

Pressure relief valve, pilot-operated

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

Type DB20K.1X/...E



Operating instructions
RE 25818-B/11.21

Replaces: 09.17
English
Mat. no. R901557891



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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.

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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:

- Type-examination tested safety valves according to Pressure Equipment Directive 2014/68/EU, type DB20K.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.

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



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

1.2 Required and amending documentation

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

Table 1: Required and amending documentation

Title	Document number	Document type
 Hydraulic valves for industrial applications	07600-B	Operating instructions
 Pressure relief valve, pilot-operated	25818	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 to ensure quick and safe working with the product using this documentation. For better understanding, they are explained in the following sections.

1.3.1 Safety instructions

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

Safety instructions are structured as follows:

 SIGNAL WORD
<p>Type and source of danger! Consequences in case of non-compliance</p> <ul style="list-style-type: none"> ▶ 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 injury if not avoided.
 WARNING	Indicates a dangerous situation which may cause death or severe injury if not avoided.
 CAUTION	Indicates a dangerous situation which may cause minor or medium personal injury if not avoided.
NOTICE	Damage to property: The product or the environment could be damaged.

1.3.2 Symbols

The following symbols indicate 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
DB	Pressure relief valve
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 etching substances 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 25818*".

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 25818*". 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

The safety valve is not suitable for use in potentially explosive environment; it must not be used there.

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 25818 and/or table 8*".

The max. admissible counter pressure must not be exceeded. Also refer to "*Data sheet 25818*".

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 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 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 diagrams,
- 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 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 medication 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.

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.

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 machine end-user 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 delivered configuration.

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

NOTICE

Inadmissible mechanical 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".

5 Product information



For information on the performance and product description please refer to "*Data sheet 25818*" of your valve.

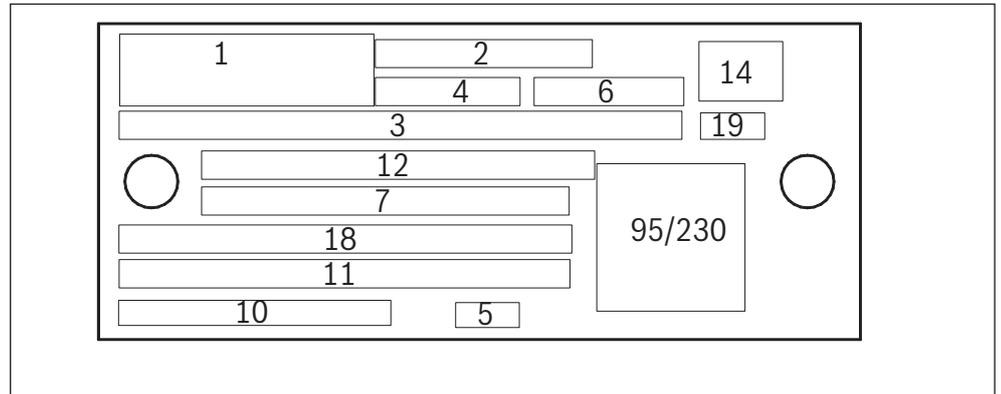
5.1 Product identification

5.1.1 Information on the name plate of the safety valve

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

The name plate comprises the following information:

Table 6: Name plate of the safety 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	---
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
95	Rexroth QR code

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.

5.2 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

TÜV.	SV.	-	1001.	14,4.	F.	G.	p
Mark of the notified body which has carried out the type-examination procedure		Safety valve		Last digit of the year of the last extension of the validity of the component marking	Number of the component marking assigned by VdTÜV	Smallest flow diameter in front of the valve seat in mm	Fluid
							Maximum admissible flow in l/min without counter pressure in the discharge line ¹⁾
							Set response pressure in bar

¹⁾See also "Data sheet 25818, characteristic curves: Type-examination tested safety valves"

5.2.1 Limitations of use

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



In the plant, the response pressure specified in the component marking is set at a flow of 2 l/min.

The maximum admissible flow stated in the component marking applies for:

- pilot oil return external "Y" without counter pressure in the pilot oil return line:
- Admissible counter pressure in the discharge line (port T) < 10 bar.

Table 8: Limitations of use

Response pressure p_A in bar	maximum flow q_{Vmax} in l/min
30...60	70
61...110	100
111...210	150
211...315	200
316...350	300

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.

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.



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 25818*". 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 protective cap.

- ▶ Check whether the sealing and/or the protective cap 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 25818".
- ▶ 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.

7.5 Prior to assembly

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 25818*".
- ▶ Check whether the unit dimensions for the relevant type specified in "*Data sheet 25818*" correspond to the dimensions of the mounting cavity.

7.6 Assembly



WARNING

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 tighten it applying the tightening torque specified in table 9.

Table 9: Tightening torques¹⁾

Pressure ratings		Valve type
		Component marking DB20K.1X/...E 1001
up to 60 bar	50 Nm +5 Nm	
up to 110 bar	50 Nm +5 Nm	
up to 210 bar	50 Nm +5 Nm	
up to 350 bar	50 Nm +5 Nm	

¹⁾ Lubricated screws; tighten using a manual torque wrench with an accuracy of $\pm 10\%$

The specified tightening torques were calculated with the frictional value $\mu_G = 0.12$ in the thread. For tightening, a manual torque wrench with a tolerance of $\leq 10\%$ is to be used. The tightening torques are to be corrected according to the relevant material pairing of safety valve and valve block. Steel is to be assumed as valve material in this case.



Secure safety valves against unauthorized removal from the mounting cavity by wire or seal. A bore is already provided for this in the valve hexagon.

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 safety valves and cause serious injuries.

- ▶ Only commission the system after the safety valve has 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.

- ▶ 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 25818*".
- 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



Only valves type **DB20K1-1X/...E** can be set to a lower 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.

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. Unload the valve spring as described in chapter 10.2.3 "Safety instructions", screw in the adjustment spindle again as far as possible but do not tighten the lock nut yet after unloading the spring.
3. Switch on the system and wait until the system pressure has built up.

4. 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.
5. Tighten the lock nut clockwise using a manual torque wrench with an accuracy of $\pm 10\%$ and the tightening torque indicated in table 10.

Table 10: Information on the lock nut

Valve type Component marking	DB20K.1X/...E 1001
Wrench size	22
Tightening torque	10 +5 Nm

6. Switch off the system, let the pressure decrease, depressurize any provided pressure accumulators, if applicable. Remove the temporarily installed pressure gauge.
7. 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

See chapter 5.2.1 "Limitations of use"

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.

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 safety valves 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 chapter 10.4 "Spare parts".

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

10.2.3 Unloading safety valves of type DB20K1-1X/...E

To verify the function, the valve spring **may** - in safety valves of type **DB20K1-1X/...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 DB20K1-1X/...E safety valve **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 of 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.

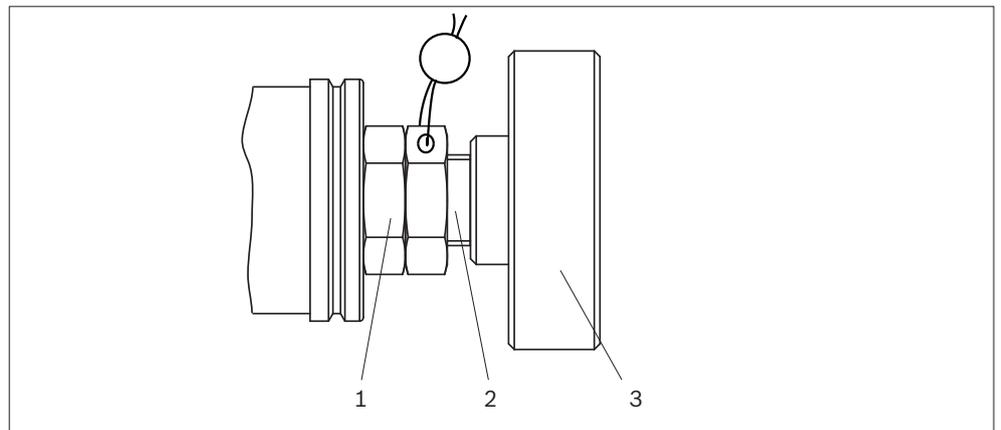


Abb. 1: Loosening the locking

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 11: Information on the lock nut

Valve type Component marking	DB20K1-1X/...E 1001
Wrench size	22
Tightening torque	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 chapter 10 "Maintenance and repair" are admissible.
- ▶ Only qualified personnel (see chapter 2.4 "Qualification of personnel") is authorized to repair the safety valve.
- ▶ The sealing and/or the protective cap 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 safety 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 safety 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 12.
6. Screw in the safety valve again and tighten it applying the specified tightening torque. For tightening torques, please refer to table 9.

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 12: Spare part seal kit

Valve type Component marking	DB20K.1X/...E 1001
NBR	R900722821
FKM	R900722822



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 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.

6. If the device is to be returned to the manufacturer for repair, close the housing of the safety 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 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 safety 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 13: Fault table

Fault	Possible cause	Remedy
The response pressure indicated on the component marking is not reached during testing at the test stand.	The O-ring in the bottom of the safety valve is missing or defective.	Install the correct, dedicated O-ring and tighten the safety valve using the specified torque, see table 9
	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 25818".
	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.
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.
	Type DB20K1-1X/...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 DB20K1-1X/...E".

Fault	Possible cause	Remedy
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 DB20K1-1X/...E : 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 DB20K1-1X/...E".	Type DB20K2-1X/...E : 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 is worn.	Order a new seal kit according to the spare part list and tighten the safety valve using the specified torque, see table 9. Seal the safety valve again at the housing.
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 is damaged or missing.	The lead seal 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.
External leakage	The seal of the adjustment device is worn.	Replace the safety valve.
	O-ring at valve body is worn.	Order a new seal kit according to the spare part list and replace seals, see chapter 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.

Fault	Possible cause	Remedy
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

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

Headquarters

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

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

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

Phone +49 (9352) 18 - 3631 / 3447
Email LoP1QMM7.Abstellungspostfach@boschrexroth.de
Internet www.boschrexroth.de

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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