pressure intensification that may damage cylinder chamber, supply line, and valve.
- ▶ To ensure proper functioning, the valve must be bled.
- ▶ Pressure peaks in the joint return line of more than one valve may cause unintended movements of the control spool and thus unintended switching processes. This particularly holds true when valves with detent are used. It is recommended to use separate return lines.
- ▶ If due to the operating conditions to be expected during the switching processes, flows have to be anticipated that exceed the performance limits of the valve that can be seen from the characteristic curve, a throttle insert must be used in channel P for flow limitation.
- ▶ The performance limit specified in “*Data sheet 23178-VP1*” only applies in case of two flows in opposite directions (e.g. flow from P to A and simultaneous return flow from B to T). Due to the flow forces acting within the valves, the performance limit may be considerably lower in applications with only one flow.
- ▶ In the case of valves with symbol A and B (see “*Data sheet 23178-VP1*”), port T must be used as leakage oil connection if the operating pressure exceeds the permissible tank pressure.
- ▶ Ports P, A and B with a 3/2 directional valve or ports P, A, B and T with a 4/2 and 4/3 directional valve are clearly assigned according to their function and must not be arbitrarily exchanged or plugged. The flow is only admissible in the direction of the arrow specified in “*Data sheet 23178-VP1*”.
- ▶ Switching off the valve solenoid results in a voltage peak due to the inductive effect. The valve solenoid already contains an interference protection circuit dampening this voltage peak. However, additional external switching measures have to be taken, if required, to avoid an influence of the residual voltage peak on connected electric circuits. The values for the residual voltage peak depend on the valve solenoid used, see “*Data sheet 23178-VP1*”.

## 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 23178-VP1*"; in particular that the limit values indicated in "*Data sheet 23178-VP1*" 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 the 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 mounted, 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 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 spool valve, direct operated, with solenoid actuation type WE6../.B..VP1...
  - Operating instructions
- 
- ▶ Check the scope of delivery for completeness.
  - ▶ Check the scope of delivery for possible transport damage, see chapter 6 „Transport und Lagerung“.



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 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 23178-VP1*” of your valve.



## 5.1 Product identification

### 5.1.1 Information on the nameplate and the valve solenoid housing

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

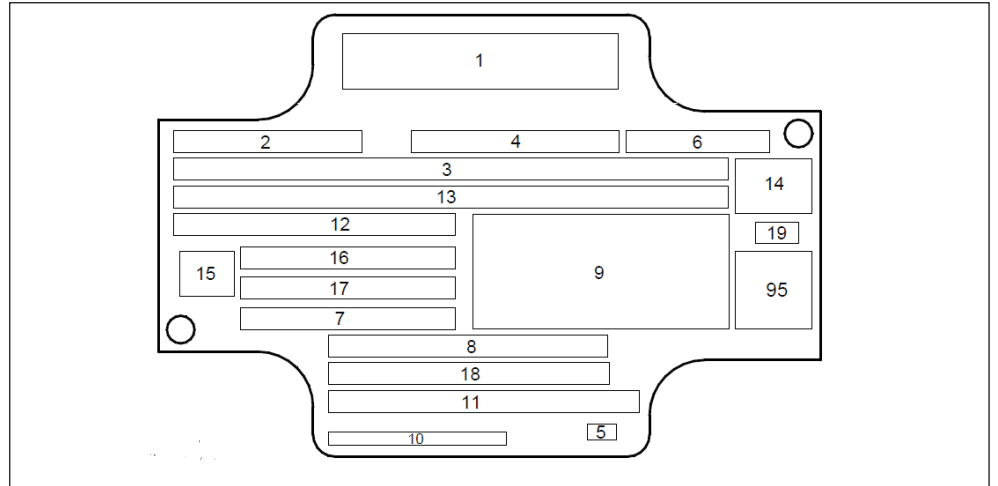


Fig. 1: Nameplate of complete valve

Table 5: Information on the nameplate

No.	Type of information	Information or example
1	Manufacturer's logo	<b>Rexroth</b>
2	Material no. of the valve	e.g. MNR: <b>R901234567</b>
3	Type designation complete valve	e.g. <b>4WE6E6X/BG24NVP1Z2</b>
4	Serial number of the valve	e.g. <b>SN: 0002111</b>
5	Manufacturer's factory number	e.g. <b>7081</b>
6	Date of manufacture (year and week)	e.g. <b>FD: 03W01</b>
7	Maximum operating pressure	<b>pmax 350 bar</b>
8	Ambient temperature range	<b>-20 °C ≤ Ta ≤ +60 °C</b>
9	Hydraulic symbol according to ISO 1219	<b>Graphic</b>
10	Designation of origin	<b>Made in Germany</b>
11	Name and address of the manufacturer	<b>Bosch Rexroth AG D-97816 LOHR</b>
12	Customer's or production order number	e.g. <b>123456789012345678</b>
13	---	---
14	---	---
15	---	---
16	---	---
17	---	---
95	Rexroth QR code	<b>QR code</b>

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

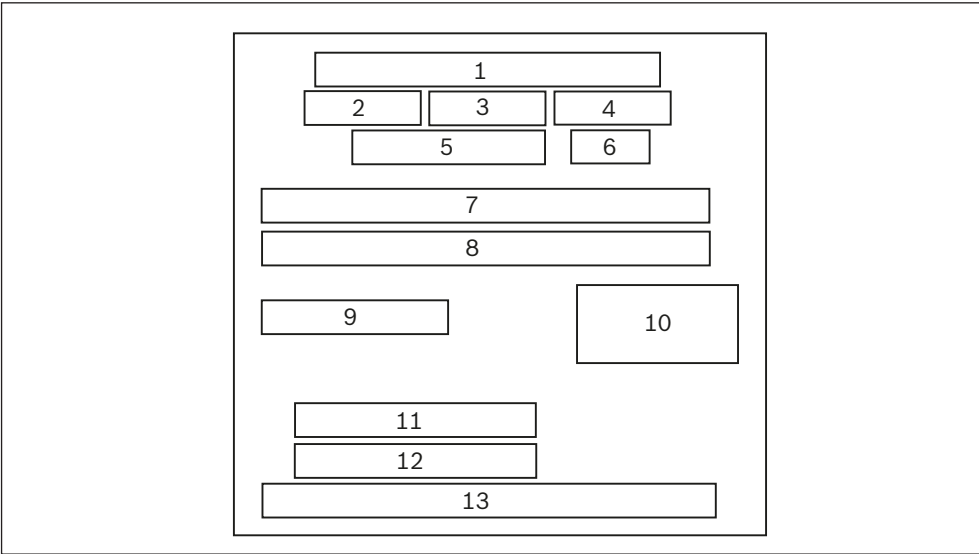



Fig. 2: Solenoid nameplate

Table 6: Information on the nameplate

No.	Type of information	Information or example
1	Type designation of the valve solenoid	e.g. xx EX21 047A A012
2	Nominal input voltage	e.g. 24 VDC
3	Resistance	e.g. 28.5 Ohm
4	Maximum current	e.g. 0.55 A
5	Bosch Rexroth material number	e.g. R901234567
6	Date of production	e.g. 588
7	Ex marking according to NEC500 and CEC appendix J	Cl. I, DIV. 1, Grps. B,C,D T4
8	Ex marking according to NEC502 and CEC section 18	Cl. II/III, DIV. 1, Grp. E,F,G T4
9	Protection class according to NEMA / IEC 60529	Type 4X / IP66
10	Explosion protection mark	
11	External fuse protection	$I_N \leq 3 \times I_G$
12	Admissible ambient temperature range	$-20\text{ °C} \leq T_a \leq +60\text{ °C}$
13	Address of the valve solenoid manufacturer	Schienle GmbH, D-88682 Salem Germany

### 5.1.2 Explosion protection marking

The valve is intended for use in potentially explosive atmospheres according to:

- NEC500 and CEC appendix J: **Class I, Division 1, Groups B,C,D T4**
- NEC502 and CEC Section 18: **Class II/III, Division 1, Groups E,F,G T4**



For a detailed explanation on explosion protection marking, please refer to table 7, table 8 and table 9.

**Table 7: Explanation on explosion protection marking - Part 1**

Explosion protection marking	Abbreviation	Explanation
according to NEC500 and CEC appendix J	Class I	Flammable gases, vapors and fluids
<b>Class I, Division 1, Groups B,C,D T4</b>	Division 1	Areas where explosive atmospheres of flammable gases, vapors or fluids are continuously present or present for long periods under normal operating conditions.
	Groups B,C,D	Hazardous substance groups Air/gas mixture with hydrogen Air/gas mixture with ethylene Air/gas mixture with propane
	T4	Maximum surface temperature: 135 °C

**Table 8: Explanation on explosion protection marking - Part 2**

Explosion protection marking	Abbreviation	Explanation
according to NEC502 and CEC section 18	Class II	Flammable dusts
<b>Class II, Division 1, Groups E,F,G T4</b>	Division 1	Areas where explosive atmospheres of flammable dust are continuously present or present for long periods under normal operating conditions.
	Groups E,F,G	Hazardous substance groups Air/metal dust mixture Air/carbon dust mixture Air/grain dust mixture
	T4	Maximum surface temperature: 135 °C

**Table 9: Explanation on explosion protection marking - Part 3**

Explosion protection marking	Abbreviation	Explanation
according to NEC502 and CEC section 18	Class III	Flammable fluffs and fibers
<b>Class III, Division 1</b>	Division 1	Areas where explosive atmospheres of flammable dust are continuously present or present for long periods under normal operating conditions.

## 6 Transport and storage

### 6.1 Transporting the valve



#### CAUTION

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

When improperly handled, the valve may fall down and cause injuries and / or damage, since the parts be, for example, 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

Hydraulic valves are delivered in an unobjectionable state.



For transporting and storing the product, always observe the environmental conditions specified in “Data sheet 23178-VP1”. 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 may 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 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 demounting

If a dismantled 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 Mounting

### CAUTION

#### **High pressure!**

Risk of injury due to parts being ejected during works on 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.
- ▶ Installation 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 to the valve!**

Any change to 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.

### 7.3 Installation conditions

- ▶ For installing the product, always observe the environmental conditions specified in “Data sheet 23178-VP1”.
- ▶ 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 service life of the valve.
- ▶ Observe the installation position specified in “Data sheet 23178-VP1”.

### 7.3.1 Requirements on the valve subplate

## ! WARNING

### 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 10: Minimum values of the valve subplates**

Position	Minimum value
Thermal conductivity	at least 38 W/mK
Minimum size L x W x H for individual mounting	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	55 mm

## 7.4 Before mounting

## ! 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 nameplate of the solenoid system comply with the information in these operating instructions.
- ▶ Check whether you have the correct valve type by means of the type designation on the nameplate of the valve.
- ▶ Check whether the “Class, Division” specifications 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 mount 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 11: Valve mounting screws

Type	Quantity	Friction coefficient according to VDA 235-101	Material number
ISO 4762-M5x50-10.9-flZn-240h-L	4	0.09...0.14	R913000064

Subplates



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

Throttle inserts

Table 12: Throttle inserts

Throttle diameter	Material number
0.8 mm	R900152065
1.0 mm	R900152066
1.2 mm	R900152067

Locating pin

Table 13: Locating pins for porting pattern according to ISO 4401-03-02-0-05

Dimensions	Material number
3 × 8 according to EN ISO 8752	R90005694

Ordering address for accessories and valves

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



## 7.7 Mounting the valve

### 7.7.1 Installing the valve in the system

#### **WARNING**

##### **Faulty fitting of plug screws and lines!**

Improperly fastened plug screws and lines may become loose during subsequent operation, fly around due to the pressure and thus cause serious injury!

- ▶ 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 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 mount the valve according to the mounting specifications using suitable mounting aids.
- ▶ Only mount the valve to 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 on the valve.

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

##### **Leaking hydraulic fluid!**

Hydraulic fluid may leak during mounting and demounting of the valve.

Consequently, persons may slip or fall.

- ▶ Only remove the protective caps of valve directly before the mounting the valve.
- ▶ After demounting, 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 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.



To ensure proper functioning, the valve must be bled.

1. Before any mounting and demounting work starts, the surroundings must be cleaned so that no dirt can get into the oil circuit. Only lint-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 23178-VP1*”). Remove the protective plate from the valve. Keep it safe for returns in case any repairs become necessary later.
4. Dry the valve connection surface using suitable cleaning materials.
5. Check the seal rings at the valve connection surface for completeness. Other sealants are not admissible.
6. Check whether 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.



For reasons of stability, use exclusively the valve mounting screws given 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 mounting on comparable gray cast iron installation surfaces, tighten all four valve mounting screws using a torque power screwdriver (tolerance  $\pm 10\%$ ) and a tightening torque of 7 Nm (5.2 ft-lbs)  $\pm 10\%$ . 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 reduces the service life of the valve and of the complete machine or system.

- Mount lines and hoses without stress.

1. De-pressurize 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

#### **Explosion hazard caused by improper mounting!**

Improper mounting may cause explosion!

- ▶ For application of the valve in the intended explosion protection atmosphere - refer to chapter 5.1.2 "Explosion protection marking" -, a conduit seal has to be installed in the pipeline within 450 mm (downstream of the valve solenoid).

#### **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 installation, before pulling and connecting electrical connections and all other installation work. Secure the electrical equipment against restarting.
- ▶ 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 equipotential bonding according to NEC250 (comparable with 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 solenoid's rated current (max.  $3 \times I_G$  according to IEC 60127-2/V) 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 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 interconnected separately.

## ! WARNING

### Explosion hazard caused by improper mounting!

In the connection compartment of the valve solenoid and at the pipeline inlet (NPT 1/2"), there are no provisions for the safe connection of shielding or armoring. The use of connection lines with shielding or armoring may lead to accidental energization which constitutes an explosion hazard!

- ▶ Only use connection lines without shielding or armoring.



For information on the prescribed pre-fuse, refer to "Data sheet 23178-VP1".

## ! 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 are leak-proof.

- ▶ The connection lines requires a minimum temperature rating of 105 °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.
- ▶ Avoid bends in the connection lines and litz wires in order to avoid short-circuits and interruptions.
- ▶ Use finely stranded conductors only if they are equipped with pressed-on wire end ferrules.
- ▶ Use only lines which satisfy the requirements for the clamping ranges of the connection terminals and pipeline inlet (NPT 1/2"), see "Data sheet 23178-VP1".
- ▶ When installing the component, ensure leak-tightness between pipeline inlet (NPT 1/2") and connection compartment. For installation of the pipeline system, use suitable pipe sealing material at least in compliance with NEMA type 4x.
- ▶ The pipeline inlet (NPT 1/2") is provided by the customer and has to comply with protection class NEMA type 4X as a minimum.



Connection of the valve solenoid is polarity-independent.

**Connecting connection lines to valve solenoids with terminal compartment**

1. De-energize the relevant system part.
2. Open the connection compartment (internal hexagon, wrench size 14 mm)
3. Remove the outer sheath of the connection line and the insulation of the individual conductors. Press the wire end ferrule on the individual conductors.



Stripping length operating voltage and protective earthing conductor (internal)  
5.5...6.5 mm  
Stripping length connection for potential equalization conductor (external)  
9...10 mm

4. Remove the plug at the inlet of the connection line into the connection compartment.
5. Lead the connection line through the pipeline inlet (NPT 1/2“) into the terminal compartment.

**WARNING!** Improper tightening of the pipeline connection may lead to damage to the valve!

- When tightening the pipeline connection, always apply a suitable tool for counterholding.

6. Tighten a suitable pipeline connection at the inlet to the pipeline connection at the solenoid.

**Table 14: Connection data of the pipeline inlet (NPT 1/2“)**

Internal connection thread	1/2“ NPT
----------------------------	----------

7. Tighten the clamping screws to fix the line ends.  
Tightening torques of the clamping screws:

**Table 15: Tightening torques**

Operating voltage connection	3.54 lb in. +0.88 lb in. (0.4 +0.1 Nm)
Connection for protective earthing conductor	3.54 lb in. +0.88 lb in. (0.4 +0.1 Nm)
Externally at the solenoid: External connection for potential equalization conductor	17 lb in. +3.5 lb in. (2 +0.4 Nm)

**WARNING!** Improper tightening of the plug screw of the connection compartment may lead to damage at the valve!

- When tightening the plug screw, always apply a suitable tool for counterholding.

8. Mount the plug screw (internal hexagon, wrench size 14 mm) with seal beneath at the connection compartment.  
Tightening torque: 354 lb in. (40 Nm)

## 8 Commissioning

### **WARNING**

#### **Faulty mounting!**

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 replace defective seal rings immediately.
- ▶ Wear personal protective equipment during initial commissioning.
- ▶ The solenoid system may only be put into operation at a valve with connected protective earthing conductor and connection for potential equalization conductor.
- ▶ The valve may only be put into operation with correctly tightened plug screw (tightening torque 354 lb in., 40 Nm)

#### **Inadmissibly high operating pressure!**

In hydraulic applications with different area ratios, the hydraulic pressure is increased and may - in case of incorrect rating - 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 connection compartment 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 at 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”.

#### 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.
- Seals are subject to a natural aging process, so check seals for damage and replace them, if necessary, every time you open the connection compartment. This check has to be carried out at least **every 3 years from the date of manufacture of the valve**. For order details for seal kits, please refer to chapter 10.6 “Spare parts”.



Valve-specific internal leakage may occur but does not have any influence on the functionality of the valve.



## 9 Operation

### 9.1 General information

#### **WARNING**

##### **Explosion hazard caused by overheating!**

Loss of explosion protection due to overheating.

- ▶ In case of valves with two solenoids, maximally one of the solenoids may be energized at a time.
- ▶ Simultaneous power supply of several valves in bank mounting is possible if the ambient temperature does not exceed 50 °C.
- ▶ An ambient temperature range of -20 °C...+60 °C is to be complied with.
- ▶ A maximum hydraulic fluid temperature of +70 °C is to be complied with.
- ▶ Ensure unobstructed heat dissipation at the solenoid. Do not cover the solenoid and protect it from direct sunlight.

##### **Explosion hazard caused by overheating!**

Dust and dirt accumulations may lead to overheating and explosion!

- ▶ Regularly remove dust and dirt accumulations as required.

#### **CAUTION**

##### **Loud noise!**

In case of an unfavorable arrangement 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 23178-VP1*”. 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

### ***NOTICE***

**Danger of damage to property!**

If the manual override is operated in an uncontrolled manner, there is a risk of damage to 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 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.
- ▶ 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 when 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.

## 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 hydraulic fluid 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 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.

### 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 ensures that any deficiencies which 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 nameplate, see chapter 5.1.1 "Information on the nameplate 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 using a damp cloth.

3. Check all external fittings for completeness and tight seat.
4. Check pipeline inlet (NPT 1/2"), plug screw, external earthing connection and connection line for tight seat.
5. Check the valve for external leakage. Replace the seals, if required, see chapter 10.5 "Rectifying external leakages".
6. Open the connection compartment and replace any damaged sealing devices, if required.
7. Check the inside of the connection compartment for corrosion. Corrosion is an indication of leakage. In case of visible corrosion, remove the valve and have it repaired.
8. Check the internal lines and litz wires of the valve solenoid for visible damage. In case of visible damage, remove the valve and have it repaired.
9. Check all screws and connections for tight seat.
10. Check all connection lines for damage. If there is visible damage, replace the connection lines.

**WARNING!** Improper tightening of the plug screw of the connection compartment may lead to damage at the valve!

- When tightening the plug screw, always apply a suitable tool for counterholding.

11. Fit the plug screw (internal hexagon, wrench size 14) with seal beneath at the connection compartment.

Tightening torque: 354 lb in. (40 Nm)

### 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 "Demounting and removal".
2. Check the contact surfaces for the seal rings at the valve for cleanliness and 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. Mount the valve at the contact surface, see chapter 7 "Mounting".

10.6 Spare parts

Seal kit for the valve connection surface

Table 16: Replacement seal kit for the valve connection surface

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



Ensure suitability of the sealing materials for the hydraulic fluid used! See “Data sheet 23178-VP1”.

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

# 11 Demounting and removal

## **WARNING**

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

When working on pressurized or energized system parts, there is the danger of injury by leaking hydraulic fluid or electric current.

- ▶ Before demounting, 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 demounting and replacement 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 demounted valve may fall down and cause injuries.

- ▶ During demounting, 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 mounting screws of the valve.
5. Remove the valve mounting screws and remove the valve from the connection 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 7 "Mounting".

## 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. Hydraulic valves have 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 hydraulic valves basically consist 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.
- ▶ With valves with only one valve solenoid, this valve solenoid 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 an overview of the functions of the 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 17: Fault table**

Error	Possible cause(s)	Remedy
Valve does not switch	Electrical connection interrupted, no current continuity	
	• Cable break	Replace the 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. See chapter 9.2 “Operating the manual override”. If this fails: 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 them using a manual torque wrench. See also chapter 7 “Mounting”.
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.

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Technical data

For the technical data of your valve please refer to “Data sheet 23178-VP1”.

## 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](mailto: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 (9352) 18 - 0  
Email [info@boschrexroth.de](mailto:info@boschrexroth.de)

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

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