Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth Bosch Group

Explosion-proof hydraulic valves, Type WE 6../.E..XN

RE 23178-XN-B0/08.12
Replaces: 04.10

Operating instructions

Explosion-proof hydraulic products

RE 07010-X-B1/03.12
Replaces: 03.05

Operating Instructions

for explosion-proof
control valves
continuous valves

ATEX - units
For potentially explosive atmospheres

Operating Instructions
Part I General Information

CE

Ex

What you need to know about these Operating Instructions

These operating instructions apply to Rexroth explosion-proof hydraulic products and consist of the following three parts:

Part I General Information 07010-X-B1
Part II Data Sheet
Part III Product-specific instructions

For further information on the correct use of Rexroth hydraulic products please refer to our publication *General product information on hydraulic products, 07008.*

Contents

1 Important basic information

1.1 Conventions used in this product information document

Cross-references are printed in *italics*.

⚠ DANGER

This symbol indicates a threat of danger which will result directly in death or very serious injury if not avoided.

⚠ WARNING

This symbol indicates a threat of danger which may result in death or very serious injury if not avoided.

⚠ CAUTION

This symbol indicates possible danger which may lead to minor or serious injury and/or material damage.

IMPORTANT

This symbol indicates additional information.

2 Responsibilities

2.1 Liability, warranty, guarantee

Bosch Rexroth AG shall not be liable for damages resulting from these Operating Instructions not being adhered to or not being adhered to in full.

Unauthorised tampering shall render the warranty null and void.

Bosch Rexroth shall only be liable if the scope of delivery was shown to be defective. Bosch Rexroth shall not be liable if a deficiency occurs that involves parts that are replaced by the customer with equivalent but not identical parts as specified by the manufacturer.

Please refer to our general terms of supply or your contract for details of the guarantee and manufacturer's warranty.

2.2 Operator/user responsibilities

Mineral-oil-based pressure fluid is hazardous to water and flammable.

It may be used only if the relevant safety datasheet from the manufacturer is available and all the measures stipulated therein have been implemented.

If there is a risk of fluid leaking from the hydraulic product and contaminating water or the ground, the hydraulic product in question must be placed in a suitable collecting trough.

The operator is responsible for ensuring that

- the hydraulic product is used only in accordance with the proper use as defined in these Operating Instructions;
- the hydraulic product is used only in accordance with the technical data, as well as the ambient and operating conditions indicated in these Operating Instructions, and in particular that the limiting values given in the *Data Sheet* are not exceeded;
- the applicable rules, regulations, and directives on explosion protection are complied with.

If the hydraulic product is part of another product, e.g. a hydraulic system, then the person or organisation responsible for this other product (e.g. the designer/constructor of the system) shall ensure that

- the hydraulic product is used only in accordance with the proper use as defined in these Operating Instructions;
- the hydraulic product is used only in such a manner that the technical data, as well as the ambient and operating conditions indicated in these Operating Instructions, are complied with, and in particular that the limiting values given in the *Data Sheet* are not exceeded as far as anyone can judge and are in compliance with its user's manual;
- the applicable regulations and directives on explosion protection are complied with.

2.3 Copyright

3 Important basic safety instructions

3.1 Requirements of personnel, duty of care

3.1.1 General requirements, qualifications

Persons under the age of 18 who are currently receiving instruction or training or are working under supervision may not work on Rexroth hydraulic products.

This does not apply to young persons of 16 or over if

- working on Rexroth hydraulic products is necessary in order for them to accomplish their training objective;
- their protection is guaranteed through the supervision of an experienced, specialist member of staff;
- they are only allowed to use tools, equipment, and protective gear that preclude the risk of injury.

Specialist personnel are those who, using their specialist training, knowledge, and experience as well as familiarity with the relevant conditions, can recognise possible dangers and undertake the necessary measures to eliminate possible accidents.

3.1.2 Requirements of maintenance personnel

It may be necessary to carry out maintenance tasks on the hydraulic product in order to keep it in proper working order. For details, please refer to *Part III, Product-specific Instructions*. Maintenance tasks include the inspection, servicing, and repair of hydraulic and electrical components. Personnel carrying out these various tasks must have certain minimum qualifications.

For the inspection of the hydraulic components, personnel must fulfil the following requirements:

- They must be instructed about the tasks.
- Specialist knowledge of hydraulics is not required.

For the servicing of the hydraulic components, personnel must fulfil the following requirements:

- They have been instructed in the relevant activity.
- Specialist knowledge of hydraulics is not required to carry out servicing work.

For the maintenance of the hydraulic components, personnel must fulfil the following requirements:

- They must be hydraulics experts instructed in the tasks as defined above.
- They must be familiar with the function of the hydraulic system as a whole, from subsystems to their interaction with the function of the machine as a whole.
- They must be able to read hydraulic circuit diagrams, interpret individual functions from their symbols, and understand function diagrams.
- They must possess knowledge of the function and construction of hydraulic elements.

The following applies to work on the electrical systems:

All work on electrical equipment may only be carried out by an authorised, qualified electrician, or by instructed persons under the guidance and supervision of an authorised qualified electrician, in accordance with the rules applicable to electro-technical products.

3.2 Ancillary dangers and protective measures

⚠ DANGER

Danger zone	Ancillary danger	Protective measure(s), safety instructions
Connections and pressure lines (pipes and conduits)	Risk of injury or loss of life from sprayed pressure fluid under high pressure during maintenance work.	Depressurise hydraulic system before starting maintenance work. Relieve any accumulators of pressure. Rectify leaks immediately.
Surfaces of components and pressure lines	Risk of burning due to high surface temperatures	Allow hydraulic parts to cool before commencing maintenance work. Wear protective clothing.
Electrical components	Electric shock Loss of explosion protection	Work on electrical components only in a non-powered state. Switch electrical connections off before assembly and disassembly work begins. All tasks that require product components to be dismantled may be performed only within the scope given in *Part III, Product-specific instructions*.
	Failure caused by excessive moisture penetration following cleaning with a high pressure cleaner	Shield the hydraulic product from the direct effect of high pressure water jets.

Handling pressure fluid without protection is hazardous to your health.

Please observe the manufacturer's *safety instructions* for the pressure fluid used and the associated *Safety Data Sheet*.

⚠ CAUTION

Danger zone	Ancillary danger	Protective measure(s), safety instructions
Connections and pressure lines (pipes and conduits)	Water or ground pollution due to leakage	Collecting trough. Rectify leaks immediately.

IMPORTANT

See also *2.2 Operator/user responsibilities.*

3.3 Proper use

Your hydraulic product has been conceived and designed for the transmission, open-loop control, or closed-loop control of energy and signals with the aid of the flow of oil. It fulfils the requirements of EU Directive 94/9/EC on Equipment used in Potentially Explosive Atmospheres (Atex). The equipment groups and categories can be found in the *Technical Data Sheet* under *Areas of use in accordance with Directive 94/9/EC*.

Safety components integrated in the Bosch Rexroth hydraulic product satisfy at least Safety Category B in accordance with EN ISO 13849-1:2008.

However, only by carefully observing this user's manual can accidents be prevented and the problem-free operation of your Bosch Rexroth hydraulic product be guaranteed.

Store the hydraulic product only in a dry, dust-free environment that is free of corrosive agents and vapours, has a low moisture content, and undergoes no large variations in temperature. We recommend the use of clean conservation oil for storage periods longer than six months.

IMPORTANT

The factory-applied corrosion protection is adequate for storage under the conditions given above, provided that no condensation or leaked water can penetrate the hydraulic product.

The hydraulic product is only to be used with the operating fluids listed in the *Data Sheet*. Information on using products with different pressure fluids is available on request.

Use the hydraulic product only if it is in perfect technical condition and only in accordance with the proper use as defined in these Operating Instructions. The connections, operating conditions and performance data defined in these Operating Instructions must not be changed.

IMPORTANT

Please contact Bosch Rexroth AG first should you wish to use the hydraulic product under other connection, usage, or performance data than those specified by Bosch Rexroth AG in these operating instructions. The hydraulic product may not be used with any other connection, usage, or performance data other than those described in these operating instructions without written permission from Bosch Rexroth AG.

The hydraulic product must only be converted within the scope given in *Part III*, *Product-specific Instructions*.

During setting up or maintenance work, the safety devices fitted by Bosch Rexroth AG must be present, properly installed, and in full working order, unless this is impossible. They must not be relocated, bypassed, or rendered ineffective.

Rexroth hydraulic products must never be operated or maintained by persons under the influence of alcohol, drugs, or other medication which can affect one's ability to react.

3.4 Use in areas endangered by explosion

⚠ DANGER

The hydraulic product is only to be used in the areas indicated in the *Data Sheet, Requirements for explosion protection* or in areas with lower requirements.

3.4.1 Zones, equipment groups, and categories

The user/operator must divide areas endangered by explosion into zones in accordance with EU Directive 1999/92/EC. The following table shows the equipment groups and categories alongside the zones.

The hydraulic product is to be used exclusively in the area and zone corresponding to the appropriate equipment group and category. Use of the product must also comply with the other Requirements for explosion protection in the *Data Sheet*.

Comparison of the equipment groups and categories in accordance with 94/9/EC and the associated zone in accordance with 1999/92/EC

Equipment group to 94/9/EC	Category to 94/9/EC	Area of use, characteristics (extract from the Directive)	Usable in zone according to 1999/92/EC
I	M1	Atmospheres endangered by firedamp (equipment group I), i.e. underground mines and their surface installations. Can remain operational in the presence of a potentially explosive atmosphere. Very high level of safety.	-
I	M2	Atmospheres endangered by firedamp (equipment group I), i.e. underground mines and their surface installations. Must be able to be switched off in the presence of a potentially explosive atmosphere. High level of safety.	-
II	1G	Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are present permanently, or frequently, or for long periods (equipment group II). Equates to Zone 0 in accordance with Directive 1999/92/EC. Very high level of safety.	0, 1, 2
II	2G	Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are occasionally present (equipment group II). Equates to Zone 1 in accordance with Directive 1999/92/EC. High level of safety.	1,2
II	3G	Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are normally not present, or present only infrequently, or for short periods (equipment group II). Equates to Zone 2 in accordance with Directive 1999/92/EC. Normal level of safety.	2
II	1D	Potentially explosive atmospheres in which potentially explosive dust/air mixtures are present permanently, or frequently, or for long periods (equipment group II). Equates to Zone 22 in accordance with Directive 1999/92/EC. Very high level of safety.	20, 21, 22
II	2D	Potentially explosive atmospheres in which potentially explosive dust/air mixtures are occasionally present (equipment group II). Equates to Zone 21 in accordance with Directive 1999/92/EC. High level of safety.	21, 22
II	3D	Potentially explosive atmospheres in which a potentially explosive atmosphere from raised dust is normally not present, or present only infrequently, or for short periods (equipment group II). Equates to Zone 22 in accordance with Directive 1999/92/EC. Normal level of safety.	22

3.4.2 Temperature classes in equipment group II

In potentially explosive atmospheres where a risk of explosion from explosive gases, mists, or vapours exists (zones **0, 1, 2**, applicable devices: equipment group **II**, categories **1G**, **2G** and **3G**), the maximum surface temperature of the hydraulic product must, in addition, be below the ignition temperature of the surrounding potentially explosive gases, mists, or vapours.

These hydraulic products are divided in accordance with EN 13463-1 into the temperature classes T1 to T6, in line with their maximum surface temperature. With hydraulic products of equipment group **II** and categories **1G**, **2G** and **3G**, the temperature class is a constituent of the explosion protection mark, see *Part II, Data Sheet*, providing information on the suitability of the hydraulic product for use in a particular potentially explosive atmosphere where there are potentially explosive gases, mists, or vapours.

Temperature class	Highest permissible surface temperature	Permissible ignition temperature of the gas, mist, or vapour
T1	450 °C	>450 °C
T2	300 °C	>300 °C
T3	200 °C	>200 °C
T4	135 °C	>135 °C
T5	100 °C	>100 °C
T6	85 °C	>85 °C

3.5 Improper use

⚠ DANGER

Modifications to the product are only permitted within the scope given in *Part III, Product-specific Instructions*.

The hydraulic product is pre-coated at the factory with a surface protection ready for service. This surface protection must not normally be altered – through the application of paint, for example – as this would render the explosion protection ineffective. Should, by way of exception, alteration to the surface protection be permitted, this will be expressly stipulated in *Part III, Product-specific Instructions*. Please observe the limitations specified here, where applicable.

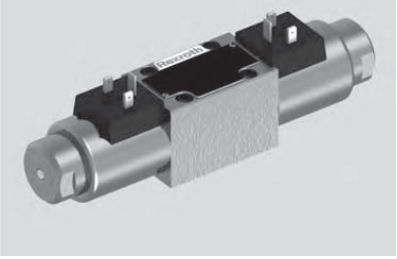
3.6 Disposal

- Empty the hydraulic product and dispose of it as scrap metal.
- Collect residual oil and dispose of it in accordance with the instructions in the safety datasheet for hydraulic fluids.
- Dispose of any electronic components properly and in accordance with applicable regulations.

4/3, 4/2 and 3/2 directional valves with wet-pin DC solenoids

RE 23178-XN-B2/08.12
Replaces: 04.10

Type WE 6 ../.E..XN...



Size 6
Component series 6X
Maximum operating pressure 350 bar
Maximum flow 80 l/min

ATEX units
For explosive areas

Part II Data sheet

Information on the explosion protection:

- Area of application in accordance with the Explosion Protection Directive 94/9/EC: **II 3G; II 3D**
- Type of protection of the valve solenoid
  Ex nA IIC T3 Gc according to EN 60079-15:2010 and
  Ex tc IIIC T140°C Dc IP65 according to EN 60079-31:2009

What you need to know about these operating instructions

These operating instructions apply to the explosion-proof version of Rexroth valves and consist of the following three parts:

Part I General information 07010-X-B1
Part II Data sheet 23178-XN-B2
Part III Product-specific instructions 23178-XN-B3

Operating instructions 23178-XN-B0

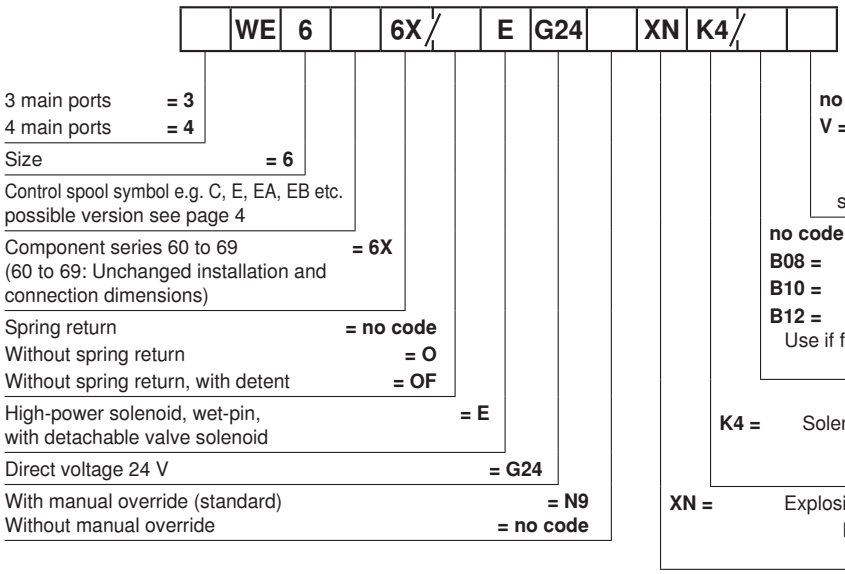
You can find further information on the correct handling of Rexroth hydraulic products in our publication "General product information on hydraulic products" 07008.

Table of contents

Features

- Direct operated directional spool valve with solenoid actuation for proper use in explosive atmospheres
- Porting pattern according to ISO 4401-03-02-0-05
- Subplates available in FE/ZN version (see page 10)
- Wet-pin DC solenoids
- Solenoid coil rotatable by 90 °
- Electrical connection as individual connection with connector according to EN 175301-803, design A
- With manual override, optional

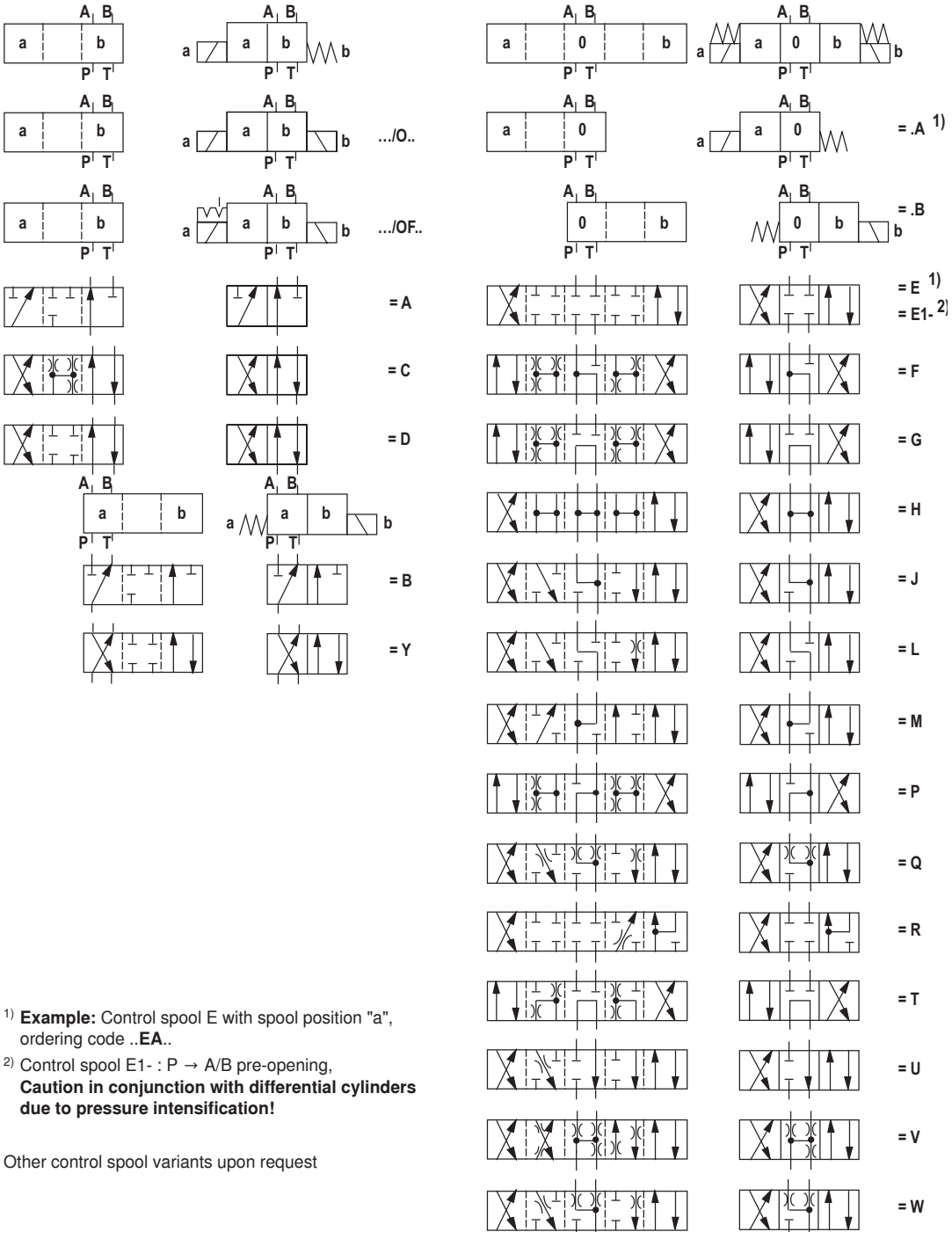
Ordering code and scope of delivery



Included in the scope of delivery:

Valve operating instructions with declaration of conformity in part III

Control spool symbols



1) **Example:** Control spool E with spool position "a", ordering code ..**EA**..

2) Control spool E1- : P → A/B pre-opening, **Caution in conjunction with differential cylinders due to pressure intensification!**

Other control spool variants upon request

Function, section

Directional valves of type WE are solenoid operated directional spool valves. They control the start, stop and direction of a fluid flow.

The directional valves basically consist of housing (1), one or two solenoids (2), control spool (3), and one or two return springs (4).

In the de-energized condition, control spool (3) is held in the central position or in the initial position by the return springs (4) (except for impulse spools). The control spool (3) is actuated by wet-pin solenoids in hydraulic fluid (2).

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

The force of solenoid (2) acts via plunger (5) on control spool (3) and pushes the latter from its rest position to the required end position. This enables the necessary direction of flow from P → A and B → T or P → B and A → T

After solenoid (2) was de-energized, return spring (4) pushes control spool (3) back to its rest position.

An optional manual override (6) allows control spool (3) to be moved without solenoid energization.

Type 4WE 6 ..6X/O...XN... (only possible with control spool symbols A, C and D)

This version is a directional valve with two spool positions and two solenoids without detent.

In the de-energized condition, there is no defined spool position.

Type 4WE 6 ..6X/OF... XN... (impulse spool, only possible with control spool symbols A, C and D)

This version is a directional valve with two spool positions, two solenoids and one detent. It alternately locks the two spools in position and the solenoid therefore needs not to be permanently energized.

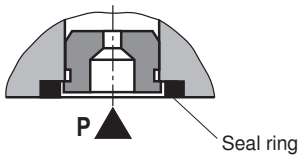
Important:
Pressure peaks in the tank line to two or several valves can result in unintended spool movements in case of valves with detent! We therefore recommend that separate return lines be provided or a check valve installed in the tank line.

The tank line must not be allowed to run empty. With corresponding installation conditions, a preload valve (preload pressure approx. 2 bar) must be installed.

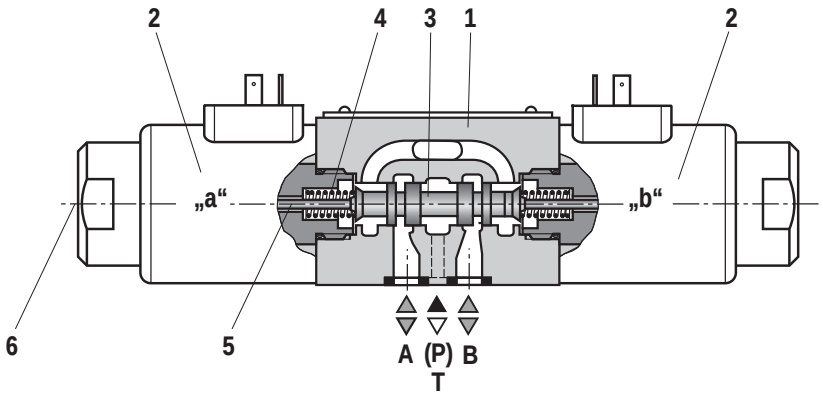
Throttle insert (valve type 4WE 6 ..6X/…XN../**B**..)

The use of a throttle insert is required when due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.

It is inserted in channel P of the directional valve.



Type 4WE 6 E6X/...E..XNK4...



Technical data

general

Installation position			Any
Ambient temperature range		°C	–20… +50
Storage temperature range		°C	+15… +30
Admissible vibration load			20 … 2000 Hz amplitude 0.05 g^2/Hz (10 g RMS)
Weight	with 1 solenoid	kg	2.3
	with 2 solenoids	kg	2.85
Surface protection			Galvanically coated

hydraulic

Maximum operating pressure	Port A, B, P	bar	350	
	Port T	bar	210	With symbols A and B, port T must be used as leakage oil connection if the operating pressure exceeds the admissible tank pressure.
Maximum flow		l/min	80	
Flow cross-section (spool position 0)	Control spool Q		Approx. 6 % of the nominal cross-section	
	Control spool W		Approx. 3 % of the nominal cross-section	
Hydraulic fluid			Mineral oil (HL, HLP) according to DIN 51524 [1]; fast bio-degradable hydraulic fluids according to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; Flame-resistant hydraulic fluid HFC according to ISO 12922 [3], other hydraulic fluids on request, ignition temperature > 190 °C	
Hydraulic fluid temperature range		°C	–20 … +80 (for NBR seals) [4]	
			–15 … +80 (for FKM seals) [4]	
Viscosity range		mm^2/s	2.8 … 500	
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 [5]	

[1] Suitable for NBR **and** FKM seals

[2] Suitable **only** for FKM seals

[3] Only in connection with NBR seals, max. admissible pressure 210 bar, $\Delta p < 15$ bar, hydraulic fluid temperature max. 60 °C
More information is available from our sales staff.

[4] Observe the "Special conditions for safe use" on page 7.

[5] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components. For the selection of the filters see www.boschrexroth.com/filter.

Technical data

electric

Voltage type			Direct voltage (DC)
Nominal voltage		V	24
Voltage tolerance		%	±10
Admissible residual ripple		%	< 5
Duty cycle / operating mode according to VDE 0580			100 % / S1 (continuous operation)
Switching times according to ISO 6403	On	ms	25 … 45
	Off	ms	10 … 25
Switching frequency		1/h	up to 15000
Nominal power at ambient temperature 20 °C		W	23
Maximum power with 1.1 x nominal voltage and ambient temperature 20 °C		W	28.8
Protection class according to EN 60529			IP 65 [1]

[1] If suitable mating connectors are used (protection class at least IP 65) and in case of appropriate assembly.

Information on the explosion protection

Area of application as per directive 94/9/EC		II 3G	II 3D
Type of protection of the valve solenoid according to EN 60079-15: 2006 / EN 61241-1: 2007		Ex nA IIC T3 Gc	Ex tc IIIC T140°C Dc IP65
Maximum surface temperature [1]	°C	140	140
Type examination certificate Solenoid		BVS 12 ATEX E 062 X	
Type of protection Valve		c (EN 13463-5:2011)	
Special conditions for safe use		– Connection lines must be passed in a pull-relieved way. – The valve is to be installed so that no impact stresses > 4 J can take effect. – In order to avoid dangers caused by static charging, the base and/or subplate on which the valve is to be fitted must be electrically conductive and included in the equipotential bonding. – The valve solenoid must not be installed close to charge-generating processes. – Dust layers with a thickness > 50 mm are not admissible. – In case of valves with two solenoids, maximally one of the solenoids may be energized at a time. – Maximum hydraulic fluid temperature: In case of bank assembly, as long as only one solenoid is energized at a time, and in case of individual assembly: +80 °C In case of bank assembly when more than one solenoid is energized at a time: +65 °C – The maximum temperature of the valve casing surface is 110 °C. This has to be considered when selecting the connection cable and/or contact of the connection cable with the casing surface is to be prevented.	
Ambient temperature range	°C	–20 … +50	

Requirements on the mating connector

Temperature at the connector of the valve solenoid	°C	≥ 100
Area of application as per directive 94/9/EC		II 3G; II 3D
Protection class in plugged condition		IP 65

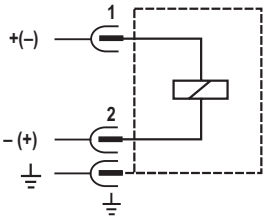
[1] Surface temperature > 50 °C, provide contact protection

Electrical connection

The valves are equipped with a plug-in connector according to EN 175301-803, design A.

Information on the suitability of mating connectors is available on page 7.

Circuit diagram



Connection is polarity-independent

For protection of the valve solenoids, suitable measures are to be taken which limit the switch-off overvoltages to a maximum of 500 V.

Over-current fuse and switch-off voltage peak

Important:

A fuse appropriate for the solenoid's rated current (max. 3 x I_{rated} according to DIN 41571 and/or IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping must be connected to each valve solenoid as short-circuit protection. The cut-off capacity of the fuse must match or exceed the short-circuit current of the supply source.

This fuse or protective motor switch may only be fitted outside the explosive area or must be of an explosion-proof design.

When an inductivity is switched off, a voltage peak results which may cause failures or damage in the connected control electronics.

Voltage data in the valve type code	Nominal voltage Valve solenoid	Rated current Valve solenoid	Recommended pre-fuse characteristics medium time-lag according to DIN EN 60127-1: 2011
G24	24 V DC	0.95 A DC	1 A

Performance limits (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

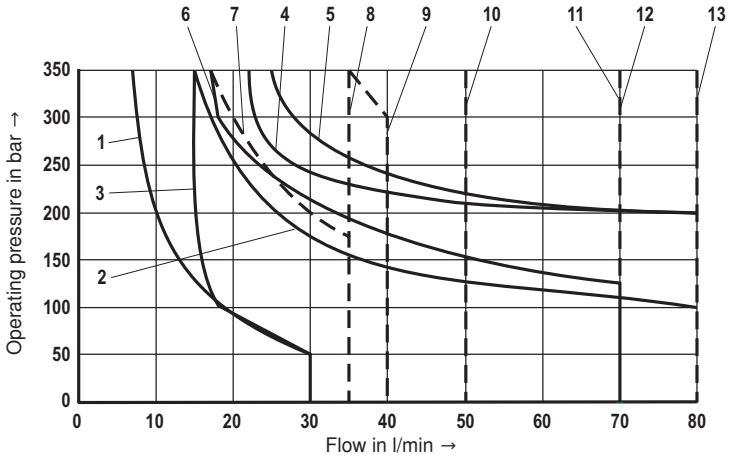
Important:

The specified switching power limits are valid for operation with two directions of flow (e.g. from P → A and simultaneous return flow from B → T).

Due to the flow forces acting within the valves, the admissible switching power limit may be considerably lower with only one direction of flow (e.g. from P → A while port B is blocked)!

(In such cases, please consult us.)

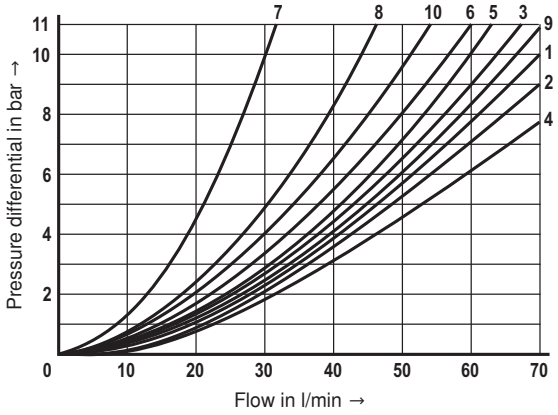
The switching power limit was established while the solenoids were at operating temperature, at 10 % under-voltage and without tank pre-loading.



Control spool symbol	Characteristic curve
A,B	1
J,L,U	2
V	3
D,C,Y	4
Q,W	5
A/0, A/0F	6
F,P	7
T	8
G	9
H	10
D/0F, C/0F	11
M, D/0, C/0	12
E1, R, E	13

Characteristic curve (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

Δ_p - q_V characteristic curves

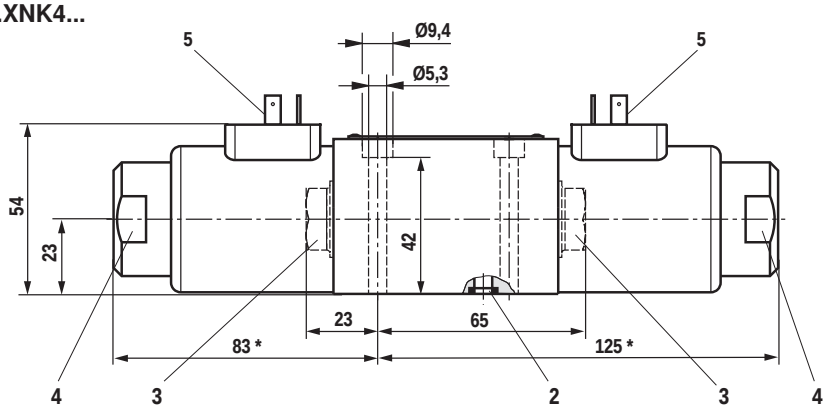


Characteristic curve selection

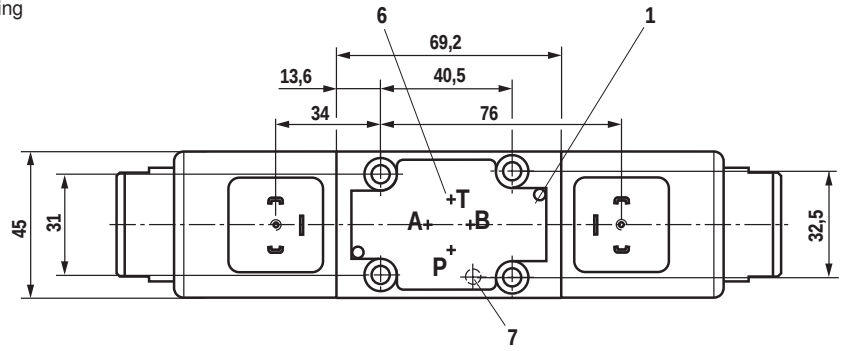
Control spool symbol	Direction of flow					
	P – A	P – B	A – T	B – T	B – A	P – T
A, B	3	3	–	–	–	–
C46, C	1	1	3	1	–	–
D46, D, Y	5	5	3	3	–	–
E	3	3	1	1	–	–
F	1	3	1	1	–	–
T	10	10	9	9	–	8
H	2	4	2	2	–	9
J, Q	1	1	2	1	–	–
L	3	3	4	9	–	–
M	2	4	3	3	–	–
P	3	1	1	1	–	–
R	5	5	4	–	7	–
V	1	2	1	1	–	–
W	1	1	2	2	–	–
U	3	3	9	4	–	–
G	6	6	9	9	–	8

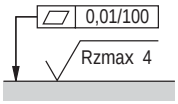
Device dimensions (dimensions in mm)

Type 4WE 6 ...6X/...E..XNK4...



* Plus 50.5 mm for detaching the solenoid coil





Required surface quality of the valve contact surface

1 Name plate
2 Identical seal rings for ports A, B, P, T
3 Plug screw for valves with one solenoid
4 Mounting nut with double edge SW32
Tightening torque M_A = 8 + 1 Nm
5 Plug-in connector according to EN 175301-803, design A
6 Porting pattern according to ISO 4401-03-02-0-05
7 Receiving hole for locating pin according to ISO 4401-03-02-0-05, (locating pin must be ordered separately, mat. no. **R900005694)**

Valve mounting screws

For reasons of stability, exclusively use the following valve mounting screws:
4 hexagon socket head cap screws
ISO 4762-M5x50-10.9-flZn-240h-L
(friction coefficient 0.09 – 0.14 according to VDA 235-101)

Material no. **R913000064**
(must be ordered separately)

Subplates

(**without** locating hole)	G 341/01 FE/ZN (G1/4)
	G 342/01 FE/ZN (G3/8)
	G 502/01 FE/ZN (G1/2)
(**with** locating hole)	G 341/60 FE/ZN (G1/4)
	G 342/60 FE/ZN (G3/8)
	G 502/60 FE/ZN (G1/2)

with dimensions as in the data sheet 45052
(must be ordered separately)

Important:

Subplates are no components in the sense of directive 94/9/EC and can be used after the manufacturer of the overall system has assessed the risk of ignition.

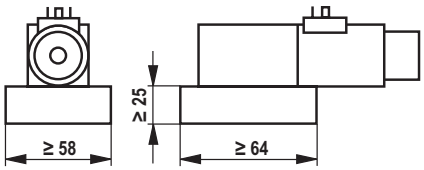
The G...FE/ZN versions are free from aluminum and/or magnesium and galvanized.

Installation conditions (dimensions in mm)

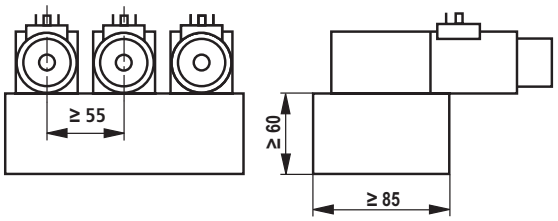
	Individual assembly	Bank assembly
Subplate dimensions	Minimum dimensions Length ≥ 64, width ≥ 58, height ≥ 25	Minimum cross-section Height ≥ 60, width ≥ 85
Thermal conductivity of the subplate	≥ 38 W/mK (EN-GJS-500-7)	
Minimum distance between the longitudinal valve axes	≥ 55 mm	

Schematic diagram

Individual assembly



Bank assembly



Important:

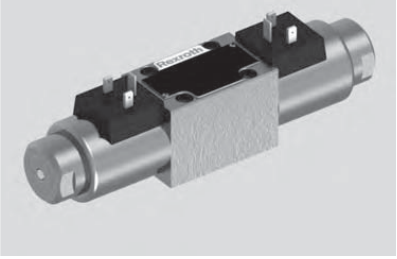
With regard to the hydraulic fluid temperature, observe the "Special conditions for safe use" on page 7.

Notes

4/3, 4/2 and 3/2 directional valves with wet-pin DC solenoids

RE 23178-XN-B3/08.12
Replaces: 04.10

Type WE 6 ../.E..XN...



Size 6
Component series 6X
Maximum operating pressure 350 bar
Maximum flow 80 l/min

ATEX units
For explosive areas

Operating instructions
Part III Product-specific instructions

What you need to know about these operating instructions

These operating instructions apply to the explosion-proof version of Rexroth valves and consist of the following three parts:

Part I General information 07010-X-B1
Part II Data sheet 23178-XN-B2
Part III Product-specific instructions 23178-XN-B3

Operating instructions 23178-XN-B0

You can find further information on the correct handling of Rexroth hydraulic products in our publication "General product information on hydraulic products 07008".

Contents

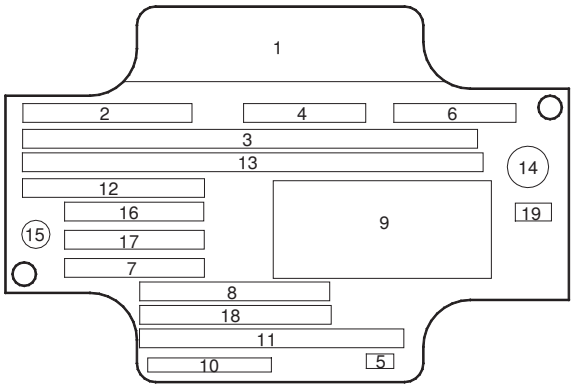
1 Scope of delivery

For the scope of delivery of the valve, please refer to the "Data sheet" of this valve (part II of these operating instructions).

2 Amending general safety instructions

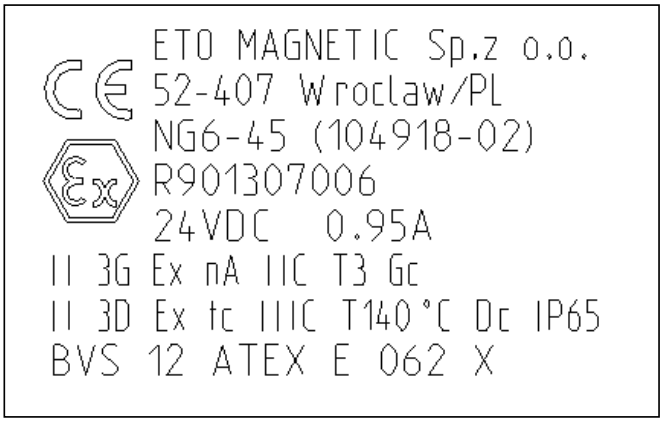
2.1 Information on the name plate and the valve solenoid

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



No.	Type of information	Information or example
1	Manufacturer's logo	**Rexroth**
2	Material number of the valve (= Order number)	**e.g.: MNR: R901234567**
3	Type designation complete valve	**e.g.: 4WE6E6X/EG24N9XNK4**
4	Serial number of the valve	**e.g.: SN: 0002111**
5	Manufacturer's factory number	**e.g.: 708 F**
6	Date of manufacture (year and week)	**e.g.: FD: 03W01**
7	Maximum operating pressure	**e.g.: pmax = 350 bar**
8	Ambient temperature range	**–20 °C ≤ Ta ≤ +50 °C**
9	Hydraulic symbol according to ISO 1219	Graphic
10	Designation of origin	**Made in Germany**
11	Name and address of the manufacturer	**BOSCH REXROTH AG D–97816 LOHR**
12	Customer's or production order number	**e.g.: 123456789012345678**
13	Customer's material number or additional information	**e.g.: CNR: 1234567890**
14	CE mark	**CE**
15	Explosion protection mark	**Ex**
16	Mark for protection class according to Explosion Protection Directive 94/9/EC and mark for the type of protection of the mechanical part according to EN 13463-5:2011	**II 3G c T3 X**
17	Additional mark for protection class according to Explosion Protection Directive 94/9/EC and mark for the type of protection of the mechanical part according to EN 13463-5:2011	**II 3D c T140°C IP 65 X**
18	—	—
19	—	—

There is the following information on the electrical part available on the valve solenoid.



The meaning of this information can be seen from the following table.

Information or example	**Type of information**
ETO MAGNETIC Sp.z o.o 52-407 Wroclaw/Pl	Manufacturer with address
CE	CE mark
Size 6-45 (104918-02)	Type designation
R901307006	Internal identification number
24 VDC	Nominal voltage
0.95 A	Rated current at 20 °C and nominal voltage
Ex	Explosion protection mark
II 3G Ex nA IIC T3 Gc	Mark for protection class according to Explosion Protection Directive 94/9/EC and type of protection according to EN 60079-15:2010 (gases, vapors, steams)
II 3D Ex tc IIIC T140°C Dc IP65	Additional mark for protection class according to Explosion Protection Directive 94/9/EC, protection class and maximum surface temperature according to EN 60079-31:2009 (dusts)
BVS 12 ATEX E 062 X	Number of the type examination certificate

2.2 Special residual risks and protective measures

⚠ WARNING

Danger zone	Residual risk	Protective measure(s), safety instruction
Valve	Loss of explosion protection due to overheating	Observe the prescribed minimum distance in case of bank assembly of several valves. Observe the prescribed minimum size and minimum thermal conductivity of the valve subplate. Ensure that the dissipation of the valve heat is not obstructed. See "2.2.1 Requirements on the valve subplate". If several valve solenoids are energized simultaneously in case of bank assembly, the maximum hydraulic fluid temperature must be limited to +65 °C. Observe the "Special conditions for safe use" in the "data sheet" on page 7.
	Explosion hazard by the ignition of dust deposits	Ensure that the maximum admissible dust layer thickness according to standards EN 60079-31 and/or EN 1127 is not exceeded. If necessary, remove dust accumulations at regular intervals.
Valve solenoid	Risk of burning from hot surfaces	Provide for a suitable touch guard. Allow the valve solenoid to cool down to room temperature before touching it directly with your hands during maintenance works. Put on heat-protective gloves before touching it, if necessary.

2.2.1 Requirements on the valve subplate

⚠ WARNING

Explosion hazard!

If the following minimum values are not observed, there is the risk of excessive heating of the valve solenoid and loss of explosion protection.

- ➢ Thermal conductivity: At least 38 W/mK
- ➢ Minimum size L x W x H in case of individual assembly: 64 × 58 × 25 mm, recommended subplates see "9.1 Available accessories"
- ➢ Minimum cross-section W × H of the manifold in case of bank assembly of several valves: 85 × 60 mm
- ➢ Minimum distance between the longitudinal valve axes in case of bank assembly of several valves: 55 mm

2.2.2 Changes at the surface protection of the valve

⚠ WARNING

Explosion hazard!

The valve solenoids must not be painted or otherwise provided with non-conductive substances!

Dissipation of the valve heat must not be obstructed.

Any change at the surface protection of the valve solenoid will lead to loss of the explosion protection!

Additional painting of the valve housing may only be applied according to the provisions of EN 13463-1:2009, section 6.7; otherwise, explosion protection can no longer be ensured.

2.2.3 Modifications

⚠ WARNING

Modifications exceeding the extent described in these operating instructions are not permitted.

Particularly the solenoid coil must not be moved to the opposite side of the valve as this would interchange the switching positions and the type designation would no longer give a unique indication of the valve functions.

2.2.4 Note on the valve use

Observe the following information during the project planning:

⚠ WARNING

During operation, the surface temperature of the valve solenoid exceeds 50 °C. Provide for suitable and satisfactory touch guard.

Be aware of possible pressure intensification if the valve is connected to the chamber on the piston rod side of a differential cylinder. If the outflow of the hydraulic fluid from this chamber is obstructed, pressure on the cylinder may result in a pressure intensification that may damage cylinder chamber, supply line, and valve.

Make sure that in all operating states, maximally one valve solenoid is actuated at a time. The simultaneous operation of both valve solenoids leads to malfunctions, excessive heating and may result in loss of explosion protection.

Make sure that there is adequate mechanical protection against any high-pressure water jet that may be used during cleaning.

A fuse appropriate for the coil's rated current (max. $3 \cdot I_{rated}$ according to DIN 41571 and/or IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping must be connected to each solenoid coil as short-circuit protection.
The cut-off capacity of this fuse must match or exceed the short-circuit current of the supply voltage source.
This fuse or protective motor switch may only be fitted outside the explosive area or must be of an explosion-proof design.
The fuse can be accommodated in the related supply unit or must be separately connected upstream.

For information on the recommended pre-fuse see "data sheet, overcurrent fuse and switch-off voltage peak".

IMPORTANT

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

Pressure peaks in the joint return line of more than one valve may cause unintended control spool movements and thus unintended switching processes. This particularly holds true when valves with detent are used. It is recommended to use separate return lines.

If due to the operating conditions to be expected during the switching processes, flows have to be anticipated that exceed the valve's performance limits that can be seen from the characteristic curve, a throttle insert must be used in channel P to limit the flow.

With valves with the switching symbol A and B (see "data sheet"), port T must be used as leakage oil connection if the operating pressure exceeds the permissible tank pressure.

Switching off the valve solenoid results in a voltage peak due to the inductive effect.

⚠ WARNING

Additional switching measures have to be taken in order to avoid connected operating media being influenced by the residual voltage peak.
The residual voltage peak of maximally 500 V must not be exceeded.

For more data see "Data sheet, section overcurrent fuse and switch-off voltage peaks".

2.2.5 Working safely at the valve

⚠ DANGER

Before carrying out any work at the valve, you must first make sure that an explosive atmosphere cannot occur during the period of the work.

3 Assembly and (initial) commissioning

3.1 Safety instructions for assembly and (initial) commissioning

⚠ DANGER

Before any work such as assembly or disassembly is carried out at the valve, the hydraulic system must be depressurized and the electrical control de-energized.

In order to prevent dangers caused by static charging, the base and/or subplate on which the valve is to be fitted must be electrically conductive and included in the equipotential bonding according to EN 60079-14 and IEC 60364-4-41.
The valve solenoid must not be installed close to charge-generating processes.
Dust layers with a thickness ≥ 50 mm are not admissible!
The valve is to be installed so that no impact stresses > 4 J can take effect.

3.2 Rotating the solenoid coil by ±90 °

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

IMPORTANT

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

⚠ WARNING

Explosion hazard!

Strictly observe the modification instructions as improper assembly will result in loss of the explosion protection.

1. Loosen the mounting nut of the solenoid coil at the pole tube (wrench size 32) and remove the O-ring. See "Data sheet, device dimensions".
2. Remove the solenoid coil from the valve and rotate it by 90 ° in the desired direction.
3. Re-attach the solenoid coil in the desired position so that the locating pin of the solenoid coil enters the corresponding locating hole of the valve housing.
4. Push the O-ring onto the pole tube and re-tighten the mounting nut of the solenoid coil (wrench size 32). Tightening torque: 8 + 1 Nm.

3.3 Assembly

⚠ WARNING

Explosion hazard!
Check whether the explosion protection marks on the name plate of the valve comply with the information in these operating instructions.

Check

- **based on the type designation on the name plate of the valve,**
- **based on the information on the name plate of the valve solenoid,**

whether there is the correct valve type.

Also check the scope of delivery for completeness and possible transport damage. Also observe the safety instructions in "2.2 Special residual risks and protective measures" as well as "2.2.5 Working safely at the valve".

Check whether the operating instructions for the valve are complete. Contact us if the operating instructions are incomplete.

Before any assembly and disassembly work starts, the surroundings must be cleaned so that no dirt can get into the oil circuit. Only non-linting fabric or special paper may be used for cleaning.

1. Check valve contact surface for required surface quality (see "Data sheet, device dimensions"). Remove the protective plate from the valve and keep it safe for returns in case any repairs become necessary later.
2. Check the seal rings at the valve connection surface for completeness. Other sealants are inadmissible.
3. Put the valve on the valve contact surface.

⚠ WARNING

For reasons of stability, exclusively the valve mounting screws specified in "9.1 Available accessories" may be used!

Always fasten the valve with all 4 valve mounting screws as otherwise, leak-tightness is not guaranteed.

4. When using the subplates mentioned under "9.1 Available accessories" or in case of assembly on comparable cast iron installation surfaces, all four valve mounting screws are to be tightened with a torque power screwdriver (tolerance ≤ 10 %) and a tightening torque of 7 Nm [5.2 ft-lbs] ± 10 %. This tightening torque refers to the maximum admissible operating pressure.

⚠ DANGER

Check the set-up of the hydraulic product using the circuit diagrams, device lists and assembly drawings.

Clarify possible differences with the responsible persons.

5. Make sure that pipes and/or hoses are connected to all ports and/or that the ports are sealed with plug screws.
6. Carry out a special check to make sure that the cap nuts and flanges are correctly tightened at the pipe fittings and flanges.

IMPORTANT

Mark all checked fittings, e.g. using a permanent marker.

7. Make sure that all pipes and hose lines and every combination of connection pieces, couplings or connection points with hoses or pipes are checked for their operational safety by a person with appropriate knowledge and experience.

3.4 Establishing the electrical connection

⚠ CAUTION

The valve may only be connected by or under the supervision of a specialized electrician.

De-energize the connection line before the assembly.

Only use mating connectors corresponding to the conditions in section "Information on the explosion protection", page 7 in the "data sheet".

The max. temperature of the valve casing surface is 110 °C. This has to be considered when selecting the connection cables and/or contact of the connection cable with the casing surface is to be prevented. Connect the protective earthing conductor and the earthing correctly.

Avoid sharp bends in connection lines and litz wires to prevent short-circuits and interruptions.

Pass the connection line in a pull-relieved way. The first mounting point must be within 15 cm of the cable bushing.

The connection technology is not included in the scope of delivery.

Observe the assembly instructions printed onto the packaging of the mating connector and the tightening torques specified there.

The connection is polarity-independent.

IMPORTANT

After the assembly, attach a permanently readable information sign with the following labeling in the immediate vicinity of the valve solenoid: **Do not disconnect when energized!**

The plug-in connection is not suitable for normal separation of the electric circuit during operation.

3.5 Initial commissioning, re-commissioning

3.5.1 Checking electrical connections / replacing seals

The following applies to all valves irrespective of the type of connection:
Check the connection line for visible damage and check the correct seat of the plug-in connection, if necessary.
Replace damaged connection lines or damaged plug-in connections.

For order details for seal kits please refer to "8.3 Available spare parts".

3.5.2 Bleeding the hydraulic system

IMPORTANT

Observe the operating instructions of the device and/or system into which the valve is installed.

1. Switch the valve several times under operating pressure before placing it into full operation. This will press out any remaining air from the valve. Thus, mechanical damage being caused by inadmissibly high acceleration of the fluid and the control spool is avoided and the life cycle of the valve is extended.

   IMPORTANT

   You can also achieve the switching movement of the control spool necessary for the bleeding procedure by manual actuation of the manual override. In this connection see "5.1 Operating the optional manual override".

3.5.3 Performing a leak test

Check whether during operation, hydraulic fluid leaks at the valve or at the connections.

4 Disassembly

⚠ DANGER

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

1. Loosen the electrical connections professionally.
2. Prepare a container for collecting the escaping hydraulic fluid.
3. Only loosen the valve mounting screws using a suitable tool.
4. Remove the valve mounting screws and take off the valve from the valve mounting face.
5. Collect the escaping hydraulic fluid in the provided container and dispose of it properly.
6. If the valve is to be returned to the manufacturer for repair, close the valve connection surface using the protective plate supplied or protect it using equivalent packaging in order to avoid contamination and damage.
7. Seal the subplate in order to avoid contamination.

5 Operation

5.1 Operating the optional manual override

Valves of type **.WE 6 ../...N9XN** are equipped with a manual override. Using this manual override, the switching function of the valve can also be triggered if the valve solenoid is not energized.

The manual override is only intended for manual operation.

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

IMPORTANT

With valves of type **.WE 6 ../...N9XN**, the manual override is only useful if the pressure in the tank channel of the valve does not exceed 50 bar. Above this pressure value, the required actuating force is too large and there is a risk of injury if the tool slips.

⚠ DANGER

Only operate the manual override if it is ensured that this will not trigger any dangerous working movement of the connected actuator!

⚠ CAUTION

Do not use sharp-edged tools to operate the manual override!

There is the risk of damaging sealing surfaces at the valve solenoid.

The manual override is only intended for short-term manual actuation and must not be brought into a certain spool position for a longer period or permanently by means of mechanical equipment.

The manual override is not suitable for frequently recurring manual operations!

1. Use a rounded tool with a maximum diameter of 5 mm to push the manual override in the direction of the valve housing.

6 Troubleshooting

The valve is not sensitive to faults as long as the specified application conditions are complied with, in particular the oil quality.

Error	Possible cause(s)	Remedy
Valve does not switch	Electrical connection interrupted, no current continuity	
	• Cable break	Replace the connection cable
	• Electrical defect in the solenoid coil	Remove valve and have it repaired
	• No pressure at P	Check and/or reapply pressure at port P
	• Control spool is jammed due to contamination	If possible, try to release the control spool by manually actuating the manual override. See "5.1 Operating the optional manual override". If this is not successful: Remove valve and replace it with a new one.
External leakage	Seal defective	
	• Seal at the connection surface is defective	Remove the valve and replace the seals
	• Other leakage	Remove valve and replace it with a new one

Following faults due to contamination, it is - in addition to the repair - essential to check the oil quality and improve it, if necessary, by suitable measures such as flushing or the additional installation of filters.

7 Inspection and maintenance

IMPORTANT

If applicable, dust accumulations on the valve are to be removed at regular intervals, see "2.2 Special residual risks and protective measures".

The following inspection, testing and maintenance works are to be carried out regularly. Also considering the operating conditions, the corresponding intervals are to be chosen so that defects that can reasonably be expected are dealt with in good time. The check must, however, at least be carried out every **three years from the date of manufacture of the valve**. The date of manufacture of the valve can be seen on the name plate, see "2.1 Information on the name plate and the valve solenoid".

IMPORTANT

The check is also to be carried out if the valve is only stored, however not used!

For order details for seal kits please refer to "8.3 Available spare parts".

1. De-energize the connection line.
2. Remove coarse dirt from the exterior.

   ⚠ CAUTION

   In order to prevent electrostatic charging, only clean the coil and the mating connector using a damp cloth.
3. Check all external fittings for completeness and tight seat.
4. Check valve for external leakage, replace the seals if necessary, see "8.2 Rectifying external leakages".
5. Check the connection line for damage. Replace the connection line if there is any visible damage.

8 Repair and spare parts

8.1 Safety instructions regarding repairs

⚠ DANGER

In the interests of your safety, please observe all safety instructions carefully and at any time.

- **For repair works, the valve may only be disassembled to the extent described in this "Product-specific instruction".**
- **Defective parts may only be replaced by new, interchangeable, tested components in original equipment quality.**
- **Clean the external environment of fittings and devices before the disassembly. Do not use cotton waste for the cleaning.**
- **Close all openings using protective caps.**

8.2 Rectifying external leakages

External leakage at the valve connection surface can be rectified on site. Other leakages have to be rectified by specialists of the manufacturer.

8.2.1 Rectifying leakage at the valve connection surface

1. Remove the valve, see "4 Disassembly".
2. Check the seal recesses on the valve connection surface for cleanliness and damage.
3. Fit the new seals.

8.3 Available spare parts

- NBR seal kit for the valve connection surface, mat. no. R961000837
- FKM seal kit for the valve connection surface, mat. no. R961000838

IMPORTANT

Ensure suitability of the sealing materials for the hydraulic fluid used!
See "data sheet".

8.4 Contacts for repair and spare parts

Bosch Rexroth AG
Service Industriehydraulik
Bürgermeister-Dr. Nebel-Str. 8
97816 Lohr am Main
Germany

Phone +49 (9352) 18-1164
Fax +49 (9352) 18-3363

www.boschrexroth.com/service

9 Accessories

9.1 Available accessories

➢ Valve mounting screws:
For reasons of stability, exclusively use the following valve mounting screws.

4 hexagon socket head cap screws
ISO 4762-M5x50-10.9-flZn-240h-L
(friction coefficient 0.09...0.14 according to VDA 235-101),
mat. no. R913000064

➢ Subplates with dimensions like in the "data sheet 45052" for valves with porting pattern according to DIN 24340-A6 **without** locating hole:

- G 341/01 FE/ZN with G1/4 ports,
  mat. no. R900510636
- G 342/01 FE/ZN with G3/8 ports,
  mat. no. R900511297
- G 502/01 FE/ZN with G1/2 ports,
  mat. no. R900519180

➢ Subplates with dimensions like in the "data sheet 45052" for valves with porting pattern according to ISO 4401-03-02-0-05:

- G 341/60 FE/ZN with G1/4 ports,
  mat. no. R901043863
- G 342/60 FE/ZN with G3/8 ports,
  mat. no. R901043864
- G 502/60 FE/ZN with G1/2 ports,
  mat. no. R901043866

➢ Locating pin for porting pattern according to ISO 4401-03-02-0-05

- Locating pin 3 × 8 according to EN ISO 8752,
  Mat. no. R900005694

➢ Throttle inserts

- Throttle Ø 0.8 mm, mat. no. R900152065
- Throttle Ø 1.0 mm, mat. no. R900152066
- Throttle Ø 1.2 mm, mat. no. R900152067

9.2 Address for ordering accessories and valves

Headquarters:
Bosch Rexroth AG
Hydraulics
Zum Eisengießer
97816 Lohr am Main
Germany

Phone +49 (9352) 18-0

or the respectively competent sales organizations. You can find the addresses on the Internet at:

www.boschrexroth.com

10 EC Declaration of Conformity

Rexroth
Bosch Group

Declaration of Conformity

Date: 13.08.2012

- ☐ in accordance with Machinery Directive 2006/42/EC
- ☐ in accordance with Low Voltage Directive 2006/95/EC
- ☐ in accordance with EMC Directive 2004/108/EC
- ☐ in accordance with Pressure Equipment Directive 97/23/EC
- ☒ in accordance with ATEX Directive 94/9/EC
- ☐

The manufacturer

Bosch Rexroth AG, Zum Eisengiesser 1, 97816 Lohr am Main

hereby declares that the products below

Name:	**4/3-, 4/2- and 3/2 directional valves with wet-pin DC solenoids**	
Type:	**WE 6../.E..XN...**	**RE23178-XN**
Marking:	**⟨Ex⟩ II 3G c T3 X** **⟨Ex⟩ II 3D c T140°C X**	

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

EC type examination certificate no. of the valve solenoid: **BVS 12 ATEX E 062 X**
Issued by: **DEKRA EXAM GmbH**
Dinnendahlstraße 9
44809 Bochum
Deutschland

Harmonized Standards applied:

Electrical part	**EN 60079-0: 2009, EN 60079-15: 2010, EN 60079-31: 2009**
Non-electrical part	**EN 13463-1: 2009, EN 13463-5: 2011**

National Standards and Technical Specifications applied:

Further explanations:

Taking account of RE23178-XN

Lohr am Main (Place), dated 13.08.2012 (Date) pp. H. Leuzl (Head of Development) pp. (Head of Production)

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