

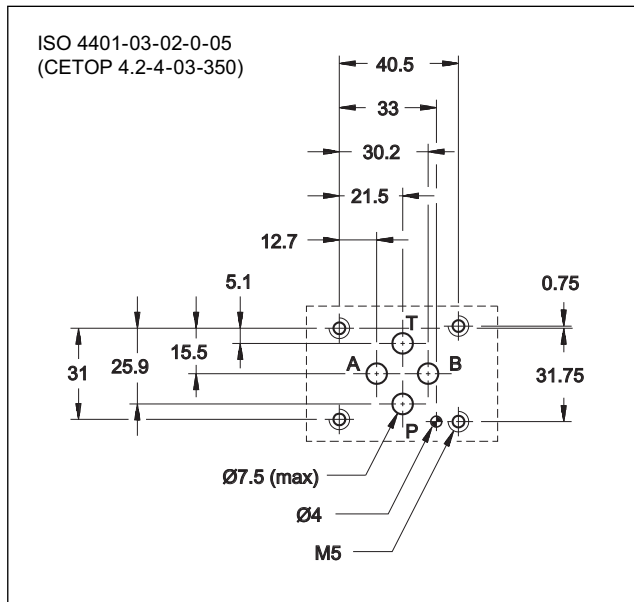
DSE3

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL SERIES 11

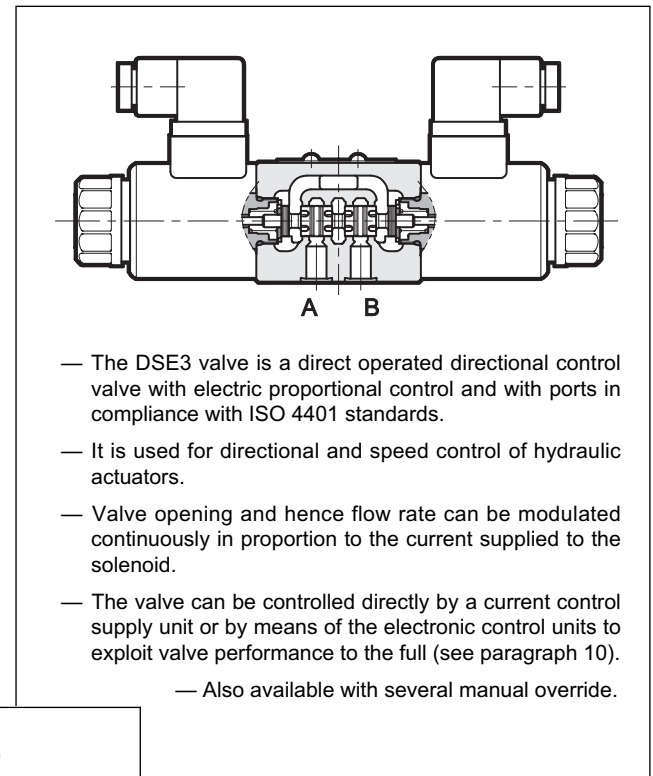
SUBPLATE MOUNTING ISO 4401-03

p max 350 bar
Q max 40 l/min

MOUNTING SURFACE



OPERATING PRINCIPLE

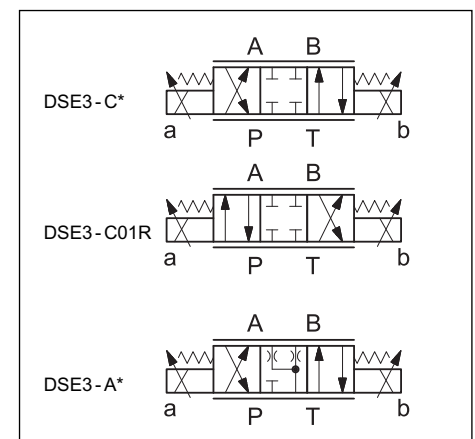


PERFORMANCES

(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 chapter 6
Hysteresis (with PWM 200 Hz)	% Q_{max}	< 6%
Repeatability	% Q_{max}	< $\pm 1,5\%$
Electrical characteristics		see chapter 5
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass: single solenoid valve	kg	1,6
double solenoid valve		2,0

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

D	S	E	3	-			/	11	-		/	
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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

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

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

Option: manual override (see at par. 9)

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)

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

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

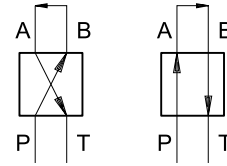
"SB" configuration: 1 solenoid on side B.
2 positions (central + external) with spring centering

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

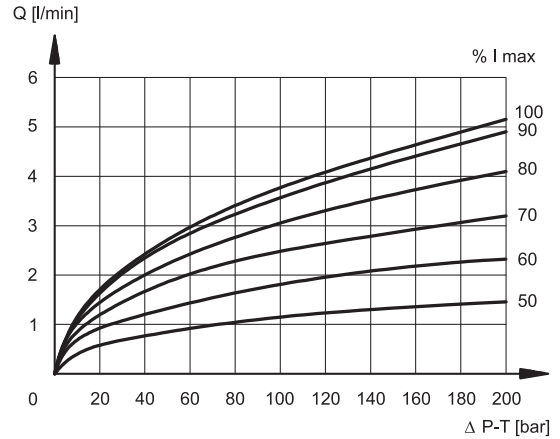
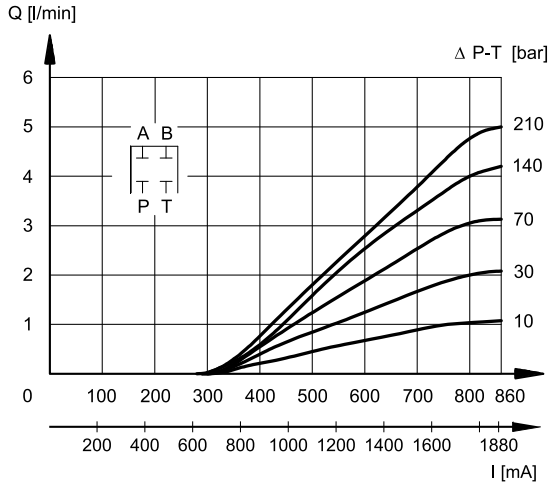
3 - CHARACTERISTIC CURVES

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

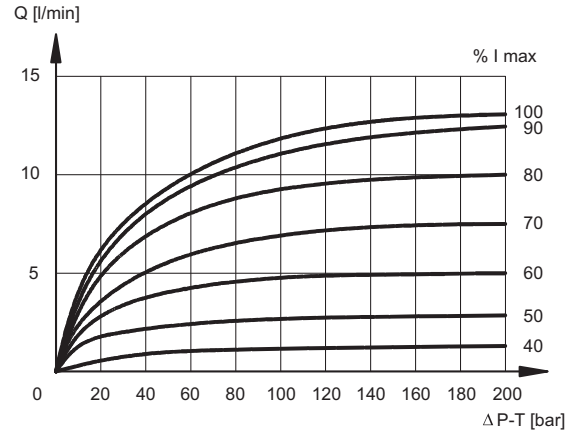
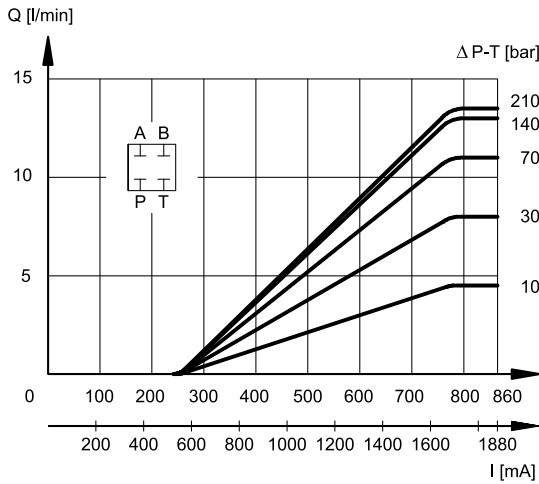
Typical flow rate control curves according to the current supply to solenoid. The reference Δp values are measured between ports P and T on the valve.



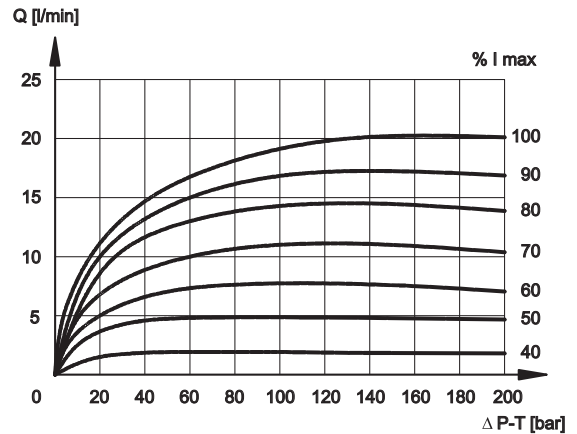
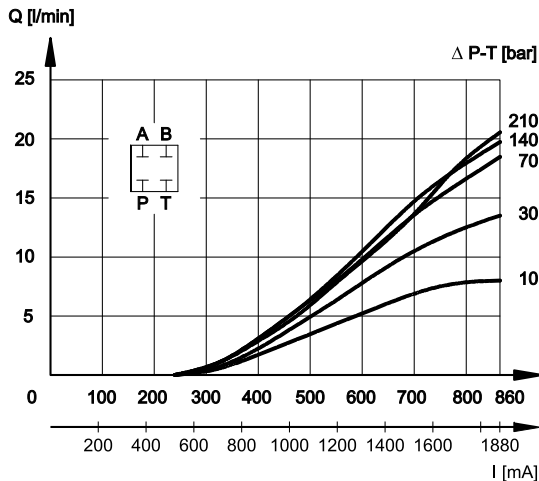
SPOOL TYPE C01R



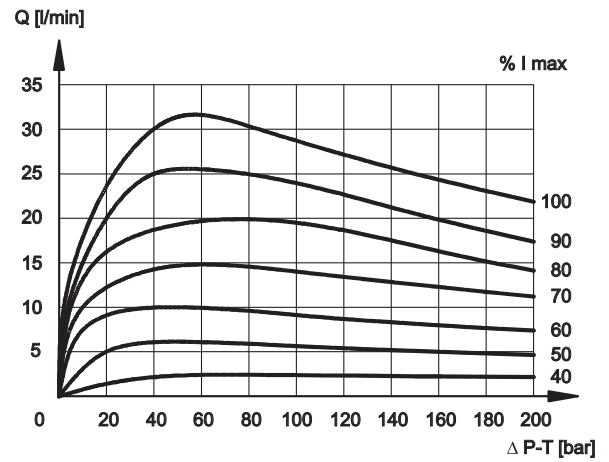
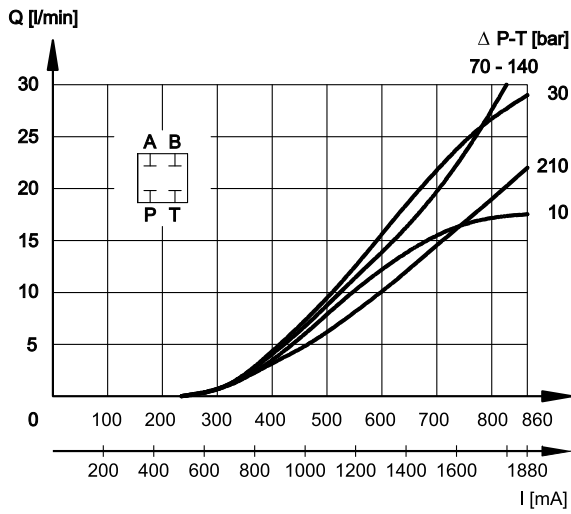
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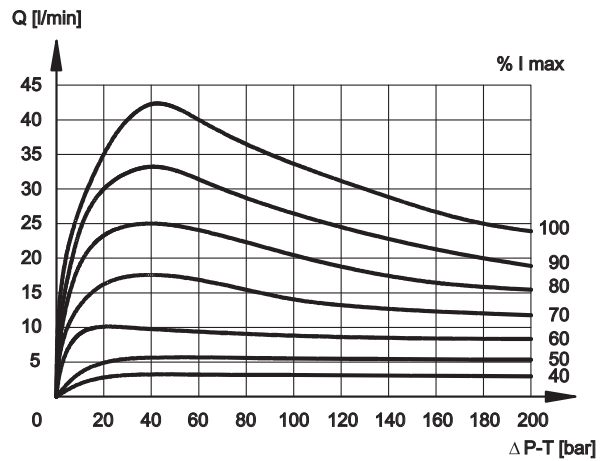
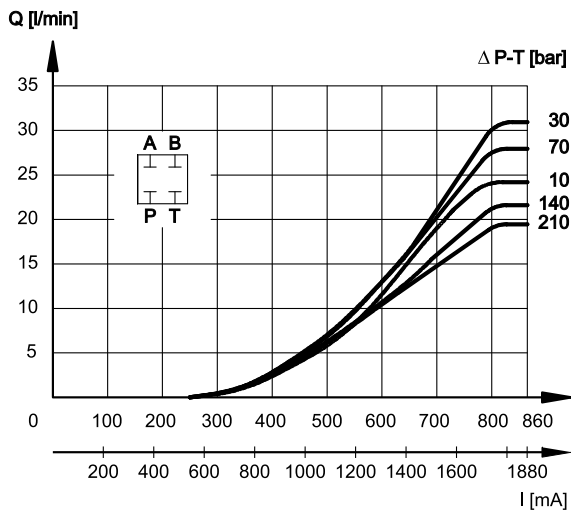
SPOOL TYPE C08



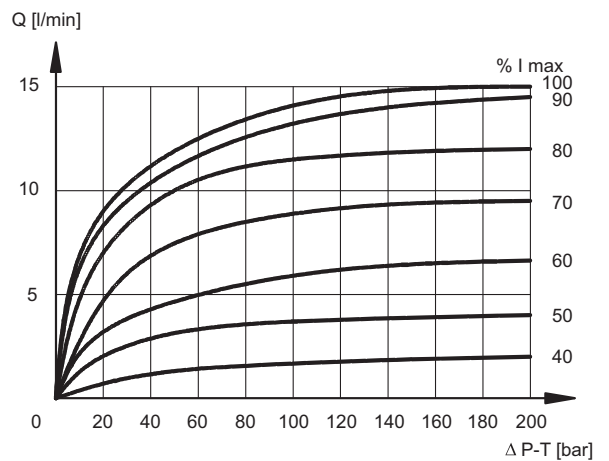
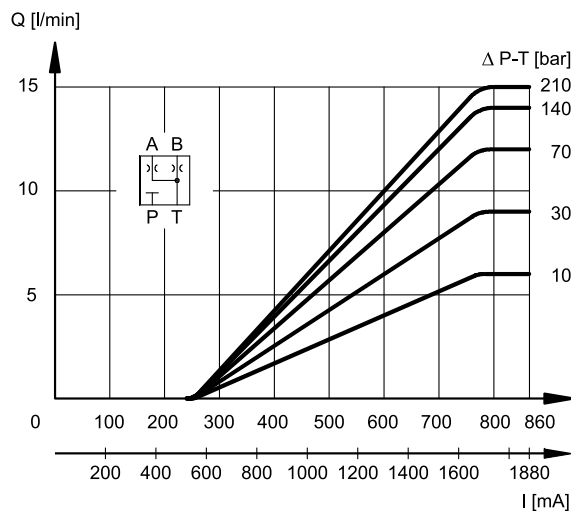
SPOOL TYPE C16



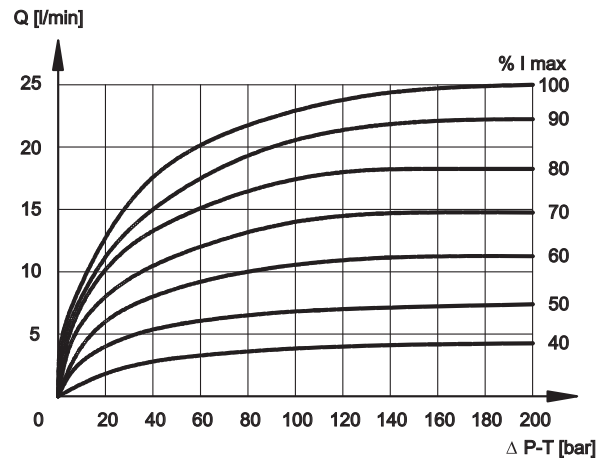
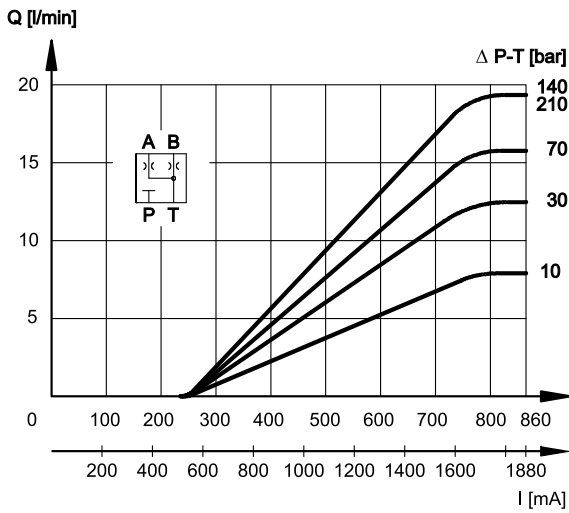
SPOOL TYPE C26



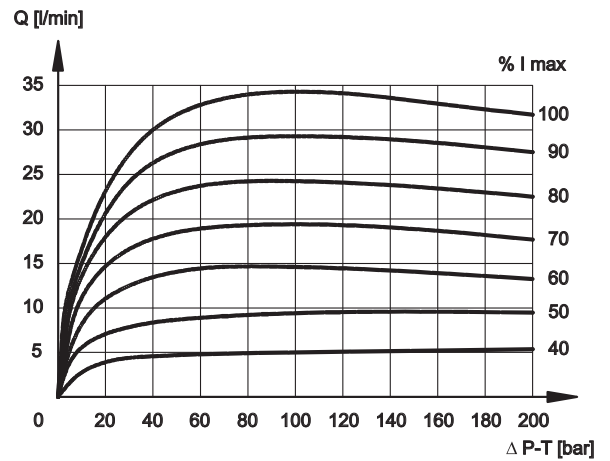
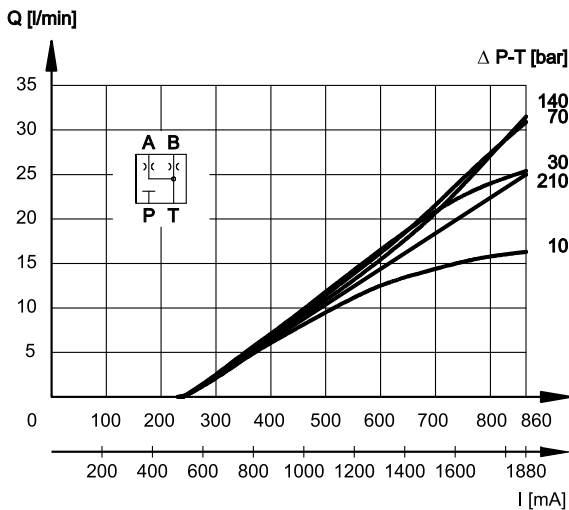
SPOOL TYPE A04



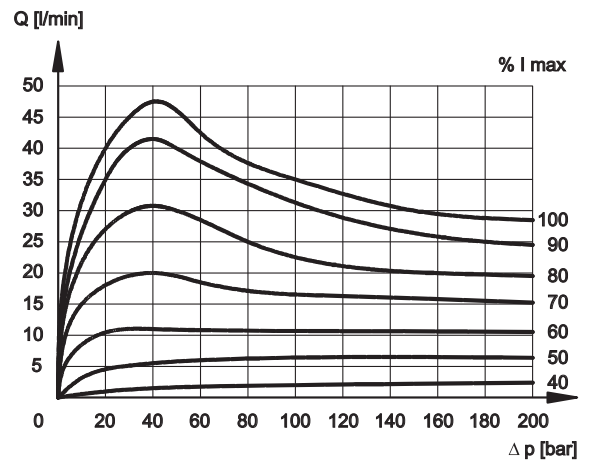
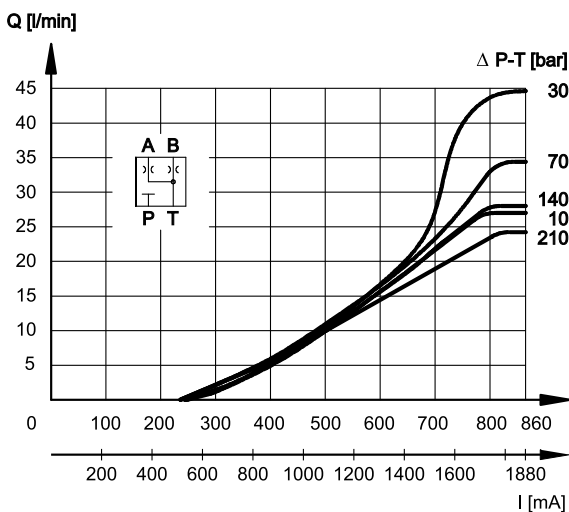
SPOOL TYPE A08



SPOOL TYPE A16



SPOOL TYPE A26



4 - 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

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

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

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

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	

6 - 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 settled positioning value, following a step change of reference signal. The table shows typical response times tested with spool type C16 and Δp = 30 bar P-T.

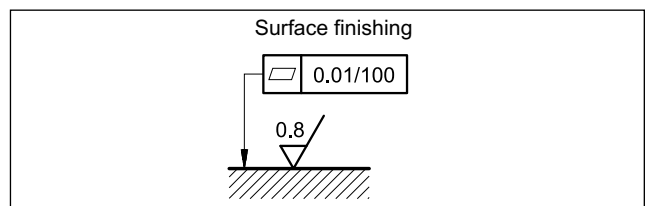
REFERENCE SIGNAL STEP	0→100%	100%→0
	Step response [ms]	
DSE3-A* DSE3-C*	50	40

7 - INSTALLATION

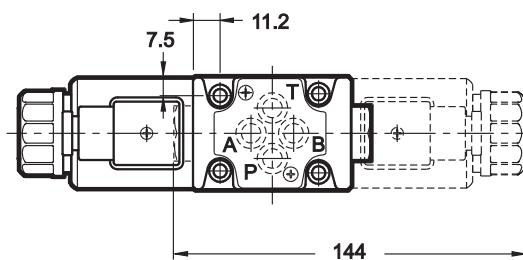
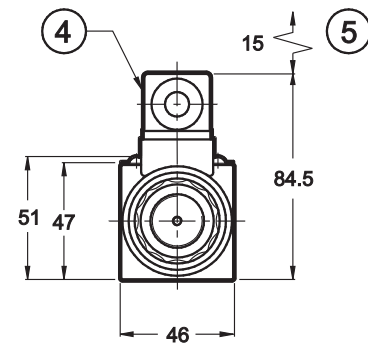
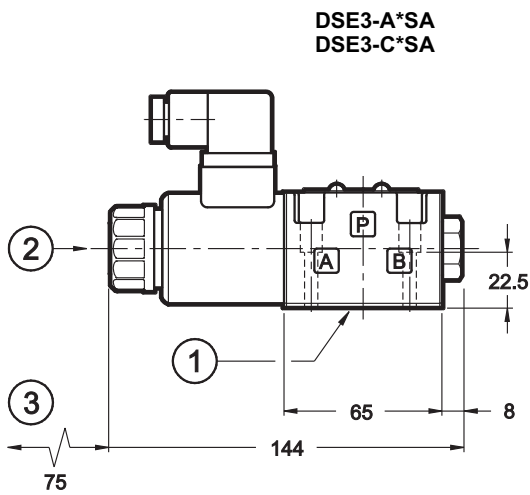
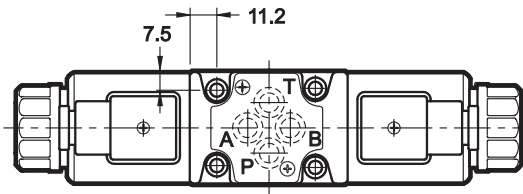
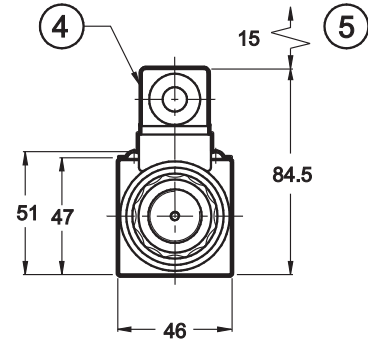
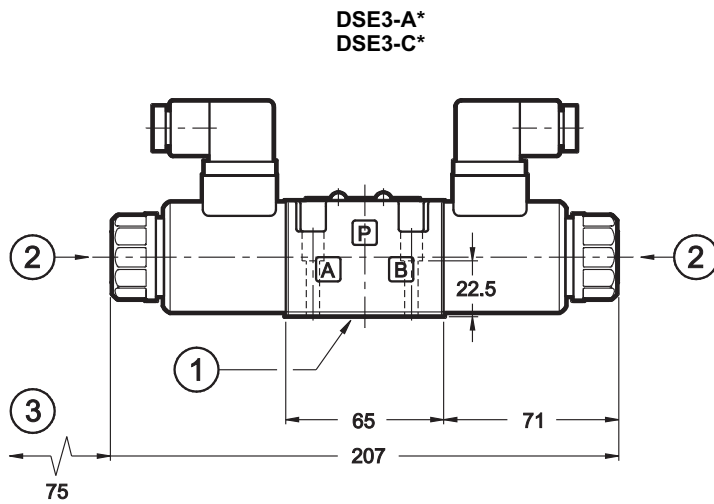
DSE3 valves can be installed in any position without impairing correct operation.

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.



8 - 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

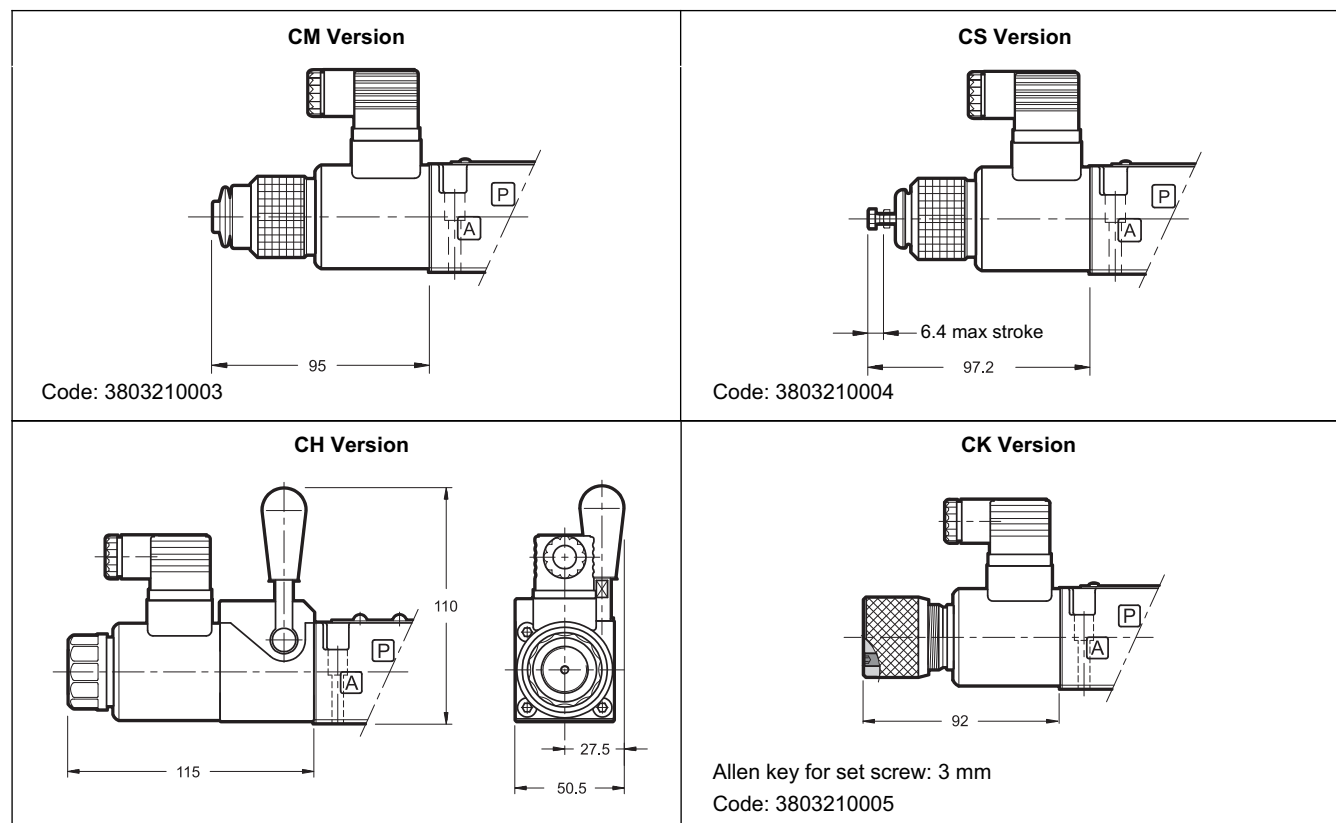
Fastening bolts: 4 SHCS M5x30 - ISO 4762
Torque: 5 Nm (A8.8)
Threads of mounting holes: M5x10

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.

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.
- **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.



10 - 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		

11 - 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



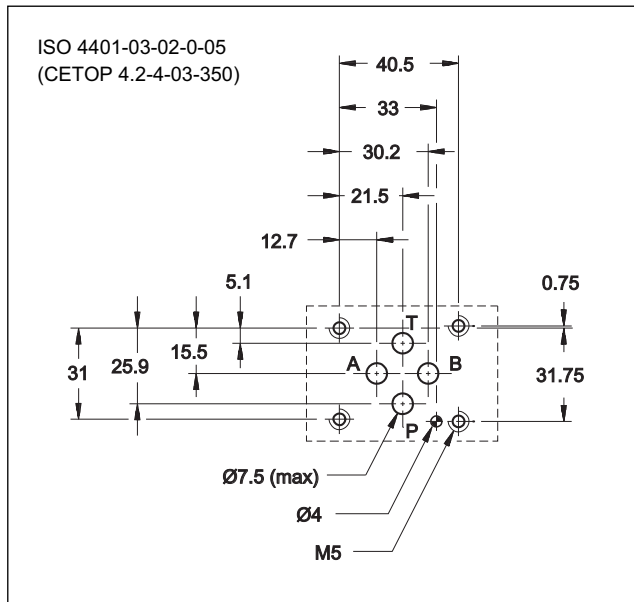
DSE3B

DIRECTIONAL VALVE WITH PROPORTIONAL CONTROL SERIES 10

**SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)**

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

MOUNTING INTERFACE



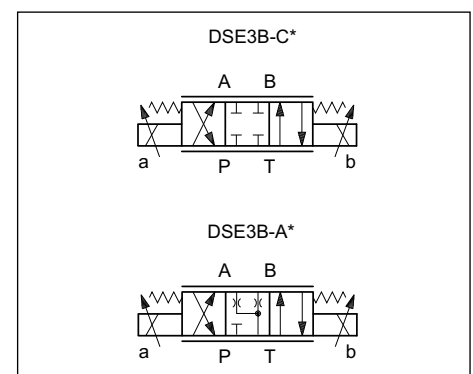
OPERATING PRINCIPLE

- The DSE3B valve is a directly operated directional control valve with electric proportional control and with ports, in compliance with ISO 4401-03 standards (CETOP RP 121H).
- 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 combined with an external electronic card to exploit valve performance to the full (see par. 10).

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

Max operating pressure: P - A - B ports	bar	350
T port		160
Nominal flow with Δp 10 bar P-T	l/min	8 - 16 - 26
Step response		see chapter 6
Hysteresis (with PWM 200 Hz)	% Q_{max}	< 6%
Repeatability	% Q_{max}	< \pm 2%
Electrical characteristics		see chapter 5
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	kg	1,6
double solenoid valve		2,0

HYDRAULIC SYMBOLS (typical)



1 - IDENTIFICATION CODE

D	S	E	3	B	-					/ 10	-			/	
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Directly operated directional control valve

Electric proportional control

Size ISO 4401-03 (CETOP 03)

Spool type:
C = closed centers
A = open centers

Spool nominal flow (see paragraph 2)

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

NOTE:The valve is supplied with standard surface treatment of phosphatising black. On request we can supply these valves with other surface finishes.
Add suffix / W * at the end of the code.

W2 = mat epoxy painting black RAL 9005
thickness 20 ÷ 40µ

W4 = gas nitriding and oxidation process black colour

Manual override (see par. 9)

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

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

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

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

2 - CONFIGURATIONS

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

2 solenoids configuration:
3 positions with spring centering

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

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

*

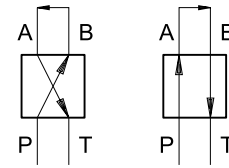
Controlled flow with Δp_{10} bar P-T

08	8 l/min
16	16 l/min
26	26 l/min

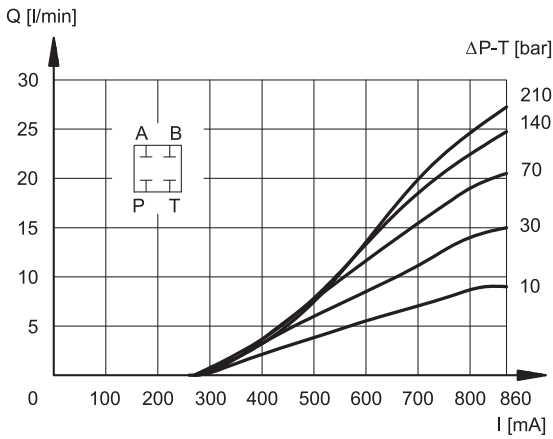
3 - CHARACTERISTIC CURVES (values measured with viscosity of 36 cSt at 50°C with valves connected to the relative electronic control units)

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

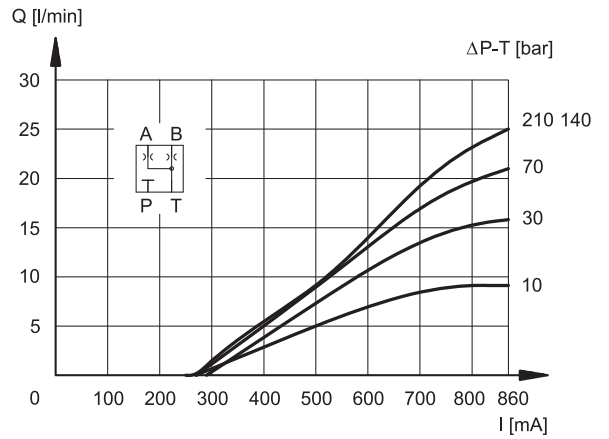
The reference Δp values are measured between ports P and T on the valve.



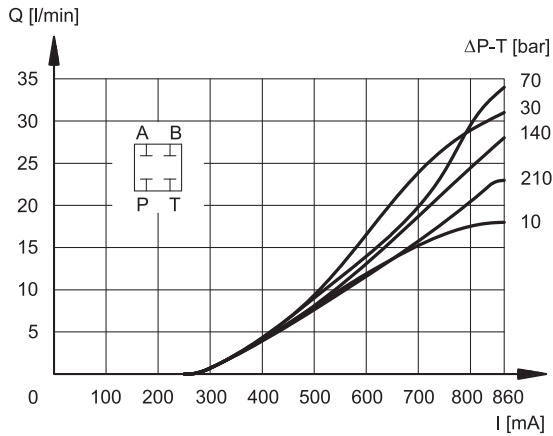
SPOOL TYPE C08



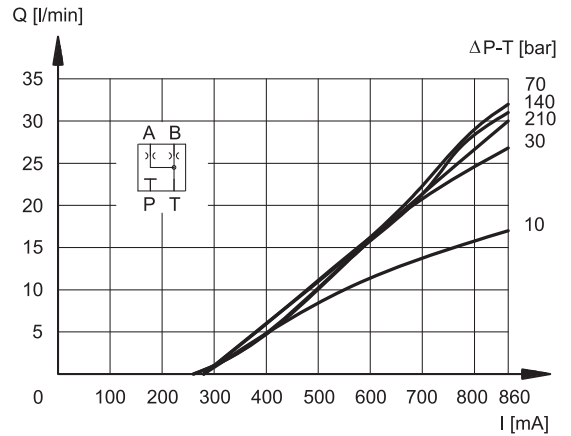
SPOOL TYPE A08



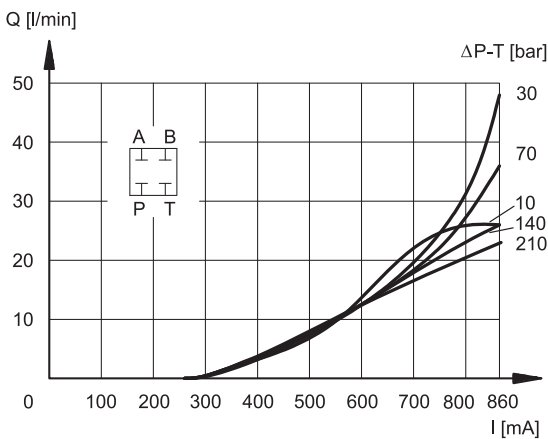
SPOOL TYPE C16



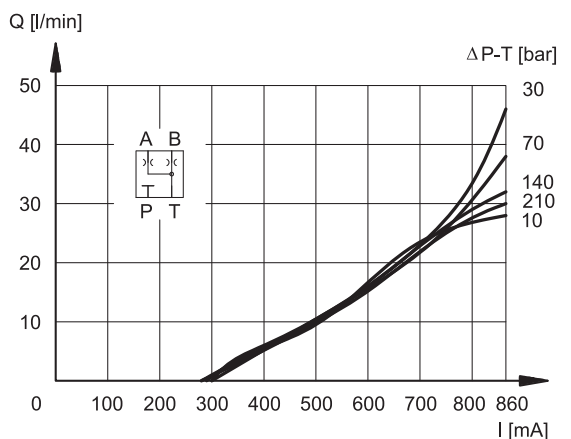
SPOOL TYPE A16



SPOOL TYPE C26



SPOOL TYPE A26



4 - 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.

5 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

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

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

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

Protection from atmospheric agents CEI 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)	Ω	4,4	18,6
MAXIMUM 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		

6 - STEP RESPONSE

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

Step response is the time taken for the valve to reach 90% of the settled 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.

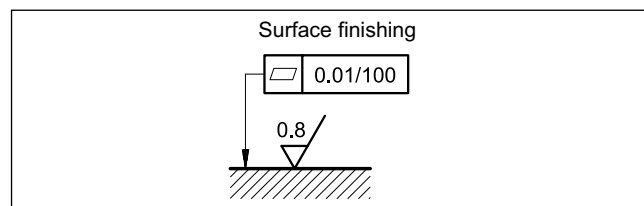
REFERENCE SIGNAL STEP	0 → 100%	100 → 0%
Step response [ms]		
DSE3B-A* DSE3B-C*	50	40

7 - INSTALLATION

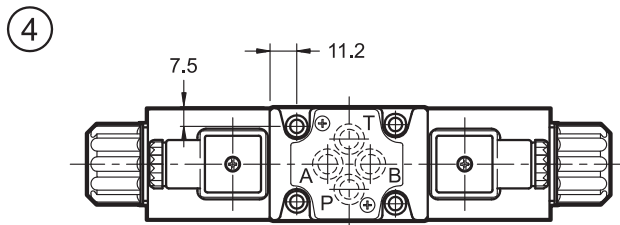
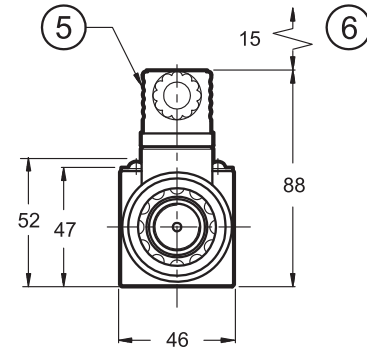
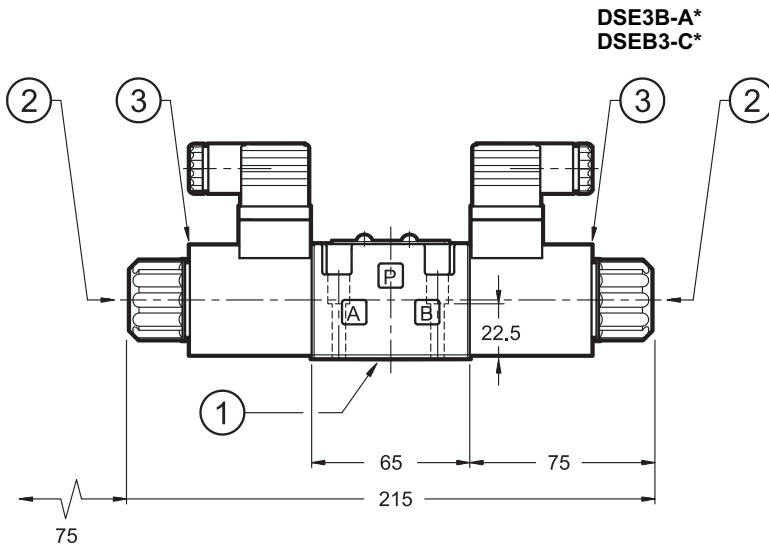
DSE3B valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

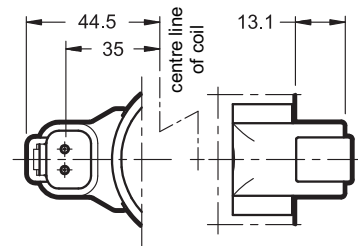
Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed fluid can easily leak between the valve and support surface.



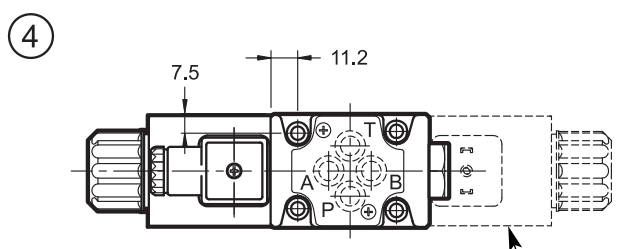
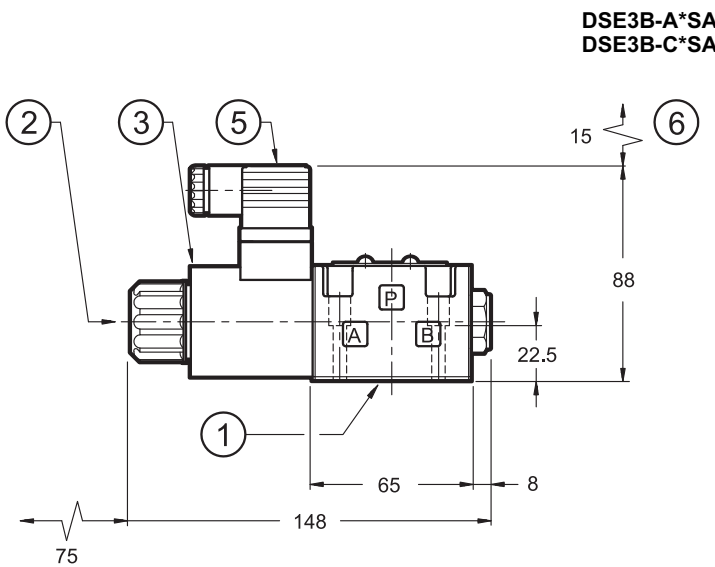
9 - OVERALL AND MOUNTING DIMENSIONS



plug code **K7**: DEUTSCH DT04-2P for male connector DEUTSCH DT06-2S



dimensions in mm



A*SB and C*SB versions solenoid position

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25 x 1.78) 90 shore
2	Standard manual override integrated in the solenoid tube (included in the supply) see par. 9
3	Coil (360° revolving)
4	Coil removal space
5	DIN 43650 electric coil connector
6	Connector removal space

Fastening bolts: 4 SHCS M5x30
Torque: 5 Nm

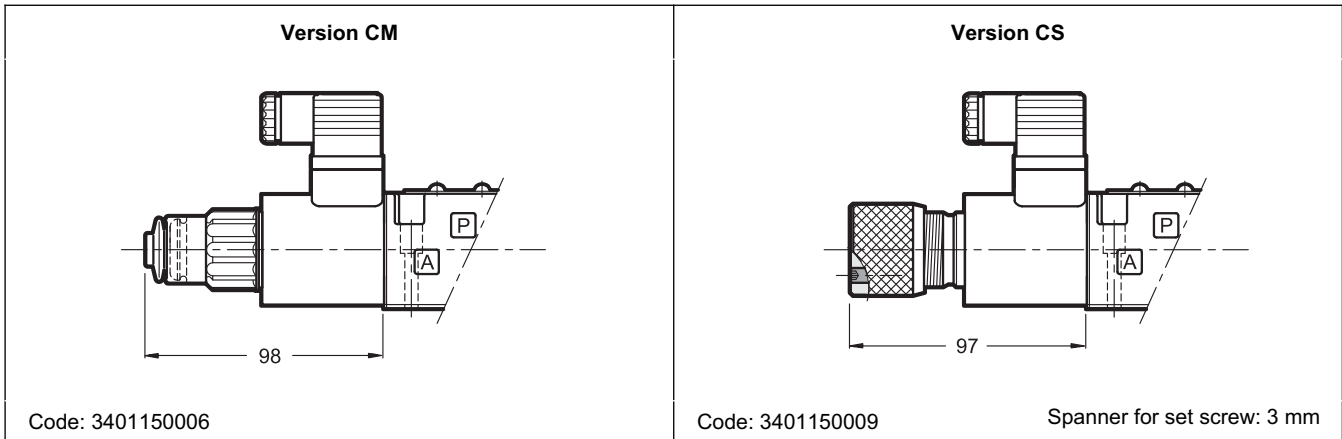
Locking ring tightening torque:
5 ± 0.5 Nm

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.
- **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 losing.



10 - ELECTRONIC CONTROL UNITS

DSE3B - ** SA (SB)

EDC-112	for solenoid 24V DC	plug version	see cat.89 120
EDC-142	for solenoid 12V DC		
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M142	for solenoid 12V DC		

DSE3B - A* DSE3B - C*

EDM-M212	24V DC solenoids	rail mounting DIN EN 50022	see cat. 89 250
EDM-M242	12V DC solenoids		

11 - SUBPLATES (see catalogue 51 000)

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