



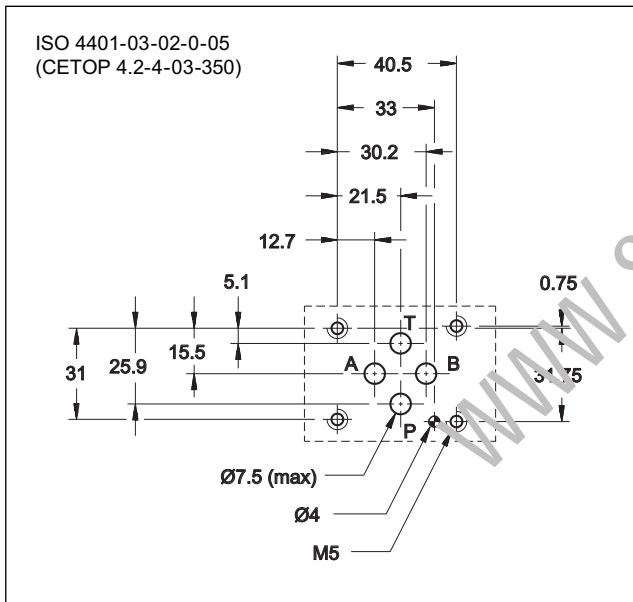
DSE3

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL SERIES 11

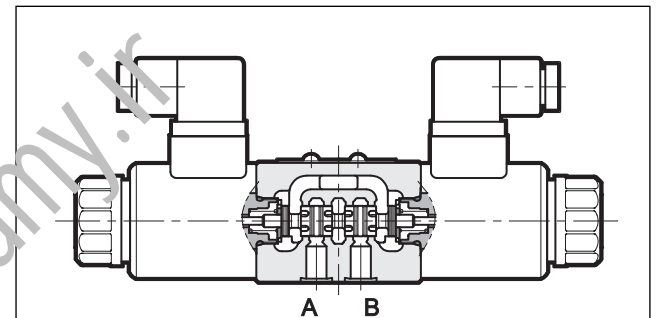
**SUBPLATE MOUNTING
ISO 4401-03**

p max 350 bar
Q max 40 l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



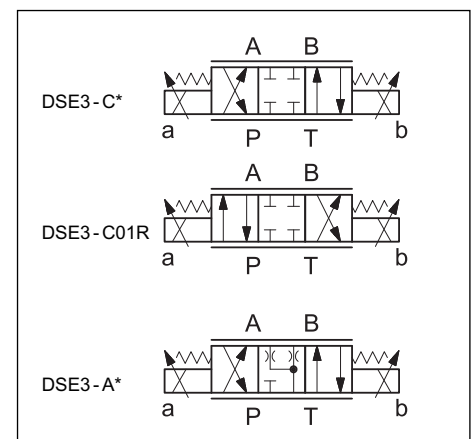
- The DSE3 valve is a direct operated directional control valve with electric proportional control and with ports in compliance with ISO 4401 standards.
- It is used for directional and speed control of hydraulic actuators.
- Valve opening and hence flow rate can be modulated continuously in proportion to the current supplied to the solenoid.
- The valve can be controlled directly by a current control supply unit or by means of the electronic control units to exploit valve performance to the full (see paragraph 11).
- Also available with several manual override.

PERFORMANCES

(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

Max operating pressure: P - A - B ports	bar	350
T port		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}	< $\pm 1,5\%$
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	kg	1,6
double solenoid valve		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 centers
A = open centers

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

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 DIN 43650 (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male

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. (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.

1.2 - 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. Electrical features at paragraph 4.

The boot manual override (CM) is installed as standard in order to protect the solenoid tube.

Follow the identification code below to order it:

D	S	E	3	-			/	11	-			/		/	W7
---	---	---	---	---	--	--	---	----	---	--	--	---	--	---	----

Choices as in standard identification code

DC power supply
D12 = 12 V
D24 = 24 V

Coil electrical connection
WK1 = plug for connector type DIN 43650
 On request: plug DEUTSCH DT04-2P, for male connector type DEUTSCH DT06-2S.

Manual override:
CM = manual override, boot protected (**standard**)
CS = screw override
CH = lever manual override
CK = knob manual override

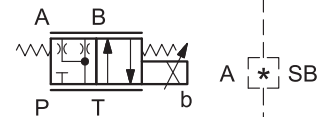
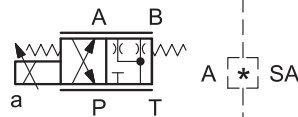
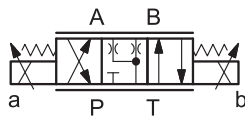
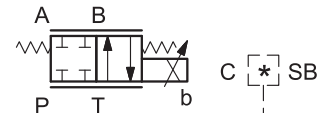
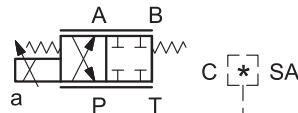
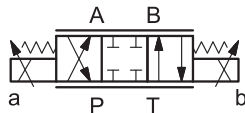
2 - CONFIGURATIONS

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

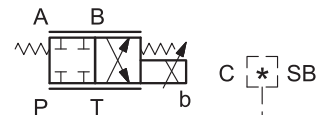
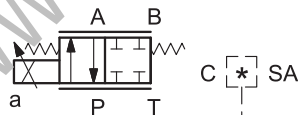
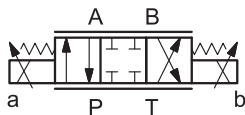
2 solenoids configuration:
3 positions with spring centering

"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



*	Nominal flow with $\Delta p 10$ bar P→T
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

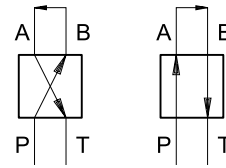


*	Nominal flow with $\Delta p 10$ bar P→T
01R	1 l/min

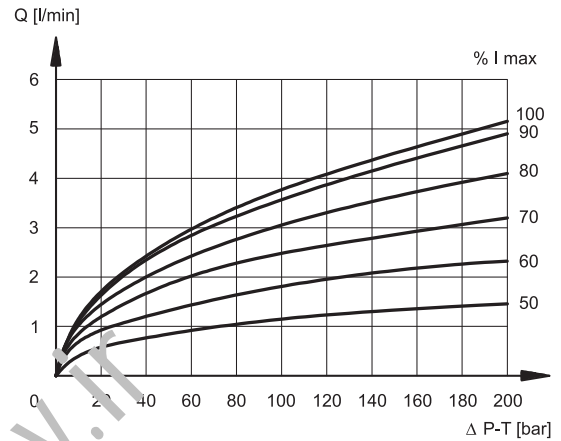
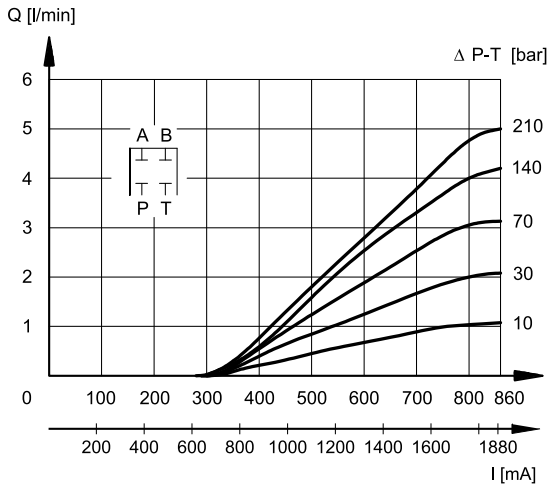
3 - CHARACTERISTIC CURVES

(values measured with viscosity of 36 cSt at 50°C with electronic control unit)

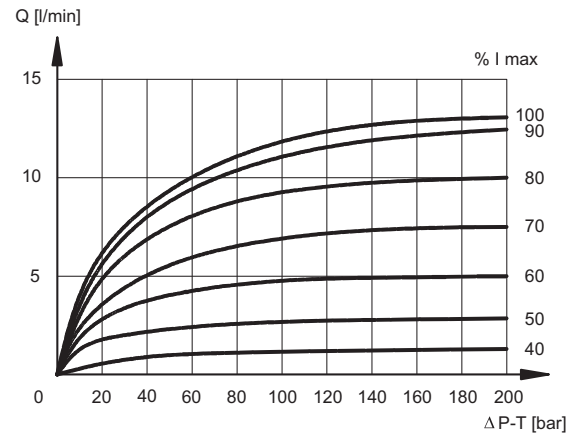
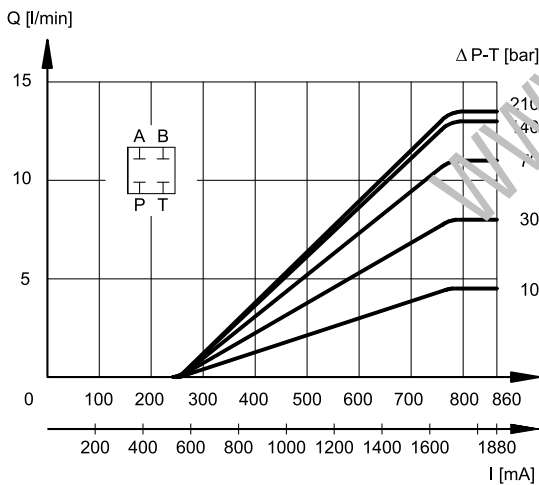
Typical flow rate control curves according to the current supply to solenoid. The reference Δp values are measured between ports P and T on the valve.



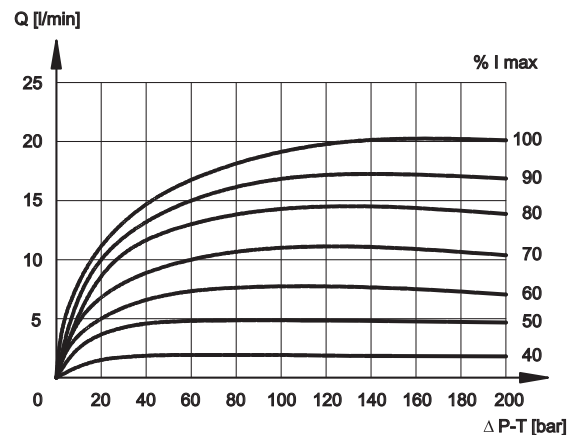
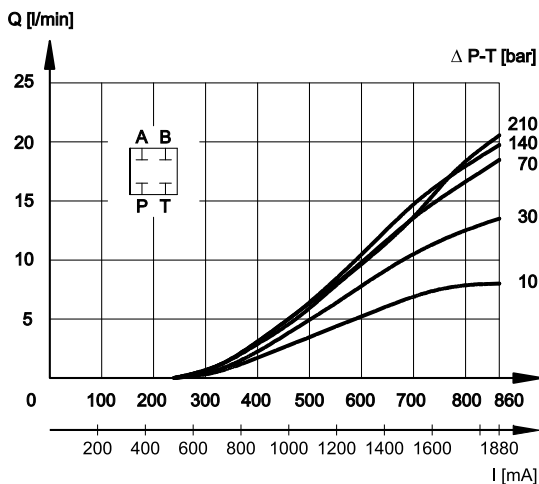
SPOOL TYPE C01R



SPOOL TYPE C04

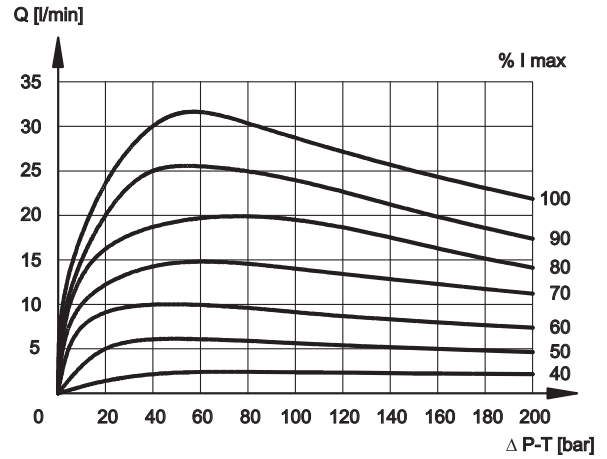
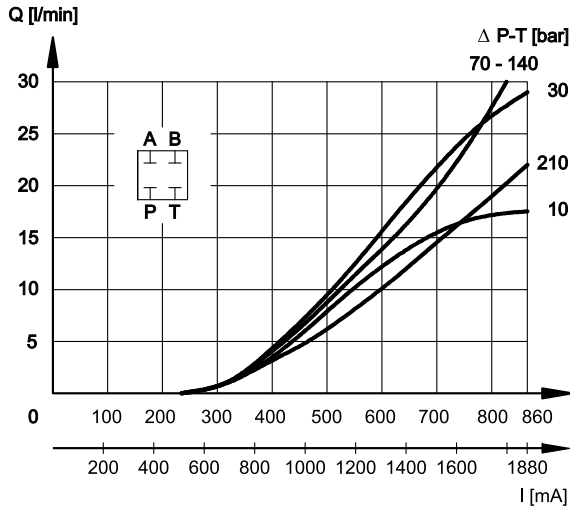


SPOOL TYPE C08

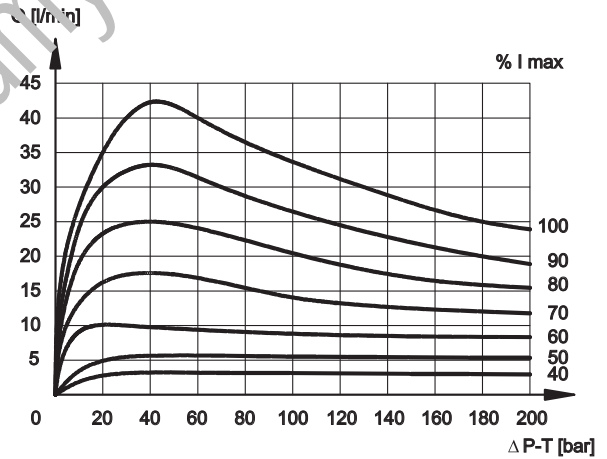
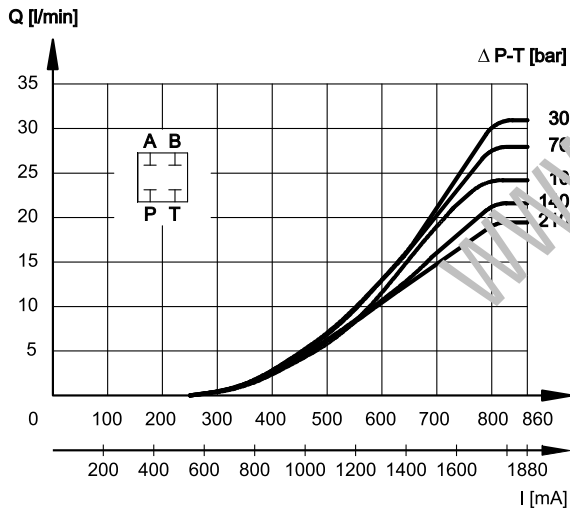




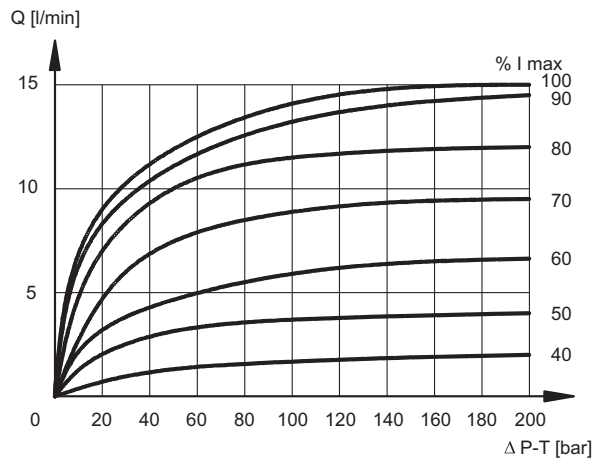
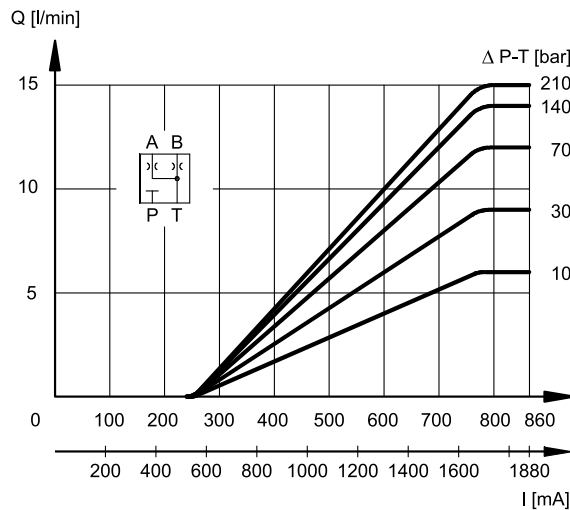
SPOOL TYPE C16



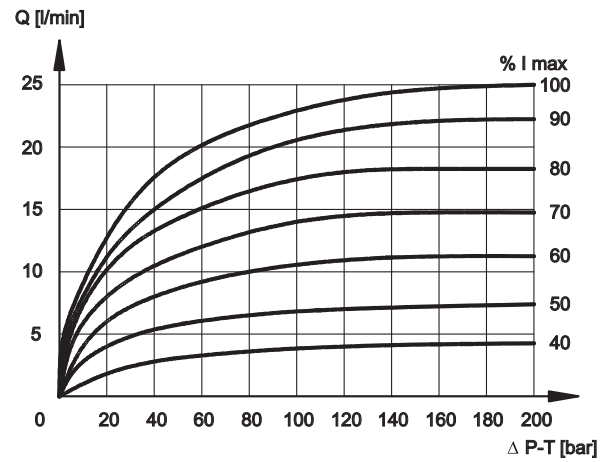
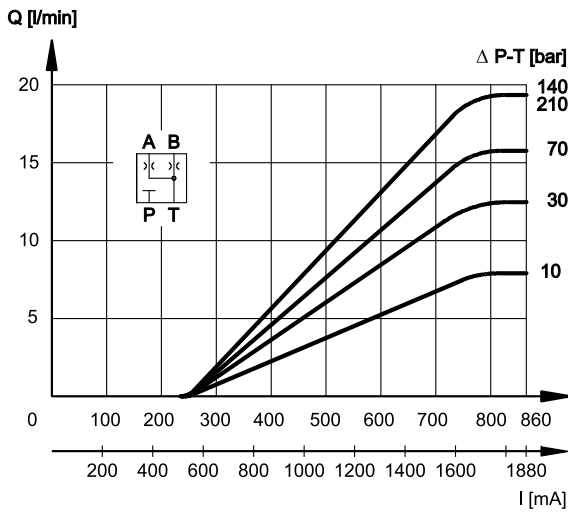
SPOOL TYPE C23



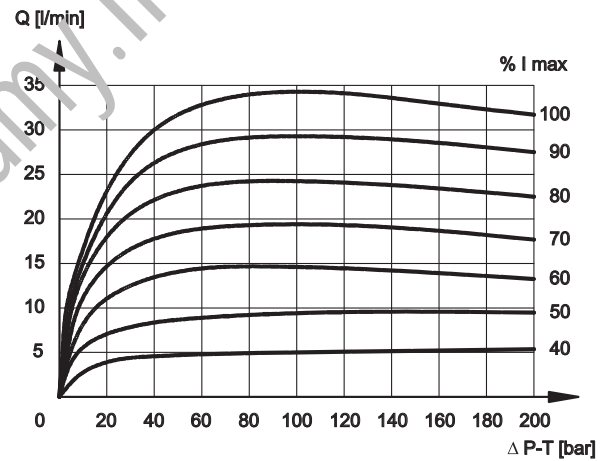
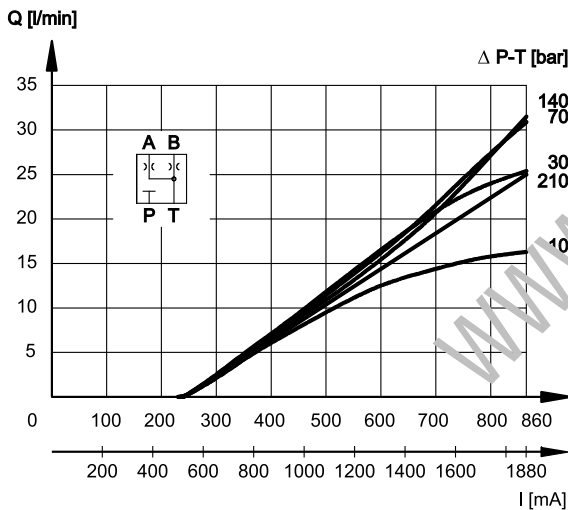
SPOOL TYPE A04



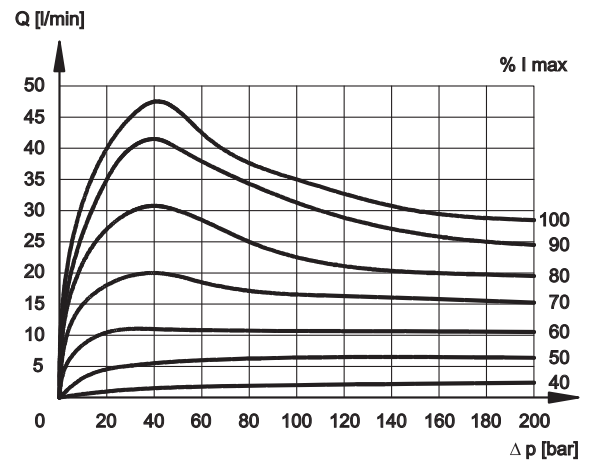
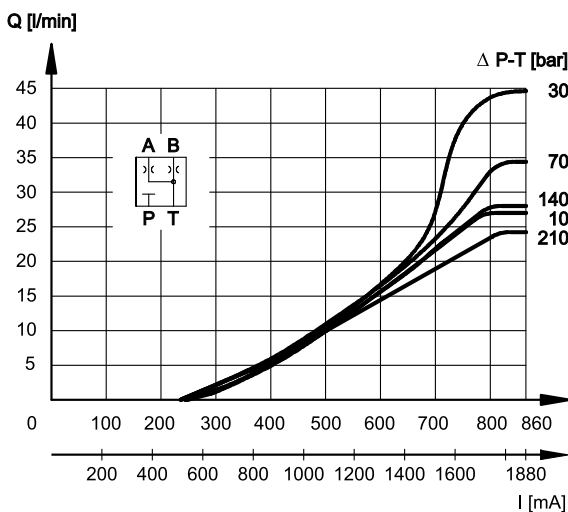
SPOOL TYPE A08



SPOOL TYPE A16



SPOOL TYPE 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.

Protection from atmospheric agents IEC EN 60529

Plug-in type	IP 65	IP 69 K
K1 DIN 43650	x (*)	
K7 DEUTSCH DT04 male	x	x (*)

(*) The protection degree is guaranteed only with the connector correctly connected and installed

NOMINAL VOLTAGE	V DC	12	24
RESISTANCE (at 20°C) K1 coil K7 coil	Ω	3.66 4	17.6 19
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE		100%	
ELECTROMAGNETIC COMPATIBILITY (EMC)	According to 2004/108/EC		
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class F		

5 - STEP RESPONSE

(measured with mineral oil with viscosity of 36 cSt at 50°C with electronic control unit)

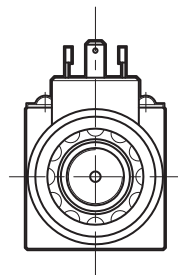
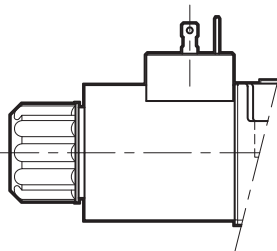
Step response is the time taken for the valve to reach 90% of the setted positioning value, following a step change of reference signal. The table shows typical response times tested with spool type C16 and $\Delta p = 30$ bar P-T.

REFERENCE SIGNAL STEP	0→100%	100%→0
Step response [ms]		
DSE3-A* DSE3-C*	50	40

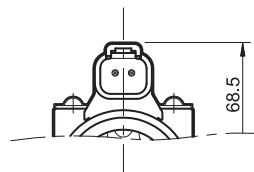
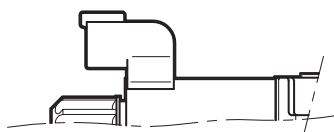
6 - ELECTRIC CONNECTIONS

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

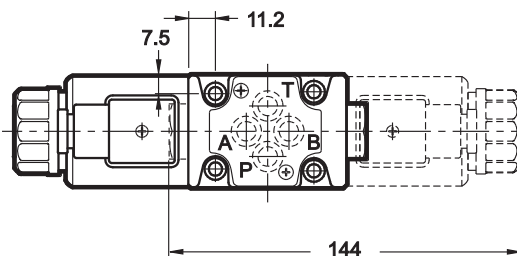
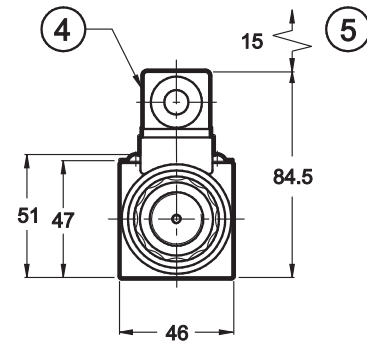
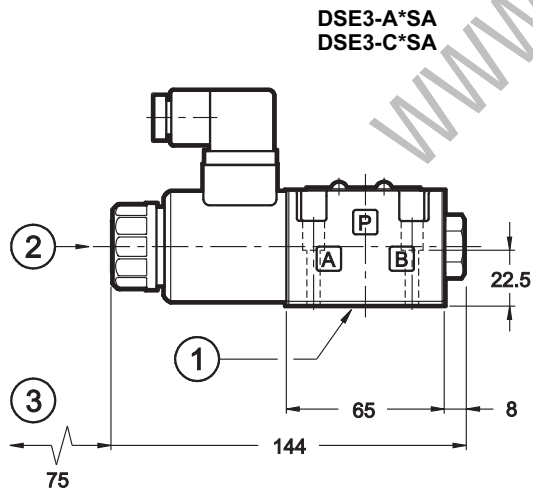
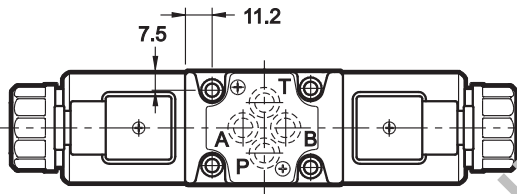
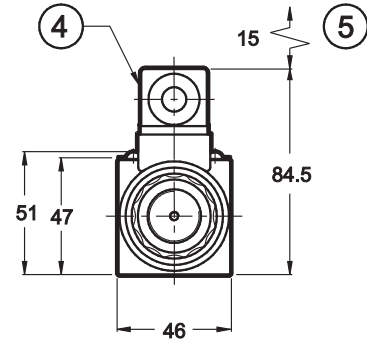
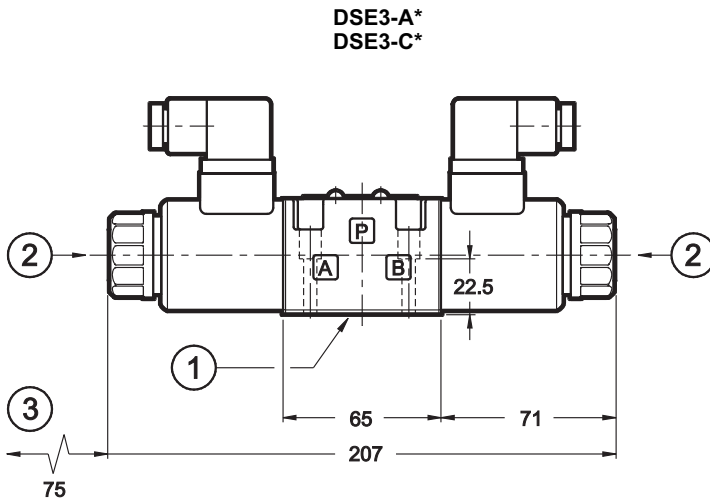
connection for DIN 43650
connector
code **K1 (standard)**
code **WK1** (W7 version only)



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



7 - OVERALL AND MOUNTING DIMENSIONS



A*SB and C*SB versions solenoid position

dimensions in mm

1	Mounting surface with sealing rings: 4 OR type 2037 - 90 shore (9.25 x 1.78)
2	Standard manual override integrated in the solenoid tube see par. 9
3	Coil removal space
4	DIN 43650 electric coil connector
5	Connector removal space

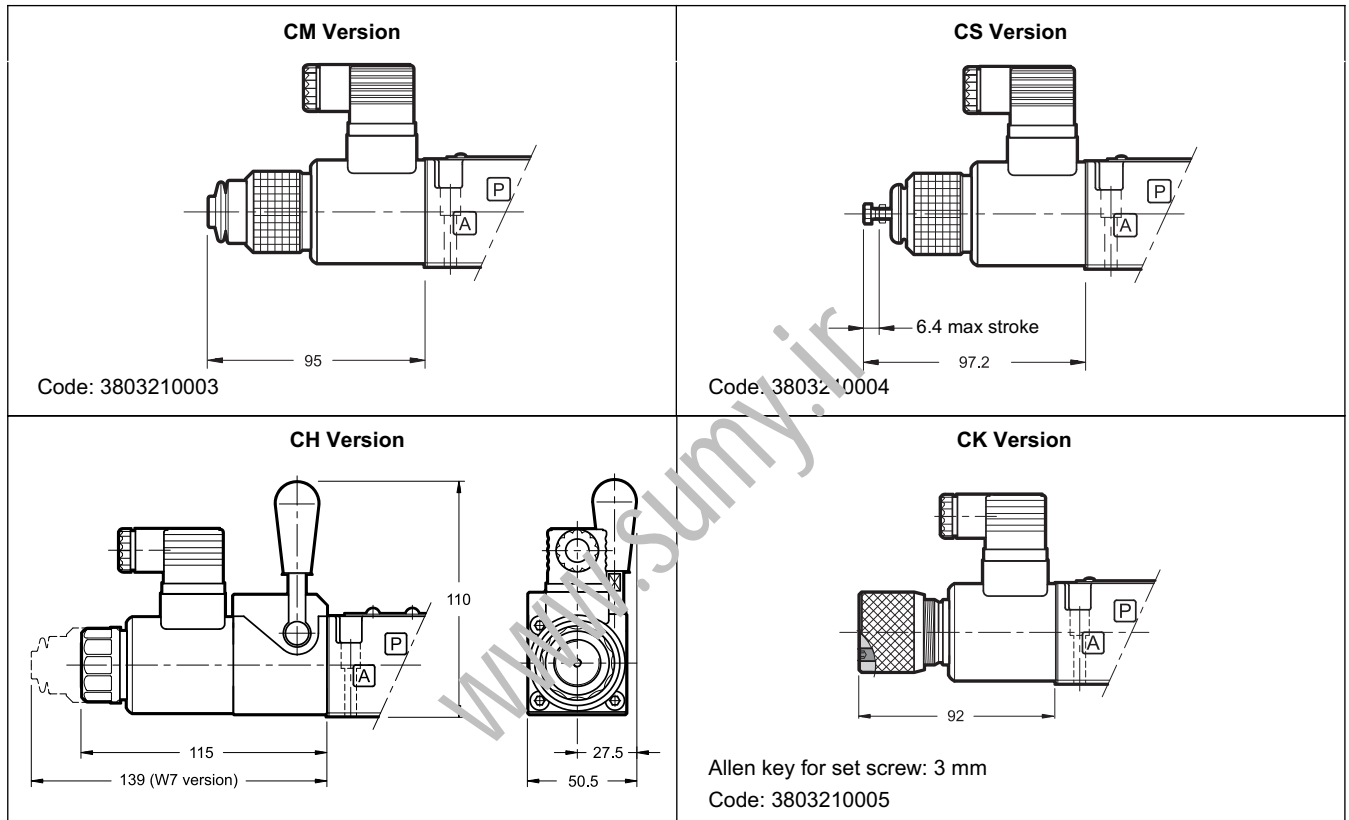
Fastening bolts: 4 SHCS M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

8 - 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.

Four different manual override versions 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.
- **CH** version, lever manual override. The lever device is always placed at the A side of the valve.
- **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 loosening.



9 - 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.

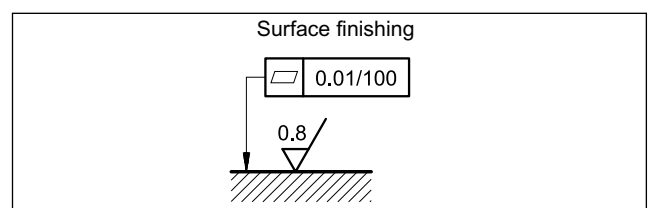
Operation with fluid temperature exceeding 80°C causes premature deterioration of the quality of the fluid and seals. The physical and chemical properties of the fluid must be maintained.

10 - 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.





11 - 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. 89 250
EDM-M142	for solenoid 12V DC		

DSE3 - A* DSE3 - C*

EDM-M212	24V DC solenoids	rail mounting DIN EN 50022	see cat. 89 250
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

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