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INSTRUCTIONS FOR USE AND MAINTENANCE OF EXPLOSION PROOF VALVES ACCORDING TO ATEX DIRECTIVE 2014/34/EU

HL-*-*-KD2-*D-
E*HL-*-*-KD2-*D-

1018544 Rev. 01/2019

These safety instructions are for installation, operation and maintenance of on-off and proportional valves with different functions (directional control, pressure control, control flow, etc...) for environments with potentially explosive atmospheres, manufactured by Continental hydraulics.

On-off versions

HL-*-*-KD2-*D-

Proportional versions

E*HL-*-*-KD2-*D-

All these valves are suitable for use in environments with potentially explosive atmospheres because they meet the essential safety requirements set out in the ATEX Directive 2014/34/EU and are characterized by the following type of protection:

II 2G IIC T4 Gb (-20°C Ta +80°C)

II 2D IIIC T154°C Db IP66/IP68 (-20°C Ta +80°C)

Low temperature versions

II 2G IIC T4 Gb (-40°C Ta +80°C)

II 2D IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)

1 GENERAL RULES

Before installation read this file and the documentation supplied with the device. The user must carefully follow what is indicated in this file and in the documentation supplied with the device.

For assembly use only materials fit for purpose, as recommended by the manufacturer. Duplomatic MS disclaims any liability for damage to person or property resulting from noncompliance of rules and instructions here declared, from misuse or incorrect use or from tampering of provided devices.

2 PRELIMINARY CHECKS - FEATURES

All operations (e.g. transport, storage, assembly, wiring, commissioning, maintenance and repair), must be carried out in total absence of potentially explosive atmosphere and only by qualified personnel. The assembly operations and maintenance must be performed in the absence of pressure and tension according to the attached technical tables.

2.1 SUITABILITY

Before use in areas with explosion hazard, you must verify and ensure that all technical data and the mark of conformity to the ATEX Directive on the equipment are identical to the plant design and/or machine and in particular, that the equipment is suitable for the classification of the area and flammable substances present in the system.

The essential requirements for safety against risks of explosion in classified areas are established by the European Directive:

- 2014/34/EU - equipment
- 99/92/EC - plants
- EN 60079-14 - technical requirements of electrical equipment in classified areas
- EN 60079-10 - criteria to classify the areas against risks of explosion

The user must employ suitable oil for the plant and compatible with seals selected. It must be considered that the oil should withstand high temperatures without degrading and especially it must remain stable up to temperatures of 50° C higher than the operating temperature of the plant (Safety Factor).

2.2 MARKING RELATED TO SAFETY

2.2.1 VALVE MARKING

The plate on the valve identifies the marking valid for the whole equipment.

MARKING FOR GAS, VAPOR, MISTS  II 2G IIC T4 Gb

	Mark of Conformity to the 2014/34/EU Directive and to the technical norms
II	Equipment for surface plants
2	Category 2 high protection, suitable for zone 1 (eligible for category 3 zone 2)
G	Type of atmosphere with gases, vapours, mists
IIC	Gas group (therefore also eligible for group IIA and IIB)
T4	Temperature class (max surface temperature)
Gb	EPL protection level for electrical devices
-20°C Ta +80°C	Ambient temperature range for valves with both A and G seals
-40°C Ta +80°C	Ambient temperature range for valves with AL seals

MARKING FOR DUSTS  II 2D IIIC T154°C Db IP66/IP68

	Mark of Conformity to the 2014/34/EU Directive and to the technical norms
II	Equipment for surface plants
2	Category 2 high protection, suitable for zone 21 (eligible for category 3 zone 22)
D	Type of atmosphere with dusts
IIIC	Dusts group (therefore also eligible for group IIIA and IIIB)
T154°C	Temperature class (max surface temperature)
Db	EPL protection level for electrical devices
IP66/IP68	Protection degree from atmospheric agents according to IEC EN 60529
-20°C Ta +80°C	Ambient temperature range for valves with both A and G seals
-40°C Ta +80°C	Ambient temperature range for valves with AL seals

2.2.2 COILS MARKING

Equipped coils are separately certified, they have their own plate with marking; therefore, they are suitable for use in environments with potentially explosive atmospheres.

MARKING FOR GAS, VAPOR, MISTS  II 2G Ex db IIC T4 Gb (-40°C Ta +80°C)

	Mark of Conformity to the 2014/34/EU Directive and to the technical norms
II	Equipment for surface plants
2	Category 2 high protection, suitable for zone 1 (eligible for category 3 zone 2)
G	Type of atmosphere with gases, vapours, mists
Ex db	"db" protection type, explosion-proof case
IIC	Gas group (therefore also eligible for group IIA and IIB)
T4	Temperature class (max surface temperature)
Gb	EPL protection level for electrical devices
-40°C Ta +80°C	Ambient temperature range

MARKING FOR DUSTS  II 2D Ex tb IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)

	Mark of Conformity to the 2014/34/EU Directive and to the technical norms
II	Equipment for surface plants
2	Category 2 high protection, suitable for zone 21 (eligible for category 3 zone 22)
D	Type of atmosphere with dusts
Ex tb	'tb' protection type
IIIC	Gas group (therefore also eligible for group IIIA and IIIB)
T154°C	Temperature class (max surface temperature)
Db	EPL protection level for electrical devices
IP66/IP68	Protection degree from atmospheric agents according to IEC EN 60529
-40°C Ta +80°C	Ambient temperature range

2.3 OPERATING TEMPERATURES AND OTHER LIMITS

The valves are manufactured with different types of seals, depending on the fluid type and ambient temperature they must withstand. Check the letter in the product identification code engraved on the plate of the valve.

For ambient temperatures between -20°C to +80°C (-4°F to +176°F) with mineral oils use valves with NBR seals (code A); with special fluids use valves with Viton seals (code G). Fluids temperature must be between -20°C and +80°C (-4°F to +176°F).

For ambient temperatures between -40°C and +80°C (-40°F to +176°F) with mineral oils use valves with seals with AL code. Fluids temperature must be between -40°C and +80°C (-40°F to +176°F).

For all other operating limits related to the operation of the valves, refer to the attached technical tables.

2.3.1 Important notes:

- Valves in T4 class temperature (T154°C) are suitable also for use in higher temperature classes T3, T2, T1 for gases and T 200°C for dusts.
- Valves in IIC gases group are suitable also for environments with gases, vapours and mists in IIA e IIB groups.
- Valves in IIIC dusts group are suitable also for environments with IIIA e IIIB groups.

2.4 POWER SUPPLY CHARACTERISTICS

Refer to the information in the attached technical tables and strictly adhere to them.

3 INSTALLATION

3.1 INSTALLATION OF VALVES AND HYDRAULIC CONNECTIONS

The valve installation on the machinery/plant is a user responsibility and must be done abiding by the valve technical table and the technical reference standards.

All installation tasks must be performed without oil pressure in the pipelines and in the valve, and with no supply voltage at the electrical connections.
Make sure that all the fixing screws of the valve have been tightened according to the requirements listed in the technical specifications of the component (screws are not included in delivery) and that the hydraulic connections are tight before the system is pressurized (seals for mounting surface are included in delivery).
Vent the air in the system before commissioning.

Avoid direct sunlight.

3.1.1 PAINTING

Any painting operations are not recommended.

If necessary, painting must be done according to EN 13463-1, to avoid increases in thickness over the permitted (the dry film thickness reachable for devices in the IIG group must not be greater than 2 mm if

working in environments with the presence of gas and vapours of groups IIA and IIB; the thickness must not be greater than 0.2 mm if in the presence of gas and vapours of group IIC; there is no limit to the devices of the group IID).

The paint dry film must have a flash point that is at least 25 °C (safety factor) higher to the maximum surface temperature reached by the device during operation.

3.2 WIRING AND EARTH CONNECTIONS

The electrical wiring and grounding connections are not charged to Duplomatic MS. It is recommended to the user to make the wiring as reported by the standard EN 60079-14 and according to the specific National rules.

Duplomatic MS can provide the suitable cable glands upon request.

3.2.1 WIRING INSTRUCTIONS

Access the terminal block (1) unscrewing the 4 screws (2) that fasten the cover (3) with the box (4) that contain the terminal block.

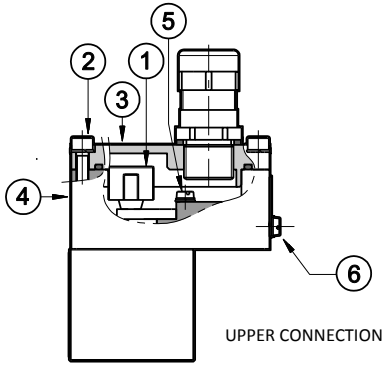
The electrical connection is polarity-independent.

By doing electrical connection it is important to connect also the grounding point (5) in the terminal block box (M4 screws), through suitable conductors with the general grounding line of the system.

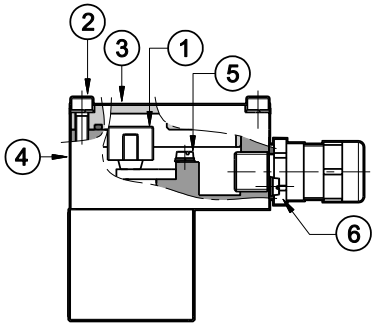
On the external body of the coil there is a grounding point (6) (M4 screw) that allow to ensure equipotentiality between the valve and the general grounding line of the system; connecting this point the observance of the EN 13463-1 standard is guaranteed: this standard imposes to verify the equipotentiality of the elements included in a potentially explosive environment (the maximum resistance between the elements must be 100 Ω).

At the end of the electrical wiring, it is necessary to reassemble the cover (3) on the box (4), checking the correct positioning of the seal located in the cover seat and fastening the 4 M5 screws with a torque of 4.9 ÷ 6 Nm.

Cable glands must be installed and removed only with no supply voltage.



UPPER CONNECTION



SIDE CONNECTION

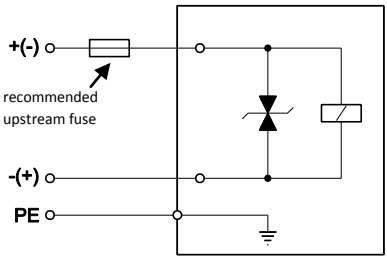
CABLE SPECS

Function	Cable section
Operating voltage cables connection	max 2.5 mm²
Connection for internal grounding point	max 2.5 mm²
Connection for external equipotential grounding point	max 6 mm²

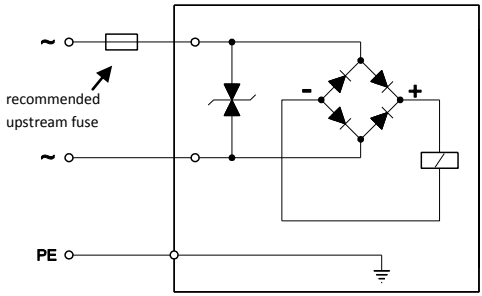
Cables for wiring must be non-armoured cables, with external covering sheath and must be suitable for use in environments with temperatures from -20 °C to +110 °C (-4°F to +230°F) (for valves either with A or G seals) or from -40 °C to +110°C (-40°F to +230°F) (for valves with AL seals).

3.3 ELECTRICAL DIAGRAMS

ON-OFF AND PROPORTIONAL DC VALVES



RAC ON-OFF VALVES



OVERCURRENT FUSE AND SWITCH-OFF VOLTAGE PEAK

Upstream of each valve, an appropriate fuse (max 3 x In according to IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping, as short-circuit protection, must be connected.

The cut-off power of the fuse must correspond or exceed the short circuit current of the supply source. The fuse or the protective motor must be placed outside the dangerous area or they must be protected with an explosion-proof covering.

In order to safeguard the electronic device connected to the valve, there is a protection circuit in the coil that reduces voltage peaks, which can occur when inductances are switched off.

The table shows the type of fuse recommended according to the nominal voltage of the valve and to the value of the voltage peaks reduction.

On-off valves

Coil type	Nominal voltage [V]	Rated current [A]	**Recommended pre-fuse characteristics medium time-lag according to DIN 41571 [A]**	Maximum voltage value upon switch off	Suppressor circuit
D12	12	1,7	**2,5**	- 49	Transient voltage suppressor
D24	24	0,83	**1,25**	- 49	
D48	48	0,42	**0,6**	- 81	
D110	110	0,2	**0,3**	- 309	
R120	120	0,21	**0,3**	- 3	
R240	240	0,1	**0,15**	- 3	

Proportional valves

Coil type	Nominal voltage [V]	Rated current [A]	**Recommended pre-fuse characteristics medium time-lag according to DIN 41571 [A]**	Maximum voltage value upon switch off	Suppressor circuit
D12	12	1,88	**2,5**	- 49	Transient voltage suppressor
D24	24	0,86	**1,25**	- 49	

4 CHECK AND MAINTENANCE

All inspections and maintenance of the valves should be made according to the criteria below:

- EN 60079-17 Explosive atmospheres - Part 17: Electrical installations inspection and maintenance
- EN 60079-31 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
- EN 1127-1 Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
- EN 13463-1 Non-electrical equipment for use in potentially explosive atmospheres - Part 1: Basic method and requirements

Usually, the valves are maintenance free.

However, it is recommended to do the following periodic inspections:

- Check for leakages/oil leakages.
  If so, remove the valve from the machinery/system and contact the manufacturer service.
- In environments with explosive dusts, check that they have not deposited on the valve in ineligible amount (> 5 mm) - EN 1127-1.
  If so, remove the layer of dust with a damp cloth.

- Make sure the fastening screws/bolts of the mounting surface that secure the valve to the machinery/system are well tight.
  If not, tighten screws and bolts with the required torque, as shown in the technical table or from current standards.
- Check the grounding and the power cables for damages.
  Replace immediately the damaged cables.
- Check the filter cleaning system and replace them if necessary.
- Check oil level and temperature in the system.

All maintenances listed after a check must be performed in absence of explosive atmosphere and with stopped system.

4.1 REMOVAL

If it becomes necessary to remove the valve from the plant / machinery, the operation should be done by qualified personnel. **Do not dismantle the valve and do not remove the coils from it.**

5 ADJUSTMENTS

Any adjustments that become necessary during operation must be done using only non-sparking tools (wrenches/spanners, screwdrivers, etc.). Where possible, it would be preferable to perform these adjusting actions with machine stopped and in absence of explosive atmosphere.

6 REPAIR

In case of malfunction, fault or damage, the user has to remove the valve and send the whole valve with all its parts to the manufacturer, who will repair or replace it.

Any non-authorized intervention, in addition to being extremely dangerous to health and safety, leads to immediate decay of the warranty.

Manufacturer

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7 STORAGE

The valve must be stored in a dry place, free from corrosive substances and vapours and at a temperature between -20°C to +80°C (-4°F to +176°F).

If storage exceeds 12 months, we recommend an overhaul of the valve before use it.

8 ANNEXES

Specific technical tables of the purchased valve.

The technical tables can also be downloaded at https://www.continentalhydraulics.com