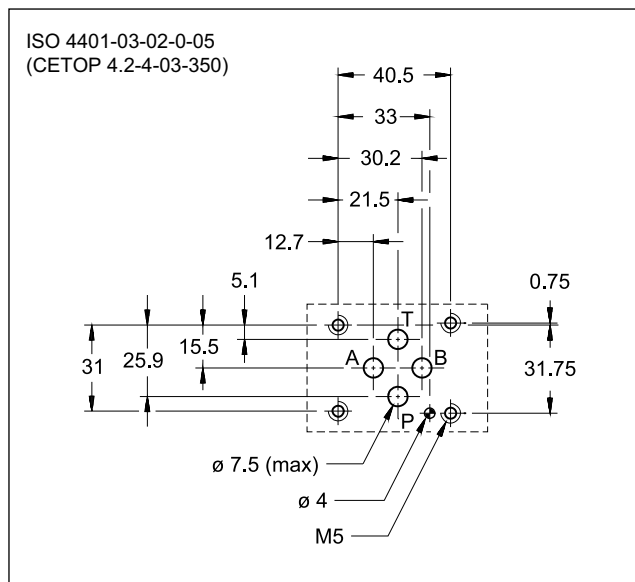# DUPLOMATIC
MOTION SOLUTIONS

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)

ø 7.5 (max)
ø 4
M5

OPERATING PRINCIPLE

B | A

— 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.

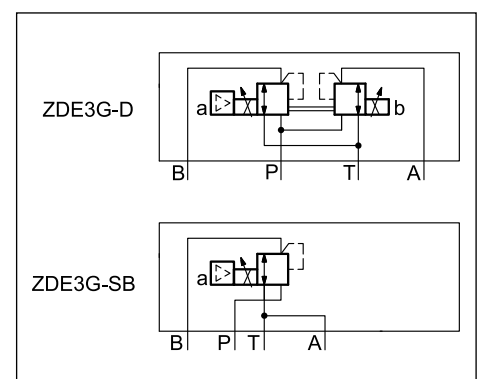— A solenoid current monitoring signal is available.

— 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)

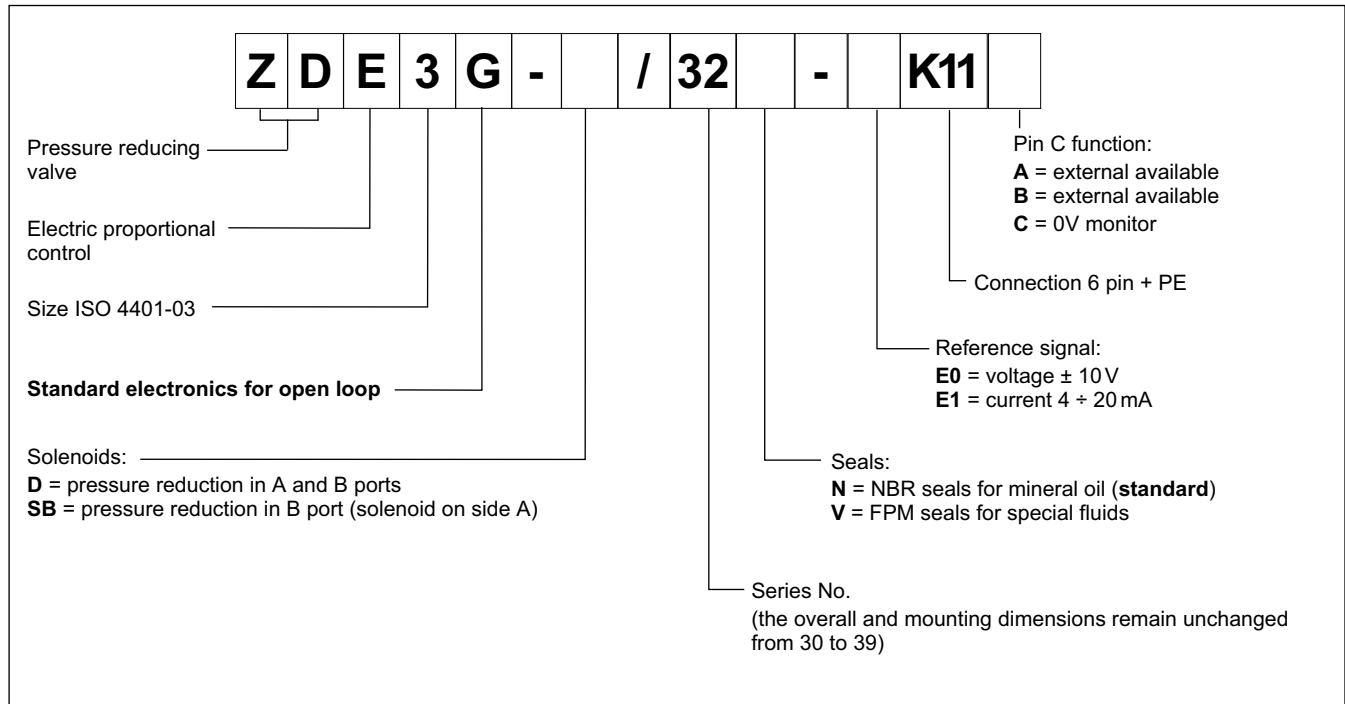|		
Operating pressure range port P	bar	30 ÷ 100
Operating pressure range port T (par. 5)	bar	0 ÷ 30
Controlled pressure	bar	23
Maximum flow	l/min	15
Hysteresis	% Q max	< 3 %
Repeatability	% Q max	< 1 %
Electrical characteristics	see paragraph 2	
Ambient temperature range	°C	-20 / +50
Fluid temperature 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

ZDE3G-D

B   P   T   A

ZDE3G-SB

B   P T   A

1 - IDENTIFICATION CODE

1.1 - Standard

Z	D	E	3	G	-		/32		-	K11	

Pressure reducing valve

Electric proportional control

Size ISO 4401-03

Standard electronics for open loop

Solenoids:
D = pressure reduction in A and B ports
SB = pressure reduction in B port (solenoid on side A)

Pin C function:
A = external available
B = external available
C = 0V monitor

Connection 6 pin + PE

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

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

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

1.2 - Compact version

Z	D	E	3	GL	-		/10		-	K12	/	

Pressure reducing valve

Electric proportional control

Size ISO 4401-03

Digital integrated electronics for open loop - compact box

Solenoids:
D = pressure reduction in A and B ports
SB = pressure reduction in B port (solenoid on side A)

Option: manual override (see par. 7)

Connection 5 pin M12

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

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)

1.3 - Electronics with fieldbus comunication

| Z | D | E | 3 | GH | - | | /32 | - | K16 | / | | | |

Pressure reducing valve

Electric proportional control

Size ISO 4401-03

Digital integrated electronics for open loop with fieldbus communication

Solenoids:
D = pressure reduction in A and B ports
SB = pressure reduction in B port (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
FD = full digital version (on request)

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

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

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

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

Main connection: 11 pin + PE

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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)

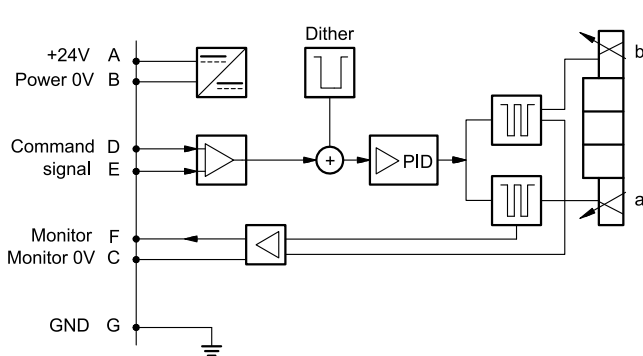### 3.2 - On-board electronics diagrams

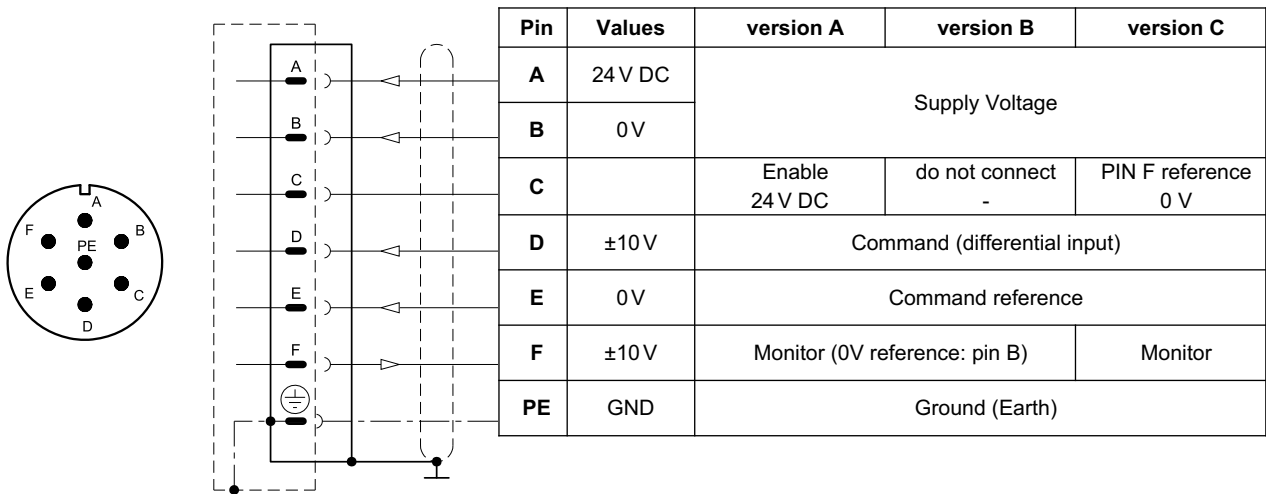**VERSION A** - External Enable
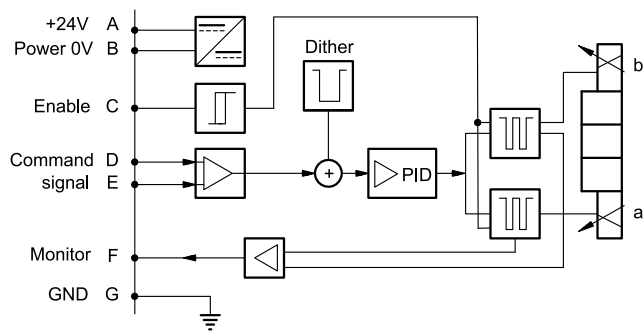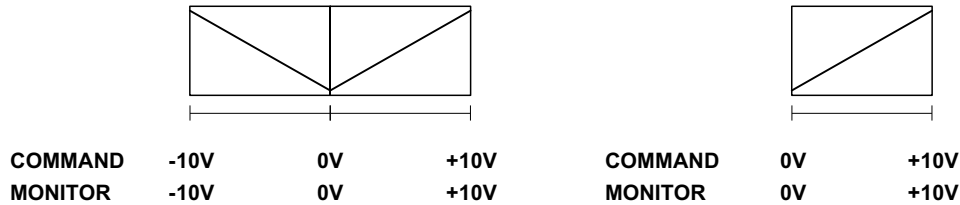

VERSION B - Internal Enable
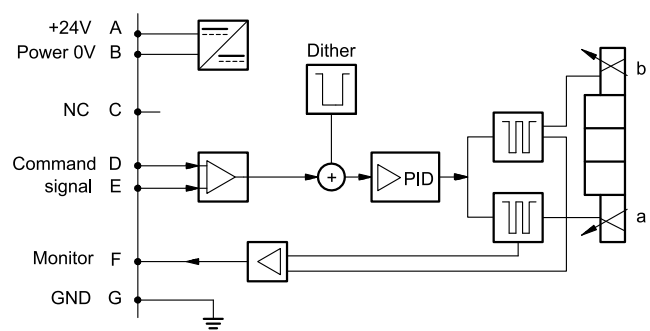
VERSION C - 0V Monitor
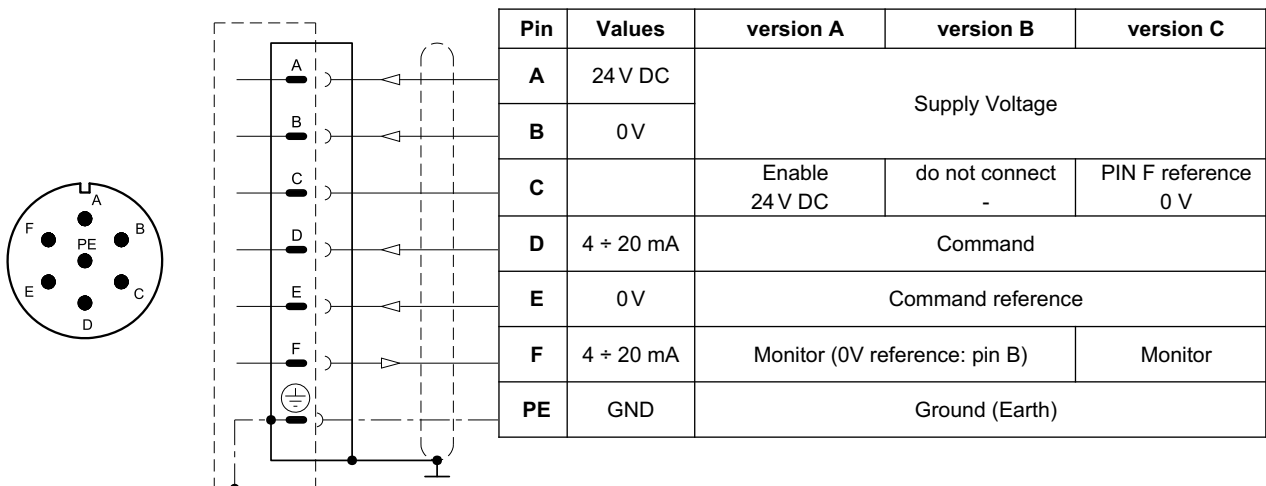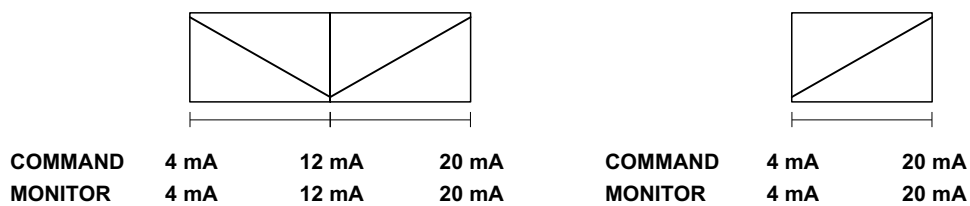
3.3 - Versions with voltage command (E0)

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
MONITOR	-10V	0V	+10V

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	±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
MONITOR	4 mA	12 mA	20 mA

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)		

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4 - ZDE3GL - 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.

4.1 - Electrical characteristics

| Command signal: | voltage (E0) | V DC | ±10 (Impedance Ri = 11 kOhm) |
	current (E1)	mA	4 ÷ 20 (Impedance Ri = 58 Ohm)
Monitor signal (current to solenoid):	voltage (E0)	V DC	0 ÷ 5 (Impedance Ro > 1 kOhm)
	current (E1)	mA	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
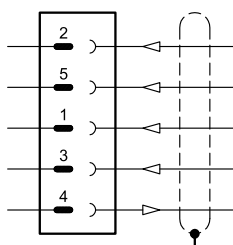
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	± 10 V	Command
3	0V	Command reference
4	0 ÷ 5V	Monitor (0V reference: pin 5)

'E1' connection
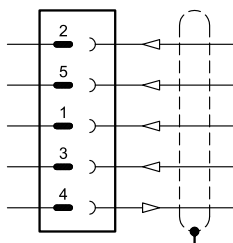
Pin	Values	Function
2	24 V DC	Supply voltage (solenoid and logic)
5	0 V	
1	4 ÷ 20 mA	Command
3	0V	Command reference
4	4 ÷ 20 mA	Monitor (0V reference: pin 5)

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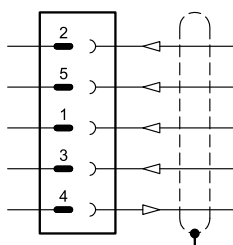
Pin	Values		Function
2	2L+	24 V DC	Supply of the power stage
5	2L-	0 V (GND)	Internal galvanic isolation from PIN 3
1	1L+	+24 V DC	IO-Link supply voltage
3	1L-	0 V (GND)	
4	C/Q		IO-Link Communication

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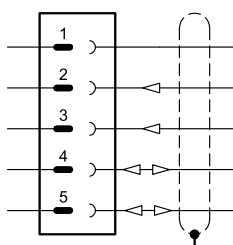
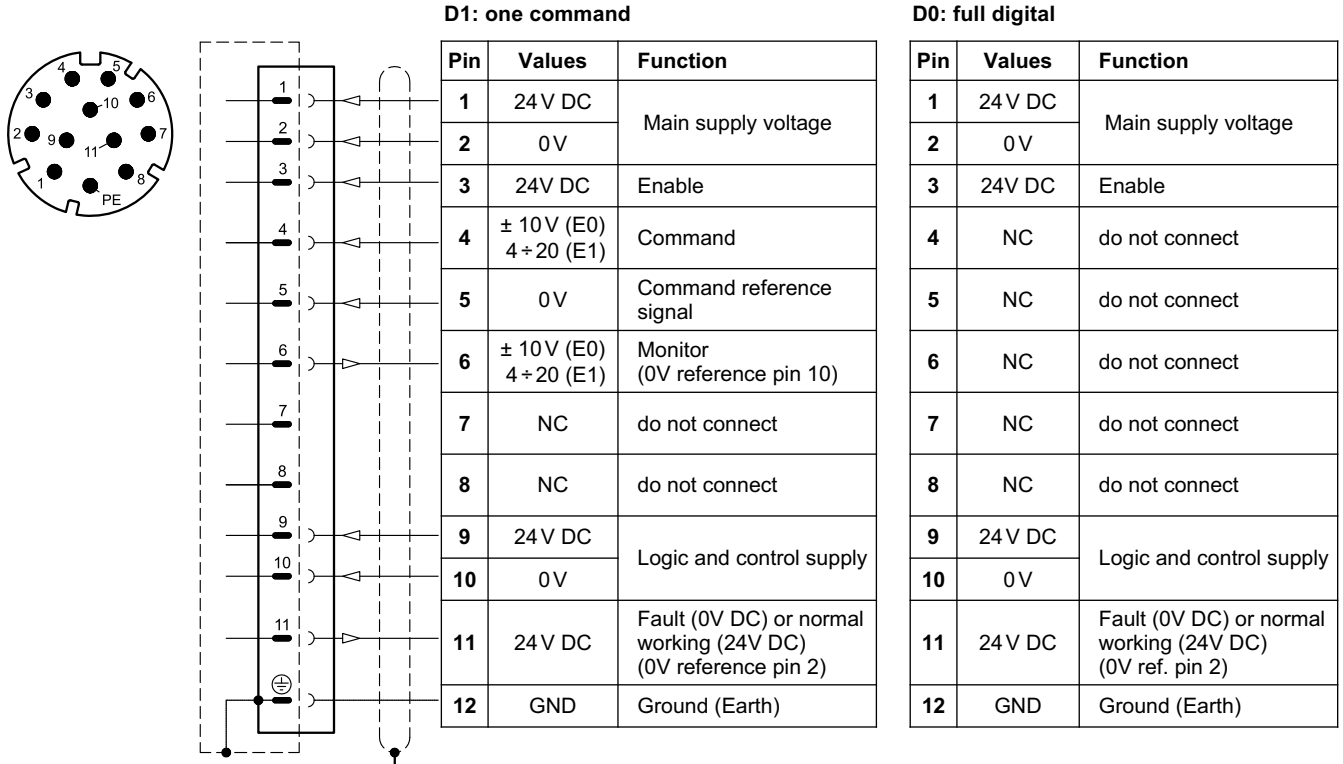| Pin	Values	Function
1	CAN_SH	Shield
2	24 V DC	Supply voltage
3	0 V (GND)	
4	CAN H	Bus line (high)
5	CAN_L	Bus line (low)

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

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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	

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.

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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

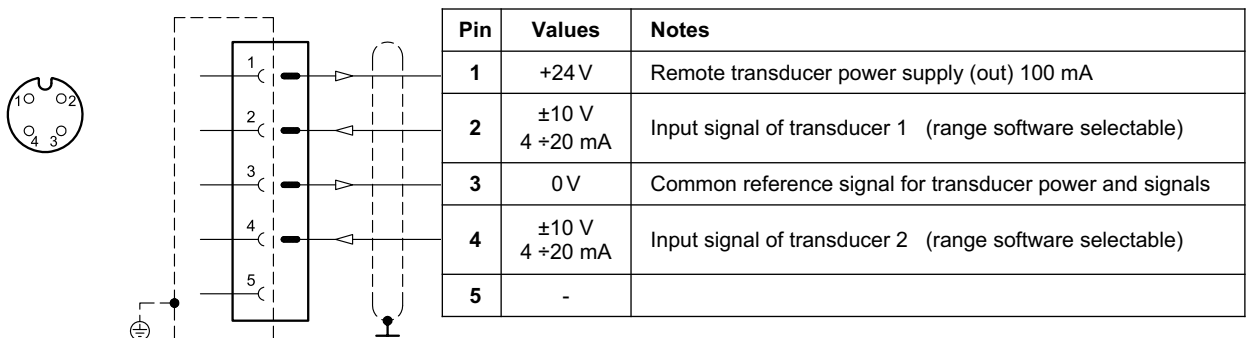| Pin	Values	Function	Notes
1	ENC_Z+	input channel Z+	Input - digital signal
2	ENC_Z-	input channel Z-	
3	ENC_A+	input channel A+	
4	ENC_A-	input channel A+	
5	ENC_B+	input channel B+	
6	ENC_B-	input channel B+	
7	+5 V	transducer power supply	Output power supply
8	0 V	-	Common GND

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)

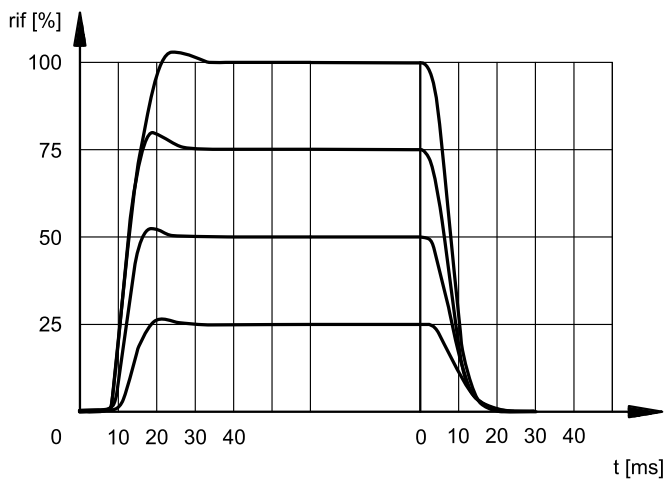| Pin	Values	Notes
1	+24 V	Remote transducer power supply (out) 100 mA
2	±10 V 4 ÷20 mA	Input signal of transducer 1 (range software selectable)
3	0 V	Common reference signal for transducer power and signals
4	±10 V 4 ÷20 mA	Input signal of transducer 2 (range software selectable)
5	-	

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)
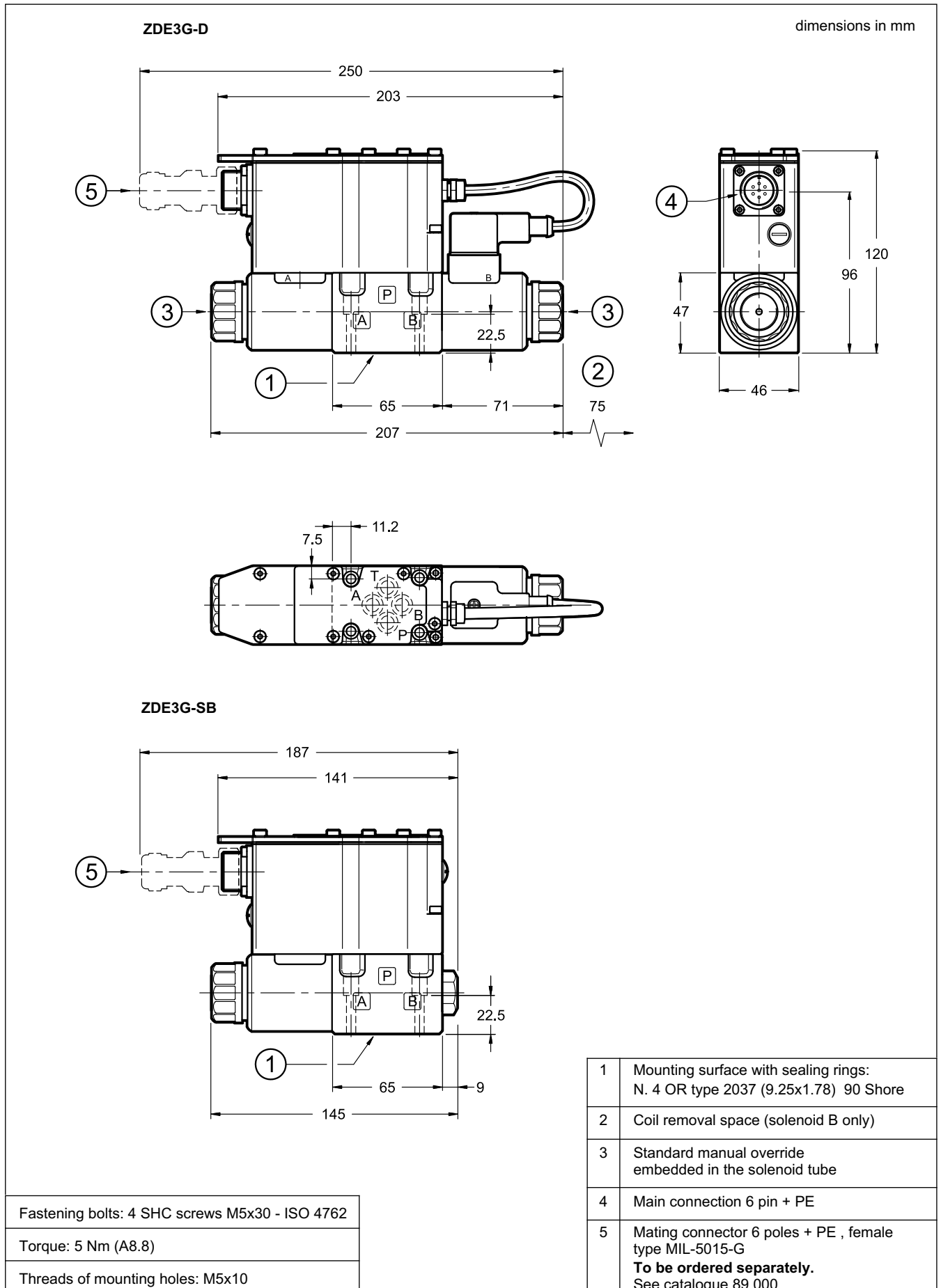
PRESSURE DROP Δp = f(Q)
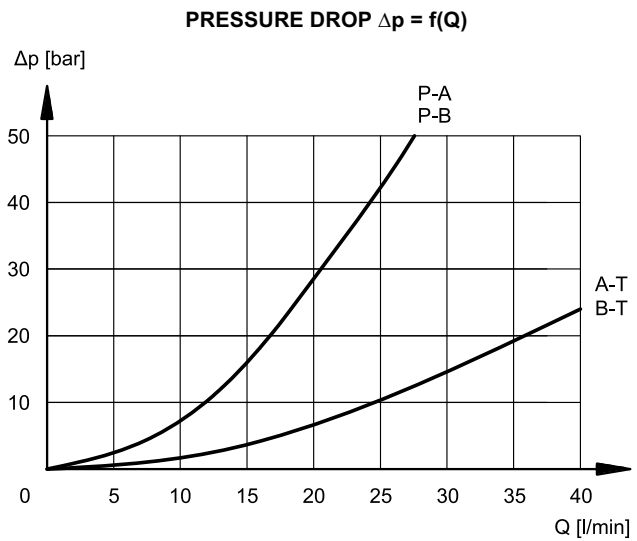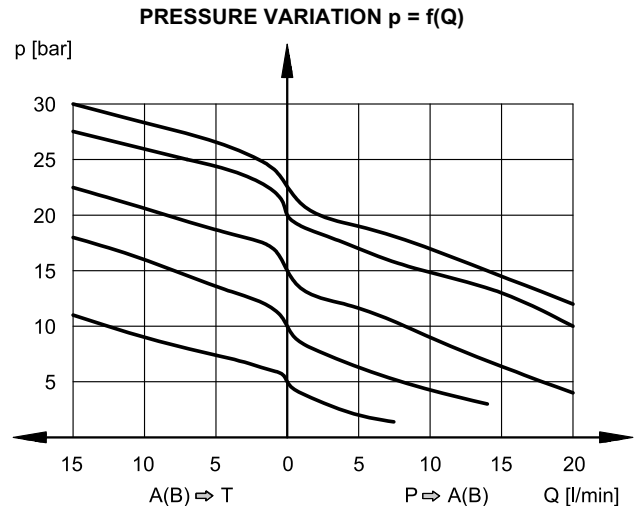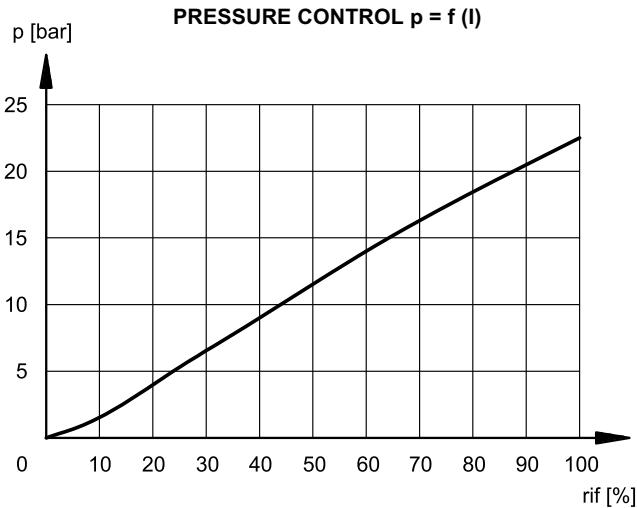
7 - STEP RESPONSE

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.
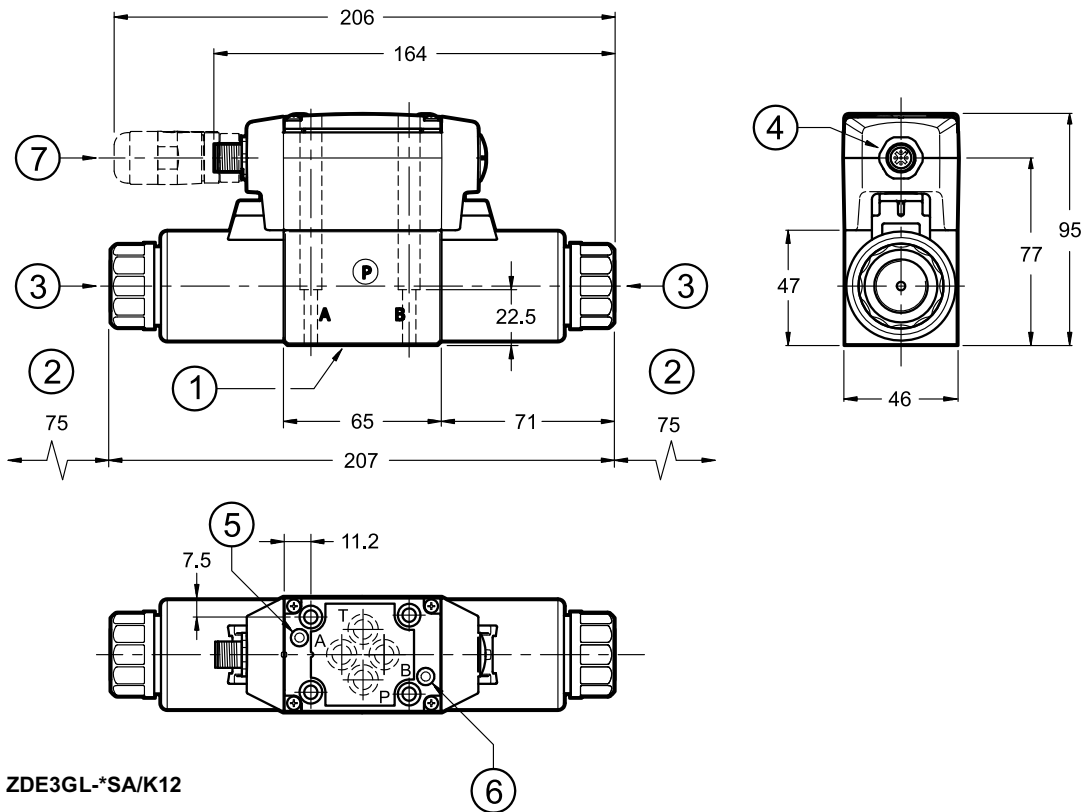
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8 - ZDE3G - OVERALL AND MOUNTING DIMENSIONS

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

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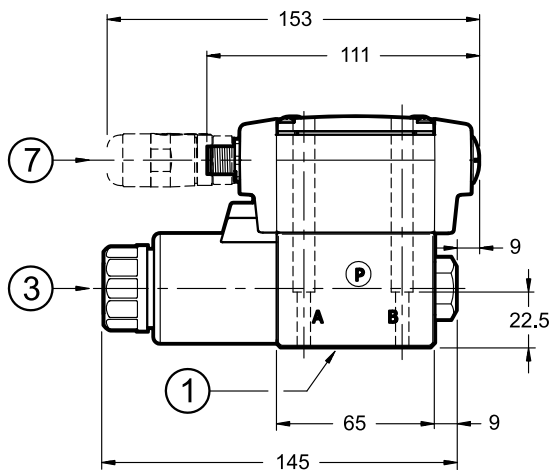
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9 - ZDE3GL - OVERALL AND MOUNTING DIMENSIONS

ZDE3GL-/K12**

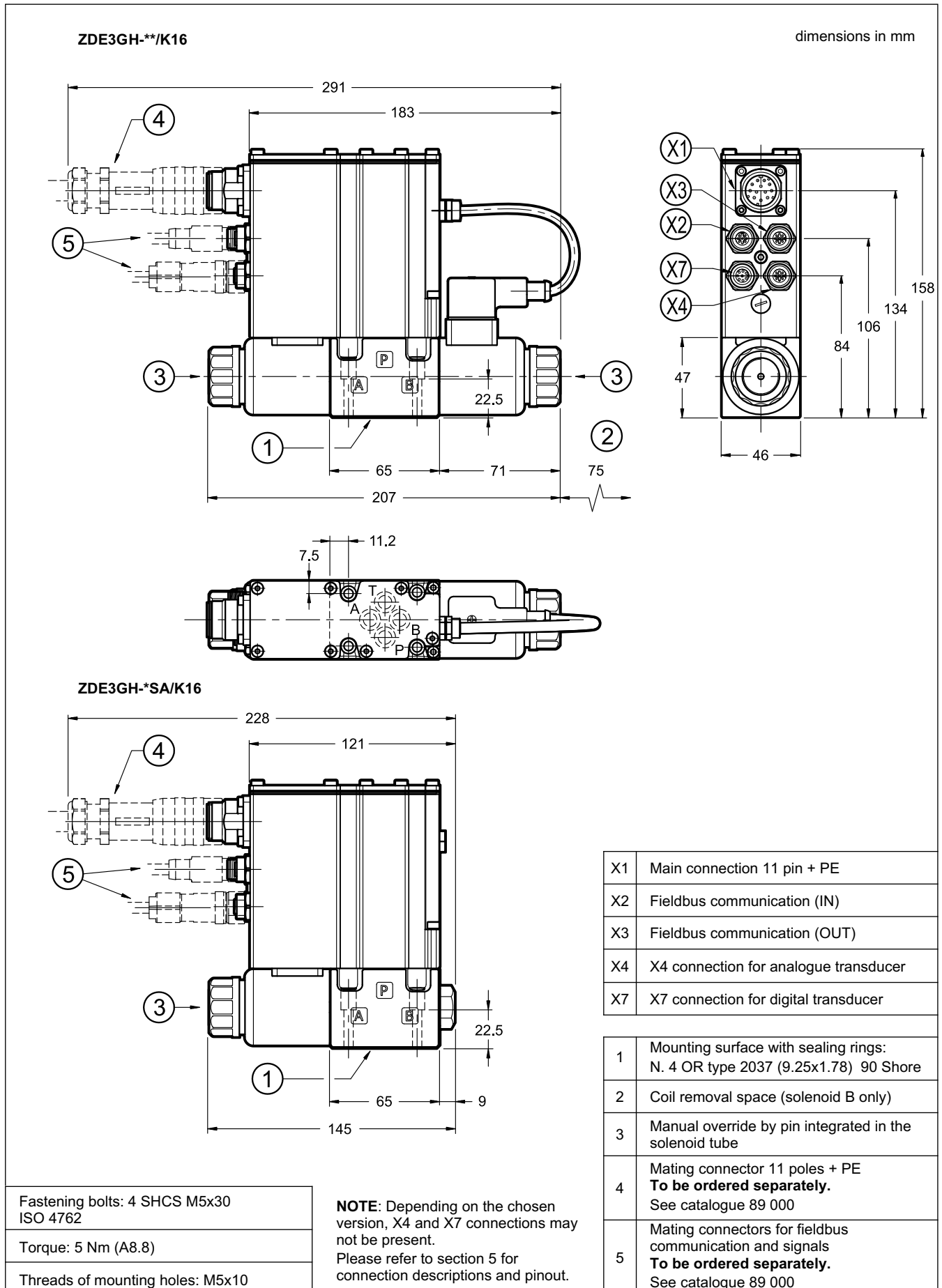**ZDE3GL-*SA/K12**

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

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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.

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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	CS Version
95	max stroke 97.2
Code: 3803210003	Code: 3803210004
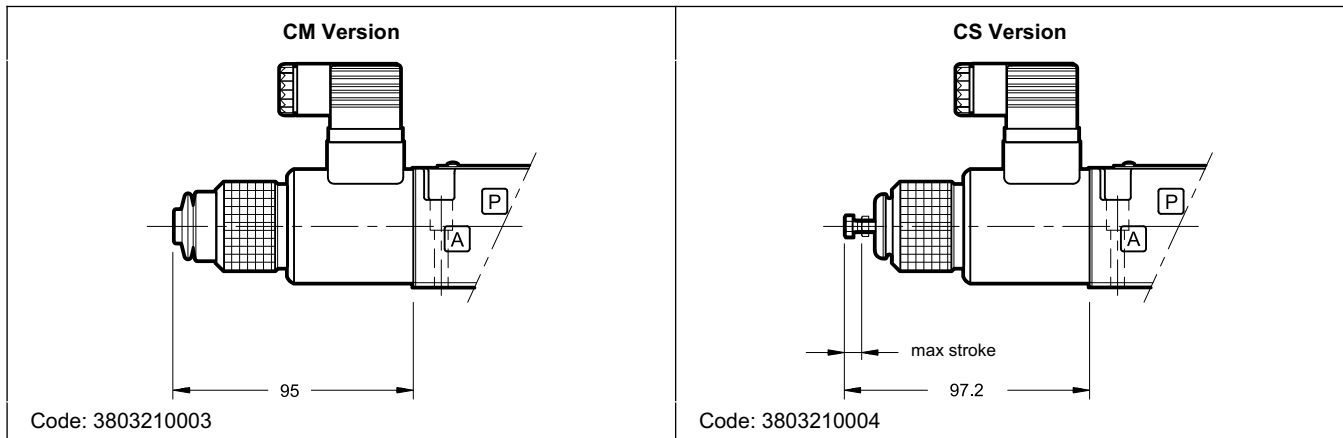
12 - HYDRAULIC FLUIDS

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

0.01/100

0.8
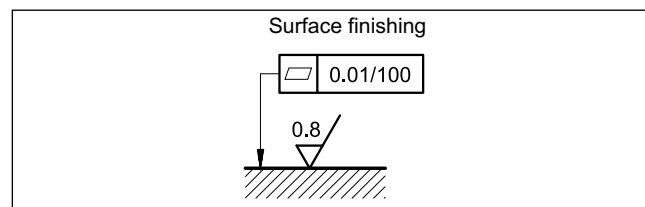
14 - ACCESSORIES
(to be ordered separately)

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

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