Solenoid Valve Type 5404

Operating Manual

OP 580

Solenoid Valve Type 5404

Table of contents

1 Operating instructions

The operating instructions contain important information.
- Read the operating instructions carefully and follow the safety instructions in particular, and also observe the operating conditions.
- Operating instructions must be available to each user.
- The liability and warranty for the device are void if the operating instructions are not followed.

1.1 Symbols

- Designates an instruction to prevent risks.
  - Designates a procedure which you must carry out. Warning of injuries:

Danger!
Imminent danger!
Serious or fatal injuries.

Warning!
Potential danger!
Serious or fatal injuries.

Caution!
Danger!
Minor or moderately severe injuries.

Warns of damage to property.

1.2 Intended use

Incorrect use of the solenoid valve Type 5404 can be dangerous to people, nearby quipment and the environment.
- The device is designed to control, shut off and meter neutral media up to a viscosity of 21 mm2/s.
- In areas at risk of explosion, only use devices approved for use in those areas. These devices are labeled with a separate Ex type label. For use in areas at risk of explosion, note the information provided on the separate Ex type label and the separate explosion-related operating instructions included in the scope of supply.
- Provided the cable plug is connected and installed correctly, the device satisfies protection class IP65 in accordance with DIN EN 60529 / IEC 60529.
- Use according to the permitted data, operating conditions and conditions of use specified in the contract documents and operating instructions.
- Correct transportation, correct storage and installation and careful use an maintenance are essential for reliable and problem-free operation.
- Use the device only as intended.

1.2.1 Definition of therm “device”

In these operating instructions, the term “device” always refers to the solenoid valve Type 5404.

1.3 Basic safety instructions

These safety instructions do not consider any contingencies or incidents which occur during installation, operation and maintenance. The operator is responsible for observing the location-specific safety regulations, also with reference to the personne.

Danger of high pressure.
- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

Risk of burns / Risk of fire if used continuously through hot device surface.
- Keep the device away from highly flammable substances and media and do not touch with bare hands.

Risk of injury due to malfunction of valves with alternating current (AC). Sticking core causes coil to overheat, resulting in a malfunction.
- Monitor process to ensure function is in perfect working order.

Risk of short-circuit/escape of media through leaking screw joints.
- Ensure seals are seated correctly.
- Carefully screw valve and connection lines together.

General hazardous situations.
To prevent injury, ensure that:
- The device may be operated only when in perfect condition and in consideration of the operating instructions.
- Do not make any changes and do not subject the device to mechanical loads.
- Secure system against unintentional activation.
- Installation, operation and maintenance may only be performed by qualified specialists.
- Install the device according to the regulations applicable in the country.
- After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- Observe the general rules of technology.

1.3.1 Warranty

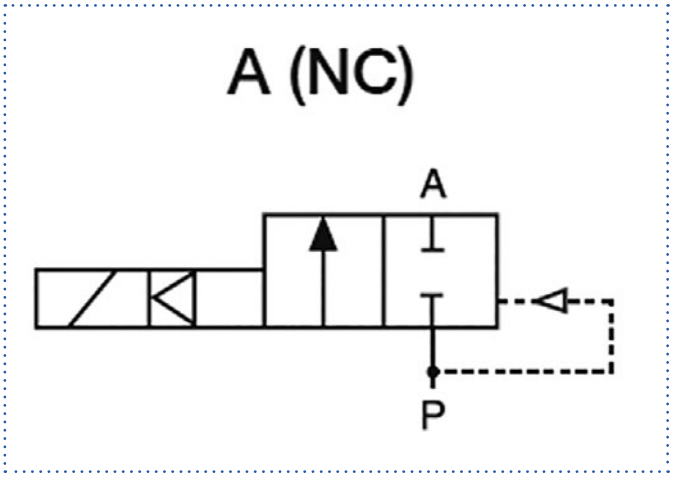
The warranty is only valid if the device is used as intended in accordance with the specified application conditions.

1.4 Technical data

1.4.1 Operating conditions

The following values are indicated on the type label:
- Voltage (Tolerance ±10 %) / Current type
- Coil power consumption (active power in W - at operating temperature)
- Pressure range
- Body material: Brass (MS), cast iron (GG)
- Seal material: PTFE + FKM (EF), PTFE + EPDM (EA), PTFE + Graphite (EG), EPDM + Graphite (AG)

Circuit function 2/2-way valve:



Protection class: IP65 in accordance with DIN EN 60529 / IEC 60529 with cable plug, e.g. Bürkert Type 2518

1.4.2 Conformity

The device conforms with the EU Directives according to the EU Declaration of Conformity (if applicable).

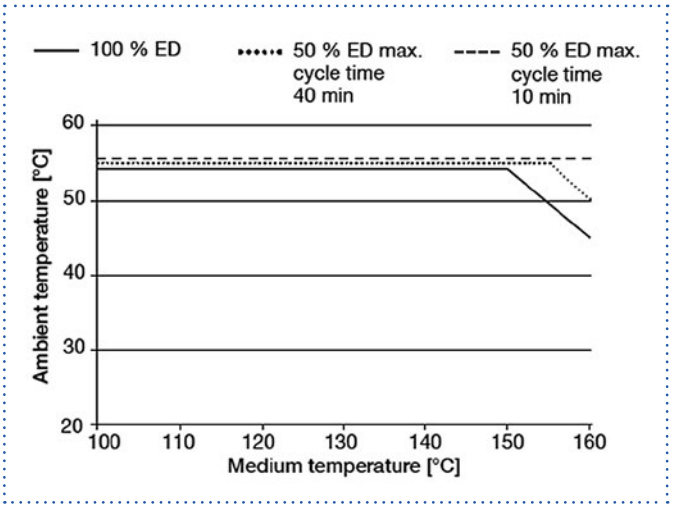
1.4.3 Standards

The applied standards, which verify conformity with the EU Directives, can be found on the EU-Type Examination Certificate and / or the EU Declaration of Conformity (if applicable).

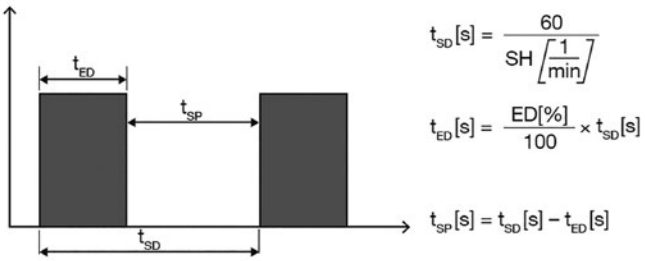
1.4.4 Application conditions

Ambient temperature: max. +55 °C
Permitted medium temperature depending on coil material and seal material:

Coil material	Exposit
Type	5404 NA38
Seal material	PTFE + FKM
Medium temperature	-10...+120 °C



Characteristic values intermittent operation:
t_{SD} - Cycle time
t_{ED} - Duty cycle
t_{SP} - De-energized pause
ED - Relative duty cycle
SH - Switching frequency



Observe for values with UL/UR app:

Medium	Seal designation	Medium temperature	Ambient temperature
Air, inert gas	EF (PTFE + FKM)	-10...+110 °C	-10...+55 °C
Water		0...+100 °C	0...+55 °C
Water (Fire Protection Service Valve, var. Code PE48)		+5...+90 °C	+5...+55 °C
Oxygen (var. Code NL02)	EF (PTFE + FKM)	-10...+60 °C	-10...+55 °C
No. 2 fuel oil		-10...+110 °C	-10...+55 °C

Operating duration: Unless otherwise indicated on the type label, the solenoid system is suitable for continuous operation.

Important information for functional reliability during continuous operation: If standstill for a long period at least 1-2 activations per day are recommended.

Service life: High switching frequency and high pressures reduce the service life.

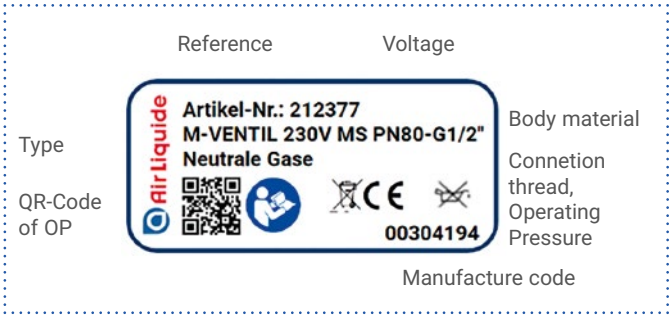
Permitted media depending on seal material:

Seal material	Permitted media
PTFE + FKM	Neutral media such as compressed air, water, hydraulic oil, Oxygen*), hot air, hot oils, oils with additives, Per solutions

*) for special design NL02 only

Note!
If liquid media is used with high differential pressures, water hammer can occur.

1.4.5 Type label



1.5 Installation

WARNING

Danger!

Risk of injury from high pressure and discharge of medium.
- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

WARNING

Warning!

Risk of injury from improper installation.
- Installation may be carried out by authorized technicians only and with the appropriate tools.
- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

1.5.1 Before installation

Installation position: any, actuator preferably upwards.
- Check pipelines for dirt and clean.
- Install a dirt filter before the valve inlet (≤ 500 µm).

1.5.2 Installation

Note!
Caution risk of breakage.
- Do not use the coil as a lever arm.

Hold the device using a suitable tool on the body and screw into the pipeline. Valve body must not be installed under tension. Sealing material must not get into the device.

- bserve direction of flow: The arrow on the body indicates the direction of flow.

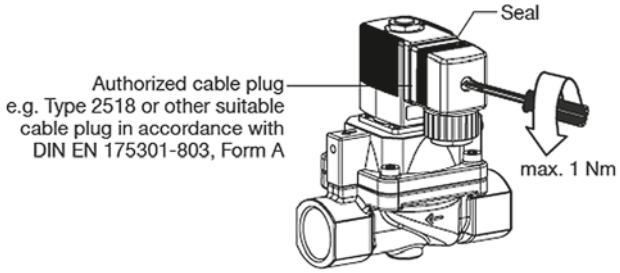
1.5.3 Electrical connection of the cable plug

WARNING

Warning!

Risk of injury due to electrical shock.
- Before reaching into the system, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

If the protective conductor is not connected, there is a risk of electric shock.
- Always connect protective conductor and check electrical continuity between coil and body.



- Tighten cable plug (authorized cable plug see data sheet), observing maximal torque 1 Nm.
- Check that seal is fitted correctly.
- Connect protective conductor and check electrical continuity between coil and body.

1.6 Maintenance, troubleshooting

WARNING

Danger!

Risk of injury from high pressure and discharge of medium.
- Before loosening the lines and valves, turn off the pressure and vent the lines.

WARNING

Warning!

Risk of injury from improper maintenance.
- Maintenance may be carried out by authorized technicians only and with the appropriate tools.
- Secure system from unintentional activation.
- Following maintenance, ensure a controlled restart.

1.6.1 Installation of the coil

WARNING

Warning!

Risk of injury due to electrical shock.
- Before reaching into the system, switch off the power supply and secure to prevent reactivation.

If the protective conductor contact between the coil and body is missing or if coil incorrectly installed, there is danger of electrical shock.
- Check protective conductor contact after installing the coil.
- During installation ensure that the coil is situated firmly on the body cover so that the protective conductor connection of the coil is connected to the valve body.

WARNING

Warning!

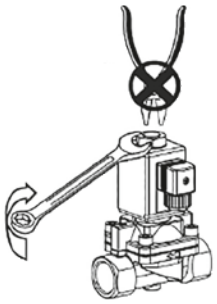
Escaping medium.
When a sticking nut is loosened, medium may escape.
- Do not tighten sticking nut any further.

Overheating, risk of fire.
If the protective conductor contact between the coil and body is missing, there is danger of electrical shock.
- Check protective conductor contact after installing the coil.
  - Connect coil body to the core guide pipe.
  - Screw on coil with nut. Observe the tightening torques in the following table.
  - Check protective conductor.

Note!
Device will be damaged if the wrong tools are used.

If other tools are used (e.g. pliers), the device may be damaged.
- Always use a wrench to tighten nut.

Observe tightening torque for fastening nut (see table)



Type	DN	[Nm]*	Fastening the coil
5404	**12...25**	**4,5...5,5**	**Nut**

*) Tightening torques

1.6.2 Malfunctions

If malfunctions occur, check whether:
- the device has been installed according to the instructions,
- the electrical and fluid connections are correct,
- the device is not damaged,
- all screws have been tightened,
- the voltage and pressure have been switched on,
- the pipelines are clean,
- the power supply is adequately high.

Possible cause if the valve does not switch:
- Short circuit or coil interrupted.
- Inadequate power supply.
- Core or core area dirty.
- Medium pressure outside the permitted pressure range.

Possible cause if the valve does not close:
- Internal space of the valve is dirty.

1.7 Transport, storage, disposal

Note!

Transport damages when inadequately protected devices.
- During transportation protect the device against wet and dirt in shock-resistant packaging.
- Avoid exceeding or dropping below the permitted storage temperature. Incorrect storage may damage the device.
- Store the device in a dry and dust-free location.
- Storage temperature: –40...+80 °C. Damage to the environment caused by device components contaminated with media.
- Dispose of the device and packaging in an environmentally friendly manner.
- Observe applicable regulations on disposal and the environment.

2 Operating instructions

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the device.

Operating instruction contain important information.
- Read the operating instructions carefully and follow the safety instructions in particular.
- Operating instructions must be available to each user.
- The liability and warranty for the device are void if the operating instructions are not followed.

2.1 Definition of terms

In these instructions, the term “device” always refers to the solenoid coil AC10.

In these instructions, the abbreviation “Ex” always refers to “potentially explosive”.

2.2 Basic safety Instructions

These safety instructions do not consider any contingencies or incidents which occur during installation, operation and maintenance. The operator is responsible for observing the location-specific safety regulations, also with reference to the personnel.

Danger – high pressure.
- Before loosening the lines and valves, turn off the pressure and vent the lines. Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

Risk of burns and risk of fire if used during long-term operation through hot device surface. The solenoid coil can get very hot during long-term operation.
- Keep the device away from highly flammable substances and media and do not touch the device with bare hands.

Risk of explosion.
The solenoid coil and valve body form a closed system after installation. When used in potentially explosive atmosphere, there is a risk of explosion if the system is opened in the operating state.
- Do not remove or open the system during operation.

Risk of explosion due to electrostatic discharge. In the event of a sudden discharge from electrostatically charged devices or individuals, there is a risk of an explosion in the potentially explosive atmosphere.
- Take suitable measures to ensure that no electrostatic discharges can build up in the potentially explosive atmosphere.
- Do not use the device in areas where there are powerful chargegeneratingprocesses, mechanical reaming and cutting processes, the spraying of electrons (e.g. in the vicinity of electrostatic coating equipment) as well as pneumatically conveyed dust.
- Clean the device surface by gently wiping it with a damp or antistatic cloth only.

To avoid the risk of explosion, the following must be observed for operation in potentially explosive atmosphere:
- Information on the temperature class, ambient temperature, degree of protection and voltage on the type label for potentially explosive atmosphere.
- Installation, operation and maintenance may only be performed by qualified specialists.
- The applicable safety regulations (including national regulations) as well as general technical standards must be observed during setup and operation.
- Repairs may only be performed by the manufacturer.
- The device must not be exposed to any mechanical and / or thermal loads which exceed the limits specified in the operating instructions.
- Before opening the terminal box, disconnect the power supply.

General hazardous situations.
To prevent injury, ensure:
- Secure system / equipment against unintentional activation.
- Observe the direction of flow during installation.
- After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- Don’t use the device as a lever when screwing the valve into the line.

2.2.1 Warranty

The warranty is only valid if the solenoid coil AC10 is used as intended in accordance with the specified application conditions.

2.3 Product description

2.3.1 Design

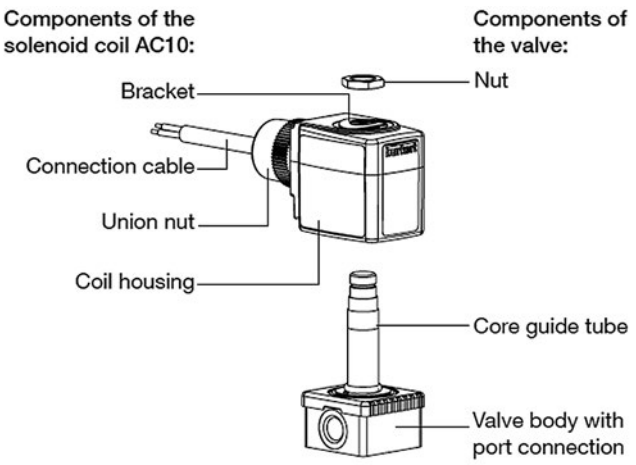


Fig. 1: Solenoid coil Type AC10 with cable outlet

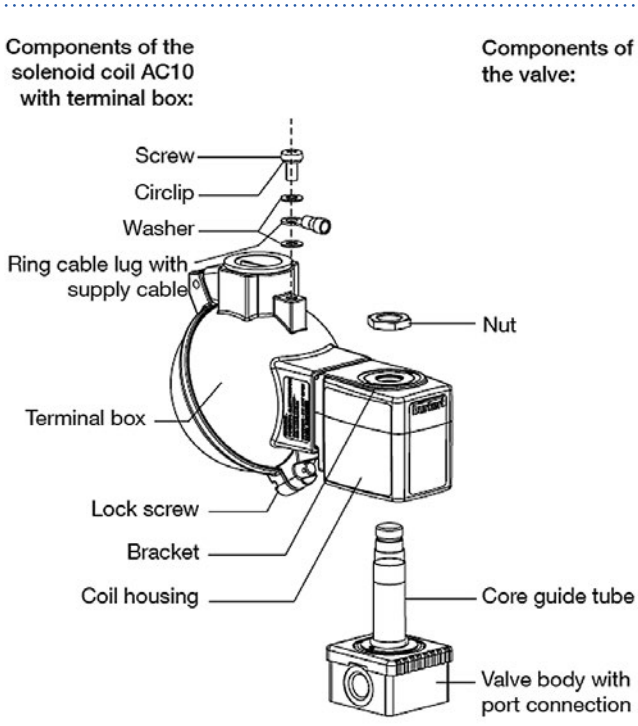


Fig. 2: Solenoid coil Type AC10 with terminal box

2.3.2 Solenoid coil with cable outlet

The solenoid coil type AC10 is an electromagnetic valve actuator for various Bürkert valves. As a so-called top-mounted coil, it is separated 100 % from the valve. The valve is a closed system even if the coil is removed.

The solenoid coil consists of:
- coil winding,
- coil housing (made from epoxy),
- electrical connection cable,
- bridge rectifier.

Alternating current or direct current control is possible. The solenoid coil type AC10 is available in a range of ratings distributed across 2 frame sizes. The interface between the coil and valve is identical for both frame sizes.
The coil is placed over the core guide tube of the valve and attached with a nut. It is positively locked to prevent turning relative to the valve.
The electrical connection cable exits perpendicular to the coil axis. The cable is permanently integrated in the coil. The union nut is not designed to be removed.
An electrical contact is made between the metal components of the valve and the coil at the interface between the coil and the valve. All metal components must be grounded via the protective conductor in the connection cable.

2.3.3 Solenoid coil with terminal box

The design of the solenoid coil is identical to the description under “5.2”, however a terminal box is also installed here (see “Fig. 2”). The terminal box is certified with the Type Examination Certificate PTB 15 ATEX 1011 U or IECEx PTB 15.0037U.
The cable outlet direction can be selected according to the order requirements. The outlet direction can be changed subsequently, however this requires a special tool1). A connection set for additional potential equalisation is enclosed with the terminal box; observe the specifications in chapter “8.2”.

2.4 Application conditions of the devices

2.4.1 Special conditions

2.4.1.1 Avoiding build-up of electrostatic charge

Warning!
Risk of explosion due to electrostatic discharge.

In the event of a sudden discharge from electrostatically charged devices or individuals, there is a risk of an explosion in the potentially explosive atmosphere.
- Take suitable measures to ensure that no electrostatic discharges can build up in the potentially explosive atmosphere.
- Do not use the device in areas where there are powerful charge-generating processes, mechanical reaming and cutting processes, the spraying of electrons (e.g. in the vicinity of electrostatic coating equipment) as well as pneumatically conveyed dust.
- Clean the device surface by gently wiping it with a damp or antistatic cloth only.

2.4.1.2 Block assembly

Valve blocks are preferably made up so that all units have the same coil power consumption. If different coil power consumption values are used in a single valve block, then the technical data for the coil with the highest power rating must be used to determine the temperature class. In this case the ambient temperature must be no higher than +40 °C.

2.4.1.3 Operating conditions

The valve provides a cooling function for the solenoid coil. The solenoid coil may not be operated without a valve. The valve body must meet the following requirements:

- Material Metal (brass, aluminium, stainless steel) or polyamide
- Minimum dimensions 32 mm x 32 mm x 10 mm

A larger valve body with a higher heat-dissipating capability can be used at any time.
The solenoid coils designed for individual installation may not be used for block assembly.
The solenoid coils designed for block assembly are suitable for both block assembly and for individual installation.

2.4.1.4 Operating temperature range

Observe the operating temperature range specified in the electrical data for all types.

2.5 Technical Data

2.5.1 Safety instructions

Danger!

Risk of explosion.
Dangerous situations can result if the technical safety data and values specified on the type label aren't observed or cannot be met.

- The degree of protection and temperature class for use of the device must be observed.

Exceeding the voltage specified on the type label creates a safety hazard since it can lead to overheating of the device!

- Don't connect the device to a higher voltage than that specified on the type label.

2.5.2 Standards and directives

The device complies with the relevant EU harmonisation legislation. In addition, the device also complies with the requirements of the laws of the United Kingdom.
The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity/UK Declaration of Conformity.

2.6 Type label for potentially explosive atmosphere

2.6.1 Identification of the solenoid coil

Solenoid coil AC10 with sample valve and the positions of the type label:

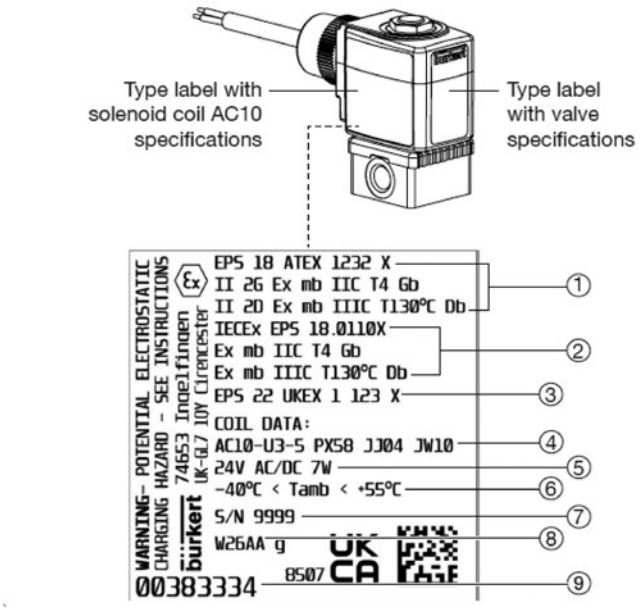


Fig. 3: Location and description of the explosion type labels

Position	Description
1	ATEX, certificate issuer and certificate number, explosion protection labelling
2	IECEx, certificate issuer and certificate number, explosion protection labelling
3	UKEx, certificate issuer and certificate number
4	Type label with Ex-code (last 4 digits)
5	Nominal voltage, nominal power
6	Ambient temperature range
7	Serial number
8	Date of manufacture
9	Identification number

2.6.2 Identification of the terminal box

Note!
Attachment of the terminal box changes the type of protection.

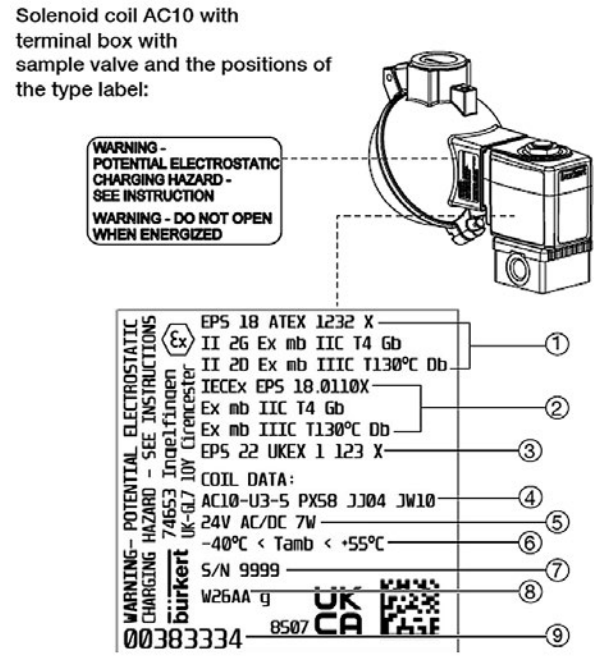


Fig. 4: Location and description of the explosion type labels

Position	Description
1	ATEX, certificate issuer and certificate number, explosion protection labelling
2	IECEx, certificate issuer and certificate number, explosion protection labelling
3	UKEx, certificate issuer and certificate number
4	Type label with Ex-code (last 4 digits)
5	Nominal voltage, nominal power
6	Ambient temperature range
7	Serial number
8	Date of manufacture
9	Identification number

2.7 Installation and removal

WARNING

Danger!

Danger – high pressure.
- Before loosening the lines and valves, turn off the pressure and vent the lines.
- Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

Risk of burns or risk of fire if used during long-term operation through hot device surface.
- Keep the device away from highly flammable substances and media and do not touch the device with bare hands.

Risk of short-circuit due to damaged connection cable.
- The coil connection cable have to be fixed and protected against damage.

Risk of explosion.
The solenoid coil and valve body form a closed system after installation. When used in potentially explosive atmosphere, there is a risk of explosion if the system is opened in the operating state.
- The system must not be disassembled during operation.

Risk of explosion due to electrostatic discharge.
In the event of a sudden discharge from electrostatically charged devices or individuals, there is a risk of an explosion in the potentially explosive atmosphere.
- Take suitable measures to ensure that no electrostatic discharges can build up in the potentially explosive atmosphere.
- Do not use the device in areas where there are powerful charge-generating processes, mechanical reaming and cutting processes, the spraying of electrons (e.g. in the vicinity of electrostatic coating equipment) as well as pneumatically conveyed dust.
- Clean the device surface by gently wiping it with a damp or antistatic cloth only.

WARNING

Warning!

Risk of injury from improper installation.
- Installation may be carried out by authorized technicians only and with the appropriate tools.
- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

2.7.1 Electrical connection

WARNING

Danger!

Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

There is a risk of electric shock if there is no electrical contact between the metal parts of the valve and the protective conductor of the coil.
- Always connect the protective conductor.
- Test for continuity between the protective conductor of the coil and the core guide tube of the valve.

If solenoid coils feature a terminal box, also observe the following:
- Insert permanently installed cables and lines only.
- Use a suitable cable and line entry (see chapter “8”). Observe specifications in the enclosed operating instructions.
- In the terminal box connect only wires which have a rated connection between 0.5 mm2 and 2.5 mm2.
- Tighten terminal screws to 0.25 Nm.
- Lock housing cover properly. Tighten lock screw to 2 Nm.
- Check continuity of the protective conductor connection.
- Before opening the housing cover, disconnect the power supply.
- Temperature resistance of the cable must be min. 15 K above the max. ambient temperature.

Terminal box
- The connection terminals for the external earth connection, which are packed for delivery in a bag and bonded to the housing cover, must be removed during installation of the device.

2.7.2 Solenoid coils with cable outlet

The connection cable is encapsulated with the solenoid coil Type AC10 and cannot be removed. Observe the indicated voltage according to the type label.

Wire color	Pin assignment
green-yellow	**Protective conductor**
black	**Phase / positive pole (+)**
black	**Neutral conductor / negative pole (–)**

2.7.3 Solenoid coils with terminal box

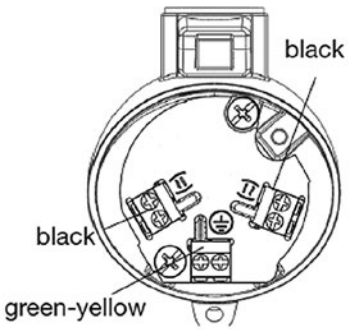


Fig. 5: Terminal Box

Position	Pin assigment of the supply line
⏚	**Protective conductor**
(≃)	**Phase / positive pole (+)**
(≃)	**Neutral conductor / negative pole (–)**

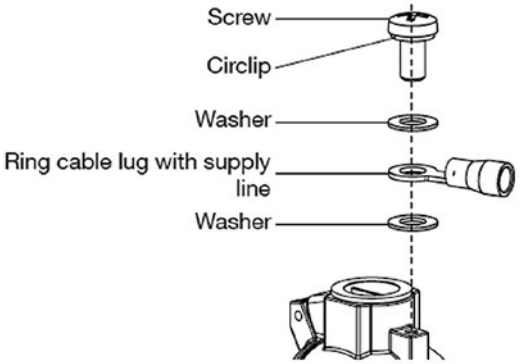


Fig. 6: Connection of external potential equalization

2.7.4 Removal

WARNING

Danger!

Danger – high pressure.
- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock.
- Before reaching into the device, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

Warning!

Risk of injury from improper removal.
- Removal may be carried out by authorized technicians only and with the appropriate tools.

Risk of injury due to media escaping from leaky connections.
- Seal the connection lines carefully.
  - Separate the electrical connections.
  - Separate the valve body from the pipeline.

Note!

Malfunctions due to dirt!
- Remove the old PTFE tape from the connections during reinstalls. Tape residue must not get into the pipeline.

2.7.5 Start-Up

Warning!

Risk of injury from improper operation.
Improper operation may result in injuries as well as damage to the device and the area around it.
- Before start-up, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may start up the equipment or the device.

Before starting up the device, ensure that:
- the device has been installed correctly,
- the connection has been made properly,
- the device is not damaged,
- all screws have been tightened.

2.8 Maintenance, repair, troubleshooting

2.8.1 Maintenance work

The solenoid coil AC10 are maintenance-free when operated under the conditions described in this manual.

2.8.2 Repair

Danger!

Danger due to improper repairs.
The safety and functionality of the AC10 coil and corresponding solenoid valve following a repair are only given if the repair work was performed by the manufacturer.
- Only have the device repaired by the manufacturer!

2.8.3 Troubleshooting

If malfunctions occur, ensure that:
- the device has been installed correctly,
- the connection has been made properly,
- the device is not damaged,
- the voltage and pressure have been switched on,
- the pipelines are free,
- all screws have been tightened.

2.9 Transportation, storage, disposal

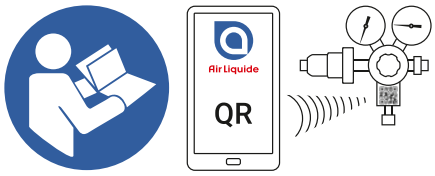
Note!

Transport damages.
Inadequately protected equipment may be damaged during transport.
- During transportation protect the device against wet and dirt in shock-resistant packaging.
- Avoid exceeding and dropping below the allowable storage temperature.
- Incorrect storage may damage the device.

Allowable storage temperature –40...+80 °C.
- Store the device in a dry and dust-free location.

Environmentally friendly disposal

- Follow national regulations regarding disposal and the environment.
- Collect electrical and electronic devices.



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Gebrauchsanleitung / Operating Instructions / Manuel d'utilisation / Istruzioni per l'uso

Contact

Air Liquide Deutschland GmbH
Fütingsweg 34
47805 Krefeld
Tel: +49 (0) 2151 379 - 4555
equipment@airliquide.com
www.airliquide.de

Air Liquide Austria GmbH
Sendnergasse 30
2320 Schwechat
Tel: +43 810 242427
technik.at@airliquide.com
www.airliquide.at

Carbagas AG
Hofgut
3073 Gümligen
Tel: +41 31 95 05050
info@carbagas.ch
www.carbagas.ch

www.airliquide.de

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