

2-way cartridge valve

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

Type LFA...DB(W).-7X/...E



Operating instructions
RE 21055-B/11.21

Replaces 02.20
Mat. No. R901557901
English



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

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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 of the design 2-way cartridge valves type LFA...DB.-7X/...E and LFA...DBW.-7X/...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 product" chapter before working with the product.



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

Product scope

Table 1: Product main features

Valve type	Size	Component series
LFA...DB.-7X/...E or	32	7X
LFA...DBW.-7X/...E	40	7X
	50	7X
	63	7X



For the limitations of use please refer to "Data sheet 21055".

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 2: Required and amending documentation

	Title	Document number	Document type
	Safety valve according to PED 2014/68/EU design: 2-way cartridge valve	21055	Data sheet
	Hydraulic valves for industrial applications	07600-B	Operating instructions
	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 hazard avoidance measures described 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 3: 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 4: 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.	Numbered instruction:
2.	The numbers indicate that the actions must be carried out one after the other.
3.	

1.3.3 Designations

The following designations are used in this documentation:

Table 5: 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 6: Abbreviations

Abbreviation	Meaning
DB	Pressure limiting function
PED	Pressure Equipment Directive 2014/68/EU
DIN	<i>Deutsche Industrienorm</i> (German Industry Standard)
EN	European Standard
ISO	International Organization for Standardization
LFA	Logic cartridge valve
RE	Rexroth document
SV	Safety valve
TÜV	Technical monitoring 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 danger of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- ▶ Read this documentation completely and thoroughly before working with the product.
- ▶ Keep this documentation in a location where it is accessible to all users at all times.
- ▶ Always include the required documentation when you pass the product on to third parties.

2.2 Intended use

The product is a hydraulic component.

You may use the product as follows:

- as safety valve according to PED 2014/68/EU design: 2-way cartridge valve

The product is only intended for professional use and not for private use.

Apart from that, you may use the safety valve as follows:

- Complying with the application and environmental conditions according to the data sheet.
- Complying with the specified performance limits.
- Use in the original condition, without damage.
- Repair by customers is not admissible. (Only the repair and maintenance works described in these operating instructions are admissible.)

Intended use includes having read and understood this documentation completely, especially chapter 2 "Safety instructions".

2.3 Improper use

Any use deviating from the intended use is improper and thus not admissible.

Bosch Rexroth AG does not assume any liability for damage caused by improper use.

The user assumes all risks involved with improper use.

The following cases of foreseeable misuse are also regarded as being improper:

- Use in potentially explosive environments
- Incorrect storage
- Incorrect transport
- Lack of cleanliness during storage and assembly
- Incorrect installation
- Use of inappropriate/non-admissible media
- Exceedance of the specified maximum pressures
- Operation outside the approved temperature range
- Incorrect area of application (Use as high-response valve is not admissible)
- Exceedance of the max. admissible flow
- Exceedance of the max. admissible counter pressure in control line Y and tank port B
- Exchange or removal of the nozzles
- Removal or exchange of name plates and lead seals and/or the protective cap at the pilot control valve that cannot be disassembled in a non-destructive manner
- Removal of the locating pin at the connection surface of the control cover
- Operation of the safety valve type "LFA..DBW" without pressure-tight cover of the valve connection surface

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. An overview over the training contents can be found online at:
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 the 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 more over the danger of serious injury caused by a powerful 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. be 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. Therefore, 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.

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 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.

Environmentally harmful hydraulic fluid

Leaking hydraulic fluid leads to environmental pollution.

- ▶ Immediately remedy possible leakage.
- ▶ Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country.

Wear!

Wear may lead to malfunctions.

- ▶ Carry out the prescribed maintenance works.

4 Scope of delivery

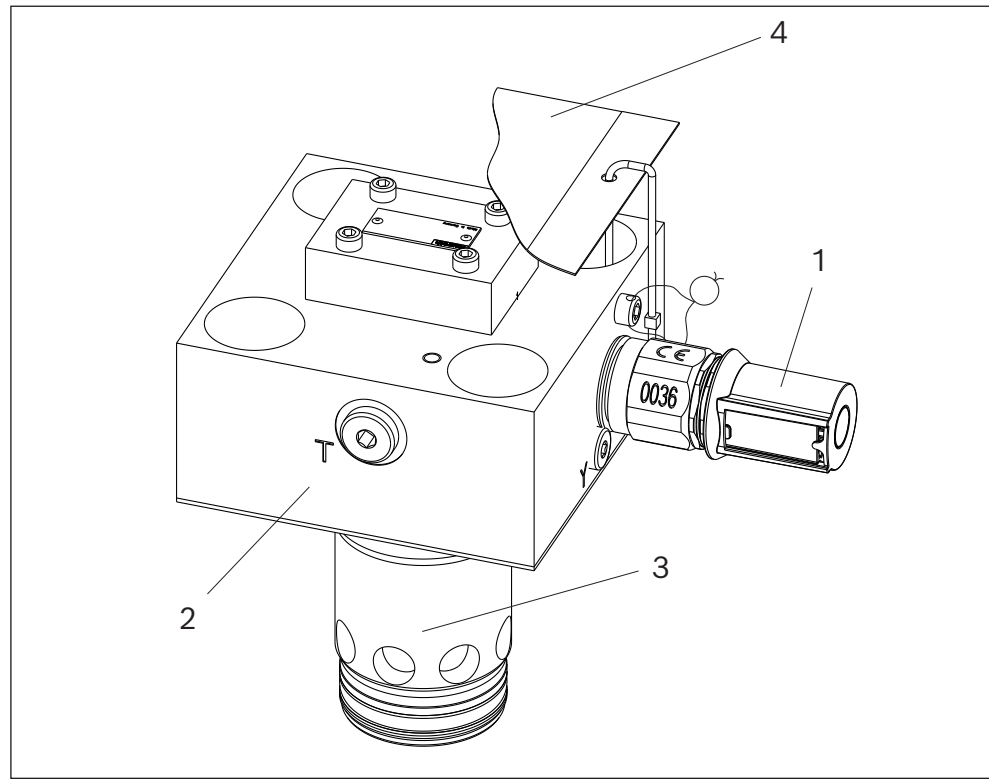


Fig. 1: LFA40DBW2-7X/...E

The scope of delivery includes:

- Type-examination tested safety valve consisting of **two** assemblies:
 - Control cover **(2)**, with type LFA...DBW.-7X/...E including mounted cover plate on the connection diagram of the directional valve) with the sealed pressure limitation unit **(1)** and safety cap that cannot be disassembled in a non-destructive manner (from NG40)
 - Cartridge valve with compression spring **(3)**
- Operating instructions, Setting certificate, Declaration of conformity **(4)**

- ▶ 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 16.1 "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").

With the mounting set that is offered optionally as accessories, the control cover **(2)** can be sealed after the assembly and thus be additionally protected against disassembly.

5 Product information



For information on the performance and product description please refer to the data sheet of your valve. For the data sheet, please refer to:

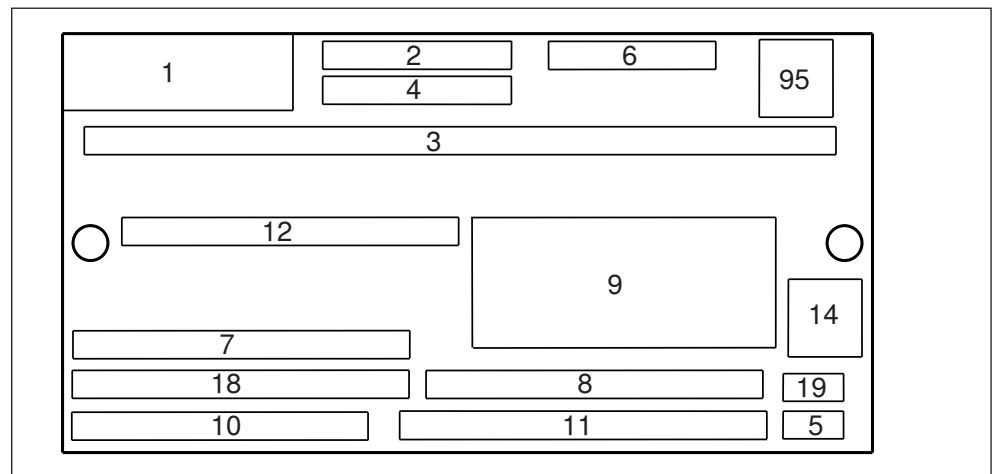
www.boschrexroth.com/mediadirectory

5.1 Product identification

Information on the name plate of the complete valve

The meaning of the information on the name plate of the valve can be read in the correspondingly numbered fields of the following table. The name plate is located on the top of the control cover (type LFA...DB.-7X/...E), or on one side of the control cover (type LFA...DBW.-7X/...E) and applies to control cover and cartridge.

Table 7: Name plate complete valve



No.	Type of information
1	Word mark
2	Material number
3	Type designation
4	Serial number ¹⁾
5	Area/plant number
6	Date of production
7	Max. operating pressure
8	Adm. temperature range
10	Designation of origin
11	Company address
12	Customer / production order
14	CE mark
18	Component marking
19	Testing authority
95	Data Matrix Code

¹⁾ Control covers and cartridges belonging together can be clearly identified from the identical, numbering (consisting of order/serial number) which is only assigned once for every control cover and the related cartridge.

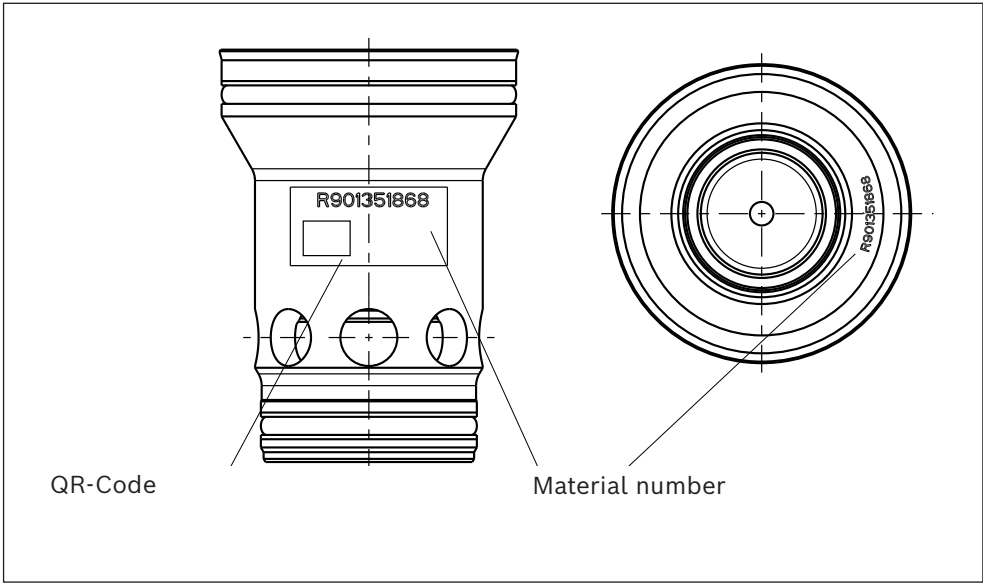


**Information on the
cartridge**

The order and serial number are more over noted on the setting certificate.

The information given on the cartridge is specified in the following figure.

Fig. 2: Information on the cartridge (radial and on the front side) using the example LFA40DB(W).-7X/..E



**Information on the
packaging of the cartridge**

Apart from that, the following information is given on the packaging of the cartridge:

- Manufacturer
- Type
- Material number
- Date of production
- Serial number (hand-written)



WARNING

Damage to persons and property!

The approval according to the Pressure Equipment Directive becomes void when an unapproved cartridge is used.

- You may only install cartridges listed in table 8 "Approved cartridges", see below.

Table 8: Approved cartridges

Type of information	Material number (NBR)	Material number (FKM)
NG32	R901468313	R901468316
NG40	R901351868	R901363295
NG50	R901353391	R901363297
NG63	R901353392	R901363298

5.2 Component marking

Type-examination tested safety valves bear a coded component marking with a pre-defined coded set-up.

Table 9: Example of component marking

TÜV.	SV.	-	1138.	38.	F.	2000.	200
							Response pressure in bar set at the factory and secured by means of a lead seal
							Maximum admissible flow in l/min without counter pressure in the discharge line ¹⁾
							Valve for hydraulic fluid
							Smallest flow diameter in front of the valve seat in mm
							Number of the component marking assigned by the testing authority
							Last digit of the year of the last extension of the validity of the component marking
							Safety valve
							Mark of the notified body which has carried out the type-examination procedure

¹⁾The maximum flow specified in the component marking can only be used in case of operation within the identical pressure range, see "Data sheet 21055"

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.
- ▶ Until complete assembly, transport and secure the safety valve at the intended lifting eyes and not at parts with little stability.
- ▶ Use only suitable lifting gear for the 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 danger 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!

Danger 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.



Further information regarding the transport is available from Bosch Rexroth. Further 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 www.boschrexroth.com/adressen

6.2 Storing the safety valve

Safety valves are delivered in an unobjectionable state.



For transporting and storing the product always observe the environmental conditions specified in the relevant data sheet. 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 must 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.

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 16.1 "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 at the bottom side of the control cover until assembly.
- ▶ Only remove the valve insert from its transport sleeve shortly before the assembly.
- ▶ Immediately remove leaking oil.

Insufficient assembly space!

Danger of jamming and bruising! Danger 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



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 at the pilot control valve and/or the safety cap that cannot be disassembled in a non-destructive manner is intact.

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 specified in the data sheet.
- ▶ 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 and impair the function of the safety valve.

7.2.1 Installation position

The installation position is not relevant.

7.3 Painting the control cover and the mounting plate

- ▶ 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.
- ▶ After painting, the name plate must still be readable.

7.4 Required 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. For the prescribed tightening torques, please refer to table 11.

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 10: Available accessories

Valve mounting set	Material number
Size 32	R901476528
Size 40, 50	R901362574
Size 63	R901362575

- The contents of the valve mounting set in each case consist of:
- 3 hexagon socket head cap screws ISO 4762 (standard)
 - 1 mod. hexagon socket head cap screw ISO 4762 (with cross bore)
 - 1 capstan head screw M6
 - 1 lead seal
 - 1 sealing wire



The valve mounting set specified above serves the **optional** sealing of a valve mounting screw. For handling and use of the valve mounting set, please refer to chap. 7.7.3 "Additionally sealing the control cover with the optional mounting set after the assembly".

7.6 Prior to assembly

- 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 16.1 "List of addresses".

- Check whether the max. admissible flow is suitable for your application and/or compatible with the hydraulic system.



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.

- Check whether the present version of the safety valve (for ordering code of the "sealing type" see "Data sheet 21055) is suitable for operation with the specified hydraulic fluid.

7.7 Assembling the safety valve

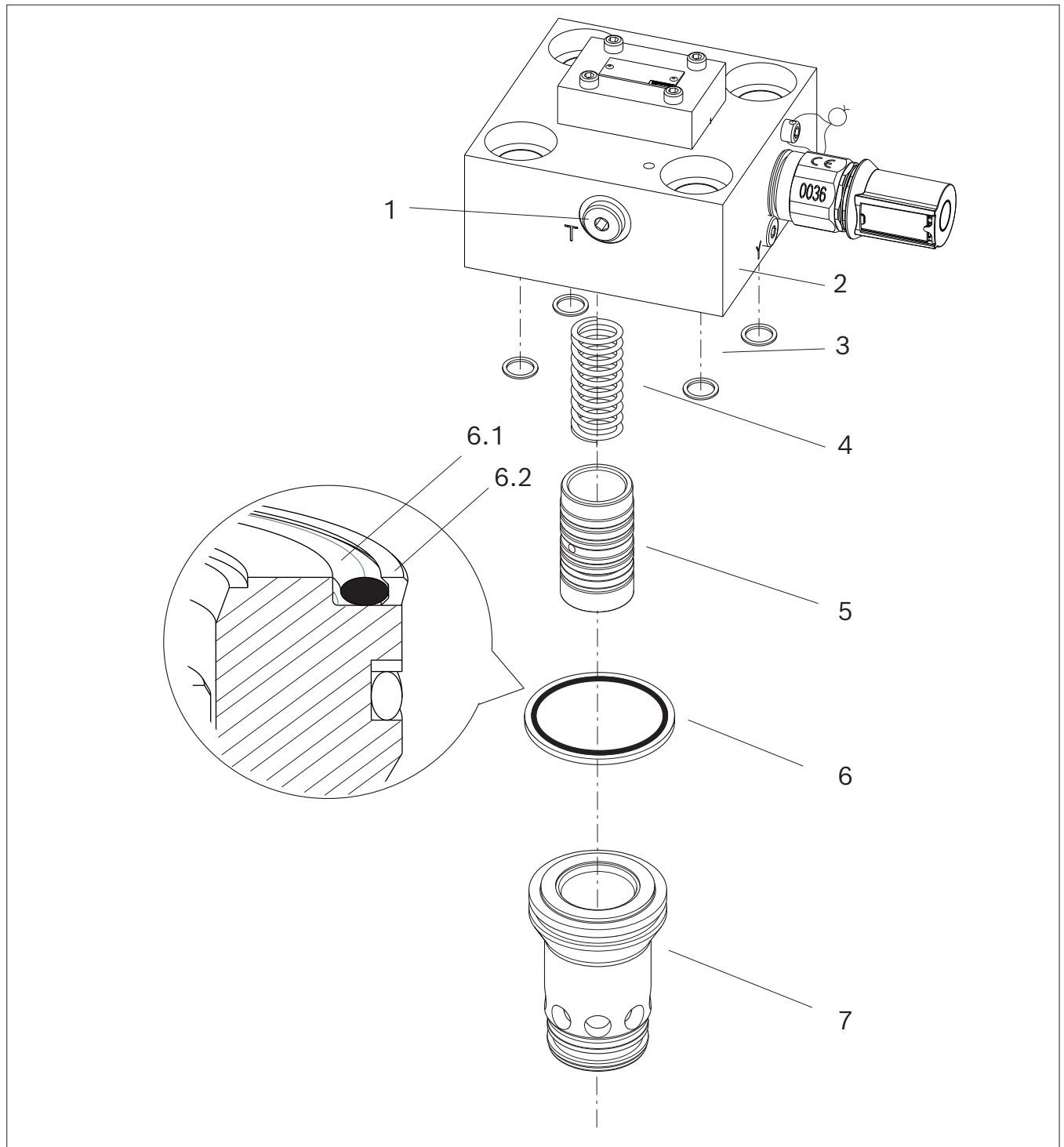


Fig. 3: Exploded drawing LFA40DBW2-7X/...E

- | | |
|---------------------------------------|-----------------------------------|
| 1 External tank port (T) | 2 Control cover |
| 3 Seals, pilot oil connections | 4 Compression spring |
| 5 Valve insert | 6 Axial seal ¹⁾ |

¹⁾ When inserting a two-part sealing package (**6**), consisting of support ring (**6.2**) and O-ring (**6.1**), correct position of the support ring has to be ensured.



WARNING

Faulty installation of the valve mounting screws and the mounting screws of the cover plate!

Improperly mounted 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 and plug 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.

7.7.1 Assembly steps for the cartridge installation

1. Check whether the order and serial number on the name plate of the control cover complies with the information on the cartridge packaging.

WARNING! Damage to persons and property! The approval according to the Pressure Equipment Directive becomes void when an unapproved cartridge is used.

- ▶ You may only install cartridges listed in table 8 "Approved cartridges".

2. Remove the cartridge from the packaging.

CAUTION! Parts falling out! Risk of injury! The cartridge and the spool with spring running in it are loosely inserted into the latter. (See elements **4**, **5** and **7**, fig. 3). If the packaging is opened improperly or during transport, the spool with spring may fall out and cause injuries or damage of the parts.

- ▶ Open the original packaging of the cartridge with the cover facing up to prevent parts of the cartridge from falling out.
- ▶ Transport the cartridge with inserted spool and spring only vertically (e.g. in the packaging container) and ensure in case of horizontal installation that the spool with spring does not fall out of the cartridge.

3. Check whether all seals are available and intact.
4. Both the cartridge and the designated installation bore must be intact and clean.
5. Carefully insert the cartridge (see element **7**, fig. 3) into the installation bore and carefully push it down to the base.



Make sure that no seals are damaged or lost during the insertion.

6. Make sure that the compression spring is inserted (see element **4** and **5**, fig. 3)
7. Make sure that the axial seal (see element **6**, fig. 3) is inserted into the valve installation surface **in the correct position**.

7.7.2 Assembly steps for the control cover installation

Both the mounting surface of the control cover and the provided installation surface must be intact and clean.

- ▶ Only use non-linting fabric for cleaning the valve installation surface.

1. Remove the protective cover from the control cover.
2. Make sure that the serial number on the control cover name plate complies with the serial number of the cartridge.
3. Ensure correct orientation of the control cover. Observe the porting pattern according to the symbol and connection labeling at the control cover. At the connection surface of the control cover, a locating pin has been attached preventing the incorrect attachment of the control cover on the valve installation surface.

4. Check whether the seals of the pilot oil channels (see element **3**, fig. 3) are completely available and intact.
5. Carefully put the control cover onto the cartridge. While doing so, observe the orientation of compression spring (spring puncture in the cover) and axial seal of the valve insert.

Caution! Unsecured components falling down! Due to the length of the compression spring, the control cover rests on the front side of the compression spring (see elements **2** and **4**, fig. 3). Due to improper positioning, the control cover may fall down and cause personal injuries or damage of the components.

- ▶ Provide for a stable position of the control cover during the assembly. If required, threaded bars can be used as installation aid.
 - ▶ Carry out the installation of the control cover (NG63) using the ring bolts installed by default.
6. Use the valve mounting kit listed in table 10 or valve mounting screws of the type listed in table 11.
 7. 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 table 11.
 8. Please note that the tightening torques may change if other screw types are used.

Table 11: Mounting screws and tightening torques

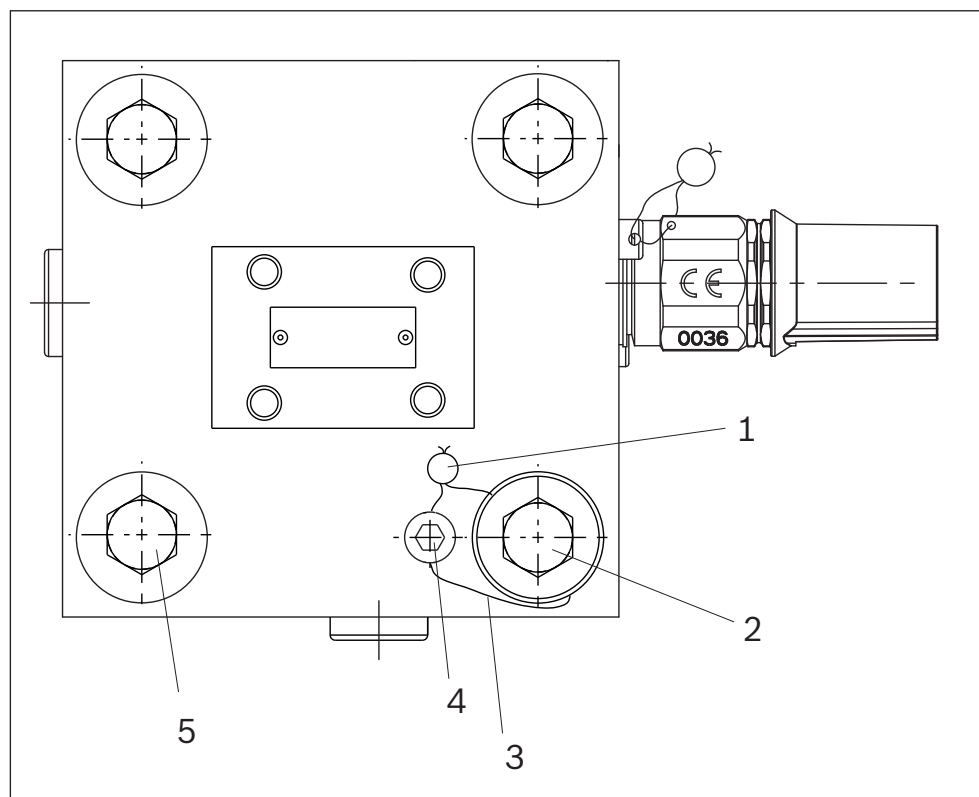
Size	Mounting screws (control cover)	Tightening torque ¹⁾
32	Hexagon socket head cap screws ISO 4762 - M16 x 60-10.9-fZn/nc/480h/C	240 Nm ±10%
40, 50	Hexagon socket head cap screws ISO 4762 - M20 x 80-10.9-fZn/nc/480h/C	480 Nm ±10%
63	Hexagon socket head cap screws ISO 4762 - M30 x 110-10.9-fZn/nc/480h/C	1600 Nm ±10%

¹⁾The specified tightening torques were calculated with total friction coefficient $\mu = 0.09 \dots 0.14$; In case of changed surfaces, they are to be adjusted.

The specified tightening torques stated are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench (tolerance ±10%).

7.7.3 Additionally sealing the control cover with the optional mounting set after the assembly

Fig. 4: Sealing at the control cover (using "LFA40DBW2-7X/...E" as example)



- 1 Lead seal
- 2 Modified hexagon socket head cap screw with cross bore
- 3 Sealing wire
- 4 Capstan head screw
- 5 Hexagon socket head cap screw



The small parts required for the sealing are contained in the valve mounting set, see chapter 7.7.2 "Accessories".

1. Assemble the capstan head screw **(4)** hand-tight on the front side of the control cover, see fig. 4 "Sealing at the control cover"
2. Assemble the modified mounting screw **(2)**, see chapter 7.7.2 "Assembly steps for the control cover".
3. Thread the sealing wire **(3)** through capstan head screw **(4)** and mounting screw **(2)** and subsequently grout the two wire ends with the lead seal **(1)**.

7.7.4 Use of the external tank port (T)

NOTICE

Damage to the safety valve!

When installing hydraulic lines and hoses under pressure, they are exposed to additional mechanical forces during operation, which reduces the life cycle of the safety valve and the complete machine or system.

► Assemble lines and hoses without stress.



Optionally, there is the possibility to use the external tank port (T) (see element **1**, fig. 3) instead of the internal pilot oil channel "Y".

1. Depressurize the relevant system part. Connect your line at the tank port T observing the operating instructions of the system. The connection values are specified in table 12 "Connection thread for optional T port".
2. Make sure that the line is correctly tightened.

Table 12: Connection thread for external tank port (T)

Valve type	Connection thread
LFA32DBW.-7X/...E	G 1/4
LFA40DB(W).-7X/...E	G 1/4
LFA50DB.-7X/...E	G 1/4
LFA50DBW.-7X/...E	G 3/8
LFA63DB(W).-7X/...E	G 1/2

8 Commissioning

WARNING

Personal injury and damage to property!

Commissioning of the safety valve requires basic hydraulic knowledge.

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

- ▶ Make sure that all hydraulic ports are closed.
- ▶ 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 on the hydraulic fluid

- The released operating media and limitations of operation for your safety valve are contained in the data sheet.
- Bosch Rexroth offers the suitable seal designs for the hydraulic fluid used. This information is also contained in the data sheet.

Bleeding the hydraulic system

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 the Pressure Equipment Directive becomes void when an unapproved cartridge is used.

- ▶ 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".

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 its aging.

- ▶ Do not 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 (in the installed condition), observe the following:

- ▶ Remove external coarse dirt and keep sensitive and important parts clean.
- ▶ Only clean the safety valve using a non-linting cloth.

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, provide for absolute cleanliness in order to prevent foreign particles like e.g. welding beads or metal chips from getting into the hydraulic lines, the valve installation bore and into the safety valve.
- ▶ 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

1. Remove coarse dirt from the exterior.
2. Check all external fittings for completeness and tight seat.
3. Check the safety valve for external leakage, replace the seals if necessary, see chapter 10.3 "Repair".
4. Check the connection surface of the safety valve for the formation of corrosion. In the ongoing operation, corrosion may cause leakage. Remove the safety valve and have the contact surface concerned repaired if there is any visible corrosion.

10.2.2 Maintenance interval for safety valves (type LFA...DB(W)...7X/...E)

For ensuring the function, the safety valves have to be made to respond on a suitable test stand **at regular intervals**. For a complete functional test (set pressure, response of the main stage), we recommend a delivery volume of min. 100 l/min. 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 a safety valve of type LFA...DB(W)1-7X/...E (pilot control valve with rotary knob)

To check the function, you **can** - with safety valves of type

LFA...DB(W)1-7X/...E - change the response pressure by means of the rotary knob **(3)** so that the valve responds at a lower pressure value. After the manual functional test, the basic position has to be restored in order to achieve the relief pressure adjusted in the factory.

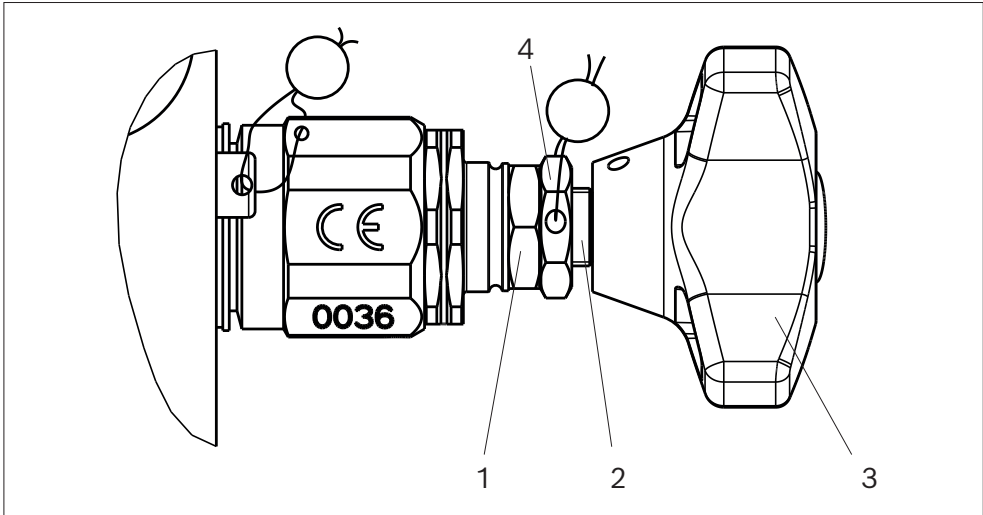


WARNING

Improper unloading of the safety valve!

Improper unloading of the safety valve **LFA...DB(W)1-7X/...E** in the system may cause hazards or faults.

- ▶ Only qualified personnel (see chapter 2.4 "Qualification of personnel") is authorized to 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.



¹⁾ Pos. 5 can be omitted; not relevant for the approval
Fig. 5: Detailed drawing pilot control valve using "LFA40DB(W)1-7X/...E" as example

**Unloading the safety valve
in the installed condition**

- 1. The sealed position of the stop screw (4) must not be changed in a manual test.
- 2. Release the locking of the adjustment spindle (2):
Release the preload of the lock nut (1) by slightly rotating it counterclockwise.
- 3. Purging the safety valve:
Screw out the adjustment device by rotating the rotary knob (3) counterclockwise until it is purged (approx. 3...10 seconds).
- 4. Establishing the basic setting:
Screw in the lock nut (1) hand-tight (without play) against the safety nut (4).
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.
- 5. 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.
- 6. Visual examination: Lock nut (4) rests against the lock nut (1).

Table 13: Information regarding the locking (element 1, fig. 5)

Lock nut (1)	Wrench size	Tightening torque
NG32	17	10 +5 Nm
NG40, 50, 63	19	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.

Removing 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.



In order to remedy leakage at the safety valve, **all** seals of the safety valve (valve insert, pilot oil seals as well as seals at the directional valve connection surfaces that might exist) are to be considered. The seals of the sealed pilot control valve are excluded. For an overview of the seals to be exchanged refer to the accompanying document of the seal kit.

1. Remove the safety valve, see chapter 11 "Disassembly and exchange".
2. Check the sealing surfaces for cleanliness and intactness.
3. Clean the contact surfaces of all seals using suitable cleaning materials.
4. Assemble the new seals using suitable assembly tools.
5. Re-assemble the safety valve into the specified installation bore, see chapter 7 "Assembly".

10.4 Spare parts

When ordering spare parts, please indicate their material numbers.

Table 14: Spare part seal kit

Valve type	Material number Seal kit
LFA32DB(W).-7X/.NE	R961012400
LFA32DB(W).-7X/.FE	R961012401
LFA40DB(W).-7X/.NE	R961009425
LFA40DB(W).-7X/.FE	R961009426
LFA50DB(W).-7X/.NE	R961009427
LFA50DB(W).-7X/.FE	R961009428
LFA63DB(W).-7X/.NE	R961009429
LFA63DB(W).-7X/.FE	R961009430



The spare parts are available from the address specified in chapter 16.1 "List of addresses".

11 Disassembly and replacement



WARNING

Pressurized and energized system parts!

When working on system parts which have not been depressurized or de-energized, there is the danger of injury by leaking hydraulic fluid or electric shock.

- ▶ Before disassembly, make sure that the hydraulic system is depressurized and de-energized.



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. Only use suitable tools to loosen the valve mounting screws.

WARNING! Risk of injury caused by incorrect disassembly! The spring preload of the cartridge must be observed.

- ▶ The mounting screws must be loosened crosswise, alternately.

6. Remove the control cover.

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 chapter 6 "Transport and storage".

7. Remove the spring (see element **4**, fig. 3).
8. Remove the axial seal from the cartridge valve (see element **6**, fig. 3).
9. Only with NG32: Pull the upper part (ring) of the two-part socket out of the installation bore (see element **5**, fig. 3) using a suitable tool.

10. Pull the spool out of the valve insert (see element 5, fig. 3) using a suitable tool.
11. Pull the socket (see element 5, fig. 3) out of the installation bore using a suitable tool.
12. Collect the escaping hydraulic fluid in the provided container and dispose of it properly.
13. If the safety valve (consisting of control cover and valve insert) is to be returned to the manufacturer for repair, cover the connection surface of the control cover by means of a protective plate to protect it against mech. damage and deposition of dirt and pack the valve insert in the original case.
14. Close an unfitted installation bore immediately in order to prevent contamination of the system.
15. It is not admissible to switch on or operate the system without safety valve.



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

Improper 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 expanded polystyrene. They can be recycled without any problems. Due to ecological reasons, disposable packaging should not be used for returning products to Bosch Rexroth.

The valve insert is supplied in plastic packaging.

12.4 Materials used

This safety valve does not contain hazardous materials which will be released during intended use. So no detrimental 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

13.1 Extension

Subsequent set-up of a directional valve

An additional switching function of the safety valve type **LFA...DBW.-7X/...E** by a subsequently attached directional valve **must not** lead to any impairment of the safety-relevant function. This has to be checked and ensured by the system end-user before the functionality extension.

13.2 Modification

Any exchange of parts or any modification within the original assembly of type **LFA...DB(W).-7X/...E** is **not** admissible.

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 within 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 maintained and used as intended?
 - How did the fault become apparent?
- ▶ Try to get a clear idea of the cause of error. Ask the direct (machine) operator, if necessary.

Fault table The safety valve will remain functionally safe as long as the specified application conditions, in particular the oil quality and the operating temperature, and the maintenance instructions are complied with.

Table 15: Fault table

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.
	With type LFA...DB(W)1-7X/...E : The adjustment type 1 (rotary knob) is not rotated to fixedly sealed stop.	Rotate the rotary knob to the fixedly set and sealed stop.
There is a permanent flow through the safety valve.	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.
	Dirt in the safety valve prevents the closing of the valve.	Establish oil cleanliness by means of suitable measures. Replace the safety valve.
Sealing at the pilot control valve or safety cap is damaged or missing.	The lead seal and/or the safety cap at the pilot control valve has been destroyed by the operating personnel or mechanical influence.	The pilot control valve must not be re-sealed, replaced or repaired. If the lead seal is missing, the approval according to PED will no longer apply. Completely replace the safety valve.
External leakage	Plug screws leaky, seals at the plug screw are worn. For the position of the plug screws refer to the "Unit dimensions" data sheet.	Install new seals according to the spare part list, see chapter 10.4 "Spare parts", make sure the sealing surfaces are intact. For more information refer to the accompanying document of the seal kit.
	The safety valve leaks between control cover and valve installation surface. Internal seals are worn.	Order new seal kit according to the spare part list, see chapter 10.4 "Spare parts" and replace the seals, see chapter 10.3 "Repair".
With type LFA...DB(W)1-7X/...E : Rotary knob is destroyed.	Transport damage, improper handling	Replace the safety valve.
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 chapter 16.1 "List of addresses".

Following faults due to contamination, it is more over 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.

15 Technical data

For the technical data of your safety valve please refer to "*Data sheet 21055*".

16 Appendix

16.1 List of addresses

Contacts for service and spare parts

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

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

Headquarters

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

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

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

**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.Absatzpostfach@boschrexroth.de
Internet www.boschrexroth.com

In your request, please specify the order and serial number, the date of manufacture and the type designation of your valve. All these specifications are indicated on the name plate of the valve, see chapter 5.1 "Product identification".

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