rexroth
A Bosch Company

Pressure relief valve, direct operated

(Safety valve according to Pressure Equipment Directive 2014/68/EU)

Type DBD...1X/..E

CE

Operating instructions
RE 25402-B/10.21

Replaces 25402-B/03.20
English
Mat. no. R901557680

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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.

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:

- Type-examination tested safety valves according to Pressure Equipment Directive 2014/68/EU, type DBD...-1X/...E

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

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

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

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

1.2 Required and amending documentation

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

Table 1: Required and amending documentation

	Title	Document number	Document type
🕮	Hydraulic valves for industrial applications	07600-B	Operating instructions
🕮	Pressure relief valve, direct operated (NG 6-30)	25402	Data sheet
🕮	Pressure relief valve, direct operated (NG 4)	25710	Data sheet
🕮	Setting certificate	is included in the scope of delivery	Certificate
🕮	EU declaration of conformity	is included in the scope of delivery	Certificate

1.3 Representation of information

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

1.3.1 Safety instructions

In this documentation, safety instructions are included in chapter 2.6 "Product-specific safety instructions" and in chapter 3 "General information on damage to property and damage to product" and whenever a sequence of actions or instructions is explained which bear the danger of personal injury or damage to property. The described hazard avoidance measures must be observed.

Safety instructions are set out as follows:

⚠ SIGNAL WORD

Type and source of danger!
Consequences in case of non-compliance
- ▶ Hazard avoidance measures
- ▶ <Enumeration>

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

Table 2: Risk classes according to ANSI Z535.6-2011

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

1.3.2 Symbols

The following symbols indicate 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 Designations

The following designations are used in this documentation:

Table 4: Designations

Designation	Meaning
AD2000	Rules regarding the application and implementation of the Pressure Equipment Directive

1.3.4 Abbreviations

The following abbreviations are used in this documentation:

Table 5: Abbreviations

Abbreviation	Meaning
EN	European Standard
DIN	Deutsche Industrienorm (German Industry Standard)
ISO	International Organization for Standardization
DBD	Pressure relief function, direct operated
EU	European Union
SO	Special version
VDMA	German Machinery and Plant Manufacturing Association

2 Safety instructions

2.1 General information on this chapter

The product has been produced according to the rules AD 2000. However, there is still the risk 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 valves comply with safety category B according to EN ISO 13849-1.
Store the safety valve only in a dry and dust-free environment which is free from corrosives and fumes and which is subject to a low degree of air humidity and only minor temperature variations. For storage exceeding 12 months, we recommend filling in clean conservation oil, see also DIN 7716.
The factory corrosion protection is sufficient if the valve is stored under the stated conditions and if no condensate or leakage water may enter the safety valve.
The safety valve may only be operated with the hydraulic fluids stated in *"Data sheet 25402 and/or 25710"*.
Please consult us for information on the use of the product with other hydraulic fluids.
The safety valve may only be operated in a technically unobjectionable condition and it may only be stored, operated and maintained according to the technical data, operating and environmental conditions indicated in *"Data sheet 25402 and/or 25710"*. Particularly the limit values specified in the Technical data must not be exceeded.
The valve may only be used with other connection, application and performance data than those defined in these operating instructions with the written approval by Bosch Rexroth AG.
Changes at the product are only admissible within the scope specified in these operating instructions.
Any safeguards fitted by Bosch Rexroth AG have to be present, properly installed and fully functional, unless this is not appropriate for setup or maintenance operation. Their position must not be changed; they must not be circumvented or made ineffective.

2.3 Improper use

When using the safety valve in a potentially explosive atmosphere (ATEX) observe the requirements in *“Sales information 07011 (Use of non-electrical hydraulic components in a potentially explosive atmosphere (ATEX))”*.
The safety valve may not be used if the maximum possible flow of the system in all imaginable operating states exceeds the value indicated as maximum admissible flow in the technical data for the relevant valve type. For the maximum admissible flow, please refer to the characteristic curves in *"Data sheet 25402 and/or 25710"* and chapter 9.3 "Operation with counter pressure in the discharge line".
The safety valve must not be used as high-response valve.
The safety valve must not be operated with corrosive operating media or in corrosive environments.
A sealing at the safety valve, the locking paint and/or the safety cap which cannot be disassembled in non-destructive manner must not be removed by the machine end-user.
Only persons authorized by accredited testing authorities according to the EU Pressure Equipment Directive may remove the lead seal and/or the safety

cap which cannot be disassembled in non-destructive manner or re-adjust the response pressure.
The safety valve must not be disassembled to an extent exceeding the one specified in these operating instructions.
Name plates and product identifications may not be overlacquered but must be kept in a readable condition.

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics, electrics and hydraulics 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.

Bosch Rexroth offers measures supporting the training in specific fields. Please find an overview of the training contents on the Internet at:
`http://www.boschrexroth.de/didactic`

2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country in which the product is used/applied.
- Exclusively use Rexroth products in technically perfect condition.
- Observe all notices on the product.
- Persons assembling, operating, disassembling or maintaining Rexroth products must not be under the influence of alcohol, other drugs or medications influencing the ability to react.
- Only use original Rexroth accessories and spare parts in order to exclude hazards to persons due to unsuitable spare parts.
- Comply with the technical data and environmental conditions indicated in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating conditions when being used which in turn could cause personal injuries and/or damage to property. Therefore, 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 application.

2.6 Product-specific safety instructions

The following safety instructions apply to chapters 6 to 14.

⚠ WARNING

Pressurized system parts and leaking hydraulic fluid!

When working at hydraulic systems with stored pressure energy (accumulator or cylinders working under gravity), valves may even be pressurized after the pressure supply has been switched off. During assembly and disassembly works, the safety 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 leaking hydraulic fluid jet.

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

Non-compliance with functional safety!

Hydraulic valves control 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.

Faulty mounting!

Mounting of the safety valve with valve mounting screws of reduced stability, insufficient mounting at blocks and plates with insufficient stability may cause the safety valve to become loose and fall down. Consequently, hydraulic fluid may leak and lead to personal injuries and/or damage to property. Safety valves with high weight may bruise or kill persons. Special care must be taken with safety valves with suspended installation.

- Completely assemble the safety valve according to the assembly specifications by means of suitable assembly aids.
- Only assemble the safety valve at valve installation surfaces suitable for the weight of the valves.
- Comply with tightening torques and screw stabilities.

Easily inflammable hydraulic fluid!

In connection with fire or other heat sources, leaking hydraulic fluid mist may lead to fire or explosions due to defective or incompletely mounted safety valves and their connections.

- Do not use the safety valve in areas with open fire and only at a sufficient distance to hot heat sources.

⚠ WARNING

High weight and sharp edges of the safety valve!

The described safety valve may be very heavy. In case of improper handling, it may fall down and cause serious injuries and/or crush injuries as the safety valve may e.g. by sharp-edged, heavy, oily, loose or bulky.

- If necessary, transport the safety valve to the intended places using suitable lifting gear.
- Provide for a stable position during transport to the place of installation.
- Wear personal protective equipment while transporting and assembling the safety valve.
- Comply with the national laws and regulations regarding occupational health and safety for the transport.

Hot surface!

Risk of burning!

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

⚠ CAUTION

Contaminated hydraulic fluid!

Contamination in the hydraulic fluid may cause functional failures of the safety 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 safety valve over the entire operating range.

Exceedance of the maximum temperatures!

Use of the safety valve outside the temperature intended for that purpose may lead to functional failures.

- Only use the safety valve within the environmental and fluid temperatures intended for that purpose.
- Immediately exchange seals in case of leakage at the connection surfaces.

Leakage in case of incorrect working temperatures!

Use of the safety valve outside the temperature intended for that purpose may lead to permanent leakage at the safety 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 safety valve within the environmental and fluid temperatures intended for that purpose.
- In case of leakage, immediately exchange damaged seals or the safety valve.

Contact with salt water leads to increased corrosion at the safety valve. Thus, mounting screws and plug screws as well as movable components may be chemically corroded and damaged. So take suitable corrosion protection measures.

2.7 Personal protective equipment

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

2.8 Obligations of the machine end-user

The operator of the Bosch Rexroth safety valve is responsible that the safety valve is only used according to the intended use as defined in these operating instructions.

- 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 safety valve are complied with.
- the safety valve is only stored, operated and maintained according to the Technical data, operating and environmental conditions indicated in these operating instructions, in particular that the limit values indicated in the Technical data are not exceeded.

If leakage at the valve can lead to water or soil contamination, the valve must be put into a suitable collecting pan.

IT-Security

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology. Accordingly, Bosch Rexroth products and their properties must be considered as components of installations, systems and machines for their holistic IT security concept.
Unless otherwise documented, Bosch Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

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

The warranty only applies to the supplied configuration.

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

NOTICE

Inadmissible mechanical movement!

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

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

Dirt and foreign particles in hydraulic components!

Penetrating dirt and foreign particles lead to wear and malfunctions. Safe function of the safety valve is therefore no longer ensured.

- ▶ During assembly, ensure utmost cleanliness in order to prevent foreign particles such as welding beads or metal chips from getting into the hydraulic lines.
- ▶ Do not use linting 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.

Wear!

Wear may lead to malfunctions.

- ▶ Carry out the prescribed maintenance works.

4 Scope of delivery

The scope of delivery includes:

- Type-examination tested safety valve
- Operating instructions
- Setting certificate
- Declaration of conformity

- ▶ Check the scope of delivery for completeness.
- ▶ Check the scope of delivery for possible transport damage, see section 6 "Transport and storage".

In case of complaints, please contact Bosch Rexroth AG, see section 14.2 "List of addresses".

Valve mounting screws are not included in the scope of delivery; they can, however, be ordered separately. (see chapter 7.5 "Accessories").

5 Product information

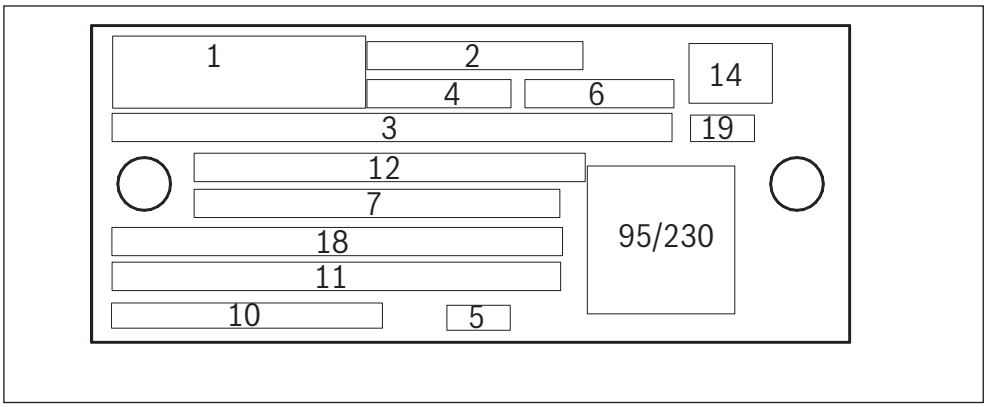
For information on the performance and product description please refer to "Data sheet 25402 and/or 25710" of your valve.

5.1 Product identification

5.1.1 Screw-in cartridge valve

With versions with safety cap, the name plate is integrated into the latter. With versions with rotary knob or hand wheel, the name plate is attached to the sealing. The name plate is also present at safety valves for subplate mounting and at safety valves for threaded connection and can always be found at the attached screw-in cartridge valve.
The name plate comprises the following information:

Table 6: Name plate of screw-in cartridge valve



No.	Type of information
1	Manufacturer's logo
2	Material no. of the valve (=order no.)
3	Type designation of the complete valve
4	Valve serial number [1]
5	Manufacturer's factory number
6	Date of manufacture
7	Performance characteristics
10	Designation of origin
11	Name and address of the manufacturer
12	Customer's or production order number [2]
14	CE mark [3]
18	Component marking
19	Reference number of the testing authority
20	Test stamp
21	Assembly stamp
95	Bar code (data matrix)
230	Bar code (QR)

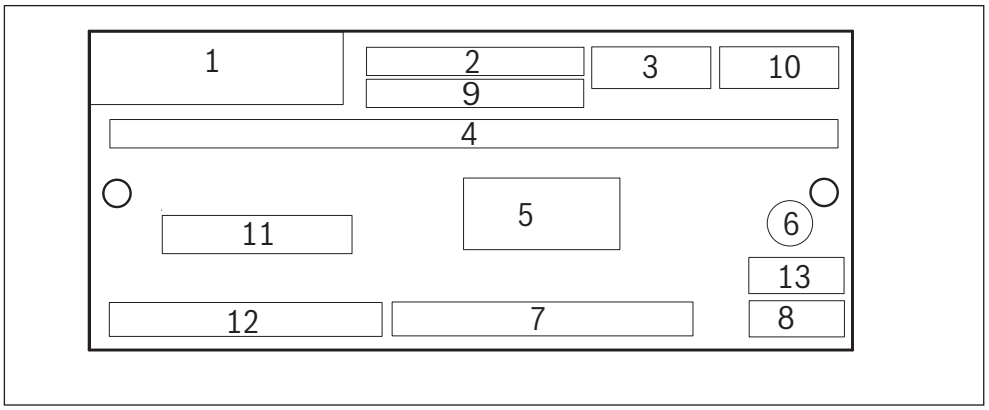
[1] Consecutively assigned code number for safety valves from one production order.

[2] Consecutively assigned number. This number is identical with the valve no. in the related certificate regarding the setting of safety valves (setting certificate) and thus allows for the unambiguous assignment of the valve to this setting certificate. If one production order comprises several identical safety valves, the same number may be assigned to all safety valves from this production order. The related setting certificate will then apply to all identical safety valves of this production order and to the customer’s or production order number specified in the setting certificate, the total number x of the valves will be added in the form /1 – x.

[3] Alternatively, the CE mark may also be embossed at the valve body.

5.1.2 Valve for subplate mounting and valve for threaded connection

In addition to the name plate, which is attached to the screw-in cartridge valve (for details, see chapter 5.1.1. "Screw-in cartridge valve"), safety valves which are supplied for subplate mounting or threaded connection have another name plate at the housing: It contains the following information:



No.	Type of information
1	Manufacturer's logo
2	Material no. of the valve (=order no.)
3	Date of manufacture [1], (coded, for internal tests)
4	Type designation complete valve
5	Hydraulic symbol according to ISO 1219 (for pressure relief valve)
6	CE mark
7	Designation of origin
8	Manufacturer's factory number
9	Serial number of the valve
10	Bar code (DMC/QR)
11	Customer's or production order number [2]
12	Component marking
13	Reference number of the testing authority

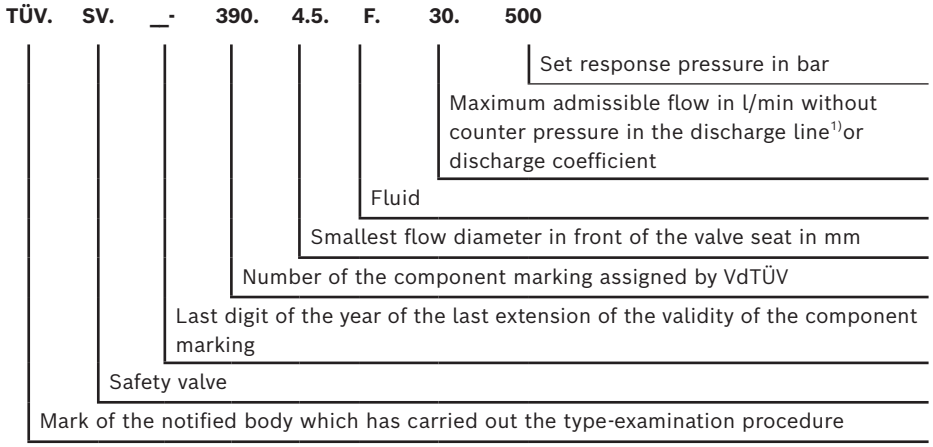
[1] The uncoded date of manufacture of the complete valve can always been seen from the name plate of the screw-in cartridge valve.

[2] Consecutively assigned number. This number is identical with the valve no. in the related certificate regarding the setting of safety valves (setting certificate) and thus allows for the unambiguous assignment of the valve to this setting certificate. If one production order comprises several identical safety valves, the same number may be assigned to all safety valves from this production order. The related setting certificate will then apply to all identical safety valves of this production order and to the customer’s or production order number specified in the setting certificate, the total number x of the valves will be added in the form /1 – x.

5.2 Component marking

Type-examination tested safety valves bear a coded component marking. The component marking always comprises the identical elements, the meaning of which is shown in the following example:

Table 7: Example of component marking



1) See also *"Data sheet 25402 and/or 25710, Characteristic curves: Type-examination tested safety valves"*

5.2.1 Limitations of use

The safety valves may only be operated within certain operating limits. The maximum admissible flow in l/min or the discharge coefficient is always the last but one figure of the component marking attached to the safety valve.

Table 8: Limitations of use

Valve size	Response pressure p_A in bar	maximum flow q_{Vmax} in l/min
NG4	60...315	10
NG4	320...500	17
NG6, 10, 20, 30	see characteristic curves and component marking	see characteristic curves and component marking

6 Transport and storage

6.1 Transporting the product

Bosch Rexroth hydraulic valves are high-quality products. In order to prevent damage at the safety valve, transport the safety valves in the original packaging or with equivalent transport protection.

⚠ CAUTION

Unsecured safety valves toppling over or falling down!

Unsecured safety valves may topple over or fall down and bruise or kill persons if they are heavy.

- Use the original packaging for transport.
- Provide for a stable position during transport to the place of installation.
- Use only suitable lifting gear for transport.
- Wear your personal protective equipment.
- Comply with the national laws and regulations regarding occupational health and safety and transport.

Heavy components!

When lifting a safety valve with high weight, there is the risk of health hazards.

- Use a suitable lifting, putting down and moving technique.
- Products >15 kg are usually provided with lifting eyes for transport by means of lifting gear. Use these lifting eyes.
- Transport the safety valve complying with the safety instructions and using a forklift or suitable lifting gear. Make sure that the lifting capacity of the lifting gear is sufficient.
- Observe the weight of the safety valve, the center of gravity and the intended mounting and attachment points when transporting the valve.
- During transport, secure the safety valve against toppling over.
- Do not jam the safety valve.
- Put the safety valve carefully onto the contact surface in order not to damage it.

Sharp edges!

Risk of cut injuries.

- Wear suitable protective equipment when transporting the safety valve.
- Secure the transported goods and the means of transport by means of suitable measures.

6.1.1 Transport using lifting gear

In transport, consider the following aspects:

- Properties of the load (e.g. weight, center of gravity, mounting and attachment points).
- Type of attachment or pick-up of the load.
- Ensure that the lifting gear's lifting capacity is sufficient in order to transport the safety valve without risk.
- Use textile attachment devices according to DIN EN 1492-2.

More information regarding the transport is available from Bosch Rexroth. More information regarding the transport using chain hoists is also available in the data sheet 07600-B, chapter 6 "Transport and storage".

Notify your responsible sales contact person 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 safety valve

Safety valves are delivered in an unobjectionable state.

For transportation and storage of the product, always observe the environmental conditions specified in *"Data sheet 25402 and/or 25710"*. Improper storage may damage the safety valve.

Safety 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.
- ▶ The storage facilities must be free from etching substances and gases.
- ▶ Do not store the safety valve outdoors but in a well-ventilated room.
- ▶ Protect the safety valve against humidity, particularly ground humidity. Store the safety valve on a shelf or on a pallet.
- ▶ Store the safety valve protected against impacts and sliding and do not stack it.
- ▶ Safety valves may be very heavy. In this connection observe the admissible load-bearing capacities of your storage system.
- ▶ Store the safety valve in the original packaging or comparable packaging in order to protect it from dust and dirt.
- ▶ All ports at the safety valve must be closed with closing elements.
- ▶ After opening the transport packaging, it must be closed properly again for the storage. Use the original packaging for storage.

Procedure after the expiration of the maximum storage time of 12 months

After expiry of the maximum storage time, we recommend having the safety valve checked by your competent Rexroth service. In case of questions regarding spare parts, please contact the Rexroth service responsible for your safety valve, see chapter 14.2 "List of addresses".

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 safety 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.

Leaking hydraulic fluid!

Slip hazard!

- Do not remove the protective covers until assembly.
- Immediately remove leaking oil.

Insufficient assembly space!

Risk of jamming and bruising! Risk of component damage! Insufficient installation space may lead to jamming or abrasions in case of actuation or adjustment works at the safety valve. Components cannot be properly mounted or might be damaged.

- Make sure that the assembly space is sufficient.

7.1 Unpacking

⚠ CAUTION

Parts falling out!
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.

The response pressure has been set by the manufacturer and secured by means of lead seal and/or safety cap.

- Check whether the sealing and/or the safety cap is undamaged.
- Check whether the point with the locking paint is undamaged.

Dispose of the packaging in accordance with the national conditions of your country.

7.2 Installation conditions

- For installing the product always observe the environmental conditions demanded in *"Data sheet 25402 and/or 25710"*.
- It is imperative to provide for absolute cleanliness. The safety valve must be protected from dirt during installation. Contamination of the hydraulic fluid may considerably reduce the life cycle of the safety valve.

7.2.1 Installation position

The installation position is not relevant.

7.3 Painting the valve housing

- Completely protect the hydraulic ports against paint application by screwing-in plastic screw-in plugs.
- Protect the mounting bores against paint application.
- Mask the flange surfaces carefully before painting so that no dirt or paint may enter.
- Protect the name plate against paint application.
- Protect existing information signs against paint application.
- When removing the paint protection and the plastic screw-in plugs make sure that no paint chips or other foreign particles enter the safety valve.

7.4 Necessary tools

In order to assemble the safety valve, you need standard tools only. Apart from that, you need a manual torque wrench to tighten the valve mounting screws.

7.5 Accessories

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

Table 9: Valve mounting screws for subplate mounting

Valve type + size	Component marking	Dimensions	Material number
DBD6	849	M6 x 50	R913048088
DBD10	850, 390	M8 x 70	R913014548
DBD20	361	M8 x 90	R913069227
DBD30	362	M10 x 110	R913059433

Further details on the valve mounting screws for subplate mounting are contained in table 11.

7.6 Prior to assembly

⚠ WARNING

Faulty assembly of valve mounting screws!

Improperly mounted valve mounting screws may become loose during subsequent operation and fly around due to the pressure and thus cause serious injuries.

- Only pressurize your system after all valve mounting screws have been completely and properly mounted according to the specifications.

⚠ CAUTION

Leaking hydraulic fluid!

Hydraulic fluid may leak during assembly and disassembly of safety valves. Consequently, persons may slip or fall.

- Immediately remove hydraulic fluid that has leaked out.

Sharp edges!

Safety valves may have sharp edges at the valve openings. During transport or assembly/disassembly, cutting or abrasive injuries may result.

- Wear corresponding protective clothing during transport.
- Do not reach into valve openings!

NOTICE

Wear, tear and malfunctions!

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

- Always ensure absolute cleanliness.
- Install the safety valve free from any pollution.
- Make sure that all connections, hydraulic lines and attachment parts are clean.
- When sealing the connections, make sure that no contamination can get into the system.
- Ensure that no cleaning agents are able to penetrate the hydraulic system.

Have sufficiently dimensioned collecting containers, non-linting cloth and medium-binding materials ready in order to collect or bind leaking hydraulic fluid.

- Check the scope of delivery for completeness and transport damage.
- Compare the material number and the designation (type code) with the details in the order confirmation. If the material number of the safety valve does not match the number in the order confirmation, contact the Rexroth service for clarification; for the address see chapter 14.2 "List of addresses".

- Check whether the information in the setting certificate and in the declaration of conformity correspond to the data indicated at the safety valve and whether they comply with the requirements of the system.
- Check whether the response pressure indicated at the safety valve (last number of the component marking) and the maximum flow (second to last number of the component marking), if indicated, comply with the requirements of the system.
- The value for the maximum admissible flow which is specified for the relevant safety valve in the Technical data must always be higher than the maximum possible flow of the system at the selected response pressure. See also *"Data sheet 25402 and/or 25710, Characteristic curves: Type-examination tested safety valves"*.
- Check for cartridge valves whether the unit dimensions for the relevant type which are indicated in these operating instructions correspond to the dimensions of the mounting cavity.
- If you use the front panel mounting (see also *"Data sheet 25402, Dimensions: Sheet cut-out for front panel mounting with type-examination tested safety valves")* for a valve of type **DBDH..G1X./..E**, the hand wheel or the rotary knob must be removed before the valve assembly. To do so, you have to
  - -remove the clamping sleeve at the rotary knob for safety valves of size 6...20.
  - -release the countersunk screw at the hand wheel for safety valves from size 30.

  Rotary knob or hand wheel must be re-attached after completed assembly.

7.7 Assembly of screw-in cartridge valves

⚠ WARNING

Faulty installation!

In case of faulty assembly due to a mix up of the hydraulic ports, the safety valve loses its safety function!

- Check whether the pressure to be limited is connected to port P and the discharge line is connected to port T.

Insufficient design of the housing for the mounting cavity!

The safe pressure relief function does no longer work if material and dimensions of the housing have been incorrectly designed for the mounting cavity.

- Material and dimensions of the housing for the mounting cavity are to be selected so that sufficient safety is provided for all imaginable operating conditions. This for example applies to pressure resistance, resistance to stripping of the threads and the tightening torque.

1. Remove the transport protection cap from the safety valve. Remove the individual seal ring or the two seal rings supplied in the transport protection cap.
2. If there are two seal rings provided with the safety valve, clamp the smaller seal ring in the bigger one.
3. Insert the seal ring or the seal ring combination into the mounting cavity; ensure that the position in the mounting cavity is as concentric as possible and that the entire surface is in contact.
4. Screw in the safety valve and fasten it applying the tightening torque specified in table 10.

Table 10: Tightening torque dependent on valve type and size[1)]

Pressure ratings	Valve type and size Component marking				
	DBD4 1038	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
up to 210 bar	-	50 ± 5 Nm	100 ± 5 Nm	150 ± 10 Nm	350 ± 20 Nm
up to 400 bar	-	80 ± 5 Nm	150 ± 10 Nm	300 ± 15 Nm	500 ± 30 Nm
up to 500 bar	23 ± 2 Nm	-	-	-	-
up to 630 bar	-	-	200 ± 10 Nm	-	-

[1)] Lubricated screws; tighten using a manual torque wrench with an accuracy of ± 10%

The specified tightening torques were calculated with the frictional value μ_G = 0.12 in the thread or with the frictional value μ_K = 0.12 underneath the head or underneath the Usit ring. For tightening, a manual torque wrench with a tolerance of ≤10% is to be used. The tightening torques are to be corrected according to the relevant material pairing of screw-in cartridge valve and valve block. Steel is to be assumed as valve material in this case.

Secure screw-in cartridge valves against unauthorized removal from the mounting cavity by wire or seal. A bore is already provided for this in the valve hexagon (except DBD4).

7.8 Assembly of valves for subplate mounting

⚠ WARNING

Faulty fastening of the safety valve!

Mounting of the safety valve using valve mounting screws of reduced stability may cause the safety valve to become loose and lead to damage to persons and property!

- For reasons of stability, only valve mounting screws according to table 11 or of comparable quality (dimensions, property class) may be used. Screw dimensions, property classes and tightening torques depend on the valve type and the size.

Faulty installation!

In case of faulty assembly due to a mix up of the hydraulic ports, the safety valve loses its safety function!

- Check whether the pressure to be limited is connected to port P and the discharge line is connected to port T.

Insufficient design of the subplate!

The safe pressure relief function does no longer work if material and dimensions of the subplate have been incorrectly designed.

- Material and dimensions of the subplate are to be selected so that sufficient safety is provided for all imaginable operating conditions. This for example applies to pressure resistance, the resistance to stripping of the connection threads and the resistance to stripping of the threads of the valve mounting screws.

The mounting surfaces of the valve and the valve installation surface must be clean and free from hydraulic fluid.

- Use non-linting fabric for cleaning the valve installation surface.

1. Remove the protective cover from the valve.
2. Prior to assembly, check whether the seals are placed into the connection counterbores of the safety valve and are not damaged. If required, retrofit any missing seals.
3. Carefully place the valve on the valve installation surface. Observe the position of the connections.
4. Ensure that the valve mounting screws are tightened using the specified tightening torque. Tighten them crosswise using a suitable manual torque wrench. For the tightening torques, please refer to the table further down.
5. Please note that the tightening torques may change if other screw types are used.

Table 11: Information on mounting screws according to EN ISO 4762

Valve type + size Component marking	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
Dimensions	M6 x 50	M8 x 70	M8 x 90	M10 x 110
Property class according to EN ISO 4762	10.9	10.9	12.9	12.9
Tightening torque [1], related to the max. operating pressure	12.5 Nm	28 Nm	28 Nm	56 Nm

[1] Friction coefficient μ = 0.09 to 0.14

7.9 Assembly of valves with threaded connection

⚠ WARNING

Faulty installation!

In case of faulty assembly due to a mix up of the hydraulic ports, the safety valve loses its safety function!

- Check whether the pressure to be limited is connected to port P and the discharge line is connected to port T.

⚠ CAUTION

Faulty installation!

A safety valve with threaded connection which you install under high mechanical load generates additional forces during operation, which reduce the life cycle of the safety valve and of the overall machine or system.

- Mount the safety valve in a way that ensures that reaction forces which act on the valve (e.g. due to vibration, shock) and hydraulic forces which act on the connection lines (in particular when the line tears off) are absorbed by the fixation in a risk-free manner.

The connection surface of the valve and the valve installation surface must be clean and free from hydraulic fluid.

- Use non-linting fabric for cleaning the valve installation surface.

1. Tighten pipe fittings which are directly screwed into the safety valve using the tightening torque specified in table 12.

Table 12: Type of pipe fitting

Valve type + size Component marking	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
Fitting with pipe thread according to EN ISO 228 Part 1	G 1/4	G 1/2	G 1	G 1 1/2
Tightening torque [1], related to the max. operating pressure	60 Nm	130 Nm	380 Nm	600 Nm

[1] Friction coefficient μ = 0.09 to 0.14

7.10 Additional P port (only with response pressure up to 400 bar)

Safety valves for subplate mounting or with threaded connection are equipped with an additional port P at the front. In the state as delivered, the port is closed by a plug screw. When the plug screw is removed, a pressure gauge for pressure indication can be connected to the P port at the front.

Always use the tightening torque specified by the pressure gauge manufacturer to install the pressure gauge.

To seal the port again using the plug screw, the screw must be tightened using the tightening torque specified in table 13.

Table 13: P port, information on the plug screw

Valve type + size Component marking	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
Fitting of hydraulic connections, valves with pipe thread according to EN ISO 228 Part 1	G 1/4	G 1/2	G 1	G 1 1/2
Tightening torque [1], related to the max. operating pressure	30 Nm	60 Nm	135 Nm	560 Nm

[1] Friction coefficient μ = 0.09 to 0.14

8 Commissioning

⚠ WARNING

Faulty assembly, leaking hydraulic fluid!

Carelessly or incorrectly fastened safety valves may become loose during operation, fall down and cause serious injuries. A hydraulic fluid jet may leak at incompletely mounted hydraulic connections and connection lines and cause serious injuries.

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

Personal injury and damage to property!

Commissioning of the safety valve requires basic hydraulic knowledge.

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

- ▶ Make sure that all hydraulic connections are covered.
- ▶ Commission the safety valve only if it is completely installed.
- ▶ Immediately depressurize the system if hydraulic fluid still leaks despite proper assembly and continue with chapter 14 "Troubleshooting".

Information for the hydraulic fluid

- The released operating media and limitations of operation for your safety valve are contained in *"Data sheet 25402 and/or 25710"*.
- Bosch Rexroth offers the suitable seal designs for the hydraulic fluid used.

Bleeding the hydraulic system

Bleeding of the safety valve is usually not necessary. However, Bosch Rexroth recommends bleeding the entire hydraulic system.

Performing the leak test

Check whether during operation hydraulic fluid leaks at the safety valve and at the connections.

9 Operation

⚠ WARNING

Incorrect area of application!
The approval according to Pressure Equipment Directive and thus the safe pressure limiting function are no longer applicable if the safety valve is used incorrectly or outside its area of application.
▶ Do **not** use the safety valve as high-response valve!

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

If errors occur, refer to chapter 14 "Troubleshooting".

9.1 General information on the operation

It must be ensured that
• Discharge lines of safety valves end in a risk-free manner.
• No fluid can accumulate in the discharge lines.
• No more valves, shut-off cocks, etc. are installed in the discharge lines.

9.2 Setting the valve to a low response pressure

▶ When setting the valve, please ensure that the attached name plate is not damaged or torn off.

You can set safety valves which have been provided with a hand wheel or rotary knob to a lower response pressure without damaging the lead seal. To do this, the system into which the safety valve is installed needs to be equipped with a pressure gauge which indicates the pressure at port P or a pressure gauge has to be connected temporarily to the additional P port, which is normally closed by a plug screw.
The response pressure of a safety valve may only be within the specified pressure range due to the installed compression spring. For the setting range of the relevant response pressure, refer to table 8. The maximum flow indicated by the component marking can only be utilized within this pressure range.

1. Temporarily deactivate or remove any other pressure limiting devices which are installed in the system and have an impact on channel P and seal any openings which were caused by this.
2. For systems without a pressure gauge installed in channel P, connect a pressure gauge at the additional P port; see also chapter 7.10 "Additional P port (only with response pressure up to 400 bar)".
3. Unload the valve spring as described in chap. 10.2.3 "Unloading a safety valve of type DBDH..1X/..E", screw in the adjustment spindle again as far as possible but do not tighten the lock nut yet after unloading the spring.
4. Switch on the system and wait until the system pressure has built up.

5. Set the desired **lower** response pressure:
   Screw out the adjustment spindle so far that the pressure gauge indicates the desired pressure. When you screw out the valve spindle, the safety valve opens and limits the system pressure.
6. Tighten the lock nut clockwise using a manual torque wrench with an accuracy of ± 10% and the tightening torque indicated in the table.

Table 14: Information on the lock nut

Valve type + size Component marking	**DBD4** 1038	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
Wrench size	17	19	19	19	19
Tightening torque	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm

7. Switch off the system, let the pressure decrease, depressurize any provided pressure accumulators, if applicable. Remove the temporarily installed pressure gauge and seal the additional P port using the plug screw. Tightening torque see chapter 7.10 "Additional P port (only with response pressure up to 400 bar)".
8. Return any other pressure limiting devices which are installed in the system and have an impact on channel P and which you have deactivated or removed before to the normal operating state.

As an alternative to the procedure described above, the safety valve may also be removed and set to the desired lower response pressure on a test stand.

9.3 Operation with counter pressure in the discharge line

In principle, the safety valve should be operated without counter pressure in the discharge line, if possible. In case of counter pressure in the discharge line, the maximum flow possible is reduced. There is a relationship between maximum admissible counter pressure p_T in the discharge line and flow q_V, which can be seen from the following diagrams. Characteristic curves for intermediate values of the response pressure which are not listed must be determined by means of interpolation.

When the flow approaches zero, the maximum admissible counter pressure p_T is in each case 10% of the response pressure. With increasing flow, the maximum admissible counter pressure p_T decreases.

9.3.1 Operation with counter pressure in the discharge line of type DBD.4K1X/..E

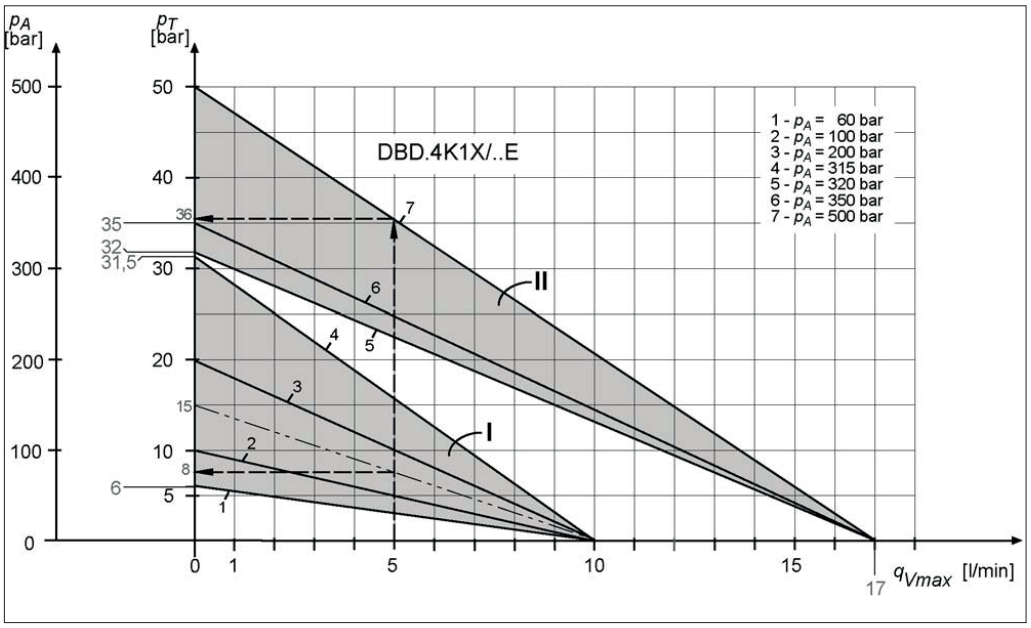


Fig. 1: Diagram DBD.4K1X/..E

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the safety valve dependent on the flow q_{Vmax} for safety valves **DBD.4K1X/..E** with different response pressures p_A

p_A Response pressure in bar

p_T Maximum admissible counter pressure in the discharge line (port T) in bar

q_{Vmax} Maximum flow in l/min

Area I Interpolation area **I**, for valves **DBD.4K1X/..E** with response pressure p_A=60...315 bar and maximum flow q_{Vmax}=10 l/min

Area II Interpolation area **II**, for valves **DBD.4K1X/..E** with response pressure p_A=320...500 bar and maximum flow q_{Vmax}=17 l/min

Interpolation of intermediate values from the diagram

1. At the axis referred to as p_T, mark 1/10 of the value of response pressure p_A.
2. From the marked point, draw a straight line within the interpolation area to the zero-crossing on the axis referred to as q_{Vmax} (here 10 /min for interpolation area I and/or 17 l/min for interpolation area II).
3. Mark the system flow to be secured at the axis referred to as q_{Vmax}.
4. Read off the maximum admissible counter pressure for this value using the line at the axis referred to as p_T drawn before.

Example 1 with already existing characteristic curve

Flow of the system / accumulator to be secured: q_{Vmax} = 5 l/min
Safety valve set to: p_A = 500 bar
Read off the maximum admissible counter pressure p_T of approx. 36 bar from the diagram (see arrows, characteristic curve 7).

Example 2 with interpolated characteristic curve

Flow of the system / accumulator to be secured: q_{Vmax} = 5 l/min
Safety valve set to: p_A = 150 bar
Value to be marked at the axis referred to as p_T: 1/10 ·150 bar = 15 bar,
Read off the maximum admissible counter pressure p_T of approx. 8 bar from the diagram (see arrows, dashed characteristic curve).

9.3.2 Operation with counter pressure in the discharge line of type DBD.6.1X/..E

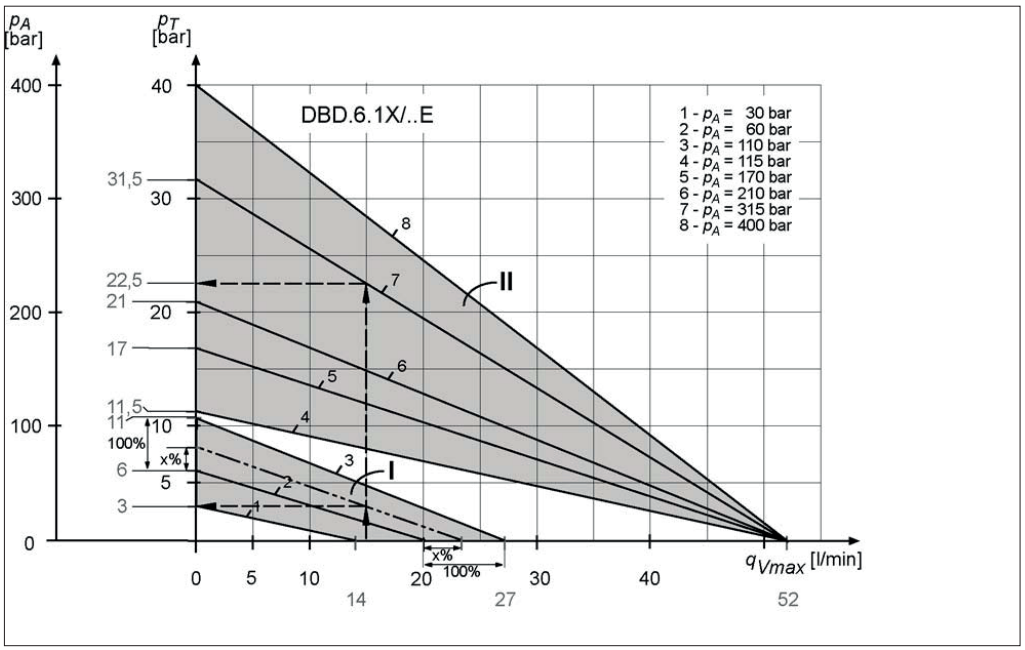


Fig. 2: Diagram DBD.6.1X/..E

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the safety valve dependent on the flow q_{Vmax} for safety valves **DBD.6.1X/..E** with different response pressures p_A

p_A Response pressure in bar
p_T Maximum admissible counter pressure in the discharge line (port T) in bar
q_{Vmax} Maximum flow in l/min
Area I Interpolation area **I**, for valves **DBD.6.1X/..E** with response pressure p_A=30...110 bar and maximum flow q_{Vmax}=14...27 l/min
Area II Interpolation area **II**, for valves **DBD.6.1X/..E** with response pressure p_A=115...400 bar and maximum flow q_{Vmax}=52 l/min

Interpolation of intermediate values from the diagram

1. At the axis referred to as p_T, mark 1/10 of the value of response pressure p_A.
2. Determine the next lower and the next higher characteristic curve for this point. The point marked at p_T divides the section between lower and higher characteristic curve on the p_T axis with a certain percentage.
3. At the axis referred to as q_{Vmax}, divide the section between next lower and next higher characteristic curve in the same percentage as the section at the p_T axis. From the zero-crossing on the axis referred to as q_{Vmax} determined in that way, draw a straight line to the value on the p_T axis marked before.
4. Mark the system flow to be secured at the axis referred to as q_{Vmax}.
5. Read off the maximum admissible counter pressure for this value using the line at the axis referred to as pT drawn before.

Example 1 with already existing characteristic curve

Flow of the system / accumulator to be secured: q_{Vmax} = 15 l/min
Safety valve set to: p_A = 315 bar
Read off the maximum admissible counter pressure of approx. 22.5 bar from the diagram (see arrows, characteristic curve 7).

Example 2 with interpolated characteristic curve

Flow of the system / accumulator to be secured: q_{Vmax} = 15 l/min
Safety valve set to: p_A = 80 bar
Value to be marked at the axis referred to as p_T: 1/10 · 80 bar = 8 bar,
Read off the maximum admissible counter pressure of approx. 3 bar from the diagram (see arrows, dashed characteristic curve).

9.3.3 Operation with counter pressure in the discharge line of type DBD.10.1X/..E

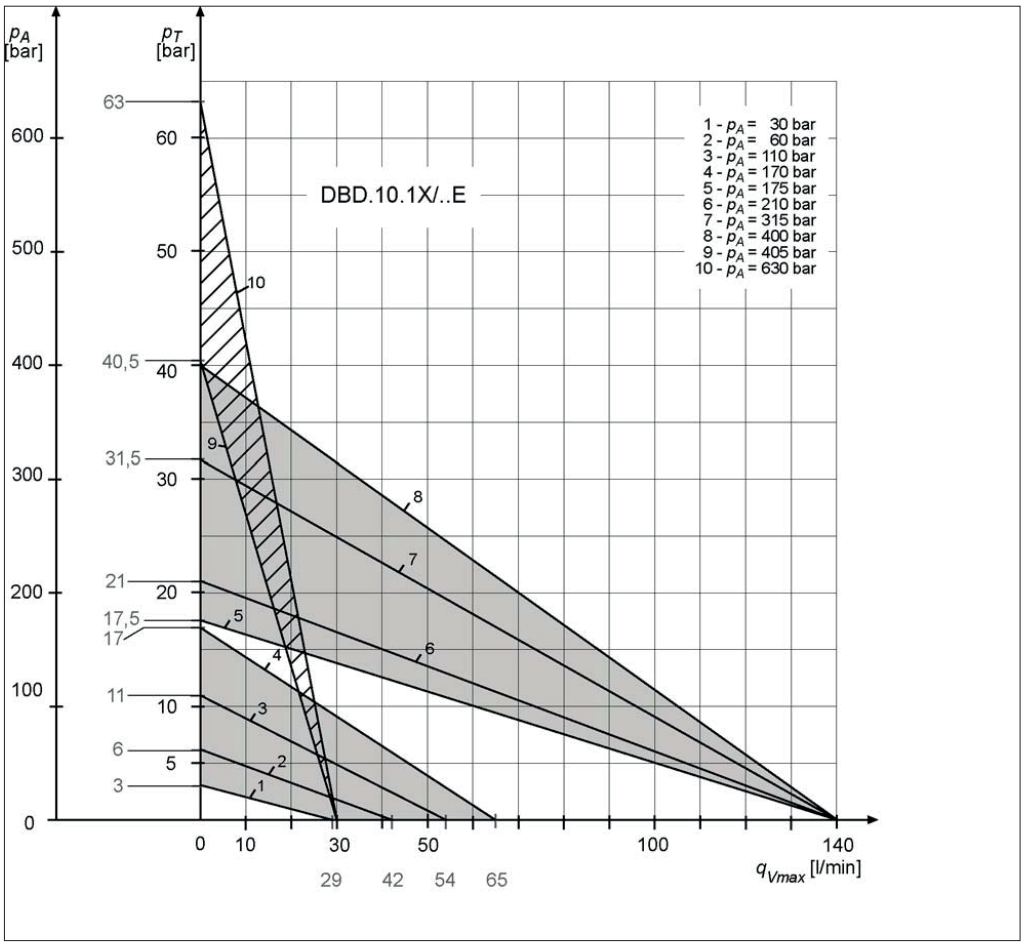


Fig. 3: Diagram DBD.10.1X/..E

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the safety valve dependent on the flow q_{Vmax} for safety valves **DBD.10.1X/..E** with different response pressures p_A Intermediate values can be determined by means of interpolation.
Regarding the procedure for interpolation refer to the explanatory notes on the preceding pages.

p_A Response pressure in bar
p_T Maximum admissible counter pressure in the discharge line (port T) in bar
q_{Vmax} Maximum flow in l/min
Area (cross-hatched, gray) Interpolation areas

9.3.4 Operation with counter pressure in the discharge line of type DBD.20.1X/..E

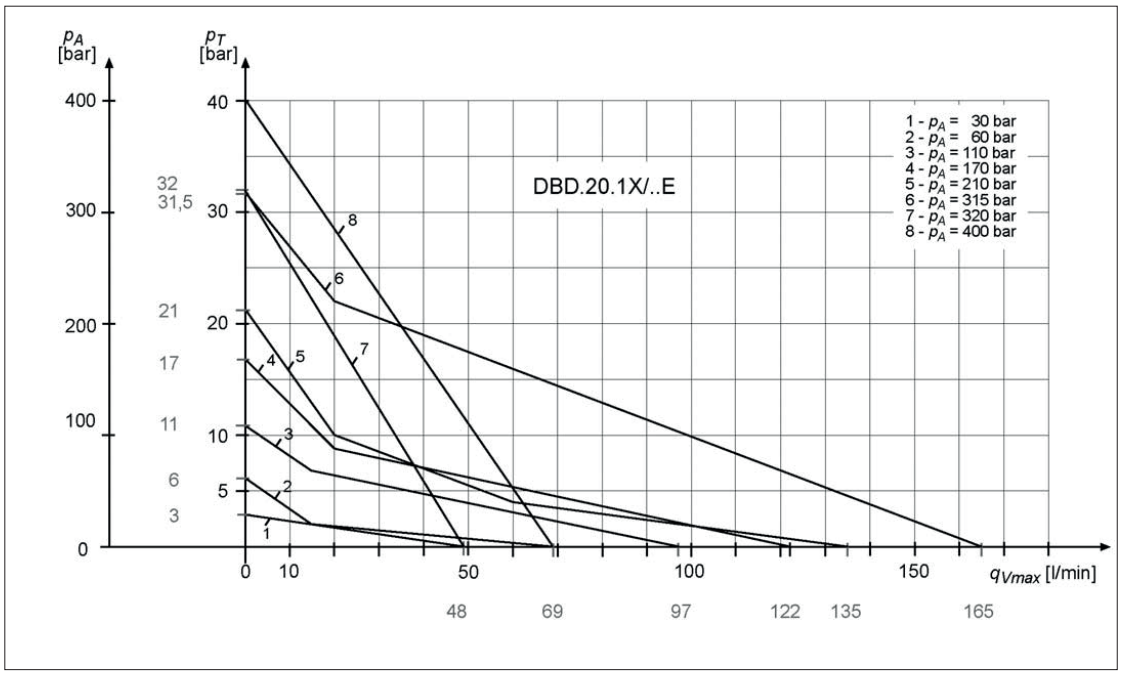


Fig. 4: Diagram DBD.20.1X/..E

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the safety valve dependent on the flow q_{Vmax} for safety valves **DBD.20.1X/..E** with different response pressures p_A Intermediate values can be determined by means of interpolation.
Regarding the procedure for interpolation refer to the explanatory notes on the preceding pages.

9.3.5 Operation with counter pressure in the discharge line of type DBD.30.1X/..E

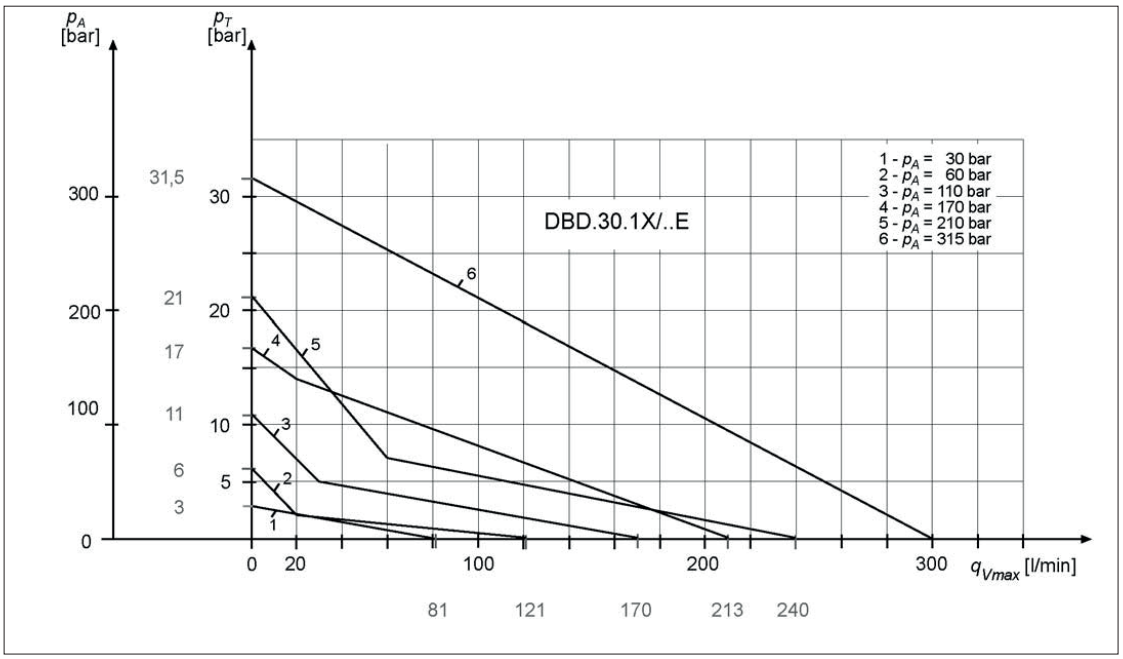


Fig. 5: Diagram DBD.30.1X/..E

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the safety valve dependent on the flow q_{Vmax} for safety valves **DBD.30.1X/..E** with different response pressures p_A. Intermediate values can be determined by means of interpolation.
Regarding the procedure for interpolation refer to the explanatory notes on the preceding pages.

10 Maintenance and repair

10.1 Cleaning and care

NOTICE

Solvents and aggressive cleaning agents!
Aggressive cleaning agents may damage the seals of the safety valve and accelerate aging.

- Never use solvents or aggressive cleaning agents.

Damage to the hydraulic system and seals!
The water pressure of a high-pressure washer may damage the hydraulic system and the seals of the safety valve.

- Do not use a high-pressure washer for cleaning.

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

- Remove external coarse dirt and keep sensitive and important parts clean.
- Only clean the safety valve using a damp, non-linting cloth. Only use water and a mild cleaning agent, if necessary, to do so.
- The locking paint at the screw-in cartridge valve must not be removed.

10.2 Inspection and maintenance

NOTICE

Dirt and foreign particles in the safety valve!
Penetrating dirt and foreign particles in the safety valve lead to wear and malfunctions. Safe function of the safety valve is therefore no longer ensured.

- During all works at the safety valve, provide for absolute cleanliness in order to prevent foreign particles like e.g. welding beads or metal chips from getting into the hydraulic lines.
- Do not use linting fabric for cleaning.
- Ensure that no cleaning agents are able to penetrate the hydraulic system.
- Flush the hydraulic system if necessary. Replace the fluid filter or the hydraulic fluid.

10.2.1 General maintenance instructions

- Remove coarse dirt from the exterior.
- Check all external fittings for completeness and tight seat.
- Check safety valve for external leakage, replace the seals if necessary, see chap. 10.3 "Repair".
- Check the safety valve for corrosion. Corrosion is an indication of leakage. Remove the safety valve and have it repaired if there is any visible corrosion.

10.2.2 Maintenance interval for safety valves

For ensuring the function, the safety valves have to be made to respond on a suitable test stand **at regular intervals**. It has to be checked whether the response pressure complies with the information on the name plate. The time intervals depend on the functional use of the safety valve and/or on the maintenance intervals of the overall system.

Within the scope of this test, we recommend replacing the seals intended for exchange by new ones. For order details regarding the seal kits, refer to chap. 10.4 "Spare parts".

If used as intended, Rexroth safety valves are designed for durability.

10.2.3 Unloading safety valves of type DBDH..1X/..E

To verify the function, the valve spring **may** - in safety valves of type **DBDH..1X/..E** - be unloaded at regular intervals and the valve may then be made to respond at low pressure.

⚠ WARNING

Improper unloading of the safety valve!

Improper unloading of the safety valve DBDH..1X/..E **in the system** may cause hazards or faults.

- Only qualified personnel (see chap. 2.4 "Qualification of personnel") may unload the safety valve.
- Observe the operating instructions and/or the functional set-up of the system.
- After unloading, the rotating spindle must be brought back into the initial position by means o the rotary knob. This is the only way to guarantee that the valve will still work with the response pressure pre-set by Bosch Rexroth.

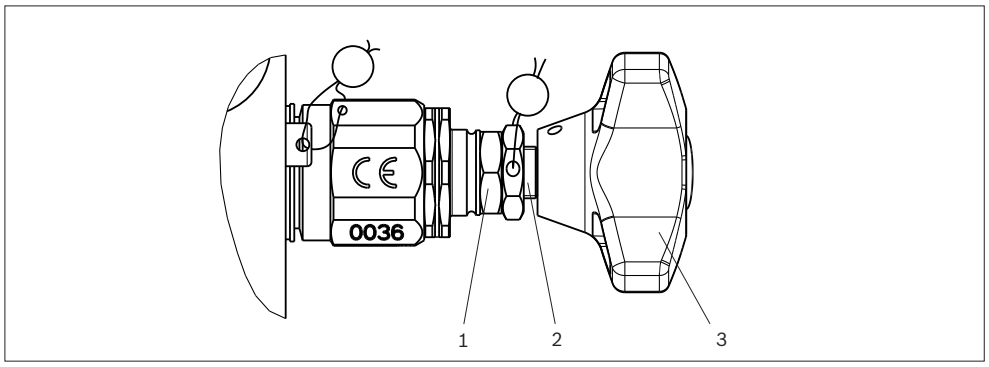


Fig. 6: Loosening the locking

Unloading the valve while it remains in the system

1. Release the locking of the adjustment spindle **(2)**:
   release the lock nut **(1)** by means of an open-end wrench by rotating it counterclockwise.
2. Purging the safety valve:
   Screw out the adjustment spindle **(2)** to the stop by rotating the rotary knob **(3)** counterclockwise. Now allow free flow through the safety valve for approx. 5...10 seconds so that dirt particles that might exist at the valve seat are removed by the flow.
3. Screw in the adjustment spindle **(2)** by rotating the rotary knob **(3)** clockwise so that the lock nut **(1)** rests against the valve body without any play.
4. Hold the rotary knob **(3)** and tighten the lock nut **(1)** by means of a manual torque wrench applying the specified tightening torque by rotating it clockwise.

Table 15: Information on the lock nut

Valve type + size Component marking	DBD4 1038	DBD6 849	DBD10 850, 390	DBD20 361	DBD30 362
Wrench size	17	19	19	19	19
Tightening torque	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm	10 + 5 Nm

10.3 Repair

⚠ WARNING

Damage to persons and property caused by improper repair!

In case of improper repair, the safety function of the safety valve is no longer given in subsequent operation.

- Only repair measures listed in chap. 10 "Maintenance and repair" are admissible.
- Only qualified personnel (see chap. 2.4 "Qualification of personnel" may repair the safety valve.
- The sealing and/or the safety cap must not be removed.
- The point with locking paint must not be removed.

Remedying external leakage at the safety valve

The seals of hydraulic valves are subject to a natural process of wear and aging. We thus recommend replacing them at appropriate time intervals. The intervals are mainly determined by the operating conditions and the cleanliness of the hydraulic fluid.

- Regularly check the safety valve for leak-tightness!
- As a precaution, exchange seals at reasonable time intervals.

If there is leakage at the outside of the screw-in cartridge valve during operation, the seal at the valve body might be damaged. Check the seal as follows:

1. Switch off the hydraulic power unit, let the pressure decrease, depressurize any provided pressure accumulators, if applicable.
2. Disassemble the screw-in cartridge valve.
3. Check the seal at the housing of the screw-in cartridge valve for damage.
4. Check the valve mounting cavity for contamination and damage. Remove dirt, if applicable.
5. Replace the damaged seal by a new seal, observe the suitability of the seal material for the hydraulic fluid used, see also table 16.
6. Screw in the screw-in cartridge valve again and tighten it applying the specified tightening torque.

If oil continues to leak after re-installation of the safety valve, the safety valve itself is defective. In this case, send the safety valve to the manufacturer for repair.

10.4 Spare parts

When ordering spare parts, please indicate their material numbers.

Table 16: Spare part seal kit

Valve type + size Component marking	**DBD4** 1038	**DBD6** 849	**DBD10** 850, 390	**DBD20** 361	**DBD30** 362
NBR	R961000879	R961000882	R961000885	R961000888	R961000891
FKM	R961000880	R961000883	R961000886	R961000889	R961000892
MT	-	R961000884	R961000887	R961000890	R961000893

The spare parts are available from the address specified in chap. 14.2 "List of addresses".

11 Disassembly and replacement

⚠ WARNING

Pressurized and energized system parts!

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

- ▶ Ensure that the hydraulic system is depressurized and the electrical control is de-energized before the disassembly.

⚠ CAUTION

Incompletely mounted valve components falling down!

Incompletely disassembled valve components may fall down and cause injuries.

- ▶ During the disassembly, secure the safety valves against falling down.

Have sufficiently dimensioned collecting containers, non-linting cloth and medium-binding materials ready in order to collect or bind leaking hydraulic fluid.

1. Switch off your system, de-energize and depressurize the system and secure the system against restarting before all disassembly works.
2. Unload the hydraulic accumulators, if applicable.
3. Provide for a clean environment during the disassembly.
4. Prepare a container or a pan for collecting the leaking hydraulic fluid.
5. Detach the safety valve from the pipelines or the subplate using appropriate tools or screw it out of the mounting cavity. Collect any hydraulic fluid that might leak in the provided tank. Dispose of the hydraulic fluid properly.

WARNING! Heavy components! When lifting safety valves or components with high weight, there is the danger of damage to property and personal injuries.

- ▶ Please observe the safety instructions in chap. 6 "Transport and storage".

6. If the device is to be returned to the manufacturer for repair, close the threaded connections or the housing of the screw-in cartridge valve using the supplied transport protection or protect it using equivalent packaging in order to avoid contamination and damage.
7. Close the connection and/or installation bore or threaded connections of the valve installation surface in order to avoid contamination of the system.

In case of new installation and/or exchange of the safety valve, the following steps are analog to chapter 7 "Assembly".

12 Disposal

12.1 Environmental protection

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

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

12.2 Return to Bosch Rexroth AG

The hydraulic products manufactured by us can be returned to us for disposal purposes free of charge. There must be no inappropriate foreign substances or third-party components when products are returned. Safety 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 Service]
Bürgermeister-Dr.-Nebel-Straße 8
97816 Lohr am Main
Germany

12.3 Packaging

Upon request, reusable systems can be used for regular deliveries.
The materials for disposable packaging are mostly cardboard, wood, and polystyrene. They can be recycled without any problems. Due to ecological reasons, disposable packaging should not be used for returning products to Bosch Rexroth.
The screw-in cartridge valve is delivered in a plastic packaging.

12.4 Materials used

Hydraulic components from Bosch Rexroth do not contain any hazardous materials that could be released during intended use. Normally, no adverse effects on human beings and on the environment have to be expected.
The safety valves basically comprise of:

- Cast iron
- Steel
- Aluminum
- Plastics
- 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.

13 Extension and modification

Do **not** retrofit the safety valve.

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 how the safety valve works in conjunction with the overall system.
- Try to find out whether the safety valve has worked properly in conjunction with the overall system before the error occurred first.
- Try to determine any changes of the overall system in which the safety valve is integrated:
  - Were there any changes to the safety valve's application conditions or area of application?
  - Have changes (refittings) or repair works been carried out at the overall system (machine/system, electrical systems, control) or at the safety valve? If so: What were they?
  - Was the safety valve or machine used as intended?
  - How did the fault become apparent?

- Try to get a clear idea of the cause of the error. If necessary, ask the actual (machine) operator.

Fault table

The safety 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

Fault	Possible cause	Remedy
The response pressure indicated on the component marking is not reached during testing at the test stand.	Type **DBD..K1X/..E**: The seal at the valve seat is missing or a wrong seal was used.	Install the correct, dedicated seal and tighten the screw-in cartridge valve using the specified torque, see table 10
The response pressure indicated on the component marking is not exceeded during testing at the test stand.	The valve parts are mixed up.	Check the ports; connect the safety valve correctly. Observe the connection designations P (pressure port) and T (port of the discharge line).
	The safety valve is damaged and blocked internally.	Replace the safety valve.
If the response pressure is exceeded, the system pressure increases excessively even though the safety valve responds. During bleeding, the system pressure exceeds the 10% limit above the maximum admissible pressure (see EU Pressure Equipment Directive 2014/68/EU, Appendix I, chap. 7.3).	A safety valve with insufficiently dimensioned flow was installed.	Select and order a safety valve with suitable specified flow, see *"Data sheet 25402 and/or 25710, characteristic curves: Type-examination tested safety valve"*.
	The P port of the safety valve is connected via a line with excessive flow resistance.	Use larger supply pipes (increase supply cross-sections); avoid a deflection of flow.
	The T port of the safety valve is connected via a line with excessive flow resistance.	Use larger discharge pipes (increase outlet diameters), avoid a deflection of flow, observe the maximum admissible counter pressure in the discharge line, see *"Data sheet 25402 and/or 25710"*.
	The viscosity of the hydraulic fluid is outside the valve specification.	Check whether a suitable hydraulic fluid can be used in the system and exchange the hydraulic fluid.

Fault	Possible cause	Remedy
Safety valve response pressure is too low.	A safety valve with unsuitable response pressure has been installed.	Check the specified response pressure of the safety valve by means of the last figure of the component marking at the safety valve or name plate. Select and order a safety valve with suitable response pressure.
	The difference between operating pressure and response pressure of the safety valve is too small.	Check whether the system can be operated at lower operating pressure or select and order a safety valve with suitable response pressure.
	With type **DBDH..1X/..E**: The hand wheel is not turned to the securely sealed stop.	Turn the hand wheel to the fixedly set and sealed stop, see also chapter 10.2.3 "Unloading safety valves of type DBDH..1X/..E".
Safety valve is permanently flown through.	A safety valve with unsuitable response pressure has been installed.	Check the specified response pressure of the safety valve by means of the last figure of the component marking at the safety valve or name plate. Select and order a safety valve with suitable response pressure.
	The difference between operating pressure and response pressure of the safety valve is too small.	Check whether the system can be operated at lower operating pressure or select and order a safety valve with suitable response pressure.
	Dirt prevents the closing of the safety valve.	Establish oil cleanliness by means of suitable measures.
		Type **DBDH...**: Flush the safety valve; to do so, unload the safety valve at the adjustment device, see chap. 10.2.3 "Unloading safety valves of type DBDH..1X/..E".
		Type **DBDS...**: Make the safety valve respond on a separate, suitable test stand in order to flush the dirt out of the gap between valve seat and poppet. If you are not successful, replace the safety valve.
	The axial sealing of the screw-in cartridge valve is worn.	Type **DBD..K1X/..E**: Order a new seal kit according to the spare part list and tighten the screw-in cartridge valve using the specified torque, see table 10. Seal the screw-in cartridge valve again at the housing.

Fault	Possible cause	Remedy
Safety valve oscillates.	Together with other components, the safety valve constitutes an oscillating system in which there are regulating oscillations.	A safety valve may not be used as a high-response valve.
Sealing or safety cap is damaged or missing.	The lead seal and/or the safety cap has been destroyed by the operating personnel or mechanical influence.	The safety valve may not be re-sealed or repaired. Otherwise the approval according to PED will no longer apply. Replace the safety valve.
Point with locking paint is damaged or missing.	The point with locking paint has been destroyed by the operating personnel or mechanical influence.	The point with locking paint must not be re-applied. Otherwise the approval according to PED will no longer apply. Replace the safety valve.
External leakage	The seal of the adjustment device is worn.	Replace the safety valve.
	Type **DBD..G/P1X/..E**: Plug screw(s) is/are leaking; O-ring at the plug screw is worn.	Replace the O-ring. Screw-in the plug screw and tighten it using the specified torque, see table 13
	Type **DBD..P1X/..E**: The safety valve is leaking between the housing and the subplate. The R-ring in the housing connection surface is worn, see chap. "Dimensions of valves for subplate mounting, connection diagram with dimensions".	Order a new seal kit according to the spare part list and replace the R-rings. Screw in the valve mounting screws and tighten them using the specified tightening torque, see table 11
	Type **DBD..K1X/..E**: O-ring at valve body is worn.	Type **DBD..K1X/..E**: Order a new seal kit according to the spare part list and replace the seals, see chap. 10.3 "Repair".
Hand wheel is destroyed.	Transport damage, improper handling.	Send safety valve to the authorized facility for repair. Please contact your regional Bosch Rexroth representative.
Name plate is missing or cannot be completely read.		Replace the safety valve.
Setting certificate of the testing authority is missing.		Request the setting certificate from the Bosch Rexroth Quality Assurance, see chap. 14.2 "List of addresses".

Following faults due to contamination, it is moreover essential to check the quality of the hydraulic fluid and to improve it, if necessary, by suitable measures such as flushing or the additional installation of filters.

14.2 List of addresses

Contacts for service and spare parts

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

Headquarters

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

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

Ordering address for setting certificate

A possibly missing setting certificate can be requested from the Rexroth Quality Assurance at the following address:
Bosch Rexroth AG
Department LoP1/QMM7
Zum Eisengießer 1
97816 Lohr am Main

In your request, please specify the production number, the date of manufacture and the type designation of your safety valve. All these specifications are indicated on the name plate of the safety valve, see chap. "Product identification".

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