



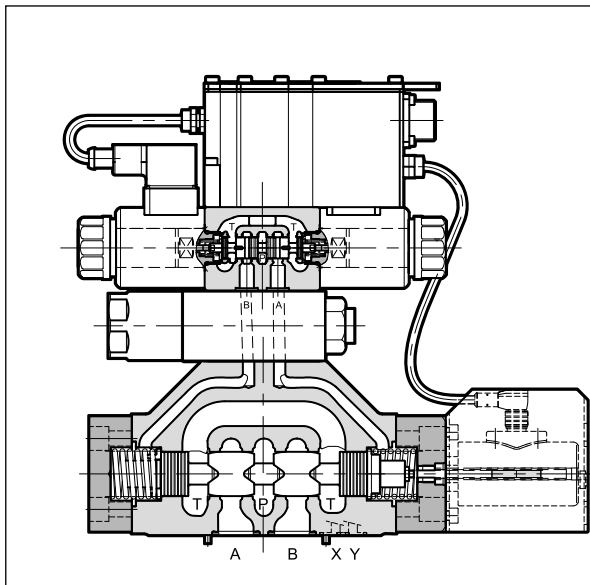
DDPE*J*

PROPORTIONAL DIRECTIONAL CONTROL VALVES, PILOT OPERATED, WITH FEEDBACK AND INTEGRATED ELECTRONICS

SUBPLATE MOUNTING

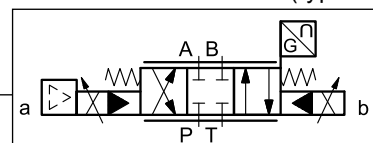
- DDPE5RJ* ISO 4401-05
- DDPE7J* ISO 4401-07
- DDPE8J* ISO 4401-08
- DDPE9J* ISO 4401-08 oversize ports
- DDPE10J* ISO 4401-10
- DDPE11J* ISO 4401-10 oversize ports

OPERATING PRINCIPLE



- The DDPE*J* are proportional directional control valves, pilot-operated, with feedback and integrated electronics, with mounting interface in compliance with ISO 4401 standards.
- They are controlled directly by an integrated digital amplifier. Transducer and digital card allow a fine control of the positioning of the spool, reducing hysteresis and response times.
- They are available with different types of electronics, with analogue or fieldbus interfaces.
- A monitoring signal of the main spool position is available.
- The valves are easy to install. The driver manages digital settings directly.

HYDRAULIC SYMBOL (typical)



PERFORMANCES

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

		DDPE5RJ*	DDPE7J*	DDPE8J*	DDPE9J*	DDPE10J*	DDPE11J*
Max operating pressure: P - A - B ports T port	bar	350 see point 10					
Rated flow at Δp 10 bar	l/min	100	220	400	500	800	1000
Hysteresis	% Q _{max}	< 0.5%					
Repeatability	% Q _{max}	< ± 0.2%					
Electrical characteristics		see point 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	5.7	10.3	16.2	15.9	55	53



1 - IDENTIFICATION CODE

1.1 - Standard electronics

D	D	P	E		J	-		/		-		/	K11	
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Pilot operated directional valve

Electric proportional control

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

Standard electronics for valves with feedback

Spool type: _____
(see table on point 3)
C = closed centre
A = open centre
R1C = for external regenerative circuit
R1A = for external regenerative circuit
R4C = for internal regenerative circuit
R4A = for internal regenerative circuit
X1A = progressive differential spool

Spool nominal flow rate (see table p. 3) _____

Series No. _____
40 = DDPE5RJ, DDPE7J, DDPE8J and DDPE9J
32 = DDPE10J and DDPE11J

Option:
/ W7 = zinc-nickel surface treatment. Omit if not required (see p. 1.4)

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

Connection: 6 pin + PE

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

Drain:
I = internal
E = external

Pilot supply with built-in 30 bar pressure reducing valve (see p. 10.1)
I = internal
E = external

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

1.2 - Compact electronics

D	D	P	E		JL	-		/	10	-		/	K12	
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Pilot operated directional valve

Electric proportional control

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

Digital integrated electronics for valves with feedback - compact box

Spool type: _____
(see table on point 3)
C = closed centre
A = open centre
R1C = for external regenerative circuit
R1A = for external regenerative circuit
R4C = for internal regenerative circuit
R4A = for internal regenerative circuit
X1A = progressive differential spool

Spool nominal flow rate (see table p. 3) _____

Series No. _____
20 = DDPE5RJL, DDPE7JL, DDPE8JL and DDPE9JL
11 = DDPE10JL and DDPE11JL

Option:
/ W7 = zinc-nickel surface treatment. Omit if not required (see p. 1.4)

Connection: 5 pin M12

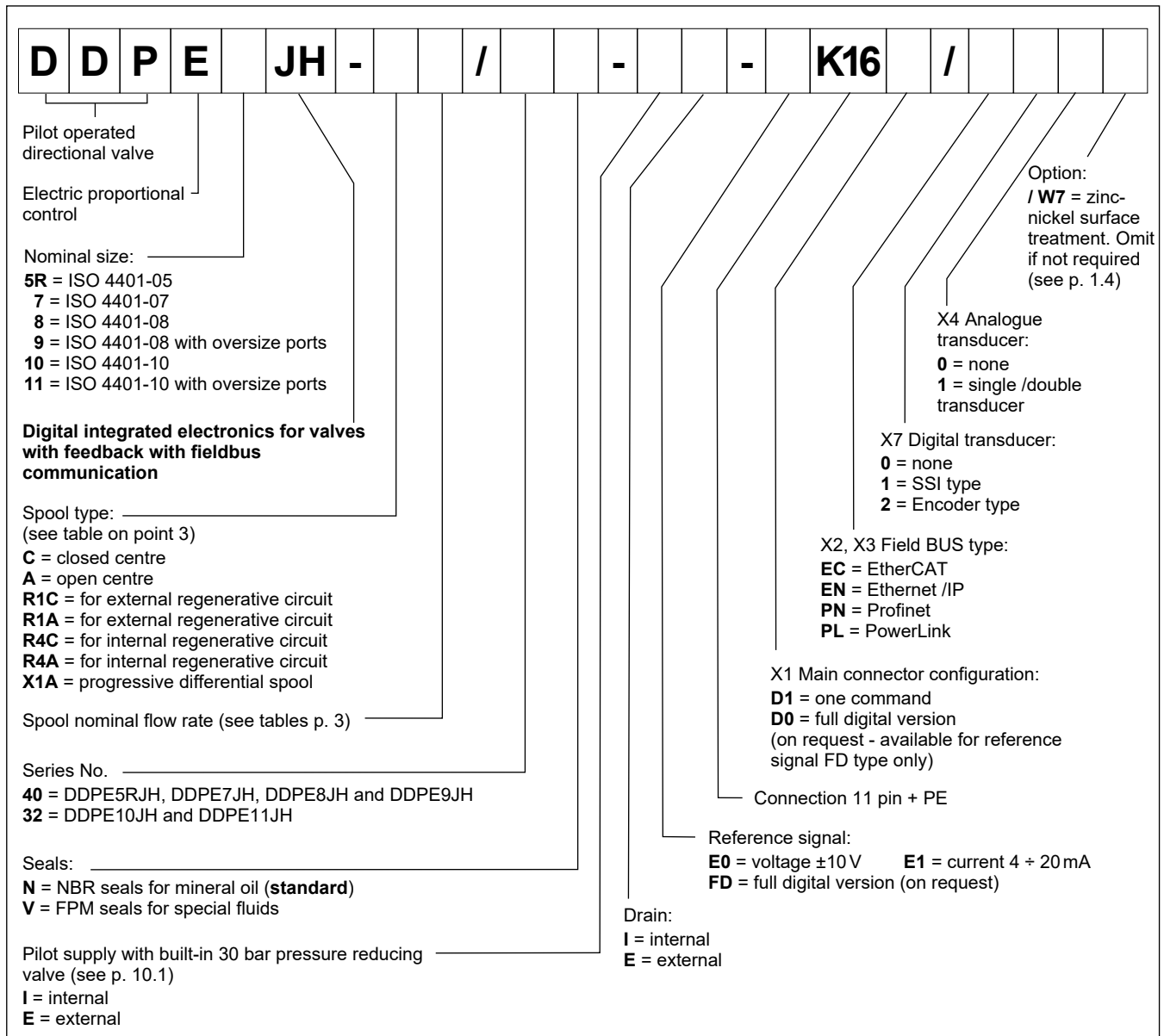
Interfaces:
E0 = analogue, voltage ±10 V
E1 = analogue, current 4 ÷ 20 mA
IOL = IO-Link interface
CA = CAN Open

Drain:
I = internal
E = external

Pilot supply with built-in 30 bar pressure reducing valve (see p. 10.1)
I = internal
E = external

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

1.3 - Electronics with fieldbus communication



1.4 - 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 240 hours. (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

2 - COMPARISON AMONG INTEGRATED ELECTRONICS

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 points 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 between spool type and rated flow.

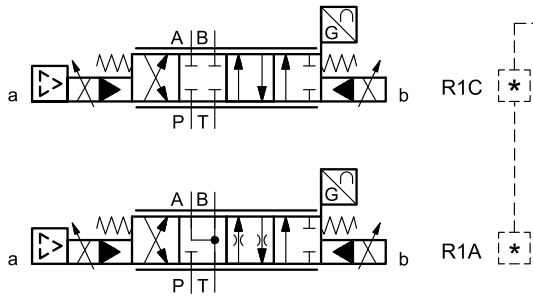
3 positions with spring centring

valve type	*	Nominal flow with Δp 10 bar P-T
DDPE5RJ	100	100 l/min
DDPE7J	120	120 l/min
	220	220 l/min
DDPE8J	250	250 l/min
	400	400 l/min
DDPE9J	480	480 l/min
DDPE10J	800	800 l/min
DDPE11J	1000	1000 l/min

detailed symbol (spool type C)

regenerative differential spools, external

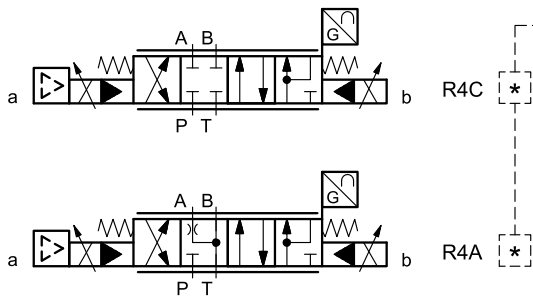
R1C and R1A spools are specific for regenerative circuits made by means of an additional external check valve.



valve type	*	Nominal flow with Δp 10 bar P-T
DDPE7J	220	220 l/min

regenerative differential spools, internal

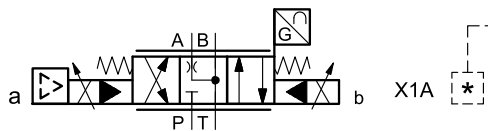
R4C and R4A spools are specific for regenerative circuits where the regenerative function is performed by the valve itself.



valve type	*	Nominal flow with Δp 10 bar P-T
DDPE7J	220	220 l/min
DDPE9J	480	480 l/min

progressive differential spool

The X1A spool is specific for alternate p/Q control, typical of plastic injection cycles.



valve type	*	Nominal flow with Δp 10 bar P-T
DDPE7J	220	220 l/min
DDPE8J	430	430 l/min

4 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529 (NOTE): DDPE*J, DDPE*JH, DDPE*JL		IP65 / IP67 IP65
Supply voltage	V DC	24 (from 19 to 30 V DC), 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

NOTE: The IP degree is guaranteed only with mating connector of equivalent IP degree, installed and tightened correctly. Moreover, on the JH versions it is necessary to protect any unused connections with caps.

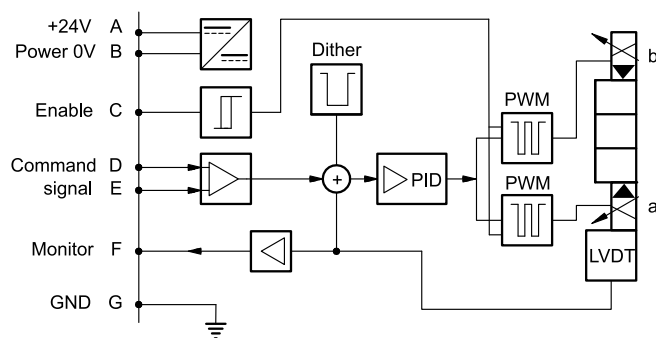
5 - DDPE*J - STANDARD ELECTRONICS

5.1 - Electrical characteristics

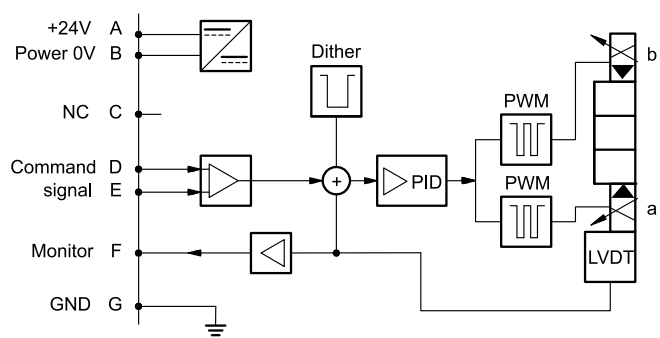
Command signal: voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_i > 11$ kOhm) $4 \div 20$ (Impedance $R_i = 58$ Ohm)
Monitor signal (current to solenoid): voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_o > 1$ kOhm) $4 \div 20$ (Impedance $R_o = 500$ Ohm)
Communication for diagnostic		LIN-bus 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

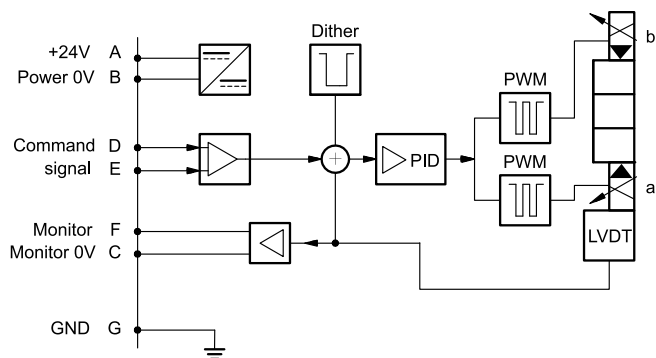
VERSION A - External Enable



VERSION B - Internal Enable

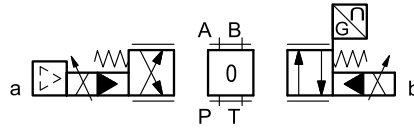


VERSION C - 0V Monitor

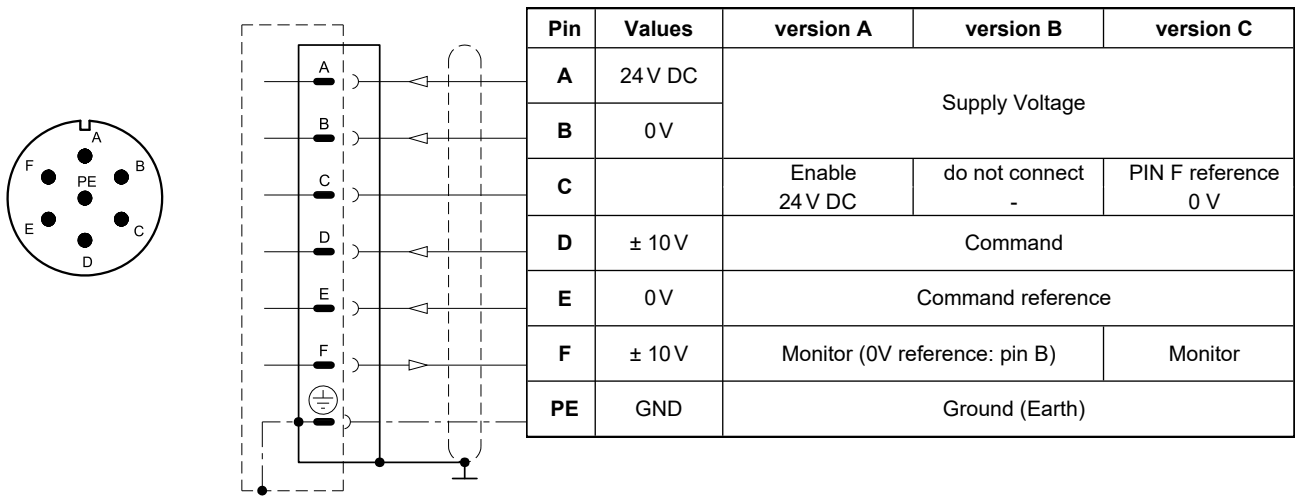


5.3 - Versions with voltage command (E0)

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.



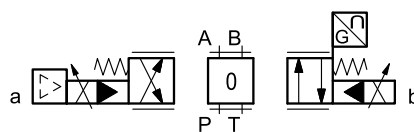
COMMAND	-10V	0V	+10V
MONITOR	-10V	0V	+10V



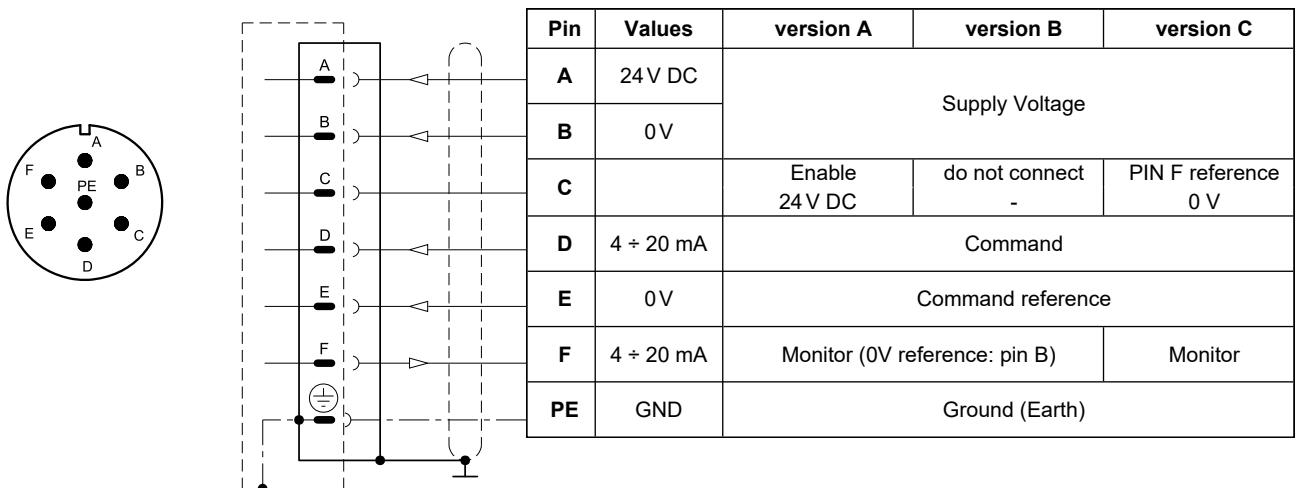
5.4 - Versions with current command (E1)

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



6 - DDPE*JL - COMPACT ELECTRONICS

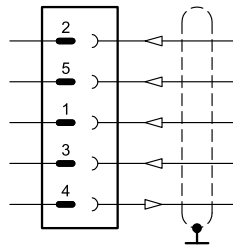
In versions 'IOL' and 'CA' pin 3 and pin 5 are galvanic isolated up to 100 V to avoid earth loops. In IO-Link networks, the length of the connecting cables is limited to 20 metres.

6.1 - Electrical characteristics

Command signal:	voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_i > 11 \text{ k}\Omega$) $4 \div 20$ (Impedance $R_i = 58 \text{ }\Omega$)
Monitor signal :	voltage (E0) current (E1)	V DC mA	$0 \div 5$ (Impedance $R_o > 1 \text{ k}\Omega$) $4 \div 20$ (Impedance $R_o = 500 \text{ }\Omega$)
IO-Link communication (IOL): Data rate		kBaud	IO-Link Port Class B 230.4
Can Open communication (CA): Data rate		kbit	$10 \div 1000$
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)

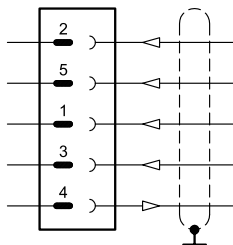
6.2 - Pin tables

'E0' connection



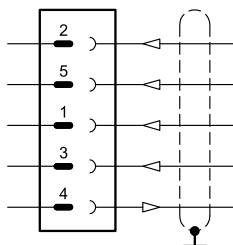
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0V	
1	$\pm 10 \text{ V}$	Command
3	0V	Command reference
4	$0 \div 5 \text{ V}$	Monitor (0V reference: pin 5)

'E1' connection



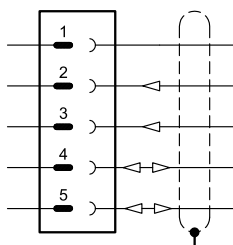
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0V	
1	$4 \div 20 \text{ mA}$	Command
3	0V	Command reference
4	$4 \div 20 \text{ mA}$	Monitor (0V reference: pin 5)

'IOL' connection



Pin	Values	Function
2	2L+ 24 V DC	Supply of the power stage
5	2L- 0V (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	0V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

7 - DDPE*JH - FIELD BUS ELECTRONICS

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

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

7.1 - Electrical characteristics

Command signal:	voltage (E0) current (E1) digital (FD)	V DC mA	± 10 (Impedance $R_i > 11$ kOhm) $4 \div 20$ (Impedance $R_i = 58$ Ohm) via fieldbus
Monitor signal (main spool position):	voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_o > 1$ kOhm) $4 \div 20$ (Impedance $R_o = 500$ Ohm)
Communication / diagnostic			via Bus register
Communication interface standards			IEC 61158
Communication physical layer			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	24V DC	Main supply voltage
2	0V	
3	24V DC	Enable
4	± 10 V (E0) $4 \div 20$ (E1)	Command
5	0V	Command reference signal
6	± 10 V (E0) $4 \div 20$ (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24V DC	Logic and control supply
10	0V	
11	24V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24V DC	Main supply voltage
2	0V	
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	24V DC	Logic and control supply
10	0V	
11	24V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

7.3 - FIELD BUS connections

Please wire following guidelines provided by the related standards communication protocol. Any connections present and not used must be protected with special caps so as not to nullify the protection against atmospheric agents.

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



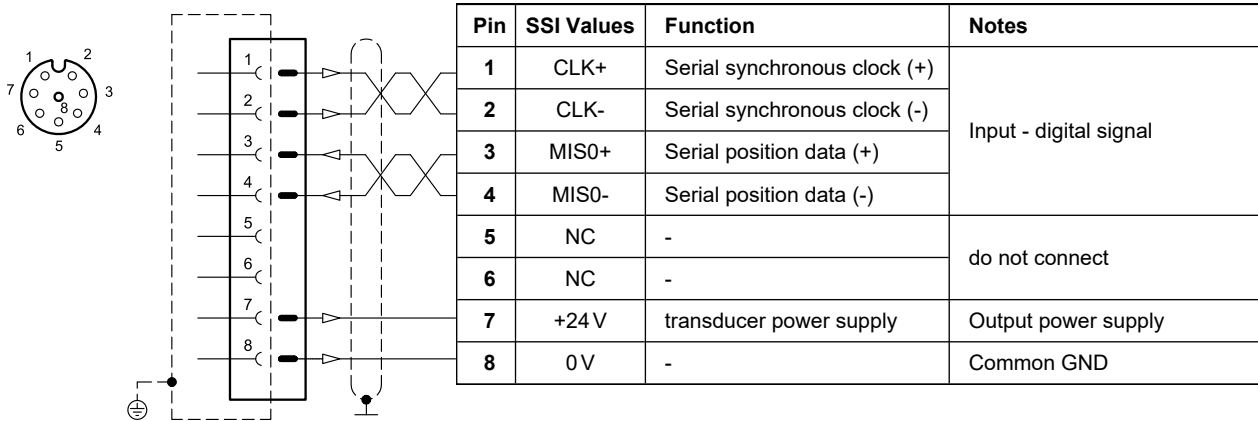
Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

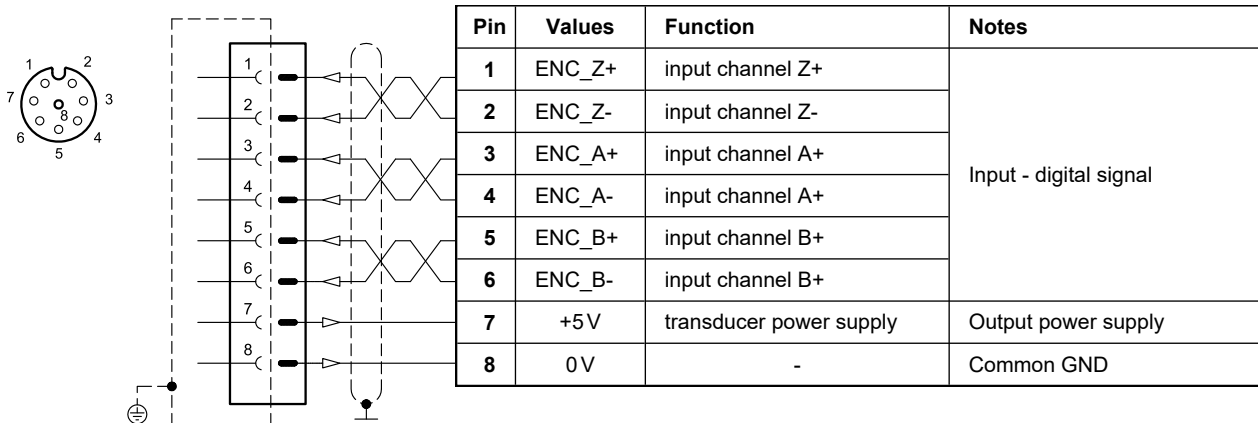
7.4 - Digital transducer connection

X7 connection: M12 A 8 pin female

VERSION 1: SSI type



VERSION 2: ENCODER type

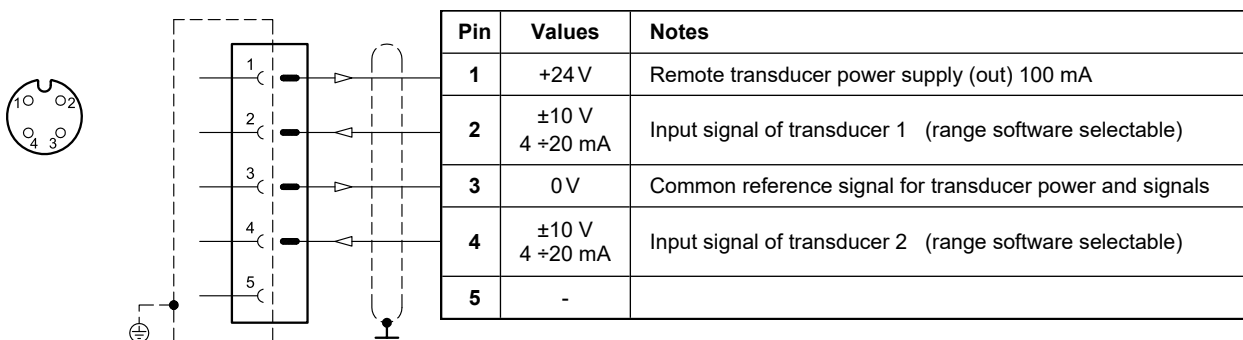


7.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

(single or double is a software-selectable option)



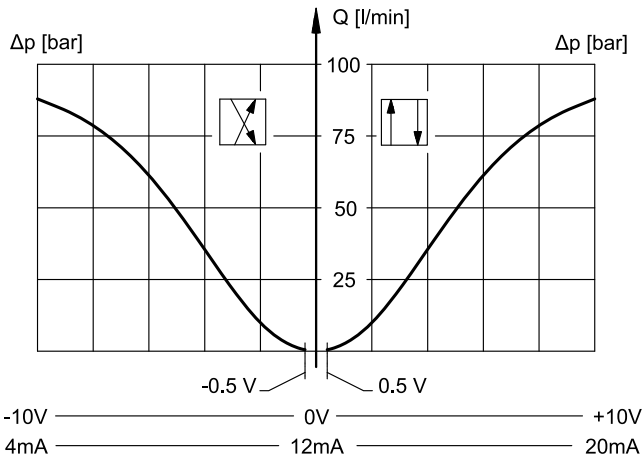
8 - CHARACTERISTIC CURVES

(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: $\Delta p = 5 \text{ bar}$ ($\Delta p \text{ P} \rightarrow \text{T} = 10 \text{ bar}$).

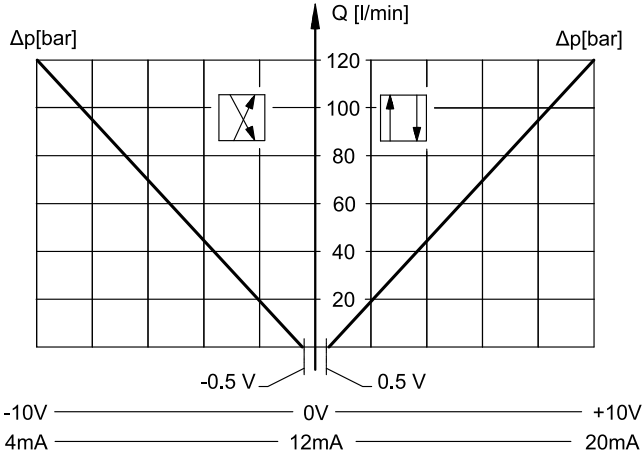
8.1 - Characteristic curves DDPE5RJ *

SPOOL C100 / A100

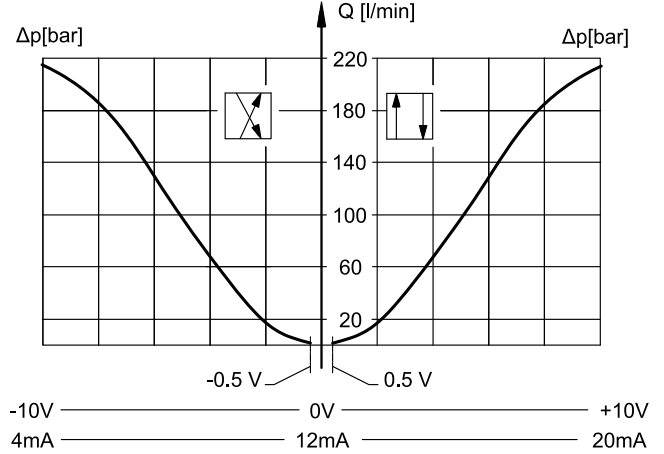


8.2 - Characteristic curves DDPE7J*

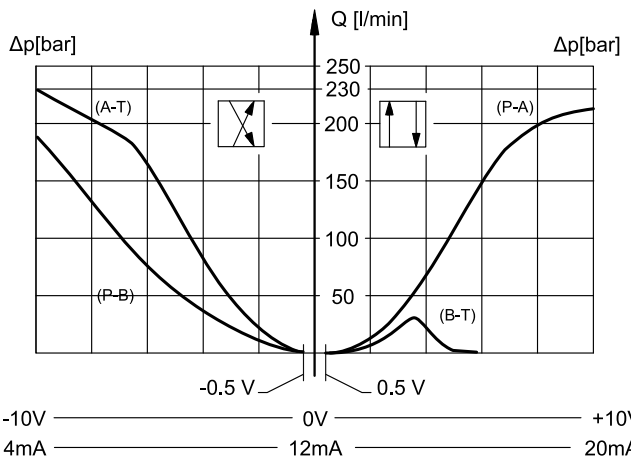
SPOOL C120 / A120



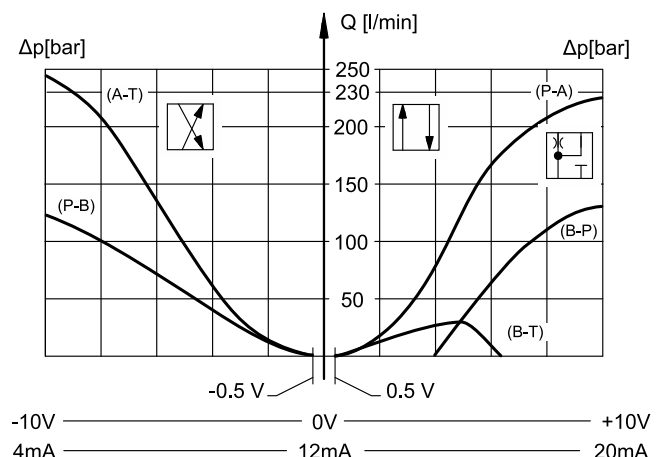
SPOOL C220 / A220



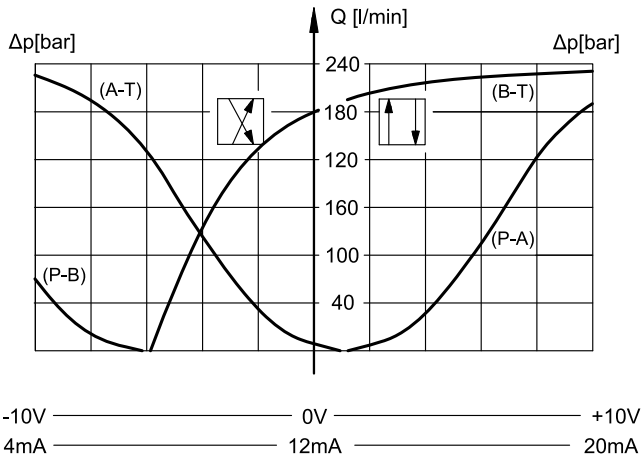
SPOOL R1C220 / R1A220



SPOOL R4C220 / R4A220

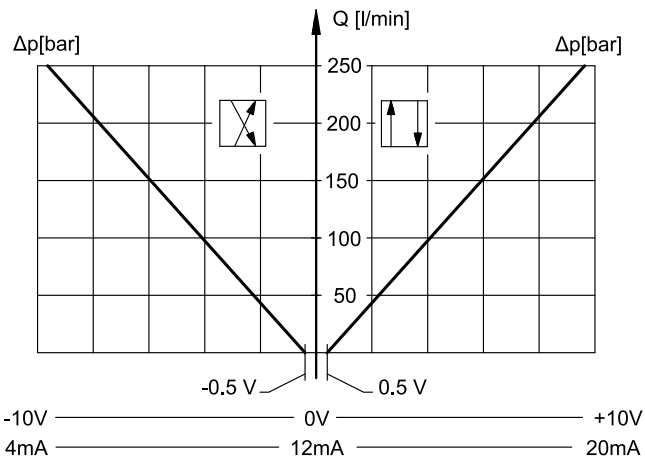


SPOOL X1A220

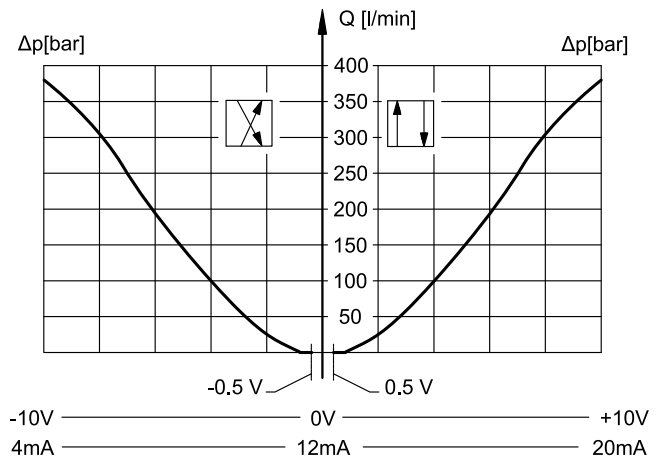


8.3 - Characteristic curves DDPE8J*

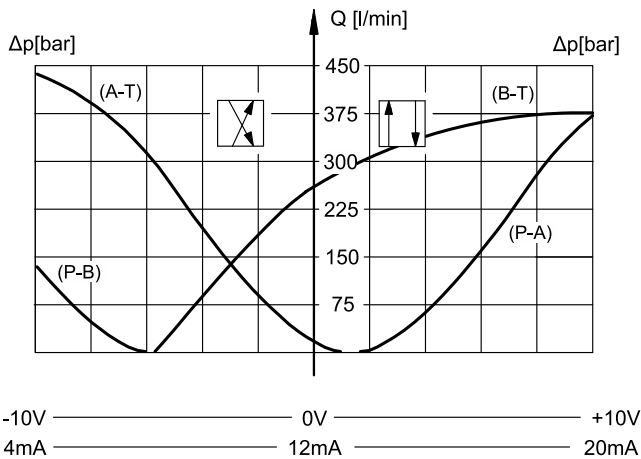
SPOOL C250 / A250



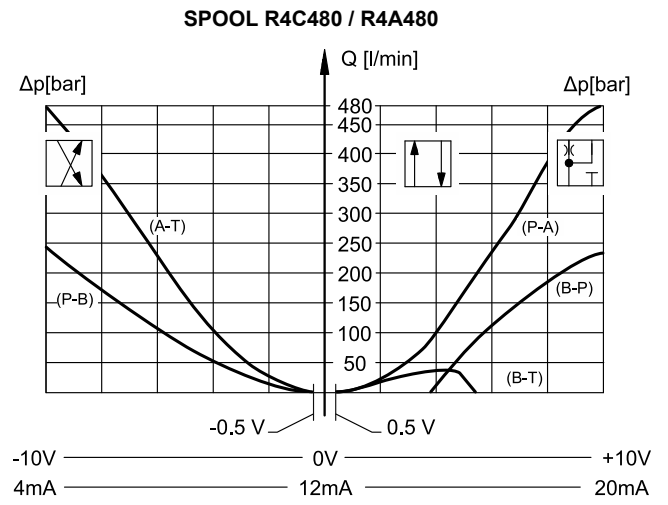
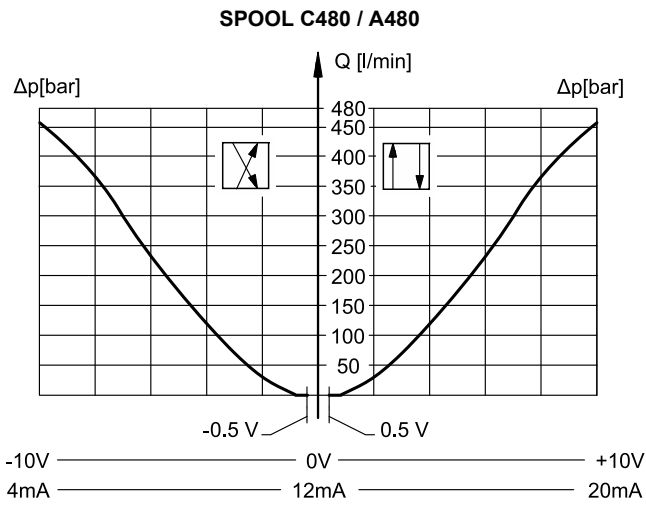
SPOOL C400 / A400



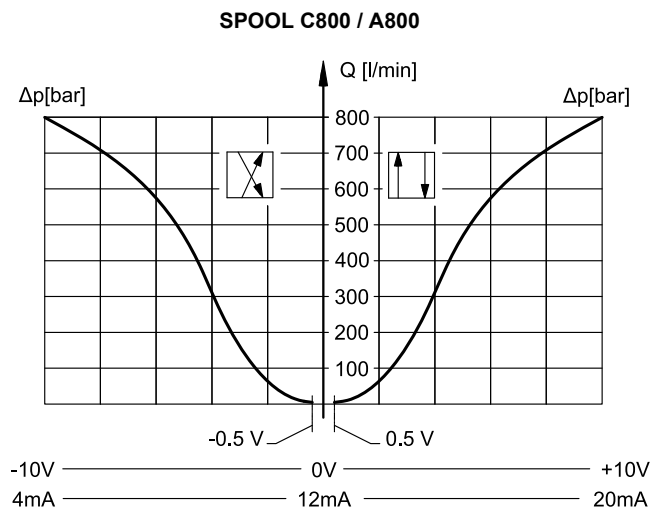
SPOOL X1A430



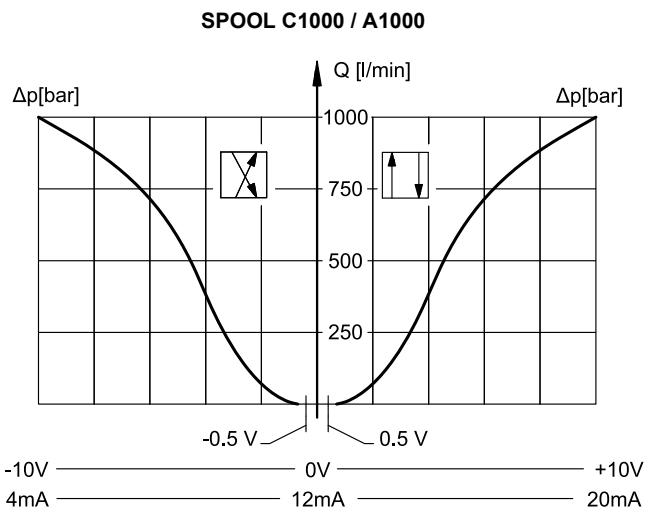
8.4 - Characteristic curves DDPE9J*



8.5 - Characteristic curves DDPE10J*



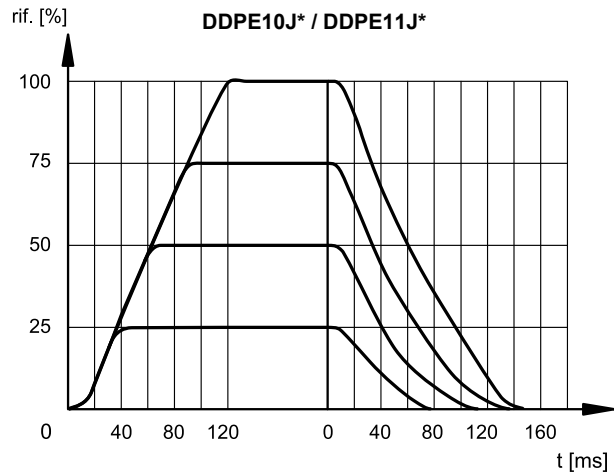
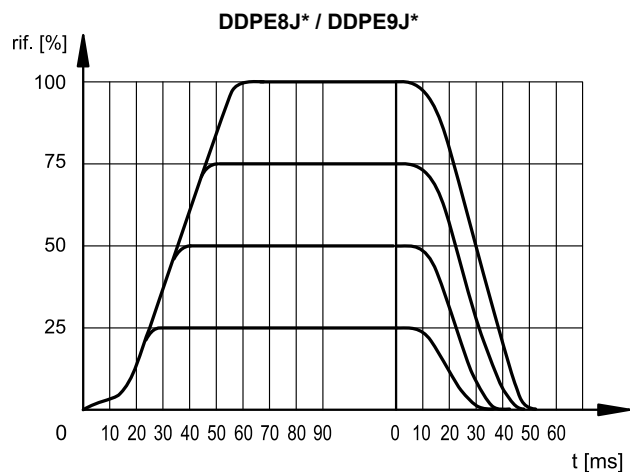
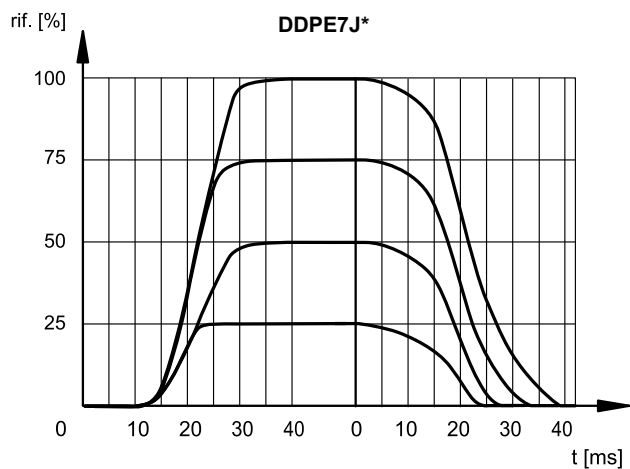
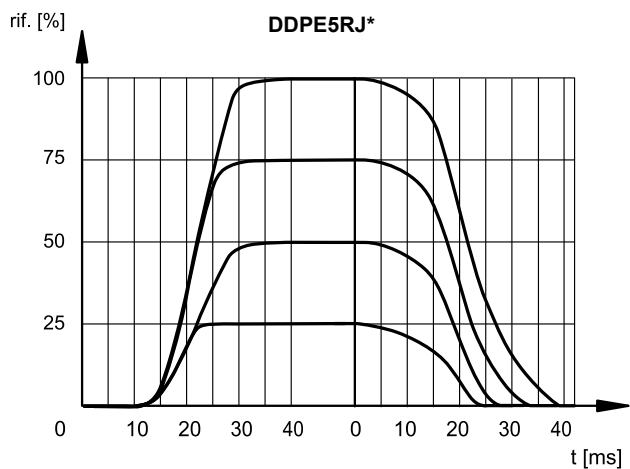
8.6 - Characteristic curves DDPE11J*





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)

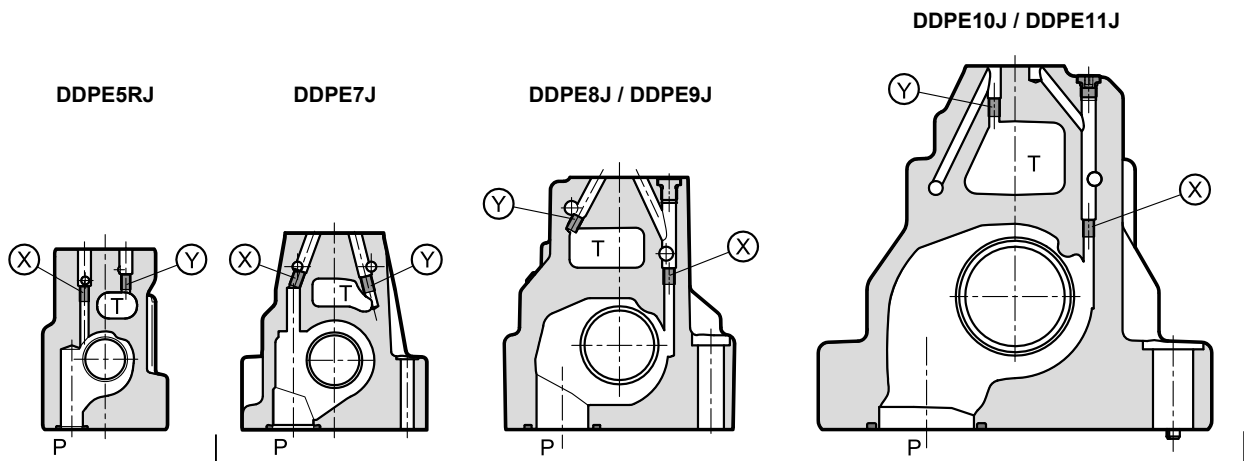
		DDPE5RJ*	DDPE7J*	DDPE8J*	DDPE9J*	DDPE10J*	DDPE11J*
Max flow rate	l/min	180	450	900	1000	1600	3500
Piloting flow requested with operation 0 → 100%	l/min	7	13	28	28	35	35
Piloting volume requested with operation 0 → 100%	cm ³	1.7	3.2	10	10	22	22

10.1 - Pilot supply and drain

The DDPE*J* valves are available with internal or external pilot supply and are always equipped with a 30 bar pressure reducing valve. Drain can be internal or external. The version with external drain allows a higher back pressure on the T line.

NOTE: The configuration of pilots and drains must be chosen when ordering. Subsequent modifications are allowed only to specialized operators with authorization and in factory.

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



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

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

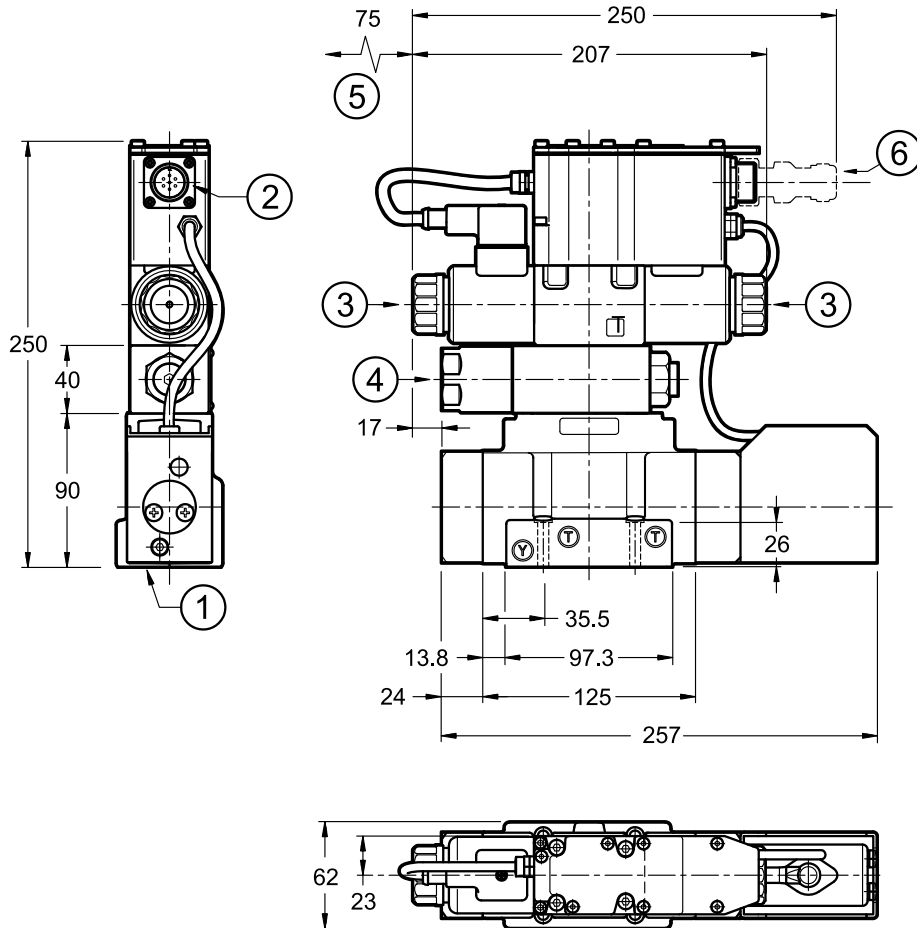
PRESSURES (bar)

Pressure	MIN	MAX
Pilot pressure on X port	30 (NOTE)	350
Pressure on T port with internal drain	-	10
Pressure on T port with external drain	-	250

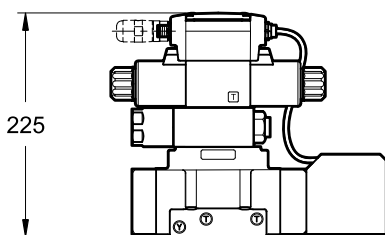
NOTE: The valve works well also with inlet pressure, starting from 10 bar. Low pressure affects response times, that will be slower.

11 - DDPE5RJ - OVERALL AND MOUNTING DIMENSIONS

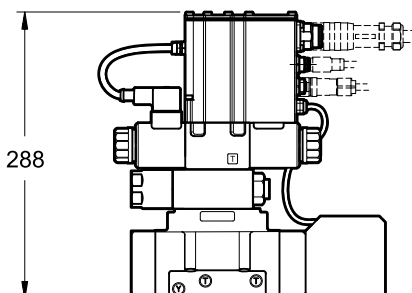
dimensions in mm



DDPE5RJL



DDPE5RJH



NOTES:

- See mounting surface at point 15.
- Do not dismantle 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	Pressure reducing valve
5	Coil removal space
6	Mating connector. To be ordered separately. See catalogue 89 000

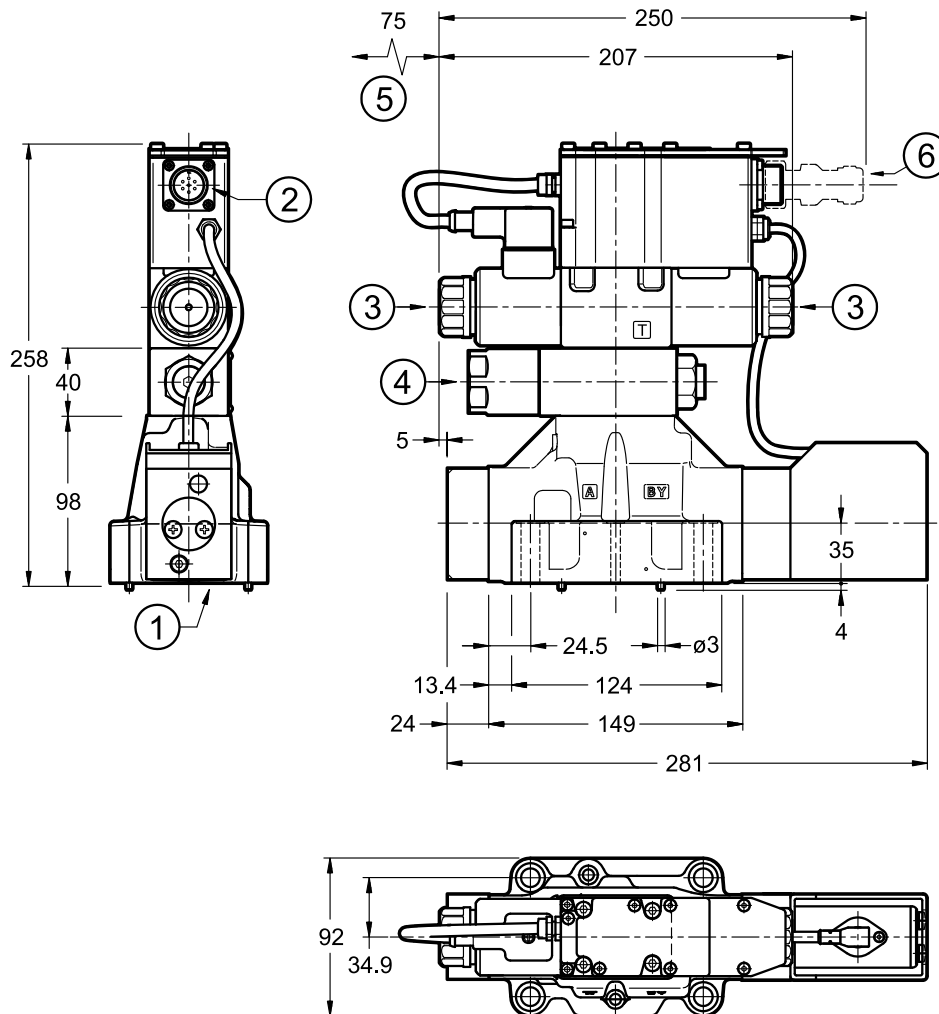
Valve fastening:
4 SHC ISO 4762 screws M6x35

Tightening torque: 8 Nm (A8.8 screws)

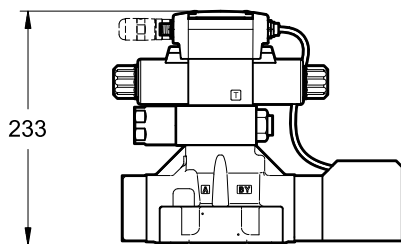
Threads of mounting holes: M6x10

12 - DDPE7J - OVERALL AND MOUNTING DIMENSIONS

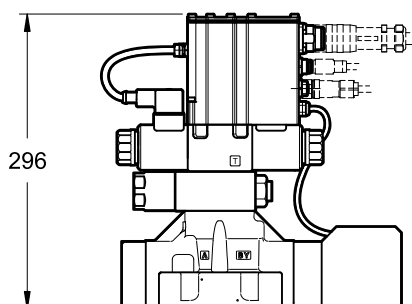
dimensions in mm



DDPE7JL



DDPE7JH



NOTES:

- See mounting surface at point 15.
- Do not dismantle 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	Pressure reducing valve
5	Coil removal space
6	Mating connector. To be ordered separately. See catalogue 89 000

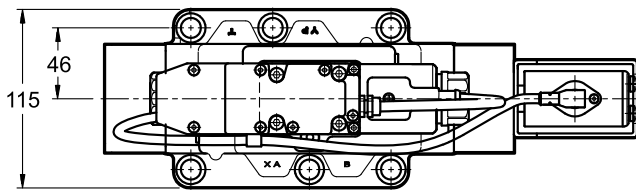
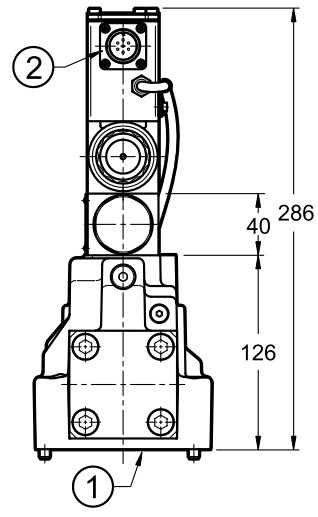
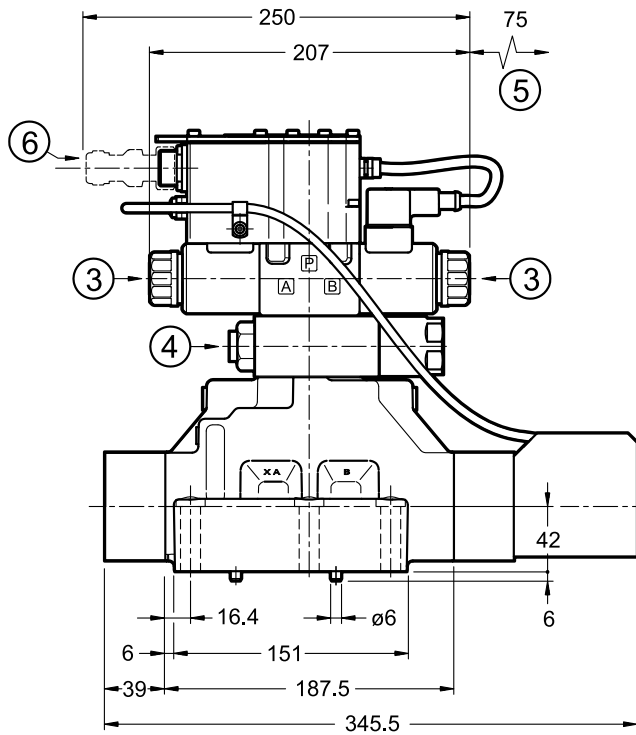
Valve fastening: 4 SHC screws ISO 4762 M10x50
2 SHC screws ISO 4762 M6x50

Tightening torque: M10x50: 40 Nm (A8.8 screws)
M6x50: 8 Nm (A8.8 screws)

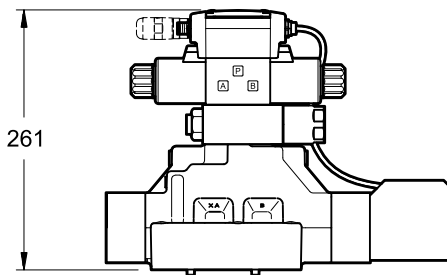
Threads of mounting holes: M6x18; M10x18

13 - DDPE8J/DDPE9J - OVERALL AND MOUNTING DIMENSIONS

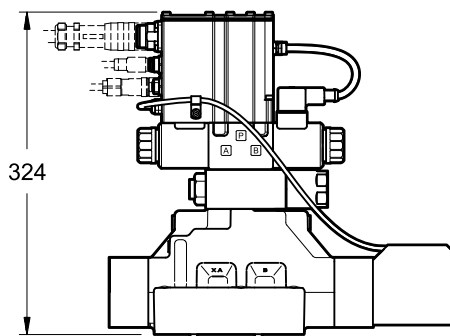
dimensions in mm



DDPE8JL



DDPE8JH



NOTES:

- See mounting surface at point 15.
- Do not dismantle the transducer.

1	Mounting surface with sealing rings: DDPE8J* 4 OR type 3131 (29.82x2.62) - 90 Shore 2 OR type 3087 (20.24x2.62) - 90 Shore DDPE9J* 4 OR type 3150 (37.77x2.62) - 90 Shore 2 OR type 3087 (20.24x2.62) - 90 Shore
2	Main connection 6 pin + PE
3	Manual override embedded in the solenoid tube
4	Pressure reducing valve
5	Coil removal space
6	Mating connector. To be ordered separately. See catalogue 89 000

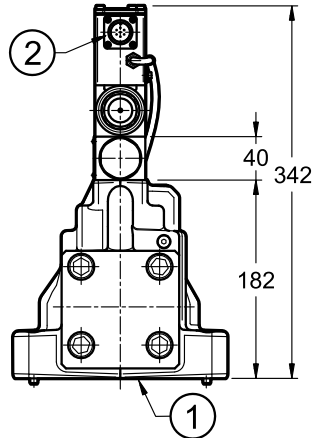
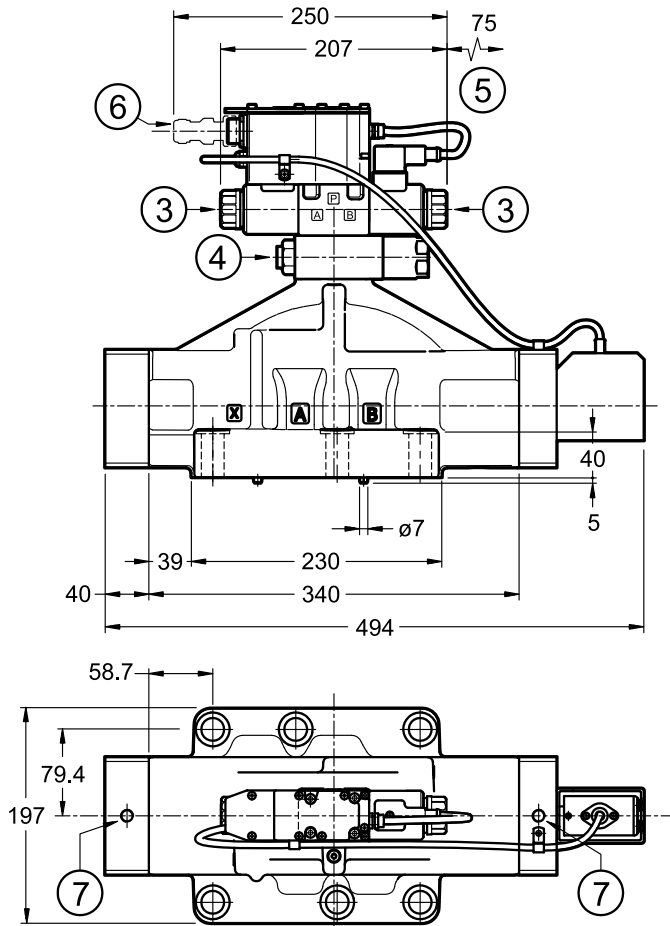
Valve fastening: 6 SHC ISO 4762 screws M12x60

Tightening torque: 69 Nm (A8.8 screws)

Threads of mounting holes: M12x20

14 - DDPE10J / DDPE11J - OVERALL AND MOUNTING DIMENSIONS

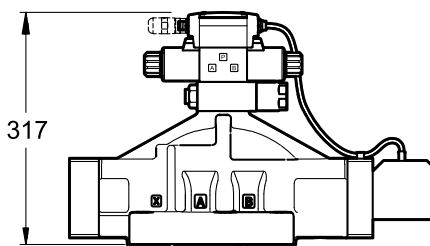
dimensions in mm



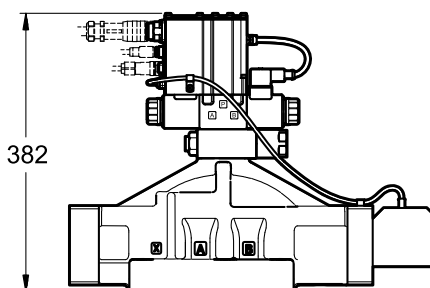
NOTES:

- See mounting surface at point 15.
- Do not dismantle the transducer.

DDPE10JL



DDPE10JH



1	Mounting surface with sealing rings: DDPE10J* 4 OR type 4162 (40.86x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore DDPE11J* 4 OR type 4212 (53.57x3.53) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore
	2
3	Manual override embedded in the solenoid tube
4	Pressure reducing valve
5	Coil removal space
6	Mating connector. To be ordered separately. See catalogue 89 000
7	M12 eyebolt seat for safe lift

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

16 - HYDRAULIC FLUIDS

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

Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

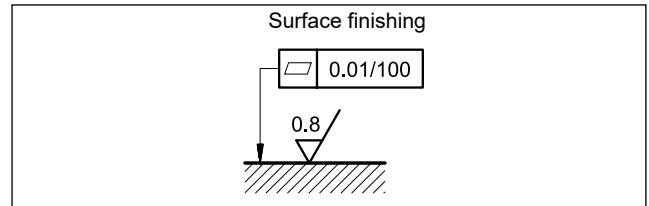
The fluid must be preserved in its physical and chemical characteristics.

17 - INSTALLATION

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.



18 - ACCESSORIES

(to be ordered separately)

18.1 - 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.

18.2 - 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.

18.3 - 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 mm²
- up to 40 m cable length: 1,5 mm² (IO-Link excluded)

Cross section for signals (command, monitor):

- 0,50 mm²

18.4 - 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.

19 - SUBPLATES

(see catalogue 51 000)

No subplates are available for DDPE5RJ*, DDPE9J*, DDPE10J* and DDPE11J*.

	DDPE7J*	DDPE8J*
Type with rear ports	PME07-AI6G	-
Type with side ports	PME07-AL6G	PME5-AL8G
P, T, A, B ports dimensions	1" BSP	1 1/2" BSP
X, Y ports dimensions	1/4" BSP	1/4" BSP



DDPE*J*

DUPLOMATIC
MOTION SOLUTIONS
*a member of **DAIKIN** group*

DUPLOMATIC MS Spa

via Mario Re Depaolini, 24 | 20015 Parabiago (MI) | Italy

T +39 0331 895111 | E vendite.ita@duplomatic.com | sales.exp@duplomatic.com

duplomaticmotionsolutions.com