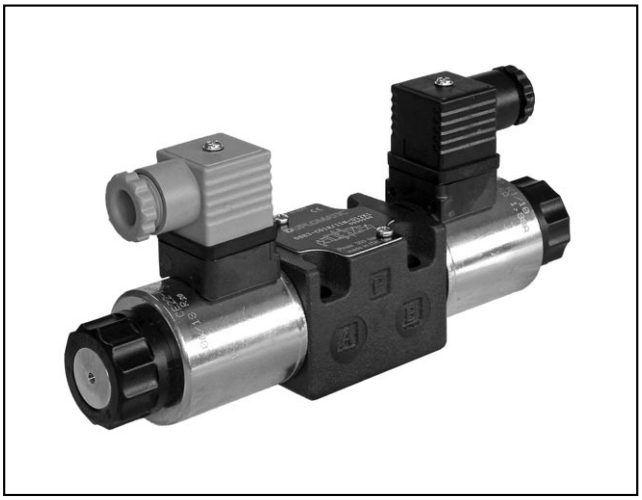
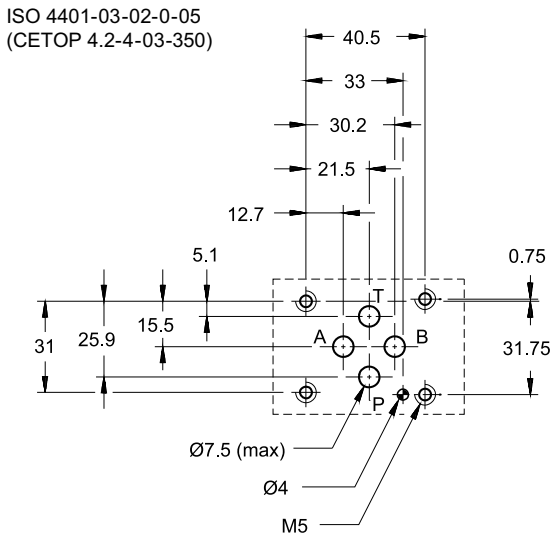


DSE3
PROPORTIONAL DIRECTIONAL VALVE
SERIES 11

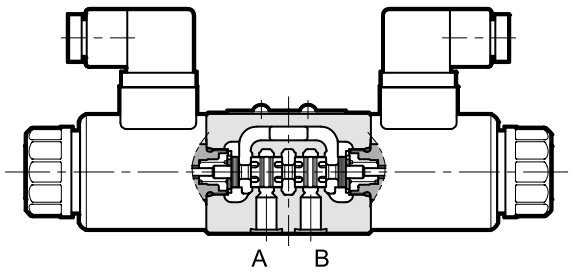
SUBPLATE MOUNTING
ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— The DSE3 valve is a proportional directional valve, direct operated, with ports in compliance with ISO 4401-03 standards.

— It is suitable for directional and speed control of hydraulic actuators.

— Valve opening and hence flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

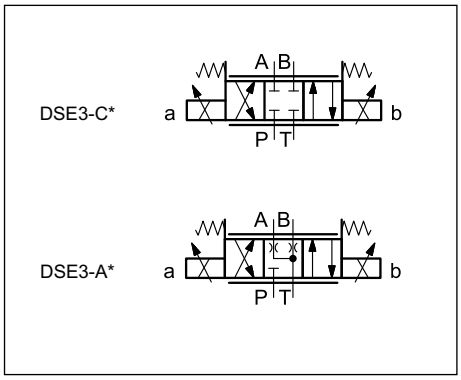
— The valve can be controlled directly by a current control supply unit or combined with an external electronic card to maximize the valve performances (see par. 12).

— Several manual overrides are available.

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

Max operating pressure: P - A - B ports T port	bar	 350 210
Maximum flow with Δp 10 bar P-T	l/min	1 - 4 - 8 - 16 - 26
Step response		see par. 5
Hysteresis (with PWM 200 Hz)	% Q_{max}	< 6%
Repeatability	% Q_{max}	< ± 1,5%
Electrical characteristics		see par. 4
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1.4 2.0

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

D	S	E	3	-				/	11		-			/		

Direct operated directional control valve

Electric proportional control

Size ISO 4401-03

Spool type:
C = closed centres
A = open centres

Spool nominal flow. See par. 2

Solenoid position (omit for configuration with two solenoids):
SA = 1 solenoid on A side
SB = 1 solenoid on B side

Series No.
(from 10 to 19 sizes and mounting dimensions remain unchanged)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

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

Coil electrical connection:
K1 = plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male

Option: manual override (see at par. 8)

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
Omit if not required

NOTE: The standard valve is supplied with surface treatment of phosphating black. The zinc-nickel finishing on the valve body makes the valve suitable to ensure a salt spray resistance up to **240** hours. For a salt spray resistance up to **600** hours refer to **paragraph 9**.
(test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

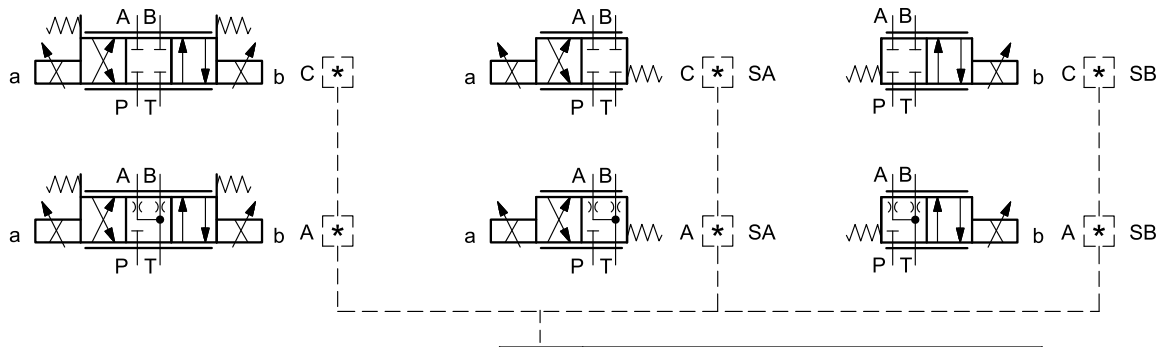
2 - CONFIGURATIONS

Valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, nominal flow rate.

2 solenoids configuration:
3 positions with spring centreing

"**SA**" configuration: 1 solenoid on side A.
2 positions (central + external) with spring centreing

"**SB**" configuration: 1 solenoid on side B.
2 positions (central + external) with spring centreing

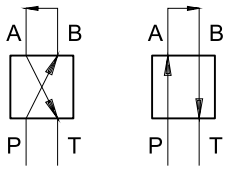


*	Nominal flow with Δp 10 bar P→T
01	1 l/min
04	4 l/min
08	8 l/min
16	16 l/min
16/08	16 (P→A) / 08 (B→T) l/min
26	26 l/min
26/13	26 (P→A) / 13 (B→T) l/min

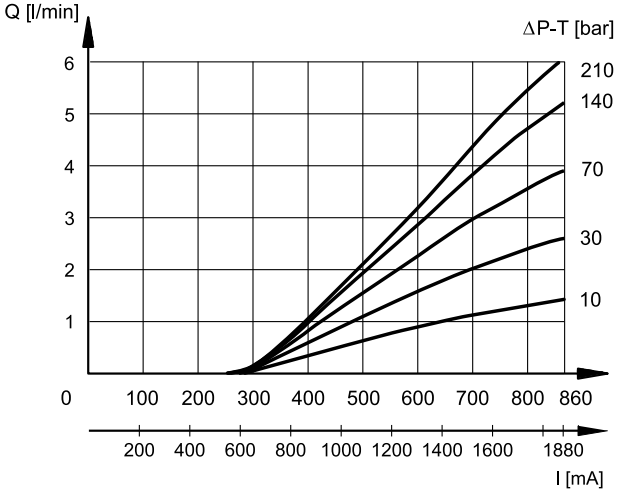
3 - CHARACTERISTIC CURVES

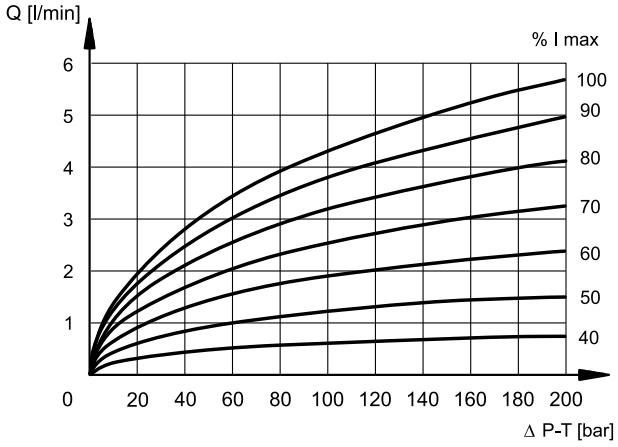
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

Typical flow rate control curves according to the current supply to solenoid. The reference Δp values are measured between ports P and T on the valve.

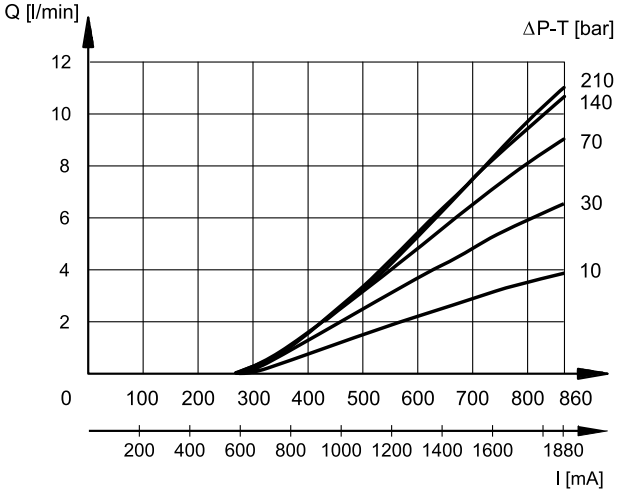


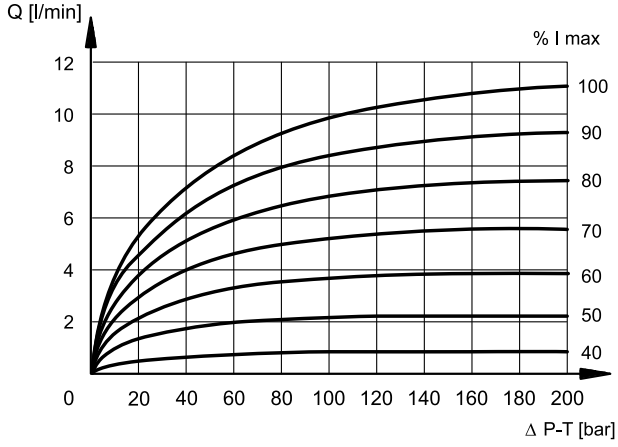
C01 / A01



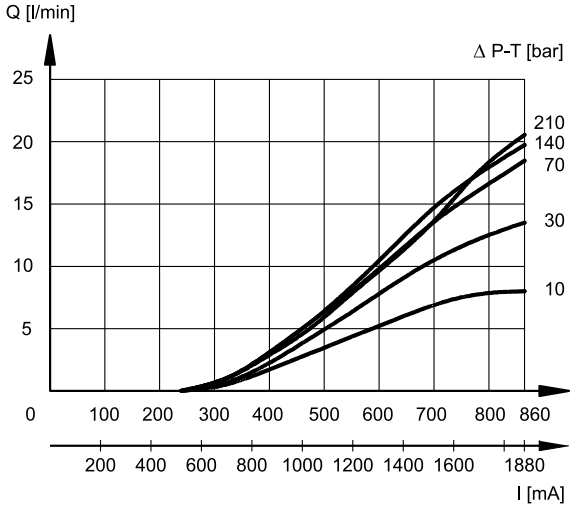


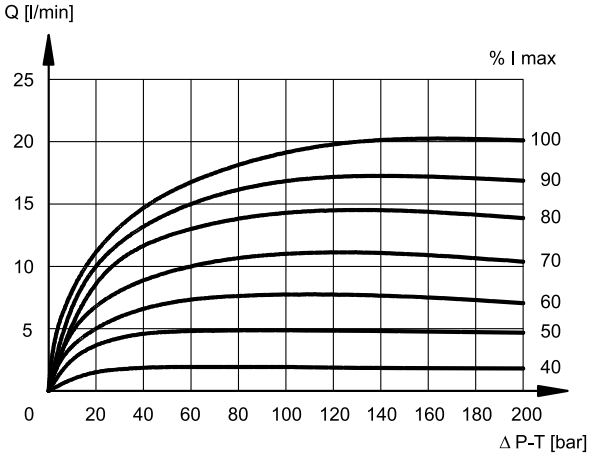
C04 / A04



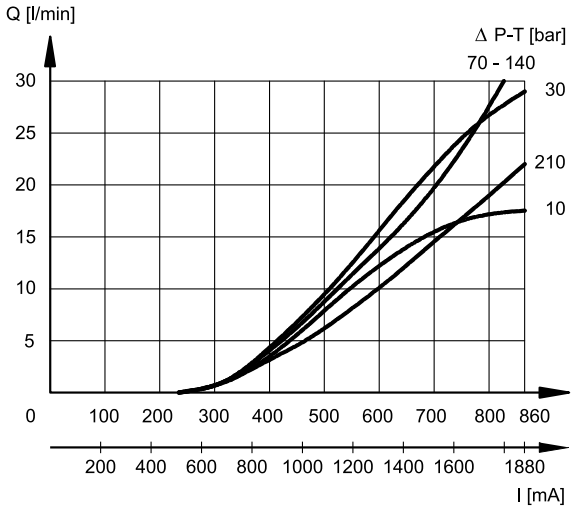


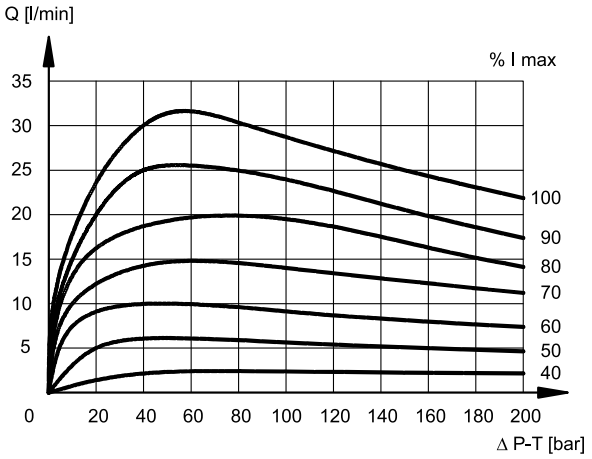
C08 / A08



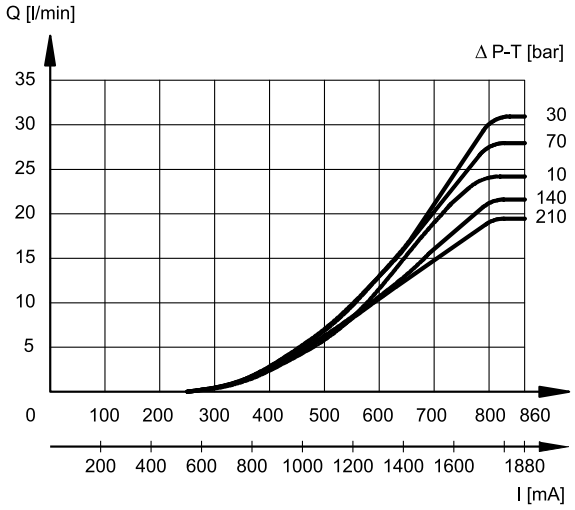


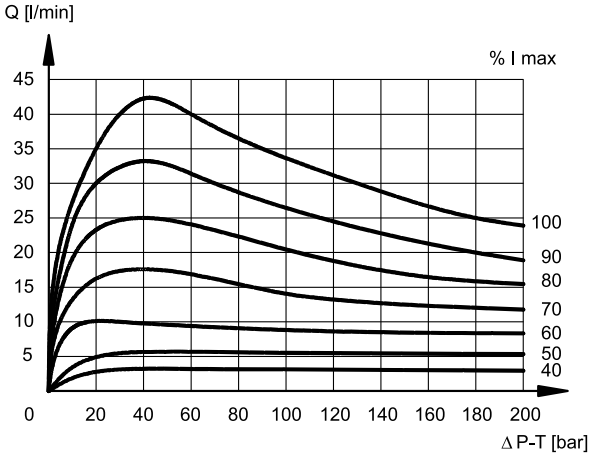
C16 / A16





C26 / A26





4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut.

It can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C) K1 coil K7 coil	Ω	3.66 4.4	17.6 18.6
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE		100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)		According to 2014/30/EU	
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation		class H class F	

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.

electric connection	electric connection protection	whole valve protection
K1 EN 175301-803 (ex DIN 43650)	IP65	IP65
K7 DEUTSCH DT04 male	IP65/67	

5 - STEP RESPONSE

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

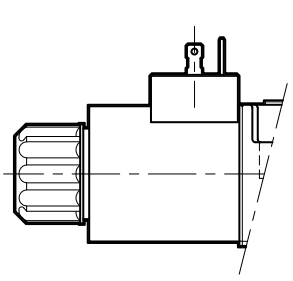
Step response is the time taken for the valve to reach 90% of the setted positioning value, following a step change of reference signal. The table shows typical response times tested with spool type C16 and Δp = 30 bar P-T.

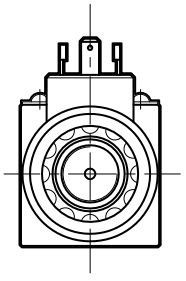
REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	50	40

6 - ELECTRIC CONNECTIONS

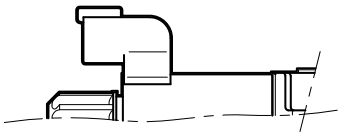
Connectors for K1 connection are always delivered together with the valve.

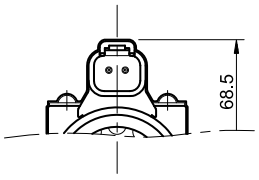
connection for EN 175301-803
(ex DIN 43650) connector
code **K1** (**standard**)
code **WK1** (W7 version only)



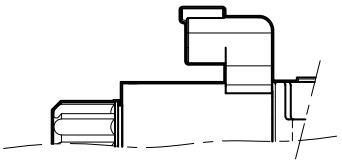


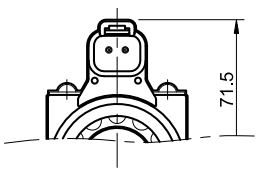
connection for
DEUTSCH DT06-2S male connector
code **K7**





connection for
DEUTSCH DT06-2S male connector
code **WK7** (W7 version only)

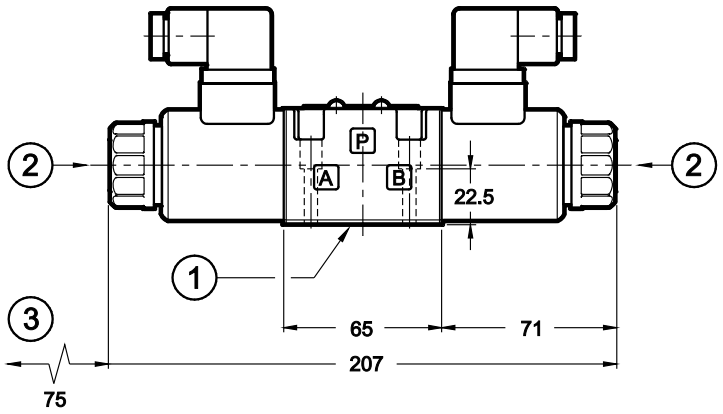


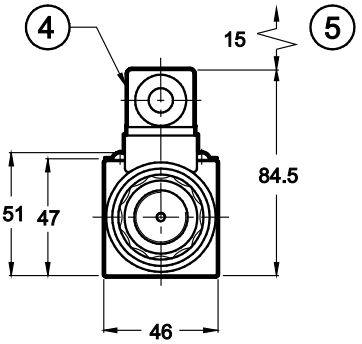


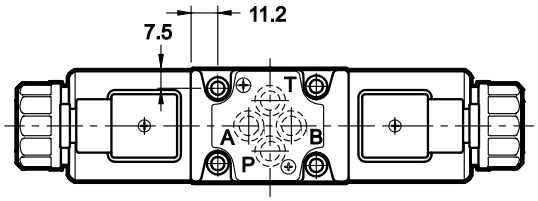
7 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

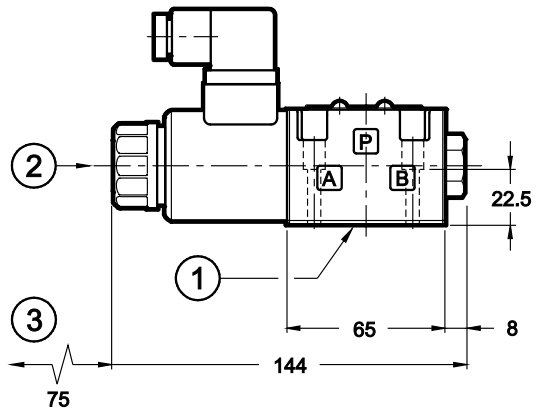
DSE3-**

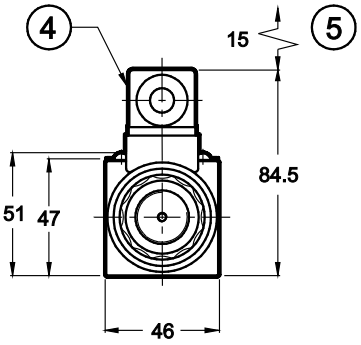


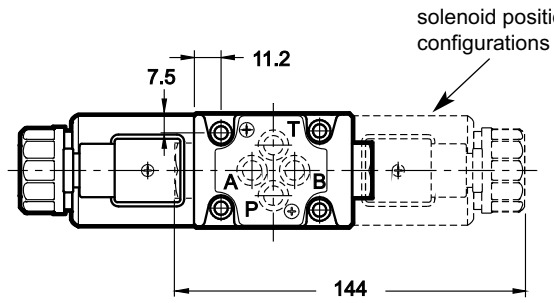




DSE3-*SA







Fastening bolts: 4 bolts M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Standard manual override, integrated in the solenoid tube
3	Coil removal space
4	Electric connector type EN 175301-803 (ex DIN 43650)
5	Connector removal space

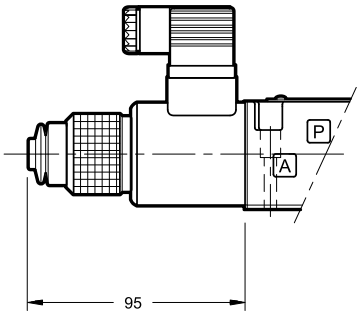
8 - MANUAL OVERRIDE

These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

Four different manual override versions are available upon request:

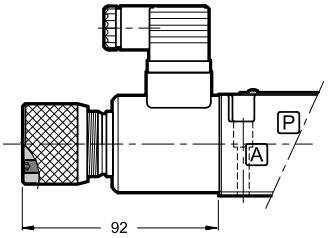
- **CM** version, manual override boot protected.
- **CK** version, knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosing.
- **CS** version, with metal ring nut provided with a M4 screw and a locknut.
- **CH** version, lever manual override. The lever device is always placed at the A side of the valve.

CM Version



Code: 3803210003

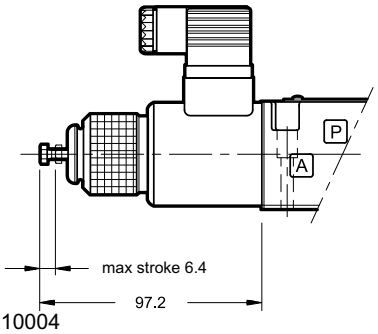
CK Version



Allen key for set screw: 3 mm

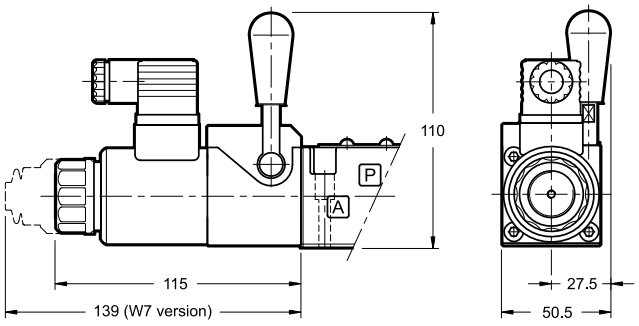
Code: 3803210005

CS Version

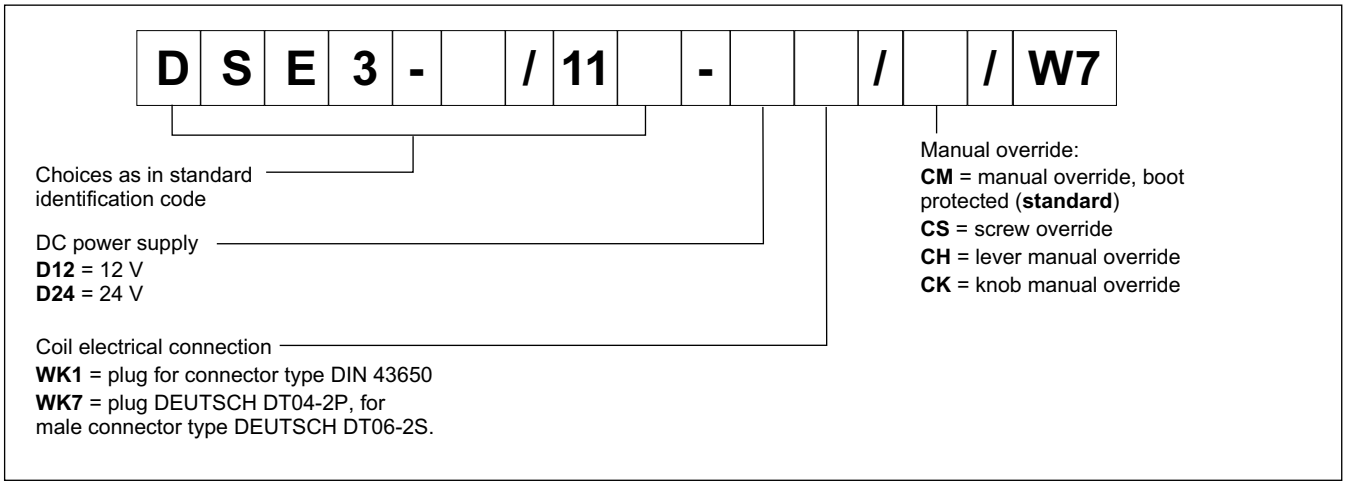


Code: 3803210004

CH Version



9 - HIGH IP AND CORROSION RESISTANCE VERSION



9.1 - Corrosion resistance

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600** hours (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The boot protected manual override is fitted as standard in order to protect the solenoid tube. See the dimensions of the CM manual override in par. 8.

9.2 - Coils

The coils feature a zinc-nickel surface treatment. The electrical characteristics do not change compared to the standard version: see table in par. 4

9.3 - Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.

electric connection	electric connection protection	whole valve protection
WK1 EN 175301-803 (ex DIN 43650)	IP66	IP66
WK7 DEUTSCH DT04 male	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(*) The IP69K protection degree is not taken into account in IEC 60529 but it is included in ISO 20653.

NOTE: As regards the liquid ingress protection (second digit), there are three means of protection.

Codes from 1 to 6 are related to water jets.

Rates 7 and 8 are related to immersion.

Rate 9 is reserved for high pressure and temperature water jets.

This means that IPX6 covers all the lower steps, rate IPX8 covers IPX7 but not IPX6 and lower, instead IPX9 does not cover any of them.

Whether a device meets two types of protection requirements it must be indicated by listing both the tests separated by a slash.

(E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).

10 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids like HL or HM type, according to ISO 6743-4. With this kind of fluids, use NBR seals type (code N). For HFDR fluids type (phosphate esters) use FPM seals (code V). For use with other kind of fluids such as HFA, HFB, HFC please consult our technical department.

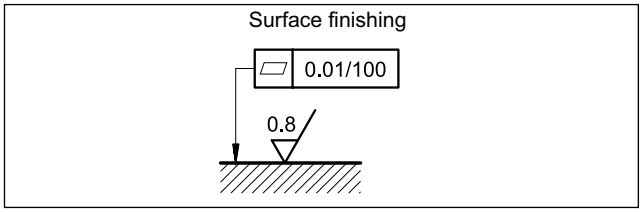
Operation with fluid temperature exceeding 80°C causes premature deterioration of the quality of the fluid and seals. The physical and chemical properties of the fluid must be maintained.

11 - INSTALLATION

DSE3 valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.



12 - ELECTRONIC CONTROL UNITS

DSE3 - * * SA (SB)

EDC-112	for solenoid 24V DC	plug version	see cat.89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

DSE3 - A* DSE3 - C*

EDM-M212	24V DC solenoids	rail mounting DIN EN 50022	see cat. 89 251
EDM-M242	12V DC solenoids		

12 - SUBPLATES

(see catalogue 51 000)

Type PMMD-AI3G ports on rear
Type PMMD-AL3G side ports
P, T, A, B port threading: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

DSE3B

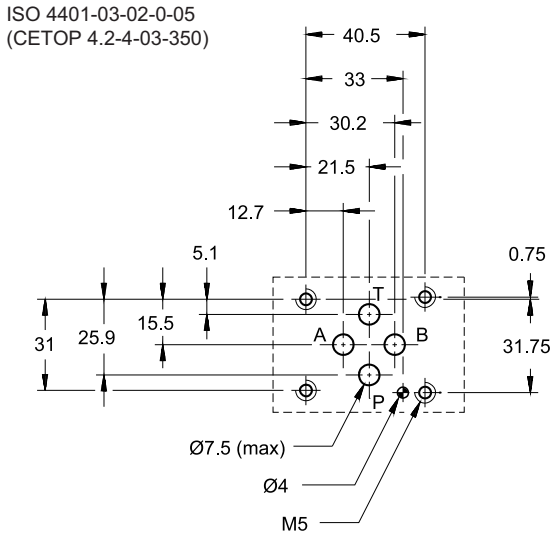
DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL

SERIES 10

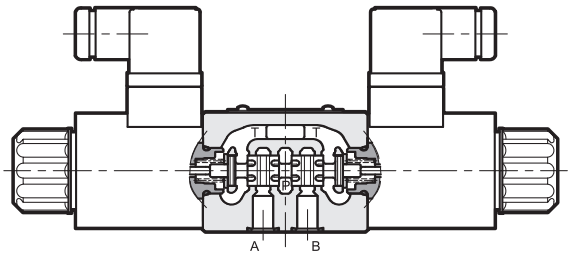
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The DSE3B valve is a direct operated directional valve with electric proportional control, with ports in compliance with ISO 4401-03 standards.

— It is suitable for directional and speed control of hydraulic actuators.

— Valve opening and hence flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or combined with an external electronic card to exploit valve performance to the full (see par. 12).

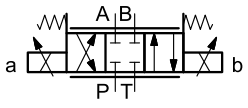
PERFORMANCES

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

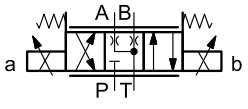
Max operating pressure: P - A - B ports T port	bar	 350 160
Nominal flow with Δp 10 bar P-T	l/min	1 - 4 - 8 - 16 - 26
Step response		see chapter 5
Hysteresis (with PWM 200 Hz)	% Q max	< 6%
Repeatability	% Q max	< ± 2%
Electrical characteristics		see chapter 4
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1.6 2.0

HYDRAULIC SYMBOLS (typical)

DSE3B-C*



DSE3B-A*



1 - IDENTIFICATION CODE

D	S	E	3	B	-				/	10		-			/		

Direct operated directional valve

Electric proportional control

Size ISO 4401-03

Spool type:
C = closed centres
A = open centres

Spool nominal flow
(see paragraph 2)

Solenoid position (omit for configuration with two solenoids):
SA = 1 solenoid on side A
SB = 1 solenoid on side B

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
Omit if not required

Option: manual override (see at par. 8)

Coil electrical connection:
K1 = plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S

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

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Series No.
(from 10 to 19 sizes and mounting dimensions remain unchanged)

NOTE: The standard valve is supplied with surface treatment of phosphating black. The zinc-nickel finishing on the valve body makes the valve suitable to ensure a salt spray resistance up to **240** hours. For a salt spray resistance up to **600** hours refer to **paragraph 9**. (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

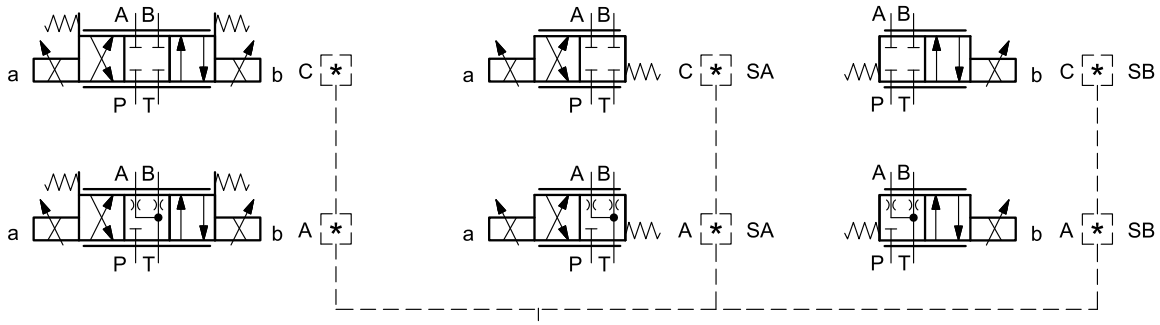
2 - CONFIGURATIONS

Valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, nominal flow rate.

2 solenoids configuration:
3 positions with spring centreing

"**SA**" configuration: 1 solenoid on side A.
2 positions (central + external)
with spring centreing

"**SB**" configuration: 1 solenoid on side B.
2 positions (central + external)
with spring centreing



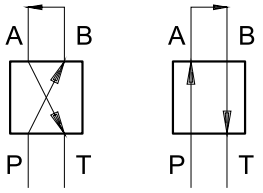
*	Controlled flow with Δp10 bar P-T
01	1 l/min
04	4 l/min
08	8 l/min
16	16 l/min
26	26 l/min

3 - CHARACTERISTIC CURVES

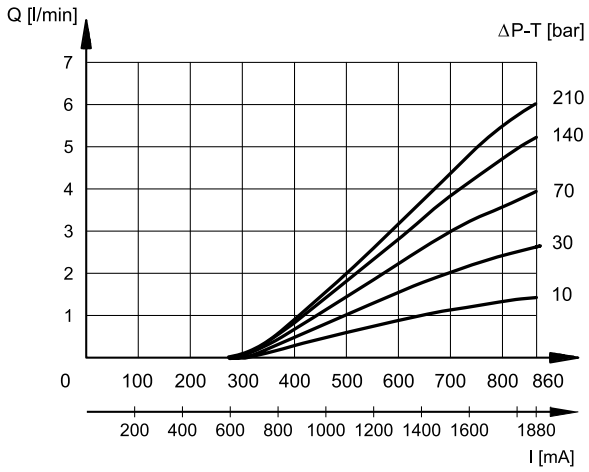
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

Typical constant flow rate control curves at Δp according to current supply to solenoid (D24 version, maximum current 860 mA), measured for the various spool types available.

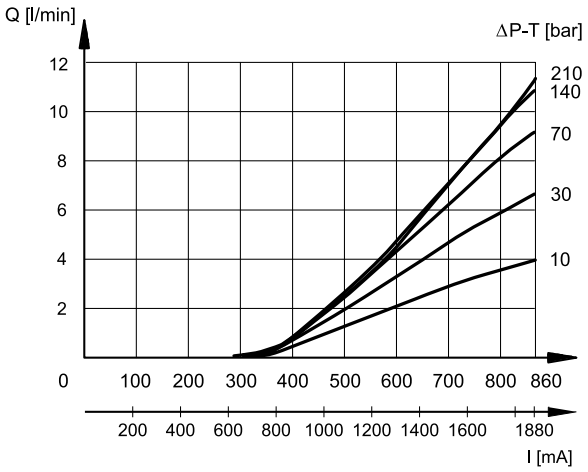
The reference Δp values are measured between ports P and T on the valve.



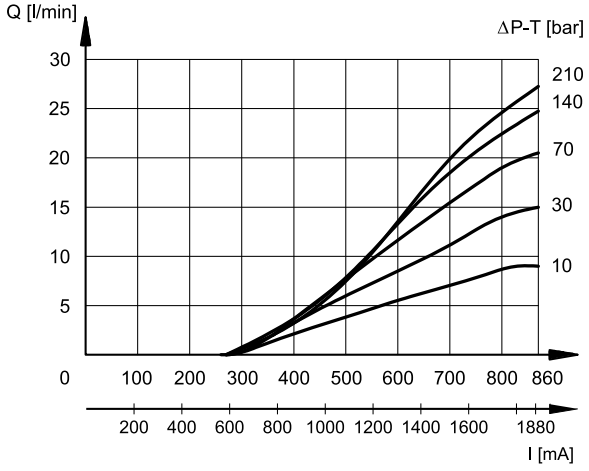
SPOOL TYPE C01/A01



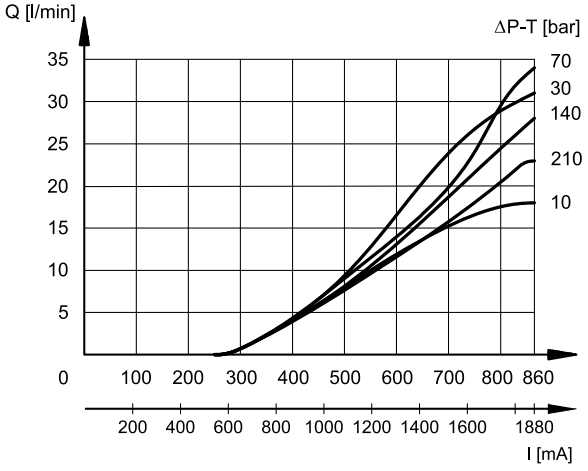
SPOOL TYPE C04/A04



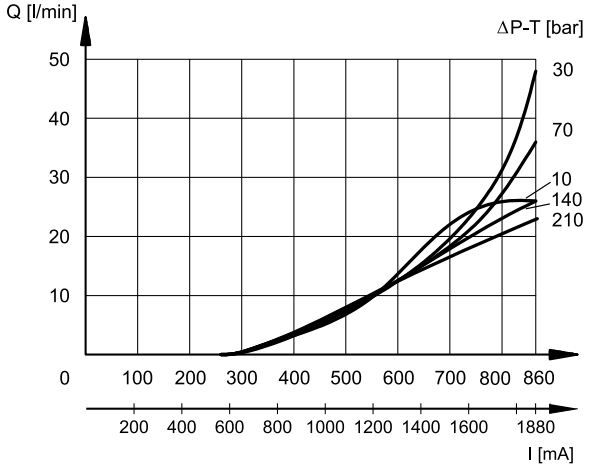
SPOOL TYPE C08/A08



SPOOL TYPE C16/A16



SPOOL TYPE C26/A26



4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil. The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut. It can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	4,4	18,6
MAXIMUM CURRENT	A	1,88	0,86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	according to 2014/30/EU		
CLASS OF PROTECTION coil insulation (VDE 0580) impregnation	class H class F		

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.

electric connection	electric connection protection	whole valve protection
K1 EN 175301-803 (ex DIN 43650)	IP65	IP65
K7 DEUTSCH DT04 male	IP65/67	

5 - 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 setted positioning value, following a step change of reference signal.

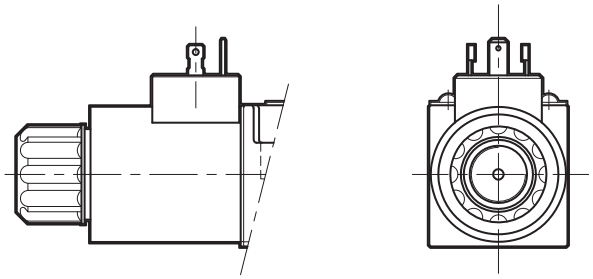
The table shows typical response times tested with spool type C16 and Δp = 30 bar P-T.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	50	40

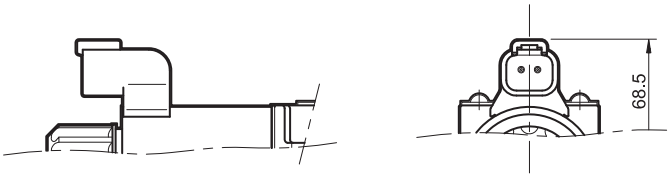
6 - ELECTRIC CONNECTIONS

Connectors for K1and WK1 connections are always delivered together with the valve.

connection for EN 175301-803 connector
code **K1** (**standard**)
code **WK1** (W7 version only)



connection for
DEUTSCH DT06-2S male connector
code **K7**

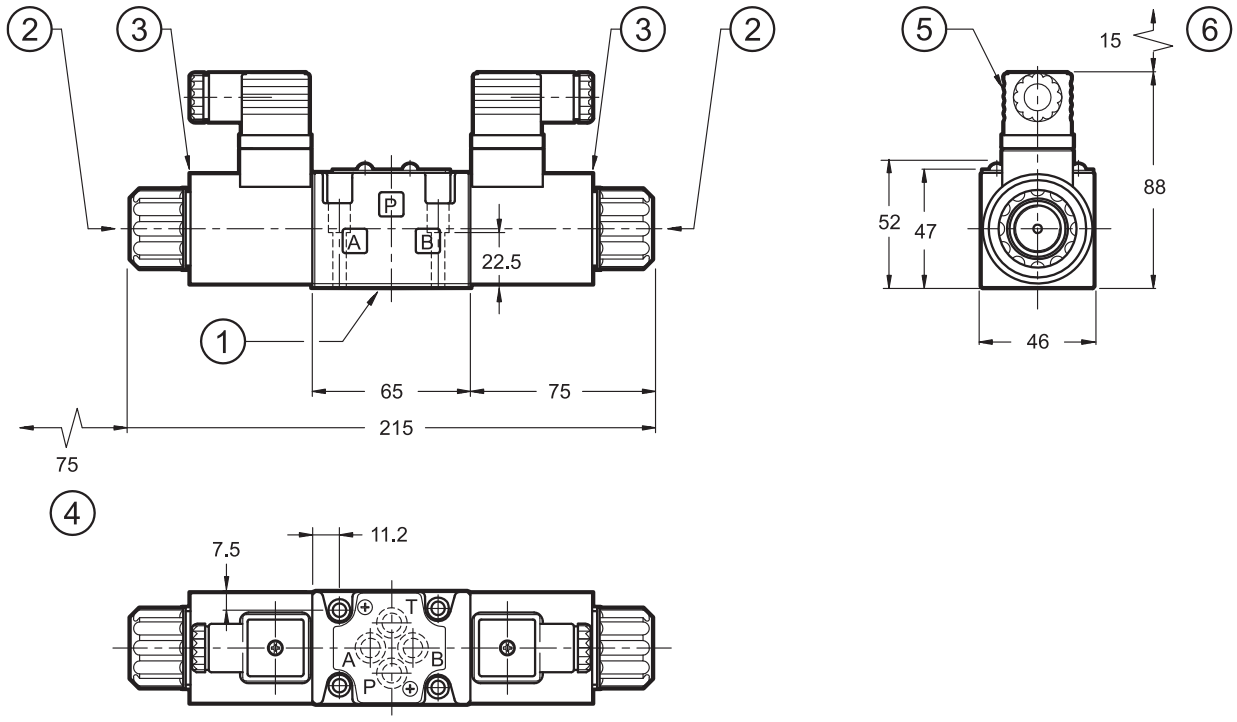


connection for
DEUTSCH DT06-2S male connector
code **WK7** (W7 version only)

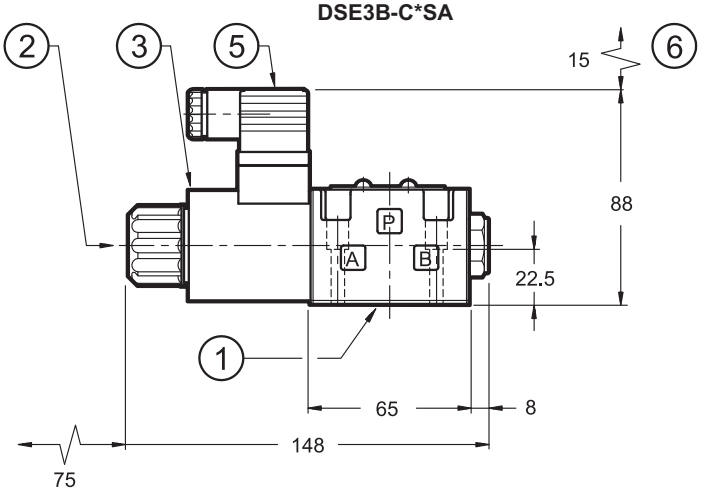
7 - OVERALL AND MOUNTING DIMENSIONS

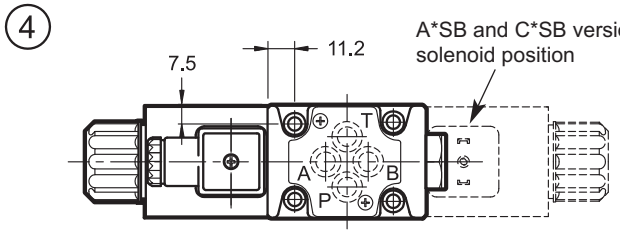
dimensions in mm

DSE3B-A*
DSEB3-C*



DSE3B-A*SA
DSE3B-C*SA





Fastening bolts: 4 SHCS M5x30 - ISO 4762	
Torque: 5 Nm (A 8.8)	
Threads of mounting holes : M5x10	
Locking ring tightening torque: 5 ± 0.5 Nm	

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Standard manual override integrated in the solenoid tube **NOTE**: The valve version with high IP and high corrosion resistance fits the CM manual override as standard See the CM dimensions in par. 8
3	Coil (360° revolving)
4	Coil removal space
5	EN 175301-803 (ex DIN 43650) electric coil connector
6	Connector removal space

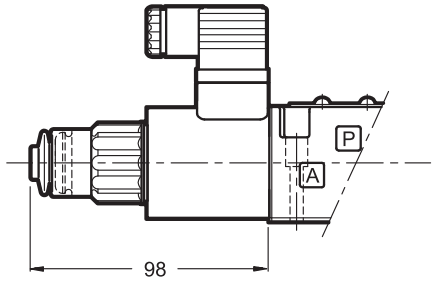
8 - MANUAL OVERRIDE

These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

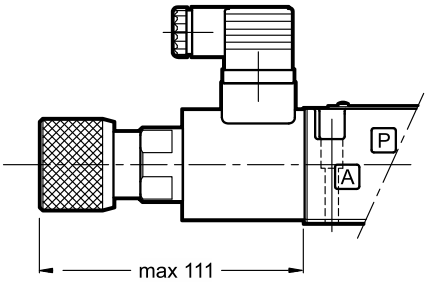
Three different manual override version are available upon request:

- **CM** version, manual override boot protected.
- **CK1** version, turning knob override.
- **CS** version, with metal ring nut provided with a M8 screw and a blocking locknut to allow the continuous mechanical operations.

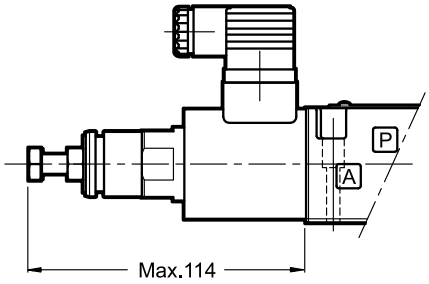
CM Version - Code: 3401150006



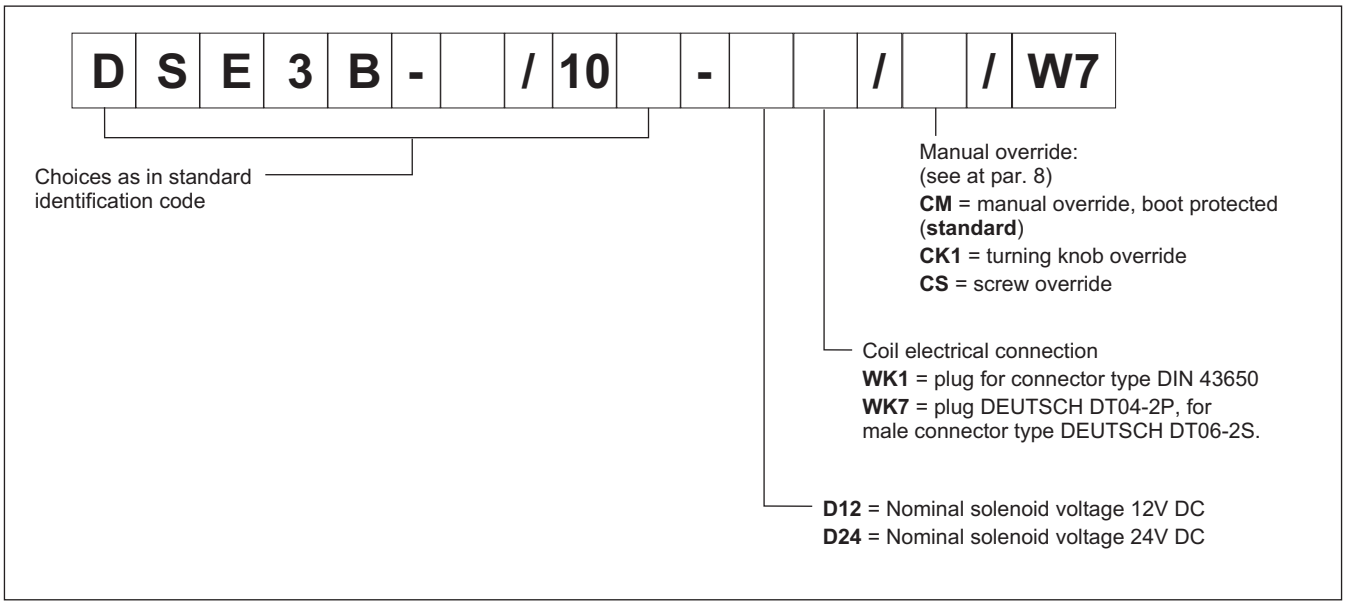
CK1 Version - Code: 3401150021



CS Version - Code: 3803210006



9 - HIGH IP AND CORROSION RESISTANCE VERSION



9.1 - Corrosion resistance

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600** hours (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The boot protected manual override is fitted as standard in order to protect the solenoid tube. See the dimensions of the CM manual override in par. 8.

9.2 - Coils

The coils feature a zinc-nickel surface treatment. The electrical characteristics do not change compared to the standard version: see table in par. 4

9.3 - Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree correctly connected and installed.

electric connection	electric connection protection	whole valve protection
WK1 EN 175301-803 (ex DIN 43650)	IP66	IP66
WK7 DEUTSCH DT04 male	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(*) The IP69K protection degree is not taken into account in IEC 60529 but it is included in ISO 20653.

NOTE: As regards the liquid ingress protection (second digit), there are three means of protection.

Codes from 1 to 6 are related to water jets.

Rates 7 and 8 are related to immersion.

Rate 9 is reserved for high pressure and temperature water jets.

This means that IPX6 covers all the lower steps, rate IPX8 covers IPX7 but not IPX6 and lower, instead IPX9 does not cover any of them.

Whether a device meets two types of protection requirements it must be indicated by listing both the tests separated by a slash.

(E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).

10 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids like HL or HM type, according to ISO 6743-4. With this kind of fluids, use NBR seals type (code N). For HFDR fluids type (phosphate esters) use FPM seals (code V). For use with other kind of fluids 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.

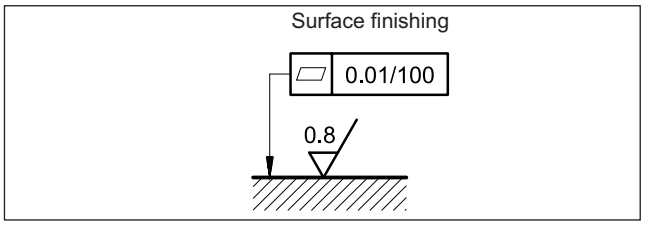
11 - INSTALLATION

DSE3B valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

Valves are fixed by means of screws or tie rods on a lapped surface with planarity and roughness equal to or better than those indicated in the symbol.

If minimum values of planarity or smoothness are not observed, fluid leakages between valve and mounting surface can easily occur.



12 - ELECTRONIC CONTROL UNITS

DSE3B - * * SA (SB)

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

DSE3B - A* **DSE3B - C***

EDM-M212	for solenoids 24V DC	rail mounting DIN EN 50022	see cat. 89 251
EDM-M242	for solenoids 12V DC		

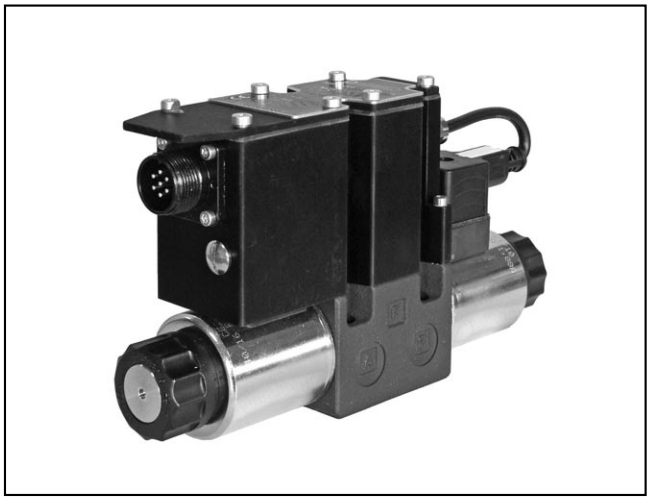
13 - SUBPLATES

(see catalogue 51 000)

Type PMMD-AI3G ports on rear (3/8” BSP threaded)
Type PMMD-AL3G side ports (3/8” BSP threaded)

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



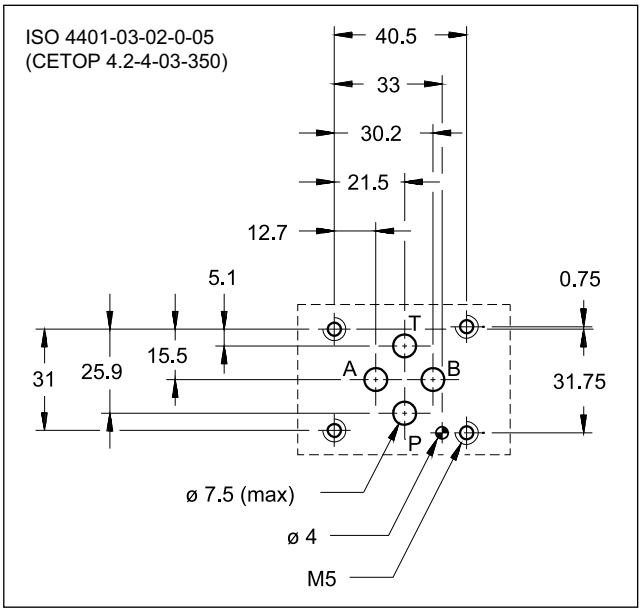
DSE3G*

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL AND DIGITAL INTEGRATED ELECTRONICS

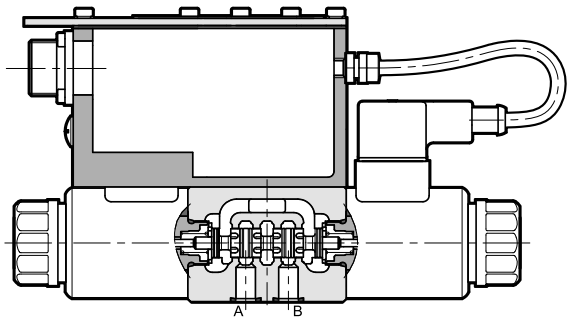
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The DSE3G* are proportional directional valves, direct operated, with digital integrated electronics and with mounting interface according to ISO 4401-03 standards.

— They control the positioning and the speed of hydraulic actuators.

— They are available with different types of electronics, with analogue or fieldbus interfaces.

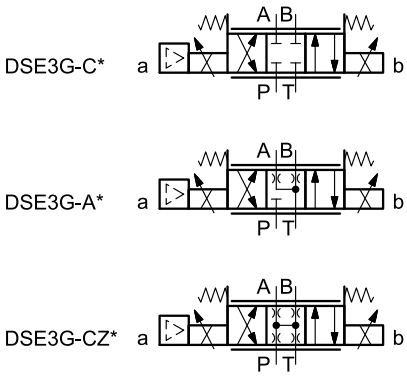
— The valves are easy to install. The driver manages digital settings directly.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

Max operating pressure: - P - A - B ports - T port	bar	 350 210
Nominal flow with Δp 10 bar P-T	l/min	1 - 4 - 8 - 16 - 26
Response times	see paragraph 6	
Hysteresis	% of Q max	< 3%
Repeatability	% of Q max	< ±1%
Electrical characteristics	see paragraphs 3 and 4	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1.9 2.4

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODES AND CONFIGURATION

1.1 - Standard electronics

D	S	E	3	G	-				/	31		-		K11	

Direct operated directional control valve

Electric proportional control

Size ISO 4401-03

Standard electronics for open loop

Spool type:
C = closed centres
CZ = with software overstep of the overlap
A = open centres

Nominal flow rate (see par. 1.2)

Solenoid position (omit for 2 solenoids configuration):
SA = 1 solenoid on side A

Series No. (the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage ±10 V **E1** = current 4 ÷ 20 mA

Connection: 6 pin + PE

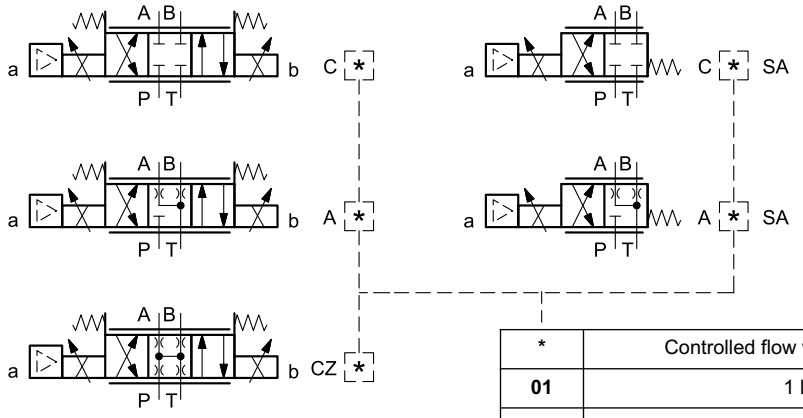
Pin C function:
A = external enable
B = internal enable
C = 0V monitor

1.2 - Configurations

Valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, rated flow.

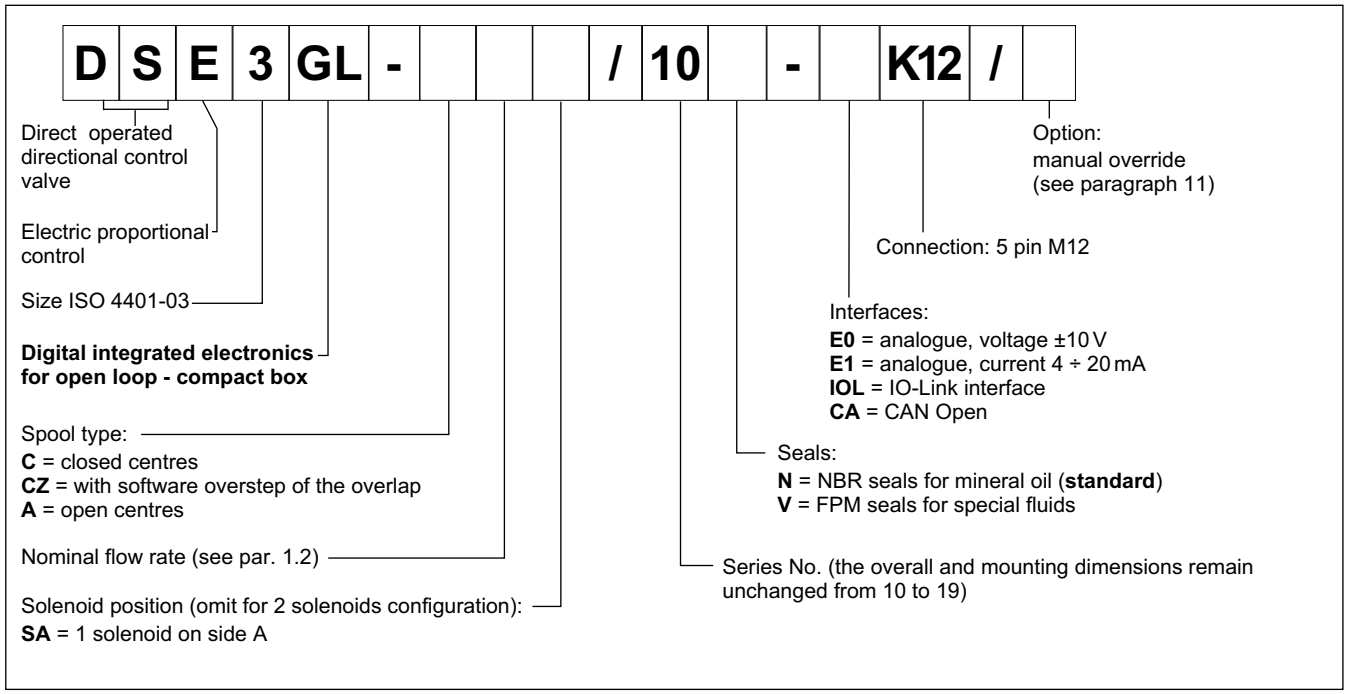
Configuration 2 solenoids :
3 positions with spring centreing

Configuration 1 solenoid on side A "**SA**":
2 positions (central + external) with spring centreing

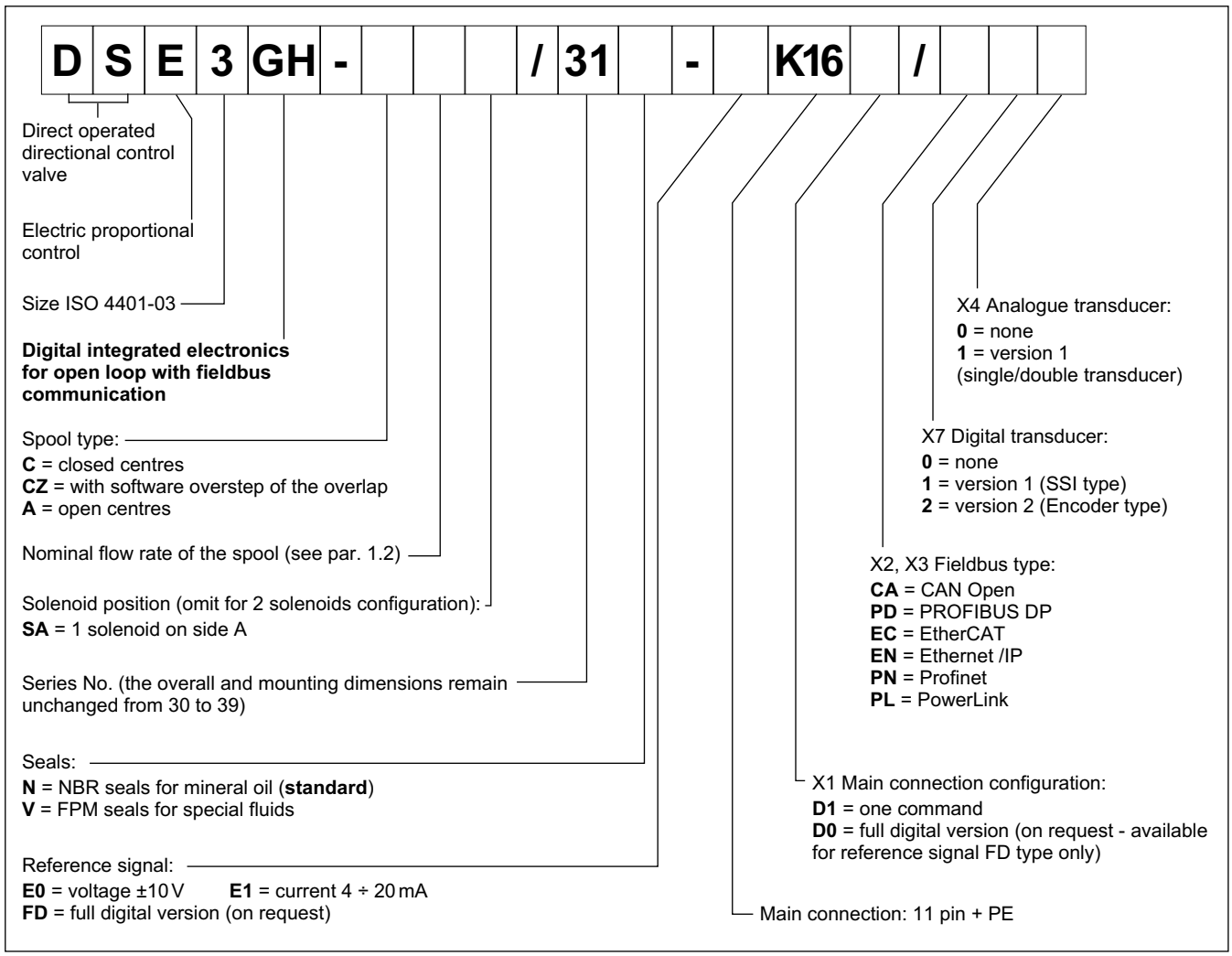


*	Controlled flow with Δp10 bar P-T
01	1 l/min
04	4 l/min
08	8 l/min
16	16 l/min
16/08	16 (P-A) / 08 (B-T) l/min
26	26 l/min
26/13	26 (P-A) / 13 (B-T) l/min

1.3 - Compact electronics



1.4 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	3
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

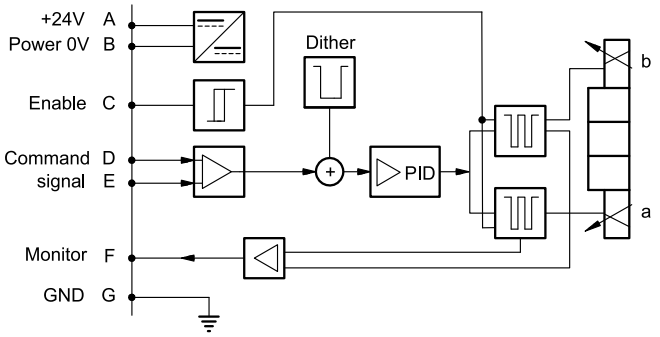
3 - DSE3G - STANDARD ELECTRONICS

3.1 - Electrical characteristics

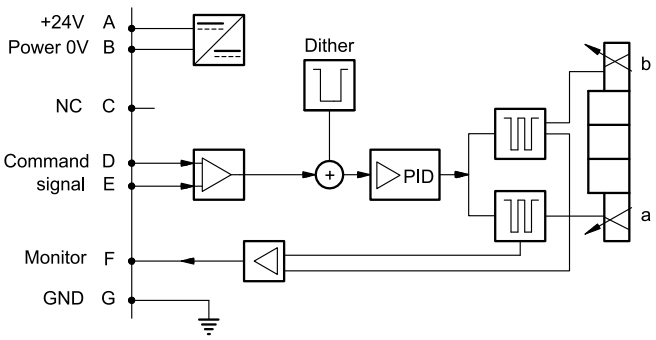
Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

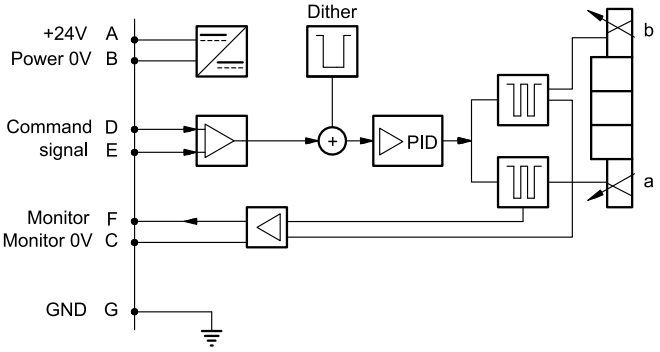
VERSION A - External Enable



VERSION B - Internal Enable

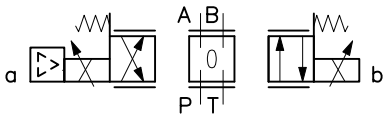


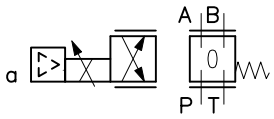
VERSION C - 0V Monitor



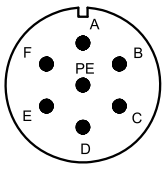
3.3 - Versions with voltage command (E0)

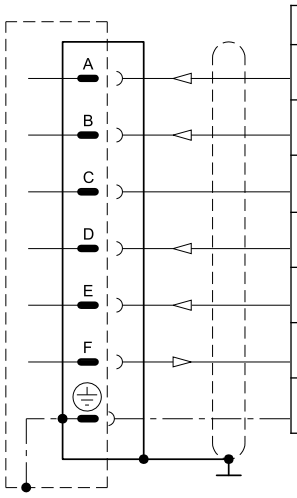
The reference signal is between -10V and +10V on double solenoid valve, and 0 ÷ 10V on single solenoid valve SA. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.





COMMAND	**-10V**	**0V**	**+10V**	**COMMAND**	**+10V**	**0V**
MONITOR	**-10V**	**0V**	**+10V**	**MONITOR**	**+10V**	**0V**



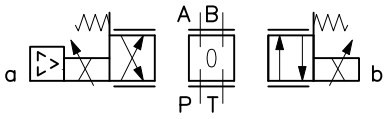


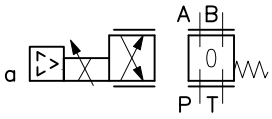
Pin	Values	version A	version B	version C
A	24 V DC	Supply voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

3.4 - Versions with current command (E1)

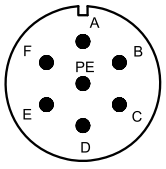
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient restoring the signal.

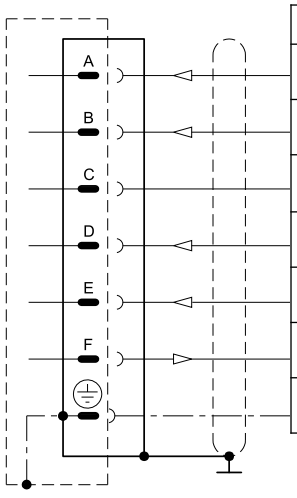
The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.





COMMAND	**4 mA**	**12 mA**	**20 mA**	**COMMAND**	**20 mA**	**4 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**	**MONITOR**	**20 mA**	**4 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - DSE3GL - COMPACT ELECTRONICS

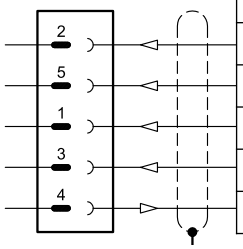
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	kBaud	IO-Link Port Class B 230,4
Can Open communication (CA): Data rate	kbit	10 ÷ 1000
Connection		5-pin M12 code A (IEC 61076-2-101)

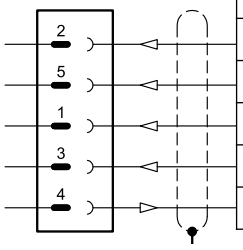
4.2 - Pin tables

'E0' connection



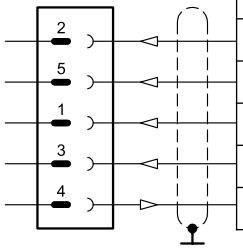
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



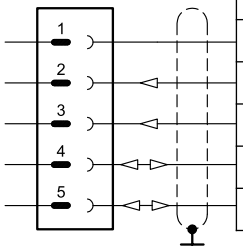
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - DSE3GH - FIELDBUS ELECTRONICS

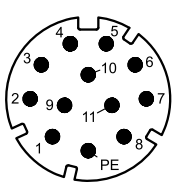
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

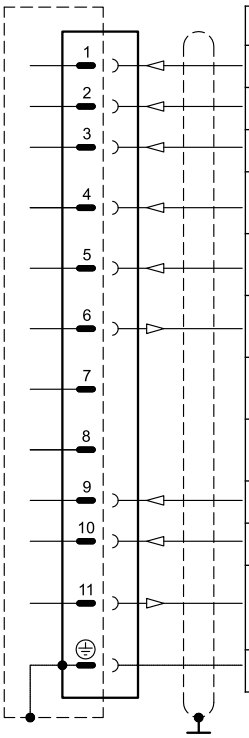
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

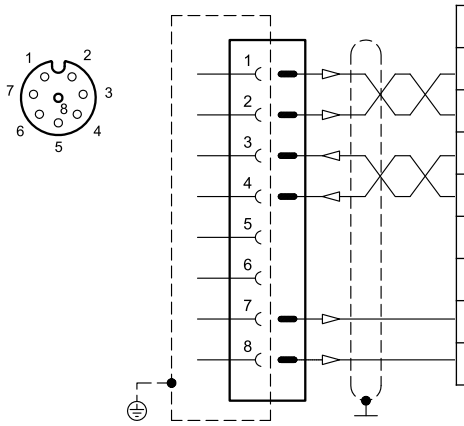
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

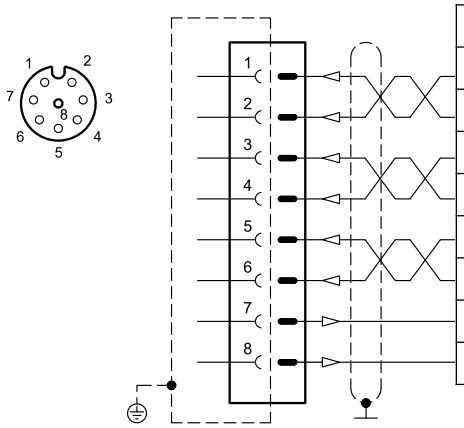
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



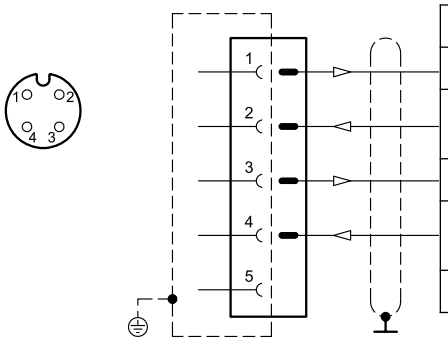
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



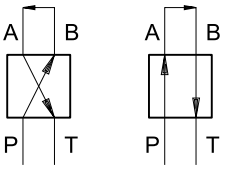
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

6 - CHARACTERISTIC CURVES

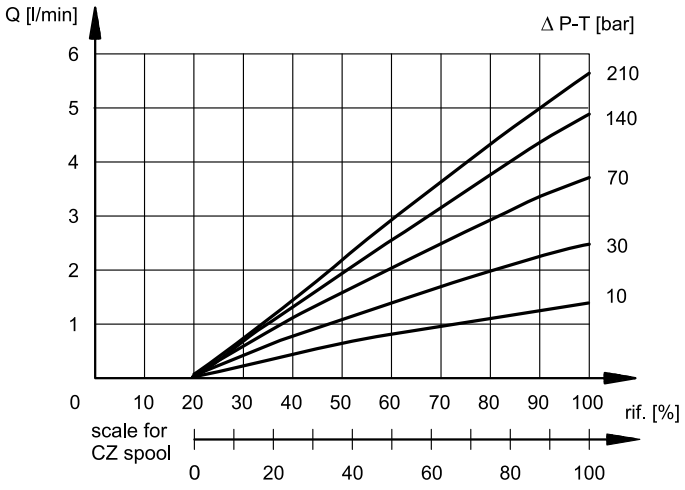
(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

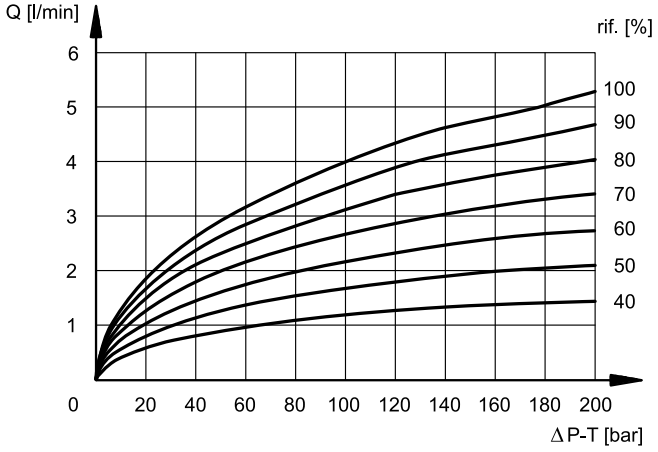
Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools. The Δp values are measured between P and T valve ports.

Curves obtained after linearization of the characteristic curve in factory, through the digital amplifier. The linearization of the curve is performed with a constant Δp of 5 bar and by setting the value of flow start at 20% of the reference signal.

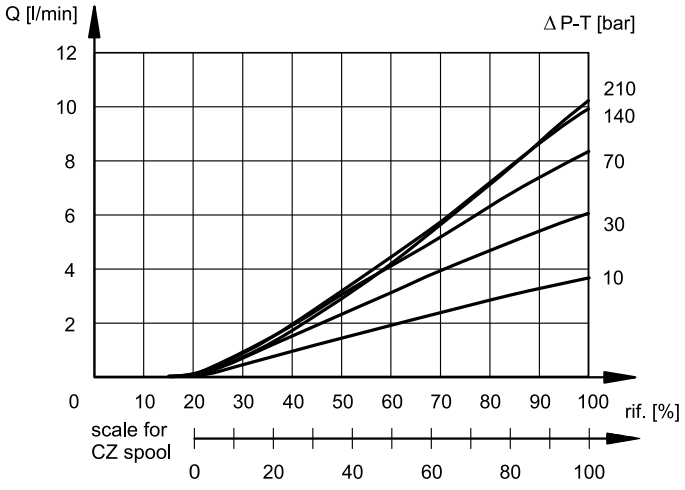


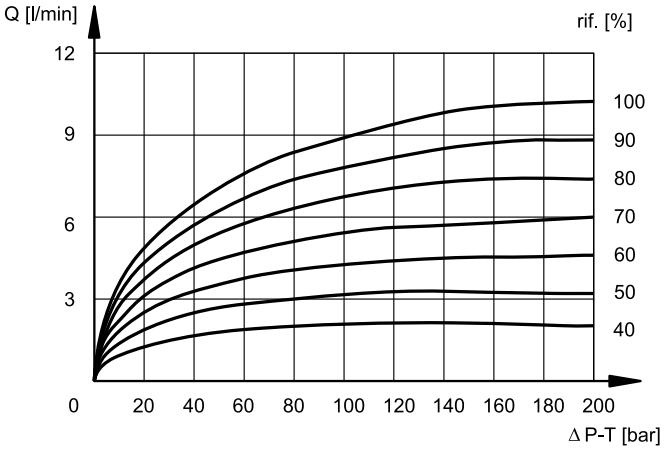
SPOOL TYPE C01/A01



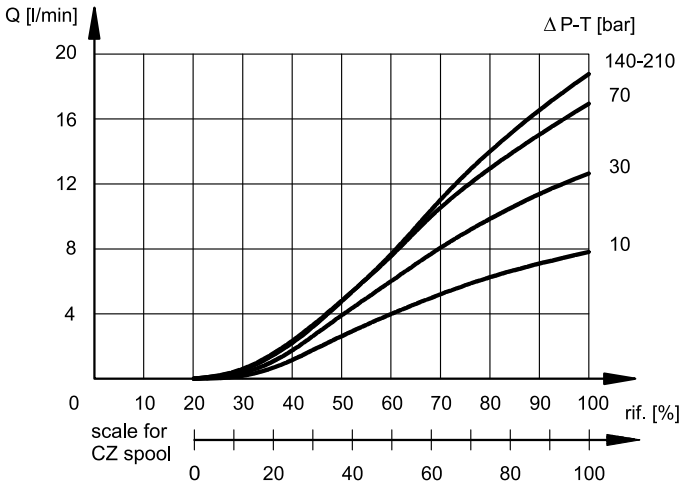


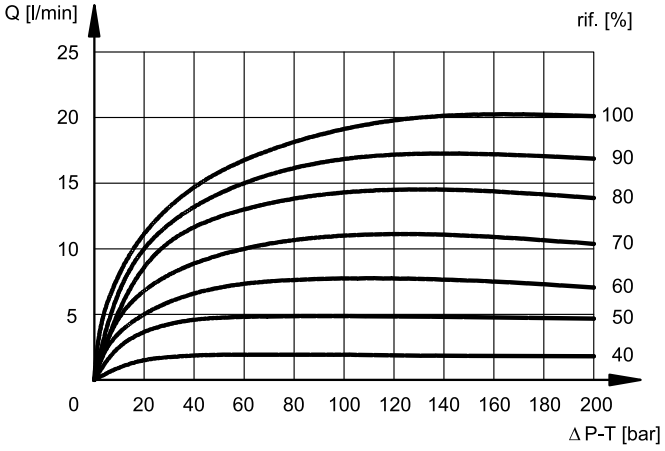
SPOOL TYPE C04/A04



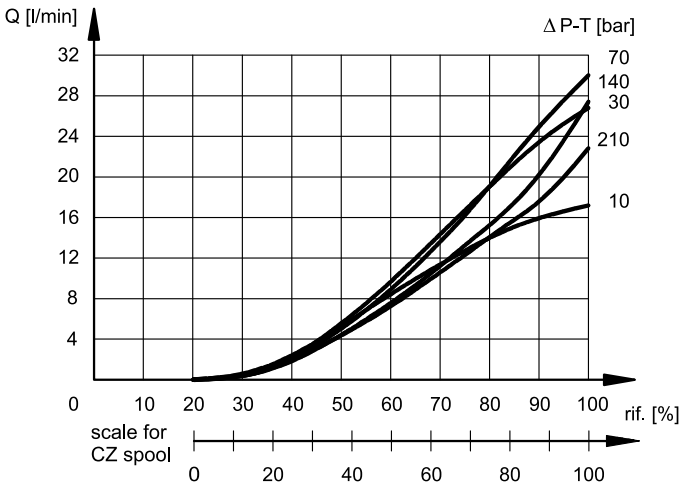


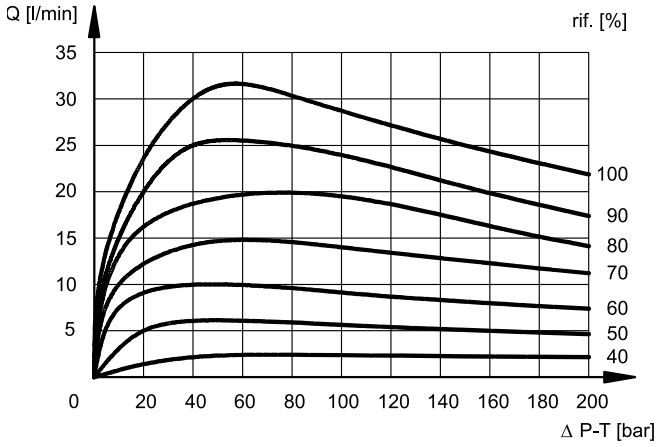
SPOOL TYPE C08/A08



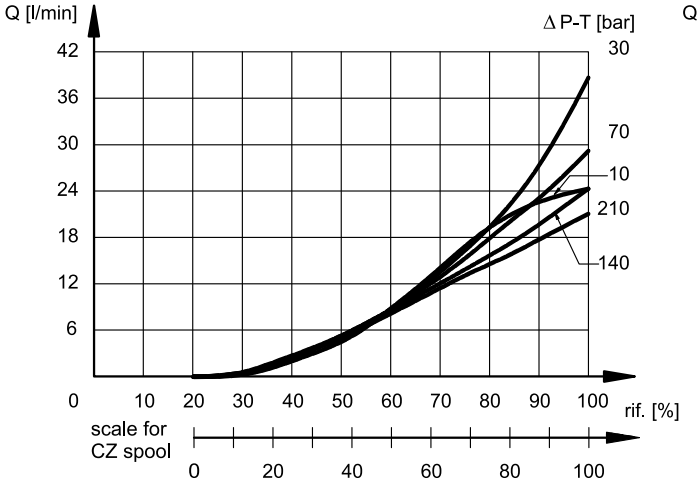


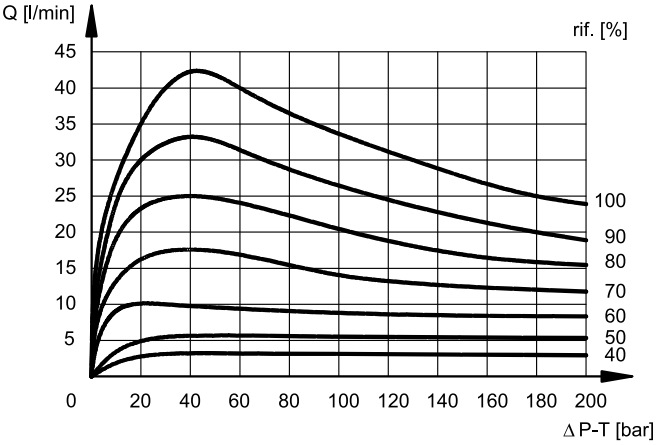
SPOOL TYPE C16/A16





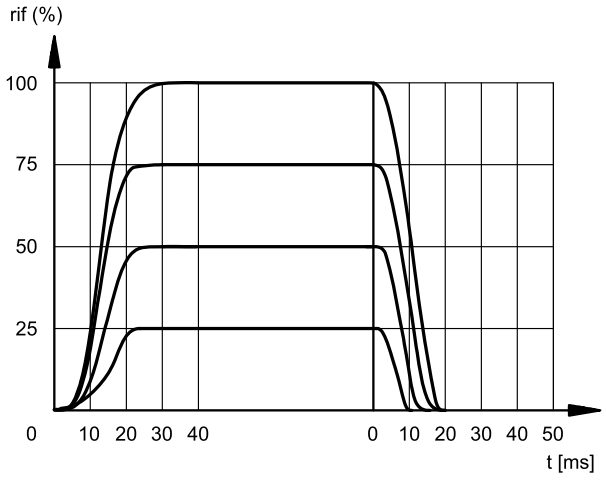
SPOOL TYPE C26/A26





7 - RESPONSE TIMES

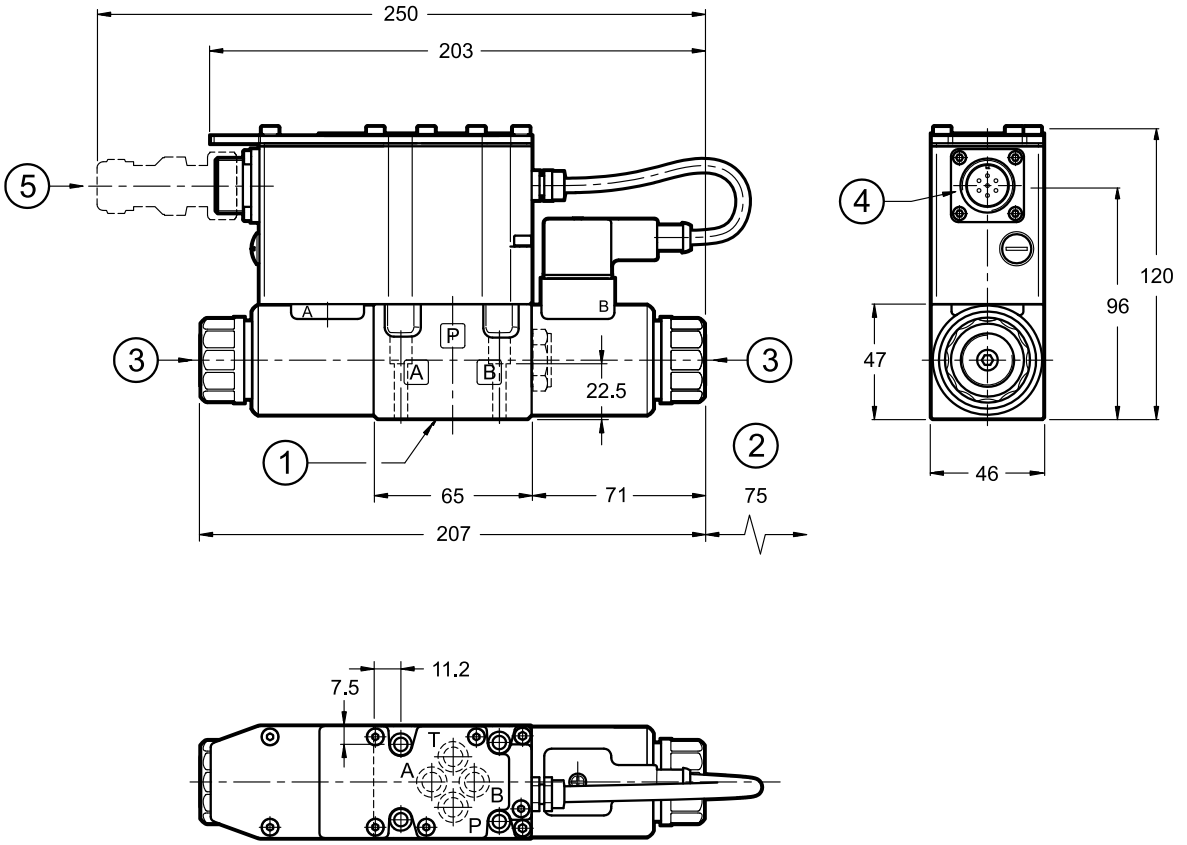
(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)



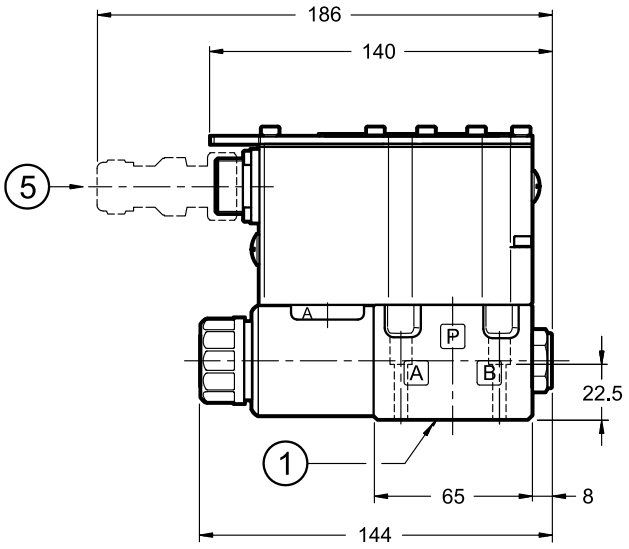
8 - DSE3G - OVERALL AND MOUNTING DIMENSIONS

DSE3G-/K11**

dimensions in mm



DSE3G-*SA/K11

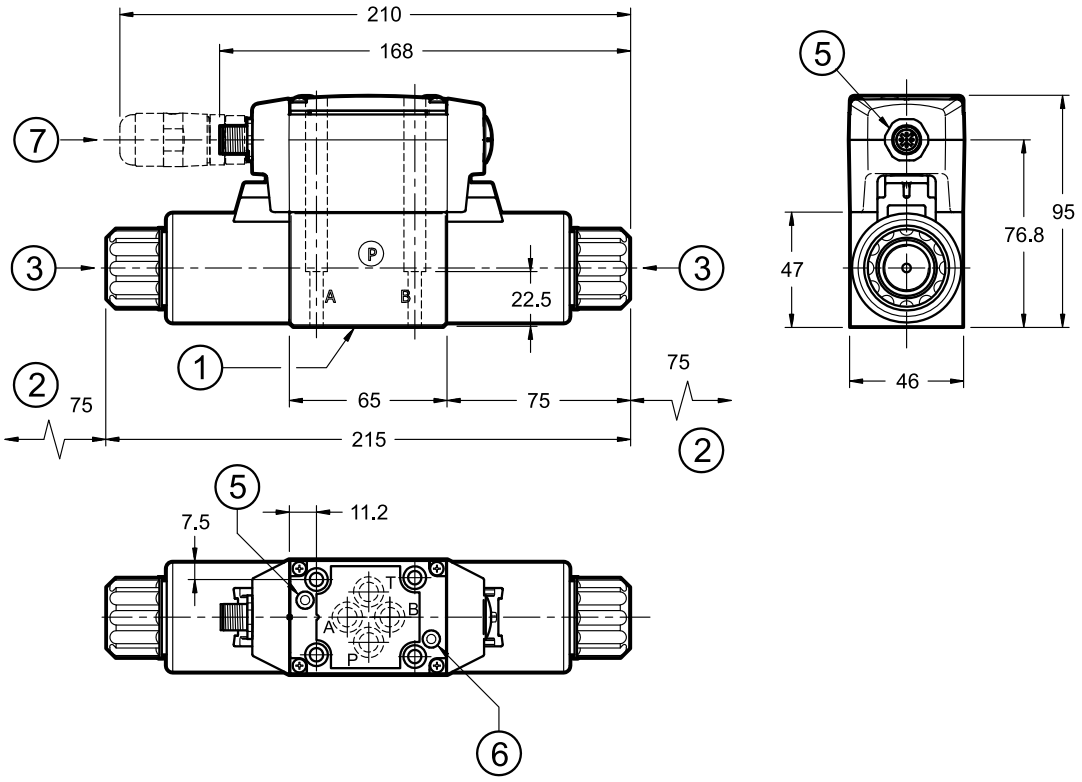


1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Manual override by pin embedded in the solenoid tube
4	Main connection 6 pin + PE
5	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000

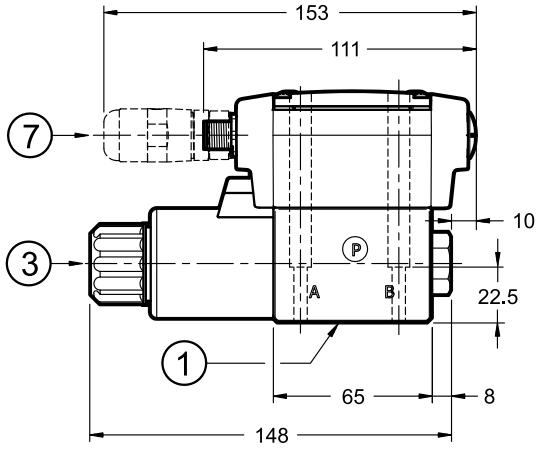
Fastening bolts: 4 bolts M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

9 - DSE3GL - OVERALL AND MOUNTING DIMENSIONS

DSE3GL-/K12**



DSE3GL-*SA/K12



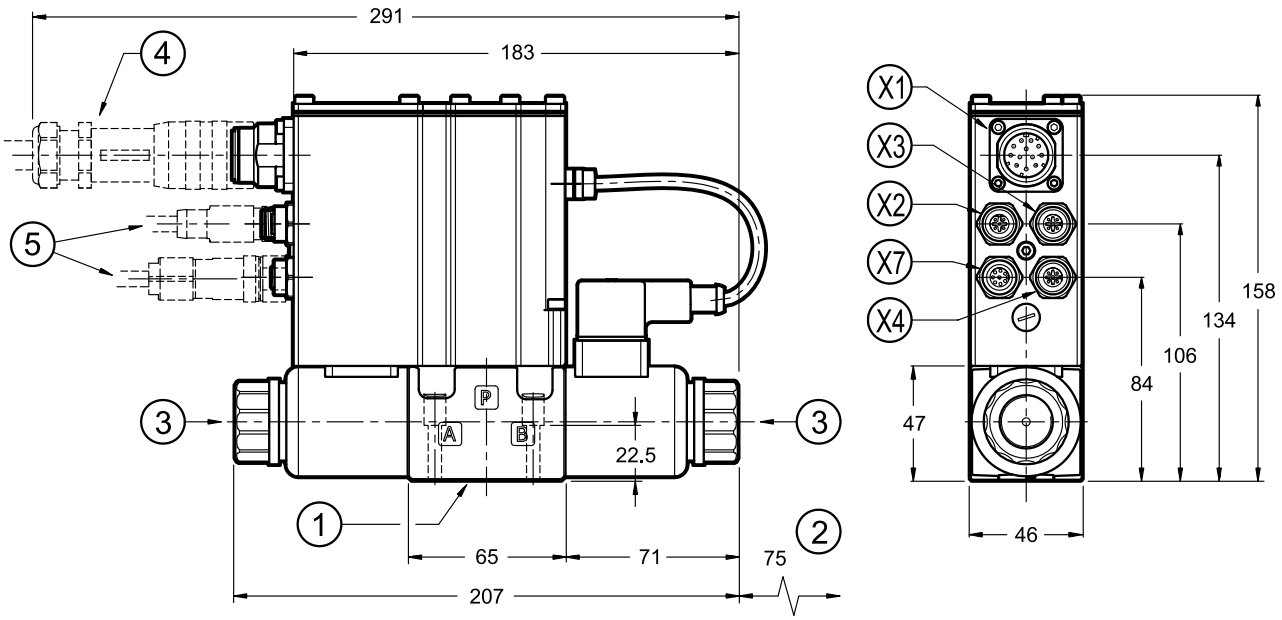
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space
3	Standard manual override embedded in the solenoid tube
4	Connection M12 A 5 pin
5	L1 LED
6	L2 LED
7	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 bolts M5x30- ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

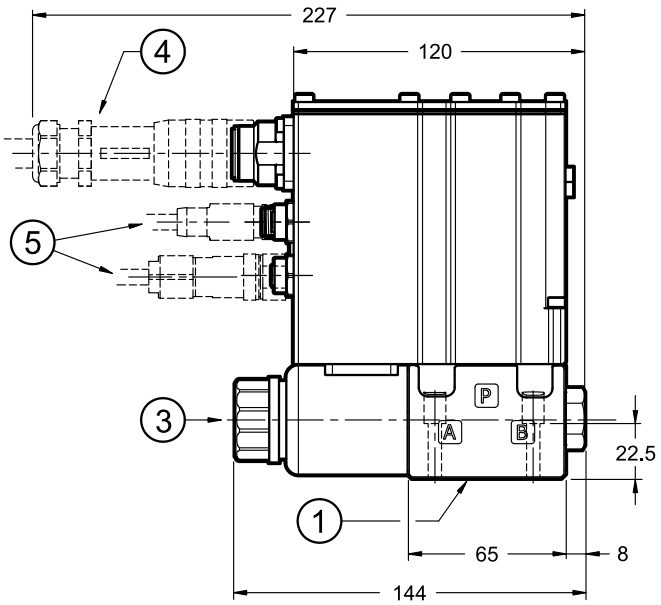
10 - DSE3GH - OVERALL AND MOUNTING DIMENSIONS

DSE3GH-/K16**

dimensions in mm



DSE3GH-*SA/K16



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Manual override by pin integrated in the solenoid tube
4	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
5	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 bolts M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

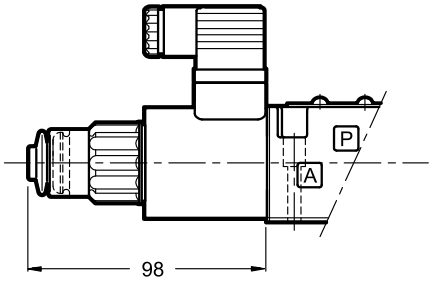
11 - MANUAL OVERRIDE

These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

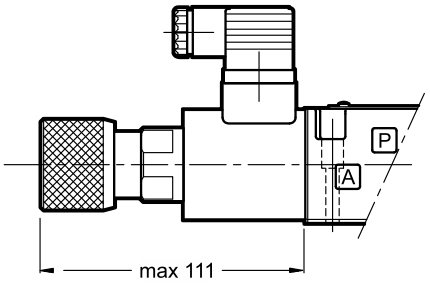
Three other types of manual overrides can fit the DSE3GL valve:

- **CM** version, manual override boot protected
- **CK1** version, turning knob override.
- **CS** version, with metal ring nut provided with a M8 screw and locknut.

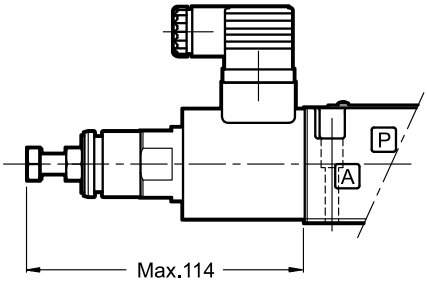
CM Version - Code: 3401150006



CK1 Version - Code: 3401150021



CS Version - Code: 3803210006



12 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

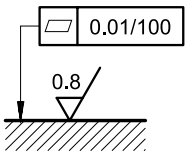
13 - INSTALLATION

DSE3G* valves can be installed in any position without impairing correct operation. Ensure that there is no air in the hydraulic circuit.

Valves are fixed by means of screws or tie rods on a lapped surface with planarity and roughness equal to or better than those indicated in the drawing.

If minimum values are not observed, fluid can easily leak between the valve and the mounting interface.

Surface finishing



14 - ACCESSORIES
(to be ordered separately)

14.1 - Mating connectors
Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

14.2 - Mating connectors for fieldbus communication and for sensors.
Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

14.3 - Connection cable
The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

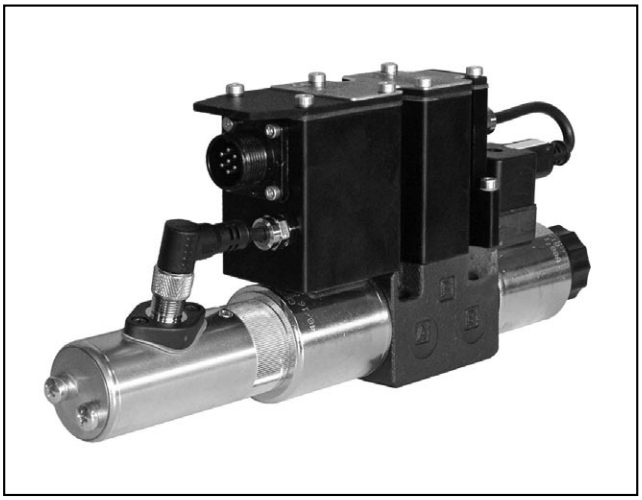
14.4 - Kit for start-up LINPC-USB
Device for service start-up and diagnostic, see catalogue 89 850.

15 - SUBPLATES
(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



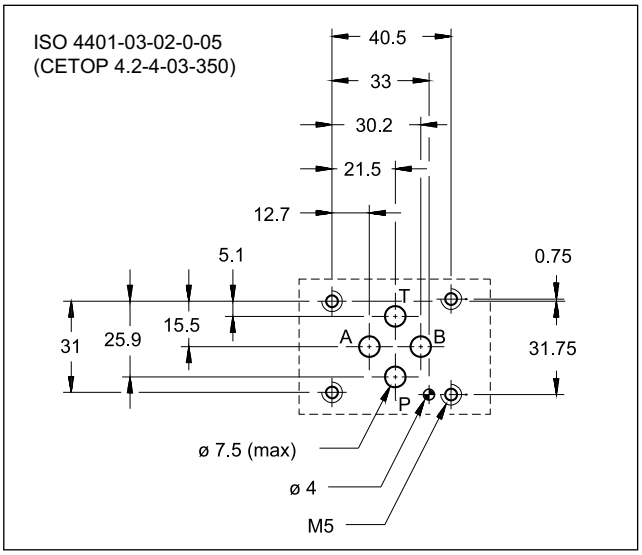
DSE3J*

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL, FEEDBACK AND INTEGRATED ELECTRONICS

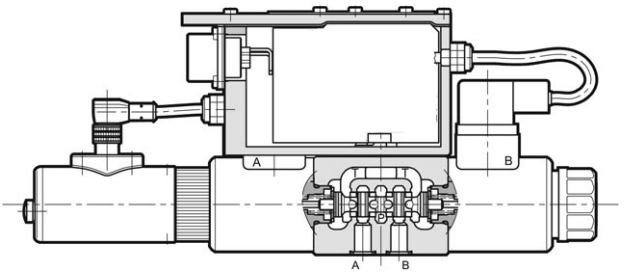
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **80** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The DSE3J* are proportional directional valves, direct operated, with closed loop position control. The mounting interface is in compliance with ISO 4401 standards.

— The valve opening and hence flow rate can be modulated continuously in proportion to the reference signal. Transducer and digital card allow a fine control of the spool position, reducing both hysteresis and response times and optimizing the valve performance.

— The valves are available with different types of electronics, with analogue or fieldbus interfaces.

— The fail safe function is available for spools type Z.

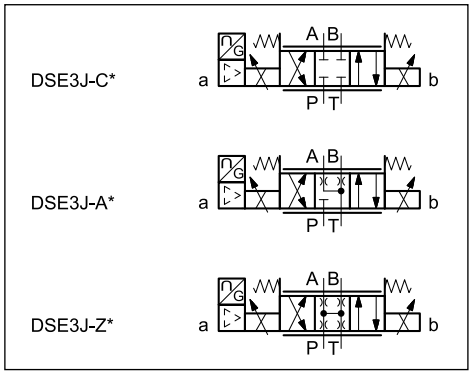
— Valves are easy to install. The driver manages digital settings directly.

PERFORMANCES

(Mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

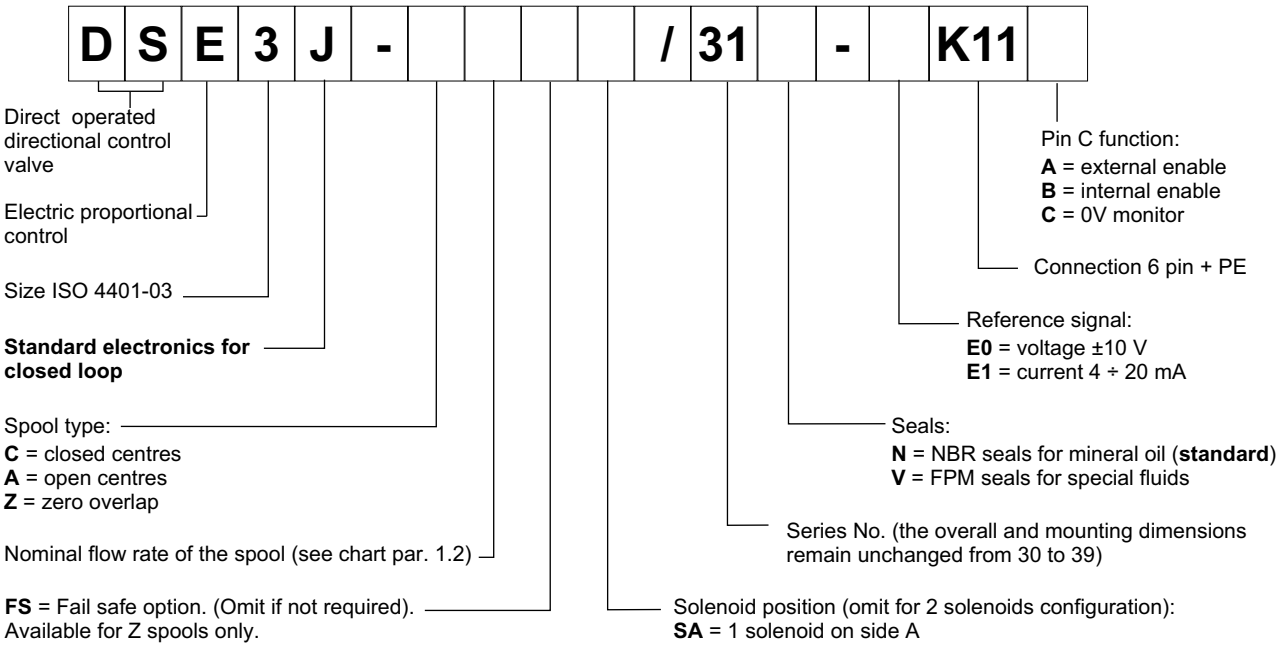
Max operating pressure: P - A - B ports T port	bar	350 210
Nominal flow with Δp 10 bar P-T	l/min	1 - 4 - 12 -18 - 30
Response times	see paragraph 7	
Hysteresis	% of Q_{max}	< 0.2%
Repeatability	% of Q_{max}	< 0.2%
Threshold		< 0.1%
Valve reproducibility		≤ 5%
Electrical characteristics	see paragraph 3	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	2.2 2.7

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

1.1 - Standard electronics



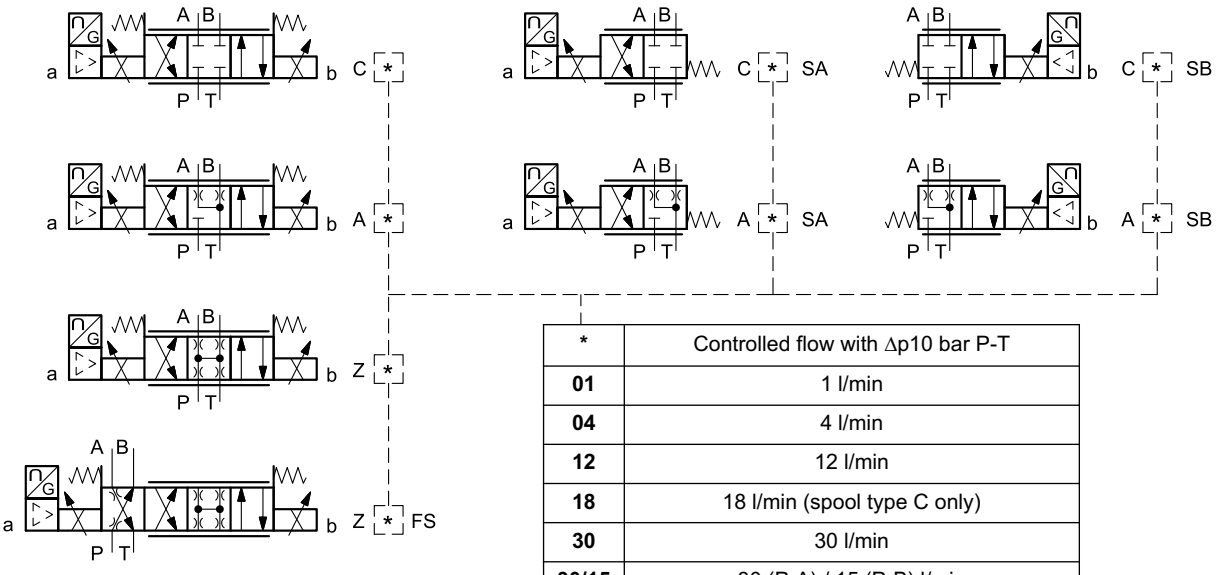
1.2 - Configurations

Valve configuration depends on the combination of the following elements: number of proportional solenoids, spool type, rated flow.

Configuration 2 solenoids :
3 positions with spring centering

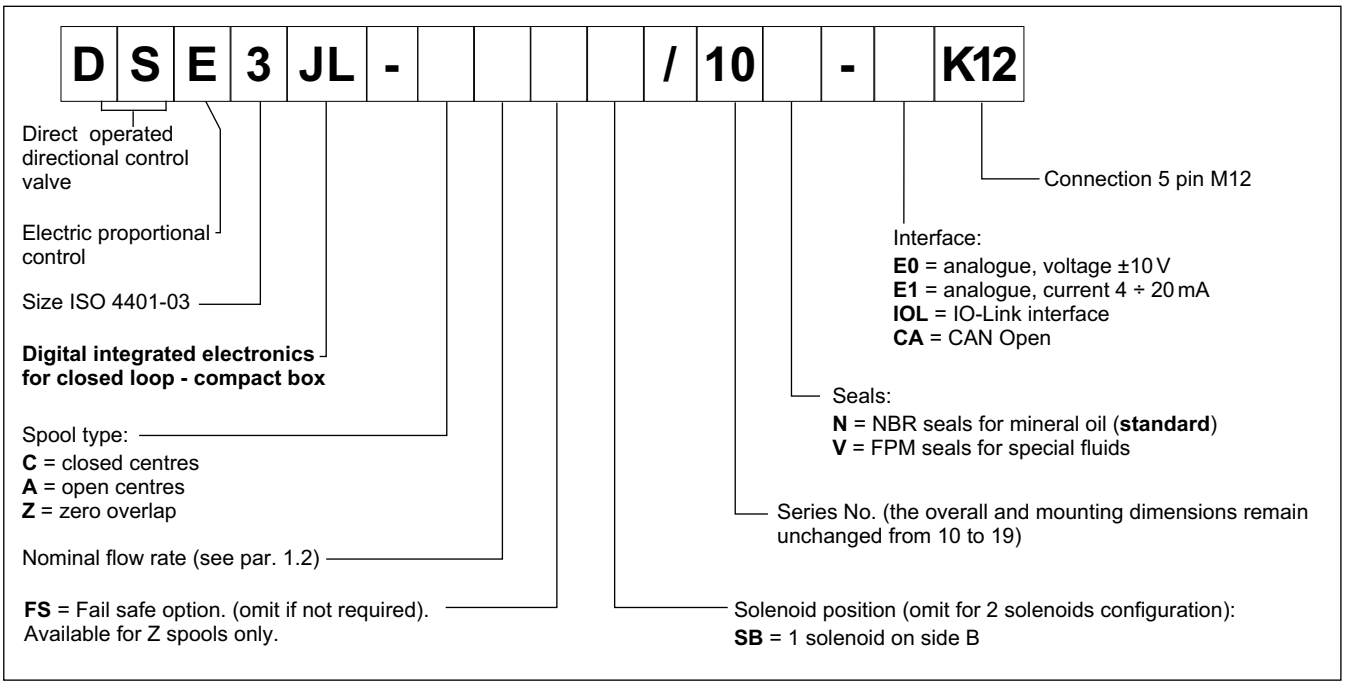
Configuration 1 solenoid on side A "**SA**":
2 positions (central + external)
with spring centering
(for DSE3J and DSE3JH only)

Configuration 1 solenoid on side B "**SB**":
2 positions (central + external)
with spring centering
(for DSE3JL only)

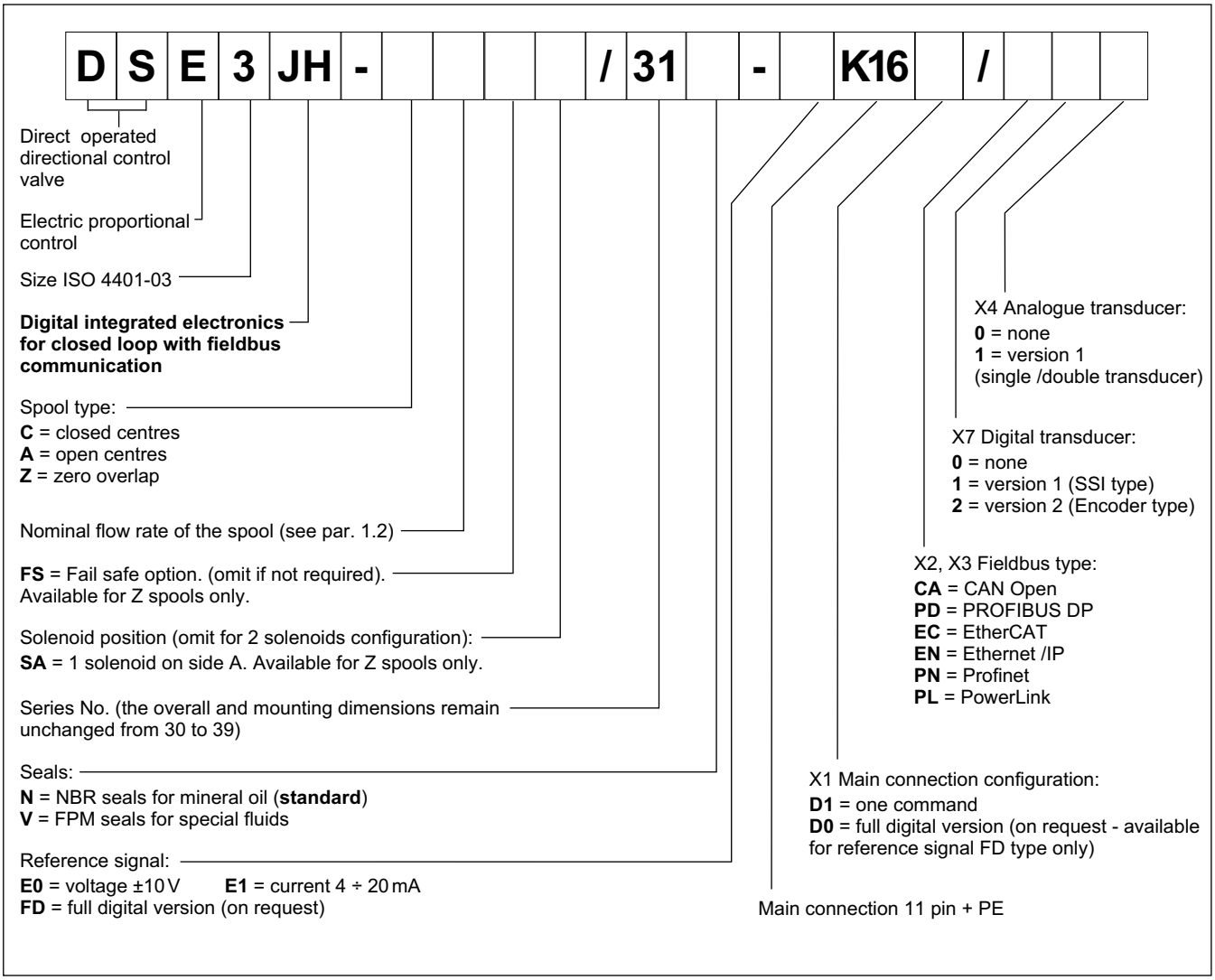


*	Controlled flow with Δp10 bar P-T
01	1 l/min
04	4 l/min
12	12 l/min
18	18 l/min (spool type C only)
30	30 l/min
30/15	30 (P-A) / 15 (P-B) l/min

1.3 - Compact electronics



1.4 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	3
Managed breakdowns		Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failure
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

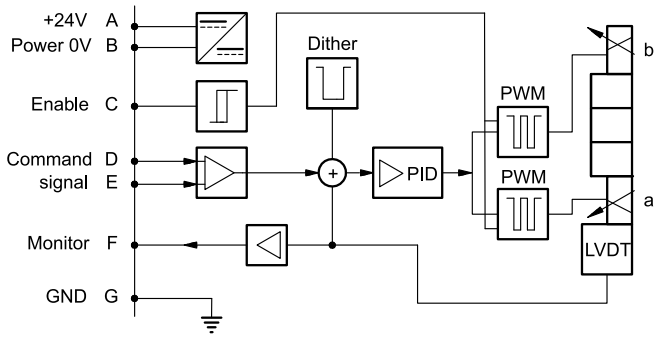
3 - DSE3J - STANDARD ELECTRONICS

3.1 - Electrical characteristics

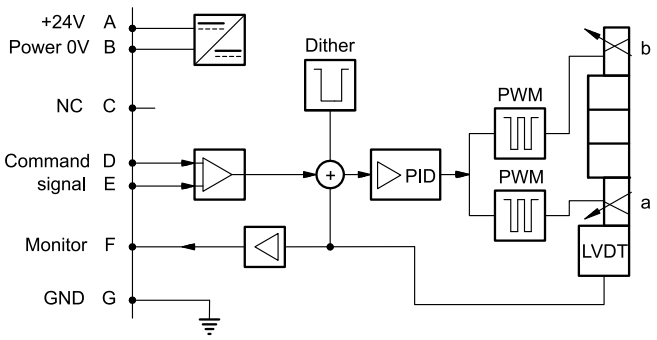
Command signal:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic			LIN-bus Interface (by means of the optional kit)
Connection			6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

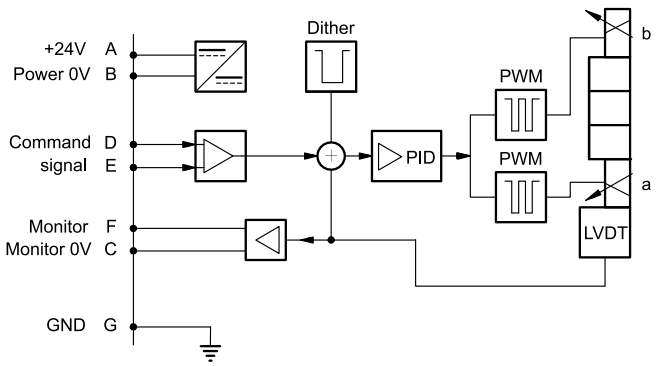
VERSION A - External Enable



VERSION B - Internal Enable

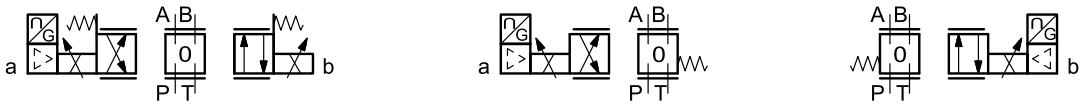


VERSION C - 0V Monitor

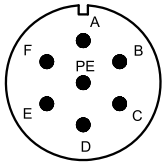


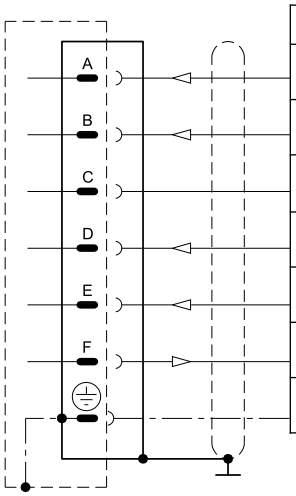
3.3 - Versions with voltage command (E0)

The reference signal is between -10V and +10V on double solenoid valve, and 0 ÷ 10V on single solenoid valve SA. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**		**+10V**	**0V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**		**+10V**	**0V**	**0V**	**+10V**



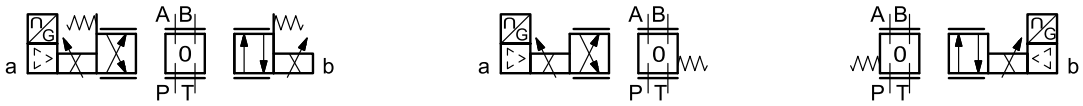


Pin	Values	version A	version B	version C
A	24 V DC	Supply voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

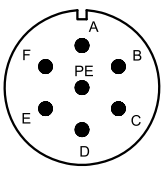
3.4 - Versions with current command (E1)

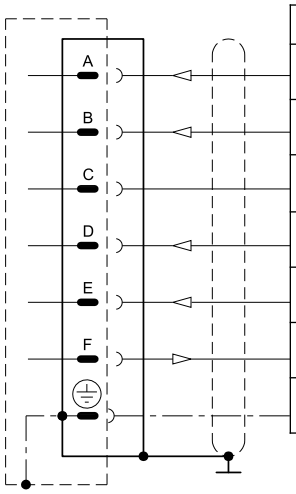
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**		**20 mA**	**4 mA**	**4 mA**	**12 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**		**20 mA**	**4 mA**	**4 mA**	**12 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - DSE3JL - COMPACT ELECTRONICS

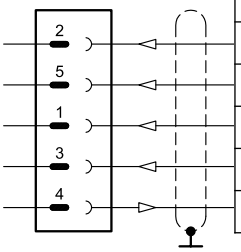
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cable is limited to 20 metres.

4.1 - Electrical characteristics

Command signal:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal:	voltage (E0) current (E1)	V DC mA	0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate		kBaud	IO-Link Port Class B 230,4
Can Open communication (CA): Data rate		kbit	10 ÷ 1000
Data register (IOL and CA versions only)			solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection			5-pin M12 code A (IEC 61076-2-101)

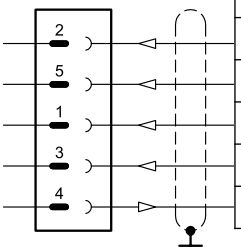
4.2 - Pin tables

'E0' connection



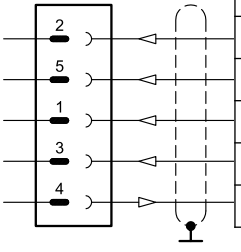
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



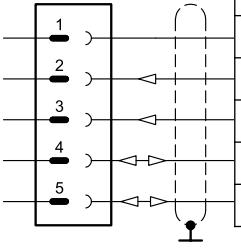
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - DSE3JH - FIELDBUS ELECTRONICS

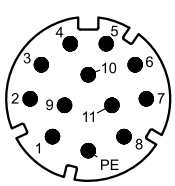
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

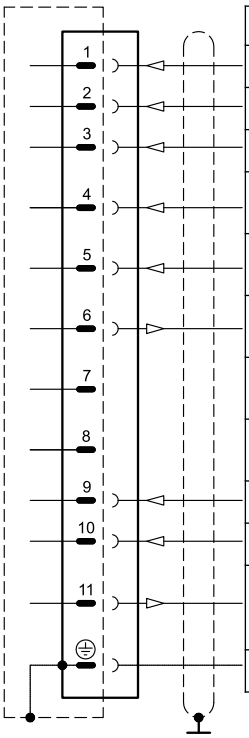
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal:	voltage (E0) current (E1) digital (FD)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic			via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink			 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink			 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection			11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

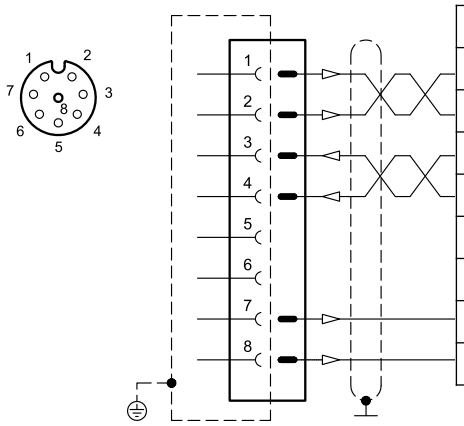
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

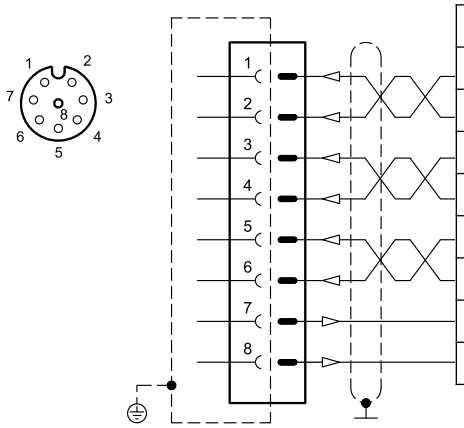
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



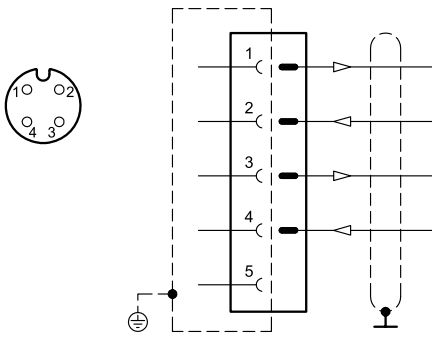
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)

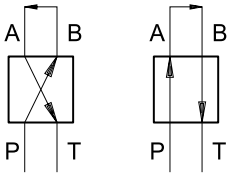


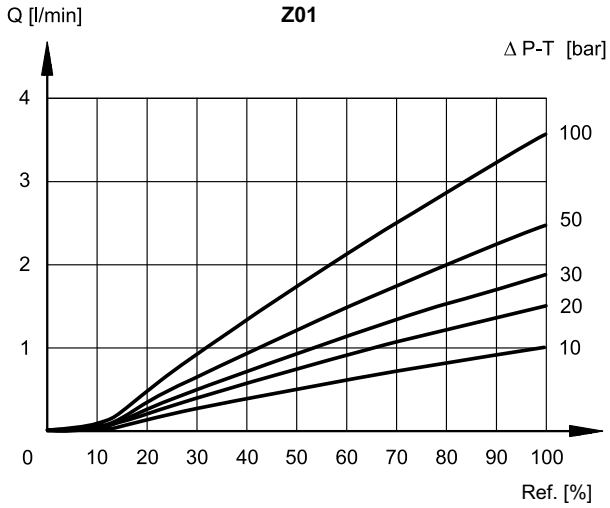
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

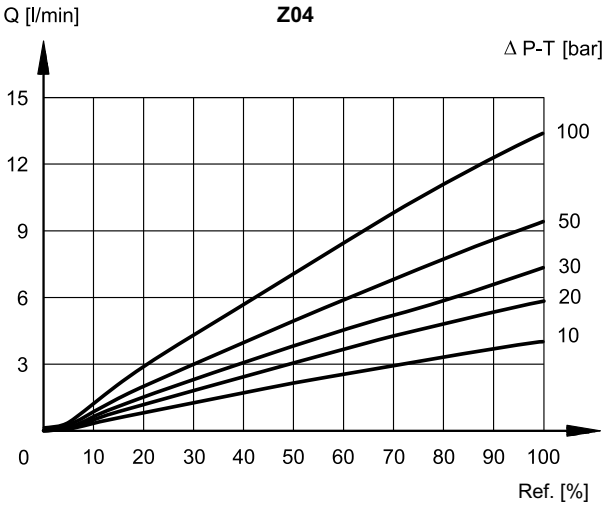
6 - CHARACTERISTIC CURVES

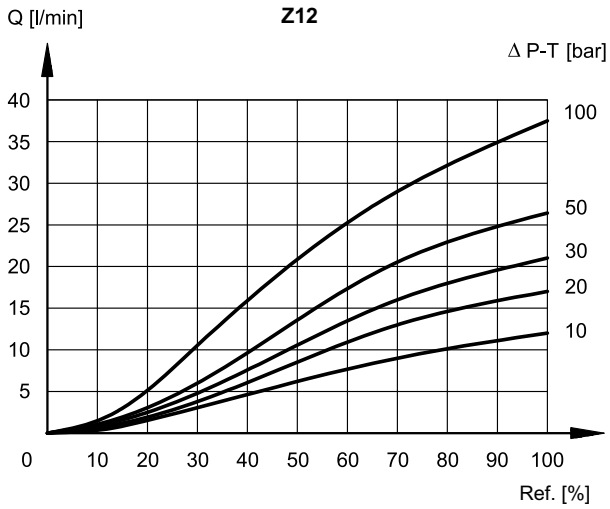
(obtained with mineral oil with viscosity of 36 cSt at 50°C and with digital integrated electronics)

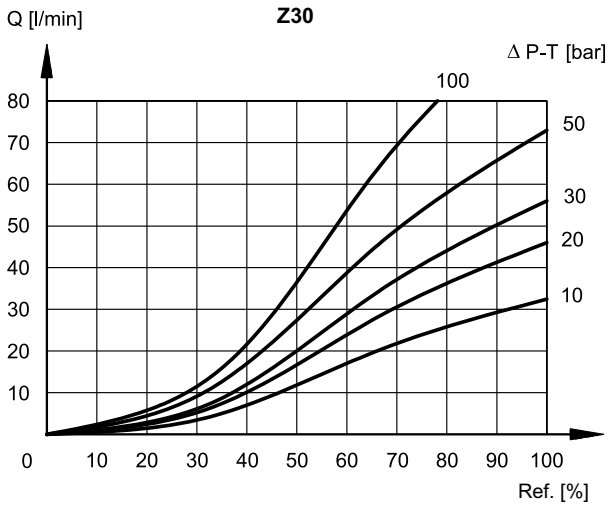
Typical flow rate curves related to the reference signal and measured for the available spools. The Δp values are measured between P and T valve ports.

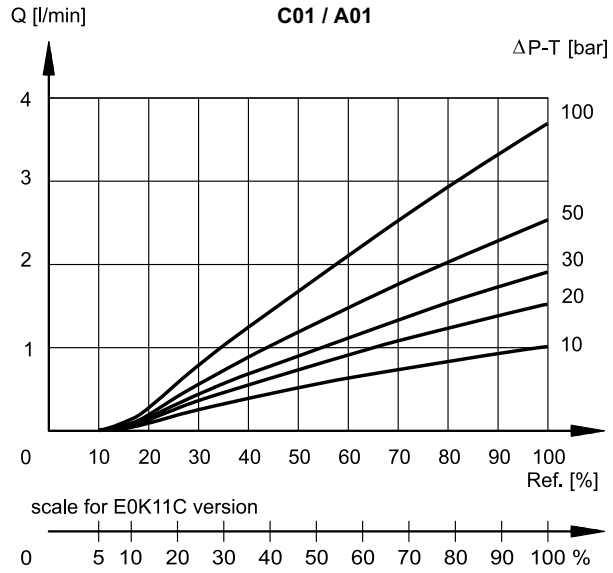


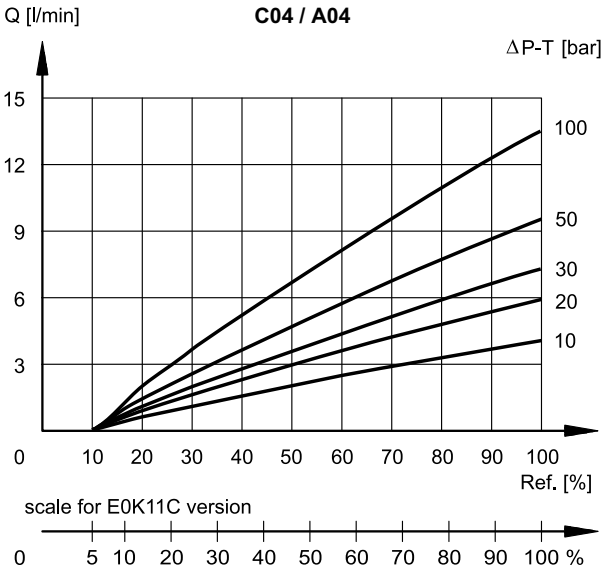


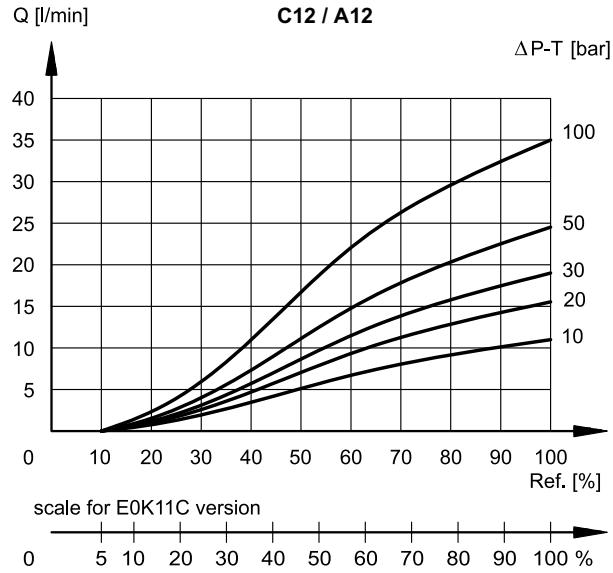


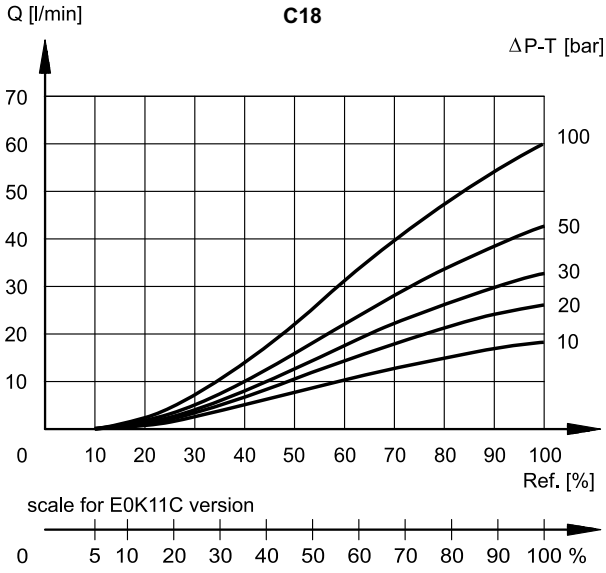


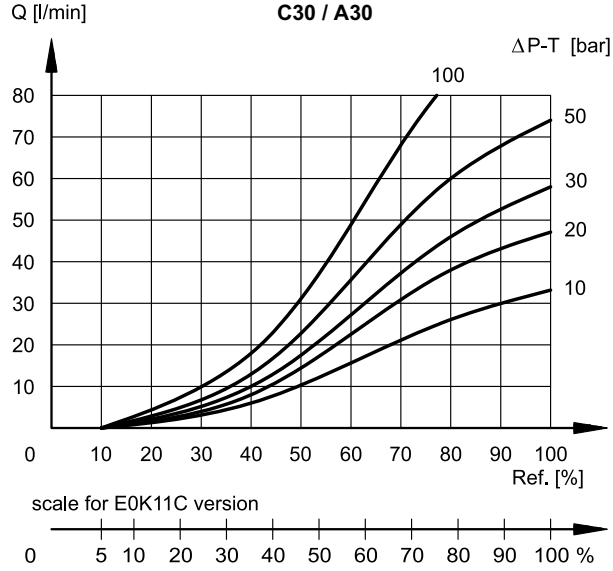



Q [l/min]
C01 / A01
ΔP-T [bar]
4
3
2
1
0
10 20 30 40 50 60 70 80 90 100
Ref. [%]
100
50
30
20
10
scale for E0K11C version
0 5 10 20 30 40 50 60 70 80 90 100 %

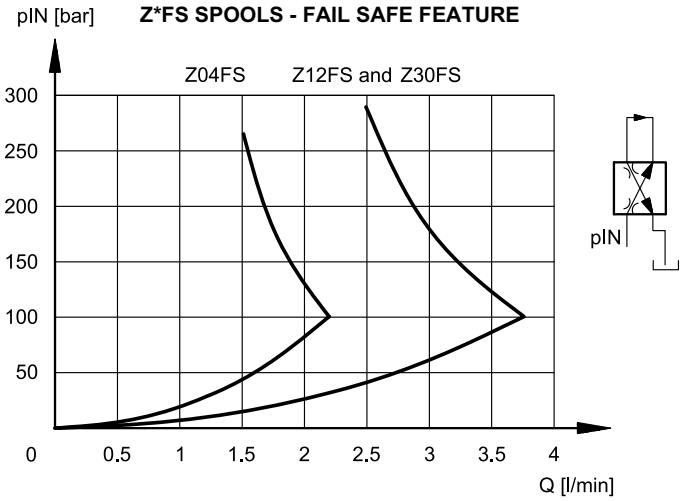

Q [l/min]
C04 / A04
ΔP-T [bar]
15
12
9
6
3
0
10 20 30 40 50 60 70 80 90 100
Ref. [%]
100
50
30
20
10
scale for E0K11C version
0 5 10 20 30 40 50 60 70 80 90 100 %


Q [l/min]
C12 / A12
ΔP-T [bar]
40
35
30
25
20
15
10
5
0
10 20 30 40 50 60 70 80 90 100
Ref. [%]
100
50
30
20
10
scale for E0K11C version
0 5 10 20 30 40 50 60 70 80 90 100 %


Q [l/min]
C18
ΔP-T [bar]
70
60
50
40
30
20
10
0
10 20 30 40 50 60 70 80 90 100
Ref. [%]
100
50
30
20
10
scale for E0K11C version
0 5 10 20 30 40 50 60 70 80 90 100 %


Q [l/min]
C30 / A30
ΔP-T [bar]
80
70
60
50
40
30
20
10
0
10 20 30 40 50 60 70 80 90 100
Ref. [%]
100
50
30
20
10
scale for E0K11C version
0 5 10 20 30 40 50 60 70 80 90 100 %

Z*FS SPOOLS - FAIL SAFE FEATURE

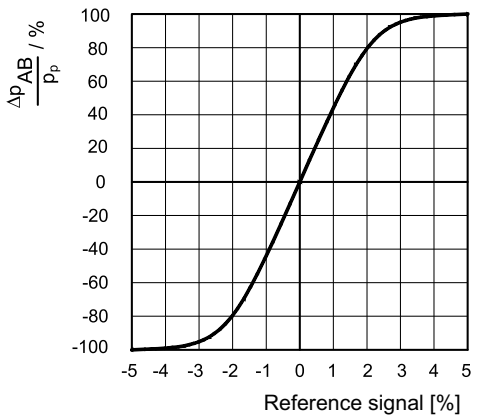


Flow P→B / A→T with valve in fail safe position, depending on the inlet pressure.

When a power failure (enabling OFF) occurs, the valve moves in 'fail safe' position, maintaining a minimum flow that allows the actuator to return slowly to a safe position.

During the black-out the centering springs retain the spool in fail safe-position.

Z SPOOLS - PRESSURE GAIN



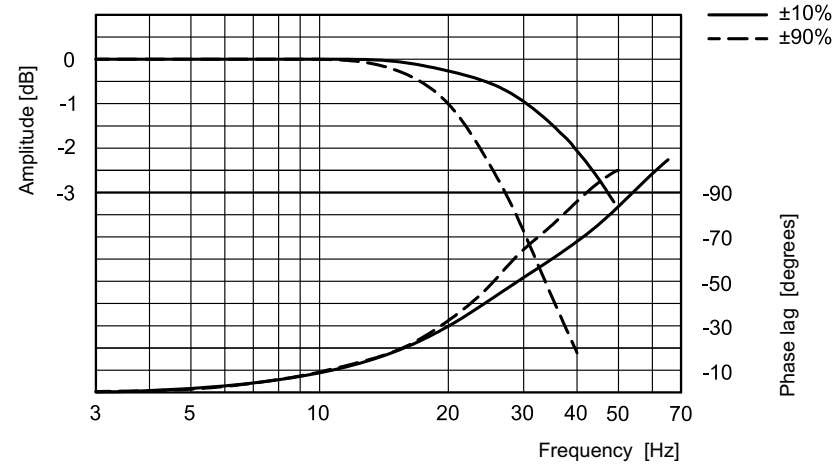
The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal.

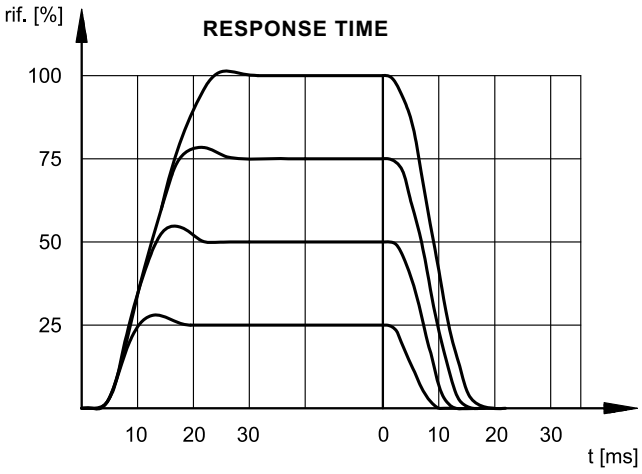
In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

7 - RESPONSE TIMES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and 140 bar Δp P→T)

FREQUENCY RESPONSE (Z SPOOLS)

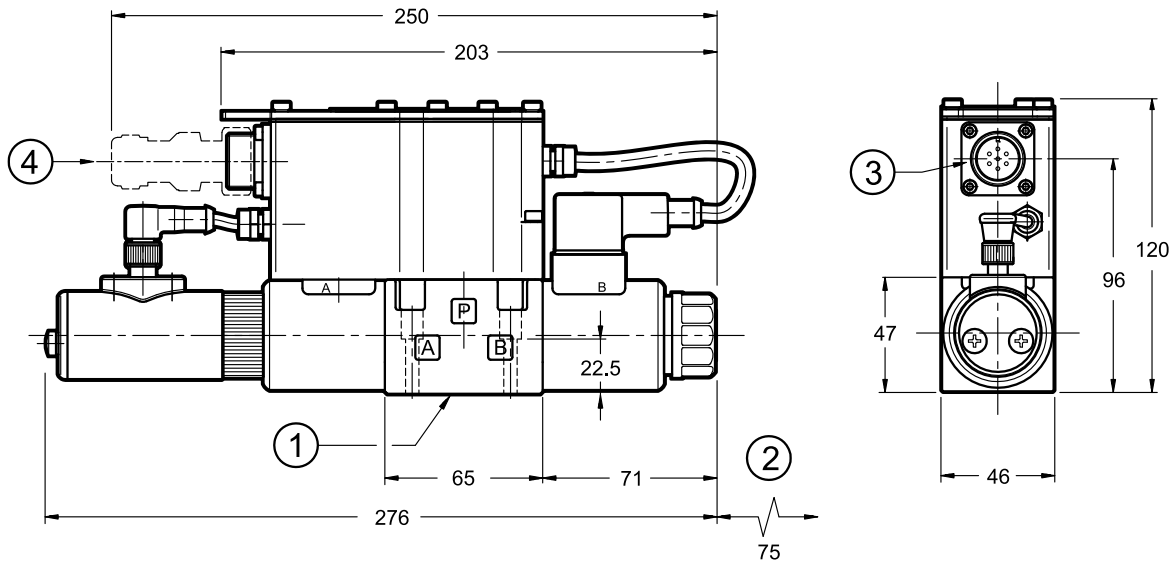


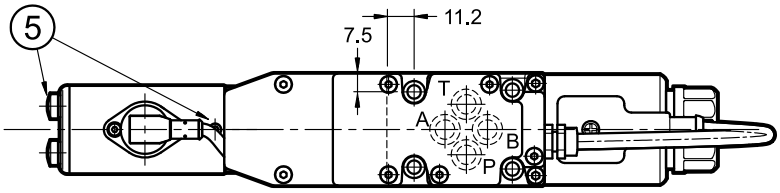


8 - DSE3J - OVERALL AND MOUNTING DIMENSIONS

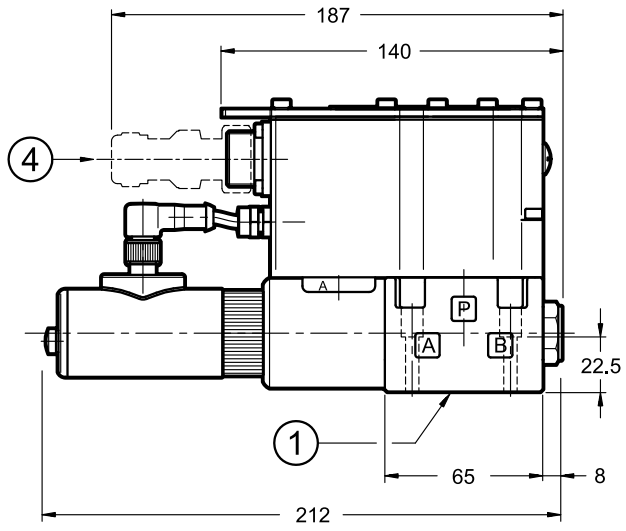
dimensions in mm

DSE3J-/K11**





DSE3J-*SA/K11



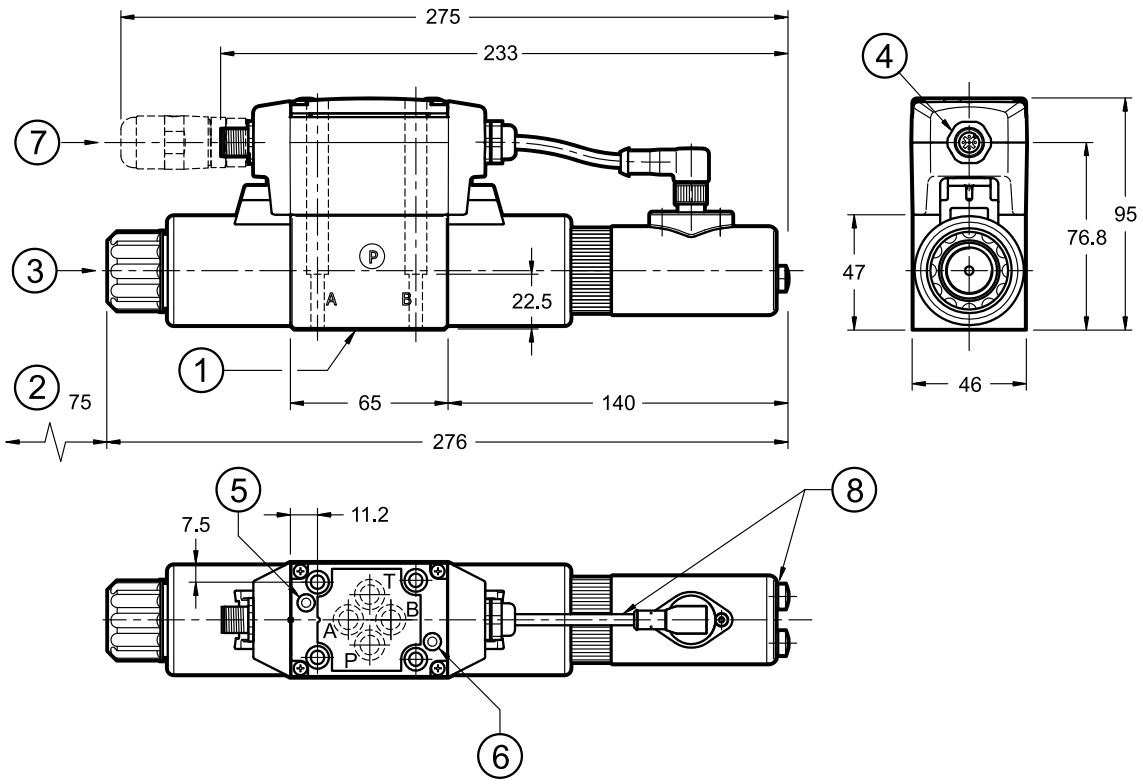
Valve fastening: 4 SHC screws M5x30 - ISO 4762	
Torque: 5 Nm (A8.8)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Main connection 6 pin + PE
4	Mating connector 6 poles + PE, female type MIL-5015-G **To be ordered separately.** See catalogue 89 000
5	Adjustment sealing performed at factory. Do not disassemble the transducer.

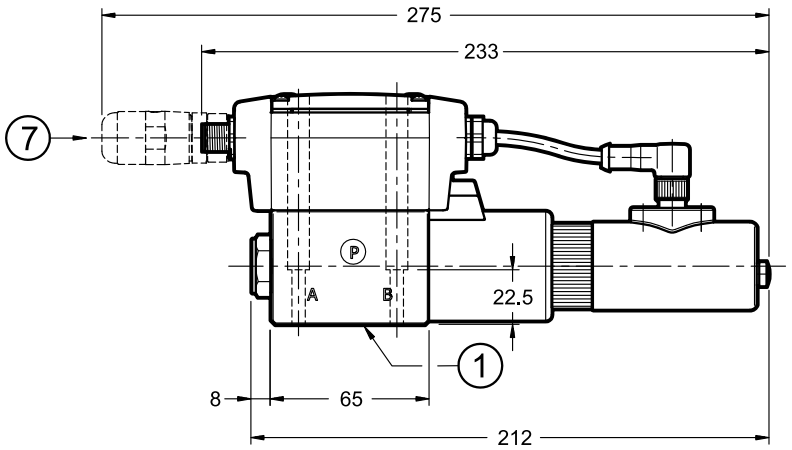
9 - DSE3JL - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DSE3JL-/K12**



DSE3JL-*SB/K12



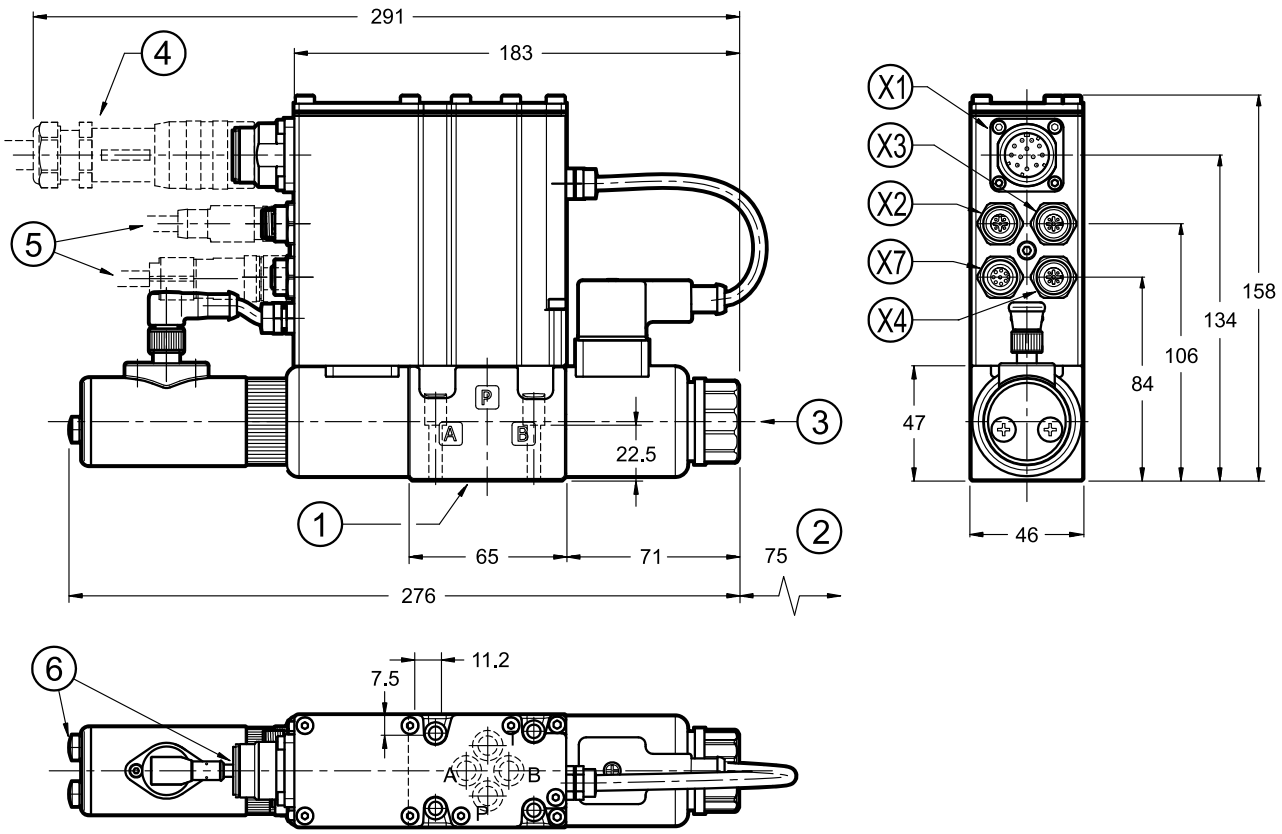
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space
3	Manual override by pin integrated in the solenoid tube
4	Connection M12 A 5 pin
5	L1 LED
6	L2 LED
7	Mating connector M12 5 poles - code A, female. **To be ordered separately.** See catalogue 89 000
8	Adjustment sealing performed at factory. Do not disassemble the transducer.

Valve fastening: 4 SHC screws M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

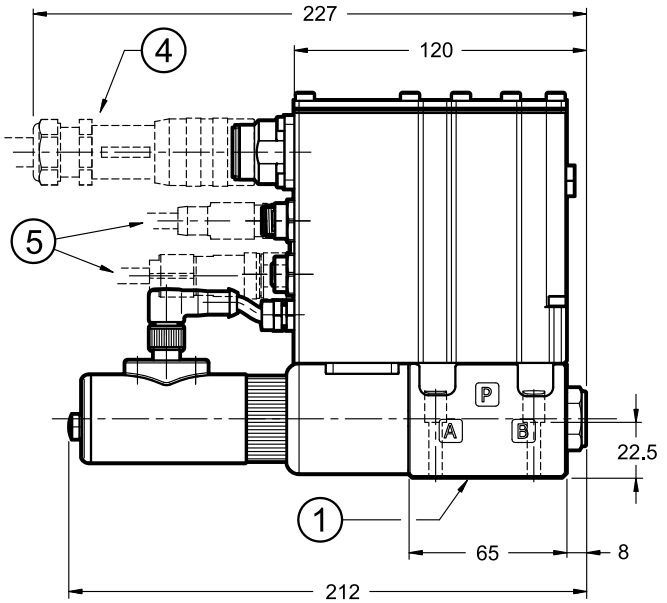
10 - DSE3JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DSE3JH-/K16**



DSE3JH-*SA/K16



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Manual override by pin integrated in the solenoid tube
4	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
5	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Valve fastening: 4 SHC screws M5x30 ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

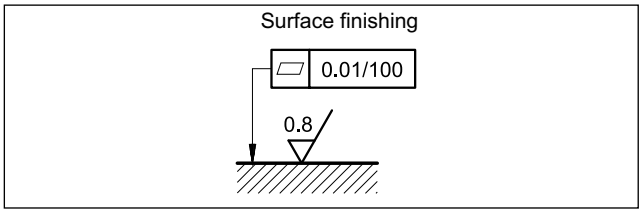
The fluid must be preserved in its physical and chemical characteristics.

12 - INSTALLATION

DSE3J valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connections. See catalogue 89 850.

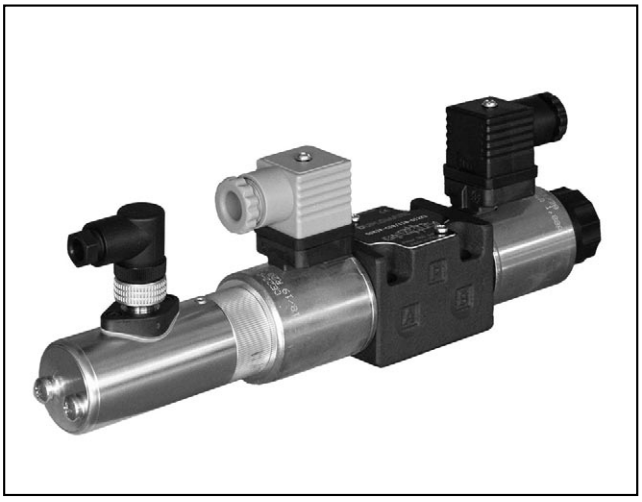
14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DSE3F

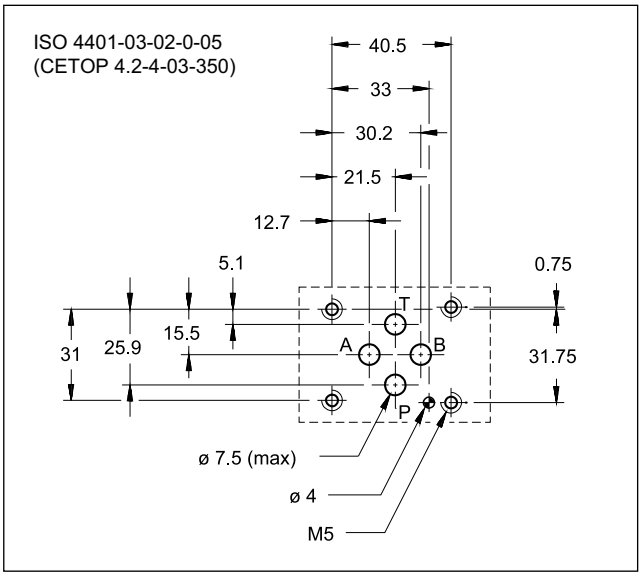
DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL AND ELECTRICAL FEEDBACK

SERIES 11

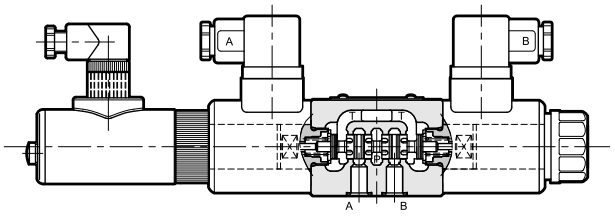
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— DSE3F is a direct operated directional valve with proportional control, electrical feedback with ports in compliance with ISO 4401-03 standards.

— It is suitable for directional and speed control of hydraulic actuators.

— The valve opening and hence flow rate can be modulated continuously in proportion to the reference signal.

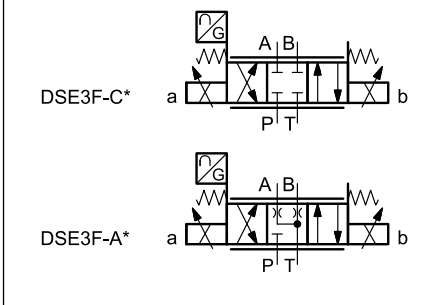
— The valve must be controlled directly by an external electronic card to maximize the valve performances: the input signal and the signal coming from the valve are compared to obtain an accurate positioning with a reduced hysteresis.

PERFORMANCES

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

Max operating pressure: - P - A - B ports - T port	bar	 350 210
Nominal flow with Δp 10 bar P-T	l/min	8 - 16 - 26
Response times	see paragraph 6	
Hysteresis	% of Q max	< 1,5 %
Repeatability	% of Q max	< 1 %
Electrical characteristics, IP	see paragraph 5	
Valve reproducibility		< 5%
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1,9 2,3

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

D	S	E	3	F	-				/	11		-	D12	K1

Direct operated directional control valve

Electric proportional control

Size ISO 4401-03

Position feedback

Spool type:
C = closed centres
A = open centres

Nominal flow rate:
08 = 8 l/min
16 = 16 l/min
26 = 26 l/min

Solenoid position (omit for configuration with two solenoids):
SA = 1 solenoid on side A

Coil electrical connection:
plug for connector type
EN 175301-803
(ex DIN 43650) (**standard**)

Nominal solenoid voltage 12 VDC

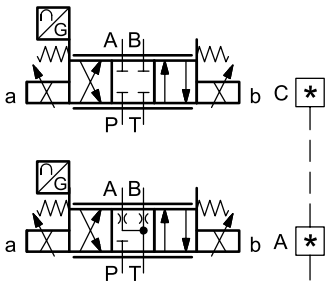
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)

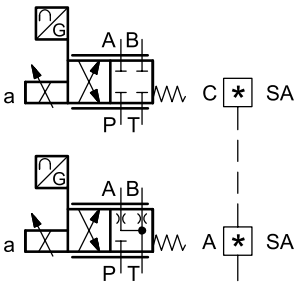
2 - CONFIGURATIONS

Valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, rated flow.

Configuration 2 solenoids
3 positions with spring centering



Configuration 1 solenoid on side A "**SA**":
2 positions (central + external) with spring centering

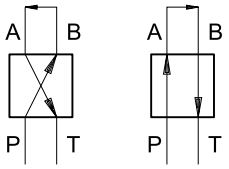


*	Controlled flow with Δp 10 bar P-T
08	8 l/min
16	16 l/min
26	26 l/min

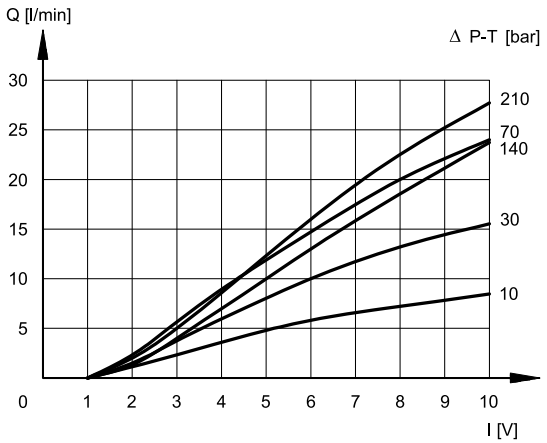
3 - CHARACTERISTIC CURVES

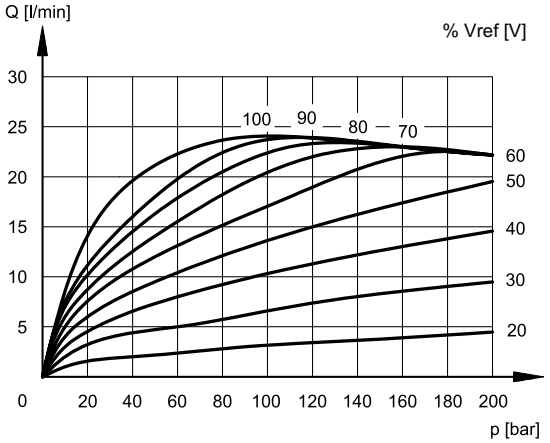
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronics type UEIK-*RSD)

Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools. The Δp values measured between P and T valve ports.

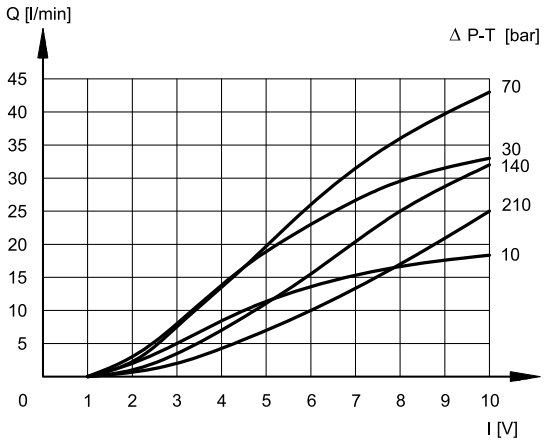


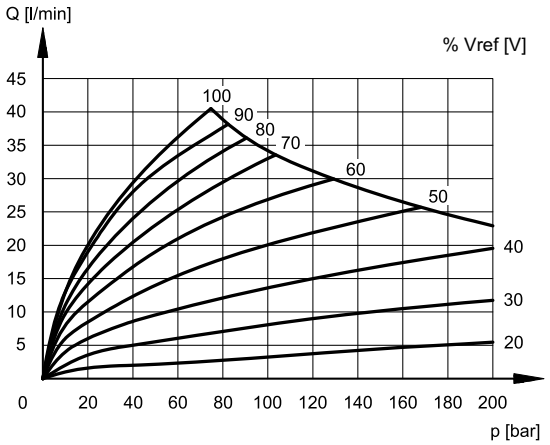
C08 / A08



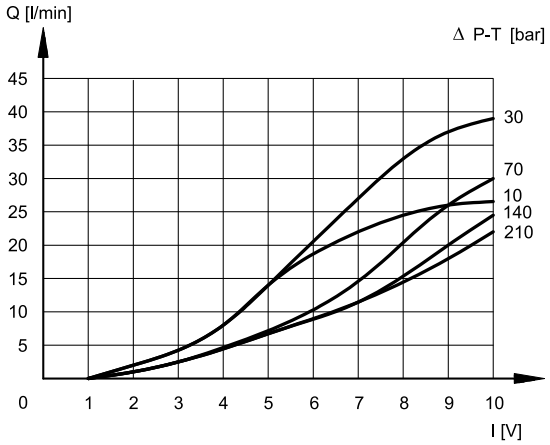


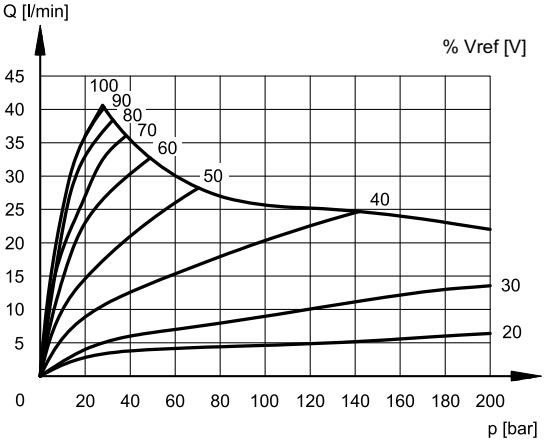
C16 / A16





C26 / A26





4 - 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.

5 - ELECTRICAL CHARACTERISTICS

5.1 - Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to reduce friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube and secured by means of a lock nut. Only the coil on side B can be rotated through 360°depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**
RESISTANCE (AT 20°C)	Ω	3.66
MAXIMUM CURRENT	A	1.88
DUTY CYCLE		100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)	IP 65	

5.2 - Position transducer

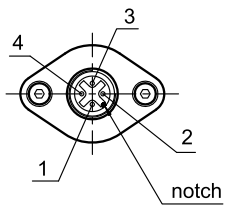
The DSE3F valve has an LVDT type position transducer with amplified signal. This type of transducer allows a precise control of the spool stroke and hence of the set flow rate, improving repeatability and hysteresis characteristics.

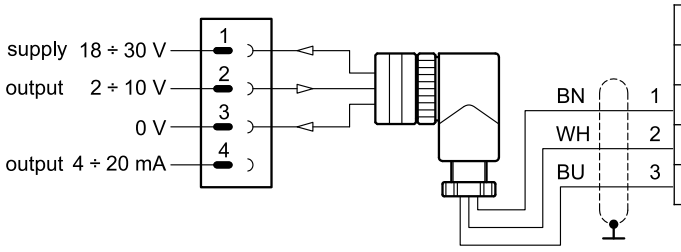
The transducer is fitted coaxially on the proportional solenoid and the connector features 360° positioning. The field-wireable mating connector is always included.

Use a screened cable to avoid interferences.

Technical specifications and wiring are indicated here below.

The transducer is protected against polarity inversion on the power line.

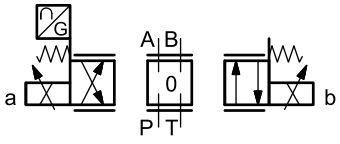


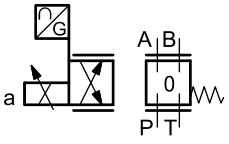


pin on control card	
UEIK-*1RSD	EDM-J*/DSE3F
8c	13
24a	10
22c	15 (**NOTE**)

NOTE: with jumper on pin 11

signal / stroke





transducer ouput 10V 6 V 2V 10 V 6 V

6 - 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.

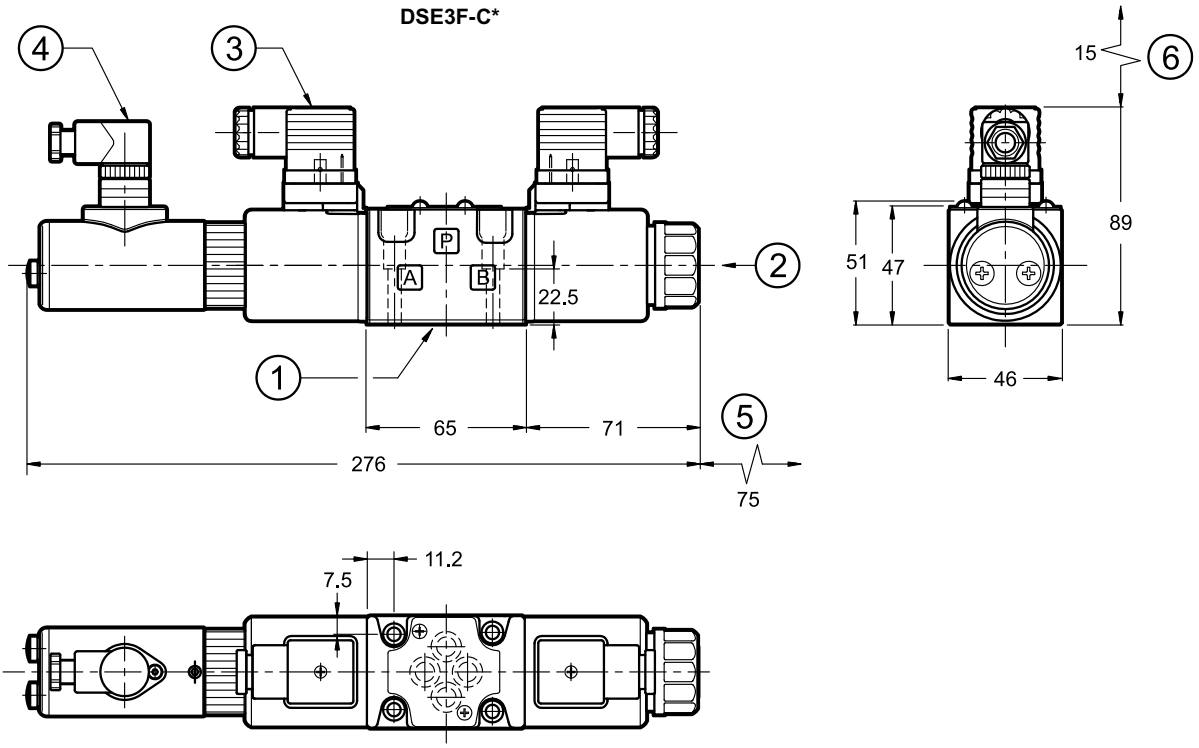
The table illustrates typical response times with the C16 spool and with Δp = 30 bar P-T.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	30	25

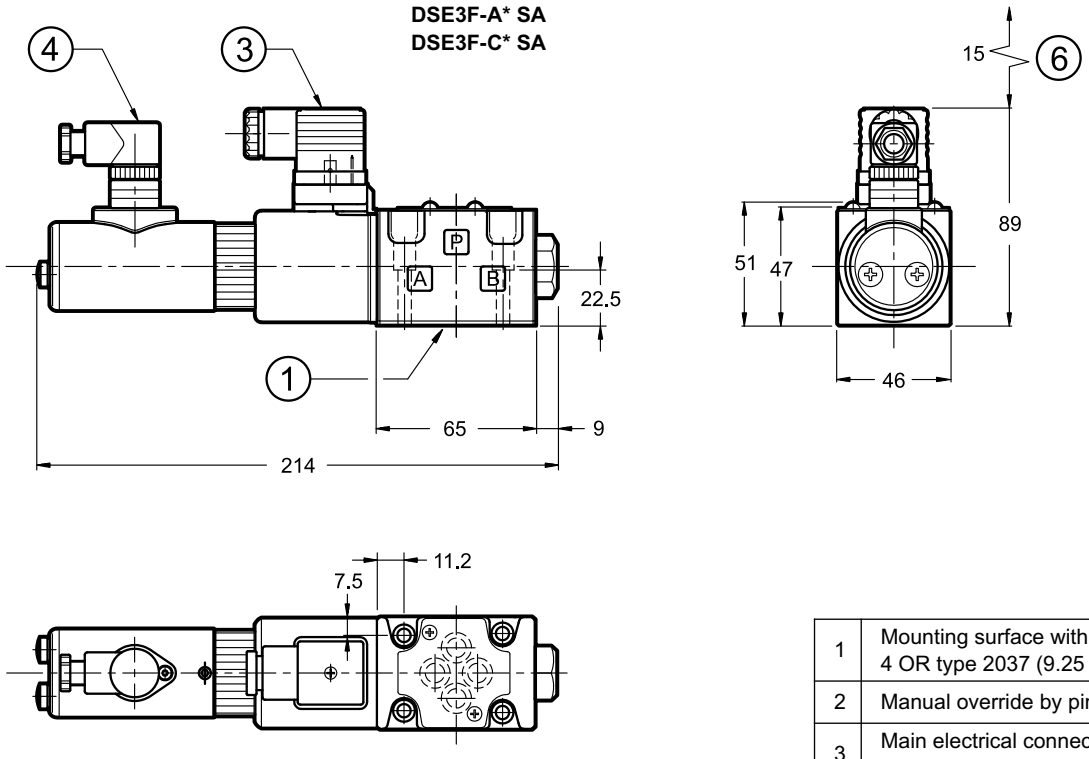
7 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DSE3F-A*
DSE3F-C*



DSE3F-A* SA
DSE3F-C* SA



1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Manual override by pin
3	Main electrical connector EN 175301-803 (ex DIN 43650)
4	Electrical connector 4 pin EC4S/M12S/10 code 3491001002 for position transducer (included)
5	Coil removal space
6	Removal space of the main electrical connector

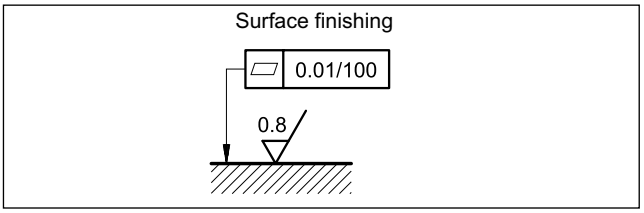
Fastening bolts:4 bolts M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

8 - INSTALLATION

DSE3F valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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 mounting surface.



9 - ELECTRONIC CONTROL UNITS

EDM-J2/*DSE3F	for double solenoid valve	DIN EN 50022 rail mounting	see cat. 89 255
EDM-J1/*DSE3F	for single solenoid valve		
UEIK-21RSD	for double solenoid valve	Eurocard	see cat. 89 335
UEIK-11RSD	for single solenoid valve		see cat. 89 315

The card holder for Eurocard electronics is available. See catalogue 89 900.

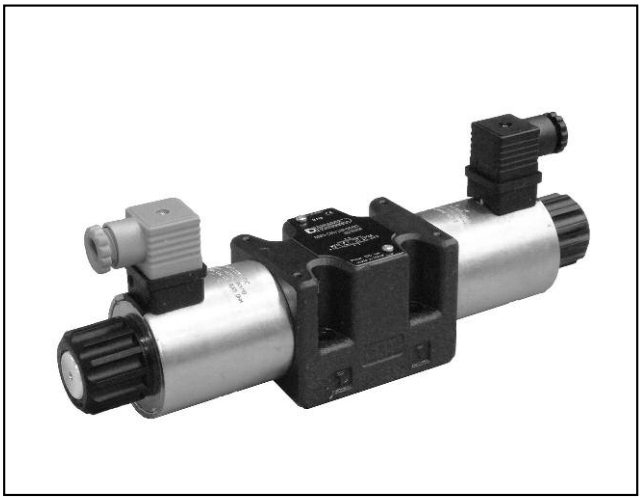
10 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DSE5

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL

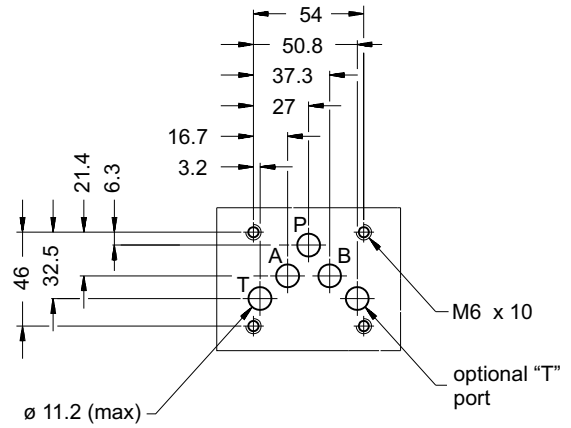
SERIES 10

SUBPLATE MOUNTING ISO 4401-05

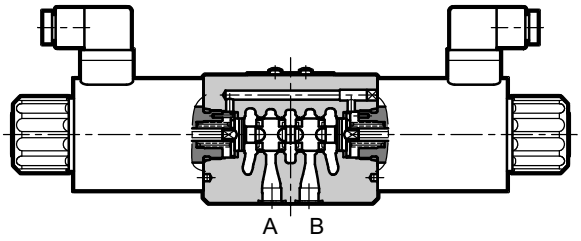
p max **320** bar
Q max **90** l/min

MOUNTING INTERFACE

ISO 4401-05-04-0-05
(CETOP 4.2-4-05-320)



OPERATING PRINCIPLE



— The DSE5 valve is a directly operated directional control valve with electric proportional control and with ports in compliance with ISO 4401 standards.

— It is used for directional and speed control of the hydraulic actuators.

— Valve opening and hence flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or by means of the relative electronic control units to exploit valve performance to the full (see paragraph 11).

— Other two versions with external subplate drain port are available (see paragraph 9).

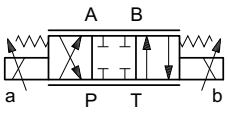
PERFORMANCES

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

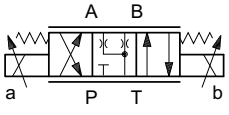
Maximum operating pressure: - P - A - B ports - T port : standard version version with Y port	bar	 320 210 320
Maximum flow with Δp 10 bar P-T	l/min	30 - 60
Step response	see paragraph 6	
Hysteresis (with PWM 100 Hz)	% of Q max	< 6%
Repeatability	% of Q max	< ±1,5%
Electrical characteristics	see paragraph 5	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	4,4 5,9

HYDRAULIC SYMBOLS (typical)

DSE5-C*



DSE5-A*



1 - IDENTIFICATION CODE

D	S	E	5	-				/	10		-			/		

Directly operated directional control valve

Electric proportional control

Size ISO 4401-05

Spool type:
C = closed centers
A = open centers

Spool nominal flow (see table 2)

Solenoid position (omit for configuration with two solenoids):
SA = 1 solenoid on side A
SB = 1 solenoid on side B

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
Omit if not required

Option: manual override (see at par. 9)

Coil electrical connection:
plug for connector type
EN 175301-803 (ex DIN 43650) (**standard**)

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

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Series No. (from 10 to 19 sizes and mounting dimensions remain unchanged)

NOTE: The standard valve is supplied with surface treatment of phosphating black.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to 240 hours (test operated according to EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

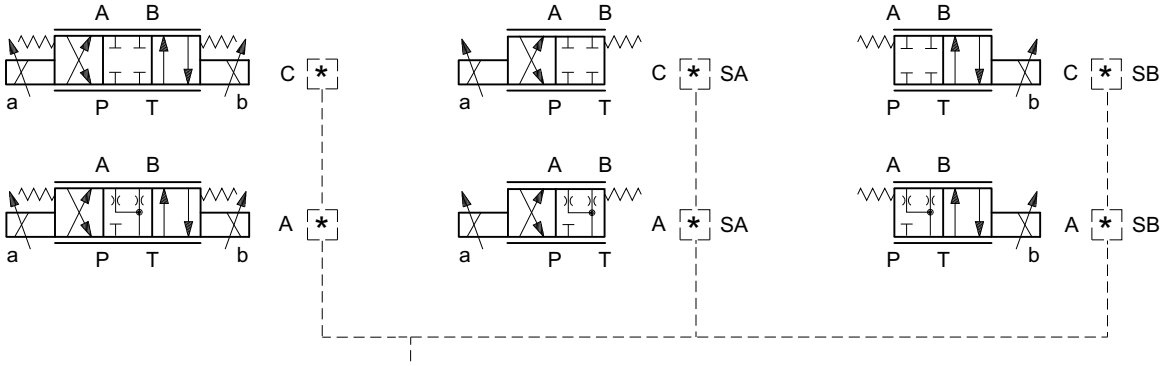
2 - CONFIGURATIONS

Valve configuration depends on the combination of the following elements: number of proportional solenoids, spool type, nominal flow rate.

2 solenoids configuration:
3 positions with spring centering

"**SA**" configuration: 1 solenoid on side A.
2 positions (central + external)
with spring centering

"**SB**" configuration: 1 solenoid on side B.
2 positions (central + external)
with spring centering



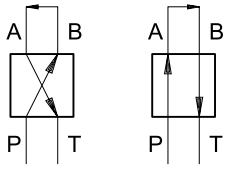
*	Controlled flow with Δp 10 bar P-T
30	30 l/min
60	60 l/min
60/30	60 (P-A) / 30 (B-T) l/min

3 - CHARACTERISTIC CURVES

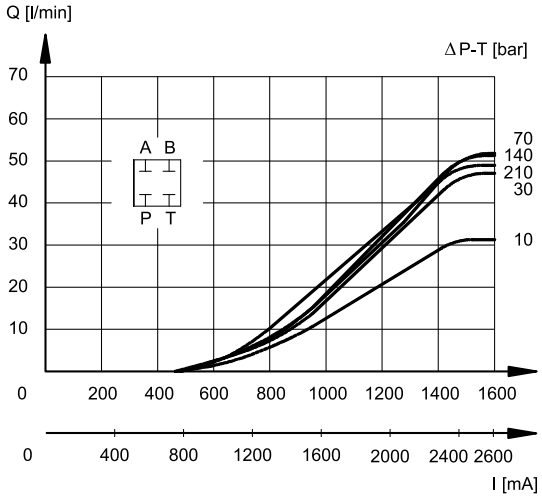
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

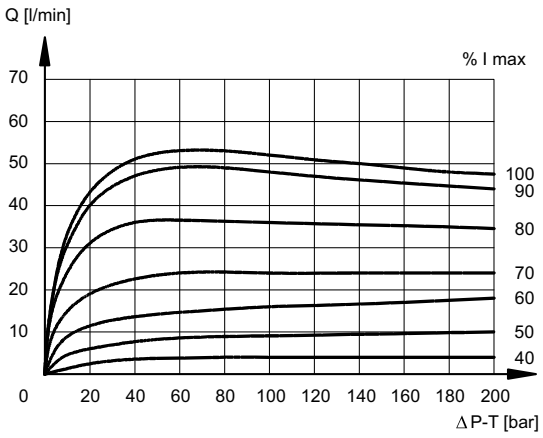
Typical constant flow rate control curves at Δp according to current supply to solenoid (D24 version, maximum current 1600 mA), measured for the various spools types available.

The reference Δp values are measured between ports P and T on the valve.

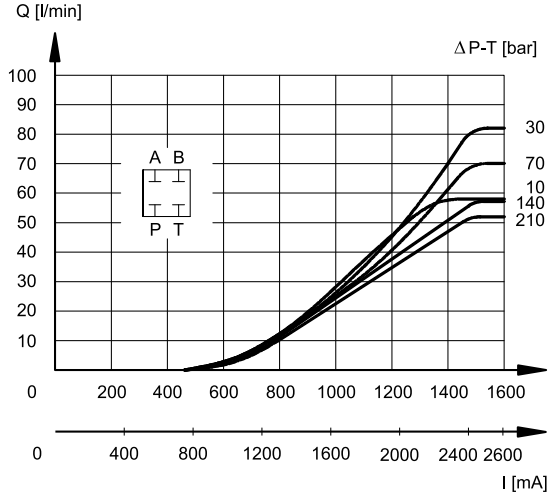


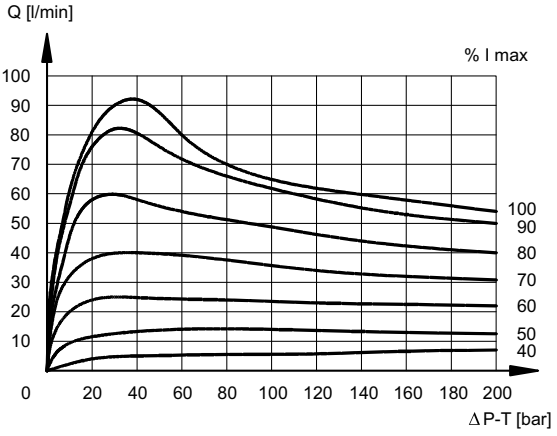
SPOOL TYPE C30



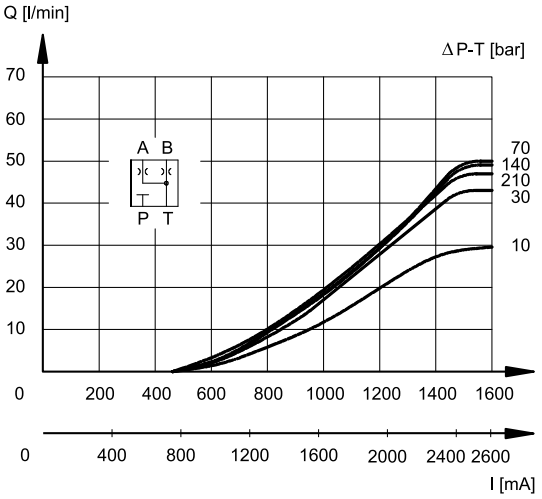


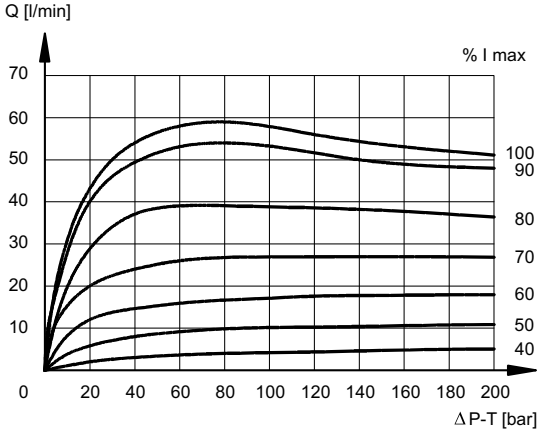
SPOOL TYPE C60



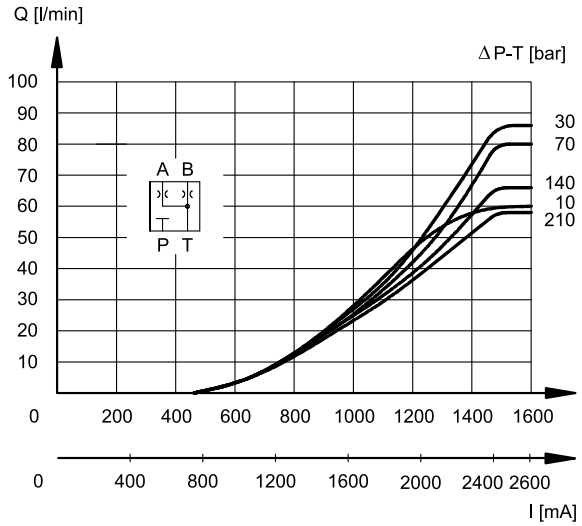


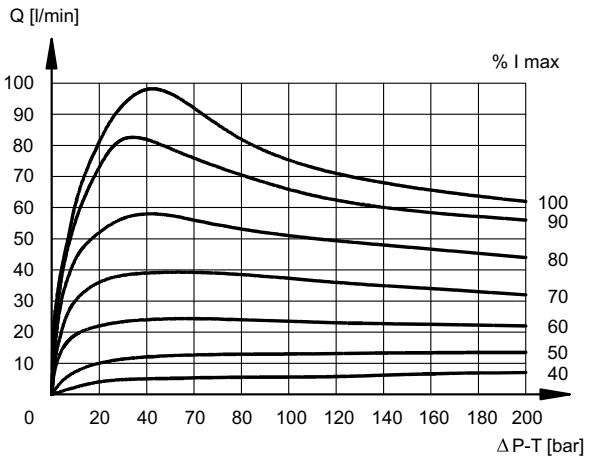
SPOOL TYPE A30





SPOOL TYPE A60





4 - 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 fluid types 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut.

It can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	VDC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3 - 3.4	8.65
MAXIMUM CURRENT	A	2.6	1.6
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	according to 2014/30/EU		
CLASS OF PROTECTION atmospheric agents (IEC 60529) coil insulation (VDE 0580) Impregnation	IP 65 class H class F		

6 - 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 position value following a step change of reference signal.

The table shows typical response times tested with spool type C60 and Δp = 20 bar P-T.

REFERENCE SIGNAL STEP	0→100%	100%→0
Step response [ms]	50	40

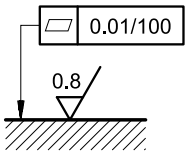
7 - INSTALLATION

DSE5 valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.

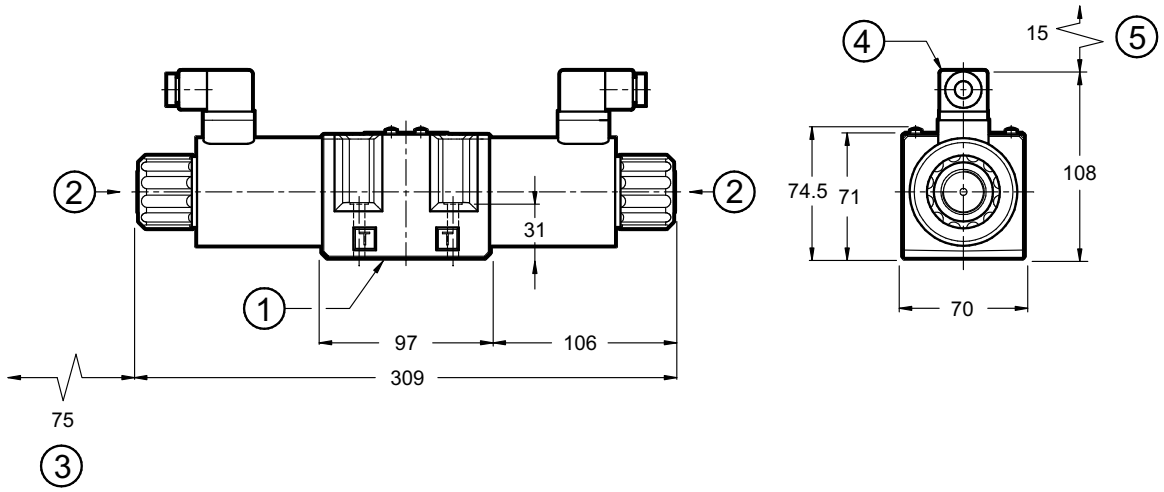
Surface finishing

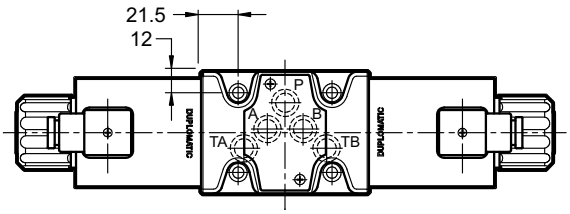


8 - OVERALL AND MOUNTING DIMENSIONS

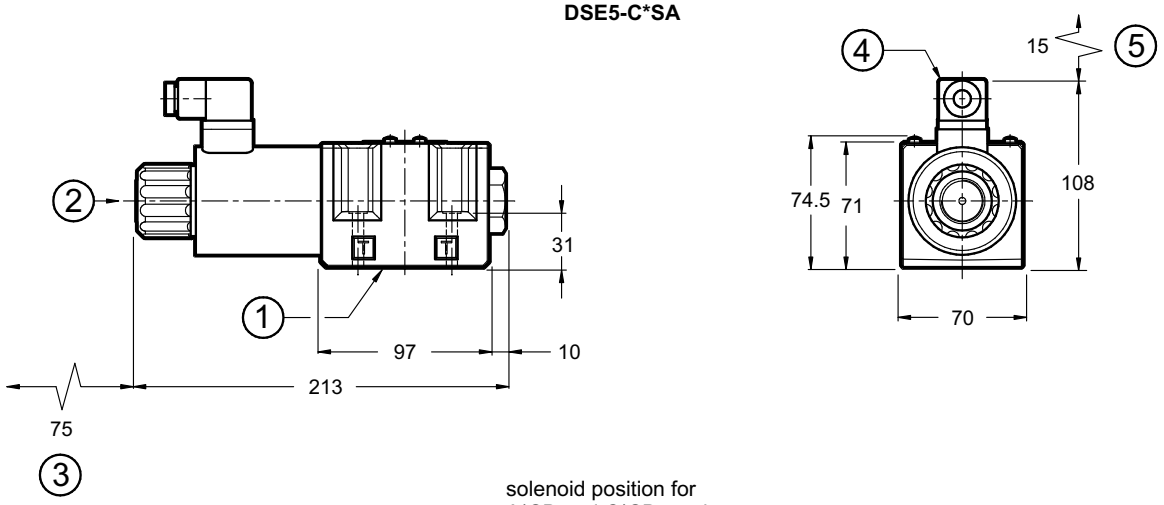
dimensions in mm

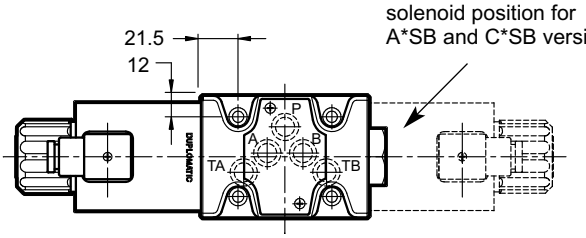
DSE5-A*
DSE5-C*





DSE5-A*SA
DSE5-C*SA



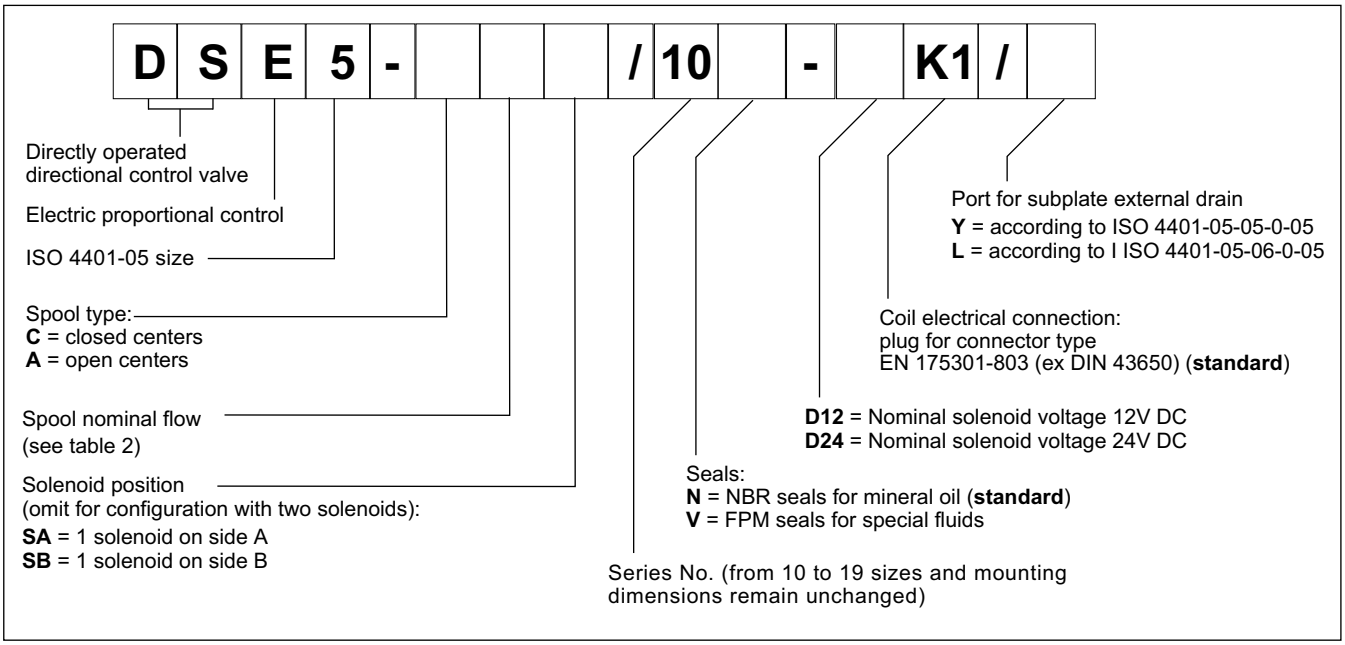


1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore Additional for version Y: 1 OR 2037 (9.25x1.78) - 90 Shore Additional for version L: 1 OR 2025 (6.07x1.78) - 90 Shore
2	Standard manual override integrated in the solenoid tube
3	Coil removal space
4	EN 175301-803 (ex DIN 43650) electric connector
5	Connector removal space

Fastening bolts: 4 SHC screws ISO 4762 M6x40
Torque: 8 Nm (bolts A8.8)
Threads of mounting holes: M6x10

9 - VERSIONS WITH EXTERNAL DRAIN PORT

9.1 - Identification Code



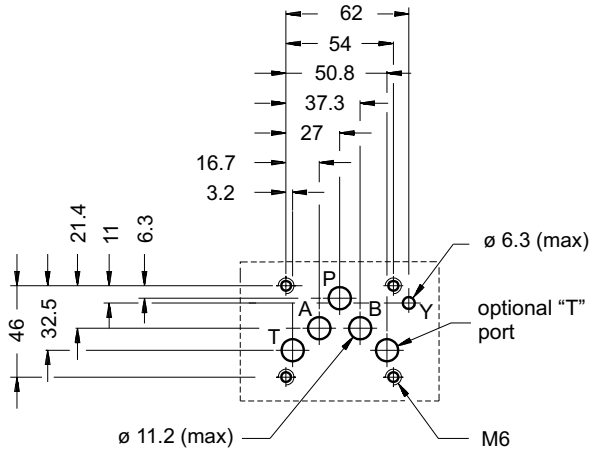
These versions allow the operation with pressures up to 320 bar on T port of the valve .

The additional drain port is connected with the solenoid chamber: in this way the tubes are not stressed by the pressure operating on the T port of the valve.

9.2 - Y Version

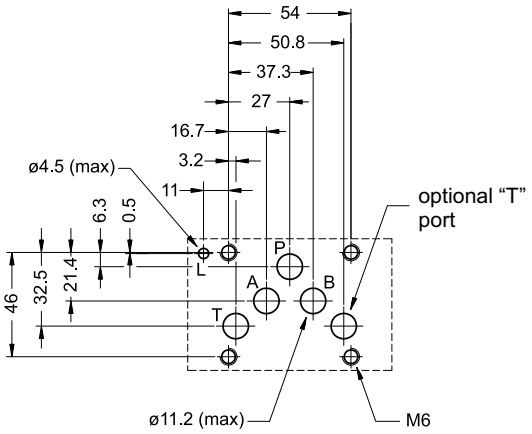
The drain port Y is realized on the valve mounting surface in compliance with ISO 4401-05-05-0-05 standard.

There is no X port.



9.3 - L version

It consists of a drain port on the mounting surface of the valve according to ISO 4401-05-06-0-05 standard



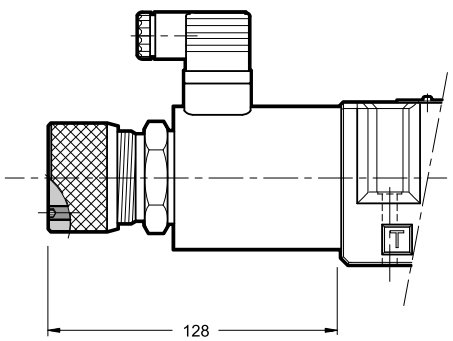
10 - MANUAL OVERRIDE

The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

The following manual override is available upon request:

- **CK** version, knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosing.

CK Version



Spanner for set screw: 3 mm
Code: 3803260003

11 - ELECTRONIC CONTROL UNITS

DSE5- * *SA (SB)

EDC-131	for solenoid 24V DC	plug version	see catalogue 89 120
EDC-151	for solenoid 12V DC		
EDM-M131	for solenoid 24V DC	DIN EN 50022 rail mounting	see catalogue 89 251
EDM-M151	for solenoid 12V DC		

DSE5- A* DSE5-C*

EDM-M231	for solenoid 24V DC	DIN EN 50022 rail mounting	see catalogue 89 251
EDM-M251	for solenoid 12V DC		

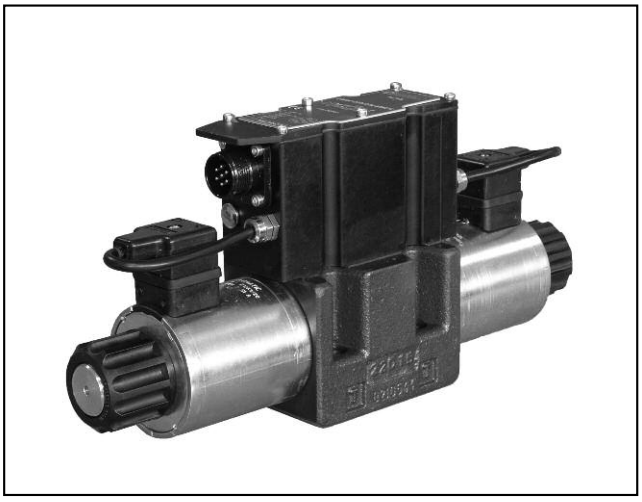
12 - SUBPLATES

(see cat. 51 000)

Type PMD4-AI4G with rear ports 3/4” BSP
Type PMD4-AL4G with side ports 1/2” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DSE5G

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL AND INTEGRATED ELECTRONICS

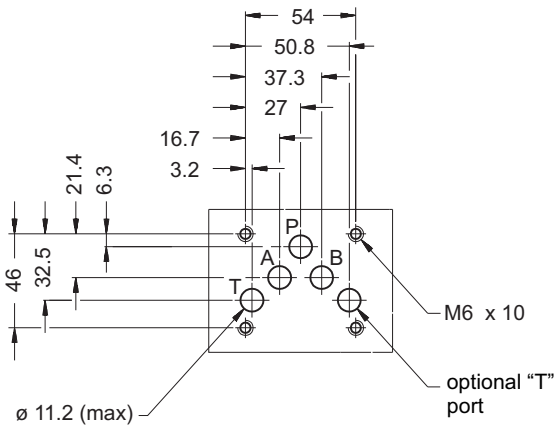
SERIES 31

SUBPLATE MOUNTING
ISO 4401-05

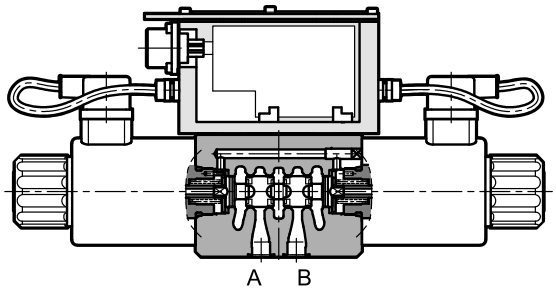
p max **320** bar
Q max **90** l/min

MOUNTING SURFACE

ISO 4401-05-04-0-05
(CETOP 4.2-4-05-320)



OPERATING PRINCIPLE



— The DSE5G is a direct operated directional valve with integrated electric proportional control and mounting interface in compliance with ISO 4401 standards.

— It is used for control the positioning and the speed of hydraulic actuators.

— Valves are available with command signal in voltage or current, and on-board electronics with internal enable, external enable or 0V monitor on pin C.

— A solenoid current monitoring signal is available.

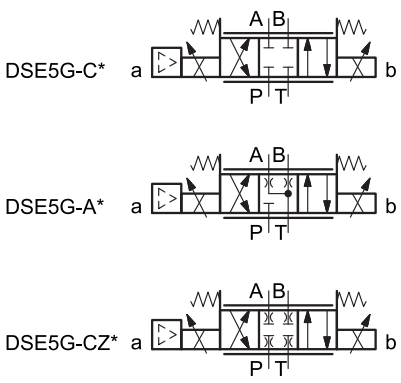
— The valve is easy to install. The driver directly manages digital settings. In the event of special applications, you can customize settings using the optional kit (see par. 11.3).

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

Maximum operating pressure: - P - A - B ports - T port	bar	 320 140
Maximum flow with Δp 10 bar P-T	l/min	30 - 60
Response times	see paragraph 7	
Hysteresis	% of Q max	< 3%
Repeatability	% of Q max	< ±1%
Electrical characteristics	see paragraph 3	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	5,1 6,6

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

D	S	E	5	G	-				/	31		-		K11	

Direct operated directional control valve

Electric proportional control

Size ISO 4401-05

Digital integrated electronics for open loop

Spool type:
C = closed centres
A = open centers
CZ = closed centres with overlap jump

Nominal flow rate of the spool (see chart par. 2)

Solenoid position (omit for 2 solenoids configuration):
SA = 1 solenoid on side A

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage ±10 V
E1 = current 4 ÷ 20 mA

Main connector 6 pin + PE

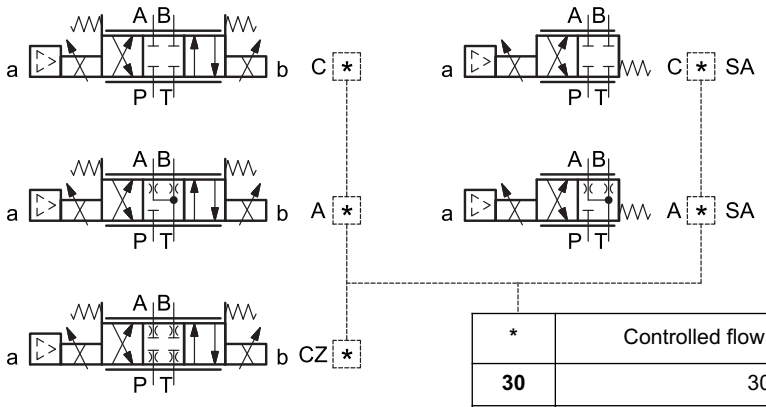
Pin C function:
A = external enable
B = internal enable
C = 0V monitor

2 - CONFIGURATION

The valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, rated flow.

Configuration 2 solenoids :
3 positions with spring centering

Configuration 1 solenoid on side A "**SA**":
2 positions (central + external)
with spring centering



*	Controlled flow with Δp 10 bar P-T
30	30 l/min
60	60 l/min
60/30	60 (P-A) / 30 (P-B) l/min

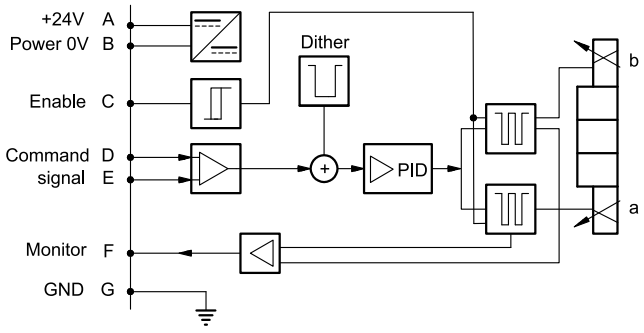
3 - ELECTRICAL CHARACTERISTICS

3.1 - Electrical on board electronics

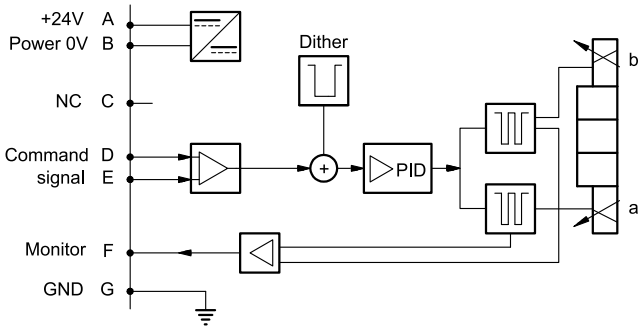
Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 35 VDC), ripple max 3 Vpp
Power consumption	VA	40
Maximum solenoid current	A	2.8
Fuse protection, external		3A
Command signals: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri > 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signals (current to solenoid): voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failure
Communication		LIN-bus Interface (with the optional kit)
Connection		7 - pin MIL-C-5015-G (DIN-EN 175201-804)
Electromagnetic compatibility (EMC) emissions EN 61000-6-4 immunity EN 61000-6-2		According to 2014/30/EU standards

3.2 - On-board electronics diagrams

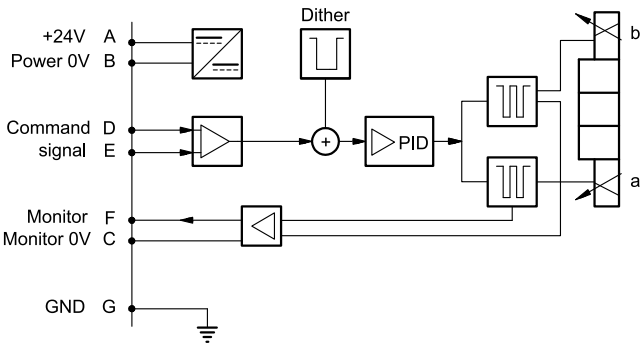
VERSION A - External Enable



VERSION B - Internal Enable

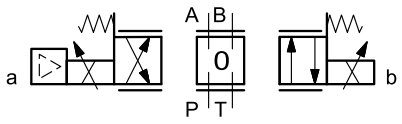


VERSION C - 0V Monitor

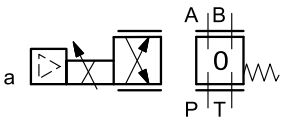


4 - VERSIONS WITH VOLTAGE COMMAND (E0)

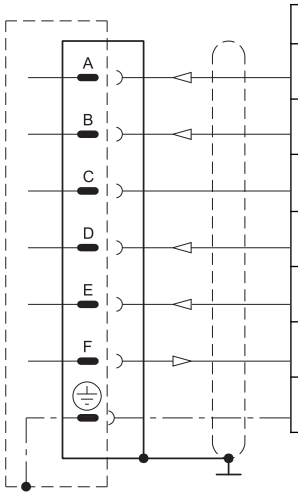
The reference signal is between -10V and +10V on double solenoid valves, and 0 ÷ 10V on single solenoid valves SA. The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



COMMAND	**+10V**	**0V**	
MONITOR	**+10V**	**0V**	

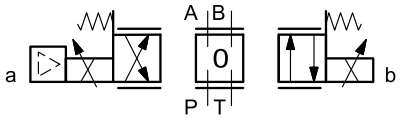


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	± 10 V	Command (differential input)		
E	0 V	PIN D reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

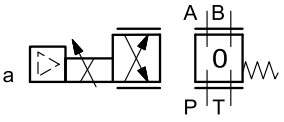
5 - VERSIONS WITH CURRENT COMMAND (E1)

The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

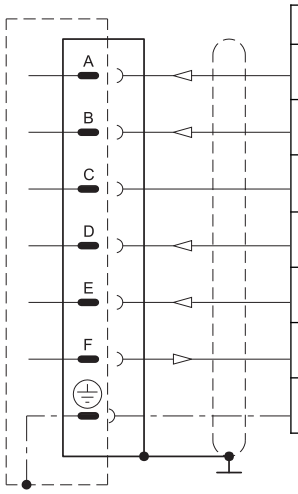
The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**



COMMAND	**20 mA**	**4 mA**	
MONITOR	**20 mA**	**4 mA**	



Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	PIN D reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

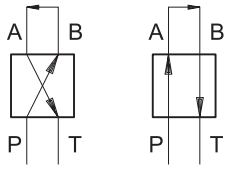
6 - CHARACTERISTIC CURVES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

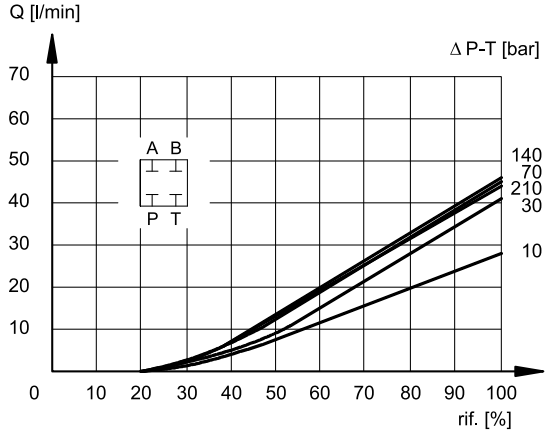
Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools.

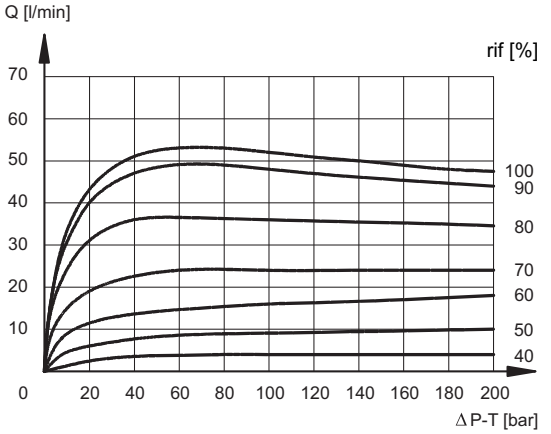
The curves are obtained with a constant meter-in with Δp of 5 bar and by setting the value of flow start at 20% of the reference signal.

NOTE: for spools with overlap jump (Z), please refer to the characteristic curves of spools C type, considering that the starting flow rate value is approx. 150 mV.

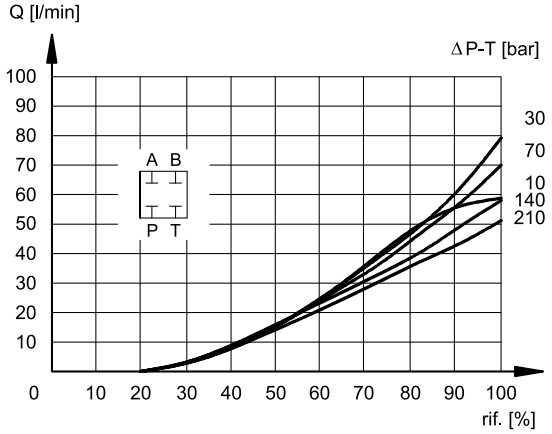


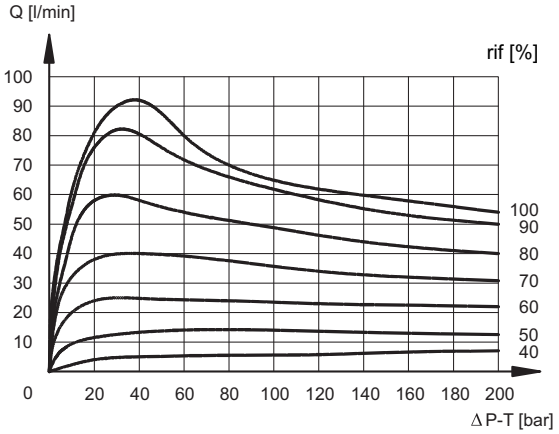
SPOOL TYPE C30



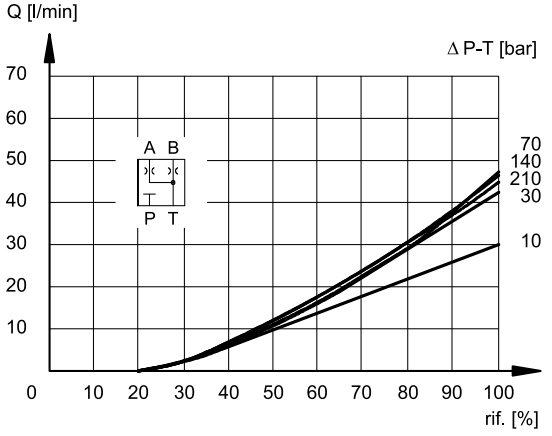


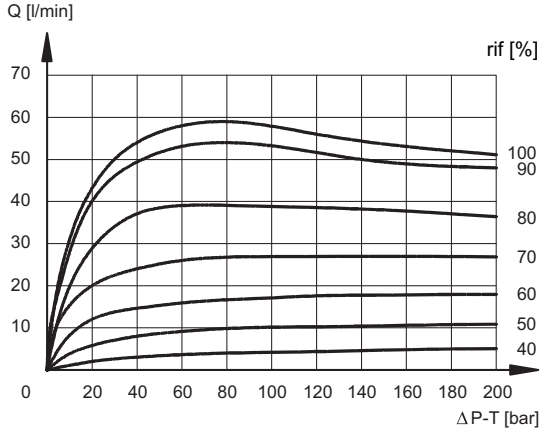
SPOOL TYPE C60



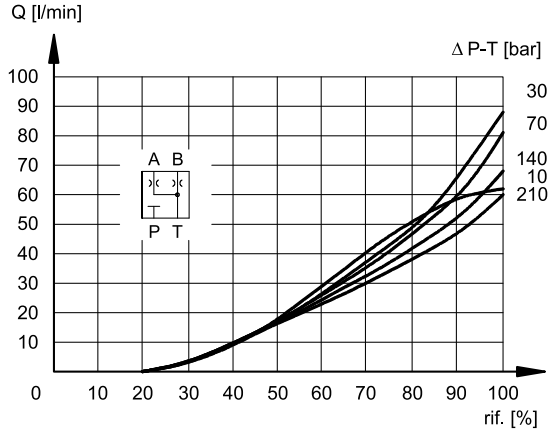


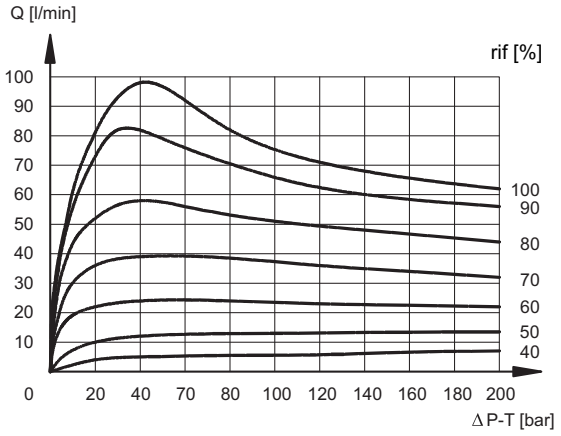
SPOOL TYPE A30





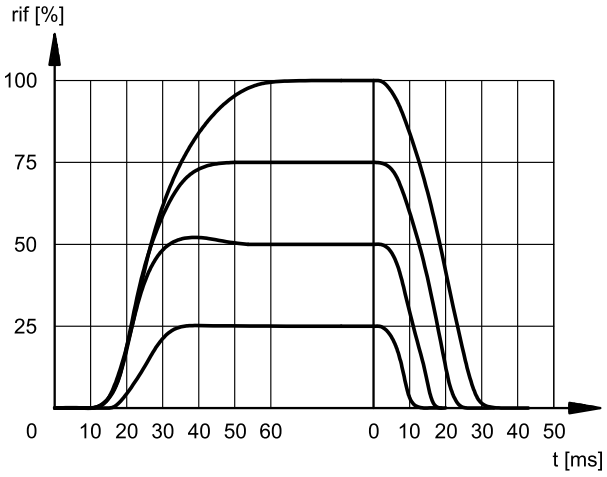
SPOOL TYPE A60





7 - RESPONSE TIMES

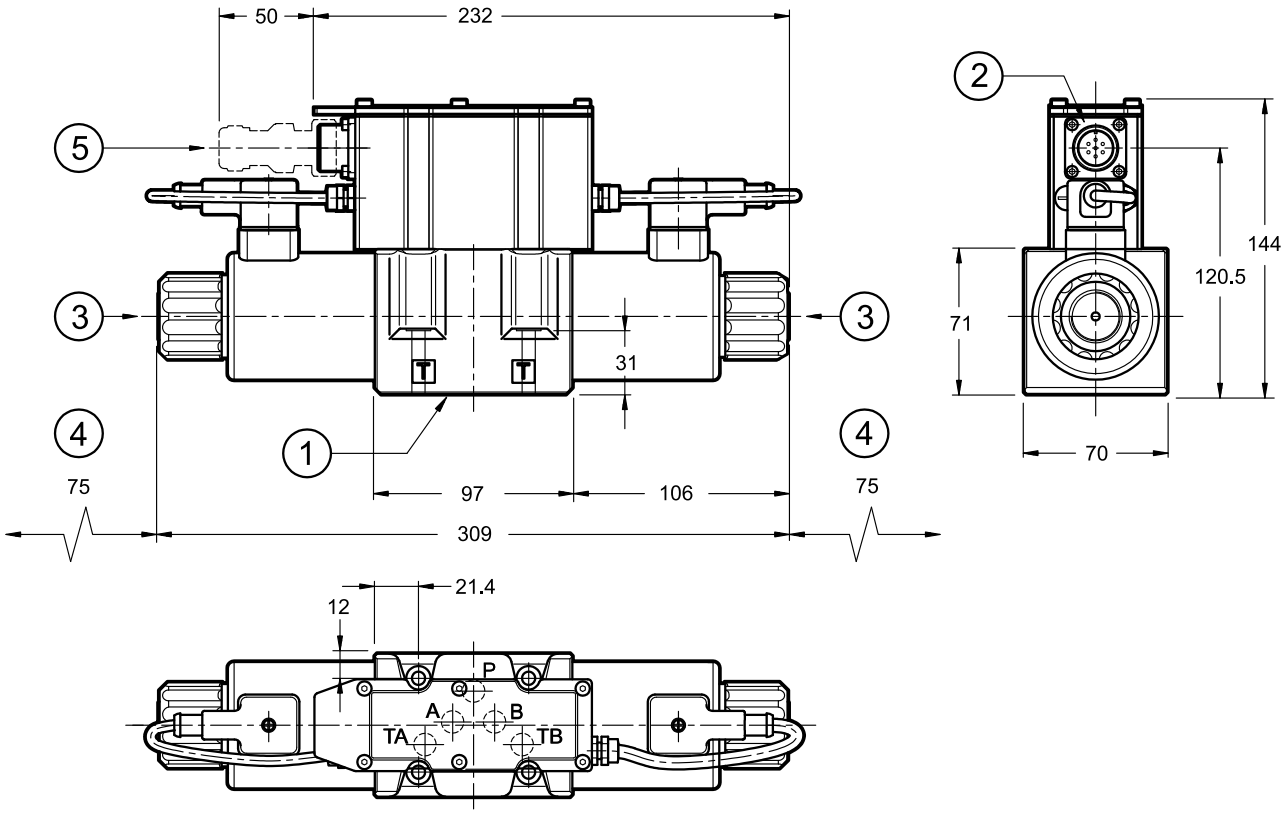
(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)



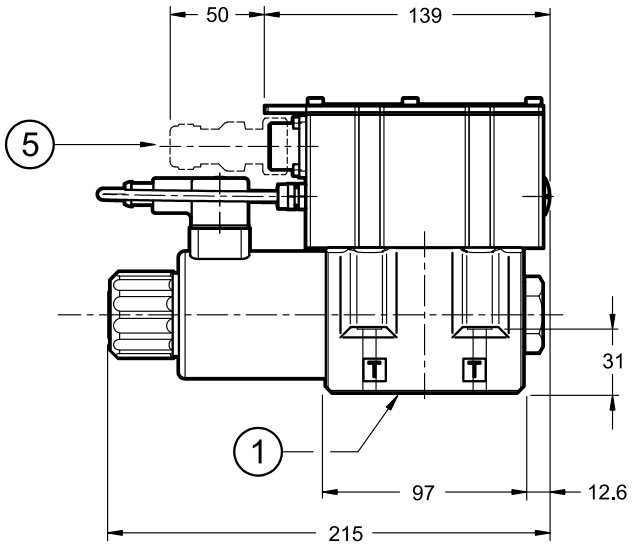
8 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DSE5G-A*
DSE5G-C*
DSE5G-CZ*



DSE5G-A* SA
DSE5G-C* SA



1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) 90 Shore
2	Main connection
3	Standard manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See paragraph 11

Fastening bolts: 4 SHC bolts M6x40 - ISO 4762
Torque: 8 Nm (A8.8)
Threads of mounting holes: M6x10

9 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

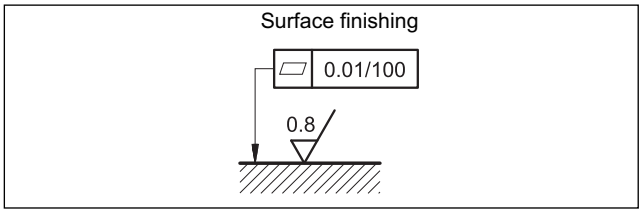
The fluid must be preserved in its physical and chemical characteristics.

10 - INSTALLATION

DSE5G valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.

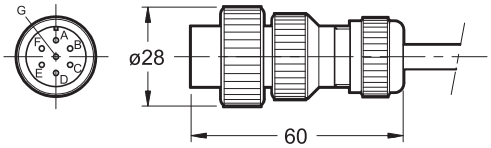


11 - ACCESSORIES

(to be ordered separately)

11.1 - Mating connector

These valves have a plug for 7-pin mating connector, that is placed on the box of the integral motion control.



So as to avoid electromagnetic troubles and comply with the electromagnetic compatibility regulation EMC, it is recommended the use of a metal connector.

If a plastic connector is used, make sure that the protection characteristics IP and EMC of the valve are guaranteed.

Duplomatic offers a metal cable connector type MIL-C-5015-G (EN 175201-804).

name: **EX7S/L/10** code **3890000003**

11.2 - Connection cables size

Power supply:
- up to 20 m cable length : 1,0 mm²
- up to 40 m cable length : 1,5 mm²

Signal: 0,50 mm²

A suitable cable would have 7 isolated conductors, a separate screen for the signal wires and an overall screen.

11.3 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, see catalogue 89850.

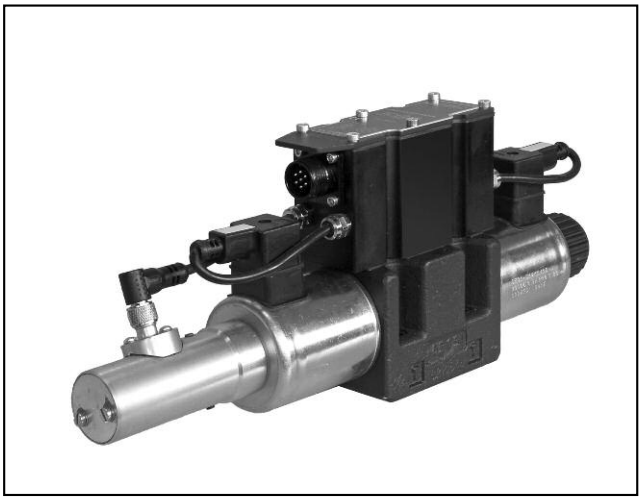
12 - SUBPLATES

(see catalogue 51 000)

PMD4-AI4G rear ports 3/4” BSP
PMD4-AL4G side ports 1/2” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DSE5J

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL FEEDBACK AND INTEGRATED ELECTRONICS

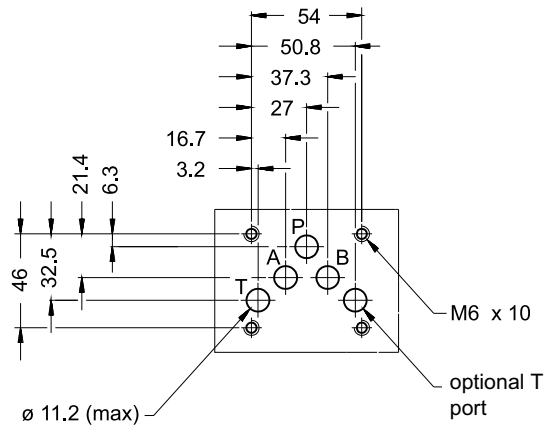
SERIES 31

SUBPLATE MOUNTING ISO 4401-05

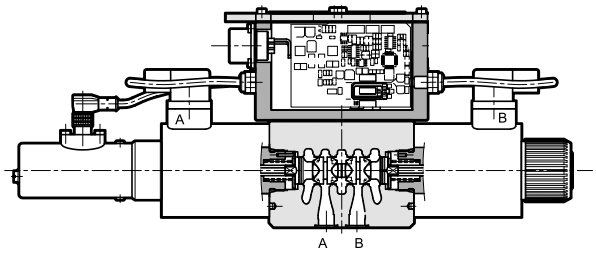
p max **320** bar
Q max **180** l/min

MOUNTING INTERFACE

ISO 4401-05-04-0-05
(CETOP 4.2-4-05-320)



OPERATING PRINCIPLE



— The DSE5J is a direct operated directional valve with electric proportional control, on-board electronics and feedback, with mounting interface in compliance with ISO 4401 standards.

— It is used to control the direction and the speed of hydraulic actuators.

— Transducer and digital card allow a fine control of the positioning of the cursor, reducing hysteresis and response time and optimizing the performance of the valve.

— The valves are available with command signal in voltage or current and on board electronics with internal enable, external enable or 0V monitor on pin C.

— The monitoring of the spool position is available on pin F.

— The valve is easy to install. The driver directly manages digital settings (see par. 6). In the event of special applications, you can customize the settings using the optional kit (see par. 11).

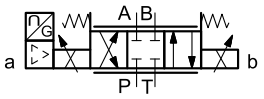
PERFORMANCES

(Obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

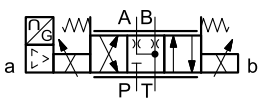
Max operating pressure: - P - A - B ports - T port	bar	320 210
Nominal flow with Δp 10 bar P-T	l/min	50 - 75
Response times	see paragraph 7	
Hysteresis	% of Q max	< 0,2%
Repeatability	% of Q max	< ± 0,1%
Threshold		< 0,1%
Valve reproducibility		≤ 5%
Electrical characteristics, IP	see paragraph 3	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	5,6 7,1

HYDRAULIC SYMBOLS (typical)

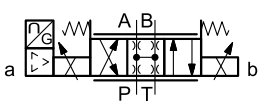
DSE5J-C*



DSE5J-A*



DSE5J-Z*



1 - IDENTIFICATION CODE

D	S	E	5	J	-					/	31		-		K11	

Direct operated directional control valve

Electric proportional control

Size ISO 4401-05

Digital integrated electronics for valves with feedback

Spool type:
C = closed centre
A = open centre
Z = zero overlap
RC = regenerative closed centre

Nominal flow rate of the spool (see par. 2)

FS = Fail safe option (omit if not required).
Available on spools type Z only.

Solenoid position (omit for 2 solenoids configuration):
SA = 1 solenoid on side A

Series N. (the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage ±10 V
E1 = current 4 ÷ 20 mA

Main connector 6 pin + PE

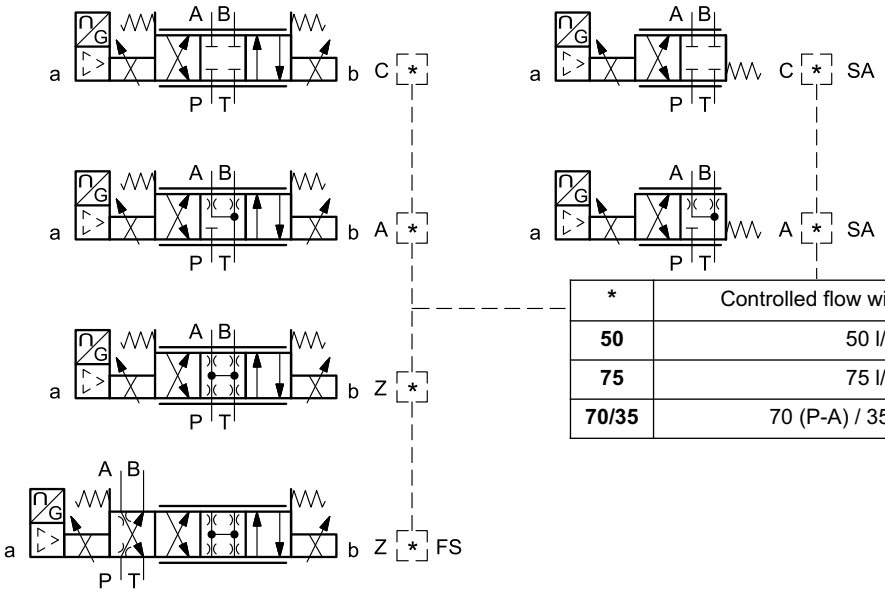
Pin C function:
A = external enable
B = internal enable
C = 0V monitor

2 - CONFIGURATIONS

The valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, rated flow.

Configuration 2 solenoids :
3 positions with spring centering

Configuration 1 solenoid on side A "**SA**":
2 positions (central + external) with spring centering



*	Controlled flow with Δp 10 bar P-T
50	50 l/min
75	75 l/min
70/35	70 (P-A) / 35 (P-B) l/min

*	Controlled flow with Δp 5 bar
75/45	75 (P-A, A-T) / 45 (B-P) l/min

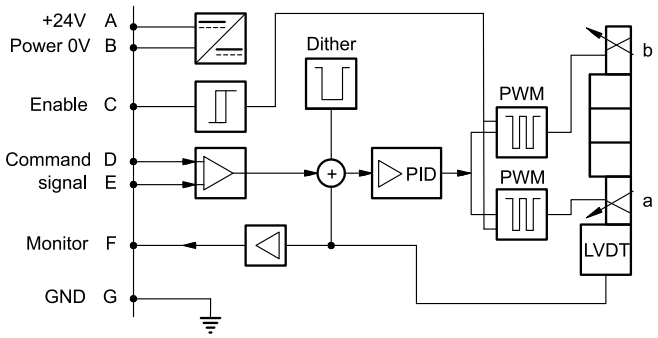
3 - ELECTRICAL CHARACTERISTICS

3.1 - Electrical on board electronics

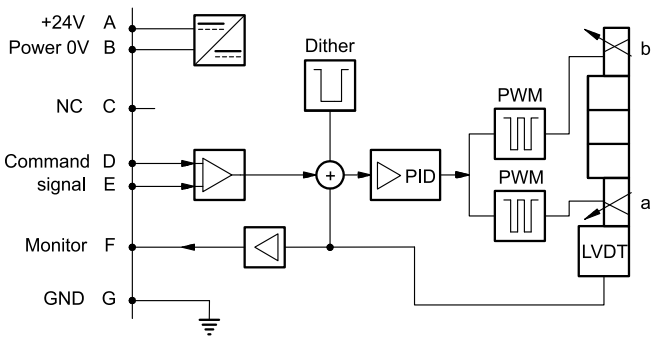
Duty cycle			100% (continuous operation)
Protection class according to EN 60529			IP65 / IP67
Supply voltage		V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption		VA	40
Maximum solenoid current		A	2.8
Fuse protection, external			3A
Command signals:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri > 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signals:	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Managed breakdowns			Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failure
Communication			LIN-bus Interface (with the optional kit)
Connection			7 - pin MIL-C-5015-G (DIN-EN 175201-804)
Electromagnetic compatibility (EMC) emissions EN 61000-6-4 immunity EN 61000-6-2			According to 2014/30/EU standards

3.2 - On-board electronics diagrams

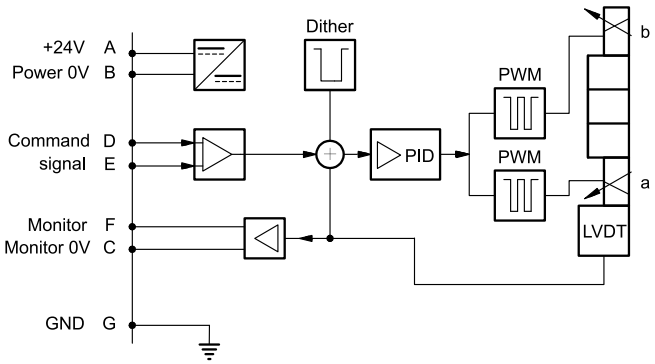
VERSION A - External Enable



VERSION B - Internal Enable

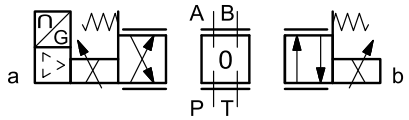


VERSION C - 0V Monitor

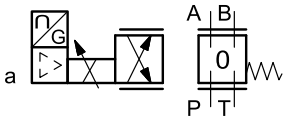


4 - VERSIONS WITH VOLTAGE COMMAND (E0)

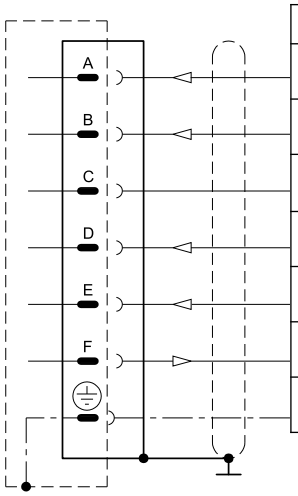
The reference signal is between -10V and +10V on double solenoid valves, and 0 ÷ 10V on single solenoid valves SA. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



COMMAND	**+10V**	**0V**	
MONITOR	**+10V**	**0V**	

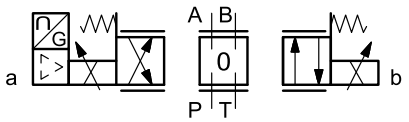


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	± 10 V	Command (differential input)		
E	0 V	PIN D reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

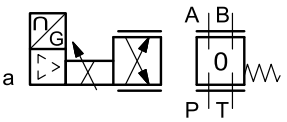
5 - VERSIONS WITH CURRENT COMMAND (E1)

The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower ,the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

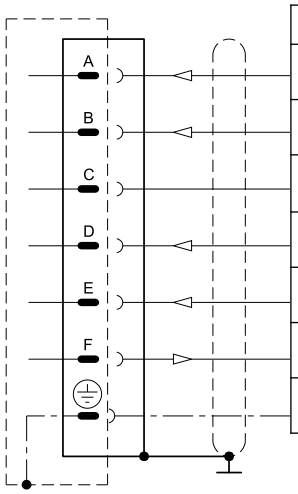
The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**



COMMAND	**20 mA**	**4 mA**	
MONITOR	**20 mA**	**4 mA**	

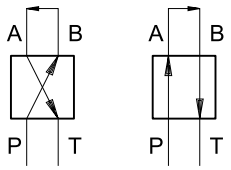


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	PIN D reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

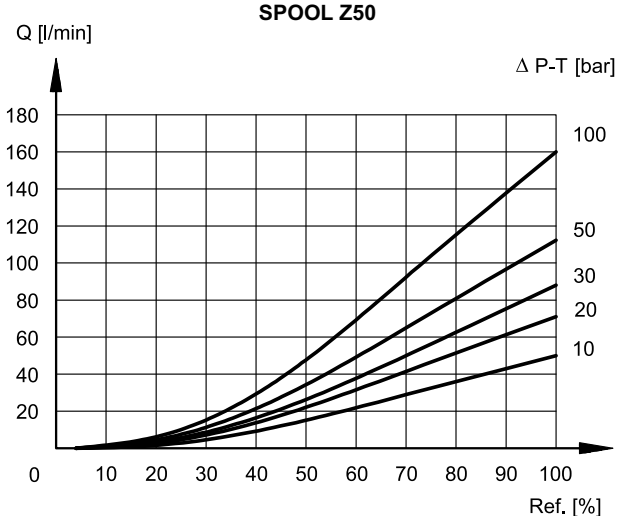
6 - CHARACTERISTIC CURVES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

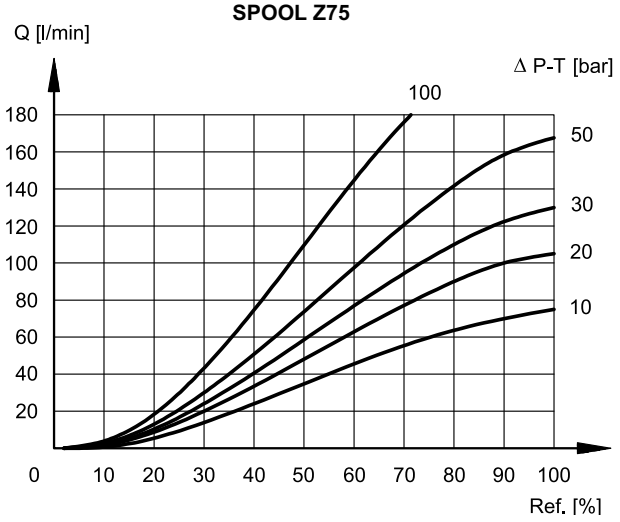
Typical flow rate curves related to the reference signal and measured for the available spools.
The Δp values are measured between P and T valve ports.



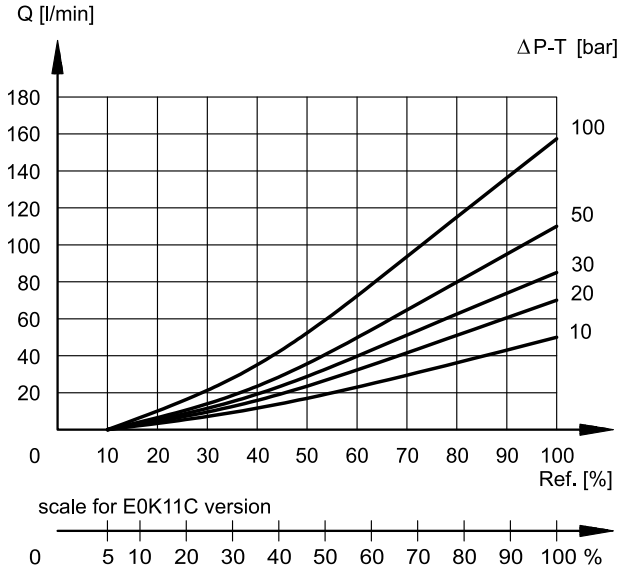
SPOOL Z50



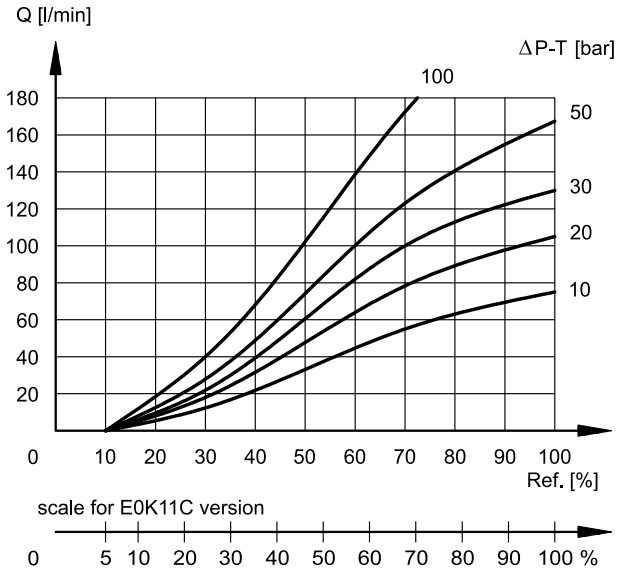
SPOOL Z75



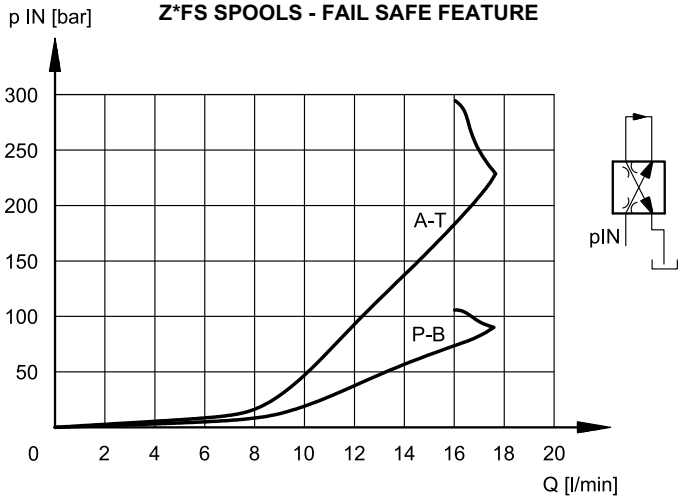
SPOOLS A50 - C50



SPOOLS A75 - C75



Z*FS SPOOLS - FAIL SAFE FEATURE

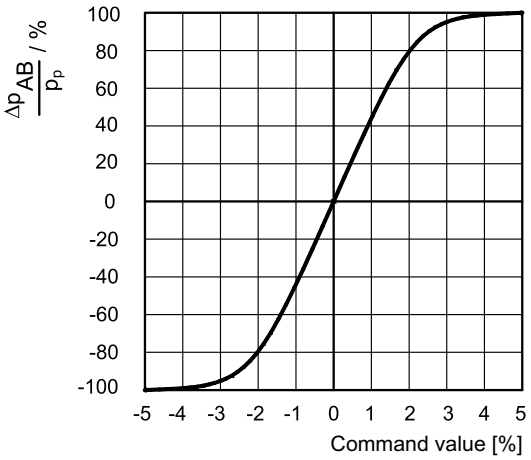


Flow P→B / A→T with valve in fail safe position, depending on the incoming pressure.

When a power failure (enabling OFF) occurs, the valve moves in 'fail safe' position by maintaining a minimum flow that allows the actuator to return slowly to a safety position.

During the black-out the centering springs retain the spool in fail safe-position.

Z SPOOLS - PRESSURE GAIN



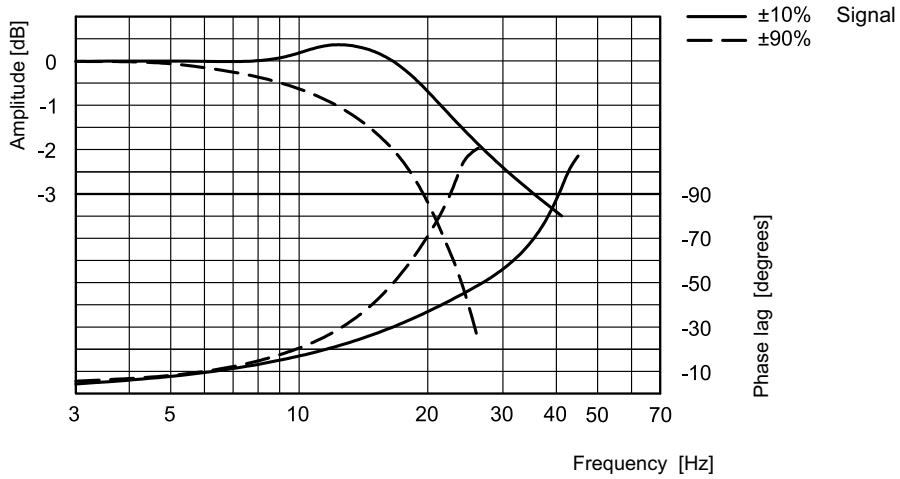
The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal.

In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

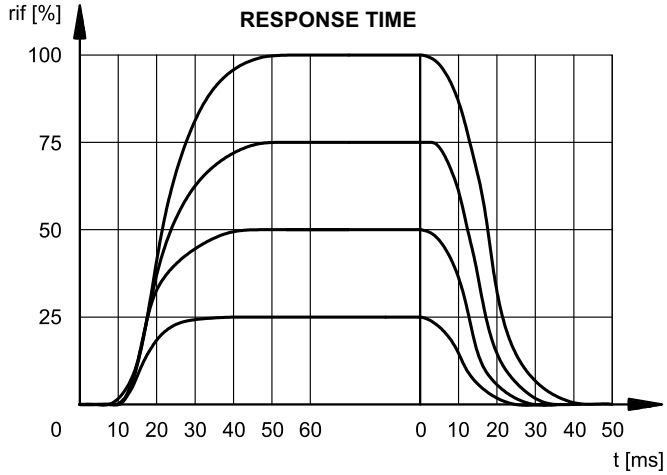
7 - RESPONSE TIMES

(obtained with mineral oil with viscosity of 36 cSt at 50°C 140 bar Δp P→T)

FREQUENCY RESPONSE (SPOOL Z - 4/3 valve)



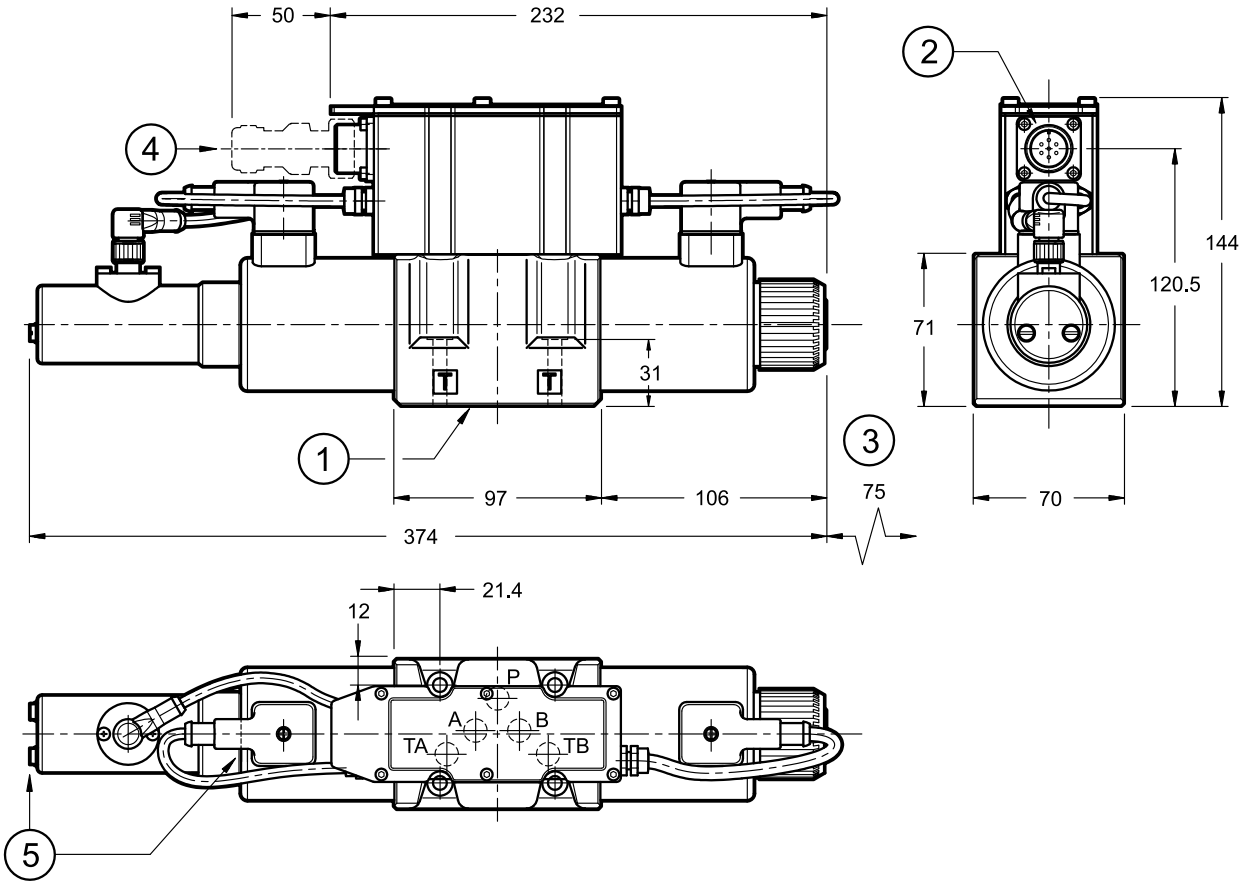
RESPONSE TIME



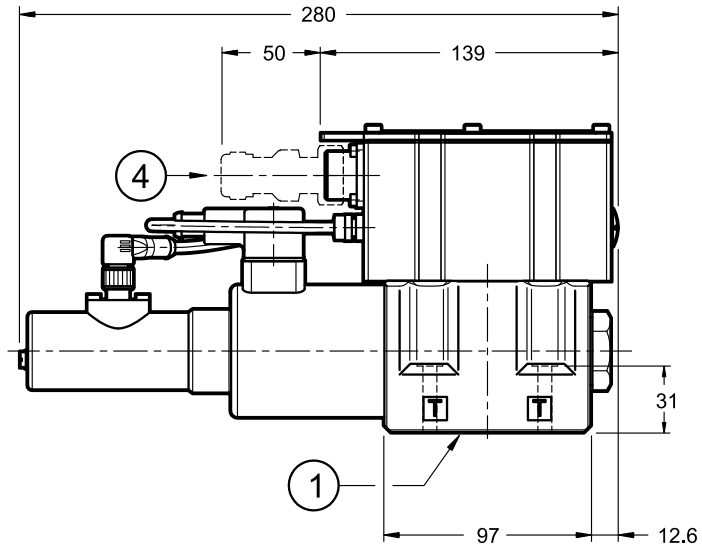
8 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DSE5J-A*
DSE5J-C*, DSE5J-RC*
DSE5J-Z*



DSE5J-A* SA
DSE5J-C* SA



1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) 90 Shore
2	Main connection
3	Coil removal space (solenoid B only)
4	Mating connector. **To be ordered separately.** See paragraph 11
5	Adjustment sealing performed at factory. Do not disassemble the transducer.

Fastening bolts: 4 SHC bolts M6x40 - ISO 4762
Torque: 8 Nm (A8.8)
Threads of mounting holes: M6x10

9 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

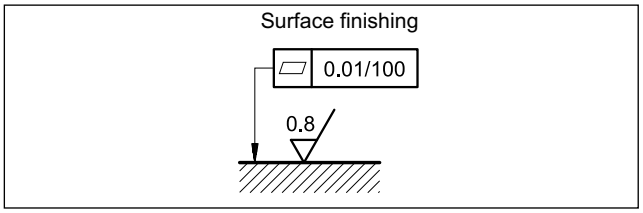
The fluid must be preserved in its physical and chemical characteristics.

10 - INSTALLATION

DSE5J valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.

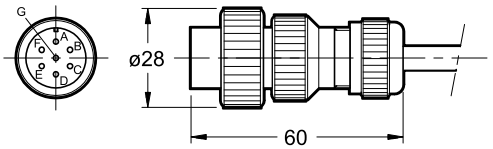


11 - ACCESSORIES

(to be ordered separately)

11.1 Mating connector

These valves have a plug for 7-pin mating connector, that is placed on the box of the integral motion control.



So as to avoid electromagnetic troubles and comply with the electromagnetic compatibility regulation EMC, it is recommended the use of a metal connector.

If a plastic connector is used, make sure that the protection characteristics IP and EMC of the valve are guaranteed.

Duplomatic can provide a metal cable connector type MIL-C-5015-G (EN 175201-804).

name: **EX7S/L/10** code **3890000003**

11.2 - Connection cables size

Power supply:
- up to 20 m cable length : 1,0 mm²
- up to 40 m cable length : 1,5 mm²

Signal: 0,50 mm²

A suitable cable would have 7 isolated conductors, a separate screen for the signal wires and an overall screen.

11.3 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, see catalogue 89850.

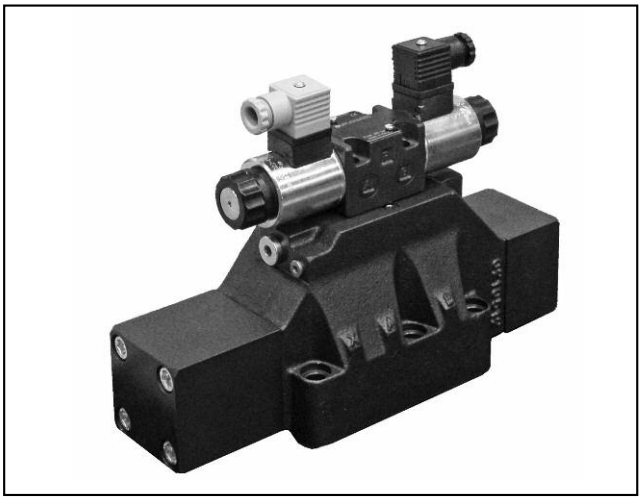
12 - SUBPLATES

(see catalogue 51 000)

PMD4-AI4G rear ports 3/4” BSP
PMD4-AL4G side ports 1/2” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DSPE*

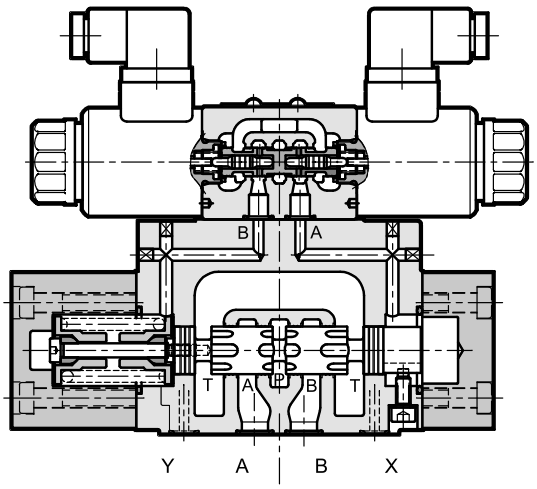
PILOT OPERATED DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL

SERIES 11

DSPE5 **CETOP P05**
DSPE5R **ISO 4401-05**
DSPE7 **ISO 4401-07**
DSPE8 **ISO 4401-08**
DSPE10 **ISO 4401-10**

p max (see performances table)
Q max (see performances table)

OPERATING PRINCIPLE



— The DSPE* are pilot operated directional control valves with electric proportional control and mounting interface in compliance with ISO 4401 standards.

— The valve opening (and hence the flow rate) can be modulated continuously in proportion to the current supplied to the proportional solenoids of the pilot valve.

— They can be controlled directly by a current control supply unit or by means of the relative electronic control units to exploit valve performance to the full (see par. 16).

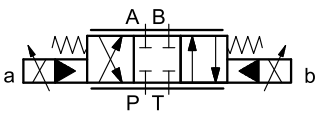
— They are available in CETOP P05, ISO 4401-05 , ISO 4401-07, ISO 4401-08 and ISO 4401-10 sizes. Each size can be supplied with different controlled flow rates, up to 1600 l/min.

PERFORMANCES

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

		DSPE5 DSPE5R	DSPE7	DSPE8	DSPE10
Max operating: - P - A - B ports - T port	bar	350 see paragraph 6			
Controlled flow rate with Δp 10 bar P-T	l/min	see paragraph 2			
Step response		see paragraph 5			
Hysteresis (with PWM 100 Hz)	% Q max	< 4%			
Repeatability	% Q max	< ±2%			
Electrical characteristics		see paragraph 4			
Ambient temperature range	°C	-20 / +60			
Fluid temperature range	°C	-20 / +80			
Fluid viscosity range	cSt	10 ÷ 400			
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13				
Recommended viscosity	cSt	25			
Mass: single solenoid valve double solenoid valve	kg	7,1 7,5	9,3 9,7	15,6 16	52,5 53

HYDRAULIC SYMBOL (typical)



1 - IDENTIFICATION CODE

D	S	P	E		-				/	11		-			/		K1	/	

Pilot operated directional control valve

Electric proportional control

Nominal size:
5 = CETOP P05 (**NOTE**)
5R = ISO 4401-05
7 = ISO 4401-07
8 = ISO 4401-08
10 = ISO 4401-10

Spool type:
C = closed centres
A = open centres
RC = regenerative closed centres
RA = regenerative open centres

Spool nominal flow rate (see table par. 2)

Configurations for single solenoid version (omit for double solenoid version):
SA = 1 solenoid for cross configuration
SB = 1 solenoid for parallel configuration

Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Piloting: **I** = internal
E = external
Z = internal piloting with 30 bar fixed adj. pressure reducing valve (see par. 6)

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

Coil electrical connection: for connector type EN 175301-803 (ex DIN 43650)
D12 = voltage 12V DC
D24 = voltage 24V DC

Manual override: (see par. 7)

NOTE: This version is interchangeable with the model E4E Duplomatic

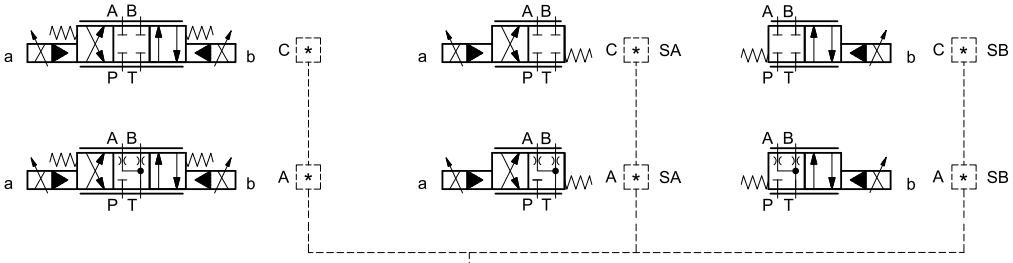
2 - AVAILABLE CONFIGURATIONS

The valve configuration depends on the combination of the following elements: number of proportional solenoids, spool type, rated flow.

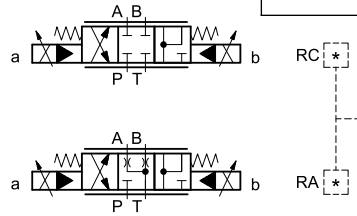
Configuration 2 solenoids:
3 positions with spring centering

1 solenoid for cross configuration "**SA**":
2 positions (central + external)
with spring centering

1 solenoid for parallel configuration "**SB**":
2 positions (central + external)
with spring centering



valve type	*	nominal flow rate with Δp 10 bar P-T
DSPE5 DSPE5R	**80**	80 l/min
	80/40	80 (P-A) / 40 (B-T) l/min
DSPE7	**100**	100 l/min
	150	150 l/min
	150/75	150 (P-A) / 75 (B-T) l/min
DSPE8	**200**	200 l/min
	300	300 l/min
	300/150	300 (P-A) / 150 (B-T) l/min
DSPE10	**350**	350 l/min
	500	500 l/min
	500/250	500 (P-A) / 250 (B-T) l/min



valve type	*	nominal flow rate with Δp 10 bar P-T
DSPE7	**150/75**	150 (P-A) / 75 (B-T) l/min
DSPE8	**300/150**	300 (P-A) / 150 (B-T) l/min
DSPE10	**500/250**	500 (P-A) / 250 (B-T) l/min

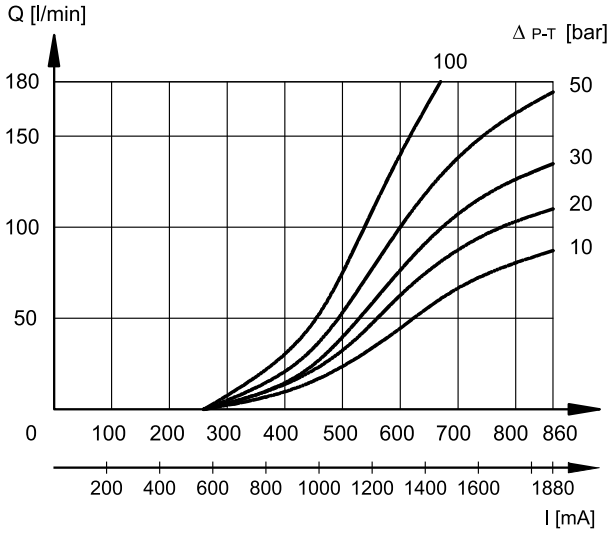
3 - CHARACTERISTIC CURVES

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

Typical flow rate control curves at constant Δp according to the current supply to the solenoid, measured for the available spool types.
The reference Δp values are measured between valve ports P and T.

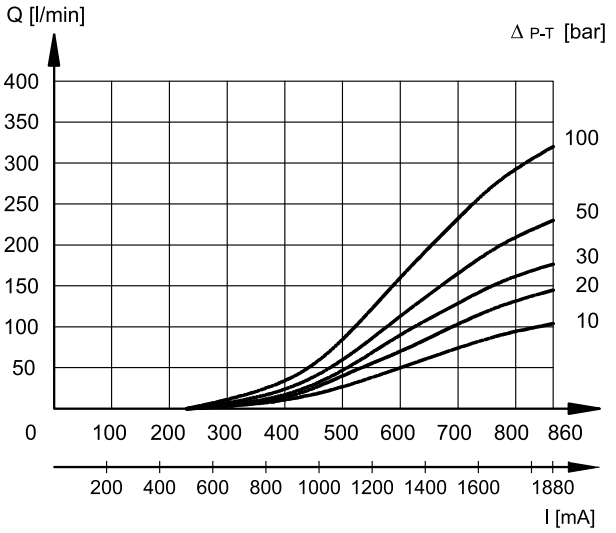
3.1 - Characteristic curves DSPE5 e DSPE5R

SPOOL C80 - A80

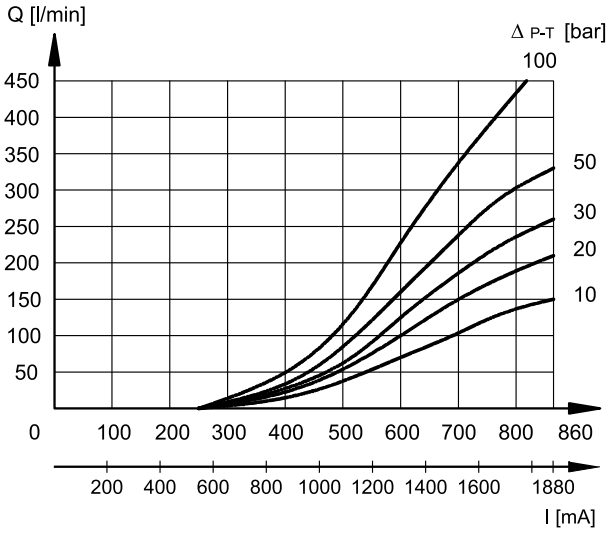


3.2 - Characteristic curves DSPE7

SPOOL C100 - A100

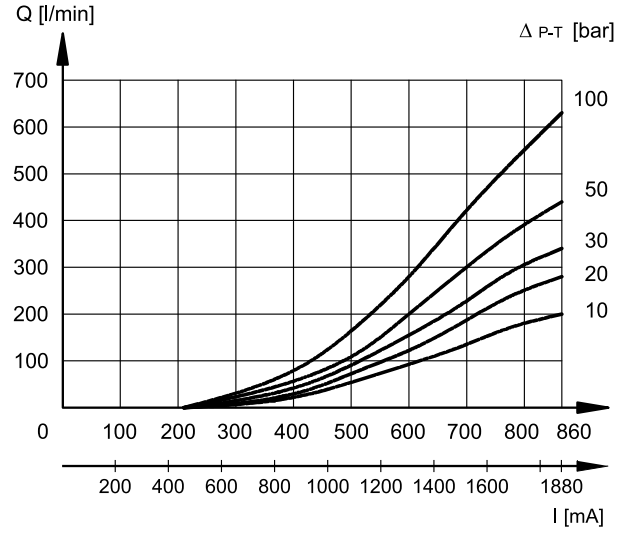


SPOOL C150 - A150

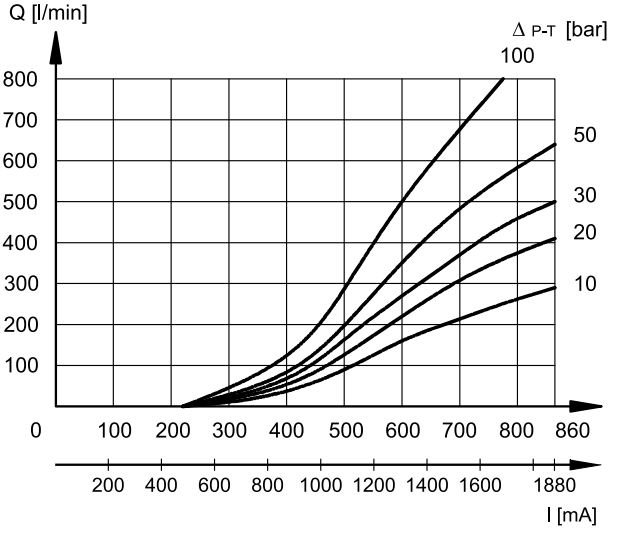


3.3 - Characteristic curves DSPE8

SPOOL C200 - A200

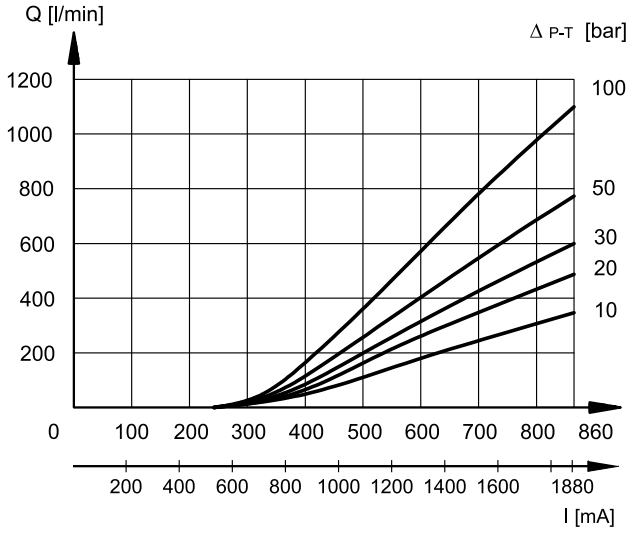


SPOOL C300 - A300

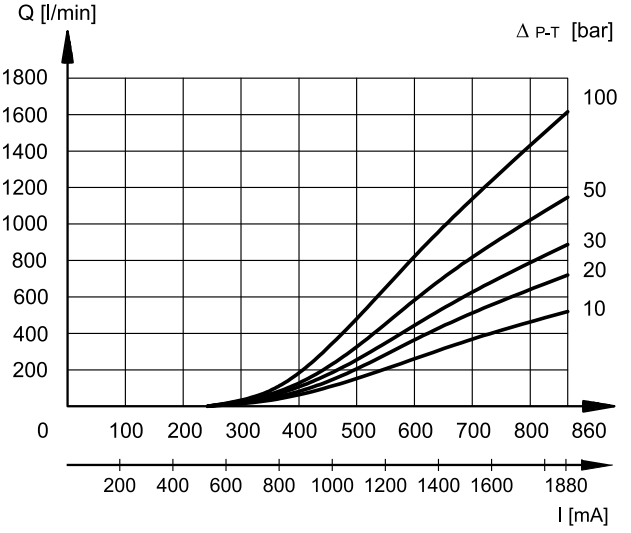


3.4 - Characteristic curves DSPE10

SPOOL C350 - A350



SPOOL C500 - A500



4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut.

It can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE		100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)		According to 2014/30/EU	
CLASS OF PROTECTION atmospheric agents (CEI EN 60529) coil insulation (VDE 0580) Impregnation		IP 65 class H class F	

5 - 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 shows the typical step response tested with static pressure 100 bar.

REFERENCE SIGNAL	0 → 100%	100 → 0%
	Step response [ms]	
DSPE5 / DSPE5R	50	40
DSPE7	80	50
DSPE8	100	70
DSPE10	200	120

6 - HYDRAULIC CHARACTERISTICS

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

		DSPE5 DSPER5	**DSPE7**	**DSPE8**	**DSPE10**
Max flow rate	l/min	180	450	800	1600
Piloting flow requested with operation 0 →100%	l/min	3	5	9	13
Piloting volume requested with operation 0 →100%	cm^3	1,7	3,2	9,1	21,6

PRESSURES (bar)	MIN	MAX
Piloting pressure on X port	30	210 (**NOTE**)
Pressure on T port with interal drain	–	10
Pressure on T port with external drain	–	250

NOTE: if the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure.

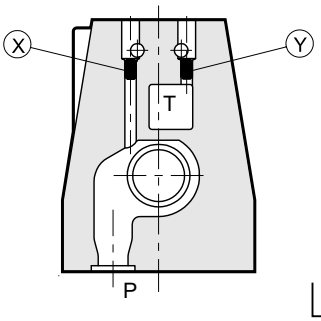
Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered (piloting type: Z, see par. 1 and 12).

6.1 - Pilot and drain

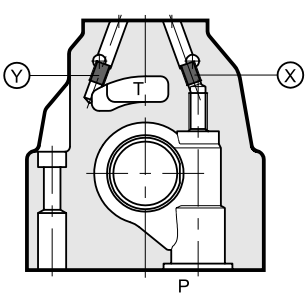
DSPE* valves are available with pilot and drain both internal and external. The version with external drain allows a higher back pressure on the unloading. The version with external pilot with reduced pressure must be used when higher pressures are needed.

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

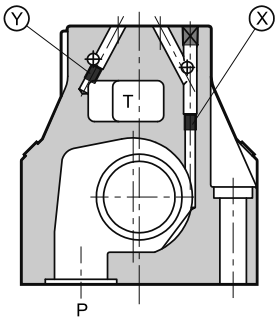
DSPE5
DSPE5R



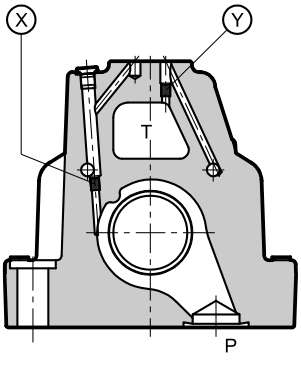
DSPE7



DSPE8



DSPE10



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

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

7 - MANUAL OVERRIDE

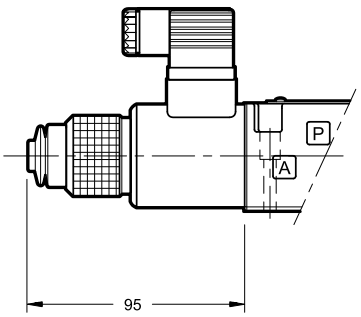
The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Three different manual override version are available upon request:

- **CM** version, manual override belt protected
- **CS** version, with metal ring nut provided with a M4 screw and a blocking locknut to allow the continuous mechanical operations.
- **CK** version, knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosing.

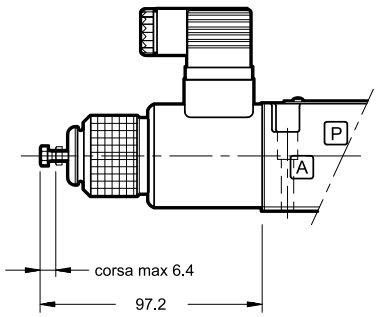
NOTE: The manual override use doesn't allow any proportional regulation; in fact, using this kind of override the main stage spool opens completely and the valve will behave as an on-off valve.

CM version



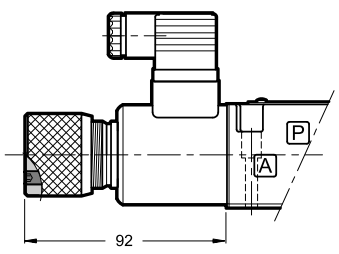
Code: 3803210003

CS version



Code: 3803210004

CK version

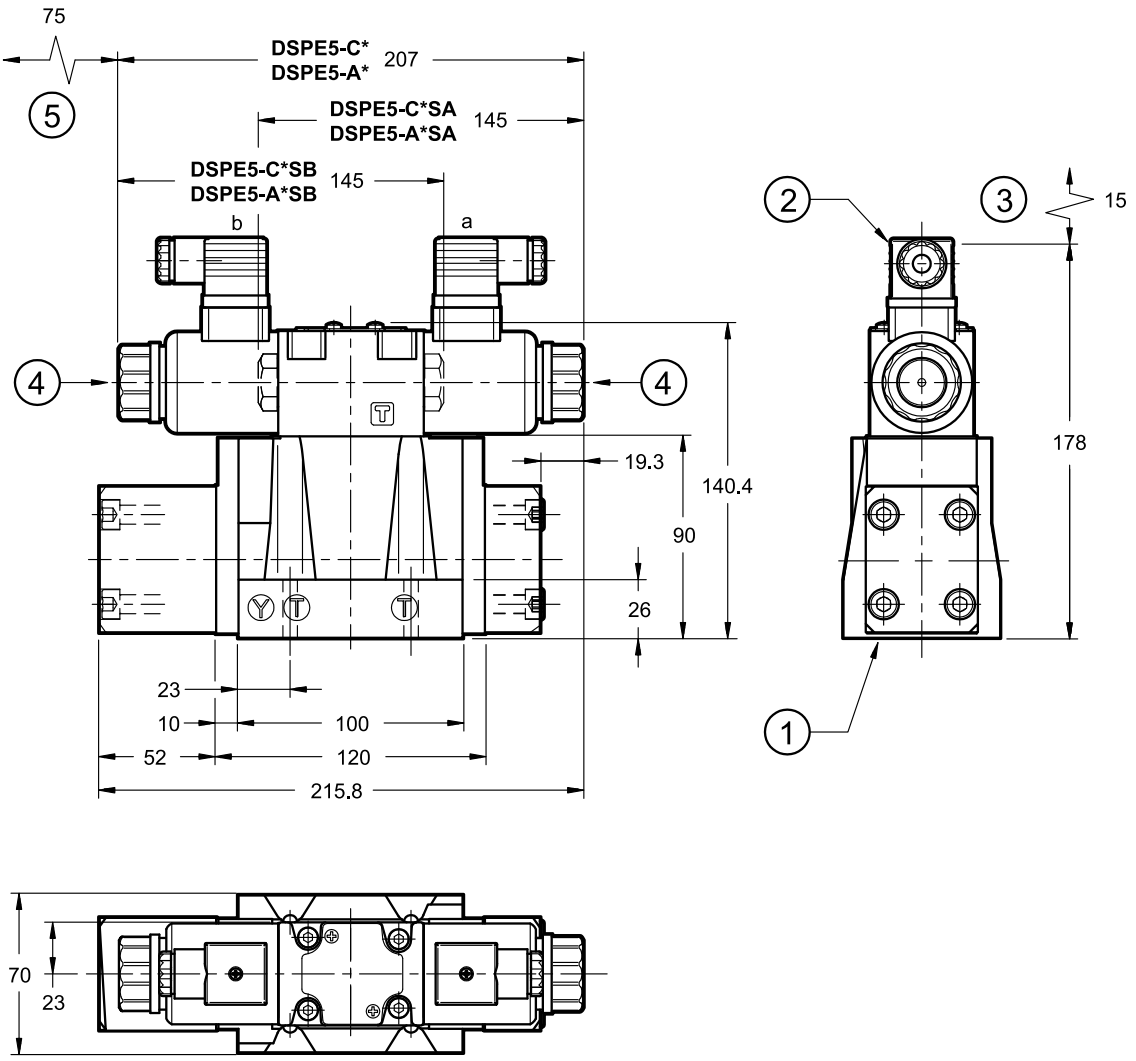


Allen key for set screw: 3 mm

Code: 3803210005

8 - OVERALL AND MOUNTING DIMENSIONS DSPE5 AND DSPE5R

dimensions in mm



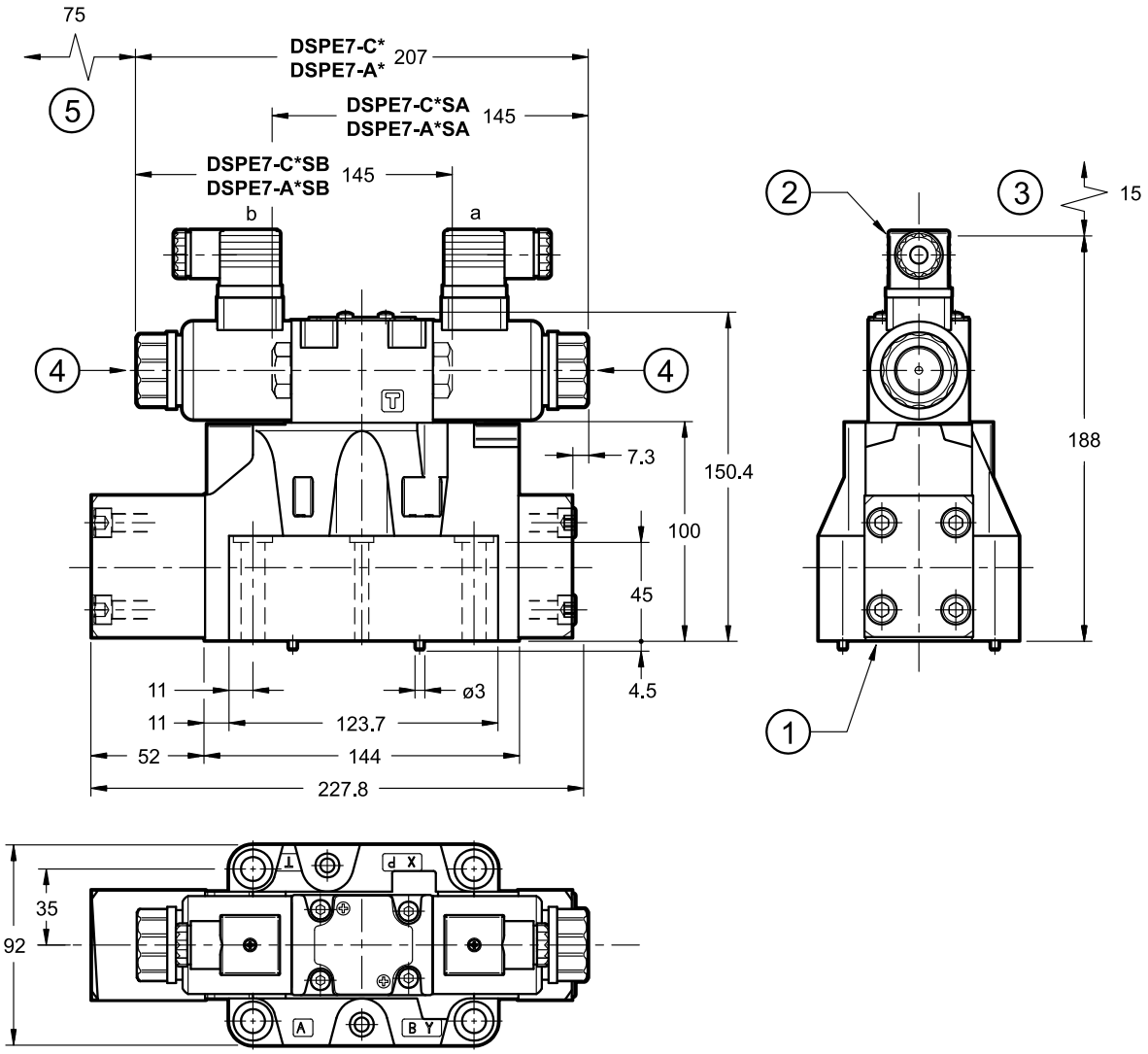
NOTE: for overall dimensions with Z option
(fixed adjustment pressure reducing valve) see par.12.
- Mounting surface at par. 13.

Valve fastening: N. 4 SHC screws M6x35 - ISO 4762
Tightening torque: 8 Nm (A 8.8 bolts)
Thread of mounting holes: M6x10

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space

9 - OVERALL AND MOUNTING DIMENSIONS DSPE7

dimensions in mm



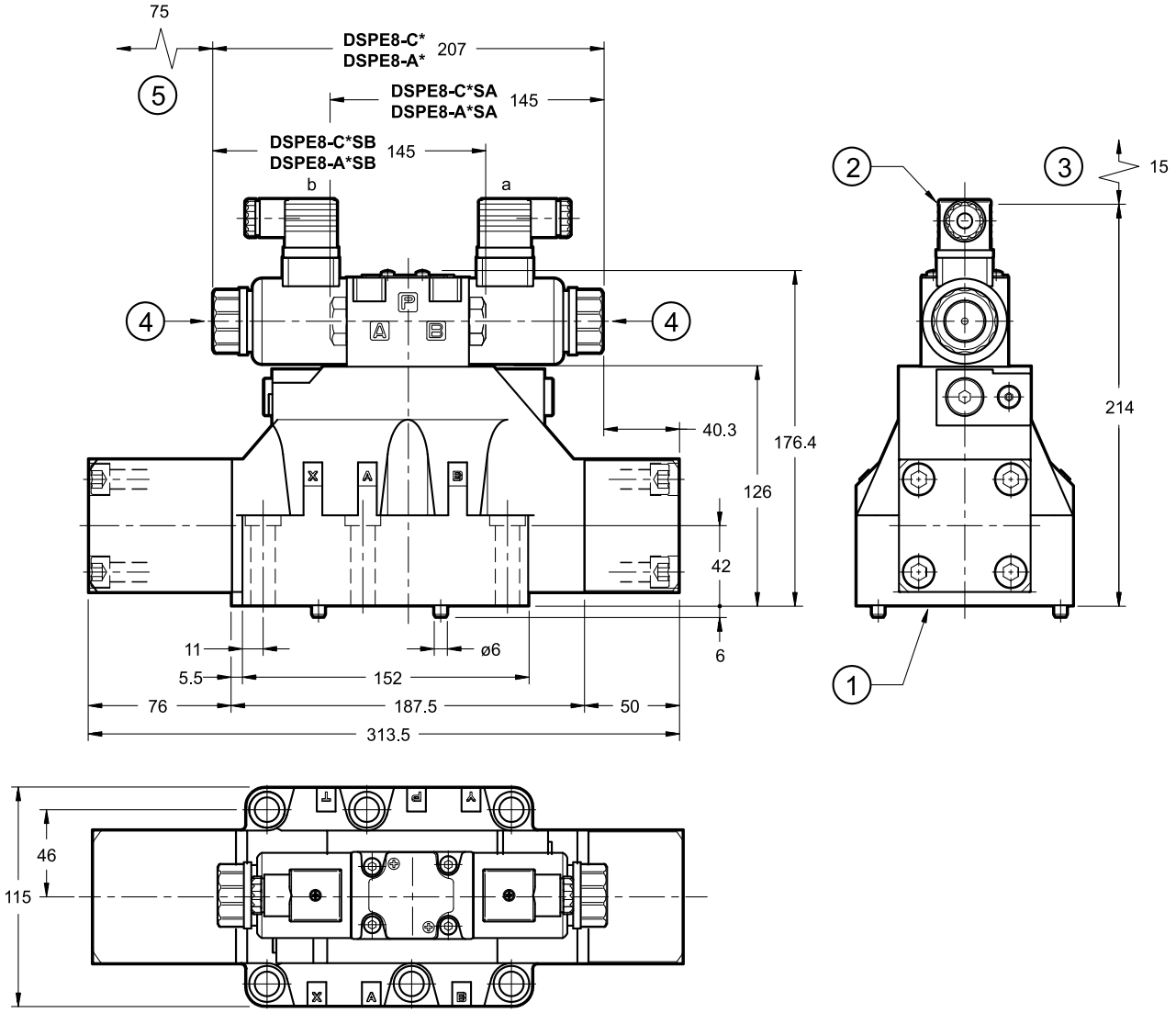
NOTE: for overall dimensions with Z option
(fixed adjustment pressure reducing valve) see par.12.
- Mounting surface at par. 13.

Single valve fastening:	N. 4 SHC M10x60 bolts - ISO 4762 N. 2 SHC M6x60 bolts - ISO 4762
Tightening torque:	M10x60: 40 Nm (A 8.8 bolts) M6x60: 8 Nm (A 8.8 bolts)
Thread of mounting holes:	M6x18; M10x18

1	Mounting surface with sealing rings: N. 4 OR type 130 (22.22x2.62) - 90 Shore N. 2 OR type 2043 (10.82x1.78) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space

10 - OVERALL AND MOUNTING DIMENSIONS DSPE8

dimensions in mm



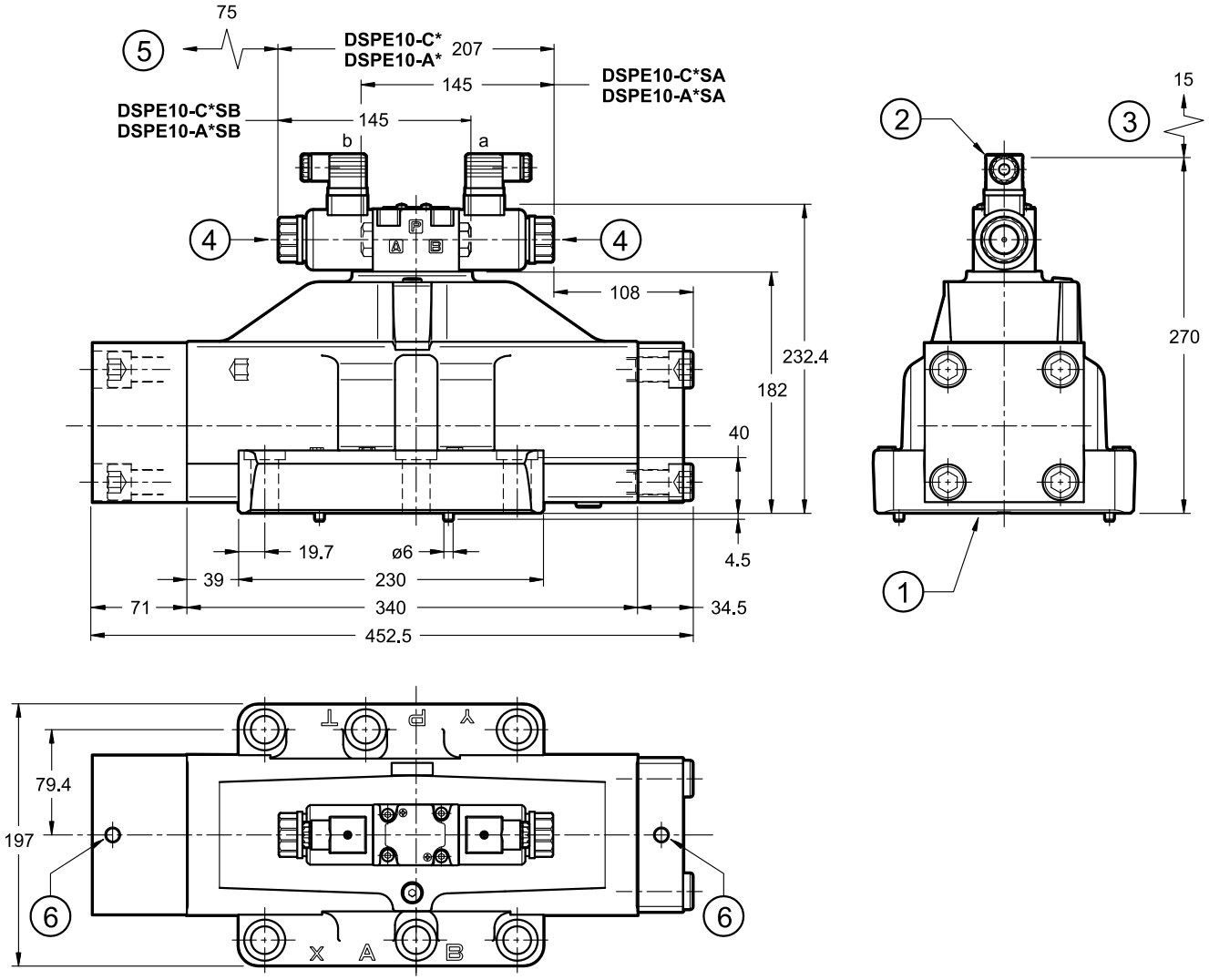
NOTE: for overall dimensions with Z option
(fixed adjustment pressure reducing valve) see par.12.
- Mounting surface at par. 13.

Valve fastening: N. 6 SHC M12x60 bolts - ISO 4762
Tightening torque: 69 Nm (A 8.8 bolts)
Thread of mounting holes: M12x20

1	Mounting surface with sealing rings: N. 4 OR type 3118 (29.82x2.62) - 90 Shore N: 2 OR type 3081 (20.24x2.62) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space

11 - OVERALL AND MOUNTING DIMENSIONS DSPE10

dimensions in mm



NOTE: for overall dimensions with Z option
(fixed adjustment pressure reducing valve) see par.12.
- Mounting surface at par. 13.

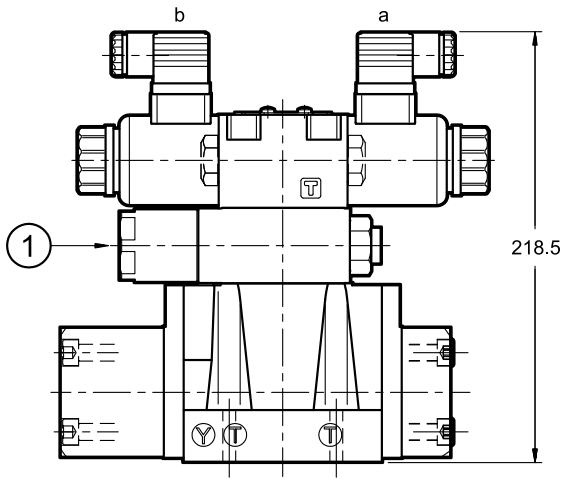
Valve fastening: N. 6 SHC M12x70 screw - ISO 4762
Tightening torque: 330 Nm (A 8.8 bolts)
Thread of mounting holes: M20x40

1	Mounting surface with sealing rings: N. 4 OR type 4150 (37.59x3.53) - 90 Shore N: 2 OR type 3081 (20.24x2.62) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override embedded in the solenoid tube
5	Coil removal space
6	N. 2 M12 holes for eyebolts lifting

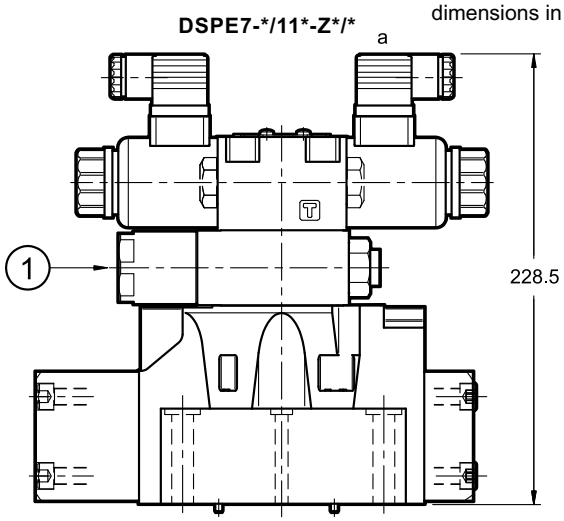
12 - OVERALL AND MOUNTING DIMENSIONS DSPE*-*/11*-Z*/*

dimensions in mm

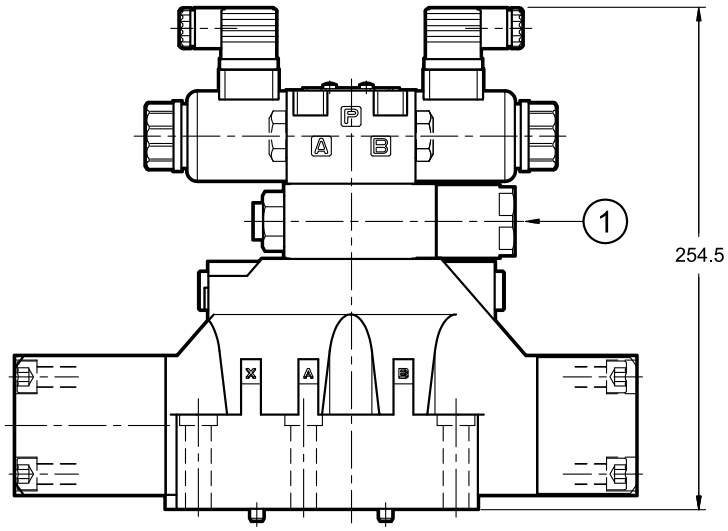
DSPE5-*/11*-Z*/*



DSPE7-*/11*-Z*/*

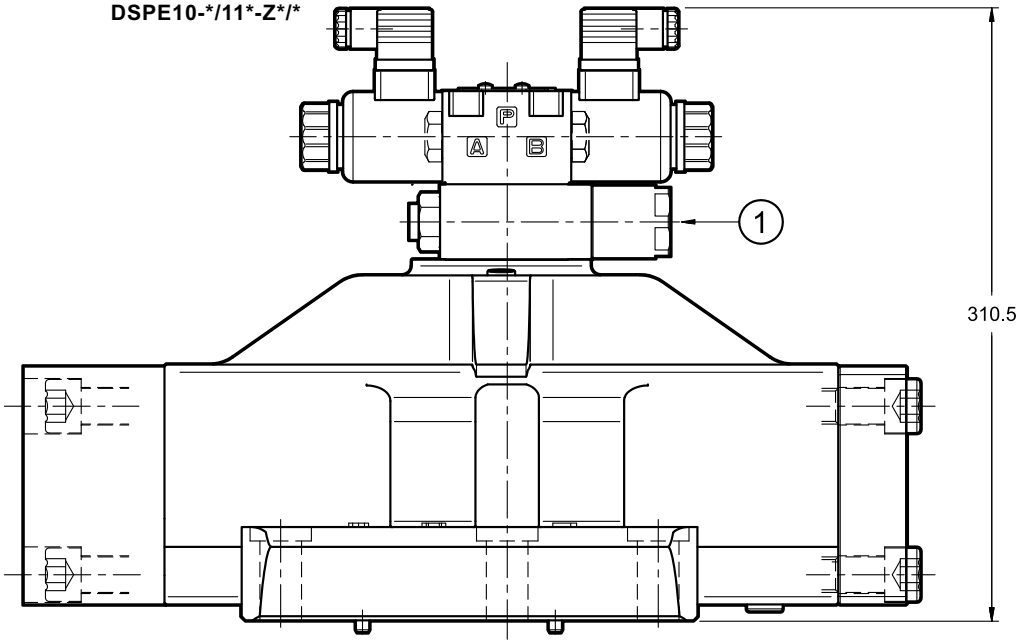


DSPE8-*/11*-Z*/*



NOTE: for missing overall dimensions and characteristics see par. 8 - 9 - 10 - 11

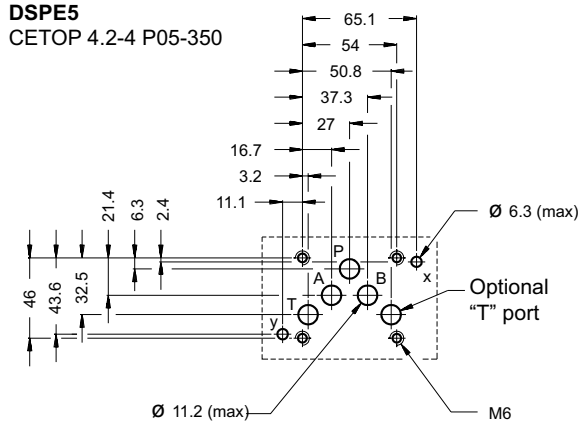
DSPE10-*/11*-Z*/*



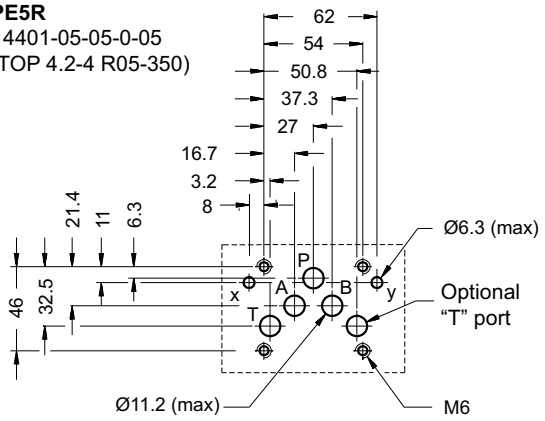
1	30 bar fixed adjustment pressure reducing valve

13 - MOUNTING SURFACES

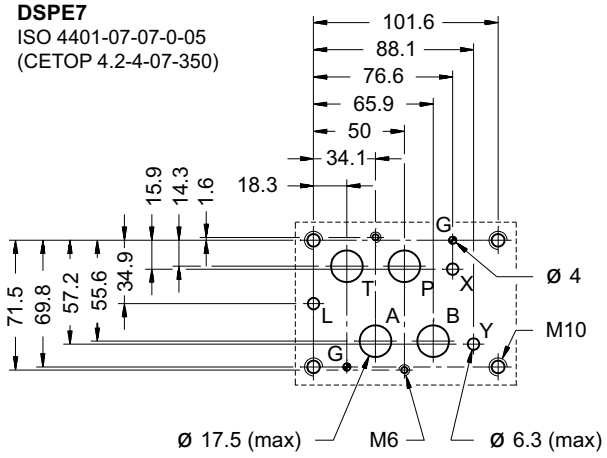
DSPE5
CETOP 4.2-4 P05-350



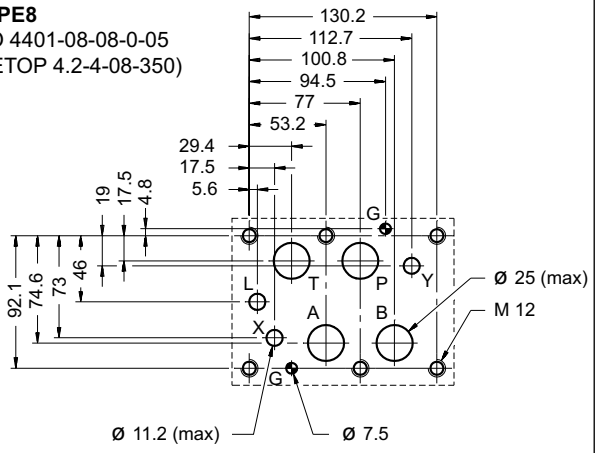
DSPE5R
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



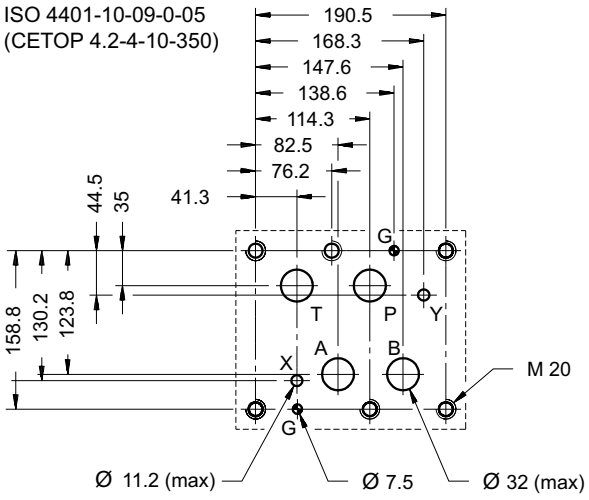
DSPE7
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DSPE8
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



DSPE10
ISO 4401-10-09-0-05
(CETOP 4.2-4-10-350)



14 - 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 fluid types such as HFA, HFB, HFC, please consult our technical department.

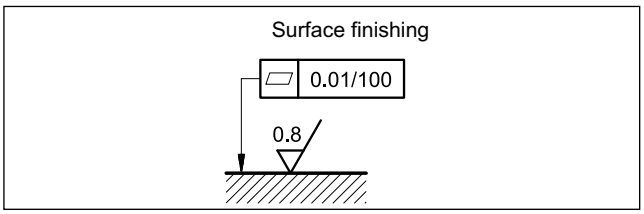
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

15 - INSTALLATION

The DSPE* valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.



16 - ELECTRONIC CONTROL UNITS

DSPE* - * * SA (SB)

EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDC-141	for solenoid 12V DC		
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M141	for solenoid 12V DC		

DSPE* - A* **DSPE* - C***

EDM-M211	for solenoid 24V DC	rail mounting DIN EN 50022	see cat. 89 251
EDM-M241	for solenoid 12V DC		

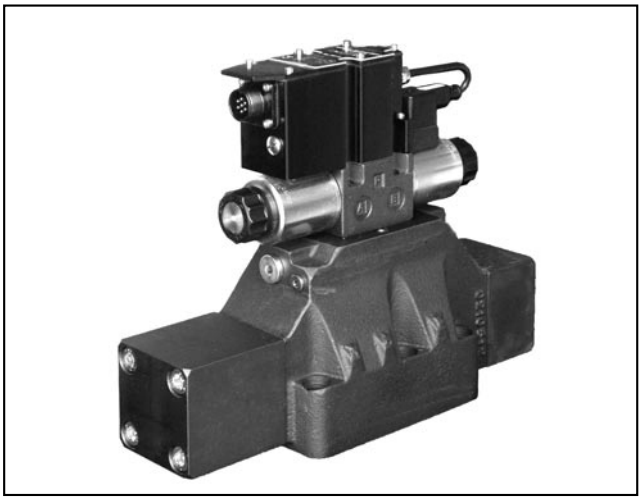
17 - SUBPLATES

(see catalogue 51 000)

		DSPE5	**DSPE7**	**DSPE8**	**DSPE10**
Model with rear ports		PME4-AI5G	PME07-AI6G	-	-
Model with side ports		PME4-AL5G	PME07-AL6G	PME5-AL8G	-
Thread of ports:	P - T - A - B X - Y	3/4” BSP 1/4” BSP	1” BSP 1/4” BSP	1½” BSP 1/4” BSP	-

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



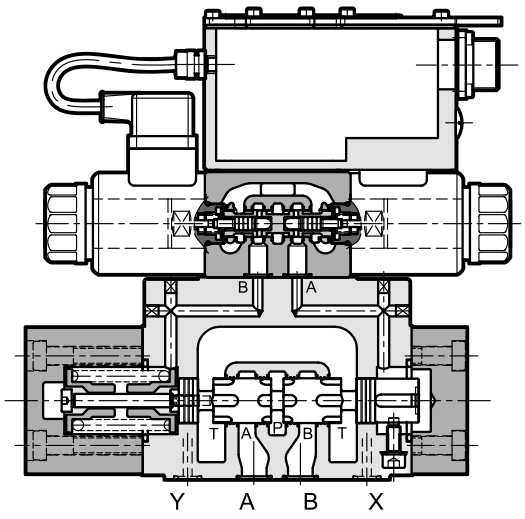
DSPE*G*

PROPORTIONAL DIRECTIONAL VALVES, PILOT OPERATED WITH INTEGRATED ELECTRONICS

SUBPLATE MOUNTING

DSPE5G* **CETOP P05**
DSPE5RG* **ISO 4401-05**
DSPE7G* **ISO 4401-07**
DSPE8G* **ISO 4401-08**
DSPE10G* **ISO 4401-10**
DSPE11G* **ISO 4401-10** oversize ports

OPERATING PRINCIPLE



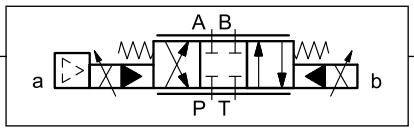
— The DSPE*G* are proportional directional control valves, pilot operated, with integrated electronics and with mounting interface in compliance with ISO 4401 standards.

— They control direction and flow of the fluid.

— The valves are available with different types of electronics, with analogue or fieldbus interfaces.

— The valves are easy to install. The driver directly manages digital settings.

HYDRAULIC SYMBOL (typical)



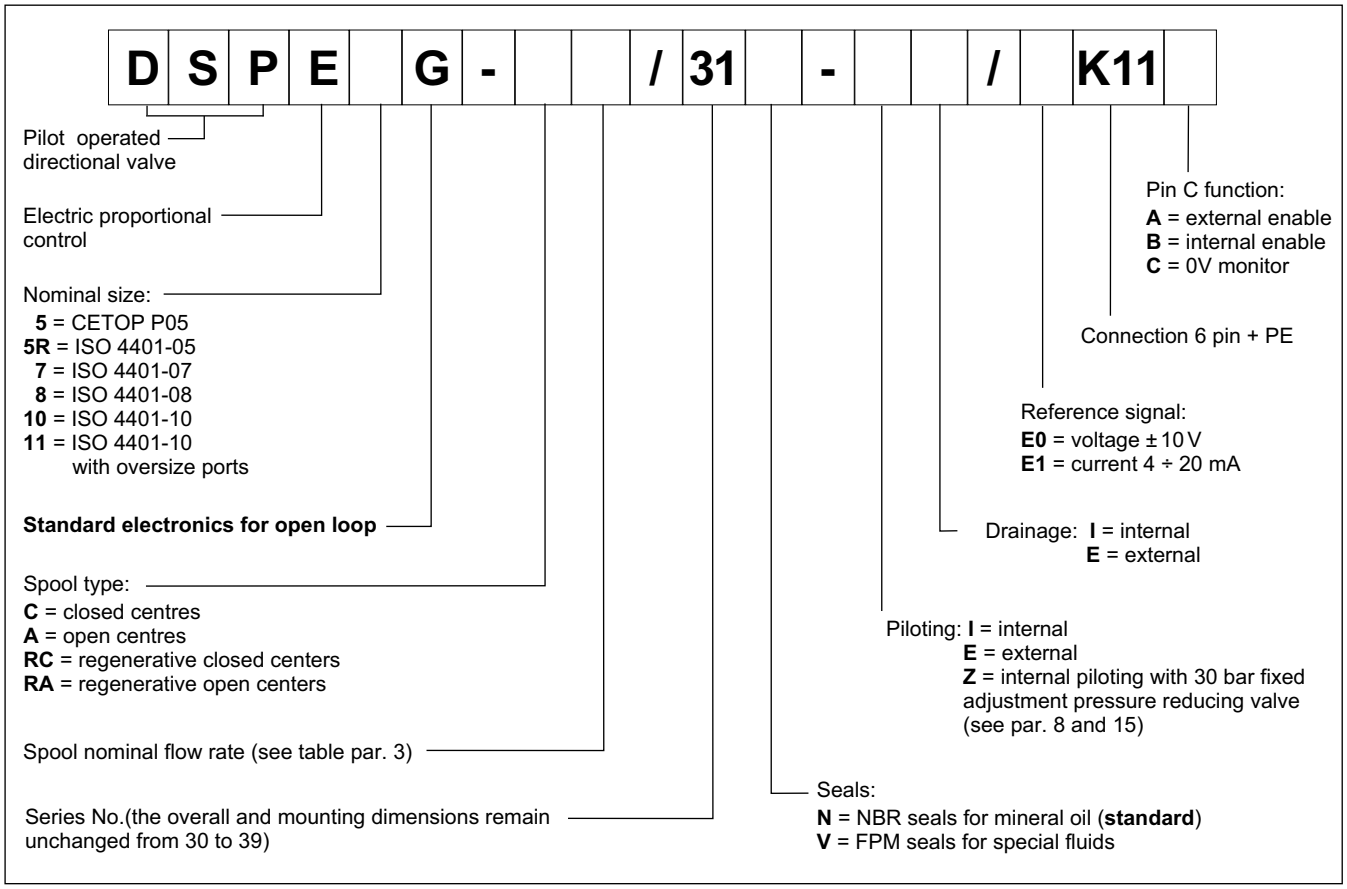
PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

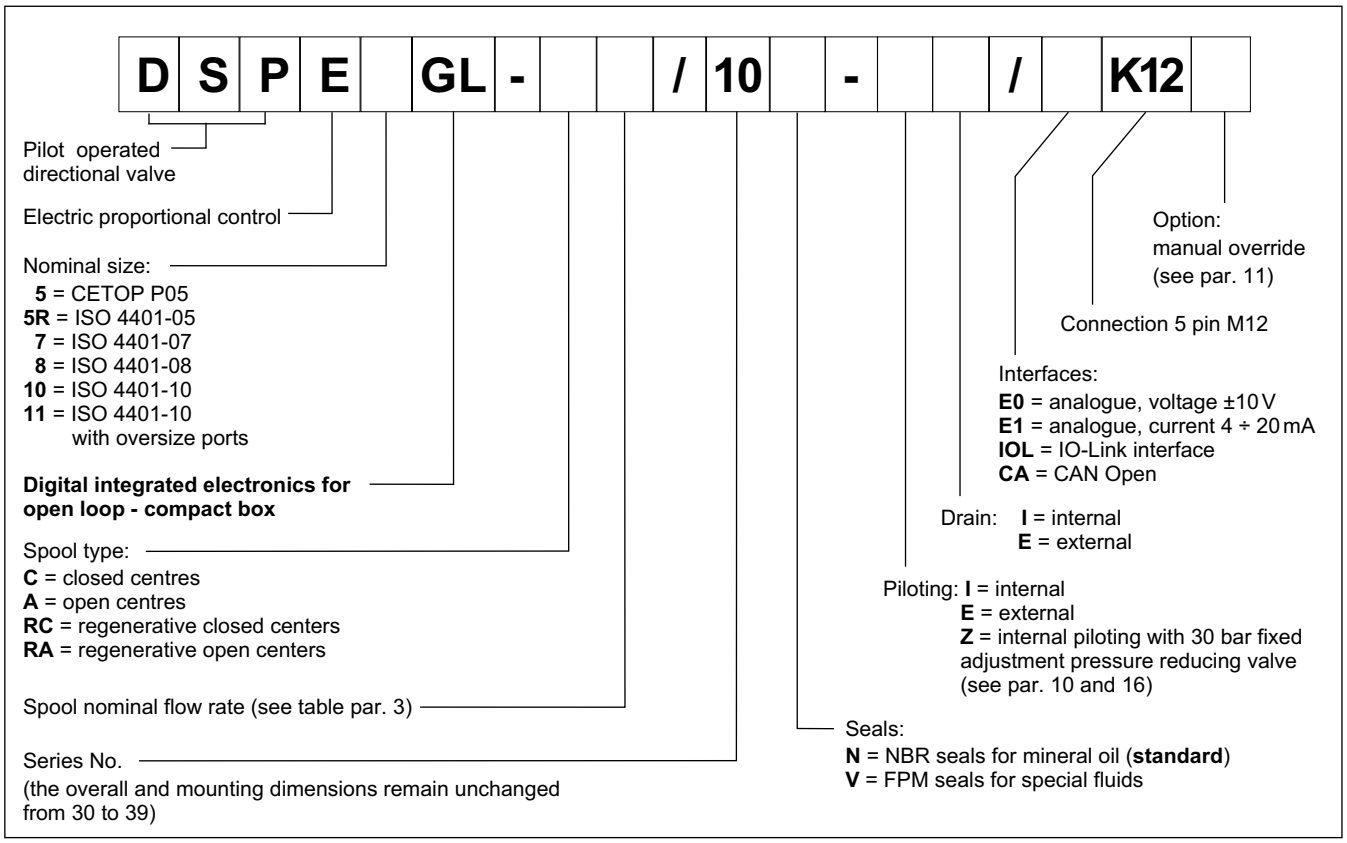
		DSPE5G* DSPE5RG*	DSPE7G*	DSPE8G*	DSPE10G*	DSPE11G*
Max operating pressure: P - A - B ports T port	bar	350 see paragraph 10				
Max flowrate	l/min	180	450	800	1600	2800
Hysteresis	% Q max	< 2 %				
Repeatability	% Q max	< ± 1%				
Electrical characteristics		see paragraph 4				
Ambient temperature range	°C	-20 / +60				
Fluid temperature range	°C	-20 / +80				
Fluid viscosity range	cSt	10 ÷ 400				
Fluid contamination degree		According to ISO 4406:1999 class 18/16/13				
Recommended viscosity	cSt	25				
Mass	kg	7.9	10.1	16.4	53.3	53

1 - IDENTIFICATION CODES

1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication

D	S	P	E		GH	-			/	31		-			-		K16		/			

Pilot operated directional valve

Electric proportional control

Nominal size:
5 = CETOP P05
5R = ISO 4401-05
7 = ISO 4401-07
8 = ISO 4401-08
10 = ISO 4401-10
11 = ISO 4401-10 with oversize ports

Digital integrated electronics for open loop with fieldbus communication

Spool type:
C = closed centres
A = open centres
RC = regenerative closed centers
RA = regenerative open centers

Spool nominal flow rate (see table par. 3)

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Piloting:
I = internal
E = external
Z = internal piloting with 30 bar fixed adjustment pressure reducing valve (see par. 8 and 15)

Drain:
I = internal
E = external

Reference signal:
E0 = voltage ±10 V **E1** = current 4 ÷ 20 mA
FD = full digital version (on request)

Connection 11 pin + PE

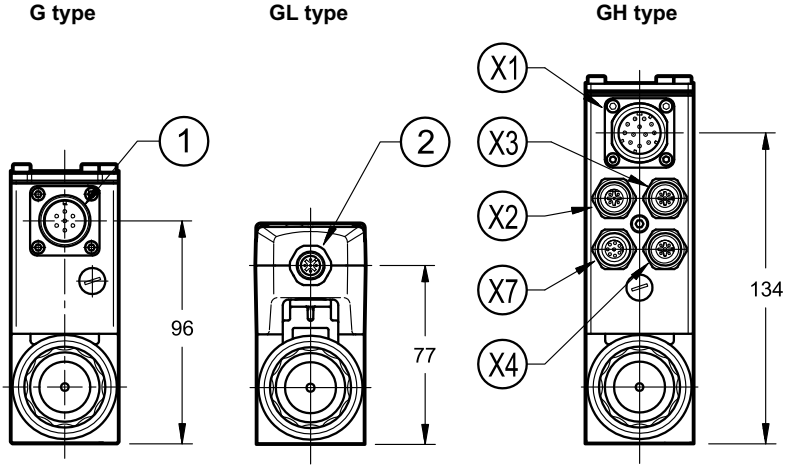
X1 Main connector configuration:
D1 = one command
D0 = full digital version
(on request - available for reference signal FD type only)

X2, X3 Field BUS type:
CA = CAN Open
PD = PROFIBUS DP
EC = EtherCAT
EN = Ethernet /IP
PN = Profinet
PL = PowerLink

X7 Digital transducer:
0 = none
1 = version 1 (SSI type)
2 = version 2 (Encoder type)

X4 Analogue transducer:
0 = none
1 = version 1 (single /double transducer)

2 - COMPARISON AMONG INTEGRATED ELECTRONICS



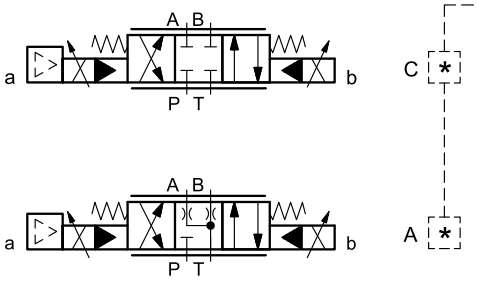
1	Connection 6 pin + PE
2	Connection M12 5 pin, code A, male
X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	Connection for analogue transducer
X7	Connection for digital transducer

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present. Please refer to sections 5, 6 and 7 for connections descriptions and pinouts.
NOTE 2: Related mating connectors have to be ordered separately. See catalogue 89 000.

3 - AVAILABLE CONFIGURATIONS

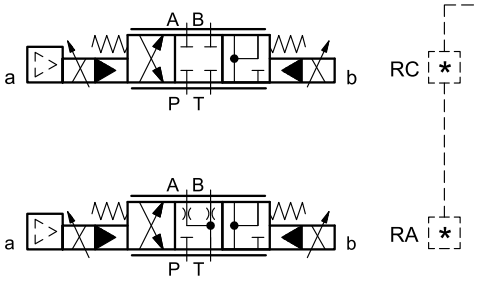
The valve configuration depends on the combination of spool type and rated flow.

3 positions with spring centreing



valve type	*	Nominal flow with Δp 10 bar P-T
DSPE5G* DSPE5RG*	**80**	80 l/min
	80 / 40	80 (P-A) / 40 (B-T) l/min
DSPE7G*	**100**	100 l/min
	150	150 l/min
	150 / 75	150 (P-A) / 75 (B-T) l/min
DSPE8G*	**200**	200 l/min
	300	300 l/min
	300 / 150	300 (P-A) / 150 (B-T) l/min
DSPE10G*	**350**	350 l/min
	500	500 l/min
	500 / 250	500 (P-A) / 250 (B-T) l/min
DSPE11G*	**800**	800 l/min
	800 / 500	800 (P-A) / 500 (B-T) l/min

regenerative spool



valve type	*	Nominal flow with Δp 10 bar P-T
DSPE7G*	**150/75**	150 (P-A) /75 (B-T) l/min
DSPE8G*	**300/150**	300 (P-A) /150 (B-T) l/min
DSPE10G*	**500/250**	500 (P-A) /250 (B-T) l/min

4 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	3
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

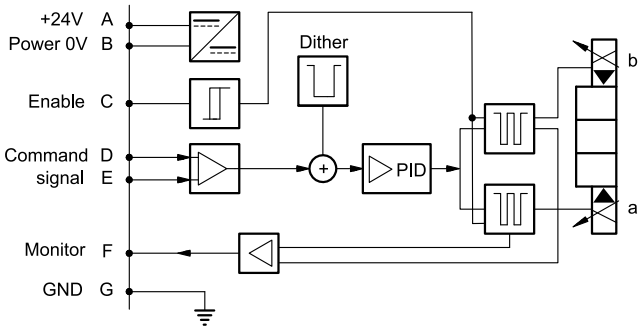
5 - DSPE*G - STANDARD ELECTRONICS

5.1 - Electrical characteristics

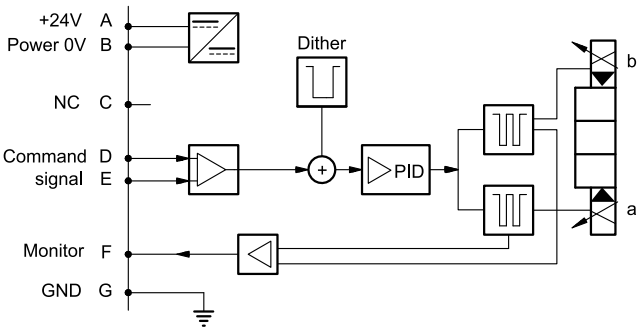
Command signal: voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

5.2 - On-board electronics diagrams

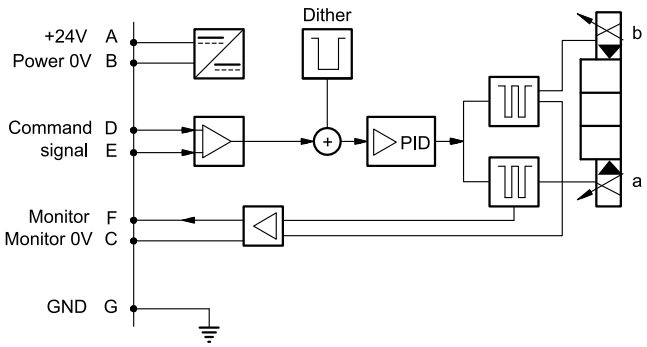
VERSION A - External Enable



VERSION B - Internal Enable

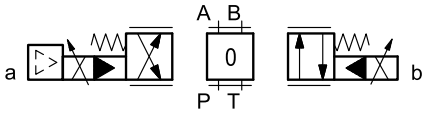


VERSION C - 0V Monitor

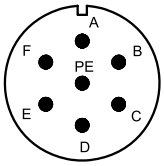


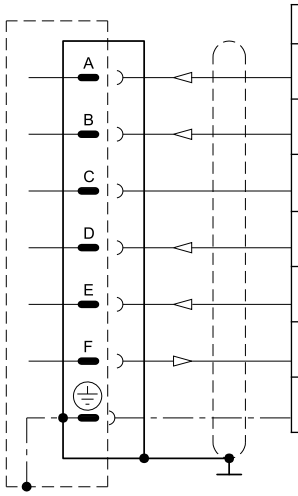
5.3 - Versions with voltage command (E0)

The reference signal is between -10V and +10V on double solenoid valves, and 0 ÷ 10V on single solenoid valves. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



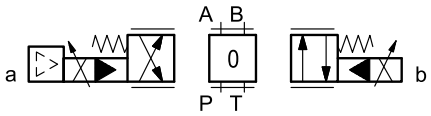


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

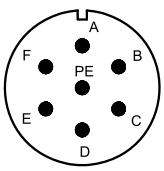
5.4 - Versions with current command (E1)

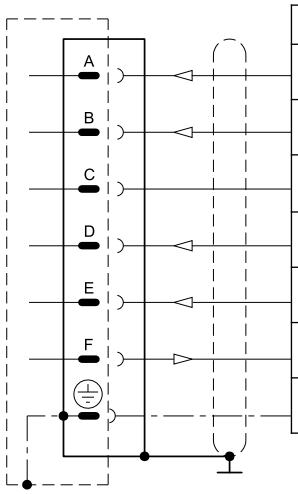
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**	
MONITOR	**4 mA**	**12 mA**	**20 mA**	





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

6 - DSPE*GL - COMPACT ELECTRONICS

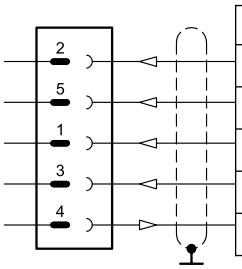
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

6.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	 IO-Link Port Class B 230,4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Connection		5-pin M12 code A (IEC 61076-2-101)

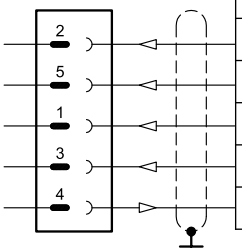
6.2 - Pin tables

'E0' connection



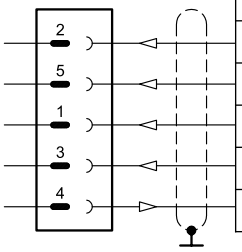
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



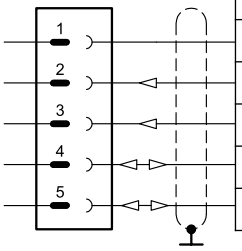
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

7 - DSPE*GH - FIELDBUS ELECTRONICS

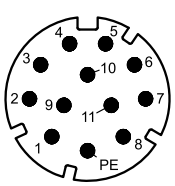
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

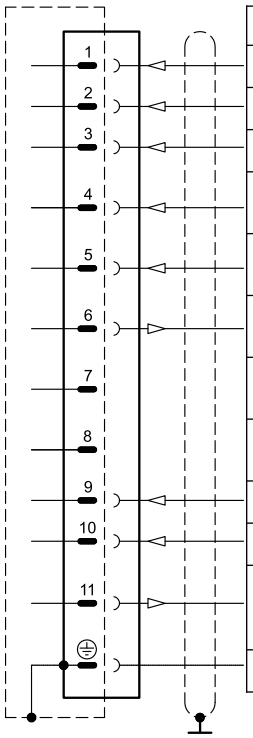
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 5.3 and 5.4.

7.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

7.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

7.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

7.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

7.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

7.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

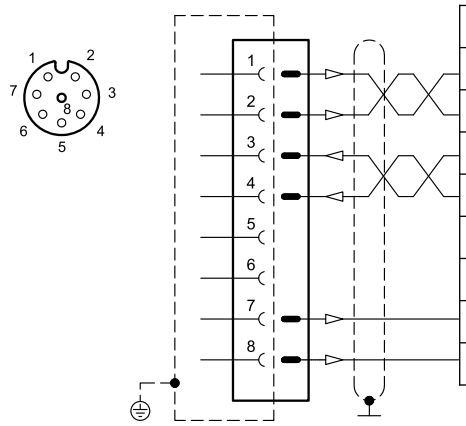
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

7.4 - Digital transducer connection

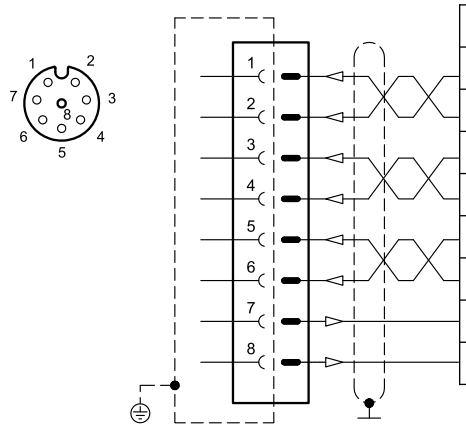
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



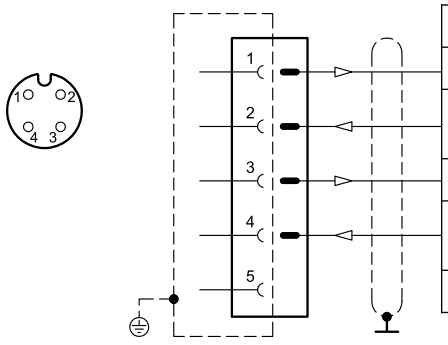
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

7.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

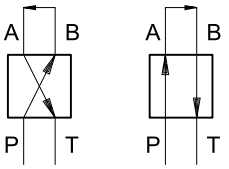
(single or double is a software-selectable option)



Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

8 - CHARACTERISTIC CURVES

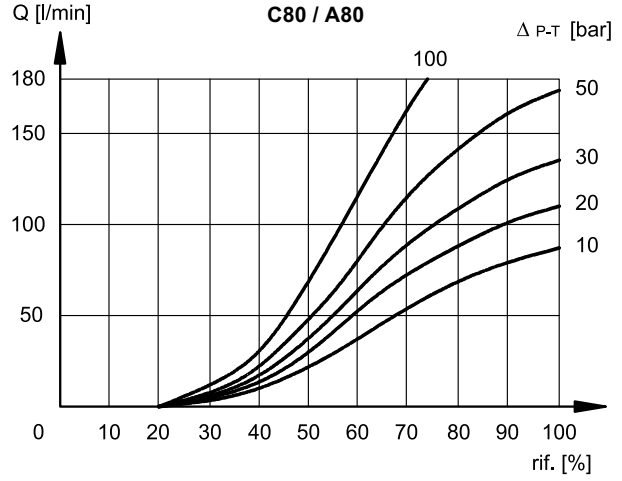
(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)



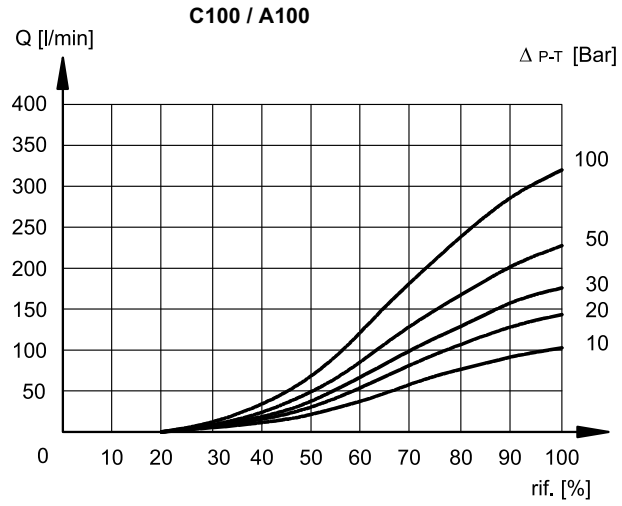
Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools. The Δp values are measured between P and T valve ports.

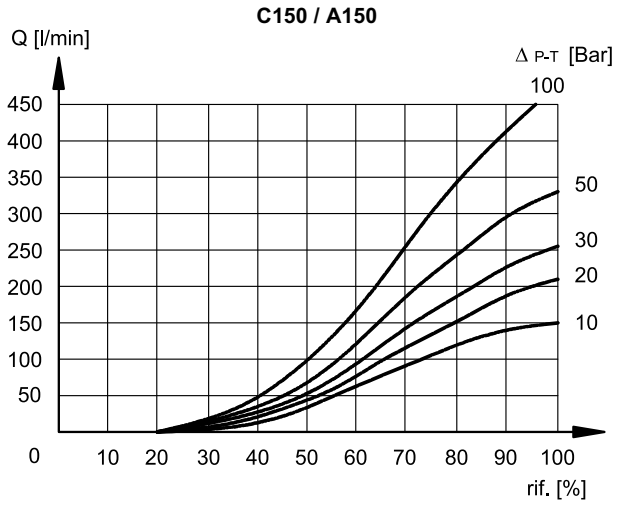
The adjustment of the curve is performed with a constant Δp of 30 bar by setting the value of flow start at 20% of the reference signal.

8.1 - Characteristic curves DSPE5G* and DSPE5RG*

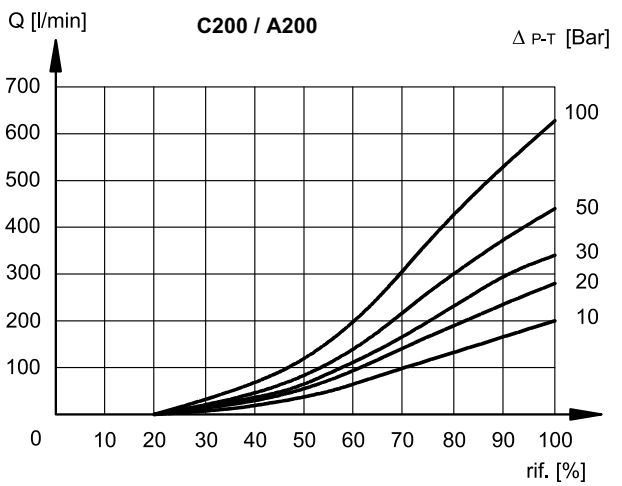


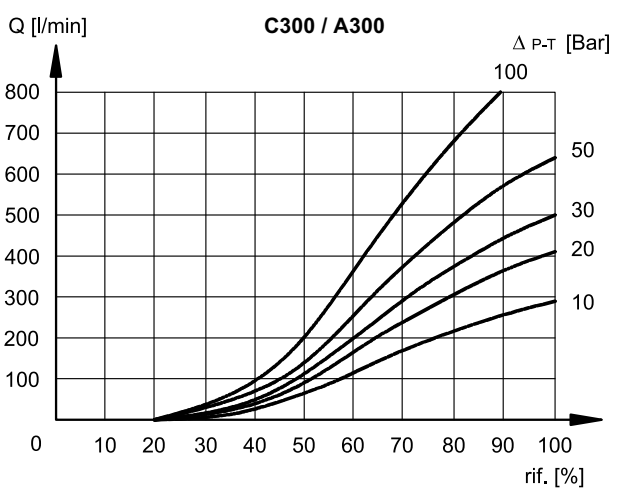
6.2 - Characteristic curves DSPE7G*





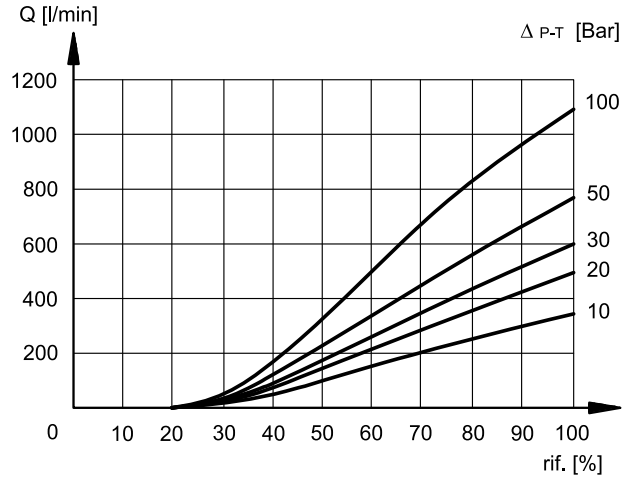
6.3 - Curve Characteristic DSPE8G*



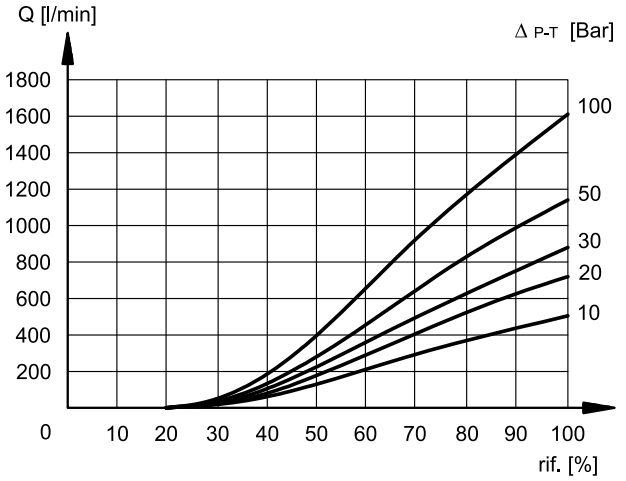


8.4 - Characteristic curves DSPE10G*

C350 / A350

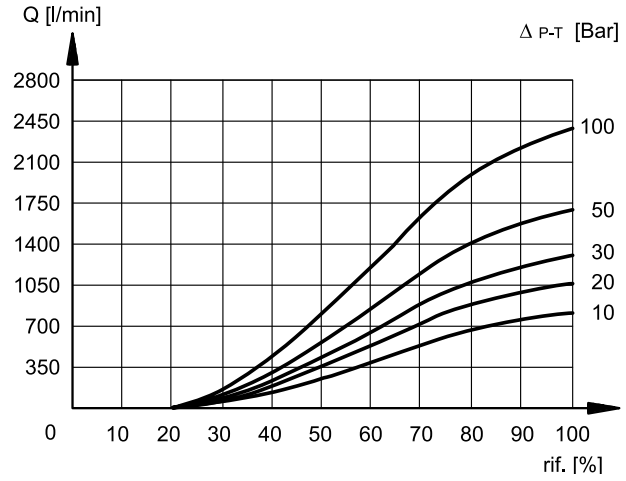


C500 / A500



8.5 - Characteristic curves DSPE11G*

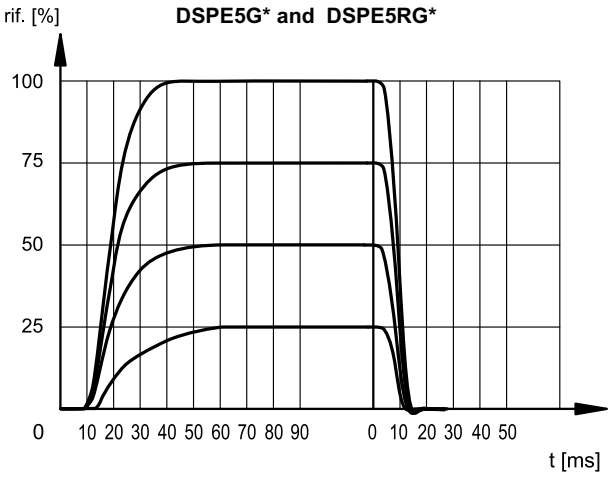
C800 / A800



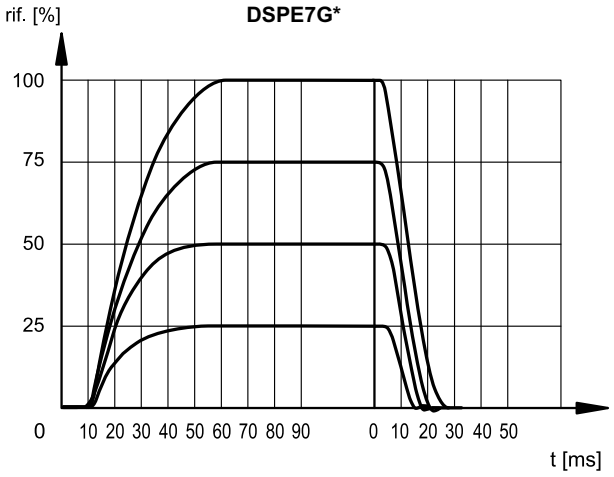
9 - STEP RESPONSE

(obtained with mineral oil with viscosity of 36 cSt at 50°C and static pressure = 100 bar)

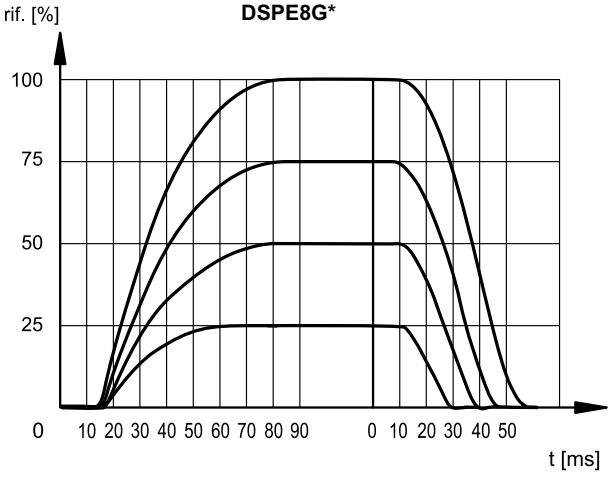
DSPE5G* and DSPE5RG*



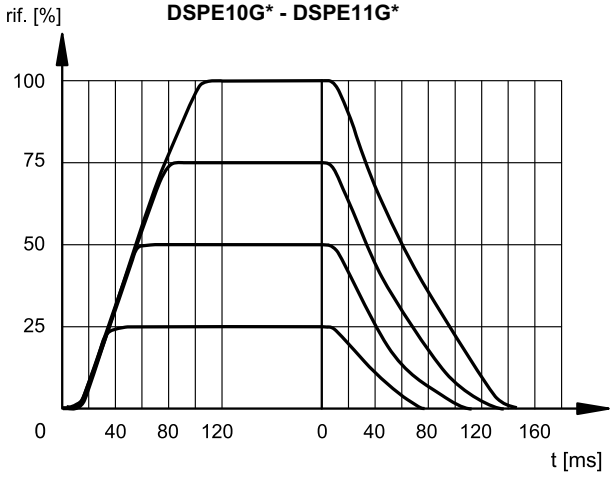
DSPE7G*



DSPE8G*



DSPE10G* - DSPE11G*



10 - HYDRAULIC CHARACTERISTICS

(with mineral oil with viscosity of 36 cSt at 50°C and static pressure = 100 bar)

FLOWRATES		**DSPE5G* DSPER5G***	**DSPE7G***	**DSPE8G***	**DSPE10G***	**DSPE11G***
Max flow rate	l/min	180	450	800	1600	2800
Piloting flow requested with operation 0 →100%	l/min	3.5	4.1	9.2	13.7	13.7
Piloting volume requested with operation 0 →100%	cm^3	1.7	3.2	9.1	21.6	21.6

PRESSURES (bar)	MIN	MAX
Pilot pressure on X port	30	210 (**NOTE**)
Pressure on T port with internal drain	–	10
Pressure on T port with external drain	–	250

NOTE: if the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure.

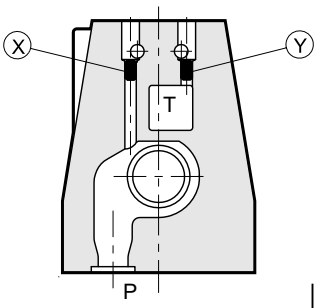
Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered (piloting type: Z, see section 1).

10.1 - Pilot and drain

The DSPE*G* valves are available with pilot and drain both internal and external. The version with external drain allows a higher back pressure on the discharge line.

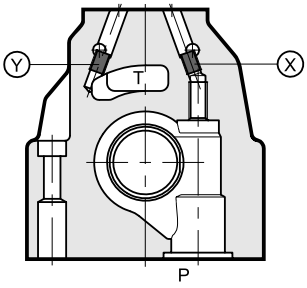
TYPE OF VALVE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

DSPE5G* / DSPE5RG*

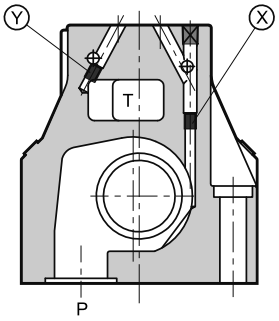


X: plug M5x6 for external pilot
Y: plug M5x6 for external drain

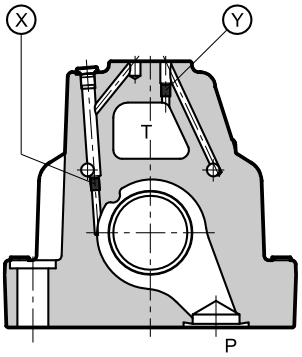
DSPE7G*



DSPE8G*



DSPE10G* / DSPE11G*



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

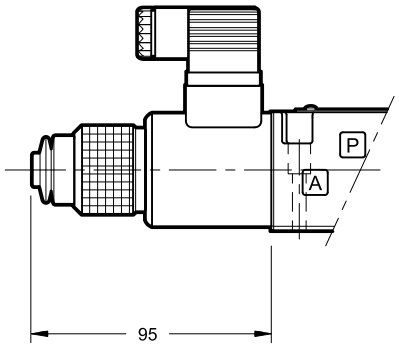
11 - MANUAL OVERRIDE

These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

Two other types of manual overrides can fit the DSPE*GL valve:

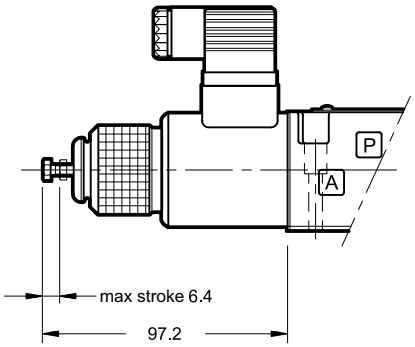
- **CM** version, manual override boot protected
- **CS** version, with metal ring nut provided with a M4 screw and a blocking locknut.

CM Version



Code: 3803210003

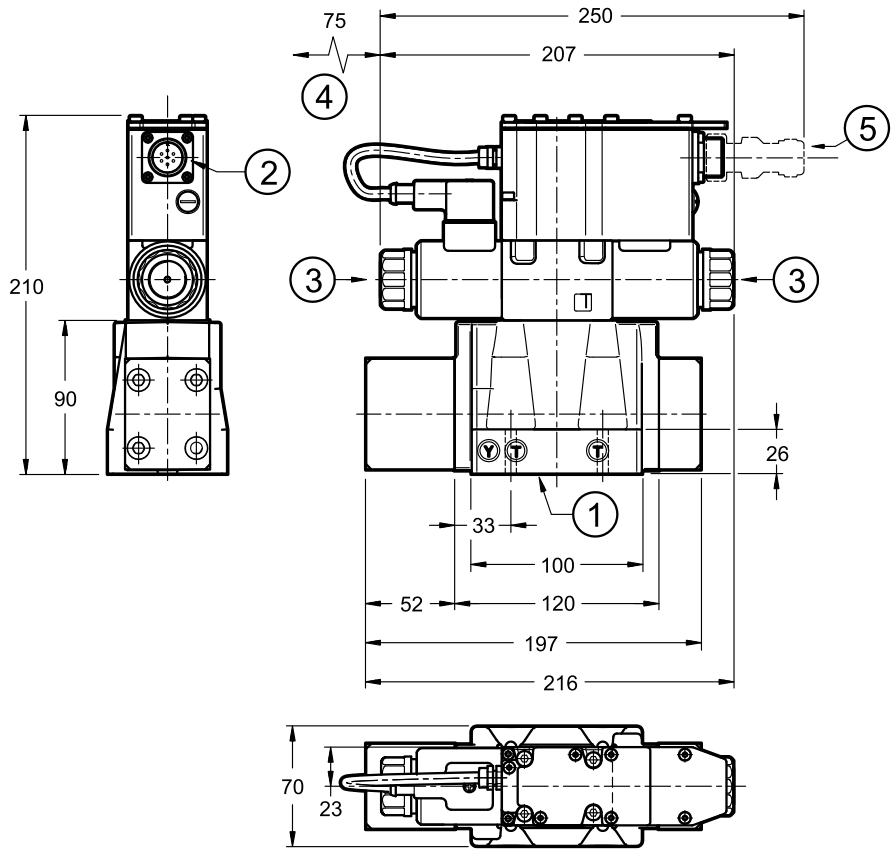
CS Version



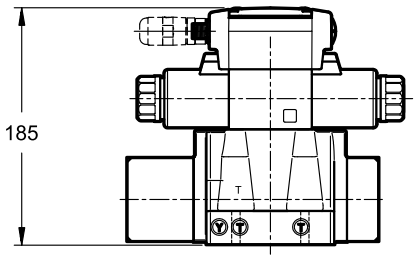
Code: 3803210004

12 - OVERALL AND MOUNTING DIMENSIONS DSPE5G*

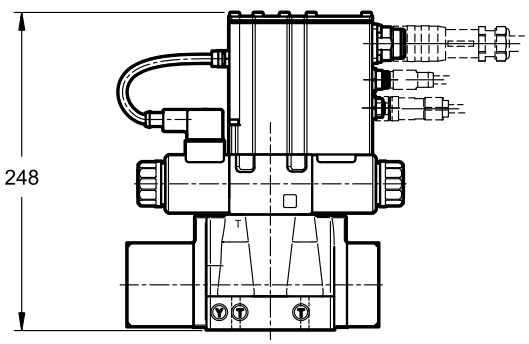
dimensions in mm



DSPE5GL



DSPE5GH

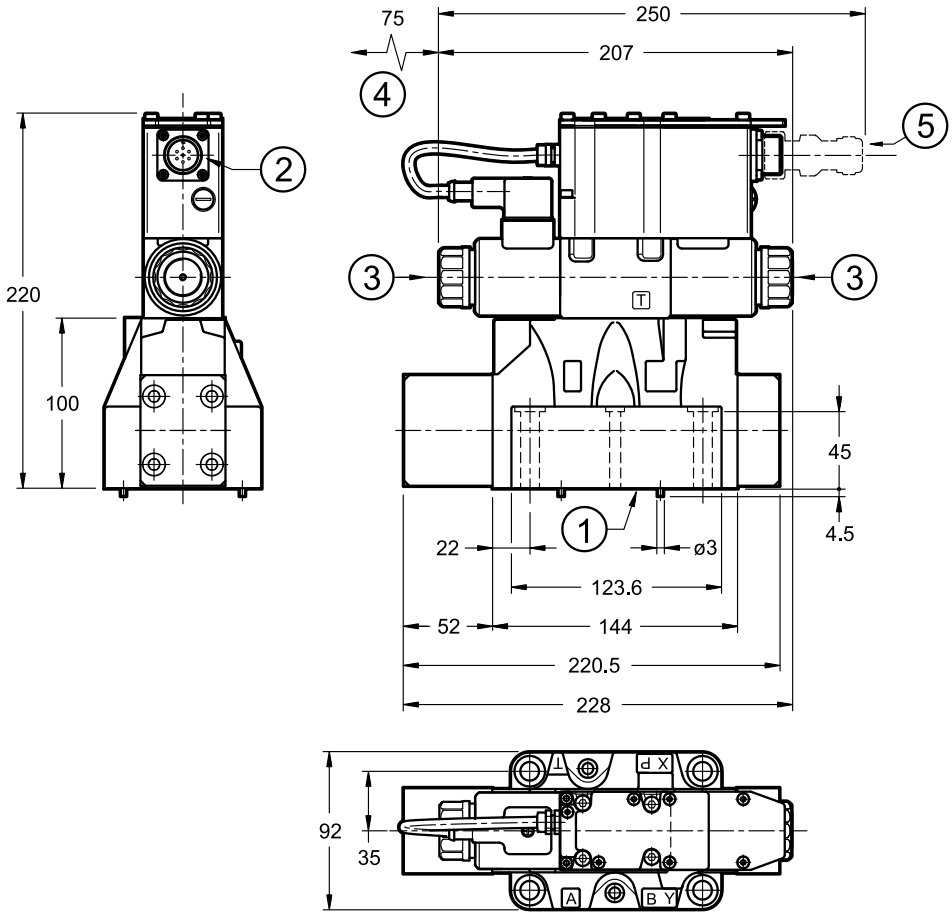


NOTES:
See mounting surface at section 17.

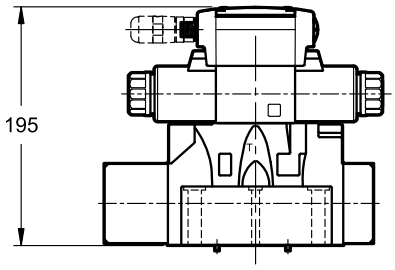
1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 2 OR type 2037 (9.25x1.78) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

Valve fastening: 4 SHC ISO 4762 screws M6x35
Tightening torque: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x10

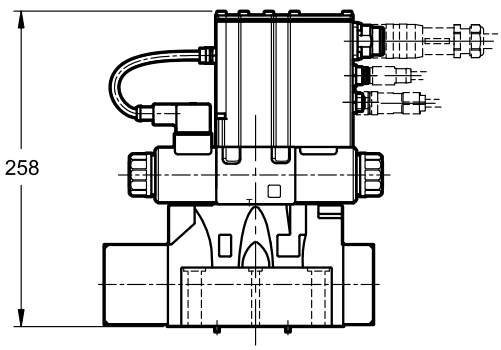
13 - OVERALL AND MOUNTING DIMENSIONS DSPE7G*



DSPE7GL



DSPE7GH



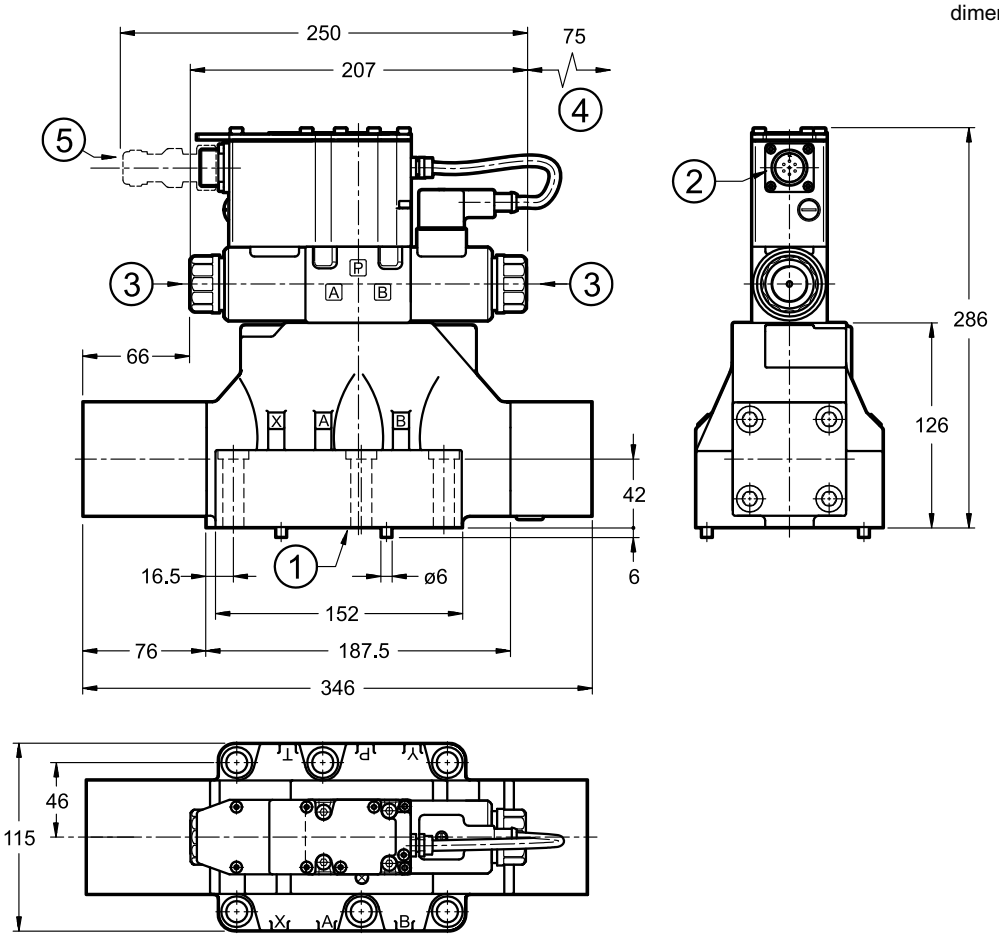
NOTES:
See mounting surface at section 17.

1	Mounting surface with sealing rings: 4 OR type 130 (22.22x2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

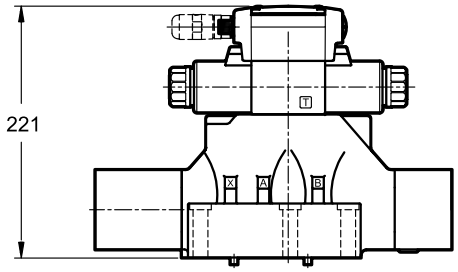
Valve fastening: 4 SHC screws ISO 4762 M10x60 2 SHC screws ISO 4762 M6x60
Tightening torque: M10x60: 40 Nm (A8.8 screws) M6x60: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x18; M10x18

14 - OVERALL AND MOUNTING DIMENSIONS DSPE8G*

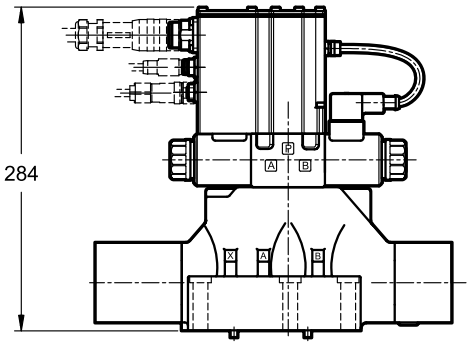
dimensions in mm



DSPE8GL



DSPE8GH



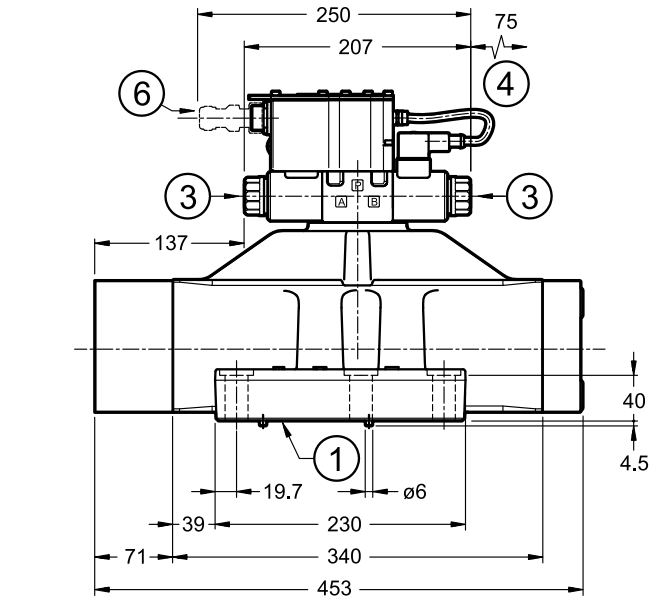
NOTES:
See mounting surface at section 17.

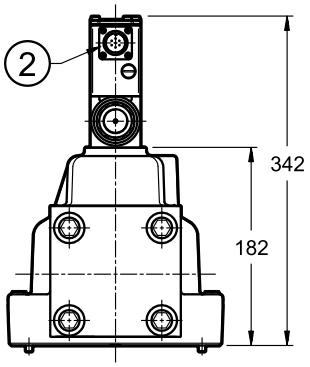
1	Mounting surface with sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

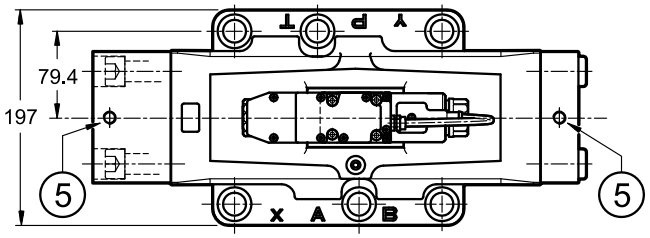
Valve fastening: 6 SHC ISO 4762 screws M12x60
Tightening torque: 69 Nm (A8.8 screws)
Threads of mounting holes: M12x20

15 - OVERALL AND MOUNTING DIMENSIONS DSPE10G* / DSPE11G*

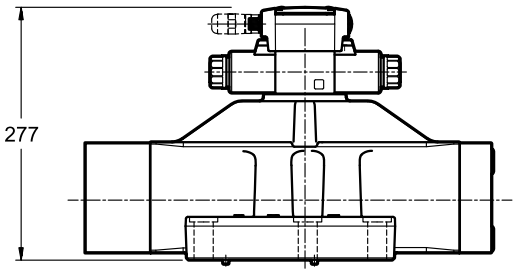
dimensions in mm



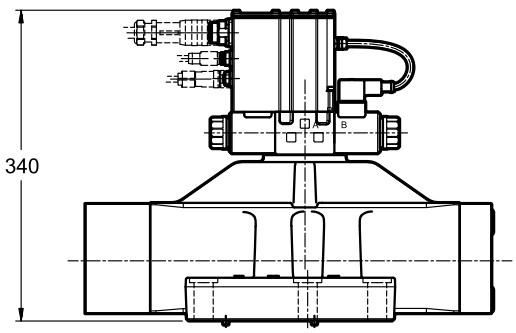




DSPE10GL



DSPE10GH



NOTES:
See mounting surface at section 17.

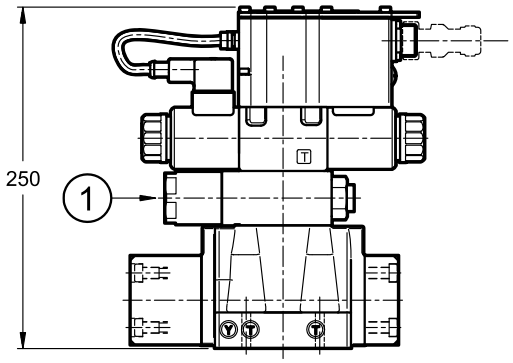
1	Mounting surface with sealing rings: **DSPE10G*** 4 OR type 4150 (37.59x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore **DSPE11G*** 4 OR type 4212 (53.57x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	M12 eyebolt seat for safe lift
6	Mating connector. **To be ordered separately.** See catalogue 89 000

Valve fastening: 6 SHC screws ISO 4762 M20x70
Tightening torque: 330 Nm (A8.8 screws)
Threads of mounting holes: M20x40

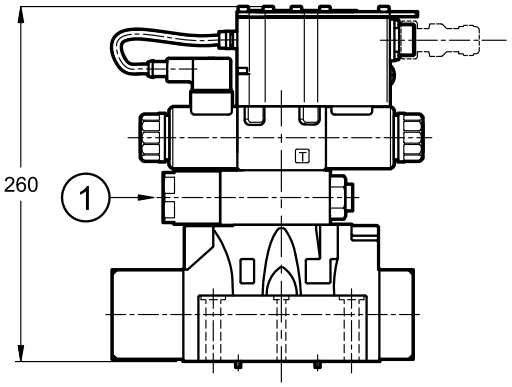
16 - OVERALL AND MOUNTING DIMENSIONS OF DSPE*G* WITH PILOT PATTERN TYPE Z

dimensions in mm

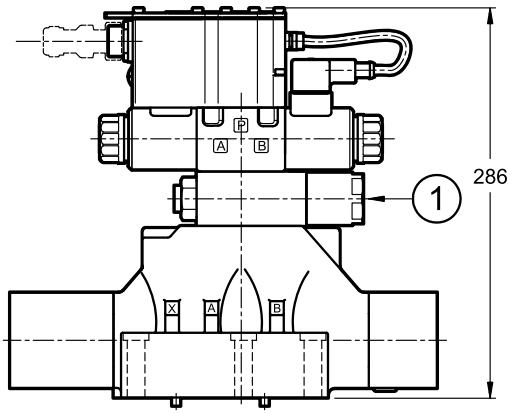
DSPE5G*



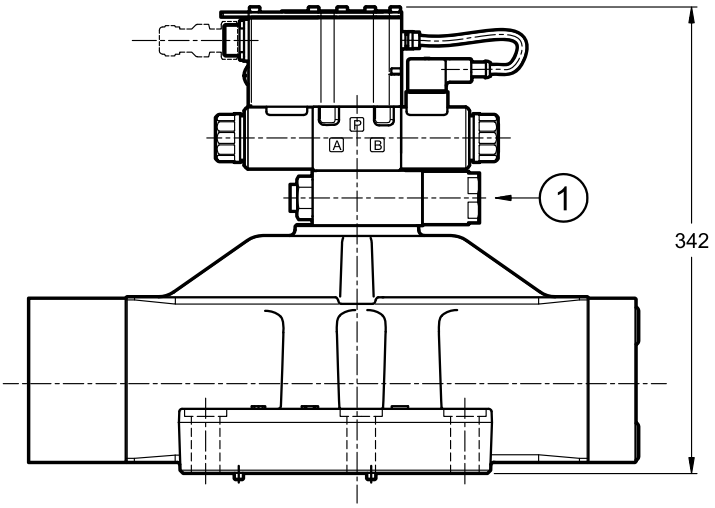
DSPE7G*



DSPE8G*



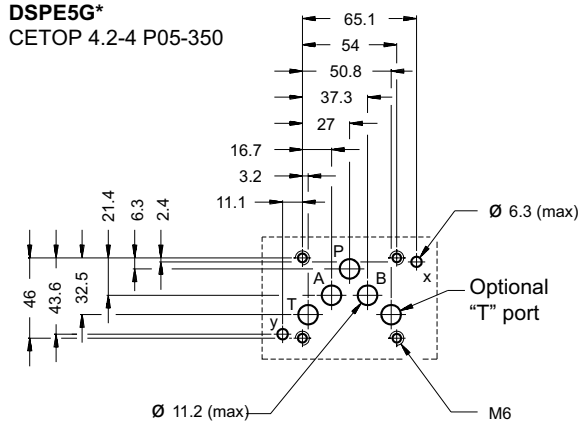
DSPE10G*



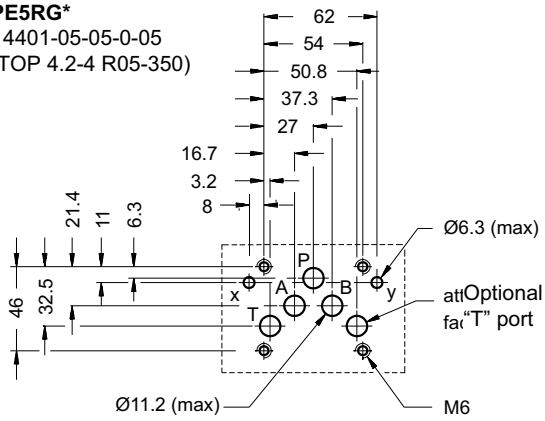
1	30 bar fixed adjustment pressure reducing valve

17 - MOUNTING SURFACES

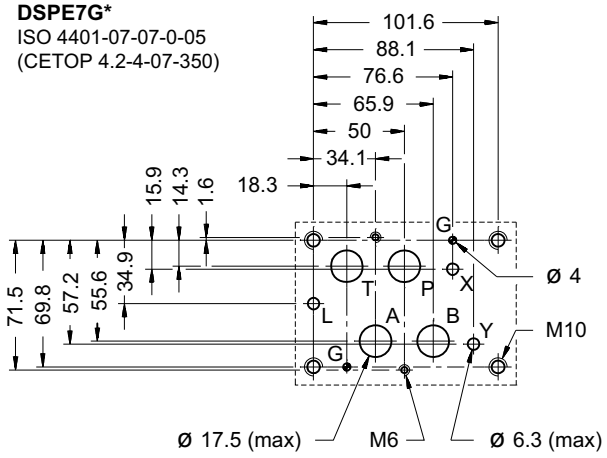
DSPE5G*
CETOP 4.2-4 P05-350



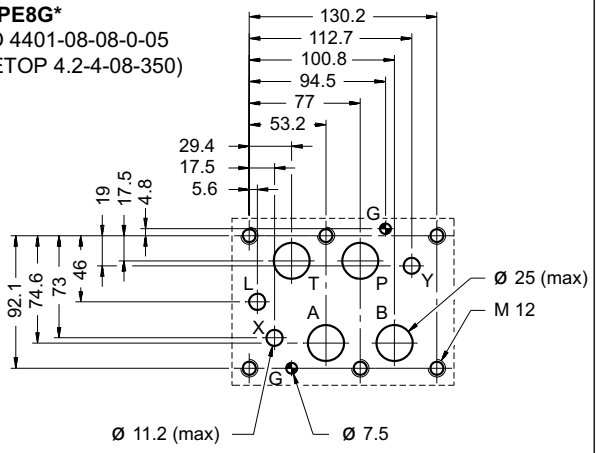
DSPE5RG*
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



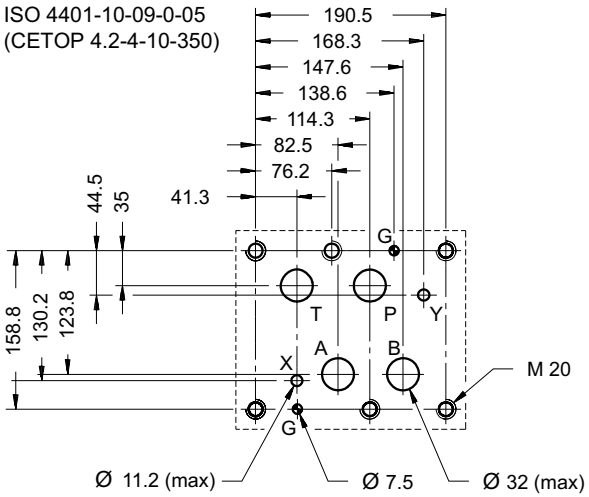
DSPE7G*
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DSPE8G*
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)

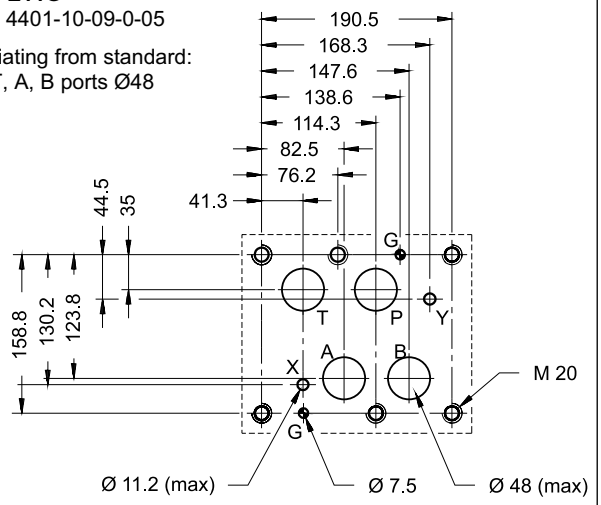


DSPE10G*
ISO 4401-10-09-0-05
(CETOP 4.2-4-10-350)



DSPE11G*
ISO 4401-10-09-0-05

deviating from standard:
P, T, A, B ports Ø48



18 - 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.

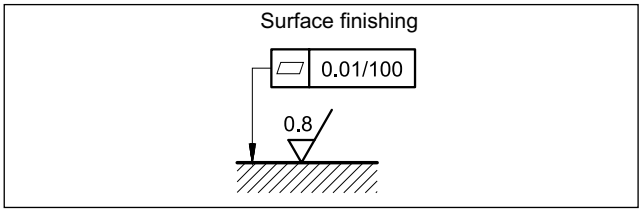
The fluid must be preserved in its physical and chemical characteristics.

19 - INSTALLATION

The valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.



20 - ACCESSORIES

(to be ordered separately)

20.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

20.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

20.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

20.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connections. See catalogue 89 850.

21 - SUBPLATES

(see catalogue 51 000)

No subplates are available for DSPE5RG*, DSPE10G* and DSPE11G*.

	DSPE5G*	DSPE7G*	DSPE8G*
Type with rear ports	PME4-AI5G	PME07-AI6G	-
Type with side ports	PME4-AL5G	PME07-AL6G	PME5-AL8G
P, T, A, B ports dimensions X, Y ports dimensions	3/4” BSP 1/4” BSP	1” BSP 1/4” BSP	1 ½” BSP 1/4” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
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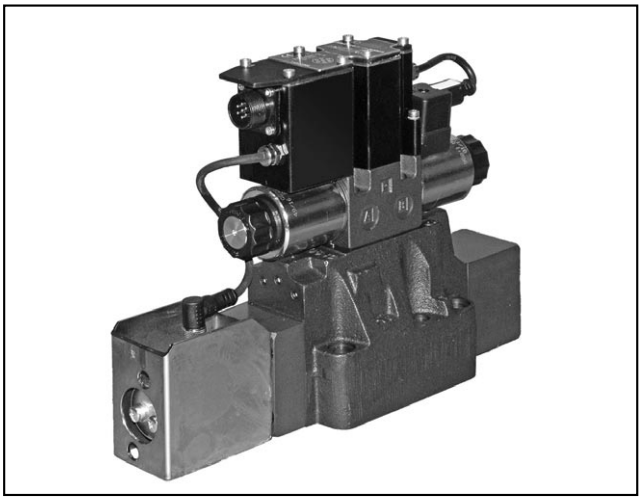
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



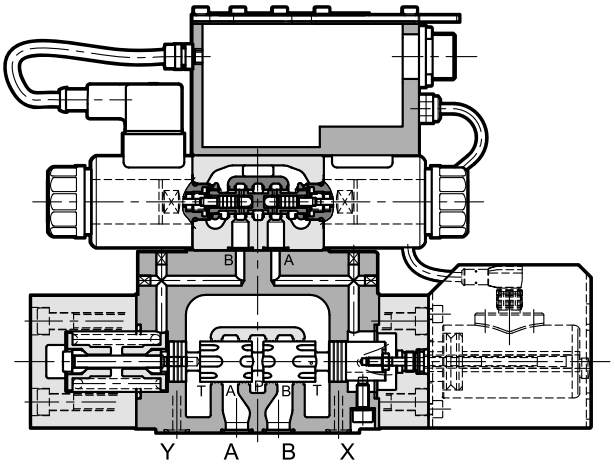
DSPE*J*

PROPORTIONAL DIRECTIONAL VALVE PILOT OPERATED WITH FEEDBACK AND INTEGRATED ELECTRONICS

SUBPLATE MOUNTING

DSPE5J* **CETOP P05**
DSPE5RJ* **ISO 4401-05**
DSPE7J* **ISO 4401-07**
DSPE8J* **ISO 4401-08**
DSPE10J* **ISO 4401-10**
DSPE11J* **ISO 4401-10** oversize ports

OPERATING PRINCIPLE



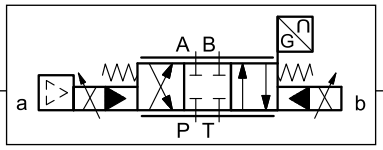
— The DSPE*J* are proportional directional valve operated with feedback and integrated electronics and with mounting interface in compliance with ISO 4401 standards.

— They are controlled directly by the integrated electronics. Transducer and digital card allow a fine control of the spool position, reducing both hysteresis and response times and oprimizing the valve performance.

— The valves are available with different types of electronics, with analogue or fieldbus interfaces.

— The valves are easy to install. The driver directly manages digital settings.

HYDRAULIC SYMBOL (typical)



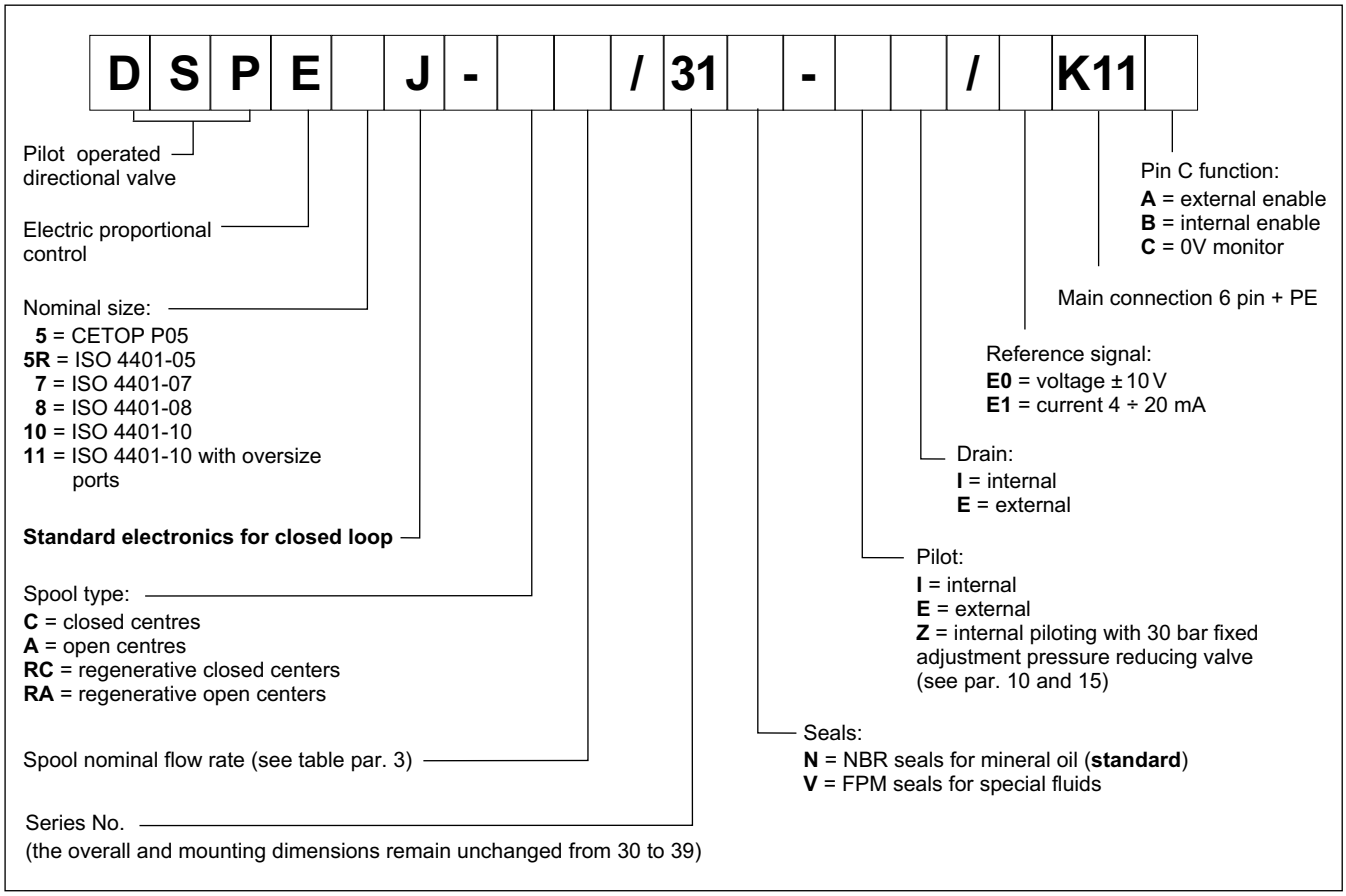
PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p =140 bar)

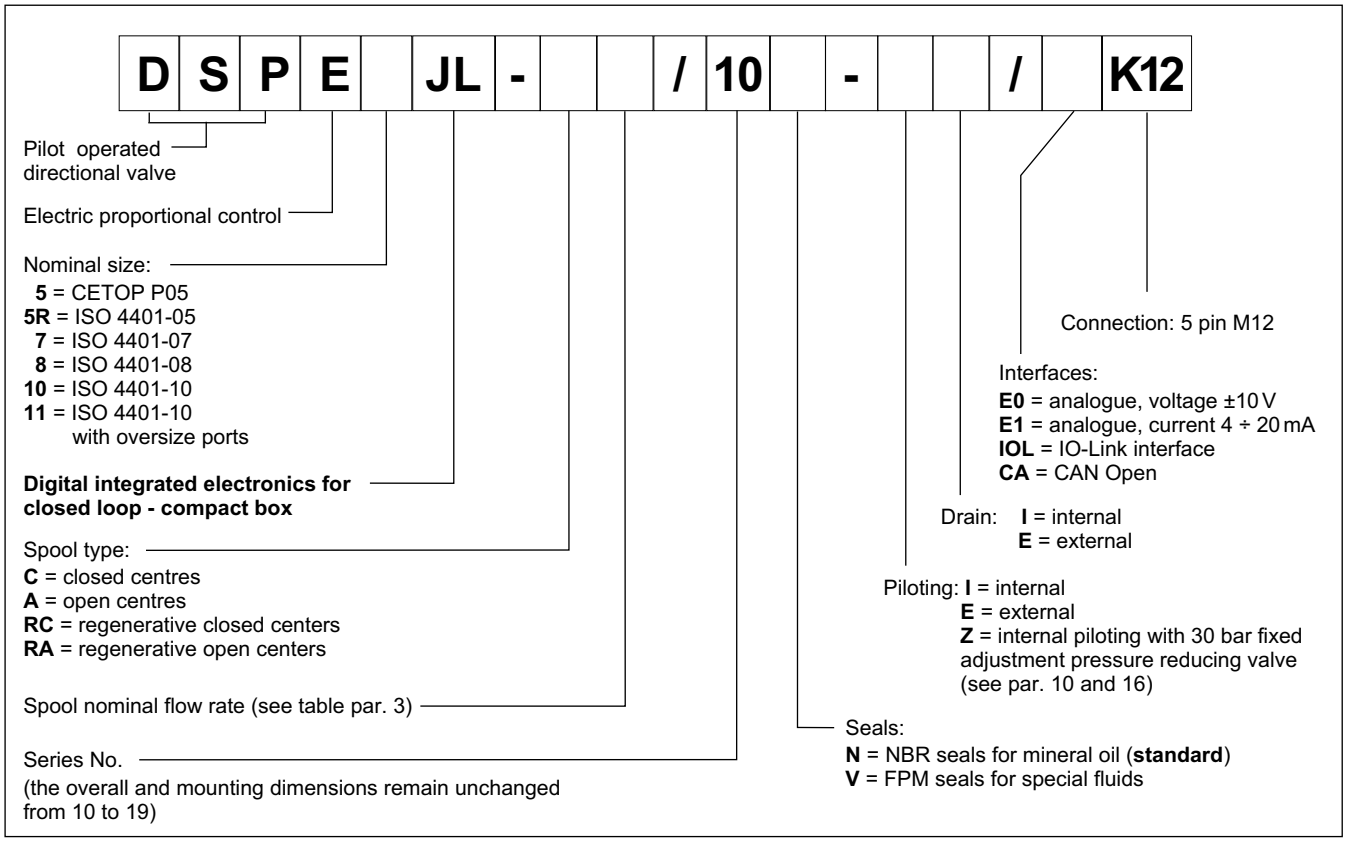
		DSPE5J* DSPE5RJ*	DSPE7J*	DSPE8J*	DSPE10J*	DSPE11J*
Max operating pressure: P - A - B ports T port	bar	350 see paragraph 10				
Max flowrate	l/min	180	450	800	1600	2800
Hysteresis	% Q_{max}	< 0,5%				
Repeatability	% Q_{max}	< ± 0,2%				
Electrical characteristics		see paragraph 4				
Ambient temperature range	°C	-20 / +60				
Fluid temperature range	°C	-20 / +80				
Fluid viscosity range	cSt	10 ÷ 400				
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13					
Recommended viscosity	cSt	25				
Mass	kg	9	11	17.5	56.5	55

1 - IDENTIFICATION CODES

1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication

D	S	P	E		JH	-			/	31		-			-		K16		/			

Pilot operated directional valve

Electric proportional control

Nominal size:
5 = CETOP P05
5R = ISO 4401-05
7 = ISO 4401-07
8 = ISO 4401-08
10 = ISO 4401-10
11 = ISO 4401-10 with oversize ports

Digital integrated electronics for closed loop with fieldbus communication

Spool type:
C = closed centres
A = open centres
RC = regenerative closed centers
RA = regenerative open centers

Spool nominal flow rate (see table par. 3)

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Piloting:
I = internal
E = external
Z = internal piloting with 30 bar fixed adjustment pressure reducing valve (see par. 10 and 16)

Drain:
I = internal
E = external

Reference signal:
E0 = voltage ±10 V **E1** = current 4 ÷ 20 mA
FD = full digital version (on request)

Connection 11 pin + PE

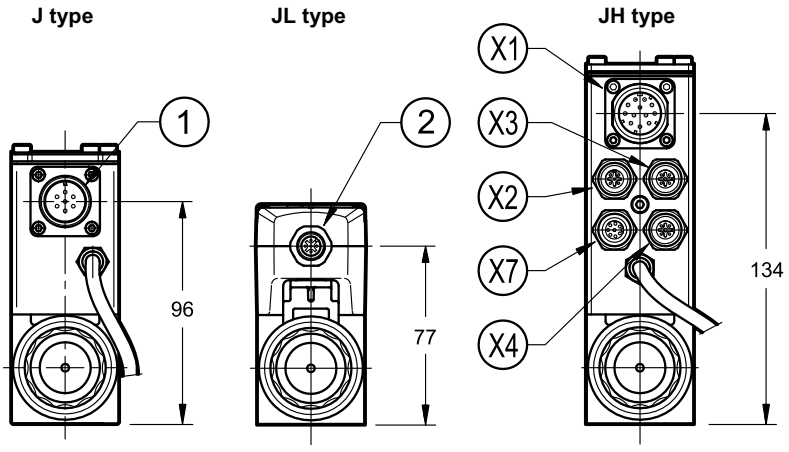
X1 Main connector configuration:
D1 = one command
D0 = full digital version
(on request - available for reference signal FD type only)

X2, X3 Field BUS type:
CA = CAN Open
PD = PROFIBUS DP
EC = EtherCAT
EN = Ethernet /IP
PN = Profinet
PL = PowerLink

X7 Digital transducer:
0 = none
1 = version 1 (SSI type)
2 = version 2 (Encoder type)

X4 Analogue transducer:
0 = none
1 = version 1 (single /double transducer)

2 - COMPARISON AMONG INTEGRATED ELECTRONICS



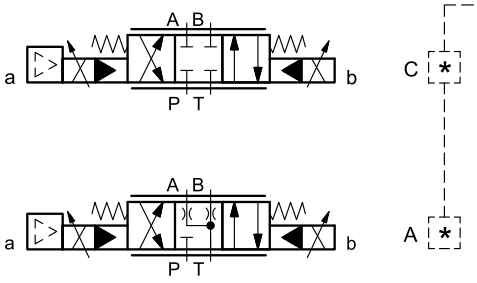
1	Connection 6 pin + PE
2	Connection M12 5 pin, code A, male
X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	Connection for analogue transducer
X7	Connection for digital transducer

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present. Please refer to sections 5, 6 and 7 for connections descriptions and pinouts.
NOTE 2: Related mating connectors have to be ordered separately. See catalogue 89 000.

3 - AVAILABLE CONFIGURATIONS

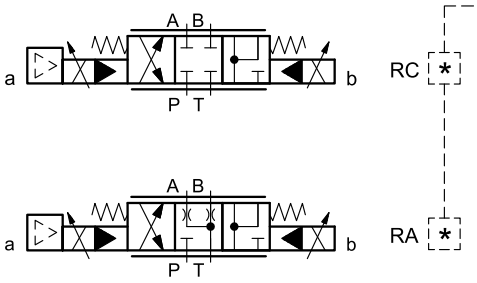
The valve configuration depends on the combination of spool type and rated flow.

3 positions with spring centreing



valve type	*	Nominal flow with Δp 10 bar P-T
DSPE5J* DSPE5RJ*	**80**	80 l/min
	80 / 40	80 (P-A) / 40 (B-T) l/min
DSPE7J*	**100**	100 l/min
	150	150 l/min
	150 / 75	150 (P-A) / 75 (B-T) l/min
DSPE8J*	**200**	200 l/min
	300	300 l/min
	300 / 150	300 (P-A) / 150 (B-T) l/min
DSPE10J*	**350**	350 l/min
	500	500 l/min
	500 / 250	500 (P-A) / 250 (B-T) l/min
DSPE11J*	**800**	800 l/min
	800 / 500	800 (P-A) / 500 (B-T) l/min

regenerative spool



valve type	*	Nominal flow with Δp 10 bar P-T
DSPE7J*	**150/75**	150 (P-A) /75 (B-T) l/min
DSPE8J*	**300/150**	300 (P-A) /150 (B-T) l/min
DSPE10J*	**500/250**	500 (P-A) /250 (B-T) l/min

4 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	3
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

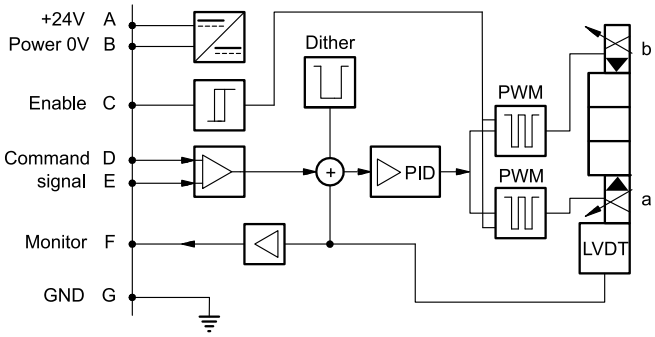
5 - DSPE*J* - STANDARD ELECTRONICS

5.1 - Electrical characteristics

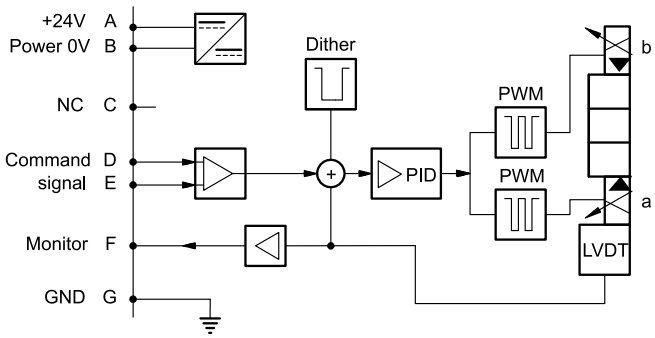
Command signal: voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (main spool position): voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

5.2 - On-board electronics diagrams

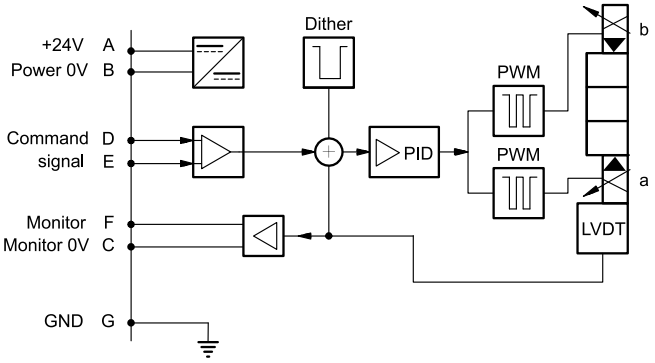
VERSION A - External Enable



VERSION B - Internal Enable

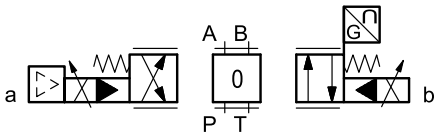


VERSION C - 0V Monitor

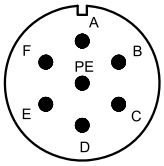


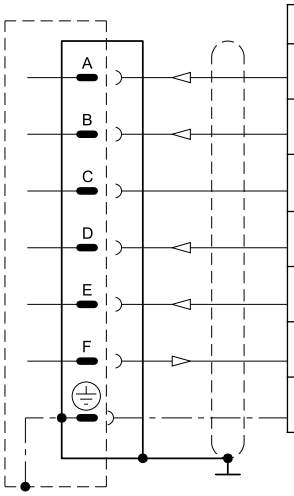
5.3 - Versions with voltage command (E0)

The reference signal is between -10V and +10V.. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



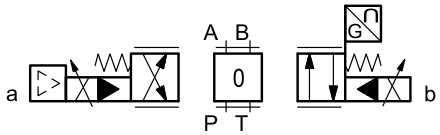


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

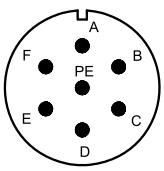
5.4 - Versions with current command (E1)

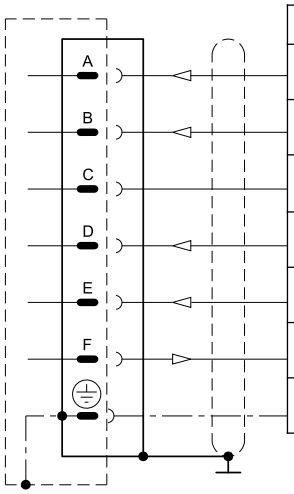
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

6 - DSPE*JL - COMPACT ELECTRONICS

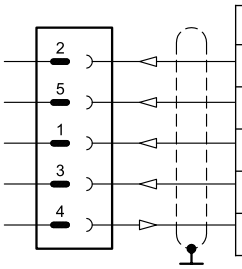
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

6.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	 IO-Link Port Class B 230,4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Connection		5-pin M12 code A (IEC 61076-2-101)

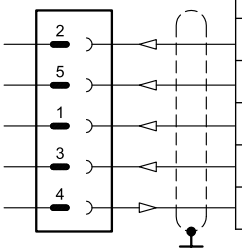
6.2 - Pin tables

'E0' connection



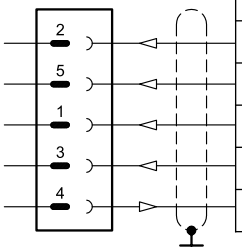
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



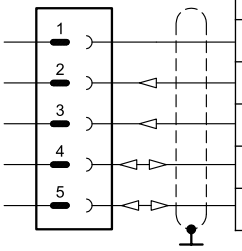
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

7 - DSPE*JH - FIELDBUS ELECTRONICS

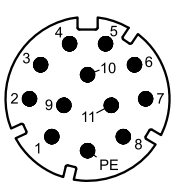
The 11 + PE pin connection allows separate supply voltage for electronics and solenoids.

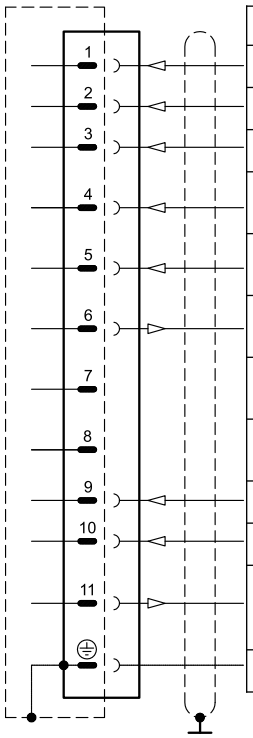
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 5.3 and 5.4.

7.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (main spool position): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

7.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

7.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

7.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

7.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

7.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

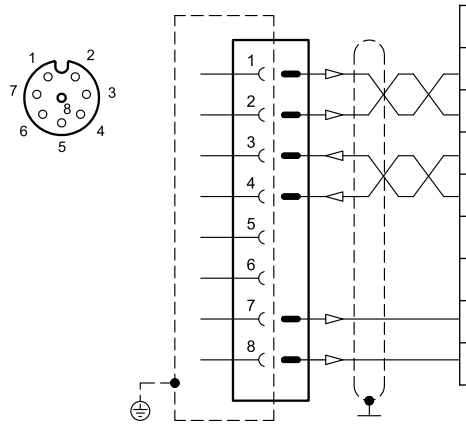
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

7.4 - Digital transducer connection

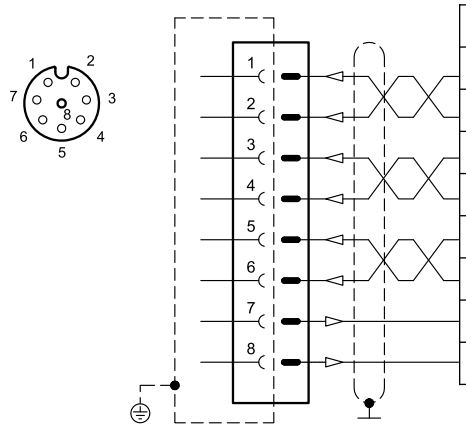
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



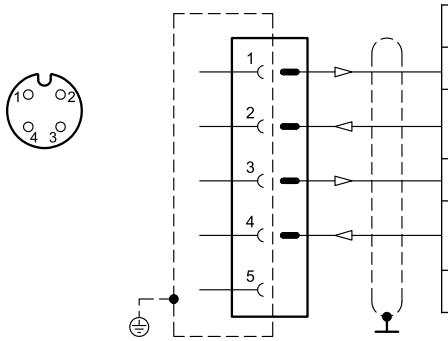
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

7.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)

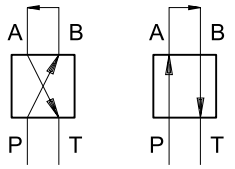


Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

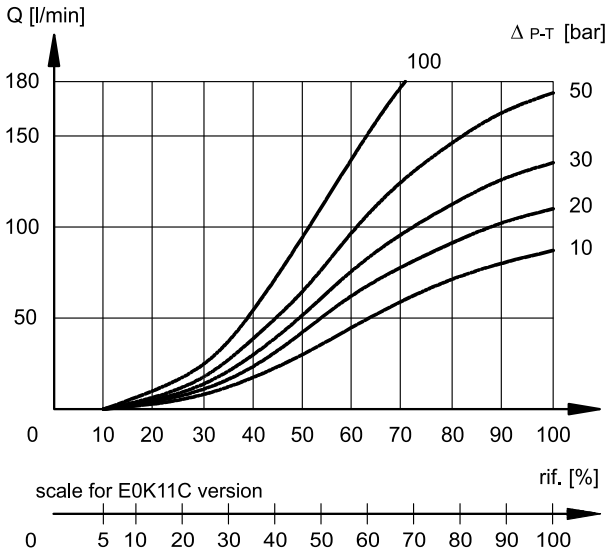
8 - CHARACTERISTIC CURVES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

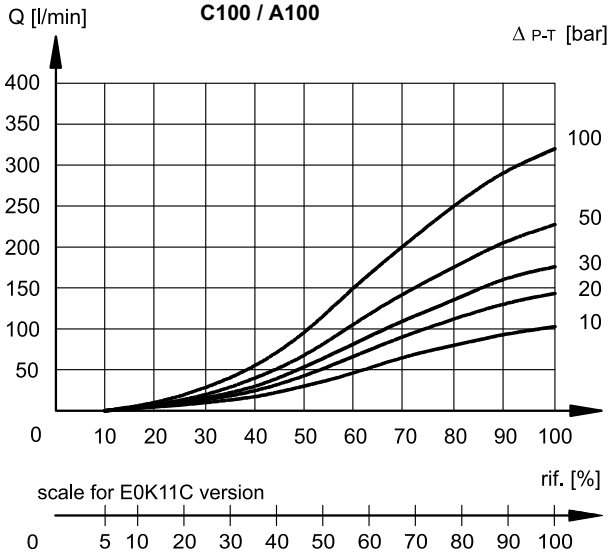
Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools. The Δp values are measured between P and T valve ports.

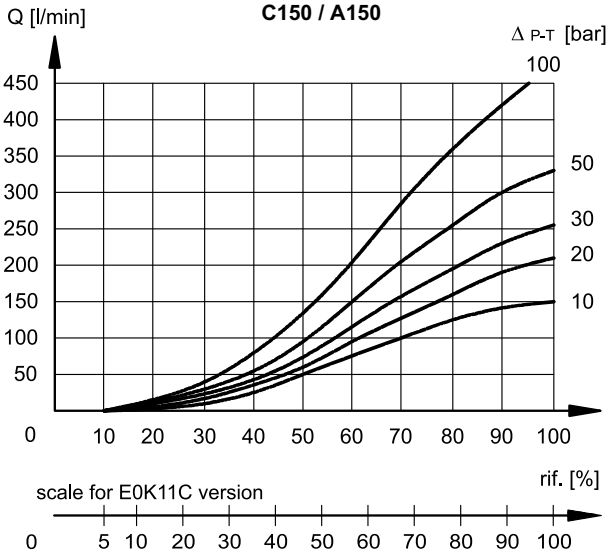


8.1 - Characteristic curves DSPE5J* and DSPE5RJ*

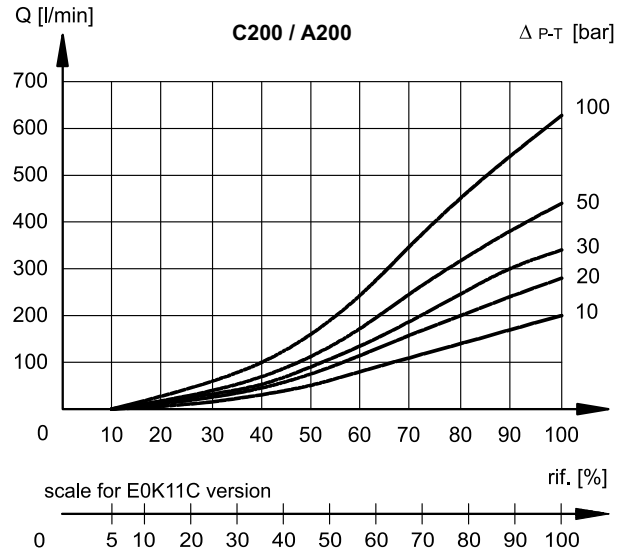


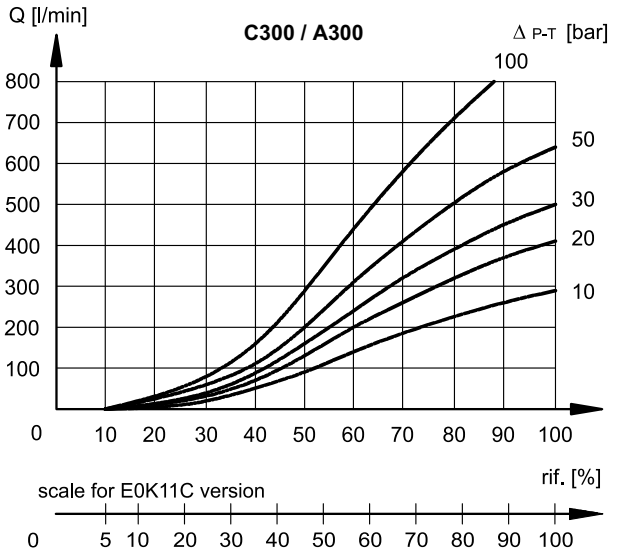
8.2 - Characteristic curves DSPE7J*



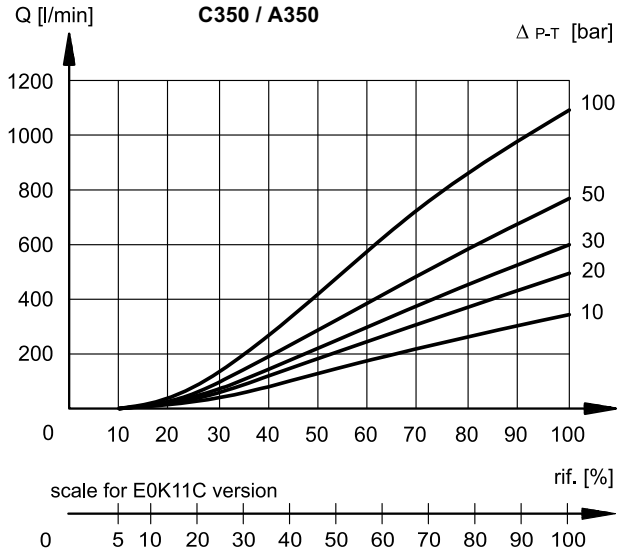


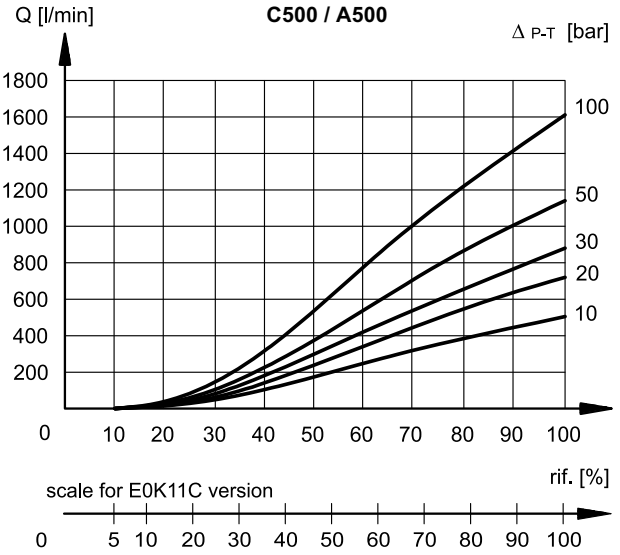
8.3 - Characteristic curves DSPE8J*



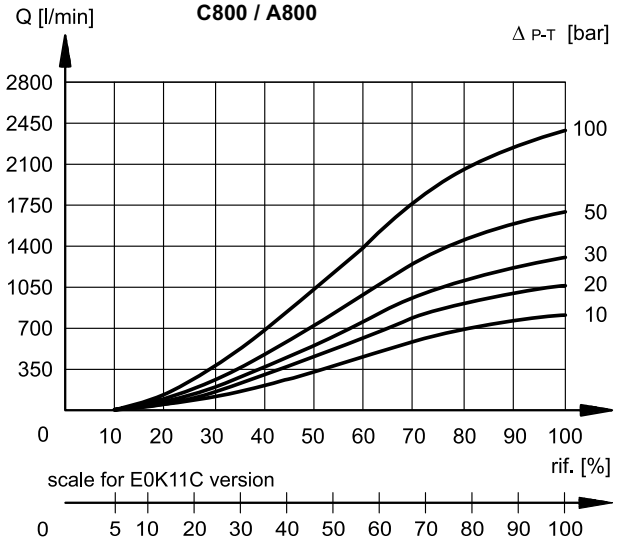


8.4 - Characteristic curves DSPE10J*



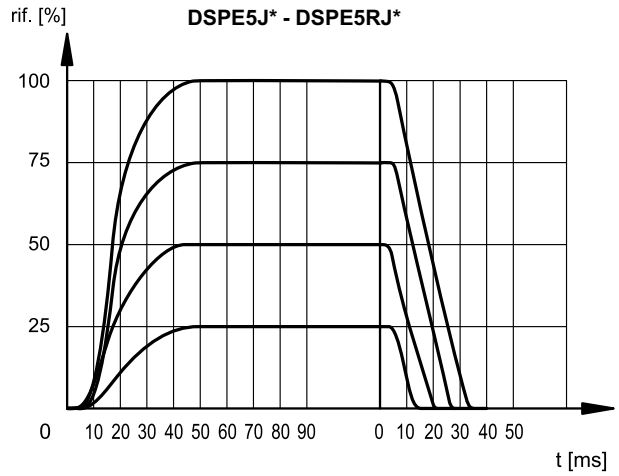


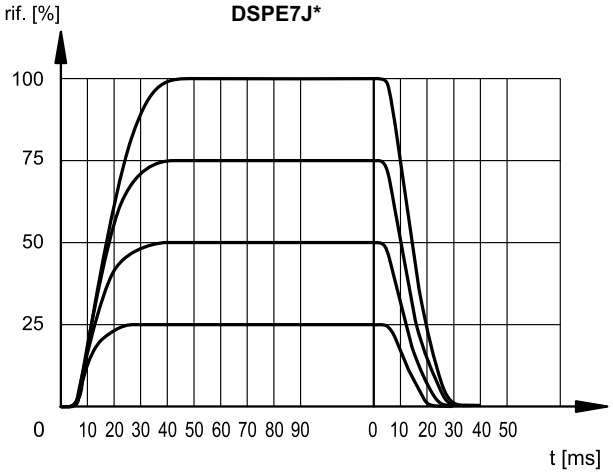
8.5 - Characteristic curves DSPE11J*

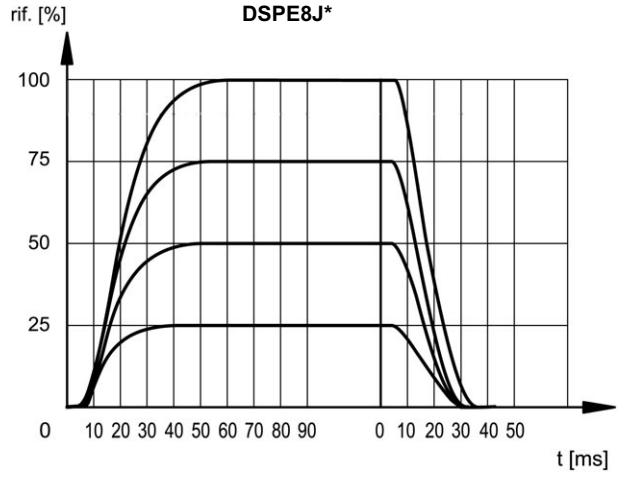


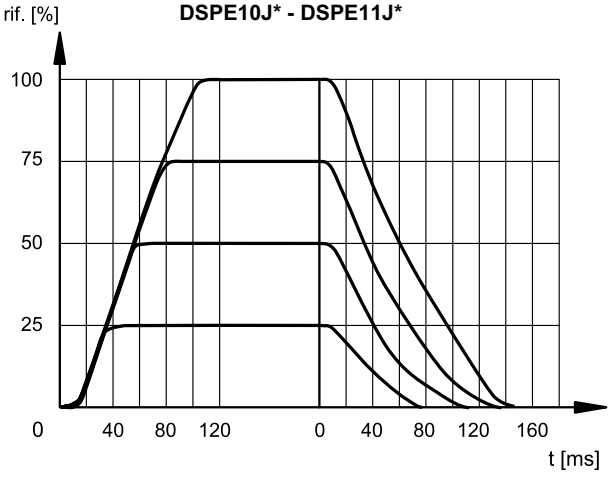
9 - STEP RESPONSE

(obtained with mineral oil with viscosity of 36 cSt at 50°C and static pressure 100 bar)









10 - HYDRAULIC CHARACTERISTICS

(with mineral oil with viscosity of 36 cSt at 50°C)

FLOWRATES		DSPE5J* DSPE5RJ*	DSPE7J*	DSPE8J*	DSPE10J*	DSPE11J*
Max flow rate	l/min	180	450	800	1600	2800
Piloting flow requested with operation 0 →100%	l/min	3.5	6.4	15.3	13.7	13.7
Piloting volume requested with operation 0 →100%	cm^3	1.7	3.2	9.2	21.6	21.6

PRESSURES (bar)	MIN	MAX
Piloting pressure on X port	30	210 (**NOTE**)
Pressure on T port with interal drain	–	10
Pressure on T port with external drain	–	250

NOTE: if the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure.

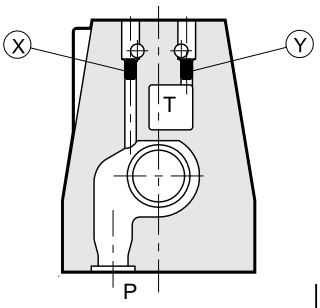
Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered (piloting type: Z, see section 1).

10.1 - Pilot and drain

The DSPE*J* valves are available with pilot and drain both internal and external. The version with external drain allows a higher back pressure on the discharge line.

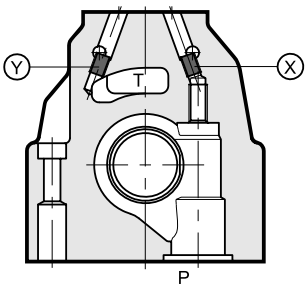
TYPE OF VALVE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

DSPE5J* / DSPE5RJ*

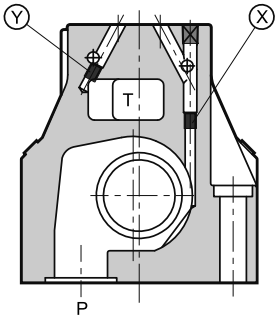


X: plug M5x6 for external pilot
Y: plug M5x6 for external drain

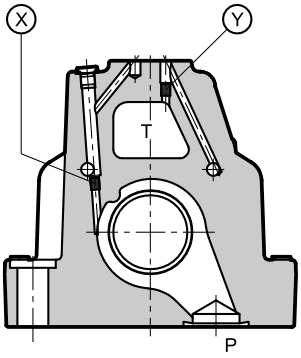
DSPE7J*



DSPE8J*



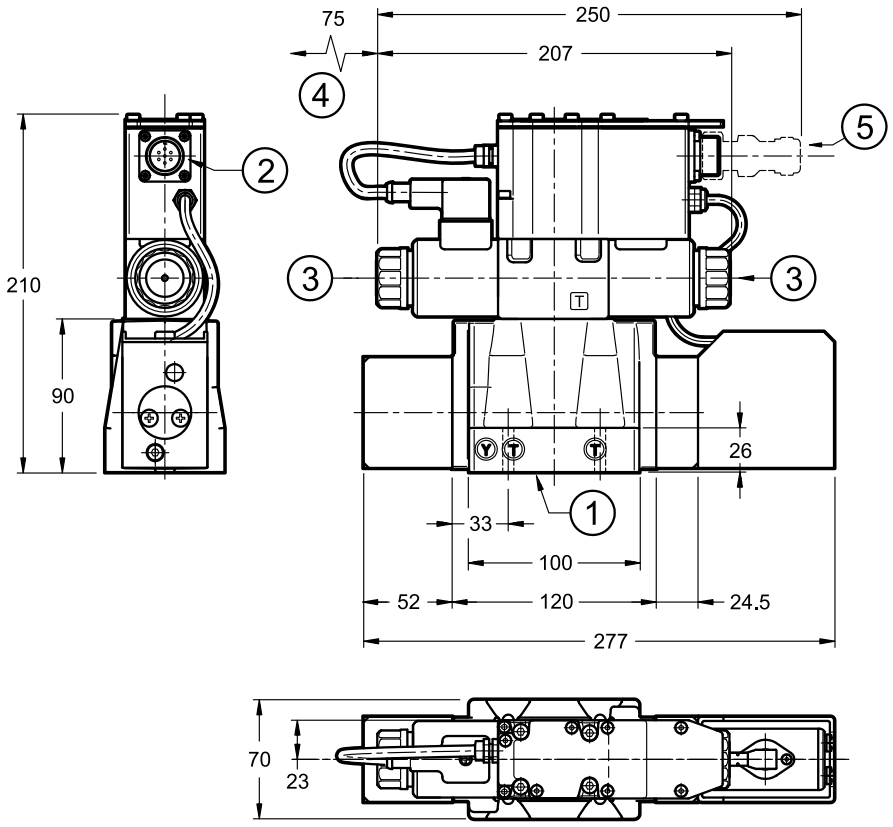
DSPE10J* / DSPE11J*



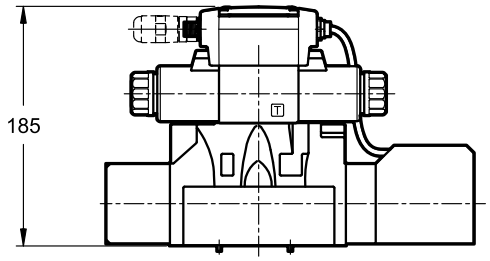
X: plug M6x8 for external pilot
Y: plug M6x8 for external drain

11 - DSPE5J* AND DSPE5RJ* - OVERALL AND MOUNTING DIMENSIONS

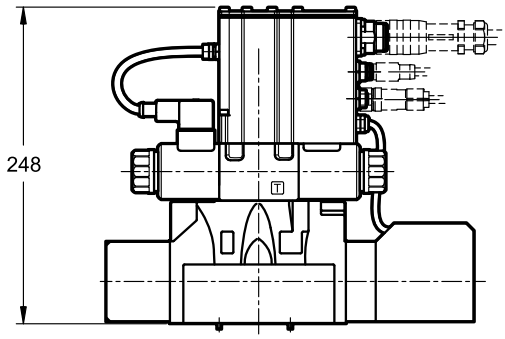
dimensions in mm



DSPE5JL



DSPE5JH



NOTES:

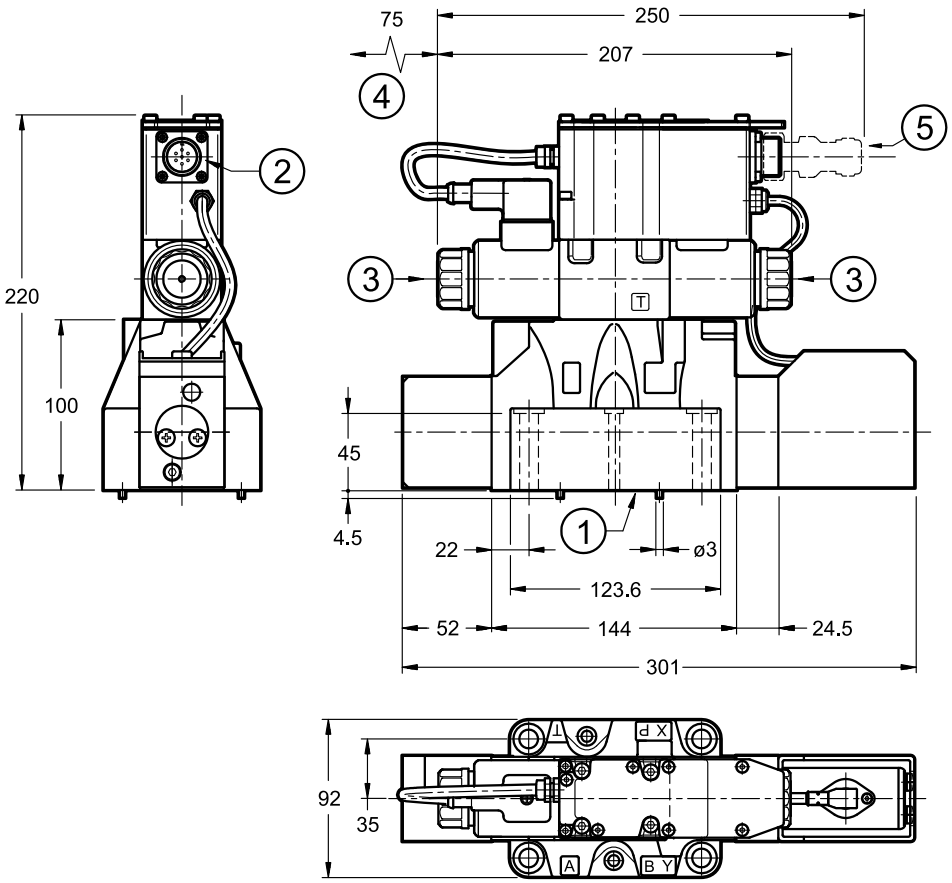
- Overall dimensions with Z option (fixed adjustment pressure reducing valve) at par. 15.
- Mounting surface at par. 16.
- It is recommended to not disassemble the transducer.

1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 2 OR type 2037 (9.25x1.78) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

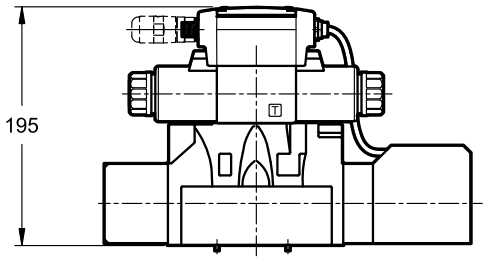
Valve fastening: 4 SHC screws M6x35 ISO 4762
Tightening torque: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x10

12 - DSPE7J* - OVERALL AND MOUNTING DIMENSIONS

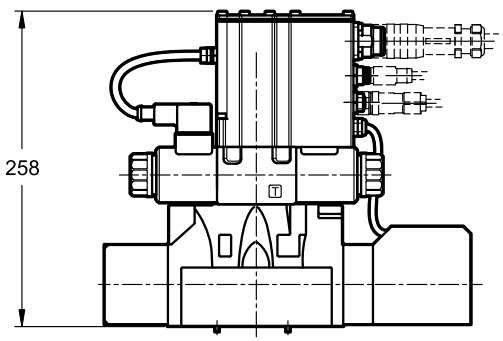
dimensions in mm



DSPE7JL



DSPE7JH



NOTES:

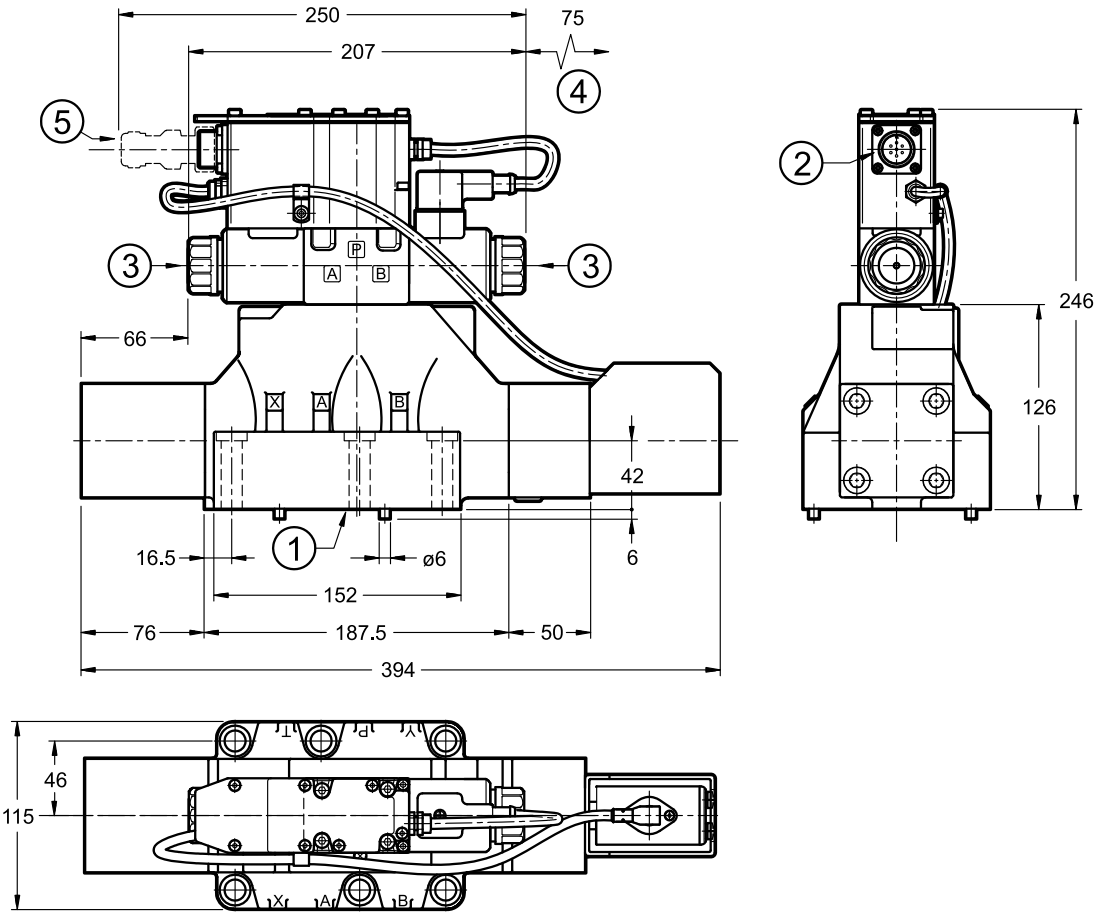
- Overall dimensions with Z option (fixed adjustment pressure reducing valve) at par. 15.
- Mounting surface at par. 16.
- It is recommended to not disassemble the transducer.

1	Mounting surface with sealing rings: 4 OR type 130 (22.22x2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

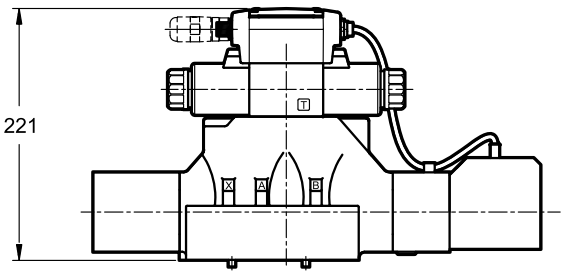
Valve fastening: 4 SHC screws M10x60 ISO 4762 2 SHC screws M6x60 ISO 4762
Tightening torque: M10x60: 40 Nm (A8.8 screws) M6x60: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x18; M10x18

13 - DSPE8J* - OVERALL AND MOUNTING DIMENSIONS

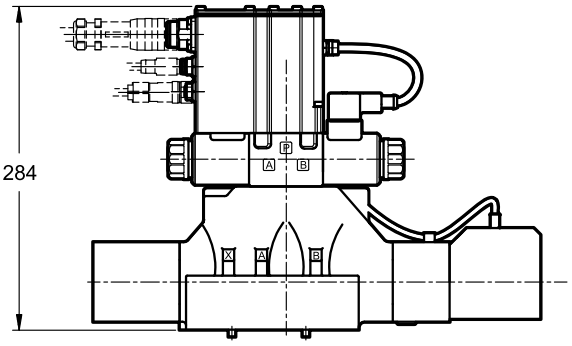
dimensions in mm



DSPE8JL



DSPE8JH



NOTES:

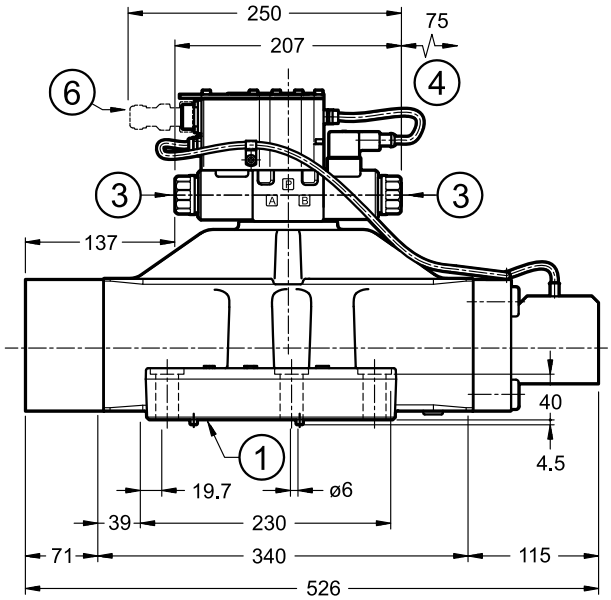
- Overall dimensions with Z option (fixed adjustment pressure reducing valve) at par. 15.
- Mounting surface at par. 16.
- It is recommended to not disassemble the transducer.

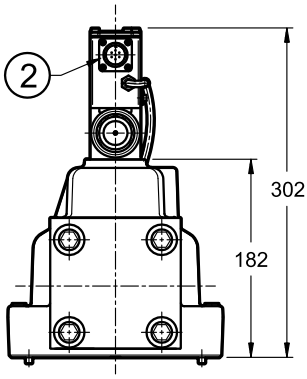
1	Mounting surface with sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	Mating connector. **To be ordered separately.** See catalogue 89 000

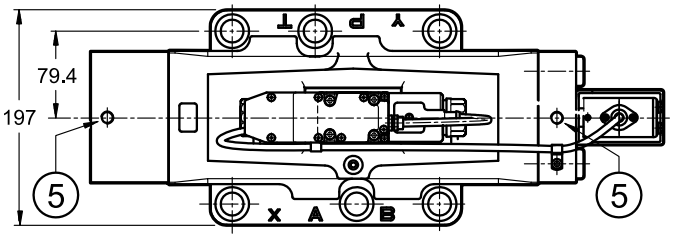
Valve fastening: 6 SHC screws M12x60 ISO 4762
Tightening torque: 69 Nm (A8.8 screws)
Threads of mounting holes: M12x20

14 - DSPE10J* / DSPE11J* - OVERALL AND MOUNTING DIMENSIONS

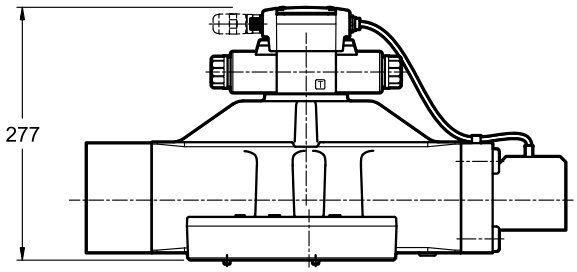
dimensions in mm



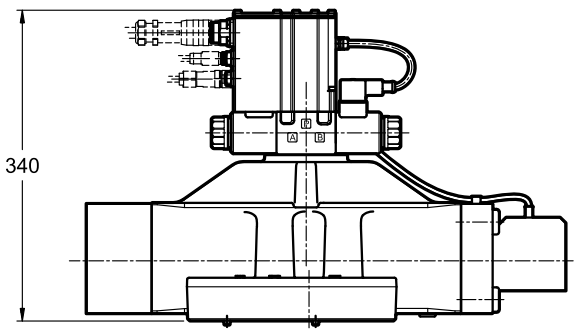




DSPE10JL



DSPE10JH



NOTES:

- Overall dimensions with Z option (fixed adjustment pressure reducing valve) at par. 15.
- Mounting surface at par. 16.
- It is recommended to not disassemble the transducer.

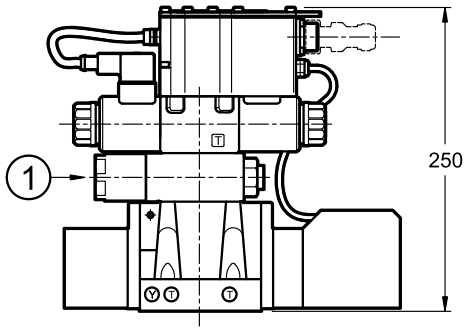
1	Mounting surface with sealing rings: **DSPE10J*** 4 OR type 4150 (37.59x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore **DSPE11J*** 4 OR type 4212 (53.57x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Coil removal space
5	M12 eyebolt seat for safe lift
6	Mating connector. **To be ordered separately.** See catalogue 89 000

Valve fastening: 6 SHC screws M20x70 ISO 4762
Tightening torque: 330 Nm (A8.8 screws)
Threads of mounting holes: M20x40

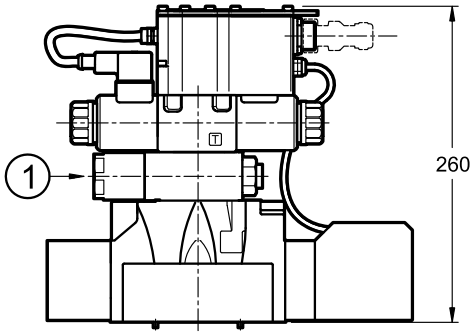
15 - OVERALL AND MOUNTING DIMENSIONS OF DSPE*J* WITH PILOT TYPE Z

dimensions in mm

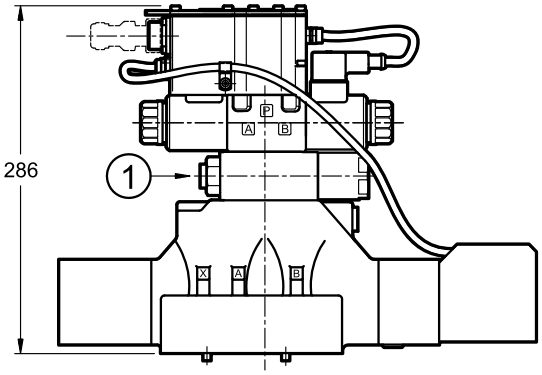
DSPE5J*



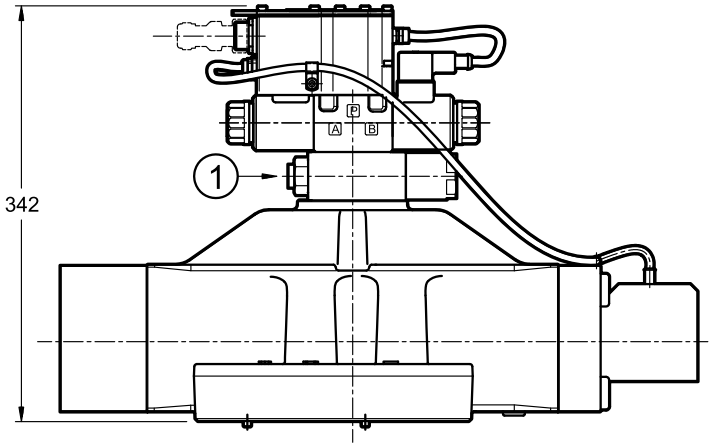
DSPE7J*



DSPE8J*



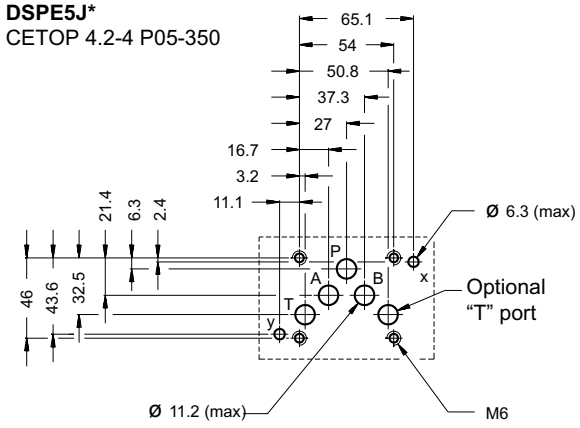
DSPE10J* / DSPE11J*



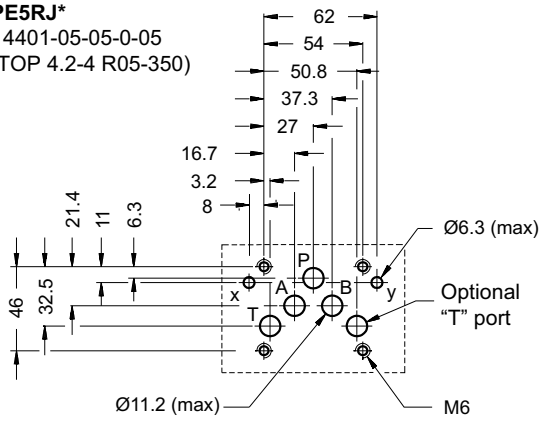
1	30 bar fixed adjustment pressure reducing valve

16 - MOUNTING SURFACES

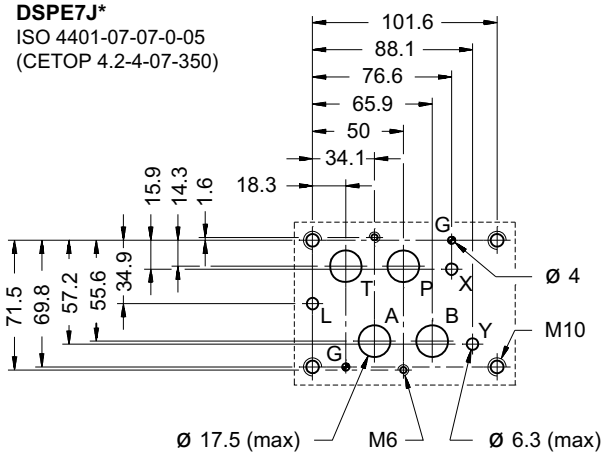
DSPE5J*
CETOP 4.2-4 P05-350



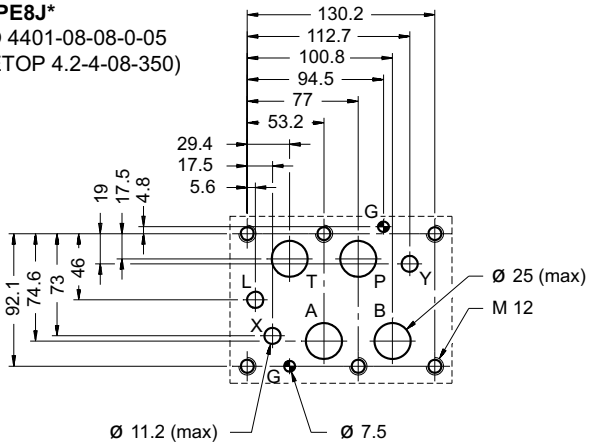
DSPE5RJ*
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



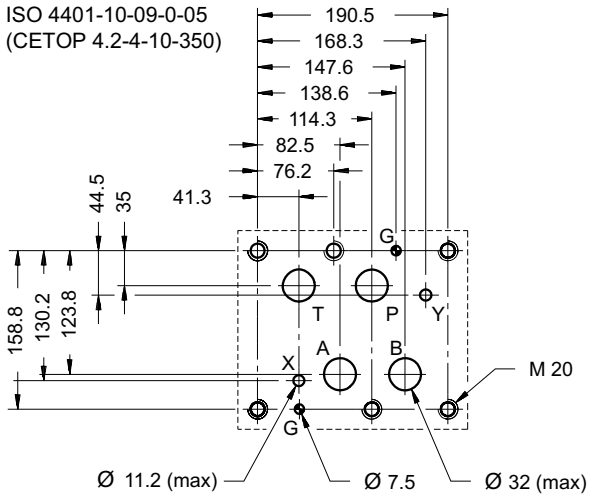
DSPE7J*
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DSPE8J*
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)

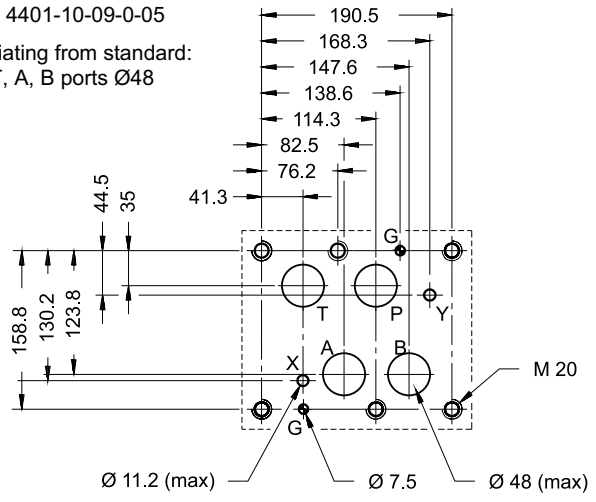


DSPE10J*
ISO 4401-10-09-0-05
(CETOP 4.2-4-10-350)



DSPE11J*
ISO 4401-10-09-0-05

deviating from standard:
P, T, A, B ports Ø48



17 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

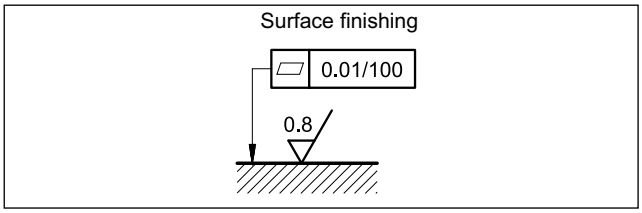
The fluid must be preserved in its physical and chemical characteristics.

18 - INSTALLATION

The valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.



19 - ACCESSORIES

(to be ordered separately)

19.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

19.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

19.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

19.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connections. See catalogue 89 850.

20 - SUBPLATES

(see catalogue 51 000)

No subplates are available for DSPE5RJ*, DSPE10J* and DSPE11J*.

	DSPE5J*	**DSPE7J***	**DSPE8J***
Type with rear ports	PME4-AI5G	PME07-AI6G	-
Type with side ports	PME4-AL5G	PME07-AL6G	PME5-AL8G
P, T, A, B ports dimensions X, Y ports dimensions	3/4” BSP 1/4” BSP	1” BSP 1/4” BSP	1 ½” BSP 1/4” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

CRE

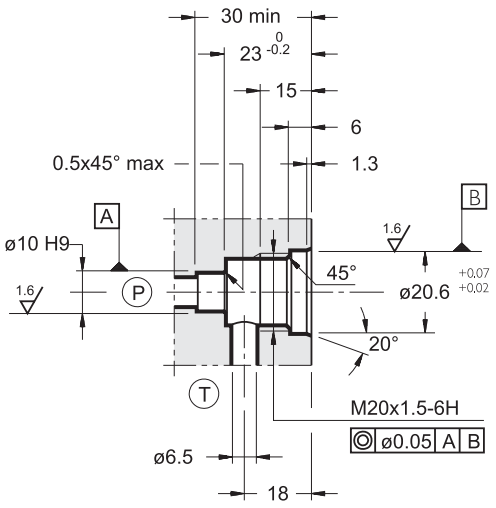
DIRECT OPERATED PRESSURE CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROL

SERIES 20

CARTRIDGE TYPE

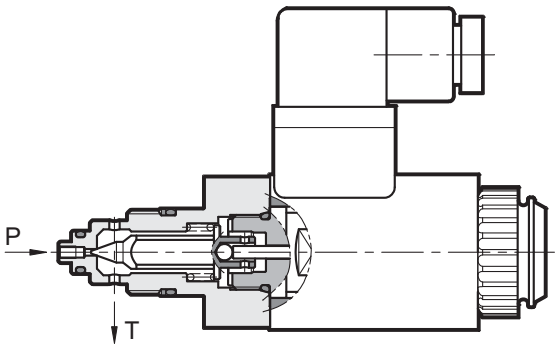
p max **350** bar
Q max **1,5** l/min

SEAT DIMENSIONS: D-10A



NOTE: provide seat for optional restrictor in T line

OPERATING PRINCIPLE



— The CRE valve is a direct operated pressure control valve with electric proportional control with cartridge execution which can be used in blocks and panels with type D-10A seat.

— The valve is suitable as a pilot stage for remote control of two stage pressure control and reducing valves.

— Pressure adjustment can be continuous in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control power supply unit or by means of the relative electronic control units to exploit valve performance to the full (see paragraph 8).

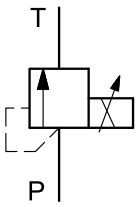
— The valve is available in three pressure control ranges up to 250 bar.

PERFORMANCES

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

Maximum operating pressure: - P port - T port	bar	 350 2
Minimum controlled pressure	see Δp-Q diagram	
Nominal flow Maximum flow	l/min	0,5 1,5
Step response	see paragraph 5	
Hysteresis (with PWM 200 Hz)	% of p nom	< 5%
Repeatability	% of p nom	< ±1,5%
Electrical characteristic	see paragraph 4	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	0,54

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

C	R	E	-		/	20		-		K1

Pressure control valve cartridge type

Electrical proportional control

Pressure control range
070 = up to 70 bar
140 = up to 140 bar
250 = up to 250 bar

Series No. (from 20 to 29 sizes and mounting dimensions remain unchanged)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

D12 = Nominal solenoid voltage 12 VDC
D24 = Nominal solenoid voltage 24 VDC

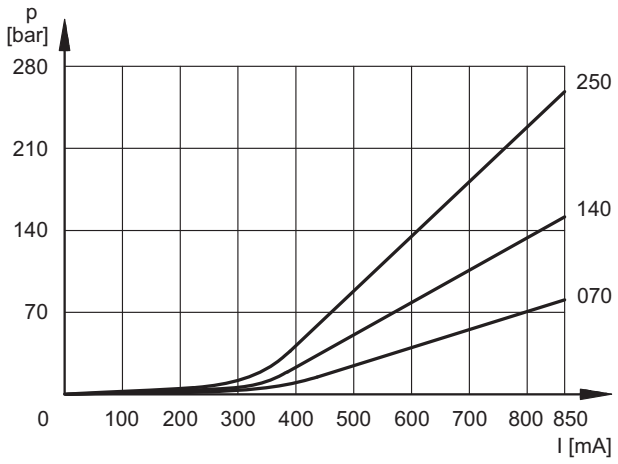
Coil electrical connection: plug for connector type DIN 43650 (**standard**)

2 - CHARACTERISTIC CURVES

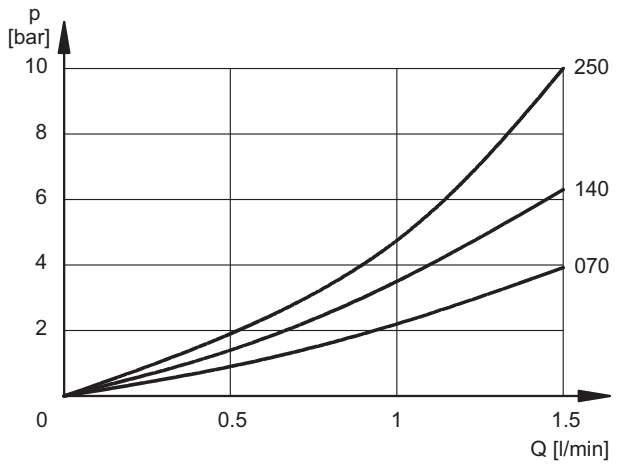
(measured with viscosity of 36 cSt at 50°C)

Typical control curves according to the current supplied to the solenoid, measured with input flow rate Q=0,5 l/min. The curves have been obtained without any hysteresis and linearity compensation and they are measured without any backpressure in T.

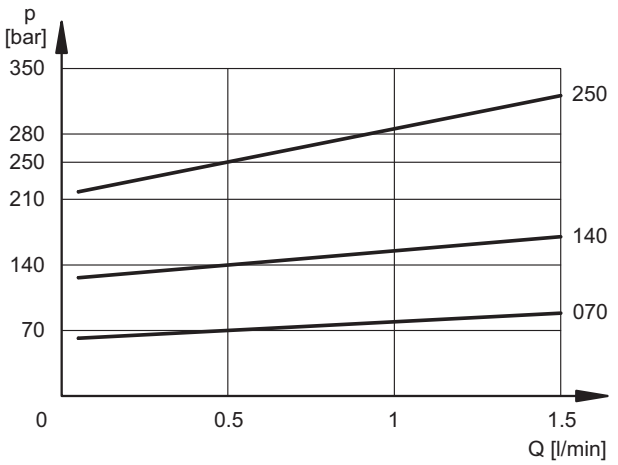
PRESSURE CONTROL p = f (I)



MINIMUM CONTROLLED PRESSURE p min = f (Q)



PRESSURE VARIATION p max = f (Q)



3 - 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 fluid types 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.

4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	16.6
MAXIMUM CURRENT	A	1.9	0.85
DUTY CYCLE		100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)		According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)		IP65	

5 - 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 Q = 0,5 l/min.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	80	40

6 - INSTALLATION

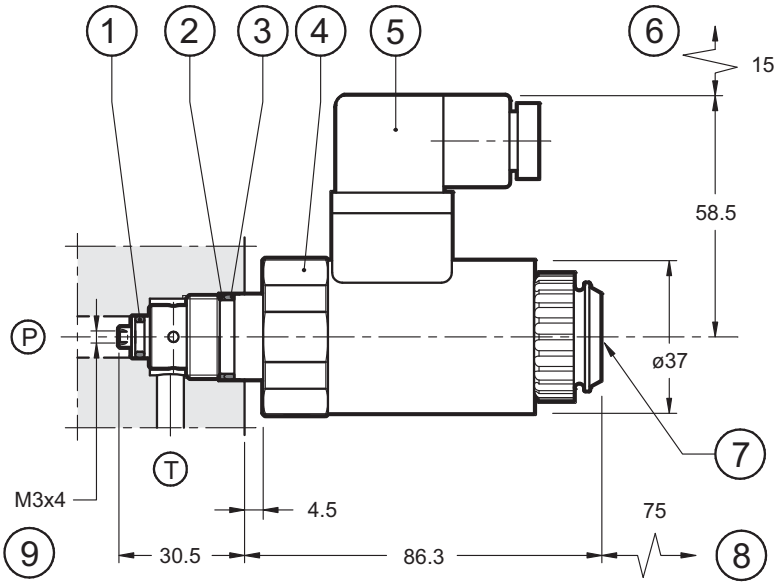
We recommend to install the CRE valve either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated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

Ensure that there is no air in the hydraulic circuit. In particular applications, it can be necessary to vent the air entrapped in the solenoid tube, by using the apposite drain screw in the solenoid tube. Ensure that the solenoid tube is always filled with oil (see par. 7). At the end of the operation, make sure of having screwed correctly the drain screw.

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.**

7 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	OR type 2025 (6.07x1.78)
2	PARBAK type 8-017 (18.01x1.14x1.35)
3	OR type 2068 (17.17x1.78)
4	Hex: spanner 36, torque 45 ÷ 50 Nm
5	EN 175301-803 (ex DIN 43650) electric connector
6	Connector removal space
7	Breather (male hexagonal spanner 4)
8	Coil removal space
9	Seat for optional calibrated flow restrictor

NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (7) placed at the end of the solenoid tube.

* The 4,5 mm dimension can be reduced to 0,5 mm by increasing the axial dimensions of the D-10A seat of 4 mm.

8 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

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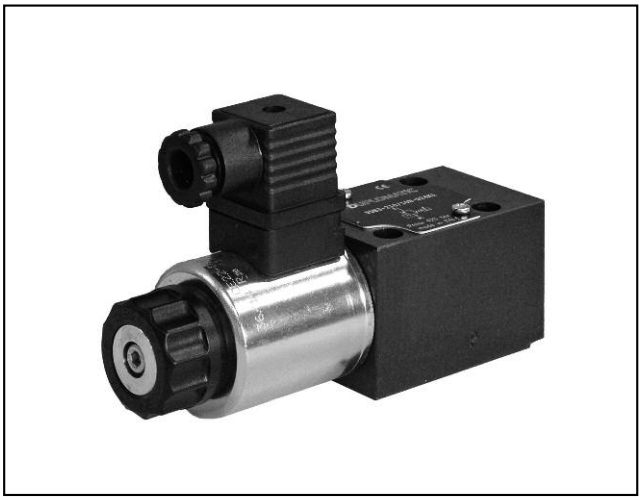


PDE3

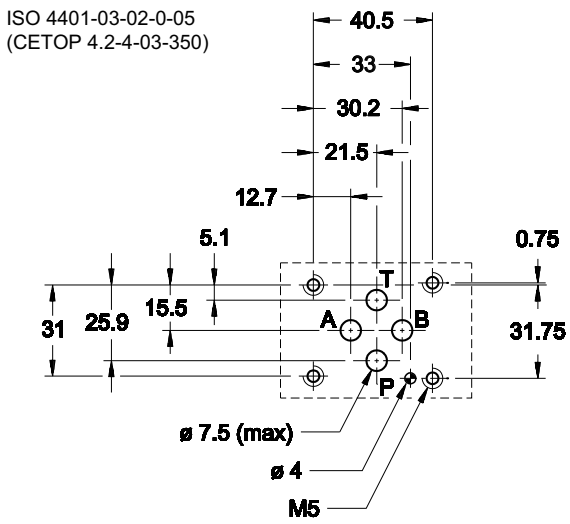
PROPORTIONAL PRESSURE RELIEF VALVE, DIRECT OPERATED

SERIES 10

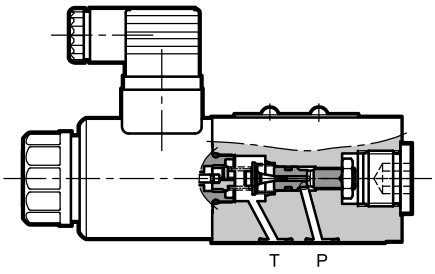
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **2** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— The PDE3 valve is a direct operated proportional pressure relief valve, with mounting interface in compliance with ISO 4401 standards.

— It is suitable to pilot two-stage valves or for pressure control in hydraulic circuits.

— The design of this valve has a mechanical pressure limitation feature for higher safety of the application.

— The valve can be controlled directly by a current control supply unit or by an electronic control unit, to exploit valve performance to the full (see par. 9).

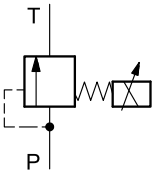
— The valve is available in five pressure control ranges up to 350 bar.

PERFORMANCES

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

Maximum operating pressure: - P port - T port	bar	 350 2
Minimum controlled pressure	see p min = f(Q) diagram	
Nominal flow Maximum flow (see p min = f(Q) diagram)	l/min	1 2
Step response	see paragraph 6	
Hysteresis (with PWM 200 Hz)	% of p nom	< 5%
Repeatability	% of p nom	< ±1,5%
Electrical characteristic	see paragraph 5	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	1,6

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

P	D	E	3	-		/	10		-		K1

Pressure control valve

Direct operated

Electrical proportional control

Size ISO 4401-03

Pressure control range
025 = 0,9 - 25 bar
070 = 1,6 - 70 bar
140 = 2,4 - 140 bar
210 = 3,2 - 210 bar
350 = 5 - 350 bar

Series No.
(the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Coil electrical connection:
plug for connector type
EN 175301-803 (ex DIN 43650)
(**standard**)

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

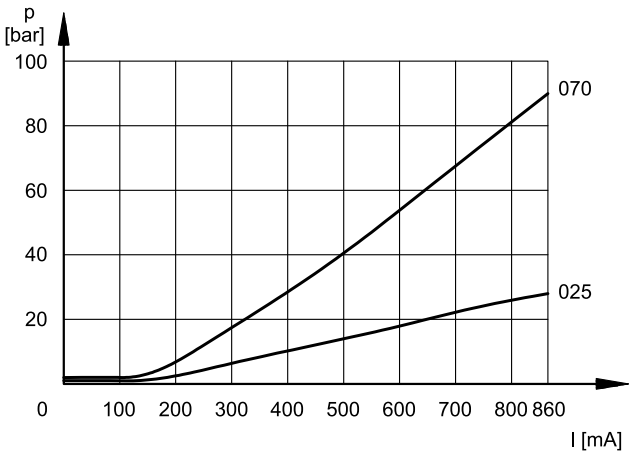
2 - CHARACTERISTIC CURVES

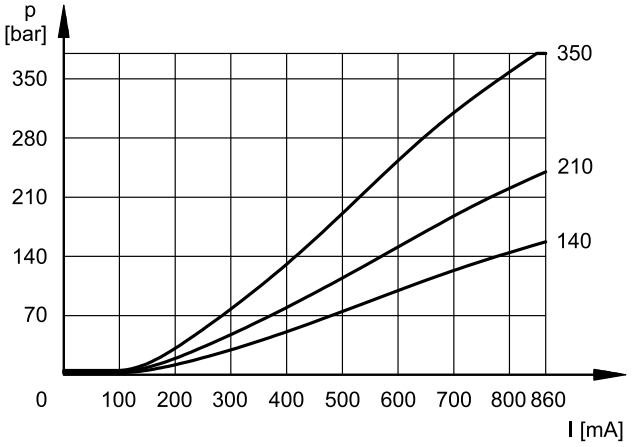
(obtained with viscosity of 36 cSt at 50°C, and valves with D24 coil)

Typical control curves according to the current supplied to the solenoid, measured with input flow rate Q = 1 l/min.

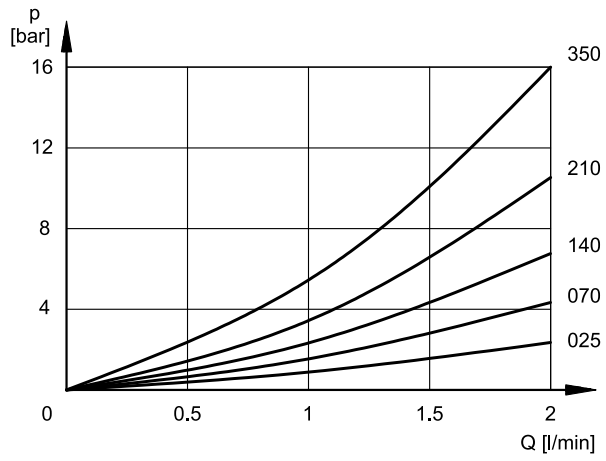
Curves have been obtained without any hysteresis and linearity compensation and they are measured without any backpressure in T. The full scale pressure is set in factory with a flow rate of 1 l/min. In case of higher flow rate, the full scale pressure will increase considerably (see diagram pmax = f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

PRESSURE CONTROL p = f(I)

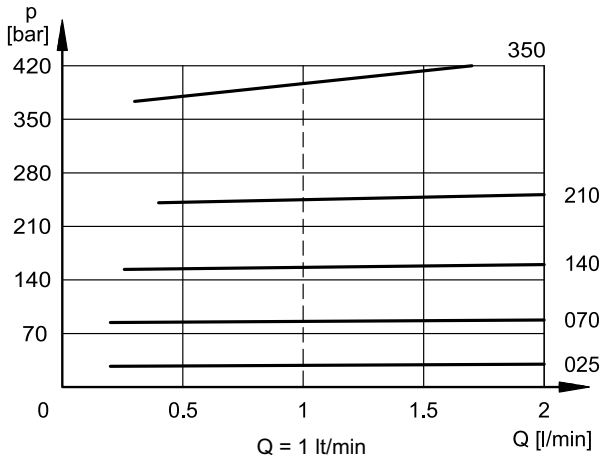




MINIMUM CONTROLLED PRESSURE p min = f (Q)



PRESSURE VARIATION p max = f (Q)



3 - MAX PRESSURE VALUES

This valve incorporates a mechanical limit of the maximum pressure, that operates independently of the applied current. This kind of design ensures that the pressure cannot rise over even if the solenoid current exceeds the maximum current ($I > I_{max}$).

Values obtained with oil viscosity of 36 cSt at 50°C, Q = 1 l/min

		PDE3-025	PDE3-070	PDE3-140	PDE3-210	PDE3-350
pressure value at 800 mA	bar	25	77	142	217	360
max pressure value when $I > I_{max}$	bar	33,5	90	161	252	390

4 - 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
CLASS OF PROTECTION atmospheric agents (EN 60529) coil insulation (VDE 0580) Impregnation	IP65 class H class F		

6 - 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 PDE3-210 and with an input flow rate of Q = 1 l/min and pressure oil volume of 0,1 litre. The response time is affected both by the flow rate and the oil volume in the pipework.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	60	70

7 - INSTALLATION

We recommend installing these valves with the solenoid downward, either in horizontal or vertical position. If the valve is installed on vertical axis with the solenoid upward, you should consider possible variations of the minimum controlled pressure from those indicated in paragraph 2.

Ensure that there is no air in the hydraulic circuit. In certain applications it might be necessary to vent the air entrapped in the solenoid tube by unfastening the drain screw placed in the solenoid tube.

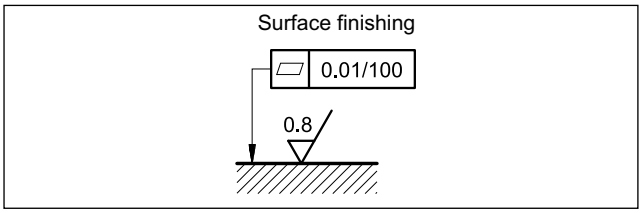
Ensure the solenoid tube is always filled with oil. Make sure the drain screw has been put back correctly at the end of the task.

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.

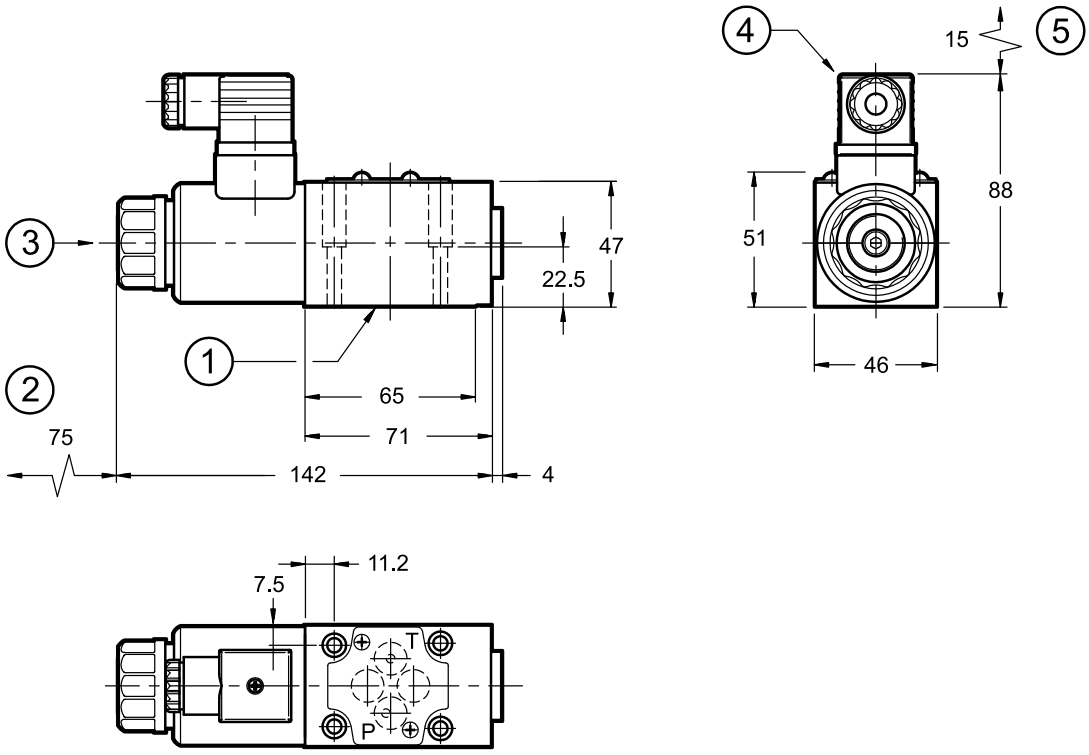
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols.

If minimum values are not observed, fluid can easily leaks between the valve and support surface.



8 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (3) placed at the end of the solenoid tube.

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

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Coil removal space
3	Breather (Allen key 4)
4	EN 175301-803 (ex DIN 43650) connector, included in the supply
5	Connector removal space

9 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

10 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions: P, T, A, B: 3/8” BSP thread

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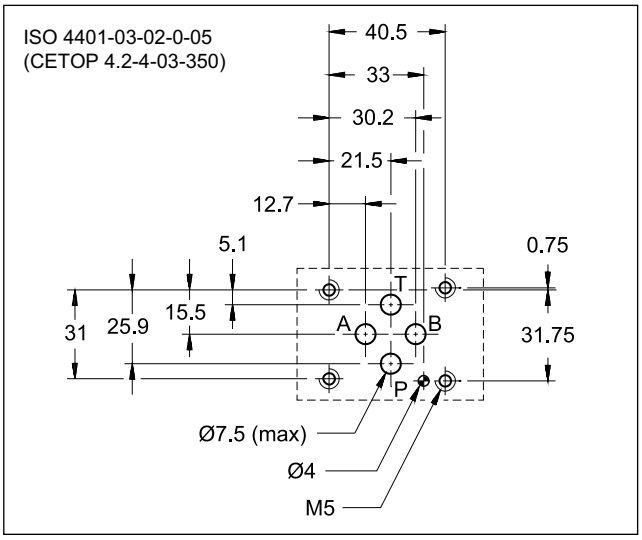
PDE3G*

PRESSURE CONTROL VALVE WITH PROPORTIONAL CONTROL AND INTEGRAL ELECTRONICS

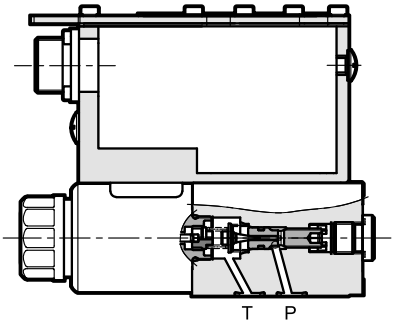
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **2** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The PDE3G* valve is a direct operated pressure control valve, with integrated electric proportional control and mounting interface in compliance with ISO 4401 standards.

— It is suitable to pilot two-stage valves, for pressure control in hydraulic circuits.

— Valves are available with different types of electronics, with analogue or fieldbus interfaces

— A solenoid current monitoring signal is available.

— Five pressure control ranges are available, up to 350 bar.

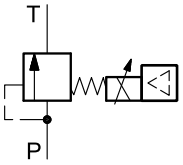
— The valves are easy to install. The driver manages digital settings directly.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

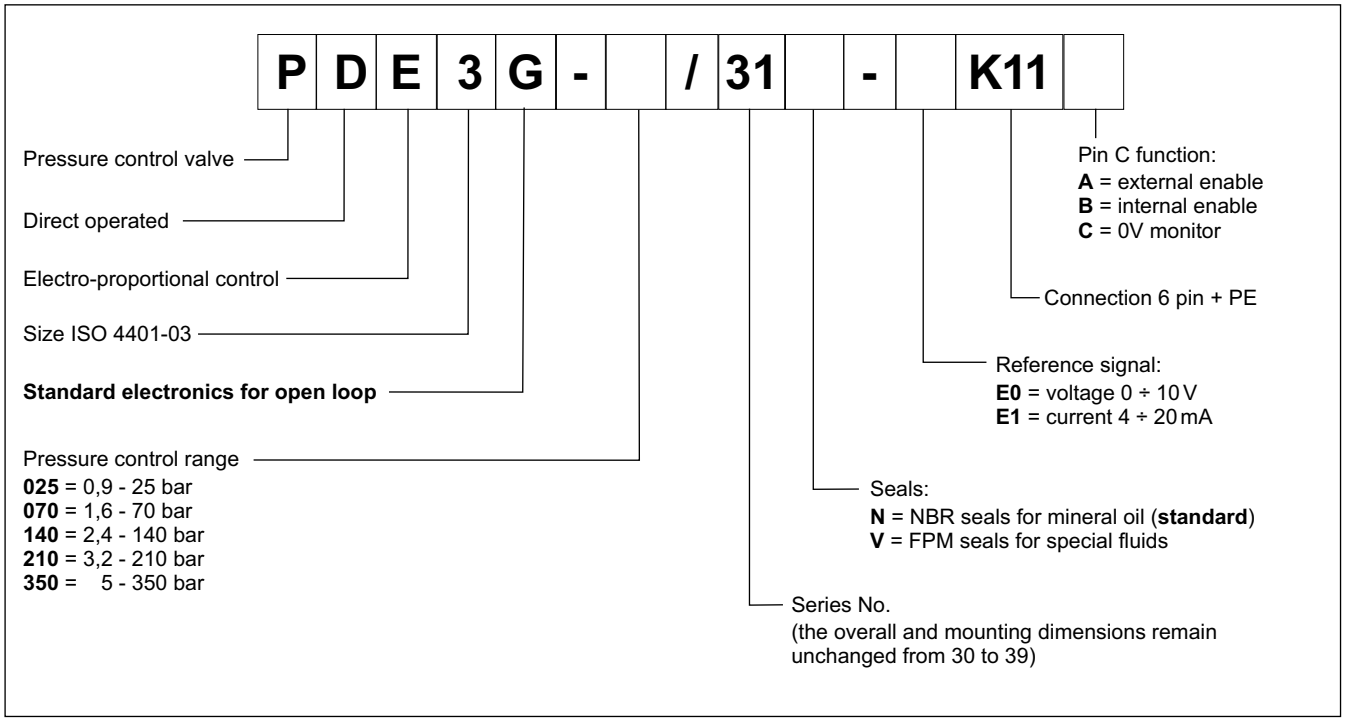
Maximum operating pressure: - P port - T port	bar	 350 2
Nominal flow Maximum flow (see diagram p min = f(Q))	l/min	1 2
Step response	see paragraph 7	
Hysteresis	% of p nom	< 3%
Repeatability	% of p nom	< ±1%
Electrical characteristic	see paragraph 2	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	2

HYDRAULIC SYMBOL

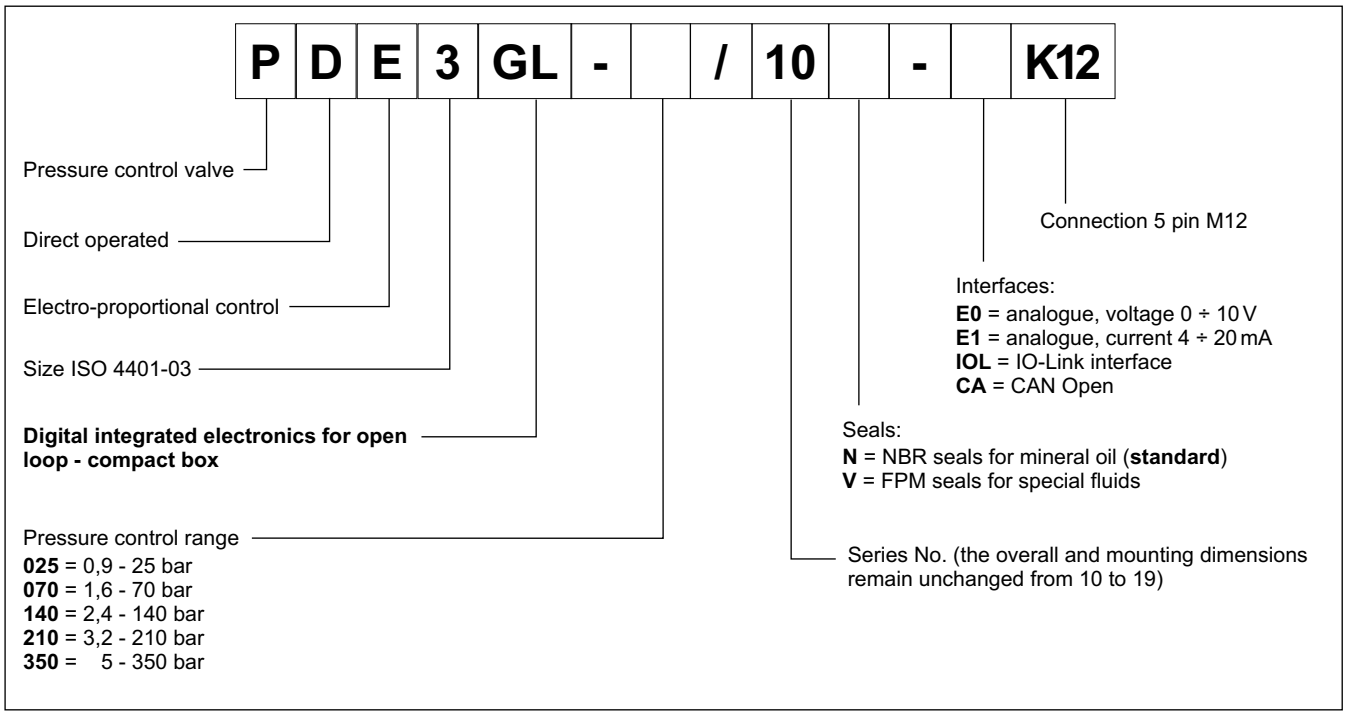


1 - IDENTIFICATION CODE

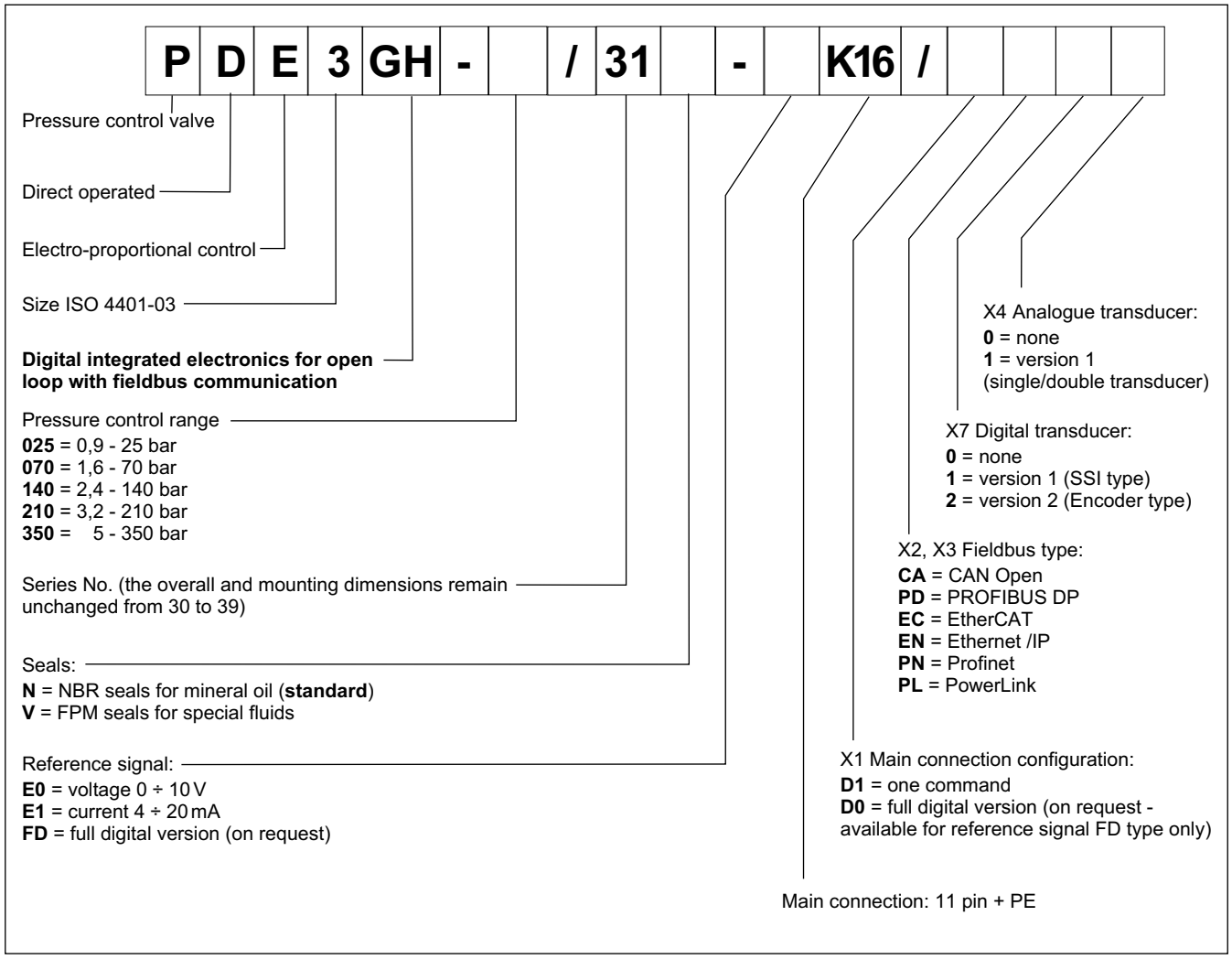
1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

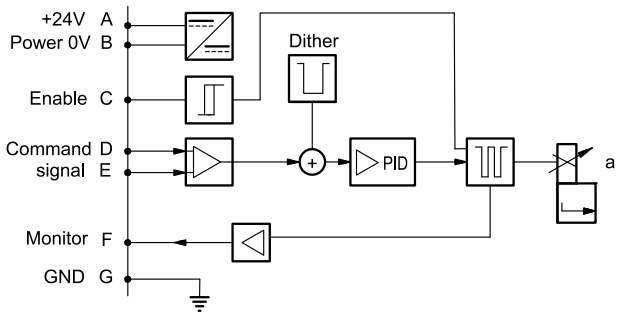
3 - PDE3G - STANDARD ELECTRONICS

3.1 - Electrical characteristics

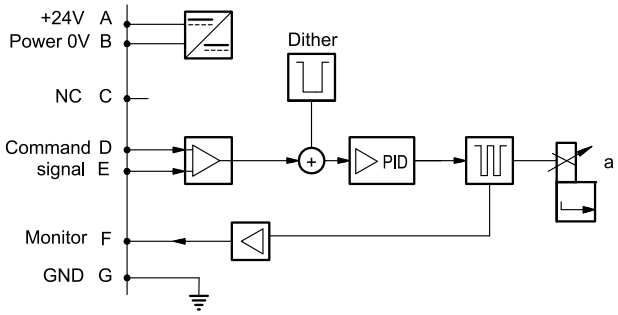
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

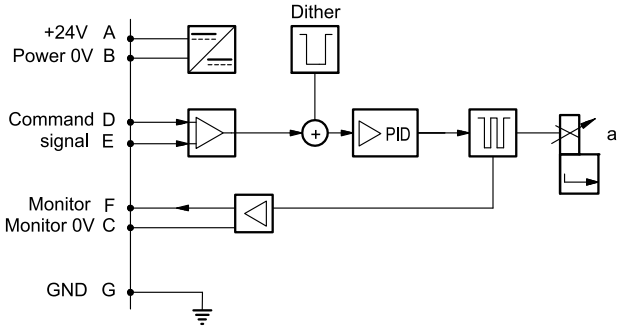
VERSION A - External Enable



VERSION B - Internal Enable

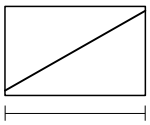


VERSION C - 0V Monitor

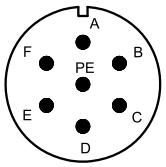


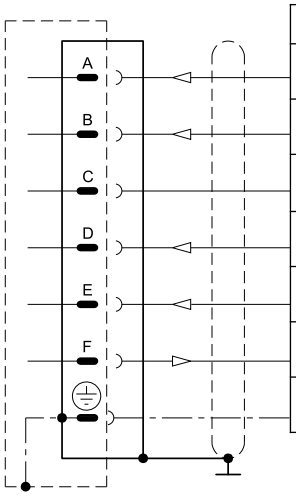
3.3 - Versions with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



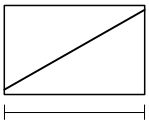


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

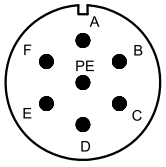
3.4 - Versions with current command (E1)

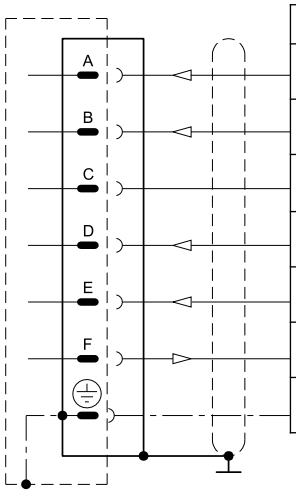
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - PDE3GL - COMPACT ELECTRONICS

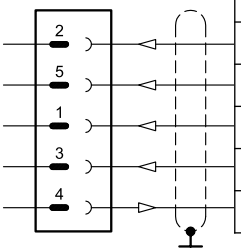
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	kBaud	IO-Link Port Class B 230,4
Can Open communication (CA): Data rate	kbit	10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

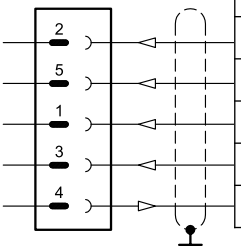
4.2 - Pin tables

'E0' connection



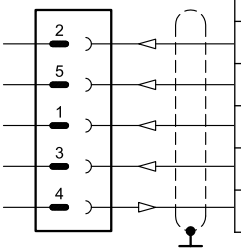
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0 V	Command reference
4	0 ÷ 5 V	Monitor (0V reference: pin 5)

'E1' connection



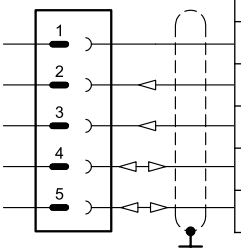
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0V (GND)	
4	C/Q		IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - DSE3GH - FIELDBUS ELECTRONICS

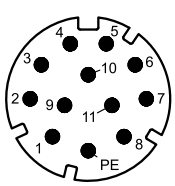
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

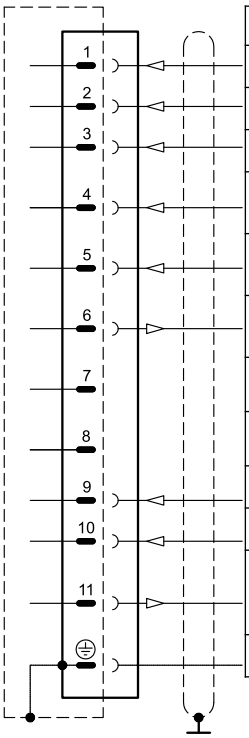
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.2 and 3.3.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

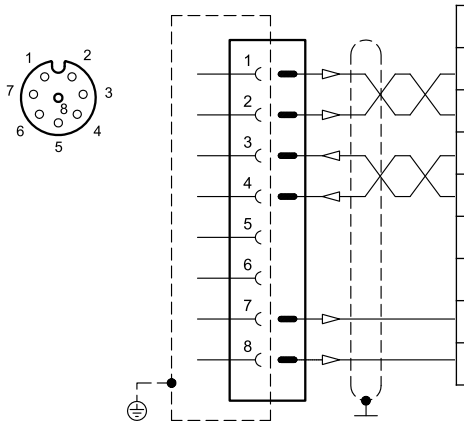
Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

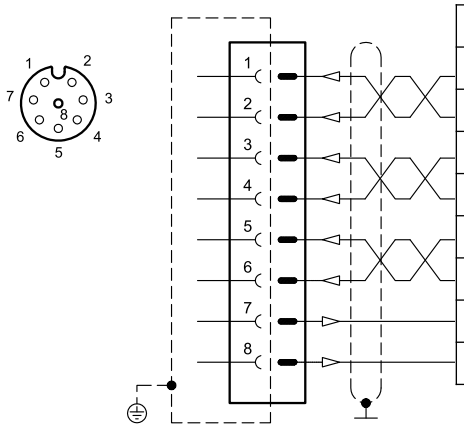
5.4 - Digital transducer connection
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

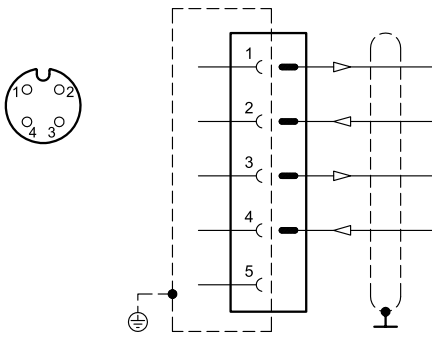
VERSION 2: ENCODER type



Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection
X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer
(single or double is a software-selectable option)



Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

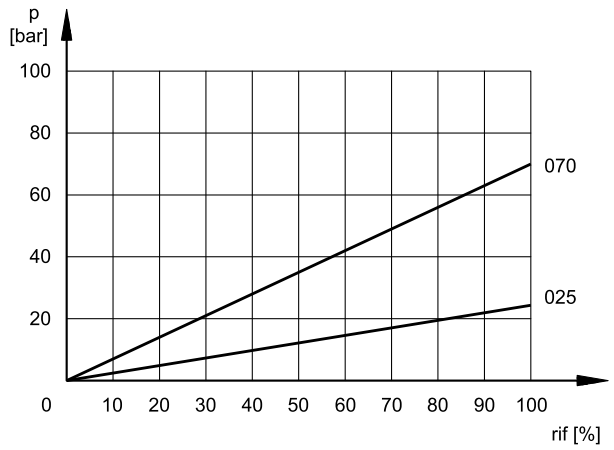
6 - CHARACTERISTIC CURVES

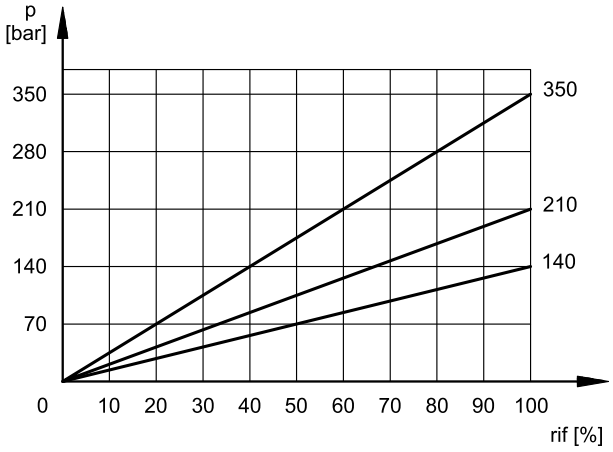
(measured with viscosity of 36 cSt at 50°C)

Typical control curves according to the reference signal for pressure control ranges, measured with input flow rate Q = 1 l/min. Characteristic curves measured without backpressure in T, with linearity compensation set by the onboard electronics.

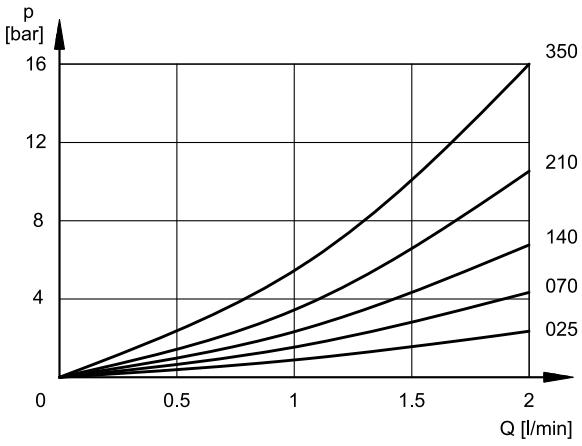
The full scale pressure is set in factory with a flow rate of 1 l/min. In case of higher flow rate, the full scale pressure will increase considerably. See diagram pmax = f (Q).

PRESSURE CONTROL p = f (I)

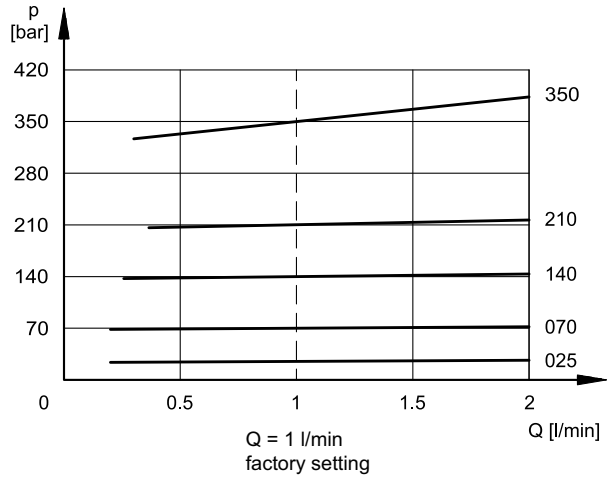




MINIMUM CONTROLLED PRESSURE p min = f (Q)



PRESSURE VARIATION p max = f (Q)



Q = 1 l/min
factory setting

7 - 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.

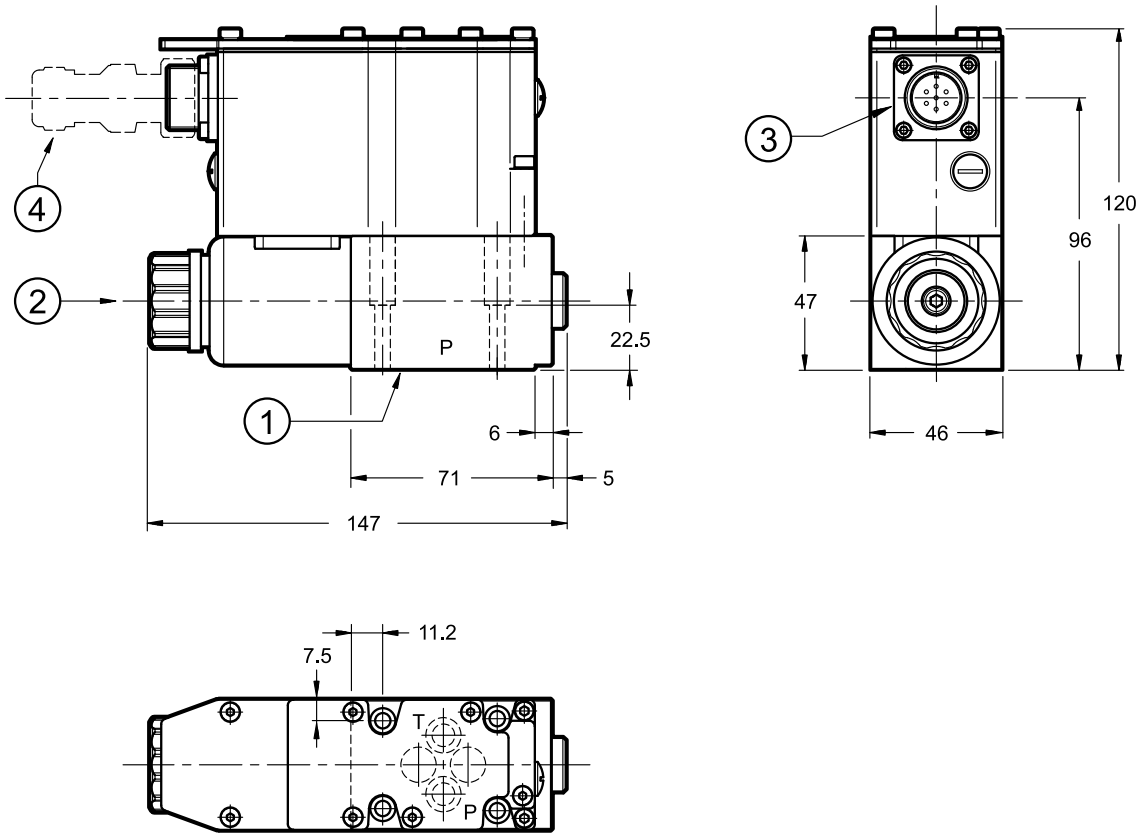
The table illustrates typical step response times measured with a PDE3G-210 and with an input flow rate of Q = 1 l/min and pressure oil volume of 0,1 litre.

The response time is affected both by the flow rate and the oil volume in the pipework.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	60	20

8 - PDE3G - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

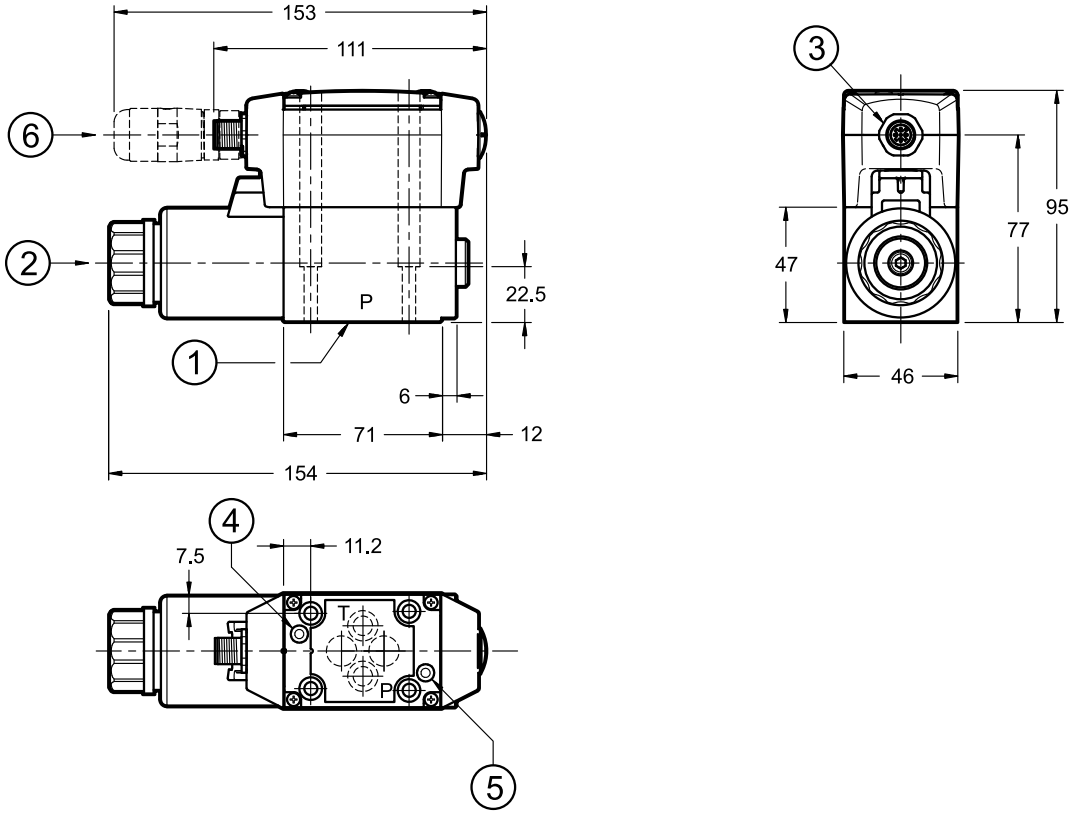


NOTE:
at the first start up or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

Fastening bolts: 4 SHCS M5x30 - ISO 4762	
Torque: 5 Nm (A8.8)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25 x 1.78)
2	Breather: Allen key 4
3	Main connection 6 pin + PE
4	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000

9 - PDE3GL - OVERALL AND MOUNTING DIMENSIONS

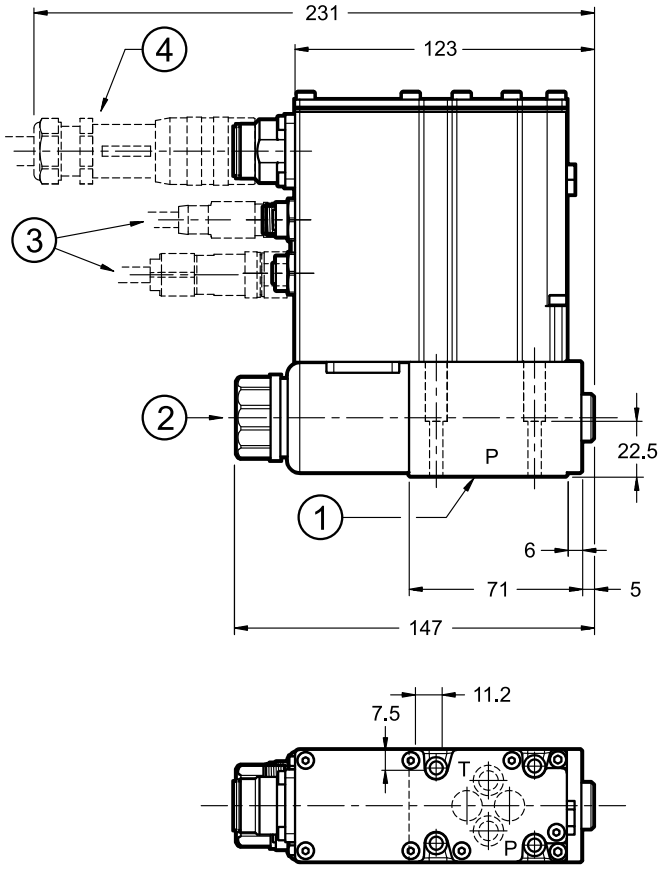


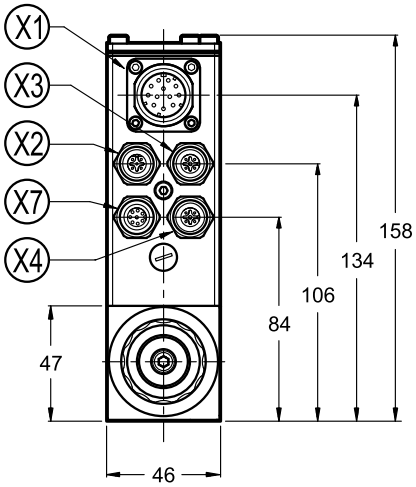
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Connection M12 A 5 pin
4	L1 LED
5	L2 LED
6	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHCS M5x30- ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

10 - PDE3GH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm





X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHCS M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

12 - INSTALLATION

We recommend installing these valves with the solenoid downward, either in horizontal or vertical position. If the valve is installed on vertical axis with the solenoid upward, you should consider possible variations of the minimum controlled pressure from those indicated in par. 6.

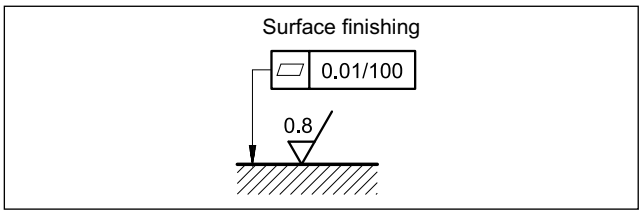
Ensure that there is no air in the hydraulic circuit. In certain applications it might be necessary to vent the air entrapped in the solenoid tube by unfastening the drain screw placed in the solenoid tube.

Ensure the solenoid tube is always filled with oil. Make sure the drain screw has been put back correctly at the end of the task. 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 leaks between the valve and support surface.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

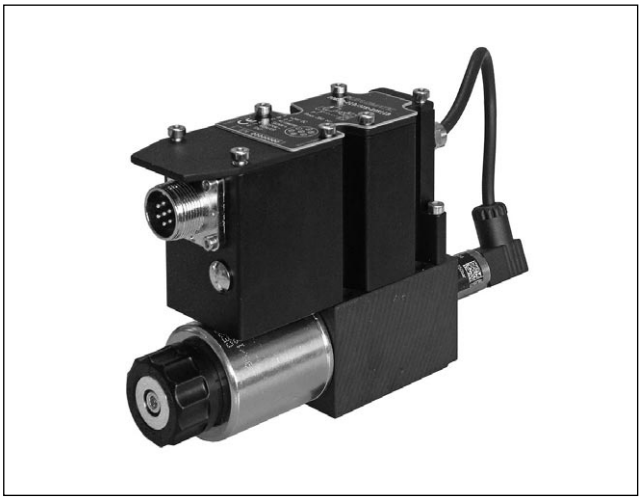
14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



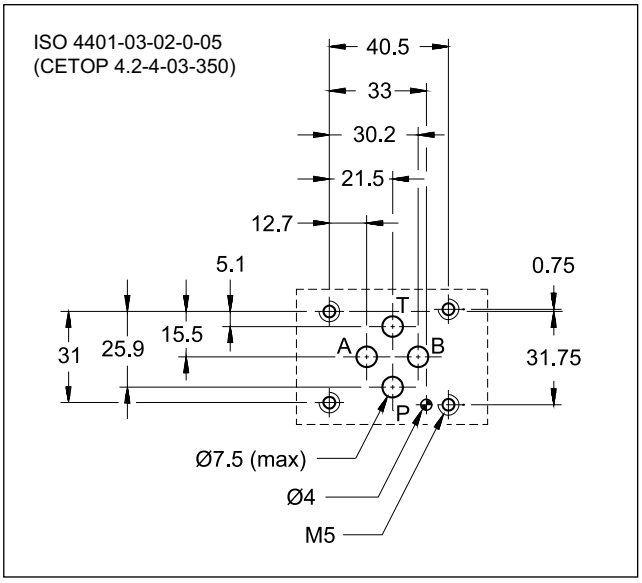
PDE3J*

PROPORTIONAL PRESSURE CONTROL VALVE, DIRECT OPERATED, WITH INTEGRATED ELECTRONICS FOR CLOSED LOOP

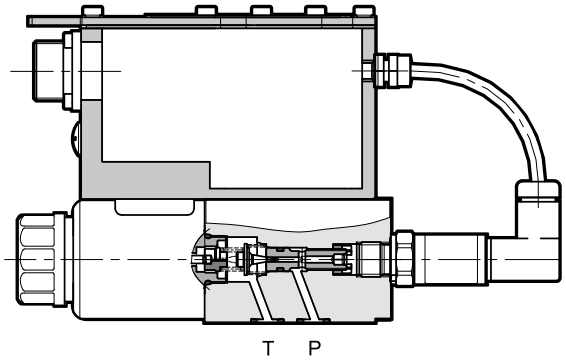
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **2** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The PDE3J* valve is a direct operated pressure control valve with integrated electric proportional control and mounting interface in compliance with ISO 4401 standards.

— It is suitable to pilot two-stage valves, for pressure control in hydraulic circuits.

— It is available with different types of electronics, with analogue or fieldbus interfaces.

— The monitoring of the value detected by the pressure transmitter is available on pin F.

— Three pressure adjustment ranges are available up to 350 bar .

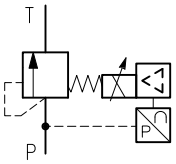
— The valve is easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

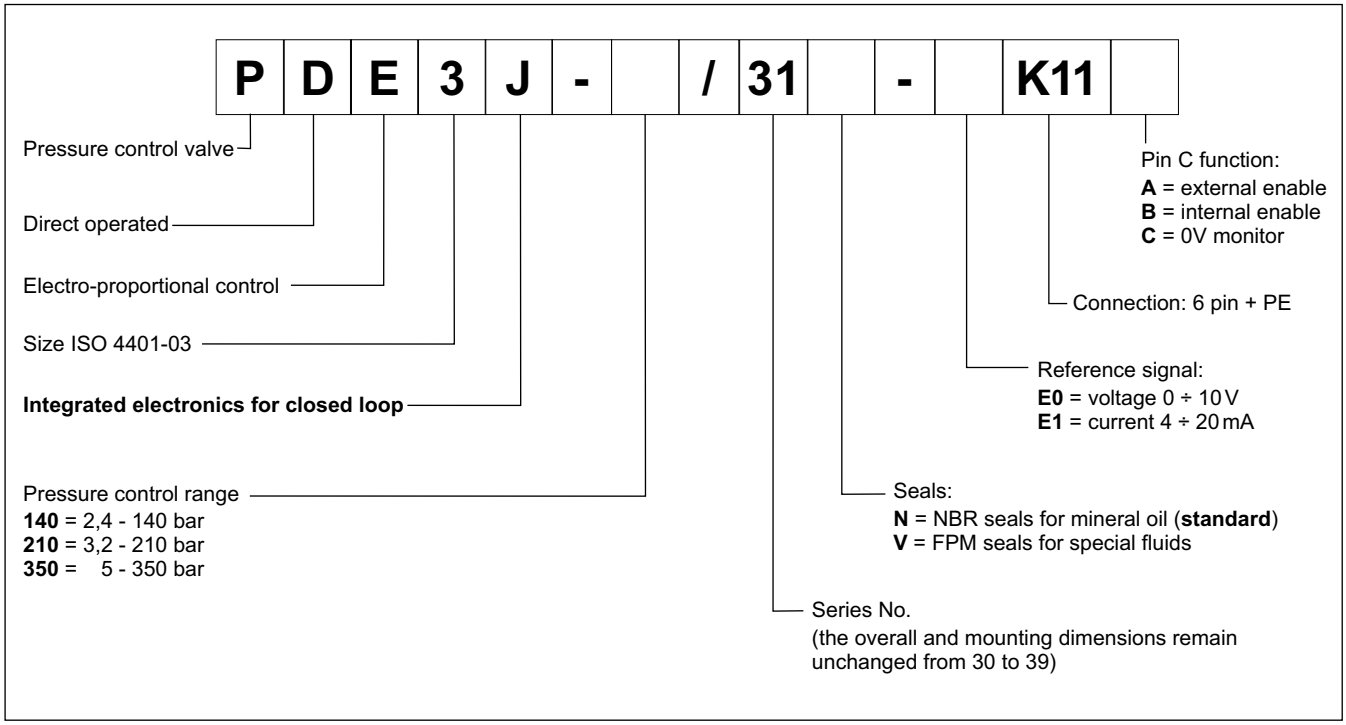
Maximum operating pressure: - P port - T port	bar	 350 2
Nominal flow Maximum flow (see p min= f(Q) diagram)	l/min	1 2
Step response	see paragraph 7	
Hysteresis	% of p nom	< 1%
Repeatability	% of p nom	< ±0,5%
Electrical characteristic	see paragraph 2	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	2,5

HYDRAULIC SYMBOL

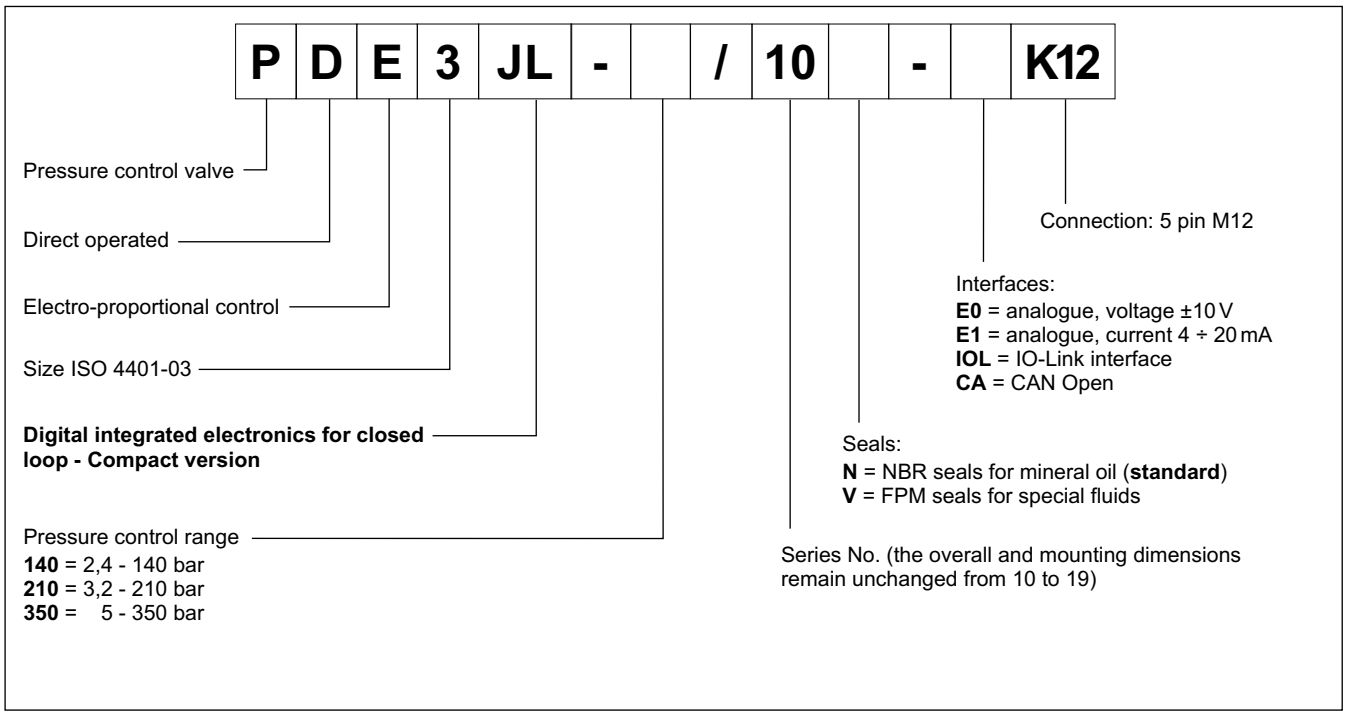


1 - IDENTIFICATION CODE

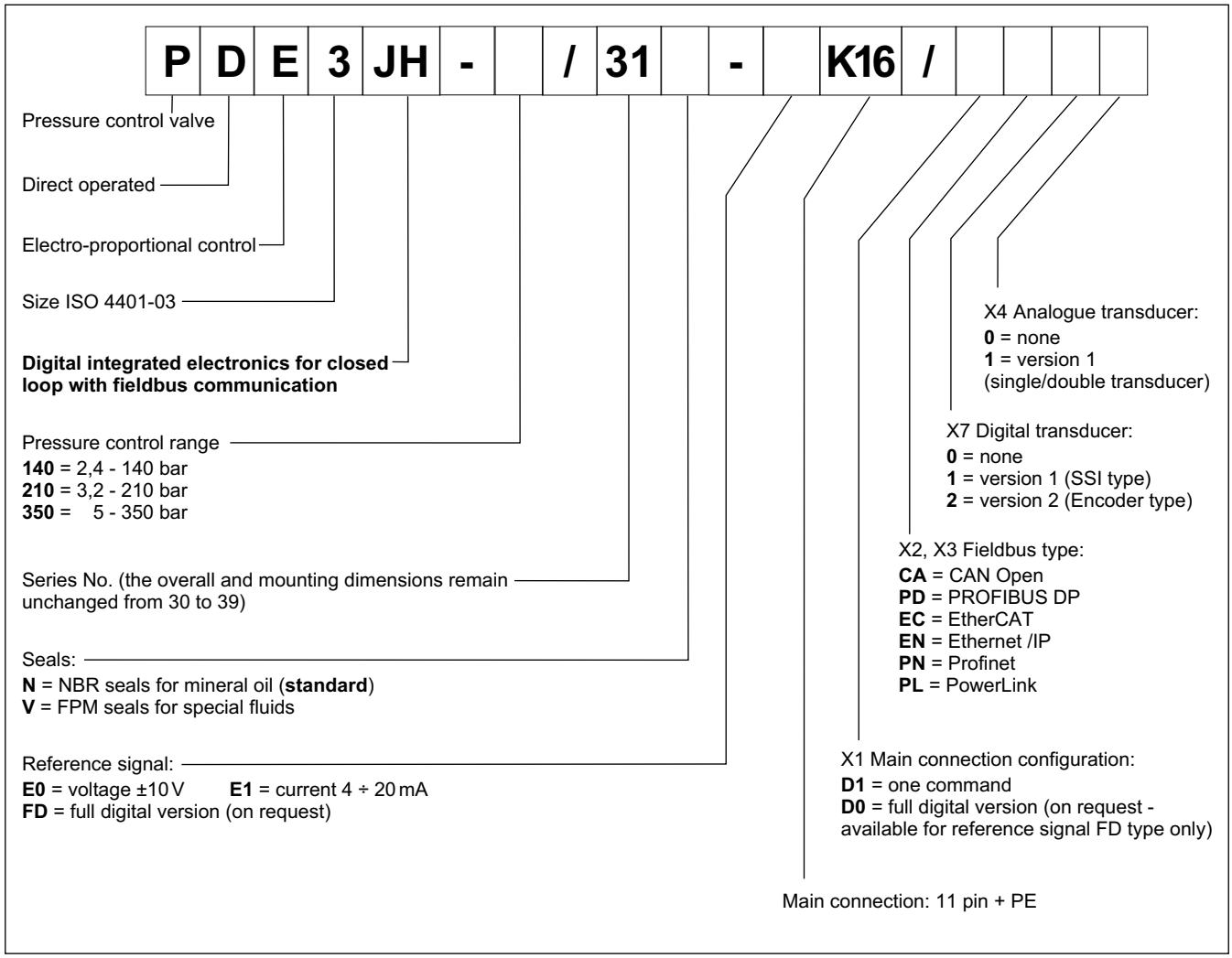
1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

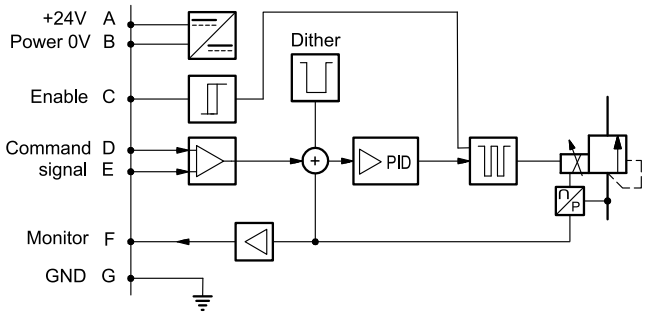
3 - PDE3J - STANDARD ELECTRONICS

3.1 - Electrical characteristics

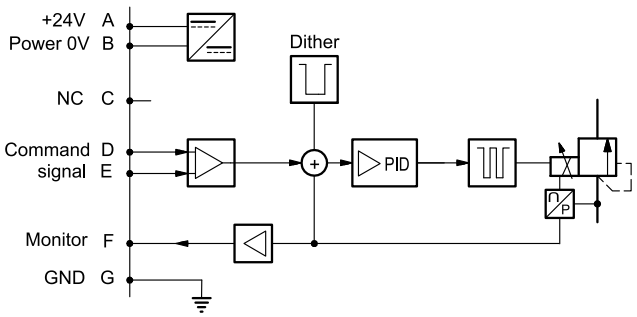
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

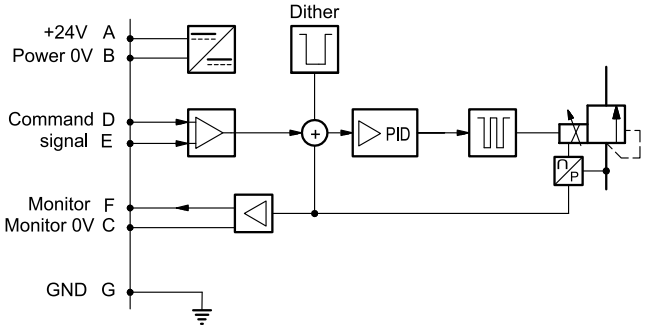
VERSION A - External Enable



VERSION B - Internal Enable

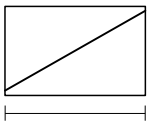


VERSION C - 0V Monitor

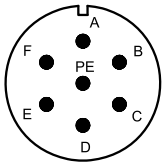


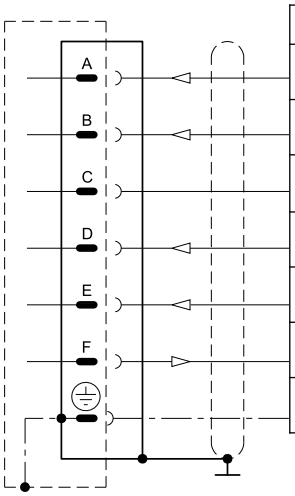
3.3 - Version with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



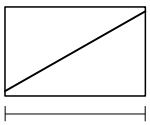


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command (differential input)		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

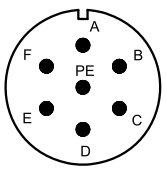
3.4 - Versions with current command (E1)

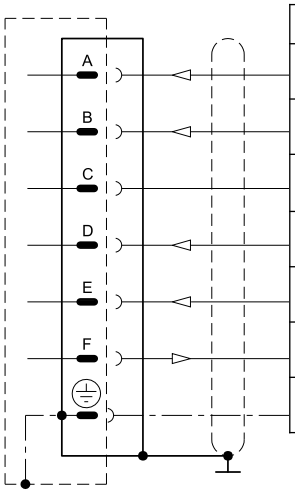
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - PDE3JL - COMPACT ELECTRONICS

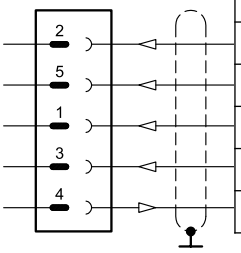
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	kBaud	IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	kbit	10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

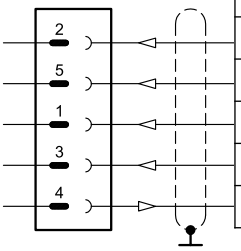
4.2 - Pin tables

'E0' connection



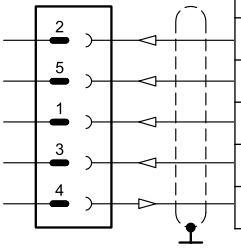
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



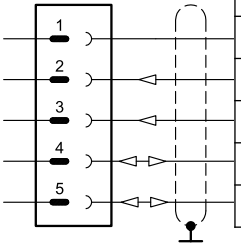
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0V (GND)	
4	C/Q		IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - PDE3JH - FIELDBUS ELECTRONICS

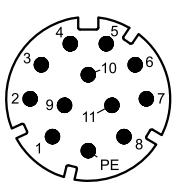
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

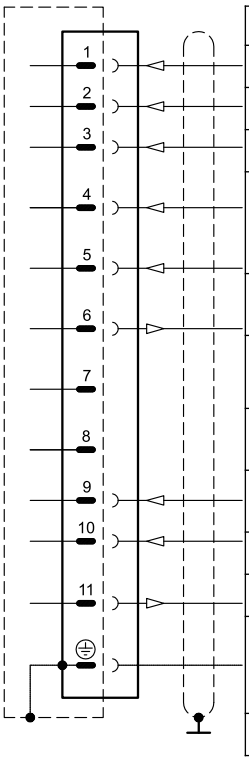
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (pressure at transducer): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

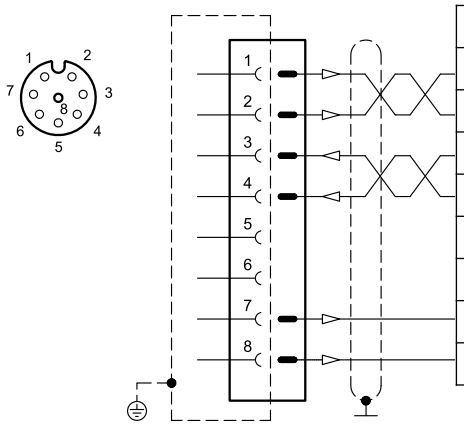
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

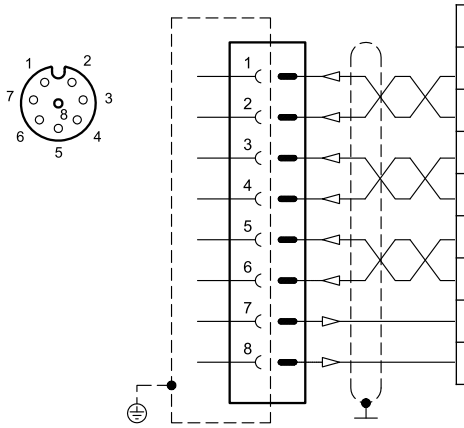
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



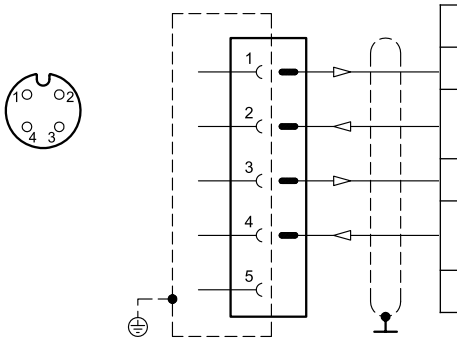
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

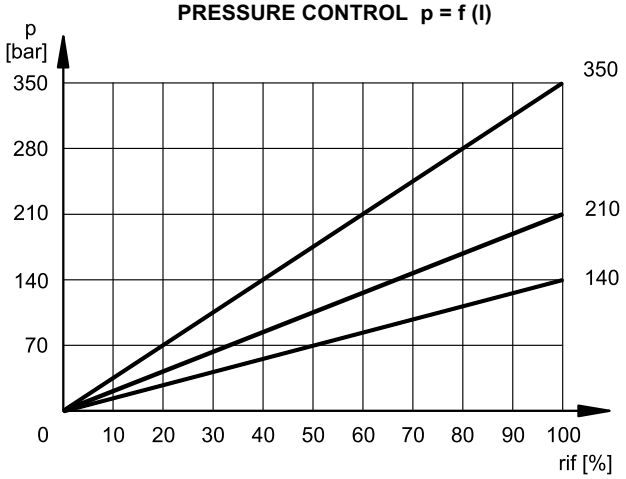
6 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

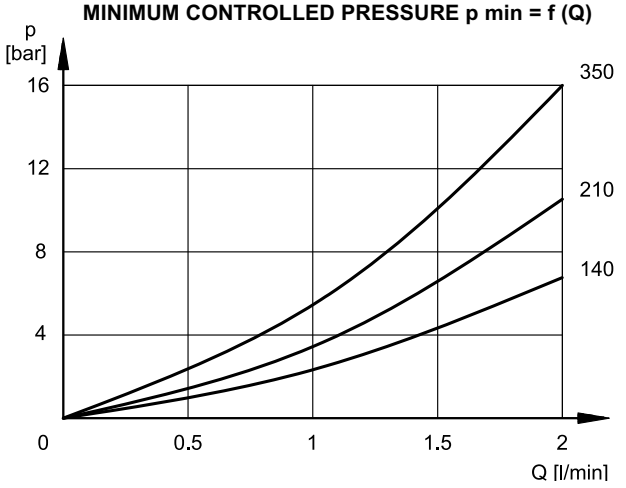
Typical control characteristics, according to the reference signal for available pressure control ranges, measured with input flow rate Q = 1 l/min.

Characteristic curves measured without backpressure in T, with linearity and hysteresis compensation set by the onboard electronics.

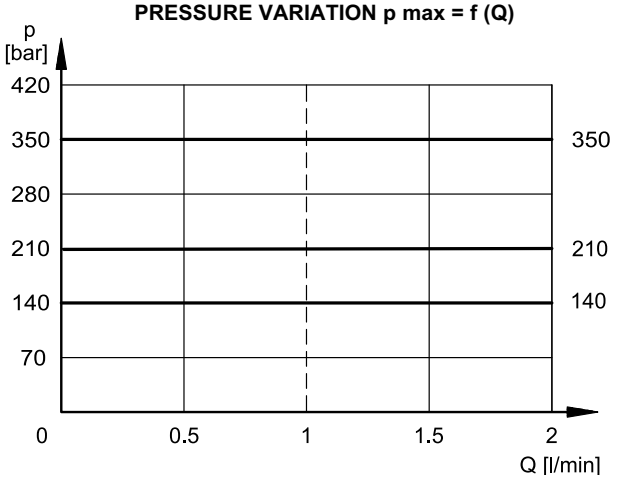
PRESSURE CONTROL p = f (I)



MINIMUM CONTROLLED PRESSURE p min = f (Q)



PRESSURE VARIATION p max = f (Q)



7 - 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.

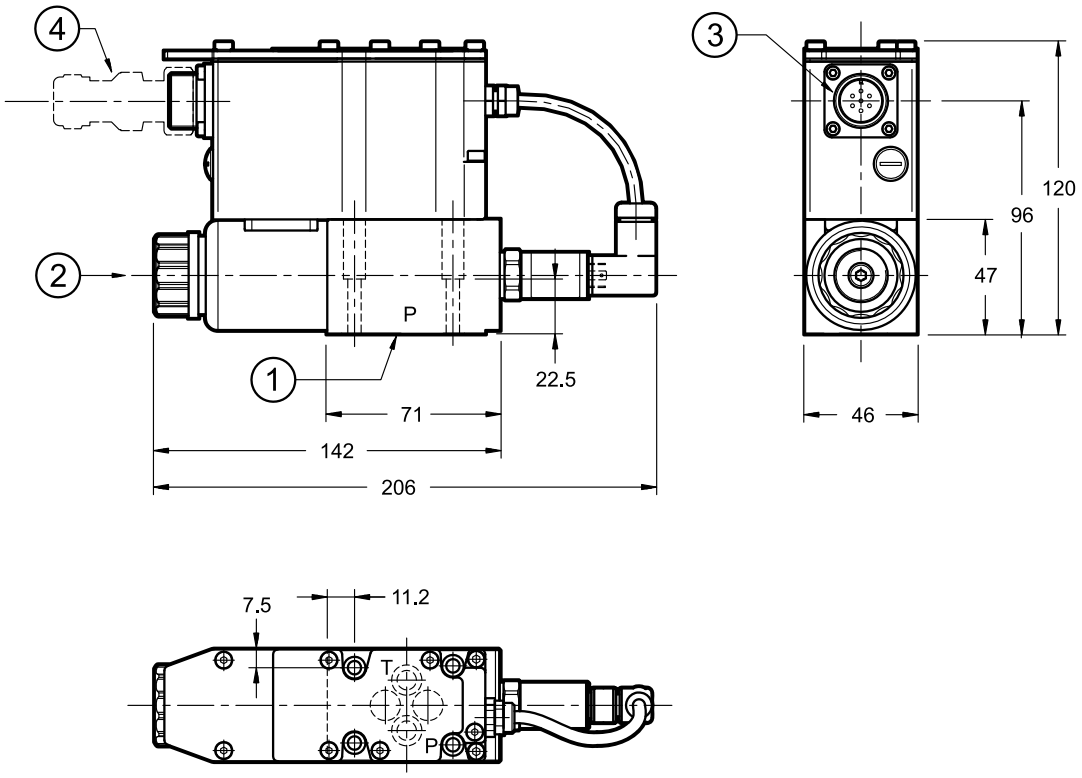
The table illustrates typical step response times measured with a PDE3J-210 and with an input flow rate of Q = 1 l/min and pressure oil volume of 0,1 litre.

The response time is affected both by the flow rate and the oil volume in the pipework.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	60	20

8 - PDE3J - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



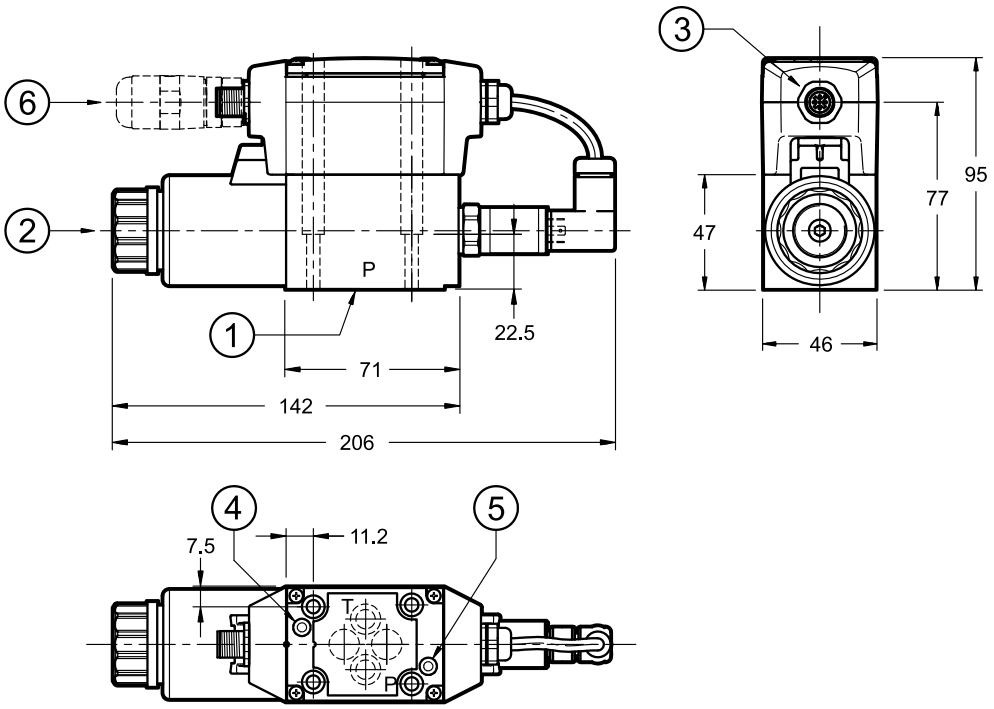
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

Fastening bolts: 4 SHC screws M5x30- ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) - 90 shore
2	Breather: Allen key 4
3	Main connection
4	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000 0

9 - PDE3JL - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



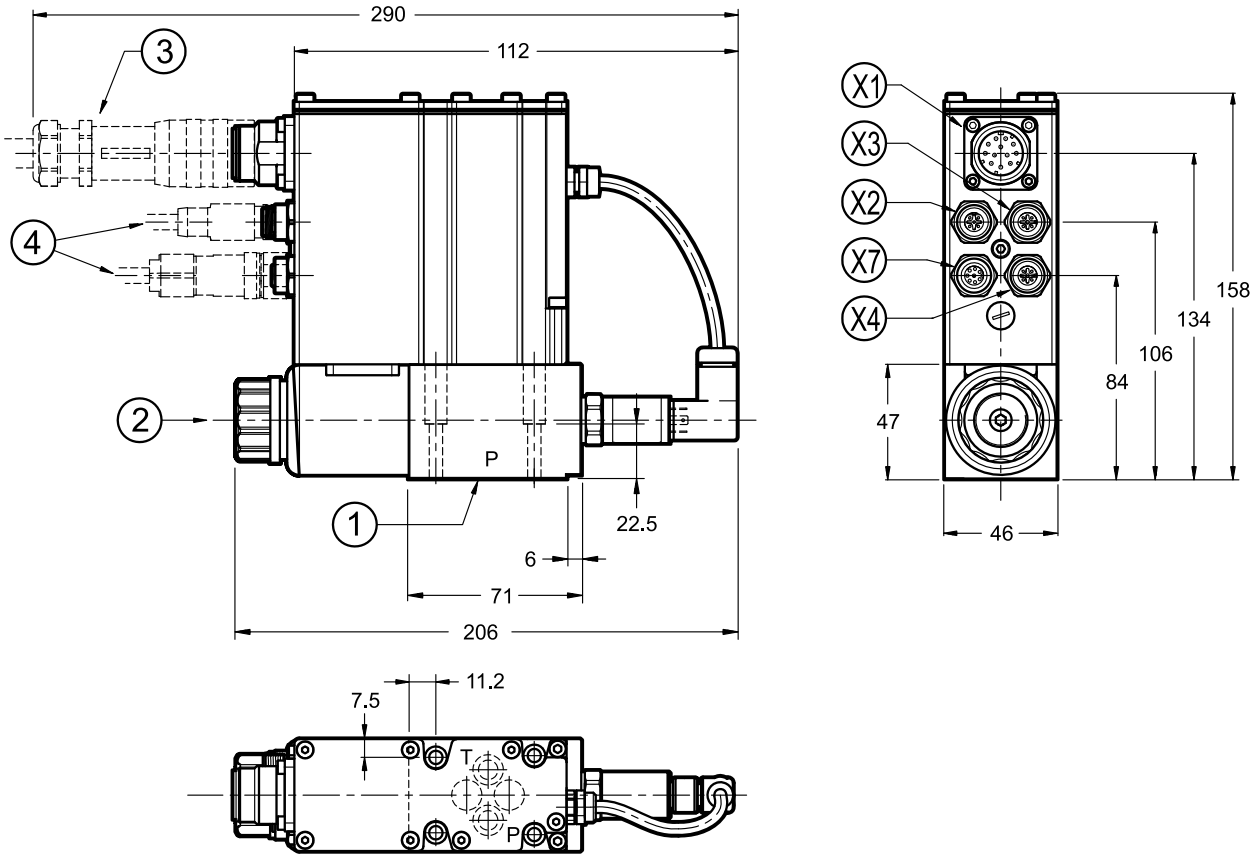
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

Fastening bolts: 4 SHC screws M5x30- ISO 4762	
Torque: 5 Nm (A8.8)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Connection M12 A 5 pin
4	L1 LED
5	L2 LED
6	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

10 - PDE3JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHC screws M5x30 ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

NOTE 2: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

12 - INSTALLATION

We recommend installing these valves with the solenoid downward, either in horizontal or vertical position. If the valve is installed on vertical axis with the solenoid upward, you should consider possible variations of the minimum controlled pressure from those indicated in paragraph 5.

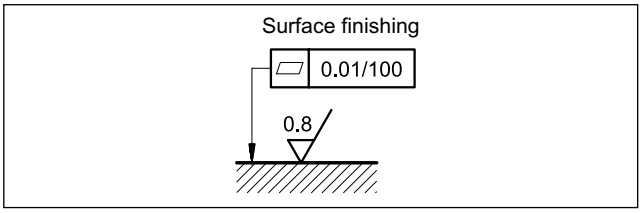
Ensure that there is no air in the hydraulic circuit. In certain applications it might be necessary to vent the air entrapped in the solenoid tube by unfastening the drain screw placed in the solenoid tube.

Ensure the solenoid tube is always filled with oil. Make sure the drain screw has been put back correctly at the end of the task. 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 leaks between the valve and support surface.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

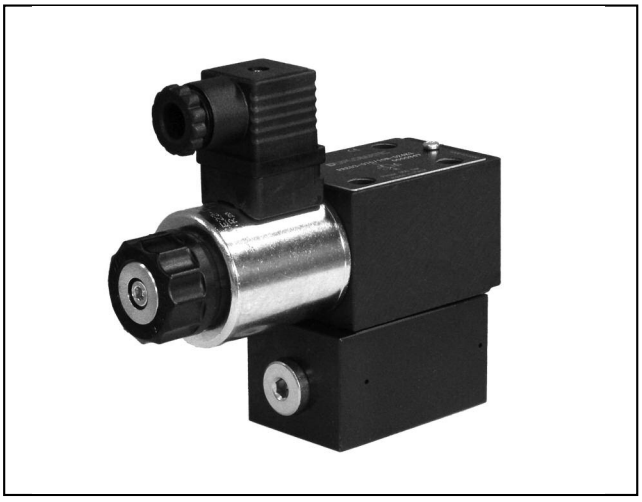
14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



PRE3

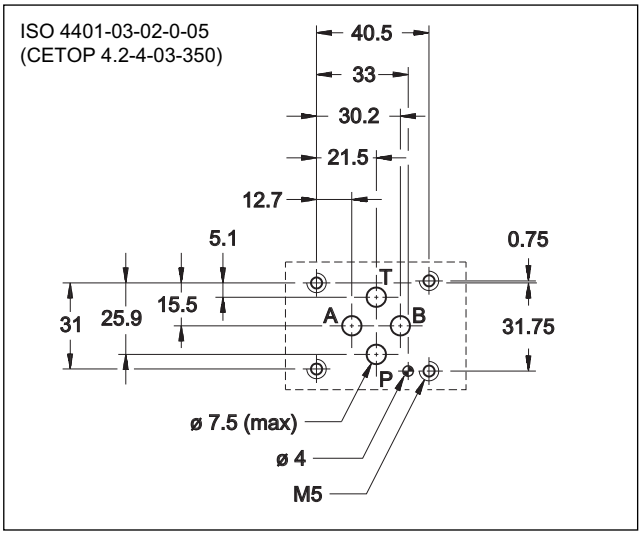
PILOT OPERATED PRESSURE CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROL

SERIES 20

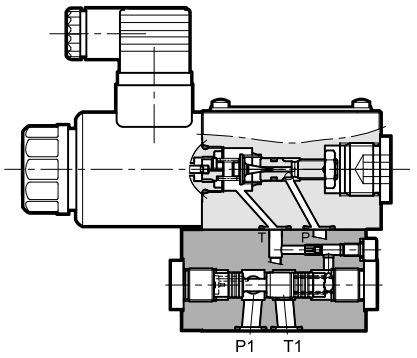
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The PRE3 is a pilot operated pressure control valve with electric proportional control and mounting interface in compliance with ISO 4401 standards.

— It is suitable to modulate the pressure in hydraulic circuits.

— The valve can be controlled directly by a current control supply unit or by an electronic control unit to exploit valve performance to the full (see at paragraph 9).

— The design of this valve has a mechanical pressure limitation feature for higher safety of the application.

— Five pressure control ranges up to 350 bar are available.

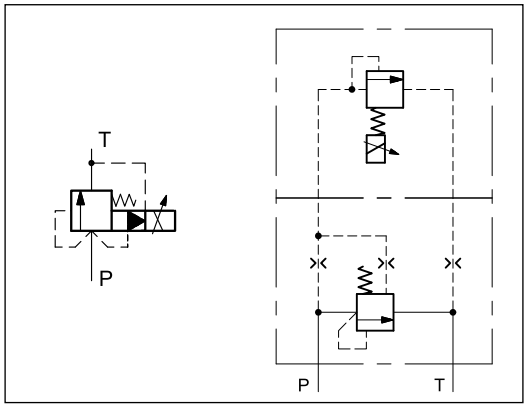
PERFORMANCES

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

Maximum operating pressure: - P port - T port	bar	 350 2
Minimum controlled pressure	see p min = f(Q) diagram	
Minimum flow Maximum flow (see graph p max= f(Q))	l/min	2 40
Step response	see paragraph 6	
Hysteresis (with PWM 200 Hz)	% of p nom	< 5%
Repeatability	% of p nom	< ±1,5%
Electrical characteristic	see paragraph 5	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	3,5

HYDRAULIC SYMBOL

simplified **detailed**



1 - IDENTIFICATION CODE

P	R	E	3	-		/	20		-		K1

Pressure control valve, pilot operated

Electrical proportional control

Size ISO 4401-03

Pressure control range
025 = 4 - 25 bar
070 = 4 - 70 bar
140 = 4 - 140 bar
210 = 5 - 210 bar
350 = 5 - 350 bar

Series No.
(the overall and mounting dimensions remain unchanged from 20 to 29)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Coil electrical connection:
for connector type EN 175301-803
(ex DIN 43650) (**standard**)

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

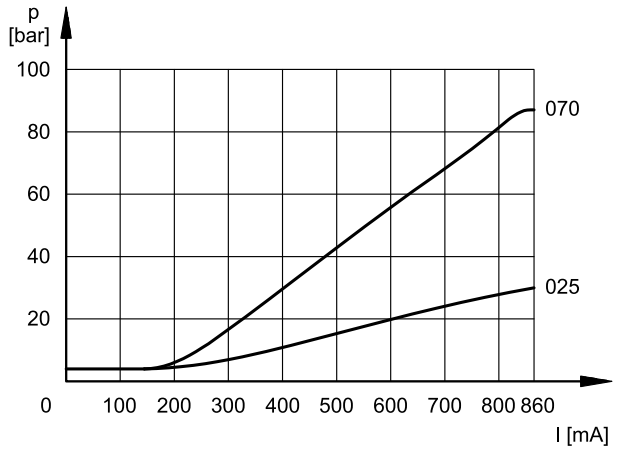
2 - CHARACTERISTIC CURVES

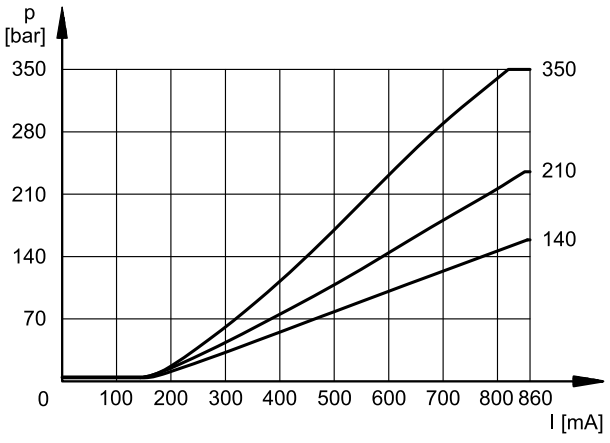
(measured with viscosity of 36 cSt at 50°C)

Typical control curves according to the current supplied to the solenoid (D24 version with maximum current 860 mA) for the available pressure control ranges, measured with input flow rate Q = 10 l/min. Curves have been obtained without any hysteresis and linearity compensation and they have been measured without any backpressure in T.

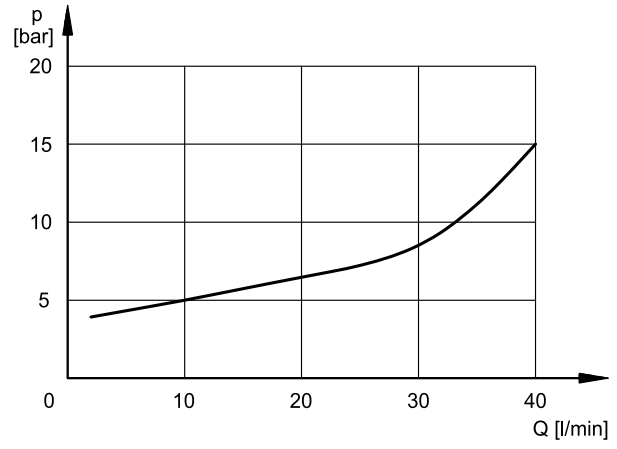
The full scale pressure is set in factory with a flow rate of 10 l/min. In case of higher flow rate, the full scale pressure will increase (see diagram pmax = f (Q)).

PRESSURE CONTROL p = f (I)

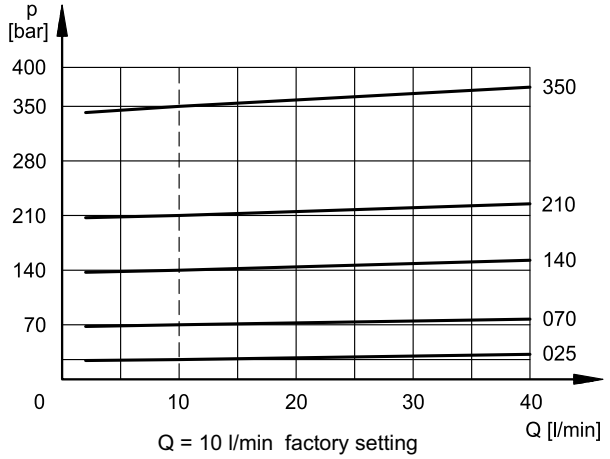




MINIMUM CONTROLLED PRESSURE pmin = f (Q)



PRESSURE VARIATION pmax = f (Q)



Q = 10 l/min factory setting

3 - MAX PRESSURE VALUES

This valve incorporates a mechanical limit of the maximum pressure, that operates independently of the applied current. This kind of design ensures the pressure cannot rise over even if the solenoid current exceeds the maximum current ($I > I_{max}$).

Values obtained with oil viscosity of 36 cSt at 50°C, Q = 10 l/min

		PRE3-025	PRE3-070	PRE3-140	PRE3-210	PRE3-350
pressure value at 800 mA	bar	28	82	145	215	335
max pressure value when $I > I_{max}$	bar	30	86	155	230	350

4 - 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 fluid types 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
MAXIMUM CURRENT	A	1.88	0.86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
PROTECTION FROM ATMOSPHERIC AGENTS (IEC 60529)	IP65		
CLASS OF PROTECTION Coil insulation (VDE 0580) Impregnation	class H class F		

6 - 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 PRE3-210 and with input flow rate Q = 10 l/min, and a pressure oil volume of 1 litre. The response time is affected by both the flow rate and the oil volume inside the piping.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	80	40

7 - INSTALLATION

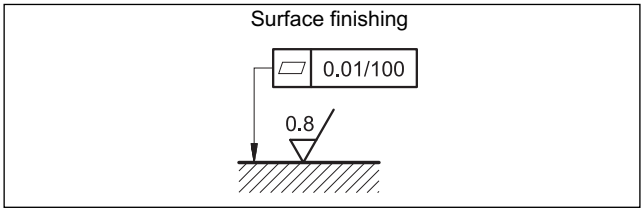
We recommend to install the PRE3 valve either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated in paragraph 2.

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

Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the controlled pressure value.

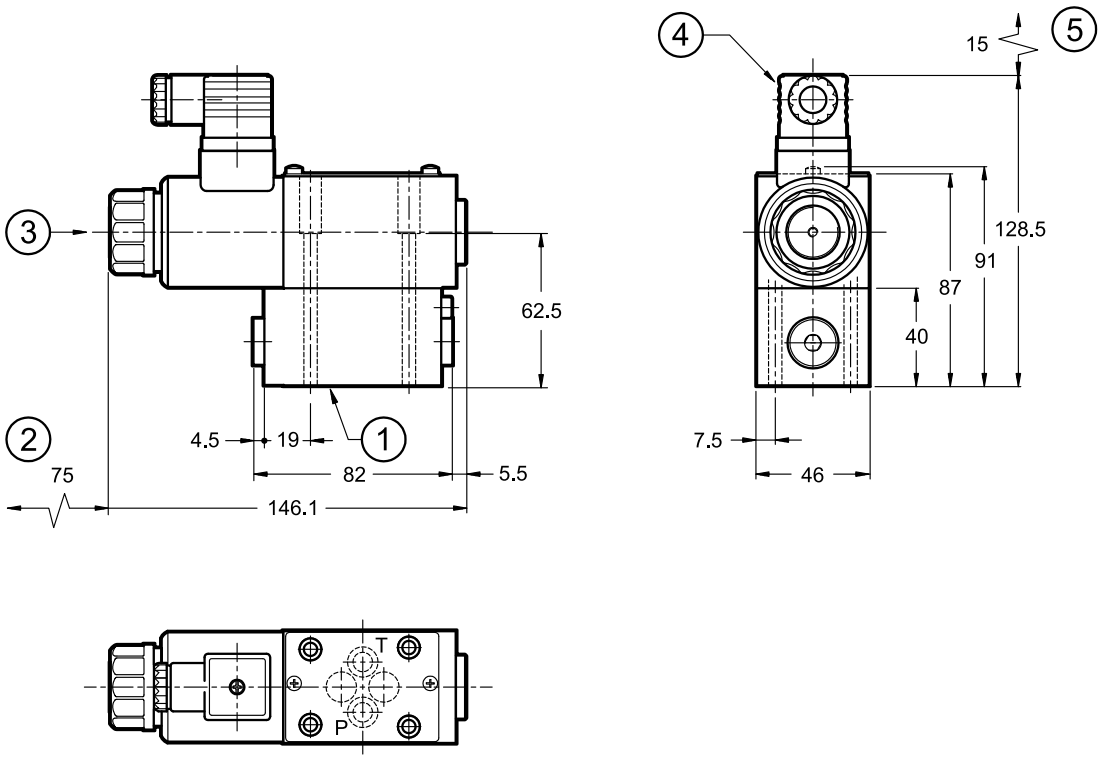
Maximum admissible backpressure in the T line, under operational conditions, is 2 bar.

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.



8 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (3) placed at the end of the solenoid tube.

Fastening bolts: 4 SHC screws M5x70 - ISO 4762	
Torque: 5 Nm (A8.8)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) - 90 shore
2	Coil removal space
3	Breather (male hexagonal spanner 4)
4	EN 175301-803 (ex DIN 43650) connector (included in the delivery)
5	Connector removal space

9 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see catalogue 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see catalogue 89 251
EDM-M142	for solenoid 12V DC		

10 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions P, T, A and B: 3/8” BSP thread

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

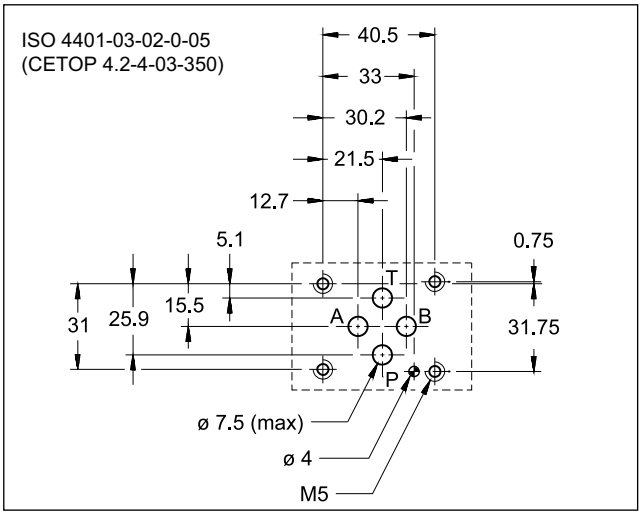
PRE3G*

PILOT OPERATED PRESSURE CONTROL VALVE WITH PROPORTIONAL CONTROL AND INTEGRAL ELECTRONICS

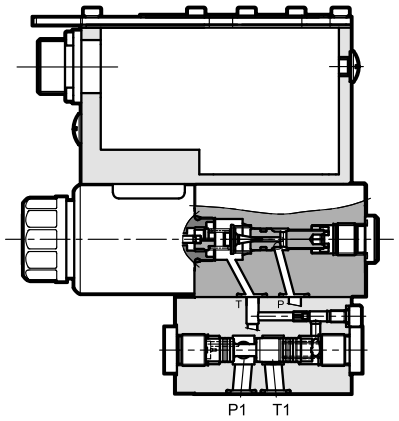
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The PRE3G* valve is a pilot operated pressure control valve with electric proportional control and mounting surface in compliance with ISO 4401 standards, controlled by an integral digital amplifier.

— It is suitable to modulate the pressure in hydraulic circuits.

— It is available with different types of electronics, with analogue or fieldbus interfaces.

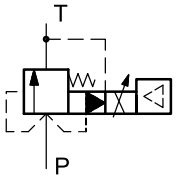
— Valves are easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

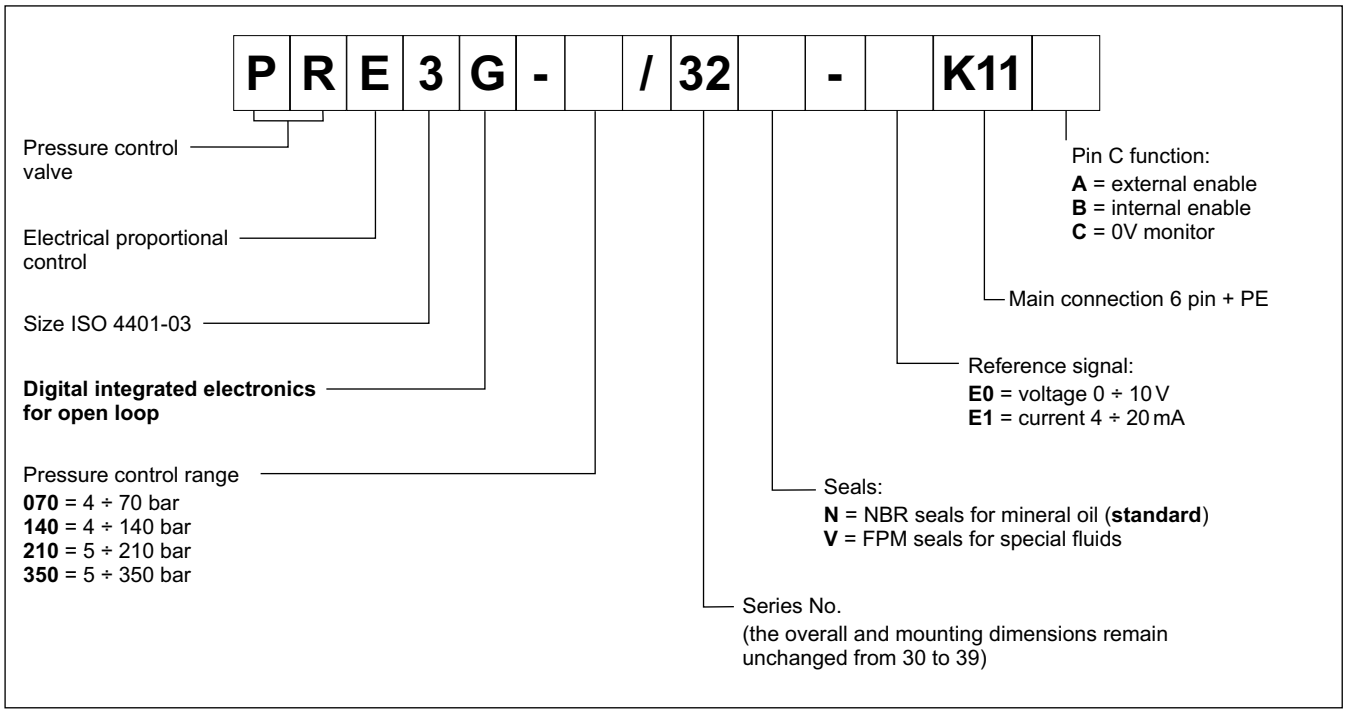
Maximum operating pressure: - P port - T port	bar	 350 2
Minimum controlled pressure	see p min= f(Q) diagram	
Minimum flow Maximum flow (see p max = f(Q) diagram)	l/min	2 40
Step response	see paragraph 7	
Hysteresis	% of p nom	< 3%
Repeatability	% of p nom	< ±1%
Electrical characteristic	see paragraph 2	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	3.8

HYDRAULIC SYMBOL

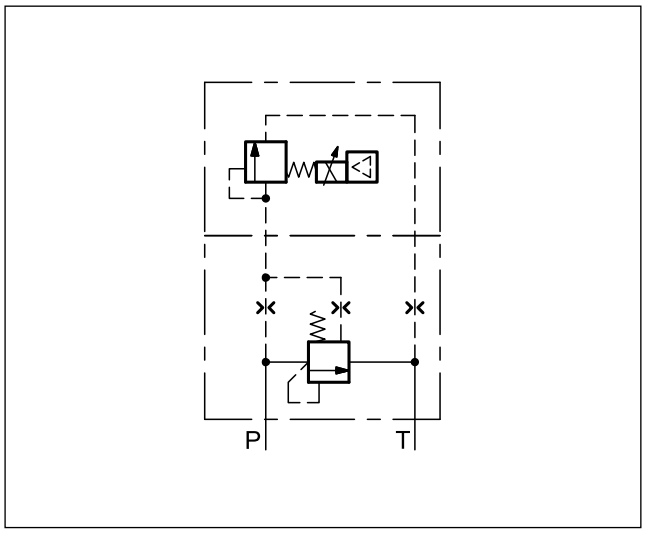


1 - IDENTIFICATION CODE

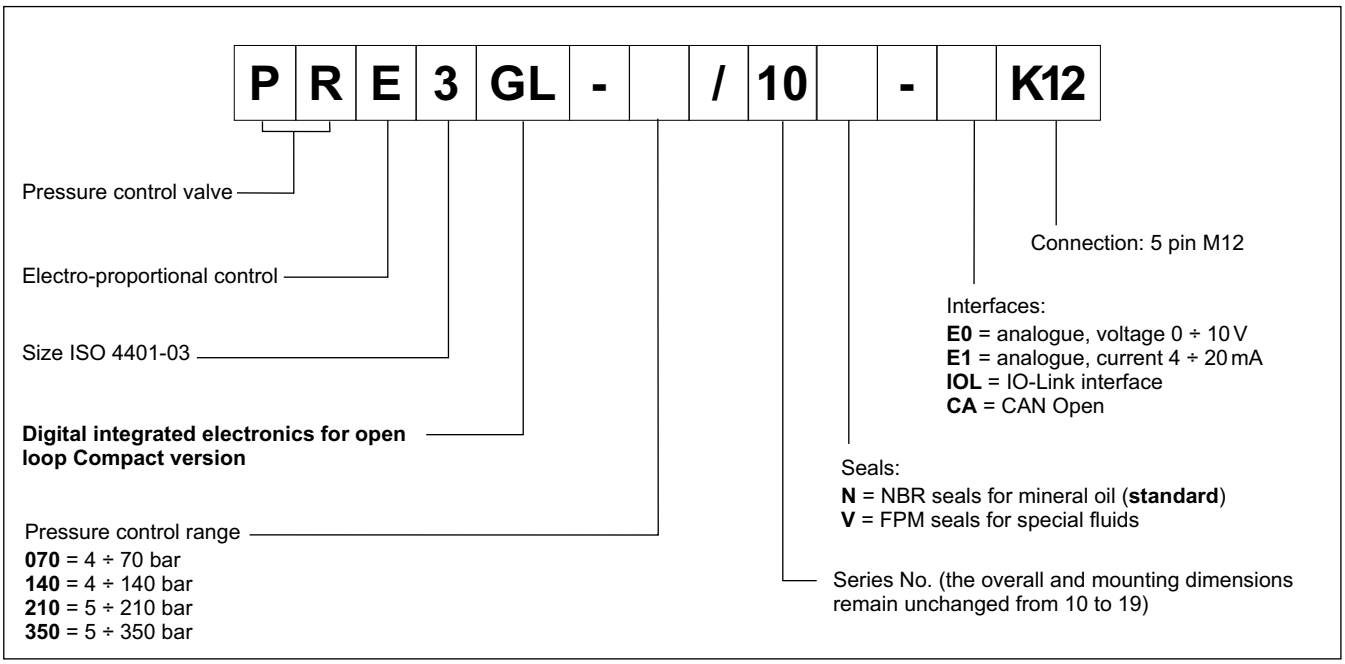
1.1 - Standard electronics



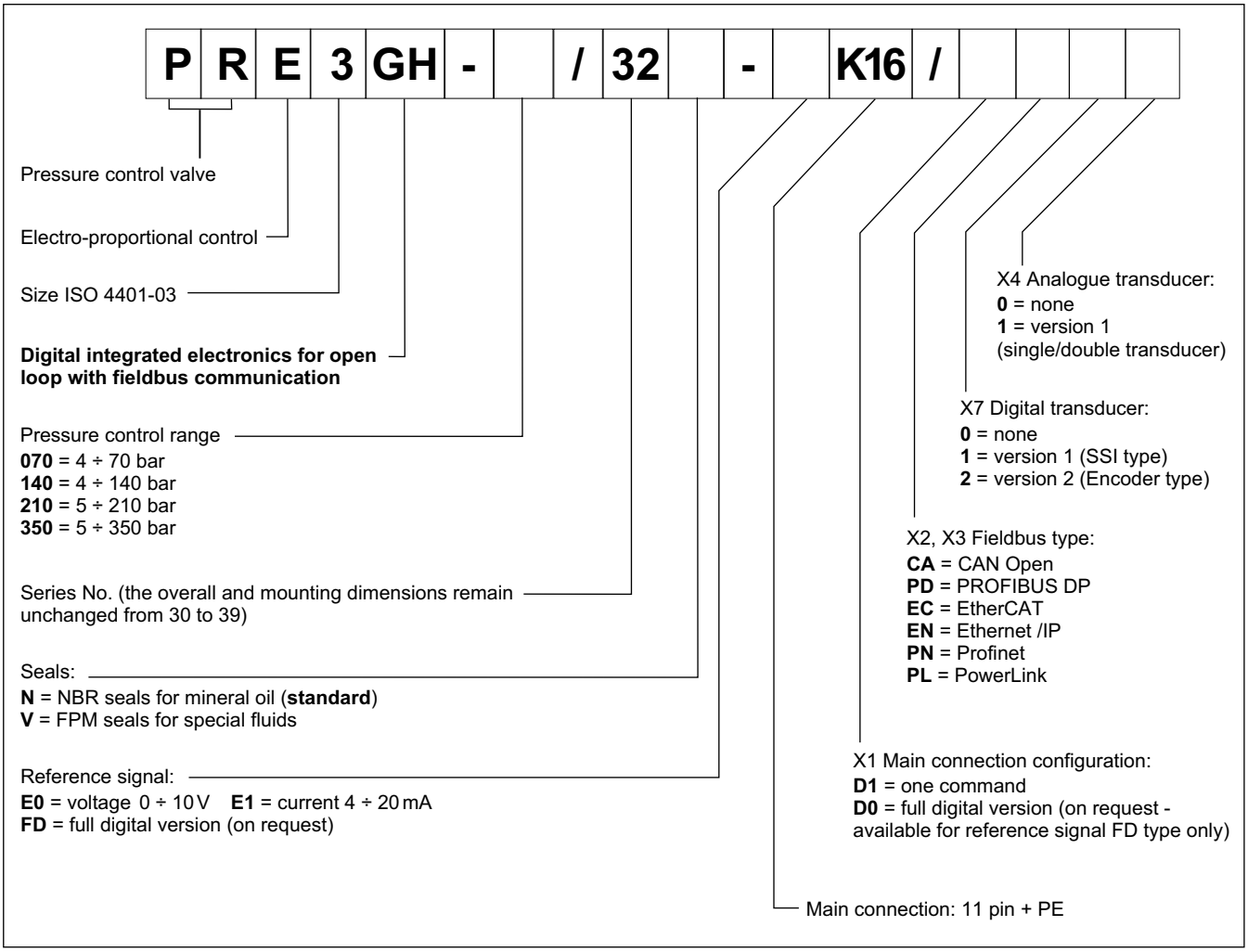
1.2 - Detailed symbol



1.3 - Compact electronics



1.4 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

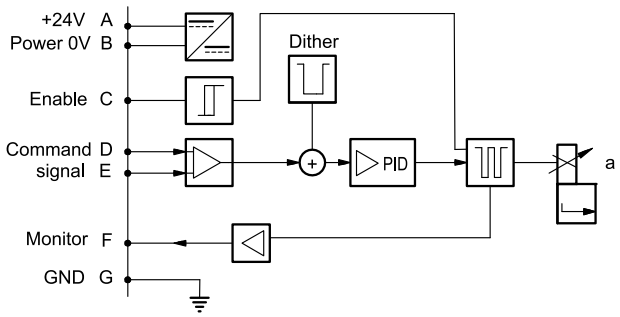
3 - PRE3G - STANDARD ELECTRONICS

3.1 - Electrical characteristics

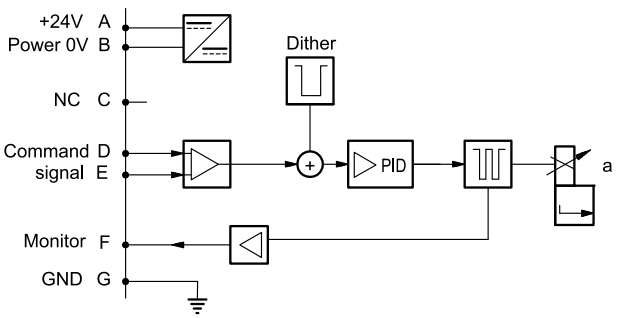
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

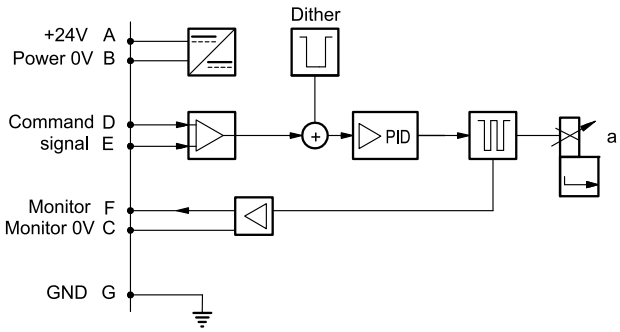
VERSION A - External Enable



VERSION B - Internal Enable

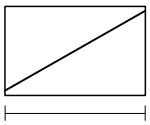


VERSION C - 0V Monitor

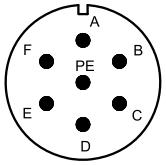


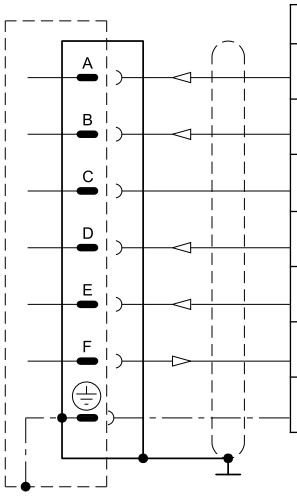
3.3 - Versions with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



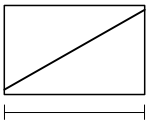


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

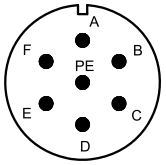
3.4 - Versions with current command (E1)

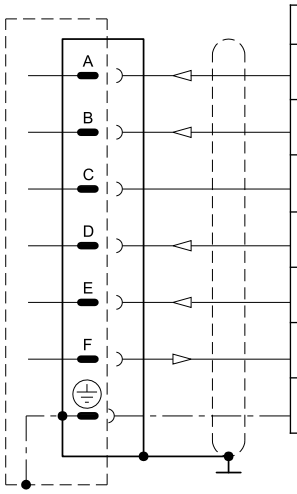
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - PRE3GL - COMPACT ELECTRONICS

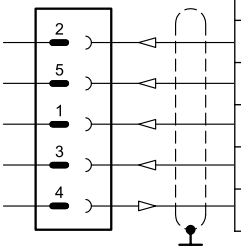
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	kbit	10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

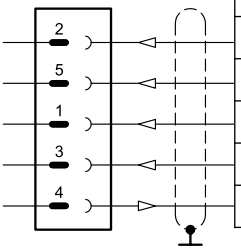
4.2 - Pin tables

'E0' connection



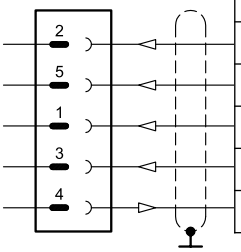
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



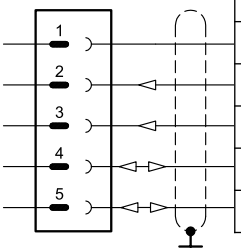
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0V (GND)	
4	C/Q		IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - PRE3GH - FIELDBUS ELECTRONICS

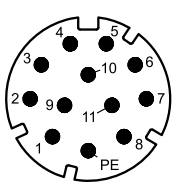
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

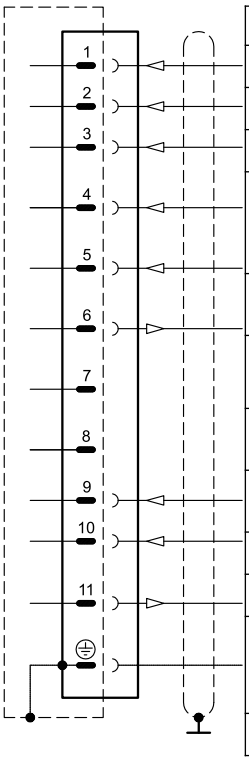
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

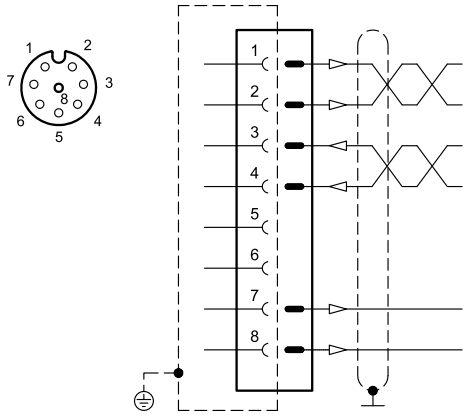
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

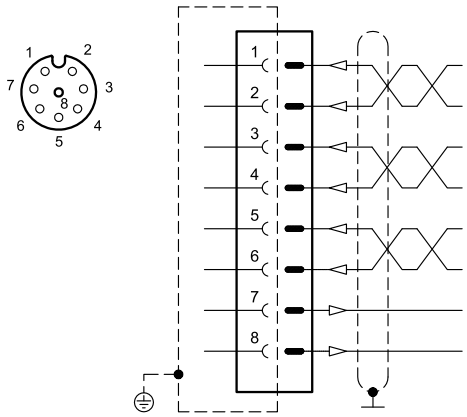
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



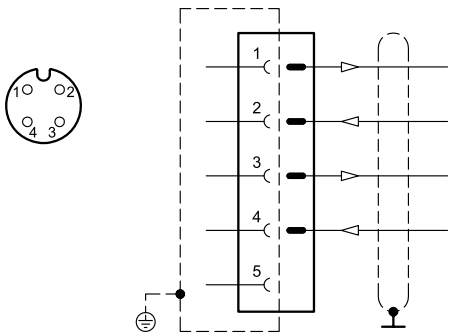
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

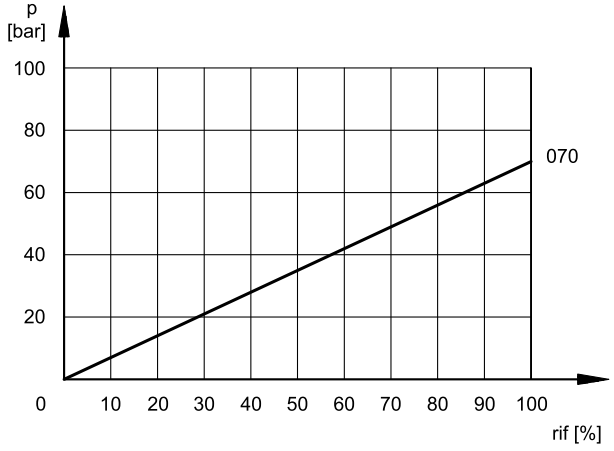
6 - CHARACTERISTIC CURVES

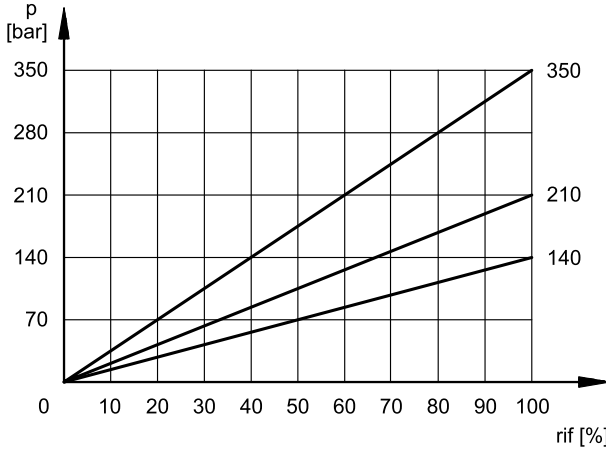
(measured with viscosity of 36 cSt at 50°C)

Typical control characteristics, according to the reference signal for available pressure control ranges, measured with input flow rate Q = 10 l/min. Characteristic curves measured without backpressure in T, with linearity compensation set by the onboard electronics.

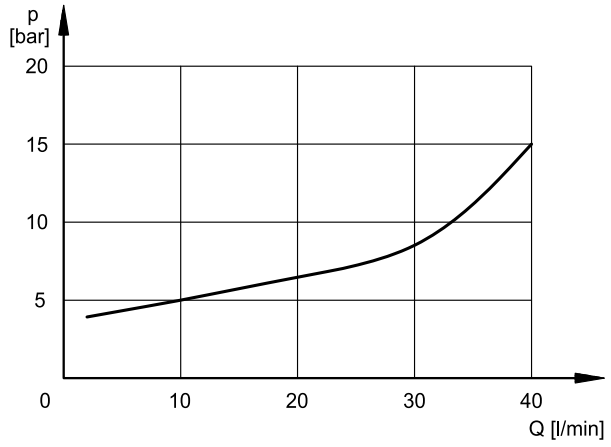
The full scale pressure is set in factory with a flow rate of 10 l/min. In case of higher flow rate, the full scale pressure will increase (see diagram p max = f (Q)).

PRESSURE CONTROL p = f (I)

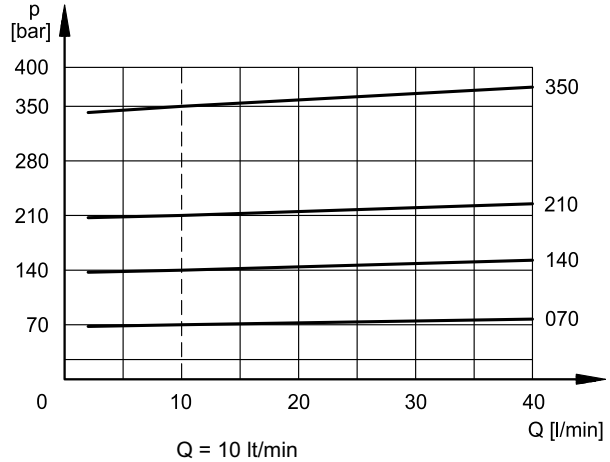




MINIMUM CONTROLLED PRESSURE p min = f (Q)



PRESSURE VARIATION p max = f (Q)



Q = 10 lt/min
factory setting

7 - 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.

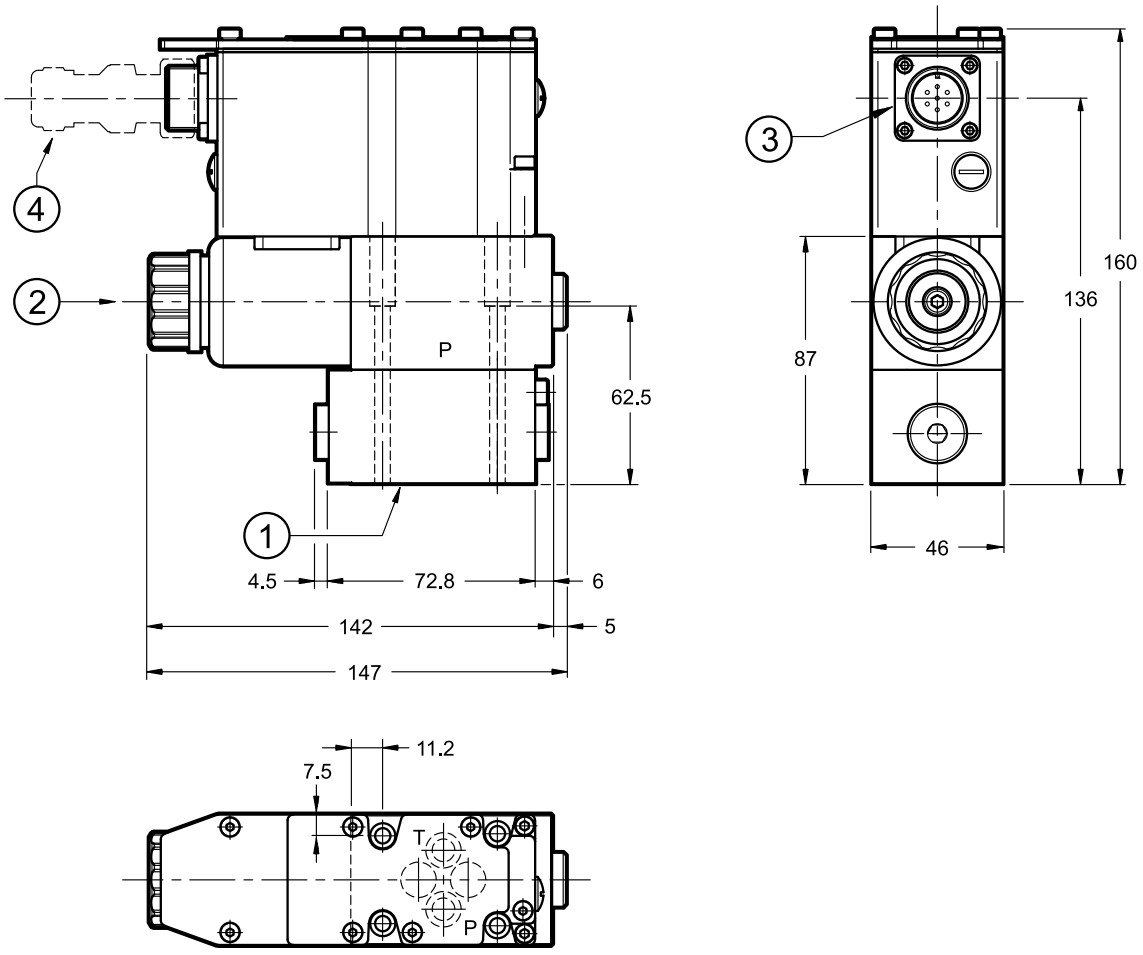
The table illustrates typical step response times measured with a PRE3G-210 and with an input flow rate of Q = 10 l/min and pressure oil volume of 0,1 litre.

The response time is affected both by the flow rate and the oil volume in the pipework.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	80	40

8 - PRE3G - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

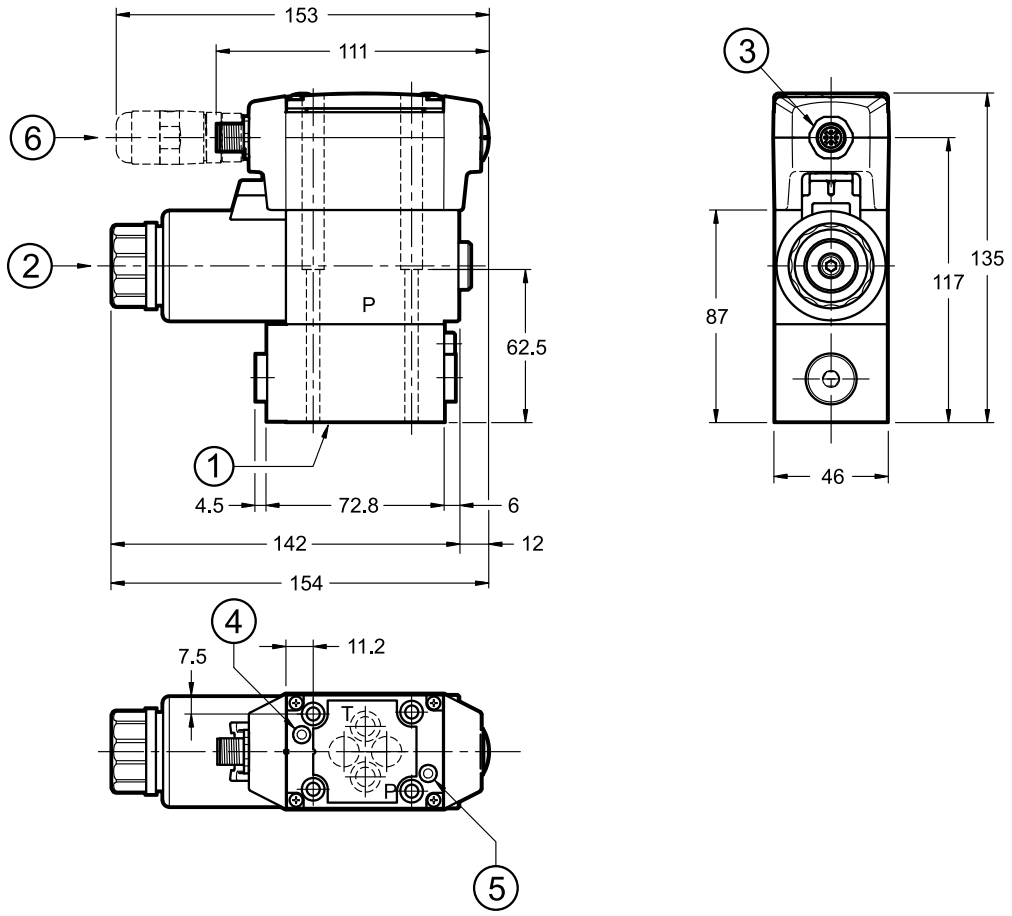


NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of

Fastening bolts: 4 SHC screws M5x70 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25 x 1.78)
2	Breather: Allen key 4
3	Main connection 6 pin + PE
4	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000

9 - PRE3GL - OVERALL AND MOUNTING DIMENSIONS



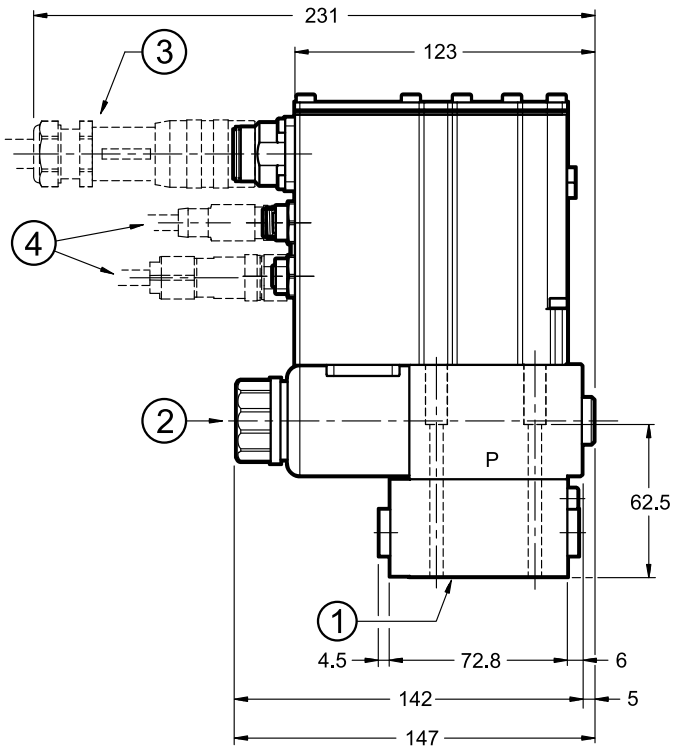
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

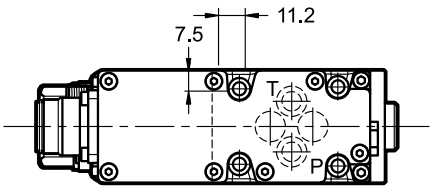
Fastening bolts: 4 bolts M5x70- ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

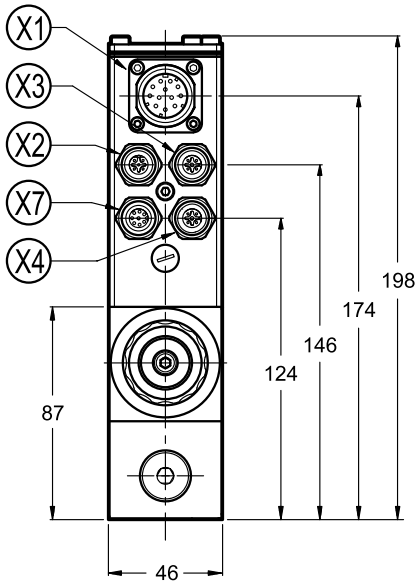
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Connection M12 A 5 pin
4	L1 LED
5	L2 LED
6	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

10 - PRE3GH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm







X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

Fastening bolts: 4 bolts M5x70 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

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 (2) placed at the end of the solenoid tube.

NOTE 2: Depending on the chosen version, X4 and X7 connections may not be present.

Please refer to section 5 for connection descriptions and pinout.

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

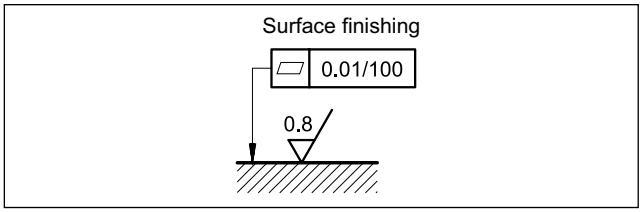
12 - INSTALLATION

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 section 6.

Ensure that there is no air in the hydraulic circuit. In particular applications, can be necessary to vent the air entrapped in the solenoid tube, by using the appropriate drain screw in the solenoid tube. So, ensure the solenoid tube is always filled with oil. When finished, make sure you have screwed the screw back in 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.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions P, T, A, B: 3/8” BSP thread

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

PRE*

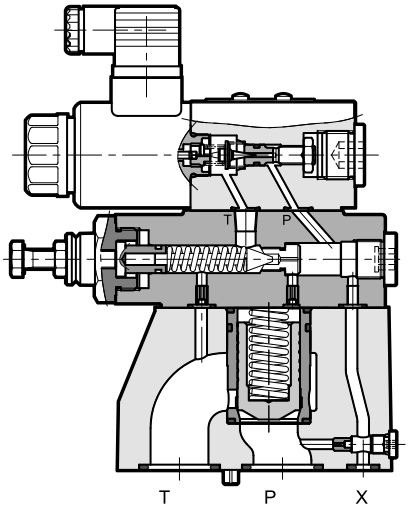
PROPORTIONAL PRESSURE RELIEF VALVES, PILOT OPERATED

SERIES 20

SUBPLATE MOUNTING ISO 6264

p max **350** bar
Q max (see table of performances)

OPERATING PRINCIPLE



— PRE* valves are pilot operated pressure relief valves with electric proportional control and mounting interface in compliance with ISO 6264 standards.

— These valves are used to control hydraulic circuit pressure and to enable the use of the full flow rate of the pump, even with settings approach the calibration value.

— The two-stage design and wide passages ensure reduced pressure drops thereby improving the system energy performance.

— The design of these valves has a mechanical pressure limitation feature inside the pilot stage, for higher safety of the application.

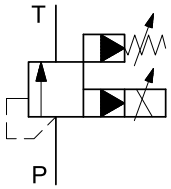
— Valves can be controlled directly by a current control supply unit or by means of an electronic control unit, to exploit valve performance to the full (see par. 11).

— They are fitted with a manual pressure relief valve which is factory set to ≥ 15% of the maximum value in the pressure control range.

— They are available in three sizes for flow rates up to 500 l/min and in five pressure control ranges up to 350 bar.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)		**PRE10**	**PRE25**	**PRE32**
Maximum operating pressure:	bar	350		
Minimum controlled pressure		see Δp-Q diagram		
Maximum flow	l/min	200	400	500
Step response		see paragraph 6		
Hysteresis (PWM 200 Hz)	% of p nom	< 5%		
Repeatability	% of p nom	< ±1,5%		
Electrical characteristic		see paragraph 5		
Ambient temperature range	°C	-20 / +60		
Fluid temperature range	°C	-20 / +80		
Fluid viscosity range	cSt	10 ÷ 400		
Fluid contamination degree		According to ISO 4406:1999 class 18/16/13		
Recommended viscosity	cSt	25		
Mass:	kg	5	5,8	8

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

P	R	E		-		/	20		-		K1

Pilot operated pressure relief valve

Electric proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Pressure control range:
025 = up to 25 bar
070 = up to 70 bar
140 = up to 140 bar
210 = up to 210 bar
350 = up to 350 bar

Series No.
(from 20 to 29 sizes and mounting dimensions remain unchanged)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

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

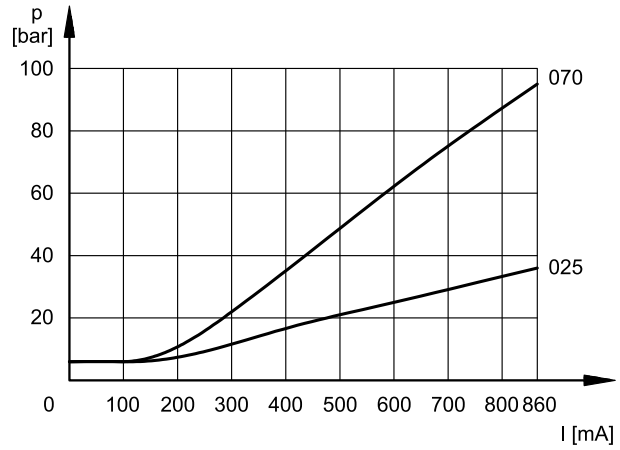
Coil electrical connection:
plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)

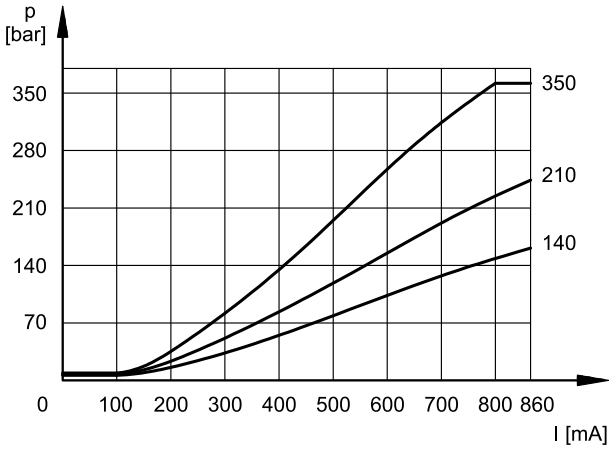
2 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

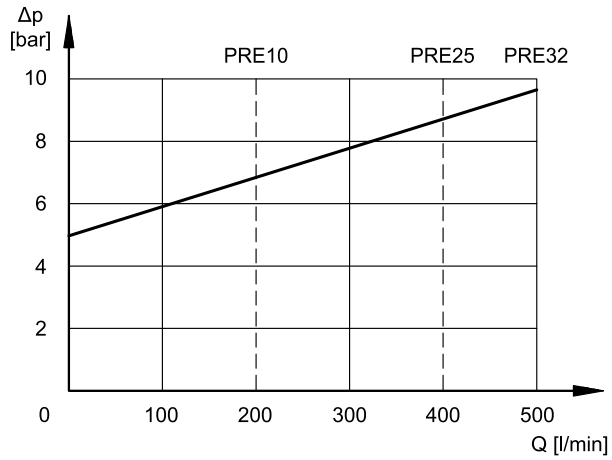
Typical control curves according to the current supplied to the solenoid (D24 version with maximum current 860 mA) for the available pressure control ranges, measured with input flow rate Q = 50 l/min. Curves have been obtained without any hysteresis and linearity compensation and they have been measured without any backpressure in T.

PRESSURE CONTROL p = f (I)

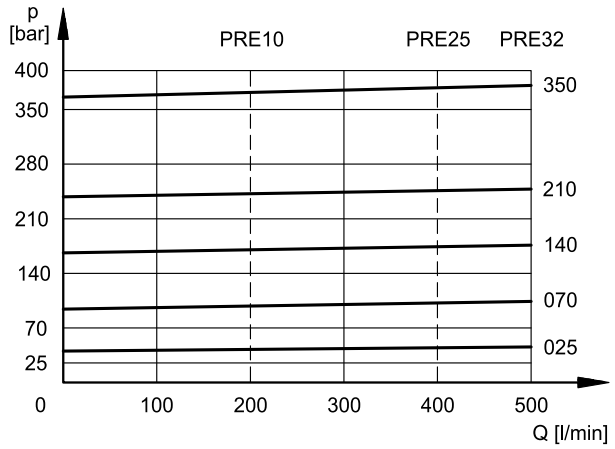




MINIMUM CONTROLLED PRESSURE pmin = f (Q)



PRESSURE VARIATION pmax = f (Q))



3 - MAX PRESSURE VALUES

This valve incorporates a mechanical limit of the maximum pressure, that operates independently of the applied current. This kind of design ensures the pressure cannot rise over even if the solenoid current exceeds the maximum current ($I > I_{max}$).

Values obtained with oil viscosity of 36 cSt at 50°C, Q = 50 l/min

	PRE*-025	PRE*-070	PRE*-140	PRE*-210	PRE*-350
pressure value at 800 mA (bar)	27	85	147	220	365
max pressure value when $I > I_{max}$ (bar)	35	95	165	255	370

4 - 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
CLASS OF PROTECTION atmospheric agents (IEC 60529) coil insulation (VDE 0580) impregnation	IP 65 class H class F		

6 - 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 PRE32-210 and with input flow rate Q = 50 l/min, and a pressure oil volume of 2 litres. The response time is affected by both the flow rate and the oil volume inside the piping.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	120	90

7 - INSTALLATION

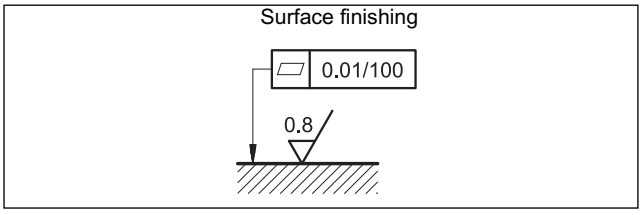
We recommend installing the PRE* valve either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated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

Ensure there is no air in the hydraulic circuit. In particular applications, it can be necessary to vent the air entrapped inside the solenoid tube, by using the apposite drain screw (see par. 8 - 9 - 10). 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.

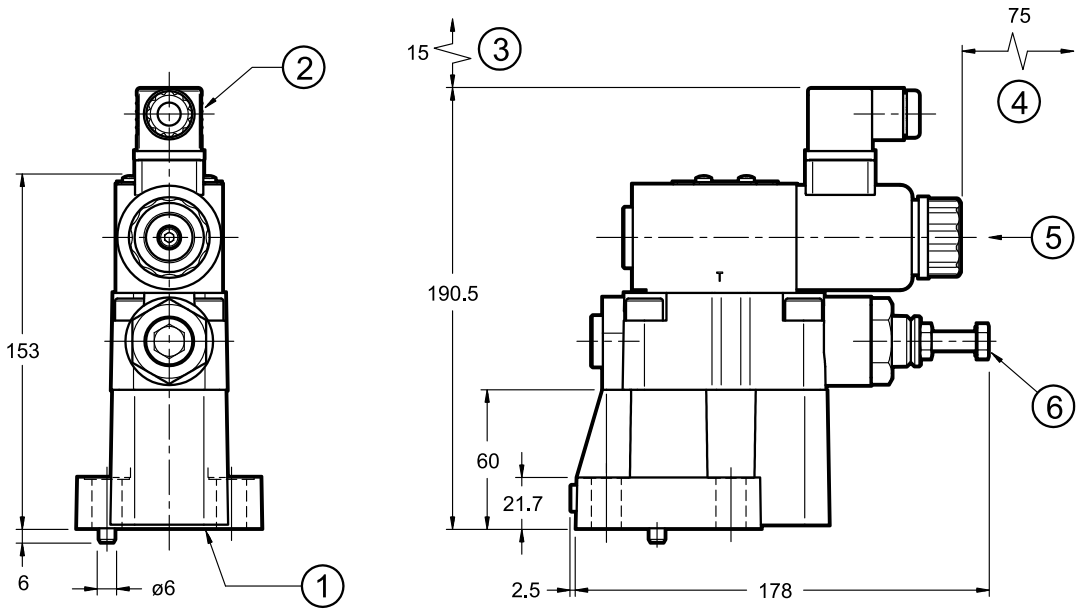
Maximum admissible backpressure in the T line, under operational conditions, is 2 bar.

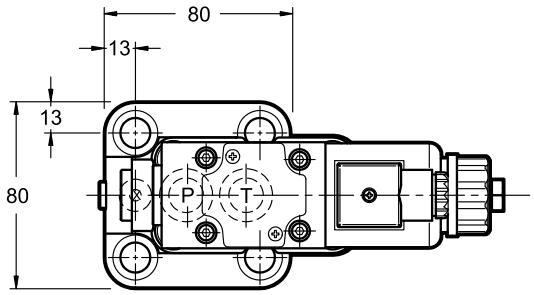
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



8 - PRE10 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

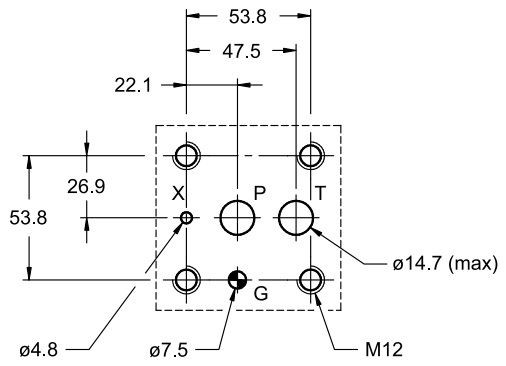




NOTE:
at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (5) placed at the end of the solenoid tube.

Fastening bolts: 4 SHCS M12x40 - ISO 4762
Torque: 69 Nm (A8.8 screws)
Thread of mounting holes: M12x20

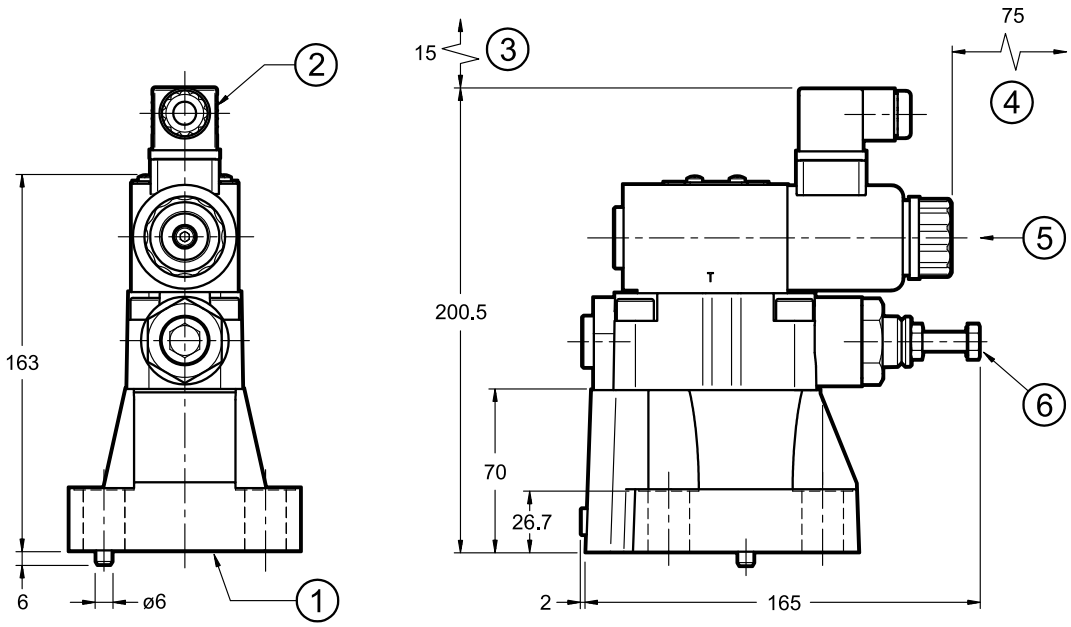
MOUNTING INTERFACE:
ISO 6264-06-09-*-97
(CETOP 4.4.2-2-R06-350)

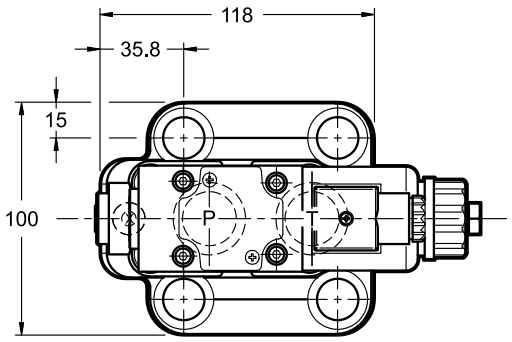


1	Mounting surface with sealing rings: 2 OR type 123 (17.86x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electric connector
3	Connector removal space
4	Coil removal space
5	Breather (male hexagonal spanner 4)
6	Pressure relief valve (factory set)

9 - PRE25 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

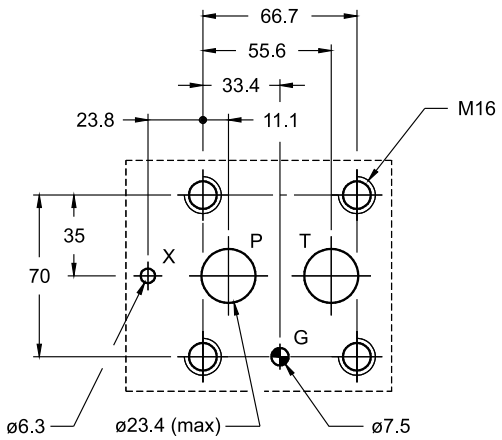




NOTE:
at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (5) placed at the end of the solenoid tube.

Fastening bolts: 4 SHCS M16x60 - ISO 4762
Torque: 170 Nm (A8.8 screws)
Thread of mounting holes: M16x25

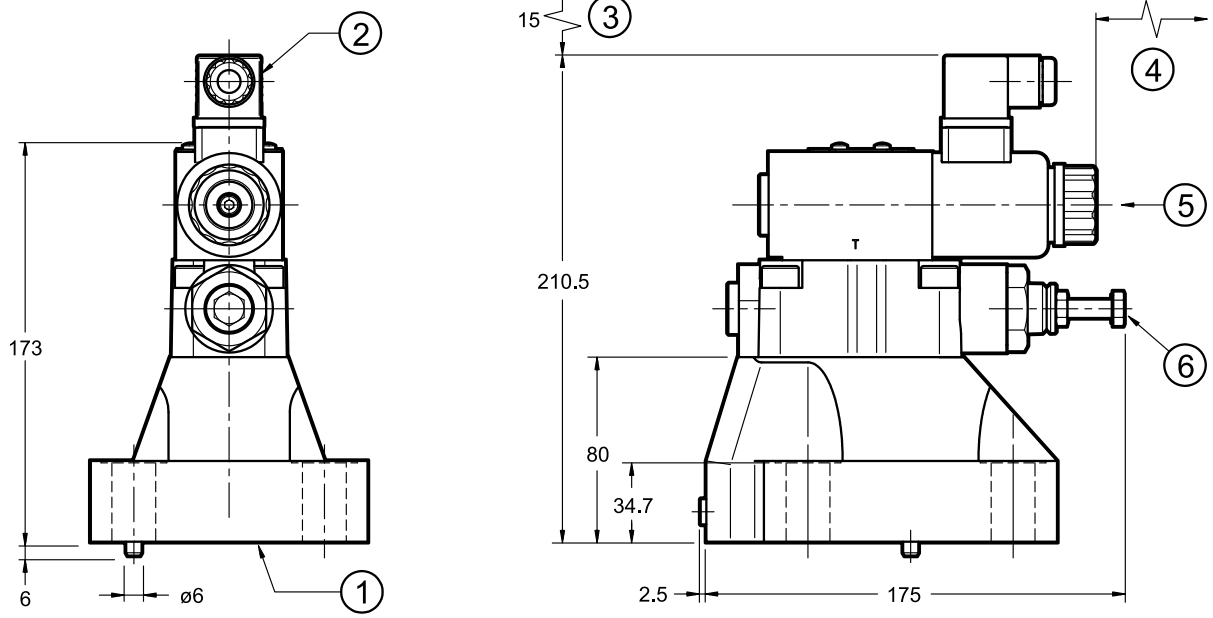
MOUNTING INTERFACE:
ISO 6264-08-13-*-97
(CETOP 4.4.2-2-R08-350)

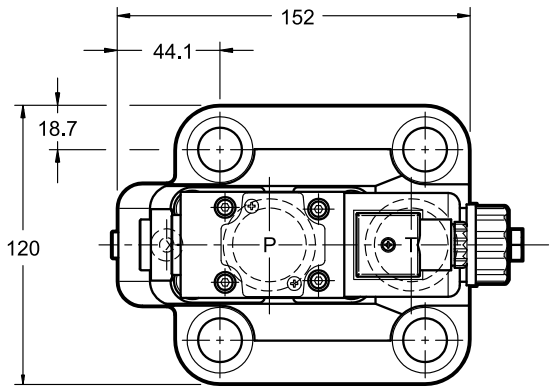


1	Mounting surface with sealing rings: 2 OR type 3118 (29.82x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	EN 175301-803 (ex DIN 43650) electric connector
3	Connector removal space
4	Coil removal space
5	Breather (male hexagonal spanner 4)
6	Pressure relief valve (factory set)

10 - PRE32 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

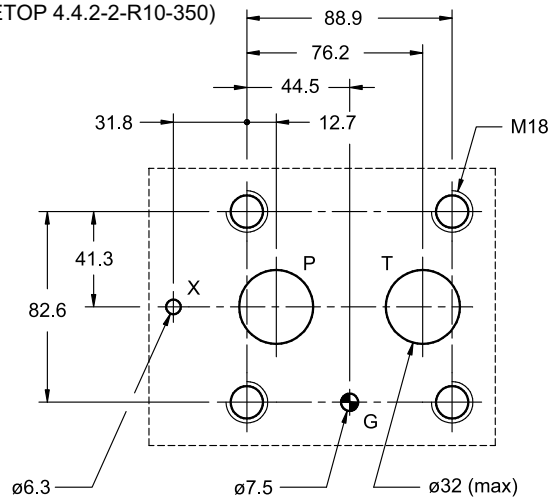




NOTE:
at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (5) placed at the end of the solenoid tube.

Fastening bolts: 4 SHCS M18x60 - ISO 4762
Torque: 235 Nm (A8.8 screws)
Thread of mounting holes: M18x27

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



1	Mounting surface with sealing rings: 2 OR type 4137 (34.52x3.53) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore)
2	EN 175301-803 (ex DIN 43650) electric connector
3	Connector removal space
4	Coil removal space
5	Breather (male hexagonal spanner 4)
6	Pressure relief valve (factory set)

11 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

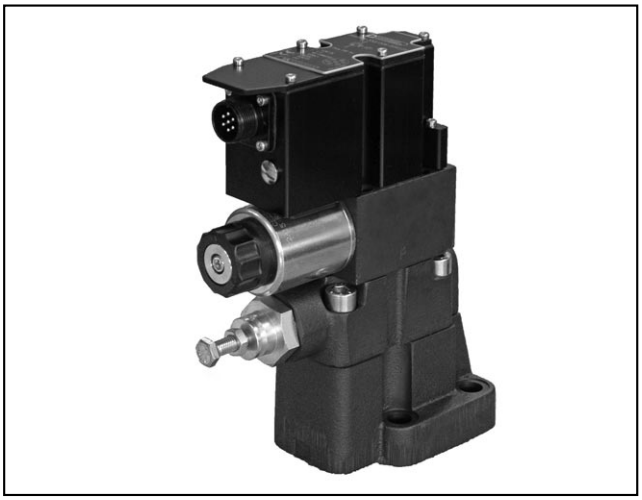
12 - SUBPLATES

(see catalogue 51 000)

	PRE10	**PRE25**	**PRE32**
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports
P, T ports dimensions	P: 1/2" BSP T: 3/4" BSP	1" BSP	1" ¼ BSP
X port dimensions	1/4" BSP	1/4" BSP	1/4" BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



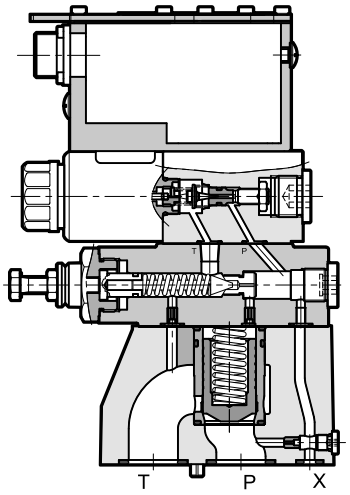
PRE*G*

PROPORTIONAL PRESSURE RELIEF VALVES, PILOT OPERATED, WITH INTEGRATED ELECTRONICS

SUBPLATE MOUNTING
ISO 6264

p max **350** bar
Q max (see table of performances)

OPERATING PRINCIPLE



— The PRE*G* valves are proportional pressure relief valves, pilot operated, with integrated electronics and mounting interface in compliance with ISO 6264 standards.

— These valves are used to control hydraulic circuit pressure and enable the use of the full flow rate of the pump, even with settings approaching calibrated values.

— The two-stage design and wide passages ensure reduced pressure drops thereby improving the system energy performance.

— They are fitted with a manual pressure relief valve which is factory set to ≥15% of the maximum value in the pressure control range.

— Valves are available with different types of electronics, with analogue or fieldbus interfaces.

— They are available in three sizes with flow rates up to 500 l/min and in four pressure control ranges up to 350 bar.

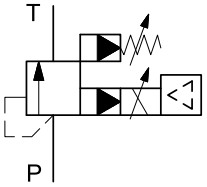
— The valves are easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

		PRE10G*	PRE25G*	PRE32G*
Maximum operating pressure	bar	350		
Maximum flow	l/min	200	400	500
Step response		see paragraph 8		
Hysteresis	% of p nom	< 3%		
Repeatability	% of p nom	< ±1%		
Electrical characteristic		see paragraph 3		
Ambient temperature range	°C	-20 / +60		
Fluid temperature range	°C	-20 / +80		
Fluid viscosity range	cSt	10 ÷ 400		
Fluid contamination degree		According to ISO 4406:1999 class 18/16/13		
Recommended viscosity	cSt	25		
Mass	kg	5.5	6.3	8.5

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 - Standard electronics

P	R	E		G	-		/	32		-		K11		

Pilot operated pressure relief valve

Electro-proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Standard electronics for pressure control in open loop

Pressure control range
070 = up to 70 bar **210** = up to 210 bar
140 = up to 140 bar **350** = up to 350 bar

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage 0 ÷ 10 V **E1** = current 4 ÷ 20 mA

Connection 6 pin + PE

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

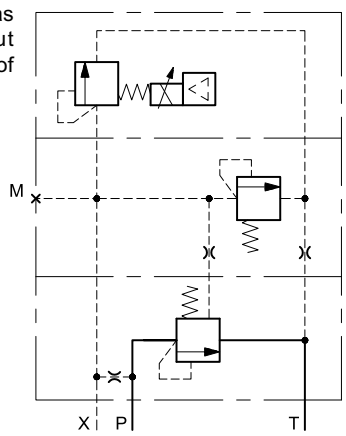
Option:
/ W7 = Zinc-nickel surface treatment
(see **NOTE**)
Omit if not required

NOTE: The standard valve is supplied with surface treatment of phosphating black on the valve body.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to 240 hours (test operated according to EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

1.2 - Detailed symbol

Port X is not intended as a pilot supply line, but exclusively as a signal of the input pressure .



1.3 - Compact electronics

P	R	E		GL	-		/	10		-		K12	

Pilot operated pressure relief valve

Electro-proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Digital integrated electronics for open loop compact box

Pressure control range
070 = up to 70 bar **210** = up to 210 bar
140 = up to 140 bar **350** = up to 350 bar

Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Interfaces:
E0 = analogue, voltage 0 ÷ 10 V
E1 = analogue, current 4 ÷ 20 mA
IOL = IO-Link interface
CA = CAN Open

Connection 5 pin M12

Option:
/ W7 = Zinc-nickel surface treatment
(see **NOTE** par. 1.1)
Omit if not required

1.4 - Electronics with fieldbus communication

P R E _ GH - _ / 32 _ - _ K16 _ / _ _ _ _

Pilot operated pressure relief valve

Electro-proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Digital integrated electronics for open loop with fieldbus communication

Pressure control range
070 = up to 70 bar
140 = up to 140 bar
210 = up to 210 bar
350 = up to 350 bar

Series No. (the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage 0 ÷ 10 V
E1 = current 4 ÷ 20 mA
FD = full digital version (on request)

Main connection 11 pin + PE

X1 Main connection configuration:
D1 = one command
D0 = full digital version (on request - available for reference signal FD type only)

X2, X3 Fieldbus type:
CA = CAN Open
PD = PROFIBUS DP
EC = EtherCAT
EN = Ethernet /IP
PN = Profinet
PL = PowerLink

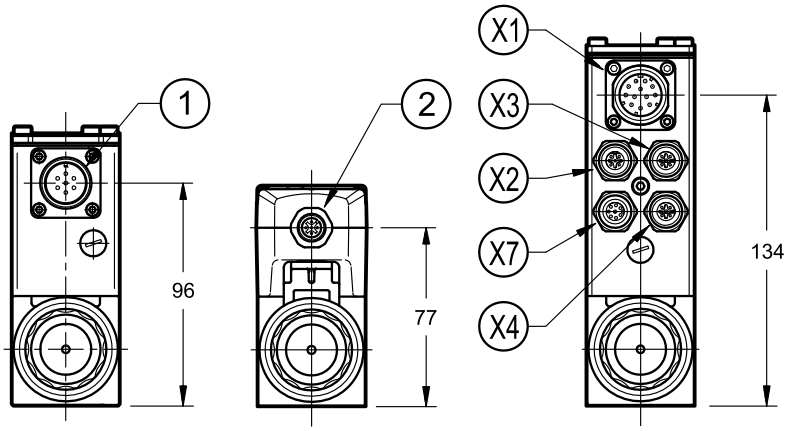
X7 Digital transducer:
0 = none
1 = version 1 (SSI type)
2 = version 2 (Encoder type)

X4 Analogue transducer:
0 = none
1 = version 1 (single/double transducer)

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE** par. 1.1)
Omit if not required

2 - COMPARISON AMONG INTEGRATED ELECTRONICS

G type **GL type** **GH type** dimensions in mm



1	Connection 6 pin + PE
2	Connection M12 5 pin, code A, male
X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	Connection for analogue transducer
X7	Connection for digital transducer

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present. Please refer to sections 4, 5 and 6 for connections descriptions and pinouts.
NOTE 2: Related mating connectors have to be ordered separately. See catalogue 89 000.

3 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

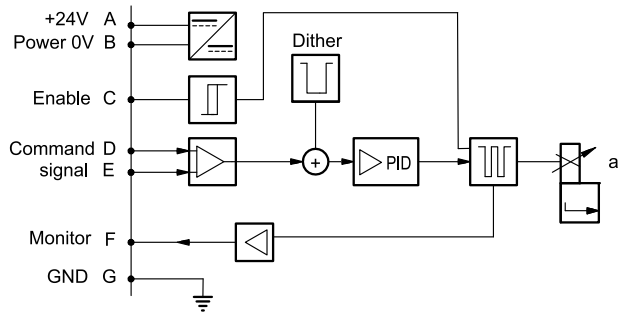
4 - PRE*G - STANDARD ELECTRONICS

4.1 - Electrical characteristics

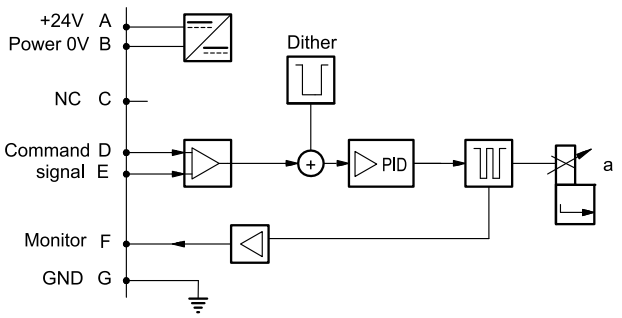
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

4.2 - On-board electronics diagrams

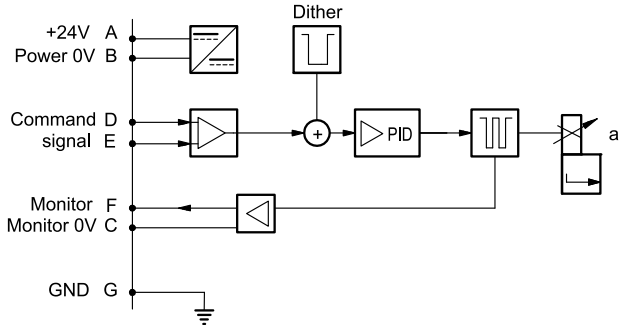
VERSION A - External Enable



VERSION B - Internal Enable

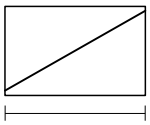


VERSION C - 0V Monitor

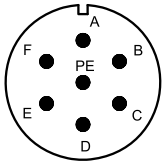


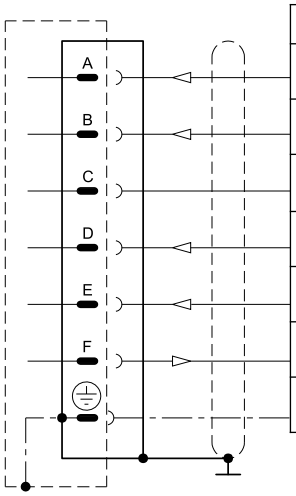
4.3 - Versions with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



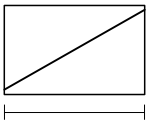


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

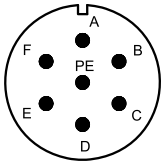
4.4 - Versions with current command (E1)

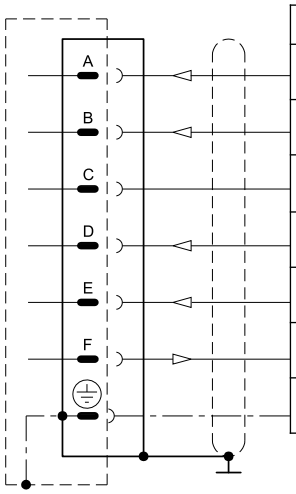
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

5 - PRE*GL - COMPACT ELECTRONICS

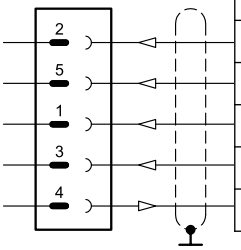
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	kbit	10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

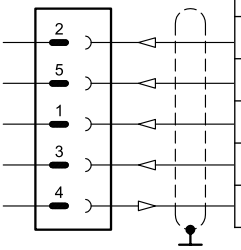
5.2 - Pin tables

'E0' connection



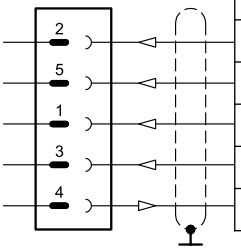
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



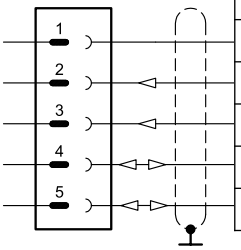
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0V (GND)	
4	C/Q		IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

6 - PRE*GH - FIELDBUS ELECTRONICS

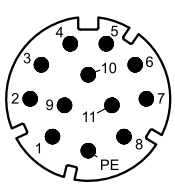
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

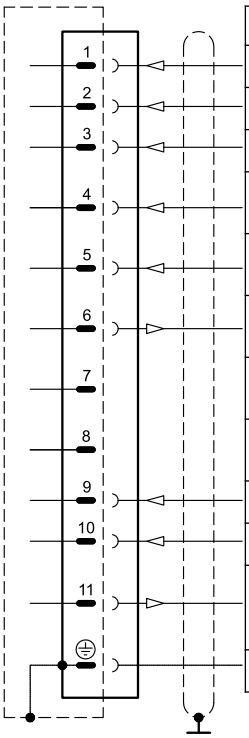
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 4.3 and 4.4.

6.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

6.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

6.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

6.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

6.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

6.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

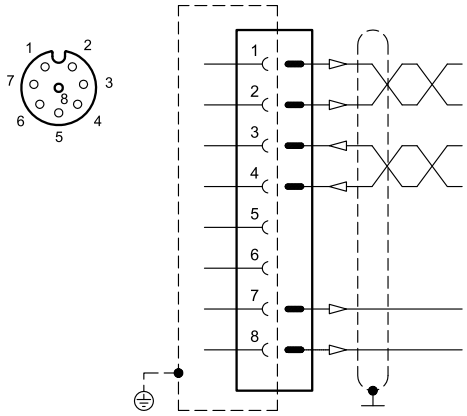
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

6.4 - Digital transducer connection

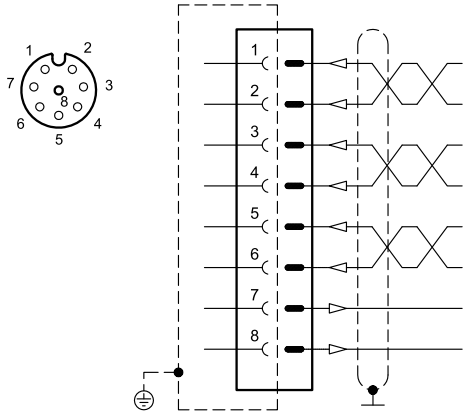
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



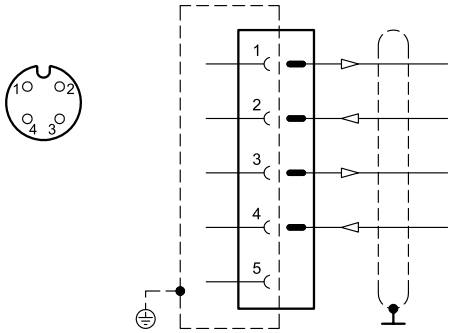
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

6.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



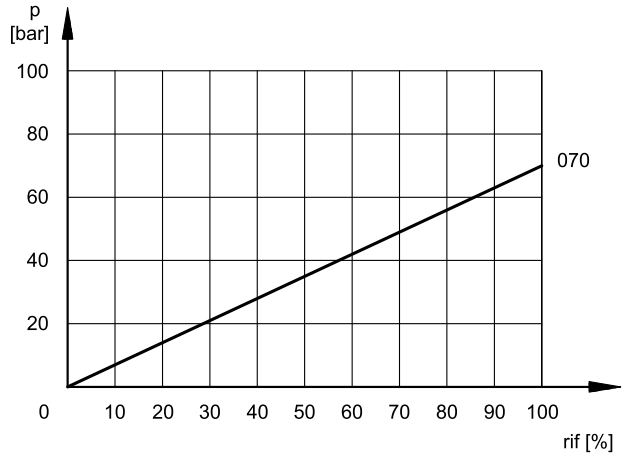
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

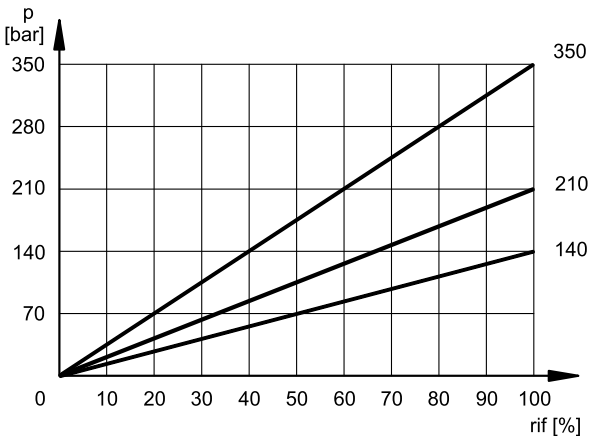
7 - CHARACTERISTIC CURVES

(obtained with mineral oil with viscosity of 36 cSt at 50°C)

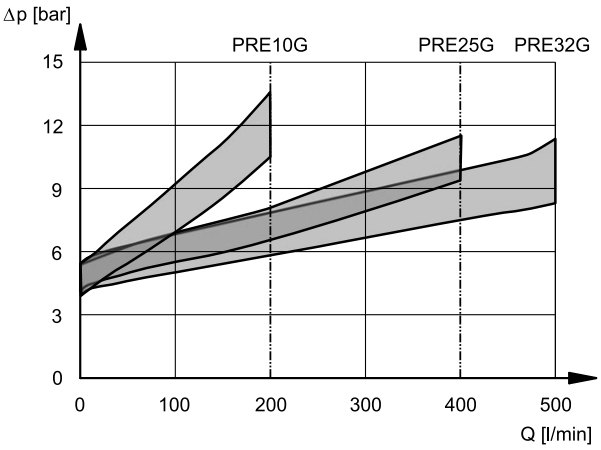
Typical control characteristics, according to the reference signal for available pressure control ranges, measured with input flow rate Q = 50 l/min. Characteristic curves measured without backpressure in T, with linearity compensation set by the onboard electronics.

PRESSURE CONTROL p = f (I)



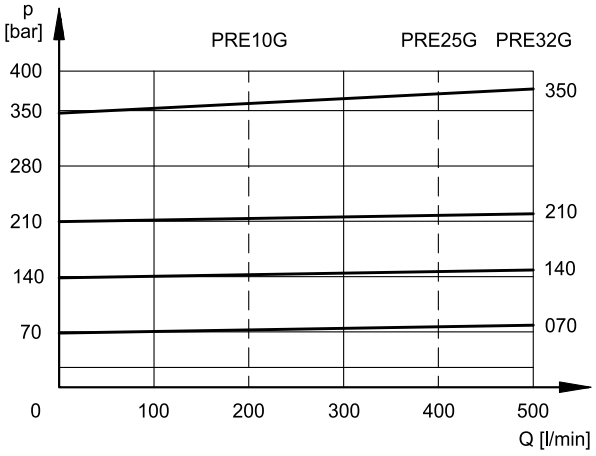


MINIMUM CONTROLLED PRESSURE p min = f (Q)



minimum regulated pressure for pressure control ranges between 70 bar and 350 bar.

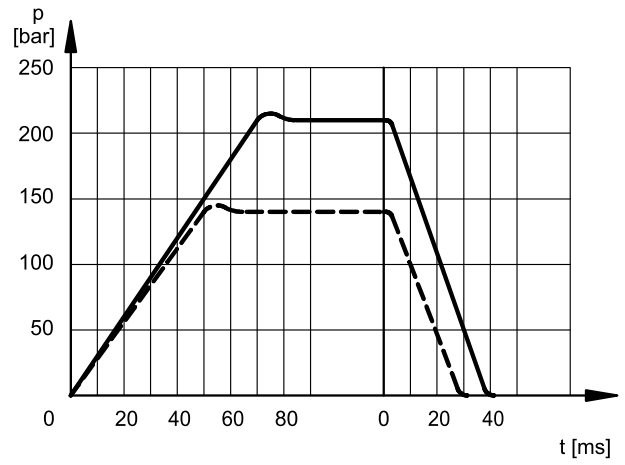
PRESSURE VARIATION p max = f (Q)



8 - STEP RESPONSE

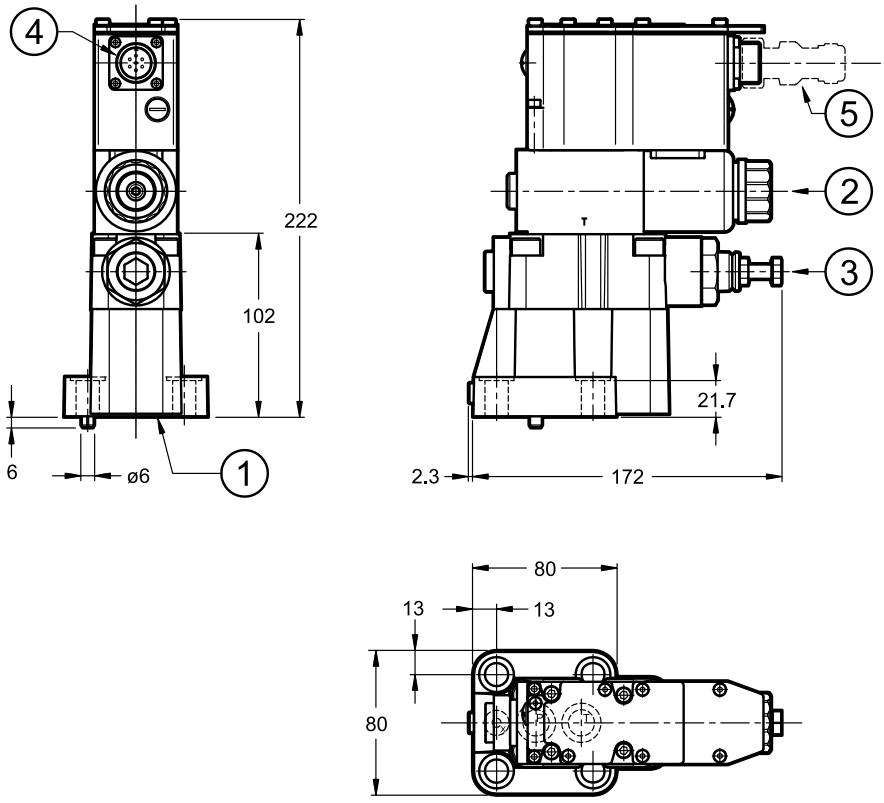
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

Response times obtained withh PRE*G-210 valves, with an input flow rate of 50 l/min and a pressure oil volume of 2 litres. The response time is affected both by the flow rate and the oil volume in the pipework.

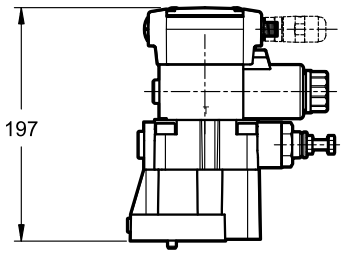


9 - OVERALL AND MOUNTING DIMENSIONS PRE10G*

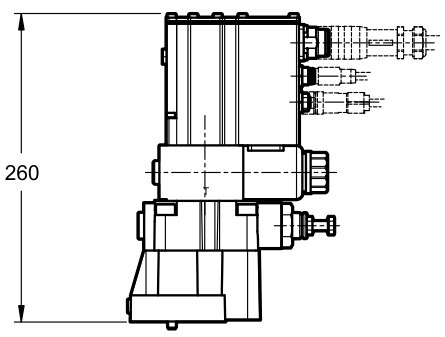
dimensions in mm



PRE10GL



PRE10GH



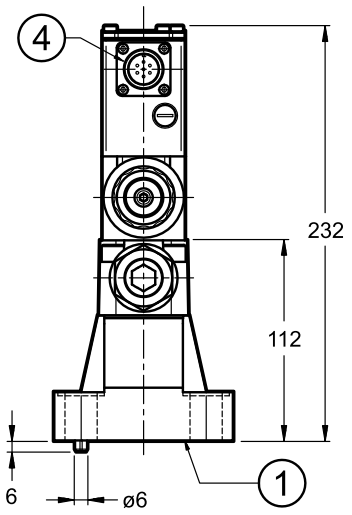
NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.
NOTE 2: Mounting interface at par. 12.

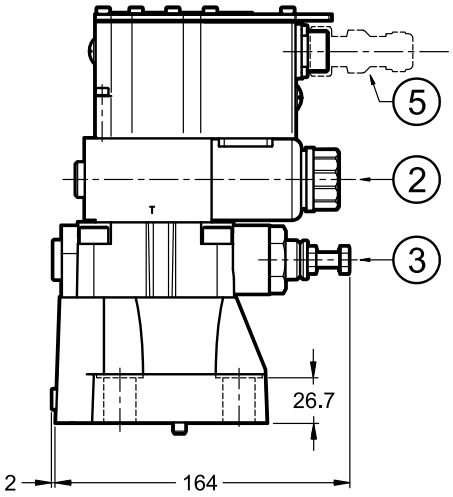
1	Mounting surface with sealing rings: 2 OR type 123 (17.86x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating connector **To be ordered separately**. See catalogue 89 000

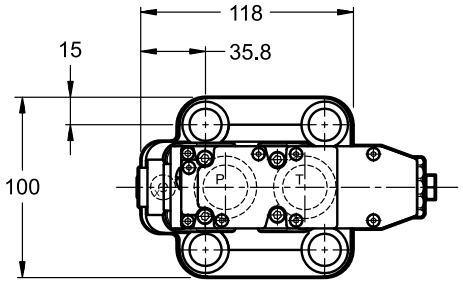
Valve fastening: 4 SHCS M12x40 - ISO 4762
Torque: 69 Nm (screws A8.8)
Thread of mounting holes: M12x20

10 - OVERALL AND MOUNTING DIMENSIONS PRE25G*

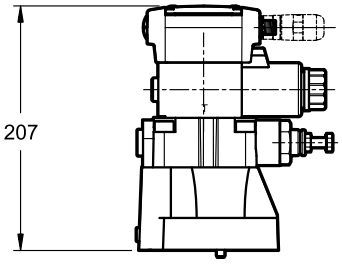
dimensions in mm



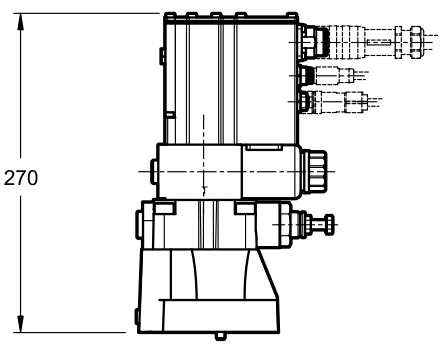




PRE25GL



PRE25GH



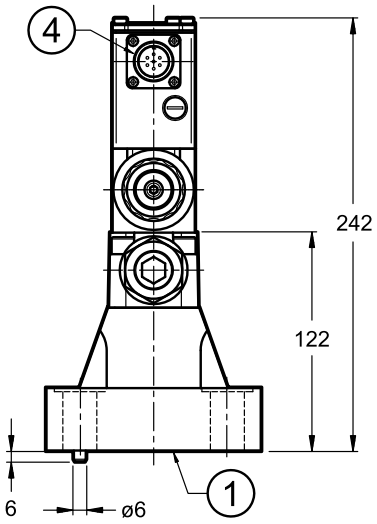
NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.
NOTE 2: Mounting interface at par. 12.

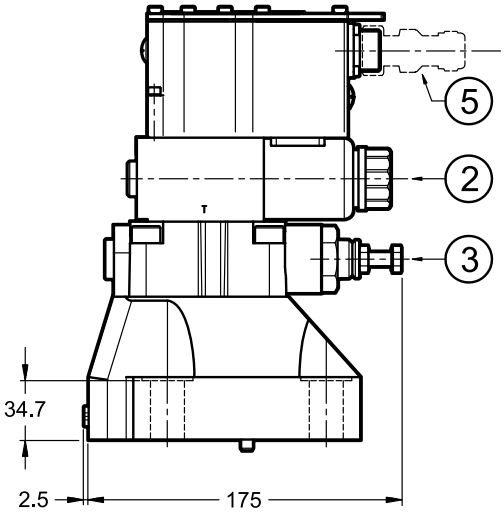
1	Mounting surface with sealing rings: 2 OR type 3118 (29.82x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating connector **To be ordered separately**. See catalogue 89 000

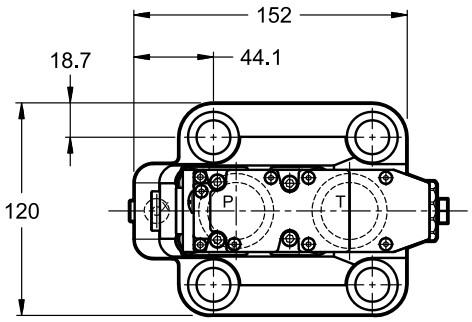
Valve fastening: 4 SHCS M16x60 - ISO 4762
Torque: 170 Nm (screws A8.8)
Thread of mounting holes: M16x25

11 - OVERALL AND MOUNTING DIMENSIONS PRE32G*

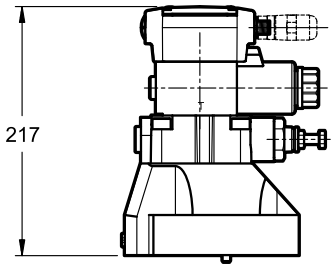
dimensions in mm



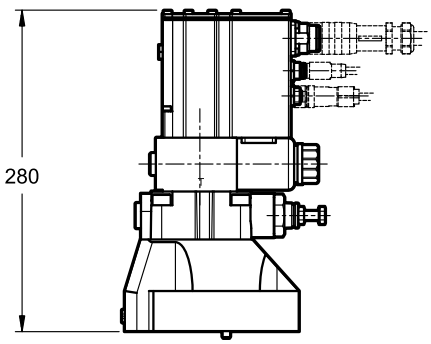




PRE32GL



PRE32GH



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 (2) placed at the end of the solenoid tube.

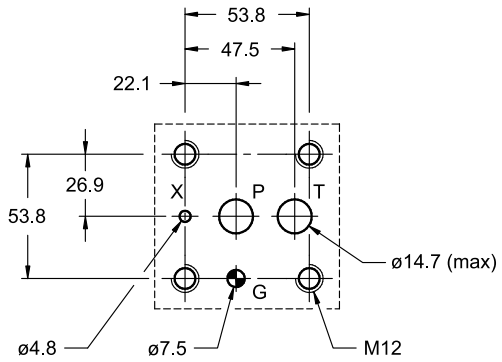
NOTE 2: Mounting interface at par. 12.

1	Mounting surface with sealing rings: 2 OR type 4137 (34.52x3.53) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating electrical connector **To be ordered separately**. See catalogue 89 000

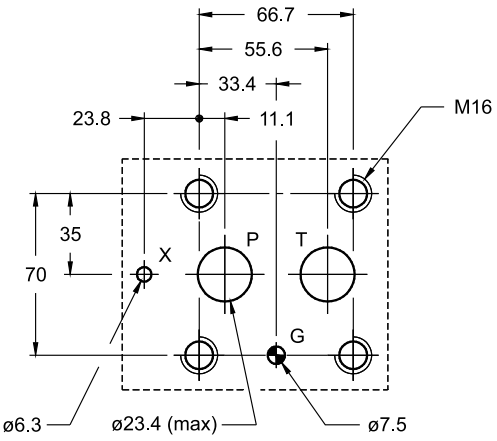
Valve fastening: 4 SHCS M18x60 - ISO 4762
Torque: 235 Nm (screws A8.8)
Thread of mounting holes: M18x27

12 - MOUNTING INTERFACES

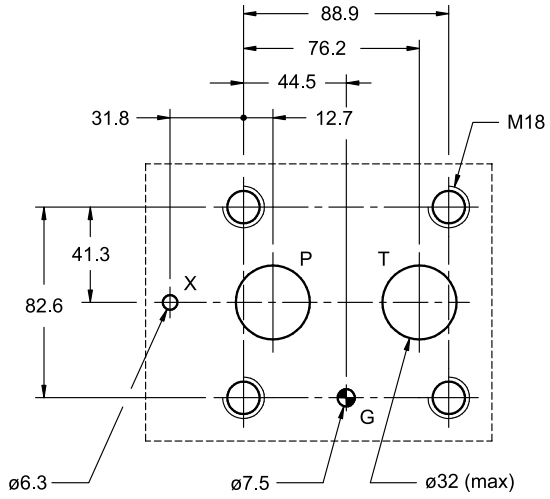
PRE10G*:
ISO 6264-06-09-*-97
(CETOP 4.4.2-2-R06-350)



PRE25G*:
ISO 6264-08-13-*-97
(CETOP 4.4.2-2-R08-350)



PRE32G*:
ISO 6264-10-17-*-97
(CETOP 4.4.2-2-R10-350)



13 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

14 - INSTALLATION

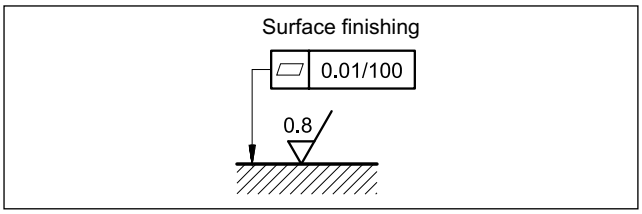
We recommend to install the valves either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated in paragraph 7.

Ensure that there is no air in the hydraulic circuit. In particular applications, can be necessary to vent the air entrapped in the solenoid tube, by using the appropriate drain screw in the solenoid tube.

Ensure the solenoid tube is always filled with oil. At the end of the operation, make sure of having correctly replaced the drain screw. 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.



15 - ACCESSORIES

(to be ordered separately)

15.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

15.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

15.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

15.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

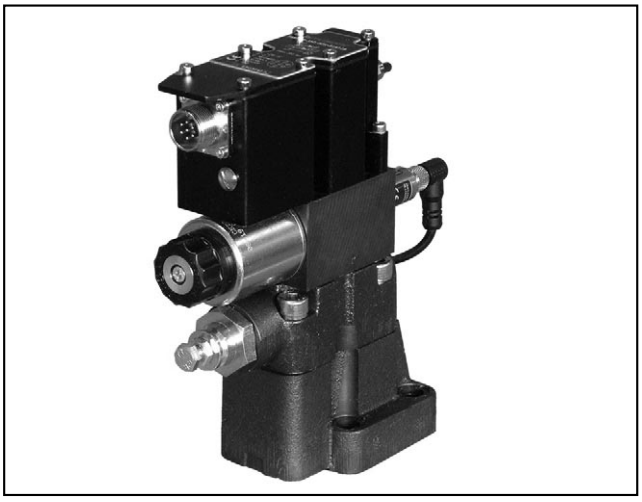
16 - SUBPLATES

(see catalogue 51 000)

	PRE10G*	**PRE25G***	**PRE32G***
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports
P, **T** port dimensions	P: 1/2” BSP T: 3/4” BSP	1” BSP	1” ¼ BSP
X port dimensions	1/4” BSP	1/4” BSP	1/4” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



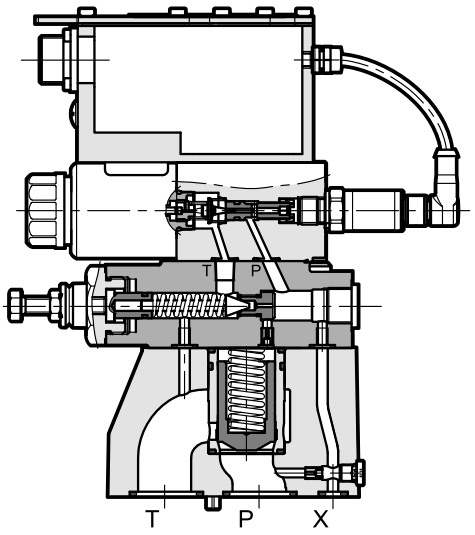
PRE*J*

PROPORTIONAL PRESSURE RELIEF VALVES, PILOT OPERATED, WITH INTEGRATED ELECTRONICS AND PRESSURE CLOSED LOOP

SUBPLATE MOUNTING

p max **350** bar
Q max (see table of performances)

OPERATING PRINCIPLE



— PRE*J* valves are proportional pressure relief valves, pilot operated, with integrated electronics and pressure closed loop, with mounting interface in compliance with ISO 6264 standard.

— These valves are used to control hydraulic circuit pressure and enable the use of the full flow rate of the pump, even with settings approaching calibrated values.

— The two-stage design and wide passages ensure reduced pressure drops thereby improving the system energy performance.

— They are fitted with a manual pressure relief valve which is factory set to ≥ 15% of the maximum value in the pressure control range.

— Valves are available with different types of electronics, with analogue or fieldbus interfaces.

— They are available in three sizes with flow rates up to 500 l/min and in four pressure control ranges up to 350 bar.

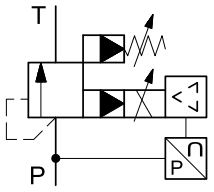
— The valves are easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

		PRE10J*	PRE25J*	PRE32J*
Maximum operating pressure	bar	350		
Maximum flow	l/min	200	400	500
Step response		see paragraph 8		
Hysteresis	% of p nom	< 1%		
Repeatability	% of p nom	< ± 0,5%		
Electrical characteristic		see paragraph 3		
Ambient temperature range	°C	-20 / +60		
Fluid temperature range	°C	-20 / +80		
Fluid viscosity range	cSt	10 ÷ 400		
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13			
Recommended viscosity	cSt	25		
Mass	kg	5,5	6,3	8,5

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 - Standard electronics

P	R	E		J	-		/	33		-		K11		

Pilot operated pressure relief valve

Electro-proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Standard electronics for pressure control in closed loop

Pressure control range
140 = up to 140 bar **210** = up to 210 bar
350 = up to 350 bar

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Reference signal:
E0 = voltage 0 ÷ 10 V **E1** = current 4 ÷ 20 mA

Connection 6 pin + PE

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

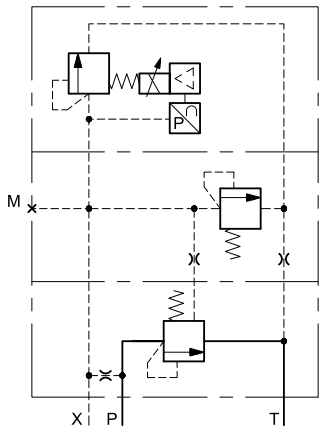
Option:
/ W7 = Zinc-nickel surface treatment
(see **NOTE**)
Omit if not required

NOTE: The standard valve is supplied with surface treatment of phosphating black on the valve body.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to 240 hours (test operated according to EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

1.2 - Detailed symbol

Port X is not intended as a pilot supply line, but exclusively as a signal of the input pressure .



1.3 - Compact electronics

P	R	E		JL	-		/	10		-		K12	

Pilot operated pressure relief valve

Electro-proportional control

Size:
10 = ISO 6264-06
25 = ISO 6264-08
32 = ISO 6264-10

Digital integrated electronics for closed loop compact box

Pressure control range
140 = up to 140 bar
210 = up to 210 bar
350 = up to 350 bar

Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)

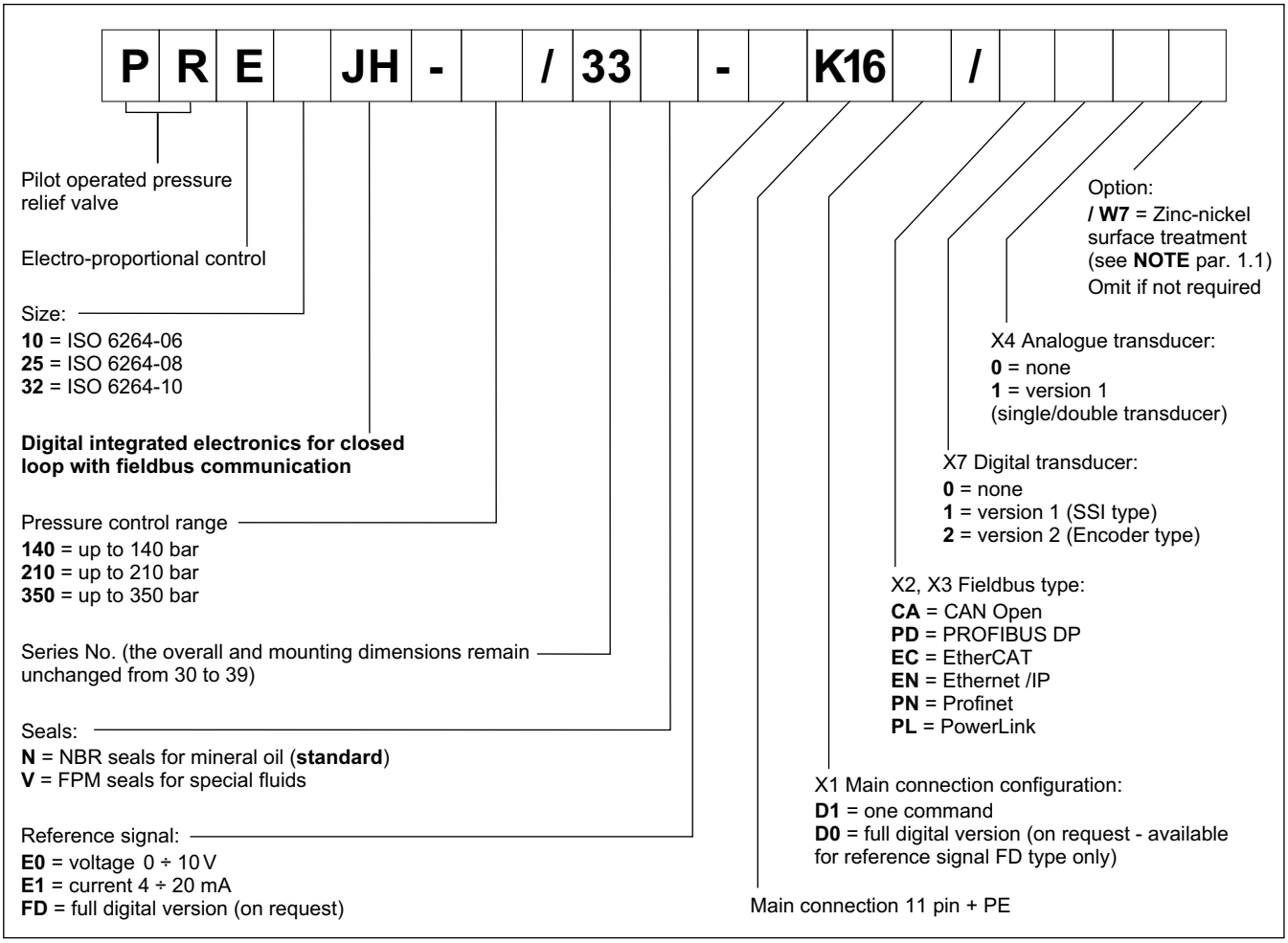
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Interfaces:
E0 = analogue, voltage 0 ÷ 10 V
E1 = analogue, current 4 ÷ 20 mA
IOL = IO-Link interface
CA = CAN Open

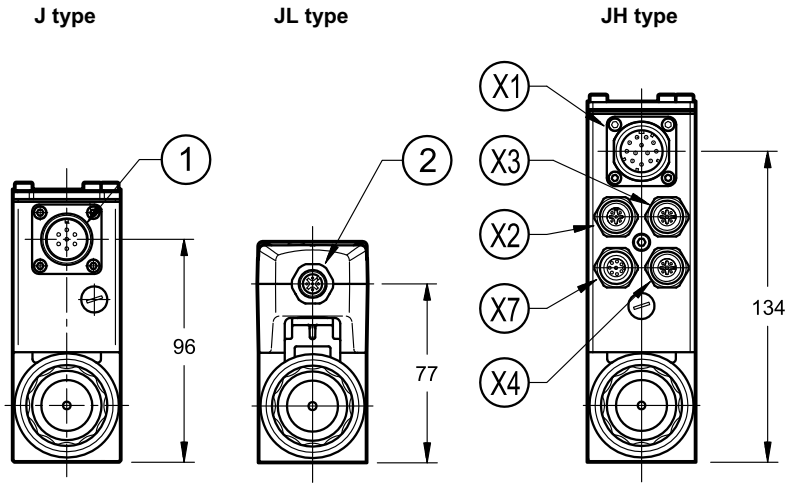
Connection 5 pin M12

Option:
/ W7 = Zinc-nickel surface treatment
(see **NOTE** par. 1.1)
Omit if not required

1.4 - Electronics with fieldbus communication



2 - COMPARISON AMONG INTEGRATED ELECTRONICS



1	Connection 6 pin + PE
2	Connection M12 5 pin, code A, male
X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	Connection for analogue transducer
X7	Connection for digital transducer

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present. Please refer to sections 6 for connections descriptions and pinouts.
NOTE 2: Related mating connectors have to be ordered separately. See catalogue 89 000.

3 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

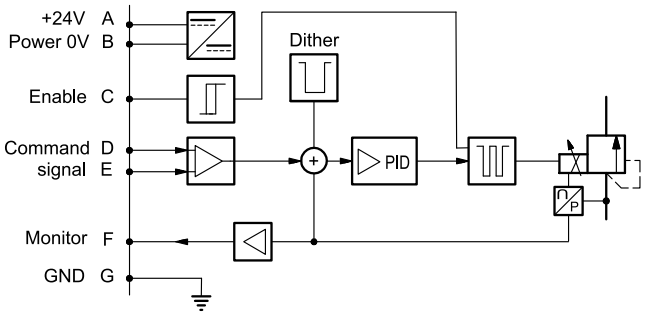
4 - PRE*J - STANDARD ELECTRONICS

4.1 - Electrical characteristics

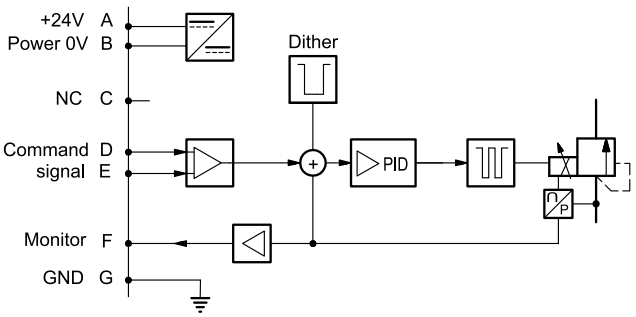
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

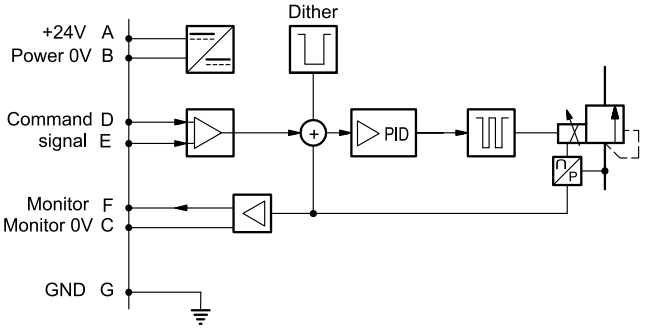
VERSION A - External Enable



VERSION B - Internal Enable

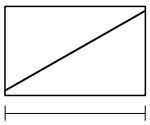


VERSION C - 0V Monitor

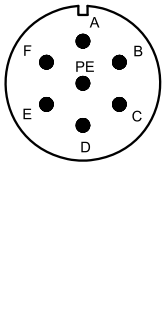


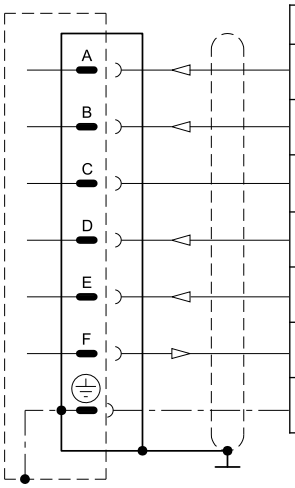
4.3 - Version with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



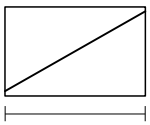


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

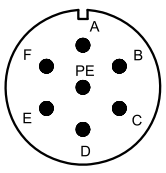
4.4 - Version with current command (E1)

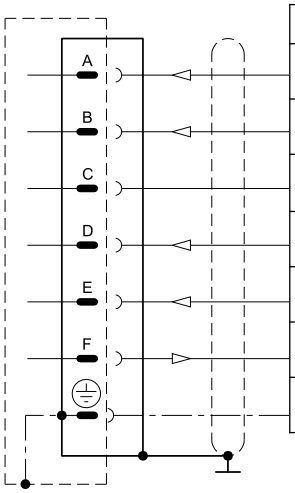
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

5 - PRE*JL - COMPACT ELECTRONICS

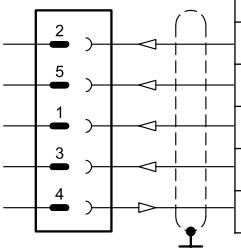
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	 IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5 pin M12 code A (IEC 61076-2-101)

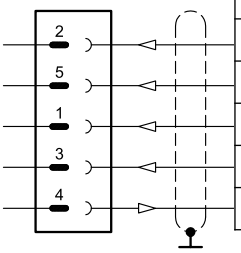
5.2 - Pin tables

'E0' connection



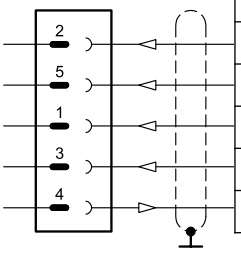
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



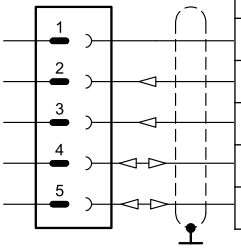
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

6 - PRE*JH - FIELDBUS ELECTRONICS

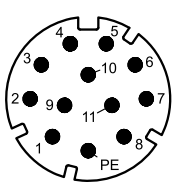
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

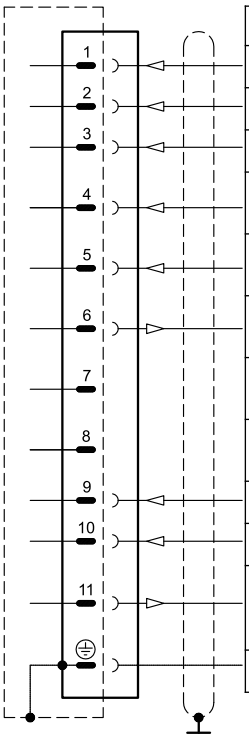
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 4.3 and 4.4.

6.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (pressure at transducer): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

6.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

6.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

6.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

6.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

6.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

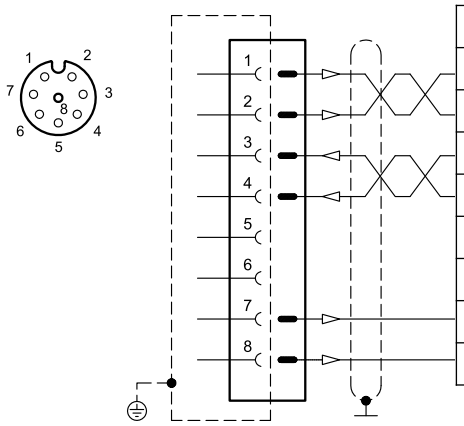
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

6.4 - Digital transducer connection

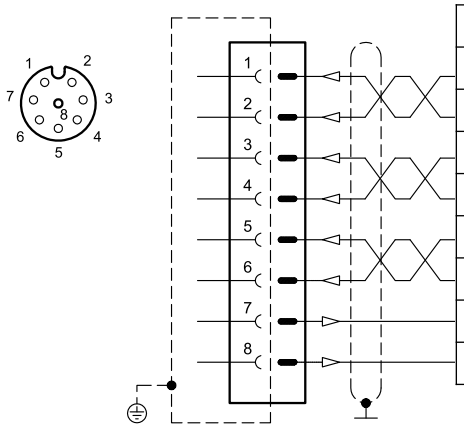
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



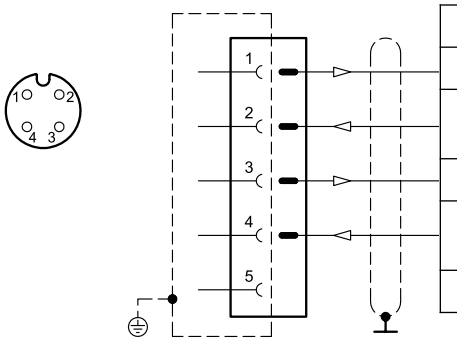
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

6.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



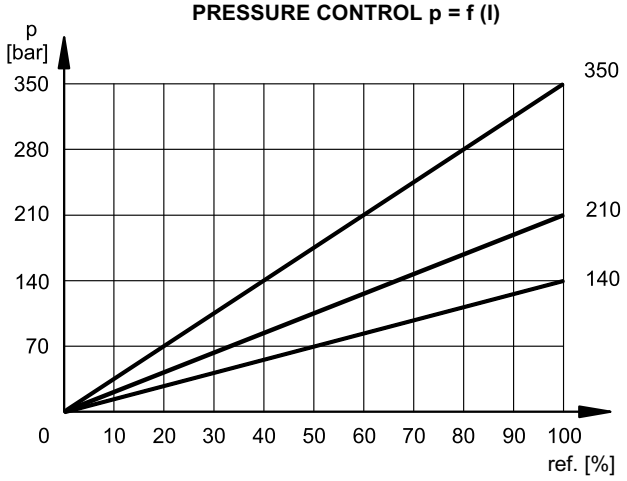
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

7 - CHARACTERISTIC CURVES

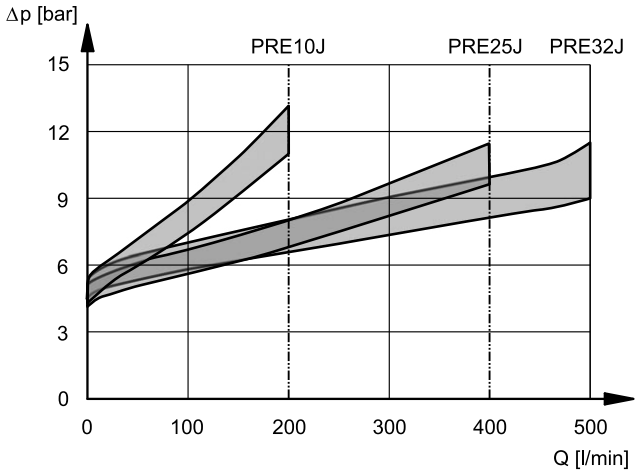
(measured with viscosity of 36 cSt at 50°C)

Typical control characteristics, according to the reference signal for available pressure control ranges, measured with input flow rate Q = 50 l/min. Characteristic curves measured without backpressure in T, with linearity and hysteresis compensation set by the onboard electronics.

PRESSURE CONTROL p = f (I)

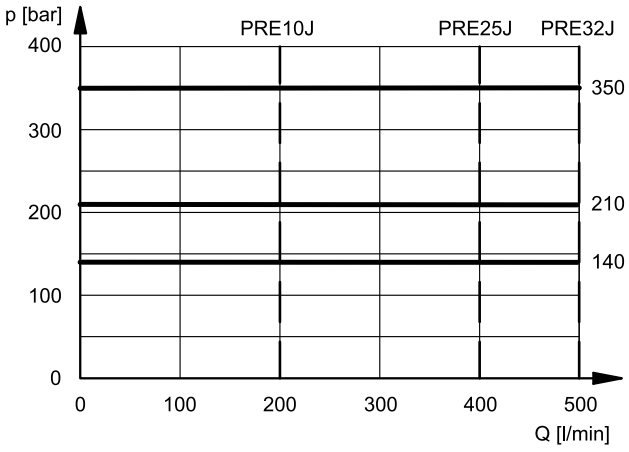


MINIMUM CONTROLLED PRESSURE p min = f (Q)



minimum controlled pressure for pressure control ranges between 140 bar and 350 bar.

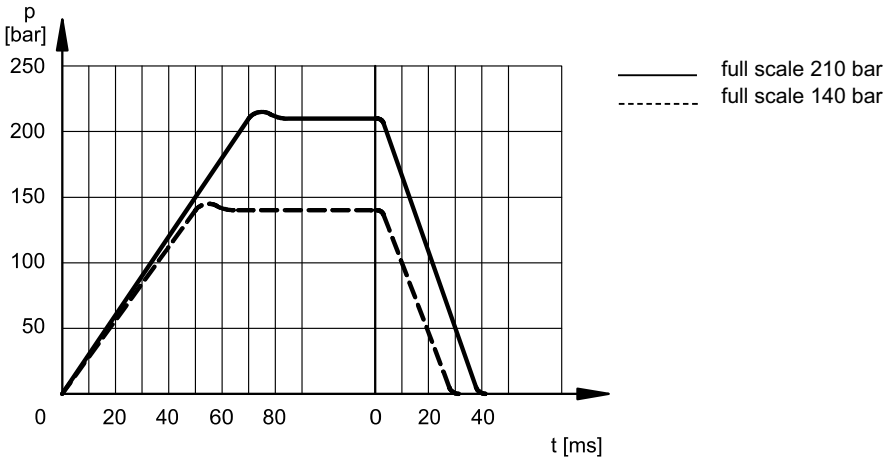
PRESSURE VARIATION p max = f (Q)



8 - STEP RESPONSE

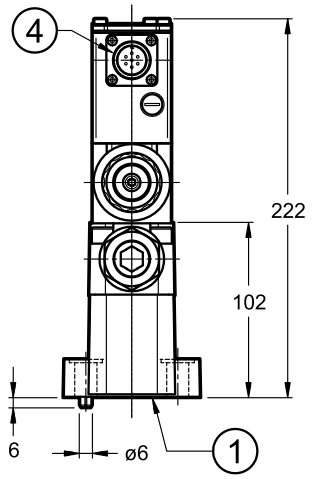
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

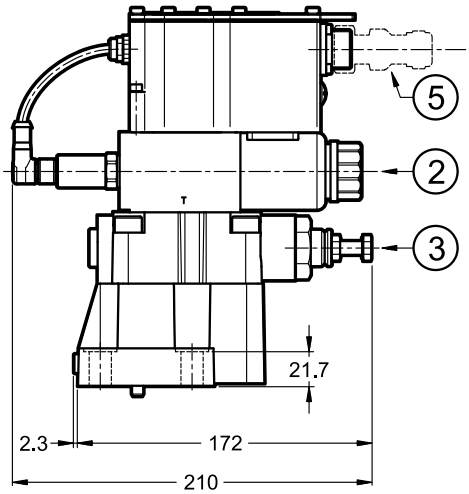
Response times obtained with PRE*J*-210 valves, with an input flow rate of 50 l/min and a pressure oil volume of 2 litres. The response time is affected both by the flow rate and the oil volume in the pipework.

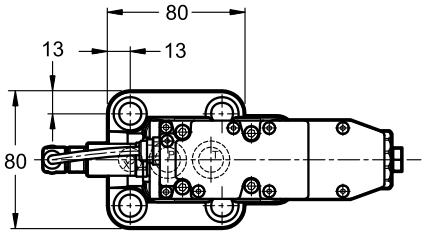


9 - OVERALL AND MOUNTING DIMENSIONS PRE10J*

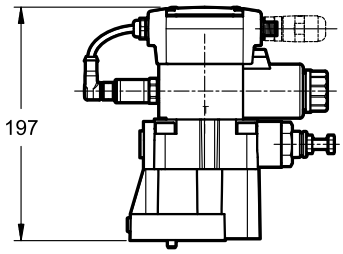
dimensions in mm



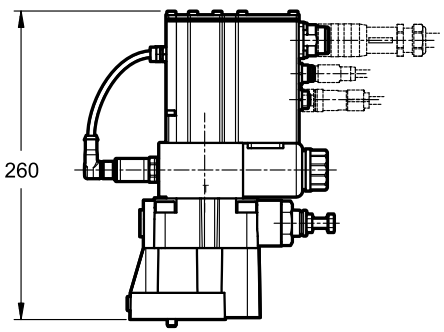




PRE10JL



PRE10JH



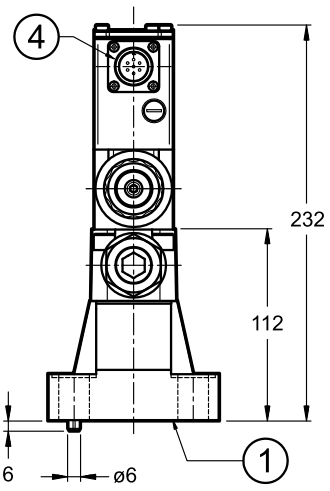
NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.
NOTE 2: Mounting interface at par. 12.

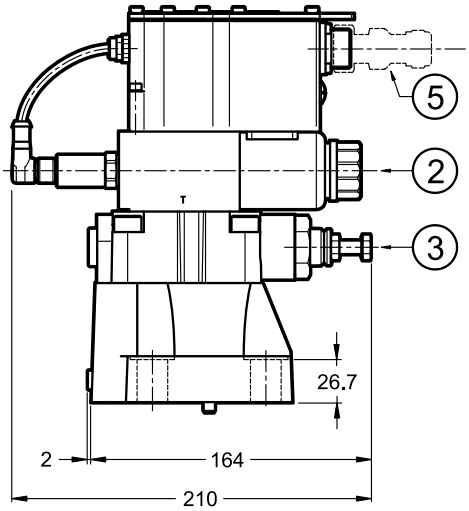
1	Mounting surface with sealing rings: 2 OR type 123 (17.86x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating connector **To be ordered separately**. See catalogue 89 000

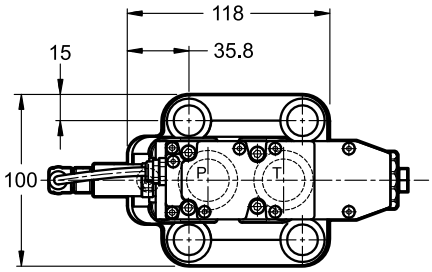
Valve fastening: 4 SHCS M12x40 - ISO 4762
Torque: 69 Nm (viti A8.8)
Thread of mounting holes: M12x20

10 - OVERALL AND MOUNTING DIMENSIONS PRE25J*

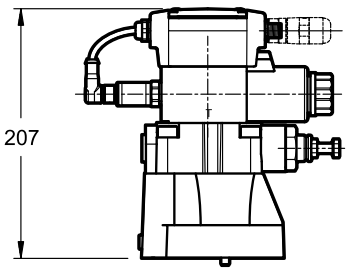
dimensions in mm



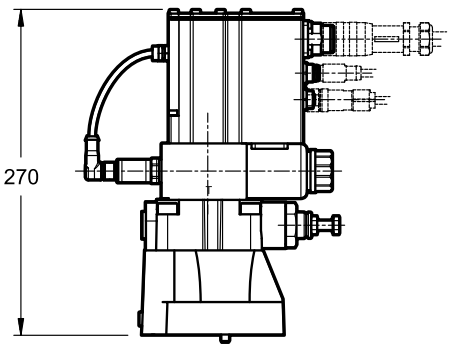




PRE25JL



PRE25JH



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 (2) placed at the end of the solenoid tube.

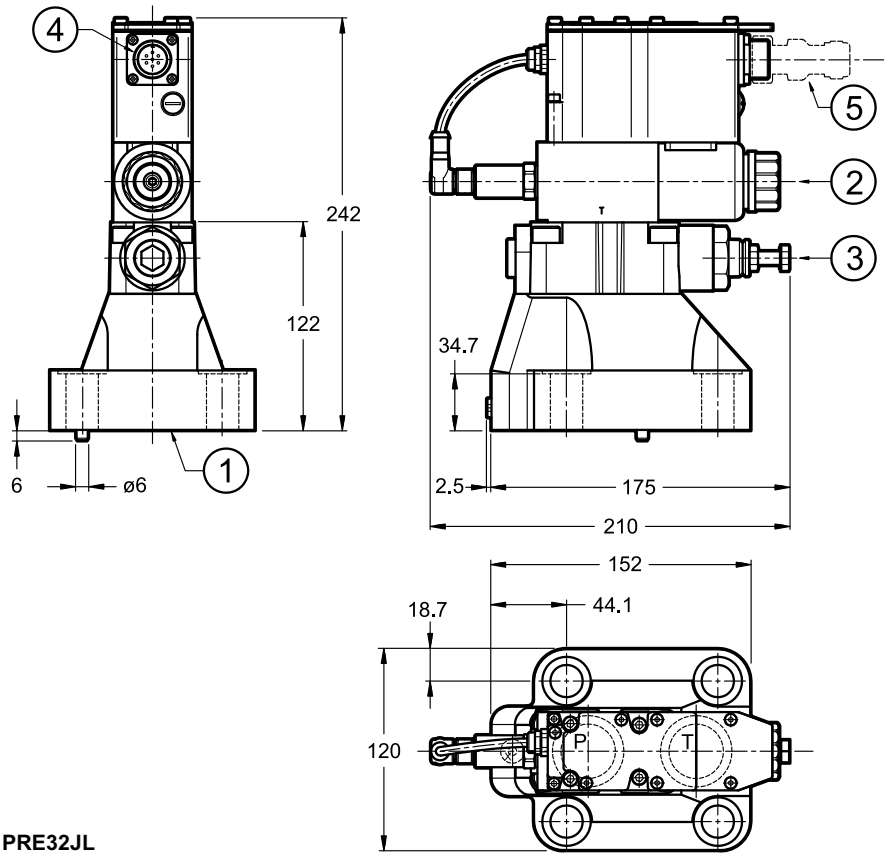
NOTE 2: Mounting interface at par. 12.

1	Mounting surface with sealing rings: 2 OR type 3118 (29.82x2.62) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating connector **To be ordered separately**. See catalogue 89 000

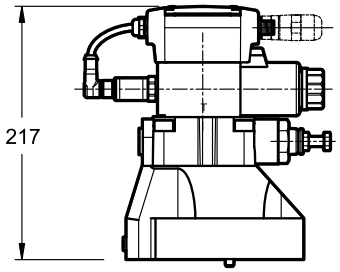
Valve fastening: 4 SHCS M16x60 - ISO 4762
Torque: 170 Nm (viti A8.8)
Thread of mounting holes: M16x25

11 - OVERALL AND MOUNTING DIMENSIONS PRE32J*

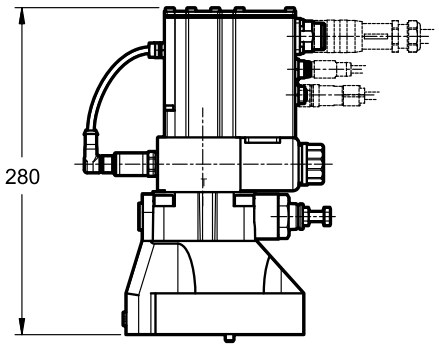
dimensions in mm



PRE32JL



PRE32JH



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 (2) placed at the end of the solenoid tube.

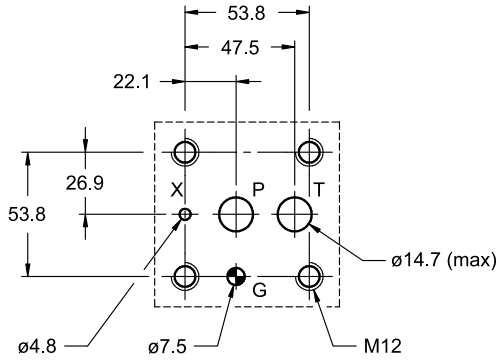
NOTE 2: Mounting interface at par. 12.

1	Mounting surface with sealing rings: 2 OR type 4137 (34.52x3.53) - 90 Shore 1 OR type 109 (9.13x2.62) - 90 Shore
2	Breather: Allen key 4
3	Factory-set pressure relief valve
4	Main connection 6 pin + PE
5	Mating electrical connector **To be ordered separately**. See catalogue 89 000

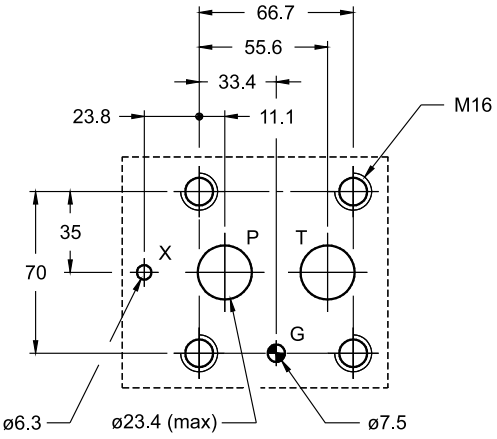
Valve fastening: 4 SHCS M18x60 - ISO 4762
Torque: 235 Nm (viti A8.8)
Thread of mounting holes: M18x27

12 - MOUNTING INTERFACES

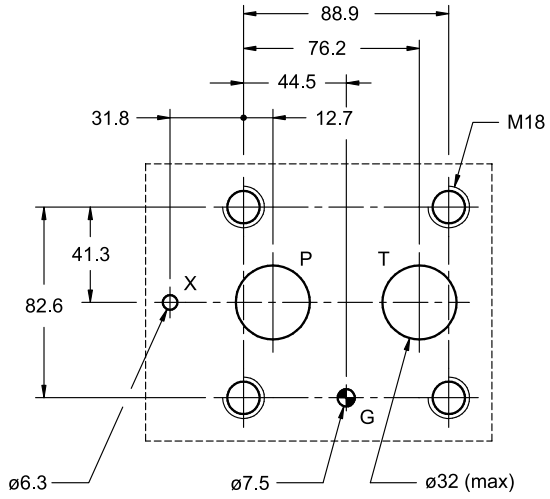
PRE10J*:
ISO 6264-06-09-*-97
(CETOP 4.4.2-2-R06-350)



PRE25J*:
ISO 6264-08-13-*-97
(CETOP 4.4.2-2-R08-350)



PRE32J*:
ISO 6264-10-17-*-97
(CETOP 4.4.2-2-R10-350)



13 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

14 - INSTALLATION

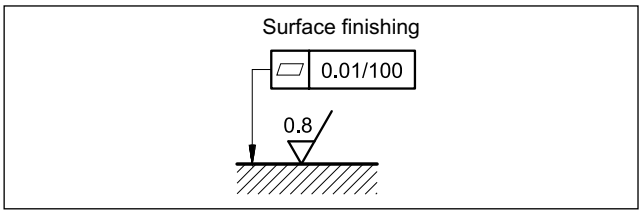
We recommend to install the valves either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated in paragraph 7.

Ensure that there is no air in the hydraulic circuit. In particular applications, can be necessary to vent the air entrapped in the solenoid tube, by using the appropriate drain screw in the solenoid tube.

Ensure the solenoid tube is always filled with oil. At the end of the operation, make sure of having correctly replaced the drain screw. 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.



15 - ACCESSORIES

(to be ordered separately)

15.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

15.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

15.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

15.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

16 - SUBPLATES

(see catalogue 51 000)

	PRE10J*	**PRE25J***	**PRE32J***
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports
P, T port dimensions	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

DUPLOMATIC MOTION SOLUTIONS

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RPCED1

DIRECT OPERATED FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROL

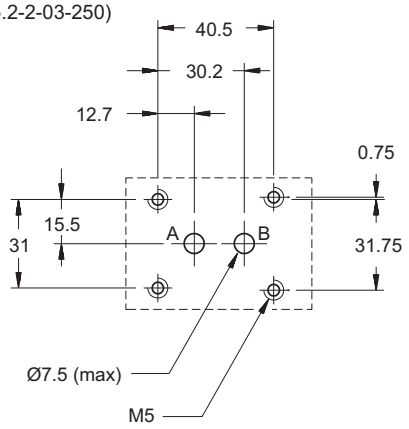
SERIES 52

SUBPLATE MOUNTING ISO 6263-03

p max **250** bar
Q max (see table of performances)

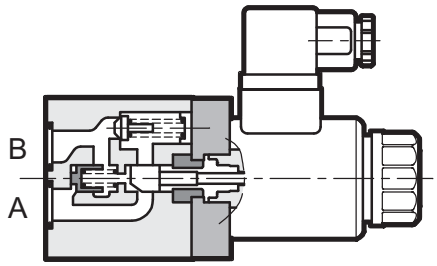
MOUNTING INTERFACE

ISO 6263-03-03-*-97
(CETOP 4.5.2-2-03-250)



NOTE: The RPCED1 mounting interface, with ISO 6263-03 holes, must not have P and T ports or must have the 0113388 subplate (to be ordered separately).

OPERATING PRINCIPLE



— The RPCED1 valve is a two-way flow control valve with pressure and thermal compensation, electric proportional control, and mounting interface in compliance with ISO 6263 standards.

— It is normally used for flow rate control in hydraulic circuit branches or for speed control of hydraulic actuators.

— Flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or by means of the relative electronic control units to exploit valve performance to the full (see par. 10).

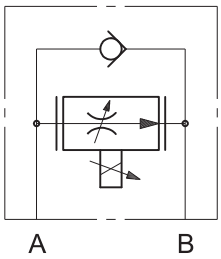
— It is available in five flow rate control ranges up to 25 l/min.

PERFORMANCES

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

Maximum operating pressure Minimum Δp between A and B port	bar	250 10
Maximum controlled flow Min. controlled flow (for 1 and 4 l/min. reg.) Maximum free-reverse flow	l/min	1,5 - 4 - 8 - 16 - 25 0,025 40
Step response	see paragraph 7	
Hysteresis (with PWM 100 Hz)	% of p nom	< 6%
Repeatability	% of p nom	< ±2,5%
Electrical characteristic	see paragraph 6	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13 (class 17/15/12 for flows < 0,5 l/min)	
Recommended viscosity	cSt	25
Mass	kg	1,5

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

R	P	C	E	D	1	-		/	C	/	52	-	24	/	

Compensated flow control valve

Electric proportional control

Open loop control

Size: ISO 6263-03

Maximum controlled flow:
1 = 1,5 l/min **8** = 8 l/min **25** = 25 l/min
4 = 4 l/min **16** = 16 l/min

Built-in check valve

Series No. (from 50 to 59 sizes and mounting dimensions remain unchanged)

Nominal solenoid voltage 24 V DC

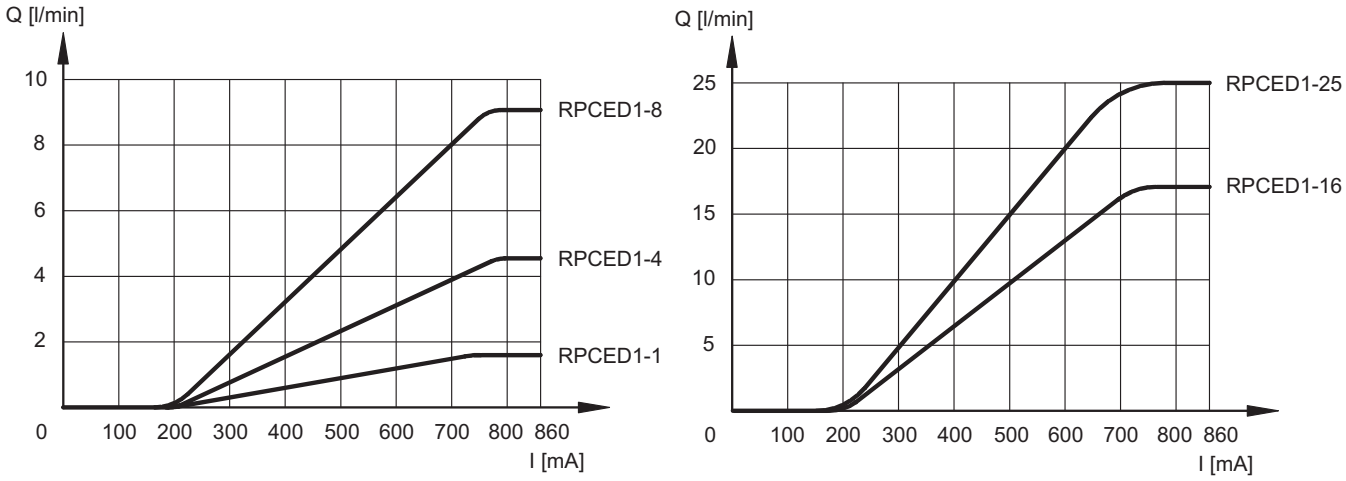
Seal: omit for mineral oils
V = viton for special fluids

2 - CHARACTERISTIC CURVES

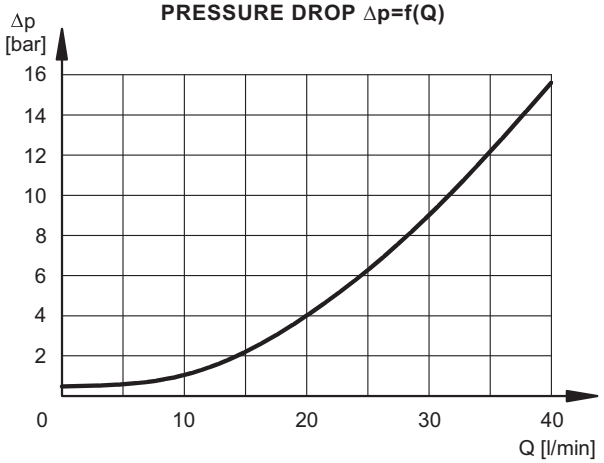
(measured with viscosity of 36 cSt at 50°C)

Typical curves for flow rate A → B according to the current supplied to the solenoid for controlled flow rate of: 1- 4 - 8 - 16 - 25 l/min.

FLOW CONTROL Q=f(I)



PRESSURE DROP Δp=f(Q)



Pressure drop with free flow B →A through check valve.

3 - PRESSURE COMPENSATION

The valves are equipped with two restrictors in series. The first one is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor ensures constant pressure drop across the adjustable restrictor. In these conditions, the set flow rate value is maintained constant within a tolerance limit of ± 2% of the full scale flow rate for maximum pressure variation between the valve inlet and outlet chambers.

4 - THERMAL COMPENSATION

Thermal compensation of the valve is obtained by adopting the principle of restricted fluid passage, so that the fluid is not influenced significantly by variations in oil viscosity.

For controlled flow rates of lower than 0.5 l/min and with a temperature change of 30°C, flow rate varies by approx. 13% of the set value. For higher flow rates and with the same temperature change the flow rate variation is <4% of the set flow rate.

5 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

6 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	24
RESISTANCE (AT 20°C)	Ω	17.6
MAXIMUM CURRENT	A	0.86
DUTY CYCLE		100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)	IP65	

7 - 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 response times with valve flow rate of 16 l/min and with input pressure of 100 bar.

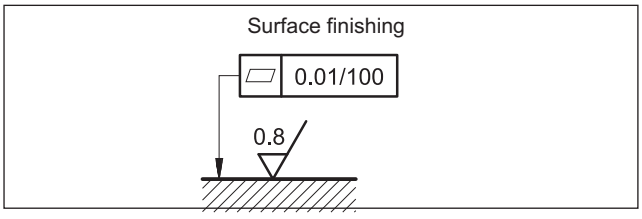
REFERENCE SIGNAL STEP	0 → 100%	100 → 0%	25→75%	75→25%
Step response [ms]	60	80	50	70

8 - INSTALLATION

RPCED1 valves can be installed in any position without impairing correct operation.

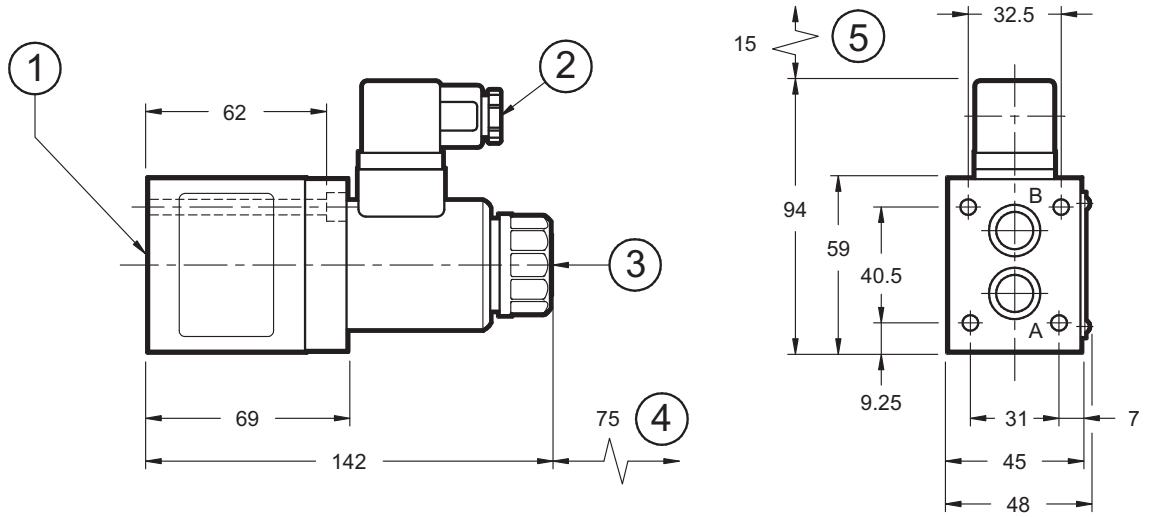
Ensure that there is no air in the hydraulic circuit.

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.



9 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Mounting surface with sealing rings: 2 ORM-0140-20 (14x2)
2	Coil electrical connector EN 175301-803 (ex DIN 43650)
3	Manual override control
4	Coil removal space
5	Connector removal space

Fastening bolts: 4 bolts M5x70
Torque: 5 Nm

10 - ELECTRONIC CONTROL UNITS

EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251

11 - SUBPLATES

(see cat. 51 000)

Type	PMRPC1-AI3G ports on rear PMRPC1-AL3G side ports
Port dimensions	3/8” BSP

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RPCED1-*/T3

THREE-WAY DIRECT OPERATED FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROL

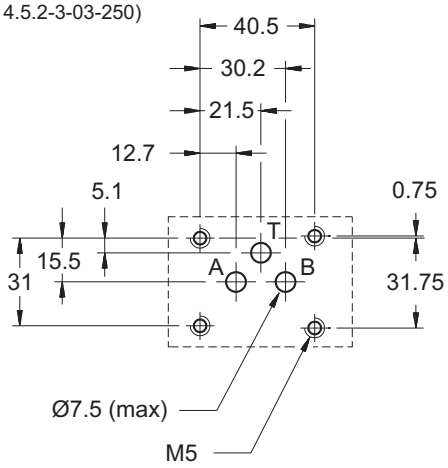
SERIES 52

SUBPLATE MOUNTING
ISO 6263-03

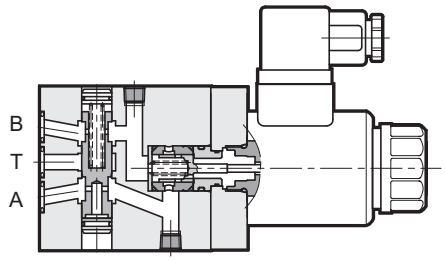
p max **250** bar
Q max (see table of performances)

MOUNTING INTERFACE

ISO 6263-03-03-*-97
(CETOP 4.5.2-3-03-250)



OPERATING PRINCIPLE



— RPCED1-*/T3 is a three-way flow control valve, pressure and temperature compensated with electric proportional control and mounting interface in compliance with ISO 6263 standards.

— This valve controls the flow to the circuit, by dumping the exceeding oil flow to the tank.

— Flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or by means of the relative electronic control units to exploit valve performance to the full (see par. 10).

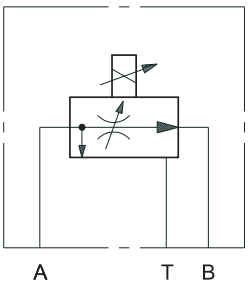
— It is available in five flow rate control ranges up to 25 l/min.

PERFORMANCES

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

Maximum operating pressure Minimum Δp between A and B port	bar	250 8
Maximum controlled flow Min. controlled flow (for 1 and 4 l/min. reg.)	l/min	1,5 - 4 - 8 - 16 - 25 0,025
Step response	see paragraph 7	
Hysteresis (PWM 100)	% of Q max	< 6%
Repeatability	% of Q max	< ±2,5%
Electrical characteristic	see paragraph 6	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13 (class 17/15/12 for flows < 0,5 l/min)	
Recommended viscosity	cSt	25
Mass	kg	1,5

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

R	P	C	E	D	1	-		/	T3	/	52	-	24	/	

Compensated flow control valve

Electric proportional control

Open loop control

Size ISO 6263

Maximum controlled flow:
1 = 1,5 l/min **8** = 8 l/min **25** = 25 l/min
4 = 4 l/min **16** = 16 l/min

Three-way version

Series No. (from 50 to 59 sizes and mounting dimensions remain unchanged)

Nominal solenoid voltage 24 V DC

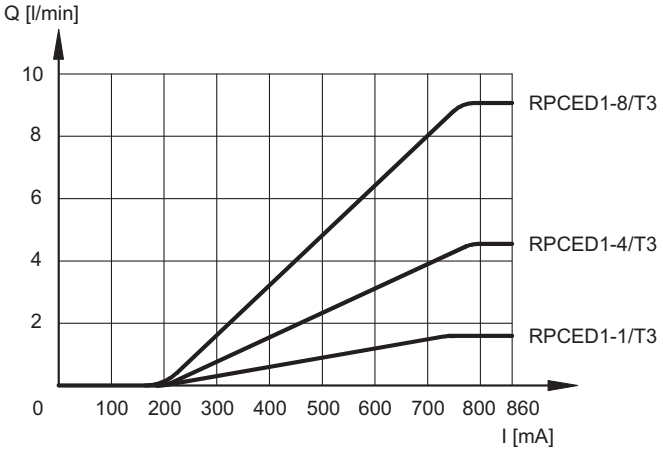
Seal:
omit for mineral oils
V = FPM seals for special fluids

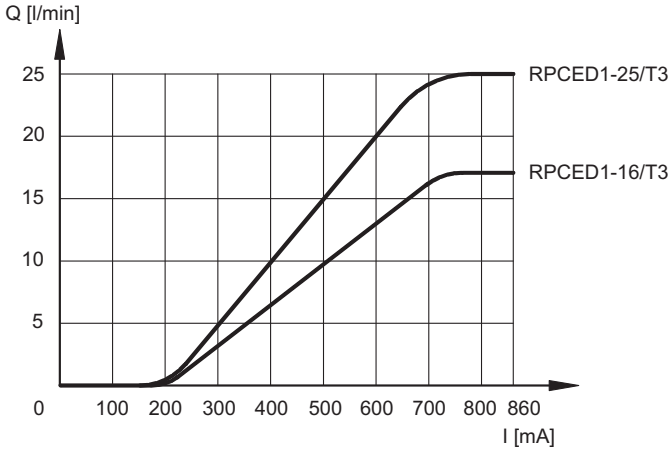
2 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

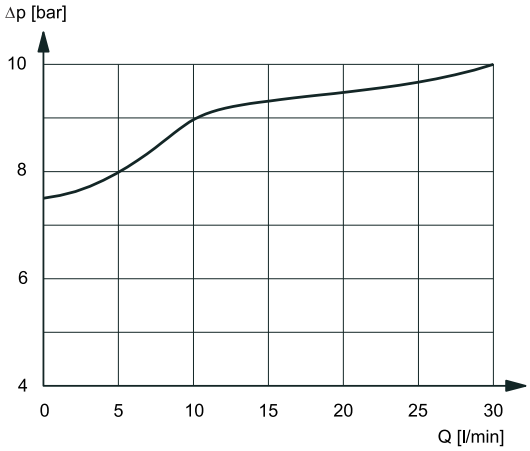
Typical curves for flow rate A→B according to the current supplied to the solenoid for controlled flow rate of: 1 - 4 - 8 - 16 - 25 l/min.

FLOW CONTROL Q = f(I)





PRESSURE DROP Δp = f(Q)



Pressure drop with flow A → T through the compensator.

3 - PRESSURE COMPENSATION

The valves are equipped with two restrictors. The first is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor ensures constant pressure drop across the adjustable restrictor. In these conditions, the set flow rate value is maintained constant within a tolerance limit of ± 2% of the set flow rate for maximum pressure variation between the valve inlet and outlet chambers.

4 - THERMAL COMPENSATION

Thermal compensation of the valve is obtained by adopting the principle of restricted fluid passage, so that the fluid is not influenced significantly by variations in oil viscosity.

For controlled flow rates of lower than 0.5 l/min and with a temperature change of 30°C, flow rate varies by approx. 13% of the set value.For higher flow rates and with the same temperature change the flow rate variation is <4% of the set flow rate.

5 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types 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.

6 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**24**
RESISTANCE (at 20°C)	Ω	17.6
MAXIMUM CURRENT	A	0.86
DUTY CYCLE		100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)	IP 65	

7 - 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 response times with valve flow rate of 16 l/min and with input pressure of 100 bar.

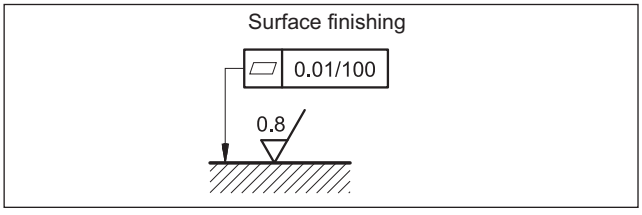
REFERENCE SIGNAL STEP	0 → 100%	100 → 0%	25→75%	75→25%
Step response [ms]	60	80	50	70

8 - INSTALLATION

RPCED1-*/T3 valves can be installed in any position without impairing correct operation.

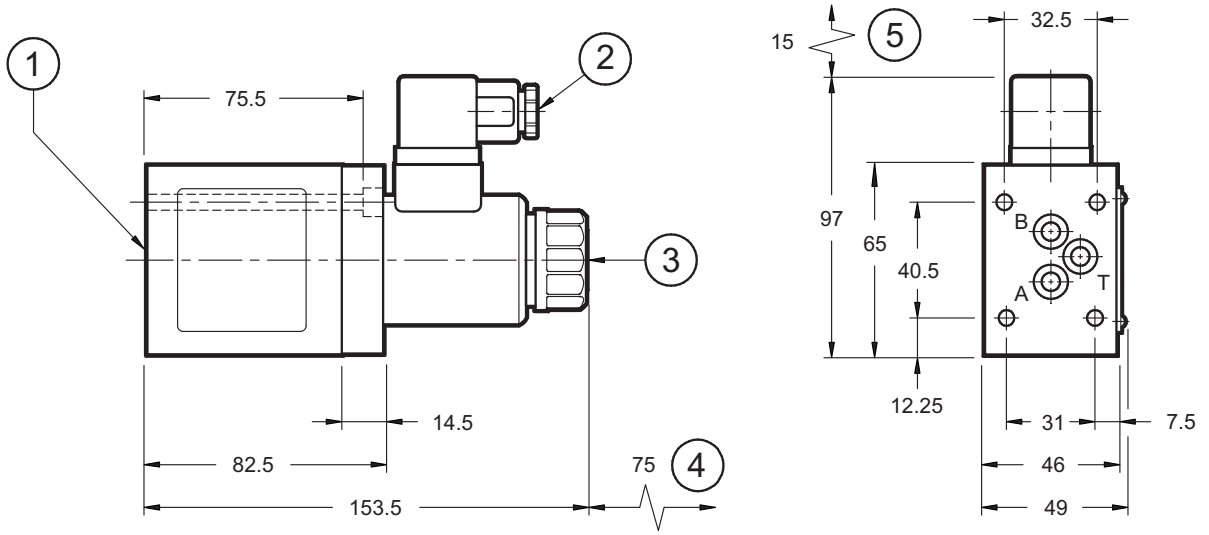
Ensure that there is no air in the hydraulic circuit.

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.



9 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Mounting surface with sealing rings: 3 OR type 2037 (9.25x1.78) - 90 Shore
2	Coil electrical connector EN 175301-803 (ex DIN 43650)
3	Manual override control
4	Coil removal space
5	Connector removal space

Fastening bolts: 4 bolts M5x85
Torque: 5 Nm

10 - ELECTRONIC CONTROL UNITS

EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251

11 - SUBPLATES

(see cat. 51 000)

PMMD-AI3G rear ports with user P plugged
PMMD-AL3G side ports with user P plugged
Port dimensions 3/8” BSP

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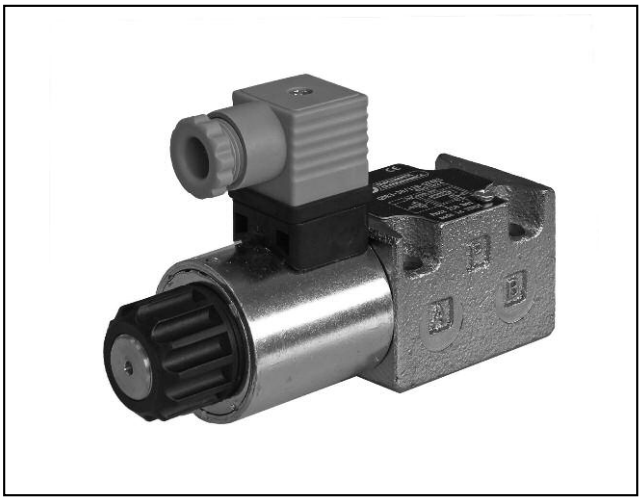


QDE*

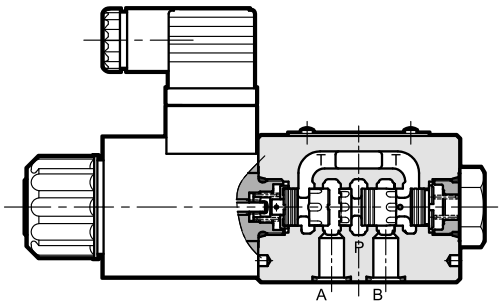
PROPORTIONAL FLOW CONTROL VALVE WITH COMPENSATION

SERIES 11

SUBPLATE MOUNTING
ISO 6263-03
ISO 4401-05

p max **250** bar
Q max **80** l/min

OPERATING PRINCIPLE



— QDE* are compensated flow control valves with pressure compensation and proportional electric control, with mounting surface according to ISO 6263-03 and ISO 4401-05, supplied with 2 or 3 way design, depending on the use of port P.

— This valve is used for the flow control in branches of a hydraulic circuit or for the speed control of hydraulic cylinders.

— The valve can be controlled directly by a current control supply unit or by means of an electronic control unit, to exploit valve performance to the full (see paragraph 13).

— QDE* valves are available in two sizes, for 5 flow adjustment ranges of up to 80 l/min.

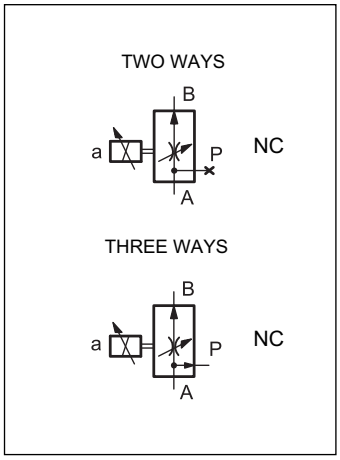
— The valve body is zinc-nickel coated.

PERFORMANCES

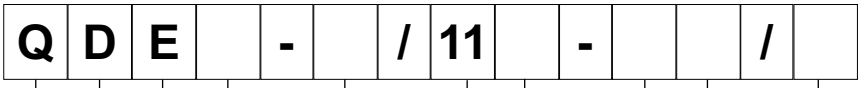
(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

		QDE3				QDE5
Maximum operating pressure	bar	250				250
Controlled flow (Q_B)	l/min	14	20	30	40	80
Max input flow (Q_A) (3-way)	l/min	40	50	40	50	90
Spring setting in pressure compensator	bar	4	8	4	8	8
Minimum pressure drop A > B	bar	10	22	10	22	22
Hysteresis	% of Q_{max}	< 6 %				
Repeatability	% of Q_{max}	< ± 1,5 %				< ±2 %
Electrical characteristics	see paragraph 5					
Fluid temperature range	°C	-20 / +60				
Fluid temperature range	°C	-20 / +80				
Fluid viscosity range	cSt	10 ÷ 400				
Fluid contamination degree	according to ISO 4406:1999 class 18/16/13					
Recommended viscosity	cSt	25				
Mass	kg	1,4				4,4

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



Flow control valve direct operated

Electric proportional control

Size:
3 = ISO 6263-03
5 = ISO 4401-05

Controlled flow:

QDE3
14 = 14 l/min
20 = 20 l/min
30 = 30 l/min
40 = 40 l/min

QDE5
80 = 80 l/min

Series no. (from 10 to 19 sizes and mounting dimensions remains unchanged)

Seals:
N = NBR seals (**standard**)
V = FPM seals for special fluids

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

Coil electrical connection:
K1 = plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male

Option: manual override (see at par. 10)

NOTE: The zinc-nickel finishing on the valve body makes the valve suitable to ensure a salt spray resistance up to **240** hours. (test operated according to EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

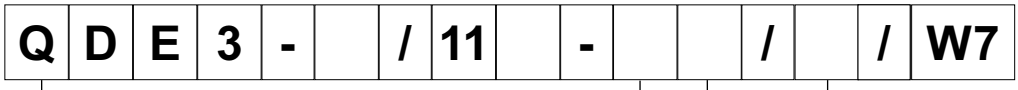
For a salt spray resistance up to 600 hours order the high corrosion resistance version.

1.1 - QDE3: high corrosion resistance version

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600** hours (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The coil are specific for this version, featuring a zinc-nickel surface treatment. The boot manual override (CM) is installed as standard in order to protect the solenoid tube.

Follow the identification code below to order it:



Choices as in standard identification code

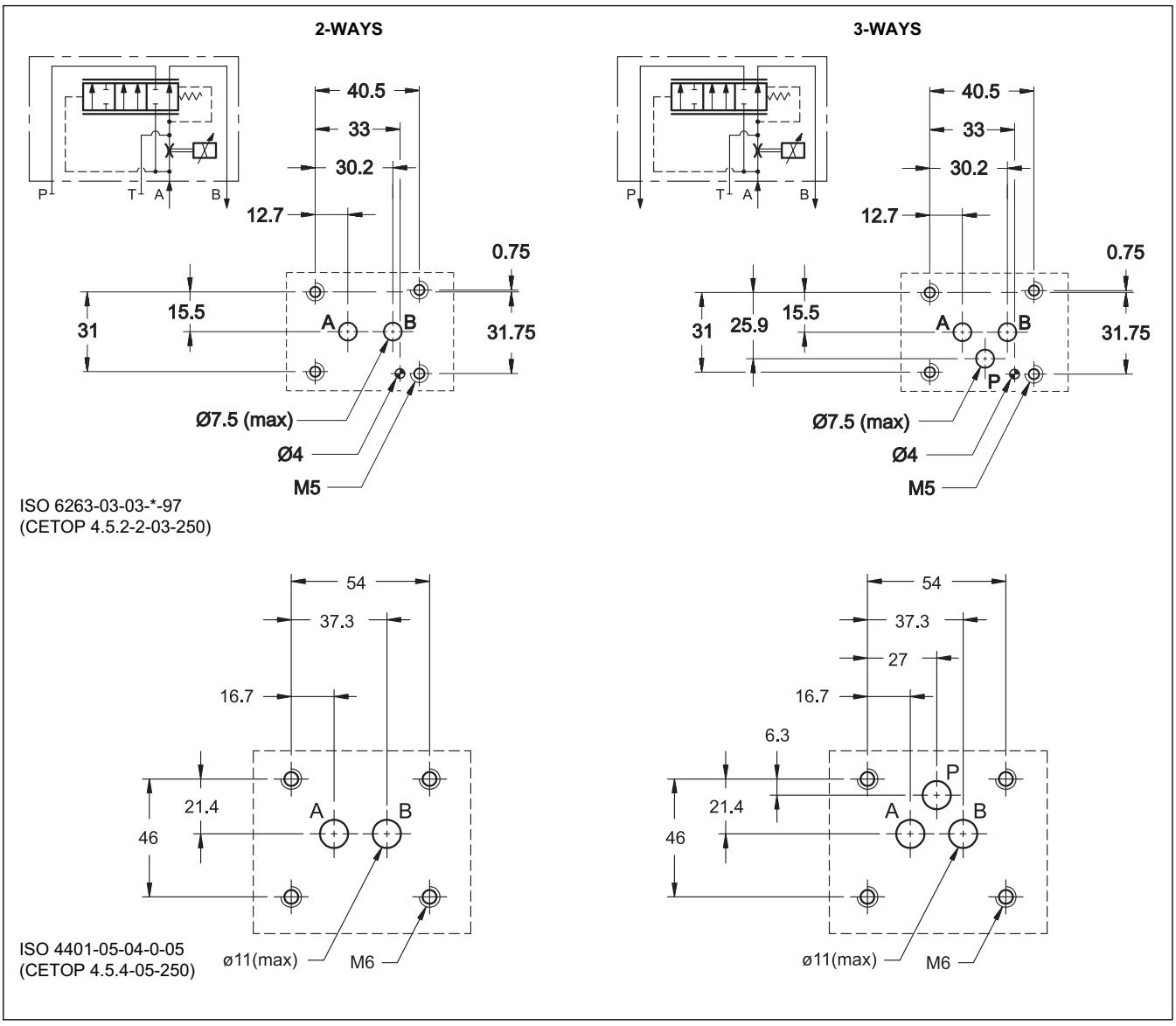
Coil electrical connection
WK1 = plug for connector type EN 175301-803 (ex DIN 43650)
WK7 = plug DEUTSCH DT04-2P, for male connector type DEUTSCH DT06-2S.

Manual override: (see at par. 10)
CM = manual override, boot protected (**standard**)
CK1 = knob manual override

2 - CONFIGURATIONS AND MOUNTING INTERFACE

The function of two or three ways is obtained realizing the mounting interface according to ISO 6263-03 for QDE3 and ISO 4401-05 for QDE5, using the port P for three way configuration only. The port T will never be used.

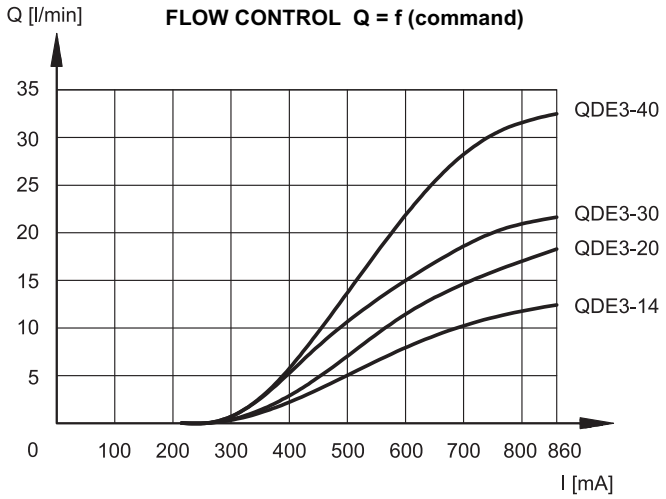
To use the valve in two ways for QDE3 is also possible to interpose a subplate with plug (code 0113388 and 0530384) be ordered separately.

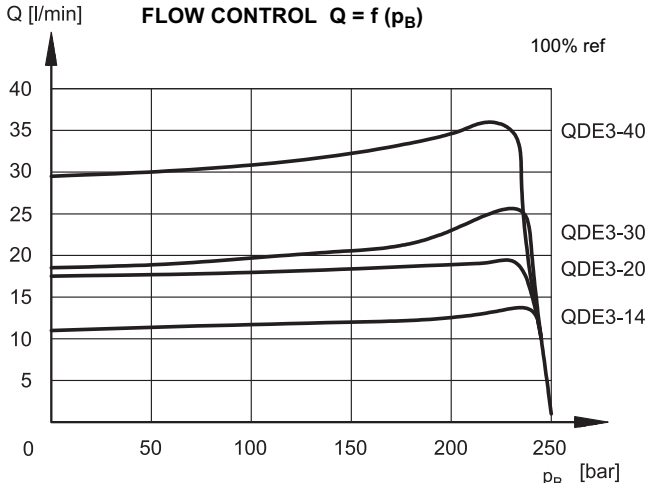


3 - CHARACTERISTIC CURVES QDE3

(obtained with viscosity of 36 cSt a 50°C)

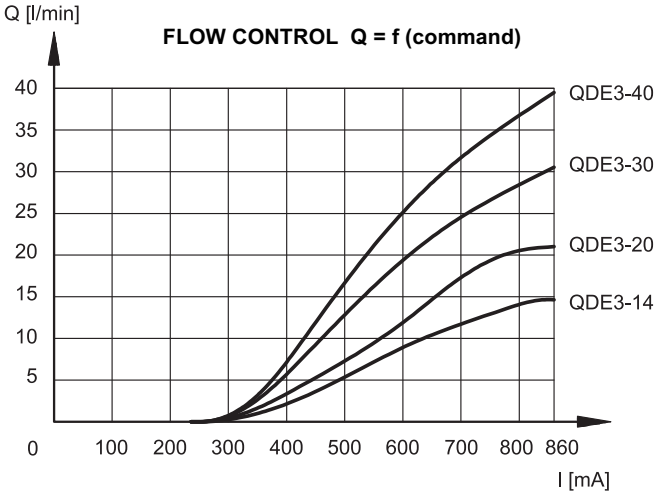
3.1 - Two ways

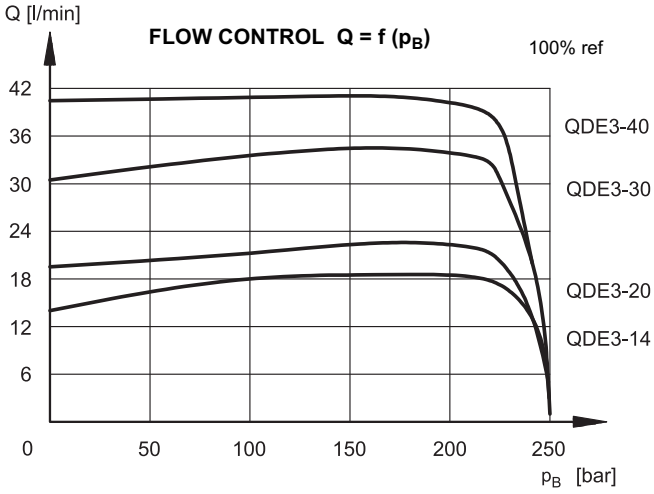




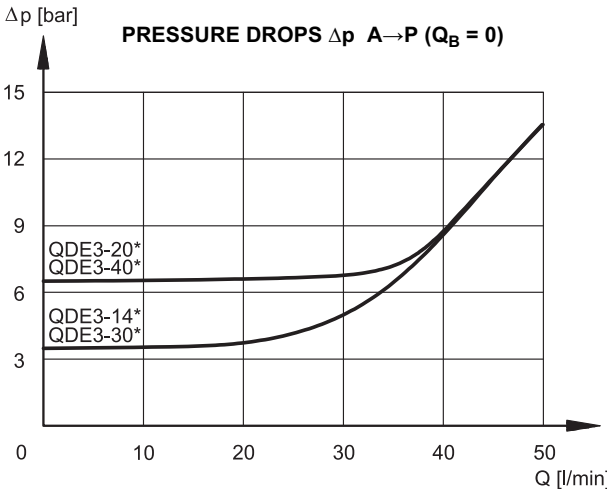
Typical flow rate characteristics A → B for controlled flow rate:
14 - 20 - 30 - 40 l/min in function of the current supplied to the solenoid (D24 version, maximum current 860 mA, PWM 100 Hz)

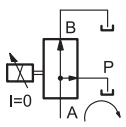
3.2 - Three ways





Typical flow rate characteristics A → B for controlled flow rate:
14 - 20 - 30 - 40 l/min in function of the current supplied to the solenoid (D24 version, maximum current 860 mA, PWM 100 Hz)



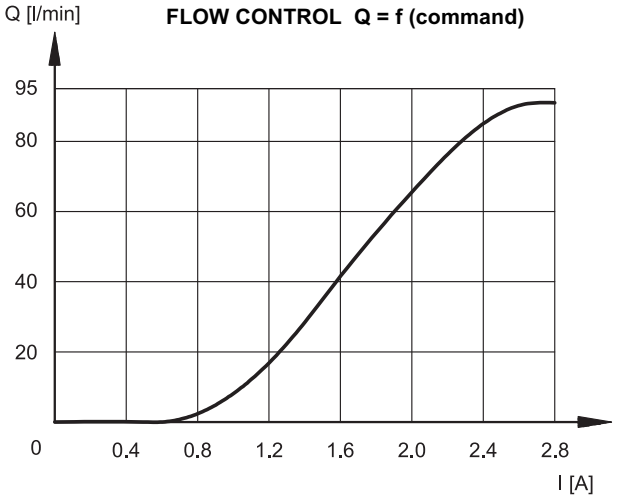


Pressure drops with flow A→P.
Obtained with Q_B = 0 (no current)

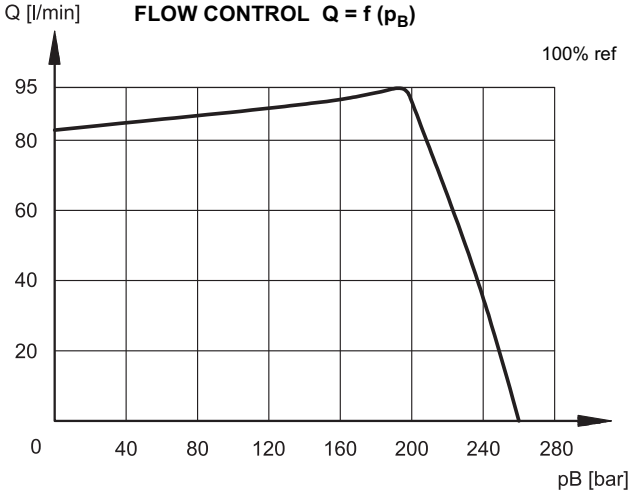
4 - CHARACTERISTIC CURVES QDE5

(obtained with viscosity of 36 cSt a 50°C)

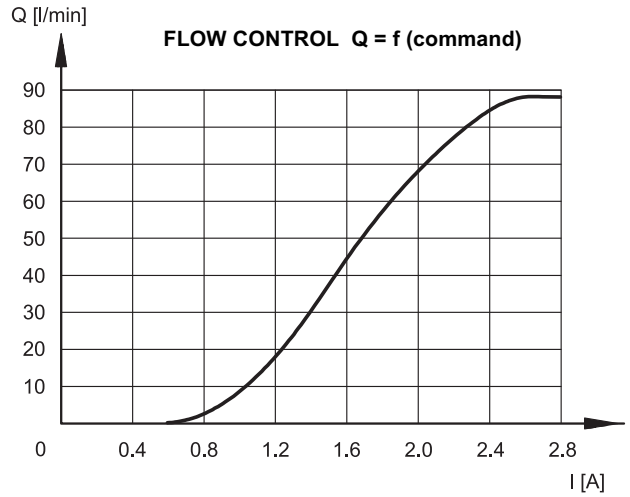
4.1 - Two ways



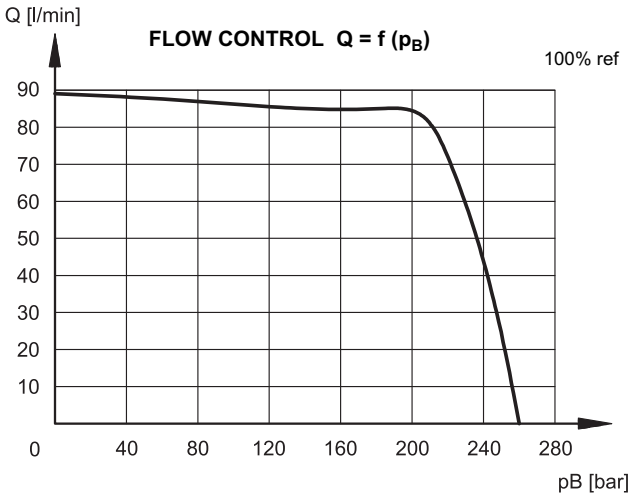
Typical flow rate characteristics A→B in function of the current supplied to the solenoid (D12 version, max current 2.8 A, PWM 100 Hz).

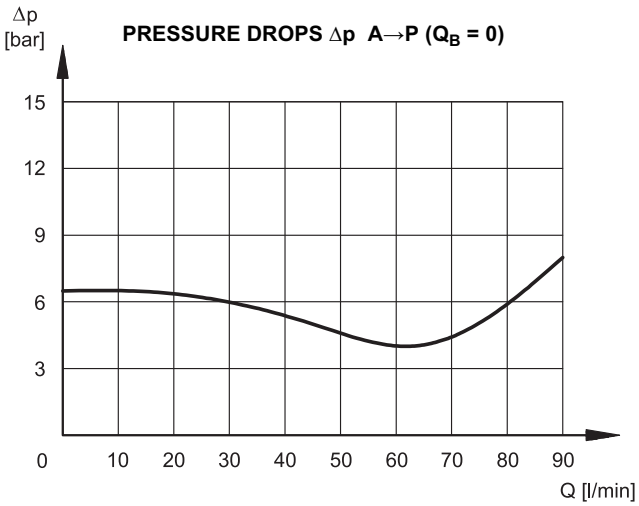


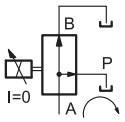
4.2 - Three ways



Typical flow rate characteristics A→B in function of the current supplied to the solenoid (D12 version, max current 2.8 A, PWM 100 Hz).







Pressure drops with flow A→P.
Obtained with Q_B = 0 (no current)

5 - ELECTRICAL CHARACTERISTIC

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU
CLASS OF PROTECTION: coil insulation (VDE 0580) Impregnation	 class H class F

		QDE3		QDE5	
NOMINAL VOLTAGE	VDC	12	24	12	24
RESISTANCE (at 20°C)	ohm	4,4	18,6	3	12
NOMINAL CURRENT	A	1,88	0,86	2,8	1,6
PWM FREQUENCY	Hz	100		100	

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP grade correctly connected and installed.

electric connection	electric connection protection	whole valve protection
QDE3		
K1 EN 175301-803	IP65	IP65
K7 DEUTSCH DT04 male	IP65/IP67	
WK1 EN 175301-803	IP66	IP66
WK7 DEUTSCH DT04 male	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

QDE5		
K1 EN 175301-803	IP65	IP65
K7 DEUTSCH DT04 male	IP65/IP67	

6 - STEP RESPONSE

(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

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

The table illustrates typical response times with Δp = 8 bar.

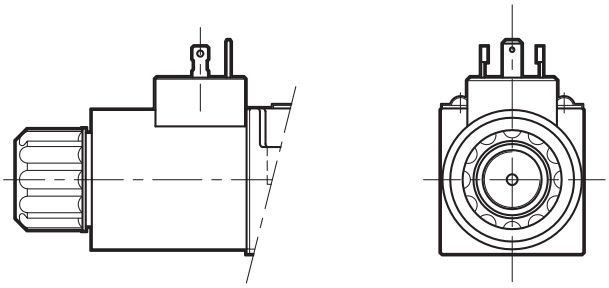
REFERENCE SIGNAL STEP	0 →100%
Step response [ms]	< 70

7 - ELECTRIC CONNECTIONS

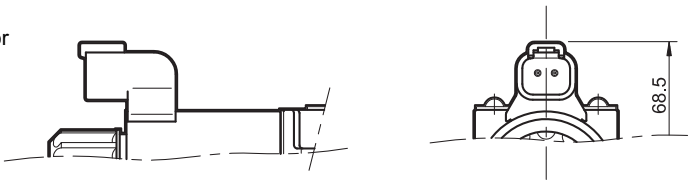
Connectors for K1and WK1 connections are always delivered together with the valve.

7.1 - QDE3

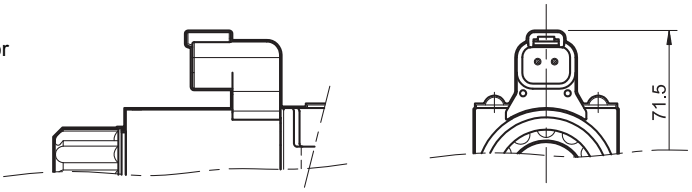
connection for EN 175301-803
(ex DIN 43650) connector
code **K1** (**standard**)
code **WK1** (W7 version)



connection for
DEUTSCH DT06-2S male connector
code **K7**

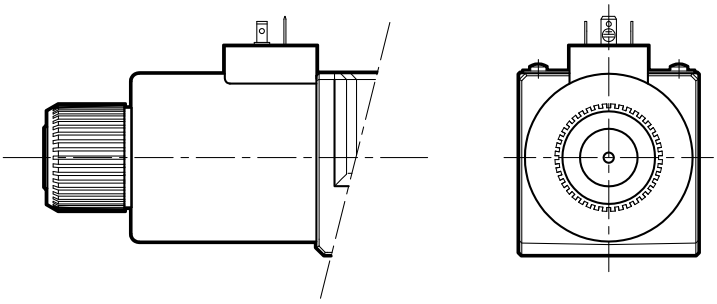


connection for
DEUTSCH DT06-2S male connector
code **WK7 (**W7 version)

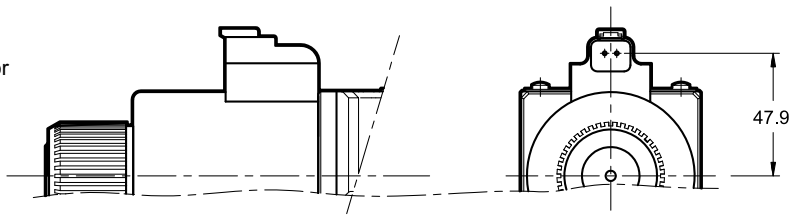


7.2 - QDE5

connection for EN 175301-803
(ex DIN 43650) connector
code **K1** (**standard**)

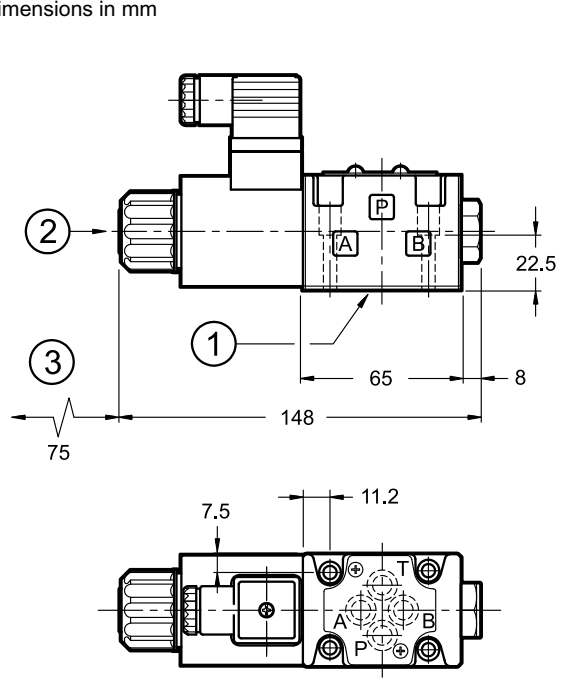


connection for
DEUTSCH DT06-2S male connector
code **K7**



8 - QDE3 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

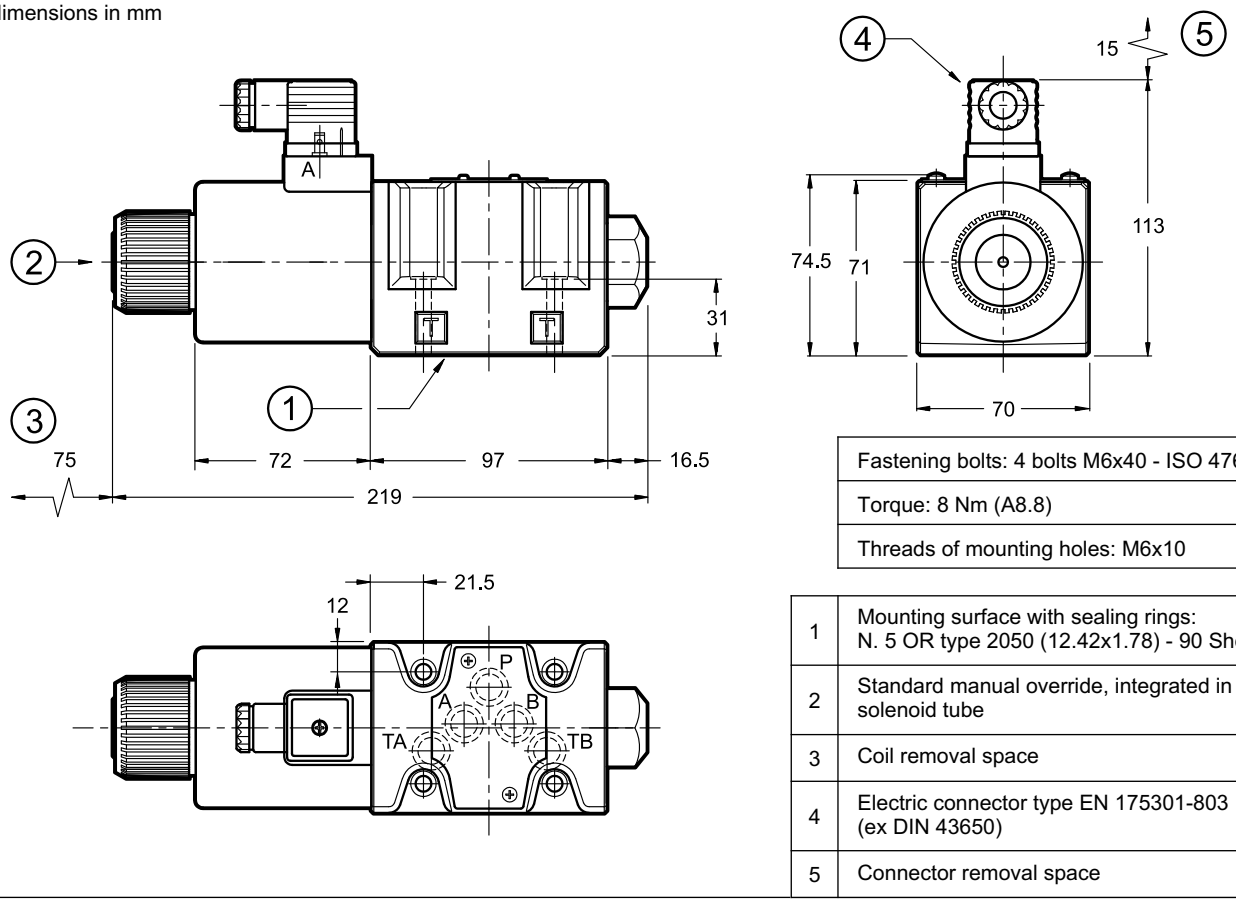


Fastening bolts: 4 bolts M5x30 - ISO 4762	
Torque: 5 Nm (A8.8)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Standard manual override, integrated in the solenoid tube
3	Coil removal space
4	Electric connector type EN 175301-803 (ex DIN 43650)
5	Connector removal space

9 - QDE5 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



Fastening bolts: 4 bolts M6x40 - ISO 4762	
Torque: 8 Nm (A8.8)	
Threads of mounting holes: M6x10	

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore
2	Standard manual override, integrated in the solenoid tube
3	Coil removal space
4	Electric connector type EN 175301-803 (ex DIN 43650)
5	Connector removal space

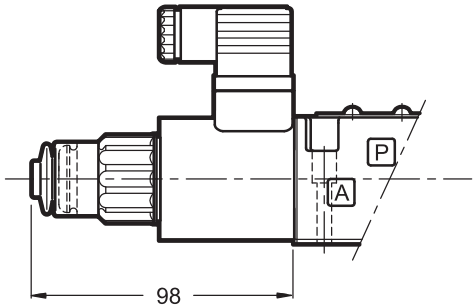
10 - MANUAL OVERRIDE

Standard valves have the pin for the manual operation integrated in the solenoid tube. The operation of this override must be executed with a suitable tool, minding not to damage the sliding surface.

For QDE3 are available:

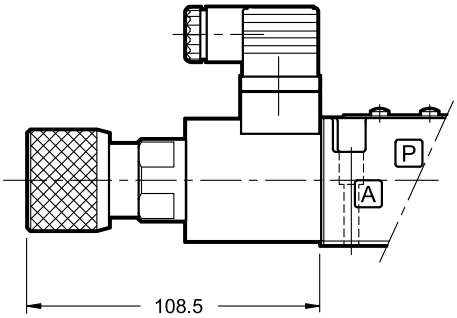
- **CM**: manual override boot protected (mandatory for WK1 coils).
- **CK1** version, knob.

CM Version



Code: 3401150006

CK1 Version

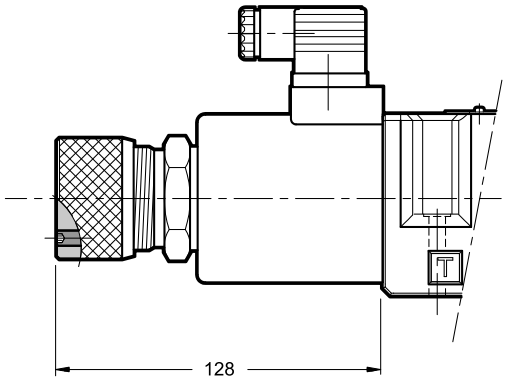


Code: 3401150015

For QDE5 only available:

- **CK** version, knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosing.

CK Version



Spanner for set screw: 3 mm

Code: 3803260003

11 - 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.

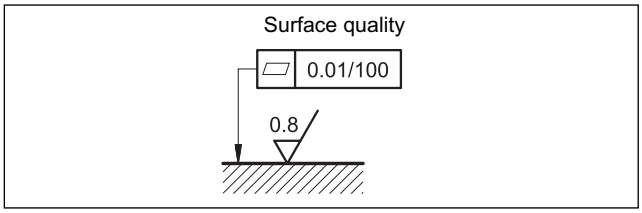
The fluid must be preserved in its physical and chemical characteristics.

12 - INSTALLATION

QDE* valves can be installed in any position without impairing correct operation. Ensure that there is no air in the hydraulic circuit.

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.



13 - ELECTRONIC CONTROL UNITS

QDE3

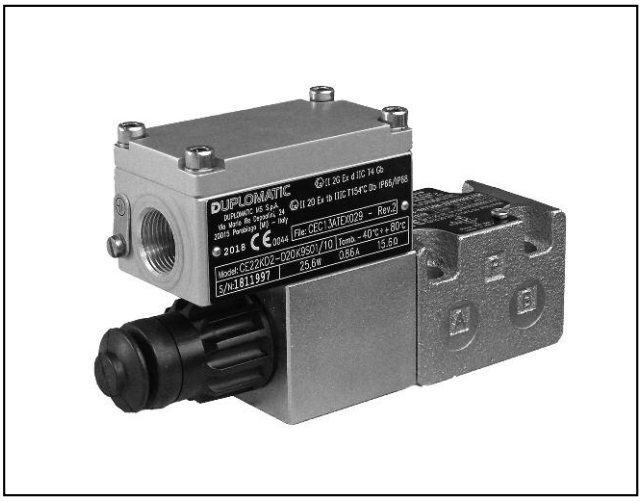
EDM-M111	24V DC solenoids	rail mounting DIN EN 50022	see catalogue 89 251
EDM-M141	12V DC solenoids		
EWM-A-PV	12V / 24V DC software config.		see catalogue 89 620

QDE5

EDM-M131	24V DC solenoids	rail mounting DIN EN 50022	see catalogue 89 251
EDM-M151	12V DC solenoids		
EWM-A-PV	12V / 24V DC software config.		see catalogue 89 620

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



QDE3K*

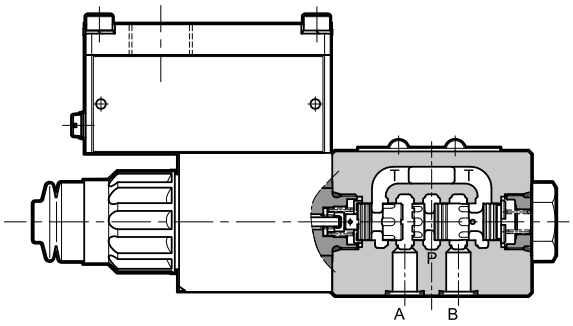
PROPORTIONAL FLOW CONTROL VALVE WITH COMPENSATION ATEX, IECEx, INMETRO

SERIES 10

SUBPLATE MOUNTING ISO 6263-03

p max **250** bar
Q max **40** l/min

OPERATING PRINCIPLE



— QDE3K* are compensated flow control valves with pressure compensation and proportional electric control, with mounting surface according to ISO 6263-03, supplied with 2 or 3 way design, depending on the use of port P.

— These valves are used for the flow control, in branches of a hydraulic circuit or for the speed control of hydraulic cylinders.

— 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 valve body is zinc-nickel coated.

— **Details for classification, operating temperatures and electrical characteristics are in the technical data sheet 02 500 'Explosion proof classification'.**

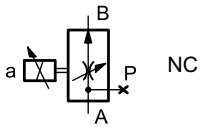
PERFORMANCES

(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

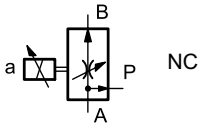
Maximum operating pressure	bar	250					
Controlled flow (Q_B)	l/min	6	8,5	14	20	30	40
Max input flow (Q_A) (3-way)	l/min	40	50	40	50	40	50
Spring setting in pressure compensator	bar	4	8	4	8	4	8
Minimum pressure drop A > B	bar	10	22	10	22	10	22
Hysteresis	% of Q_{max}	< 6 %					
Repeatability	% of Q_{max}	< ± 1,5 %					
Electrical characteristics	see paragraph 5						
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	1,9					

HYDRAULIC SYMBOLS

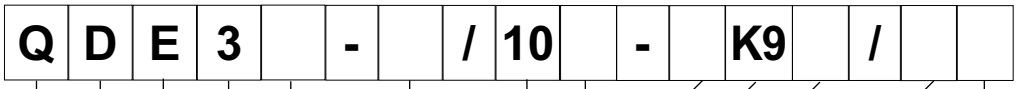
TWO WAYS



THREE WAYS



1 - IDENTIFICATION CODE



Flow control valve direct operated

Electric proportional control

Size ISO 6263-03

Explosion-proof certification:
See table 1.1

Controlled flow:
06 = 6 l/min
08 = 8,5 l/min
14 = 14 l/min
20 = 20 l/min
30 = 30 l/min
40 = 40 l/min

Series no. (from 10 to 19 sizes and mounting dimensions remains unchanged)

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)

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

Coil electrical connection: junction box

Connection type for cable gland
upper connection:
T01 = M20x1.5 - ISO 261
T02 = Gk 1/2 - UNI EN 10226-2
not available for INMETRO
T03 = 1/2" NPT - ANSI B1.20.1
(ex ANSI B2.1)
side connection:
S01 = M20x1.5 - ISO 261
S02 = Gk 1/2 - UNI EN 10226-2
not available for INMETRO
S03 = 1/2" NPT - ANSI B1.20.1
(ex ANSI B2.1)
S04 = M16x1.5 - ISO 261

Manual override:
CM = boot protected
standard for both N and V seals
not available for NL seals
CB = blind ring nut
standard for NL seals
available upon request for both N and V seals
CK1 = turning knob override
CK2 = push and twist knob override
CS = screw manual override

Option: **/T5**
version in T5 temperature class.
Omit if not required.

Version with monobloc steel coil

Standard coils are made from zinc-nickel steel and with anodized aluminium junction box.

On request, monobloc coils **MD24K9S01** are available completely made from steel, with zinc-nickel treatment (power supply voltage D24 and cable gland connection type S01). Other variants for voltage and cable gland connection are available, always on request.

NOTE: The zinc-nickel standard finishing surface treatment is suitable to ensure a salt spray resistance up to 600 hours (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards)

1.1 - Names of valves per certification

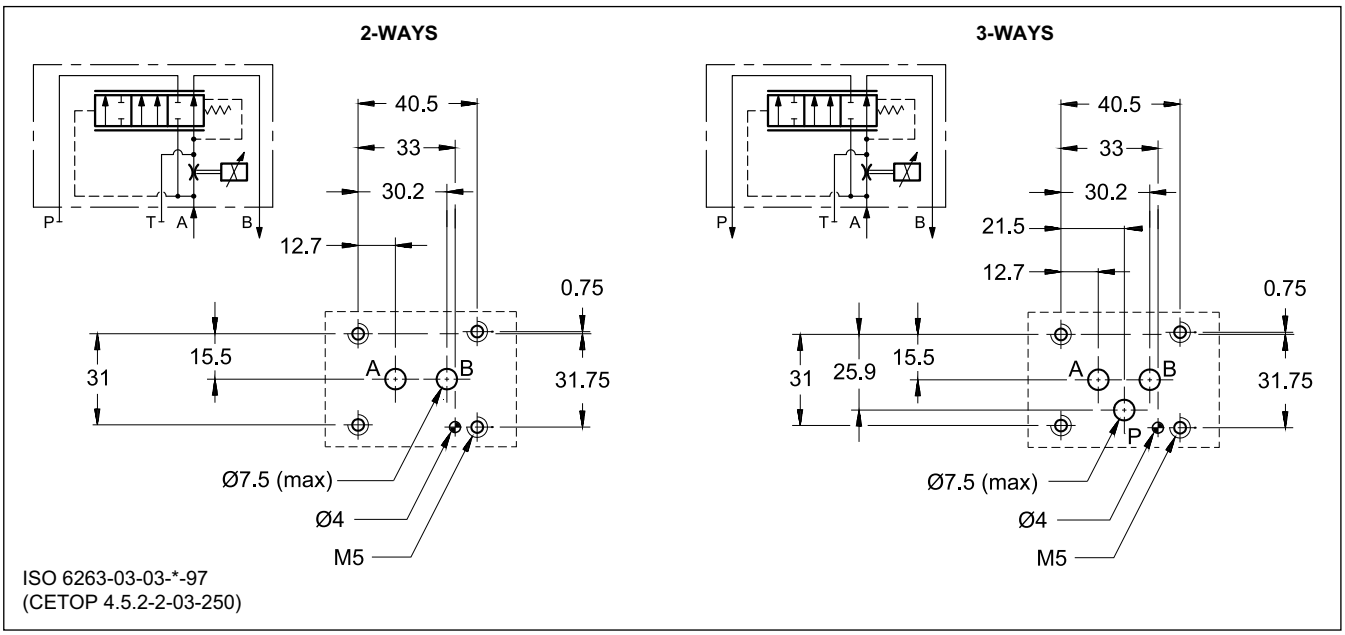
	ATEX		IECEx		INMETRO	
for gases for dusts	**KD2**	II 2GD	**KXD2**	IECEx Gb IECEx Db	**KBD2**	INMETRO Gb INMETRO Db
for mines	**KDM2**	I M2	**KXDM2**	IECEx Mb	**KBDM2**	INMETRO Mb

NOTE: Refer to the technical data sheet 02 500 for marking, operating temperatures and available versions.

2 - CONFIGURATIONS AND MOUNTING INTERFACE

The function of two or three ways is obtained realizing the mounting interface according to ISO 6263-03, using the port P for three-ways configuration only. The port T will never be used.

To use the valve in two-ways mode is also possible interposing a subplate with plug (code 0113388 and 0530384), to be ordered separately.

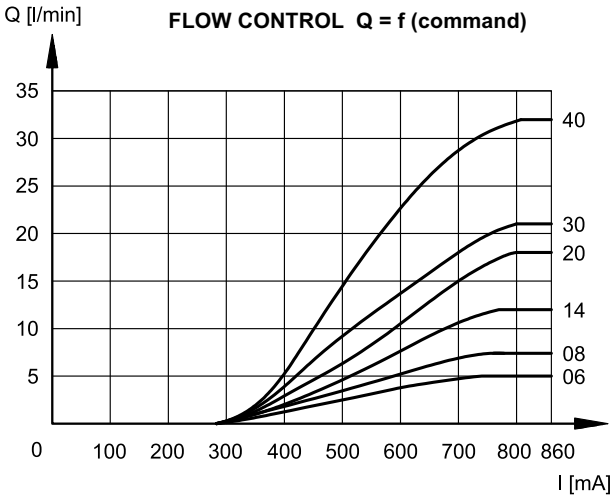


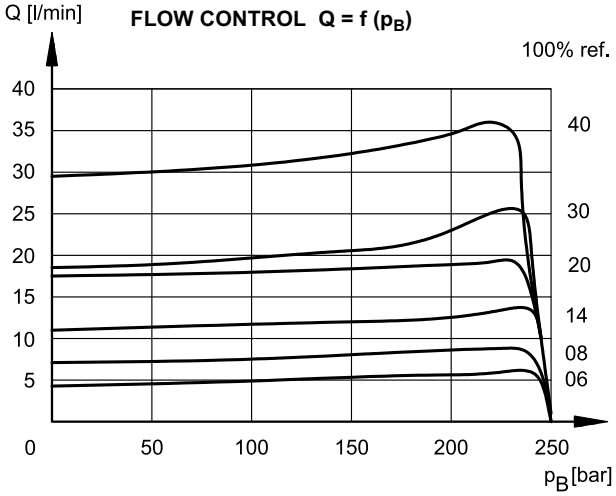
ISO 6263-03-03-*-97
(CETOP 4.5.2-2-03-250)

3 - CHARACTERISTIC CURVES

(obtained with viscosity of 36 cSt a 50°C)

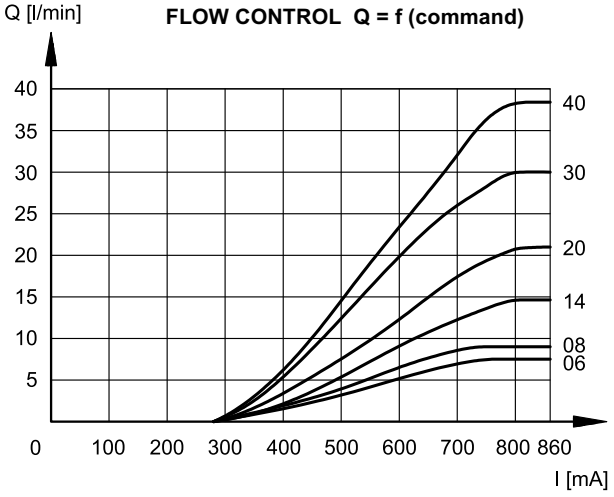
3.1 - Two ways

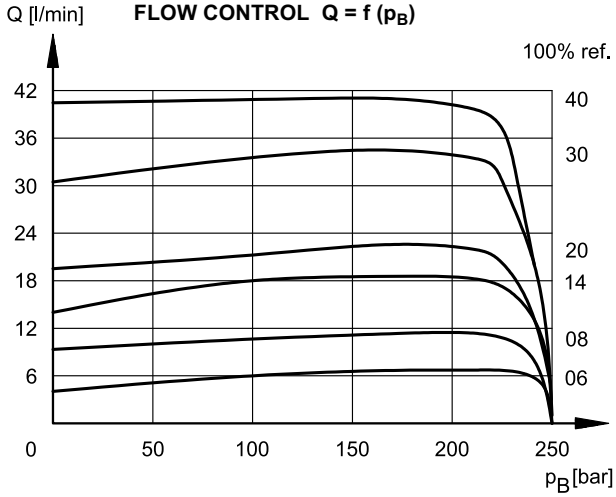




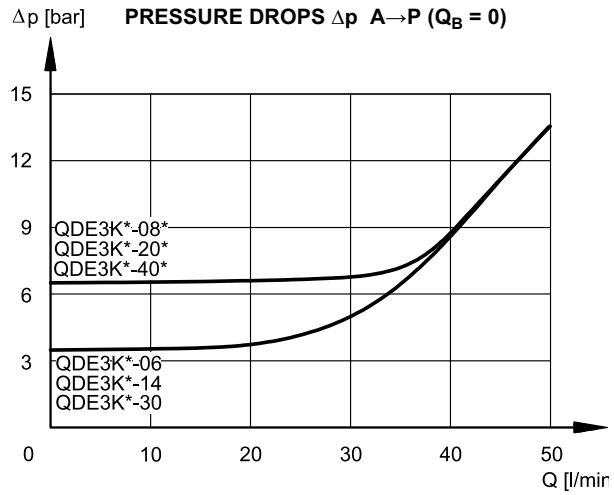
Typical flow rate characteristics A → B for controlled flow rate: 14 - 20 - 30 - 40 l/min in function of the current supplied to the solenoid (D24 version, maximum current 860 mA, PWM 100 Hz)

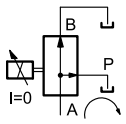
3.2 - Three ways





Typical flow rate characteristics A → B for controlled flow rate: 14 - 20 - 30 - 40 l/min in function of the current supplied to the solenoid (D24 version, maximum current 860 mA, PWM 100 Hz)





Pressure drops with flow A→P.
Obtained with Q_B = 0 (no current)

4 - STEP RESPONSE

(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

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

The table illustrates typical response times with Δp = 8 bar.

REFERENCE SIGNAL STEP	0 →100%
Step response [ms]	< 70

5 - ELECTRICAL CHARACTERISTICS

(values ± 5%)

NOMINAL VOLTAGE	V DC	12	24
RESISTANCE (AT 20°C)	Ω	3,8	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

5.1 - 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.

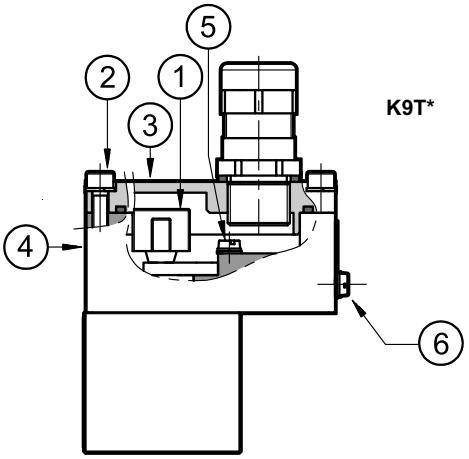
The electrical connection is polarity-independent.

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.

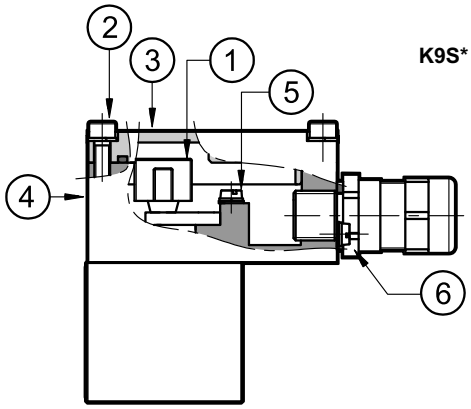
On the external body of the coil there is a grounding point (6) (M4 screw) that allow to ensure equipotentiality between the valve and the general grounding line of the system; connecting this point the regulation of the EN 13463-1 standard, that impose to verify the equipotentiality of the elements 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 in compliance with standards about protection against explosion hazards



K9T*



K9S*

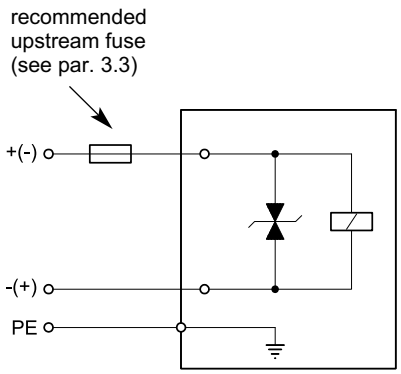
Characteristics of the cables connectable for wiring are indicated in the table below:

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

5.2 - Electrical diagrams



5.3 - 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.

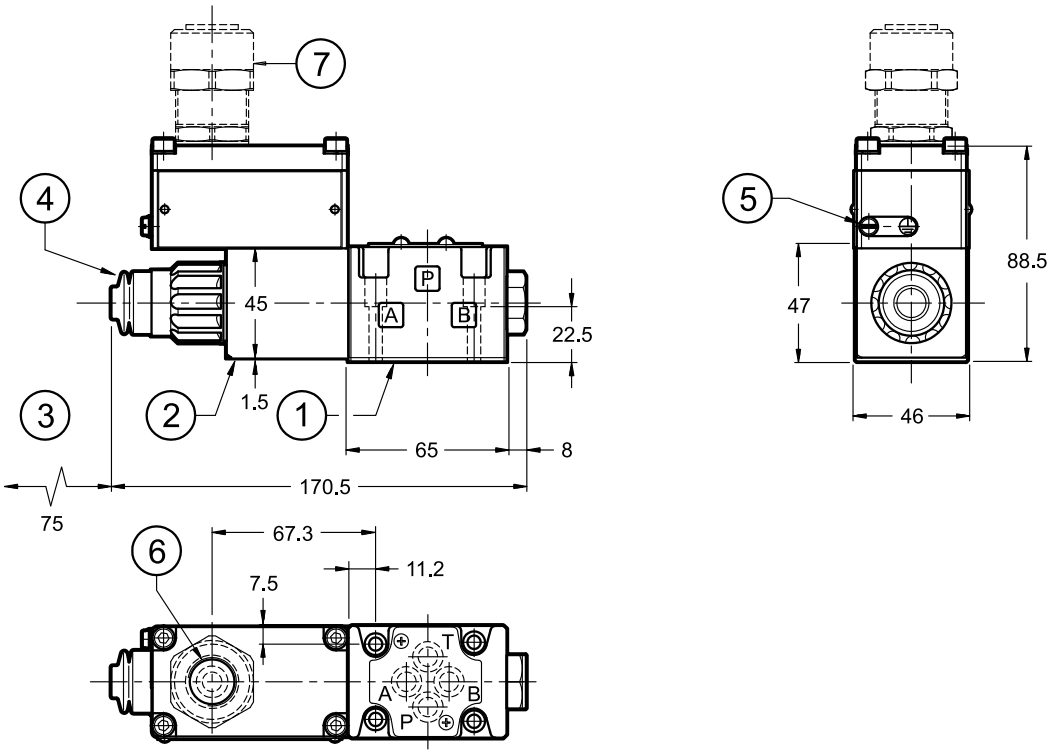
The table shows the type of fuse recommended according to the nominal voltage of the valve and to the value of the voltage peaks reduction.

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	

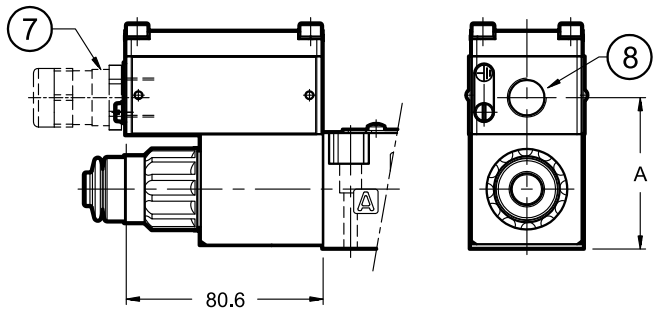
6 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

QDE3K*-*/10*-*K9T*/CM



QDE3K*-*/10*-*K9S*/CM



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

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) - 90 Shore
2	Explosion-proof coil
3	Minimum clear space required
4	Manual override, boot protected (**standard for both N and V seals**) for blind ring nut dimensions (standard for NL seals) see par. 9
5	Terminal for supplementary GND connection
6	Upper port for cable gland
7	Cable gland. To be ordered separately, see par. 10
8	Side port for cable gland

Valve fastening: 4 SHC screws ISO 4762 M5x30
Tightening torque: 5 Nm (A8.8 screws)
Threads of mounting holes: M5x10

7 - 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 fluid types 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.

8 - INSTALLATION

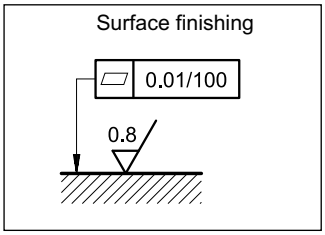
Installation must adheres to instructions reported in the *Use and Maintenance manual*, always attached to the valve. Unauthorized interventions can be harmful to people and goods because of the explosion hazards present in potentially explosive atmospheres.

The valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



9 - MANUAL OVERRIDES

9.1 - CB - Blind ring nut

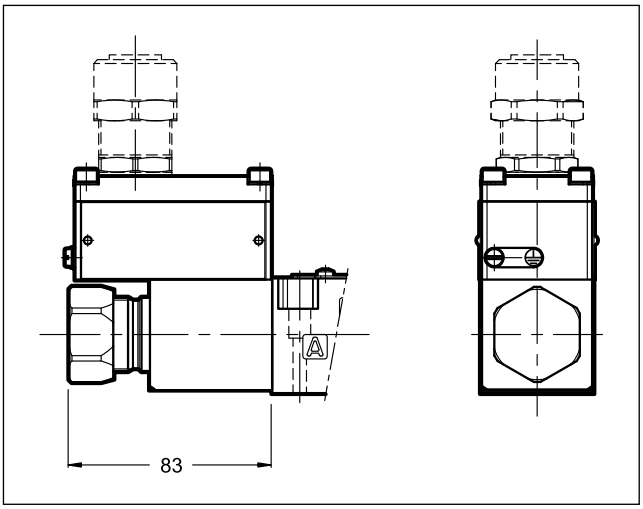
The metal ring nut protects the solenoid tube from atmospheric agents and isolates the manual override from accidental operations. The ring nut is tightened on a threaded fastener that keeps the coil in its position even without the ring nut.

To access the manual override, loosen the ring nut and remove it; then reassemble hand tightening, until it stops.

Activate the manual override always and only with non-sparking tools suitable for use in potentially explosive atmospheres.

More information on safe use of explosion-proof components are provided in the instruction manual, always supplied with the valve.

CAUTION!: The manual override use doesn't allow any proportional regulation.

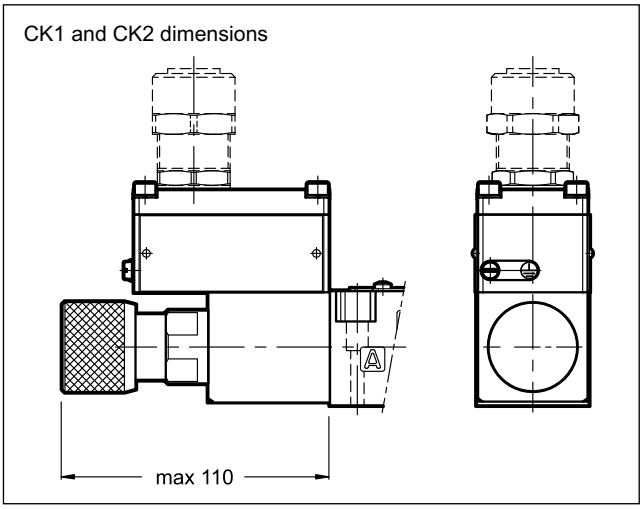


9.2 - CK1 - Knob manual override

Screwing the knob activates this manual override.

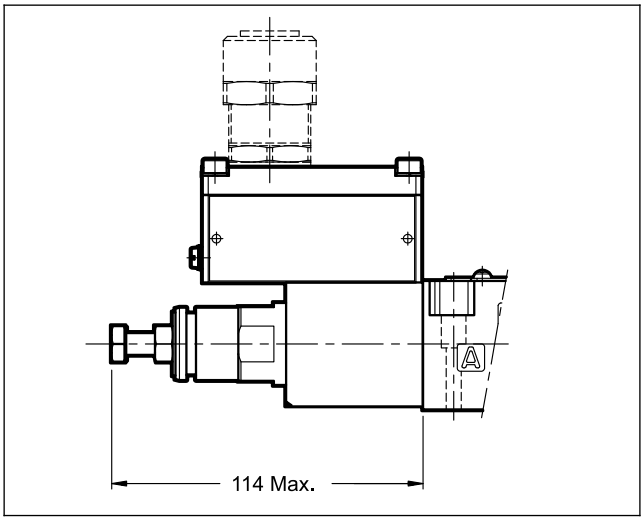
9.3 - CK2 - Push and twist manual override

Pressing and turning the knob activates this manual override.



9.3 - CS - Screw manual override

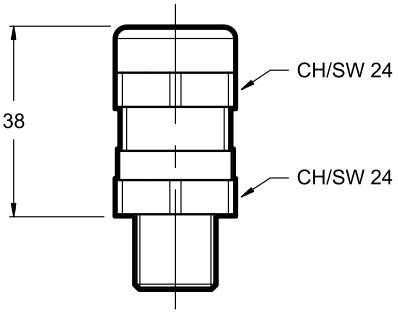
Metal ring nut provided with a M8 screw and a blocking locknut to allow the continuous mechanical operations.



10 - 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);
- 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 ºC ÷ +220 ºC
- 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

11 - ELECTRONIC CONTROL UNITS

EDM-M111	24V DC solenoids	rail mounting DIN EN 50022	see catalogue 89 251
EDM-M141	12V DC solenoids		
EWM-A-PV	12V / 24V DC software config.		see catalogue 89 620

NOTE: electronic control units offered are not explosion proof certified; therefore, they must be installed outside the classified area.

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

EXPLOSION-PROOF CLASSIFICATION for

SOLENOID AND PROPORTIONAL VALVES

ref. catalogues:

pressure control valves	
RQM*K*-P	**21 515**
P*E*K*	**81 316**
ZDE3K*	**81 515**
DZCE*K*	**81 605**
flow control valves	
QDE*K*	**82 225**
directional valves	
D*K*	**41 515**
DT3K*	**42 215**
DS(P)E*K*	**83 510**

GENERAL INFO

This informative technical datasheet displays information about **classification and marking** of Duplomatic explosion-proof valves range.

Duplomatic MS offers valves with the following certifications:

ATEX	**II 2G**	**II 2D**	**I M2**
IECEx	**Gb**	**Db**	**Mb**
INMETRO	**Gb**	**Db**	**Mb**

Instructions for use and maintenance can be found in the related manuals, always supplied toghether with valves.

1 - ATEX CLASSIFICATION AND TEMPERATURES

Duplomatic certificates the combination valve-coil for the valves suitable for application and installation in potentially explosive atmospheres, according to ATEX directive; 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.

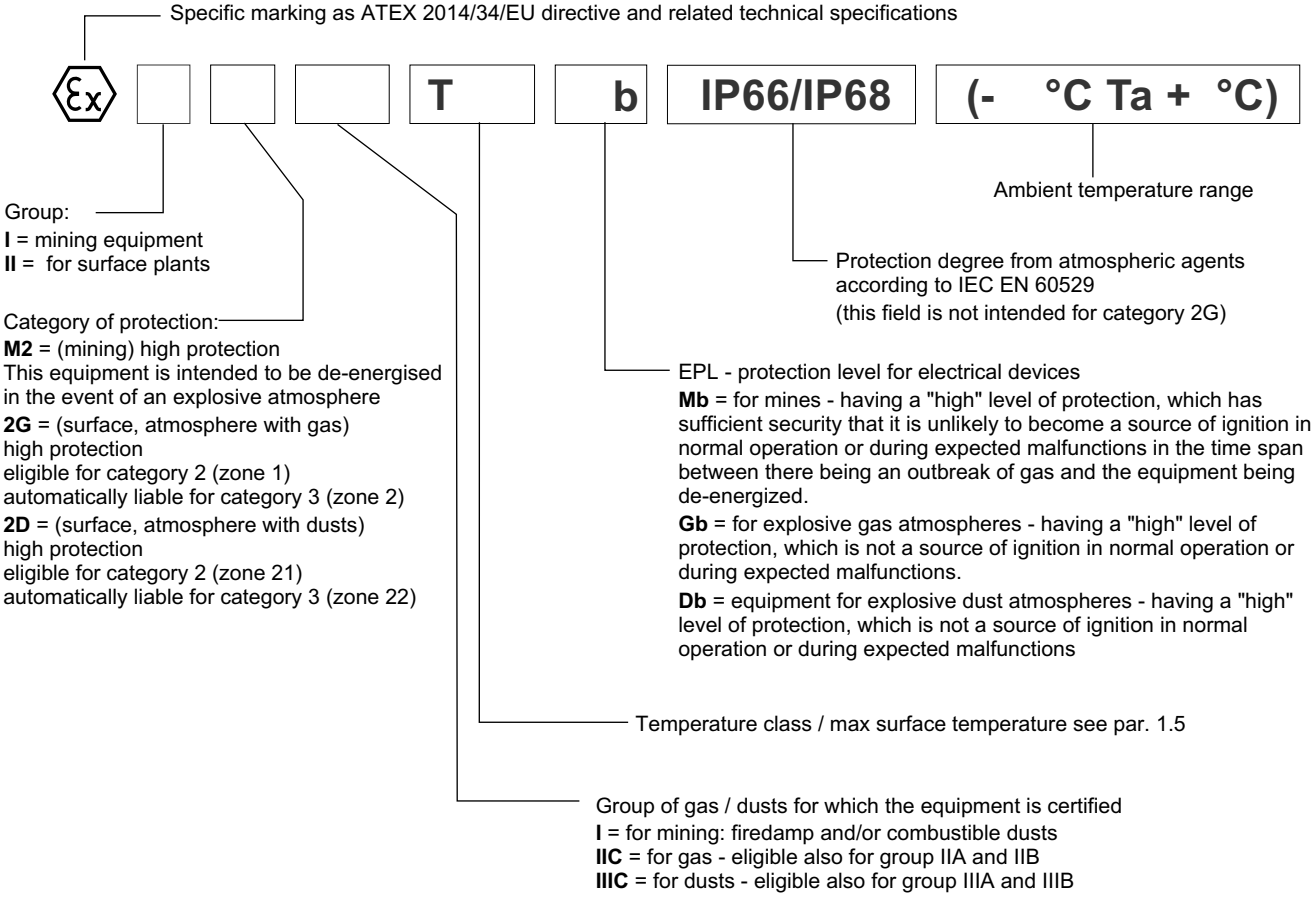
1.1 - ATEX classification for valves

Type examination certificate: AR18ATEX055
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

ATEX II 2G ATEX II 2D	***KD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
ATEX I M2	***KDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

1.2 - ATEX marking for valves

valve code		N and V seals	NL seals
***KD2**	for gas	Ⓔx II 2G IIC T4 Gb (-20°C Ta +80°C)	Ⓔx II 2G IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ⓔx II 2D IIIC T154°C Db IP66/IP68 (-20°C Ta +80°C)	Ⓔx II 2D IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
***KD2 /T5**	for gas	Ⓔx II 2G IIC T5 Gb (-20°C Ta +55°C)	Ⓔx II 2G IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-20°C Ta +55°C)	Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
***KDM2**	mining	Ⓔx I M2 I T150°C Mb IP66/68 (-20°C Ta +75°C)	Ⓔx I M2 I T150°C Mb IP66/68 (-40°C Ta +75°C)



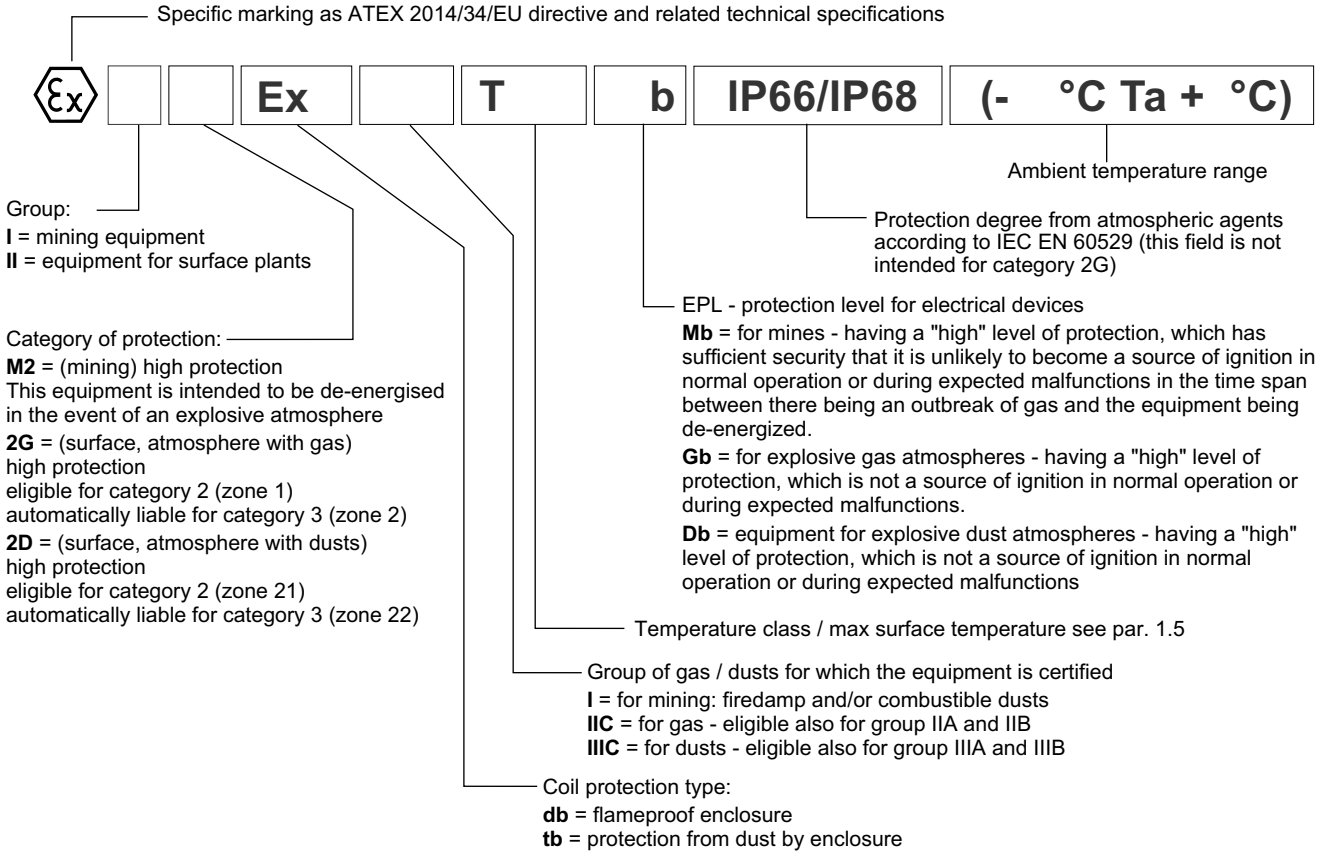
1.3 - ATEX classification of the coils

The coil of the explosion-proof valves is ATEX certified itself an as such is identified with its own tag, 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 db” type protection (explosion-proof coil).

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

1.4 - ATEX marking on coils

for valve type ***KD2**	for gas	Ⓔx II 2G Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ⓔx II 2D Ex tb IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
for valve type ***KD2 /T5**	for gas	Ⓔx II 2G Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ⓔx II 2D Ex tb IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
for valve type ***KDM2**	mining	Ⓔx I M2 Ex db I T150°C Mb IP66/IP68 (-40°C Ta +75°C)



1.5 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

The valves in group II can also be used for less limiting temperature classes (surface temperature allowed higher).

		temperature range	**N and V seals**	**NL seals**	Temperature class	eligible also for
ATEX II 2G ATEX II 2D	***KD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T154°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T129°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
ATEX I M2	***KDM2**	of ambient	-20 / +75 °C	-40 / +75 °C	T150°C	-
		of fluid				

2 - IECEx CLASSIFICATION AND TEMPERATURES

The IECEx certification requires the classification of the electrical equipment only.

Duplomatic supplies valves with IECEx certified coils, suitable for application and installation in potentially explosive atmospheres. 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 db” type protection (explosion-proof coil).

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

The supply always includes the operating and maintenance manual, that contains all the information needed for a correct use of the valve in potentially explosive environment.

2.1 - IECEx classification

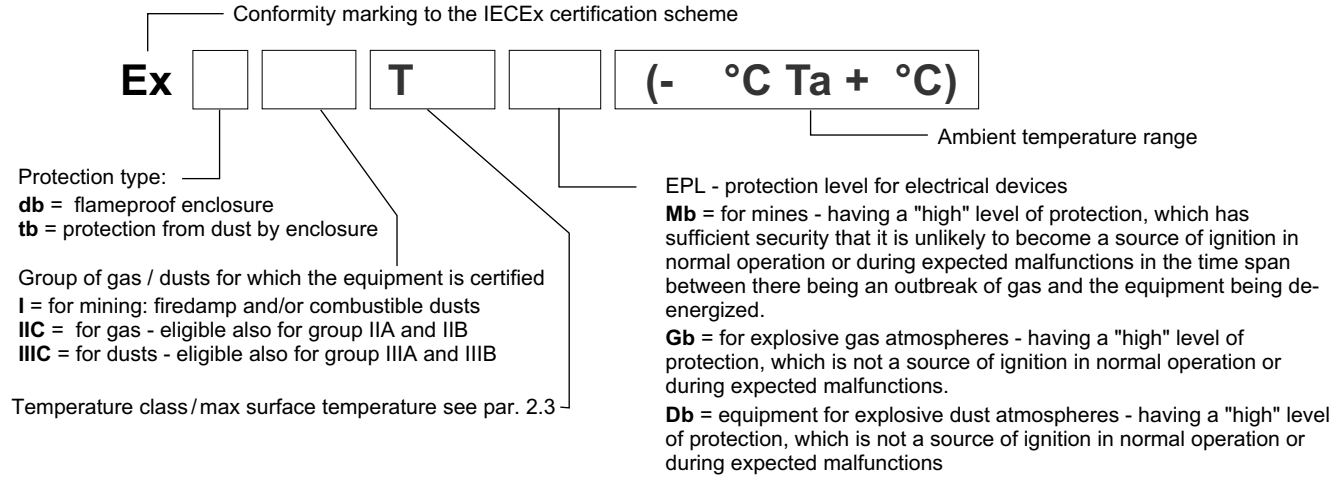
Certificate of conformity (CoC): IECEx TUN 15.0028X
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

IECEx Gb IECEx Db	***KXD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
IECEx Mb	***KXDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

2.2 - IECEx marking

There is a plate with the IECEx mark on each coil.

***KXD2** valves	for gas	Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ex tb IIIC T135°C Db (-40°C Ta +80°C)
***KXD2 /T5** valves	for gas	Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ex tb IIIC T100°C Db (-40°C Ta +55°C)
***KDM2** valves	mining	Ex db I Mb (-40°C Ta +80°C)



2.3 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

Valves for surface plants can also be used for less limiting temperature classes (higher surface temperature allowed).

		temperature range	**N and V seals**	**NL seals**	Temperature class	eligible also for
IECEx Gb IECEx Db	***KXD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T135°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KXD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T100°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
IECEx Mb	***KXDM2**	of ambient	-20 / +80 °C	-40 / +80 °C	-	-
		of fluid				

3 - INMETRO CLASSIFICATION AND TEMPERATURES

The INMETRO certification requires the classification of the electrical equipment only.

Duplomatic supplies valves with INMETRO certified coils, suitable for application and installation in potentially explosive atmospheres. 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 db” type protection (explosion-proof coil).

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

The supply always includes the operating and maintenance manual, that contains all the information needed for a correct use of the valve in potentially explosive environment.

3.1 - INMETRO classification

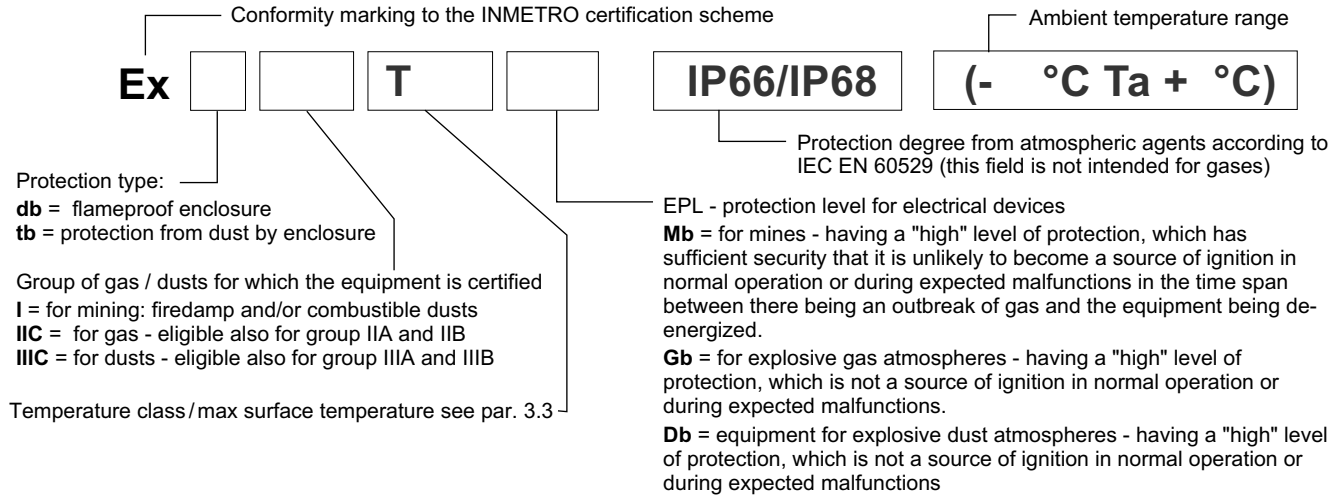
Certificate of conformity: DNV 15.0094 X
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

INMETRO Gb INMETRO Db	***KBD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
INMETRO Mb	***KBDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

3.2 - INMETRO marking

There is a plate with the INMETRO mark on each coil.

***KBD2** valves	for gas	Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ex tb IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
***KBD2 /T5** valves	for gas	Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ex tb IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
***KBDM2** valves	mining	Ex db I T150° Mb IP66/IP68 (-40°C Ta +75°C)



3.3 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

Valves for surface plants can also be used for less limiting temperature classes (higher surface temperature allowed).

		temperature range	N and V seals	NL seals	Temperature class	eligible also for
INMETRO Gb INMETRO Db	***KBD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T154°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KBD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T129°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
INMETRO Mb	***KBDM2**	of ambient	-20 / +75 °C	-40 / +75 °C	T150°C	-
		of fluid				

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RPCER1

DIRECT OPERATED FLOW CONTROL VALVE WITH ELECTRIC PROPORTIONAL CONTROL AND POSITION FEEDBACK

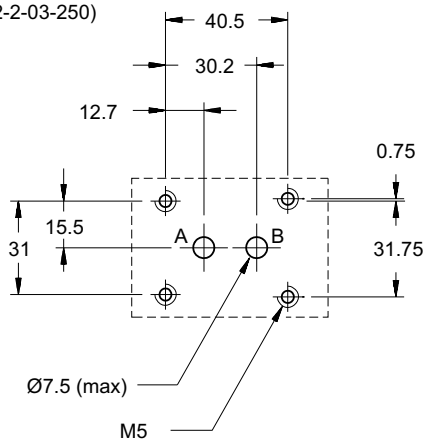
SERIES 52

SUBPLATE MOUNTING
ISO 6263-03

p max **250** bar
Q max (see performances table)

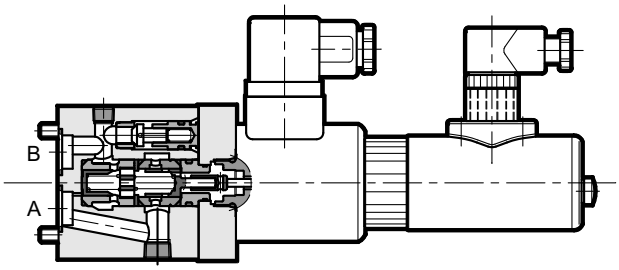
MOUNTING INTERFACE

ISO 6263-03-03-0-97
(CETOP 4.5.2-2-03-250)



NOTE: the RPCER1 mounting interface, with holes according to ISO 6263-03, must not have P and T ports

OPERATING PRINCIPLE



— RPCER1 is a pressure and temperature compensated two-way flow control valve, with electric proportional control and mounting interface according to ISO 6263 standards.

— The position feedback of the flow rate controlling throttle gives regulation conditions featuring highly reduced hysteresis and high repeatability.

— This valve controls the flow rate in a branch of the hydraulic circuit or the speed of hydraulic actuators.

— The flow rate can be modulated continuously in proportion to the reference signal coming from the electronic control unit.

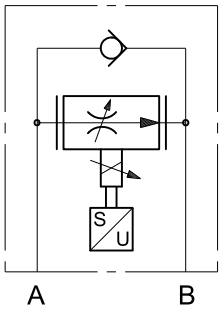
— It is available in five flow rate control ranges up to 25 l/min.

PERFORMANCES

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

Maximum operating pressure Minimum Δp between A and B port	bar	250 10
Maximum controlled flow Min. controlled flow (for 1 and 4 l/min. reg.) Maximum free-reverse flow	l/min	1,5 - 4 - 8 - 16 - 25 0,025 40
Step response	see paragraph 7	
Hysteresis	% of Q max	< 2,5%
Repeatability	% of Q max	< ±1%
Electrical characteristic	see paragraph 6	
Ambient temperature range	°C	-10 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13 (class 17/15/12 for flows < 0,5 l/min)	
Recommended viscosity	cSt	25
Mass	kg	2,2

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

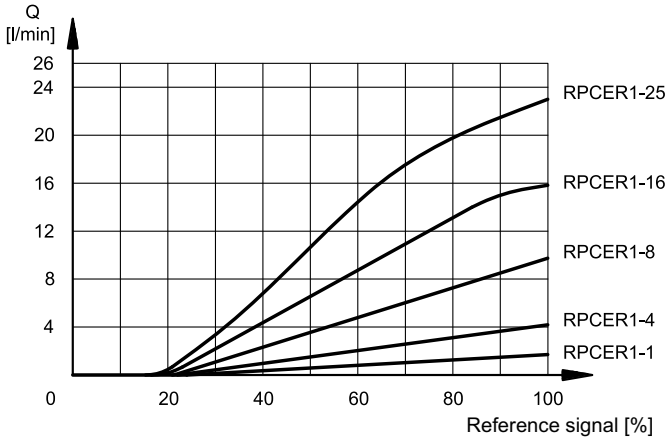
R	P	C	E	R	1	-		/	C	/	52	-	24	/	

- Compensated flow control valve
- Electric proportional control
- Position feedback
- ISO 6263-03 size
- Maximum controlled flow:
  1 = 1.5 l/min **16** = 16 l/min
  4 = 4 l/min **25** = 25 l/min
  8 = 8 l/min
- Built-in check valve
- Series No. (from 50 to 59 sizes and mounting dimensions remain unchanged)
- Nominal solenoid voltage 24 V DC
- Seal: omit for mineral oils
  V = FPM seals for special fluids

2 - CHARACTERISTIC CURVES

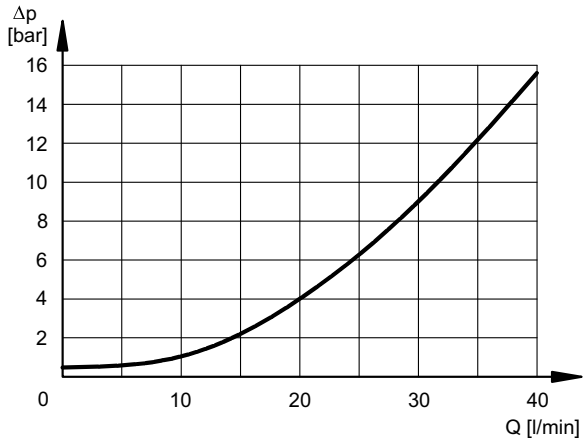
(measured with viscosity of 36 cSt at 50°C and UEIK-11RSQ/52-24 card)

FLOW CONTROL Q = f (ref)



Typical curves for flow rate A →B according to the reference signal sent to the electronic control unit.

PRESSURE DROP Δp = f (Q)



Pressure drop with free flow B→A through check valve.

3 - PRESSURE COMPENSATION

The valves are equipped with two restrictors in series. The first is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor ensures constant pressure drop across the adjustable restrictor.

In these conditions, the set flow rate value is maintained constant within a tolerance limit of ± 2% of the full scale flow rate for maximum pressure variation between the valve inlet and outlet chambers.

4 - THERMAL COMPENSATION

Thermal compensation of the valve is obtained by adopting the principle of restricted fluid passage, so that the fluid is not influenced significantly by variations in oil viscosity.

For controlled flow rates of lower than 0.5 l/min and with a temperature change of 30°C, flow rate varies by approx. 13% of the set value.

For higher flow rates and with the same temperature change the flow rate variation is <4% of the set flow rate.

5 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4.

For these fluids, use NBR seals. 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.

6 - ELECTRICAL CHARACTERISTICS

6.1 - Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to reduce friction to a minimum thereby reducing hysteresis.

The armature connected to the LVDT transducer core sends the position status to the electronic card.

NOMINAL VOLTAGE	V DC	**24**
RESISTANCE (at 20°C)	Ω	17.6
MAXIMUM CURRENT	A	0.86
DUTY CYCLE	100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)	IP65	

6.2 - Position transducer

The RPCER1 valve has an LVDT type position transducer with amplified signal. This type of transducer allows a precise control of the restrictor and of the set flow rate, thus improving repeatability and hysteresis characteristics.

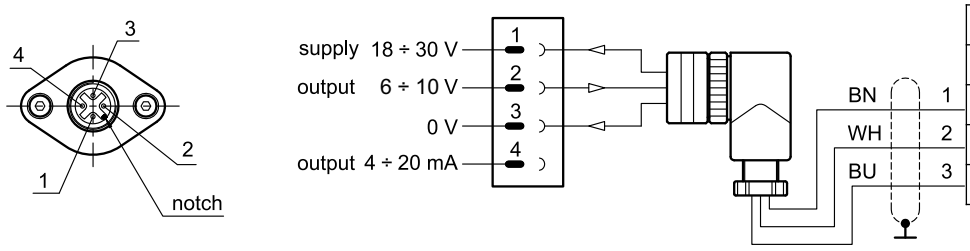
The transducer is fitted coaxially on the proportional solenoid and the connector features 360° positioning. The field-wireable mating connector is always included.

Use a screened cable to avoid interferences.

Technical specifications and connections are indicated here below.

The transducer is protected against polarity inversion on the power line.

transducer ouput at closed valve 6 V, at open valve 10 V



pin on control card	
UEIK-11RSQ	EDM-J1*/RPCER1
8c	13
24a	10
22c	15 (**NOTE**)

NOTE: with jumper on pin 11

7 - STEP RESPONSE

(measured with mineral oil with viscosity of 36 cSt at 50°C with UEIK-11RSQ/52-24 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 response times with valve flow rate of 16 l/min and with input pressure of 100 bar.

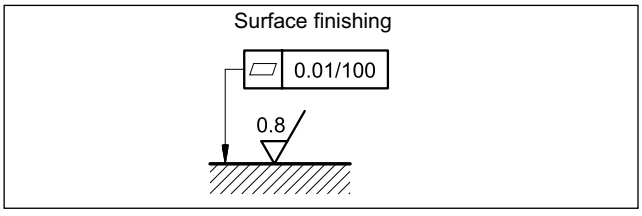
REFERENCE SIGNAL	0 → 100%	100 → 0%	25→100%	100→25%
Step response [ms]	180	150	150	120

8 - INSTALLATION

RPCER1 valves can be installed in any position without impairing correct operation.

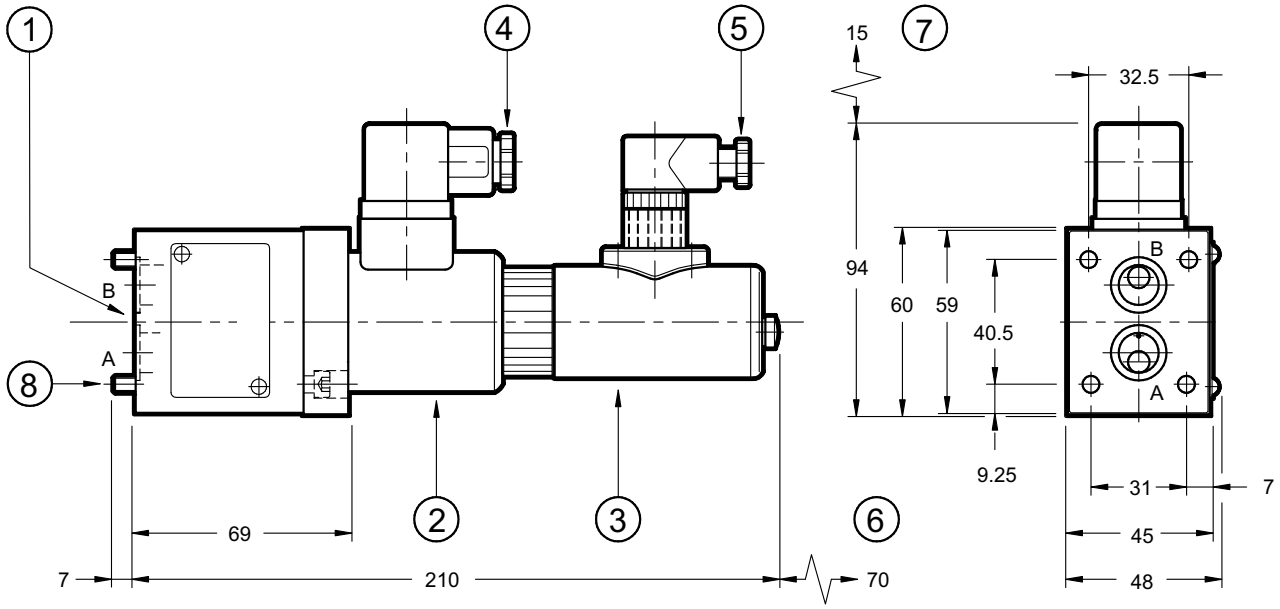
Ensure that there is no air in the hydraulic circuit.

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 mounting surface.



9 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Mounting surface with sealing rings: 2 ORM-0140-20 (14x2)
2	Proportional solenoid
3	Position transducer
4	EN 175301-803 (ex DIN 43650) electrical connector for proportional solenoid
5	Electrical connector 4 pin M12 - IP67 PG7 for position transducer
6	Position transducer removal space
7	Connector removal space
8	4 SHCS M5x65 included in the supply. Torque: 5 Nm

10 - ELECTRONIC CONTROL UNIT

EDM-J1/*RPCER1	DIN EN 50022 rail mounting	see cat. 89 255
UEIK-11RSQ	Eurocard	see cat. 89 315

The card holder for Eurocard electronics is available.

Code 3899000001 to order.

11 - SUBPLATES

(see cat. 51 000)

PMRPC1-AI3G rear ports
PMRPC1-AL3G side ports
Port dimensions: 3/8” BSP

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RPCE2-*

PROPORTIONAL FLOW CONTROL VALVE, PILOT OPERATED

SERIES 52

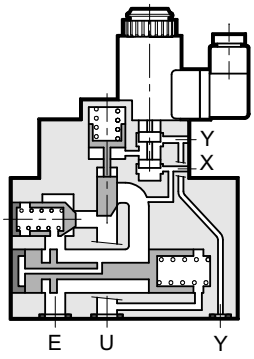
RPCE2-∗/C two-port
RPCE2-70-T3 three-port

SUBPLATE MOUNTING
ISO 6263-06

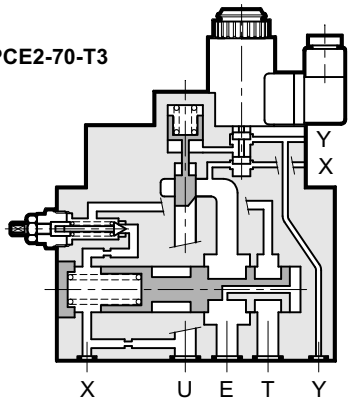
p max **250** bar
Q max (see performances table)

OPERATING PRINCIPLE

RPCE2-*/C



RPCE2-70-T3



— RPCE2 valves are proportional flow control valves pressure- and temperature-compensated, with two-ports or three-ports, with mounting interface in compliance with ISO 6263 standards.

— These valves are employed for flow rate control in hydraulic circuit branches and for speed control of hydraulic actuators.

— Flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or combined with an external electronic card to maximize the valve performances (see par. 10).

— The valves are available in three flow control ranges: two with progressive gain up to 72 l/min and the third with differential gain of 30 l/min.

— The minimum pilot flow rate required to operate correctly is 2 l/min, with a minimum pressure of 20 bar.

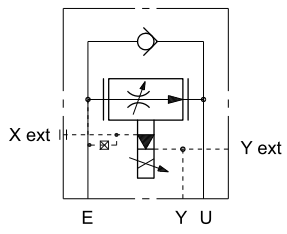
— Pilot signal can be internal, flowing through port E in the mounting surface, or coming from an external pilot line with 1/4" BSP connection to the X port placed on valve side. If internal pilot is chosen this X port comes plugged.

— Drainage is always external and must be connected directly to the tank without backpressure flowing from Y port in the mounting surface (OR Ø35) or from Y port on valve side by a drain line (1/4"BSP connection).

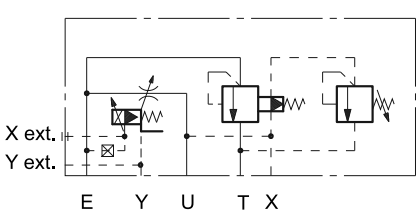
— The three-port version RPCE2-70-T3 allows controlled flow in working line U, dumping the residual flow to the tank. The maximum pressure from the circuit is limited by means of an adjustable relief valve which operates on the compensator pilot.

HYDRAULIC SYMBOLS

RPCE2-*/C

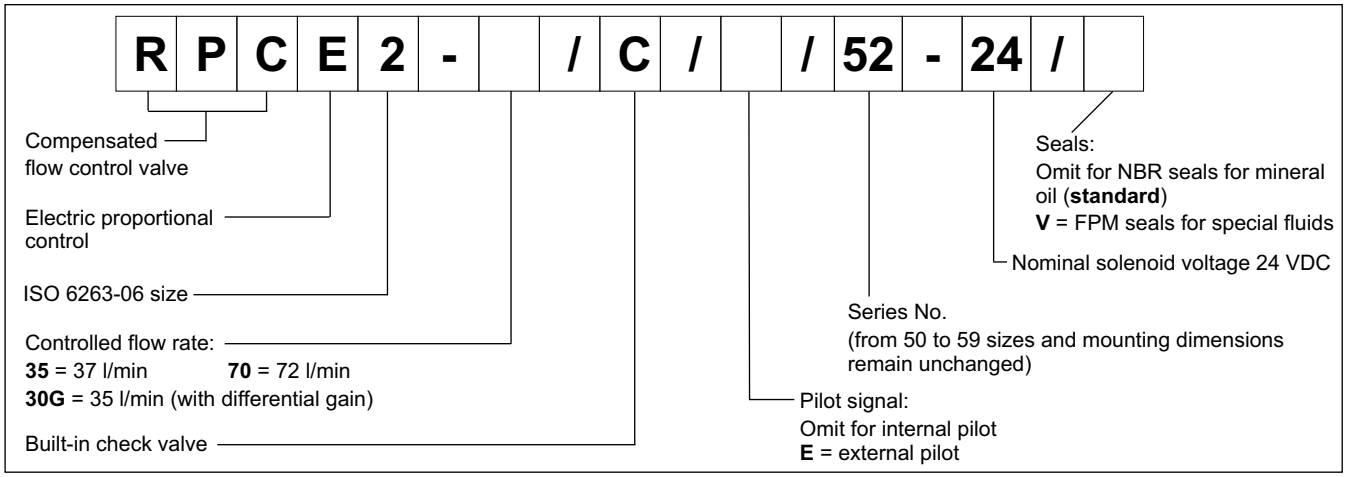


RPCE2-70-T3

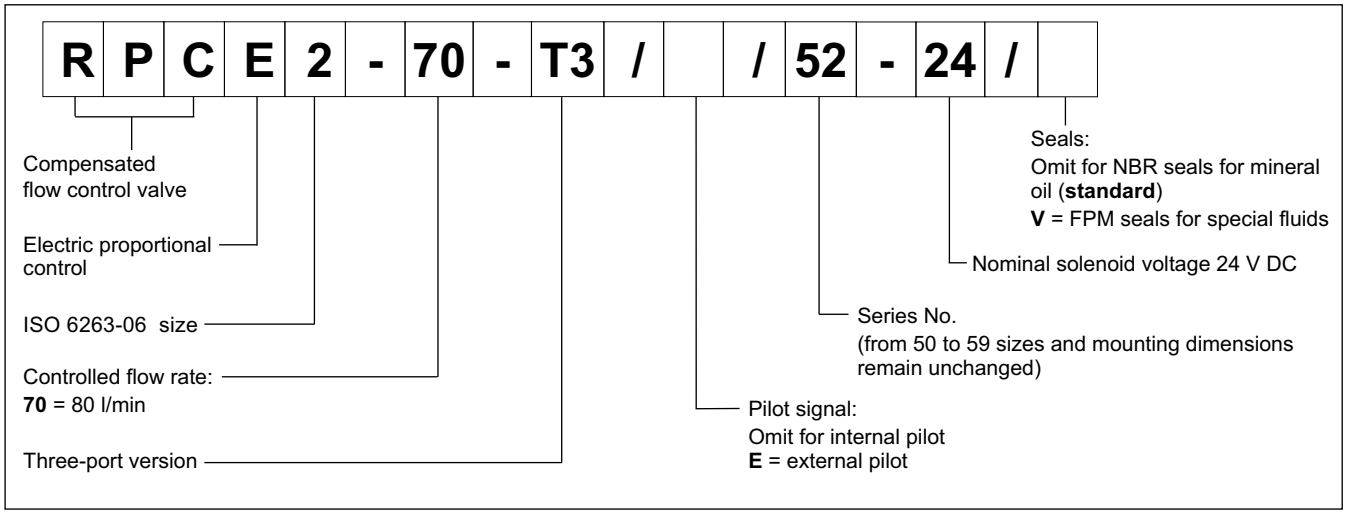


1 - IDENTIFICATION CODES

1.1 - Identification code for two-port valve: RPCE2-*/C



1.2 - Identification code for three-port valve: RPCE2-70-T3



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

Maximum working pressure Minimum Δp across E and U ports Piloting pressures: min max	bar	250 10 20 160 (**NOTE 1**)
Maximum controlled flow E→U (RPCE2-*/C) Maximum controlled flow (RPCE2-70-T3) Minimum controlled flow with P=100 bar (versions 35 and 70) (version 30G) Maximum free reverse flow U→E	l/min	30 - 37 - 72 80 0,5 0,2 60 (**NOTE 2**)
Step response	see paragraph 8	
Hysteresis (with PWM 100 Hz)	% of Q_{max}	< 8%
Repeatability	% of Q_{max}	< ±3%
Electrical features	see paragraph 7	
Ambient temperature range	°C	-10 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: RPCE2-*/C RPCE2-70-T3	kg	6 6,8

NOTE 1: Pilot signal must be external pressure line is over 160 bar.

NOTE 2: Maximum recommended flow U→E through the check valve (only for two-port version).

3 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

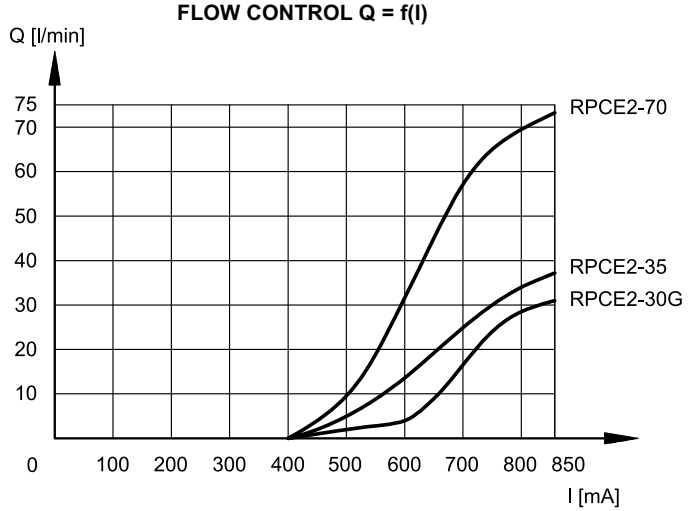
The fluid must be preserved in its physical and chemical characteristics.

4 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

4.1 - 2-way valve

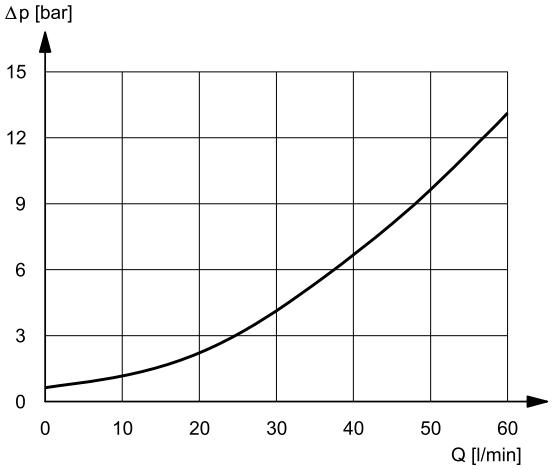
FLOW CONTROL Q = f(I)



Typical flow control curves for flow rate E→U according to the current supplied to the solenoid.

The RPCE2-G version, featuring differential gain control, is particularly suitable for “FAST-SLOW” flow rate control as it ensures high sensitivity at low flow rates while enabling high flow rates for rapid actuator movement.

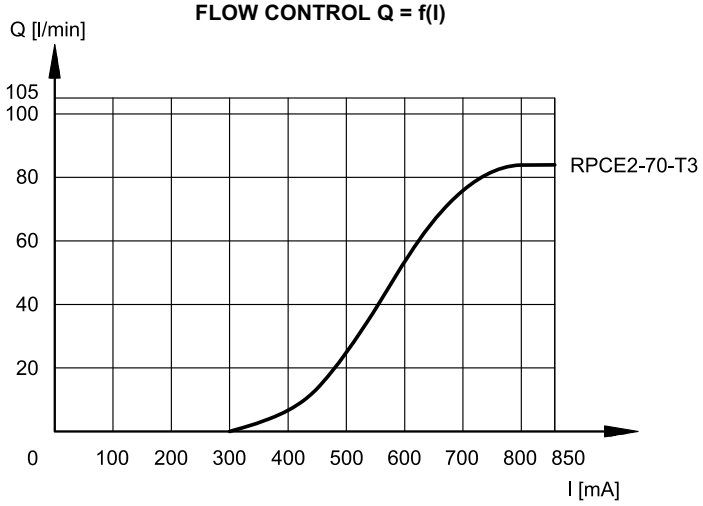
PRESSURE DROPS Δp = f(Q)



Pressure drops with free flow U → E through check valve.

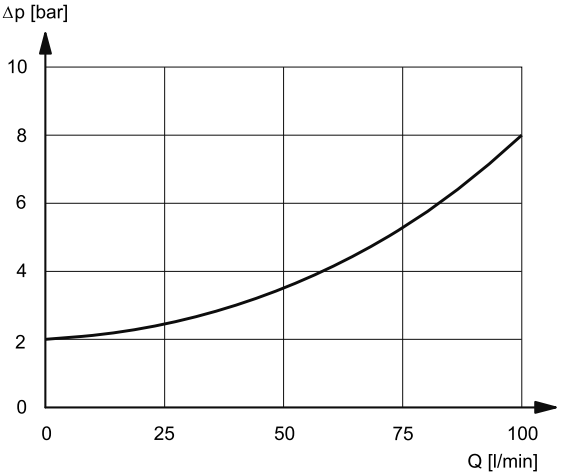
4.2 - 3-way valve

FLOW CONTROL Q = f(I)



Typical flow control curves for flow rate E→T, according to the current supplied to the solenoid.

PRESSURE DROPS Δp = f(Q)



Pressure drops E→T
Curve obtained with unloading electrical control

5 - PRESSURE COMPENSATION

The valves are equipped with two restrictors. The first is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor ensures constant pressure drop across the adjustable restrictor. In these conditions, the set flow rate value is maintained constant within a tolerance range of ±3% of the set flow rate for maximum pressure variation between the valve inlet and outlet ports.

6 - THERMAL COMPENSATION

A temperature-sensitive device installed on the flow control element corrects the position and maintains the set flow rate virtually unchanged, also in the case of fluid viscosity variation.

Flow rate variation remains within 2,5% of the set flow rate, for a fluid temperature variation of 10°C.

7 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**24**
RESISTANCE (at 20°C)	Ω	16.6
MAXIMUM CURRENT	A	0.85
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30 EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529) Coil insulation (VDE 0580) Impregnation	IP 65 class H class F	

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.

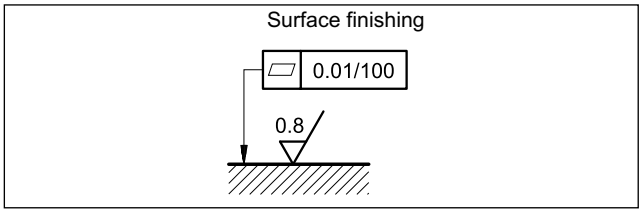
REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	250	120

9 - INSTALLATION

RPCE2-* valves, both two-port or three-port versions, can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.

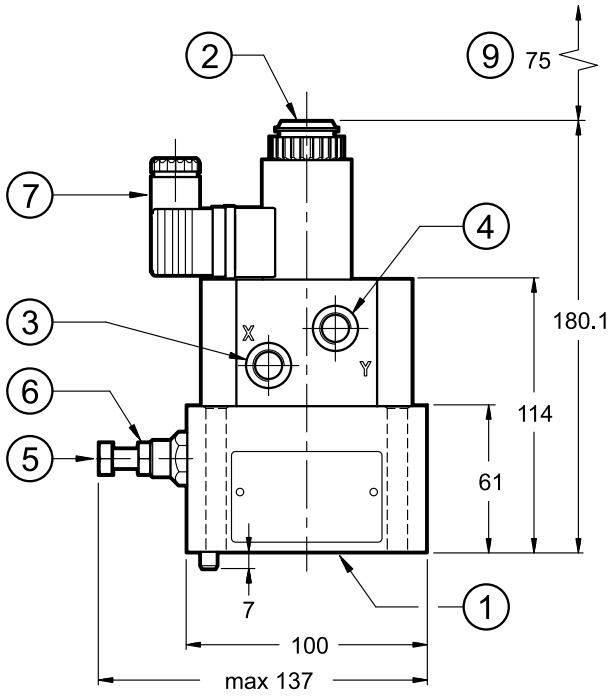


10 - ELECTRONIC CONTROL UNITS

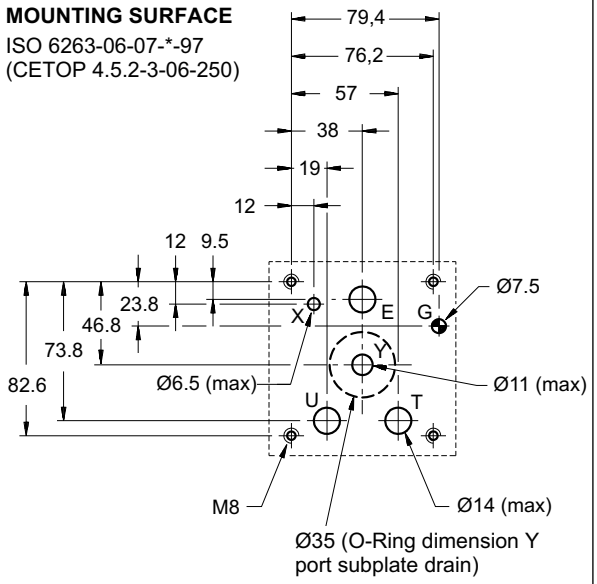
EDC-111	plug version	see cat. 89 120
EDM-M111	DIN EN 50022 rail mounting	see cat. 89 251

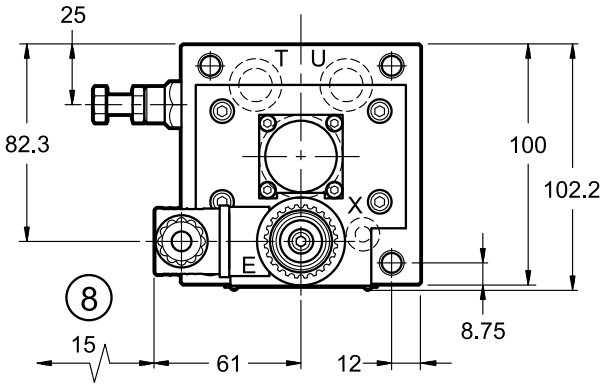
11 - RPCE2-70-T3 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



MOUNTING SURFACE
ISO 6263-06-07-*-97
(CETOP 4.5.2-3-06-250)



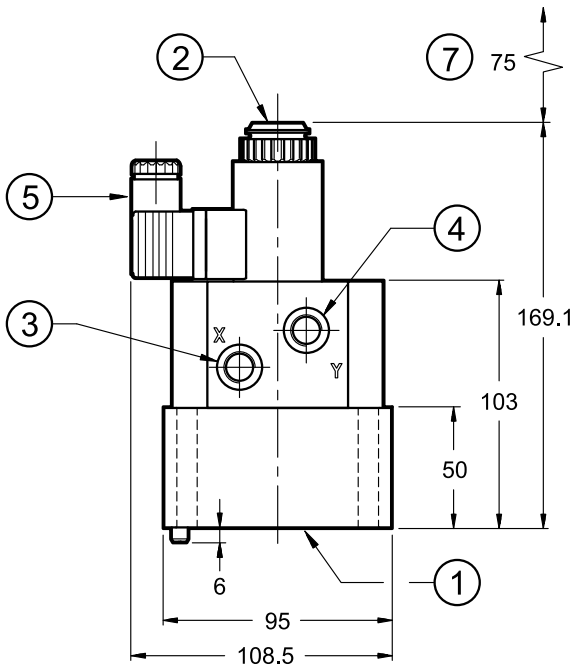


Valve fastening: 4 SHC screws ISO 4762 M8x75
Tightening torque: 20 Nm (A8.8)
Threads of mounting holes: M8x15

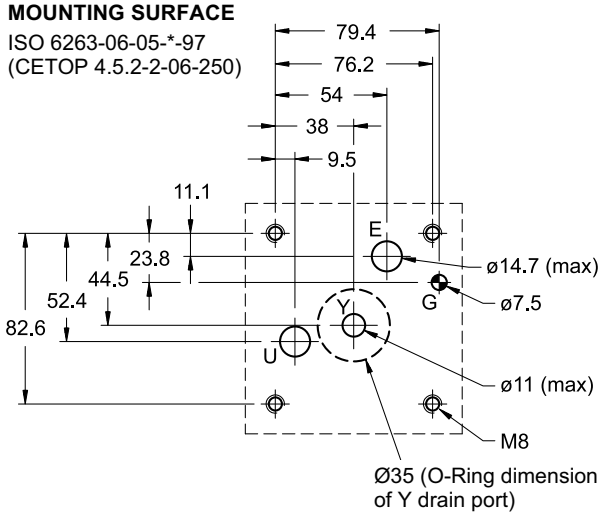
1	Mounting surface with sealing rings: 3 OR type 3068 (17.13x2.62) 1 OR type 2125 (31.47x1.78) 1 OR type 109 (9.13x2.62)
2	Breather (Allen key 4)
3	External pilot port X: 1/4” BSP. (plugged if internal pilot is chosen)
4	Drain port Y: 1/4” BSP if port Y in mounting surface is not used
5	Pressure relief valve: Adjustment screw: spanner 13 Turn clockwise to increase pressure. P max 210 bar
6	Locking ring: spanner 13
7	EN 175301-803 (ex DIN 43650) electric connector
8	Connector removal space
9	Coil removal space

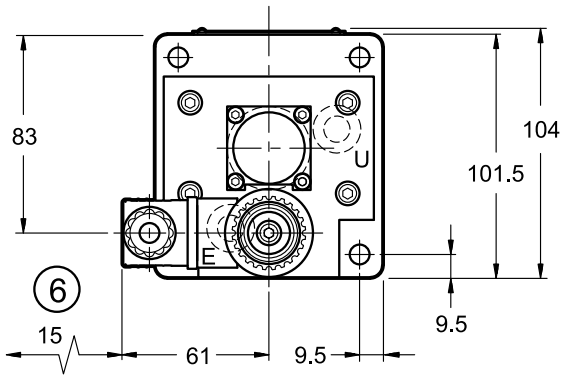
12 - OVERALL AND MOUNTING DIMENSION TWO-PORT VALVE RPCE2-*/C

dimensions in mm



MOUNTING SURFACE
ISO 6263-06-05-*-97
(CETOP 4.5.2-2-06-250)





1	Mounting surface with sealing rings: 2 OR type 119 (15.08x2.62) 1 OR type 2125 (31.47x1.78)
2	Breather (Allen key 4)
3	External pilot port X: 1/4" BSP. (plugged if internal pilot is chosen)
4	Drain port Y: 1/4" BSP if port Y in mounting surface is not used
5	EN 175301-803 (ex DIN 43650) electric connector
6	Connector removal space
7	Coil removal space

Valve fastening: 4 SHC screws ISO 4762 M8x60
Tightening torque: 20 Nm (A8.8)
Threads of mounting holes: M8x10

13 - SUBPLATES

(see catalogue 51 000)

Subplates listed below are suitable only for valves with Y drain with external pipe.

	RPCE2-*/C two-port version	**RPCE2-70-T3** three-port version
Type	PMRPC2-AI4G rear ports	PMRPCQ2-AI4G rear ports
E, U, T ports threading	1/2" BSP	1/2" BSP
X port threading	-	1/4" BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com

RPCE3-*

PROPORTIONAL FLOW CONTROL VALVE, PILOT OPERATED

SERIES 52

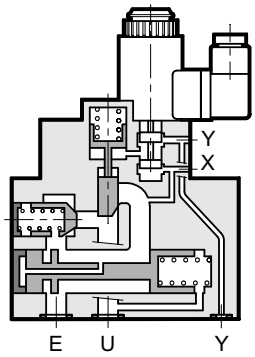
RPCE3-*/C **two-port**
RPCE3-100-T3 **three-port**

SUBPLATE MOUNTING ISO 6263-07

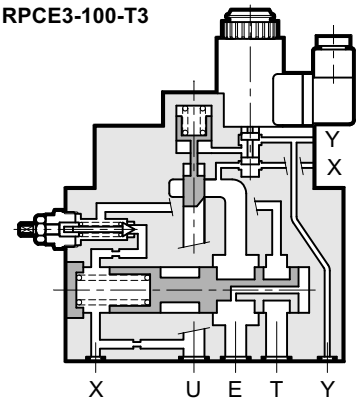
p max **250** bar
Q max (see performances table)

OPERATING PRINCIPLE

RPCE3-*/C



RPCE3-100-T3



— RPCE3 valves are proportional flow control valves pressure- and temperature-compensated, with two-ports or three-ports, with mounting interface in compliance with ISO 6263 standards.

— These valves are employed for flow rate control in hydraulic circuit branches and for speed control of hydraulic actuators.

— Flow rate can be modulated continuously in proportion to the current supplied to the solenoid.

— The valve can be controlled directly by a current control supply unit or combined with an external electronic card to maximize the valve performances (see par. 10).

— The valves are available in three flow control ranges: two with progressive gain up to 72 l/min and the third with differential gain of 30 l/min.

— The minimum pilot flow rate required to operate correctly is 2 l/min, with a minimum pressure of 20 bar.

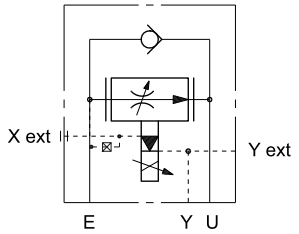
— Pilot signal can be internal, flowing through port E in the mounting surface, or coming from an external pilot line with 1/4" BSP connection to the X port placed on valve side. If internal pilot is chosen this X port comes plugged.

— Drainage is always external and must be connected directly to the tank without backpressure flowing from Y port in the mounting surface (OR Ø32) or from Y port on valve side by a drain line (1/4" BSP connection).

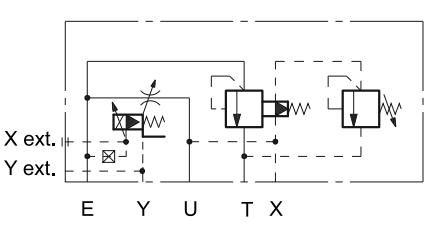
— The three-port version RPCE3-100-T3 allows controlled flow in working line U, dumping the residual flow to the tank. The maximum pressure from the circuit is limited by means of an adjustable relief valve which operates on the compensator pilot.

HYDRAULIC SYMBOLS

RPCE3-*/C

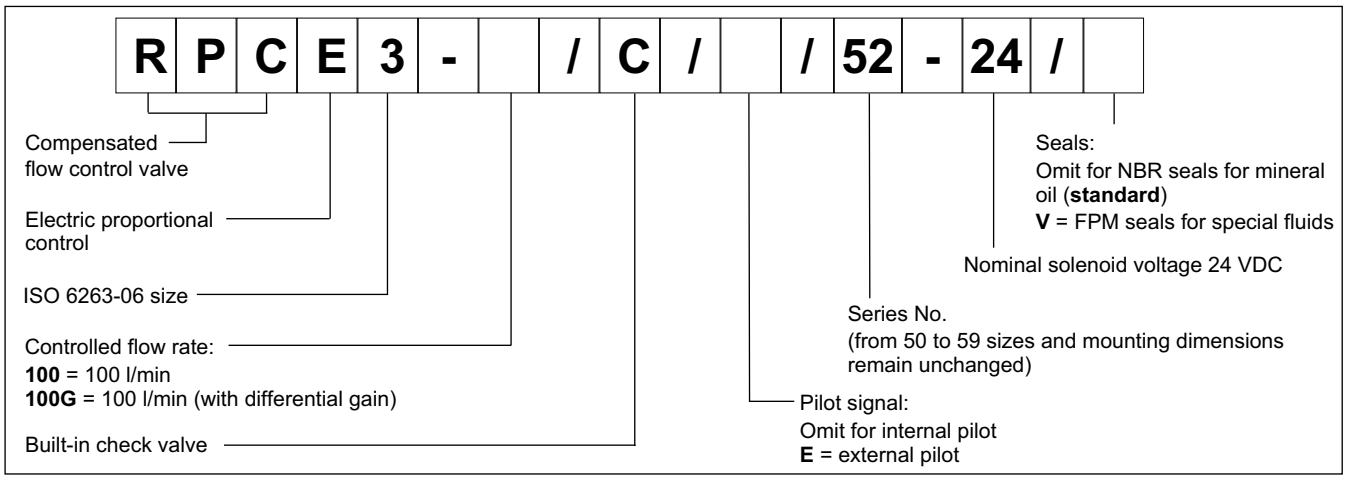


RPCE3-100-T3

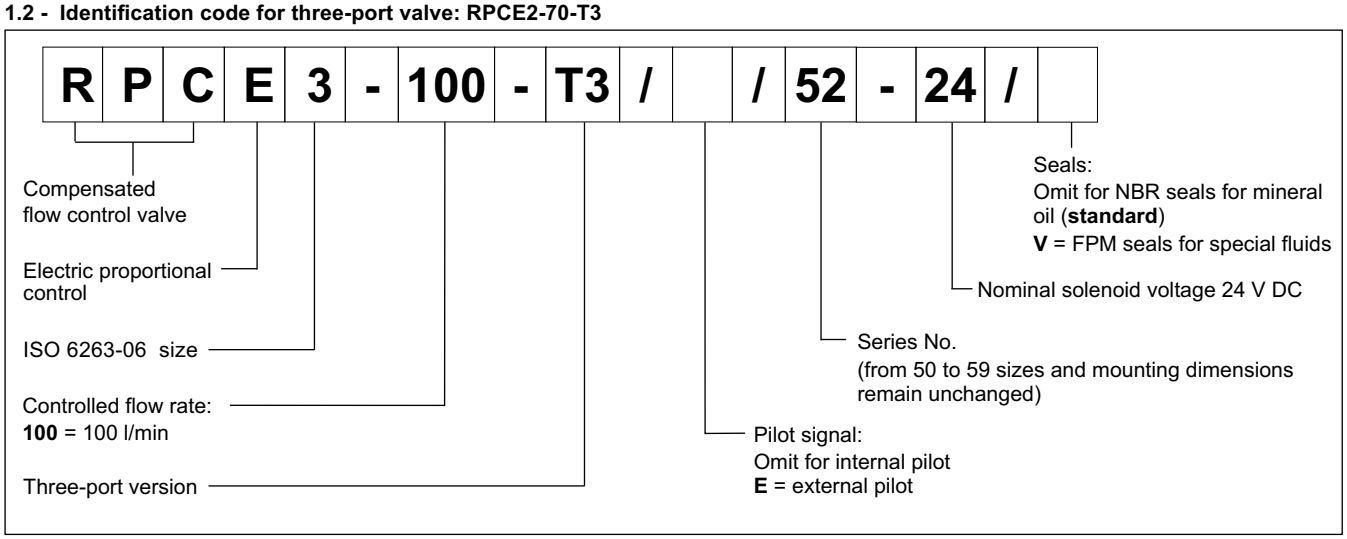


1 - IDENTIFICATION CODES

1.1 - Identification code for two-port valve: RPCE3-*/C



1.2 - Identification code for three-port valve: RPCE2-70-T3



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

Maximum working pressure Minimum Δp across E and U ports Piloting pressures: min max	bar	250 10 20 160 (**NOTE 1**)
Maximum controlled flow E→U (RPCE3-*) Minimum controlled flow with P=100 bar (version 100) (version 100G) Maximum free reverse flow U→E	l/min	100 1,5 0,5 150 (**NOTE 2**)
Step response	see paragraph 8	
Hysteresis (with PWM 100 Hz)	% of Q_{max}	< 8%
Repeatability	% of Q_{max}	< ±3%
Electrical features	see paragraph 7	
Ambient temperature range	°C	-10 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	10,3

NOTE 1: Pilot must be external if the valve had to operate with pressure line over 160 bar.

NOTE 2: Maximum recommended flow U→E through the check valve (only for two-port version).

3 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

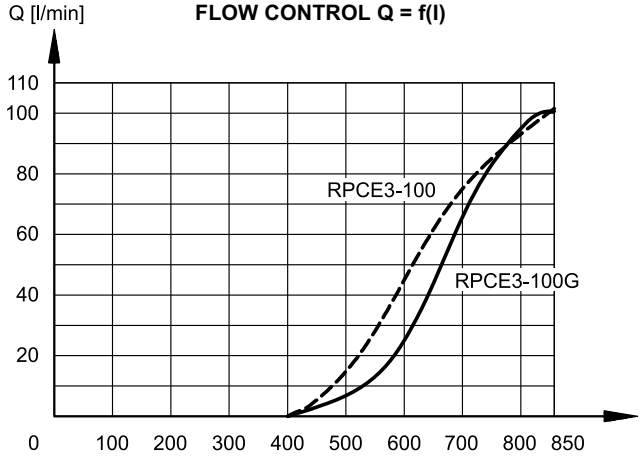
The fluid must be preserved in its physical and chemical characteristics.

4 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

4.1 - 2-way valve

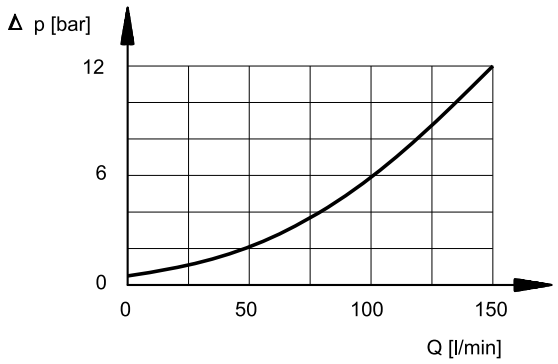
FLOW CONTROL Q = f(I)



Typical flow control curves for flow rate E→U, according to the current supplied to the solenoid.

The RPCE3-100G version, featuring differential gain control, is particularly suitable for “FAST-SLOW” flow rate control as it ensures high sensitivity at low flow rates while enabling high flow rates for rapid actuator movement.

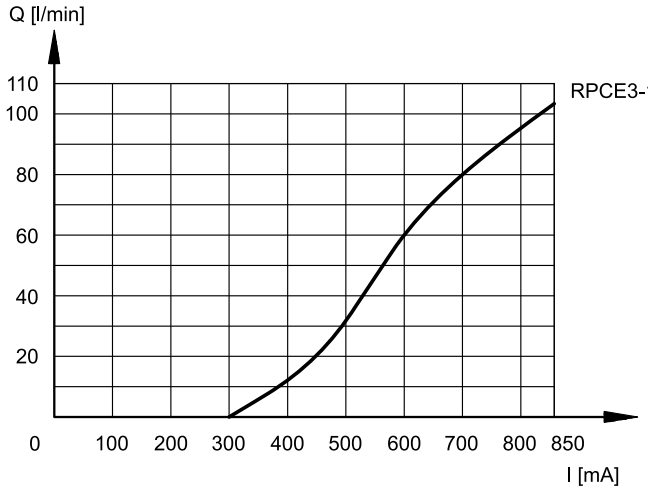
PRESSURE DROPS Δp = f(Q)



Pressure drops with free flow U→E through the check valve.

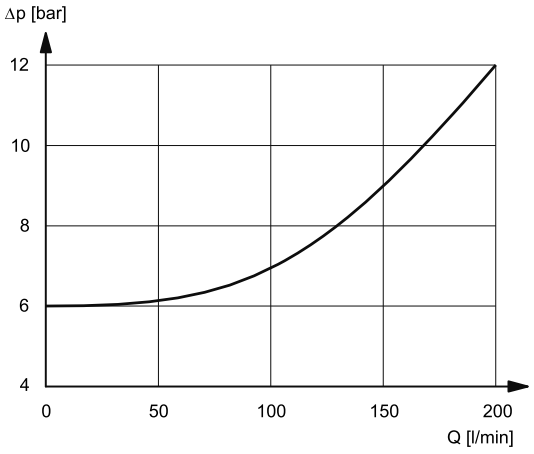
4.1 - 3-way valve

FLOW CONTROL Q = f(I)



Typical flow control curves for flow rate E→U, according to the current supplied to the solenoid.

PRESSURE DROPS Δp = f(Q)



Pressure drops E→T

5 - PRESSURE COMPENSATION

The valves are equipped with two restrictors. The first is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor ensures constant pressure drop across the adjustable restrictor.

In these conditions, the set flow rate value is maintained constant within a tolerance range of ±3% of the set flow rate for maximum pressure variation between the valve inlet and outlet chambers.

6 - THERMAL COMPENSATION

A temperature-sensitive device installed on the flow control element corrects the position and maintains the set flow rate virtually unchanged, also in the case of fluid viscosity variation.

Flow rate variation remains within 2,5% of the set flow rate, for a fluid temperature variation of 10°C.

7 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**24**
RESISTANCE (AT 20°C)	Ω	16.6
MAXIMUM CURRENT	A	0.85
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU	
CLASS OF PROTECTION Atmospheric agents (IEC EN 60529)	IP 65	

8 - STEP RESPONSE

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

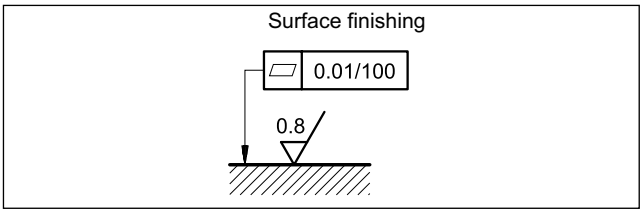
Step response is the time taken for the valve to reach 90% of the set pressure value following a step change of reference signal.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	250	120

9 - INSTALLATION

The RPCE3 valves, both two-port or three-port versions, can be installed in any position without impairing correct operation. Ensure that there is no air in the hydraulic circuit.

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.

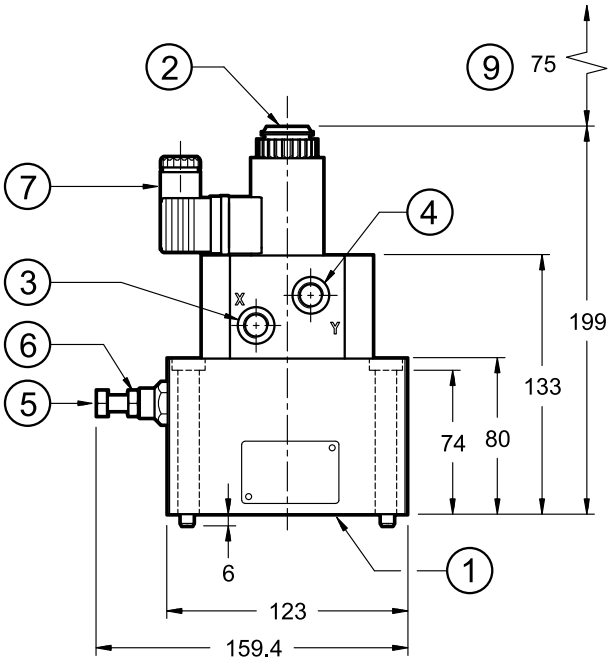


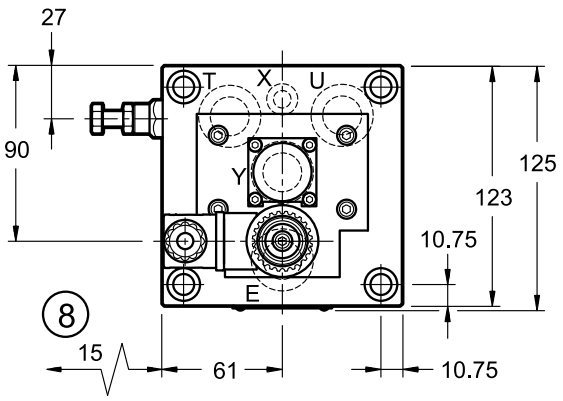
10 - ELECTRONIC CONTROL UNITS

EDC-111	plug version	see cat. 89 120
EDM-M111	DIN EN 50022 rail mounting	see cat. 89 251

11 - RPCE3-100-T3 - OVERALL AND MOUNTING DIMENSIONS

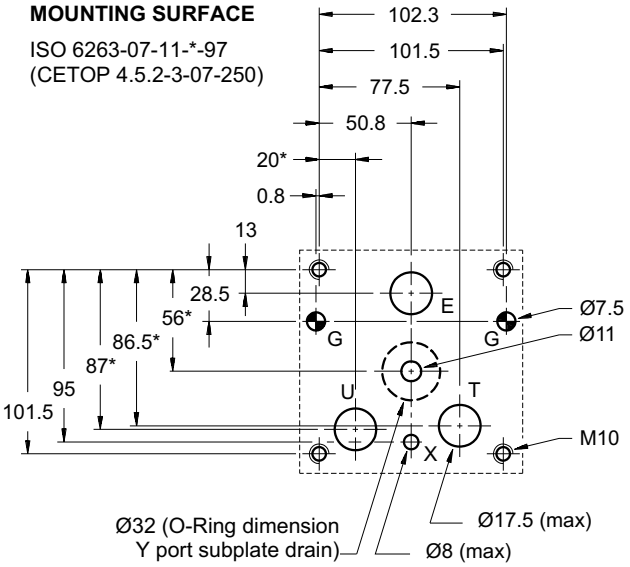
dimensions in mm





MOUNTING SURFACE

ISO 6263-07-11-*-97
(CETOP 4.5.2-3-07-250)



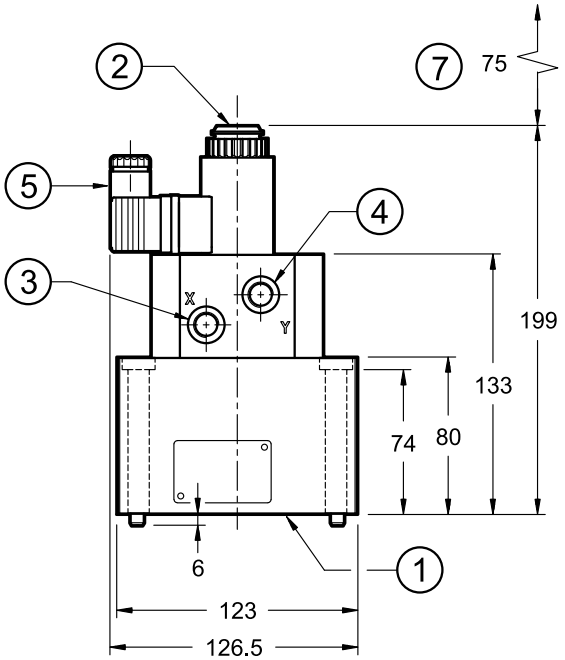
NOTE: Dimensions with the asterisk * deviate from ISO standard.

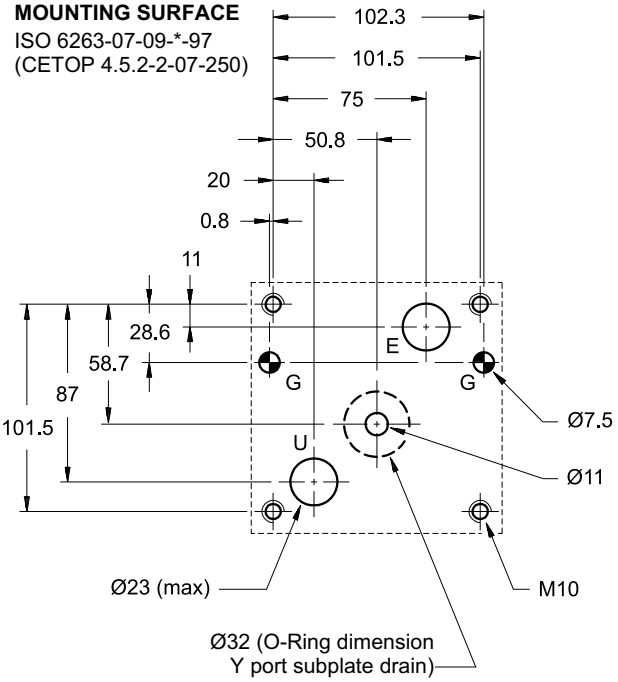
Valve fastening: 4 SHC screws ISO 4762 M10x90
Tightening torque: 40 Nm (A8.8)
Threads of mounting holes: M10x15

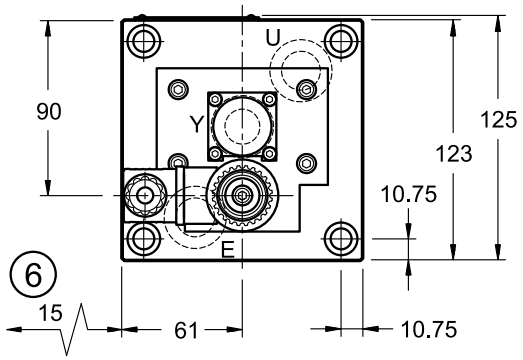
1	Mounting surface with sealing rings: N. 3 OR type 3106 (26.65x2.62) N. 1 OR type 2112 (28.30x1.78) N. 1 OR type 3043 (10.78x2.62)
2	Breather (Allen key 4)
3	External pilot port X: 1/4” BSP. (plugged if internal pilot is chosen)
4	Drain port Y: 1/4” BSP if port Y in mounting surface is not used
5	Pressure relief valve: Adjustment screw: spanner 13 Turn clockwise to increase pressure. P max 210 bar
6	Locking ring: spanner 13
7	EN 175301-803 (ex DIN 43650) electric connector
8	Connector removal space
9	Coil removal space

12 - OVERALL AND MOUNTING DIMENSIONS TWO-PORT VALVE RPCE3-*/C

dimensions in mm







Valve fastening: 4 SHC screws ISO 4762 M10x90
Tightening torque: 40 Nm (A8.8)
Threads of mounting holes: M10x15

1	Mounting surface with sealing rings: N. 2 OR type 3106 (26.65x2.62) N. 1 OR type 2112 (28.30x1.78)
2	Breather (Allen key 4)
3	External pilot port X: 1/4” BSP. (plugged if internal pilot is chosen)
4	Drain port Y: 1/4” BSP if port Y in mounting surface is not used
5	EN 175301-803 (ex DIN 43650) electric connector
6	Connector removal space
7	Coil removal space

13 - SUBPLATES

(see catalogue 51 000)

Subplates listed below are suitable only for valves with Y drain with external pipe.

	RPCE3-*/C two way version	**RPCE3-*-T3** three way version
Type	PMRPC3-AI6G rear ports	PMRPCQ3-AI6G rear ports
E, U, T ports threading	1” BSP	1” BSP
X port threading	-	1/4” BSP

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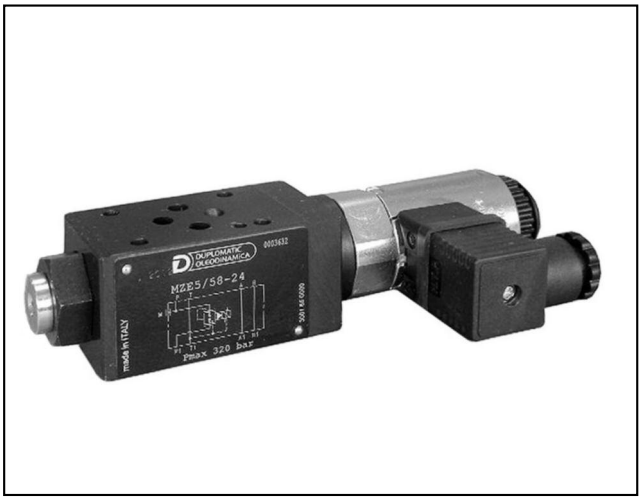


MZE

PILOT OPERATED PRESSURE REDUCING VALVE WITH ELECTRIC PROPORTIONAL CONTROL

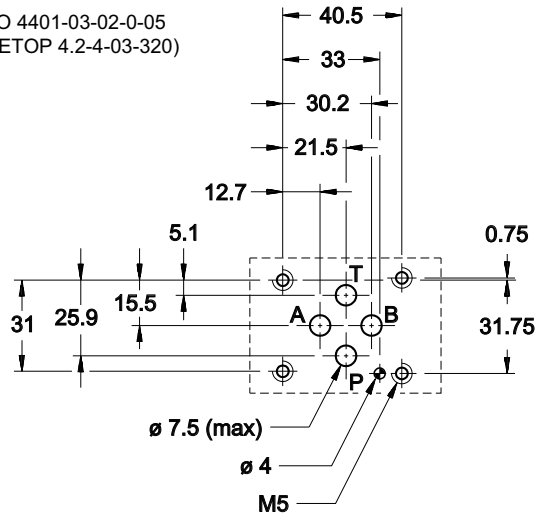
SERIES 58

MODULAR VERSION ISO 4401-03

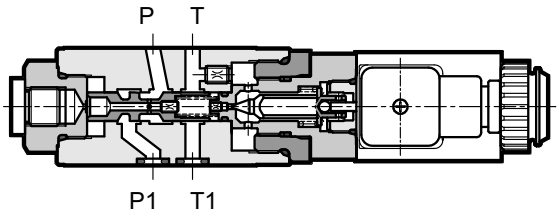
p max **320** bar
Q max (see table of performances)

MOUNTING SURFACE

ISO 4401-03-02-0-05
(CETOP 4.2-4-03-320)



OPERATING PRINCIPLE



— MZE valves are 3-way pilot operated pressure reducing valves, with electric proportional control, designed as modular versions with mounting interface in compliance with ISO 4401) standards.

— The valves are used to reduce pressure in the secondary circuit branches thus ensuring stability of controlled pressure in the event of variations of the flow rate through the valve.

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

— The valve can be controlled directly by a current control supply unit or by an electronic control unit, to exploit valve performance to the full (see par. 8).

— The valve is available in three different pressure reduction ranges of up to 230 bar.

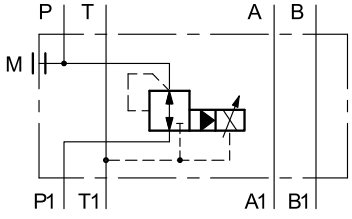
— The valve is available only with internal drain to the T line inside the valve.

PERFORMANCES

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

Maximum operating pressure: - P-A-B ports - T port	bar	 320 2
Minimum controlled pressure	see Δp-Q diagram	
Maximum flow in P line Maximum flow on passing lines Drain flow	l/min	30 50 0,4
Step response	see paragraph 5	
Hysteresis (with PWM 200 Hz)	% of p nom	< 3%
Repeatability	% of p nom	< ±1,5%
Electrical characteristic	see paragraph 4	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
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

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

M	Z	E		/	58	-		/	

Size: ISO 4401-03

3-way pressure reducing valve:
Modular version

Electric proportional control

Pressure control range:
3 = 7 ÷ 70 bar
4 = 7.5 ÷ 150 bar
5 = 8 ÷ 230 bar

Series No.
(from 50 to 59 sizes and mounting dimensions remain unchanged)

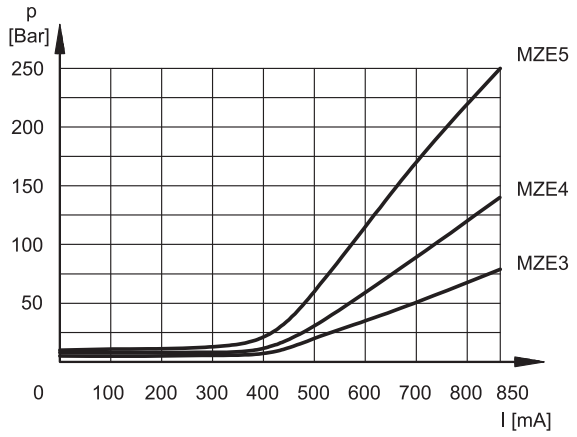
12 = Nominal solenoid voltage 12V DC
24 = Nominal solenoid voltage 24V DC

Seal:
omit for mineral oils
V = FPM seals for special fluids

2 - CHARACTERISTIC CURVES

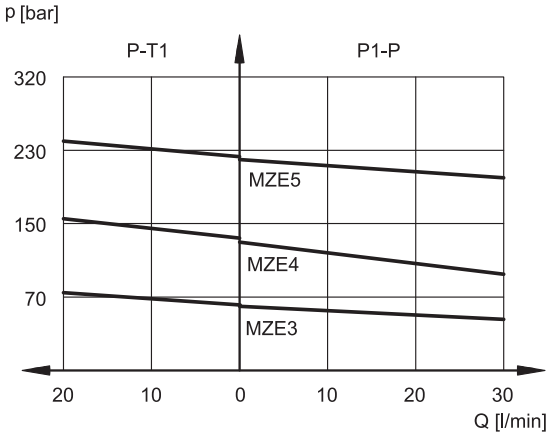
(measured with viscosity 36 cSt at 50°C)

PRESSURE CONTROL p = f (I)



The curves have been obtained with working lines closed (without flow).

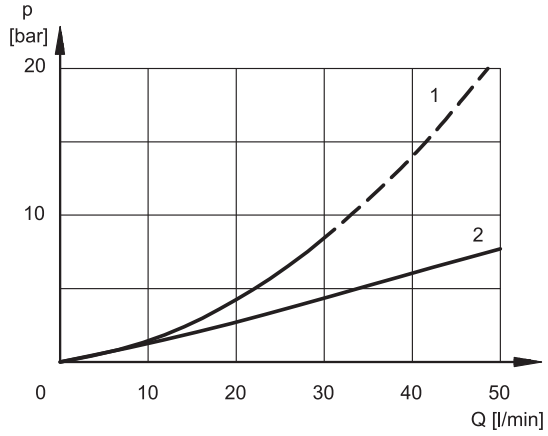
PRESSURE VARIATION p = f(Q)



The curves have been obtained with inlet pressure 50 bar greater than nominal pressure.

Pressure values in P1 greater than 50 bar reduce flow values considerably.

PRESSURE DROP Δp = f(Q)



1. pressure drops P1→ P
2. pressure drop in passing lines
(ex. A ↔ A1)

3 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals.

For fluids HFDR type (phosphate esters) use FPM seals (code V).

For the use of other fluid types 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.

4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	16.6
MAXIMUM CURRENT	A	1.9	0.85
DUTY CYCLE		100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
CLASS OF PROTECTION: Atmospheric agents (IEC EN 60529)	IP 65		

5 - 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 input flow rate of Q = 25 l/min.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	100	80

6 - INSTALLATION

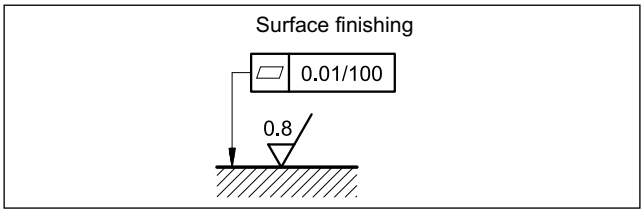
We recommend that MZE valves should be installed either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is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

Ensure that there is no air in the hydraulic circuit. In particular applications, it can be necessary to vent the air entrapped in the solenoid tube, by using the apposite drain screw in the solenoid tube. Ensure that the solenoid tube is always filled with oil (see par.7). At the end of the operation, make sure of having screwed correctly the drain screw.

Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the reduced pressure value.

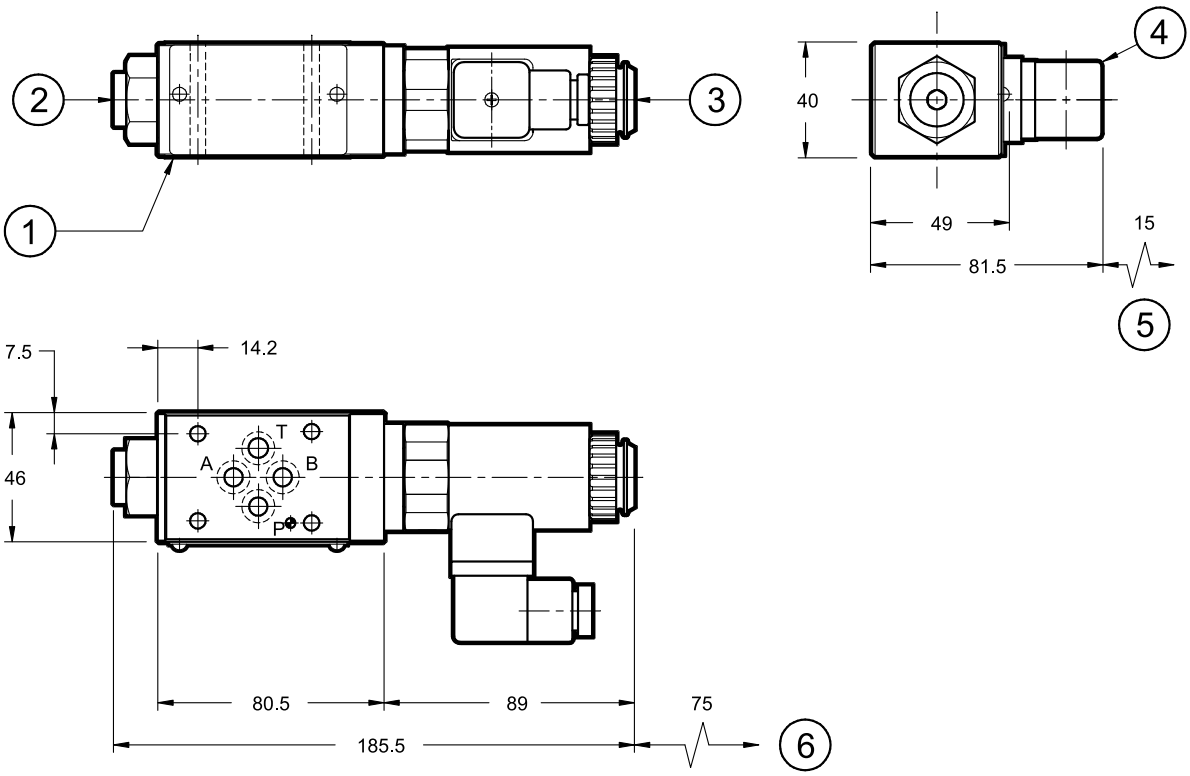
The maximum admissible backpressure in the T line, under operational conditions, is 2 bar.

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.



7 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25x1.78)
2	Pressure gauge port 1/4" BSP
3	Breather (male hexagonal spanner 4)
4	EN 175301-803 (ex DIN 43650) (included in the delivery)
5	Connector removal space
6	Coil removal space

NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (3) placed at the end of the solenoid tube.

8 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

DUPLOMATIC MOTION SOLUTIONS

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PZE3

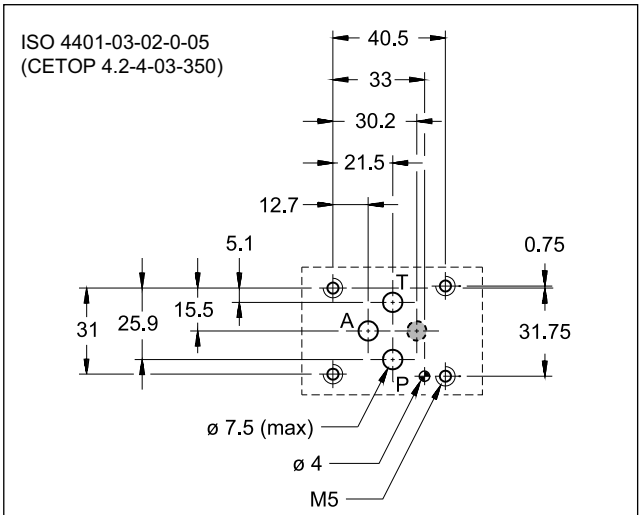
PROPORTIONAL 3-WAY PRESSURE REDUCING VALVE, PILOT OPERATED

SERIES 11

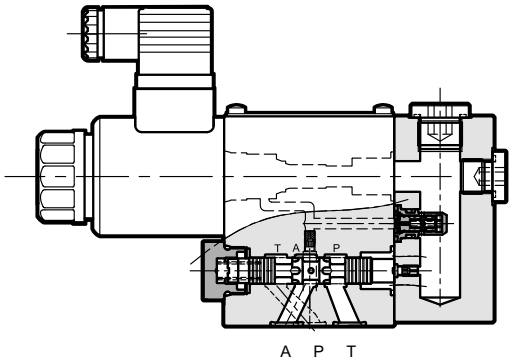
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— The PZE3 valve is a proportional 3-way pressure reducing valve, pilot operated with mounting surface according to ISO 4401-03 standards.

— This valve controls the outlet pressure on port A by an electrical proportional control, reducing the inlet pressure from line P or relieving the overpressure from line A into T keeping it at the set value. (typically: hydraulic counter-weight or load balancing)

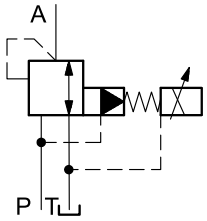
— PZE3 valves can be controlled directly by an amplifier or a proper electronic control unit

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

Maximum operating pressure: - P port - T port	bar	 350 2
Maximum flow (see p max = f(Q) diagram)	l/min	40
Step response	see paragraph 5	
Hysteresis	% of p nom	< 5%
Repeatability	% of p nom	< ±2%
Electrical characteristic	see paragraph 4	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	2,4

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

P	Z	E	3	-		/	11		/		K1

3-way pressure reducing valve, pilot operated

Electrical proportional control

Size ISO 4401-03

Pressure control range:
025 = 0 ÷ 25 bar
070 = 0 ÷ 70 bar
140 = 0 ÷ 140 bar
210 = 0 ÷ 210 bar
310 = 0 ÷ 310 bar

Series No.
(the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

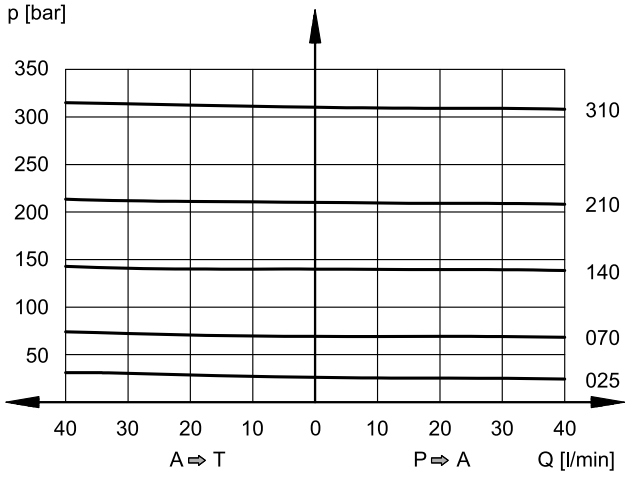
Nominal solenoids voltage:
D12 = 12 V CC
D24 = 24 V CC

Coil electrical connection:
for connector type EN 175301-803
(ex DIN 43650) (**standard**)

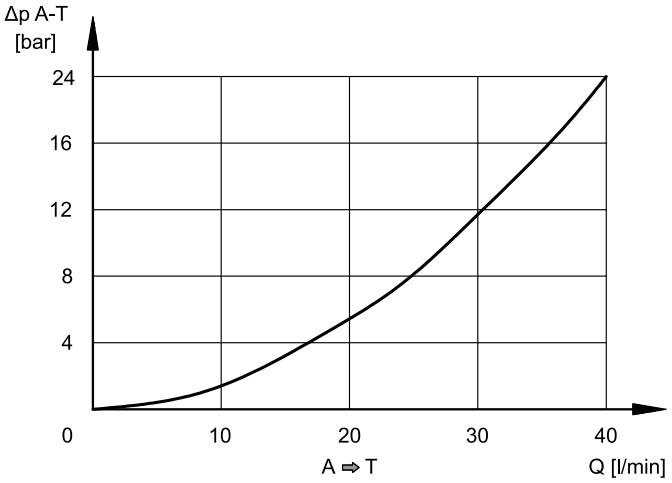
2 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

SET PRESSURE

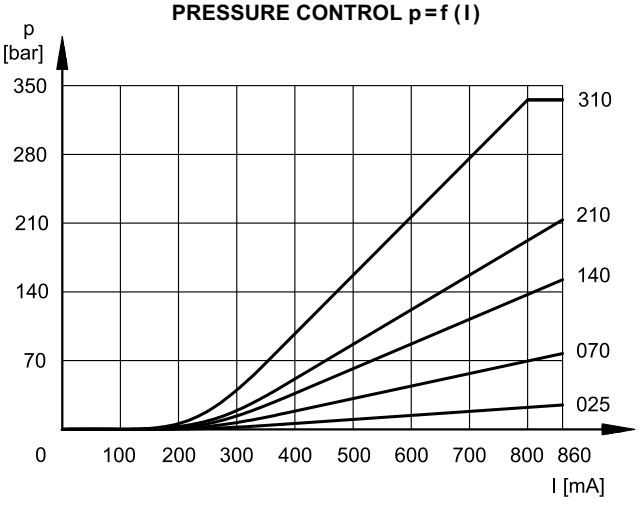


MINIMUM PRESSURE Δp = f (Q)



Pressure drops A →T vs. flow, without backpressure in T port and command signal = 0V.

PRESSURE CONTROL p = f (I)



3 - 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 fluid types 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.

4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube, secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
MAXIMUM CURRENT	A	1.88	0.86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
PROTECTION FROM: Atmospheric agents (EN 60529)	IP 65		
CLASS OF PROTECTION: Coil insulation (VDE 0580) Impregnation	class H class F		

5 - STEP RESPONSE

(obtained with mineral oil with viscosity of 36 cSt at 50°C)

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%
Step response [ms]	80	80

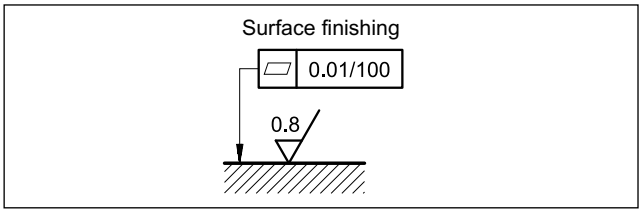
6 - INSTALLATION

We recommend installing the PZE3 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 shown in paragraph 2.

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

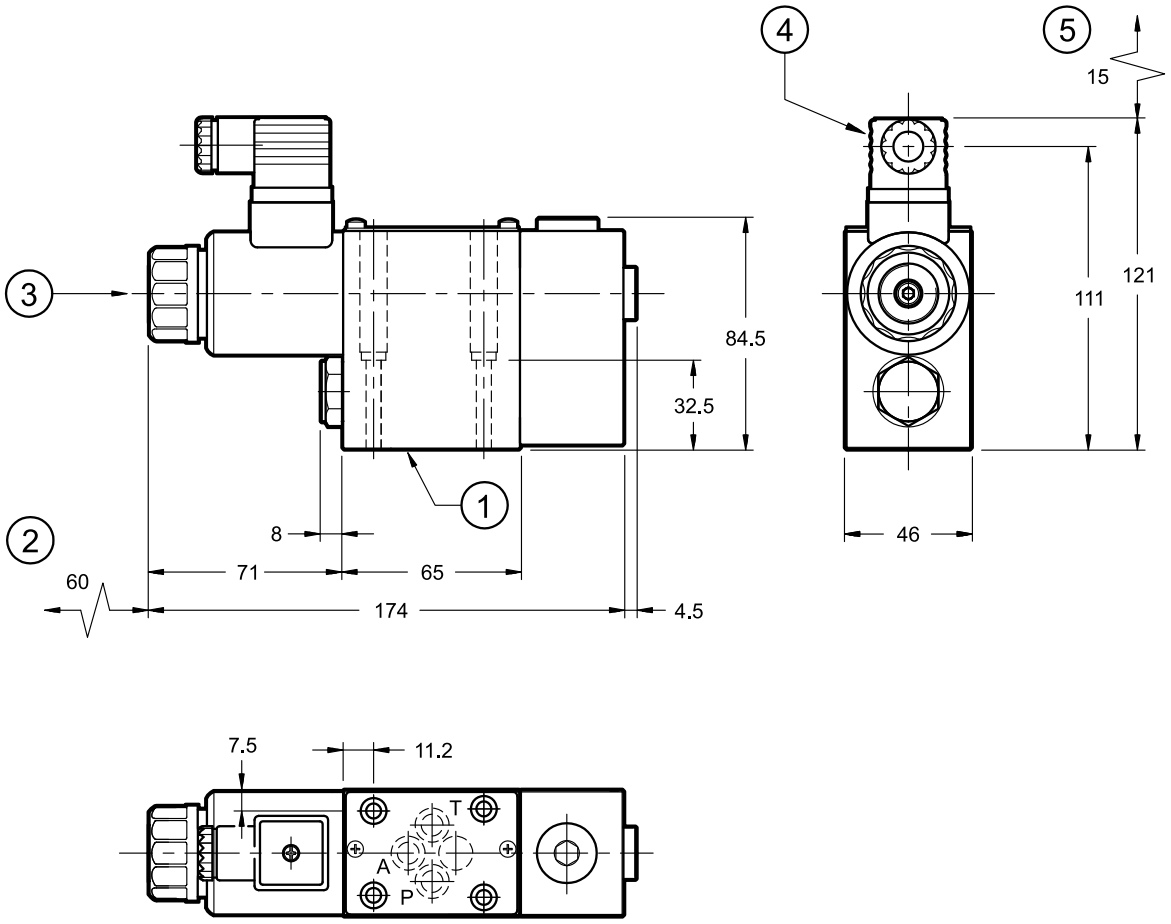
Connect the valve T port directly to the tank. **Add any backpressure value detected in the T line to the controlled pressure value. Maximum admissible backpressure in the T line, under operational conditions, is 2 bar.**

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



7 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



NOTE: at first start up, or after a long period of no use, it is necessary to vent the air through the breather (3) placed at the end of the solenoid tube.

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) - 90 shore
2	Coil removal space
3	Breather (male hexagonal spanner 4)
4	EN 175301-803 (ex DIN 43650) electric connector (included in the delivery)
5	Connector removal space

Valve fastening: N. 4 bolts M5x40 - ISO 4762
Tightening torque: 5 Nm (A8.8 screws)
Threads of mounting holes: M5x10

8 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

9 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions P, T, A and B: 3/8” BSP thread

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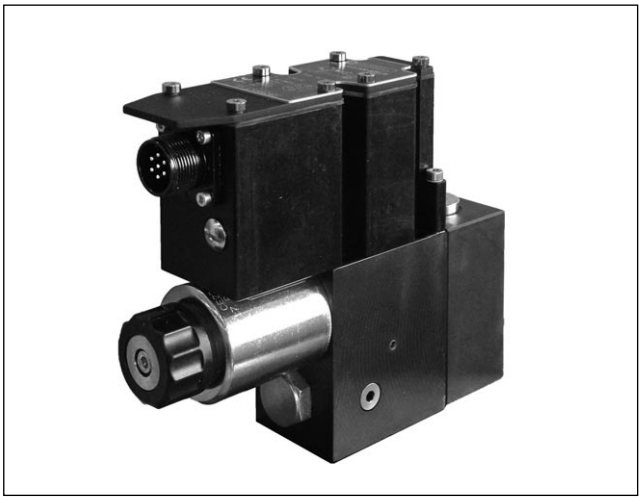


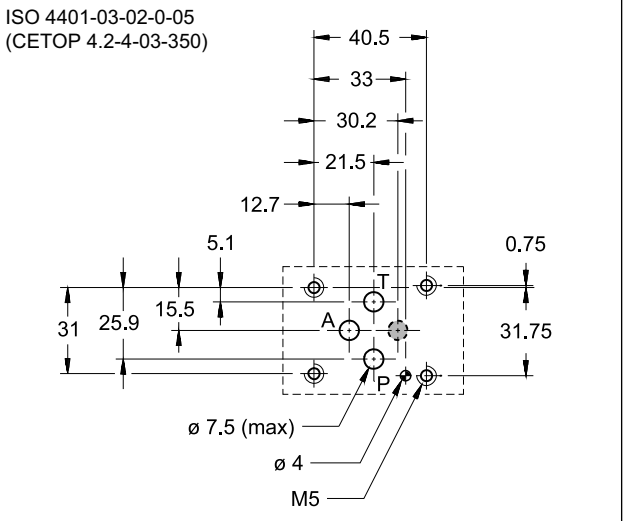
PZE3G*

PROPORTIONAL 3-WAY PRESSURE REDUCING VALVE, PILOT OPERATED, WITH INTEGRATED ELECTRONICS

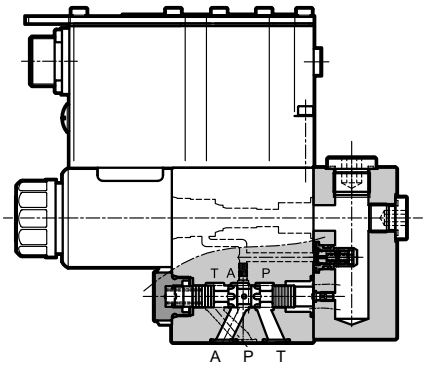
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— PZE3G* valve is a proportional 3-way pressure reducing valve, pilot operated, with on-board electronics with mounting surface according to ISO 4401-03 standards.

— This valve controls the outlet pressure on port A, reducing the inlet pressure from line P or relieving the overpressure from line A into T keeping it at the set value. (typically: hydraulic counter-weight or load balancing)

— It is suitable to modulate the pressure in hydraulic circuits.

— It is available with different types of electronics, with analogue or fieldbus interfaces.

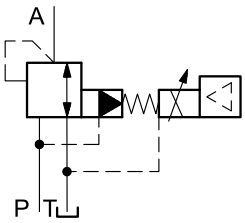
— Valves are easy to install. The driver directly manages digital settings

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

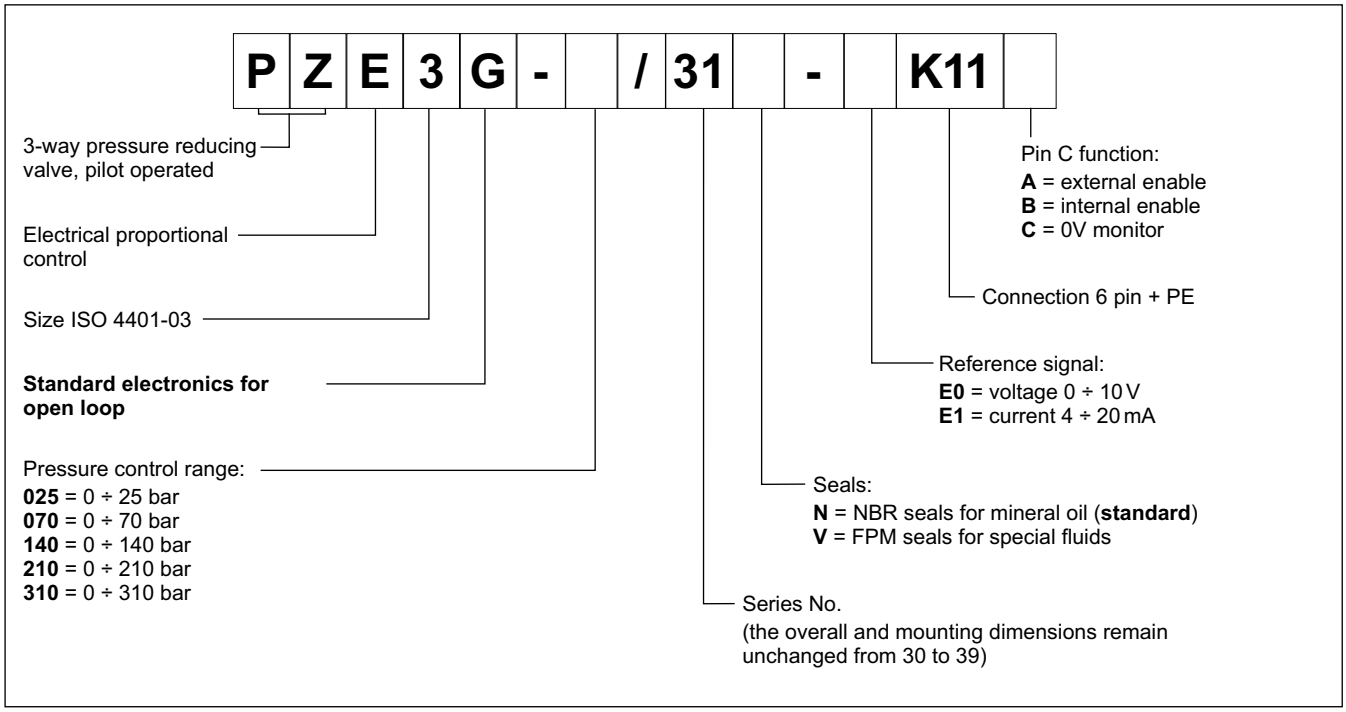
Maximum operating pressure: - P port - T port	bar	 350 2
Maximum flow (see p max = f(Q) diagram)	l/min	40
Step response	see paragraph 7	
Hysteresis	% of p nom	< 3%
Repeatability	% of p nom	< ±1%
Electrical characteristic	see paragraph 2	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	2.7

HYDRAULIC SYMBOL

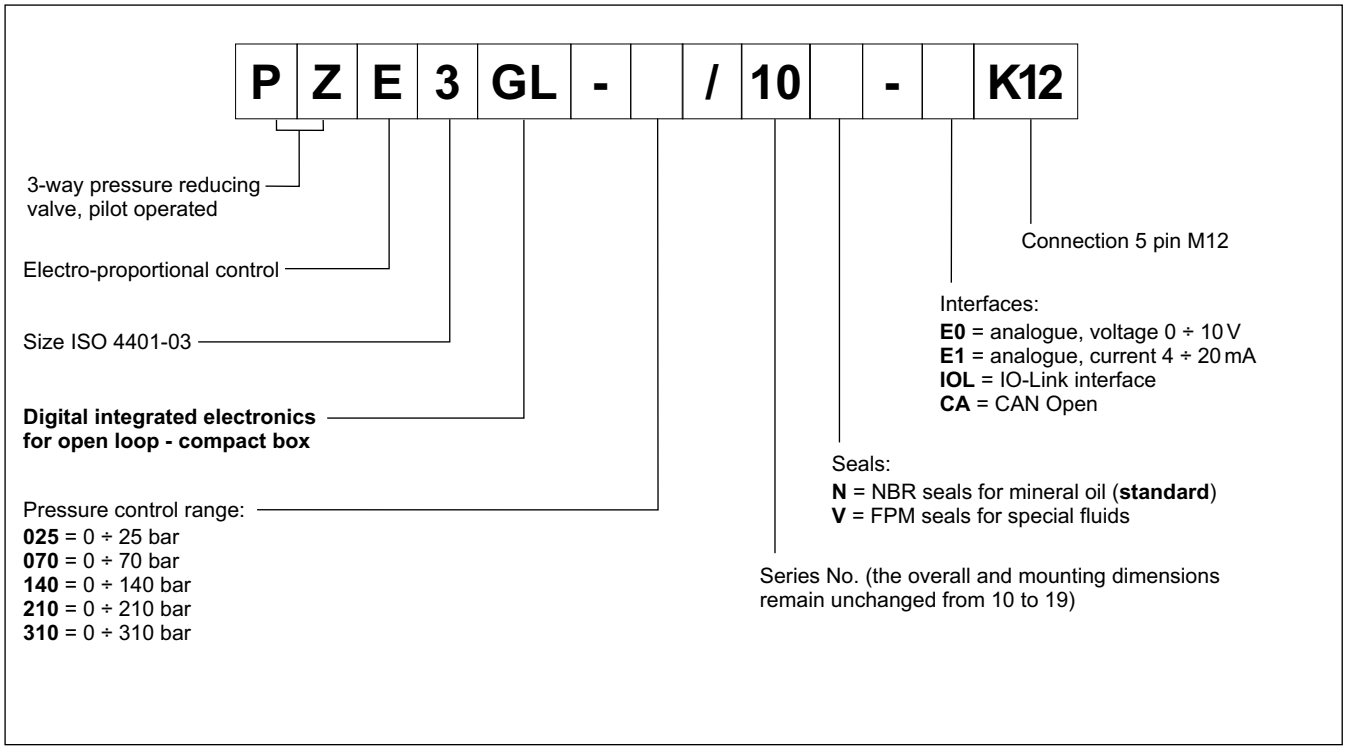


1 - IDENTIFICATION CODE

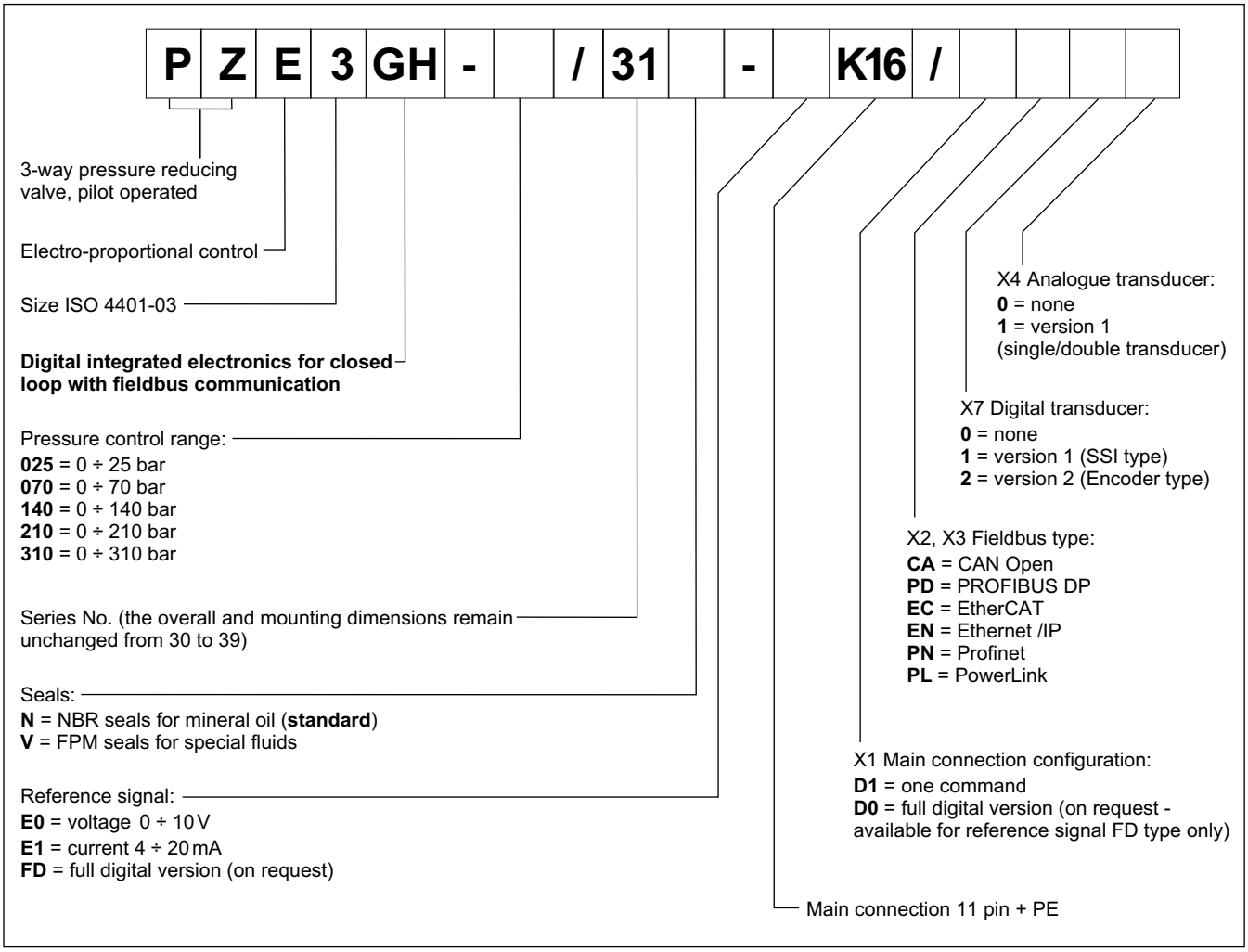
1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

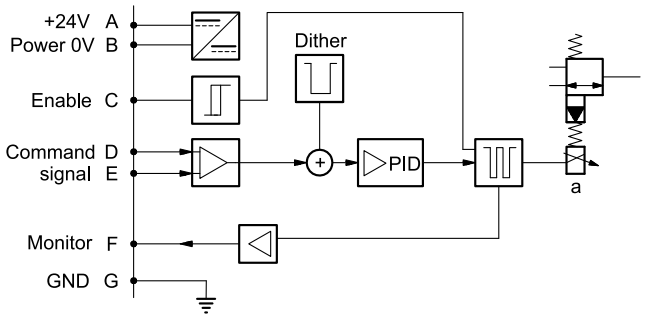
3 - PZE3G - STANDARD ELECTRONICS

3.1 - Electrical characteristics

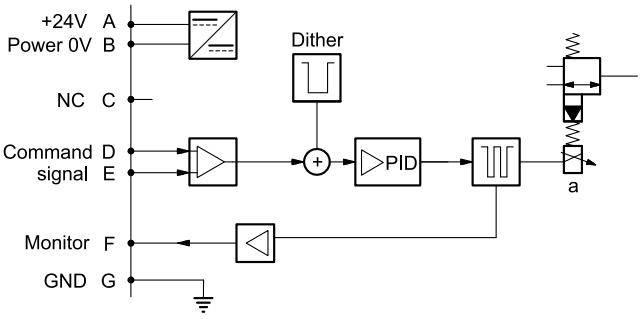
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

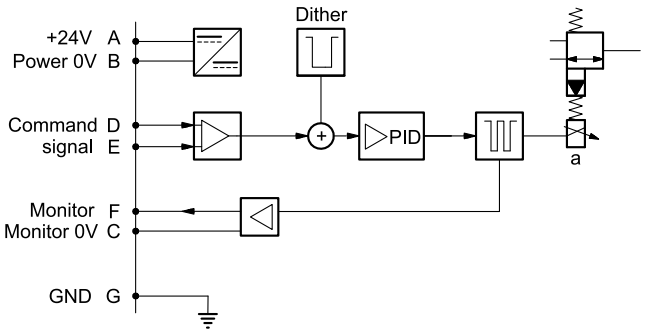
VERSION A - External Enable



VERSION B - Internal Enable

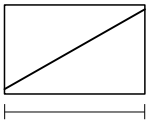


VERSION C - 0V Monitor

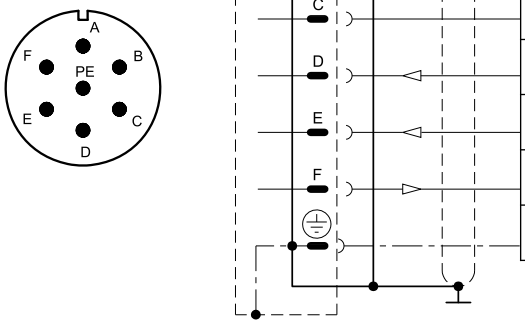


3.3 - Versions with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**

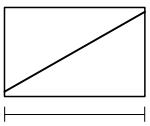


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command (differential input)		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

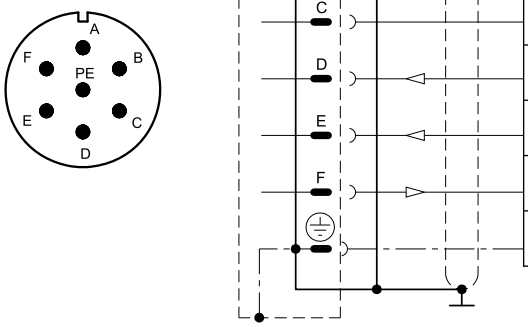
3.4 - Version with current command (E1)

The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**



Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - PZE3GL - COMPACT ELECTRONICS

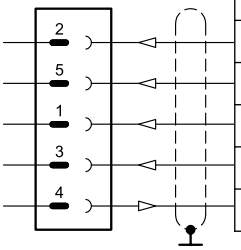
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

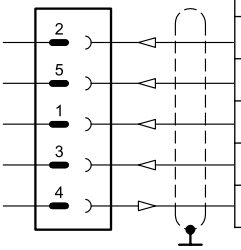
4.2 - Pin tables

'E0' connection



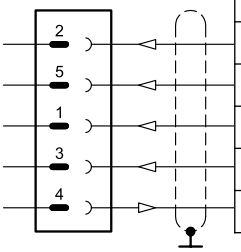
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



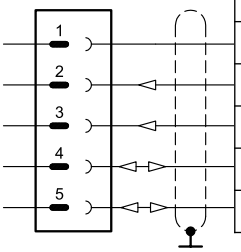
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0V (GND)	
4	C/Q		IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - PZE3GH - FIELDBUS ELECTRONICS

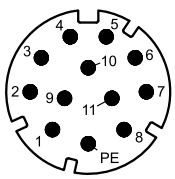
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

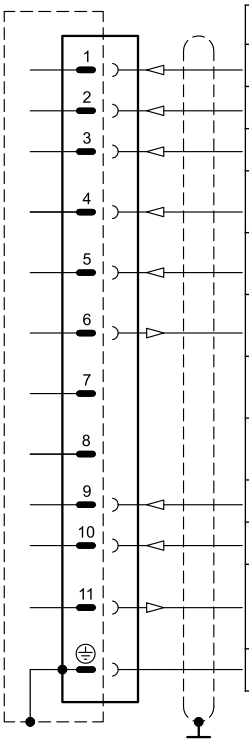
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

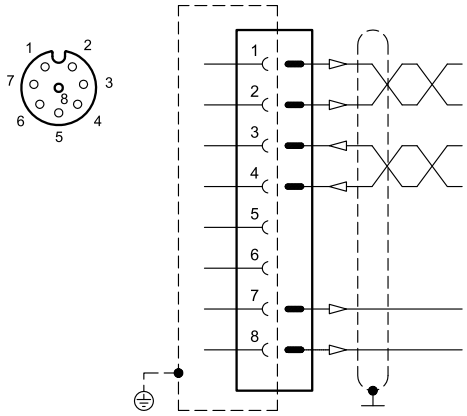
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

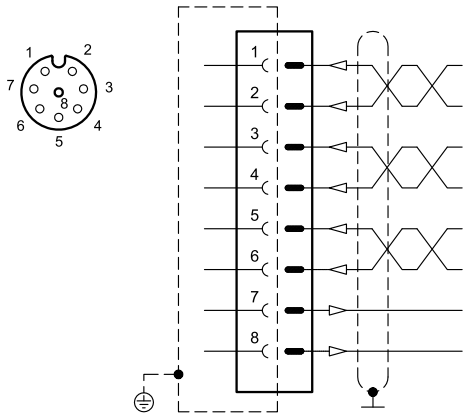
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



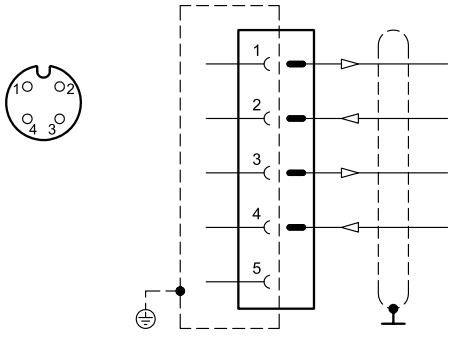
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



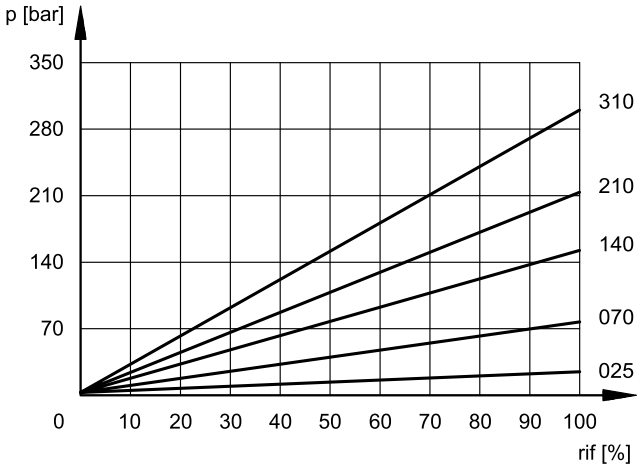
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

6 - CHARACTERISTIC CURVES

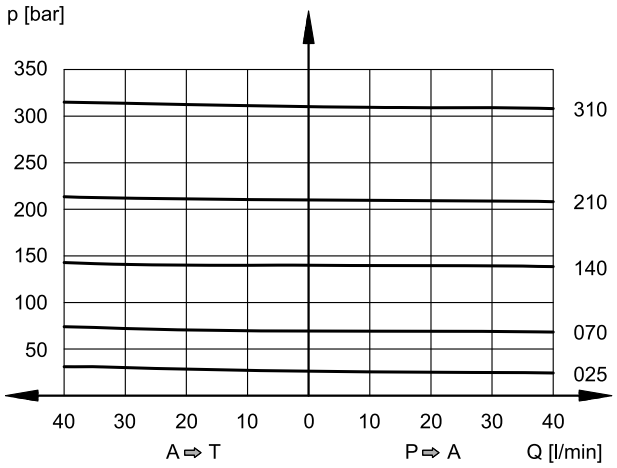
(measured with viscosity of 36 cSt at 50°C)

Typical control characteristics, according to the reference signal for available pressure control ranges. Characteristic curves measured without backpressure in T, with linearity compensation set by the onboard electronics.

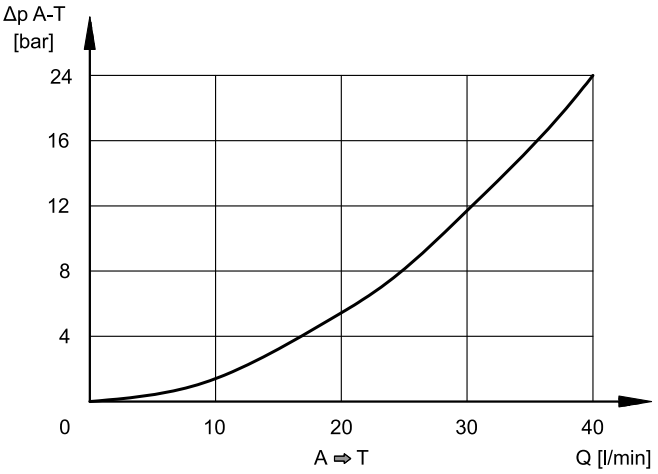
PRESSURE CONTROL p = f (I)



SET PRESSURE p max = f (Q)



MIN. CONTROLLED PRESSURE p min = f (Q)



Pressure drops A →T vs. flow, without backpressure in T port and reference signal = 0 %

7 - RESPONSE TIMES

(obtained with mineral oil with viscosity of 36 cSt at 50°C)

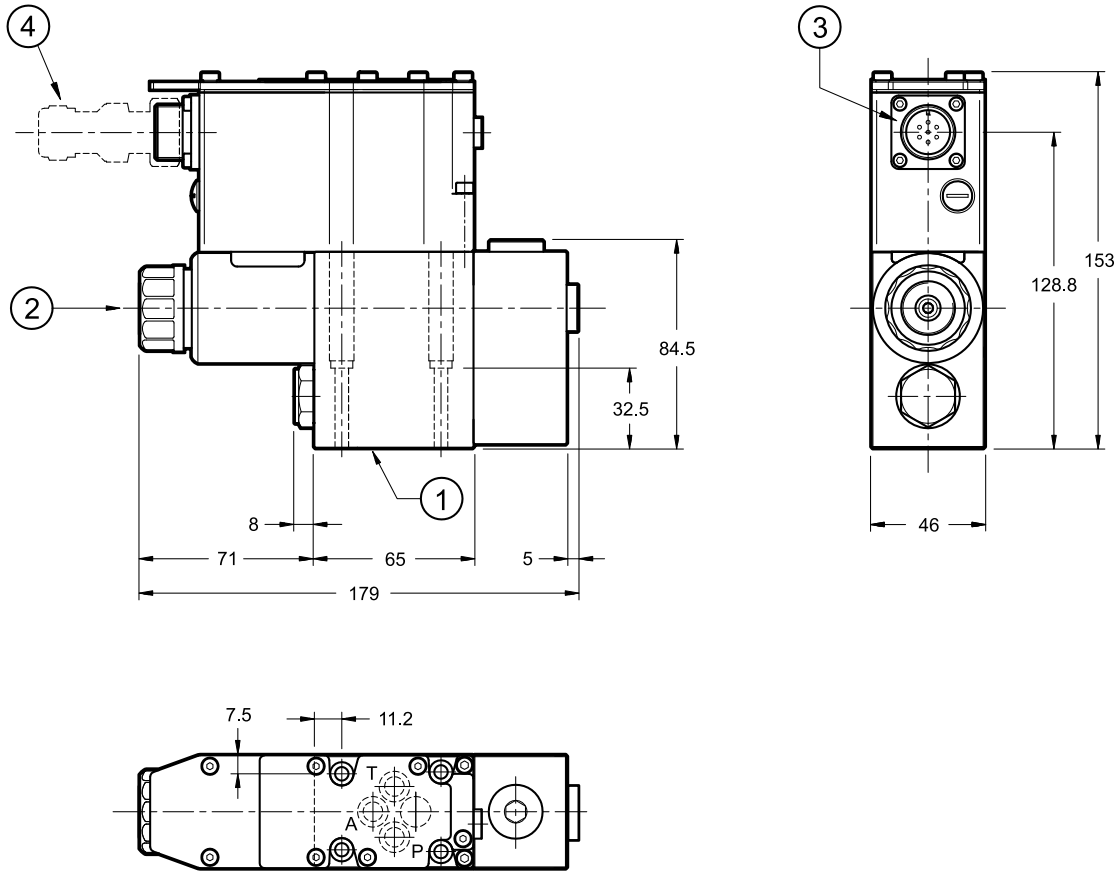
Step response is the time taken for the valve to reach 90% of the set pressure value following a step change of reference signal.

The response time is affected both by the flow rate and the oil volume in the pipework.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	80	80

8 - PZE3G - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



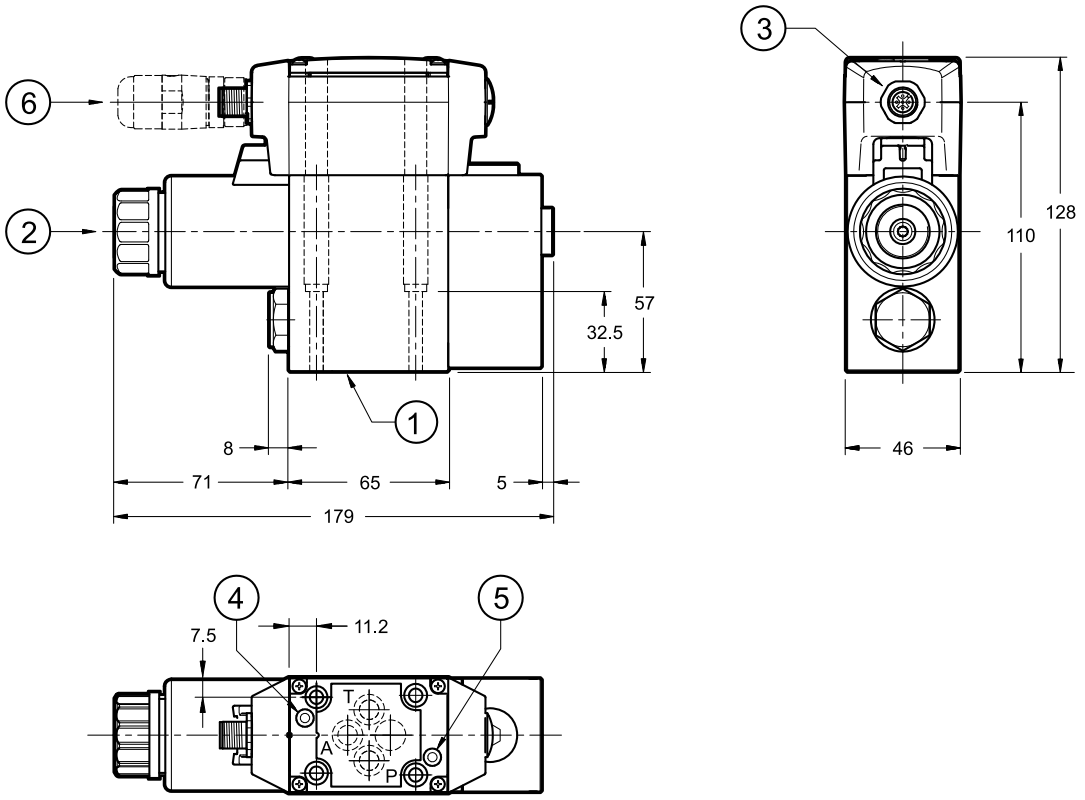
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

Valve fastening: N. 4 SHC screws M5x40 - ISO 4762
Tightening torque: 5 Nm (A8.8 screws)
Threads of mounting holes: M5x10

1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25 x 1.78)
2	Breather: Allen key 4
3	Main connection 6 pin + PE
4	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000

9 - PZE3GL - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



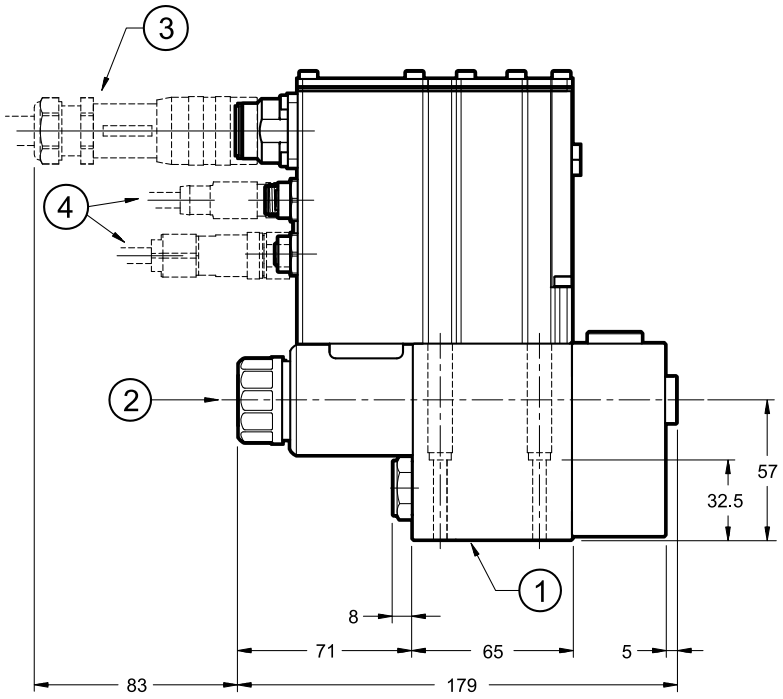
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

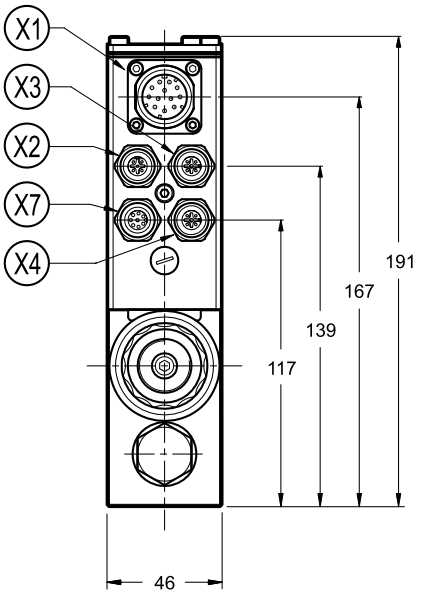
Fastening bolts: 4 SHC screws M5x40 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

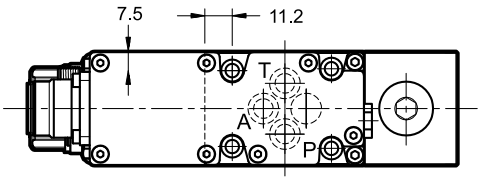
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Connection M12 A 5 pin
4	L1 LED
5	L2 LED
6	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

10 - PZE3GH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm







X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

Fastening bolts: 4 bolts M5x40 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

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 (2) placed at the end of the solenoid tube.

NOTE 2: Depending on the chosen version, X4 and X7 connections may not be present.

Please refer to section 5 for connection descriptions and pinout.

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

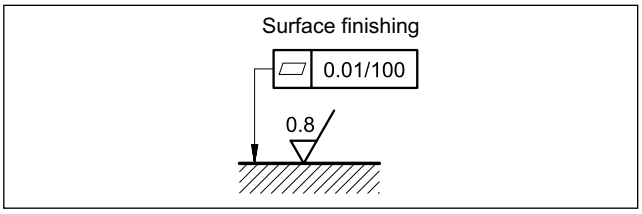
12 - INSTALLATION

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 section 6.

Ensure that there is no air in the hydraulic circuit. In particular applications, can be necessary to vent the air entrapped in the solenoid tube, by using the appropriate drain screw in the solenoid tube. So, ensure the solenoid tube is always filled with oil. When finished, make sure you have screwed the screw back in 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.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

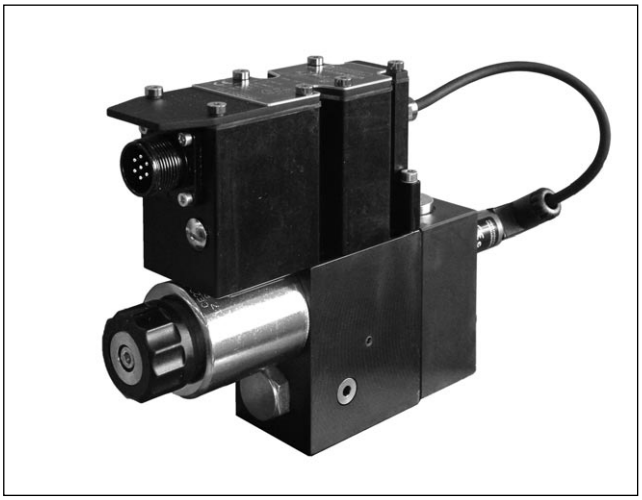
14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions P, T, A, B: 3/8” BSP thread

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



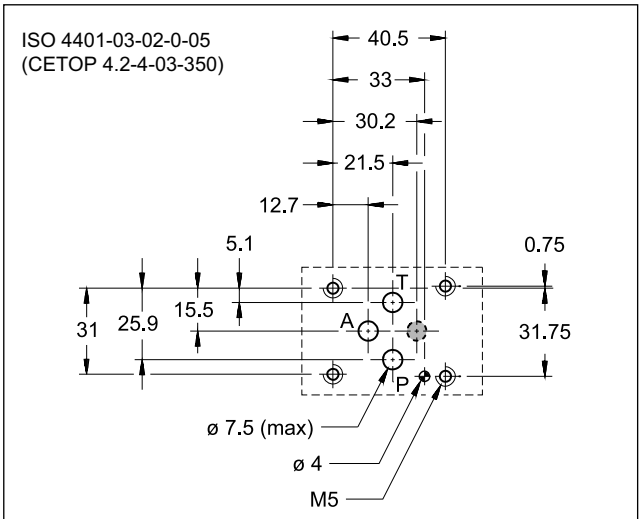
PZE3J*

PROPORTIONAL 3-WAY PRESSURE REDUCING VALVE, WITH PRESSURE CLOSED LOOP AND INTEGRATED ELECTRONICS

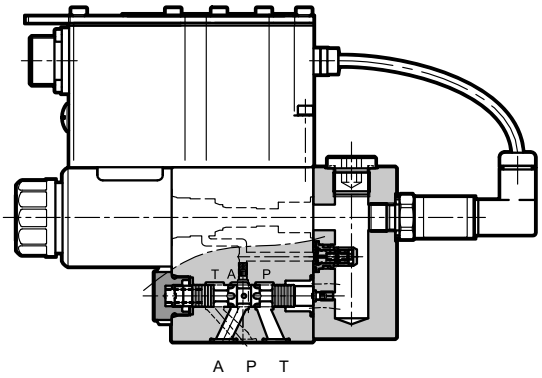
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **40** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



— PZE3J* valve is a proportional 3-way pressure reducing valve, pilot operated, with pressure feedback, on-board electronics and mounting surface according to ISO 4401-03 standards.

— This valve controls the outlet pressure on port A, reducing the inlet pressure from line P or relieving the overpressure from line A into T keeping it at the set value. (typically: hydraulic counter-weight or load balancing)

— The valve is available with different types of electronics, with analogue or fieldbus interfaces.

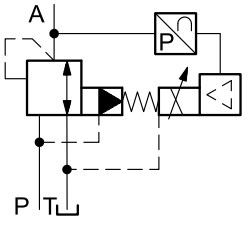
— The valve is easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

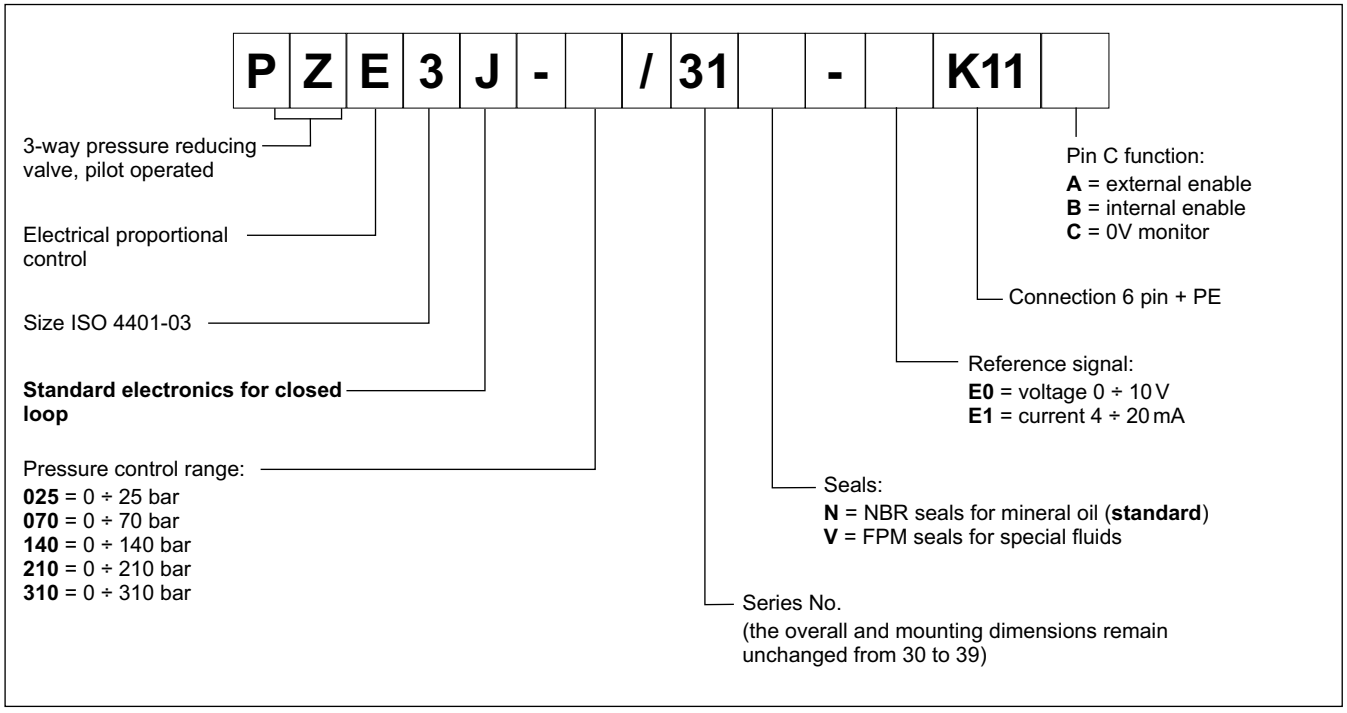
Maximum operating pressure: - P port - T port	bar	 350 2
Maximum flow (see p max = f(Q) diagram)	l/min	40
Step response	see paragraph 7	
Hysteresis	% of p nom	< 1 %
Repeatability	% of p nom	< ± 0.5%
Electrical characteristic	see paragraph 2	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	3

HYDRAULIC SYMBOL

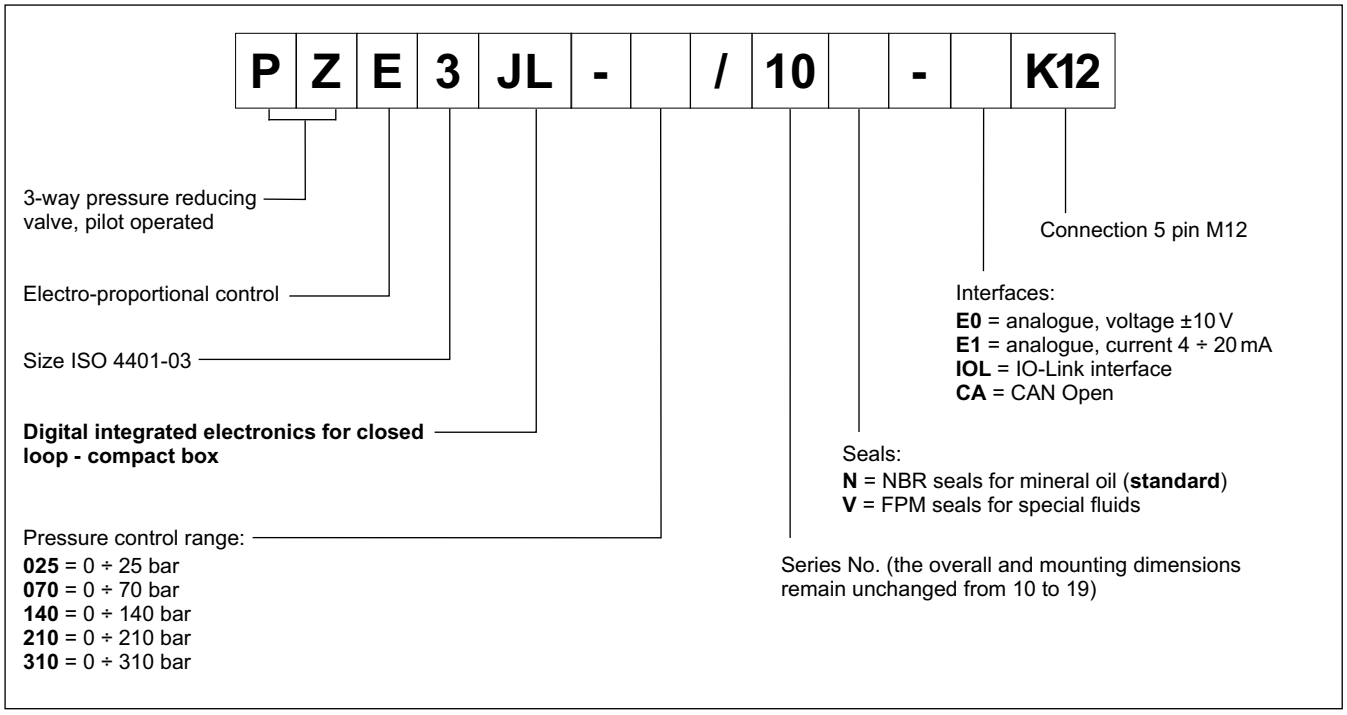


1 - IDENTIFICATION CODE

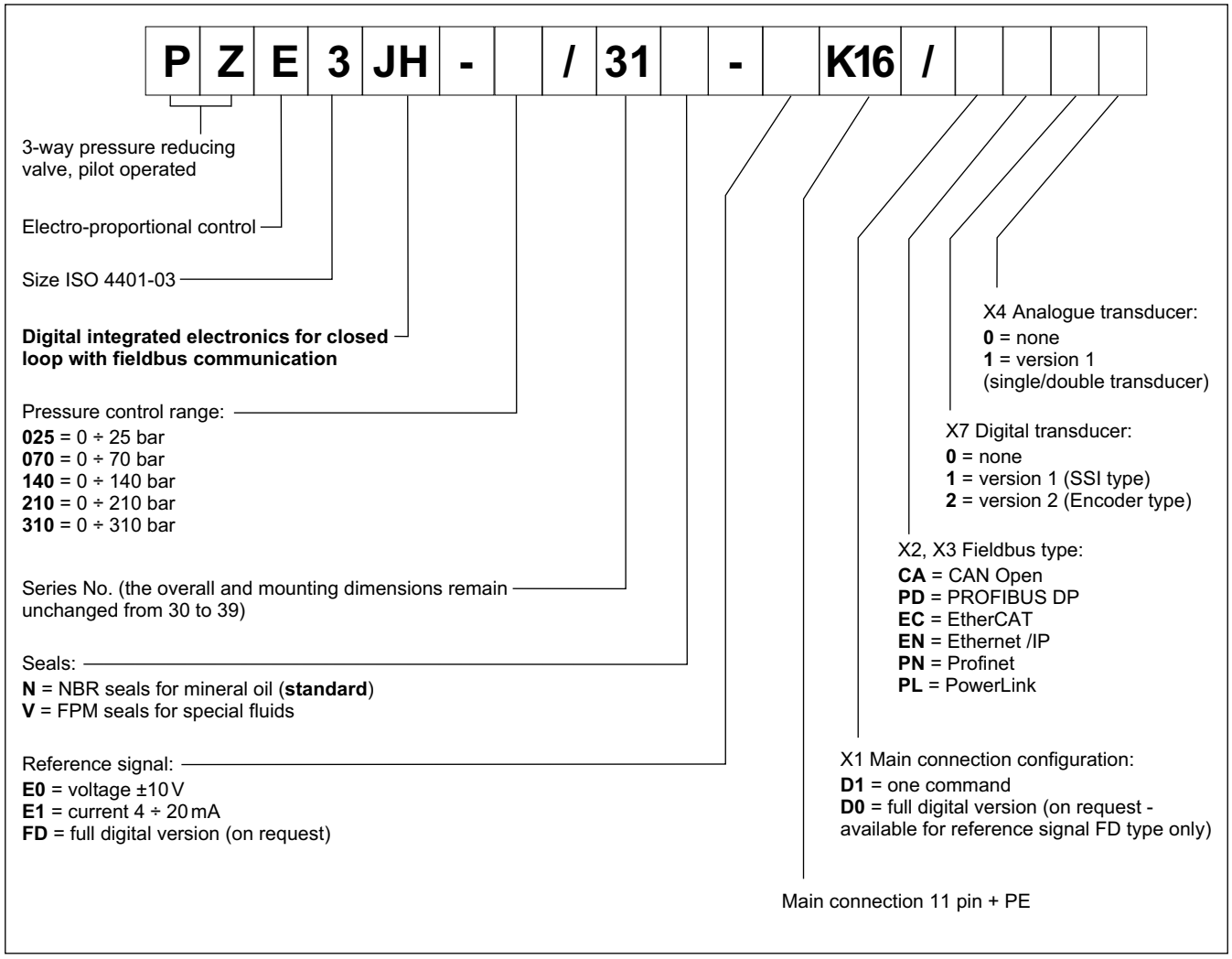
1.1 - Standard electronics



1.2 - Compact electronics



1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	2A time lag
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

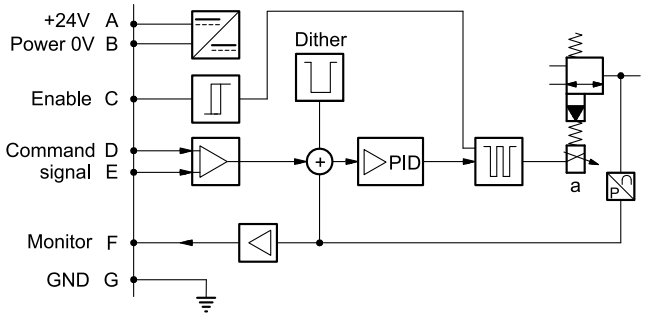
3 - PZE3J - STANDARD ELECTRONICS

3.1 - Electrical characteristics

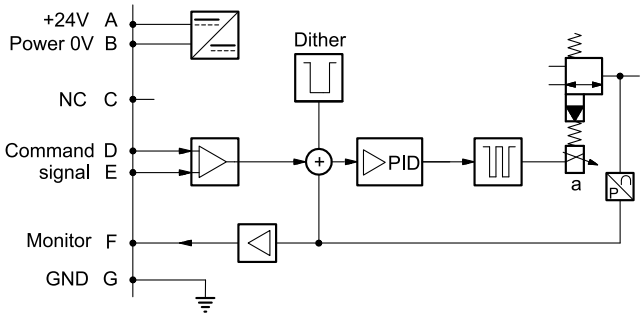
Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

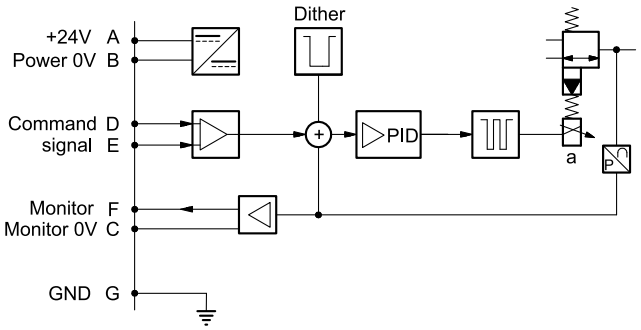
VERSION A - External Enable



VERSION B - Internal Enable

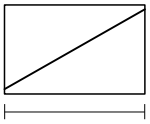


VERSION C - 0V Monitor

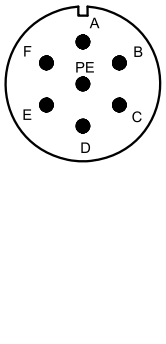


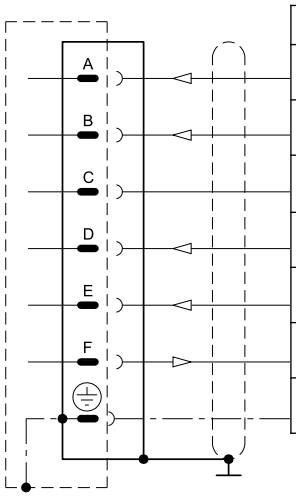
3.3 - Versions with voltage command (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**



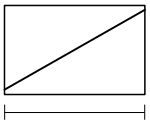


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	0 ÷ 10 V	Command (differential input)		
E	0 V	Command reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

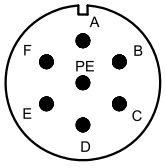
3.4 - Versions with current command (E1)

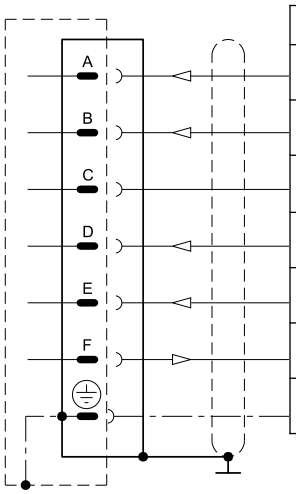
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - PZE3JL - COMPACT ELECTRONICS

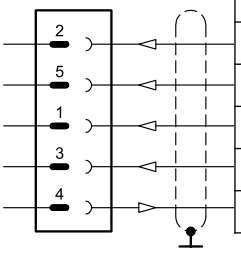
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (pressure at transducer): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	 IO-Link Port Class B 230.4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Data register (IOL and CA versions only)		solenoid voltage supply, solenoid faults (shortcircuit, bad config, internal), box temperature, switch-on time, vibrations
Connection		5-pin M12 code A (IEC 61076-2-101)

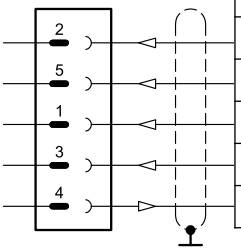
4.2 - Pin tables

'E0' connection



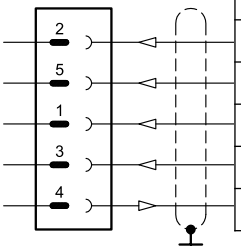
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	0 ÷ 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



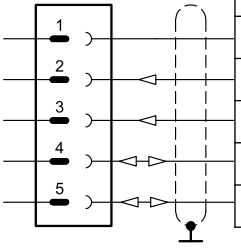
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - PZE3JH - FIELDBUS ELECTRONICS

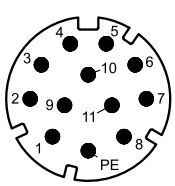
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

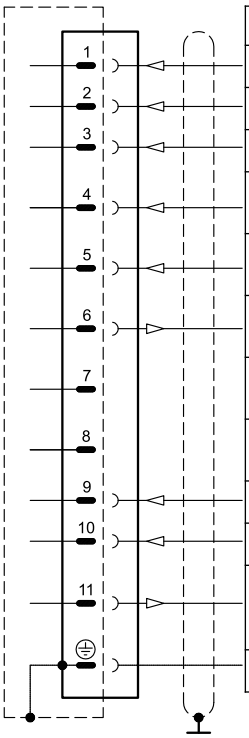
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	V DC mA	0 ÷ 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (pressure at transducer): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	0 ÷ 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero for data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination signal supply
2	PB_A	Bus line (high)
3	0 V	Signal zero for data line and termination
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

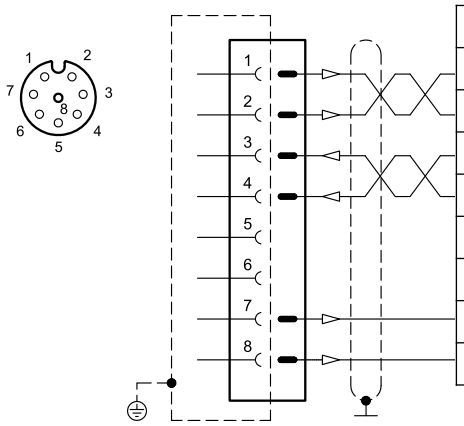
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

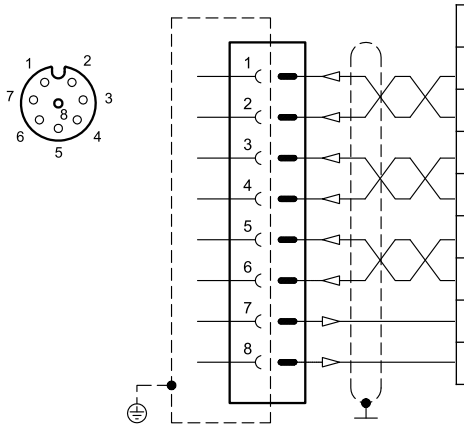
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



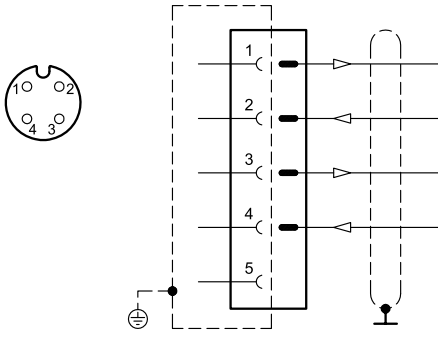
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



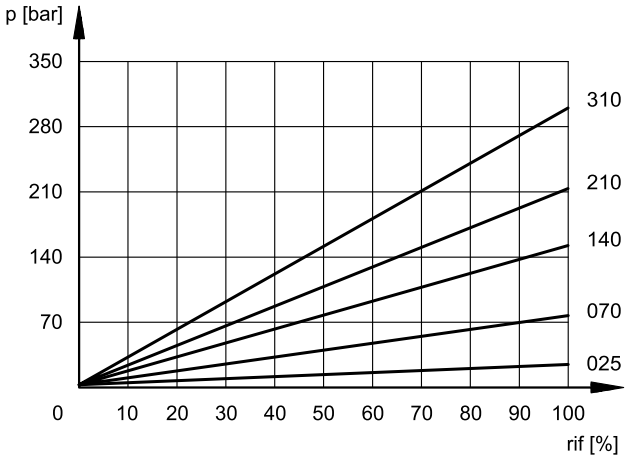
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

6 - CHARACTERISTIC CURVES

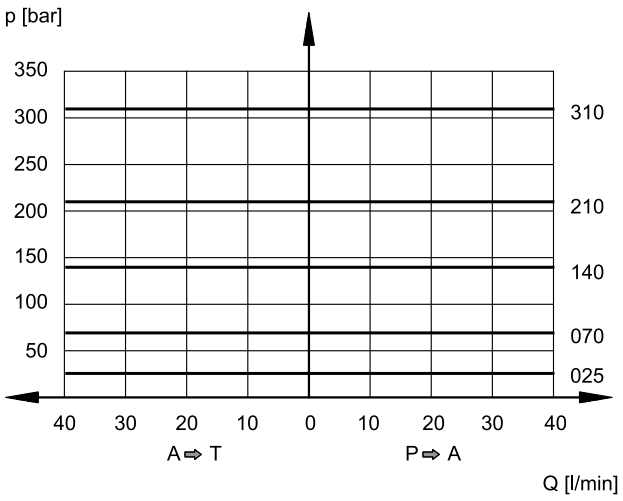
(measured with viscosity of 36 cSt at 50°C)

Typical control characteristics, according to the reference signal for available pressure control ranges. Characteristic curves measured without backpressure in T, with linearity and hysteresis compensation set by the onboard electronics.

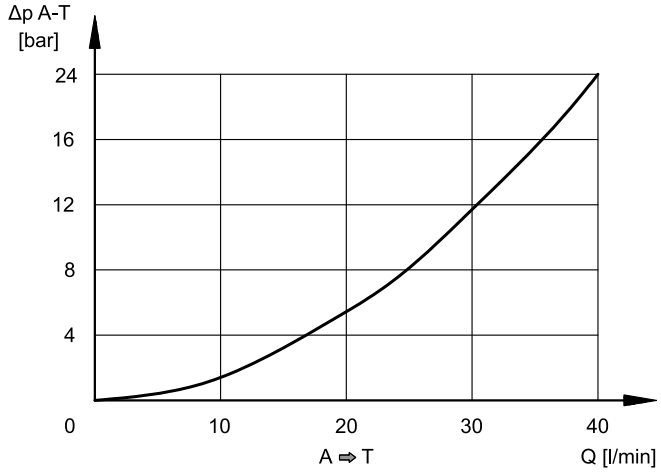
PRESSURE CONTROL p = f (I)



SET PRESSURE p max = f (Q)



MIN CONTROLLED PRESSURE pmin = f (Q)

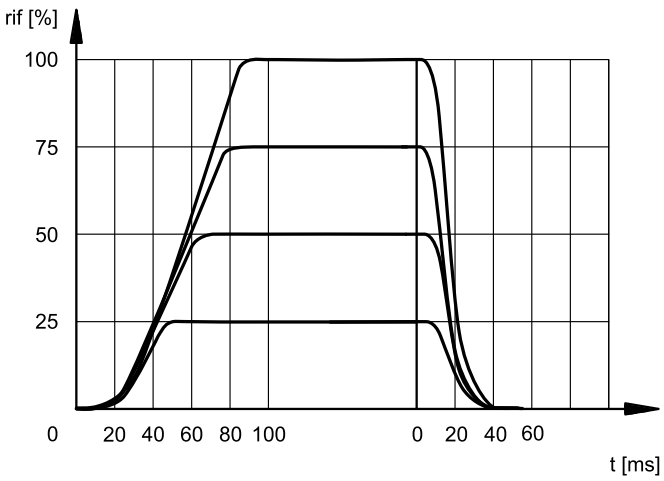


Pressure drops A →T vs. flow, without backpressure in T port and reference signal = 0 %

7 - RESPONSE TIMES

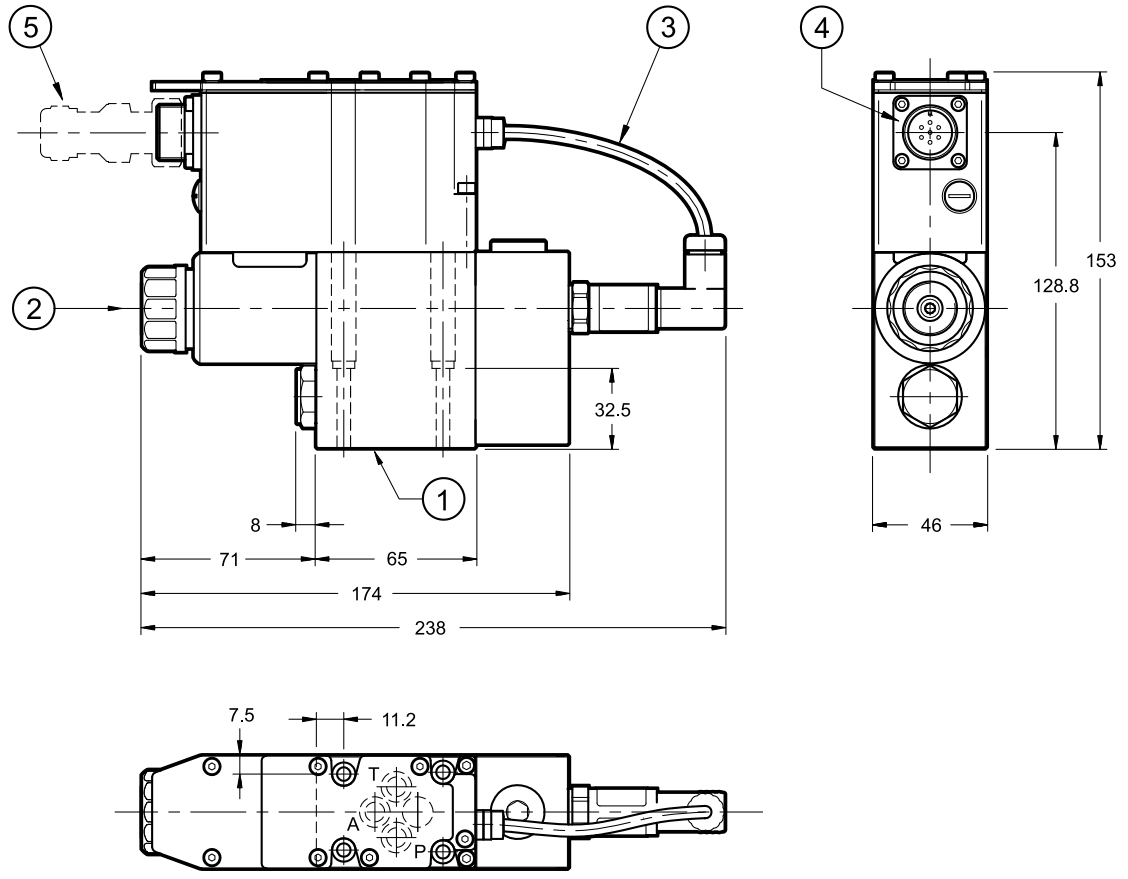
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

The response time is affected by both the flow rate and the oil volume in the pipework.



8 - PZE3J - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



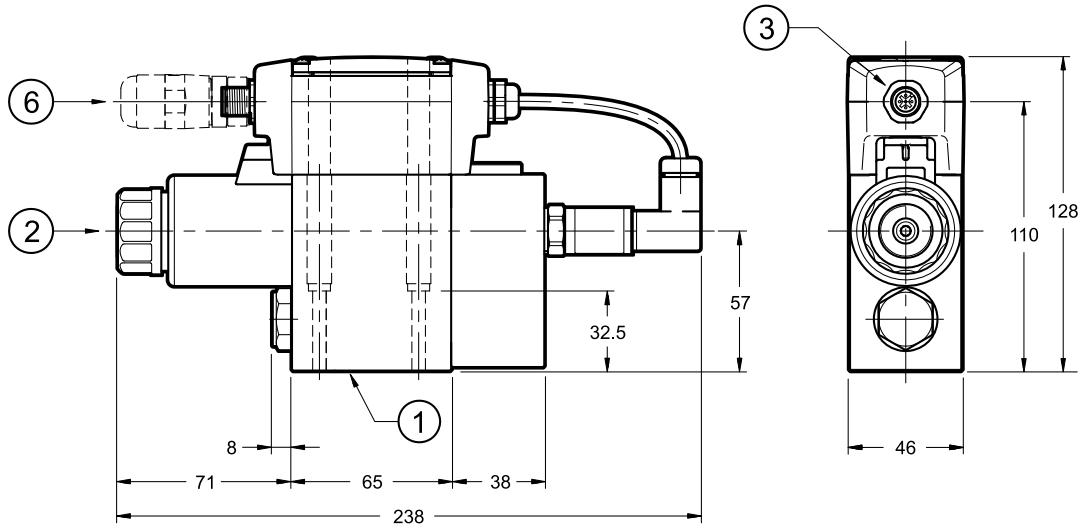
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

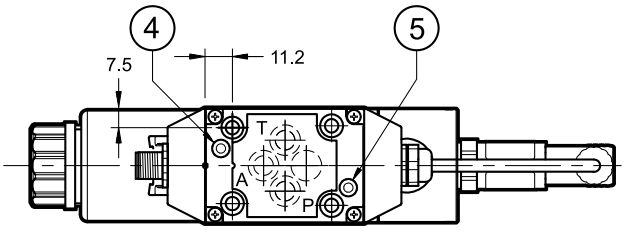
Valve fastening: N. 4 SHC screws M5x40 - ISO 4762	
Tightening torque: 5 Nm (A8.8 screws)	
Threads of mounting holes: M5x10	

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) - 90 shore
2	Breather: Allen key 4
3	Cable with connector for pressure transducer
4	Main connection
5	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000 0

9 - PZE3JL - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm





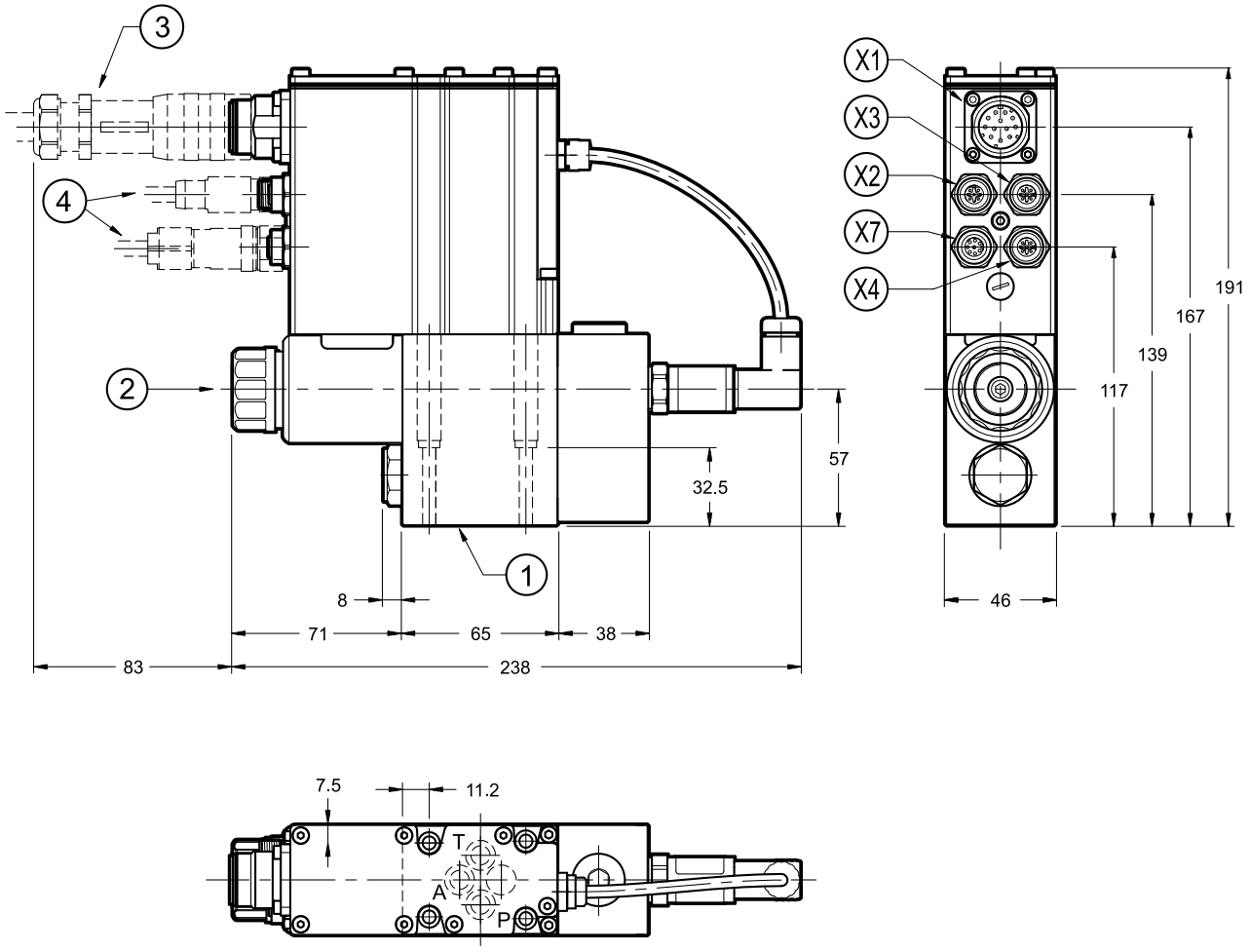
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

Fastening bolts: 4 SHC screws M5x40 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Connection M12 A 5 pin
4	L1 LED
5	L2 LED
6	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

10 - PZE3JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Breather: Allen key 4
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHC screws M5x40 ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

NOTE 2: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

11 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

12 - INSTALLATION

We recommend installing these valves with the solenoid downward, either in horizontal or vertical position. If the valve is installed on vertical axis with the solenoid upward, you should consider possible variations of the minimum controlled pressure from those indicated in paragraph 5.

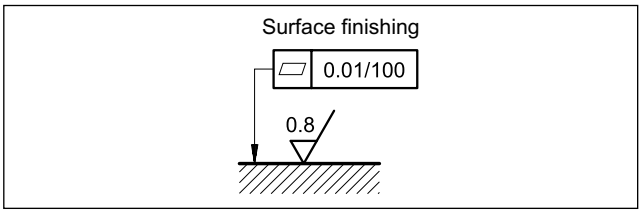
Ensure that there is no air in the hydraulic circuit. In certain applications it might be necessary to vent the air entrapped in the solenoid tube by unfastening the drain screw placed in the solenoid tube.

Ensure the solenoid tube is always filled with oil. Make sure the drain screw has been put back correctly at the end of the task. 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 leaks between the valve and support surface.



13 - ACCESSORIES

(to be ordered separately)

13.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

13.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

13.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

13.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connection, see catalogue 89 850.

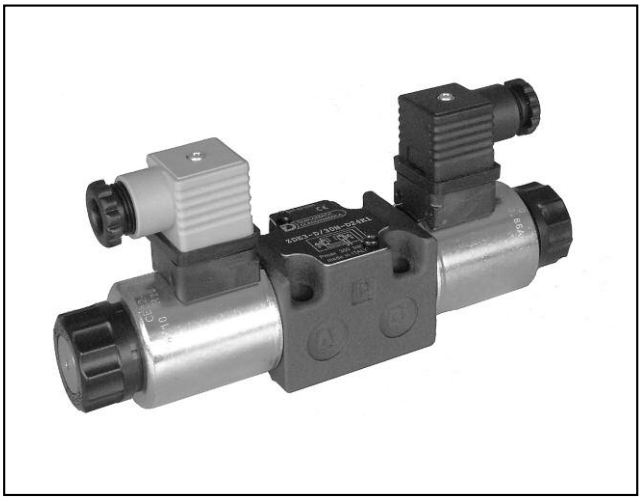
14 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G with ports on rear
PMMD-AL3G with side ports
Ports dimensions P, T, A, B: 3/8” BSP thread

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



ZDE3

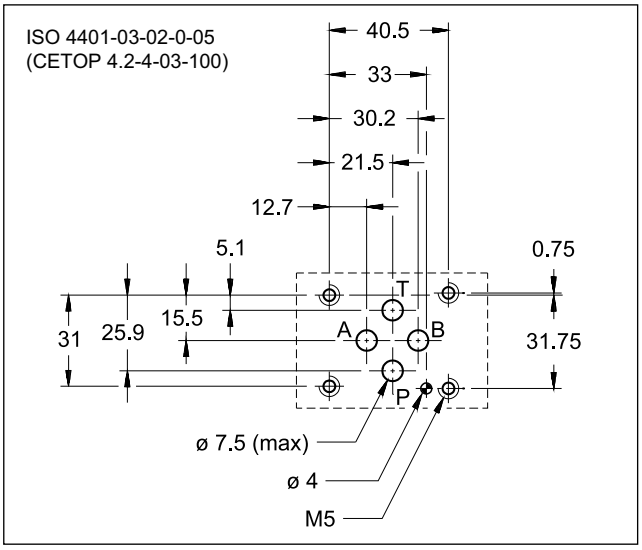
DIRECT OPERATED PRESSURE REDUCING VALVE WITH ELECTRIC PROPORTIONAL CONTROL

SERIES 30

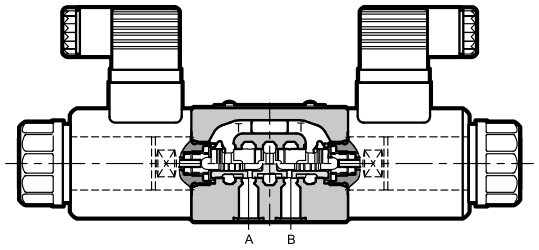
SUBPLATE MOUNTING ISO 4401-03

p max **100** bar
Q max **15** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— ZDE3 valves are direct operated pressure reducing valves with electric proportional control, with mounting interface in compliance with ISO 4401 standards.

— These valves are used to reduce pressure in the secondary circuit branches thus ensuring stability of controlled pressure in the event of variations of the flow rate through the valve.

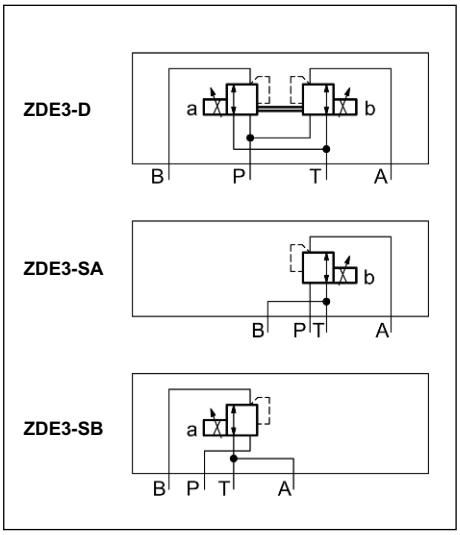
— The valve can be controlled directly by a current control supply unit or by means of the relative electronic control units to exploit valve performance to the full (see par. 10).

PERFORMANCES

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

Pressure allowed on P port	bar	30 ÷ 100
Pressure allowed on T port (see par. 3)	bar	0 ÷ 30
Controlled pressure	bar	23
Minimum controlled pressure	see Δp-Q diagram	
Maximum flow	l/min	15
Step response	see paragraph 4	
Hysteresis (with PWM 200 Hz)	% of p nom	< 4%
Repeatability	% of p nom	< ±1%
Electrical characteristic	see paragraph 3	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1,6 2

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

Z	D	E	3	-		/	30		-			/		

Pressure reducing valve

Electric proportional control

Size ISO 4401-03

Solenoids:
D = pressure reduction in A and B ports
SA = pressure reduction in A port (solenoid on side B)
SB = pressure reduction in B port (solenoid on side A)

Series No.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

NOTE: The standard valve is supplied with surface treatment of phosphating black.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to 240 hours (test operated according to EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

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

Coil electrical connection:
(see paragraph 5)
K1 = plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male

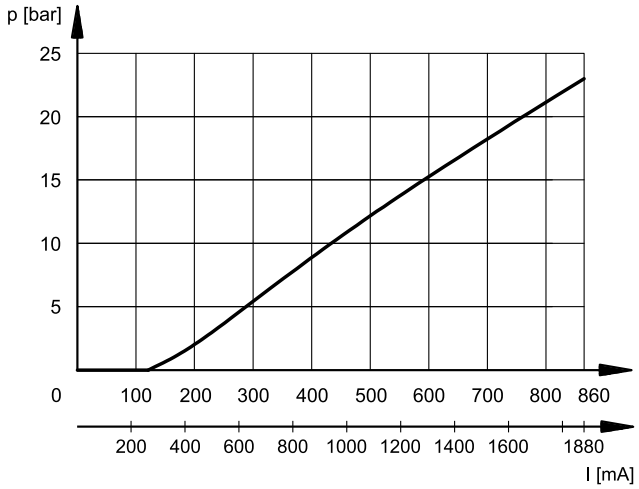
Manual override (see par. 7)

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
Omit if not required

2 - CHARACTERISTIC CURVES

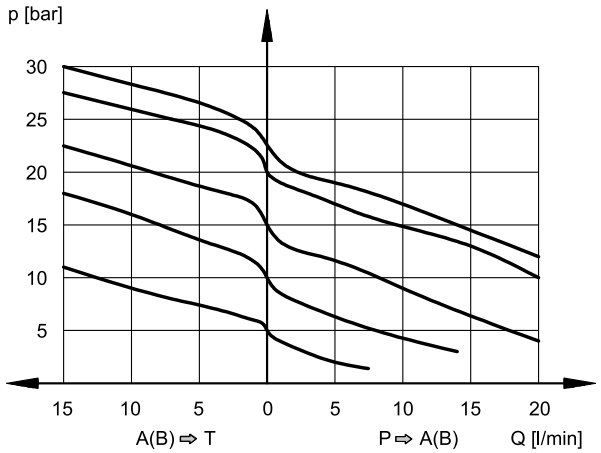
(values obtained with a ZDE3-D/30N-D24K1 PWM 100 Hz and oil with viscosity 36 cSt at 50°C)

PRESSURE CONTROL p = f (I)



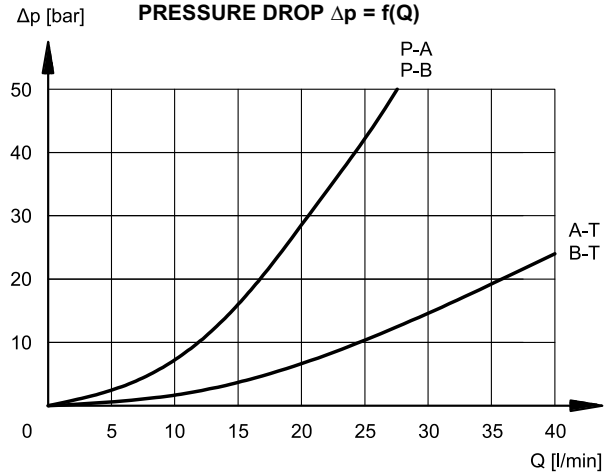
Pressure regulation is 0.5 bar lower in versions SA and SB

PRESSURE VARIATION p = f(Q)



Curves have been obtained with inlet pressure 100 bar.

PRESSURE DROP Δp = f(Q)



3 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut and can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE		V DC	**12**	**24**
RESISTANCE (at 20°C)	K1 coil K7 coil	Ω	3.66 4	17.6 19
MAXIMUM CURRENT		A	1.88	0.86
DUTY CYCLE			100%	
PWM FREQUENCY		Hz	200	100
ELECTROMAGNETIC COMPATIBILITY (EMC)			According to 2014/30/EU	
PROTECTION FROM: Atmospheric agents (IEC 60529)			IP65	
CLASS OF PROTECTION: Coil insulation (VDE 0580) Impregnation			class H class F	

4 - STEP RESPONSE

(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.

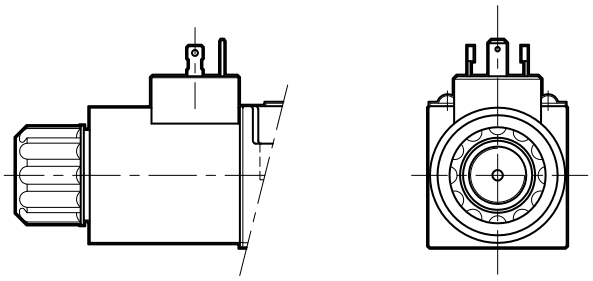
The table illustrates typical step response times measured with input flow rate of Q = 5 l/min and p = 50 bar.

REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]	30	30

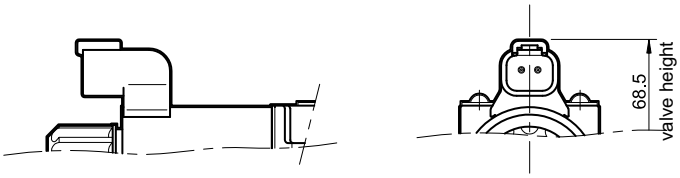
5 - ELECTRIC CONNECTIONS

Connectors for standard K1 connection are always supplied with the valve.

connection for EN 175301-803
(ex DIN 43650) connector
code **K1** (**standard**)



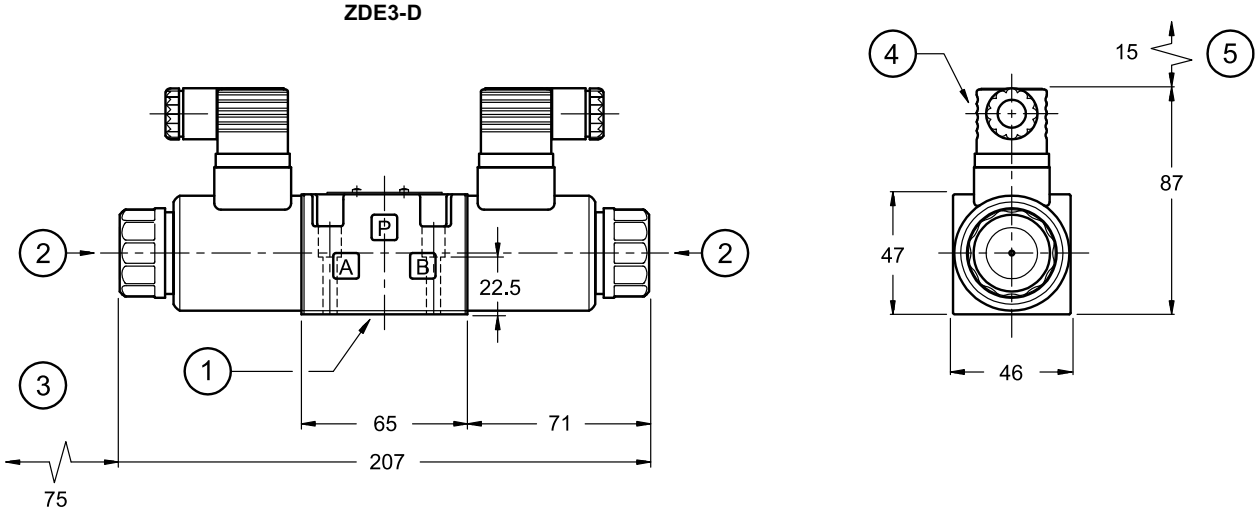
connection for
DEUTSCH DT06-2S male connector
code **K7**

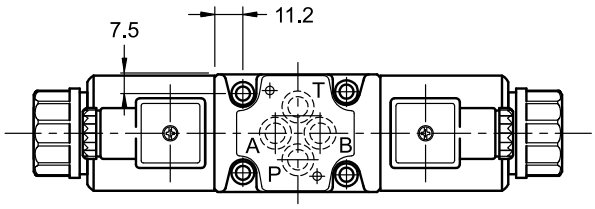


6 - OVERALL AND MOUNTING DIMENSIONS

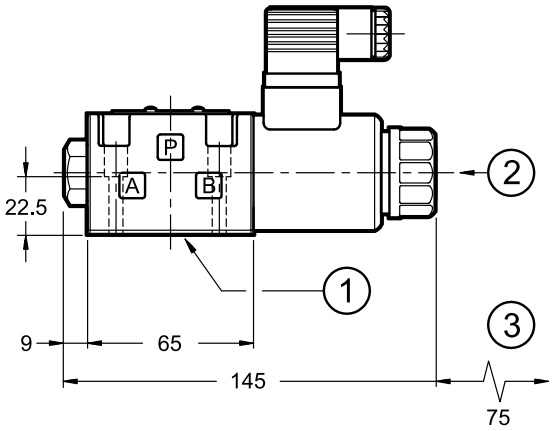
dimensions in mm

ZDE3-D

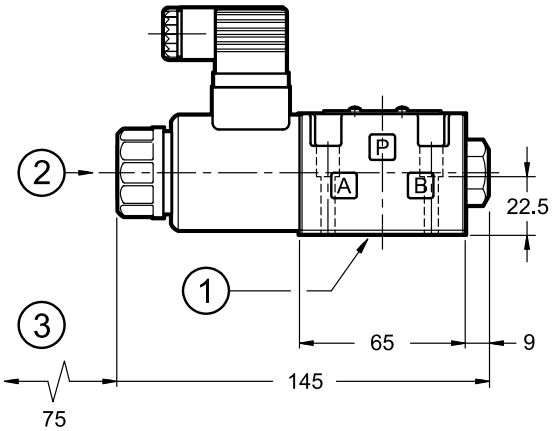




ZDE3-SA



ZDE3-SB



1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25x1.78)
2	Locking ring with boot protected manual override
3	Coil removal space
4	EN 175301-803 (ex DIN 43650) electrical connector
5	Connector removal space

Fastening bolts: 4 bolts M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

7 - MANUAL OVERRIDE

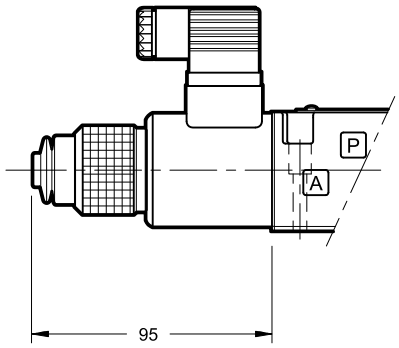
The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Two different manual override version are available upon request:

- **CM** version, manual override belt protected
- **CS** version, screw override with metal ring nut, provided with a M4 screw and a blocking locknut to allow the continuous mechanical operation.

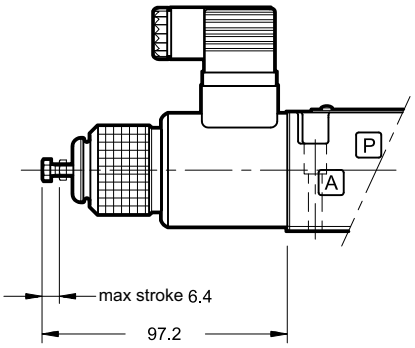
CAUTION!: The manual override use doesn't allow any proportional regulation; indeed using this kind of override, the main stage spool will open completely and the whole inlet pressure will pass through A or B line.

CM Version



Code: 3803210003

CS Version



Code: 3803210004

8 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types 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.

9 - INSTALLATION

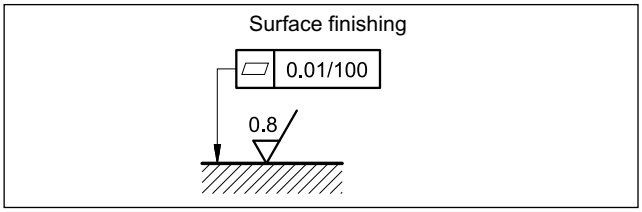
The ZDE3 valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

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.

Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the reduced pressure value.

Maximum admissible backpressure in the T line, under operational conditions, is 30 bar.



10 - ELECTRONIC CONTROL UNITS

ZDE3-SA* ZDE3-SB*

EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

ZDE3-D*

EDM-M211	for solenoid 24V DC	rail mounting DIN EN 50022	see cat. 89 251
EDM-M242	for solenoid 12V DC		

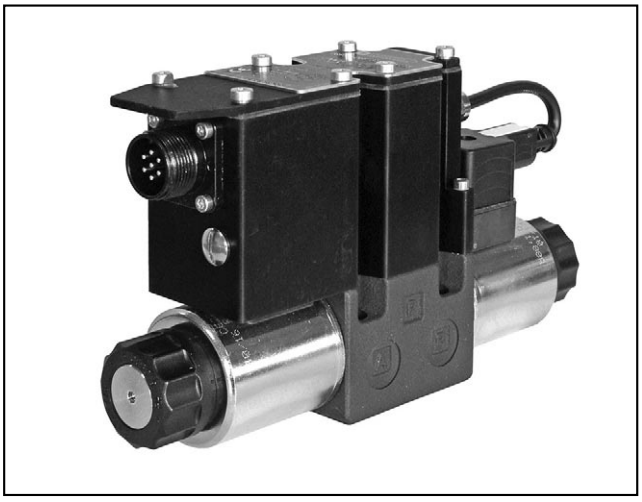
11 - SUBPLATES

(see catalogue 51 000)

Type PMMD-AI3G with rear ports
Type PMMD-AL3G with side ports
P, T, A, B port threading: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



ZDE3G*

DIRECT OPERATED PRESSURE REDUCING VALVE WITH PROPORTIONAL CONTROL AND INTEGRATED ELECTRONICS

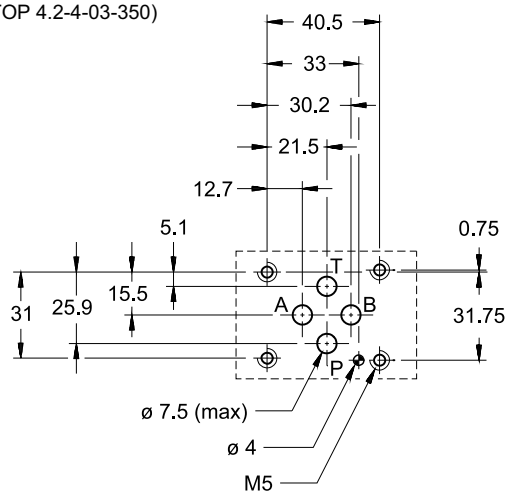
SERIES 32

SUBPLATE MOUNTING
ISO 4401-03

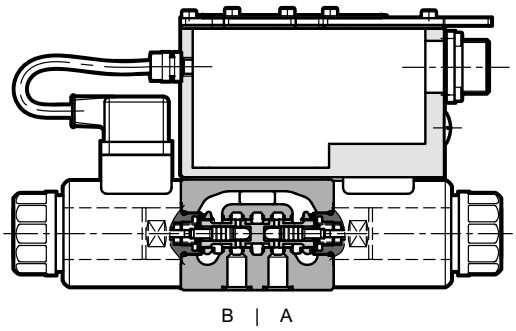
p max **100** bar
Q max **15** l/min

MOUNTING INTERFACE

ISO 4401-03-02-0-05
(CETOP 4.2-4-03-350)



OPERATING PRINCIPLE



— The ZDE3G are direct operated pressure reducing valves with electric proportional control and integrated electronics and with mounting interface in compliance with ISO 4401 standards.

— The valves are used to reduce pressure in the secondary circuit branches thus ensuring stability of controlled pressure in the event of variations of the flow rate through the valve.

— They are available with different types of electronics, with analogue or fieldbus interfaces.

— A solenoid current monitoring signal is available.

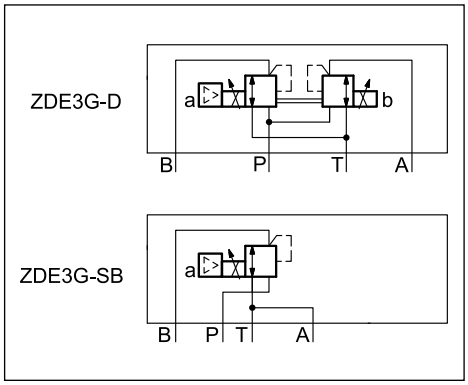
— The valve is easy to install. The driver directly manages digital settings.

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p = 140 bar)

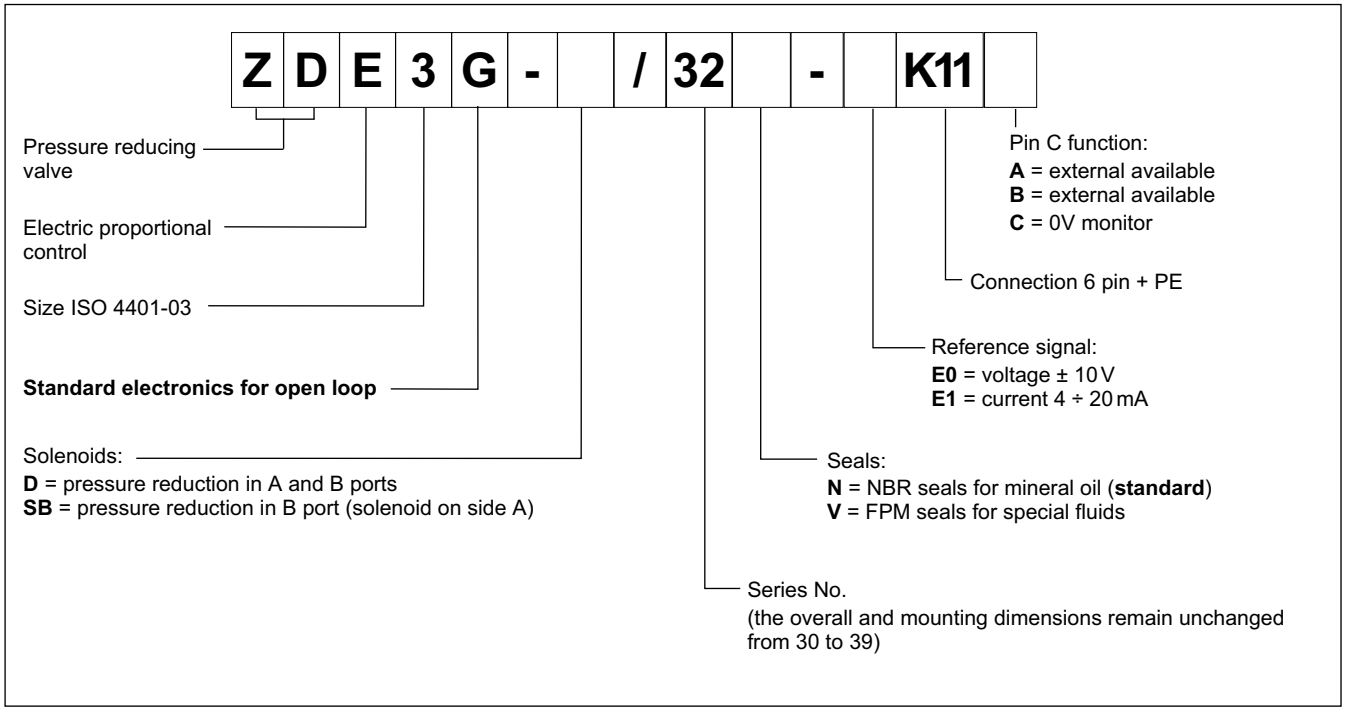
Operating pressure range port P	bar	30 ÷ 100
Operating pressure range port T (par. 5)	bar	0 ÷ 30
Controlled pressure	bar	23
Maximum flow	l/min	15
Hysteresis	% Q max	< 3 %
Repeatability	% Q max	< 1 %
Electrical characteristics	see paragraph 2	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1,9 2,4

HYDRAULIC SYMBOL

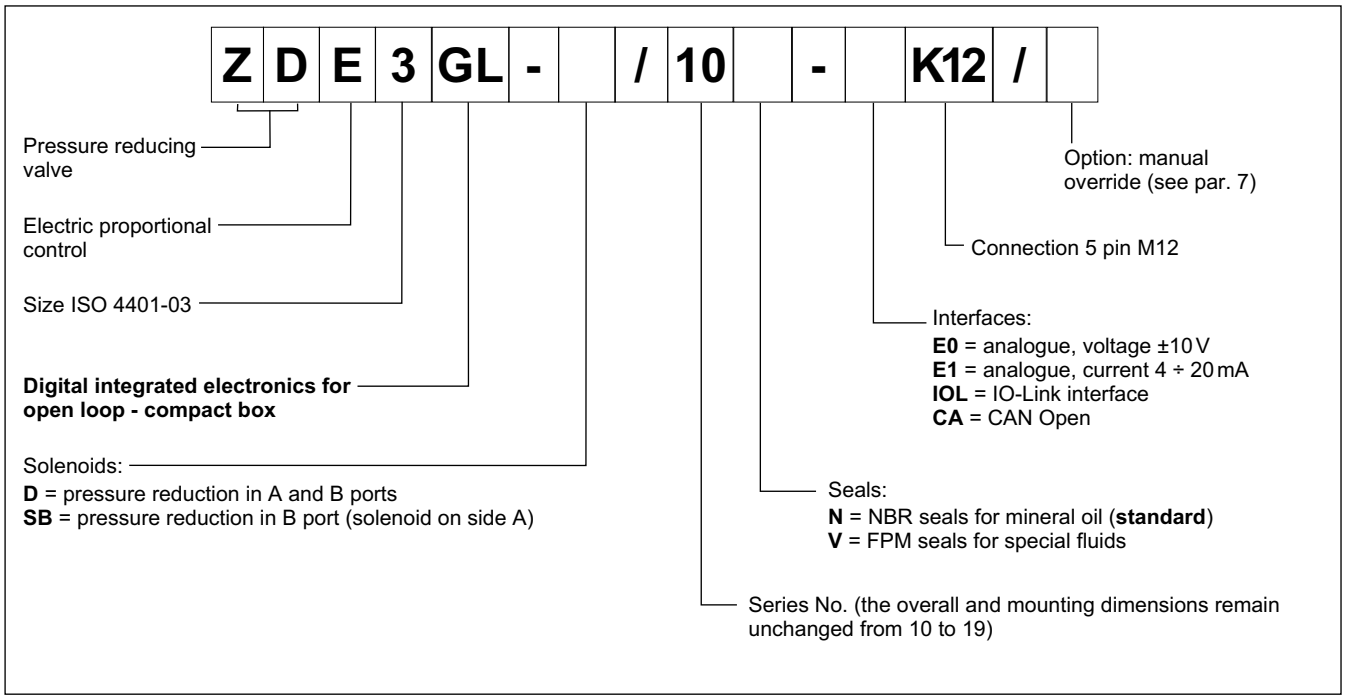


1 - IDENTIFICATION CODE

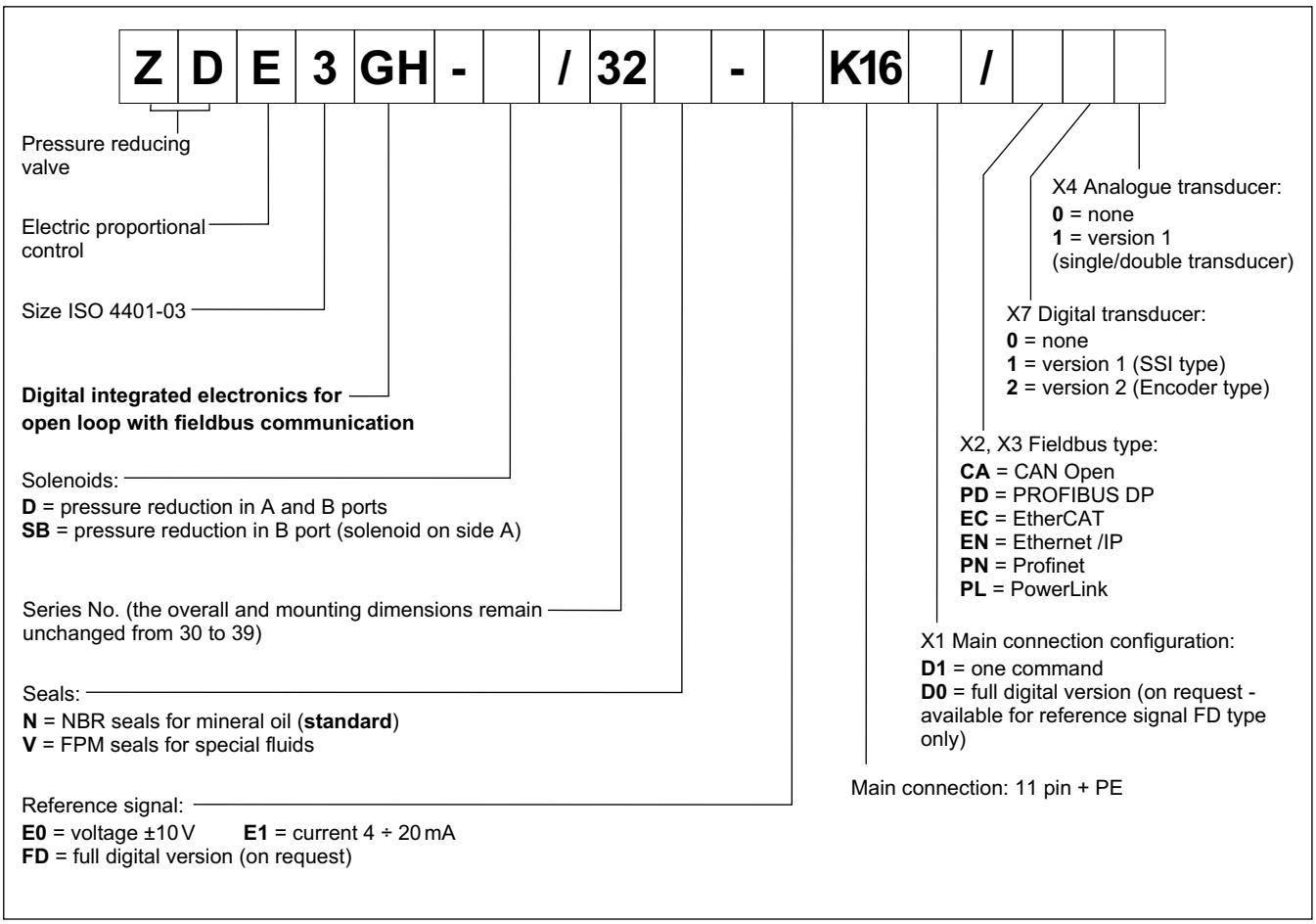
1.1 - Standard



1.2 - Compact version



1.3 - Electronics with fieldbus comunication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external	A	3
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

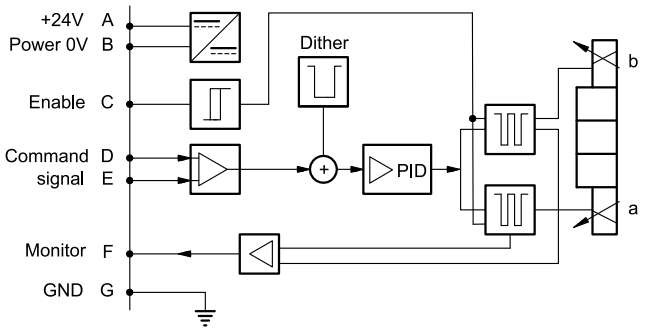
3 - ZDE3G - STANDARD ELECTRONICS

3.1 - Electrical characteristics

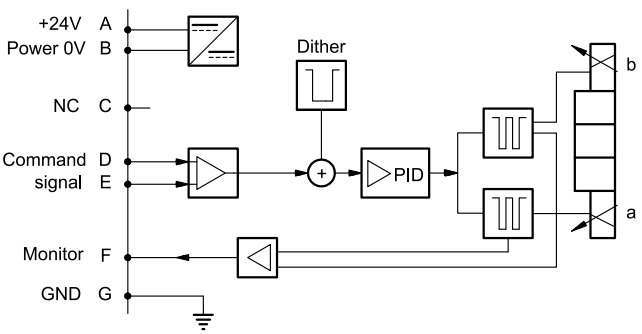
Command signal: voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	± 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

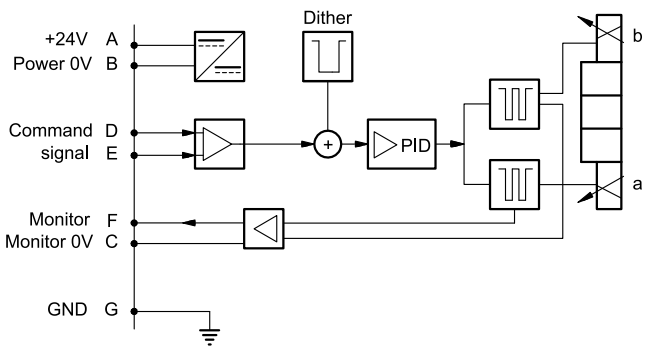
VERSION A - External Enable



VERSION B - Internal Enable

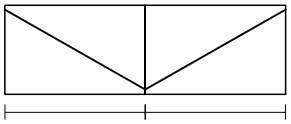


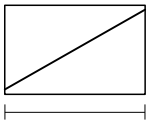
VERSION C - 0V Monitor



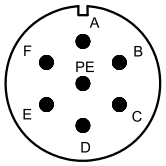
3.3 - Versions with voltage command (E0)

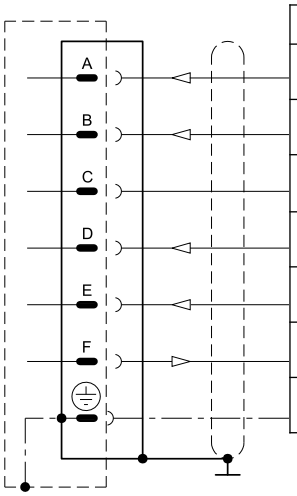
The reference signal is between -10V and +10V on double solenoid valve, and 0 ÷ 10V on single solenoid valve SA. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.





COMMAND	**-10V**	**0V**	**+10V**	**COMMAND**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**	**MONITOR**	**0V**	**+10V**



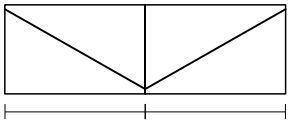


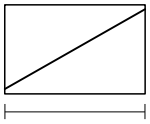
Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	±10 V	Command (differential input)		
E	0 V	Command reference		
F	±10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

3.4 - Versions with current command (E1)

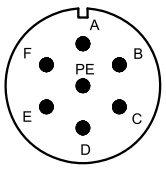
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient restoring the signal.

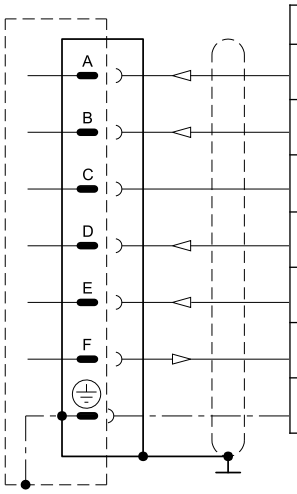
The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.





COMMAND	**4 mA**	**12 mA**	**20 mA**	**COMMAND**	**4 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**	**MONITOR**	**4 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - ZDE3GL - COMPACT ELECTRONICS

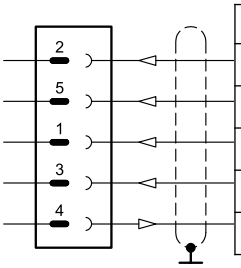
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 0 ÷ 5 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
IO-Link communication (IOL): Data rate	 kBaud	 IO-Link Port Class B 230,4
Can Open communication (CA): Data rate	 kbit	 10 ÷ 1000
Connection		5-pin M12 code A (IEC 61076-2-101)

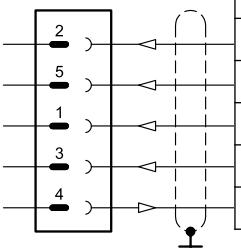
4.2 - Pin tables

'E0' connection



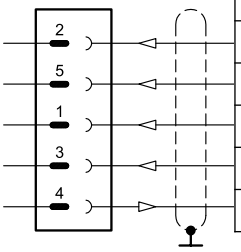
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection



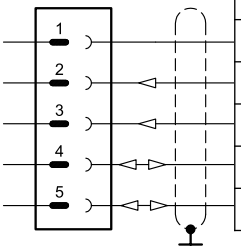
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+ +24 V DC	IO-Link supply voltage
3	1L- 0V (GND)	
4	C/Q	IO-Link Communication

'CA' connection



Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

5 - ZDE3GH - FIELDBUS ELECTRONICS

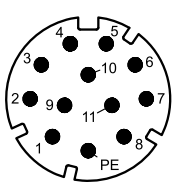
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

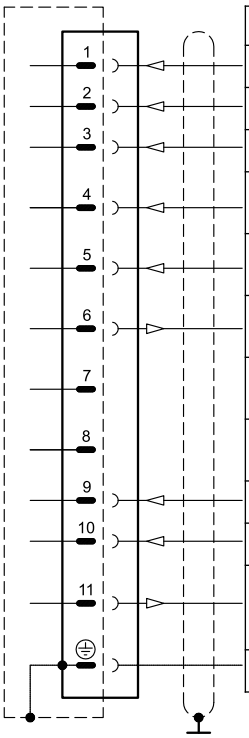
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

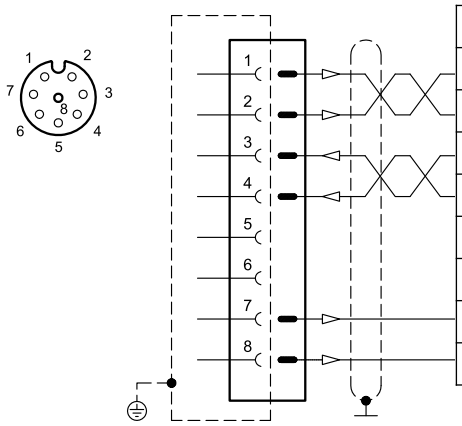
X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

5.4 - Digital transducer connection

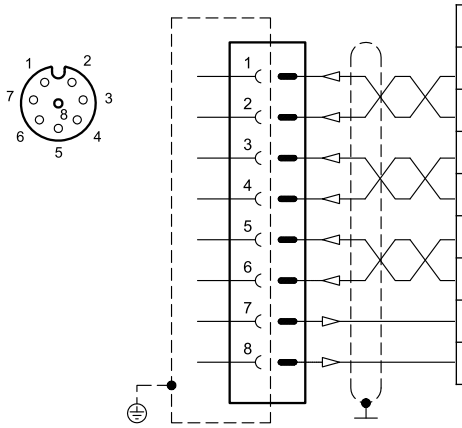
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

VERSION 2: ENCODER type



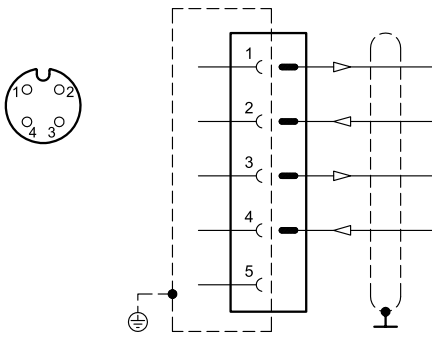
Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



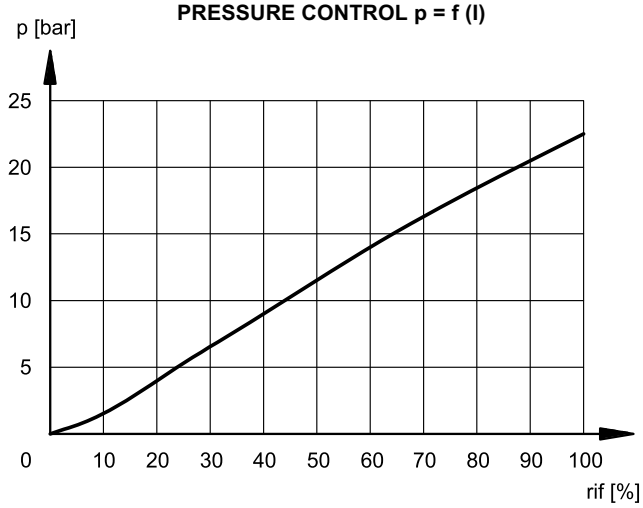
Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

6 - CHARACTERISTIC CURVES

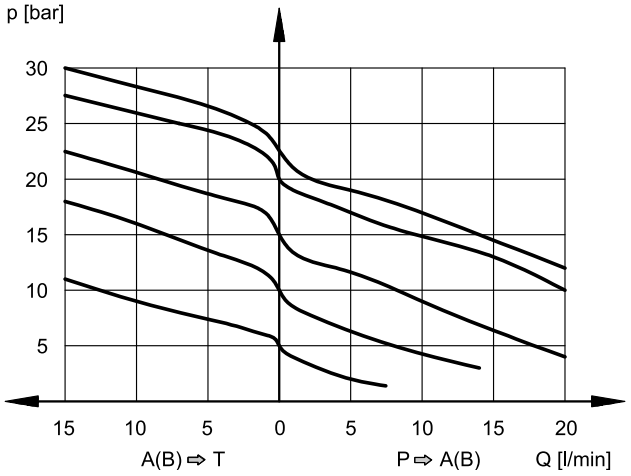
(obtained with oil with viscosity 36 cSt at 50°C)

Adjustment characteristics depending from reference signal, obtained with inlet pressure = 100 bar.

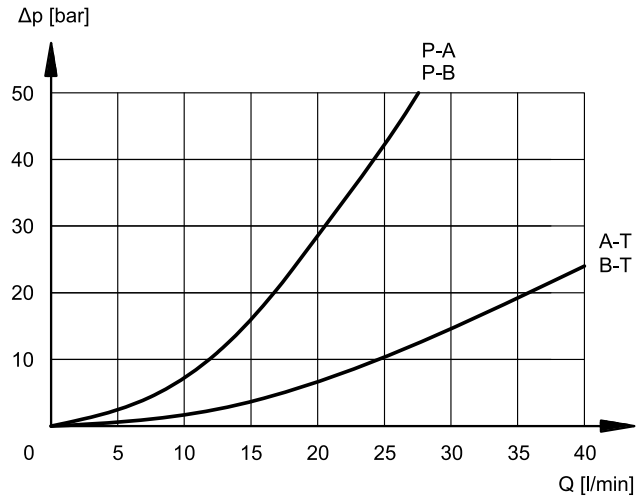
PRESSURE CONTROL p = f (I)



PRESSURE VARIATION p = f(Q)

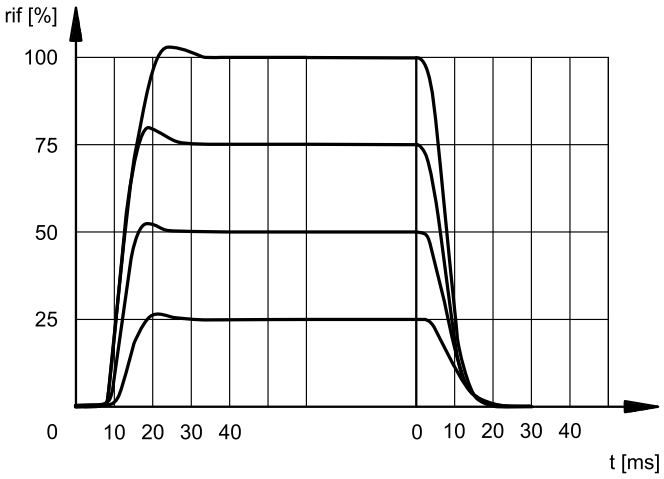


PRESSURE DROP Δp = f(Q)



7 - STEP RESPONSE

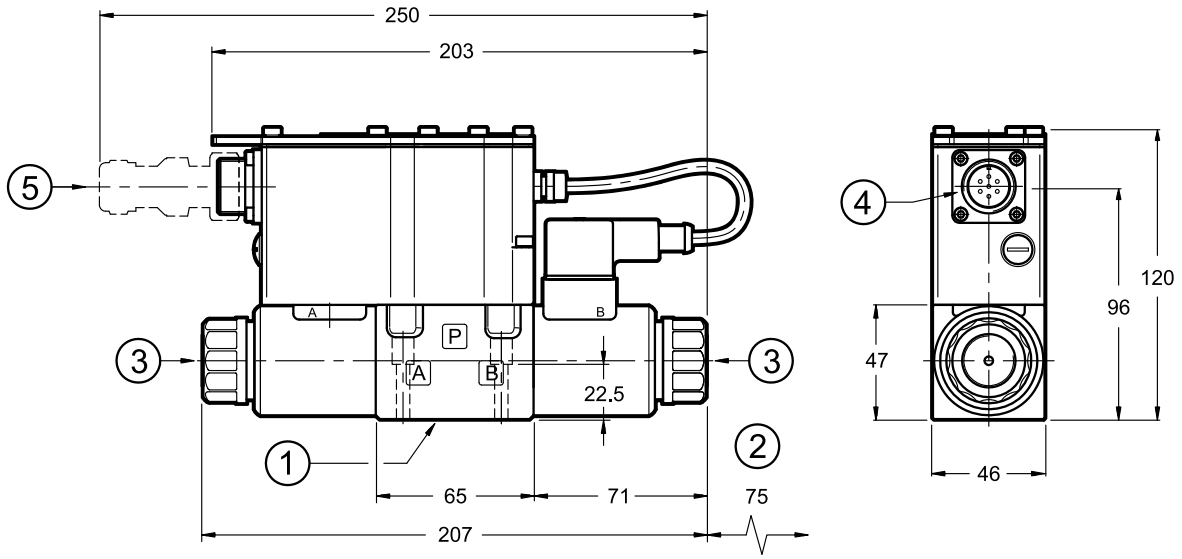
Response times are obtained with an inlet pressure of 100 bar and oil volume of 0,3 litres. The response time is affected both by the flow rate and the oil volume in the pipework.

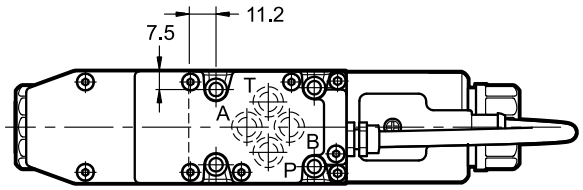


8 - ZDE3G - OVERALL AND MOUNTING DIMENSIONS

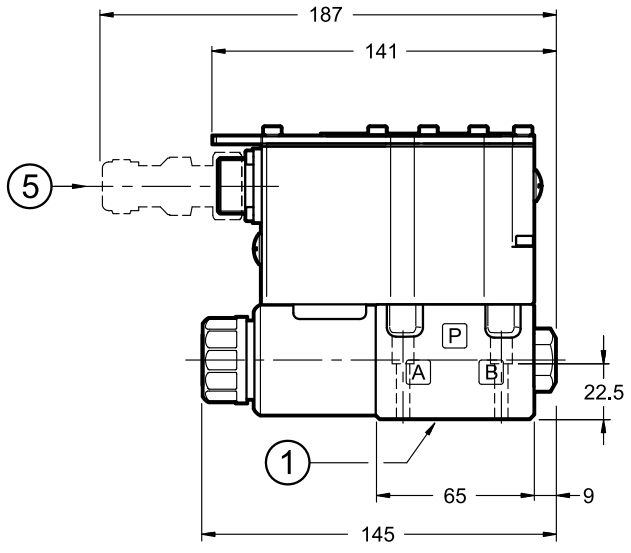
ZDE3G-D

dimensions in mm





ZDE3G-SB

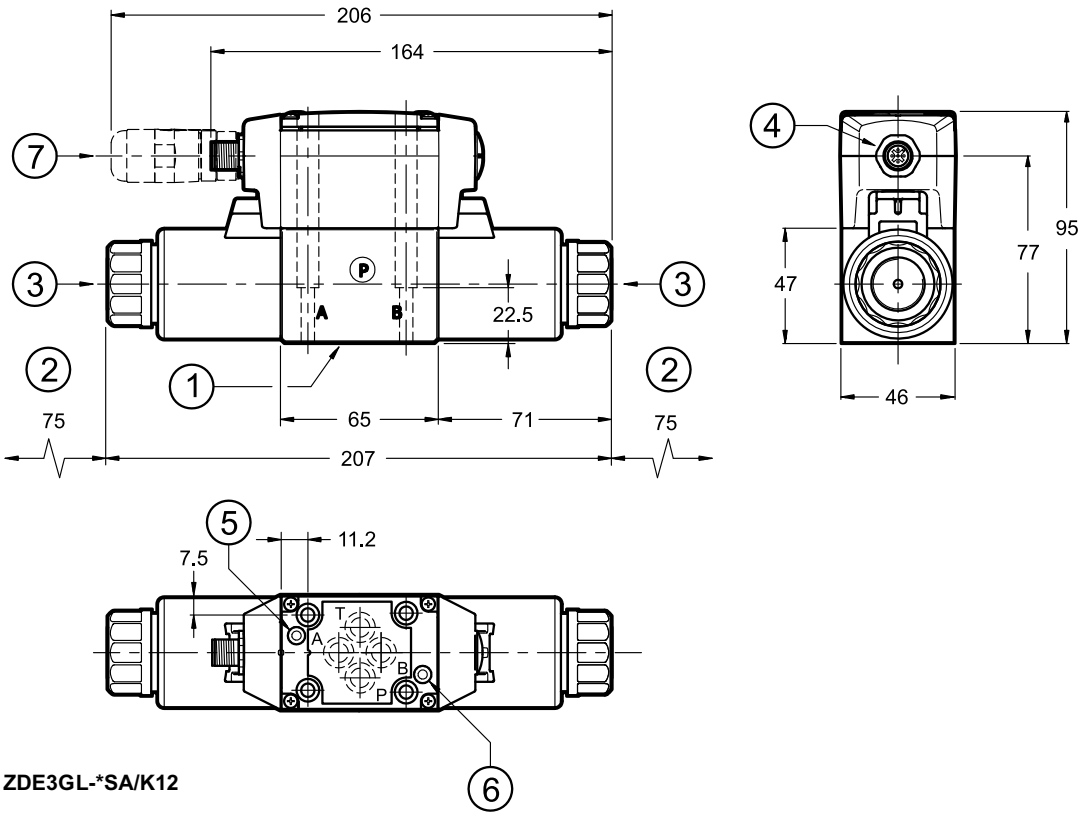


1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Standard manual override embedded in the solenoid tube
4	Main connection 6 pin + PE
5	Mating connector 6 poles + PE , female type MIL-5015-G **To be ordered separately.** See catalogue 89 000

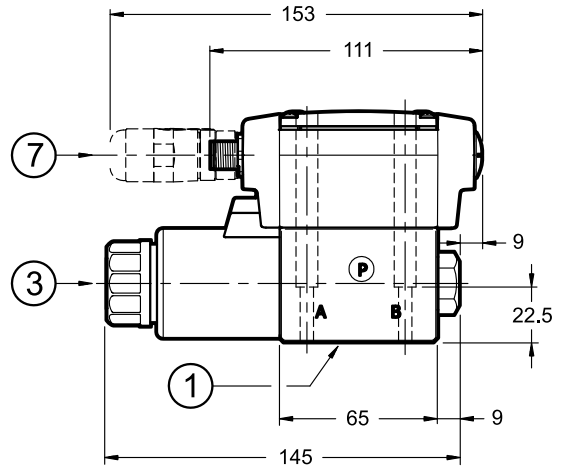
Fastening bolts: 4 SHC screws M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

9 - ZDE3GL - OVERALL AND MOUNTING DIMENSIONS

ZDE3GL-/K12**



ZDE3GL-*SA/K12



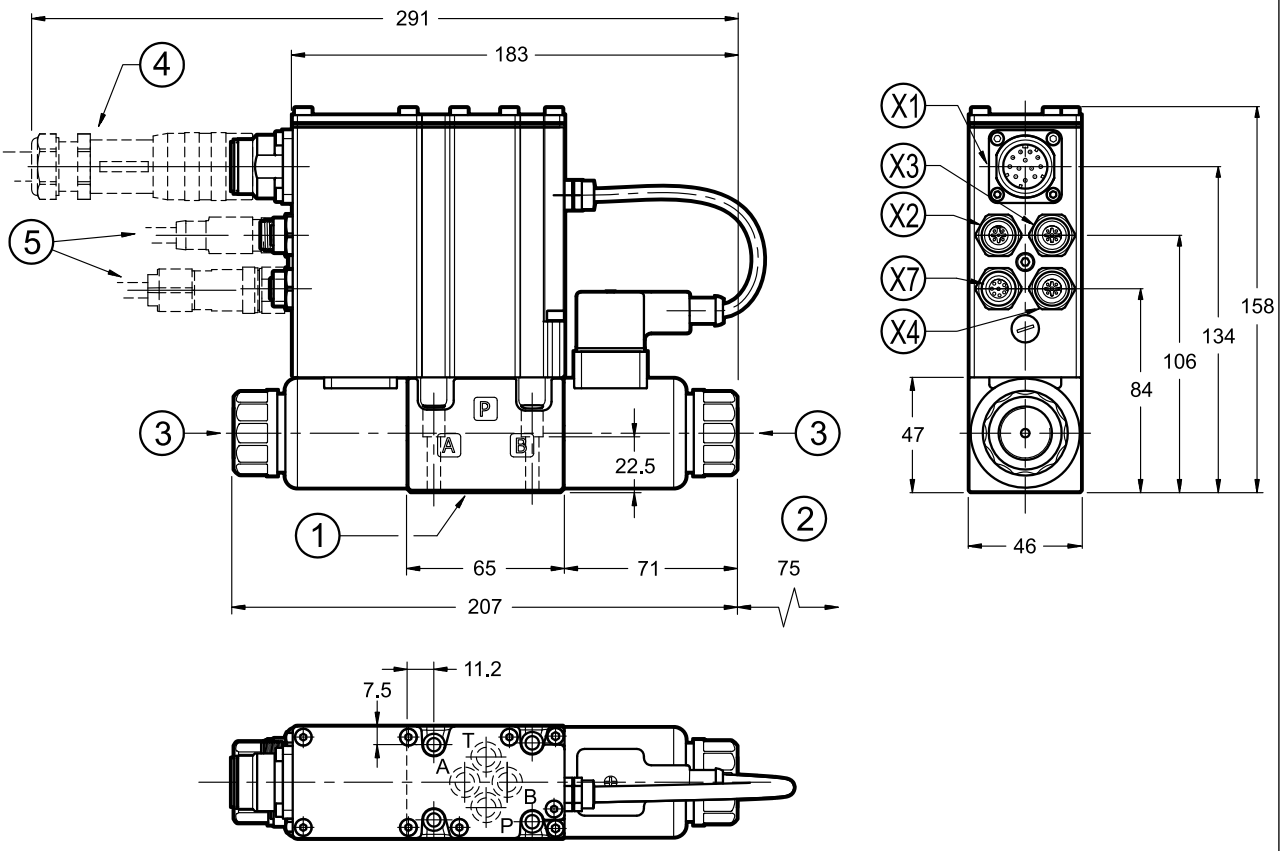
1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space
3	Standard manual override embedded in the solenoid tube
4	Connection M12 A 5 pin
5	L1 LED
6	L2 LED
7	Mating connector M12 5 poles - code A, female **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHC screws M5x30- ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

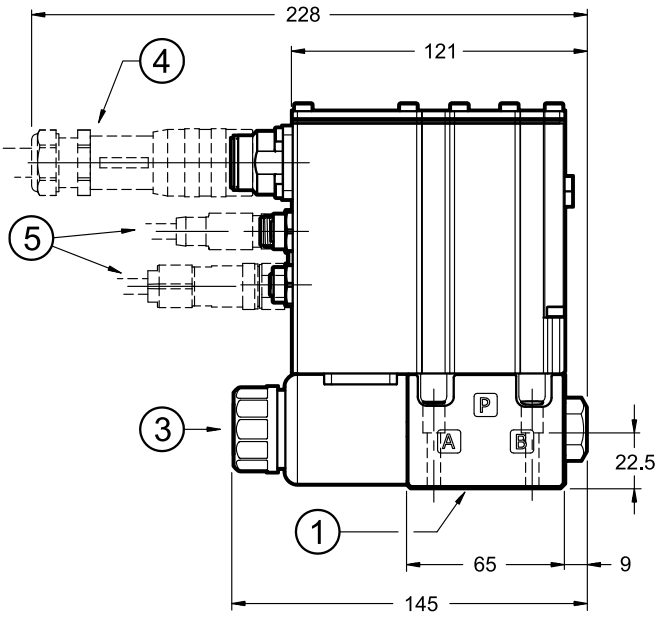
10 - ZDE3GH - OVERALL AND MOUNTING DIMENSIONS

ZDE3GH-/K16**

dimensions in mm



ZDE3GH-*SA/K16



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Coil removal space (solenoid B only)
3	Manual override by pin integrated in the solenoid tube
4	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
5	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000

Fastening bolts: 4 SHCS M5x30 ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

NOTE: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

11 - MANUAL OVERRIDE

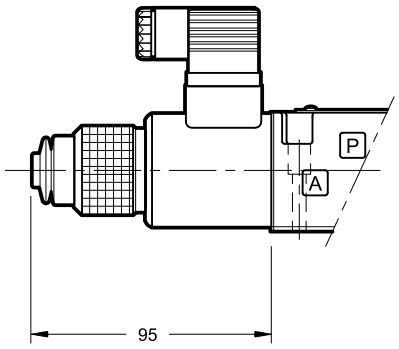
These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

Three other types of manual overrides can fit the ZDE3GL valve:

- **CM** version, manual override boot protected
- **CS** version, with metal ring nut provided with a M4 screw and a blocking locknut to allow the continuous mechanical operations.

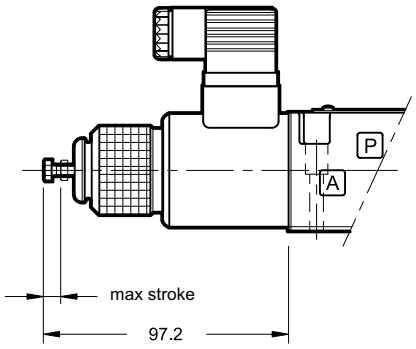
CAUTION!: The manual override use doesn't allow any proportional regulation; indeed using this kind of override, the main stage spool will open completely and the whole inlet pressure will pass through A or B line.

CM Version



Code: 3803210003

CS Version



Code: 3803210004

12 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

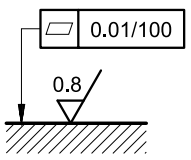
13 - INSTALLATION

ZDE3G* valves can be installed in any position without impairing correct operation. Ensure that there is no air in the hydraulic circuit. Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the reduced pressure value.

Maximum admissible backpressure in the T line, under operational conditions, is 30 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.

Surface finishing



14 - ACCESSORIES
(to be ordered separately)

14.1 - Mating connectors
Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

14.2 - Mating connectors for fieldbus communication and for sensors.
Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

14.3 - Connection cable
The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

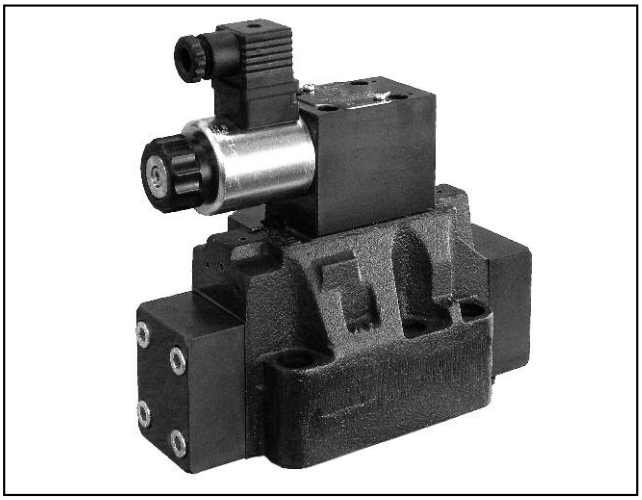
14.4 - Kit for start-up LINPC-USB
Device for service start-up and diagnostic, see catalogue 89 850.

15 - SUBPLATES
(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DZCE*

PRESSURE REDUCING VALVE WITH PROPORTIONAL CONTROL

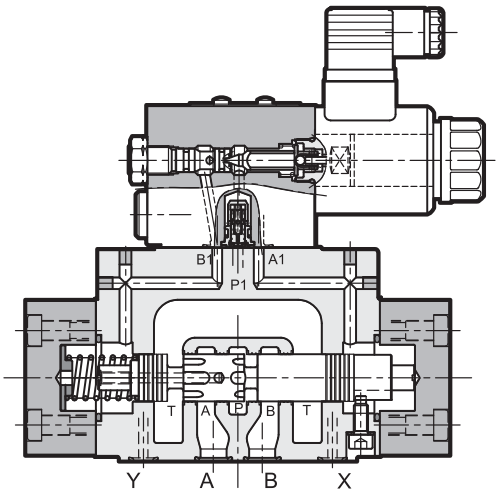
SERIES 11

DZCE5	**CETOP P05**
DZCE5R	**ISO 4401-05**
DZCE7	**ISO 4401-07**
DZCE8	**ISO 4401-08**

p max **350** bar

Q max (see table of performances)

OPERATING PRINCIPLE



— The DZCE* are pressure reducing valves with electric proportional control and mounting interface in compliance with ISO 4401 standards.

— These valves, besides reducing the pressure from line P to working line A, allow the flow to return from the line A to the return line T when a pressure greater than the set value is generated in the downstream circuit (flow path A): a typical case of hydraulic counterweight or load balancing.

— 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 the electronic control units (par. 12) to exploit valve performance to the full .

— They are available in CETOP P05, ISO 4401-05, ISO 4401-07 and ISO 4401-08 sizes.

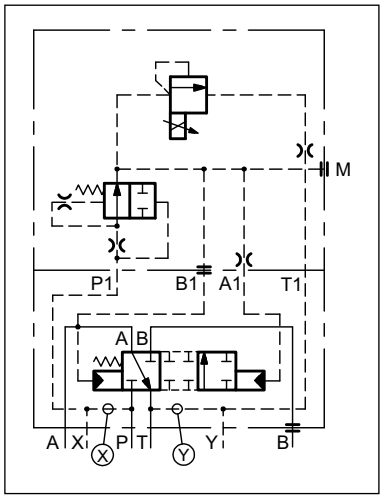
— Every size can be supplied with several controlled flow rates, up to 500 l/min.

PERFORMANCES

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

		DZCE5 DZCE5R	DZCE7	DZCE8
Maximum operating pressure	bar	350		
Maximum flow	l/min	150	300	500
Step response		see paragraph 6		
Hysteresis (with PWM 200 Hz)	% of p_{max}	< 4%		
Repeatability	% of p_{max}	< ±2%		
Electrical characteristic		see paragraph 5		
Ambient temperature range	°C	-20 / +60		
Fluid temperature range	°C	-20 / +80		
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	9,2	15,3

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

D	Z	C	E		-		/	11		-			/		K1

Pressure reducing valve

Electric proportional control

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

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:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

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

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

Supply voltage:
D12 = voltage 12V DC
D24 = voltage 24V DC

Coil electrical connection: for connector type EN 175301-803 (**standard**)

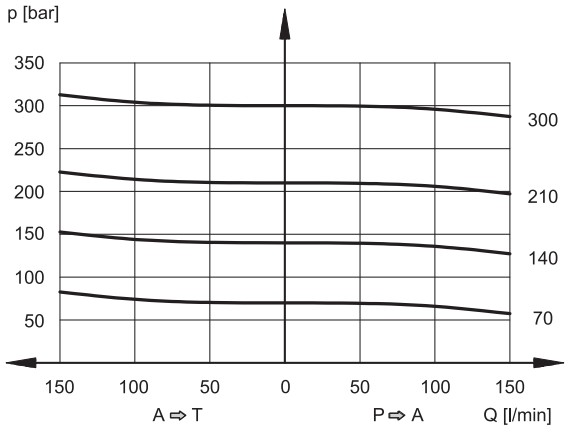
NOTE: This version is interchangeable with the model ZCE4 Duplomatic.

2 - CHARACTERISTIC CURVES

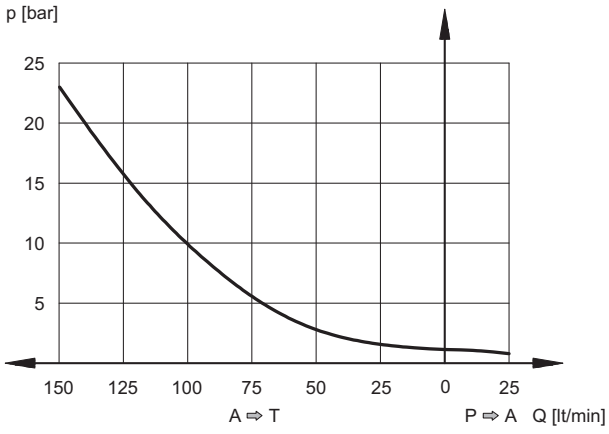
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

2.1 - Characteristic curves DZCE5 and DZCE5R

ADJUSTMENT

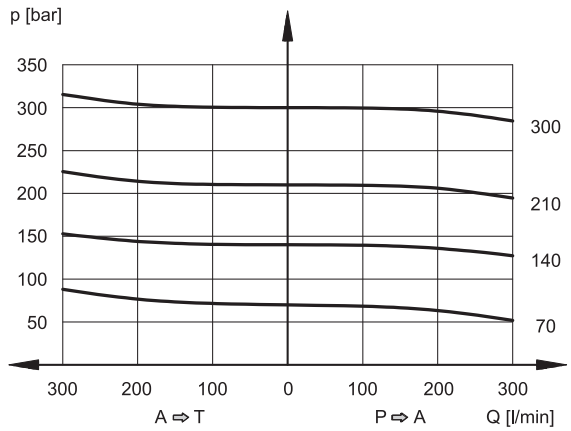


MIN. CONTROLLED PRESSURE p min = f(Q)

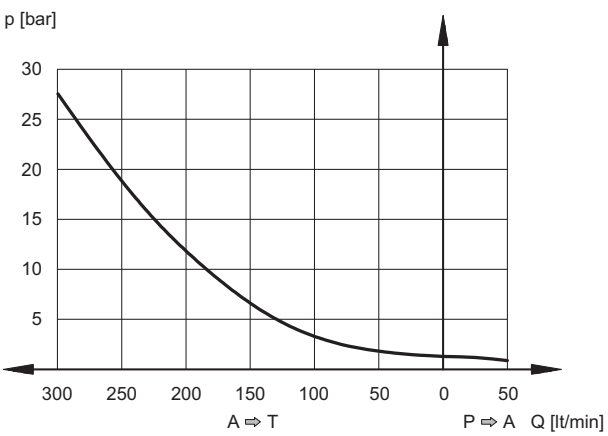


2.2 - Characteristic curves DZCE7

ADJUSTMENT

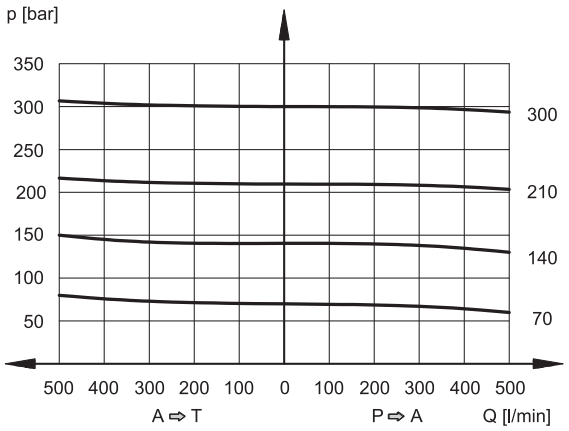


MIN. CONTROLLED PRESSURE p min = f(Q)

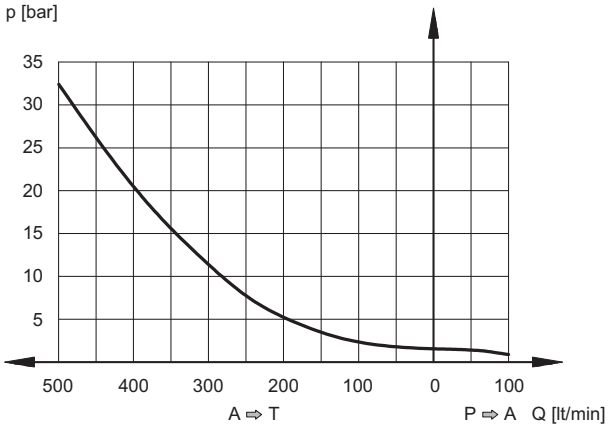


2.3 - Characteristic curves DZCE8

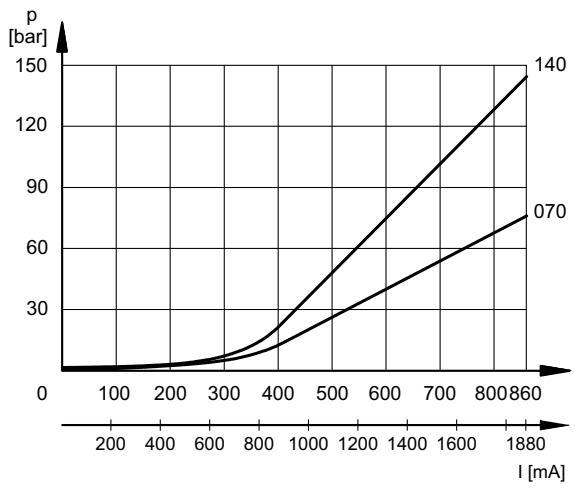
ADJUSTMENT

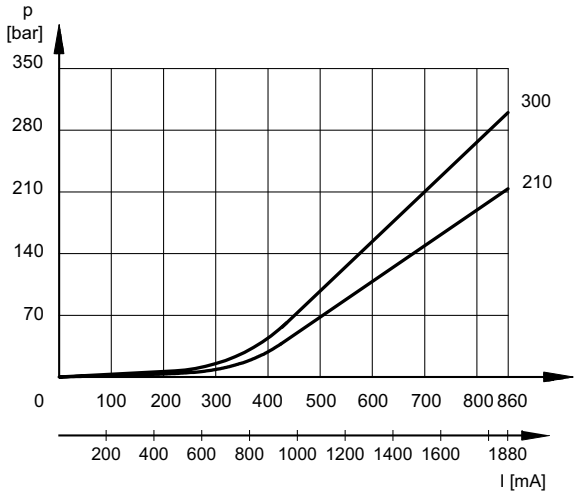


MIN. CONTROLLED PRESSURE p min = f(Q)



2.4 - Pressure control p = f(I) DZCE5, DZCE5R, DZCE7 and DZCE8





3 - 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.

4 - PILOTING AND DRAINAGE

DZCE* valves are available with piloting and drainage, both internal and external.

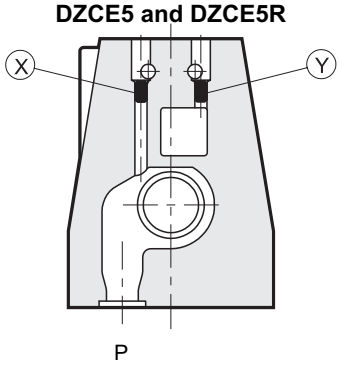
We suggest using the version with external drainage, that allows a higher backpressure on the unloading.

VALVE TYPE		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)

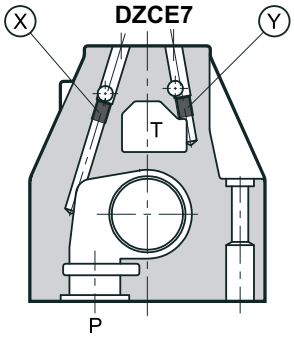
Pressure	MIN	MAX
Piloting pressure on X port	30	350
Pressure on T port with internal drain	-	2
Pressure on T port with external drain	-	250

DZCE5 and DZCE5R



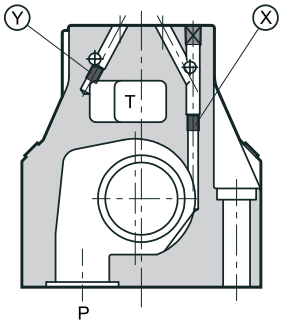
X: M5x6 plug for external pilot
Y: M5x6 plug for external drain

DZCE7



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

DZCE8



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

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut.

It can be rotated through 360° depending on installation clearances.

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (at 20°C)	Ω	3.66	17.6
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2014/30/EU		
CLASS OF PROTECTION: atmospheric agents (EN 60529) coil insulation (VDE 0580) Impregnation	IP 65 class H class F		

6 - STEP RESPONSE

(measured with mineral oil with viscosity of 36 cSt at 50°C with 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.

REFERENCE SIGNAL STEP	0 →100%	100→0%
response times [ms]		
DZCE5 and DZCE5R	100	70
DZCE7	100	50
DZCE8	100	50

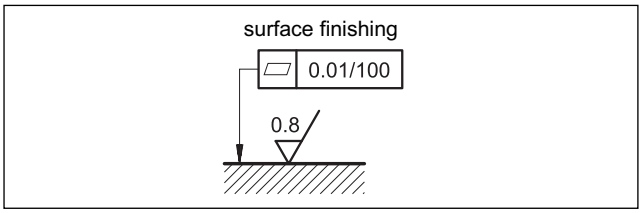
7 - INSTALLATION

We recommend to install the DZCE* 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.

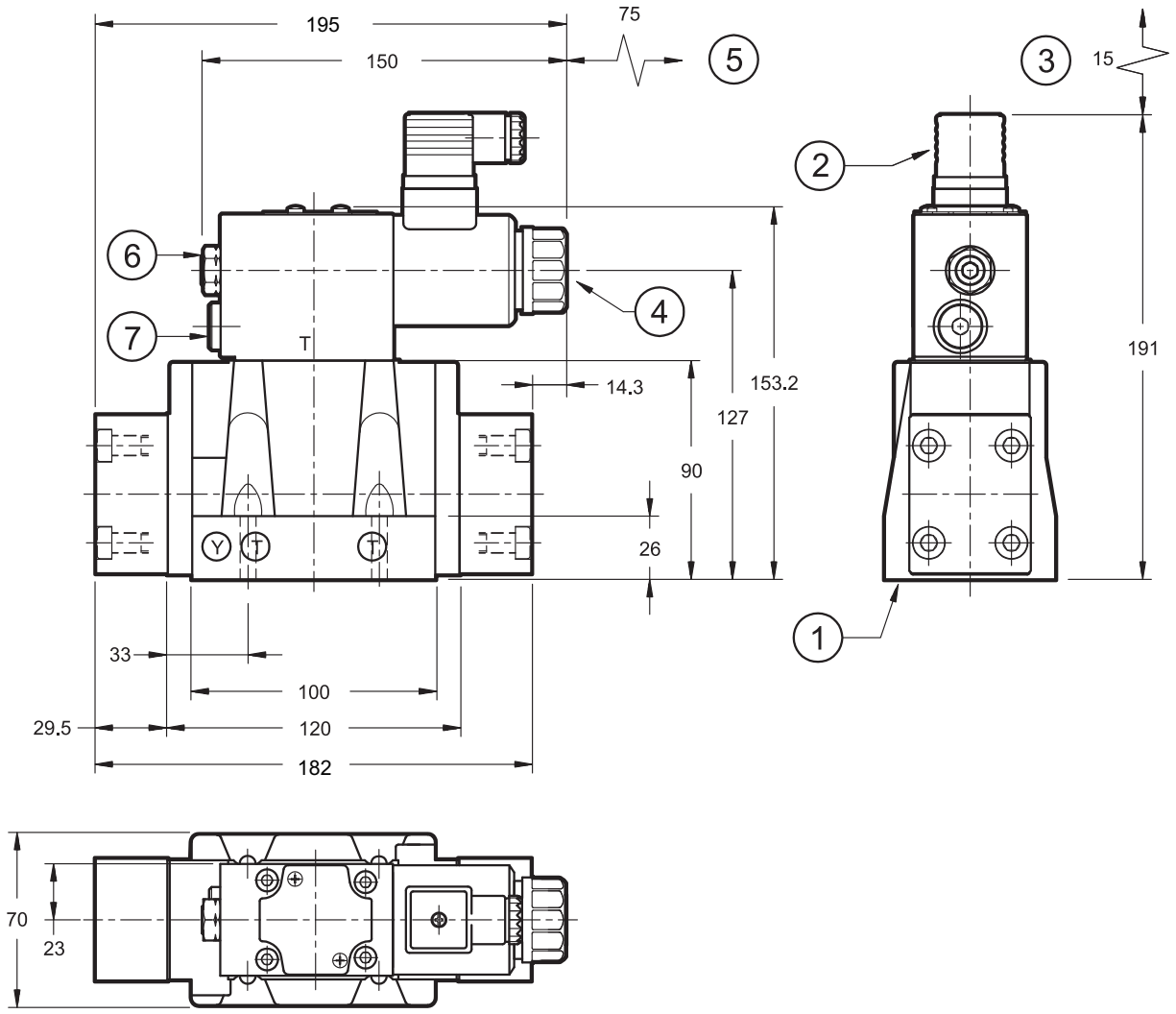
Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the controlled pressure value. **Maximum admissible backpressure in the T line, under operational conditions, is 2 bar.**

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.



8 - DZCE5 AND DZCE5R OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



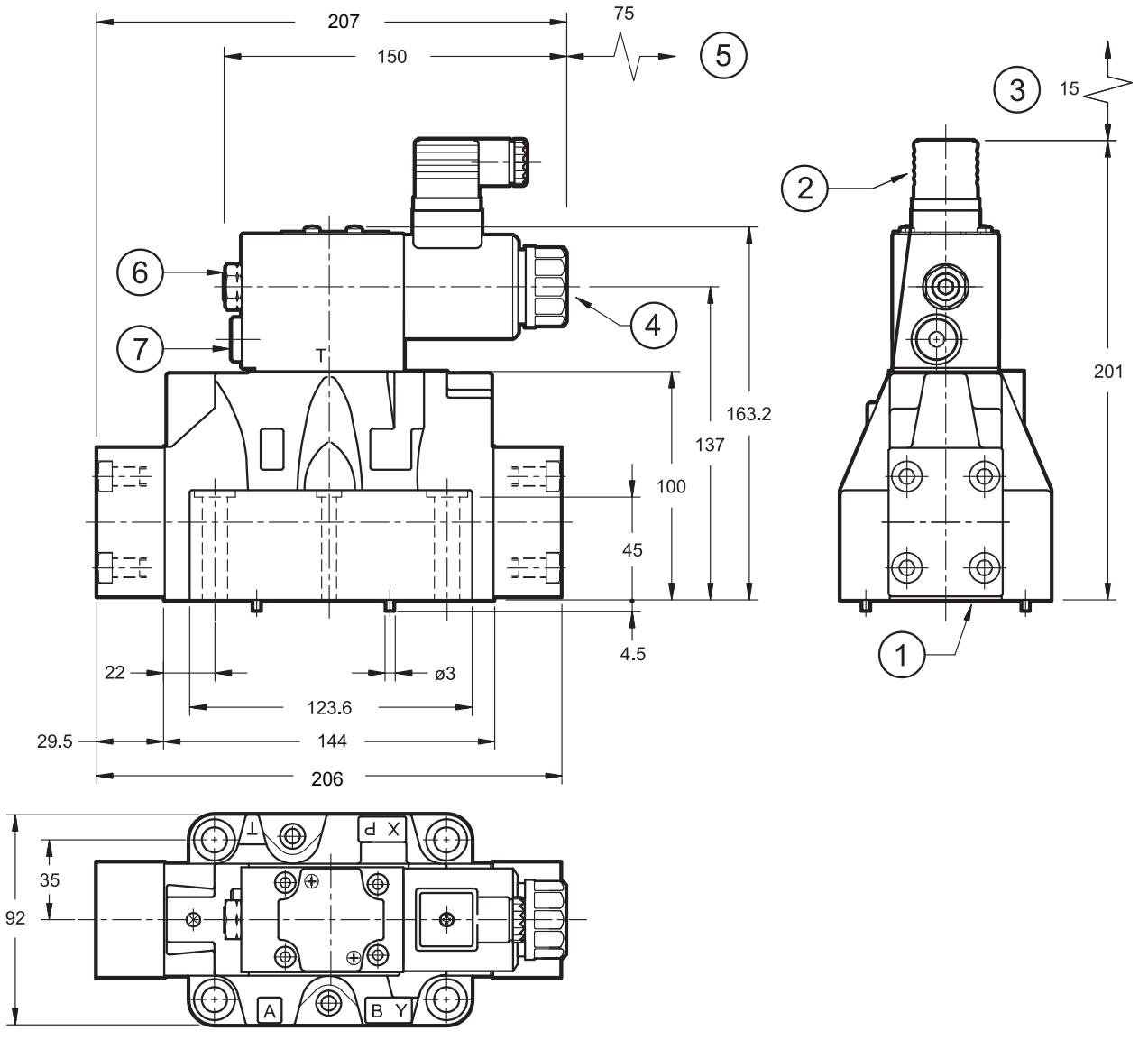
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.

Valve fastening: N. 4 bolts SHC M6x35 - ISO 4762
Tightening torque: 8 Nm (A 8.8 bolts)
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	EN 175301-803 electrical connector (included in the supply)
3	Connector removal space
4	Breather (Allen key 4)
5	Coil removal space
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP

9 - DZCE7 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



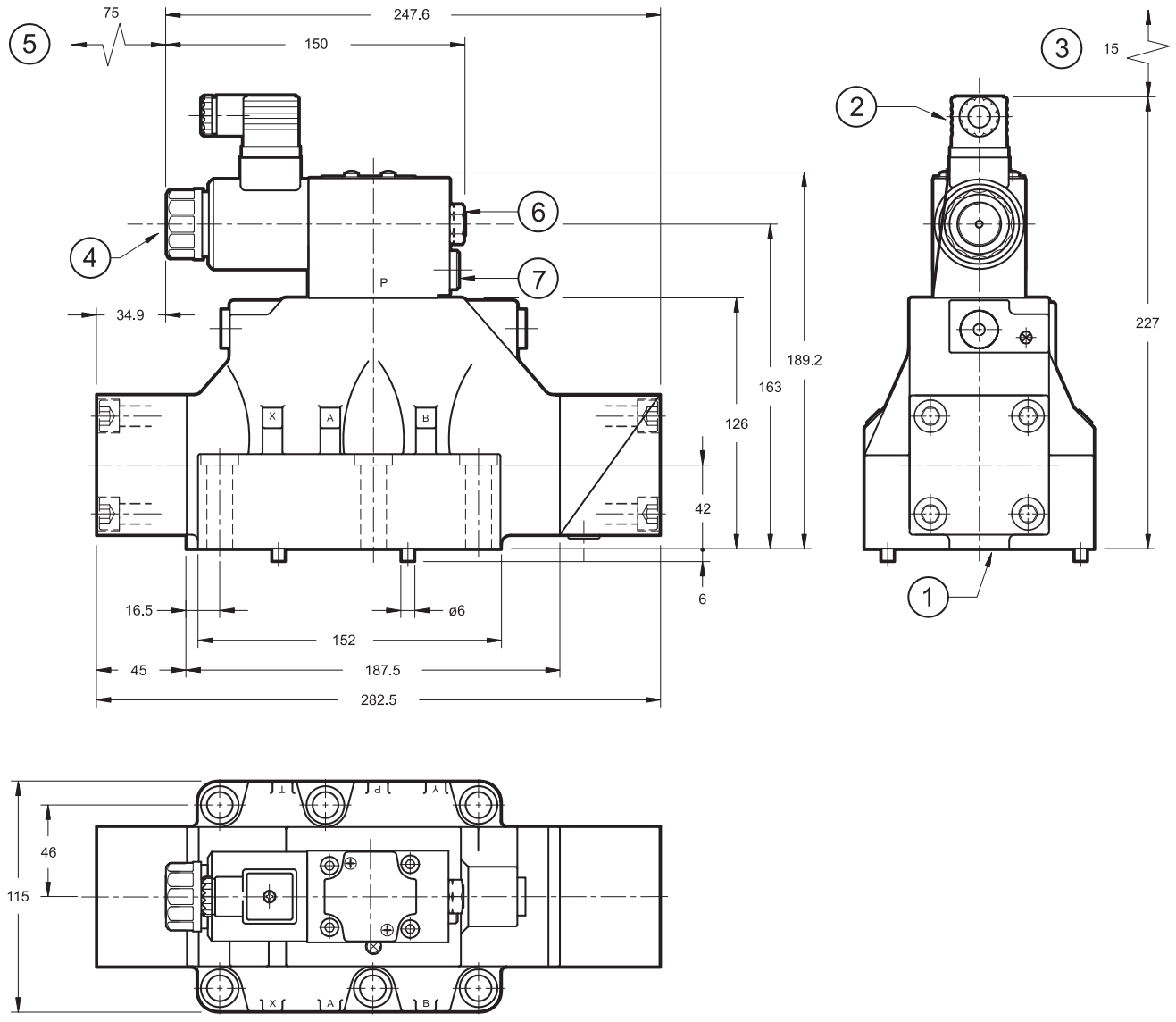
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.

Single valve fastening:	N. 4 SHC M10x60 bolts - ISO 4762 N. 2 SHC M6x60 bolts - ISO 4762
Tightening torque M10x60: 40 Nm (A 8.8 bolts) M6x60: 8 Nm (A 8.8 bolts)	
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	EN 175301-803 electrical connector (included in the supply)
3	Connector removal space
4	Breather (Allen key 4)
5	Coil removal space
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP

10 - DZCE8 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



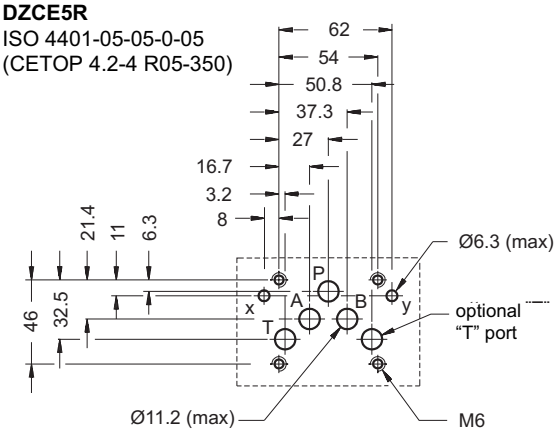
NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.

Valve fastening: N. 6 SHC M12x60 screws - ISO 4762
Tightening torque: 69 Nm (A 8.8 bolts)
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

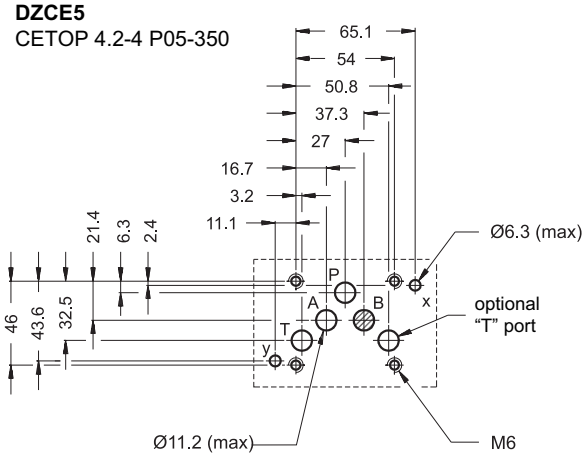
1	Mounting surface with sealing rings
2	EN 175301-803 electrical connector (included in the supply)
3	Connector removal space
4	Breather (Allen key 4)
5	Coil removal space
6	Adjustment sealing made in factory. Do not unscrew the nut.
7	Pressure gauge port 1/4” BSP

11 - MOUNTING SURFACES

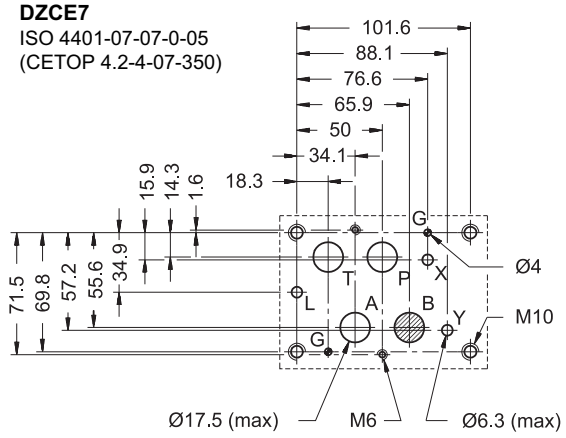
DZCE5R
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



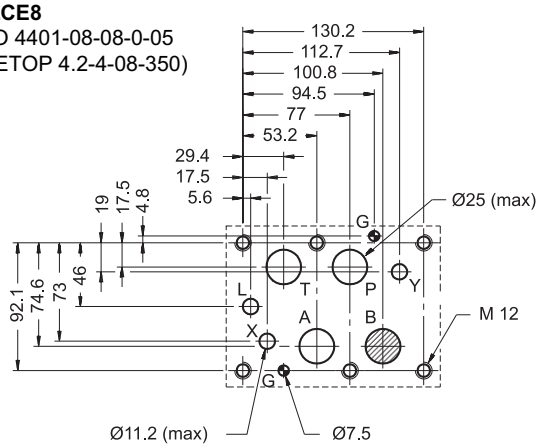
DZCE5
CETOP 4.2-4 P05-350



DZCE7
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DZCE8
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



12 - ELECTRONIC CONTROL UNITS

EDC-112	for solenoid 24V DC	plug version	see cat. 89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M142	for solenoid 12V DC		
UEIK-11	for solenoid 24V DC	Eurocard type	see cat. 89 300

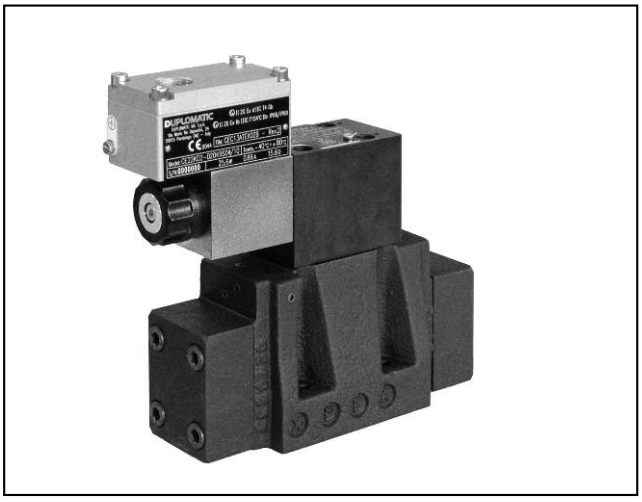
13 - SUBPLATES

(see catalogue 51 000)

		DZCE5	**DZCE7**	**DZCE8**
Model with rear ports		PME4-AI5G	PME07-AI6G	-
Model 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

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



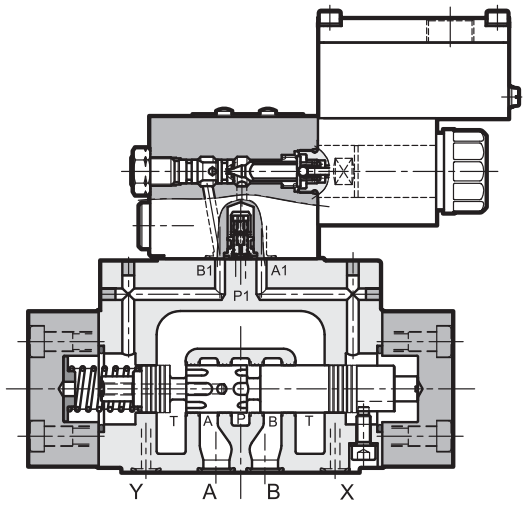
DZCE*K*

EXPLOSION-PROOF PRESSURE REDUCING VALVE WITH PROPORTIONAL CONTROL ATEX, IECEx, INMETRO

SERIES 11

DZCE5K*	**CETOP P05**
DZCE5RK*	**ISO 4401-05**
DZCE7K*	**ISO 4401-07**
DZCE8K*	**ISO 4401-08**

OPERATING PRINCIPLE



— The DZCE*K* are explosion-proof pressure reducing valves, pilot operated, with proportional control, available with CETOP P05, ISO 4401-05, ISO 4401-07 and ISO 4401-08 mounting surfaces.

— 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.

— 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. 14).

— Upon request, DZCE*K* valves can be supplied with a finishing surface treatment (zinc-nickel) which is suitable to ensure a salt spray resistance up to 600 hours.

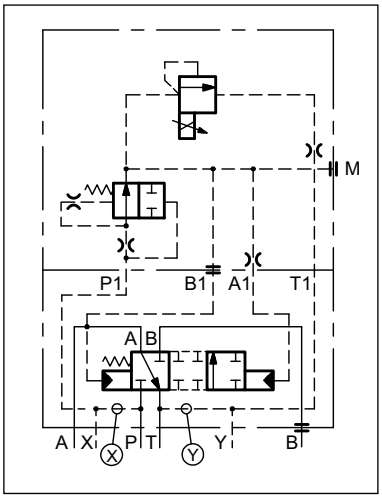
— Details for classification, operating temperatures and electrical characteristics are in the technical data sheet 02 500 ‘Explosion proof classification’.

PERFORMANCES

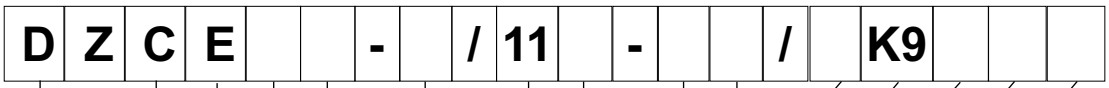
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

		DZCE5K* DZCE5RK*	DZCE7K*	DZCE8K*
Maximum operating pressure	bar	350		
Maximum flow	l/min	150	300	500
Step response		see paragraph 3		
Hysteresis (with PWM 200 Hz)	% of p_{max}	< 4%		
Repeatability	% of p_{max}	< ±2%		
Electrical characteristic		see paragraph 4		
Temperature ranges (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	7,3	9,5	15,6

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



Pressure reducing valve

Electric proportional control

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

Explosion-proof certification:
See table 1.1

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)

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

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

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

Coil electrical connection:
junction box

Connection type for cable gland
upper connection:
T01 = M20x1.5 - ISO 261
T02 = Gk 1/2 - UNI EN 10226-2 not available for INMETRO
T03 = 1/2" NPT - ANSI B1.20.1 (ex ANSI B2.1)
side connection:
S01 = M20x1.5 - ISO 261
S02 = Gk 1/2 - UNI EN 10226-2 not available for INMETRO
S03 = 1/2" NPT - ANSI B1.20.1 (ex ANSI B2.1)
S04 = M16x1.5 - ISO 261

Option: **/T5**
version in T5 temperature class.
Omit if not required.

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

Version with monobloc steel coil

Standard coils are made from zinc-nickel steel and with anodized aluminium junction box.

On request, monobloc coils **MD24K9S01** are available completely made from steel, with zinc-nickel treatment (power supply voltage D24 and cable gland connection type S01). Other variants for voltage and cable gland connection are available, always on request.

NOTE: the valves are supplied with standard surface treatment of phosphating black.

Upon request we can supply these valves with full zinc-nickel surface treatment, 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 standard).

For zinc-nickel surface treatment add **/W7** at the end of the identification code.

1.1 - Names of valves per certification

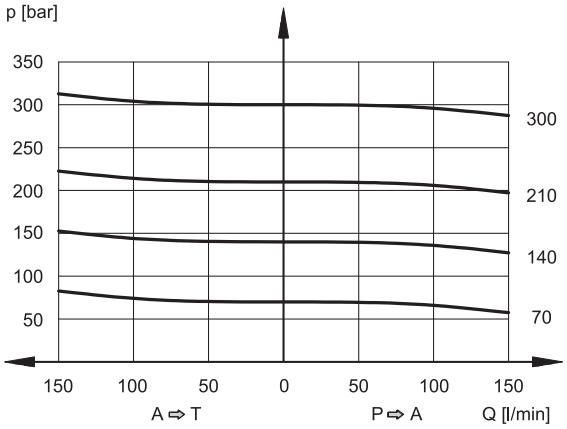
	ATEX		IECEx		INMETRO	
for gases for dusts	**KD2**	II 2GD	**KXD2**	IECEx Gb IECEx Db	**KBD2**	INMETRO Gb INMETRO Db
for mines	**KDM2**	I M2	**KXDM2**	IECEx Mb	**KBDM2**	INMETRO Mb

NOTE: Refer to the technical data sheet 02 500 for marking, operating temperatures and available versions.

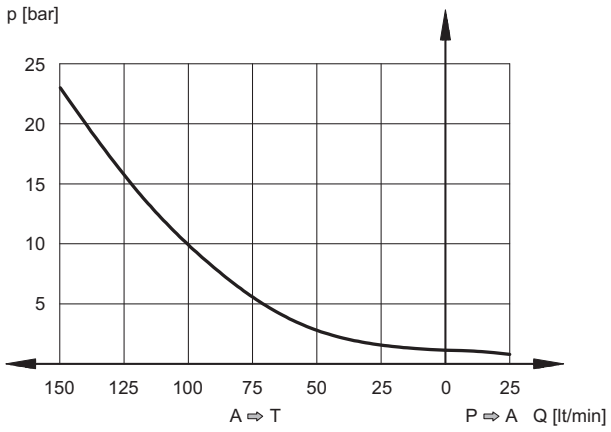
2 - CHARACTERISTIC CURVES
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

2.1 - Characteristic curves DZCE5K* and DZCE5RK*

ADJUSTMENT

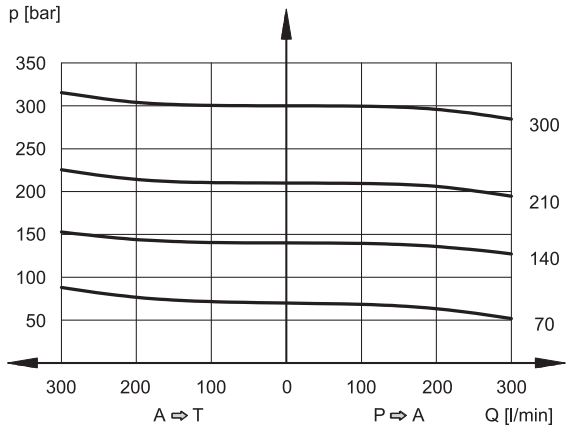


MIN. CONTROLLED PRESSURE p min = f(Q)

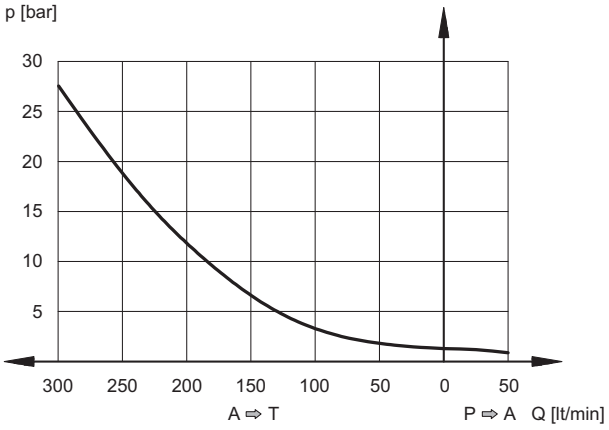


2.2 - Characteristic curves DZCE7K*

ADJUSTMENT

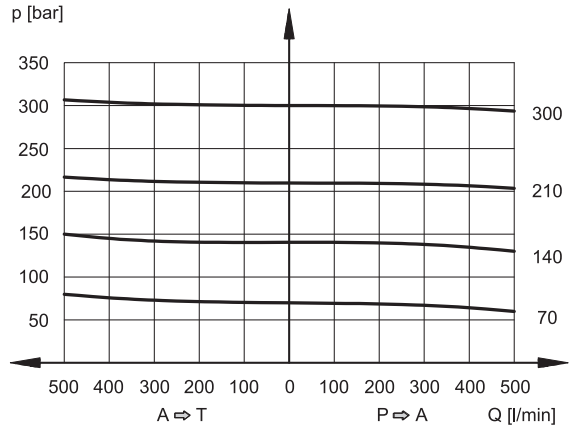


MIN. CONTROLLED PRESSURE p min = f(Q)

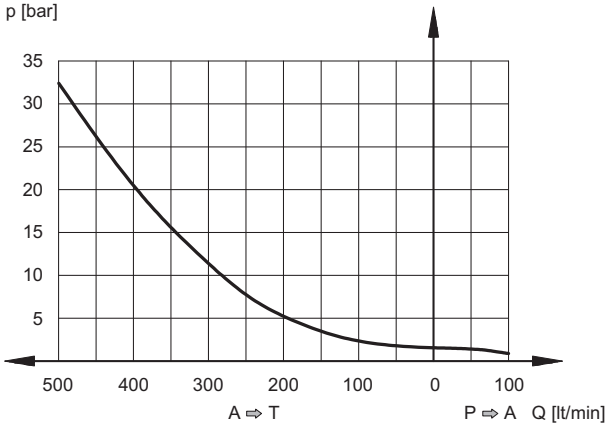


2.3 - Characteristic curves DZCE8K*

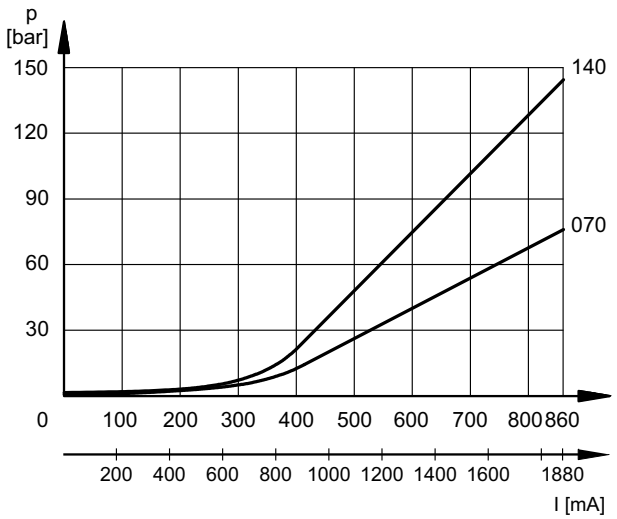
ADJUSTMENT

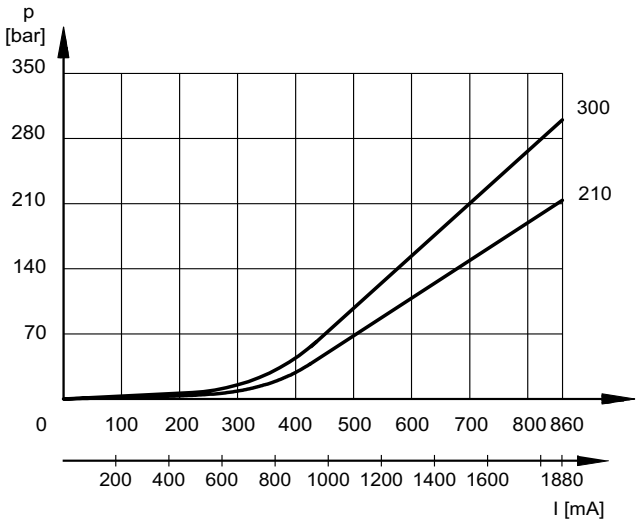


MIN. CONTROLLED PRESSURE p min = f(Q)



2.4 - Pressure control p = f(I) DZCE5K*, DZCE5RK*, DZCE7K* and DZCE8K*





3 - STEP RESPONSE

(measured with mineral oil with viscosity of 36 cSt at 50°C)

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]		
DZCE5K* and DZCE5RK*	100	70
DZCE7K*	100	50
DZCE8K*	100	50

4 - ELECTRICAL CHARACTERISTICS

(values ± 5%)

NOMINAL VOLTAGE	V DC	**12**	**24**
RESISTANCE (AT 20°C)	Ω	3,8	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

4.1 - 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.

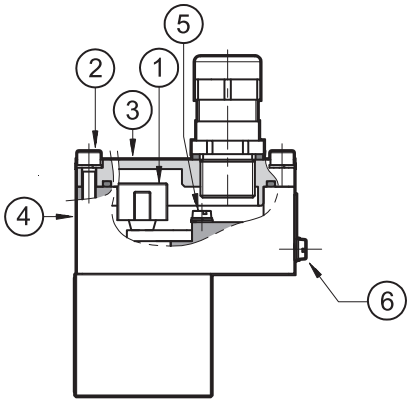
The electrical connection is polarity-independent.

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.

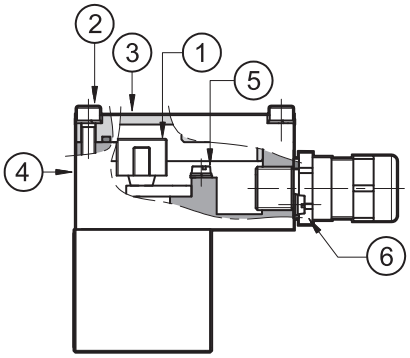
On the external body of the coil there is a grounding point (6) (M4 screw) that allow to ensure equipotentiality between the valve and the general grounding line of the system; connecting this point the regulation of the EN 13463-1 standard, that impose to verify the equipotentiality of the elements 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 in compliance with standards about protection against explosion hazards.



K9T*



K9S*

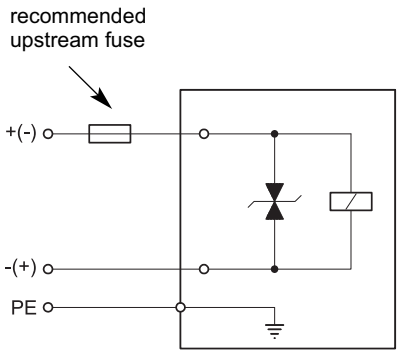
Characteristics of the cables connectable for wiring are indicated in the table below:

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

4.2 - Electrical diagram



4.3 - 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	

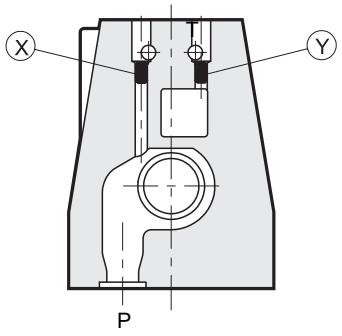
5 - PILOT AND DRAIN

The DZCE*K* 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

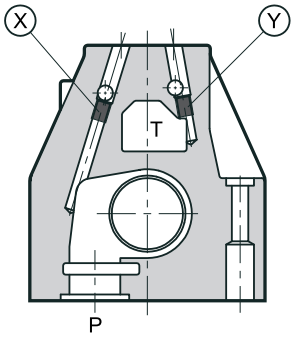
PRESSURES [bar]	MIN	MAX
Piloting pressure on X port	30	350
Pressure in T port with internal drain	-	2
Pressure in T port with external drain	-	250

DZCE5K* and DZCE5RK*



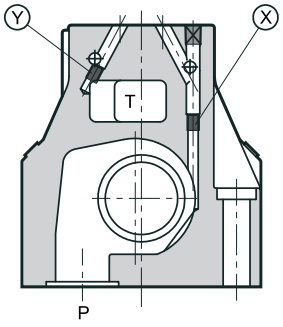
X: M5x6 plug for external pilot
Y: M5x6 plug for external drain

DZCE7K*



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

DZCE8K*

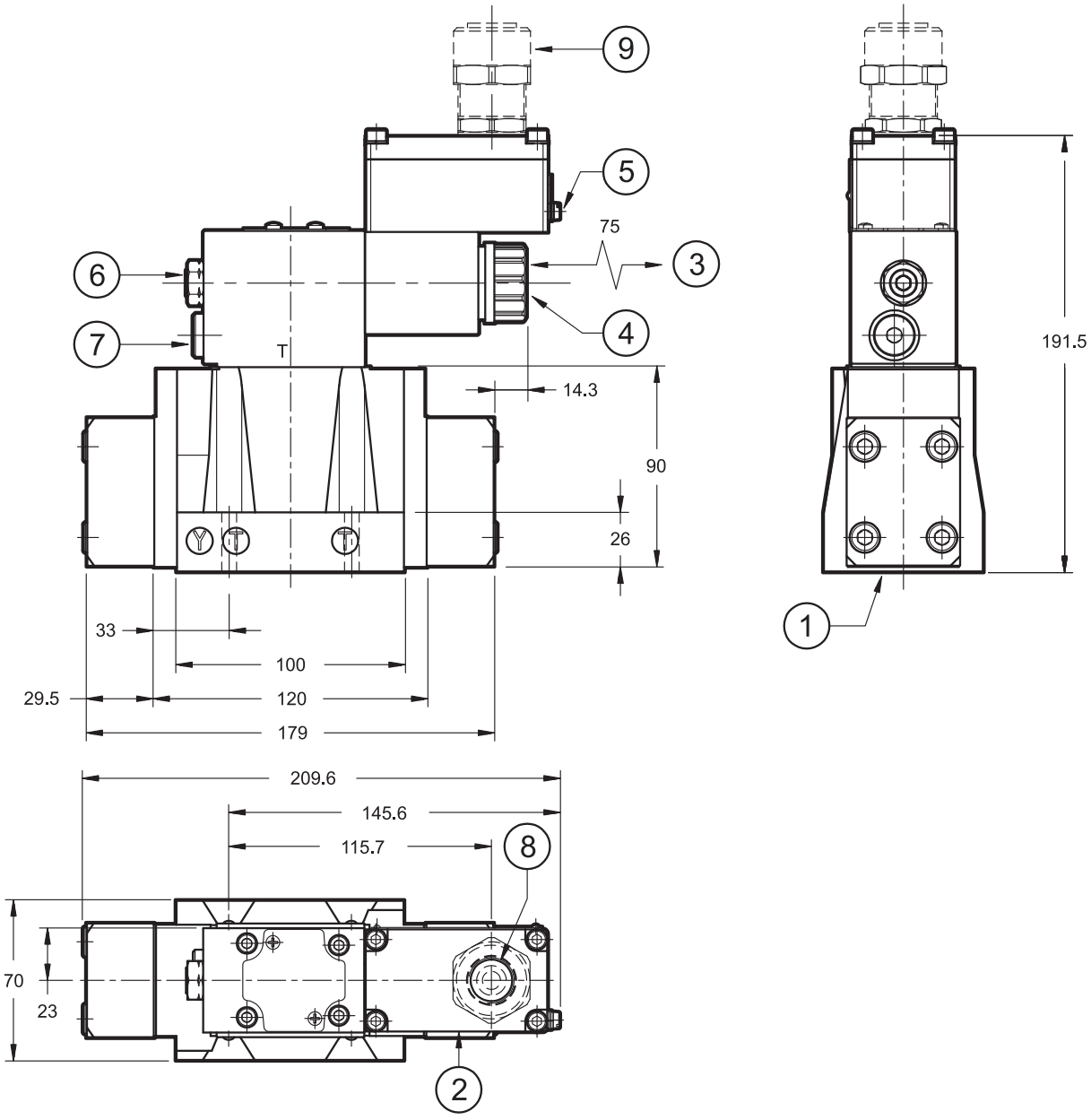


X: M6x8 plug for external pilot
Y: M6x8 plug for external drain

6 - DZCE5K* AND DZCE5RK* WITH UPPER CONNECTION - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE5K*-*/11*-*/*K9T*
DZCE5RK*-*/11*-*/*K9T*



1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore
2	Explosion-proof coil
3	Minimum clear space required
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. To be ordered separately, see paragraph 13

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.

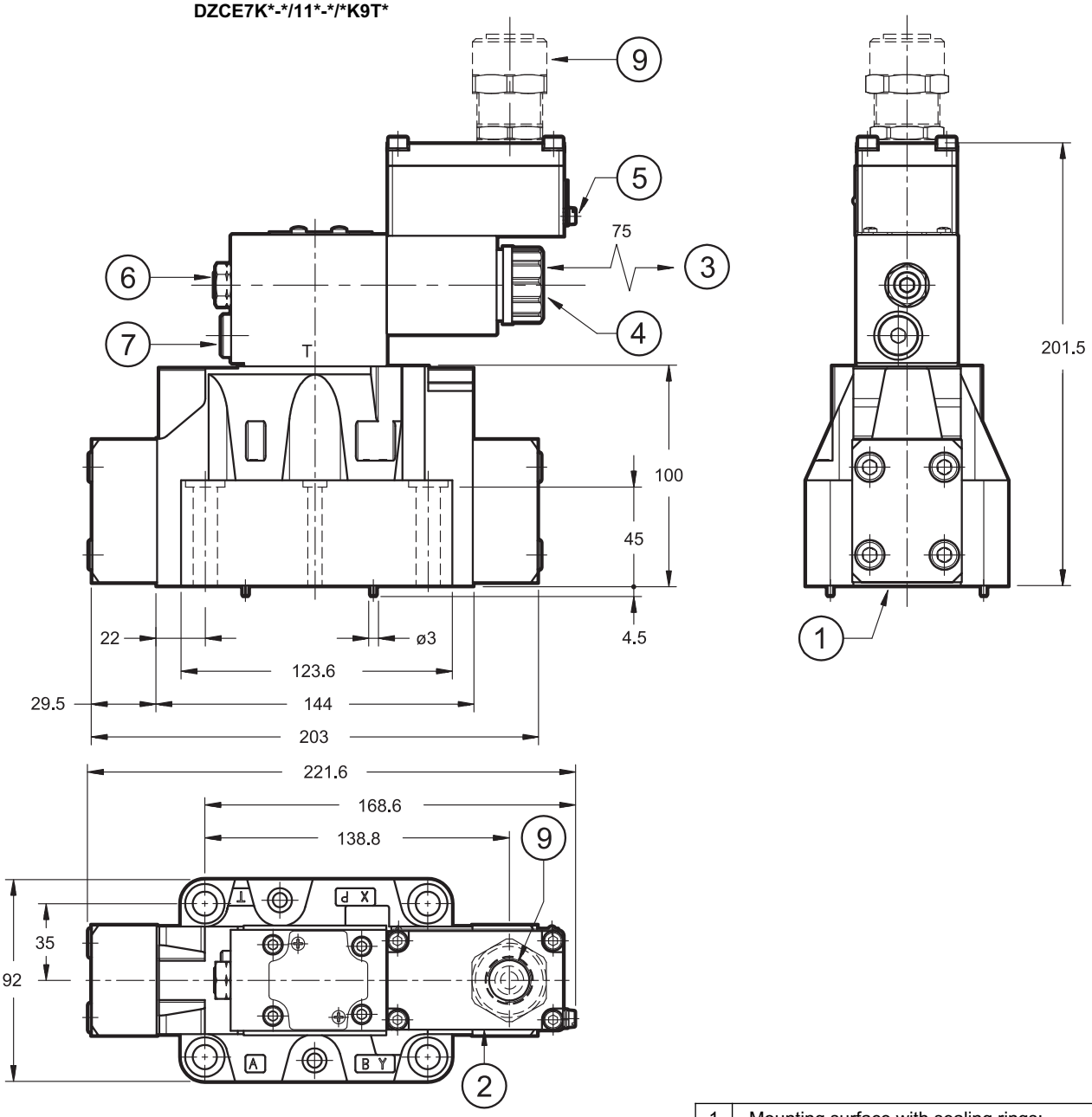
NOTE 2: for side port cable gland see paragraph 9.

Valve fastening: N. 4 SHC screws M6x35 - ISO 4762
Tightening torque: 8 Nm (A 8.8 screws)
Thread of mounting holes: M6x10

7 - DZCE7K* WITH UPPER CONNECTION - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE7K*-*/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 9.

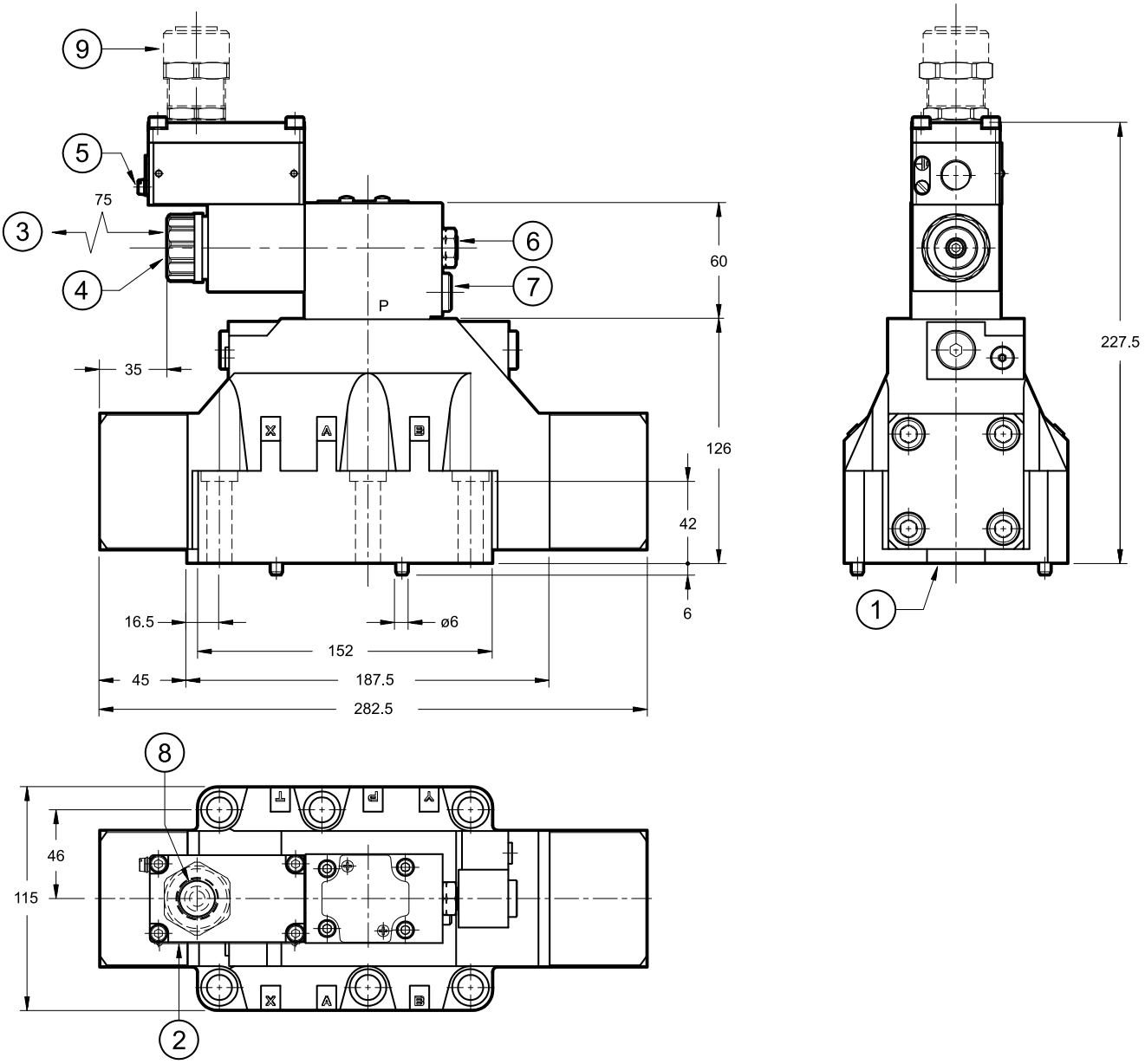
Single valve fastening:	N. 4 SHC screws M10x60 - ISO 4762 N. 2 SHC screws M6x60 - ISO 4762
Tightening torque	M10x60: 40 Nm (A 8.8 screws) M6x60: 8 Nm (A 8.8 screws)
Thread of mounting holes: M6x18; M10x18	

1	Mounting surface with sealing rings: 4 OR type 130 (22.22x2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Explosion-proof coil
3	Minimum clear space required
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. To be ordered separately, see paragraph 13

8 - DZCE8K* WITH UPPER CONNECTION - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

DZCE8K*-*/11*-*/*K9T*



1	Mounting surface with sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Explosion-proof coil
3	Minimum clear space required
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. To be ordered separately, see paragraph 13

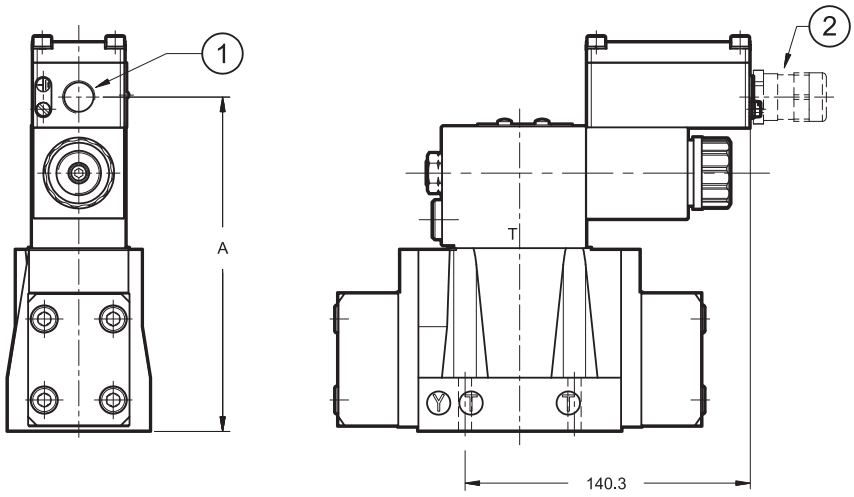
NOTE 1: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (4) placed at the end of the solenoid tube.

NOTE 2: for side port cable gland see paragraph 9.

Valve fastening: N. 6 SHC screws M12x60 - ISO 4762
Tightening torque: 69 Nm (A 8.8 screws)
Thread of mounting holes: M12x20

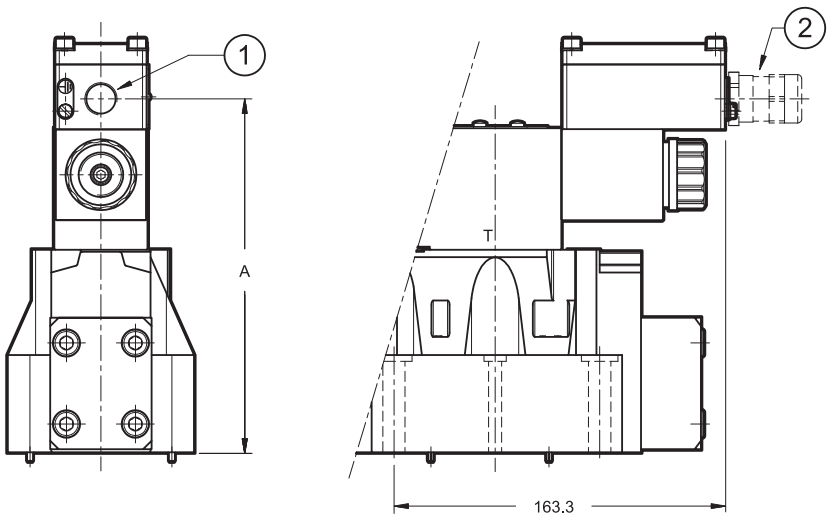
9 - DZCE*K* WITH SIDE CONNECTION - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



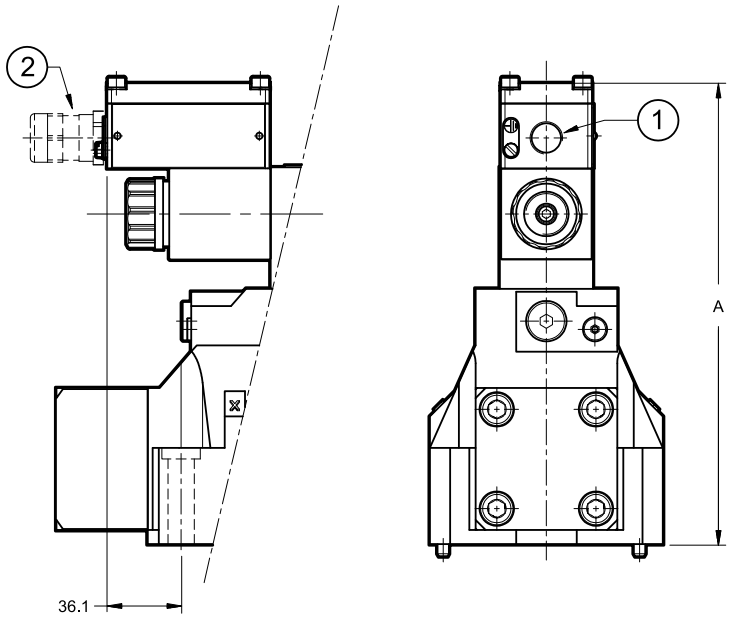
DZCE5K*-*/11*-*/*K9S*
DZCE5RK*-*/11*-*/*K9S*

Side port type	Dimension A
S01, S04	180.5
S02, S03	180



DZCE7K*-*/11*-*/*K9S*

Side port type	Dimension A
S01, S04	190.5
S02, S03	190



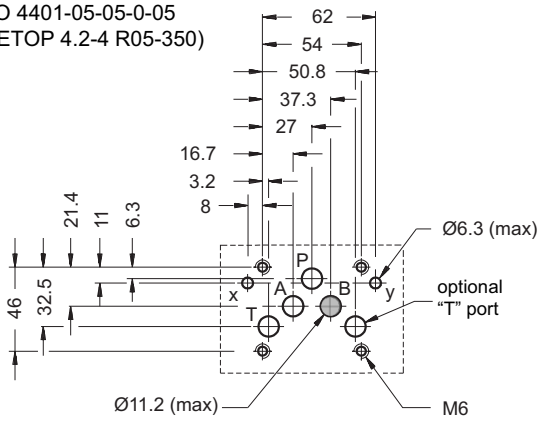
DZCE8K*-*/11*-*/*K9S*

Side port type	Dimension A
S01, S04	226.5
S02, S03	226

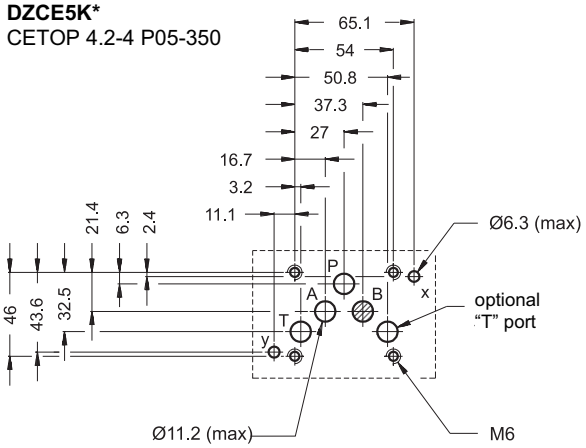
1	Side port for cable gland
2	Cable gland. To be ordered separately, see par. 13

10 - MOUNTING SURFACES

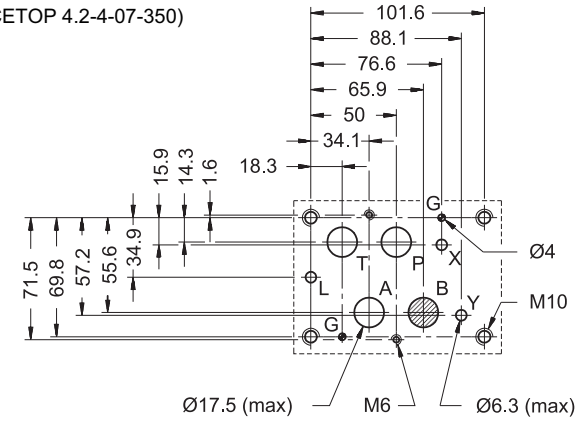
DZCE5RK*
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



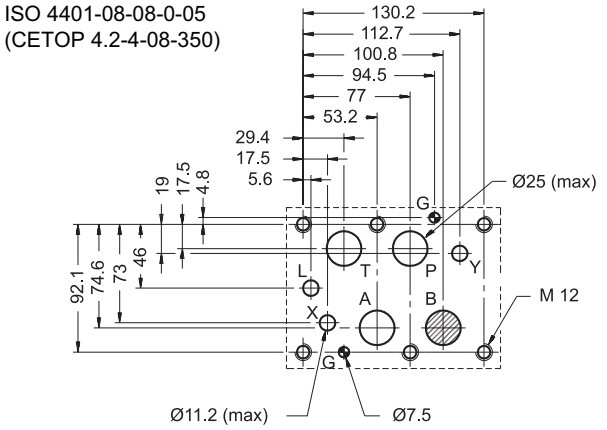
DZCE5K*
CETOP 4.2-4 P05-350



DZCE7K*
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DZCE8K*
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



11 - 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.

12 - INSTALLATION

Installation must adheres 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.

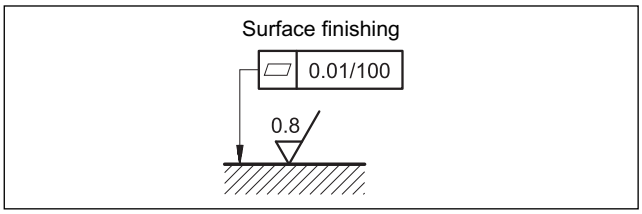
We recommend to install the DZCE*K* valve either in horizontal position, or vertical position with the solenoid downward. If the valve is installed in vertical position and with the solenoid upward, you must consider possible variations of the minimum controlled pressure, if compared to what is indicated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

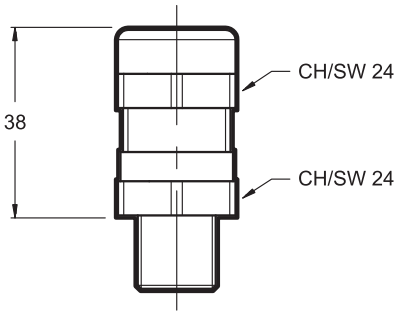
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



13 - 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);
- 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 ºC ÷ +220 ºC
- 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

14 - ELECTRONIC CONTROL UNITS

EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 251
EDM-M142	for solenoid 12V DC		

NOTE: electronic control units offered are not explosion-proof certified; therefore, they must be installed outside classified areas.

15 - SUBPLATES

(see catalogue 51 000)

		DZCE5K*	**DZCE7K***	**DZCE8K***
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 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.

DUPLOMATIC MOTION SOLUTIONS

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EXPLOSION-PROOF CLASSIFICATION for

SOLENOID AND PROPORTIONAL VALVES

ref. catalogues:

pressure control valves	
RQM*K*-P	**21 515**
P*E*K*	**81 316**
ZDE3K*	**81 515**
DZCE*K*	**81 605**
flow control valves	
QDE*K*	**82 225**
directional valves	
D*K*	**41 515**
DT3K*	**42 215**
DS(P)E*K*	**83 510**

GENERAL INFO

This informative technical datasheet displays information about **classification and marking** of Duplomatic explosion-proof valves range.

Duplomatic MS offers valves with the following certifications:

ATEX	**II 2G**	**II 2D**	**I M2**
IECEx	**Gb**	**Db**	**Mb**
INMETRO	**Gb**	**Db**	**Mb**

Instructions for use and maintenance can be found in the related manuals, always supplied toghether with valves.

1 - ATEX CLASSIFICATION AND TEMPERATURES

Duplomatic certificates the combination valve-coil for the valves suitable for application and installation in potentially explosive atmospheres, according to ATEX directive; 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.

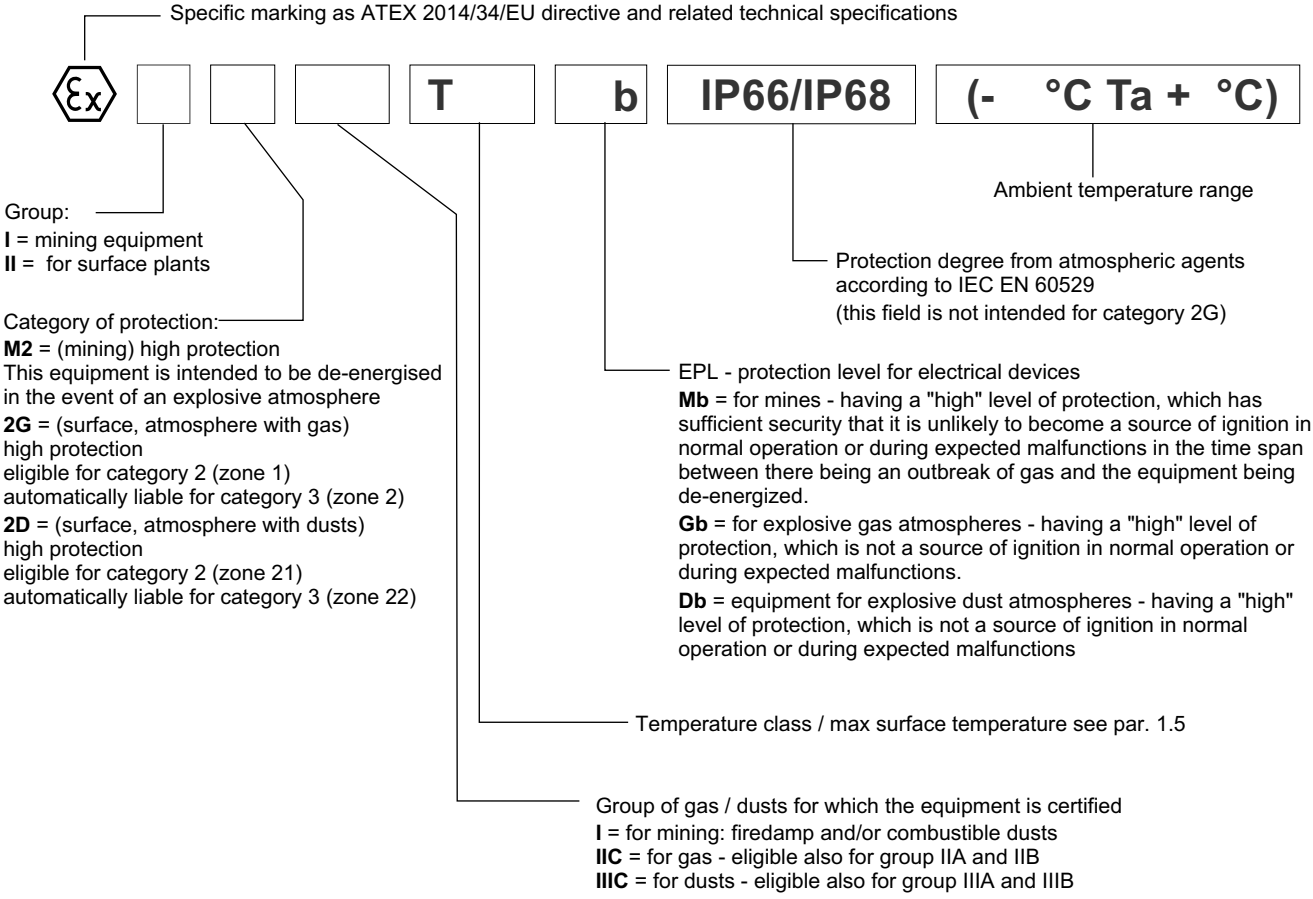
1.1 - ATEX classification for valves

Type examination certificate: AR18ATEX055
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

ATEX II 2G ATEX II 2D	***KD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
ATEX I M2	***KDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

1.2 - ATEX marking for valves

valve code		N and V seals	NL seals
***KD2**	for gas	Ⓔx II 2G IIC T4 Gb (-20°C Ta +80°C)	Ⓔx II 2G IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ⓔx II 2D IIIC T154°C Db IP66/IP68 (-20°C Ta +80°C)	Ⓔx II 2D IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
***KD2 /T5**	for gas	Ⓔx II 2G IIC T5 Gb (-20°C Ta +55°C)	Ⓔx II 2G IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-20°C Ta +55°C)	Ⓔx II 2D IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
***KDM2**	mining	Ⓔx I M2 I T150°C Mb IP66/68 (-20°C Ta +75°C)	Ⓔx I M2 I T150°C Mb IP66/68 (-40°C Ta +75°C)



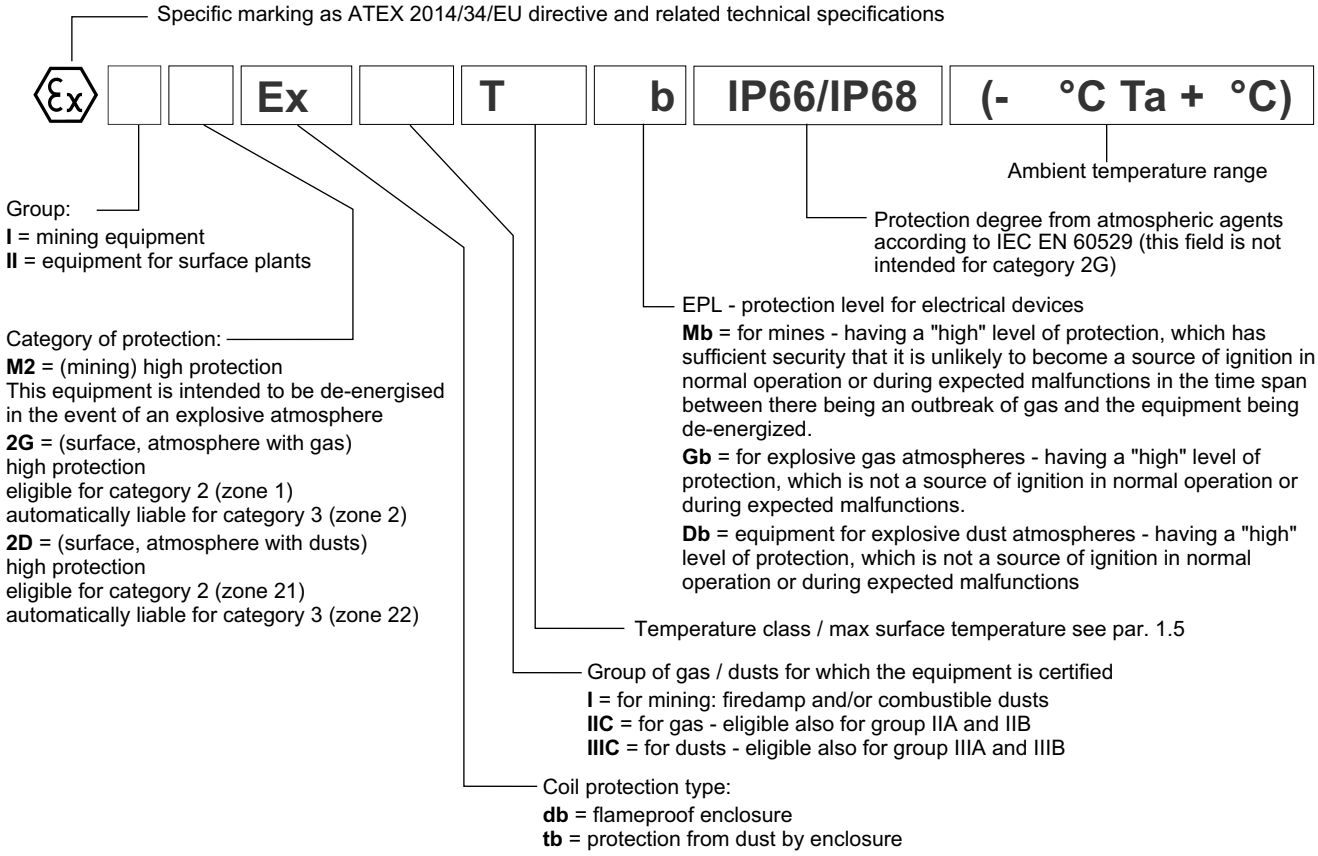
1.3 - ATEX classification of the coils

The coil of the explosion-proof valves is ATEX certified itself an as such is identified with its own tag, 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 db” type protection (explosion-proof coil).

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

1.4 - ATEX marking on coils

for valve type ***KD2**	for gas	Ⓔx II 2G Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ⓔx II 2D Ex tb IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
for valve type ***KD2 /T5**	for gas	Ⓔx II 2G Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ⓔx II 2D Ex tb IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
for valve type ***KDM2**	mining	Ⓔx I M2 Ex db I T150°C Mb IP66/IP68 (-40°C Ta +75°C)



1.5 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

The valves in group II can also be used for less limiting temperature classes (surface temperature allowed higher).

		temperature range	**N and V seals**	**NL seals**	Temperature class	eligible also for
ATEX II 2G ATEX II 2D	***KD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T154°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T129°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
ATEX I M2	***KDM2**	of ambient	-20 / +75 °C	-40 / +75 °C	T150°C	-
		of fluid				

2 - IECEx CLASSIFICATION AND TEMPERATURES

The IECEx certification requires the classification of the electrical equipment only.

Duplomatic supplies valves with IECEx certified coils, suitable for application and installation in potentially explosive atmospheres. 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 db” type protection (explosion-proof coil).

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

The supply always includes the operating and maintenance manual, that contains all the information needed for a correct use of the valve in potentially explosive environment.

2.1 - IECEx classification

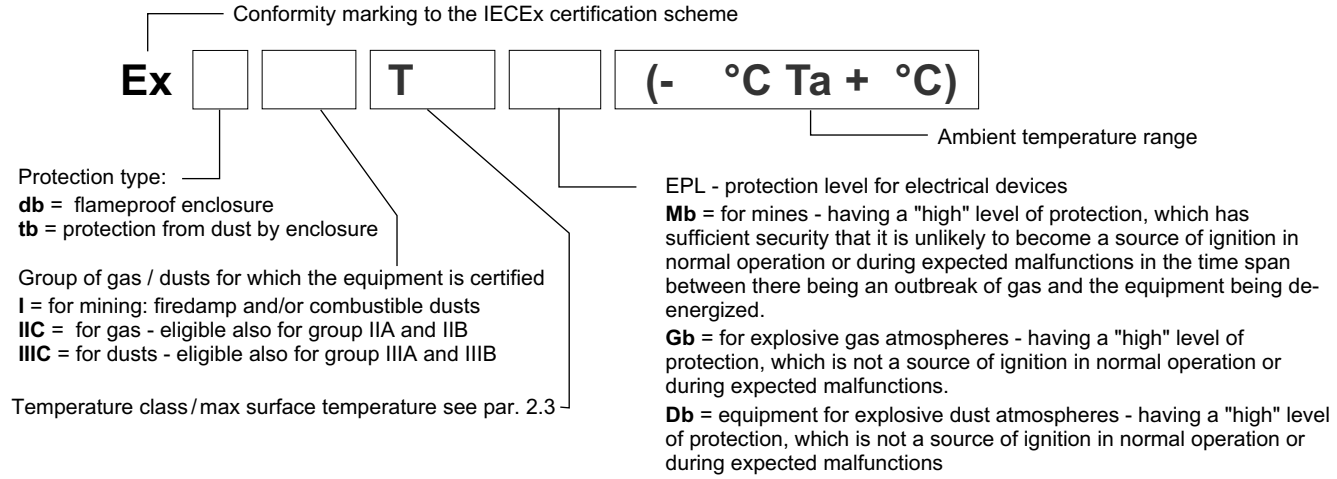
Certificate of conformity (CoC): IECEx TUN 15.0028X
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

IECEx Gb IECEx Db	***KXD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
IECEx Mb	***KXDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

2.2 - IECEx marking

There is a plate with the IECEx mark on each coil.

***KXD2** valves	for gas	Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ex tb IIIC T135°C Db (-40°C Ta +80°C)
***KXD2 /T5** valves	for gas	Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ex tb IIIC T100°C Db (-40°C Ta +55°C)
***KDM2** valves	mining	Ex db I Mb (-40°C Ta +80°C)



2.3 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

Valves for surface plants can also be used for less limiting temperature classes (higher surface temperature allowed).

		temperature range	**N and V seals**	**NL seals**	Temperature class	eligible also for
IECEx Gb IECEx Db	***KXD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T135°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KXD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T100°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
IECEx Mb	***KXDM2**	of ambient	-20 / +80 °C	-40 / +80 °C	-	-
		of fluid				

3 - INMETRO CLASSIFICATION AND TEMPERATURES

The INMETRO certification requires the classification of the electrical equipment only.

Duplomatic supplies valves with INMETRO certified coils, suitable for application and installation in potentially explosive atmospheres. 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 db” type protection (explosion-proof coil).

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

The supply always includes the operating and maintenance manual, that contains all the information needed for a correct use of the valve in potentially explosive environment.

3.1 - INMETRO classification

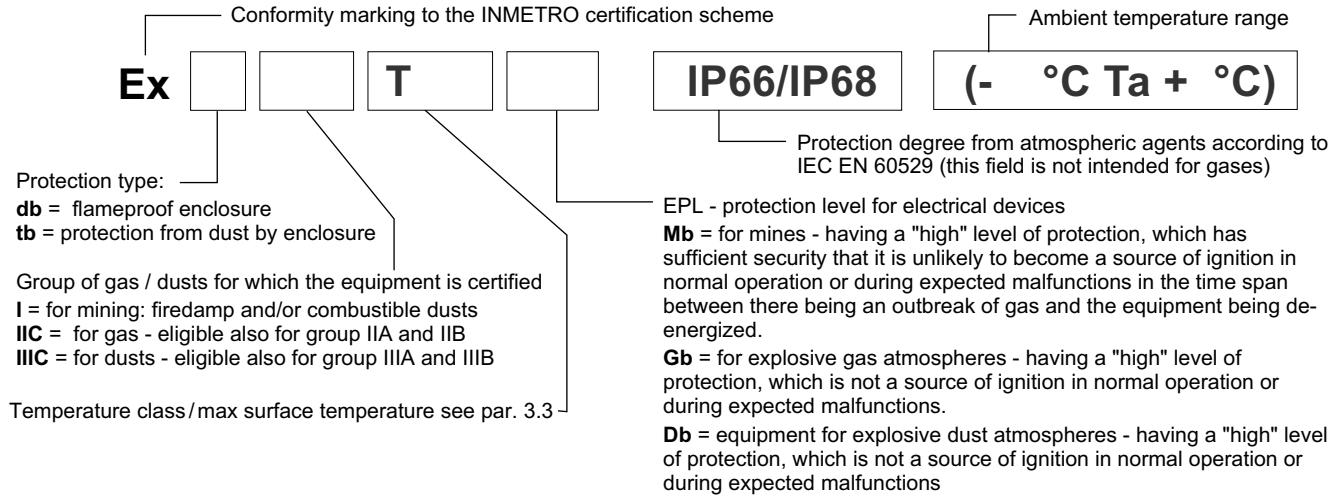
Certificate of conformity: DNV 15.0094 X
The valves are suitable for applications and installations in potentially explosive atmospheres that fall within:

INMETRO Gb INMETRO Db	***KBD2**	equipment intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur occasionally.
INMETRO Mb	***KBDM2**	equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energised in the event of an explosive atmosphere.

3.2 - INMETRO marking

There is a plate with the INMETRO mark on each coil.

***KBD2** valves	for gas	Ex db IIC T4 Gb (-40°C Ta +80°C)
	for dusts	Ex tb IIIC T154°C Db IP66/IP68 (-40°C Ta +80°C)
***KBD2 /T5** valves	for gas	Ex db IIC T5 Gb (-40°C Ta +55°C)
	for dusts	Ex tb IIIC T129°C Db IP66/IP68 (-40°C Ta +55°C)
***KBDM2** valves	mining	Ex db I T150° Mb IP66/IP68 (-40°C Ta +75°C)



3.3 - Operating temperatures

These valves are classified according to their maximum surface temperature (EN 13463-1), which must be lower than the ignition temperature of the gases, vapors and dusts for which the area in which they will be used is classified.

Valves for surface plants can also be used for less limiting temperature classes (higher surface temperature allowed).

		temperature range	N and V seals	NL seals	Temperature class	eligible also for
INMETRO Gb INMETRO Db	***KBD2**	of ambient	-20 / +80 °C	-40 / +80 °C	T4 (gas) T154°C (dusts)	T3, T2, T1 T200°C and higher
		of fluid				
	***KBD2 /T5**	of ambient	-20 / +55 °C	-40 / +55 °C	T5 (gas) T129°C (dusts)	T4, T3, T2, T1 T135°C and higher
		of fluid	-20 / +60 °C	-40 / +60 °C		
INMETRO Mb	***KBDM2**	of ambient	-20 / +75 °C	-40 / +75 °C	T150°C	-
		of fluid				

DUPLOMATIC MOTION SOLUTIONS

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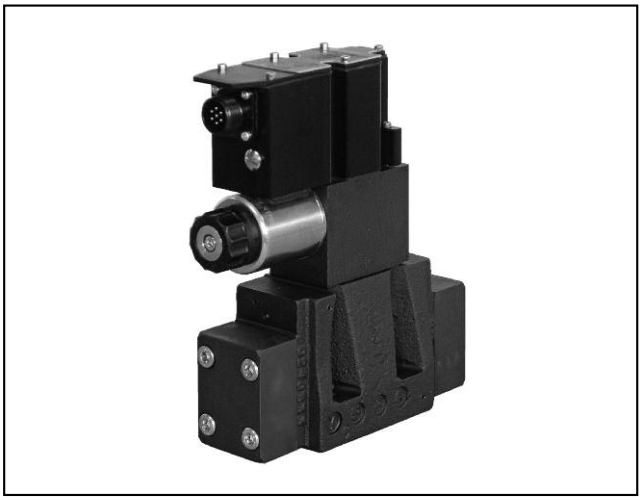


DZCE*G

PRESSURE REDUCING VALVES WITH PROPORTIONAL CONTROL AND INTEGRAL ELECTRONICS

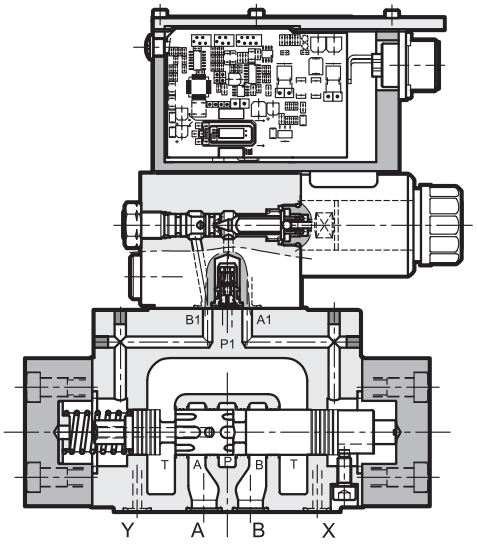
SERIES 31

DZCE5G	**CETOP P05**
DZCE5RG	**ISO 4401-05**
DZCE7G	**ISO 4401-07**
DZCE8G	**ISO 4401-08**

p max **350** bar

Q max (see performance table)

OPERATING PRINCIPLE



— The DZCE*G are pressure reducing valves with electric proportional control with integrated electronics, with mounting interface in compliance with ISO 4401 standards.

— Those valves, besides reducing the pressure from line P to working line A, allow the flow to return from the line A to the return line T when a pressure greater than the set value is generated in the downstream circuit (flow path A): a typical case of hydraulic counterweight or load balancing.

— The valves are available with command signal in voltage or current and on board electronics with internal enable, external enable or 0V monitor on pin C.

— A solenoid current monitoring signal is available.

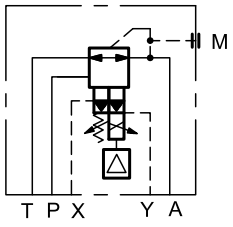
— The valves are easy to install. The driver directly manages digital settings. In the event of special applications, you can customize the settings using the optional kit (see par. 15.3)

PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C p = 140 bar)

		DZCE5G DZCE5RG	DZCE7G	DZCE8G
Max operating pressure	bar	350		
Maximum flow	l/min	150	300	500
Step response		see paragraph 7		
Hysteresis	% of p_{max}	< 2%		
Repeatability	% of p_{max}	< ±2%		
Electrical characteristics		see paragraph 3		
Ambient temperature range	°C	-20 / +60		
Fluid temperature range	°C	-20 / +80		
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		G	-		/	31		-			/		K11	

Pressure reducing valve

Electric proportional control

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

Integrated electronics for open loop

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

Series No.
(the overall and mounting dimensions remain unchanged from 30 to 39)

Seals:
N = NBR seals for mineral oil (standard)
V = FPM seals for special fluids

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

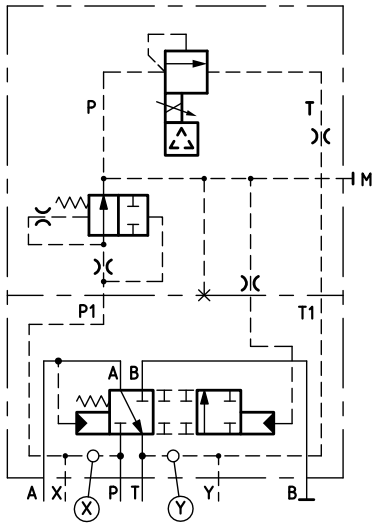
Drainage: **I** = internal
E = external

Reference signal:
E0 = voltage 0÷10 V
E1 = current 4÷20 mA

Main connector 6 pin + PE

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

2 - DETAILED SYMBOL



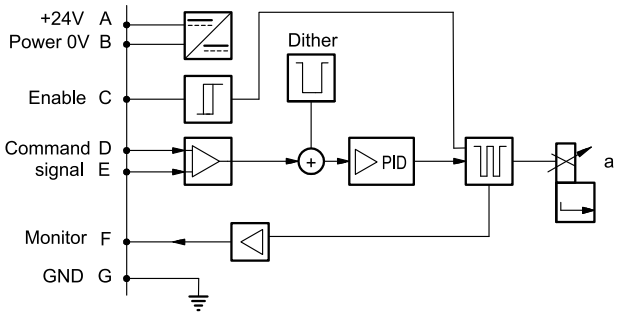
3 - ELECTRICAL CHARACTERISTICS

3.1 - Electrical on board electronics

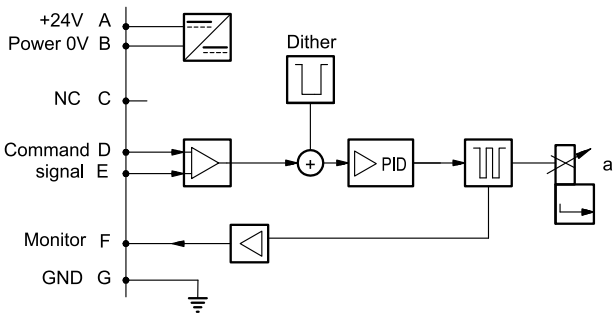
Duty cycle		100% (continuous operation)
Protection class according to IEC 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	25
Maximum solenoid current	A	1.88
Fuse protection, external		2A time lag
Command signals: voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ri > 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	0 ÷ 10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Managed breakdowns		Overload and electronics overheating, cable breakdown, supply voltage failures
Communication		LIN-bus Interface (with the optional kit)
Connection		7 - pin MIL-C-5015-G (DIN-EN 175201-804)
Electromagnetic compatibility (EMC) emissions EN 61000-6-4 immunity EN 61000-6-2		According to 2014/30/EU standards

3.2 - On-board electronics diagrams

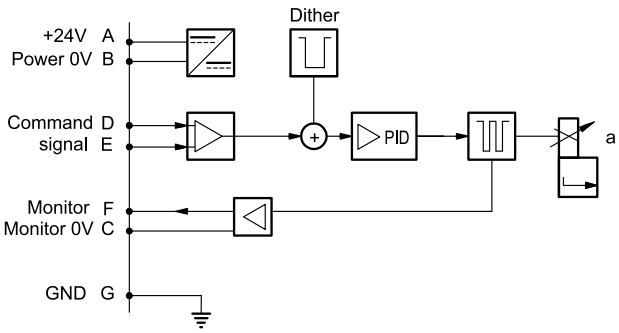
VERSION A - External Enable



VERSION B - Internal Enable

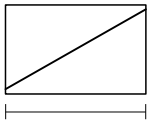


VERSION C - 0V Monitor

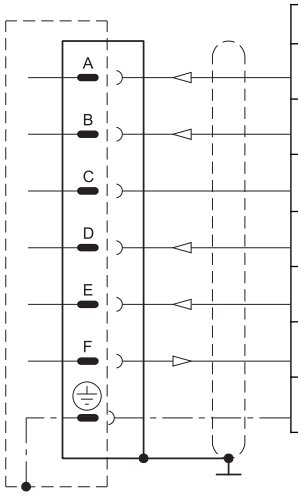


4 - VERSIONS WITH VOLTAGE COMMAND (E0)

The reference signal is between 0 ÷ 10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**0V**	**+10V**
MONITOR	**0V**	**+10V**

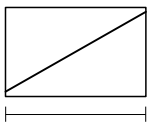


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	0 ÷ 10 V	Command (differential input)		
E	0 V	PIN D reference		
F	0 ÷ 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

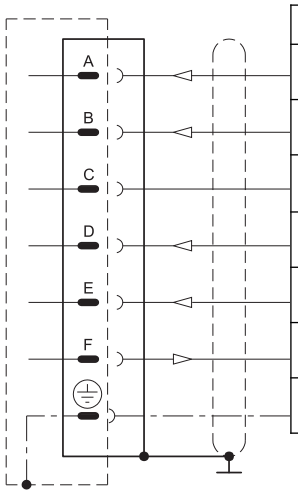
5 - VERSIONS WITH CURRENT COMMAND (E1)

The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**20 mA**
MONITOR	**4 mA**	**20 mA**



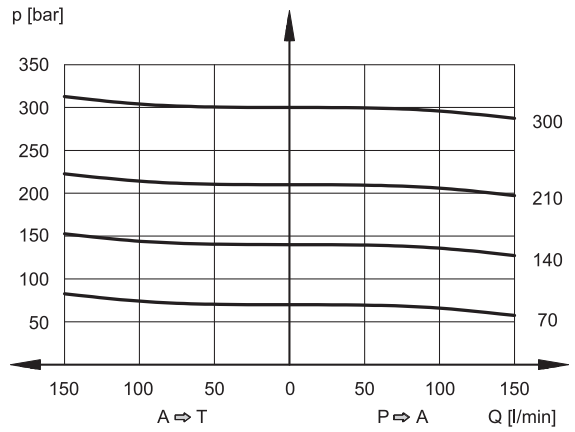
Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	not used -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	PIN D reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

6 - CHARACTERISTIC CURVES

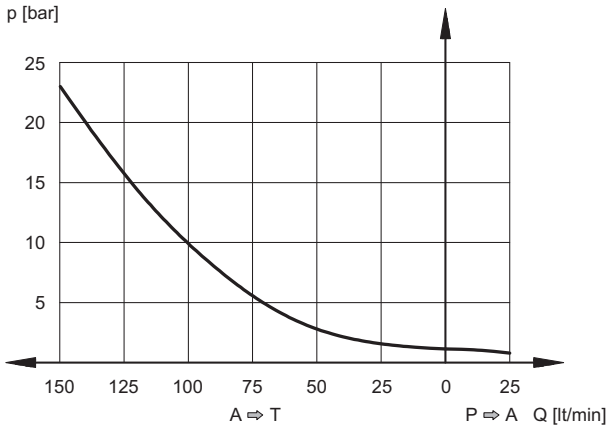
(with mineral oil with viscosity of 36 cSt at 50°C)

6.1 - Characteristic Curves of DZCE5G and DZCE5RG

ADJUSTMENT

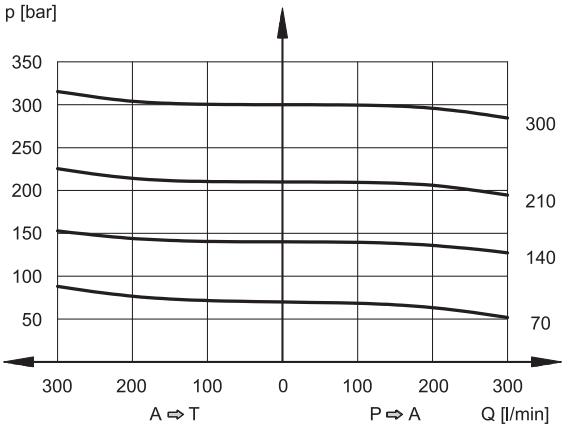


MIN. CONTROLLED PRESSURE p min = f(Q)

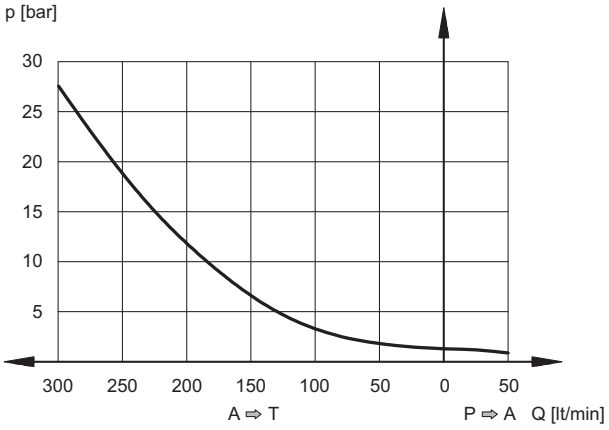


6.2 - Characteristic Curves of DZCE7G

ADJUSTMENT

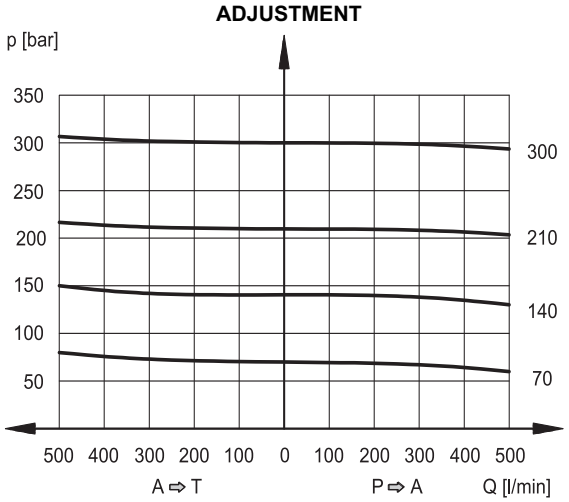


MIN. CONTROLLED PRESSURE p min = f(Q)

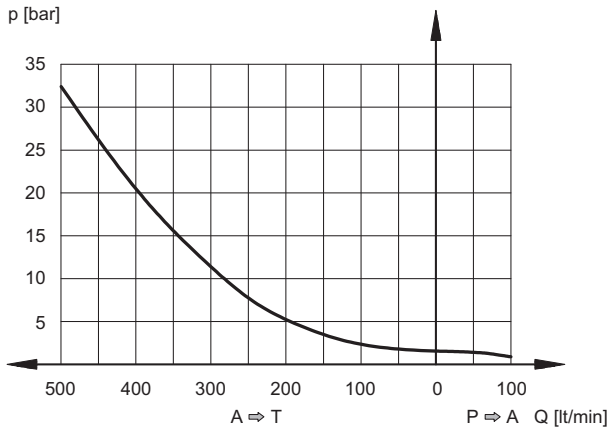


6.3 - Characteristic Curves of DZCE8G

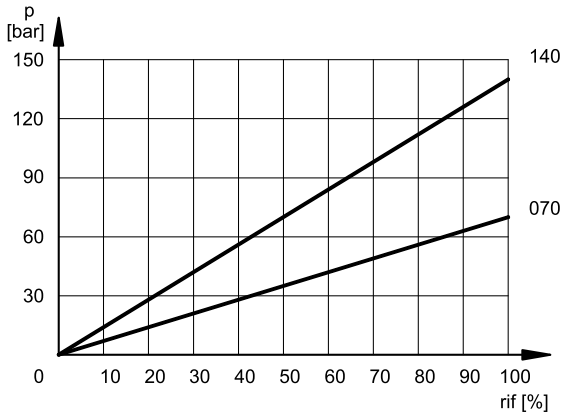
ADJUSTMENT

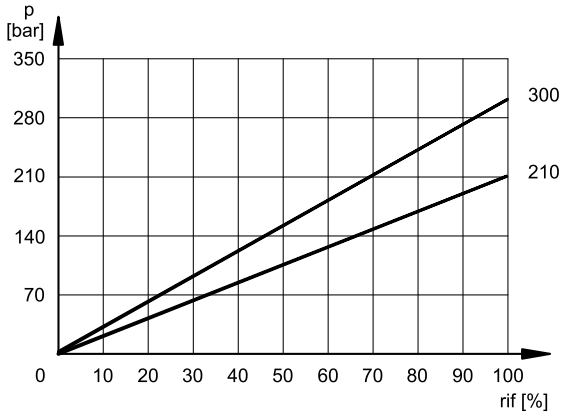


MIN. CONTROLLED PRESSURE p min = f(Q)



6.4 - CONTROLLED PRESSURE p = f(I)



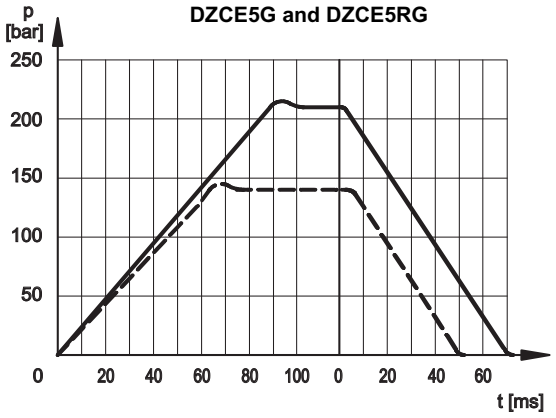


7 - STEP RESPONSE

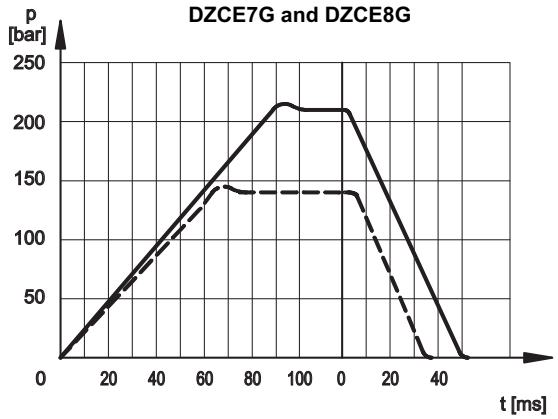
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

The graphs show the typical step response tested with static pressure 100 bar.

DZCE5G and DZCE5RG



DZCE7G and DZCE8G

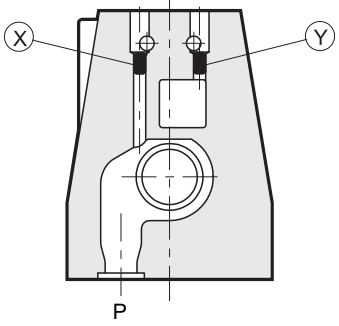


8 - PILOTING AND DRAINAGE

The valves are available with piloting and drainage, both internal and external. The version with external drainage allows a higher backpressure on the unloading.

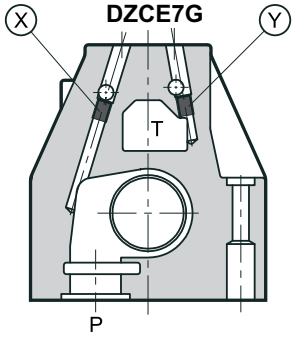
TYPE OF VALVE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

DZCE5 and DZCE5RG



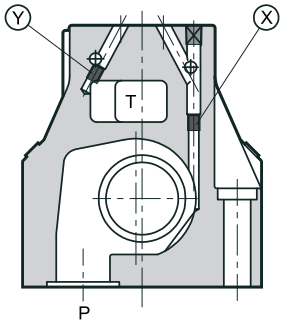
X: M5x6 plug for external pilot
Y: M5x6 plug for external drain

DZCE7G



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

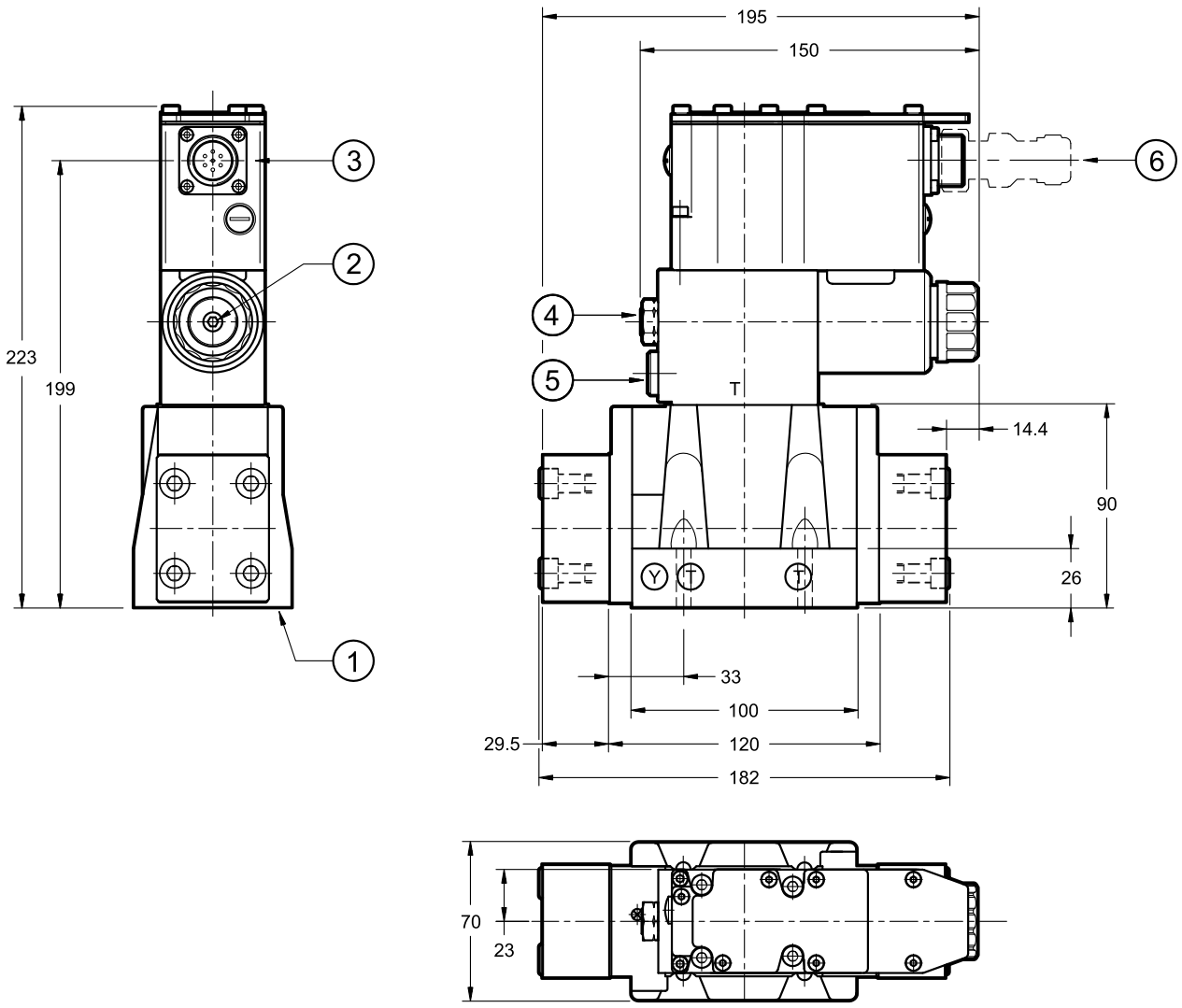
DZCE8G



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

9 - OVERALL AND MOUNTING DIMENSIONS DZCE5G AND DZCE5RG

dimensions in mm



NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

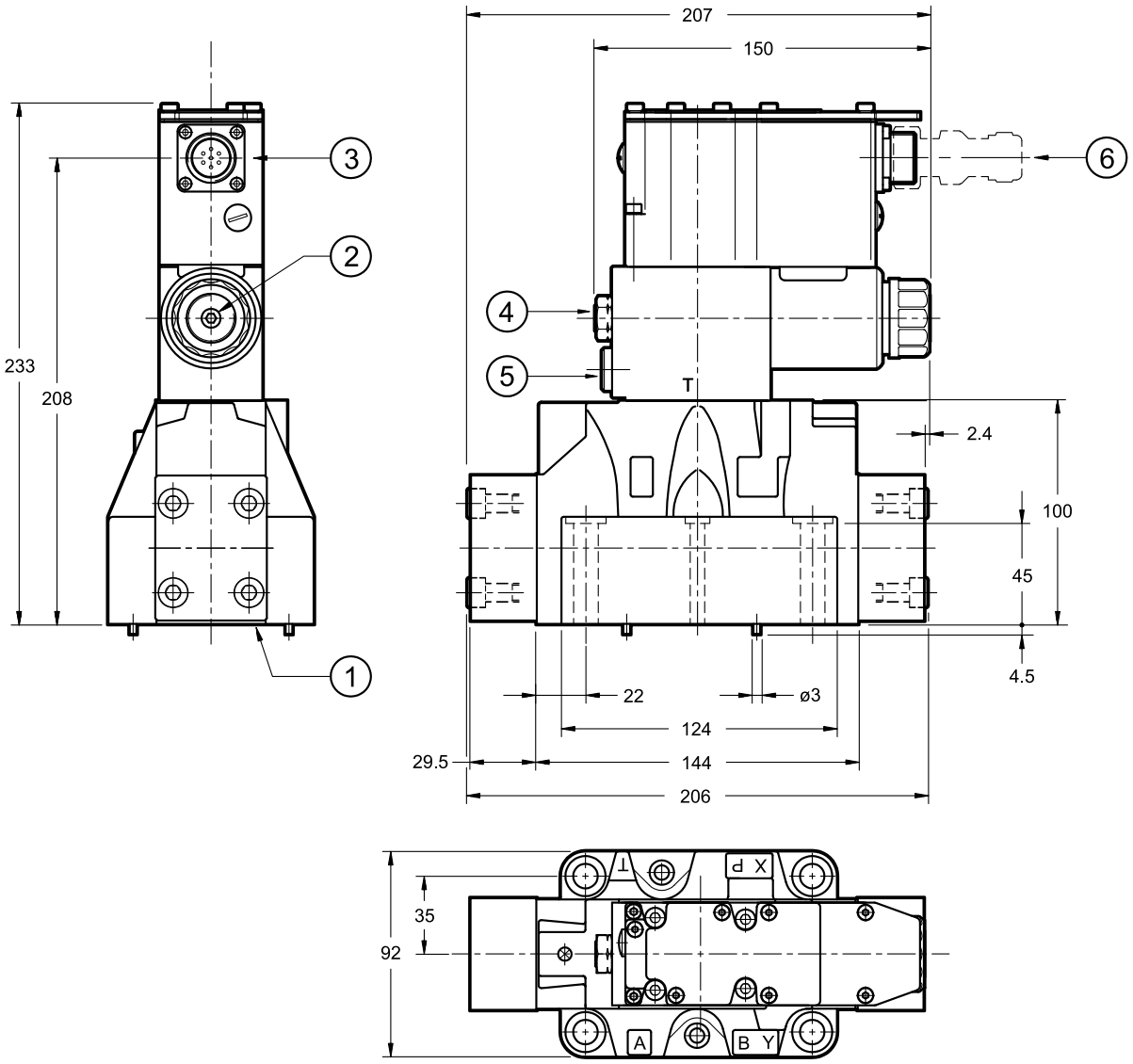
Mounting surface shown at paragraph 12.

Valve fastening: N. 4 bolts SHC M6x35 - ISO 4762	
Tightening torque: 8 Nm (bolts A 8.8)	
Thread of mounting holes: M6x10	

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore
2	Breather (Allen key 4)
3	Main connection
4	Adjustment seal, set in factory. It is recommended not to unscrew the nut.
5	Pressure gauge port 1/4 BSP”
6	Mating electrical connector **to be ordered separately.** See at section 15

10 - OVERALL AND MOUNTING DIMENSIONS DZCE7G

dimensions in mm



NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

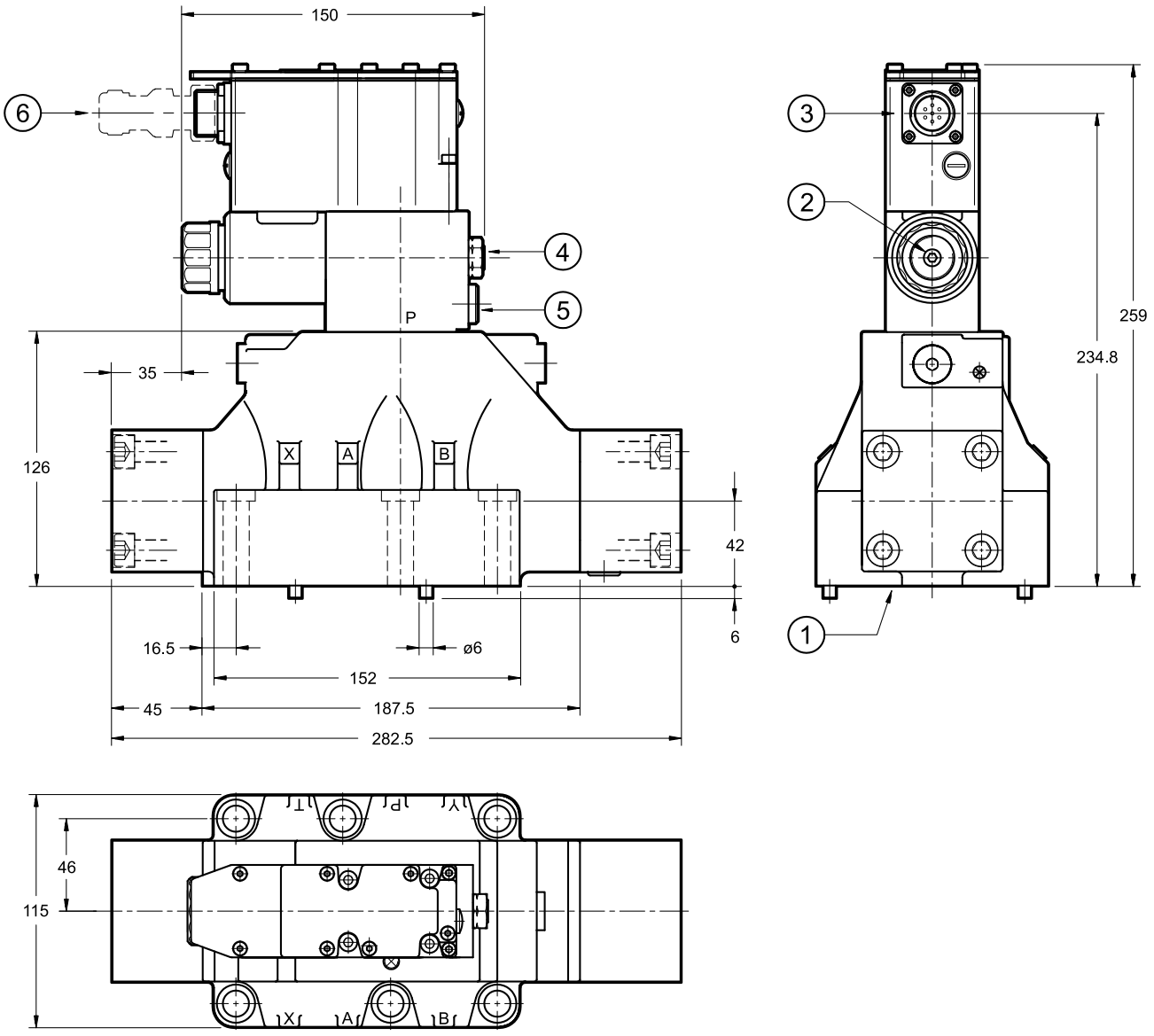
Mounting surface shown at paragraph 12.

Valve fastening:	N. 4 bolts SHC M10x60 - ISO 4762 N. 2 bolts SHC M6x60 - ISO 4762
Tightening torque:	M10x60: 40 Nm (bolts A 8.8) M6x60: 8 Nm (bolts A 8.8)
Thread of mounting holes:	M6x18; M10x18

1	Mounting surface with sealing rings: N. 4 OR type 130 (22.22x2.62) - 90 Shore N. 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Breather (Allen key 4)
3	Main connection
4	Adjustment seal, set in factory. It is recommended not to unscrew the nut.
5	Pressure gauge port 1/4 BSP”
6	Mating electrical connector **to be ordered separately.** See at section 15

11 - OVERALL AND MOUNTING DIMENSIONS DZCE8G

dimensions in mm



NOTE: at the first start up, or after a long period of no use, it is necessary to vent the air through the breather (2) placed at the end of the solenoid tube.

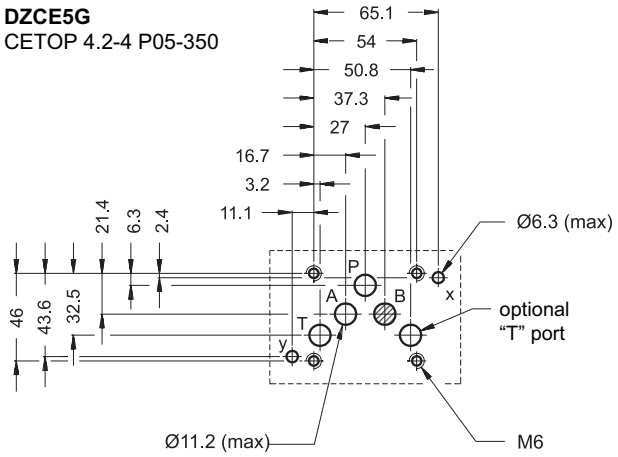
Mounting surface shown at paragraph 12.

1	Mounting surface with sealing rings: N. 4 OR type 3118 (29.82x2.62) - 90 Shore N: 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Breather (Allen key 4)
3	Main connection
4	Adjustment seal, set in factory. It is recommended not to unscrew the nut.
5	Pressure gauge port 1/4 BSP”
6	Mating electrical connector **to be ordered separately.** See at section 15

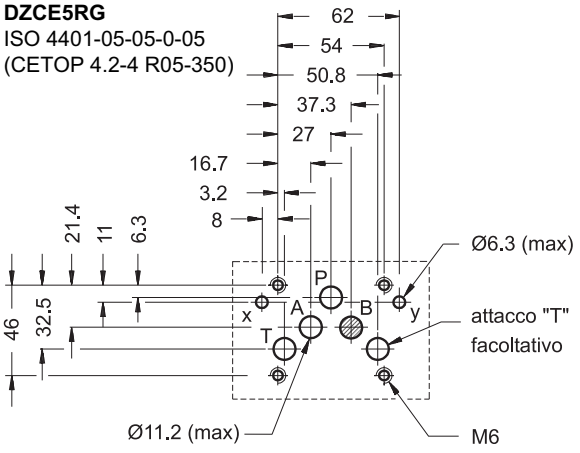
Valve fastening: N. 6 bolts SHC M12x60 - ISO 4762
Tightening torque: 69 Nm (bolts A 8.8)
Thread of mounting holes: M12x20

12 - MOUNTING SURFACES

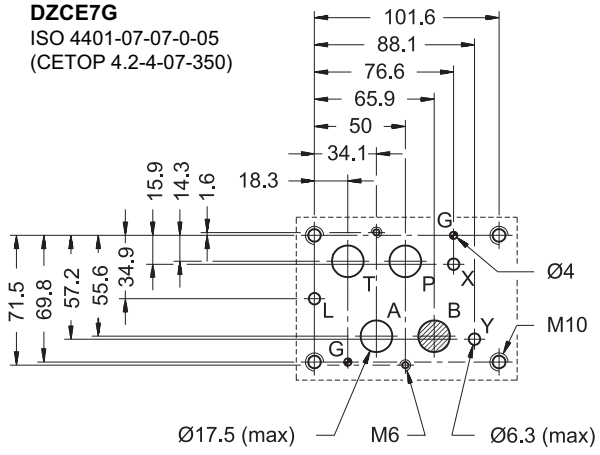
DZCE5G
CETOP 4.2-4 P05-350



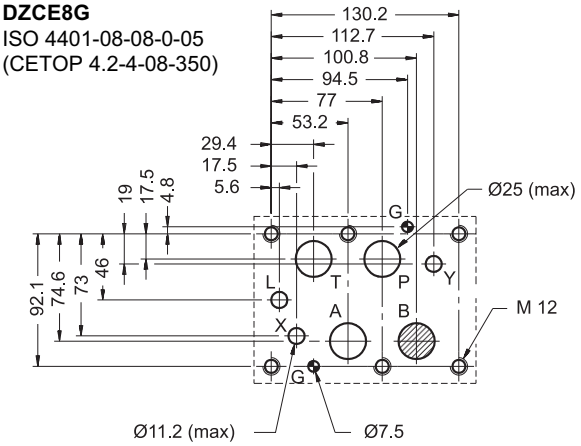
DZCE5RG
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



DZCE7G
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DZCE8G
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



13 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

14 - INSTALLATION

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 paragraph 5.

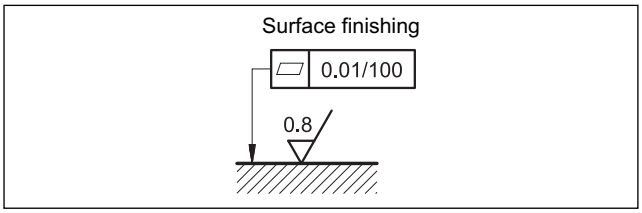
Ensure that there is no air in the hydraulic circuit. In particular applications, can be necessary to vent the air entrapped in the solenoid tube, by using the appropriate drain screw in the solenoid tube.

Ensure the solenoid tube is always filled with oil. At the end of the operation, make sure of having correctly replaced the drain screw.

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.

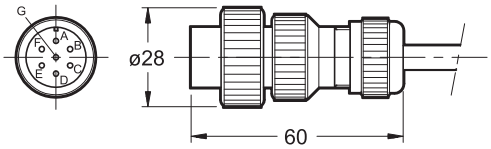
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



15 - ACCESSORIES
(to be ordered separately)

15.1 Mating connector

These valves have a plug for 7-pin mating connector, that is placed on the box of the integral motion control.



So as to avoid electromagnetic troubles and comply with the electromagnetic compatibility regulation EMC, it is recommended the use of a metal connector.

If a plastic connector is used, make sure that the protection characteristics IP and EMC of the valve are guaranteed.

Duplomatic offers a metal cable connector type MIL-C-5015-G (EN 175201-804).

name: **EX7S/L/10** code **3890000003**

15.2 - Connection cables size

Power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2

Signal: 0,50 mm^2

A suitable cable would have 7 isolated conductors, a separate screen for the signal wires and an overall screen.

15.3 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, see catalogue 89850.

16 - SUBPLATES
(see catalogue 51 000)

		DZCE5G	DZCE7G	DZCE8G
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	1” BSP 1/4” BSP	1½” BSP 1/4” BSP

DUPLOMATIC MOTION SOLUTIONS

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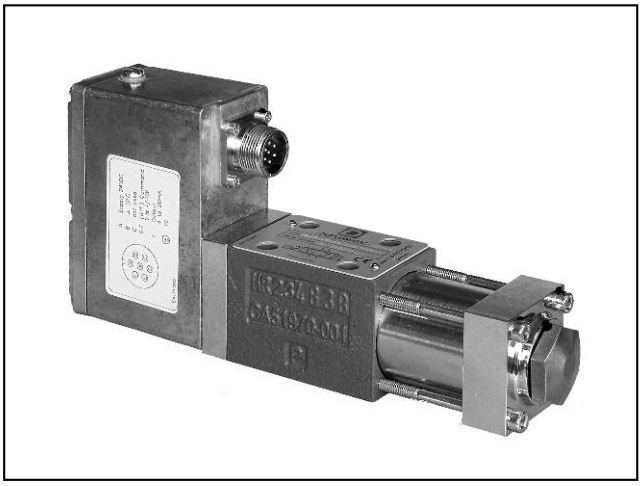
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DXJ3

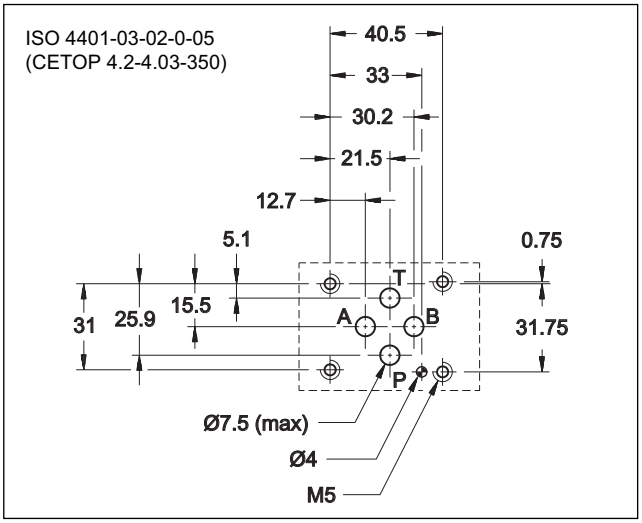
ELECTRO-HYDRAULIC SERVOVALVE WITH INTEGRATED ELECTRONICS

SERIES 10

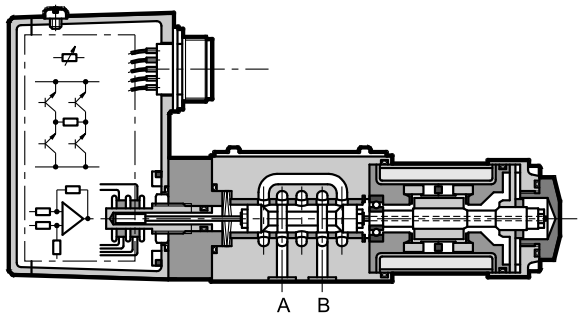
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max (see performances table)

MOUNTING SURFACE



OPERATING PRINCIPLE



— The DXJ3 valve is a four-way servo-proportional valve where the spool moves inside a sleeve. This valve has a direct drive with a linear force motor resulting in high dynamic performances which are independent of system pressure. The spool position is controlled by a linear transducer (LVDT) with closed loop which ensures high precision and repeatability.

— It is available in four different flow rate control ranges up to 40 l/min, with spools with zero overlap and a mounting surface in compliance with ISO 4401standards.

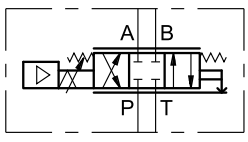
— The valve is featured by integrated electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit does not require any adjustment other than the possible electronic regulation of the zero.

— Suitable for control applications with closed loop of position, velocity and pressure. With a loss of power or with a zero reference signal, the spool goes automatically at rest-position. In this position the valve has a minimum leakage, depending on the operating pressure (see the performances table).

PERFORMANCES (with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure Ports P - A - B Port T	bar	 350 50
Rated flow Q nom (with Δp 70 bar P - T)	l/min	5 - 10 - 20 - 40
Null leakage flow (with p = 140 bar)	l/min	≤ 3% of Q nom
Hysteresis	% In	< 0,2
Threshold	% In	< 0,1
Thermal drift (with ΔT= 50°C)	% In	< 1,5
Response time	ms	≤ 12
Vibration on the three axes	g	30
Electric features	see paragraph 3	
Protection degree according IEC EN 60529	IP65	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	5 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 17/15/12 (16/14/11 for longer life)	
Recommended viscosity	cSt	25
Mass	kg	2,5

HYDRAULIC SYMBOL



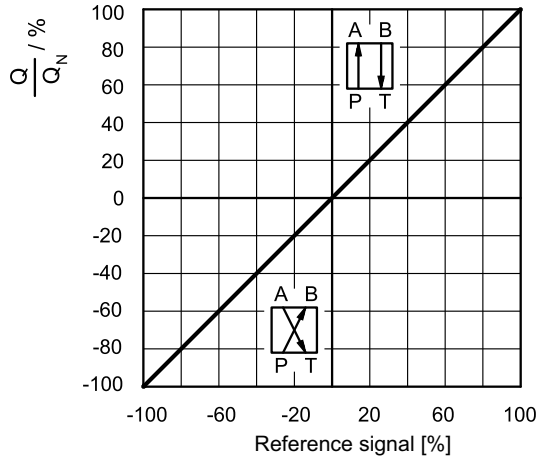
1 - IDENTIFICATION CODE

D	X	J	3	-	D	0	L		/	10		/	E0	K11

- D X: Servo-proportional valve with bushing spool
- J: Integrated electronics and position feedback
- 3: Rated size ISO 4401-03
- D: Symmetric spool
- 0: Spool with zero overlap
- L: Spool with a linear flow rate curve
- (blank): Rated flow (with p = 70 bar P - T)
  05 = 5 l/min **20** = 20 l/min
  10 = 10 l/min **40** = 40 l/min
- 10: Series No. (from 10 to 19 sizes and mounting dimensions remain unchanged)
- (blank): Seals:
  N = NBR seals for mineral oil (**standard**)
  V = FPM seals for special fluids
- E0: Reference signal:
  ±10V (other signals available on request)
- K11: 6 + PE pole connector

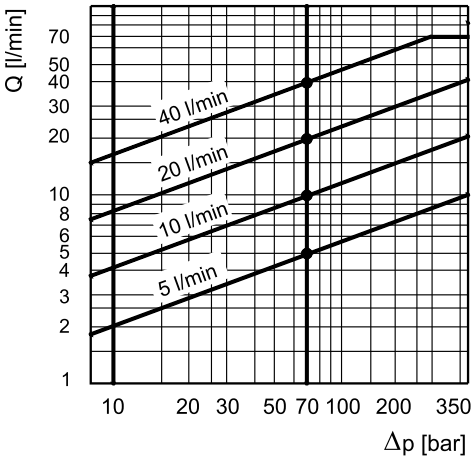
2 - CHARACTERISTIC CURVES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

REFERENCE / FLOW RATE CURVE



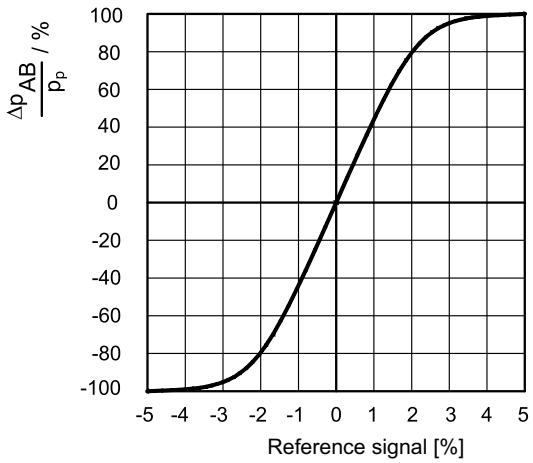
Typical flow rate curves at constant Δp = 70 bar P-T according to the reference signal.
NOTE: with positive reference signal connected to pin D the valve regulates P - A / B - T.

FLOW RATE CURVE ACCORDING TO ΔP



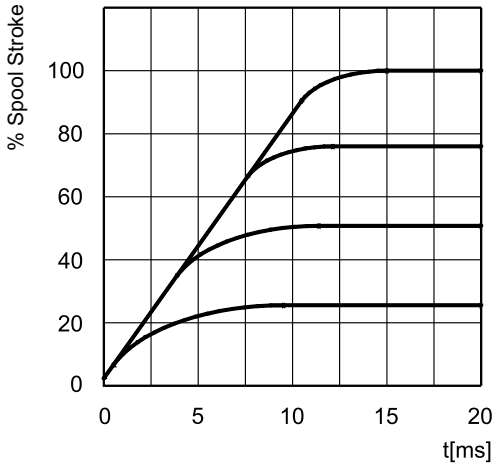
The diagram states the maximum valve controlled flow rate according to the pressure drop between the P and T ports.

PRESSURE GAIN

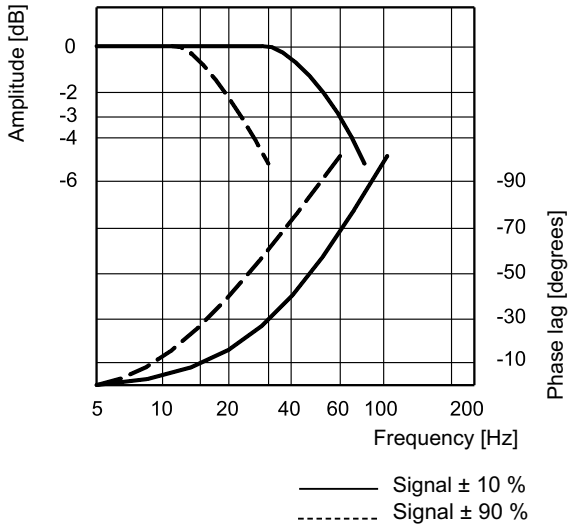


The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal. In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

RESPONSE TIME

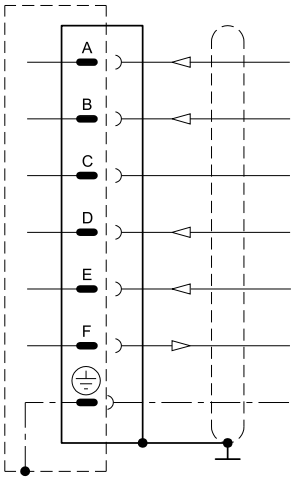


FREQUENCY RESPONSE



3 - ELECTRICAL FEATURES

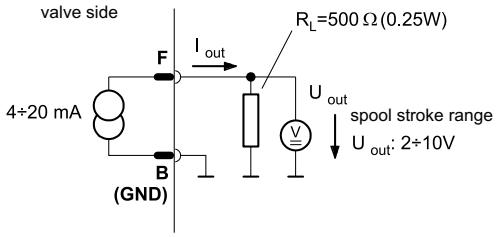
CONNECTION WIRING



Pin	Values	Function	NOTES
A	24 VDC	Supply	From 19 to 32 VDC $I_{A\ MAX}$ = 1,2 A
B	0 V	Signal ground	0 V
C	----	Not used	----
D	± 10 V	Input rated command	R_e = 10 kΩ (see **NOTE 1**)
E	0 V	Input rated command	----
F	4 ÷ 20 mA	Spool position	R_L = from 300 to 500 Ω (see **NOTE 2**)
PE	----	Protective earth	----

NOTE 1: The input stage is a differential amplifier. With positive reference signal connected to pin D, valve opening P - A e B - T is achieved. With a zero reference signal the spool is in centred position. The spool stroke is proportional to U_D - U_E. If only one command signal is available (single-end), pin E must be connected to pin B (0V ground).

NOTE 2: The spool position value can be measured at pin F (see diagram right). The position signal output goes from 4 to 20 mA. The centered position is at 12 mA, while 20 mA corresponds to 100% valve opening P - A and B - T. This monitoring allows to detect a cable break when I_F = 0V.



General requirements:

- External fuse = 1,6 A
- Minimum cross-section of all leads ≈0,75 mm²
- When making electric connections to the valve (shield, protective earth) appropriate measures must be taken to ensure that locally different earth potentials do not results in excessive ground currents.
- The differential and the spool position signal lines must be connected to the mating connector housing at valve side and to the 0V (signal ground) at cabinet side.
- **EMC**: meets the requirements of EN 55011:1998, class B, and the immunity regulation according to EN 61000-6-2:1998

4 - HYDRAULIC FLUIDS

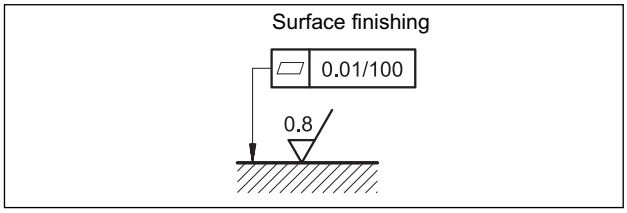
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

5 - INSTALLATION

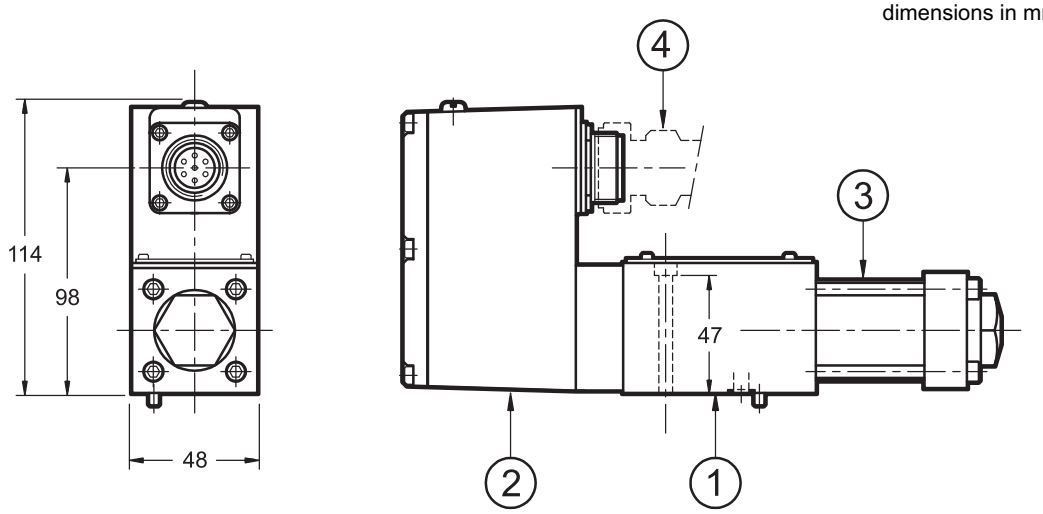
The DXJ3 valve can be installed in any position without impairing its correct operation.

The valve is fixed by means of screws on a flat surface with planarity between 0,01 mm over 100 mm and roughness R_a <0,8 µm. If the minimum values are not observed, the fluid can easily leak between the valve and the mounting surface. While mounting pay attention to the environment and valve cleanliness.

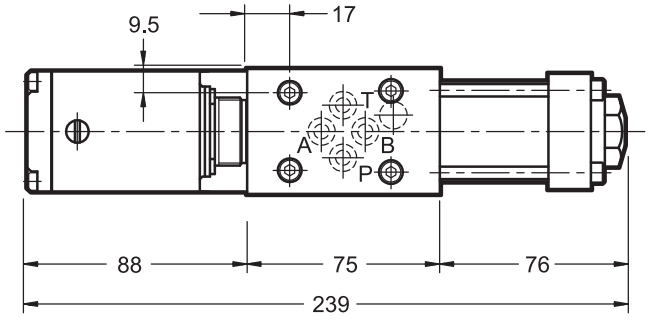


6 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



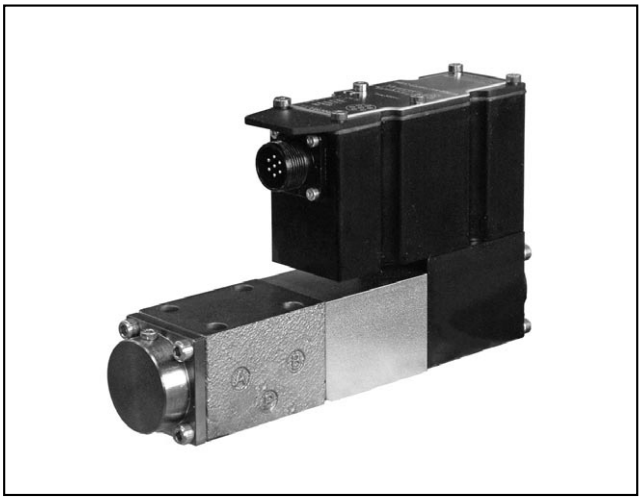
Fastening bolts: 4 bolts SHC M5 x 55 - ISO 4762
Torque: 8,5 Nm



1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) - 90 Shore N. 1 OR type 2031 (7.66x1.78) - 90 Shore
2	Integrated electronics
3	Linear force motor
4	Electric connector 7 pins DIN 43563 - IP67 PG11 EX7S/L/10 cod. 3890000003 (**to be ordered separately**)

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DXE3J

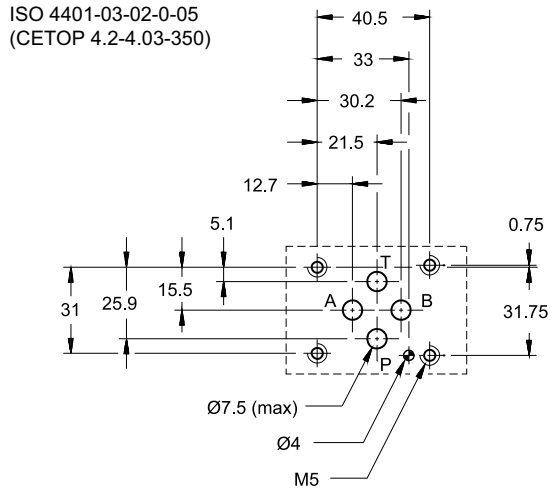
HIGH RESPONSE SERVO-PROPORTIONAL VALVE WITH INTEGRATED ELECTRONICS

SERIES 31

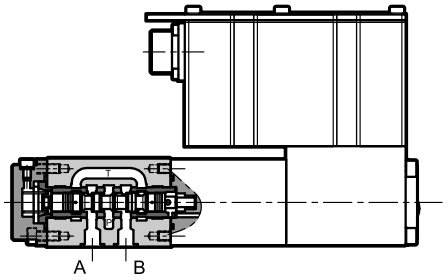
SUBPLATE MOUNTING ISO 4401-03

p max **350** bar
Q max **70** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— The DXE3J valve is a four-way (3 + fail-safe position) servo-proportional valve where the spool moves inside a sleeve. It is operated by a proportional solenoid highly dynamic, which achieves high performance and it not requires pilot pressure. The spool position is controlled by a linear transducer (LVDT) in closed loop which ensures high precision and repeatability.

— It is available in six different flow ranges up to 40 l/min, with spools with zero overlap.

— A version for potentially explosive athmospheres according to ATEX 2014/34/EU II 3GD is available.

— The valve is featured by integral electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit doesn't require any adjustment other than the possible electronic regulation of the zero.

— Two types of integrated electronics are available, with analogue or fieldbus interfaces.

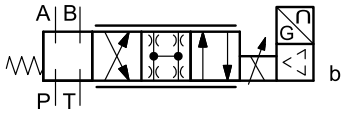
— Suitable for control applications with closed loop of position, velocity and pressure. With a power down or without the enable input, the spool moves itself at fail-safe position.

PERFORMANCES

(with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure Ports P - A - B Port T	bar	 350 250
Rated flow Q nom (with ∆p 70 bar P - T)	l/min	1 - 2 - 5 - 10 - 20 - 40
Hysteresis	% In	< 0.2
Threshold	% In	< 0.1
Thermal drift (with ∆T= 40 °C)	% In	< 1.0
Response time (0-100%)	ms	≤ 10
Vibration on the three axes	g	30
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	5 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 17/15/12 (16/14/11 for longer life)	
Recommended viscosity	cSt	25
Mass	kg	2.6

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 - Standard electronics

D	X	E	3	J		-	LZ			/	31		-		K11	

Servo-proportional valve with spool in sleeve

Electric proportional control

Size ISO 4401-03

Standard electronics for closed loop

K3 = Version for potentially explosive atmospheres compliant with ATEX 2014/34/EU II 3GD (par. 2).
Omit if not required.

Spool with linear flowrate curve and zero overlap, low leakage

Rated flow (with Δp = 70 bar P - T)
01 = 1 l/min **10** = 10 l/min
02 = 2 l/min **20** = 20 l/min
05 = 5 l/min **40** = 40 l/min

Fail safe type
F1 = closed centre
F3 = float
FC = cross centre

Series No.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

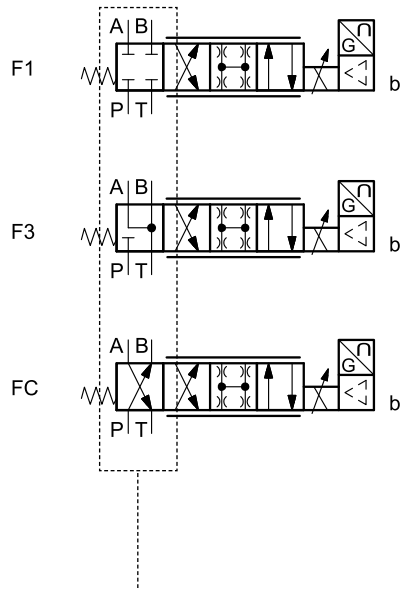
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Command value:
E0 = voltage ±10 V
E1 = current 4 ÷ 20 mA

6 + PE pole connection

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

1.2 - Available versions



leakage flow in fail safe position at 100 bar [cm³/min]		
F1	P → A	20
	P → B	30
	A → T	30
	B → T	30
F3	P → A	20
	P → B	30

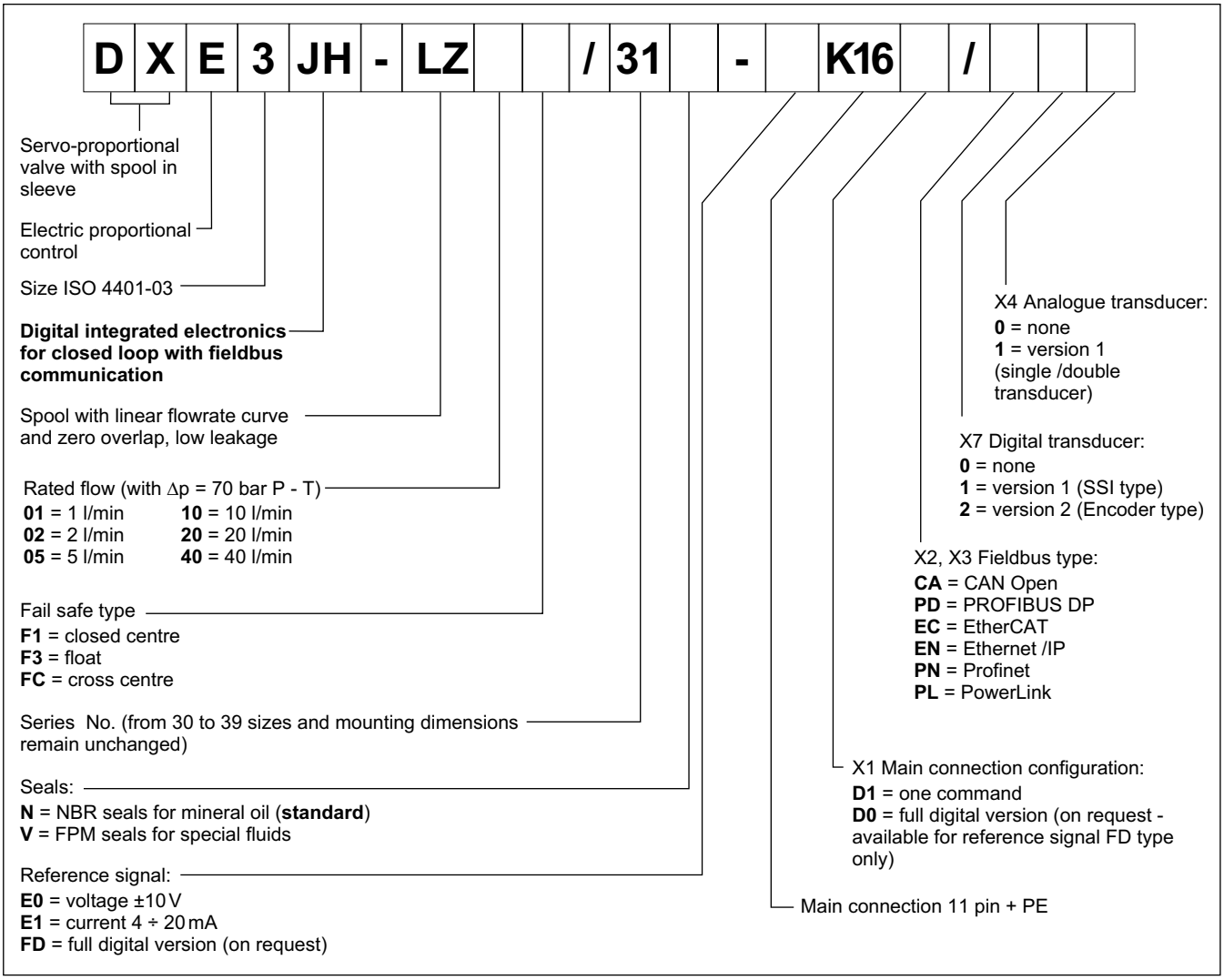
flow rate	fail safe type		
	F1	F3	FC
01	■	-	-
02	■	-	-
05	■	■	■
10	■	■	■
20	■	■	■
40	■	■	■

■ available - not available

FAIL SAFE POSITION

When a power failure occurs, the electronics de-energizes the solenoid and the spool will take the fail safe position by spring return.

1.3 - Electronics with fieldbus communication



2 - ATEX 2014/34/EU RATED VERSION

Valves suitable for use in potentially explosive atmospheres certified according to ATEX 2014/34/EU classified under ATEX II 3GD are now available.

The electrical and technical characteristics and dimensions of ATEX certified valves are identical to those of standard valves.

The supply is always delivered toghether with the ATEX declaration of conformity and the operating and maintenance user manual, where are described all the information for the proper use of valves in potentially explosive atmospheres.

TYPE EXAMINATION CERTIFICATE N°: **AR20ATEX046**

2.1 - Identification code

To order the ATEX-rated version, simply insert letters K3 in the initial part of the identification code. The description becomes DXE3JK3. Please use the identification code shown at par. 1.1 to order.

Example:

- DXE3J**K3**-LZ40F1/31N-E0K11A

2.2 - Classification

The valves DXE3JK3 are ATEX marked as below:

MARKING FOR GASES, VAPOURS AND MISTS:

Ⓔx II 3G Ex ec IIC T4 Gc

EX: Specific marking of explosion protection as ATEX 2014/34/EU directive and related technical specification requests
II: Group II for surface plants
3: Category 3 normal protection, eligible for zone 2
G: for use in areas in which explosive atmospheres caused by gases, vapours, mists
Ex ec: "ec" protection type, increased safety
IIC: Gas group
(automatically eligible for group IIA and IIB)
T4: Temperature class (max surface temperature)
Gc: Protection level for electrical devices (EPL)
Equipment for explosive gas atmospheres, having an "enhanced' level of protection, which is not a source of ignition in normal operation and which may have some additional protection to ensure that it remains inactive as an ignition source in the case of regular expected occurrences.

MARKING FOR DUSTS:

Ⓔx II 3D Ex tc IIIC T135°C Dc

EX: Specific marking of explosion protection as ATEX 2014/34/EU directive and related technical specification requests
II: Group II for surface plants
3: Category 3 normal protection, eligible for zone 22
D: for use in areas in which explosive atmospheres are caused by explosive dusts
Ex tc: "tc" protection type, protected by enclosures
IIIC: Dusts group
(automatically eligible for group IIIA and IIIB)
T135°C: Temperature class (max surface temperature)
Dc: Protection level for electrical devices (EPL)
Equipment for explosive dust atmospheres, having an "enhanced' level of protection, which is not a source of ignition in normal operation and which may have some additional protection to ensure that it remains inactive as an ignition source in the case of regular expected occurrences.

2.3 - IP protection degree

The IP protection degree of the valve is IP66/IP68 according to IEC EN 60529.

NOTE: the test carried out to reach IP68 is: duration 1 h, depth 1 m.

The IP degree is guaranteed only with mating connector of equivalent IP degree, installed and tightened correctly.

2.4 - Operating temperatures

The operating ambient temperature must be between -20°C and +60 °C.

The fluid temperature must be between -20°C and +80°C.

The valves are T4 (T135° C) class temperature classified, so they are eligible for operation also at higher class temperature (T3, T2, T1 (T200° C).

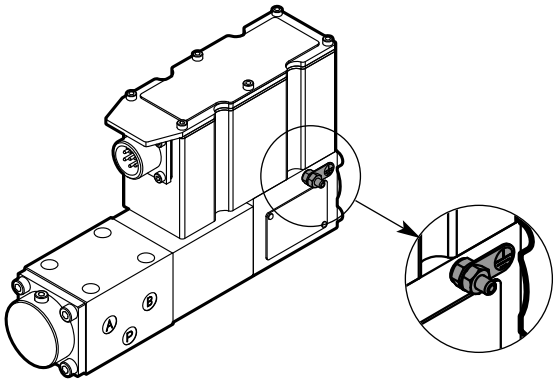
2.5 - Connectors

The connector is not supplied with the valve, but can be ordered separately. **The connector must be suitable for the intended conditions of use.**

Duplomatic can provide 7-pin connectors to wire, metal type, suitable for use with DXE3JK3 valves (see catalogue 89 000, connectors type EX7S).

2.6 - Grounding points

The ATEX certified valves are supplied with a grounding point with M4 screw.



The grounding point must always be wired with the general earthing system by means of a suitable conductive line.

3 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to IEC EN 60529		IP66/IP68 (**NOTE**)
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	35
Maximum solenoid current	A	2.6
Fuse protection, external	A	(fast), max current 4A
Managed breakdowns		Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

NOTE: The IP degree is guaranted only with mating connector of equivalent IP degree, installed and tightened correctly. The test carried out to reach IP68 is: duration 1 h, depth 1 m

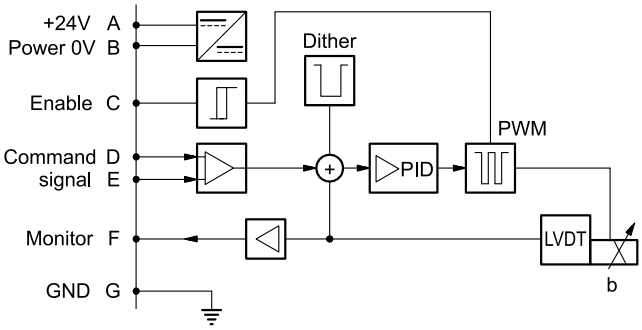
4 - DXE3J - STANDARD ELECTRONICS

4.1 - Electrical characteristics

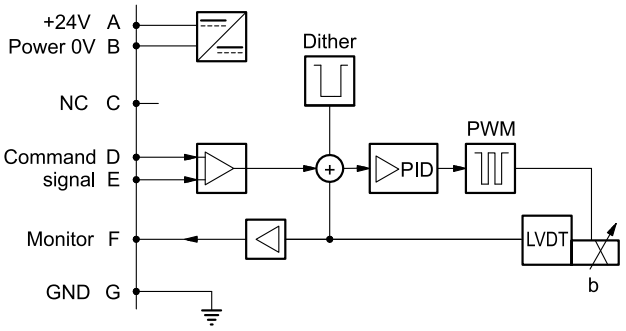
Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

4.2 - On-board electronics diagrams

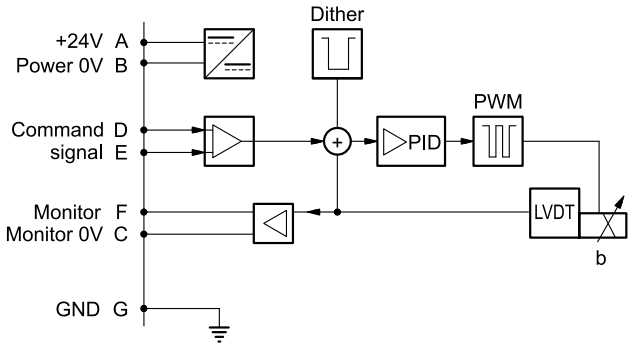
VERSION A - External Enable



VERSION B - Internal Enable

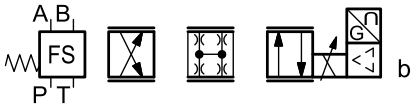


VERSION C - 0V Monitor

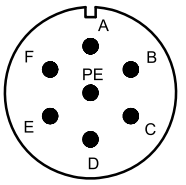


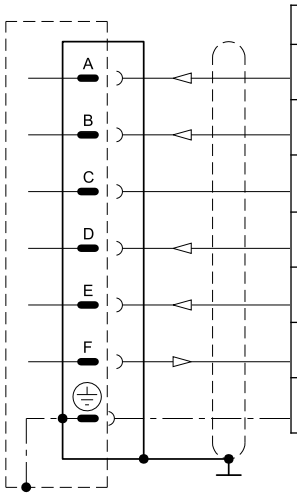
4.3 - Version with voltage command (E0)

The reference signal must be between -10V and +10V. The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



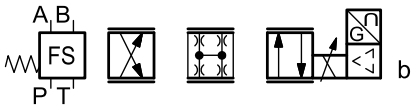


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command (differential input)		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

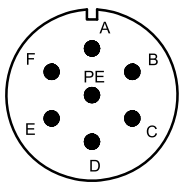
4.4 - Versions with current command (E1)

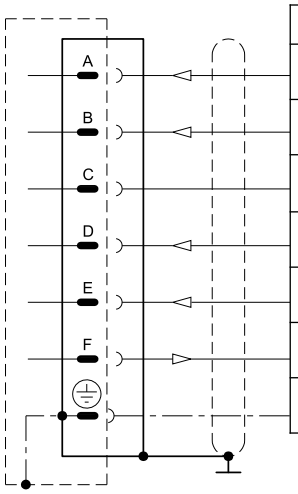
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

5 - DXE3JH - FIELDBUS ELECTRONICS

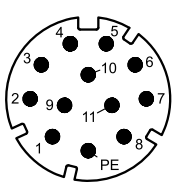
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

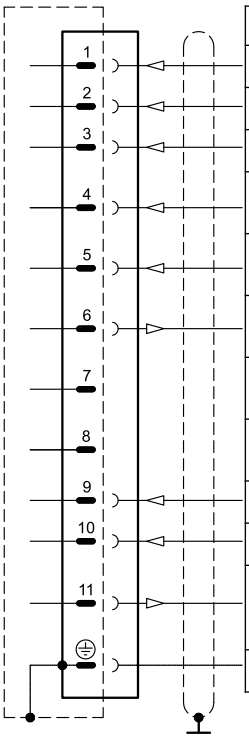
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 4.3 and 4.4.

5.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

5.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

5.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

5.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

5.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

5.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

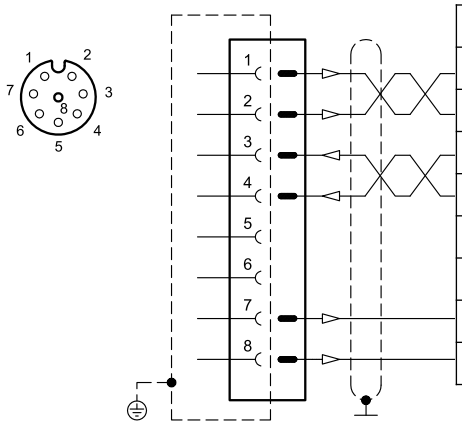
NOTE: Shield connection on connector housing is recommended.

X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

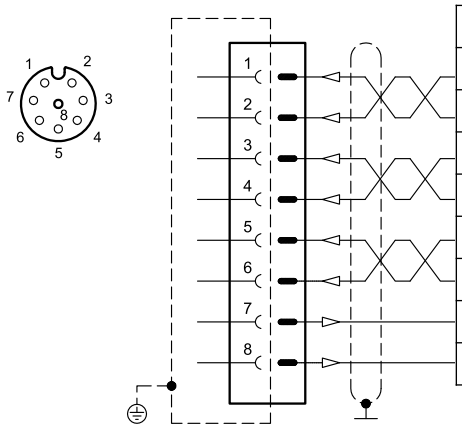
5.4 - Digital transducer connection
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

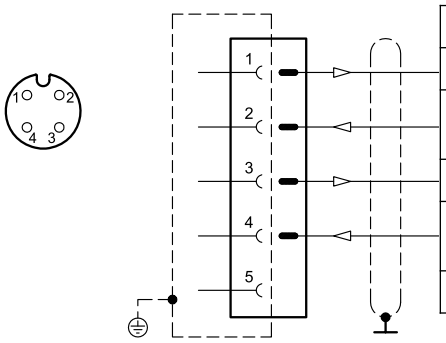
VERSION 2: ENCODER type



Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

5.5 - Analogue transducer connection
X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer
(single or double is a software-selectable option)

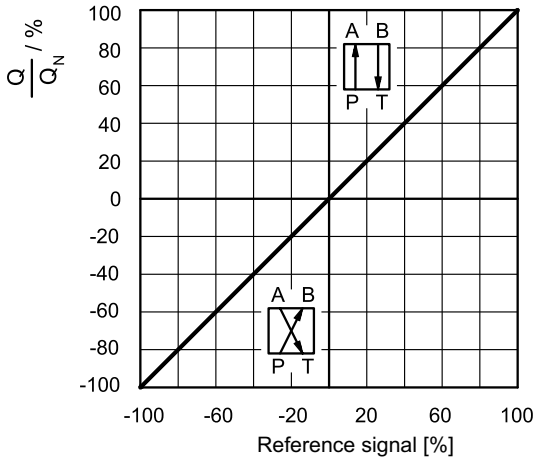


Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

6 - CHARACTERISTIC CURVES

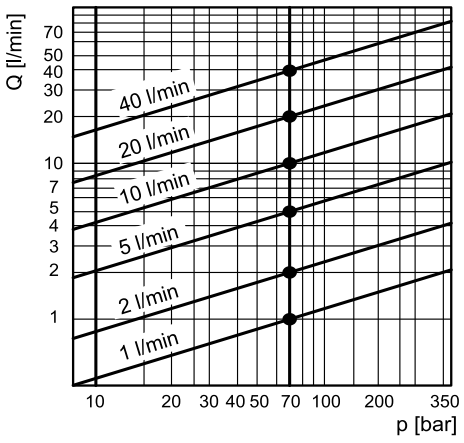
(measured with viscosity of 36 cSt at 50°C)

REFERENCE / FLOW RATE CURVE



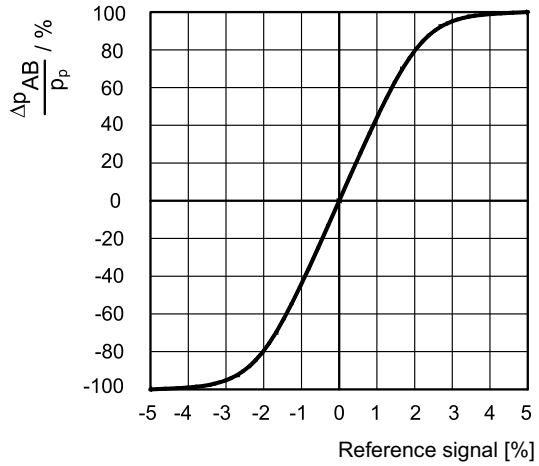
Typical flow rate curves at constant Δp = 70 bar P-T according to the reference signal.
NOTE: with positive reference signal connected to pin D the valve regulates P - A / B - T.

FLOW RATE CURVE ACCORDING TO Δp



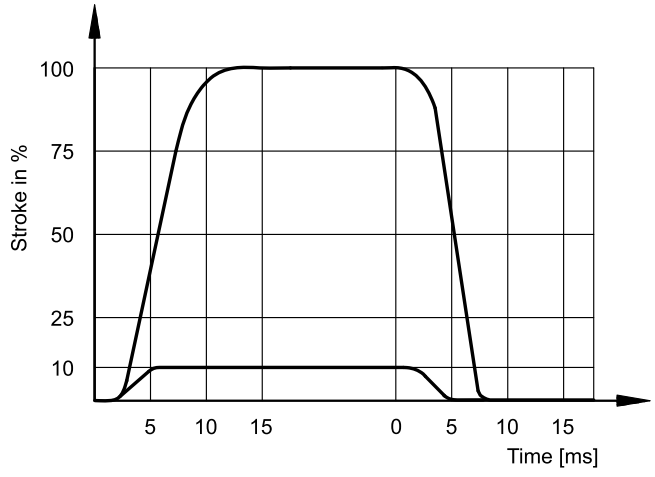
The diagram states the maximum valve controlled flow rate according to the pressure drop between the P and T ports.

PRESSURE GAIN

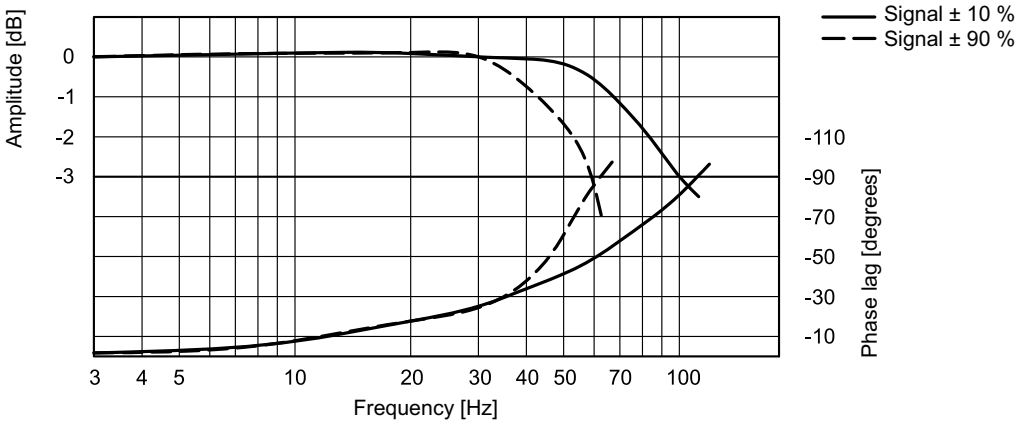


The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal. In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

RESPONSE TIME

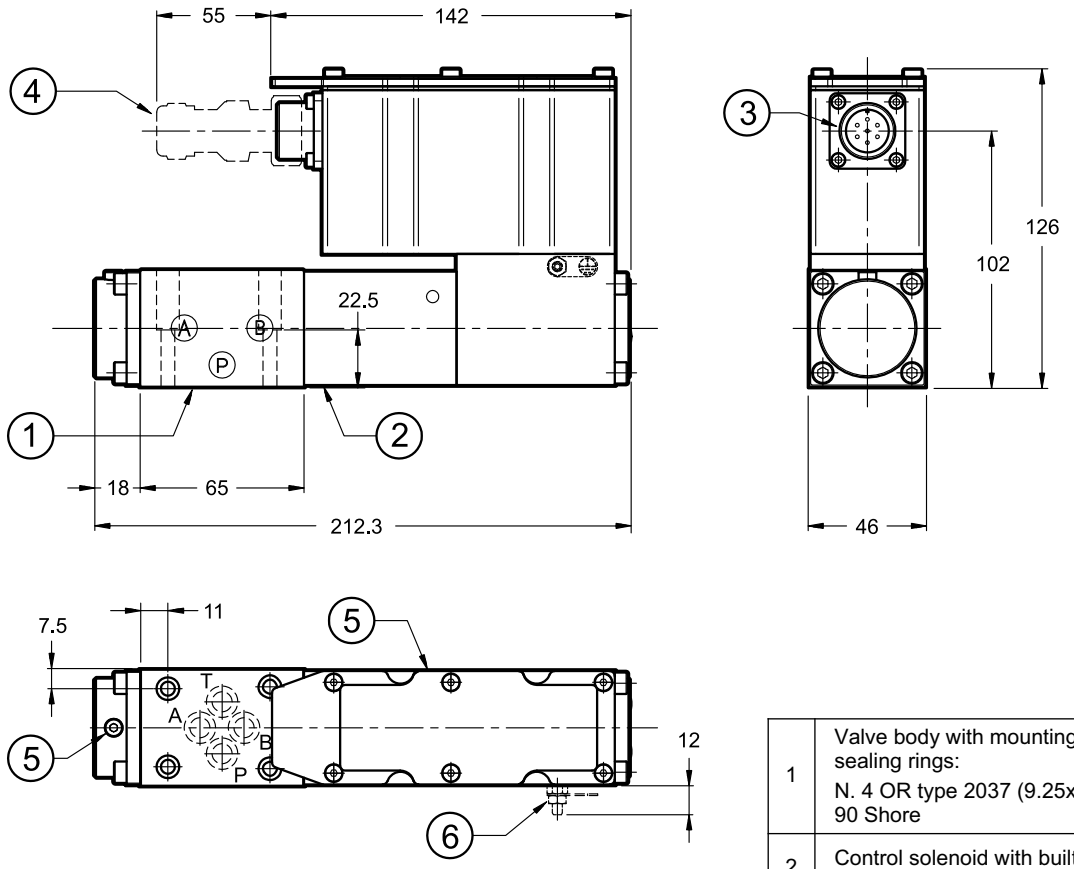


FREQUENCY RESPONSE



7 - DXE3J - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



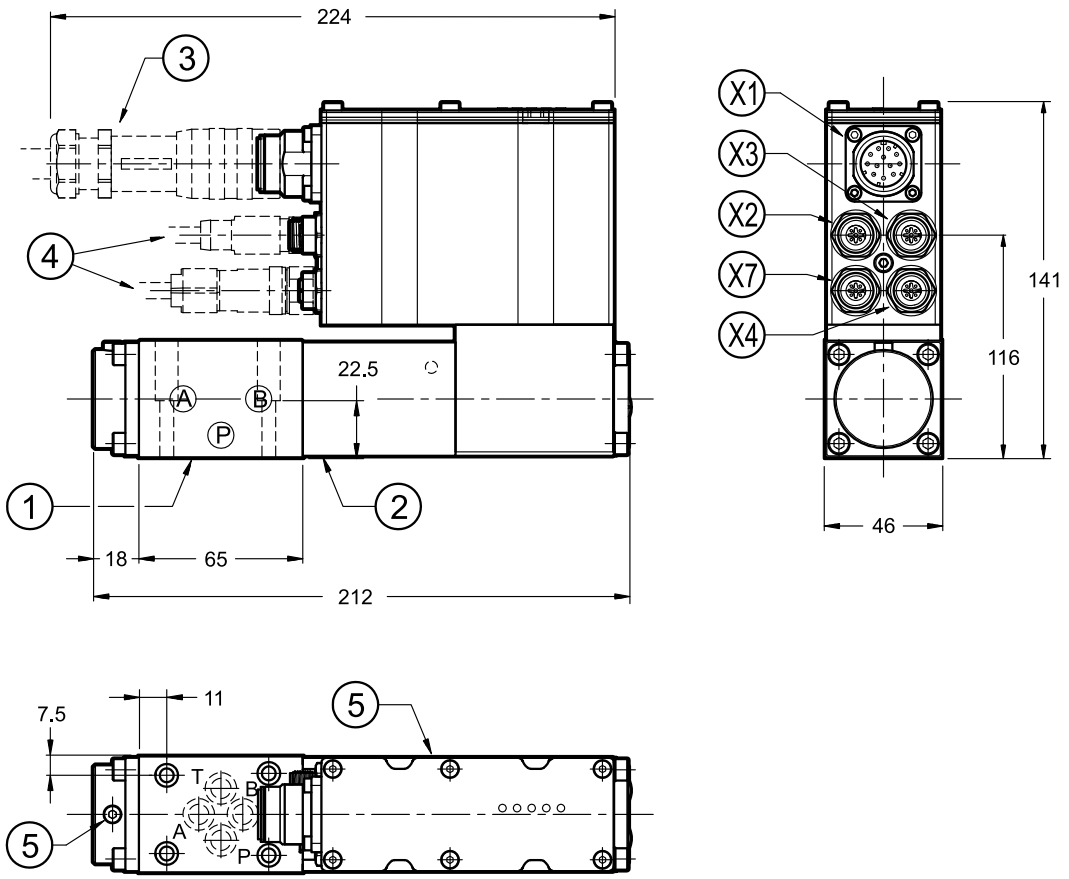
1	Valve body with mounting surface sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Control solenoid with built-in position transducer
3	Main connection
4	Mating connector 6 poles + PE, female type MIL-5015-G **To be ordered separately.** See catalogue 89 000
5	Air breather. Sealed at the factory (**NOTE**)
6	DXE3JK3 only: grounding point

Fastening bolts: 4 SHC screws M5x30
Torque: 5 Nm ± 10% (A8.8)
Threads of mounting holes: M5x10

NOTE: The valve is filled with mineral oil during testing, therefore the breather should not be used without specific authorization. Breaking the seals can cause the loss of the guarantee.

8 - DXE3JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

Fastening bolts: 4 SHC screws M5x30
Torque: 5 Nm ± 10% (A8.8)
Threads of mounting holes: M5x10

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

NOTE 2: The valve is filled with mineral oil during testing, therefore the breather should not be used without specific authorization. Breaking the seals can cause the loss of the guarantee.

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Control solenoid with built-in position transducer
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000
5	Air breather. Sealed at the factory (**NOTE 2**)

9 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

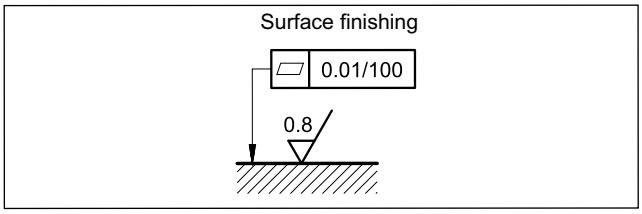
The fluid must be preserved in its physical and chemical characteristics.

10 - INSTALLATION

The valves can be installed in any position without impairing correct operation. 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 leaks between the valve and support surface.

Take care to the cleanliness of the mounting surfaces and surrounding environment upon installation.



11 - ACCESSORIES

(to be ordered separately)

11.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

We recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

11.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

11.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2

Cross section for signals (command, monitor):
- 0,50 mm^2

11.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic. See catalogue 89 850.

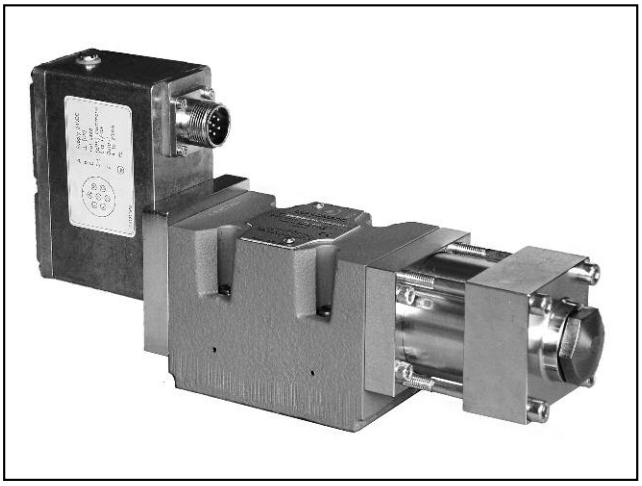
12 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8” BSP

DUPLOMATIC MOTION SOLUTIONS

DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DXJ5

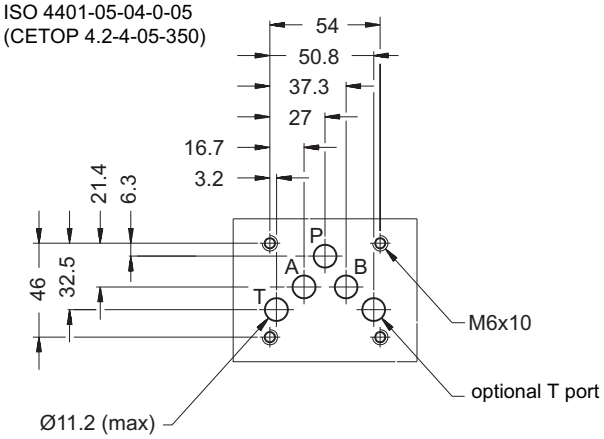
ELECTRO-HYDRAULIC SERVOVALVE WITH INTEGRATED ELECTRONICS

SERIES 10

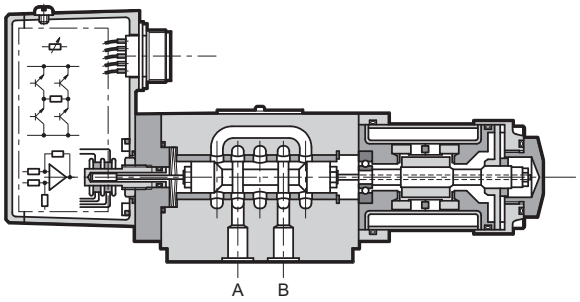
SUBPLATE MOUNTING ISO 4401-05

p max **350** bar
Q max (see performances table)

MOUNTING SURFACE



OPERATING PRINCIPLE



— The DXJ5 is a four-way servo-proportional valve where the spool moves inside a sleeve. This valve has a direct drive with a linear force motor resulting in high dynamic performances independent of system pressure. A linear transducer (LVDT) with closed loop controls the spool position, ensuring high precision and repeatability.

— It is available in four different flow rate control ranges up to 100 l/min, with spools with zero overlap and a ISO 4401 mounting surface.

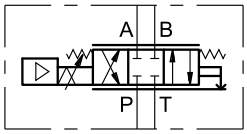
— The valve is featured by integrated electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit does not require any adjustment other than the possible electronic regulation of the zero.

— Suitable for control applications with closed loop of position, velocity and pressure. With a loss of power or with a zero reference signal, the spool goes automatically at rest-position. In this position the valve has a minimum leakage, depending on the operating pressure (see the performances table).

PERFORMANCES (with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure Ports P - A - B Port T	bar	 350 50
Rated flow Q nom (with Δp 70 bar P - T)	l/min	60 ÷ 100
Null leakage flow (with p=140 bar)	l/min	≤ 3% of Q nom
Hysteresis	% In	< 0,2
Threshold	% In	< 0,1
Thermal drift (with ΔT= 50°C)	% In	< 1,5
Response time	ms	≤ 20
Vibration on the three axes	g	30
Electric features	see paragraph 3	
Protection degree according IEC EN 60529	IP65	
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	5 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 17/15/12 (16/14/11 for longer life)	
Recommended viscosity	cSt	25
Mass	kg	6,3

HYDRAULIC SYMBOL



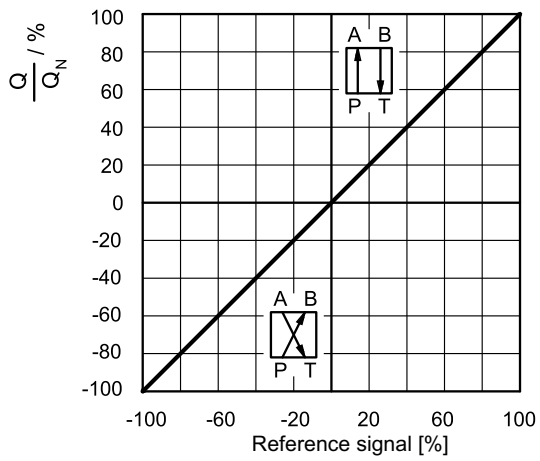
1 - IDENTIFICATION CODE

D	X	J	5	-	D	0	L		/	10		/	E0	K11

- Servo-proportional-valve with bushing spool
- Integrated electronics and position feedback
- Rated size ISO 4401-05
- Symmetric spool
- Spool with zero overlap
- Spool with a linear characteristic of flow
- Rated flow (with Δp = 70 bar P - T)
  060 = 60 l/min **100** = 100 l/min
- Series N. (from 10 to 19 sizes and mounting dimensions remain unchanged)
- Seals:
  N = NBR seals for mineral oil (**standard**)
  V = FPM seals for special fluids
- Reference signal: ±10V (other signals available on request)
- 6 + PE pole connector

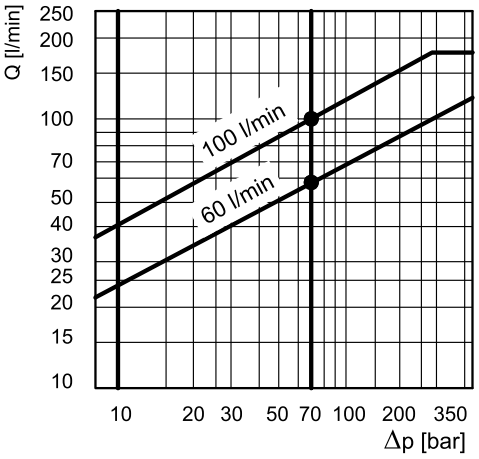
2 - CHARACTERISTIC CURVES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

REFERENCE / FLOW RATE CURVE



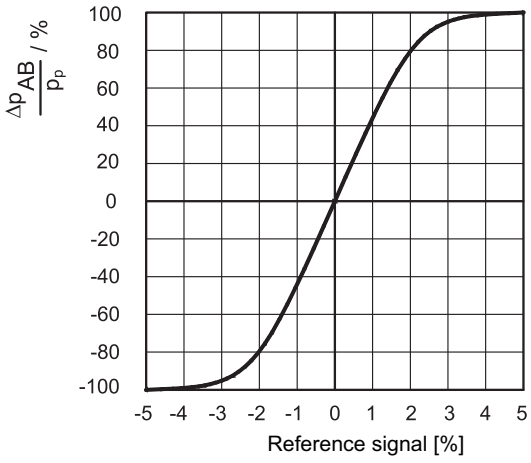
Typical flow rate curves at constant Δp = 70 bar P-T according to the reference signal.
NOTE: with positive reference signal connected to pin D the valve regulates P - A / B - T.

FLOW RATE CURVE ACCORDING TO ΔP



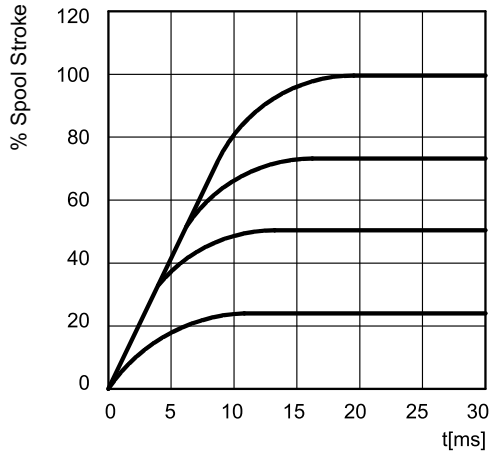
The diagram states the maximum valve controlled flow rate according to the pressure drop between the P and T ports.

PRESSURE GAIN

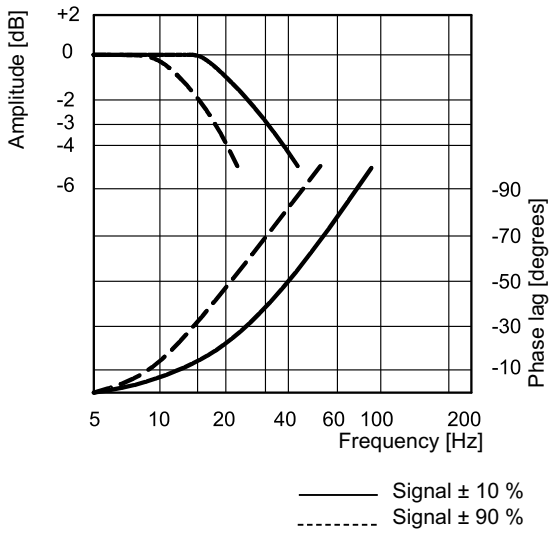


The diagram on the left shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal. Practically, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

STEP RESPONSE

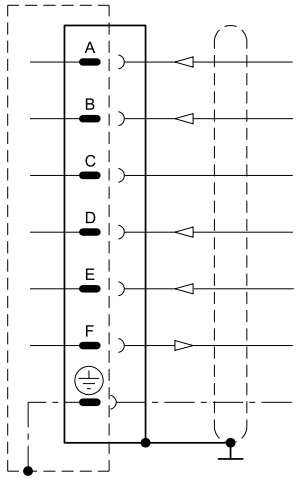


FREQUENCY RESPONSE



3 - ELECTRICAL FEATURES

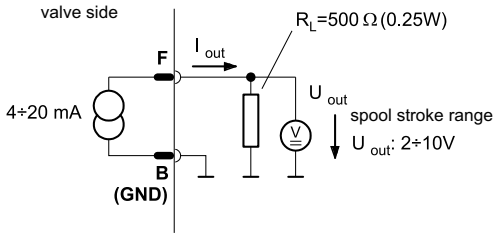
CONNECTION WIRING



Pin	Values	Function	NOTES
A	24 VDC	Supply	From 19 to 32 VDC $I_{A\ MAX.}$ = 2,2 A
B	0 V	Signal ground	0 V
C	----	Not used	----
D	± 10 V	Input rated command	R_e = 10 kΩ (see **NOTE 1**)
E	0 V	Input rated command	----
F	4 ÷ 20 mA	Spool position	R_L = from 300 to 500 Ω (see **NOTE 2**)
PE	----	Protective earth	----

NOTE 1: The input stage is a differential amplifier. With positive reference signal connected to pin D, valve opening P - A e B - T is achieved. With a zero reference signal the spool is in centred position. The spool stroke is proportional to U_D - U_E. If only one command signal is available (single-end), pin E must be connected to pin B (0V ground).

NOTE 2: The spool position value can be measured at pin F (see diagram right). The position signal output goes from 4 to 20 mA. The centered position is at 12 mA, while 20 mA, corresponds to 100% valve opening P - A and B - T. This monitoring allows to detect a cable break when I_F = 0V.



General requirements:

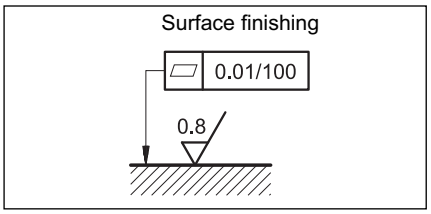
- External fuse = 2,5 A
- Minimum cross-section of all leads ≈ 0,75 mm²
- When making electric connections to the valve (shield, protective earth) appropriate measures must be taken to ensure that locally different earth potentials do not results in excessive ground currents.
- The differential and the spool position signal lines must be connected to the mating connector housing at valve side and to the 0V (signal ground) at cabinet side.
- **EMC**: meets the requirements of EN 55011:1998, class B, and the immunity regulation according to EN 61000-6-2:1998

4 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

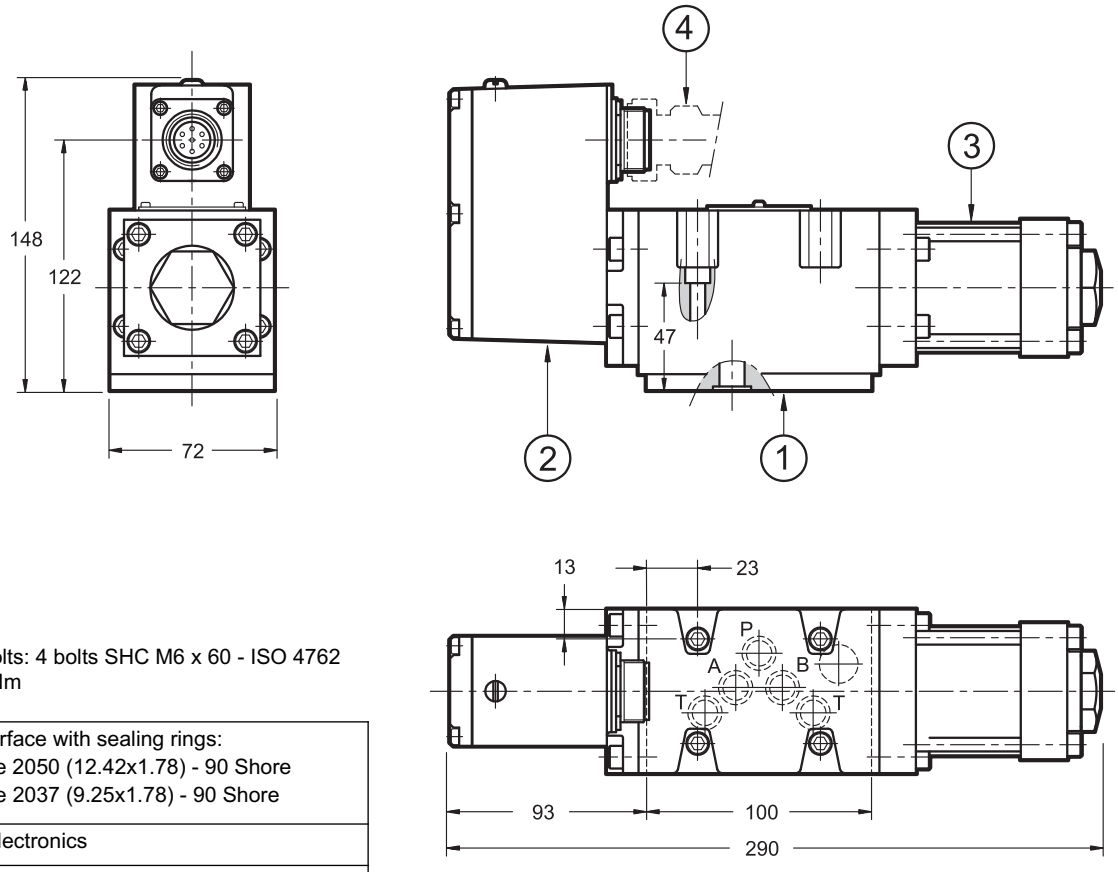
5 - INSTALLATION

The DXJ5 valve can be installed in any position without impairing its correct operation.
The valve is fixed by means of screws on a flat surface with planarity between 0,01 mm over 100 mm and roughness R_a < 0,8 µm. If the minimum values are not observed, the fluid can easily leak between the valve and the mounting surface. While mounting pay attention to the environment and valve cleanliness.



7 - OVERALL AND MOUNTING DIMENSIONS

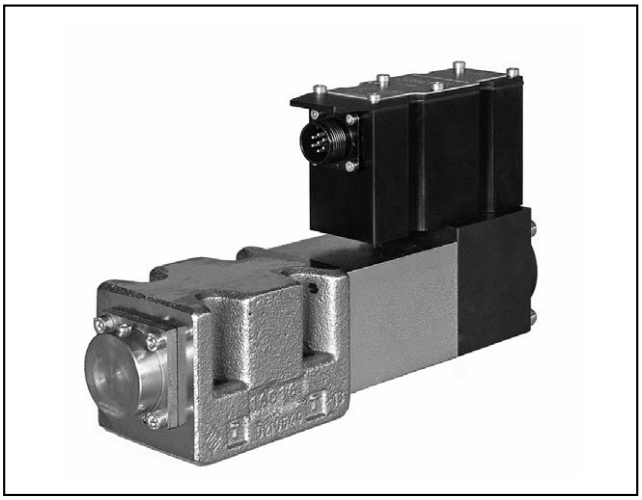
dimensions in mm



Fastening bolts: 4 bolts SHC M6 x 60 - ISO 4762
Torque: 13 Nm

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 1 OR type 2037 (9.25x1.78) - 90 Shore
2	Integrated electronics
3	Linear force motor
4	Electric connector 7 pins DIN 43563 - IP67 PG11 EX7S/L/10 cod. 3890000003 (**to be ordered separately**)

DUPLOMATIC MOTION SOLUTIONS
DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DXE5J

HIGH RESPONSE SERVO-PROPORTIONAL VALVE WITH FEEDBACK AND INTEGRATED ELECTRONICS

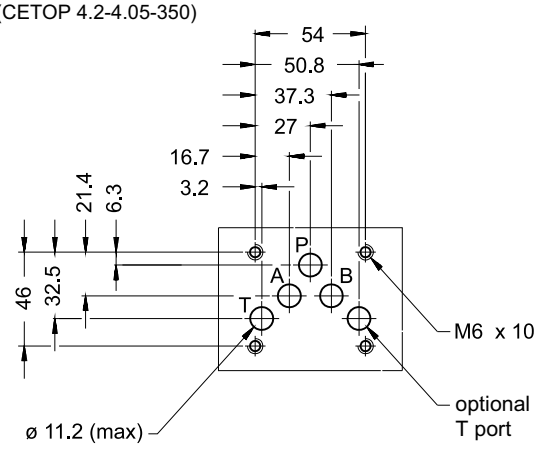
SERIES 31

SUBPLATE MOUNTING ISO 4401-05

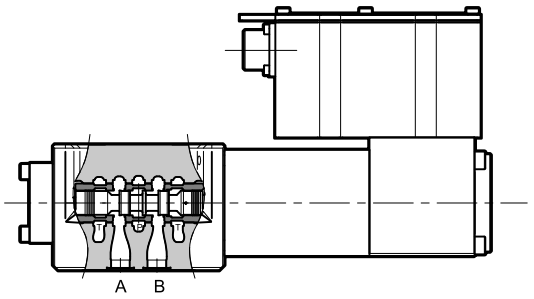
p max **350** bar
Q max **100** l/min

MOUNTING INTERFACE

ISO 4401-05-04-0-05
(CETOP 4.2-4.05-350)



OPERATING PRINCIPLE



— The DXE5J valve is a four-way (3 + fail-safe position) servo-proportional valve where the spool moves inside a sleeve. It is operated by a proportional solenoid highly dynamic, which achieves high performance and not requires pilot pressure. The spool position is controlled by a linear transducer (LVDT) in closed loop, which ensures high precision and repeatability.

— It is available with two flow ranges up to 100 l/min with spools with zero overlap.

— The valve is featured by integral electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit does not require any adjustment other than the possible electronic regulation of the zero.

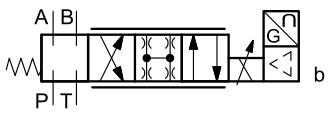
— Suitable for control applications with closed loop of position, velocity and pressure. if the valve is not powered or is without the enable input (Version A only), the spool moves automatically at fail-safe position.

PERFORMANCES

(with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure Ports P - A - B Port T	bar	 350 250
Rated flow Q nom (with Δp 70 bar P - T)	l/min	60 - 100
Hysteresis	% In	< 0,2
Threshold	% In	< 0,1
Thermal drift (with ΔT= 40 °C)	% In	< 1,0
Response time (0-100%)	ms	≤ 20
Vibration on the three axes	g	30
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	5 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 17/15/12 (16/14/11 for longer life)	
Recommended viscosity	cSt	25
Mass	kg	6

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 Standard electronics

D	X	E	5	J	-	LZ			/	31		-		K11	

Servo-proportional valve with spool in sleeve

Electric proportional control

Size ISO 4401-05

On-board electronic for closed loop

Spools with linear flowrate curve and zero overlap for low leakage

Rated flow (with Δp = 70 bar P - T)
60 = 60 l/min
100 = 100 l/min

Fail safe type
F1 = closed centre
F3 = float
FC = cross centre

Series No.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

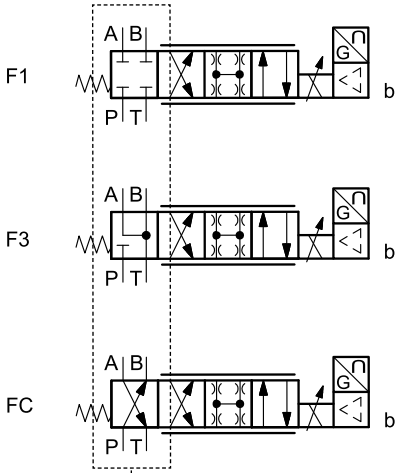
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Command value:
E0 = voltage ±10 V
E1 = current 4 ÷ 20 mA

6 + PE pin connection

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

1.2 Available versions



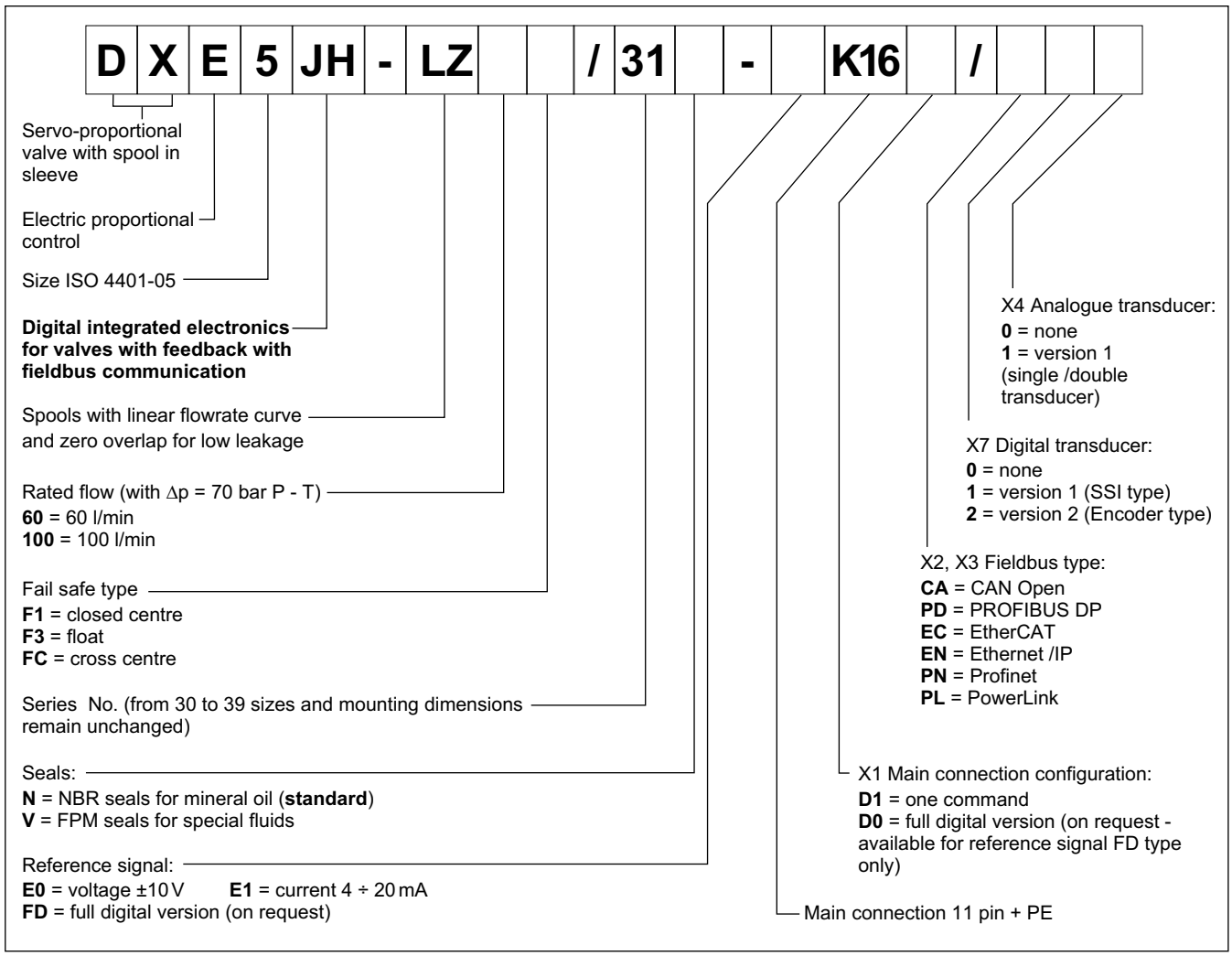
flow rate	fail safe type		
	F1	F3	FC
60	■	■	□
100	■	■	□

■ available □ on request

FAIL SAFE POSITION

When a power failure occurs, the electronics de/energize the solenoid and the spool will take the fail safe position by means of the centering springs.

1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	60
Maximum solenoid current	A	3.7
Fuse protection, external	A	(fast), max current 6A
Managed breakdowns		Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

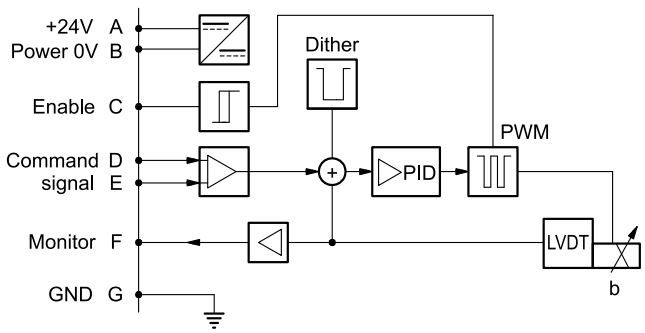
3 - DXE5J - STANDARD ELECTRONICS

3.1 - Electrical characteristics

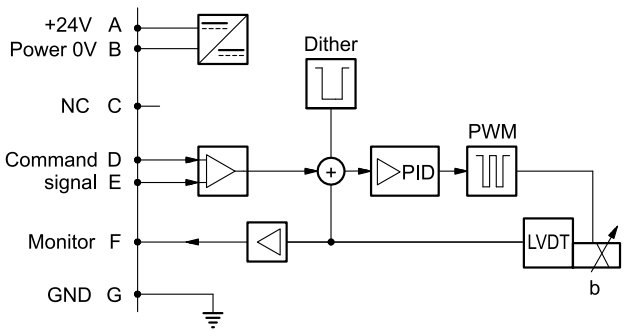
Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

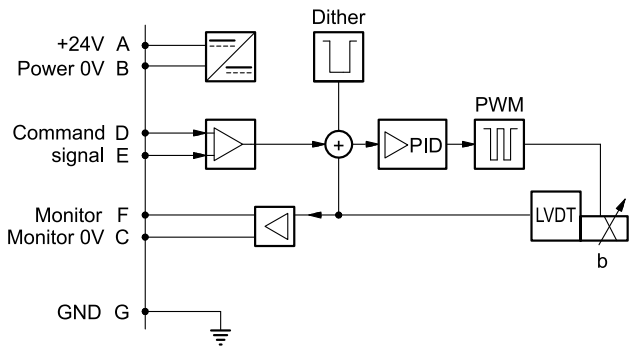
VERSION A - External Enable



VERSION B - Internal Enable

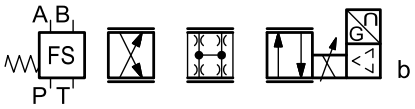


VERSION C - 0V Monitor

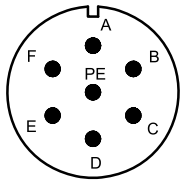


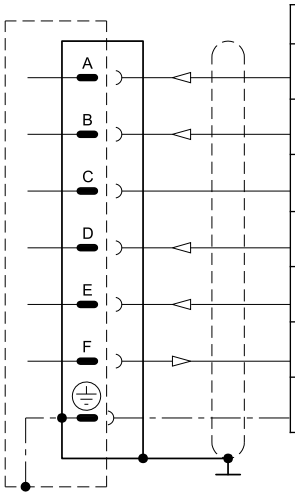
3.3 - Versions with voltage COMMAND (E0)

The reference signal must be between -10V and +10V. The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



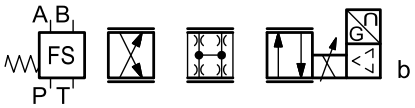


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command (differential input)		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

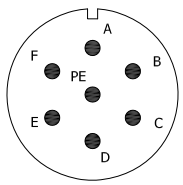
3.4 - Versions with CURRENT COMMAND (E1)

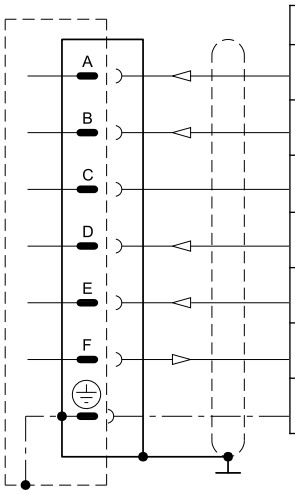
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B anc C becomes available with a delay of 0,5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**	
MONITOR	**4 mA**	**12 mA**	**20 mA**	





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

4 - DXE5JH - FIELDBUS ELECTRONICS

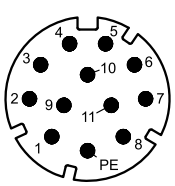
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

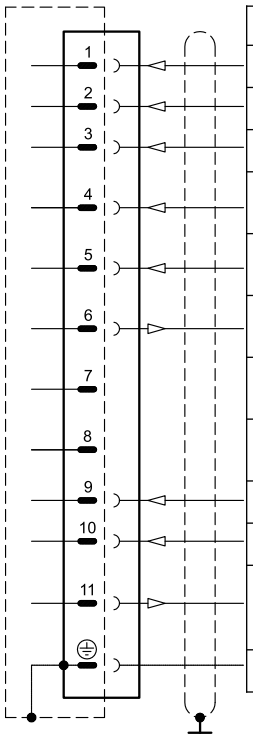
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

4.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

4.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

4.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

4.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

4.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

4.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

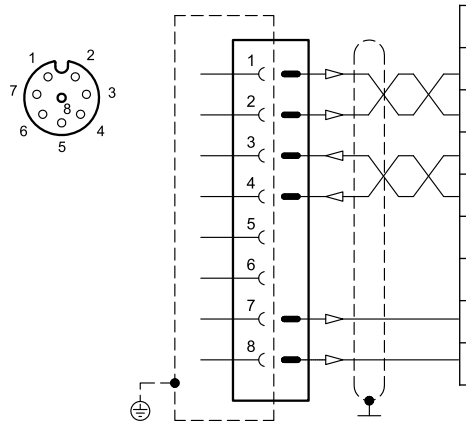
NOTE: Shield connection on connector housing is recommended.

X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

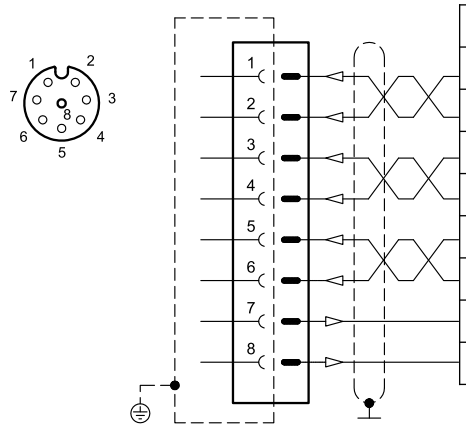
4.4 - Digital transducer connection
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

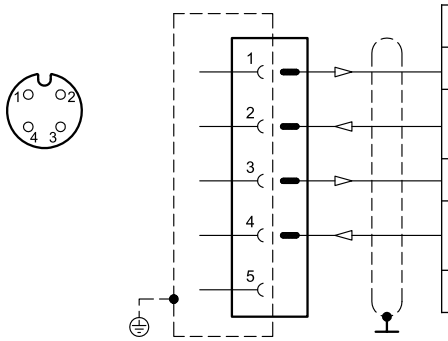
VERSION 2: ENCODER type



Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

4.5 - Analogue transducer connection
X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer
(single or double is a software-selectable option)

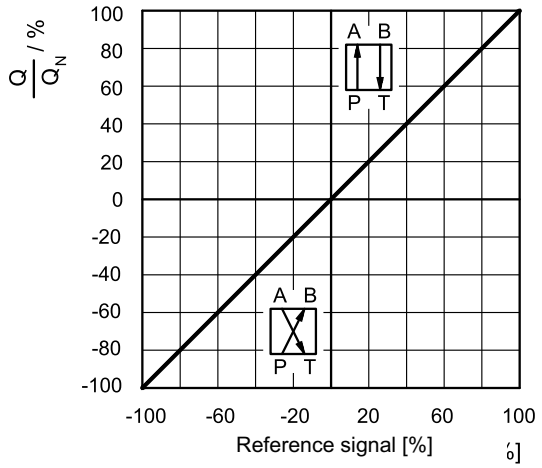


Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

5 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

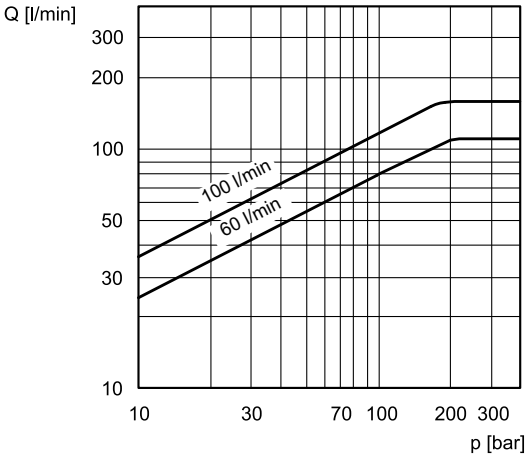
REFERENCE / FLOW RATE CURVE



Typical flow rate curves at constant Δp = 70 bar P-T according to the reference signal.

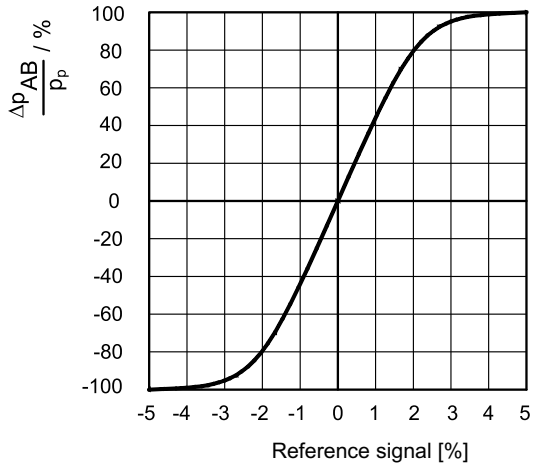
NOTE: with positive reference signal connected to pin D the valve regulates P - A / B - T.

FLOW RATE CURVE ACCORDING TO Δp



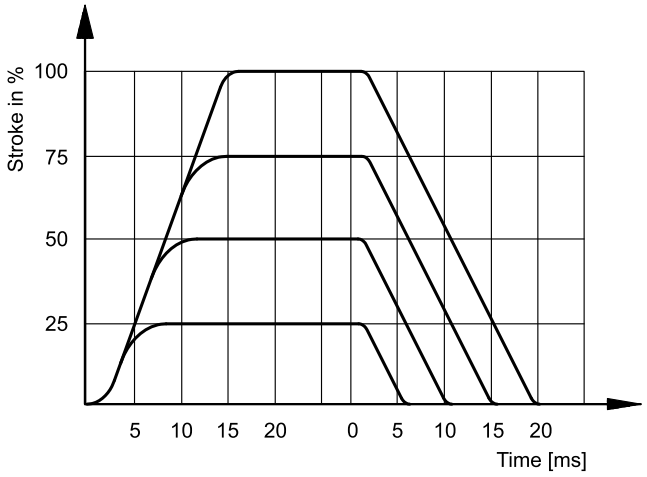
The diagram states the maximum valve controlled flow rate according to the pressure drop between the P and T ports.

PRESSURE GAIN

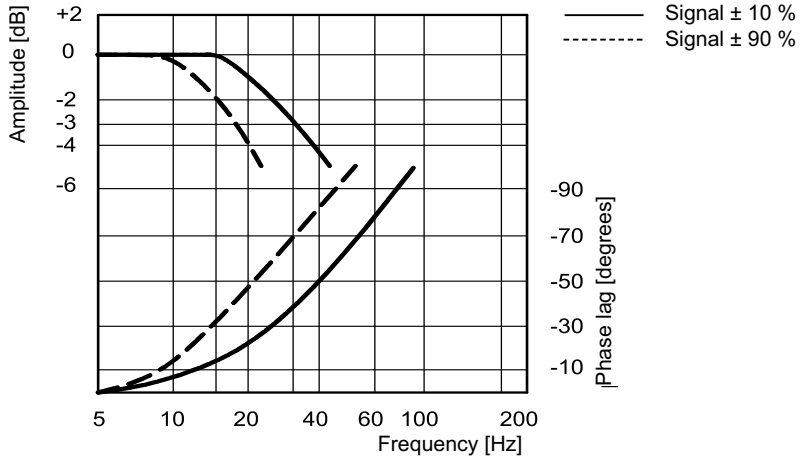


The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp AB) and the P system pressure, according to the reference signal. In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

RESPONSE TIME

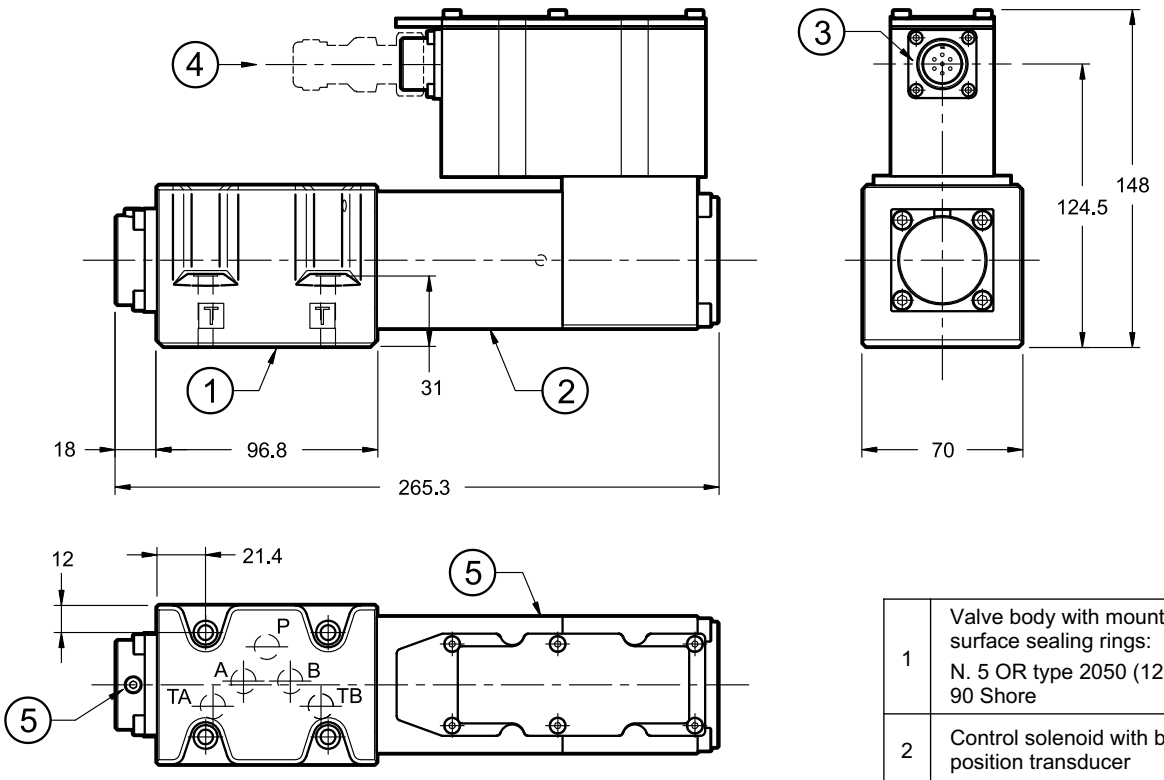


FREQUENCY RESPONSE



6 - DXE5J - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



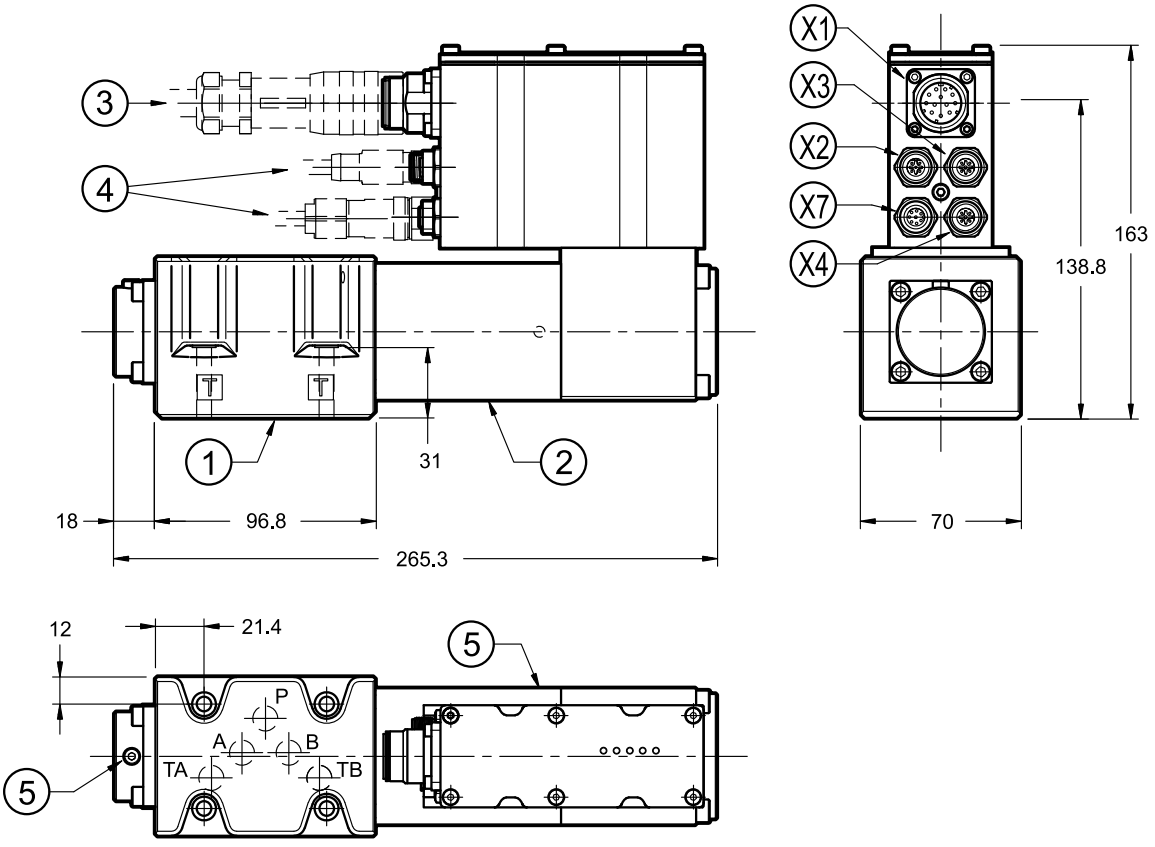
1	Valve body with mounting surface sealing rings: N. 5 OR type 2050 (12.42x1.78) 90 Shore
2	Control solenoid with built-in position transducer
3	Main connection
4	Mating connector 6 poles + PE, female type MIL-5015-G **To be ordered separately.** See catalogue 89 000
5	Air breather. Sealed at the factory (**NOTE**)

Fastening bolts: 4 SHC screws M6x40 - ISO 4762
Torque: 8 Nm ± 10% (A8.8)
Threading holes: M6x10

NOTE: The valve is filled with mineral oil during testing, therefore the breather should not be used without specific authorization. Breaking the seals can cause the loss of the guarantee.

7 - DXE5JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) 90 Shore
2	Control solenoid with built-in position transducer
3	Mating connector 11 poles + PE **To be ordered separately.** See catalogue 89 000
4	Mating connectors for fieldbus communication and signals **To be ordered separately.** See catalogue 89 000
5	Air breather. Sealed at the factory (**NOTE 2**)

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

NOTE 2: The valve is filled with mineral oil during testing, therefore the breather should not be used without specific authorization. Breaking the seals can cause the loss of the guarantee.

Fastening bolts: 4 bolts M6x40 - ISO 4762
Torque: 8 Nm ± 10% (A8.8)
Threading holes: M6x10

8 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

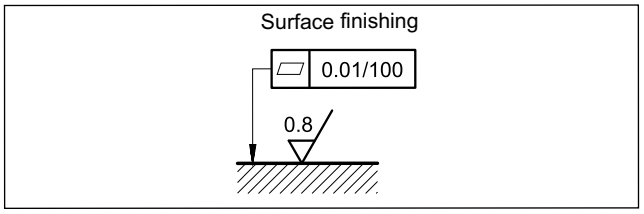
The fluid must be preserved in its physical and chemical characteristics.

9 - INSTALLATION

The valves can be installed in any position without impairing correct operation. 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 leaks between the valve and support surface.

Take care to the cleanliness of the mounting surfaces and surrounding environment upon installation.



10 - ACCESSORIES

(to be ordered separately)

10.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

10.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

10.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2 (IO-Link excluded)

Cross section for signals (command, monitor):
- 0,50 mm^2

10.4 - Kit for start-up LINPC-USB

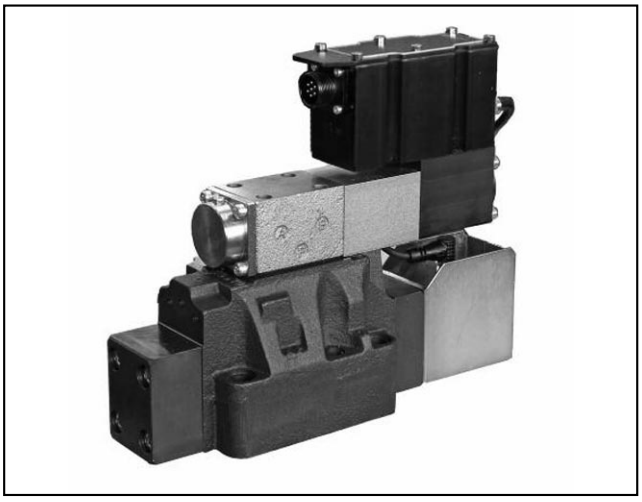
Device for service start-up and diagnostic, available for valves with K11 and K16 connections. See catalogue 89 850.

11 - SUBPLATES

(see catalogue 51 000)

PMD4-AI4G rear ports 3/4” BSP
PMD4-AL4G side ports 1/2” BSP

DUPLOMATIC MOTION SOLUTIONS
DUPLOMATIC MS S.p.A.
via M. Re Depaolini 24 ▪ 20015 PARABIAGO (MI) ▪ ITALY
tel. +39 0331.895.111 ▪ www.duplomatic.com ▪ e-mail: sales.exp@duplomatic.com



DXRE*J

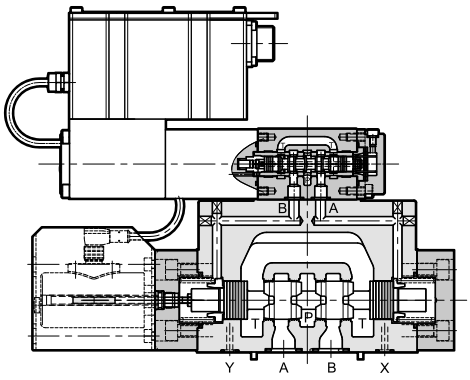
DIRECTIONAL CONTROL VALVES, PILOT OPERATED, WITH OBE AND FEEDBACK

SERIES 31

SUBPLATE MOUNTING

DXRE5RJ	**ISO 4401-05**
DXRE7J	**ISO 4401-07**
DXRE8J	**ISO 4401-08**
DXRE10J	**ISO 4401-10**
DXRE11J	**ISO 4401-10** oversize ports

OPERATING PRINCIPLE



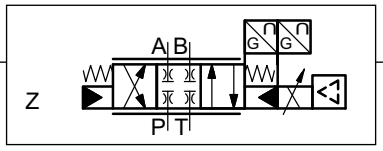
— DXRE*J are directional control valves operated by a servo-proportional pilot, with mounting surface compliant with ISO 4401 standards. The main spool position is controlled by a linear transducer LVDT in closed loop, which ensures high precision and repeatability. .

— The valve is featured by integral electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit doesn't require any adjustment other than the possible electronic regulation of the zero.

— Two types of integrated electronics are available, with analogue or fieldbus interfaces.

— Suitable for control applications with closed loop of position, velocity and pressure. With a power down or without the enable input, the main spool is set to a fail-safe position by springs.

HYDRAULIC SYMBOL (typical)



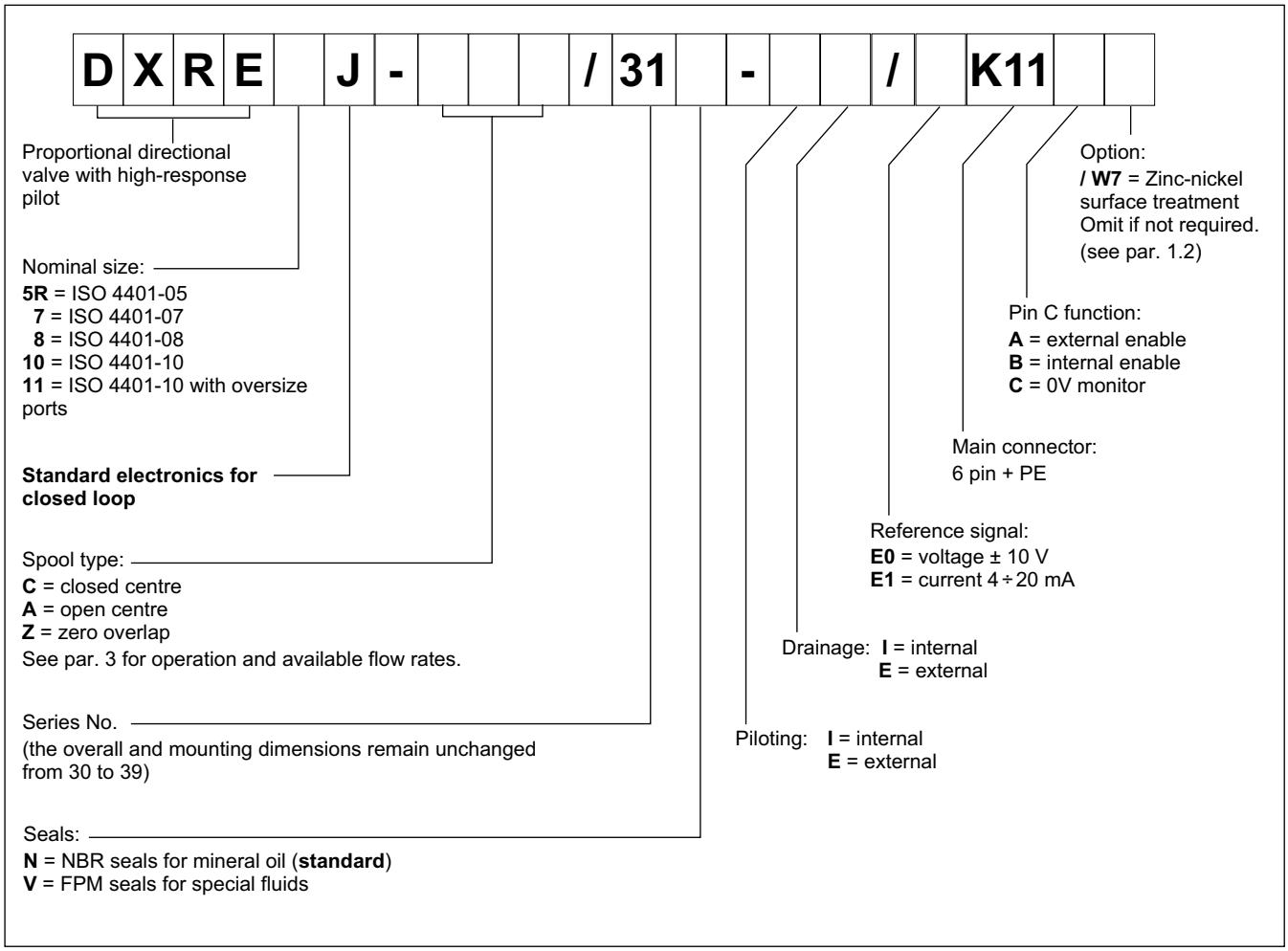
PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C and p =140 bar)

		DXRE5RJ	DXRE7J	DXRE8J	DXRE10J	DXRE11J
Max operating pressure: P - A - B ports T - X - Y ports	bar			350 250		
Controlled flow with Δp 10 bar P-T	l/min	100	220	400	800	1000
Hysteresis	% Q_{max}			< 0.2%		
Repeatability	% Q_{max}			± 0.1%		
Electrical characteristics				see paragraph 4		
Ambient temperature range	°C			-20 / +60		
Fluid temperature range	°C			-20 / +80		
Fluid viscosity range	cSt			10 ÷ 400		
Fluid contamination degree				According to ISO 4406:1999 class 18/16/13 (16/14/11 for longer life)		
Recommended viscosity	cSt			25		
Mass	kg	8	10.2	17	56	56

1 - IDENTIFICATION CODE

1.1 - Standard electronics



1.2 - Surface treatments

The standard valve is supplied with surface treatment of phosphating black.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to **600** hours (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

1.3 - Electronics with fieldbus communication

D	X	R	E		JH	-				/	31		-			-		K16		/				

Proportional directional valve with high-response pilot

Nominal size:
5R = ISO 4401-05
7 = ISO 4401-07
8 = ISO 4401-08
10 = ISO 4401-10
11 = ISO 4401-10 with oversize ports

Digital integrated electronics for closed loop with fieldbus communication

Spool type:
C = closed centre
A = open centre
Z = zero overlap
See par. 2 for operation and available flow rates.

Series No.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Drainage:
I = internal
E = external

Piloting:
I = internal
E = external

Reference signal:
E0 = voltage ±10 V
E1 = current 4 ÷ 20 mA
FD = full digital version (on request)

Main connection 11 pin + PE

X1 Main connection configuration:
D1 = one command
D0 = full digital version (on request - available for reference signal FD type only)

X2, X3 Fieldbus type:
CA = CAN Open
PD = PROFIBUS DP
EC = EtherCAT
EN = Ethernet /IP
PN = Profinet
PL = PowerLink

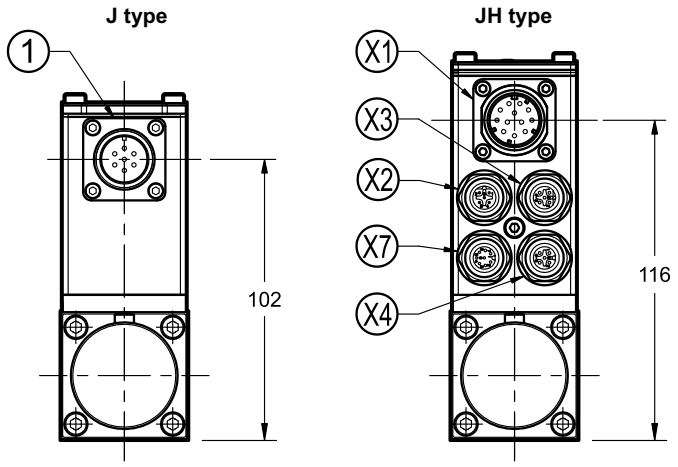
X7 Digital transducer:
0 = none
1 = version 1 (SSI type)
2 = version 2 (Encoder type)

X4 Analogue transducer:
0 = none
1 = version 1
(single /double transducer)

Option:
/ W7 = Zinc-nickel surface treatment
Omit if not required.
(see par. 1.2)

2 - COMPARISON AMONG INTEGRATED ELECTRONICS

dimensions in mm



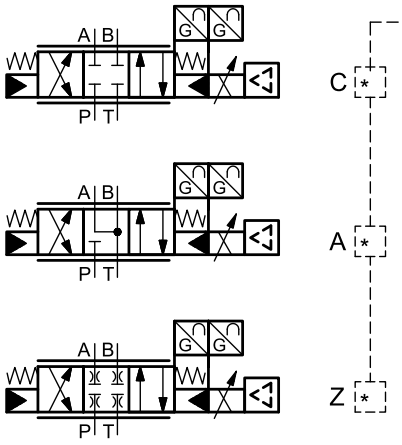
NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present. Please refer to sections 5, 6 and 7 for connections descriptions and pinouts.
NOTE 2: Related mating connectors have to be ordered separately. See catalogue 89 000.

1	Connection 6 pin + PE
X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	Connection for analogue transducer
X7	Connection for digital transducer

3 - AVAILABLE CONFIGURATIONS

The valve configuration depends on the combination of spool type and rated flow.

3 positions with spring centering

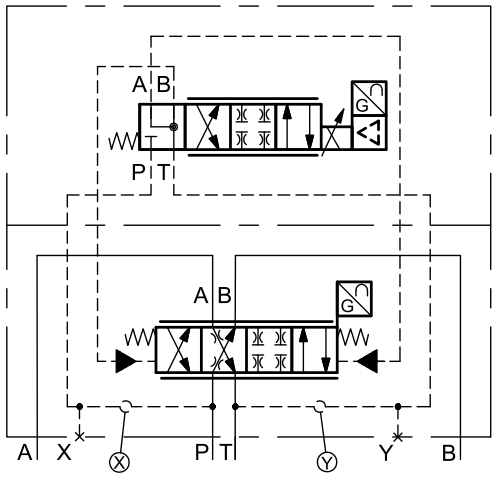


valve type	*	Controlled flow with Δp 10 bar P-T
DXRE5RJ	**100**	100 l/min
DXRE7J	**120**	120 l/min
	220	220 l/min
DXRE8J	**250**	250 l/min
	400	400 l/min
DXRE10J	**800**	800 l/min
DXRE11J	**1000**	1000 l/min

OFFSET POSITION for Z SPOOLS

After electrical swith-off or Enable signal swich-off (version K11A) the main spool moves to springs offset position, with limited opening (1%... 6% of main spool stroke in direction P-B / A-T)

detailed symbol (spool Z)



4 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	35
Maximum solenoid current	A	2.6
Fuse protection, external	A	(fast), max current 4A
Managed breakdowns		Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

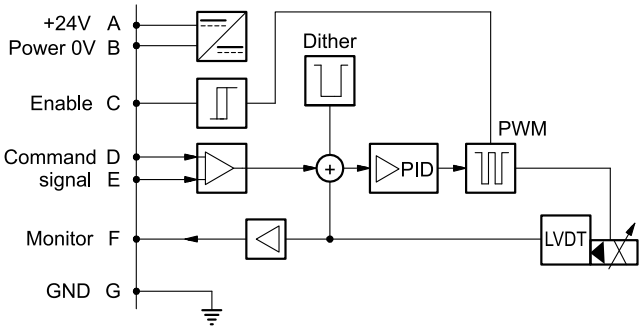
5 - DXRE*J - STANDARD ELECTRONICS

5.1 - Electrical characteristics

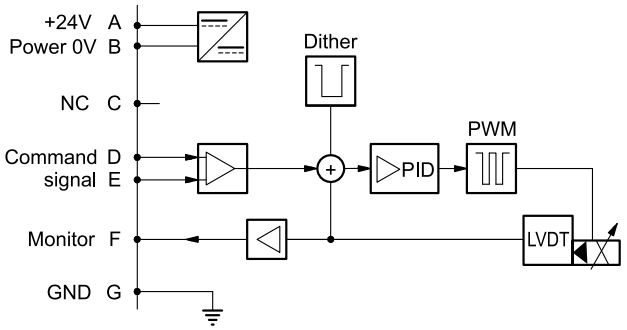
Command signal: voltage (E0) current (E1)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication for diagnostic		LIN-bus Interface (by means of the optional kit)
Connection		6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

5.2 - On-board electronics diagrams

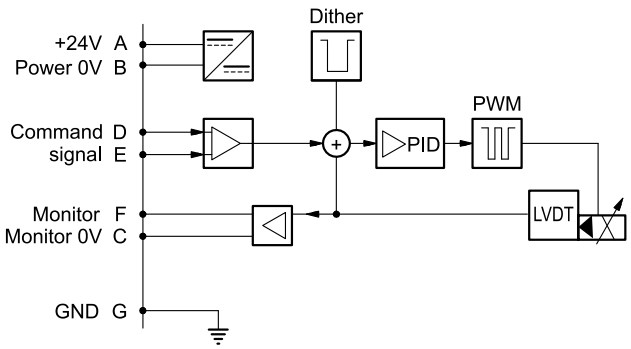
VERSION **A** - External Enable



VERSION **B** - Internal Enable

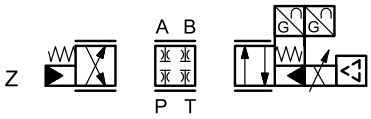


VERSION **C** - 0V Monitor

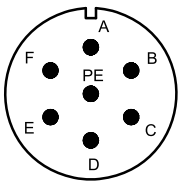


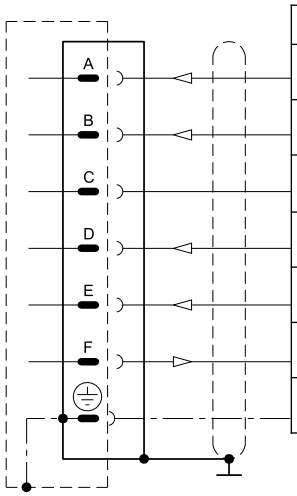
5.3 - Version with voltage command (E0)

The reference signal must be between -10V and +10V. The monitor feature of versions B and C becomes available with a delay of 0.5 sec from the power-on of the card.



COMMAND	**-10V**	**0V**	**+10V**
MONITOR	**-10V**	**0V**	**+10V**



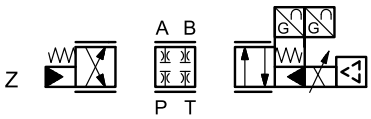


Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	± 10 V	Command (differential input)		
E	0 V	Command reference		
F	± 10 V	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

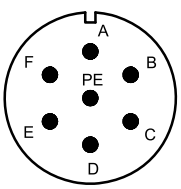
5.4 - Version with current command (E1)

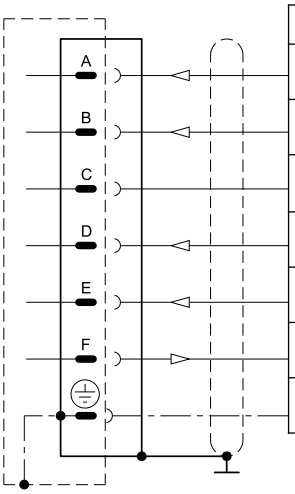
The reference signal is supplied in current 4 ÷ 20 mA. If the current for command is lower than 4 mA the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0.5 sec from the power-on of the card.



COMMAND	**4 mA**	**12 mA**	**20 mA**
MONITOR	**4 mA**	**12 mA**	**20 mA**





Pin	Values	version A	version B	version C
A	24 V DC	Supply Voltage		
B	0 V			
C		Enable 24 V DC	do not connect -	PIN F reference 0 V
D	4 ÷ 20 mA	Command		
E	0 V	Command reference		
F	4 ÷ 20 mA	Monitor (0V reference: pin B)		Monitor
PE	GND	Ground (Earth)		

6 - DXRE*JH - FIELDBUS ELECTRONICS

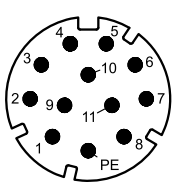
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

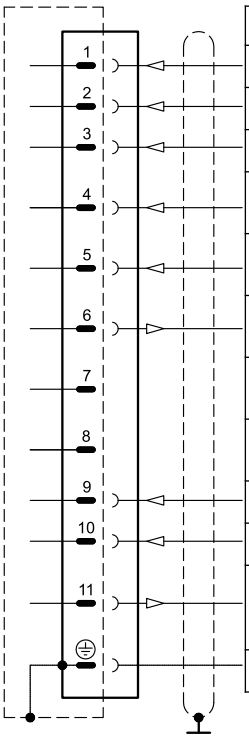
Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 5.3 and 5.4.

6.1 - Electrical characteristics

Command signal: voltage (E0) current (E1) digital (FD)	 V DC mA	 ±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid): voltage (E0) current (E1)	 V DC mA	 ±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic		via Bus register
Communication interface standards CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		 optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection		11 pin + PE (DIN 43651)

6.2 - X1 Main connection pin table





D1: one command

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	± 10 V (E0) 4 ÷ 20 (E1)	Command
5	0 V	Command reference signal
6	± 10 V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24 V DC	Main supply voltage
2	0 V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24 V DC	Logic and control supply
10	0 V	
11	24 V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

6.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

6.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male

Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

6.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female

Pin	Values	Function
1	+5 V	Termination supply signal
2	PB_A	Bus line (high)
3	0 V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

6.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

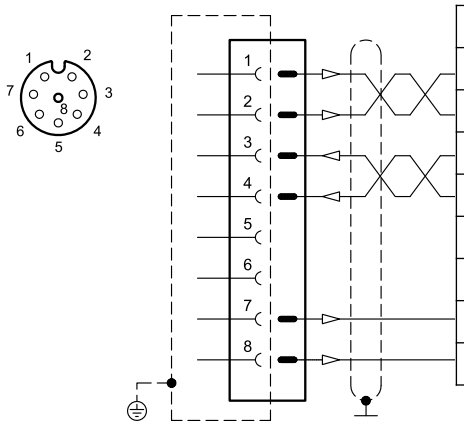
NOTE: Shield connection on connector housing is recommended.

X3 (OUT) connection: M12 D 4 pin female

Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

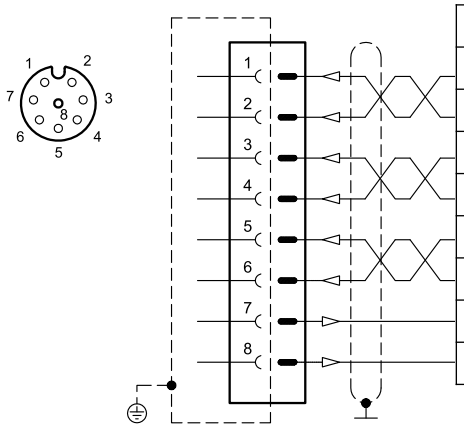
6.4 - Digital transducer connection
X7 connection: M12 A 8 pin female

VERSION 1: SSI type



Pin	SSI Values	Function	Notes
1	CLK+	Serial synchronous clock (+)	Input - digital signal
2	CLK-	Serial synchronous clock (-)	
3	MIS0+	Serial position data (+)	
4	MIS0-	Serial position data (-)	
5	NC	-	do not connect
6	NC	-	
7	+24 V	transducer power supply	Output power supply
8	0 V	-	Common GND

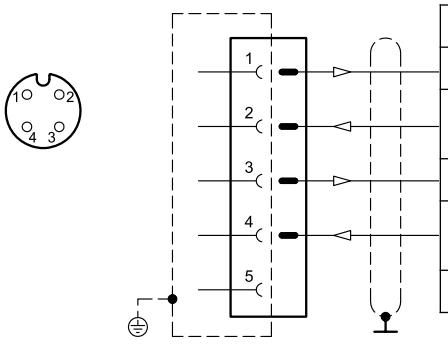
VERSION 2: ENCODER type



Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

6.5 - Analogue transducer connection
X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer
(single or double is a software-selectable option)



Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

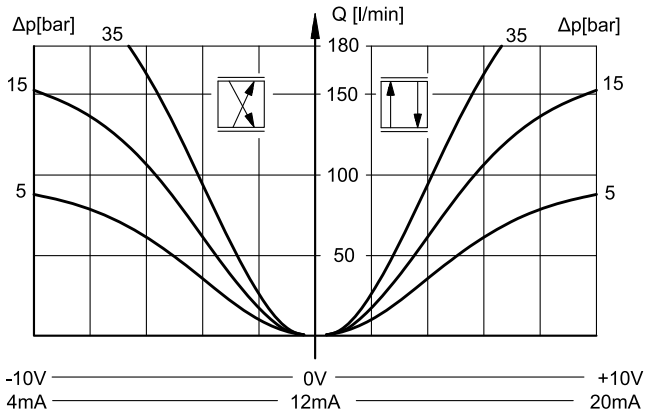
7 - CHARACTERISTIC CURVES

(with mineral oil with viscosity of 36 cSt at 50°C)

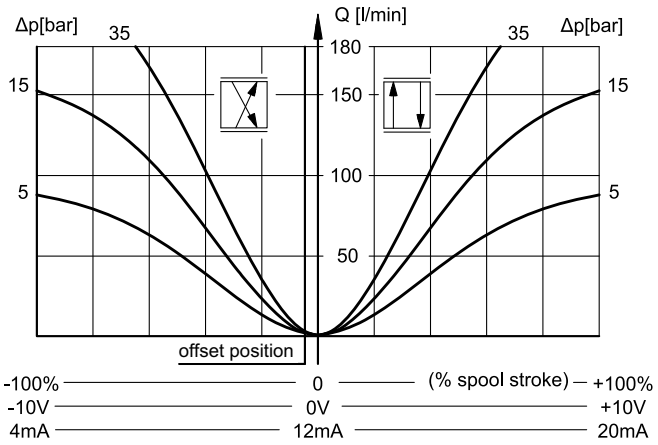
Typical flow rate curves at constant Δp related to the reference signal and measured for the available spools.
The Δp values are measured per land.

7.1 - Characteristic curves DXRE5RJ

SPOOL C100 / A100

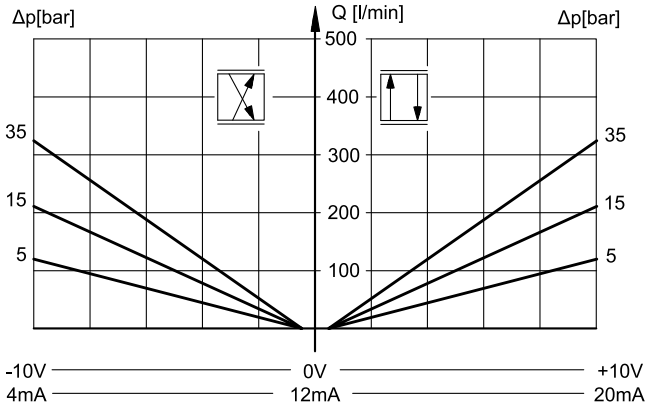


SPOOL Z100

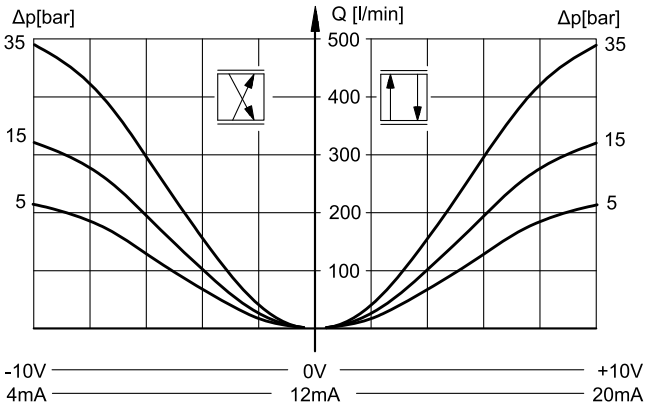


7.2 - Characteristic curves DXRE7J

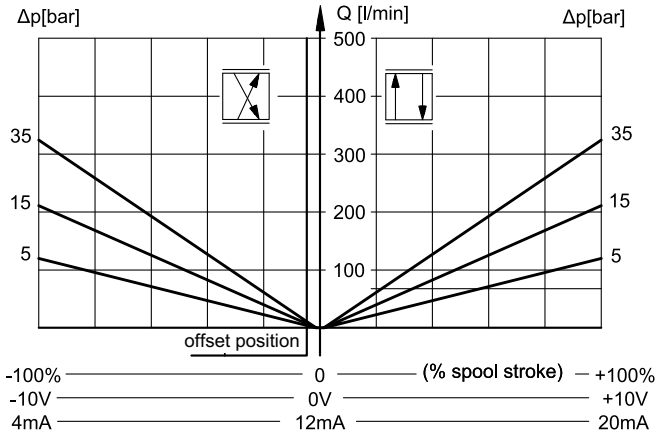
SPOOL C120 / A120



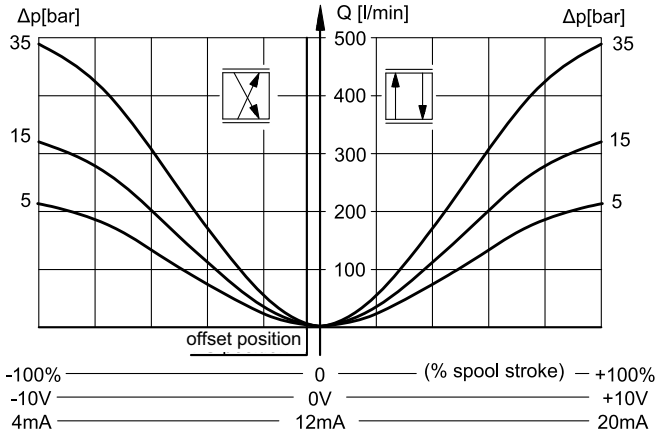
SPOOL C220 / A220



SPOOL Z120

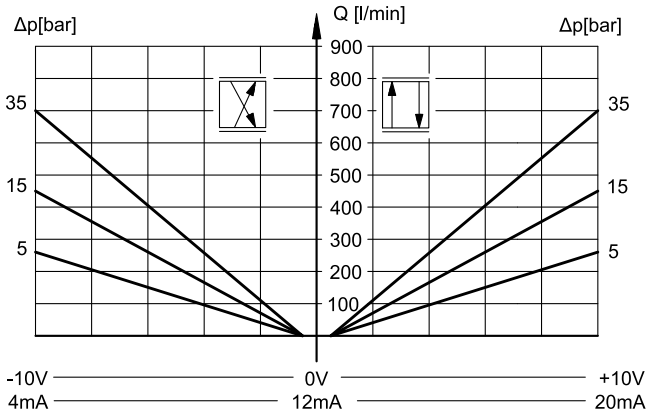


SPOOL Z220

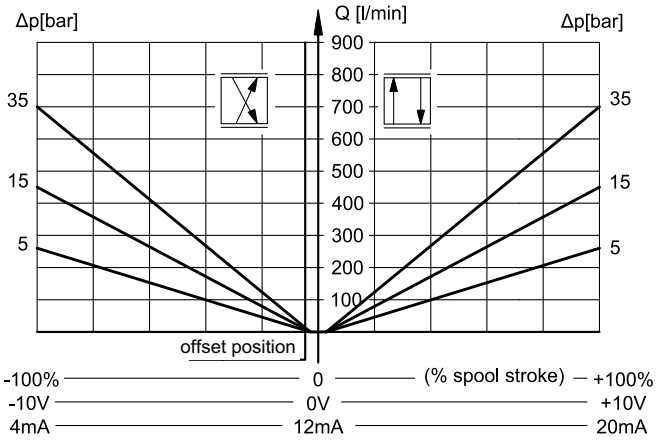


7.3 - Characteristic curves DXRE8J

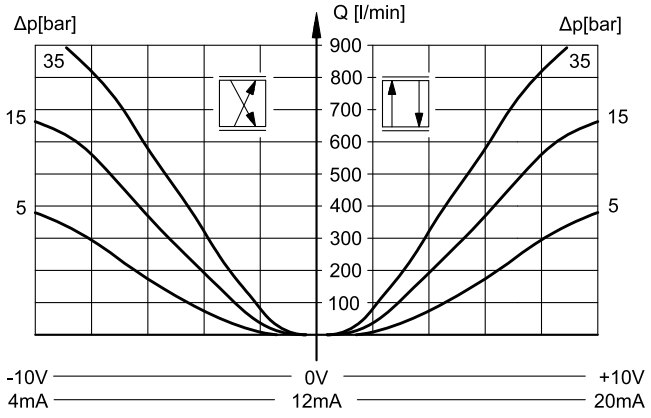
SPOOL C250 / A250



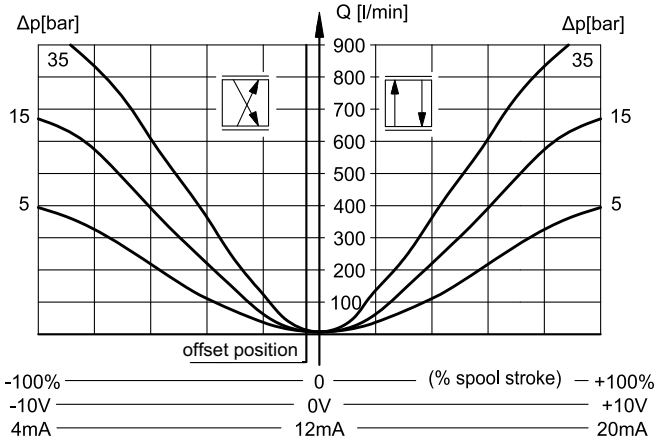
SPOOL Z250



SPOOL C400 / A400

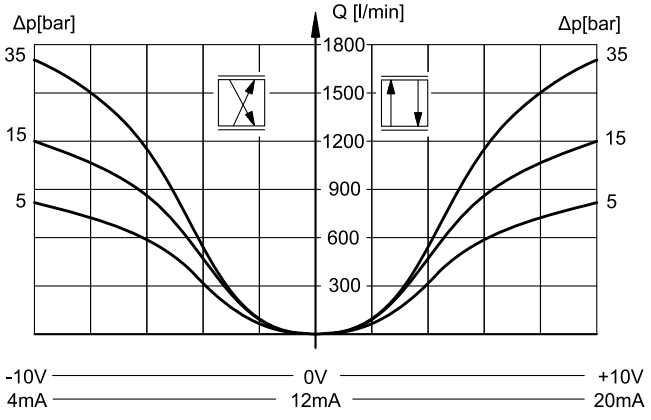


SPOOL Z400

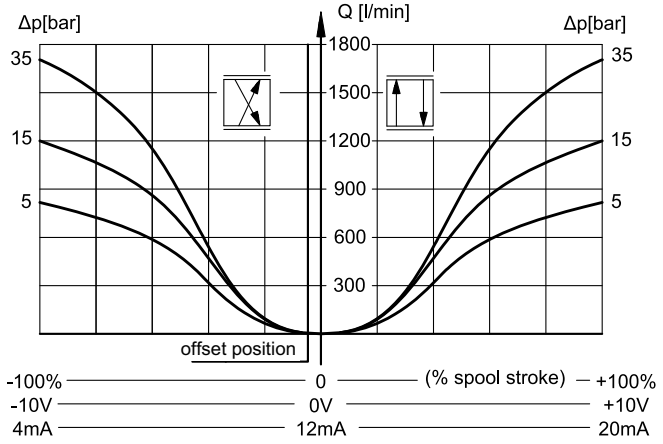


7.4 - Characteristic curves DXRE10J*

SPOOL C800

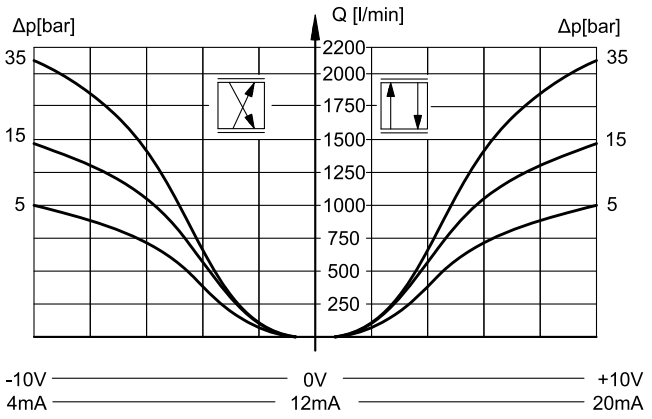


SPOOL Z800

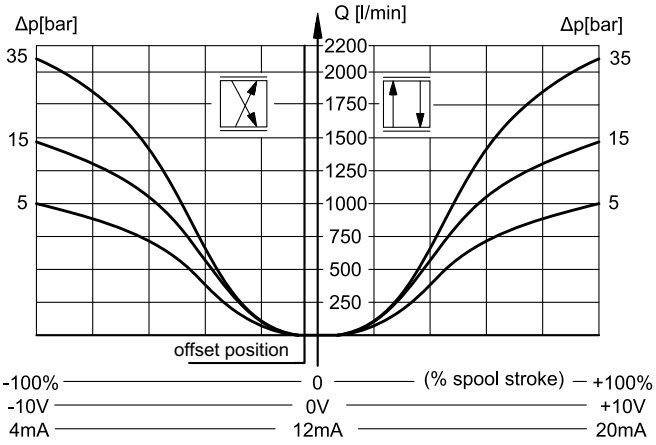


7.5 - Characteristic curves DXRE11J

SPOOL C1000 / A1000



SPOOL Z1000



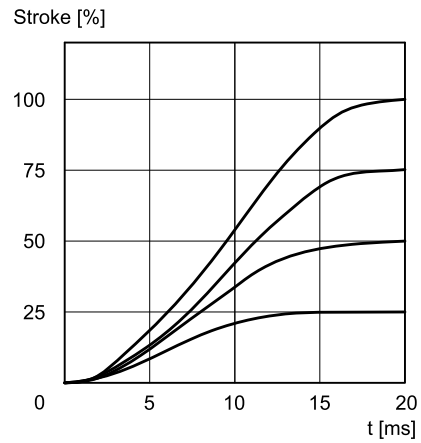
8 - RESPONSE TIMES

(obtained with mineral oil with viscosity of 36 cSt at 50°C)

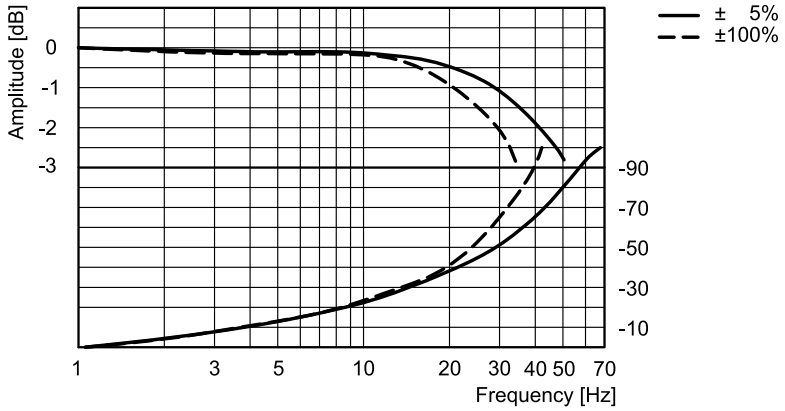
The tables shows the typical step response tested with static pressure 100 bar.

8.1 - DXRE5RJ

RESPONSE TIME

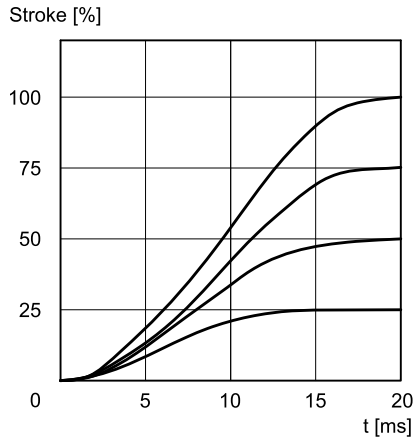


FREQUENCY RESPONSE (spools type Z)

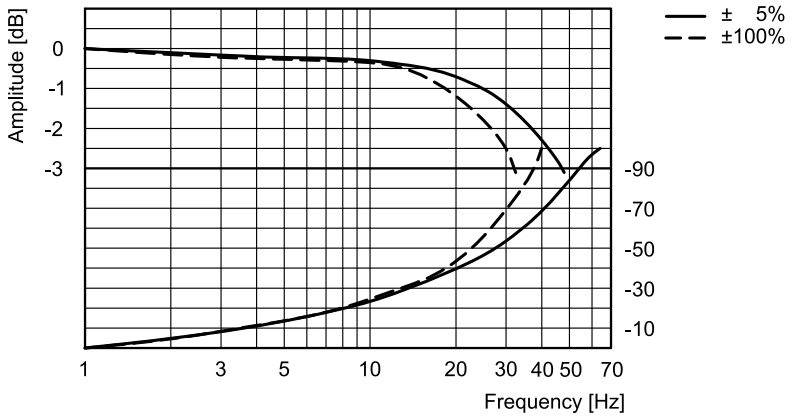


8.2 - DXRE7J

RESPONSE TIME

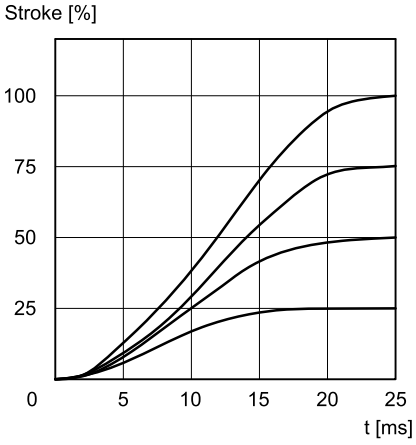


FREQUENCY RESPONSE (spools type Z)

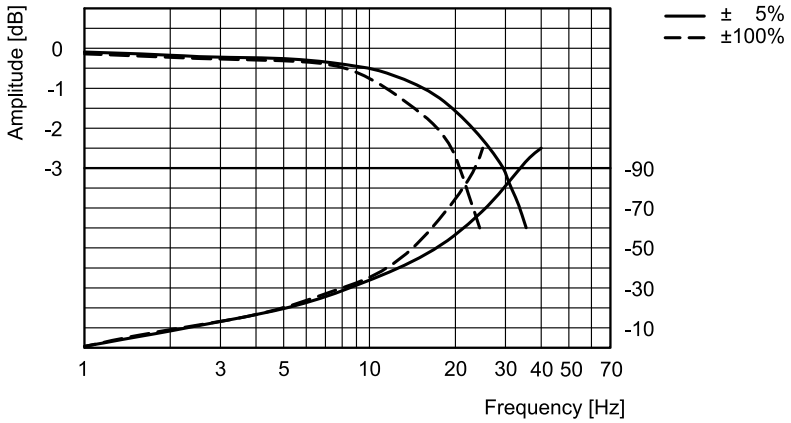


8.3 - DXRE8J

RESPONSE TIME

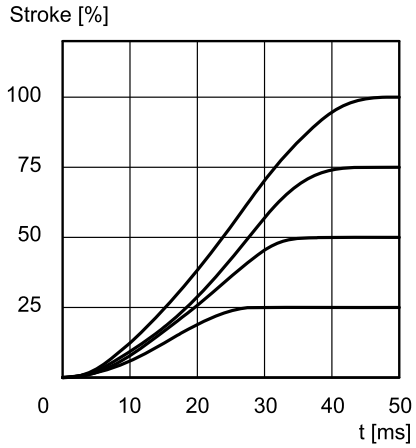


FREQUENCY RESPONSE (spools type Z)

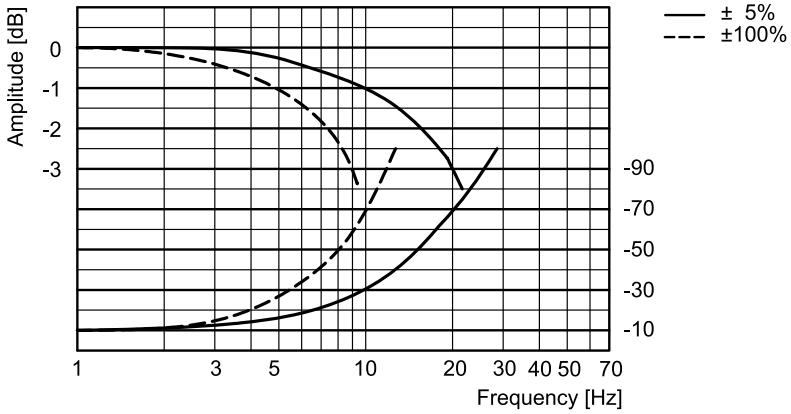


8.4 - DXRE10J and DXRE11J

RESPONSE TIME



FREQUENCY RESPONSE (spools type Z)



9 - HYDRAULIC CHARACTERISTICS

(with mineral oil with viscosity of 36 cSt at 50°C)

		DXRE5RJ	DXRE7J	DXRE8J	DXRE10J	DXRE11J
Max flow rate	l/min	180	450	900	1600	3500
Piloting flow requested with operation 0 →100%	l/min	7	13	28	35	35
Piloting volume requested with operation 0 →100%	cm^3	1.7	3.2	10	22	22

9.1 - Pilot and drain

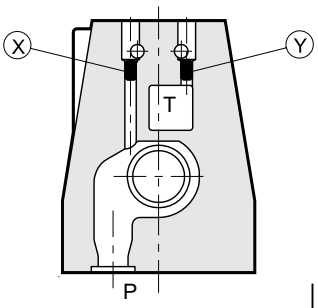
The DXRE*J valves are available with pilot and drain both internal and external. The version with external drain allows a higher back pressure on the discharge line.

PRESSURES (bar)

Pressure	MIN	MAX
Piloting pressure on X port	15	250
Pressure on T port with internal drain	-	30
Pressure on T port with external drain	-	250

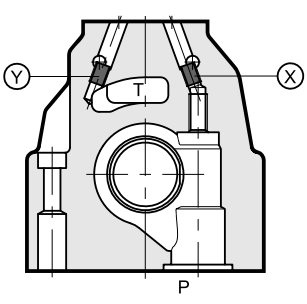
TYPE OF VALVE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

DXRE5RJ

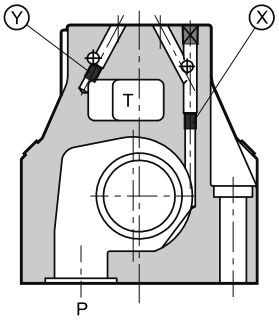


X: plug M5x6 for external pilot
Y: plug M5x6 for external drain

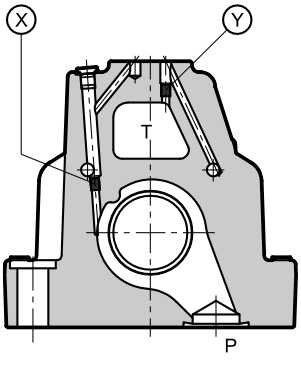
DXRE7J



DXRE8J



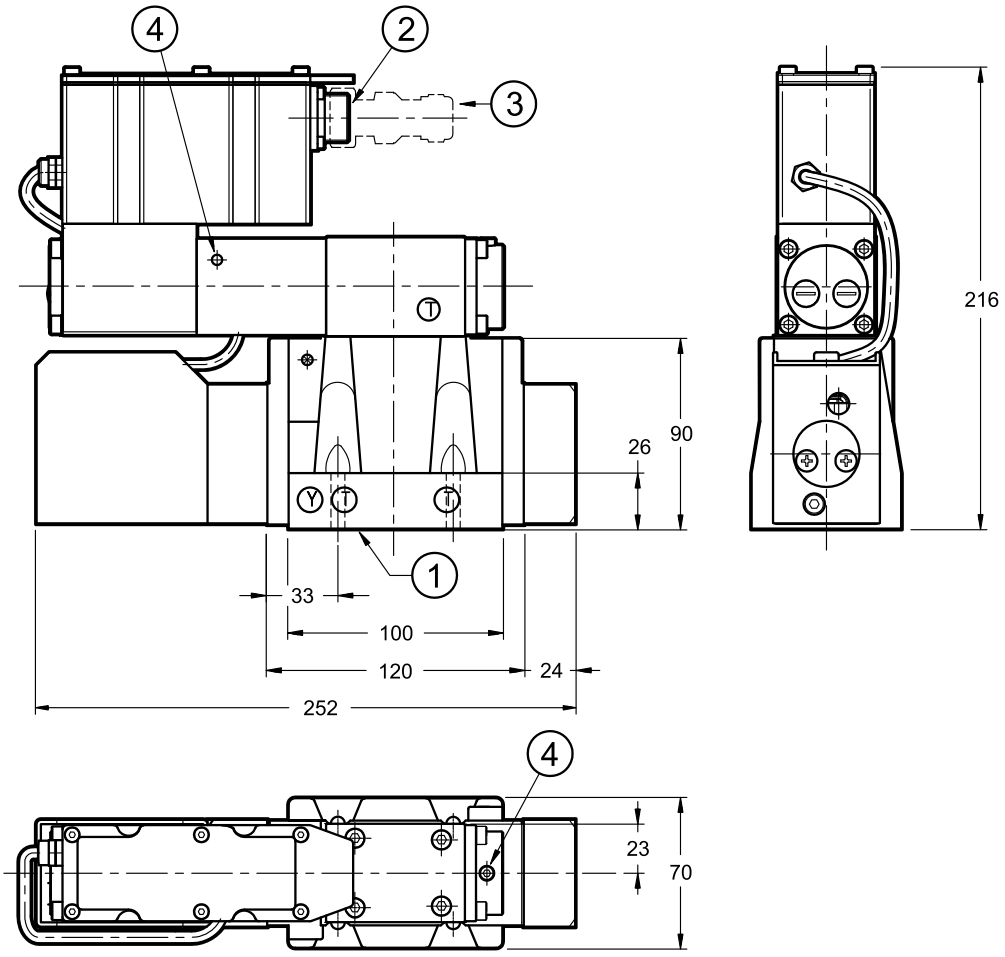
DXRE10J / DXRE11J



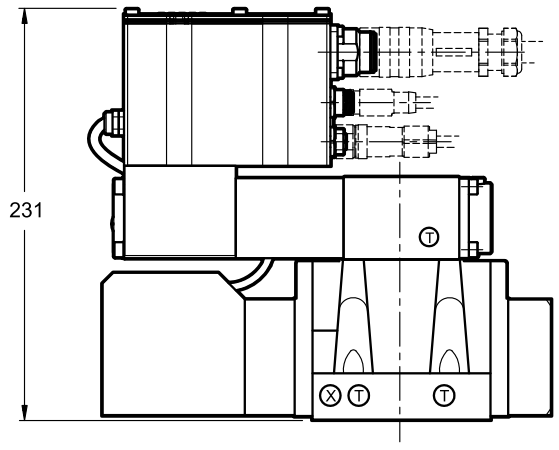
X: plug M6x8 for external pilot
Y: plug M6x8 for external drain

10 - OVERALL AND MOUNTING DIMENSIONS DXRE5RJ

dimensions in mm



DXRE5RJH



NOTES:

See mounting surface at section 14.

- Do not dismantle the transducer.

- The valve is filled with mineral oil during testing. the breathers on the pilot stage must not be opened without specific authorization.

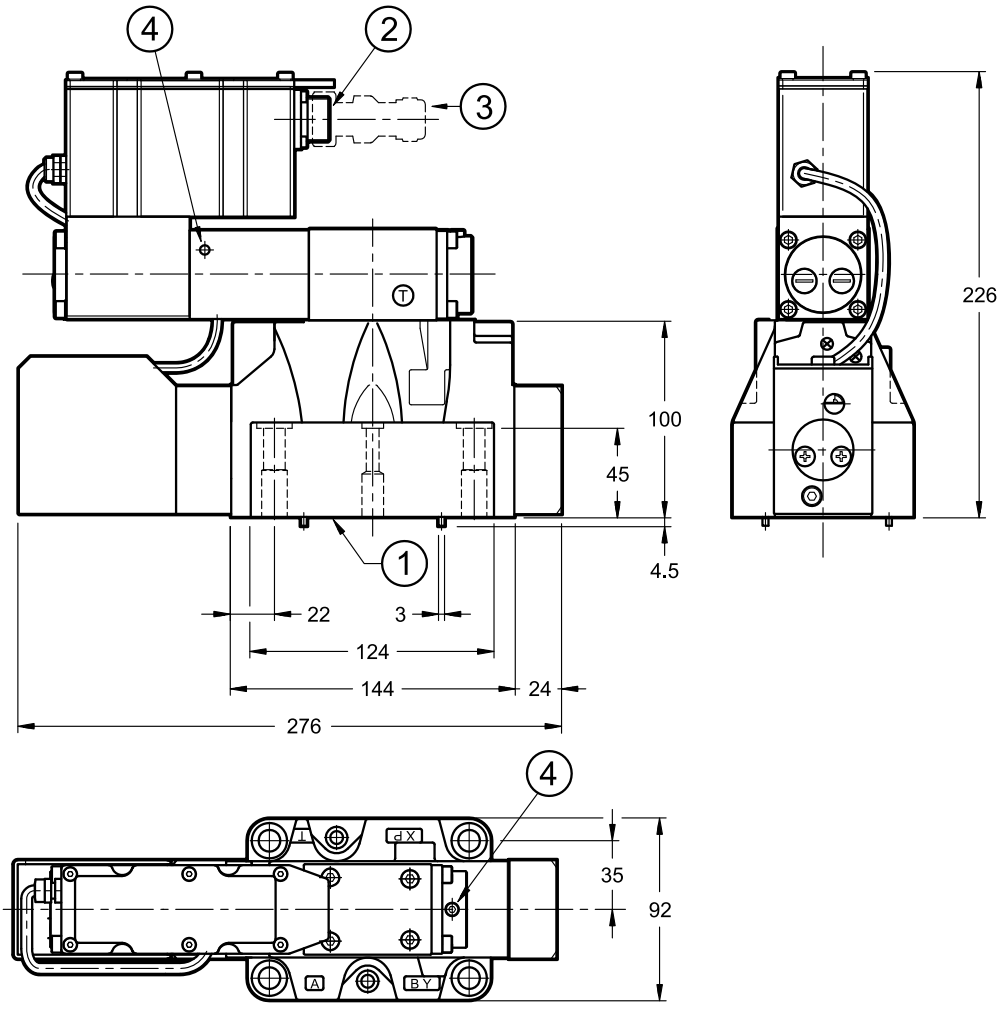
Breaking the seals may cause the loss of the guarantee.

1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 1 OR type 2037 (9.25x1.78) - 90 Shore
2	Main connection
3	Electrical connector **(to be ordered separately)** see paragraph 17
4	Air breather. Sealed at the factory (**NOTES**)

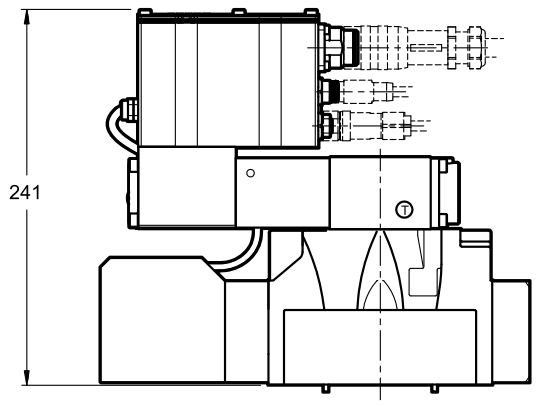
Valve fastening: N. 4 bolts M6x35 - ISO 4762
Tightening torque: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x10

11 - OVERALL AND MOUNTING DIMENSIONS DXRE7J

dimensions in mm



DXRE7JH



NOTES:

See mounting surface at section 14.

- Do not dismantle the transducer.

- The valve is filled with mineral oil during testing. the breathers on the pilot stage must not be opened without specific authorization.

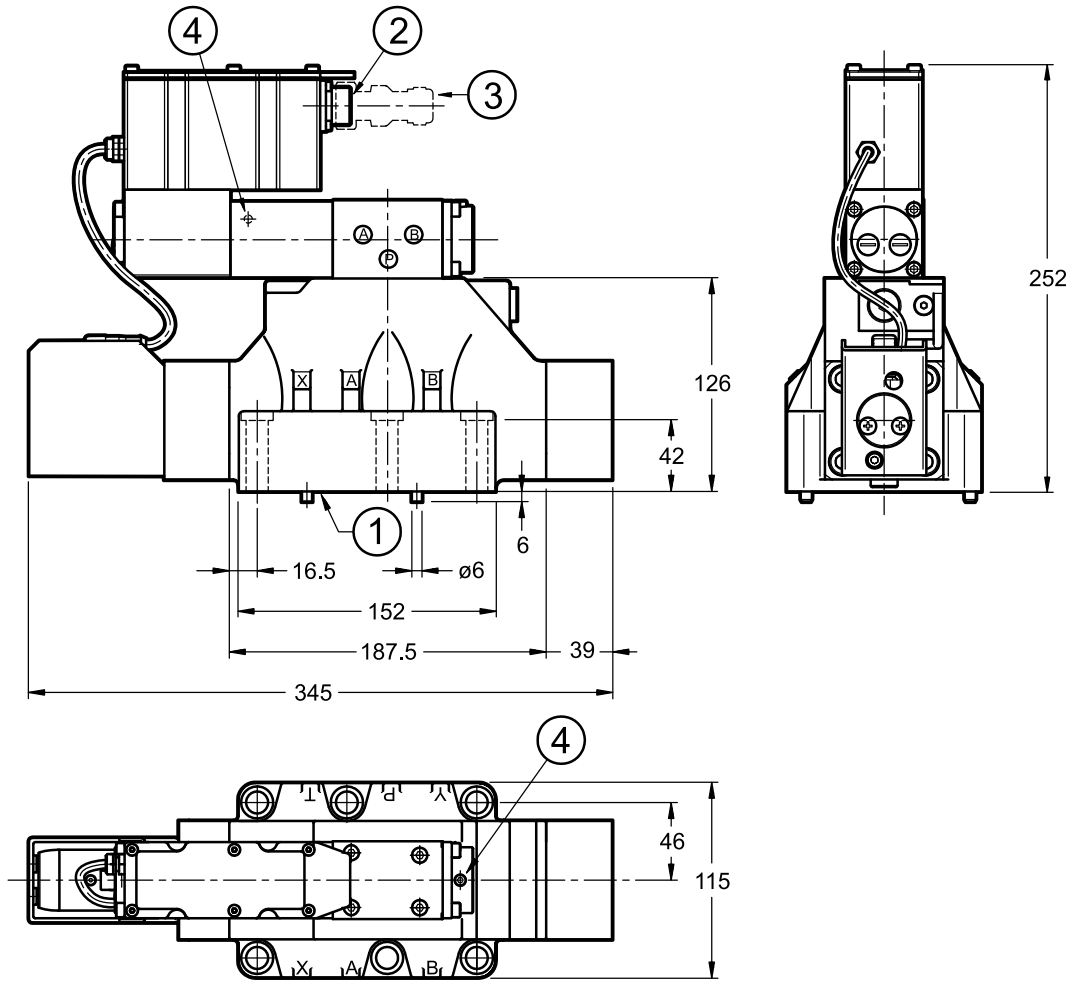
Breaking the seals may cause the loss of the guarantee.

1	Mounting surface with sealing rings. 4 OR type 130 (22.22X2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Main connection
3	Electrical connector (**to be ordered separately**) see paragraph 17
4	Air breather. Sealed at the factory (**NOTE**)

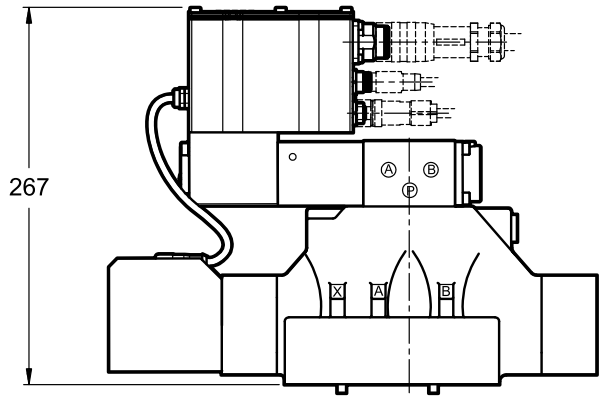
Valve fastening:	N. 4 bolts M10x60 - ISO 4762 N. 2 bolts M6x60 - ISO 4762
Tightening torque	M10x60: 40 Nm (A8.8 screws) M6x60: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x18; M10x18	

12 - OVERALL AND MOUNTING DIMENSIONS DXRE8J

dimensions in mm



DXRE8JH



NOTES:

See mounting surface at section 14.

- Do not dismantle the transducer.

- The valve is filled with mineral oil during testing. the breathers on the pilot stage must not be opened without specific authorization.

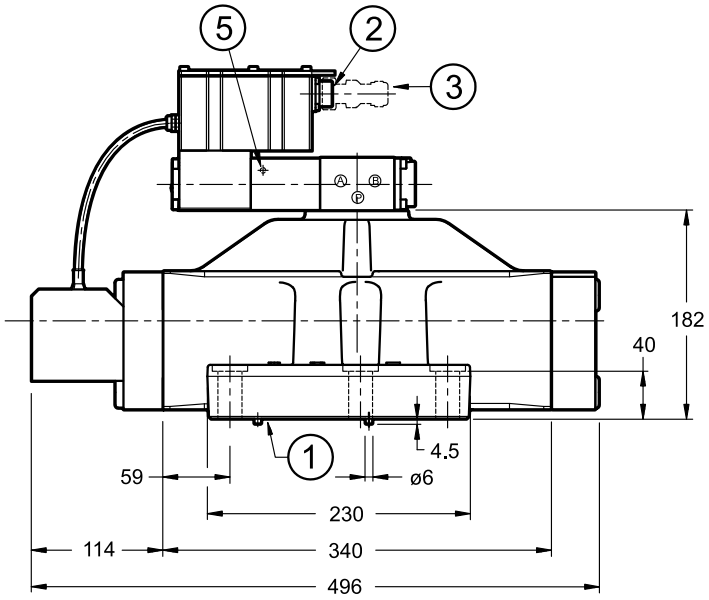
Breaking the seals may cause the loss of the guarantee.

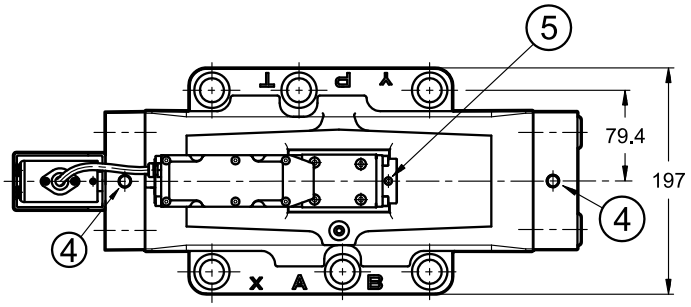
1	Mounting surface with sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection
3	Electrical connector (**to be ordered separately**) see paragraph 17
4	Air breather. Sealed at the factory (**NOTE**)

Fastening of single valve: N. 6 bolts M12X60 - ISO 4762
Tightening torque: 69 Nm (A8.8 screws)
Threads of mounting holes: M12X20

13 - OVERALL AND MOUNTING DIMENSIONS DXRE10J / DXRE11J

dimensions in mm





NOTES:

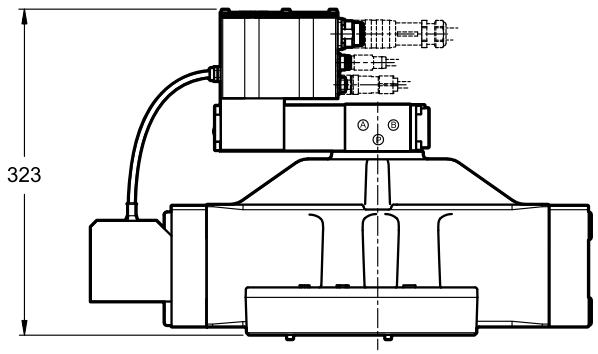
See mounting surface at section 14.

- Do not dismantle the transducer.

- The valve is filled with mineral oil during testing. the breathers on the pilot stage must not be opened without specific authorization.

Breaking the seals may cause the loss of the guarantee.

DXRE10JH

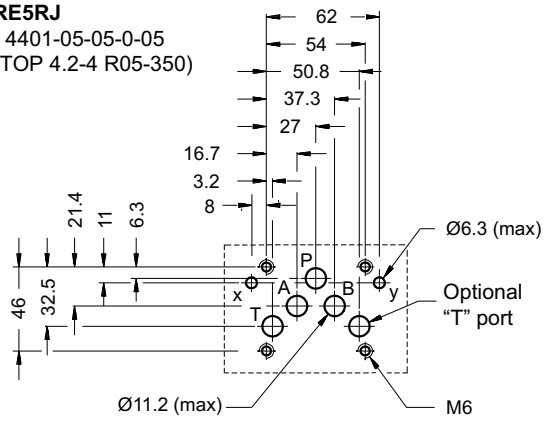


1	Mounting surface with sealing rings: **DXRE10J** 4 OR type 4150 (37.59x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore **DXRE11J** 4 OR type 4212 (53.57x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
2	Main connection
3	Electrical connector (**to be ordered separately**) see paragraph 17
4	M12 eyebolt seat for safe lift
5	Air breather. Sealed at the factory (**NOTE**)

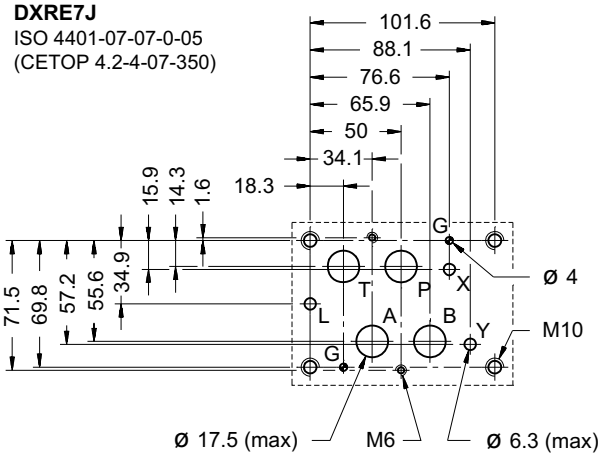
Valve fastening: 6 SHC screws ISO 4762 M20x70
Tightening torque: 330 Nm (A8.8 screws)
Threads of mounting holes: M20x40

14 - MOUNTING SURFACES

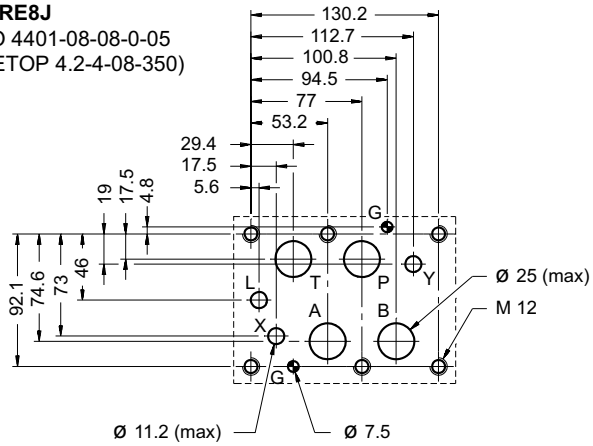
DXRE5RJ
ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



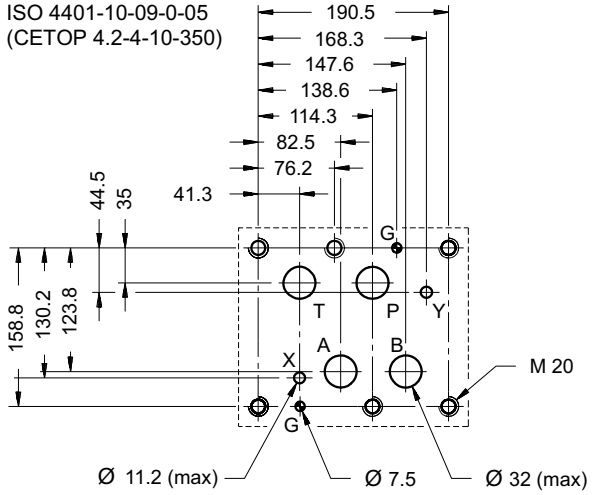
DXRE7J
ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DXRE8J
ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)

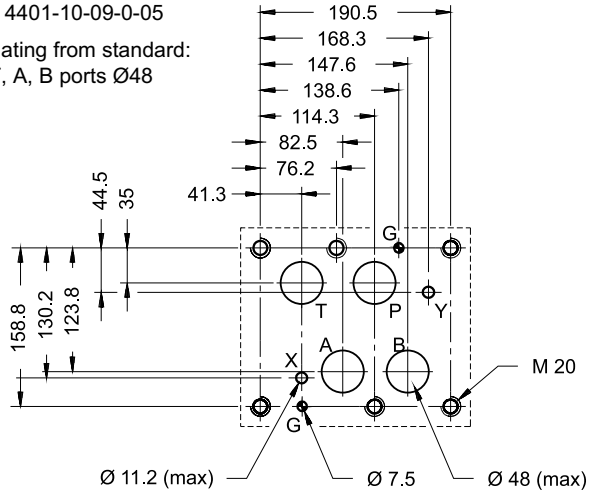


DXRE10J
ISO 4401-10-09-0-05
(CETOP 4.2-4-10-350)



DXRE11J
ISO 4401-10-09-0-05

deviating from standard:
P, T, A, B ports Ø48



15 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

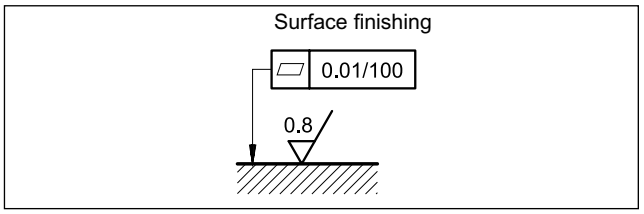
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

16 - INSTALLATION

The valves can be installed in any position without impairing correct operation. Make sure the hydraulic circuit is free of air.

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.

Take care to the cleanliness of the mounting surfaces and surrounding environment upon installation.



17 - ACCESSORIES

(to be ordered separately)

17.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.

We recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

17.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

17.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:
- up to 20 m cable length : 1,0 mm^2
- up to 40 m cable length : 1,5 mm^2

Cross section for signals (command, monitor):
- 0,50 mm^2

17.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic. See catalogue 89 850.

18 - SUBPLATES

(see catalogue 51 000)

Subplates are not available for DXRE5RJ, DXRE10J and DXRE11J.

		DXRE7J	DXRE8J
with rear ports		PME07-AI6G	-
with side ports		PME07-AL6G	PME5-AL8G
thread of ports:	P - T - A - B X - Y	1” BSP 1/4” BSP	1½” BSP 1/4” BSP

DUPLOMATIC MOTION SOLUTIONS

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