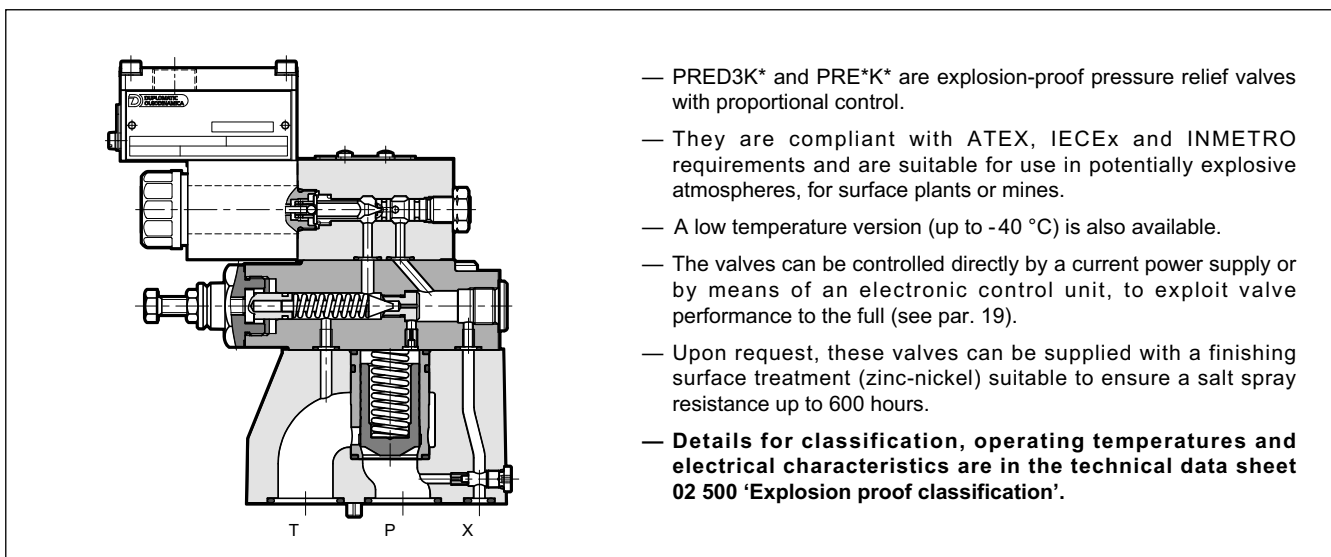


PRE(D)*K*

EXPLOSION-PROOF PROPORTIONAL PRESSURE RELIEF VALVE, PILOT OPERATED ATEX, IECEx, INMETRO SERIES 10

PRED3K*	ISO 4401-03
PRE3K*	ISO 4401-03
PRE10K*	ISO 6264-06
PRE25K*	ISO 6264-08
PRE32K*	ISO 6264-10

OPERATING PRINCIPLE



- PRED3K* and PRE*K* are explosion-proof pressure relief valves with proportional control.
- They are compliant with ATEX, IECEx and INMETRO requirements and are suitable for use in potentially explosive atmospheres, for surface plants or mines.
- A low temperature version (up to -40 °C) is also available.
- The valves can be controlled directly by a current power supply or by means of an electronic control unit, to exploit valve performance to the full (see par. 19).
- Upon request, these valves can be supplied with a finishing surface treatment (zinc-nickel) suitable to ensure a salt spray resistance up to 600 hours.
- **Details for classification, operating temperatures and electrical characteristics are in the technical data sheet 02 500 'Explosion proof classification'.**

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

		PRED3K*	PRE3K*	PRE10K*	PRE25K*	PRE32K*
Maximum operating pressure	- P port - T port	bar				
		350 2				
Minimum flow		-	2	-	-	-
Nominal flow		1	10	-	-	-
Maximum flow		3	40	200	400	500
Step response		see paragraph 8				
Hysteresis	% of p nom	< 5%				
Repeatability	% of p nom	< ±1,5%				
Electrical characteristic		see paragraph 9				
Operating temperatures (ambient and fluid)		see data sheet 02 500				
Fluid viscosity range	cSt	10 ÷ 400				
Fluid contamination degree		According to ISO 4406:1999 class 18/16/13				
Recommended viscosity	cSt	25				
Mass	kg	1,8	3,8	5,3	6,1	8,3



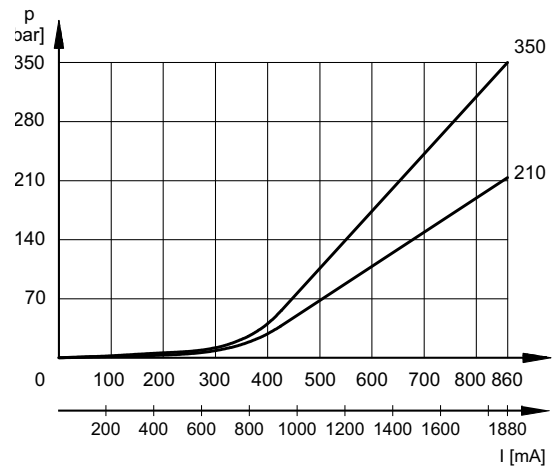
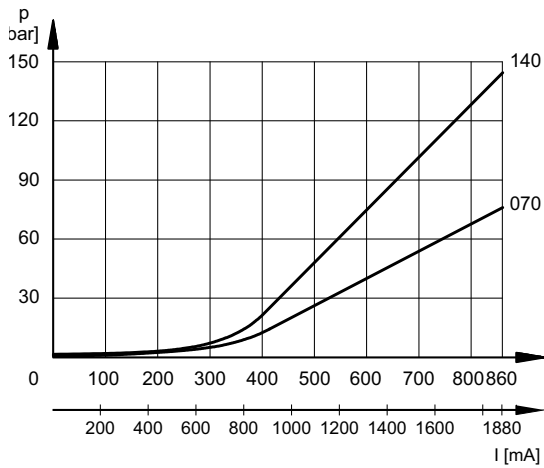
3 - CHARACTERISTIC CURVES FOR DIRECT OPERATED PROPORTIONAL VALVE PRED3K*

(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

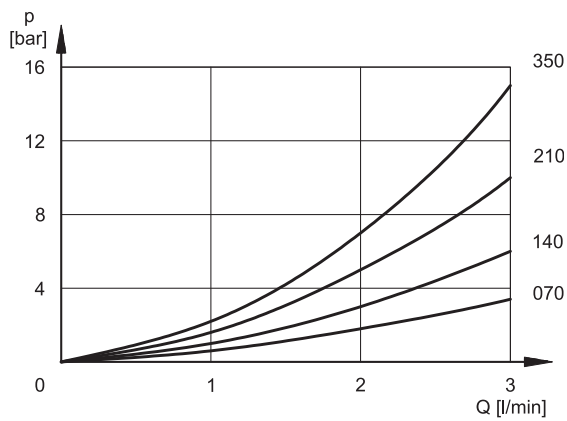
Typical control curves according to the current supplied to the solenoid for pressure control ranges: 070, 140, 210, 350, measured with input flow rate $Q = 1$ l/min.

The curves are obtained without any hysteresis and linearity compensation and they are measured without any backpressure in T. The full scale pressure is set in factory with a flow rate of 1 l/min. In case of higher flow rate, the full scale pressure will increase considerably (see diagram $p_{max} = f(Q)$).

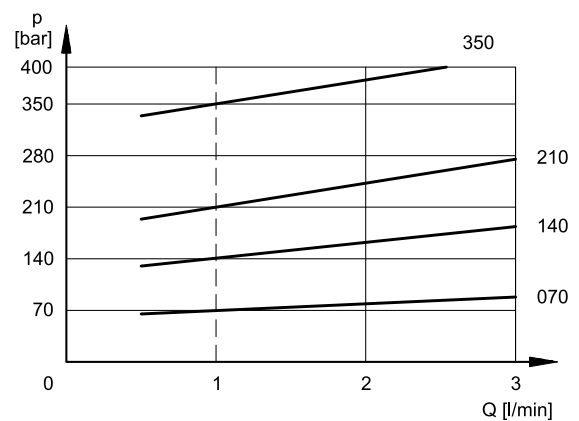
PRESSURE CONTROL $p = f(I)$



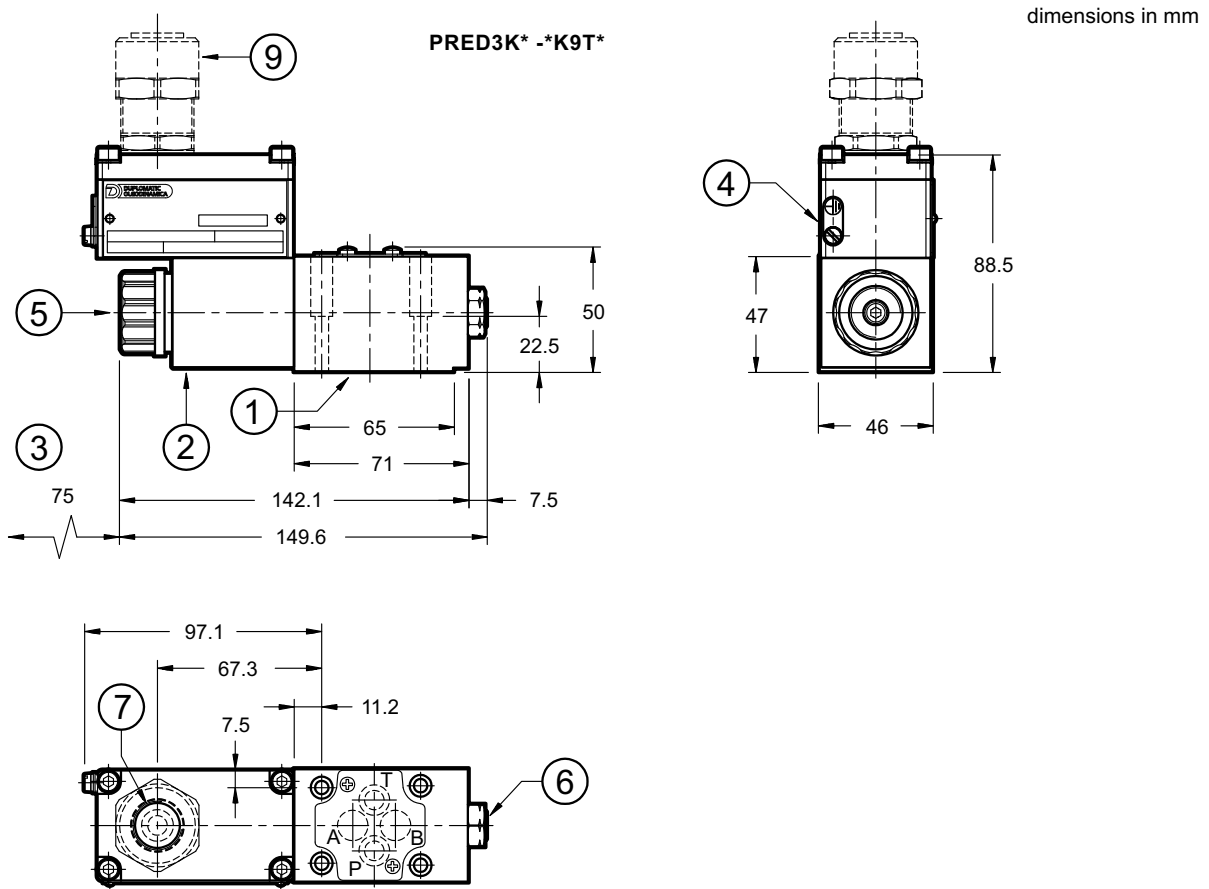
MINIMUM CONTROLLED PRESSURE $p_{min} = f(Q)$



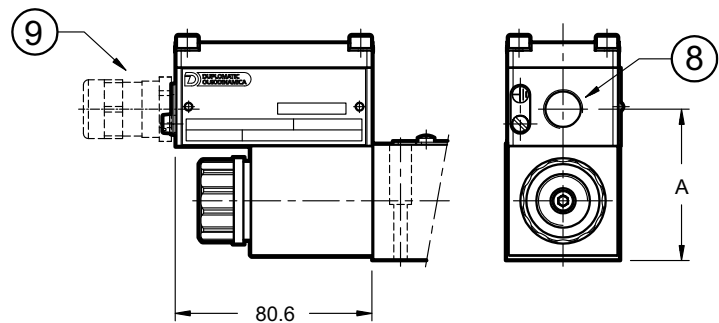
PRESSURE VARIATION $p_{max} = f(Q)$



4 - PRED3K* OVERALL AND MOUNTING DIMENSIONS



PRED3K* - *K9S*



1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Explosion-proof coil
3	Minimum clear space required
4	Terminal for supplementary GND connection
5	Breather (Allen key 4)
6	Factory setting sealing (we recommend not unscrewing the nut)
7	Upper port for cable gland
8	Side port for cable gland
9	Cable gland To be ordered separately, see par.18

Side port type	A
S01, S04	60.5
S02, S03	60

NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (5) placed at the end of the solenoid tube.

Fastening of single valve: 4 SHC screws M5x30 - ISO 4762
Tightening torque: 5 Nm (A 8.8 screws)
Threads of mounting holes: M5x10

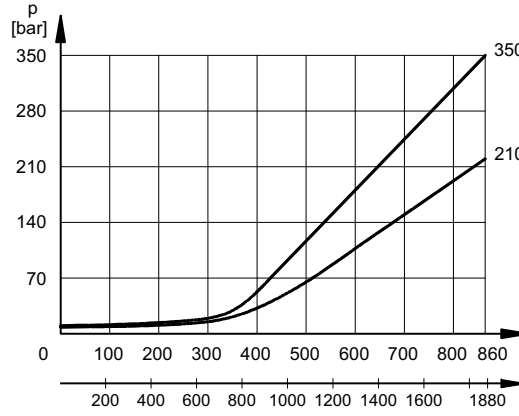
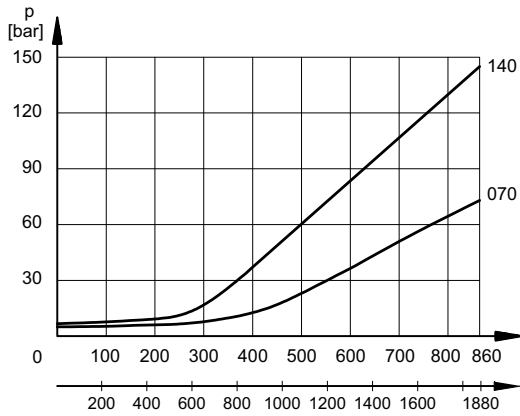


7 - CHARACTERISTIC CURVES OF PILOT OPERATED PROPORTIONAL VALVES

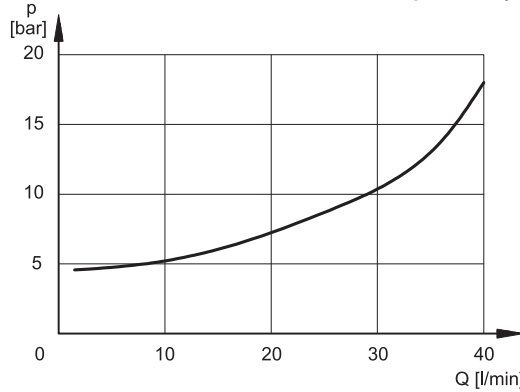
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

7.1 - PRE3K*

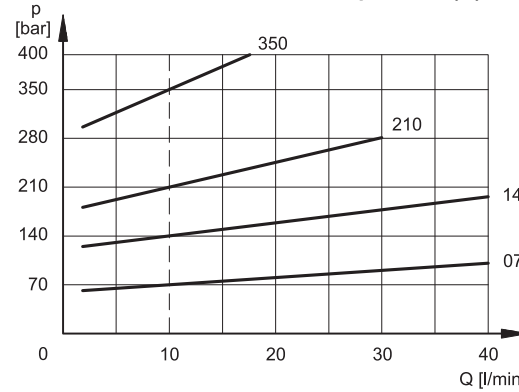
PRESSURE CONTROL $p=f(I)$



MINIMUM CONTROLLED PRESSURE $p_{min} = f(Q)$

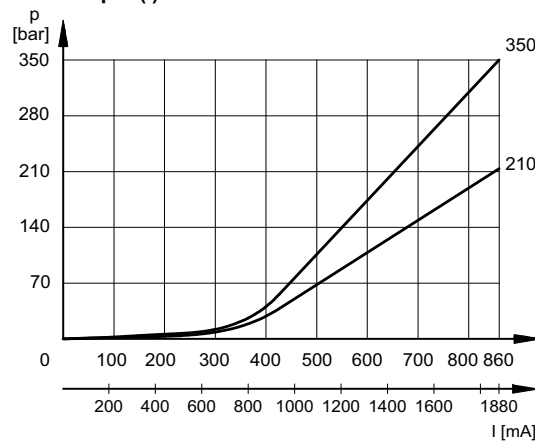
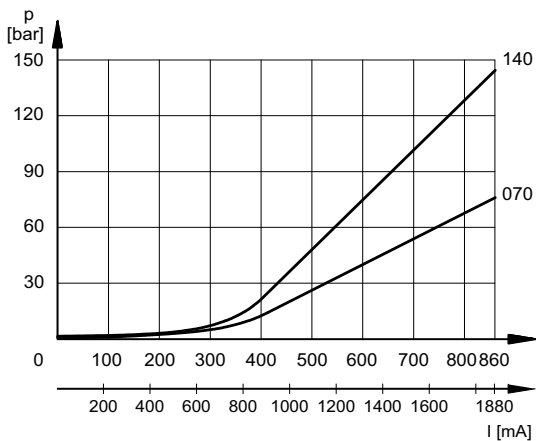


PRESSURE VARIATION $p_{max} = f(Q)$

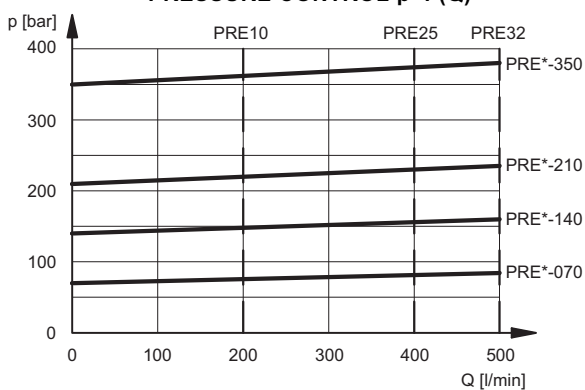


7.2 - PRE10K*, PRE25K* and PRE32K*

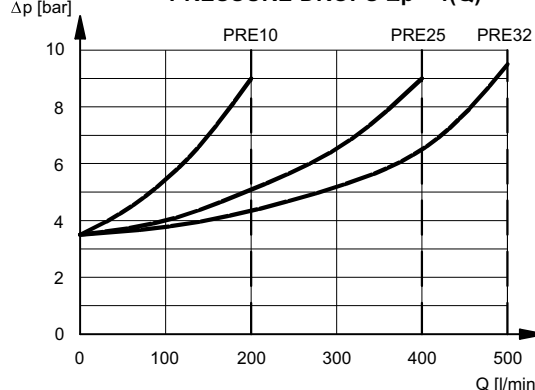
PRESSURE CONTROL $p=f(I)$



PRESSURE CONTROL $p=f(Q)$



PRESSURE DROPS $\Delta p = f(Q)$



8 - STEP RESPONSE

(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

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

The table illustrates typical step response times measured with a valve of pressure range up to 140 bar and with input flow rate of Q = 2 l/min for PRED3K*, Q = 10 l/min for PRE3K* and Q = 50 l/min for PRE10K*, PRE25K* and PRE32K*.

REFERENCE SIGNAL	0 → 100%	100 → 0%
	Step response [ms]	
PRED3K*	80	40
PRE3K*	80	40
PRE10K*, PRE25K* and PRE32K*	120	90

9 - 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%
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU
CLASS OF PROTECTION: Atmospheric agents Coil insulation (VDE 0580)	IP66 / IP68 class H

9.1 - 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.

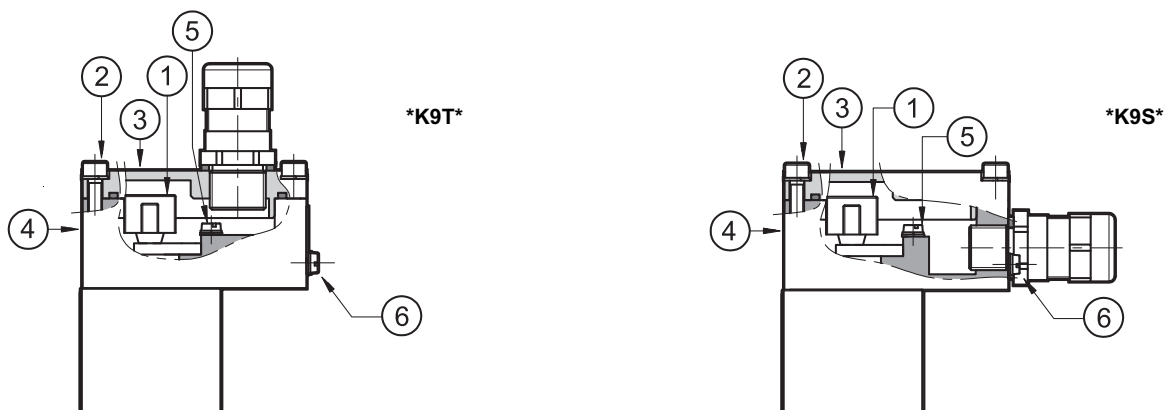
The electrical connection is polarity-independent.

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 standard about protection against explosion hazards.



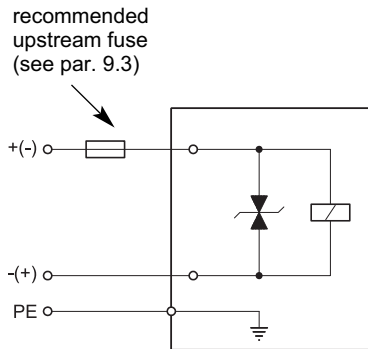
Characteristics of the cables connectable for wiring are indicated in the table below:

Function	Cable section
Operating voltage cables connection	max 2.5 mm ²
Connection for internal grounding point	max 2.5 mm ²
Connection for external equipotential grounding point	max 6 mm ²

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 18) allow to use cables with external diameter between 8 and 10 mm.

9.2 - Electrical diagrams



9.3 - Overcurrent fuse and switch-off voltage peak

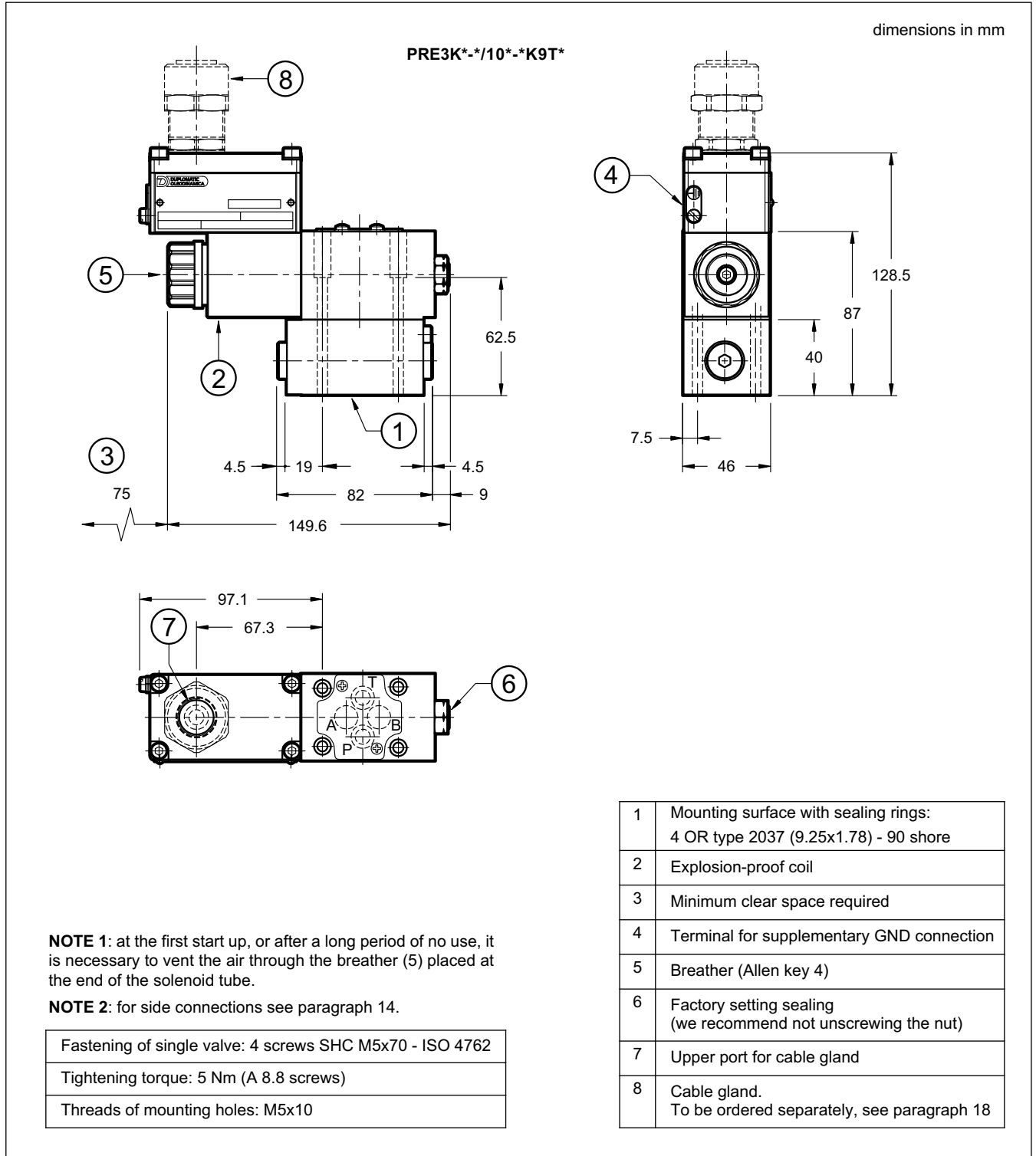
Upstream of each valve, an appropriate fuse (max 3 x I_n according to IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping, as short-circuit protection, must be connected. The cut-off power of the fuse must correspond or exceed the short circuit current of the 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.

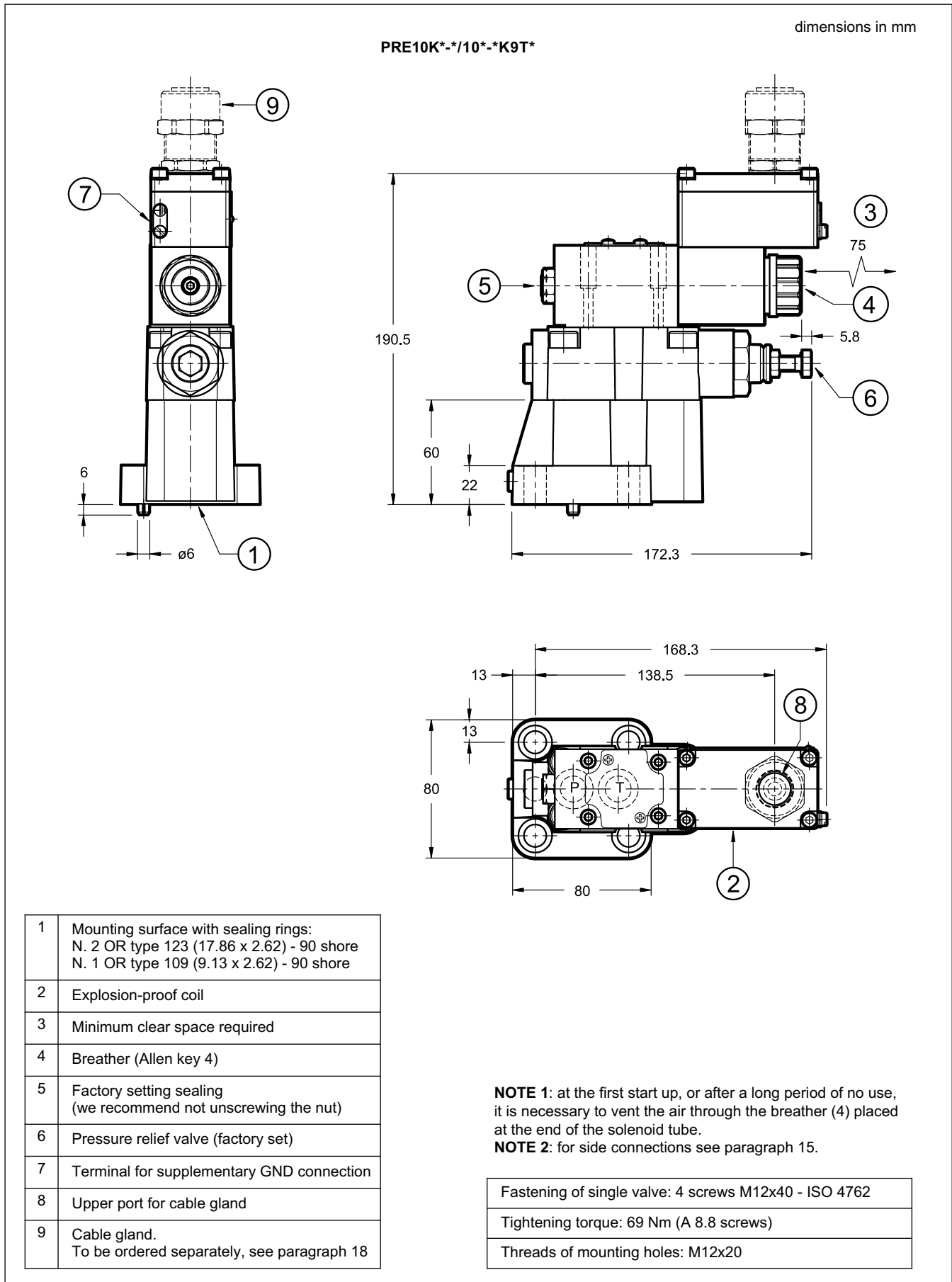
The table shows the type of fuse recommended according to the nominal voltage of the valve and to the value of the voltage peaks reduction.

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	

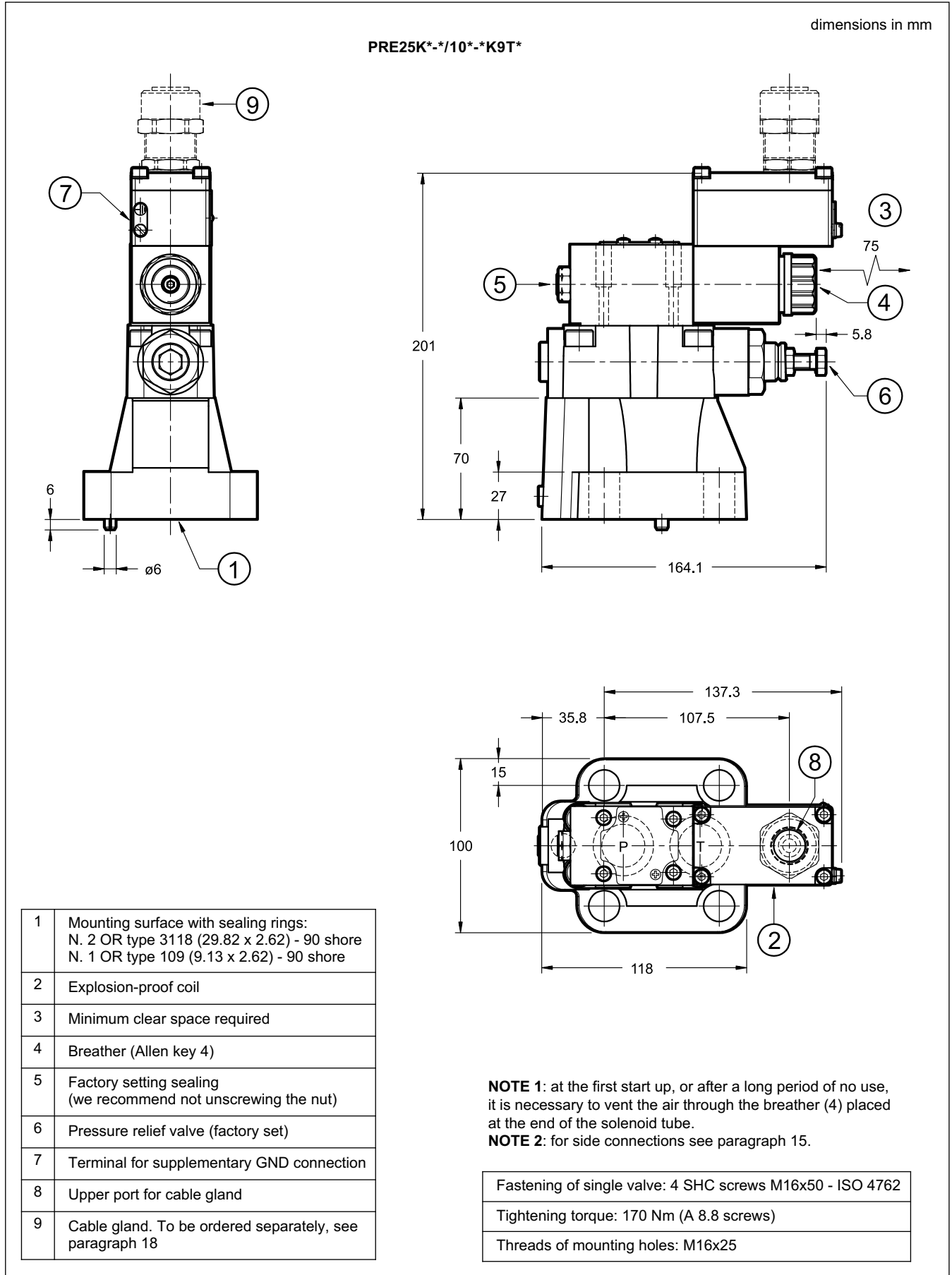
10 - PRE3K* OVERALL AND MOUNTING DIMENSIONS



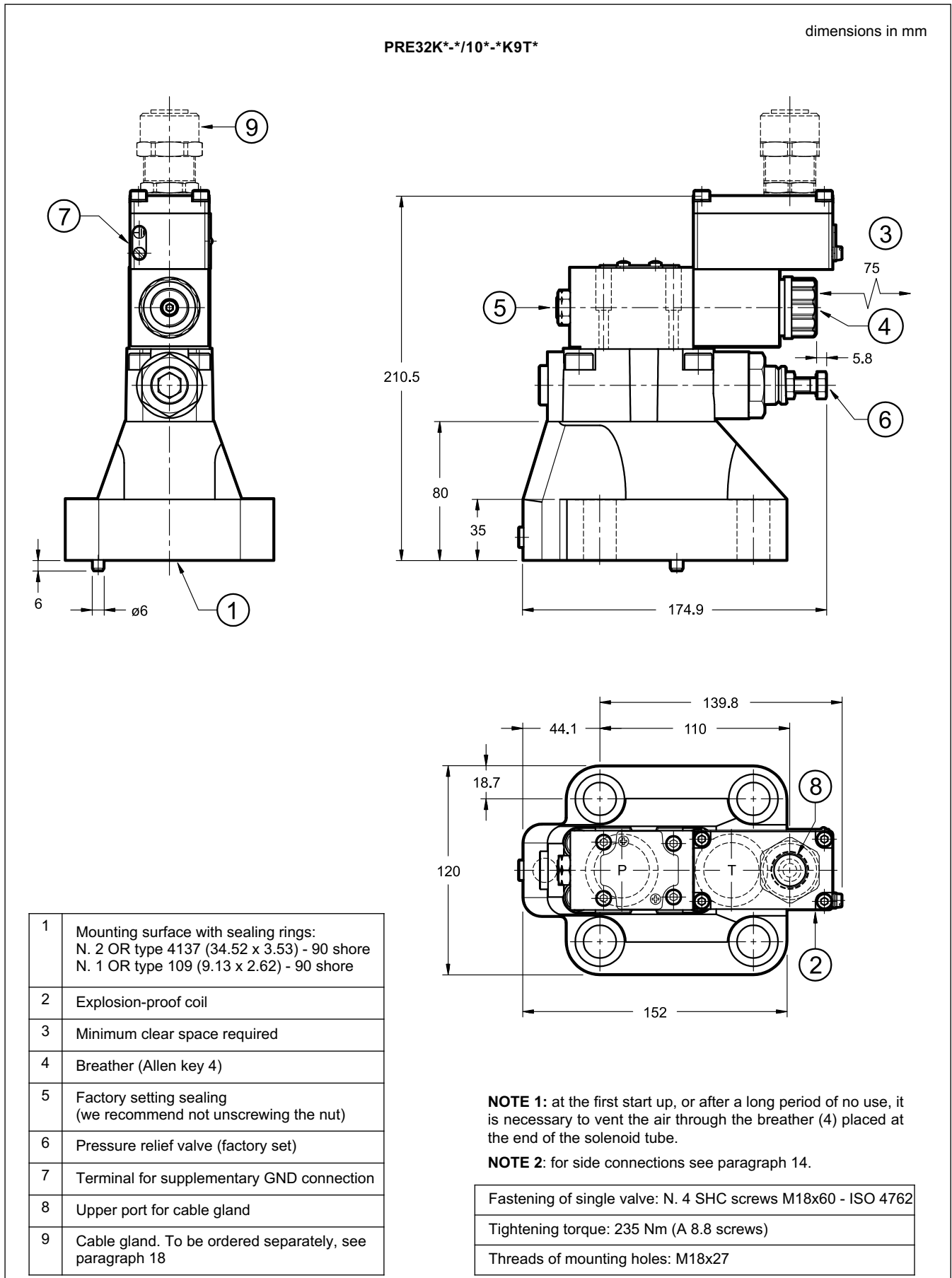
11 - PRE10K* OVERALL AND MOUNTING DIMENSIONS



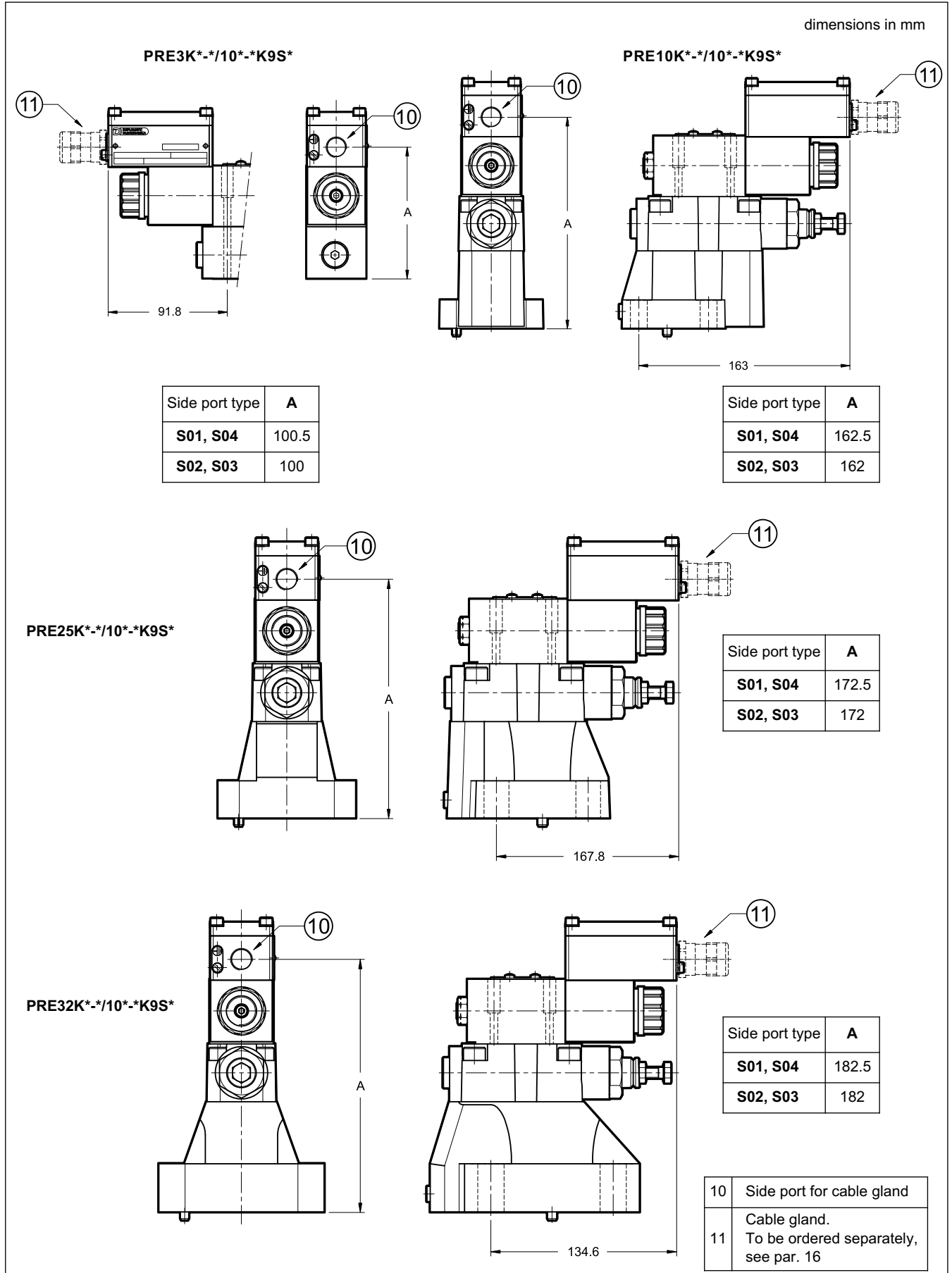
12 - PRE25K* OVERALL AND MOUNTING DIMENSIONS



13 - PRE32K* OVERALL AND MOUNTING DIMENSIONS



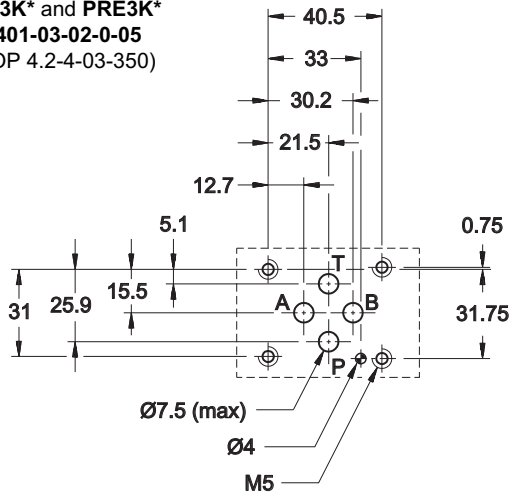
14 - PRE*K*-/10*-*K9S* (SIDE CONNECTION) OVERALL AND MOUNTING DIMENSIONS



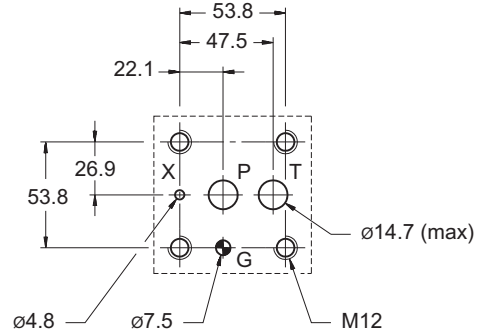


15 - MOUNTING SURFACES

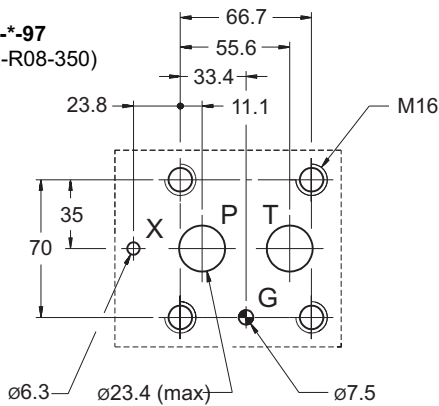
PRED3K* and PRE3K*
ISO 4401-03-02-0-05
(CETOP 4.2-4-03-350)



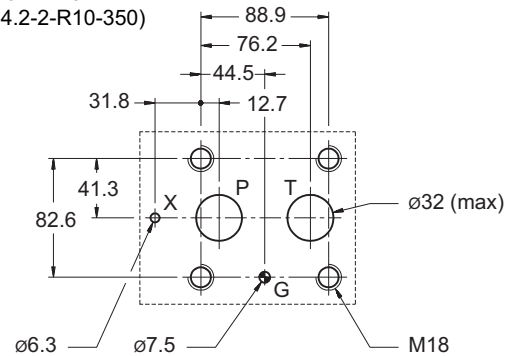
PRE10K*
ISO 6264-06-09-*-97
(CETOP 4.4.2-2-R06-350)



PRE25K*
ISO 6264-08-13-*-97
(CETOP 4.4.2-2-R08-350)



PRE32K*
ISO 6264-10-17-*-97
(CETOP 4.4.2-2-R10-350)



16 - 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.

17 - INSTALLATION



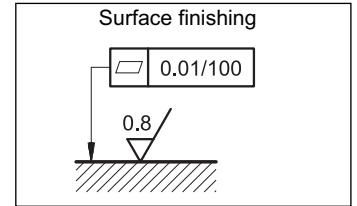
Installation must adhere to instructions reported in the *Use and Maintenance manual*, always attached to the valve. Unauthorized interventions can be harmful to people and goods because of the explosion hazards present in potentially explosive atmospheres.

We recommend to install the valves 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 paragraphs 3 and 7.

Ensure that there is no air in the hydraulic circuit. In particular applications, it can be necessary to vent the air, by using the apposite drain screw in the solenoid tube. At the end of the operation, make sure of having correctly screwed the drain screw.

Connect the T port on the valve 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.**

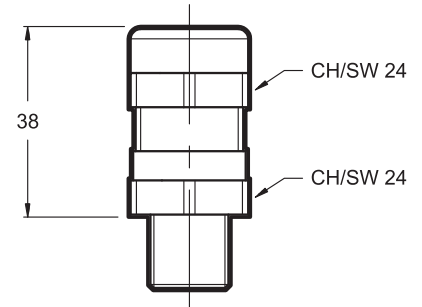
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



18 - CABLE GLANDS

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

- version for non-armoured cable, external seal on the cable (suitable for $\varnothing 8+10$ mm cables);
- ATEX II 2GD, I M2; IECEX Gb, Db, Mb; INMETRO Gb, Db, Mb certified
- cable gland material: nickel brass
- rubber tip material: silicone
- ambient temperature range: $-70\text{ }^{\circ}\text{C} + +220\text{ }^{\circ}\text{C}$
- protection degree: IP66/IP68



To order the desired cable glands, specify description, code and quantity.

Description: CGK2/NB-01/10

Code: 3908108001

M20x1.5 - ISO 261 male thread, suitable for coils with T01 and S01 connections. It is supplied equipped with copper washer, that must be assembled between the cable gland and the coil, so as to ensure IP66/IP68 protection degree.

Tightening torque: 45 ÷ 50 Nm

Description: CGK2/NB-02/10

Code: 3908108002

Gk 1/2 - UNI EN 10226-2 male thread, suitable for coils with T02 and S02 connections. The customer must apply LOCTITE® 243™ threadlocker or similar between the cable gland connection thread and the coil in order to ensure IP66/IP68 protection degree.

Tightening torque: 20 ÷ 25 Nm

Description: CGK2/NB-03/10

Code: 3908108003

1/2" NPT - ANSI B1.20.1 (ex ANSI B2.1), suitable for coils with T03 and S03 connections. The customer must apply LOCTITE® 243™ threadlocker or similar between the cable gland connection thread and the coil in order to ensure IP66/IP68 protection degree.

Tightening torque: 20 ÷ 25 Nm

Description: CGK2/NB-04/10

Code: 3908108004

M16x1.5 - ISO 261 male thread, suitable for coils with S04 connection. It is supplied equipped with copper washer, that must be assembled between the cable gland and the coil, so as to ensure IP66/IP68 protection degree.

Tightening torque: 45 ÷ 50 Nm



19 - 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 explosion-proof certified; therefore, they must be installed outside classified areas.

20 - SUBPLATES

(see catalogue 51 000)

	PRED3K*	PRE3K*	PRE10K*	PRE25K*	PRE32K*
Type with rear ports	PMMD-AI3G	PMMD-AI3G	PMRQ3-AI4G	PMRQ5-AI5G	PMRQ7-AI7G
Type with side ports	PMMD-AL3G	PMMD-AL3G	-	-	-
P, T ports dimensions	3/8" BSP	3/8" BSP	P: 1/2" BSP T: 3/4" BSP	1" BSP	1" 1/4 BSP
X port dimensions	-	-	1/4" BSP	1/4" BSP	1/4" BSP

NOTE: Subplates (to be ordered separately) do not contain neither aluminium nor magnesium at a rate higher than the value allowed by norms according to ATEX directive for category II 2GD and I M2.

The user will bear to do the complete assessment of the ignition risk that can occur from the relative use in potentially explosive environments.



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