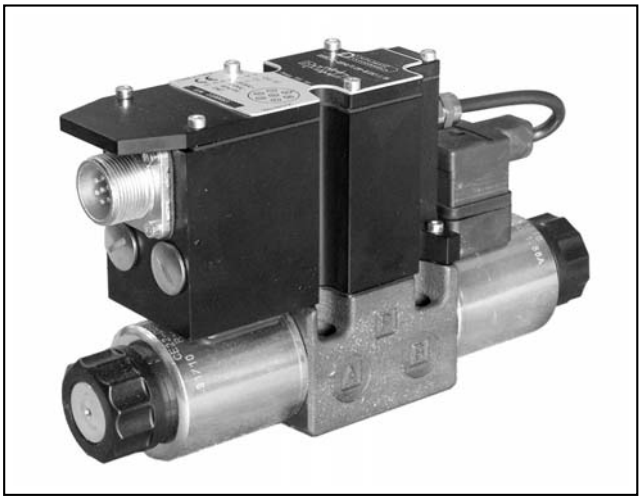


ZDE3G

DIRECT OPERATED REDUCING VALVE WITH PROPORTIONAL CONTROL AND INTEGRATED ELECTRONICS

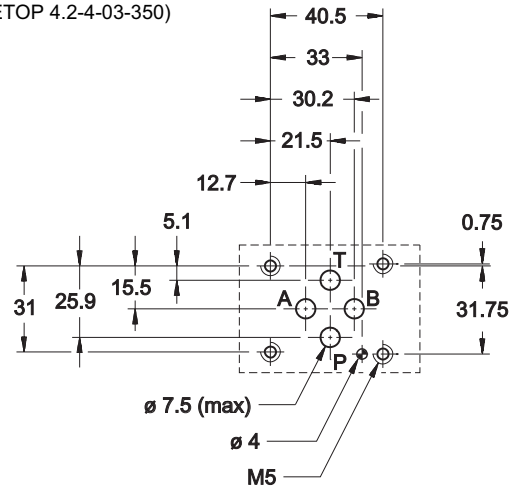
SERIES 30

SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

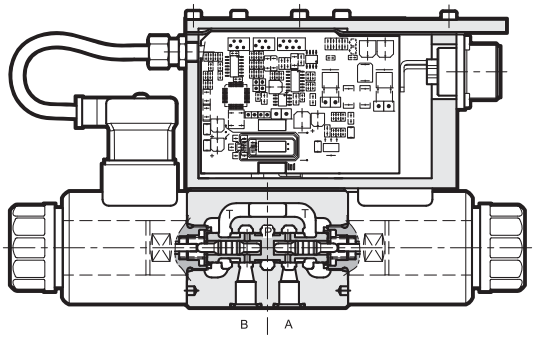
p max **100** bar
Q max **15** l/min

SUBPLATE MOUNTING

ISO 4401-03-02-0-05
(CETOP 4.2-4-03-350)



OPERATING PRINCIPLE



— The ZDE3G are direct operated pressure valves with electric proportional control and integrated electronics and with mounting interface in compliance with ISO 4401 (CETOP RP121H) standards.

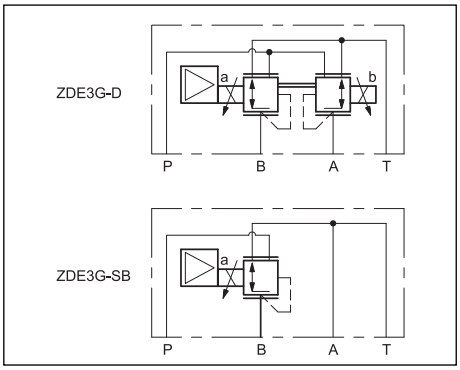
— The valves are used to reduce pressure in the secondary circuit branches thus ensuring stability of controlled pressure in the event of variations of the flow rate through the valve..

— They are controlled directly by an integrated digital amplifier (see par. 4).

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

Pressure allowed on P port	bar	30 ÷ 100
Pressure allowed on T port (see par. 6)	bar	0 ÷ 30
Controlled pressure	bar	23
Maximum flow	l/min	15
Hysteresis	% Q_{max}	< 3 %
Repeatability	% Q_{max}	< 1 %
Electrical characteristics	see paragraph 4	
Ambiente 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

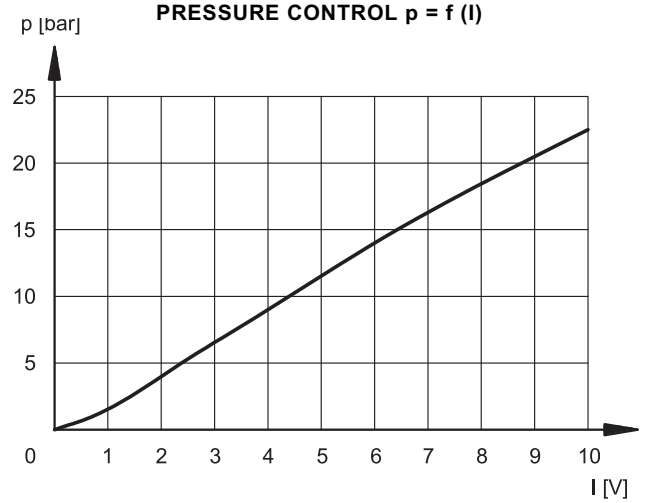
Z	D	E	3	G	-		/	30		-		K11	/		/	

- Pressure reducing valve
- Electric proportional control
- Dimensione ISO 4401-03 (CETOP 03)
- Integrated electronics for open loop
- 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 0 / +10 V
  E1 = current 4 / 20 mA
- Main connector 6 pin + PE
- **B** = standard version
  C = with CAN connection
- Manual override (see par. 9)

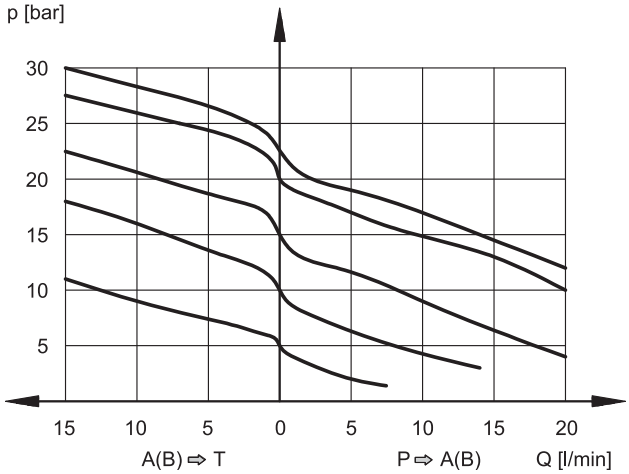
2 - CHARACTERISTIC CURVES (obtained with oil with viscosity 36 cSt at 50°C)

Adjustment characteristics depending from solenoid current supply, obtained with inlet pressure = 100 bar.

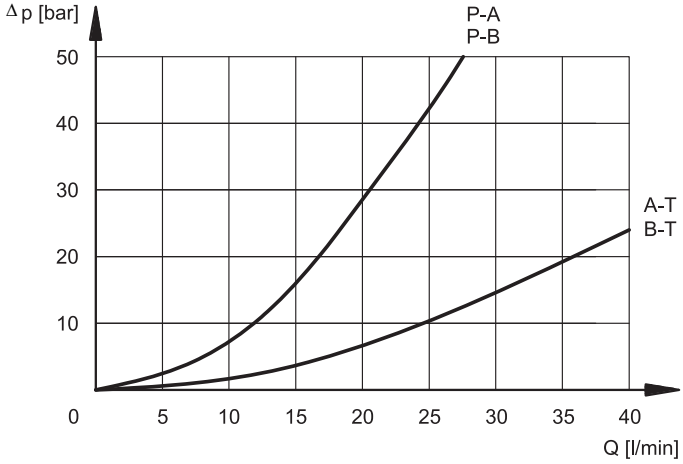
PRESSURE CONTROL p = f (I)



PRESSURE VARIATION p = f(Q)



PRESSURE DROP Δp = f(Q)



3 - STEP RESPONSE

Response times are obtained with an inlet pressure of 100 bar and a pressure oil volume of 0,5 lt. The response time is affected both by the flow rate and the oil volume in the pipework.

STEP RESPONSE (±10%) [ms]	
0 → 100%	100% → 0
30	20

4 - ELECTRICAL CHARACTERISTICS

4.1 - Digital integrated electronics

The proportional valve is controlled by a digital amplifier (driver), which incorporates a microprocessor that controls, via software, all the valve functions, such as:

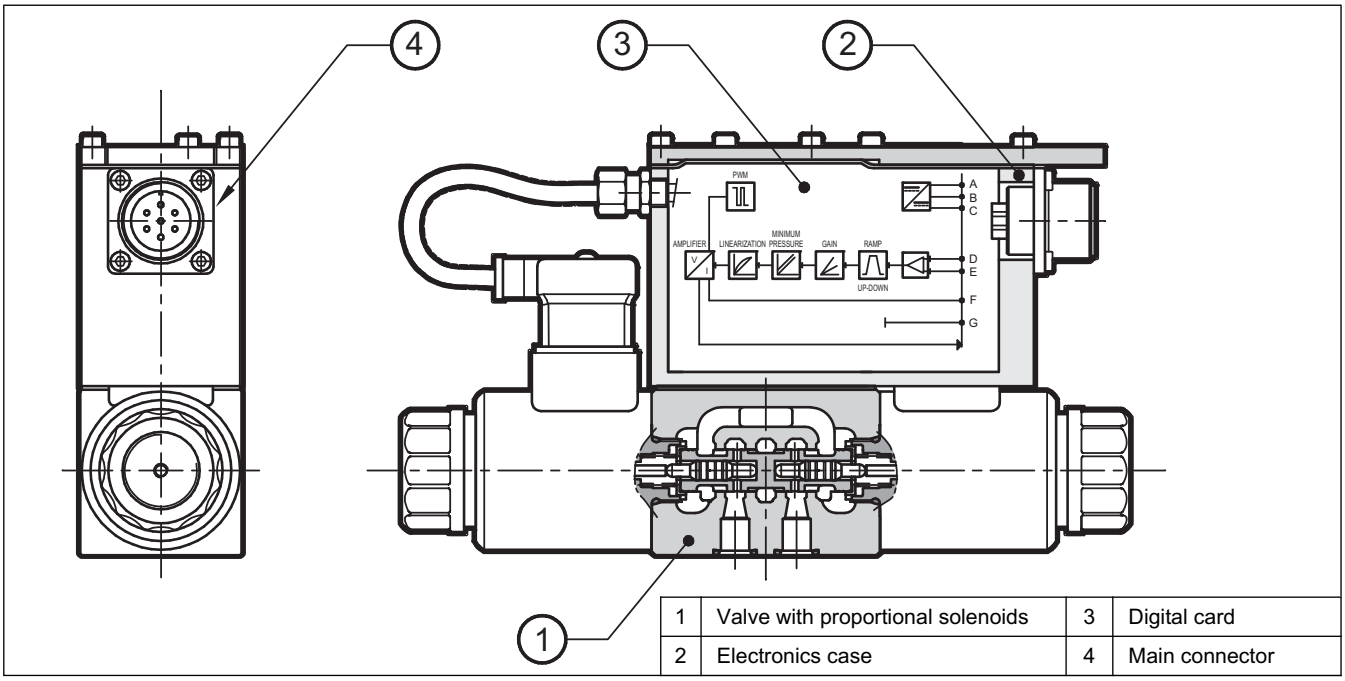
- continuous converting (0,5 ms) of the voltage reference signal (E0) or of the current reference signal (E1) in a digital value
- generation of up and down ramps (see **NOTE**)
- gains limit (see **NOTE**)
- compensation of the dead band
- linearization of the characteristic curve
- regulation of the current to the solenoid
- dynamic regulation of PWM frequency
- protection of the solenoid outputs against possible short circuits

NOTE: These parameters can be set through the connection to the CAN connector, by means of a personal computer and relevant software (see par. 5.3)

The digital driver enables the valve to reach better performance compared to the analogic version, such as:

- reduced hysteresis and better repeatability
- reduced response times
- linearization of the characteristic curve which is optimised in factory for each valve
- complete interchangeability in case of valve replacement
- possibility to set, via software, the functional parameters
- possibility to interface a CAN-Open network
- possibility to perform a diagnostic program by means of the CAN connection
- high immunity to electromagnetic troubles

4.2 - Functional block diagram



1	Valve with proportional solenoids	3	Digital card
2	Electronics case	4	Main connector

4.3 - Electrical characteristics

NOMINAL VOLTAGE	V DC	24 (from 19 to 35 VDC, ripple max 3 Vpp)
ABSORBED POWER	W	50
MAXIMUM CURRENT	A	1,88
DUTY CYCLE		100%
VOLTAGE SIGNAL (E0)	V DC	±10 (Impedence Ri > 50KΩ)
CURRENT SIGNAL (E1)	mA	4 ÷ 20 (Impedence Ri = 500 Ω)
ALARMS		Overload and electronics overheating
COMMUNICATION		Interface of the optoisolated industrial Field-bus type CAN-Bus ISO 11898
MAIN CONNECTOR		7 - pin MIL-C-5015-G (DIN 43563)
CAN-BUS CONNECTOR		M12-IEC 60947-5-2
ELECTROMAGNETIC COMPATIBILITY ((EMC) emissions CEI EN 61000-6-4 immunity CEI EN 61000-4-2		According to 2004/108/CE standards
PROTECTION AGAINST ATMOSPHERIC AGENTS :		IP67 (CEI EN 60529 standards)

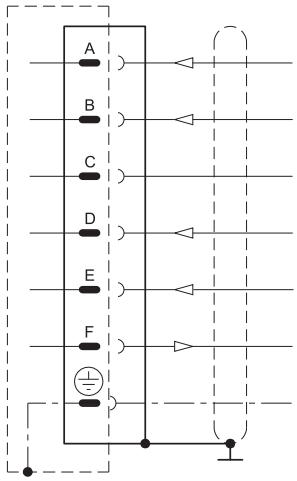
5 - OPERATING MODALITIES

The digital driver of ZDE3G valve may be used with different functions and operating modalities, depending on the requested performances.

5.1 -Standard version with voltage reference signal (E0)

This is the most common version; it makes the valve completely interchangeable with the traditional proportional valves with analogue type integrated electronics. The valve has only to be connected as indicated below. This version doesn't allow the setting of the valve parameters, for example the ramps must be performed in the PLC program, as well as the reference signal limit.

E0 connection scheme (B version - E0)



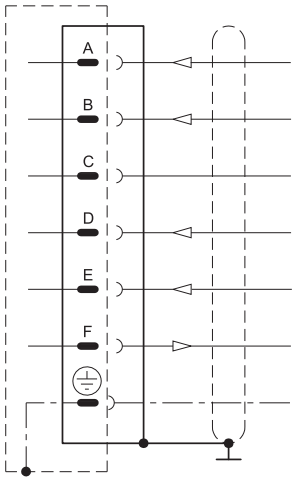
Pin	Values	Function	NOTES
A	24 VDC	Voltage	from 19 to 35 VDC (ripple max 3 Vpp) (see **NOTE 3**)
B	0 V	Power supply (zero)	0 V
C	----	Not used	----
D	± 10 V	Input rated command	Impedence R_i > 50 kΩ (see **NOTE 1**)
E	0 V	Input rated command	----
F	± 10 V	Coil current	± 100% I_{MAX} (see **NOTE 2**)
PE	GND	Protective ground	----

5.2 - Standard version with current reference signal (E1)

This version has characteristics which are similar to the previous one, with the difference that in this case the reference signal is supplied in current 4 - 20 mA. With the 12 mA signal the valve is in central position, with the 20 mA signal the valve performs the configuration P-A and B-T, while with 4 mA the configuration is P-B and A-T. For "SA" single solenoid valves, with reference 20 mA to pin D, the valve full opening is P-B and A-T, while with 4 mA the valve is at rest. This configuration may be modified via software.

If the current to solenoid is lower, than the card shows a BREAKDOWN CABLE error. To reset the error switch-off the supply.

E1 connection scheme (B version - E1)



Pin	Values	Function	NOTES
A	24 VDC	Voltage	from 19 to 35 VDC (ripple max 3 Vpp) (see **NOTE 3**)
B	0 V	Power supply (zero)	0 V
C	----	Not used	----
D	4 ÷ 20 mA	Input signal	Impedence R_i = 500 Ω
E	0 V	Zero reference	----
F	± 10 V	Coil current	± 100% I_{MAX} (see **NOTE 2**)
PE	GND	Protective ground	----

NOTE 1: The input signal is differential type. For double solenoid valves, with positive reference signal connected to pin D, the valve opening is P - A and B - T. With zero reference signal the valve is in central position. For "SA" single solenoid valves, with positive reference to pin D, the valve opening is P-B and A-T. The spool stroke is proportional to U_D - U_E. If only one input signal (single-end) is available, the pin B (0V power supply) and the pin E (0V reference signal) must be connected through a jumper and both connected to GND, electric panel side.

NOTE 2: read the test point pin F in relation to pin B (0V).

NOTE 3: preview on the Pin A (24 VDC) an external fuse for protecting electronics. Fuse characteristics: 5A/50V type fast.

NOTE for the wiring: connections must be made via the 7-pin plug mounted on the amplifier. Recommended cable sizes are 0,75 mm^2 for cables up to 20m and 1,00 mm^2 for cables up to 40m, for power supply. The signal cables must be 0,50 mm^2 . A suitable cable would have 7 cores, a separate screen for the signal wires and an overall screen.

5.3 - Version with parameters set by means of CAN connector (version C)
This version enables the setting of some parameters of the valve, by connecting the CAN connector to a traditional computer.

To do this, it is necessary to order the interface device for USB port CANPC-USB/20, cod. 3898101002, with the relevant configuration software, the communication cable (L=3 meters) and an hardware converter for connecting the valve to the PC USB port. The software is Microsoft Windows XP© compliant.

The parameters that can be set are described below:

Maximun current (Gain regulation)
Imax A and Imax B set the maximun current to the solenoid A corresponding to the positive value of the input reference. This parameter allows the reduction of the valve flow rate with the maximum reference.

Default value = 100% of full scale

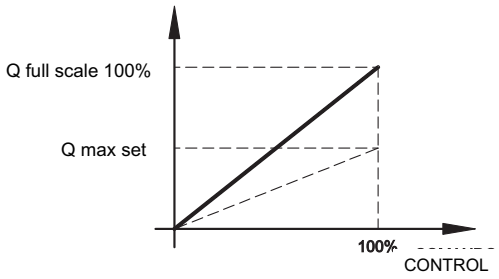
Range: from 100% to 50% of full scale

PWM Frequency
Sets the PWM frequency, which is the pulsating frequency of the control current. The PWM decrease improves the valve accuracy, decreasing the regulation stability.

The PWM increase improves the regulation stability, causing a higher hysteresis.

Default value = 300 Hz

Range 50 ÷ 500 Hz



Ramps
Increase time of Ramp R1 - solenoid A: sets the current increase time for a variation from 0 to 100% of the input reference from zero to -10V.

Decrease time of Ramp R2 - solenoid A: sets the current decrease time for a variation from 100 to 0% of the input reference from -10V to zero.

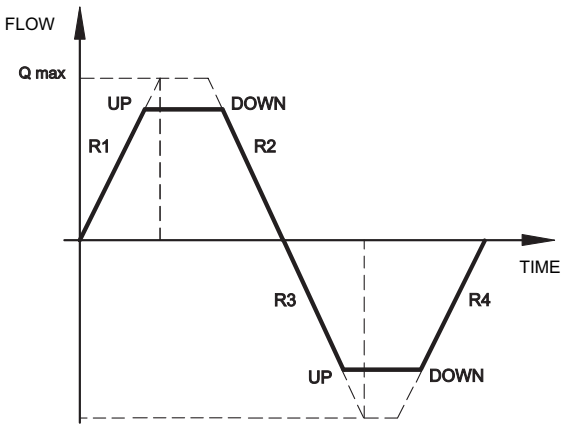
Increase time of Ramp R3 - solenoid B: sets the current increase time for a variation from 0 to 100% of the input reference from zero to -10V.

Decrease time of Ramp R4 - solenoid B: sets the current decrease time for a variation from 100 to 0% of the input reference from -10V to zero.

Min time = 0,001 sec

Max time = 40,000 sec

Default time = 0,001 sec.



Diagnostics
Provides several information parameters, such as:

· The electronic driver status (Working or Broken)
· The active regulation
· Input reference
· Current value

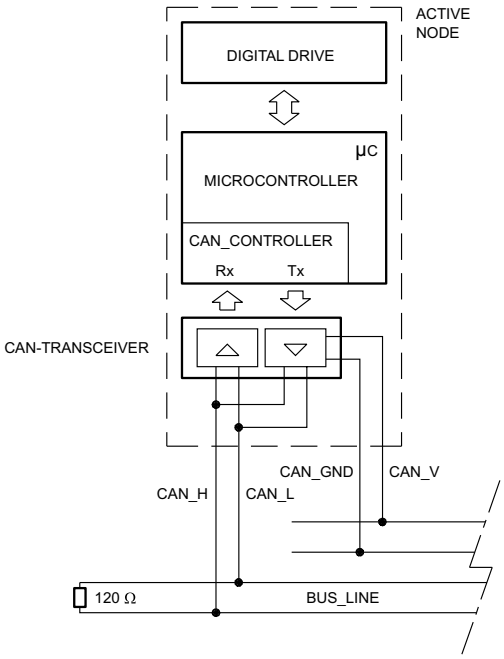
5.4 - Version with CAN-Bus interface (version C)
This version allows the valve piloting through the industrial field bus CAN-Open, according to ISO 11898 standards.

The CAN connector must be connected (see scheme) as a slave node of the CAN-Open bus, while the main connector is wired only for the power supply (pin A and B + earth).

The most important characteristics of a CAN - Open connection are:

- Parameter storage also in PLC
- Parameters setting in real-time (PDO communication)
- On-line valve diagnostics
- Easy wiring with the serial connection
- Communication program according to international standards

For detailed information on the CAN-Open communication software, see cat. 89 800.



CAN connector connection scheme

Pin	Values	Function
1	CAN_SHLD	Monitor
2	CAN +24VDC	BUS + 24 VDC (max 30 mA)
3	CAN 0 DC	BUS 0 VDC
4	CAN_H	BUS line (high signal)
5	CAN_L	BUS line (low signal)

N.B. Insert a 120Ω resistance on pin 4 and 5 of the CAN connector when the valve is the closure knot of the CAN network.

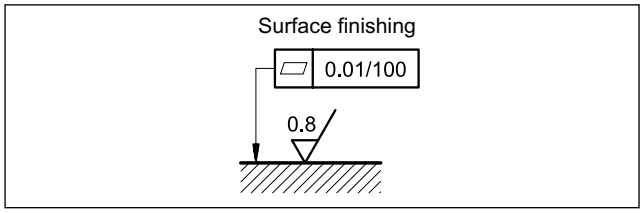
6 - INSTALLATION

The 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.



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).

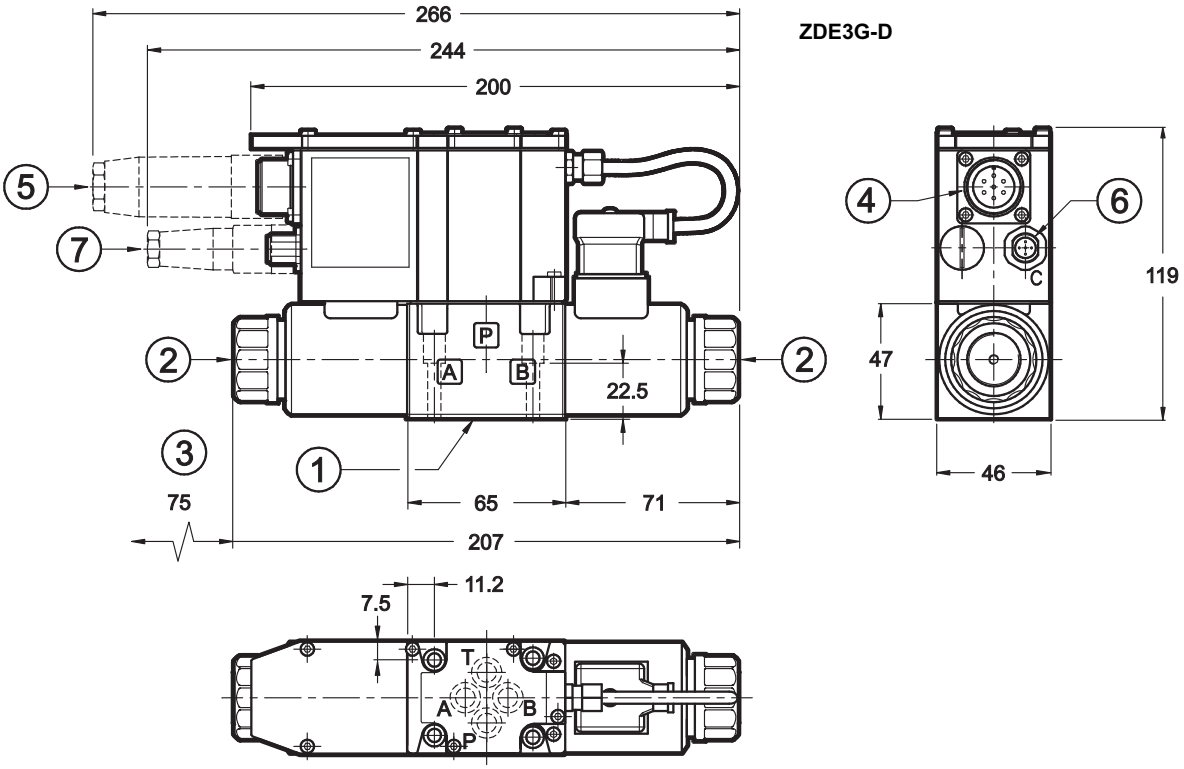
For fluids HFDR type (phosphate esters) use FPM seals (code V).

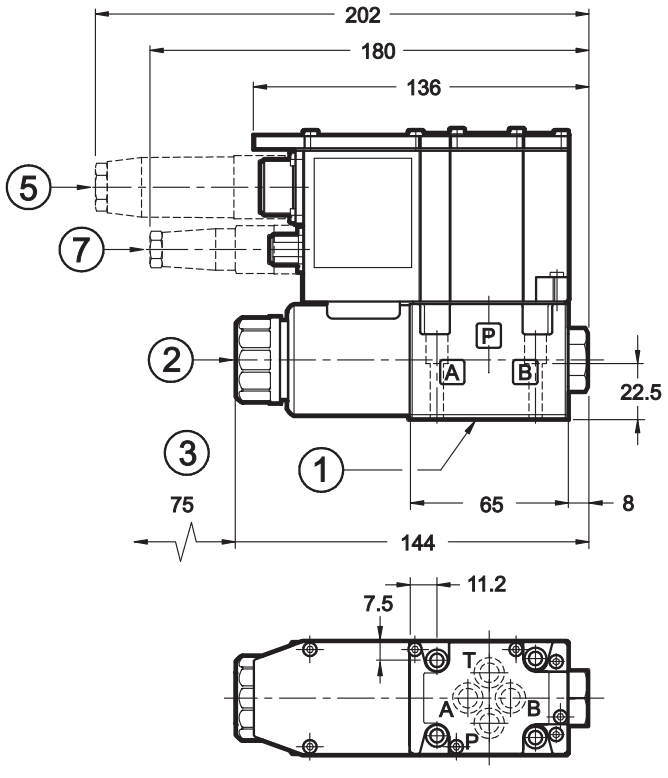
For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department.

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 - OVERALL AND MOUNTING DIMENSIONS





Fastening bolts: n° 4 bolts A8.8 M5x30

Torque: 5 Nm

dimensions in mm

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) - 90 Shore
2	Locking ring with integrated manual override
3	Coil removal space
4	Main connection
5	Electrical connector 7 pin DIN 43563 - IP67 PG11 EX7S/L/10 code 3890000003 (**to be ordered separately**)
6	CAN-Bus connection (**only for version C**)
7	Electrical connector 5 pin M12 - IP67 PG7 EC5S/M12L/10 code 3491001001 only for version C (**to be ordered separately**)

9 - MANUAL OVERRIDE

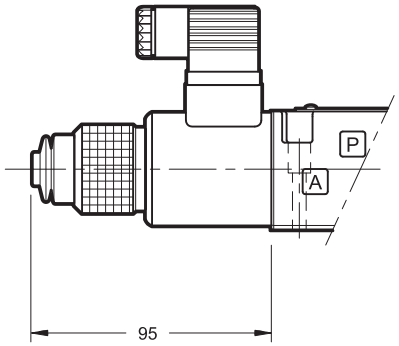
The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Two different manual override version are available upon request:

- **CM** version, manual override belt protected
- **CS** version, 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



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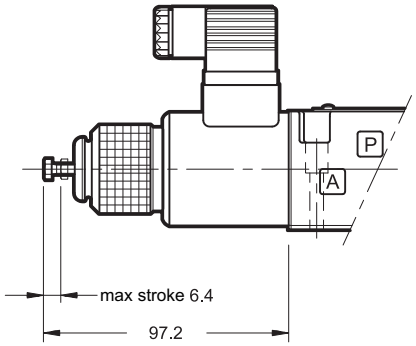
CS Version



Code: 3803210004

10 - 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 OLEODINAMICA

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

ZEUS
HYDRATECH LTD

ZEUS HYDRATECH LTD

ZEUS
HYDRATECH LTD

T: (01270) 898594
E: oliver@zeushydratech.com
www.zeushydratech.com
Building 1, Radway Green, Cheshire, CW2 5PR