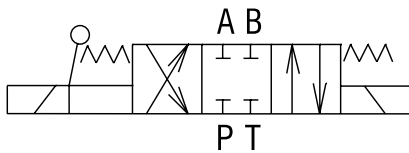
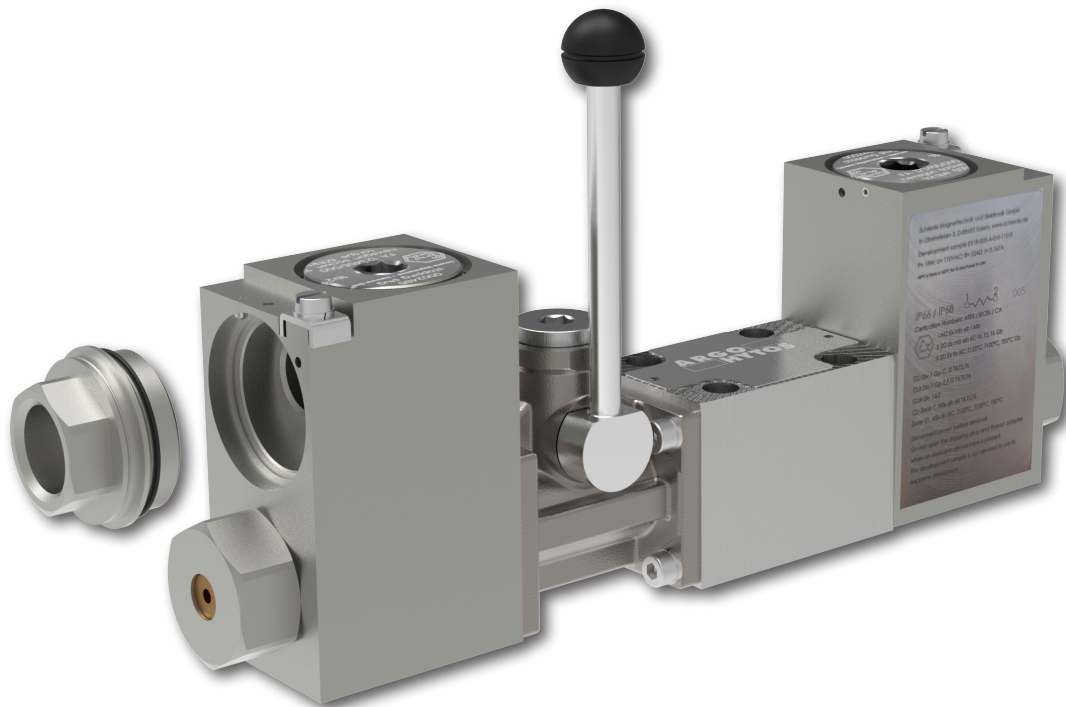


**4/3 and 4/2 SOLENOID OPERATED DIRECTIONAL CONTROL VALVE
WITH AUXILIARY LEVER OVERRIDE
DESIGNED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES**

RPER2X3-06



EN



Important! Read the instructions before using the product.
Save the instructions for future reference.

If the operating instructions are lost, new ones can be found on the ARGO-HYTOS website www.argo-hytos.com

The following is the authorised translation of original operating instruction RPER2X3-06 no 15312_1cz_06/2023 issued by the producer:

PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
EU-KONFORMITÄTSEKTLÄRUNG nach der Richtlinie 2014/34/EU



Výrobce / Manufacturer / Hersteller:

ARGO-HYTOS s.r.o.
Dělnická 1306, 543 15 Vrchlabí, Czech Republic

Výrobek / Product / Produkt:

Elektromagneticky ovládané hydraulické ventily pro použití v prostředí s nebezpečím výbuchu
Solenoid operated hydraulic valves for use in potentially explosive atmospheres
Elektromagnetisch betätigte hydraulische Ventile für den Einsatz in explosionsgefährdeten Bereichen

Typ / Type / Typ:

RPE2X, RPER2X, RNE2XH, SD2E2X, SD1E2X, SD3E2X, SD2P2X, PRM2X, PVRM2X

Prohlášení o shodě / Declaration of Conformity / Konformitätserklärung

Prohlašujeme na svou výlučnou zodpovědnost, že výše uvedené ventily, které jsou určeny k řízení hydraulických obvodů, na které se vztahuje toto prohlášení, jsou za podmínek obvyklého a určeného použití bezpečné a splňují požadavky **Směrnice 2014/34/EU**, harmonizovaného **Nařízení vlády ČR 116/2016 Sb.** a návazných technických norem.

We declare under our sole responsibility that the above listed valves, which are intended for control of hydraulic circuits, covered by this declaration, are safe under conditions of usual and intended use and comply with the **Directive 2014/34/EU** and related technical standards.

Hiermit erklären wir unter unserer Verantwortung, dass die o.a. Ventile zur Steuerung von Hydraulikkreisläufen, auf die sich diese Konformitätserklärung bezieht, unter Bedingungen einer bestimmungsgemäßen Verwendung sicher sind und mit der **Richtlinie 2014/34/EU** und den zugehörigen technischen Normen übereinstimmen.

Posouzení shody elektrické části (cívky) / Conformity assessment of electric part (coil) / Konformitätsbewertung des elektrischen Teils (der Spule)

Použité technické normy / Used technical standards / Verwendete technische Normen

EN IEC 60079-0:2018 Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-1:2014 Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure “d”, Edition 3
EN 60079-31:2014 Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”, Edition 2
EN 60529:1991 + A1:2000 + A2:2013 Degrees of protection provided by enclosures (IP Code)

Oznámený subjekt / Notified body / Notifizierte Stelle

Na posuzování shody elektrické části se podílel oznámený subjekt č. 2809 FM APPROVALS EUROPE Ltd., který vydal certifikát ATEX.

The notified body No. 2809 FM APPROVALS EUROPE Ltd. participated in the conformity assessment of electric part and issued ATEX certificate.

Die notifizierte Stelle Nr. 2809 FM APPROVALS EUROPE Ltd. hat sich an der Konformitätsbewertung des elektrischen Teiles beteiligt und ATEX-Zertifikat ausgestellt.

Jméno / Name / Name: **FM APPROVALS EUROPE Ltd.**
Adresa / Address / Adresse: 1 Georges Quay Plaza, Dublin, Ireland D02 E440

ATEX Certifikát / ATEX Certificate / ATEX-Zertifikat

Typ / Type / Typ	Číslo / No. / Nr.	Vydán / Issued / Ausgestellt
EU – Type Examination Certificate	FM23ATEX0008X	13.06.2023

PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
 EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
 EU-KONFORMITÄTSERKLÄRUNG nach der Richtlinie 2014/34/EU



IECEX Certifikát / IECEX Certificate / IECEX-Zertifikat

Typ / Type / Typ	Číslo / No. / Nr.	Vydán / Issued / Ausgestellt
IECEX Certificate of Conformity	IECEX FMG 23.0003X, rev. 0	12.6.2023

Certifikát byl vystaven společností / The certificate was issued by / Das Zertifikat wurde ausgestellt vom:
 Jméno / Name / Name: **FM APPROVALS LLC**
 Adresa / Address / Adresse: 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA







Stupeň ochrany (IP kód) / Degree of Protection (IP Code) / Schutzart (IP-Code)

Zařízení poskytuje stupeň ochrany **IP66 / IP68** podle EN 60529. Podmínky zkoušky IP68: cívka ponořená v hloubce 1 m pod vodní hladinou po dobu 24 hodin. Uvedený stupeň ochrany je podmíněn správným upevněním a utěsněním napájecího kabelu.

The equipment provides Degree of Protection **IP66 / IP68** in accordance with EN 60529. IP68 test conditions: the coil at a depth of 1 m under the water surface for 24 hours. The declared degree of protection is conditioned by the correct fastening and sealing of the power cable.

Das Gerät bietet Schutzart **IP66 / IP68** gemäß EN 60529. IP68 – Prüfbedingungen: die Spule befindet sich 24 Stunden lang in einer Tiefe von 1 m unter der Wasseroberfläche. Voraussetzung für die angegebene Schutzart ist die korrekte Befestigung und Abdichtung des Netzkabels.

Označení cívek ventilů / Marking of valve coils / Bezeichnung der Ventilspulen




Nominální napětí cívek / Nominal voltage of coils / Nennspannung der Spulen:	
12 V, 24 V, 48 V, 110 V DC, 110 V, 230 V AC 50/60 Hz	
Nominální příkon / Nominal input power / Nennleistung	
10 W	18 W
 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T6, T5, T4 Gb  II 2D Ex tb IIIC T85°C, T100°C, T135°C Db	 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T4 Gb  II 2D Ex tb IIIC T135°C Db

Posouzení shody neelektrické části ventilů / Conformity assessment of non-electrical valve part / Konformitätsbewertung des nichtelektrischen Ventiltiles

Použité technické normy / Used technical standards / Verwendete technische Normen

EN ISO 80079-36:2016 Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements, Edition: 1.0
 EN ISO 80079-37:2016 Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety „c“, control of ignition sources „b“, liquid immersion „k“, Edition: 1.0
 EN ISO/IEC 80079-38:2016 Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

Označení neelektrických částí ventilů / Marking of non-electrical valve parts / Bezeichnung der nichtelektrischen Ventiltile

 I M2 Ex h I Mb  II 2G Ex h IIC T6, T5, T4 Gb  II 2D Ex h IIIC T85°C, T100°C, T135°C Db	Způsob ochrany / Type of protection / Schutzart: „c“ - bezpečná konstrukce / constructional safety / konstruktive Sicherheit
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PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
EU-KONFORMITÄTSEKTLÄRUNG nach der Richtlinie 2014/34/EU



Oblasti použití ventilů / Application areas of valves / Einsatzbereiche der Ventile

EQUIPMENT-GROUP I <i>Doly / Mines / Bergwerke</i>	EQUIPMENT-GROUP II (IIG) <i>Plyny / Gases / Gase</i>	EQUIPMENT-GROUP III (IID) <i>Prach / Dust / Staub</i>
Category M1 <i>Zakázané použití Prohibited use Verbotene Nutzung</i>	Zone 0 <i>Zakázané použití Prohibited use Verbotene Nutzung</i>	Zone 20 <i>Zakázané použití Prohibited use Verbotene Nutzung</i>
Category M2 <i>(the equipment is de-energised)</i>	Zone 1 Zone 2	Zone 21
		Zone 22
		<i>IIA (Propane)</i>
		<i>IIIB (Non-conductive dust)</i>
		<i>IIIC (Conductice dust)</i>

Specifické podmínky použití / Specific conditions of use / Spezifische Nutzungsbedingungen (X)

1	<i>Maximální teplota pracovní kapaliny / Maximum temperature of working fluid / Maximale Temperatur der Arbeitsflüssigkeit: 70°C</i>
2	<i>Rozsah teploty okolí / Ambient temperature range / Umgebungstemperaturbereich: -30°C ≤ T_{amb} ≤ +70°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +55°C for temperature class / max. valve surface temperature T5 / T 100°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +40°C for temperature class / max. valve surface temperature T6 / T 85°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +60°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 18W</i>
3	<i>Typ a úroveň ochrany (EPL) elektrického zařízení (např. snímače), instalovaného společně s certifikovaným ventilem, musí splňovat požadavky pro daný typ výbušné atmosféry. Stanovené podmínky použití musí být upraveny podle povolených parametrů tohoto zařízení. Type of protection and protection level (EPL) of electrical equipment (e.g. sensor), installed together with the certified valve, must correspond with requirements set for applied explosive atmosphere. The defined conditions of use must be modified according to allowed parameters of this equipment. Schutzart und Schutzniveau (EPL) der elektrischen Ausrüstung (z.B. Sensor), die zusammen mit dem zertifiziertem Ventil installiert wird, müssen den festgelegten Anforderungen für die Art der explosionsgefährdeten Atmosphäre entsprechen. Die angegebenen Nutzungsbedingungen müssen entsprechend den zulässigen Parametern dieser Ausrüstung modifiziert werden.</i>

Datum vydání / Date of issue / Ausstellungsdatum: 1.11.2023
Místo vydání / Place of issue / Ausstellungsort: Vrchlabí, Czech Republic

Za výrobce / On behalf of the manufacturer / Im Auftrag des Herstellers:




Ing. Milan Bezdiček
General Manager

UK DECLARATION OF CONFORMITY

UKSI 2016:1107

Manufacturer:

ARGO-HYTOS s.r.o.
Dělnická 1306, 543 15 Vrchlabí, Czech Republic

Product:

Solenoid operated hydraulic valves for use in potentially explosive atmospheres

Type:

RPE2X, RPER2X, RNE2XH, SD2E2X, SD1E2X, SD3E2X, SD2P2X, PRM2X, PVRM2X

Declaration of Conformity

We declare under our sole responsibility that the above listed valves, which are intended for control of hydraulic circuits, covered by this declaration, are safe under conditions of usual and intended use and comply with **The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulation 2016** (UKSI 2016:1107) and related technical standards.

Conformity assessment of electric part (coil)

Used technical standards:

EN IEC 60079-0:2018 Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-1:2014 Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure “d”
EN 60079-31:2014 Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”
EN 60529:1991 + A1:2000 + A2:2013 Degrees of protection provided by enclosures (IP Code)







UK approved body

The approved body No. 1725 FM APPROVALS Ltd. participated in the conformity assessment of electric part and issued UKEX certificate.
Name: FM APPROVALS Ltd.
Address: Voyager Place, Maidenhead, Berkshire, SL6 2PJ, United Kingdom

UKEX Certificate

Type	No.	Issued
UK – Type Examination Certificate	FM23UKEX0010X	16.06.2023

Marking of valve coils

Nominal voltage of coils:	12 V, 24 V, 48 V, 110 V DC, 110 V, 230 V AC 50/60 Hz	
Nominal input power:	10 W	18 W
 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T6, T5, T4 Gb  II 2D Ex tb IIIC T85°C, T100°C, T135°C Db	 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T4 Gb  II 2D Ex tb IIIC T135°C Db	

Degree of protection (IP Code) in accordance with EN 60529.

The equipment provides Degree of protection **IP66/IP68** in accordance with EN 60529. IP68 test conditions: the coil at a depth of 1 m under the water surface for 24 hours. The declared degree of protection is conditioned by the correct fastening and sealing of the power cable.

UK DECLARATION OF CONFORMITY

UKSI 2016:1107

Conformity assessment of non-electrical valve part

Used technical standards:

EN ISO 80079-36:2016 Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements, Edition 1.0
 EN ISO 80079-37:2016 Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety „c“, control of ignition sources „b“, liquid immersion „k“, Edition 1.0
 EN ISO/IEC 80079-38:2016 Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

Marking of non-electrical valve parts

<p>Ex I M2 Ex h I Mb Ex II 2G Ex h IIC T6, T5, T4 Gb Ex II 2D Ex h IIC T85°C, T100°C, T135°C Db</p>	<p>Type of protection: „c“ - constructional safety</p>
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Application areas of valves

EQUIPMENT-GROUP I Mines	EQUIPMENT-GROUP II (IIG) Gases		EQUIPMENT-GROUP III (IID) Dust	
Category M1 Prohibited use	Zone 0 Prohibited use		Zone 20 Prohibited use	
Category M2 (the equipment is de-energised)	Zone 1	IIA (Propane)	Zone 21 Zone 22	IIIA (Flamable fibres)
	Zone 2	IIB (Ethylene)+H2		IIIB (Non-conductive dust)
				IIIC (Conductice dust)

Specific conditions of use (X)

1	Maximum temperature of working fluid: 70°C
2	<p>Ambient temperature range: -30°C ≤ T_{amb} ≤ +70°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +55°C for temperature class / max. valve surface temperature T5 / T 100°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +40°C for temperature class / max. valve surface temperature T6 / T 85°C and rated nominal solenoid power 10W -30°C ≤ T_{amb} ≤ +60°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 18W</p>
3	Type of protection and protection level (EPL) of electrical equipment (e.g. sensor), installed together with the certified valve, must correspond with requirements set for applied explosive atmosphere. The defined conditions of use must be modified according to allowed parameters of this equipment.

Date of issue: 1.11.2023

Place of issue: Vrchlabí, Czech Republic

On behalf of the manufacturer:





 Ing. Milan Bezdiček
 General Manager

Mandatory traceability

- Based on legislative requirements, all operators in the logistics chain, from the manufacturer of the certified Ex solenoid coil to the end user of the complete equipment, are obliged to make and maintain traceability records of Ex products, enabling, if necessary, the withdrawal of products of certain serial numbers from the market due to defects of non-conformities, endangering safety of use in an explosive atmosphere. In practice, this means keeping records of the assignment of Ex coil/valve identification numbers to the identification numbers of the operators immediately down the logistics chain.
- To meet the requirement for traceability of Ex products, it is necessary to keep product type labels legible throughout their technical life.

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Related documents:

Ex-coil EX18 user manual (Original document B18 of the coil manufacturer, SCHIENLE)

Product catalogue: Directional control valve RPER2X3-06 (no. 5312)

Datasheet: General Technical Information GI (no. 0060)

Spare parts catalogue sheet SP (no. 8010)

An overview of signal words and warning signs used in the text

	DANGER	Signal word combined with a warning sign used to signify that a dangerous situation which could result in death or serious injury is imminent.
	WARNING	Signal word combined with a warning sign used to signify the occurrence of a potentially dangerous situation that could result in death or serious injury if not avoided.
	CAUTION	Signal word combined with a warning sign used to signify a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

An overview of other symbols and abbreviations used in the text

Symbol, designation	Description of the meaning of the symbol, designation
AC, DC	Designation for alternating (AC) and direct (DC) current, voltage
ATEX	Explosive Atmospheres
EPL	Equipment Protection Level (see EN 60079.0)
IEC	International Electrotechnical Commission
NBR	Rubber used for the manufacture of seals
PA	Polyamide
PE	Polyethylene

Glossary of technical terms used

- › **A hydraulic mechanism** is one in which energy is transmitted via the pressure energy of the working fluid.
- › **A hydraulic directional control valve** is a valve designed to control the direction of movement or stop the output component of an appliance.
- › **The volumetric flow rate Q** is the amount of liquid in volume units that flows through a given flow cross-section per unit time (SI unit is m^3s^{-1} , in practice the unit **l/min** is used)
- › **The control solenoid** is designed to reposition the valve spool that interconnects or closes the ports in the body. The solenoid consists of an excitation coil which, by passing an electric current through the winding, generates a magnetic field which exerts a force on the armature of the mechanical actuating system.
- › **Pressure** is the force acting per area unit (SI unit **Pascal** ($1 Pa = Nm^{-2}$), in practice the unit used is **bar** ($1bar = 0.1MPa$))

1. Use of the product

The **RPER2X3-06 directional control valve** is a directly controlled, solenoid operated spool valve. The valve body has a connection pattern at the base with a nominal clearance of DN 06 according to ISO 4401. The product is designed to control the movement direction of the hydraulic cylinder piston rod or the rotation direction of the hydraulic motor output shaft by connecting the individual channels via a spool in the valve body. By stemming the fluid flow through the valve spool, the movement of the appliance can be stopped. The valve also has a auxiliary manual lever operated emergency spool control that can be used up to 100 bar in the T-port.

Valves with ATEX certification according to Directive 2014/34/EU and **IECEX** certification according to IECEx OD 009 and related harmonized standards may be used in explosive atmospheres consisting of firedamp, gas or dust. The valves are marked with the CE Ex mark of conformity and are accompanied by a Declaration of Conformity.

Use in explosive atmospheres

Equipment - group I, mines, where the explosive atmosphere of firedamp consists predominantly methane. The valve has a high level of safety (EPL = Mb), which makes initiation unlikely during the interval between gas discharge and valve shutdown. It is designed for category M2 devices that remain off after gas discharge.

Equipment - group II, where the explosive atmosphere consists of gasses other than mines gas. The valve has a high level of safety (EPL = Gb) which allows the valve to be used in zones 1 and 2. The valve must not be used in zone 0. There is a risk of explosion. The valve is certified for gas groups IIA (typical gas is propane), IIB (typical gas is ethylene) also for hydrogen from group IIC. The joint dimensions do not meet the requirements for Group IIC acetylene.

Equipment - group III, where the explosive atmosphere consists of dust and flammable flying particles. The valve has a high level of safety (EPL = Db) which allows the valve to be used in zones 21 and 22. The valve must not be used in zone 20. There is a risk of explosion. The valve is certified for all dust groups - IIIA (flammable flying particles), IIIB (non-conductive dust) and IIIC (conductive dust).

Area of application:

Equipment - group I – MINES	Equipment - group II (IIG) - GAS		Equipment - group III (IID) - DUST	
Category M1– NO	Zone 0 - NO		Zone 20 - NO	
Categorie M2 (the device remains switched off)	Zone 1 Zone 2	IIA (propane)	Zone 21 Zone 22	IIIA (flammable particles)
		IIB (ethylene) + H2 (hydrogen)		IIIB (non-conductive dust)
			IIIC (conductive dust)	

The valves are available in three surface temperature classes:

T4 with a maximum surface temperature of 135 °C

T5 with a maximum surface temperature of 100 °C

T6 with a maximum surface temperature of 85 °C

The use of the valve in the temperature class is subject to the maximum supply voltage of the coil not being exceeded, the working fluid temperature and the ambient temperature not being exceeded (see Table 4.4 Basic technical parameters).

2. Valve protection against initiation of explosion of explosive atmosphere

2.1 Protection of electrical parts

The electrical part of the valve is an ATEX and IECEx certified solenoid coil.

The basic is the „d“ protection by flameproof enclosure (EN 60079-1, IEC 60079-1), which prevents the penetration of hot gases into the surrounding explosive atmosphere in the event that an explosion is initiated inside the flameproof enclosure. For explosive atmospheres consisting of dust, the enclosure „t“ (EN 60079-31, IEC 60079-31) is used. In addition, the coil is sealed with a potting compound.

Use of the valve in potentially explosive atmospheres



Certification ATEX, IECEx and UKCA

- I M2 Ex db I Mb
- II 2G Ex db IIB + H2 T6, T5, T4 Gb
- II 2D Ex tb IIIC T185°C, T100°C, T135°C Db

Certification	Number	Issued	Certification body
EU-Type Examination Certificate	FM23ATEX0008X	13.6.2023	FM Approvals Europe Ltd. (Notified body No. 6024) One Georges Quay Plaza, Dublin, Ireland D02 E440
IECEx Certificate of Conformity	IECEx FMG 23.0003X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA
UK-Type Examination Certificate	FM23UKEX0010X	16.6.2023	FM Approvals Ltd. (Approved body No. 1725) Voyager Place, Maidenhead, Berkshire, SL6 2PJ, UK



Certification across standards NEC 500 and NEC 505, 506

NEC 500 (USA), Annex J (Canada)	NEC 505, 506 (USA)	CEC Section 18 (Canada)
Class I Division 1 Group B, C, D T6...T4 Class II/III Division 1 Group E, F, G T6...T4	Cl 1 Zone 1, AEx db IIB+H2 T6...T4 Zone 21, AEx tb IIIC T85°C...T135°C Db	Ex db IIB+H2 T6...T4 Gb Ex tb IIIC T85°C...T135°C Db

Group	Description	Corresponds to EPL
Group B	A typical gas is hydrogen	Gb
Group C	The typical gas is ethylene	Gb
Group D	Typical gases are methane and propane	Gb
Group E	Conductive dust	Db
Group F	Coal dust	Db
Group G	Non-conductive dust, grain dust	Db
Class III	Flammable airborne particles, paper or cotton processing	Db

Certificate	Number	Issued	Certification body
Certificate of Conformity	FM23US0009X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA
Certificate of Conformity	FM23CA0005X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA

2.2 Cable gland

The cable gland is a separately certified ex-component. A gland with certified type protection „d“ must be used to prevent hot gases from escaping and initiating an explosion in the surrounding environment in the event of an explosion in the interior of the coil casing. (The gland is not included with the valve.)




- I M2 Ex db I Mb
- II 2G Ex db IIC Gb
- II 2D Ex tb IIIC Db

2.3 Protection of non-electrical parts

The non-electrical part of the valve consists of the hydraulic part and the solenoid actuating system.

The safety of the non-electrical parts has been ensured and assessed according to EN ISO 80079-36, EN ISO 80079-37 a EN ISO/IEC 80079-38.

- › The moving parts, the spool/cone, armature and pin of the control system, perform a sliding motion in a space separated by a seal from the surrounding environment and flooded with working fluid.
- › Not exceeding the maximum surface temperature of the given temperature class is conditioned by not exceeding the maximum temperature of the working fluid (70 °C), the maximum ambient temperature (see table 4.4 Basic technical parameters) and the nominal voltage of the coil.
- › The valve body and coil body are of robust construction, sufficiently resistant to destruction by mechanical shock.
(Valve body impact resistance test performed according to EN IEC 60079-0 paragraph 26.4.2: two impacts with a weight with a hardened head of diameter D25 mm, weighing m = 1 kg, falling from a height of 0.7 m, with a total potential energy of 7 J)
- › The hydraulic section has sufficient compressive strength, tested at 1.5 times the maximum operating pressure of the fluid.
- › The surface of the valve is grounded using a grounding screw and protected against static electricity discharge.
- › The construction materials used meet the requirements for limited content of certain elements to prevent the formation of electrical cells and excessive corrosion.
- › The surface materials used do not produce sparks during mechanical impacts.
- › The rotary pin of the manual emergency control lever is protected by a seal against the ingress of pollutants, especially hard particles, which could create an initiation spark.

Non-electrical parts of valve	 I M2 Ex h I Mb
	 II 2G Ex h IIC T6, T5, T4 Gb
	 II 2D Ex h IIIC T85°C, T100°C, T135°C Db

2.4 Applicable legislation and standards

The valve complies with the relevant requirements of legislation and standards:

Directive 2014/34/EU (harmonized NV 116/2016) Equipment for potentially explosive atmospheres (ATEX)

IECEx OD 009 Operational Document

Standards used to assess the conformity of the electrical parts:

CENELEC EN IEC 60079-0

Explosive atmospheres – Part 0: Equipment – General requirements

EN 60079-1, IEC 60079-1

Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure „d“

EN 60079-31, IEC 60079-31

Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure „t“

Standards used to assess the conformity of the non-electrical parts:

EN ISO 1127-1

Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology

EN ISO 80079-36

Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirement

EN ISO 80079-37




Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non-electrical type of protection constructional safety „c“, control of ignition sources „b“. liquid immersion „k“

EN ISO/IEC 80079-38







Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

3. Risks and limitations of product use



3.1 Risks associated with operating in explosive atmospheres

	DANGER	Explosive atmosphere type and zone The valve must not be used outside the specified range (see paragraph 1 Product use), in particular it is not intended for equipment category M1 group I (mines) zone 0 group II (gases) and zone 20 group III (dust). Risk of explosion.
	DANGER	Surface temperature When selecting the valve, the surface temperature requirement of the valve must be taken into account. It must be min. 25 °C lower than the temperature necessary to initiate an explosion of an explosive atmosphere of a given composition. If the initiation temperature is exceeded an explosion will occur.
	DANGER	Handling in an explosive atmosphere It is forbidden to install, disassemble, repair or replace the valve in an explosive atmosphere. Risk of explosion.

3.2 Risk associated with the hydraulic part of the valve

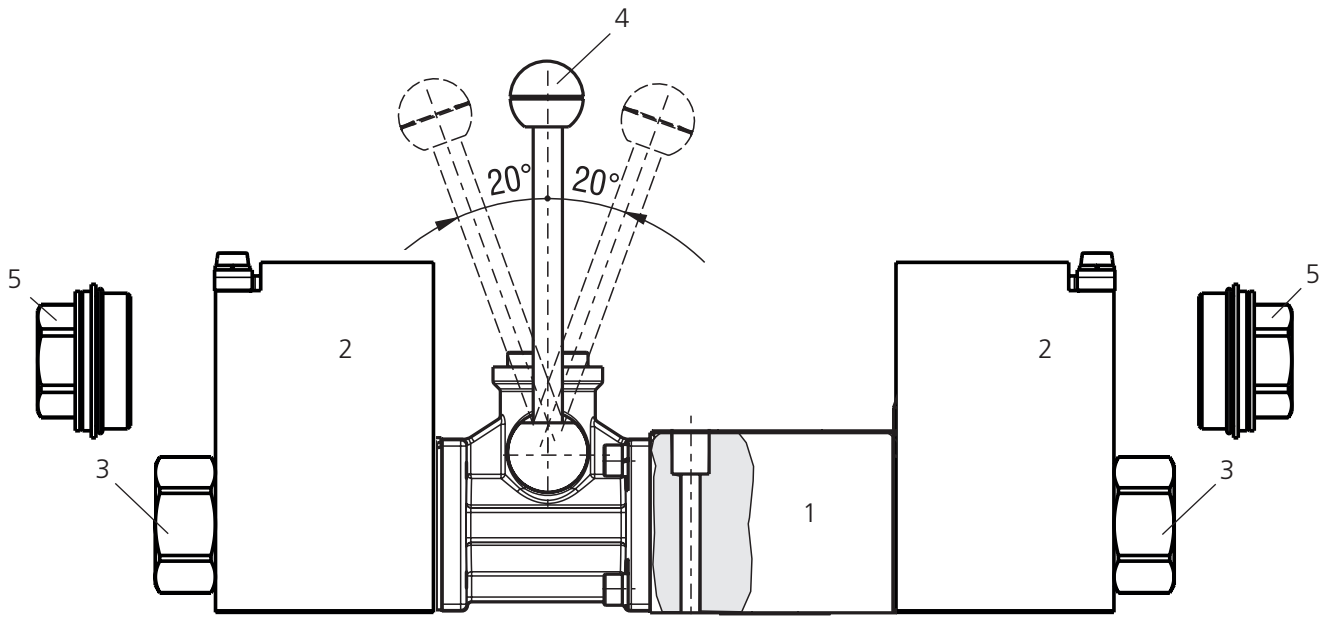
	DANGER	Maximum operating pressure The valve may be used for a maximum pressure of 350 bar in the ports P, A, B and 100 bar in port T. If the maximum pressure is exceeded there is a risk of damage to the valve. Exceeding the pressure value may cause the valve to rupture i.e. exceeding 525 bar in ports P, A, B and 150 bar in port T.
	DANGER	Maximum hydraulic output Section 4.6 of the datasheet shows the operating limit curves for each type of spool valve. The hydraulic performance is provided as the product of the working pressure and the flow rate. If the instant power exceeds the curve limit, the valve may lose function. The spool is subjected to excessive hydrodynamic forces, the valve spool will not be switched over and control of the appliance will be lost.
	WARNING	Valve installation The valve may only be mounted to a sufficiently machined surface with a specified connection pattern. The specified sealing rings must be inserted, undamaged into the body recesses. The valve is fastened with four M5x45 ISO 4762 bolts tightened to a tightening torque of 8.9+1 Nm. Otherwise, there is a risk of leakage of the working fluid and loosening of the valve by pressure (For details, see paragraph 7.2 Product installation)
	CAUTION	Maximum operating temperature The maximum operating temperature must not exceed the temperature range allowed in paragraph 4.4 Basic technical parameters or in the datasheet. Both the temperature of the operating fluid and the ambient temperature significantly influence: a) the surface temperature of the valve b) the temperature of the solenoid coil winding - there is a risk of a reduction in hydraulic performance c) the seal material - risk of seal damage and leakage of the working fluid.
	CAUTION	Surface temperature of the valve The surface temperature of the valve can exceed 100 °C due to the temperature of the working fluid and pressure loss in the valve being converted to heat. Do not touch the surface of the valve when the circuit is operational, even after switching off. Wait until it has cooled down to a safe temperature. There is a risk of burns.
	CAUTION	Working fluids used Valves may only be used for normal working fluids, especially hydraulic oils (see chapter 4. Product description). It is forbidden to use the following as working fluids, in particular: › water and aqueous solutions that will cause corrosion and loss of valve function › liquids which are flammable or explosive, the heating of which may cause fire or explosion when passing through the valve › aggressive liquids (e.g. acids and hydroxides) which will cause damage to the valve and loss of function. The flash point of the used working fluid must be at least 50 K higher than the maximum allowed of surface temperature of the valve in the given temperature class.

3.3 Risks associated with the electrical part of the valve

	DANGER	Electric shock The solenoid coil is an electrical device that should be wired by a person with appropriate electrical qualifications. Before wiring the solenoid, check the parameters of the power supply, the integrity of the cable and the solenoid. There is a risk of electric shock.
	CAUTION	Electrical supply values The solenoid coil is energised by the electrical current passing through the winding. The values of the electrical supply must not exceed the values indicated on the coil. There is a risk of losing solenoid function.

4. Product description

The hydraulic part of the valve consists of a cast iron body (1) with output ports on the lower base, a hardened steel spool and return springs that hold the spool in its base position. The spool is adjusted to the working positions by means of solenoids (2) certified for explosive atmospheres. The solenoid coils are fixed to the actuating system with hexagonal nut (3). The body of the manual lever control (4) is built between the solenoid and the hydraulic part. When the valve is operated by the solenoid, the lever remains in its basic position due to the backdrop and does not reduce its performance. Thread adapter (5) with an optional thread is used for connecting the power cable, e.g. using a suitable cable gland.



4.1 Emergency manual lever control

The emergency manual spool position control is used to reposition the spool in the event of loss of solenoid function or in the event of power failure to the coils to achieve a safe position of the operated mechanism. The use of the manual emergency control is limited to a maximum pressure of 100 bar in the T-port.



CAUTION

Use of the emergency manual control is forbidden when the valve solenoids are operational.

If the valve is operated by solenoids do not use the emergency manual control of the valve spool. Valve damage and loss of function may result.

4.2 Materials used:

Body of valve and manual emergency control– grey cast iron
 Spool – hardened steel
 Compression spring – patented steel wire for the production of springs
 Valve seal – NBR
 Pole piece, tube and armature of actuating system, coil body and steel plug, coil hexagonal nut - low carbon steel
 Non-magnetic ring and pin of actuating system – Cr-Ni stainless steel
 End plug of actuating system – brass
 Coil body – stainless steel
 Coil winding – enamelled Cu wire
 Coil seal on actuating system – silicone
 Shipping plate – PE
 The materials used are not found in the lists of prohibited and mandatory documented substances
 Directive 2015/863/EU (RoHS) and EU Regulation no. 1907/2006 (REACH).

4.3 Surface protection against corrosion

The valve surface is zinc-coated with 520 h corrosion protection in NSS according to ISO 9227. Surface layer without hexavalent chromium Cr+6.

4.4 Basic technical parameters

Parameter	Unit	Value	
Nominal valve size		DN 06	
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)	
Maximum operating pressure at port T	bar (PSI)	100 (1450)	
Maximum flow volume through the valve	l/min (GPM)	60 (15.9)	
Pressure drop	bar (PSI)	graph $\Delta p = f(Q)$	
Fluid temperature range NBR	°C	-30 ... +70	
Max. switching frequency	1/h	15 000	
Switching time ON at $v = 32 \text{ mm}^2\text{s}^{-1}$	ms	AC: 30-40 DC: 30-50	
Switching time OFF $v = 32 \text{ mm}^2\text{s}^{-1}$	ms	AC: 30-70 DC: 10-50	
Working fluid kinematic viscosity range	mm^2s^{-1}	10 to 400	
Minimum required working fluid purity	class	21/18/15 ISO 4406	
Lifetime	cycles	10^7	
Valve weight with manual lever control	with 1 solenoid	kg (lbs)	3.15 (6.94)
	with 2 solenoids	kg (lbs)	4.65 (10.25)
Technical data of manual lever control			
Lever length	mm	102	
Lever deflection angle (working)	°	± 12 to 20	
Control force at the end of the lever	N	40	
Technical Data - Solenoid for use in explosive atmospheres			
Voltage type		AC 50 / 60 Hz DC	
Available nominal voltages U_N	V	110, 230 12, 24, 48, 110	
Supply voltage fluctuations		$\pm 10\% U_N$	
Available nominal input power (coils)	W	10	
Duty cycle		100 % ED	
Electrical protection IP according to EN 60529		IP66 / IP68*	
Ambient temperature range for each surface temperature class T4, T5, T6			
Temperature class	Nominal coil input power	Ambient temperature range	
T4 – 135 °C	10 W	-30 ... +70 (-22 ... 158)	
T5 – 100 °C	10 W	-30 ... +55 (-22 ... 131)	
T6 – 85 °C	10 W	-30 ... +40 (-22 ... 104)	

*IP68 – test conditions: product submerged 1m under water for 24 hours.
The indicated IP protection level is only achieved if the cable is properly mounted.

4.5 Working fluid

The valve is designed for common hydraulic working fluids:

- › mineral oils of performance classes HM and HV according to ISO 6734-4
- › non-flammable and difficult to ignite hydraulic fluids according to ISO 12922
- › environmentally acceptable hydraulic fluids according to ISO 15380

NOTICE: NBR seal material is not suitable for some working fluid groups, such as the HFD group.

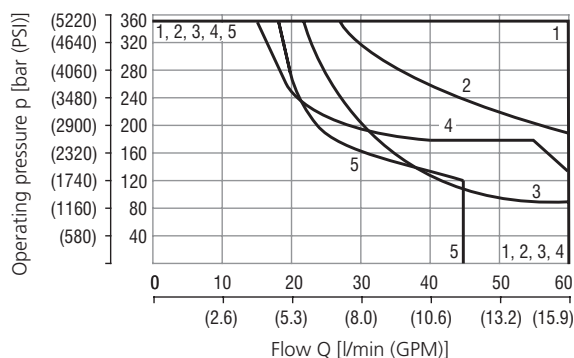
In case of uncertainty, we recommend to perform a test of the mutual tolerance of the seal material and the working fluid.

4.6 Valve characteristics

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

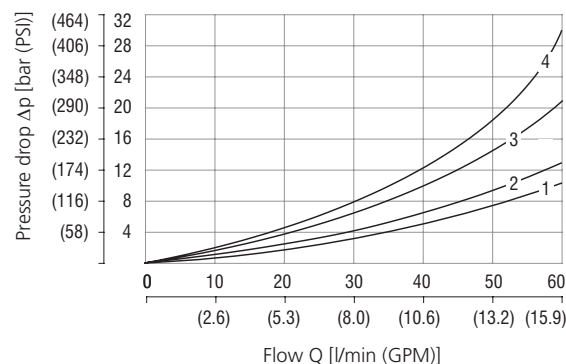
Operating limits (p-Q)

Ambient temp 70 °C (158 °F), voltage $U_N - 10\%$ (24 V DC), power P_N 10 W



	1	2	3	4	5
	R30	Z11	Y11	H11, H51	C11

Pressure drop related to flow (Δp -Q)



	P→A	P→B	A→T	B→T	P→T		P→A	P→B	A→T	B→T	P→T
Z11	1	1	2	2		Y11	1	1	1	1	
C11	3	3	3	4	2	R30	1	1	2	2	
H11	1	1	1	2	2	H51		1	2		

4.7 Legislation and standards:

ČSN EN ISO 4413 Hydraulics - General rules and safety requirements for hydraulic systems and their components

Other regulations and standards used:

ČSN ISO 6403 Hydrostatic drives. Valves for flow and pressure control. Test methods

ČSN ISO 4411 Measurement of the characteristics $\Delta p = \text{function}(Q)$ of hydraulic valves

ČSN EN ISO 9001 Quality management systems

ČSN EN ISO 12100 Machine safety / risk analysis

Directive 2006/42/EU on machinery / used chapters: 1.7.4 Instructions for use, Annex III CE marking

ČSN EN 82079-1 Preparation of instruction manuals - Structure, content and presentation / Part 1: General principles and detailed requirements

5. Product modification

An overview of possible valve modifications is described in the ordering key.

The number of spool positions, the spool connection and the type of manual override and the electrical parameters of the coil cannot be subsequently changed by the user. In the case of a valve with a 10 W coil, the coil surface temperature and the application for the temperature class can be affected by adjusting the ambient temperature (see 4.4 Ambient temperature range for each class).

Ordering code

RPER2X3-06 <input type="checkbox"/> <input type="checkbox"/> / <input type="checkbox"/> <input type="checkbox"/> A6 <input type="checkbox"/> <input type="checkbox"/> - B <input type="checkbox"/>		Certifications of valve ATEX, IECEx, No designation UKCA, FM APPROVED
Explosion proof, 4/2 and 4/3, directional control valve, solenoid operated, with lever override		Surface treatment zinc-coated (ZnNi), ISO 9227 (520 h)
Valve size		Hand lever position A19 standard, lever on side A pointing up B19 standard, lever on side B pointing up
Number of valve positions two positions 2 three positions 3		Sealing material NBR
Spool symbols according to the connection table		Temperature class - solenoid nominal input power Class T4, T5, T6 - 10 W
DC voltage (I_N) 12 V DC / 0.75 A 01200 24 V DC / 0.39 A 02400 48 V DC / 0.19 A 04800 110 V DC / 0.086 A 11000		Threaded adapter with thread M20x1,5 ½ NPT ANSI
AC voltage 50/60 Hz (I_N) 110 V AC / 0.084 A 11050 230 V AC / 0.046 A 23050	M NPT	
	<ul style="list-style-type: none"> - For directional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged. - The solenoids must be switched off when the valve is operated by hand lever. 	

Mounting bolts M5x45 DIN 912 10.9 nor studs must be ordered separately. Tightening torque 8.9+1 Nm (6.56+0.7 lbf.ft).

Spool Symbols

Type	Symbol	Interpositions	Type	Symbol	Interpositions
Z11			R30		
C11			H51		
H11					
Y11					

6. Target group of users

All of the above activities related to this valve, in particular installation and connection to the hydraulic circuit, require specialist technical knowledge and experience in the field of hydraulics. The minimum level of competence required is CETOP level 2. This level is generally defined as performing a variety of activities that require an understanding of technical factors and contexts. This may lead to the need for correct interpretation (e.g. tolerances, operating methods) or the application of various non-repetitive procedures. This may require the performance of checks, simple analysis and diagnostics, and the ability to react to changes in an operational manner. Teamwork is often necessary. The connection of solenoid coils to the supply voltage must only be carried out by persons with the appropriate electrical qualifications. All operations must be carried out with responsibility for correctness and quality, as this is a dangerous area of product use.

It is forbidden for the following persons to carry out any activities related to this product:

- › minors (the exception is practical training of pupils under the professional supervision of a teacher)
- › without established professional competence
- › under the influence of alcohol and/or drugs
- › patients whose medical condition could affect safety (reduced attention and ability to react in time, excessive fatigue)
- › under the influence of drugs that have a demonstrable effect on attention and timeliness
- › allergic to hydraulic working fluids

7. Operating instructions broken down by product life stage

7.1 Transportation and storage of the product

The valve is packaged in vacuum shrink-wrapped PE foil and protected against moisture and dust as standard. The P, A, B, T ports on the base are additionally protected by a plastic (PE) shipping plate. An identification label is affixed to the packaging.

The products should only be stored for the necessary time at a temperature of 0 to +30 °C in a dry place with a relative humidity of up to 65 %. After extended periods of storage, we recommend checking the product for corrosion damage, replacing seal at the base of the body and flushing the product with clean oil before connecting it to the hydraulic circuit.

7.2 Installation of the product

Check that the valve type on the identification plate is correct. Cut the packaging with scissors and carefully remove the valve from the packaging. Unpack the valve in a clean place and prevent contamination of the valve. The packaging is made of PE and can be easily contaminated with residual hydraulic oil from the valve. Dispose of the packaging in accordance with applicable environmental regulations.

The mounting position of the valve is arbitrary. However, if vibrations or shocks are applied to the valve during operation, they must not be applied in the direction of the spool axis.



WARNING

Slippery valve surface

The valve contains a small amount of residual oil after a hydraulic function test carried out by the manufacturer. If the surface of the unpacked valve is contaminated with oil, remove the oil using a cleaning cloth. A slippery valve surface can cause the valve to fall during handling and cause minor injury or damage to the valve.

7.2.1 Electrical connection of coils

When connecting the coil power cable, proceed as follows:

- › Use a "d" certified cable to connect the coils to the power supply. When selecting the cable structure and outer diameter, follow the manufacturer's recommendations for the certified cable gland used. (The cable gland is not included with the valve.)
- › Use a cable and cable gland with sufficient insulation temperature rating. For a 10 W coil, the insulation temperature class must be 35 °C higher than the maximum allowable ambient temperature for that temperature class.

Temperature class	Max. ambient temperature	Min. temperature insulation class
T4	70 °C (158 °F)	105 °C (221 °F)
T5	55 °C (131 °F)	90 °C (194 °F)
T6	40 °C (104 °F)	75 °C (167 °F)

- › The cable should be sufficiently protected against damage with respect to environmental conditions, e.g. resistant to mechanical damage or chemical attack.
- › The design of the coil casing allows the connection of the power cable from the vertical or horizontal direction depending on which hole in the casing the thread adapter with external thread M36x1 is screwed into.
- › Thread adapter with M20x1.5 female thread or with ½ NPT ANSI tapered female thread can be selected.
- › The second hole in the casing is closed with a plug after the wires are mounted to the coil terminal.
- › The thread adapter and plug are sealed in the casing with a VQM silicone rubber O-ring.
- › The thread adapter and closing plug are protected against loosening after assembly by screwing in the M3x4 grub screws in the radial direction.



WARNING

Sealing ring

During assembly, the ring must not be damaged or the part must not be mounted without the sealing ring. There is a risk of explosion.

1. Stopping plug

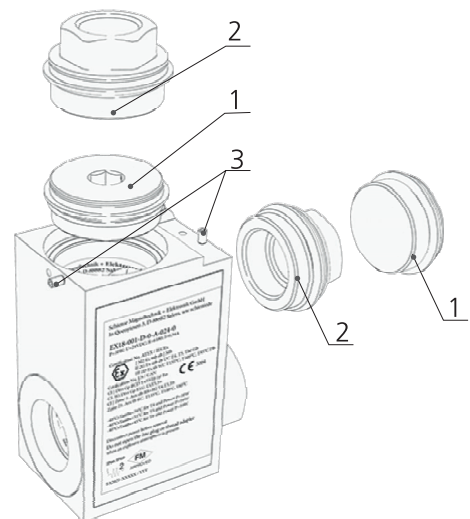
with M36x1 thread and sealing ring

2. Thread adapter

with thread M36x1 and sealing ring
- A. Internal thread M20x1,5
- B. ANSI ½ NPT tapered female thread

3. Grub screws

M3x4

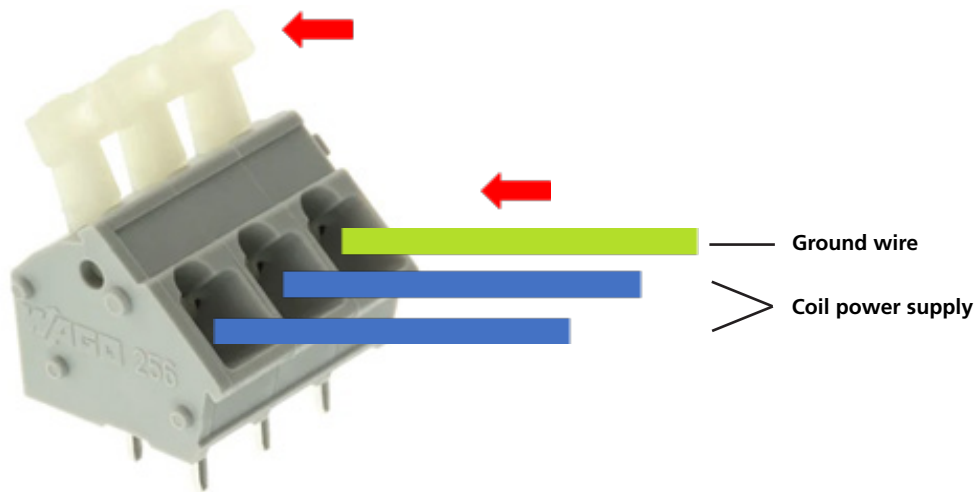



When connecting the coil power cable, proceed as follows:


- › Using the inbus wrench A/F 10, loosen and unscrew the steel plug on the top surface of the coil housing to gain access to the terminal block inside the housing. Do not damage the plug seal.
- › Disassemble the cable gland into its individual parts. Strip the end of the cable and thread the cable successively through all parts of the gland, the thread adapter and the horizontal or vertical hole in the coil casing (depending on the direction of cable feed).
- › Strip the ends of the wires and plug them into the terminal block (see picture below).
- › Screw the thread adapter into the coil casing and tighten it to a torque of 30 ± 5 Nm using a wrench A/F 27.
- › Screw the part of the cable gland to be screwed into the thread adapter and tighten to the torque specified by the manufacturer.
- › Assemble the cable gland according to the manufacturer's instructions so that the cable is sufficiently secured against pulling out by external force and displacement by gases in the event of an explosion in the inner space of the coil casing. The inner space of the coil casing must be sufficiently sealed.
- › Fit a steel plug with seal into the free hole in the coil casing and tighten it to the specified torque of 30 ± 5 Nm using an inbus wrench A/F 10. Secure the position of the thread adapter and the steel plug against loosening with M3x4 grub screws and tighten them to a torque of 0.4 ± 0.1 Nm using an inbus wrench A/F 1.5 mm.
- › After mounting the valve, the surface of the coil must be grounded by connecting the ground wire to the terminal on the top surface of the coil casing using an M5x10 screw. Tighten the screw to a tightening torque of 2.2 ± 0.2 Nm using an 8 mm wide screwdriver.

Connecting the wires to the terminal block:

- › Remove the insulation from the end of the cable so that when the cable is fixed in the cable gland, the insulated part of the cable sufficiently extends into the inner space of the terminal block.
- › Strip the ends of the wires to a length of 5 to 6 mm. Release the clamp by pressing the lever against the spring in the direction of the arrow and insert a wire with a cross section of 0.5 to 1.5 mm². Releasing the lever secures the wire. The right clamp is for the earth wire.
- › Make sure that the conductors are sufficiently secured in the clamps and are not in danger of loosening.



 DANGER	<p>Correct electrical connection of coils</p> <p>Pay attention to the correct fixing of the wires in the terminal box, the correct fixing and sealing of the thread adapter, the steel stopping plug and the cable in the cable gland. There is a risk of explosion.</p>
--	---

 DANGER	<p>Coil surface grounding</p> <p>If the surface of the coil and thus the entire valve is not grounded, an electrical discharge of static electricity may occur.</p>
--	--

Power fuse protection

- › The user must protect the electrical circuit of the solenoid with a fuse with a tripping characteristic corresponding to the slow fuse wire blowing. The fuse tripping current shall be $I_N \leq 3 \times I_G$, where I_G is the current flowing through the solenoid coil at the maximum coil temperature. (For I_G values, see the coil electrical parameter table.) Conductors and elements shall be used for the fuse circuit that are rated for a higher electric current than the maximum short-circuit current in the customer's equipment circuit.
- › If elements of the electrical installation, including the fuse, are also located in a potentially explosive atmosphere, these elements must also have the appropriate degree of protection.

Electrical wiring diagram of coils

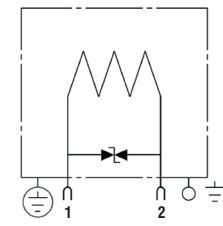
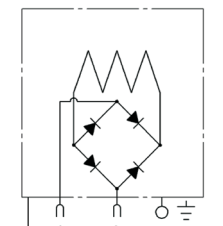
Coils with DC power supply and surge protection by bipolar diode	Coils with AC power supply and rectifier
<p> $U_z = 36$ V for $U_N = 12$ V DC a 24 V DC $U_z = 75$ V for $U_N = 48$ V $U_z = 180$ V for $U_N = 110$ V DC </p> 	

Table of coil electrical parameters

Coil type with DC electric power supply	Nominal supply voltage	Winding resistance at t = 20 °C	Nominal current	Limit current	Bipolar diode	Wattage
	U _N [V DC]	R ₂₀ [Ω]	I _N [A]	I _G [A]	U _Z [V]	P _N [W]
EX18-001-D-1-A-012-0 IDXa	12	16.1	0.750	0.700	36	8.9
EX18-001-D-1-A-024-0 IDXi	24	61.	0.390	0.360	36	9.3
EX18-001-D-1-A-048-0 IDXa	48	254.0	0.190	0.177	75	9.1
EX18-001-D-1-A-110-0 IDXa	110	1277.0	0.086	0.080	180	9.6

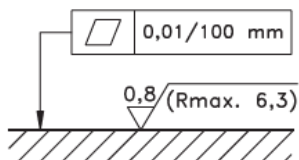
Coil type with AC electric power supply (f=50/60 Hz)	Nominal supply voltage	Winding resistance at t = 20 °C	Nominal current	Limit current	Bipolar diode	Wattage
	U _N [V AC]	R ₂₀ [Ω]	I _N [A]	I _G [A]	U _Z [V]	P _N [W]
EX18-001-A-1-A-110-0 IDXi	110	1172	0.084	0.079	ano	10.0
EX18-001-A-1-A-230-0 IDXa	230	4490	0.046	0.043	ano	9.5

Coil description note: Nominal input power of coil EX18-001 is 10 W, nominal input power of coil EX18-002 is 18 W.

7.2.2 Connecting the valve to the hydraulic circuit

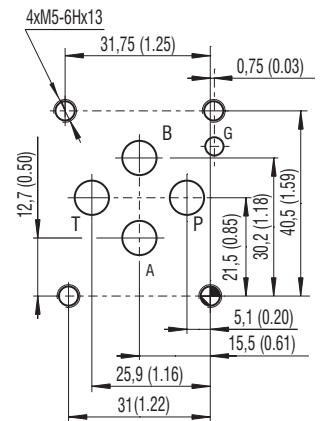
The valve is designed for plate mounting with connection pattern ISO 4401-03-02-0-05 for mounting surface DN 06. The connection plate must have a sufficiently machined surface to ensure a seal in the dividing plane between the plate and the valve body.

Required surface quality of the counterpart



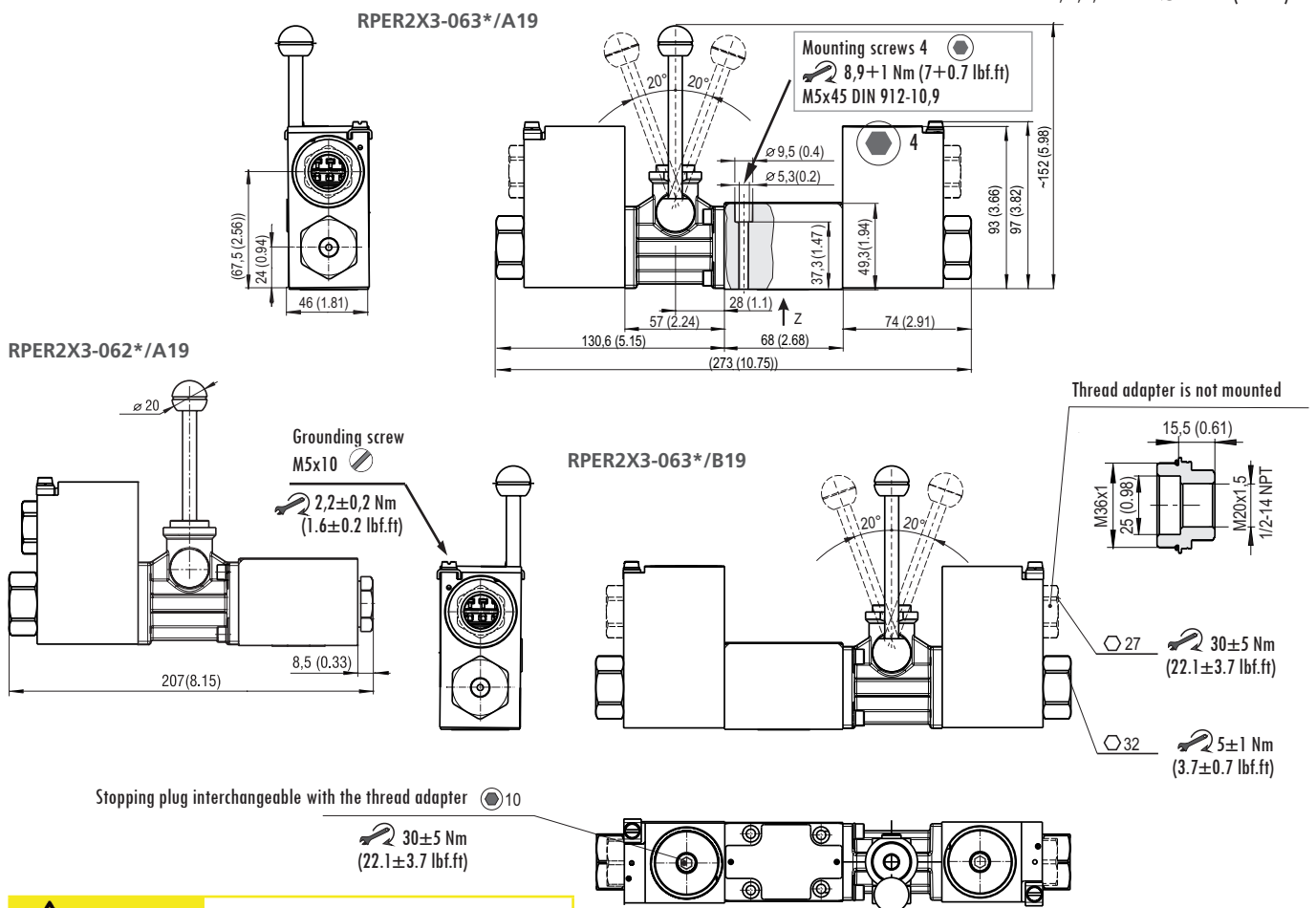
Remove the shipping plate from the valve body. Before assembly, check the connection surfaces for damage and cleanliness, and check the sealing rings on the valve body base for damage. Carefully place the valve on the connection pattern of the plate. Ensure the correct orientation of the ports. Fix the valve with four M5x45 DIN 912-10.9 strength screws and tighten them evenly with an inbus wrench A/F 4 to a torque of 8.9+1 Nm (6.56+0.7 lbf.ft). (The screws are not included with the valve, they must be ordered separately)

ISO 4401-03-02-0-05



Ports P, A, B, T - max. Ø7.5 mm (0.29 in)

Dimensions of the RPER2X3-06 directional control valve, dimensions in mm (in)



VAROVÁNÍ The lever operator should never be used when any solenoid is energized.

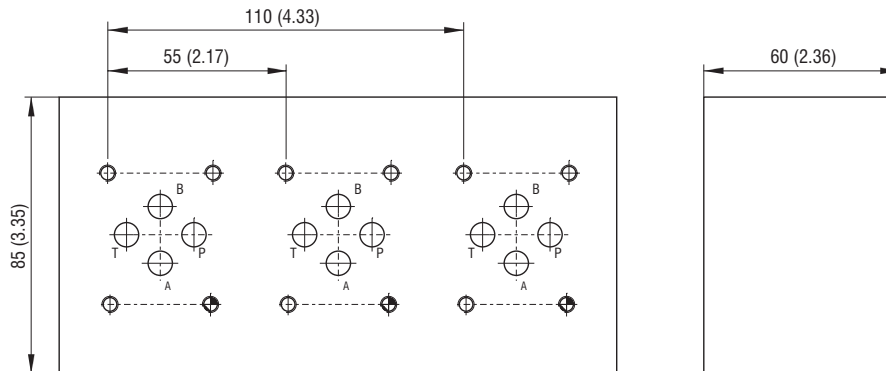


WARNING

Correct installation of the valve

The four sealing rings on the base of the body must be undamaged and inserted into the recesses, the connection surface of the plate sufficiently machined and undamaged, the valve must be fixed with four fastening bolts tightened to the specified torque. Failure to meet these conditions for proper valve installation may result in leakage of working fluid.

The solenoid windings heat up during operation. Effective external cooling must be provided to ensure that the maximum winding temperature is not exceeded, by not exceeding the maximum fluid and ambient temperature and by maintaining minimum volume of the connection block. A valve body volume of (152.5 cm³) is sufficient for one manifold. If several valves that can be switched simultaneously are connected on the connection plate, a distance of at least 10 mm must be maintained between the bodies of adjacent valves (see fig).



7.3 Commissioning

Before commissioning the hydraulic circuit, check that the valve is correctly mounted on the connection plate and that electrical supply cables are correctly connected. The valve is not to be adjusted. Test operation should be conducted without the presence of an explosive atmosphere. After the hydraulic circuit has been commissioned, check the valve for leaks. Simply verify the directional control valve function, repositioning the spool by alternately switching the solenoids and monitoring the movement of the appliance or the amount of pressure in the appliance branches (ports A and B).

7.4 Normal operation

During normal operation, the directional control valve spool is adjusted by the solenoids. Normal operation of the system does not require any manipulation of the valve.



WARNING

Switching solenoids

Directional control valves with two solenoids, coils must not be switched at the same time. There is a risk of damaging the valves.



WARNING

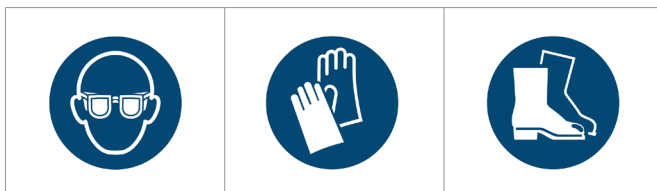
Coil cooling

Coil cooling takes into account the cooling surface of the hydraulic part of the valve. Do not power separately disassembled coils. Excessive winding heat, insulation damage and short circuiting between coils may occur. For the same reason, the surface of the coils must not be covered, exposed to direct heat sources or sunlight. The valve must not be closed in a tight space without ensuring air circulation.

DO NOT exceed the MAXIMUM PARAMETERS, shown in table 4.4.

OBSERVE THE OPERATIONAL RESTRICTIONS AND AVOID THE RISKS, referred to in paragraph 3.

USE PROTECTIVE EQUIPMENT







When working with hydraulic fluid, it is recommended to wear safety goggles, protective rubber gloves and sturdy shoes with non-slip soles.



7.5 Extraordinary and emergency situations

In the event of a power failure to the solenoids or a coil failure, the centering spring will return the valve spool to its base position. Based on the results of the risk analysis, the following potential faults have been identified:

- › External valve leakage due to seal damage associated with a working fluid leak.
- › Loss of valve function, resulting in loss of control of the appliance.
- › Mechanical damage to the electrical part of the valve, including the cable.

 DANGER	<p>Shutdown of electrical power, pressure source and circuit relief In the event of an emergency, immediately shut off the electrical power supply to the control solenoids and the pressure source (pump). Relieve all parts of the hydraulic circuit including the hydraulic accumulators by connecting them to the tank. A malfunctioning valve may cause a dangerous operating situation due to loss of control. A damaged electrical part can initiate an explosion.</p>
 DANGER	<p>Prohibition of handling and repair in explosive atmospheres A defective valve must not be repaired or dismantled when an explosive atmosphere is present. There is a risk of initiating an explosion.</p>
 WARNING	<p>Check pressure relief part of the circuit Always ensure that the circuit is depressurised before intervening in the hydraulic circuit, for example before removing a valve. Otherwise there is a risk of leakage of working fluid and contamination of persons.</p>
 WARNING	<p>Surface temperature Before starting disassembly, make sure that the surface of the valve and solenoid coils has cooled to a low enough temperature to prevent skin burns.</p>

Defective valves must be replaced/repared.

	<p>ENVIRONMENTAL PROTECTION Spilled working fluid must be removed immediately, e.g. with suitable absorbents, contaminated parts of the perimeter cleaned, contaminated objects in the vicinity cleaned or disposed of. Contaminated objects and residues of leaked working fluid must be disposed of in accordance with the applicable environmental regulations.</p>
	<p>FIRST AID</p> <p>Electric shock</p> <ul style="list-style-type: none"> › Switch off the power supply immediately › Make sure the casualty is breathing. › Call emergency medical services › If the casualty is not breathing, initiate measures to restore basic life functions according to first aid abilities (CPR, artificial respiration) and equip the workplace (defibrillator) with life-saving equipment. <p>Contamination by hydraulic working fluid If contamination of persons occurs, contaminated parts of clothing must be removed immediately and the skin thoroughly washed with soap or treated with a suitable cream. If the eyes are contaminated, flush them with clean water and seek medical attention. Seek medical attention also in case of accidental ingestion of working fluid or skin allergic reaction to splashes of working fluid.</p>

7.6 Repairs carried out by specialist

A suitably qualified user is authorised to replace the complete valve, the seals at the base of the valve body, which are supplied as a spare set.

7.6.1 Replacing a defective valve

A defective valve that is not caused by a malfunctioning solenoid coil must be removed and replaced with a new one.

Repairs to a defective valve may only be carried out by the manufacturer.

When replacing the defective valve with a new one, proceed as follows:

- › Ensure that no explosive atmosphere is present during the repair period (see also 7.5).
- › Switch off the pressure source (pump) of the hydraulic circuit (see also 7.5).
- › Relieve the hydraulic circuit including the accumulators by connecting it to the tank (see also 7.5).
- › Ensure that the hydraulic circuit is pressure-free (see also 7.5).
- › Switch off the electrical supply to the directional control valve solenoids (see also 7.5).
- › Ensure that the surface of the valve and solenoid coils is cooled to a low enough temperature to prevent skin burns (see also 7.5).
- › Disconnect the electrical supply cable to the coils (see 7.6.3).
- › Switch off the electrical supply to the position sensor (if the valve is equipped with one) and disconnect the M12x1 connector.
- › Remove the coil surface ground wire by loosening the M5x10 ground screw.
- › Clean the surface and surroundings of the directional control valve.
- › Allow the remaining working fluid from the valve to drain into the prepared smaller container.

Remove residual working fluid from the dismantled defective valve, seal the ports with a shipping plate and package it to prevent mechanical damage and contamination of the area outside the package during transport. Send the packaged valve with a description of the manifestation of the defect to the manufacturer. A new valve is warranted by the manufacturer for 1 year. However, a claim may not be accepted by the manufacturer if the valve is mechanically damaged, the seal material is damaged by aggressive liquid, or the valve has been shown to have been used improperly and not in accordance with these instructions of use.

7.6.2 Replacing the sealing rings at the base of the valve body

In case of leaks in the dividing plane, the sealing rings must be replaced with new ones. The disassembly and reassembly procedure is similar.

- › Ensure that no explosive atmosphere is present during the repair (see also 7.5).
- › Switch off the pressure source (pump) of the hydraulic circuit (see also 7.5).
- › Lighten the hydraulic circuit including the accumulators by connecting it to the tank (see also 7.5).
- › Ensure that the hydraulic circuit is depressurised (see also 7.5).
- › Switch off the electrical supply to the directional control valve solenoids (see also 7.5).
- › Make sure that the surface of the valve and solenoid coils is cooled to a low enough temperature to prevent skin burns (see also 7.5).
- › Clean the surface and surroundings of the directional control valve.
- › Loosen and unscrew the four fastening screws M5x45 DIN 912 using the inbus wrench A/F 4. Carefully remove the valve from the connection plate.
- › Allow the remaining working fluid from the valve to drain into the prepared smaller container.
- › Using a small screwdriver, remove the sealing rings from the recess in the body.
- › Work carefully to avoid damaging the sealing surfaces.
- › Clean the connection surfaces of the valve body and plate. Check them for damage.
- › Insert new sealing rings into the recesses in the valve body so that they do not fall out when the valve is reassembled.
- › Insert the four fastening screws into the holes in the valve body and fasten the valve to the plate using the inbus wrench A/F 4. Tighten the screws in a crosswise sequence to the specified torque of 8.9 + 1 Nm. Uneven tightening may cause deformation of the body and unreliable valve function.
- › If any of the fixing screws are damaged, replace them.



WARNING

Valve mounting screws

The screws must be high tensile screws (SCREW M5x45 DIN 912 10.9), preferably from the valve manufacturer. A screw of normal tensile can be broken due to the high pressure in the hydraulic circuit and can cause massive leakage of the working fluid.

- › Check that the coil cables in the cable gland and the earth wires are properly secured to ensure that they are not loose when the valve is handled.
- › After the repair, verify the new seals are tight and the valve is working properly.

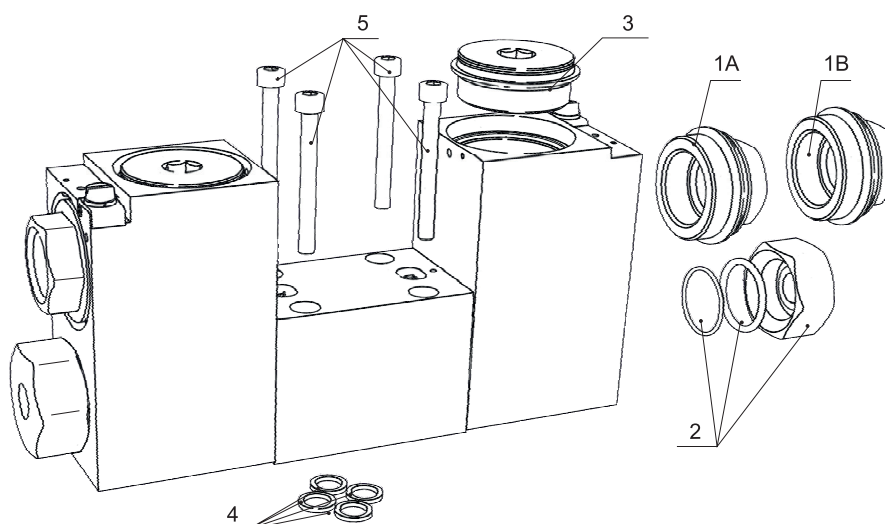
7.7 Product maintenance

During normal operation, keep the valve clean and free of dust deposits on the surface. Deposits both impair cooling of the valve and coils and can form flammable layers prone to ignition. Choose the surface cleaning interval according to the dustiness of the environment so that the thickness of the deposited dust layer does not exceed 3 mm. Depending on the conditions of use, check the hydraulic circuit for leaks, the electrical parts including cables for damage and the valve and position sensor for correct operation at appropriate intervals. The check should be performed every time the device is started, but at least once a week during long-term operation.

7.8 Spare parts supplied

Ordered as spare parts: see catalog SP 8010

Position	Component name	Description	Ordering number
1A	Thread adapter with the thread M20x1.5	Set with the sealing ring 36x2 VQM (silicone)	44915100
1B	Thread adapter with the tapered thread ½ NPT ANSI	Set with the sealing ring 36x2 VQM (silicone)	44915000
2	Coil nut	Set with the sealing rings	44915200
	Sealing ring actuating system-coil	O-ring 22x1.5 VMQ 50 (silicone)	
	Nut sealing	O-ring 21.89x2.62 VMQ 70 (silicone)	
3	Stopping plug	Set with the sealing ring 36x2 VQM (silicone)	44923800
4	Set of seals	4x Square ring 9.25x1.68 NBR	15845200
5	Valve mounting screws	Set 4x M5x45 DIN 912 10.9	15845100



The storage conditions for seals are specified in ISO 2230 - Rubber products - Storage guidelines:

Seals to be stored:

- › in covered, dry and tempered areas at temperatures of +15 to +25 °C, away from direct heat sources
- › protected from the weather, direct sunlight and ultraviolet radiation
- › undeformed, on a clean flat base in the original packaging
- › out of reach of petroleum and chemical substances

Rubber group	Chemical name abbreviation according to ISO	Chemical composition	Length of storage
A	Polyurethane PU	Polyester urethane rubber	5 years
B	NBR	Butadiene acrylonitrile rubber	7 years
C	FKM / FPM (Viton)	Fluoroelastomer	10 years
C	VMQ	Vinyl-methyl - silicone rubber	10 years

7.9 Product disposal



Remove the valve from the hydraulic circuit (see chapter 7.6.1 Emergency and emergency situations). Remove as much residual working fluid from the valve as possible. Dispose of the valve in an environmentally friendly manner in accordance with the applicable regulations. The valve is mainly made of recyclable materials such as low carbon steel, copper wire, etc. (see chapter 4.2 Materials used).

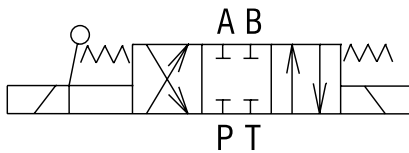
8. Manufacturer contact



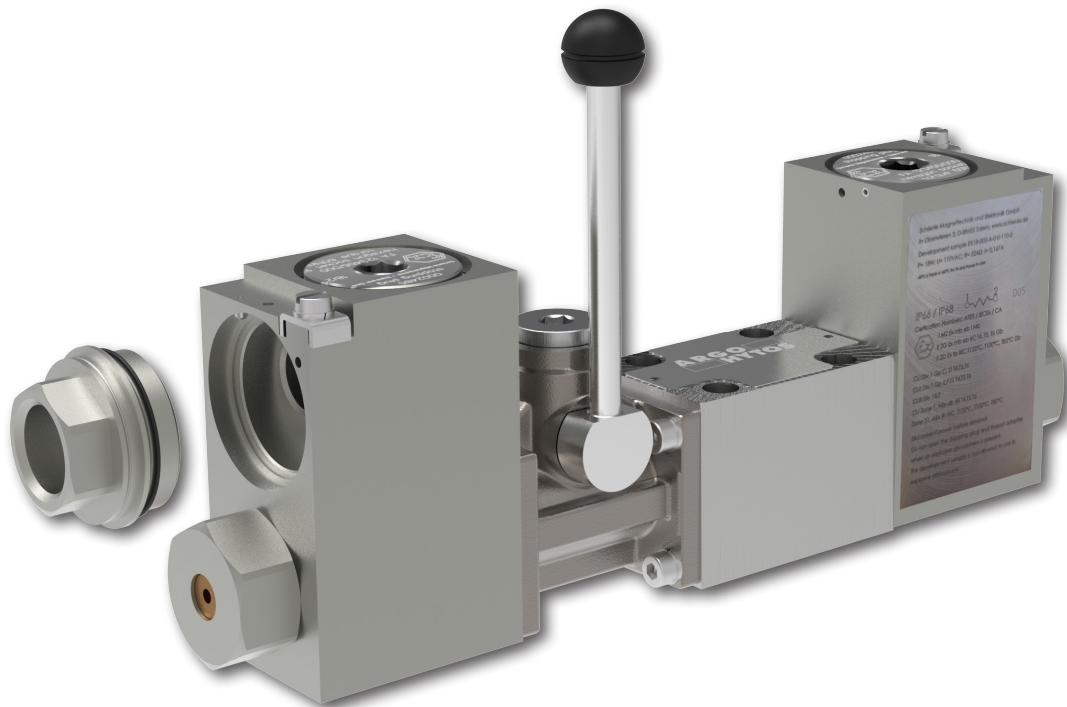
ARGO-HYTOS s.r.o.
Dělnická 1306 • CZ - 543 01 VRCHLABÍ • Czech Republic
Tel. +420 499 403 111 • E-mail: info.cz@argo-hytos.com

**4/3 and 4/2 SOLENOID OPERATED DIRECTIONAL CONTROL VALVE
WITH AUXILIARY LEVER OVERRIDE
DESIGNED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES**

RPER2X3-06



EN



Important! Read the instructions before using the product.
Save the instructions for future reference.

If the operating instructions are lost, new ones can be found on the ARGO-HYTOS website www.argo-hytos.com

The following is the authorised translation of original operating instruction RPER2X3-06 no 15312_1cz_06/2023 issued by the producer:

PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
EU-KONFORMITÄTSEKTLÄRUNG nach der Richtlinie 2014/34/EU



Výrobce / Manufacturer / Hersteller:

ARGO-HYTOS s.r.o.
Dělnická 1306, 543 15 Vrchlabí, Czech Republic

Výrobek / Product / Produkt:

Elektromagneticky ovládané hydraulické ventily pro použití v prostředí s nebezpečím výbuchu
Solenoid operated hydraulic valves for use in potentially explosive atmospheres
Elektromagnetisch betätigte hydraulische Ventile für den Einsatz in explosionsgefährdeten Bereichen

Typ / Type / Typ:

RPE2X, RPER2X, RNE2XH, SD2E2X, SD1E2X, SD3E2X, SD2P2X, PRM2X, PVRM2X

Prohlášení o shodě / Declaration of Conformity / Konformitätserklärung

Prohlašujeme na svou výlučnou zodpovědnost, že výše uvedené ventily, které jsou určeny k řízení hydraulických obvodů, na které se vztahuje toto prohlášení, jsou za podmínek obvyklého a určeného použití bezpečné a splňují požadavky **Směrnice 2014/34/EU**, harmonizovaného **Nařízení vlády ČR 116/2016 Sb.** a návazných technických norem.

We declare under our sole responsibility that the above listed valves, which are intended for control of hydraulic circuits, covered by this declaration, are safe under conditions of usual and intended use and comply with the **Directive 2014/34/EU** and related technical standards.

Hiermit erklären wir unter unserer Verantwortung, dass die o.a. Ventile zur Steuerung von Hydraulikkreisläufen, auf die sich diese Konformitätserklärung bezieht, unter Bedingungen einer bestimmungsgemäßen Verwendung sicher sind und mit der **Richtlinie 2014/34/EU** und den zugehörigen technischen Normen übereinstimmen.

Posouzení shody elektrické části (cívky) / Conformity assessment of electric part (coil) / Konformitätsbewertung des elektrischen Teils (der Spule)

Použité technické normy / Used technical standards / Verwendete technische Normen

EN IEC 60079-0:2018 Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-1:2014 Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure “d”, Edition 3
EN 60079-31:2014 Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”, Edition 2
EN 60529:1991 + A1:2000 + A2:2013 Degrees of protection provided by enclosures (IP Code)

Oznámený subjekt / Notified body / Notifizierte Stelle

Na posuzování shody elektrické části se podílel oznámený subjekt č. 2809 FM APPROVALS EUROPE Ltd., který vydal certifikát ATEX.

The notified body No. 2809 FM APPROVALS EUROPE Ltd. participated in the conformity assessment of electric part and issued ATEX certificate.

Die notifizierte Stelle Nr. 2809 FM APPROVALS EUROPE Ltd. hat sich an der Konformitätsbewertung des elektrischen Teiles beteiligt und ATEX-Zertifikat ausgestellt.

Jméno / Name / Name: **FM APPROVALS EUROPE Ltd.**
Adresa / Address / Adresse: 1 Georges Quay Plaza, Dublin, Ireland D02 E440

ATEX Certifikát / ATEX Certificate / ATEX-Zertifikat

Typ / Type / Typ	Číslo / No. / Nr.	Vydán / Issued / Ausgestellt
EU – Type Examination Certificate	FM23ATEX0008X	13.06.2023

PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
 EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
 EU-KONFORMITÄTSERKLÄRUNG nach der Richtlinie 2014/34/EU



IECEX Certifikát / IECEX Certificate / IECEX-Zertifikat

Typ / Type / Typ	Číslo / No. / Nr.	Vydán / Issued / Ausgestellt
IECEX Certificate of Conformity	IECEX FMG 23.0003X, rev. 0	12.6.2023

Certifikát byl vystaven společností / The certificate was issued by / Das Zertifikat wurde ausgestellt vom:
 Jméno / Name / Name: **FM APPROVALS LLC**
 Adresa / Address / Adresse: 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA







Stupeň ochrany (IP kód) / Degree of Protection (IP Code) / Schutzart (IP-Code)

Zařízení poskytuje stupeň ochrany **IP66 / IP68** podle EN 60529. Podmínky zkoušky IP68: cívka ponořená v hloubce 1 m pod vodní hladinou po dobu 24 hodin. Uvedený stupeň ochrany je podmíněn správným upevněním a utěsněním napájecího kabelu.

The equipment provides Degree of Protection **IP66 / IP68** in accordance with EN 60529. IP68 test conditions: the coil at a depth of 1 m under the water surface for 24 hours. The declared degree of protection is conditioned by the correct fastening and sealing of the power cable.

Das Gerät bietet Schutzart **IP66 / IP68** gemäß EN 60529. IP68 – Prüfbedingungen: die Spule befindet sich 24 Stunden lang in einer Tiefe von 1 m unter der Wasseroberfläche. Voraussetzung für die angegebene Schutzart ist die korrekte Befestigung und Abdichtung des Netzkabels.

Označení cívek ventilů / Marking of valve coils / Bezeichnung der Ventilspulen




Nominální napětí cívek / Nominal voltage of coils / Nennspannung der Spulen:	
12 V, 24 V, 48 V, 110 V DC, 110 V, 230 V AC 50/60 Hz	
Nominální příkon / Nominal input power / Nennleistung	
10 W	18 W
 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T6, T5, T4 Gb  II 2D Ex tb IIIC T85°C, T100°C, T135°C Db	 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T4 Gb  II 2D Ex tb IIIC T135°C Db

Posouzení shody neelektrické části ventilů / Conformity assessment of non-electrical valve part / Konformitätsbewertung des nichtelektrischen Ventiltiles

Použité technické normy / Used technical standards / Verwendete technische Normen

EN ISO 80079-36:2016 Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements, Edition: 1.0
 EN ISO 80079-37:2016 Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety „c“, control of ignition sources „b“, liquid immersion „k“, Edition: 1.0
 EN ISO/IEC 80079-38:2016 Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

Označení neelektrických částí ventilů / Marking of non-electrical valve parts / Bezeichnung der nichtelektrischen Ventiltile

 I M2 Ex h I Mb  II 2G Ex h IIC T6, T5, T4 Gb  II 2D Ex h IIIC T85°C, T100°C, T135°C Db	Způsob ochrany / Type of protection / Schutzart: „c“ - bezpečná konstrukce / constructional safety / konstruktive Sicherheit
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PROHLÁŠENÍ O SHODĚ podle zák. č. 90/2016 Sb.

EU PROHLÁŠENÍ O SHODĚ podle Směrnice 2014/34/EU
EU DECLARATION OF CONFORMITY acc. to Directive 2014/34/EU
EU-KONFORMITÄTSEKTLÄRUNG nach der Richtlinie 2014/34/EU



Oblasti použití ventilů / Application areas of valves / Einsatzbereiche der Ventile

EQUIPMENT-GROUP I Doly / Mines / Bergwerke	EQUIPMENT-GROUP II (IIG) Plyny / Gases / Gase	EQUIPMENT-GROUP III (IID) Prach / Dust / Staub
Category M1 Zakázané použití Prohibited use Verbotene Nutzung	Zone 0 Zakázané použití Prohibited use Verbotene Nutzung	Zone 20 Zakázané použití Prohibited use Verbotene Nutzung
Category M2 (the equipment is de-energised)	Zone 1	Zone 21
		Zone 22
	Zone 2	IIA (Propane)
		IIIB (Non-conductive dust)
		IIIC (Conductice dust)

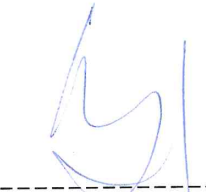
Specifické podmínky použití / Specific conditions of use / Spezifische Nutzungsbedingungen (X)

1	Maximální teplota pracovní kapaliny / Maximum temperature of working fluid / Maximale Temperatur der Arbeitsflüssigkeit: 70°C
2	Rozsah teploty okolí / Ambient temperature range / Umgebungstemperaturbereich: -30°C ≤ T _{amb} ≤ +70°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +55°C for temperature class / max. valve surface temperature T5 / T 100°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +40°C for temperature class / max. valve surface temperature T6 / T 85°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +60°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 18W
3	Typ a úroveň ochrany (EPL) elektrického zařízení (např. snímače), instalovaného společně s certifikovaným ventilem, musí splňovat požadavky pro daný typ výbušné atmosféry. Stanovené podmínky použití musí být upraveny podle povolených parametrů tohoto zařízení. Type of protection and protection level (EPL) of electrical equipment (e.g. sensor), installed together with the certified valve, must correspond with requirements set for applied explosive atmosphere. The defined conditions of use must be modified according to allowed parameters of this equipment. Schutzart und Schutzniveau (EPL) der elektrischen Ausrüstung (z.B. Sensor), die zusammen mit dem zertifiziertem Ventil installiert wird, müssen den festgelegten Anforderungen für die Art der explosionsgefährdeten Atmosphäre entsprechen. Die angegebenen Nutzungsbedingungen müssen entsprechend den zulässigen Parametern dieser Ausrüstung modifiziert werden.

Datum vydání / Date of issue / Ausstellungsdatum: 1.11.2023

Místo vydání / Place of issue / Ausstellungsort: Vrchlabí, Czech Republic

Za výrobce / On behalf of the manufacturer / Im Auftrag des Herstellers:

Ing. Milan Bezdiček
General Manager

UK DECLARATION OF CONFORMITY

UKSI 2016:1107

Manufacturer:

ARGO-HYTOS s.r.o.
Dělnická 1306, 543 15 Vrchlabí, Czech Republic

Product:

Solenoid operated hydraulic valves for use in potentially explosive atmospheres

Type:

RPE2X, RPER2X, RNE2XH, SD2E2X, SD1E2X, SD3E2X, SD2P2X, PRM2X, PVRM2X

Declaration of Conformity

We declare under our sole responsibility that the above listed valves, which are intended for control of hydraulic circuits, covered by this declaration, are safe under conditions of usual and intended use and comply with **The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulation 2016** (UKSI 2016:1107) and related technical standards.

Conformity assessment of electric part (coil)

Used technical standards:

EN IEC 60079-0:2018 Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-1:2014 Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure “d”
EN 60079-31:2014 Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”
EN 60529:1991 + A1:2000 + A2:2013 Degrees of protection provided by enclosures (IP Code)







UK approved body

The approved body No. 1725 FM APPROVALS Ltd. participated in the conformity assessment of electric part and issued UKEX certificate.
Name: FM APPROVALS Ltd.
Address: Voyager Place, Maidenhead, Berkshire, SL6 2PJ, United Kingdom

UKEX Certificate

Type	No.	Issued
UK – Type Examination Certificate	FM23UKEX0010X	16.06.2023

Marking of valve coils

Nominal voltage of coils:	12 V, 24 V, 48 V, 110 V DC, 110 V, 230 V AC 50/60 Hz	
Nominal input power:	10 W	18 W
 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T6, T5, T4 Gb  II 2D Ex tb IIIC T85°C, T100°C, T135°C Db	 I M2 Ex db I Mb  II 2G Ex db IIB + H2 T4 Gb  II 2D Ex tb IIIC T135°C Db	

Degree of protection (IP Code) in accordance with EN 60529.

The equipment provides Degree of protection **IP66/IP68** in accordance with EN 60529. IP68 test conditions: the coil at a depth of 1 m under the water surface for 24 hours. The declared degree of protection is conditioned by the correct fastening and sealing of the power cable.

UK DECLARATION OF CONFORMITY

UKSI 2016:1107

Conformity assessment of non-electrical valve part

Used technical standards:

EN ISO 80079-36:2016 Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements, Edition 1.0
 EN ISO 80079-37:2016 Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety „c“, control of ignition sources „b“, liquid immersion „k“, Edition 1.0
 EN ISO/IEC 80079-38:2016 Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

Marking of non-electrical valve parts

<p>Ex I M2 Ex h I Mb Ex II 2G Ex h IIC T6, T5, T4 Gb Ex II 2D Ex h IIC T85°C, T100°C, T135°C Db</p>	<p>Type of protection: „c“ - constructional safety</p>
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Application areas of valves

EQUIPMENT-GROUP I Mines	EQUIPMENT-GROUP II (IIG) Gases		EQUIPMENT-GROUP III (IID) Dust	
Category M1 Prohibited use	Zone 0 Prohibited use		Zone 20 Prohibited use	
Category M2 (the equipment is de-energised)	Zone 1	IIA (Propane)	Zone 21 Zone 22	IIIA (Flamable fibres)
	Zone 2	IIB (Ethylene)+H2		IIIB (Non-conductive dust)
				IIIC (Conductice dust)

Specific conditions of use (X)

1	Maximum temperature of working fluid: 70°C
2	Ambient temperature range: -30°C ≤ T _{amb} ≤ +70°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +55°C for temperature class / max. valve surface temperature T5 / T 100°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +40°C for temperature class / max. valve surface temperature T6 / T 85°C and rated nominal solenoid power 10W -30°C ≤ T _{amb} ≤ +60°C for temperature class / max. valve surface temperature T4 / T 135°C and rated nominal solenoid power 18W
3	Type of protection and protection level (EPL) of electrical equipment (e.g. sensor), installed together with the certified valve, must correspond with requirements set for applied explosive atmosphere. The defined conditions of use must be modified according to allowed parameters of this equipment.

Date of issue: 1.11.2023

Place of issue: Vrchlábí, Czech Republic

On behalf of the manufacturer:





 Ing. Milan Bezdiček
 General Manager

Mandatory traceability

- Based on legislative requirements, all operators in the logistics chain, from the manufacturer of the certified Ex solenoid coil to the end user of the complete equipment, are obliged to make and maintain traceability records of Ex products, enabling, if necessary, the withdrawal of products of certain serial numbers from the market due to defects of non-conformities, endangering safety of use in an explosive atmosphere. In practice, this means keeping records of the assignment of Ex coil/valve identification numbers to the identification numbers of the operators immediately down the logistics chain.
- To meet the requirement for traceability of Ex products, it is necessary to keep product type labels legible throughout their technical life.

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Related documents:

Ex-coil EX18 user manual (Original document B18 of the coil manufacturer, SCHIENLE)

Product catalogue: Directional control valve RPER2X3-06 (no. 5312)

Datasheet: General Technical Information GI (no. 0060)

Spare parts catalogue sheet SP (no. 8010)

An overview of signal words and warning signs used in the text

	DANGER	Signal word combined with a warning sign used to signify that a dangerous situation which could result in death or serious injury is imminent.
	WARNING	Signal word combined with a warning sign used to signify the occurrence of a potentially dangerous situation that could result in death or serious injury if not avoided.
	CAUTION	Signal word combined with a warning sign used to signify a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

An overview of other symbols and abbreviations used in the text

Symbol, designation	Description of the meaning of the symbol, designation
AC, DC	Designation for alternating (AC) and direct (DC) current, voltage
ATEX	Explosive Atmospheres
EPL	Equipment Protection Level (see EN 60079.0)
IEC	International Electrotechnical Commission
NBR	Rubber used for the manufacture of seals
PA	Polyamide
PE	Polyethylene

Glossary of technical terms used

- › **A hydraulic mechanism** is one in which energy is transmitted via the pressure energy of the working fluid.
- › **A hydraulic directional control valve** is a valve designed to control the direction of movement or stop the output component of an appliance.
- › **The volumetric flow rate Q** is the amount of liquid in volume units that flows through a given flow cross-section per unit time (SI unit is m^3s^{-1} , in practice the unit **l/min** is used)
- › **The control solenoid** is designed to reposition the valve spool that interconnects or closes the ports in the body. The solenoid consists of an excitation coil which, by passing an electric current through the winding, generates a magnetic field which exerts a force on the armature of the mechanical actuating system.
- › **Pressure** is the force acting per area unit (SI unit **Pascal** ($1 Pa = Nm^{-2}$), in practice the unit used is **bar** ($1bar = 0.1MPa$))

1. Use of the product

The **RPER2X3-06 directional control valve** is a directly controlled, solenoid operated spool valve. The valve body has a connection pattern at the base with a nominal clearance of DN 06 according to ISO 4401. The product is designed to control the movement direction of the hydraulic cylinder piston rod or the rotation direction of the hydraulic motor output shaft by connecting the individual channels via a spool in the valve body. By stemming the fluid flow through the valve spool, the movement of the appliance can be stopped. The valve also has a auxiliary manual lever operated emergency spool control that can be used up to 100 bar in the T-port.

Valves with ATEX certification according to Directive 2014/34/EU and **IECEX** certification according to IECEx OD 009 and related harmonized standards may be used in explosive atmospheres consisting of firedamp, gas or dust. The valves are marked with the CE Ex mark of conformity and are accompanied by a Declaration of Conformity.

Use in explosive atmospheres

Equipment - group I, mines, where the explosive atmosphere of firedamp consists predominantly methane. The valve has a high level of safety (EPL = Mb), which makes initiation unlikely during the interval between gas discharge and valve shutdown. It is designed for category M2 devices that remain off after gas discharge.

Equipment - group II, where the explosive atmosphere consists of gasses other than mines gas. The valve has a high level of safety (EPL = Gb) which allows the valve to be used in zones 1 and 2. The valve must not be used in zone 0. There is a risk of explosion. The valve is certified for gas groups IIA (typical gas is propane), IIB (typical gas is ethylene) also for hydrogen from group IIC. The joint dimensions do not meet the requirements for Group IIC acetylene.

Equipment - group III, where the explosive atmosphere consists of dust and flammable flying particles. The valve has a high level of safety (EPL = Db) which allows the valve to be used in zones 21 and 22. The valve must not be used in zone 20. There is a risk of explosion. The valve is certified for all dust groups - IIIA (flammable flying particles), IIIB (non-conductive dust) and IIIC (conductive dust).

Area of application:

Equipment - group I – MINES	Equipment - group II (IIG) - GAS		Equipment - group III (IID) - DUST	
Category M1– NO	Zone 0 - NO		Zone 20 - NO	
Categorie M2 (the device remains switched off)	Zone 1 Zone 2	IIA (propane)	Zone 21 Zone 22	IIIA (flammable particles)
		IIB (ethylene) + H2 (hydrogen)		IIIB (non-conductive dust)
			IIIC (conductive dust)	

The valves are available in three surface temperature classes:

T4 with a maximum surface temperature of 135 °C

T5 with a maximum surface temperature of 100 °C

T6 with a maximum surface temperature of 85 °C

The use of the valve in the temperature class is subject to the maximum supply voltage of the coil not being exceeded, the working fluid temperature and the ambient temperature not being exceeded (see Table 4.4 Basic technical parameters).

2. Valve protection against initiation of explosion of explosive atmosphere

2.1 Protection of electrical parts

The electrical part of the valve is an ATEX and IECEx certified solenoid coil.

The basic is the „d“ protection by flameproof enclosure (EN 60079-1, IEC 60079-1), which prevents the penetration of hot gases into the surrounding explosive atmosphere in the event that an explosion is initiated inside the flameproof enclosure. For explosive atmospheres consisting of dust, the enclosure „t“ (EN 60079-31, IEC 60079-31) is used. In addition, the coil is sealed with a potting compound.

Use of the valve in potentially explosive atmospheres



Certification ATEX, IECEx and UKCA

- I M2 Ex db I Mb
- II 2G Ex db IIB + H2 T6, T5, T4 Gb
- II 2D Ex tb IIIC T185°C, T100°C, T135°C Db

Certification	Number	Issued	Certification body
EU-Type Examination Certificate	FM23ATEX0008X	13.6.2023	FM Approvals Europe Ltd. (Notified body No. 6024) One Georges Quay Plaza, Dublin, Ireland D02 E440
IECEx Certificate of Conformity	IECEx FMG 23.0003X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA
UK-Type Examination Certificate	FM23UKEX0010X	16.6.2023	FM Approvals Ltd. (Approved body No. 1725) Voyager Place, Maidenhead, Berkshire, SL6 2PJ, UK



Certification across standards NEC 500 and NEC 505, 506

NEC 500 (USA), Annex J (Canada)	NEC 505, 506 (USA)	CEC Section 18 (Canada)
Class I Division 1 Group B, C, D T6...T4 Class II/III Division 1 Group E, F, G T6...T4	Cl 1 Zone 1, AEx db IIB+H2 T6...T4 Zone 21, AEx tb IIIC T85°C...T135°C Db	Ex db IIB+H2 T6...T4 Gb Ex tb IIIC T85°C...T135°C Db

Group	Description	Corresponds to EPL
Group B	A typical gas is hydrogen	Gb
Group C	The typical gas is ethylene	Gb
Group D	Typical gases are methane and propane	Gb
Group E	Conductive dust	Db
Group F	Coal dust	Db
Group G	Non-conductive dust, grain dust	Db
Class III	Flammable airborne particles, paper or cotton processing	Db

Certificate	Number	Issued	Certification body
Certificate of Conformity	FM23US0009X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA
Certificate of Conformity	FM23CA0005X	12.6.2023	FM Approvals LLC 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA

2.2 Cable gland

The cable gland is a separately certified ex-component. A gland with certified type protection „d“ must be used to prevent hot gases from escaping and initiating an explosion in the surrounding environment in the event of an explosion in the interior of the coil casing. (The gland is not included with the valve.)




- I M2 Ex db I Mb
- II 2G Ex db IIC Gb
- II 2D Ex tb IIIC Db

2.3 Protection of non-electrical parts

The non-electrical part of the valve consists of the hydraulic part and the solenoid actuating system.

The safety of the non-electrical parts has been ensured and assessed according to EN ISO 80079-36, EN ISO 80079-37 a EN ISO/IEC 80079-38.

- › The moving parts, the spool/cone, armature and pin of the control system, perform a sliding motion in a space separated by a seal from the surrounding environment and flooded with working fluid.
- › Not exceeding the maximum surface temperature of the given temperature class is conditioned by not exceeding the maximum temperature of the working fluid (70 °C), the maximum ambient temperature (see table 4.4 Basic technical parameters) and the nominal voltage of the coil.
- › The valve body and coil body are of robust construction, sufficiently resistant to destruction by mechanical shock.
(Valve body impact resistance test performed according to EN IEC 60079-0 paragraph 26.4.2: two impacts with a weight with a hardened head of diameter D25 mm, weighing m = 1 kg, falling from a height of 0.7 m, with a total potential energy of 7 J)
- › The hydraulic section has sufficient compressive strength, tested at 1.5 times the maximum operating pressure of the fluid.
- › The surface of the valve is grounded using a grounding screw and protected against static electricity discharge.
- › The construction materials used meet the requirements for limited content of certain elements to prevent the formation of electrical cells and excessive corrosion.
- › The surface materials used do not produce sparks during mechanical impacts.
- › The rotary pin of the manual emergency control lever is protected by a seal against the ingress of pollutants, especially hard particles, which could create an initiation spark.

Non-electrical parts of valve	 I M2 Ex h I Mb
	 II 2G Ex h IIC T6, T5, T4 Gb
	 II 2D Ex h IIIC T85°C, T100°C, T135°C Db

2.4 Applicable legislation and standards

The valve complies with the relevant requirements of legislation and standards:

Directive 2014/34/EU (harmonized NV 116/2016) Equipment for potentially explosive atmospheres (ATEX)

IECEx OD 009 Operational Document

Standards used to assess the conformity of the electrical parts:

CENELEC EN IEC 60079-0

Explosive atmospheres – Part 0: Equipment – General requirements

EN 60079-1, IEC 60079-1

Explosive atmospheres – Part 1: Equipment protection by flameproof enclosure „d“

EN 60079-31, IEC 60079-31

Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure „t“

Standards used to assess the conformity of the non-electrical parts:

EN ISO 1127-1

Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology

EN ISO 80079-36

Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirement

EN ISO 80079-37




Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non-electrical type of protection constructional safety „c“, control of ignition sources „b“. liquid immersion „k“

EN ISO/IEC 80079-38







Explosive atmospheres – Part 38: Equipment and components in explosive atmospheres in underground mines

3. Risks and limitations of product use



3.1 Risks associated with operating in explosive atmospheres

	DANGER	Explosive atmosphere type and zone The valve must not be used outside the specified range (see paragraph 1 Product use), in particular it is not intended for equipment category M1 group I (mines) zone 0 group II (gases) and zone 20 group III (dust). Risk of explosion.
	DANGER	Surface temperature When selecting the valve, the surface temperature requirement of the valve must be taken into account. It must be min. 25 °C lower than the temperature necessary to initiate an explosion of an explosive atmosphere of a given composition. If the initiation temperature is exceeded an explosion will occur.
	DANGER	Handling in an explosive atmosphere It is forbidden to install, disassemble, repair or replace the valve in an explosive atmosphere. Risk of explosion.

3.2 Risk associated with the hydraulic part of the valve

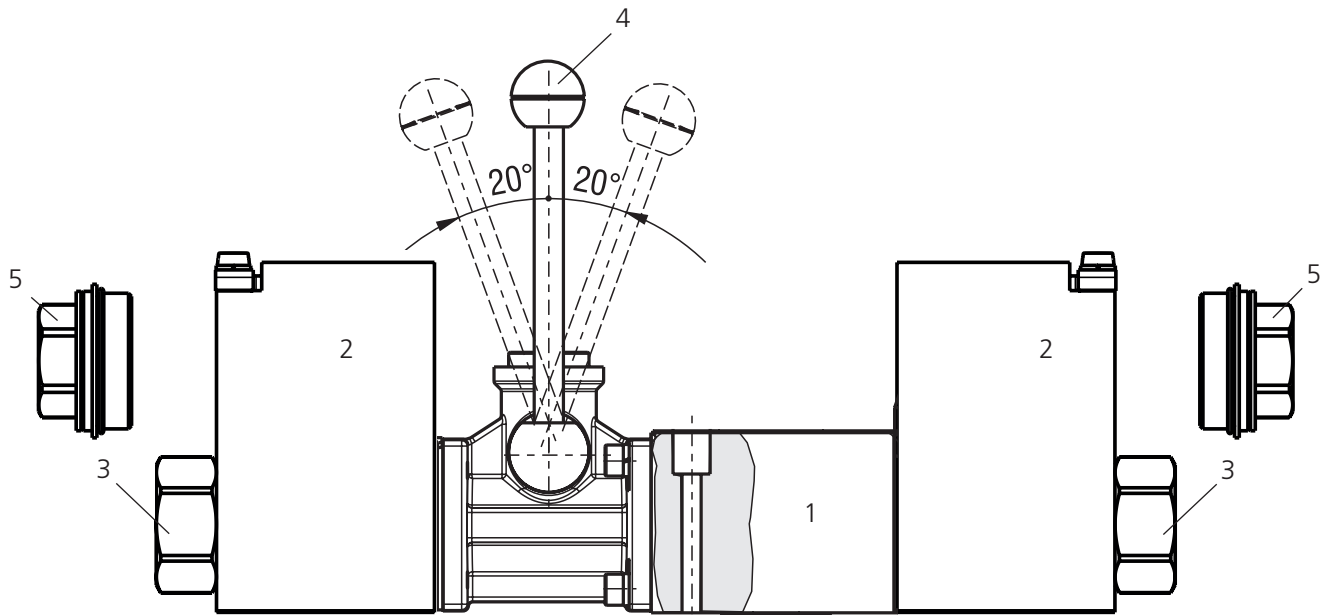
	DANGER	Maximum operating pressure The valve may be used for a maximum pressure of 350 bar in the ports P, A, B and 100 bar in port T. If the maximum pressure is exceeded there is a risk of damage to the valve. Exceeding the pressure value may cause the valve to rupture i.e. exceeding 525 bar in ports P, A, B and 150 bar in port T.
	DANGER	Maximum hydraulic output Section 4.6 of the datasheet shows the operating limit curves for each type of spool valve. The hydraulic performance is provided as the product of the working pressure and the flow rate. If the instant power exceeds the curve limit, the valve may lose function. The spool is subjected to excessive hydrodynamic forces, the valve spool will not be switched over and control of the appliance will be lost.
	WARNING	Valve installation The valve may only be mounted to a sufficiently machined surface with a specified connection pattern. The specified sealing rings must be inserted, undamaged into the body recesses. The valve is fastened with four M5x45 ISO 4762 bolts tightened to a tightening torque of 8.9+1 Nm. Otherwise, there is a risk of leakage of the working fluid and loosening of the valve by pressure (For details, see paragraph 7.2 Product installation)
	CAUTION	Maximum operating temperature The maximum operating temperature must not exceed the temperature range allowed in paragraph 4.4 Basic technical parameters or in the datasheet. Both the temperature of the operating fluid and the ambient temperature significantly influence: a) the surface temperature of the valve b) the temperature of the solenoid coil winding - there is a risk of a reduction in hydraulic performance c) the seal material - risk of seal damage and leakage of the working fluid.
	CAUTION	Surface temperature of the valve The surface temperature of the valve can exceed 100 °C due to the temperature of the working fluid and pressure loss in the valve being converted to heat. Do not touch the surface of the valve when the circuit is operational, even after switching off. Wait until it has cooled down to a safe temperature. There is a risk of burns.
	CAUTION	Working fluids used Valves may only be used for normal working fluids, especially hydraulic oils (see chapter 4. Product description). It is forbidden to use the following as working fluids, in particular: › water and aqueous solutions that will cause corrosion and loss of valve function › liquids which are flammable or explosive, the heating of which may cause fire or explosion when passing through the valve › aggressive liquids (e.g. acids and hydroxides) which will cause damage to the valve and loss of function. The flash point of the used working fluid must be at least 50 K higher than the maximum allowed of surface temperature of the valve in the given temperature class.

3.3 Risks associated with the electrical part of the valve

	DANGER	Electric shock The solenoid coil is an electrical device that should be wired by a person with appropriate electrical qualifications. Before wiring the solenoid, check the parameters of the power supply, the integrity of the cable and the solenoid. There is a risk of electric shock.
	CAUTION	Electrical supply values The solenoid coil is energised by the electrical current passing through the winding. The values of the electrical supply must not exceed the values indicated on the coil. There is a risk of losing solenoid function.

4. Product description

The hydraulic part of the valve consists of a cast iron body (1) with output ports on the lower base, a hardened steel spool and return springs that hold the spool in its base position. The spool is adjusted to the working positions by means of solenoids (2) certified for explosive atmospheres. The solenoid coils are fixed to the actuating system with hexagonal nut (3). The body of the manual lever control (4) is built between the solenoid and the hydraulic part. When the valve is operated by the solenoid, the lever remains in its basic position due to the backdrop and does not reduce its performance. Thread adapter (5) with an optional thread is used for connecting the power cable, e.g. using a suitable cable gland.



4.1 Emergency manual lever control

The emergency manual spool position control is used to reposition the spool in the event of loss of solenoid function or in the event of power failure to the coils to achieve a safe position of the operated mechanism. The use of the manual emergency control is limited to a maximum pressure of 100 bar in the T-port.



CAUTION

Use of the emergency manual control is forbidden when the valve solenoids are operational.

If the valve is operated by solenoids do not use the emergency manual control of the valve spool. Valve damage and loss of function may result.

4.2 Materials used:

Body of valve and manual emergency control– grey cast iron
 Spool – hardened steel
 Compression spring – patented steel wire for the production of springs
 Valve seal – NBR
 Pole piece, tube and armature of actuating system, coil body and steel plug, coil hexagonal nut - low carbon steel
 Non-magnetic ring and pin of actuating system – Cr-Ni stainless steel
 End plug of actuating system – brass
 Coil body – stainless steel
 Coil winding – enamelled Cu wire
 Coil seal on actuating system – silicone
 Shipping plate – PE
 The materials used are not found in the lists of prohibited and mandatory documented substances Directive 2015/863/EU (RoHS) and EU Regulation no. 1907/2006 (REACH).

4.3 Surface protection against corrosion

The valve surface is zinc-coated with 520 h corrosion protection in NSS according to ISO 9227. Surface layer without hexavalent chromium Cr+6.

4.4 Basic technical parameters

Parameter	Unit	Value	
Nominal valve size		DN 06	
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)	
Maximum operating pressure at port T	bar (PSI)	100 (1450)	
Maximum flow volume through the valve	l/min (GPM)	60 (15.9)	
Pressure drop	bar (PSI)	graph $\Delta p = f(Q)$	
Fluid temperature range NBR	°C	-30 ... +70	
Max. switching frequency	1/h	15 000	
Switching time ON at $v = 32 \text{ mm}^2\text{s}^{-1}$	ms	AC: 30-40 DC: 30-50	
Switching time OFF $v = 32 \text{ mm}^2\text{s}^{-1}$	ms	AC: 30-70 DC: 10-50	
Working fluid kinematic viscosity range	mm^2s^{-1}	10 to 400	
Minimum required working fluid purity	class	21/18/15 ISO 4406	
Lifetime	cycles	10^7	
Valve weight with manual lever control	with 1 solenoid	kg (lbs)	3.15 (6.94)
	with 2 solenoids	kg (lbs)	4.65 (10.25)
Technical data of manual lever control			
Lever length	mm	102	
Lever deflection angle (working)	°	± 12 to 20	
Control force at the end of the lever	N	40	
Technical Data - Solenoid for use in explosive atmospheres			
Voltage type		AC 50 / 60 Hz DC	
Available nominal voltages U_N	V	110, 230 12, 24, 48, 110	
Supply voltage fluctuations		$\pm 10\% U_N$	
Available nominal input power (coils)	W	10	
Duty cycle		100 % ED	
Electrical protection IP according to EN 60529		IP66 / IP68*	
Ambient temperature range for each surface temperature class T4, T5, T6			
Temperature class	Nominal coil input power	Ambient temperature range	
T4 – 135 °C	10 W	-30 ... +70 (-22 ... 158)	
T5 – 100 °C	10 W	-30 ... +55 (-22 ... 131)	
T6 – 85 °C	10 W	-30 ... +40 (-22 ... 104)	

*IP68 – test conditions: product submerged 1m under water for 24 hours.
The indicated IP protection level is only achieved if the cable is properly mounted.

4.5 Working fluid

The valve is designed for common hydraulic working fluids:

- › mineral oils of performance classes HM and HV according to ISO 6734-4
- › non-flammable and difficult to ignite hydraulic fluids according to ISO 12922
- › environmentally acceptable hydraulic fluids according to ISO 15380

NOTICE: NBR seal material is not suitable for some working fluid groups, such as the HFD group.

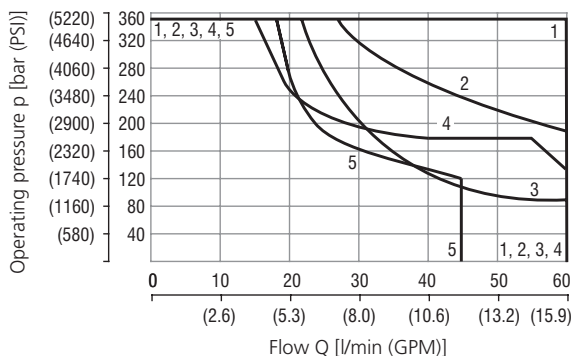
In case of uncertainty, we recommend to perform a test of the mutual tolerance of the seal material and the working fluid.

4.6 Valve characteristics

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

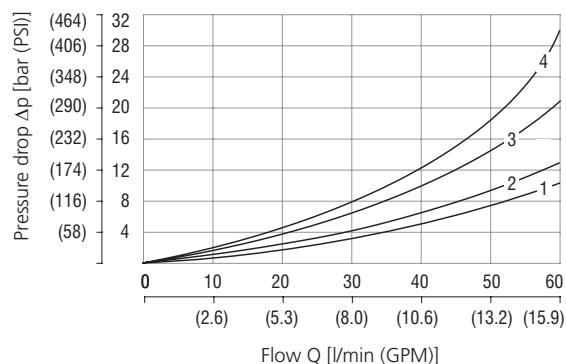
Operating limits (p-Q)

Ambient temp 70 °C (158 °F), voltage $U_N - 10\%$ (24 V DC), power P_N 10 W



1	2	3	4	5
R30	Z11	Y11	H11, H51	C11

Pressure drop related to flow (Δp -Q)



	P→A	P→B	A→T	B→T	P→T		P→A	P→B	A→T	B→T	P→T
Z11	1	1	2	2		Y11	1	1	1	1	
C11	3	3	3	4	2	R30	1	1	2	2	
H11	1	1	1	2	2	H51		1	2		

4.7 Legislation and standards:

ČSN EN ISO 4413 Hydraulics - General rules and safety requirements for hydraulic systems and their components

Other regulations and standards used:

ČSN ISO 6403 Hydrostatic drives. Valves for flow and pressure control. Test methods

ČSN ISO 4411 Measurement of the characteristics $\Delta p = \text{function}(Q)$ of hydraulic valves

ČSN EN ISO 9001 Quality management systems

ČSN EN ISO 12100 Machine safety / risk analysis

Directive 2006/42/EU on machinery / used chapters: 1.7.4 Instructions for use, Annex III CE marking

ČSN EN 82079-1 Preparation of instruction manuals - Structure, content and presentation / Part 1: General principles and detailed requirements

5. Product modification

An overview of possible valve modifications is described in the ordering key.

The number of spool positions, the spool connection and the type of manual override and the electrical parameters of the coil cannot be subsequently changed by the user. In the case of a valve with a 10 W coil, the coil surface temperature and the application for the temperature class can be affected by adjusting the ambient temperature (see 4.4 Ambient temperature range for each class).

Ordering code

RPER2X3-06 [] [] / [] [] A6 [] [] - B []		Certifications of valve ATEX, IECEx, No designation UKCA, FM APPROVED
Explosion proof, 4/2 and 4/3, directional control valve, solenoid operated, with lever override		Surface treatment zinc-coated (ZnNi), ISO 9227 (520 h)
Valve size		Hand lever position A19 standard, lever on side A pointing up B19 standard, lever on side B pointing up
Number of valve positions two positions three positions	2 3	Sealing material NBR
Spool symbols according to the connection table		No designation
DC voltage (I_N) 12 V DC / 0.75 A 24 V DC / 0.39 A 48 V DC / 0.19 A 110 V DC / 0.086 A	01200 02400 04800 11000	Temperature class - solenoid nominal input power Class T4, T5, T6 - 10 W
AC voltage 50/60 Hz (I_N) 110 V AC / 0.084 A 230 V AC / 0.046 A	11050 23050	Threaded adapter with thread M20x1,5 ½ NPT ANSI
	M NPT	
		- For directional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged. - The solenoids must be switched off when the valve is operated by hand lever.

Mounting bolts M5x45 DIN 912 10.9 nor studs must be ordered separately. Tightening torque 8.9+1 Nm (6.56+0.7 lbf.ft).

Spool Symbols

Type	Symbol	Interpositions	Type	Symbol	Interpositions
Z11			R30		
C11			H51		
H11					
Y11					

6. Target group of users

All of the above activities related to this valve, in particular installation and connection to the hydraulic circuit, require specialist technical knowledge and experience in the field of hydraulics. The minimum level of competence required is CETOP level 2. This level is generally defined as performing a variety of activities that require an understanding of technical factors and contexts. This may lead to the need for correct interpretation (e.g. tolerances, operating methods) or the application of various non-repetitive procedures. This may require the performance of checks, simple analysis and diagnostics, and the ability to react to changes in an operational manner. Teamwork is often necessary. The connection of solenoid coils to the supply voltage must only be carried out by persons with the appropriate electrical qualifications. All operations must be carried out with responsibility for correctness and quality, as this is a dangerous area of product use.

It is forbidden for the following persons to carry out any activities related to this product:

- › minors (the exception is practical training of pupils under the professional supervision of a teacher)
- › without established professional competence
- › under the influence of alcohol and/or drugs
- › patients whose medical condition could affect safety (reduced attention and ability to react in time, excessive fatigue)
- › under the influence of drugs that have a demonstrable effect on attention and timeliness
- › allergic to hydraulic working fluids

7. Operating instructions broken down by product life stage

7.1 Transportation and storage of the product

The valve is packaged in vacuum shrink-wrapped PE foil and protected against moisture and dust as standard. The P, A, B, T ports on the base are additionally protected by a plastic (PE) shipping plate. An identification label is affixed to the packaging.

The products should only be stored for the necessary time at a temperature of 0 to +30 °C in a dry place with a relative humidity of up to 65 %. After extended periods of storage, we recommend checking the product for corrosion damage, replacing seal at the base of the body and flushing the product with clean oil before connecting it to the hydraulic circuit.

7.2 Installation of the product

Check that the valve type on the identification plate is correct. Cut the packaging with scissors and carefully remove the valve from the packaging. Unpack the valve in a clean place and prevent contamination of the valve. The packaging is made of PE and can be easily contaminated with residual hydraulic oil from the valve. Dispose of the packaging in accordance with applicable environmental regulations.

The mounting position of the valve is arbitrary. However, if vibrations or shocks are applied to the valve during operation, they must not be applied in the direction of the spool axis.



WARNING

Slippery valve surface

The valve contains a small amount of residual oil after a hydraulic function test carried out by the manufacturer. If the surface of the unpacked valve is contaminated with oil, remove the oil using a cleaning cloth. A slippery valve surface can cause the valve to fall during handling and cause minor injury or damage to the valve.

7.2.1 Electrical connection of coils

When connecting the coil power cable, proceed as follows:

- › Use a "d" certified cable to connect the coils to the power supply. When selecting the cable structure and outer diameter, follow the manufacturer's recommendations for the certified cable gland used. (The cable gland is not included with the valve.)
- › Use a cable and cable gland with sufficient insulation temperature rating. For a 10 W coil, the insulation temperature class must be 35 °C higher than the maximum allowable ambient temperature for that temperature class.

Temperature class	Max. ambient temperature	Min. temperature insulation class
T4	70 °C (158 °F)	105 °C (221 °F)
T5	55 °C (131 °F)	90 °C (194 °F)
T6	40 °C (104 °F)	75 °C (167 °F)

- › The cable should be sufficiently protected against damage with respect to environmental conditions, e.g. resistant to mechanical damage or chemical attack.
- › The design of the coil casing allows the connection of the power cable from the vertical or horizontal direction depending on which hole in the casing the thread adapter with external thread M36x1 is screwed into.
- › Thread adapter with M20x1.5 female thread or with ½ NPT ANSI tapered female thread can be selected.
- › The second hole in the casing is closed with a plug after the wires are mounted to the coil terminal.
- › The thread adapter and plug are sealed in the casing with a VQM silicone rubber O-ring.
- › The thread adapter and closing plug are protected against loosening after assembly by screwing in the M3x4 grub screws in the radial direction.



WARNING

Sealing ring

During assembly, the ring must not be damaged or the part must not be mounted without the sealing ring. There is a risk of explosion.

1. Stopping plug

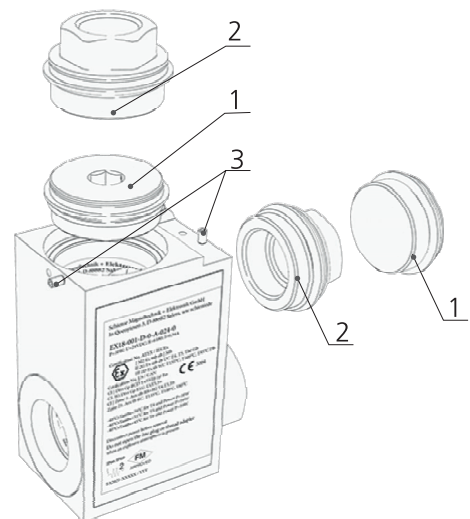
with M36x1 thread and sealing ring

2. Thread adapter

with thread M36x1 and sealing ring
- A. Internal thread M20x1,5
- B. ANSI ½ NPT tapered female thread

3. Grub screws

M3x4

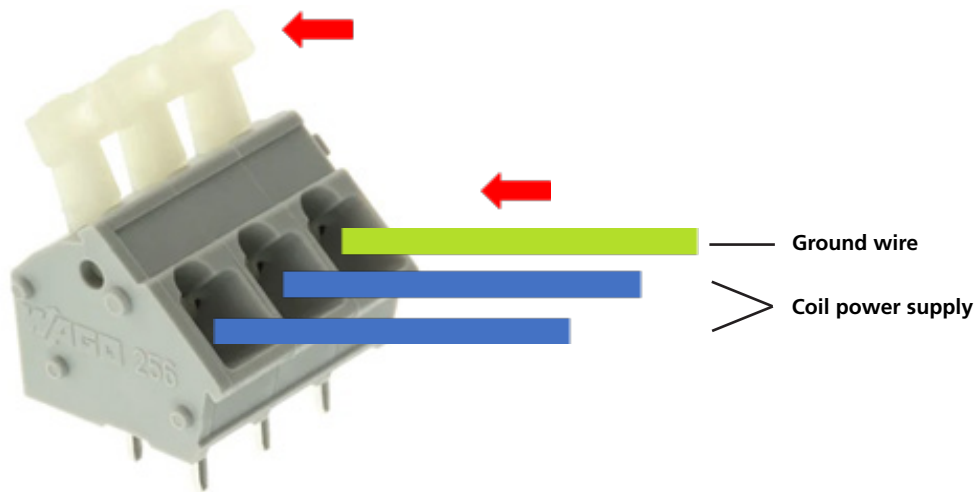



When connecting the coil power cable, proceed as follows:


- › Using the inbus wrench A/F 10, loosen and unscrew the steel plug on the top surface of the coil housing to gain access to the terminal block inside the housing. Do not damage the plug seal.
- › Disassemble the cable gland into its individual parts. Strip the end of the cable and thread the cable successively through all parts of the gland, the thread adapter and the horizontal or vertical hole in the coil casing (depending on the direction of cable feed).
- › Strip the ends of the wires and plug them into the terminal block (see picture below).
- › Screw the thread adapter into the coil casing and tighten it to a torque of 30 ± 5 Nm using a wrench A/F 27.
- › Screw the part of the cable gland to be screwed into the thread adapter and tighten to the torque specified by the manufacturer.
- › Assemble the cable gland according to the manufacturer's instructions so that the cable is sufficiently secured against pulling out by external force and displacement by gases in the event of an explosion in the inner space of the coil casing. The inner space of the coil casing must be sufficiently sealed.
- › Fit a steel plug with seal into the free hole in the coil casing and tighten it to the specified torque of 30 ± 5 Nm using an inbus wrench A/F 10. Secure the position of the thread adapter and the steel plug against loosening with M3x4 grub screws and tighten them to a torque of 0.4 ± 0.1 Nm using an inbus wrench A/F 1.5 mm.
- › After mounting the valve, the surface of the coil must be grounded by connecting the ground wire to the terminal on the top surface of the coil casing using an M5x10 screw. Tighten the screw to a tightening torque of 2.2 ± 0.2 Nm using an 8 mm wide screwdriver.

Connecting the wires to the terminal block:

- › Remove the insulation from the end of the cable so that when the cable is fixed in the cable gland, the insulated part of the cable sufficiently extends into the inner space of the terminal block.
- › Strip the ends of the wires to a length of 5 to 6 mm. Release the clamp by pressing the lever against the spring in the direction of the arrow and insert a wire with a cross section of 0.5 to 1.5 mm². Releasing the lever secures the wire. The right clamp is for the earth wire.
- › Make sure that the conductors are sufficiently secured in the clamps and are not in danger of loosening.



 DANGER	<p>Correct electrical connection of coils</p> <p>Pay attention to the correct fixing of the wires in the terminal box, the correct fixing and sealing of the thread adapter, the steel stopping plug and the cable in the cable gland. There is a risk of explosion.</p>
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 DANGER	<p>Coil surface grounding</p> <p>If the surface of the coil and thus the entire valve is not grounded, an electrical discharge of static electricity may occur.</p>
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Power fuse protection

- › The user must protect the electrical circuit of the solenoid with a fuse with a tripping characteristic corresponding to the slow fuse wire blowing. The fuse tripping current shall be $I_N \leq 3 \times I_G$, where I_G is the current flowing through the solenoid coil at the maximum coil temperature. (For I_G values, see the coil electrical parameter table.) Conductors and elements shall be used for the fuse circuit that are rated for a higher electric current than the maximum short-circuit current in the customer's equipment circuit.
- › If elements of the electrical installation, including the fuse, are also located in a potentially explosive atmosphere, these elements must also have the appropriate degree of protection.

Electrical wiring diagram of coils

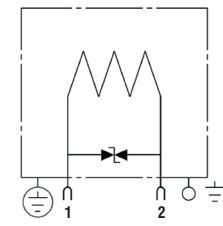
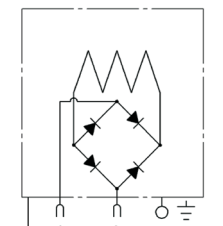
Coils with DC power supply and surge protection by bipolar diode	Coils with AC power supply and rectifier
<p> $U_z = 36$ V for $U_N = 12$ V DC a 24 V DC $U_z = 75$ V for $U_N = 48$ V $U_z = 180$ V for $U_N = 110$ V DC </p> 	

Table of coil electrical parameters

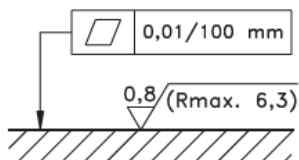
Coil type with DC electric power supply	Nominal supply voltage	Winding resistance at t = 20 °C	Nominal current	Limit current	Bipolar diode	Wattage
	U _N [V DC]	R ₂₀ [Ω]	I _N [A]	I _G [A]	U _Z [V]	P _N [W]
EX18-001-D-1-A-012-0 IDXa	12	16.1	0.750	0.700	36	8.9
EX18-001-D-1-A-024-0 IDXi	24	61.	0.390	0.360	36	9.3
EX18-001-D-1-A-048-0 IDXa	48	254.0	0.190	0.177	75	9.1
EX18-001-D-1-A-110-0 IDXa	110	1277.0	0.086	0.080	180	9.6
Coil type with AC electric power supply (f=50/60 Hz)	Nominal supply voltage	Winding resistance at t = 20 °C	Nominal current	Limit current	Bipolar diode	Wattage
	U _N [V AC]	R ₂₀ [Ω]	I _N [A]	I _G [A]	U _Z [V]	P _N [W]
EX18-001-A-1-A-110-0 IDXi	110	1172	0.084	0.079	ano	10.0
EX18-001-A-1-A-230-0 IDXa	230	4490	0.046	0.043	ano	9.5

Coil description note: Nominal input power of coil EX18-001 is 10 W, nominal input power of coil EX18-002 is 18 W.

7.2.2 Connecting the valve to the hydraulic circuit

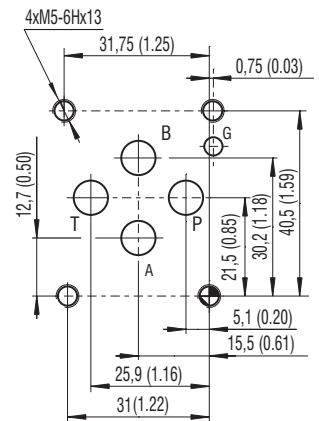
The valve is designed for plate mounting with connection pattern ISO 4401-03-02-0-05 for mounting surface DN 06. The connection plate must have a sufficiently machined surface to ensure a seal in the dividing plane between the plate and the valve body.

Required surface quality of the counterpart



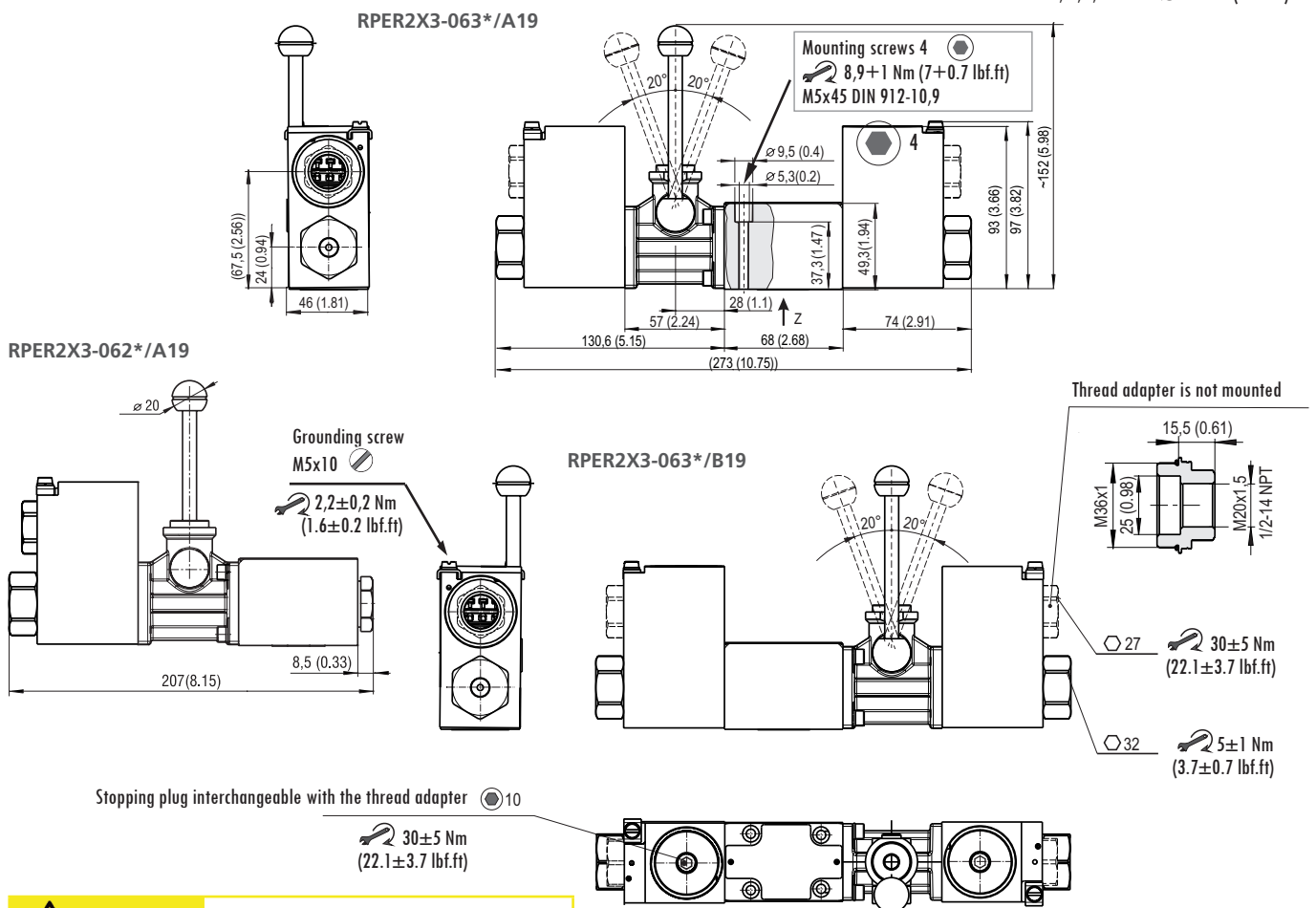
Remove the shipping plate from the valve body. Before assembly, check the connection surfaces for damage and cleanliness, and check the sealing rings on the valve body base for damage. Carefully place the valve on the connection pattern of the plate. Ensure the correct orientation of the ports. Fix the valve with four M5x45 DIN 912-10.9 strength screws and tighten them evenly with an inbus wrench A/F 4 to a torque of 8.9+1 Nm (6.56+0.7 lbf.ft). (The screws are not included with the valve, they must be ordered separately)

ISO 4401-03-02-0-05



Ports P, A, B, T - max. Ø7.5 mm (0.29 in)

Dimensions of the RPER2X3-06 directional control valve, dimensions in mm (in)



VAROVÁNÍ The lever operator should never be used when any solenoid is energized.

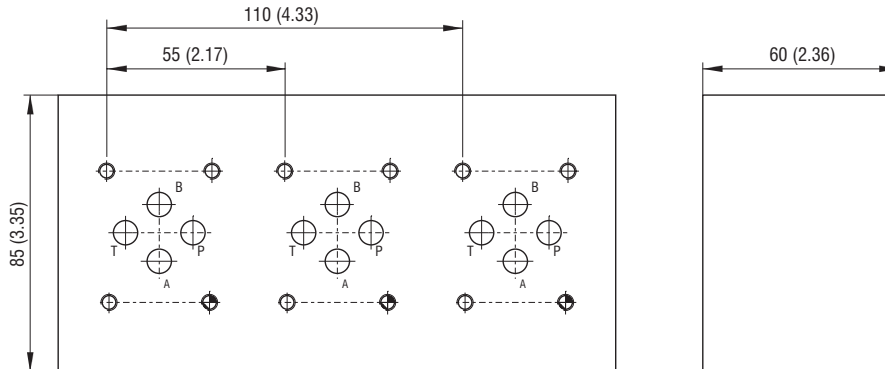


WARNING

Correct installation of the valve

The four sealing rings on the base of the body must be undamaged and inserted into the recesses, the connection surface of the plate sufficiently machined and undamaged, the valve must be fixed with four fastening bolts tightened to the specified torque. Failure to meet these conditions for proper valve installation may result in leakage of working fluid.

The solenoid windings heat up during operation. Effective external cooling must be provided to ensure that the maximum winding temperature is not exceeded, by not exceeding the maximum fluid and ambient temperature and by maintaining minimum volume of the connection block. A valve body volume of (152.5 cm³) is sufficient for one manifold. If several valves that can be switched simultaneously are connected on the connection plate, a distance of at least 10 mm must be maintained between the bodies of adjacent valves (see fig).



7.3 Commissioning

Before commissioning the hydraulic circuit, check that the valve is correctly mounted on the connection plate and that electrical supply cables are correctly connected. The valve is not to be adjusted. Test operation should be conducted without the presence of an explosive atmosphere. After the hydraulic circuit has been commissioned, check the valve for leaks. Simply verify the directional control valve function, repositioning the spool by alternately switching the solenoids and monitoring the movement of the appliance or the amount of pressure in the appliance branches (ports A and B).

7.4 Normal operation

During normal operation, the directional control valve spool is adjusted by the solenoids. Normal operation of the system does not require any manipulation of the valve.



WARNING

Switching solenoids

Directional control valves with two solenoids, coils must not be switched at the same time. There is a risk of damaging the valves.



WARNING

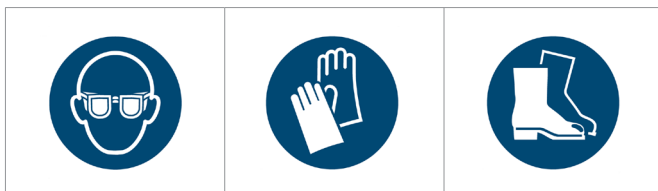
Coil cooling

Coil cooling takes into account the cooling surface of the hydraulic part of the valve. Do not power separately disassembled coils. Excessive winding heat, insulation damage and short circuiting between coils may occur. For the same reason, the surface of the coils must not be covered, exposed to direct heat sources or sunlight. The valve must not be closed in a tight space without ensuring air circulation.

DO NOT exceed the MAXIMUM PARAMETERS, shown in table 4.4.

OBSERVE THE OPERATIONAL RESTRICTIONS AND AVOID THE RISKS, referred to in paragraph 3.

USE PROTECTIVE EQUIPMENT







When working with hydraulic fluid, it is recommended to wear safety goggles, protective rubber gloves and sturdy shoes with non-slip soles.



7.5 Extraordinary and emergency situations

In the event of a power failure to the solenoids or a coil failure, the centering spring will return the valve spool to its base position. Based on the results of the risk analysis, the following potential faults have been identified:

- › External valve leakage due to seal damage associated with a working fluid leak.
- › Loss of valve function, resulting in loss of control of the appliance.
- › Mechanical damage to the electrical part of the valve, including the cable.

 DANGER	<p>Shutdown of electrical power, pressure source and circuit relief In the event of an emergency, immediately shut off the electrical power supply to the control solenoids and the pressure source (pump). Relieve all parts of the hydraulic circuit including the hydraulic accumulators by connecting them to the tank. A malfunctioning valve may cause a dangerous operating situation due to loss of control. A damaged electrical part can initiate an explosion.</p>
 DANGER	<p>Prohibition of handling and repair in explosive atmospheres A defective valve must not be repaired or dismantled when an explosive atmosphere is present. There is a risk of initiating an explosion.</p>
 WARNING	<p>Check pressure relief part of the circuit Always ensure that the circuit is depressurised before intervening in the hydraulic circuit, for example before removing a valve. Otherwise there is a risk of leakage of working fluid and contamination of persons.</p>
 WARNING	<p>Surface temperature Before starting disassembly, make sure that the surface of the valve and solenoid coils has cooled to a low enough temperature to prevent skin burns.</p>

Defective valves must be replaced/repared.

	<p>ENVIRONMENTAL PROTECTION Spilled working fluid must be removed immediately, e.g. with suitable absorbents, contaminated parts of the perimeter cleaned, contaminated objects in the vicinity cleaned or disposed of. Contaminated objects and residues of leaked working fluid must be disposed of in accordance with the applicable environmental regulations.</p>
	<p>FIRST AID</p> <p>Electric shock</p> <ul style="list-style-type: none"> › Switch off the power supply immediately › Make sure the casualty is breathing. › Call emergency medical services › If the casualty is not breathing, initiate measures to restore basic life functions according to first aid abilities (CPR, artificial respiration) and equip the workplace (defibrillator) with life-saving equipment. <p>Contamination by hydraulic working fluid If contamination of persons occurs, contaminated parts of clothing must be removed immediately and the skin thoroughly washed with soap or treated with a suitable cream. If the eyes are contaminated, flush them with clean water and seek medical attention. Seek medical attention also in case of accidental ingestion of working fluid or skin allergic reaction to splashes of working fluid.</p>

7.6 Repairs carried out by specialist

A suitably qualified user is authorised to replace the complete valve, the seals at the base of the valve body, which are supplied as a spare set.

7.6.1 Replacing a defective valve

A defective valve that is not caused by a malfunctioning solenoid coil must be removed and replaced with a new one.

Repairs to a defective valve may only be carried out by the manufacturer.

When replacing the defective valve with a new one, proceed as follows:

- › Ensure that no explosive atmosphere is present during the repair period (see also 7.5).
- › Switch off the pressure source (pump) of the hydraulic circuit (see also 7.5).
- › Relieve the hydraulic circuit including the accumulators by connecting it to the tank (see also 7.5).
- › Ensure that the hydraulic circuit is pressure-free (see also 7.5).
- › Switch off the electrical supply to the directional control valve solenoids (see also 7.5).
- › Ensure that the surface of the valve and solenoid coils is cooled to a low enough temperature to prevent skin burns (see also 7.5).
- › Disconnect the electrical supply cable to the coils (see 7.6.3).
- › Switch off the electrical supply to the position sensor (if the valve is equipped with one) and disconnect the M12x1 connector.
- › Remove the coil surface ground wire by loosening the M5x10 ground screw.
- › Clean the surface and surroundings of the directional control valve.
- › Allow the remaining working fluid from the valve to drain into the prepared smaller container.

Remove residual working fluid from the dismantled defective valve, seal the ports with a shipping plate and package it to prevent mechanical damage and contamination of the area outside the package during transport. Send the packaged valve with a description of the manifestation of the defect to the manufacturer. A new valve is warranted by the manufacturer for 1 year. However, a claim may not be accepted by the manufacturer if the valve is mechanically damaged, the seal material is damaged by aggressive liquid, or the valve has been shown to have been used improperly and not in accordance with these instructions of use.

7.6.2 Replacing the sealing rings at the base of the valve body

In case of leaks in the dividing plane, the sealing rings must be replaced with new ones. The disassembly and reassembly procedure is similar.

- › Ensure that no explosive atmosphere is present during the repair (see also 7.5).
- › Switch off the pressure source (pump) of the hydraulic circuit (see also 7.5).
- › Lighten the hydraulic circuit including the accumulators by connecting it to the tank (see also 7.5).
- › Ensure that the hydraulic circuit is depressurised (see also 7.5).
- › Switch off the electrical supply to the directional control valve solenoids (see also 7.5).
- › Make sure that the surface of the valve and solenoid coils is cooled to a low enough temperature to prevent skin burns (see also 7.5).
- › Clean the surface and surroundings of the directional control valve.
- › Loosen and unscrew the four fastening screws M5x45 DIN 912 using the inbus wrench A/F 4. Carefully remove the valve from the connection plate.
- › Allow the remaining working fluid from the valve to drain into the prepared smaller container.
- › Using a small screwdriver, remove the sealing rings from the recess in the body.
- › Work carefully to avoid damaging the sealing surfaces.
- › Clean the connection surfaces of the valve body and plate. Check them for damage.
- › Insert new sealing rings into the recesses in the valve body so that they do not fall out when the valve is reassembled.
- › Insert the four fastening screws into the holes in the valve body and fasten the valve to the plate using the inbus wrench A/F 4. Tighten the screws in a crosswise sequence to the specified torque of 8.9 + 1 Nm. Uneven tightening may cause deformation of the body and unreliable valve function.
- › If any of the fixing screws are damaged, replace them.



WARNING

Valve mounting screws

The screws must be high tensile screws (SCREW M5x45 DIN 912 10.9), preferably from the valve manufacturer. A screw of normal tensile can be broken due to the high pressure in the hydraulic circuit and can cause massive leakage of the working fluid.

- › Check that the coil cables in the cable gland and the earth wires are properly secured to ensure that they are not loose when the valve is handled.
- › After the repair, verify the new seals are tight and the valve is working properly.

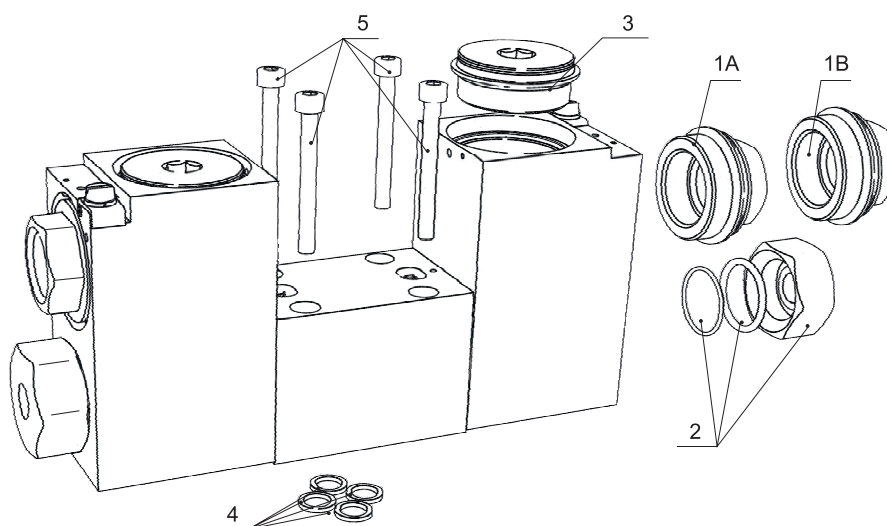
7.7 Product maintenance

During normal operation, keep the valve clean and free of dust deposits on the surface. Deposits both impair cooling of the valve and coils and can form flammable layers prone to ignition. Choose the surface cleaning interval according to the dustiness of the environment so that the thickness of the deposited dust layer does not exceed 3 mm. Depending on the conditions of use, check the hydraulic circuit for leaks, the electrical parts including cables for damage and the valve and position sensor for correct operation at appropriate intervals. The check should be performed every time the device is started, but at least once a week during long-term operation.

7.8 Spare parts supplied

Ordered as spare parts: see catalog SP 8010

Position	Component name	Description	Ordering number
1A	Thread adapter with the thread M20x1.5	Set with the sealing ring 36x2 VQM (silicone)	44915100
1B	Thread adapter with the tapered thread ½ NPT ANSI	Set with the sealing ring 36x2 VQM (silicone)	44915000
2	Coil nut	Set with the sealing rings	44915200
	Sealing ring actuating system-coil	O-ring 22x1.5 VMQ 50 (silicone)	
	Nut sealing	O-ring 21.89x2.62 VMQ 70 (silicone)	
3	Stopping plug	Set with the sealing ring 36x2 VQM (silicone)	44923800
4	Set of seals	4x Square ring 9.25x1.68 NBR	15845200
5	Valve mounting screws	Set 4x M5x45 DIN 912 10.9	15845100



The storage conditions for seals are specified in ISO 2230 - Rubber products - Storage guidelines:

Seals to be stored:

- › in covered, dry and tempered areas at temperatures of +15 to +25 °C, away from direct heat sources
- › protected from the weather, direct sunlight and ultraviolet radiation
- › undeformed, on a clean flat base in the original packaging
- › out of reach of petroleum and chemical substances

Rubber group	Chemical name abbreviation according to ISO	Chemical composition	Length of storage
A	Polyurethane PU	Polyester urethane rubber	5 years
B	NBR	Butadiene acrylonitrile rubber	7 years
C	FKM / FPM (Viton)	Fluoroelastomer	10 years
C	VMQ	Vinyl-methyl - silicone rubber	10 years

7.9 Product disposal



Remove the valve from the hydraulic circuit (see chapter 7.6.1 Emergency and emergency situations). Remove as much residual working fluid from the valve as possible. Dispose of the valve in an environmentally friendly manner in accordance with the applicable regulations. The valve is mainly made of recyclable materials such as low carbon steel, copper wire, etc. (see chapter 4.2 Materials used).

8. Manufacturer contact



ARGO-HYTOS s.r.o.
Dělnická 1306 • CZ - 543 01 VRCHLABÍ • Czech Republic
Tel. +420 499 403 111 • E-mail: info.cz@argo-hytos.com

