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Operating Instructions 2310/02_EU-ML_00815322 / Original EN

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1 OPERATING INSTRUCTION

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 instructions 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.

1.1 Definition of terms

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

1.2 Symbols



DANGER!

Warns of an immediate danger.

- ▶ Failure to observe the warning may result in a fatal or serious injury.



WARNING!

Warns of a potentially dangerous situation.

- ▶ Failure to observe the warning may result in serious injuries or death.



CAUTION!

Warns of a possible danger.

- ▶ Failure to observe this warning may result in a moderate or minor injury.

NOTE!

Warns of damage to property.



Important tips and recommendations.



Refers to information in these operating instructions or in other documentation.

- ▶ designates an instruction to prevent risks.

→ designates a procedure which you must carry out.

2 INTENDED USE

Non-authorized use of the solenoid coil Type AC10 may be a hazard to people, nearby equipment and the environment.

The solenoid coil AC10 is used to activate valves which control the gaseous or liquid media.

- ▶ A valve controlled by the solenoid coil AC10 may be used solely for the media specified in the data sheet and for use in explosion group IIC category 2G and/or explosion group IIIC category 2G, and temperature class T4, T5 or T6 (refer to the specifications on the type label for potentially explosive atmosphere).
- ▶ The solenoid coil may be used only for the applications designated in chapter “6 Specific conditions of use” and in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ The type of protection is encapsulation Ex “m” for coils with cable connection.
- ▶ The type of protection for the optionally mounted terminal box is “e” for gas and “t” for dust.
- ▶ The faultless and reliable operation of the system assumes correct transportation, correct storage and installation as well as careful operation and maintenance. Any other use is regarded as **unauthorized**. Bürkert is not liable for any resulting damage. The user alone bears the risk.
- ▶ Only use the device for its intended purpose.

2.1 Explosion protection approval

The explosion protection approval is only valid if you use the modules and components authorized by Bürkert, as described in these operating instructions.

The solenoid coil AC10 may be used only in combination with the valve types released by Bürkert, otherwise the explosion protection approval will be terminated. If you make non-authorized changes to the system, the modules or components, the explosion protection approval will also be void.

The following UL Listing for solenoid coil AC10

were issued by the:

UL LLC
333 Pfingsten Road
Northbrook
IL 60062-2096 USA

2.2 Applied standards

USL - U.S. Listed investigation to UL 429
and

UL 60079-0	EXPLOSIVE ATMOSPHERES - PART 0: EQUIPMENT - GENERAL REQUIREMENTS	Edition 6 - Revision Date 2017/10/20
UL 60079-7	STANDARD FOR EXPLOSIVE ATMOSPHERES - PART 7: EQUIPMENT PROTECTION BY INCREASED SAFETY "E"	Edition 5 - Revision Date 2017/04/21
UL 60079-18	STANDARD FOR EXPLOSIVE ATMOSPHERES - PART 18: EQUIPMENT PROTECTION BY ENCAPSULATION 'M'	Edition 4 - Revision Date 2018/05/25
UL 60079-31	EXPLOSIVE ATMOSPHERES - PART 31: EQUIPMENT DUST IGNITION PROTECTION BY ENCLOSURE "T"	Edition 2 - Issue Date 2015/06/12

Tab. 1: Applied standards USL

CNL - Canada Listed investigation to CSA C22.2 NO. 139
and

CSA C22.2 NO. 60079-0	EXPLOSIVE ATMOSPHERES -- PART 0: EQUIPMENT -- GENERAL REQUIREMENTS	Edition 3 - Issue Date 2015/10/01
CSA C22.2 NO. 60079-7:16	EXPLOSIVE ATMOSPHERES - PART 7: EQUIPMENT PRO- TECTION BY INCREASED SAFETY "E"	Edition 2 - Issue Date 2016/10/01
CSA C22.2 NO. 60079-18:16	EXPLOSIVE ATMOSPHERES - PART 18: EQUIPMENT PROTECTION BY ENCAPSU- LATION "M"	Edition 2 - Issue Date 2016/08/01
CSA C22.2 NO. 60079-31:15	EXPLOSIVE ATMOSPHERES - PART 31: EQUIPMENT DUST IGNITION PROTECTION BY ENCLOSURE 'T'	Edition 2 - Issue Date 2015/10/01

Tab. 2: Applied standards CNL

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 personnel.



Risk of injury from high pressure.

- ▶ Before working on the system or device, switch off the pressure and vent or drain 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 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.

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.
- ▶ Do not make any internal or external changes on the device and do not subject it to mechanical stress.
- ▶ Installation, operation and maintenance may only be performed by qualified specialists.
- ▶ The valves must be installed in accordance with the regulations applicable in the country.
- ▶ Observe the general rules of technology.

4 GENERAL INFORMATION

4.1 Contact addresses

Germany

Bürkert Fluid Control Systems
Sales Center
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@buerkert.com

International

Contact addresses can be found on the final pages of the printed operating instructions.

And also on the Internet at: www.burkert.com

4.2 Warranty

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

4.3 Information on the internet

Operating instructions and data sheets for Bürkert products are available online at: www.burkert.com

5 PRODUCT DESCRIPTION

5.1 Structure

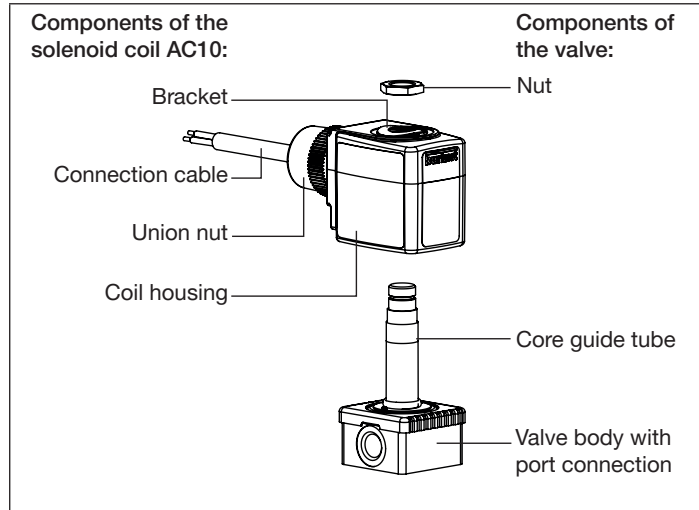


Fig. 1: Solenoid coil Type AC10 with cable outlet

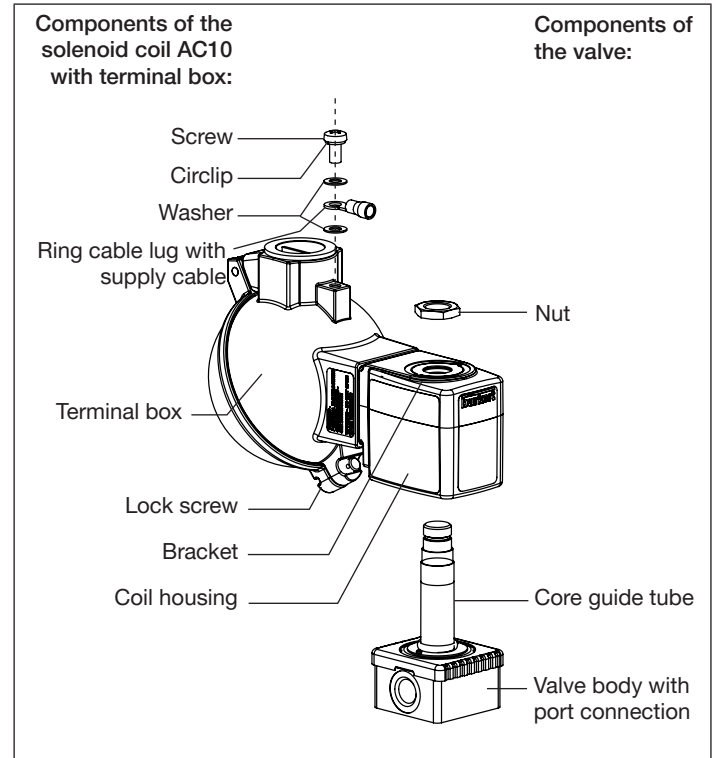


Fig. 2: Solenoid coil Type AC10 with terminal box

5.2 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.

5.3 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”](#)). A connection set for additional potential equalisation is enclosed with the terminal box; observe the specifications in chapter [“8.2”](#).

6 SPECIFIC CONDITIONS OF USE

6.1 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.
- ▶ Fluid housings made of brass must not be used in atmospheres containing acetylene.

6.2 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 (+104 °F).

6.3 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.

6.4 Operating temperature range

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

6.5 Supply connection for solenoid coil with terminal box

For connections, use wires suitable for at least +90 °C (+194 °F).

7 TECHNICAL DATA

7.1 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.

7.2 Identification of the solenoid coil with cable outlet

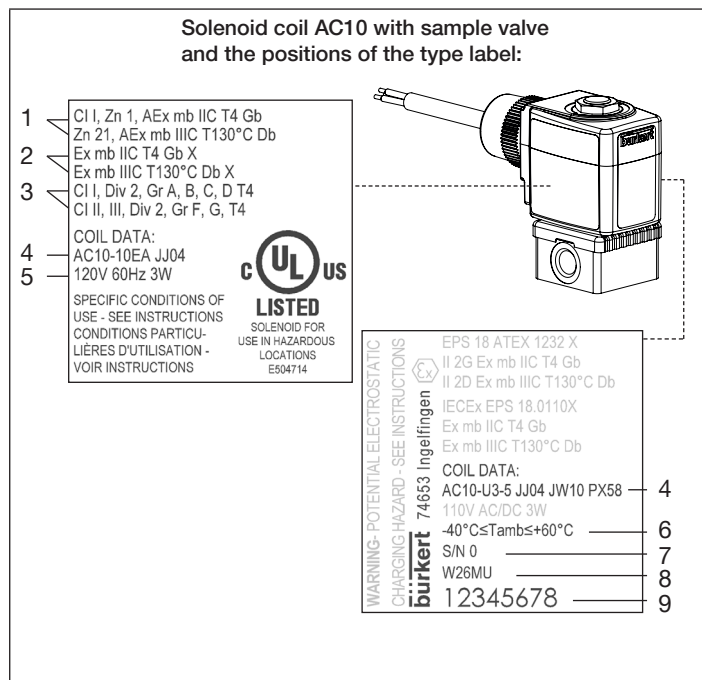


Fig. 3: Location and description of the Ex type labels

Legend:

Position	Description
1	Zone identification US
2	Zone identification CA
3	Division identification
4	Type identificaton
5	Nominal voltage, frequency and power
6	Ambient temperature
7	Serial number
8	Manufacturing location, date
9	ID number

Tab. 3: Identification of the solenoid coil with cable outlet

7.3 Identification of the solenoid coil with terminal box

NOTE!

Attachment of the terminal box changes the type of protection.

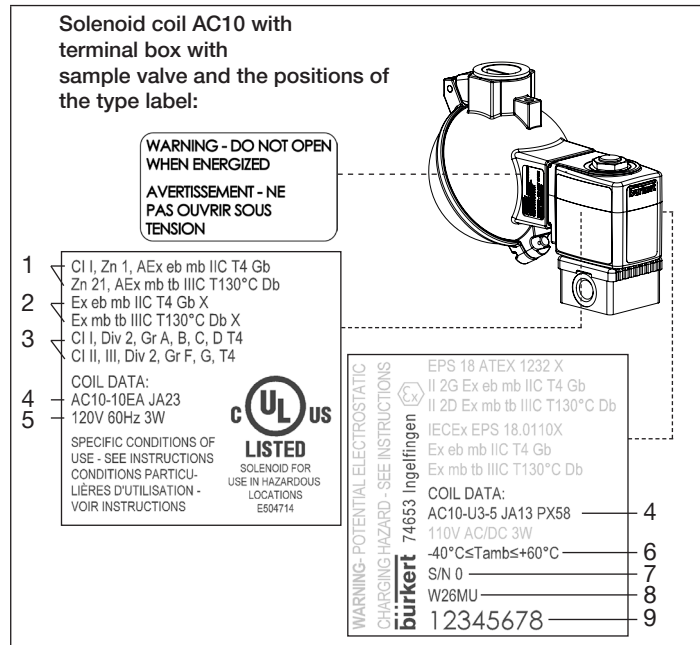


Fig. 4: Location and description of the Ex type labels

Legend:

Position	Description
1	Zone identification US
2	Zone identification CA
3	Division identification
4	Type identification
5	Nominal voltage, frequency and power
6	Ambient temperature
7	Serial number
8	Manufacturing location, date
9	ID number

Tab. 4: Identification of the solenoid coil with terminal box

7.4 Types of protection

The Ex identification complies with the types of protection of the particular components used.

Model	Internal code	Temp. Class	Ex marking	
Cable outlet	JJ04 + JWxx ¹⁾	T4 / T130 °C	CI I, Zn 1, AEx mb IIC T4 Gb Zn 21, AEx mb IIIC T130°C Db	US zone marking
			Ex mb IIC T4 Gb X Ex mb IIIC T130°C Db X	CA zone marking
			CI I, Div 2, Gr A,B,C,D T4 CI II,III, Div 2, Gr F, G T4	US & CA division marking
		T6 / 80 °C	CI I, Zn 1, AEx mb IIC T6 Gb Zn 21, AEx mb IIIC T80°C Db	US zone marking
			Ex mb IIC T6 Gb X Ex mb IIIC T80°C Db X	CA zone marking
			CI I, Div 2, Gr A,B,C,D T6 CI II,III, Div 2, Gr F, G T6	US & CA division marking

Model	Internal code	Temp. Class	Ex marking	
Terminal box	JAxx	T4 / T130 °C	CI I, Zn 1, AEx eb mb IIC T4 Gb Zn 21, AEx mb tb IIIC T130°C Db	US zone marking
			Ex eb mb IIC T4 Gb X Ex mb tb IIIC T130°C Db X	CA zone marking
			CI I, Div 2, Gr A,B,C,D T4 CI II,III, Div 2, Gr F,G T4	US & CA division marking
		T6 / 80 °C	CI I, Zn 1, AEx eb mb IIC T6 Gb Zn 21, AEx mb tb IIIC T80°C Db	US zone marking
			Ex eb mb IIC T6 Gb X Ex mb tb IIIC T80°C Db X	CA zone marking
			CI I, Div 2, Gr A,B,C,D T6 CI II,III, Div 2, Gr F,G T6	US & CA division marking

Tab. 5: Ex identification

¹⁾ Different cable lengths

7.5 Electrical data

Nominal voltage / Frequency	12 V / DC, 60 Hz 24 V / DC, 60 Hz 120 V / 60 Hz 240 V / 60 Hz
Voltage tolerance	±10%
Nominal power	see "Tab. 7" and "Tab. 8"
Ambient temperature range	see "Tab. 7" and "Tab. 8"
Operating mode	Long-term operation Intermittent operation

Tab. 6: Electrical data



Observe the maximum permitted ambient temperature range indicated for each valve type under operating conditions of the valve.



DANGER!

Risk of explosion due to overheating!

- ▶ Do not connect the device to a voltage which is higher than the one stated on the type label.

7.5.1 Coils for single mounting

Code	Overall width [mm]	Ambient temperature range [°C] / [°F]	Nominal power [W]
PX58	32	−40...+55 / −40...+131	7.0
	40	−40...+55 / −40...+131	9.0
PX60	32	−40...+40 / −40...+104	3.0
PX61	40	−40...+55 / −40...+131	1.8
PX62	32	−40...+50 / −40...+122	2.25
PX66	32	−40...+80 / −40...+176	3.0

Tab. 7: Coils for single mounting

7.5.2 Coils for block mounting

Code	Overall width [mm]	Ambient temperature range [°C] / [°F]	Nominal power [W]
PX59	32	−40...+40 / −40...+104	7.0
PX63	32	−40...+40 / −40...+104	2.25

Tab. 8: Coils for block mounting

7.5.3 Electrical connection

Material²⁾: Polyolefin
 Temperature operating range²⁾: –55...+145 °C (–67...+293 °F) for fixed installation
 Minimum bending radius²⁾: 4 x external diameter for fixed installation
 External diameter²⁾: 6.2 mm
 Structure and function: 3 x stranded copper wire 0.5 mm²/LNPE
 Halogen-free according to: IEC 60754-1

Variants	Code	Enclosure type
Permanently installed cable	JJ04 + JWxx ³⁾	This equipment must be mounted in an UL/cUL AEx eb/Ex eb resp. AEx tb/Ex tb enclosure certified for use in Class I, Zone 1 resp. Zone 21.
Terminal box 90° with internal thread M20 x 1.5	JA13	Type 1
Terminal box 90° with internal thread NPT1/2	JA23	Type 1
Terminal box 45° with internal thread M20 x 1.5	JA16	Type 1
Terminal box 45° with internal thread NPT1/2	JA26	Type 1

Tab. 9: Electrical connection

²⁾ Specifications as per the manufacturer

³⁾ Different cable lengths

8 ACCESSORIES

8.1 Cable gland for terminal box



Device must be installed in accordance with Article 505 and 506 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada. Note that the operating temperature of the cable gland must be at least 15 K above the maximum ambient temperature.

8.2 External grounding connection for terminal box

If solenoid coils feature a terminal box, connection terminals are enclosed for the external grounding connection.

If the potential equalization is not to be connected by a pipeline or by the use of a plastic fitting, the connection can be made via the external grounding connection. Its use is therefore optional and must be assessed by the operator.

The connection capacity of the ring cable lug is 4...6 mm² and the tightening torque is 1.2 Nm. The connection is made as shown in "Fig. 6".

9 INSTALLATION AND REMOVAL



DANGER!

Risk of injury from high pressure.

- ▶ Before working on the system or device, switch off the pressure and vent or drain 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.
- ▶ 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.



DANGER!

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!

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.

9.1 Installation



Device must be installed in accordance with Article 505 and 506 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.



Detailed installation instructions can be found in the operating instructions of the respective valve and/or online at: www.burkert.com

9.2 Electrical connection



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.
- ▶ Connect maximum two conductors to each terminal.

External grounding connection for 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.

9.2.1 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	Assignment
green-yellow	Protective conductor
black	Neutral conductor / negative pole (-)
black	Phase / positive pole (+)

Tab. 10: Wire assignment

9.2.2 Solenoid coils with terminal box

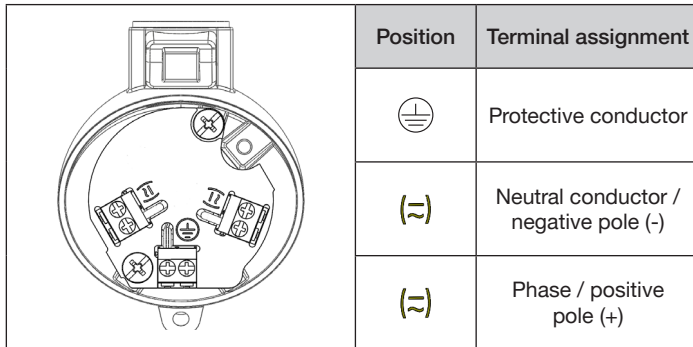


Fig. 5: Terminal box

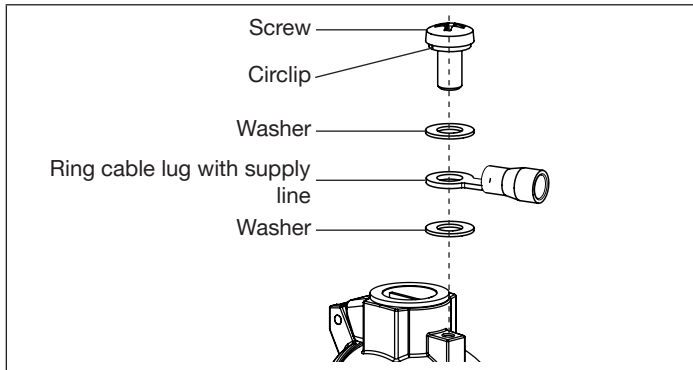


Fig. 6: Connection of external potential equalization

9.3 Removal



DANGER!

Risk of injury from 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 re-installs. Tape residue must not get into the pipeline.

10 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.

11 MAINTENANCE, REPAIR, TROUBLESHOOTING

11.1 Maintenance work

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

11.2 Repair



DANGER!

Danger due to improper maintenance and repair work.

Improper maintenance and repair work may result in injuries as well as damage to the device and its environment.

- ▶ Only trained technicians may perform maintenance work.
- ▶ Perform maintenance work with suitable tools only.
- ▶ Have repair work on the device performed by the manufacturer only.
- ▶ When maintaining or repairing the system, do not open the valve and do not disconnect the protective conductor connection.

11.3 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.

12 TRANSPORT, STORAGE, DISPOSAL

NOTE!

Transport damage.

Inadequately protected devices may be damaged during transportation.

- ▶ Protect the device against moisture and dirt in shock-resistant packaging during transportation.
- ▶ Prevent the temperature from 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 $-40...+80\text{ °C}$ ($-40...+176\text{ °F}$).

Damage to the environment caused by device components contaminated with media.

- ▶ Dispose of the device and packaging in an environmentally friendly manner.
- ▶ Observe applicable disposal and environmental regulations.

www.burkert.com