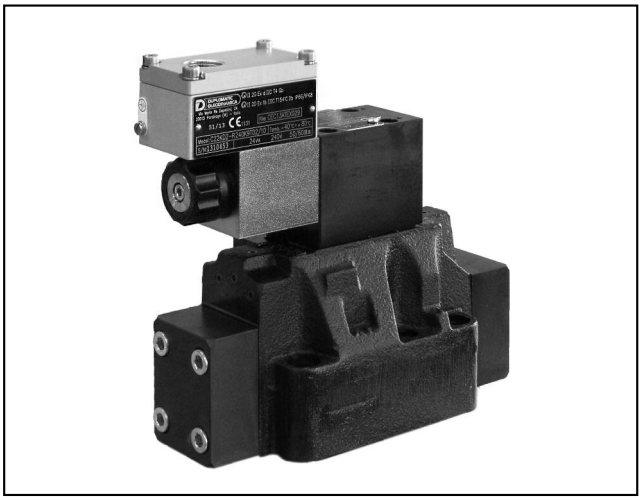


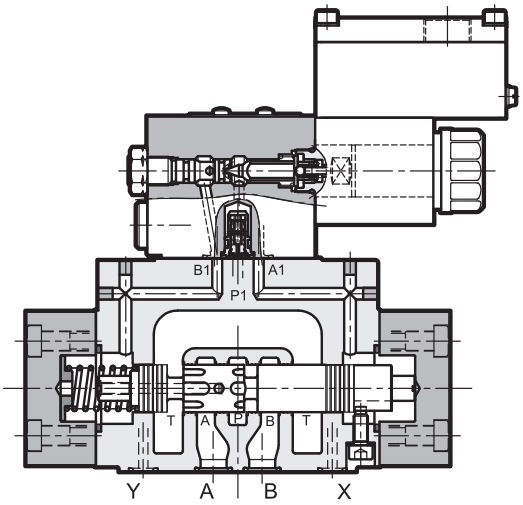
DZCE*KD2

EXPLOSION-PROOF PRESSURE REDUCING VALVE WITH PROPORTIONAL CONTROL in compliance with ATEX 94/9/EC

SERIES 11

DZCE5KD2 **CETOP P05**
DZCE5RKD2 **ISO 4401-05** (CETOP R05)
DZCE7KD2 **ISO 4401-07** (CETOP 07)
DZCE8KD2 **ISO 4401-08** (CETOP 08)

OPERATING PRINCIPLE



TYPE EXAMINATION CERTIFICATE No: CEC 13 ATEX 030-REV.1

— The DZCE*KD2 are explosion-proof pressure reducing valves, pilot operated, with proportional control in compliance with ATEX 94/9/EC standards. They are suitable for use in potentially explosive atmospheres, that fall within the ATEX II 2GD either for gas or for dust classification. See at par. 7 for ATEX classification, operating temperatures and electrical characteristics.

— The pressure can be modulated continuously in proportion to the current supplied to the solenoid.

— They can be controlled directly by a current control supply unit or by means of an electronic card to exploit valve performance to the full (see par. 15).

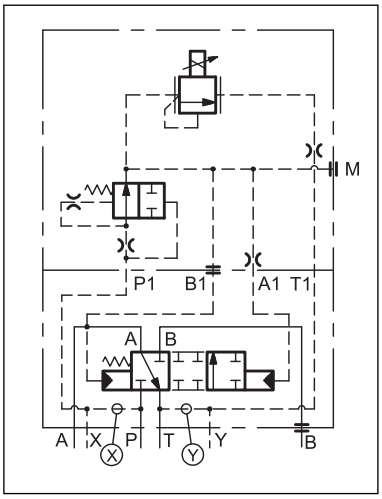
— They are available with CETOP P05, ISO 4401-05 (CETOP R05), ISO 4401-07 (CETOP 07) and ISO 4401-08 (CETOP 08) mounting surfaces.

— The statement of conformity to the up mentioned standards is always supplied with the valve.

— Upon request, DZCE*KD2 valves can be supplied with a finishing surface treatment (zinc-nickel) suitable to ensure a salt spray resistance up to 600 h (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control cards)		**DZCE5KD2 DZCE5RKD2**	**DZCE7KD2**	**DZCE8KD2**
Maximum operating pressure	bar	350		
Maximum flow	l/min	150	300	500
Step response		see paragraph 4		
Hysteresis (with PWM 200 Hz)	% of p_{max}	< 4%		
Repeatability	% of p_{max}	< ±2%		
Electrical characteristic		see paragraph 7.5		
Ambient temperature range	°C	-20 / +80 (NBR and FPM) -40 / +80 (NL)		
Fluid temperature range	°C	-20 / +80 (NBR and FPM) -40 / +80 (NL)		
Fluid viscosity range	cSt	10 ÷ 400		
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13			
Recommended viscosity	cSt	25		
Mass	kg	7,3	9,5	15,6

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

D	Z	C	E		KD2	-		/	10		-			/		K9			

Pressure reducing valve

Electric proportional control

Nominal size:
5 = CETOP P05
5R = ISO 4401-05 (CETOP R05)
7 = ISO 4401-07 (CETOP 07)
8 = ISO 4401-08 (CETOP 08)

Explosion-proof version, according to ATEX - II 2GD for gas or for dust (protection type of the coil: “d”)

Pressure control range
070 = 1 ÷ 70 bar
140 = 1 ÷ 140 bar
210 = 1 ÷ 210 bar
300 = 1 ÷ 300 bar

Series N. (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
For temperature range -20 / +80 °C
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids
For temperature range -40 / +80 °C
NL = seal for low temperatures (for mineral oil)

NOTE: the valve is supplied with standard surface treatment of phosphating black. Upon request we can supply these valves with zinc-nickel surface treatment.
For this option add the suffix **/W7** at the end of the identification code.

Piloting: **I** = internal
E = external

Drainage: **I** = internal
E = external

Nominal solenoid voltage:
D12 = 12V DC
D24 = 24V DC

Coil electrical connection:
electrical connection by terminal block

Connection type for cable gland
for upper connection:
T01 = M20x1.5 - ISO 261
T02 = Gk 1/2 - UNI EN 10226-2
T03 = 1/2” NPT - ANSI B1.20.1 (ex ANSI B2.1)
for side connection:
S04 = M16x1.5 - ISO 261 (only for D24 coils)
S01 = M20x1.5 - ISO 261 (available upon request only)

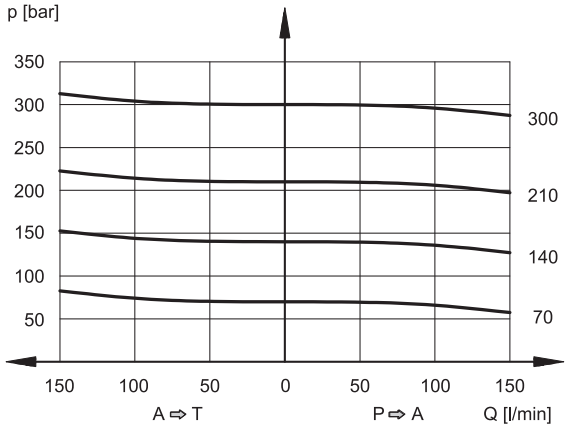
Option: **/T5**
version in T5 temperature class.
See at par. 7.4
Omit if not required.

Option: surface treatment not standard.
Omit if not required
(see **NOTE**)

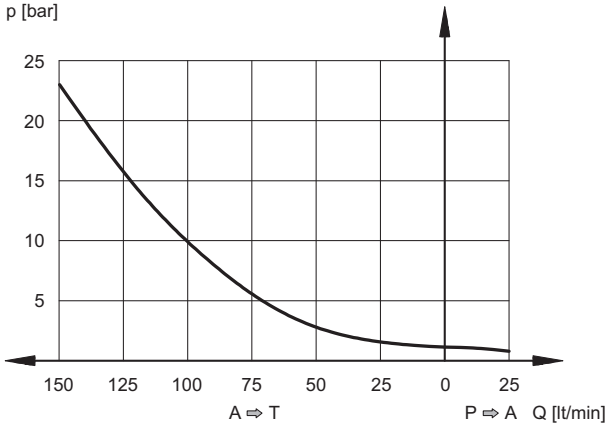
2 - CHARACTERISTIC CURVES
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control cards)

2.1 - Characteristic curves DZCE5KD2 and DZCE5RKD2

ADJUSTMENT

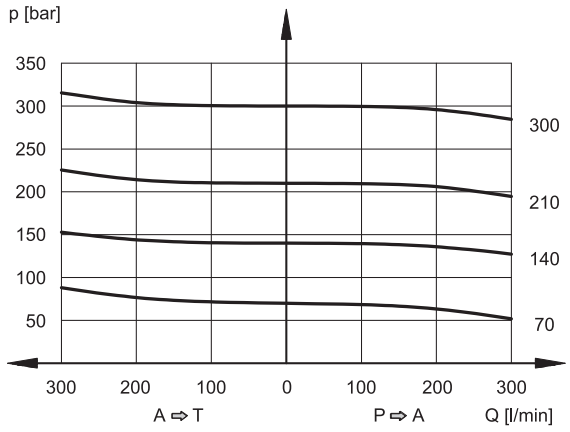


MIN. CONTROLLED PRESSURE p min = f(Q)

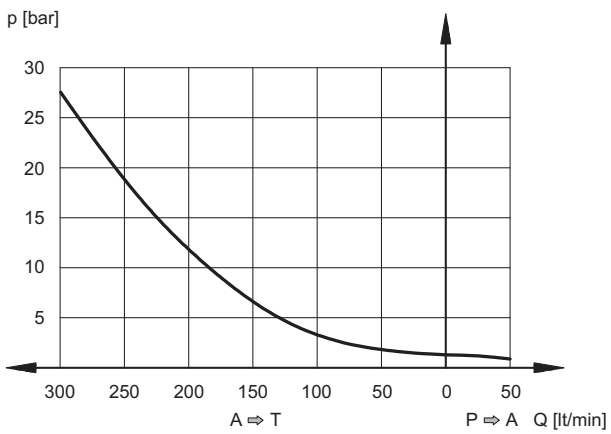


2.2 - Characteristic curves DZCE7KD2

ADJUSTMENT

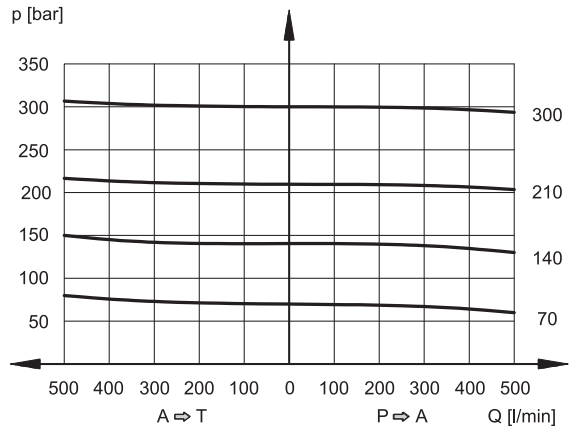


MIN. CONTROLLED PRESSURE p min = f(Q)

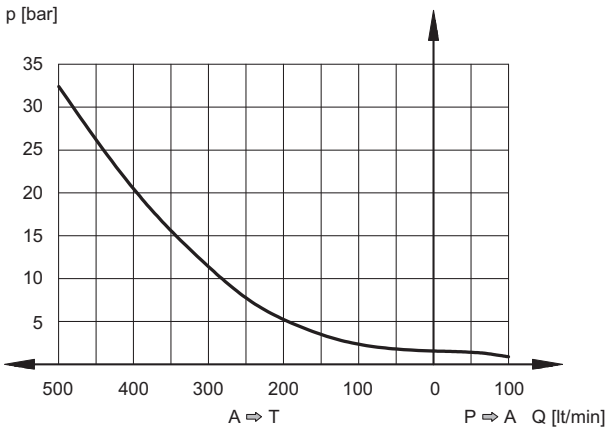


2.3 - Characteristic curves DZCE8KD2

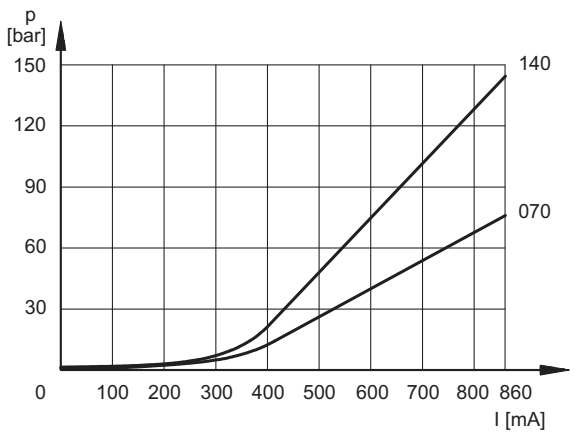
ADJUSTMENT

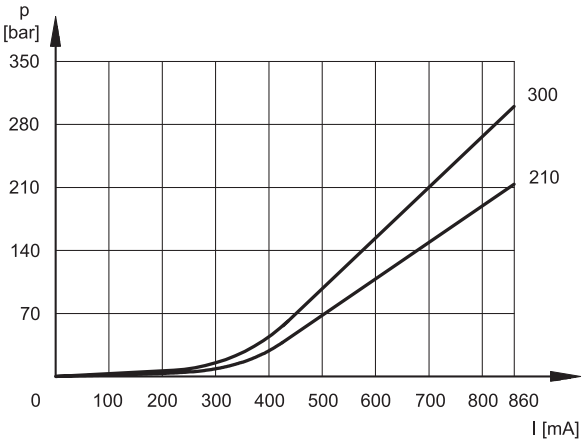


MIN. CONTROLLED PRESSURE p min = f(Q)



2.4 - Pressure control p = f(I) DZCE5KD2, DZCE5RKD2, DZCE7KD2 and DZCE8KD2





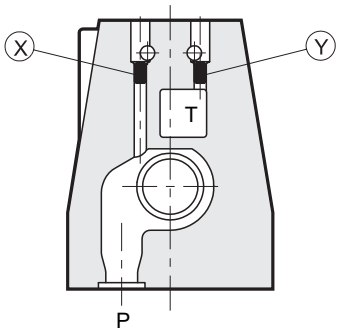
3 - PILOTING AND DRAINAGE

The DZCE*KD2 valves are available with piloting and drainage, both internal and external.
We suggest to use the version with external drainage that allows a higher backpressure on the unloading.

TYPE OF VALVE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

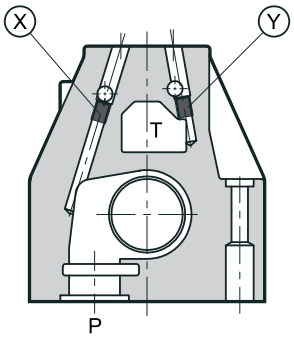
PRESSURES [bar]	MIN	MAX
Piloting pressure on X port	30	350
Pressure in T port with internal drain	-	2
Pressure in T port with external drain	-	250

DZCE5KD2 and DZCE5RKD2



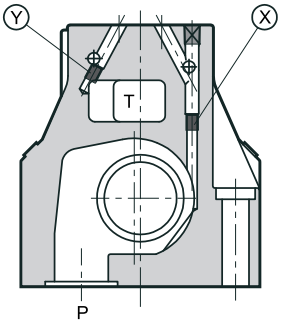
X: M5x6 plug for external pilot
Y: M5x6 plug for external drain

DZCE7KD2



X: M6x8 plug for external pilot
Y: M6x8 plug for external drain

DZCE8KD2



X: M6x8 plug for external pilot
Y: M6x8 plug for external drain

4 - STEP RESPONSE

(measured with mineral oil with viscosity of 36 cSt at 50°C with the relative electronic control units)

Step response is the time taken for the valve to reach 90% of the set pressure value following a step change of reference signal.

REFERENCE SIGNAL STEP	0 →100%	100→0%
Response times [ms]		
DZCE5KD2 and DZCE5RKD2	100	70
DZCE7KD2	100	50
DZCE8KD2	100	50

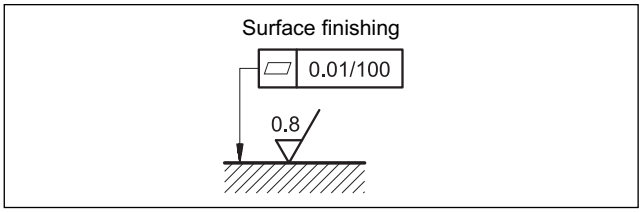
5 - INSTALLATION

We recommend to install the DZCE*KD2 valve either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated in paragraph 2.

Ensure that there is no air in the hydraulic circuit. In particulars applications,it can be necessary to vent the air entrapped in the solenoid tube, using the special drain screw and then ensure to screwed it correctly.

Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the controlled pressure value. Maximum admissible backpressure in the T line, under operational conditions, is 2 bar.

Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



6 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

The fluid must be preserved in its physical and chemical characteristics.

7 - ATEX CLASSIFICATION, OPERATING TEMPERATURES AND ELECTRICAL CHARACTERISTICS

For valves suitable for application and installation in potentially explosive atmospheres, according to ATEX directive prescriptions, Duplomatic certificates the combination valve-coil; **the supply always includes the declaration of conformity to the directive and the operating and maintenance manual, that contains all the information needed for a correct use of the valve in potentially explosive environments**.

Coils assembled on these valves have been separately certified according to ATEX directive and so they are suitable for use in potentially explosive atmospheres.

7.1 - Valve ATEX classification

The valves can be used for applications and installations in potentially explosive atmospheres that fall within either the ATEX II 2G or the ATEX II 2D classification, with the follow marking:

MARKING FOR GASES, VAPOURS, MISTS

for N and V seals:

II 2G IIC T4 Gb (-20°C Ta +80°C)

fori NL seals:

II 2G IIC T4 Gb (-40°C Ta +80°C)

EX Specific marking of explosion protection as ATEX 94/9/EC directive and related technical specification requests.

II: Group II for surface plants

2: Category 2 high protection, eligible for zone 1 (therefore also 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 N and V seals

-40°C Ta +80°C: Ambient temperature range for valves with NL seals

MARKING FOR DUSTS

for N and V seals:

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

for NL seals:

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

EX Specific marking of explosion protection as ATEX 94/9/EC directive and related technical specification requests.

II: Group II for surface plants

2: Category 2 high protection, eligible for zone 21 (therefore also 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 N and V seals

-40°C Ta +80°C: Ambient temperature range for valves with NL seals

7.2 - Coils ATEX classification

The coil of the explosion-proof valves is identified with its own tag, which carries the relative ATEX marking. **The mechanical construction of the coil housing is made in order to ensure its resistance to possible internal explosion and to avoid any explosion propagation to the outside environment, matching an "Ex d" type protection (explosion-proof coil).**

Moreover, the solenoid is designed to maintain its surface temperature below the limits specified to the relevant class.

Here below you find the coils marking:

MARKING FOR GASES, VAPOURS, MISTS

II 2G Ex d IIC T4 Gb (-40°C Ta +80°C)

EX: Specific marking of explosion protection as ATEX 94/9/EC directive and related technical specification requests.

II: Group II for surface plants

2: Category 2 high protection, eligible for zone 1 (therefore also eligible for category 3 zone 2)

G: Type of atmosphere with gases, vapours, mists

Ex d: "d" 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)

EX Specific marking of explosion protection as ATEX 94/9/EC directive and related technical specification requests.

II: Group II for surface plants

2: Category 2 high protection, eligible for zone 21 (therefore also eligible for category 3 zone 22)

D: Type of atmosphere with dusts

Ex tb: 'tb' protection type

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

-40°C Ta +80°C: Ambient temperature range

7.3 - Operating temperatures

The operating ambient temperature must be between -20 / +80 °C, for valves with both N and V seals and -40 / +80 °C, for valves with NL seals.

The fluid temperature must be between -20 / +80 °C, for valves with both N and V seals and -40 / +80 °C, for valves with NL seals.

The valves are classified in T4 temperature class (T154 °C), therefore they are eligible for operation also at higher class temperature (T3, T2, T1 for gas and T200 °C for dust).

7.4 - /T5 Option: Version for T5 temperature class

The valves classified for T5 temperature class are suitable for operation in potentially explosive atmospheres with ambient temperatures between -20 / +55 °C, for both valves with N and V seals and -40 / +55 °C, for valves with NL seals.

The fluid temperature must be between -20 / +60 °C, for both valves with N and V seals and -40 / +55 °C, for valves with NL seals.

The valves are classified in T5 temperature class (T129 °C), therefore they are eligible for operation also at higher class temperature (T4, T3, T2, T1 for gas and T135 °C for dusts).

The marking for T5 class temperature versions are:

VALVES MARKING FOR GASES, VAPOURS, MISTS

for N and V seals:

Ⓔx II 2G IIC T5 Gb (-20°C Ta +55°C)

for NL seals:

Ⓔx II 2G IIC T5 Gb (-40°C Ta +55°C)

VALVES MARKING FOR DUSTS

for N and V seals:

Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-20°C Ta +55°C)

for NL seals:

Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)

COIL MARKING FOR GASES, VAPOURS, MISTS

Ⓔx II 2G Ex d IIC T5 Gb (-40°C Ta +55°C)

COIL MARKING FOR DUSTS

Ⓔx II 2D Ex tb IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)

7.5 - Electrical characteristics (values ± 5%)

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (AT 20°C)	Ω	3,4	15,6
NOMINAL CURRENT	A	1,88	0,86

DUTY CYCLE	100%
EXPLOSION-PROOF VERSION	According to ATEX 94/9/CE
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2004/108/CE
CLASS OF PROTECTION: Atmospheric agents Coil insulation (VDE 0580)	 IP66 / IP68 class H

8 - ELECTRICAL CONNECTION

8.1 - Wiring

In order to realise the electrical connection of the coil, it is necessary to access the terminal block (1) unscrewing the 4 screws (2) that fasten the cover (3) with the box (4) that contains the terminal block.

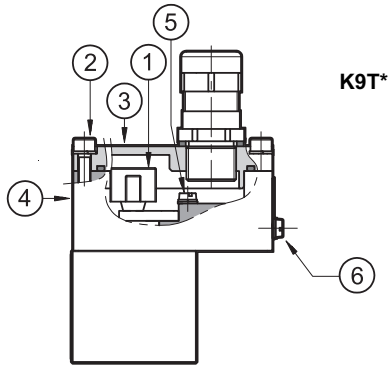
The electrical connection is polarity-independent.

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.

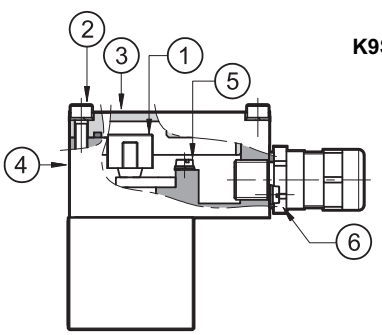
On the external body of the coil there is a grounding point (6) (M4 screw) that allow to ensure equipotentiality between the valve and the general grounding line of the system; connecting this point the regulation of the EN 13463-1 standard, that impose to verify the equipotentiality of the elements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

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.

Electrical wiring must be done following the instructions of the rules in compliance with ATEX standards.



K9T* connection



K9S* connection

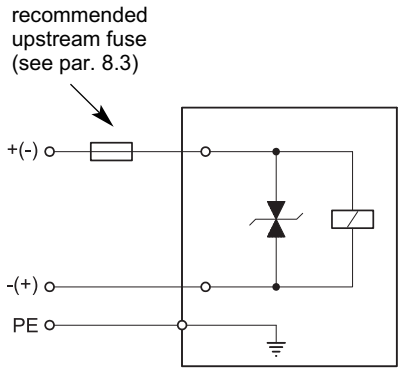
Characteristics of the cables connectable for wiring are indicated in the table below:

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 (for valves either with N or V seals) or from - 40 °C to +110 °C (for valves with NL seals).

Cable glands (which must be ordered separately, see paragraph 14) allow to use cables with external diameter between 8 and 10 mm.

8.2 - Electrical diagram



8.3 - 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 to which the valve is connected, there is a protection circuit in the coil, that reduces voltage peaks, which can occur when inductances are switched off.

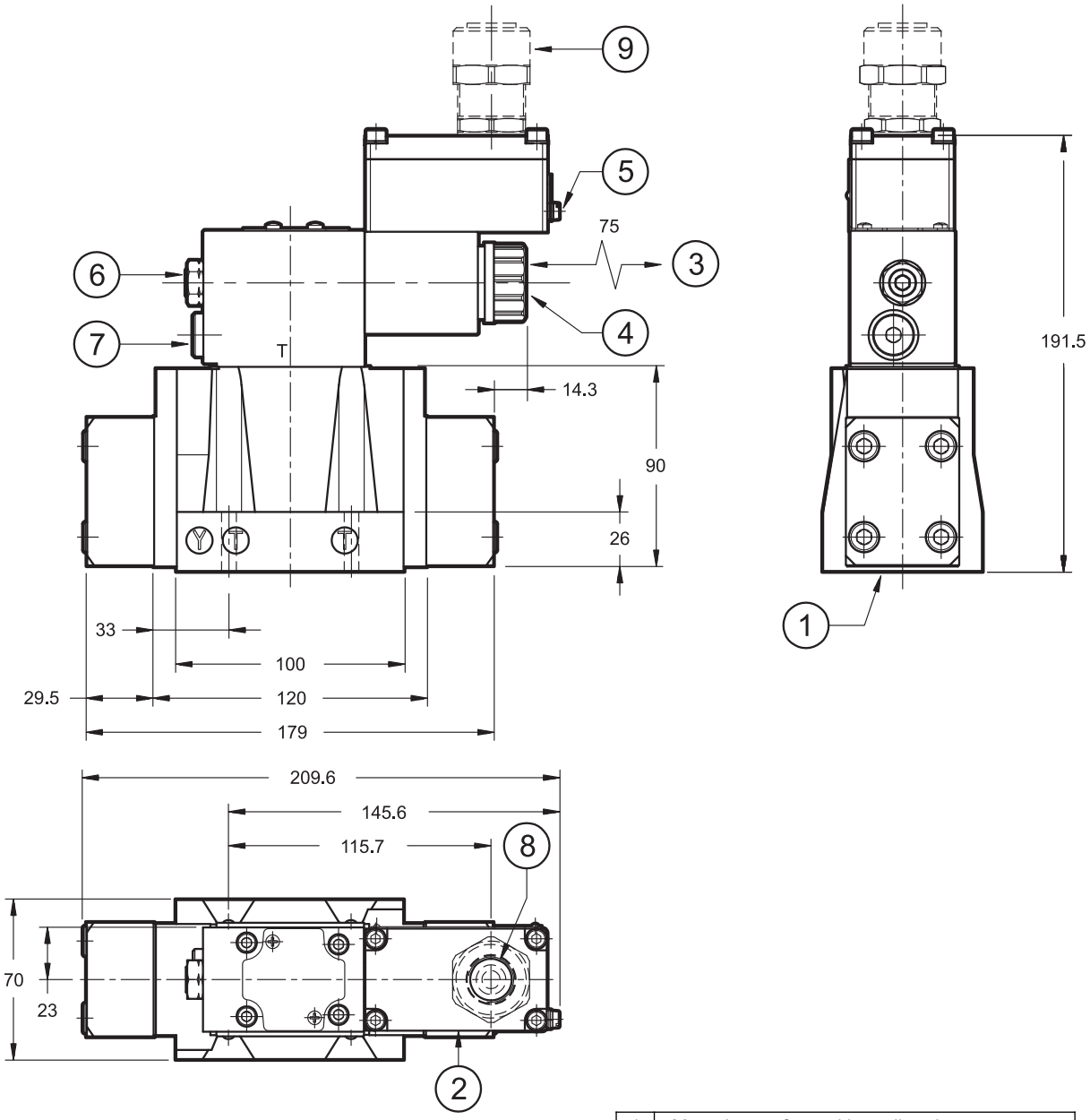
The table shows the type of fuse recommended according to the nominal voltage of the valve and to the value of the voltage peaks reduction.

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 [V]	Suppressor circuit
D12	12	1,88	2,5	- 49	Transient voltage suppressor bidirectional
D24	24	0,86	1,25	- 49	

9 - DZCE5KD2 AND DZCE5RKD2 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE5KD2-*/11*-*/*K9T*
DZCE5RKD2-*/11*-*/*K9T*



NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.

NOTE 2: for side port cable gland see paragraph 12.

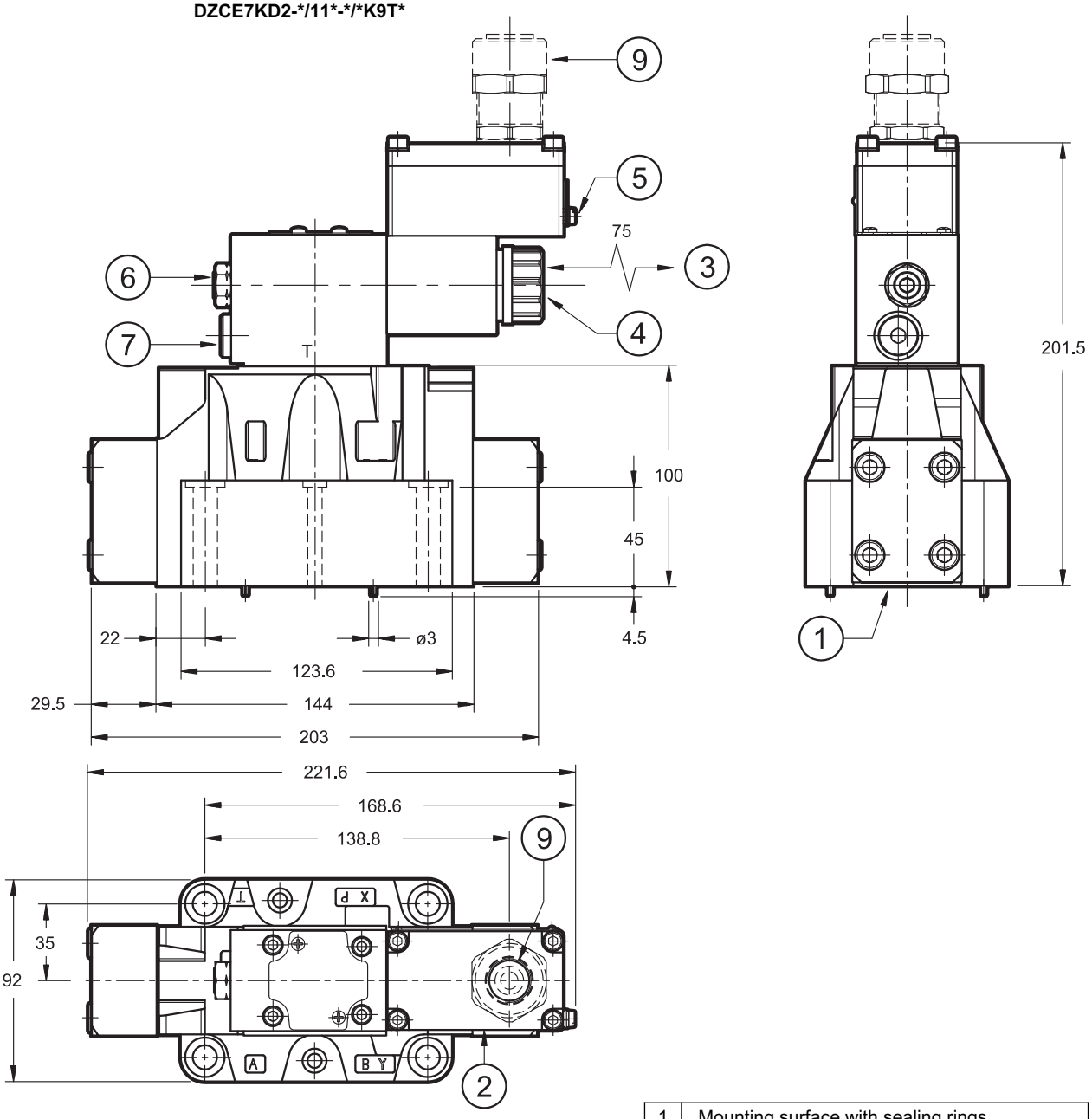
Valve fastening: N. 4 SHC screws M6x35 - ISO 4762
Tightening torque: 8 Nm (A 8.8 screws)
Thread of mounting holes: M6x10
Sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Explosion-proof coil
3	Coil removal space
4	Breather (Allen key 4)
5	Terminal for supplementary earth (GND) connection
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP
8	Upper port for cable gland
9	Cable gland (upper port shown). To be ordered separately, see paragraph 14

10 - DZCE7KD2 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE7KD2-*/11*-*/*K9T*



NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.
NOTE 2: for side port cable gland see paragraph 12.

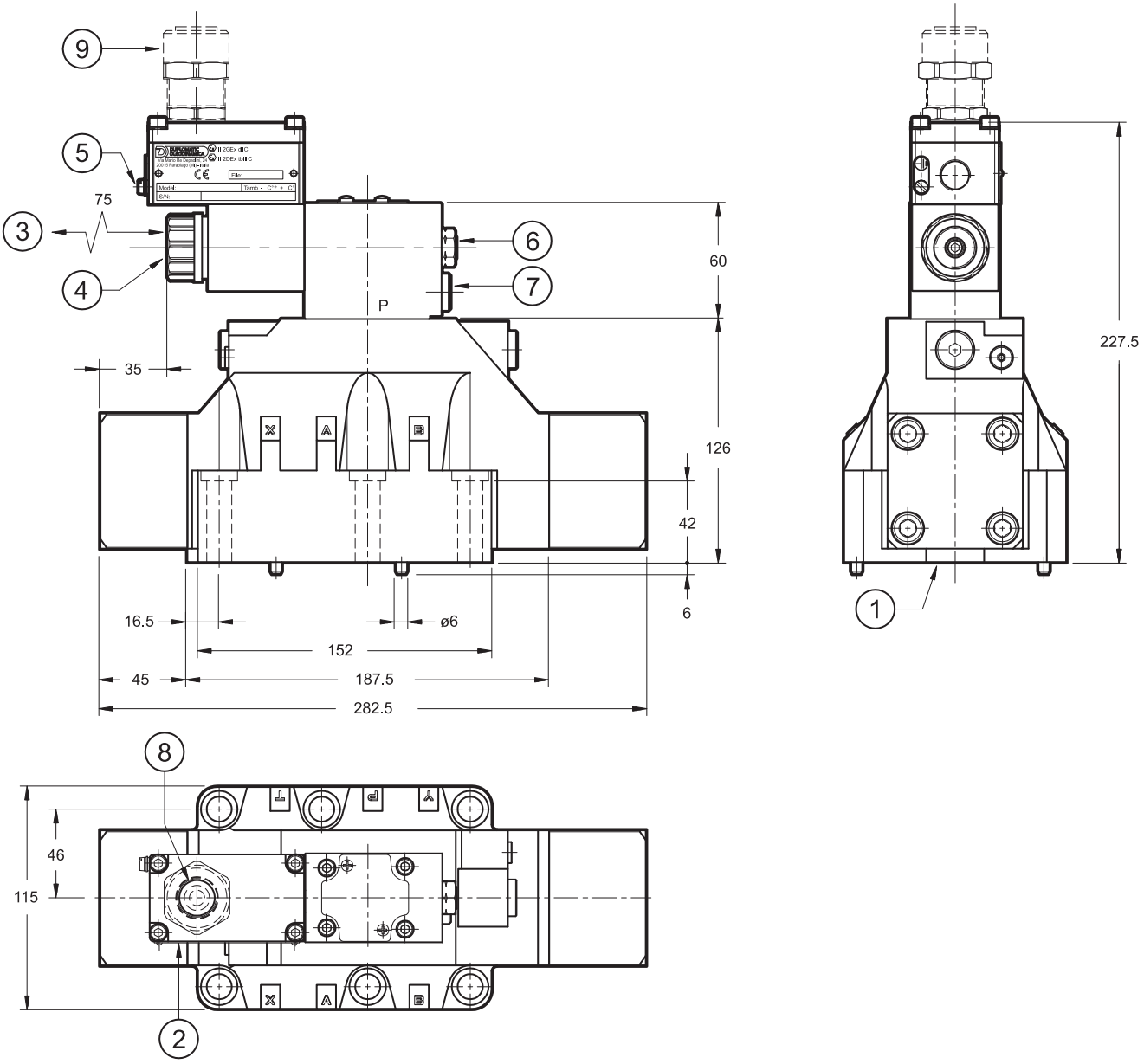
Single valve fastening:	N. 4 SHC screws M10x60 - ISO 4762 N. 2 SHC screws M6x60 - ISO 4762
Tightening torque M10x60: 40 Nm (A 8.8 screws) M6x60: 8 Nm (A 8.8 screws)	
Thread of mounting holes: M6x18; M10x18	
Sealing rings:	N. 4 OR type 130 (22.22x2.62) - 90 Shore N. 2 OR type 2043 (10.82x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Explosion-proof coil
3	Coil removal space
4	Breather (Allen key 4)
5	Terminal for supplementary earth (GND) connection
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP
8	Upper port for cable gland
9	Cable gland (upper port shown). To be ordered separately, see paragraph 14

11 - DZCE8KD2 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE8KD2-*/11*-*/*K9T*

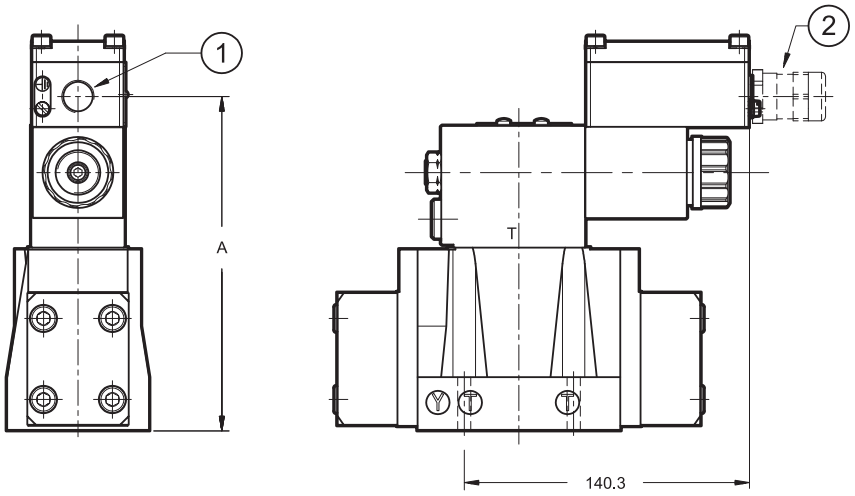


NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.
NOTE 2: for side port cable gland see paragraph 12.

Valve fastening: N. 6 SHC screws M12x60 - ISO 4762
Tightening torque: 69 Nm (A 8.8 screws)
Thread of mounting holes: M12x20
Sealing rings: N. 4 OR type 3118 (29.82x2.62) - 90 Shore N. 2 OR type 3081 (20.24x2.62) - 90 Shore

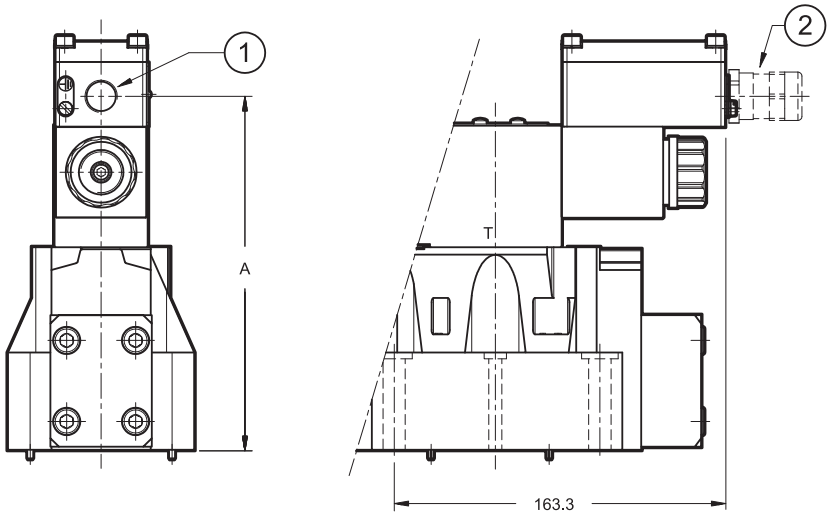
1	Mounting surface with sealing rings
2	Explosion-proof coil
3	Coil removal space
4	Breather (Allen key 4)
5	Terminal for supplementary earth (GND) connection
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP
8	Upper port for cable gland
9	Cable gland (upper port shown). To be ordered separately, see paragraph 14

12 - DZCE*KD2-*/11*-*/*K9S* (SIDE CONNECTION) OVERALL AND MOUNTING DIMENSIONS



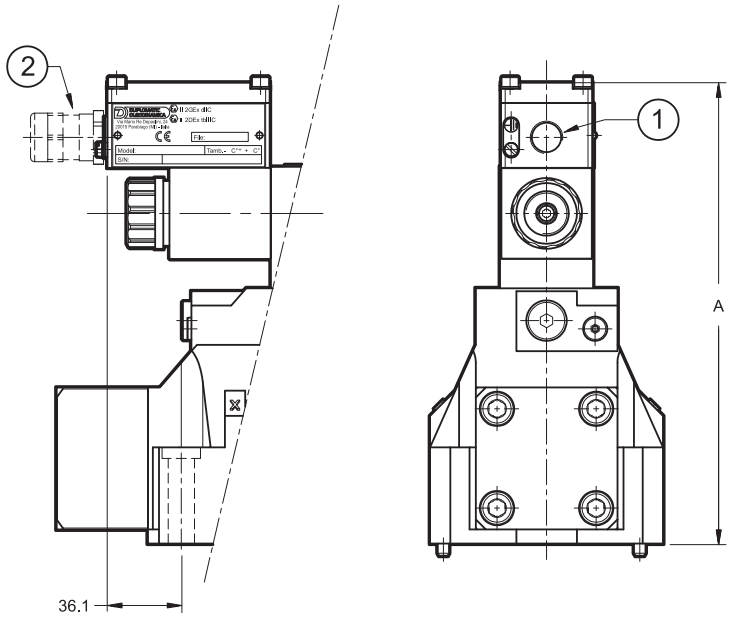
DZCE5KD2-*/11*-*/*K9S*
DZCE5RKD2-*/11*-*/*K9S*

Side port type	Dimension A
S01	180.5
S04	181.5



DZCE7KD2-*/11*-*/*K9S*

Side port type	Dimension A
S01	190.5
S04	191.5



DZCE8KD2-*/11*-*/*K9S*

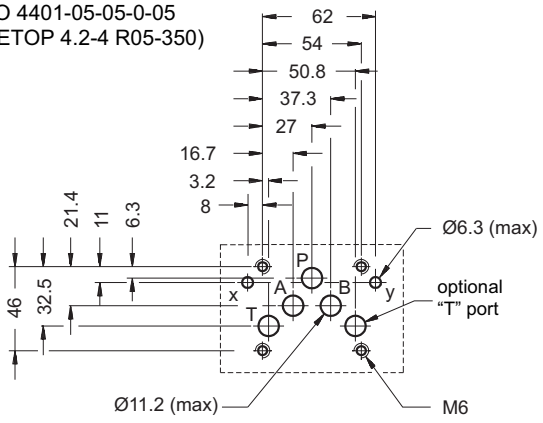
Side port type	Dimension A
S01	226.5
S04	227.5

dimensions in mm

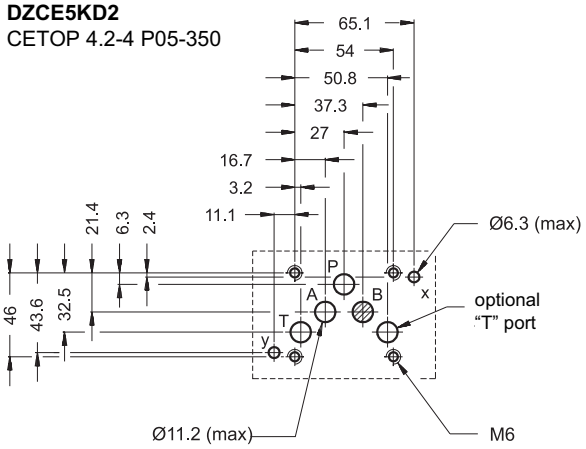
1	Side port for cable gland
2	Cable gland (side port shown). To be ordered separately, see par. 14

13 - MOUNTING SURFACES

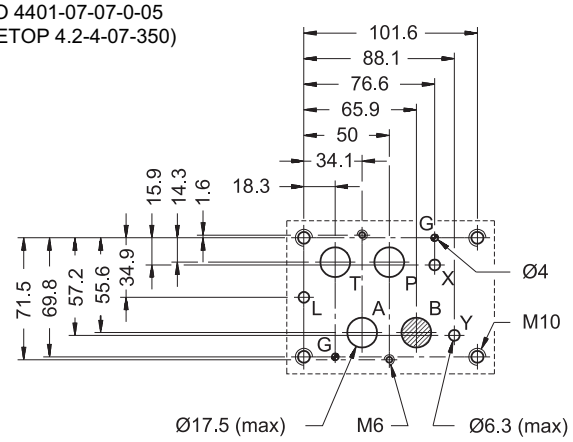
DZCE5RKD2
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



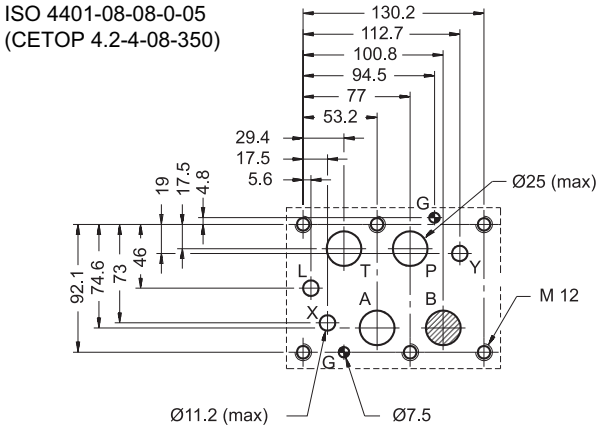
DZCE5KD2
CETOP 4.2-4 P05-350



DZCE7KD2
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



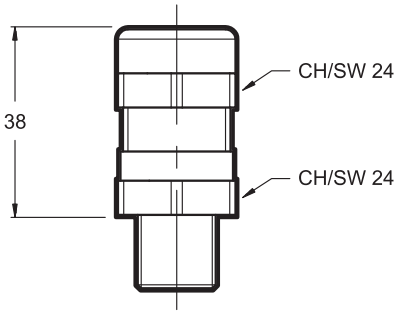
DZCE8KD2
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



14 - CABLE GLANDS

Cable glands must be ordered separately; Duplomatic offers some types of cable glands with the following features:

- version for non-armoured cable, external seal on the cable (suitable for Ø 8 ÷ 10 mm cables);
- according to ATEX II 2GD directive certified
- cable gland material: nickel brass
- rubber tip material: silicone
- ambient temperature range: -70ºC ÷ +220ºC
- protection degree: IP66/IP68



To order, list the description and the code of the version chosen from among those listed below:

Description: CGK2/NB-01/10

Code: 3908108001

Version with M20x1.5 - ISO 261 male thread, suitable for coils with T01 and S01 connection types; it is supplied equipped with silicone seal, that must be assembled between the cable gland and the coil cover, so as to ensure IP66 / IP68 protection degree.

Description: CGK2/NB-02/10

Code: 3908108002

Version with Gk 1/2 - UNI EN 10226-2 male thread, suitable for coils with T02 connection type; in order to ensure IP66/IP68 protection degree. The customer must apply LOCTITE® 243™ threadlocker or similar between the cable gland connection thread and the coil cover.

Description: CGK2/NB-03/10

Code: 3908108003

Version with 1/2" NPT - ANSI B1.20.1 (ex ANSI B2.1), suitable for coils with T03 connection type; in order to ensure IP66/IP68 protection degree. The customer must apply LOCTITE® 243™ threadlocker or similar between the cable gland connection thread and the coil cover.

Description: CGK2/NB-04/10

Code: 3908108004

Version with M16x1.5 - ISO 261 male thread, suitable for coils with S04 connection type; it is supplied equipped with silicone seal, that must be assembled between the cable gland and the coil cover, so as to ensure IP66/IP68 protection degree.

15 - ELECTRONIC CONTROL UNITS

EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M142	for solenoid 12V DC		

NOTE: electronic control units offered are not certified according to ATEX 94/9/EC Directive; therefore, they must be installed outside the classified area.

16 - SUBPLATES

(see catalogue 51 000)

		DZCE5KD2	DZCE7KD2	DZCE8KD2
Type with rear ports		PME4-AI5G	PME07-AI6G	-
Type with side ports		PME4-AL5G	PME07-AL6G	PME5-AL8G
Thread of ports:	P - T - A - B X - Y	3/4" BSP 1/4" BSP	1½" BSP 1/4" BSP	1" BSP 1/4" BSP

NOTE: Subplates (to be ordered separately) do not contain neither aluminium nor magnesium at a higher rate than the value allowed by norms according to ATEX directive for category 2GD.

The user must take care and make a complete assessment of the ignition risk, that can occur from the relative use in potentially explosive environments.

DUPLOMATIC OLEODINAMICA

DUPLOMATIC OLEODINAMICA S.p.A.
20015 PARABIAGO (MI) • Via M. Re Depaolini 24
Tel. +39 0331.895.111
Fax +39 0331.895.339
www.duplomatic.com • e-mail: sales.exp@duplomatic.com