

CR

DIRECT OPERATED PRESSURE CONTROL VALVE SERIES 22

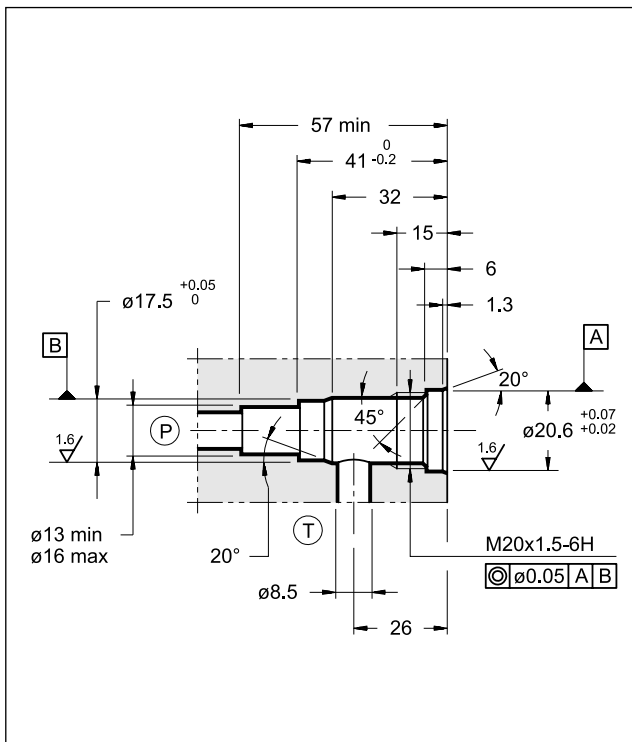


CARTRIDGE TYPE

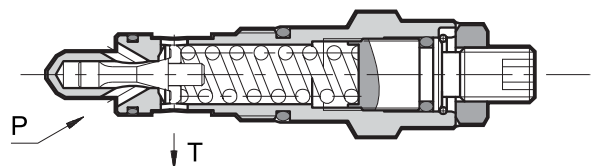
p max 350 bar

Q max 50 l/min

SEAT DIMENSIONS: D-10B



OPERATING PRINCIPLE

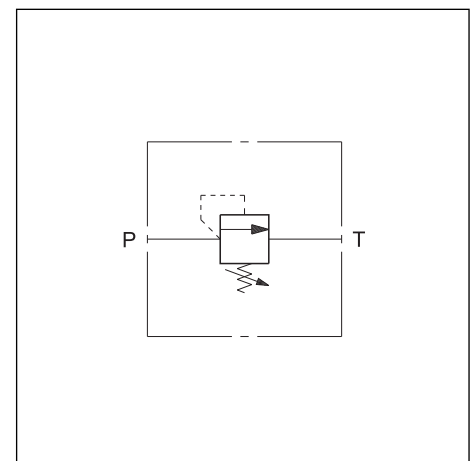


- „ The CR valve is a direct operated pressure control valve cartridge type that can be used in blocks or panels with type D-10B seat.
- „ It is normally used to control the maximum pressure in the hydraulic circuits or as a limiting device for pressure peaks generated during hydraulic actuator movement variation.
- „ It is available in "ve different pressure control ranges up to 350 bar.
- „ The circuit pressure acts on the shutter which is directly loaded by a spring on the opposite side. Once the set pressure is reached, the shutter opens, and discharges the excess "ow in port T connected directly to the reservoir.
- „ The pressure can be adjusted by a screw, usually supplied as the countersunk hex type, equipped with locking nut and maximum adjustment limiter.

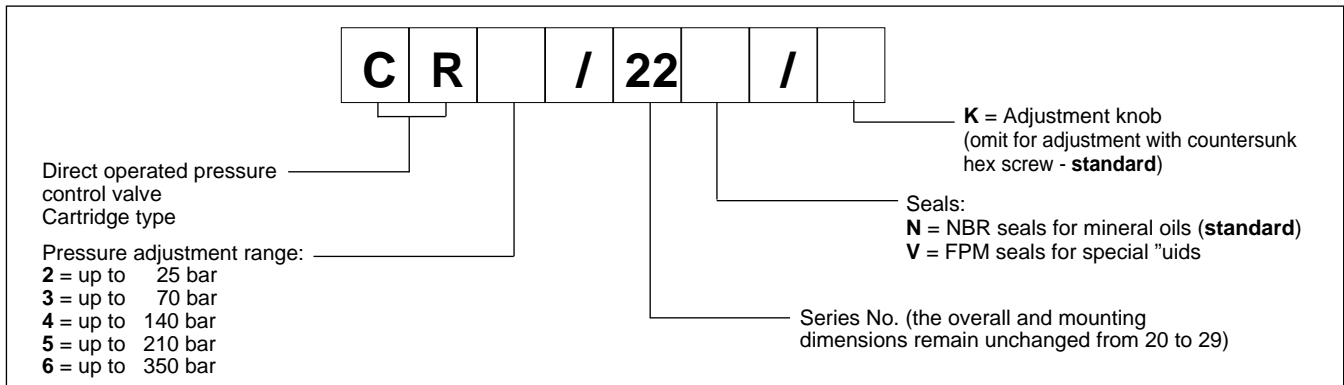
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Max working pressure	bar	350
Minimum controlled pressure and pressure drop	see diagram	
Maximum "ow rate	l/min	50
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,16
Surface treatment: electrolytic zinc covering	Fe // Zn 8 // B EN 12329	

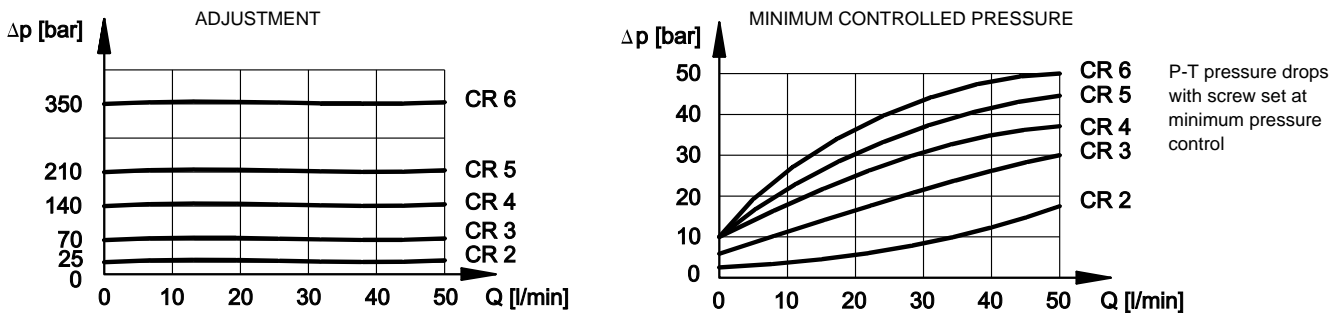
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



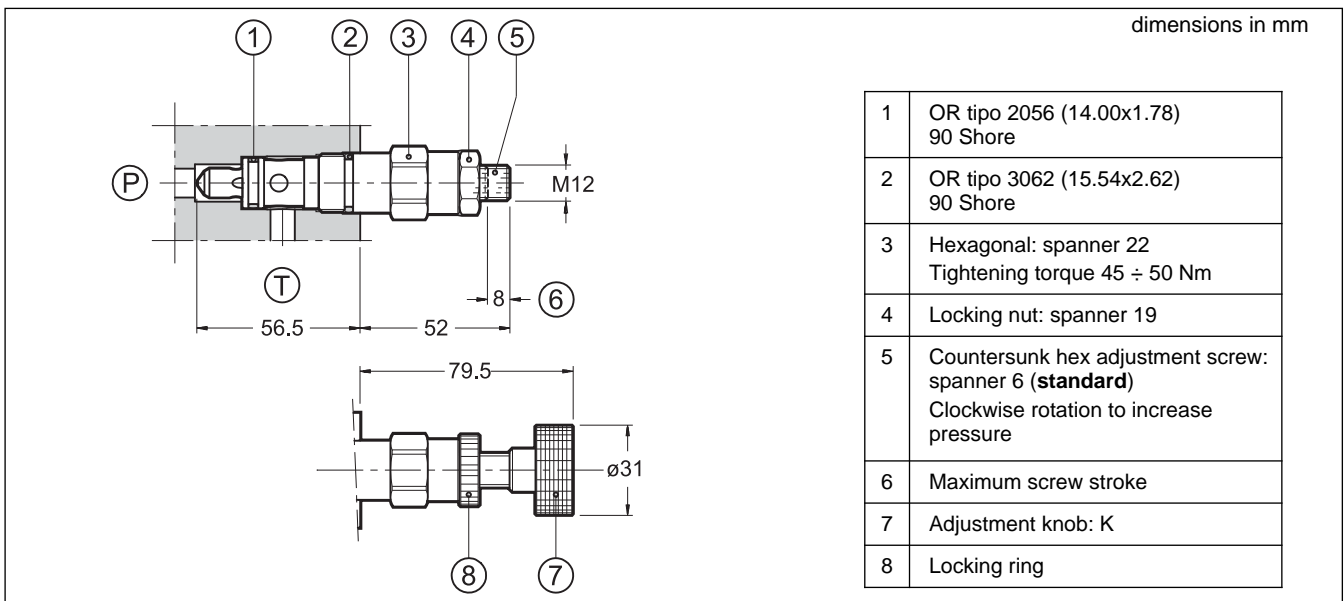
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



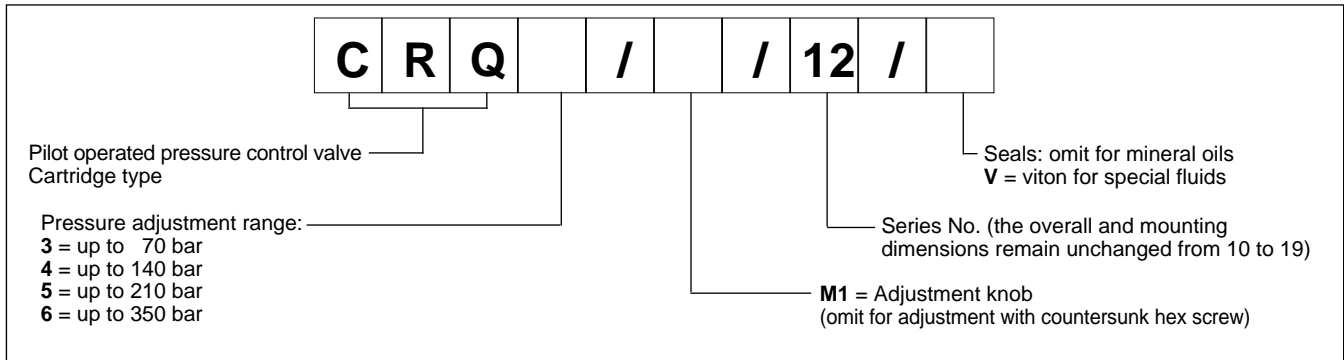
3 - HYDRAULIC FLUIDS

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.

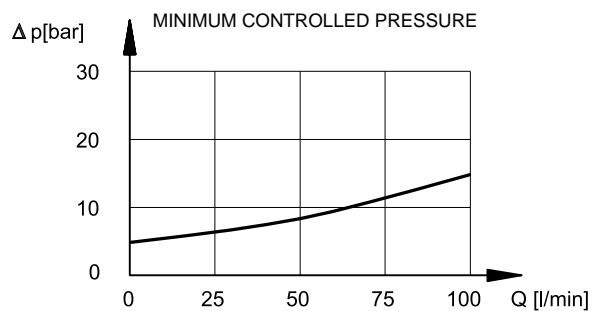
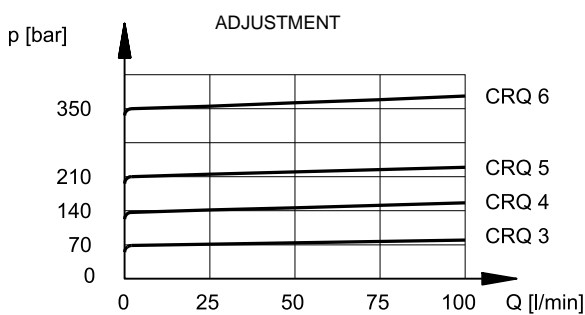
4 - OVERALL AND MOUNTING DIMENSIONS



1 - IDENTIFICATION CODE



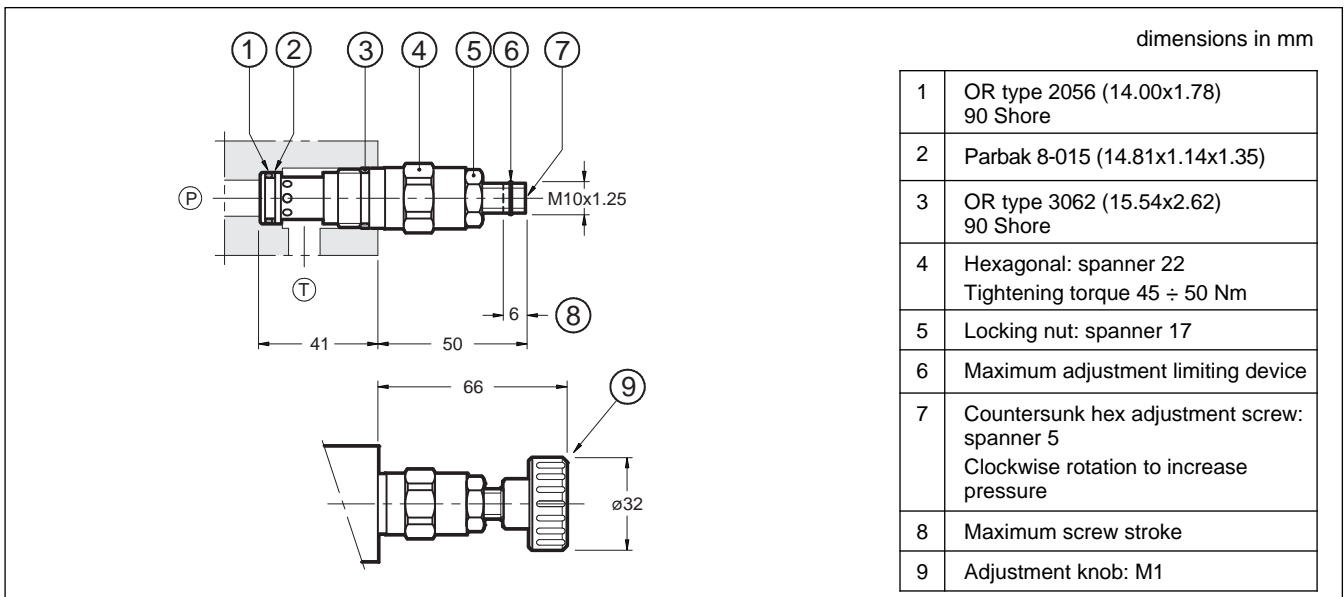
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





PRK10

PILOT OPERATED PRESSURE CONTROL VALVE SERIES 10

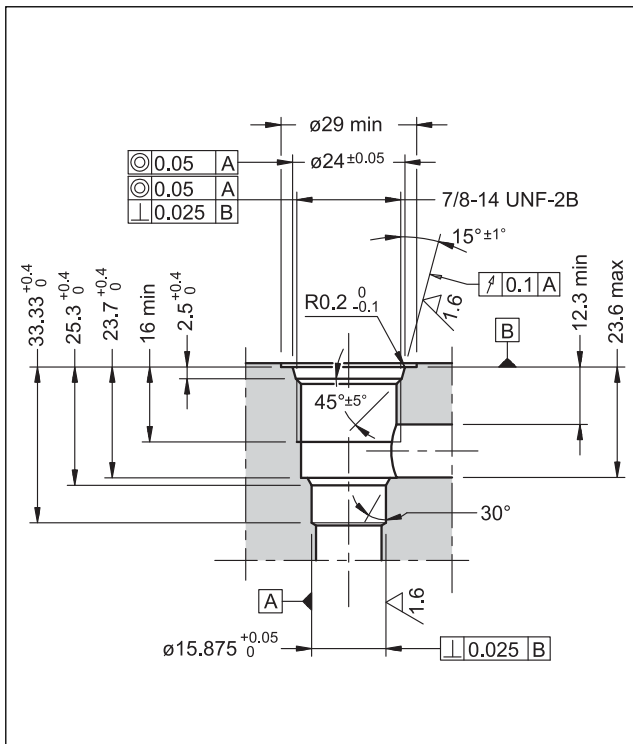
CARTRIDGE TYPE

seat 7/8-14 UNF-2B (SAE - 10)

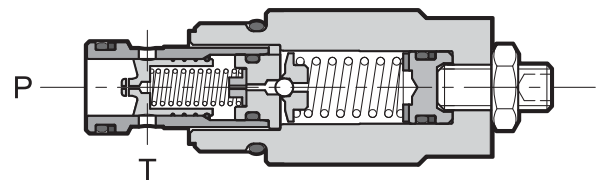
p max **350** bar

Q max **120** l/min

SEAT DIMENSIONS: 7/8-14 UNF-2B (SAE - 10)



OPERATING PRINCIPLE

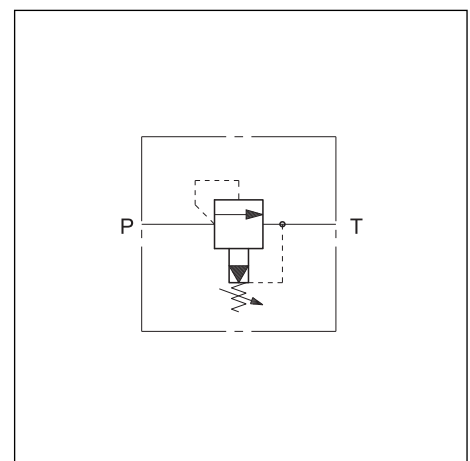


- „ The PRK10 valve is a pilot operated pressure control valve, cartridge type, that can be used in blocks or panels with 7/8-14 UNF-2B (SAE - 10) type seat.
- „ It is normally used to control the hydraulic circuit pressure and allows use of the entire flow of the pump even at pressure values near the set value.
- „ It is available in four different pressure control ranges from 6 to 350 bar.
- „ It consists of a main balanced type spool and a pilot stage. The main spool, normally closed, opens when the circuit pressure exceeds the set value generated by the pilot stage, discharging the excess flow in port T, directly connected to the tank.
- „ The pressure is adjustable with a screw, usually supplied as the countersunk hex type, equipped with locking nut or with a knob.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Max working pressure	bar	350
Minimum controlled pressure and pressure drop	see diagram	
Maximum flow rate	l/min	120
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,2
Surface finishing: electrolytic coating	ISO 2081 - Fe/Zn12/A	

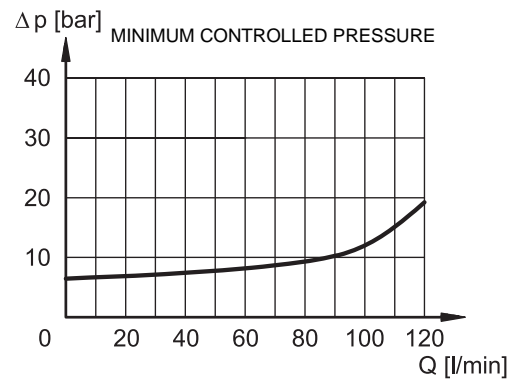
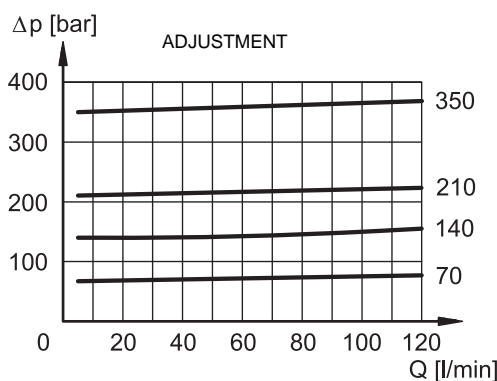
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

P	R	K	10	-	/	10	/	
Pressure control valve, pilot operated						Option: K = Adjustment knob. Omit for adjustment with hex socket screw (standard)		
Cartridge type						Seals: N = NBR seals for mineral oils (standard) V = FPM seals for special fluids		
Size						Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)		
Pressure adjustment range:								
070 = from 6 to 70 bar		210 = from 6 to 210 bar						
140 = from 6 to 140 bar		350 = from 6 to 350 bar						

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

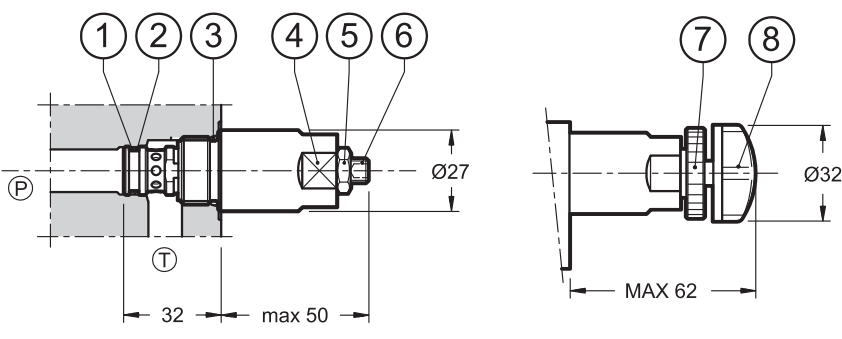


3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	OR type 2050 (12.42x1.78)
2	Parbak 8-014 (13.23x1.14x1.35)
3	OR type 3-910 (19.18x2.46)
4	Cartridge tightening: spanner: 24 Tightening torque 38 Nm
5	Locking nut: spanner 13
6	Socket hex adjustment screw: Hex key 4. Rotate clockwise to increase pressure
7	Locking ring
8	Adjustment knob: K



DBV

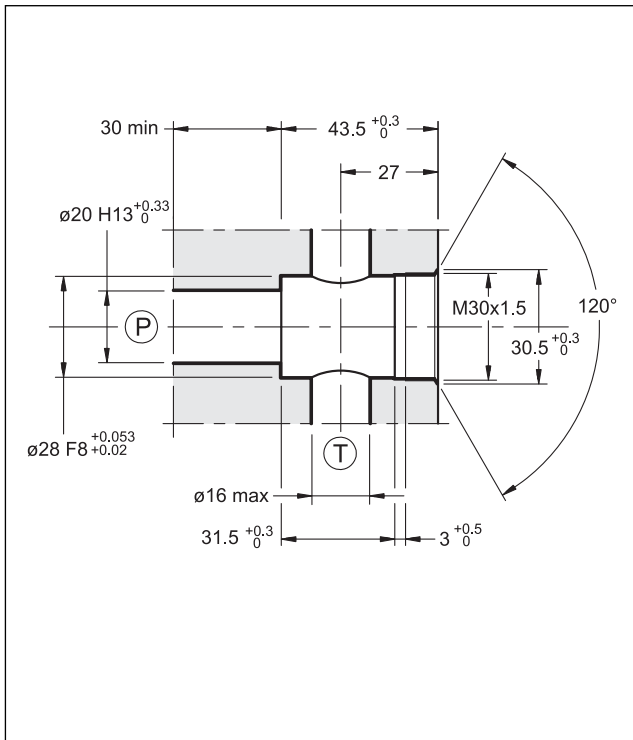
DIRECT OPERATED PRESSURE CONTROL VALVE

SERIES 10

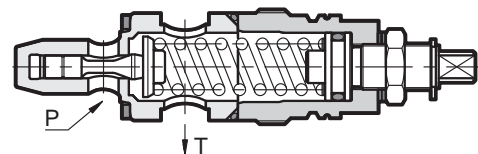
CARTRIDGE TYPE

p max 380 bar
Q max 120 l/min

SEAT DIMENSIONS: D-10E



OPERATING PRINCIPLE

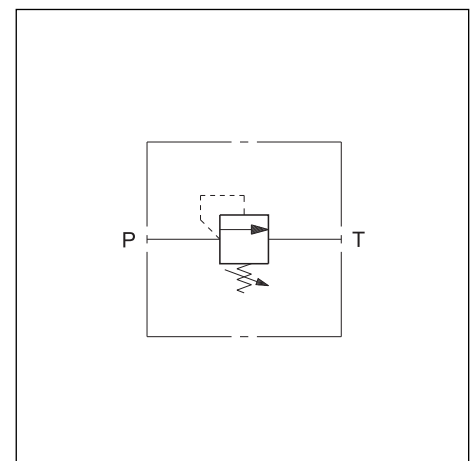


- „ The DBV valve is a direct operated pressure control valve cartridge type that can be used in blocks or panels with seat.
- „ It is normally used to control the maximum pressure in the hydraulic circuits or as a limiting device for pressure peaks generated during hydraulic actuator movement variation.
- „ It is available in different pressure control ranges up to 300 bar.
- „ The circuit pressure acts on the shutter which is directly loaded by a spring on the opposite side. Once the set pressure is reached, the shutter opens, and discharges the excess flow in port T connected directly to the reservoir.
- „ The pressure can be adjusted by a screw, equipped with locking nut and maximum adjustment limiter.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Max working pressure	bar	380
Minimum controlled pressure and pressure drop	see diagram	
Maximum flow rate	l/min	120
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,25
Surface treatment:electrolytic zinc covering	Fe // Zn 8 // B EN 12329	

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

D	B	V	-	/	10	/	
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Direct operated pressure control valve
Cartridge type

Pressure adjustment range:

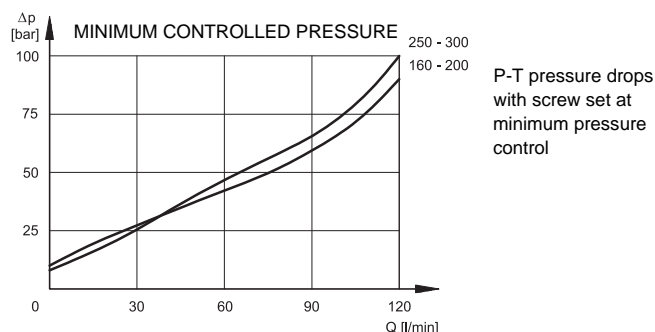
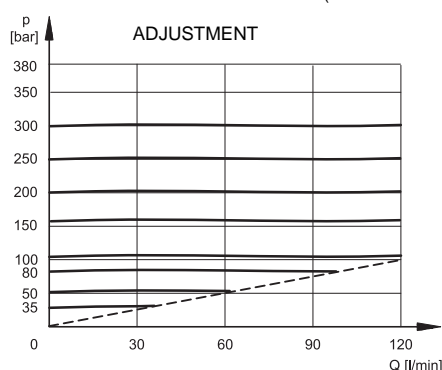
35 = up to 35 bar	160 = up to 160 bar
50 = up to 50 bar	200 = up to 200 bar
80 = up to 80 bar	250 = up to 250 bar
100 = up to 100 bar	300 = up to 300 bar

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

K = Adjustment knob
(omit for adjustment with hex screw - **standard**)

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

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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Countersunk hex adjustment screw: spanner 8 (standard) Clockwise rotation to increase pressure
2	Locking nut: spanner 17
3	Hexagonal spanner 24 Tightening torque 70 ÷ 100 Nm
4	OR type 130 (22.22x2.62) 90 Shore
5	Maximum screw stroke
6	Adjustment knob: K



PCK06

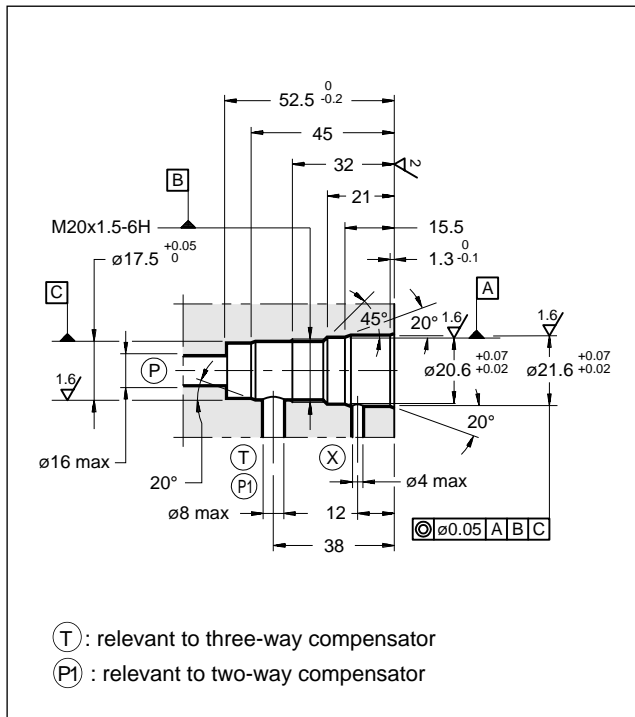
TWO- AND THREE-WAY PRESSURE COMPENSATOR WITH FIXED OR VARIABLE ADJUSTMENT SERIES 10

CARTRIDGE TYPE

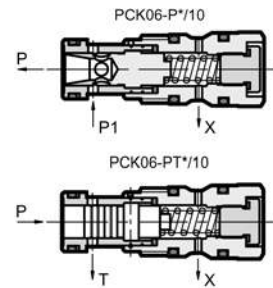
p max 350 bar

Q max 40 l/min

SEAT DIMENSIONS D-10D



OPERATING PRINCIPLE

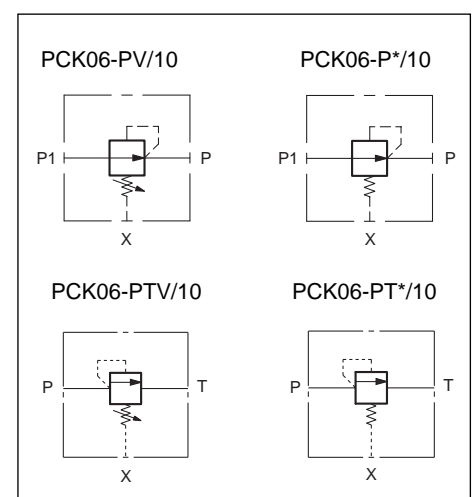


- „ The PCK06 valve is a two or three-way pressure compensator, cartridge type, for block or manifold application.
- „ It keeps the pressure drop (characteristic p) between the P and the X pilot connections, at a constant level.
- „ It is normally used together with proportional directional valves, in order to control the flow rate independently of the pressure variations.
- „ The setting of the variable adjustment compensator can be varied from 7 to 33 bar; adjustment can be operated either via a countersunk hex adjustment screw, or via an adjustment knob.
- „ The fixed adjustment version can be supplied with a characteristic p setting of either 4 or 8 bar.

PERFORMANCES (working with mineral oil of viscosity of 36 cSt a 50°C)

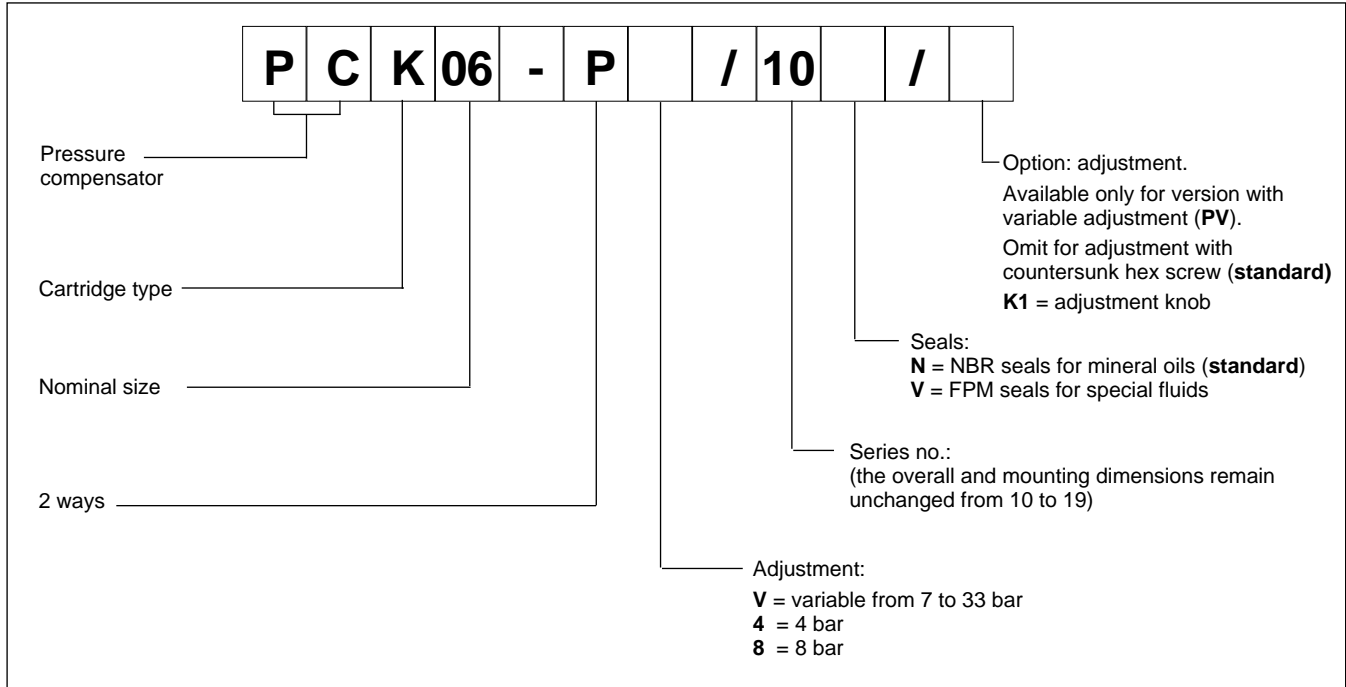
Maximum operating pressure	bar	350
Characteristic p: fixed adjustment	bar	4 - 8
variable adjustment	bar	7 ÷ 33
Maximum flow rate	l/min	40
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	0,2
Surface treatment : electrolytic zinc covering	Fe // Zn 8 // B EN 12329	

HYDRAULIC SYMBOLS

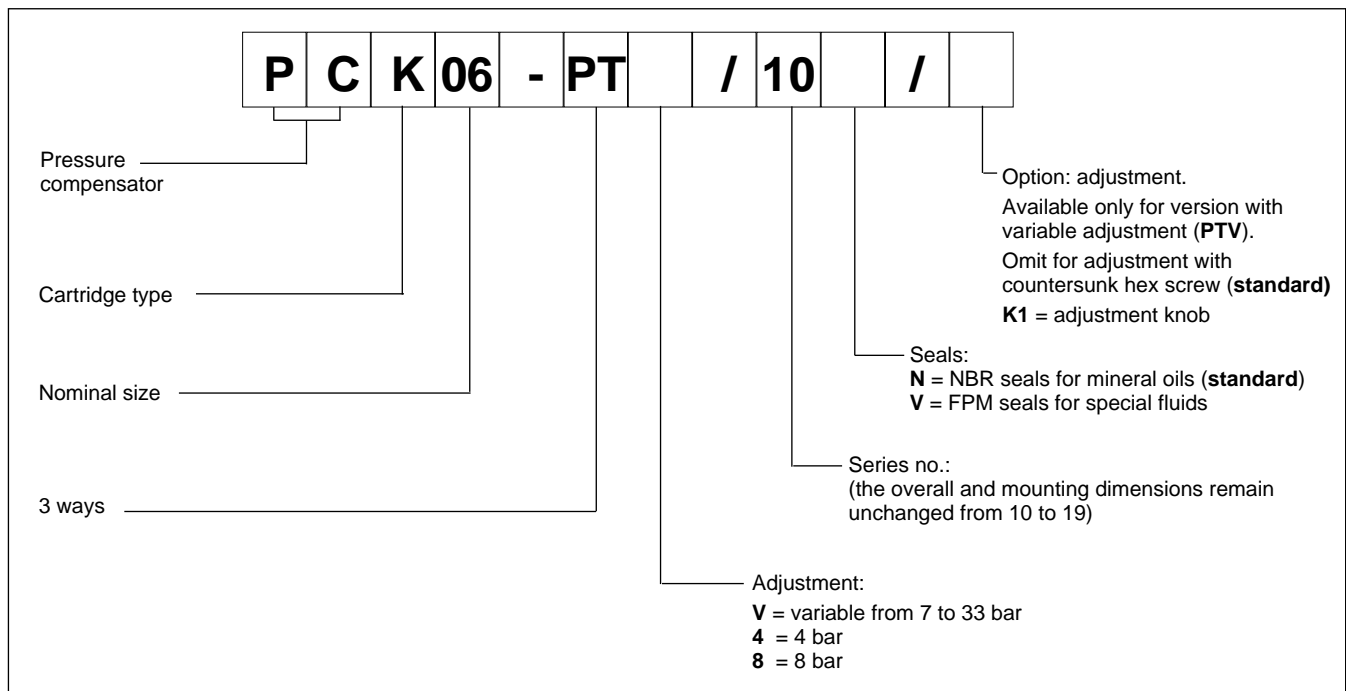


1 - IDENTIFICATION CODE

1.1 - Two-way compensator identification code



1.2 - Three-way compensator identification code

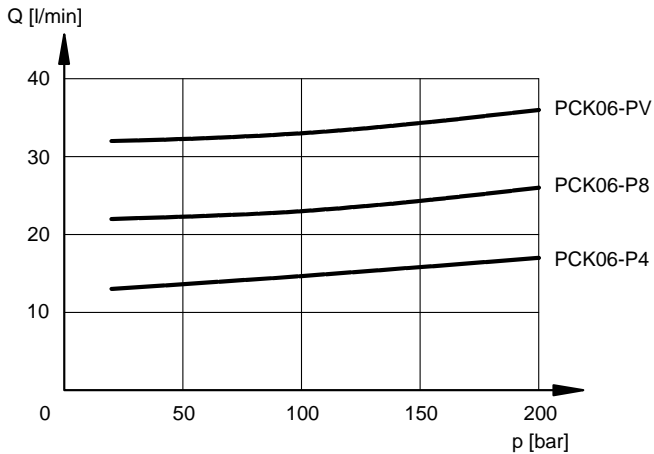




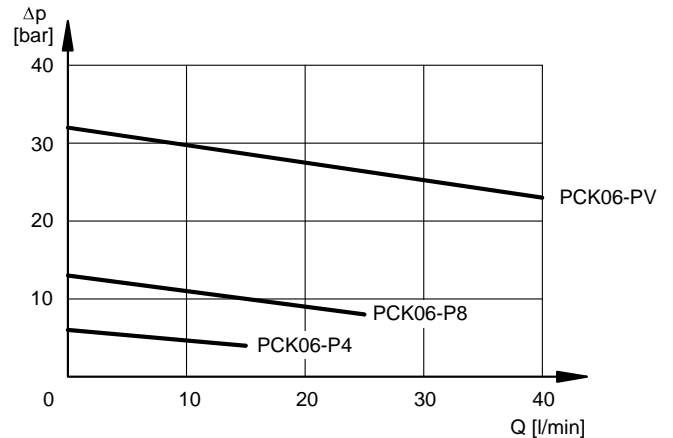
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

2.1 - Two-way compensator characteristic curves

FLOW RATE - PRESSURE $Q = f(p)$

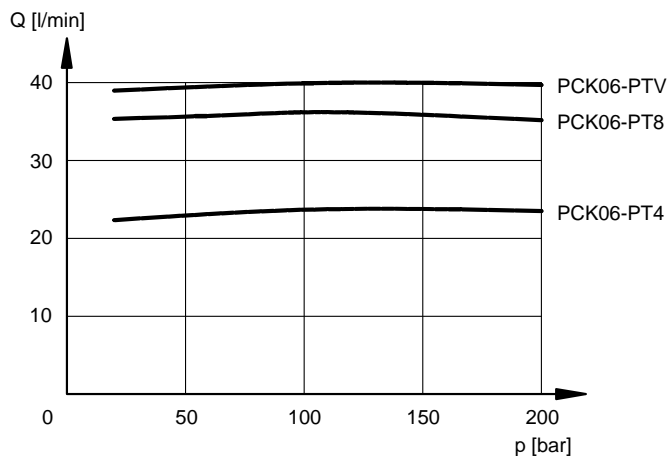


PRESSURE DROPS $\Delta p = f(Q)$

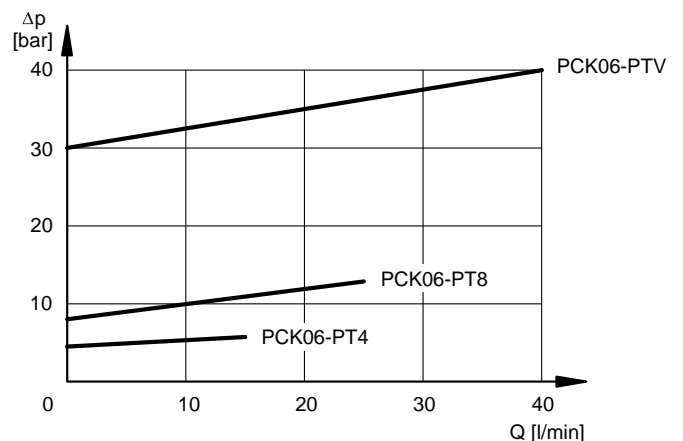


2.2 - Three-way compensator characteristic curves

FLOW RATE - PRESSURE $Q = f(p)$



PRESSURE DROPS $\Delta p = f(Q)$

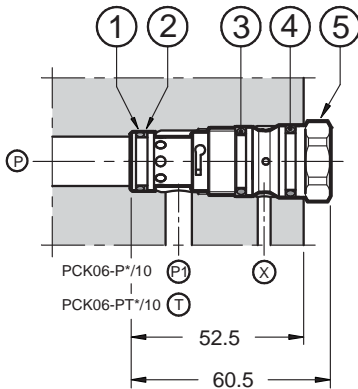


3 - HYDRAULIC FLUIDS

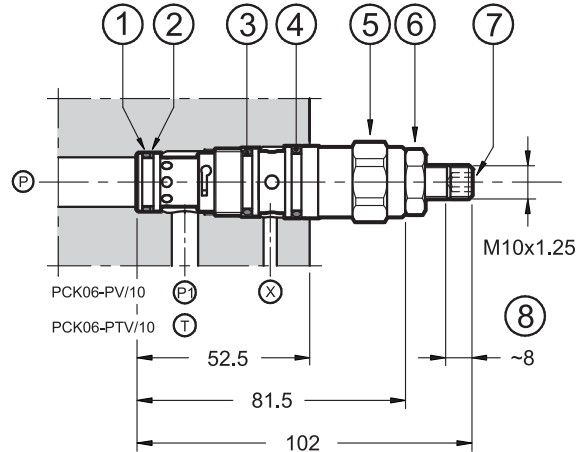
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at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

4 - OVERALL AND MOUNTING DIMENSIONS

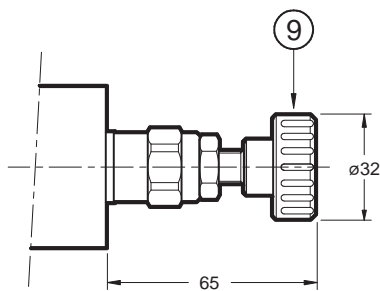
PCK06-P*/10
PCK06-PT*/10



PCK06-PV/10
PCK06-PTV/10



PCK06-PV/10*/K1
PCK06-PTV/10*/K1



dimensions in mm

1	OR type 2056 (14.00x1.78)
2	Parbak 8-015 (14.81x1.14x1.35)
3	OR type 3062 (15.54x2.62)
4	OR type 3062 (15.54x2.62)
5	Hexagonal: spanner 22 Tightening torque 45 ÷ 50 Nm
6	Locking nut: spanner 17
7	Countersunk hex adjustment screw: spanner 5 Clockwise rotation to increase pressure
8	Maximum screw stroke
9	Adjustment knob: K1



CD1-W

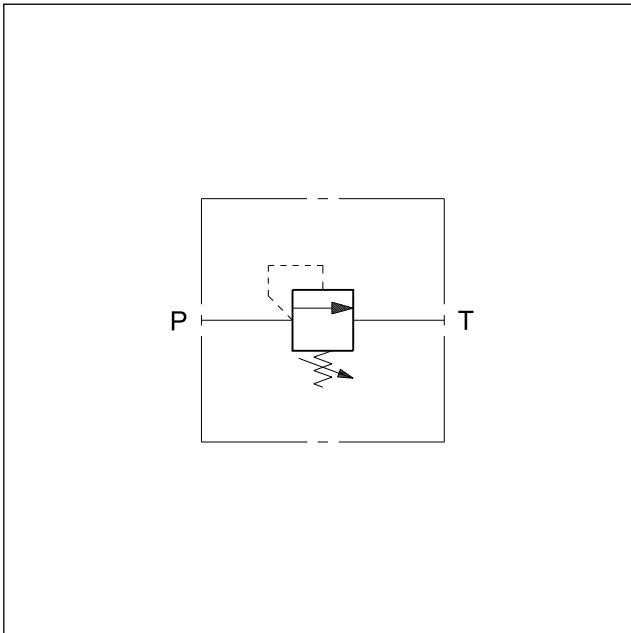
DIRECT OPERATED PRESSURE CONTROL VALVE SERIES 10

THREADED PORTS

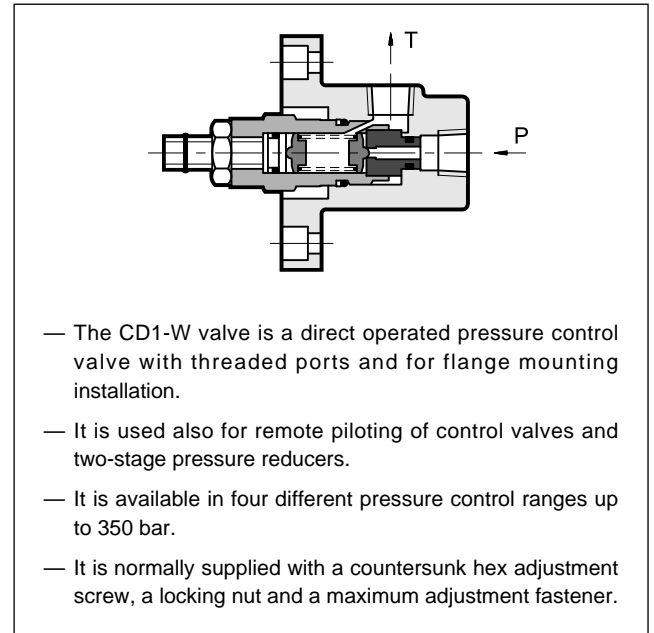
p max 350 bar

Q max 3 l/min

HYDRAULIC SYMBOL



OPERATING PRINCIPLE



PERFORMANCE RATINGS (measured with mineral oil of viscosity 36 cSt at 50°C)

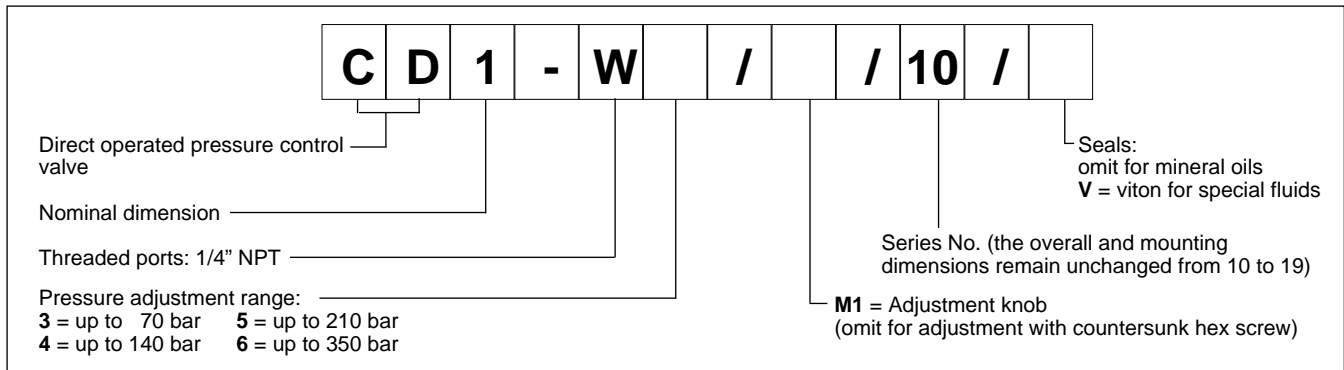
Maximum operating pressure	bar	350
Minimum controlled pressure	see diagram	
Maximum flow rate	l/min	3
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Recommended filtration	according to ISO4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	1,2



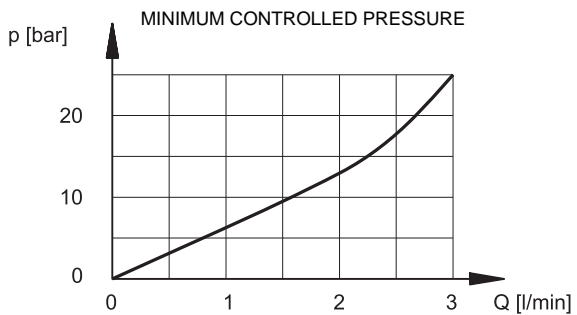
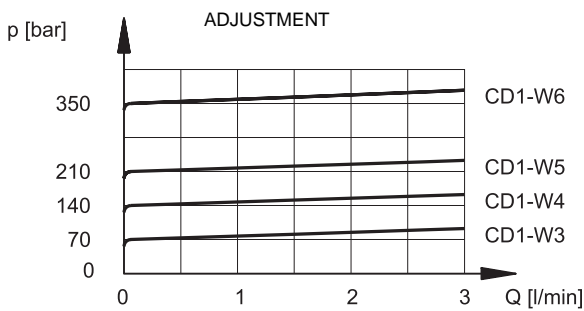
CD1-W

SERIES 10

1 - IDENTIFICATION CODE



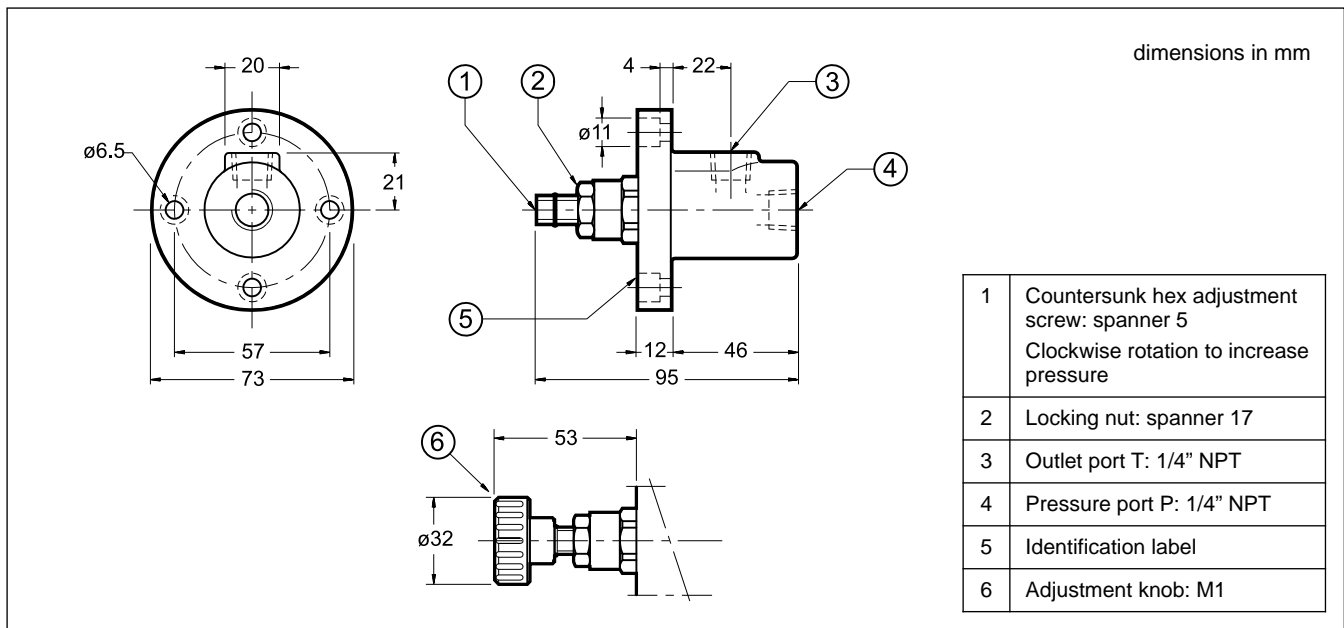
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS



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 Fax +39 0331.895.339
 www.diplomatic.com • e-mail: sales.exp@diplomatic.com



RM*-W

PRESSURE CONTROL VALVES

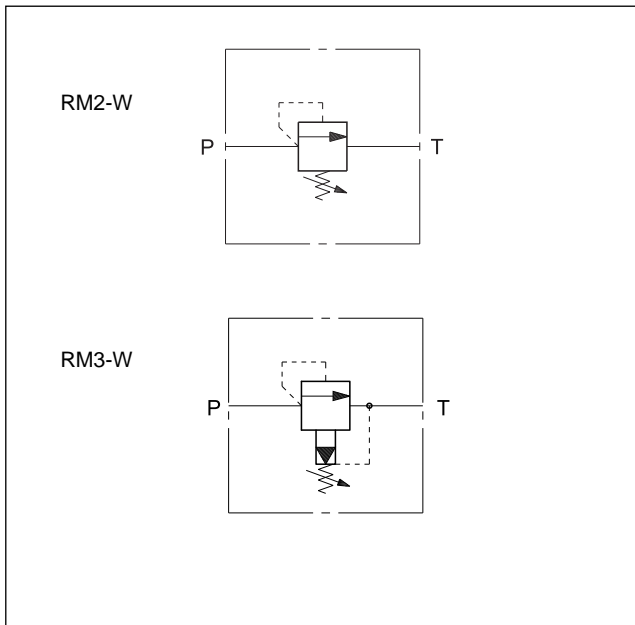
RM2-W SERIES 31
RM3-W SERIES 30

THREADED PORTS

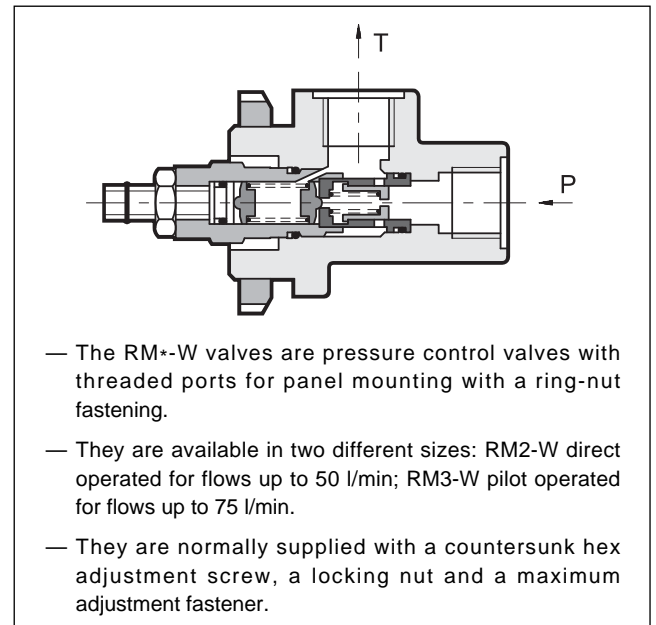
p max **350** bar

Q max (see table of performances)

HYDRAULIC SYMBOLS



OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RM2-W	RM3-W
Maximum operating pressure	bar	350	
Minimum controlled pressure		see diagram	
Maximum flow rate	l/min	50	75
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 20/18/15	
Recommended viscosity	cSt	25	
Mass	kg	0,9	

1 - IDENTIFICATION CODE

R	M	-	W	/						
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Example: RM2-W3/31N/K
RM3-W3/M1/30/V

Pressure control valve

Nominal dimension:
2 = 3/8" 3 = 1/2"

Threaded ports BSP

Pressure adjustment range:
3 = up to 70 bar 5 = up to 210 bar
4 = up to 140 bar 6 = up to 350 bar

only for RM2: /K = Adjustment knob
(omit for adjustment with countersunk hex screw)

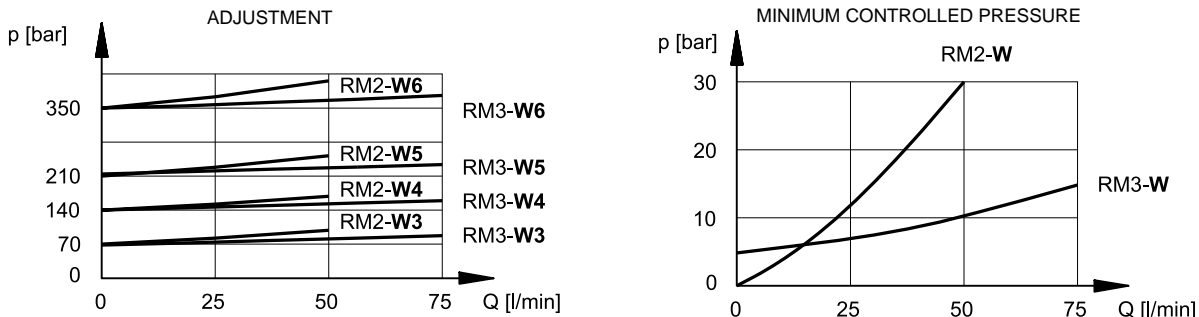
only for RM3: Seals
Omit for NBR seals for mineral oils (**standard**)
V = FPM seals for special fluids

Series no: 31 for RM2-W 30 for RM3-W

only for RM2: Seals
N = NBR seals for mineral oils (**standard**)
V = FPM seals for special fluids

only for RM3: M1 = Adjustment knob
(omit for adjustment with countersunk hex screw)

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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

<p>dimensions in mm</p>	1	Countersunk hex adjustment screw: RM2-W: spanner 6 RM3-W: spanner 5 Clockwise rotation to increase pressure
	2	Locking nut: RM2-W: spanner 19 RM3-W: spanner 17
	3	Ring-nut for flange mounting type SKF KM9
	4	Outlet port 1/2" BSP
	5	Pressure port: RM2-W: 3/8" BSP RM3-W: 1/2" BSP
	6	Adjustment knob: RM3-W: M1
	7	Adjustment knob: RM2-W: K
	8	Locking ring



RQ*-W

PRESSURE RELIEF VALVE

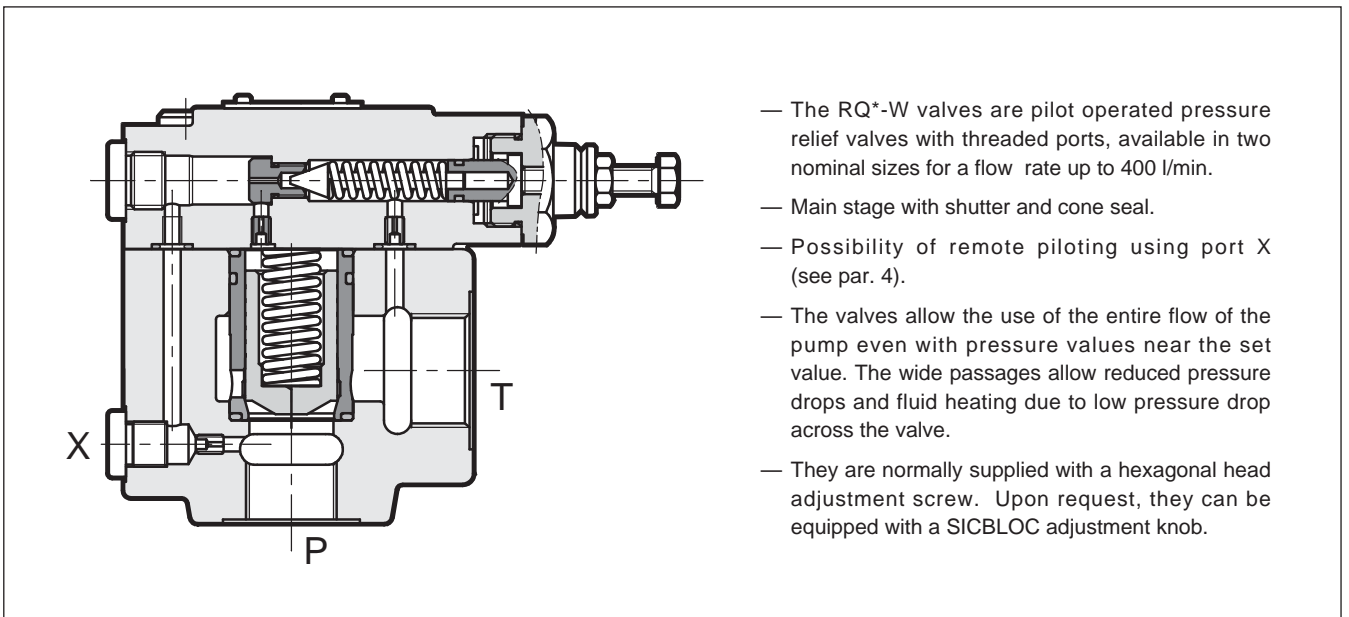
SERIES 41

THREADED PORTS

p max 350 bar

Q max (see table of performances)

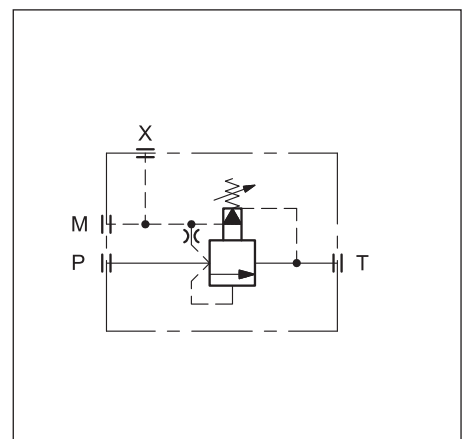
OPERATING PRINCIPLE



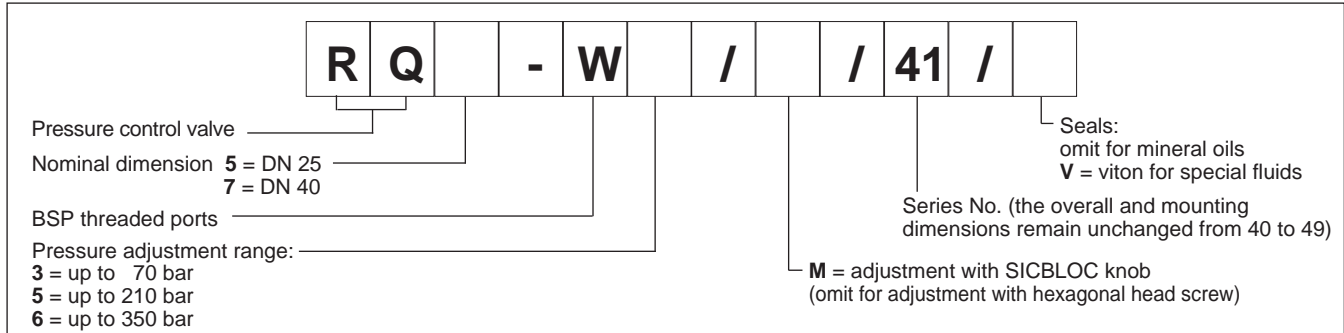
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQ5-W	RQ7-W
Maximum operating pressure	bar	350	
Maximum flow rate	l/min	250	400
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 20/18/15		
Recommended viscosity	cSt	25	
Mass	kg	4,1	8

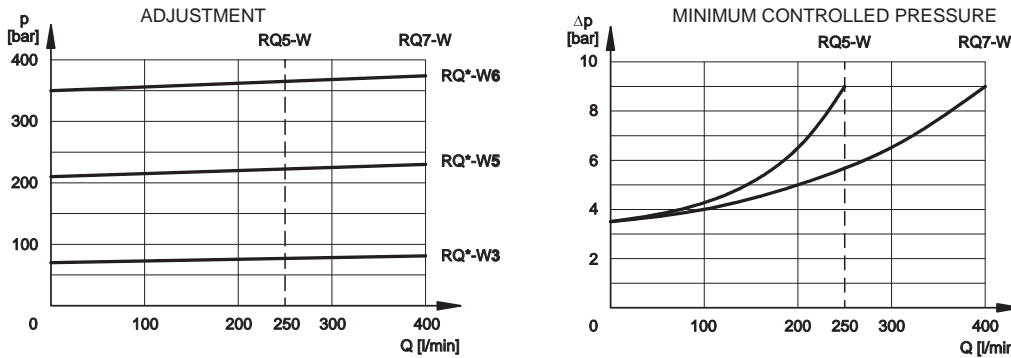
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Hexagonal head adjustment screw. Spanner 13. Clockwise rotation to increase pressure
2	Remote piloting port X: 1/4" BSP
3	Outlet port T RQ5-W: 1" BSP RQ7-W: 1" 1/2 BSP
4	Pressure port P RQ5-W: 3/4" BSP RQ7-W: 1" 1/4 BSP
5	Pressure gauge port 3/8" BSP
6	SICBLOC adjustment knob. To operate, push and rotate at the same time.

	A	B	C	D	ØE	F	G	H	I	L	M	ØN	ØO
RQ5-W	168	98	49	4	22	21.5	44.5	123	80	87	53	35.5	46
RQ7-W	168	98	49	4	22	43	59.5	145	102	109	68	50	56



RQM*-W

SOLENOID OPERATED PRESSURE RELIEF VALVE WITH UNLOADING AND PRESSURE SELECTION

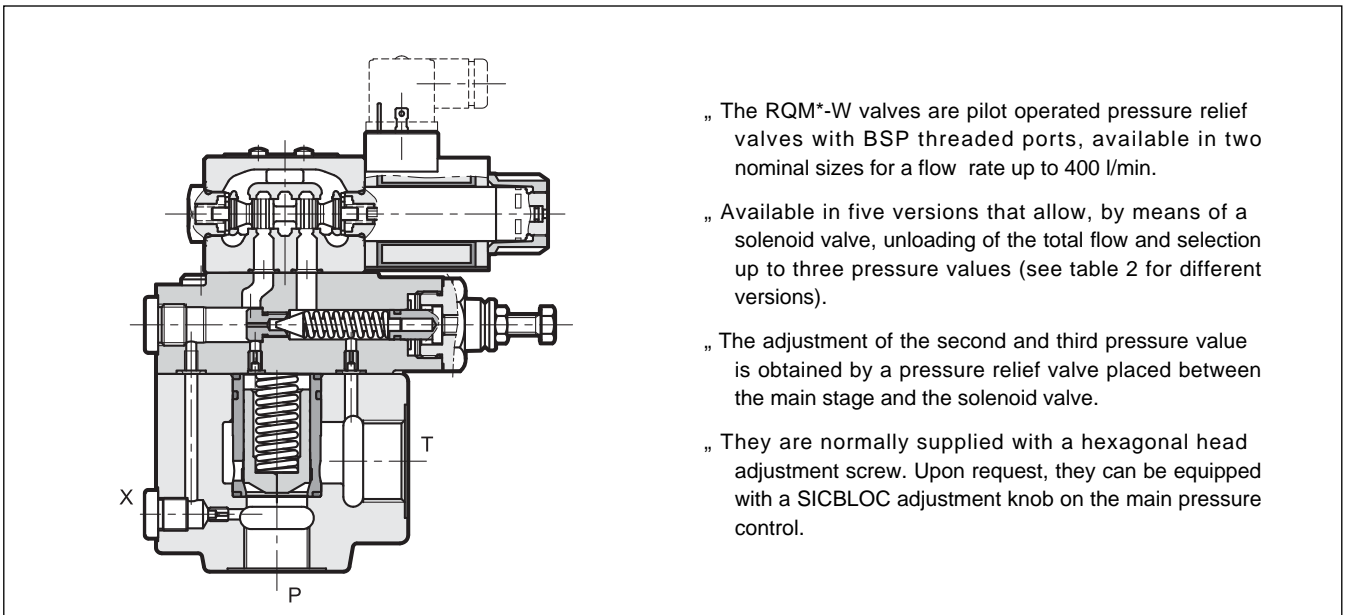
SERIES 60

THREADED PORTS

p max **350** bar

Q max (see table of performances)

OPERATING PRINCIPLE



- „ The RQM*-W valves are pilot operated pressure relief valves with BSP threaded ports, available in two nominal sizes for a flow rate up to 400 l/min.
- „ Available in five versions that allow, by means of a solenoid valve, unloading of the total flow and selection up to three pressure values (see table 2 for different versions).
- „ The adjustment of the second and third pressure value is obtained by a pressure relief valve placed between the main stage and the solenoid valve.
- „ They are normally supplied with a hexagonal head adjustment screw. Upon request, they can be equipped with a SICBLOC adjustment knob on the main pressure control.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQM5-W	RQM7-W
Maximum operating pressure	bar	350	
Maximum flow rate	l/min	250	400
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 20/18/15		
Recommended viscosity	cSt	25	

NOTE: for the solenoid valve DS3 characteristics see catalogue 41 150

1 - IDENTIFICATION CODE

R	Q	M	-	W	/	/	/	60	-	K1	/	
----------	----------	----------	----------	----------	----------	----------	----------	-----------	----------	-----------	----------	--

Pressure relief valve pilot operated

solenoid valve for venting / pressure selection

Nominal dimension: **5** = ND 25
7 = ND 40

BSP threaded ports

Pressure adjustment range:
3 = up to 70 bar **6** = up to 350 bar
5 = up to 210 bar

Versions: **A**
B
C
D
G } see description in table 2 versions

M = adjustment with SICBLOC knob available on the main pressure control (omit for adjustment with hexagonal head screw)

Series No. (the overall and mounting dimensions remain unchanged from 60 to 69)

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected

Coil electrical connection: plug for connector type DIN 43650 (**standard**)

DC power supply

D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see **NOTE**)

AC power supply

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see **NOTE**)

F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

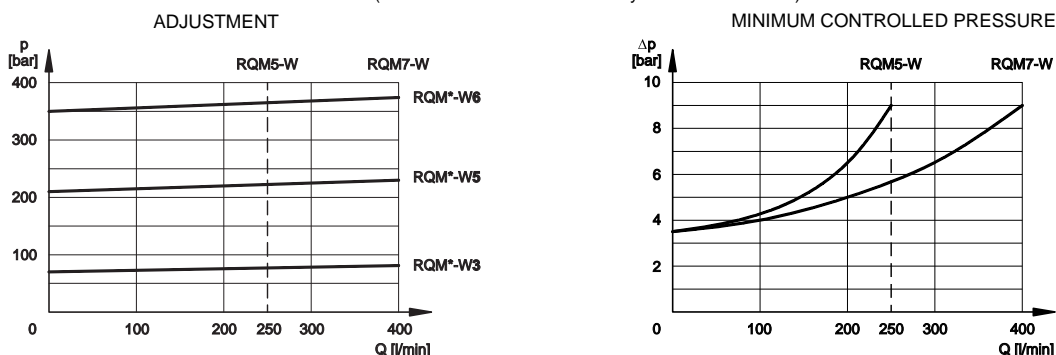
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

NOTE: The locking rings of the coils and the relevant O-Rings are supplied together with valves

2 - VERSIONS

RQM*-W */A	RQM*-W */B	RQM*-W */C	RQM*-W */D	RQM*-W */G
<p>1 pressure setting and unloading with de-energized solenoid</p>	<p>1 pressure setting and unloading with energized solenoid</p>	<p>2 pressure settings The highest setting is reached with energized solenoid</p>	<p>2 pressure settings and unloading with de-energized solenoids</p>	<p>3 pressure settings The highest setting is reached with de-energized solenoids</p>

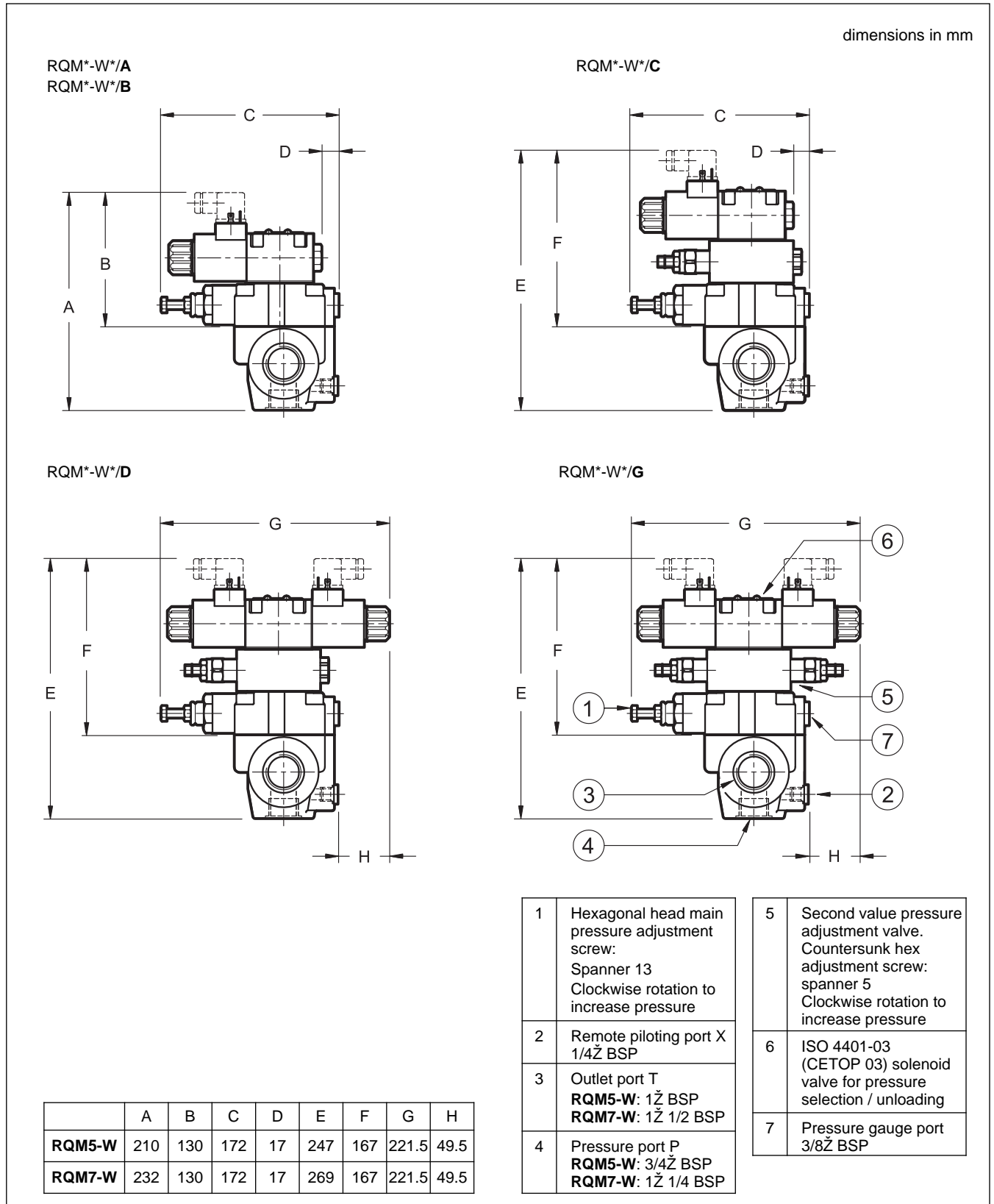
3 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



4 - 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.

5 - OVERALL AND MOUNTING DIMENSIONS

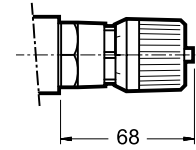




6 - ADJUSTMENT KNOB

The RQ valves can be equipped with a SICBLOC adjustment knob, only on the main pressure regulation. To operate it, push and rotate at the same time.

To request this option, add: /M (see paragraph 1).



7 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without the connectors. They must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

8 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or utilization in tropical climates, use of the manual override, boot protected, is recommended. Add the suffix **CM** to request this device (see paragraph 1).

For overall dimensions see catalogue 41 150.



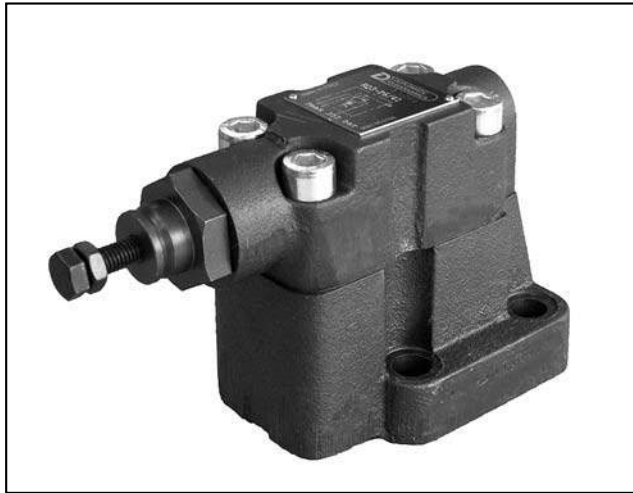
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RQ*-P

PRESSURE RELIEF VALVES

SERIES 41

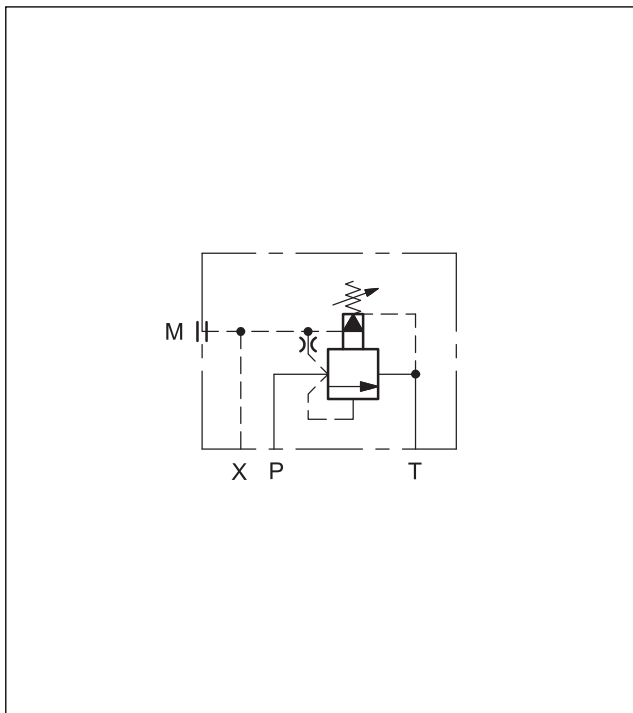
SUBPLATE MOUNTING

RQ3-P ISO 6264-06 (CETOP R06)

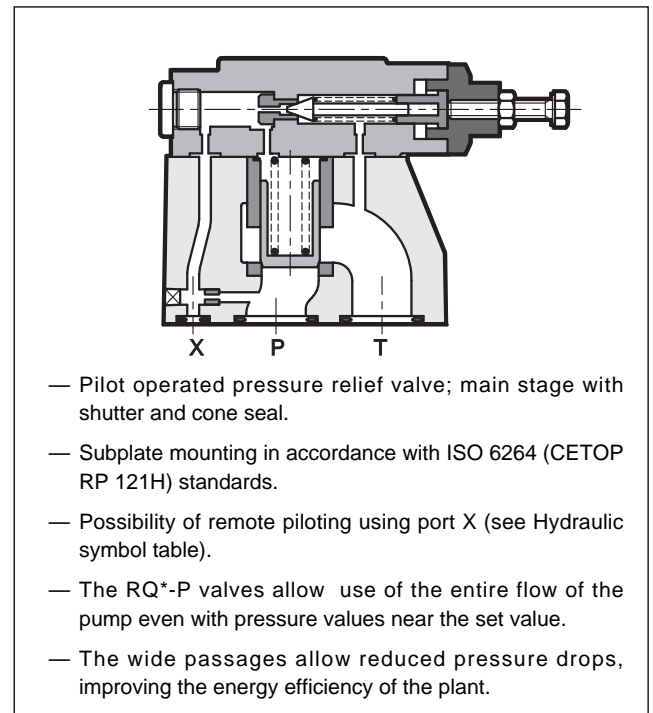
RQ5-P ISO 6264-08 (CETOP R08)

RQ7-P ISO 6264-10 (CETOP R10)

HYDRAULIC SYMBOL



OPERATING PRINCIPLE



- Pilot operated pressure relief valve; main stage with shutter and cone seal.
- Subplate mounting in accordance with ISO 6264 (CETOP RP 121H) standards.
- Possibility of remote piloting using port X (see Hydraulic symbol table).
- The RQ*-P valves allow use of the entire flow of the pump even with pressure values near the set value.
- The wide passages allow reduced pressure drops, improving the energy efficiency of the plant.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQ3-P	RQ5-P	RQ7-P
Maximum operating pressure	bar	350		
Maximum flow rate	l/min	200	400	500
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 20/18/15			
Recommended viscosity	cSt	25		
Mass	kg	3,5	4,3	6,5

1 - IDENTIFICATION CODE

R	Q	-	P	/	/	41	/
----------	----------	----------	----------	----------	----------	-----------	----------

Double stage pressure relief valve

Size: **3** = ISO 6264-06 (CETOP R06)
5 = ISO 6264-08 (CETOP R08)
7 = ISO 6264-10 (CETOP R10)

Subplate mounting

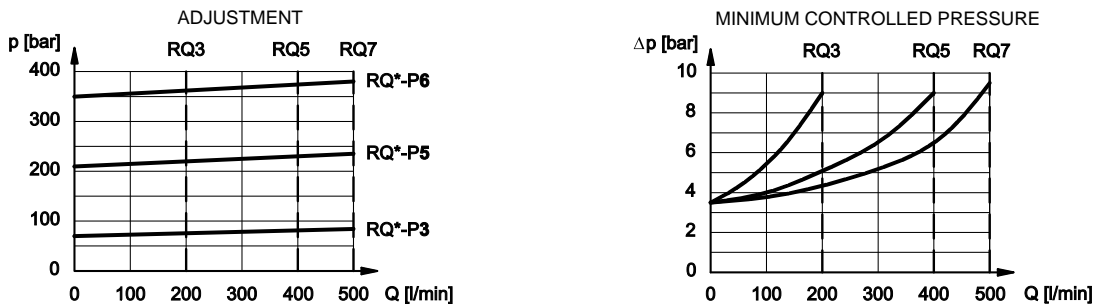
Pressure adjustment range: _____
3 = up to 70 bar **6** = up to 350 bar
5 = up to 210 bar

Seals: omit for mineral oils
V = viton for special fluids

Series No.
 (the overall and mounting dimensions remain unchanged from 40 to 49)

M = adjustment with SICBLOC knob
 (omit for adjustment with hexagonal head screw)

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



3 - 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.

4 - RQ3-P OVERALL AND MOUNTING DIMENSIONS

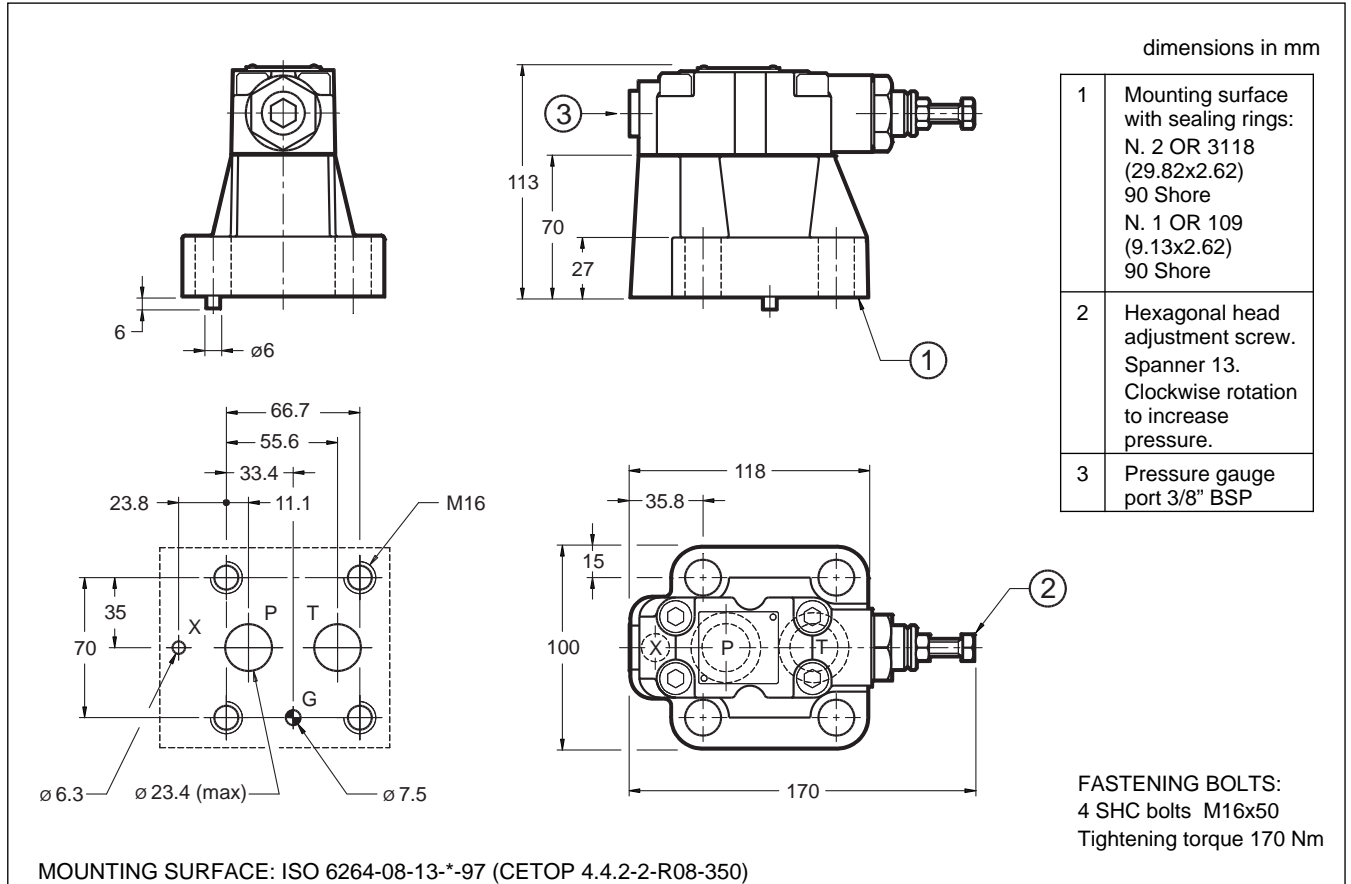
dimensions in mm

1	Mounting surface with sealing rings: 2 OR type 123 (17.86x2.62) 90 Shore 1 OR type 109 (9.13x2.62) 90 Shore
2	Hexagonal head adjustment screw. Spanner 13. Clockwise rotation to increase pressure.
3	Pressure gauge port Y 3/8" BSP

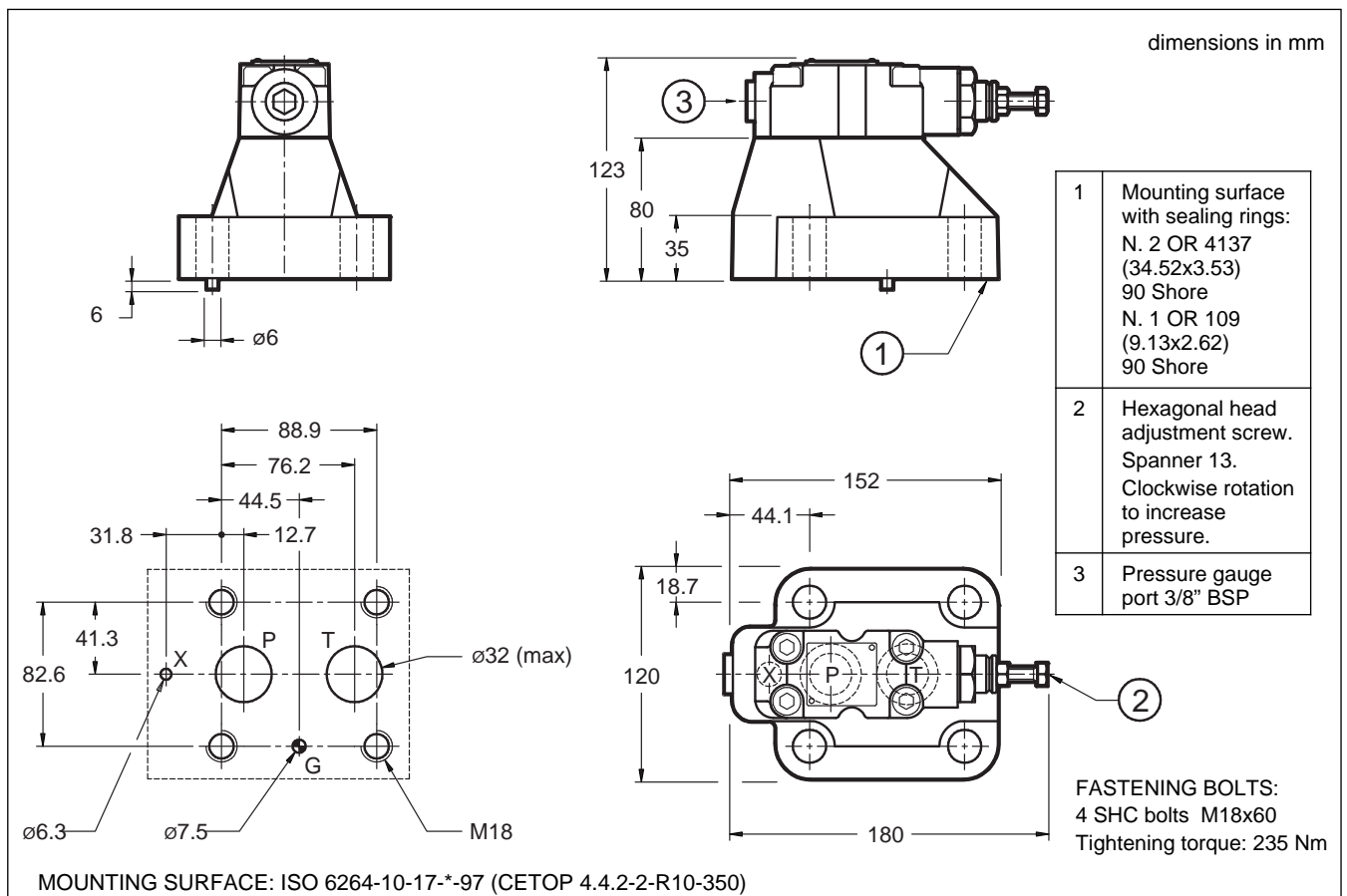
FASTENING BOLTS:
 4 SHC bolts M12x40
 Tightening torque: 69 Nm

MOUNTING SURFACE: ISO 6264-06-09-*-97 (CETOP 4.4.2-2-R06-350)

5 - RQ5-P OVERALL AND MOUNTING DIMENSIONS



6 - RQ7-P OVERALL AND MOUNTING DIMENSIONS

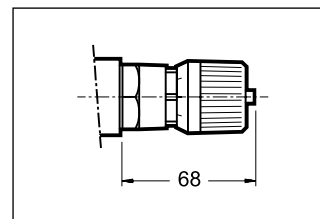




7 - ADJUSTMENT KNOB

The RQ valves can be equipped with a SICBLOC adjustment knob. To operate it, push and rotate at the same time.

To request this option, add: **/M** (see paragraph 1).



8 - SUBPLATES (see catalogue 51 000)

	RQ3-P	RQ5-P	RQ7-P
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports
P, T ports dimension	P: 1/2" BSP T: 3/4" BSP	1" BSP	1" 1/4 BSP
X port dimension	1/4" BSP	1/4" BSP	1/4" BSP



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RQM*-P

SOLENOID OPERATED PRESSURE RELIEF VALVES WITH UNLOADING AND PRESSURE SELECTION

SERIES 60

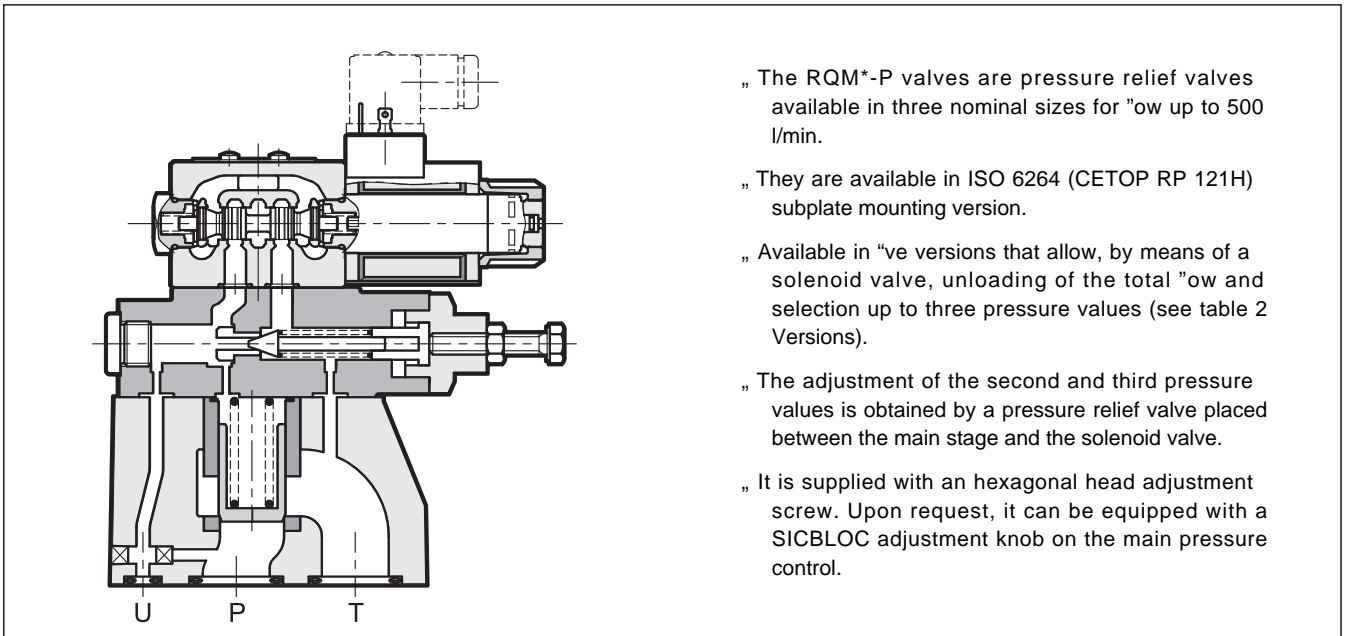
SUBPLATE MOUNTING

RQM3-P ISO 6264-06 (CETOP R06)

RQM5-P ISO 6264-08 (CETOP R08)

RQM7-P ISO 6264-10 (CETOP R10)

OPERATING PRINCIPLE



- „ The RQM*-P valves are pressure relief valves available in three nominal sizes for flow up to 500 l/min.
- „ They are available in ISO 6264 (CETOP RP 121H) subplate mounting version.
- „ Available in “ve versions that allow, by means of a solenoid valve, unloading of the total flow and selection up to three pressure values (see table 2 Versions).
- „ The adjustment of the second and third pressure values is obtained by a pressure relief valve placed between the main stage and the solenoid valve.
- „ It is supplied with an hexagonal head adjustment screw. Upon request, it can be equipped with a SICBLOC adjustment knob on the main pressure control.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQM3-P	RQM5-P	RQM7-P
Maximum operating pressure	bar	350		
Maximum flow rate	l/min	200	400	500
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 20/18/15			
Recommended viscosity	cSt	25		

NOTE: for the solenoid valve DS3 characteristics see catalogue 41 150

1 - IDENTIFICATION CODE

R	Q	M	-	P	/	/	/	60	-	K1	/
----------	----------	----------	----------	----------	----------	----------	----------	-----------	----------	-----------	----------

pilot operated pressure relief valve

solenoid valve for unloading / pressure selection

Size: **3** = ISO 6264-06 (CETOP R06)
5 = ISO 6264-08 (CETOP R08)
7 = ISO 6264-10 (CETOP R10)

Subplate mounting

Pressure adjustment range:
3 = up to 70 bar **6** = up to 350 bar
5 = up to 210 bar

Versions: **A** } see description
B } in hydraulic symbols
C } table
D }
G }

M = adjustment with SICBLOC knob available only on the main pressure control (Omit for adjustment with hexagonal head screw)

Series No. (the overall and mounting dimensions remain unchanged from 60 to 69)

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected

Coil electrical connection: plug for connector type DIN 43650 (**standard**)

DC power supply

D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see note)

AC power supply

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see note)

F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

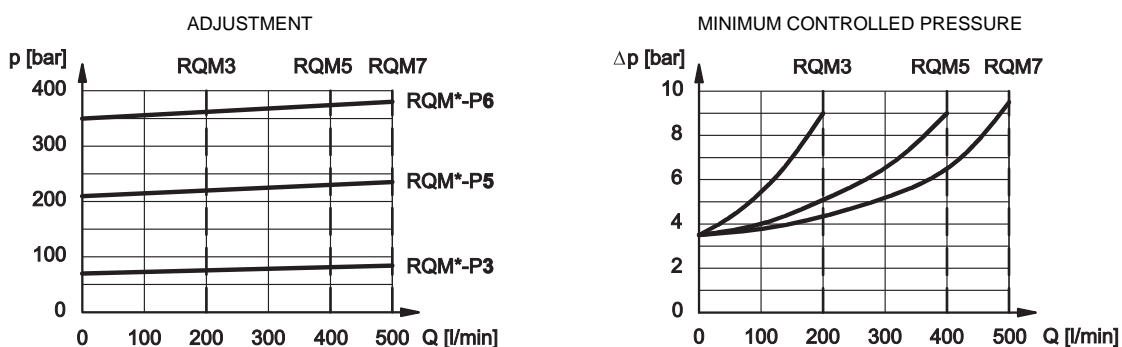
Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

NOTE: The locking rings of the coils and the relevant O-Rings are supplied together with valves

2 - VERSIONS

RQM*-P*/A	RQM*-P*/B	RQM*-P*/C	RQM*-P*/D	RQM*-P*/G
<p>1 pressure setting and unloading with de-energized solenoid</p>	<p>1 pressure setting and unloading with energized solenoid</p>	<p>2 pressure settings The highest setting is reached with energized solenoid</p>	<p>2 pressure settings and unloading with de-energized solenoids</p>	<p>3 pressure settings The highest setting is reached with de-energized solenoids</p>

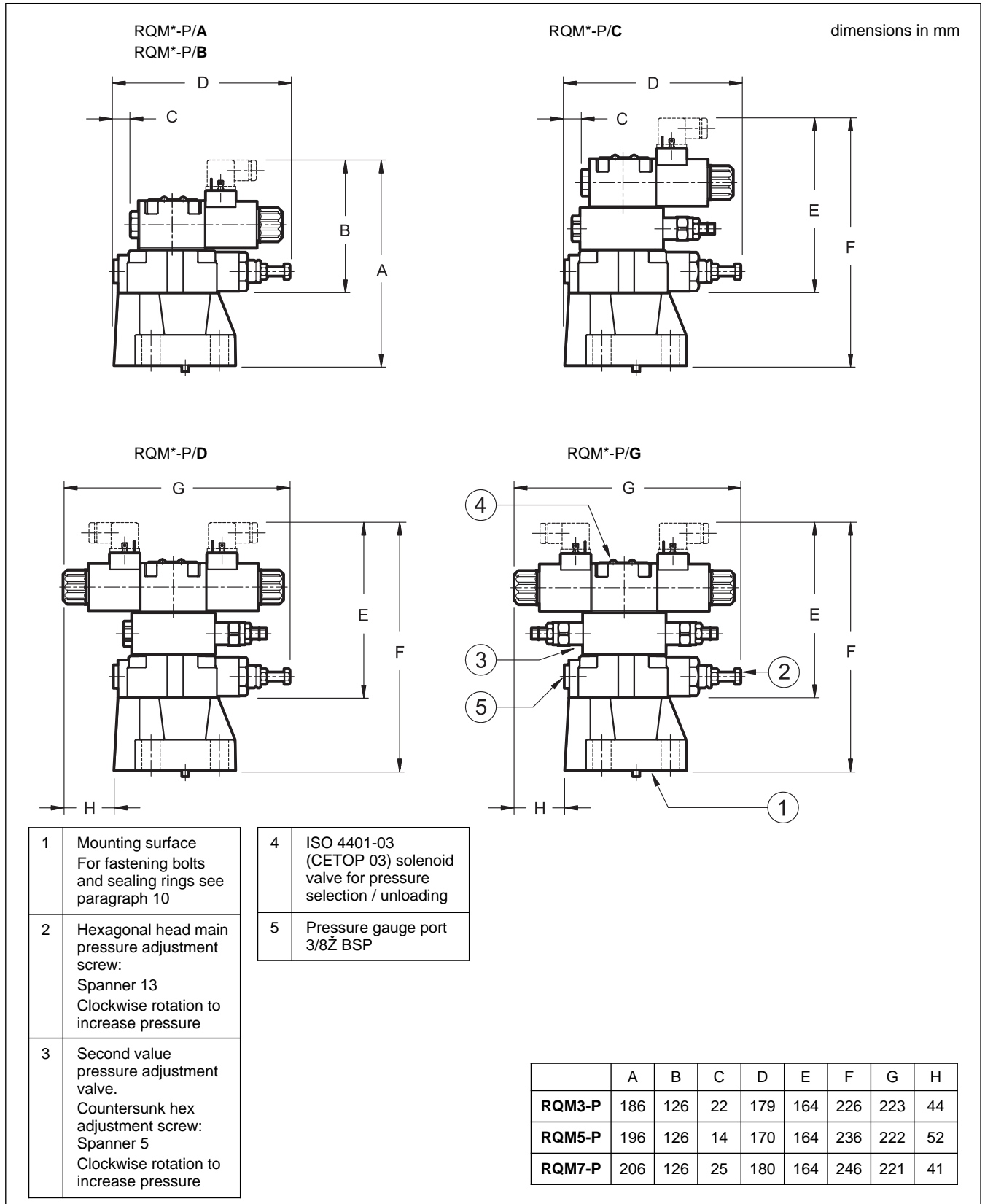
3 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



4 - HYDRAULIC FLUIDS

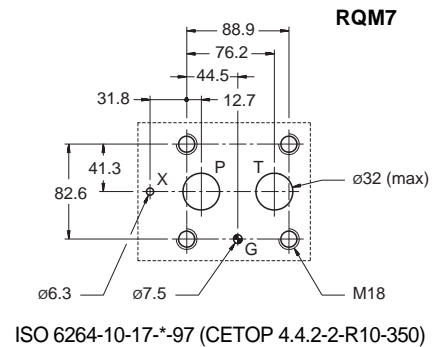
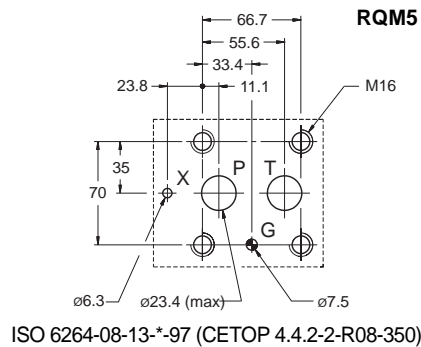
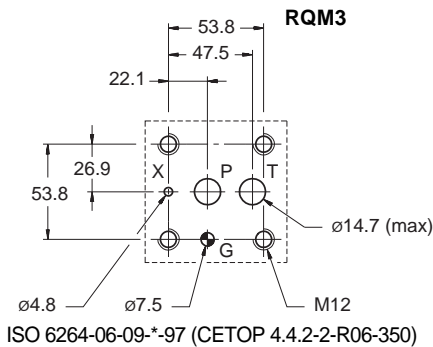
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at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

5 - OVERALL AND MOUNTING DIMENSIONS





6 - MOUNTING SURFACES



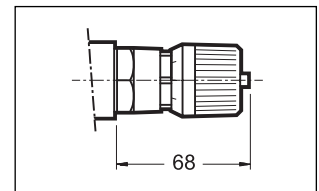
7 - ADJUSTMENT KNOB

The valves can be equipped with a SICBLOC adjustment knob, only on the main pressure regulation. To operate it, push and rotate at the same time.

To request this option, add: **/M** (see paragraph 1).

8 - ELECTRIC CONNECTORS

The solenoid valves are never supplied with connector. Connectors must be ordered separately. For the identification of the connector type to be ordered, please see catalogue 49 000.



9 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or utilization in tropical climates, use of the manual override boot protected is recommended.

Add the suffix **CM** to request this device (see paragraph 1). For overall dimensions see catalogue 41 150.

10 - FASTENING BOLTS AND SEALING RINGS

	RQM3-P	RQM5-P	RQM7-P
Fastening (4 SHC bolts ISO 4762)	M12 x 40	M16 x 50	M18 x 60
Torque	69 Nm	170 Nm	235 Nm
Sealing rings	N. 2 OR type 123 (17.86x2.62) 90 Shore N. 1 OR type 109 (9.13x2.62) 90 Shore	N. 2 OR type 3118 (29.82x2.62) 90 Shore N. 1 OR type 109 (9.13x2.62) 90 Shore	N. 2 OR type 4137 (34.52x3.53) 90 Shore N. 1 OR type 109 (9.13x2.62) 90 Shore

11 - SUBPLATES (see catalogue 51 000)

	RQM3-P	RQM5-P	RQM7-P
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports
P, T, U ports dimension	P: 1/2" BSP T: 3/4" BSP	1" BSP	1" 1/4 BSP
X port dimension	1/4" BSP	1/4" BSP	1/4" BSP



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MRQA

UNLOADING VALVE

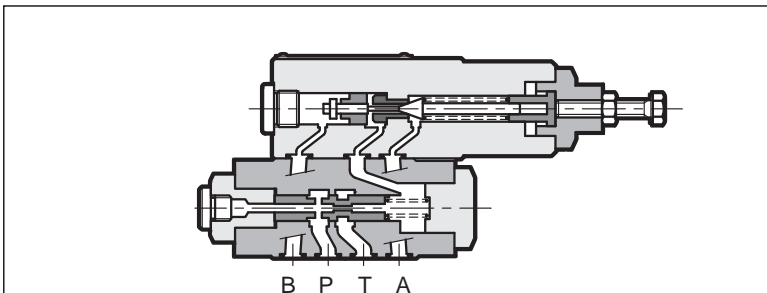
(FOR CIRCUITS WITH ACCUMULATOR)

SERIES 42

SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

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

OPERATING PRINCIPLE



— MRQA is a pressure relief and safety valve with automatic unloading. Upon reaching the set value, the valve freely unloads the pump and puts it under pressure again when the pressure values descend in the circuit to correspond to 68% or 78% of the set value.

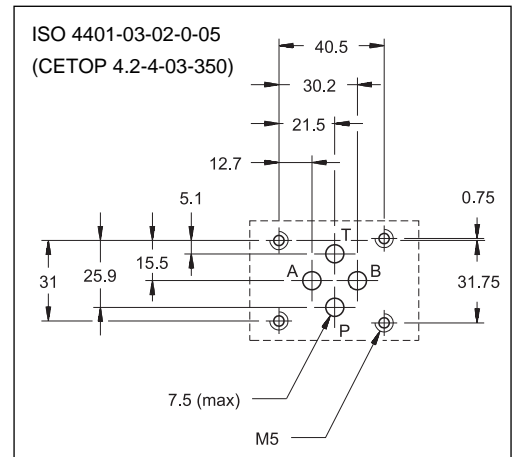
In order to assure this operation, it is necessary to use an accumulator (see hydraulic diagram) that guarantees pressure maintenance in the circuit. A check valve, incorporated in the panel or available as a plate under the valve MRQA/C, prevents the accumulator unloading through the open valve.

This system maintains the pressure in the hydraulic circuit, avoiding heating of the oil and reducing energy consumption.

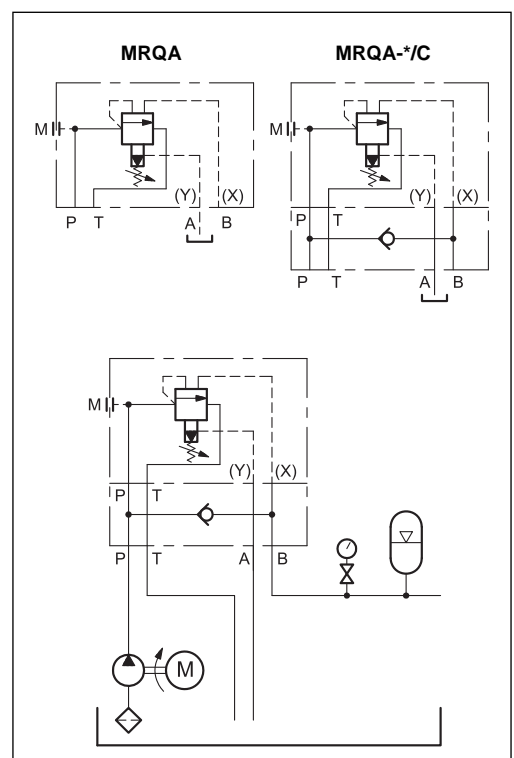
It is recommended to place the accumulator as close as possible to the MRQA, without reducing the connection size.

— The cycle time depends on the pump flow rate, the accumulator capacity and pre-charge, and the flow requirement of the system.

MOUNTING INTERFACE



HYDRAULIC SYMBOLS & DIAGRAM



PERFORMANCE RATINGS (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	40
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 21/19/16	
Recommended viscosity	cSt	25
Mass: MRQA	kg	3,3
MRQA*/C	kg	4,2

1 - IDENTIFICATION CODE

	M	R	Q	A	-	/	/	/	/	42	/	
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Size ISO 4401-03 (CETOP 03) —————

Unloading valve —————

Automatic unloading for circuits with accumulator —————

Pressure adjustment range: —————

3 = 25 ÷ 70 bar
5 = 50 ÷ 210 bar
6 = 100 ÷ 320 bar

Differential pressure (values ± 2.5%)
1 = pump switch on at 78% of adjustment value
2 = pump switch on at 68% of adjustment value

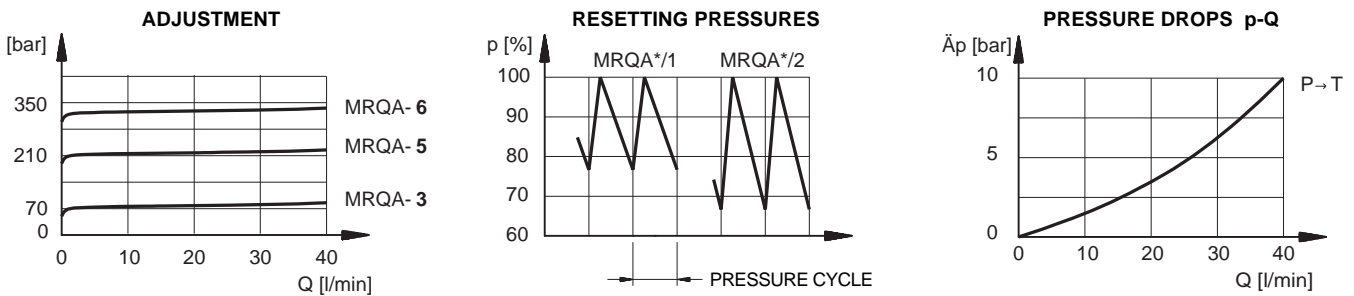
Seals: omit for mineral oils
V = viton for special fluids

Series No. (the overall and mounting dimensions remain unchanged from 40 to 49)

C = Check valve (omit if not required)

M = Adjustment with SICBLOC knob (omit for adjustment with hexagonal head screw)

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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

FASTENING SCREWS:
MRQA
 4 SHC screws ISO 4762 M5x95
MRQA/C
 4 SHC screws ISO 4762 M5x135
 Tightening torque: 5 Nm

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) - 90 Shore
2	Hexagonal head adjustment screw. Spanner 13. Clockwise rotation to increase pressure
3	SICBLOC adjustment knob. To operate, push and rotate at the same time.
4	Pressure gauge port 1/4" BSP
5	Check valve for version /C



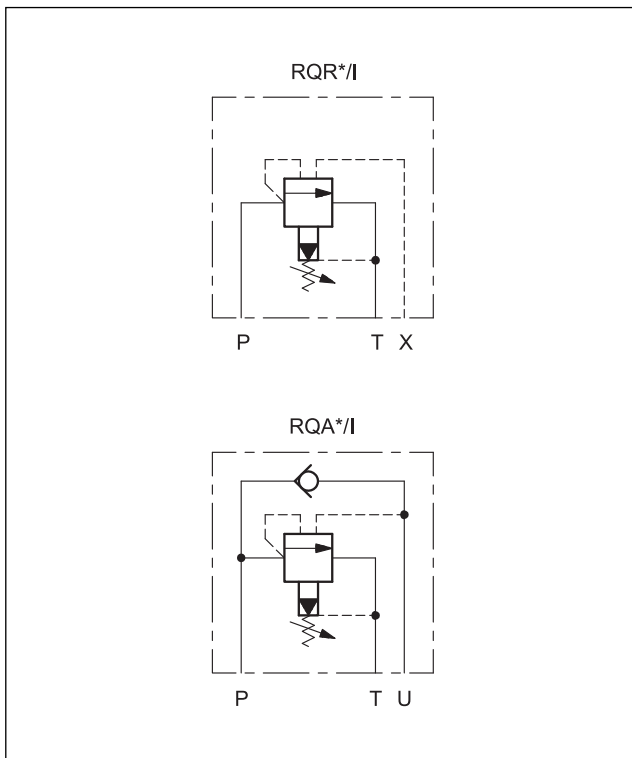
RQ-P**
UNLOADING VALVE
(FOR CIRCUITS WITH ACCUMULATOR)
SERIES 42

RQR*-P
FOR REMOTE PILOTING

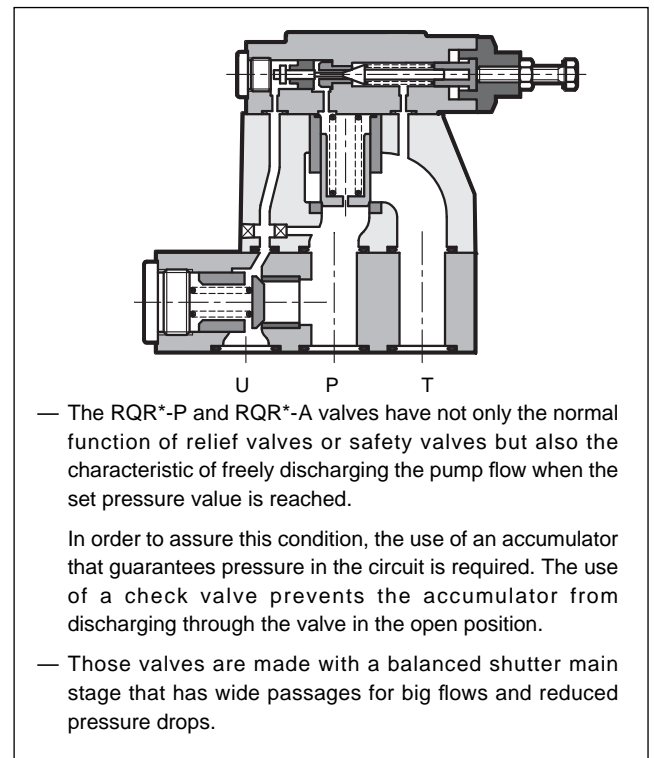
RQA*-P
WITH INCORPORATED CHECK VALVE

SUBPLATE MOUNTING

HYDRAULIC SYMBOLS



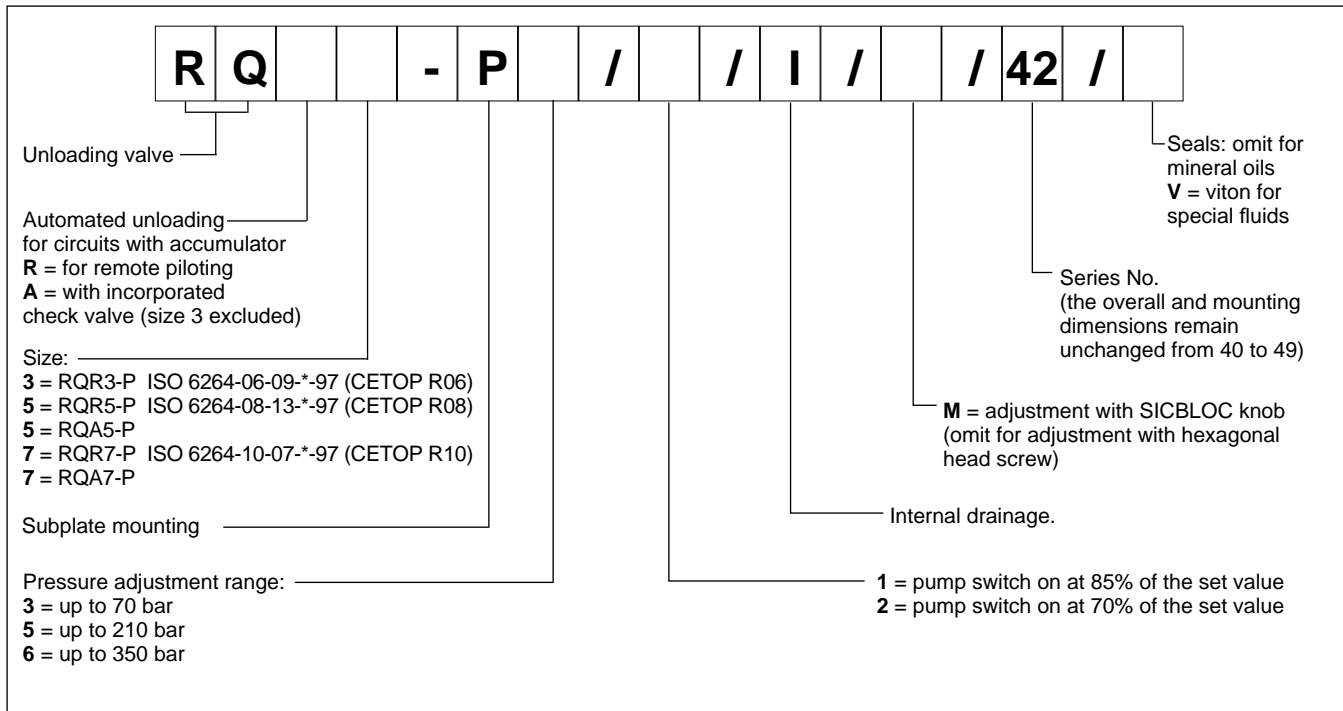
OPERATING PRINCIPLE



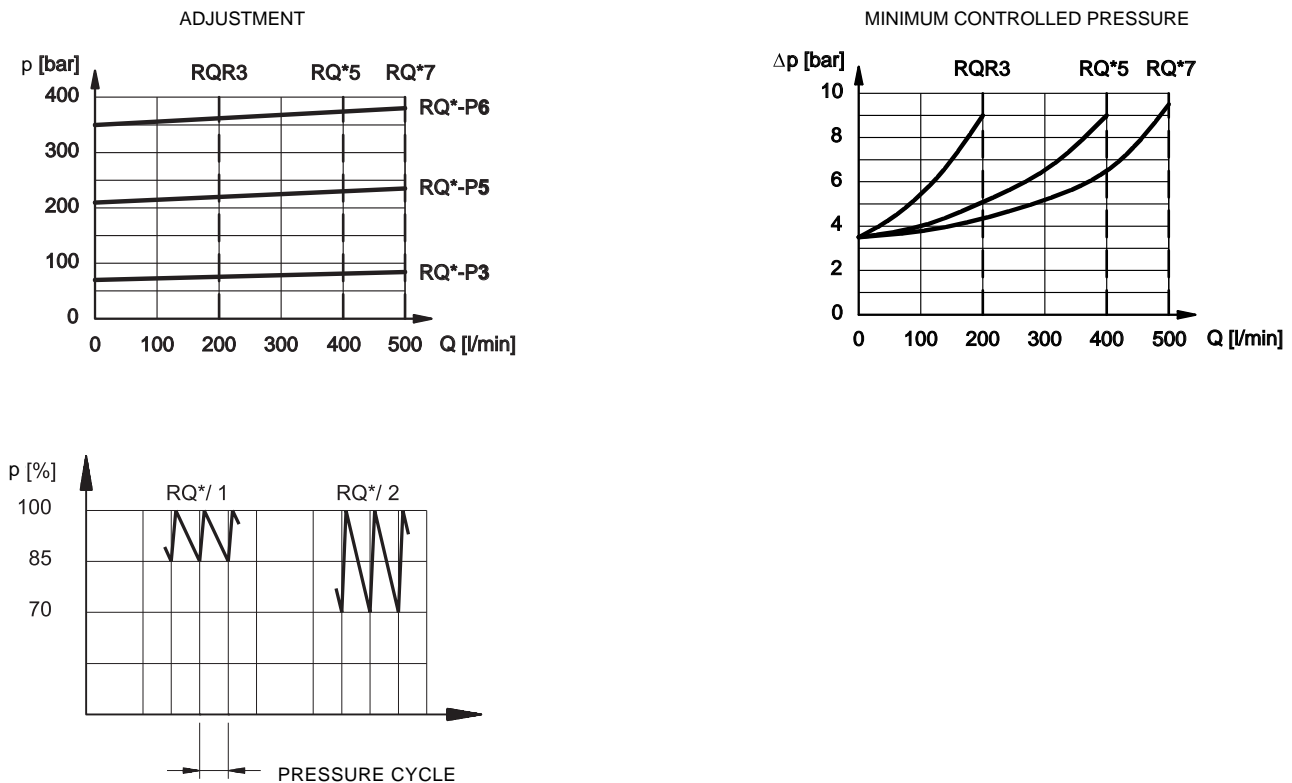
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQR3-P	RQR5-P	RQR7-P	RQA5-P	RQA7-P
Maximum operating pressure	bar	350				
Maximum flow rate	l/min	200	400	500	400	500
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 20/18/15				
Recommended viscosity	cSt	25				
Mass	Kg	3,5	4,3	6,5	10	17

1 - IDENTIFICATION CODE



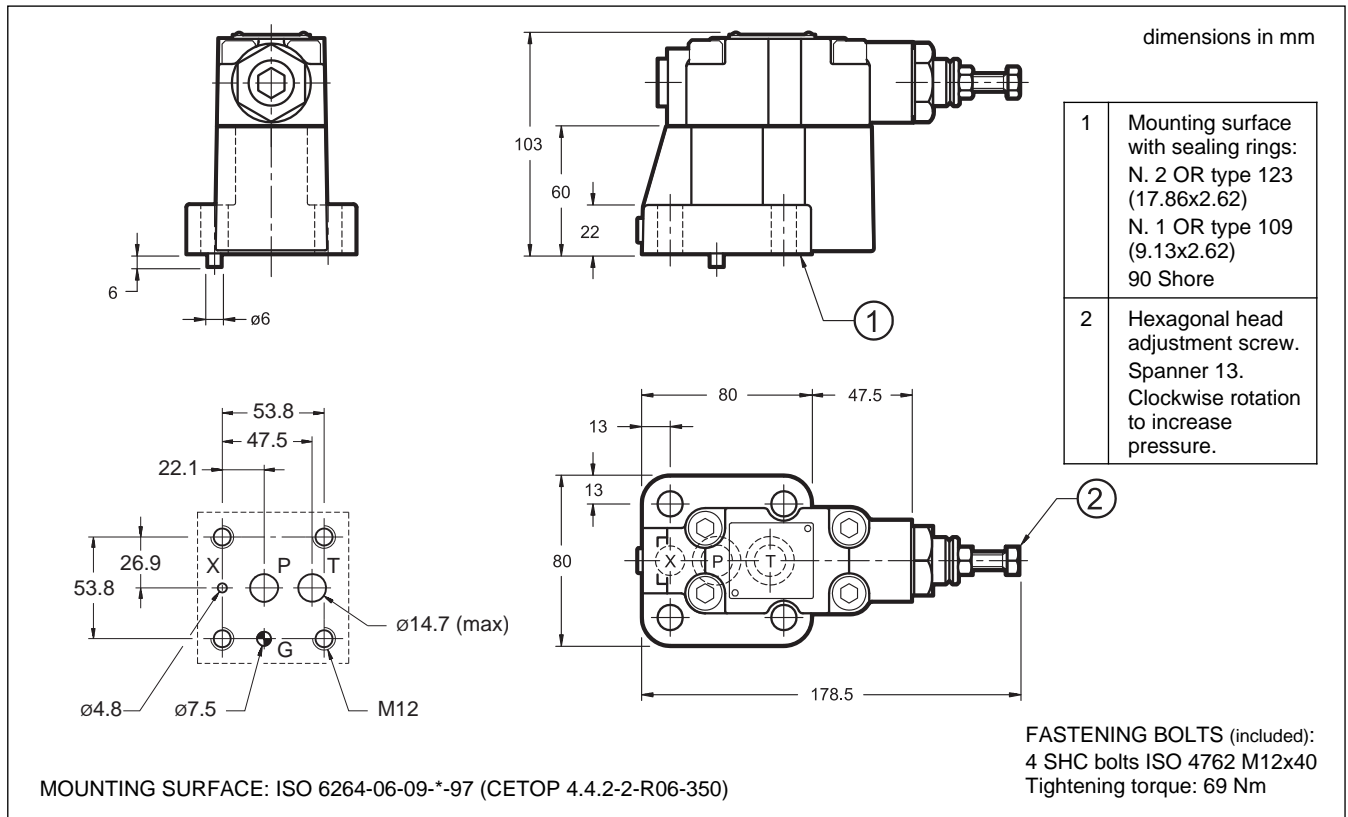
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



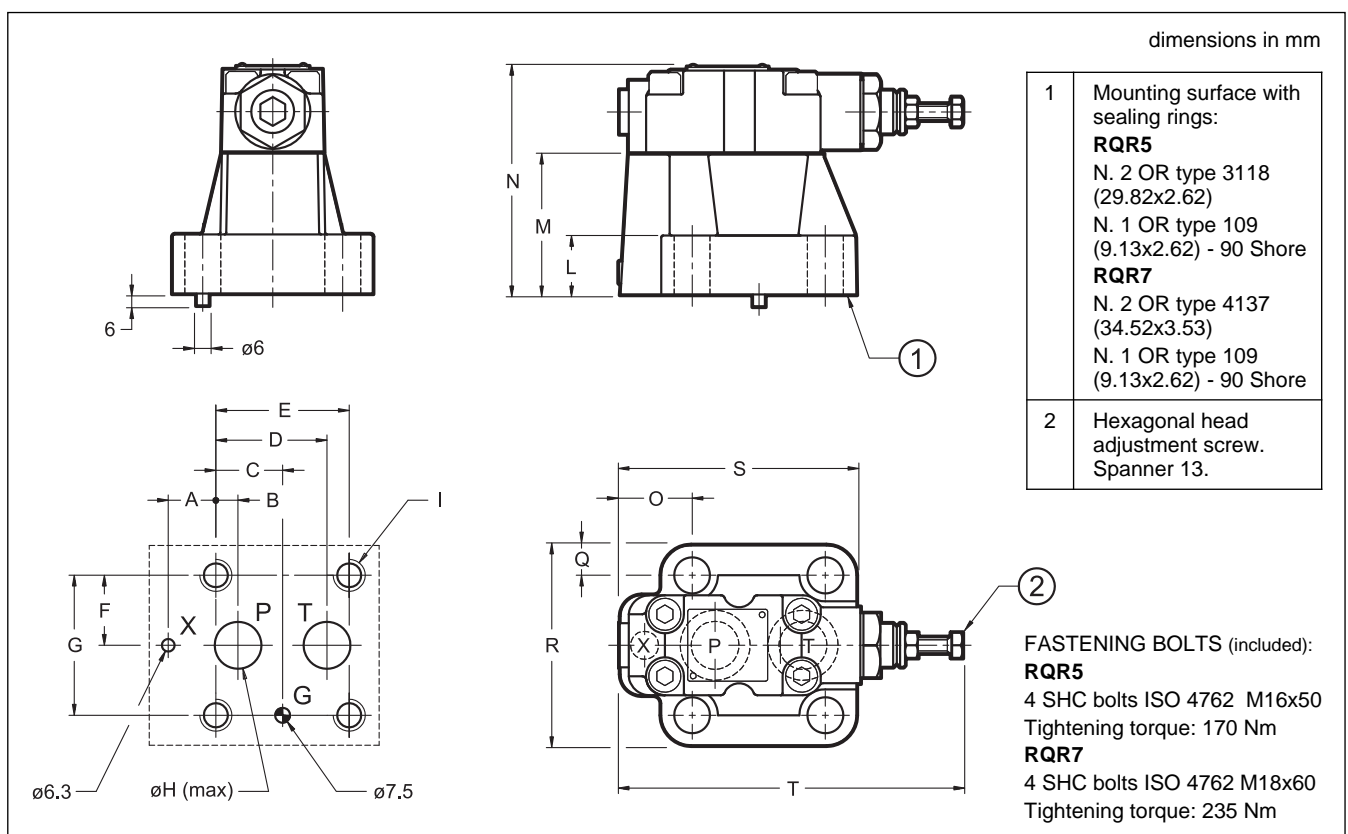
3 - HYDRAULIC FLUIDS

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.

4 - RQR3-P OVERALL AND MOUNTING DIMENSIONS

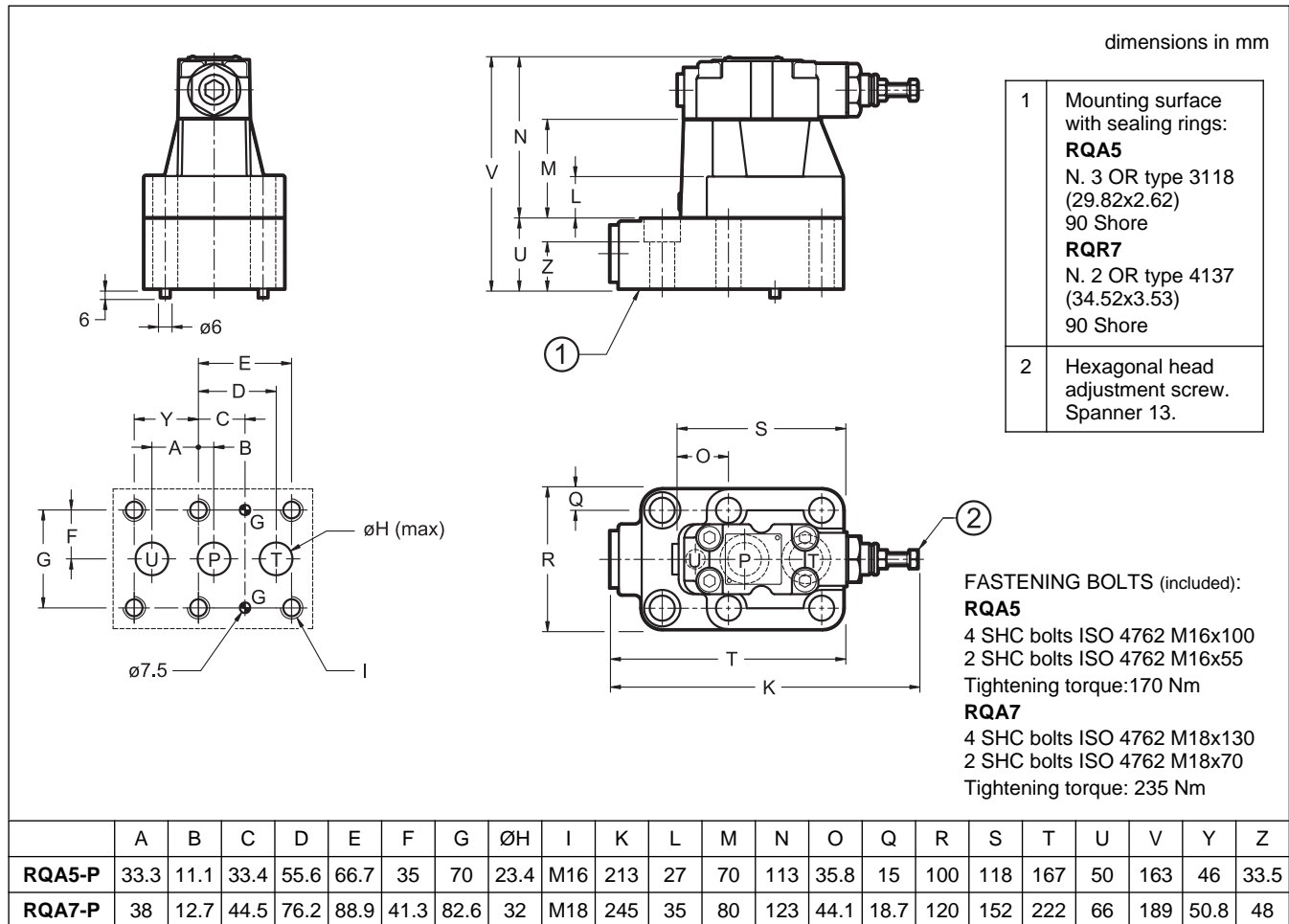


5 - RQR5-P and RQR7-P OVERALL AND MOUNTING DIMENSIONS



	MOUNTING SURFACE	A	B	C	D	E	F	G	ØH	I	L	M	N	O	Q	R	S	T
RQR5-P	ISO 6264-08-13-* -97 (CETOP 4.4.2-2-R08-350)	23.8	11.1	33.4	55.6	66.7	35	70	23.4	M16	27	70	113	35.8	15	100	118	170
RQR7-P	ISO 6264-10-17-* -97 (CETOP 4.4.2-2-R10-350)	31.8	12.7	44.5	76.2	88.9	41.3	82.6	32	M18	35	80	123	44.1	18.7	120	152	180

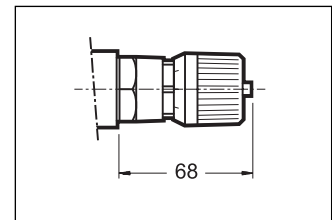
6 - RQA5-P and RQA7P OVERALL AND MOUNTING DIMENSIONS



7 - ADJUSTMENT KNOB

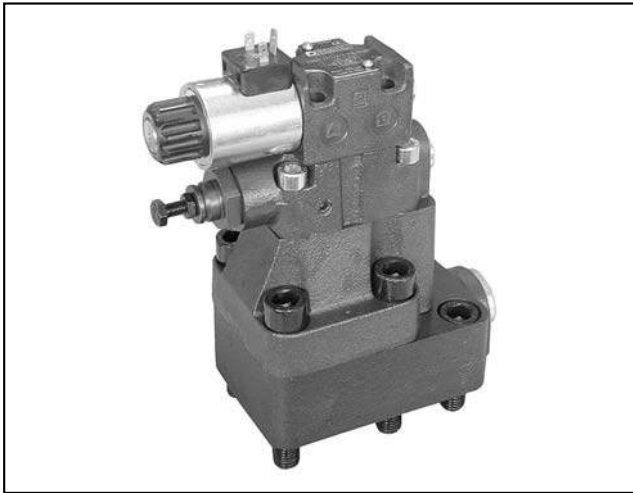
The valves can be equipped with a SICBLOC adjustment knob. To operate it, push and rotate at the same time.

To request this option, add: /M (see paragraph 1).



8 - SUBPLATES (see catalogue 51 000)

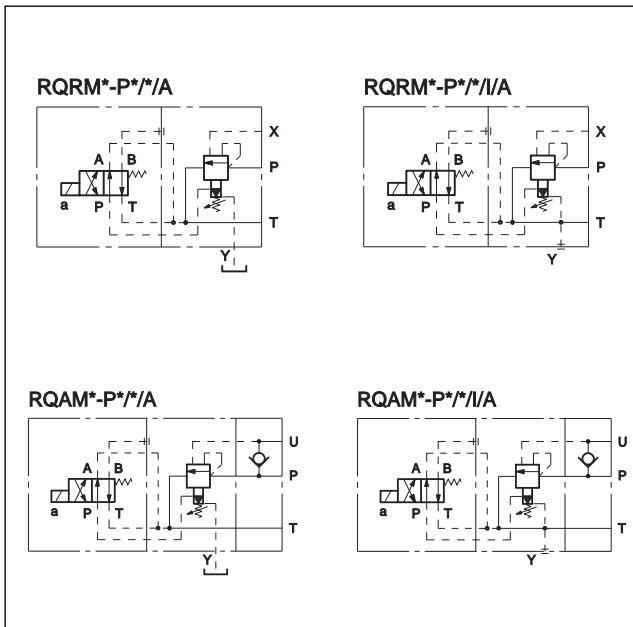
	RQR3-P	RQR5-P	RQR7-P	RQA5-P	RQA7-P
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports	PMRQA5-AI5G rear ports	PMRQA7-AI7G rear ports
P, T, U ports dimensions	P: 1/2" BSP T: 3/4" BSP	1" BSP	1" 1/4 BSP	3/4" BSP	1" 1/4 BSP
X port dimension	1/4" BSP	1/4" BSP	1/4" BSP	-	-



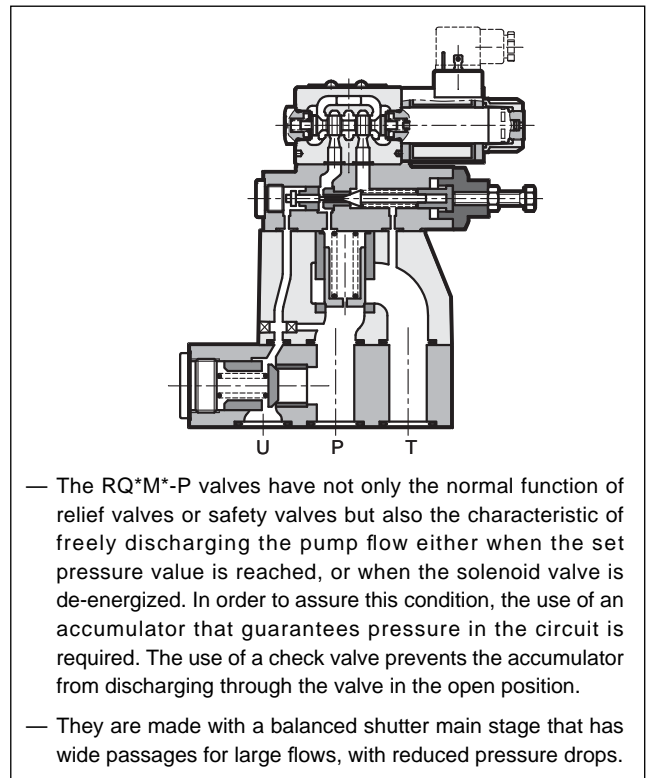
RQ*M*-P
UNLOADING VALVE
WITH AUTOMATIC OR
SOLENOID OPERATED VENTING
(FOR CIRCUITS WITH ACCUMULATOR)
SERIES 51
RQRM*-P
FOR REMOTE PILOTING
RQAM*-P
WITH INCORPORATED CHECK VALVE

SUBPLATE MOUNTING

HYDRAULIC SYMBOLS



OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		RQRM3-P	RQRM5-P	RQRM7-P	RQAM5-P	RQAM7-P
Maximum operating pressure	bar	350				
Maximum flow rate	l/min	200	400	500	400	500
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 20/18/15				
Recommended viscosity	cSt	25				
Mass	Kg	5	5,8	8	12	19

NOTE: for the solenoid valve DS3 characteristics see catalogue 41 150



1 - IDENTIFICATION CODE

R	Q	M	-	P	/	/	A	/	/	/	51	-	K1	/
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Unloading valve

Automatic venting for circuits with accumulator
R = for remote piloting
A = with embedded check valve (unavailable on size 3)

Solenoid valve for electrical unloading

Size: _____
3 = (RQRM3-P) ISO 6264-06-09-*-.97 (CETOP R06)
5 = (RQRM5-P) ISO 6264-08-13-*-.97 (CETOP R08)
5 = (RQAM5-P)
7 = (RQRM7-P) ISO 6264-10-17-*-.97 (CETOP R10)
7 = (RQAM7-P)

Subplate mounting _____

Pressure adjustment range: _____
3 = up to 70 bar **6** = up to 350 bar
5 = up to 210 bar

1 = pump switch on at 85% of the set value
2 = pump switch on at 70% of the set value

Unloading with de-energized solenoid _____

I = internal drainage (not possible when the backpressure on the return line is greater than 2 bar). Omit for external drainage.

CM = manual override, boot protected.
Omit for override integrated in the tube (standard)

Coil electrical connection: plug for connector type DIN 43650 (standard)

DC power supply
D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see NOTE)

AC power supply
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see NOTE)
F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

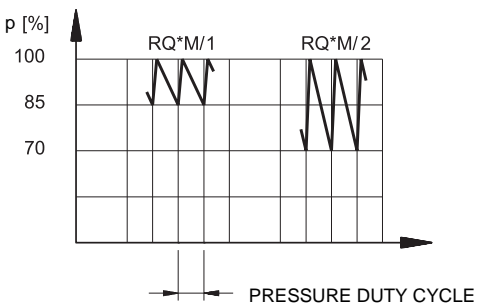
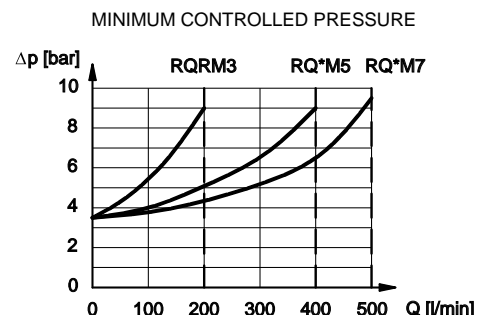
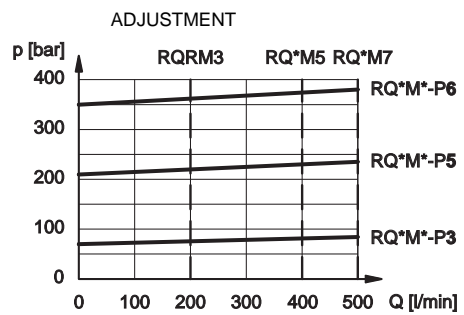
Seals:
N = NBR seals for mineral oil (standard)
V = FPM seals for special fluids

Series No. (the overall and mounting dimensions remain unchanged from 50 to 59)

M = adjustment with SICBLOC knob (omit for adjustment with hexagonal head screw)

NOTE: The locking rings of the coils and the relevant O-Rings are supplied together with valves

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



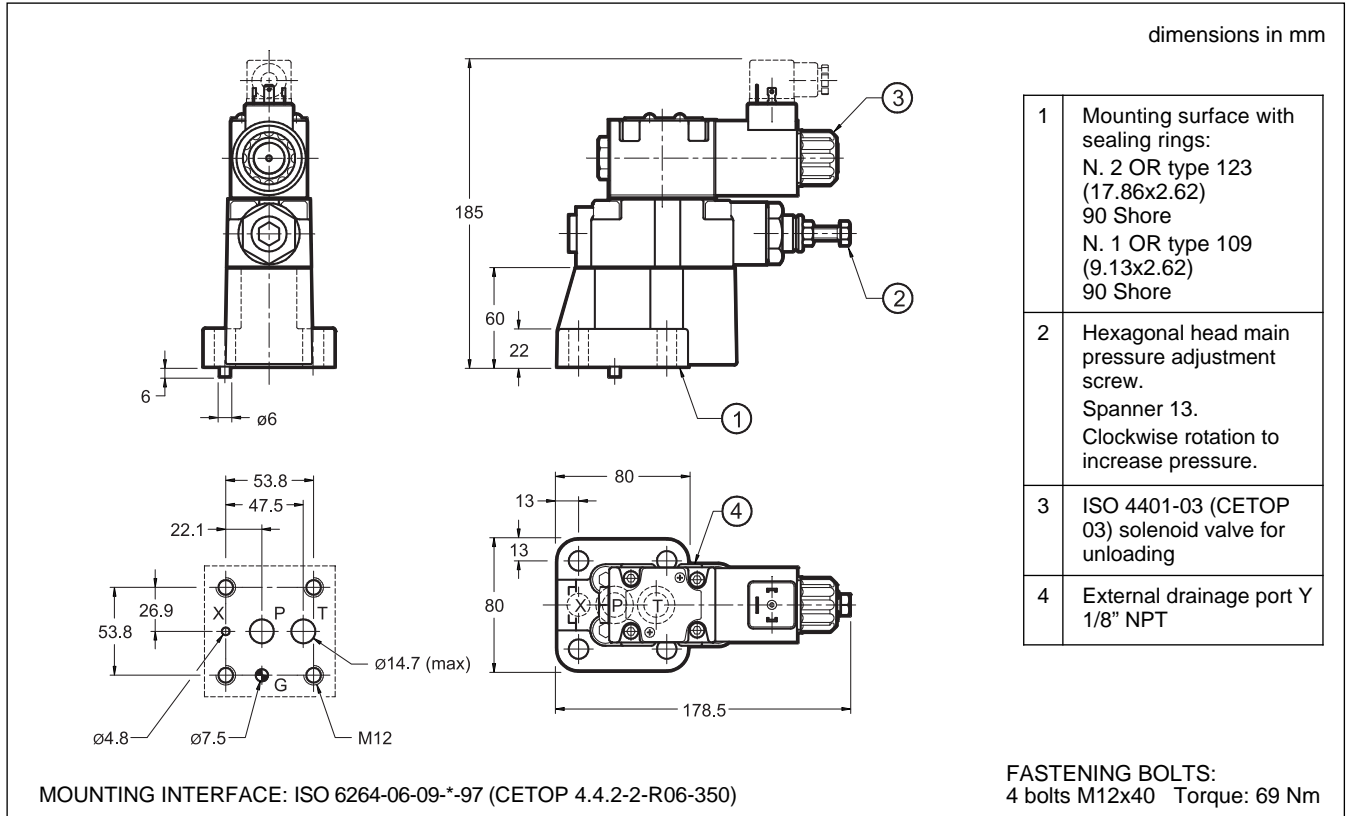
3 - HYDRAULIC FLUIDS

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.

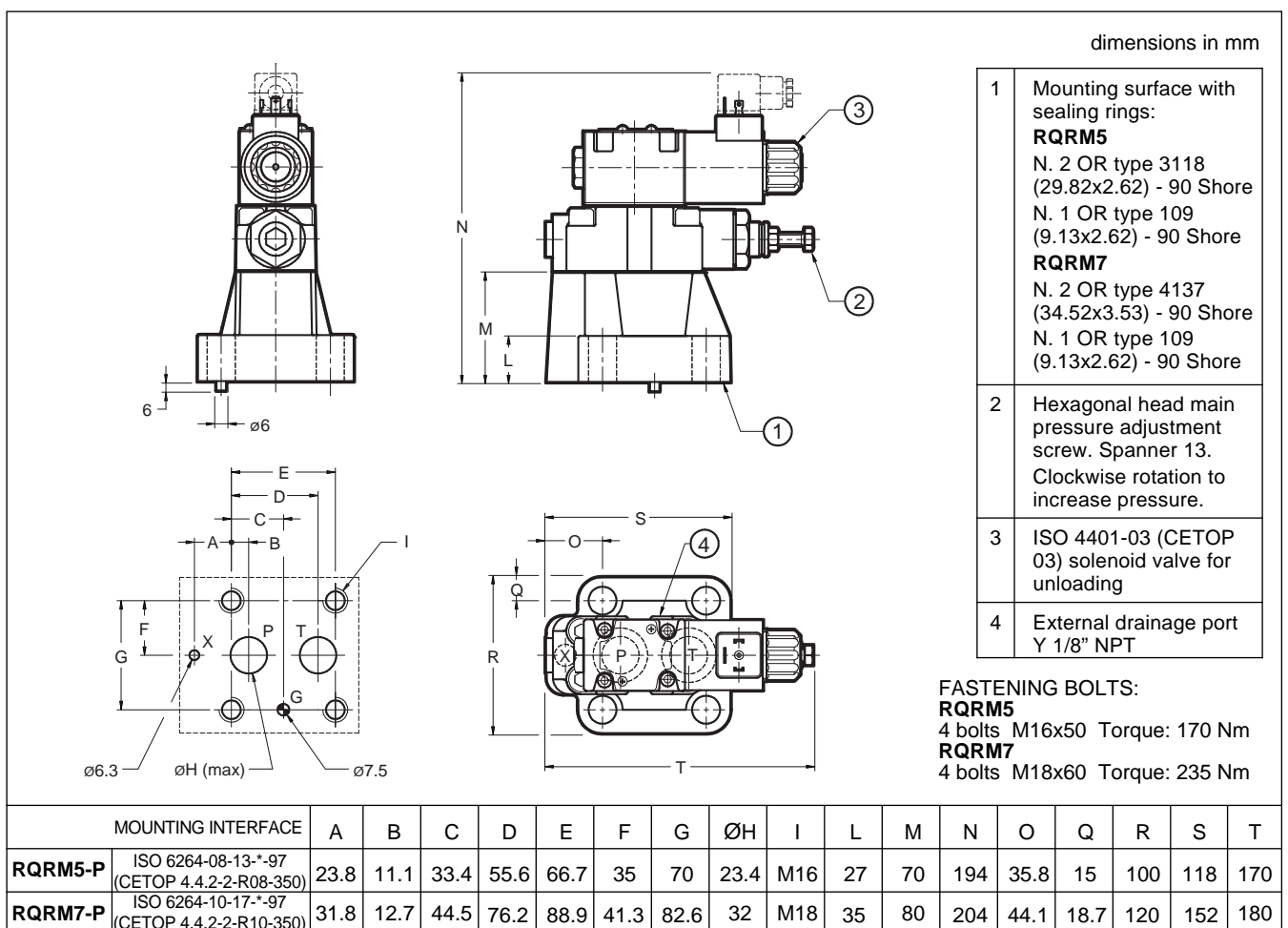
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

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

4 - RQRM3-P OVERALL AND MOUNTING DIMENSIONS

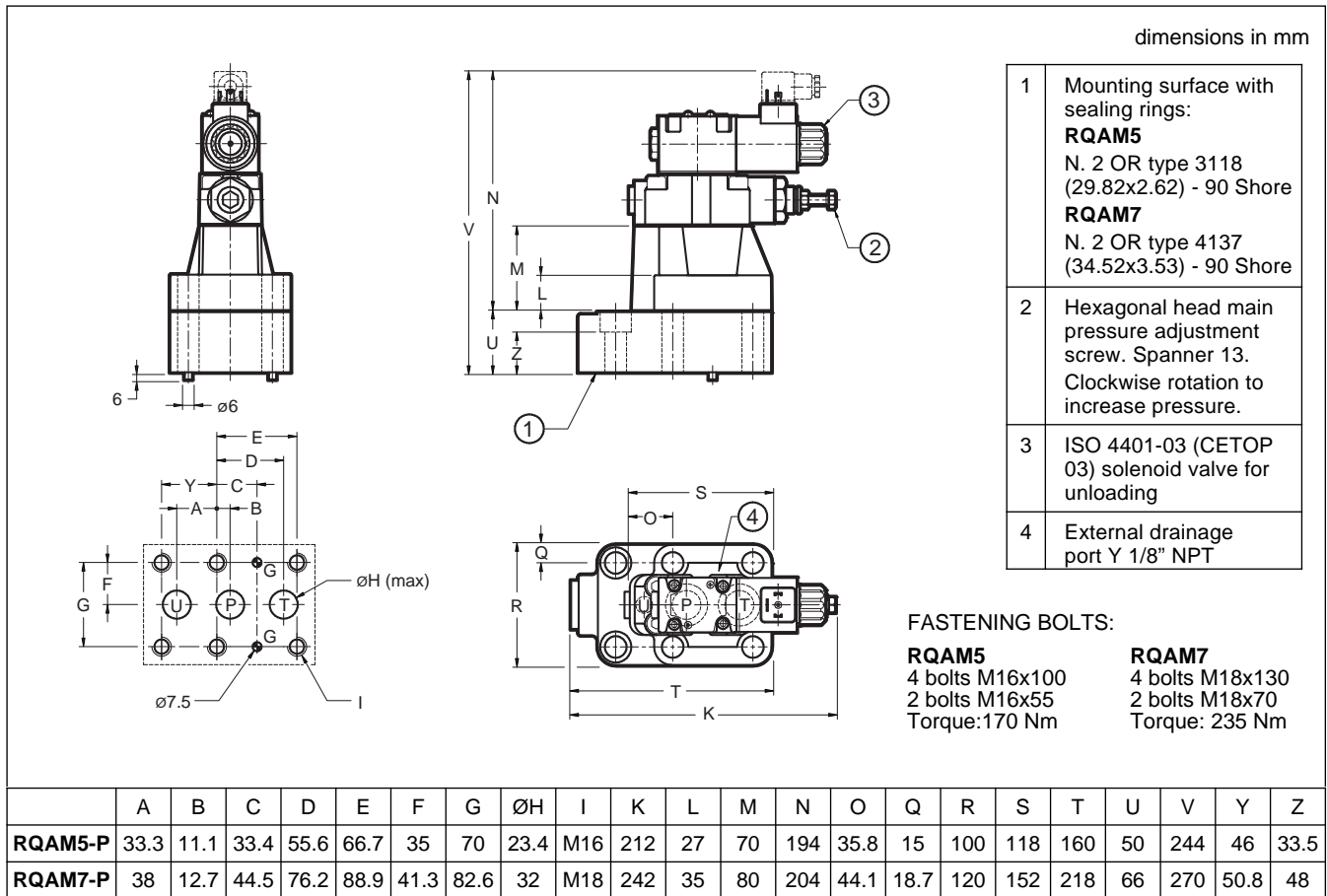


5 - RQRM5-P and RQRM7-P OVERALL AND MOUNTING DIMENSIONS



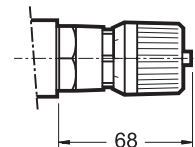


6 - RQAM5-P and RQAM7-P OVERALL AND MOUNTING DIMENSIONS



7 - ADJUSTMENT KNOB

The RQ*M*-P valves can be equipped with a SICBLOC adjustment knob. To operate it, push and rotate at the same time. To request this option, add: /M (see paragraph 1).



8 - ELECTRIC CONNECTORS

The solenoid valves are never supplied with connector. Connectors must be ordered separately. For the identification of the connector type to be ordered, please see catalogue 49 000.

9 - MANUAL OVERRIDE, BOOT PROTECTED: CM

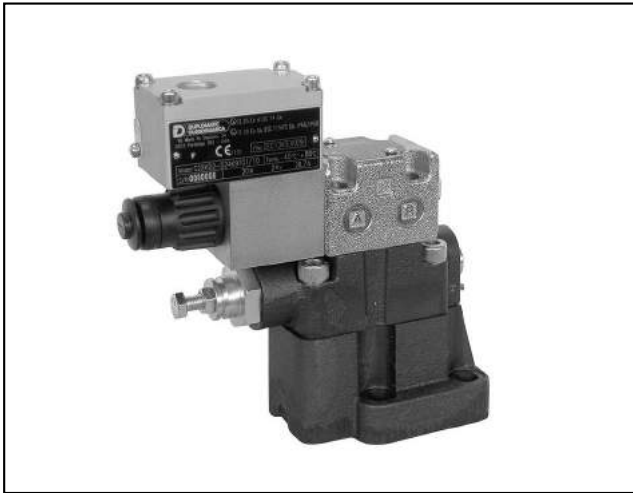
Whenever the solenoid valve installation may involve exposure to atmospheric agents or utilization in tropical climates, use of the manual override, boot protected is recommended. Add the suffix **CM** to request this device (see paragraph 1). For overall dimensions see catalogue 41 150.

10 - SUBPLATES (see catalogue 51 000)

	RQRM3-P	RQRM5-P	RQRM7-P	RQAM5-P	RQAM7-P
Type	PMRQ3-AI4G rear ports	PMRQ5-AI5G rear ports	PMRQ7-AI7G rear ports	PMRQA5-AI5G rear ports	PMRQA7-AI7G rear ports
P T U port dimensions	1/2" BSP	1" BSP	1" 1/4 BSP	3/4" BSP	1" 1/4 BSP
X port dimensions	1/4" BSP	1/4" BSP	1/4" BSP	-	-



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 www.diplomatic.com • e-mail: sales.exp@diplomatic.com



RQM*KD2-P

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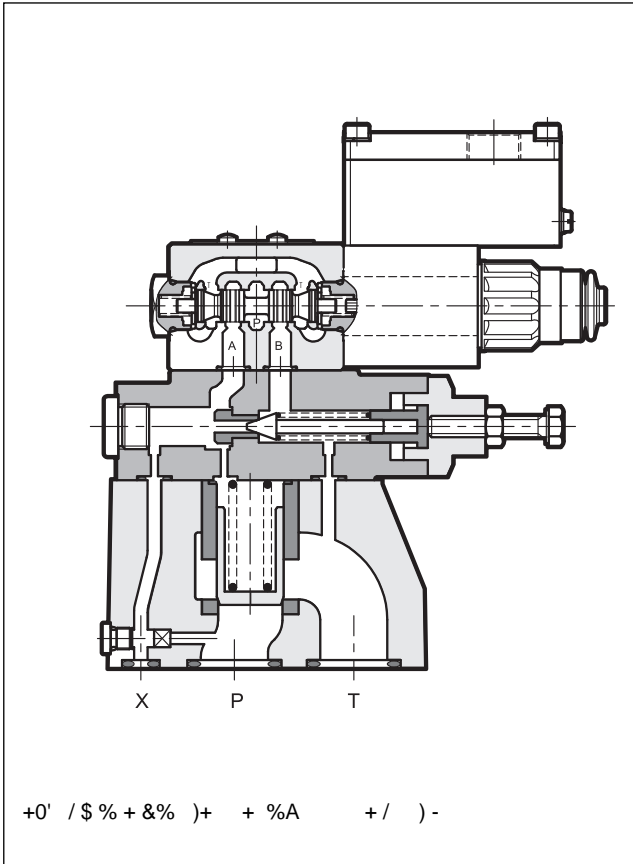
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U +:7)(\$ " ' H3>H7E 3D7 7JB>AE;A@ BDAA8 BD7EEGD7 D7>;78
H3>H7E 3H3;>34>7 ;@ *% +&') EG4B>3F7
?AG@F;@9 H7DE;A@ I;F: F:D77 @A?;@3> E;L7E 8AD \A\ GB FA
> ?;@

U +:7E7 H3>H7E 3D7 +/ EF3@63D6E 57DF;8;76 3@6 3D7
EG;F34>7 8AD F:7 GE7 ;@ BAF7@F;3>>K 7JB>AE;H7 3F?AEB:7D7E F:3F
83>> I;F;@ 7;F:7D F:7 +/ 8AD 93E AD 8AD 6GEF
5>3EE;8;53F;A@ *77 B3D 8AD +/ 5>3EE;8;53F;A@ AB7D3F;@9
F7?B7D3FGD7E 3@6 7>75FD;53> 5:3D35F7D;EF;5E

U +:7K 3D7 3H3;>34>7 ;@ [H7 H7DE;A@ E F:3F 3>>AI F:7 G@>A36;@9 A8
F:7 FAF3> \AI 3@6 E7>75F;A@ GB FA F:D77 BD7EEGD7 H3>G7E E77
B3D39D3B: -7DE;A@E 4K ?73@E A8 3 EA>7@A;6 H3>H7

U +:7K 3D7 EGBB>;76 I;F: 3 :7J39A@3> :736 36<GEF?7@F E5D7I
,BA@ D7CG7EF ;F 53@ 47 7CG;BB76 I;F: 3 * #& 36<GEF?7@F
=@A4 A@ F:7 ?3;@ BD7EEGD7 5A@FDA>

U +:7 36<GEF?7@F A8 F:7 E75A@6 3@6 F;D6 BD7EEGD7 H3>G7E ;E
A4F3;@76 4K 3 BD7EEGD7 D7>;78 H3>H7 B>3576 47FI77@ F:7 ?3;@
EF397 3@6 F:7 EA>7@A;6 H3>H7

U +:7 675>3D3F;A@ A8 5A@8AD?;FK FA F:7 GB ?7@F;A@76 EF3@63D6E ;E
3>I3KE EGBB>;76 I;F: F:7 H3>H7

U +:7 H3>H7 ;E EGBB>;76 I;F: EF3@63D6E EGD8357 FD73F?7@F A8
B:AEB:3F;@9 4>35= 8AD F:7 ?3;@ 4A6K 3@6 L;@5 @;5>7> 8AD F:7
B;>AF 4A6K ,BA@ D7CG7EF I7 53@ EGBB>K F:7E7 H3>H7E
5A?B>7F7>K I;F: L;@5 @;5>7> EGD8357 FD73F?7@F EG;F34>7 FA
7@EGD7 3 E3>F EBD3K D7E;EF3@57 GB FA : F7EF AB7D3F76
355AD6;@9 FA ,% % *% EF3@63D6E 3@6 F7EF 7H3>G3F;A@
AB7D3F76 355AD6;@9 FA ,% % *% EF3@63D6E

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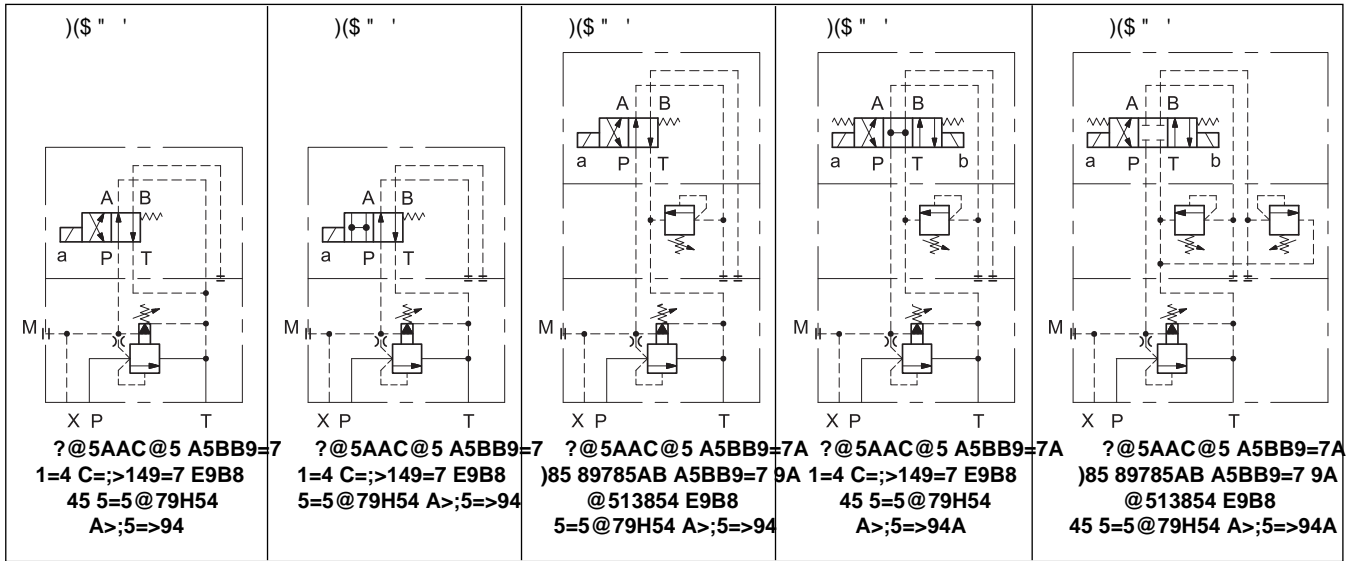
		'&" %	'&" %	'&" %
\$3J;?G? AB7D3F;@9 BD7EEGD7	43D			
\$3J;?G? 8>AI D3F7	> ?;@			
?4;7@F F7?B7D3FGD7 D3@97	M	%) 3@6 '\$ _ % #		
>G;6 F7?B7D3FGD7 D3@97	M	%) 3@6 '\$ _ % #		
>G;6 H;E5AE;FK D3@97	5*F	Z		
>G;6 5A@F3?;@3F;A@ 679D77		55AD6;@9 FA *% 5>3EE		
)75A??7@676 H;E5AE;FK	5*F			



RQM*KD2-P

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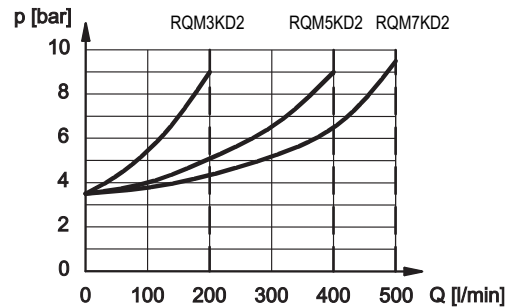
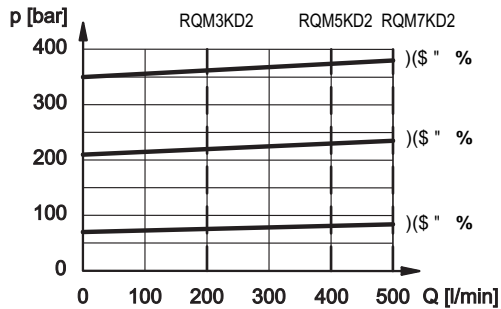
,E7 ?;@7D3> A;> 43E76 :K6D3G>;5 8>G;6E # AD \$ FKB7 355AD6;@9 FA *& AD F:7E7 8>G;6E GE7 %) E73>E 5A67 % AD 8>G;6E) FKB7
 B:AEB:3F7 7EF7DE GE7 '\$ E73>E 5A67 - AD F:7 GE7 A8 AF:7D =;@6E A8 8>G;6E G5: 3E B>73E7 5A@EG>F AGD F75:@;53>
 67B3DF?7@F
 ,E:@9 8>G;6E 3F F7?B7D3FGD7E ;:9D F:3@ M 53GE7E 3 83EF7D 679D363F;A@ A8 F:7 8>G;6E 3@6 A8 F:7 E73>E 5:3D35F7D;EF;5E +:7 8
 BD7E7DH76 ;@ ;FE B:KE;53> 3@6 5:7?;53> 5:3D35F7D;EF;5E

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H3>G7E A4F3;@76 I;F: H;E5AE;FK A8 5*F 3F M

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RQM*KD2-P

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AD H3>H7E EG;F34>7 8AD 3BB>;53F;A@ 3@6 ;@EF3>>3F;A@ ;@ BAF7@F;3>>K 7JB>AE;H7 3F?AEB:7D7E 355AD6;@9 FA + / 6;D75F;H7 BD7E5D
57DF;8;53F7E F:7 5A?4;@3F;A@ H3>B855AC??;G 1;E1GA 9=3;C45A B85 453;1@1B9>=> >6 3>=>6>@<9BG B> B85 49@53B9D5 1=4 B85 >?5@1B9=
<19=B5=1=35 <1=C1; B81B 3>=B19=A 1;; B85 9=6>@<1B9>==55454 6>@ 1 3>@ @53B CA5 >6 B85 D1;D5 9= ?>B5=B91;;G 5F?;>A9D5 5=D9@>=
A;>E 3EE7?4>76 A@ F:7E7 H3>H7E :3H7 477@ E7B3D3F7>K 57DF;8;76 355AD6;@9 FA + / 6;D75F;H7 3@6 EA F:7K 3D7 EG;F34>7 8AD GE7 ;@
7JB>AE;H7 3F?AEB:7D7E

+1;D5) - 3;1AA96931B9>=

+ :7 H3>H7E 53@ 47 GE76 8AD 3BB>;53F;A@E 3@6 ;@EF3>>3F;A@E ;@ BAF7@F;3>>K 7JB>AE;H7 3F?AEB:7D7E F:3F 83>> I;F;;@ 7;F:7D F:7 + /
5>3EE;8;53F;A@ I;F: F:7 8A>>AI ?3D=;@9

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6;D75F;H7 3@6 D7>3F76 F75:@;53> EB75;8;53F;A@ D7CG7EFE
DAGB 8AD EGD8357 B>3@FE

/ *B75;8;5 ?3D=;@9 A8 7JB>AE;A@ BDAF75F;A@ 3E + /
6;D75F;H7 3@6 D7>3F76 F75:@;53> EB75;8;53F;A@ D7CG7EFE
DAGB 8AD EGD8357 B>3@FE

3F79ADK ;:9: BDAF75F;A@ 7>;9;4>7 8AD LA@7
F:7D78AD7 3>EA 7>;9;4>7 8AD 53F79ADK LA@7
+KB7 A8 3F?AEB:7D7 I;F: 93E7E H3BAGDE ?;EFE
3E 9DAGB
F:7D78AD7 3>EA 7>;9;4>7 8AD 9DAGB 3@6

3F79ADK ;:9: BDAF75F;A@ 7>;9;4>7 8AD LA@7
F:7D78AD7 3>EA 7>;9;4>7 8AD 53F79ADK LA@7
+KB7 A8 3F?AEB:7D7 I;F: 6GEFE
GEFE 9DAGB
F:7D78AD7 3>EA 7>;9;4>7 8AD 9DAGB 3@6

+ ?7?B7D3FGD7 5>3EE ?3J EGD8357 F7?B7D3FGD7

+ M ?7?B7D3FGD7 5>3EE ?3J EGD8357 F7?B7D3FGD7

4 # BDAF75F;A@ >7H7> 8AD 7>75FD;53> 67H;57E

4 # BDAF75F;A@ >7H7> 8AD 7>75FD;53> 67H;57E

M +3 M ?4;7@F F7?B7D3FGD7 D3@97 8AD H3>H7E I;F: 4AF: %
3@6 - E73>E

' ' DAF75F;A@ 679D77 8DA? 3F?AEB:7D;5 397@FE 355AD6;@9 FA
%

_ M +3 M ?4;7@F F7?B7D3FGD7 D3@97 8AD H3>H7E I;F: % #
E73>E

_ M +3 M ?4;7@F F7?B7D3FGD7 D3@97 8AD H3>H7E I;F: 4AF: %
3@6 - E73>E

_ M +3 M ?4;7@F F7?B7D3FGD7 D3@97 8AD H3>H7E I;F: % # E73>E

>9;A) - 3;1AA96931B9>=

+ :7 5A;> A8 F:7 7JB>AE;A@ BDAA8 H3>H7E ;E ;67@F;8;76 I;F: ;FE AI@ F39 I;;5: 53DD;7E F:7 D7>3F;H785 453B1=99; 3>=AB@C3B9>=> >6
B85 3>9; 8>CA9=7 9A <145 9= >@45@ B> 5=AC@5 9BA @5A9AB1=35 B> ?>AA92;5 9=B5@=1; 5F?;>A9>= 1=4 B> 1D>94 1=G 5F?;>A9>= ?@>?
B85 >CBA945 5=D9@>=<5=B <1B389=7 1= K F 4L BG?5 ?@>B53B9>= 5F?;>A9>= ?@>>6 3>9;

\$AD7AH7D F:7 EA>7@A;6 ;E 67E;9@76 FA ?3;@F3;@ ;FE EGD8357 F7?B7D3FGD7 47>AI F:7 >;?;FE EB75;8;76 FA F:7 D7>7H3
>7) 5A;>E 8AD 3>F7D@3F;@9 5GGD7@F EGBB>K 5A@F3;@ 3 4G;>F ;@ D75F;8;7D 4D;697

7D7 47>AI KAG 8;@6 F:7 5A;>E ?3D=;@9

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/ *B75;8;5 ?3D=;@9 A8 7JB>AE;A@ BDAF75F;A@ 3E + /
6;D75F;H7 3@6 D7>3F76 F75:@;53> EB75;8;53F;A@ D7CG7EFE
DAGB 8AD EGD8357 B>3@FE

/ *B75;8;5 ?3D=;@9 A8 7JB>AE;A@ BDAF75F;A@ 3E + /
6;D75F;H7 3@6 D7>3F76 F75:@;53> EB75;8;53F;A@ D7CG7EFE
DAGB 8AD EGD8357 B>3@FE

3F79ADK ;:9: BDAF75F;A@ 7>;9;4>7 8AD LA@7
F:7D78AD7 3>EA 7>;9;4>7 8AD 53F79ADK LA@7
+KB7 A8 3F?AEB:7D7 I;F: 93E7E H3BAGDE ?;EFE
J 6 V6W BDAF75F;A@ FKB7 7JB>AE;A@ BDAA8 53E7
3E 9DAGB
F:7D78AD7 3>EA 7>;9;4>7 8AD 9DAGB 3@6

3F79ADK ;:9: BDAF75F;A@ 7>;9;4>7 8AD LA@7
F:7D78AD7 3>EA 7>;9;4>7 8AD 53F79ADK LA@7
+KB7 A8 3F?AEB:7D7 I;F: 6GEFE
J F 4 XF4Y BDAF75F;A@ FKB7
GEFE 9DAGB
F:7D78AD7 3>EA 7>;9;4>7 8AD 9DAGB 3@6

+ ?7?B7D3FGD7 5>3EE ?3J EGD8357 F7?B7D3FGD7

+ M ?7?B7D3FGD7 5>3EE ?3J EGD8357 F7?B7D3FGD7

4 # BDAF75F;A@ >7H7> 8AD 7>75FD;53> 67H;57E

4 # BDAF75F;A@ >7H7> 8AD 7>75FD;53> 67H;57E

_ M +3 M ?4;7@F F7?B7D3FGD7 D3@97

' ' DAF75F;A@ 679D77 8DA? 3F?AEB:7D;5 397@FE 355AD6;@9 FA
%

_ M +3 M ?4;7@F F7?B7D3FGD7 D3@97

\$?5@1B9=7 B5<?5@1BC@5A

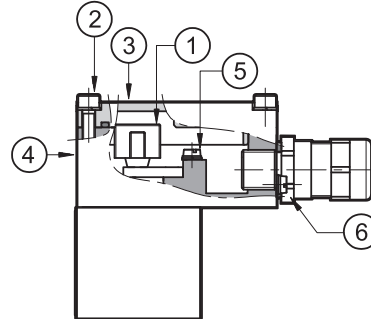
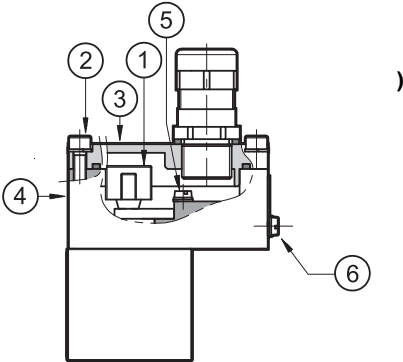
+ :7 AB7D3F;@9 3?4;7@F F7?B7D3FGD7 ?GEF 47 47FI77@ M 8AD H3>H7E I;F: 4AF: % 3@6 - E73>E 3@6 M 8AD H3>H7E I;F: % #
E73>E + :7 8>G;6 F7?B7D3FGD7 ?GEF 47 47FI77@ M 8AD H3>H7E I;F: 4AF: % 3@6 - E73>E 3@6 M 8AD H3>H7E I;F: % # E73>E

+ :7 H3>H7E 3D7 5>3EE;8;76 ;@ + F7?B7D3FGD7 5>3EE + M F:7D78AD7 F:7K 3D7 7>;9;4>7 8AD AB7D3F;A@ 3>EA 3F ;:9:7D 5>3EE F7?B7D3FGD7
+ 8AD 93E 3@6 + M 8AD 6GEF



RQM*KD2-P

;@ F:7 5AH7D E73F 3@6 83EF7@;@9 F:7 \$ E5D7IE I;F: 3 FADCG7 A8 Z %? >75FD;53> I;D;@9 ?GEF 47 6A@7 8A>>AI;@9 F:7 ;@EFDG5F;A@E A
 ;@ 5A?B>;3@57 I;F: +/^EF3@63D6E



:3D35F7D;EF;5E A8 F:7 534>7E 5A@@@75F34>7 8AD I;D;@9 3D7 ;@6;53F76 ;@ F:7 F34>7 47>AI

C=3B9>=	12;5 A53B9>=
&B7D3F;@9 HA>F397 534>7E 5A@@@75F;A@	?3J ??]
A@@@75F;A@ 8AD ;@F7D@3> 9DAG@6;@9 BA;	?3J ??]
A@@@75F;A@ 8AD 7JF7D@3> 7CG;BAF7@F;3> 9DAG@	?3J ??]

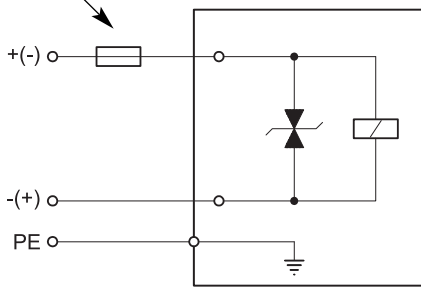
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 8DA? M FA M 8AD H3>H7E 7;F:7D I;F: % AD - E73>E AD 8DA? M FA M 8AD H3>H7E I;F: %# E73>E

34>7 9>3@6E I;5: ?GEF 47 AD67D76 E7B3D3F7>K E77 B3D39D3B: 3>>AI FA GE7 534>7E I;F: 7JF7D@3> 6;3?7F7D 47FI77@ 3@6 ??

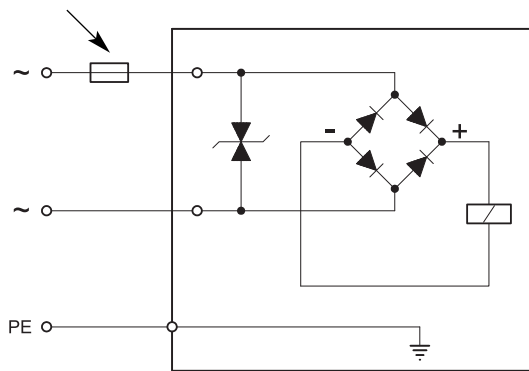
;53B@931; 4917@1<A

3>9;

D75A??@676
 GBFED73? 8GE7
 E77 B3D



D75A??@676
 GBFED73? 8GE7
 E77 B3D



\$D5@3C@@@5=B 6CA5 1=4 AE9B38 >66 D>;B175 ?51:

,BEFD73? A8 735: H3>H7 3@ 3BBDABD;3F7 8GE7 ?3J J @ 355AD6;@9 FA AD 3 BDAF75F;H7 ?AFAD EI;F5: I;F: E:ADF 5;D5G;F 3@6 F:7D
 ;@EF3@F3@7AGE FD;BB;@9 3E E:ADF 5;D5G;F BDAF75F;A@ ?GEF 47 5A@@@75F76 +:7 5GF A88 BAI7D A8 F:7 8GE7 ?GEF 5ADD7EBA@6 AD 7J5
 5GDD7@F A8 F:7 EGBB>K EAGD57 +:7 8GE7 AD F:7 BDAF75F;H7 ?AFAD ?GEF 47 B>3576 AGFE;67 F:7 63@97DAGE 3D73 AD F:7K ?GEF 47 BDA
 7JB>AE;A@ BDA8 5AH7D;@9

@ AD67D FA E3879G3D6 F:7 7>75FDA@;5 67H;57 FA I;5: F:7 H3>H7 ;E 5A@@@75F76 F:7D7 ;E 3 BDAF75F;A@ 5;D5G;F ;@ F:7 5A;> F:3F D76G57E
 I;5: 53@ A55GD I:7@ ;@6G5F3@57E 3D7 EI;F5:76 A88

+7 F34>7 E:AIE F:7 FKB7 A8 8GE7 D75A??@676 355AD6;@9 FA F:7 @A?;@3> HA>F397 A8 F:7 H3>H7 3@6 FA F:7 H3>G7 A8 F:7 HA>F397 B73=E

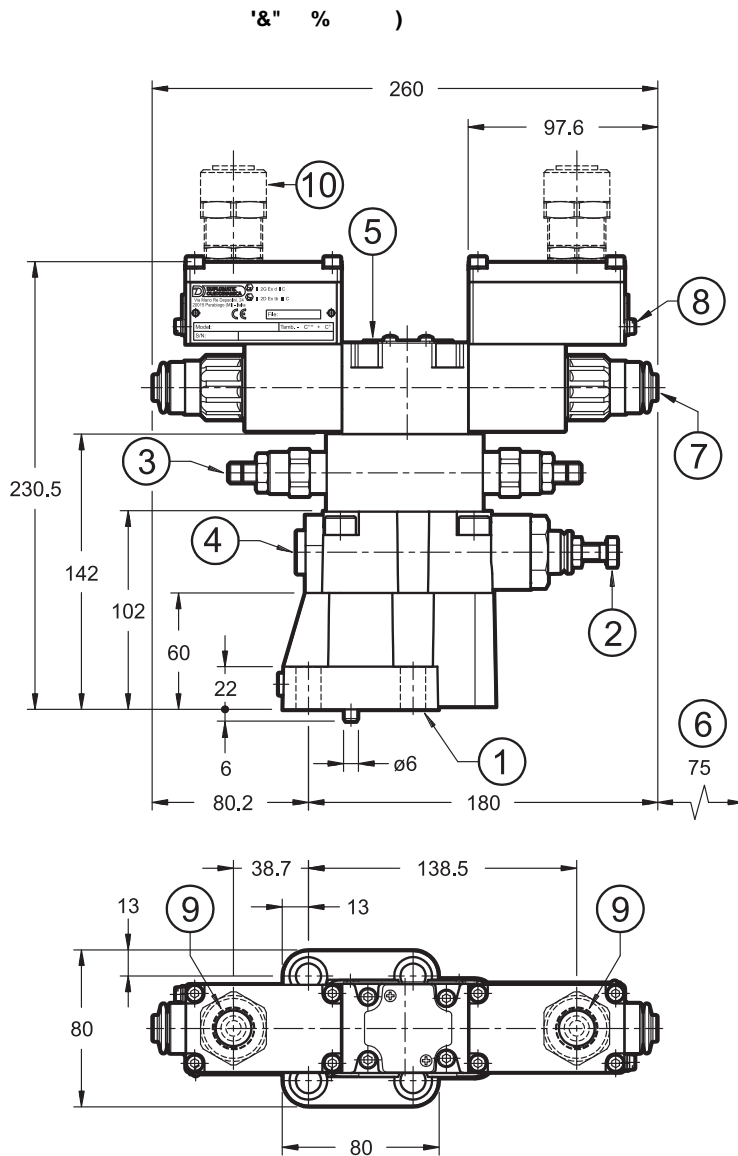
A;> FKB7	%A?;@3> HA>F397 1-2)3F76 5GDD7@ 1 2	'53><<5=454 ?@5 6CA5 381@13B5@9AB93 <549C< B9<5 ;17 133>@49=7 B> # / 0	\$3J;?G? HA>F397 H3>G7 GBA@ EI;F5: 1-2	*GBBD7EEAD 5;D5G;F +D3@E;7@F HA>F397 EGBBD7EEAD 4;6;D75F;A@3>



RQM*KD2-P

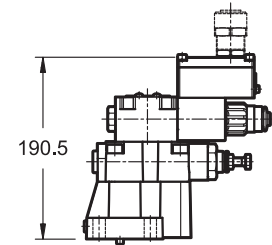
'&" % \$+ '!! # "\$*#) # " #(\$#(

6;??@E;A@E :@ ??

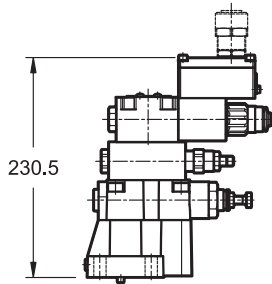


'&" %)

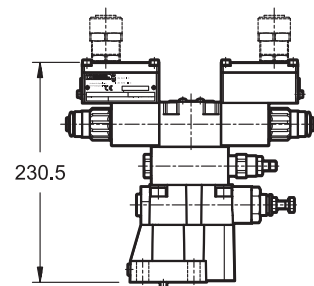
'&" %)



'&" %)



'&" %)



\$AG@F;@9 EGD8357
7J39A@3> :736 36<GEF??@F E5D7I 8AD ?3;@ BD7EEGD7 H3>G7 EB3@ @7D >A5=I;E7 DAF3F;A@ FA ;@5D73 BD7EEGD7
*75A@6 BD7EEGD7 H3>G7 36<GEF??@F *A5=7F :7J 36<GEF??@F E5D7I >>7@ =7K >A5=I;E7 DAF3F;A@ FA ;@5D73E7 BD7EEGD7
'D7EEGD7 93G97 BADF W
*& +& EA>7@A;6 H3>H7 8AD BD7EEGD7 E7>75F;A@ G@>A36;@9 I;F; 7JB>AE;A@ BDA8 5A;>E
A;> D7?AH3> EB357

\$3@G3> AH7DD;67 4AAF BDAF75F76 AB1=41@4 6>@ 2>B8 # 1=4 + A51;A AD 4>;@6 D;@9 @GF 6;??@E;A@E EF3@63D6 8AD %# E73>E E77 B3D
+7D?;@3> 8AD EGBB>7??@F3DK 73DF: 5A@ @75F;A@ ,BB7D BADF 8AD 534>7 9>3@6
34>7 9>3@6 GBB7D BADF E:AI@ +A 47 AD67D76 E7B3D3F7>K E77 B3D39D3B:

-3>H7	\$3EE
'&" % 1=4	
'&" %	
'&" %	
'&" %	

-3>H7 83EF7@;@9 % * E5D7IE \$ J *&	
+;9:F7@;@9 FADCG7 %?	
+:D736E A8 ?AG@F;@9 :A>7E \$ J	
*73>;@9 D;@9E	
% &) FKB7 J	^*:AD7
% &) FKB7 J	^*:AD7

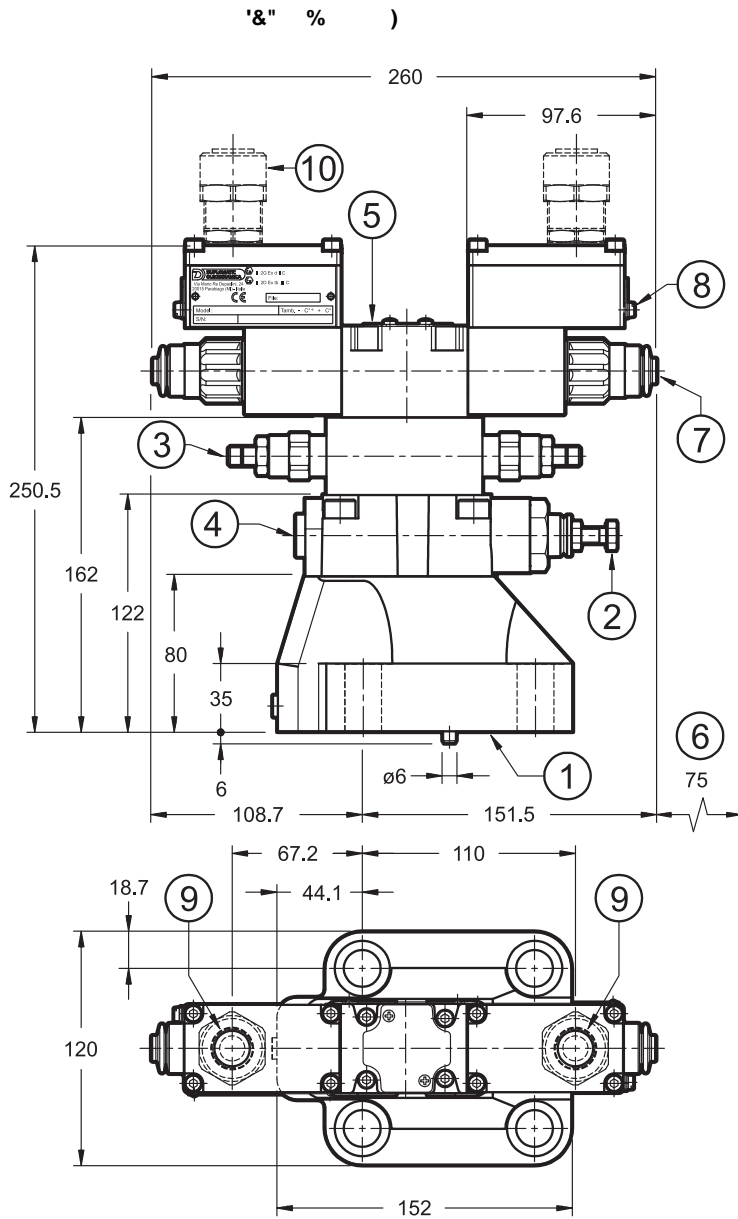
#\$) 8AD E;67 BADF 534>7 9>3@6



RQM*KD2-P

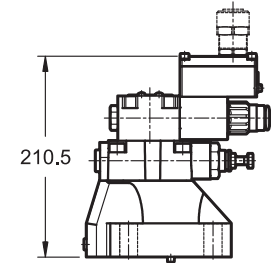
'&" % \$+ '!! # "\$*#) # " #(\$#(

6;?7@E;A@E ;@ ??

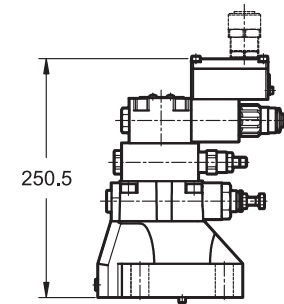


'&" %)

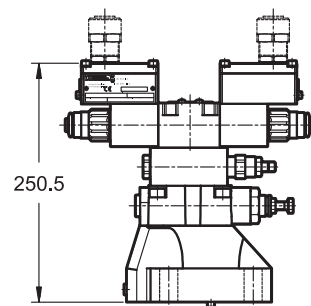
'&" %)



'&" %)



'&" %)



\$AG@F;@9 EGD8357
7J39A@3> :736 36<GEF?7@F E5D71 8AD ?3;@ BD7EEGD7 H3>G7 EB3@>7D >A5=I;E7 DAF3F;A@ FA ;@5D73 BD7EEGD7
*75A@6 BD7EEGD7 H3>G7 36<GEF?7@F *A5=7F :7J 36<GEF?7@F E5D71 >>7@ =7K >A5=I;E7 DAF3F;A@ FA ;@5D73E7 BD7EEGD7 'D7EEGD7 93G97 BADF W
*& +&' EA>7@A;6 H3>H7 8AD BD7EEGD7 E7>75F;A@ G@>A36;@9 I;F; 7JB>AE;A@ BDAA8 5A;>E A;> D7?AH3> EB357

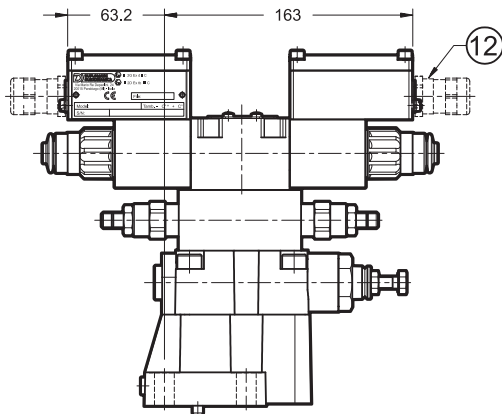
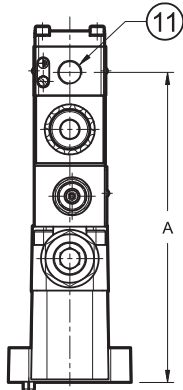
\$3@G3> AH7DD;67 4AAF BDAF75F76 AB1=41@4 6>@ 2->B8 # 1=4 + A51;A AD 4>;@6 D;@9 @GF 6;?7@E;A@E EF3@63D6 8AD %# E73>E E77 B3D
+7D?;@3> 8AD EGBB>7?7@F3DK 73DF: 5A@>75F;A@ ,BB7D BADF 8AD 534>7 9>3@6
34>7 9>3@6 GBB7D BADF E:AI@ +A 47 AD67D76 E7B3D3F7>K E77 B3D39D3B:
#)\$) 8AD E;67 BADF 534>7 9>3@6 E77 B3D39D3B:

-3>H7	\$3EE
'&" % 1=4	
'&" %	
'&" %	
'&" %	

-3>H7 83EF7@;@9 % * E5D7IE \$ J *&
+;9:F7@;@9 FADCG7 %?
+;D736E A8 ?AG@F;@9 :A>7E \$ J
73>;@9 D;@9E % &) FKB7 J ^:AD7 % &) FKB7 J ^*:AD7

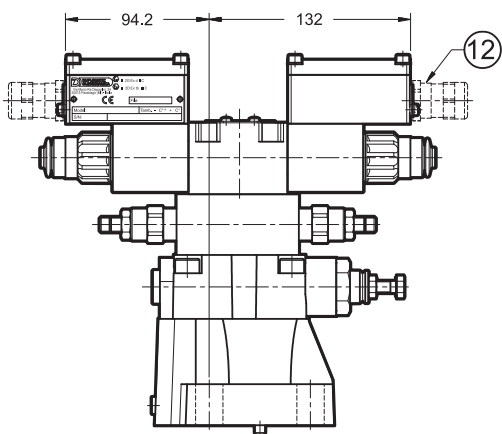
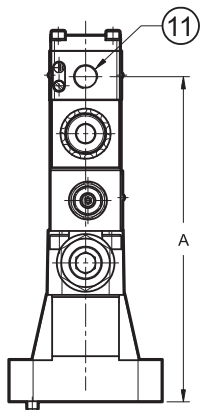
'&" % ((\$##)\$# \$+ '!! # "\$*#) # " #(\$#(

6;?7@E;A@E ;@ ??



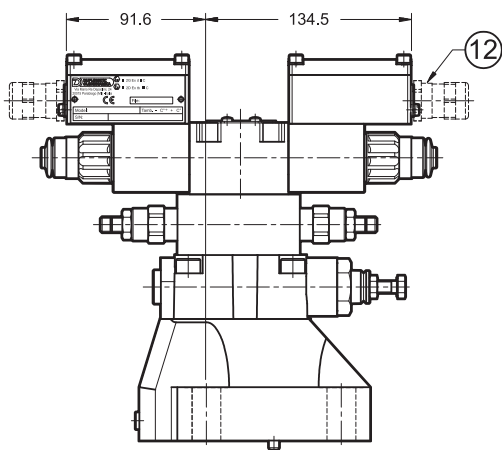
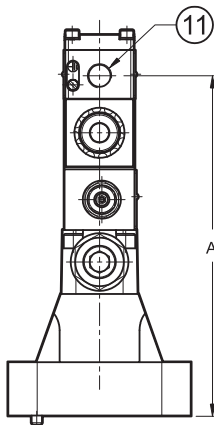
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	;?7@E;A@	
*;67 BADF FKB7)(\$ " ' :)(\$ " ' :)(\$ " ' :)(\$ " ' :)(\$ " ' :)(\$ " ' :
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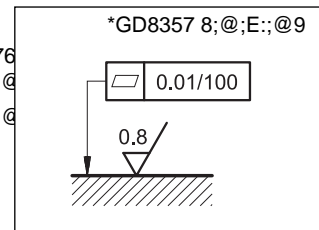
	*;67 BADF
	34>7 9>3@6 E;67 BADF E:AI@ +A 47 AD67D76 E7B3D3F7>K E77 B3D



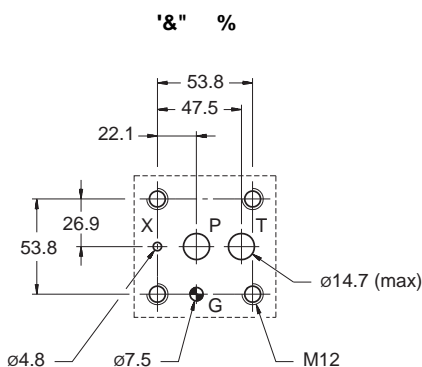
RQM*KD2-P

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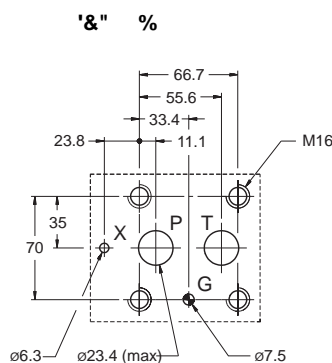
+ :7 H3>H7E 53@ 47 ; @EF3>>76 ; @ 3@K BAE;F;A@ I;F:AGF ;?B3;D;@9 5ADD75F AB7D3F;A@
-3>H7 83EF7@; @9 F3=7E B>357 4K ?73@E A8 E5D7IE AD F;7 DA6E >3K;@9 F:7 H3>H7 A@ 3 >3BB76
H3>G7E A8 B>3@3D;FK 3@6 E?AAF:@7EE F:3F 3D7 7CG3> FA AD 47FF7D F:3@ F:AE7 ;@6;53F76 ;@
8 F:7 ?;@;?G? H3>G7E A8 B>3@3D;FK AD E?AAF:@7EE 3D7 @AF ?7F 8>G;6 >73=397E 47FI77@
?AG@F;@9 EGD8357 53@ 73E;>K A55GD



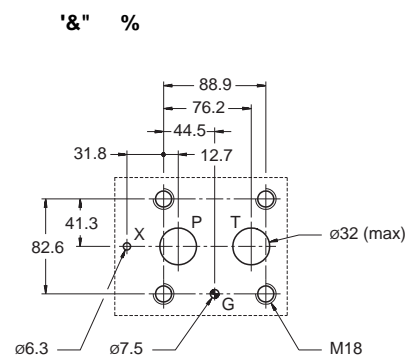
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(* %!) (

E77 53F3>A9G7

	'&" %	'&" %	'&' %
+KB7	'\$)(D73D BADFE	'\$)(D73D BADFE	'\$)(D73D BADFE
' + BADFE 6;?7@E;A@	' W *' + W *'	W *'	W *'
/ BADF 6;?7@E;A@	W *'	W *'	W *'

#)\$) *G4B>3F7E FA 47 AD67D76 E7B3D3F7>K 6A @AF 5A@F3; @ @7;F:7D 3>G?;@;G? @AD ?39@7E;G? 3F 3 ;:9:7D D3F7 F:3@ F:7 H3>G7 3>>AI76
355AD6;@9 FA + / 6;D75F;H7 8AD 53F79ADK

+ :7 GE7D ?GEF F3=7 53D7 3@6 ?3=7 3 5A?B>7F7 3EE7EE?7@F A8 F:7 ;9@;F;A@ D;E= F:3F 53@ A55GD 8DA? F:7 D7>3F;H7 GE7 ;@ BAF7@F;
7@H;DA@?7@FE



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Fax +39 0331.895.339
www.diplomatic.com • e-mail: sales.exp@diplomatic.com



Z*-P

PRESSURE REDUCING VALVES

SERIES 22

SUBPLATE MOUNTING

Z3-P ISO 5781-06 (CETOP 06)

Z5-P ISO 5781-08 (CETOP 08)

OPERATING PRINCIPLE

„ The Z*-P type valves are used when a branch with a lower pressure than the main one is desired in the hydraulic circuits.

Being normally open, they allow passage of oil up to the point when the outlet pressure is less than that set on the valve; the valve closes and keeps the outlet pressure constant when it reaches the set value. The intake pressure fluctuation, for values greater than the set values, does not affect the reduced outlet pressure, and furthermore the particular design of the valve prevents exceeding the set value even in transients.

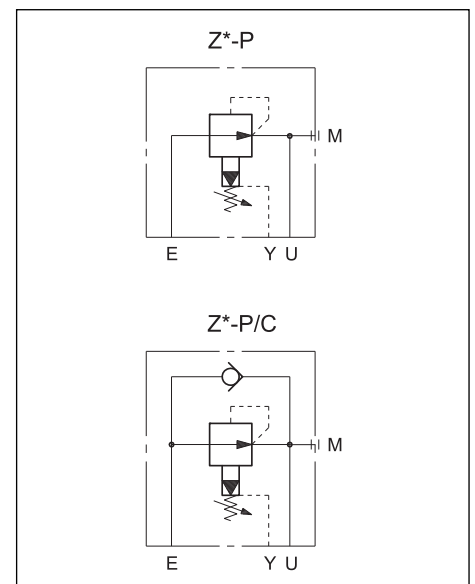
The drainage, to be connected directly to the tank, discharges about 0,8 l/min. The valves are available, upon request, with reduced drainage (0,4 l/min).

„ Available even with incorporated check valve upon request, with cracking pressure of 0,5 bar.

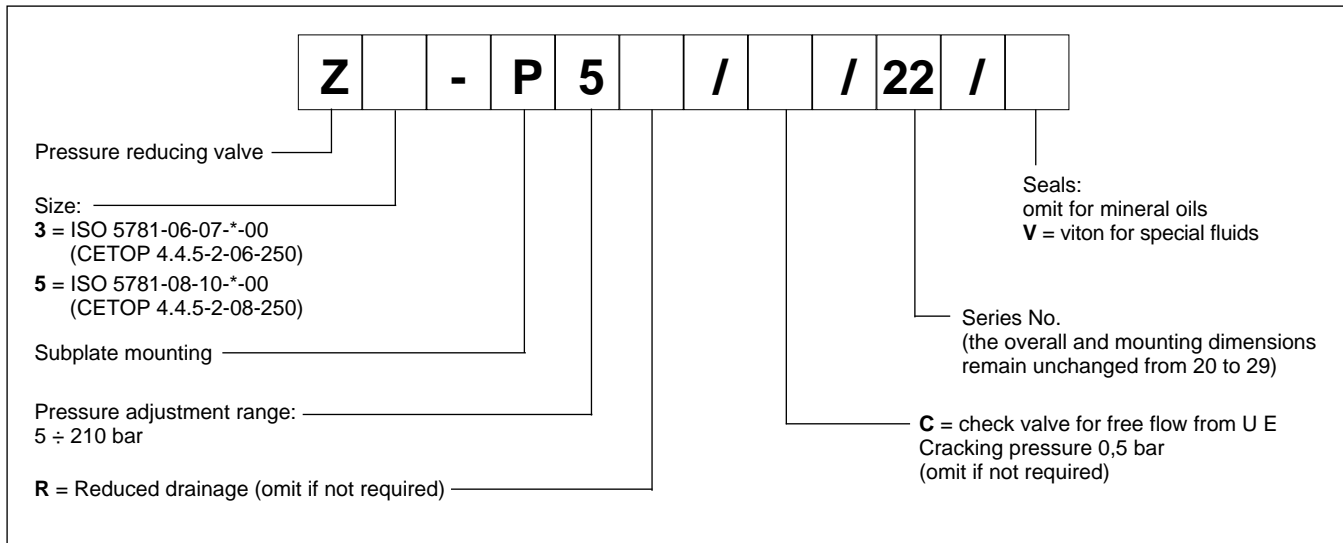
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		Z3-P	Z5-P
Maximum operating pressure	bar	250	
Maximum flow rate	l/min	40	110
Drain flow rate:	l/min	0,8	
for Z*-P for Z*-P*R		0,4	
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 classe 20/18/15		
Recommended viscosity	cSt	25	
Mass	kg	3,9	6,1

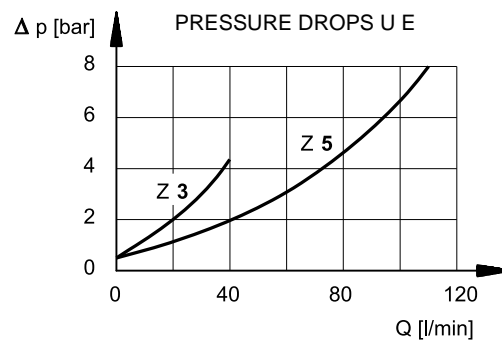
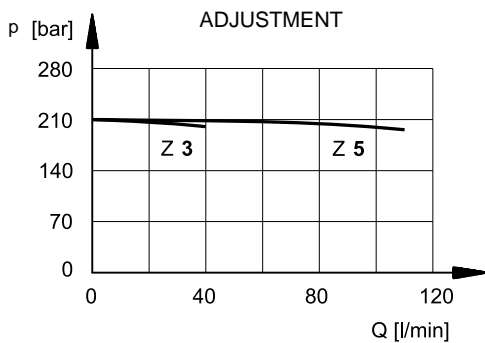
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



3 - 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.

4 - Z3-P OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

MOUNTING SURFACE:
ISO 5781-06-07-*00 (CETOP 4.4.5-2-06-250)

NOTE: the position of the Y port corresponds to the position of the X port provided for by the ISO Standard

1	SICBLOC adjustment knob. To operate, push and rotate at the same time.
2	Intake
3	Outlet port
4	Drainage port
5	Pressure gauge port 1/4" NPT
6	Supplementary tube port for drainage 1/4" BSP
7	Mounting surface with sealing rings: N. 2 OR type 3068 (17.13x2.62) N. 2 OR type 2021 (5.28x1.78) 90 Shore

FASTENING BOLTS:
4 bolts M10x70
Tightening torque: 40 Nm

5 - Z5-P OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

MOUNTING SURFACE:
ISO 5781-08-10-*00 (CETOP 4.4.5-2-08-250)

NOTE: the position of the Y port corresponds to the position of the X port provided for by the ISO Standard

1	SICBLOC adjustment knob. To operate, push and rotate at the same time.
2	Intake
3	Outlet port
4	Drainage port
5	Pressure gauge port 1/4" NPT
6	Supplementary plug for drainage 1/4" BSP
7	Mounting surface with sealing rings: N. 2 OR type 3100 (25.07x2.62) 90 Shore N. 2 OR type 2021 (5.28x1.78) 90 Shore

FASTENING BOLTS:
4 bolts M10x70
Tightening torque: 40 Nm



6 - SUBPLATES (see catalogue 51 000)

	Z3-P	Z5-P
Type	PMSZ3-Al4G with rear ports	PMSZ5-Al6G with rear ports
Port dimensions: - E, U - X, Y	1/2Ž BSP 1/4Ž BSP	1Ž BSP 1/4Ž BSP



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S*-P
SEQUENCE VALVE

U*-P
UNLOADING VALVE

T*-P
BACKPRESSURE VALVE

X*-P
BALANCING VALVE

SERIES 20

OPERATING PRINCIPLE

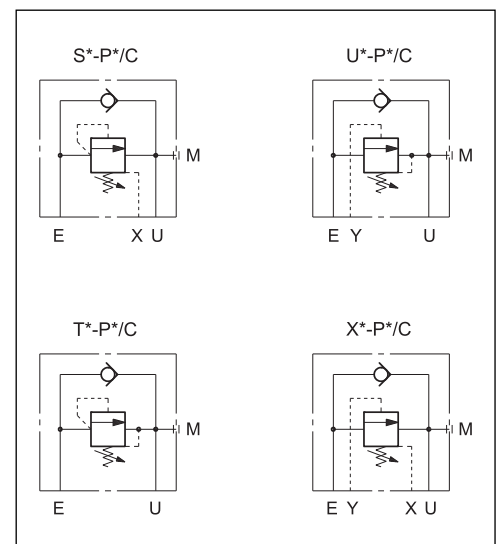
- The S U T X sequence valves are used for pressure control. They are direct-acting and normally closed.
- They are available in two nominal sizes for flows up to 150 l/min and in four pressure adjustment ranges.
- Opening takes place by means of a pilot pressure that, acting on a small piston, resists the force of the adjustment spring.
- The valve can be easily modified to get any one of the four versions **S**, **U**, **T**, **X**, turning the upper and the bottom covers in order to obtain the X and Y internal connections, as indicated in par. 7.

The figure represents the section of a type S valve.

PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

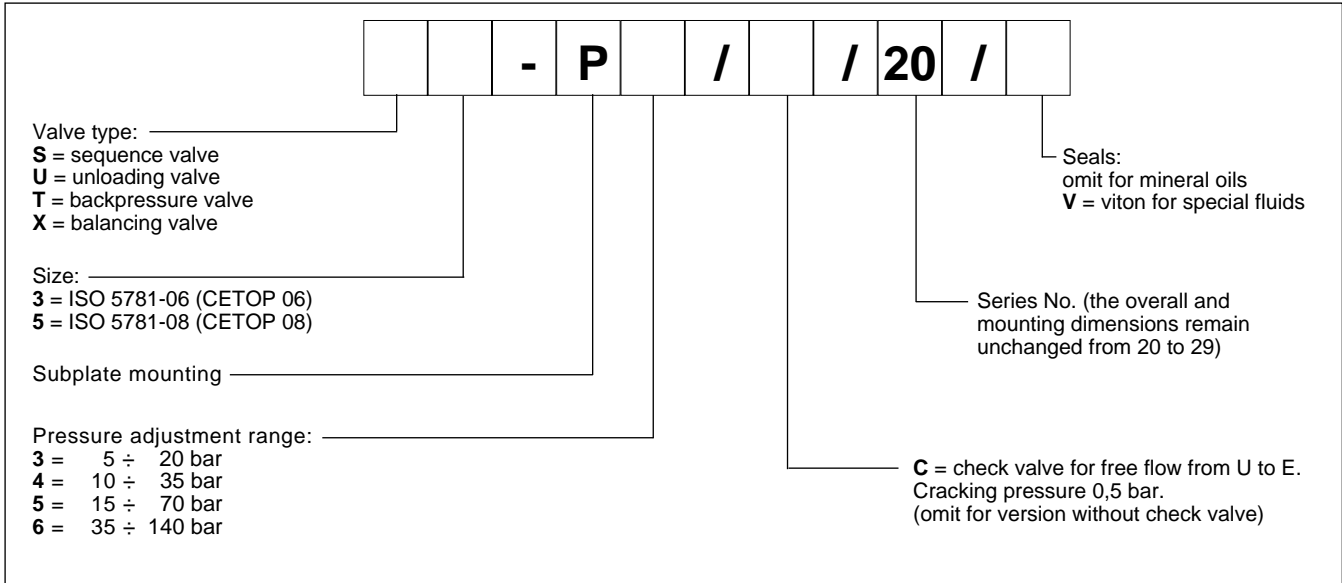
		size 3	size 5
Maximum operating pressure	bar	320	250
Maximum flow rate	l/min	4060	150
Ambient temperature range	°C	-20 / +50	
Fluid temperature range	°C	-20 / +80	
Fluid viscosity range	cSt	10 ÷ 400	
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15		
Recommended viscosity	cSt	25	
Mass	kg	5,8	6,7

HYDRAULIC SYMBOLS

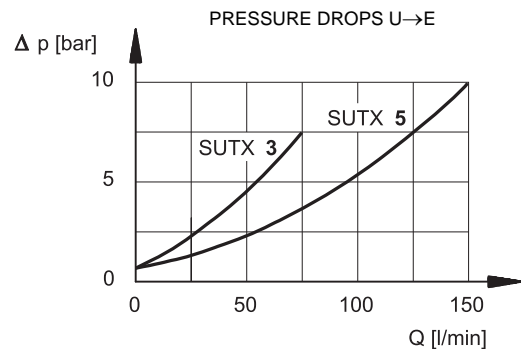
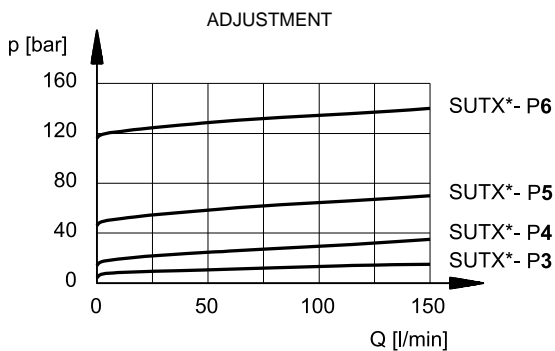




1 - IDENTIFICATION CODE



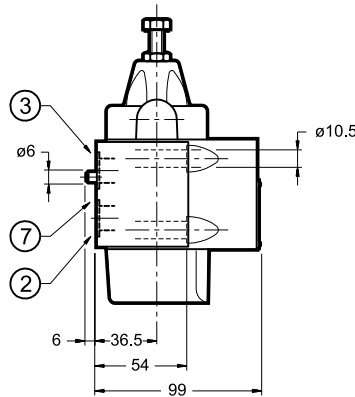
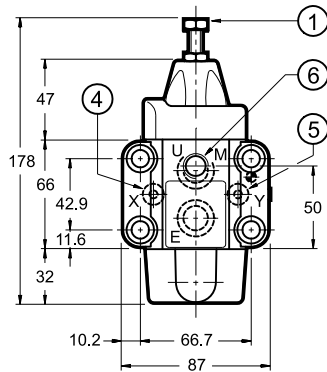
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - HYDRAULIC FLUIDS

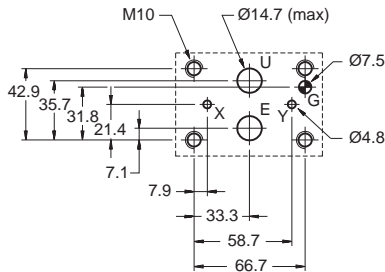
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

4 - SUTX 3-P OVERALL AND MOUNTING DIMENSIONS



FASTENING BOLTS:
4 bolts M10x70
Tightening torque: 40 Nm

MOUNTING SURFACE:
ISO 5781-06-07-*00 (CETOP 4.4.4-2-06-320)

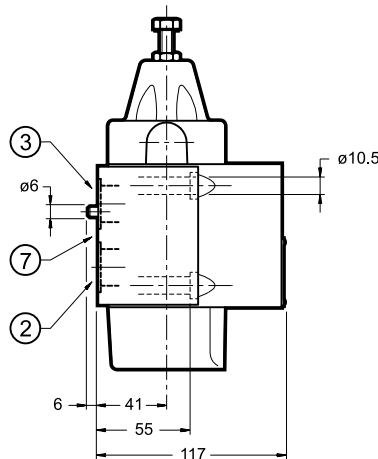
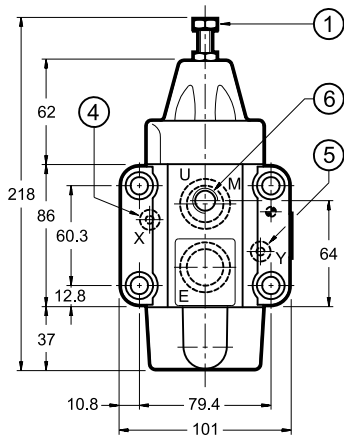


NOTE: the positions of the X and Y ports are reversed from the requirements of the ISO Standard

dimensions in mm

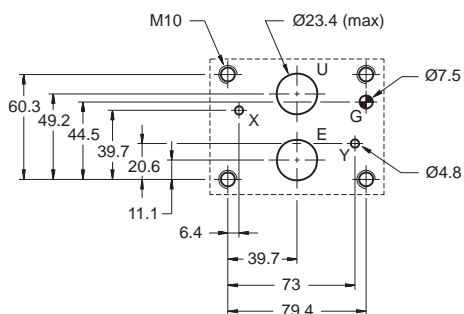
1	Hexagonal head adjustment screw. Spanner 13.
2	Intake port
3	Outlet port
4	External drainage port
5	External piloting port
6	Pressure gauge port 1/4" NPT
7	Mounting surface with sealing rings: N. 2 OR type 3068 (17.13x2.62) - 90 Shore N. 2 OR type 2021 (5.28x1.78) - 90 Shore

5 - SUTX 5-P OVERALL AND MOUNTING DIMENSIONS



FASTENING BOLTS:
4 bolts M10x70
Tightening torque: 40 Nm

MOUNTING SURFACE:
ISO 5781-08-10-*00 (CETOP 4.4.5-2-08-320)



NOTE: the positions of the X and Y ports are reversed from the requirements of the ISO Standard

dimensions in mm

1	Hexagonal head adjustment screw. Spanner 13.
2	Intake port
3	Outlet port
4	External drainage port
5	External piloting port
6	Pressure gauge port 1/4" NPT
7	Mounting surface with sealing rings: N. 2 OR type 3100 (25.07x2.62) - 90 Shore N. 2 OR type 2021 (5.28x1.78) - 90 Shore

6 - APPLICATIONS

“S” The type “S” sequence valve is normally used to successively command two or more actuators: when the pressure in the primary circuit reaches the set value on the valve, it opens and allows the fluid to feed the second circuit branch, keeping the pressure in the first branch.

The valve remains open until the pressure at the intake falls below the set value; under these conditions, the maximum pressure setting on the first circuit branch will be achieved also at the outlet.

It is also used to keep a circuit under pressure when simultaneous supply of various users, requiring the total delivery of the pump, would make the pressure value decrease.

“U” This is normally used in automatic circuits (high-low pressure) for unloading the low pressure pump; this occurs when the pressure in the circuit reaches the set value of the valve.

In this manner it is possible to utilize the total flow of the two pumps for fast movements at low pressure, with electric power saving, using high pressure only for working movements.

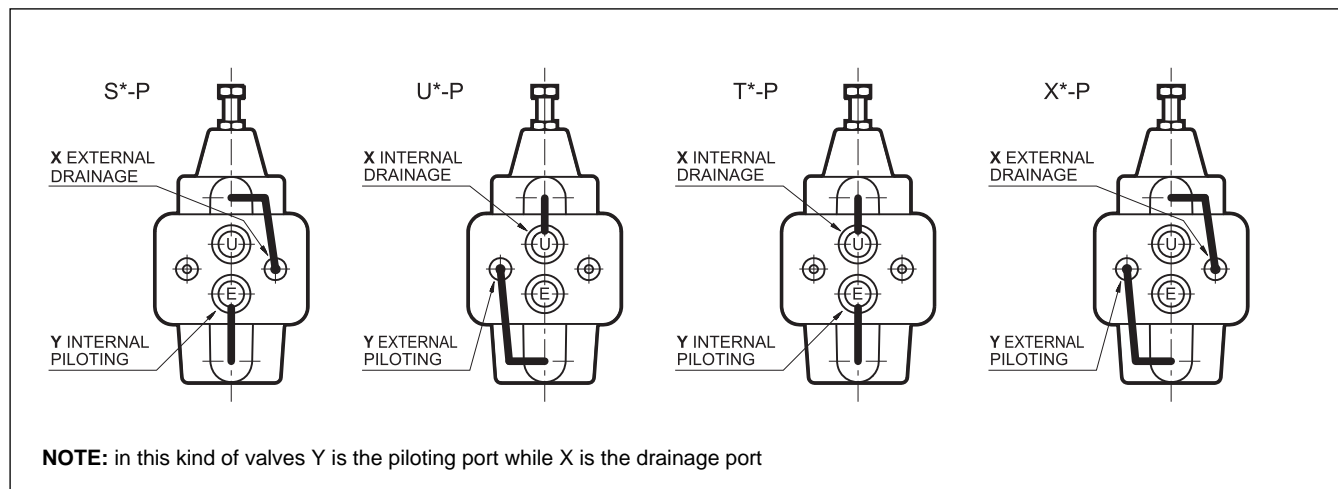
Furthermore, it is used to allow quick discharge of the large chamber of a high differential cylinder which the directional valve would not be able to drain; in this case the valve piloting is connected to the small chamber of the cylinder.

“T” Normally this is used to create hydraulic resistance (back pressure) to prevent uncontrolled movements, especially in the case of suspended loads.

The valve, normally closed, opens only when the set pressure is reached, and thus the descent of the load occurs in a controlled manner and the descending speed depends on the delivery of the pump.

“X” This is mainly used for load balancing. The piloting pressure can be taken from any point in the plant. The valve stays closed until the pilot pressure reaches the set value.

7 - COVER ORIENTATION FOR ALL THE VERSIONS S, U, T, X



7 - SUBPLATES (see catalogue 51 000)

	SIZE 3	SIZE 5
Type with rear ports	PMSZ3-AI4G	PMSZ5-AI5G
Ports dimensions:	1/2" BSP 1/4" BSP	1" BSP 1/4" BSP



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ZC2

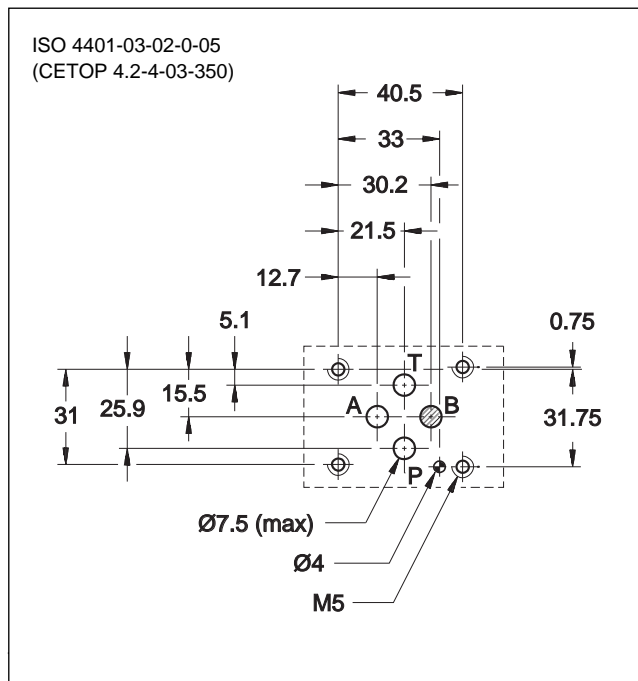
BALANCING VALVES

SERIES 51

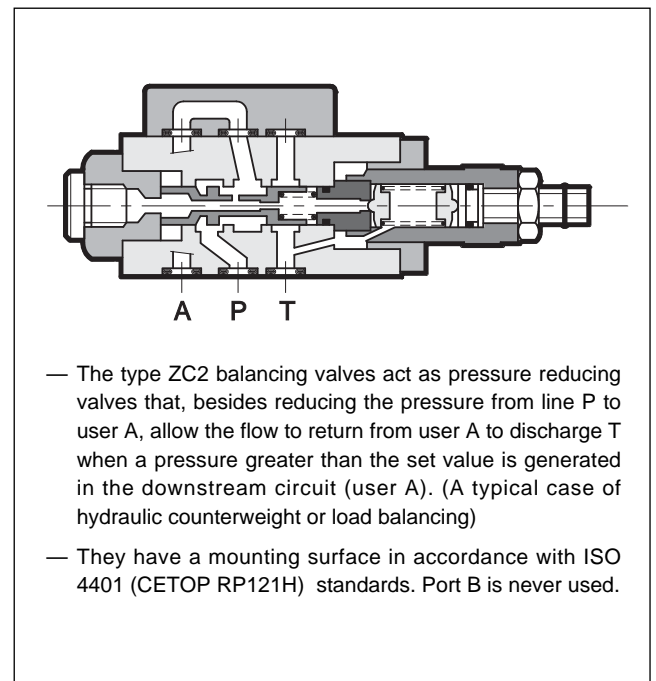
SUBPLATE MOUNTING ISO 4401-03 (CETOP 03)

p max 350 bar
Q max 25 l/min

MOUNTING INTERFACES



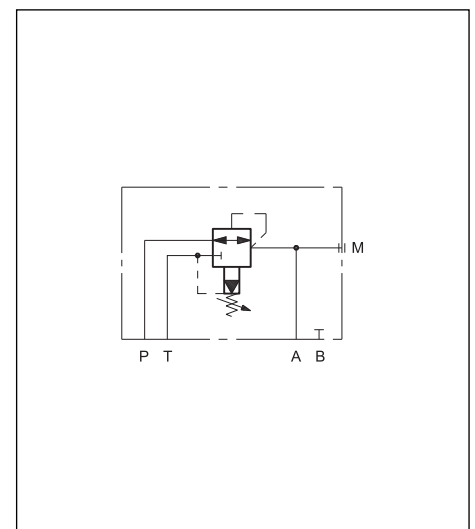
OPERATING PRINCIPLE



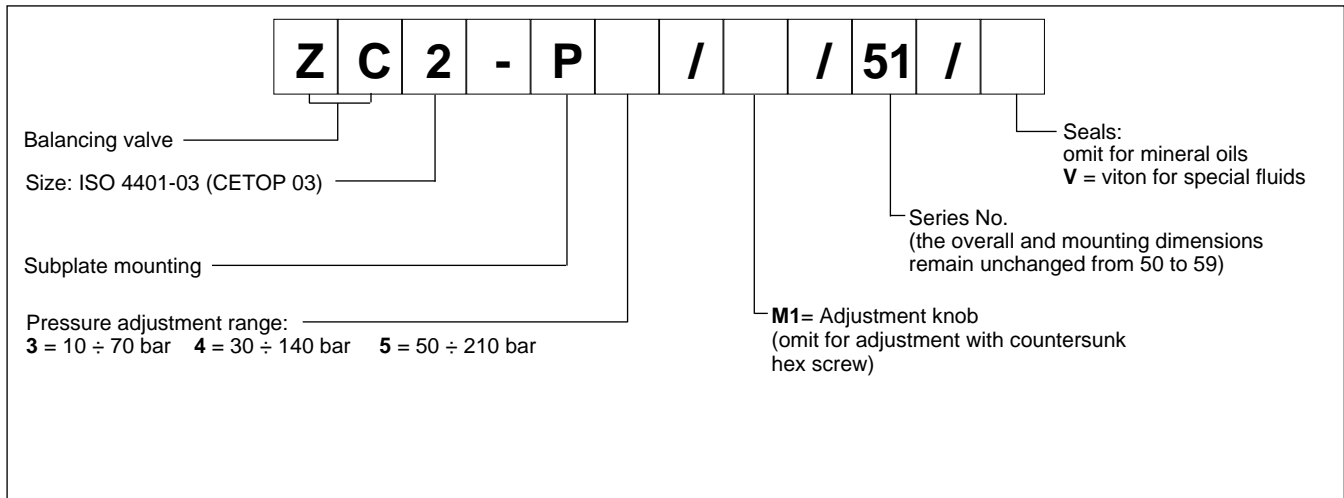
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	25
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,3

HYDRAULIC SYMBOL

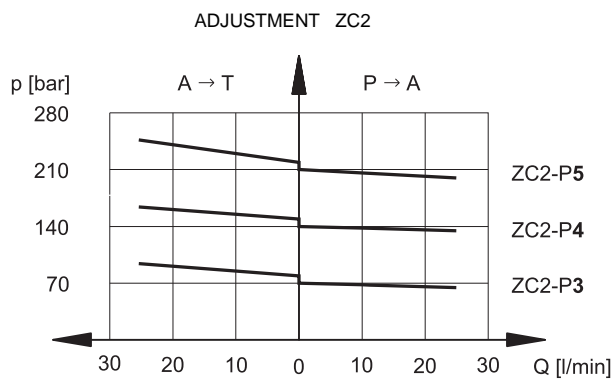


1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES

(values obtained with viscosity of 36 cSt at 50°C)

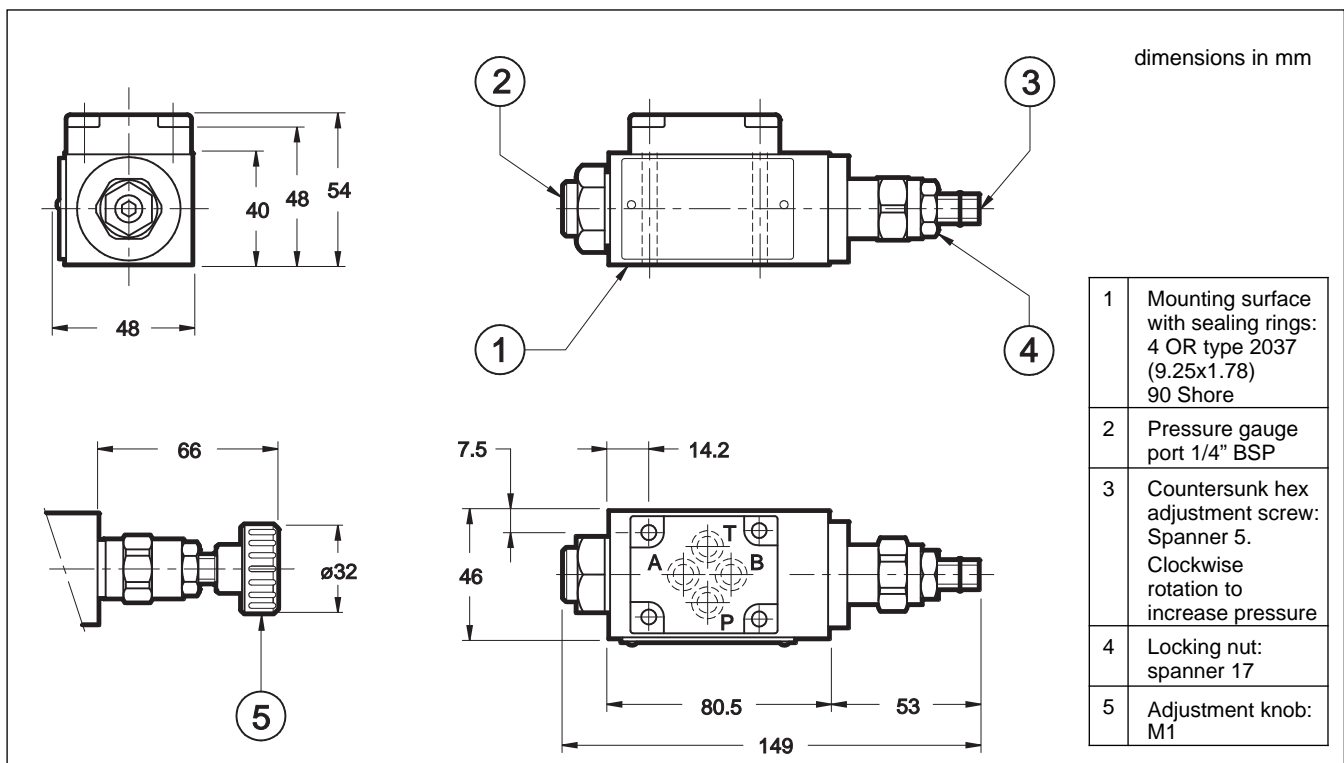


3 - HYDRAULIC FLUIDS

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.

4 - ZC2 OVERALL AND MOUNTING DIMENSIONS

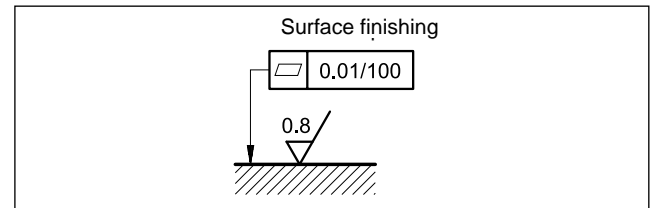




9 - INSTALLATION

The ZC2 valves can be installed in any position without impairing correct operation.

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.



6 - FASTENING BOLTS

N. 4 bolts M5x55
Tightening torque: 5Nm (A screws 8.8)

7 - SUBPLATES (see cat. 51 000)

Type PMMD-AL3G ports on rear 3/8" BSP
Type PMMD-AL3G side ports 3/8" BSP

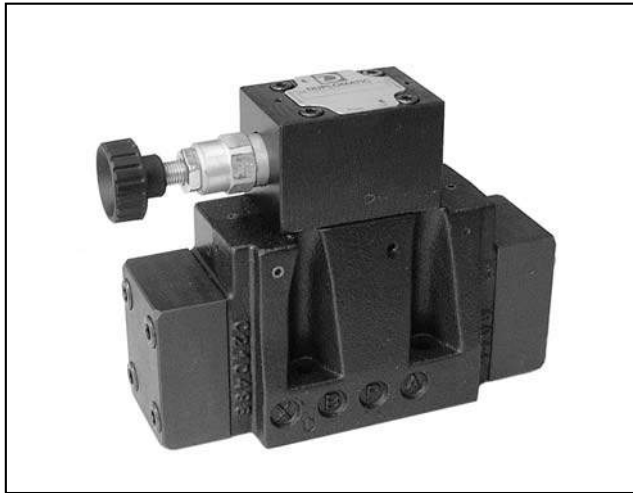


ZC2
SERIES 51



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DZC*

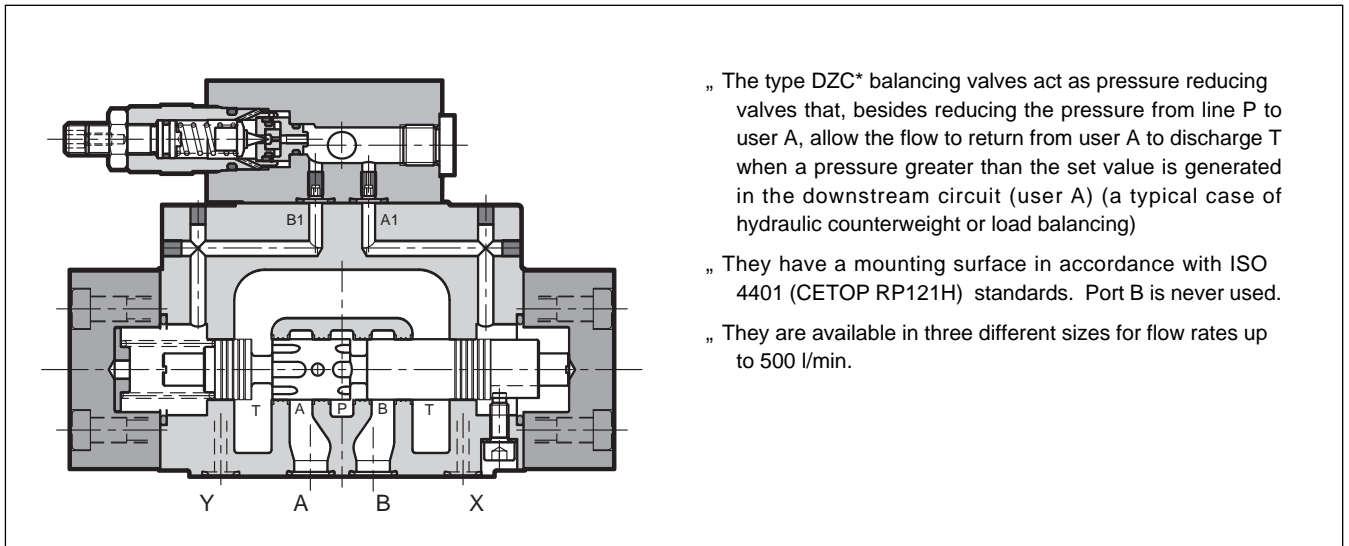
BALANCING VALVE

SERIES 10

DZC5 **CETOP P05**
DZC5R **ISO 4401-05 (CETOP R05)**
DZC7 **ISO 4401-07 (CETOP 07)**
DZC8 **ISO 4401-08 (CETOP 08)**

p max **350** bar
Q max (see table of performances)

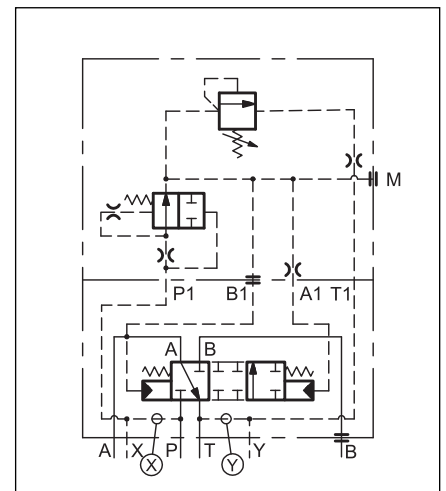
OPERATING PRINCIPLE



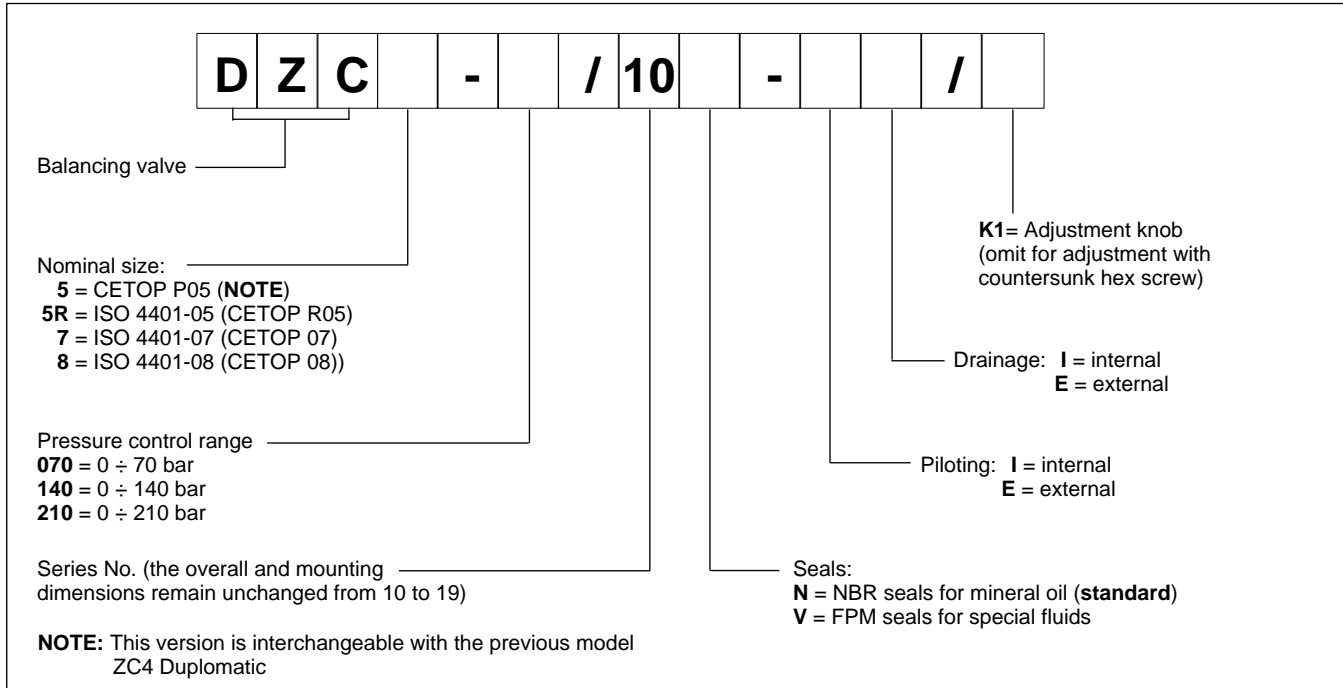
PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

		DZC5 DZC5R	DZC7	DZC8
Maximum operating pressure:	bar	350		
Maximum flow	l/min	150	300	500
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 20/18/15			
Recommended viscosity	cSt	25		
Mass:	kg	6,5	8,7	15

HYDRAULIC SYMBOL

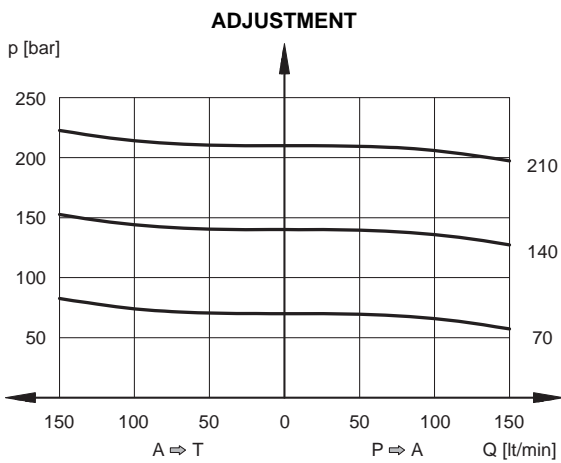


1 - IDENTIFICATION CODE

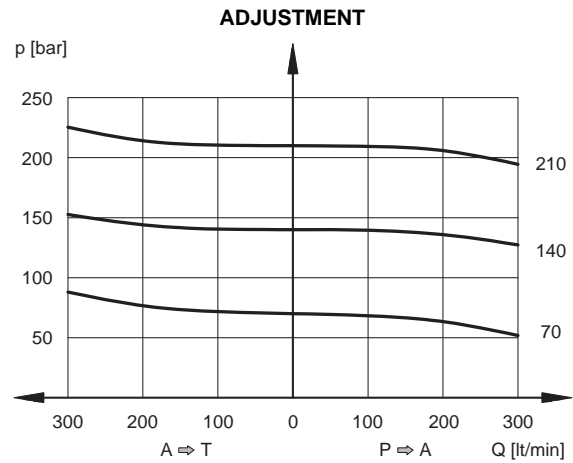


3 - CHARACTERISTIC CURVES (obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control cards)

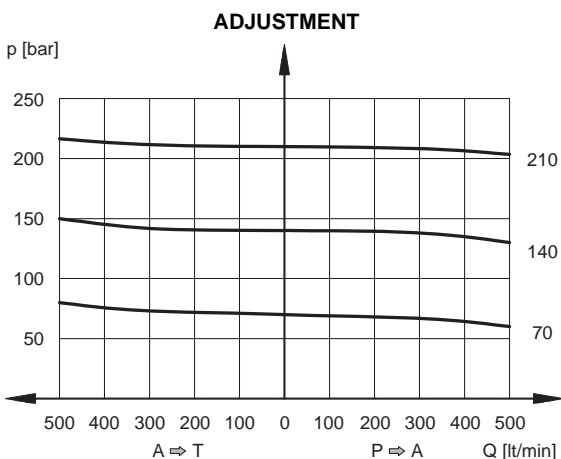
2.1 - Characteristic curves DZC5 and DZC5R



2.2 - Characteristic curves DZC7



2.3 - Characteristic curves DZC8



3 - 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.

4 - PILOTING AND DRAINAGE

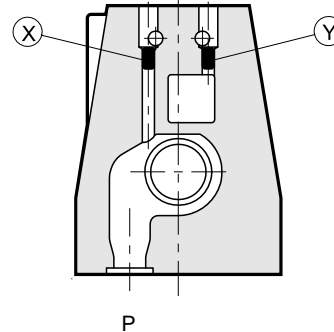
The DZC* valves are available with piloting and drainage, both internal and external. We suggest to use the version with external drainage that allows a higher backpressure on the unloading.

VALVE TYPE	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

PRESSURES (bar)

Pressure	MIN	MAX
Piloting pressure on X port	30	210
Pressure on T port with internal drain	...	2
Pressure on T port with external drain	...	250

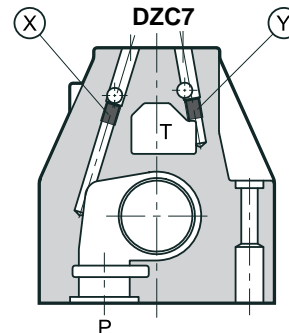
DZC5 and DZC5R



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

P

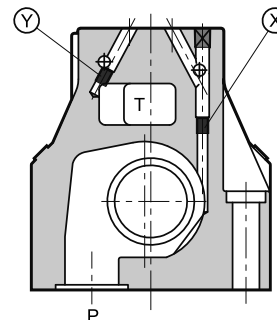
DZC7



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

P

DZC8



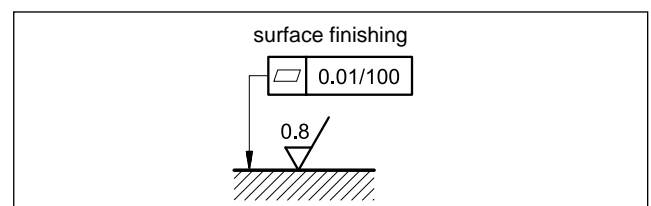
X: M6x8 plug for external pilot
Y: M6x8 plug for external drain

P

5 - INSTALLATION

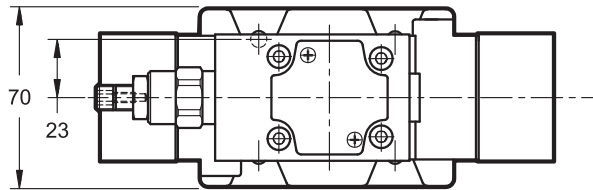
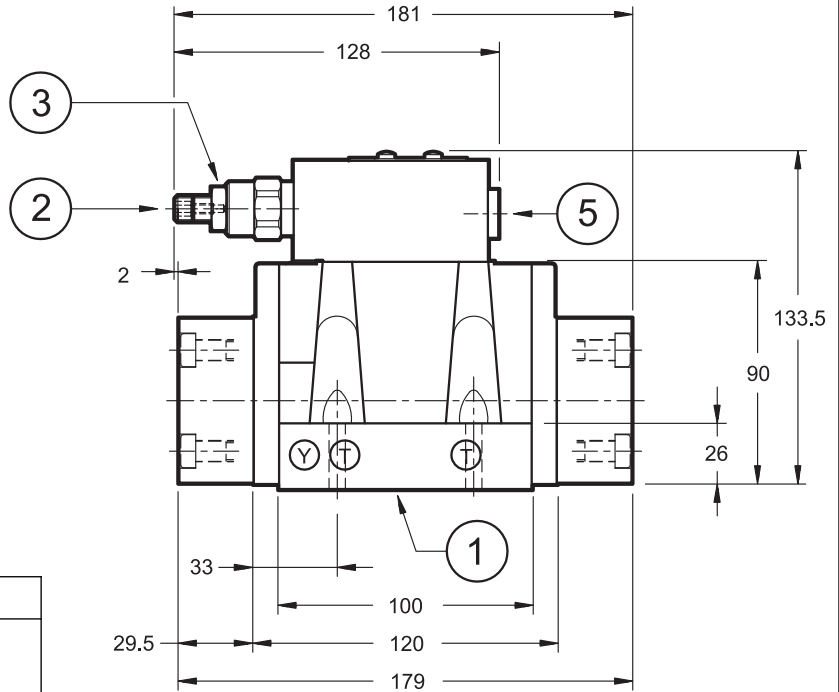
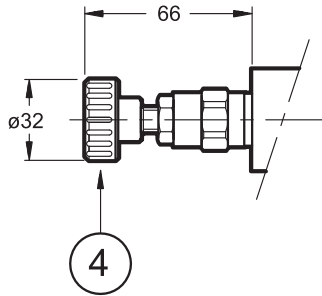
The DZC* valves can be installed in any position without impairing correct operation.

Connect the valve T port directly to the tank. Add any backpressure value detected in the T line to the controlled pressure value. Maximum admissible backpressure in the T line, under operational conditions, is 2 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.



6 - DZC5 AND DZC5R OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

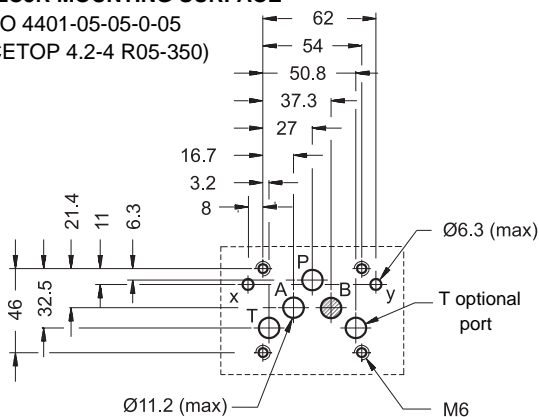


1	Mounting surface with sealing rings
2	Countersunk hex adjustment screw: Spanner 5. Clockwise rotation to increase pressure
3	Locking nut: spanner 17
4	Adjustment knob: M1
5	Pressure gauge port 1/4" BSP

Valve fastening: N. 4 bolts SHC ISO 4762 M6x35
Tightening torque: 8 Nm (A 8.8 bolts)
Thread of mounting holes: M6x10
Sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore

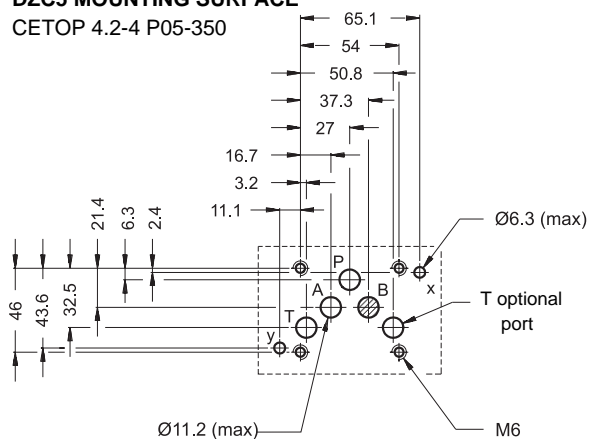
DZC5R MOUNTING SURFACE

ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-350)



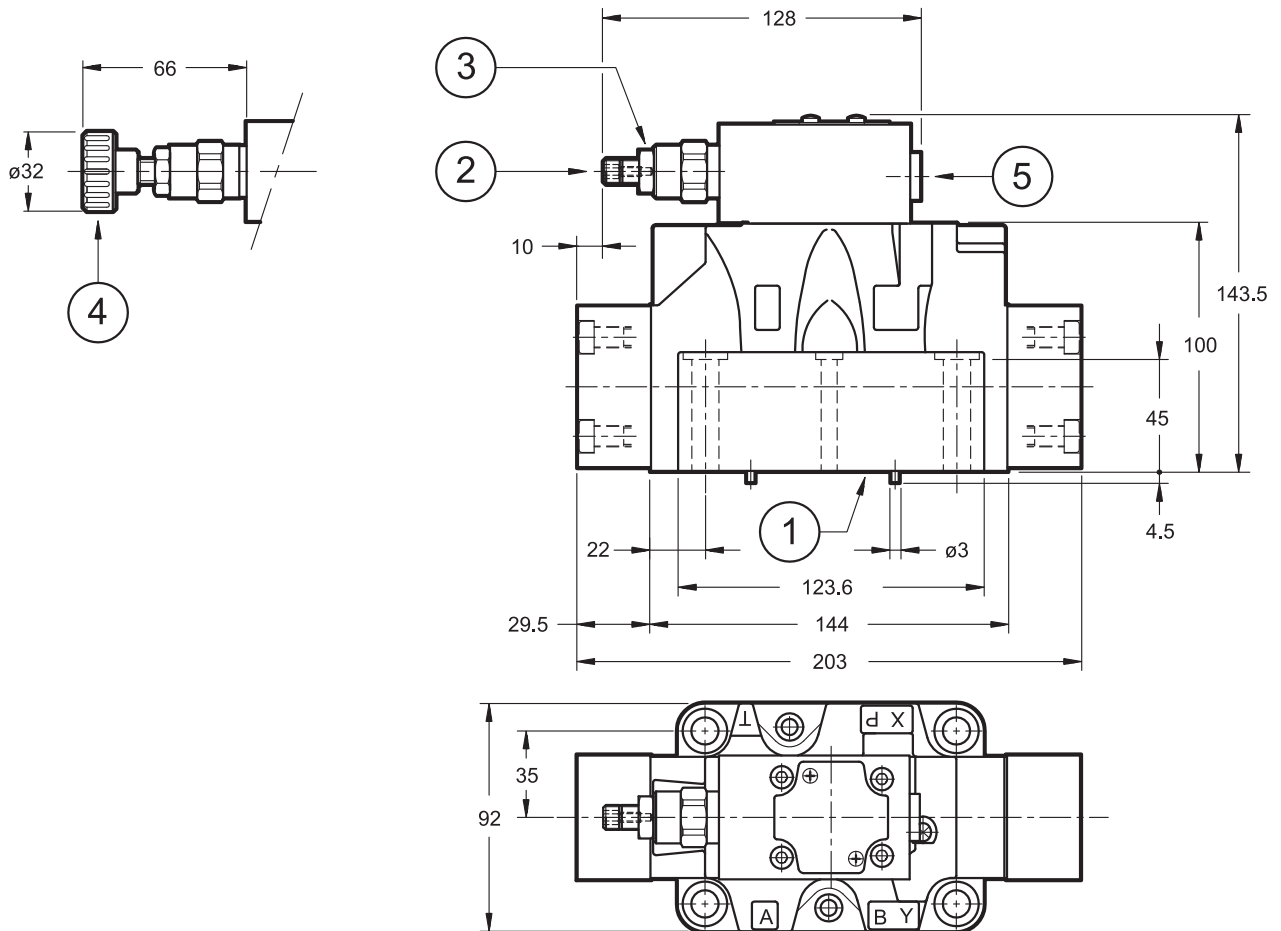
DZC5 MOUNTING SURFACE

CETOP 4.2-4 P05-350



7 - DZC7 OVERALL AND MOUNTING DIMENSIONS

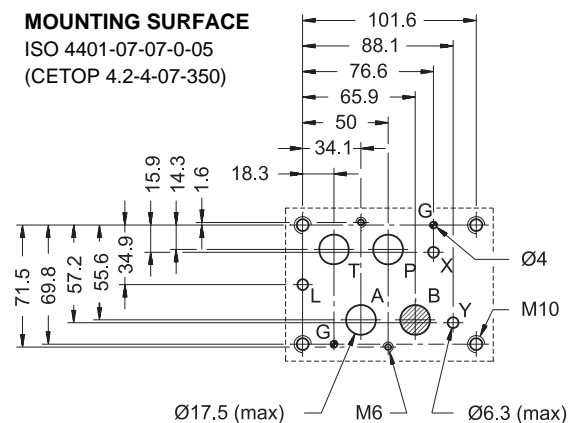
dimensions in mm



1	Mounting surface with sealing rings
2	Countersunk hex adjustment screw: Spanner 5. Clockwise rotation to increase pressure
3	Locking nut: spanner 17
4	Adjustment knob: M1
5	Pressure gauge port 1/4" BSP

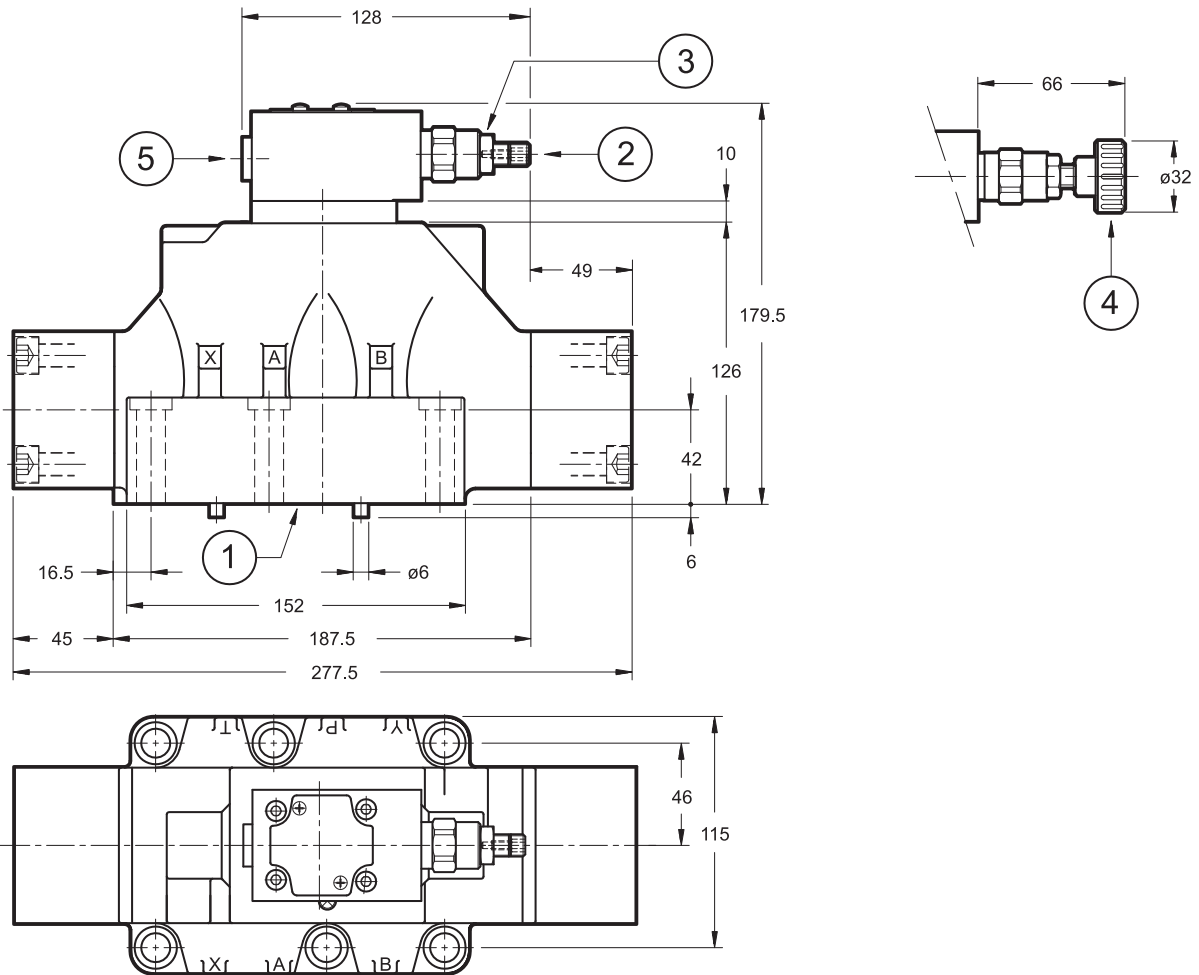
Single valve fastening:	N. 4 SHC ISO 4762 M10x60 bolts N. 2 SHC ISO 4762 M6x60 bolts
Tightening torque M10x60:	40 Nm (A 8.8 bolts) M6x60: 8 Nm (A 8.8 bolts)
Thread of mounting holes:	M6x18; M10x18
Sealing rings:	N. 4 OR type 130 (22.22x2.62) - 90 Shore N. 2 OR type 2043 (10.82x1.78) - 90 Shore

MOUNTING SURFACE

 ISO 4401-07-07-0-05
 (CETOP 4.2-4-07-350)


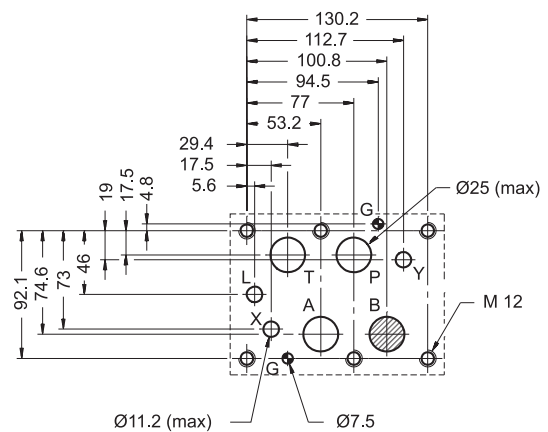
8 - DZC8 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



1	Mounting surface with sealing rings
2	Countersunk hex adjustment screw: Spanner 5. Clockwise rotation to increase pressure
3	Locking nut: spanner 17
4	Adjustment knob: M1
5	Pressure gauge port 1/4" BSP

Valve fastening: N. 6 SHC ISO 4762 M12x60 bolts
Tightening torque: 69 Nm (A 8.8 bolts)
Thread of mounting holes: M12x20
Sealing rings: N. 4 OR type 3118 (29.82x2.62) - 90 Shore N. 2 OR type 3081 (20.24x2.62) - 90 Shore

MOUNTING SURFACE
 ISO 4401-08-08-0-05
 (CETOP 4.2-4-08-350)




9 - SUBPLATES (See catalogue 51 000)

	DZC5	DZC7	DZC8
Model with rear ports	PME4-AI5G	PME07-AI6G	
Model with side ports	PME4-AL5G	PME07-AL6G	PME5-AL8G
Thread of ports: P - T - A - B X - Y	3/4Ž BSP 1/4Ž BSP	1Ž BSP 1/4Ž BSP	1½Ž BSP 1/4Ž BSP



DZC*
SERIES 10



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RS*
DOUBLE-ACTING THROTTLE
FLOW CONTROL VALVE
SERIES 30

THREADED PORTS
CARTRIDGE TYPE

p max (see table of performances)

Q max (see table of performances)

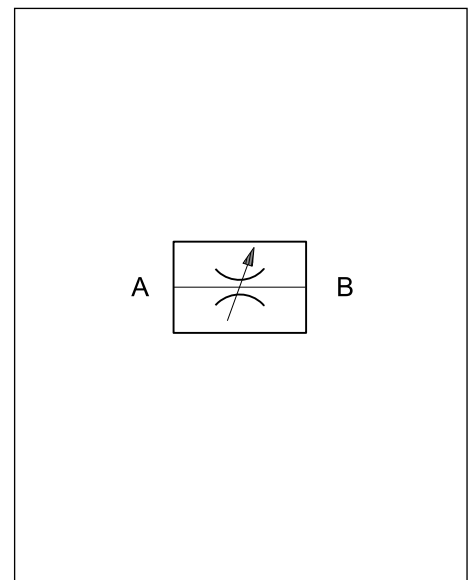
OPERATING PRINCIPLE

- The RS* and RS*-I valves are throttle flow control valves for in-line mounting, directly in the line or as a cartridge complete with threading for in-block mounting.
- Adjustment is obtained with a conical throttle that operates in a cylindrical seat and allows a good linearity of the adjusted flow.
- They are also used as flow shut-off valves since they guarantee good sealing when completely closed.
- The valves are always supplied with an adjustment knob that can be locked in any position with a transverse positioned grub screw, as may be required.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

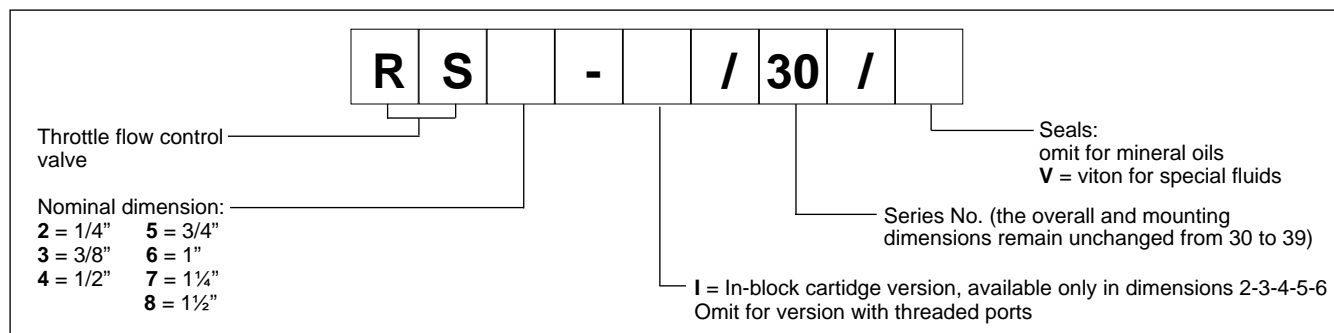
Valve code	Port dimensions BSP	Nominal flow rate [l/min]	Mass [kg]	Max. operating pressure [bar]
RS2	1/4"	15	0,2	400
RS3	3/8"	30	0,4	
RS4	1/2"	50	0,6	
RS5	3/4"	80	1,3	
RS6	1"	150	2,6	320
RS7	1 1/4"	200	3,0	
RS8	1 1/2"	220	4,2	
RS2-I	—	15	0,15	320
RS3-I	—	30	0,2	
RS4-I	—	50	0,3	
RS5-I	—	80	0,6	
RS6-I	—	150	1,2	

HYDRAULIC SYMBOL



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 20/18/15	
Recommended viscosity	cSt	25

1 - IDENTIFICATION CODE



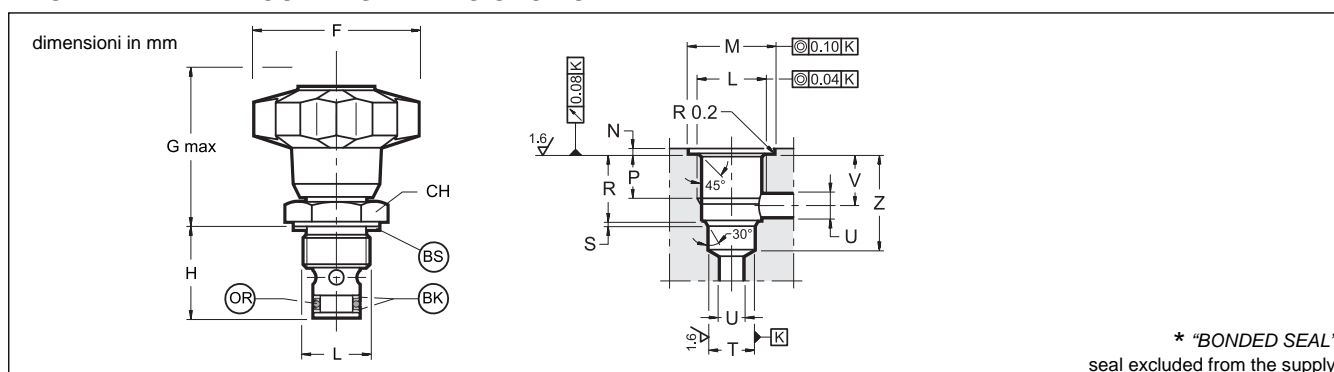
3 - HYDRAULIC FLUIDS

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.

3 - OVERALL AND MOUNTING DIMENSIONS RS*

Valve	A BSP	B	C	∅ D	E max	∅ F
RS2	1/4"	12,5	49	20	78	50
RS3	3/8"	12,5	59	25	93	70
RS4	1/2"	15,5	68	30	107	80
RS5	3/4"	17	86	40	132,5	100
RS6	1"	20	105	50	167,5	120
RS7	1 1/4"	22	120	55	172,5	120
RS8	1 1/2"	24	134	65	181	120

4 - OVERALL AND MOUNTING DIMENSIONS RS*-I



sigla valvola	∅F	G max	H	L 6H	∅M +0.2 0	N	P min	R ±0.2	S +0.2 0	∅T H8	∅U max	V ±0.2	Z min	CH	OR type	BK type	BS* type
RS2-I	50	49.5	26.5	M20x1.5	27	1	12	16.5	1	14	5	13.3	27	27	2043	2043	400-513
RS3-I	70	57.5	30.5	M20x1.5	27	1	12	20	1.2	16	8	15.2	32	27	2050	2050	400-513
RS4-I	80	66.5	40	M27x2	33	1.3	18	28	1.2	19	10	22	41	32	2062	2062	400-520
RS5-I	100	76.5	44	M33x2	40	1.3	18	30.5	1.2	27	12	23	45.5	41	130	130	400-515
RS6-I	120	102	52.5	M42x2	50	1.3	21.5	36.5	1.5	35	16	28.5	55	50	3118	3118	400-516



RSN*

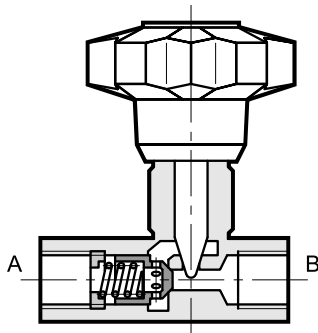
SINGLE-ACTING THROTTLE FLOW CONTROL VALVE

SERIES 30

**THREADED PORTS
CARTRIDGE TYPE**

p max (see table of performances)
Q max (see table of performances)

OPERATING PRINCIPLE



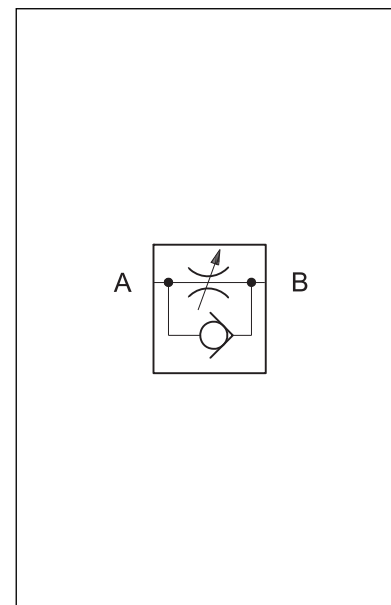
- „ The RSN* and RSN*-I valves are single-acting throttle flow control valves for in-line mounting, directly in the line or as a cartridge complete with threading for in-block mounting.
- „ Adjustment is obtained with a conical throttle that operates in a cylindrical seat and allows a good linearity of the adjusted flow.
- „ They are also used as single direction flow shut-off valves since they guarantee good sealing when completely closed. They also allow a free return in the opposite direction.
- „ The valves are always supplied with an adjustment knob that can be locked in any position with a transverse positioned grub screw, as may be required.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Valve Code	Port dimensions BSP	Nominal flow rate [l/min]	Max. flow with open flow [l/min]	Mass [kg]	Max. operating pressure [bar]
RSN2	1/4Ž	15	35	0,25	400
RSN3	3/8Ž	30	80	0,5	
RSN4	1/2Ž	50	150	0,75	
RSN5	3/4Ž	80	200	1,6	320
RSN6	1Ž	150	300	3,05	
RSN7	1 1/4Ž	200	400	3,75	
RSN8	1 1/2Ž	220	500	5,75	
RSN2-I	–	15	35	0,13	320
RSN3-I	–	30	80	0,25	
RSN4-I	–	50	150	0,34	
RSN5-I	–	80	200	0,62	

Direct check valve opening pressure	bar	0,35
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 20/18/15	
Recommended viscosity	cSt	25

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

	R	S	N	-	/	30	/	
--	----------	----------	----------	----------	----------	-----------	----------	--

Single-acting throttle flow control valve

Nominal dimension:
2 = 1/4Ž **5** = 3/4Ž
3 = 3/8Ž **6** = 1Ž
4 = 1/2Ž **7** = 1¼Ž
8 = 1½Ž

Seals:
omit for mineral oils
V = viton for special fluids

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

I = in-block cartridge version, available only in dimensions 2-3-4-5
Omit for version with threaded ports

2 - 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.

3 - OVERALL AND MOUNTING DIMENSIONS RSN*

dimensions in mm

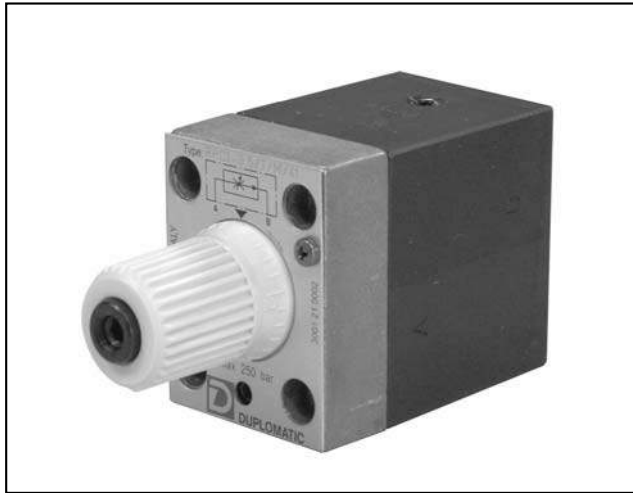
Valve	A BSP	B	C	∅ D	E max	∅ F
RSN2	1/4Ž	12,5	66	20	78	50
RSN3	3/8Ž	12,5	79	25	93	70
RSN4	1/2Ž	15,5	94,5	30	107	80
RSN5	3/4Ž	17	115	40	132,5	100
RSN6	1Ž	20	138,5	50	167,5	120
RSN7	1¼Ž	22	157	55	172,5	120
RSN8	1½Ž	24	190	65	181	120

4 - OVERALL AND MOUNTING DIMENSIONS RSN*-I

dimensions in mm

*•BONDED SEALŽ seal excluded from the supply

Valve	∅F	G max	H	L 6H	∅M + 0.2 0	N	P min	R ± 0.2	S + 0.2 0	∅T H8	∅U max	V ± 0.2	Z min	CH	OR type	BK type	BS* type
RSN2-I	50	49	30.5	M20x1.5	27	1	12	20	1.2	16	8	15.2	32	27	2050	2050	400-513
RSN3-I	70	56	40	M27x2	33	1.3	18	28	1.2	19	10	22	41	32	2062	2062	400-520
RSN4-I	80	70	44.5	M33x2	40	1.3	18	30.5	1.2	27	12	23	45.5	41	130	130	400-515
RSN5-I	100	80	52.5	M42x2	50	1.3	21.5	36.5	1.5	35	16	28.5	55	50	3118	3118	400-516



RPC1

PRESSURE AND TEMPERATURE COMPENSATED FLOW CONTROL VALVE

SERIES 41

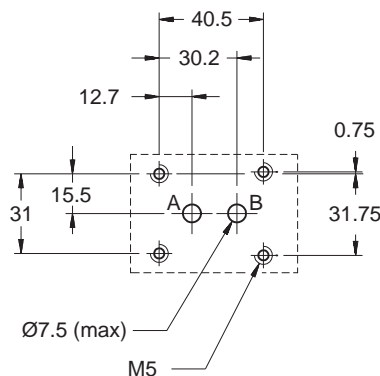
SUBPLATE MOUNTING
ISO 6263-03 (CETOP 03)

p max **250** bar

Q max (see table of performances)

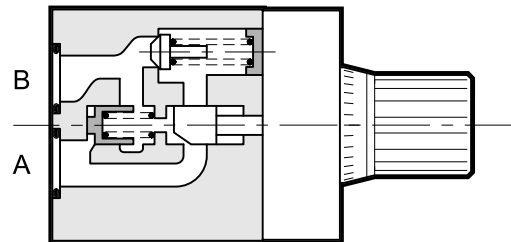
MOUNTING INTERFACE

ISO 6263-03-03-*
(CETOP 4.5.2-2-03-250)



NOTE: The RPCED1 mounting interface, with CETOP 03 holes, must not have P and T ports or must have the 0113388 subplate (see paragraph 9)

OPERATING PRINCIPLE

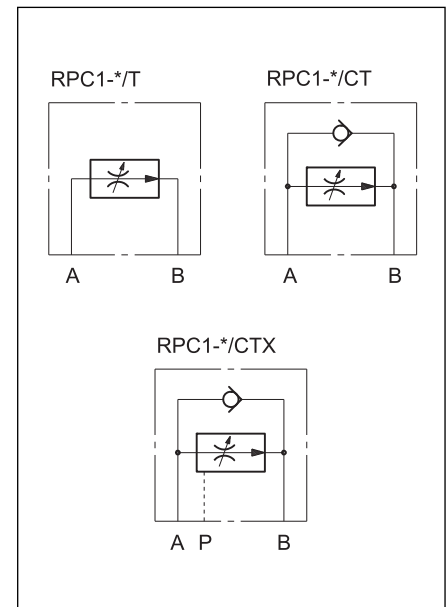


- „ The RPC1 valve is a pressure and temperature compensated flow control valve.
- „ The flow is adjusted by a calibrated knob that modulates the opening of the control gap and can be locked in any adjustment position. Adjustment is made with three turns, and upon request one-turn adjustment, RPC1*/M, is available.
- „ It is available in seven different flow rate adjustment ranges from 0,5 l/min up to 30 l/min.

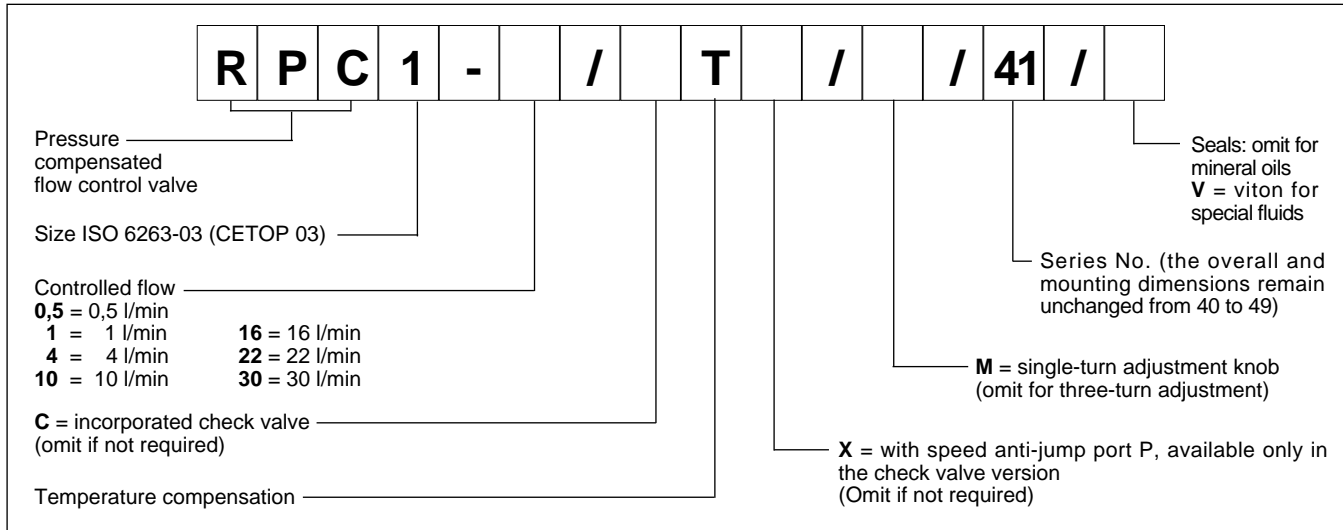
PERFORMANCE RATINGS (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure		250
Minimum pressure difference between A and B	bar	10
Check valve cracking pressure		0,5
Maximum controlled flow rates		0,5-1-4-10-16-22-30
Minimum controlled flow rate (for 0,5-1 and 4 l/min)	l/min	0,025
Maximum flow rate in free flow direction		40
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 20/18/15	
Fluid contamination degree for flows < 0,5 l/min	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	1,3
Number of adjustment knob turns	RPC1 RPC1-*/M	3 1

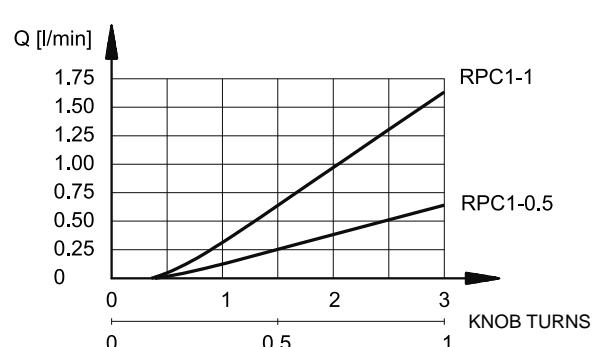
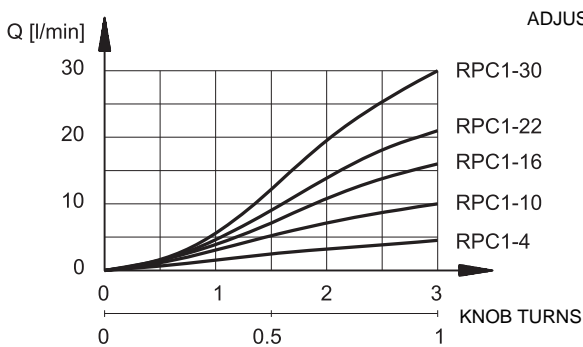
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



3 - 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.

4 - PRESSURE COMPENSATION

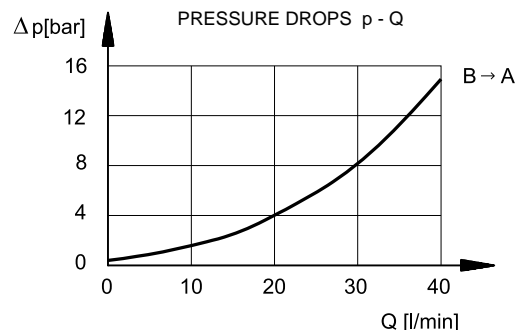
Two throttles in series are in the valve. The first is an opening regulated by the knob; the second, piloted by the pressure upstream and downstream of the first throttle, assures a constant pressure drop across the adjustable throttle. In these conditions, the set flow rate value stays constant within a tolerance range of $\pm 2\%$ of the maximum flow controlled by the valve for maximum pressure variation between the intake and outlet chambers of the valve.

5 - TEMPERATURE COMPENSATION

The valve temperature compensation is obtained with the principle of fluid passage across a thin wall orifice in which the flow rate is not substantially influenced by the oil viscosity fluctuations. For controlled flows of less than 0,5 l/min and with a temperature difference of 50 °C, flow is increased by about 13% of the set flow value. For higher flow rates, and with the same temperature difference, the flow increase is about 4% of the maximum flow controlled by the valve.

6 - REVERSE FREE FLOW

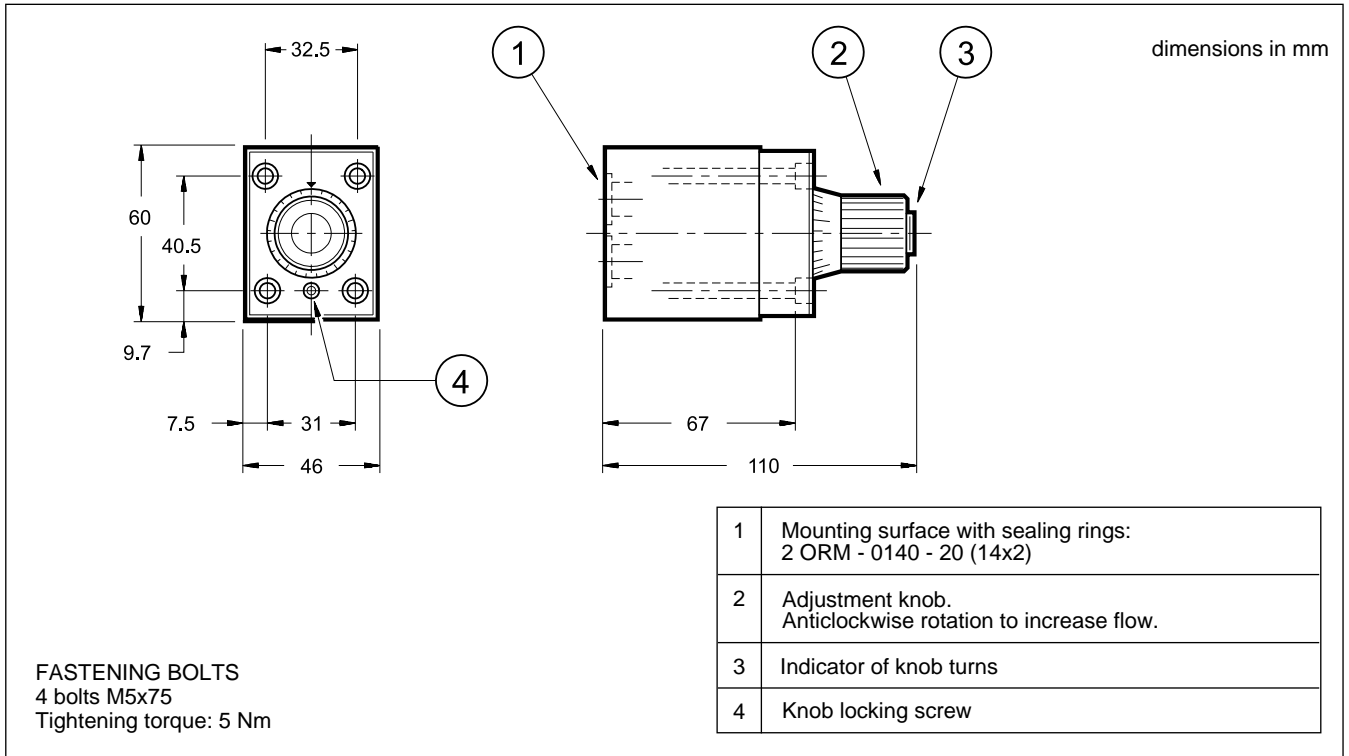
The RPC1 valve, upon request, is supplied with an incorporated check valve to allow free flow in the direction opposite to the controlled flow, B A. In this case the valve code becomes RPC1-*/CT.



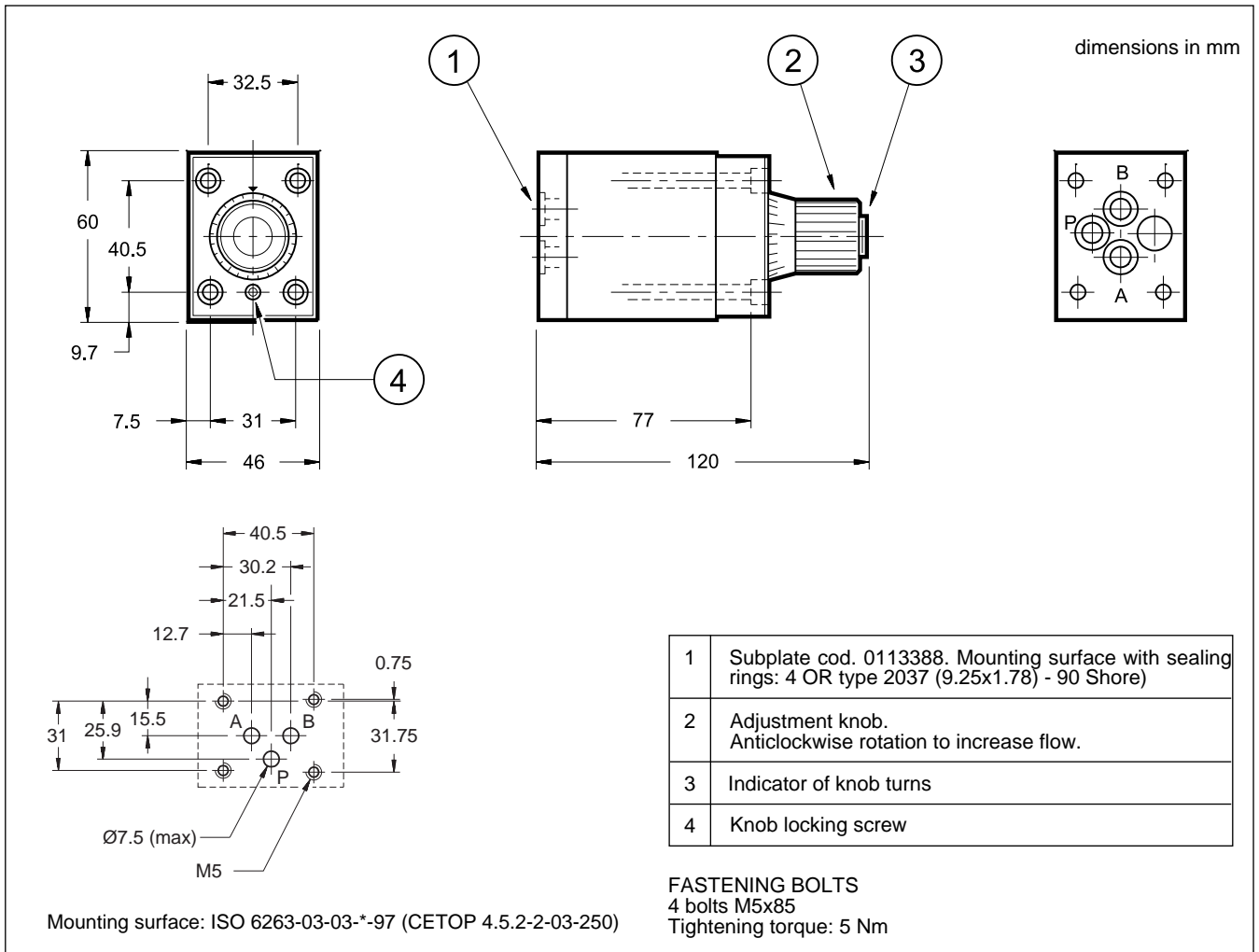
7 - RPC1-*/CTX

This valve is normally used for intake control and is positioned downstream of the directional valve. The piloting connection •PŽ keeps the compensator in the closed position, thus avoiding the initial speed jump that occurs at the time the distributor sends oil to the valve (see the application diagram, paragraph 11).

8 - RPC1-* OVERALL AND MOUNTING DIMENSIONS



9 - RPC1-*/CTX OVERALL AND MOUNTING DIMENSIONS

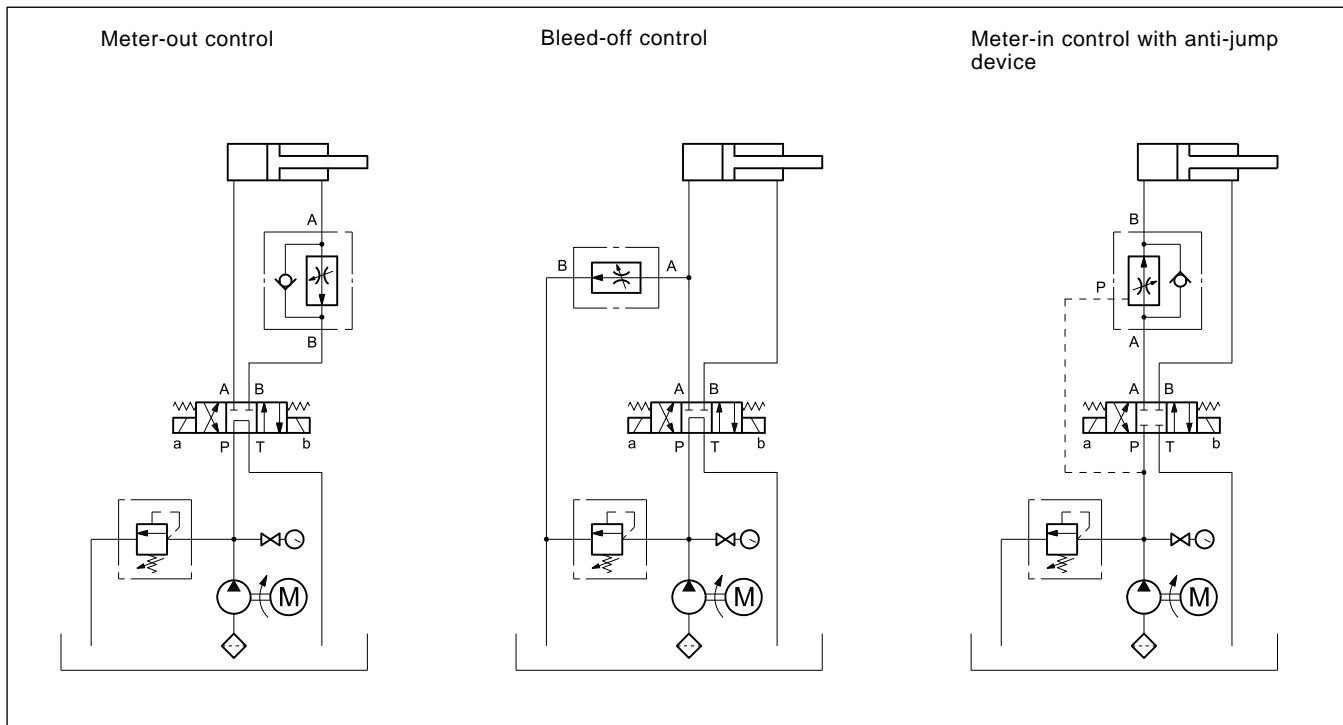




10 - SUBPLATES (look at datasheet 51 000)

Type	PMRPC1-AI3G with rear ports PMRPC1-AL3G with side ports	
Type	PMMD-AI3G with rear ports, with user T plugged PMMD-AL3G with side ports, with user T plugged	only for valve RPC1-*/CTX
Port dimension	3/8" BSP	

11 - APPLICATION EXAMPLES



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www.diplomatic.com • e-mail: sales.exp@diplomatic.com



RPC1-T3

PRESSURE AND TEMPERATURE COMPENSATED THREE-WAY FLOW CONTROL VALVE

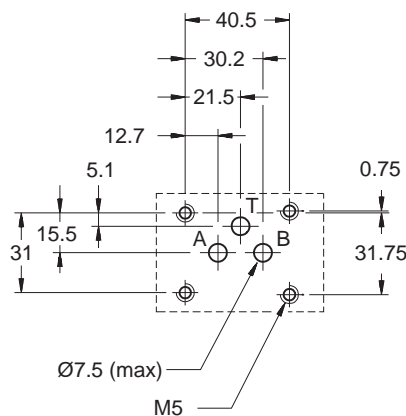
SERIES 41

SUBPLATE MOUNTING
ISO 6263-03 (CETOP 03)

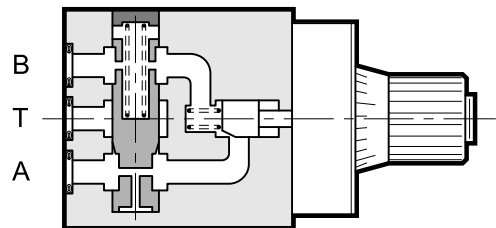
p max **250** bar
Q max (see table of performances)

MOUNTING INTERFACE

ISO 6263-03-03-*97
(CETOP 4.5.2-3-03-250)



OPERATING PRINCIPLE

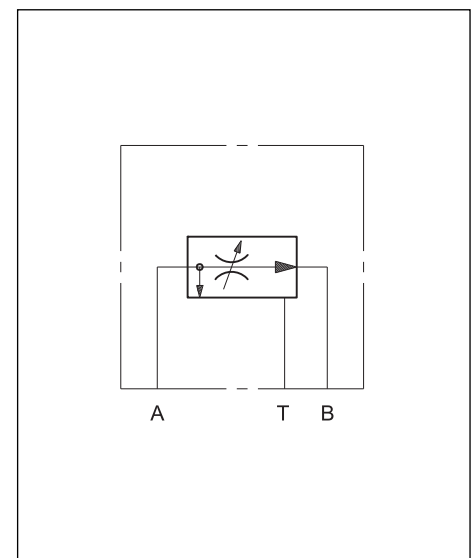


- „ The pressure and temperature compensated three-way flow control valves serve to control the flow sent to the actuator and to discharge it, which exceeds that required, back to tank at system pressure rather than at relief value pressure.
- „ The flow rate adjustment range is carried out with three turns of the knob and an indicator shows the number of turns made. A one-turn adjustment on the knob, RPC1*/M, is available upon request.
- „ The adjustment knob can be locked in any position in the adjustment range by a screw.

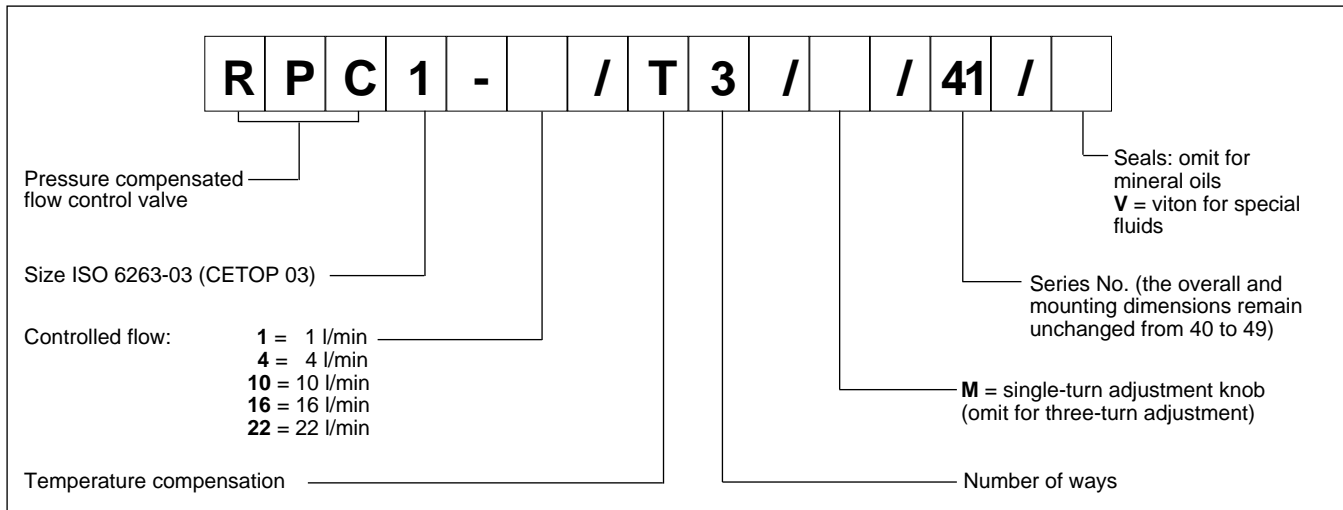
PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	250
Minimum pressure difference between A and B		12
Maximum controlled flow rates	l/min	1-4-10-16-22
Minimum controlled flow rate (for 1 and 4 l/min)		0,035
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 20/18/15	
Fluid contamination degree for flows < 0,5 l/min	According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25
Mass	kg	1,5
Number of adjustment knob turns	RPC1/T3	3
	RPC1-/T3/M	1

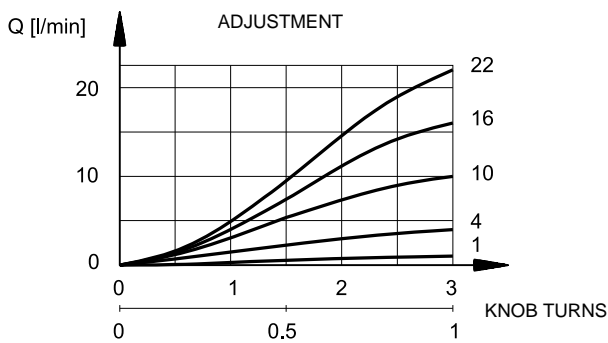
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



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



3 - 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.

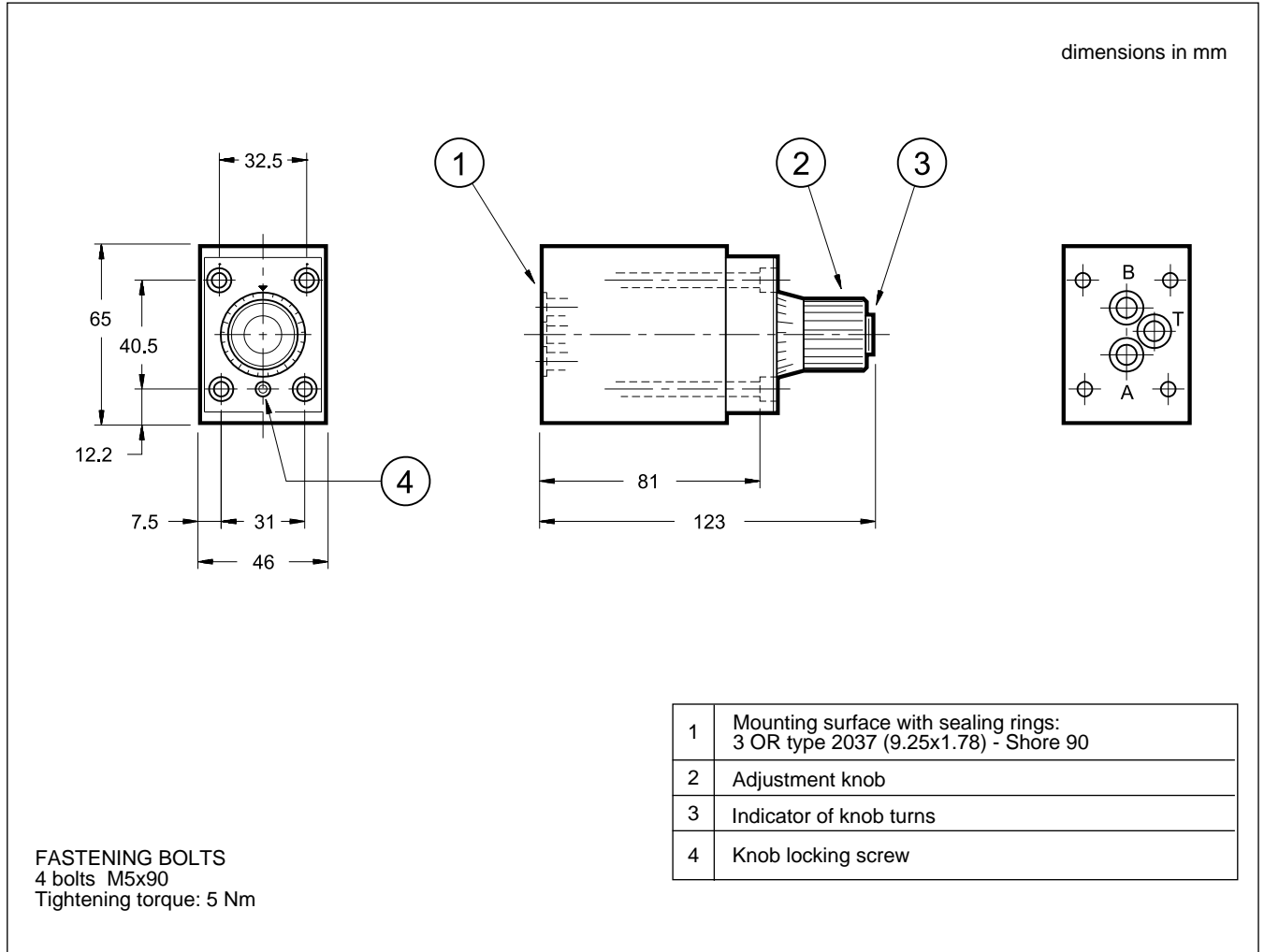
4 - PRESSURE COMPENSATION

Two throttles in series are in the valve. The first is an opening regulated by the knob; the second, piloted by the pressure upstream and downstream of the first throttle, assures a constant pressure drop across the adjustable throttle. In these conditions, the set flow rate value stays constant within a tolerance range of $\pm 2\%$ of the maximum flow controlled by the valve for maximum pressure variation between the intake and outlet chambers of the valve.

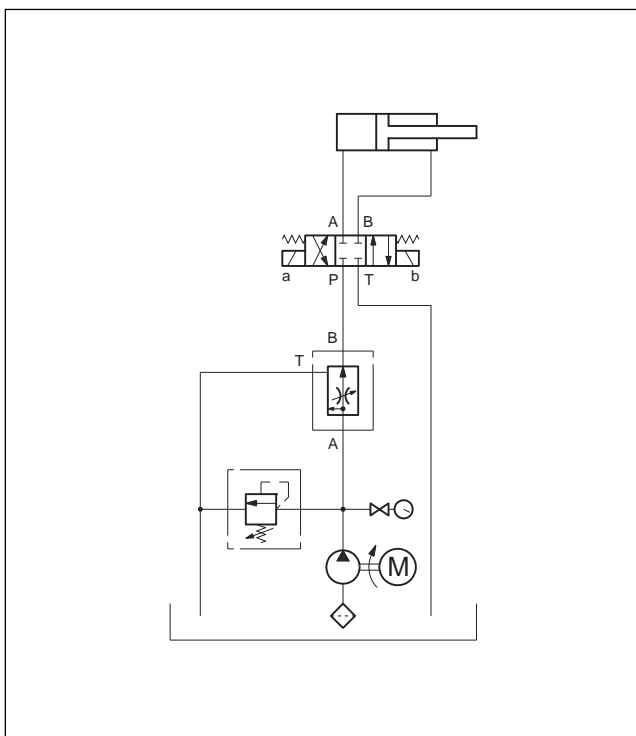
5 - TEMPERATURE COMPENSATION

The valve temperature compensation is obtained with the principle of fluid passage across a thin wall orifice in which the flow rate is not substantially influenced by the oil viscosity fluctuations. For controlled flows of less than 0,5 l/min and with a temperature difference of 50 °C, flow is increased by about 13% of the set flow value. For higher flow rates, and with the same temperature difference, the flow increase is about 4% of the maximum flow controlled by the valve.

6 - OVERALL AND MOUNTING DIMENSIONS



7 - APPLICATION EXAMPLE



8 - SUBPLATES (see datasheet 51 000)

Type	PMMD-AI3G with rear ports with user P plugged
Type	PMMD-AL3G with side ports with user P plugged
Port dimension	3/8" BSP



RPC1-T3

SERIES 41



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RPC*

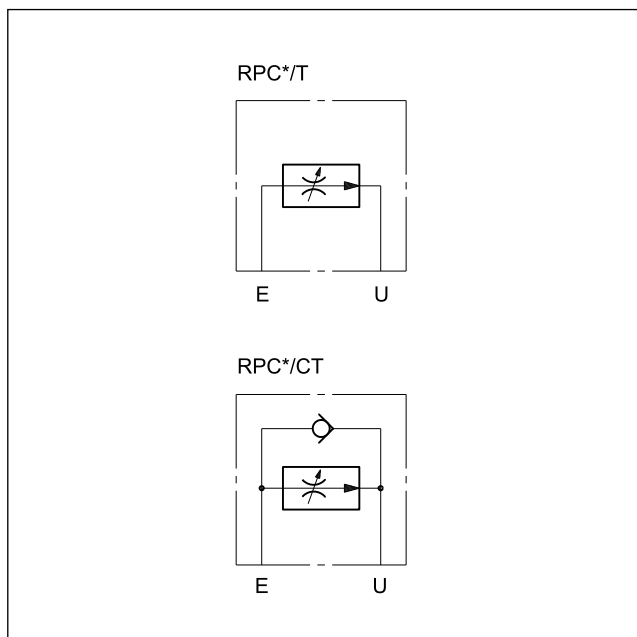
PRESSURE AND TEMPERATURE COMPENSATED FLOW CONTROL VALVES

SUBPLATE MOUNTING

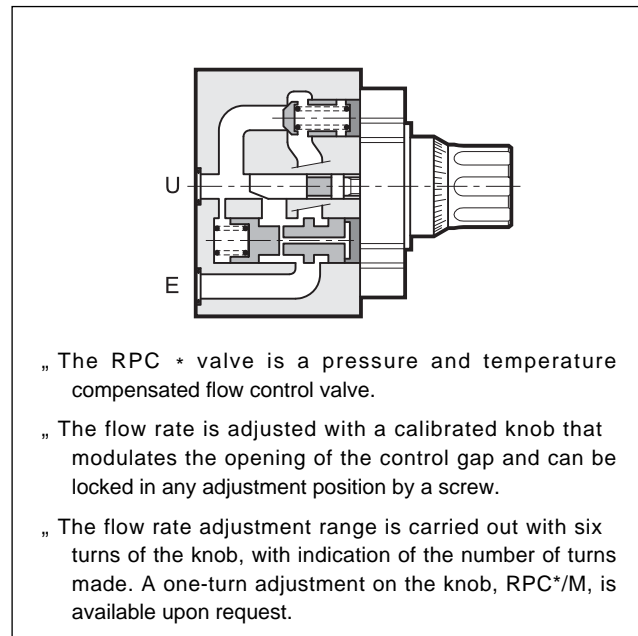
RPC2 **ISO 6263-06 (CETOP 06)**

RPC3 **ISO 6263-07 (CETOP 07)**

HYDRAULIC SYMBOL

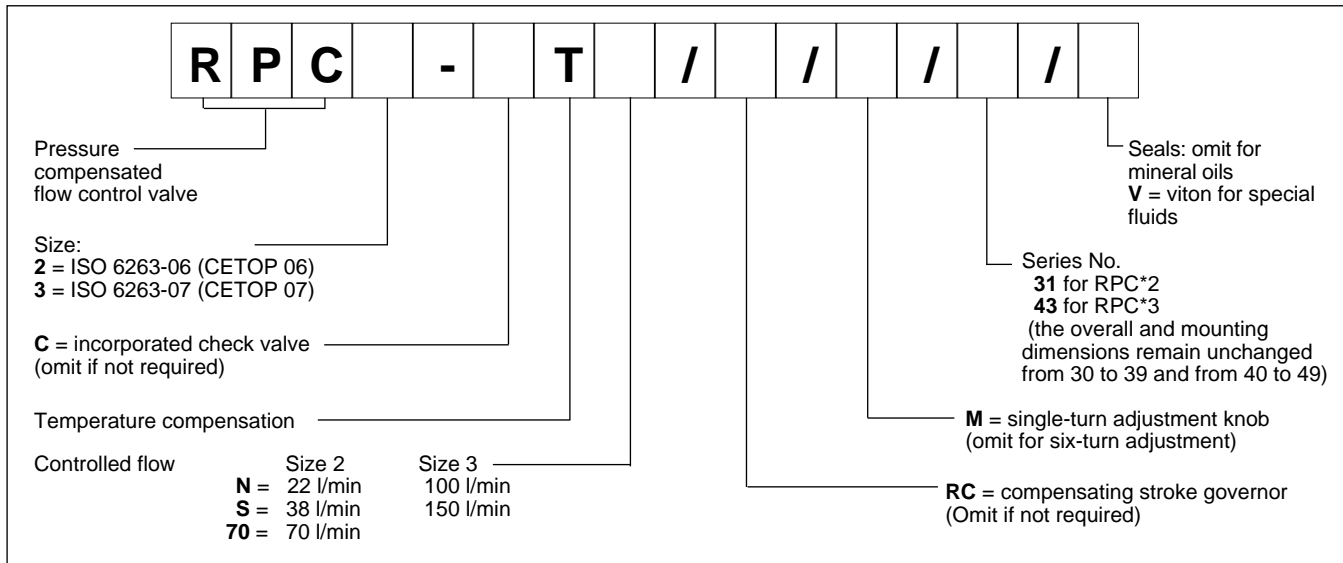


OPERATING PRINCIPLE

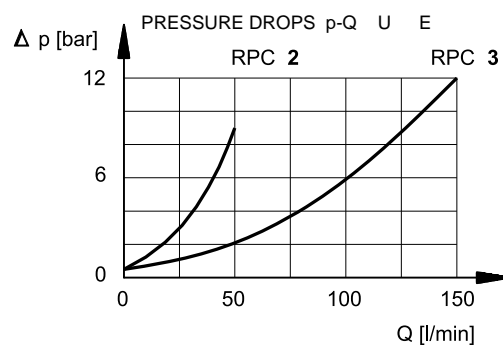
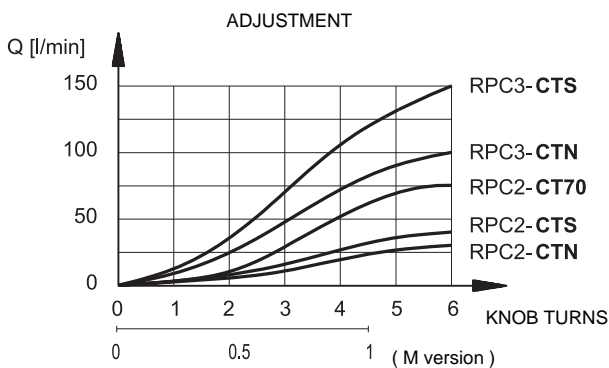


PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)		RPC2	RPC3
Maximum operating pressure	bar	320	250
Check valve cracking pressure		0,5	0,5
Minimum pressure difference between E and U		10	12
Maximum controlled flow rates	l/min	22 - 38 -70	100 - 150
Minimum controlled flow rate		0,050	0,120
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 20/18/15	
Recommended viscosity	cSt	25	
Mass	kg	3,6	7,8

1 - IDENTIFICATION CODE



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



3 - 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.

4 - PRESSURE COMPENSATION

Two throttles in series are in the valve. The first is an opening regulated by the knob; the second, piloted by the pressure upstream and downstream of the first throttle, assures a constant pressure drop across the adjustable throttle. In these conditions, the set flow rate value stays constant within a tolerance range of $\pm 3\%$ of the maximum flow controlled by the valve for the maximum pressure variation between inlet and outlet chambers of the valve.

5 - TEMPERATURE COMPENSATION

A device located on the first throttle which is sensitive to the temperature fluctuations corrects the position keeping the controlled flow more or less unaltered even should the oil viscosity change.

The fluctuation of the set flow rate stays within $\pm 2,5\%$ of the maximum flow controlled by the valve.

6 - REVERSE FREE FLOW

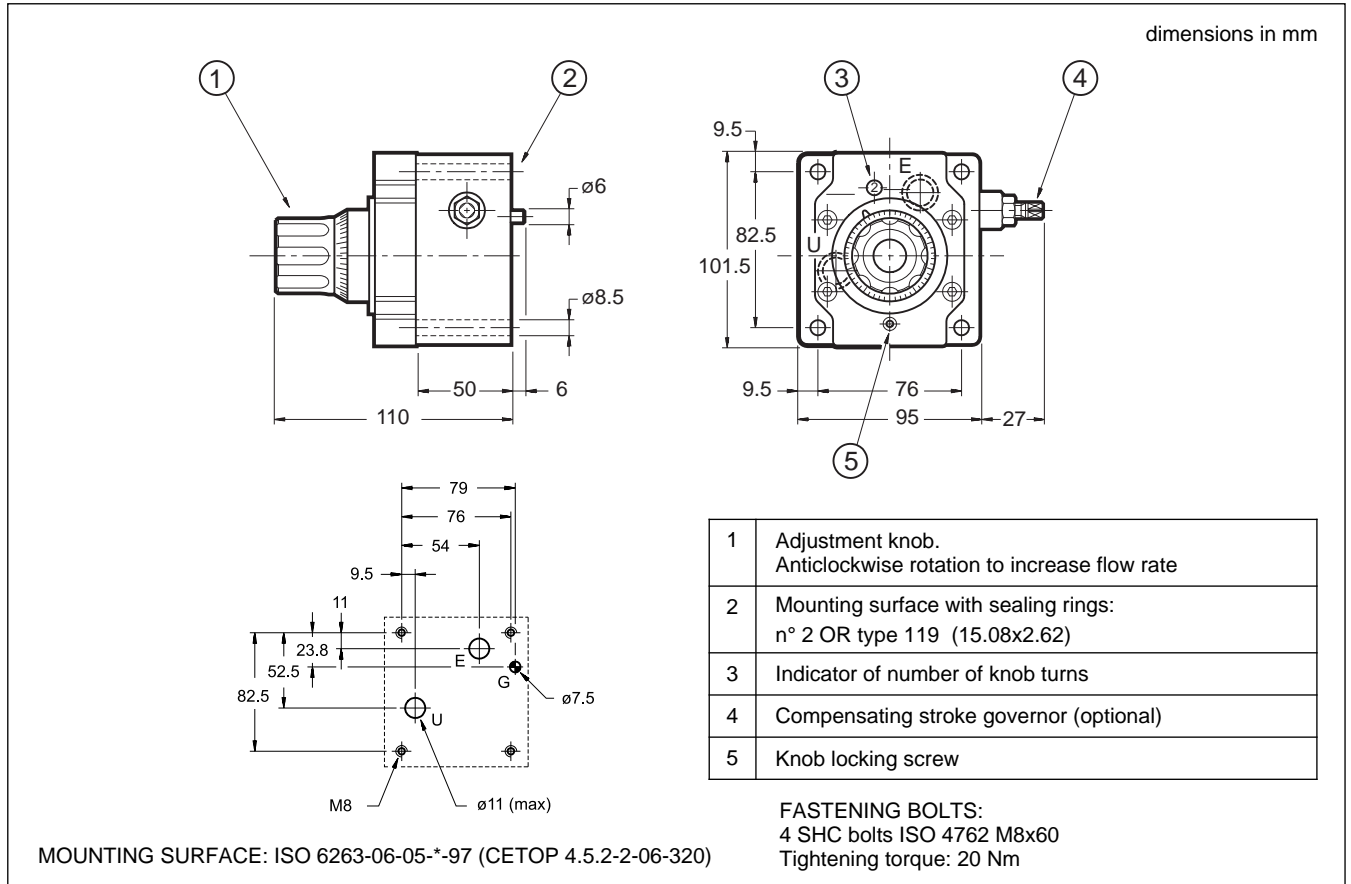
The RPC* valves, upon request, are supplied with an incorporated check valve to allow free flow in the direction opposite of the controlled flow. In this case the valve code becomes RPC*-CT.

7 - COMPENSATING STROKE GOVERNOR

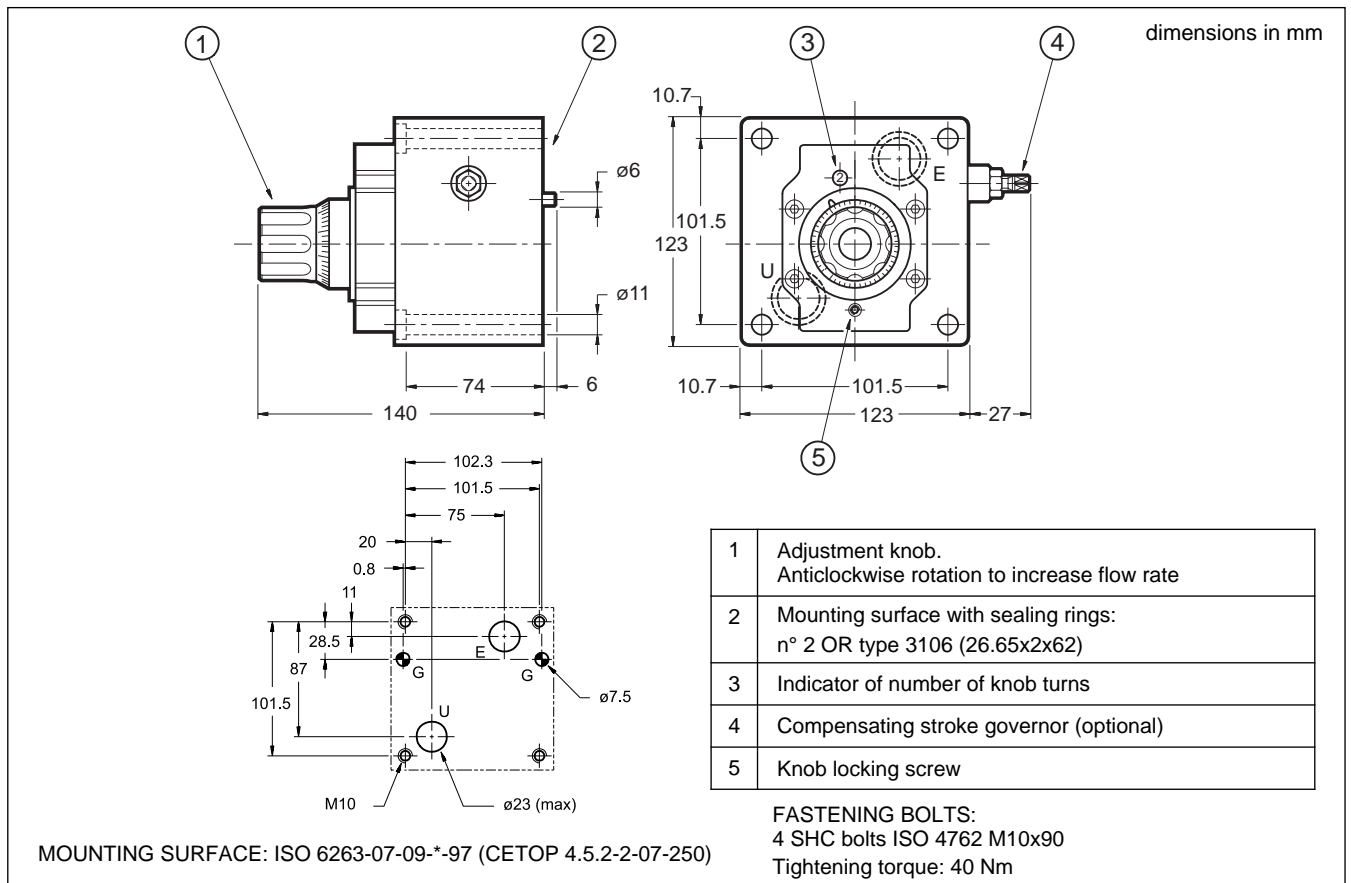
In order to avoid jumps in the actuator when it is started, the RPC valve can be equipped with a special accessory that controls the compensating stroke, thus preventing it from making uncontrolled movements.

Add the suffix **RC** to the identification code to request this governor. See paragraph 1.

8 - RPC2 SERIES 31 OVERALL AND MOUNTING DIMENSIONS



9 - RPC3 SERIES 43 OVERALL AND MOUNTING DIMENSIONS





10 - SUBPLATES (see catalogue 51 000)

	RPC2	RPC3
Type	PMRPC2-AI4G rear ports	PMRPC3-AI6G rear ports
Port dimensions	1/2Ž BSP	1Ž BSP



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RPC*-T3

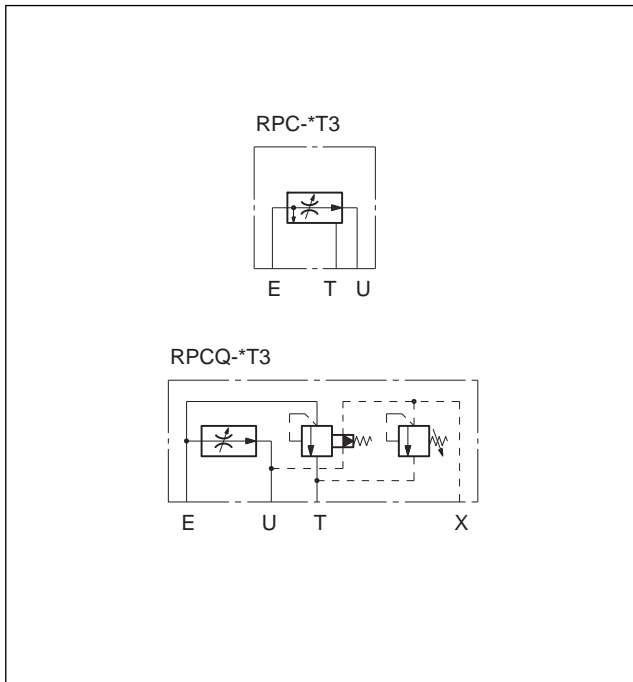
PRESSURE AND TEMPERATURE COMPENSATED THREE-WAY FLOW CONTROL VALVES

SUBPLATE MOUNTING

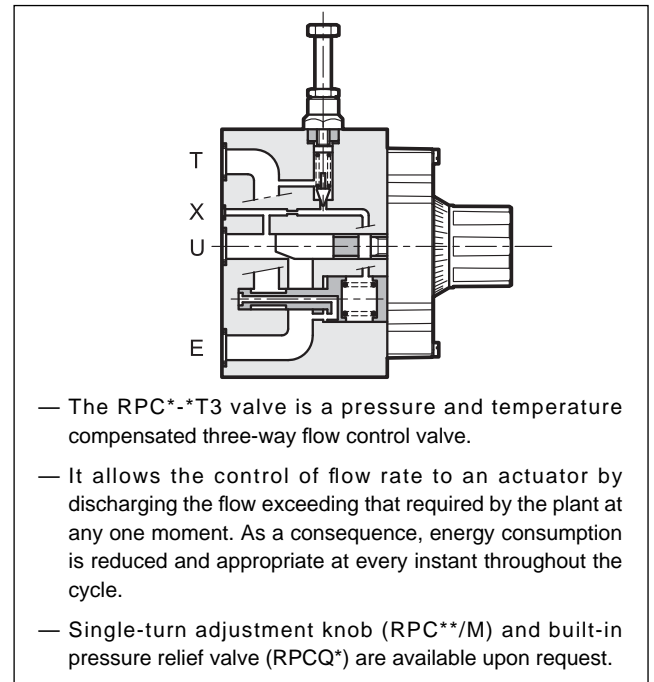
RPC-2T3 ISO 6263-06 (CETOP 06)

RPC-3T3 ISO 6263-07 (CETOP 07)

HYDRAULIC SYMBOLS



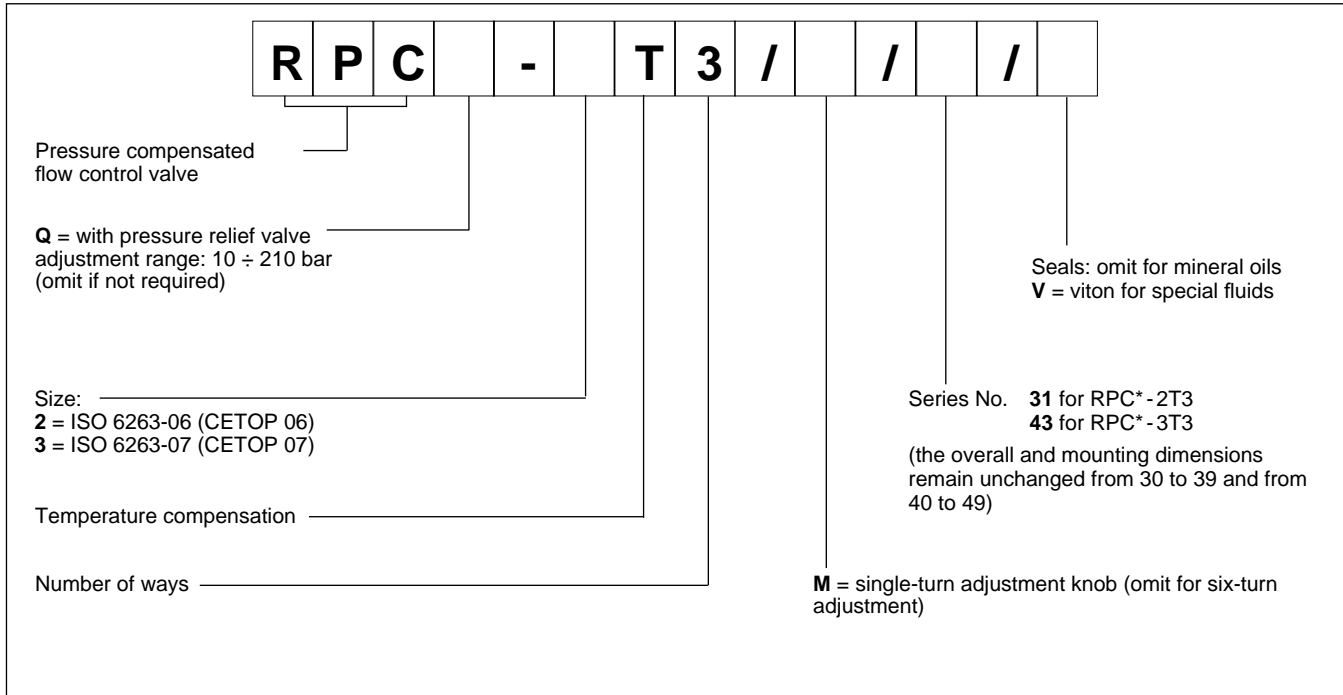
OPERATING PRINCIPLE



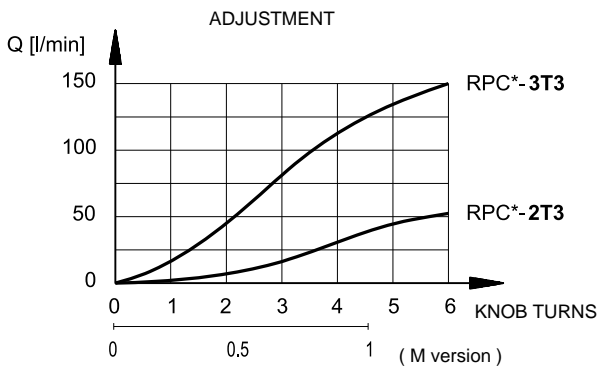
PERFORMANCE RATINGS (obtained with mineral oil with viscosity of 36 cSt at 50°C)

		RPC*-2T3	RPC*-3T3
Maximum operating pressure	bar	320	250
Minimum pressure difference between E and U		10	12
Maximum controlled flow rate	l/min	50	150
Minimum controlled flow rate		0,060	0,130
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 20/18/15	
Fluid contamination degree for flow rate <0,5 l/min		According to ISO 4406:1999 class 18/16/13	
Recommended viscosity	cSt	25	
Mass	kg	4,7	9

1 - IDENTIFICATION CODE



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



3 - 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.

4 - PRESSURE COMPENSATION

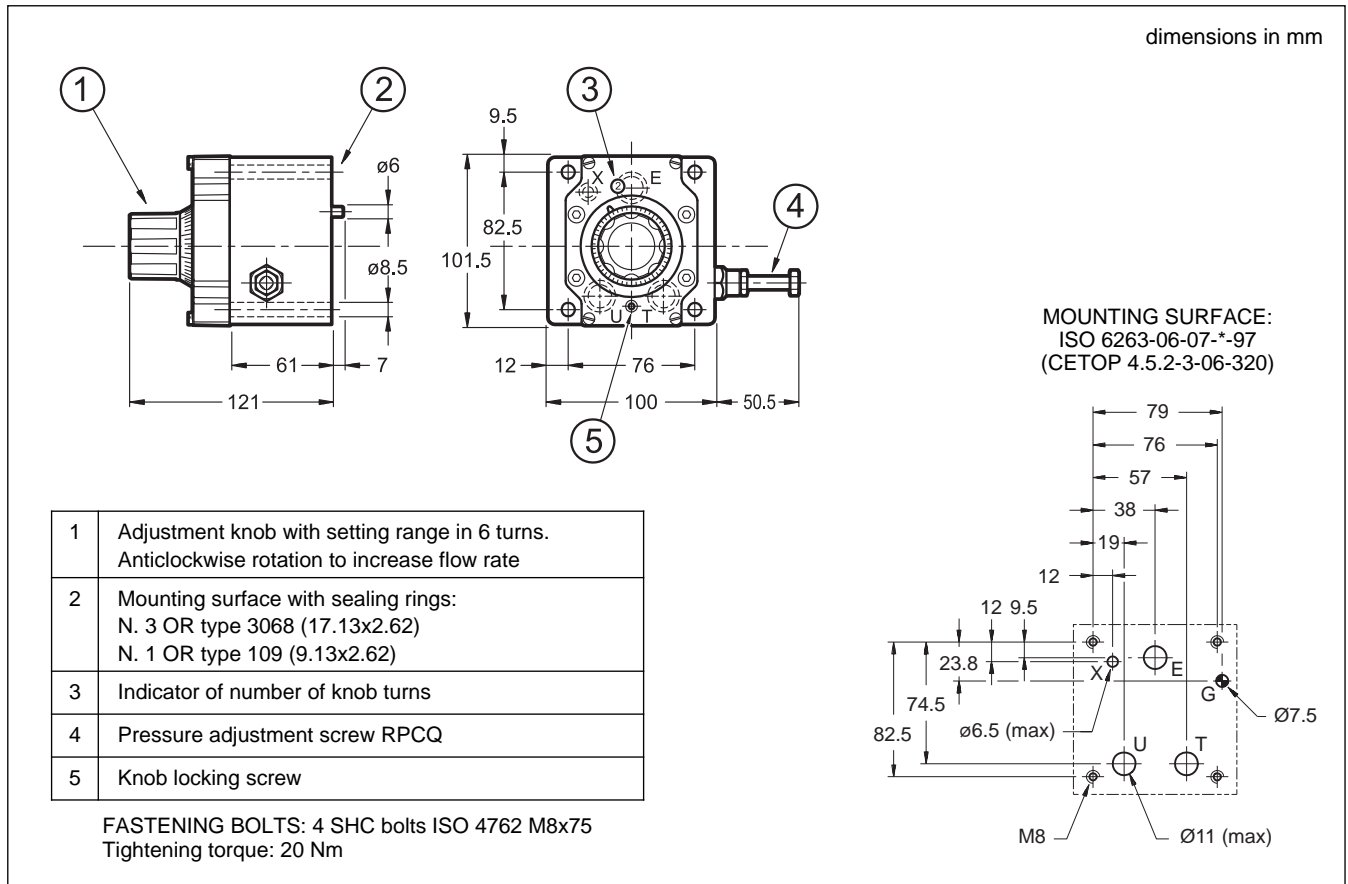
Two throttles in series are in the valve. The first is an opening regulated by the knob; the second, piloted by the pressure upstream and downstream of the first throttle, assures a constant pressure drop across the adjustable throttle. In these conditions, the set flow rate value stays constant within a tolerance range of ±3% of the maximum flow controlled by the valve for maximum pressure variation between the intake and outlet chambers of the valve.

5 - TEMPERATURE COMPENSATION

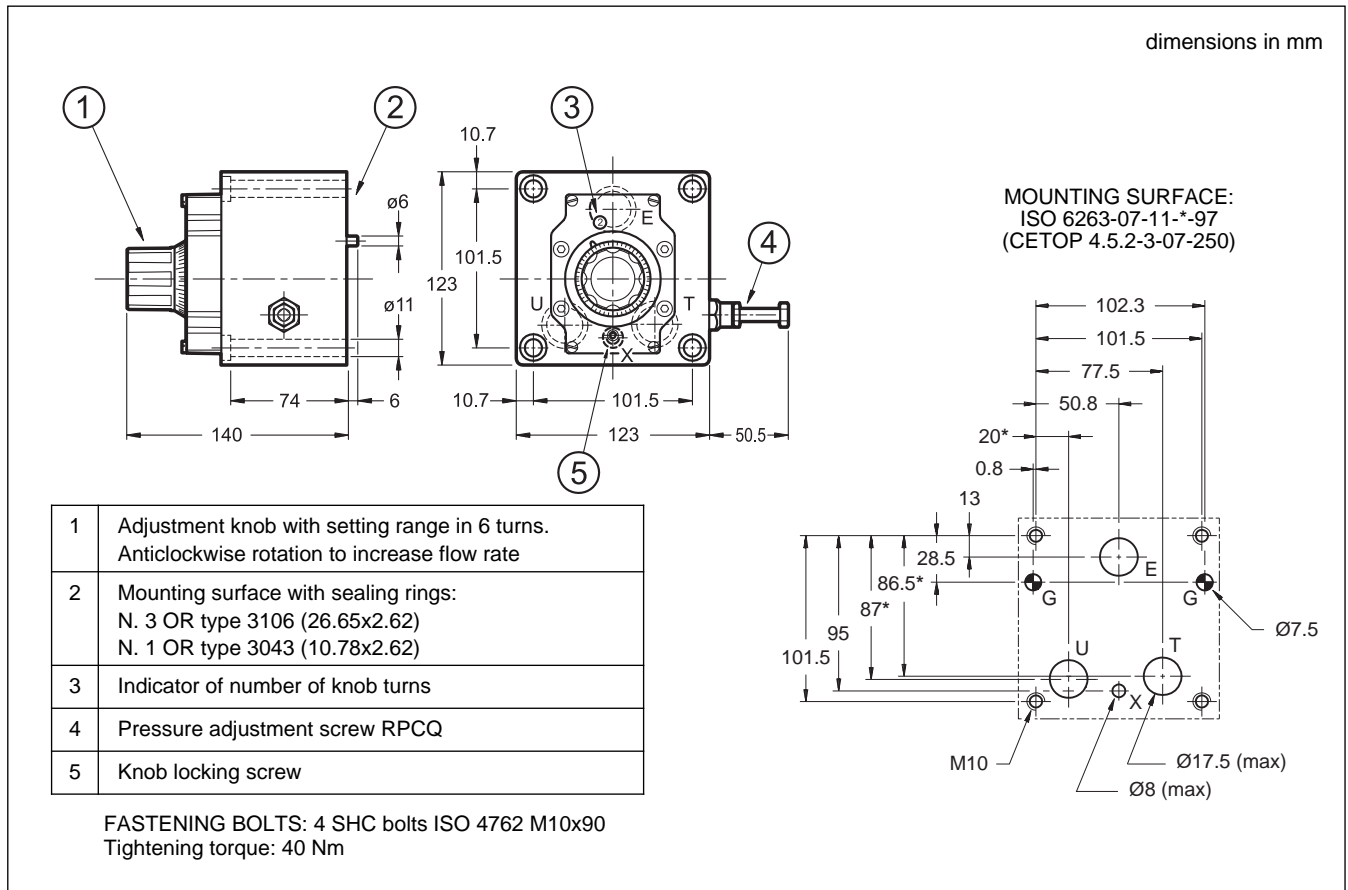
A device located on the first throttle which is sensitive to the temperature fluctuations corrects the position keeping the controlled flow more or less unaltered even should the oil viscosity change.

The fluctuation of the set flow rate stays within ±2,5% of the maximum flow controlled by the valve.

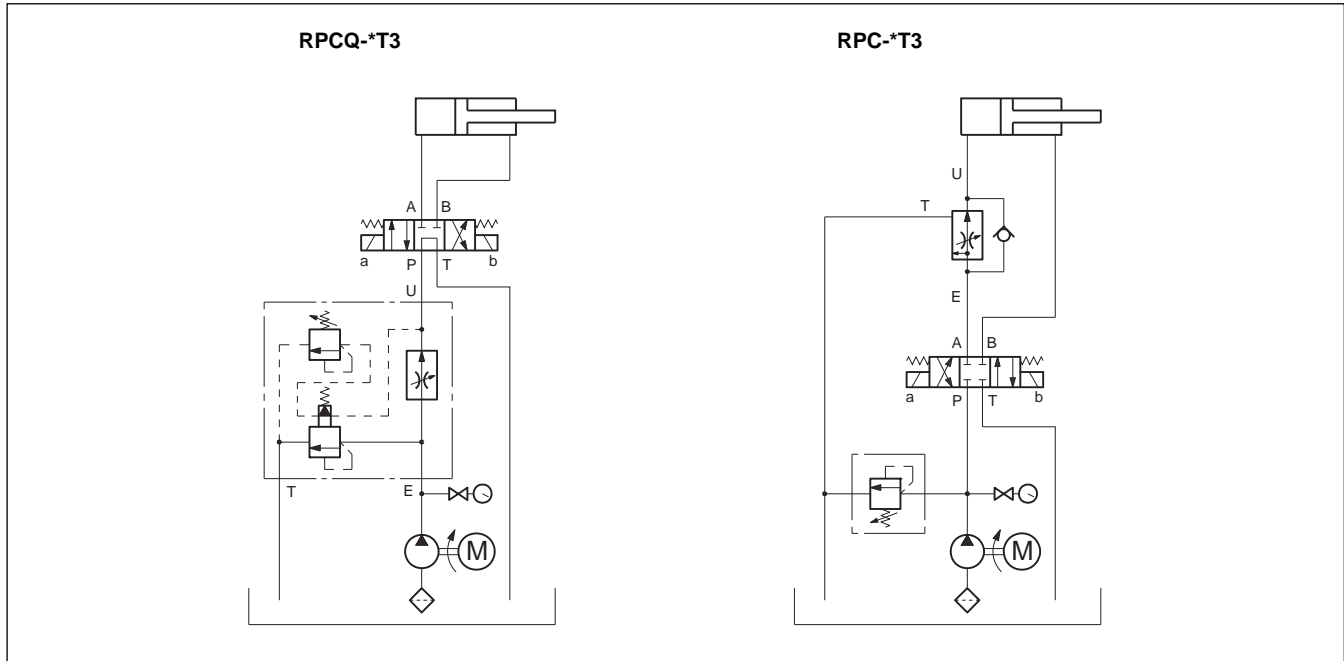
6 - RPC*-2T3 SERIES 31 OVERALL AND MOUNTING DIMENSIONS



7 - RPC*-3T3 SERIES 43 OVERALL AND MOUNTING DIMENSIONS

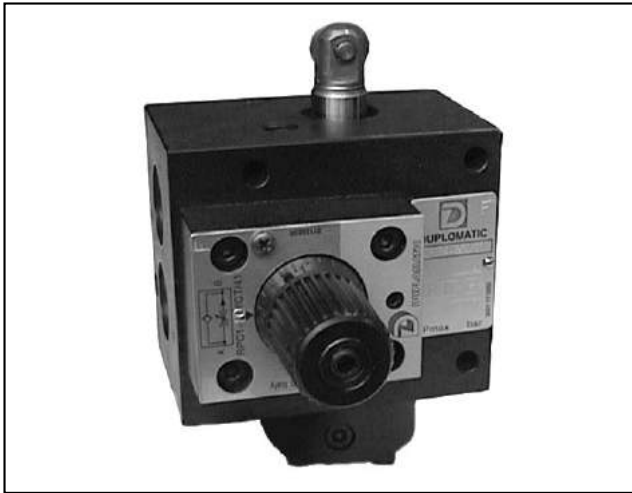


11 - APPLICATION EXAMPLES



12 - SUBPLATES (see catalogue 51 000)

	RPC* - 2T3	RPC* - 3T3
Type	PMRPCQ2-AI4G rear ports	PMRPCQ3-AI6G rear ports
E, U, T port dimensions	1/2" BSP	1" BSP
X port dimensions	1/4" BSP	1/4" BSP



CP1R*-W

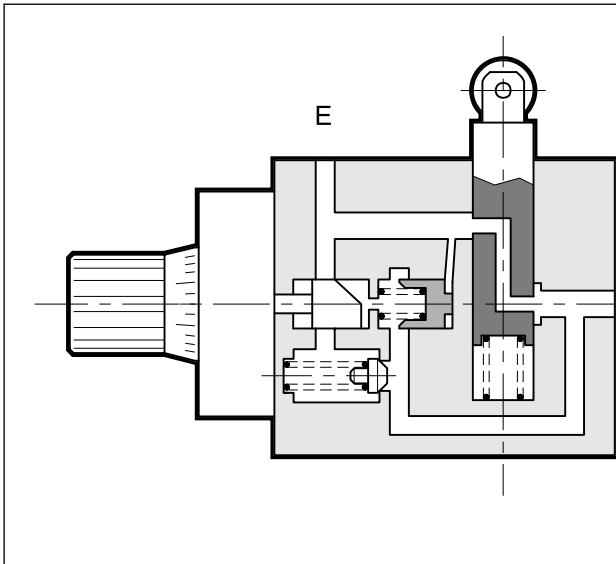
ROLLER OPERATED FAST/SLOW SPEED SELECTION VALVE

SERIES 21

THREADED PORTS

p max 70 bar
Q max 40 l/min

OPERATING PRINCIPLE



- „ The CP1R*-W valve is used for the selection and control of fast/slow speed of hydraulic axis by mechanical roller operation.
- „ The slow working speed adjustment is obtained by using a pressure compensated flow control valve.
The special shape of the control openings allows fine adjustment even with very low flow rates.
- „ Adjustment of the flow rate is carried out with three turns of the knob that can be locked in any position with a screw.
- „ It is available in two configurations:
normally open CP1RA,
normally closed CP1RC.
- „ It is supplied with an incorporated check valve that allows free passage of the reverse flow.

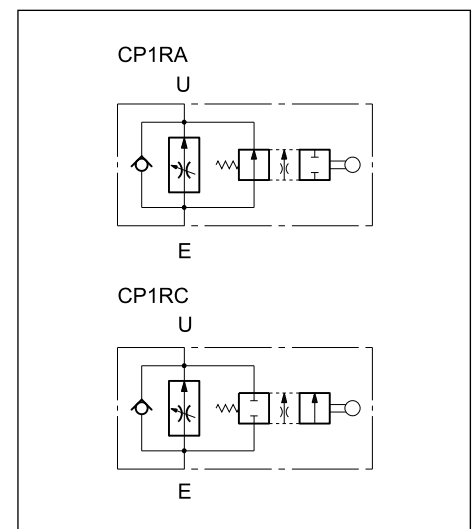
CONFIGURATIONS (see Hydraulic symbols table)

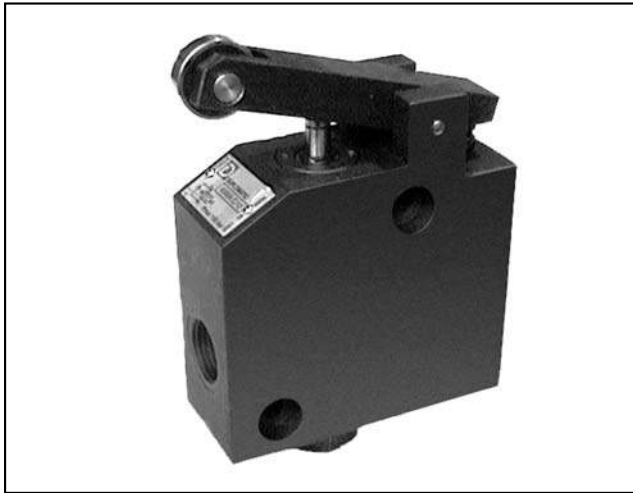
- ... CP1RA-W: normally open - fast movement with roller in rest position and controlled slow movement with roller in operation.
- ... CP1RC-W: normally closed - controlled slow movement with roller in rest position and fast movement with roller in operation.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	70
Fast movement maximum flow rate	l/min	40
Controlled slow movement flow rate	max	l/min 4 - 10 - 16
	min	l/min 0,1
Roller working movement	mm	6
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 20/18/15	
Recommended viscosity	cSt	25
Massa	kg	3,2

HYDRAULIC SYMBOLS





K4WA/C

DECELERATION VALVE

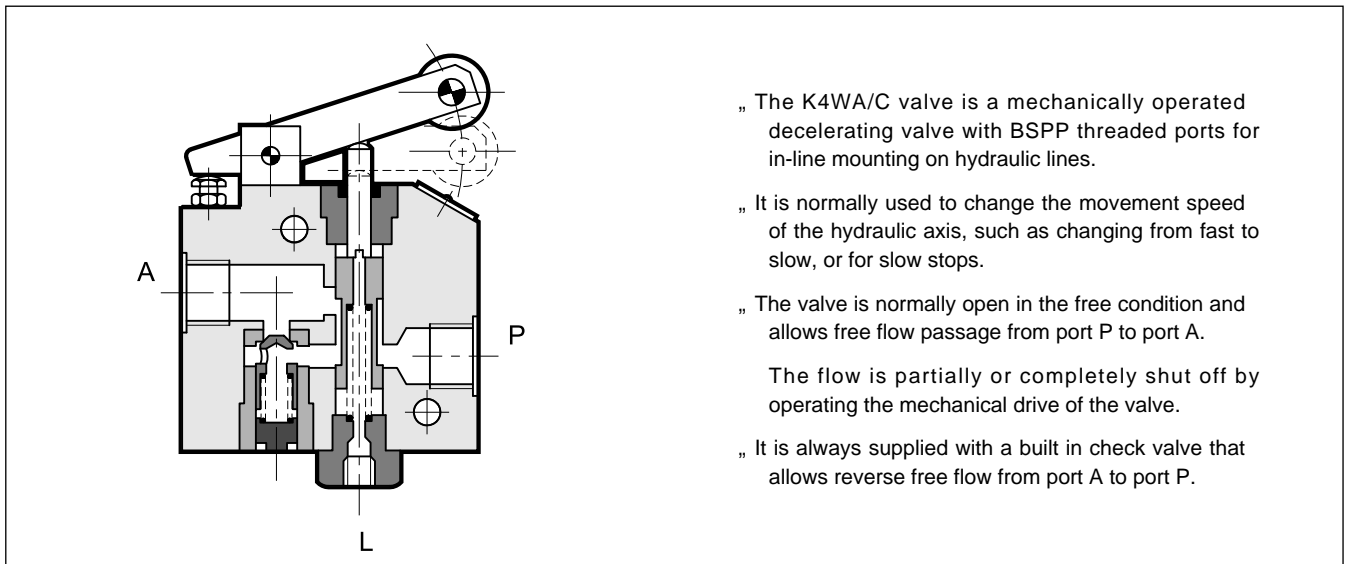
SERIES 10

THREADED PORTS

p max 150 bar

Q max 40 l/min

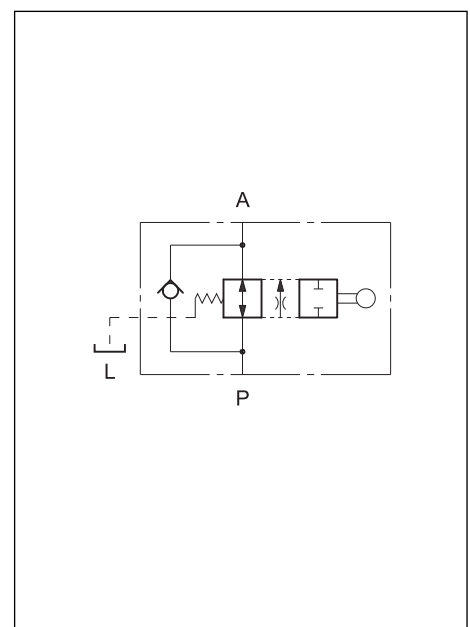
OPERATING PRINCIPLE



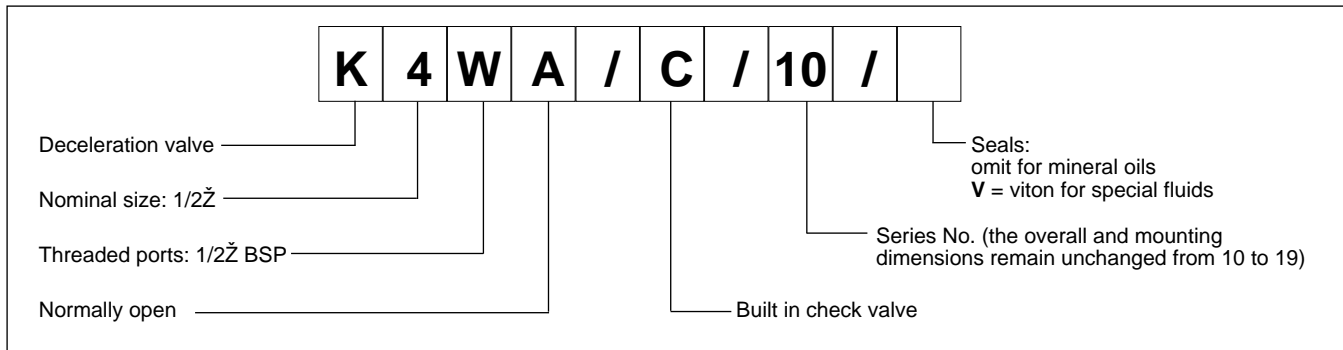
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	150
Cracking pressure of the check valve	bar	0,5
Maximum flow rate	l/min	40
Needed force on the lever to operate:		
- at beginning	Kg	6,8
- at end stroke		12,0
Maximum leakage with closed valve (p 100 bar)	l/min	0,05
Stroke (from all open to completely closed)	mm	20
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	2,5

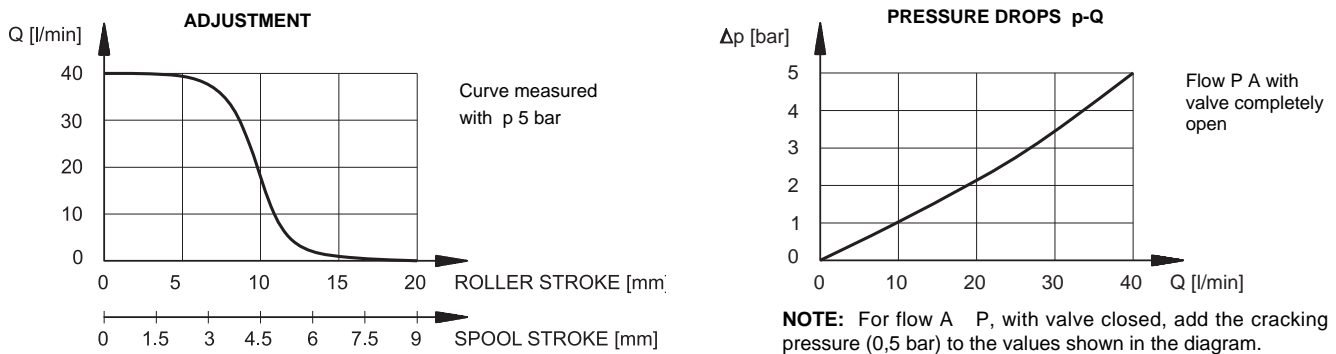
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



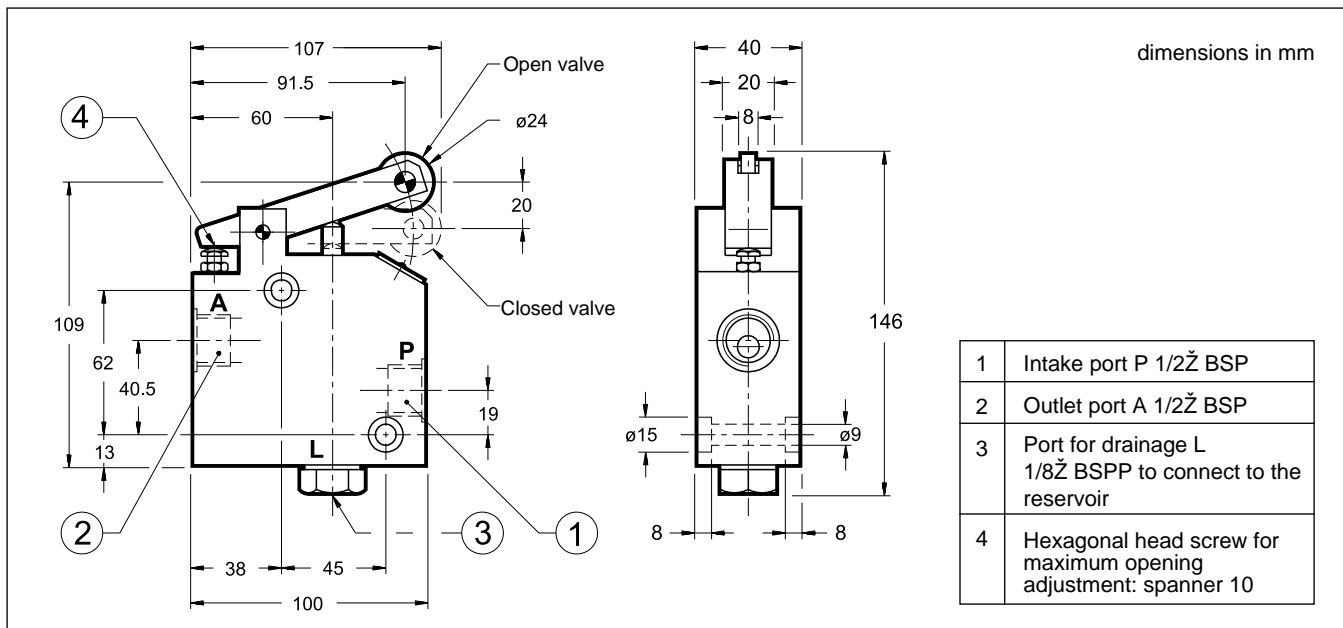
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





DL2

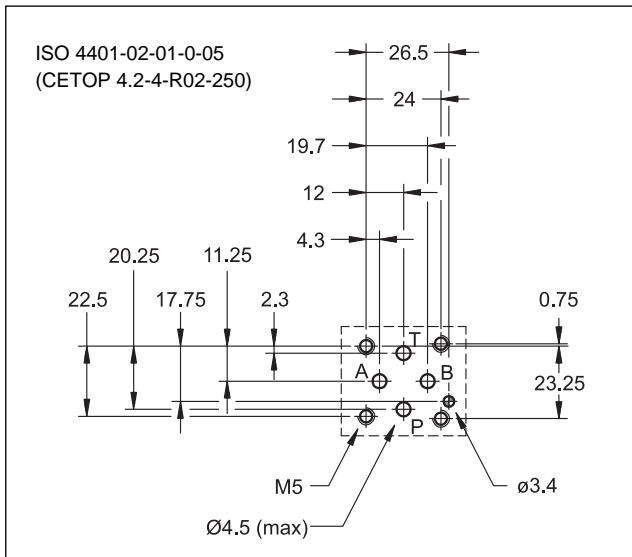
SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION

SERIES 10

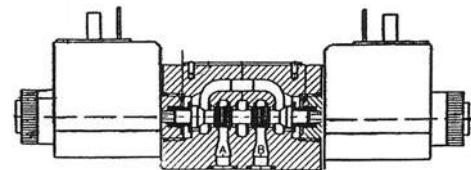
SUBPLATE MOUNTING
ISO 4401-02 (CETOP R02)

p max **250** bar
Q max **20** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



- „ Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401-02 (CETOP RP 121H) standards.
- „ Compact design with reduced solenoid dimensions, suitable for mini-power packs and mobile and agricultural applications.
- „ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see paragraph 7).
- „ The valve is supplied with 4 way designs, with 2 or 3 positions and with several interchangeable spools with different porting arrangements.
- „ The valve is available with DC or rectified current solenoids.

PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure: - ports P - A - B - port T	bar	250 160
Maximum flow rate	l/min	20
Pressure drop p-Q	see paragraph 4	
Operating limits	see paragraph 5	
Electrical features	see paragraph 7	
Electrical connections	DIN 43650	
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 20/18/15	
Recommended viscosity	cSt	25
Masse: single solenoid valve double solenoid valve	kg	0,8 1,1

1 - IDENTIFICATION CODE

D	L	2	-	/	10	-	K1
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Solenoid operated directional control valve

Compact version

ISO 4401-02 (CETOP R02) size

Spool type (see paragraph 2):

S* **TA**
SA* **TB**
SB*

Series no.: _____
 (the overall and mounting dimensions remain unchanged from 10 to 19)

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

Coil electrical connection:
 plug for connector type
 DIN 43650 (**standard**)

Power supply

D12 = 12 V } direct current
D24 = 24 V }

R110 = 110 V } rectified current
R230 = 230 V }

D00 = valve without coils (see **NOTE**)

NOTE: Coils locking ring and related OR are supplied together with valves.

2 - SPOOL TYPE

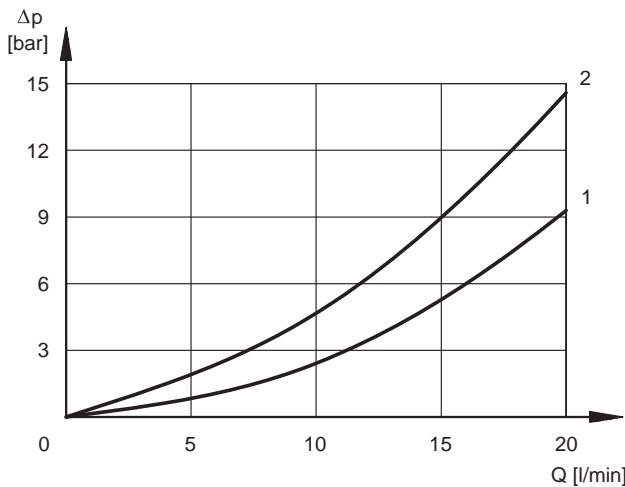
<p>Type S*: 2 solenoids - 3 positions with spring centering</p>	<p>Type SA*: 1 solenoid side A 2 positions (central + external) with spring centering</p>	<p>Type SB*: 1 solenoid side B 2 positions (central + external) with spring centering</p>
<p>Type TA: 1 solenoid side A 2 external positions with return spring</p>	<p>Type TB: 1 solenoid side B 2 external positions with return spring</p>	

3 - 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.

4 - PRESSURE DROPS $p-Q$ (obtained with viscosity of 36 cSt at 50 °C)



ENERGIZED VALVE

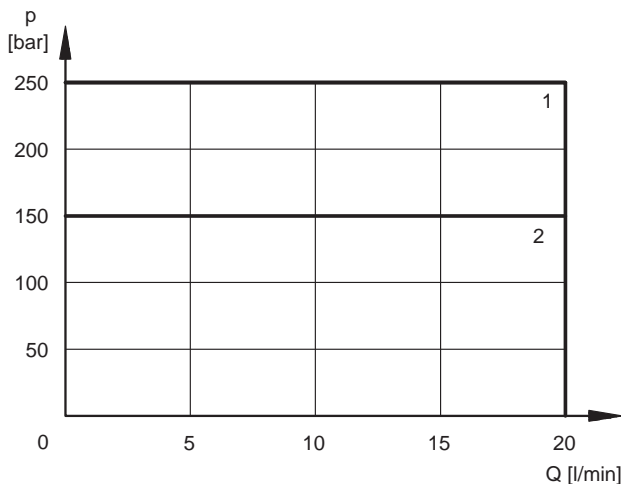
SPOOL	FLOW DIRECTIONS			
	PA	PB	AT	BT
	CURVES ON GRAPHS			
S1, SA1, SB1	1	1	1	1
S2, SA2, SB2	1	1	1	1
S3, SA3, SB3	1	1	1	1
S4, SA4, SB4	2	2	2	2
TA, TB	1	1	1	1

For the pressure drop with a de-energized valve P T of the spools S2 and S4 refer to the curve 1.

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



SPOOL	CURVE
S1, S3, S4, TA, TB	1
S2	2

6 - SWITCHING TIMES

The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

TIMES ($\pm 10\%$) [ms]	
ENERGIZING	DE-ENERGIZING
25 ÷ 75	15 ÷ 25

7 - ELECTRICAL FEATURES

7.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

The interchangeability of coils of different voltages is allowed within the same type of supply current, alternating or direct.

NOTE: In order to further reduce the emissions, with DC supply, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

SUPPLY VOLTAGE FLUCTUATION	+5% -10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95 EC
CLASS OF PROTECTION : Atmospheric agents CEI EN 60529 Coil insulation (VDE 0580) Impregnation:	IP 65* class H class F

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

7.2 - DC valve - Current and power consumption

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law: $V = R \times I$

•R• coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the •DŽ type connector (see cat. 49 000).

The table shows current and power consumption values for DC and rectified current coil types.

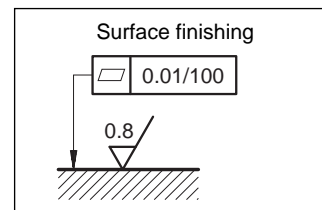
	Nominal voltage [V]	Resistance at 20°C [Ω] (±1%)	Current consumption [A] (±5%)	Power consumption (+5% -10%) [W] [VA]	
D12	12	6.7	2.4	28.8	
D24	24	24	1.2	28.8	
R110	110	350	0.3		29.7
R220	230	1500	0.15		31

8 - INSTALLATION

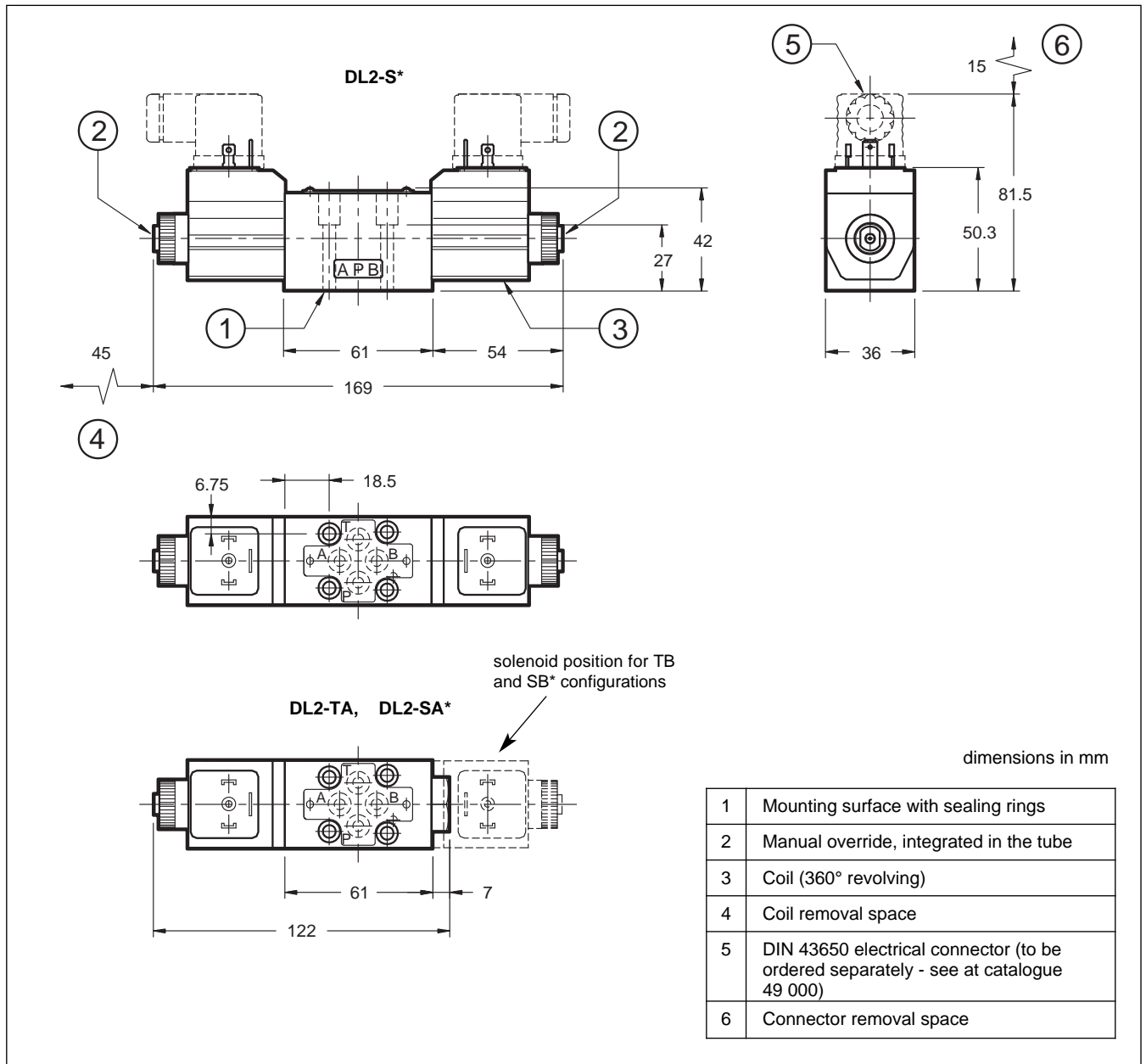
Configurations with centering and return springs can be mounted in any position.

Valve fitting takes place by means of screws or tie rods, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



9 - DL2 OVERALL AND MOUNTING DIMENSIONS



10 - ELECTRIC CONNECTORS

The solenoid valves are not supplied with connector. Connectors must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

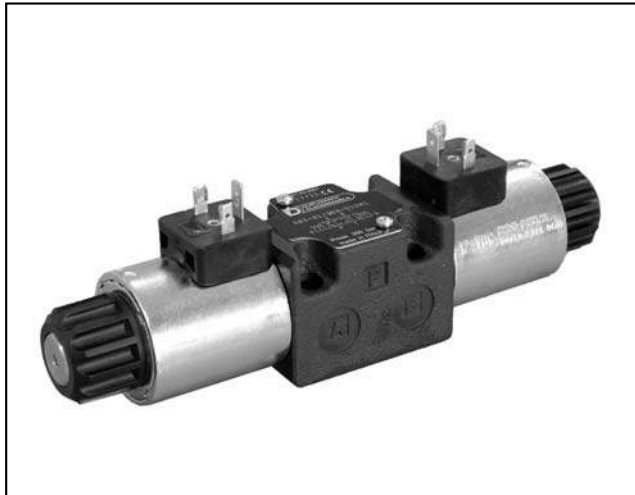
11 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 SHC screws M5x35 - ISO 4762
Tightening torque: 5 Nm (bolts A 8.8)
Threads of mounting holes: M5x10
Sealing rings: N. 4 KANTSEAL type DKAR00011 (7.65x1.68x1.68) - 70 Shore



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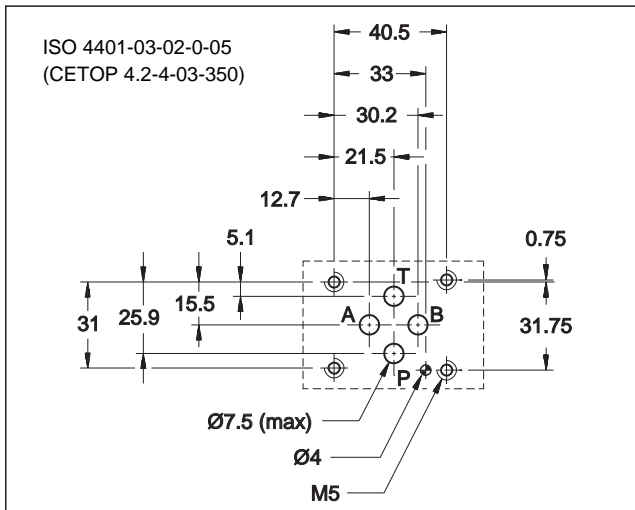
DS3

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

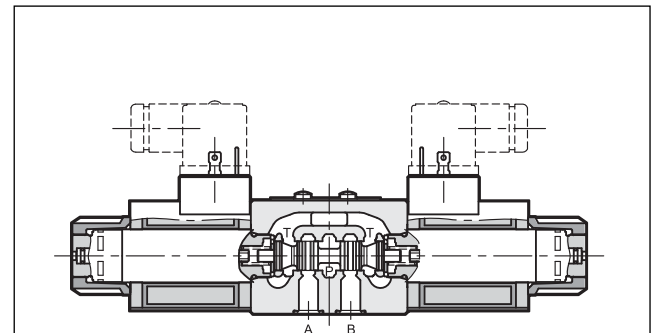
SUBPLATE MOUNTING ISO 4401-03 (CETOP 03)

p max 350 bar
Q max 100 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



„ Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401 (CETOP RP121H) standards.

„ The valve is supplied with 3 or 4 ways designs, with 2 or 3 positions with a wide range of interchangeable spools.

„ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see par. 7).

„ The valve is available with DC or AC solenoids. DC solenoids can also be fed with AC power supply, by using connectors with a built-in rectifier bridge (see paragraphs 6.4 and 7.2).

„ The DC valve is also available in a soft-shifting version (see par. 14).

„ Alternative to the standard manual override there are lever, push, boot and mechanical detent devices.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure: - P - A - B ports - T port	bar	CC	CA
		350	210 160
Maximum flowrate	l/min	100	
Pressure drops p-Q	see paragraph 4		
Operating limits	see paragraph 6		
Electrical features	see paragraph 7		
Electrical connections	see paragraph 11		
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 20/18/15		
Recommended viscosity	cSt	25	
Mass:			
single solenoid valve	kg	1,5	1,4
double solenoid valve	kg	2	2

1 - IDENTIFICATION CODE

	D	S	3	-		/	11	-			/	
--	----------	----------	----------	---	--	---	-----------	---	--	--	---	--

Solenoid operated directional control valve

ISO 4401-03 (CETOP 03) size

Spool type (see paragraph 3)

S*	RSA*	TA	RK
SA*	RSB*	TB	
SB*		TA*	
		TB*	

Series: _____
(the overall and mounting dimensions remain unchanged from 10 to 19)

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

DC power supply _____

- D12** = 12 V
- D14** = 14 V
- D24** = 24 V
- D28** = 28 V
- D48** = 48 V
- D110** = 110 V
- D220** = 220 V
- D00** = valve without coils (see **NOTE 1**)

AC power supply

- A24** = 24 V - 50 Hz
- A48** = 48 V - 50 Hz
- A110** = 110 V - 50 Hz / 120 V - 60 Hz
- A230** = 230 V - 50 Hz / 240 V - 60 Hz
- A00** = valve without coils (see **NOTE**)
- F110** = 110 V - 60 Hz
- F220** = 220 V - 60 Hz

Option: Surface treatment not standard. Omit if not required (see **NOTE 2**)

Manual override: omit for override integrated in the tube (**standard**)

- CM** = manual override, boot protected
- CH** = lever manual override (only for DC version)
- CP** = push manual override (only for DC version)
- CK** = knob manual override (only for DC version)
- CPK** = push manual override with mechanical retention (only for DC version)

Coil electrical connection (see par. 11):

- K1** = plug for connector type DIN 43650 (**standard**)
- K2** = plug for connector type AMP JUNIOR (available on D12 and D24 coils only)
- K7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on D12 and D24 coils only)
- K12** = plug for M12 connector

K1 coils and DUAL DIN 43560 connector delivered together

NOTE 1 : Coils locking ring and related OR are supplied together with valves.

NOTE 2:The valve is supplied with standard surface treatment of phosphating black. On request we can supply these valves with other surface finishes. Add suffix **/W*** at the end of the code.

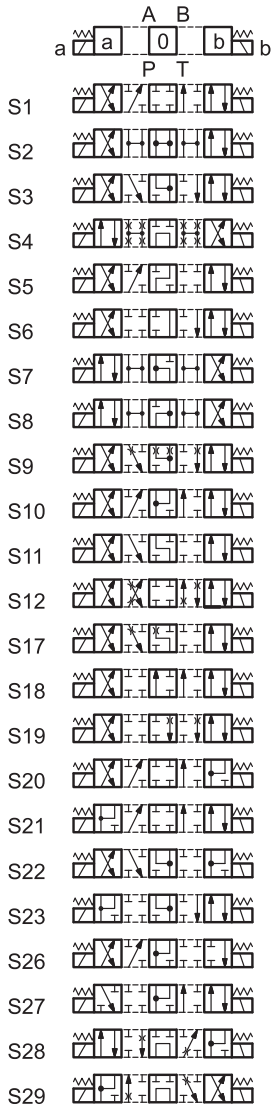
- W2** = mat epoxy painting black RAL 9005 thickness 20 ÷ 40
- W4** = gas nitriding and oxidation process black colour

2 - HYDRAULIC FLUIDS

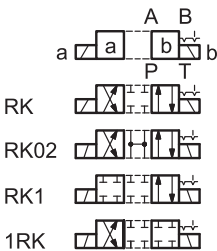
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - SPOOL TYPE

Type **S***:
2 solenoids - 3 positions
with spring centering



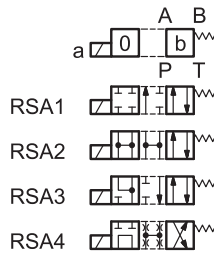
Type **RK**:
2 solenoids - 2 positions
with mechanical retention



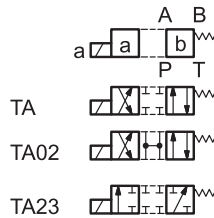
Type **SA***:
1 solenoid side A
2 positions (central + external)
with spring centering



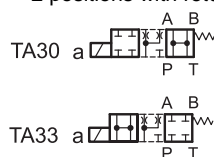
Type **RSA***:
1 solenoid side A
2 positions (external + central)
with return spring



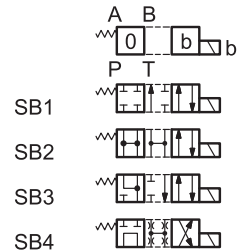
Type **TA**:
1 solenoid side A
2 external positions
with return spring



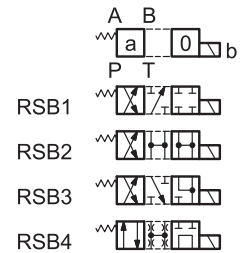
Type **TA***:
1 solenoid side A
2 positions with return spring



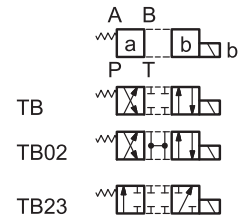
Type **SB***:
1 solenoid side B
2 positions (central + external)
with spring centering



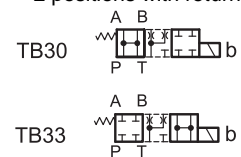
Type **RSB***:
1 solenoid side B
2 positions (external + central)
with return spring



Type **TB**:
1 solenoid side B
2 external positions
with return spring

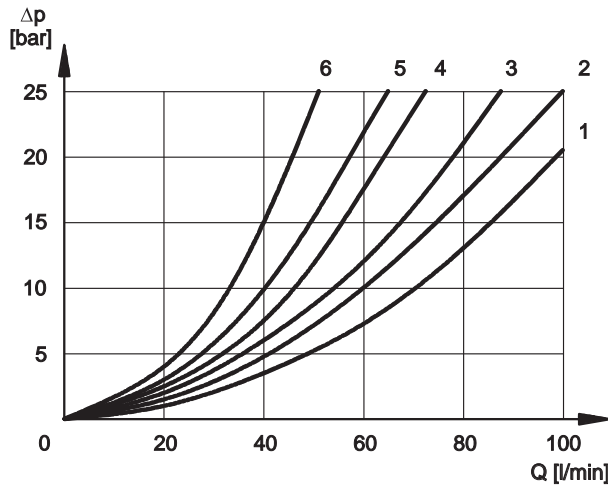


Type **TB***:
1 solenoid side B
2 positions with return spring



Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

4 - PRESSURE DROPS p-Q (obtained with viscosity 36 cSt at 50 °C)



For pressure drops between A and B lines of spools S10, S20, S21, S22 and S23, which are used in the regenerative diagram, refer to curve 5.

PRESSURE DROPS WITH VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPH			
S1, SA1, SB1	2	2	3	3
S2, SA2, SB2	1	1	3	3
S3, SA3, SB3, RSA3, RSB3	3	3	1	1
S4, SA4, SB4, RSA4, RSB4	5	5	5	5
S5	2	1	3	3
S6	2	2	3	1
S7, S8	4	5	5	5
S9	2	2	3	3
S10	1	3	1	3
S11	2	2	1	3
S12	2	2	3	3
S17	2	2	3	3
S18	1	2	3	3
S19	2	2	3	3
S20	1	5	2	
S21	5	1		2
S22	1	5	2	
S23	5	1		2
TA, TB	3	3	3	3
TA02, TB02	2	2	2	2
TA23, TB23	3	3		
RK	2	2	2	2
RK02	2	2	2	2
RK1, 1RK	2	2	2	2

PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S2, SA2, SB2					2
S3, SA3, SB3, RSA3, RSB3			3	3	
S4, SA4, SB4, RSA4, RSB4					3
S5		4			
S6				3	
S7, S8			6	6	3
S10	3	3			
S11			3		
S18	4				
S22			3	3	
S23			3	3	

5 - SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

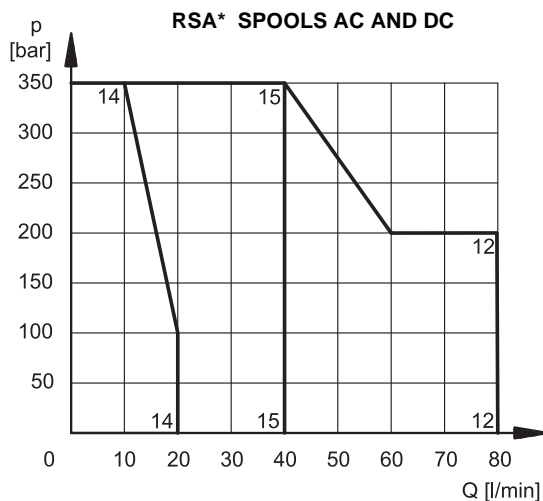
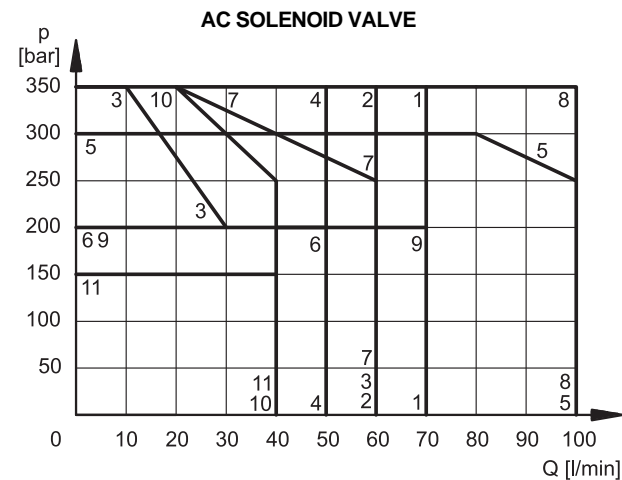
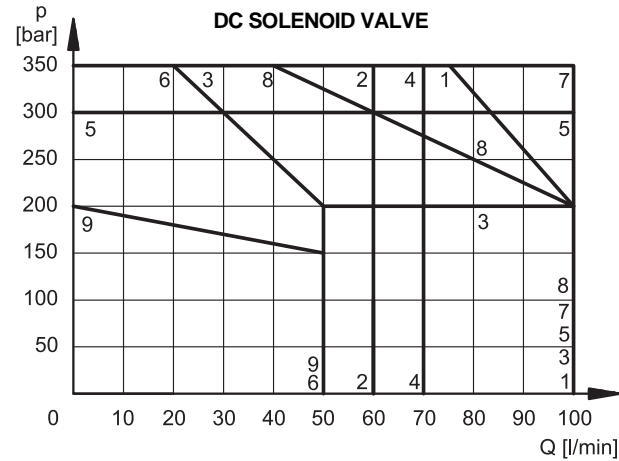
SPOOL TYPE	TIMES	
	ENERGIZING	DE-ENERGIZING
DC	25 ÷ 75 ms	15 ÷ 25 ms
AC	10 ÷ 25 ms	15 ÷ 40 ms

6 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The limits for TA02 and TA spools refer to the 4-way operation. The operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow are shown in the chart on the next page. The performance of the DC solenoid powered by AC with rectifier connectors are at par. 6.4. The performances of the soft-shift valve are shown at par. 14.

6.1 valves in standard operation



DC SOLENOID VALVE

SPOOL	CURVE	
	P A	P B
S1,SA1,SB1	1	1
S2,SA2,SB2	2	2
S3,SA3,SB3	3	3
S4,SA4,SB4	4	4
S5	5	5
S6	4	6
S7	4	4
S8	4	4
S9	7	7
S10	7	7
S11	4	6
S12	1	1
S17	4	4
S18	5	5
S19	4	4
S20	6*	6
S21	6	6*
S22	9*	6
S23	6	9*
TA, TB	7	7
TA02, TB02	8	8
TA23, TB23	2	2
RK	7	7
RK02	8	8
RK1, 1RK	7	7

AC SOLENOID VALVE

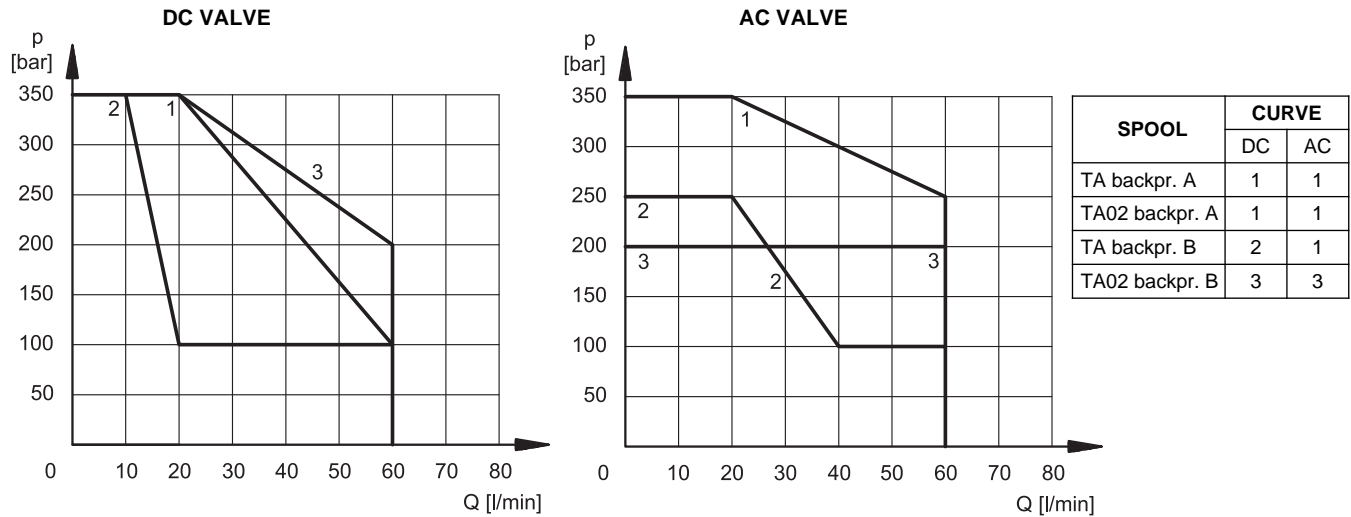
SPOOL	CURVE	
	P A	P B
S1,SA1,SB1	1	1
S2,SA2,SB2	2	2
S3,SA3,SB3	3	3
S4,SA4,SB4	1	1
S5	5	5
S6	6	6
S7	4	4
S8	4	4
S9	7	7
S10	8	8
S11	6	6
S12	2	2
S17	7	7
S18	5	5
S19	7	7
S20	10*	10
S21	10	10*
S22	10*	10
S23	10	11*
TA, TB	1	1
TA02, TB02	1	1
TA23, TB23	2	2
RK	8	8
RK02	9	9
RK1, 1RK	8	8

* Performance obtained for a valve with A and B lines connected the one to the piston-side chamber and the other to the rod-side chamber of a double-acting cylinder with area ratio 2:1.

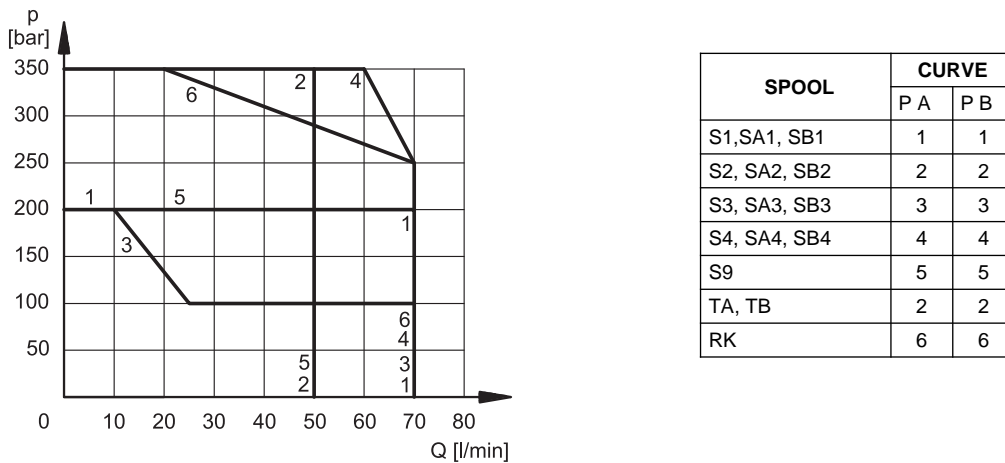
SPOOL	CURVE
RSA1	12
RSA2	
RSA3	14
RSA4	15

6.2 4-way valve in 3-way operation

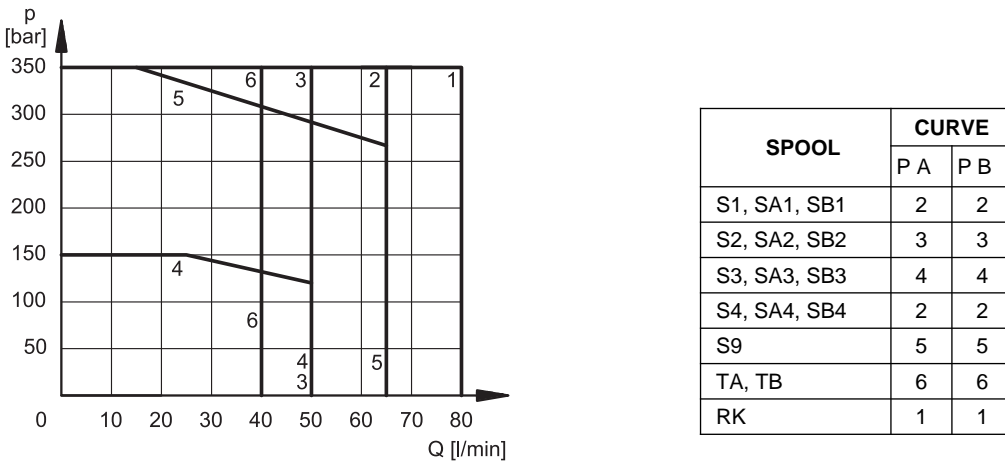
Operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow.



6.3 AC solenoid valve with coil A110 fed with 110V - 60 Hz



6.4 Operating limits for DC solenoid valves fed with AC with rectifier connectors.



7 - ELECTRICAL FEATURES

7.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K7 DEUTSCH DT04 male	x	x	x (*)
K12 DUAL DIN 43650	x	x (*)	

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

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	18.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95/EC
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation: (DC valve) (AC valve)	class H class F class H

NOTE: In order to further reduce the emissions, with DC supply, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

7.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC. The rectified current supply takes place by fitting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000), by considering a reduction of the operating limits (see diagram at paragraph 6.4).

Coils for direct current (values ±5%)

	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code		
					K1	K2	K7
D12	12	4,4	2,72	32,7	1903080	1903100	1902940
D14	14	7,2	1,93	27	1903086		
D24	24	18,6	1,29	31	1903081	1903101	1902941
D28	28	26	1,11	31	1903082		
D48	48	78,6	0,61	29,5	1903083		
D110	110	423	0,26	28,2	1903084		
D220	220	1692	0,13	28,2	1903085		

7.3 Current and absorbed power for AC solenoid valve

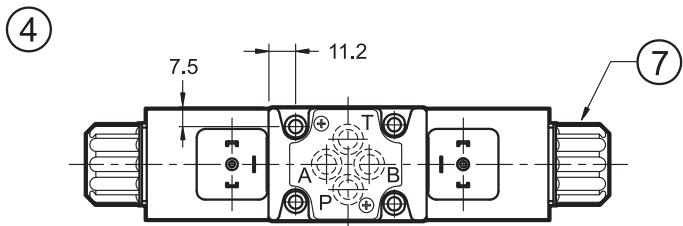
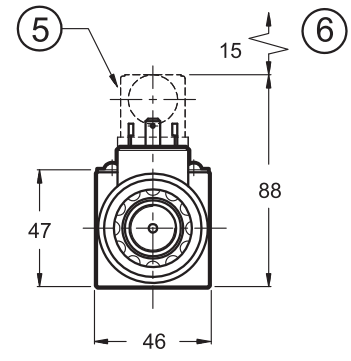
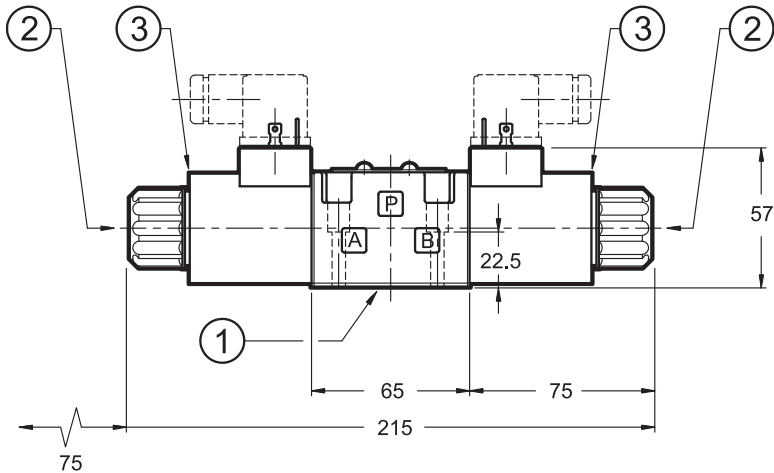
The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

Coils for alternating current (values ± 5%)

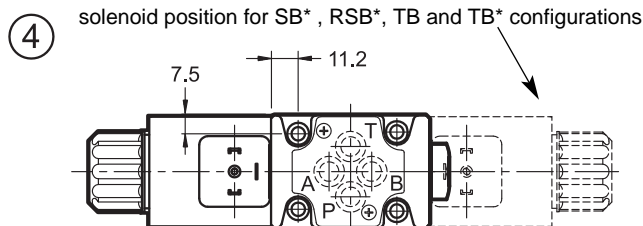
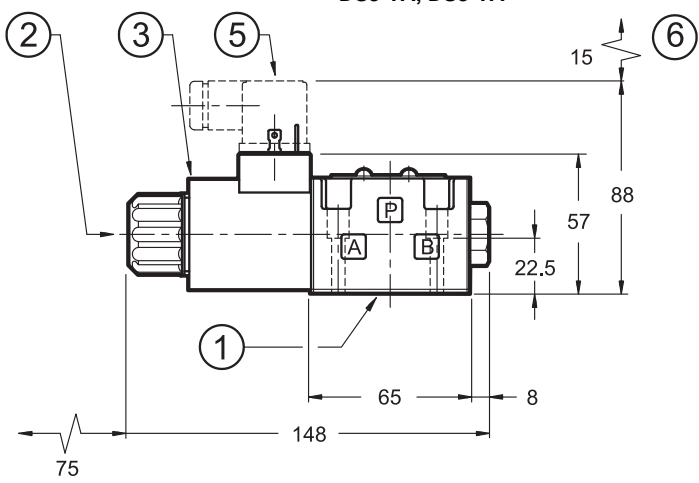
Suffix	Nominal Voltage [V]	Freq. [Hz]	Resistance at 20°C [Ω] (±1%)	Current consumption at inrush [A] (±5%)	Current consumption at holding [A] (±5%)	Power consumption at inrush (±5%) [VA]	Power consumption at holding (±5%) [VA]	Coil Code K1 e K12
A24	24	50	1,46	8	2	192	48	1902830
A48	48		5,84	4,4	1,1	204	51	1902831
A110	110V-50Hz 120V-60Hz	50/60	32	1,84	0,46	192	48	1902832
				1,56	0,39	188	47	
A230	230V-50Hz 240V-60Hz	50/60	140	0,76	0,19	176	44	1902833
				0,6	0,15	144	36	
F110	110	60	26	1,6	0,4	176	44	1902834
F220	220		106	0,8	0,2	180	45	1902835

8 - OVERALL AND MOUNTING DIMENSIONS FOR DC SOLENOID VALVES

DS3 - S*
DS3 - RK



DS3-SA*, DS3-RSA*
DS3-TA, DS3-TA*

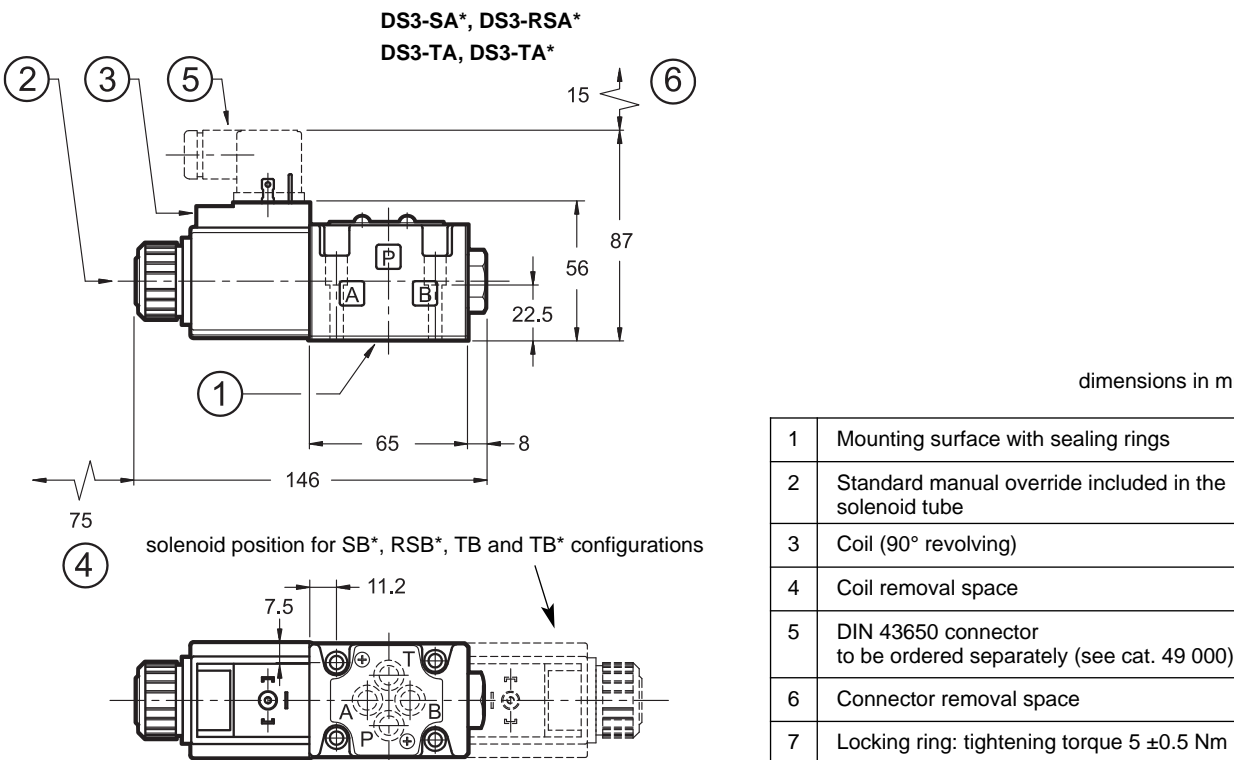
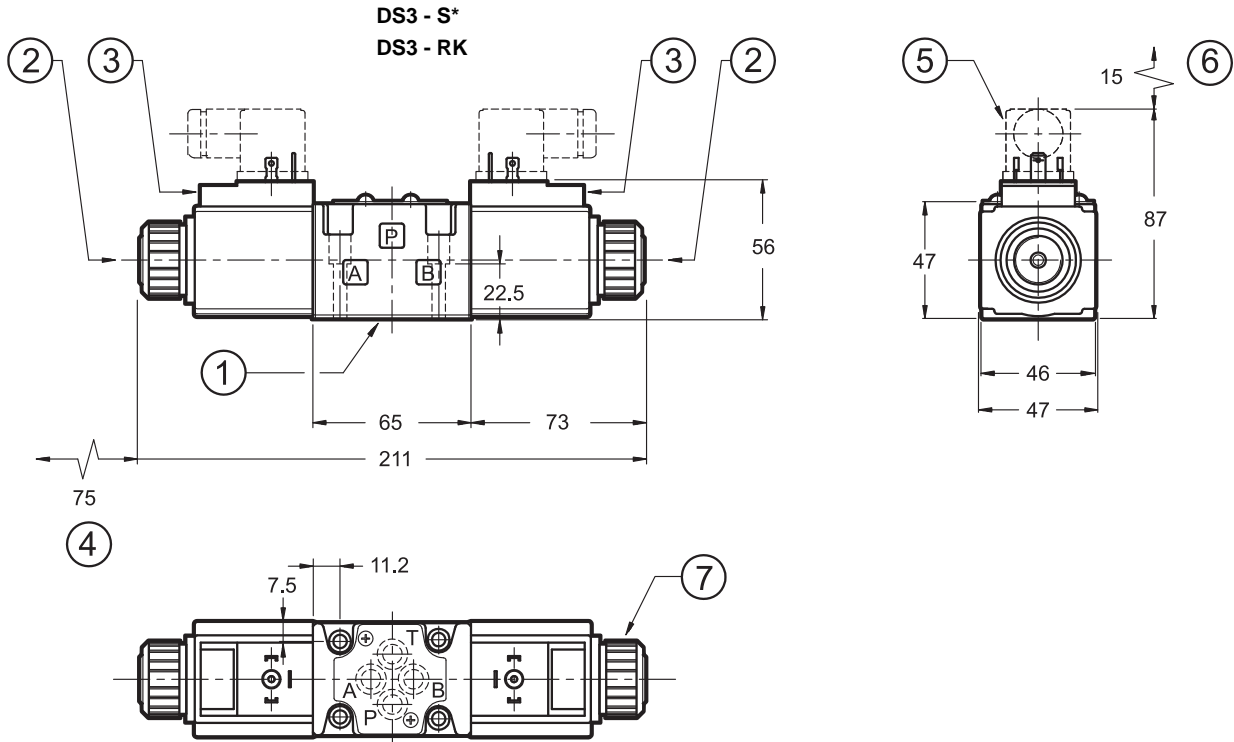


dimensions in mm

1	Mounting surface with sealing rings
2	Standard manual override included in the solenoid tube
3	Coil (360° revolving)
4	Coil removal space
5	DIN 43650 connector (standard K1 shown) to be ordered separately (see cat. 49 000)
6	Connector removal space
7	Locking ring: tightening torque 5 ±0.5 Nm

See par. 16 and 17 for fastening bolts and sealing rings

9 - OVERALL AND MOUNTING DIMENSIONS FOR AC SOLENOIDS VALVES



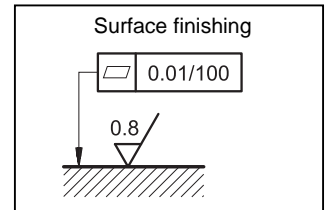
dimensions in mm

1	Mounting surface with sealing rings
2	Standard manual override included in the solenoid tube
3	Coil (90° revolving)
4	Coil removal space
5	DIN 43650 connector to be ordered separately (see cat. 49 000)
6	Connector removal space
7	Locking ring: tightening torque 5 ±0.5 Nm

See par. 16 and 17 for fastening bolts and sealing rings

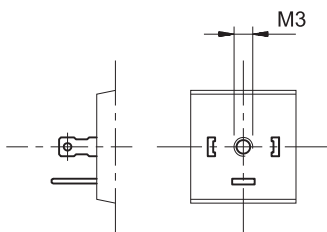
10 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal. Valve fixing takes place by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

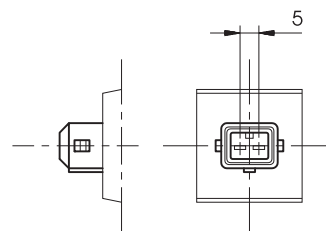


11 - ELECTRIC CONNECTIONS

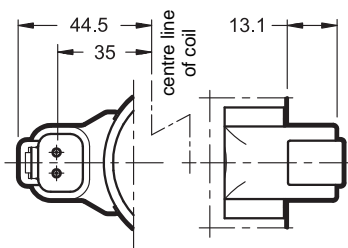
connection for DIN 43650 connector type code **K1 (standard)**



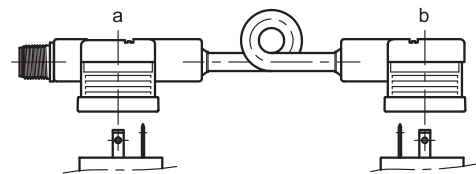
connection for AMP JUNIOR connector type code **K2**



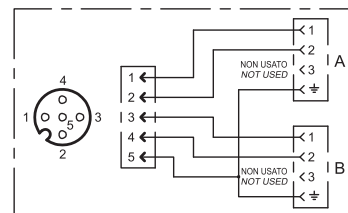
connection for DEUTSCH DT06-2S male connector type code **K7**



connection for DUAL DIN 43650 connector type code **K12**



CONNECTOR M12x1 CONNECTION SCHEME



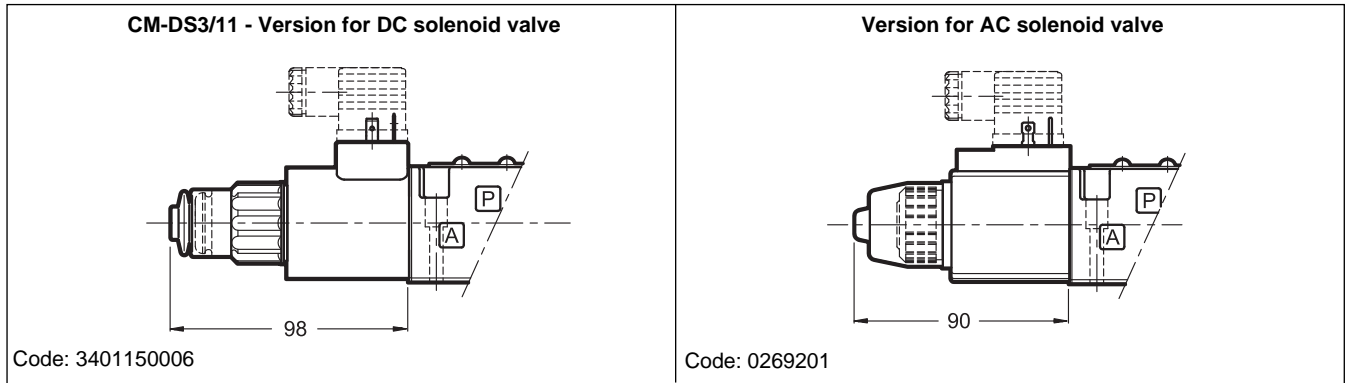
In K12 version the valve will be delivered together with the connector DUAL DIN 43650 with M12 connection already mounted on K1 coils. DUAL DIN connector allows to power two solenoids with a single cable with socket M12.

12 - ELECTRIC CONNECTORS

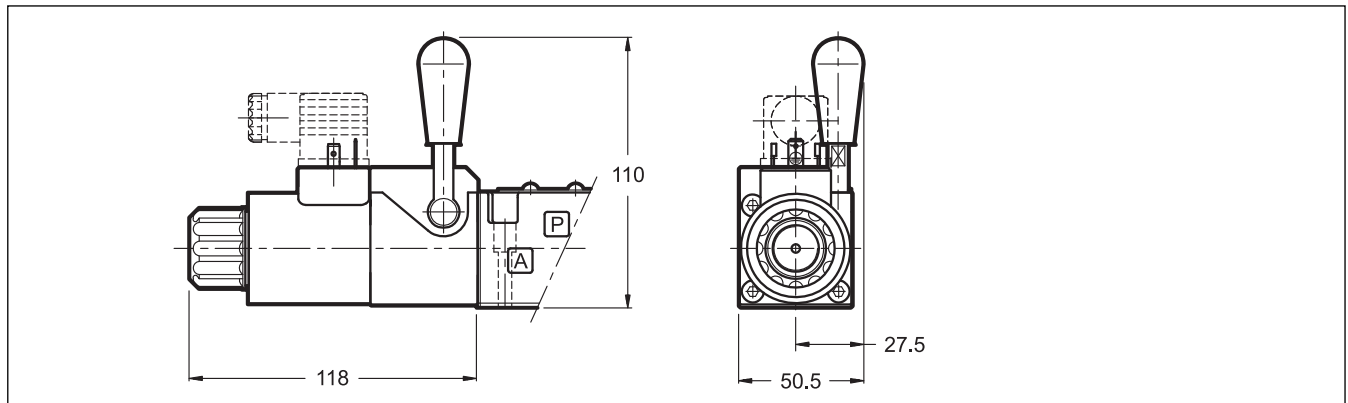
The solenoid operated valves are delivered without connector, except the version K12, where the connector is delivered together with the valve. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. For K2 and K7 connection type the relative connectors are not available.

13 - MANUAL OVERRIDES

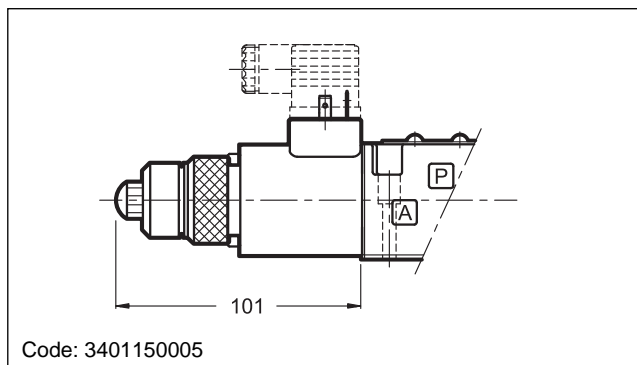
13.1 - Manual override, boot protected



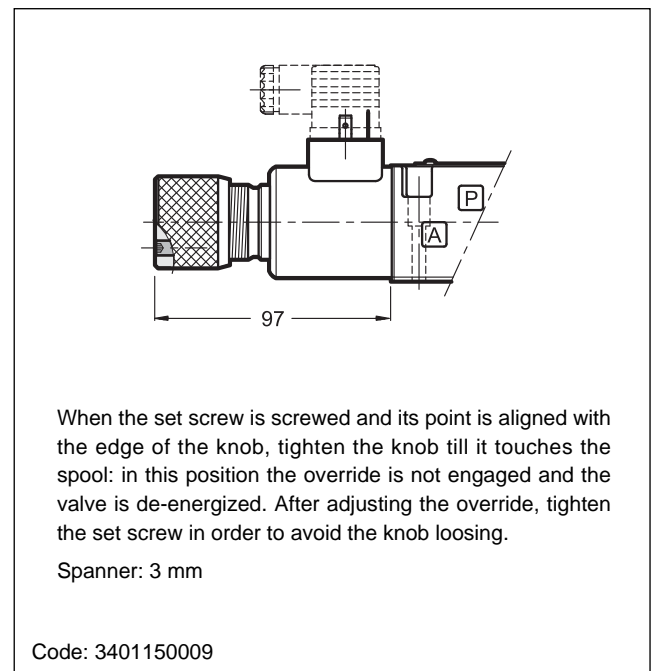
13.2 - CH-DS3/10 Lever manual override (only for DC solenoid valve)



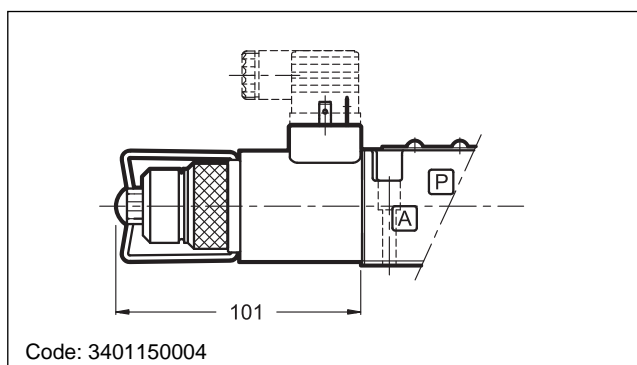
13.3 - CP-DS3/10 Push manual override (only for DC solenoid valve)



13.4 - CK-DS3/10 Knob manual override (only for DC solenoid valve)



13.5 - CPK-DS3/10 Push manual override with mechanical retention (only for DC solenoid valve)



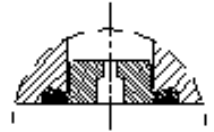
15 - PORT RESTRICTOR PLUGS

Port restrictor plugs are recommended for restricting when flows can occur during the switching processes, which exceed the performance limit of the valve or for circuit dampening.

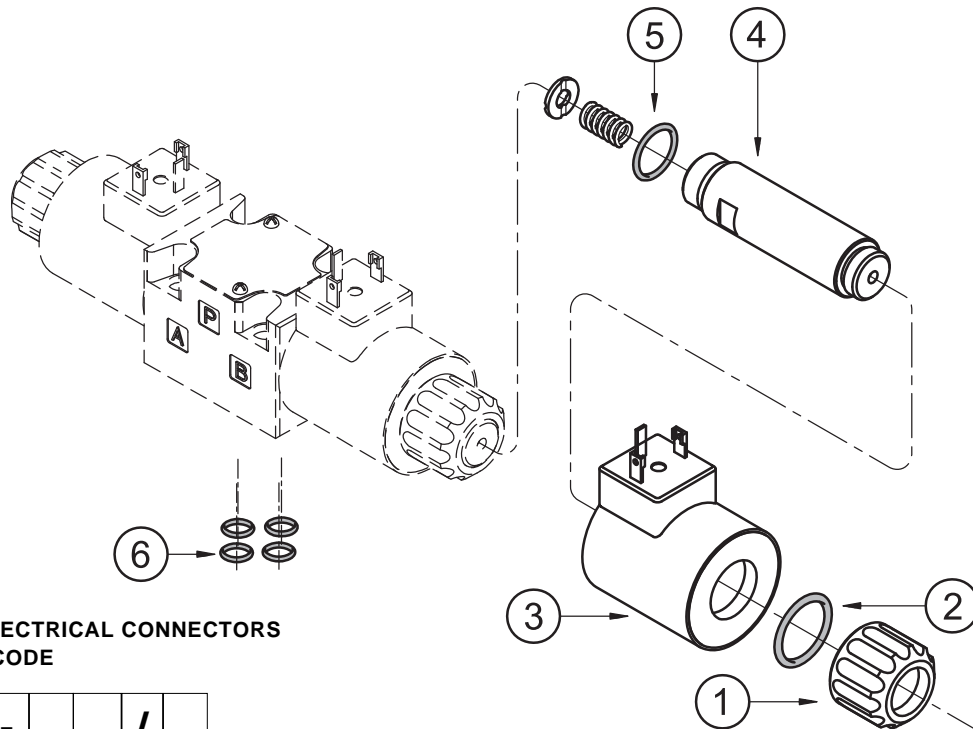
The port restrictor plugs can be ordered separately with the part numbers shown at left.

Ø (mm)	part number
blank	0144162
0.6	0144163
0.8	0144033
1	0144034

Ø (mm)	part number
1.2	0144035
1.5	0144036
1.8	0144164
2	0144165



16 - SPARE PARTS FOR DC SOLENOID VALVE



DC COILS AND ELECTRICAL CONNECTORS IDENTIFICATION CODE

C 22S3 - /

Supply voltage

- D12** = 12 V
- D14** = 14 V
- D24** = 24 V
- D28** = 28 V
- D48** = 48 V
- D110** = 110 V
- D220** = 220 V

Series no.:

- 10** = for K7
- 11** = for K1, K2 and K12
(the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection (see par. 11):

- K1** = plug for connector type DIN 43650 (**standard**)
- K2** = plug for connector type AMP JUNIOR (available on D12 and D24 coils only)
- K7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on D12 and D24 coils only)
- K12** = plug for M12 connector K1 coils and DUAL DIN 43560 connector delivered together

1	Coil locking ring with seal included cod. 0119412 Tightening torque 5 ±0.5 Nm
2	ORM type 0220-20 (22x2) - 70 Shore
3	Coil (see identification code)
4	Solenoid tube for standard version: TD22-DS3/10N (NBR seals) TD22-DS3/10V (FPM seals) Solenoid tube for version with soft-shifting: TD22-DS3F/10N (NBR seals) TD22-DS3F/10V (FPM seals) NOTE: OR n°5 included
5	OR type 2062 (15.6x1.78) - 70 Shore
6	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

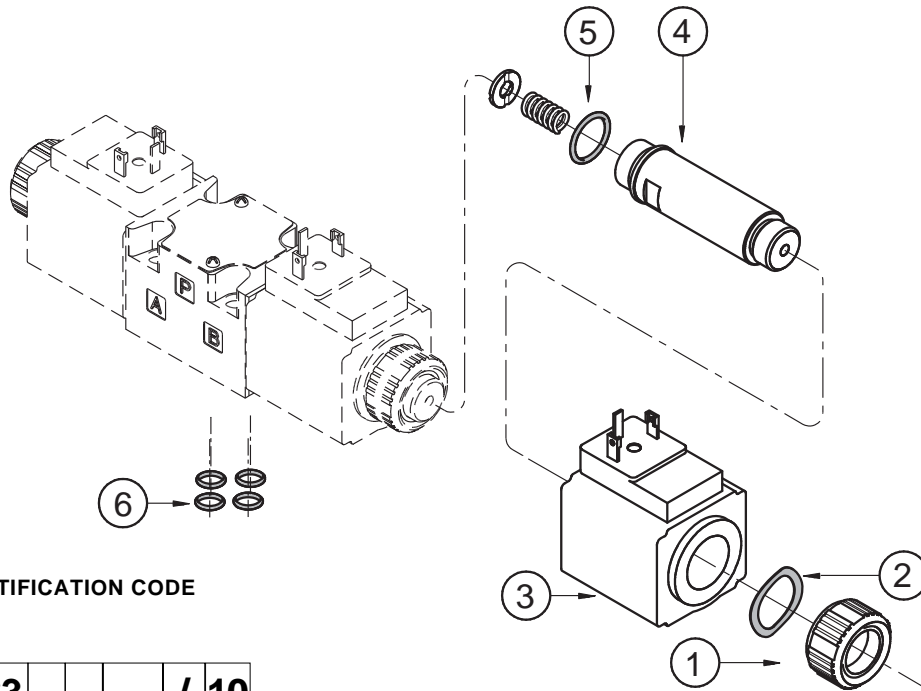
SEALS KIT

The codes include the O-Ring n° 2, 5 and 6.

- Cod. 1985406** NBR seals
- Cod. 1985410** FPM (viton) seals

NOTE: the spare part of the connector K12 (DUAL DIN) may be ordered with code 0672136

17 - SPARE PARTS FOR AC SOLENOID VALVE



AC COILS IDENTIFICATION CODE

C 20.6S3 - [] [] / 10

Supply voltage

- A24** = 24 V - 50 Hz
- A48** = 48 V - 50 Hz
- A110** = 110 V - 50 Hz
120 V - 60 Hz
- A230** = 230 V - 50 Hz
240 V - 60 Hz
- F110** = 110 V - 60 Hz
- F220** = 220 V - 60 Hz

Series no.:
(the overall and mounting dimensions remain unchanged from 10 to 19)

- K1** = Plug for connector type DIN 43650 (**standard**)
- K12** = plug for M12 connector K1 coils and DUAL DIN 43560 connector delivered together

NOTE: the spare part of the connector K12 (DUAL DIN) may be ordered with code 0672136

1	Coil locking ring cod. 0119333 Tightening torque 5 ±0.5 Nm
2	Snap ring cod. 0550483
3	Coil (see identification code on the side)
4	Solenoid tube : TA20.6-DS3/10N (NBR seals) TA20.6-DS3/10V (FPM seals) NOTE: OR n° 5 included
5	OR type 2062 (15.6x1.78) - 70 Shore
6	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

SEALS KIT

The codes include the OR nr. 5 and 6.

- Cod. 1985406** NBR seals
- Cod. 1985410** FPM (viton) seals

18 - VALVE FASTENING BOLTS

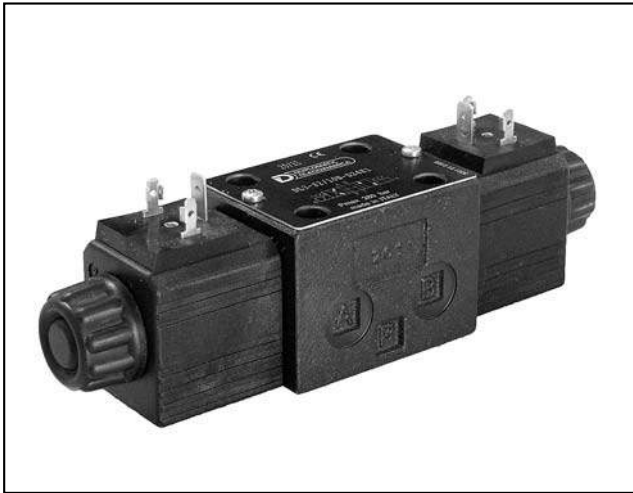
4 fastening bolts SHC M5x30
Tightening torque 5 Nm (bolts A 8.8)

19 - SUBPLATES (See catalogue 51 000)

- | |
|---|
| Type PMMD-AI3G with rear ports 3/8" BSP |
| Type PMMD-AL3G with side ports 3/8" BSP |



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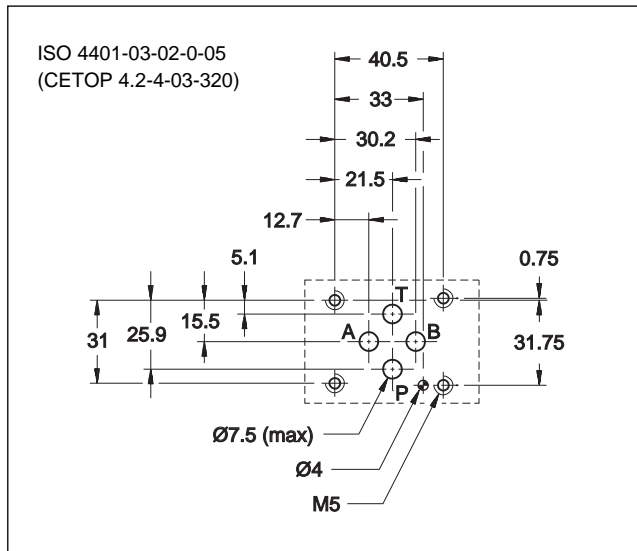
DL3

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION

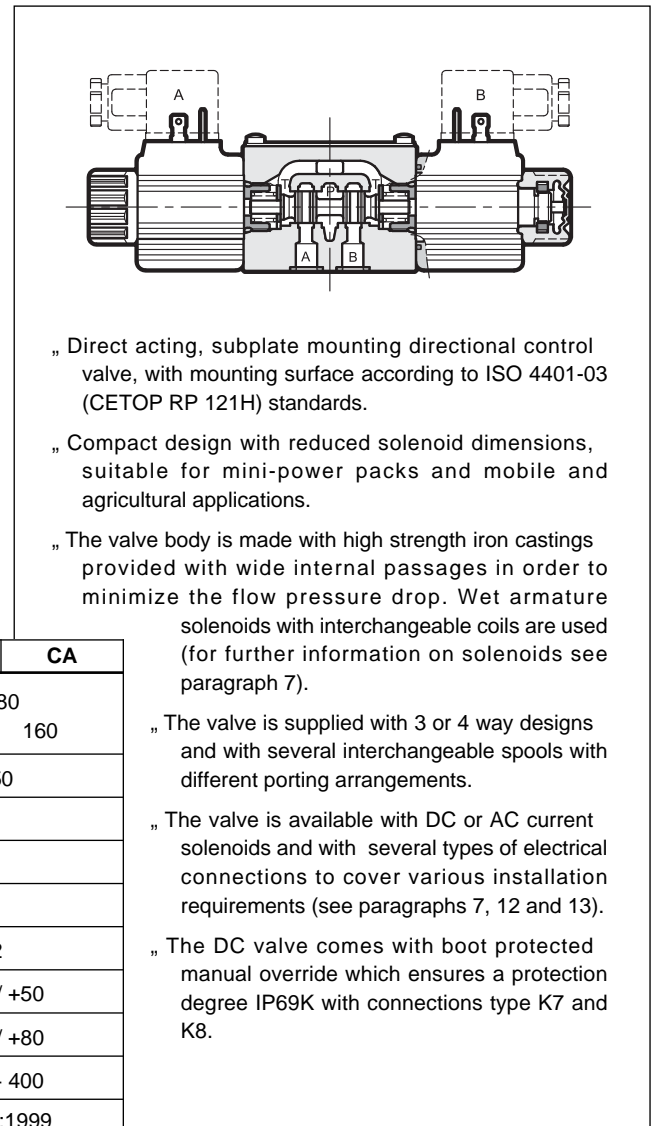
SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max **280** bar
Q max **50** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

	bar	CC	CA
			280
Maximum operating pressure: - ports P - A - B - port T		250	160
Maximum flow rate	l/min	50	
Pressure drop p-Q		see paragraph 4	
Operating limits		see paragraph 5	
Electrical features		see paragraph 7	
Electrical connections		see paragraph 12	
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 20/18/15	
Recommended viscosity	cSt	25	
Masse: single solenoid valve double solenoid valve	kg	1,1 1,4	

1 - IDENTIFICATION CODE

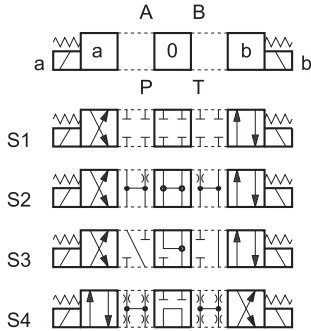
<div style="display: flex; justify-content: space-around; font-weight: bold; font-size: 1.2em;"> DL3-/-/ </div>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Solenoid operated directional control valve</p> <p>Compact version</p> <p>ISO 4401-03 (CETOP 03) size</p> <p>Spool type (see paragraph 3):</p> <table style="margin-left: 20px;"> <tr><td>S*</td><td>TA</td></tr> <tr><td>SA*</td><td>TB</td></tr> <tr><td>SB*</td><td>RK</td></tr> </table> <p>Series no.:</p> <p>10 = for direct current valves 11 = for alternate current valves (the overall and mounting dimensions remain unchanged from 10 to 19)</p> <p>Seals:</p> <p>N = NBR seals for mineral oil (standard) V = FPM seals for special fluids</p> <p>NOTE 1: Coils locking ring and related OR are supplied together with valves.</p> <p>NOTE 2: The valve is supplied with standard surface treatment of phosphating black. On request we can supply these valves with other surface finishes. Add suffix /W* at the end of the code.</p> <p>W2 = mat epoxy painting black RAL 9005 thickness 20 ÷ 40</p> <p>W4 = gas nitriding and oxidation process black colour</p> </div> <div style="width: 50%; padding-left: 20px;"> <p>Option: Surface treatment not standard. Omit if not required (see NOTE 2)</p> <p>Manual override (see par. 11) on DC version: omit for override integrated in the coil locking ring CK = knob on AC version: omit for override integrated in the tube CM = boot protected</p> <p>Coil electrical connection: (see paragraph 12)</p> <p>DC supply</p> <p>K1 = plug for connector type DIN 43650 (standard)</p> <p>K2 = plug for connector type AMP JUNIOR</p> <p>K4 = outgoing cables</p> <p>K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S</p> <p>K8 = plug for connector type AMP SUPER SEAL</p> <p>AC supply</p> <p>K1 = plug for connector type DIN 43650 (standard)</p> <p>DC power supply</p> <table style="margin-left: 20px;"> <tr><td>D12 = 12 V</td><td rowspan="4" style="font-size: 2em; vertical-align: middle;">}</td><td rowspan="4">direct current</td></tr> <tr><td>D24 = 24 V</td></tr> <tr><td>D28 = 28 V</td></tr> <tr><td>D48 = 48 V</td></tr> <tr><td>R110 = 110 V</td><td rowspan="2" style="font-size: 2em; vertical-align: middle;">}</td><td rowspan="2">rectified current</td></tr> <tr><td>R230 = 230 V</td></tr> </table> <p>D00 = valve without coils (see NOTE 1)</p> <p>AC power supply</p> <table style="margin-left: 20px;"> <tr><td>A24 = 24 V - 50 Hz</td></tr> <tr><td>A48 = 48 V - 50 Hz</td></tr> <tr><td>A110 = 110 V - 50 Hz</td></tr> <tr><td>A230 = 230 V - 50 Hz</td></tr> </table> <p>A00 = valve without coils (see NOTE 1)</p> </div> </div>	S*	TA	SA*	TB	SB*	RK	D12 = 12 V	}	direct current	D24 = 24 V	D28 = 28 V	D48 = 48 V	R110 = 110 V	}	rectified current	R230 = 230 V	A24 = 24 V - 50 Hz	A48 = 48 V - 50 Hz	A110 = 110 V - 50 Hz	A230 = 230 V - 50 Hz
S*	TA																				
SA*	TB																				
SB*	RK																				
D12 = 12 V	}	direct current																			
D24 = 24 V																					
D28 = 28 V																					
D48 = 48 V																					
R110 = 110 V	}	rectified current																			
R230 = 230 V																					
A24 = 24 V - 50 Hz																					
A48 = 48 V - 50 Hz																					
A110 = 110 V - 50 Hz																					
A230 = 230 V - 50 Hz																					

2 - HYDRAULIC FLUIDS

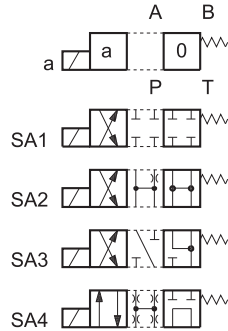
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - SPOOL TYPE

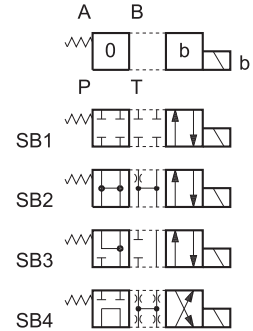
Type S*:
2 solenoids - 3 positions
with spring centering



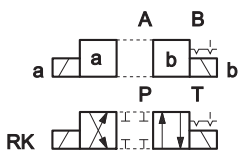
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



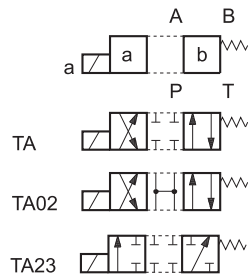
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



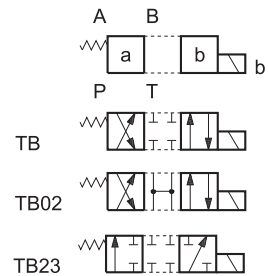
Type RK:
2 solenoids - 2 positions
with mechanical retention



Type TA:
1 solenoid side A
2 external positions
with return spring

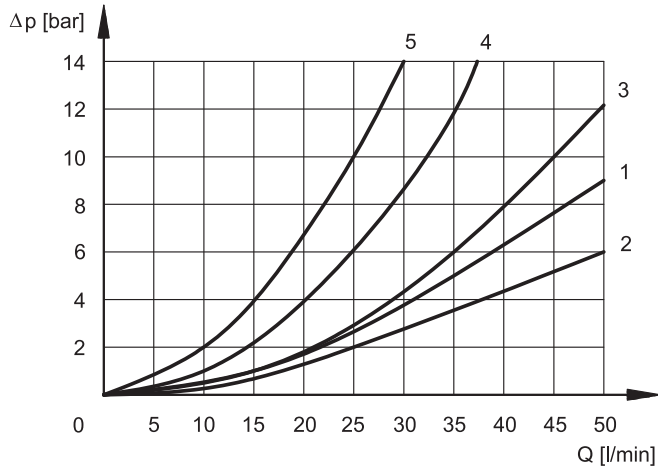


Type TB:
1 solenoid side B
2 external positions
with return spring



NOTE: Others spools available on request only.

4 - PRESSURE DROPS p-Q (obtained with viscosity of 36 cSt at 50 °C)



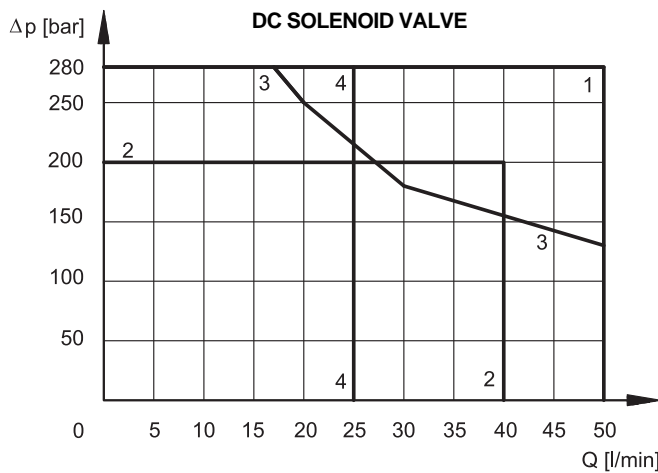
ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS				
	P A	P B	A T	B T	P T
	CURVES ON GRAPHS				
S1	1	1	1	1	-
S2	1	1	2	2	3
S3	3	3	2	2	-
S4	4	4	4	4	5
RK	1	1	1	1	-
TA	3	3	3	3	-

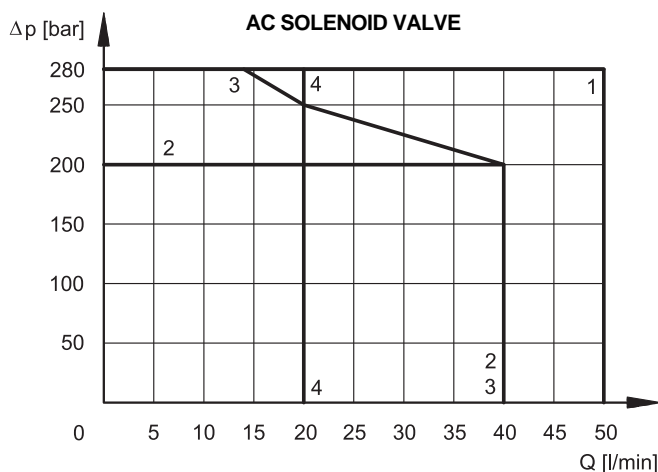
5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



SPOOL	CURVE
S1, RK, TA	1
S2	2
S3	3
S4	4



SPOOL	CURVE
S1, RK, TA	1
S2	2
S3	3
S4	4

6 - SWITCHING TIMES

The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

SUPPLY	TIMES ($\pm 10\%$) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	25 ÷ 75	15 ÷ 25
AC	10 ÷ 25	15 ÷ 30

7 - ELECTRICAL FEATURES

7.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated $\pm 90^\circ$, to suit the available space.

The interchangeability of coils of different voltages is allowed within the same type of supply current, alternating or direct.

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K4 outgoing cable	x	x	
K7 DEUTSCH DT04 male	x	x	x (*)
K8 AMP SUPER SEAL	x	x	x (*)

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

SUPPLY VOLTAGE FLUCTUATION	$\pm 10\%$ Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95 CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class H

NOTE: In order to further reduce the emissions, with DC supply, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

7.2 DC valve - Current and power consumption

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law: $V = R \times I$

•RŽ coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the •DŽ type connector (see cat. 49 000).

The table shows current and power consumption values for CC and RC coil types.

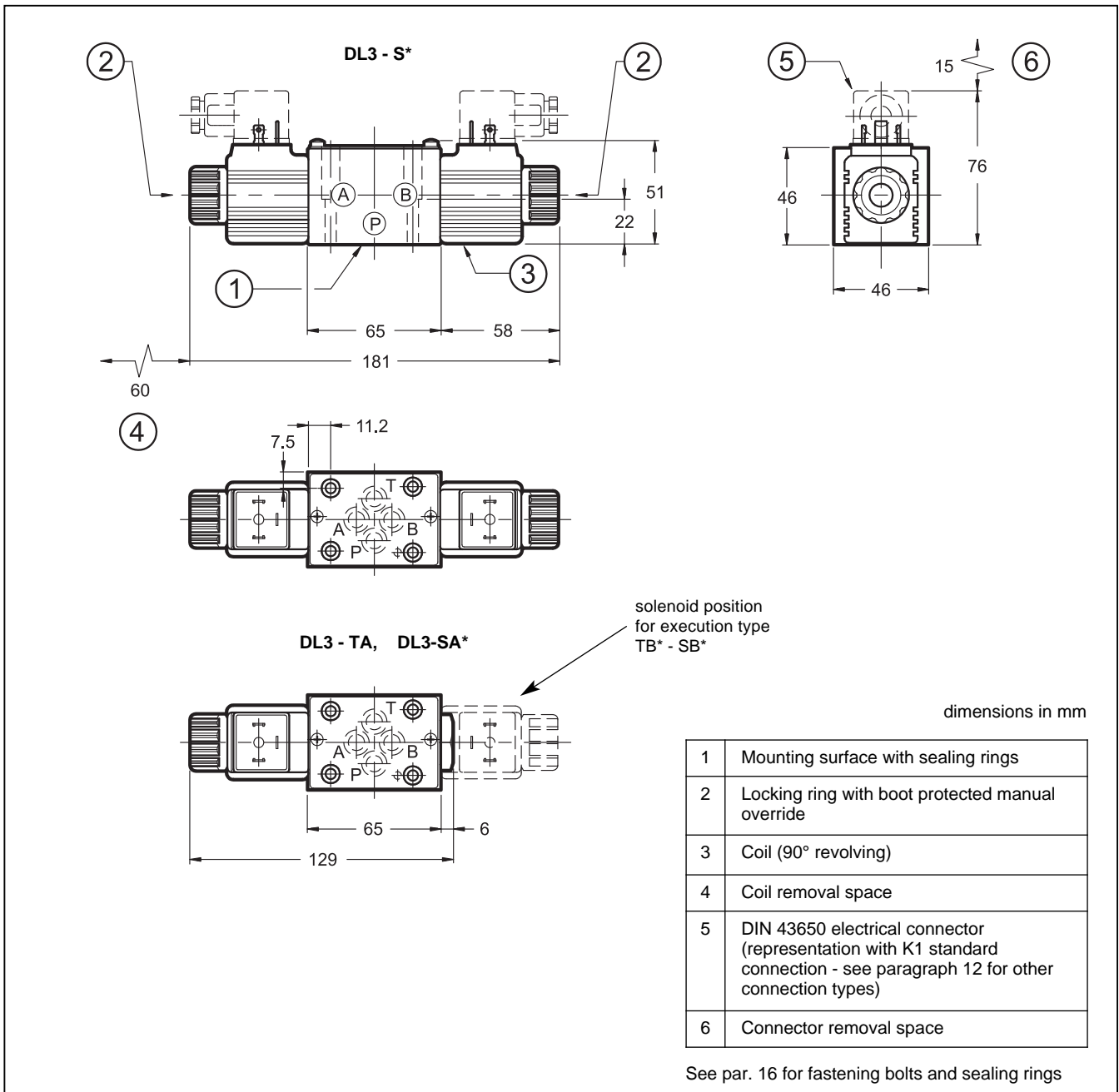
	Nominal voltage [V]	Resistance at 20°C [] ($\pm 1\%$)	Current consumption [A] ($\pm 5\%$)	Power consumption ($\pm 5\%$)		Coil code				
				[W]	[VA]	K1	K2	K4	K7	K8
D12	12	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
D24	24	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
D28	28	27,5	1,02	28,5		1902744				
D48	48	82	0,58	28		1902745				
R110	110	363	0,25		27,2	1902742				
R230	230	1640	0,11		26,4	1902743				

7.3 AC valve - Current and power consumption

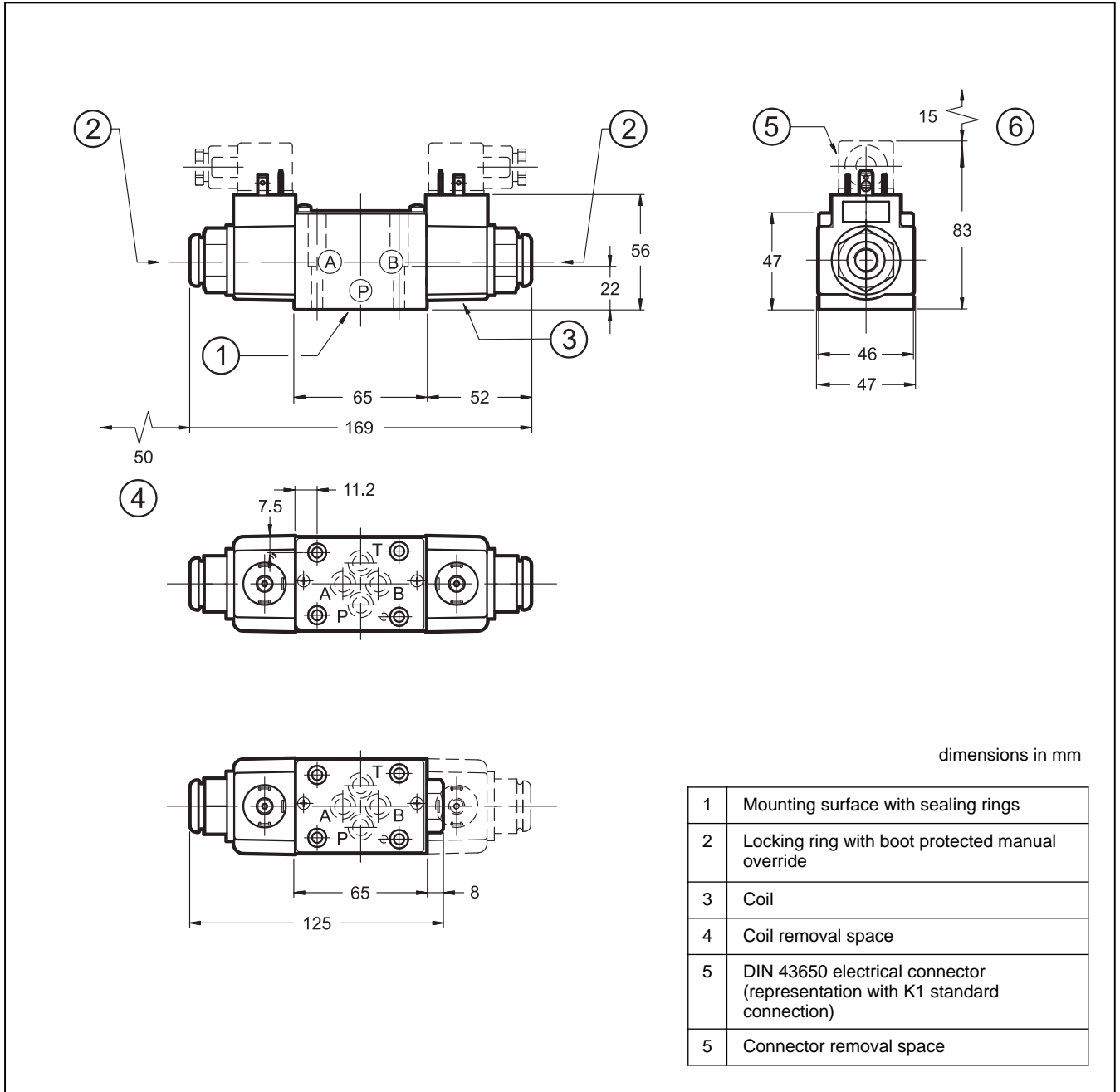
In alternating current energizing, an initial phase (maximum movement) is seen, during which the solenoid consumes elevated value currents (inrush current); the current values diminish during the plunger stroke until it reaches the minimum values (holding current) when the plunger reaches the stroke end. The table shows the values of absorption at the inrush and at holding.

	Nominal voltage [V]	Freq. [Hz]	Resistance at 20°C [Ω] (±5%)	Current consumption at inrush [A] (±10%)	Current consumption at holding [A] (±10%)	Power consumption at inrush (±10%) [VA]	Power consumption at holding (±10%) [VA]	Coil code K1
A24	24	50	2,7	4,5	1,47	109,2	35,3	1903190
A48	48		13,7	2,3	0,79	110,9	37,9	1903191
A110	110		73,4	1,0	0,31	107,8	34,1	1903192
A230	230		320	0,5	0,16	112,7	36,8	1903193

8 - DL3 DC OVERALL AND MOUNTING DIMENSIONS



9 - DL3 AC OVERALL AND MOUNTING DIMENSIONS

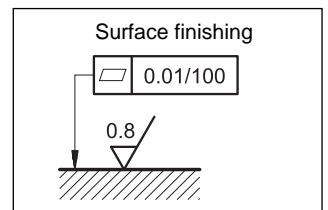


10 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fitting takes place by means of screws or tie rods, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



11 - OPTIONAL MANUAL OVERRIDES

11.1 - Boot protected manual override

On the DC version the boot override is integrated in the coil locking ring, as standard.

On the AC version, however, the boot override can be ordered by entering the code **CM** in the identification code at par. 1, or is available as option to be ordered separately: code **3401210001**.

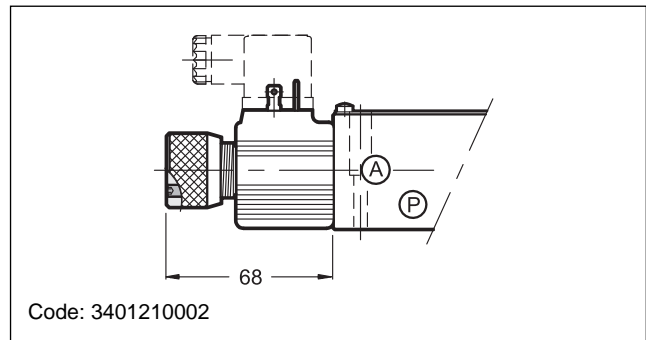
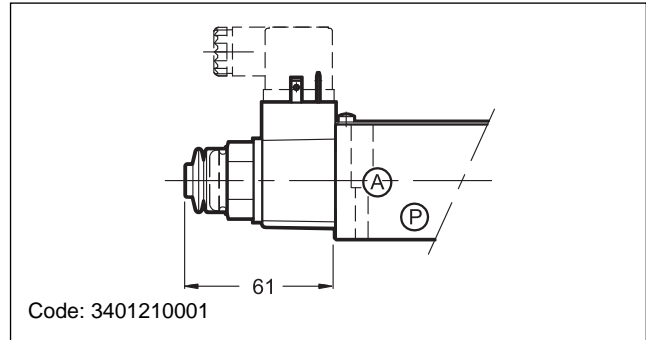
11.2 - Knob manual override

Available only for DC version

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.

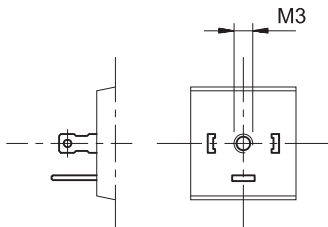
Spanner: 2.5 mm

The knob override can be ordered by entering the code **CK** in the identification code at par. 1, or is available as option to be ordered separately: code **3401210002**.

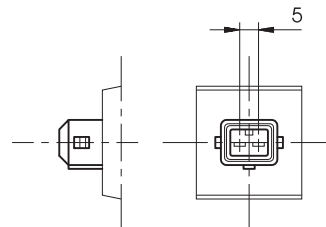


12 - ELECTRIC CONNECTIONS

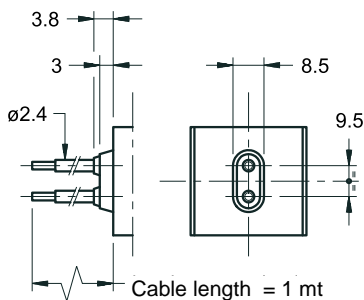
connection for DIN 43650 connector type
code **K1 (standard)**



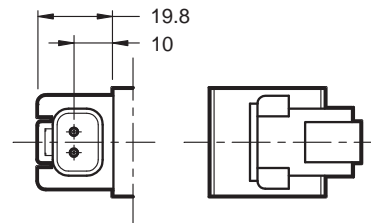
connection for AMP JUNIOR connector type
code **K2**



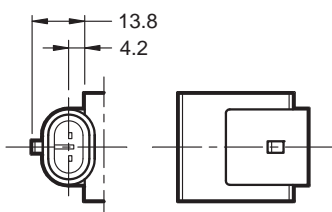
outgoing cable connections
code **K4**



connection for DEUTSCH DT04-2P
for male connector type DEUTSCH DT06-2S
code **K7**



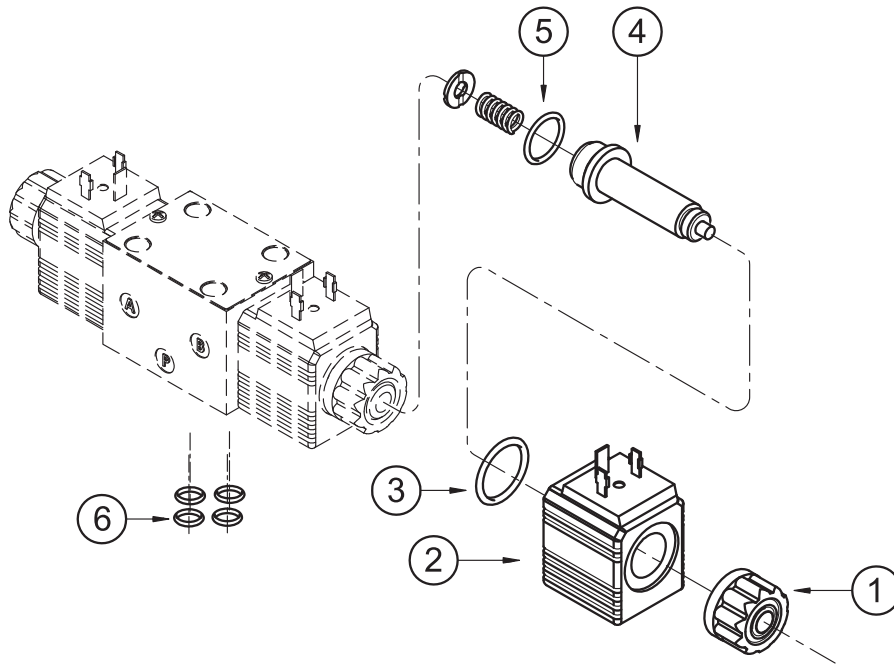
connection for AMP SUPER SEAL (two contacts)
connector type
code **K8**



13 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without connector. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. For K2, K7 and K8 connection type the relative connectors are not available.

14 - SPARE PARTS FOR DC SOLENOID VALVE



IDENTIFICATION CODE FOR DC AND RC COILS

C 14 L3 - / 10

Supply voltage
D12 = 12 V } direct current
D24 = 24 V }
D28 = 28 V }
D48 = 48 V }
R110 = 110 V } rectified current
R230 = 230 V }

Series no.:
 (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection:

- K1** = plug for connector type DIN 43650 (**standard**)
- K2** = plug for connector type AMP JUNIOR
- K4** = outgoing cables
- K7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S
- K8** = plug for connector type AMP SUPER SEAL

1	Coil locking ring - code 0119382 tightening torque: 3 Nm
2	Coil (see identification code)
3	OR type 2112 (28.3x1.78)
4	Solenoid tube: TD14-M18/11N (NBR seals) TD14-M18/11V (FPM seals) (OR n° 5 included)
5	OR type 2062 (15.6x1.78) - 70 Shore
6	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

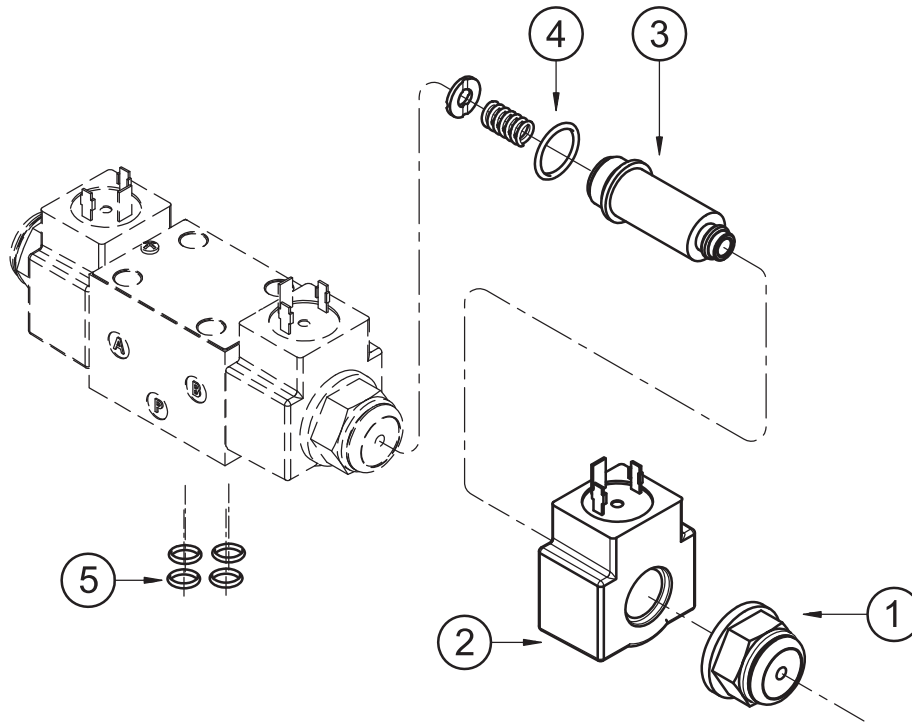
SEAL KIT

The codes included the OR n° 5 and 6.

Cod. 1984435 NBR seals

Cod. 1984436 FPM seals

15 - SPARE PARTS FOR AC SOLENOID VALVE



IDENTIFICATION CODE FOR AC COILS

C 18 L3 - K1 / 11

Supply voltage

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz
A230 = 230 V - 50 Hz

Series no.:
 (the overall and
 mounting dimensions
 remain unchanged from
 10 to 19)

Coil electrical connection:
 plug for connector type
 DIN 43650

1	Coil locking ring - code. 0119469 tightening torque: 5 Nm
2	Coil (see identification code)
3	Solenoid tube: TA18-M18/11N (NBR seals) TA18-M18/11V (FPM seals) NOTE: OR n° 4 included.
4	OR type 2062 (15.6x1.78) - 70 Shore
5	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

SEAL KIT

The codes included the OR n° 5 and 6.

Cod. 1984435 NBR seals

Cod. 1984436 FPM seals

16 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 SHC screws M5x30 - ISO 4762

Tightening torque: 5 Nm

Threads of mounting holes: M5x10

Sealing rings: N. 4 OR type 2037 (9.25x1.78) - 90 Shore

17 - 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



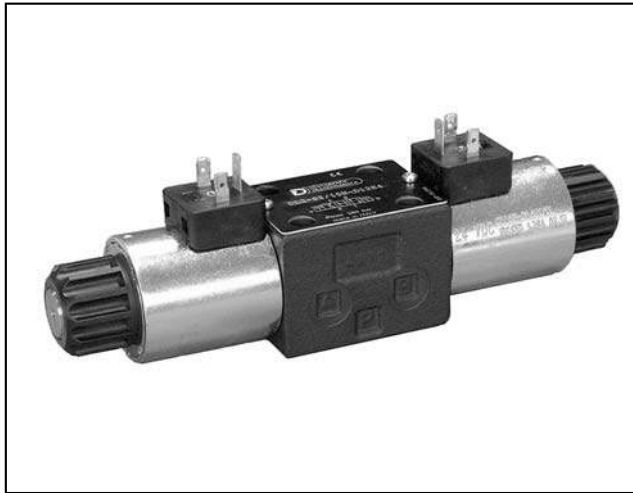
DIPLOMATIC OLEODINAMICA S.p.A.

20015 PARABIAGO (MI) • Via M. Re Depaolini 24

Tel. +39 0331.895.111

Fax +39 0331.895.339

www.diplomatic.com • e-mail: sales.exp@diplomatic.com



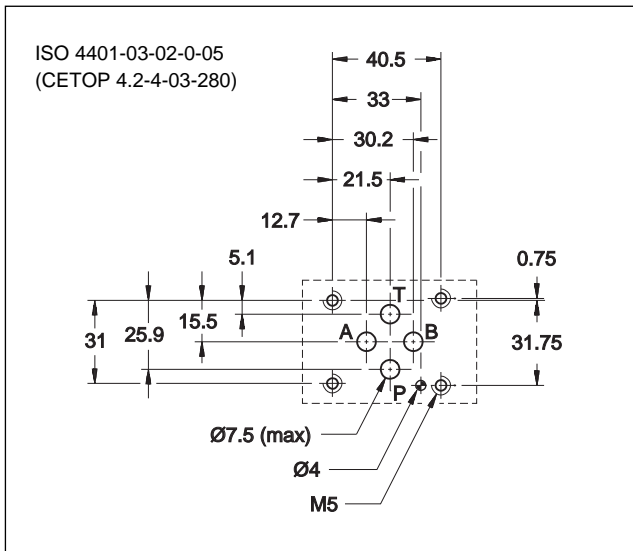
DL3B

8 WATT SOLENOID OPERATED DIRECTIONAL CONTROL VALVE SERIES 10

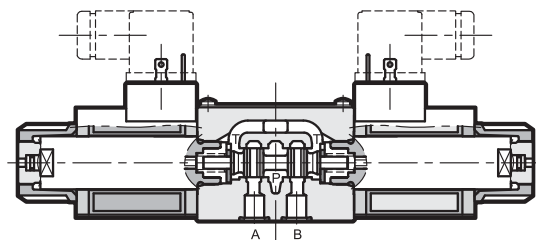
SUBPLATE MOUNTING ISO 4401-03 (CETOP 03)

p max **280** bar
Q max **60** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



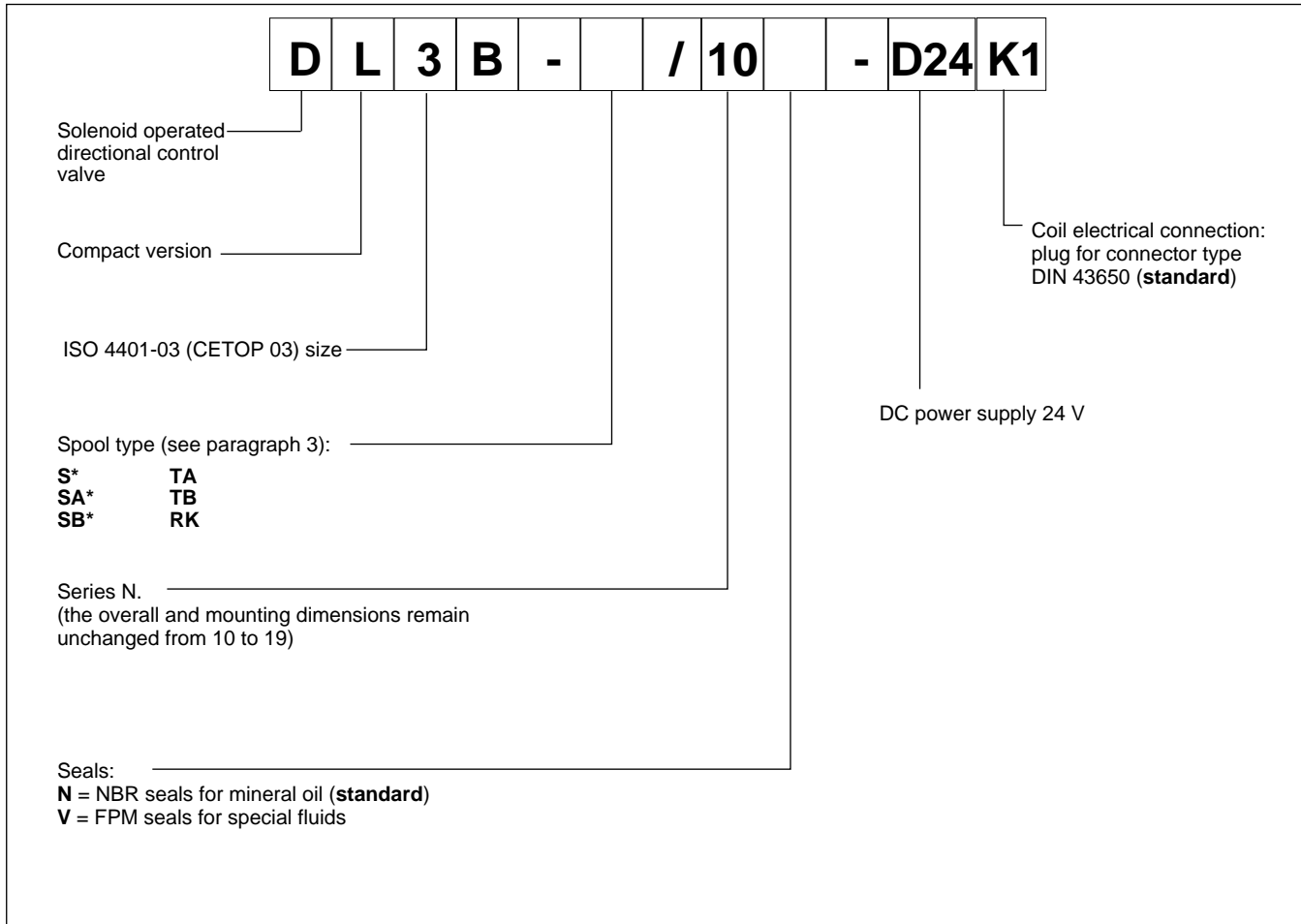
- „ 8 watt direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401-03 (CETOP RP 121H) standards.
- „ Compact design with reduced solenoid dimensions, suitable for mini-power packs and mobile and agricultural applications.
- „ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see paragraph 7).
- „ The valve is supplied with 4 way designs and with several interchangeable spools with different porting arrangements.
- „ The valve is available with DC current solenoids with 24 V power supply.

PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure: - ports P - A - B - port T	bar	280 210
Maximum flow rate	l/min	50
Pressure drop p-Q	see paragraph 4	
Operating limits	see paragraph 5	
Electrical features	see paragraph 7	
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 20/18/15	
Recommended viscosity	cSt	25
Mass: single solenoid valve double solenoid valve	kg	1,5 2



1 - IDENTIFICATION CODE

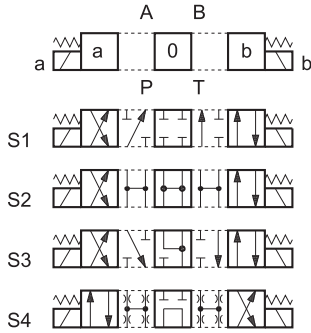


2 - HYDRAULIC FLUIDS

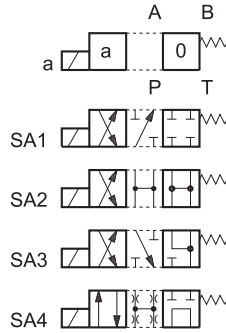
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - SPOOL TYPE

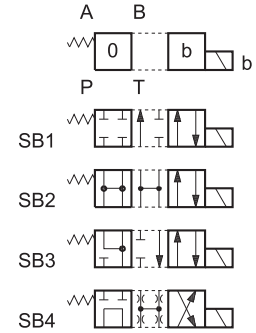
Type S*:
2 solenoids - 3 positions
with spring centering



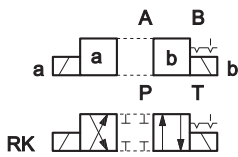
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



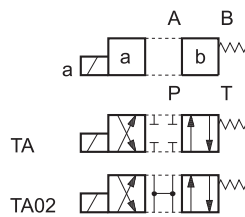
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



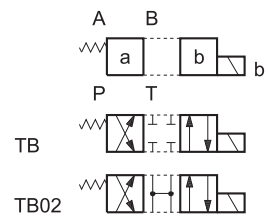
Type RK:
2 solenoids - 2 positions
with mechanical retention



Type TA:
1 solenoid side A
2 external positions
with return spring

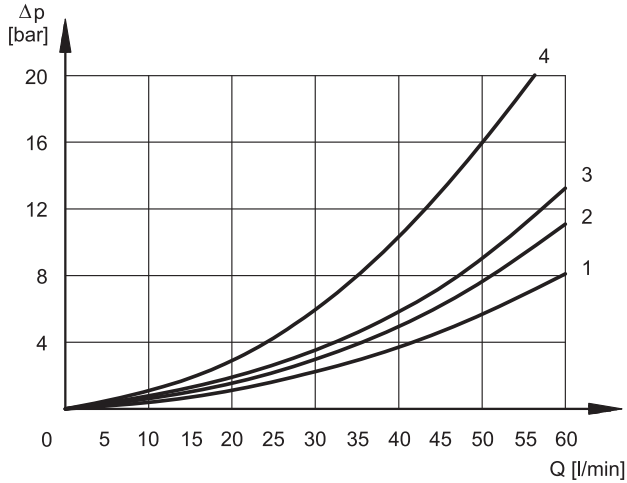


Type TB:
1 solenoid side B
2 external positions
with return spring



NOTE: Others spools available on request only.

4 - PRESSURE DROPS p-Q (obtained with viscosity of 36 cSt at 50 °C)



ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS			
	P A	P B	A T	B T
	CURVES ON GRAPH			
S1	2	3	3	2
S2	1	1	1	1
S3	3	3	1	1
S4	4	4	4	4
RK	3	3	3	3
TA, TB	3	3	3	3
TA02, TB02	1	1	1	1

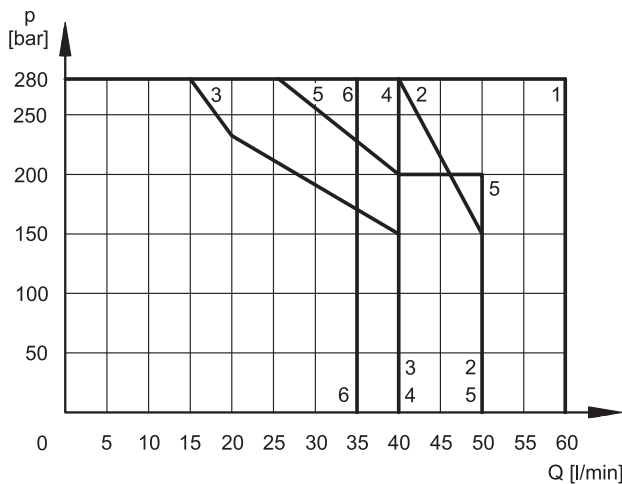
For the pressure drop with a de-energized valve P T of the spools S2 and S4 refer to the curve 3; for the spool S4 refer to the curve 4.

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The limits for TA02 and TA spools refer to the 4-way operation. The operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow are shown in the chart on the next page.



SPOOL	CURVE
S1	1
S2	1
S3	3
S4	4
TA, TB	5
TA02, TB02	2
RK	6

6 - SWITCHING TIMES

The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

TIMES (±10%) [ms]	
ENERGIZING	DE-ENERGIZING
25 ÷ 75	15 ÷ 25



7 - ELECTRICAL FEATURES

7.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	7.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95 EC
CLASS OF PROTECTION : Atmospheric agents CEI EN 60529 Coil insulation (VDE 0580) Impregnation	IP 65 (NOTE) class H class F

NOTE: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

7.2 - Current and absorbed power for solenoid valve

The table shows current and power consumption values relevant to the 24 VDC coil.

Coil for direct current (values ±5%)

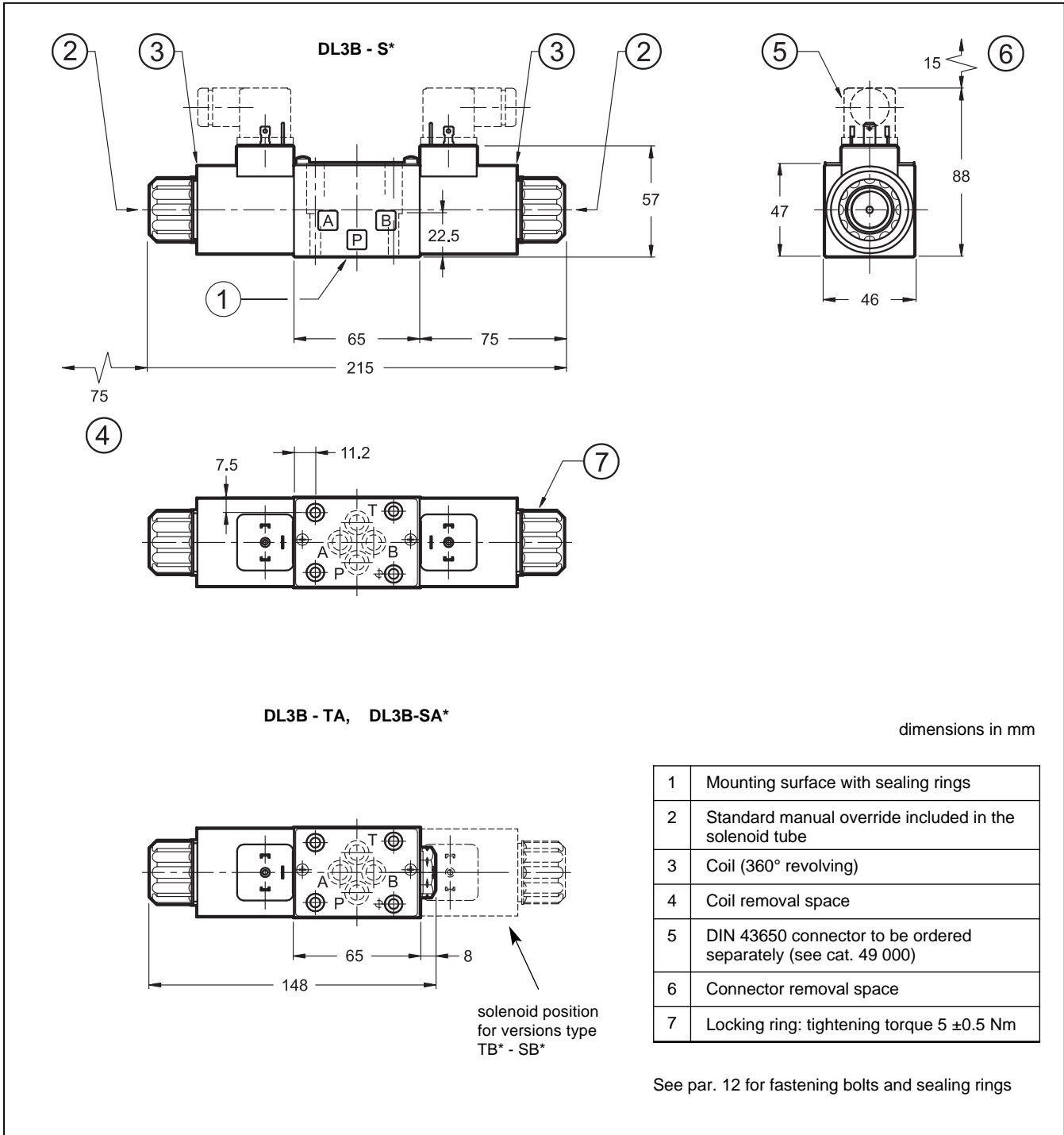
	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code
D24	24	64.6	0.37	8.92	1903291

8 - ELECTRIC CONNECTORS

The solenoid valves are not supplied with connector. Connectors must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

9 - DL3B OVERALL AND MOUNTING DIMENSIONS

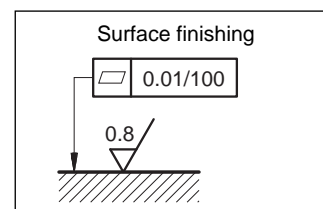


10 - INSTALLATION

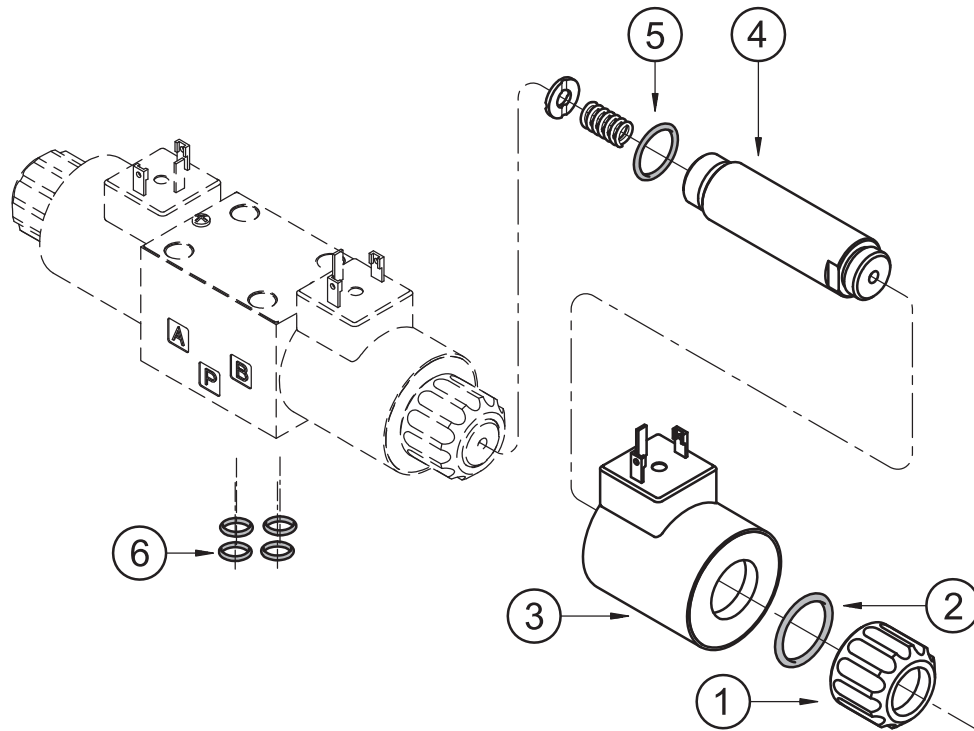
Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fitting takes place by means of screws or tie rods, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



11 - SPARE PARTS FOR SOLENOID VALVE



COILS IDENTIFICATION CODE

C 22L3B - D24K1 / 11

Supply voltage
24 VDC

Series N. (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection: plug for connector type DIN 43650 (**standard**)

1	Coil locking ring with seal included cod. 0119412 Tightening torque 5 ± 0.5 Nm
2	ORM type 0220-20 (22x2) - 70 Shore
3	Coil (see identification code)
4	Solenoid tube for standard version: TD22-DL3B/10N (NBR seals) TD22-DL3B/10V (FPM seals) NOTE: OR n°5 included
5	OR type 2062 (15.6x1.78) - 70 Shore
6	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

SEALS KIT

The codes include the O-Ring n° 2, 5 and 6.

Cod. 1985406 NBR seals

Cod. 1985410 FPM (viton) seals



DL3B

SERIES 10

12 - VALVE FASTENING BOLTS

4 fastening bolts SHC M5x30 - ISO 4762

Tightening torque 5 Nm (bolts A 8.8)

13 - SUBPLATES (see catalogue 51 000)

Type PMMD-AI3G with rear ports 3/8" BSP

Type PMMD-AL3G with side ports 3/8" BSP



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www.diplomatic.com • e-mail: sales.exp@diplomatic.com



MDS3

SOLENOID OPERATED SWITCHING VALVE

SERIES 10

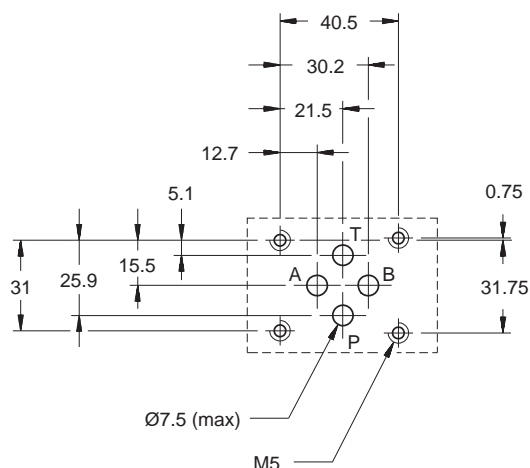
MODULAR VERSION

ISO 4401-03 (CETOP 03)

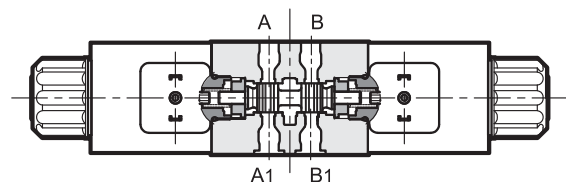
p max **350** bar
Q max **50** l/min

MOUNTING INTERFACE

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



OPERATING PRINCIPLE



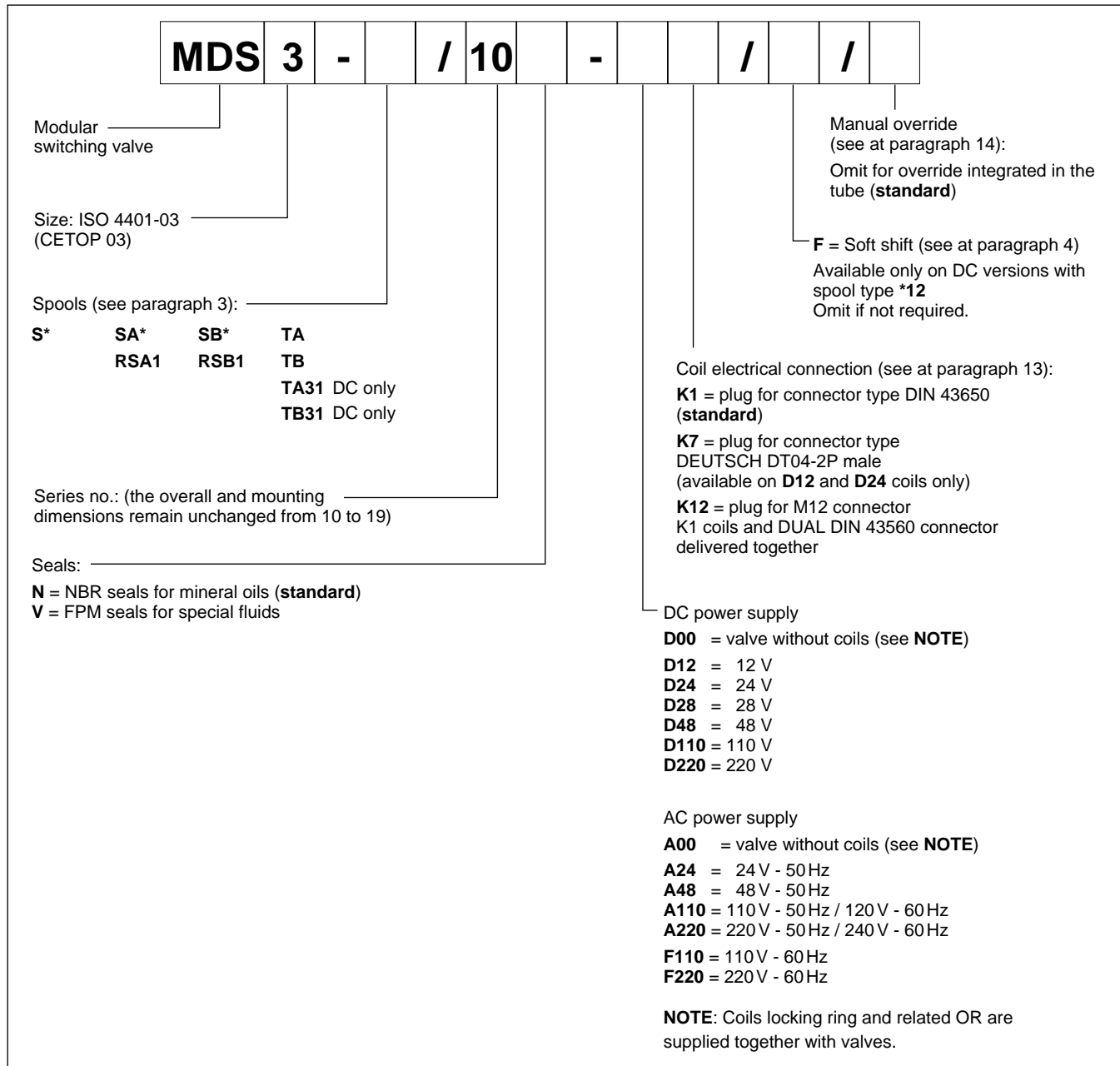
- „ The MDS3 valve is used to switch multiple flow directions, or to select pressure values. Application examples can be seen at paragraph 15.
- „ The oil passage holes pass right through the entire valve body and due to this particular design feature, the MDS3 can be assembled with all ISO 4401-03 (CETOP 03) modular valves).
- „ The special connection of the valve in parallel to the P - T - A - B lines of the circuit allows easy construction of different hydraulic configurations, reducing pressure drops to a minimum.
- „ Soft-shift feature available for some DC versions.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Max operating pressure: P - A - B ports T port (DC version) T port (AC version)	bar	350 210 140
Maximum flow on P - A - B ports	l/min	50
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 20/18/15	
Recommended viscosity	cSt	25
Mass: double solenoid single solenoid	kg	2 1,5



1 - IDENTIFICATION CODE

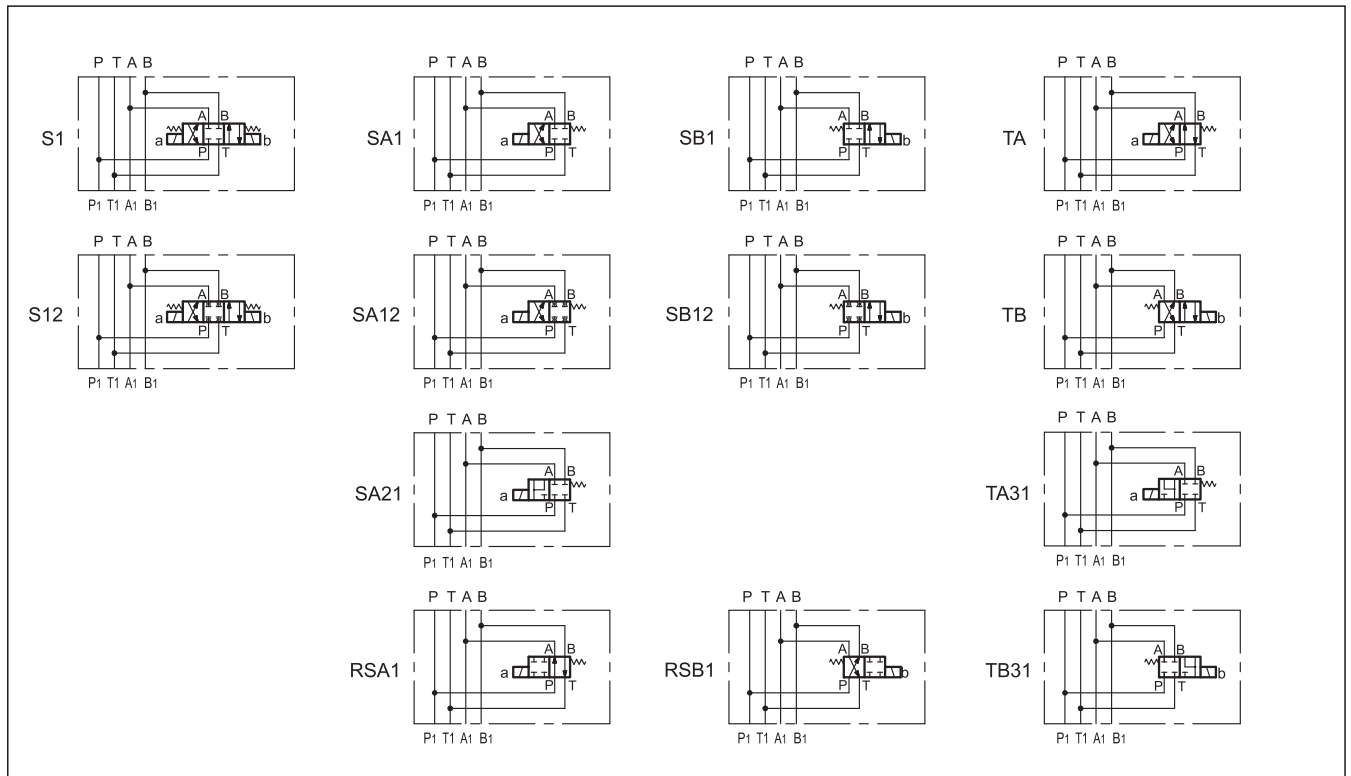


2 - HYDRAULIC FLUIDS

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.

3 - SPOOL TYPE



4 - SOFT SHIFT

At now the soft shift feature is available only on DC valves with S12, SA12 and SB12 spools.

This feature enables hydraulic actuators to perform a smooth start and stop by reducing the speed of movement of the valve spool. The shifting time and characteristics curves, are influenced by the viscosity (and thus by the temperature) of the operating fluid. Moreover, times can vary according to the flow rate and operating pressure values of the valve.

For the correct work of the soft-shift device, ensure that the solenoid tubes are always filled with oil. For this purpose, we recommend to install a backpressure valve set at $1 \div 2$ bar on T line.

5 - PRESSURE DROPS p-Q

SOON AVAILABLE

6 - OPERATING LIMITS

SOON AVAILABLE

7 - SWITCHING TIMES

SOON AVAILABLE



8 - ELECTRICAL FEATURES

8.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated to suit the available space.

Protection from atmospheric agents CEI EN 60529

Connector	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K7 DEUTSCH DT04 male	x	x	x (*)
K12 DUAL DIN 43650	x	x (*)	

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

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY DC valve AC valve	18.000 ins/hr 10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95 CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation	class H class F

NOTE: In order to further reduce the emissions is recommended the use of type H connectors. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

8.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types

The rectified current supply takes place by "tting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000), by considering a reduction of the operating limits.

Available DC coils (values ±5%)

	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code	
					K1	K7
D12	12	4,4	2,72	32,6	1903080	1902940
D24	24	18,6	1,29	31	1903081	1902941
D28	28	26	1,11	31	1903082	
D48	48	78,6	0,61	29,3	1903083	
D110	110	423	0,26	28,6	1903084	
D220	220	1692	0,13	28,6	1903085	

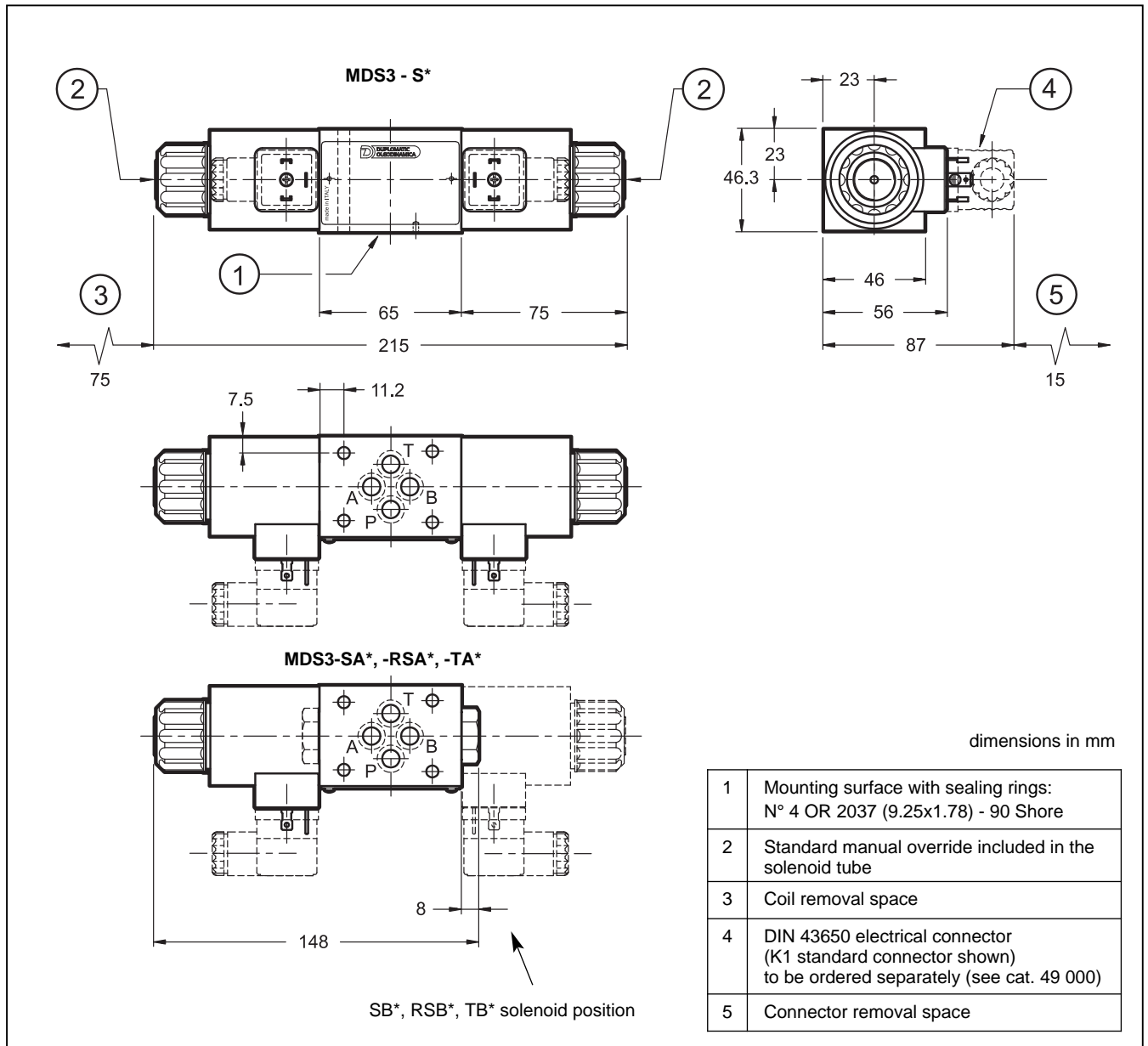
8.3 Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

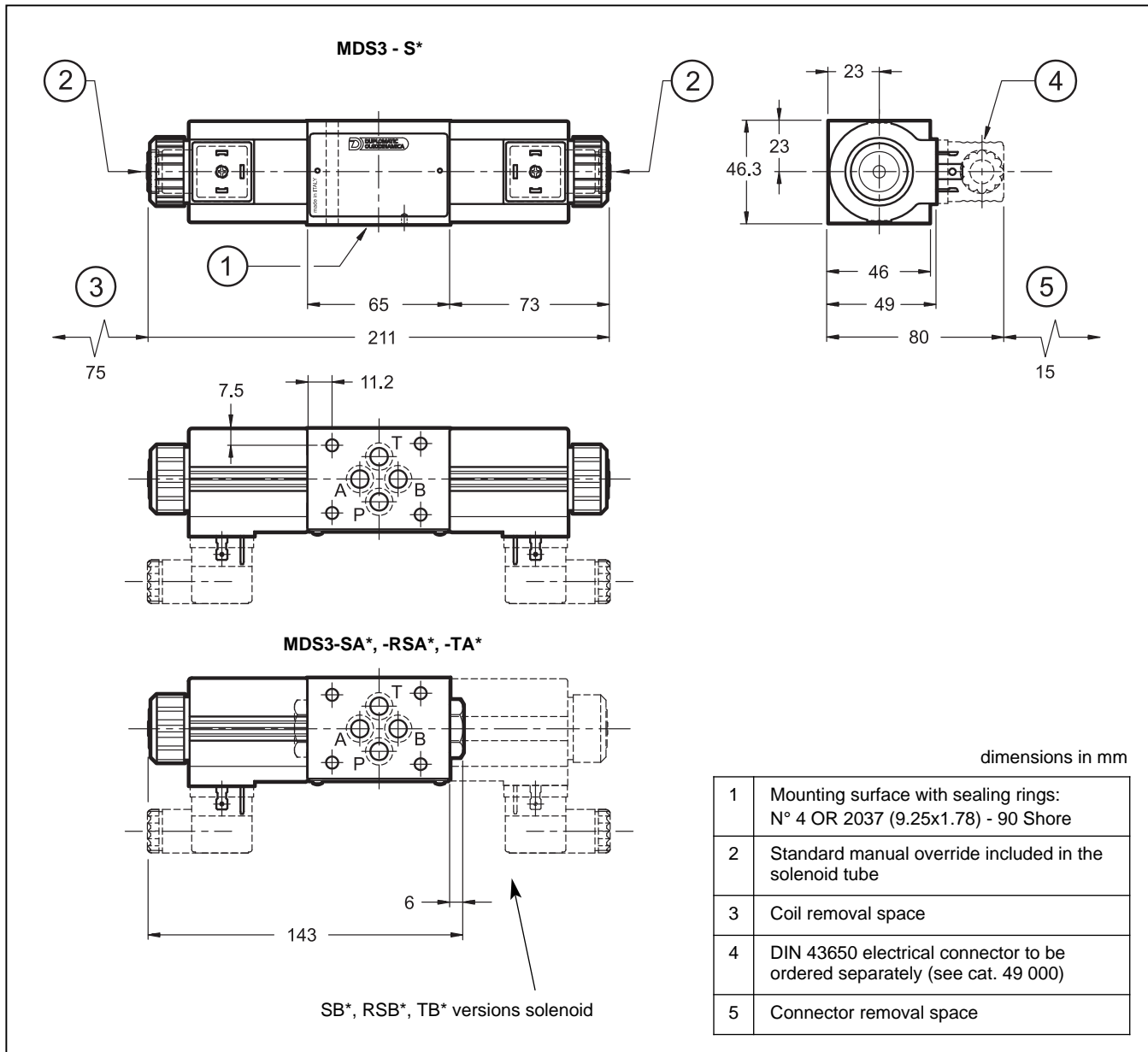
Available AC coils (values ± 5%)

Suffix	Nominal Voltage [V]	Freq. [Hz]	Resistance at 20°C [Ω] (±1%)	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil Code
A24	24	50	0.88	8.7	2.35	209	56.5	1902660
A48	48		3.2	4.5	1.25	216	60	1902661
A110	110V-50Hz 120V-60Hz	50/60	17.5	1.9	0.48	209	52.8	1902677
				1.8	0.45	216	54	
A220	220V-50Hz 240V-60Hz	60	70	0.95	0.23	209	50.6	1902678
				0.87	0.21		50.4	
F110	110	60	15	2	0.5	220	55	1902680
F220	220			60	1		0.26	57.2

9 - DC VALVE - OVERALL AND MOUNTING DIMENSIONS



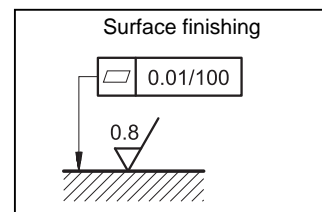
10 - AC VALVE - OVERALL AND MOUNTING DIMENSIONS



11 - INSTALLATION

The valve can be mounted in any position. Valve fixing takes place by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



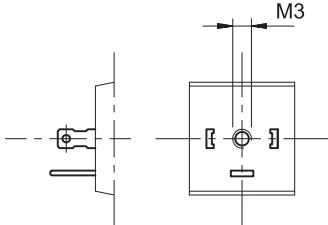
12 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without connector, except the version K12, where the connector is delivered together with the valve. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000.

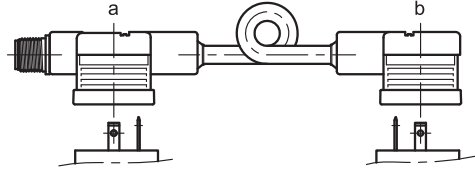
For the K7 connections the relative connectors are not available.

13 - ELECTRIC CONNECTIONS

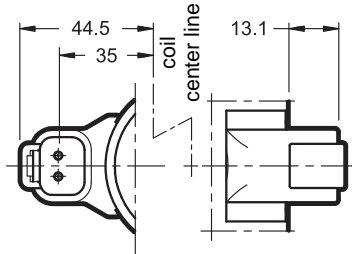
connection for DIN 43650 connector type
code **K1 (standard)**



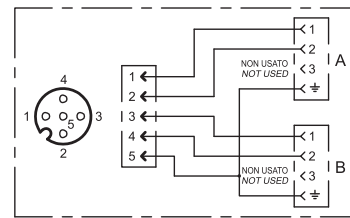
connection for DUAL DIN 43650
connector type
code **K12**



connection for DEUTSCH DT04-2P male
connector type
code **K7**



CONNECTOR M12x1 CONNECTION SCHEME



In K12 version the valve will be delivered together with the connector DUAL DIN 43650 with M12 connection already mounted on K1 coils. DUAL DIN connector allows you to power two solenoids with a single cable with socket M12.

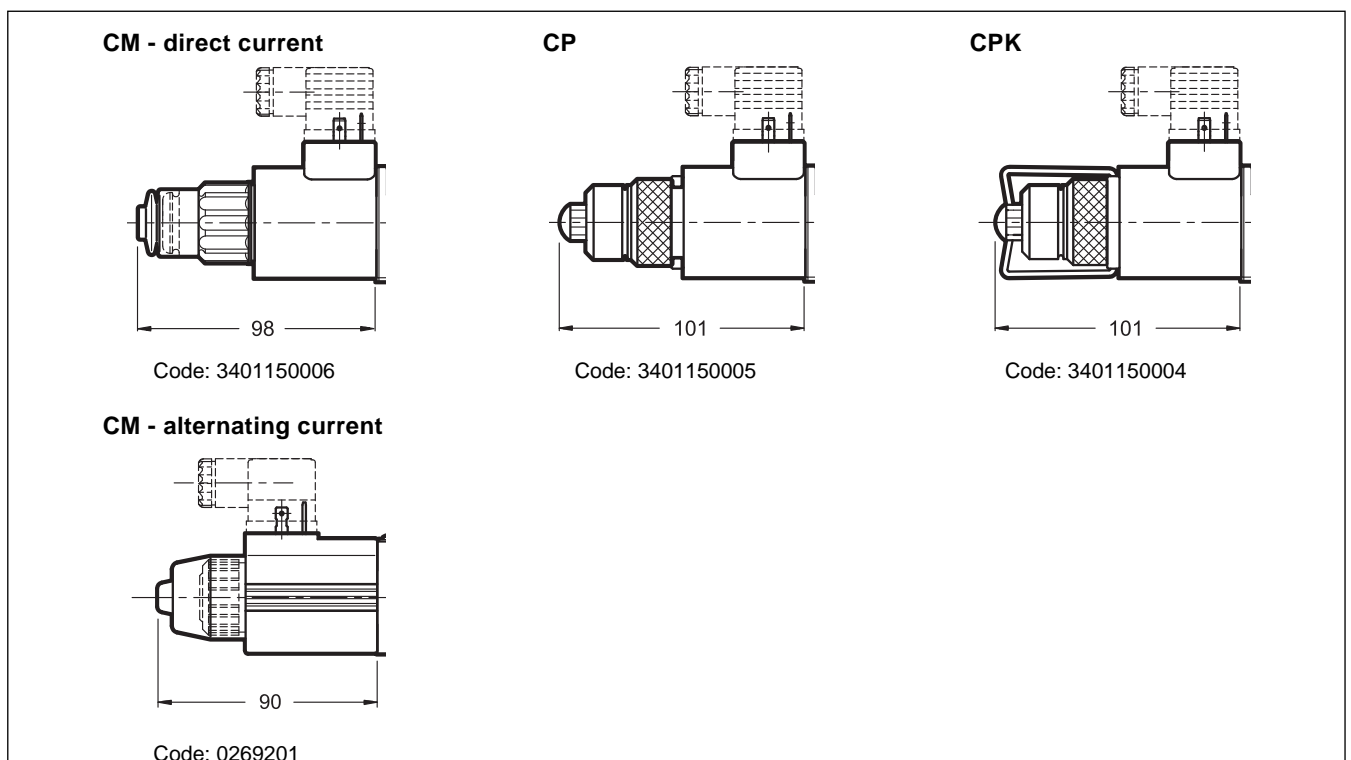
NOTE: The mere connector type K12 (DUAL DIN) spare part can be ordered with the code 0672136.

14 - MANUAL OVERRIDES

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.

Three different manual override version are available upon request:

- **CM**: manual override boot protected
- **CP**: Push manual override (for DC valves only)
- **CPK**: Push manual override with mechanical retention (for DC valves only)

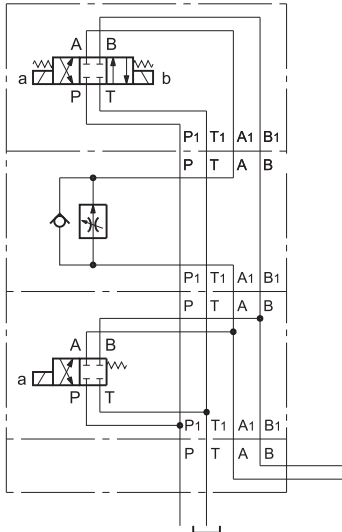


15 - APPLICATION EXAMPLES

Example of circuit used to drive working units with fast approach, adjustable working speed and fast return.

Example of circuit used to drive working units with fast approach and adjustable working speed in both directions.

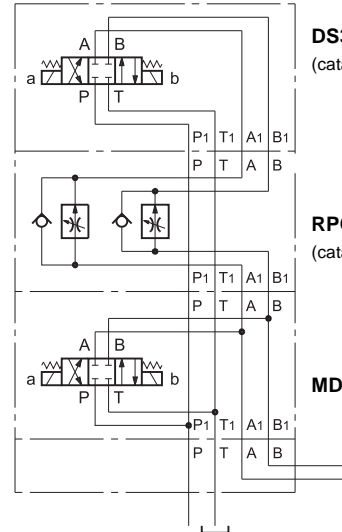
DS3-S1
(catalogue 41150)



RPC1-M/A
(catalogue 66200)

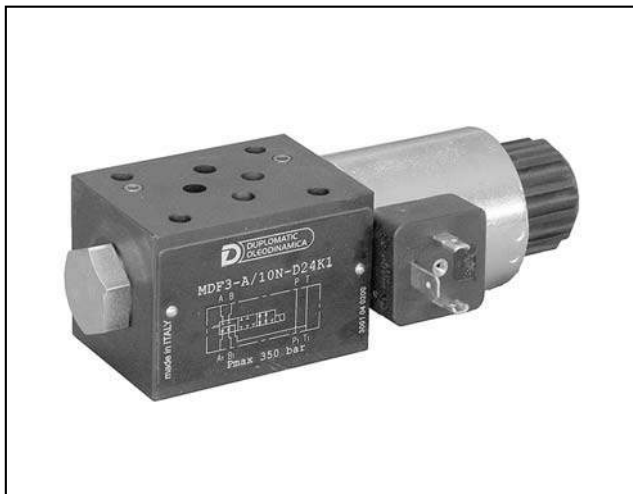
MDS3-SA1

DS3-S1
(catalogue 41150)



RPC1-M/D
(catalogue 66200)

MDS3-S1



MDF3

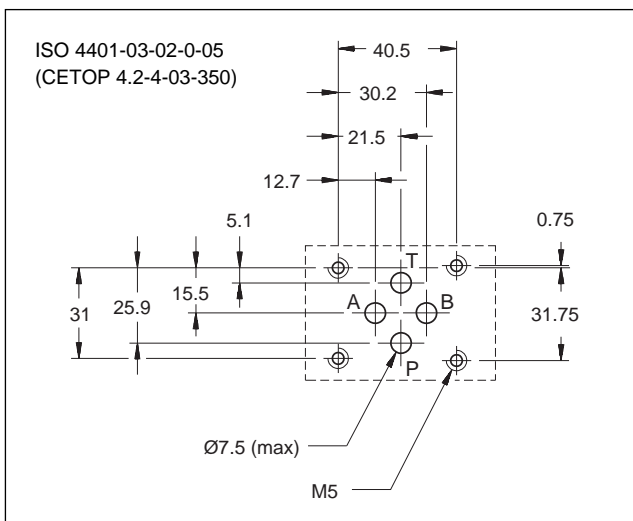
SHUT-OFF SOLENOID VALVE

SERIES 10

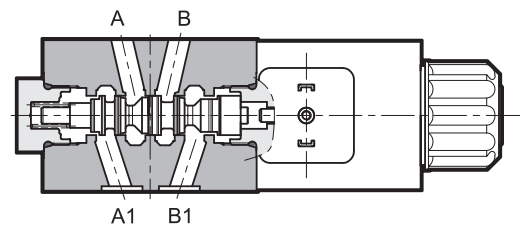
MODULAR VERSION
ISO 4401-03 (CETOP 03)

p max 350 bar
Q max 50 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



- ... Shut-off solenoid valve, direct-acting, available in two versions at rest: with lines blocked and with unloading lines.
- ... It is normally used with directional control servovalves to guarantee the circuit's safety if there is a power failure.
- ... Wet armature solenoids with interchangeable coils are used (for further information see par. 6).

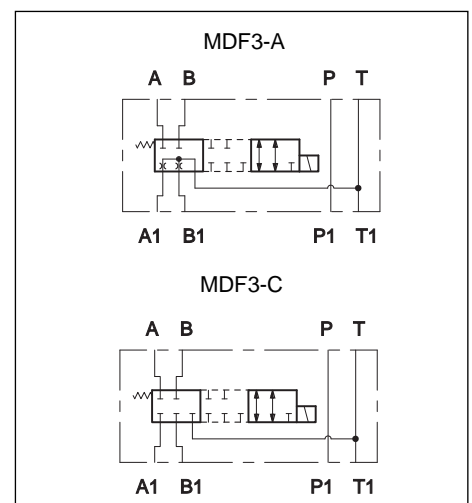
SPOOL TYPE (see hydraulic symbols table)

Type **•AŽ**: it is used to unload the lines, with the valve at rest.
Type **•CŽ**: it is used to block the lines, with the valve at rest.

PERFORMANCE RATINGS (working with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	50
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	1,5

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

	M	D	F	3	-		/	10		-		K1
--	----------	----------	----------	----------	---	--	---	-----------	--	---	--	-----------

Modular solenoid valve

FAIL SAFE feature

ISO 4401-03 (CETOP 03) size

Spool type:
A = open (with lines A1 and B1 in T at rest)
C = closed (with lines A1 and B1 closed, at rest)

Coil electrical connection:
 plug for connector type DIN 43650
(standard)

Power supply:
D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils
 (see **NOTE**)

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

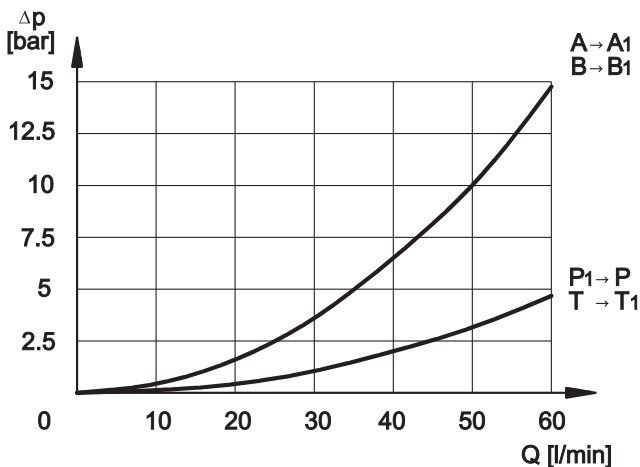
Series: (the overall and mounting dimensions remain unchanged from 10 to 19)

NOTE: the locking ring of the coil and the relevant O-Rings are supplied together with valves.

2 - 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.

3 - PRESSURE DROPS p-Q (obtained with viscosity 36 cSt at 50 °C)



4 - SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

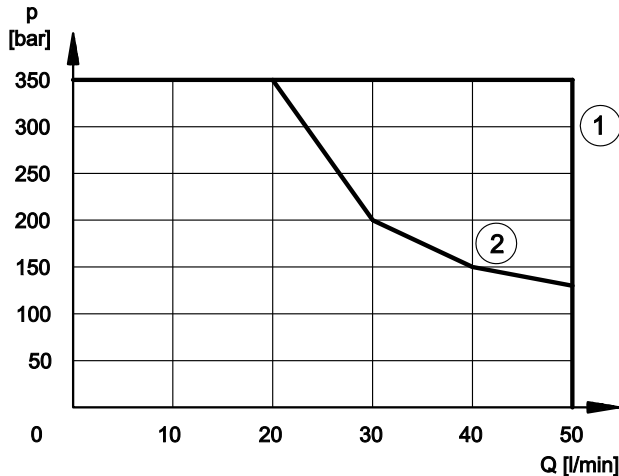
TIMES	
ENERGIZING	DE-ENERGIZING
60 ÷ 90 ms	20 ÷ 50 ms

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/15.



- 1) Curve related to the de-energizing of the solenoid valve
Curve related to the energizing of the solenoid valve, without any flow in A and B lines
- 2) Curve related to the energizing of the solenoid valve, with flow in A and B lines

6 - ELECTRICAL FEATURES

6.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	18.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation	IP 65 (NOTE 2) class H class F

6.2 - Current and absorbed power

The table shows current and power consumption values relevant to the different coil types for DC.

The rectified current supply takes place by fitting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000), by considering a reduction of the operating limits of about 5-10%.

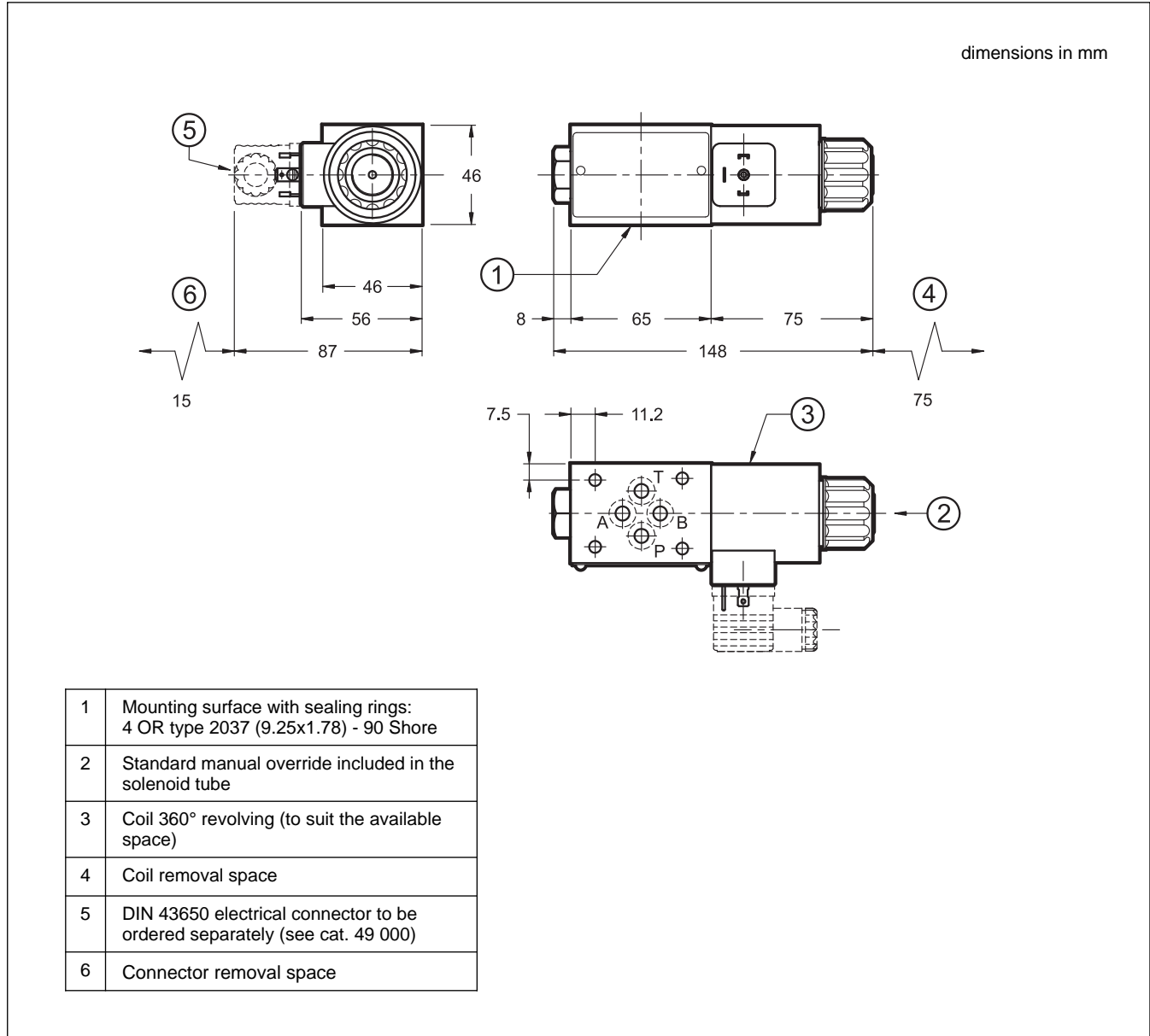
Coils for direct current (values ± 5%)

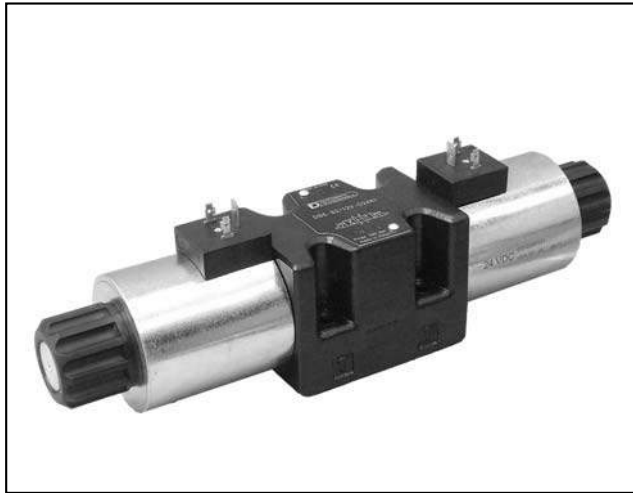
Suffix	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt. [W]	Coil code
D12	12	4,4	2,72	32,6	1903080
D24	24	18,6	1,29	31	1903081
D48	48	78,6	0,61	29,3	1903083
D110	110	423	0,26	28,6	1903084
D220	220	1692	0,13	28,6	1903085

7 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without the connectors. They must be ordered separately.
For the identification of the connector type to be ordered, please see catalogue 49 000.

8 - OVERALL AND MOUNTING DIMENSIONS





DS5

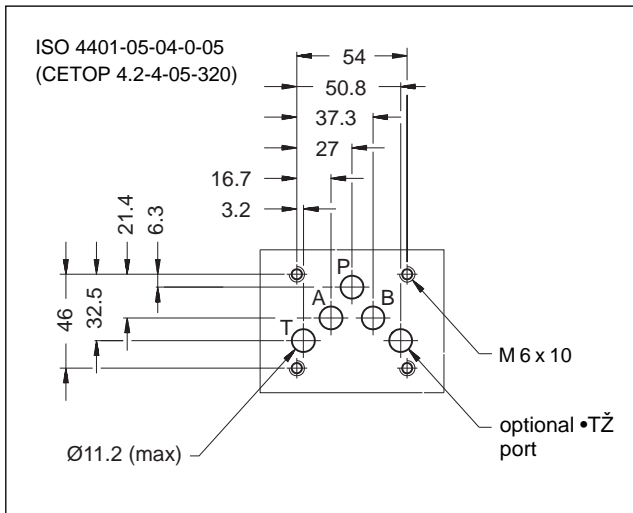
SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

SERIES 12

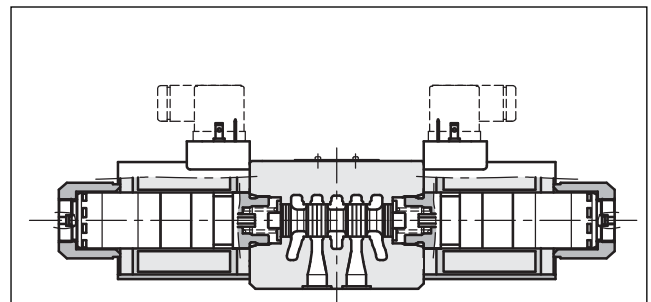
SUBPLATE MOUNTING
ISO 4401-05 (CETOP 05)

p max 320 bar
Q max 150 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



- „ Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401 (CETOP RP121H).
- „ The valve is supplied with 3 or 4 way designs and with several interchangeable spools with different porting arrangements.

PERFORMANCE RATINGS (with mineral oil of viscosity of 36 cSt at 50°C)

		DC	AC
Maximum operating pressure	P - A - B ports	320	
	T port - standard version	210	140
	T port - version with Y port (ext.drain)	320	-
Maximum flow rate	l/min	150	120
Pressure drops p-Q		see paragraph 4	
Operating limits		see paragraph 6	
Electrical features		see paragraph 7	
Electrical connections		see paragraph 11	
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 20/18/15	
Recommended viscosity	cSt	25	
Mass:	single solenoid valve	4,5	3,6
	double solenoid valve	6,1	4,3

- „ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (see paragraph 7).
- „ The valve is available with DC or AC solenoids. DC solenoids can also be fed with AC power supply, by using connectors with a built-in rectifier bridge (see paragraph 7.2).
- „ The DC solenoids DS5 directional valve is available in the following special versions:
 - version with Y external subplate drain port, (see paragraph 14.1).
 - version with soft-shifting (see paragraph 14.4)
 - version with adjustable •soft-shiftŽ device (see paragraph 14.5)

1 - IDENTIFICATION CODE

D	S	5	-		/	12	-			/		
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Solenoid operated directional control valve

ISO 4401-05 (CETOP 05) size

Spool type (see par. 3)

S* **TA**
SA* **TB**
SB* **RK**

Series: _____
 (the overall and mounting dimensions remain unchanged from 10 to 19)

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

DC power supply _____

D12 = 12 V
D24 = 24 V
D28 = 28 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see **NOTE 1**)

AC power supply

A24 = 24 V - 50 Hz.
 Not available for S4, SA4, SB4 spools
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see **NOTE 1**)
F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

Option: Surface treatment not standard. Omit if not required (see **NOTE 2**)

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected (only for DC version)
CK = knob manual override (only for DC version)

Coil electrical connection (see par. 11):
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR (available on **D12** and **D24** coils only)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on **D12** and **D24** coils only)

NOTE 1: Coils locking ring and related OR are supplied together with valves.

NOTE 2: The valve is supplied with standard surface treatment of phosphating 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 ÷ 40

W4 = Gas nitriding with oxidation process. Black colour.

2 - 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.

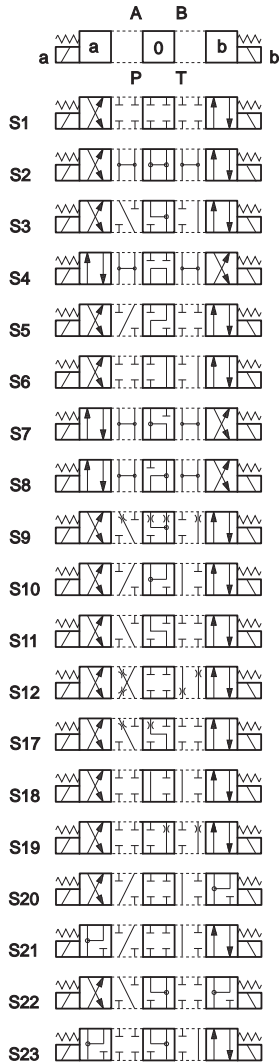
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

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

3 - SPOOL TYPE

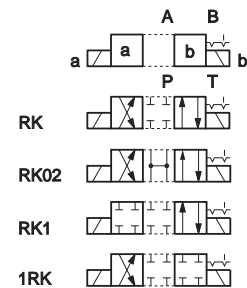
Type S*:

2 solenoids - 3 positions
with spring centering



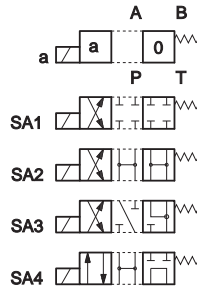
Type RK:

2 solenoids - 2 positions
with mechanical retention



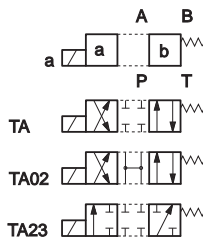
Type SA*:

1 solenoid side A
2 positions (central + external)
with spring centering



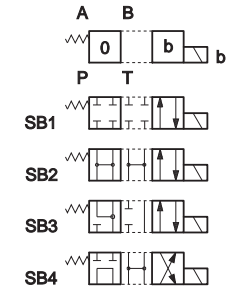
Type TA:

1 solenoid side A
2 external positions
with return spring



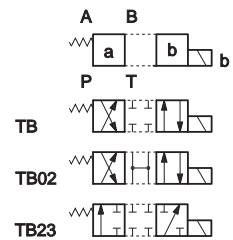
Type SB*:

1 solenoid side B
2 positions (central + external)
with spring centering



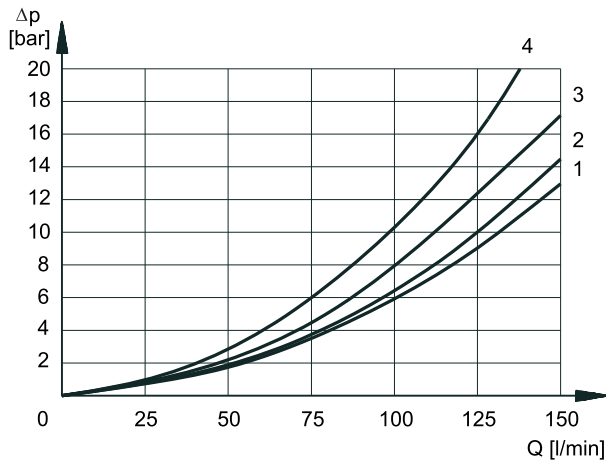
Type TB:

1 solenoid side B
2 external positions
with return spring



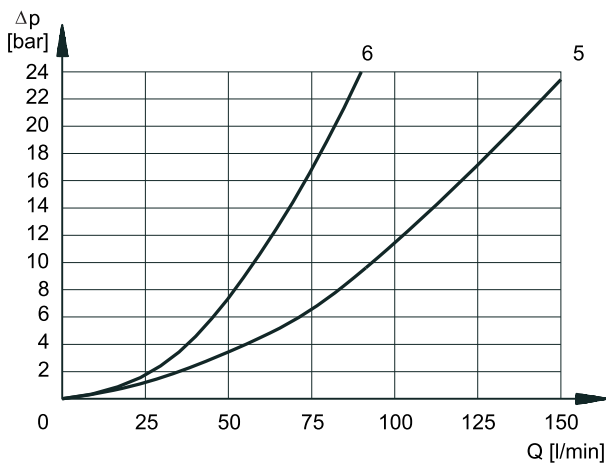
Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

4 - PRESSURE DROPS p-Q (obtained with viscosity 36 cSt at 50 °C)



PRESSURE DROPS WITH VALVE ENERGIZED

SPOOL TYPE	FLOW DIRECTION			
	P-A	P-B	A-T	B-T
	CURVES ON GRAPH			
S1, SA1, SB1	2	2	1	1
S2, SA2, SB2	3	3	1	1
S3, SA3, SB3	3	3	2	2
S4, SA4, SB4	1	1	2	2
S5	2	1	1	1
S6, S11	3	3	2	2
S7, S8	1	1	2	2
S9	3	3	2	2
S10	1	1	1	1
S12	2	2	1	1
S17, S19	2	2	1	1
S18	1	2	1	1
S20, S21				
S22, S23				
TA, TB	3	3	2	2
TA02, TB02	3	3	2	2
TA23, TB23	4	4		
RK	3	3	2	2
RK02	3	3	2	2
RK1, 1RK	3	3	2	2



PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P-A	P-B	A-T	B-T	P-T
	CURVES ON GRAPH				
S2, SA2, SB2					5
S3, SA3, SB3			6	6	
S4, SA4, SB4					5
S5		3			
S6				6	
S7					5
S8					5
S10	3	3			
S11			6		
S18	3				
S22					
S23					

5 - SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

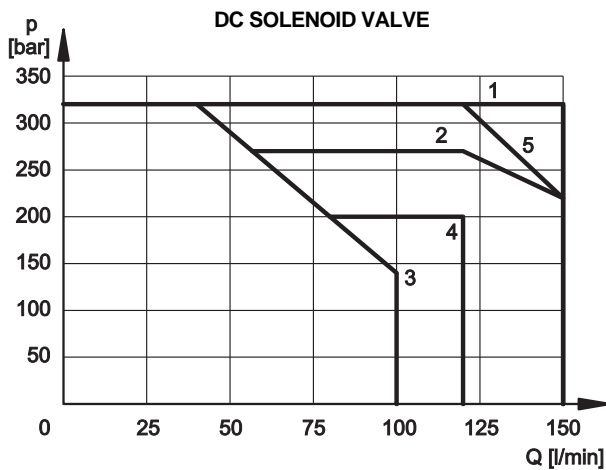
COIL TYPE	TIMES [ms]	
	ENERGIZING	-ENERGIZING
DC	100 ÷ 150 ms	20 ÷ 50 ms
AC	15 ÷ 30 ms	20 ÷ 50 ms

6 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

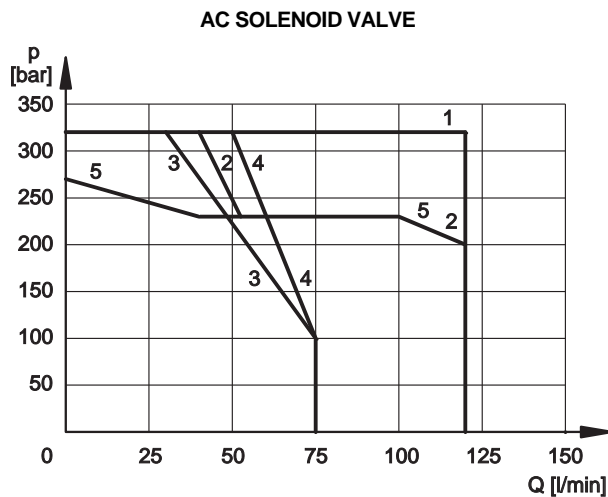
The values have been obtained according to ISO 64003 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



SPOOL TYPE	CURVE	
	P-A	P-B
S1, SA1, SB1	1	1
S2, SA2, SB2	1	1
S3, SA3, SB3	2	2
S4, SA4, SB4	3	3
S5	1	1
S6	2	1
S7	3	3
S8	3	3
S9	1	1
S10	1	1
S11	1	2
S12	1	1

SPOOL TYPE	CURVE	
	P-A	P-B
S17	1	4
S18	1	1
S19	4	1
S20		
S21		
S22		
S23		
TA, TB	5	5
TA02, TB02	4	4
TA23, TB23	1	1
RK	1	1
RK02	1	1
RK1, 1RK	1	1



SPOOL TYPE	CURVE	
	P-A	P-B
S1, SA1, SB1	1	1
S2, SA2, SB2	2	2
S3, SA3, SB3	2	2
S4, SA4, SB4	4	4
S5	1	1
S6	2	1
S7	3	3
S8	3	3
S9	2	2
S10	1	1
S11	1	2
S12	1	1

SPOOL TYPE	CURVE	
	P-A	P-B
S17	1	5
S18	1	1
S19	5	1
S20		
S21		
S22		
S23		
TA, TB	1	1
TA02, TB02	5	5
TA23, TB23	1	1
RK	1	1
RK02	1	1
RK1, 1RK	1	1

NOTE:

The values indicated in the graphs are relevant to the standard solenoid valve. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow.

For flow and pressure performances of soft-shifting configuration (options F) see par. 14.4

Flow and pressure performances of adjustable soft-shifting device configurations (options S) are influenced by the set shifting time.

7 - ELECTRICAL FEATURES

7.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated, to suit the available space.

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K7 DEUTSCH DT04 male	x	x	x (*)

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

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	15.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95/EC
CLASS OF PROTECTION: Coil insulation (VDE 0580) Impregnation:	class H class F

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see CAT. 49 000).

7.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC.

The rectified current supply takes place by fitting the valve with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000).

However, when supplying the valve with rectified current, it is necessary to consider a reduction of the operating limits by 15-20% approx.

Coils for direct current (values ± 5%)

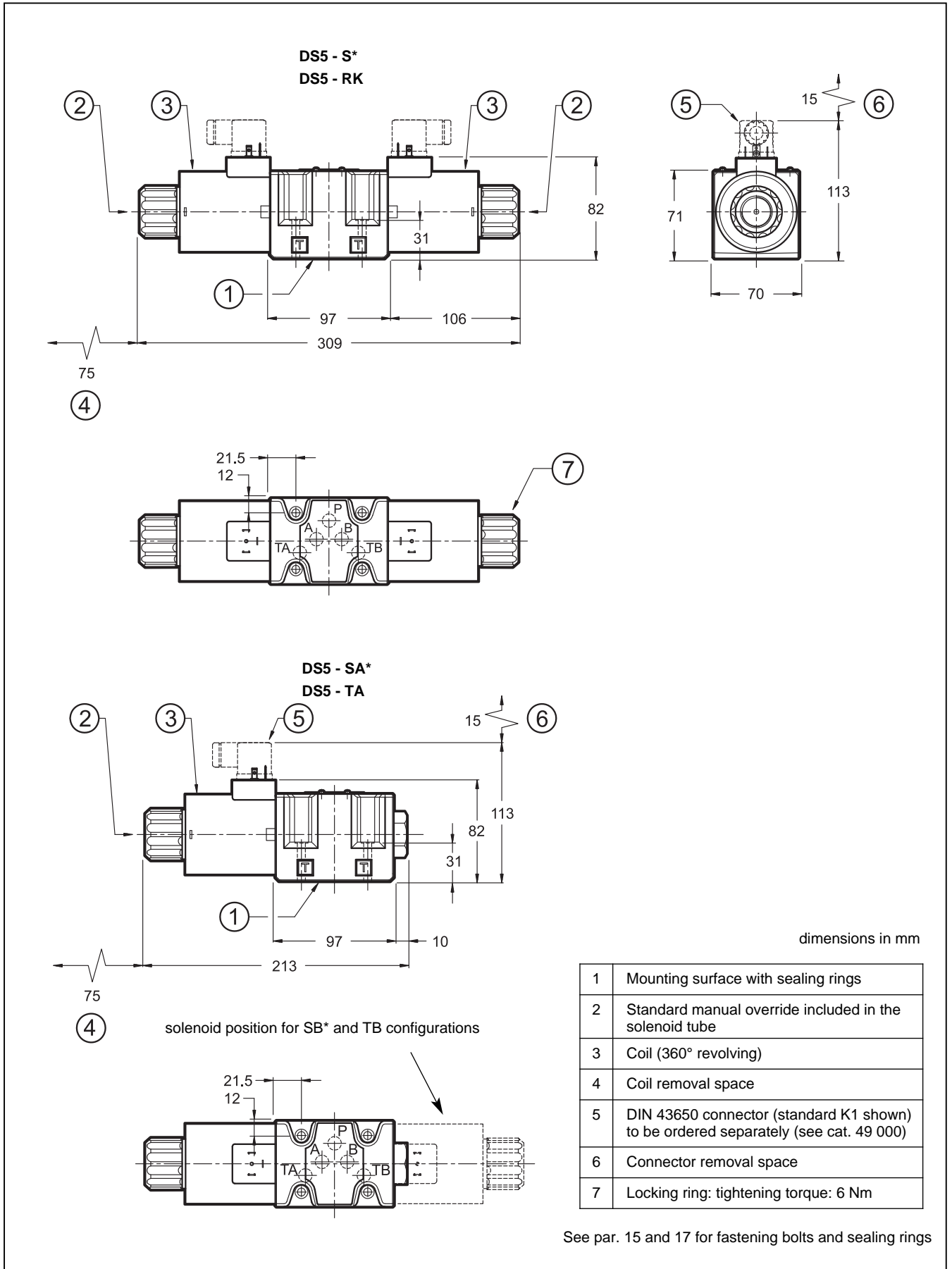
Suffix	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt. [W]	Coil code		
					K1	K2	K7
D12	12	3,2	3,75	45	1903200	1903210	1903220
D24	24	12	2	48	1903201	1903211	1903221
D28	28	16,2	1,72	48	1903202		
D48	48	49	0,98	47	1903203		
D110	110	250	0,44	48	1903204		
D220	220	1050	0,21	47	1903205		

7.3 Current and absorbed power for AC solenoid valve

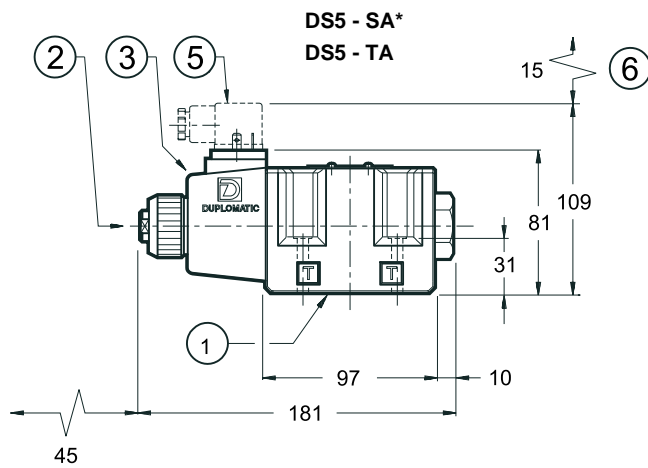
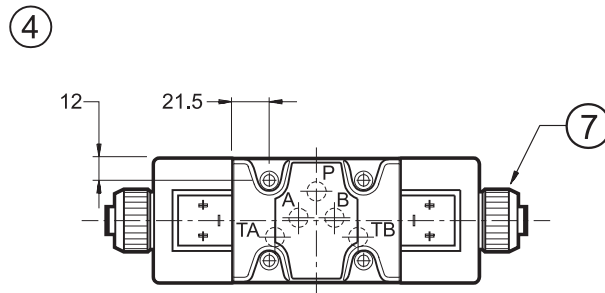
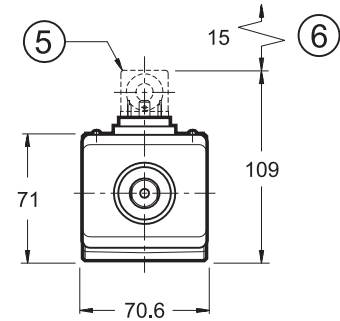
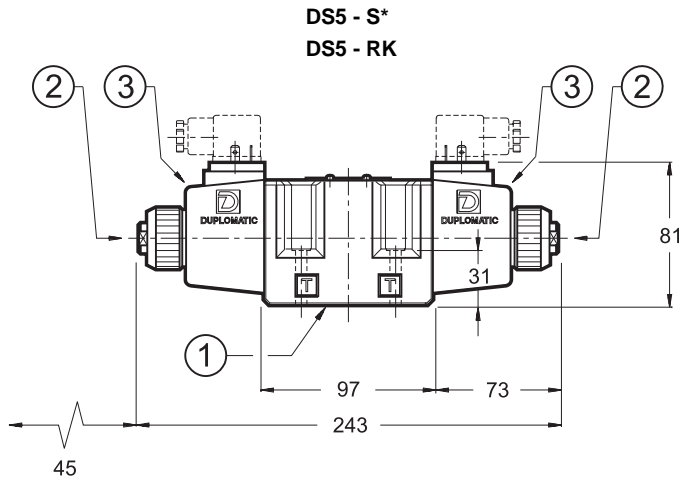
The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

Suffix	Nominal voltage [V]	Frequency [Hz]	Resistance at 20°C [ohm]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code
A24	24	50	0,53	25	3,96	600	95	1902890
A48	48		2,09	12,5	2,3	600	110	1902891
A110	110V-50Hz	50/60	10,9	5,2	0,96	572	105	1902892
	120V-60Hz		10,9	5,2	0,89	572	105	
A230	230V-50Hz		52,7	2,8	0,46	644	105	1902893
	240V-60Hz		52,7	2,8	0,38	644	105	
F110	110	60	8,80	5,2	0,95	572	105	1902894
F220	220		35,2	2,7	0,48	594	105	1902895

8 - OVERALL AND MOUNTING DIMENSIONS FOR DC SOLENOID VALVES

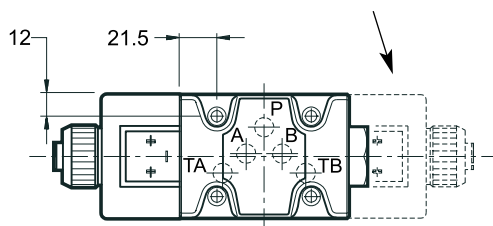


9 - OVERALL AND MOUNTING DIMENSIONS FOR AC SOLENOID VALVES



dimensions in mm

solenoïd position for SB* and TB configurations

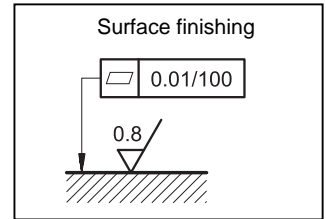


1	Mounting surface with sealing rings
2	Standard manual override included in the solenoid tube
3	Coil (360° revolving)
4	Coil removal space
5	DIN 43650 connector - to be ordered separately (see cat. 49 000)
6	Connector removal space
7	Locking ring: tightening torque: 4.5 - 5 Nm

See par. 16 and 17 for fastening bolts and sealing rings

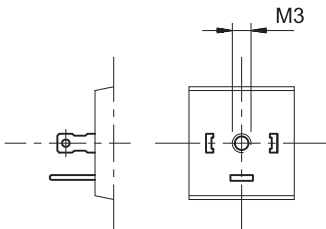
10 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal. Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.

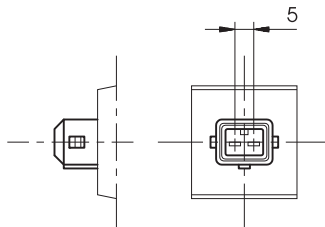


11 - ELECTRIC CONNECTIONS

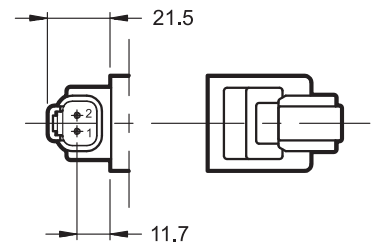
connection for DIN 43650 connector type code **K1 (standard)**



connection for AMP JUNIOR connector type code **K2**



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

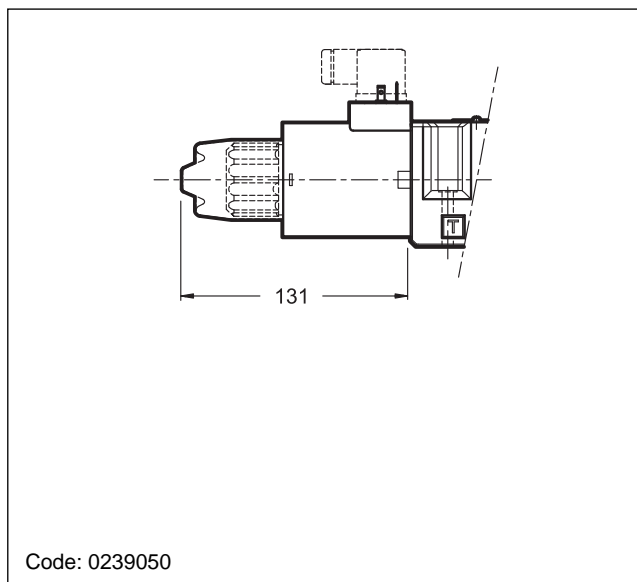


12 - ELECTRIC CONNECTORS

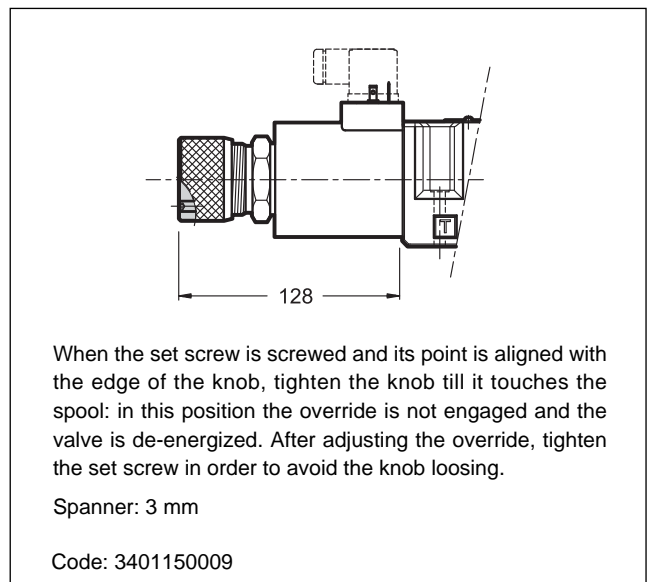
The solenoid operated valves are delivered without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. For K2 and K7 connection type the related connectors are not available.

13 - MANUAL OVERRIDES FOR DC SOLENOID VALVES

13.1 - CM - Manual override, boot protected



13.2 - CK-DS5/10 Knob manual override



14 - SPECIAL VERSIONS FOR DC SOLENOID VALVE

14.1 - Identification code for external drain version

D	S	5	-	/	12	-	K1	/	Y		
----------	----------	----------	---	---	-----------	---	-----------	---	----------	--	--

Solenoid operated directional control valve

ISO 4401-05 (CETOP 05) size

Spool type (see par. 3)

Series n.: _____
(the overall and mounting dimensions remain unchanged from 10 to 19)

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

Coil type _____

D12 = 12 V
D24 = 24 V
D28 = 28 V
D48 = 48 V
D110 = 110 V
D220 = 220 V

NOTE :The valve is supplied with standard surface treatment of phosphating 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 ÷ 40

W4 = gas nitriding with oxidation process. Black colour.

Option: Surface treatment not standard. Omit if not required (see **NOTE**)

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected
CK = knob manual override

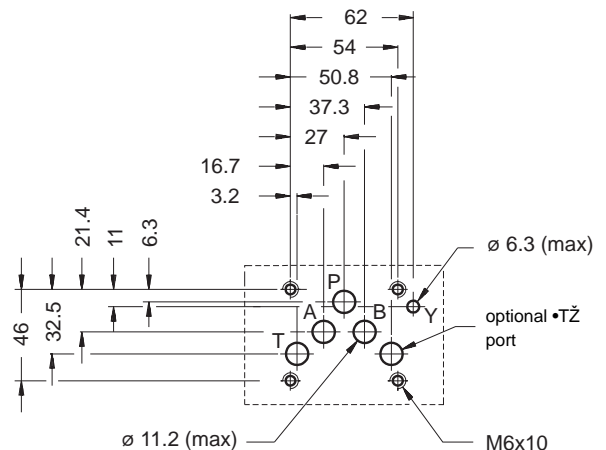
Port for subplate external drain

Coil electrical connection (see par. 11):
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR (available on **D12** and **D24** coils only)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on **D12** and **D24** coils only)

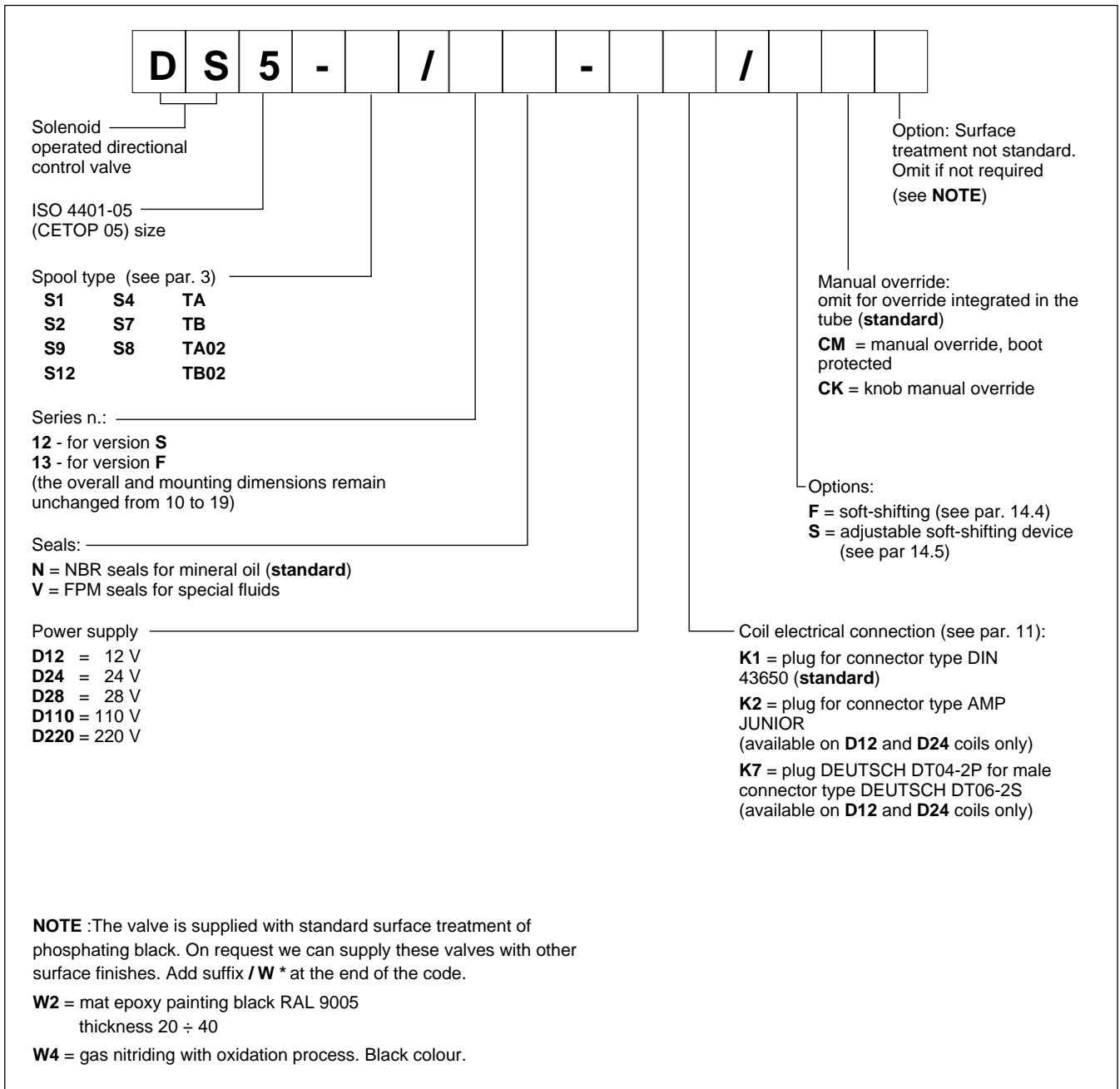
14.2 - Subplate external drain port (option Y)

This version allows the operation with pressures up to 320 bar on the valve T port.

It is a drain port Y realized on the valve mounting interface in compliance with ISO 4401-05-05-0-05 (CETOP 4.2-4-R05). The Y port is connected with the solenoid chamber: in this way the tubes are not stressed by the pressure operating on the valve T port.



14.3- Identification code for soft-shifting versions

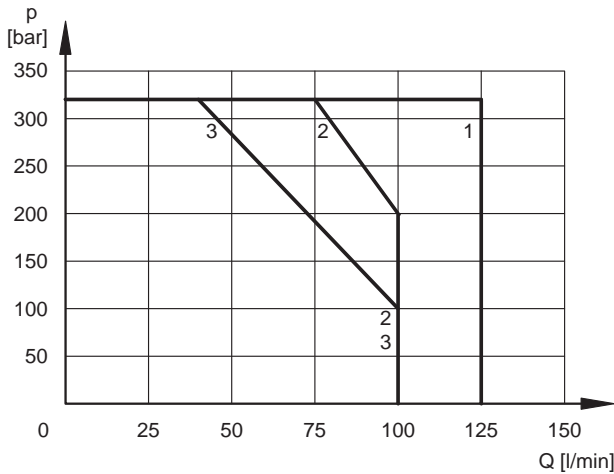


14.4 - Fixed restrictor for soft-shifting (option F)

This version enables hydraulic actuators to perform a smooth start and stop by reducing the speed of movement of the valve spool.

The diagram on the side shows the operating limits of the spools available in the soft-shifting version (**NOTE:** for this version, the S9 spool must be used instead of the S3 one). The table on the side shows the switching times. The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

The shifting time and characteristics curves are influenced by the viscosity (and thus by the temperature) of the operating fluid. Moreover, times can vary according to the flow rate and operating pressure values of the valve.



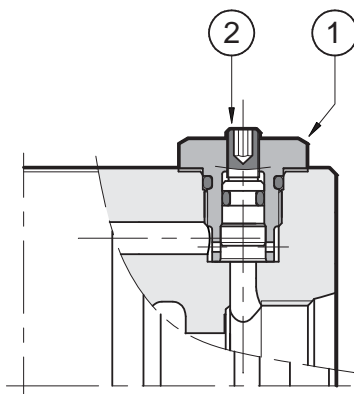
SPOOL TYPE	CURVE		TIMES	
	P-A	P-B	ENERGIZING	DE-ENERGIZING
S1, S12	1	1	300 ÷ 500	300 ÷ 500
S2	2	2	450	200 ÷ 300
S4, S7, S8	3	3	400	400 ÷ 200
S9	1	1	300 ÷ 500	300 ÷ 500
TA, TB	2	2	300 ÷ 400	300 ÷ 400
TA02, TB02	2	2	400	200 ÷ 300

14.5 - Directional solenoid valve with adjustable soft-shifting device (option S)

This solenoid valve is supplied with a suitable device, adjustable by the user, which enables the control of the valve spool shifting time.

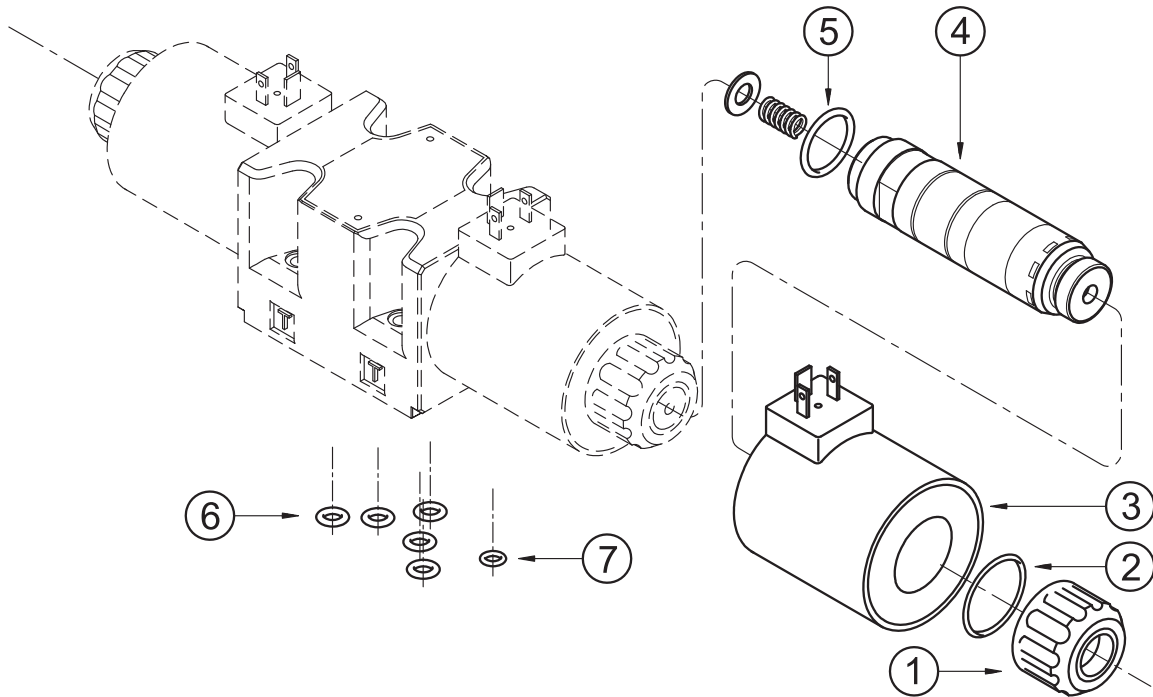
In this way the hydraulic actuators can perform smooth movements, by controlling the valve switching time according to the machine cycle and the inertia of the moving parts.

NOTE: during the first start-up the valve body must be filled with the operating fluid through the tap (1) .



1	Spanner for plug: 17 mm - tightening torque 20 Nm
2	Shifting time adjustment screw countersunk hex spanner 2,5 mm

15 - SPARE PARTS FOR DC SOLENOID VALVE



DC COILS IDENTIFICATION CODE

C 31 - / 21

Supply voltage

D12 = 12 V
D24 = 24 V
D28 = 28 V
D48 = 48 V
D110 = 110 V
D220 = 220 V

Series no.:
 (the overall and mounting
 dimensions remain
 unchanged from 20 to 29)

Coil electrical connection (see par. 11):

K1 = plug for connector type DIN
 43650 (**standard**)

K2 = plug for connector type AMP
 JUNIOR
 (available on **D12** and **D24** coils only)

K7 = plug DEUTSCH DT04-2P for male
 connector type DEUTSCH DT06-2S
 (available on **D12** and **D24** coils only)

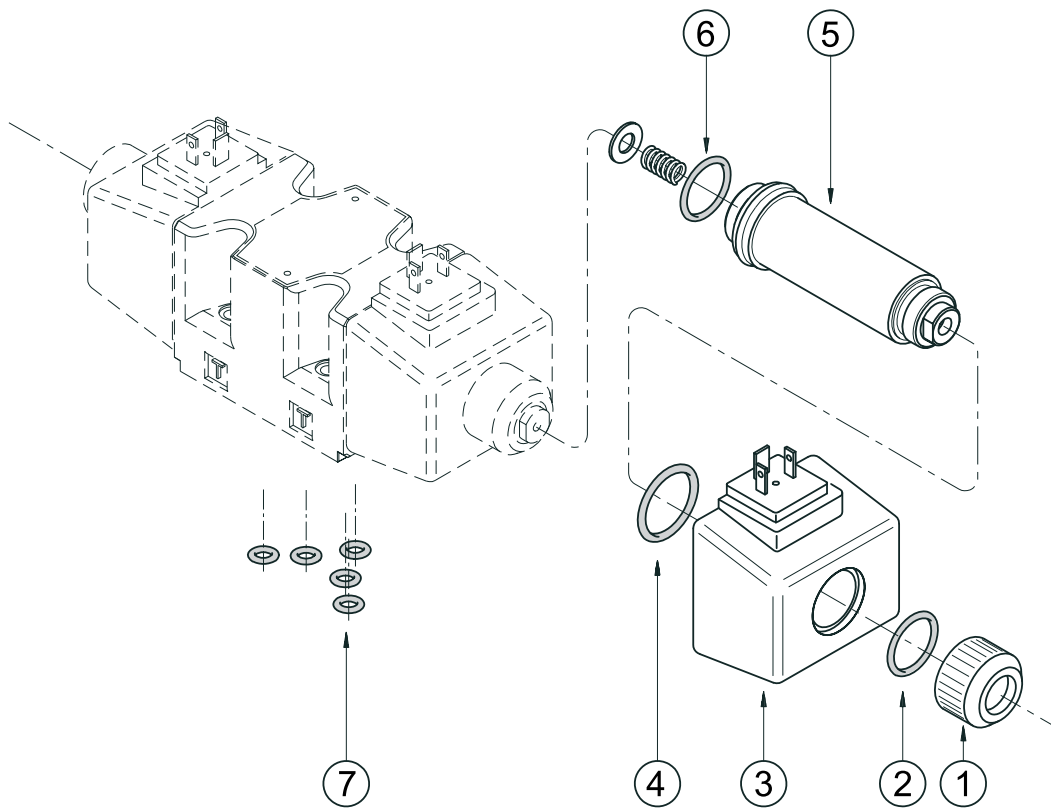
1	Coil locking ring with seal included cod. 0119383 tightening torque: 6 Nm
2	ORM type 0320 - 25 (32x2.5) - 70 Shore
3	Coil (see identification code)
4	Solenoid tube TD31-M27/20N (NBR seals) TD31-M27/20V (FPM seals) NOTE: the solenoid tube is supplied with OR n° 5.
5	OR type 3-912 (23.47x2.95) - 70 Shore
6	N. 5 OR type 2050 (12.42x1.78) - 90 Shore
7	For version with external subplate drain only (Y option): OR type 2037 (9.25x1.78) - 90 Shore

SEALS KIT

The codes here below include O-Rings ref. 2, 5, 6 and 7.

Cod. 1984418 NBR seals
Cod. 1984419 FPM (viton) seals

16 - SPARE PARTS FOR AC SOLENOID VALVE



AC COILS IDENTIFICATION CODE

C 25.4 - K1 / 11

Supply voltage

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz
 120 V - 60 Hz
A230 = 230 V - 50 Hz
 240 V - 60 Hz
F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

Series no.:
 (the overall and
 mounting dimensions
 remain unchanged
 from 10 to 19)

plug for connector type
 DIN 43650 (standard)

SEALS KIT

The codes here below include O-Rings ref. 2, 4, 6 and 7.

Cod. 1984420 NBR seals
Cod. 1984421 FPM (viton) seals

1	Coil locking ring cod. 0119402 tightening torque: 4.5 - 5 Nm
2	OR type 4100 (24.99x3.53) - 90 Shore
3	Coil (see identification code)
4	OR type 2112 (28.30x1.78) - 90 Shore
5	Solenoid tubes: TA25.4-M27/11N (NBR seals) TA25.4-M27/11V (FPM seals) NOTE: the tube is supplied with OR n° 6.
6	OR type 3-912 (23.47x2.95) - 70 Shore
7	N. 5 OR type 2050 (12.42x1.78) - 90 Shore

17 - FASTENING BOLTS

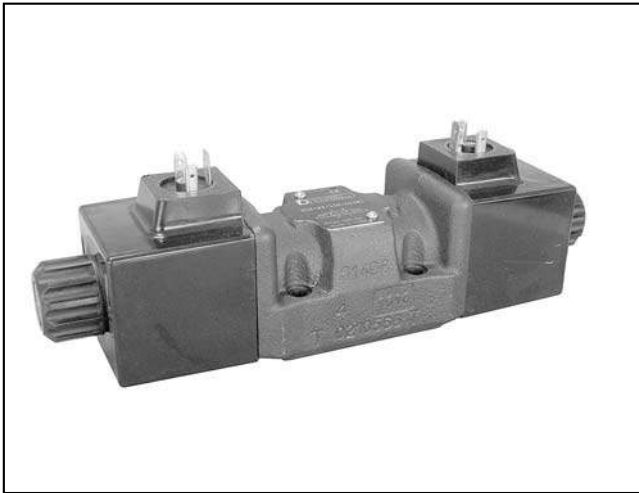
4 bolts SHC M6x40
 Tightening torque 8 Nm

18 - SUBPLATES (See catalogue 51 000)

Type PMD4-AI4G with rear ports 1/2" BSP
 Type PMD4-AL4G with side ports 1/2" BSP



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 www.diplomatic.com • e-mail: sales.exp@diplomatic.com



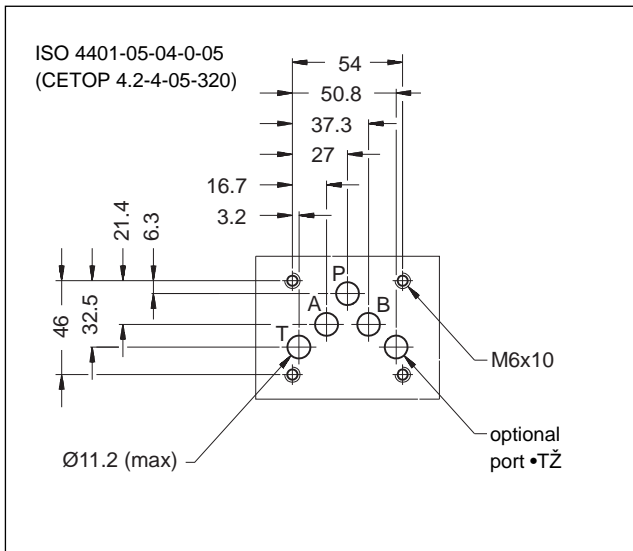
DL5

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION SERIES 10

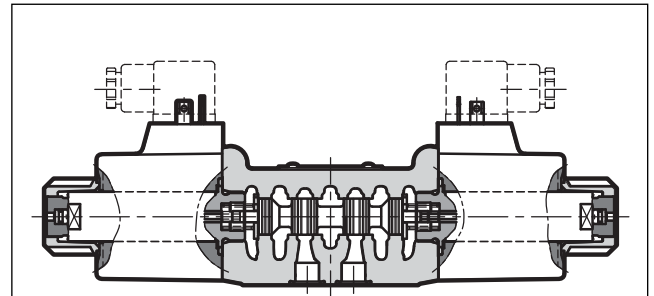
SUBPLATE MOUNTING
ISO 4401-05 (CETOP 05)

p max 320 bar
Q max 125 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



- „ Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401 (CETOP RP 121H) standards.
- „ The valve is suitable for special applications, guaranteed by the reduced solenoid dimensions.
- „ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see paragraph 7).
- „ The valve is supplied with 3 or 4 way designs and with several interchangeable spools with different porting arrangements.
- „ The valve is available with DC or AC current solenoids.

PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

	bar	CC		CA
		210	160	
Maximum operating pressure: - ports P - A - B - port T		320		
Maximum flow rate	l/min	125	100	
Pressure drop p-Q	see paragraph 4			
Operating limits	see paragraph 5			
Electrical features	see paragraph 7			
Electrical connections	DIN 43650			
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 20/18/15			
Recommended viscosity	cSt	25		
Masse: single solenoid valve double solenoid valve	kg	2,8 3,7		

1 - IDENTIFICATION CODE

	D	L	5	-		/	10	-		K1	/		
--	----------	----------	----------	---	--	---	-----------	---	--	-----------	---	--	--

Solenoid operated directional control valve

Model in compact execution

ISO 4401-05 (CETOP 05) size

Spool type (see paragraph 3):

S* **TA***
SA* **TB***
SB* **RK**

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:

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

NOTE 1: Coils locking ring and related OR are supplied together with valves.

NOTE 2: The valve is supplied with standard surface treatment of phosphating black. On request we can supply these valves with other surface finishes. Add suffix **/W*** at the end of the code.

W4 = gas nitriding and oxidation process black colour
W5 = semi-gloss epoxy painting black RAL 9005
 thickness 80 ÷ 100
W6 = gloss polyurethane painting black RAL 9005
 thickness 140

Option:
Surface treatment not standard. Omit if not required (see **NOTE 2**)

Manual override - see par. 12
Omit for override integrated in the tube (**standard**)
CM = boot protected.
For DC version only.
CK = knob.
For DC version only.

Coil electrical connection:
plug for connector type
DIN 43650 (**standard**)

DC power supply

D12 = 12 V
D24 = 24 V
D28 = 28 V
D00 = valve without coils (see **NOTE 1**)

AC power supply

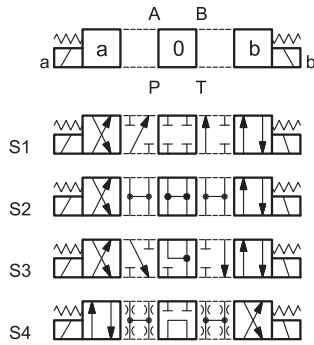
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz
A230 = 230 V - 50 Hz
A00 = valve without coils (see **NOTE 1**)

2 - HYDRAULIC FLUIDS

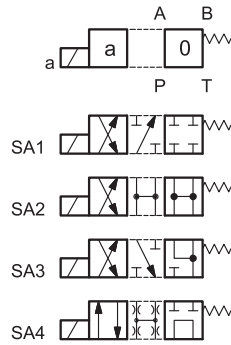
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - SPOOL TYPE

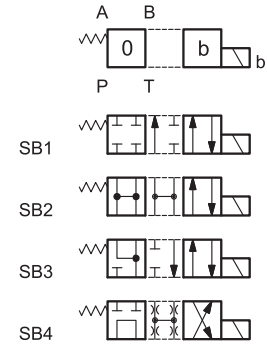
Type S*:
2 solenoids - 3 positions
with spring centering



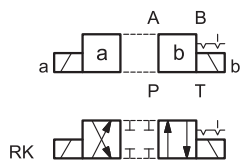
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



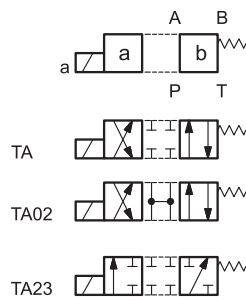
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



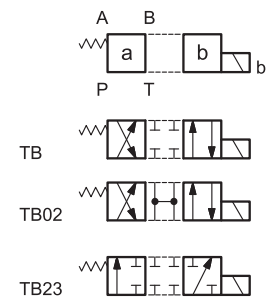
Type RK:
2 solenoids - 2 positions
with mechanical retention



Type TA:
1 solenoid side A
2 external positions
with return spring



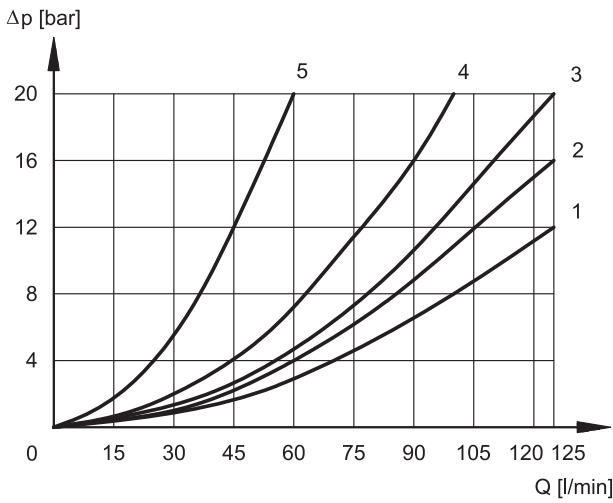
Type TB:
1 solenoid side B
2 external positions
with return spring



NOTE: Others spools available on request only.



4 - PRESSURE DROPS p-Q (obtained with viscosity of 36 cSt at 50 °C)



ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS			
	P A	P B	A T	B T
	CURVES ON GRAPHS			
S1	1	1	2	2
S2	1	1	1	1
S3	1	1	1	1
S4	4	4	4	4
RK	2	2	2	2
TA	2	2	3	3
TA02	2	2	1	1
TA23	3	3	-	-

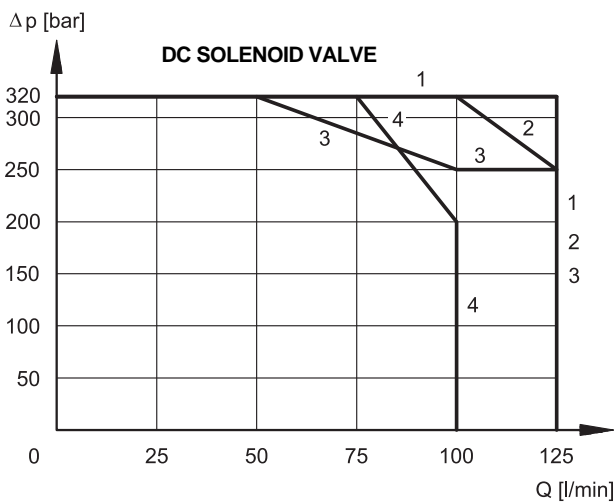
DE-ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS		
	A T	B T	P T
	CURVES ON GRAPHS		
S2	-	-	1
S3	5	5	-
S4	-	-	1

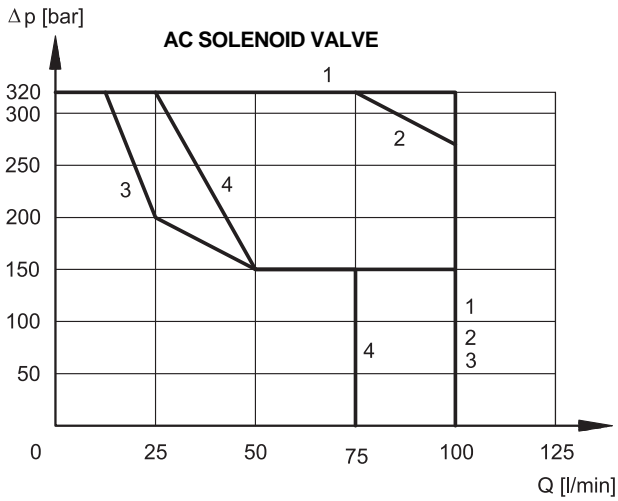
5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

5.1 - Standard operating limits



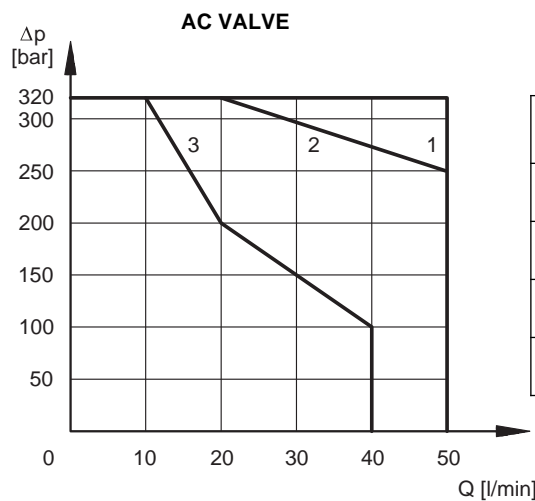
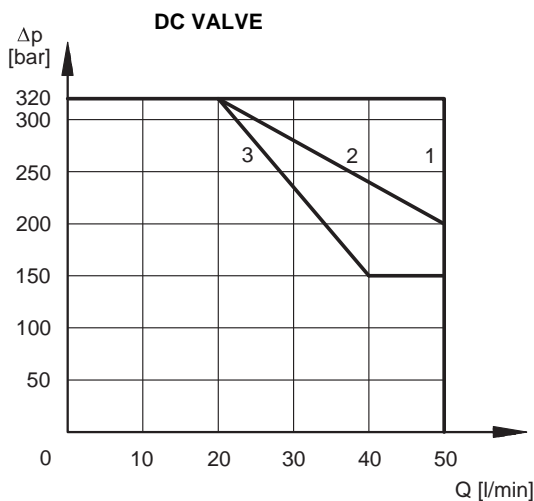
SPOOL	CURVE
S1, S2, RK, TA, TA23	1
S9, TA02	2
S3	3
S4	4



SPOOL	CURVE
S1, RK, TA, TA02, TA23	1
S2	2
S3, S9	3
S4	4

5.2 - 4-way valve in 3-way operation

Operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow.



SPOOL	CURVE	
	DC	AC
TA backpr. A TB backpr. B	2	1
TA02 backpr. A TB02 backpr. B	1	1
TA backpr. B TB backpr. A	3	3
TA02 backpr. B TB02 backpr. A	2	2

6 - SWITCHING TIMES

The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

SUPPLY	TIMES (±10%) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	40 ÷ 90	20 ÷ 50
AC	15 ÷ 30	20 ÷ 50

7 - ELECTRICAL FEATURES

7.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded ring, and can be rotated +/- 90°, to suit the available space.

The interchangeability of coils of different voltages is allowed within the same type of supply current, alternating or direct.

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) - NOTE	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95/EC
CLASS OF PROTECTION : Atmospheric agents CEI EN 60529 Coil insulation (VDE 0580) Impregnation:	IP 65 (*) class H class H

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

NOTE: In order to further reduce the emissions, with DC supply, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

7.2 - DC valve - Current and power consumption

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law: $V = R \times I$

The table shows current and power consumption values for DC types.

	Resistance at 20°C [] (±5%)	Current consumption [A] (±10%)	Power consumption [W] (±10%)	Coil code K1
C22L5-D12K1	2,9	4,14	50	1903150
C22L5-D24K1	12,3	1,95	47	1903151
C22L5-D28K1	16,8	1,67	47	1903152

7.3 - AC valve - Current and power consumption

In alternating current energizing, an initial phase (maximum movement) is seen, during which the solenoid consumes elevated value currents (inrush current); the current values diminish during the plunger stroke until it reaches the minimum values (holding current) when the plunger reaches the stroke end.

The table shows the values of absorption at the inrush and at holding.

	Freq. [VAC/Hz] (±10%)	Resistance at 20°C [] (±5%)	Current consumption at inrush [A] (±10%)	Current consumption at holding [A] (±5%)	Power consumption at inrush (±10%) [VA]	Power consumption at holding (±10%) [VA]	Coil code K1
C26L5-A24K1/10	24/50	0,58	15,1	2,84	362,4	68,2	1931600
C26L5-A48K1/10	48/50	2,34	7,4	1,29	355,2	61,9	1931610
C26L5-A110K1/10	110/50-120/60	12,3	3,6 - 3,3	0,64 - 0,62	396	70,4 - 74,4	1931620
C26L5-A230K1/10	230/50-240/60	51,6	1,8 - 1,6	0,31 - 0,28	414 - 384	71,3 - 67,2	1931630

8 - ELECTRIC CONNECTORS

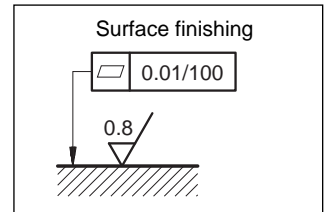
The solenoid valves are not supplied with connector. Connectors must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

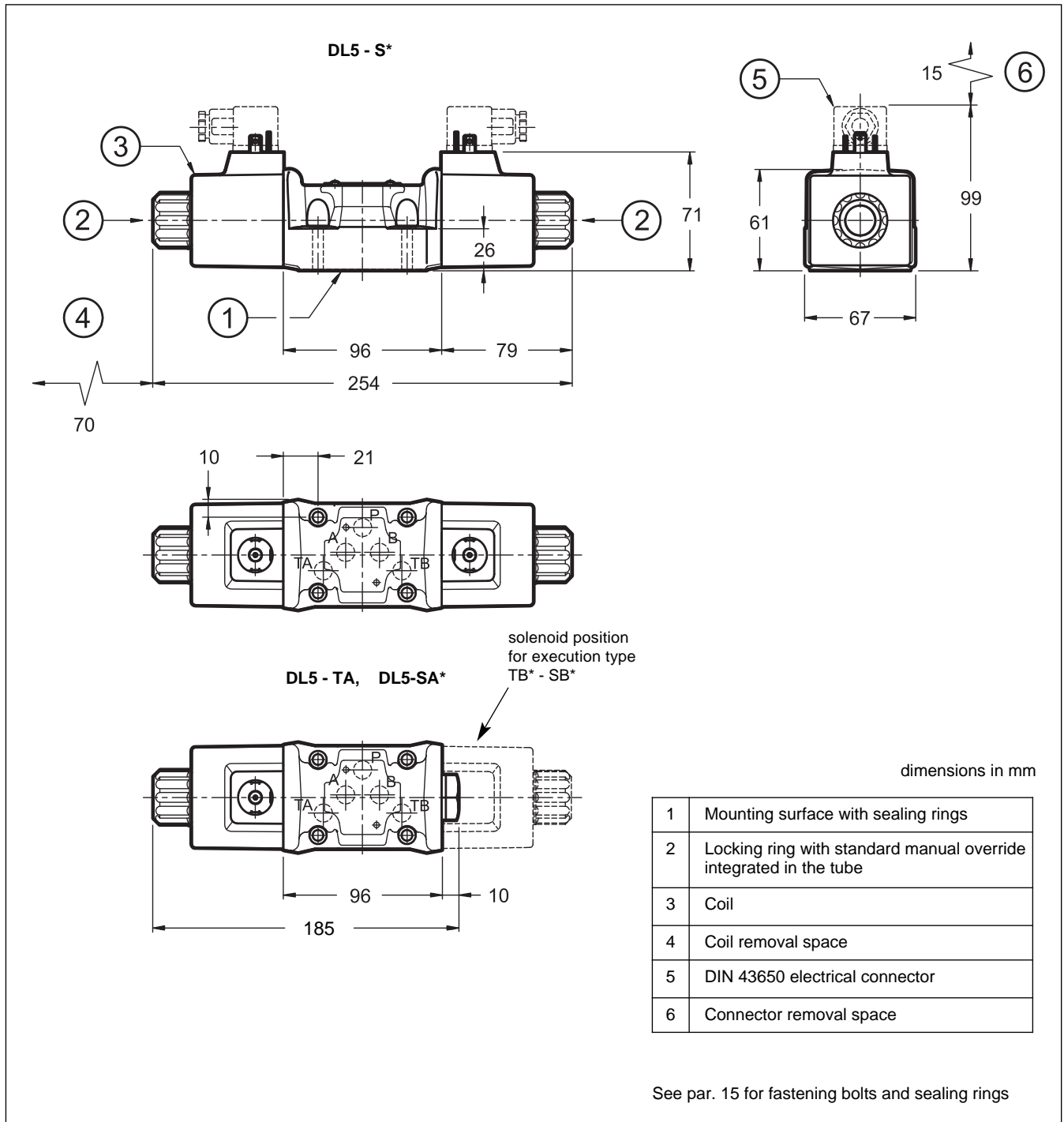
9 - INSTALLATION

The configuration with centering and return springs can be mounted in any position.

Valve fitting takes place by means of screws or tie rods, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

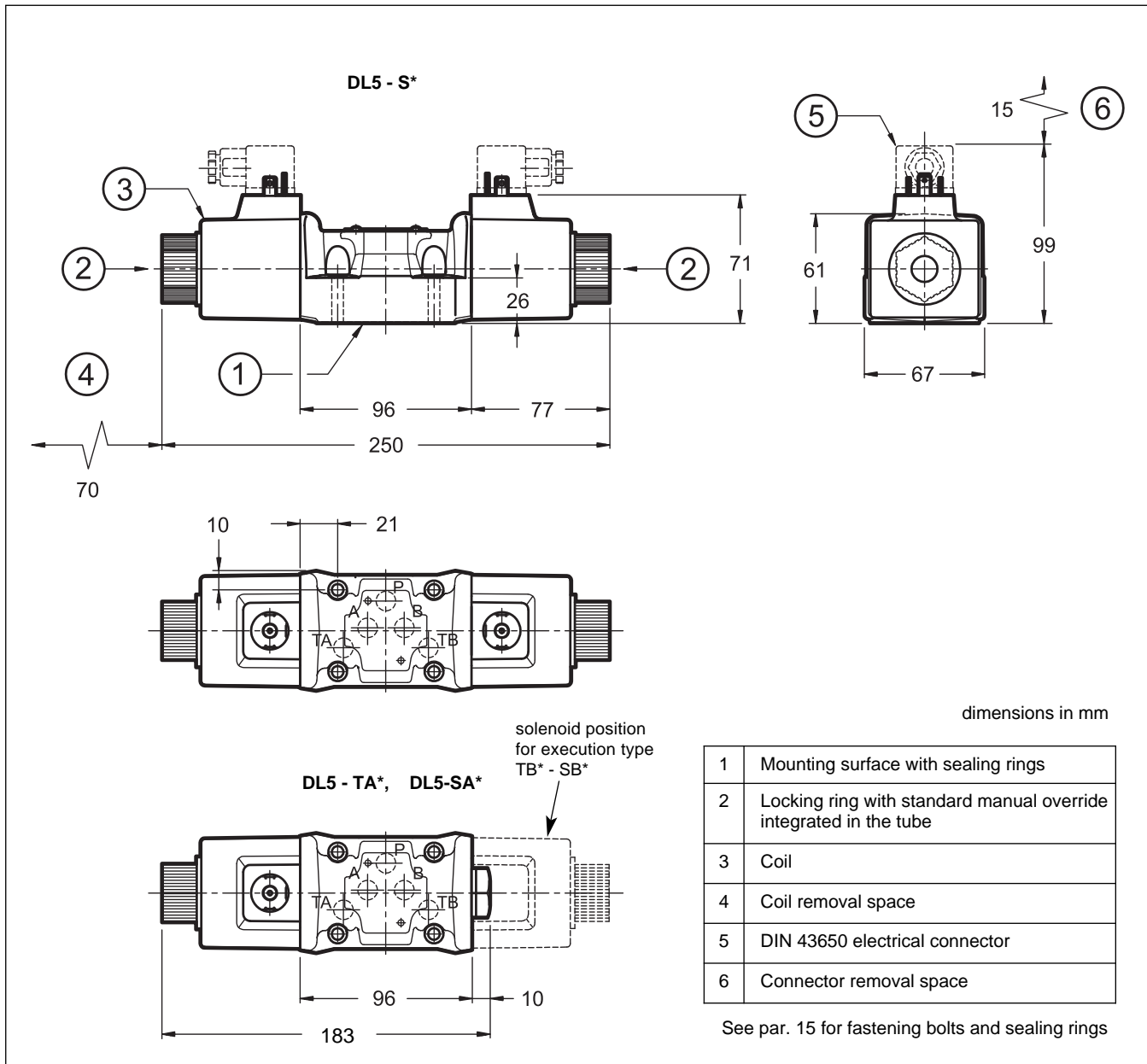


10 - DL5 DC OVERALL AND MOUNTING DIMENSIONS



See par. 15 for fastening bolts and sealing rings

11 - DL5 AC OVERALL AND MOUNTING DIMENSIONS



12 - OPTIONAL MANUAL OVERRIDES

12.1 - Boot protected manual override (only for DC solenoid valve)

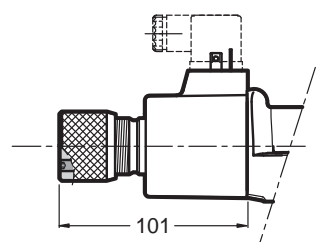
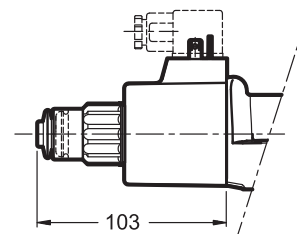
It can be ordered by entering the code **CM** in the identification code at par. 1, or is available as option to be ordered separately: code **3401150006**.

12.2 - Knob manual override (only for DC solenoid valve)

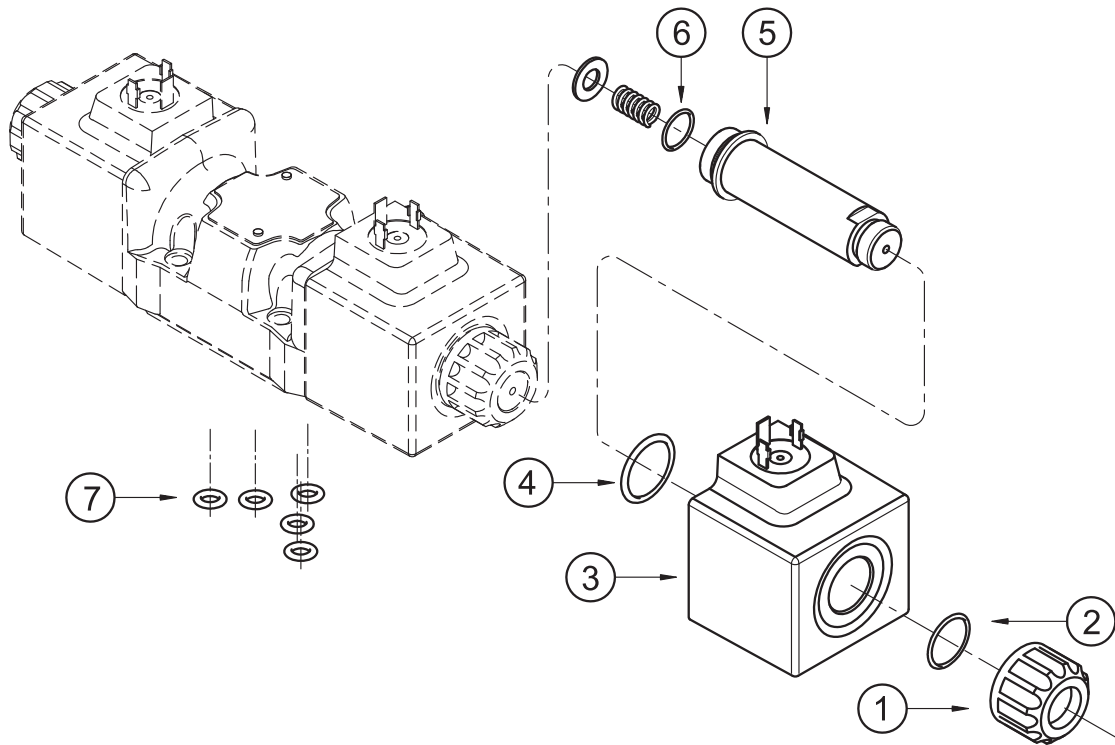
When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosening.

Spanner: 3 mm

The knob override can be ordered by entering the code **CK** in the identification code at par. 1, or is available as option to be ordered separately: code **3401150009**.



13 - SPARE PARTS FOR DC SOLENOID VALVE



IDENTIFICATION CODE FOR DC AND RC COILS

C 22 L5 - K1 / 10

Supply voltage

D12 = 12 V
D24 = 24 V
D28 = 28 V

Series no.:
 (the overall and
 mounting dimensions
 remain unchanged
 from 10 to 19)

Coil electrical connection:
 plug for connector type
 DIN 43650 (**standard**)

1	Coil locking ring - code 0119412
2	ORM-0220-20 - 70 shore
3	Coil (see identification code)
4	ORM-0296-24 (29.6x2.4) - 70 shore
5	Solenoid tube: TD22-DL5/10N (NBR seals) TD22-DL5/10V (FPM seals) (OR n° 6 included)
6	OR type 3.910 (19.18x2.46) - 70 shore
7	N. 5 OR type 2050 (12.42x1.78) - 90 Shore

SEAL KIT

The codes included the OR n° 2, 4, 6 and 7.

Cod. 1985447 NBR seals
Cod. 1985448 FPM seals

14 - SPARE PARTS FOR AC SOLENOID VALVE

IDENTIFICATION CODE FOR AC COILS

C	26	L5	-	K1	/	10
----------	-----------	-----------	---	-----------	---	-----------

Supply voltage _____

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz

Series no.:
 (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection:
 plug for connector type DIN 43650 (standard)

1	Coil locking ring - code. 0119480
2	Coil (see identification code)
3	ORM-0296-24 (29.6x2.4) - 70 shore
4	Solenoid tube: TA26-DL5/10N (NBR seals) TA26-DL5/10V (FPM seals) (OR n° 5 included)
5	OR type 3.910 (19.18x2.46) - 70 shore
6	N. 5 OR type 2050 (12.42x1.78) - 90 Shore

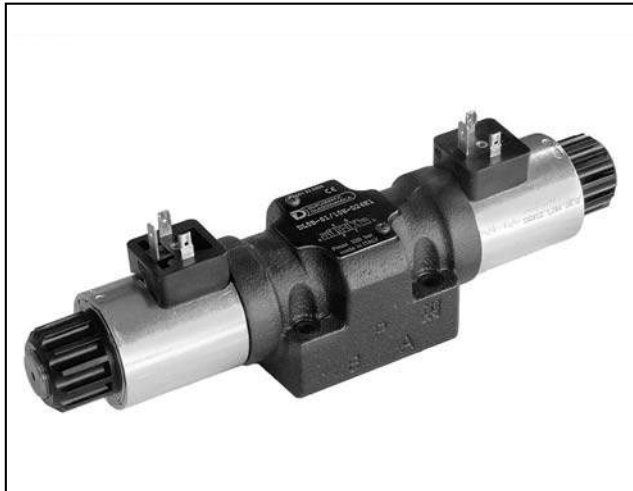
SEAL KIT
 The codes included the OR n° 3, 5 and 6.
Cod. 1985449 NBR seals
Cod. 1985450 FPM seals

15 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 SHC screws ISO 4762 M6x35
Tightening torque: 8 Nm
Sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore

16 - SUBPLATES (see catalogue 51 000)

Type PMD4-AI4G with rear ports - port threading: 3/4" BSP
Type PMD4-AL4G with side ports - port threading: 1/2" BSP



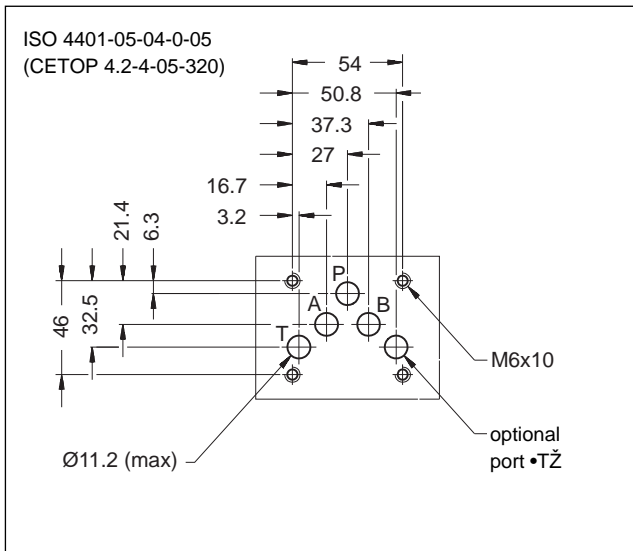
DL5B

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION SERIES 10

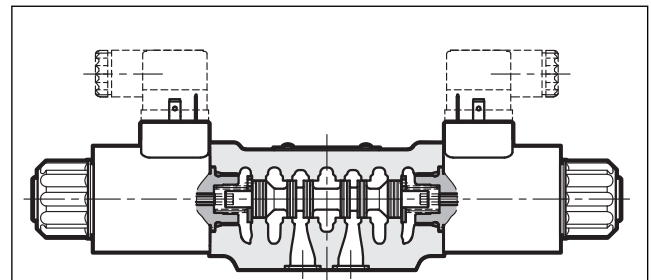
**SUBPLATE MOUNTING
ISO 4401-05 (CETOP 05)**

p max 320 bar
Q max 125 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



„ Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401 (CETOP RP 121H) standards.

„ The valve is suitable for special applications, guaranteed by the reduced solenoid dimensions.

„ The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see paragraph 7).

„ The valve is supplied with 3 or 4 way designs and with several interchangeable spools with different porting arrangements.

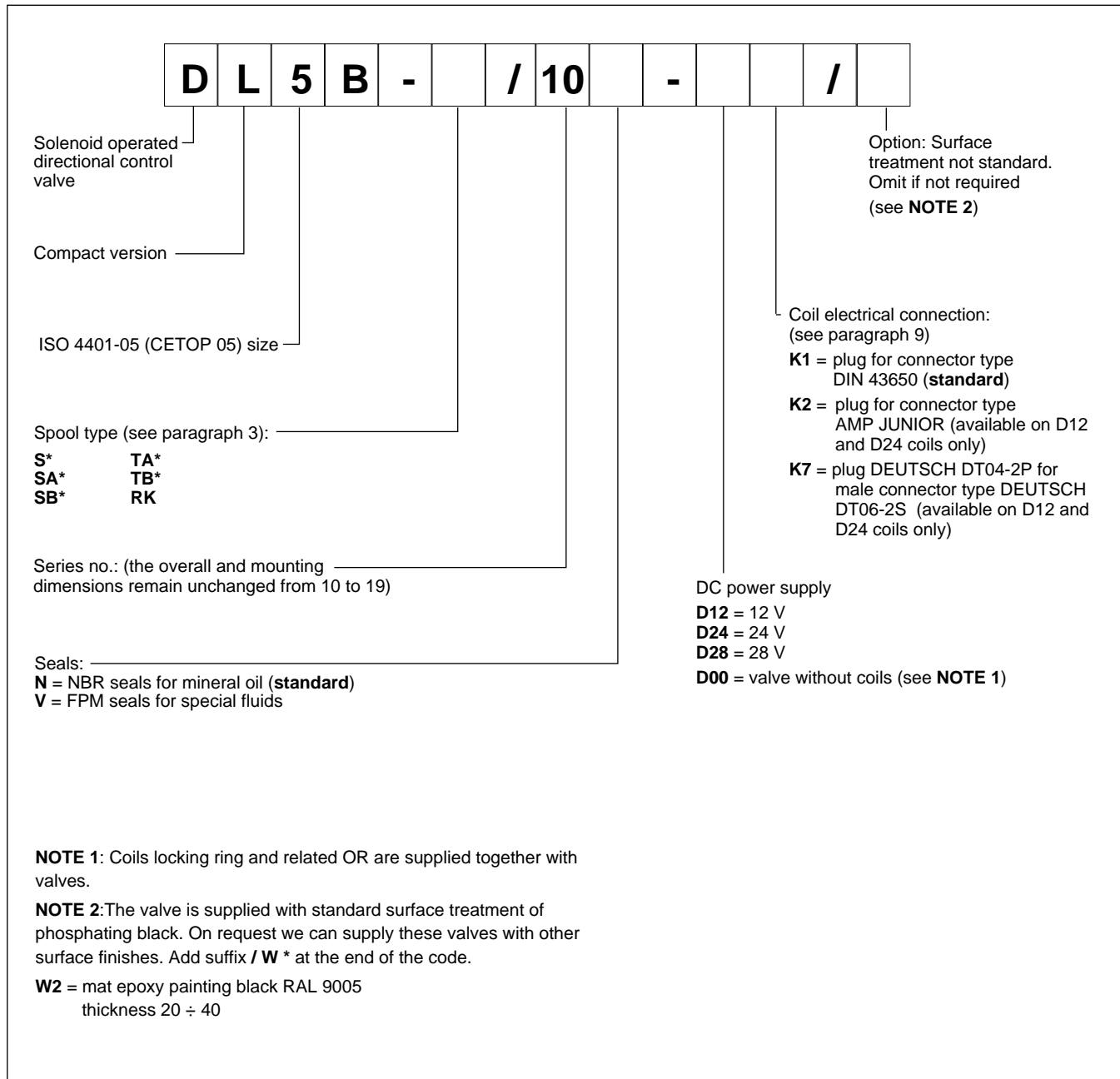
„ The valve is available with DC current solenoids only.

PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure: - ports P - A - B - port T	bar	320 210
Maximum flow rate	l/min	125
Pressure drop p-Q	see paragraph 4	
Operating limits	see paragraph 5	
Electrical features	see paragraph 7	
Electrical connections	see paragraph 8	
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 20/18/15	
Recommended viscosity	cSt	25
Masse: single solenoid valve double solenoid valve	kg	2,4 3



1 - IDENTIFICATION CODE

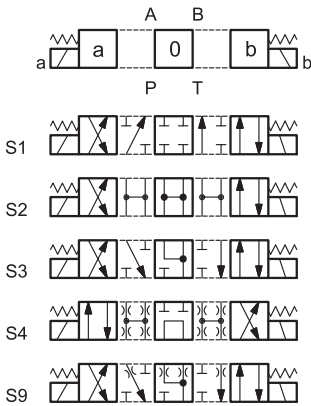


2 - HYDRAULIC FLUIDS

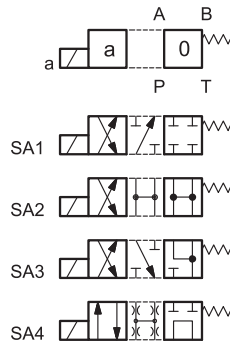
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - SPOOL TYPE

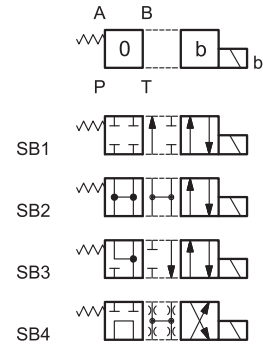
Type S*:
2 solenoids - 3 positions
with spring centering



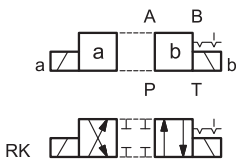
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



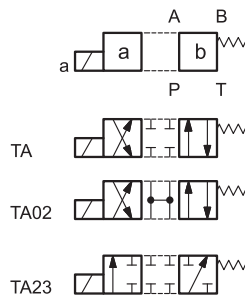
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



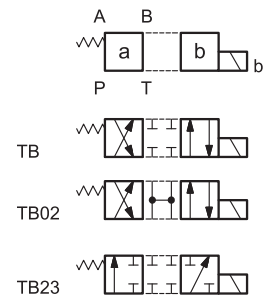
Type RK:
2 solenoids - 2 positions
with mechanical retention



Type TA:
1 solenoid side A
2 external positions
with return spring



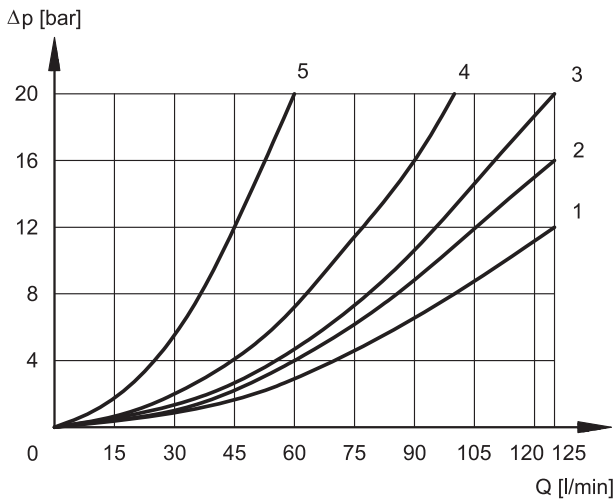
Type TB:
1 solenoid side B
2 external positions
with return spring



NOTE: Others spools available on request only.



4 - PRESSURE DROPS $p-Q$ (obtained with viscosity of 36 cSt at 50 °C)



ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS			
	P A	P B	A T	B T
	CURVES ON GRAPHS			
S1	1	1	2	2
S2	1	1	1	1
S3	1	1	1	1
S4	4	4	4	4
S9	1	1	1	1
RK	2	2	2	2
TA	2	2	3	3
TA02	2	2	1	1
TA23	3	3	-	-

DE-ENERGIZED VALVE

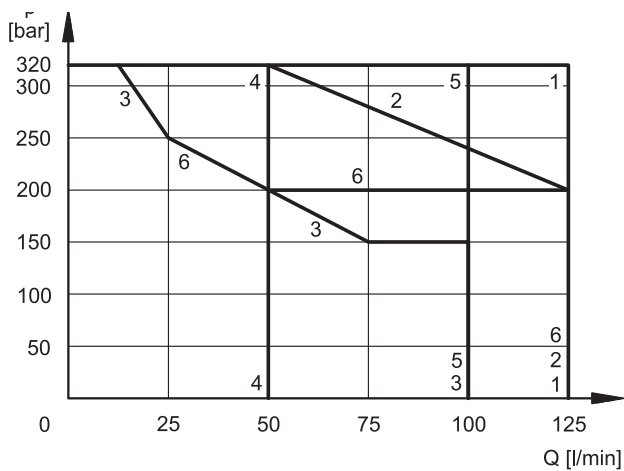
SPOOL	FLOW DIRECTIONS		
	A T	B T	P T
	CURVES ON GRAPHS		
S2	-	-	1
S3	5	5	-
S4	-	-	1

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The limits for TA02 and TA spools refer to the 4-way operation. The operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow are shown in the chart on the next page.

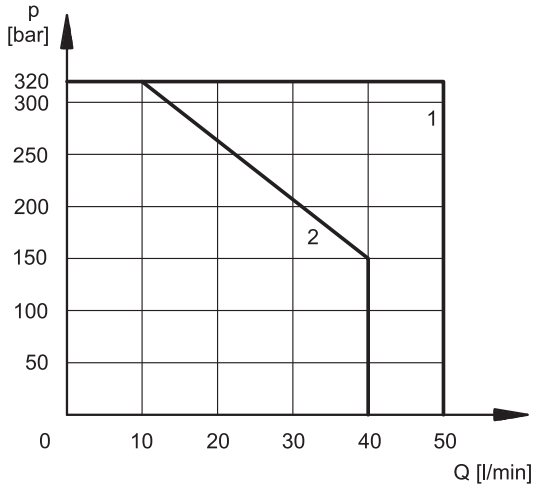
DC SOLENOID VALVE



SPOOL	CURVE
S1, S2, RK	1
TA02	2
S3	3
S4	4
TA, TA23	5
S9	6

5.1 - 4-way valve in 3-way operation

Operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow.



SPOOL	CURVE
TA	1
TA02	2

6 - SWITCHING TIMES

The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

SUPPLY	TIMES ($\pm 10\%$) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	70 ÷ 100	15 ÷ 20

7 - ELECTRICAL FEATURES

7.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated +/- 90°, to suit the available space

The coils are interchangeable.

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K7 DEUTSCH DT04 male	x	x	x (*)

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

NOTE: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95 CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class F

7.2 DC valve - Current and power consumption

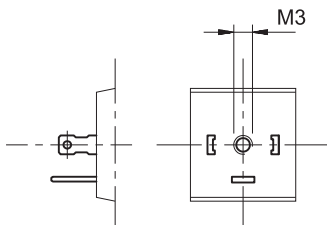
In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law: $V = R \times I$

The table shows current and power consumption values for DC types.

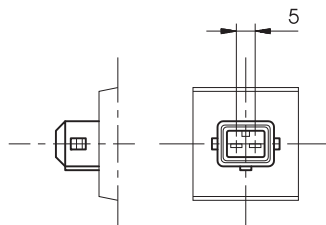
	Resistance at 20°C [Ω] (±5%)	Current consumption [A] (±10%)	Power consumption [W] (±10%)	Coil code		
				K1	K2	K7
C22S3-D12	4,4	2,72	32,7	1903080	1903100	1902940
C22S3-D24	18,6	1,29	31	1903081	1903101	1902941
C22S3-D28	26	1,11	31	1903082		-

8 - ELECTRIC CONNECTIONS

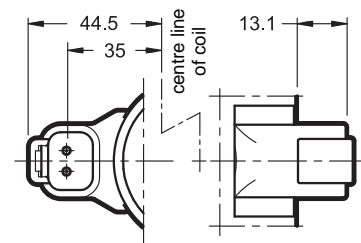
connection for DIN 43650 connector type code **K1 (standard)**



connection for AMP JUNIOR connector type code **K2**



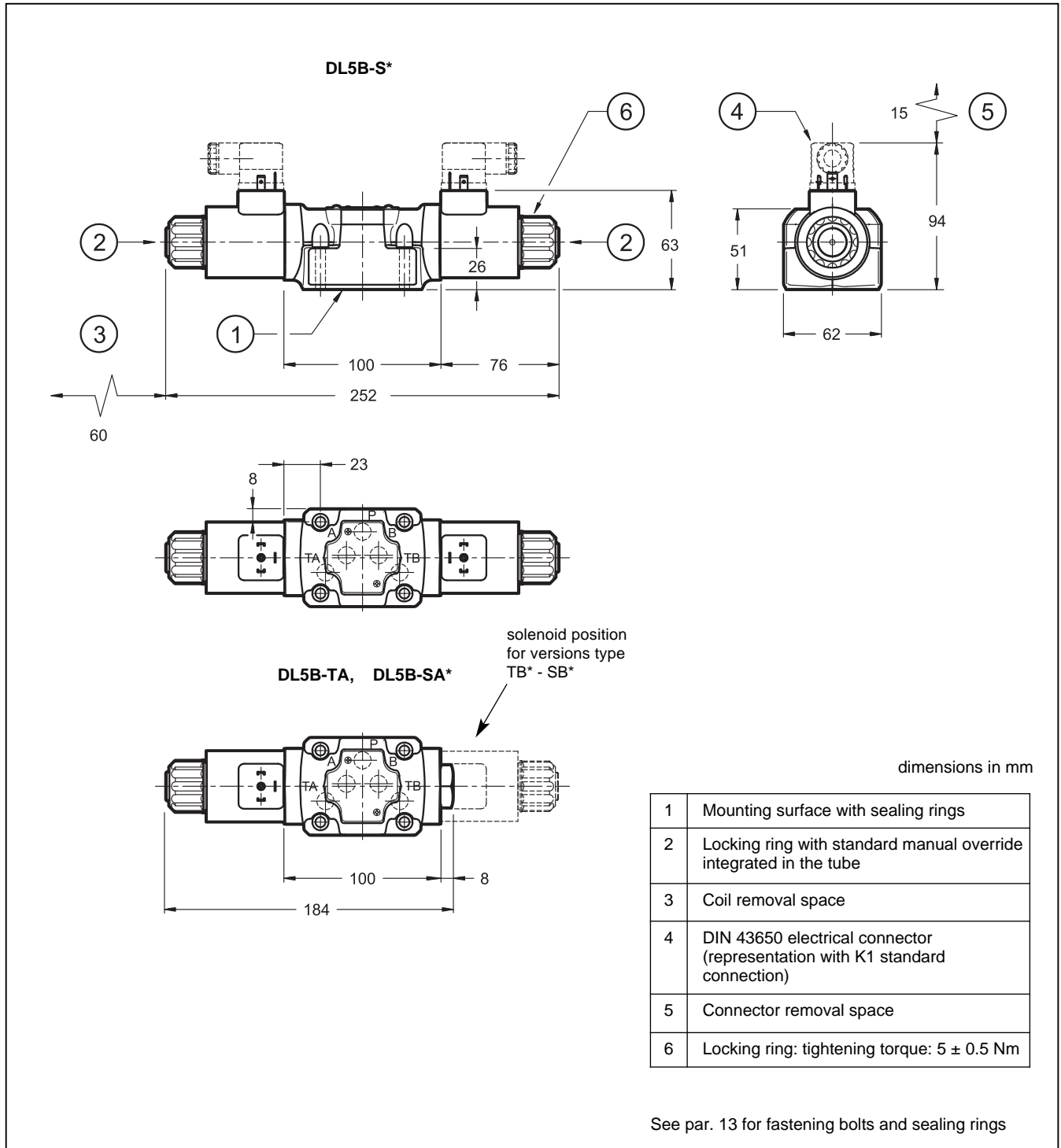
connection DEUTSCH DT04-2P for DEUTSCH DT06-2S male connector type code **K7**



9 - ELECTRIC CONNECTORS

The solenoid operated valves with K1 connection are not supplied with connector. Connectors must be ordered separately (see catalogue 49 000). K2 and K7 connectors are not available.

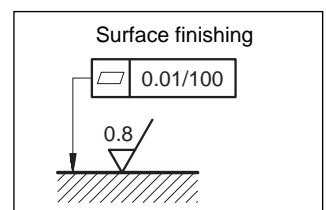
10 - DL5B DC OVERALL AND MOUNTING DIMENSIONS



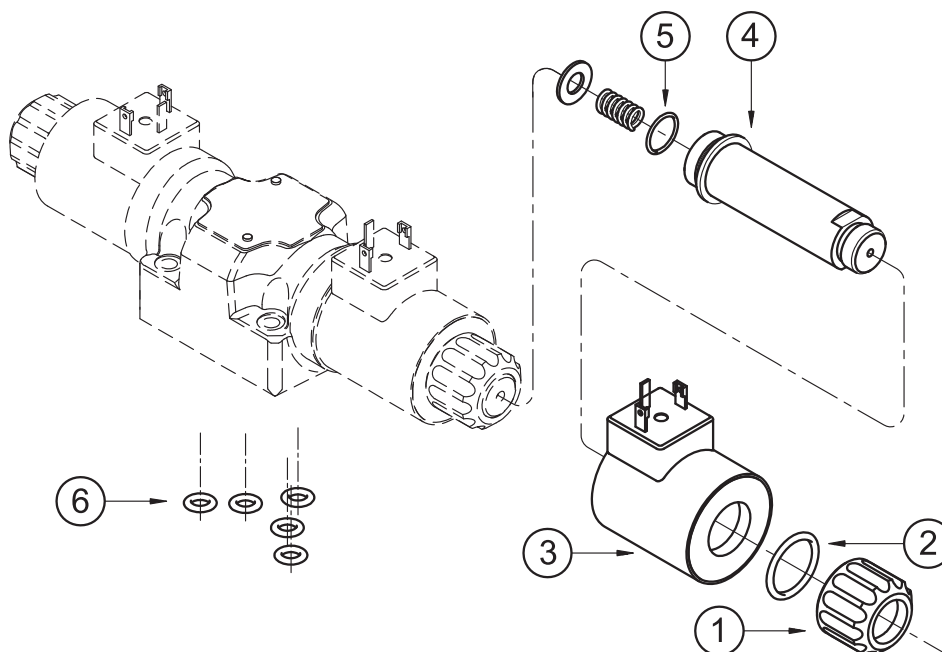
11 - INSTALLATION

The configuration with centering and return springs can be mounted in any position.

Valve fitting takes place by means of screws or tie rods, fixing the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



12 - SPARE PARTS FOR DC SOLENOID VALVE



IDENTIFICATION CODE FOR DC AND RC COILS

C 22 S3 - /

Supply voltage

D12 = 12 V
D24 = 24 V
D28 = 28 V

Series no.:

10 = for K7
11 = for K1 and K2
 (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection:

K1 = plug for connector type DIN 43650 (standard)

K2 = plug for connector type AMP JUNIOR (available on D12 and D24 coils only)

K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on D12 and D24 coils only)

1	Coil locking ring - code 0119412 tightening torque: 5 ±0.5 Nm
2	ORM-0220-20 - 70 shore
3	Coil (see identification code)
4	Solenoid tube: TD22-DL5/10N (NBR seals) TD22-DL5/10V (FPM seals) (OR n° 6 included)
5	OR type 3.910 (19.18x2.46) - 70 shore
6	N. 5 OR type 2050 (12.42x1.78) - 90 Shore

SEAL KIT

The codes included the OR n° 2, 5, and 6.

Cod. 1985461 NBR seals

Cod. 1985462 FPM seals

13 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 SHC screws M6x35

Tightening torque: 8 Nm

Sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore

14 - SUBPLATES (See catalogue 51 000)

Type PMD4-AI4G with rear ports - threading: 3/4" BSP

Type PMD4-AL4G with side ports - threading: 1/2" BSP



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Fax +39 0331.895.339

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DD44

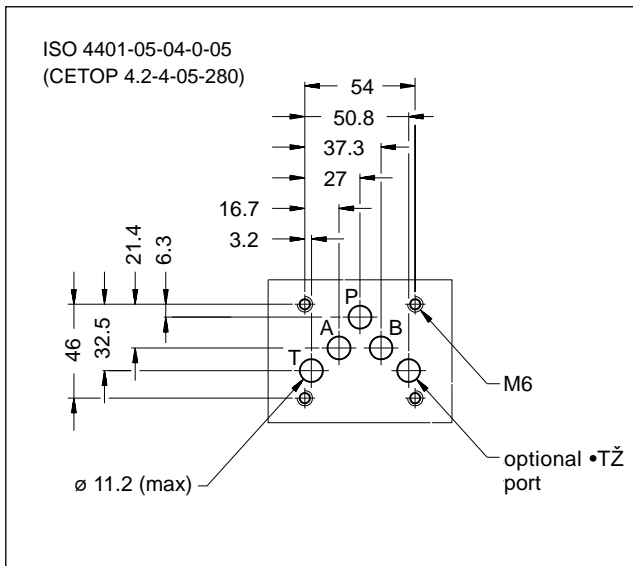
SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

DIRECT CURRENT - SERIES 50 ALTERNATING CURRENT - SERIES 62

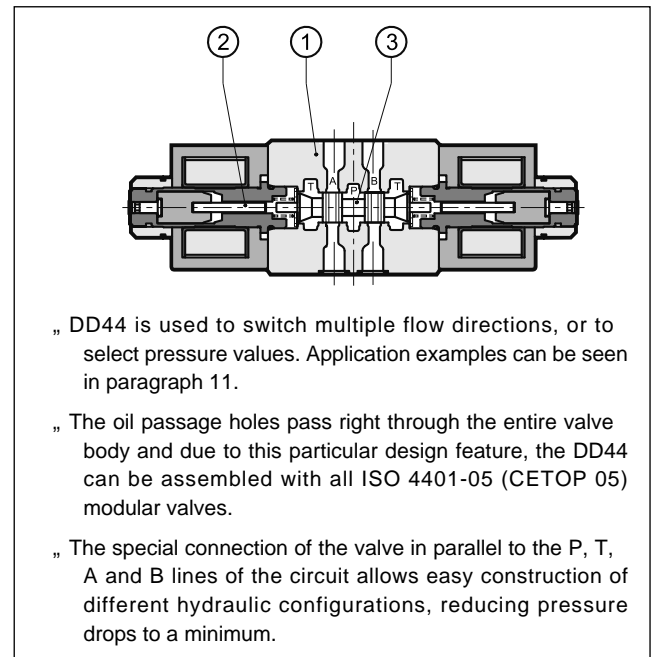
MODULAR VERSION
ISO 4401-05 (CETOP 05)

p max 280 bar
Q max 75 l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



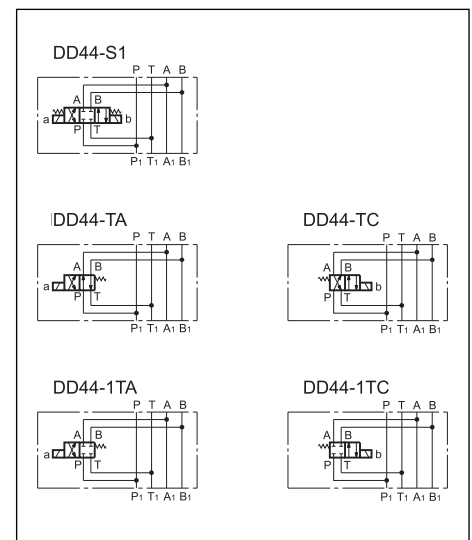
CONFIGURATIONS (see Hydraulic symbols table)

- „ Type •SŽ: a 4-way, 3-position, 2-solenoid directional valve; positioning of the spool at rest is obtained by centering springs.
- „ Type •TA/TCŽ: a 4-way, 2-position, one solenoid directional valve; positioning of the spool at rest is obtained by a return spring.

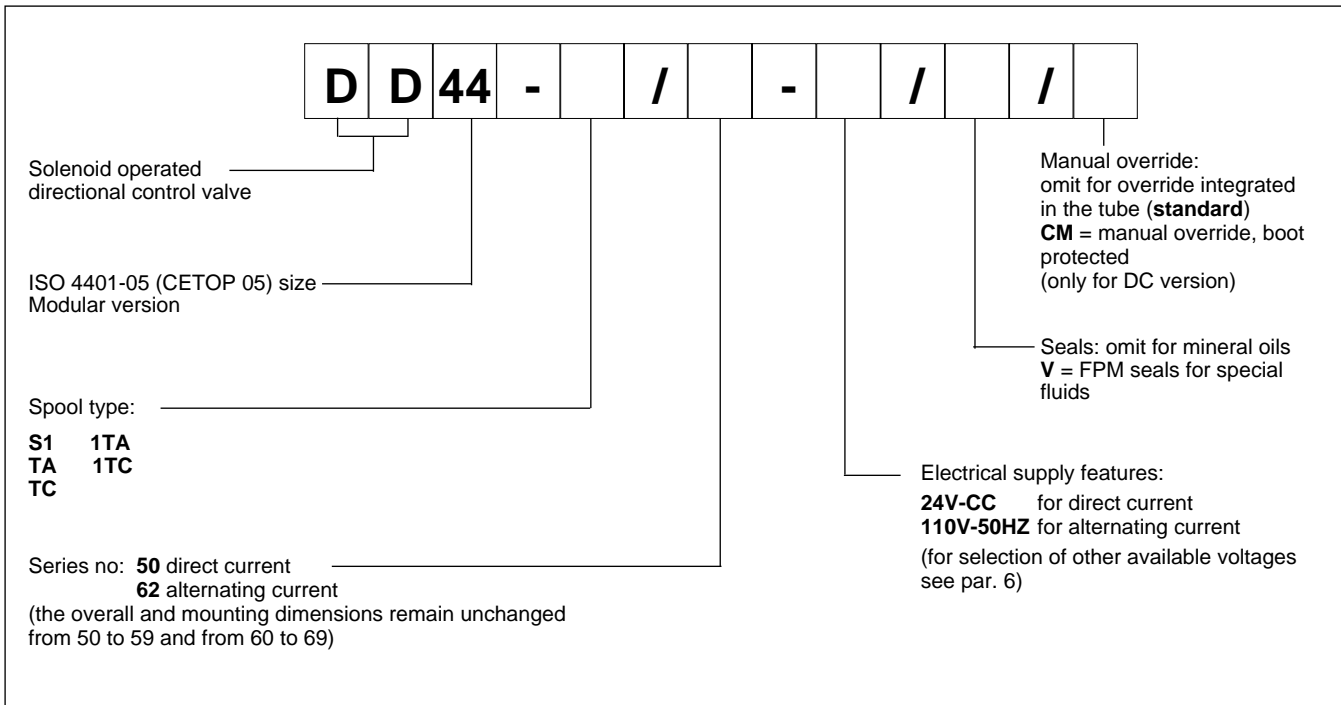
PERFORMANCES (obtained with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	280
- ports P - A - B		
- port T		140
Maximum flow rate on ports P - A - B - T	l/min	75
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 20/18/15	
Recommended viscosity	cSt	25
Mass: DD44-S	kg	4,5
DD44-TA/TC		3,6

HYDRAULIC SYMBOLS



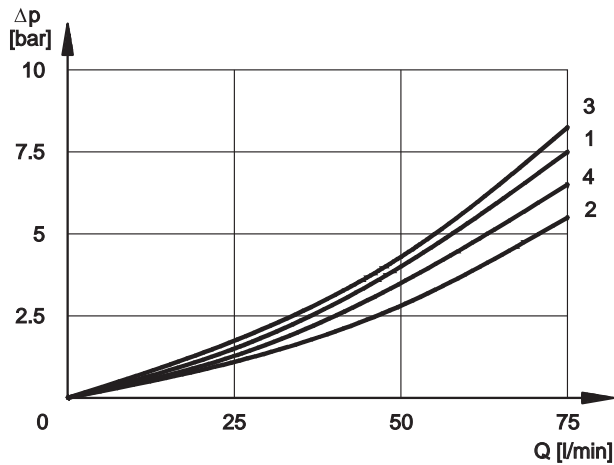
1 - IDENTIFICATION CODE



2 - 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.

3 - PRESSURE DROPS $p-Q$ (obtained with viscosity 36 cSt at 50 °C)



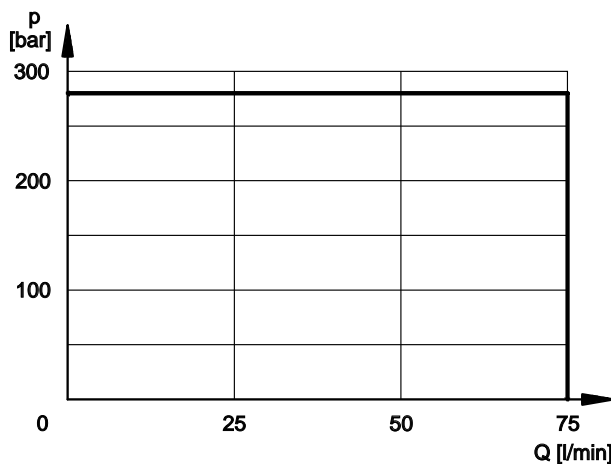
SPOOL	SPOOL POSITION	CONNECTIONS			
		P→A	P→B	A→T	B→T
CURVES ON GRAPH					
S1, 1TA, 1TC	Energized	1	1	2	2
TA, TC	De-energized	3			
	Energized		3	4	4

4 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50°C and filtration according to ISO 4406:1999 class 18/16/13.



NOTE: The values indicated in the graphs are relevant to the standard solenoid valve. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow.

5 - SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

SPOOL TYPE	TIMES	
	ENERGIZING	DE-ENERGIZING
CC	60 ms	50 ms
CA	15 ÷ 30 ms	20 ÷ 50 ms

6 - ELECTRICAL FEATURES

6.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see CAT. 49 000).

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation:	IP 65 (NOTE 2) class H class F

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

6.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC.

Coils for direct current (values ± 5%)

Nominal voltage [V]	Resistance at 20°C [ohm]	Current consumpt. [A]	Power consumpt. [W]	Code
12	3 - 3,4	3,7	44,4	1901691
24	12 - 14	1,83	43,9	1901692

6.3 Current and absorbed power for AC solenoid valve

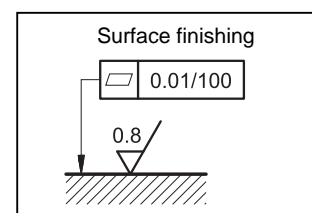
The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

Coils for alternating current (values ± 5%)

Suffix	Nominal voltage [V]	Frequence [Hz]	Resistance at 20°C [ohm]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code
A24	24	50	0,53	25	3,96	600	95	1902890
A48	48		2,09	12,5	2,3	600	110	1902891
A110	110V-50Hz	50/60	10,9	5,2	0,96	572	105	1902892
	120V-60Hz		10,9	5,2	0,89	572	105	
A230	230V-50Hz		52,7	2,8	0,46	644	105	1902893
	240V-60Hz		52,7	2,8	0,38	644	105	
F110	110	60	8,80	5,2	0,95	572	105	1902894
F220	220		35,2	2,7	0,48	594	105	1902895

7 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal. Valve fixing takes place by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

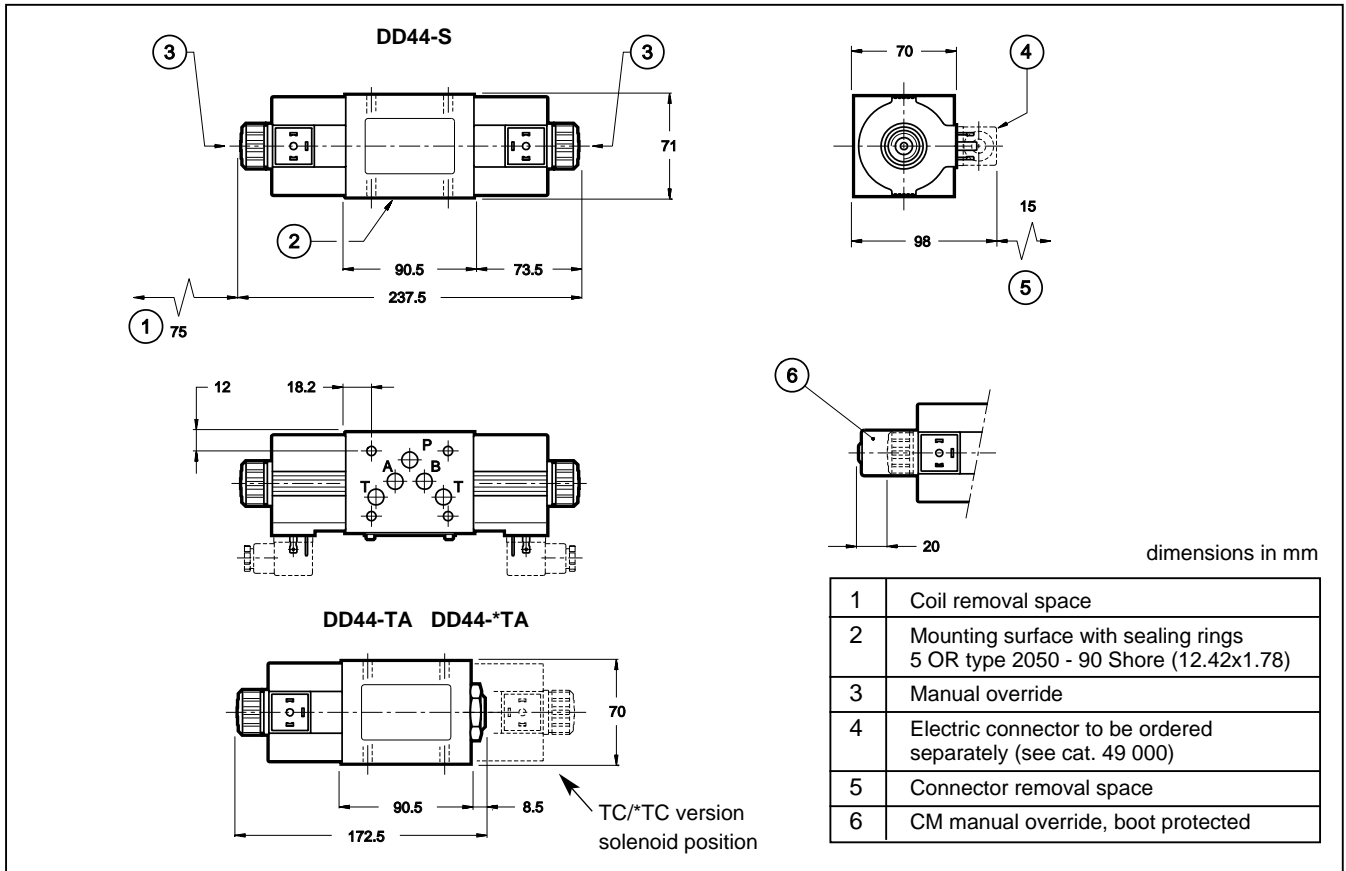


8 - ELECTRIC CONNECTORS

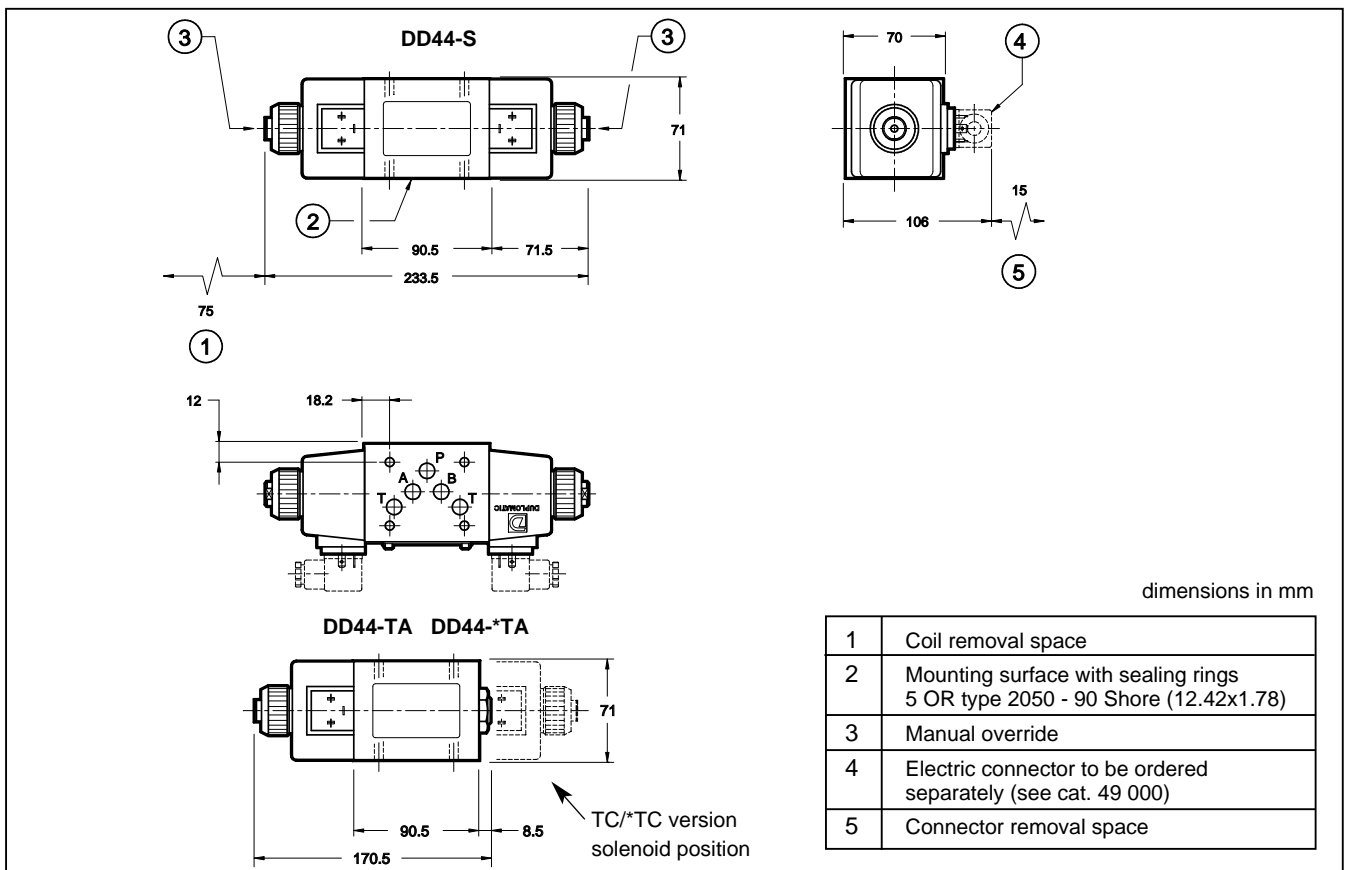
The solenoid operated valves are delivered without the connectors. They must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

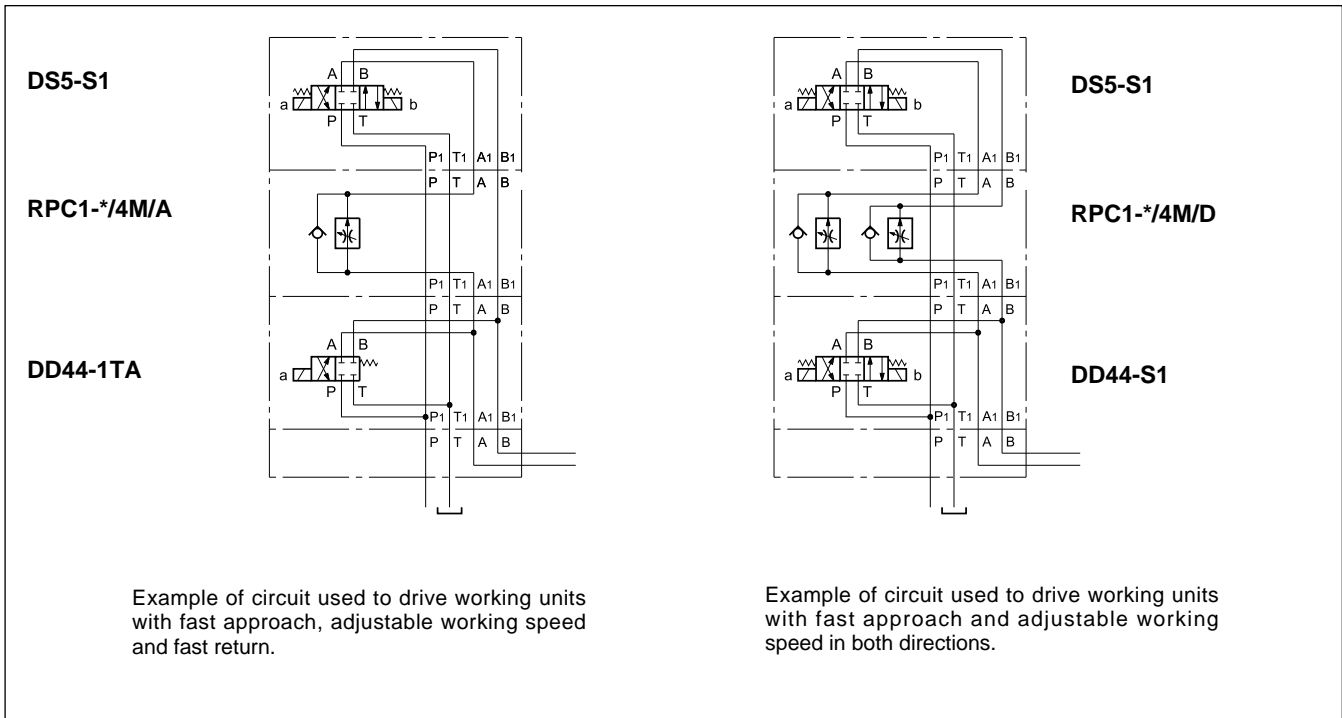
9 - OVERALL AND MOUNTING DIMENSIONS OF DIRECT CURRENT SOLENOID VALVE

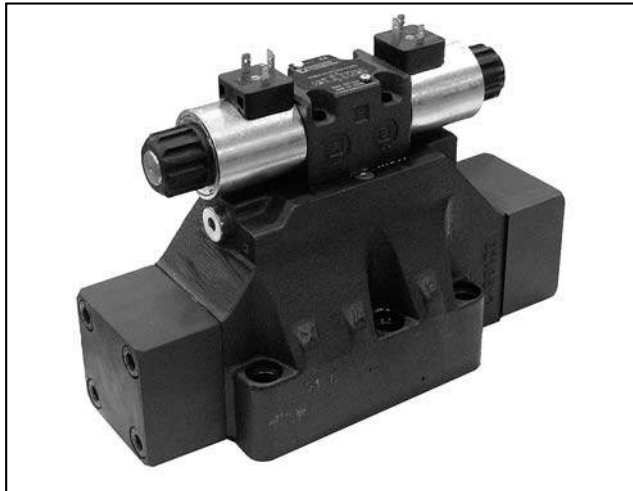


10 - OVERALL AND MOUNTING DIMENSIONS OF ALTERNATING CURRENT SOLENOID VALVE



11 - APPLICATION EXAMPLES





E*P4

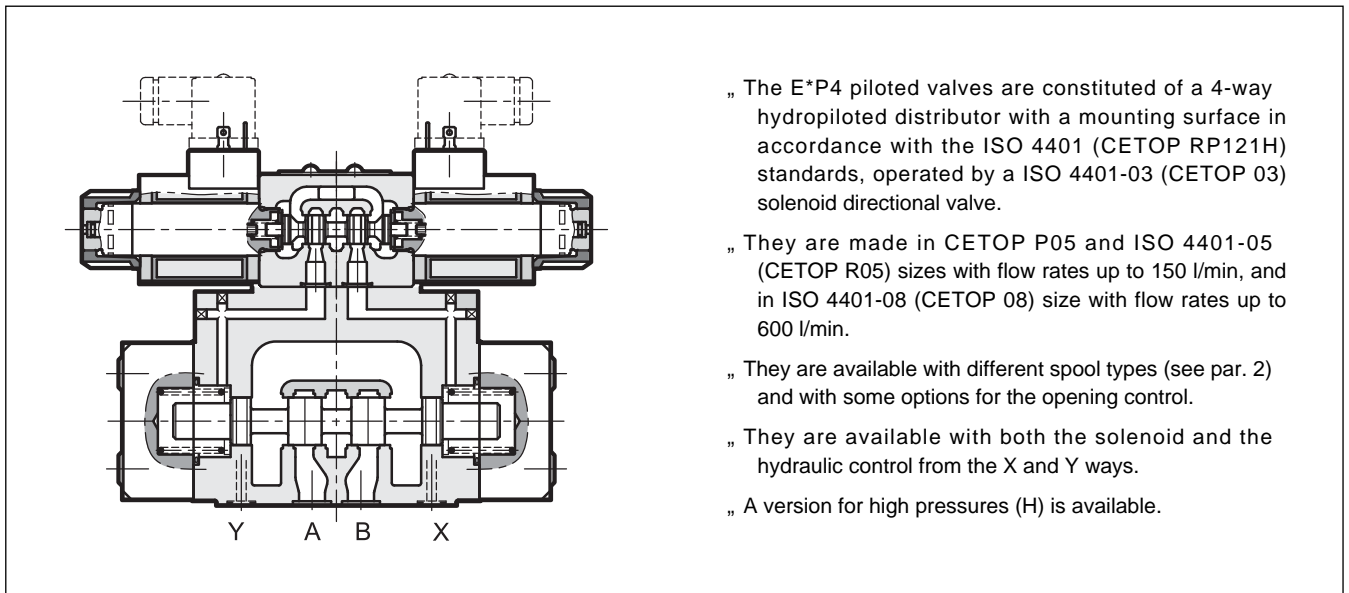
PILOT OPERATED DISTRIBUTOR SOLENOID OR HYDRAULIC (C*P4) CONTROLLED

E4P4 CETOP P05
E4R4 ISO 4401-05 (CETOP R05)
E5 ISO 4401-08 (CETOP 08)

p max (see table of performances)

Q max (see table of performances)

OPERATING PRINCIPLE

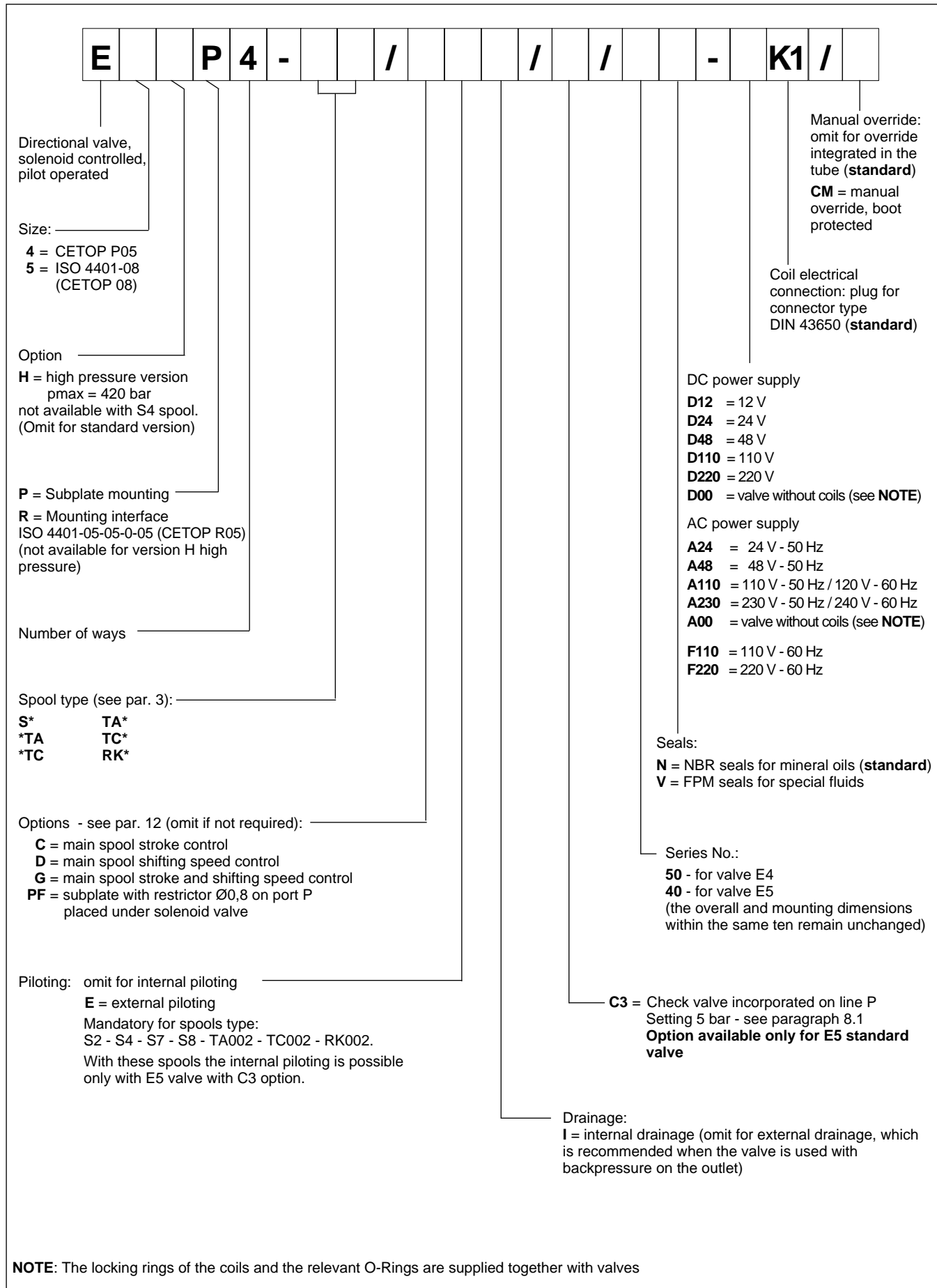


- „ The E*P4 piloted valves are constituted of a 4-way hydropiloted distributor with a mounting surface in accordance with the ISO 4401 (CETOP RP121H) standards, operated by a ISO 4401-03 (CETOP 03) solenoid directional valve.
- „ They are made in CETOP P05 and ISO 4401-05 (CETOP R05) sizes with flow rates up to 150 l/min, and in ISO 4401-08 (CETOP 08) size with flow rates up to 600 l/min.
- „ They are available with different spool types (see par. 2) and with some options for the opening control.
- „ They are available with both the solenoid and the hydraulic control from the X and Y ways.
- „ A version for high pressures (H) is available.

PERFORMANCES (obtained with mineral oil of viscosity of 36 cSt at 50°C)

		E4*4	E4HP4	E5P4	E5HP4
Maximum operating pressure	- ports P - A - B	320	420	280	420
	- port T (external drainage)	210	350	210	350
	- port T (internal drainage)	140	140	140	140
Maximum flow rate from port P to A - B - T	l/min	150		600	
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 20/18/15			
Recommended viscosity	cSt	25			
Mass: E*P4-S, RK E*P4-TA/TC	kg	7		15,6	
		6,4		15,0	

1 - IDENTIFICATION CODE FOR SOLENOID CONTROLLED DISTRIBUTOR

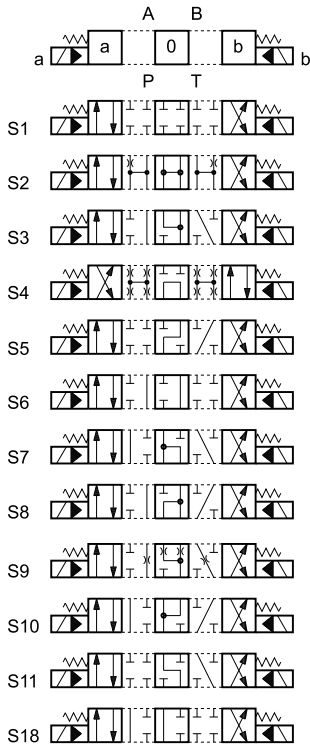


2 - SPOOL TYPE

Symbols are referred to the solenoid valve **E***. For the hydraulic control version **C*** please verify the connection scheme (see par. 4).

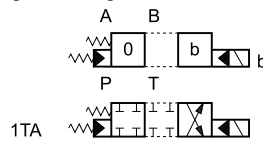
Type **S**:

3 positions with spring centering



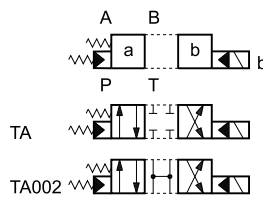
Type ***TA**:

2 positions (central + external) with spring centering



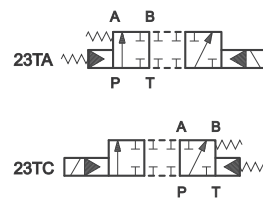
Type **TA**:

2 external positions with return spring



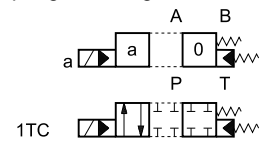
Type **23 (TA/TC)**:

3-way, 2 external positions with return spring



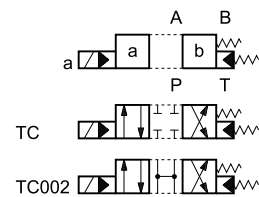
Type ***TC**:

2 positions (central + external) with spring centering



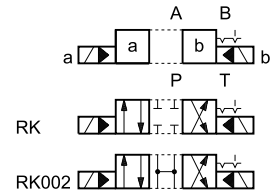
Type **TC**:

2 external positions with return spring



Type **RK**:

2 positions with mechanical detent on pilot valve



Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

3 - IDENTIFICATION CODE FOR HYDRAULIC CONTROLLED DISTRIBUTOR C*P4

C			P	4	-			/	E	/		
----------	--	--	----------	----------	----------	--	--	----------	----------	----------	--	--

Hydraulic operated directional valve through X and Y lines

Size: _____
4 = CETOP P05
5 = ISO 4401-08 (CETOP 08)

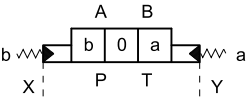
Option (Omit for standard version) _____
H = high pressure version p_{max} = 420 bar not available with S4 spool.

Mounting: _____
P = Subplate mounting
R = Mounting interface ISO 4401-05-05-0-05 (CETOP R05) only for C4 standard valve.

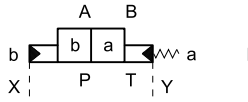
Number of ways _____

Spool type (see paragraph 2) _____
S* **TA***
TA** **TC
***TC**

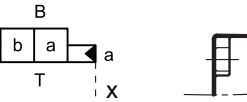
Spool type
The distributor is delivered with short-circuit subplate. The X and Y ports are used for the hydraulic control of the valve.



C*P4-S*



C*P4-TA



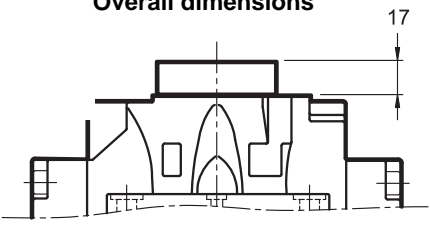
C*P4-TC

Seals:
omit for mineral oils (**standard**)
V = FPM seals for special fluids

Series No.:
43 - for valve C4
34 - for valve C5
(the overall and mounting dimensions within the same ten remain unchanged)

External piloting
External drainage
(see paragraph 8)

Overall dimensions



4 - HYDRAULIC FLUIDS

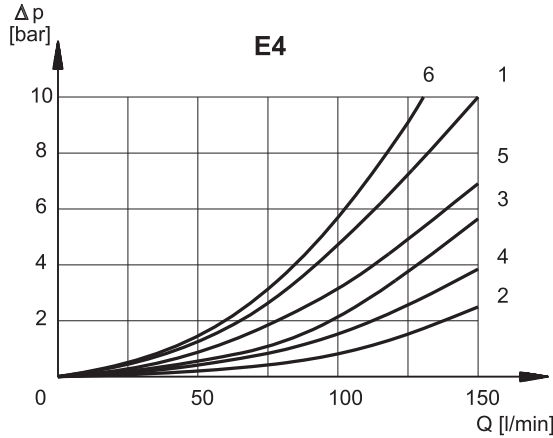
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N for solenoid controlled distributors, omit for hydraulic controlled). For fluids HFDR type (phosphate esters) use FPM seals (code V).

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.

5 - PRESSURE DROPS p - Q (values obtained with viscosity 36 cSt at 50 °C)

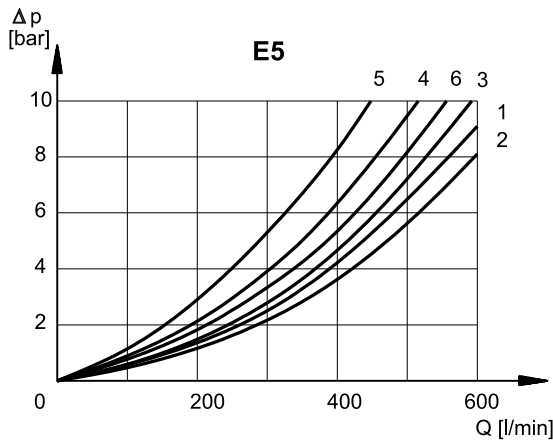
5.1 - Pressure drops E4P4



SPOOL TYPE	SPOOL POSITION	E4					
		CONNECTIONS					
		P A	P B	A T	B T	P T	T
CURVES ON GRAPH							
S1	Energized	1	1	2	3		
S2	De-energized Energized	5	5	2	4	6*	
S3	De-energized Energized	1	1	1	2	4	1°
S4	De-energized Energized	6	6	3	5	6	
S5	De-energized Energized	1	1	5	2	3	
S6	De-energized Energized	1	1	2	1	4	
S7	De-energized Energized	6	6	3	5	6°	
S8	De-energized Energized	6	6	3	5	6	
S9	Energized	1	1	2	2		
S10	De-energized Energized	1° 5	1° 5	2	3		
S11	De-energized Energized	1	1	1	2	3	
S18	De-energized Energized	5 5	1	2	3		
TA	De-energized Energized	1	1	4	3		
RK	Energized	1	1	4	3		

* A-B blocked B blocked ° A blocked

5.2 - Pressure drops E5P4



SPOOL TYPE	SPOOL POSITION	E5					
		CONNECTIONS					
		P A	P B	A T	B T	P T	T
CURVES ON GRAPH							
S1	Energized	1	1	2	3		
S2	De-energized Energized	2	2	1	2	6*	
S3	De-energized Energized	1	1	4	1	2	4°
S4	De-energized Energized	6	6	3	4	5	
S5	De-energized Energized	1	1	4	2	3	
S6	De-energized Energized	1	1	2	4	2	
S7	De-energized Energized	6	6	3	4	5°	
S8	De-energized Energized	6	6	4	3	5	
S9	Energized	1	1	2	3		
S10	De-energized Energized	4 2	4° 2	2	3		
S11	De-energized Energized	1	1	3	1	3	
S18	De-energized Energized	4 2	1	2	3		
TA	De-energized Energized	1	1	2	3		
RK	Energized	1	1	2	3		

* A-B blocked B blocked ° A blocked



6 - SWITCHING TIMES

6.1 Switching times E4P4

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

E4				
TIMES (± 10%) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
CA solenoid	35	25	35	25
DC solenoid	60	50	50	40

6.2 Switching times E5P4

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

E5				
TIMES (± 10%) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
CA solenoid	70	40	70	40
DC solenoid	100	70	80	50

7 - PERFORMANCE CHARACTERISTICS

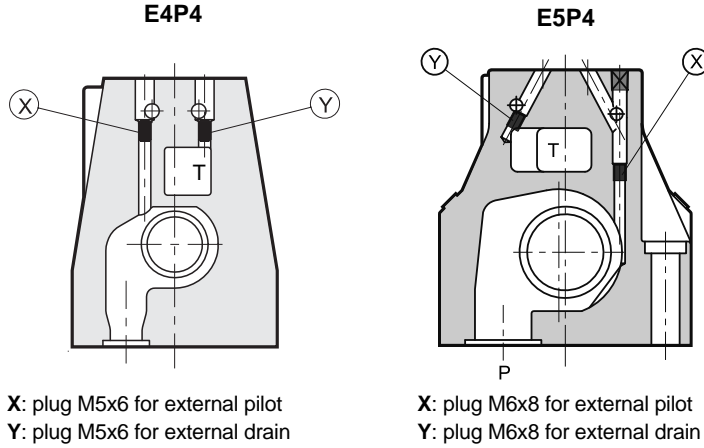
E4 - PRESSURES [bar]		E4*4	E4HP4	C4*4	C4HP4
	MIN	MAX			
Pressure in P, A, B ports		320	420	320	420
Piloting pressure (X port and / or Y port)	5	210	350	210	350
Pressure in T line with internal drainage	-	140	140	-	-
Pressure in T line with external drainage	-	210	350	210	350

E5 - PRESSURES [bar]		E5P4	E5HP4	C5P4	C5HP4
	MIN	MAX			
Pressure in P, A, B ports		280	420	280	420
Piloting pressure (X port and / or Y port)	5	210	350	210	350
Pressure in T line with internal drainage	-	140	140	-	-
Pressure in T line with external drainage	-	210	350	210	350

MAXIMUM FLOW RATES [l/min]	E4		E5	
	PRESSURES			
Spool type	at 210 bar	at 320 bar	at 210 bar	at 280 bar
S4, S7, S8	120	100	500	450
All other spools	150	120	600	500

8 - PILOTING AND DRAINAGE

The E*P4 valves are available with piloting and drainage, both internal and external.
The version with external drainage allows for a higher back pressure on the outlet.

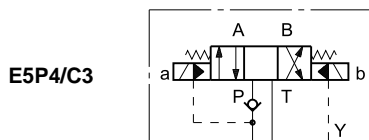


TYPE OF VALVE		Plug assembly	
		X	Y
E*P4-**	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
E*P4-**/I	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
E*P4-**/E	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
E*P4-**/EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

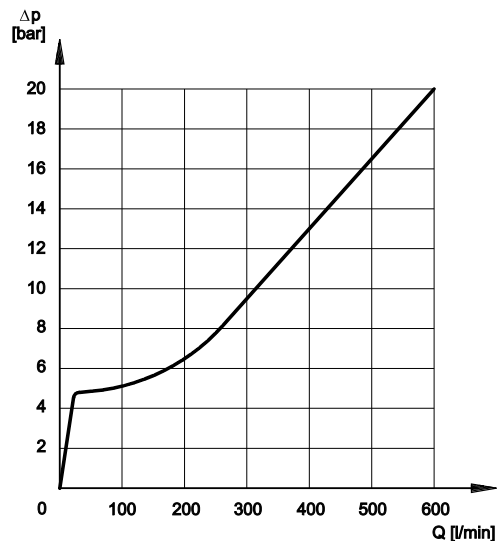
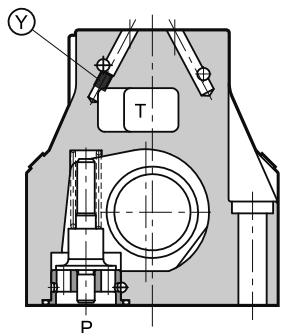
8.1 - Backpressure valve incorporated on line P available for E5 valve only

Valve E5 is available upon request with backpressure valve incorporated on line P. This is necessary to obtain the piloting pressure when the control valve, in the rest position, has the line P connected to the T outlet (spools S2 - S4 - S7 - S8 - TA002 - TC002 - RK002). The cracking pressure is of 5 bar.

Add **C3** to the identification code for this request (see paragraph 1). **In the C3 version the piloting is always internal.**



E5P4 (with C3 option)



NOTE: the backpressure valve can't be used as direct check valve because it doesn't assure the seal.

The curve refers to the pressure drop (body part only) with backpressure valve energized to which the pressure drop of the reference spool must be added. (see paragraph 5)



9 - ELECTRICAL FEATURES

9.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see catalogue. 49 000).

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	±10% Vnom
MAX SWITCH ON FREQUENCY E4 E5	10.000 ins/hr 8.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	According to 2004/108/CE
LOW VOLTAGE	According to 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation: DC valve AC valve	IP 65 (NOTE 2) class H class F class H

9.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC.

The rectified current supply takes place by fitting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000), by considering a reduction of the operating limits by 5 ÷ 10% approx.

Coils for direct current (values ± 5%)

Suffix	Nominal voltage [V]	Resistance at 20°C [ohm]	Current consumpt. [A]	Power consumpt. [W]	Coil code
D12	12	4,4	2,72	32,7	1903080
D24	24	18,6	1,29	31	1903081
D48	48	78,6	0,61	29,5	1903083
D110	110	423	0,26	28,2	1903084
D220	220	1692	0,13	28,2	1903085

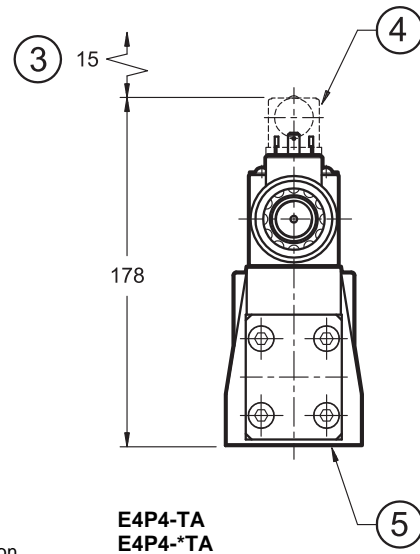
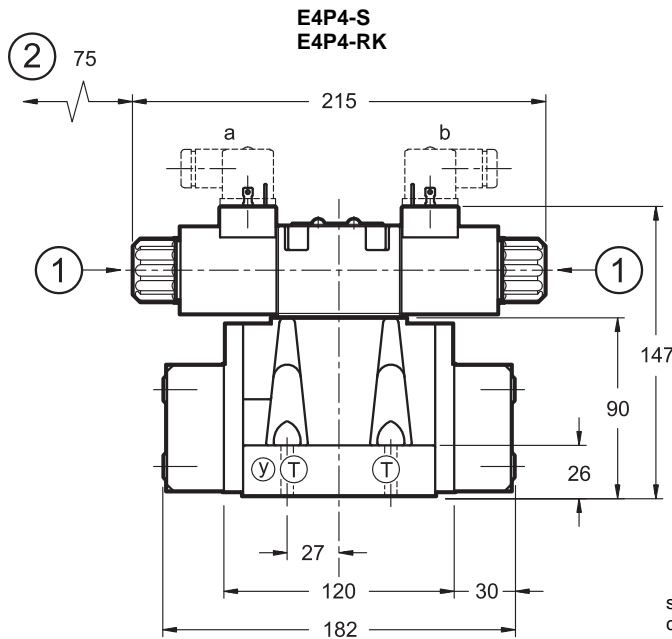
9.3 Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

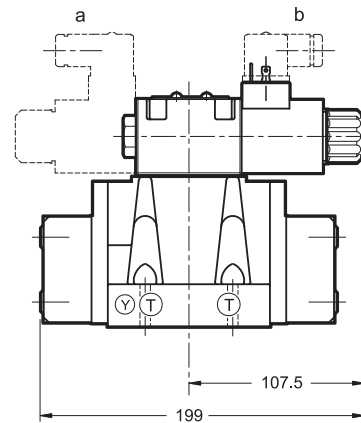
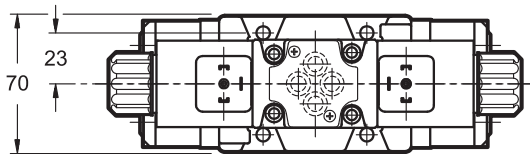
Coils for alternating current (values ± 5%)

Suffix	Nominal voltage [V]	Frequency [Hz]	Resistance at 20°C []	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code	
A24	24	50	1,46	8	2	192	48	1902830	
A48	48	50	5,84	4,4	1,1	204	51	1902831	
A110	110V-50Hz	50/60	32	1,84	0,46	192	48	1902832	
	120V-60Hz			1,56	0,39	188	47		
A230	230V-50Hz		140	140	0,76	0,19	176	44	1902833
	240V-60Hz				0,6	0,15	144	36	
F110	110	60	26	1,6	0,4	176	44	1902834	
F220	220		106	0,8	0,2	180	45	1902835	

10 - E4 OVERALL AND MOUNTING DIMENSIONS

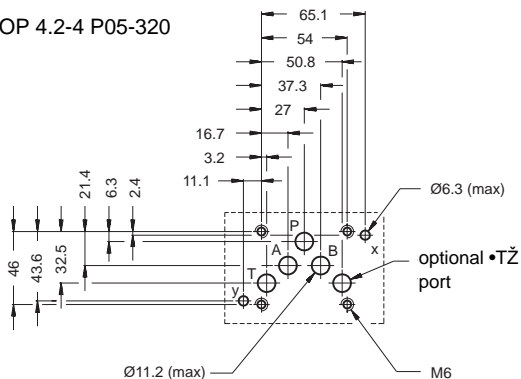


solenoid position
configuration TC/*TC



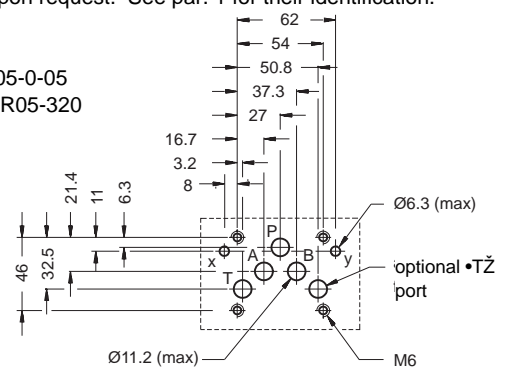
MOUNTING SURFACE (STANDARD)

CETOP 4.2-4 P05-320



Valves with ISO 4401-05-05-0-05 (CETOP R05) mounting interface are available upon request. See par. 1 for their identification.

ISO 4401-05-05-0-05
CETOP 4.2-4 R05-320



dimensions in mm

Fastening of single valve: 4 bolts M6x35 (see par. 15, NOTE)	1	Manual override
Tightening torque: 8 Nm (bolts A 8.8) 14 Nm (bolts A 12.9)	2	Coil removal space
Threads of mounting holes: M6x10	3	Connector removal space
Sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 2 OR type 2037 (9.25x1.78) - 90 Shore	4	Electric connector to be ordered separately (see cat.49 000)
	5	Mounting surface with sealing rings

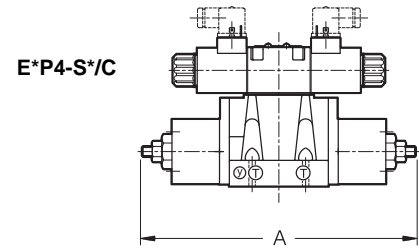
12 - OPTIONS

12.1 Control of the main spool stroke: C

It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool clearance opening.

This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable control on the actuator.

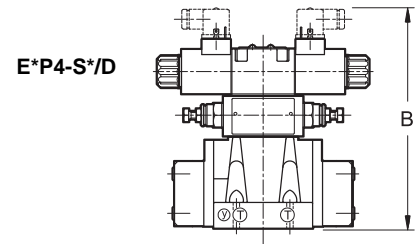
Add the letter **C** to the identification code to request this device (see paragraph 1).



12.2 Control of the main spool shifting speed: D

By placing a MERS type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the changeover smoothness can be varied.

Add the letter **D** to the identification code to request this device (see paragraph 1).



12.3 Subplate with throttle on line P

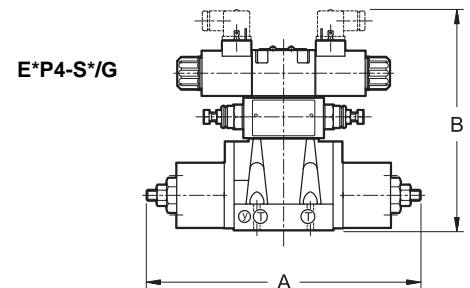
It is possible to introduce a subplate with a restrictor of $\varnothing 0,8$ on line P between the pilot solenoid valve and the main distributor.

Add **PF** to the identification code to request this option (see paragraph 1).

12.4 Control of the main spool stroke and shifting speed: G

It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device.

Add the letter **G** to the identification code to request this solution (see paragraph 1).



dimensions in mm

	E4	E5
A	280	401,5
C	218	254

13 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or use in tropical climates, the manual override, boot protection is recommended.

Add the suffix **CM** to request this device (see paragraph 1).

For overall dimensions see cat. 41 150.

14 - ELECTRIC CONNECTORS

The solenoid valves are never supplied with connector. Connectors must be ordered separately.

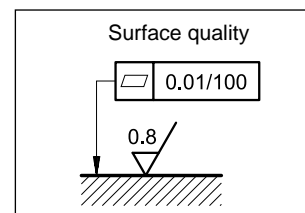
To identify the connector type to be ordered, please see catalogue 49 000.

15 - INSTALLATION

Configurations with centering and recall springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

NOTE: Use of class 12.9 fastening screws is recommended for valves in version H (high pressure).



16 - SUBPLATES (see catalogue 51 000)

These plates are for the standard valves only. They are not suitable for high pressure (H) versions.

	E4	E5
Type with rear ports	PME4-AI5G	
Type with side ports	PME4-AL5G	PME5-AL8G
P, T, A, B, port dimensions	3/4Ž	1½Ž BSP
X, Y port dimensions	1/4Ž BSP	1/4Ž BSP

1 - IDENTIFICATION CODE FOR SOLENOID DISTRIBUTOR DSP7

D	S	P	7	-	/	20	-	/	/	K1	/	
----------	----------	----------	----------	----------	----------	-----------	----------	----------	----------	-----------	----------	--

Directional valve, Solenoid controlled, Pilot operated

Size: _____
ISO 4401-07 (CETOP 07)

Option: (omit for standard version) _____
H = high pressure version
pmax = 420 bar
not available with S4, SA4, SB4 spools.

Spool type (see paragraph 2) _____
S* **TA**
SA* **TB**
SB* **RK**

Series: (the overall and mounting dimensions remain unchanged from 20 to 29) _____

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

Piloting (see paragraph 9): _____
I = internal (not available for spools S2 - S4 - S7 - S8 - TA02
TB02 -RK02 - S*2 - S*4. If internal pilot is required, choose pilot type C)
C = internal piloting with backpressure valve
Z = internal piloting with 30 bar fixes adjustment pressure reducing valve
(see paragraph 8)
E = external

Drainage (see paragraph 9): _____
I = Internal
E = External

Controls: _____
C = Main spool stroke control (see paragraph 13.1)
D = Main spool switching speed control (see paragraph 13.2)
P08 = Subplate placed under solenoid valve with restrictor of Ø0.8 on port P
(see paragraph 13.3)
S2 = Distributor delivered with pilot solenoid valve in configuration S2
(see paragraph 13.4)

Manual override:
omit for override integrated in the tube (**standard**)
CM = manual override, boot protected (see paragraph 14)

Coil electrical connection:
plug for connector type DIN 43650 (**standard**)

DC power supply
D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see **NOTE**)

AC power supply
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see **NOTE**)
F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

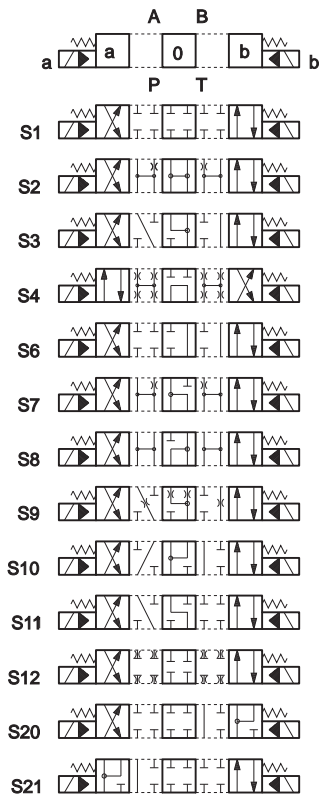
NOTE: The locking rings of the coils and the relevant O-Rings are supplied together with valves

2 - SPOOL TYPE

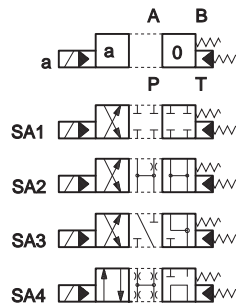
NOTE: Symbols refers to the **DSP7** solenoid valve.

For the **DSC7** hydraulic control version, please verify the connection scheme at paragraph 3.

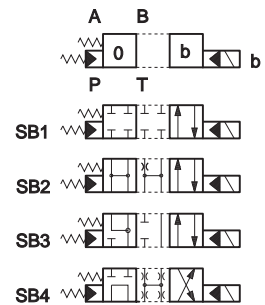
Type S*:
2 solenoids - 3 positions
with spring centering



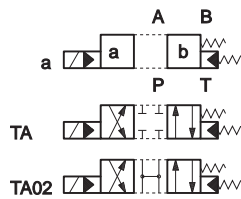
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



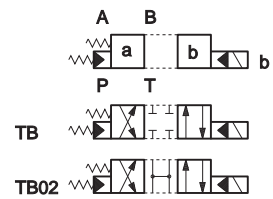
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



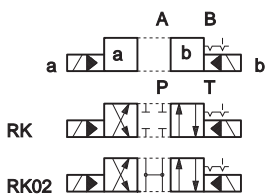
Type TA:
1 solenoid side A
2 external positions
with return spring



Type TB:
1 solenoid side B
2 external positions
with return spring

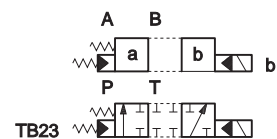
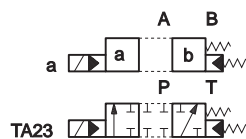


Type RK:
2 solenoids - 2 positions
with mechanical retention



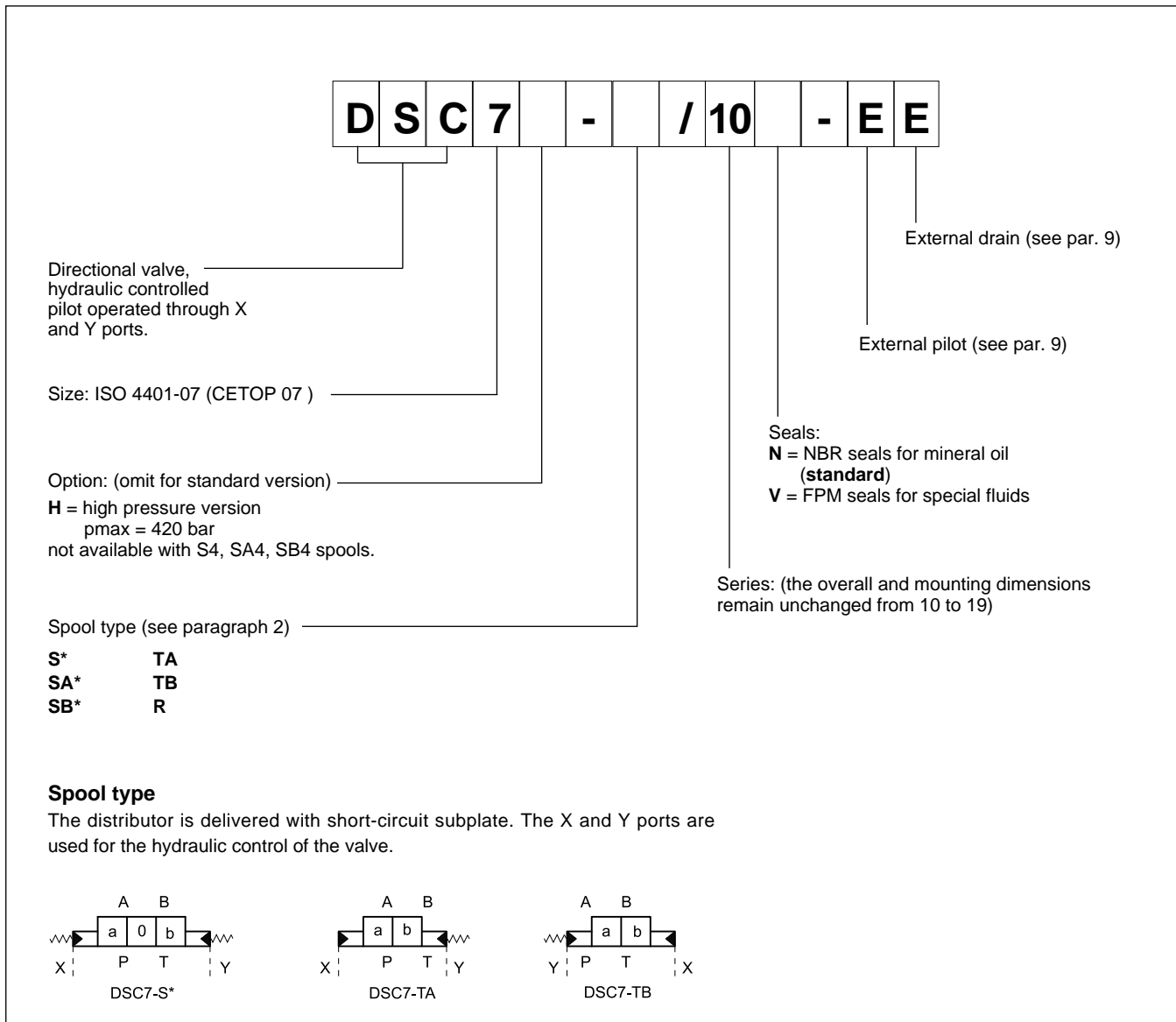
Type TA23 / TB23

three-way valve - 1 solenoid - 2 external positions, return spring



Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

3 - IDENTIFICATION CODE FOR HYDRAULIC DISTRIBUTOR DSC7



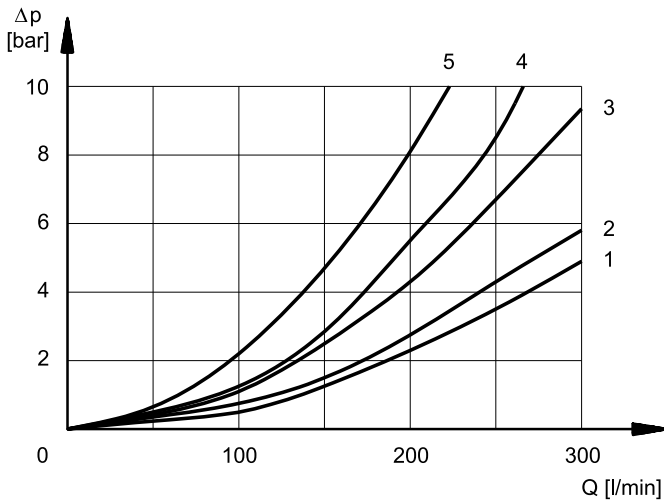
4 - HYDRAULIC FLUIDS

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.

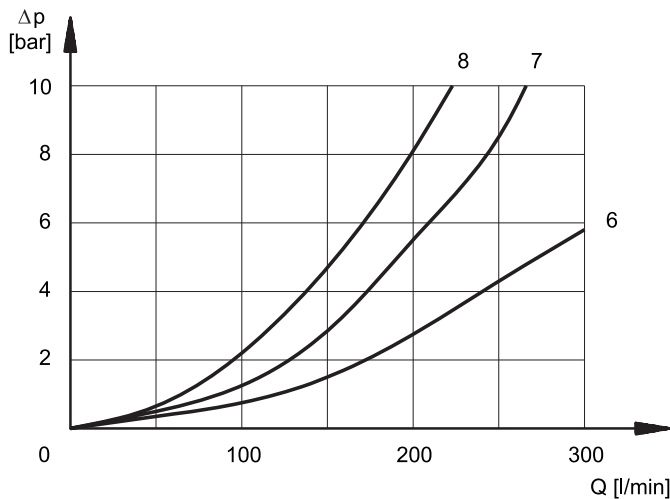
The fluid must be preserved in its physical and chemical characteristics.

5 - PRESSURE DROPS p - Q (values obtained with viscosity 36 cSt at 50 °C)



PRESSURE DROPS WITH VALVE ENERGIZED

SPOOL TYPE	FLOW DIRECTION			
	P-A	P-B	A-T	B-T
	CURVES ON GRAPH			
S1, SA1, SB1	1	1	3	4
S2, SA2, SB2	1	1	4	4
S3, SA3, SB3	1	1	4	4
S4, SA4, SB4	2	2	4	5
S6	1	1	3	4
S7	1	1	4	4
S8	1	1	3	4
S9	1	1	3	4
S10	1	1	3	4
S11	1	1	3	4
S12	1	1	3	4
S20	1	1	3	4
S21	1	1	4	4
TA, TB	1	1	3	4
TA02, TB 02	1	1	4	4
RK	1	1	3	4



PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P-A	P-B	A-T	B-T	P-T
	CURVES ON GRAPH				
S2, SA2, SB2					6
S3, SA3, SB3			7	7	
S4, SA4, SB4					7
S6				7	
S7					8
S8					8
S10			7	7	
S11			7		

6 - SWITCHING TIMES

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections. The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

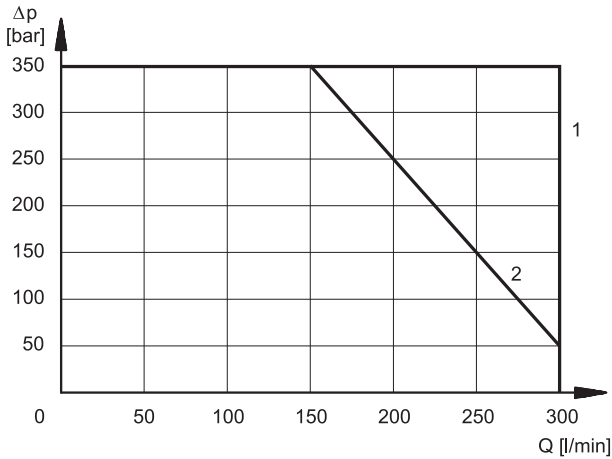
TIMES ($\pm 10\%$) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
	AC solenoid	45	30	45
DC solenoid	75	60	60	45

7 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure for the different spool types.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The values have been obtained with mineral oil, viscosity 36 cSt at 50 °C, and filtration ISO 4406:1999 class 18/16/13.



SPOOL TYPE	CURVE	
	P-A	P-B
S1, SA1, SB1	1	1
S2, SA2, SB2	1	1
S3, SA3, SB3	1	1
S4, SA4, SB4	2	2
S6	1	1
S7	2	2
S8	2	2

SPOOL TYPE	CURVE	
	P-A	P-B
S9	1	1
S10	1	1
S11	1	1
S12	1	1
S20	1	1
S21	1	1
TA, TB	1	1
TA02, TB02	1	1
TA23, TB23	1	1
RK	1	1

8 - PERFORMANCE CHARACTERISTICS

PRESSURES [bar]		DSP7	DSP7H	DSC7	DSC7H
	MIN	MAX			
Pressure in P, A, B ports		350	420	350	420
Piloting pressure (X port and / or Y port)	12 (a)	210 (b)	350	210	350
Pressure in T line with internal drainage	-	140	140	-	-
Pressure in T line with external drainage	-	210	350	210	350

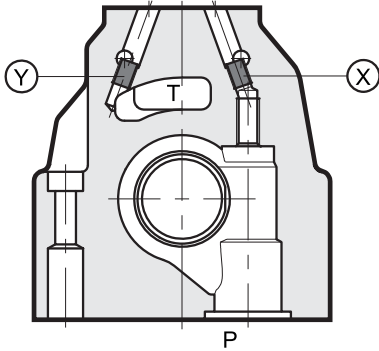
NOTES:

a) The minimum piloting pressure can be of 6 bar at low flows rates, but with higher flow rates a pressure of 12 bar is needed.

b) If the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure. Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered.

9 - PILOTING AND DRAINAGE

The DSP7 valves are available with piloting and drainage, both internal and external. The version with external drainage allows for a higher back pressure on the outlet.



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

	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

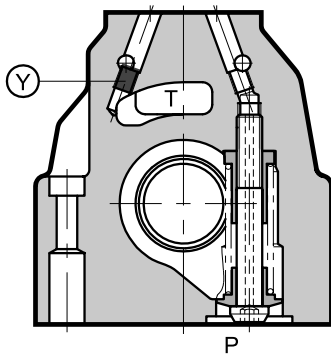
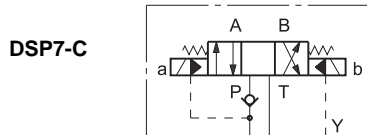
9.1 - Backpressure valve incorporated on line P

Valves DSP7 are available upon request with backpressure valve incorporated on line P. This is necessary to obtain the piloting pressure when the control valve, in rest position, has the line P connected to the T port (spools S2, S4, S7, S8, S*2, S*4, TA02, TB02, RK02). The cracking pressure is of 5 bar with a minimum flow rate of 15 l/min.

Add **C** to the identification code for this request (see paragraph 1).

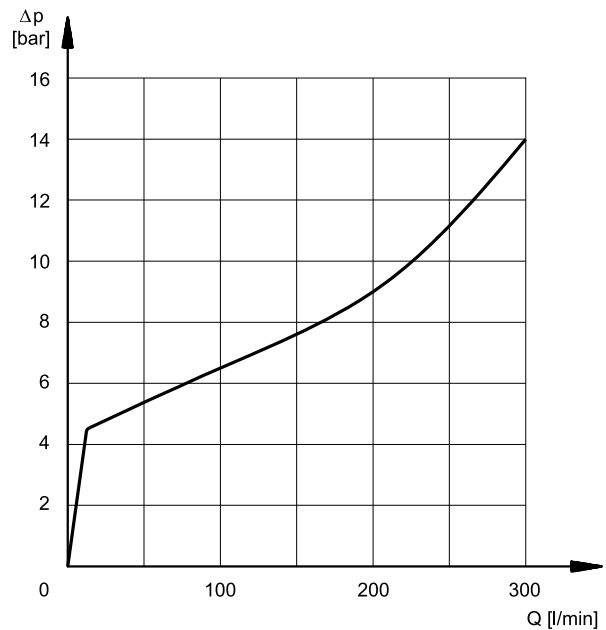
In the C version the piloting is always internal.

The backpressure valve can be also delivered separately and it can be easily mounted on line P of the main control valve. Specify the code **0266577** to order the backpressure valve separately.



pilot always internal
Y: plug M6x8 for external drain

NOTE: the backpressure valve can't be used as check valve because it doesn't assure the seal.



The curve refers to the pressure drop (body part only) with backpressure valve energized to which the pressure drop of the reference spool must be added. (see paragraph 5)

10 - ELECTRICAL FEATURES

10.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see CAT. 49 000).

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation: CC valve CA valve	IP 65 (NOTE 2) class H class F class H

10.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC.

The rectified current supply takes place by fitting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat. 49 000), by considering a reduction of the operating limits by 5 ÷ 10% approx.

Coils for direct current (values ± 5%)

Suffix	Nominal voltage [V]	Resistance at 20°C [ohm]	Current consumpt. [A]	Power consumpt. [W]	Coil code
D12	12	4,4	2,72	32,7	1903080
D24	24	18,6	1,29	31	1903081
D48	48	78,6	0,61	29,5	1903083
D110	110	423	0,26	28,2	1903084
D220	220	1692	0,13	28,2	1903085

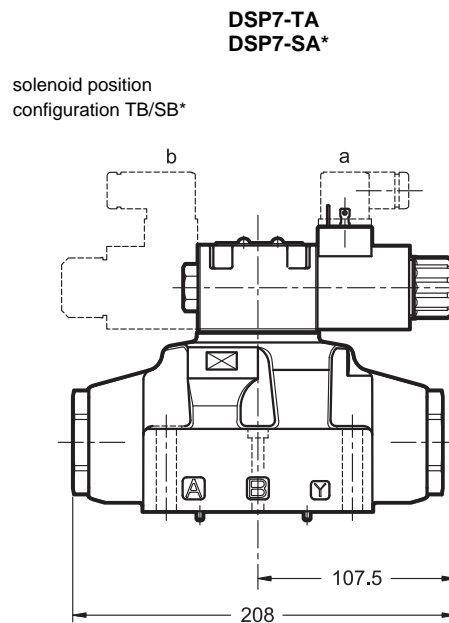
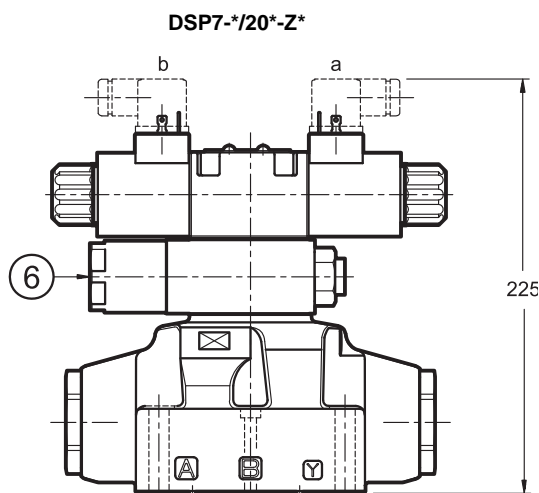
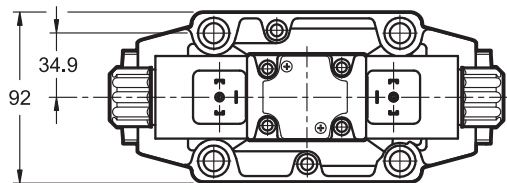
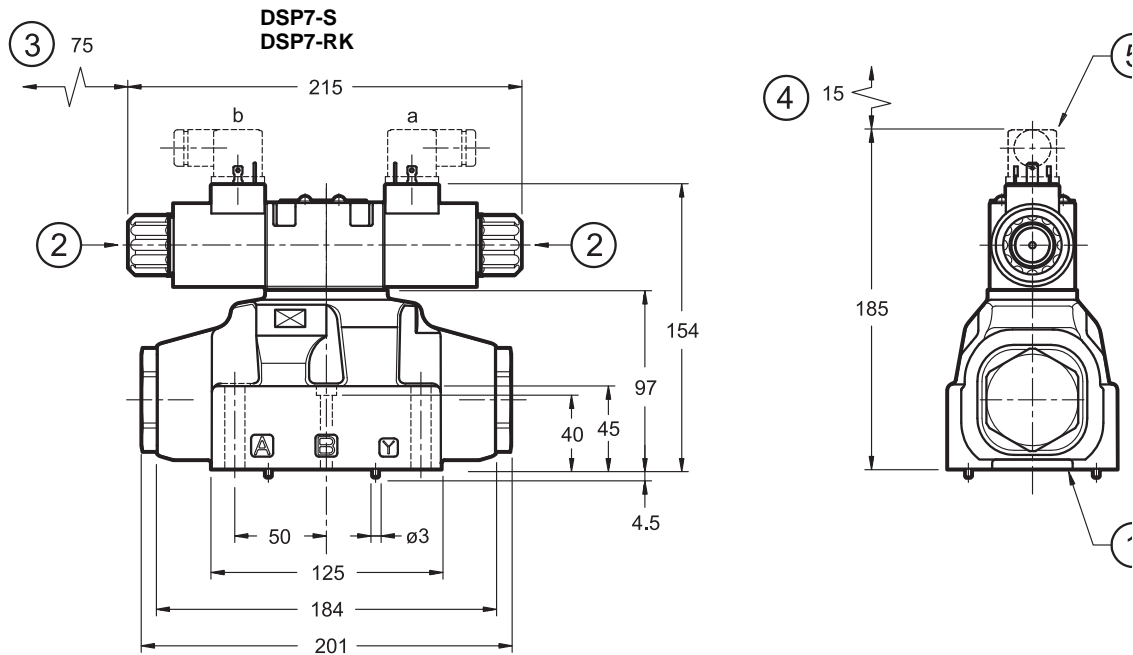
10.3 Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

Coils for alternating current (values ± 5%)

Suffix	Nominal voltage [V]	Frequency [Hz]	Resistance at 20°C [ohm]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code
A24	24	50	1,46	8	2	192	48	1902830
A48	48	50	5,84	4,4	1,1	204	51	1902831
A110	110V-50Hz	50/60	32	1,84	0,46	192	48	1902832
	120V-60Hz			1,56	0,39	188	47	
A230	230V-50Hz		140	0,76	0,19	176	44	1902833
	240V-60Hz			0,6	0,15	144	36	
F110	110	60	26	1,6	0,4	176	44	1902834
F220	220		106	0,8	0,2	180	45	1902835

11 - OVERALL AND MOUNTING DIMENSIONS FOR SOLENOID DISTRIBUTOR DSP7



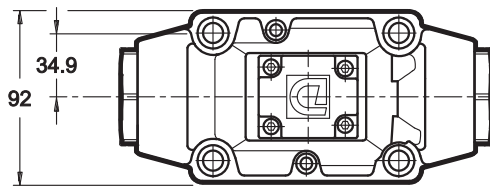
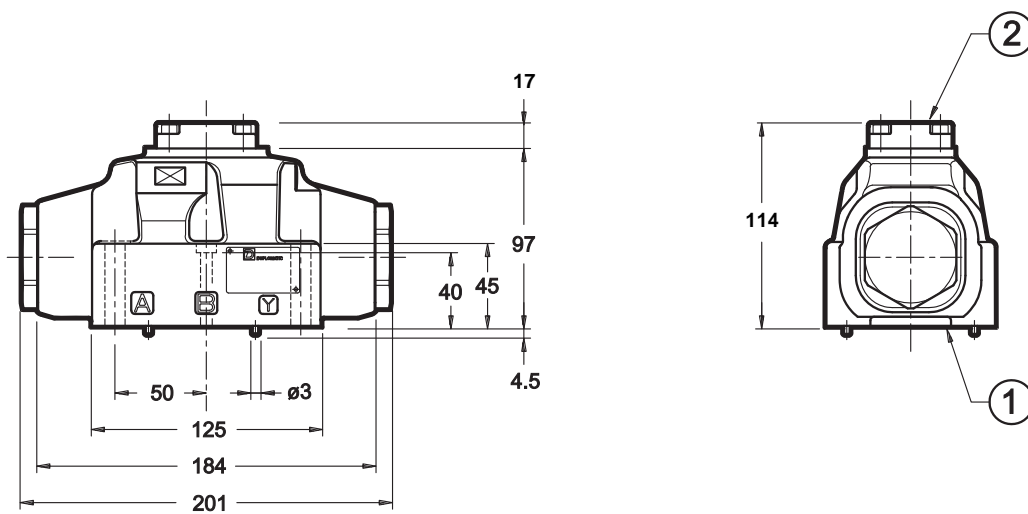
dimensions in mm

Fastening of single valve:	4 SHC screws ISO 4763 M10x60 (see par. 16)	2 SHC screws ISO 4763 M6x50
Tightening torque:	M10x60: 40 Nm (A 8.8 screws) - 67 Nm (A 12.9 screws)	M6x50: 8 Nm (A 8.8 screws) - 14 Nm (A 12.9 screws)
Threads of mounting holes:	M6x12; M10x18	
Sealing rings:	4 OR type 130 (22.22x2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore	

1	Mounting surface with sealing rings
2	Manual override
3	Coil removal space
4	Connector removal space
5	Electric connector to be ordered separately (see cat. 49 000)
6	Reducing valve with fixed adjustment 30 bar

NOTE: Use of class 12.9 fastening screws is recommended for valves in version **H** (high pressure).

12 - OVERALL AND MOUNTING DIMENSIONS FOR HYDRAULIC DISTRIBUTOR DSC7



Fastening of single valve: 4 SHC screws ISO 4763 M10x60 (see par. 16)	2 SHC screws ISO 4763 M6x50
Tightening torque: M10x60: 40 Nm (A 8.8 screws) - 67 Nm (A 12.9 screws)	M6x50: 8 Nm (A 8.8 screws) - 14 Nm (A 12.9 screws)
Threads of mounting holes: M6x12; M10x18	
Sealing rings: 4 OR type 130 (22.22X2.62) - 90 Shore	
2 OR type 2043 (10.82x1.78) - 90 Shore	

dimensions in mm

1	Mounting surface with sealing rings
2	Short-circuit subplate

NOTE: Use of class 12.9 fastening screws is recommended for valves in version **H** (high pressure).

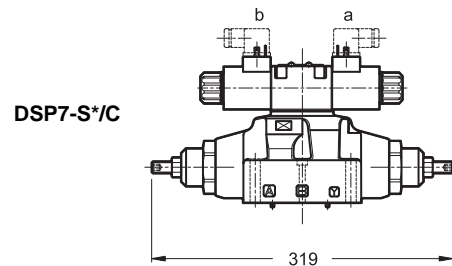
13 - OPTIONS

13.1 Control of the main spool stroke: C

With the help of special side plugs, it is possible to introduce stroke controls in the heads of the piloted valve so as to vary the maximum spool clearance opening.

This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable control on the actuator.

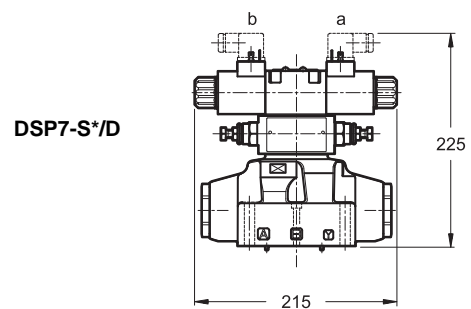
Add the letter **C** to the identification code to request this device (see paragraph 1).



13.2 Control of the main spool shifting speed: D

By placing a MERS type double flow control valve between the pilot solenoid valve and the main distributor, the piloted flow rate can be controlled and therefore the changeover smoothness can be varied.

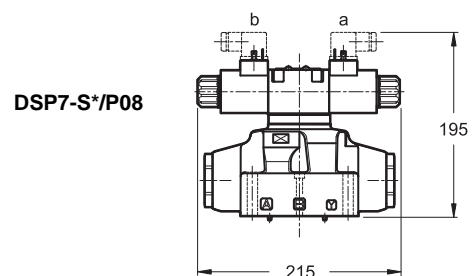
Add the letter **D** to the identification code to request this device (see paragraph 1).



13.3 Subplate with throttle on line P

It is possible to introduce a subplate with a restrictor of $\varnothing 0,8$ on line P between the pilot solenoid valve and the main distributor.

Add **P08** to the identification code to request this option (see paragraph 1).



13.4 Solenoid operated distributor with pilot valve in configuration S2

It is possible to deliver the solenoid operated distributor with pilot valve in configuration S2 (all the ports at outlet). With this option the piloting is necessarily external.

Add **S2** to the identification code to request this option (see paragraph 1).

This configuration is used with external piloting in order to allow the unloading of the piloting line when the solenoid operated valve is in rest position.

14 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or use in tropical climates, the manual override, boot protection is recommended.

Add the suffix **CM** to request this device (see paragraph 1).

For overall dimensions see cat. 41 150.

15 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without the connectors. They must be ordered separately.

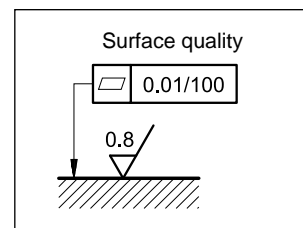
For the identification of the connector type to be ordered, please see catalogue 49 000.

16 - INSTALLATION

Configurations with centering and recall springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

NOTE: Use of class 12.9 fastening screws is recommended for valves in version **H** (high pressure).



17 - SUBPLATES (see catalogue 51 000)

These plates are for the standard valves only. They are not suitable for high pressure (H) versions .

Type with rear ports	PME07-AI6G
Type with side ports	PME07-AL6G
P, T, A, B, port dimensions X, Y; L port dimensions	1Ž BSP 1/4Ž BŞ



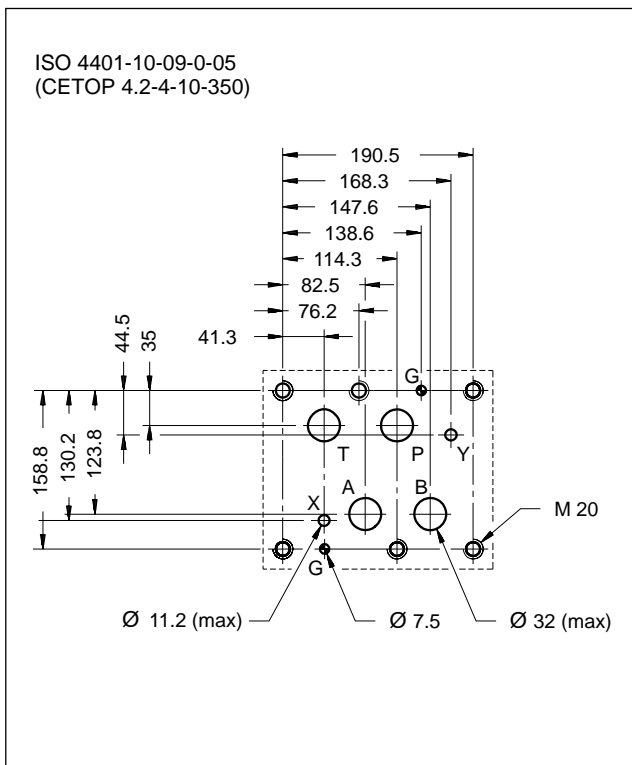
DSP10

PILOT OPERATED DISTRIBUTOR SOLENOID OR HYDRAULIC (DSC10) CONTROLLED

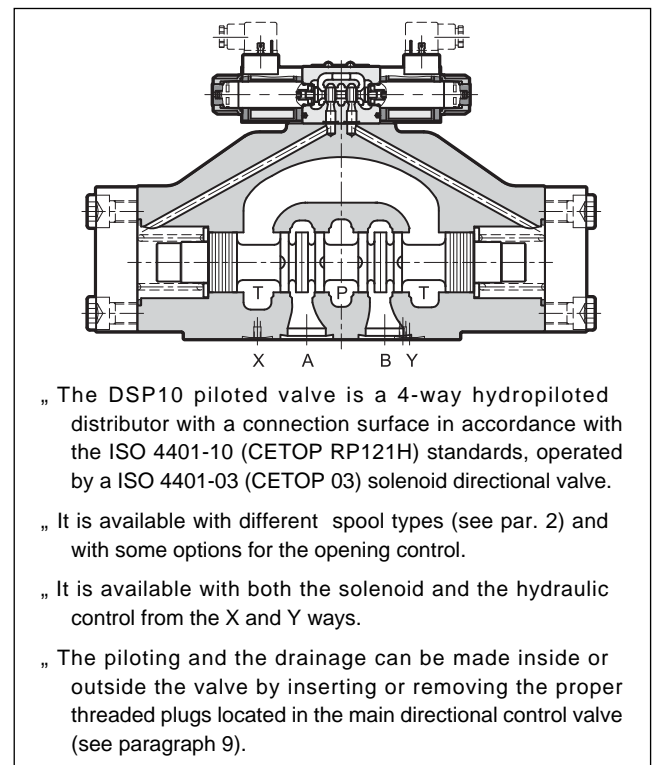
SUBPLATE MOUNTING
ISO 4401-10 (CETOP 10)

p max 350 bar
Q max 1100 l/min

MOUNTING INTERFACE



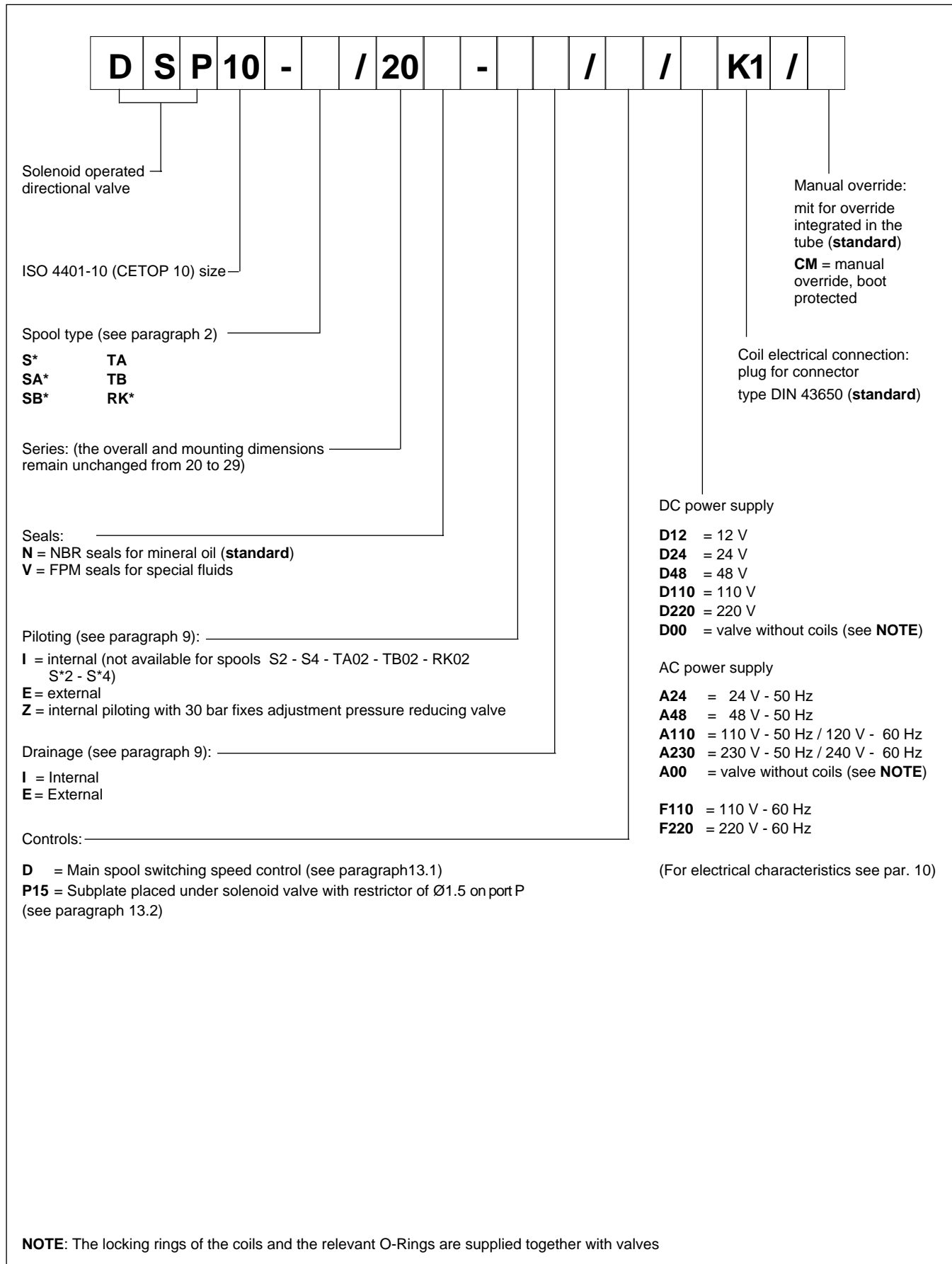
OPERATING PRINCIPLE



PERFORMANCES (obtained with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure		
- ports P - A - B (standard version)		350
- port T (external drainage)	bar	210
Maximum flow rate from port P to A - B - T	l/min	1100
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 20/18/15	
Recommended viscosity	cSt	25
Mass: DSP10		50
DSC10	kg	48

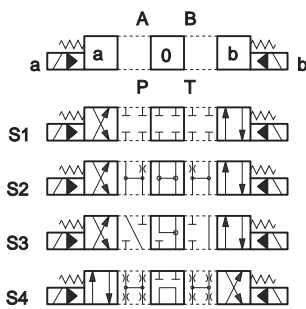
1 - IDENTIFICATION CODE FOR SOLENOID DISTRIBUTOR DSP10



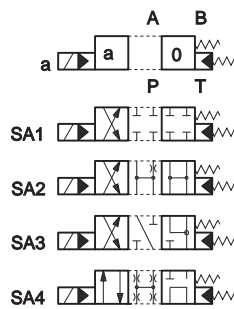
2- SPOOL TYPE

N.B.: Symbols refers to the **DSP10** solenoid valve. For the **DSC10** hydraulic control version, please verify the connection scheme (see par. 3).

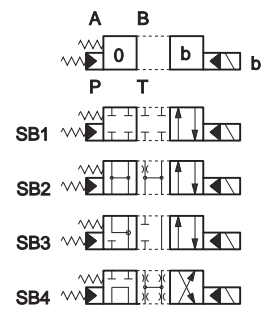
Type S*:
2 solenoids - 3 positions
with spring centering



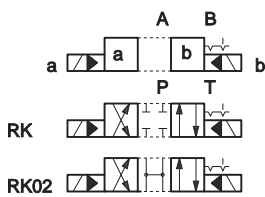
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



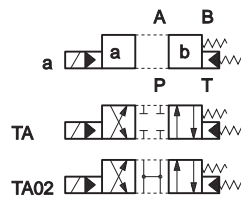
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



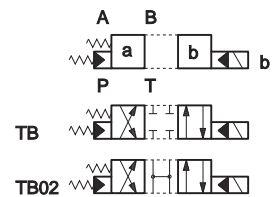
Type RK:
2 solenoids - 2 positions
with mechanical retention



Type TA:
1 solenoid side A
2 external positions
with return spring

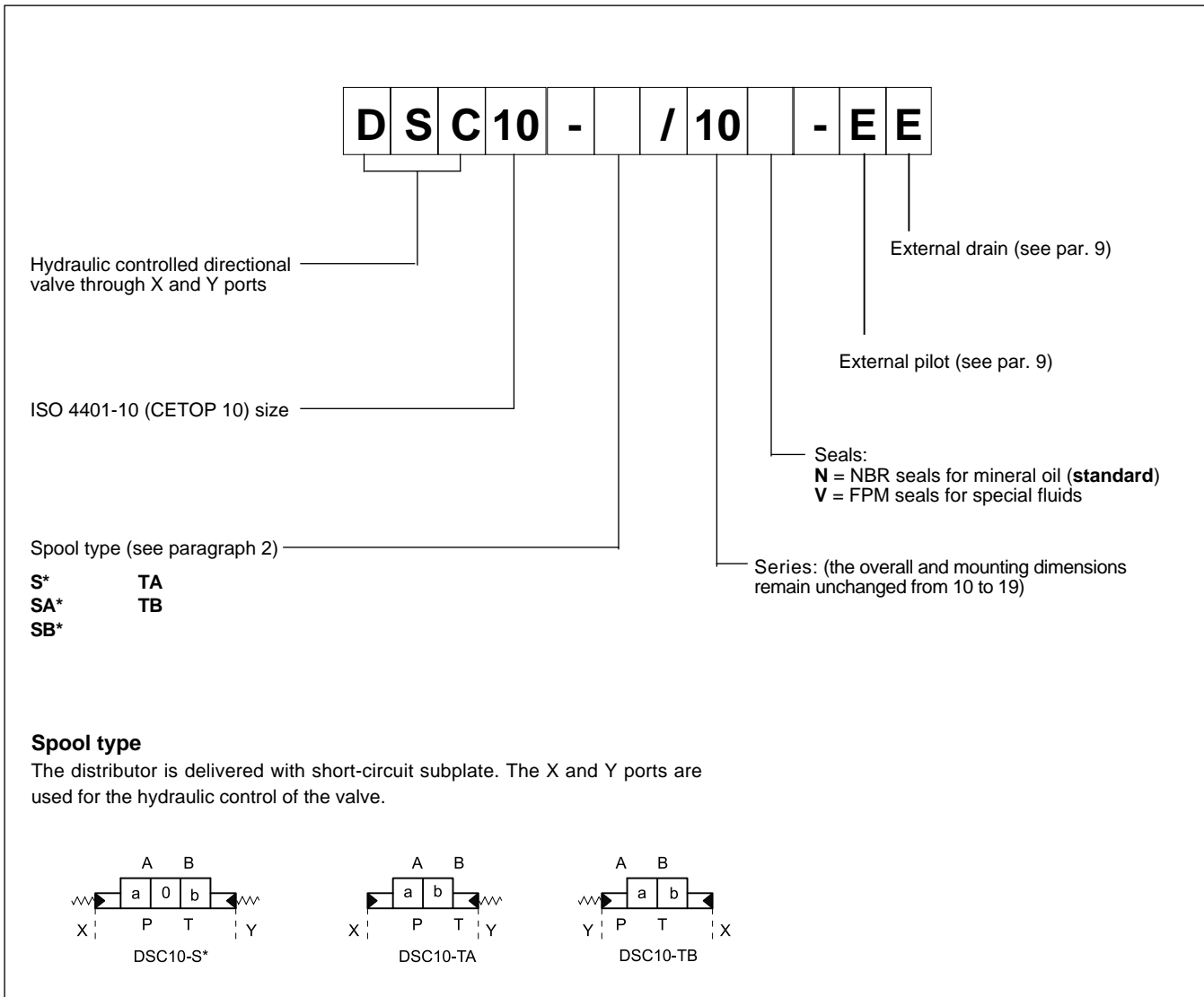


Type TB:
1 solenoid side B
2 external positions
with return spring



If other spool types are necessary please consult our Technical Department

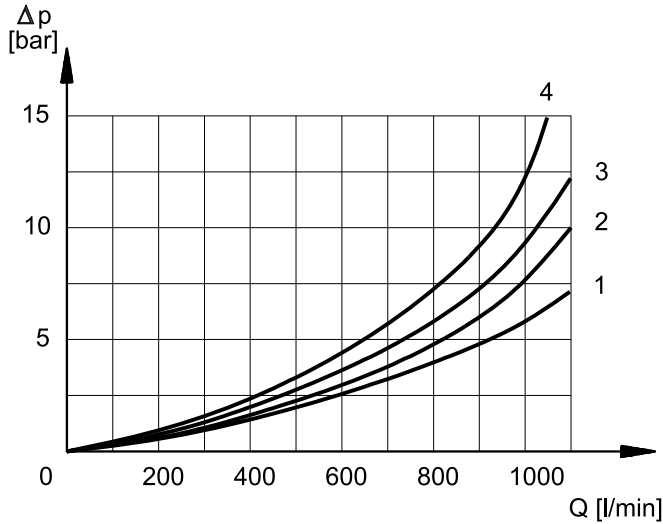
3 - IDENTIFICATION CODE FOR HYDRAULIC DISTRIBUTOR DSC10



4 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code V). 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.

5 - PRESSURE DROPS $p-Q$ (values obtained with viscosity 36 cSt at 50 °C)



PRESSURE DROPS WITH VALVE ENERGIZED

SPOOL TYPE	FLOW DIRECTION			
	P-A	P-B	A-T	B-T
	CURVES ON GRAPH			
S1, SA1, SB1	1	1	1	1
S2, SA2, SB2	2	2	2	2
S3, SA3, SB3	1	1	4	4
S4, SA4, SB4	2	2	2	2
TA, TB	1	1	1	1
TA02, TB 02	1	1	1	1
RK	1	1	1	1

PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P-A	P-B	A-T	B-T	P-T
	CURVES ON GRAPH				
S2, SA2, SB2					3
S3, SA3, SB3			4	4	
S4, SA4, SB4					4

6 - SWITCHING TIMES

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections. The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

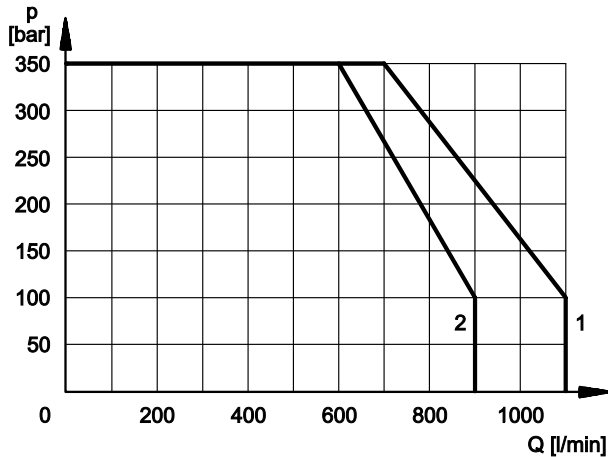
TIMES ($\pm 10\%$) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
	AC solenoid	90	60	90
DC solenoid	130	100	90	60

7 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406.1999 class 18/16/13.



SPOOL TYPE	CURVE	
	P-A	P-B
S1, SA1, SB1	1	1
S2, SA2, SB2	2	2
S3, SA3, SB3	1	1
S4, SA4, SB4	2	2
TA, TB	1	1
TA02, TB02	1	1
TA23, TB23	1	1
RK	1	1

8 - PERFORMANCE CHARACTERISTICS

PRESSURES [bar]		
	MIN	MAX
Piloting pressure	12 (NOTE a)	280 (NOTE b)
Pressure on line T with internal drainage	-	140
Pressure on line T with external drainage	-	210

NOTES:

a) The minimum piloting pressure can be of 6 bar at low flows rates, but with higher flow rates a pressure of 12 bar is needed.

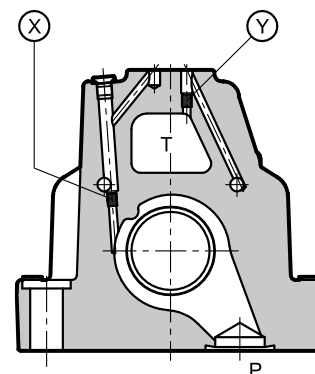
b) If the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure. Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered, inserting the letter **Z** in the code identification at piloting entry.

9 - PILOTING AND DRAINAGE

The DSP10 valves are available with piloting and drainage, both internal and external.

The version with external drainage allows for a higher back pressure on the outlet.

VALVE TYPE		Plug assembly	
		X	Y
IE	INTERNAL PILOT AND EXTERNAL DRAINAGE	NO	YES
II	INTERNAL PILOT AND INTERNAL DRAINAGE	NO	NO
EE	EXTERNAL PILOT AND EXTERNAL DRAINAGE	YES	YES
EI	EXTERNAL PILOT AND INTERNAL DRAINAGE	YES	NO



X: plug M6x8 for external pilot

Y: plug M6x8 for external drain

10 - ELECTRICAL FEATURES

10.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see CAT. 49 000).

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	6.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation: DC valve AC valve	IP 65 (NOTE 2) class H class F class H

10.2 Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the different coil types for DC.

The rectified current supply takes place by fitting the valve (with the exception of D12 coil) with an alternating current source (50 or 60 Hz), rectified by means of a bridge built-in to the •DŽ type connectors (see cat.49 000), by considering a reduction of the operating limits by 5 ÷ 10% approx.

Coils for direct current (values ± 5%)

Suffix	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt. [W]	Coil code
D12	12	4,4	2,72	32,6	1902860
D24	24	18,6	1,29	31	1902861
D48	48	78,6	0,61	29,3	1902863
D110	110	423	0,26	28,6	1902864
D220	220	1692	0,13	28,6	1902865

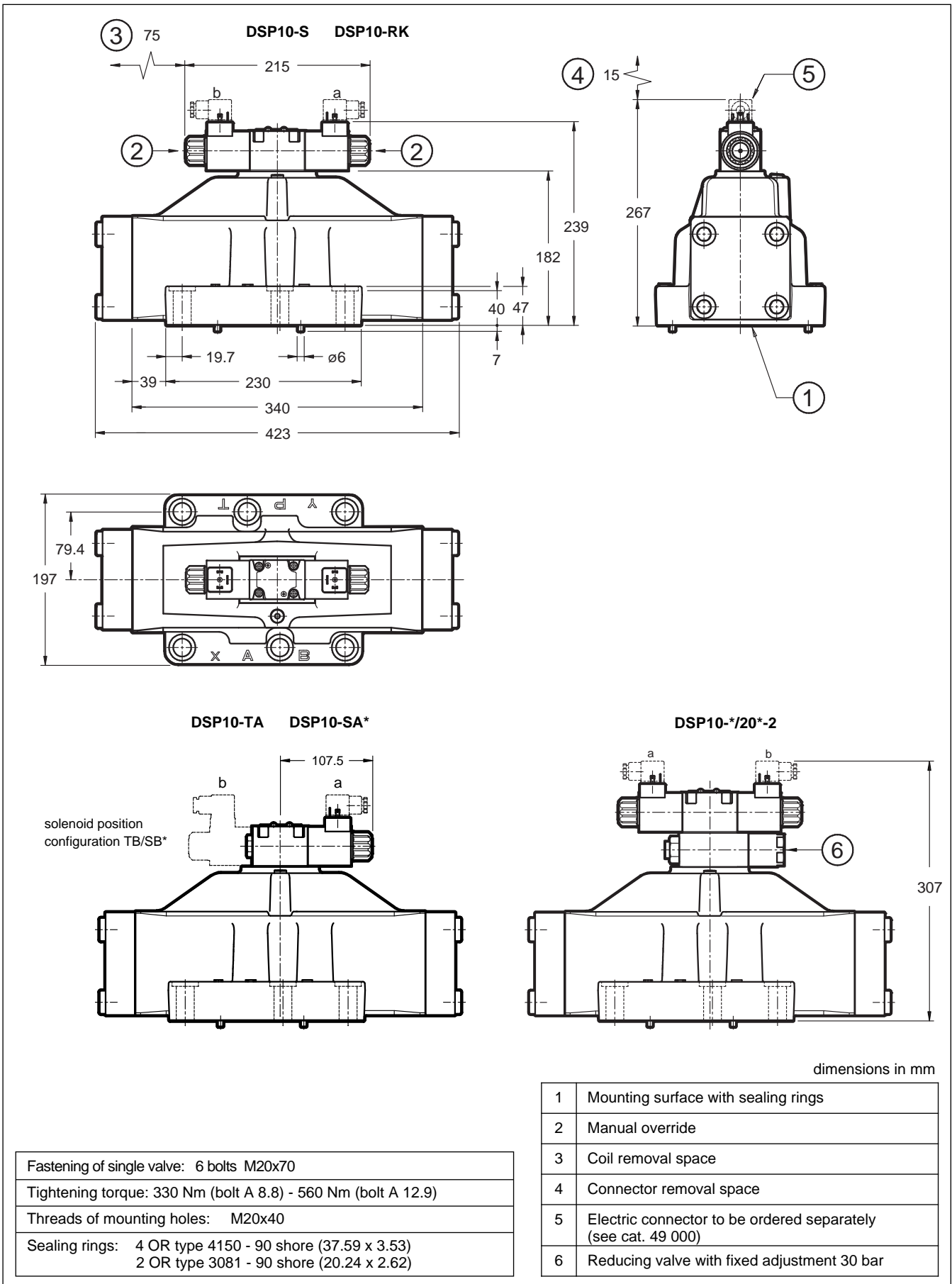
10.3 Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

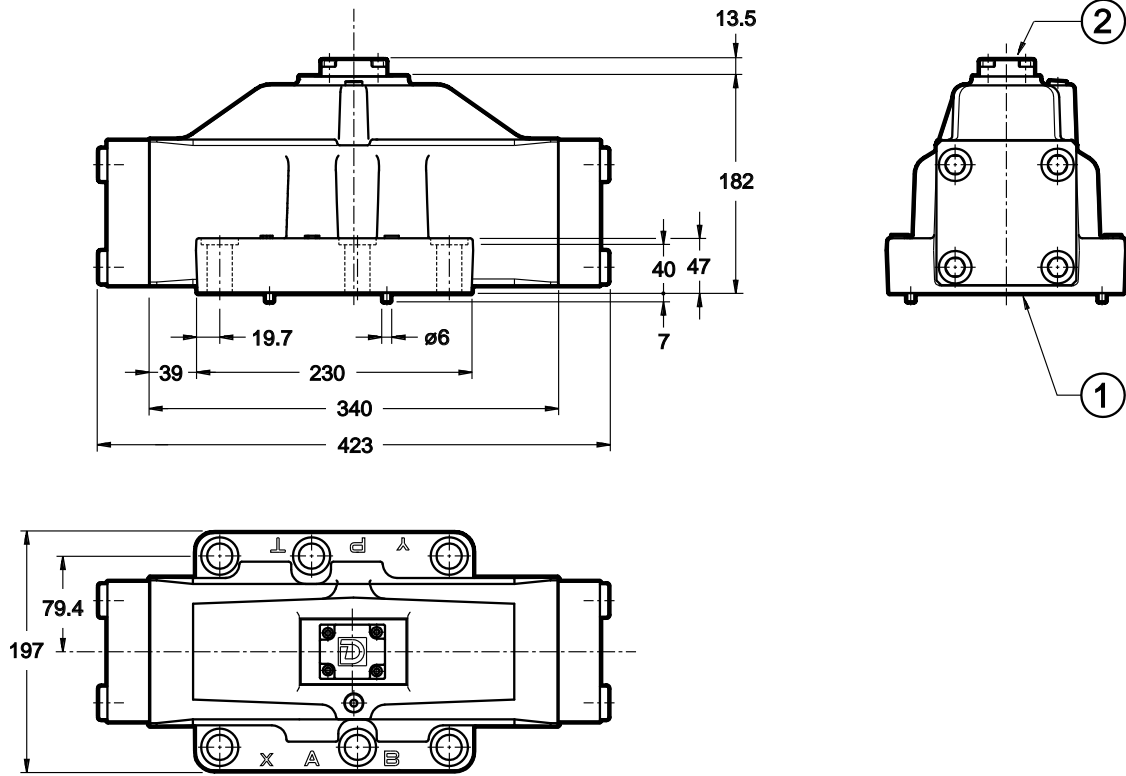
Coils for alternating current (values ± 5%)

Suffix	Nominal voltage [V]	Frequency [Hz]	Resistance at 20°C [ohm]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code
A24	24	50	1,46	8	2	192	48	1902830
A48	48	50	5,84	4,4	1,1	204	51	1902831
A110	110V-50Hz	50/60	32	1,84	0,46	192	48	1902832
	120V-60Hz			1,56	0,39	188	47	
A230	230V-50Hz		140	0,76	0,19	176	44	1902833
	240V-60Hz			0,6	0,15	144	36	
F110	110	60	26	1,6	0,4	176	44	1902834
F220	220	60	106	0,8	0,2	180	45	1902835

11 - OVERALL AND MOUNTING DIMENSIONS FOR SOLENOID DISTRIBUTOR DSP10



12 - OVERALL AND MOUNTING DIMENSIONS FOR HYDRAULIC DISTRIBUTOR DSC10



dimensions in mm

Fastening of single valve: 6 bolts M20x70
Tightening torque: 330 Nm (bolt A 8.8) - 560 Nm (bolt A 12.9)
Threads of mounting holes: M20x40
Sealing rings: 4 OR type 4150 - 90 shore (37.59 x 3.53) 2 OR type 4075 - 90 shore (20.24 x 2.62)

1	Mounting surface with sealing rings
2	Short-circuit subplate



DSP10

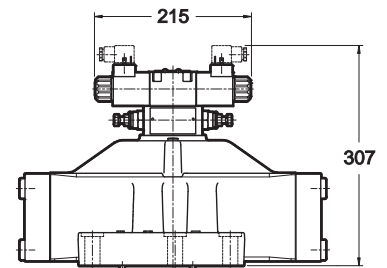
13 - OPTIONS

13.1 Control of the main spool shifting speed: D

By placing a MERS type double flow control valve between the pilot solenoid valve and the main distributor, the piloted flow rate can be controlled and therefore the changeover smoothness can be varied.

Add the letter **D** to the identification code to request this device (see paragraph 1).

DSP10-S*/D

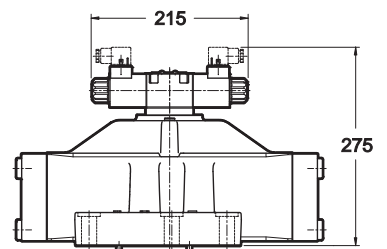


13.2 Subplate with throttle on line P

It is possible to introduce a subplate with a restrictor of Ø1,5 on line P between the pilot solenoid valve and the main distributor.

Add **P15** to the identification code to request this option (see paragraph 1).

DSP10-S*/P15



14 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or use in tropical climates, the manual override, boot protection is recommended.

Add the suffix **CM** to request this device (see paragraph 1).

For overall dimensions see cat. 41 150.

15 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without the connectors. They must be ordered separately.

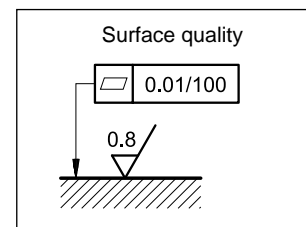
For the identification of the connector type to be ordered, please see catalogue 49 000.

16 - INSTALLATION

Configurations with centering and recall springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



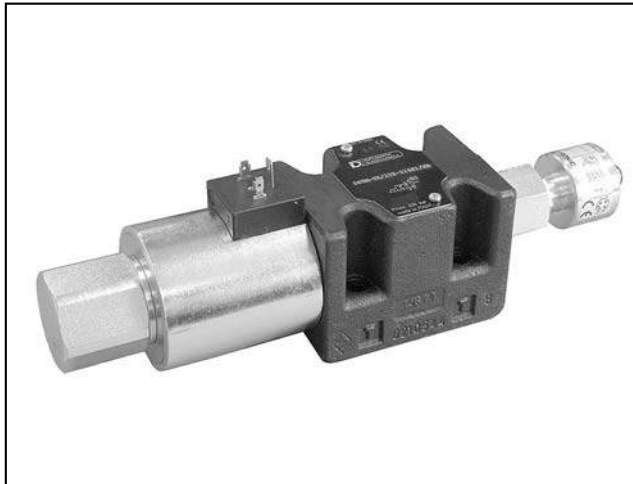
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Fax +39 0331.895.339

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DS(P)*M

DIRECTIONAL VALVES WITH SPOOL POSITION MONITORING

DS3M	ISO 4401-03 (CETOP 03)
DS5M	ISO 4401-05 (CETOP 05)
DSP5M	CETOP P05
DSP5RM	ISO 4401-05 (CETOP R05)
DSP7M	ISO 4401-07 (CETOP 07)
DSP8M	ISO 4401-08 (CETOP 08)

OPERATING PRINCIPLE

„ Solenoid operated directional control valves with monitored spools are supplied with a positioning sensor monitoring the valve spool position (in case of pilot operated directional control valves, the main spool is monitored). The switching position is indicated with a binary signal.

„ The valves of sizes ISO 4401-03 (CETOP 03) and ISO 4401-05 (CETOP 05) are direct operated while sizes CETOP P05, ISO 4401-05 (CETOP R05), ISO 4401-07 (CETOP 07) and ISO 4401-08 (CETOP 08) are pilot operated.

„ They are supplied with oil bath solenoids and only in direct current versions (see paragraph 14 for available voltages).

„ These valves have no manual override, according to EN 693:2011.

PERFORMANCES (working with mineral oil of viscosity of 36 cSt at 50°C)

		DS3M	DS5M	DSP5M DSP5RM	DSP7M	DSP8M	
Maximum operating pressure: P - A - B ports	bar	350	320	320	350	350	
T port		210		see performance limits at paragraph 6.2			
Maximum flow rate from P to A - B - T	l/min	see performance limits at paragraph 2.3			150	300	600
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 20/18/15					
Recommended viscosity	cSt	25					
Mass: single solenoid valve	kg	1,8	5	7,1	8,7	15,6	
double solenoid valve		2,2	-	8	9,6	16,6	

1 - IDENTIFICATION OF SOLENOID VALVES DIRECT OPERATED

1.1 - Identification code

D	S		M	-	/		-	K1	/	
---	---	--	---	---	---	--	---	----	---	--

Directional control valve solenoid operated

3 = ISO 4401-03 (CETOP 03) size
5 = ISO 4401-05 (CETOP 05) size

Monitoring of the spool position

Spool type (see par. 1.2)

S*	TA	TB
SA*	TA02	TB02
	TA100	TB100

Series No.

20 = for DS5M
21 = for DS3M
(the overall and mounting dimensions remain unchanged from 20 to 29)

Seals:

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

Monitored position:
(see par. 17 for switching logic)

R0 = monitored rest position
MA = monitored position •a•
MB = monitored position •b•

Coil electrical connection:
plug for connector type
DIN 43650 (standard)

DC power supply

D12 = 12 V	D110 = 110 V
D24 = 24 V	D220 = 220 V

NOTE: Verify spool and sensor type availability in the tables below

DS3		SPOOLS			
		S*	SA*	TA TB	TA100 TB100
SENSOR TYPE	R0	x			
	MA		x	x	x
	MB		x	x	x

DS5		SPOOLS		
		TA TB	TA02 TB02	TA100 TB100
SENSOR TYPE	R0			
	MA	x	x	x
	MB	x	x	x

NOTE: To be compliant with the EN 693:2011 standard, the valves have no manual override.

1.2 - Spool types for DS3M and DS5M

Type S*:
2 solenoids - 3 positions
with spring centering

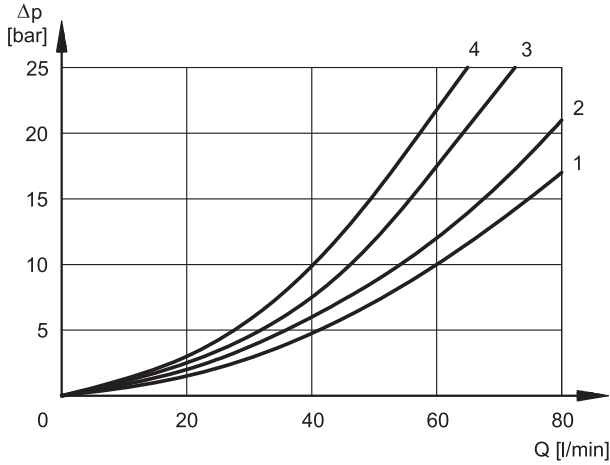
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering

Type TA:
1 solenoid side A
2 external positions with
return spring

Type TB:
1 solenoid side B
2 external positions with
return spring

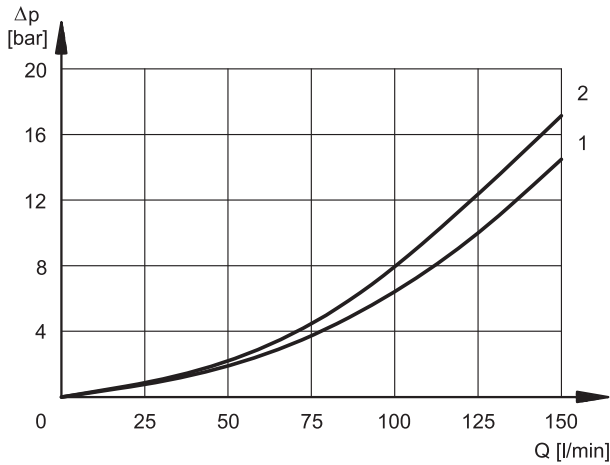
2 - CHARACTERISTIC CURVES OF SOLENOID VALVES DIRECT OPERATED

2.1 - Pressure drops p - Q for DS3M solenoid valves (obtained with viscosity 36 cSt at 50 °C)



SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S1, SA1	1	1	2	2	-
S4, SA4	4	4	4	4	2
TA, TB	1	1	1	1	-
TA100, TB100	3	3	3	3	-

2.2 - Pressure drops p - Q for DS5M solenoid valves (obtained with viscosity 36 cSt at 50 °C)



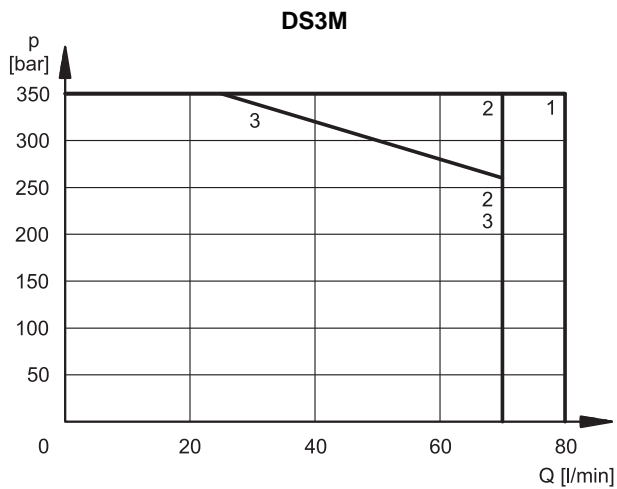
SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
TA, TB, TA02, TB02	2	2	1	1	-
TA100, TB100	1	1	1	1	-

2.3 - Performance limits for DS3M and DS5M solenoid valves

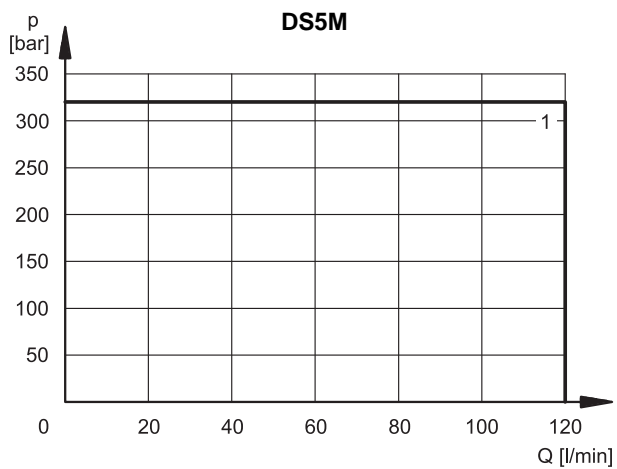
The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 64003 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow.



SPOOL	CURVE	
	P A	P B
S1, SA1	1	1
S4, SA4	2	2
TA, TB	1	1
TA100, TB100	3	3



SPOOL	CURVE	
	P A	P B
TA	1	1
TA02	1	1
TA100	1	1

2.4 - Switching times

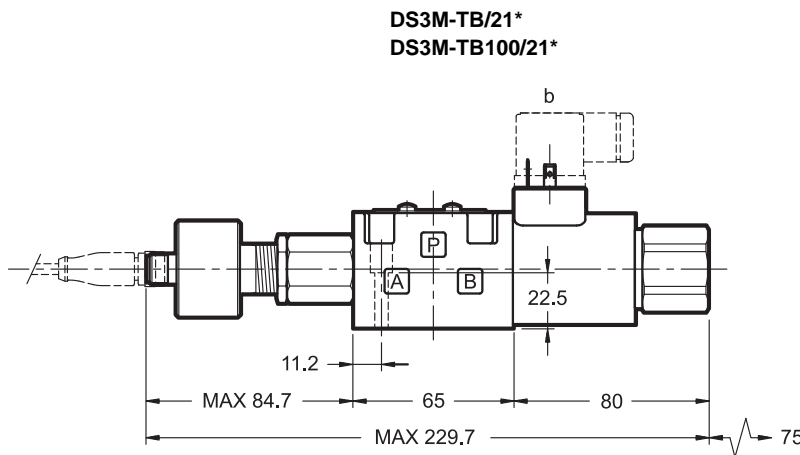
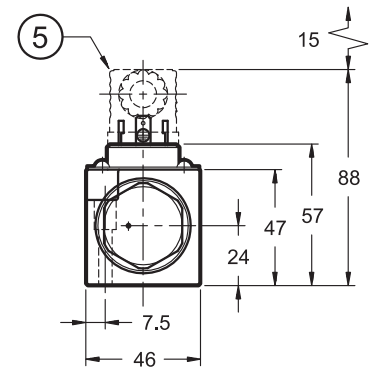
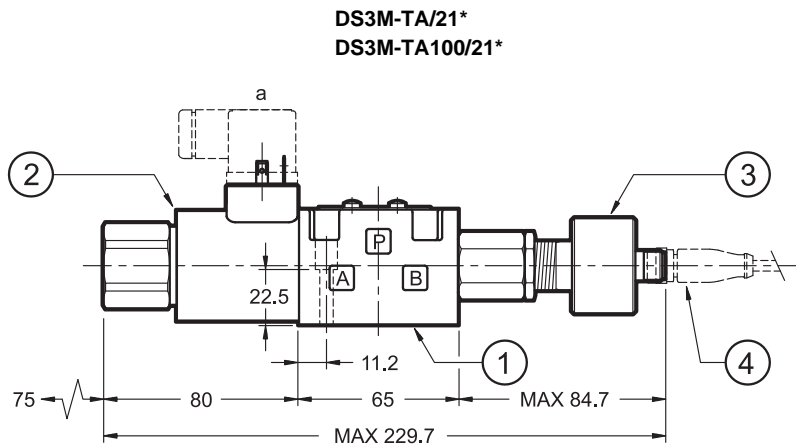
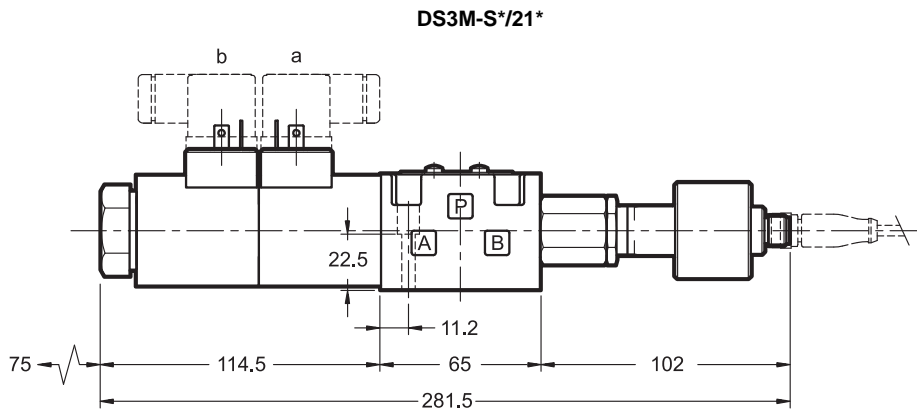
The indicated values had obtained according to ISO 6403 standards, using mineral oil with viscosity 36 cSt at 50 °C.

TIMES [ms]	ENERGIZING	DE-ENERGIZING
DS3M	25 ÷ 75	15 ÷ 25

TIMES [ms]	ENERGIZING	DE-ENERGIZING
DS5M	100 ÷ 150	20 ÷ 50

3 - OVERALL AND MOUNTING DIMENSIONS FOR DS3M

dimensions in mm

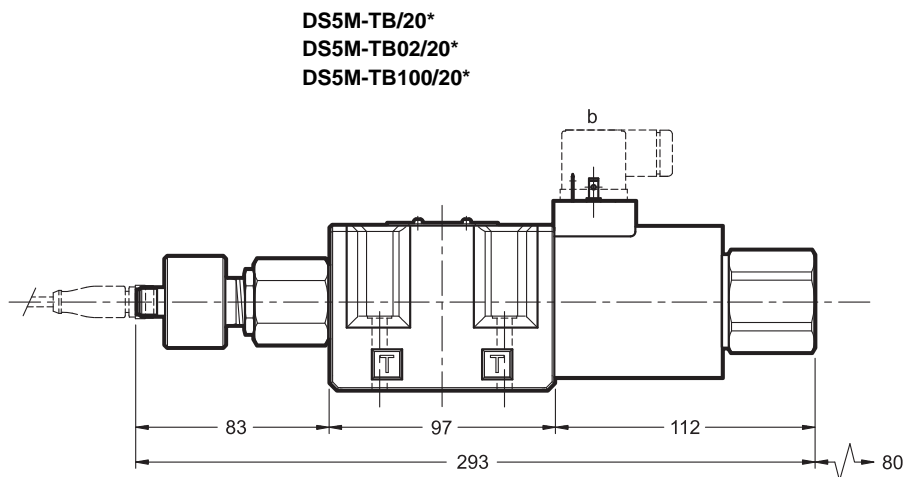
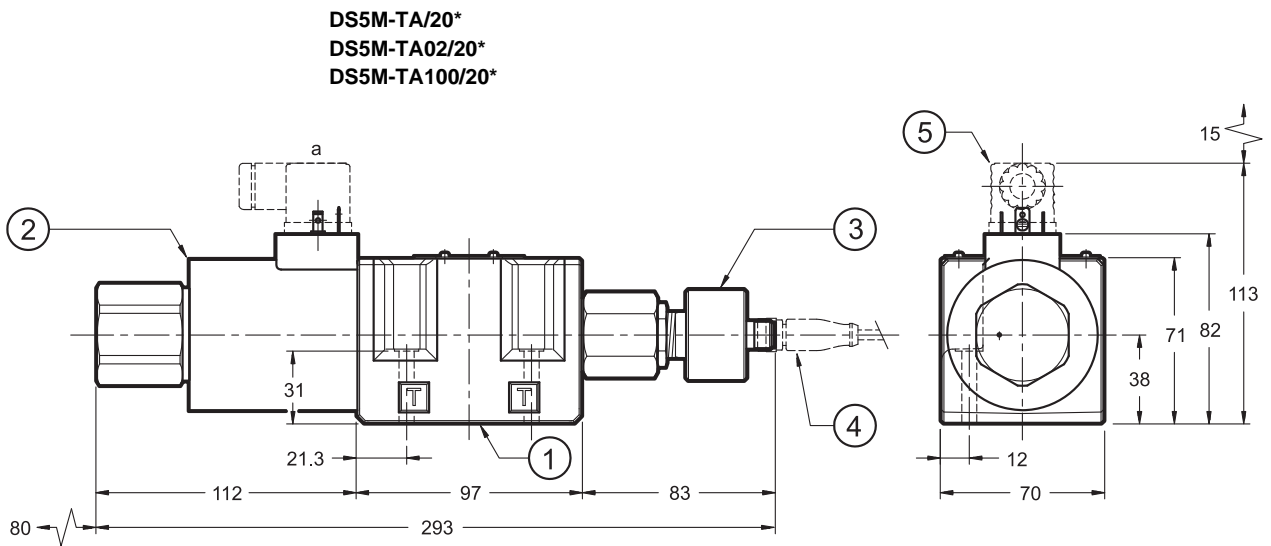


Fastening of single valve: 4 SHC screws ISO 4762 M5x30
Tightening torque: 5 Nm
Threads of mounting holes: M5x10
Sealing rings: 4 OR type 2037 (9.25x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Coil rotating 360°
3	Positioning sensor: setting sealed at factory, do not unscrew.
4	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
5	Coil electric connector DIN 43650 type to be ordered separately - cat. 49 000

4 - OVERALL AND MOUNTING DIMENSIONS FOR DS5M

dimensions in mm



Fastening of single valve: 4 SHC screws ISO 4762 M6x40
Tightening torque: 8 Nm
Threads of mounting holes: M6x10
Sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Coil rotating 360°
3	Positioning sensor: setting sealed at factory, do not unscrew.
4	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
5	Coil electric connector DIN 43650 type to be ordered separately - cat. 49 000

5 - IDENTIFICATION OF SOLENOID VALVES PILOT OPERATED

5.1 - Identification code

D	S	P	M	-	/	-	/	/	/	K1	/
---	---	---	---	---	---	---	---	---	---	----	---

Directional valve,
Solenoid controlled
Pilot operated

Size: _____
5 = CETOP P05
5R = ISO 4401-05 (CETOP R05)
7 = ISO 4401-07 (CETOP 07)
8 = ISO 4401-08 (CETOP 08)

Monitoring of the spool position _____

Spool type (see paragraph 5.2) _____
S1 SA1 SB1 TA TB
S3 TA100 TB100
S4
RK

Series: _____
10 = for DSP5M, DSP5RM and DSP8M
20 = for DSP7M
 (the overall and mounting dimensions within the same ten remain unchanged)

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

Piloting (see paragraph 7): _____
I = internal (not available for S4 spool)
E = external
C = internal piloting with backpressure valve
 (available on DSP7 and DSP8 only)
Z = internal piloting with 30 bar fixes adjustment pressure reducing valve
 (see par. 6.2)

Monitored position:
(see par. 17 for switching logic)

1 positioning sensor
R0 = rest position monitored
MA = position •a• monitored
MB = position •b• monitored

2 positioning sensor
M0 = rest position monitored
MAB = •a• and •b• positions monitored

Coil electrical connection:
plug for connector type
DIN 43650 (**standard**)

DC power supply
D12 = 12 V **D110** = 110 V
D24 = 24 V **D220** = 220 V

P = Subplate with restrictor on port P placed under pilot operated solenoid valve (omit only for valves with fixed adjustment reducing valve - version Z - and for flow control valves for the control of the main spool shifting - version D)
D = main spool shifting speed control (see par. 8)

Drainage (see paragraph 7):
I = Internal
E = External

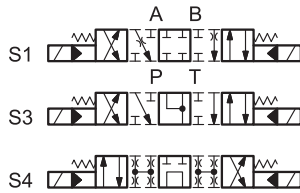
NOTE: Verify spool and sensor type availability in the table below

		SPOOLS				
		S*	SA* SB*	TA TB	TA100 TB100	RK
SENSOR TYPE	R0	x				
	MA		x	x	x	x
	MB		x	x	x	x
	M0	x				
	MAB	x	x	x	x	

NOTE: To be compliant with the EN 693:2011 standard, the valves have no manual override.

5.2 - Spool types for DSP5M, DSP5RM, DSP7M and DSP8M

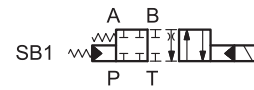
Type S*:
2 solenoids - 3 positions
with spring centering



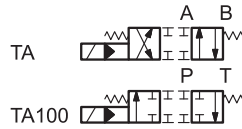
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



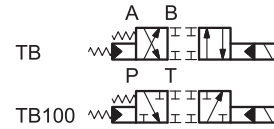
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



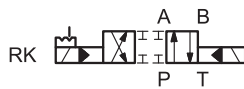
Type TA:
1 solenoid side A
2 external positions with
return spring



Type TB:
1 solenoid side B
2 external positions with
return spring

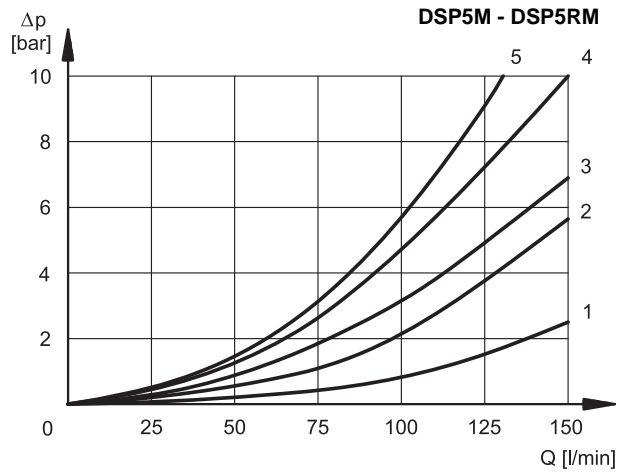


Type RK:
2 solenoids - 2 positions
with mechanical retention



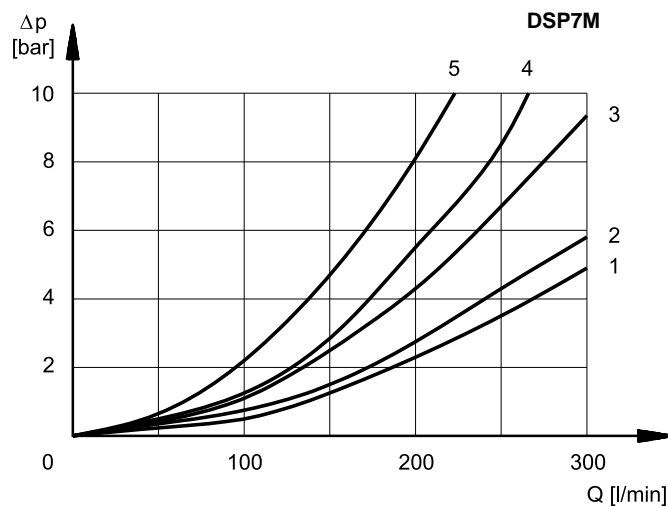
6 - CHARACTERISTIC CURVES (values obtained with viscosity 36 cSt at 50 °C)

6.1 - Pressure drops for pilot operated valves



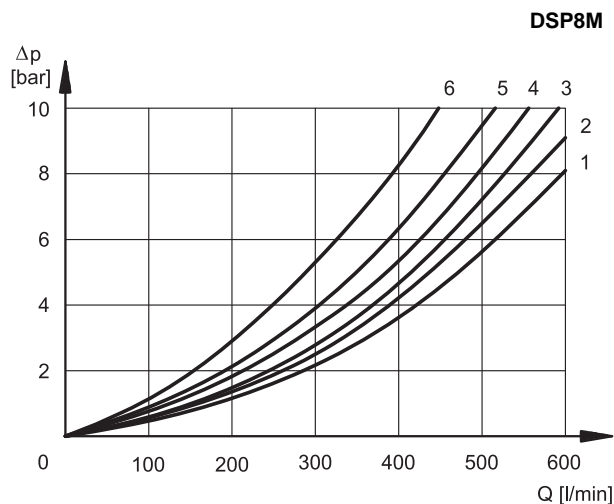
SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S1, SA1	4	4	1	1	-
S3	4	4	1	1	-
S4	5	5	2	3	5
TA, TB	4	4	1	1	-
TA100, TB100	3	3	1	1	-
RK	4	4	1	1	-

For pressure drops of the S3 spool between A-T and B-T ports in central position refer to the curve 4.



SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S1, SA1	1	1	3	4	-
S3	1	1	4	4	-
S4	2	2	4	5	4
TA, TB	1	1	3	4	-
TA100, TB100					-
RK	1	1	3	4	-

For pressure drops of the S3 spool between A-T and B-T ports in central position refer to the curve 4.



SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S1, SA1	2	2	3	3	-
S3	2	2	2	1	-
S4	4	4	3	5	6
TA, TB	2	2	3	3	-
TA100, TB100	5	5	5	5	-
RK	2	2	3	3	-

For pressure drops of the S3 spool between A-T and B-T ports in central position refer to the curve 4.

6.2 - Performance limits for DSP5M - DSP7M - DSP8M pilot operated directional valves

PRESSURES	DSP5M DSP5RM	DSP7M	DSP8M
Max pressure in P, A, B ports	320	350	350
Max pressure in T line with internal drainage	140	140	140
Max pressure in T line with external drainage	210	210	210
Min piloting pressure (X port and / or Y port) NOTE 1	5 ÷ 10	5 ÷ 12	7 ÷ 14
Max piloting pressure (X port and / or Y port) NOTE 2	210	210	210

NOTE 1: minimum piloting pressure can be the lower range value at low flows rates, but with higher flow rates the higher value is needed.

NOTE 2: if the valve operates with higher pressures it is necessary to use the version with external pilot and reduced pressure. Otherwise, the valve with internal pilot and pressure reducing valve with 30 bar fixed adjustment can be ordered. Add the letter Z to the identification code to order this option (see par. 5.1).

MAXIMUM FLOW RATES		DSP5M DSP5RM		DSP7M		DSP8M	
Spool type	[l/min]	PRESSURES					
		at 210 bar	at 320 bar	at 210 bar	at 350 bar	at 210 bar	at 350 bar
S4 - TA100		120	100	200	150	500	450
S1 - S3 - TA - RK		150	120	300	300	600	500

6.3 - Switching times

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

TIMES (± 10%) [ms]	ENERGIZING		DE-ENERGIZING	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
DSP5M - DSP5RM	60	50	50	40
DSP7M	75	60	60	45
DSP8M	100	70	80	50

7 - PILOTING AND DRAINAGE

These valves are available with piloting and drainage, both internal and external.

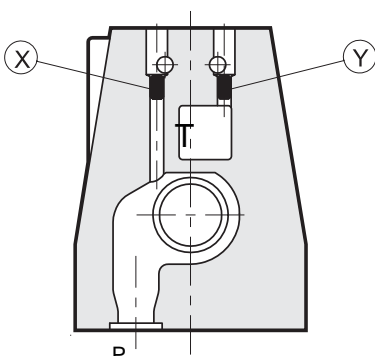
The version with external drainage allows for a higher back pressure on the outlet.

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

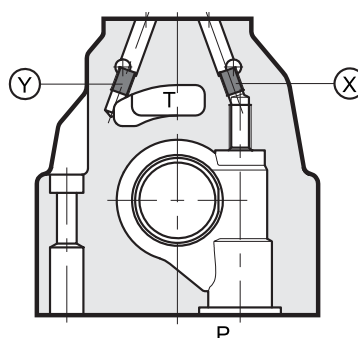
X: plug M5x6 for external pilot
Y: plug M5x6 for external drain

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

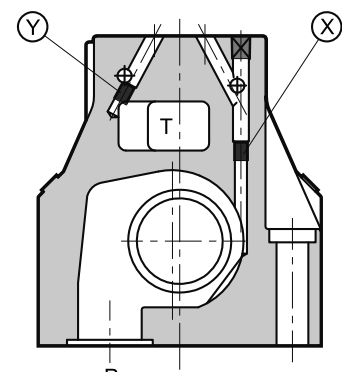
X: plug M6x8 for external pilot
Y: plug M6x8 for external drain



**DSP5M
DSP5RM**



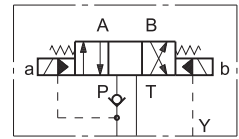
DSP7M



DSP8M

7.1 - Backpressure valve incorporated on line P (C option)

DSP7M and DSP8M valves are available upon request with backpressure valve incorporated on line P. This is necessary to obtain the piloting pressure when the control valve, in rest position, has the line P connected to the T port (spools S4). The cracking pressure is of 5 bar with a minimum flow rate of 15 l/min.

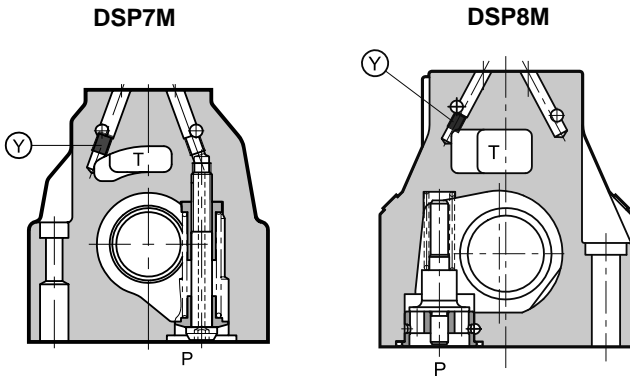


In the C version the piloting is always internal.

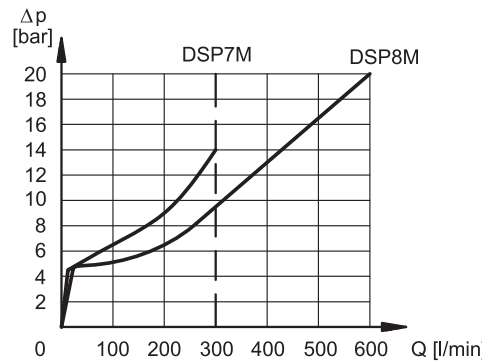
NOTE: the backpressure valve can't be used as check valve because it doesn't assure the seal.

Add C to the identification code for this request (see paragraph 5.1).

For DSP7M only, the backpressure valve can be also delivered separately and it can be easily mounted on line P of the main control valve. Ask for code 0266577 to order the backpressure valve.



pilot always internal
Y: plug M6x8 for external drain

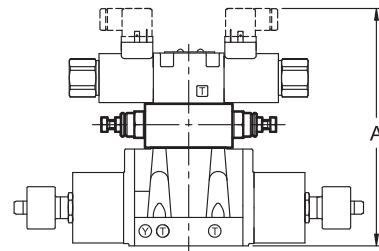


The curve refers to the pressure drop (body part only) with backpressure valve energized to which the pressure drop of the reference spool must be added. (see paragraph 6)

8 - OPTIONS: CONTROL OF THE MAIN SPOOL SHIFTING SPEED

By placing a MERS type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the change over smoothness can be varied.

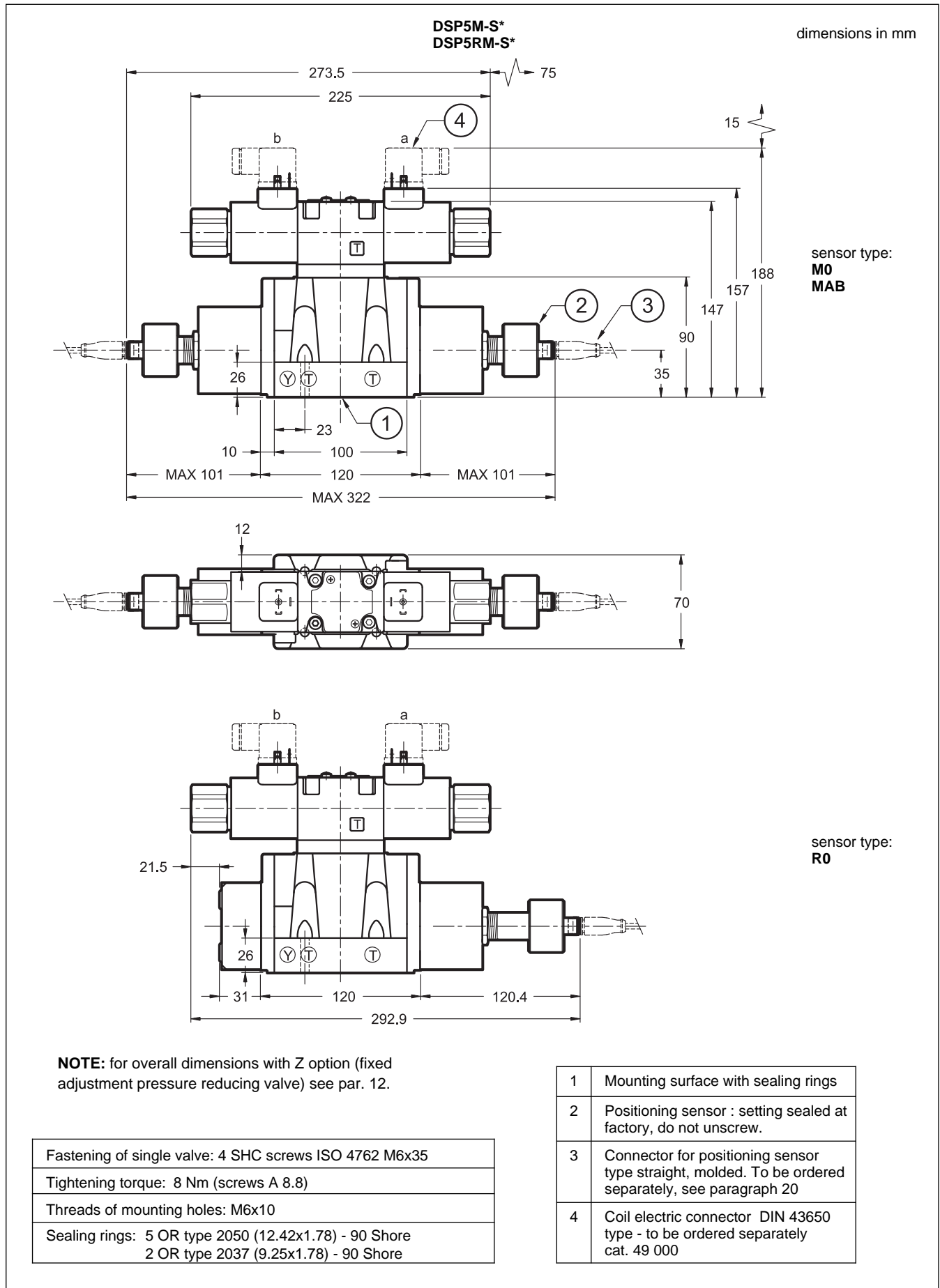
Add the letter D to the identification code to request this device (see paragraph 5.1).



dimensions in mm

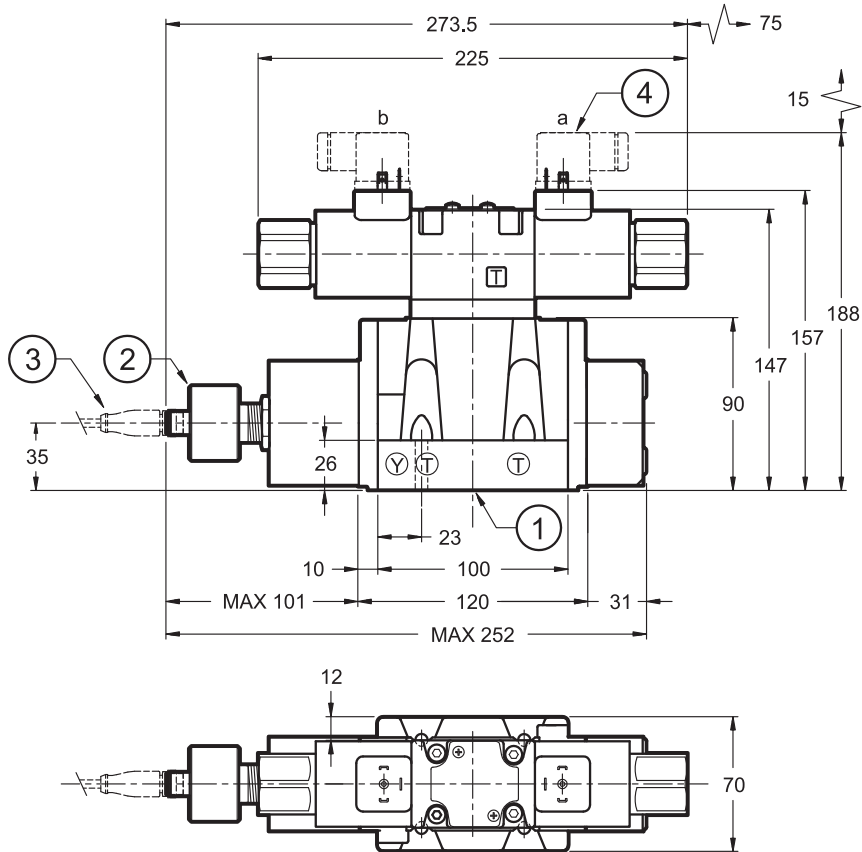
	DSP5	DSP7	DSP8
A	218	225	254

9 - DSP5M and DSP5RM OVERALL AND MOUNTING DIMENSIONS



dimensions in mm

DSP5M-RK
DSP5RM-RK



sensor type:
MA
MB

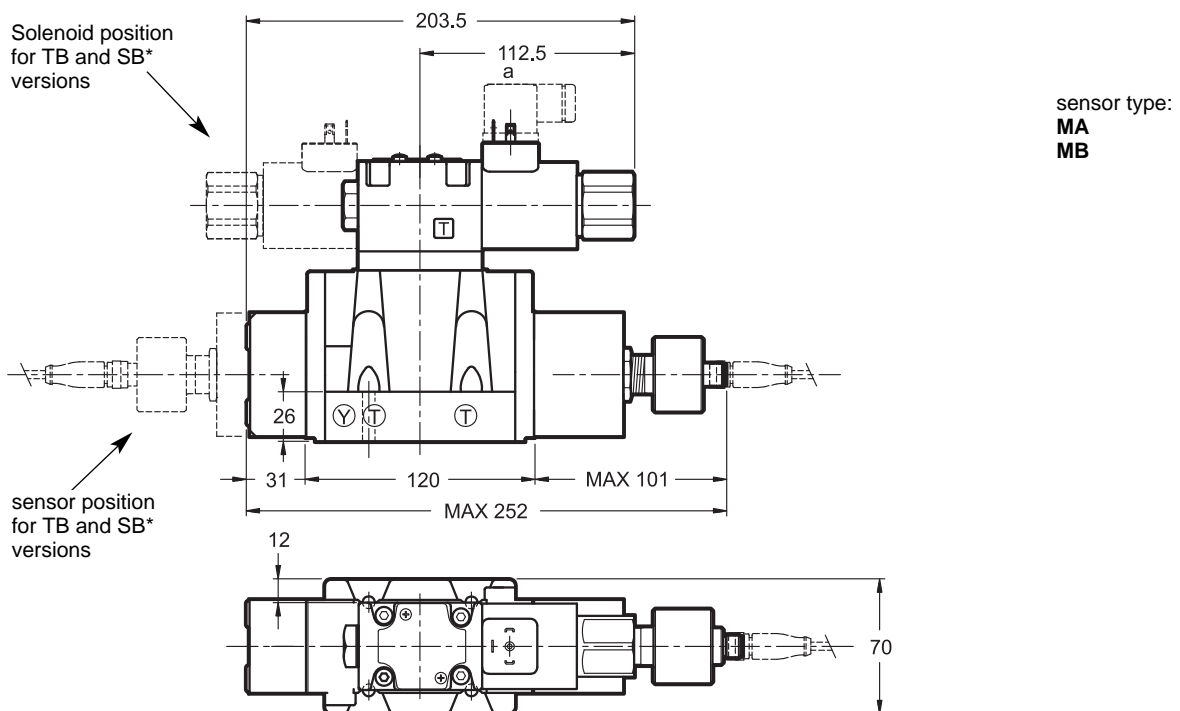
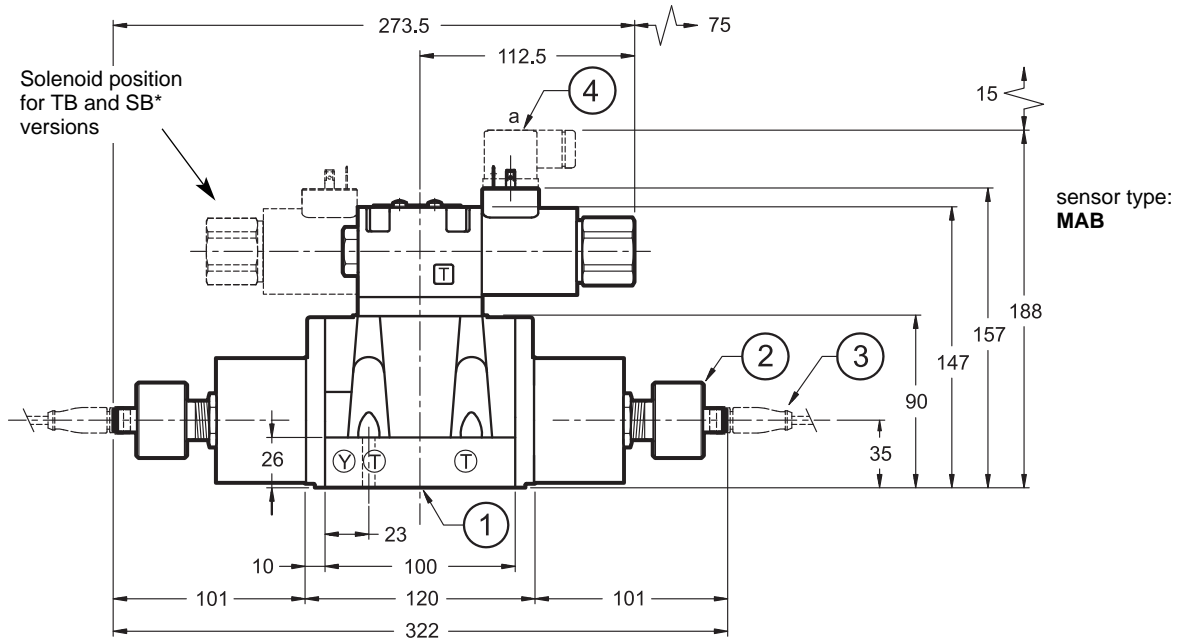
NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 4 SHC screws ISO 4762 M6x35
Tightening torque: 8 Nm (screws A 8.8)
Threads of mounting holes: M6x10
Sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 2 OR type 2037 (9.25x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

DSP5M-TA, TA100, SA1
 DSP5RM-TA, TA100, SA1

dimensions in mm

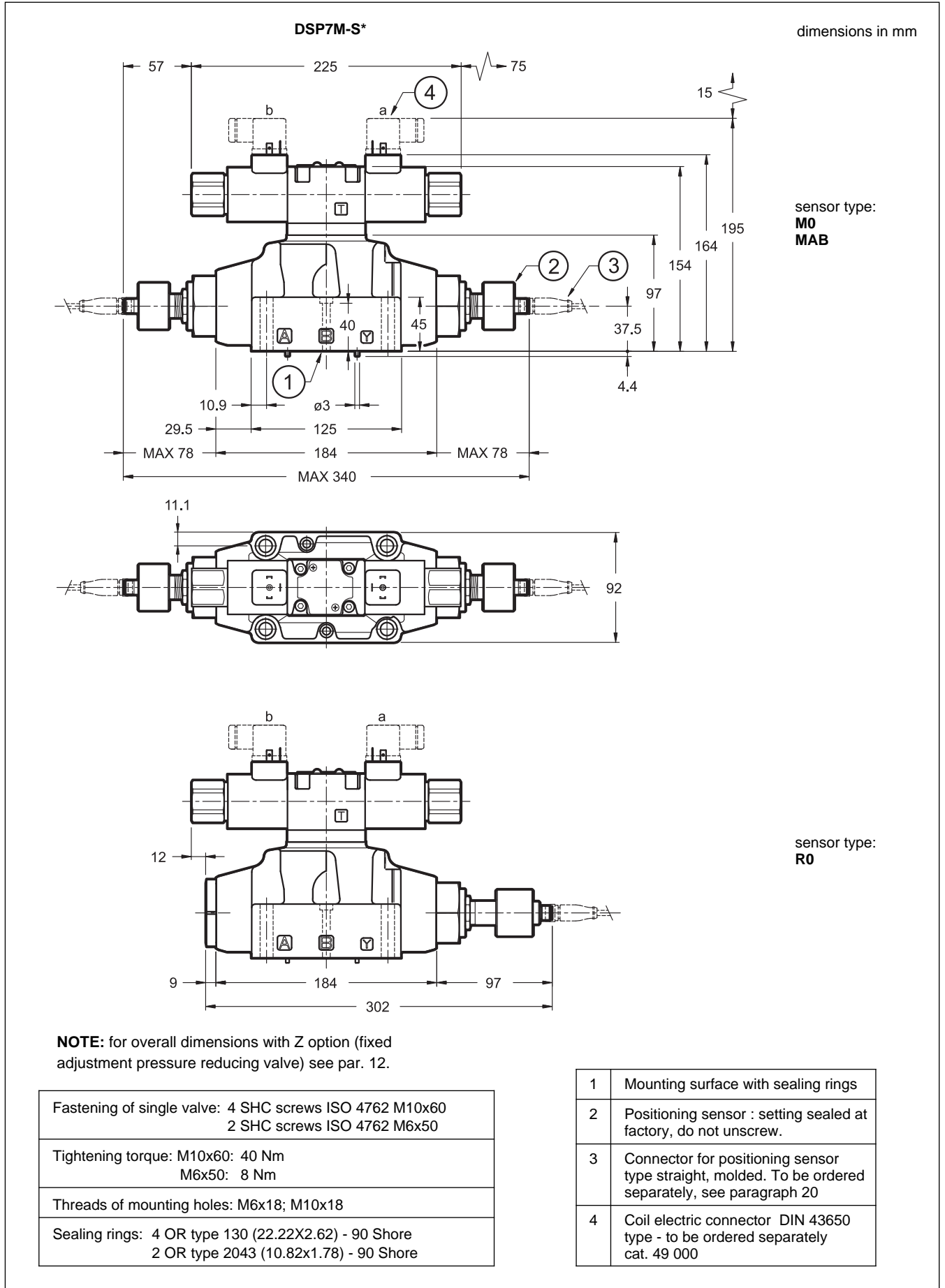


NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 4 SHC screws ISO 4762 M6x35
Tightening torque: 8 Nm (screws A 8.8)
Threads of mounting holes: M6x10
Sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore 2 OR type 2037 (9.25x1.78) - 90 Shore

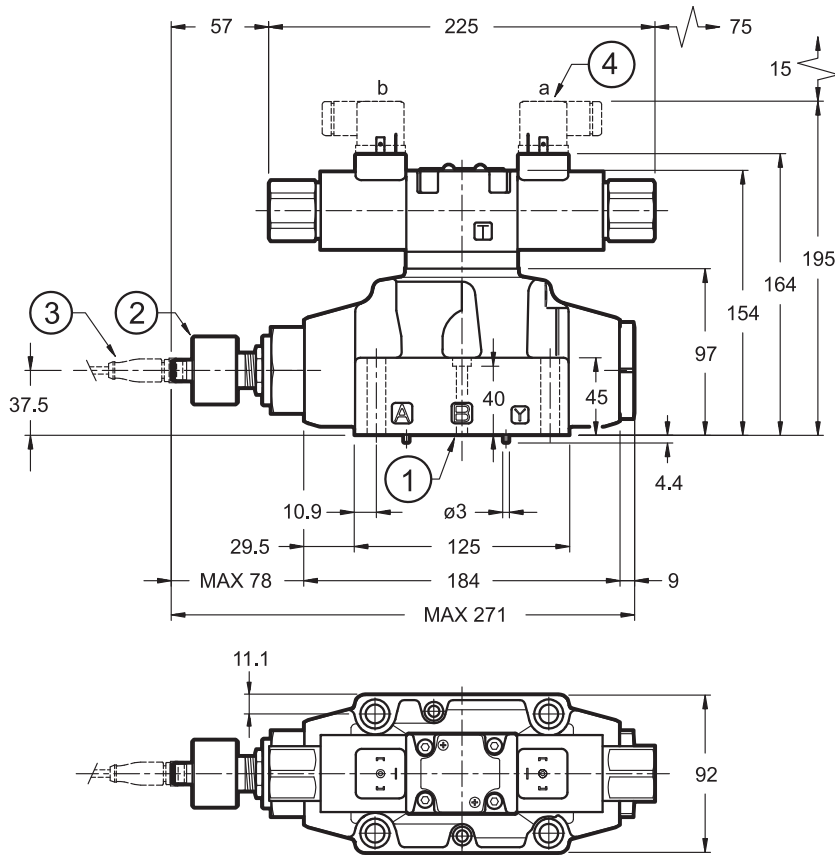
1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

10 - DSP7M OVERALL AND MOUNTING DIMENSIONS



dimensions in mm

DSP7M-RK



sensor type:
MA
MB

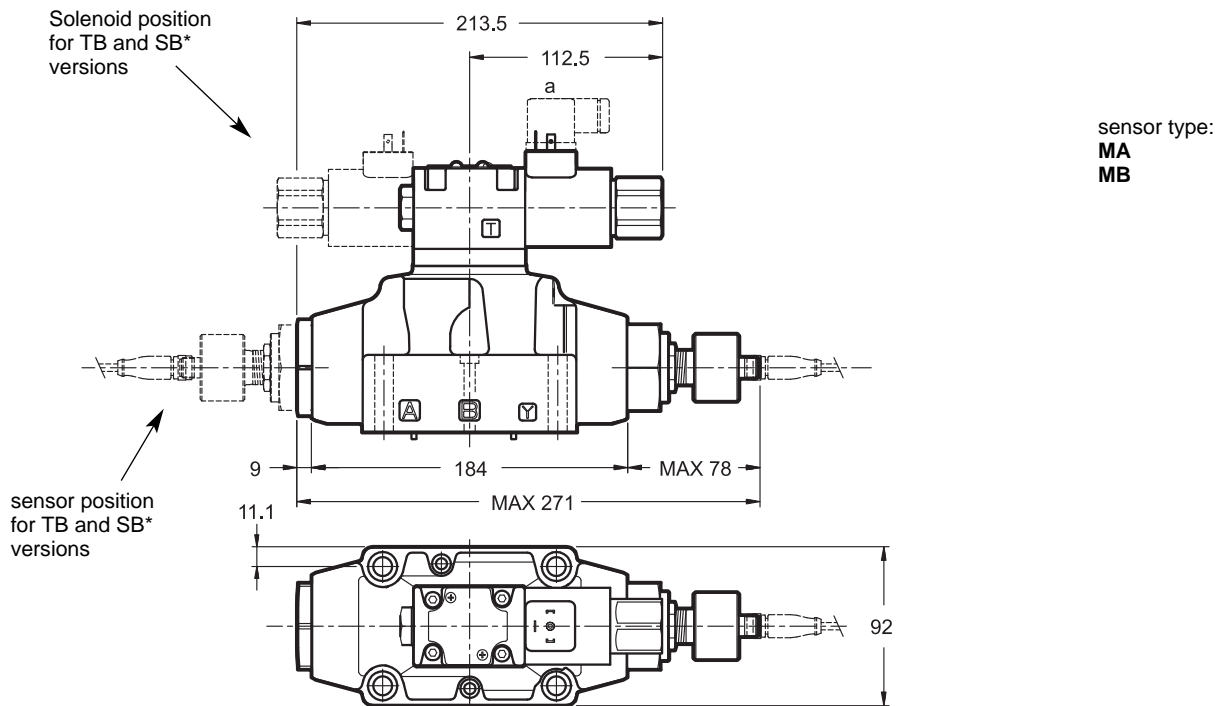
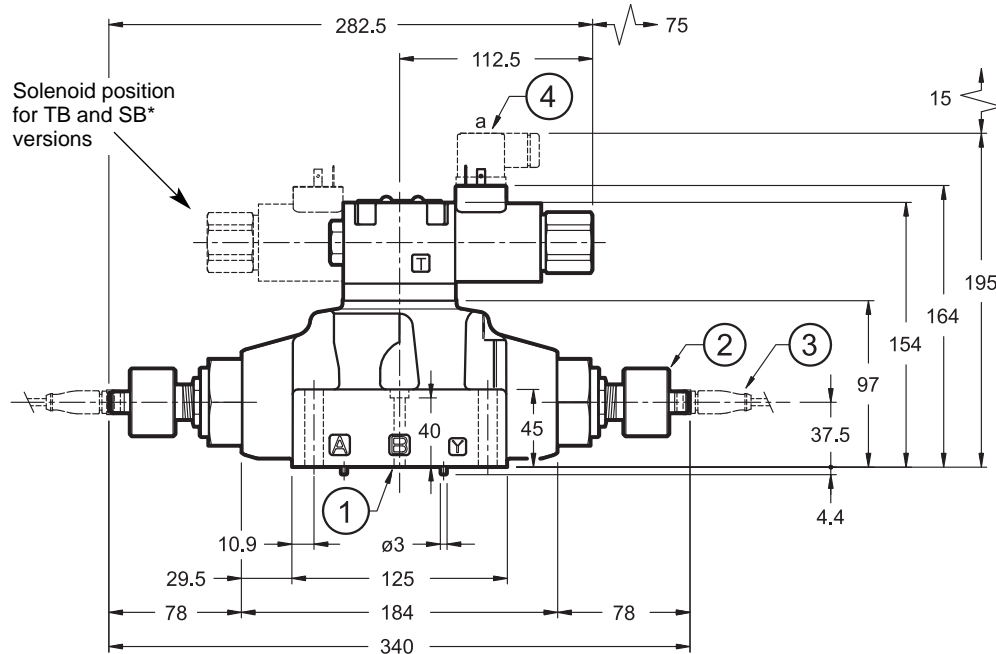
NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 4 SHC screws ISO 4762 M10x60 2 SHC screws ISO 4762 M6x50
Tightening torque: M10x60: 40 Nm M6x50: 8 Nm
Threads of mounting holes: M6x18; M10x18
Sealing rings: 4 OR type 130 (22.22X2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore

1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

DSP7M-TA, TA100, SA1

dimensions in mm

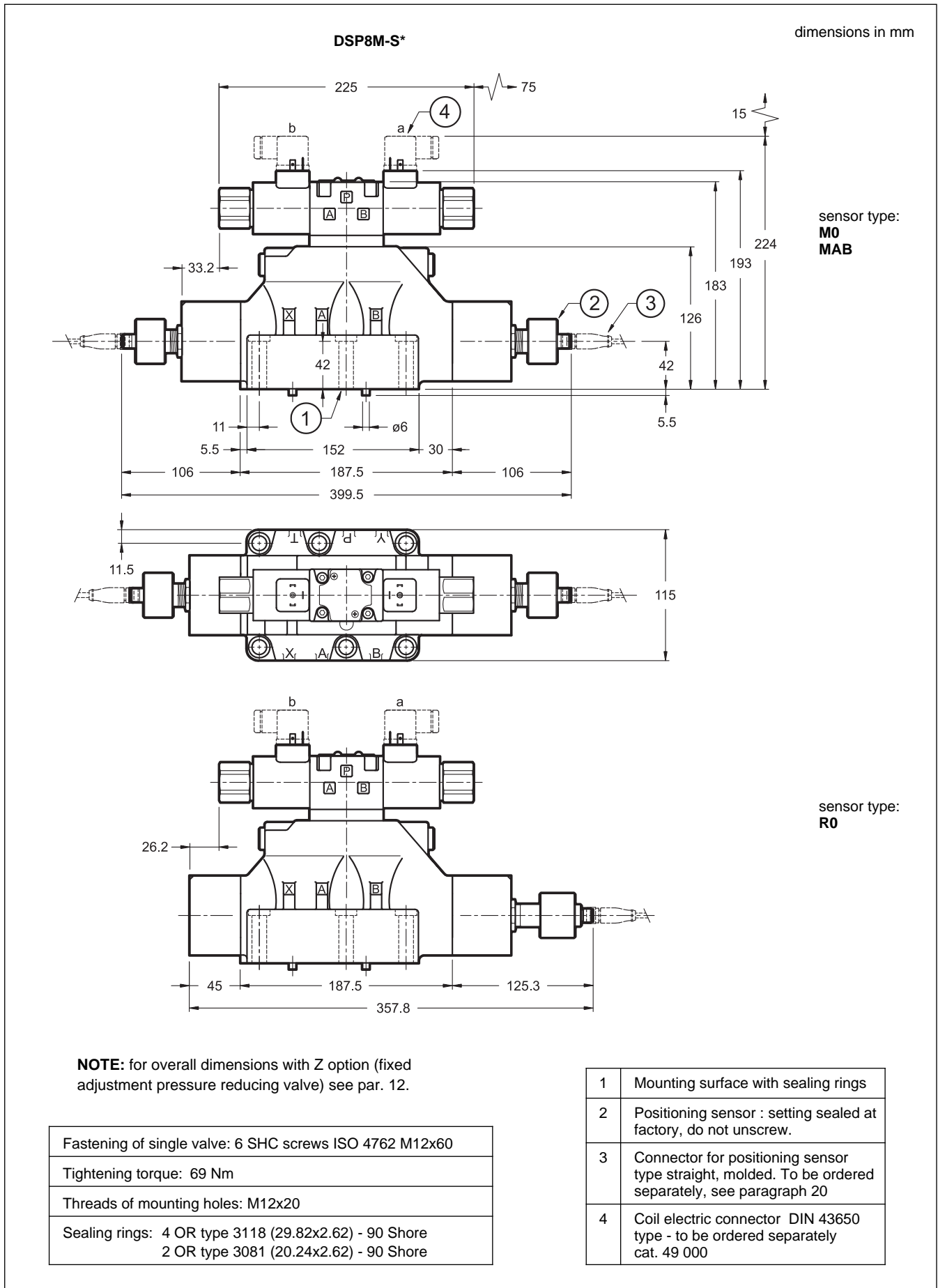


NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 4 SHC screws ISO 4762 M10x60 2 SHC screws ISO 4762 M6x50
Tightening torque: M10x60: 40 Nm M6x50: 8 Nm
Threads of mounting holes: M6x18; M10x18
Sealing rings: 4 OR type 130 (22.22X2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore

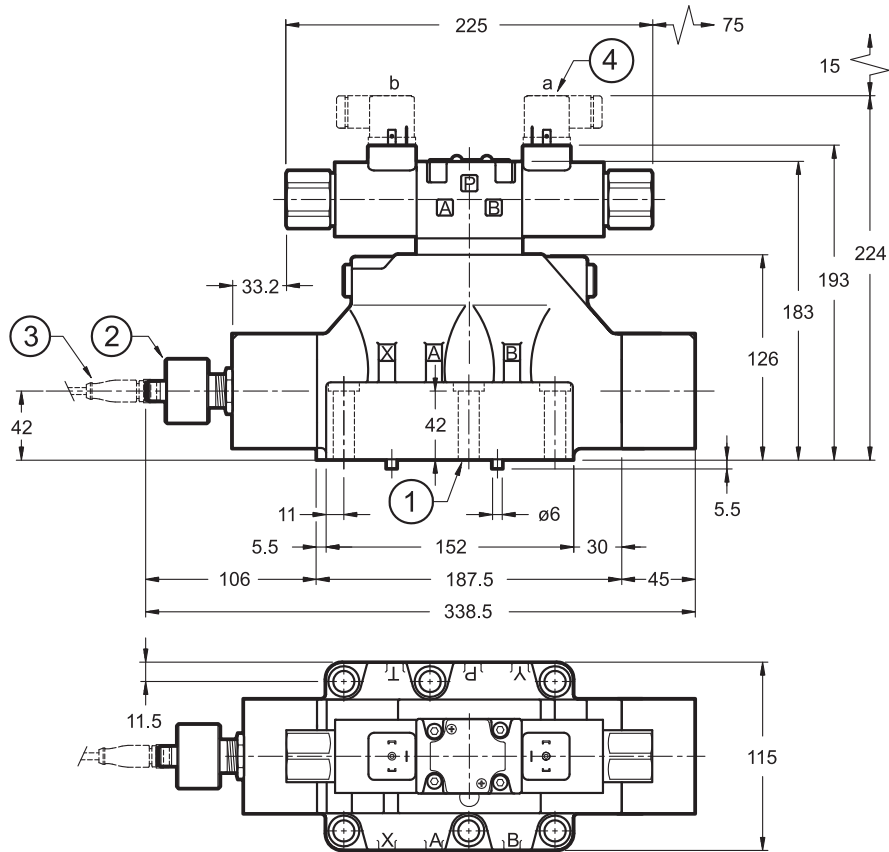
1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

11 - DSP8M OVERALL AND MOUNTING DIMENSIONS



DSP8M-RK

dimensions in mm



sensor type:
M0
MAB

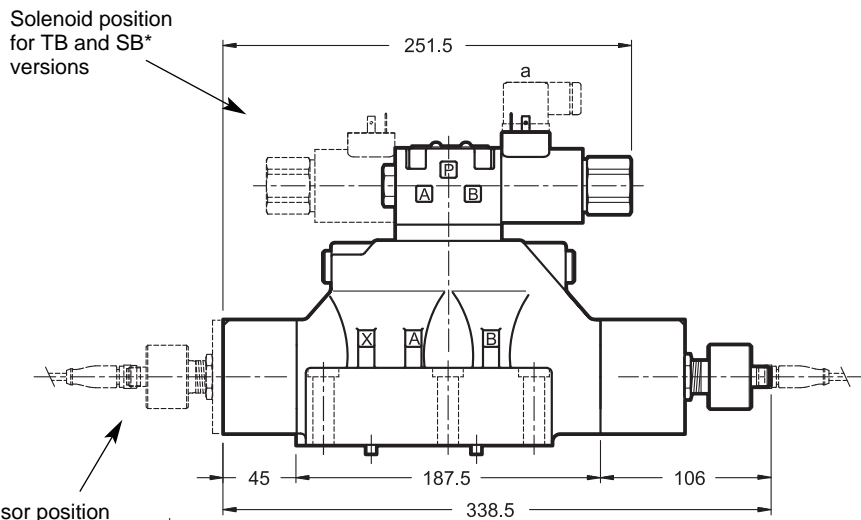
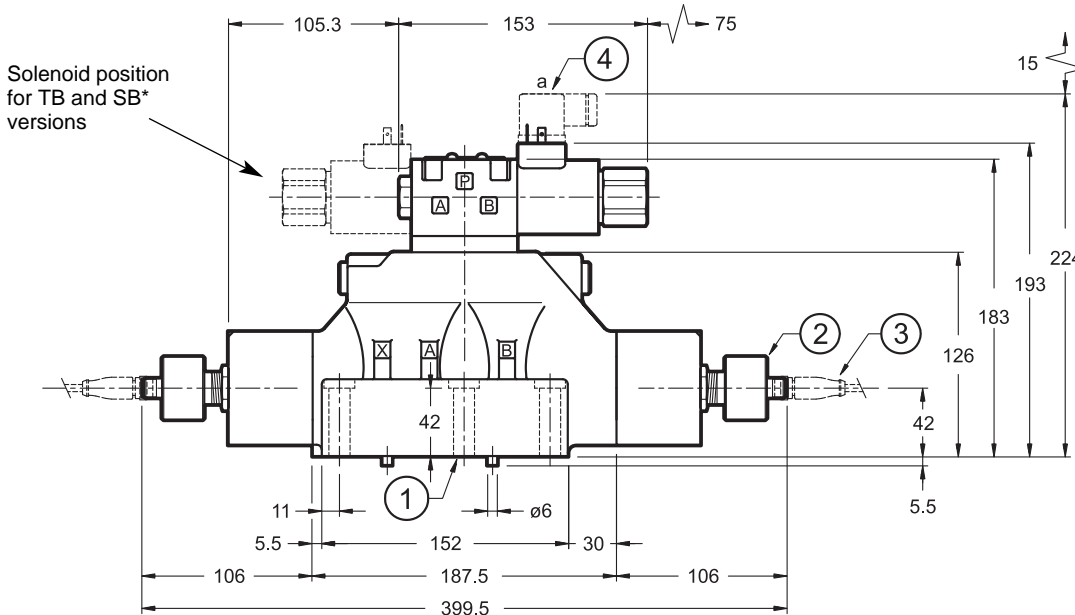
NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 6 SHC screws ISO 4762 M12x60
Tightening torque: 69 Nm
Threads of mounting holes: M12x20
Sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore

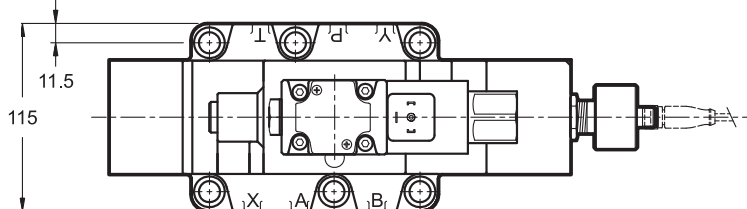
1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

DSP8M-TA, TA100, SA1

dimensions in mm



sensor position for TB and SB* versions

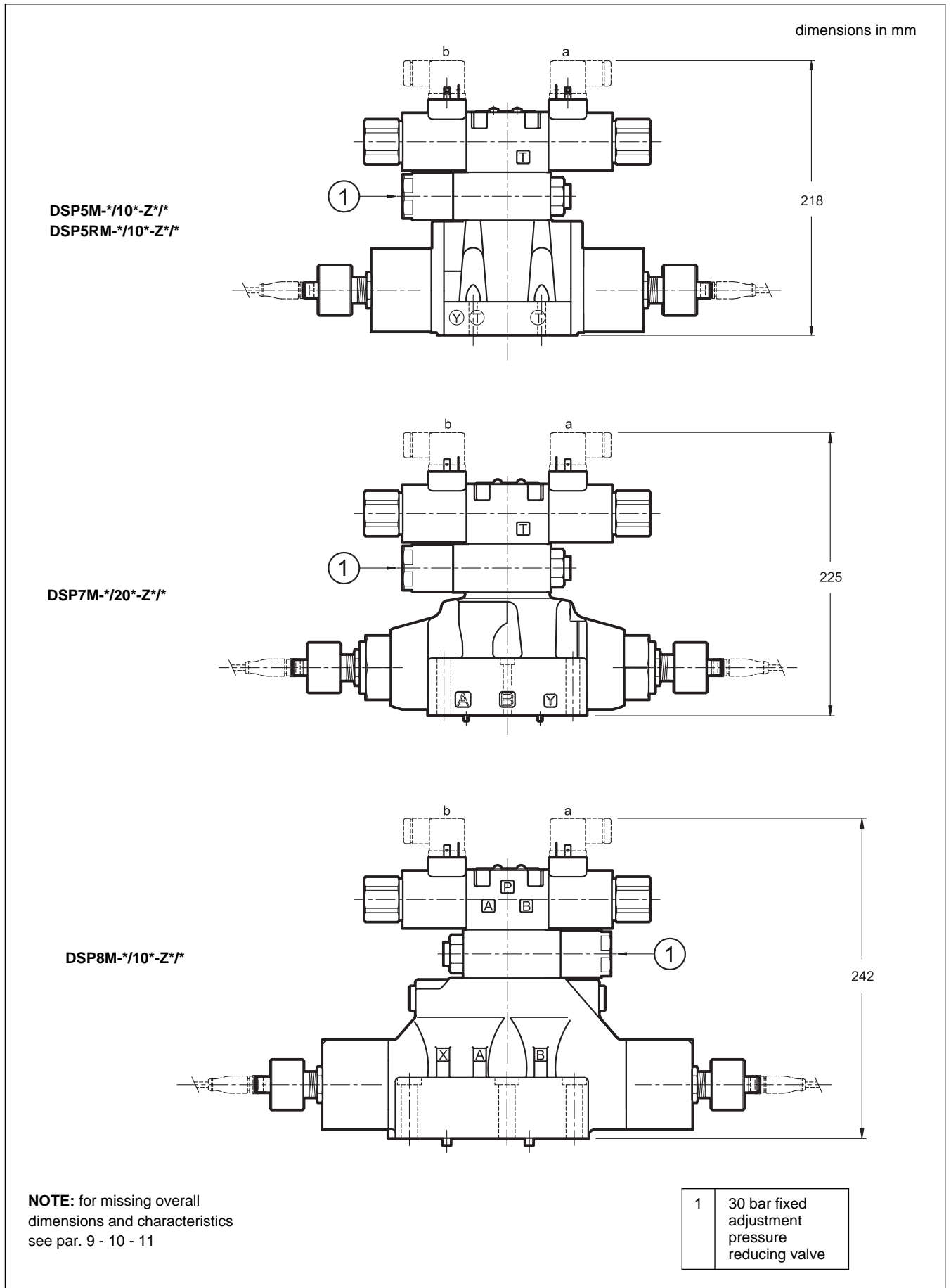


NOTE: for overall dimensions with Z option (fixed adjustment pressure reducing valve) see par. 12.

Fastening of single valve: 6 SHC screws ISO 4762 M12x60
Tightening torque: 69 Nm
Threads of mounting holes: M12x20
Sealing rings: 4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore

1	Mounting surface with sealing rings
2	Positioning sensor : setting sealed at factory, do not unscrew.
3	Connector for positioning sensor type straight, molded. To be ordered separately, see paragraph 20
4	Coil electric connector DIN 43650 type - to be ordered separately cat. 49 000

12 - DSP*M-*/10*-Z*/* OVERALL AND MOUNTING DIMENSIONS

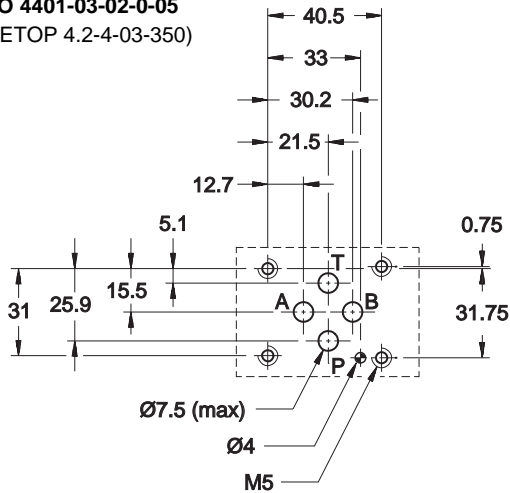


13 - MOUNTING SURFACES

13.1 - Direct operated valves

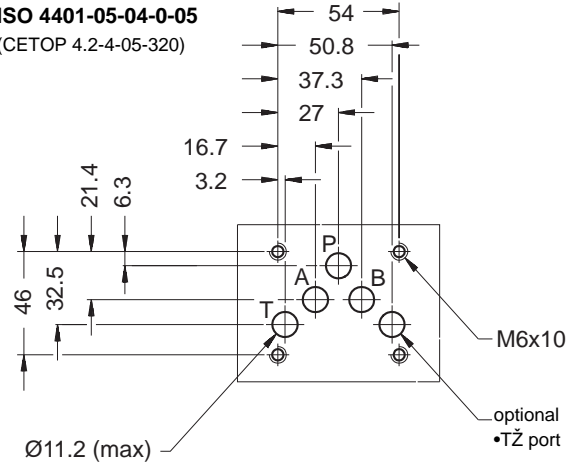
DS3M

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



DS5M

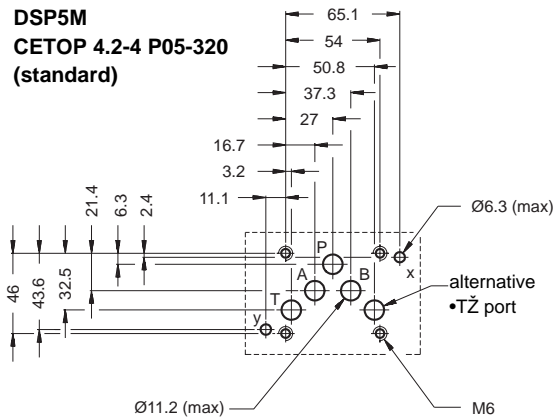
ISO 4401-05-04-0-05
(CETOP 4.2-4-05-320)



13.2 - Pilot operated valves

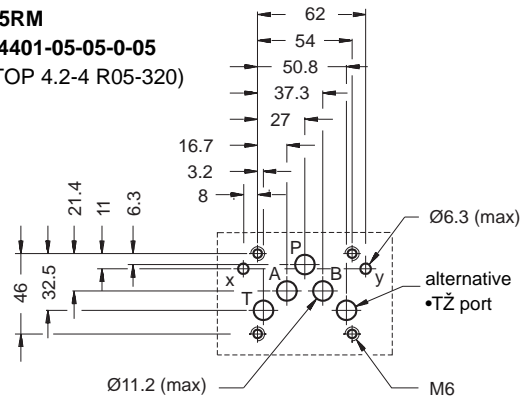
DSP5M

CETOP 4.2-4 P05-320
(standard)



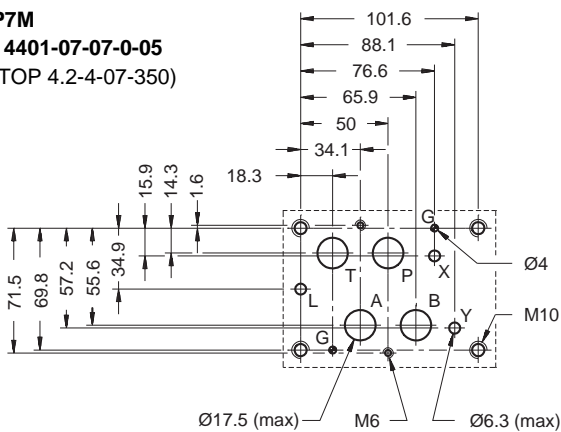
DSP5RM

ISO 4401-05-05-0-05
(CETOP 4.2-4 R05-320)



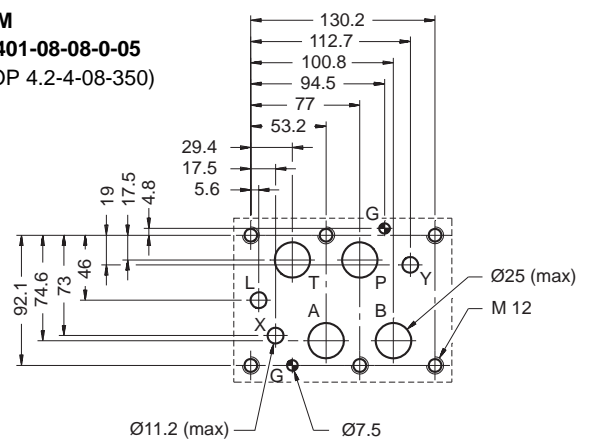
DSP7M

ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



DSP8M

ISO 4401-08-08-0-05
(CETOP 4.2-4-08-350)



14 - ELECTRICAL FEATURES

14.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated and locked to suit the available space.

NOTE 1 : In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see catalogue 49 000).

NOTE 2: The IP65 protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY DS3M DS5M DSP5M - DSP5RM DSP7M DSP8M	15.000 ins/hr 13.000 ins/hr 5.000 ins/hr 5.000 ins/hr 4.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95/EC
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation	IP 65 (NOTE 2) class H class F

14.2 - Current and absorbed power

The tables shows current and power consumption values relevant to the different coil types for DC.

DS3M, DSP5M, DSP5RM, DSP7M and DSP8M (values ± 5%)

Suffix	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code
D12	12	4,4	2,72	32,7	1903080
D24	24	18,6	1,29	31	1903081
D110	110	423	0,26	28,2	1903084
D220	220	1692	0,13	28,2	1903085

DS5M (values ± 5%)

Suffix	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code
D12	12	3,2	3,75	45	1903200
D24	24	12	2	48	1903201
D110	110	250	0,44	48	1903204
D220	220	1050	0,21	47	1903205

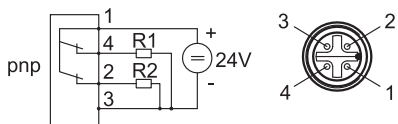
15 - COIL CONNECTORS

The solenoid operated valves are delivered without the connectors. They must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

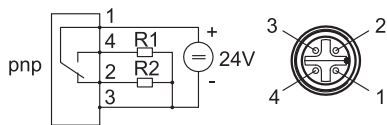
16 - POSITIONING SENSORS

R0 CONNECTION SCHEME



Pin	Values	Function
1	+24 V	Supply
2	NC	Normal Closed -
3	0 V	-
4	NC	Normal Closed +

M* CONNECTION SCHEME



Pin	Values	Function
1	+24 V	Supply
2	NC	Normal Closed
3	0 V	-
4	NO	Normal Open

NOTE: The M0 and MAB versions have two positioning sensors; consider that the connection scheme shown must be done for each sensor.

ELECTRICAL CHARACTERISTICS

Operating voltage range	V DC	20 ÷ 32
Absorbed current	A	0.4
Max output load	mA	400
Output		2 PNP
Electric protections	polarity inversion short circuit	
Hysteresis	mm	0.1
Operating temperature range	°C	-25 ÷ +80
Class of protection according to CEI EN 60529 standards (atmospheric agents)		IP65
EMC Electromagnetic compatibility	DIN EN 61000-6-1/2/3/4	

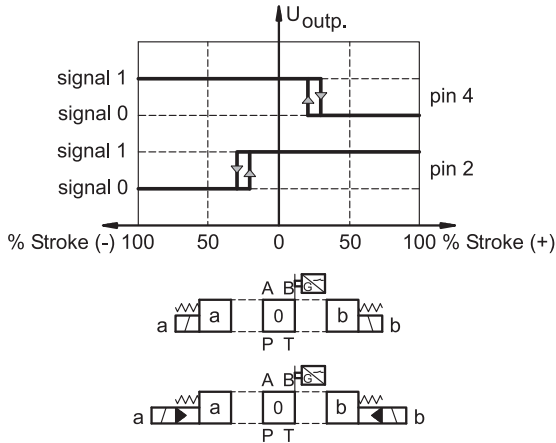
17 - SWITCHING LOGICS

Diplomatic offers a wide range of available positions to be monitored, and for the pilot operated valve there are even monitoring with redundant signal.

17.1 - R0 monitoring

Rest (middle) position monitored with one positioning sensor.

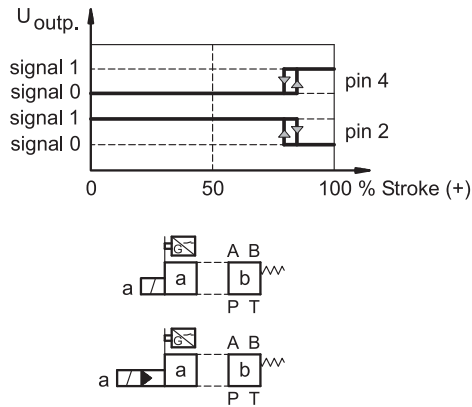
Available on both direct and pilot operated valves;
spool type S*



17.2 - MA monitoring

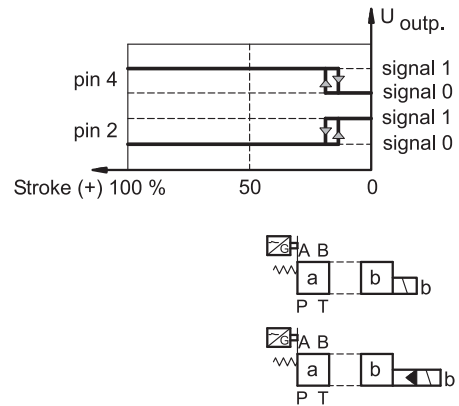
Energized position monitored with one positioning sensor.

Available on both direct and pilot operated valves;
spool type SA*, TA, TA02, TA100



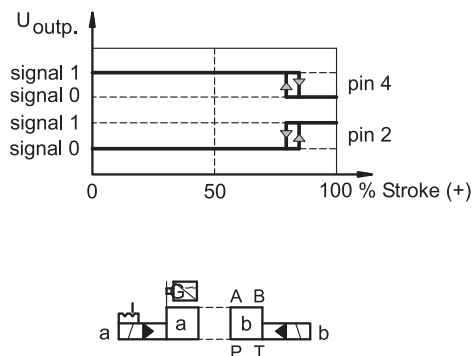
De-energized position monitored with one positioning sensor.

Available on both direct and pilot operated valves;
spool type SB*, TB, TB02, TB100



Position **•a•** monitored with one positioning sensor.

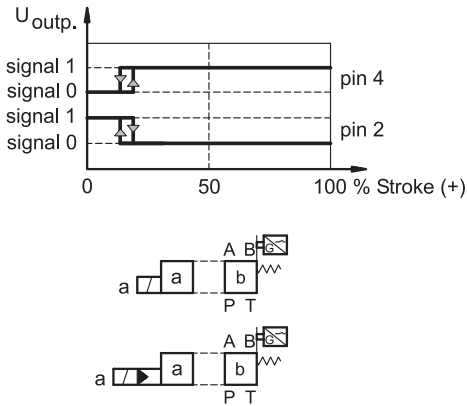
Available on pilot operated valves only;
spool type RK



17.3 - MB monitoring

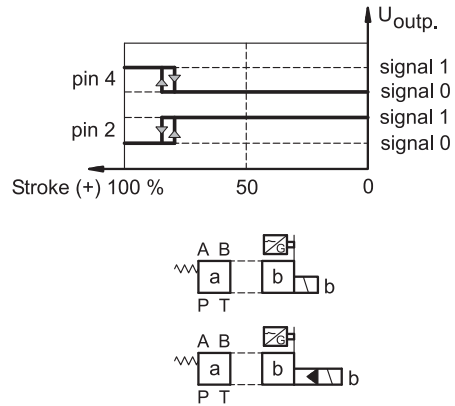
De-energized position monitored with one positioning sensor.

Available on both direct and pilot operated valves;
spool type SA*, TA, TA02, TA100



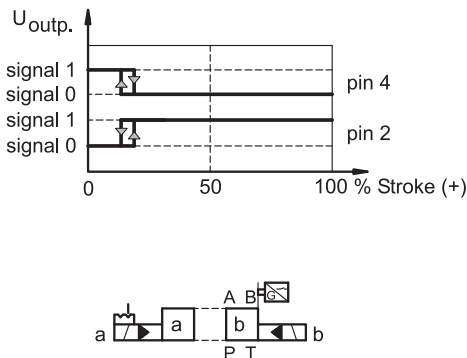
Energized position monitored with one positioning sensor.

Available on both direct and pilot operated valves;
spool type SB*, TB, TB02, TB100



Position •b• monitored with one positioning sensor.

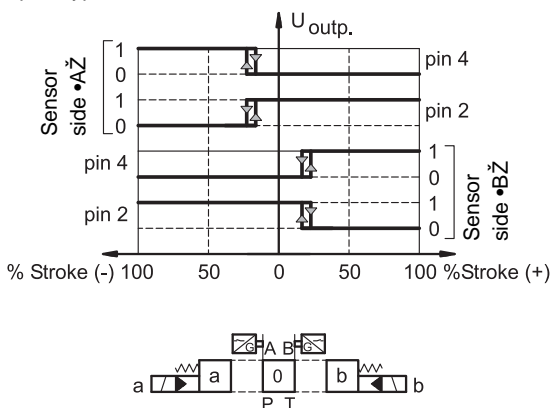
Available on pilot operated valves only;
spool type RK



17.4 - M0 monitoring

Rest (middle) position monitored by two separate positioning sensors.

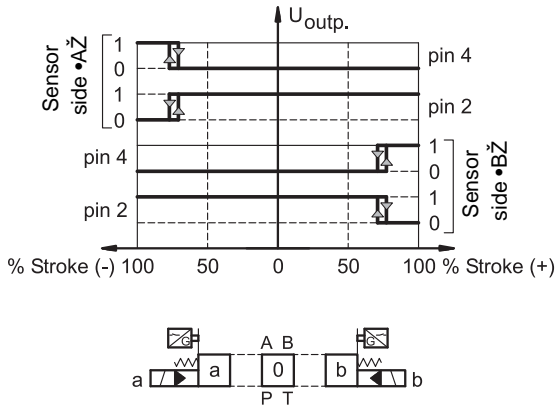
Available on pilot operated valves only;
spool type S*



17.5 - MAB monitoring

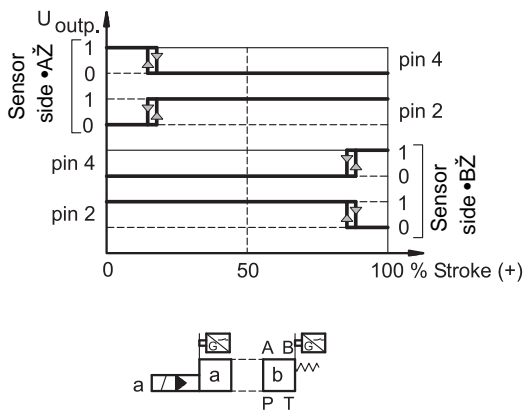
Both external positions monitored by two separate positioning sensors.

Available on pilot operated valves only;
spool type S*



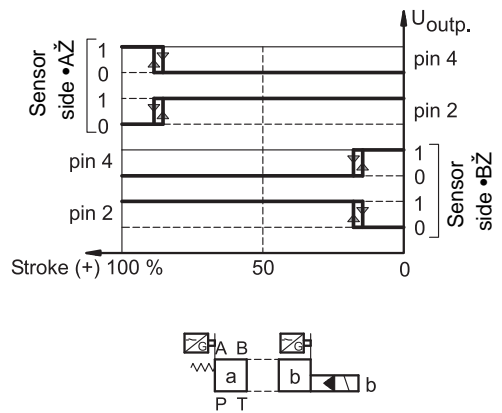
De-energized position monitored on side A.
Energized position monitored on side B.

Available on pilot operated valves only;
spool type SA1, TA, TA100



Energized position monitored on side A.
De-energized position monitored on side B.

Available on pilot operated valves only;
spool type SB1, TB, TB100



18 - 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.

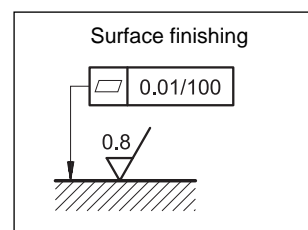
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

19 - INSTALLATION

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

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



20 - SENSOR CONNECTORS

The female connectors for position switches can be ordered separately, by specifying the descriptions here below, depending on the desired type.

STRAIGHT CONNECTOR, MOLDED CABLE, PRE-WIRED

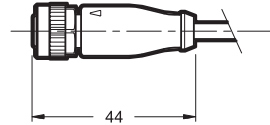
description: ECM4S/M12L/10

Protection class: IP68

Cable: with 4 conductors 0.34 mm² - length 5 mt - Ø 4.7 mm

Cable material: polyurethane resin (oil resistant)

Without LED.



ANGLED CONNECTOR, MOLDED CABLE, PRE-WIRED

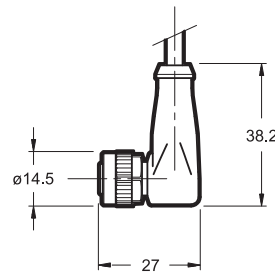
description: ECM4S/M12S/10

Protection class: IP68

Cable: with 4 conductors 0.34 mm² - length 5 mt - Ø 4.7 mm

Cable material: polyurethane resin (oil resistant)

Without LED.



ANGLED CONNECTOR, UNASSEMBLED

Circular connector with screw locking; strain relief by means of clamping cage.

description: EC4S/M12S/10

Protection class: IP67

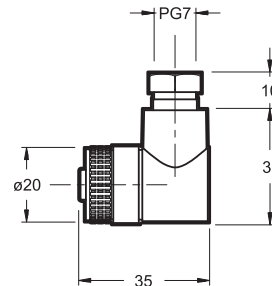
IEC 61076-2-101 (Ed. 1)/ IEC 60947-5-2

Conductor size: max 0.75 mm²

Cable gland: PG7 - suitable cables: 4 ÷ 6 mm²

Case material: polyamide (nylon)

Without LED.



21 - SUBPLATES (see catalogue 51 000)

	DS3M	DS5M	DSP5M	DSP7M	DSP8M
Type with rear ports	PMMD-AI3G	PMD4-AI4G	PME4-AI5G	PME07-AI6G	
Type with side ports	PMMD-AL3G	PMD4-AL4G	PME4-AL5G	PME07-AL6G	PME5-AL8G
P, T, A, B ports dimensions	3/8" BSP	3/4" BSP (PMD4-AI4G) 1/2" BSP (PMD4-AL4G)	3/4" BSP	1" BSP	1 1/2" BSP
X, Y ports dimensions	-	-	1/4" BSP	1/4" BSP	1/4" BSP

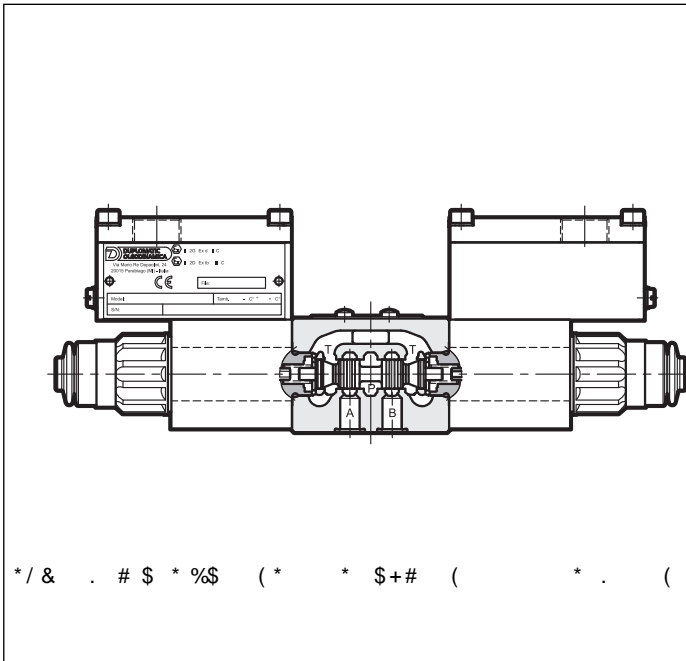


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V * : 7 EA7 @A;6 AB7D3F7 6;D75FA@>5A@DA>H3+H7E 3D7 ;@
5A? B;3@71 ;F * . E3@3D6E 3@ 3D7 EGR47
8ADF 7 GE7 ;@BA7@3>K 7JB>AE;H7 3P? AEB: 7D7E F 3F88>
I ;F ;@F 7 * . 7;F 7D8AD 93E AD8AD 6GEF
5>3EE;853FA@) 77 B3D 8AD * . 5>3EE;853FA@ AB7D3F;@
F? B7D3F7E 3@ 7>5F63>5: 3D35F7DEF;5E
V * : 7 6;D75FAB7D3F7 6 H3+H7E 3D7 3HB;>347 ;@) %
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V * : 7 E3F7? 7@F A8 5A@BA? ;FK FA F 7 GB ? 7@FA@7 6
E3@3D6E;E3+ 3KE EGBB>76 I ;F F 7 H3+H7
V) ! 3@ " ! H3+H7E 3D7 EGBB>76 I ;F 3
8@E ;@ EGBB57 F73P? 7@F L;@ @5=> EGR47 FA 7@EG7
3 E3>F EBD3K D7E;E3@7 GB FA : F7EF AB7D3F7 6
355AD6;@ FA +\$ \$)% E3@3D6E 3@ F7EF
7H3>3FA@AB7D3F7 6 355AD6;@ FA +\$ \$)%
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# 3J;? G? AB7D3F@ B07EEG7 & BADE * BADF	43D					E77 AB7D3F;@ >? ;FE 3FB3D9DB:
# 3J;? G? 8AI 8A? & BADFA *	>? ;@					
? 4;7@F7? B7D3F7 D@7	M		\$ (3@ &# ` \$"			
>G6 F7? B7D3F7 D@7	M		\$ (3@ &# ` \$"			
>G6 HE5AE;FK D@7	5) F			[
>G6 5A@B? ;@FA@679D77			55AD;@ FA) %	5>3EE		
(75A? ? 7@76 HE5AE;FK	5) F					
# 3EE E;@>7 EA7@A;6 H3+H7 6AG47 EA7@A;6 H3+H7	=9					

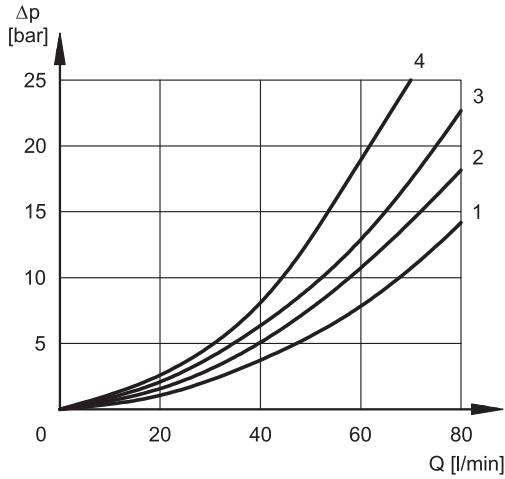


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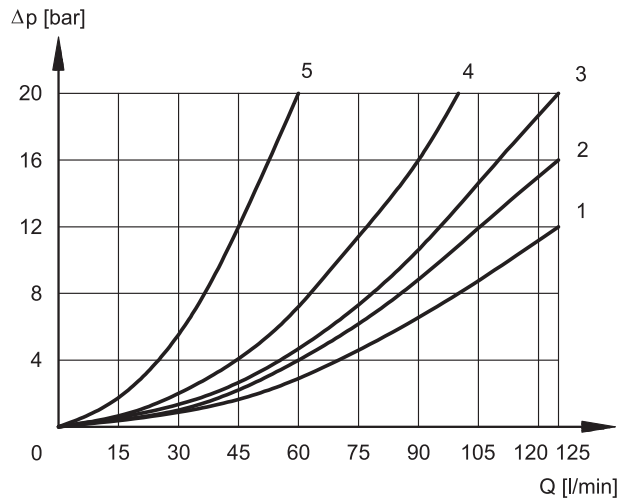


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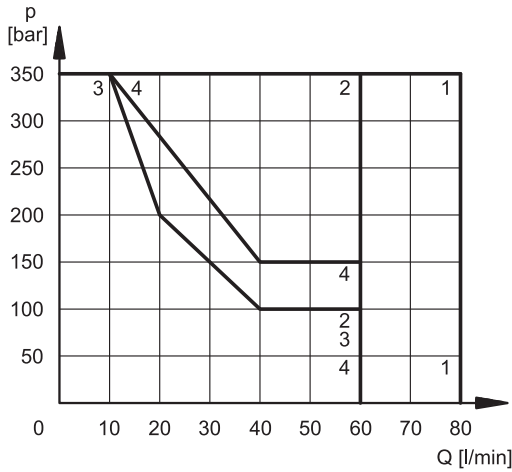
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*: 7 AB7DF; @ ? ; FE 53 @47 5A @E; 67D3 *D7 6G576 ;83 I 3KH3-7 ; EGE76 3E I 3KH3-7 I ;F BADF AD B;9976 ADI ;F ACF8AI



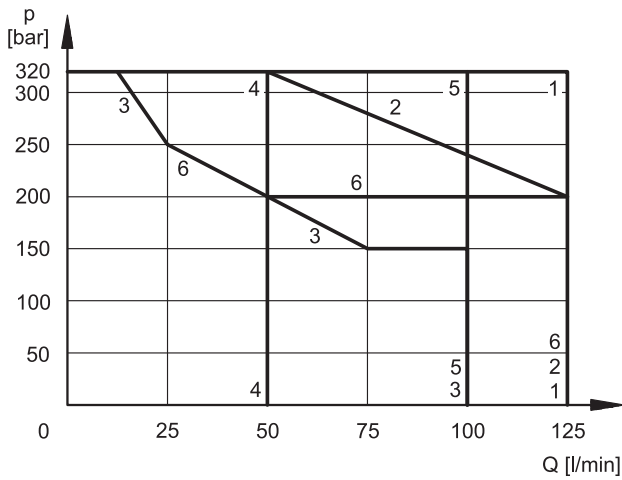
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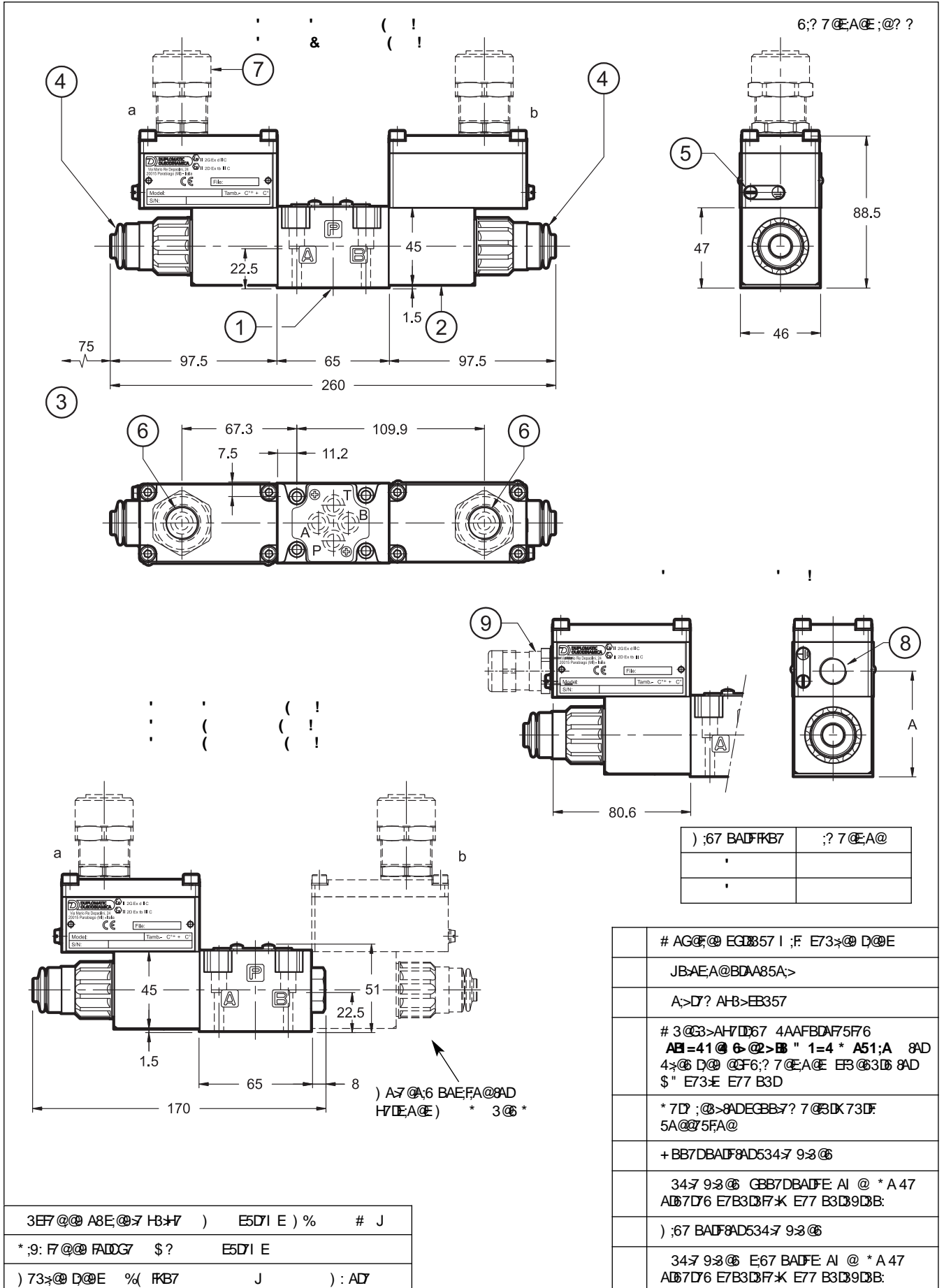
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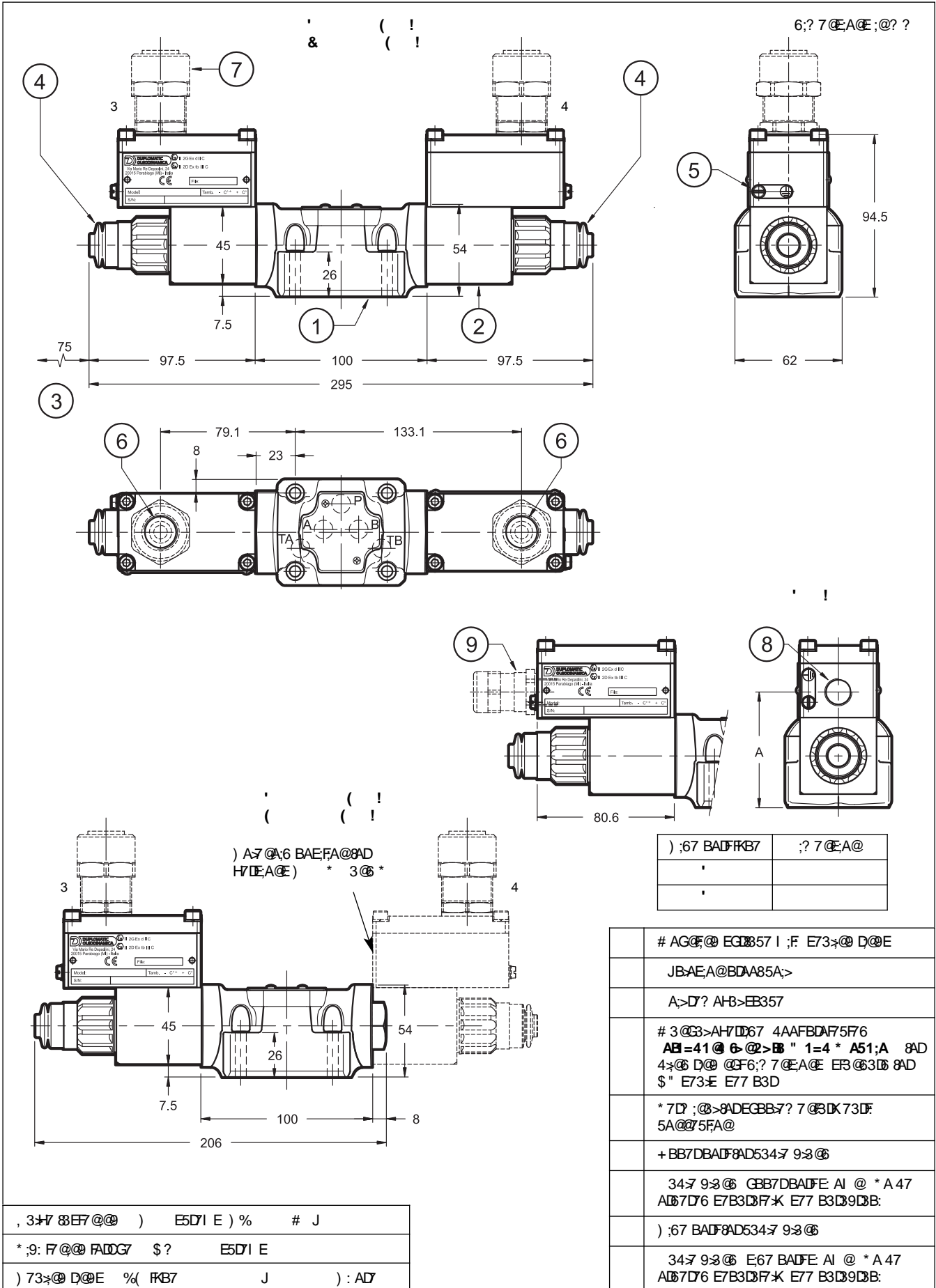
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*: 7 ; @;53F6 H3-7E 3D7 A4B; @6 355AD; @ FA) % E3 @3D I ;F ? ; @D>A; HE5AE;K 5) F3F M

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ADH;H7E EGFB47 8AD3BB;53FA@3@ ;@FB>3FA@;@BA7@F3>K7JB;AEH7 3F AEB: 7D7E 355AD;@ FA * . 6;D75FH7 B7E5DBFA@E GBA? 3F5
57DF853F7E F 7 5A? 4;@FA@HB;H7 5A;> B5 AC??;G1;E1GA 9=3;C45A B5 453;1@B= >63>=>@ 9GB B5 49@3BD5 1=4 B5 >?5@B=7 1=4
< 19-B=1=35 < 1=C1; B1B3>=B9A1;; B5 9-6 @ 1B= =55454 6 @ 3>@3BCA5 >6B5 D1;D5 9- ?>B=BI;;G5F?;>A9D5 5=D9@=< 5=BA
A;E 3EE? 476 A@F 7E7 HB;H7E: 3H7 477@E7B3D3F7K 57DF876 355AD;@ FA * . 6;D75FH7 3@ EA F 7K 3D7 EGFB47 8ADGE7 ;@BA7@F3>K
7JB;AEH7 3F AEB: 7D7E

* 1;D5 (, 3;1AA98B1B=

* : 7 HB;H7E 53@47 CE76 8AD3BB;53FA@3@ ;@FB>3FA@;@BA7@F3>K7JB;AEH7 3F AEB: 7D7E F 3F8>I ;F ;@7;F 7DF 7 * . ADF 7 * .
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8AD\$ 3@ , E73-E



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) B75;85 ? 3D;@ A87JB;AE;A@BDAF75FA@3E * .
6;D75FH7 3@ D7>F76 F75: @53>EB75;853FA@D7CG7EE

DAGB 8ADEC857 B3@E

3F79ADK ;:9: BDAF75FA@7>9;47 8ADLA@
F 7D78AD7 3>EA 7>9;47 8AD53F79ADK LA@

* KB7 A83F? AEB: 7D7 I ;F 93E7E HBBAGIE ? ;EFE

3E9DAGB

F 7D78AD7 3>EA 7>9;47 8AD9DAGB 3@

* * 7? B7D3FGD7 5>EE ? 3J EG857 F7? B7D3FGD7

4 &" BDAF75FA@>H7>8AD7>75F53>67H57E

M * 3 M ? 4;7@F7? B7D3FGD7 D3@7 8ADH;H7E I ;F 4AF \$
3@ , E73-E

` M * 3 M ? 4;7@F7? B7D3FGD7 D3@7 8ADH;H7E I ;F \$"
E73-E

(! \$ _ % (+) *)

8AD\$ 3@ , E73-E



(H 2 \$ \$ H (1 H

8AD\$ " E73-E



(H 2 \$ \$ O H (1 H

) B75;85 ? 3D;@ A87JB;AE;A@BDAF75FA@3E * .
6;D75FH7 3@ D7>F76 F75: @53>EB75;853FA@D7CG7EE

DAGB 8ADEC857 B3@E

3F79ADK ;:9: BDAF75FA@7>9;47 8ADLA@
F 7D78AD7 3>EA 7>9;47 8AD53F79ADK LA@

* KB7 A83F? AEB: 7D7 I ;F 6GEFE

GEFE 9DAGB

F 7D78AD7 3>EA 7>9;47 8AD9DAGB 3@

* M * 7? B7D3FGD7 5>EE ? 3J EG857 F7? B7D3FGD7

4 &" BDAF75FA@>H7>8AD7>75F53>67H57E

& & &DAF75FA@679D77 8A? 3F? AEB: 7D5 397@E 355AD;@ FA
\$

` M * 3 M ? 4;7@F7? B7D3FGD7 D3@7 8ADH;H7E I ;F 4AF \$
3@ , E73-E

` M * 3 M ? 4;7@F7? B7D3FGD7 D3@7 8ADH;H7E I ;F \$" E73-E

>9A (, 3;1AA98B1B=

* : 7 5A;>A8F 7 7JB;AE;A@BDA8HB;H7E;E;67@F876 I ;F ;E AI @B9 I : :5: 53D7E F 7 D7>FH7 * . ? 3D;@ (85 < 5381=9B1; 3>=AB@3B= >6
B5 3>9 8>CA9>7 9A < 145 9- >@5@> 5=AC@ 9A @A9AB=35 B ?>AA92;5 9-B@1; 5F?;>A9= 1=4 B 1D>9A 1=G5F?;>A9= ?@?171B= B
B5 >CB9945 5=D9@=< 5=B < 1B89>7 1= K F 4L B5? ?@B53B= 5F?;>A9= ?@>63>9

AD7AH7D F 7 EA>@;6 ;E 67E;9@6 FA ? 3;@F;@;FE EG857 F7? B7D3FGD7 47>AI F 7 >? ;FE EB75;876 FA F 7 D7>H3@F 5>EE

* : 7 (5A>E 8AD3>F7D3F@ 5GD7@FEGBBK 5A@B;@3 4G>F;@D75F87D4D697

7D7 47>AI KAG8@ F 7 5A>E ? 3D;@

(! \$ _ % (_)) , & % + () #) *



F4 (2 NH (1 H

) B75;85 ? 3D;@ A87JB;AE;A@BDAF75FA@3E * .
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DAGB 8ADEC857 B3@E

3F79ADK ;:9: BDAF75FA@7>9;47 8ADLA@
F 7D78AD7 3>EA 7>9;47 8AD53F79ADK LA@

* KB7 A83F? AEB: 7D7 I ;F 93E7E HBBAGIE ? ;EFE

J 6 WXBDAF75FA@FKB7 7JB;AE;A@BDA853E7

3E9DAGB

F 7D78AD7 3>EA 7>9;47 8AD9DAGB 3@

* * 7? B7D3FGD7 5>EE ? 3J EG857 F7? B7D3FGD7

4 &" BDAF75FA@>H7>8AD7>75F53>67H57E

` M * 3 M ? 4;7@F7? B7D3FGD7 D3@7

(! \$ _ % (+) *)



F8 (H 2 \$ \$ NH (1 H

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DAGB 8ADEC857 B3@E

3F79ADK ;:9: BDAF75FA@7>9;47 8ADLA@
F 7D78AD7 3>EA 7>9;47 8AD53F79ADK LA@

* KB7 A83F? AEB: 7D7 I ;F 6GEFE

J 8 YZBDAF75FA@FKB7

GEFE 9DAGB

F 7D78AD7 3>EA 7>9;47 8AD9DAGB 3@

* M * 7? B7D3FGD7 5>EE ? 3J EG857 F7? B7D3FGD7

4 &" BDAF75FA@>H7>8AD7>75F53>67H57E

& & &DAF75FA@679D77 8A? 3F? AEB: 7D5 397@E 355AD;@ FA
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` M * 3 M ? 4;7@F7? B7D3FGD7 D3@7



?5@B-7 B< ?5@EC@A

*: 7 AB7D3F@ 3? 4;7@F7? B7D3FGD ? GEF47 47H 77@ M 8ADH8+7E1 ;F 4AF \$ 3@ , E73-E 3@ ` M 8ADH8+7E1 ;F \$ " E73-E

*: 7 8G6 F? B7D3FGD ? GEF47 47H 77@ M 8ADH8+7E1 ;F 4AF \$ 3@ , E73-E 3@ ` M 8ADH8+7E1 ;F \$ " E73-E

: 7 HB+7E 3D 5-8EE;876 ;@ F? B7D3FGD 5-8EE * M F 7D78AD F 7K3D 7-9;47 8ADAB7D3FA@3-EA 3F: ;9: 7D5-8EE F? B7D3FGD * *
* 8AD93E 3@ * M 8AD6GEF

(# ?B=> * 5@9=> 6@ B< ?5@EC@ 3;1AA

: 7 HB+7E 5-8EE;876 8AD F? B7D3FGD 5-8EE 3D EG;B47 8ADAB7D3FA@;@BAF@F3-K 7JB-AE;H 3F? AEB: 7D7E1 ;F 3? 4;7@F7? B7D3FGD 47H 77@ M 8AD4AF HB+7E1 ;F \$ 3@ , E73-E 3@ ` M 8ADH8+7E1 ;F \$ " E73-E

*: 7 8G6 F? B7D3FGD ? GEF47 47H 77@ M 8AD4AF HB+7E1 ;F \$ 3@ , E73-E 3@ ` M 8ADH8+7E1 ;F \$ " E73-E

: 7 HB+7E 3D 5-8EE;876 ;@ F? B7D3FGD 5-8EE * M F 7D78AD F 7K3D 7-9;47 8ADAB7D3FA@3-EA 3F: ;9: 7D5-8EE F? B7D3FGD * *
* * 8AD93E 3@ * M 8AD6GEF

: 7 ? 3D;@ 8AD 5-8EE F? B7D3FGD H7DEA@E 3D

, " ,) # (! \$ _ % (_)) , & % + () #) *

8AD\$ 3@ , E73-E



(2 H (1 H

8AD\$ " E73-E



(2 NH (1 H

% " # (! \$ _ % (_)) , & % + () #) *



F4 (2 NH (1 H

, " ,) # (! \$ _ % (+) *)

8AD\$ 3@ , E73-E



(H 2 \$ \$ H (1 H

8AD\$ " E73-E



(H 2 \$ \$ NH (1 H

% " # (! \$ _ % (+) *)



F2 (H 2 \$ \$ NH (1 H

;53E@1; 381@315@ABBA D1;C5AI

A> FKB7	\$A? ;@> HA;B97 1 2	(7E;E3@7 3F M 1T2	GID@F 5A@EG? BF 1 2	&AI 7D 5A@EG? BF 1 2

A> FKB7 " # (\$A? ;@> HA;B97 1 2	D7C 1 L2	(7E;E3@7 3F M 1T2	GID@F 5A@EG? BF 1 2	&AI 7D 5A@EG? BF 1 2
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" # (FKB7 (5A;E 3D 8AD3-FD@F@ 5GID@F@EGBBK 8AD4AF AD
L AD(5A;E F 7 D7E;E3@7 53@AF47 ? 73EGD76 ;@F 7 GEG3>
I 3K4753GE7 A8F 7 BD7E7@7 A86;A67E 4D697 ;@E67 F 7 5A;>

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+ 90-7

@AD7DFA D73>E7 F 7 7>5FD53>5A@@75FA@A8F 7 5A;> ;F;E @75EE3DK FA 3557EE F 7 F7D ;@>4>A5= G@5D1 ;@ F 7 E5D1 E F 3F8EF@ F 7 5AH7D I ;F F 7 4AJ F 3F5A@3;@F 7 F7D ;@>4>A5=

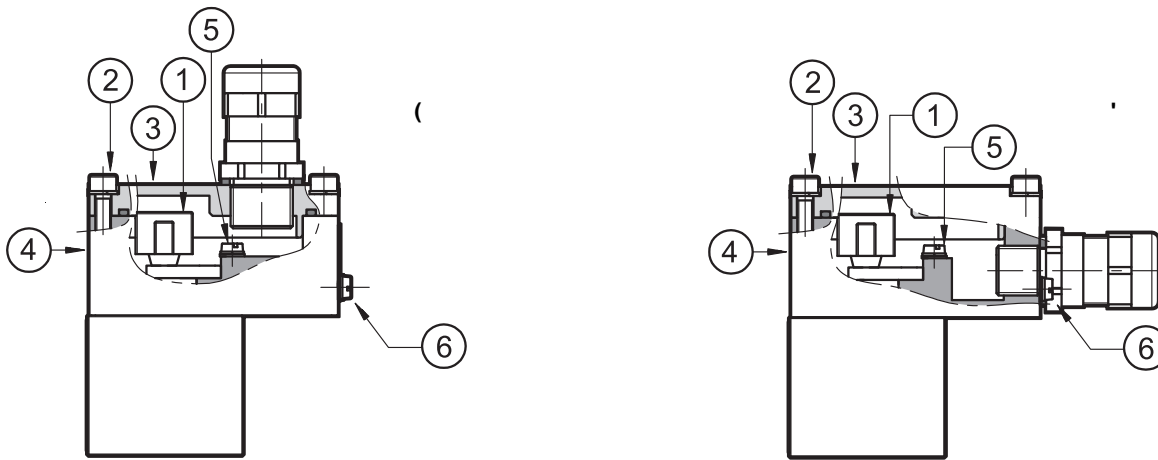
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K 6A:@ 7>5FD53>5A@@75FA@;F;E ;? BAD3@FA 5A@@75F3>EA F 7 9DAG@;@ BA;@F ;@F 7 F7D ;@>4>A5= 4AJ # E5D1 E F DAC@: EGRB47 5A@G5FAEI ;F F 7 97@D>9DAG@;@ >@ A8F 7 EKEF?

%@F 7 7JF7D@>4A6K A8F 7 5A;>F 7D ;E 3 9DAG@;@ BA;@F # E5D1 F 3F3>AI FA 7@EG7 7CGBAF7@F3>FK 47H 77@F 7 HB>H 3@ F 7 97@D>9DAG@;@ >@ A8F 7 EKEF? 5A@@75F@ F ;E BA;@F 7 D79G3FA@A8F 7 \$ E3@3D F 3F;? BAE7 FA H7D8K F 7 7CGBAF7@F3>FK A8F 7 7>? 7@E ;@>676 ;@3 BAF7@F3>K 7JB>AE;H 7 @HDA@ 7@F F 7 ? 3J;? G? D7E;E3@67 47H 77@F 7 7>? 7@E ? GEF47 T ;E 9G3D@776

FF 7 7@ A8F 7 7>5FD53>I ;D@ ;F;E @75EE3DK FA D73EE? 4> F 7 5AH7D A@F 7 4AJ 5: 75=;@ F 7 5AD75FBAE;FA@@ A8F 7 E73>>A53F76 ;@F 7 5AH7DE73F3@ 8EF@ @ F 7 # E5D1 EI ;F 3 FADG7 A8 [\$?

>5FD53>I ;D@ ? GEF47 6A@ 8A>AI ;@ F 7 ;@FD5FA@E A8F 7 D>7E ;@5A? B>3@7 I ;F * . _E3@3D@E



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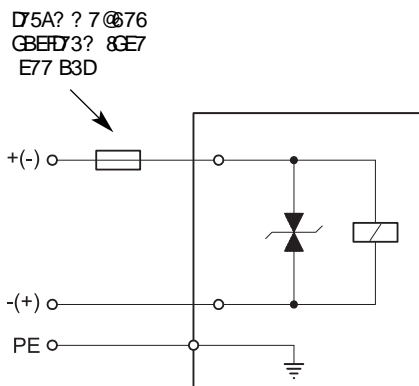
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A@@75FA@8AD7JF7D@>7CGBAF7@F3>9DAG@;@ BA;@F	? 3J ?? \

34>7E 8ADI ;D@ ? GEF47 @A@3D AG76 5347E I ;F 7JF7D@>5AH7D@ E 73F 3@ ? GEF47 EGRB47 8ADGE7 ;@7@HDA@ 7@EI ;F F? B7D@FD7E 8A? M FA M 8ADH>H7E7;F 7DI ;F \$ AD, E73>E AD8DA? M FA M 8ADH>H7E I ;F \$ " E73>E

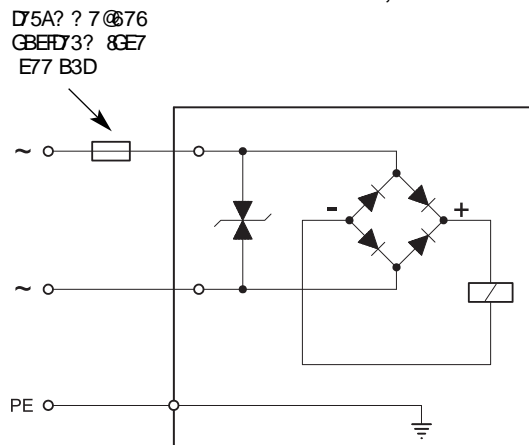
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;53B@1; 4917@< A

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& 3>9





D5@C@=B6CA5 1=4 AE938 >66D>;B75 ?51:

+BEFD73? A8735: HB+7 3@3BBDABD3F 8GE7 ? 3J J @355AD;@ FA AD3 BDAF75FH7 ? AFAD E ;f5: I ;F E ADF5;DGF3@ F 7D 3>
;@B @B @AGE F;BB;@ 3E E ADF5;DGFBD75FA@? GEF47 5A@75F76 *: 7 5GFA8BAI 7DA8F 7 8GE7 ? GEF5AD7EBA@ AD7J5776 F 7 E ADF5;DGF
5GD7 @FA8F 7 ECBBK EAG37 *: 7 8GE7 ADF 7 BDAF75FH7 ? AFAD? GEF47 B3576 AGE;67 F 7 63@7DAGE 3D73 ADF 7K? GEF47 BDAF75F76 I ;F 3@
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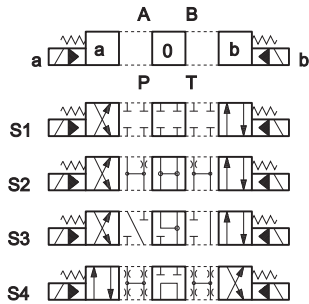
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I : ;5: 53@A55GD I : 7@;@G5B @7E 3D7 E ;f5: 76 A8

*: 7 B47 E AI E F 7 FB7 A88E7 D75A? ? 7 @76 355AD;@ FA F 7 @A? ;@>HA;B97 A8F 7 HB+7 3@ FA F 7 HB-G7 A8F 7 HA;B97 B73=E D76G5FA@

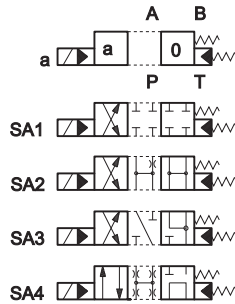
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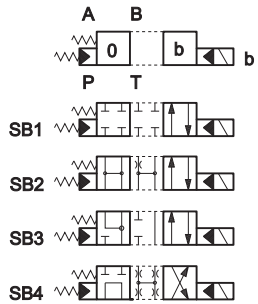
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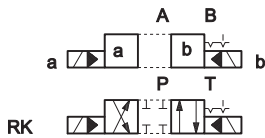
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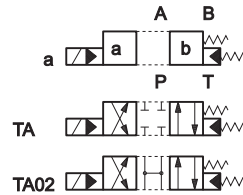
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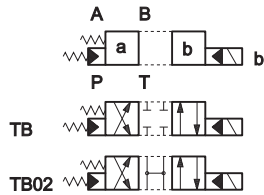
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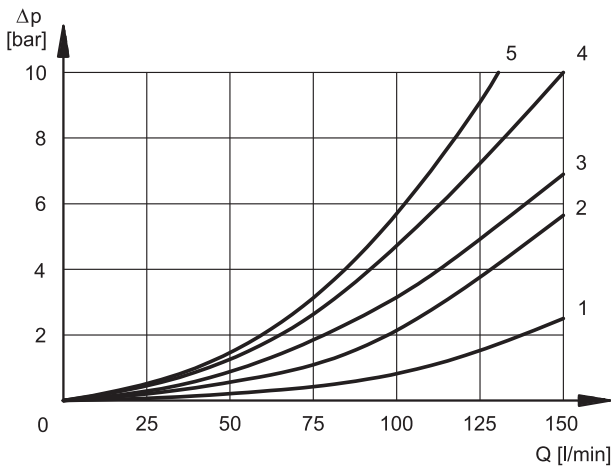


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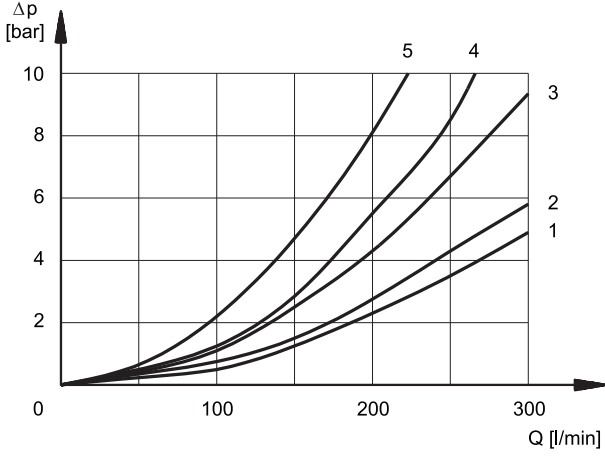
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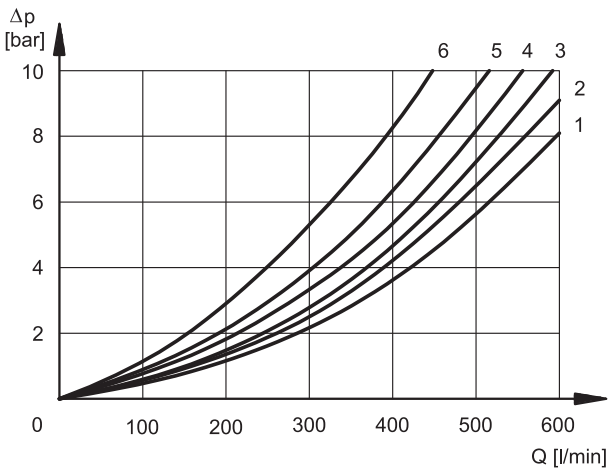
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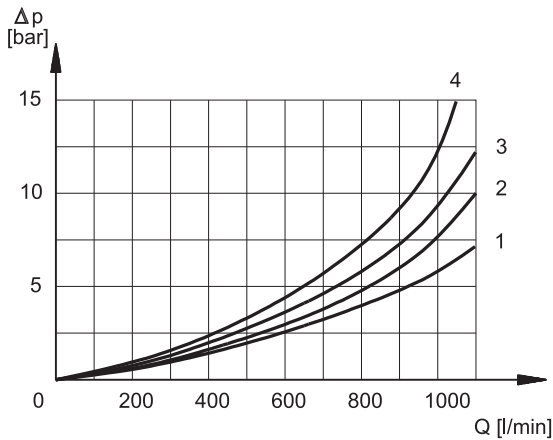
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" # (? ;@? G? B;>AF;@ BD7EEG7 53@47 F 7 >AI 7D@>7 HB>G7 3F>AI 8AI E D7FE 4GF I ;F ; ;9: 7D8AI D7FE F 7 ; ;9: 7DH>G7 ;E @7676

" # (;8F 7 HB>H7 AB7D7FE I ;F ; ;9: 7DBD7EEG7E ;F;E @57EE3DK FA GE7 F 7 H7DEA@I ;F 7JF7D@>B;>AF3@ D76G576 BD7EEG7 %F 7D ;E7 F 7 HB>H7 I ;F ;@7D@>B;>AF3@ BD7EEG7 D76G5 ;@ HB>H7 I ;F 43D8J76 36-GEF? 7@F53@47 AD7D76

66 F 7 >7F7D. FA F 7 ;67@;853FA@5A67 FA AD7DF ;E ABFA@ E77 B3D A@E67DF 3F 4K366 ;@ F 7 BD7EEG7 D76G5 ;@ HB>H7 F 7 AH7D>

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' E989-7 B- 5A

*: 7 HB;G7E;@;53F76 D7DFA 3 EA7@A6 HB+7 I AD;@ I ;F B;AF@
 BD7EEG7 A8 43D I ;F ? ;@D>A;>3F3 F? B7D7G7 A8 M 3F
 HE5AE;K A8 5) F3@ I ;F & 3@ * 5A@75FA@E

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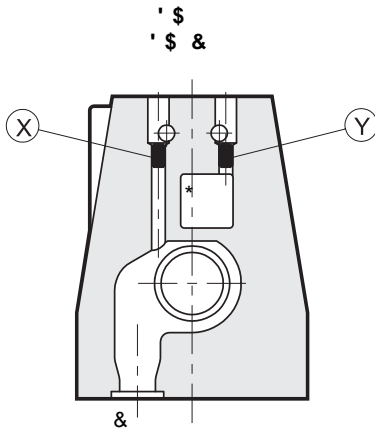
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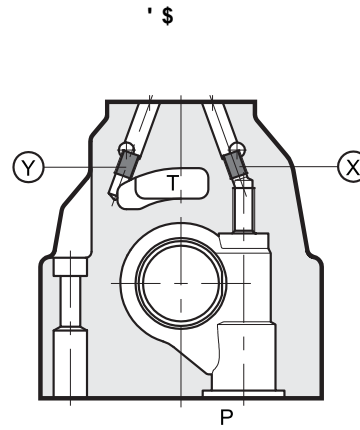
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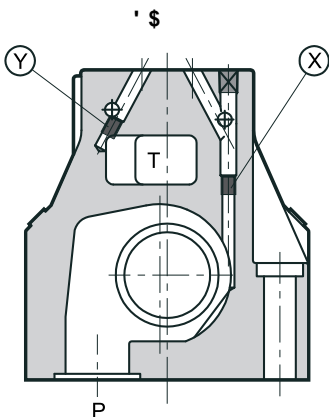
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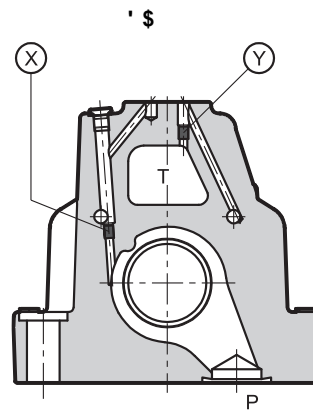
, B@ # J 8AD7J7D@>B;AF
 - B@ # J 8AD7J7D@>6D;@



, B@ # J 8AD7J7D@>B;AF
 - B@ # J 8AD7J7D@>6D;@



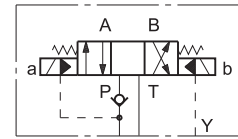
, B@ # J 8AD7J7D@>B;AF
 - B@ # J 8AD7J7D@>6D;@



, B@ # J 8AD7J7D@>B;AF
 - B@ # J 8AD7J7D@>6D;@

13: ? @AAC@ D1;D5 9:3> @> @B4 >= ;9:5 \$ >?B=

) & ! 3@) & ! HB+7E 3D 3H8;347 GBA@D'CG7EF1 ;F 435=BD'EEGD 7 HB+7 ;@A@B@D'F76 A@>@' & * : ;E @75EE3DK FA A4B3;@F 7 B;AF;@ BD'EEGD 1 : 7@F 7 5A@D>HB+7 ;@D'EFBAE;FA@ : 3E F 7 >@' & 5A@>75F76 FA F 7 * B@D'F EBAAE)))) * * * : 7 5D35=;@ BD'EEGD ;E A8 43DI ;F 3 ? ;@? G? 8AI D'F A8 >? ;@

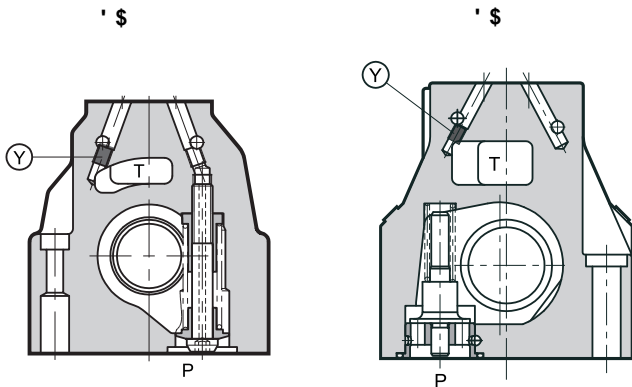


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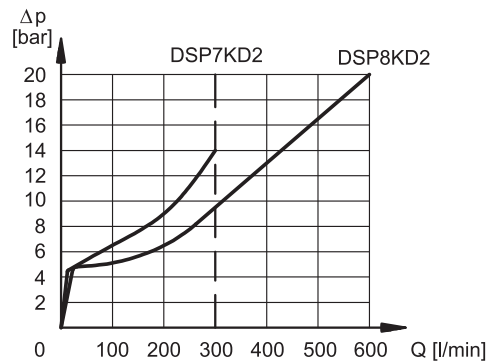
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66 FA F 7 ;67@F853FA@5A67 8ADF ;E D'CG7EF E77 B3D39DB:

>@ '\$ >=;G F 7 435=BD'EEGD 7 HB+7 53@47 3EA 67>+7D'6 E7B3D'F7K 3@ ;F53@47 73E;K? AG@76 A@>@' & A8F 7 ? 3;@5A@D>HB+7 E=8AD5A67 FA A@B'DF 7 435=BD'EEGD 7 HB+7



B;AF3+ 3KE;@7D@>
- B:9# J 8AD7J7D@>6D3;@



* : 7 5GD7 D'8'DE FA F 7 BD'EEGD 7 6DAB 4A6K B3D'FA@K 1 ;F 435=BD'EEGD 7 HB+7 7@D;L76 FA 1 : ;5: F 7 BD'EEGD 7 6DAB A8 F 7 D'8'D'@7 EBAA>? GEF47 36676 E77 B3D39DB:

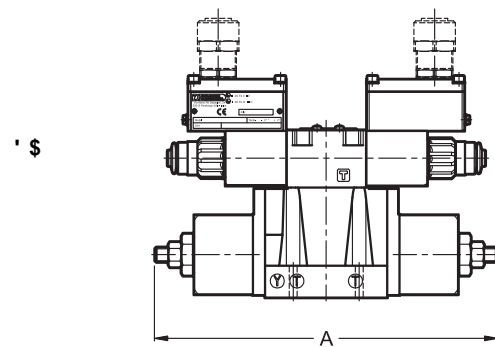
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>=B@; >6B5 <19= A?>>; AB@: 5

- ;F F 7 : 7-B A8EB75;3>E67 B:9E ;F;E BAE;47 FA ;@D'AG57 EFD=7 5A@D>E;@F 7 : 736E A8F 7 B;AF76 HB+7 EA 3E FA H3DK F 7 ? 3J;? G? EBAA>573D3@7 AB7 @@

* : ;E EA>CFA@3>AI E 5A@D>A8F 7 8AI D'F 8A? F 7 BG? B FA F 7 35FG3FAD3@ 8A? F 7 35FG3FADFA F 7 AG57F A4B3;@@ 3 6AG4>7 36-GEF4>7 5A@D>A@F 7 35FG3FAD

66 F 7 >7F7D FA F 7 ;67@F853FA@5A67 FA D'CG7EFF ;E 67H57 E77 B3D39DB:



6;? 7@E@E;@? ?

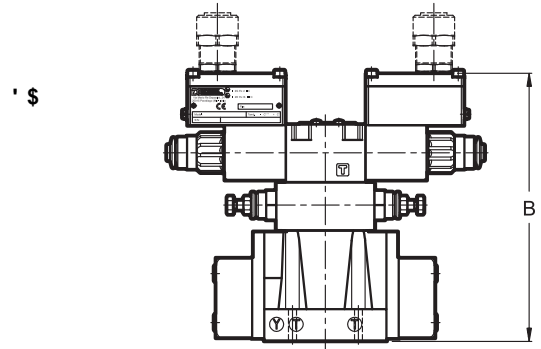
' \$ &	' \$	' \$	' \$



D*KD2

>=B@; >6B5 < 19- A?>>; A89B-7 A?554

KB35;@ 3# () fKB7 6AG4> 8AI 5A@DA>HB>H7 47F 77@F 7 B;AF
EA>@A;6 HB>H7 3@ F 7 ? 3;@6;EFD4G7AD F 7 B;>AF6 8AI D3F 53@47
5A@DA>76 3@ F 7D78AD F 7 5: 3@7AH7DE? AAF @EE 53@47 HB76
66 F 7 >H7D FA F 7 ;67@;853FA@5A67 FA D7CG7EFF ;E67H57 E77
B3D39D3B:

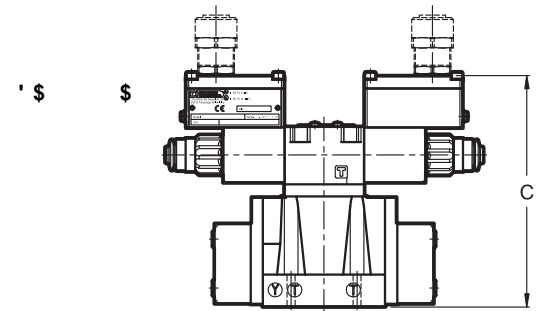


6;? 7@EAGE;@? ?

	' \$ \$ \$	' \$	' \$	' \$

' C2?;1B E9B B@B5 >= ;9-5 \$

F;E BAAE;4> FA ;@DA6G57 3 EG4B>3F I ;F 3 D7EFD5FADA@>@ &
47F 77@F 7 B;>AFE7@A;6 HB>H7 3@ F 7 ? 3;@6;EFD4G7AD
D7EFD6FADQ 8AD)& !)& (!)& ! 7)& !
D7EFD6FADQ 8AD)& !
* A D7CG7EF;@;G67 ;@F 7 5A67 B3D
\$ 8AD)& !)& (!)& ! 3@)& !
\$ 8AD)& !

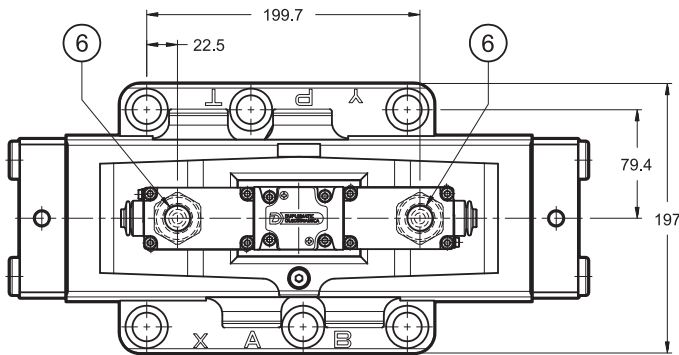
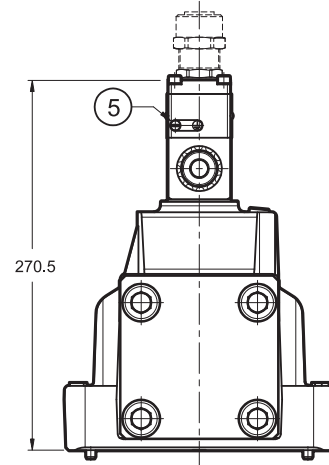
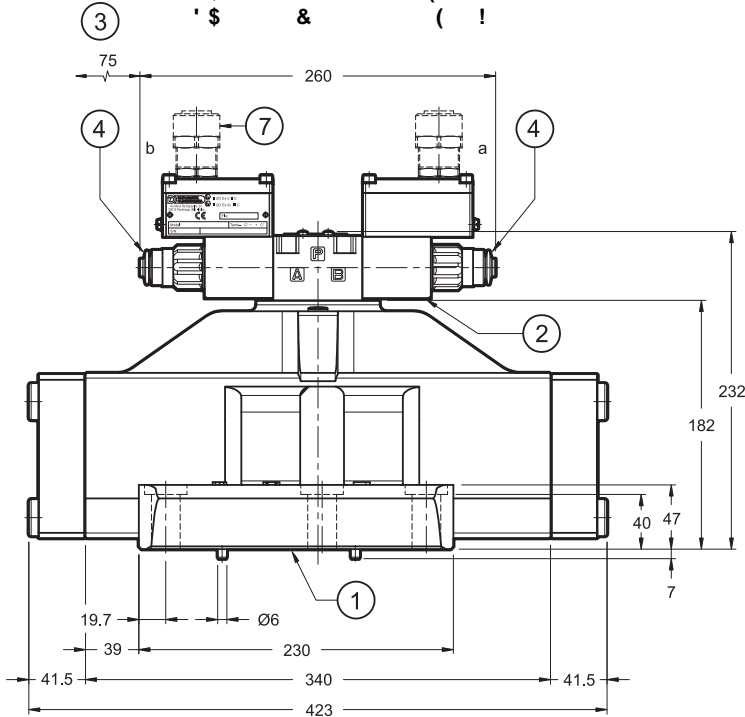


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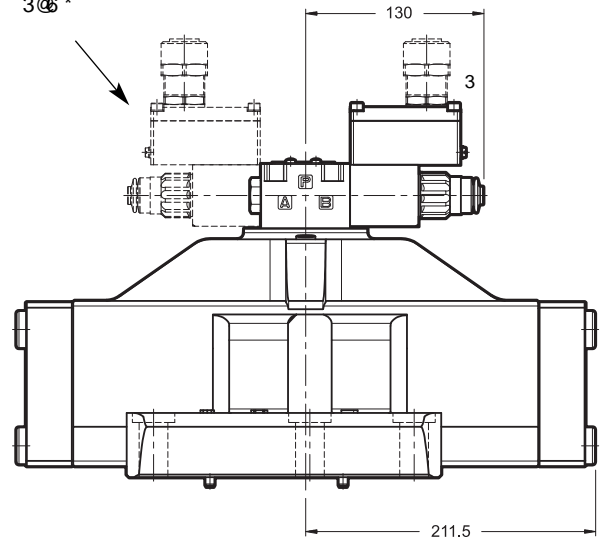
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' \$ # * & " ! #) " (" ! " ' # " "

6;? 7@EAE;@? ?



) A7@A:6
BAEFA@8AD
H7DEAE)
* 3@ *

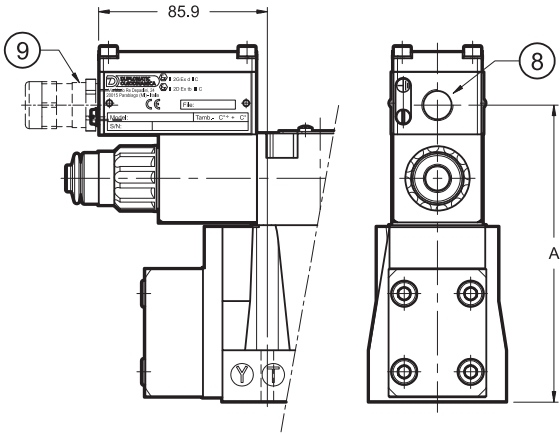


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36-GEF? 7@BD7EEG7 D76G5;@ HB+7 5A@E67D3@
;@D73E7 A8 ?? ;@: 7;9: F
"#(8ADE67 BADF534>7 9>3@ E77 B3D9DB:

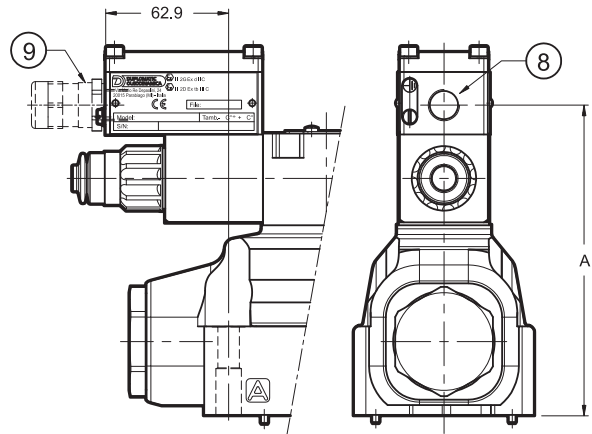
AG@;@ EG857 I ;F: E73>@ D@E
JB:AEA@BDA85A;>
A;>D? AHB>EB357
3@G>AH7D67 4AAFBD75F76 AB=41@ 6-@ 2>B" 1=4 * A51;A 8AD4>@ D@ @F 6;? 7@EAE EF3@3D8AD\$" E73-E E77 B3D
* 7D ;@>8ADECB7? 7@BDK73DF 5A@75FA@
+BB7DBADF8AD534>7 9>3@
34>7 9>3@ GBB7DBADFE AI @ * A47 AD7D76 E7B3D9DB: E77 B3D9DB:

3E7@A8E;@>7 HB+7) E5D7I E) % # J
* ;9: F7@@ FADDG \$? E5D7I E
* : D736E A8? AG@;@ : A7E # J
) 73>@ D@E %(_KB7 J E AD %(_KB7 J E AD

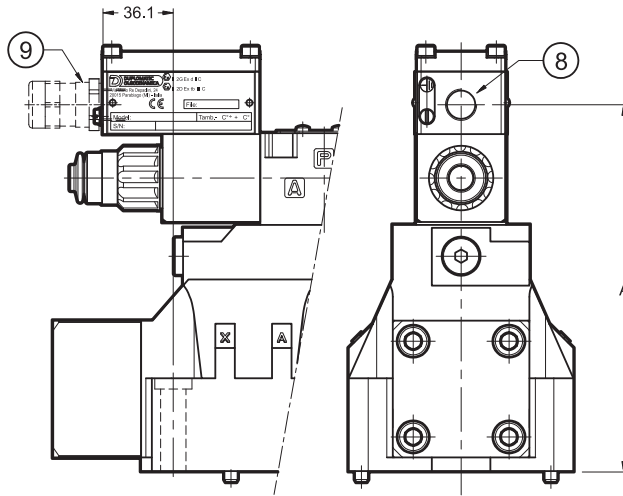
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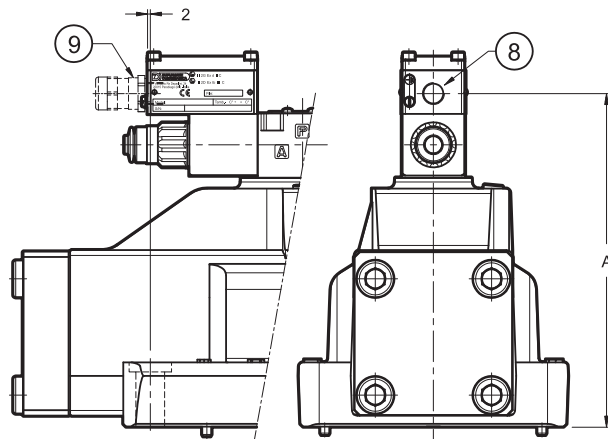
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'	
'	



) ;67 BADFKB7	;? 7@EA@
'	
'	



) ;67 BADFKB7	;? 7@EA@
'	
'	

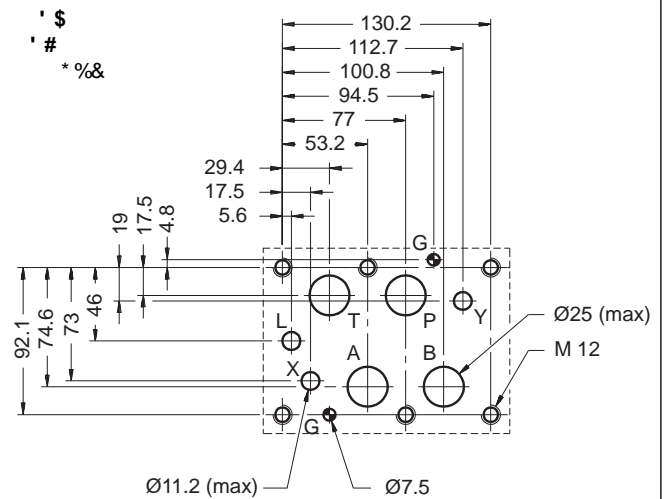
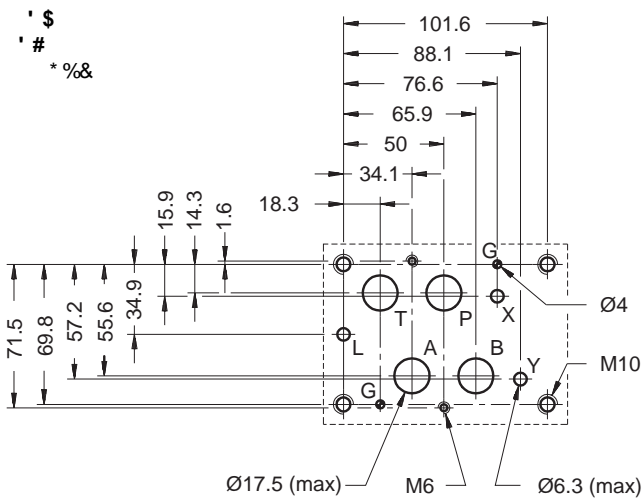
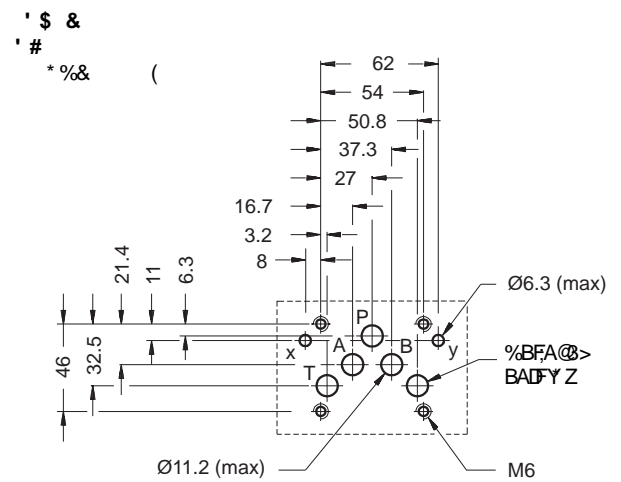
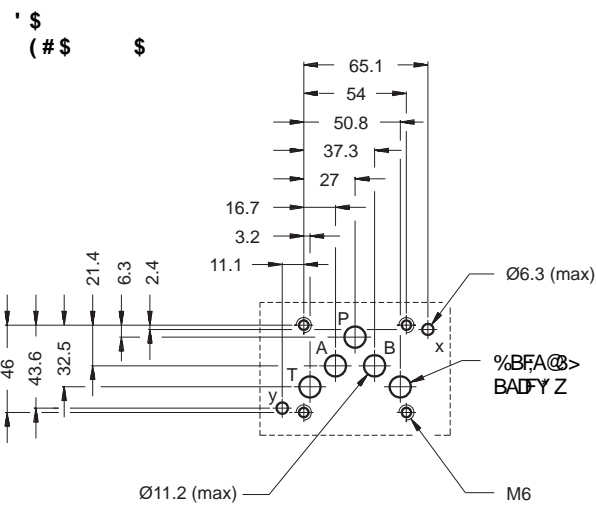
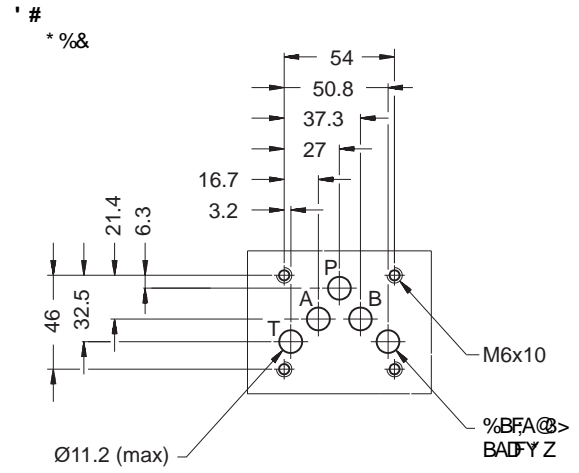
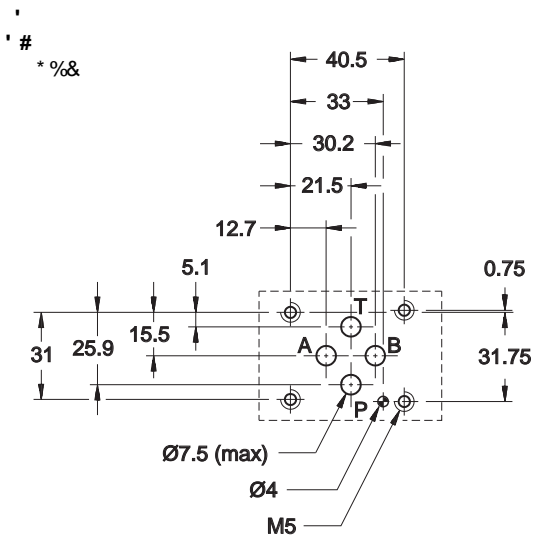


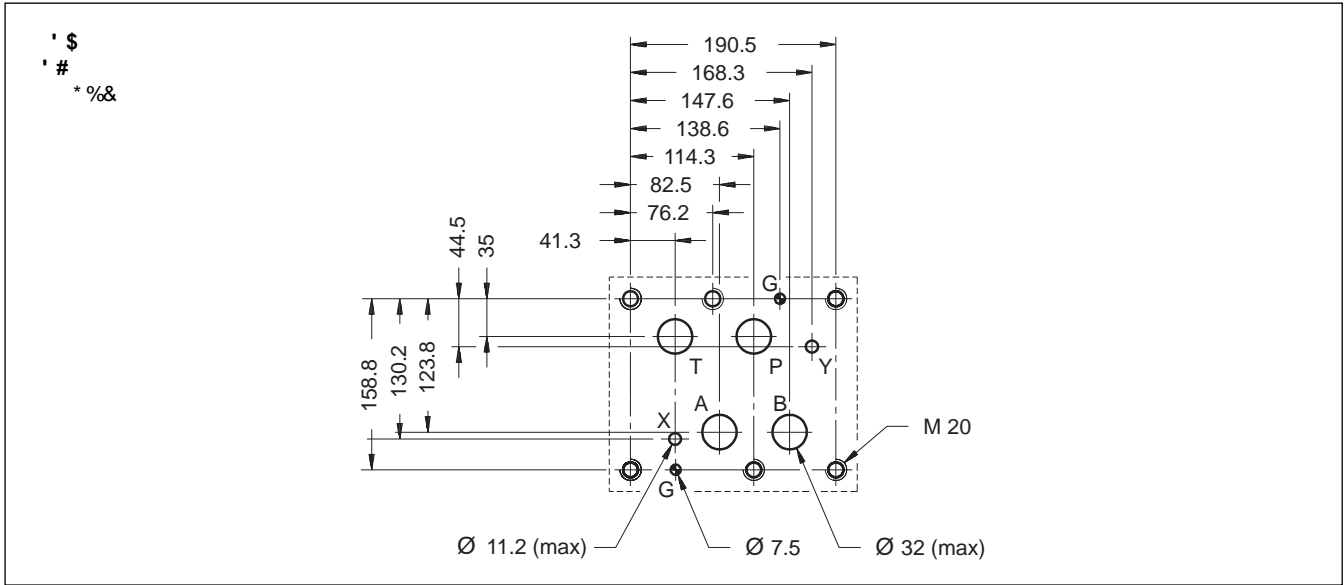
) ;67 BADFKB7	;? 7@EA@
'	
'	

6 ;? 7@EA@ ;@? ?

) ;67 BADF	
347 9-8 @ E67 BADF	
E AI @ * A47 AD67D6	
E7B3B7-K E77 B3D	

! #) " (') & ' ,





! ") #* && ' ;9-4 @-7 =CB

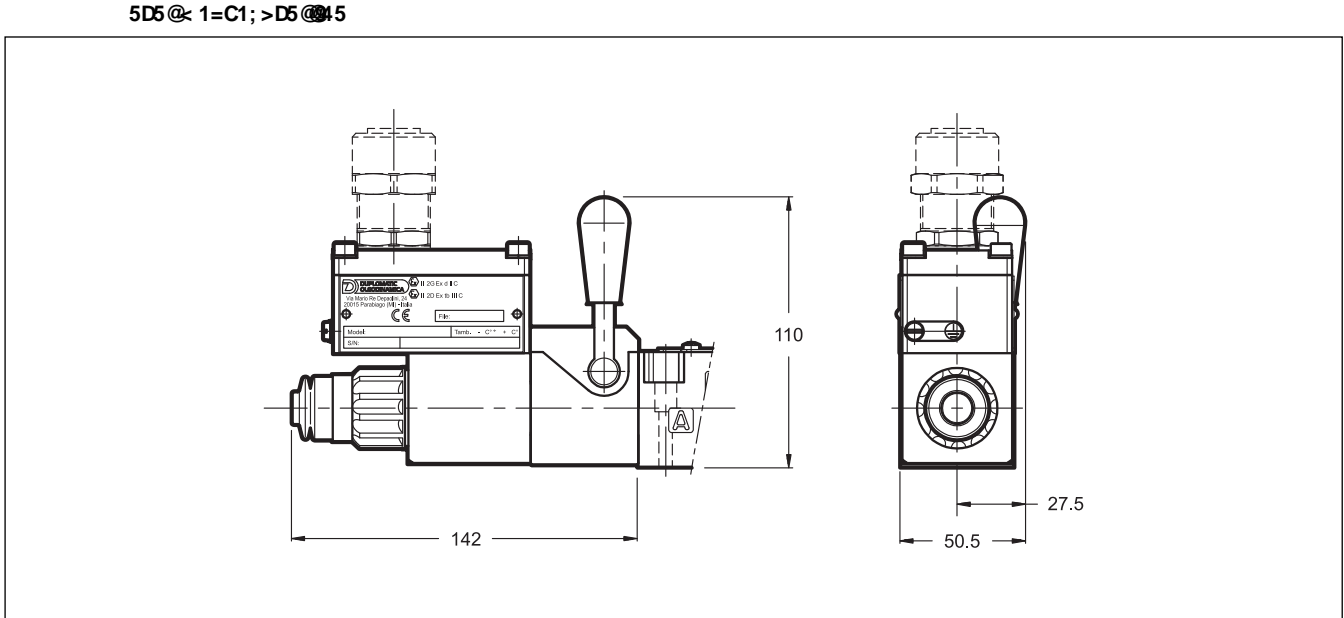
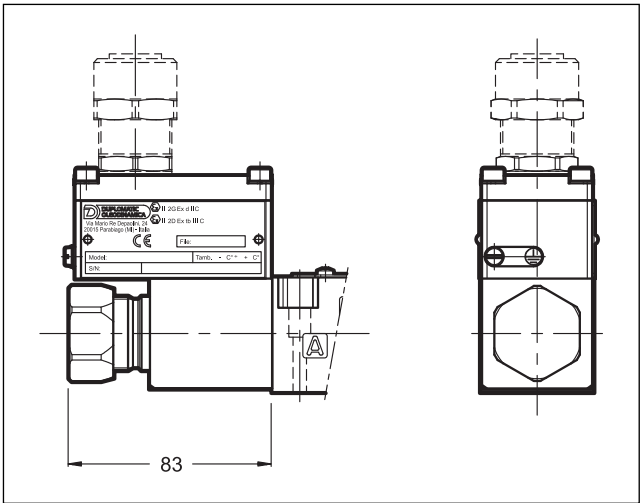
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* : 7 D@ @CF;E F9: F 7 @6 A@3 F D73676 8EF7 @DF 3F=77BE F 7 5A;> @;FE BAE;FA@7H7 @ ;F AGFF 7 D@ @CF

* A 3557EE F 7 ? 3 @3>AH7D67 >AAE7 F 7 D@ @CF3 @ D? AH7 ;F F 7 @D73EE? 47 : 3 @ F9: F 7 @ @ G@>;FEFABE

3BD1B5 B5 < 1=C1; >D5 @M45 1;E1GA 1=4 >;GE 9B ==
A?1 @9-7 B>;AAC9I 2;5 @ @CA5 9= (, 1 @1A3;1AA954

AD? @AD? 3FA@A@E387 GE7 A8 * . 5-3EE;876 5A? BA@ @E 3D7 BDAH676 ;@F 7 ;@FD6FA@? 3 @3> 34 3KE EGBB>76 I ;F F 7 HB>7



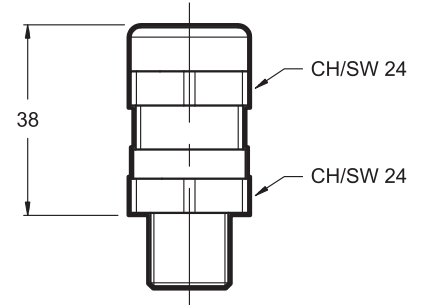


D*KD2
' & '

" "

347 9-3 @E? GEF47 AD67D76 E7B3D7F-K CB-A? 3F5 A87DE EA? 7 KKB7EA85347 9-3 @E1 ;F F 7 8A>A1 ;@ 873FGDE

NH7DEA@8AD@A@3D7 AGD76 5347 7JF7D@>E73>A@F 7 5347 EGB47 8ADQ [?? 5347E
N355A@B;@ FA * . 6;D75FH7 57DF876
N5347 9-3 @ ? 3F7D3> @5=7>4D3EE
NDB447DFB ? 3F7D3> E;>5A@
N3? 4;7 @FF? B7D3FGD7 D@7 S [S
NBDA75FA@679D77 & &



* A AD67D >EFF 7 67E5DBFA@3 @ F 7 5A67 A8F 7 H7DEA@5: AE7 @8DA? 3? A @ F AE7 >E76 47>A1

5A3 @B=- "
>45

, 7DEA@I ;F # J)% ? 3> F D736 EGB47 8AD5A;>E1 ;F
* 3 @) 5A@@75FA@KKB7E ;F;E ECBB>76 7CGBB76 I ;F E;>5A@
E73> F 3F? GEF47 3EE7? 4>76 47H 77 @F 7 5347 9-3 @ 3 @ F 7 5A;>
5AH7D EA 3E FA 7 @EGD7 & BDA75FA@679D77

5A3 @B=- "
>45

, 7DEA@I ;F X\$&* \$) 7J \$) EGB47 8AD
5A;>E1 ;F * 5A@@75FA@KKB7 ;@AD67DFA 7 @EGD7 & &
BDA75FA@679D77 * : 7 5GEFA? 7D? GEF3BB>K "% * * O P
F D736>A5=7DADE? ;>D47H 77 @F 7 5347 9-3 @ 5A@@75FA@F D736
3 @ F 7 5A;>5AH7D

5A3 @B=- "
>45

, 7DEA@I ;F = +\$ \$? 3> F D736 EGB47 8AD5A;>E
I ;F * 5A@@75FA@KKB7 ;@AD67DFA 7 @EGD7 & & BDA75FA@
679D77 * : 7 5GEFA? 7D? GEF3BB>K "% * * O P F D736>A5=7DAD
E? ;>D47H 77 @F 7 5347 9-3 @ 5A@@75FA@F D736 3 @ F 7 5A;>
5AH7D

5A3 @B=- "
>45

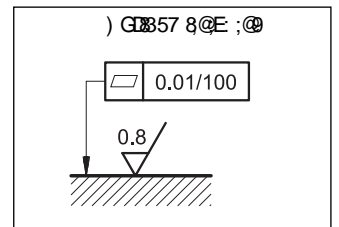
, 7DEA@I ;F # J)% ? 3> F D736 EGB47 8AD5A;>E1 ;F
) 5A@@75FA@KKB7 ;F;E ECBB>76 7CGBB76 I ;F E;>5A@ E73> F 3F
? GEF47 3EE7? 4>76 47H 77 @F 7 5347 9-3 @ 3 @ F 7 5A;>5AH7D EA
3E FA 7 @EGD7 & & BDA75FA@679D77

- &)) '

+E7? ;@D>A>43E76 ; K6DG>5 8G6E " AD # KKB7 355A@B;@ FA)% ADF 7E7 8G6E GE7 \$ (E73>E 5A67 \$ AD8G6E (KKB7
B: AEB: 3F 7EF7E GE7 &# E73>E 5A67 , ADF 7 GE7 A8AF 7D8G6 KKB7E EG6: 3E B73E7 5A@EGFAGD7F5: @53>67B3D7? 7@
+E;@ 8G6E 3FF? B7D3FGD7E ;: 7DF 3@ M 53GE7E 3 8EF7D679D363FA@A8F 7 8G6 3 @ A8F 7 E73>E 5: 3D5F7DEF5E * : 7 8G6 ? GEF47
BD7E7D76 ;@;E B: KE;53>3 @ 5: 7? ;53>5: 3D5F7DEF5E

" " ((# "

* : 7 HB>H7E 53 @47 ; @B>76 ; @3 @KBAEFA@I ;F AGF? B3;D@ 5AD75FAB7D3FA@
, 3>7 8EF7 @B B=7E B357 4K? 73 @E A8E5D1 E ADF7 DA6E >3K @ F 7 HB>H7 A@3 >BB76 EGB357 I ;F
HB>G7E A8B>3 @D7K 3 @ E? AAF @EE F 3F3D7 7CG3>FA AD47H7DF 3 @F AE7 ; @;53F76 ; @F 7 6D1 ; @
8F 7 ? ; @? G? HB>G7E A8B>3 @D7K ADE? AAF @EE 3D7 @AF? 7F 8G6 >73=397E 47H 77 @HB>H7 3 @
? AG@;@ EGB357 53 @73E;K A55GD





D*KD2
' & '

') \$ ('
E77 53B>A9G7

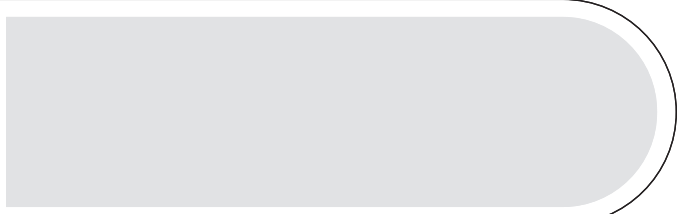
	'		' \$	' \$	' \$
* KB7 I ;F: D73DBADJE	&# #	&#	&#	&#	
* KB7 I ;F: E;67 BADJE	&# # "		&# "	&# "	&# "
& * BADJE 6;? 7@E;A@E . / BADJE 6;? 7@E;A@E	X) &	X) &	X) & X) &	X) & X) &] X) & X) &

" # () G4B>3F7E FA 47 AD>7D76 E7B3D3F7>K 6A @AF5A@B;@>@;F: 7D3>G? ;@G? @AD? 39@E;G? 3F3 : ;9: 7DD3F7 F: 3@F: 7 HB>G7 3>AI 76 4K @AD? E 355AD;>@ FA * . 6;D75F;H7 8AD53F79ADK

* : 7 GE7D? GEFRB=7 53D7 3@ ? 3=7 3 5A? B>7F 3EE7EE? 7@FA8F 7 ;9@FA@DE= F 3F53 @A55GD8DA? F 7 D7>3F;H7 GE7 ;@BAF @>3>K 7JBAEH7 7@HDA@ 7@E



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Tel. +39 0331.895.111
Fax +39 0331.895.339
www.diplomatic.com • e-mail: sales.exp@diplomatic.com





DSH*

LEVER OPERATED DIRECTIONAL CONTROL VALVE

MOUNTING SURFACES

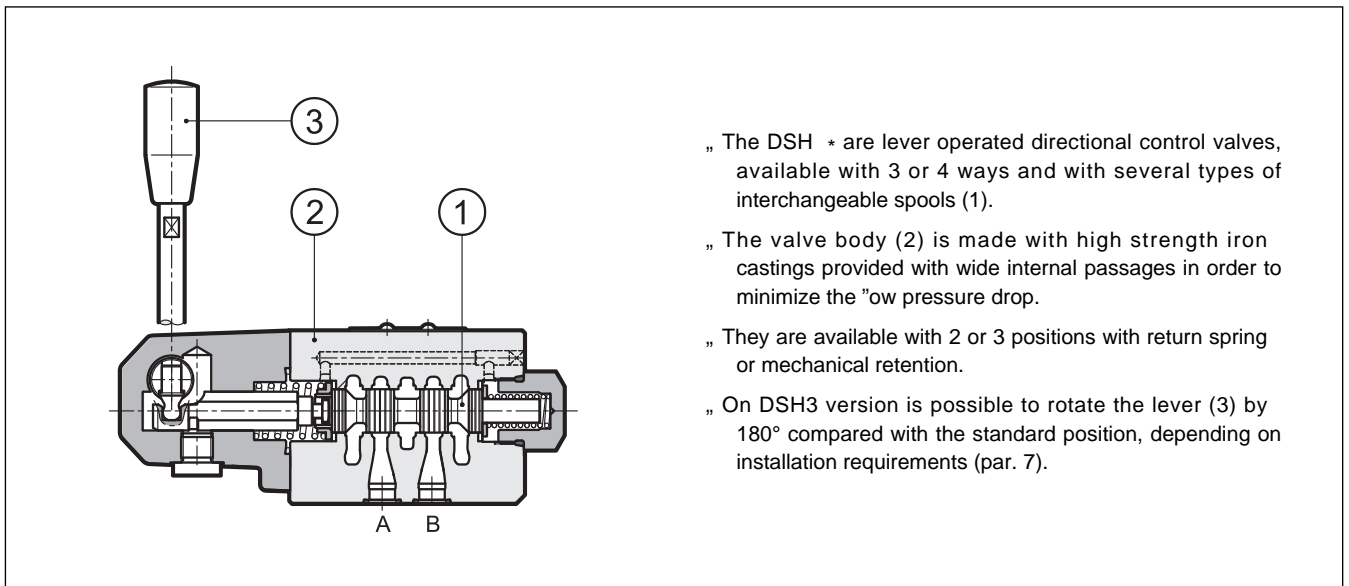
DSH3 ISO 4401-03 (CETOP 03)

DSH5 ISO 4401-05 (CETOP 05)

p max (see performances table)

Q nom (see performances table)

OPERATING PRINCIPLE



- „ The DSH * are lever operated directional control valves, available with 3 or 4 ways and with several types of interchangeable spools (1).
- „ The valve body (2) is made with high strength iron castings provided with wide internal passages in order to minimize the low pressure drop.
- „ They are available with 2 or 3 positions with return spring or mechanical retention.
- „ On DSH3 version is possible to rotate the lever (3) by 180° compared with the standard position, depending on installation requirements (par. 7).

PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

		DSH3	DSH5
Maximum working pressure:	- P - A - B ports	350	320
	- T port	210	160
Nominal flow rate	l/min	75	150
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 20/18/15	
Recommended viscosity	cSt	25	
Mass	kg	2.1	4.2

1 - IDENTIFICATION CODE

	<div style="display: flex; justify-content: space-around; align-items: center;"> D S H - / </div>	
Directional control valve with spool		Seals: N = NBR seals for mineral oil (standard) V = FPM seals for special fluids
Lever operated		Series No.: 11 for DSH3 (the overall and mounting dimensions remain unchanged from 10 to 19) 30 for DSH5 (the overall and mounting dimensions remain unchanged from 30 to 39)
Size: 3 = ISO 4401-03 (CETOP 03) 5 = ISO 4401-05 (CETOP 05)		Spool type (see par. 2) S* SK* SA* SAK* TA TAK TA23 TAK23
NOTE: On request it is possible to have the lever mounted in different positions from those in the catalogue. Consult our Technical Department.		

2 - SPOOL TYPE

<p>Type S*: 3 positions with spring centering</p> <p>S1 S2 S3 S4</p>	<p>Type SK*: 3 positions with mechanical retention</p> <p>SK1 SK2 SK3 SK4</p>	<p>Type SA*: 2 positions (central + external) with spring centering</p> <p>SA1 SA2 SA3 SA4</p>	<p>Type SAK*: 2 positions (central + external) with mechanical retention</p> <p>SAK1 SAK2 SAK3 SAK4</p>
<p>Type TA: 2 external positions with return spring</p> <p>TA TA02 TA23</p>	<p>Type TAK: 2 external positions with mechanical retention</p> <p>TAK TAK02 TAK23</p>	<p>Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our Technical Department for their identification and operating limits.</p> <p>NOTE: TA02, TA23, TAK02 and TAK23 spools are available only for DSH3.</p>	

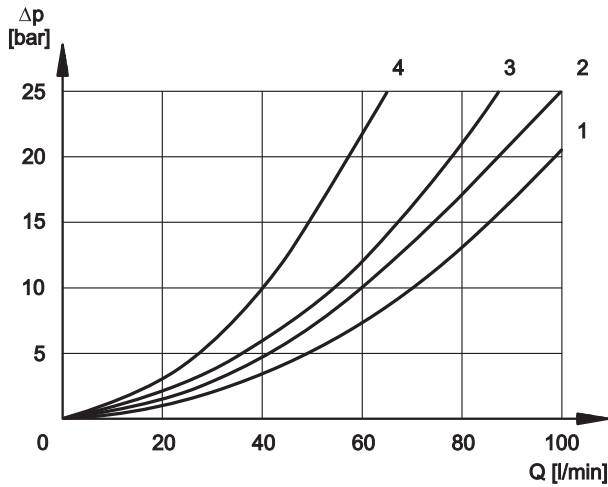
3 - HYDRAULIC FLUIDS

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.

4 - PRESSURE DROPS p - Q (values obtained with viscosity 36 cSt at 50 °C)

4.1 - DSH3



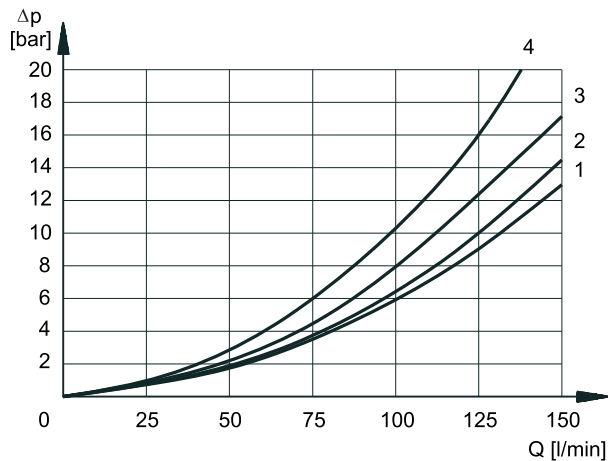
VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	PA	PB	AT	BT
	CURVES ON GRAPH			
S1, SA1, SAK1	2	2	3	3
S2, SA2, SAK2	1	1	3	3
S3, SA3, SAK3	3	3	1	1
S4, SA4, SAK4	4	4	4	4
TA, TAK	3	3	3	3
TA02, TAK02	2	2	2	2
TA23, TAK23	3	3		

VALVE IN DE-ENERGIZED POSITION

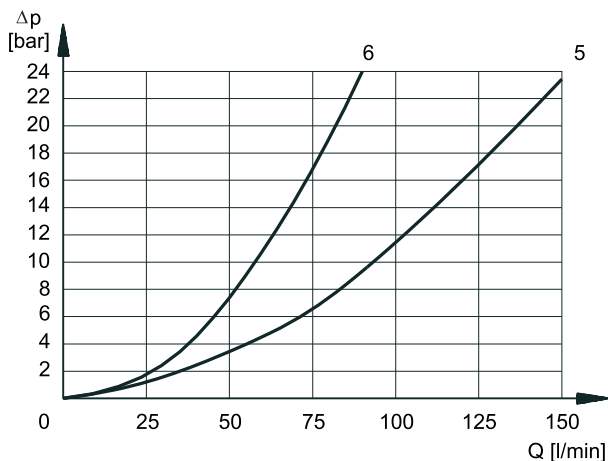
SPOOL TYPE	FLOW DIRECTION				
	PA	PB	AT	BT	PT
	CURVES ON GRAPH				
S2, SA2, SAK2					2
S3, SA3, SAK3			3	3	
S4, SA4, SAK4					3

4.2 - DSH5



VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	PA	PB	AT	BT
	CURVES ON GRAPH			
S1, SK1	2	2	1	1
S2, SK2	3	3	1	1
S3, SK3	3	3	2	2
S4, SK4	1	1	2	2
TA, TAK	3	3	2	2



VALVE IN DE-ENERGIZED POSITION

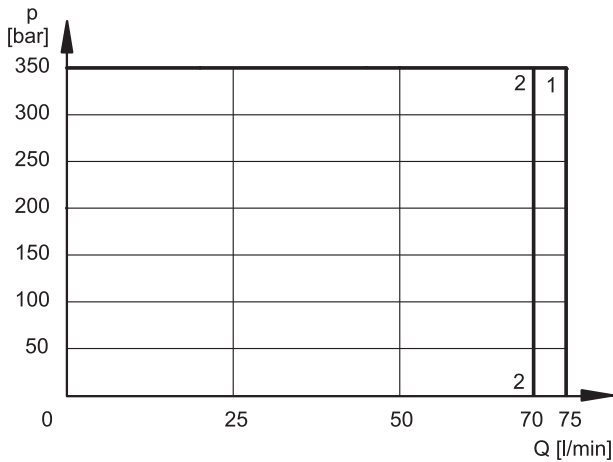
SPOOL TYPE	FLOW DIRECTION				
	PA	PB	AT	BT	PT
	CURVES ON GRAPH				
S2, SK2					5
S3, SK3			6	6	
S4, SK4					5

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm, with mineral oil viscosity 36 cSt at 50 °C and filtration ISO 4406:1999 class 18/16/13.

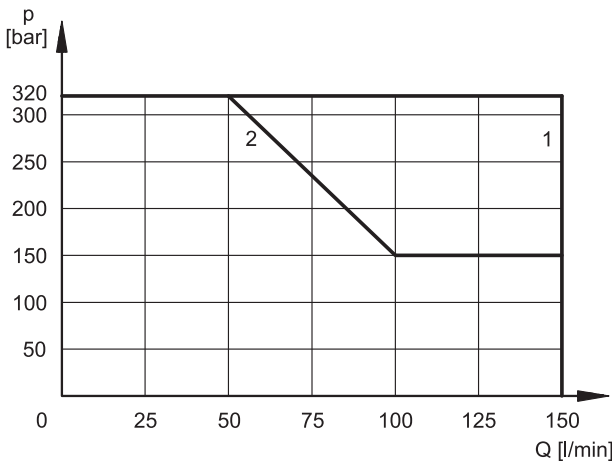
5.1 - DSH3



SPOOL TYPE	CURVE	
	P A	P B
S1, SK1, SA1, SAK1	1	1
S2, SK2, SA2, SAK2	1	1
S3, SK3, SA3, SAK3	1	1
S4, SK4, SA4, SAK4	2	2

SPOOL TYPE	CURVE	
	P A	P B
TA, TAK	1	1
TA02, TAK02	1	1
TA23, TAK23	1	1

5.2 - DSH5



SPOOL TYPE	CURVE	
	P A	P B
S1, SK1, SA1, SAK1	1	1
S2, SK2, SA2, SAK2	1	1
S3, SK3, SA3, SAK3	1	1
S4, SK4, SA4, SAK4	2	2

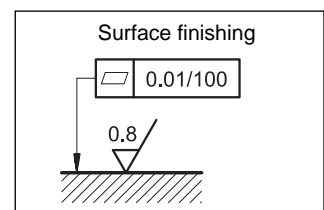
SPOOL TYPE	CURVE	
	P A	P B
TA, TAK	1	1

NOTE: Values in the graphs are relevant to the standard valve. The operating limits can be considerably reduced if a 4-way valve is used with port A or B plugged.

6 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; valves with mechanical detent must be mounted with the longitudinal axis horizontal.

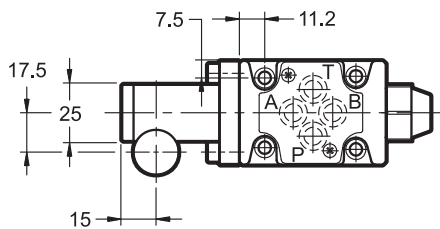
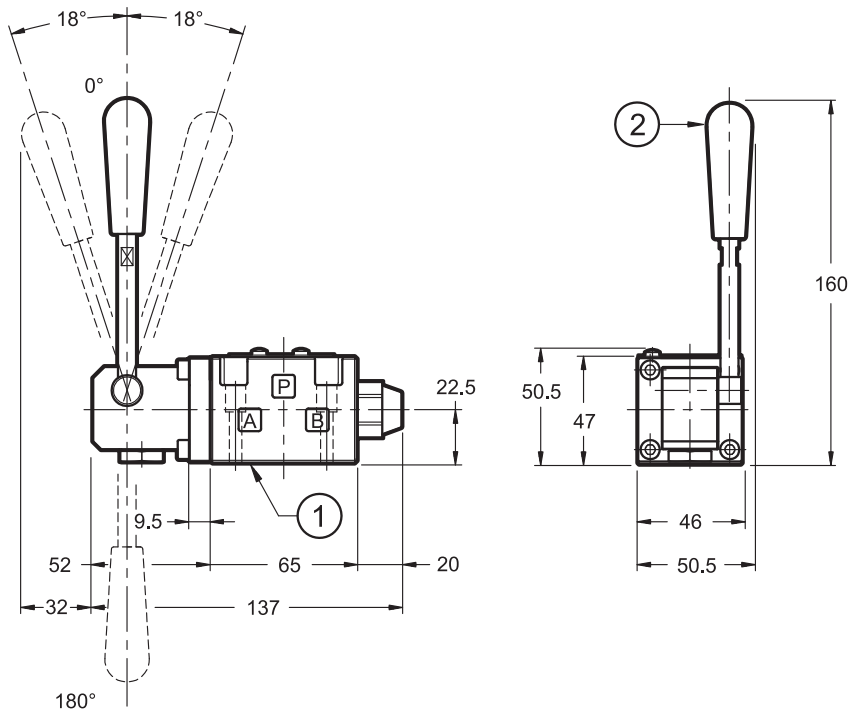
Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.



7 - OVERALL AND MOUNTING DIMENSIONS DSH3

DSH3 - S*
DSH3 - SK*

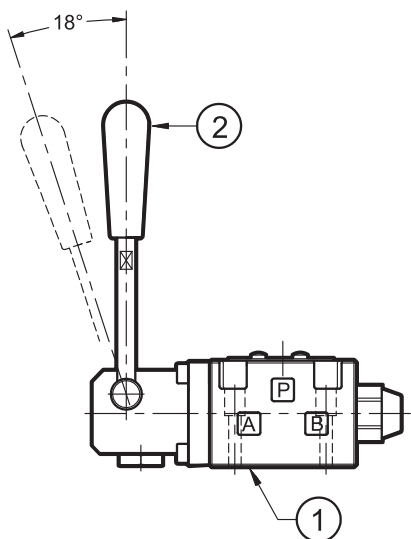
dimensions in mm



DSH3-TA
DSH3-TAK

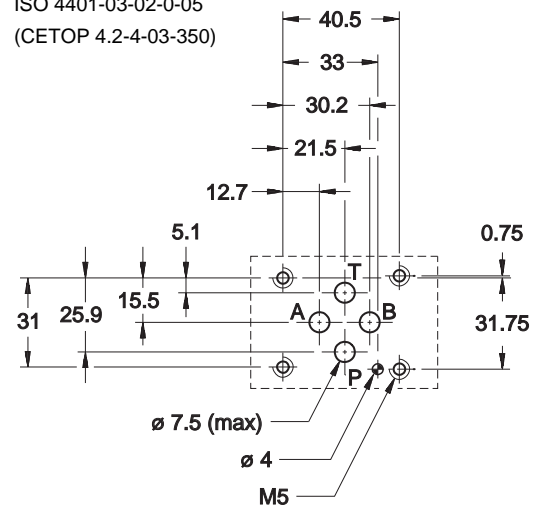
DSH3-TA23
DSH3-TAK23

DSH3-SA*
DSH3-SAK*



DSH3 MOUNTING SURFACE

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

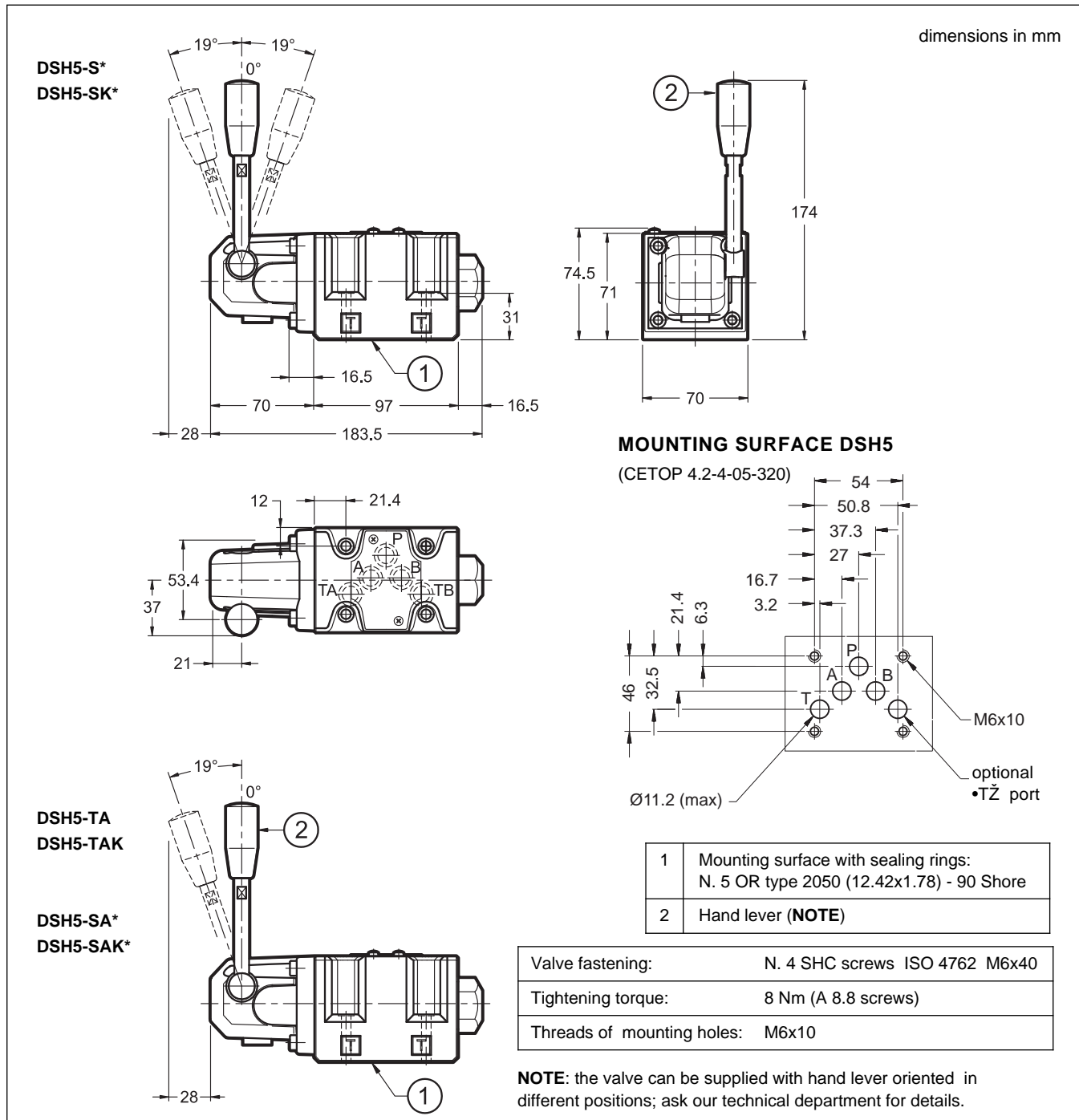


1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) - 90 Shore
2	Hand lever (NOTE)

Valve fastening:	N. 4 SHC screws M5x30 ISO 4762
Tightening torque:	5 Nm (bolts A 8.8)
Threads of mounting holes:	M5x10

NOTE: The valve is supplied with the hand lever oriented in a perpendicular position with respect to the mounting surface (as indicated in the above drawing). For installation needs the hand lever can be oriented by the user directly at 180° to the standard position, simply by unscrewing the lever and re-screwing it in the desired position.

8 - OVERALL AND MOUNTING DIMENSIONS DSH5



9 - SUBPLATES (See catalogue 51 000)

	DSH3	DSH5
Type with rear ports	PMMD-AI3G	PMD4-AI4G - 3/4" BSP threaded
Type with side ports	PMMD-AL3G	PMD4-AL4G - 1/2" BSP threaded
P, T, A and B threads	3/8" BSP	



DSH3L

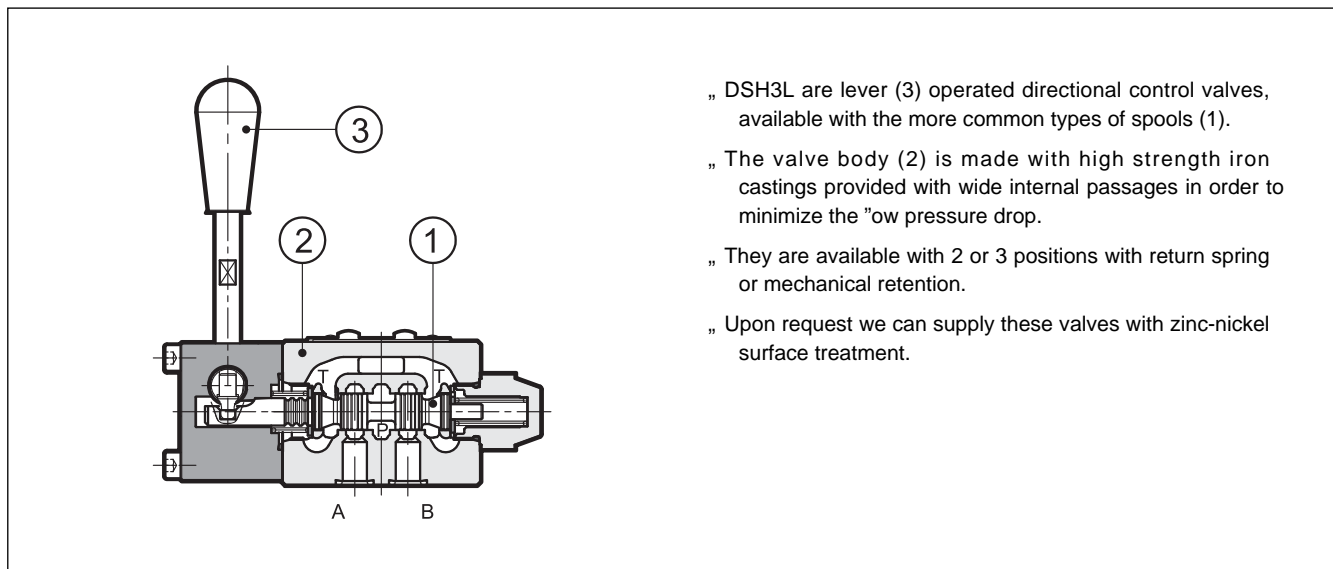
LEVER OPERATED DIRECTIONAL CONTROL VALVE

SERIES 10

MOUNTING SURFACE
ISO 4401-03 (CETOP 03)

p max (see performances table)
Q nom **60 l/min**

OPERATING PRINCIPLE

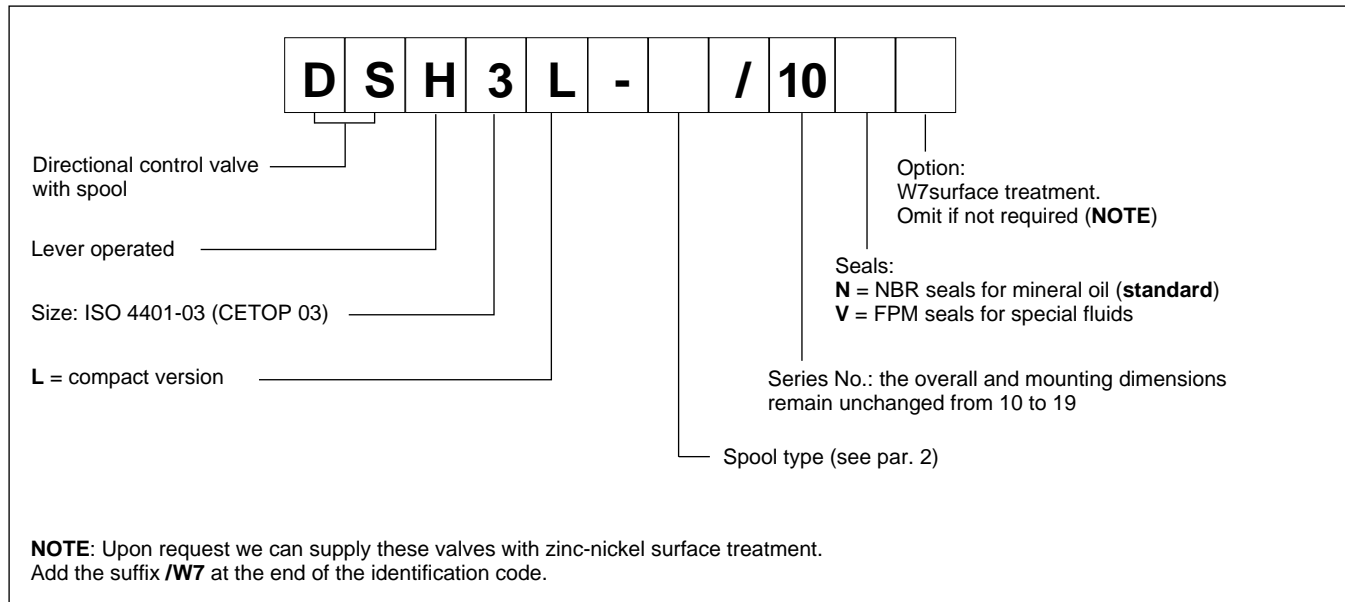


- „ DSH3L are lever (3) operated directional control valves, available with the more common types of spools (1).
- „ The valve body (2) is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop.
- „ They are available with 2 or 3 positions with return spring or mechanical retention.
- „ Upon request we can supply these valves with zinc-nickel surface treatment.

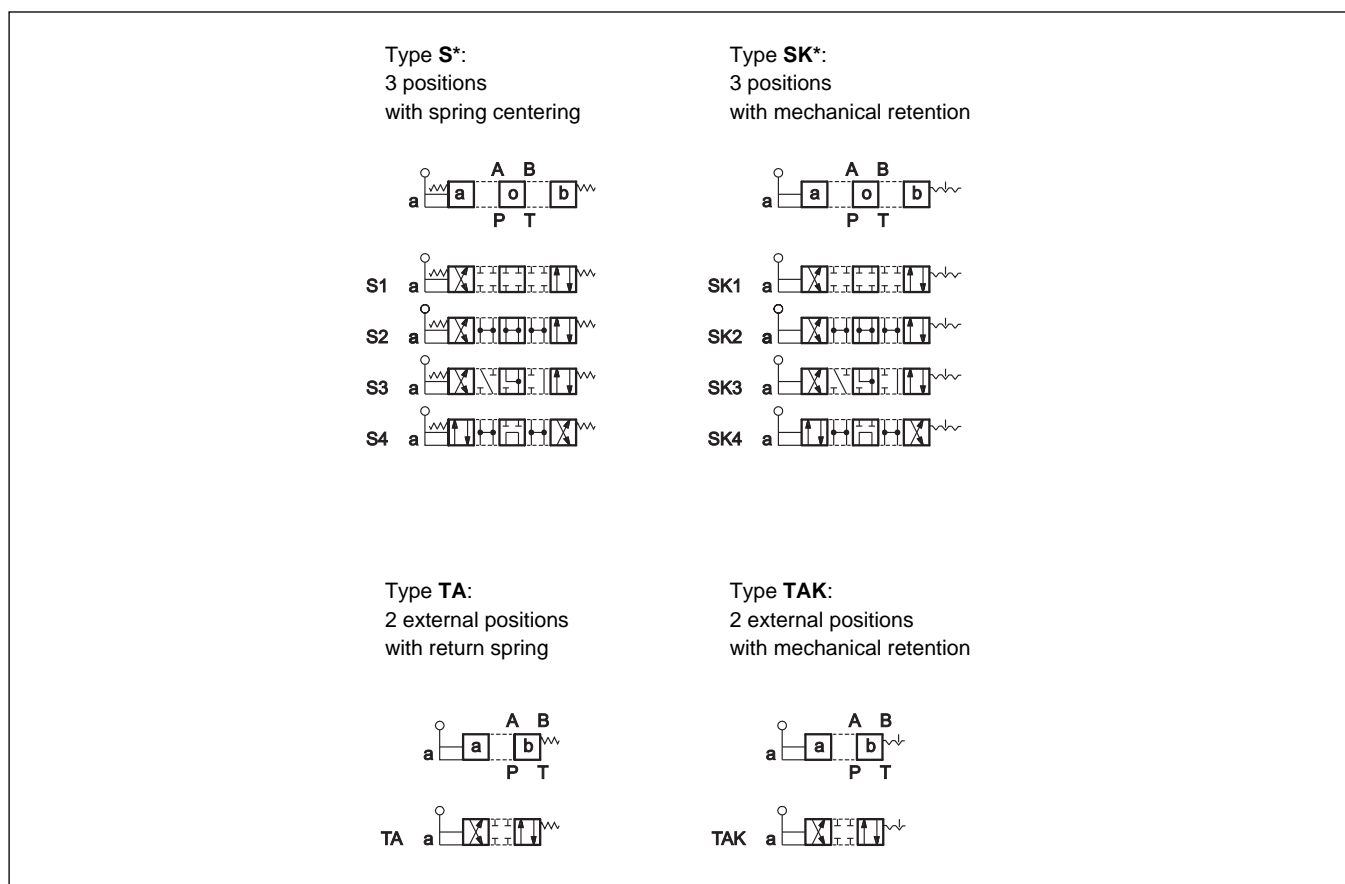
PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

Maximum working pressure: - P - A - B ports - T port	bar	350 210
Nominal flow rate	l/min	60
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 20/18/15
Recommended viscosity	cSt	25
Mass	kg	1.4

1 - IDENTIFICATION CODE



2 - SPOOL TYPE

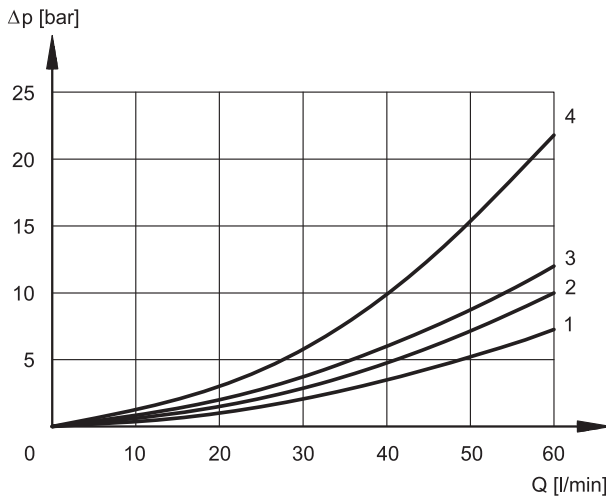


3 - HYDRAULIC FLUIDS

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.

4 - PRESSURE DROPS p - Q (values obtained with viscosity 36 cSt at 50 °C)



VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	PA	PB	AT	BT
	CURVES ON GRAPH			
S1, SK1	2	2	3	3
S2, SK2	1	1	3	3
S3, SK3	3	3	1	1
S4, SK4	4	4	4	4
TA, TAK	3	3	3	3

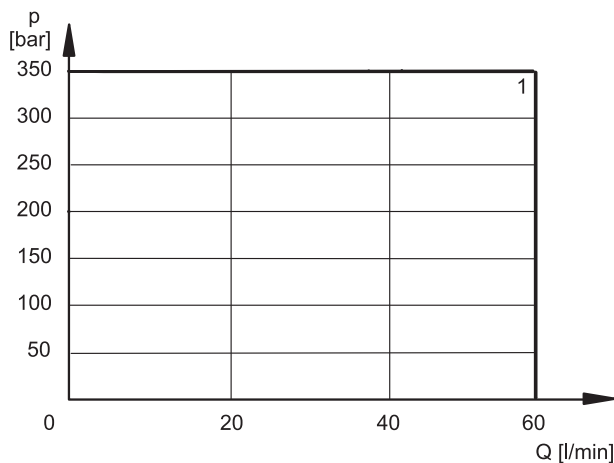
VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	PA	PB	AT	BT	PT
	CURVES ON GRAPH				
S2, SK2					2
S3, SK3			3	3	
S4, SK4					3

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm, with mineral oil viscosity 36 cSt at 50 °C and filtration ISO 4406:1999 class 18/16/13.



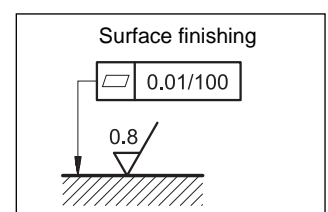
SPOOL TYPE	CURVE	
	PA	PB
S1, SK1	1	1
S2, SK2	1	1
S3, SK3	1	1
S4, SK4	1	1

SPOOL TYPE	CURVE	
	PA	PB
TA, TAK	1	1

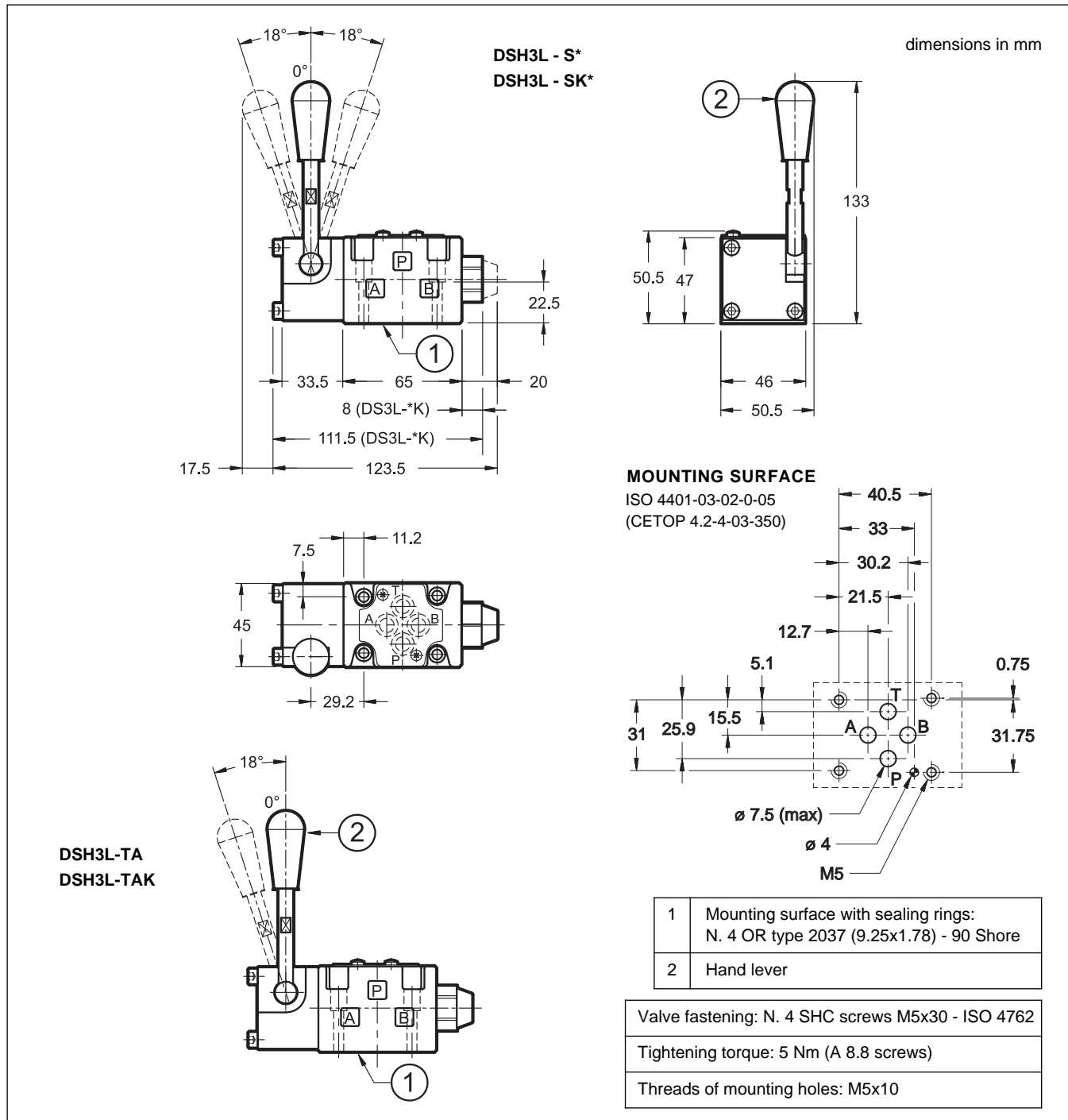
6 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; valves with mechanical detent must be mounted with the longitudinal axis horizontal.

Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.



7 - OVERALL AND MOUNTING DIMENSIONS



8 - SUBPLATES (see catalogue 51 000)

Type with rear ports: PMMD-AI3G
Type with side ports: PMMD-AL3G
P, T, A and B threads: 3/8" BSP

D **DIPLOMATIC**
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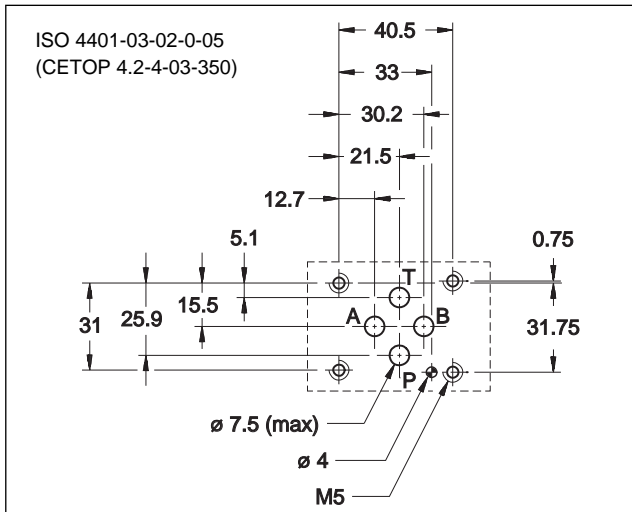
DSR3

ROLLER CAM OPERATED DIRECTIONAL CONTROL VALVE SERIES 11

SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max 350 bar
Q nom 75 l/min

MOUNTING INTERFACE

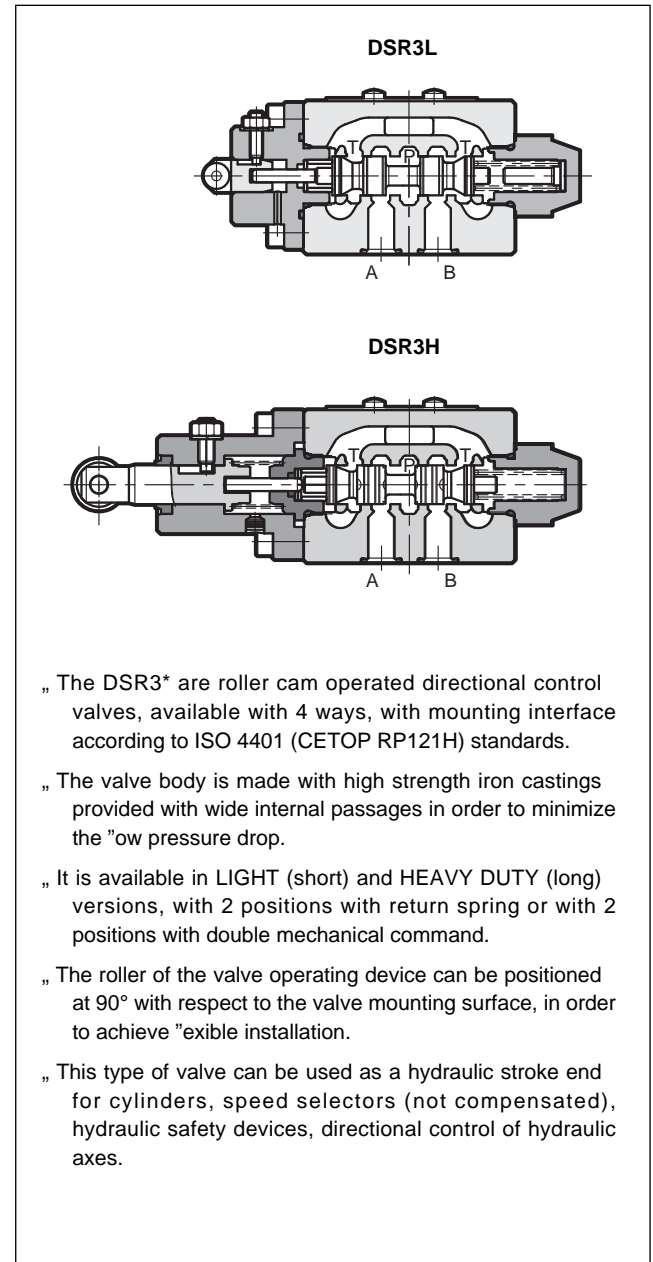


PERFORMANCE RATINGS

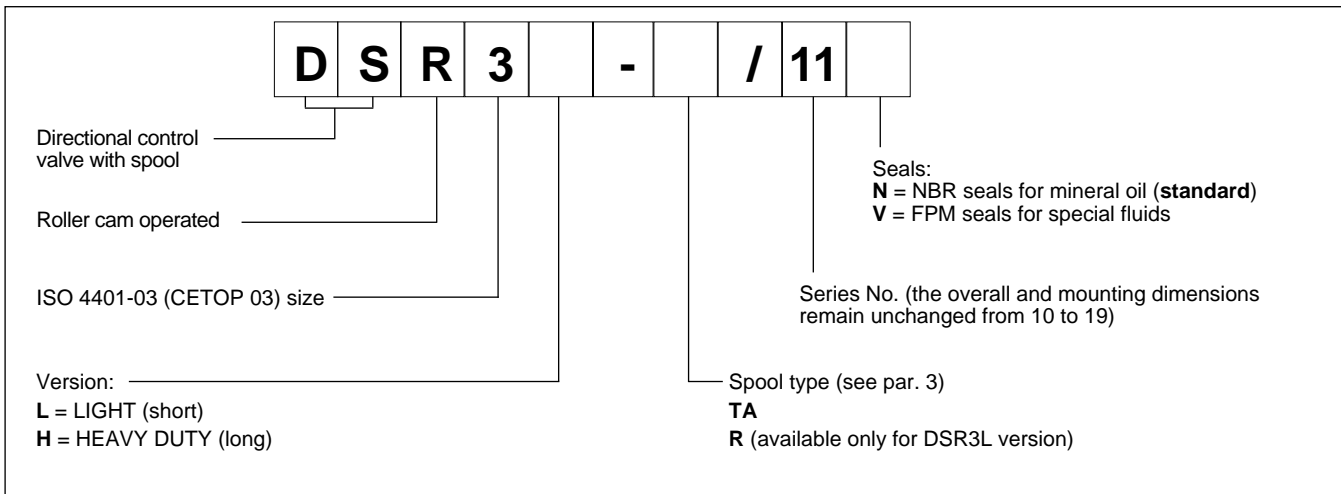
(obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure: - P A B ports - T ports	bar	350 25
Nominal flow rate	l/min	75
Pressure drop p-Q	see par. 4	
Operating limits	see par. 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 20/18/15	
Recommended viscosity	cSt	25
Mass:		
DSR3L-TA	kg	1,1
DSR3L-R	kg	1,2
DSR3H-TA	kg	1,2

OPERATING PRINCIPLE



1 - IDENTIFICATION CODE

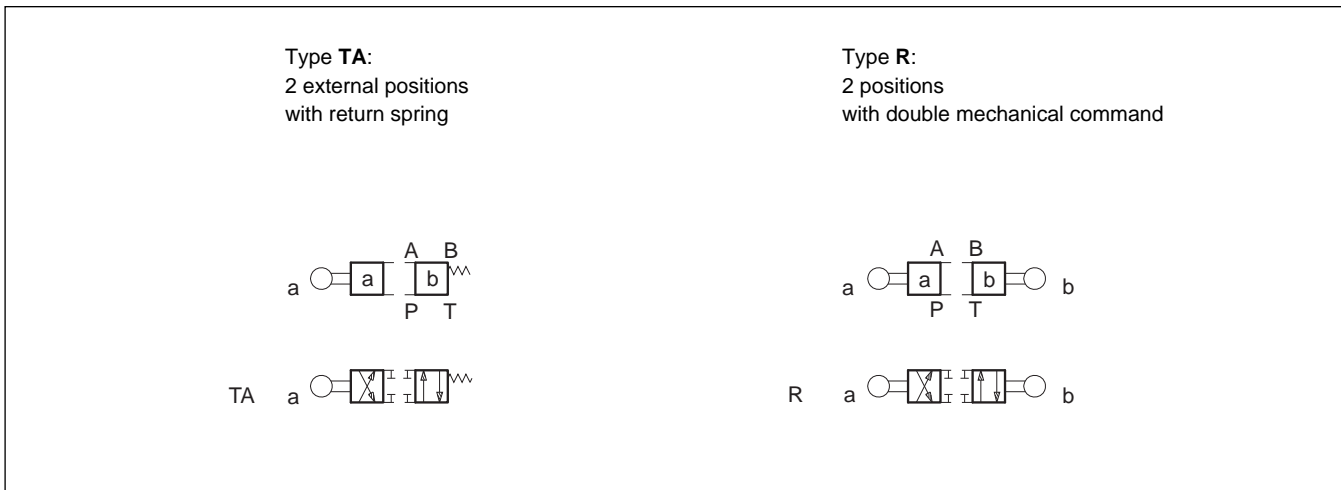


2 - HYDRAULIC FLUIDS

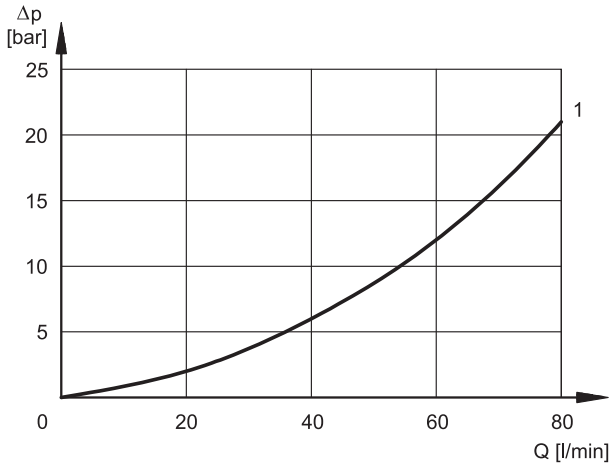
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

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.

3 - SPOOL TYPE



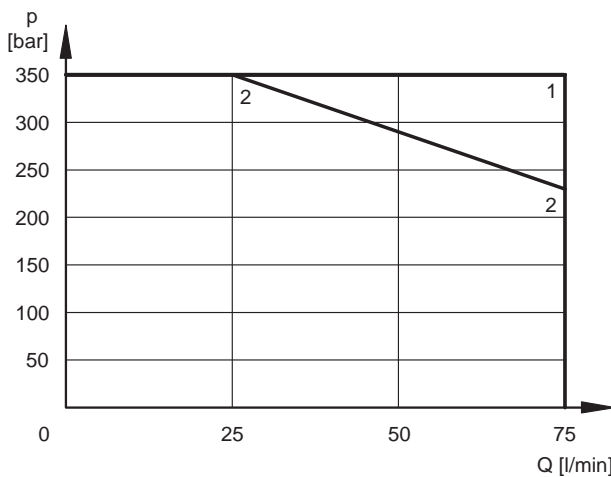
4 - PRESSURE DROPS $p-Q$ (obtained with viscosity 36 cSt at 50 °C)



SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPH			
DSR3L-TA	1	1	1	1
DSR3L-R	1	1	1	1
DSR3H-TA	1	1	1	1

5 - OPERATING LIMITS

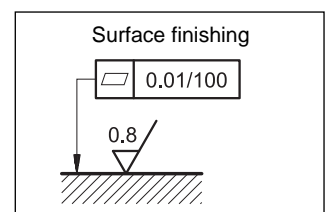
The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm, with mineral oil viscosity 36 cSt at 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



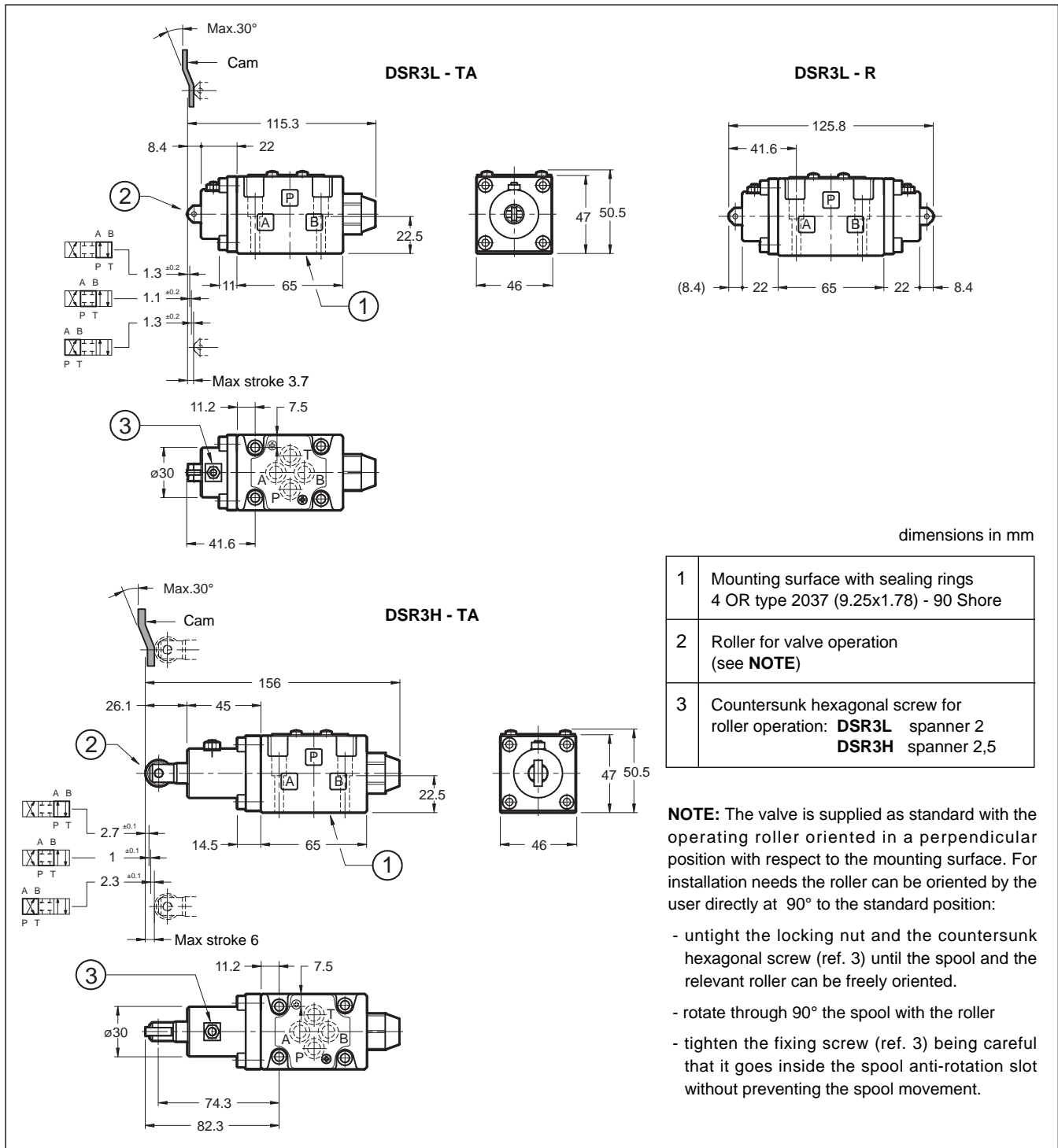
SPOOL TYPE	CURVE	
	P A	P B
DSR3L-TA	2	2
DSR3L-R	1	1
DSR3H-TA	1	1

6 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type R valves - without springs - must be mounted with the longitudinal axis horizontal. Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.



7 - OVERALL AND MOUNTING DIMENSIONS



8 - VALVE FASTENING BOLTS

N. 4 fastening bolts SHC ISO 4762 M5x30
Tightening torque 5 Nm (bolts A 8.8)

9 - SUBPLATES (see catalogue 51 000)

Type PMMD-AI3G with rear ports 3/8" BSP

Type PMMD-AL3G with side ports 3/8" BSP



DSA*

PNEUMATICALLY OPERATED DIRECTIONAL CONTROL VALVE

SUBPLATE MOUNTING

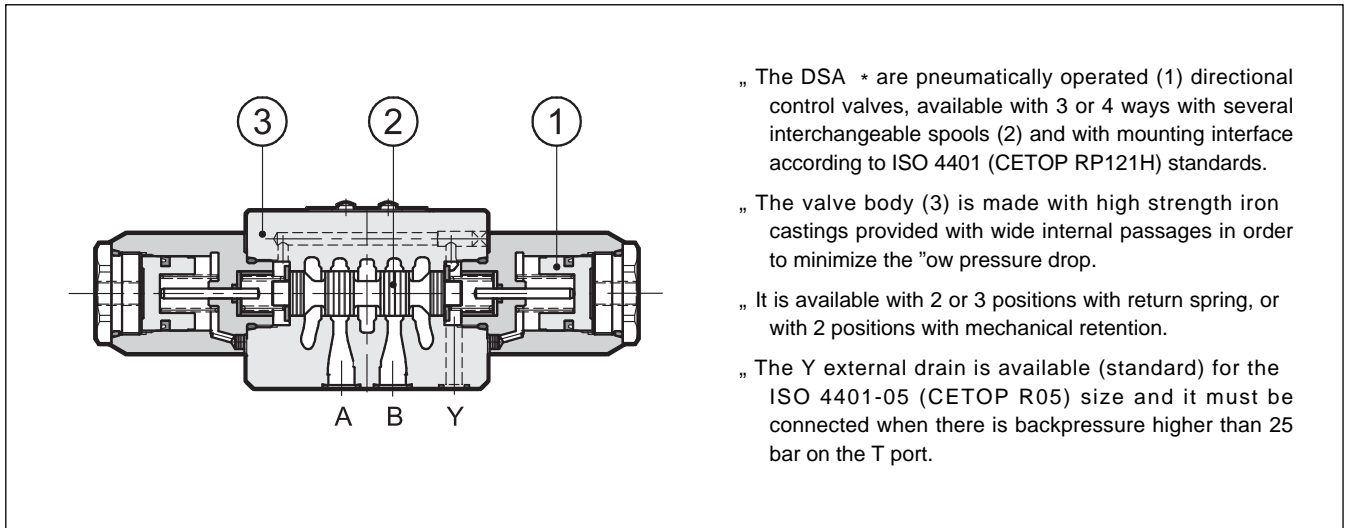
DSA3 ISO 4401-03 (CETOP 03)

DSA5 ISO 4401-05 (CETOP R05)

p max (see performances table)

Q nom (see performances table)

OPERATING PRINCIPLE



„ The DSA * are pneumatically operated (1) directional control valves, available with 3 or 4 ways with several interchangeable spools (2) and with mounting interface according to ISO 4401 (CETOP RP121H) standards.

„ The valve body (3) is made with high strength iron castings provided with wide internal passages in order to minimize the low pressure drop.

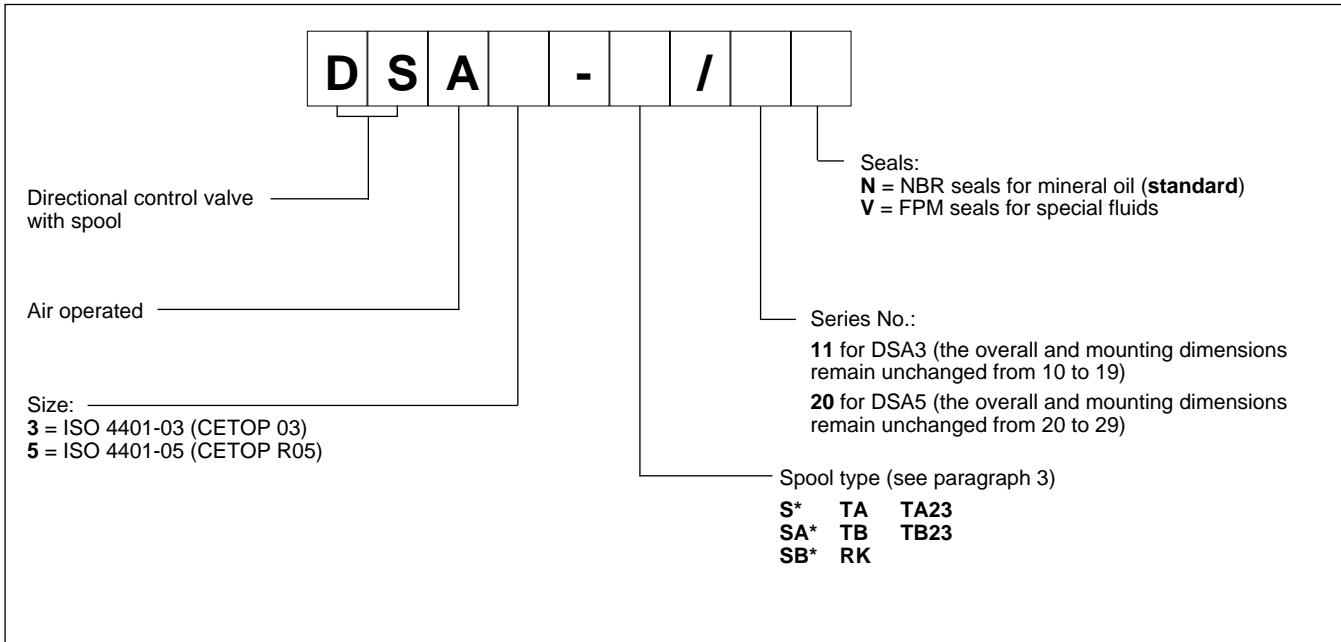
„ It is available with 2 or 3 positions with return spring, or with 2 positions with mechanical retention.

„ The Y external drain is available (standard) for the ISO 4401-05 (CETOP R05) size and it must be connected when there is backpressure higher than 25 bar on the T port.

PERFORMANCES (with mineral oil of viscosity 36 cSt at 50°C)

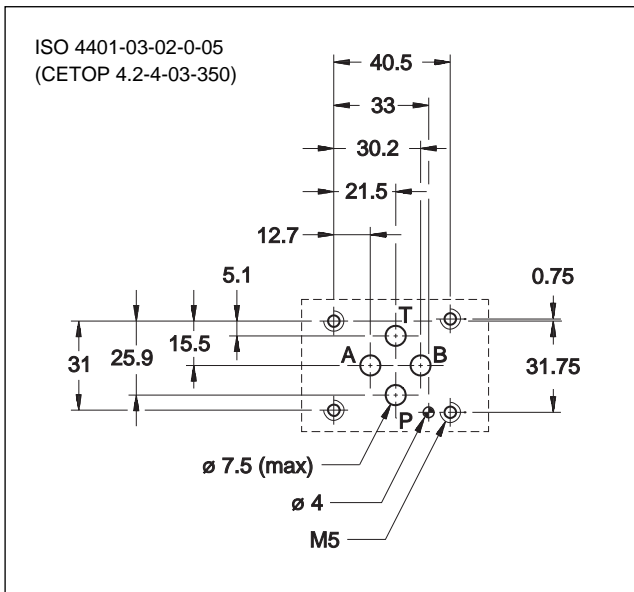
		DSA3	DSA5
Maximum working pressure:			
- P, A, B ports	bar	350	320
- T port without Y external drain		25	25
- T port with Y external drain (available for DSA5 only)		-	320
Piloting pressure:			
- min	bar	4	4,5
- max		12	12
Nominal flow rate	l/min	75	120
Ambient temperature range	°C	-20 / +50	
Fluid temperature range	°C	-20 / +80	
Fluid viscosity range	cSt	10 ÷ 400	
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15		
Recommended viscosity	cSt	25	
Mass:	kg		
single operator valve		1,3	3,2
dual operator valve		1,7	4,0

1 - IDENTIFICATION CODE

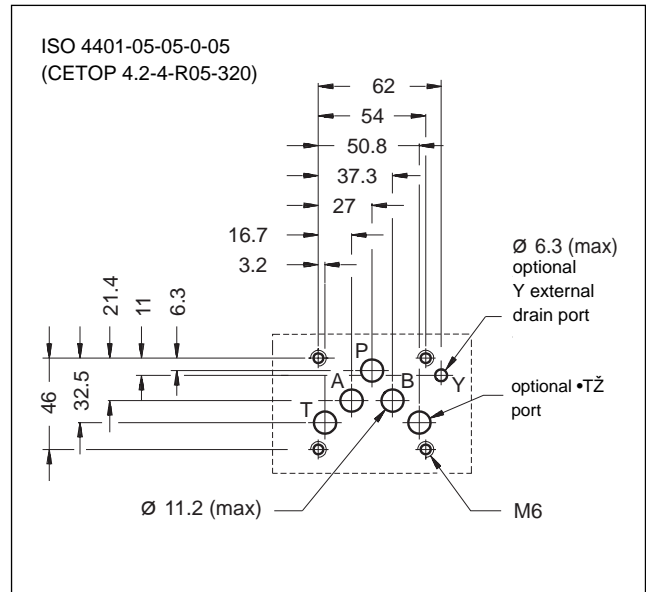


2 - MOUNTING INTERFACE

DSA3



DSA5



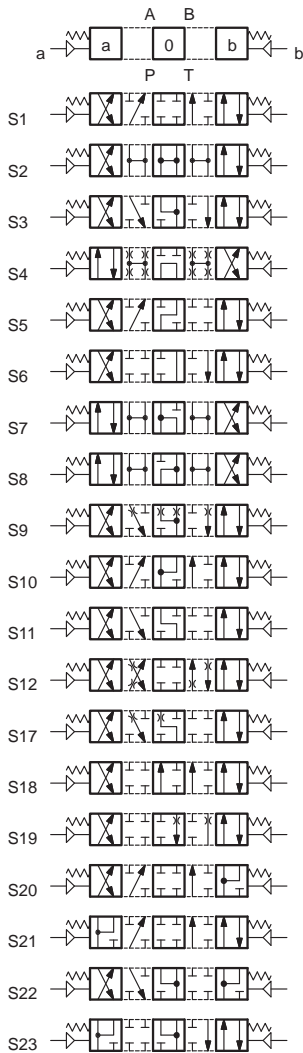
3 - HYDRAULIC FLUIDS

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.

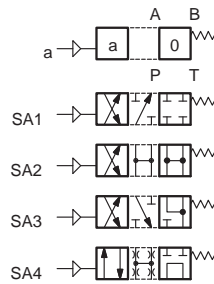
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

4 - SPOOL TYPE

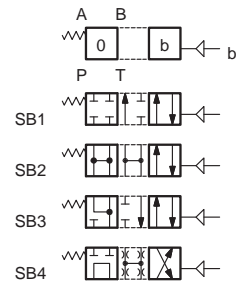
Type S*:
2 operations - 3 positions
with spring centering



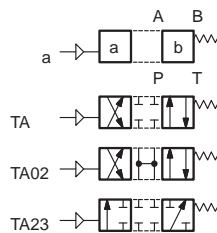
Type SA*:
1 operation side A
2 positions (central + external)
with spring centering



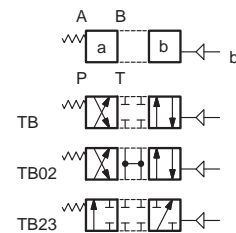
Type SB*:
1 operation side B
2 positions (central + external)
with spring centering



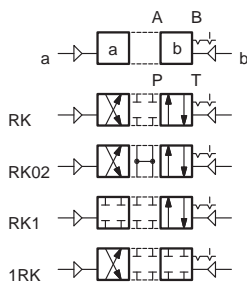
Type TA:
1 operation side A
2 external positions
with return spring



Type TB:
1 operation side B
2 external positions
with return spring



Type RK:
2 operations - 2 positions
with mechanical retention

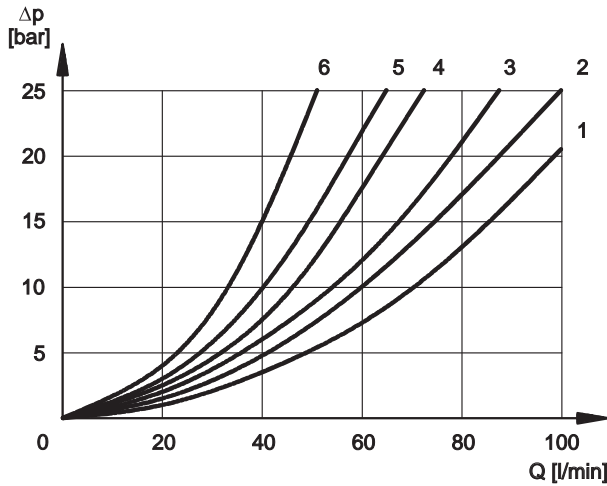


Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification and operating limits.



5 - PRESSURE DROPS p-Q (values obtained with viscosity 36 cSt at 50 °C)

5.1 - DSA3



For pressure drops between A and B lines of spools S10, S20, S21, S22 and S23, which are used in the regenerative diagram, refer to curve 5.

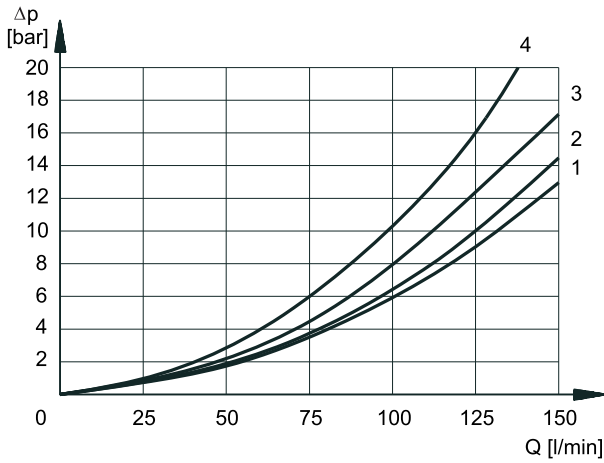
PRESSURE DROPS WITH VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPH			
S1, SA1, SB1	2	2	3	3
S2, SA2, SB2	1	1	3	3
S3, SA3, SB3	3	3	1	1
S4, SA4, SB4	5	5	5	5
S5	2	1	3	3
S6	2	2	3	1
S7, S8	4	5	5	5
S9	2	2	3	3
S10	1	3	1	3
S11	2	2	1	3
S12	2	2	3	3
S17	2	2	3	3
S18	1	2	3	3
S19	2	2	3	3
S20	1	5	2	
S21	5	1		2
S22	1	5	2	
S23	5	1		2
TA, TB	3	3	3	3
TA02, TB02	2	2	2	2
TA23, TB23	3	3		
RK	2	2	2	2
RK02	2	2	2	2
RK1, 1RK	2	2	2	2

PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

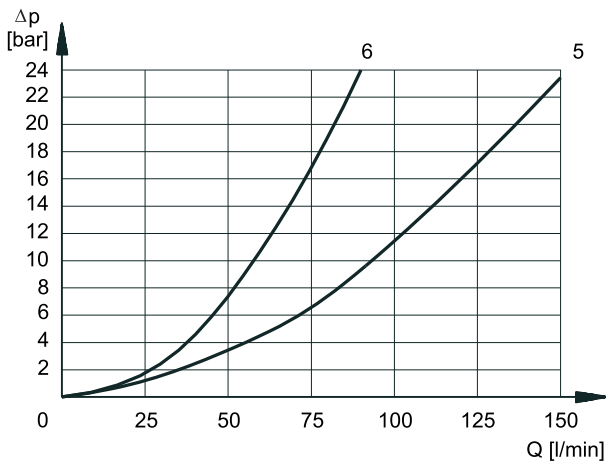
SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S2, SA2, SB2					2
S3, SA3, SB3			3	3	
S4, SA4, SB4					5
S5		4			
S6				3	
S7, S8			6	6	5
S10	3	3			
S11			3		
S18	4				
S22			3	3	
S23			3	3	

5.2 - DSA5



PRESSURE DROPS WITH VALVE IN ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPH			
S1, SA1, SB1	2	2	1	1
S2, SA2, SB2	3	3	1	1
S3, SA3, SB3	3	3	2	2
S4, SA4, SB4	1	1	2	2
S5	2	1	1	1
S6, S11	3	3	2	2
S7, S8	1	1	2	2
S9	3	3	2	2
S10	1	1	1	1
S12	2	2	1	1
S17, S19	2	2	1	1
S18	1	2	1	1
S20, S21				
S22, S23				
TA, TB	3	3	2	2
TA02, TB02	3	3	2	2
TA23, TB23	4	4		
RK	3	3	2	2
RK02	3	3	2	2
RK1, 1RK	3	3	2	2



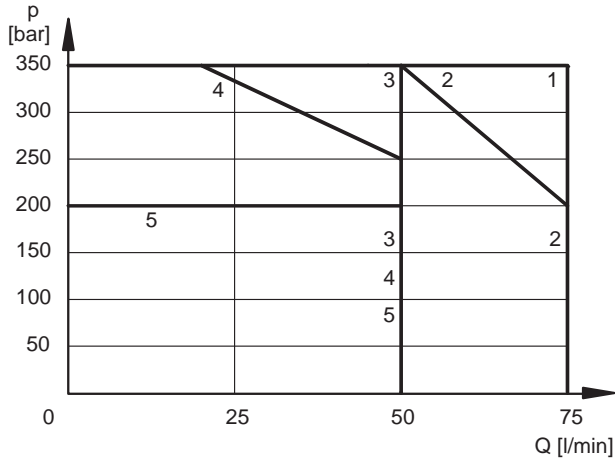
PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S2, SA2, SB2					5
S3, SA3, SB3			6	6	
S4, SA4, SB4					5
S5		3			
S6				6	
S7					5
S10	3	3			
S11			6		
S18	3				
S22					
S23					

6 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm, with mineral oil viscosity 36 cSt at 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

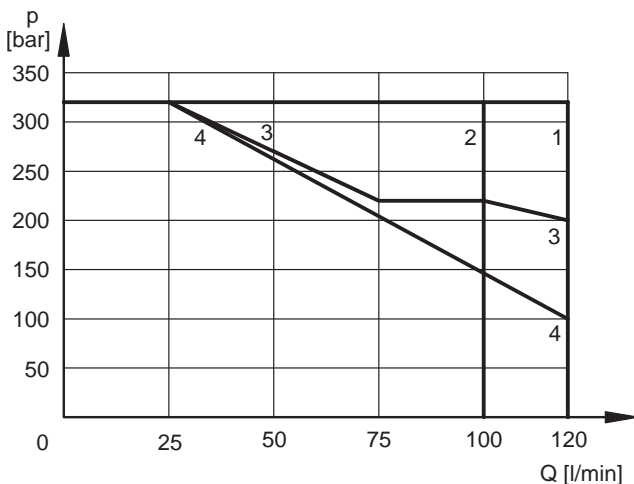
6.1 - DSA3



SPOOL TYPE	CURVE	
	P A	P B
S1,SA1,SB1	1	1
S2, SA2, SB2	1	1
S3, SA3, SB3	2	2
S4, SA4, SB4	3	3
S5	1	1
S6	3	2
S7	3	3
S8	3	3
S9	1	1
S10	1	1
S11	2	3
S12	1	1

SPOOL TYPE	CURVE	
	P A	P B
S17	1	1
S18	1	1
S19	1	1
S20	4	4
S21	4	4
S22	5	4
S23	4	5
TA, TB	1	1
TA02, TB02	1	1
TA23, TB23	1	1
RK	1	1
RK02	1	1
RK1, 1RK	1	1

6.2 - DSA5



SPOOL TYPE	CURVE	
	P A	P B
S1,SA1,SB1	1	1
S2, SA2, SB2	1	1
S3, SA3, SB3	3 *	3 *
S4, SA4, SB4	4	4
S5		
S6		
S7		
S8		
S9		
S10		
S11		
S12		

SPOOL TYPE	CURVE	
	P A	P B
S17		
S18		
S19		
S20		
S21		
S22		
S23		
TA, TB	2 *	2 *
TA02, TB02		
TA23, TB23		
RK		
RK02		
RK1, 1RK		

* **NOTE:** for spools S3 and TA, the curve has been obtained with a min. piloting pressure of 4,5 bar. If the minimum piloting pressure used is 5,5 bar, refer to the curve n° 1 (320 bar - 120 l/min).

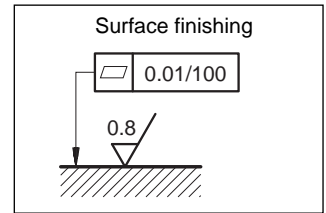
NOTE: The values indicated in the graphs are relevant to the standard valve. The operating limits can be considerably reduced if a 4-way valve is used with port A or B plugged or without flow.

7 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

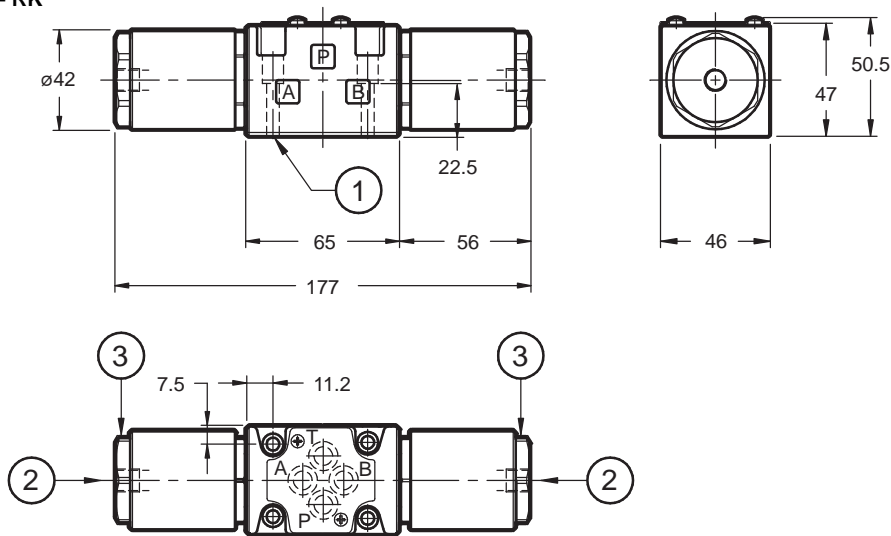
Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.

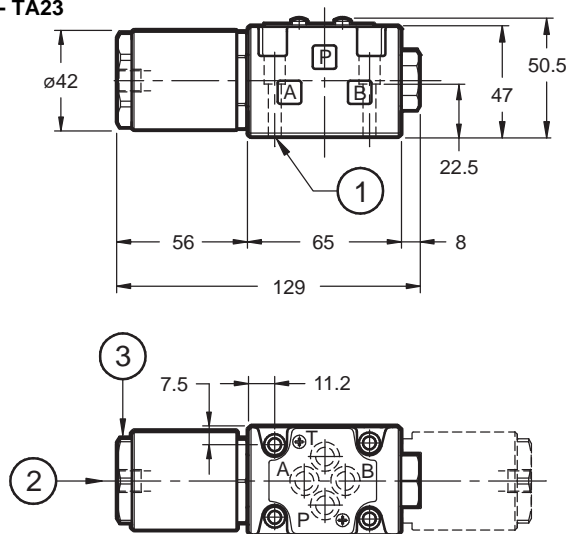


8 - DSA3 OVERALL AND MOUNTING DIMENSIONS

DSA3 - S*
DSA3 - RK



DSA3 - TA
DSA3 - SA*
DSA3 - TA23



dimensions in mm

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	1/4" BSP connection for pneumatic operator
3	Hexagon: spanner 38 Tightening torque 35 ÷ 40 Nm

Valve fastening: N. 4 SHC screws ISO 4762 - M5x30

Tightening torque: 5 Nm (bolts A 8.8)

Threads of mounting holes: M5x10

operation position configuration SB*, TB and TB23

9 - DSA5 OVERALL AND MOUNTING DIMENSIONS

DSA5 - S*
DSA5 - RK

DSA5 - TA
DSA5 - SA*
DSA5 - TA23

dimensions in mm

1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) 90 Shore N. 1 OR type 2037 (9.25x1.78) 90 Shore
2	1/4" BSP connection for pneumatic operator
3	Hexagon: spanner 38 Tightening torque 35 ÷ 40 Nm

Valve fastening:	N. 4 SHC screws ISO 4762 - M6x40
Tightening torque:	8 Nm (bolts A 8.8)
Threads of mounting holes:	M6x10

operation position configuration SB*, TB and TB23

10 - SUBPLATES (see catalogue 51 000)

	DSA3	DSA5
Type with rear ports	PMMD-AI3G	PMD4-AI4G - 3/4" BSP threaded
Type with side ports	PMMD-AL3G	PMD4-AL4G - 1/2" BSP threaded
Threading of ports P, T, A and B	3/8" BSP	



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 Fax +39 0331.895.339
 www.diplomatic.com • e-mail: sales.exp@diplomatic.com





DSC3

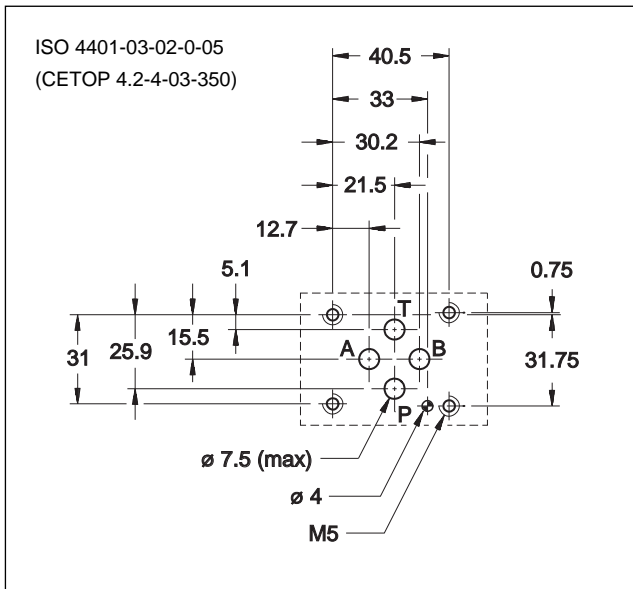
HYDRAULICALLY OPERATED DIRECTIONAL CONTROL VALVE

SERIES 11

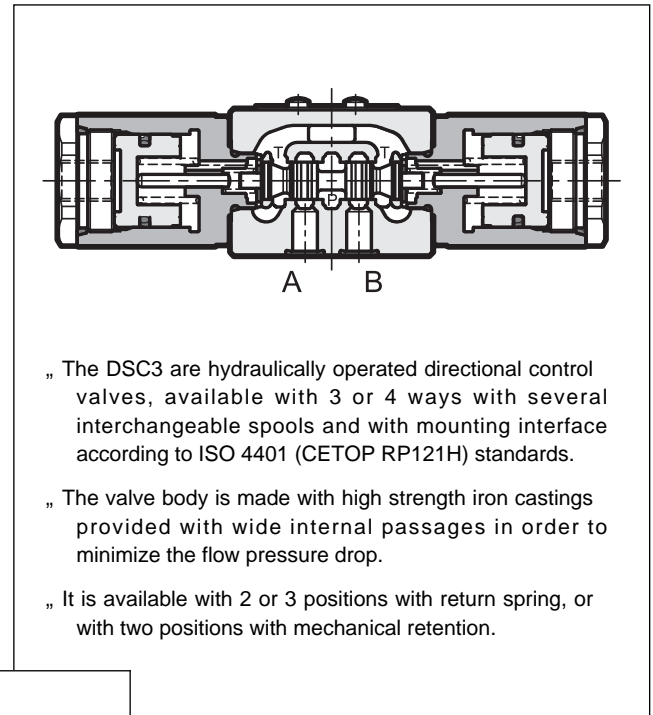
SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max (see performances table)
Q nom (see performances table)

MOUNTING SURFACE



OPERATING PRINCIPLE



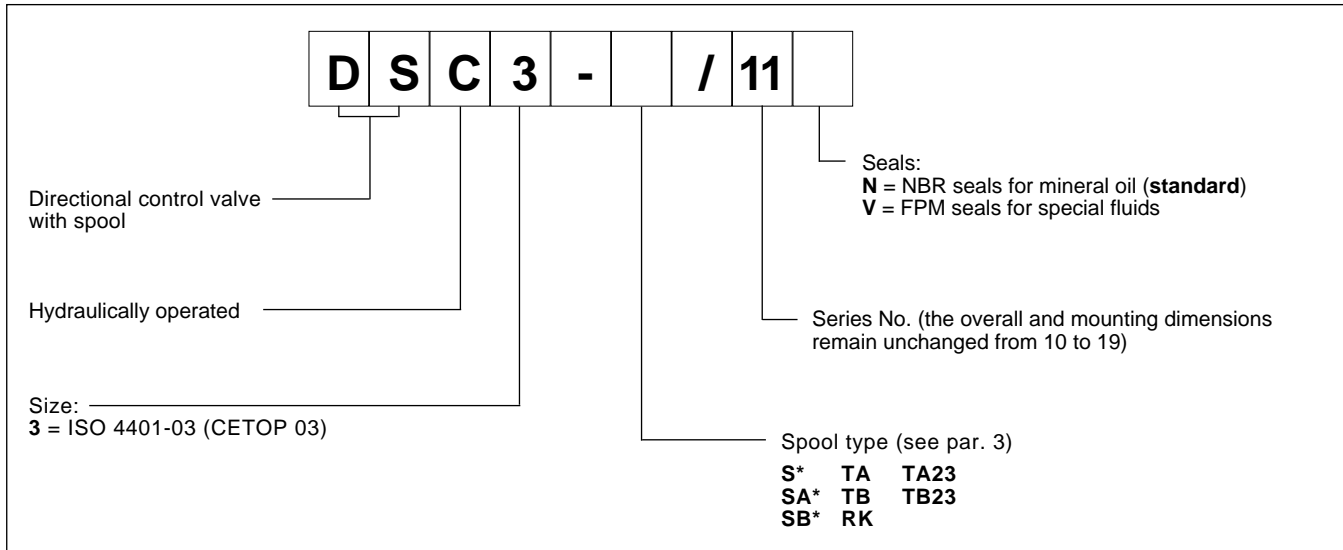
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum working pressure: - P A B ports - T port	bar	350 25
Piloting pressure - min - max	bar	15 (NOTE 1) 210
Nominal flowrate	l/min	75
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 20/18/15	
Recommended viscosity	cSt	25
Mass: single operation valve double operation valve	kg	1,3 1,7

NOTE 1: The piloting pressure must be higher than the counterpressure on T port, of 15 bar at least: to allow the cursor reversal at middle the piloting pressure has to lower quickly at 0 bar.

The piston return spring generates a minimum backpressure of 0.5 bar on the piloting line.

1 - IDENTIFICATION CODE

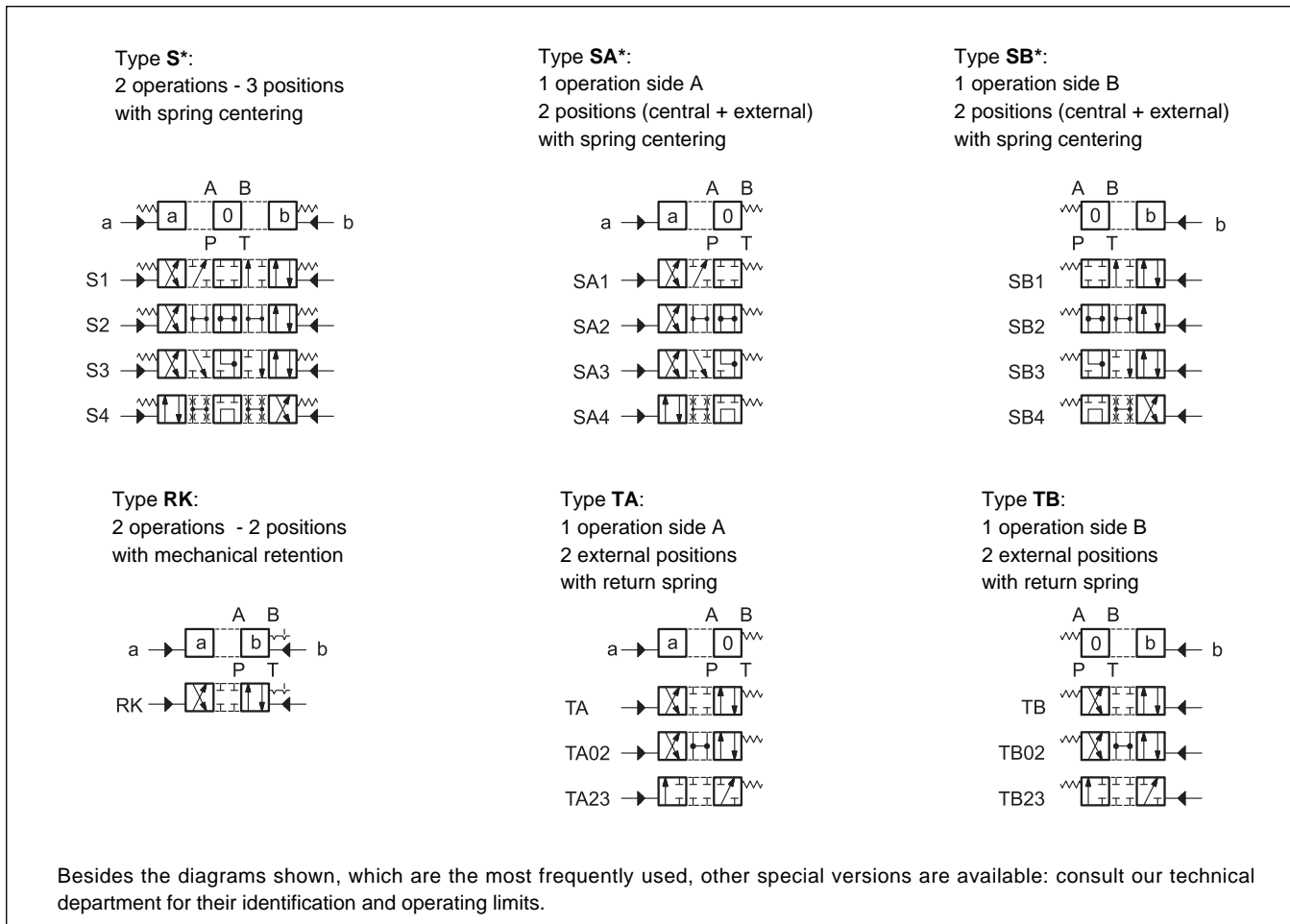


2 - HYDRAULIC FLUIDS

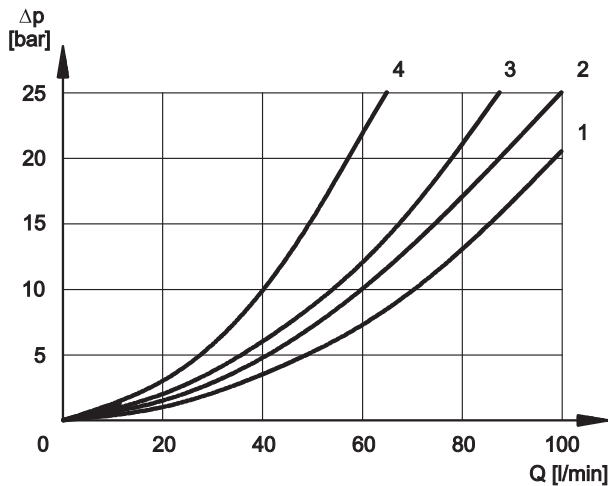
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V).

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.

3 - SPOOL TYPE



4 - PRESSURE DROPS p-Q (values obtained with viscosity 36 cSt at 50 °C)



PRESSURE DROPS WITH VALVE IN ENERGIZED POSITION

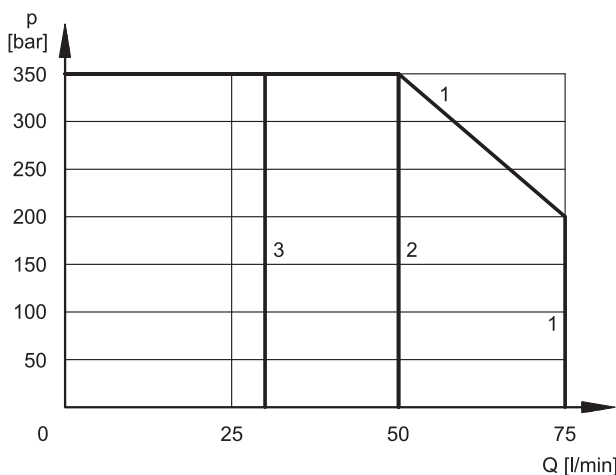
SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPH			
S1, SA1, SB1	2	2	3	3
S2, SA2, SB2	1	1	3	3
S3, SA3, SB3	3	3	1	1
S4, SA4, SB4	4	4	4	4
TA, TB	3	3	3	3
TA02, TB02	2	2	2	2
TA23, TB23	3	3		
RK	2	2	2	2

PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPH				
S2, SA2, SB2					2
S3, SA3, SB3			3	3	
S4, SA4, SB4					3

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve. The operating limits can be considerably reduced if a 4-way valve is used as 3-way valve with port A or B plugged or without flow. The values have been obtained according to ISO 6403 norm, with mineral oil viscosity 36 cSt at 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



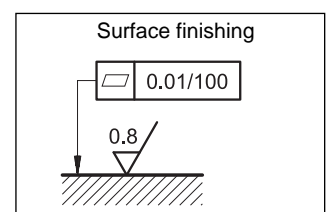
SPOOL TYPE	CURVE	
	P A	P B
S1, SA1, SB1	1	1
S2, SA2, SB2	2	2
S3, SA3, SB3	1	1
S4, SA4, SB4	2	2

SPOOL TYPE	CURVE	
	P A	P B
TA, TB	1	1
TA02, TB02	2	2
TA23, TB23	1	1
RK	3	3

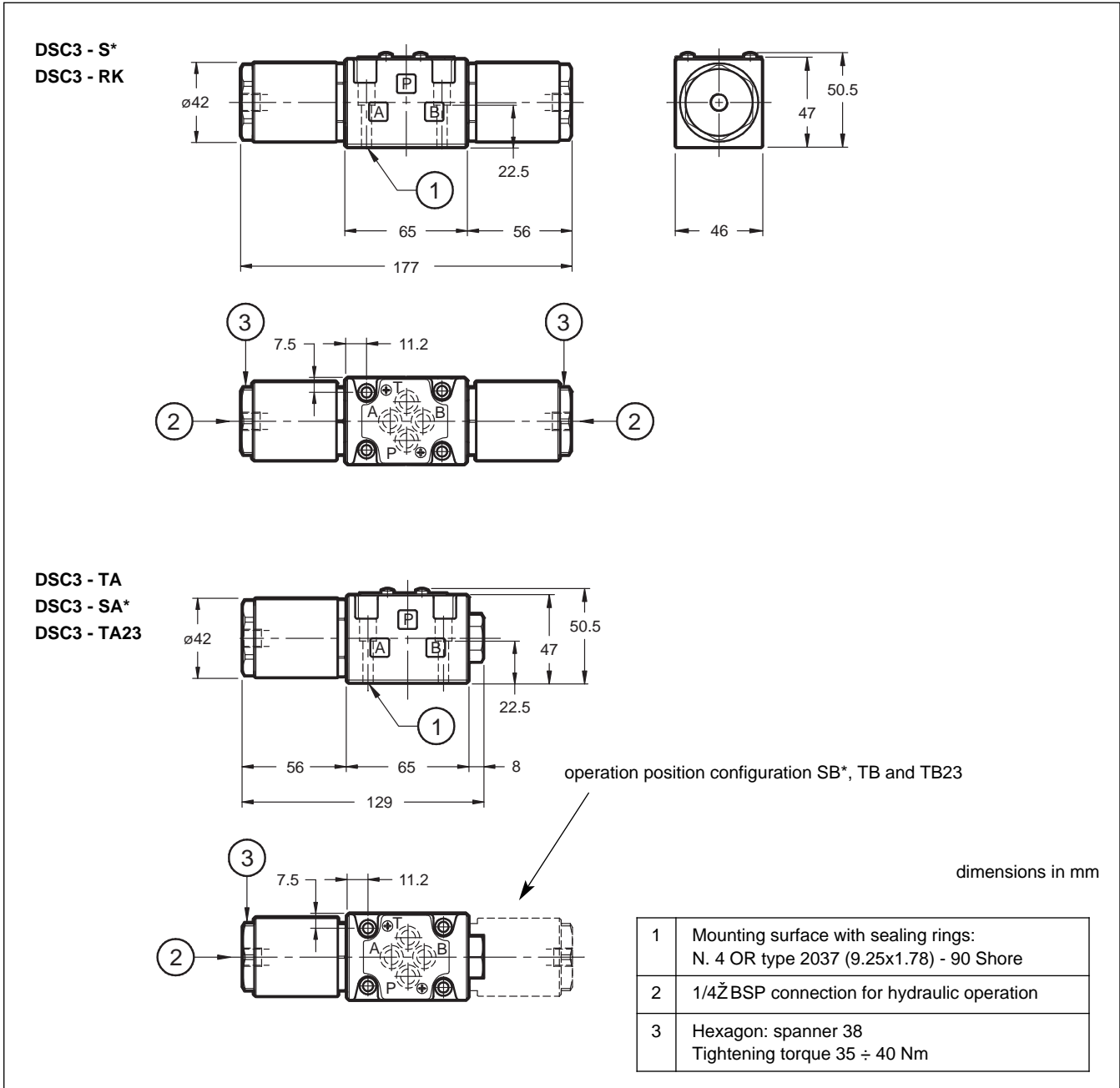
NOTE: The values indicated in the graphs are relevant to the standard valve. The operating limits can be considerably reduced if a 4-way valve is used with port A or B plugged or without flow.

6 - INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal. Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.



7 - OVERALL AND MOUNTING DIMENSIONS



8 - VALVE FASTENING BOLTS

N. 4 fastening bolts SHC ISO 4762 M5x30
Tightening torque 5 Nm (bolts A 8.8)

9 - SUBPLATES (see cat. 51 000)

PMMD-AI3G Type with rear ports

PMMD-AL3G Type with side ports

Threading of ports P, T, A, B: 3/8" BSP



DSB*

SELF-REVERSING VALVE

SERIES 10

MOUNTING SURFACES

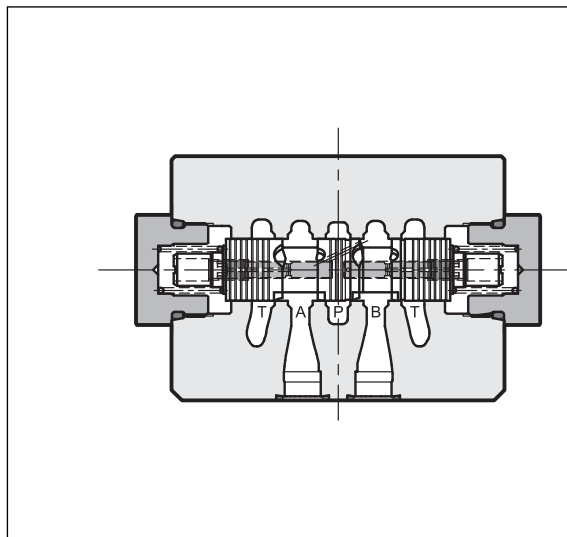
DSB3 ISO 4401-03 (CETOP 03)

DSB5 ISO 4401-05 (CETOP 05)

p max (see performances table)

Q nom (see performances table)

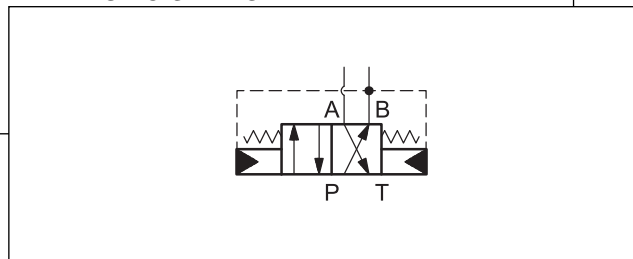
OPERATING PRINCIPLE



„ The DSB* are directional control valves with self-reversing spool and mounting interface according to ISO 4401-03 and 4401-05 (CETOP RP121H) standards.

„ The valves realize the reciprocation of the "ow direction when the "owrate stops in A or B line (f.e., when a cylinder reaches the end stroke). The reversing process is independent of the line pressure.

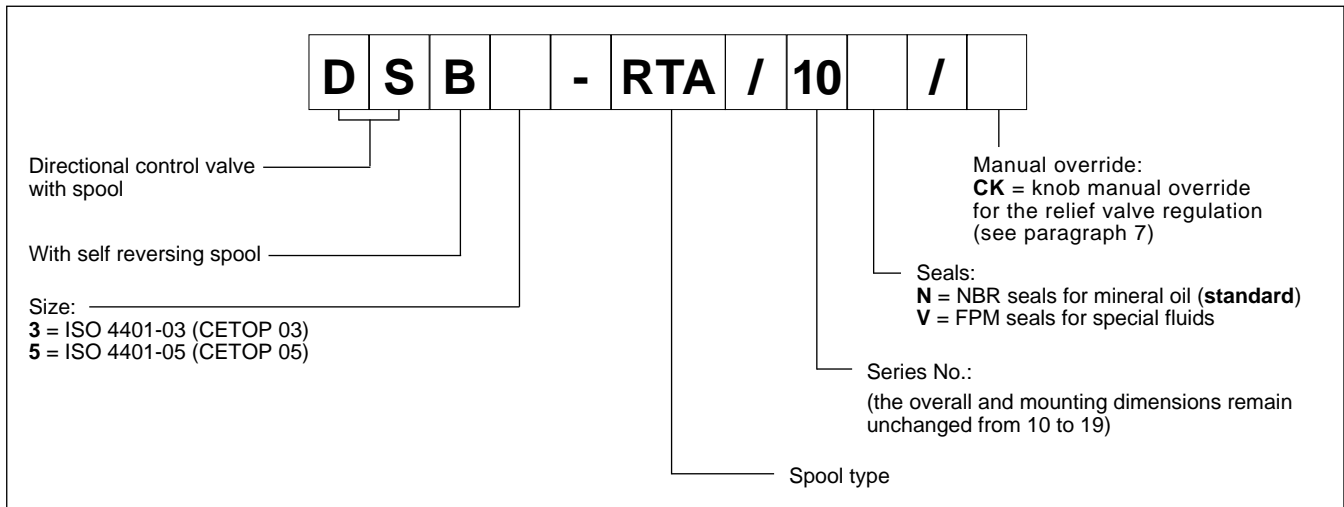
HYDRAULIC SYMBOL



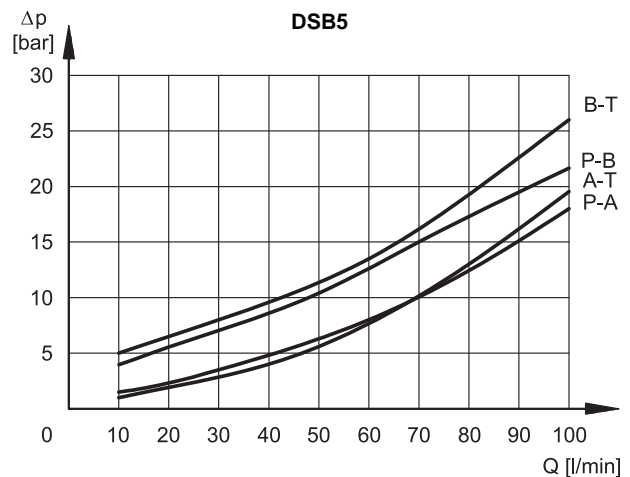
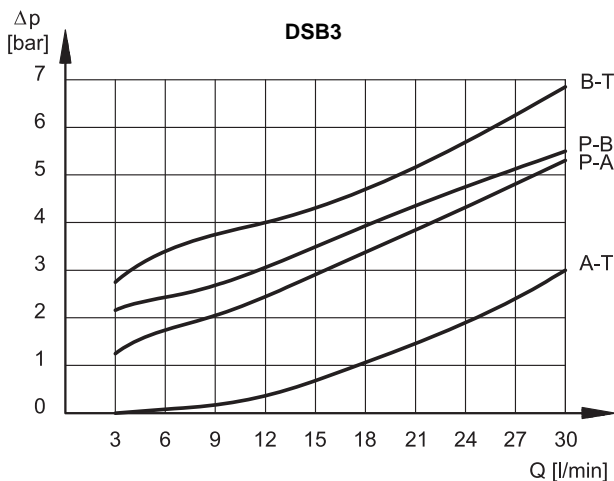
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

		DSB3	DSB5
Maximum operating pressure on port P	bar	350	320
Minimum allowed pressure	bar	50	60
Maximum flow rate	l/min	30	100
Minimum allowed flow rate	l/min	3	10
Ambient temperature range	°C	-20 / +50	
Fluid temperature range	°C	-20 / +80	
Fluid viscosity range	cSt	10 ÷ 400	
Recommended viscosity	cSt	25	
Fluid contamination degree		according to ISO 4406:1999 class 20/18/15	
Mass	kg	0,9	2,8

1 - IDENTIFICATION CODE



2 - PRESSURE DROPS p-Q (values obtained with viscosity 36 cSt at 50 °C)



3 - HYDRAULIC FLUIDS

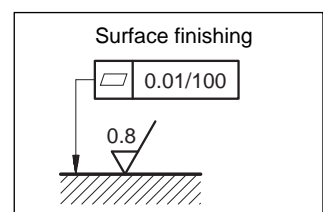
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

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.

4 - INSTALLATION

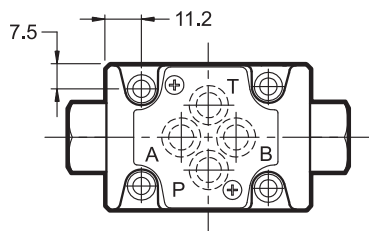
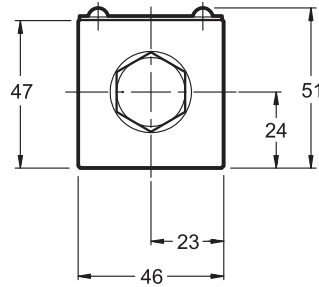
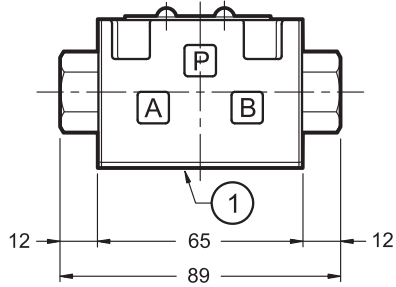
The valves can be mounted in any position. Valve fixing is by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing.

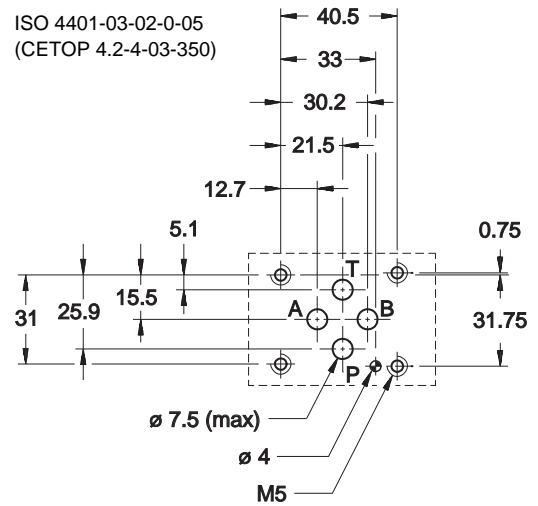
If the minimum values of planarity and/or smoothness are not met, fluid leakage between valve and mounting surface can easily occur.



5 - OVERALL AND MOUNTING DIMENSIONS DSB3

dimensions in mm


MOUNTING SURFACE

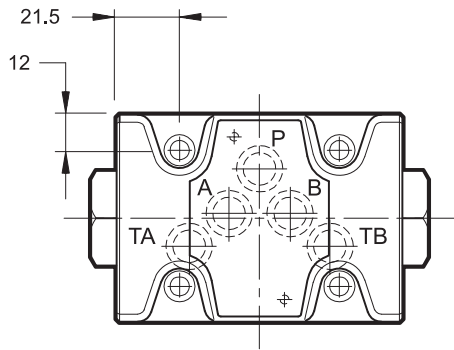
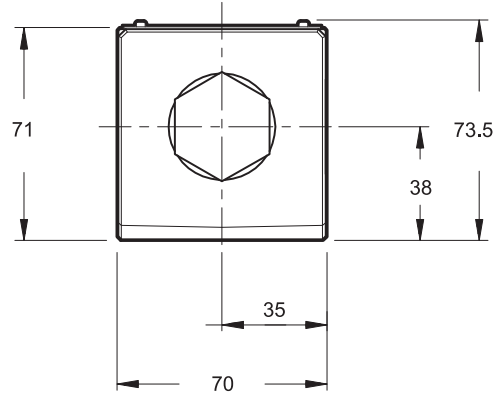
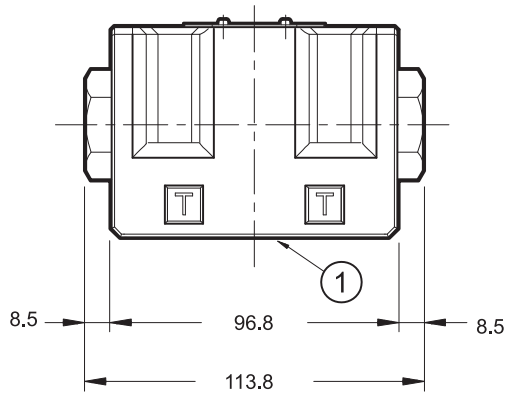
 ISO 4401-03-02-0-05
 (CETOP 4.2-4-03-350)


1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 shore
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Valve fastening:	N. 4 bolts SHC M5x30 - ISO 4762
Tightening torque:	5 Nm (bolts A 8.8)

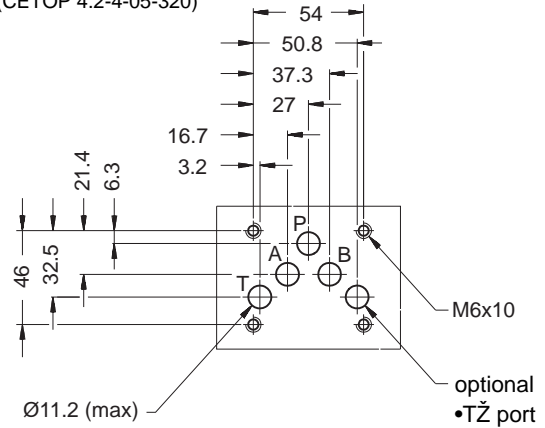
6 - OVERALL AND MOUNTING DIMENSIONS DSB5

dimensions in mm



MOUNTING SURFACE

ISO 4401-05-04-0-05
(CETOP 4.2-4-05-320)

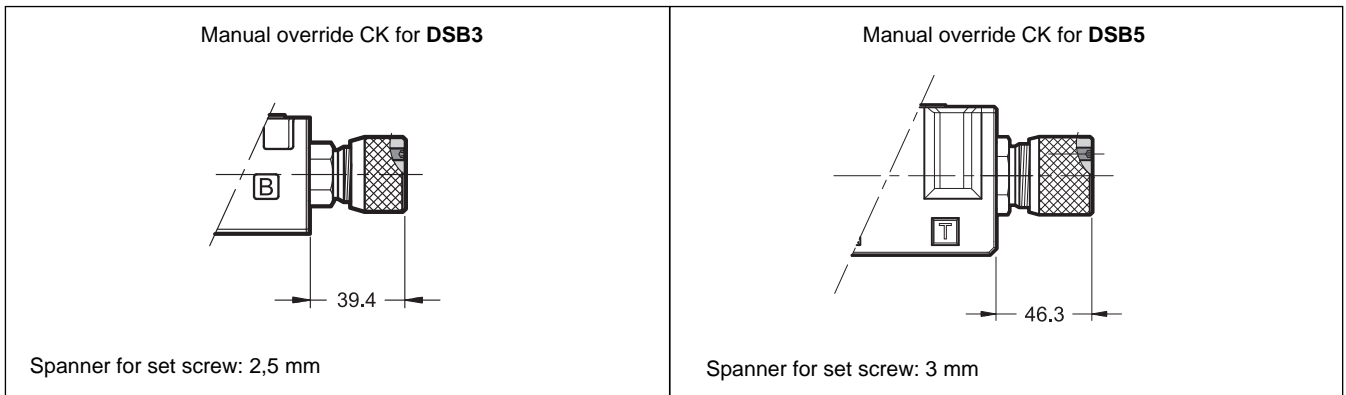


1	Mounting surface with sealing rings: N. 5 OR type 2050 (12.42x1.78) 90 shore
---	--

Valve fastening:	N. 4 bolts SHC M6x40 - ISO 4762
Tightening torque:	8 Nm (bolts A 8.8)

7 - KNOB MANUAL OVERRIDE

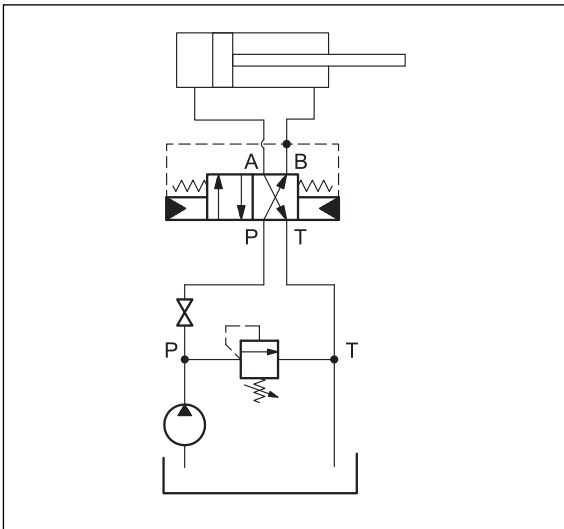
The knob manual override **CK** allows to set the pressure of the relief valve without using shut-off valves.



8 - APPLICATION EXAMPLES

We suggest to use the circuits shown, connecting the A port with the rear chamber of the cylinder. In this way, with the start of the pump, the valve places itself, so as to retract the rod. To work properly the valve needs an area ratio of the cylinder chambers included between 1:1,25 and 1:2.

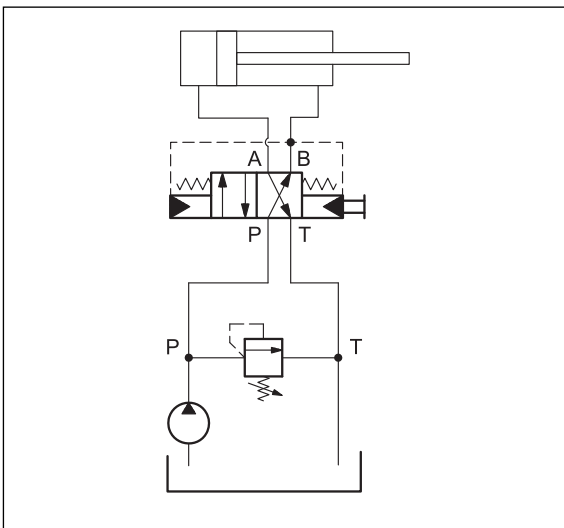
8.1 - Standard valve



To set the system relief valve correctly, the self-reversing function must be inactive.

To do so, close the shut-off valve, start the pump, set the pressure relief valve and stop the pump. Then, open the shut-off valve and restart the pump.

8.2 - Valve with knob manual override



To set the system relief valve correctly, the self-reversing function must be inactive.

To do so, completely unscrew the set screw then tighten the knob until it is at mechanical stop. The spool is now clamped in position P B and A T. Start the pump, set the pressure of the relief valve and then stop the pump. Re-establish the working conditions of the valve, unscrewing almost completely the knob and screwing the set screw, until its point is aligned with the edge of the knob.

The valve is in normal working conditions when the knob is tightened and the point of the set screw is aligned with the edge of the knob.



Do not use the manual override when the valve is on, if it is necessary stop the pump.



8 - SUBPLATES (see catalogue 51 000)

	DSB3	DSB5
Type with rear ports	PMMD-AI3G	PMD4-AI4G - 3/4" BSP threaded
Type with side ports	PMMD-AL3G	PMD4-AL4G - 1/2" BSP threaded
Threading of ports P, T, A, B	3/8" BSP	-



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DT03

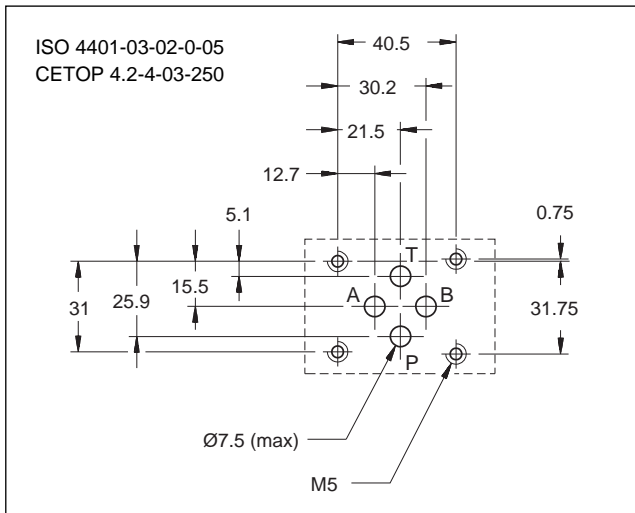
POPPET TYPE SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

SERIES 10

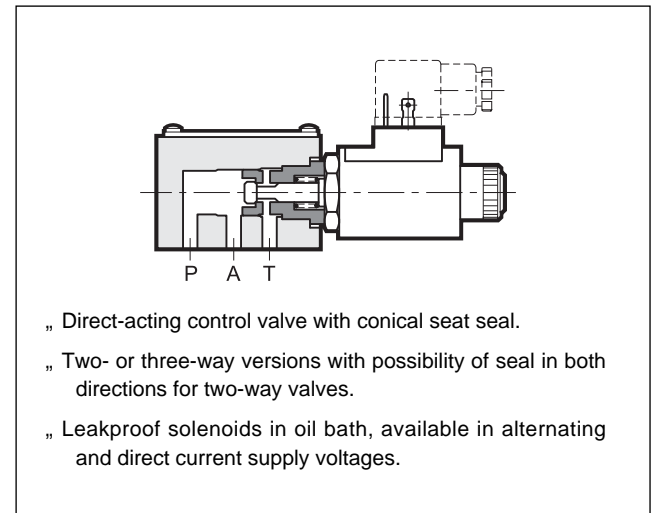
SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max **250** bar
Q max **25** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



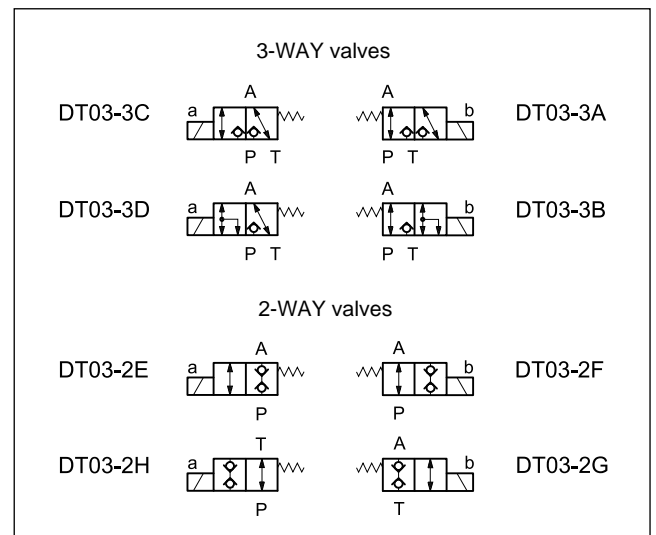
CONFIGURATIONS (see Hydraulic symbols table below)

- ... Configurations •AŽ, •BŽ, •CŽ, •DŽ: 3-way, 2-position solenoid valves.
- ... Configurations •EŽ, •FŽ, •GŽ, •HŽ: 2-way, 2-position solenoid valves.

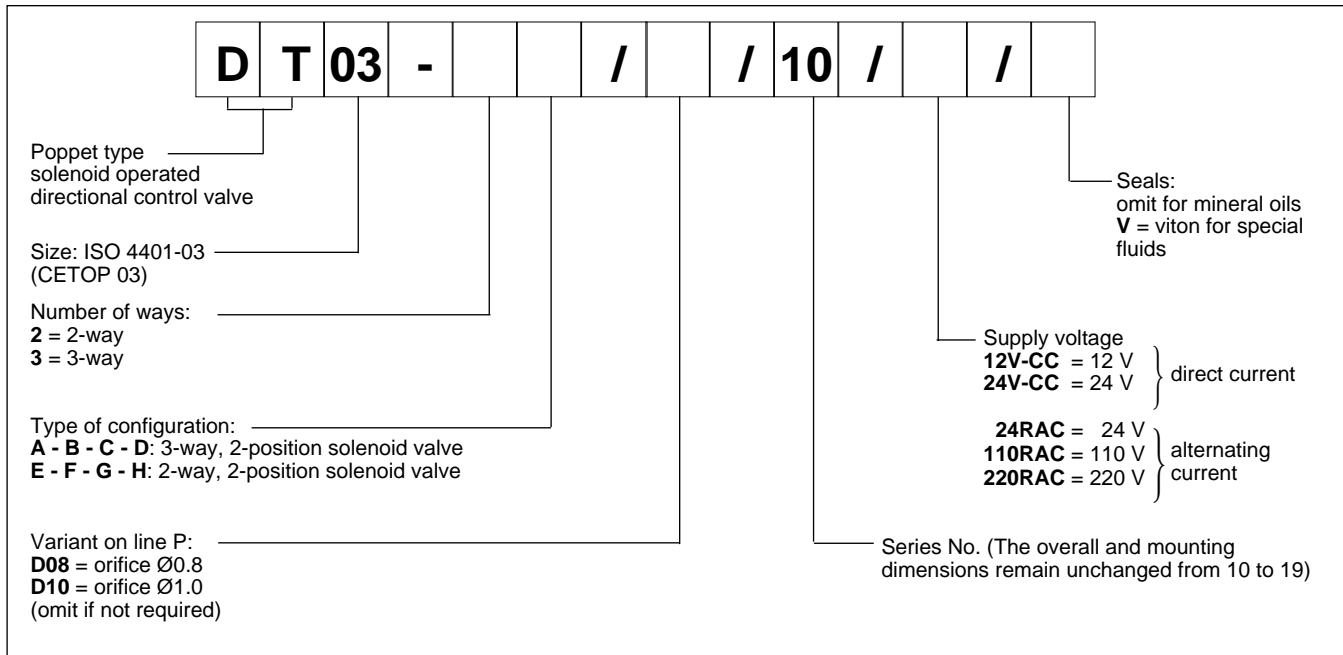
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	250
Maximum flow rate	l/min	25
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	1,3

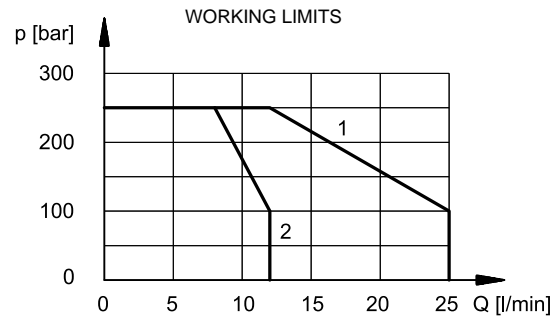
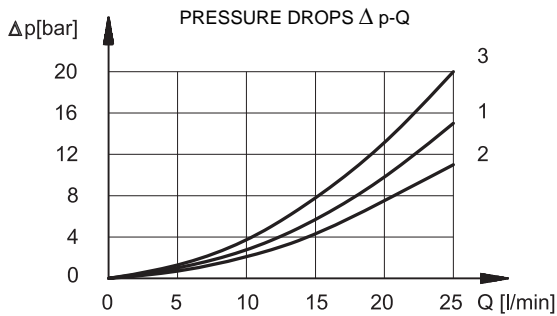
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



valve code	Curve on graph	
	De-energized solenoid	Energized solenoid
DT03-3A	1	3
DT03-3B	2	3
DT03-3C	1	3
DT03-3D	2	3
DT03-2E	-	3
DT03-2F	1	-
DT03-2G	-	3
DT03-2H	1	-

Valve	Curve on graph
DT03-3A	2
DT03-3B	1
DT03-3C	1
DT03-3D	1
DT03-2E	1
DT03-2F	2
DT03-2G	1
DT03-2H	1

3 - 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.

4 - ELECTRICAL FEATURES

4.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded onto the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded nut, and can be turned 360° on its axis, compatible with space available. The interchangeability of coils of different voltages is allowed within the same type of supply current: alternating or direct (DC / RAC).

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation	IP 65 (NOTE 2) class H class F

4.2 Current and power consumption

The table shows the consumption values for the different coil type.

It is necessary to always use •DŽ type connectors (with rectifier incorporated) and RAC coils for alternating current supply.

Rectified current supply takes place by using a bridge rectifier bridge, externally or fitted within the •DŽ type connectors, between the alternating current source (24V or 110V, /50 or /60 Hz) and the coil.

Coil	Voltage [V]	Resistance at 20°C [Ω]	Current consumption [A]	Power consumption [W]	Coil code
12V-CC	12	5,6	2,14	25,7	1902050
24V-CC	24	21,8	1,10	26,4	1902051
24RAC	24	17	1,23	26	1902052
110RAC	110	420	0,23	22	1902053
220RAC	220	1750	0,11	22	1902054

4.3 Switching times

The values indicated refer to a flow rate of Q = 10 l/min, p = 210 bar working with mineral oil at a temperature of 50°C, a viscosity of 36 cSt and supply voltage equal to 90% of the nominal voltage.

TIMES (±10%)	ENERGIZING	DE-ENERGIZING
	30 ms	50 ms

4.4 Electric connectors

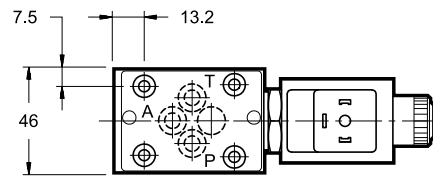
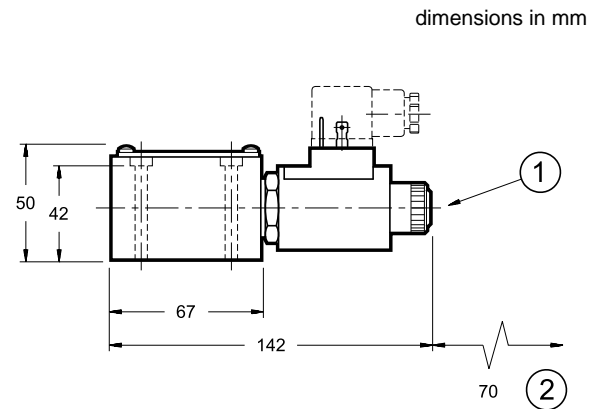
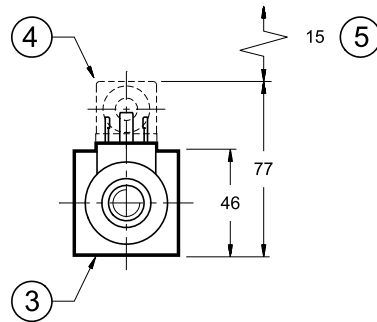
The solenoid valves are never supplied with connector.

Connectors must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

5 - OVERALL AND MOUNTING DIMENSIONS

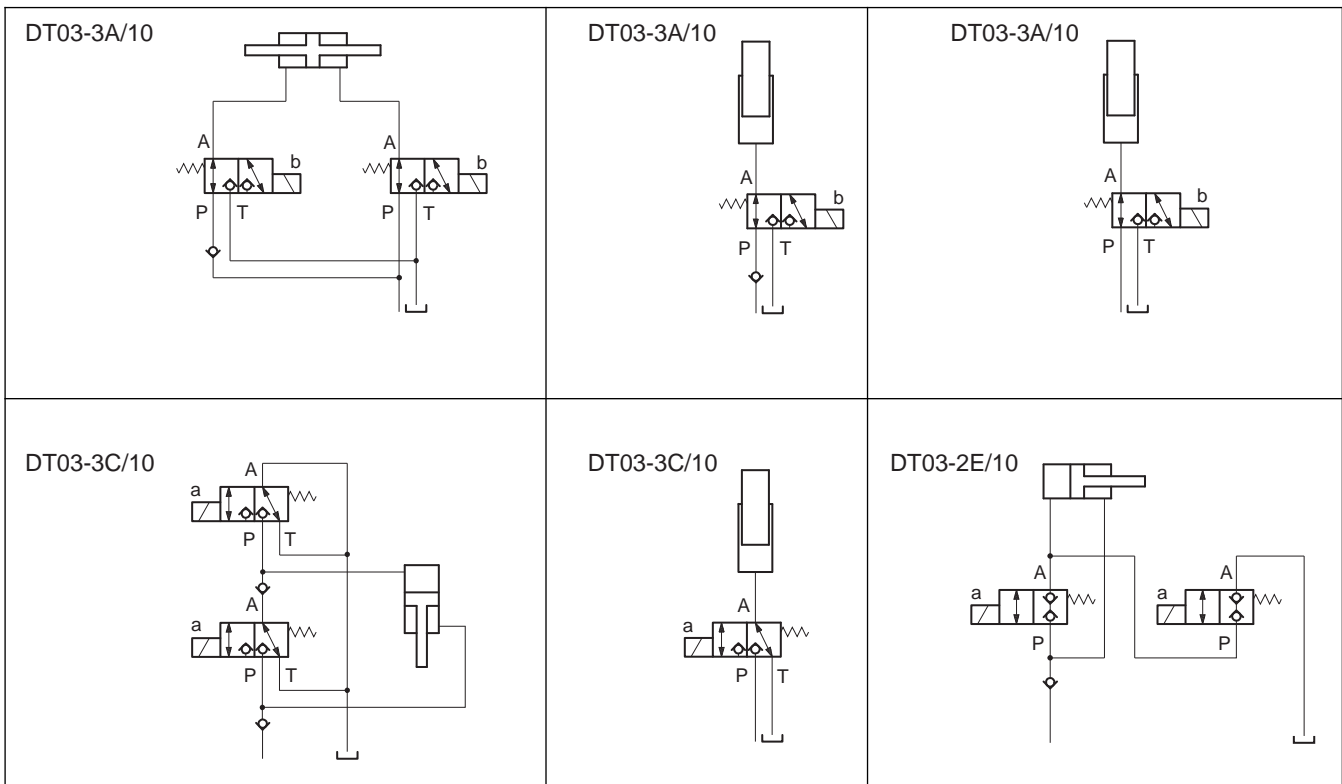
NOTE: The solenoid position here shown is for A-B-F-G versions. For the other versions the solenoid is on the opposite side.

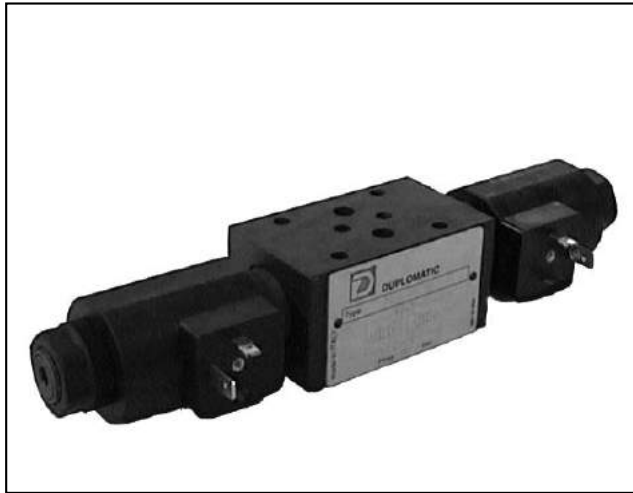


Fastening bolts:
4 bolts M5 x 50
Torque: 5 Nm

1	Manual override
2	Coil removal space
3	Mounting surface with sealing rings: 4 OR type 2037 (9.25X1.78) - 90 Shore
4	Electric connector to be ordered separately (see cat. 49 000)
5	Connector removal space

6 - APPLICATION EXAMPLES





MDT

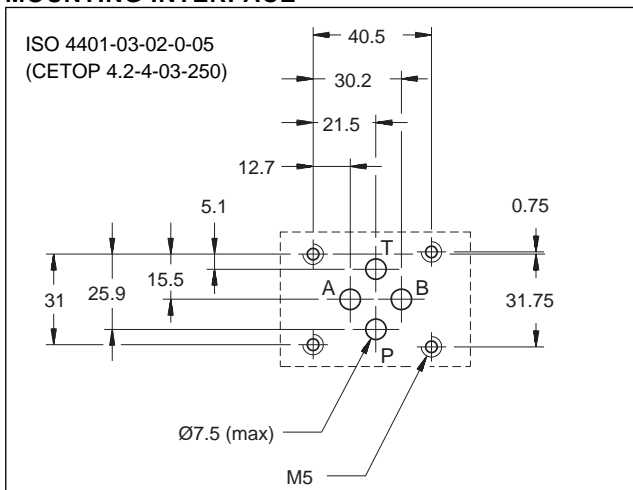
POPPET TYPE SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

SERIES 10

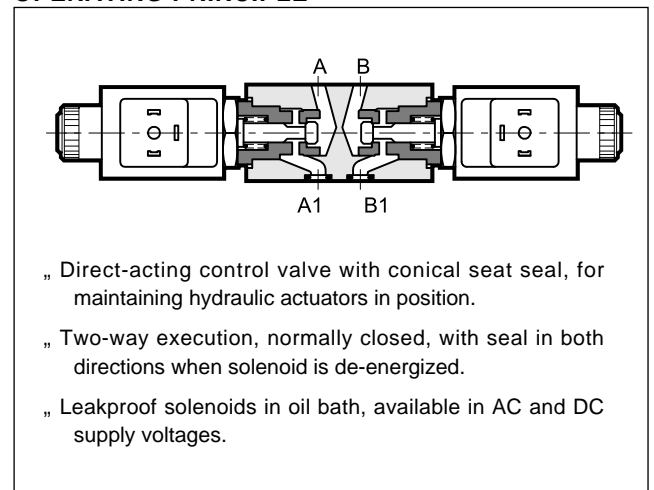
MODULAR VERSION
ISO 4401-03 (CETOP 03)

p max **250** bar
Q max **25** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



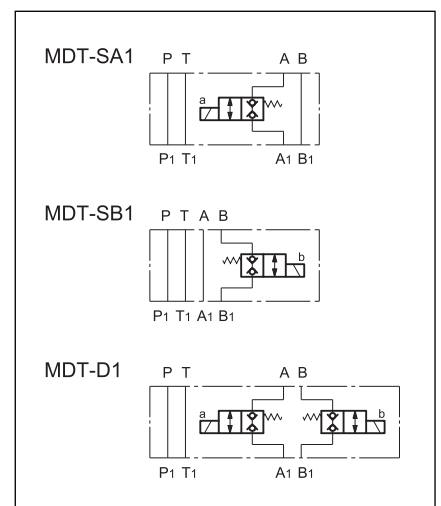
VALVE CONFIGURATIONS (see Hydraulic symbols table)

Configuration •SAŽ: utilized when line A flow is to be controlled.
Configuration •SBŽ: utilized when line B flow is to be controlled.
Configuration •DŽ: utilized when flows of lines A and B are to be controlled

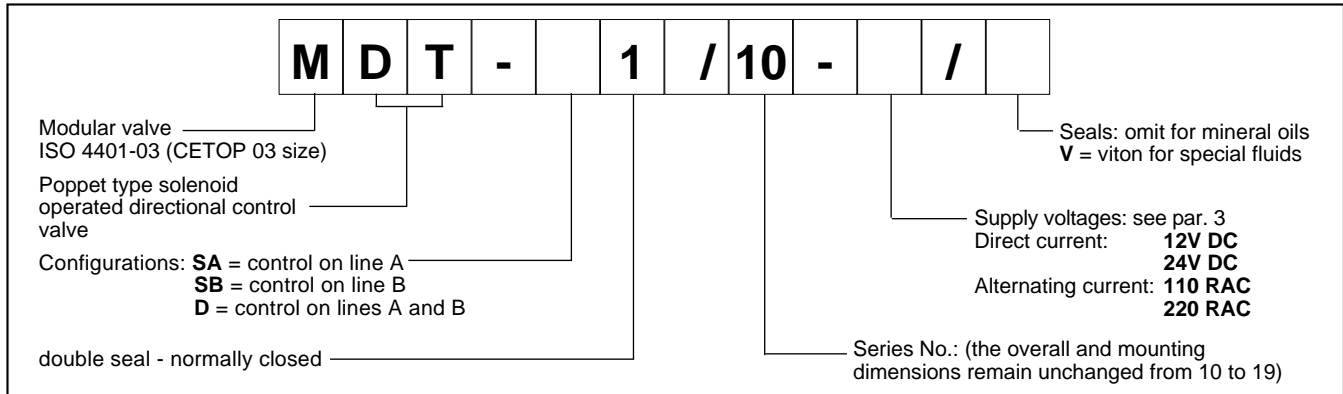
PERFORMANCE RATINGS (working with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	250
Maximum flow rate in controlled lines	l/min	25
Maximum flow rate in free lines		65
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	
MDT-D		1,7
MDT-SA/SB		1,2

HYDRAULIC SYMBOLS

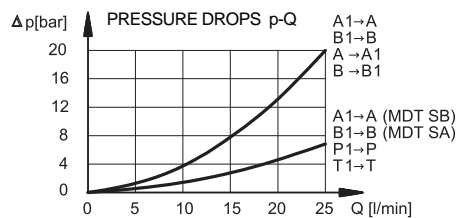
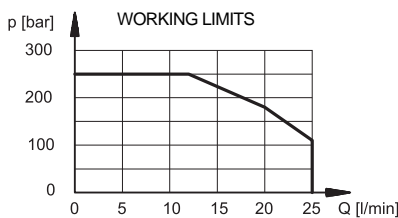


1 - IDENTIFICATION CODE



NOTE: The solenoid valves are never supplied with connector. Connectors must be ordered separately. To identify the connector type to be ordered, please see catalogue 49 000.

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



3 - SUPPLY VOLTAGES

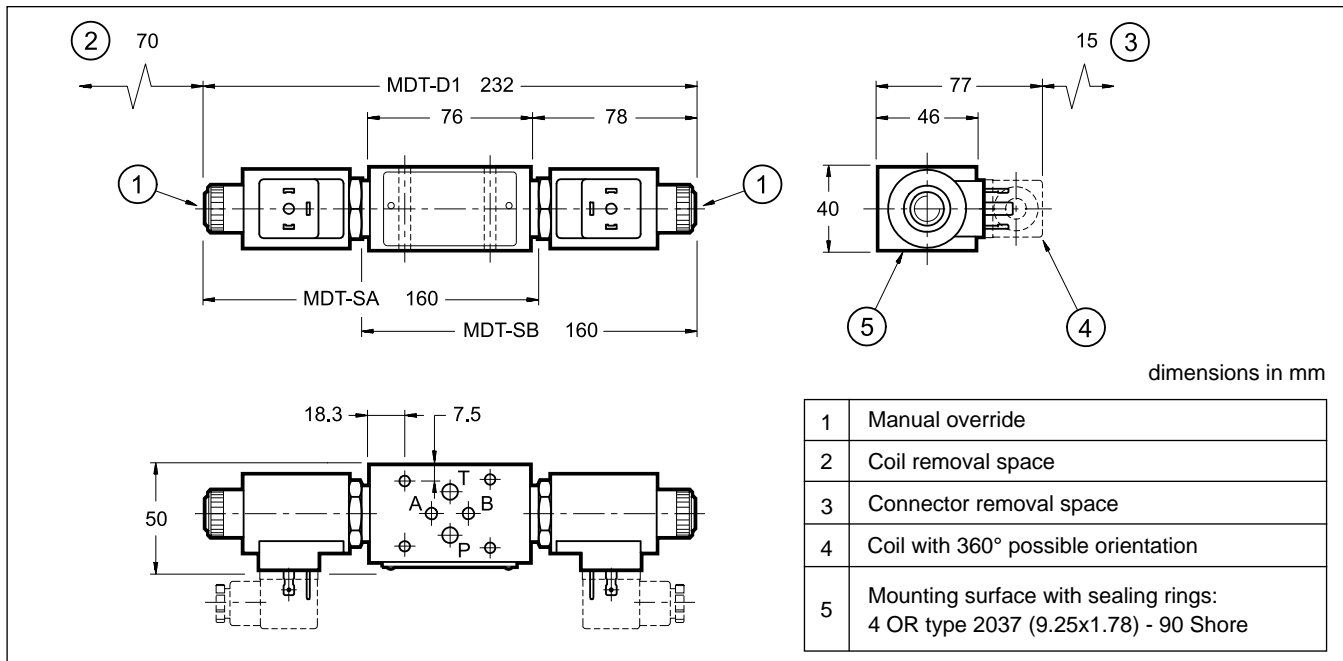
A connector with bridge rectifier and RAC coils are always used for alternating current supply.

Times ±10%	
Energizing	30 ms
De-energizing	50 ms

4 - 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.

5 - OVERALL AND MOUNTING DIMENSIONS



KT08

CARTRIDGE SOLENOID VALVE SERIES 10



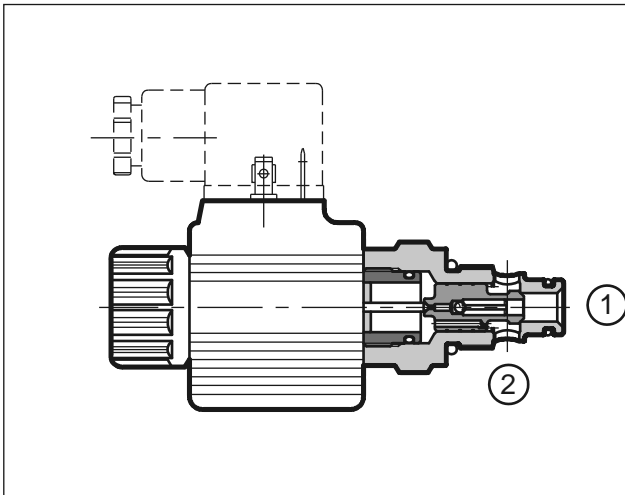
CARTRIDGE TYPE

seat 3/4-16 UNF-2B ISO 725

p max **350** bar

Q nom **50** l/min

OPERATING PRINCIPLE



„ The KT08 is a 2-ways solenoid valve, poppet type, cartridge execution, available in normally closed version (NC) and normally open version (NO) with nominal flow rate of 50 l/min.

„ It ensures a low internal leakage, which decreases while the pressure increases.

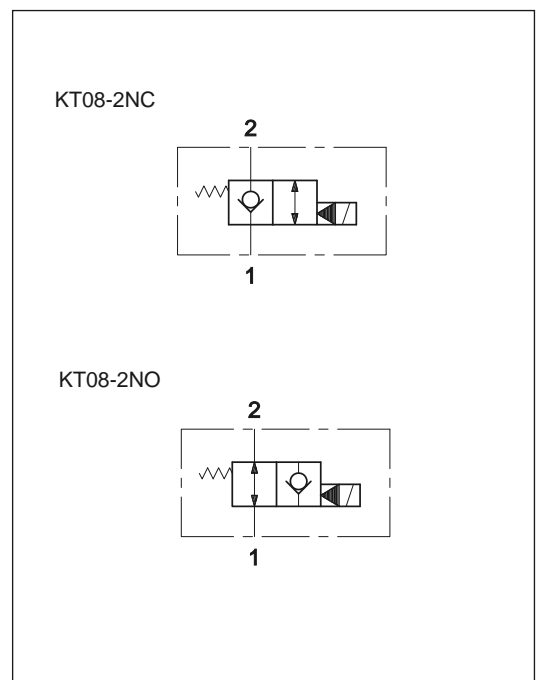
„ The valve can be ordered with direct current or rectified current solenoids and with five different types of electrical connections, in order to cover many installation requirements (see paragraph 8).

„ For every version, the emergency manual override is an available option (see paragraph 7).

PERFORMANCES (working with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure	bar	350
Nominal flow rate	l/min	50
Pressure drops p - Q	see paragraph 3	
Electrical characteristics	see paragraph 5	
Electrical connections	see paragraph 8	
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,32
Surface treatment with white colour zinc	Fe / Zn 8c 1B UNI ISO 2081/4520	

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

	K	T	08	-		/	10	-			/	
--	----------	----------	-----------	----------	--	----------	-----------	----------	--	--	----------	--

Cartridge solenoid valve

Valve type
T = poppet type

Nominal dimension
08 = mounting interface 3/4-16 UNF-2B ISO 725

Spool types:
2NC = 2-way normally closed
2NO = 2-way normally open

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

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

See **NOTE 2**

Coil electrical connection (see paragraph 8)
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL

Coil type:
D12 = 12 V } direct current
D24 = 24 V } (**standard**)
R110 = 110 V } rectified current
R230 = 230 V }
D00 = valve without coil (see **NOTE 1**)

NOTE 1: The coil locking ring and the relevant seals are included in the supply.
NOTE 2: The manual override **CM** is available as an option (see paragraph 7).

1.1 - Coil identification code

	C	14	L3	-		/	10
--	----------	-----------	-----------	----------	--	----------	-----------

Power supply

D12 = 12 V } direct current
D24 = 24 V } (**standard**)
R110 = 110 V } rectified current
R230 = 230 V }

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection (see paragraph 8)
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL

2 - HYDRAULIC FLUIDS

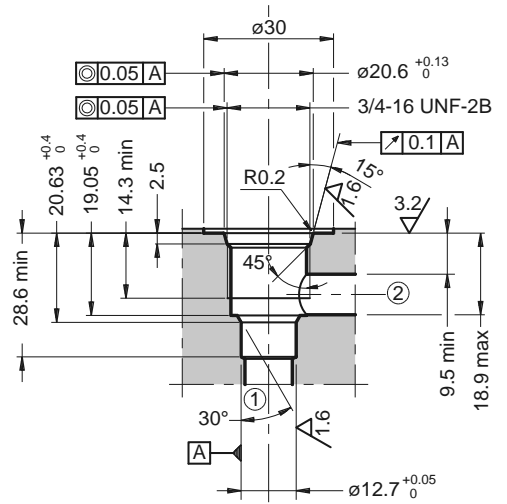
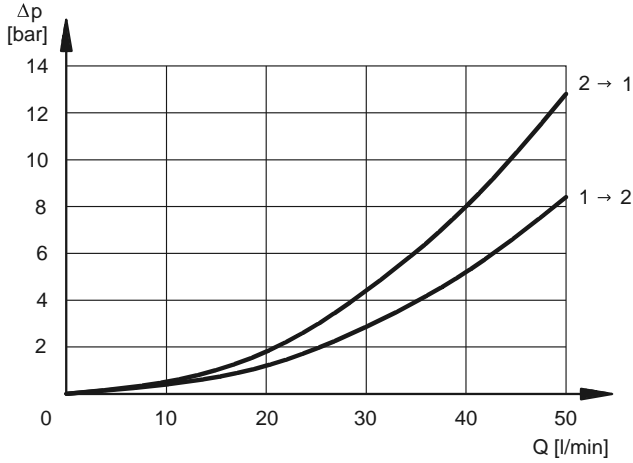
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

3 - PRESSURE DROPS Δp -Q (obtained with viscosity of 36 cSt at 50 °C)

The values in graphs refer to both NC and NO valves and they differ for the mounting interface used.

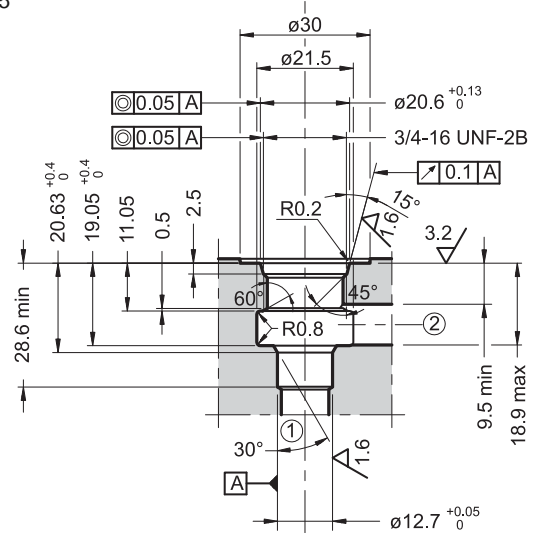
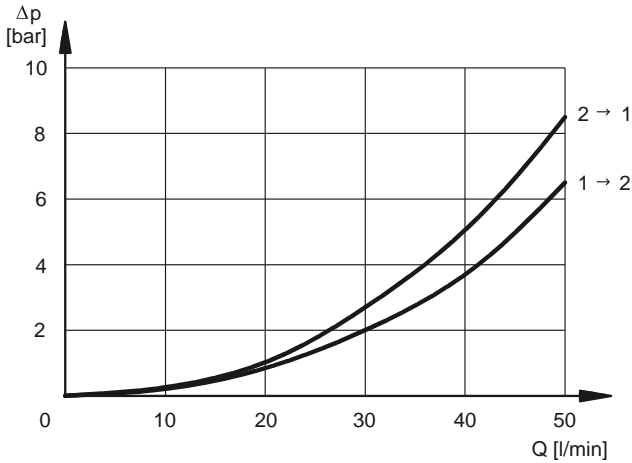
standard mounting interface dimensions
3/4-16 UNF-2B ISO 725

dimensions in mm



oversize mounting interface dimensions
3/4-16 UNF-2B ISO 725

dimensions in mm



4 - SWITCHING TIMES

The values indicated refer to a valve tested with Q=25 l/min, p=350 bar, working with mineral oil at a temperature of 50°C and a viscosity of 36 cSt.

TIMES (±10%)		
	ENERGIZING	DE-ENERGIZING
KT08-2NC	60 ms	85 ms
KT08-2NO	85 ms	60 ms

5 - ELECTRICAL FEATURES

5.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded onto the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded nut, and can be rotated according to the available space.

The interchangeability of coils of different voltages both D or R type is possible without removing the tube.

Protection according CEI EN 60529 - atmospheric agents

Connector	IP 65	IP 67	IP 69 K
K1 DIN 43650	x		
K2 AMP JUNIOR	x	x	
K4 outgoing cables	x	x	
K7 DEUTSCH DT04 male	x	x	x
K8 AMP SUPER SEAL	x	x	x

NOTE: The protection degree is guaranteed only if the connector is correctly installed and locked.

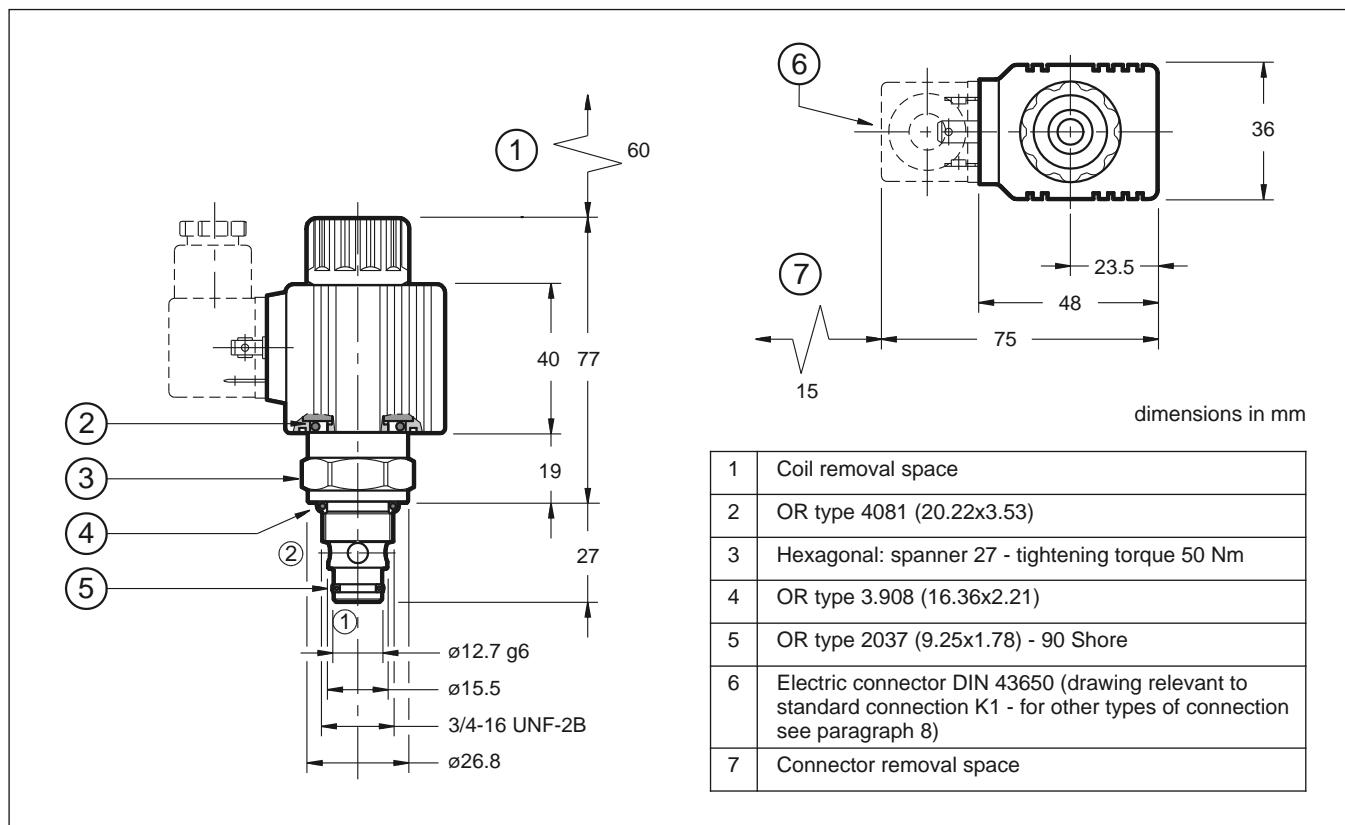
SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation	class H class H

5.2 Current and absorbed power

In the table are shown current and power consumption values relevant to the different coil types. •RŽ coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the •DŽ type connector(see cat. 49 000).

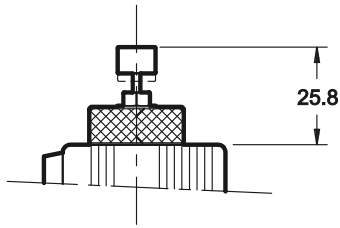
	Resistance at 20°C [] (±1%)	Absorbed current [A] (±5%)	Absorbed power (±5%)		Coil code				
			[W]	[VA]	K1	K2	K4	K7	K8
C14L3-D12*	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
C14L3-D24*	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
C14L3-R110*	363	0,25		27,2	1902742				
C14L3-R230*	1640	0,11		26,4	1902743				

6 - OVERALL AND MOUNTING DIMENSIONS

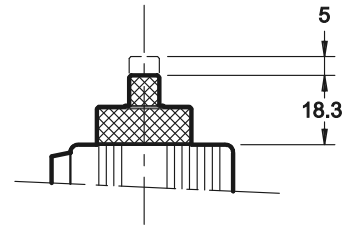


7 - MANUAL OVERRIDE

CM for NO version (pushing type)

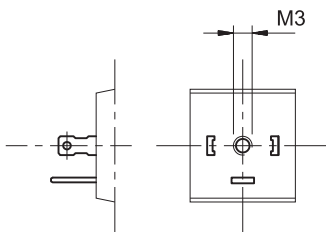


CM for NC version (screw type)

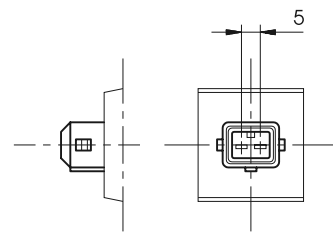


8 - ELECTRIC CONNECTIONS

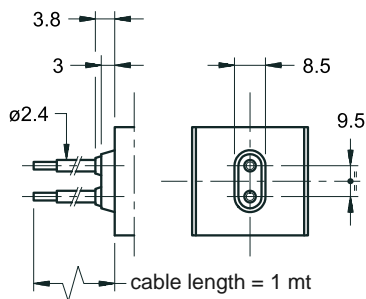
connection for DIN 43650 connector
code **K1 (standard)**



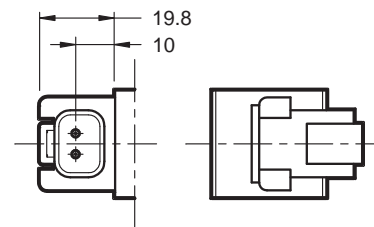
connection for AMP JUNIOR connector
code **K2**



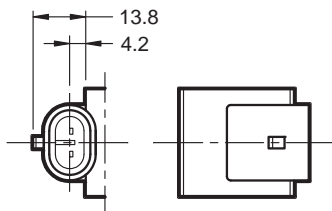
outgoing cables connection
code **K4**



connection for DEUTSCH DT04-2P male connector
code **K7**



connection for AMP SUPER SEAL connector (two contacts)
code **K8**

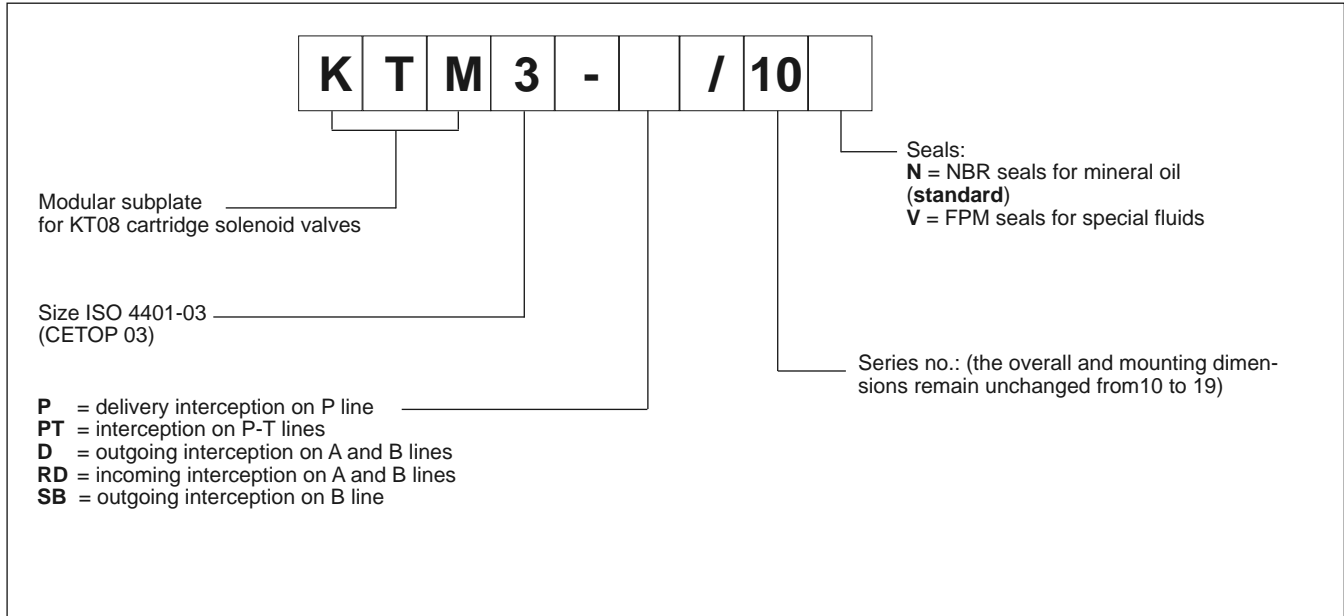


9 - ELECTRIC CONNECTORS

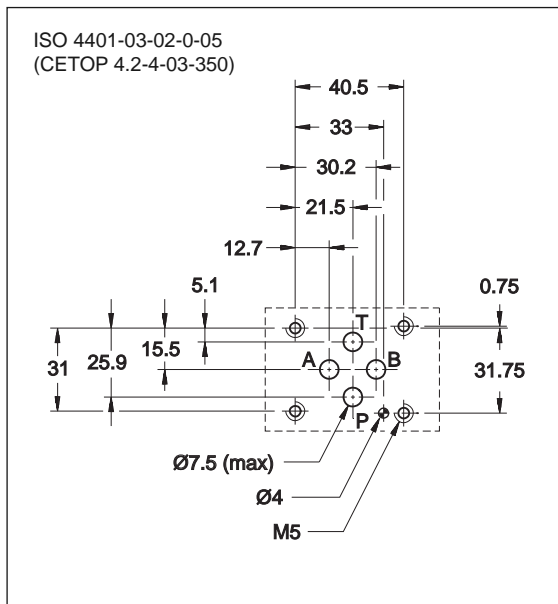
The solenoid valves are supplied without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see catalog 49 000. For K2, K7 and K8 connection type the relative connectors are not available.

10 - SUBPLATES FOR MODULAR MOUNTING

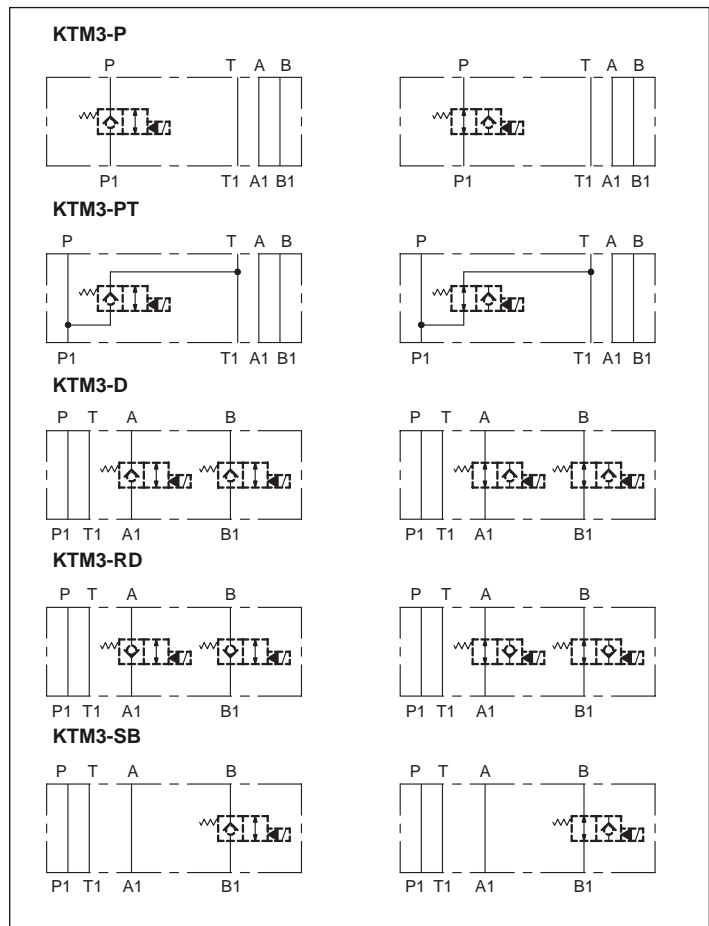
10.1 - Identification code



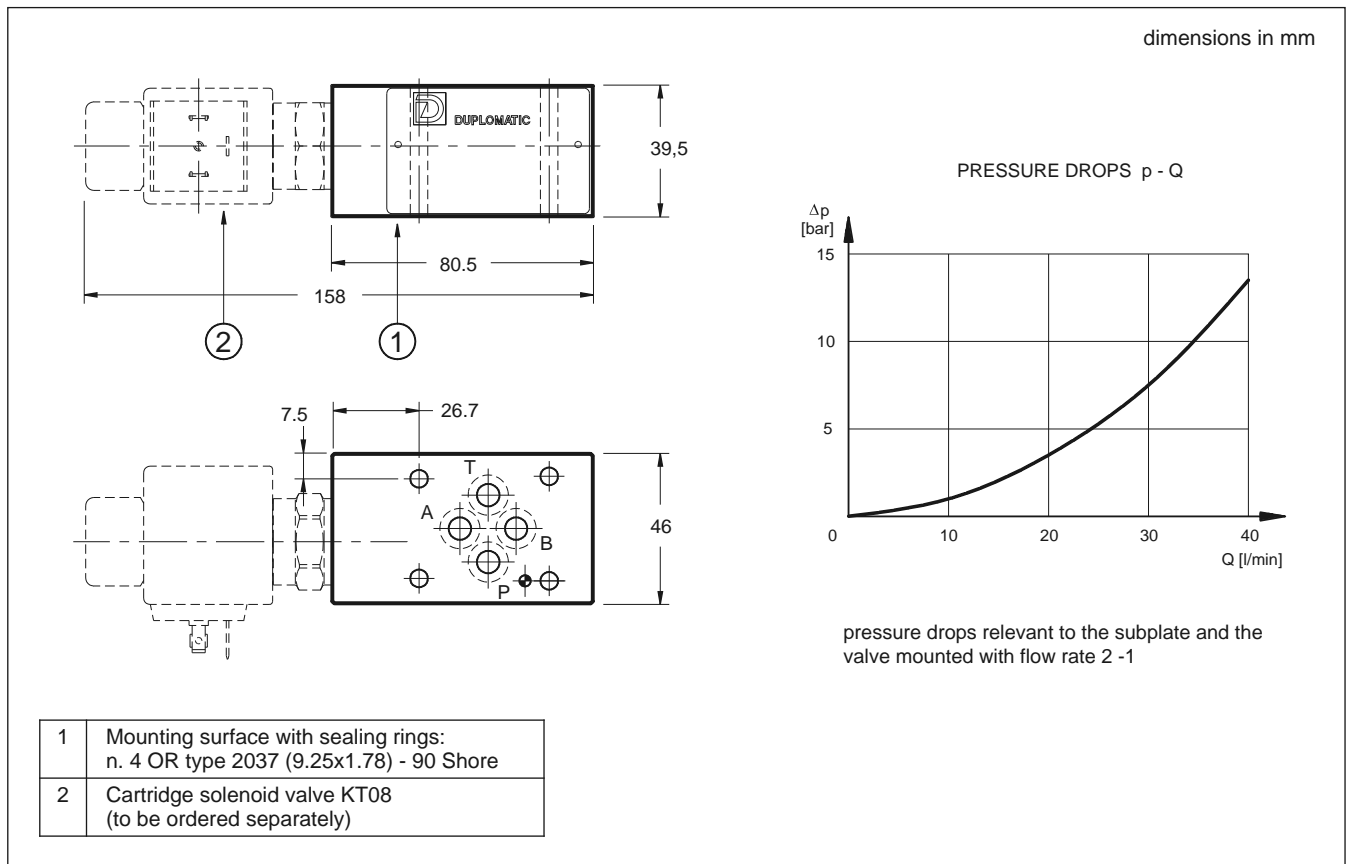
MOUNTING INTERFACE



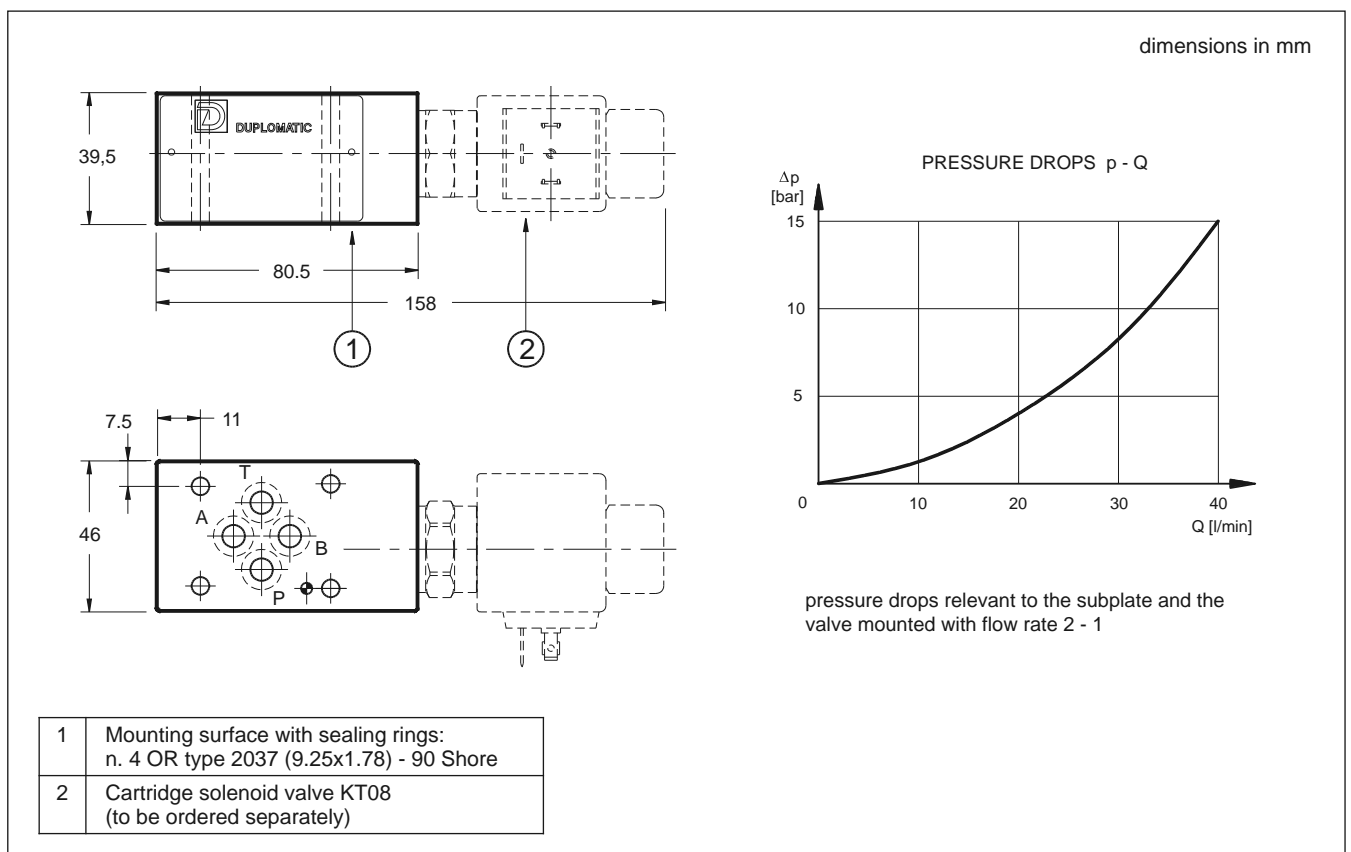
HYDRAULIC SYMBOLS



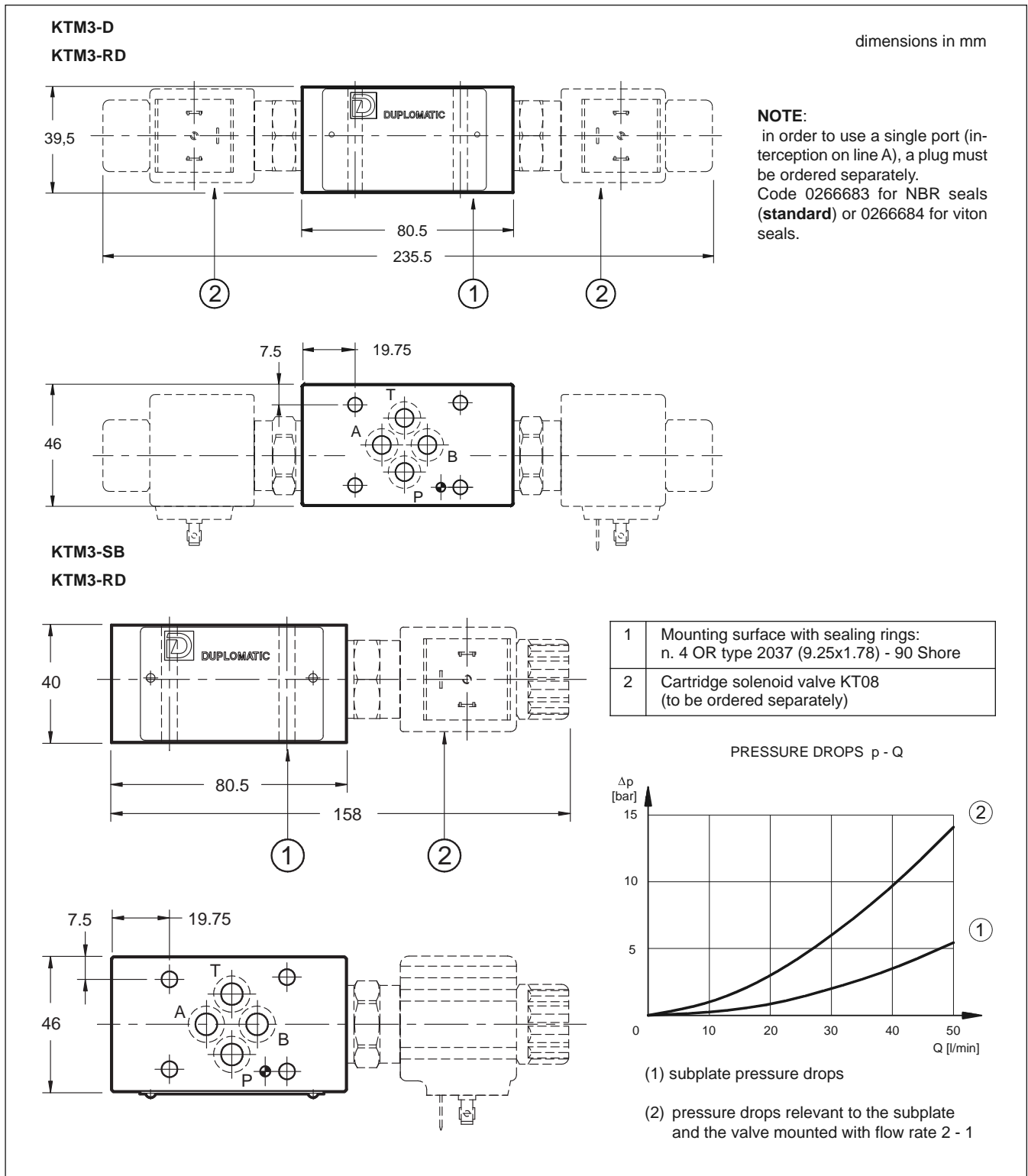
10.2 - Overall and mounting dimensions KTM3-P



10.3 - Overall and mounting dimensions KTM3-PT



10.4 - Overall and mounting dimensions KTM3-D, KTM3-RD and KTM3-SB



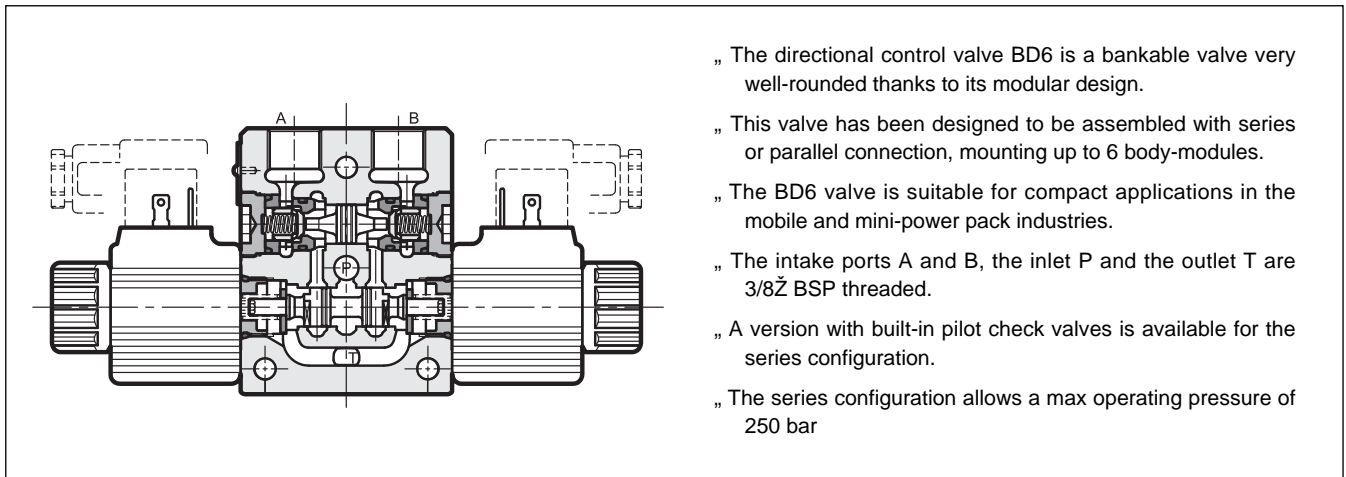


BD6

BANKABLE DIRECTIONAL CONTROL VALVE SERIES 20

p max 280 bar
Q max 40 l/min

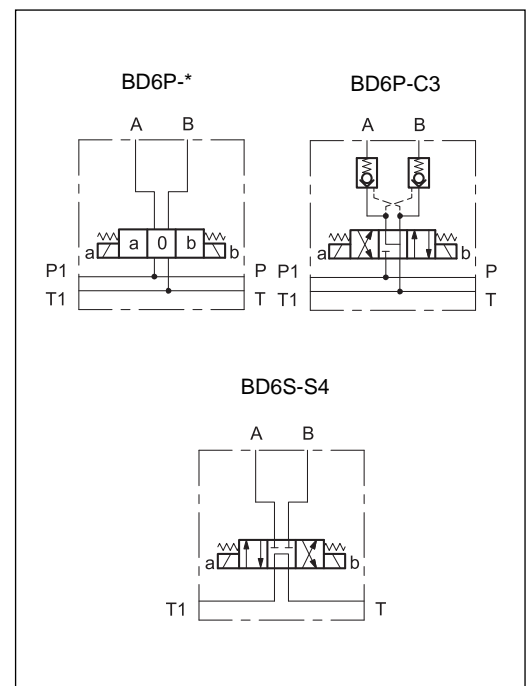
OPERATING PRINCIPLE



PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure:		
- P-A-B ports (parallel)	bar	280
- P-A-B ports (series)		250
- T and T1 ports		250
Maximum flowrate:		
- parallel	l/min	40
- series		25
Pressure drops p - Q	see paragraph 3	
Electrical characteristics	see paragraph 6	
Operating limits	see paragraph 5	
Electrical connections	see paragraph 9	
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 20/18/15	
Recommended viscosity	cSt	25
Single body mass	kg	1,84
Surface treatment of body and plates:	thermochemical antioxidant	

HYDRAULIC SYMBOLS

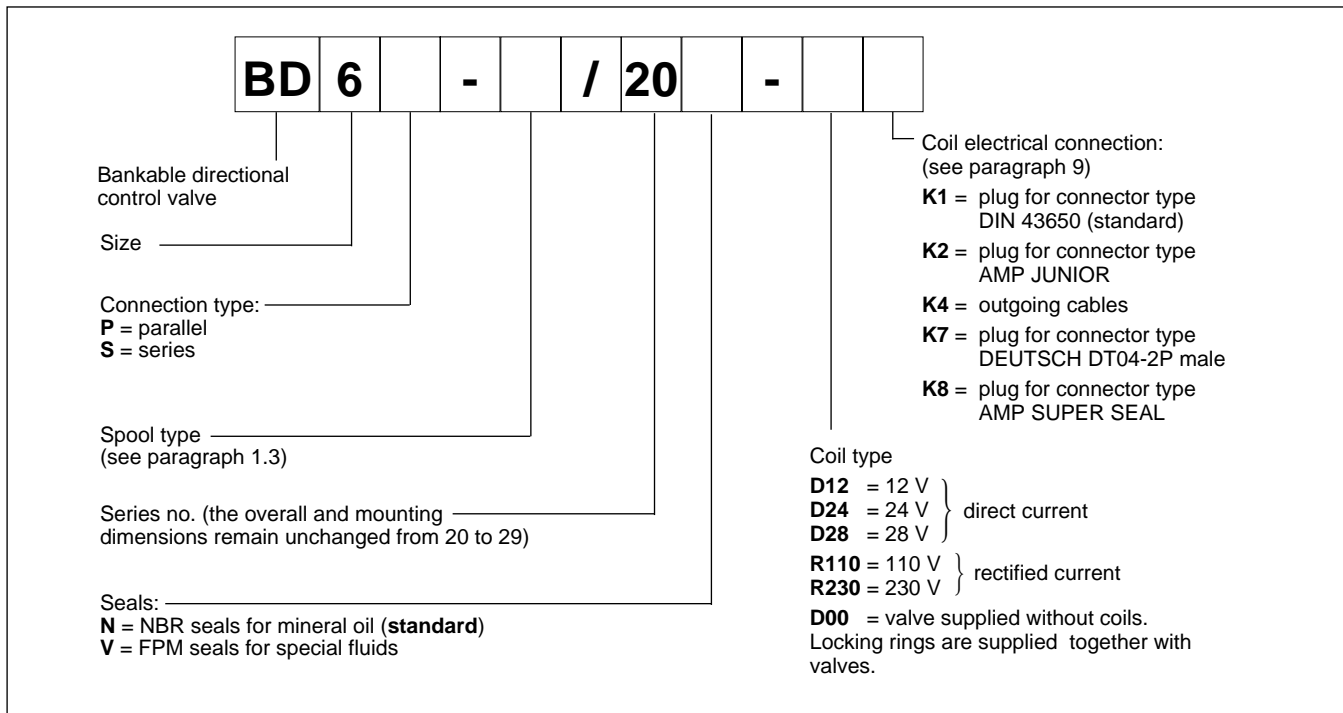


1 - IDENTIFICATION CODES FOR LOOSE MODULES

Here below all the loose components identification codes of the bankable valve are shown. To order a whole assembled valve, please use the codes at paragraphs 11 and 12.

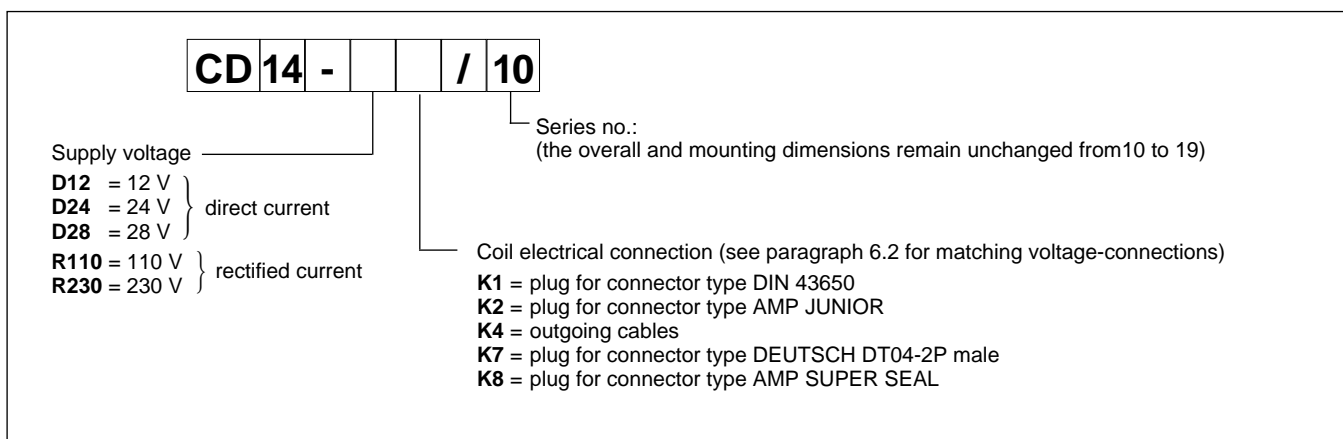
The pressure control valve and the poppet type valve with unloading function are briefly described. For more detailed information about them please see the 21 100 datasheet for the pressure control valve and the 43 100 for the unloading valve.

1.1 - Valve body

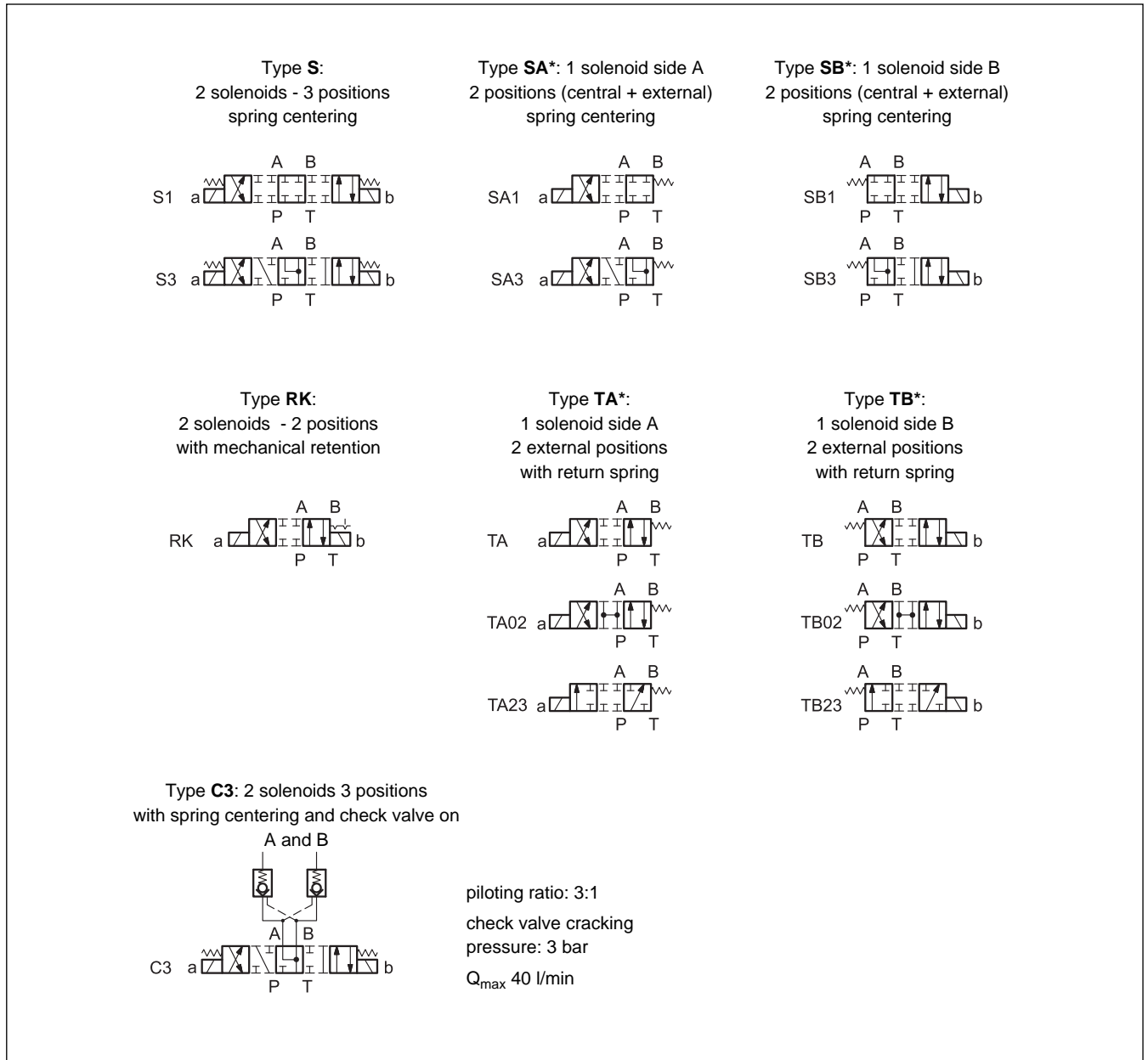


NOTE: The valve bodies and plates are supplied with a thermochemical anti-oxidation treatment.

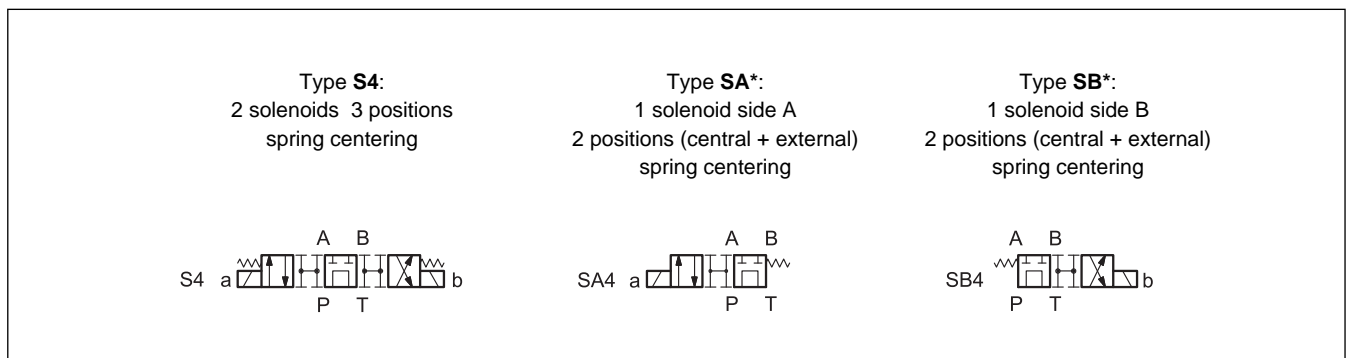
1.2 - Coil identification code



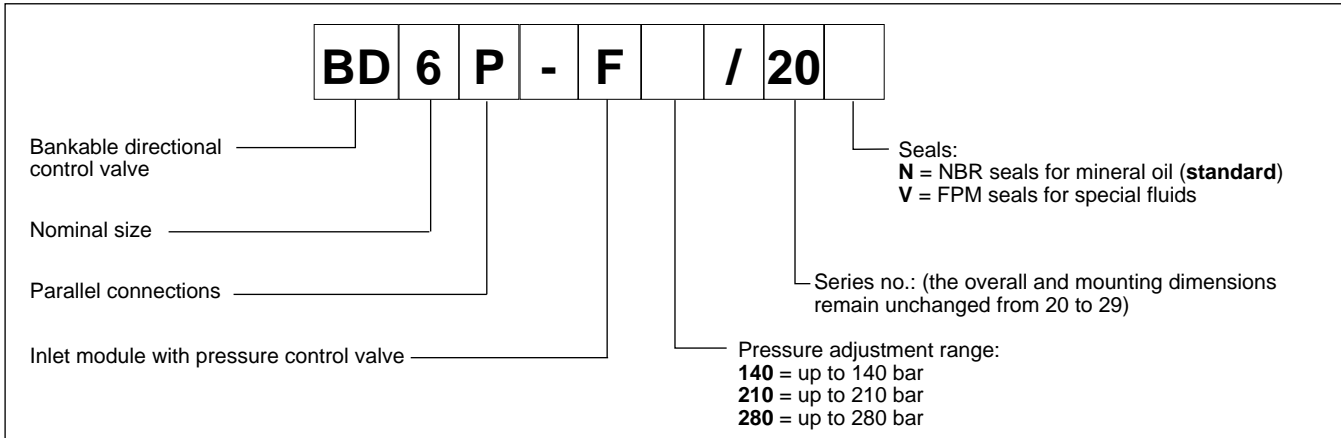
1.3 - Available spool type for parallel configuration BD6P



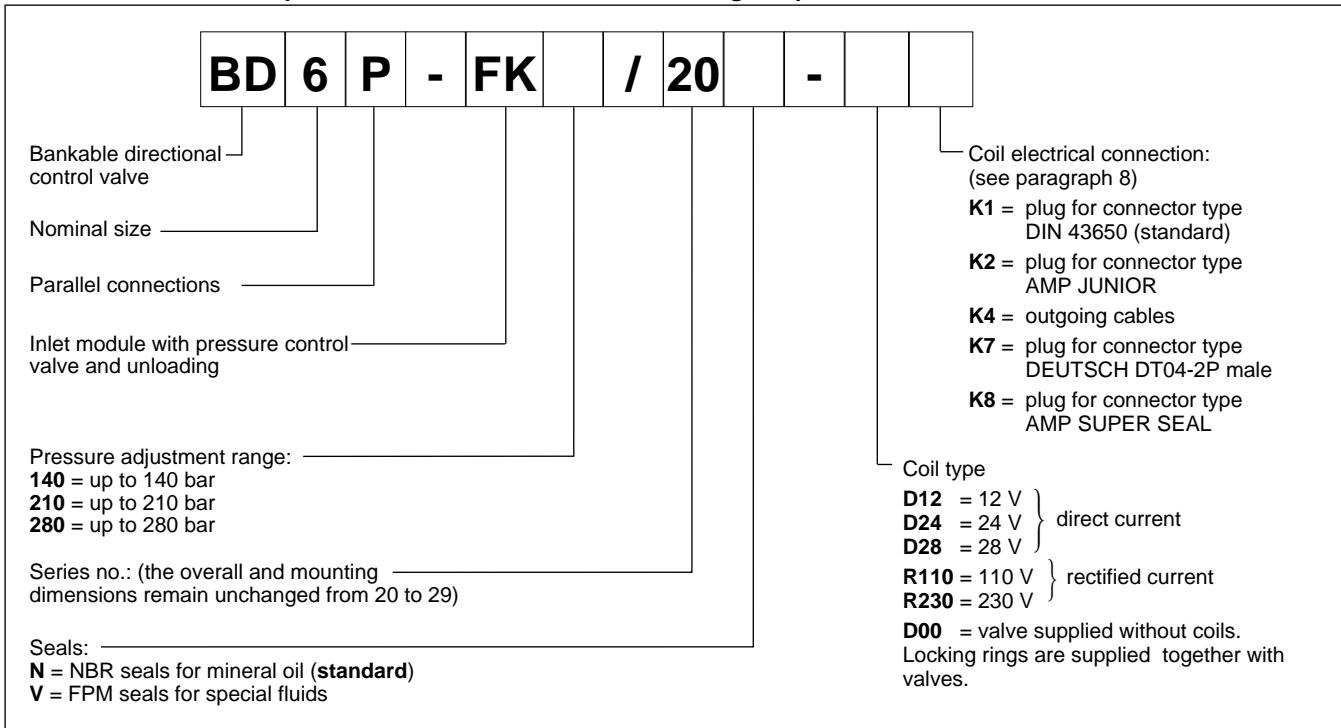
1.4 - Available spool type for series configuration BD6S



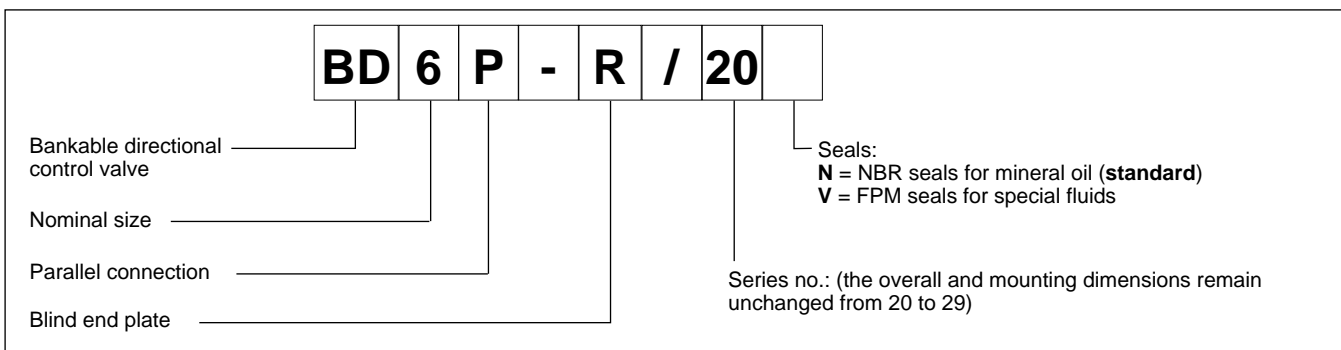
1.4 - Inlet module with pressure control valve for parallel connection



1.5 - Inlet module with pressure control valve and unloading for parallel connections



1.6 - End plate module for parallel connections



1.7 - Inlet module with pressure control valve for series connection

	BD	6	S	- F		/ 20	
--	-----------	----------	----------	------------	--	-------------	--

Bankable directional control valve

Nominal size

Series connection

Inlet module with pressure control valve

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

Series no.: (the overall and mounting dimensions remain unchanged from 20 to 29)

Pressure adjustment range:
140 = up to 140 bar
210 = up to 210 bar (**NOTE**)

NOTE: Screwing completely the pressure control valve, the reachable max operating pressure is 240 bar with Q 5 l/min

1.8 - Outlet end plate for series connection

	BD	6	S	- R1	/ 20	
--	-----------	----------	----------	-------------	-------------	--

Bankable directional control valve

Nominal size

Series configuration

Outlet plate with T1 port 3/8" BSP threaded

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

Series no.: (the overall and mounting dimensions remain unchanged from 20 to 29)

1.9 - Studs and fixing kit

no. of body modules	KIT code
2	3404100010
3	3404100011
4	3404100012
5	3404100013
6	3404100014

Fixing feet fastening:
n. 4 bolts M6 (not included)

The kit includes:
3 galvanized studs
6 galvanized nuts
6 galvanized safety washers
2 fixing feet

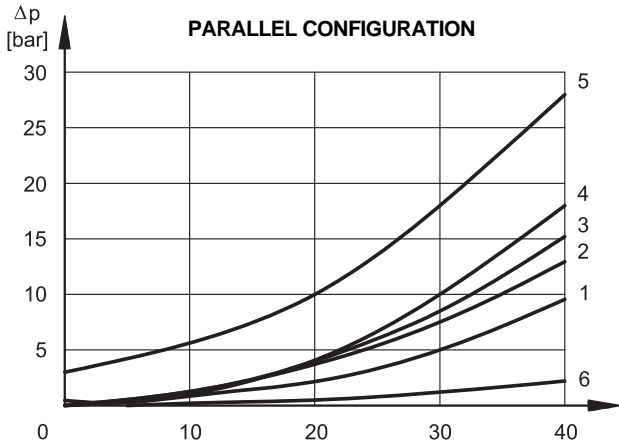
Tightening torque: 5 Nm

2 - 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.

3 - CHARACTERISTIC CURVES (values obtained with viscosity 36 cSt at 50 °C)

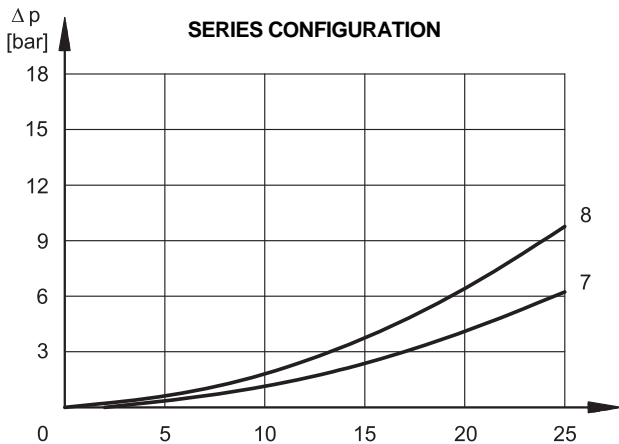
3.1 - Body modules pressure drops p-Q



ENERGIZED VALVE

SPOOL TYPE	FLOW DIRECTION			
	P A	P B	A T	B T
	CURVES ON GRAPHS			
S1, SA1, SB1	2	2	1	1
S3, SA3, SB3	2	2	1	1
C3	5	5	3	3
TA, TB	4	4	1	1
TA02, TB02	4	4	1	1
TA23, TB23	4	4		
RK	2	2	1	1
S4, SA4, SB4	8	8	8	8

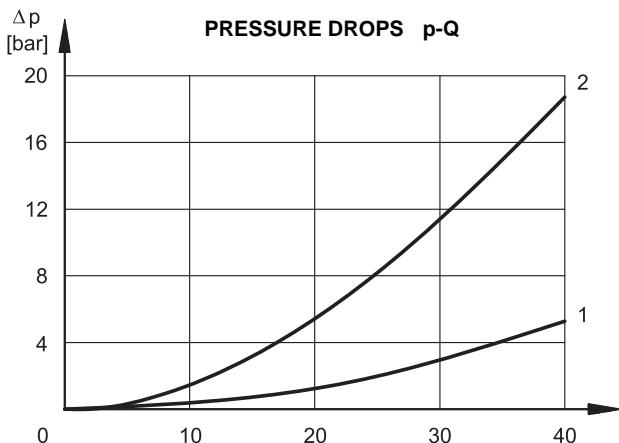
NOTE: The curve 6 shows the pressure drops in passing P or T.



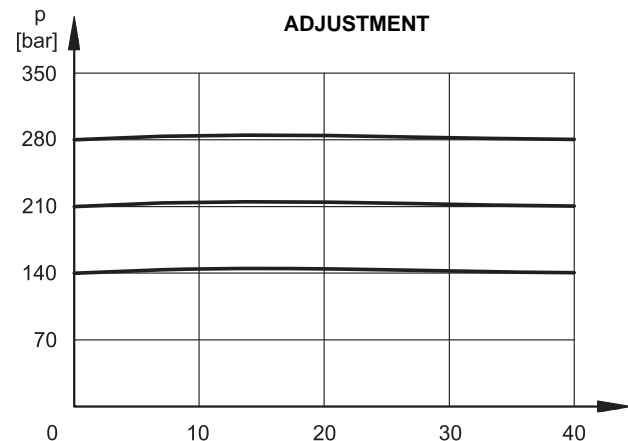
DE-ENERGIZED VALVE (central position)

SPOOL TYPE	FLOW DIRECTION				
	P A	P B	A T	B T	P T
	CURVES ON GRAPHS				
S3, SA3, SB3			2	2	
S4, SA4, SB4					7

3.1 - Inlet modules



- 1 - P-T characteristic of pressure control valve wholly unscrewed
- 2 - P-T characteristic of the unloading valve



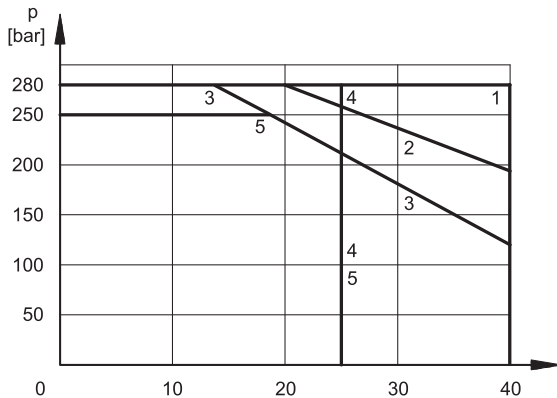
4 - SWITCHING TIMES

Values obtained according to ISO 6403, with mineral oil with viscosity 36 cSt at 50°C.

TIMES	ENERGIZING	DE-ENERGIZING
ms ($\pm 10\%$)	25 ÷ 75	15 ÷ 25

5 - BODY MODULE OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



SPOOL TYPE	P-A CURVE	P-B CURVE
S1, SA1, SB1	1	1
S3, SA3, SB3	3	3
S4, SA4, SB4	5	5
TA, TB	2	2
TA02, TB02	2	2
TA23, TB23	2	2
RK	4	4
C3	3	3

6 - ELECTRICAL FEATURES

6.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded ring, and can be rotated to suit the available space. The interchangeability of coils of different voltages is allowed within the same type of supply current, rectified or direct.

Protection from atmospheric agents CEI EN 60529

Connector	IP 65	IP 67	IP 69 K
K1 DIN 43650	x		
K2 AMP JUNIOR	x	x	
K4 outgoing cables	x	x	
K7 DEUTSCH DT04 male	x	x	x
K8 AMP SUPER SEAL	x	x	x

NOTE: The protection degree is guaranteed only with the connector correctly wired and installed.

SUPPLY VOLTAGE FLUCTUATION	$\pm 10\%$ Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class H

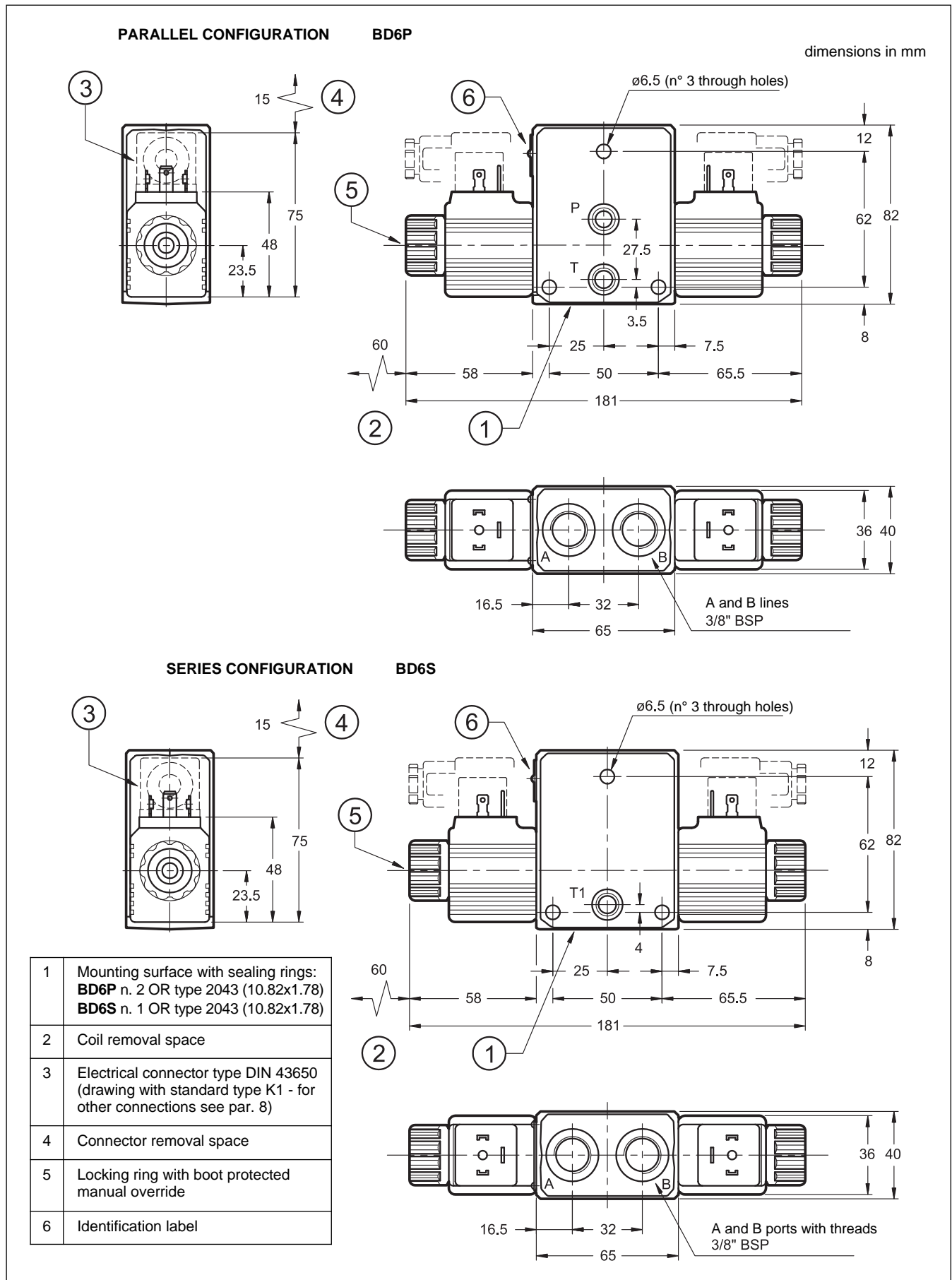
6.2 Current and absorbed power

In the table are shown current and power consumption values relevant to the different coil types. •RŽ coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the •DŽ type connector(see cat. 49 000).

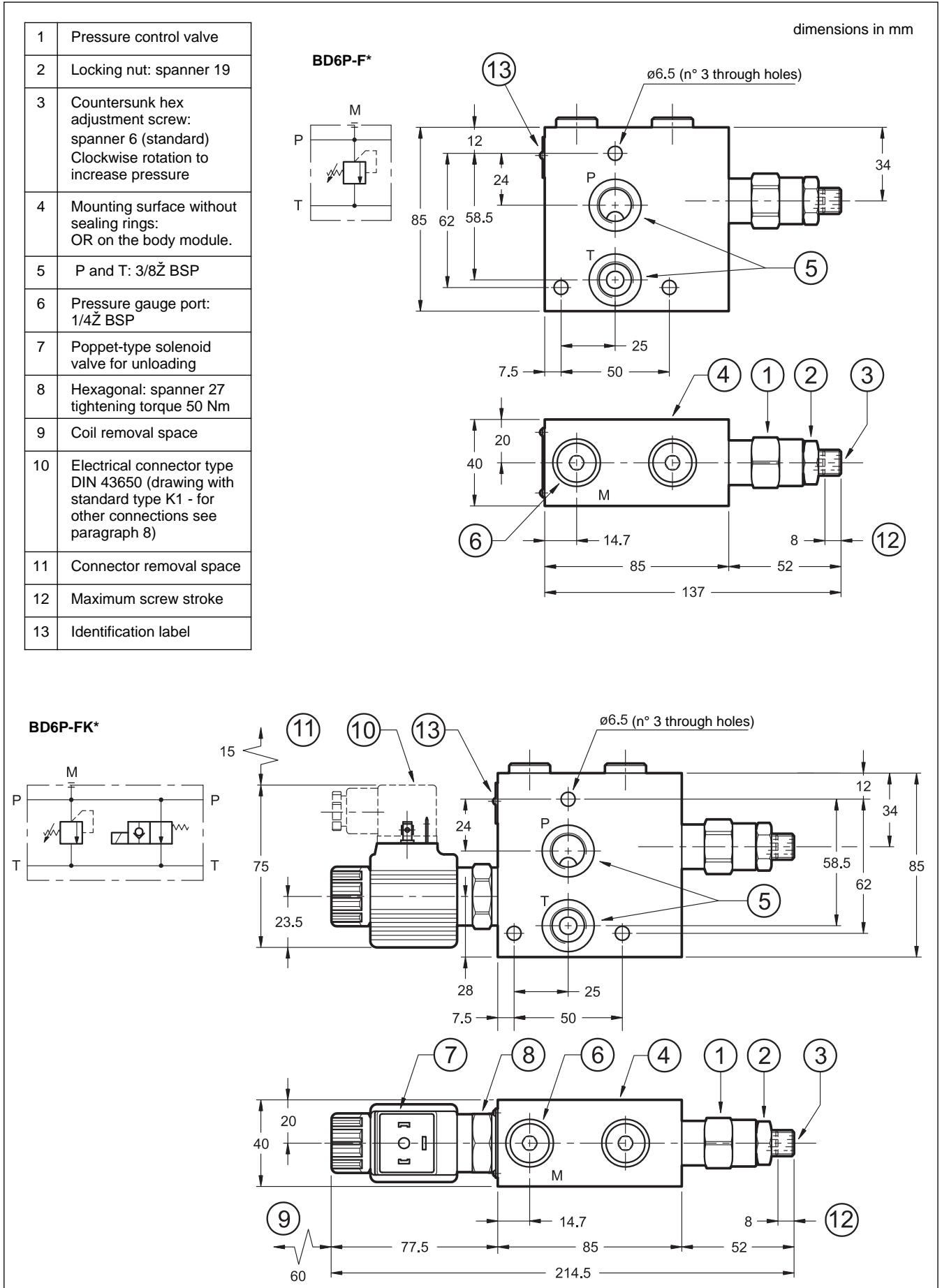
	Resistance 20°C [] ($\pm 1\%$)	Absorbed current [A] ($\pm 5\%$)	Absorbed power ($\pm 5\%$)		Coil code				
			[W]	[VA]	K1	K2	K4	K7	K8
CD14-D12*	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
CD14-D24*	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
CD14-D28*	27,5	1,02	28,5		1902744				
CD14-R110*	363	0,25		27,2	1902742				
CD14-R230*	1640	0,11		26,4	1902743				

7 - OVERALL AND MOUNTING DIMENSIONS

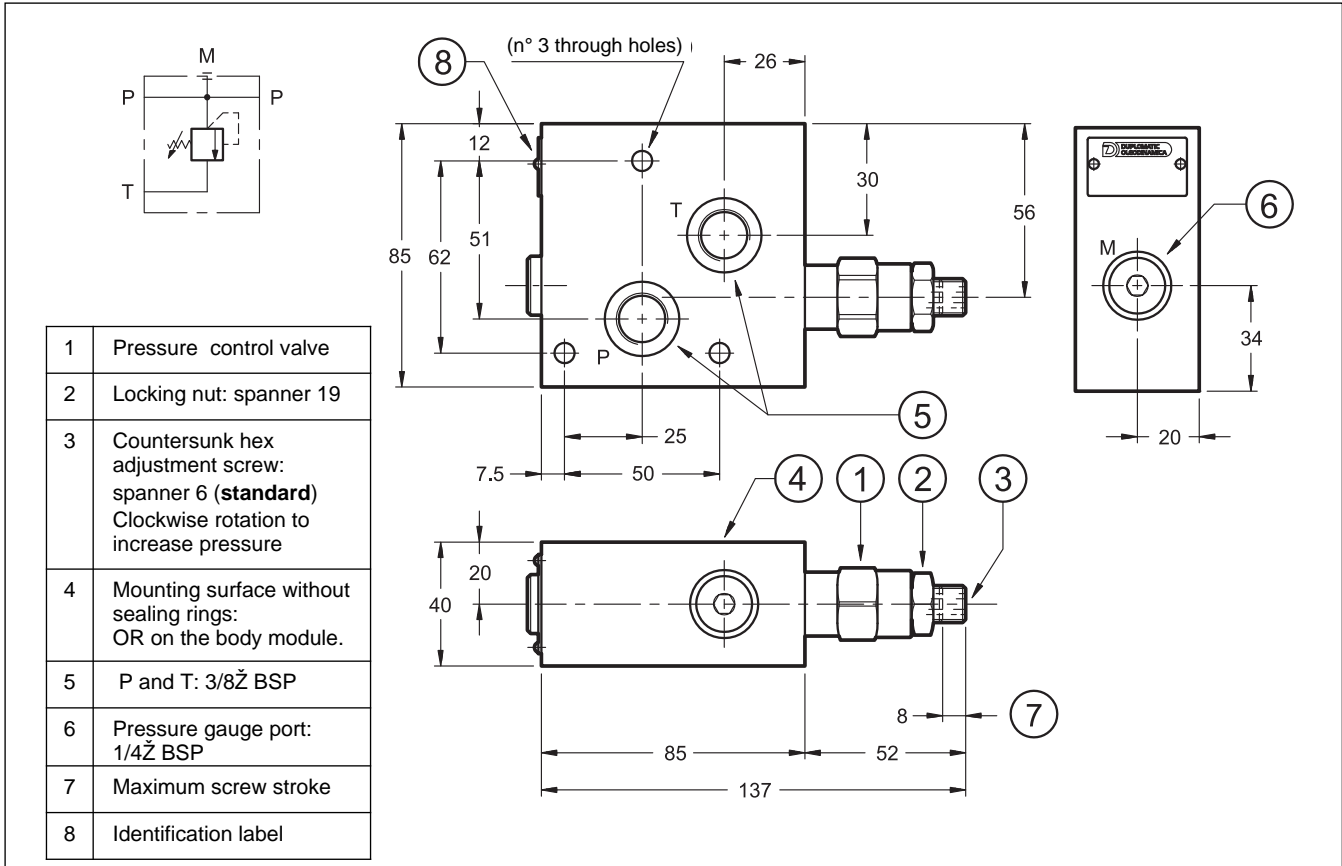
7.1 - Body module



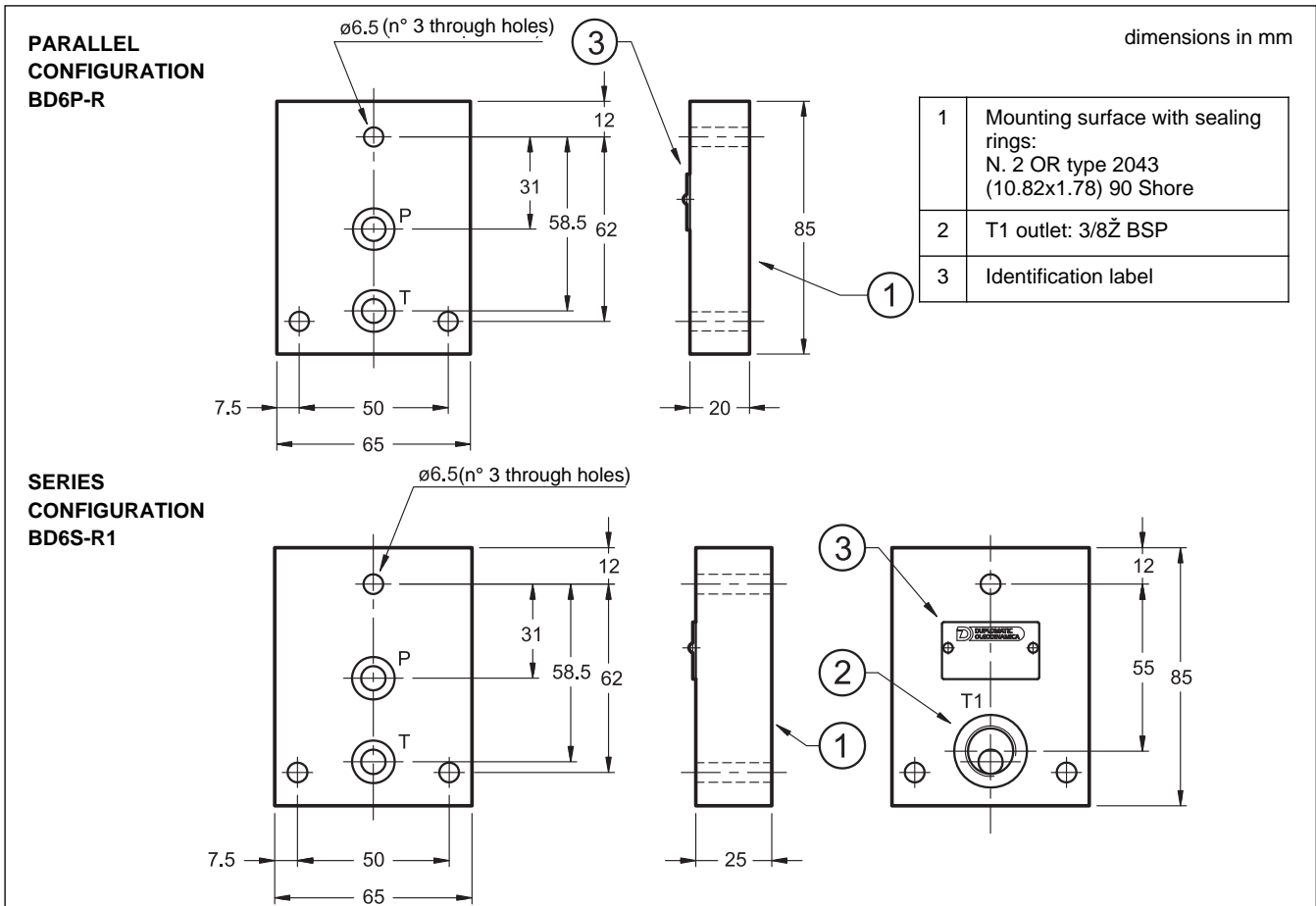
7.2 - Inlet modules for parallel configuration



7.3 - Inlet module BD6S-F* for series configuration



7.4 - End modules

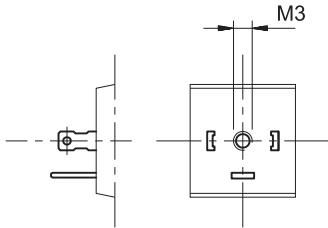


8 - INSTALLATION

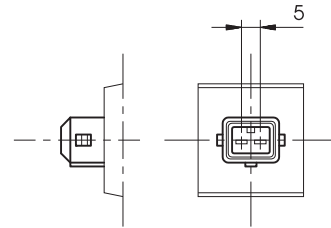
Configurations with centering and return springs can be mounted in any position.

9 - ELECTRIC CONNECTIONS

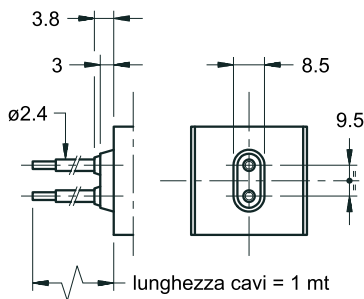
connection for DIN 43650 connector code **K1**



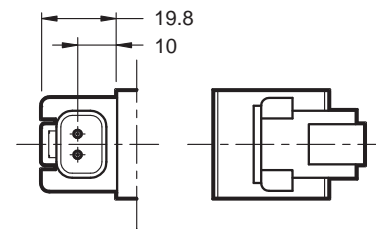
connection for AMP JUNIOR connector type code **K2**



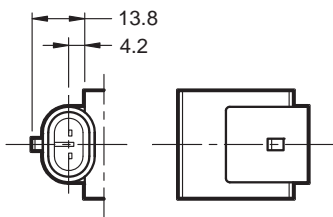
outgoing cable connections code **K4**



connection for DEUTSCH DT04-2P male connector type code **K7**



connection for AMP SUPER SEAL (two contacts) connector type code **K8**



10 - ELECTRIC CONNECTORS

The solenoid valves are supplied without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000.

For K2, K7 and K8 connection type the relative connectors are not available.

11 - ASSEMBLED VALVE - PARALLEL CONFIGURATION

11.1 - Identification code

BD6	-	P	-		/		/	R	/	20	-		
------------	---	----------	---	--	---	--	---	----------	---	-----------	---	--	--

Bankable directional control valve

Parallel configuration

No. of body modules

Inlet module
F = with pressure control valve
FK = with pressure control valve and unloading valve

Pressure adjustment range:
140 = up to 140 bar
210 = up to 210 bar
280 = up to 280 bar

Spool type:
 Enter the spool type.
 See the available spools at paragraph 1.3
 Repeat for each module.

Blind end plate

Series no.: (the overall and mounting dimensions remain unchanged from 20 to 29)

Coil electrical connection:
(see paragraph 9)

K1 = plug for connector type DIN 43650 (standard)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL

Coil type

D12 = 12 V } direct current
D24 = 24 V } (standard)

R110 = 110 V } rectified current
R230 = 230 V }

D00 = Valve supplied without coils (see par. 1.1 for available coils).
 Locking rings are supplied together with valves.

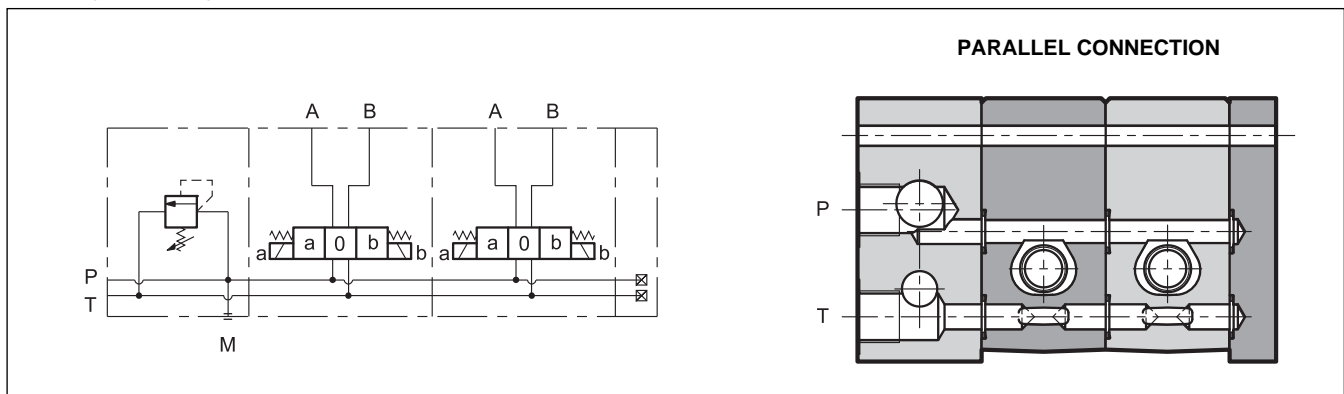
Seals:
N = NBR seals for mineral oil (standard)
V = FPM seals for special fluids

Coding example:

BD6-P4-F140/S1-S1-S1-S1/R/20N-D24K1: assembled valve includes: inlet module with pressure control valve with adjustment up to 140 bar; 4 body modules S1; blind end plate; NBR seals, 24V DC coils and K1 connection.

BD6-P3-FK280/S1-C3-S1/R/20N-D24K1: assembled valve includes: inlet module with pressure control valve with adjustment up to 280 bar and unloading valve; 1st body module with spool S1, 2nd body module with spool C3 and 3th body module with spool S1; blind end plate; NBR seals, 24V DC coils and K1 connection.

11.2 - Hydraulic symbols and connection scheme



12 - ASSEMBLED VALVE - SERIES CONFIGURATION

12.1 - Identification code

BD6	-	S	-	F	/		/	R1	/	20	-		
------------	----------	----------	----------	----------	----------	--	----------	-----------	----------	-----------	----------	--	--

Bankable directional control valve

Series configuration

No. of body modules

Inlet module with pressure relief control valve

Pressure adjustment range:
140 = up to 140 bar
210 = up to 210 bar (**NOTE**)

Spool type:
 Enter the spool type.
 See the available spools at paragraph 1.4
 Repeat for each module.

Outlet plate with T1 port 3/8" BSP threaded

Series no.: (the overall and mounting dimensions remain unchanged from 20 to 29)

Coil electrical connection:
(see paragraph 9)

K1 = plug for connector type DIN 43650

K2 = plug for connector type AMP JUNIOR

K4 = outgoing cables

K7 = plug for connector type DEUTSCH DT04-2P male

K8 = plug for connector type AMP SUPER SEAL

Coil type

D12 = 12 V } direct current
D24 = 24 V }
D28 = 28 V }

R110 = 110 V } rectified current
R230 = 230 V }

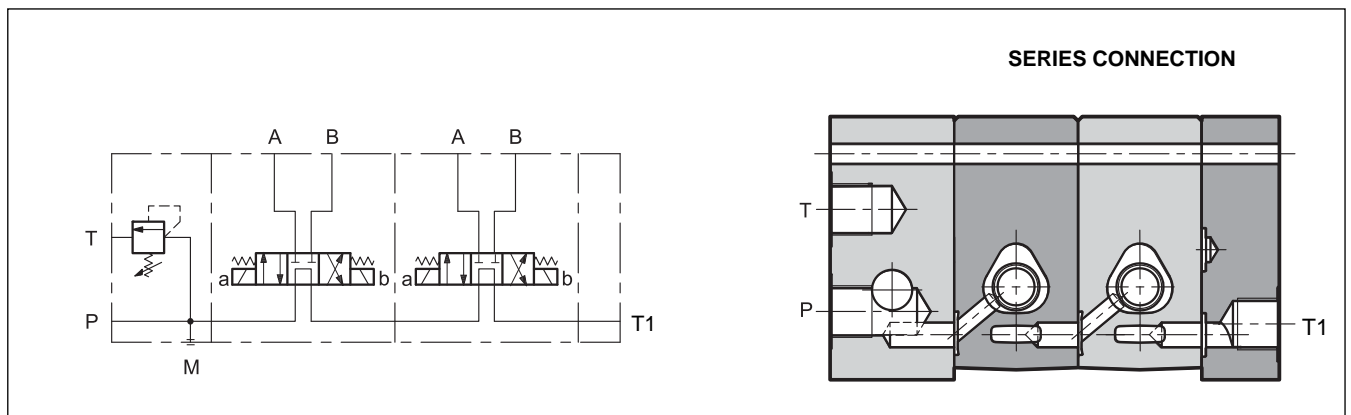
D00 = valve supplied without coils. Locking rings are supplied together with valves.

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

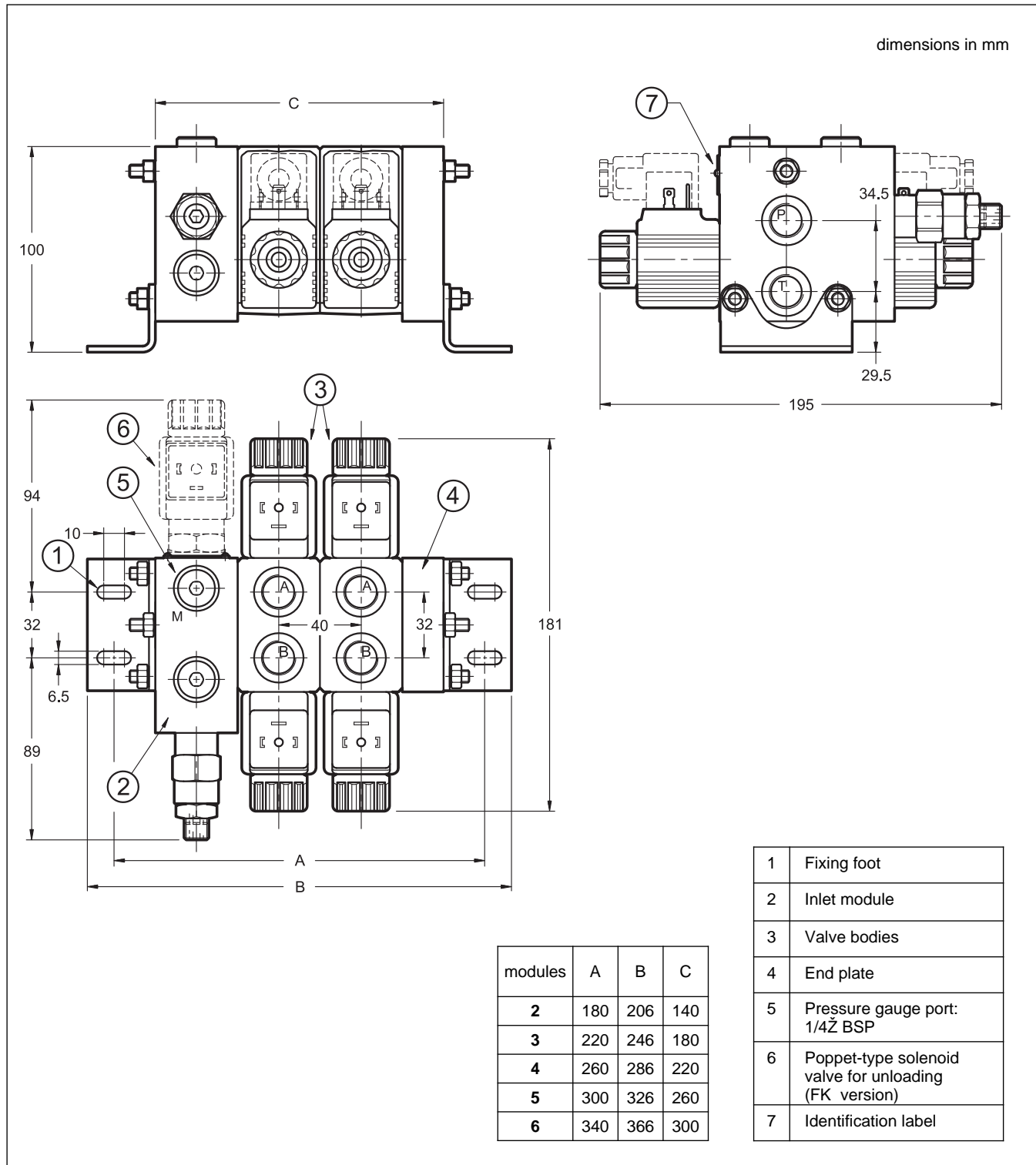
NOTE: Screwing completely the pressure control valve, the reachable max operating pressure is 240 bar with Q 5 l/min

Coding example:
BD6-S3-F140/S4-SB4-SA4/R1/20N-D24K1: assembled valve includes: inlet module with pressure control relief valve, with adjustment up to 140 bar, 1st body module with spool S4, 2nd body module with spool SB4 and 3th body module with spool SA4; outlet plate; NBR seals, 24V DC coils and K1 connection.

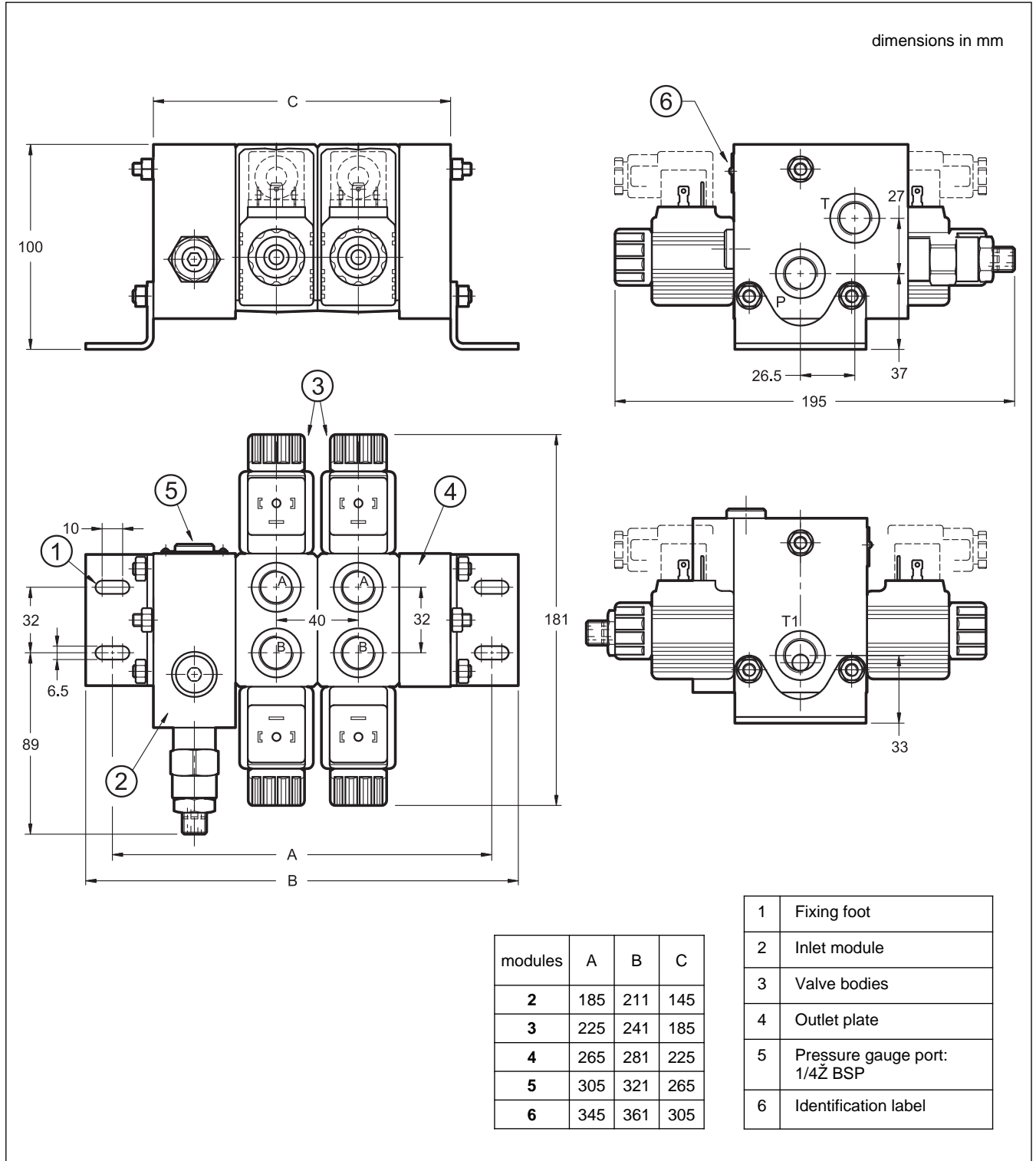
12.2 - Hydraulic symbols and connection scheme



13 - OVERALL DIMENSION OF THE ASSEMBLED VALVE IN PARALLEL CONFIGURATION



14 - OVERALL DIMENSION OF THE ASSEMBLED VALVE IN SERIES CONFIGURATION





BD6
SERIES 20



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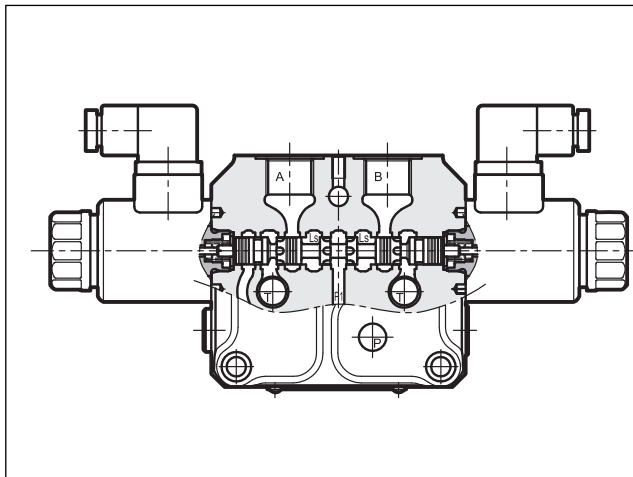
BLS6

BANKABLE LOAD SENSING PROPORTIONAL CONTROL VALVE

SERIES 11

p max 300 bar
Q max 120 l/min

OPERATING PRINCIPLE

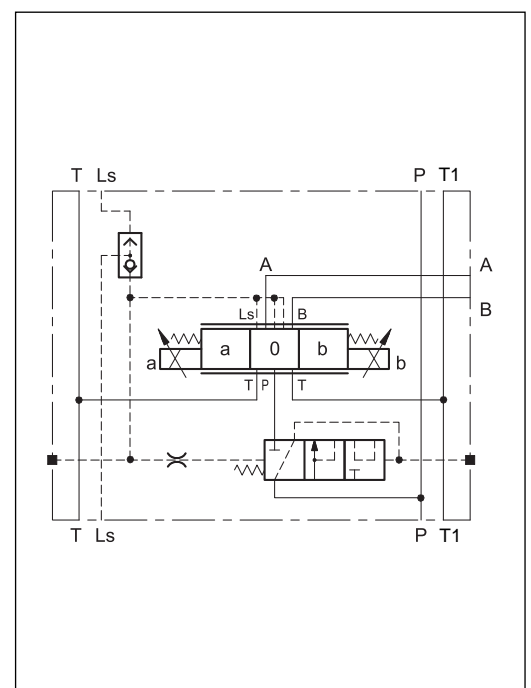


- „ The BLS6 directional control valve is stackable and can be assembled up to 8 different proportional and on/off modules .
- „ Each module is equipped with a meter-in compensator that keep constant the flow, independently from load changes.
- „ Sections with pressure compensators are not influenced in any way by other operated functions, provided that sufficient pump capacity is available. To correctly work, the sum of the flows contemporarily used must not overcome the 90% of the inlet flow.
- „ The user ports A and B are threaded 1/2" Z BSP. On the inlet module the ports P1, P2 and T1 are threaded 3/4" Z BSP.
- „ The manual lever override is available as option.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

Maximum operating pressure: - A and B ports - P1 and P2 ports - T1 port	bar	300 250 20
Maximum flowrate: - A and B ports - P1 and P2 ports - T1 port	l/min	45 100 120
Electrical characteristics	see paragraph 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
Single body mass	kg	4,5
Surface treatment of body and plates	thermochemical antioxidant	

HYDRAULIC SYMBOL



1.2 - On-off modules

If necessary the proportional spool can be used together with on-off solenoids. In this case the description for the spool type as to be as follow:

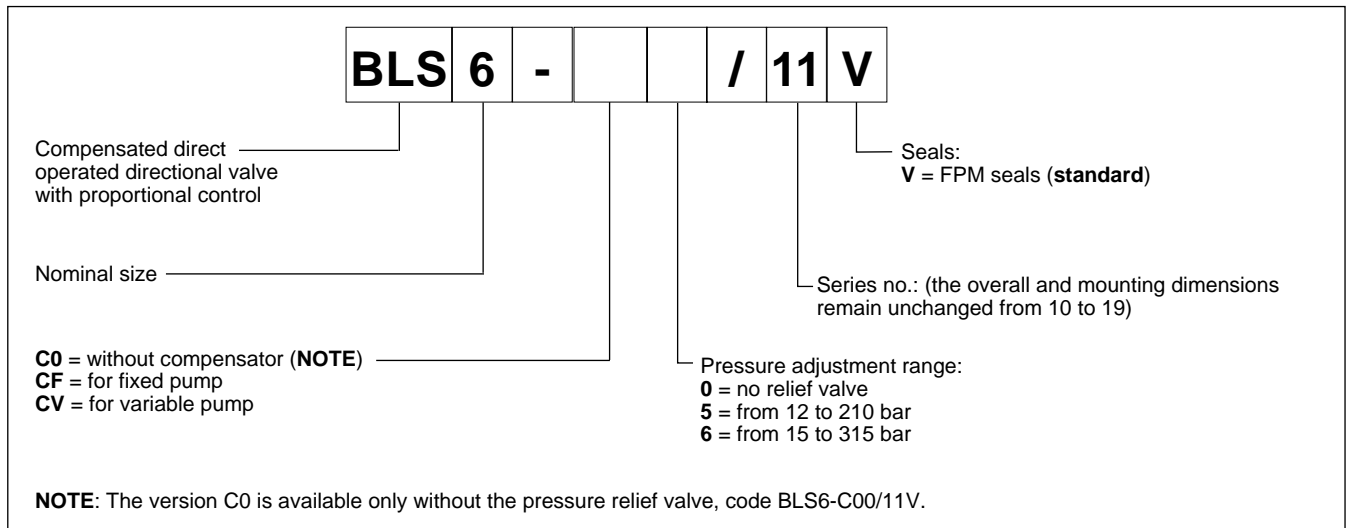
SC = closed center with on-off solenoid

SA = open center with on-off solenoid

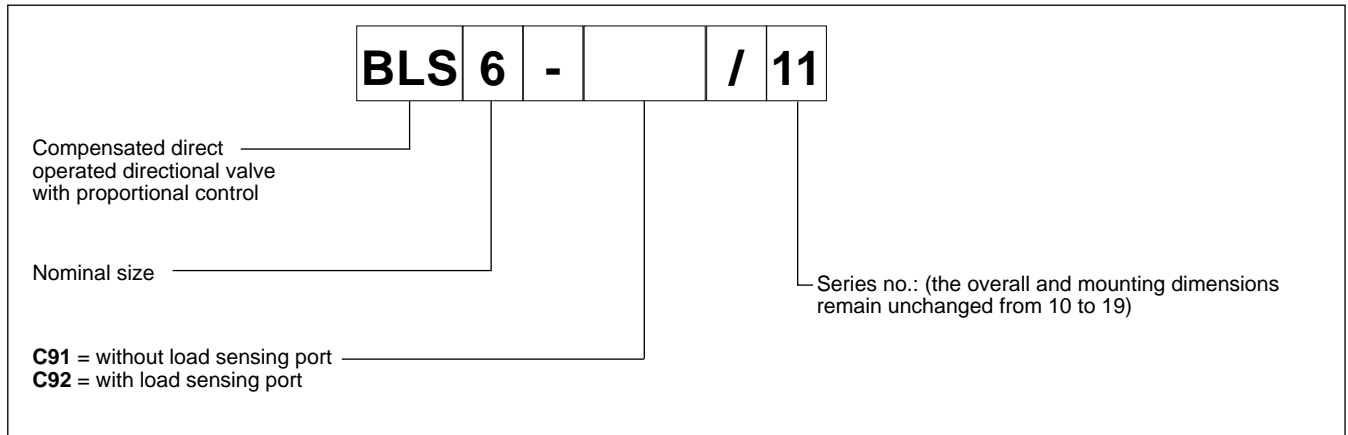
In this version is also available a spool for high flow named SC60/60 and SA60/60.

1.3 - Inlet modules

The inlet section is available in different version, for fixed and for variable pumps with load sensing. The version for fixed pump can be easily converted to work with variable pumps and vice versa.



1.4 - End plate modules



2 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4 or fluids HFDR type. 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.

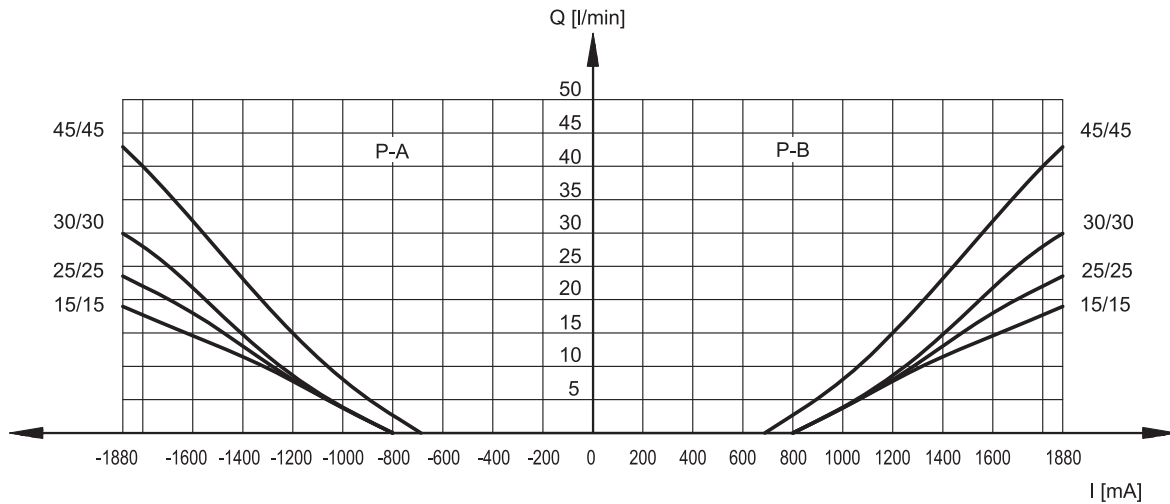
The fluid must be preserved in its physical and chemical characteristics.



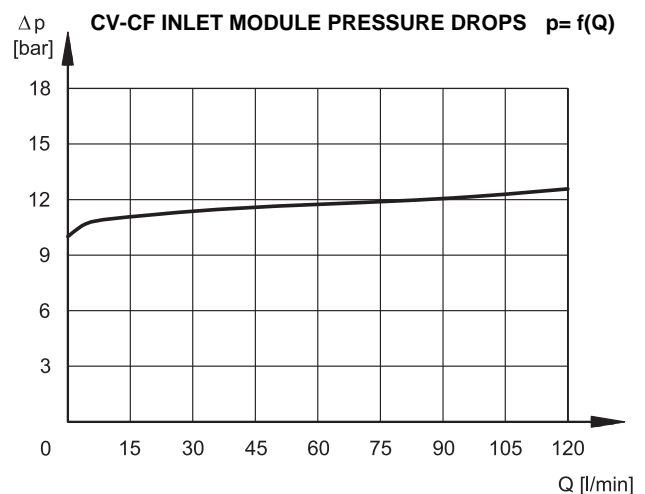
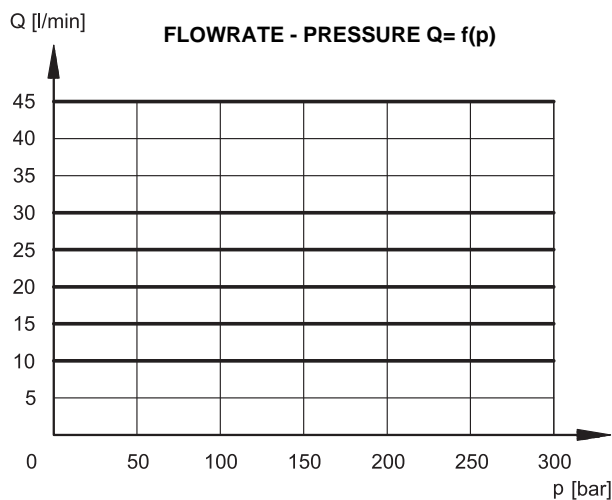
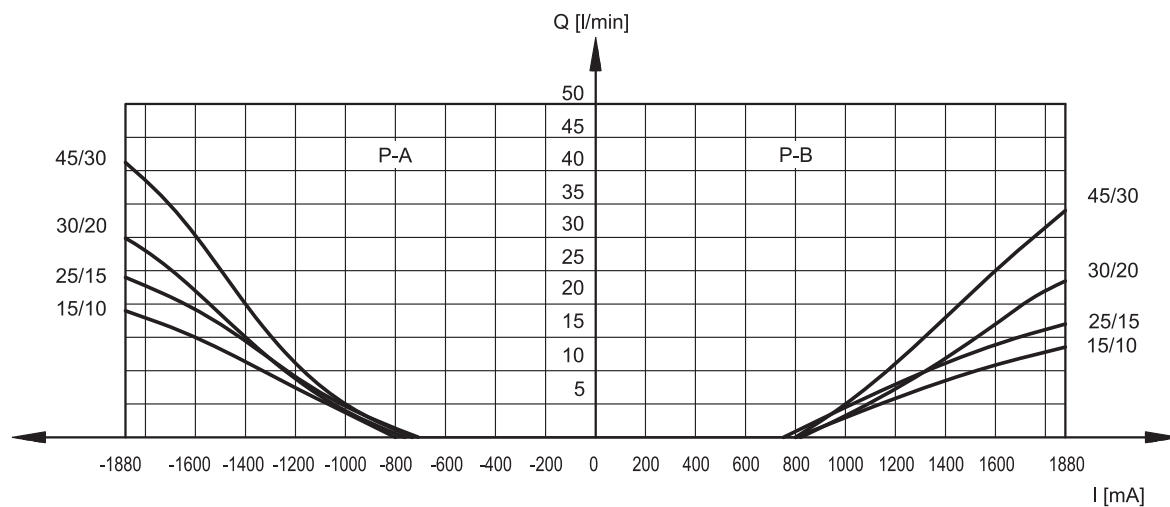
3 - CHARACTERISTIC CURVES (values obtained with viscosity 36 cSt at 50 °C)

Typical constant flow rate obtained with internal 2-way compensator, and current with 12V solenoid type (for D24 version the maximum current is 860 mA), measured for the various spool types available.

PROPORTIONAL MODULES PRESSURE DROPS p - Q SYMMETRICAL FLOWS - PC AND PA SPOOLS



ASYMMETRICAL FLOWS - PC AND PA SPOOLS



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 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)	K1 COIL K7 COIL	3.66 4	17.6 19
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE		100%	
PWM FREQUENCY	Hz	200	100
ELECTROMAGNETIC COMPATIBILITY (EMC)		According to 2004/108/CE	
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:		class H class F	

5 - STEP RESPONSE

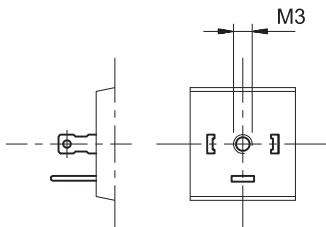
(measured with mineral oil with viscosity of 36 cSt at 50°C with the relative electronic control units)

Step response is the time (delay) taken for the valve to reach 90% of the set position value following a step change of the reference signal.

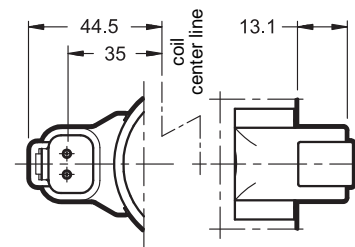
Reference signal step	0 100%	100 0%
	Step response [ms]	
BLS6	50	40

6 - ELECTRIC CONNECTIONS

connection for DIN 43650 connector
code **K1 (standard)**



connection for DEUTSCH DT04-2P connector type
code **K7**

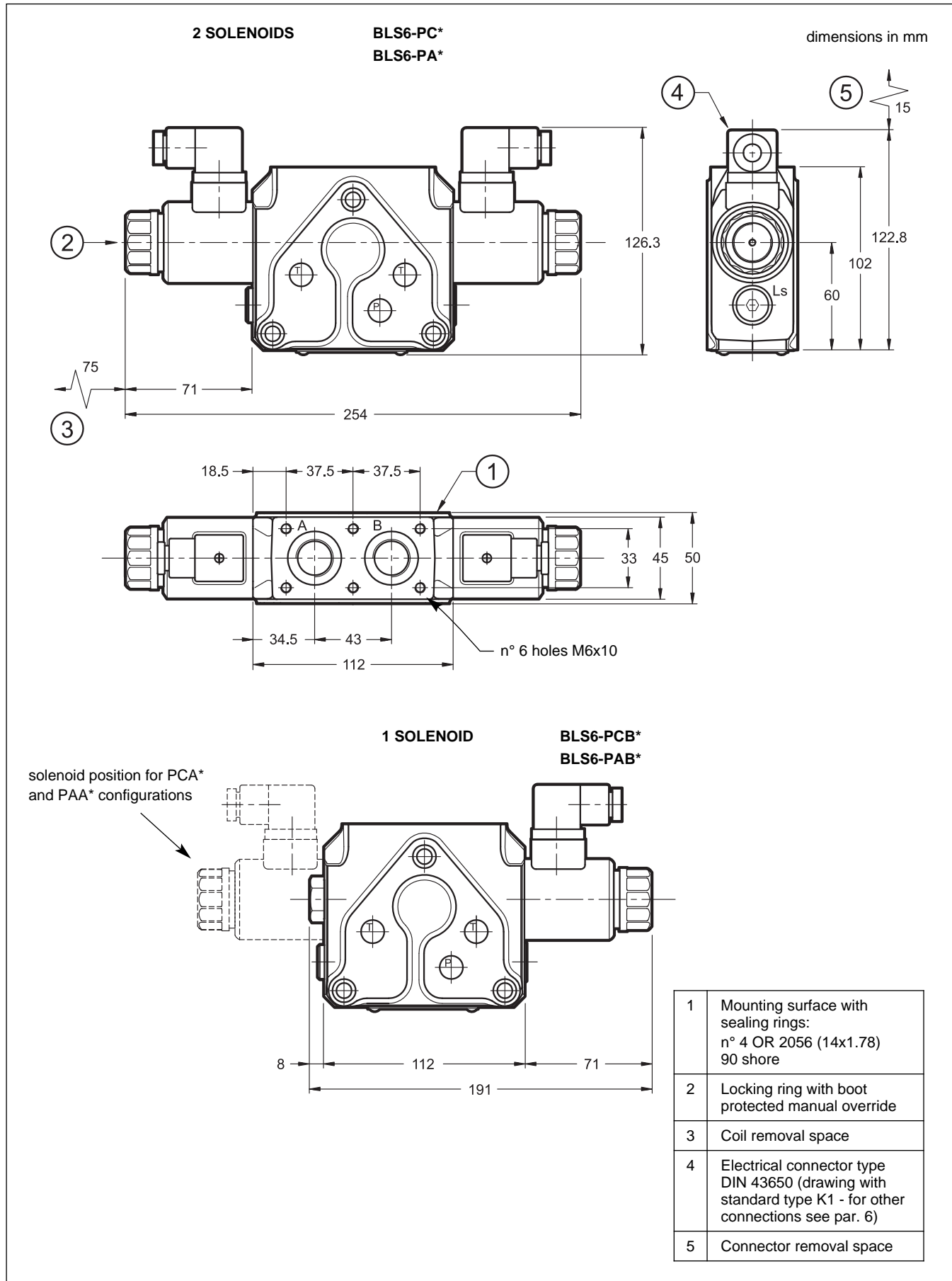


7 - ELECTRIC CONNECTORS

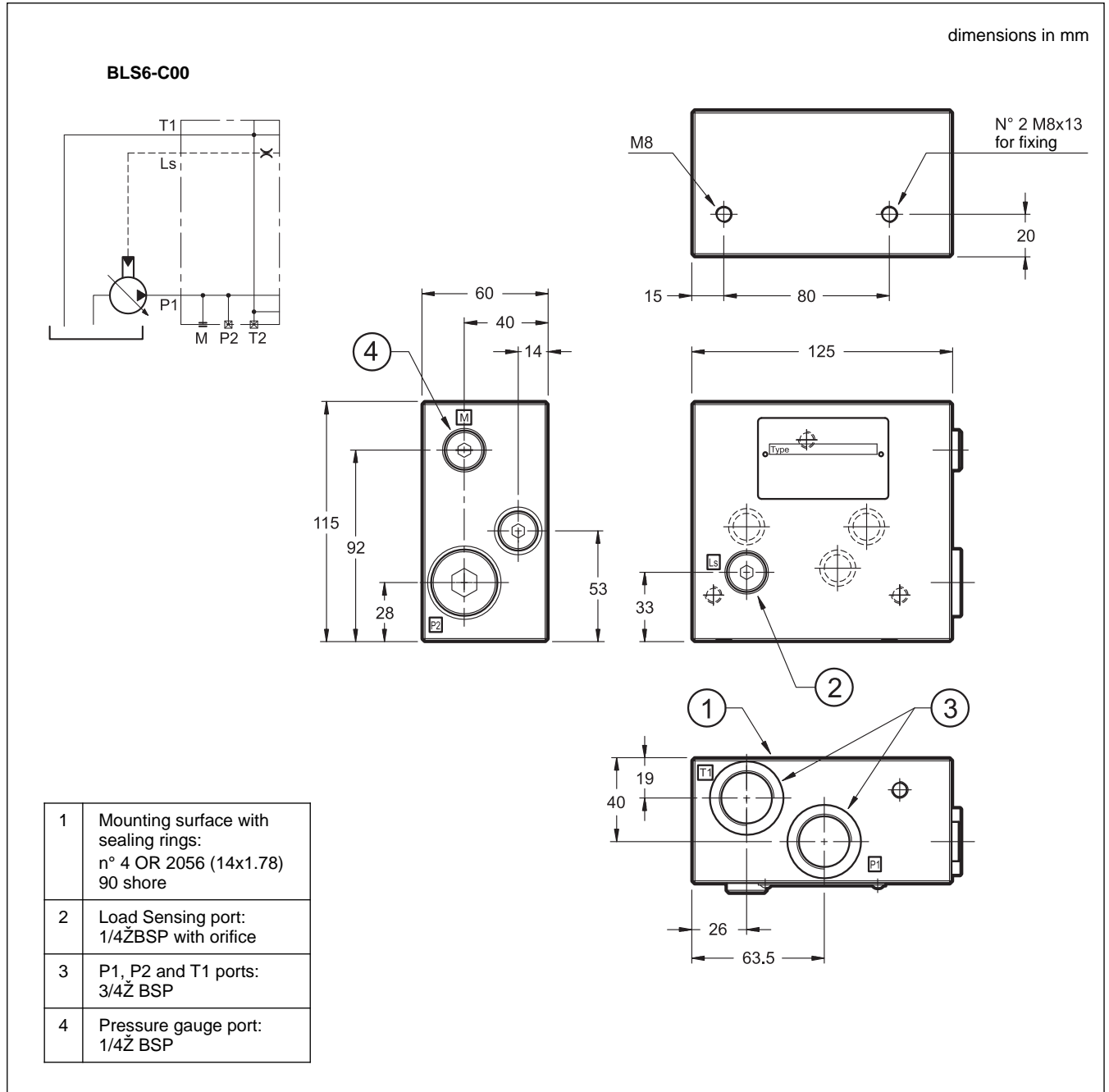
The on-off valves are supplied without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. Connectors for K7 connections are not available.

8 - OVERALL AND MOUNTING DIMENSIONS

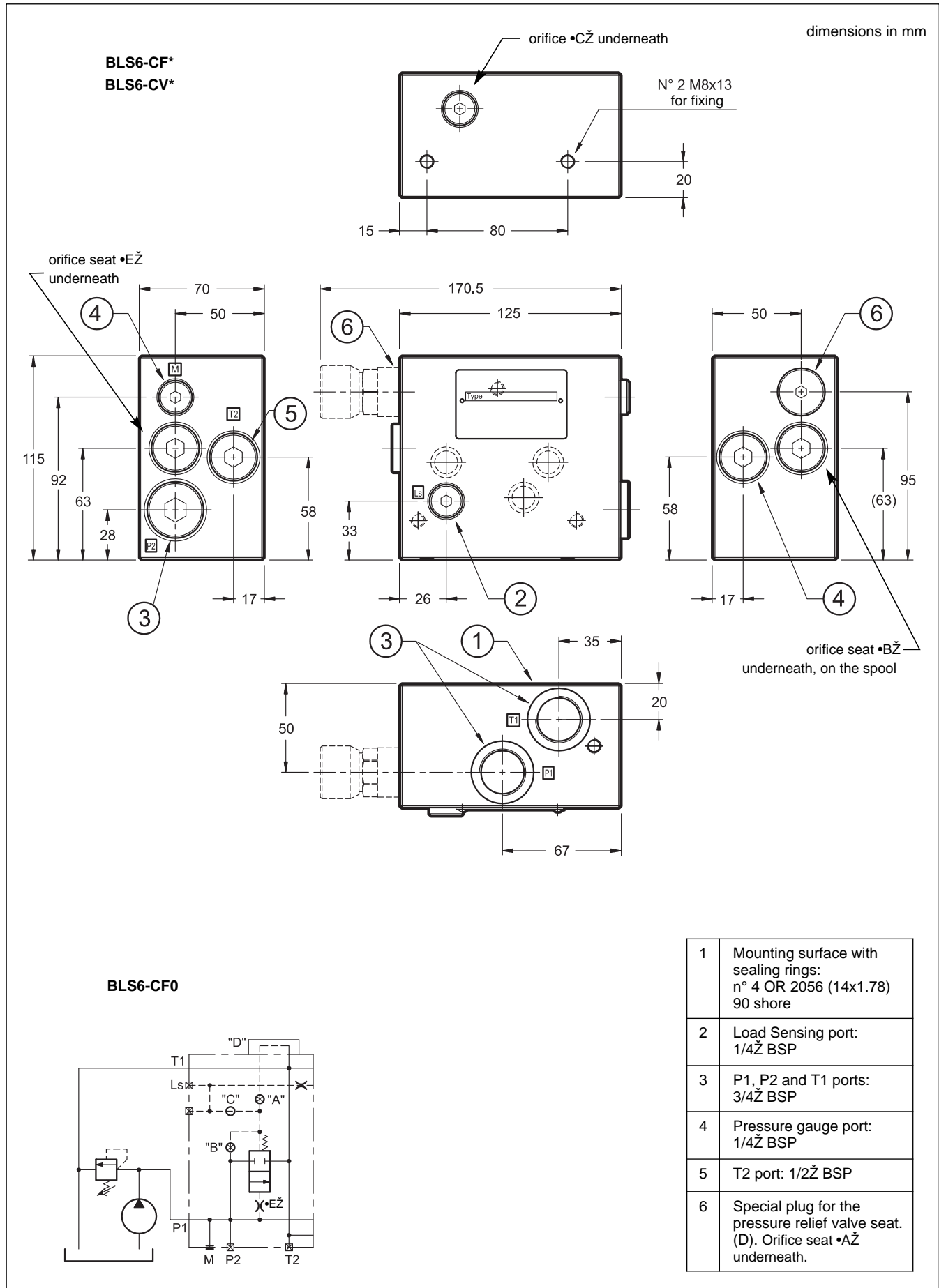
8.1 - Proportional module

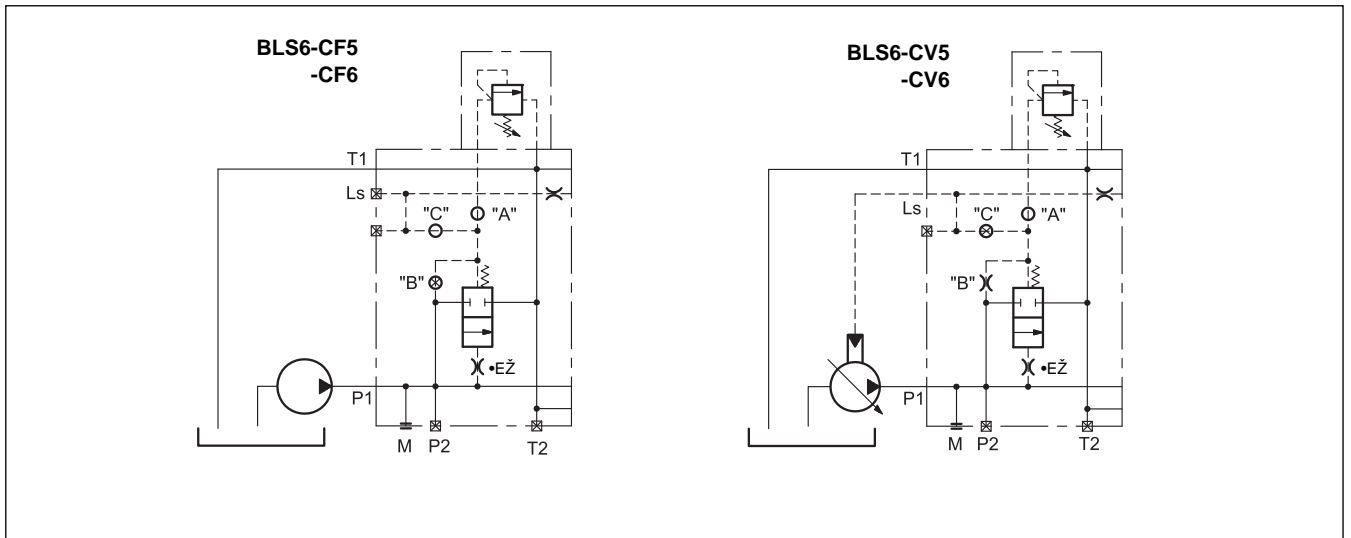


8.2 - Inlet modules

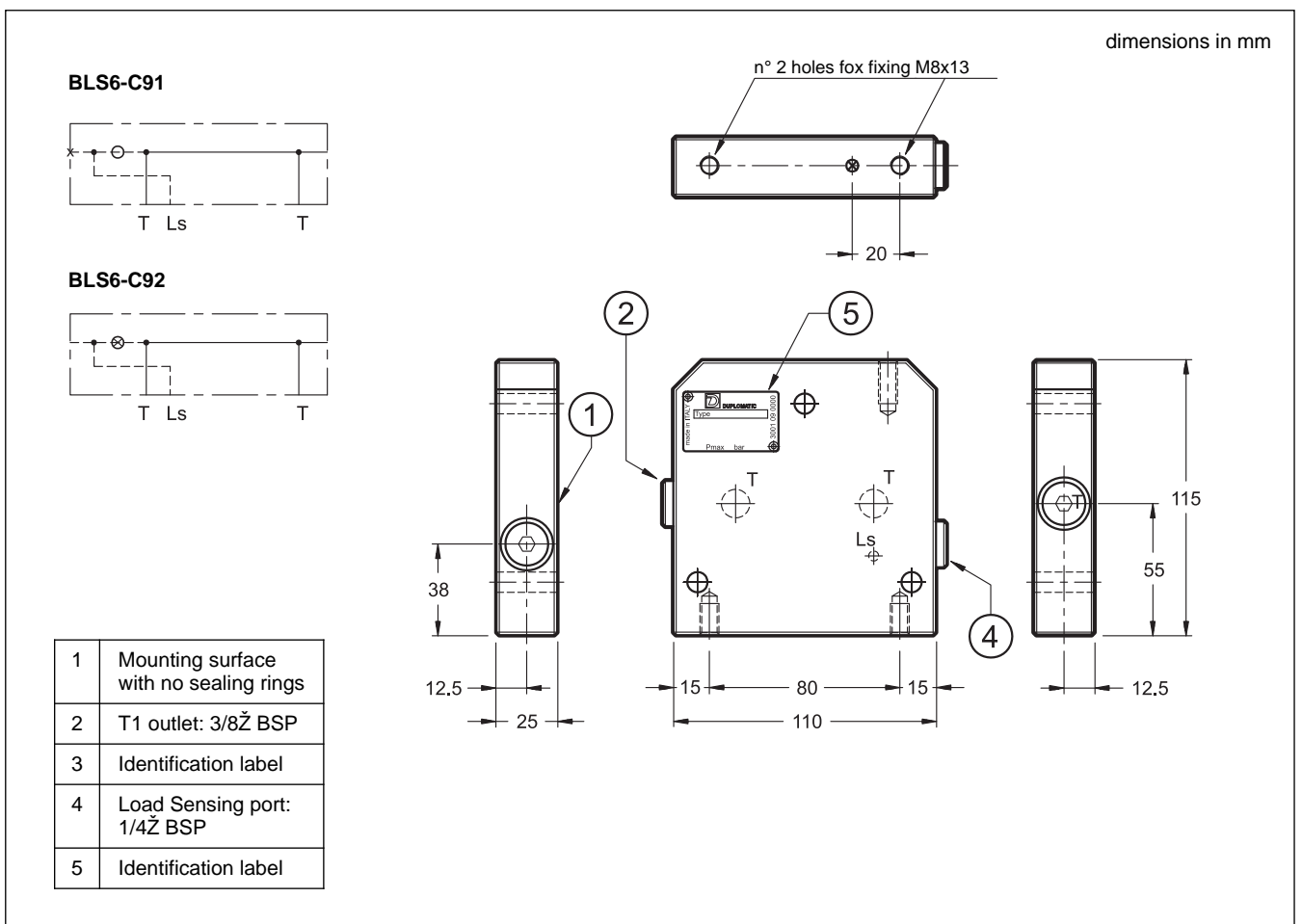


8.2 - Inlet modules





8.3 - End modules



9 - IDENTIFICATION CODE OF ASSEMBLED VALVE

BLS6	-		-		-		-		/	11	V	-		/	
-------------	---	--	---	--	---	--	---	--	---	-----------	---	---	--	---	--

Compensated direct operated directional valve with proportional control

Inlet module: _____
C0 = without compensator (**NOTE**)
CF = for fixed pump
CV = for variable pump

Pressure adjustment range: _____
0 = no relief valve
5 = from 12 to 210 bar
6 = from 15 to 315 bar

Proportional module: _____
 Choose open or closed center, and then the spool type, like code in par. 1.1
 Repeat for each proportional module required, max 8 modules.

End plate: _____
C91 = without load sensing port
C92 = with load sensing port

Manual override on all proportional modules (see par. 13)

Coil electrical connection: (see paragraph 9)
K1 = plug for connector type DIN 43650 (standard)
K7 = plug for connector type DEUTSCH DT04-2P male

Coil type:
D12 = Nominal solenoid voltage 12V DC
D24 = Nominal solenoid voltage 24V DC

Seals:
V = FPM seals (**standard**)

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

NOTE: The version C0 is available only without the pressure relief valve, with code BLS6-C00/11V.

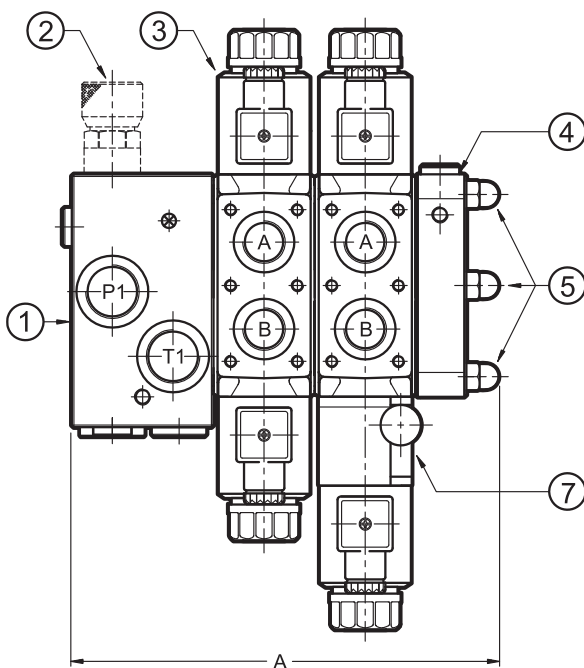
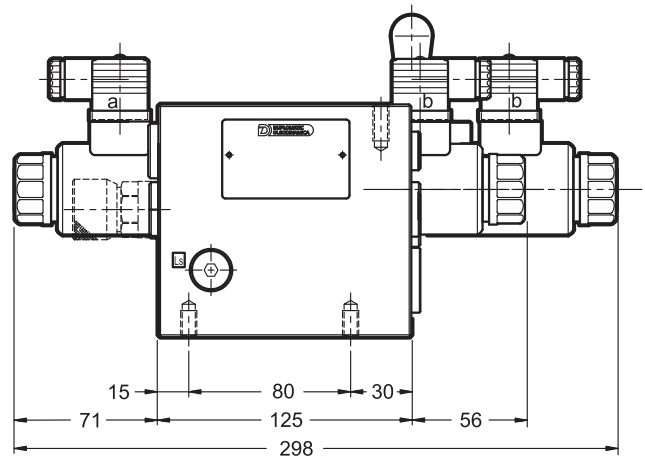
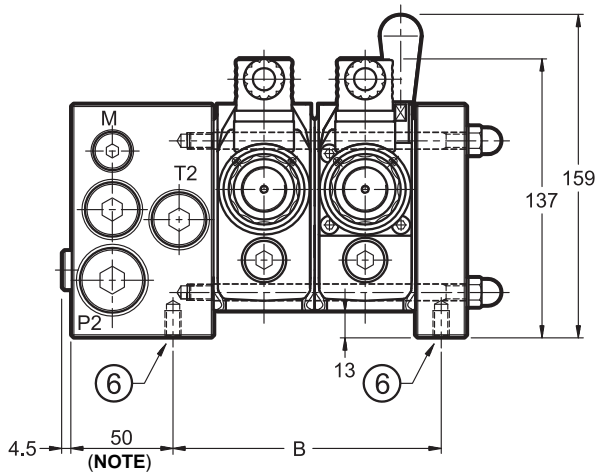
Coding example:
BLS6-C00-PC30/30-PC30/30-C92/11V-D24K1: assembled valve includes: inlet module without 3 way compensator; 2 prop. modules with closed center flow 30/30; end plate without load sensing port; FPM seals, 24V DC coils and K1 connection.

BLS6-CF5-PA45/30-PA45/30-PC30/30-PAB15/15-C91/11V-D12K1: assembled valve includes: inlet module for fixed pump, with pressure max 210 bar; 2 prop. modules with open center flow 45/30, 1 prop. module with close center, flow 30/30 and 1 prop. module with open center and solenoid only on side B, flow 15/15; end plate with load sensing port; FPM seals, 12V DC coils and K1 connection.

NOTE: To obtain the best performances, we suggest to mount the spool with the max flow first, and then the others decreasing.

10 - INSTALLATION AND OVERALL DIMENSIONS OF THE ASSEMBLED VALVE

dimensions in mm



Modules	A (NOTE)	B
2	212	132,5
3	262	182,5
4	312	232,5
5	362	282,5
6	412	332,5
7	462	382,5
8	512	432,5

NOTE: with the inlet module BLS6-C00 the dimension results 10 mm shorter.

Fixing kit

The fixing kit includes n° 3 studs, 3 self locking nuts and 3 washers, all zinc-coated.

To order it please use the following codes:

1	Inlet module
2	Pressure relief valve
3	Proportional modules
4	End plate
5	Fixing studs
6	Fixing holes
7	Manual lever override module

No. of body modules	Code
2	3404150010
3	3404150011
4	3404150012
5	3404150013
6	3404150014
7	3404150015
8	3404150016

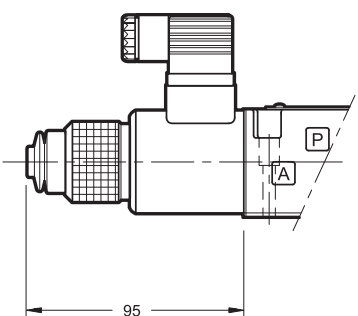
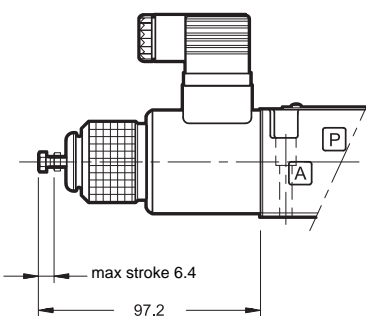
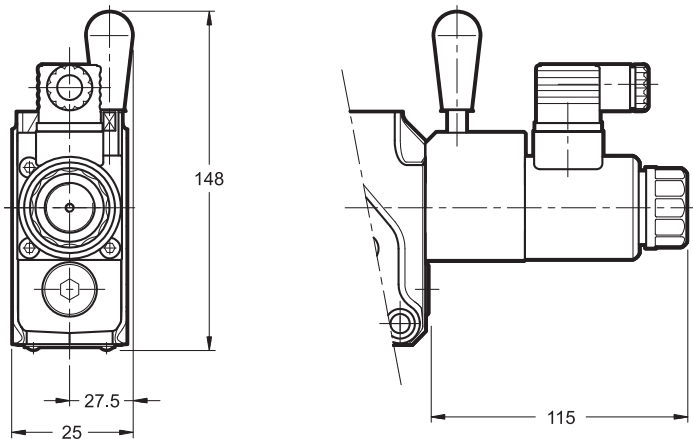
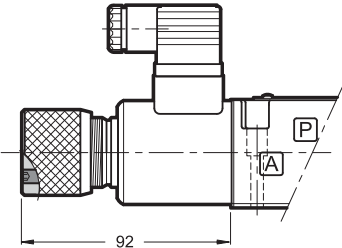
Tightening torque: 25 Nm

11 - 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 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.
- **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.

<p style="text-align: center;">CM Version</p>  <p style="text-align: center;">Code: 3803210003</p>	<p style="text-align: center;">CS Version</p>  <p style="text-align: center;">Code: 3803210004</p>
<p>CH Version</p> 	
<p style="text-align: center;">CK Version</p>  <p>Spanner for set screw: 3 mm Code: 3803210005</p>	

12 - ELECTRONIC CONTROL UNITS

One solenoid

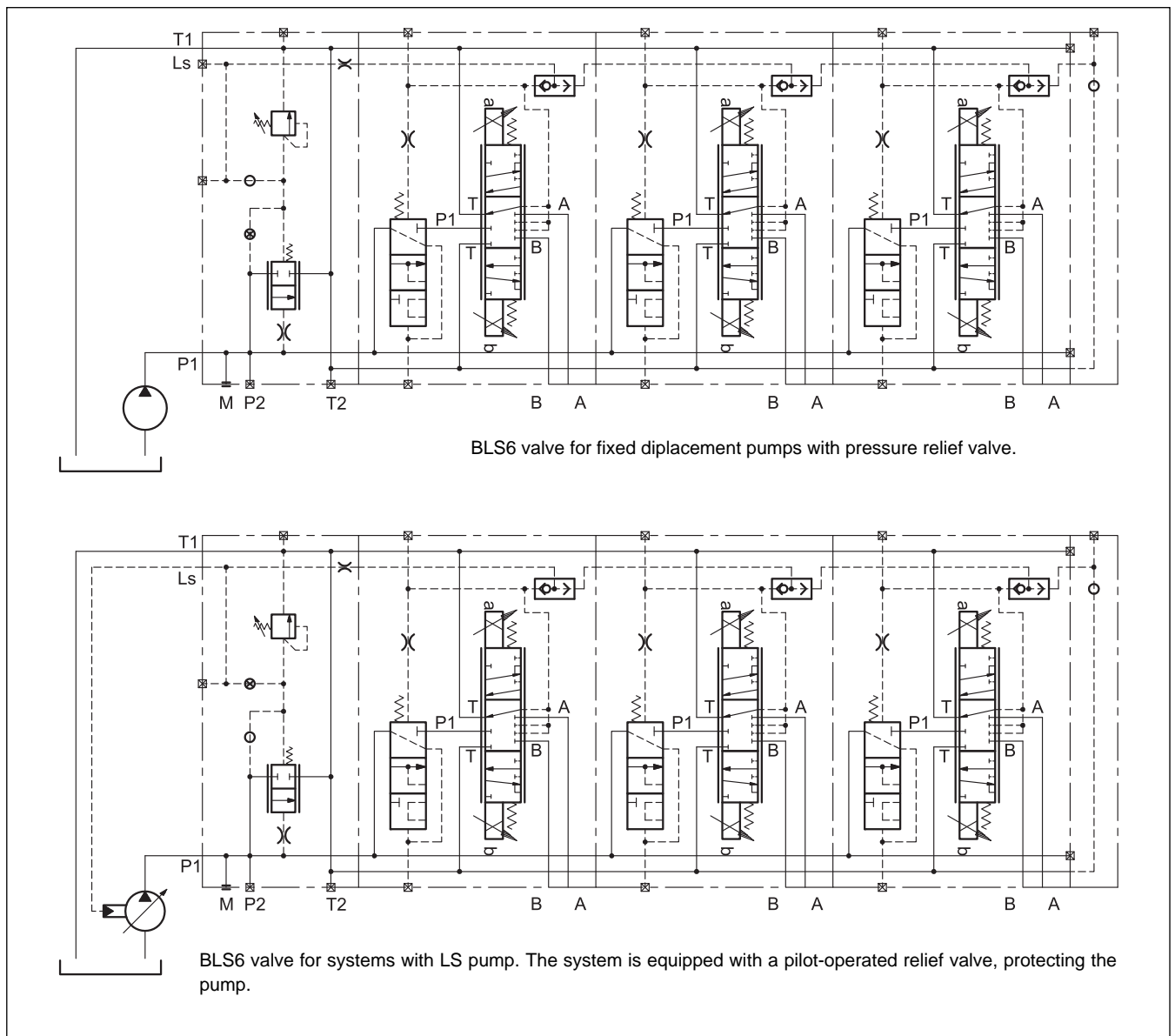
EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDC-141	for solenoid 12V DC		
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M141	for solenoid 12V DC		

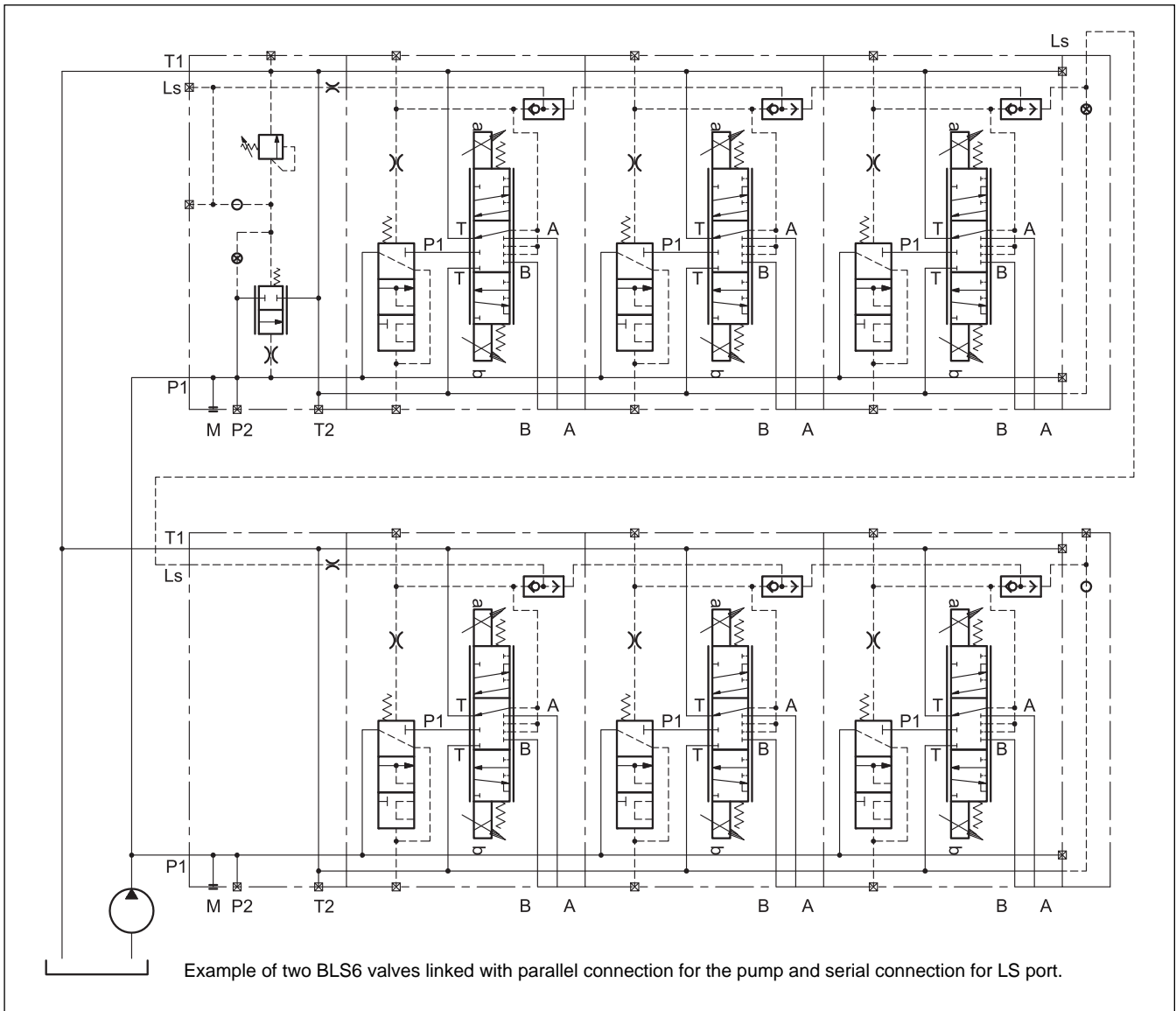
These cards drive only a module at once.
Every module to be driven with electronic card must have its one.

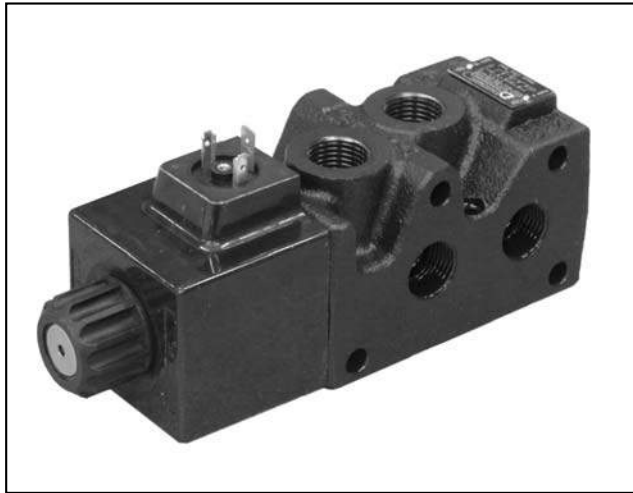
Two solenoids

EDM-M211	for solenoid 24V DC	rail mounting DIN EN 50022	see cat. 89 250
EDM-M241	for solenoid 12V DC		

13 - EXAMPLES OF APPLICATION







BFD*

SIX WAYS BANKABLE FLOW DIVERTER SERIES 10

p max 320 bar
Q max 90 l/min

OPERATING PRINCIPLE

„ BFD* is a 6 ways bankable flow diverter that allows the simultaneous connection of 2 utilities, alternating the direction of flow through a solenoid operate directional valve.

„ It is available in two sizes, depending on the requested flow, and is used mainly for compact applications for the mobile sector.

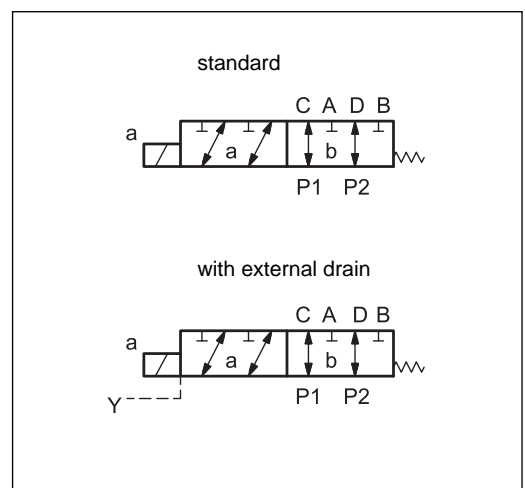
„ Valve BFD is also suitable for series mounting, lining up to max 5 modules.

„ The external drain is available as an option on both versions.

PERFORMANCES (obtained with mineral oil with viscosity of 36 cSt at 50°C)

		BFD06	BFD10
Maximum operating pressure : - with drain Y	bar	250 320	
Maximum flow	l/min	60	90
Pressure drops p - Q		see paragraph 3	
Electrical features		see paragraph 6	
Operating limits		see paragraph 4	
Electrical connections		see paragraph 10	
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 20/18/15	
Recommended viscosity	cSt	25	
Mass:	kg	3	4,2
Surface treatment		thermochemical antioxidant	

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

BFD	-		-	TA6	/	10	-		/	
------------	---	--	---	------------	---	-----------	---	--	---	--

Bankable 6 ways flow diverter

Nominal size
06 = 60 l/min
10 = 90 l/min

Ports: (see **NOTE 1**)
G038 = 3/8" BSP (for BFD06)
G012 = 1/2" BSP

Spool type: _____

Series: _____
 (the overall and mounting dimensions remain unchanged from 10 to 19)

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

NOTE 1: On BFD06 are available upon request for the threads: 3/4" 16 UNF (**S08**).

NOTE 2: The locking rings of the coils and the relevant O-Rings are supplied together with valves.

Option:
Y = External drain (see par. 12.2)

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected

Coil electrical connection (see. par. 9):
K1 = plug for connector type DIN 43650 (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male (available only for DN06)

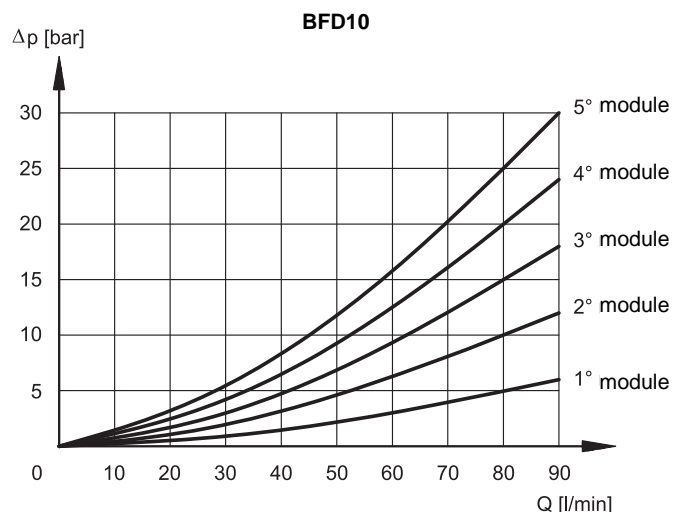
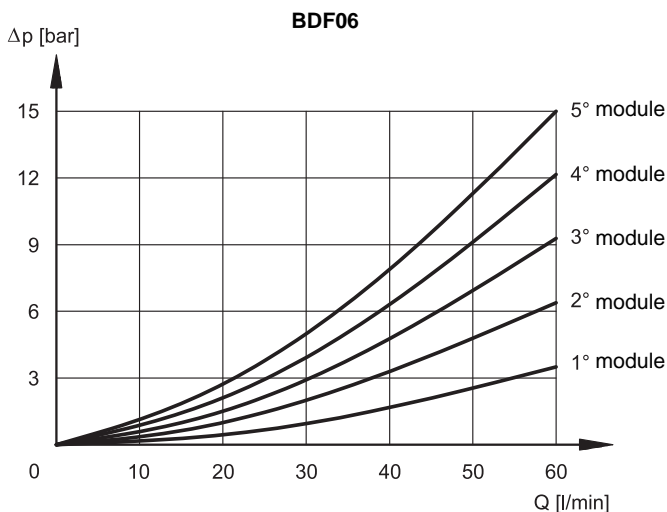
Coil type
D12 = 12 V
D24 = 24 V
D28 = 28 V (BFD06 only)
D00 = valve without coils (see **NOTE 2**)

2 - 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.

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

3.1 - Pressure Drops p-Q at rest

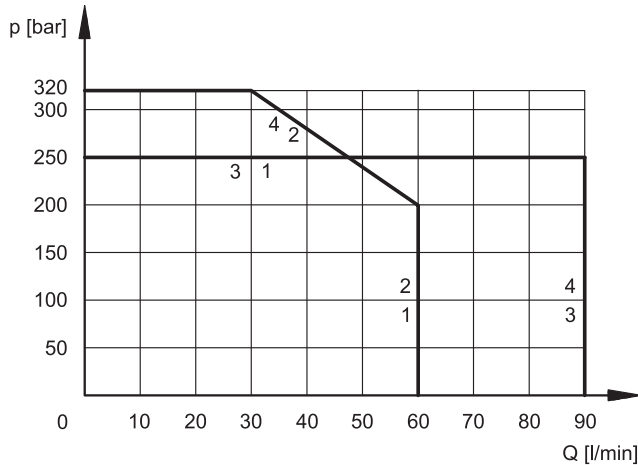


4 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



VALVE	CURVE
BFD06*	1
BFD06*/Y	2
BFD10*	3
BFD10*/Y	4

5 - SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

TIMES ms ($\pm 10\%$)	ENERGIZING	DE-ENERGIZING
BFD06	25 ÷ 75	20 ÷ 50
BFD10	50 ÷ 100	20 ÷ 40

6 - ELECTRICAL CHARACTERISTICS

6.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP
K1 DIN 43650	IP 65
K7 DEUTSCH DT04 male	IP 69 K

NOTE: The protection degree is guaranteed only with the connector correctly connected and installed.

NOTE 2: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

SUPPLY VOLTAGE FLUCTUATION	$\pm 10\%$ V _{nom}
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 2)	In compliance with 2004/108/ CE
LOW VOLTAGE	In compliance with 2006/95 CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class F (BFD06) class H (BFD10)

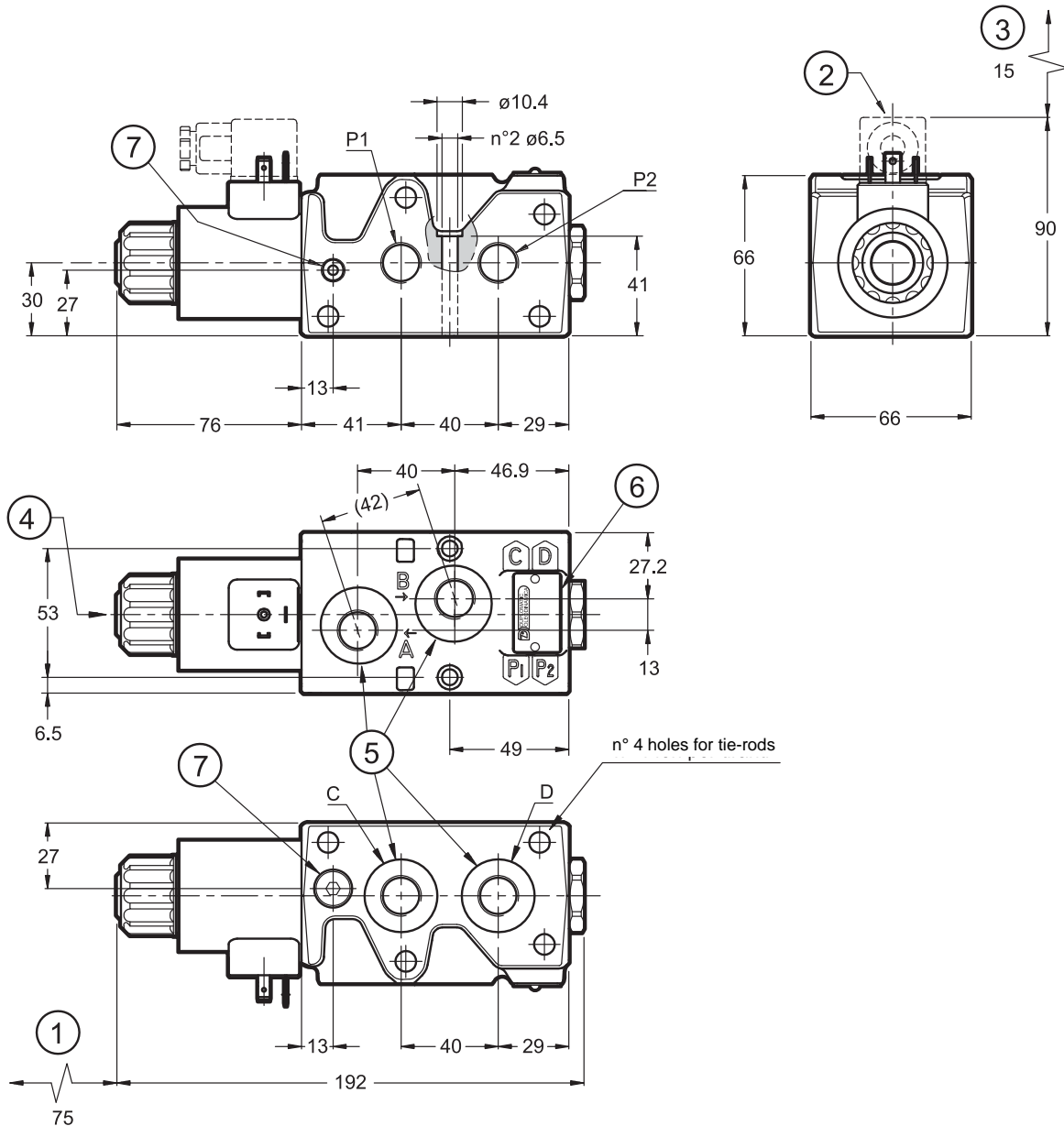
6.2 Current and absorbed power

The table shows current and power consumption values relevant to the different coil types.

Valve	Coil	Resistance at 20°C [] ($\pm 1\%$)	Current consumpt. [A] ($\pm 5\%$)	Absorbed power [W] ($\pm 5\%$)	Coil code	
					K1	K7
BFD06*	C22S3-D12	4 ÷ 5	2,72	32,7	1903080	1902940
	C22S3-D24	18 ÷ 19,5	1,29	31	1903081	1902941
	C22S3-D28	24,5 ÷ 27	1,11	31	1903082	-
BFD10*	C22L5-D12*	2,9	4,14	50	1903150	-
	C22L5-D24*	12,3	1,95	47	1903151	-

7 - BFD06 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



Fastening bolts: n°2 M6x50

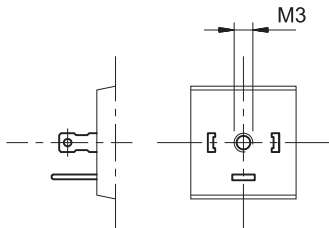
1	Coil removal space
2	DIN 43650 electrical connector
3	Connector removal space (representation with standard connection type K1 - for connection K7 see par. 10)
4	Standard manual override included in the solenoid tube
5	Ports: 3/8Ž BSP
6	Identification label
7	Option: external drain port Y 1/8Ž BSP

9 - INSTALLATION

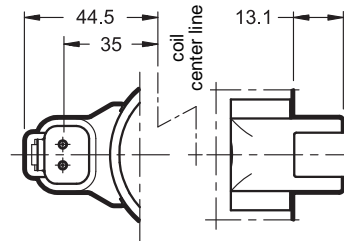
The solenoid operated valve can be installed in any position without undermining the proper functioning.

10 - ELECTRICAL CONNECTIONS

Connection type connector DIN 43650 - Code **K1**



Connection type connector DEUTSCH DT04-2P male
Code **K7** (for BFD06 only)



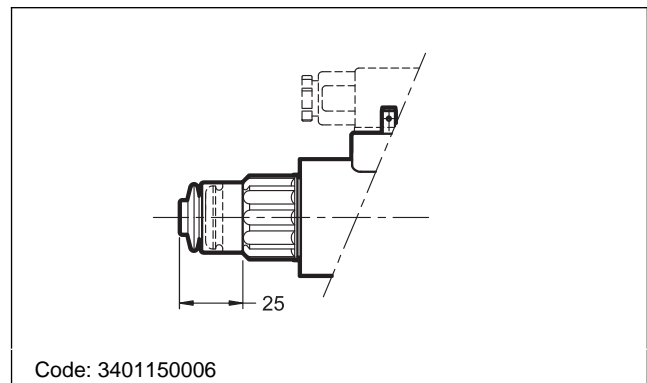
11 - ELECTRICAL CONNECTORS

The solenoid valves are supplied without connectors. For coils with electrical connection type K1 (DIN 43650) connectors can be ordered separately. To identify the type of connector to be ordered catalogue to see 49 000. For connections K7 its connectors are not available.

12 - OPTIONS

12.1 Boot 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. Option is available on both versions.



12.2 - Subplate external drain port (option Y)

This version allows the operation with pressures up to 320 bar on the ports.

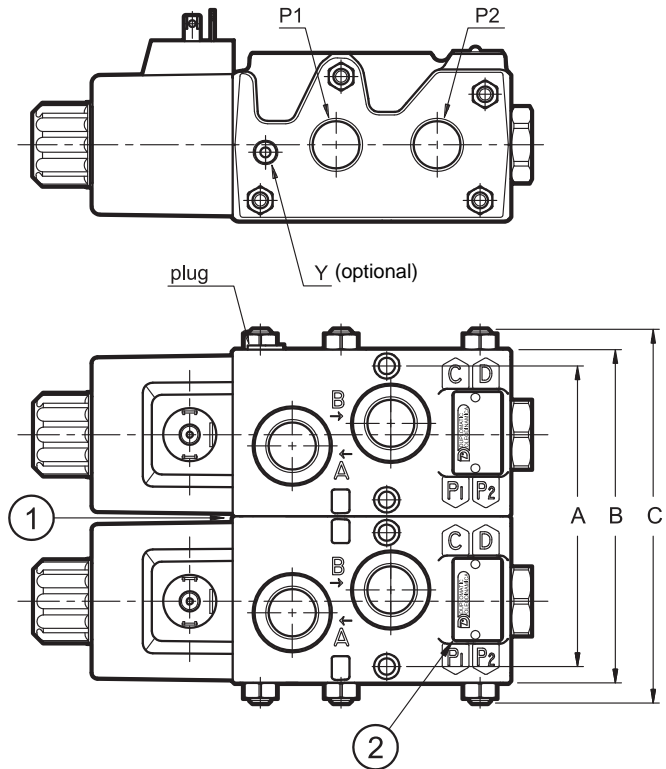
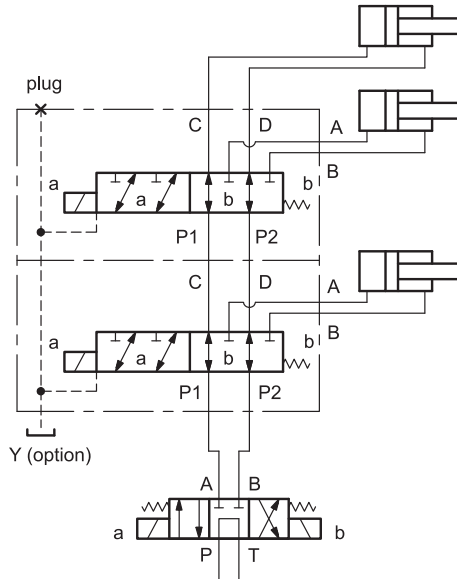
It consists in a Y drain hole realized on the valve coupling interface, where the Y port is connected with the solenoid tubes: in this way the tubes are not stressed by the pressure operating on the valve ports.

13 - SERIES CONFIGURATION

The BFD* valve can also be mounted in series, bundled up to 5 individual modules. The fixing kit must be ordered separately. It includes: rods and screws, nuts, security washers and OR, as indicated in the table below.

13.1 Hydraulic scheme, dimensions and installation

MOUNTING EXAMPLE



BFD06: 3/8" BSP ports
BFD10: 1/2" BSP ports

1	Mounting surface with sealing rings: OR 2106 (26.7x1.78) 90 shore additional just for Y version: OR 2050 (12.42x1.78) 90 shore
2	Identification label

Tightening torque: 17 Nm

modules no.	ways no.	A	B	C	bolts or tie-rods	nuts & washers	n° OR 2106	n° OR 2050	kit BFD*/10N	kit BFD*/10V
2	8	119	132	156	n° 4 bolts M8x145	4+4	2	1	3404200002	3404200012
3	10	185	198	220	n° 4 tie-rods M8x200	8+8	4	2	3404200003	3404200013
4	12	251	264	285	n° 4 tie-rods M8x265	8+8	6	3	3404200004	3404200014
5	14	317	330	350	n° 4 tie-rods M8x330	8+8	8	4	3404200005	3404200015



BFD*
SERIES 10



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VR*-I

CHECK VALVES

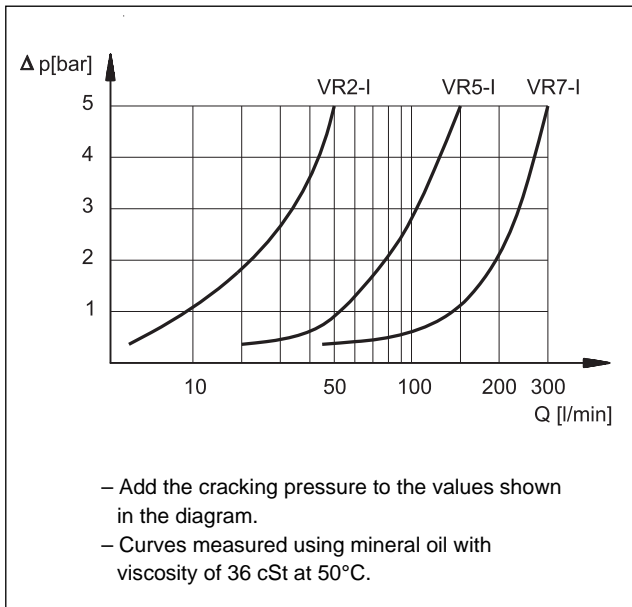
SERIES 32

CARTRIDGE TYPE

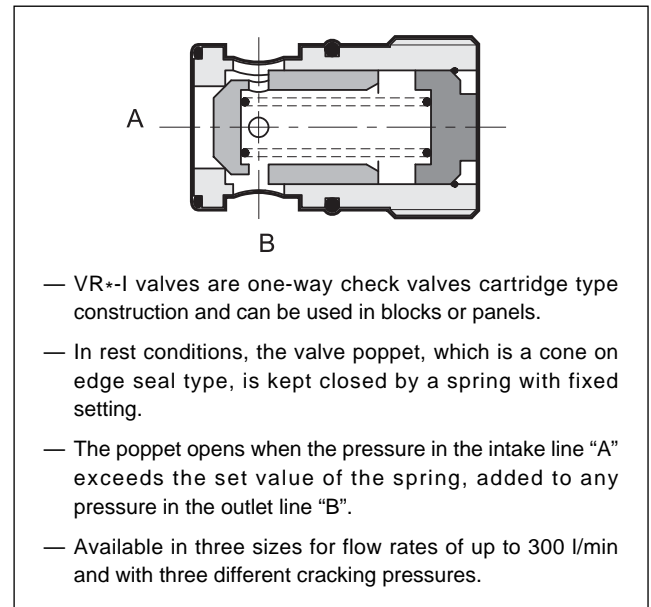
p max (see table of performances)

Q max (see table of performances)

PRESSURE DROP P-Q



OPERATING PRINCIPLE

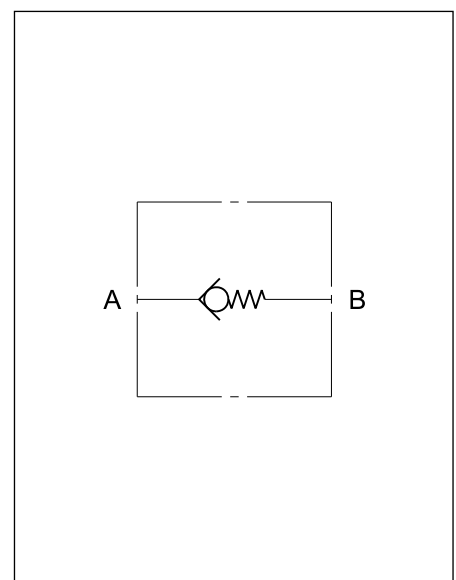


PERFORMANCES

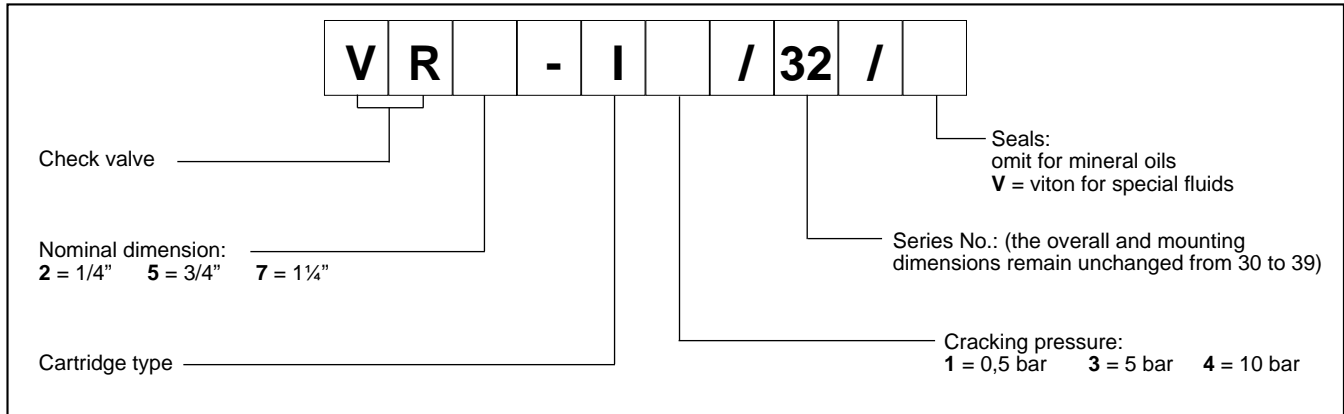
valve code	nominal dimension	maximum flow rate [l/min]	mass [kg]	max operating pressure [bar]	
				continuous	peak
VR 2- I	1/4"	50	0,1	320	320
VR 5- I	3/4"	150	0,2	250	320
VR 7- I	1 1/4"	300	0,8		

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 20/18/15	
Viscosità raccomandata	cSt	25

HYDRAULIC SYMBOL



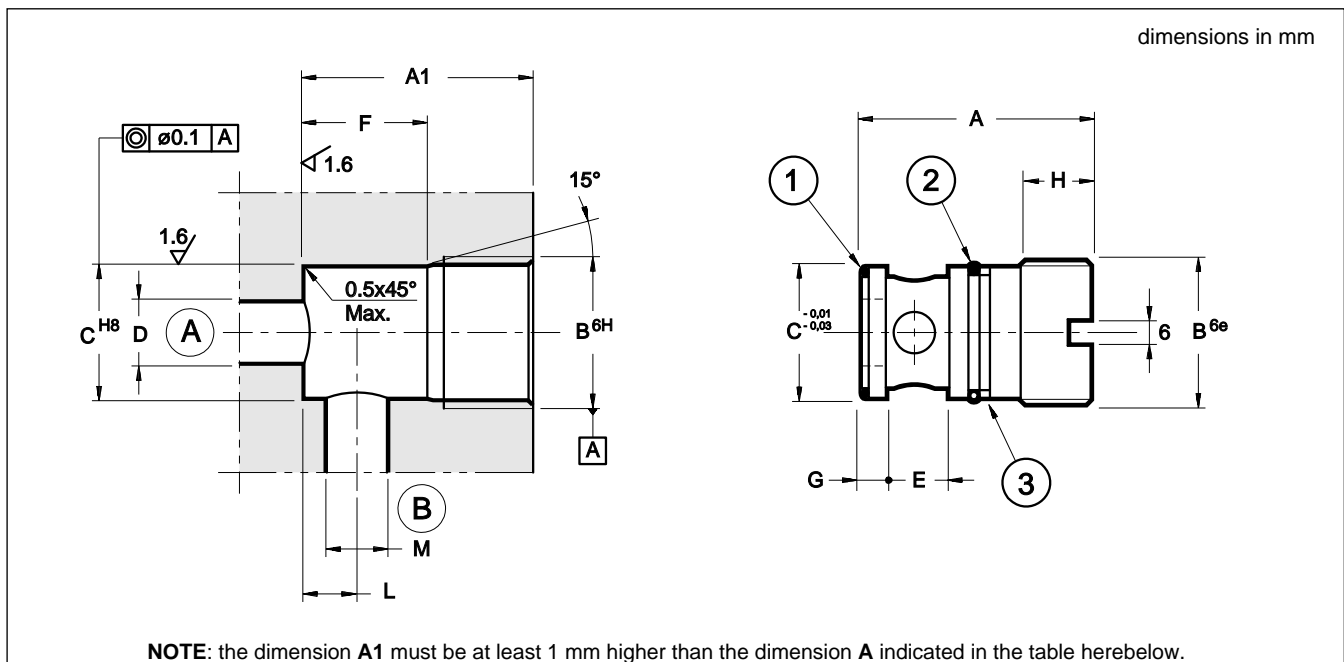
1 - IDENTIFICATION CODE



2 - 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.

3 - OVERALL AND MOUNTING DIMENSIONS



	A	B	ØC	ØD max	E	F	G	H	L	ØM max	1	2	3	tightening torque
VR 2 - I	41	M24x1,5	22	9	10	22	4	14	9	9	OR 119 (15.08x2.62)	OR 3068 (17.13x2.62)	Parbak 8-115	25 Nm
VR 5 - I	43	M30x1,5	27	15	13,5	26	4,5	12	11	12	OR 3081 (20.24x2.62) 90 Shore	OR 2093 (23.52x1.78)	Parbak 8-021	50 Nm
VR 7 - I	72	M45x2	41	21	20	40	7,5	22	16,5	16	OR 3137 (34.60x2.62)	OR 4137 (34.52x3.53) 90 Shore	Parbak 8-220	80 Nm



VSK*
SHUTTLE VALVE
SERIES 10

CARTRIDGE TYPE

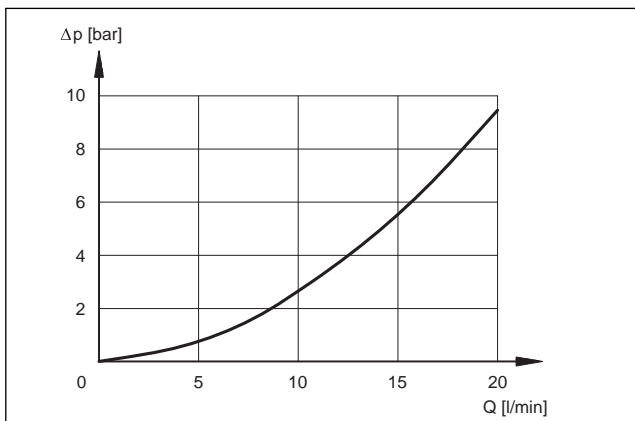
p max **350** bar

Q max (see table of performances)

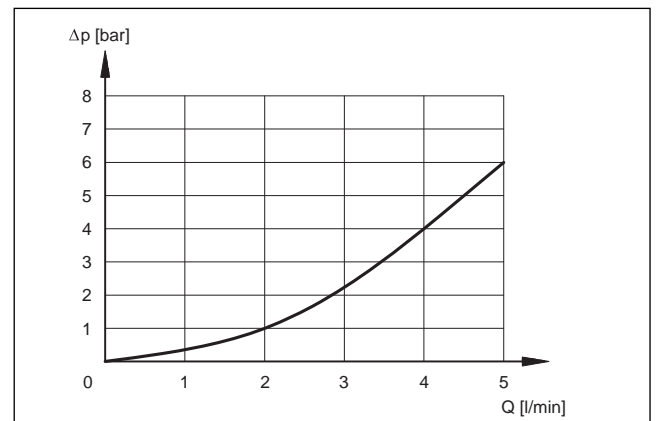
OPERATING PRINCIPLE

- The VSK* valves are shuttle type, cartridge version and it can be used in panels and blocks.
- The valve select the higher pressure signal between “1” and “3” through the output port “2”
- The VSK1 reaches flows up to 20 l/min.
- The VSK2 is a shuttle valve for pilot signals up to a 3 l/min flows.

VSK1 PRESSURE DROPS p-Q



VSK2 PRESSURE DROPS p-Q

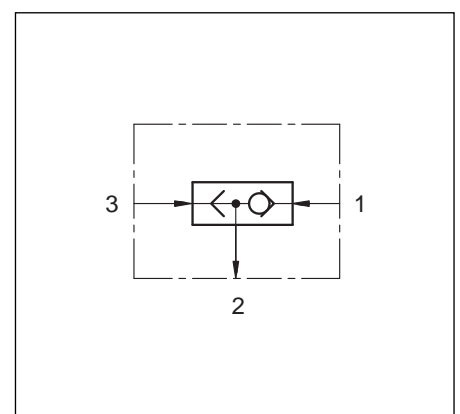


PERFORMANCES

valve	max flow [l/min]	mass [kg]
VSK1	20	0,013
VSK2	3	0,013

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 20/18/15	
Recommended viscosity	cSt	25

HDRAULIC SYMBOL





VD*-W*

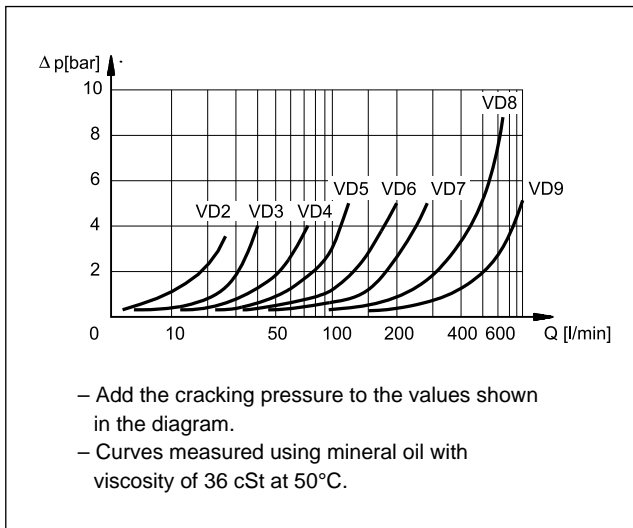
CHECK VALVES

SERIES 30

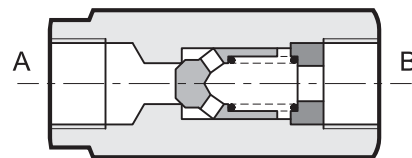
p max **400** bar

Q max (see table of performances)

PRESSURE DROPS p-Q



OPERATING PRINCIPLE



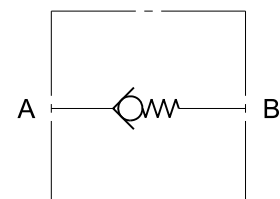
- VD*-W* valves are check valves with threaded “BSP” ports for mounting in-line on hydraulic lines.
- They allow the flow to pass freely in one direction, blocking it in the opposite direction.
- In rest conditions, the valve poppet is kept closed by a spring. The poppet opens when the pressure in the intake line “A” exceeds the set value of the spring, added to any pressure in the outlet line “B”.
- Available in eight sizes for flow rates of up to 850 l/min and with five different cracking pressures.

PERFORMANCES

Valve	BSP port dimension	Maximum flow rate [l/min]	Mass [kg]	Max operating pressure [bar]
VD2-W*	1/4"	25	0,17	400
VD3-W*	3/8"	40	0,26	
VD4-W*	1/2"	75	0,41	
VD5-W*	3/4"	125	0,6	
VD6-W*	1"	200	1,2	320
VD7-W*	1 ¼"	280	1,8	
VD8-W*	1 ½"	650	3,2	
VD9-W*	2"	850	4,8	

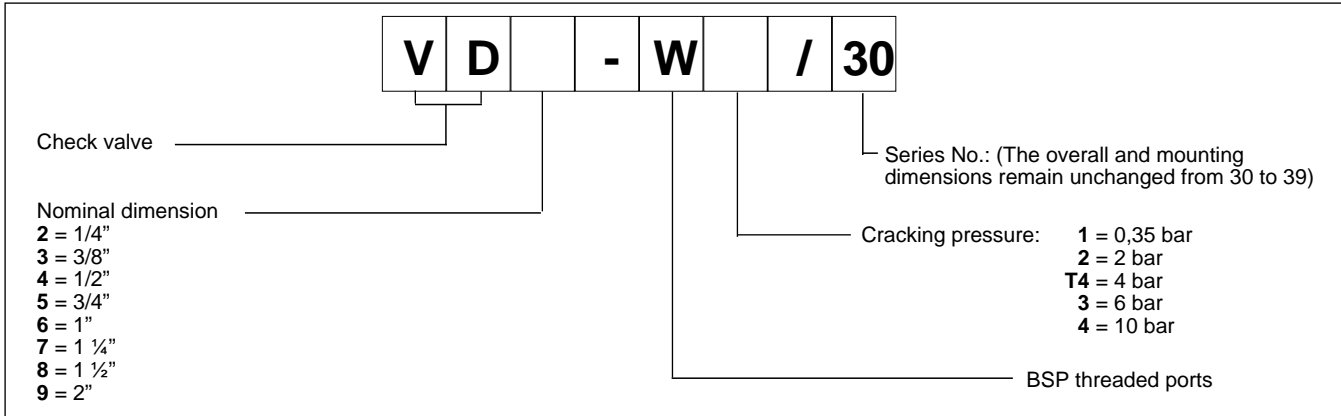
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	cSt	25
Recommended viscosity	acc. to ISO 4406:1999 class 20/18/15	

HYDRAULIC SYMBOL





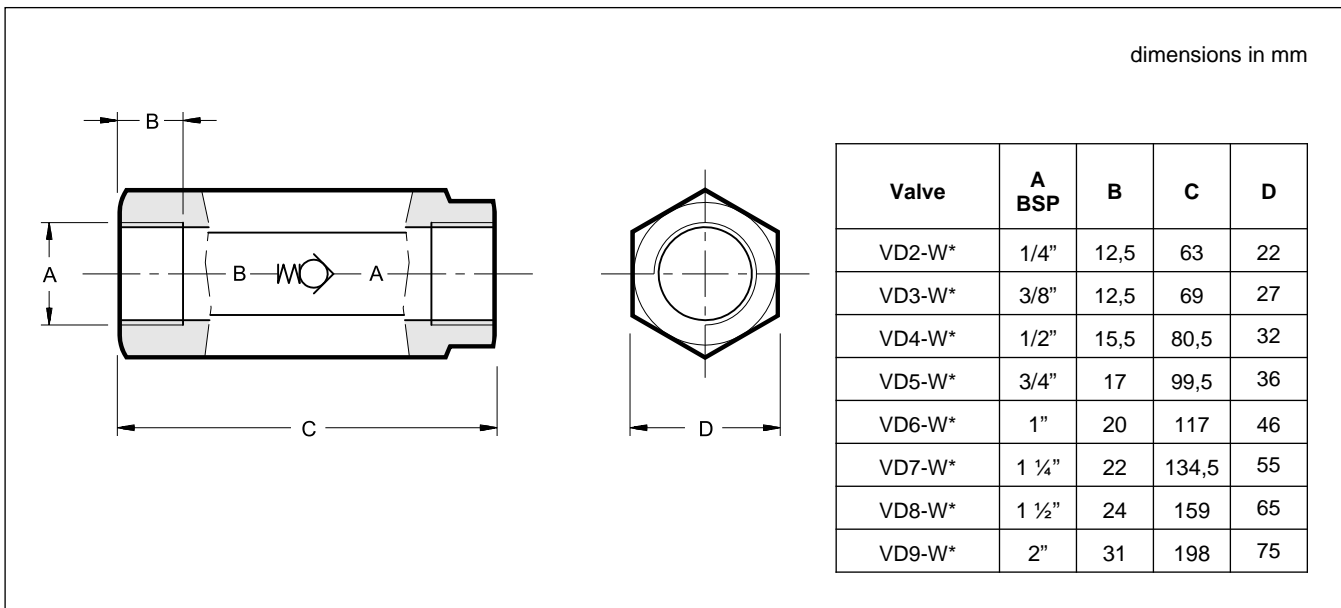
1 - IDENTIFICATION CODE



2 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4.
 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.

3 - OVERALL AND MOUNTING DIMENSIONS



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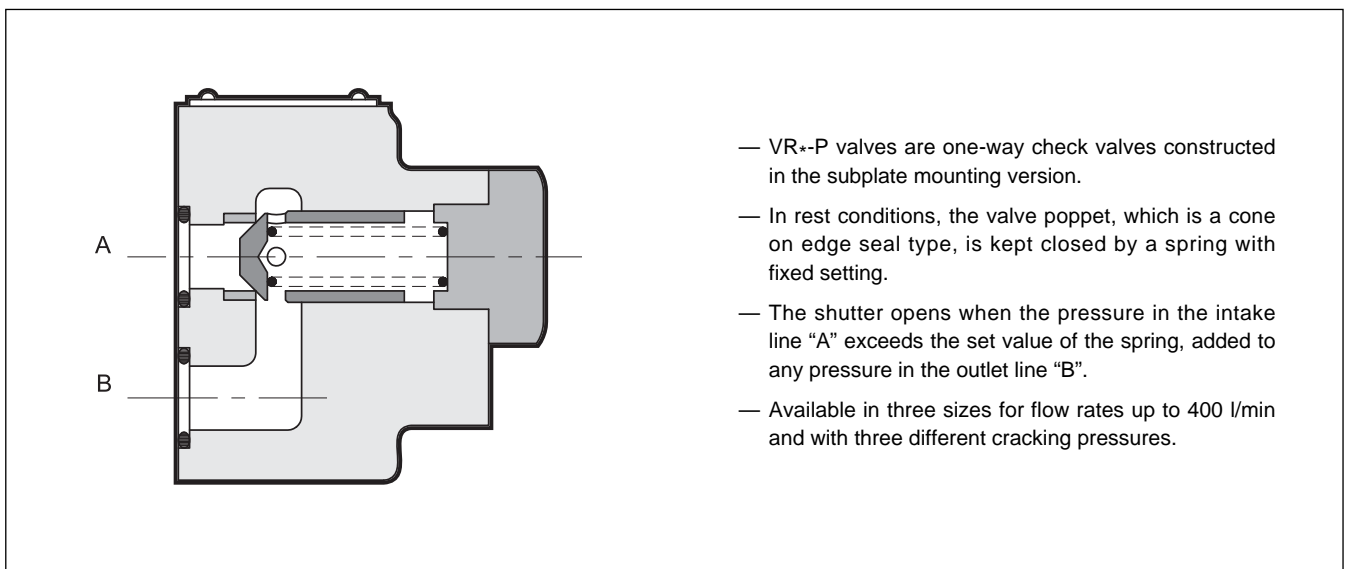


VR*-P CHECK VALVES

SUBPLATE MOUNTING

p max (see table of performances)
Q max (see table of performances)

OPERATING PRINCIPLE

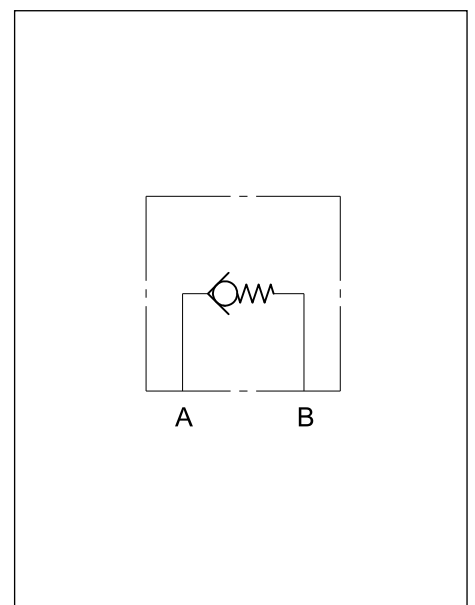


TECHNICAL SPECIFICATIONS

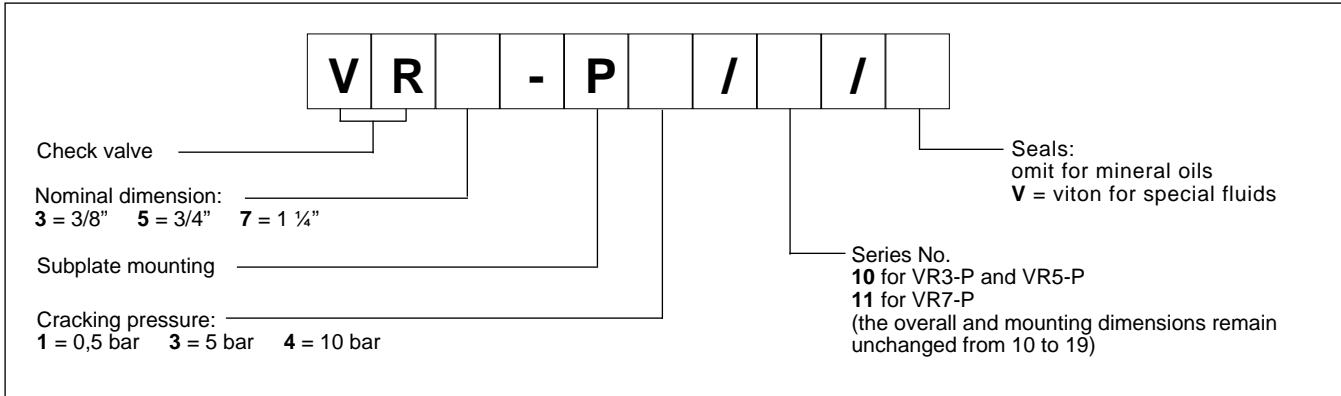
Valve code	Nominal dimension	Maximum flow rate [l/min]	Mass [kg]	Max. operating pressure [bar]
VR3 - P	3/8"	100	2,3	350
VR5 - P	3/4"	200	4,8	350
VR7 - P	1 1/4"	400	9	250

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 20/18/15	
Recommended viscosity	cSt	25

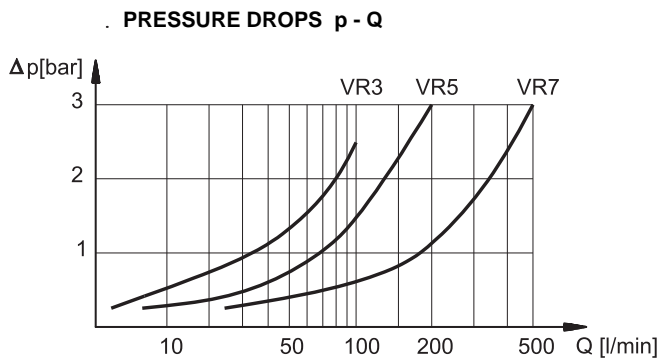
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES (values obtained with viscosità 36 cSt at 50°C)

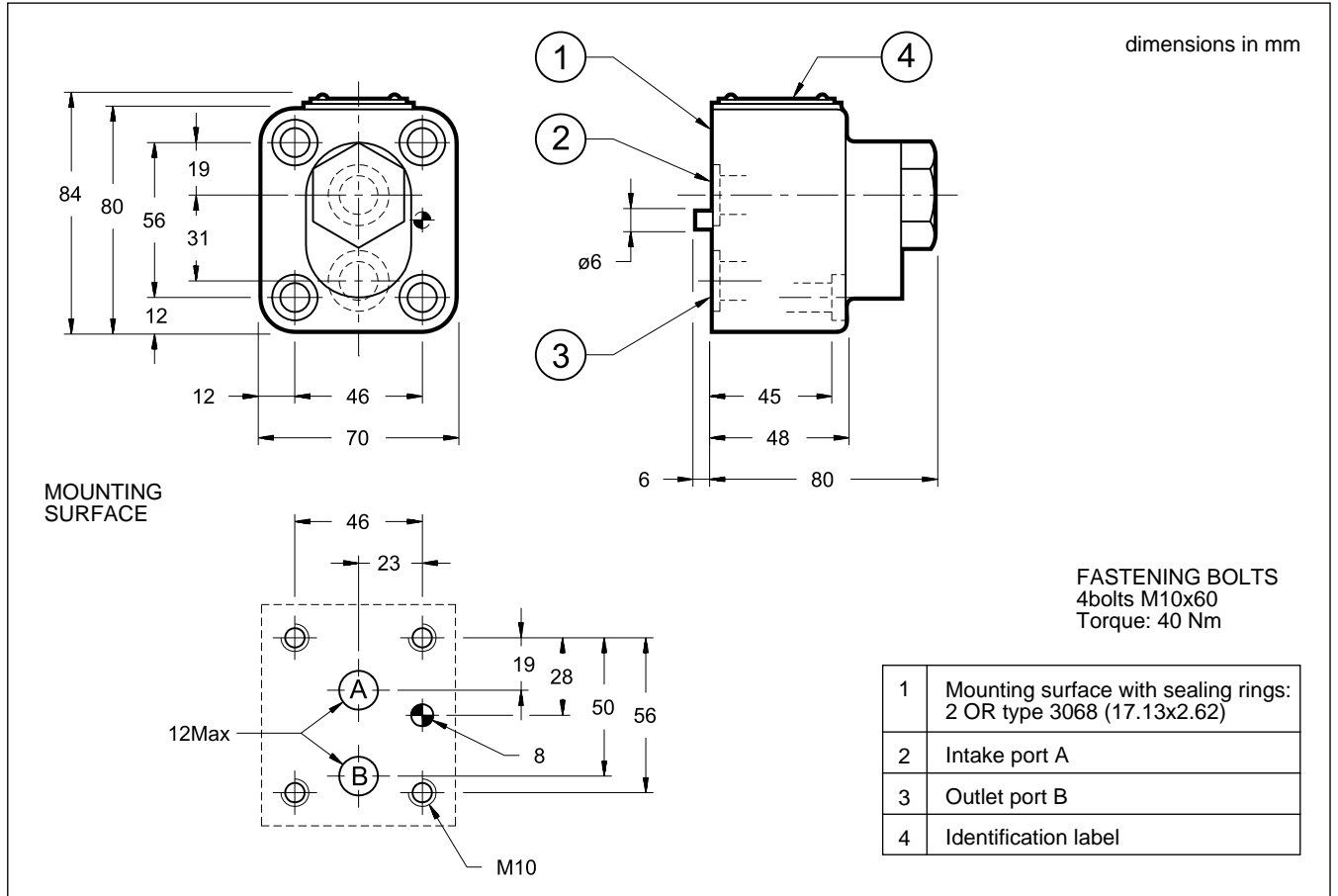


NOTE: Add the cracking pressure to the values shown in the diagram.

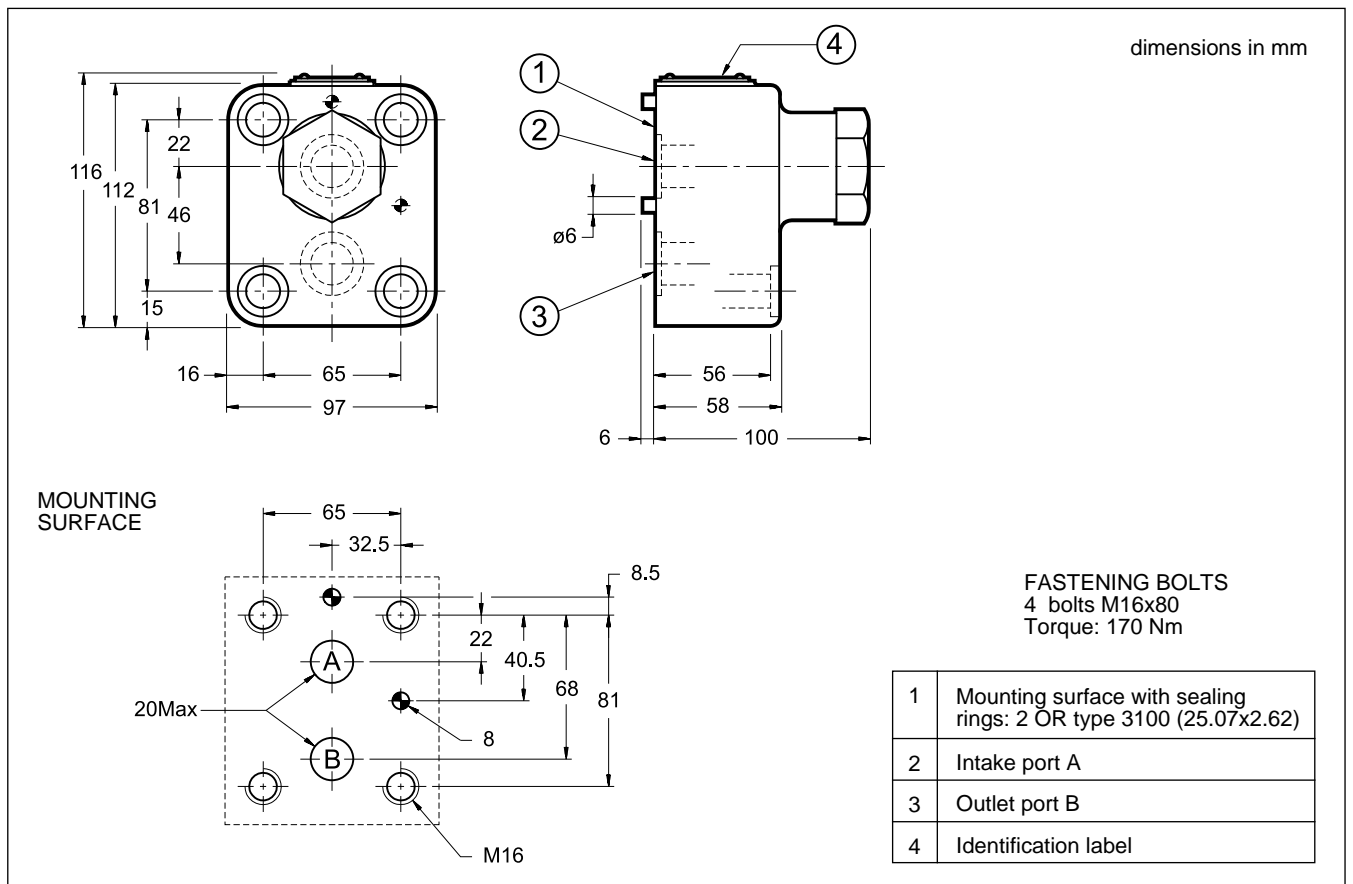
3 - HYDRAULIC FLUIDS

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.

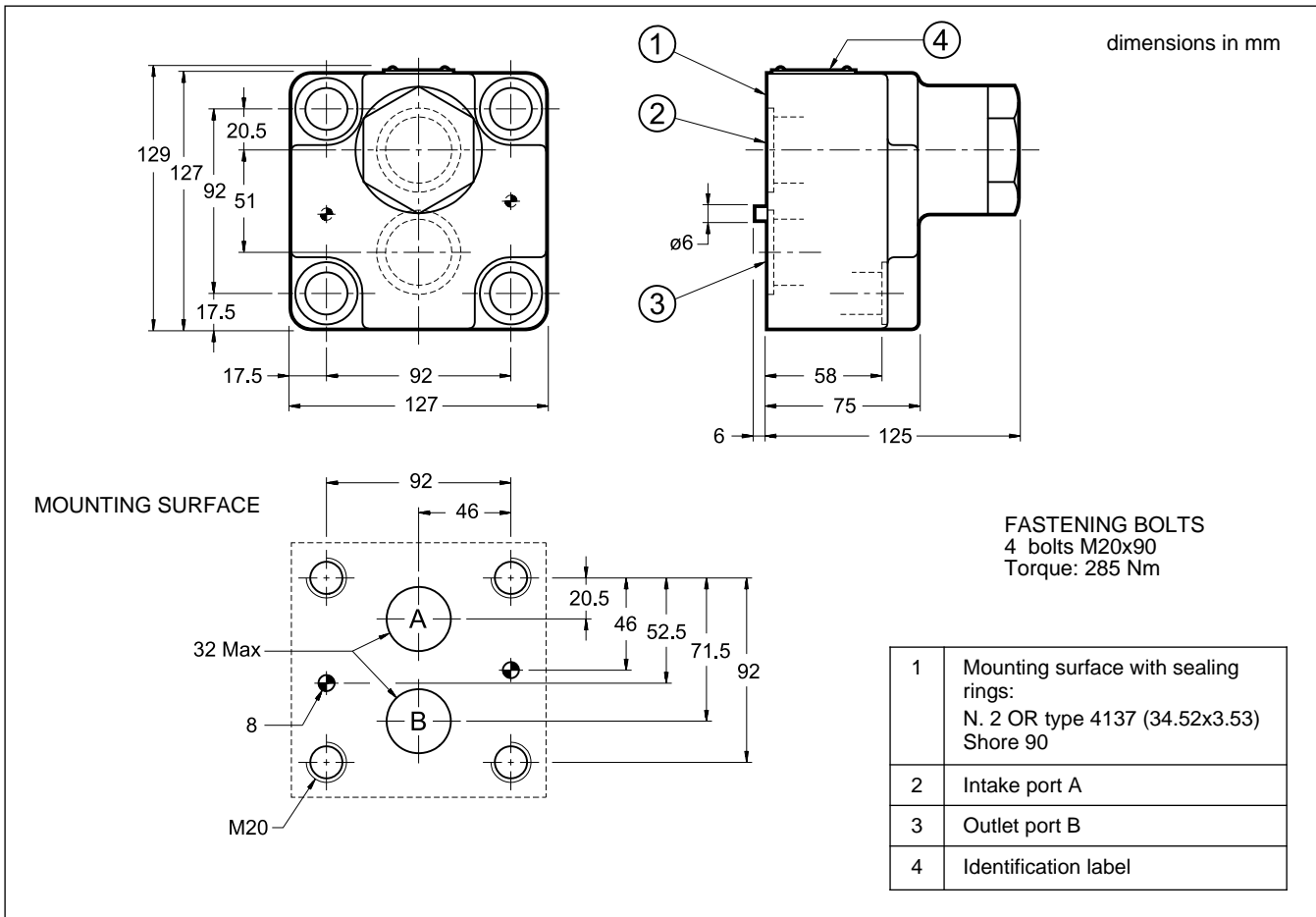
4 - VR3-P OVERALL AND MOUNTING DIMENSIONS



5 - VR5-P OVERALL AND MOUNTING DIMENSIONS



6 - VR7-P OVERALL AND MOUNTING DIMENSIONS





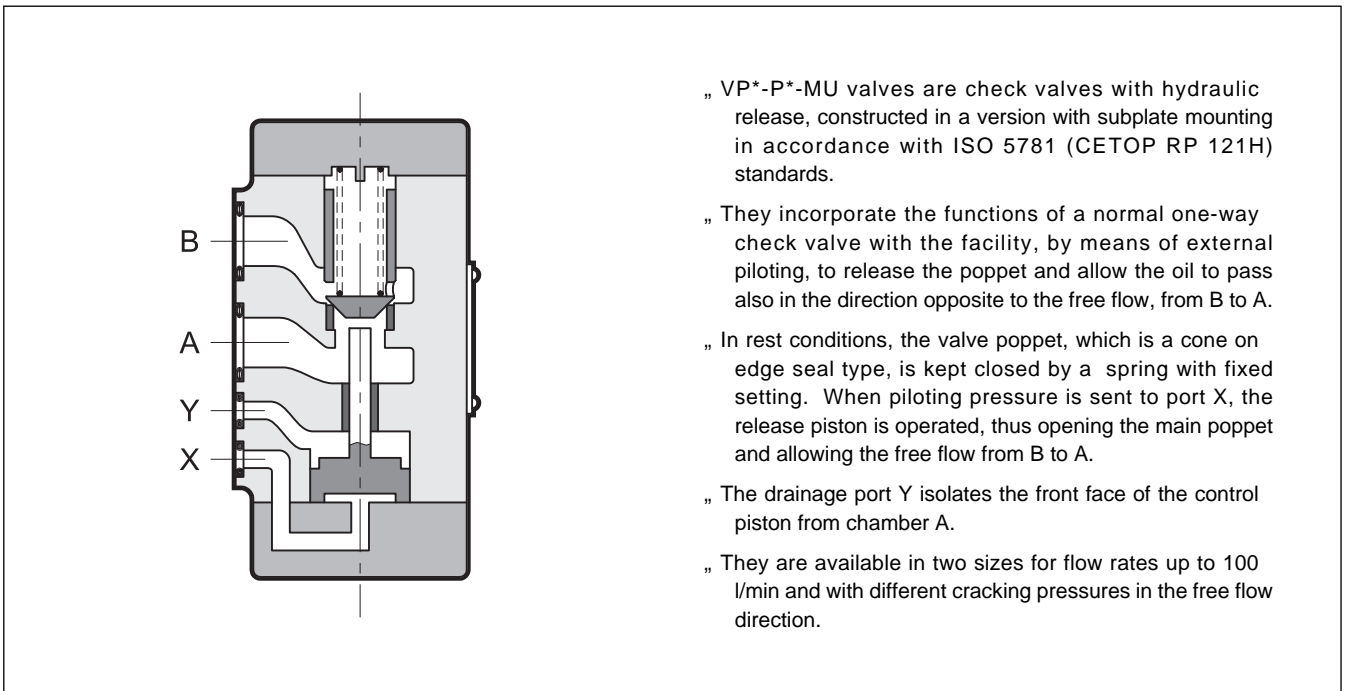
VP*-P*-MU

HYDRO-PILOT OPERATED CHECK VALVES SERIES 12

SUBPLATE MOUNTING
ISO 5781 (CETOP 06 07)

p max **320** bar
Q max (see table of performances)

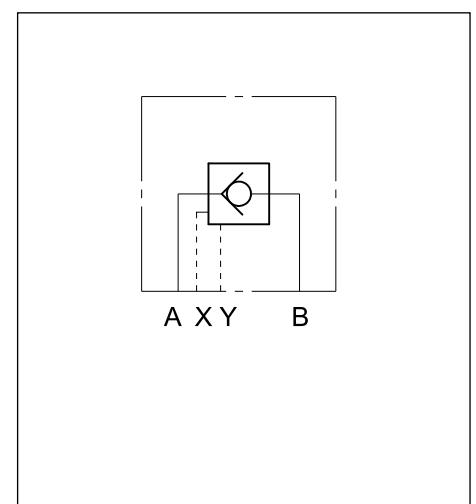
OPERATING PRINCIPLE



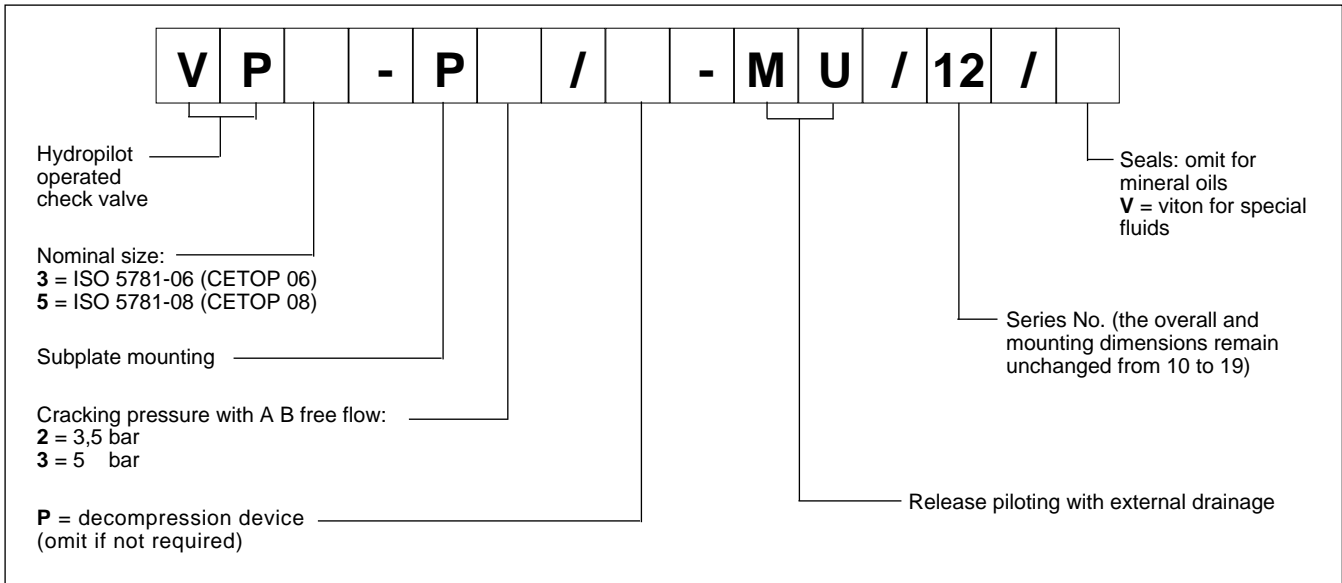
PERFORMANCES (working with mineral oil of viscosity of 36 cSt at 50°C)

		VP3	VP5
Maximum operating pressure	bar	320	320
Nominal flow rate	l/mn	50	100
Piloting ratio between release piston and sealed chamber areas	VP*-P*-MU	3,4:1	2,7:1
Piloting ratio with decompression device	VP*-P*/P-MU	12:1	14:1
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 20/18/15		
Recommended viscosity	cSt	25	
Mass:	kg	3,7	6

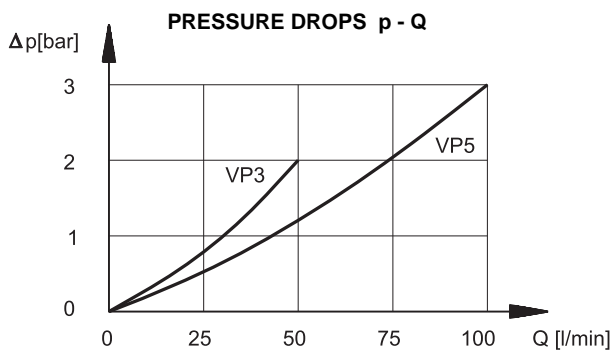
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



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

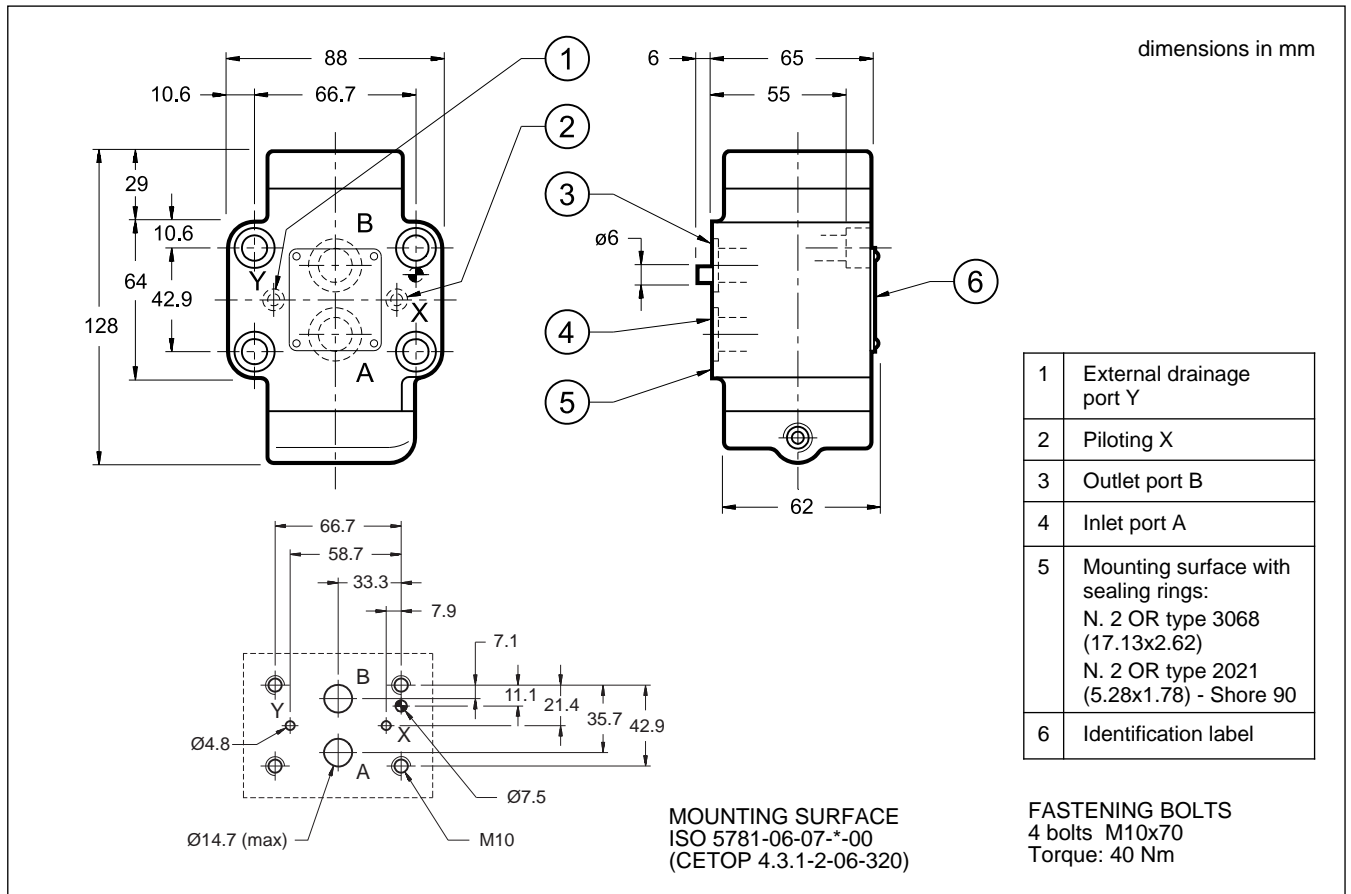


NOTE: The curves shown in the graph refer to B A and A B flow with the valve released hydraulically.
 For A B flow, with the valve not released hydraulically, add the cracking pressure to the values shown.

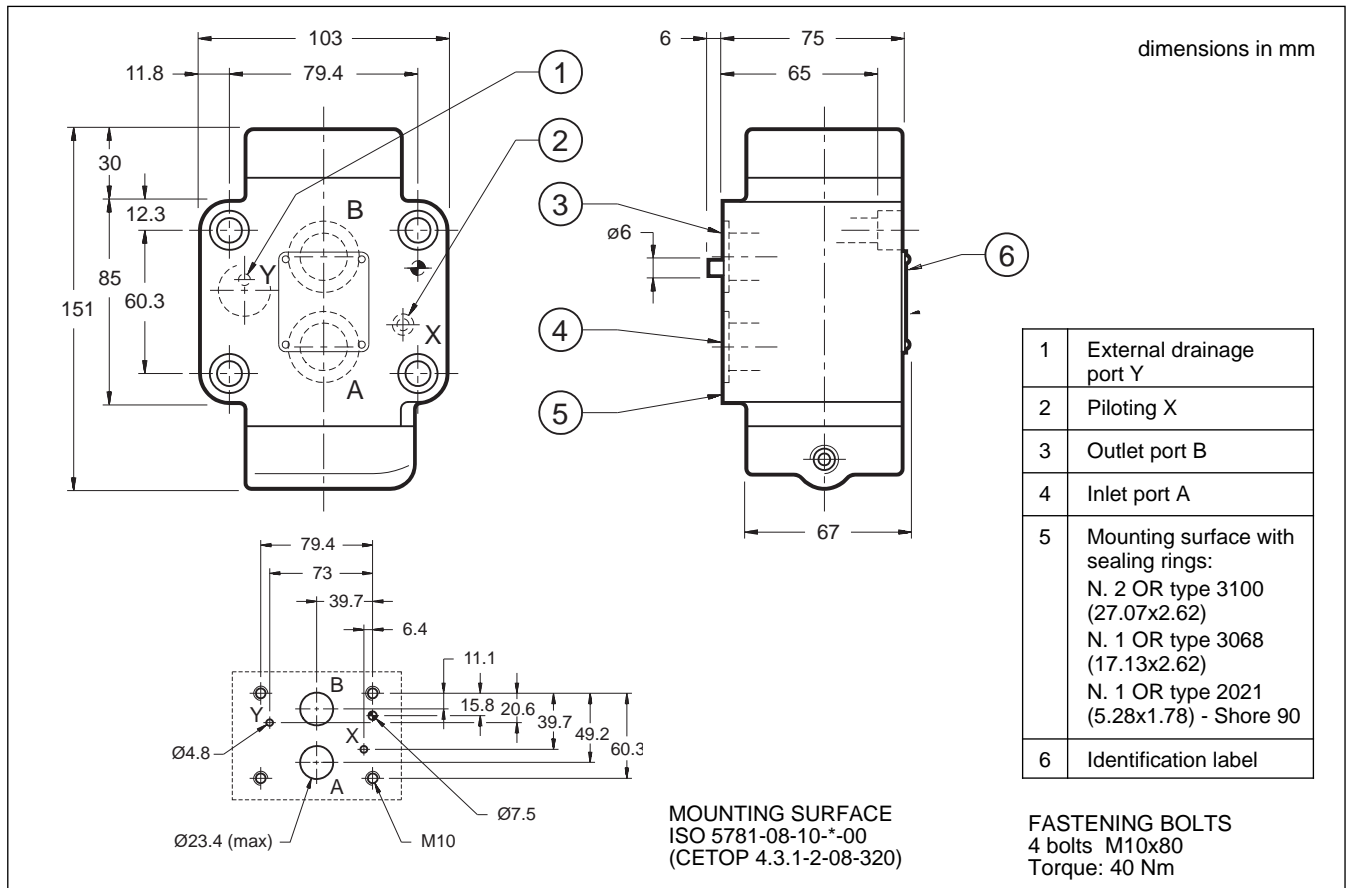
3 - HYDRAULIC FLUIDS

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.

4 - VP3-P*-MU OVERALL AND MOUNTING DIMENSIONS



5 - VP5-P*-MU OVERALL AND MOUNTING DIMENSIONS



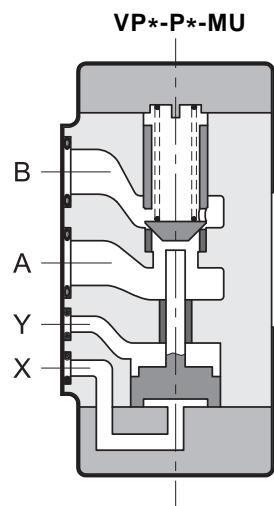
6 - USE

The VP*-P*-MU check valves with hydraulic release are used in circuits where the position of the actuators must be maintained even in the absence of hydraulic power.

They are available in two versions with the following characteristics:

VP*-P*-MU The VP*-P*-MU valves are check valves with hydraulic release that incorporate the functions of a normal one-way check valve with the possibility to release the poppet by means of external piloting, thus allowing flow of the oil also in the opposite direction of the free flow, from B to A. The valve poppet, a cone on edge seal type, is kept closed by a spring with fixed setting during rest conditions. When pilot pressure is sent to port X, the release piston is activated and opens the main poppet, thus allowing the reverse flow.

These valves have hydraulic isolation of the front face of the release piston from chamber A of the valve, by external drainage Y. This solution eliminates problems which can occur if, during the release phase of the valve, pressure builds up in chamber A near to or greater than the piloting pressure X, causing a backward movement of the piston and thus unwanted closure of the valve.



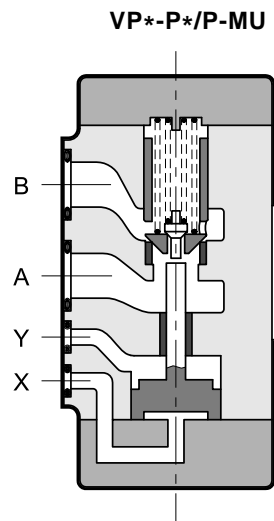
VP*-P*/P-MU The VP*-P*/P-MU valves are check valves with hydraulic release that, in addition to the characteristics of the preceding version, are equipped with a decompression device.

They are recommended when operating with high working pressures or with high loads that act as pressure multipliers.

The circuit (chamber B) is decompressed prior to complete opening of the valve during the release phase.

This prevents pressure shocks in the circuit and because of the high ratio existing between the areas of the control piston and the decompression device, release can occur even at a low piloting pressure.

Pilot pressure to port X operates the release piston which first opens the pre-opening poppet, causing decompression of the sealed chamber, it then opens the main poppet, allowing free flow from B to A.



7 - SUBPLATES (see catalogue 51 100)

	VP 3	VP 5
Type	PMSZ3 - Al 4G with rear ports PMSZ3 - AL4G with side ports	PMSZ5 - Al5G with rear ports PMSZ5 - AL5G with side ports
A - B port dimensions	1/2" BSP	3/4" BSP
X - Y port dimensions	1/4" BSP	1/4" BSP



CFP

FILLING VALVES

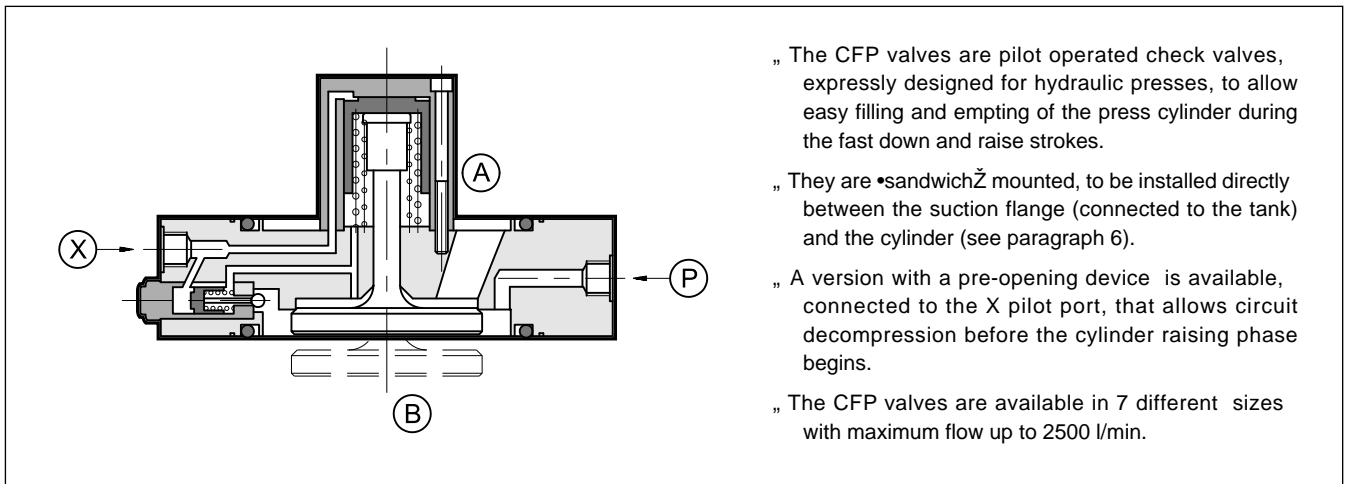
SERIES 10

SANDWICH MOUNTING

p max **350** bar

Q max (see table of performances)

OPERATING PRINCIPLE

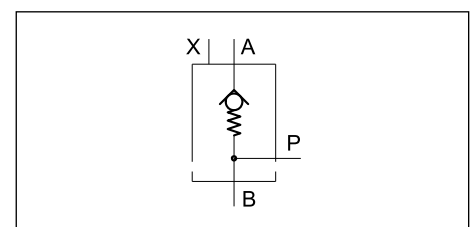


PERFORMANCES

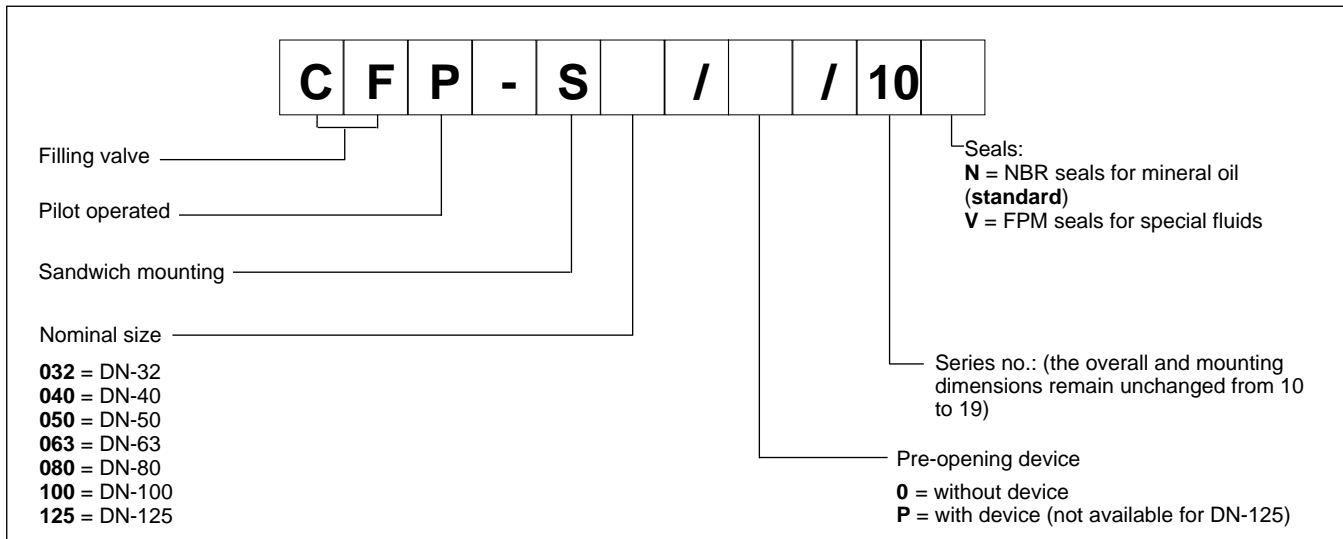
VALVE CODE		CFP-S032	CFP-S040	CFP-S050	CFP-S063	CFP-S080	CFP-S100	CFP-S125	
Nominal size		DN-32	DN-40	DN-50	DN-63	DN-80	DN-100	DN-125	
Maximum flow (with $p = 0,3$ bar and viscosity 36 cSt)		l/min	160	250	400	600	1000	1600	2500
Maximum pressure	Ports P and B	bar	350						
	Port X	bar	100						
	Port A	bar	16						
Cracking and pilot pressure			see par. 4						
Mass	kg	1,2	1,7	2,5	3,5	5,2	12	20	

Ambient temperature range	°C	...20 / +50
Fluid temperature range	°C	...20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Recommended viscosity	cSt	25
Fluid contamination degree	according to ISO 4406:1999 class 20/18/15	

HYDRAULIC SYMBOL

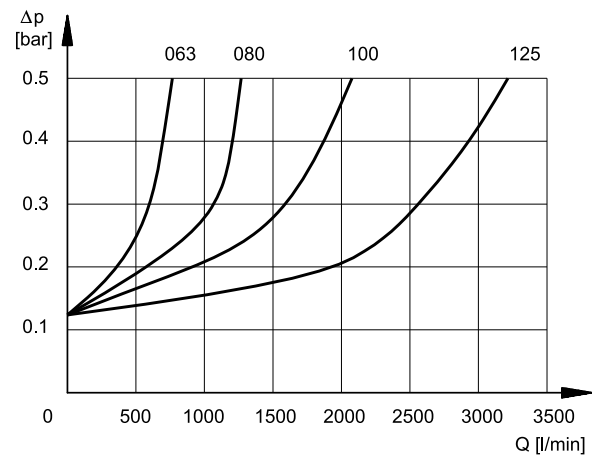
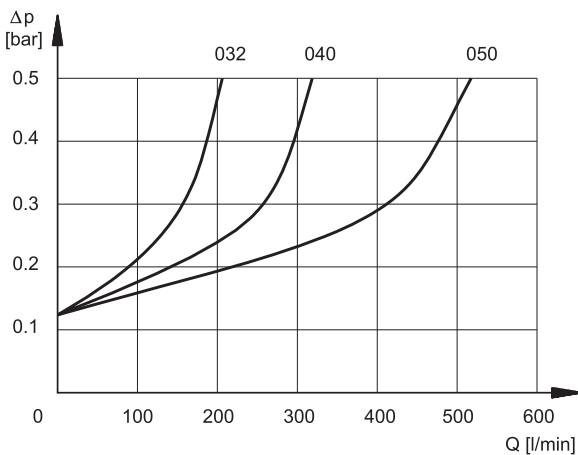


1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES (values measured with viscosity of 36 cSt at 50°C)

p - Q characteristic relevant to the different valve sizes.



3 - HYDRAULIC FLUIDS

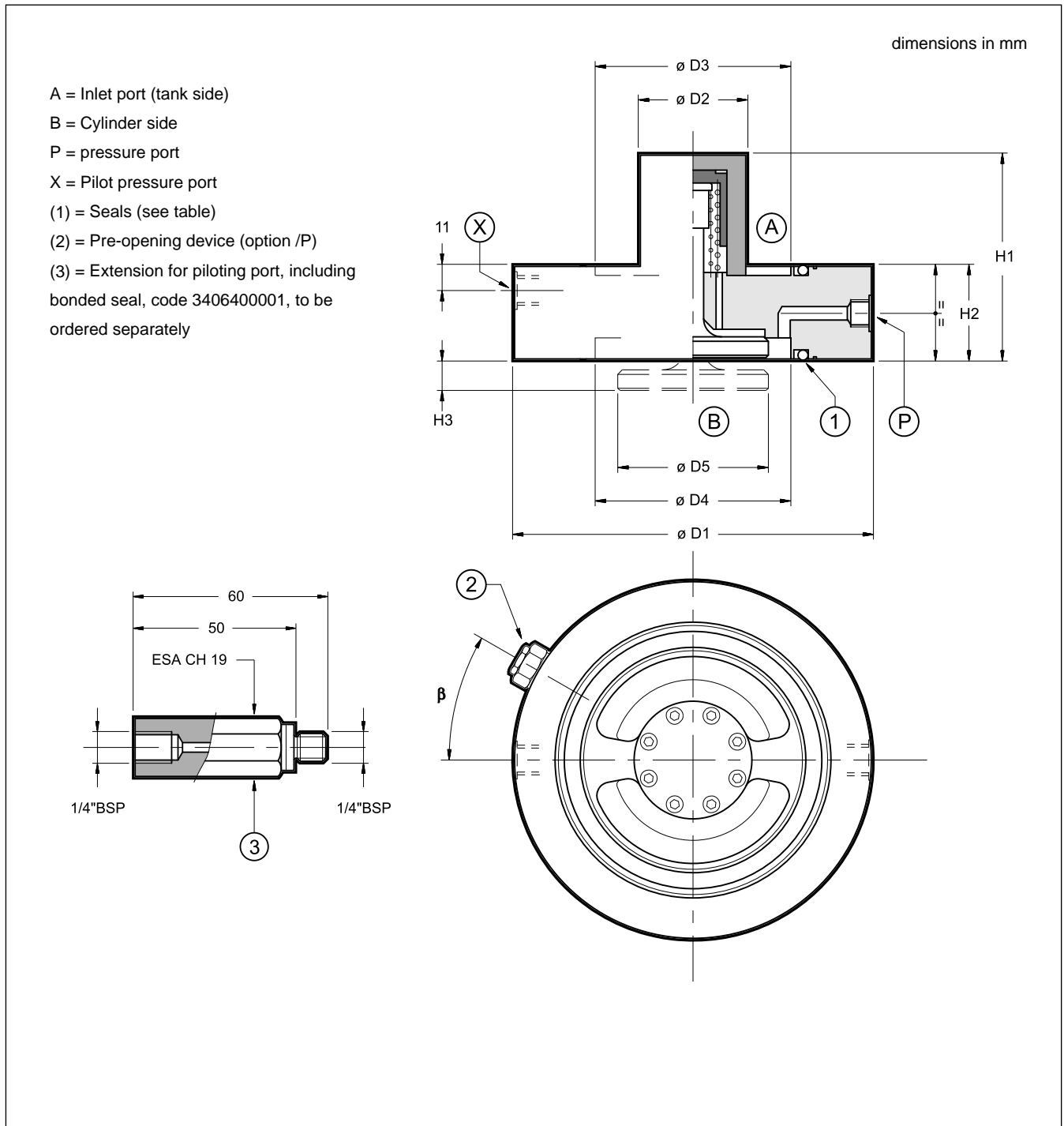
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

4 - OPENING AND PILOTING PRESSURES

Valve code	Cracking pressure A - B [bar]	Minimum pilot pressure [bar]	Pilot pressure ratio p (B) / p (X)	Pre-opening pressure (option /P) [bar]	Pilot volume for opening valve [cm³]
CFP-S032	0,12	8,0	3,6	$p(X) = 0,18 \times p(B) + 7$	1,22
CFP-S040			3,9		2,36
CFP-S050			4,2		4,91
CFP-S063	0,13		4,2		8,13
CFP-S080			4,5		12,72
CFP-S100			4,3		28,63
CFP-S125			4,3	67,86	
				-	

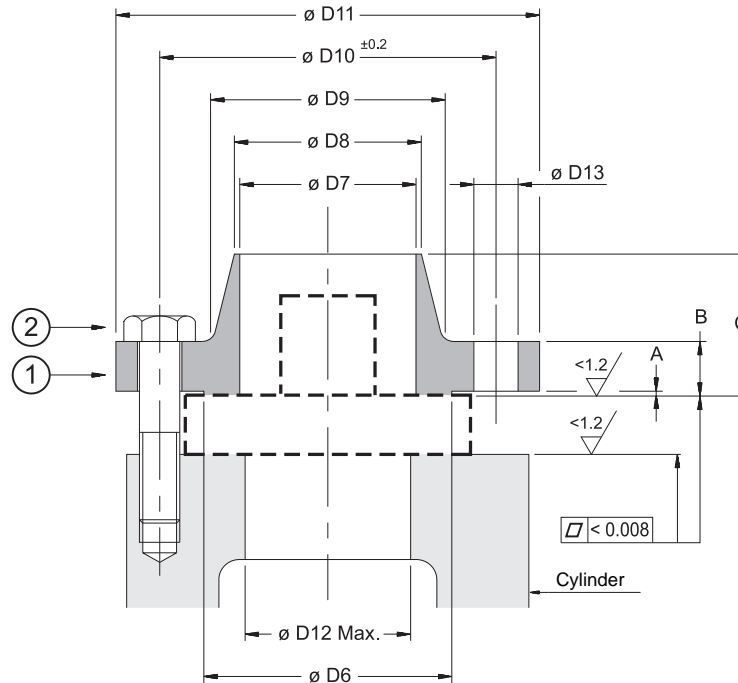
5 - OVERALL DIMENSIONS



	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	D5 [mm]	H1 [mm]	H2 [mm]	H3 [mm]	B	P	X	1 KANTSEAL
CFP-S032	93	32	43	43	32	55	27	7,5	60°	1/4Ž BSP	1/4Ž BSP	DKAR00227 (53.57x3.40x3.40)
CFP-S040	108	39	58	58	41,5	60	28	10	45°			DKAR00231 (66.27x3.40x3.40)
CFP-S050	128	45	73	73	53	72	29	12	45°			DKAR00236 (82.14x3.40x3.40)
CFP-S063	143	50	87	87	63	83	34	14	45°			DKAR00343 (94.62x5.16x5.16)
CFP-S080	169	56	107	107	80	98	38,5	17	45°			DKAR00350 (116.84x5.16x5.16)
CFP-S100	212	70	130	130	100	118	44	22	45°	3/8Ž BSP	DKAR00433 (139.07x6.73x6.73)	
CFP-S125	248	88	168	151	127	154	51	30	-	3/8Ž BSP	DKAR00442 (183.52x6.73x6.73)	

6 - INSTALLATION AND CONNECTION FLANGE DIMENSIONS

dimensions in mm



Recommended building material: C22

	(1) Suggested dimensions for connection flange (see NOTE 2)											Max pressure on port B [bar]	(2)		
	D6 [mm]	D7 [mm]	D8 [mm] NOTE 1	D9 [mm]	D10 [mm]	D11 [mm]	D12 [mm]	D13 [mm]	A [mm]	B [mm]	C [mm]		Fastening bolts (type A 12.9)	Q.ty	Tightening torque [Nm]
CFP-S032	88	42	48,3	88	110	150	46	18	3	22	45	350	M16	4	285
CFP-S040	102	53	60,3	102	125	165	58	18	3	29	62		M16	4	285
CFP-S050	122	69	76,1	122	145	185	71	18	3	34	68		M16	8	285
CFP-S063	138	82	88,9	138	160	200	86	18	3	43	72		M16	8	285
CFP-S080	162	107	114,3	162	190	235	108	22	3	51	78		M20	8	560
CFP-S100	188	131	139,7	188	240	295	132	29	3	62	105		M27	8	1400
CFP-S125	218	160	168,3	218	280	345	170	32	3	79	115		M30	8	1900

NOTE 1: Calculated diameters for PN 16 - DIN 2448 steel pipes

NOTE 2: For application with standard connection flange type UNI2284 - UNI2285 - UNI2286, special bushings to fit on fastening bolts must be provided in order to ensure a correct valve mounting.

For information about the installation with UNI connector flange, please consult our technical department.



LOGIC ELEMENTS

SERIES 20

LC* CARTRIDGE VALVES
ISO 7368 - DIN 24342

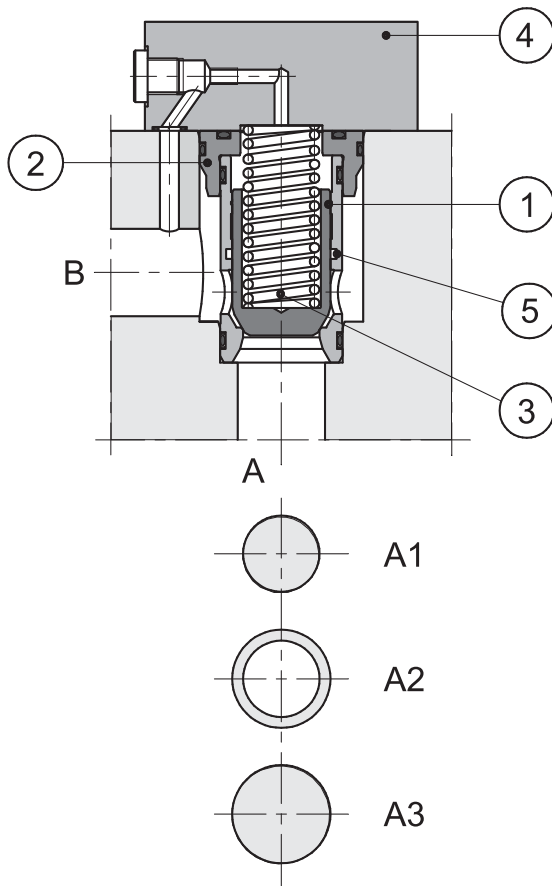
LP* COVERS

ND 16 - 25 - 32 - 40 - 50 - 63

p max 420 bar

Q max (see table of performances)

OPERATING PRINCIPLE



„ Logic elements are cartridge valves suitable for installation in blocks or manifolds. They are available in five different sizes: ND 16 - 25 - 32 - 40 - 50 - 63.

„ They are designed to perform complex hydraulic circuits, using functional compact blocks, with high flow rates and low pressure drops.

„ They are made of a cartridge valve with ISO7368 / DIN 24342 cavity bore and a control cover (4). The cover includes the cartridge valves pilot lines; some versions are designed for the installation of ISO 4401-03 (CETOP 03) valves, to realise different control functions (see paragraph 8 for diagrams and function descriptions). A low leakage version, obtained inserting a seal into the seat no. 5, is also available.

„ The cartridge valves are composed of a jacket (2), a poppet (1), and a closing spring (3). The poppet can either be standard (S) or with a damping nose (D), suitable for a smooth flow control during the valve opening and closing phases.

„ There are two different types of cartridge valves available:

- **Q type:** this valve is used for flow and directional control and as a check valve.

The areas involved are:

A_1 - corresponding to the seat diameter area, considered as reference area = 1

A_3 - corresponding to the jacket internal diameter area.

A_2 - corresponding to the difference between $A_3 - A_1$

The area ratio A_1/A_3 is 1/1,66.

The valve opens when the pressure acting either on area A_1 (flow from A to B) or on area A_2 (flow from B to A) is higher than the pressure acting on area A_3 (added to the spring load value).

- **P type:** this valve is used for pressure control.

In this case the areas A_1 and A_3 are equivalent (area ratio 1:1) and the valve enables the flow direction from A to B only.

1 - IDENTIFICATION CODE FOR CARTRIDGE VALVES

L	C	-		/	N	/	
----------	----------	---	--	---	----------	---	--

Cartridge valve

Shutter type:
(area ratio A_1 / A_3):
QS = flow rate control (1:1,66)
QD = flow rate control with damping nose (1:1,66)
PS = pressure control (1:1)

LL = Low leakage version, with seal between C and B. Omit if not required.

Seals:
NBR seals for mineral oil

20 - for ND 16, 25, 32, 40 and 50
21 - for ND 63
 (the overall and mounting dimensions remain unchanged from 20 to 29)

Nominal cracking pressure on section A1:
0.5 = 0,5 bar
1 = 1 bar (for ND 63 only)
2 = 2 bar (not available for ND 63)
4 = 4 bar
 (other cracking pressure values available on request)

AVAILABLE NOMINAL SIZES						VERSIONS	SYMBOL
16 ND16	25 ND25	32 ND32	40 ND40	50 ND50	63 ND63		
x	x	x	x	x		QS0.5	
x	x	x	x	x	x	QS2	
x	x	x	x	x		QD4	
x	x	x	x	x	x	PS1 PS2	

2 - 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.



3 - TECHNICAL CHARACTERISTICS (cartridge valve with control cover)

Max operating pressure LC cartridge valve	bar	420
Max operating pressure limit of cover type DP*, DPE*, DF1, DF2, LCM	bar	350
Max operating pressure with distributor installed on cover	See technical characteristics of the distributor	
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 20/18/15	
Recommended viscosity	cSt	25

3.1 - Cartridge valves type Q performances (flow control function)

			NOMINAL SIZE						
			16	25	32	40	50	63	
Area A1	cm ²		1,54	3	6	8,76	14,8	24,6	
Area A2	cm ²		1	2	4	5,76	9,7	16,1	
Area A3	cm ²		2,54	4,9	10	14,3	24,3	40,7	
Version S:	opening stroke h	cm	0,8	1	1,25	1,6	1,8	2,3	
	opening volume	cm ³	2,03	4,9	12,5	22,88	43,74	96,26	
	max recommended flow	l/min	250	500	900	1300	2000	3000	
Version D:	opening stroke h	cm	0,8	1,15	1,5	1,8	2,2	2,7	
	opening volume	cm ³	2,03	5,63	15	25,74	53,46	110	
	max recommended flow	l/min	200	450	800	1100	1700	2700	
Cracking pressure	A B	spring 0,5	bar	0,5	0,5	0,5	0,5	0,5	-
		spring 2		2	2	2	2	2	2
		spring 4		4	4	4	4	4	-
	B A	spring 0,5		0,9	1,1	0,7	0,76	0,8	-
		spring 2		3,1	3	3,1	3	3,2	3,2
		spring 4		6,15	5,9	5,4	5,9	5,9	-
Mass	Kg		0,25	0,5	1,1	1,9	3,9	7,8	

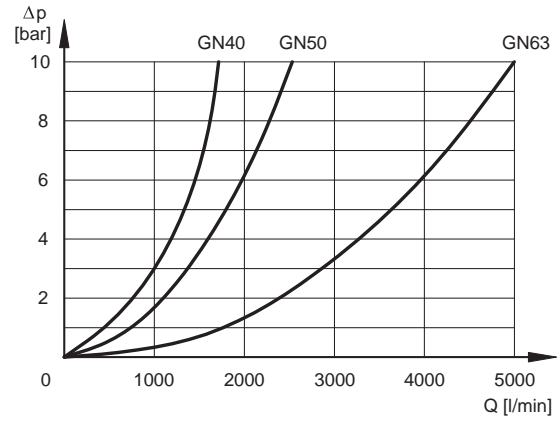
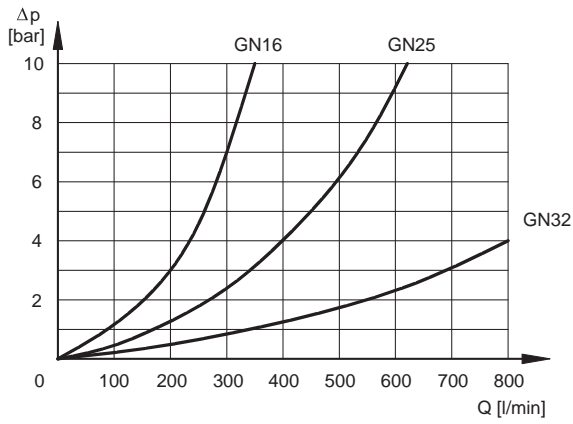
3.2 - Cartridge valves type P performances (pressure control function)

			NOMINAL SIZE					
			16	25	32	40	50	63
Area A1 = Area A3	cm ²		2,54	4,9	10	14,4	24,3	40,7
Version S:	max recommended flow	l/min	200	400	900	1000	1500	2500
Cracking pressure	spring 1	bar	-	-	-	-	-	1
	spring 2		2	2	2	2	2	-
Mass	Kg		0,25	0,5	1,1	1,9	3,9	7,8

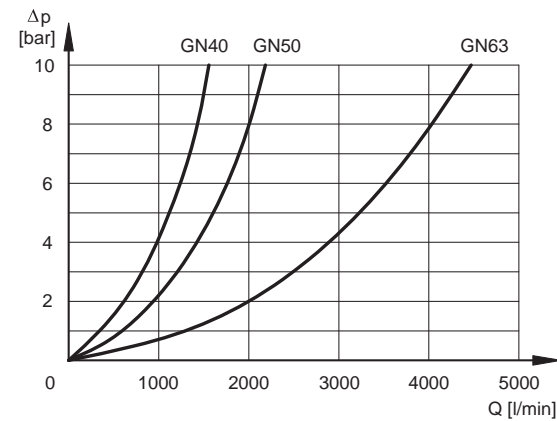
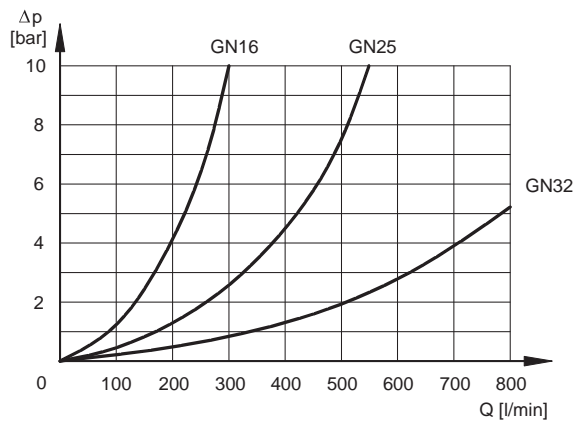


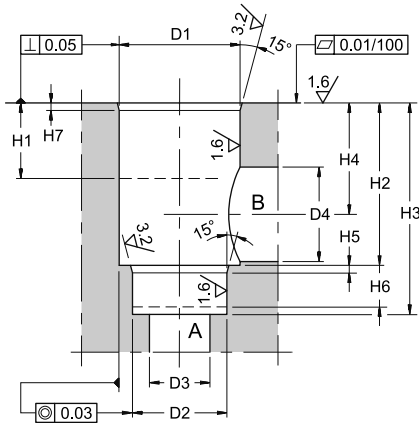
4 - CHARACTERISTIC CURVES (values obtained with viscosity 36 cSt at 50°C)

4.1 - LC*-QS flow control function and LC*-PS pressure control function

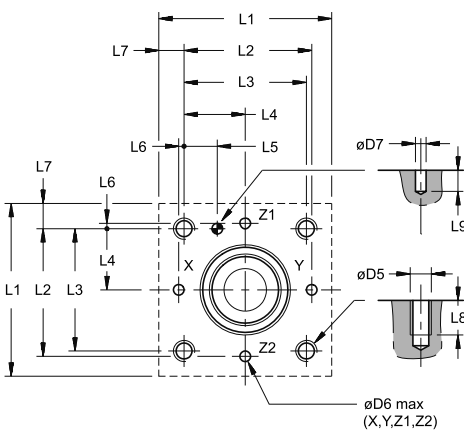


4.2 - Flow control function with damping nose LC*-QD



5 - LC CARTRIDGE VALVES SEAT DIMENSIONS ACCORDING TO ISO 7368 / DIN 24342


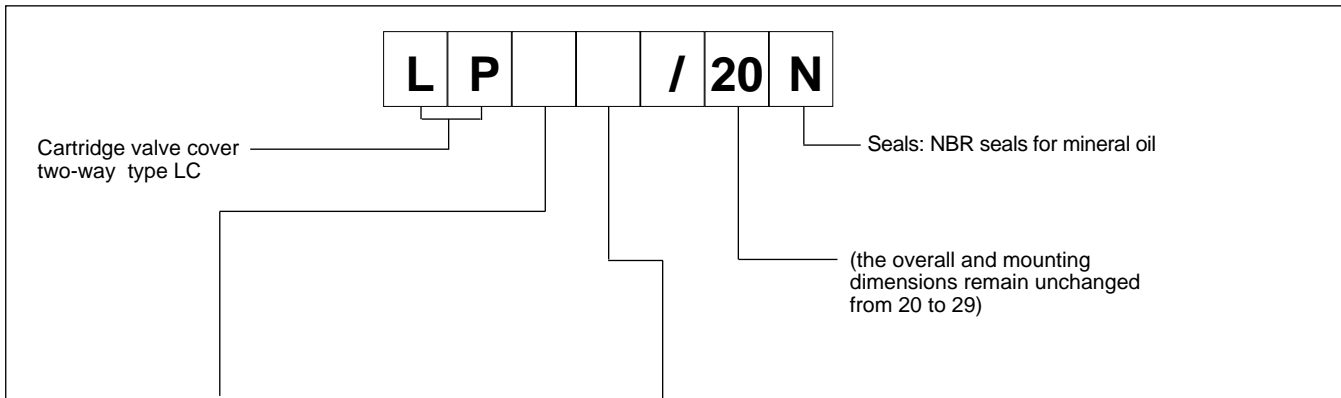
	LC CARTRIDGE VALVES NOMINAL SIZE					
	16	25	32	40	50	63
ØD1^{H7}	32	45	60	75	90	120
ØD2^{H7}	25	34	45	55	68	90
ØD3 max	16	25	32	40	50	63
ØD4	16	25	32	40	50	63
ØD4 max	25	32	40	50	63	80
H1 min	20	30	30	30	35	40
$\text{H2} \pm 0,1$	43	58	70	87	100	130
$\text{H3} \begin{smallmatrix} +0,1 \\ 0 \end{smallmatrix}$	56	72	85	105	122	155
H4 referred to diameter ØD4	34	44	52	64	72	95
H4 referred to diameter ØD4 max	29,5	40,5	48	59	65,5	86,5
H5	2	2,5	2,5	3	3	4
H6 min	11	12	13	15	17	20
H7	2	2,5	2,5	3	4	4

6 - LP CONTROL COVERS INTERFACE DIMENSIONS ACCORDING TO ISO 7368 / DIN 24342


	LP CONTROL COVERS NOMINAL SIZE					
	16	25	32	40	50	63
ØD5	M8	M12	M16	M20	M20	M30
ØD6 max	4	6	8	10	10	12
ØD7^{H13}	4	6	6	6	8	8
L1	*	85	100	125	140	180
$\text{L2} \pm 0,1$	48	62	76	92,5	108	137,5
$\text{L3} \pm 0,1$	46	58	70	85	100	125
$\text{L4} \pm 0,1$	23	29	35	42,5	50	62,5
$\text{L5} \pm 0,1$	12,5	13	18	19,5	20	24,5
$\text{L6} \pm 0,1$	2	4	6	7,5	8	12,5
L7	*	13,5	15	20	20	27,5
L8 min	15	20	28	35	35	52
L9 min	8	8	8	8	8	8

* = cover with special dimensions (see par. 9.2 ÷ 9.7)

7 - COVERS IDENTIFICATION CODE



AVAILABLE NOMINAL SIZES						COVER NAME	SYMBOL	DIAGRAM PARAGRAPH	OVERALL DIMENSIONS PARAGRAPH
16 ND16	25 ND25	32 ND32	40 ND40	50 ND50	63 ND63				
X	X	X			X	R		8.1	9.1
X	X	X	X	X	X	D		8.2	9.2
X	X	X	X			DZ		8.3	9.3
X	X	X	X	X		DF1		8.4	9.4
X	X	X	X			DF2		8.5	9.5
X	X	X	X	X	X	Q		8.6	9.6
X	X	X	X	X	X	DP*		8.7	9.7
X	X	X	X	X		DPE*		8.8	9.7

8 - FUNCTIONAL DIAGRAMS

8.1 - R cover for directional control and check valve function with external pilot X

Functional diagrams	Description
	<p>Piloting of the cartridge valve through the X port, available on the mounting surface or with pipe connection 1/4" BSP.</p> <p>For ND 40 and ND 50 sizes, the external piloting function can be realised by using control cover type D, with blanking plate code 1950751 (to be ordered separately).</p>

8.2 - D cover for directional control and check valve function

Functional diagrams	Description
	<p>Piloting of the cartridge valve by means of solenoid valve type DS3-TA (to be ordered separately - see catalogue 41 150)</p> <ul style="list-style-type: none"> - solenoid valve OFF = A B intercepted flow - solenoid valve ON = A B free flow

8.3 - DZ cover for directional control with possibility to pilot other cartridges in line

Functional diagrams	Description
	<p>The DZ cover enables the piloting of its cartridge valves and also of other valves connected to Z1 and Z2 pilot lines.</p> <p>The solenoid valve type DS3-S10 must be ordered separately (see catalogue 41 150).</p>

8.4 - DF1 cover for directional control and check function with double pilot line

Functional diagrams	Description
	<p>The DF1 cover gives the possibility of a double pilot line through X and Z1 ports.</p> <p>The solenoid valve type DS3-TA must be ordered separately (see catalogue 41 150).</p> <ul style="list-style-type: none"> - solenoid valve OFF = A B intercepted flow - solenoid valve ON = A B free flow , B A intercepted (if pilot line X is connected with B and if Z1 is connected with A).

8.5 - DF2 cover for directional control and check function with priority piloting from two external lines

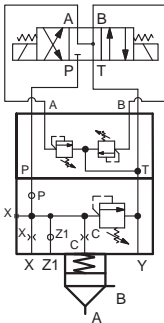
Functional diagrams	Description
	<p>The cartridge valve can be simultaneously piloted from X and Z1 lines.</p> <p>The shuttle valve, integrated in the cover, enables the automatic selection of the pilot line which has the higher pressure (priority line).</p> <p>The solenoid valve type DS3-TA must be ordered separately (see catalogue 41 150).</p> <ul style="list-style-type: none"> - solenoid valve OFF = A B intercepted flow - solenoid valve ON = A B free flow

8.6 - Q cover for flow control function

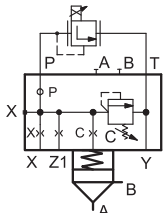
Functional diagrams	Description
	<p>Flow control function by means of cover with stroke limiter.</p> <p>For a better flow control and to avoid the wear of the valve seat, this cover is normally used with a QD4 cartridge type.</p>

8.7 - DP* cover for pressure control function

Functional diagrams	Description
	<p>Pressure control function with a built-in relief valve.</p> <ul style="list-style-type: none"> - max. adjustment pressure DP4 = 140 bar - DP6 = 350 bar <p>The top blanking plate code 1950591 must be ordered separately.</p>
	<p>Pressure control function with electrical unloading by means of DS3-SA2 solenoid valve (to be ordered separately - see catalogue 41 150).</p> <ul style="list-style-type: none"> - solenoid valve OFF = unloading at minimum pressure - solenoid valve ON = pressure controlled by the built-in relief valve.
	<p>Pressure control function with electrical unloading and two step pressure by means of the solenoid valves DS3-S2 (to be ordered separately - see catalogue 41 150), MCI*-SAT/10 (for 16, 25 and 32 sizes - to be ordered separately) and MCD*-SAT (for 40, 50 and 63 sizes to be ordered separately - see catalogue 61 200)</p> <ul style="list-style-type: none"> - solenoid valve OFF = unloading at minimum pressure - solenoid valve ON side a = pressure controlled by the relief valve integrated in the cover - solenoid valve ON side b = pressure controlled by the relief valve (MCI* or MCD*)

	<p>Pressure control function with electrical control and three steps pressure by means of the solenoid valves DS3-S3 (to be ordered separately - see catalogue 41 150), MCI*-DT/10 (for 16 - 25 and 32 sizes - to be ordered separately) and MCD*-DT/51 (for 40 and 50 sizes - to be ordered separately - see catalogue 61 200)</p> <ul style="list-style-type: none"> - solenoid valve OFF = pressure controlled by the cover relief valve. - solenoid valve ON side a = pressure controlled by the relief valve on side b. - solenoid valve ON side b = pressure controlled by the relief valve on side a.
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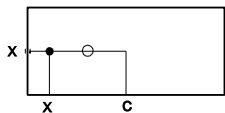
8.8 - DPE* cover for pressure control function

Functional diagram	Description
	<p>Pressure control function by means of PRED3 proportional valve (to be ordered separately see catalogue 81 210).</p> <ul style="list-style-type: none"> - max. adjustment pressure DPE4 = 140 bar - DPE6 = 350 bar - proportional valve OFF = unloading at minimum pressure - proportional valve ON = proportional control of pressure

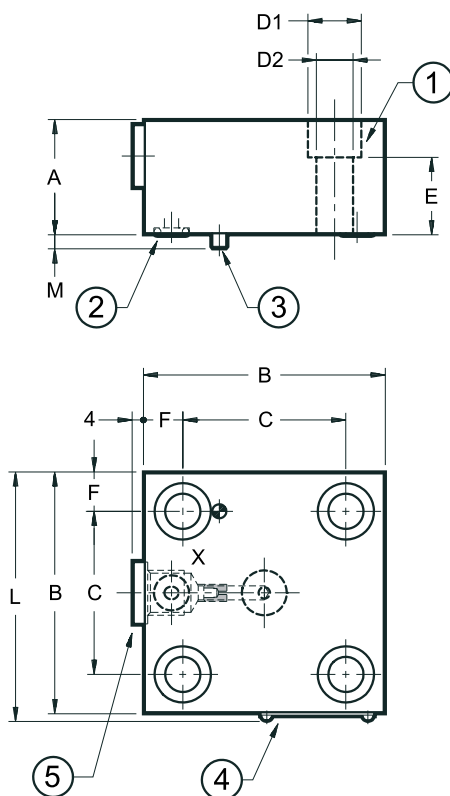
9 - OVERALL AND MOUNTING DIMENSIONS FOR CONTROL COVERS

9.1 - R type covers

dimensions in mm



LP16R
LP25R
LP32R
LP63R



	NOMINAL SIZE			
	16	25	32	63
A	30	30	40	70
B	65	85	100	180
C	46	58	70	125
D1	13,5	19	25	46
D2	8,5	13	17	31
E	19	17	22	35
F	9,5	13,5	15	27,5
L	67,5	87,5	102,5	182,5
M	4	5	5	5

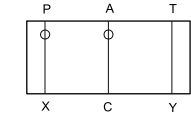
ports ready for restrictors	port X			
restrictors	M6x8		M10x10	
Mass [Kg]	1,20	2,30	4,00	17,5

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 63 = M30x80
2	N. 1 sealing ring 90 Shore: 16 = OR type 2025 (6.07x1.78) 25 = OR type 2037 (9.25x1.78) 32 = OR type 2037 (9.25x1.78) 63 = OR type 2056 (14.00x1.78)
3	Locating pin: 16 = Ø3x10 25 = Ø5x14 32 = Ø5x14 63 = Ø6x14
4	Identification label
5	Plug X: 1/4" BSP

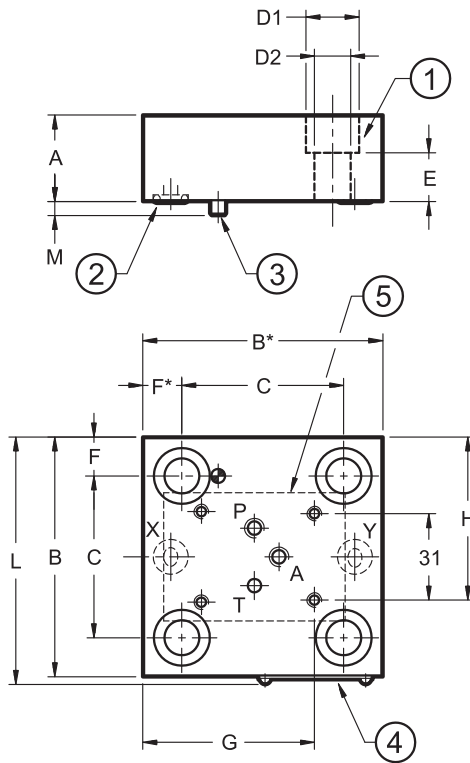
NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

9.2 - Covers type D

dimensions in mm



LP16D
LP25D
LP32D
LP40D
LP50D
LP63D



	NOMINAL SIZE					
	16	25	32	40	50	63
A	30	30	40	40	50	70
B	65	85	100	125	140	180
B*	75	85	100	125	140	180
C	46	58	70	85	100	125
D1	13,5	19	25	31	31	46
D2	8,9	13	17	21	21	31
E	19	17	22	30	30	35
F	9,5	13,5	15	20	20	27,5
F*	19,5	13,5	15	20	20	27,5
G	52	60,2	65,2	73,2	82,7	111,5
H	48	58	65,5	78	85,5	105,5
L	67,5	87,5	102,5	127,5	142,5	182,5
M	4	5	5	5	5	7

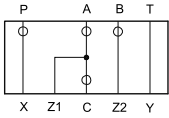
ports ready for restrictors	P, A					
restrictors	M6x8					M8x8
Mass [Kg]	1,20	2,30	4,00	4,80	7,6	17,5

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 40 = M20x50 50 = M20x60 63 = M30x80
2	n° 2 sealing rings 90 Shore : 16 = OR type 2025 (6.07x1.78) 25 = OR type 2037 (9.25x1.78) 32 = OR type 2037 (9.25x1.78) 40 = OR type 2050 (12.42x1.78) 50 = OR type 2050 (12.42x1.78) 63 = OR type 2056 (14x1.78)
3	Locating pin: 16 = Ø3x10 25 = Ø5x14 32 = Ø5x14 40 = Ø5x14 50 = Ø6x14 63 = Ø6x14
4	Identification label
5	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)

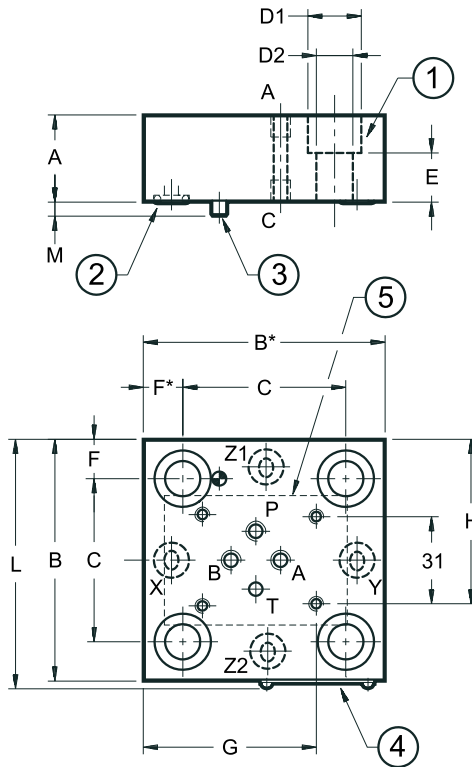
NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

9.3 - Covers type DZ

dimensions in mm



LP16DZ
LP25DZ
LP32DZ
LP40DZ



	NOMINAL SIZE			
	16	25	32	40
A	30	30	40	50
B	65	85	100	125
B*	75	85	100	125
C	46	58	70	85
D1	13,5	19	25	31
D2	8,9	13	17	21
E	19	17	22	30
F	9,5	13,5	15	20
F*	19,5	13,5	15	20
G	52	60,2	65,2	84
H	48	58	65,5	78
L	67,5	87,5	102,5	127,5
M	4	5	5	5

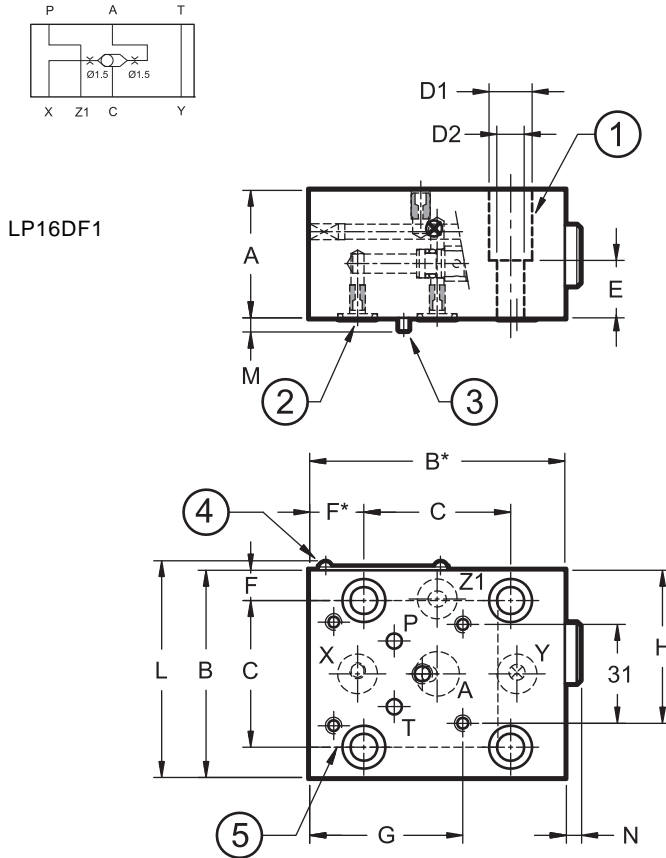
ports ready for restrictors M6x8	P, A, B, C			
Mass [Kg]	1,20	2,30	4,00	4,3

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 40 = M20x50
2	n° 4 sealing rings 90 Shore : 16 = OR type 2025 (6.07x1.78) 25 = OR type 2037 (9.25x1.78) 32 = OR type 2037 (9.25x1.78) 40 = OR type 2050 (12.42x1.78)
3	Locating pin: 16 = Ø3x10 25 = Ø5x14 32 = Ø5x14 40 = Ø5x14
4	Identification label
5	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)

NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

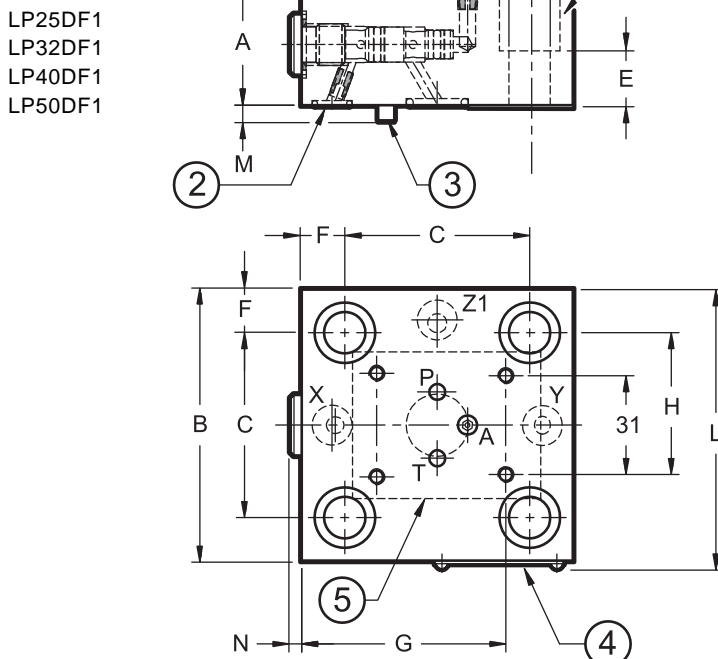
9.4 - Covers type DF1

dimensions in mm



	NOMINAL SIZE				
	16	25	32	40	50
A	40	40	40	50	50
B*	80	85	102	125	140
B	65	85	102	125	140
C	46	58	70	85	100
D1	13,5	19	25	31	31
D2	8,5	13	17	21	21
E	18	17	22	30	30
F*	17	13,5	16	20	20
F	9,5	13,5	16	20	20
G	47,5	64	72,5	84	91,5
H	48	58	66,5	78	85,5
L	67,5	87,5	104,5	127,5	142,5
M	4	5	5	5	5
N	4,5	3,5	3,5	-	-

Mass [Kg]	1,8	2,3	4	6,7	7,6
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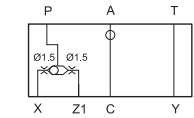


1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 40 = M20x60 50 = M20x60
2	N° 3 sealing rings 90 Shore : 16 = OR type 2037 (9.25x1.78) 25 = OR type 2037 (9.25x1.78) 32 = OR type 2037 (9.25x1.78) 40 = OR type 2050 (12.42x1.78) 50 = OR type 2050 (12.42x1.78)
3	Locating pin 16 = Ø3x10 40 = Ø5x14 25 = Ø5x14 50 = Ø6x14 32 = Ø5x14
4	Identification label
5	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)

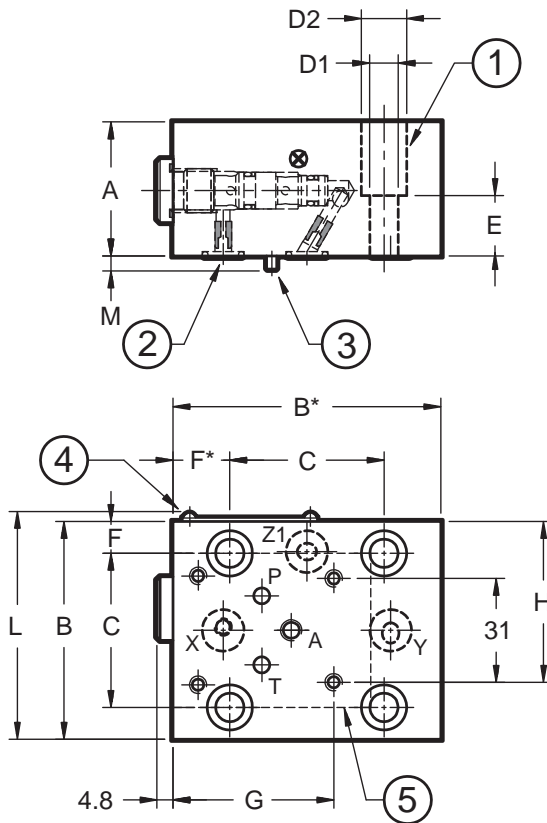
NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

9.5 - Covers type DF2

dimensions in mm



LP16DF2
LP25DF2
LP32DF2
LP40DF2



	NOMINAL SIZE			
	16	25	32	40
A	40	40	40	50
B	65	85	102	125
B*	80	85	102	125
C	46	58	70	85
D1	13,5	19	25	31
D2	8,5	13	17	21
E	18	17	22	30
F	9,5	13,5	16	20
F*	17	13,5	16	20
G	48	61	68,7	81
H	48	58	65,5	71,2
L	67,5	87,5	102,5	104,5
M	4	5	5	5

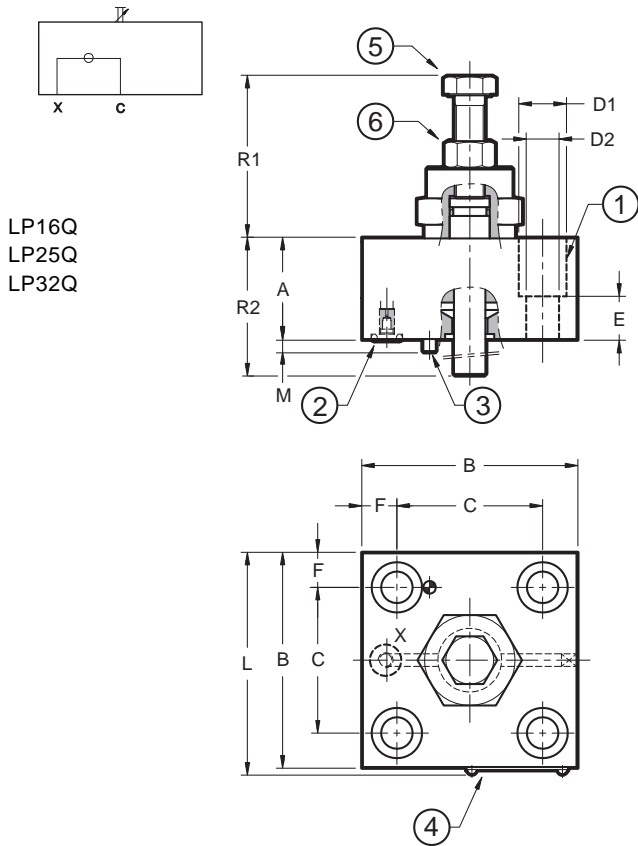
ports ready for restrictors M6x8	A			
Mass [Kg]	1,8	2,3	4	6,7

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 40 = M20x60
2	N° 3 sealing rings 90 Shore: OR type 2037 (9.25x1.78)
3	Locating pin 16 = Ø3x10 32 = Ø5x14 25 = Ø5x14 40 = Ø5x14
4	Identification label
5	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)

NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

9.6 - Covers type Q

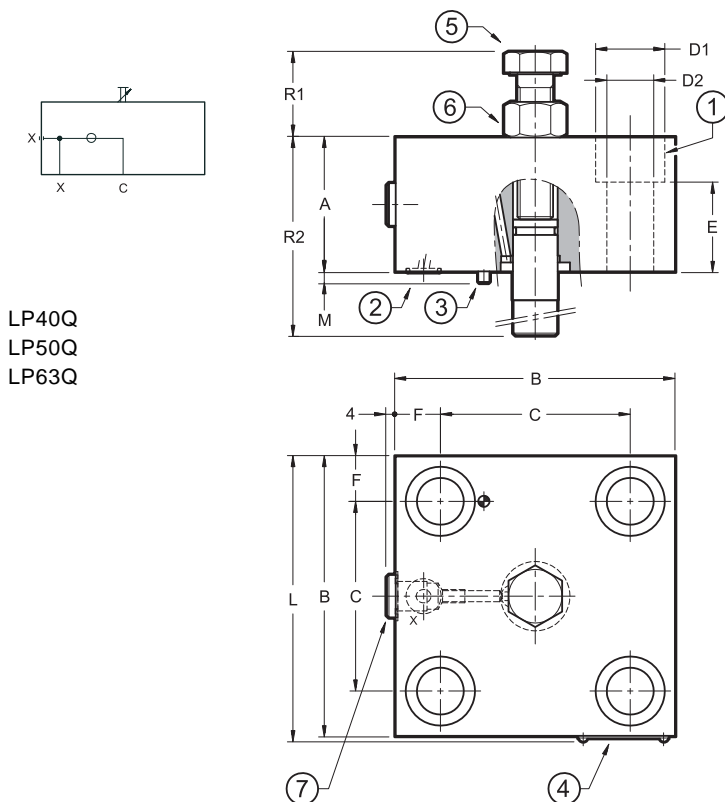
dimensions in mm



LP16Q
LP25Q
LP32Q

	NOMINAL SIZE					
	16	25	32	40	50	63
A	35	40	40	60	60	80
B	65	85	100	125	140	180
C	46	58	70	85	100	125
D1	13,5	19	25	31	31	46
D2	8,5	13	17	21	21	31
E	18	17	22	30	30	45
F	9,5	13,5	15	20	20	27,5
L	67,5	87,5	102,5	127,5	142,5	182,5
M	4	5	5	5	5	5
R1	55,5 ÷ 63,5	62,5 ÷ 74	58,5 ÷ 73,5	38,5 ÷ 57	44,5 ÷ 66,5	52 ÷ 81
R2	45 ÷ 51,5	45 ÷ 51,5	45 ÷ 51,5	44 ÷ 52	44 ÷ 52	165 ÷ 194

ports ready for restrictors	port X					
	M5x8	M6x8			M10x10	
Mass [Kg]	1,6	3	5	8,9	11,7	18



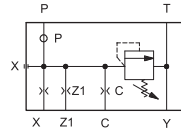
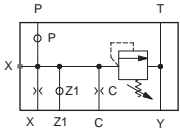
LP40Q
LP50Q
LP63Q

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x35 40 = M20x70 50 = M20x70 63 = M30x90
2	n° 1 sealing ring 90 Shore: 16 = OR type 2025 (6.07x1.78) 25 = OR type 2037 (9.25x1.78) 32 = OR type 2037 (9.25x1.78) 40 = OR type 2050 (12.42x1.78) 50 = OR type 2050 (12.42x1.78) 63 = OR type 2056 (14x1.78)
3	Locating pin: 16 = Ø3x10 25 = Ø5x14 32 = Ø5x14 40 = Ø5x14 50 = Ø6x14 63 = Ø6x14
4	Identification label
5	Stroke limiter clockwise rotation to reduce stroke 16 = 1 turn: 1,25 mm - spanner 18 25 = 1 turn: 1,25 mm - spanner 18 32 = 1 turn: 1,25 mm - spanner 18 40 = 1 turn: 2,00 mm - spanner 24 50 = 1 turn: 2,50 mm - spanner 30 63 = 1 turn: 2,00 mm - spanner 36
6	Locking nut: 16 = spanner 18 25 = spanner 18 32 = spanner 18 40 = spanner 24 50 = spanner 30 63 = spanner 36
7	Plug X: 40 = 1/4" BSP 50 = 1/4" BSP 63 = 1/4" BSP

NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

9.7 - Covers type DP* and DPE*

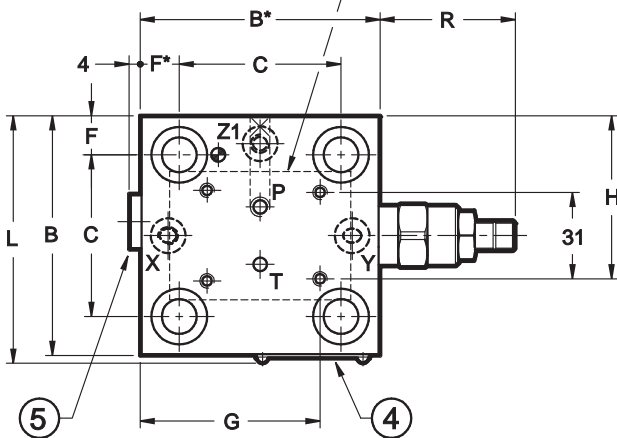
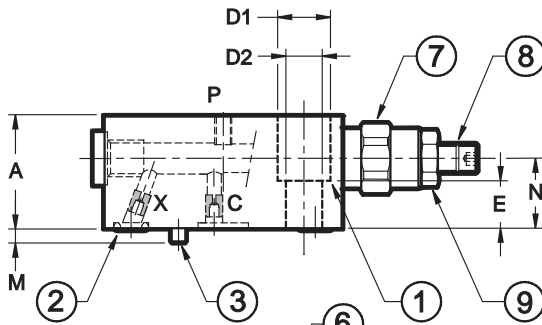
dimensions in mm



LP16DP*
LP25DP*
LP32DP*
LP40DP*
LP50DP*
LP63DP*

LP16DPE*
LP25DPE*
LP32DPE*
LP40DPE*
LP50DPE*

	NOMINAL SIZE					
	16	25	32	40	50	63
A	40	40	40	50	50	70
B	65	85	100	125	140	180
B*	75	85	100	125	140	180
C	46	58	70	85	100	125
D1	13,5	19	25	31	31	46
D2	8,5	13	17	21	21	31
E	18	17	22	30	30	35
F	9,5	13,5	15	20	20	27,5
F*	19,5	13,5	15	20	20	27,5
G	52	64	71,5	84	91,5	102,7
H	48	58	65,5	78	85,5	105,5
L	67,5	87,5	102,5	127,5	142,5	182,5
M	4	5	5	5	5	5
N	24	25	25	25	25	35
R	45 ÷ 51,5	45 ÷ 51,5	45 ÷ 51,5	44 ÷ 52	44 ÷ 52	44 ÷ 52



Mass [Kg]	16	25	32	40	50	63
	1,36	2,46	4,16	7,40	10,50	17,5

DP* restrictors

	M5x6	M6x8			M8x8
X	Ø1,2	Ø1,2	Ø1,2	Ø2,0	Ø2,0
C	Ø0,7	Ø0,7	Ø1,5	Ø1,2	Ø1,5

DPE* restrictors

	M5x6	M6x8	M6x8	M6x8	M6x8
X	Ø0,8	Ø0,7	Ø1	Ø1	Ø1
C	Ø0,6	Ø0,6	Ø0,8	Ø0,8	Ø0,8
Z1	Ø6	Ø6	Ø6	Ø6	Ø6

1	N. 4 fastening bolts (NOTE): 16 = M8x30 25 = M12x35 32 = M16x45 40 = M20x50 40 = M20x60 63 = M30x80
2	90 Shore sealing rings : 16 = n° 3 OR type 2025 (6.07x1.78) 25 and 32 = n° 3 OR type 2037 (9.25x1.78) 40 and 50 = n° 3 OR type 2050 (12.42x1.78) 63 = n° 3 OR type 2056 (14.00x1.78)
3	Locating pin: 16 = Ø3x10 25, 32 and 40 = Ø5x14 50 and 63 = Ø6x14
4	Identification label

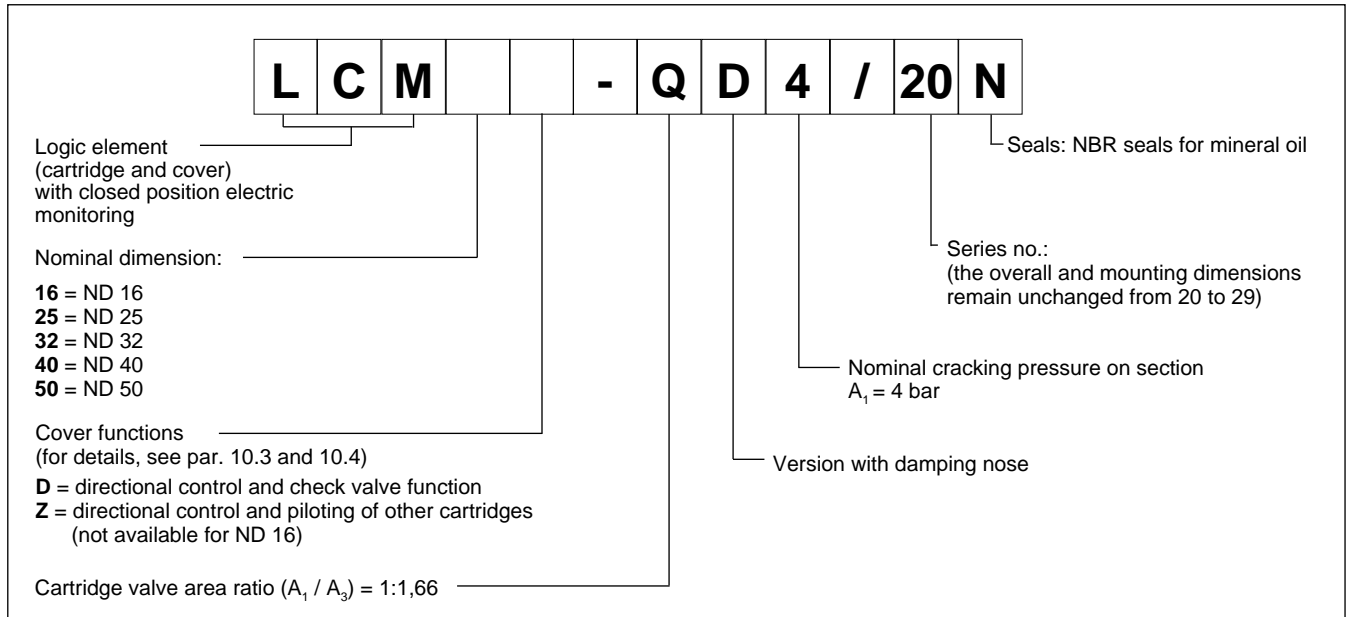
5	Plug X: 1/4" BSP
6	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)
7	Pressure control valve
8	Countersunk hex adjustment screw. Clockwise rotation to increase pressure 16, 25 and 32 = spanner 5 40, 50 and 63 = spanner 6
9	Locking nut: 16, 25 and 32 = spanner 17 40, 50 and 63 = spanner 19

NOTE: Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

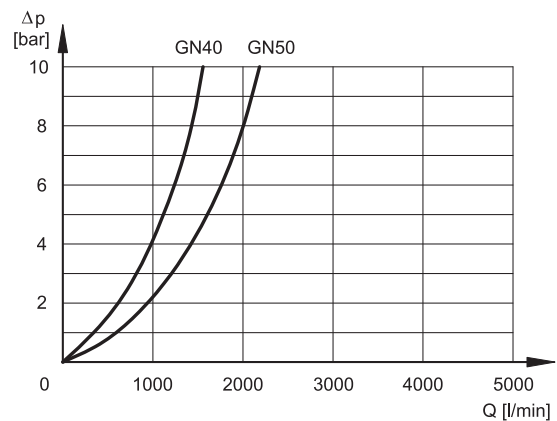
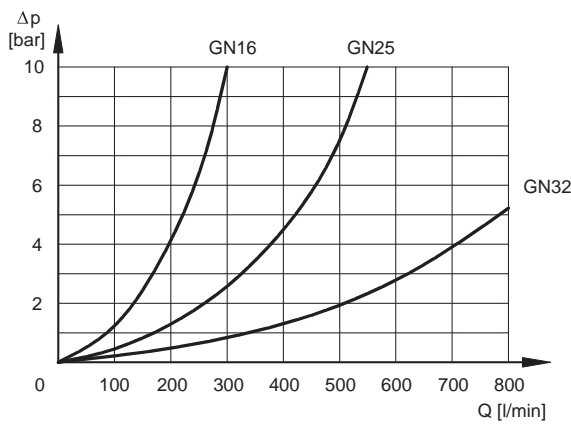
10 - MONITORED LOGIC ELEMENTS

Monitored logic elements are made of a directional function cartridge valve and a cover with built-in inductive proximity sensor. The PNP type sensor with closed contact states the condition of A B intercepted flow.

10.1 - Identification code of monitored logic elements



10.2 - Characteristic Curves (values obtained with viscosity 36 cSt at 50°C)



10.3 - Functional diagram of cover D for directional control and check valve function

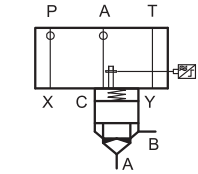
Functional diagram	Description
	<p>Piloting of cartridge valve by means of solenoid valve type DS3-TA (to be ordered separately - see catalogue 41 150)</p> <ul style="list-style-type: none"> - solenoid valve OFF = A B intercepted flow - solenoid valve ON = A B free flow
	<p>Piloting of cartridge valve by means of connection plate code 1950751 to be ordered separately.</p>

10.4 - Functional diagrams for cover Z for directional control and piloting of other cartridges

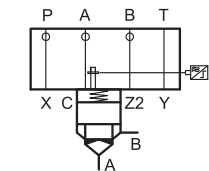
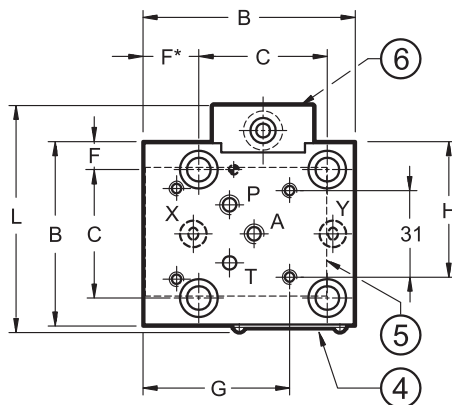
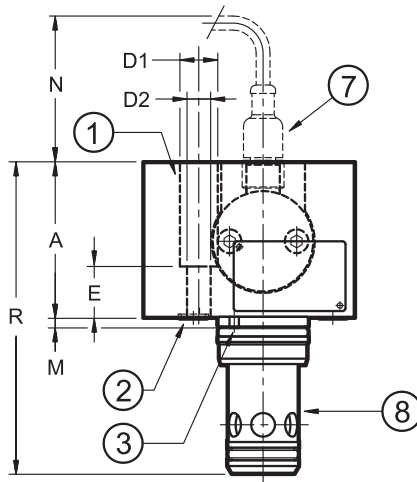
Functional diagram	Description
	<p>Piloting of cartridge valve by means of solenoid poppet valve type DT03-3A (to be ordered separately - see catalogue 42 200). ISO 4401-03 manifold type DN6 (cod.0294329) that allows to intercept the flow from two lines, obtaining a tight or the free flow.</p> <ul style="list-style-type: none"> - solenoid valve OFF = sealing tight - A B locked flow - solenoid valve ON = flow A B free flow
	<p>Piloting of cartridge valve by means of connection plate code 1950751 to be ordered separately.</p>

10.5 - OVERALL AND MOUNTING DIMENSIONS OF MONITORED LOGIC ELEMENTS

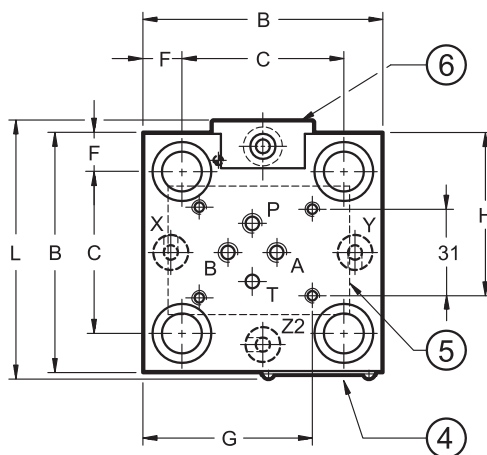
dimensions in mm



LCM16D-QD4
LCM25D-QD4
LCM32D-QD4
LCM40D-QD4
LCM50D-QD4



LCM25Z-QD4
LCM32Z-QD4
LCM40Z-QD4
LCM50Z-QD4



	NOMINAL SIZE				
	16	25	32	40	50
A	55	60	70	75	90
B	78,5	85	100	125	140
C	46	58	70	85	100
D1	13,5	19	25	31	31
D2	8,5	19	17	21	21
E	18	17	22	30	30
F*	19,5	13,5	15	20	20
F	9,5	13,5	15	20	20
G	52	60,2	67,7	80,2	87,7
H	48	58	65,5	105	85,5
L	81	92	102,5	127,5	142,5
M	4	5	5	5	5
N	70	70	65	60	55
R	111	132	155	180	212

ports ready for restrictors M6x8.5	P, A B (on cover Z only)				
Mass [Kg]	2,1	3,3	5,3	9,5	14,5

1	N. 4 fastening bolts (NOTE): 16 = M8x30 40 = M20x60 25 = M12x35 50 = M20x60 32 = M16x45
2	n° 3 sealing rings 90 Shore : 16 = OR type 2025 (6.07x1.78) (for ND 16 there are only 2 OR) 25 and 32 = OR type 2037 (9.25x1.78) 40 and 50 = OR type 2050 (12.42x1.78)
3	Locating pin: 16 = Ø3x10 40 = Ø5x14 25 = Ø5x14 50 = Ø6x14 32 = Ø5x14
4	Identification label
5	Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)
6	Proximity sensor
7	Connector for proximity sensor (to be ordered separately see par. 10.6)
8	Cartridge valve always supplied with the cover

NOTE1: fastening bolts class 12.9 ISO 4762 are recommended for cover installation (to be ordered separately)

NOTE2: for cartridge valve seat dimensions see par. 5

10.6 - Technical characteristics of proximity sensor and relevant connector

PROXIMITY SENSOR

PNP TYPE

Rated voltage	V DC	24
Power supply voltage range	V DC	10 ÷ 30
Absorbed current	mA	200
Output	normally open contact	
Electric protection	polarity inversion short circuit overvoltage	
Electric connection	with connector	
Max operating pressure	bar	350
Operating temperature range	°C	-25 / +80
Class of protection according to CEI EN 60529 standards (atmospheric agents)		IP68
Spool position LED (NOTE)		NO

NOTE: The led is placed in the connector and its light is YELLOW.

ELECTRIC CONNECTOR (to be ordered separately)

code: ECM3S / M12L / 10

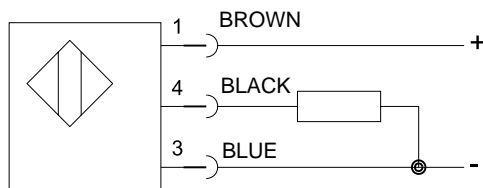
Connector: pre-wired connector M12 - IP68
 cable: with 3 conductors 0.34 mm² - length 5 mt - cable material: polyurethane resin (oil resistant)

LEDS:

GREEN LED: show the presence of power supply voltage to the connector. If the LED is off, the connector is not supplied.

YELLOW LED: show the valve condition:

- valve at rest yellow LED on - green LED on
- switched valve yellow LED off - green LED off



valve closed = closed contact (A B intercepted flow)
 valve open = open contact (A B free flow)



EC

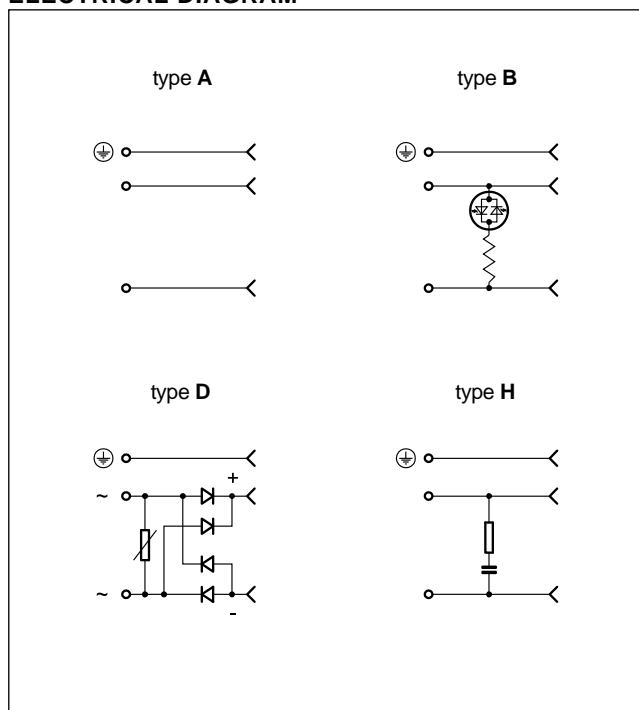
ELECTRIC CONNECTORS

SERIES 10

EN 175301-803
(ex DIN 43650 / ISO 4400)

type A

ELECTRICAL DIAGRAM



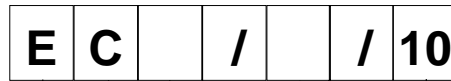
DESCRIPTION

- „ The EC connectors, according to EN 175301-803, are in the model •AŽ configuration and are used mainly for the electrical connection of valve solenoids.
- „ When they are correctly installed and coupled they provide waterproof protection according to IEC EN 60529 standards, class of protection IP65.
- „ The class of insulation is therefore in compliance with IEC 60664-1:2007 specifications, operating voltage up to 250 Volt.
- „ The wire terminal block is removable from the external housing to allow the wire connections to the clamps, and to allow the electrical contacts can be turned through 90° (except version H) if required.
- „ Four different types with specific functions are available:
 - type A, connector two poles + ground
 - type B*, with LED (available voltages: 10 ÷ 50 and 70 ÷ 250V)
 - type D, with bridge rectifier
 - type H, with RC damping circuit
- „ Type A is also available in gray colour, to differentiate the solenoids mounted on the side •AŽ or •BŽ.
- „ They are supplied with M3 fixing screw and NBR gasket.

TECHNICAL CHARACTERISTICS

		type A	type B*	type D	type H
Voltage supply	V DC/AC	up to 230	10 ÷ 50 / 70 ÷ 250	up to 230	up to 230
Number of poles		2 + ground			
Current on connections: nominal maximum	A	10 16			
Contact resistance	m	4			
Maximum conductor size	mm	1,5			
Cable exit		Pg9 / Pg11 unified			
Electromagnetic compatibility (EMC)		according to 2004/108/CE			
Low voltage		according to 2006/95/CE			
Protection degree		IP 65 - IEC 60529			
Insulation class		class C (IEC 60664-1:2007-04)			
Operating temperature	°C	-40 / +90			

1 - IDENTIFICATION CODE



Electric connector
EN 175301-803 (ex DIN 43650 / ISO 4400)

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

Connector type

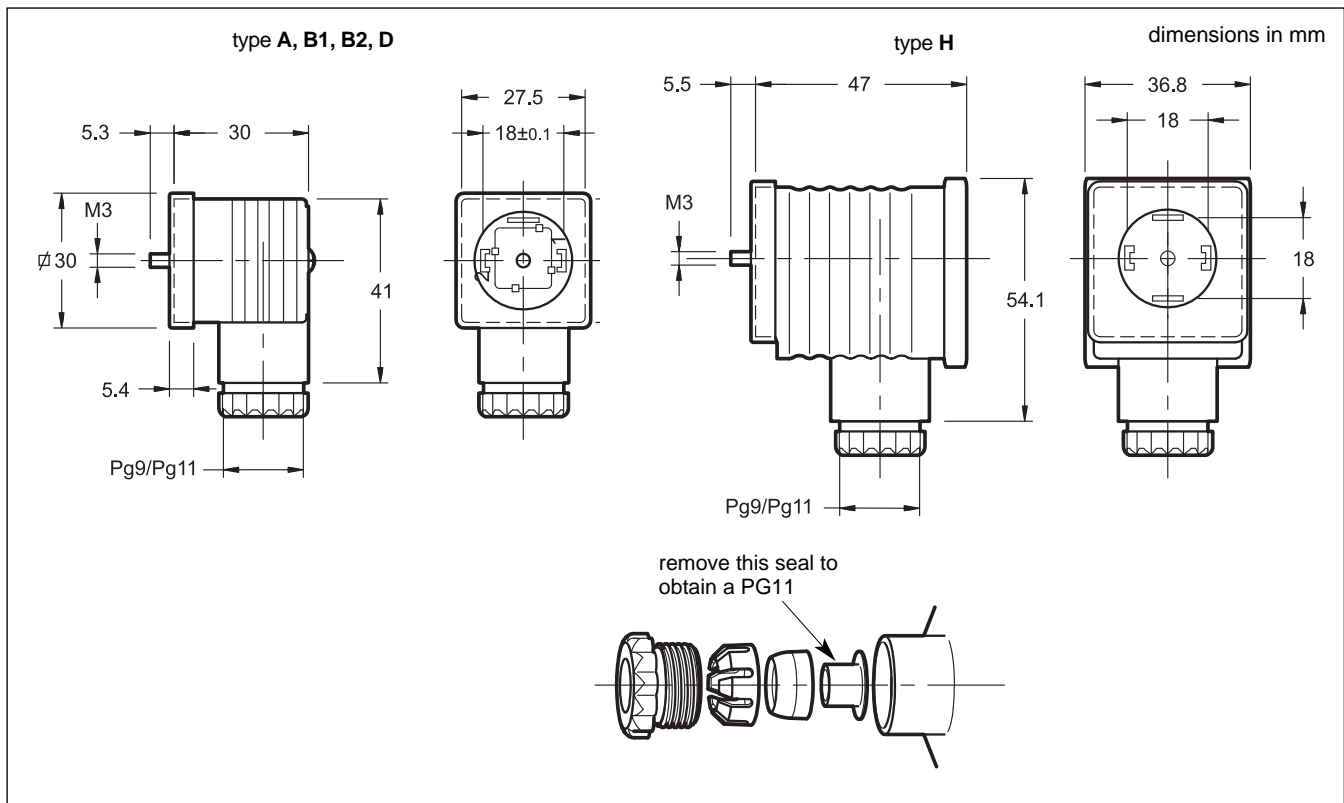
- A** = two poles + ground
- B1** = two poles + ground with led which burns when the solenoid is energized
power supply voltage 10 ÷ 50 V AC/DC
- B2** = two poles + ground with led which burns when the solenoid is energized
power supply voltage 70 ÷ 250 V AC/DC
- D** = two poles + ground with Graetz bridge rectifier:
the choice of this type of connector requires an alternating current power supply and the use of CCR and RAC direct current coils
- H** = two poles + ground with RC damping circuit, to avoid voltage peaks as circuit opening, suitable for alternating and direct current coils.

Colour:

- Type A
 - B** = black (standard)
 - A** = grey
- Type B
 - N** = transparent
- Types D, H
 - B** = black

NOTE: For the connectors type A - D - H it is not necessary to specify the operating voltage, as the power supply voltage is up to 230 V.

2 - OVERALL AND MOUNTING DIMENSIONS



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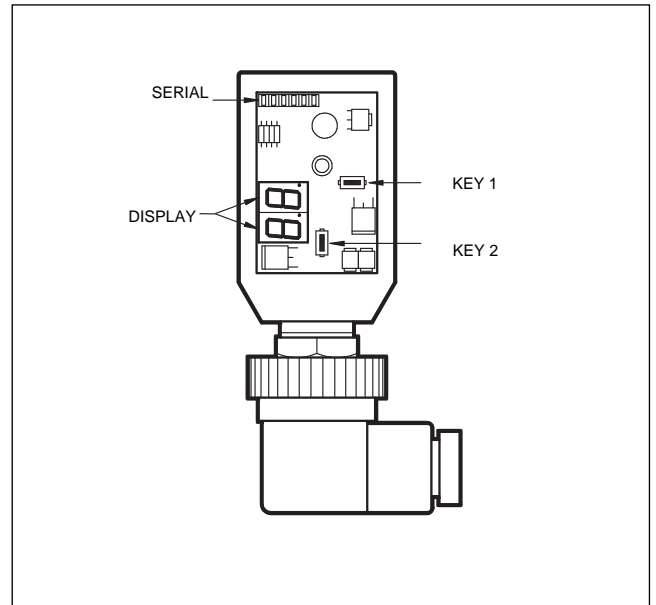
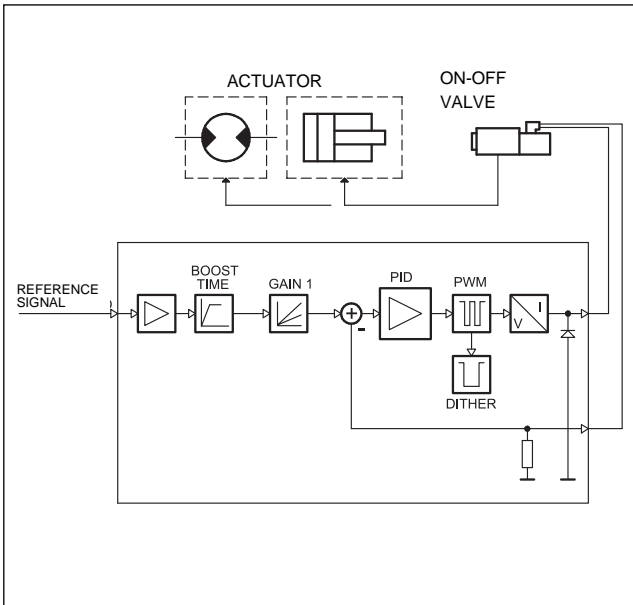


ECL

POWER SAVING DEVICE FOR ON-OFF SOLENOID VALVES SERIES 20

PLUG VERSION

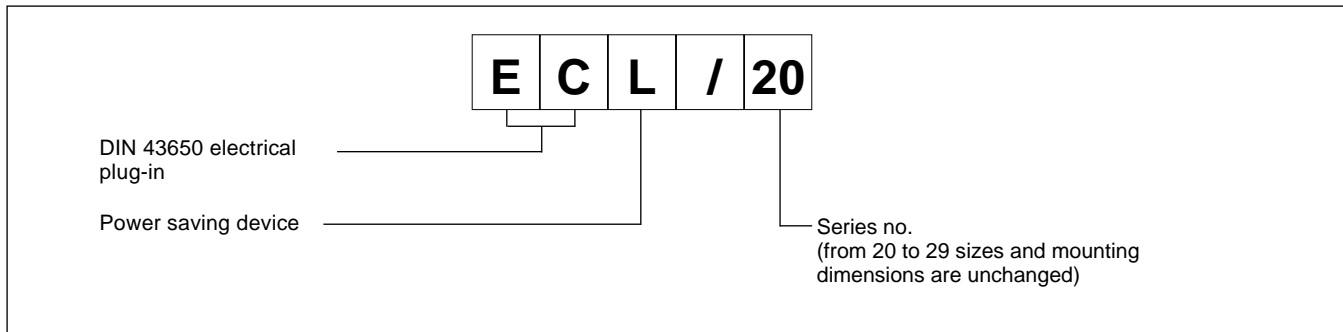
OPERATING PRINCIPLE



TECHNICAL CHARACTERISTICS

Power supply	V DC	8 ÷ 30 Ripple included
Max current	A	2,60
Absorbed current with valve not switched	mA	40
Current absorbed by the switching command (at 30 VDC)	mA	10 max
Full power feeding time	ms	50
Holding current regulating range	% I MAX	50 ÷ 100
Holding current default	% I MAX	40
Connector type		DIN 43650
Electromagnetic compatibility (EMC) - emissions CEI EN 61000-6-4 - immunity CEI EN 61000-6-2		according to 2004/108/CE standards (see paragraph 5 - NOTE)
Protection to atmospheric agents		IP 65 - 67
Operating temperature range	°C	-20 / +70
Mass	kg	0,10

1 - IDENTIFICATION CODE



The ECL connector is a digital amplifier controlling open loop on-off valves directly from PLC.

The unit supplies a set current independently from temperature variations or load impedance.

Setting is possible by buttons and display inside the case, or with a PC by RS232 with the software EDC-PC/10, (see paragraph 6.2).

2 - FUNCTIONAL SPECIFICATIONS

2.1 - Electric power supply

The connector requires a power supply of 24V DC (pin 1 and 2). The power supply voltage must be rectified and filtered, and it has not to be higher than 6A.

N.B. The value of the power supply voltage on the connector must be higher than the rated working voltage of the solenoid to be controlled.

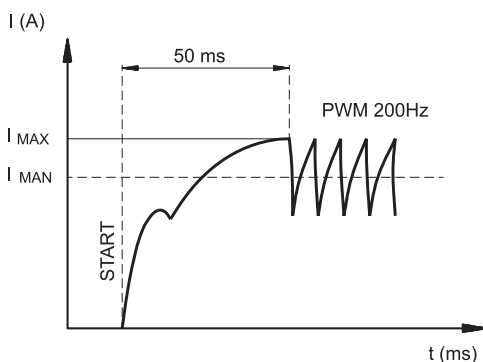
The power required by the card depends on the power supply voltage and on the maximum value of the supplied current.

2.2 - Electrical protection

The connector is protected against overvoltage and polarity inversion. On the output a protection against any short circuit is foreseen.

2.3 - Functioning

This device operates by feeding the solenoid valve at the max current value for a time sufficient to guarantee the complete valve energizing (50 ms). The current is therefore automatically reduced at holding.



I_{MAX} = max current
 I_{MAN} = holding current

default vales: I_{MAN} = 1A
 threshold : 200 mV
 freq: 200 Hz

3 - SIGNALS

3.1 - POWER ON (Power supply)

Displays indicate the connector is ON and with +24 V DC.

4 - ADJUSTMENTS

There are two way adjustments: variables view and parameters editing. The first one enables the real time monitoring of the control values, for both required and read current, on both channels. The second modality enables the operating parameters view and editing.

4.1 - Variables view

The card is switched on at the variables view modality, and it shows the first variable value, that is the C1 parameter, current solenoid.

- C1: current supplied from ECL to the solenoid read on real time
- U1: Threshold reference signal.
9.9 = Threshold active

4.2 - Parameters editing

To access the parameter editing, press the key (2) for at least 3 seconds.

The first parameter displayed is G1. To modify it, press the key (1) for two seconds, until the display starts blinking. Use the key (2) to increase the value and the key (1) to decrease it. To save the new value, press both the keys. The display stops blinking.

Pressing the key (2) again is possible to scroll all the parameters. To modify the other parameters, repeat the steps above-mentioned for the G1 parameter.

The variables that can be selected are:

- G1: I_{MAX} current, expressed in milliAmpere.
It sets the maximum current to the solenoid, when the reference signal is at the maximum value. It is used to limit the maximum value of the supplied current.
Default value of I_{max} = 1000 mA
Range = 50 ÷ 100% of I_{max}
- Fr: PWM frequency, in Hertz.
It sets the PWM frequency, which is the pulsating frequency of the solenoid current.
Default value = 200
Range = 100 ÷ 500 Hz

DISPLAY VIEW EXAMPLE:

REFERENCE (V)	VARIABLE (V)	U1	VARIABLE C1
0	00		40. (mA)
10	10.		2.6 (A)

5 - INSTALLATION

The connector type electronic unit is suitable for direct assembly on the solenoid of the relative on-off valve. With the 4-core connector for supply and for the reference signal.

NOTE: To observe EMC requirements it's important that the control unit electrical connection is in compliance with the wiring diagram of chapter 7.

As a general rule, the valve and the electronic unit connection wires must be kept as far as possible from interference sources as power wires, electrical motors, inverters and electrical switches.

In environments where there are critical electromagnetic interferences, a complete protection of the connection wires can be requested.

6 - START UP, CONTROL SETTINGS AND SIGNAL

6.1 - Set up

Settings can be changed by either acting on the (1) and (2) keys located on the card front panel, or using the EDC-PC software kit.

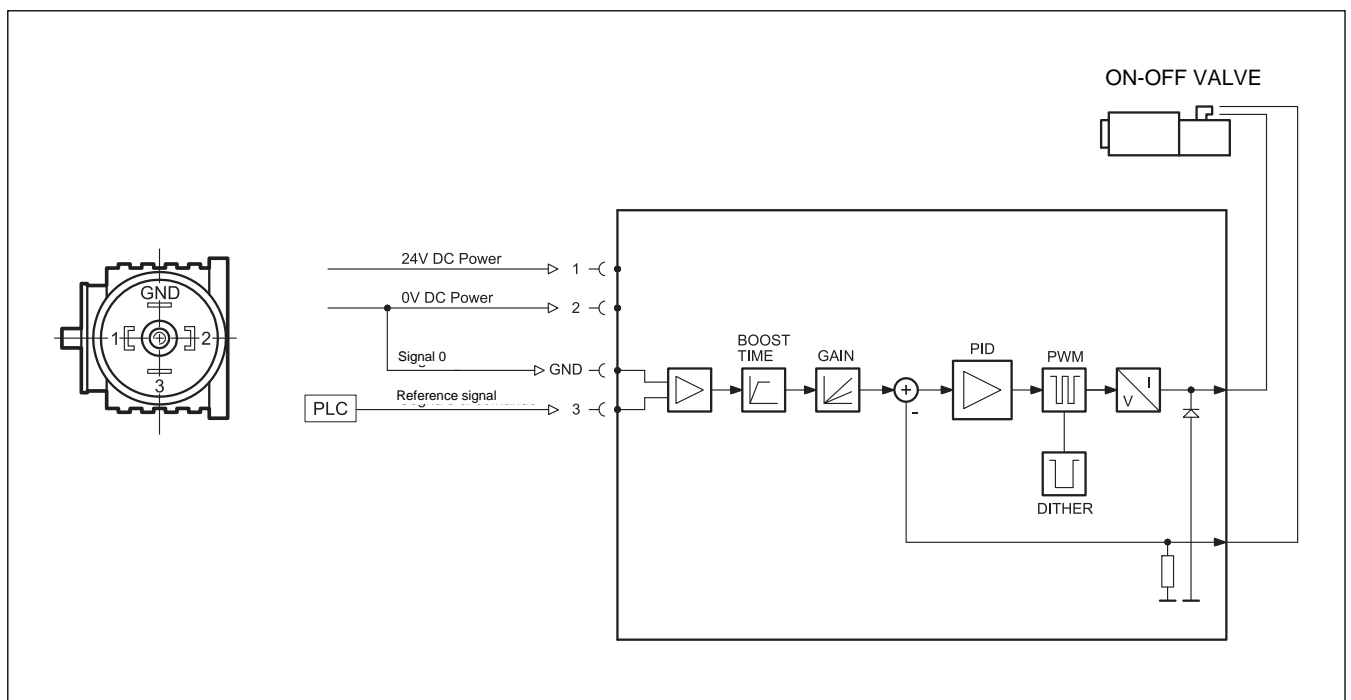
6.2 - EDC-PC/10 Software (code 3898301001)

The relevant hardware and software kit (to be ordered separately) allows to read the values and to set the connector easily.

The software communicates, through a flat cable, to the ECL; the connector is behind the protecting gate.

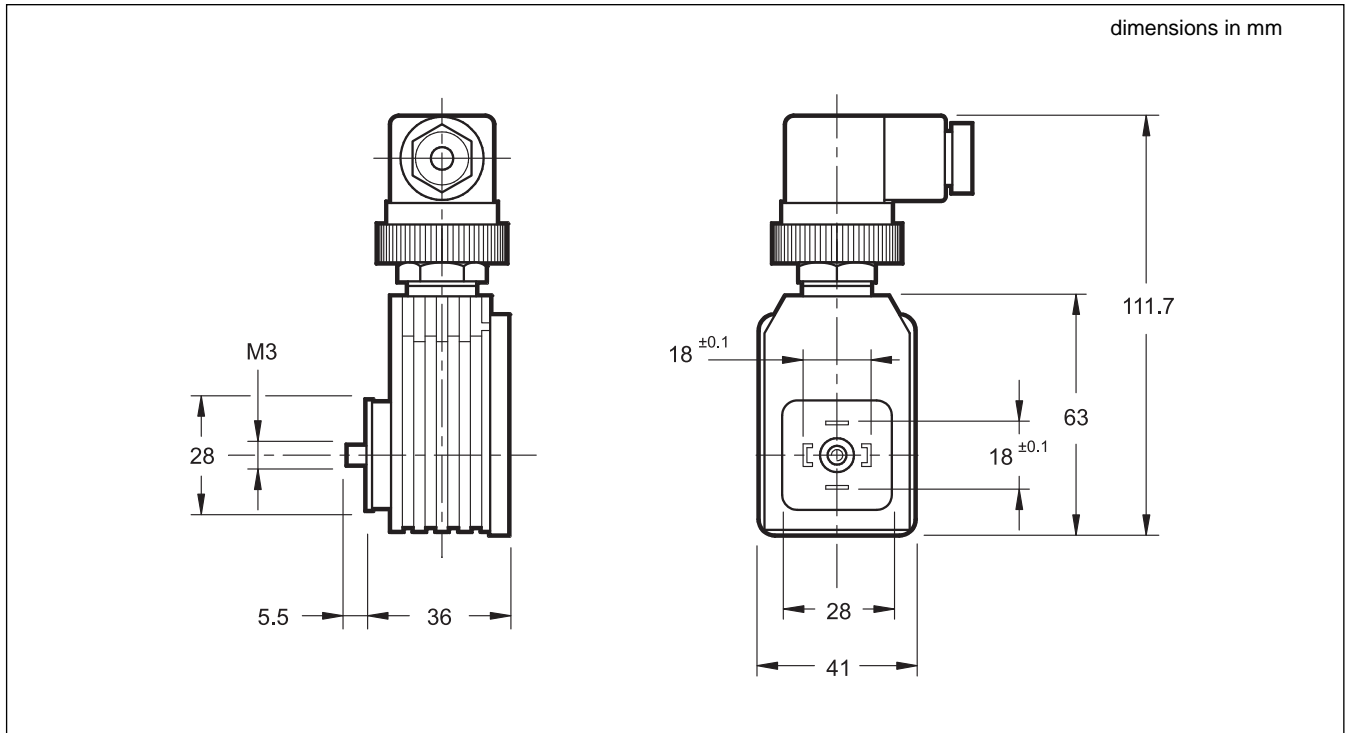
The EDC-PC/10 software compatibility is guaranteed only on Windows XP® operating systems.

7 - WIRING DIAGRAM





8 - OVERALL AND MOUNTING DIMENSIONS



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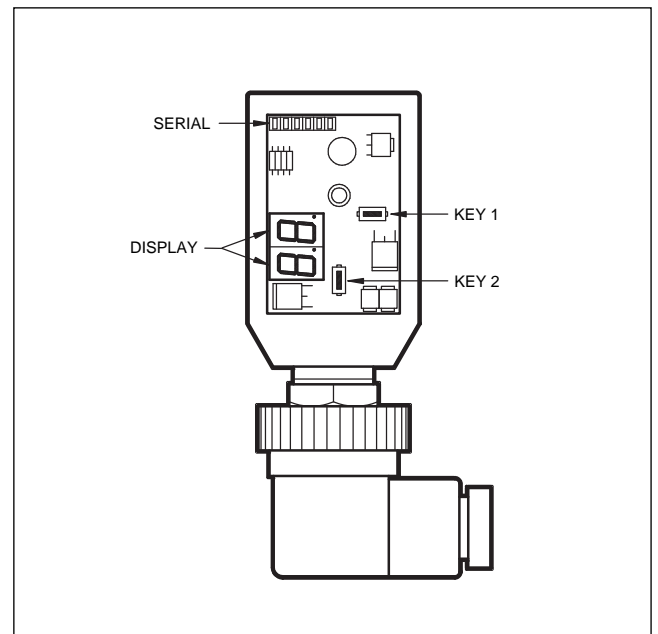
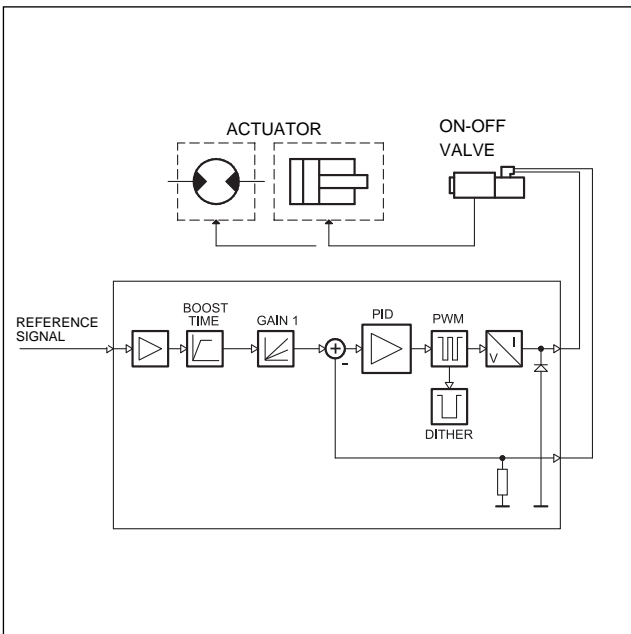
ECF

AMPLIFIED CONNECTOR FOR FAST COMMAND (RAPID) ON-OFF VALVES SERIES 20



PLUG VERSION

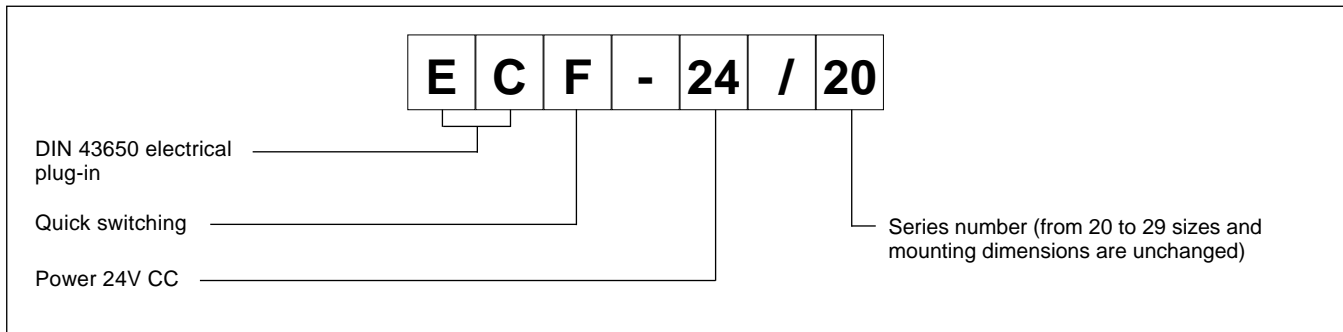
OPERATING PRINCIPLE



TECHNICAL CHARACTERISTICS

Power supply	V DC	24 ÷ 30 ripple included
Required power	W	min 50 - max 150 (see paragraph 2.1)
Output current	mA	max 3000 (see paragraph 1)
Power supply electrical protections		... overload over 33V ... polarity inversion
Output electrical protections		Short-circuit
Analogue electrical protections		up to 30 V DC
Reference signal	V DC	24
Connector type		DIN 43650
Electromagnetic compatibility (EMC) - emissions CEI EN 61000-6-4 - immunity CEI EN 61000-6-2		according to 2004/108/CE standards (see paragraph 5 - NOTE 1)
Protection to atmospheric agents		IP 65 - 67
Operating temperature range	°C	-20 / +70
Mass	kg	0,10

1 - IDENTIFICATION CODE



The ECF connector is a digital amplifier controlling open loop on-off valves.

The unit supplies a set current independently from temperature variations or load impedance.

A quick solenoid energizing is possible in two different ways, according to the used coil type (12V o 24V)

Setting is possible by buttons and display inside the case, or with a PC by RS232 with the software EDC-PC, (see paragraph 6.2).

2 - FUNCTIONAL SPECIFICATIONS

2.1 - Electric power supply

The connector requires a power supply of 24V DC (terminals 1 and 2). The power supply voltage must be rectified and filtered, and it has not to be higher than 6A.

N.B. The value of the power supply voltage on the connector must be higher than the rated working voltage of the solenoid to be controlled.

The power required by the card depends on the power supply voltage and on the maximum value of the supplied current.

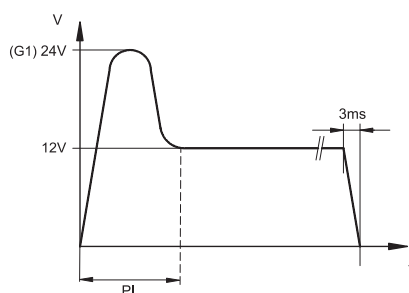
2.2 - Electrical protection

The connector is protected against overvoltage and polarity inversion. On the output a protection against any short circuit is foreseen.

2.3 - Functioning with 12V coils

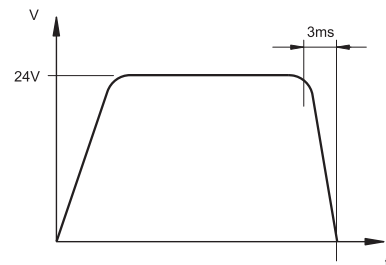
With the employment of 12V coils, the ECF valve allows a quick solenoid energizing (G1), overboosting the solenoid just the time to energize it (PI). Then, the voltage will be lowered at the rated value. The de-energizing is fast, and is 3 ms.

At overboosting time, the power-supply unit must be able to provide a 6 A intensity current strength.



2.4 - Functioning with 24V coils

24V coils do not require overboosting. A quick de-energizing is guaranteed.



3 - SIGNALS

3.1 - POWER ON (Power supply)

Displays indicate the connector is ON and with +24 V DC.

4 - ADJUSTMENTS

There are two way adjustments: variables view and parameters editing. The first one enables the real time monitoring of the control values, for both required and read current, on both channels. The second modality enables the operating parameters view and editing.

4.1 - Variables view

The card is switched on at the variables view modality, and it shows the first variable value, that is the C1 parameter, current solenoid.

C1: current supplied from ECF to the solenoid read on real time

4.2 - Parameters editing

To access the parameter editing, press the key (2) for at least 3 seconds.

The first parameter displayed is G1. To modify it, press the key (1) for two seconds, until the display starts blinking. Use the key (2) to increase the value and the key (1) to decrease it. To save the new value, press both the keys. The display stops blinking.

Pressing the key (2) again is possible to scroll all the parameters. To modify some the parameter, repeat the steps above-mentioned for the G1 parameter.

DISPLAY VIEW EXAMPLE:

REFERENCE (V)	VARIABLES (Ampere)
0	0.0 (mA)
24	2.6 (A)

The variables that can be selected are:

- G1:** • I MaxŽ current, expressed in Ampere.
It sets the maximum current to the solenoid, when the reference signal is at the maximum value +24 V. It is used to limit the maximum value of the supplied current.
Default value = 2000 mA
Range = 0 ÷ 3000 mA
- PI:** Overboosting time.
It determines the regulation of solenoid overboosting time and it is measured by milliseconds.
Default value = 40 ms
Range = 0 ÷ 500 ms
- Fr:** PWM frequency, in Hertz.
It sets the PWM frequency, which is the pulsating frequency of the solenoid current.
Default value = 200
Range = 100 ÷ 500Hz

5 - INSTALLATION

The connector type electronic unit is suitable for direct assembly on the solenoid of the relative on-off valve. With the 4-core connector for supply and for the reference signal.

NOTE: To observe EMC requirements it's important that the control unit electrical connection is in compliance with the wiring diagram of chapter 7.

As a general rule, the valve and the electronic unit connection wires must be kept as far as possible from interference sources as power wires, electrical motors, inverters and electrical switches.

In environments where there are critical electromagnetic interferences, a complete protection of the connection wires can be requested.

6 - START UP, CONTROL SETTINGS AND SIGNAL

6.1 - Set up

Settings can be changed by either acting on the (1) and (2) keys located on the card front panel, or using the EDC-PC software kit.

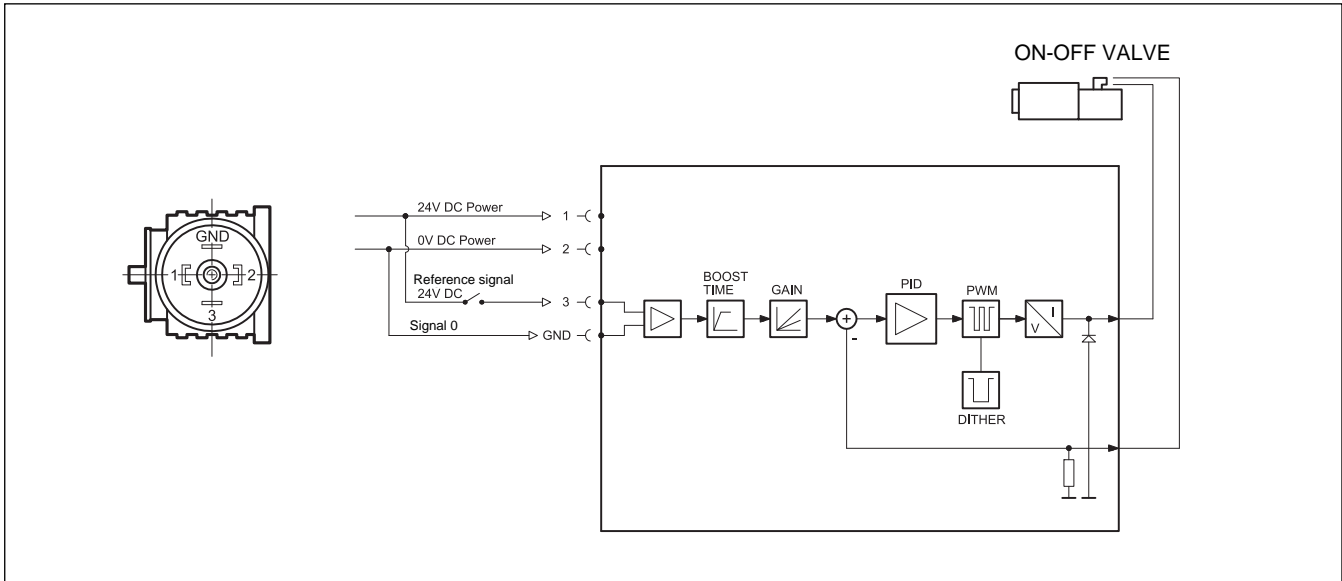
6.2 - EDC-PC Software (code 3898301001)

The relevant hardware and software kit (to be ordered separately) allows to read the values and to set the connector easily.

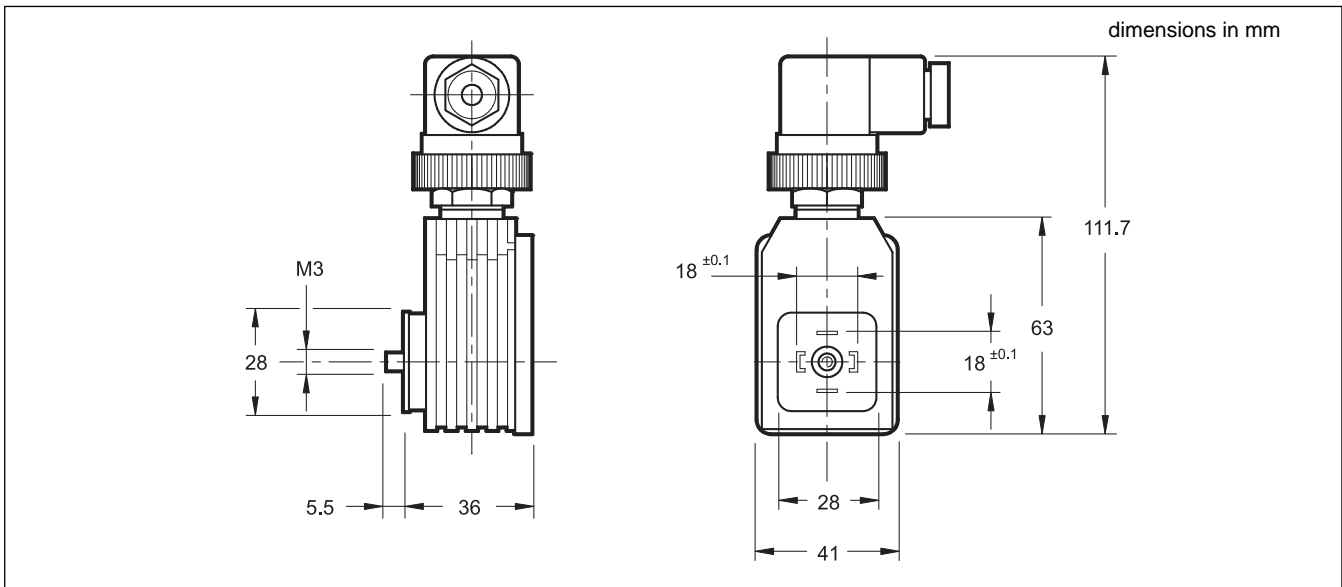
The software communicates, through a flat cable, to the ECF; the connector is behind the protecting gate.

The EDC-PC software compatibility is guaranteed only on Windows XP® operating systems.

7 - WIRING DIAGRAM



8 - OVERALL AND MOUNTING DIMENSIONS

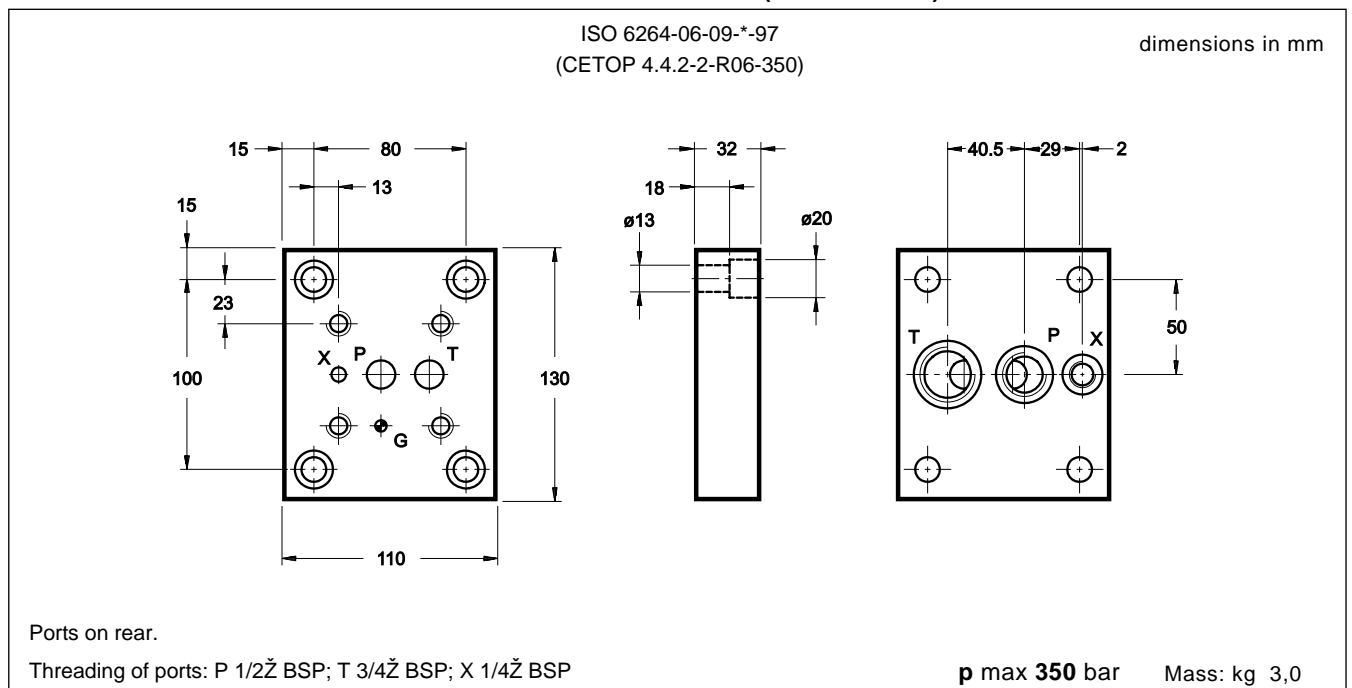


SUBPLATES

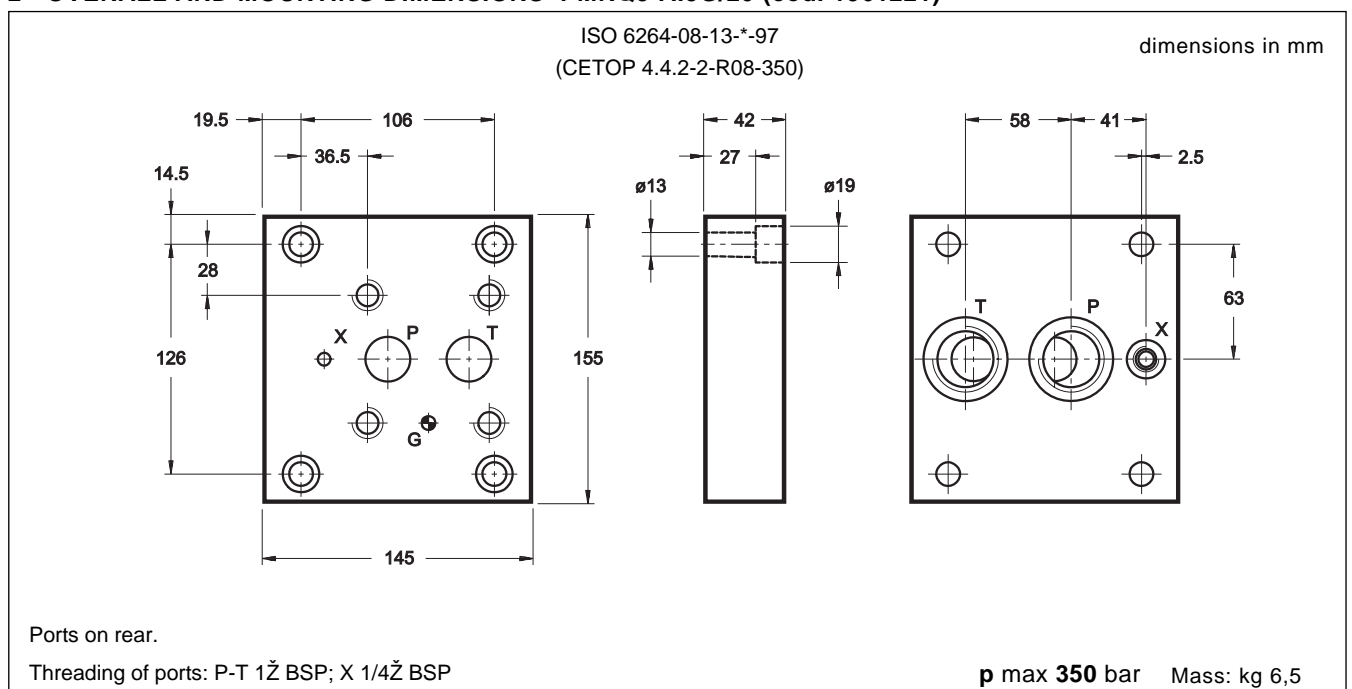
PMRQ*

SUBPLATES FOR PRESSURE CONTROL VALVES

1 - OVERALL AND MOUNTING DIMENSIONS PMRQ3-AI4G/20 (cod. 1961211)



2 - OVERALL AND MOUNTING DIMENSIONS PMRQ5-AI5G/20 (cod. 1961221)

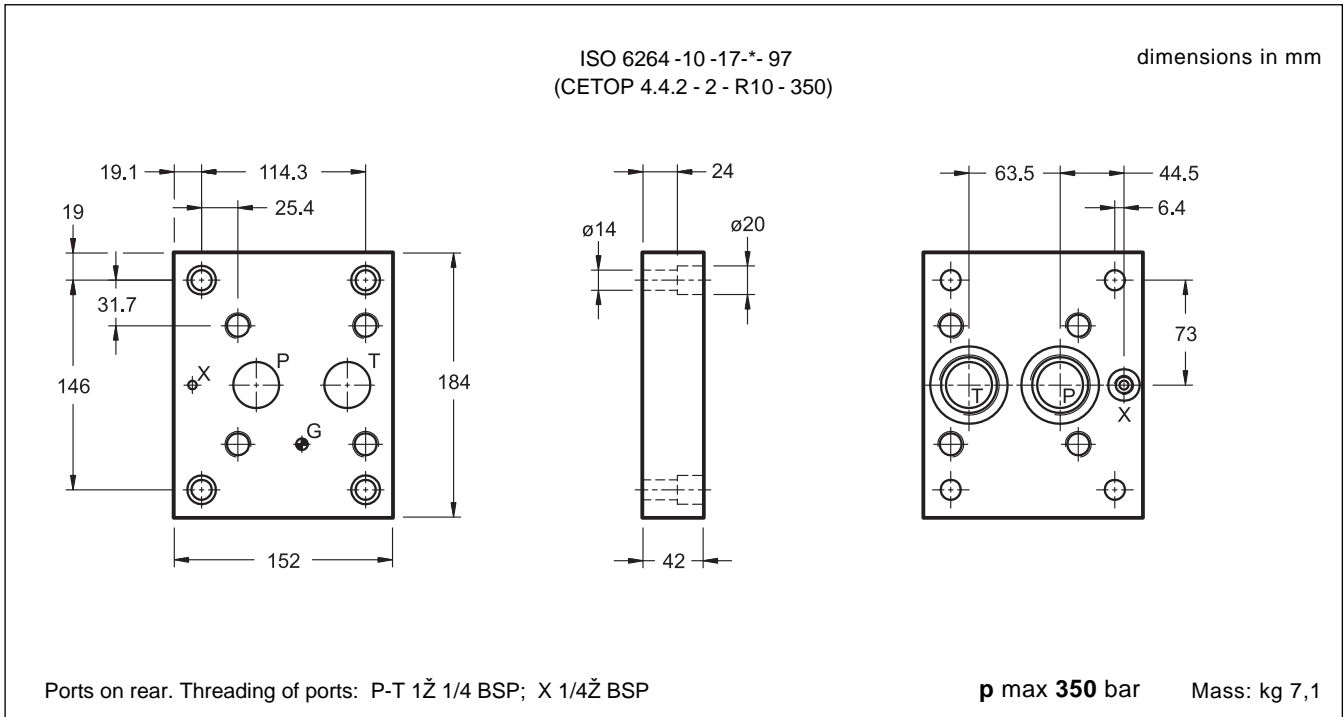




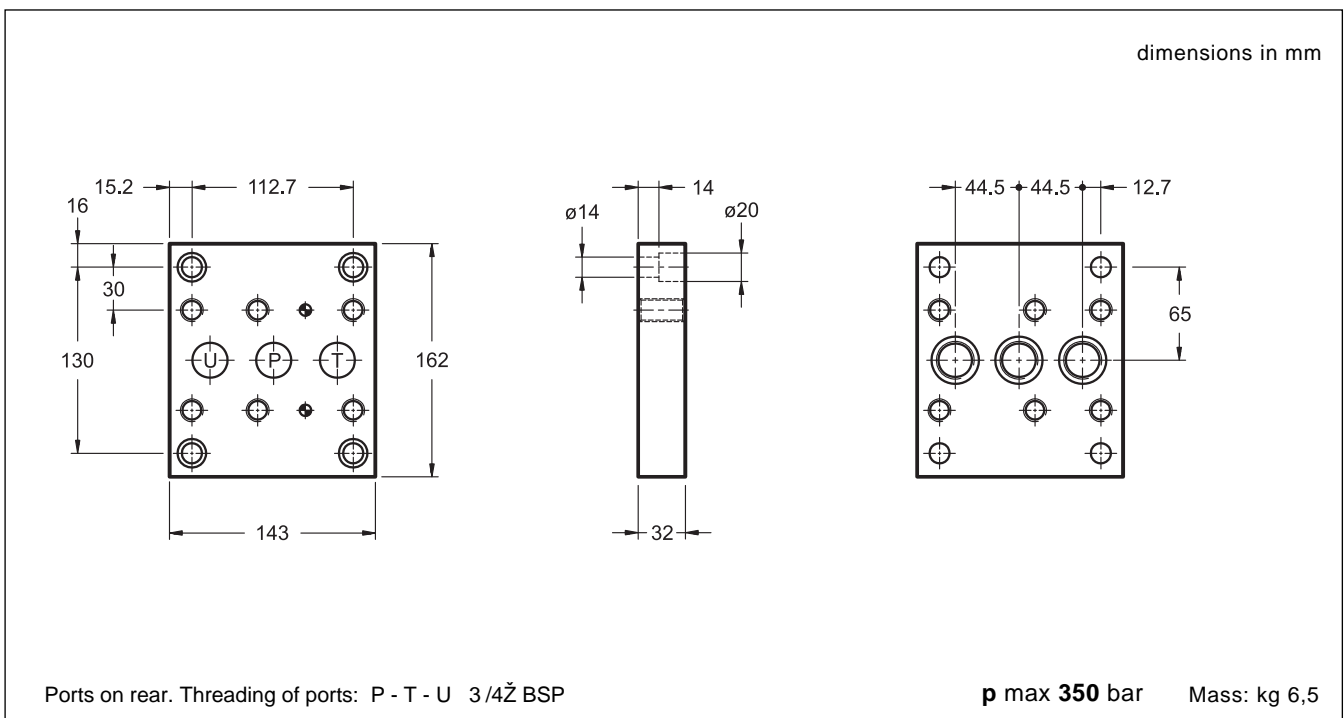
PMRQ*

SUBPLATES FOR PRESSURE CONTROL VALVES

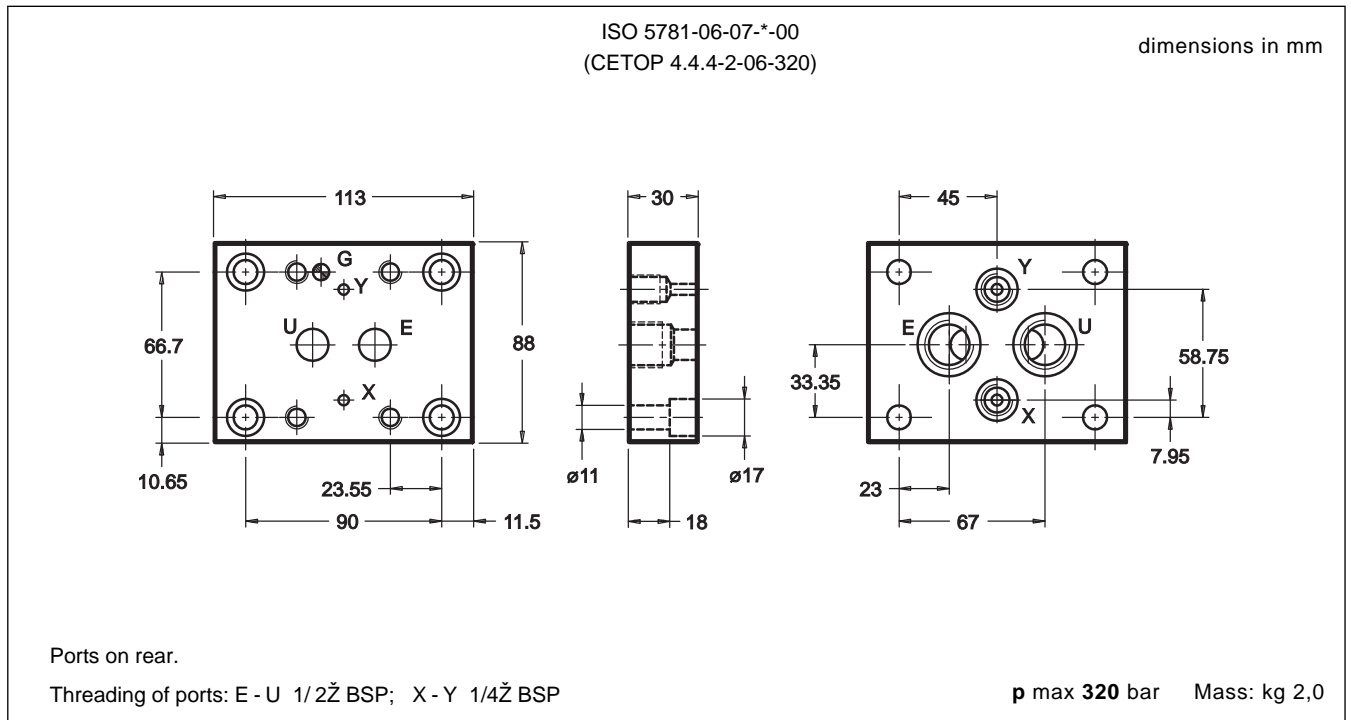
3 - OVERALL AND MOUNTING DIMENSIONS PMRQ7-AI7G/10 (cod. 1960051)



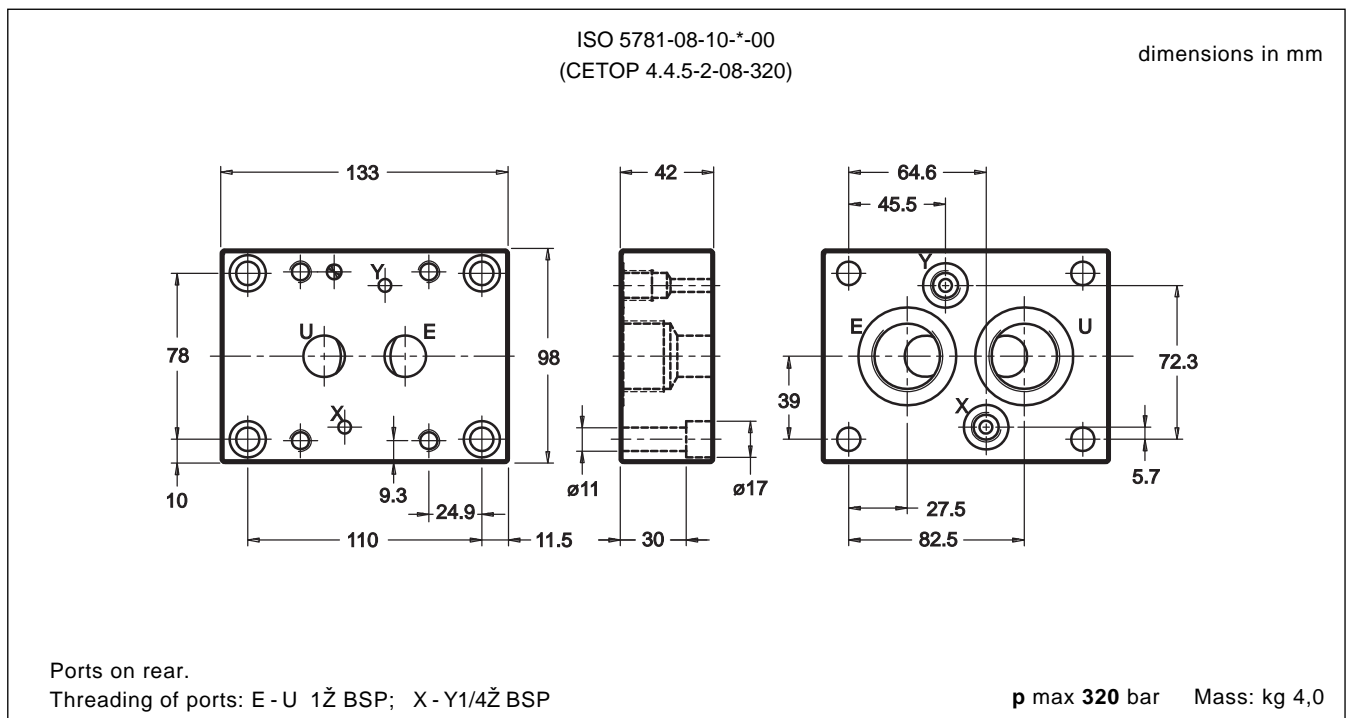
4 - OVERALL AND MOUNTING DIMENSIONS PMRQA5-AI5G/10 (cod. 1960070)



5 - OVERALL AND MOUNTING DIMENSIONS PMSZ3-AI4G/20 (cod. 1961231)



6 - OVERALL AND MOUNTING DIMENSIONS PMSZ5-AI6G/20 (cod. 1961241)

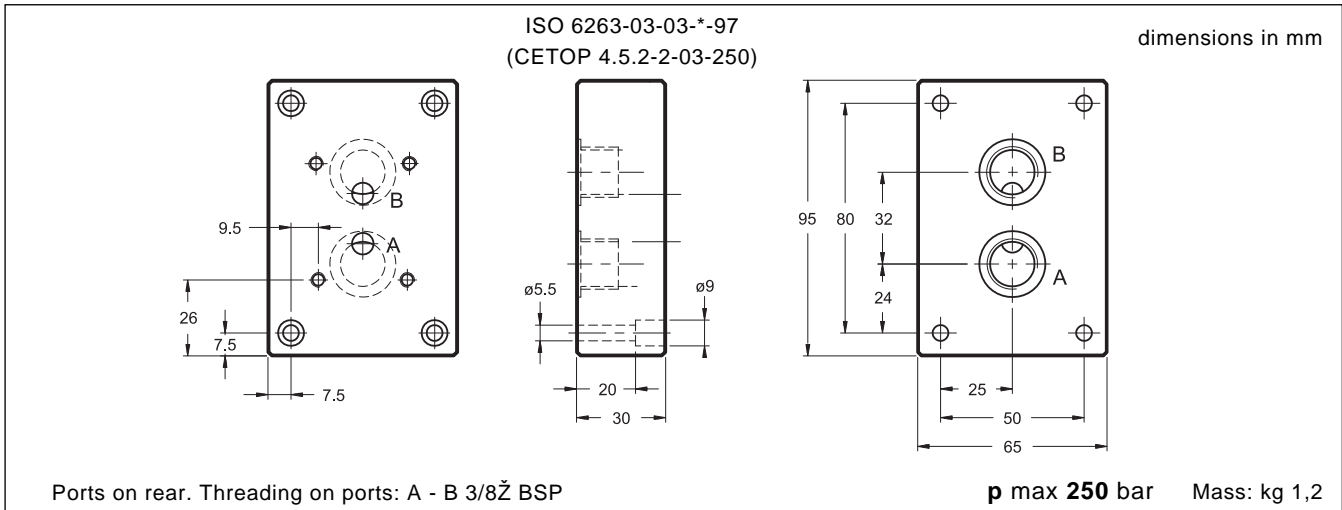




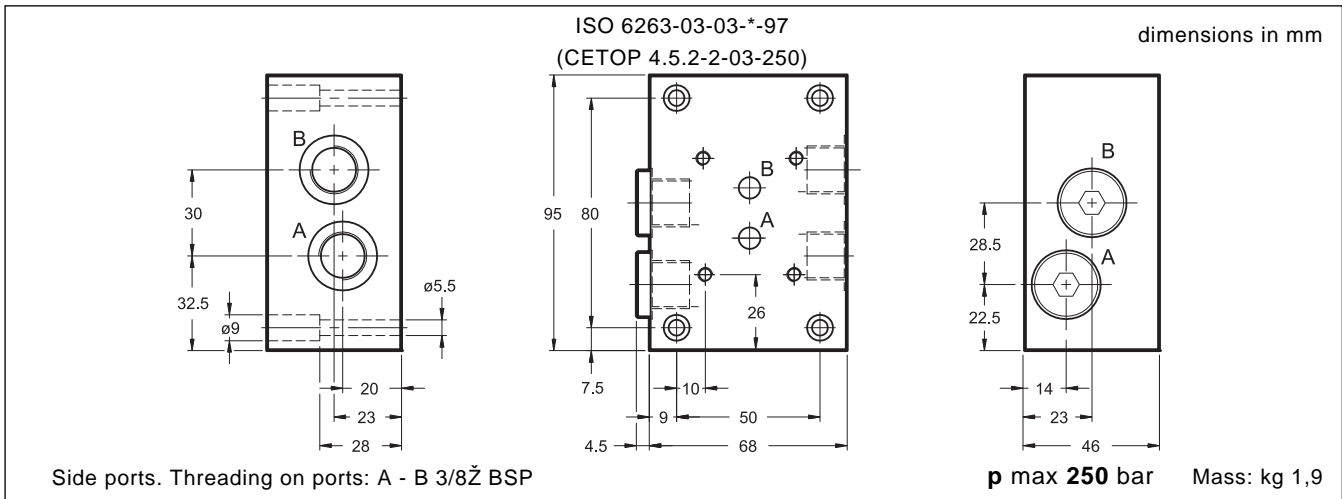
PMRPC*

SUBPLATES FOR FLOW CONTROL VALVES

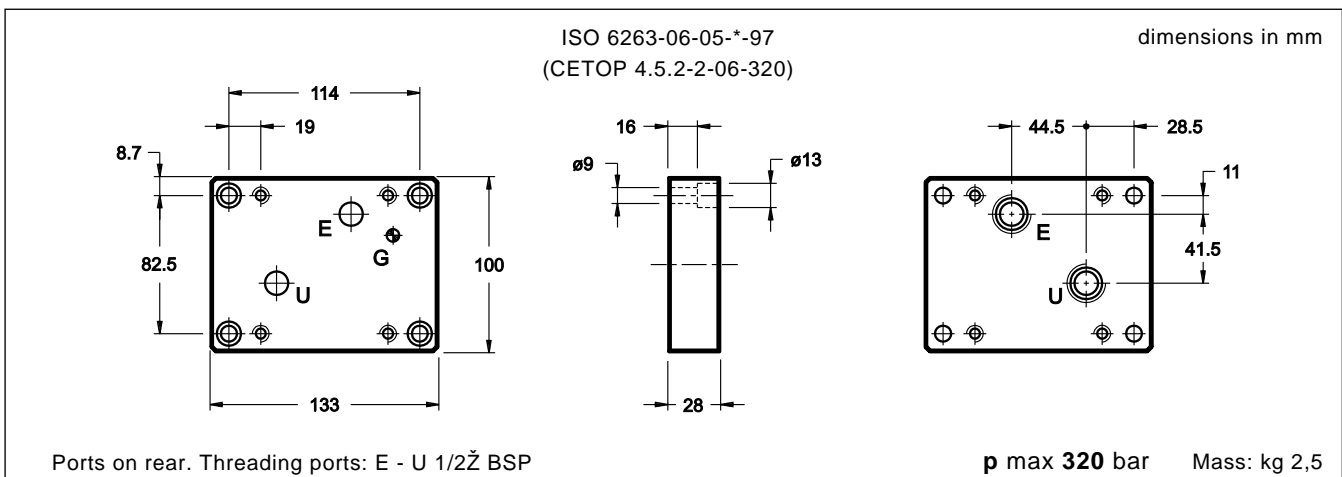
7 - OVERALL AND MOUNTING DIMENSIONS PMRPC1-AI3G/10 (cod. 1961045)



8 - OVERALL AND MOUNTING DIMENSIONS PMRPC1-AL3G/10 (cod. 1961051)



9 - OVERALL AND MOUNTING DIMENSIONS PMRPC2-AI4G/10 (cod. 1960330)

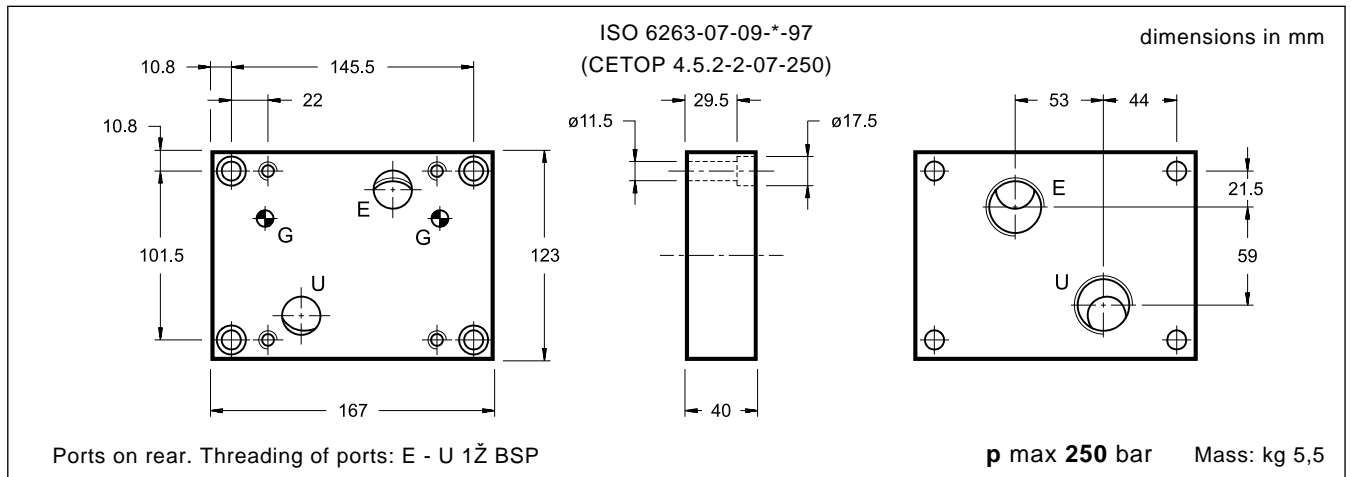




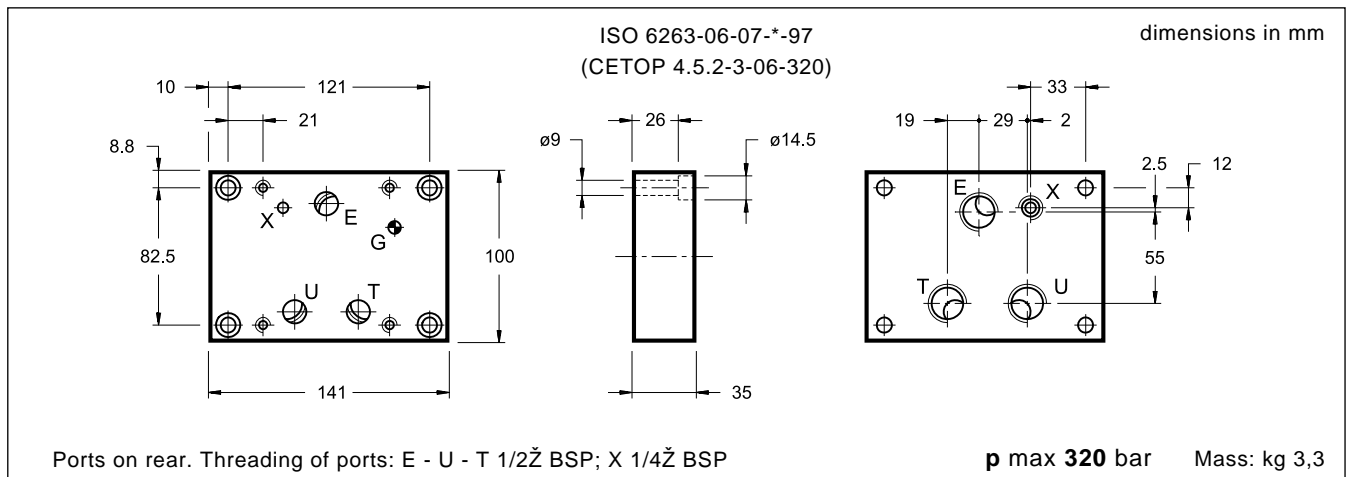
PMRPC*

SUBPLATES FOR FLOW CONTROL VALVES

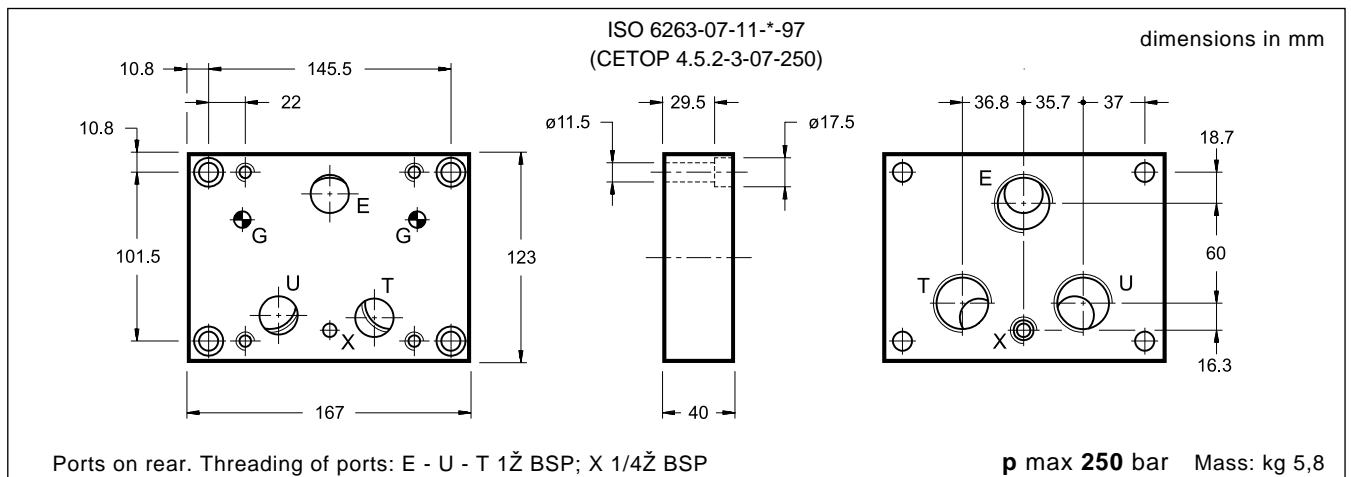
10 - OVERALL AND MOUNTING DIMENSIONS PMRPC3-AI6G/10 (cod. 1960511)



11 - OVERALL AND MOUNTING DIMENSIONS PMRPC2-AI4G/10 (cod. 1960526)



12 - OVERALL AND MOUNTING DIMENSIONS PMRPCQ3-AI6G/10 (cod. 1960423)

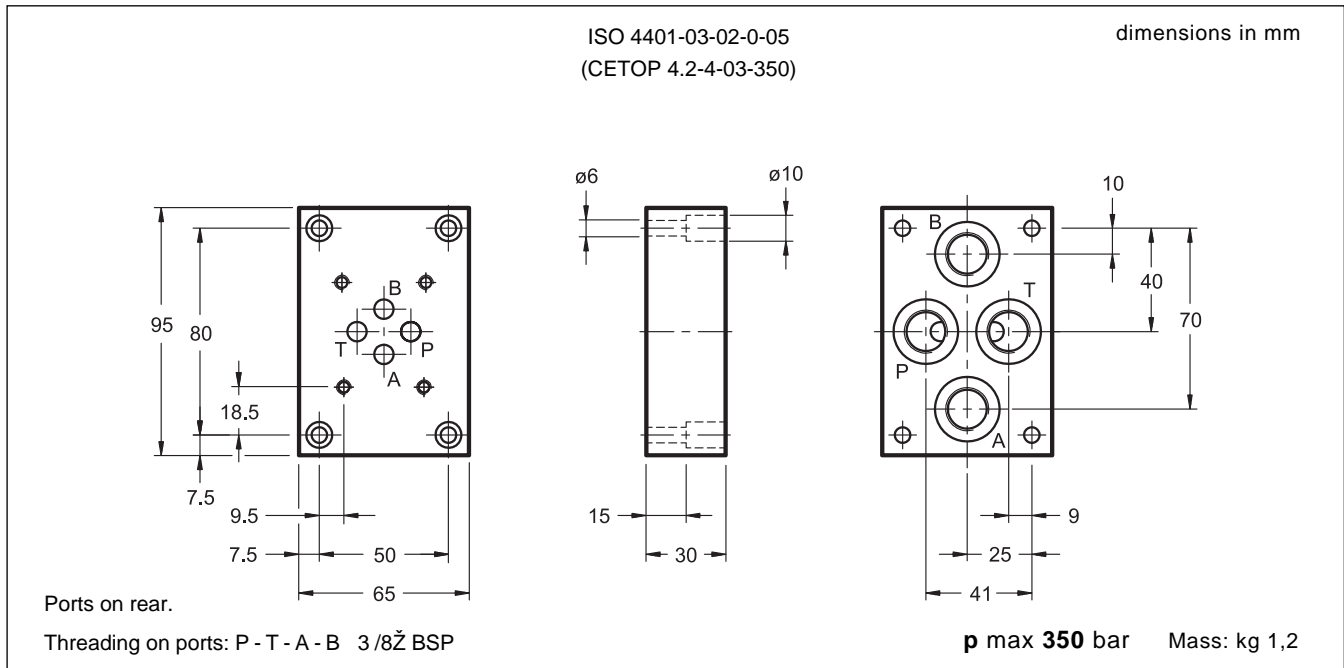




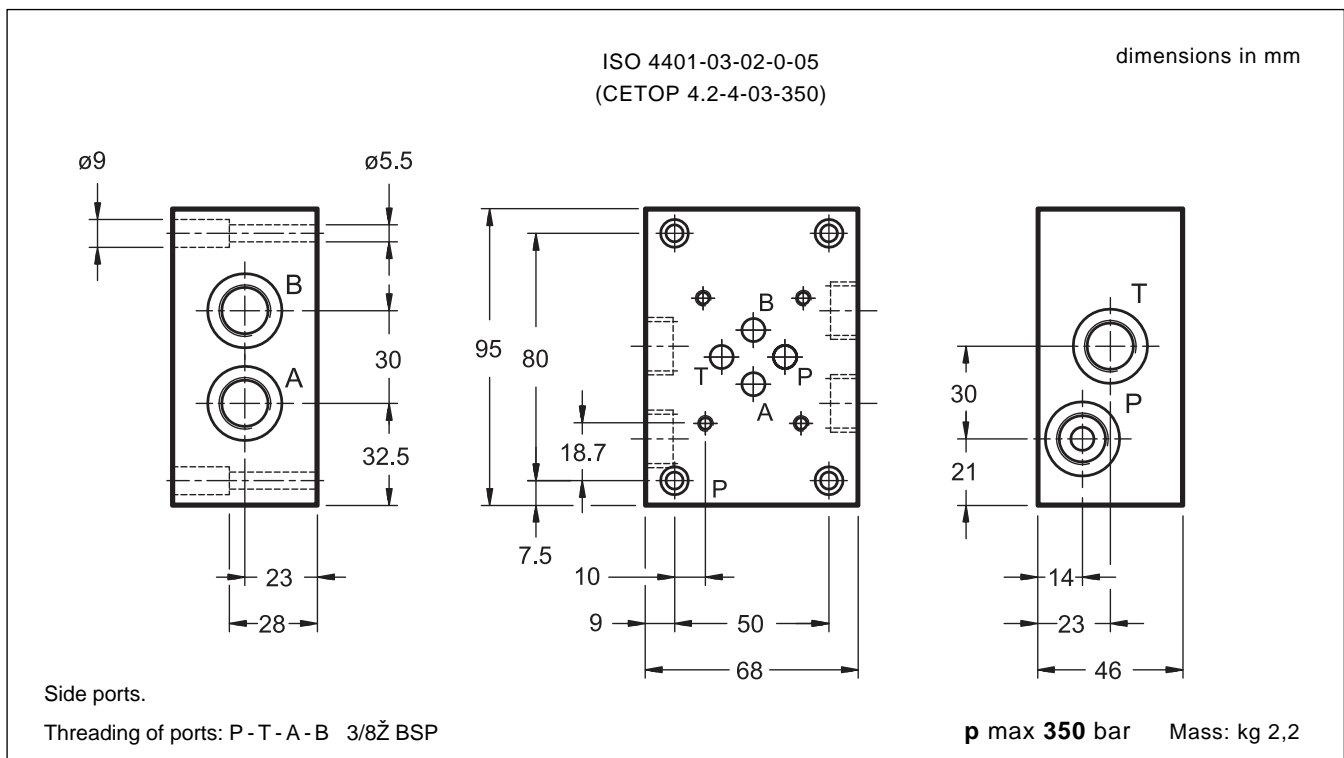
PMMD

SUBPLATES FOR ISO 4401-03 (CETOP 03) VALVES

13 - OVERALL AND MOUNTING DIMENSIONS PMMD-AI3G/20 (cod. 1961261)



14 - OVERALL AND MOUNTING DIMENSIONS PMMD-AL3G/11 (cod. 1961251)

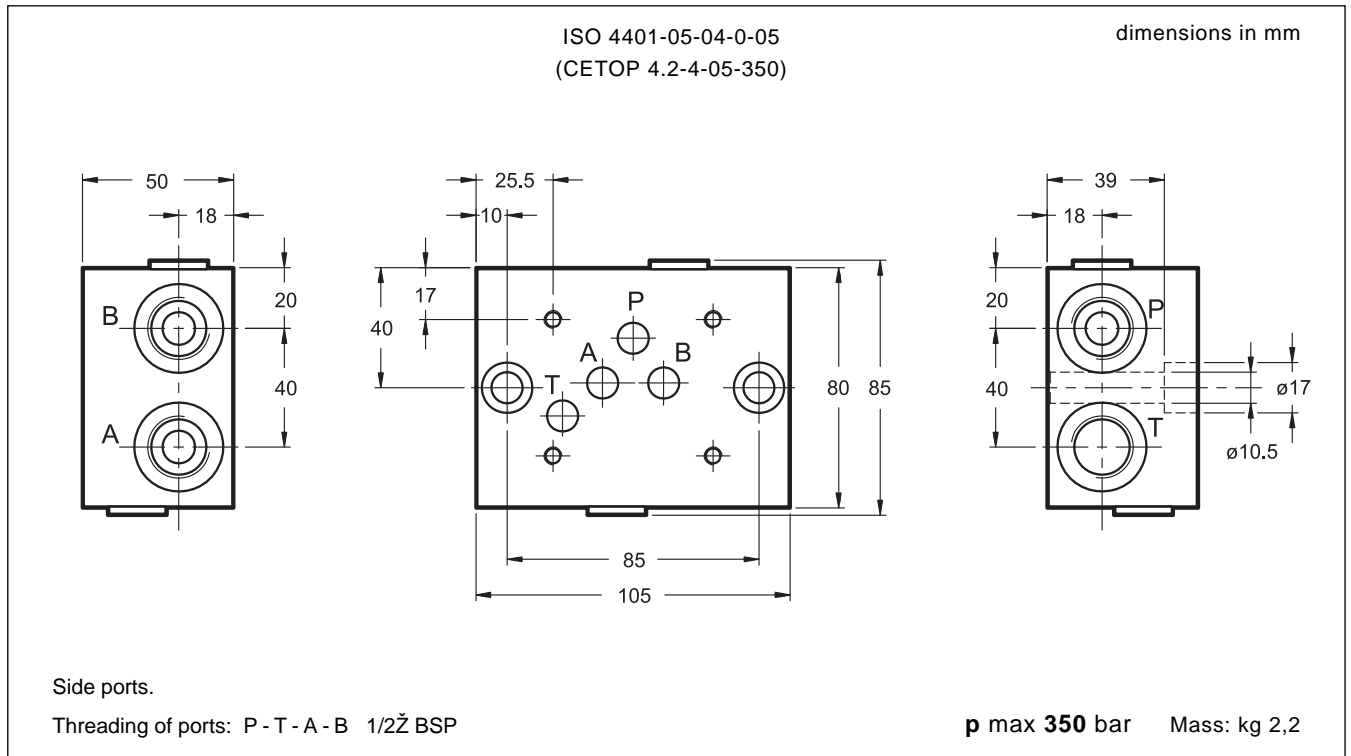




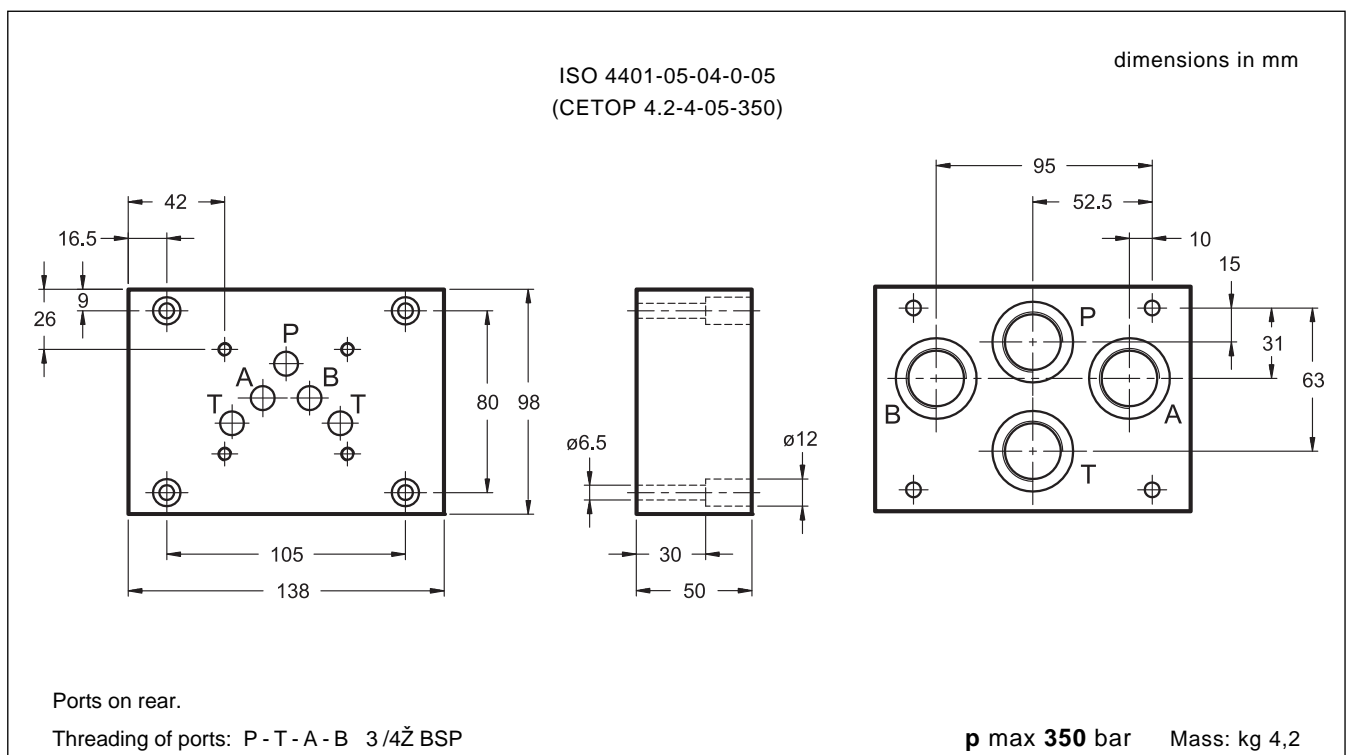
PMD4

SUBPLATES FOR ISO 4401-05 (CETOP 05) VALVES

15 - OVERALL AND MOUNTING DIMENSIONS PMD4-AL4G/10 (cod. 1960981)



16 - OVERALL AND MOUNTING DIMENSIONS PMD4-AI4G/20 (cod. 1961271)



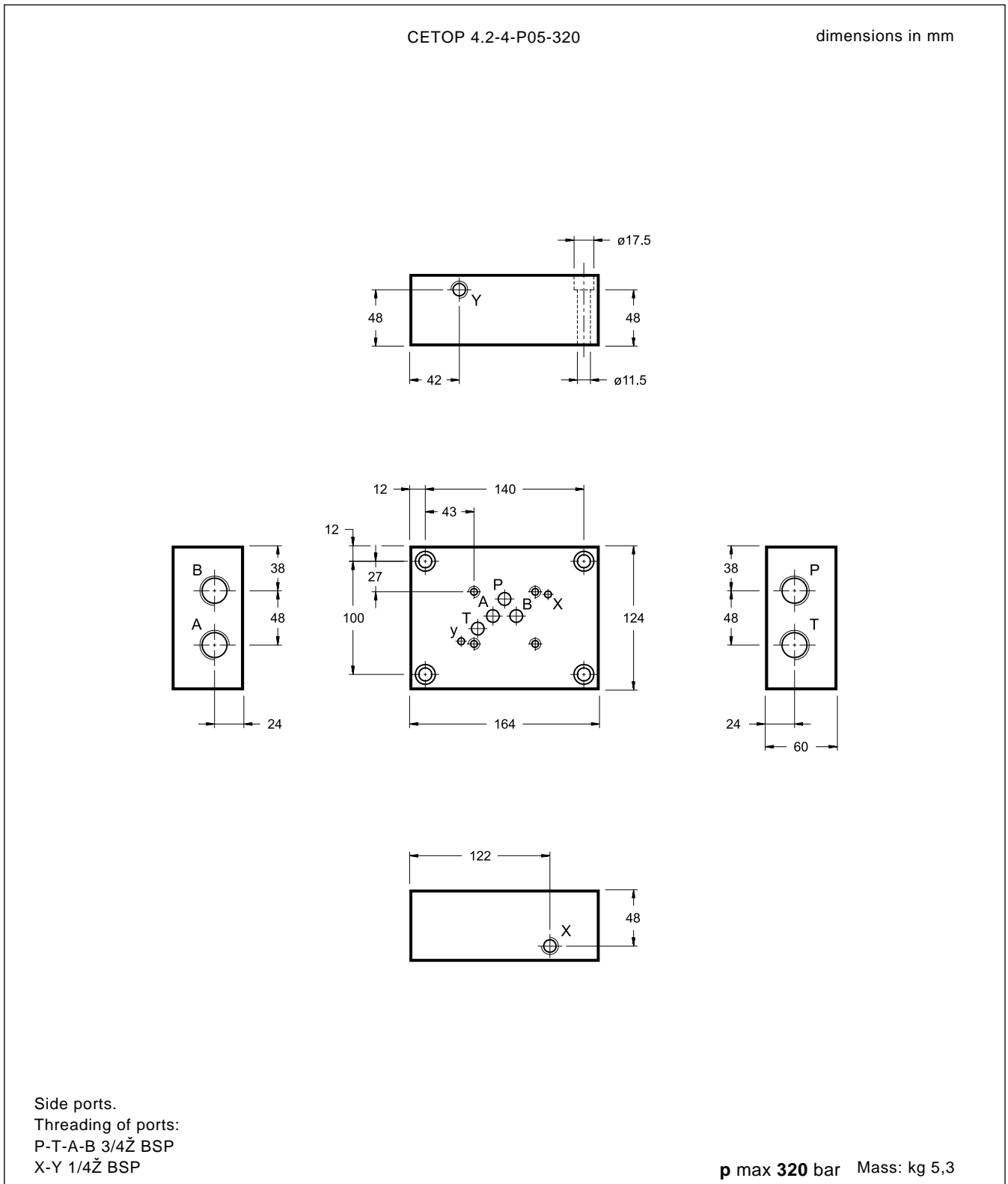


PME4

SUBPLATES

FOR CETOP P05 VALVES

18 - OVERALL AND MOUNTING DIMENSIONS PME4-AL5G/10 (cod. 1961201)





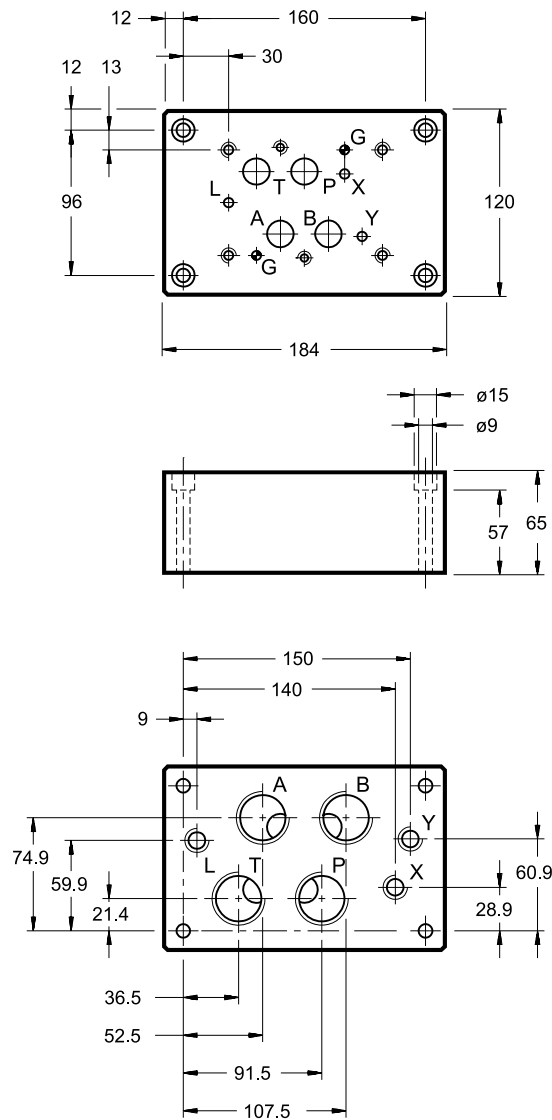
PME07

SUBPLATES FOR ISO 4401-07 (CETOP 07) VALVES

19 - OVERALL AND MOUNTING DIMENSIONS PME07-AI6G/10 (cod. 1961071)

dimensions in mm

ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



Ports on rear.
Threading of ports:
P-T-A-B 1½ BSP
X-Y-L 1/4½ BSP

p max 350 bar

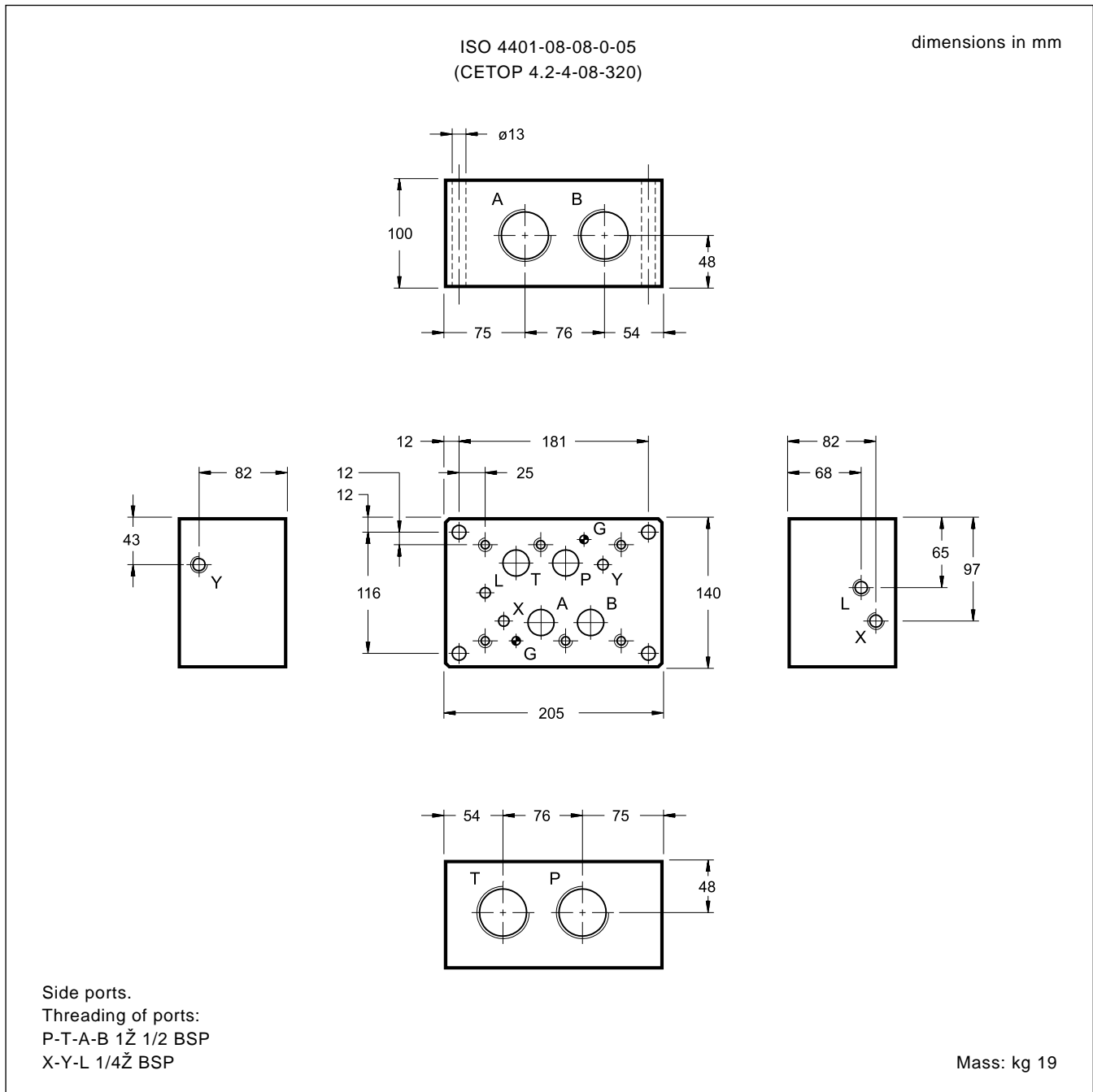
Mass: kg 9



PME5

SUBPLATES FOR ISO 4401-08 (CETOP 08) VALVES

21 - OVERALL AND MOUNTING DIMENSIONS PME5-AL8G/10 (cod. 1961141)



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This series of modular subplates has been designed to make hydraulic circuits and can be used directly on power packs or on any other section of the machine.

The subplates are assembled by means of 4 tie-rods with seal seats incorporated in the subplate.

The above assembly achieves compact units (including pressure and discharge manifolds): one face per subplate is used for connection to services and the other to mount ISO 4401-03 (CETOP 03) valves.

Complex circuits can also be set up using modular valves.

The recommended mounting configuration for **P2*** subplates on hydraulic power packs is with the main axis positioned vertically to obtain the bundle of pipes to utilities in two vertical rows; however assembly is not restricted to this configuration.

P2*

MODULAR SUBPLATES FOR ISO 4401-03 (CETOP 03) VALVES

p max 350 bar

Q max 50 l/min

TECHNICAL SPECIFICATIONS

Maximum operating pressure - ports P - A - B - port T	bar	see paragraph 11 140
Maximum flow	l/min	50
Port dimensions: P - pressure T - lower drainage T - upper drainage A/B - users	BSP	3/8Ž 1/2Ž 3/8Ž 3/8Ž
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	cSt	25
Recommended viscosity	According to ISO 4406:1999 class 20/18/15	

1 - IDENTIFICATION CODE

P	2	D	-		/	21
----------	----------	----------	----------	--	----------	-----------

Subplate _____

Dimension for _____
ISO 4401-03 (CETOP 03) valves

Single mounting facility _____

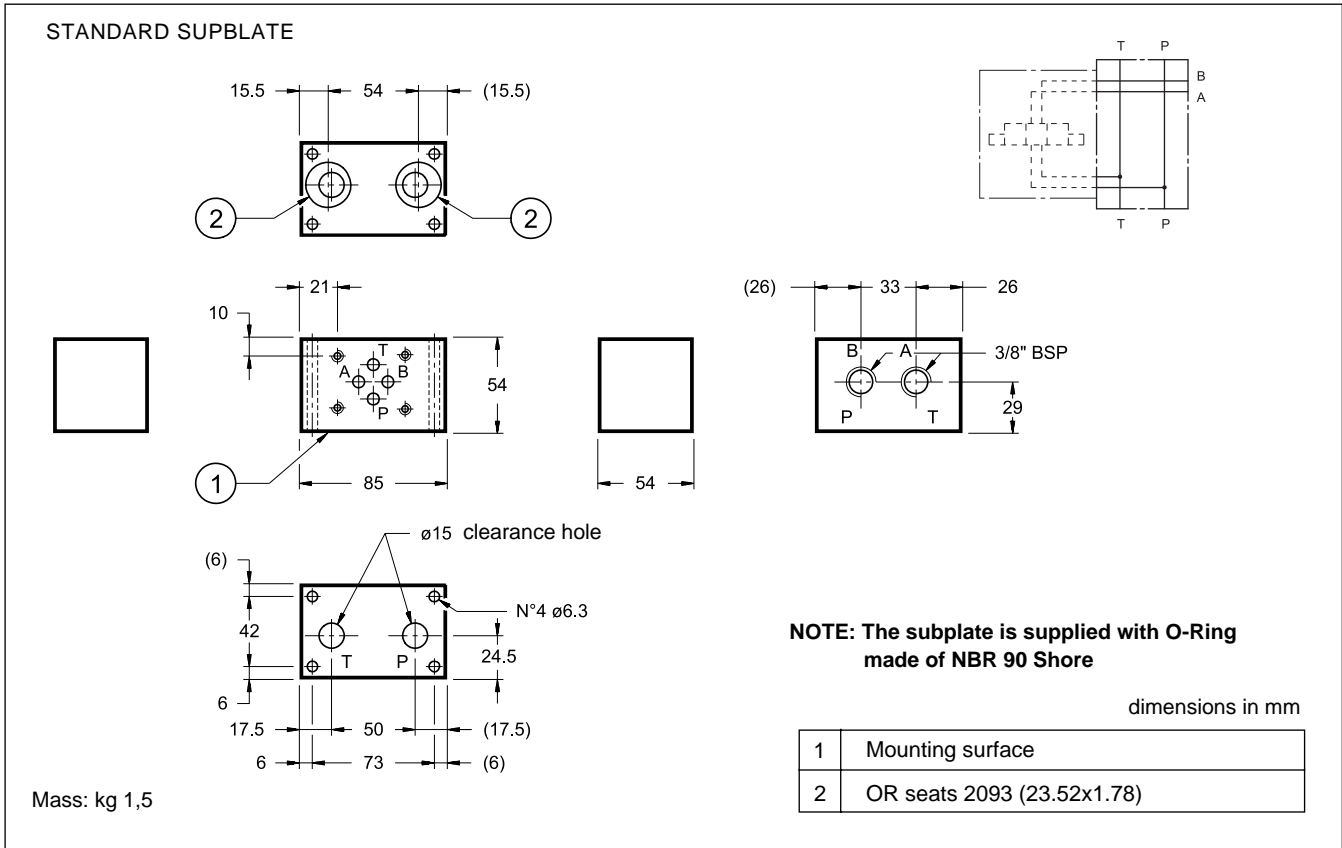
Serial No :
(from 20 to 29 and from 30 to 39 overall and mounting dimensions remain unchanged)

Versions: (omit for standard subplate P2D/21)

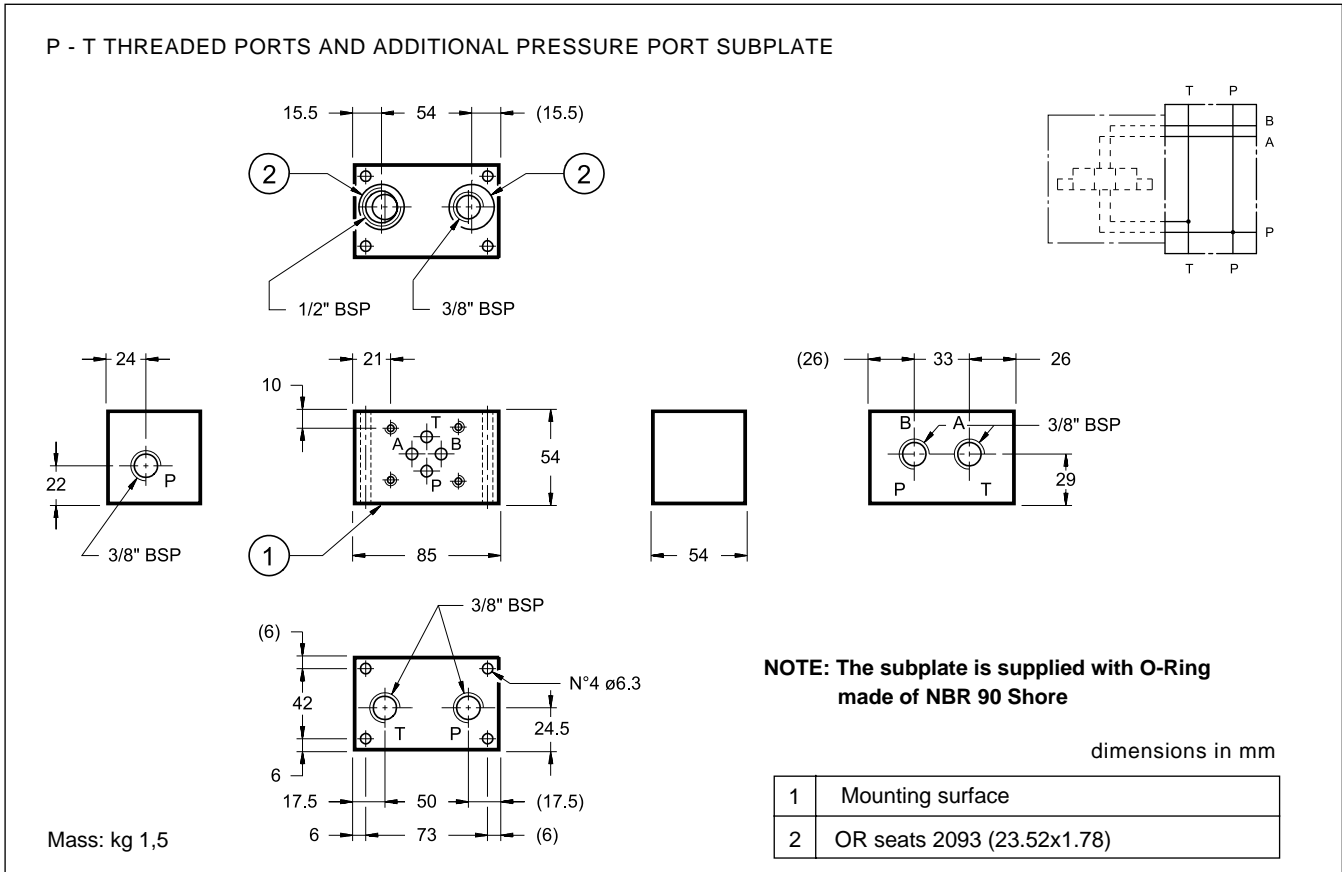
- F** = with P - T threaded ports and additional pressure port.
- I** = intermediate with threaded fastening holes to reduce rods length and additional pressure port.
- Z** = arranged for the installation of an MZD pressure reducing valve

NOTE: identification code of subplates P2*-M*/33 see paragraph 6

2 - OVERALL AND MOUNTING DIMENSIONS P2D/21 (cod. 1560121)

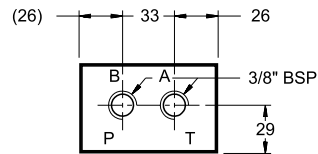
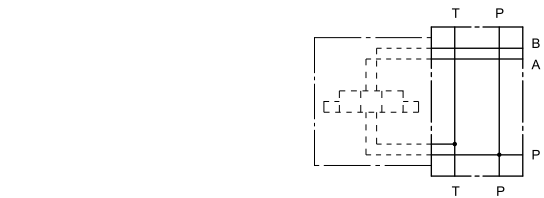
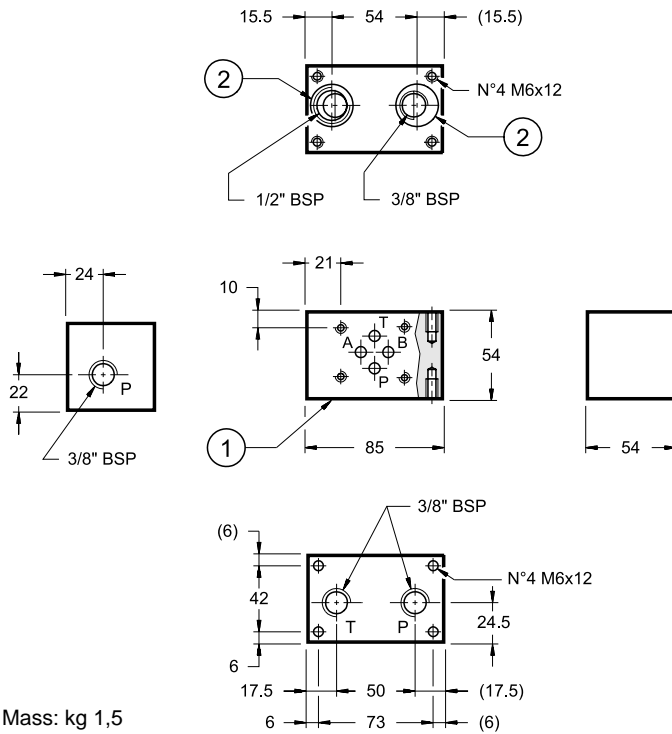


3 - OVERALL AND MOUNTING DIMENSIONS P2D-F/21 (cod. 1560122)



4 - OVERALL AND MOUNTING DIMENSIONS P2D-I/21 (cod. 1560123)

INTERMEDIATE SUBPLATE WITH THREADED FASTENING HOLES TO REDUCE ROD LENGTH AND ADDITIONAL PRESSURE PORT



NOTE: The subplate is supplied with O-Ring made of NBR 90 Shore

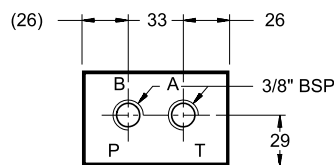
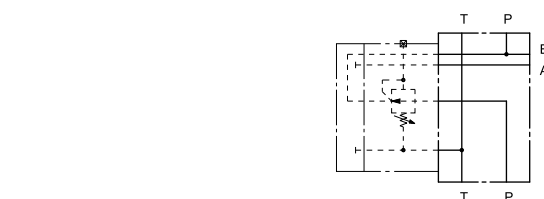
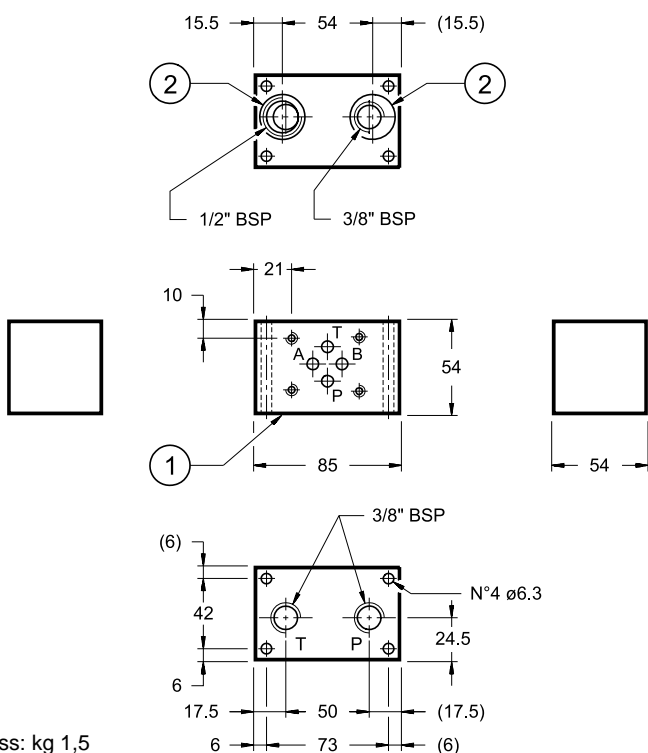
dimensions in mm

1	Mounting surface
2	OR seats 2093 (23.52x1.78)

Mass: kg 1,5

5 - OVERALL AND MOUNTING DIMENSIONS P2D-Z/21 (cod. 1560025)

SUBPLATE ARRANGED FOR THE INSTALLATION OF AN MZD PRESSURE REDUCING VALVE



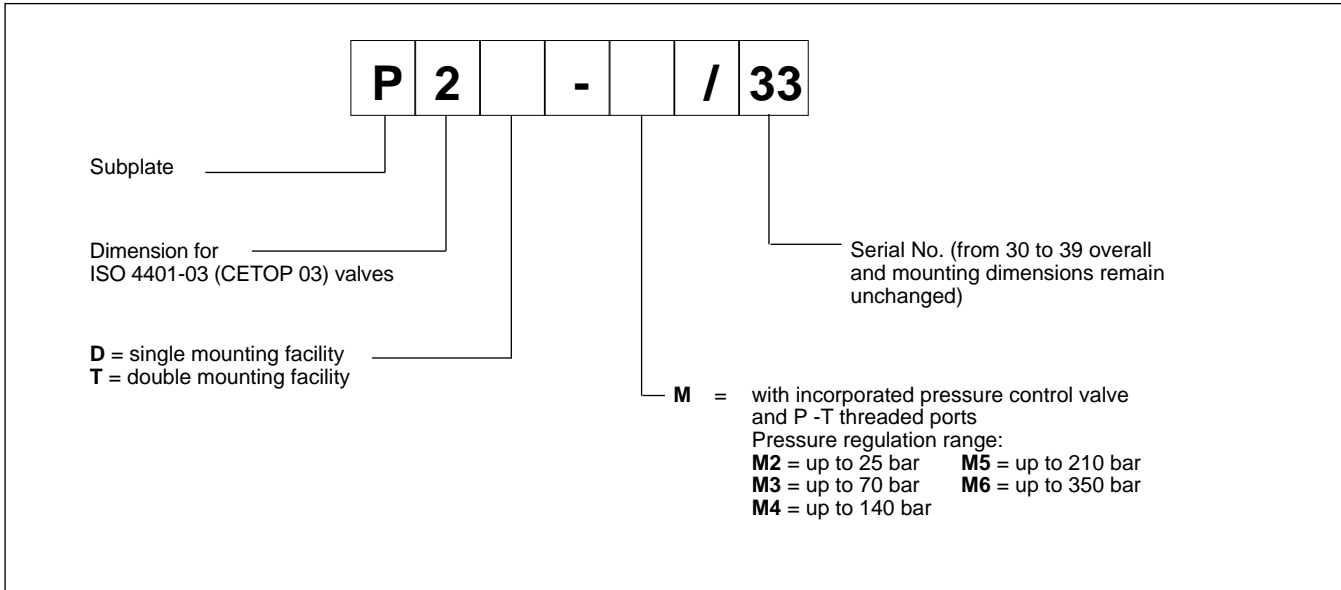
NOTE: The subplate is supplied with O-Ring made of NBR 90 Shore

dimensions in mm

1	Mounting surface
2	OR seats 2093 (23.52x1.78)

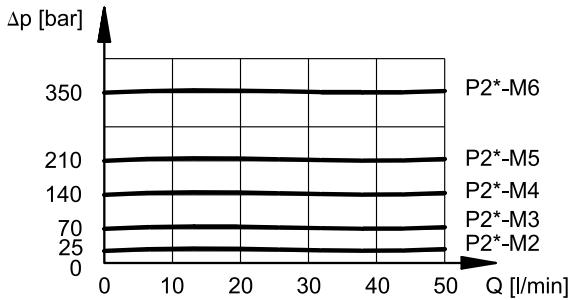
Mass: kg 1,5

6 - IDENTIFICATION CODE subplates with incorporated pressure control valve

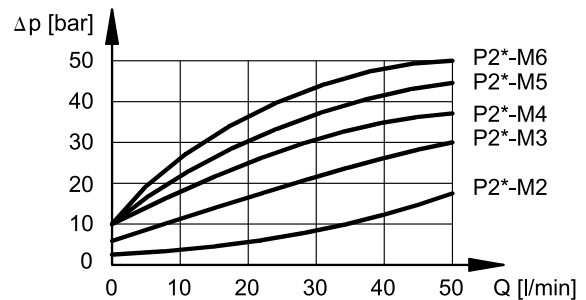


7 - CHARACTERISTIC CURVES FOR P2D-M* E P2T-M* SUBPLATES WITH PRESSURE CONTROL VALVE INCORPORATED (values obtained with viscosity of 36 cSt at 50°C)

ADJUSTMENT

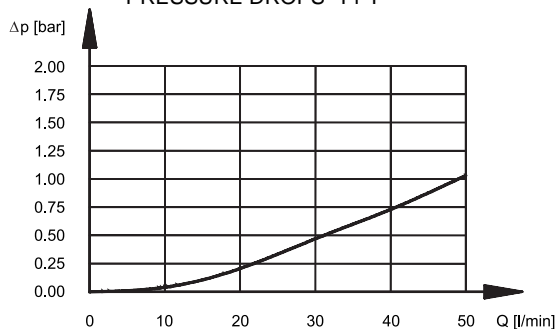


MINIMUM CONTROLLED PRESSURE



pressure drops P-T with calibrated screw at the regulation beginning (minimum controlled pressure)

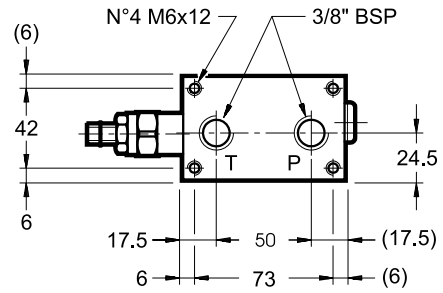
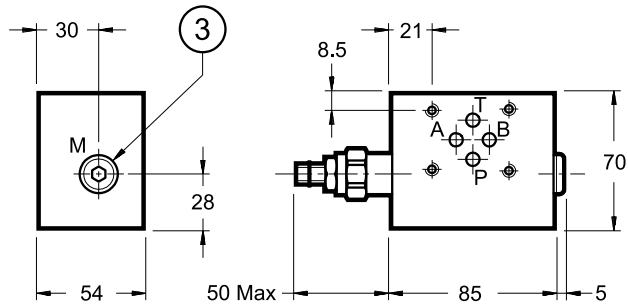
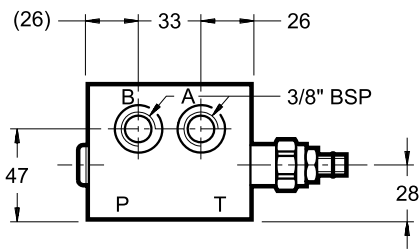
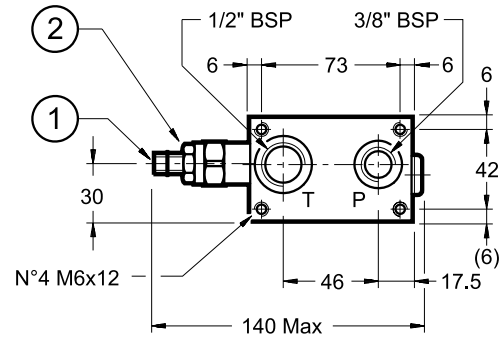
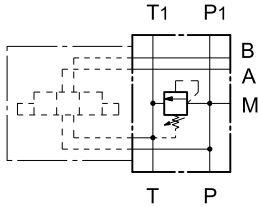
PRESSURE DROPS T1 T



8 - OVERALL AND MOUNTING DIMENSIONS P2D-M*/ 33

SINGLE MOUNTING FACILITY SUBPLATE WITH PRESSURE RELIEF VALVE INCORPORATED

HYDRAULIC SYMBOL



dimensions in mm

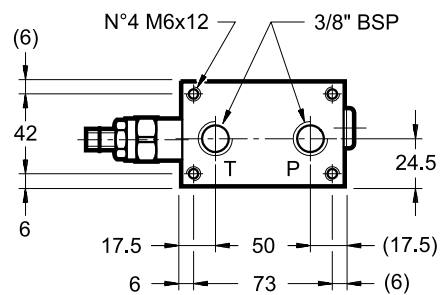
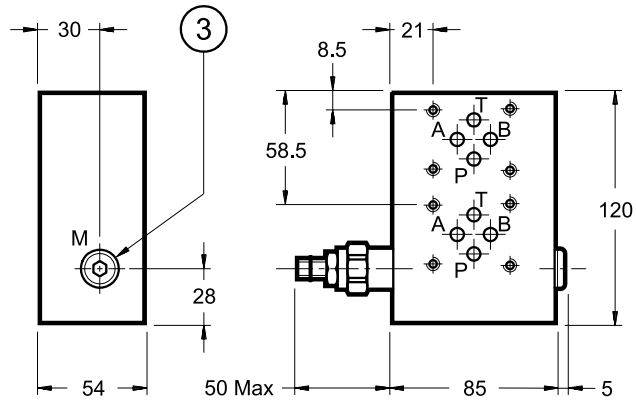
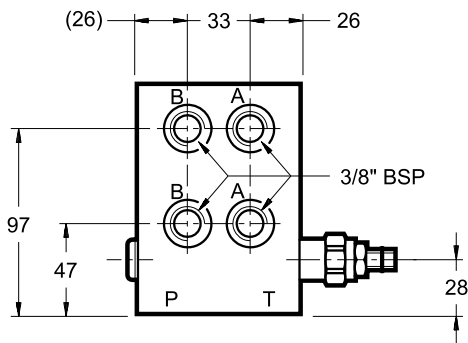
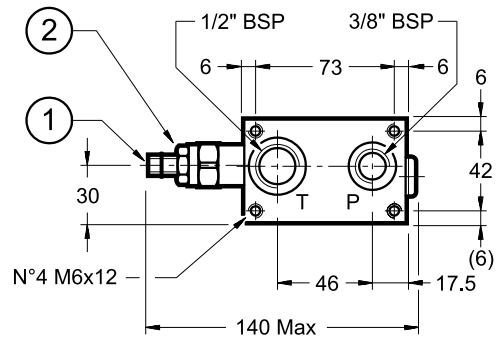
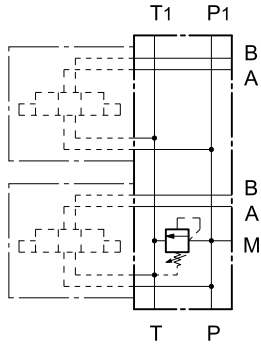
Mass: kg 2,5

1	Countersunk hex. adjustment screw: spanner 6 Clockwise rotation to increase pressure
2	Locking nut: spanner 19
3	Pressure gauge port 1/4" BSP plugged

9 - OVERALL AND MOUNTING DIMENSIONS P2T-M* /33

DOUBLE MOUNTING FACILITY SUBPLATE WITH PRESSURE RELIEF VALVE INCORPORATED

HYDRAULIC SYMBOL



dimensions in mm

1	Countersunk hex adjustment screw: spanner 6 Clockwise rotation to increase pressure
2	Locking nut: spanner 19
3	Pressure gauge port 1/4" BSP plugged

Mass: kg 5

10 - 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.

11 - PRESSURE LIMIT ON P

Depending on the tie-rod type and on the number of assembled subplates it is necessary to pay attention to the maximum pressure on P in order to avoid extruding the O-Rings.

n° of assembled subplates	Threaded bar class B7 DIN 975	Stud class 8.8 UNI 5911	Stud class 12.9
2	350 bar	350 bar	350 bar
3	300 bar	350 bar	350 bar
4	250 bar	300 bar	350 bar
5	200 bar	250 bar	300 bar
6	150 bar	200 bar	250 bar
Tightening torque	8 Nm	8 Nm	12 Nm



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www.diplomatic.com • e-mail: sales.exp@diplomatic.com



- The P2A*L series of manifolds is designed for connection in parallel of two or more ISO 4401-03 (CETOP 03) valves.
- The monocast design enables the simple creation of circuits without the use of pipes and fittings, thereby reducing overall dimensions to a minimum.
- All sections feature a common pressure and discharge fitting on both ends of the subplate.
- Maximum flow rate can be increased up to double the output if the sub-plates are powered at both ends.
- Each section is fitted with work ports A and B positioned on the side of the sub-plate.
- Subplates are available in aluminium.

P2A*L

MANIFOLDS

FOR ISO 4401-03 (CETOP 03)

VALVES WITH SIDE PORTS

SERIES 11

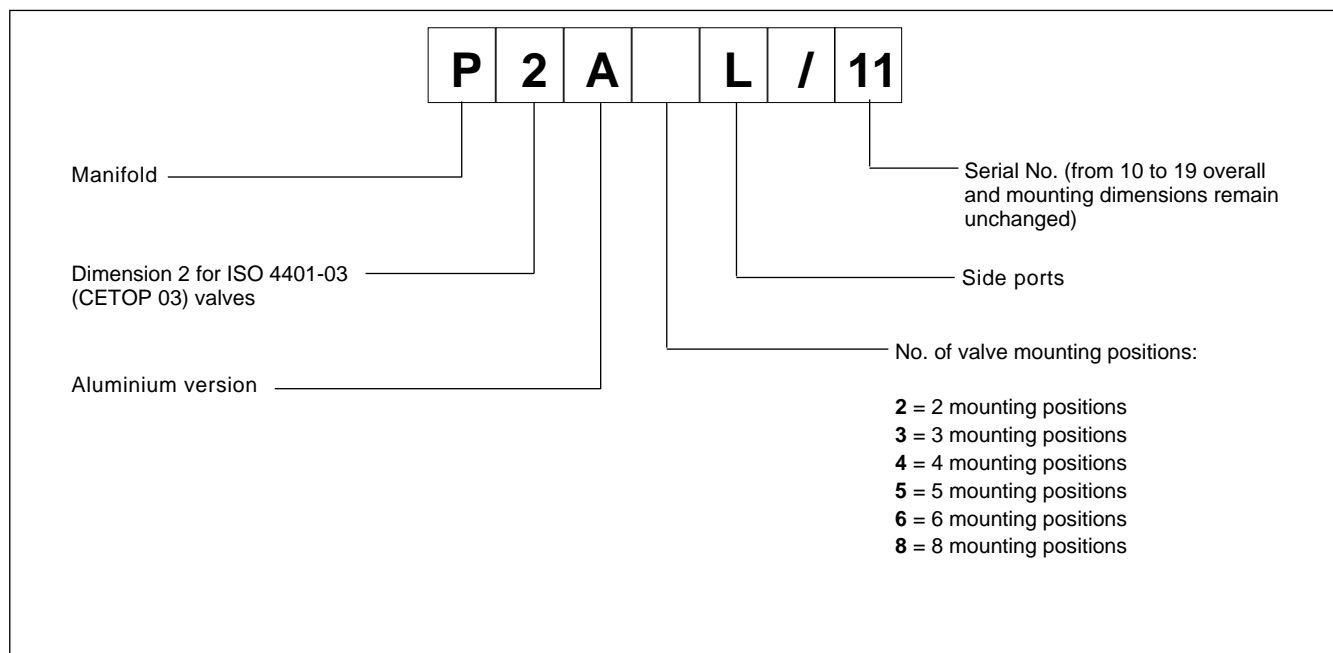
p max 210 bar

Q max 50 l/min

TECHNICAL SPECIFICATIONS

Maximum operating pressure - ports P - A - B - port T	bar	210 140
Maximum flow	l/min	50
Port dimensions: P - pressure T - lower drainage A/B - users	BSP	1/2" 1/2" 3/8"
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	cSt	25
Recommended viscosity	According to ISO 4406:1999 class 20/18/15	

1 - IDENTIFICATION CODE



P2X*M

MANIFOLDS

FOR ISO 4401-03 (CETOP 03)

VALVES WITH PORTS ON REAR

SERIES 10

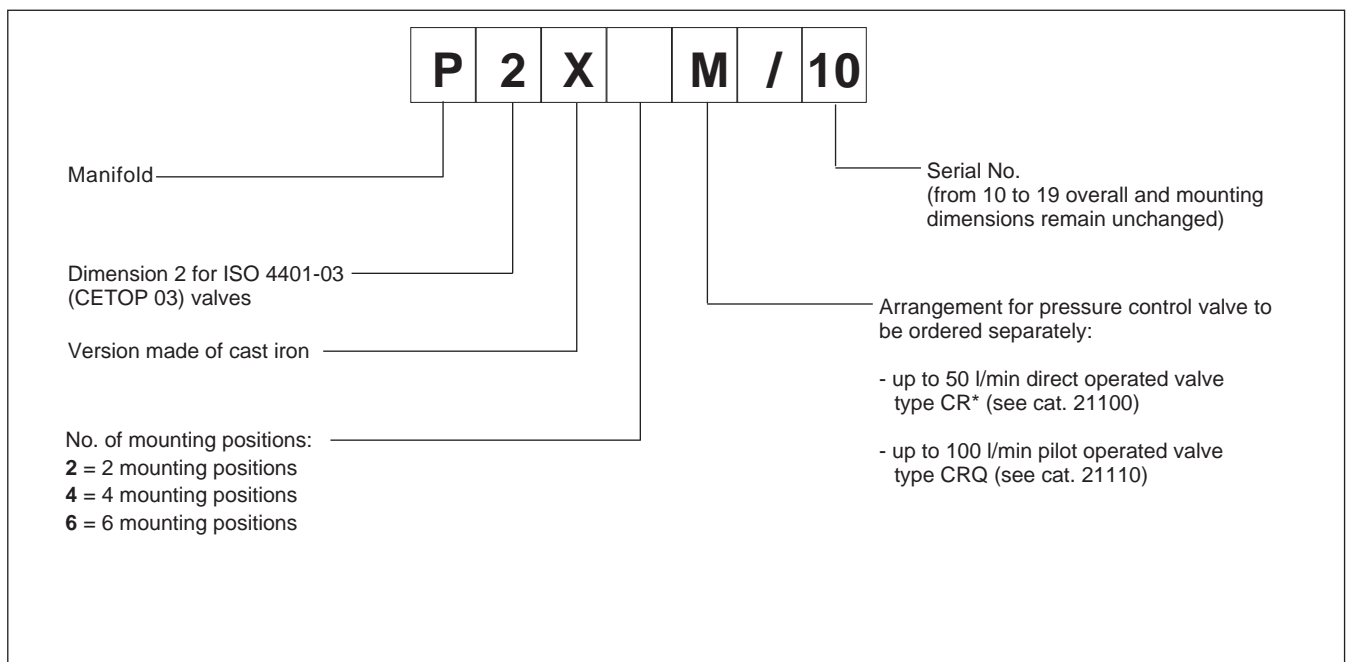
- The P2X*M series of manifolds is designed for connection in parallel of two or more ISO 4401-03 (CETOP 03) valves.
- The monobloc design enables the simple creation of circuits without the use of pipes and fittings, thereby reducing overall dimensions to a minimum.
- Subplates are arranged for the installation of a pressure control valve with cartridge.
- Each section is fitted with work ports A and B positioned on the rear of the subplate.
- Subplates are fitted with additional rear ports P and T.
- Subplates are made of cast iron.

p max 350 bar
Q max 100 l/min

TECHNICAL SPECIFICATIONS

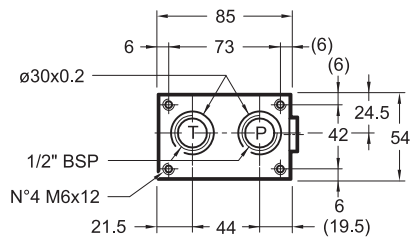
Maximum operating pressure - ports P - A - B - port T	bar	350 140
Maximum flow	l/min	100
Port dimensions: P - pressure T - drainage B - users A - drainage	BSP	1/2"
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	cSt	25
Recommended viscosity	According to ISO 4406:1999 class 20/18/15	

1 - IDENTIFICATION CODE

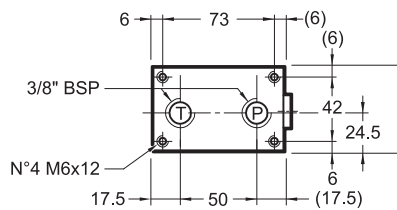
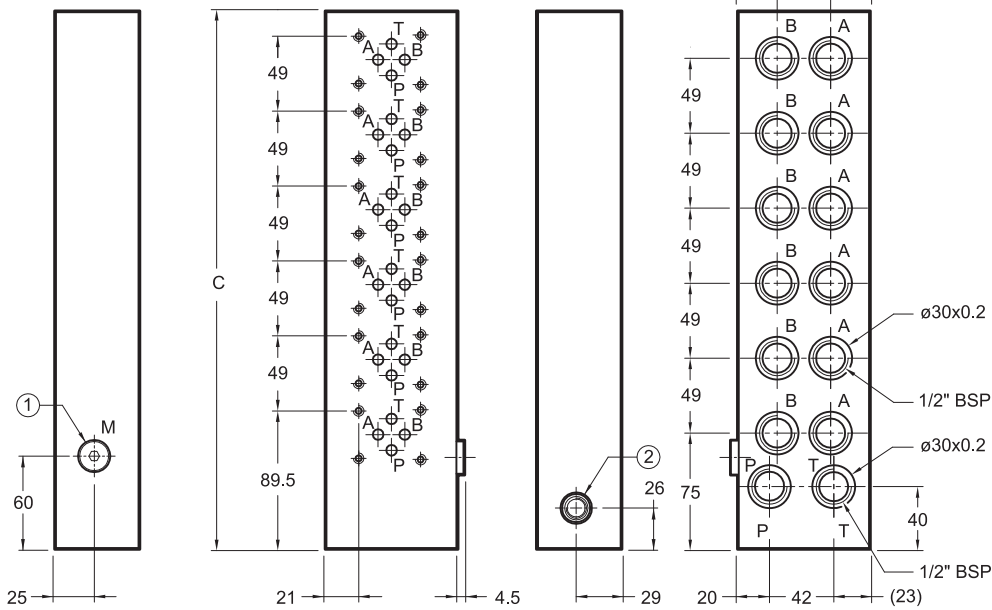
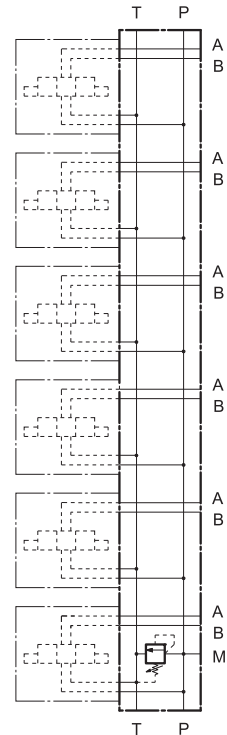




2 - OVERALL AND MOUNTING DIMENSIONS



Es. Subplate with 6 mounting positions and pressure control valve type CR*/21



dimensions in mm

Manifold	No. of valves mounting positions	C
P2X2M/10	2	150
P2X4M/10	4	250
P2X6M/10	6	350

1	Pressure gauge port 1/4" BSP plugged
2	Arranged for the installation of a pressure control valve (to be ordered separately - see par. 1)



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 www.diplomatic.com • e-mail: sales.exp@diplomatic.com

- „ This series of modular subplates has been designed to make hydraulic circuits and can be used directly on power packs or on any other section of the machine.
- „ The subplates are assembled by means of 4 tie-rods with seal seats incorporated in the subplate.
- „ The above assembly achieves compact units (including pressure and discharge manifolds): one face per subplate is used for connection to services and the other to mount ISO 4401-05 (CETOP 05) or ISO 4401-03 (CETOP 03) valves.
- „ Complex circuits can also be set up using modular valves.
- „ The recommended mounting configuration for **P4D** subplates on hydraulic power packs is with the main axis positioned vertically to obtain the bundle of pipes to utilities in two vertical rows; however, assembly is not restricted to this configuration.

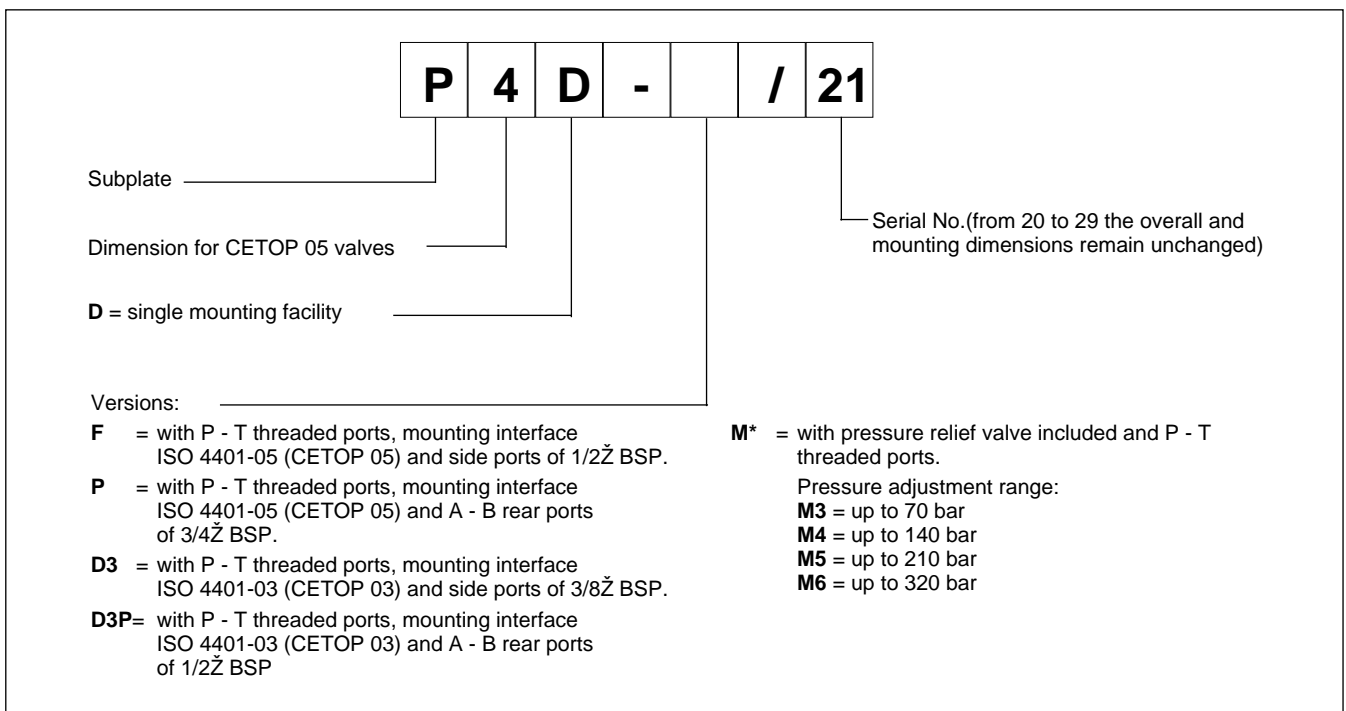
P4D*
MODULAR SUBPLATES
FOR ISO 4401-05 (CETOP 05)
VALVES
SERIES 21

p max 350 bar
Q max 100 l/min

TECHNICAL SPECIFICATIONS

Maximum operating pressure - ports P - A - B - port T	bar	see paragraph 8 140
Maximum flow	l/min	100
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	cSt	25
Recommended viscosity	According to ISO 4406:1999 class 20/18/15	

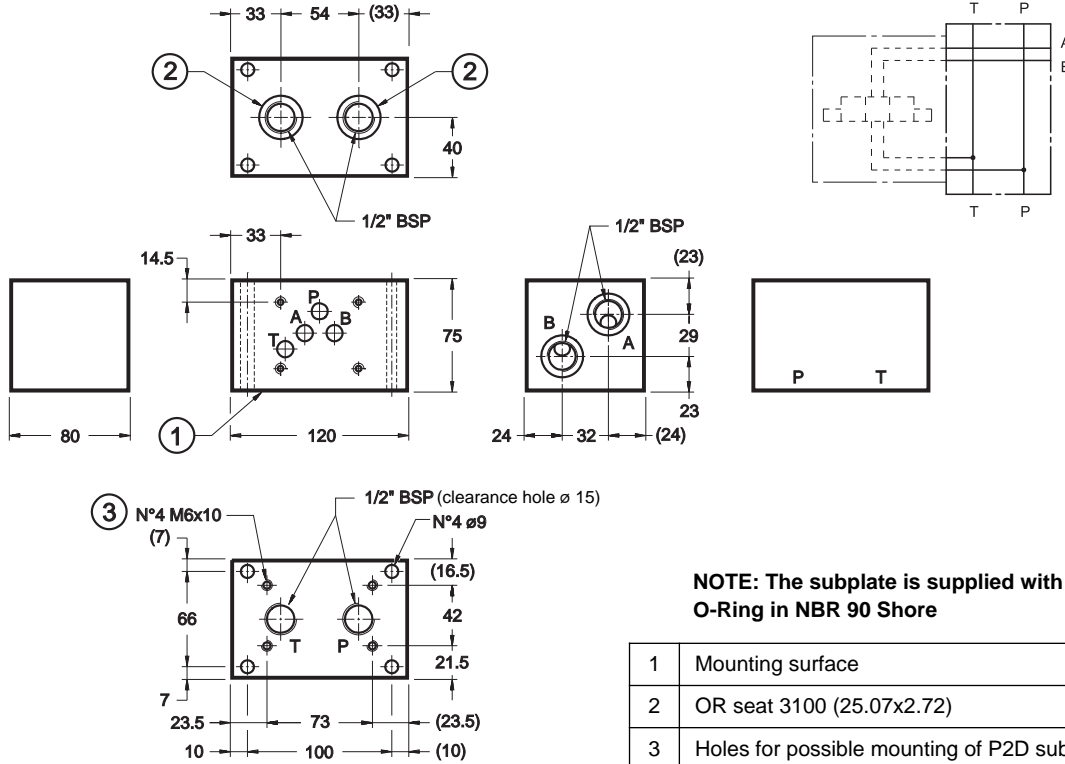
1 - IDENTIFICATION CODE



2- OVERALL AND MOUNTING DIMENSIONS P4D-F/21 (cod. 1561441)

P - T THREADED PORTS SUBPLATE, WITH MOUNTING INTERFACE FOR ISO 4401-05 (CETOP 05) VALVE AND A-B SIDE PORTS OF 1/2" BSP

dimensions in mm



NOTE: The subplate is supplied with O-Ring in NBR 90 Shore

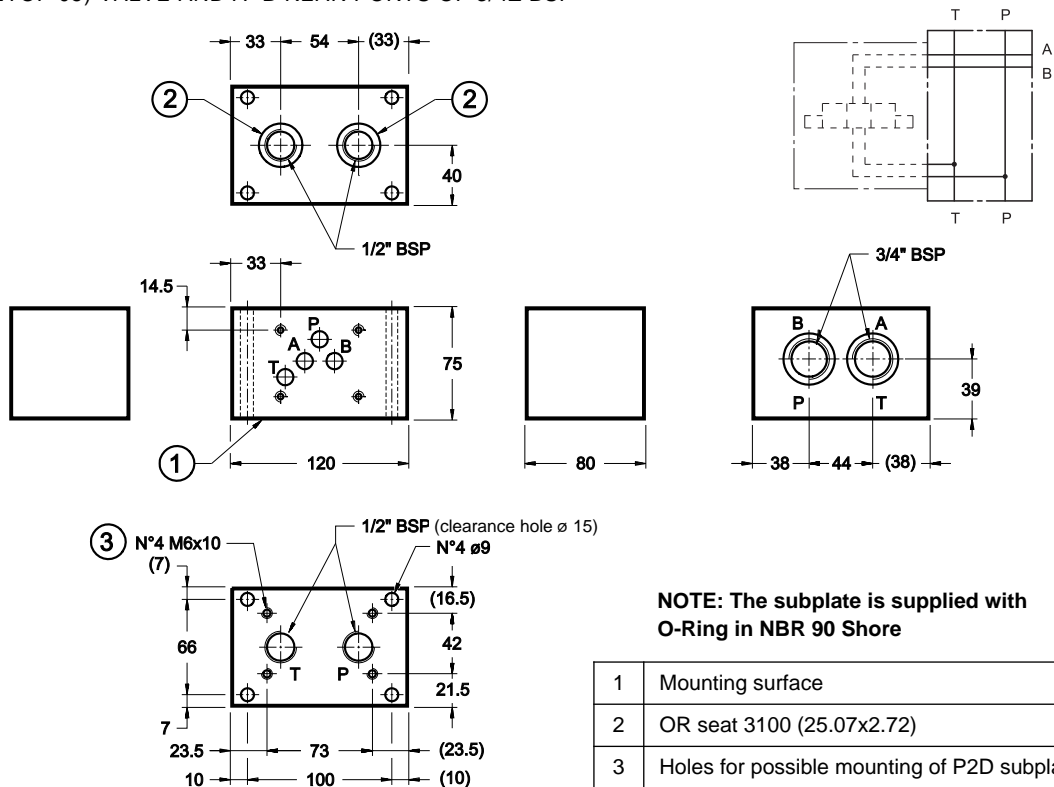
1	Mounting surface
2	OR seat 3100 (25.07x2.72)
3	Holes for possible mounting of P2D subplates

Mass: kg 4,8

3 - OVERALL AND MOUNTING DIMENSIONS P4D-P/21 (cod. 1561461)

P - T THREADED PORTS SUBPLATE WITH MOUNTING INTERFACE FOR ISO 4401-05 (CETOP 05) VALVE AND A -B REAR PORTS OF 3/4" BSP

dimensions in mm



NOTE: The subplate is supplied with O-Ring in NBR 90 Shore

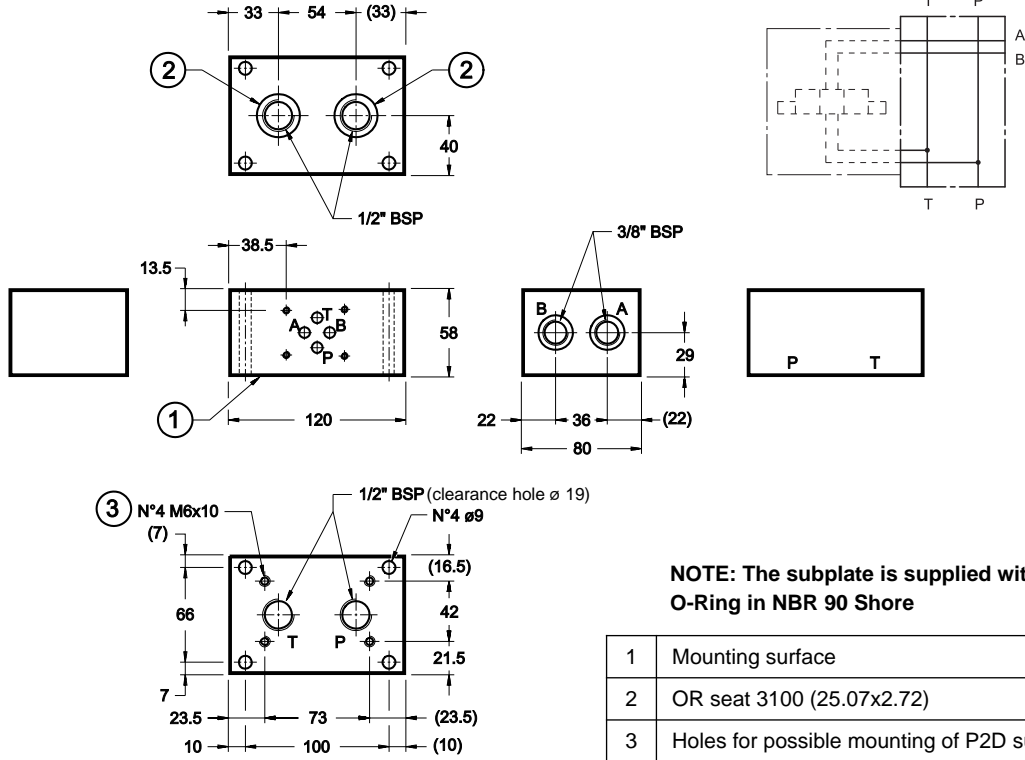
1	Mounting surface
2	OR seat 3100 (25.07x2.72)
3	Holes for possible mounting of P2D subplates

Mass: kg 4,8

4 - OVERALL AND MOUNTING DIMENSIONS P4D-D3/21 (cod. 1561451)

P - T THREADED PORTS SUBPLATE, WITH MOUNTING INTERFACE FOR ISO 4401-03 (CETOP 03) VALVE AND SIDE PORTS OF 3/8" BSP

dimensions in mm

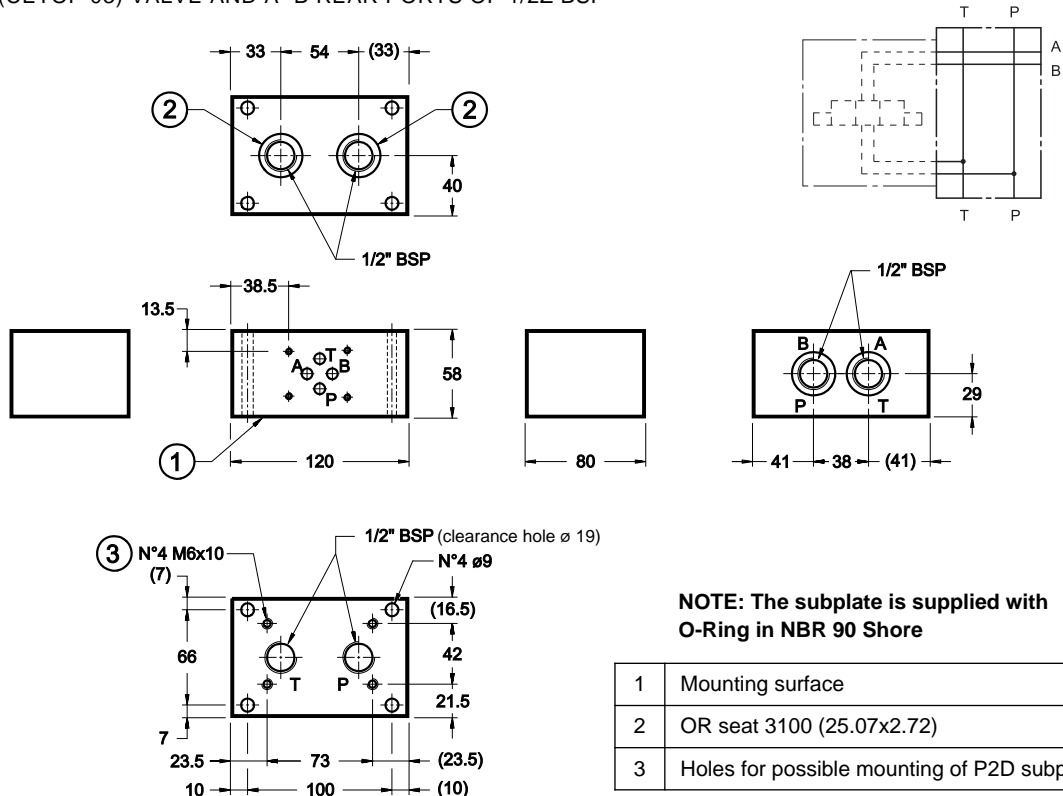


Mass: kg 3,8

5 - OVERALL AND MOUNTING DIMENSIONS P4D-D3P/21 (cod. 1561481)

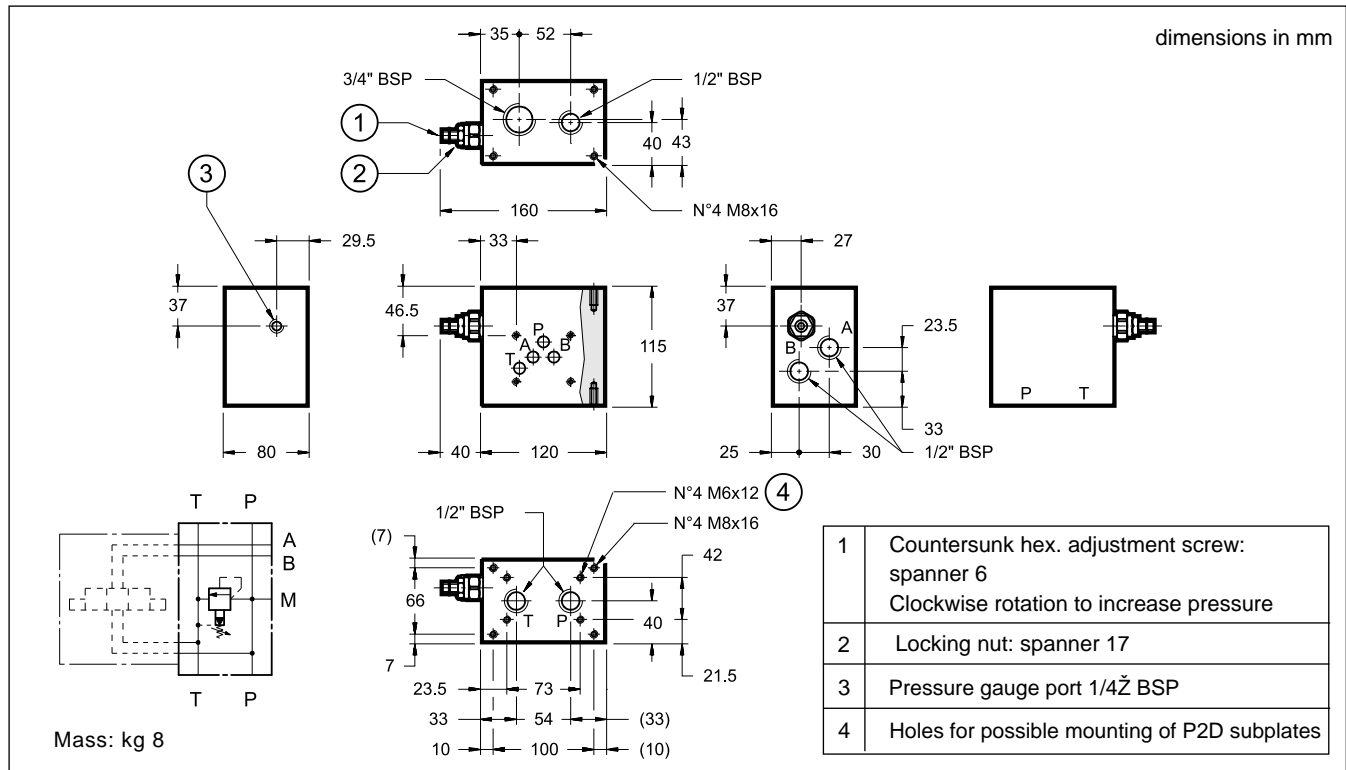
P - T THREADED PORTS SUBPLATE, WITH MOUNTING INTERFACE FOR ISO 4401-03 (CETOP 03) VALVE AND A - B REAR PORTS OF 1/2" BSP

dimensions in mm

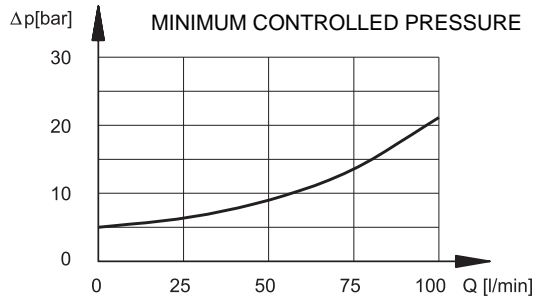
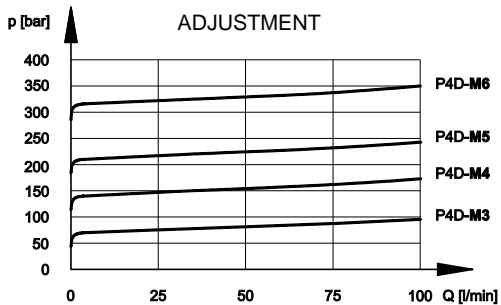


Mass: kg 3,8

6 - OVERALL AND MOUNTING DIMENSIONS P4D-M/21



7 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



8 - MAXIMUM PRESSURE ON P

Depending on the tie-rod type and on the number of assembled subplates it is necessary to pay attention to the maximum pressure on P in order to avoid extruding the O-Ring.

No. of assembled subplates	Threaded bar class B7 DIN 975	Stud class 8.8 UNI 5911	Stud class 12.9
2	350 bar	350 bar	350 bar
3	300 bar	350 bar	350 bar
4	250 bar	300 bar	350 bar
5	200 bar	250 bar	300 bar
6	150 bar	200 bar	250 bar
Tightening torque	20 Nm	20 Nm	30 Nm

RM4*-MP

SUBPLATE WITH PRESSURE RELIEF VALVE

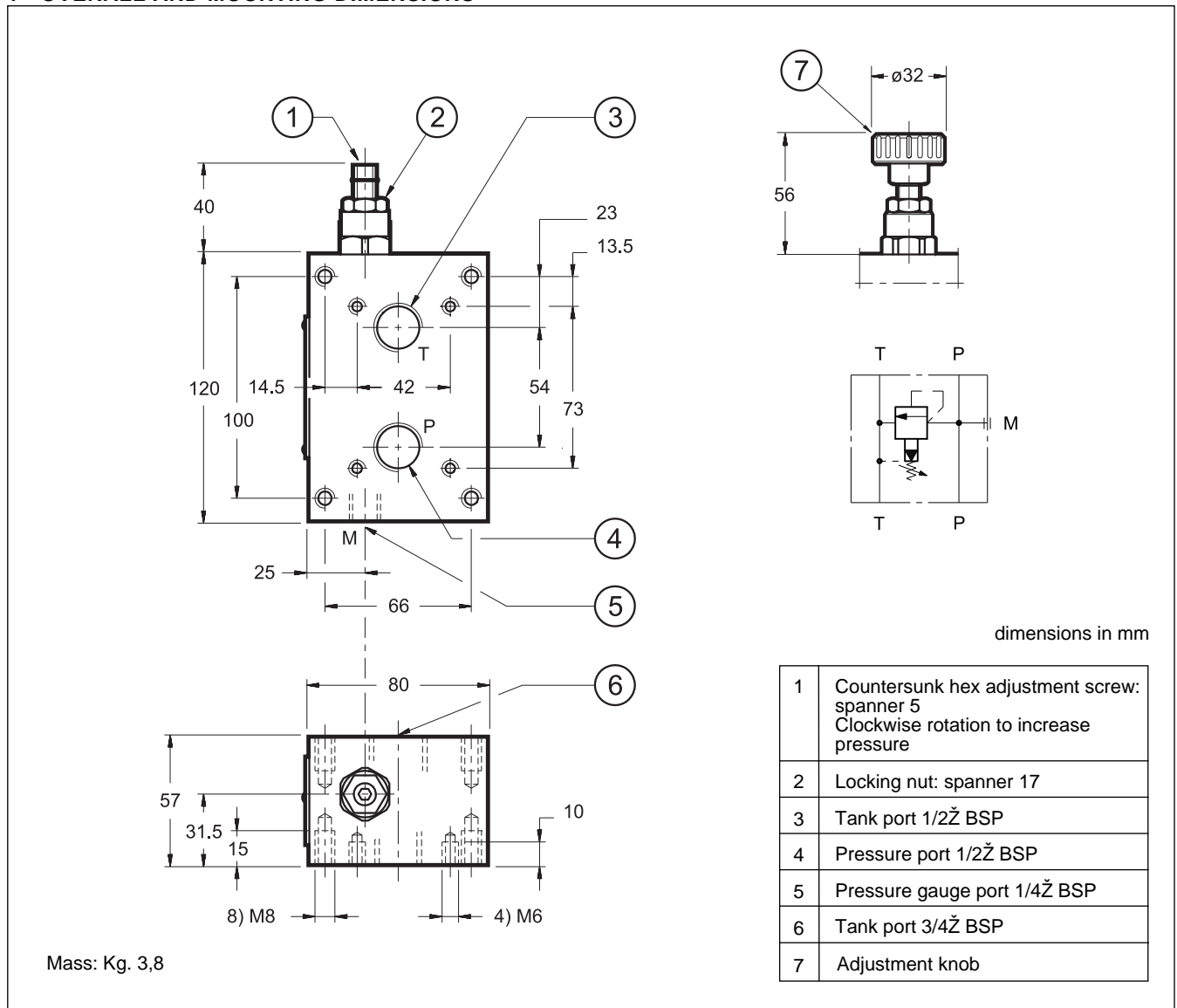
SERIES 30

- „ The RM4*-MP subplate includes a pressure relief valve with P and T threaded ports.
- „ It is used as mounting surface for P2D and P4D subplates on power packs.
- „ It is available in four pressure adjustment ranges up to 350 bar.
- „ It is normally supplied with a countersunk hex adjustment screw, locking nut and maximum adjustment limiting device.

THREADED PORTS

p max **350** bar
Q max **100** l/min

1 - OVERALL AND MOUNTING DIMENSIONS

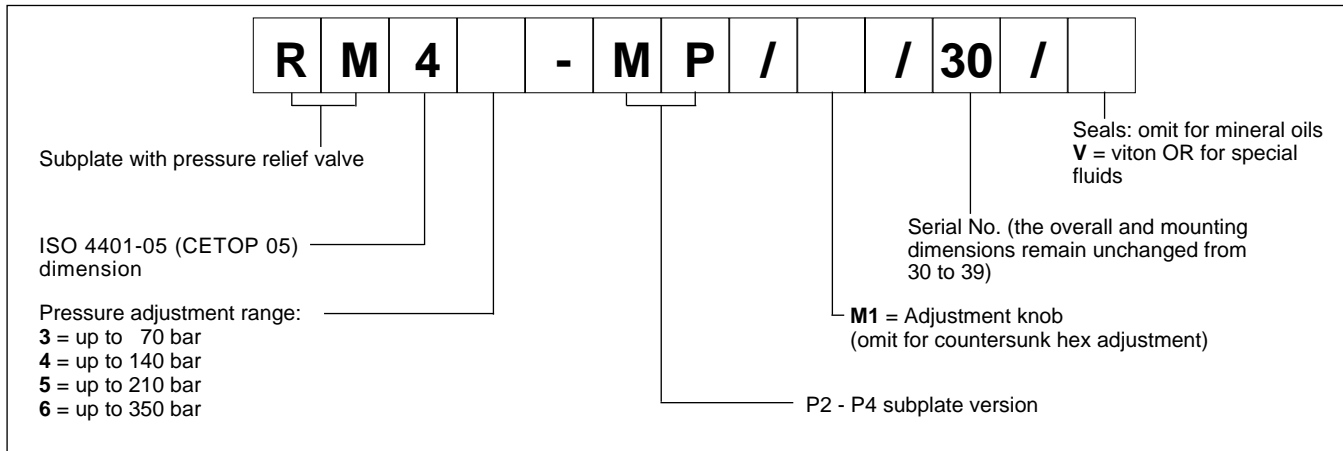




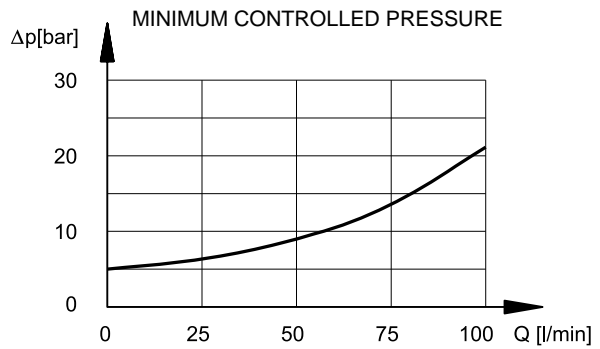
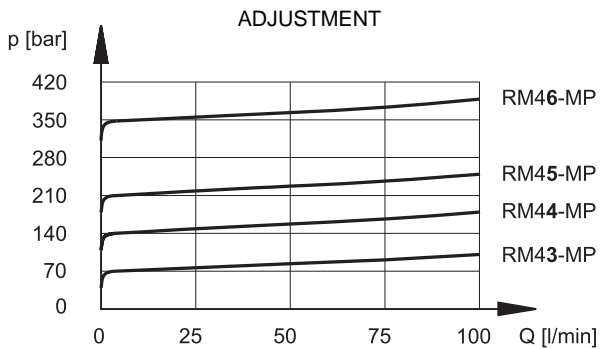
RM4*-MP

SERIES 30

1 - IDENTIFICATION CODE



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

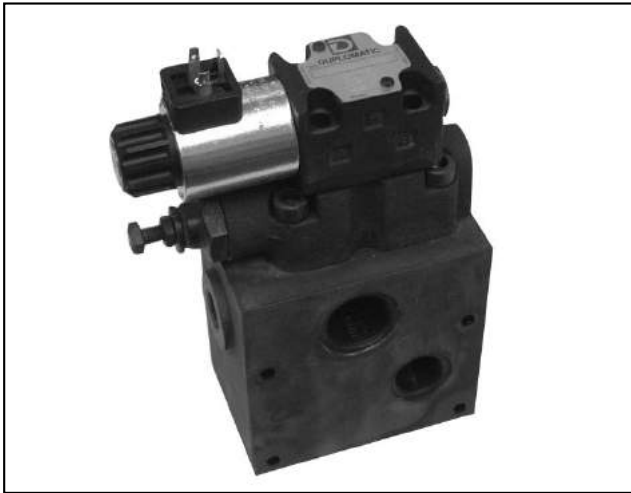


3 - HYDRAULIC FLUIDS

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.



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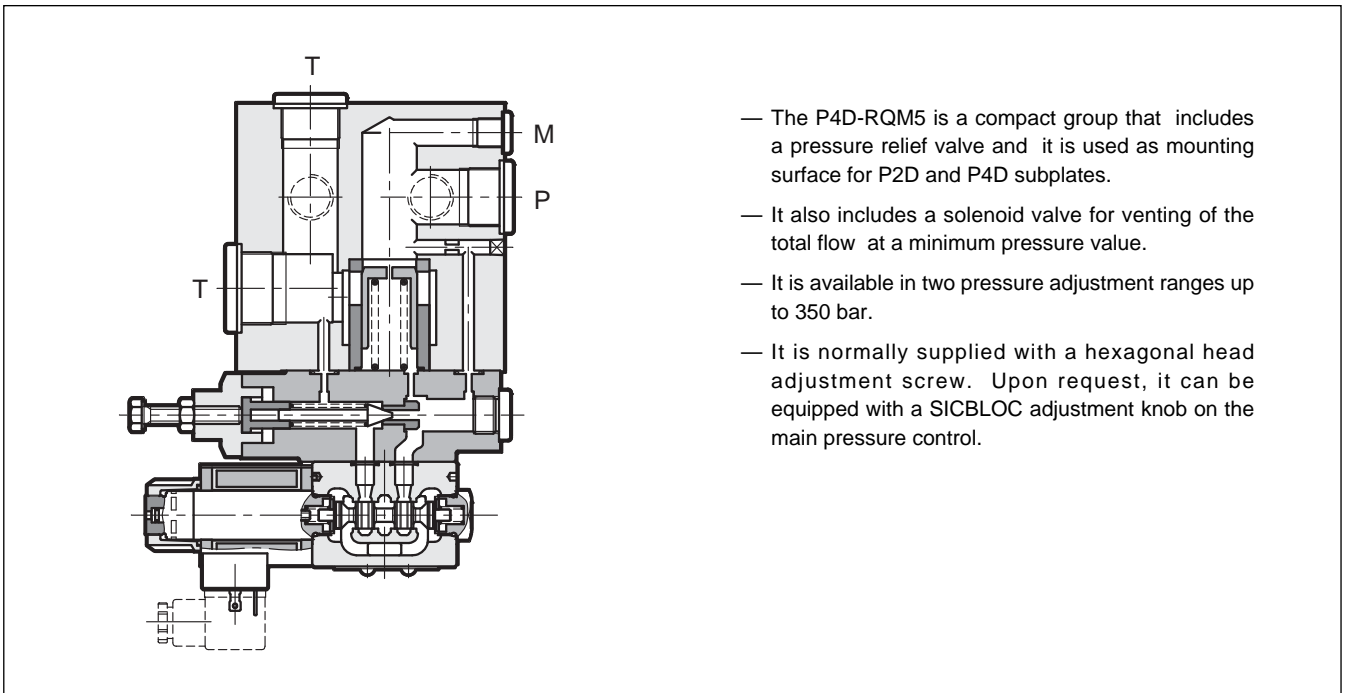
P4D-RQM5

MODULAR SUBPLATE WITH PRESSURE RELIEF VALVE AND UNLOADING SOLENOID VALVE

SERIES 30

p max 350 bar
Q max 250 l/min

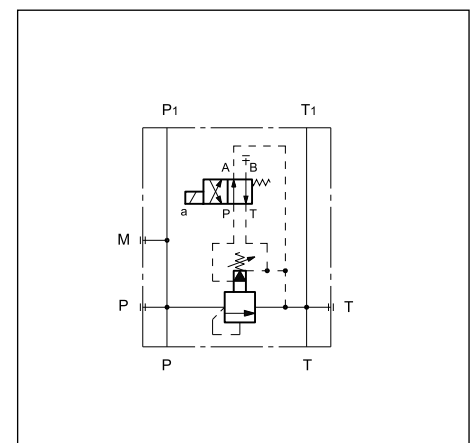
OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow on P (3/4") and T(1")		250
Maximum flow on P ₁ and T ₁ (1/2")	l/min	120
Minimum flow		10
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	10

HYDRAULIC SYMBOL



NOTE: for the solenoid valve DS3 characteristics see catalogue 41 150



P4D-RQM5

SERIES 30

1 - IDENTIFICATION CODE

P	4	D	-	R	Q	M	5	-	/	/	30	-	K1	/	
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Subplate ISO 4401-05 (CETOP 05) dimension

Pressure relief valve with unloading solenoid valve

DN 25 nominal dimension

Pressure adjustment range
5 = 250 bar 6 = 350 bar

M = SICBLOC adjustment knob (omit for hexagonal head adjustment screw)

Series: (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

NOTE: The locking rings of the coils and the relevant O-Rings are supplied together with valves.

Manual override: omit for override integrated in the tube (**standard**)
CM = manual override, boot protected

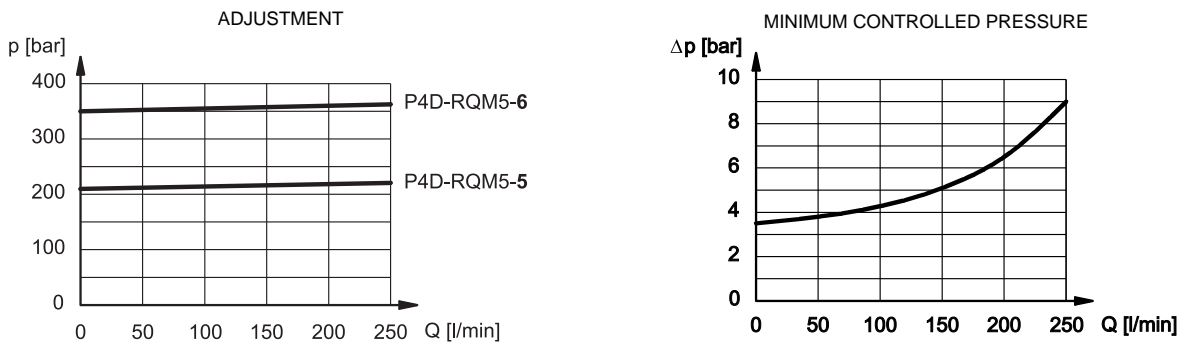
Coil electrical connection: plug for connector type DIN 43650 (**standard**)

DC power supply
D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see **NOTE**)

AC power supply
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see **NOTE**)

F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

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



NOTE: The maximum flow deliverable to P₁ port is 120 l/min (for P2D and P4D modular subplates). The maximum flow through the pressure relief valve (additional 3/4" BSP P port) is 250 l/min.

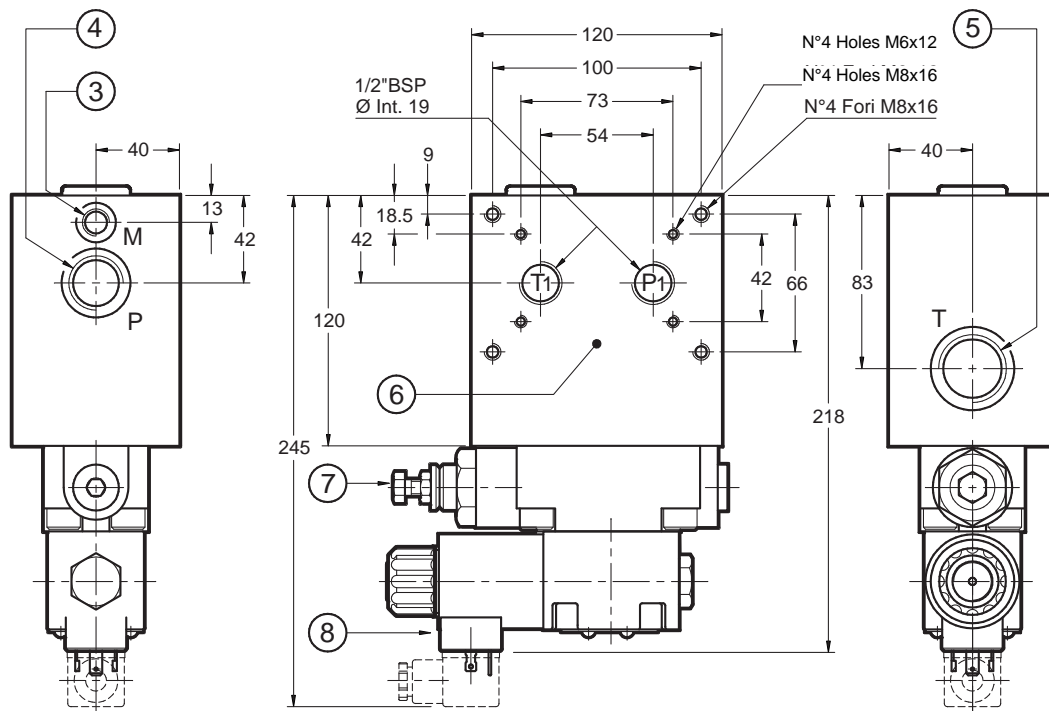
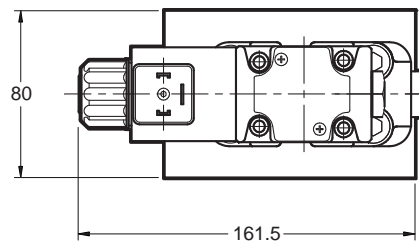
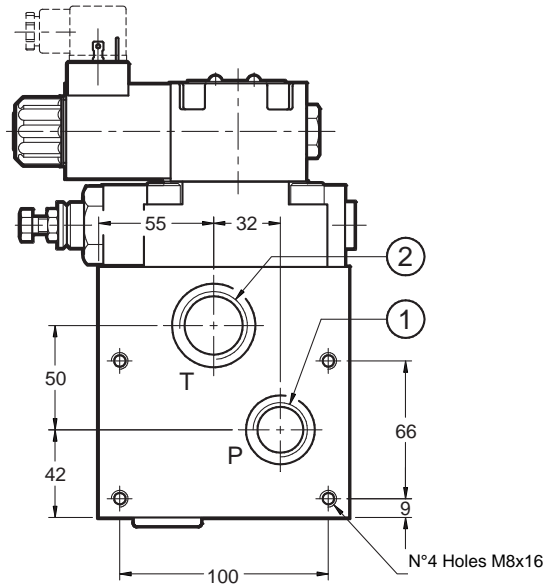
3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS

1	Pressure port P 3/4" BSP
2	Tank port T 1" BSP
3	Pressure gauge port M 1/4" BSP
4	Additional P port 3/4" BSP
5	Additional T port 1" BSP
6	Mounting surface for: P2D ISO 4401-03 (CETOP 03) P4D ISO 4401-05 (CETOP 05)
7	Hexagonal head pressure adjustment screw: spanner 13 Clockwise rotation to increase pressure
8	Unloading solenoid valve

dimensions in mm



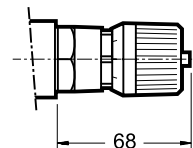


P4D-RQM5

SERIES 30

5 - ADJUSTMENT KNOB

The P4D-RQM5 valves can be equipped with a SICBLOC adjustment knob.
To operate it, push and rotate at the same time.
To request this option, add: /M (see par.1).



6 - ELECTRIC CONNECTORS

The solenoid valves are never supplied with connector. Connectors must be ordered separately. For the identification of the connector type to be ordered, please see catalogue 49 000.

7 - MANUAL OVERRIDE, BOOT PROTECTED: CM

Whenever the solenoid valve installation may involve exposure to atmospheric agents or utilization in tropical climates, use of the manual override, boot protected, is recommended.

Add the suffix **CM** to request this device (see paragraph 1).
For overall dimensions see catalogue 41 150.



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OLEODiNAMiCA

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20015 PARABIAGO (MI) • Via M. Re Depaolini 24

Tel. +39 0331.895.111

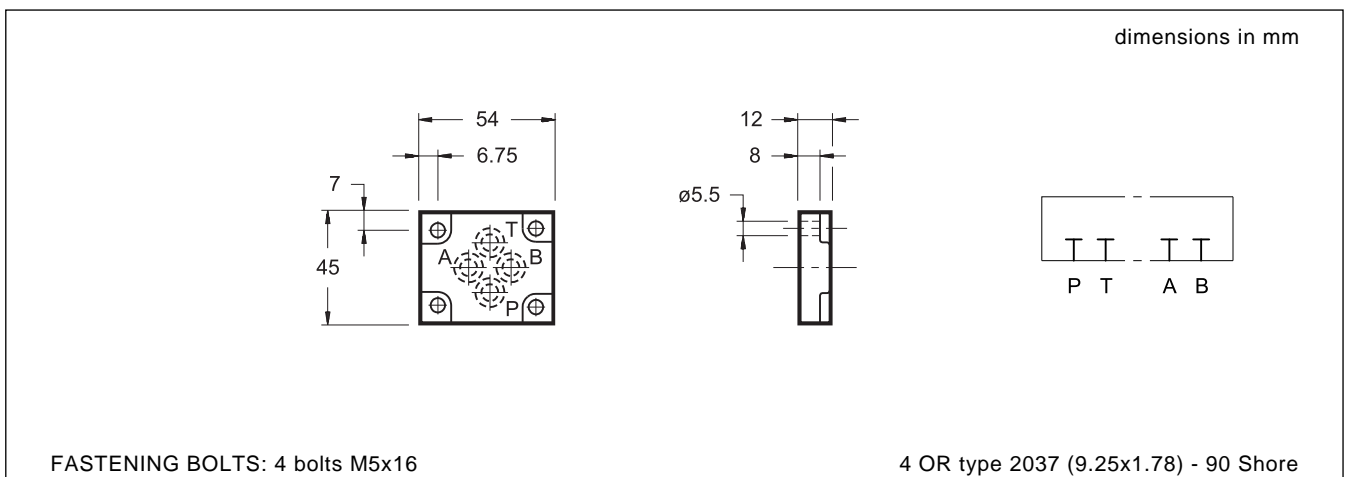
Fax +39 0331.895.339

www.diplomatic.com • e-mail: sales.exp@diplomatic.com

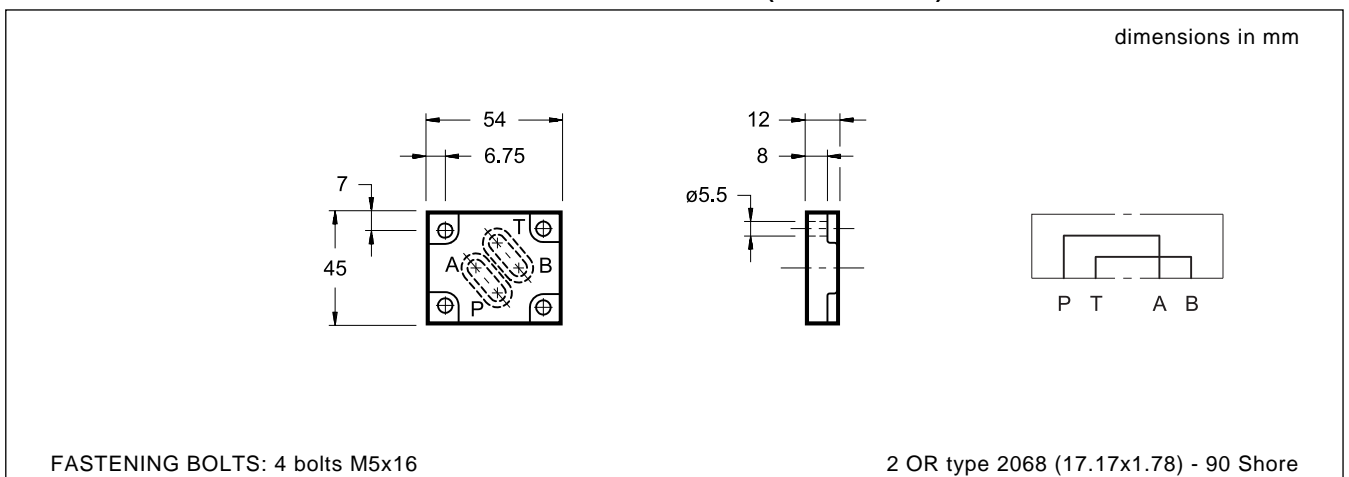
PE BLANKING PLATE

p max 350 bar

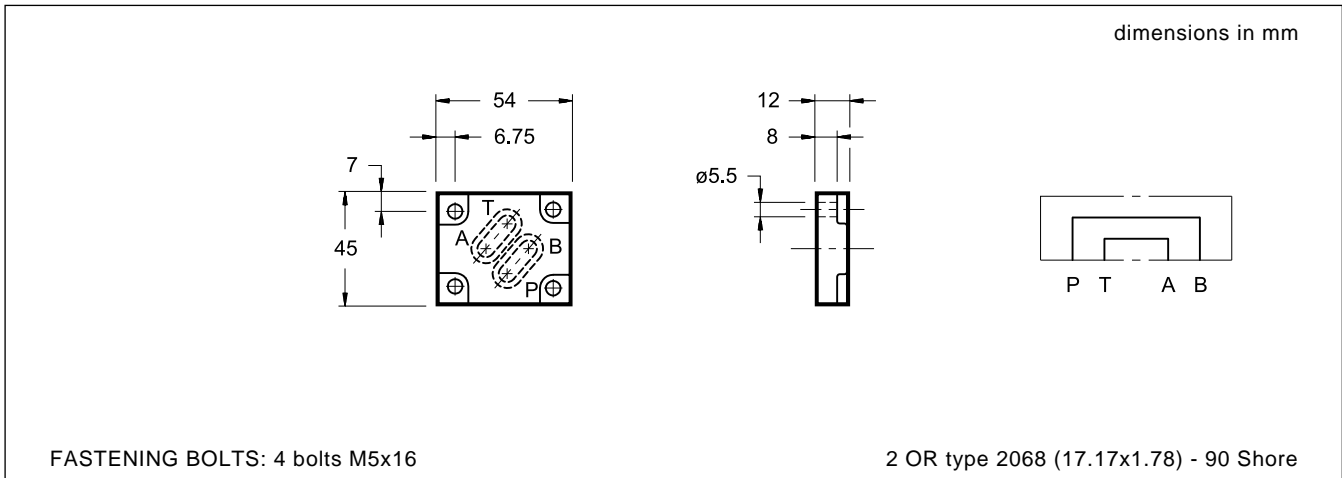
1 - OVERALL AND MOUNTING DIMENSIONS PE-MD1/20 (cod. 1950591)



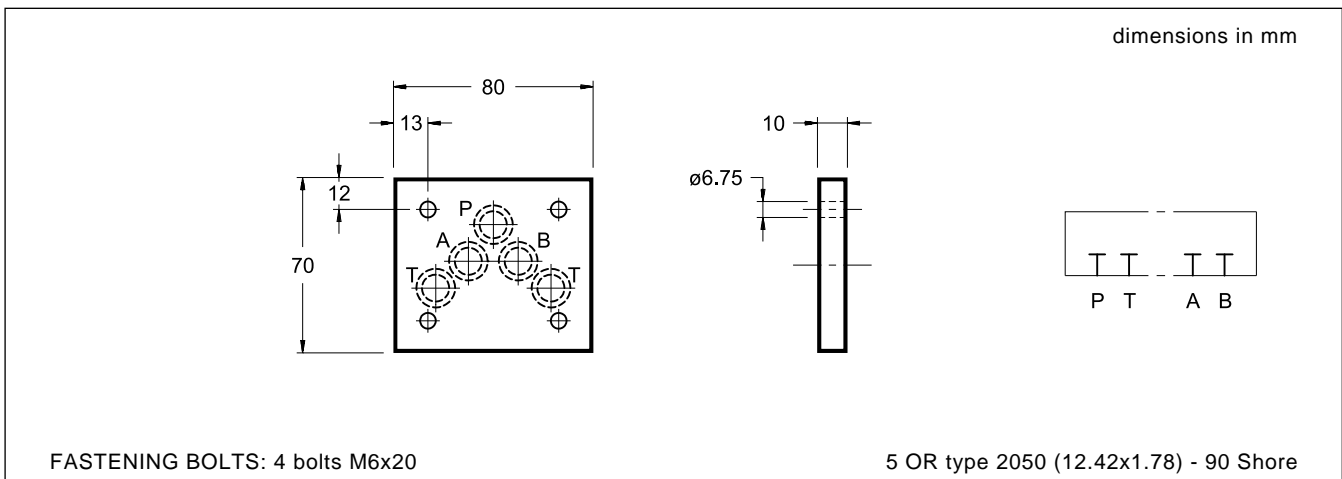
2 - OVERALL AND MOUNTING DIMENSIONS PE-C/PA/MD1/20 (cod. 1950751)



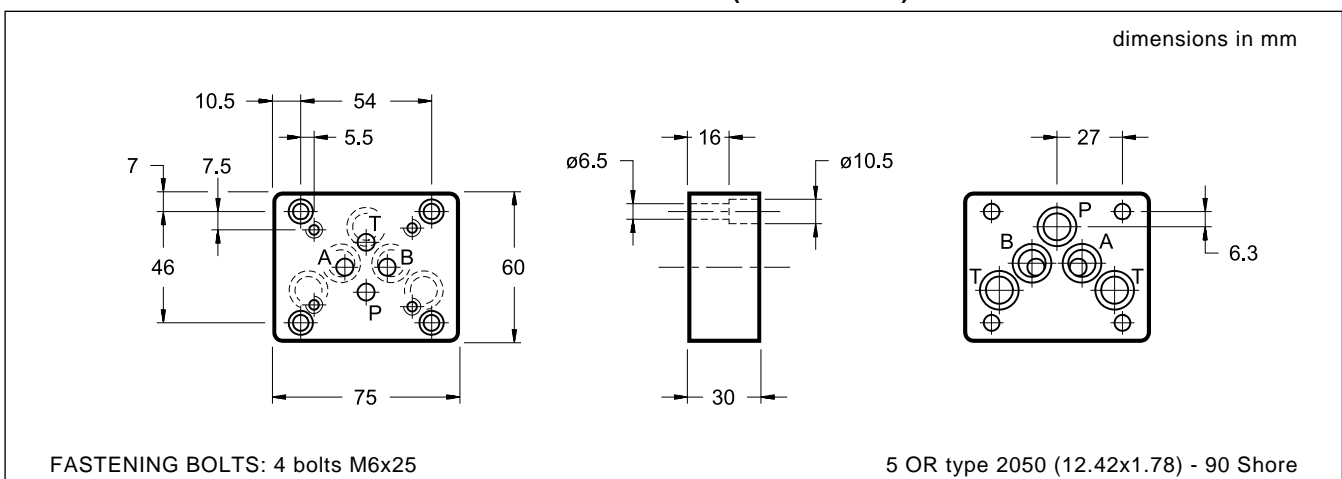
3 - OVERALL AND MOUNTING DIMENSIONS PE-C/PB/MD1/20 (cod. 1950601)



4 - OVERALL AND MOUNTING DIMENSIONS PE/D4-M (cod, 1950042)



5 - OVERALL AND MOUNTING DIMENSIONS PC-D4/MD1-M (cod. 1950222)



NOTE: On request, plates can be supplied with the O-Rings in viton. To order it, please indicate the letter /V at the end of the identification code of the plate.



DIPLOMATIC OLEODINAMICA S.p.A.
 20015 PARABIAGO (MI) • Via M. Re Depaolini 24
 Tel. +39 0331.895.111
 Fax +39 0331.895.339
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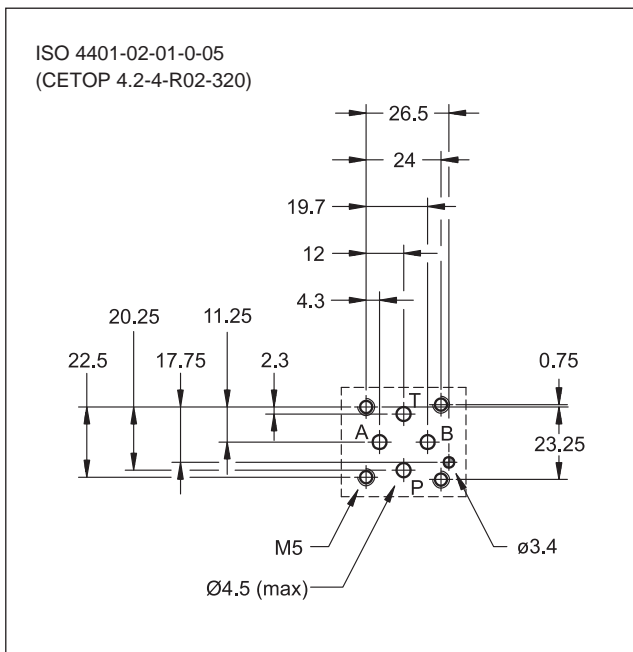
PRM2

DIRECT OPERATED PRESSURE RELIEF VALVE SERIES 10

MODULAR VERSION ISO 4401-02 (CETOP R02)

p max **320** bar
Q max **20** l/min

MOUNTING SURFACE



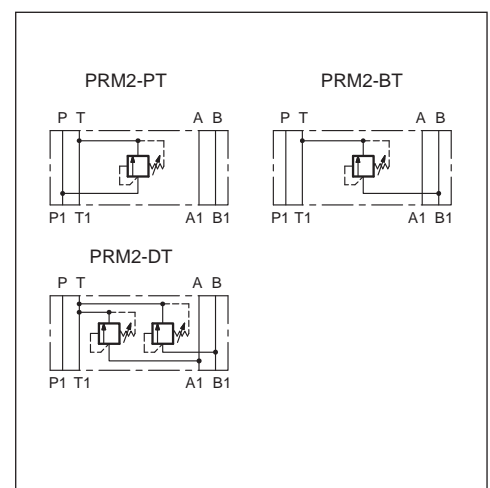
OPERATING PRINCIPLE

- „ The PRM2 valve is a direct operated pressure relief valve made as a modular version with mounting surface according to the ISO 4401 (CETOP RP 121H) standards.
- „ It can be assembled with all ISO 4401-02 (CETOP R02) modular valves without use of pipes, using suitable tie-rods or bolts.
- „ It is available in versions for single relief on P or B with discharge in T, or two independent relief on A and B with discharge in T, all with three different pressure adjustment ranges.
- „ This valve is normally used as a hydraulic circuit pressure limiting device or as a limiting device of the pressure peaks generated during the movement of hydraulic actuators.
- „ It is supplied with a countersunk hex adjustment screw and locking nut.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	320
Minimum controlled pressure	see p diagram.	
Maximum flow rate	l/min	20
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 20/18/15	
Recommended viscosity	cSt	25
Mass: PRM2-PT and PRM2-BT PRM2-DT	kg	0.85 1

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

P	R	M	2	-		/	10	
----------	----------	----------	----------	----------	--	----------	-----------	--

Direct operated pressure relief valve (P)
 Modular version (R)
 Size: ISO 4401-02 (CETOP R02) (M)
 Versions:
PT: single relief on line P with discharge in T
BT: single relief on line B with discharge in T
DT: double relief on lines A - B with discharge in T

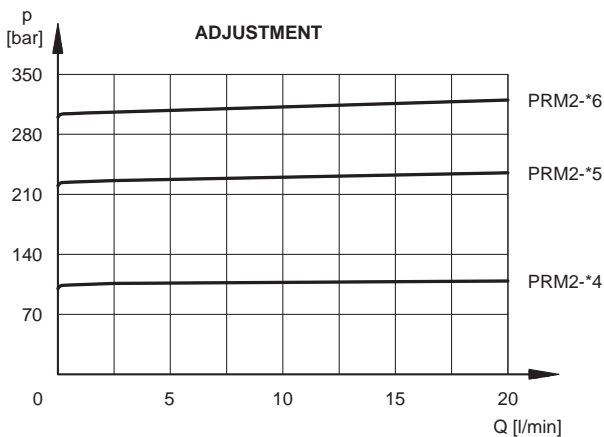
Seals:
N = NBR seals for mineral oils (**standard**)
V = FPM seals for special fluids

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

Pressure adjustment range
4 = from 63 to 125 bar (16 bar/turn)
5 = from 80 to 210 bar (26 bar/turn)
6 = from 125 to 350 bar (50 bar/turn)

2 - CHARACTERISTIC CURVES

(values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Locking nut: spanner 19
2	Countersunk hex adjustment screw: spanner 5 Rotate clockwise to increase pressure
3	Mounting surface with sealing rings: N. 4 OR type 2025 (6.07x1.78) 90 Shore



MCD

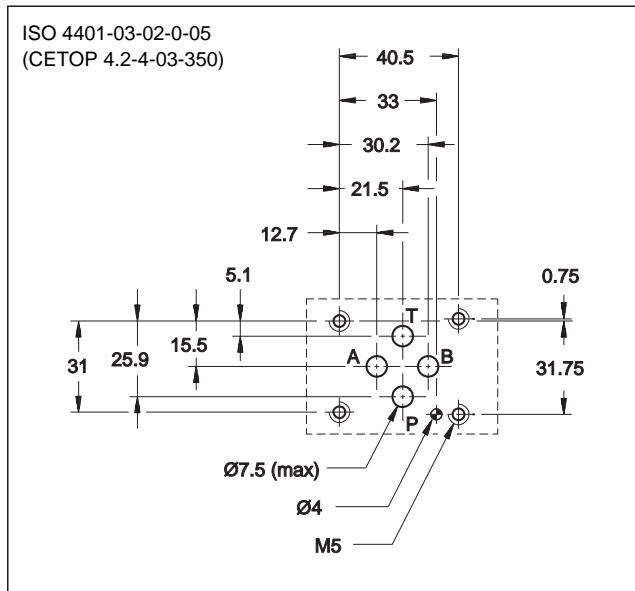
DIRECT OPERATED PRESSURE RELIEF VALVE

SERIES 51

MODULAR VERSION ISO 4401-03 (CETOP 03)

p max **350** bar
Q max (see table of performances)

MOUNTING INTERFACE

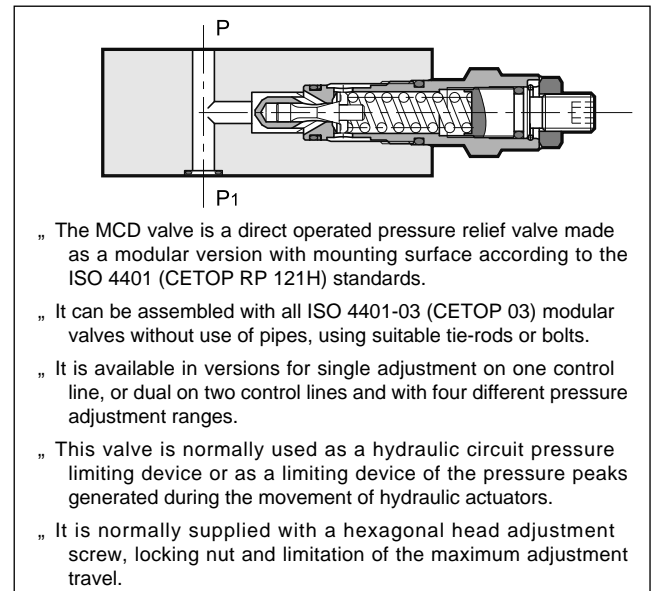


CONFIGURATIONS

(see Hydraulic symbols table)

- „•SPŽ: controls the pressure on line P with discharge in T.
- „•SATŽ: controls the pressure on line A with discharge in T.
- „•SBTŽ: controls the pressure on line B with discharge in T.

OPERATING PRINCIPLE



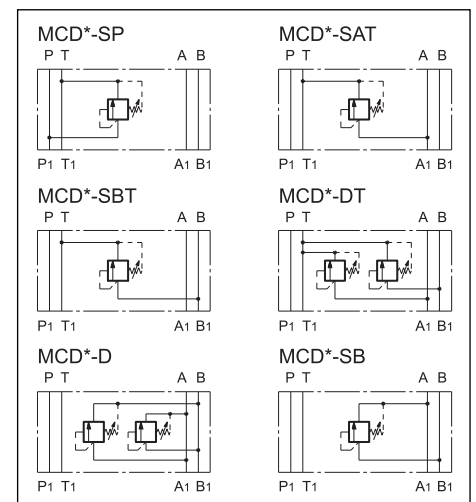
- „•DTŽ: controls the pressure on lines A-B with discharge in T.
- „•DŽ: controls the pressure on lines A-B with crossed discharges
- „•SBŽ: controls the pressure on line B with discharge in A.

PERFORMANCES

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

Maximum operating pressure	bar	350
Minimum controlled pressure	see p diagram.	
Maximum flow rate in controlled lines	l/min	50
Maximum flow rate in the free lines		75
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 20/18/15	
Recommended viscosity	cSt	25
Mass: MCD-SP / MCD-SAT / MCD-SBT / MCD-SB / MCD-DT / MCD-D	kg	1,4 2,0

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

M	C	D	-	/ 51	/
----------	----------	----------	----------	-------------	----------

Size: ISO 4401-03 (CETOP 03). Modular version

Direct operated pressure relief valve

Pressure adjustment range
2 = up to 25 bar **5** = up to 210 bar
3 = up to 70 bar **6** = up to 350 bar
4 = up to 140 bar

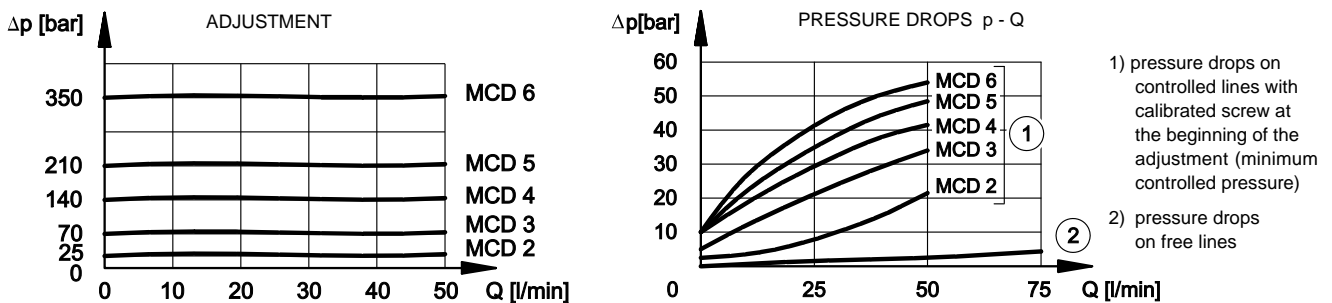
Configurations:
SP: single on line P with discharge in T
SAT: single on line A with discharge in T
SBT: single on line B with discharge in T
DT: double on lines A-B with discharge in T
D: double on lines A-B with crossed discharges
SB: single on line B with discharge in A

omit for adjustment with countersunk hex screw - **standard**
K = Adjustment knob

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

Series No. (the overall and mounting dimensions remain unchanged from 50 to 59)

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



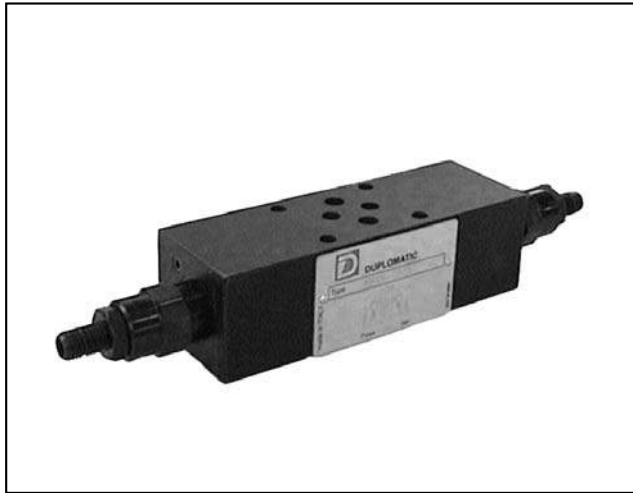
3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensioni in mm

1	Locking nut: spanner 19
2	Countersunk hex adjustment screw: spanner 6 (standard) Rotate clockwise to increase pressure
3	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) 90 Shore
4	Adjustment knob: K
5	Locking ring



MRQ

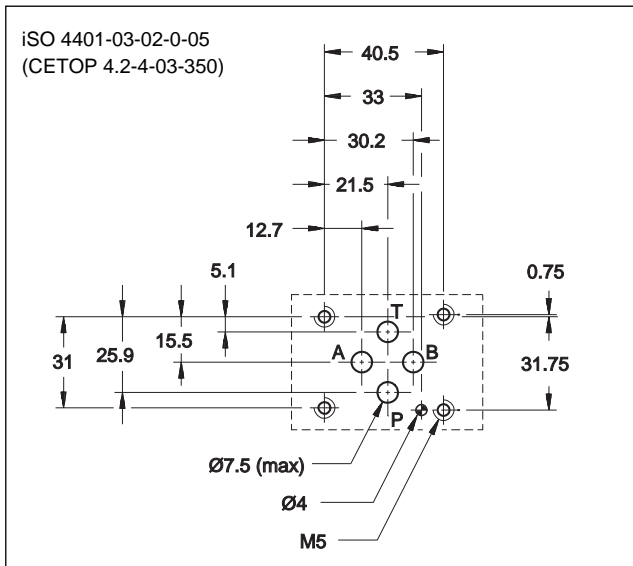
PILOT OPERATED PRESSURE RELIEF VALVE

SERIES 51

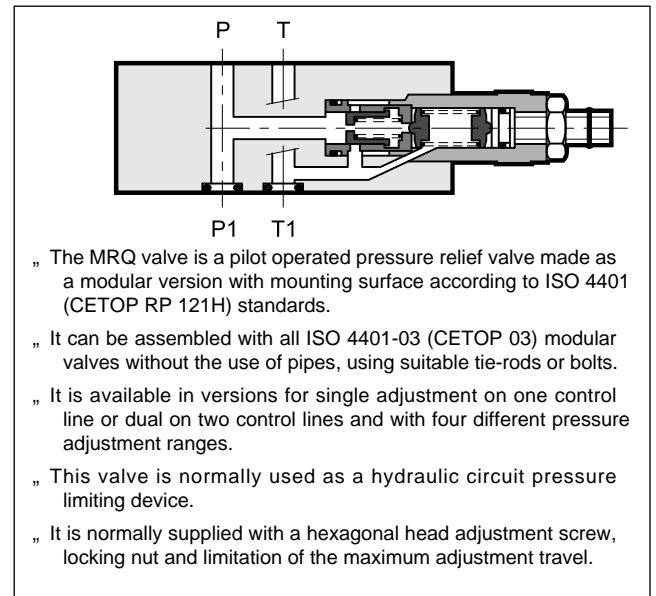
MODULAR VERSION
ISO 4401-03 (CETOP 03)

p max **350** bar
Q max **75** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



CONFIGURATIONS (see Hydraulic symbols table)

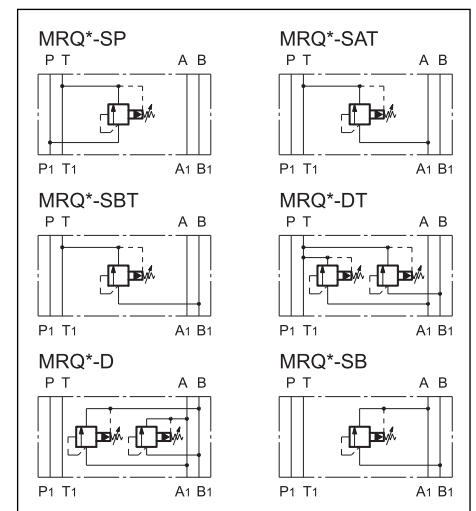
- „ •SPŽ: controls the pressure on line P with discharge in T.
- „ •SATŽ: controls the pressure on line A with discharge in T.
- „ •SBTŽ: controls the pressure on line B with discharge in T.

- „ •DTŽ: controls the pressure on lines A-B with discharge in T.
- „ •DŽ: controls the pressure on lines A-B with crossed discharges.
- „ •SBŽ: controls the pressure on line B with discharge in A.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Minimum controlled pressure	see p diagram.	
Maximum flow rate in controlled lines and in the free lines	l/min	75
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 20/18/15	
Recommended viscosity	cSt	25
Mass: MRQ-SP / MRQ-SAT / MRQ-SBT / MRQ-SB MRQ-DT / MRQ-D	kg	1,4 2,1

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

M	R	Q	-	/	/	51	/
---	---	---	---	---	---	----	---

ISO 4401-03 (CETOP 03) size. Modular version

Pilot operated pressure relief valve

Pressure adjustment range:
3 = up to 70 bar **5** = up to 210 bar
4 = up to 140 bar **6** = up to 350 bar

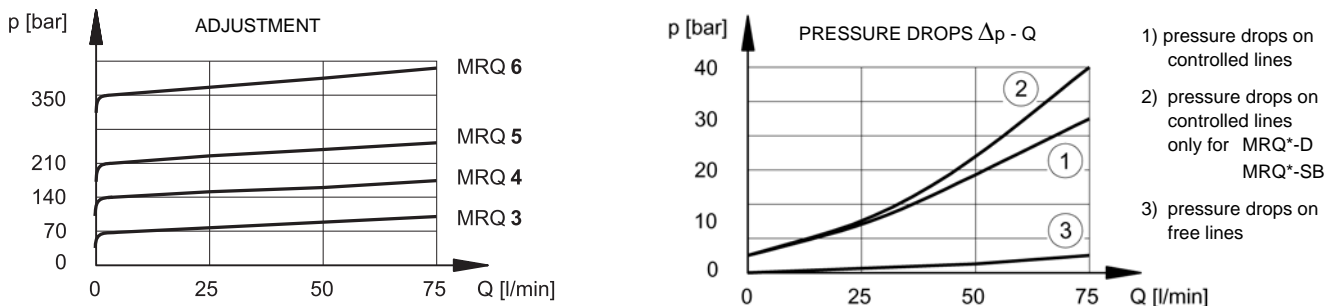
Configurations:
SP: single on line P with discharge in T
SAT: single on line A with discharge in T
SBT: single on line B with discharge in T
DT: double on lines A-B with discharge in T
D: double on lines A-B with crossed discharges
SB: single on line B with discharge in A

Seals: omit for mineral oils
V = viton for special fluids

Series No. (the overall and mounting dimensions remain unchanged from 50 to 59)

M1 = Adjustment knob (omit for adjustment with countersunk hex screw)

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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Locking nut: spanner 19
2	Countersunk hex adjustment screw: spanner 5 Rotate clockwise to increase pressure
3	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) 90 Shore
4	Adjustment knob: M1



PBM3

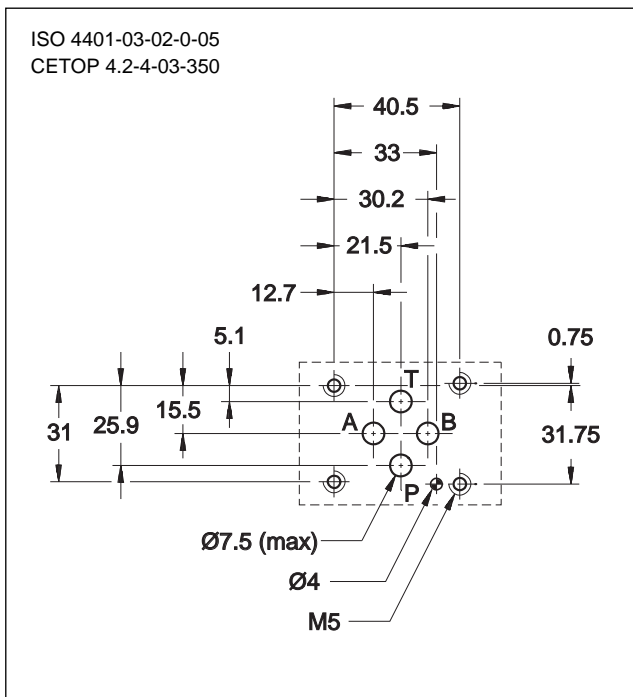
BACKPRESSURE VALVE

SERIES 10

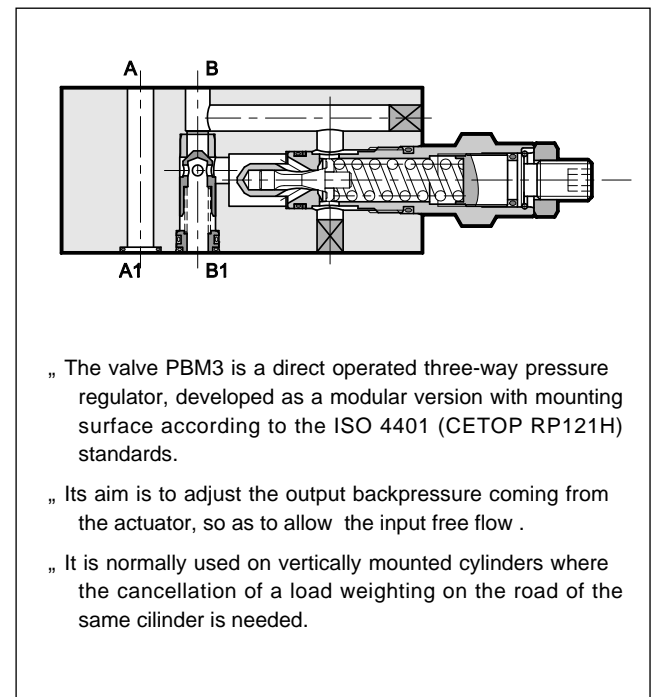
MODULAR VERSION
ISO 4401-03 (CETOP 03)

p max **350** bar
Q max (see table of performances)

MOUNTING INTERFACE



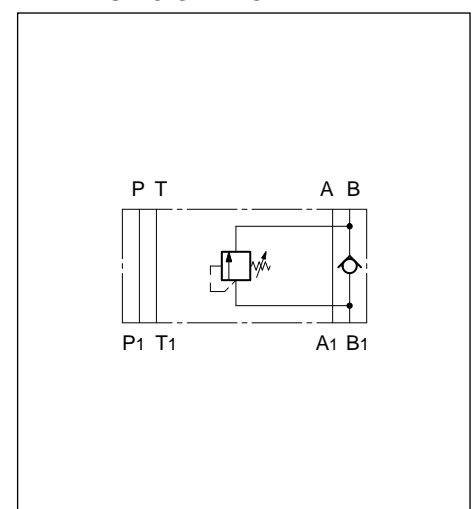
OPERATING PRINCIPLE



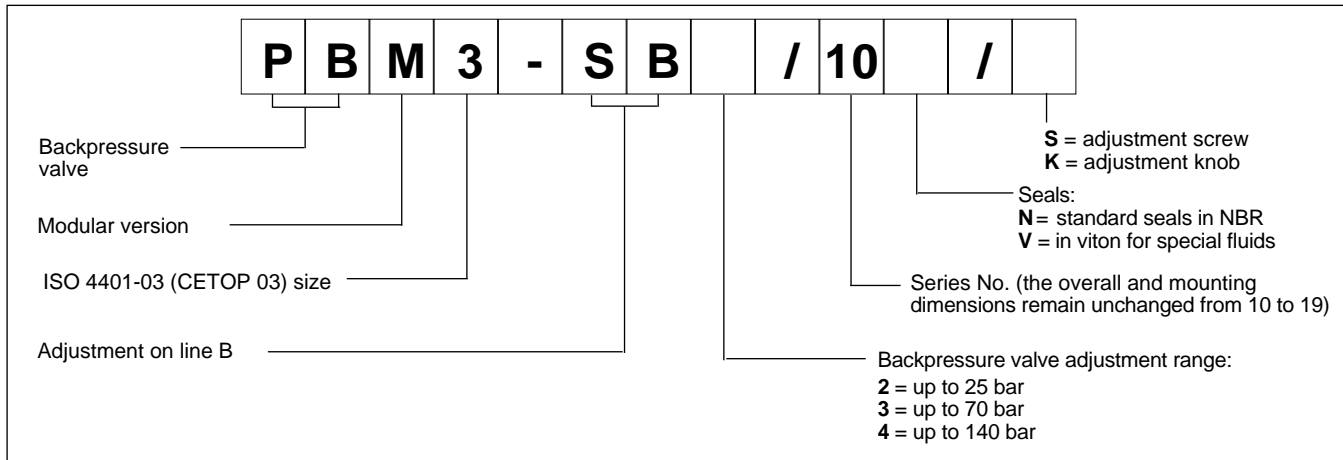
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Check valve cracking pressure	bar	3,5
Max. flow on check valve B B1 (p 8 bar)	bar	50
Maximum flow rate in controlled line B1 B	l/min	50
Maximum flow rate in the free lines P, A, T		75
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,6

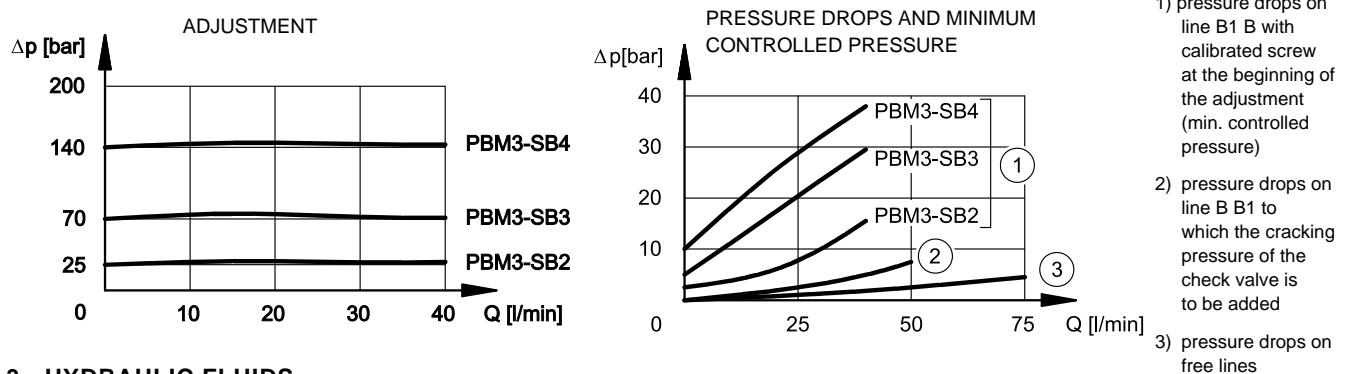
HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE



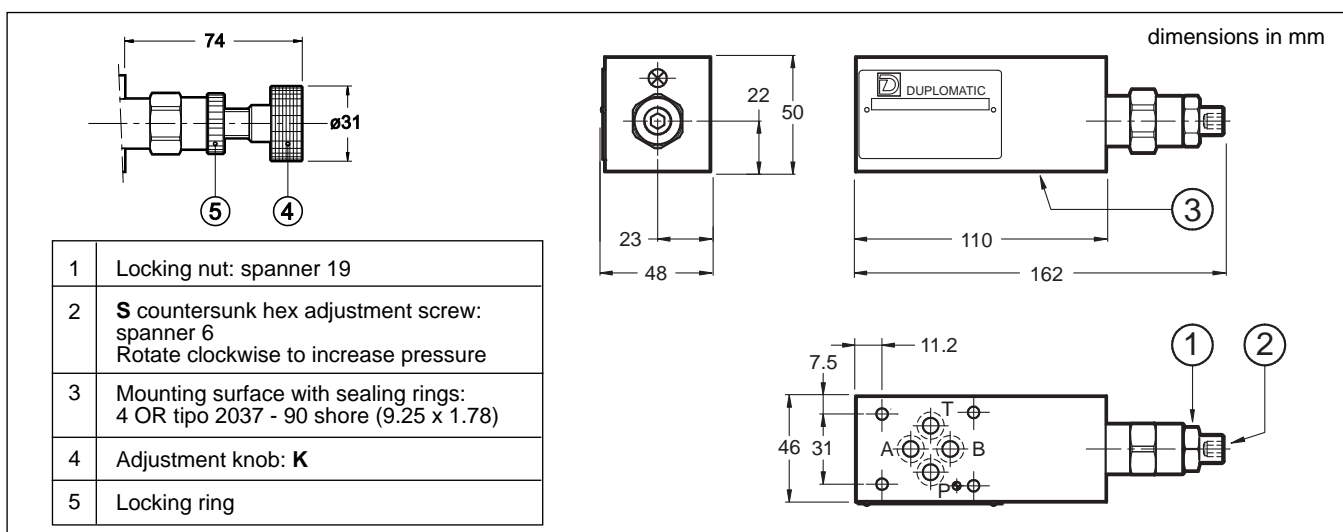
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





PRM5

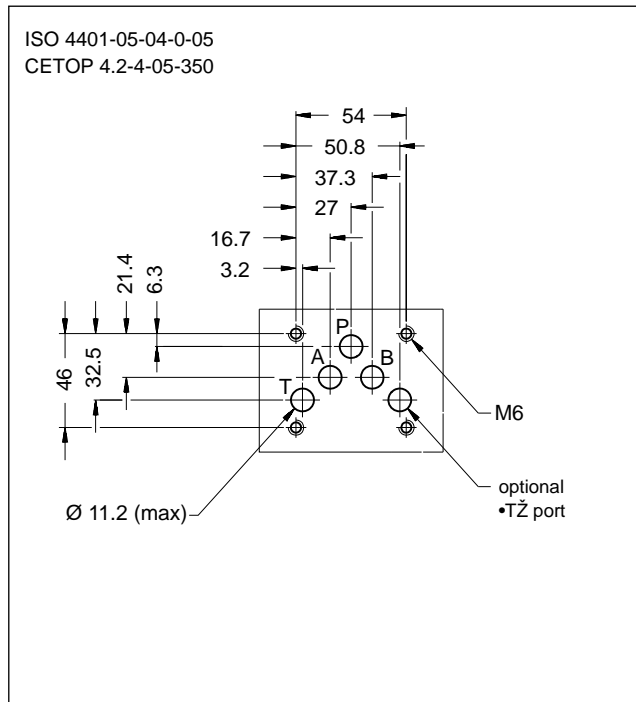
PILOT OPERATED PRESSURE RELIEF VALVE

SERIES 10

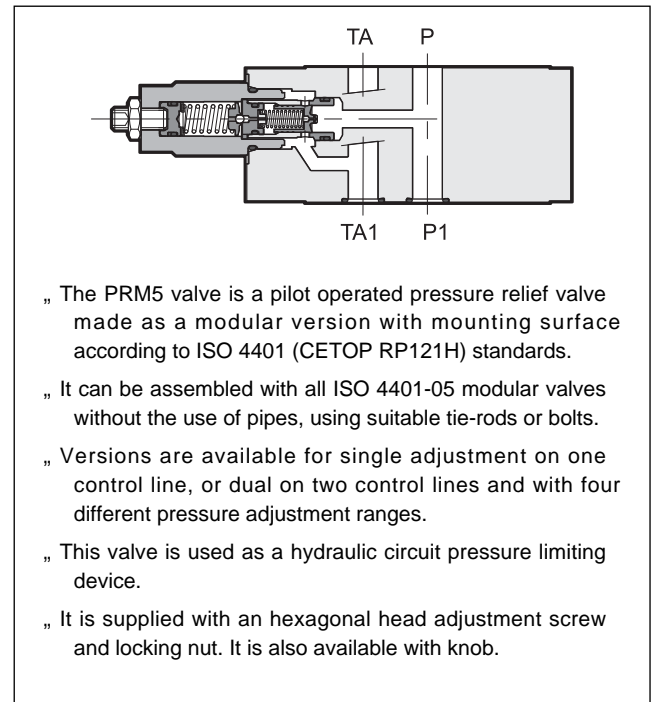
MODULAR VERSION
ISO 4401-05 (CETOP 05)

p max **350** bar
Q max **120** l/min

MOUNTING SURFACE



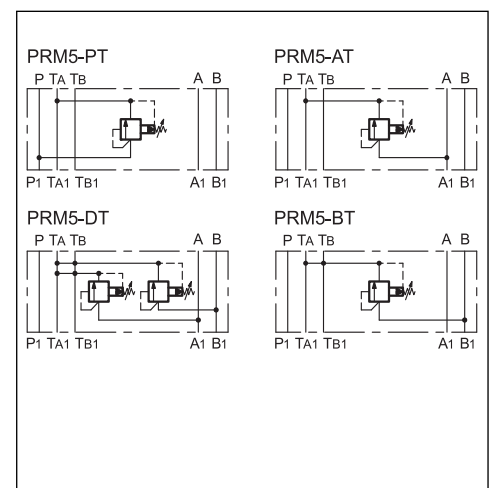
OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Minimum controlled pressure	bar	see p - Q diagram
Max flow	l/min	120
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 20/18/15	
Recommended viscosity	cSt	25
Mass: PRM5-PT, -AT, -BT PRM5-DT	kg	2,8 3

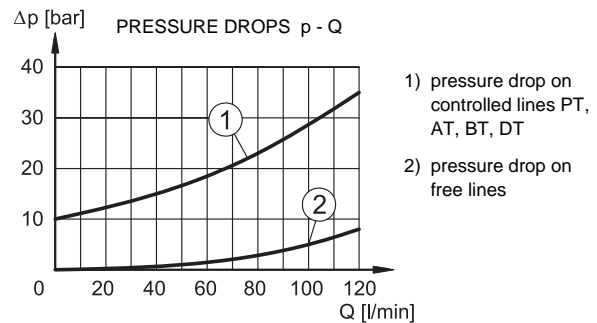
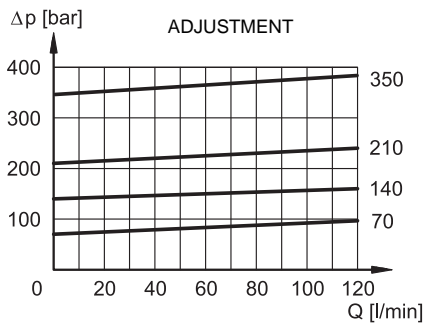
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

P R M 5 -	/ 10	/	
Pilot operated pressure relief valve Modular version ISO 4401-05 (CETOP 05) size Versions: PT: single on line P with discharge in TA AT: single on line A with discharge in TA BT: single on line B with discharge in TA and TB DT: double on lines A-B with discharge in TA and TB Pressure adjustment range: 070 = 6 ÷ 70 bar (17 bar/turn) 210 = 6 ÷ 210 bar (47 bar/turn) 140 = 6 ÷ 140 bar (32 bar/turn) 350 = 6 ÷ 350 bar (78 bar/turn)	Option: W7 surface treatment. Omit if not required (NOTE) Option: K = Adjustment knob. Omit for adjustment with hex socket screw (standard) Seals: N = NBR seals for mineral oils (standard) V = FPM seals for special fluids Series No. (the overall and mounting dimensions remain unchanged from 10 to 19)	NOTE: Upon request we can supply these valves completely with zinc-nickel surface treatment on the body. Add the suffix /W7 at the end of the identification code.	

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



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

K VERSION

1	Socket hex adjustment screw: Hex key 4. Rotate clockwise to increase pressure
2	Locking nut: spanner 13
3	Mounting surface with sealing rings: 5 OR type 2050 (12.42 x 1.78) 90 Shore



PRM7

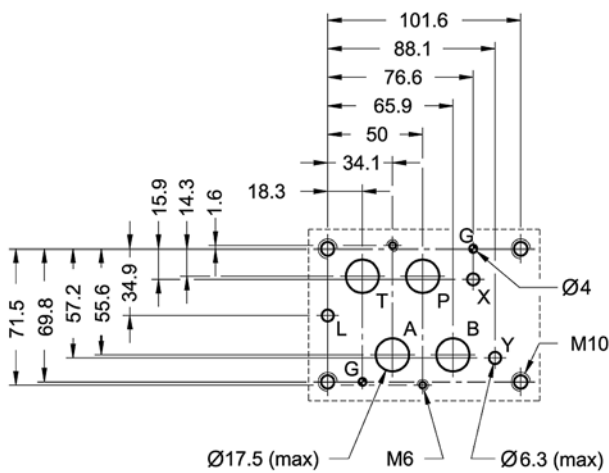
PILOT OPERATED PRESSURE RELIEF VALVE SERIES 10

MODULAR VERSION
ISO 4401-07 (CETOP 07)

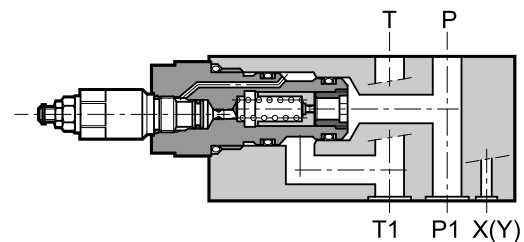
p max **350** bar
Q max **300** l/min

MOUNTING INTERFACE

ISO 4401-07-07-0-05
(CETOP 4.2-4-07)



OPERATING PRINCIPLE

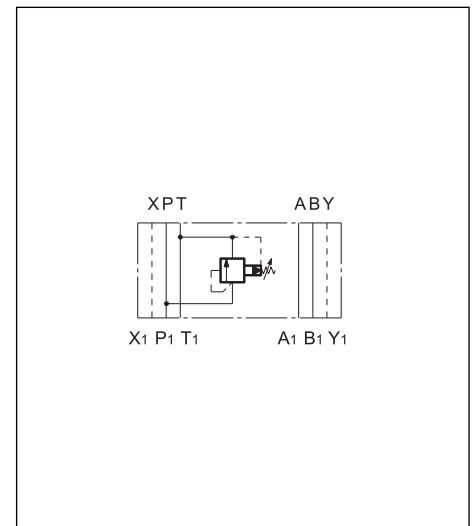


- „ The PMR7 valve is a pilot operated pressure relief valve made as a modular version with a mounting surface according to ISO 4401 (CETOP RP 121H) standards.
- „ It can be assembled with all ISO 4401-07 (CETOP 07) modular valves without the use of pipes, using suitable tie-rods or bolts.
- „ It is available in the type for single adjustment on line P and discharge in T with two pressure adjustment ranges.
- „ This valve is normally used as a hydraulic circuit pressure limiting device.
- „ It is normally supplied with an adjustment screw.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

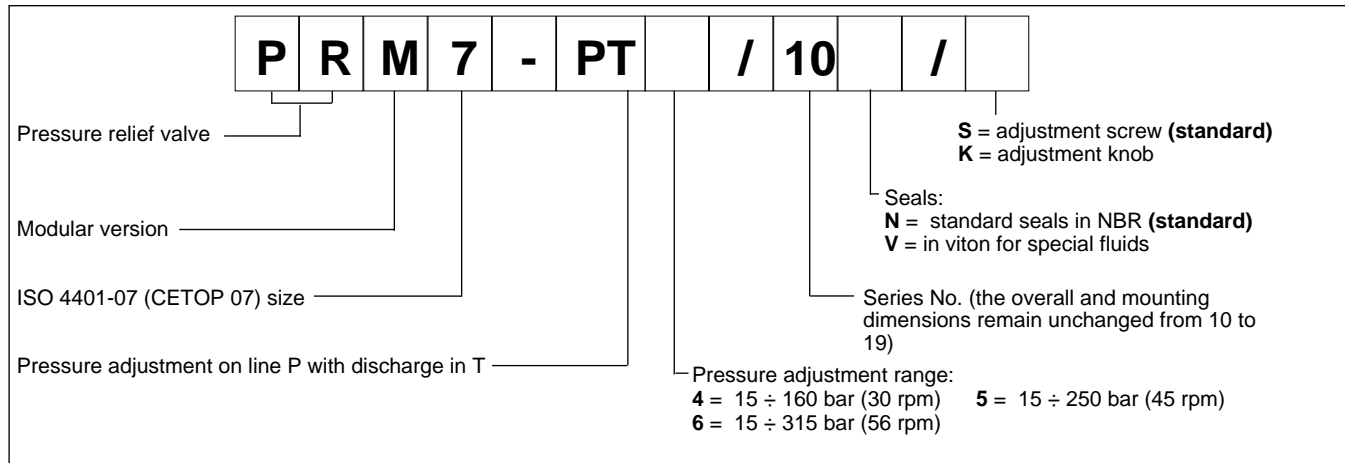
Maximum operating pressure	bar	350
Maximum flow rate	l/min	300
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	8,5

HYDRAULIC SYMBOL

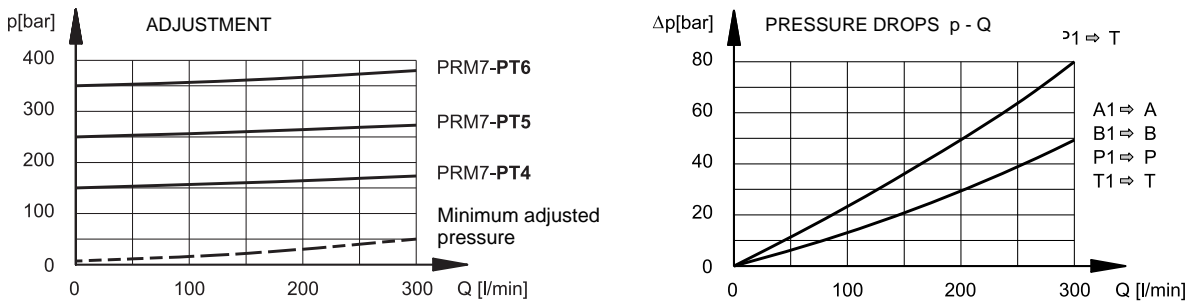




1 - IDENTIFICATION CODE



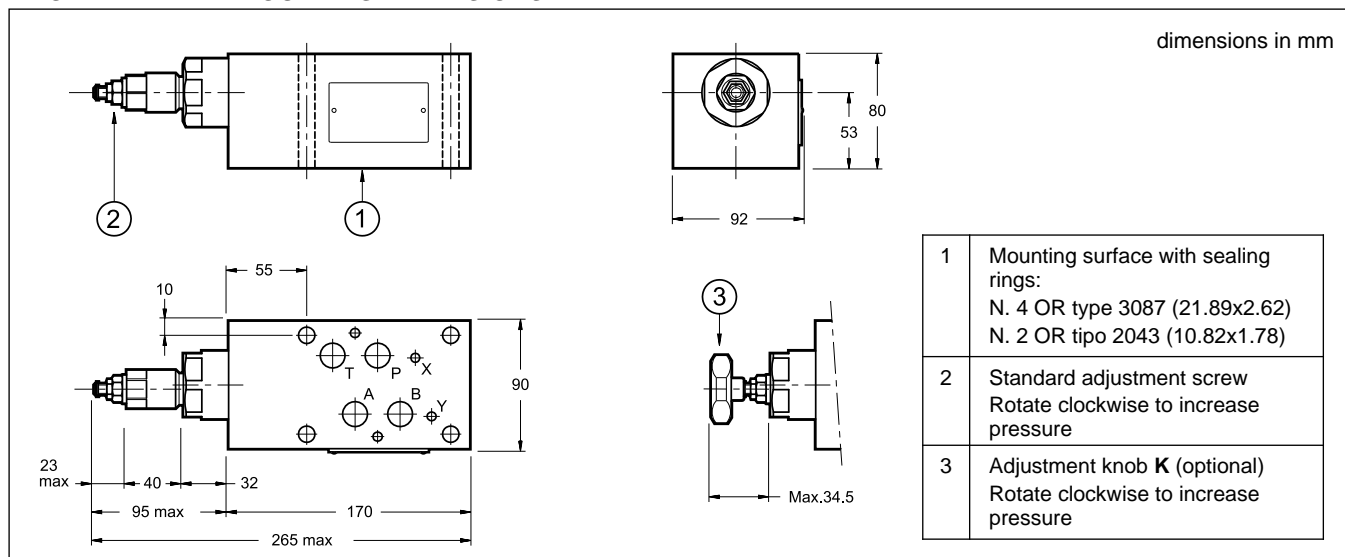
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS



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 20015 PARABIAGO (MI) • Via M. Re Depaolini 24
 Tel. +39 0331.895.111
 Fax +39 0331.895.339
 www.diplomatic.com • e-mail: sales.exp@diplomatic.com



MZD

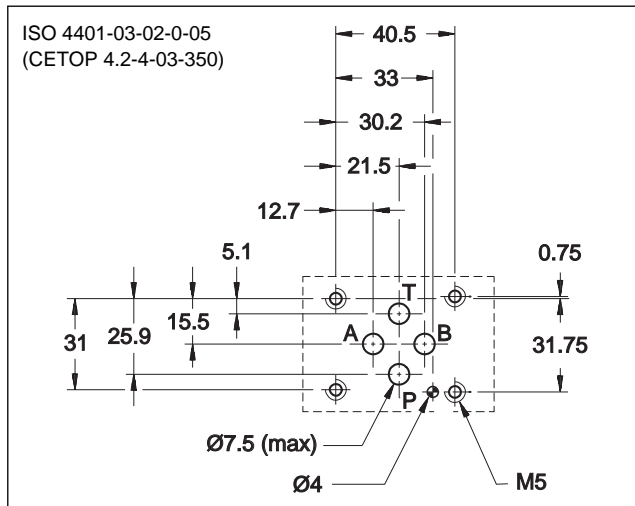
DIRECT OPERATED THREE-WAY PRESSURE REDUCING VALVE WITH FIXED OR VARIABLE ADJUSTMENT

MODULAR VERSION ISO 4401-03 (CETOP 03)

p max **350** bar

Q max (see table of performances)

MOUNTING INTERFACE



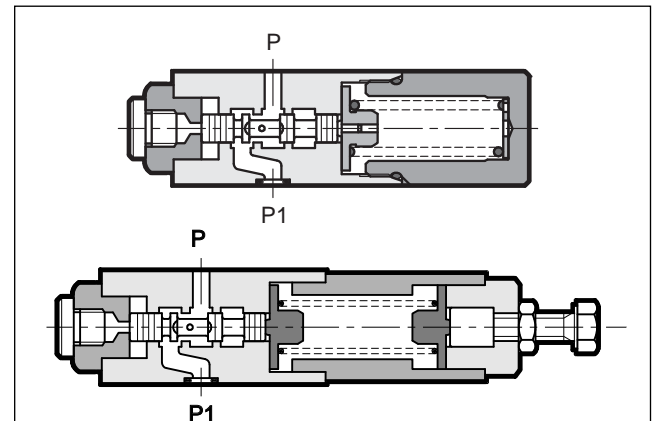
CONFIGURATIONS (see Hydraulic symbols at par.1)

- „ MZD*: pressure reduction on line P, drainage connected with line T.
- „ MZD*/A and MZD*/RA: pressure reduction on line A toward the actuator and maximum pressure in line B, drainage connected with line T.
- „ MZD*/B and MZD*/RB: pressure reduction on line B toward the actuator and maximum pressure in line A, drainage connected with line T.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum pressure on port T		10
Maximum flow rate in the controlled lines	l/min	50
Maximum flow rate in the free lines		75
Drainage flow rate		0,08
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,4

OPERATING PRINCIPLE



„ The MZD valve is a three-way spool type direct operated pressure reducing valve. It is normally open in the rest position and the hydraulic fluid passes freely from the P1 line to the P line.

The spool is subjected to the line P pressure on one side, and on the other side by the adjustment spring. When the pressure in line P exceeds the value set by the spring, the valve closes until the pressure in P (reduced) equals the calibrated value.

„ The valve construction provides good adjustment sensitivity with reduced drainage flow. The drainage is connected to line T inside the valve.

„ The three-way design provides protection of the secondary circuit from pressure surges since it allows a reverse flow from the actuator to the T discharge line.

„ It is made as a modular version with ports according to the ISO 4401 (CETOP RP 121H) standards and can be assembled quickly, without use of pipes, under the ISO 4401-03 (CETOP 03) solenoid valves.

„ The variable adjustment version is supplied with a hexagonal head adjustment screw. Upon request, it can be equipped with a SICBLOC adjustment knob.

„ The fixed adjustment version is available set at value 20, 25 or 30 bar pressure.

1 - IDENTIFICATION CODE OF MZD VARIABLE ADJUSTMENT VERSION

M	Z	D	/	/	/	/
----------	----------	----------	----------	----------	----------	----------

Size: ISO 4401-03 (CETOP 03)
Modular version

Direct operated pressure reducing valve

Pressure adjustment range:

2 = 3 ÷ 35 bar	4 = 30 ÷ 140 bar
3 = 10 ÷ 70 bar	5 = 50 ÷ 280 bar

Configurations (omit for MZD with pressure reduction on line P and regulation unit on side B)

- A:** pressure reduction on line A and full pressure on line B with regulation unit on side B
- B:** pressure reduction on line B and full pressure on line A with regulation unit on side B
- RP:** pressure reduction on line P with regulation unit on side A
- RA:** pressure reduction on line A and full pressure on line B with regulation unit on side A
- RB:** pressure reduction on line B and full pressure on line A with regulation unit on side A

Seals:
omit for mineral oils
V = viton for special fluids

Series No.:
50 - for MZD*, MZD*/RP, MZD*/A, MZD*/RA, MZD*/B valves
51 - for MZD*/RB valves
(the overall and mounting dimensions remain unchanged from 50 to 59)

M = Adjustment with SICBLOC knob
(omit for adjustment with hexagonal head screw)

Hydraulic symbols

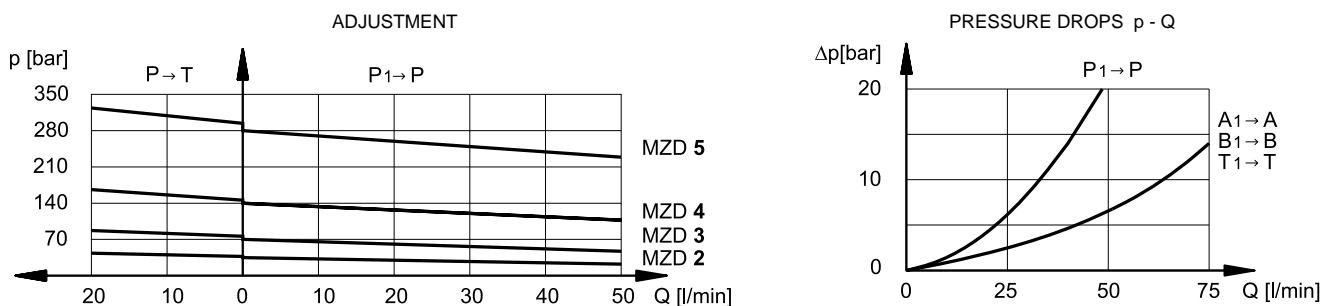
MZD*
MZD*/RP

MZD*/A
MZD*/RA

MZD*/B
MZD*/RB

NOTE: the versions RP, RA and RB have been realised with regulation unit on side A, so as to be interchangeable with valves produced by other companies.
The standard version is equipped with regulation unit on side B.

2 - MZD VARIABLE ADJUSTMENT VERSION CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - IDENTIFICATION CODE OF MZD FIXED ADJUSTMENT VERSION

	M	Z	D	-		/		/	50	/	
--	----------	----------	----------	----------	--	----------	--	----------	-----------	----------	--

Size: ISO 4401-03 (CETOP 03)
Modular version

Direct operated pressure reducing valve

Adjustment:
020 = 20 bar **030** = 30 bar
025 = 25 bar

Configurations
 (omit for MZD with pressure reduction on line P and regulation unit on side B)

A: pressure reduction on line A and full pressure on line B with regulation unit on side B

B: pressure reduction on line B and full pressure on line A with regulation unit on side B

Seals:
omit for mineral oils
V = viton for special fluids

Series No.:
(the overall and mounting dimensions remain unchanged from 50 to 59)

Hydraulic symbols

MZD-*

MZD-*/A

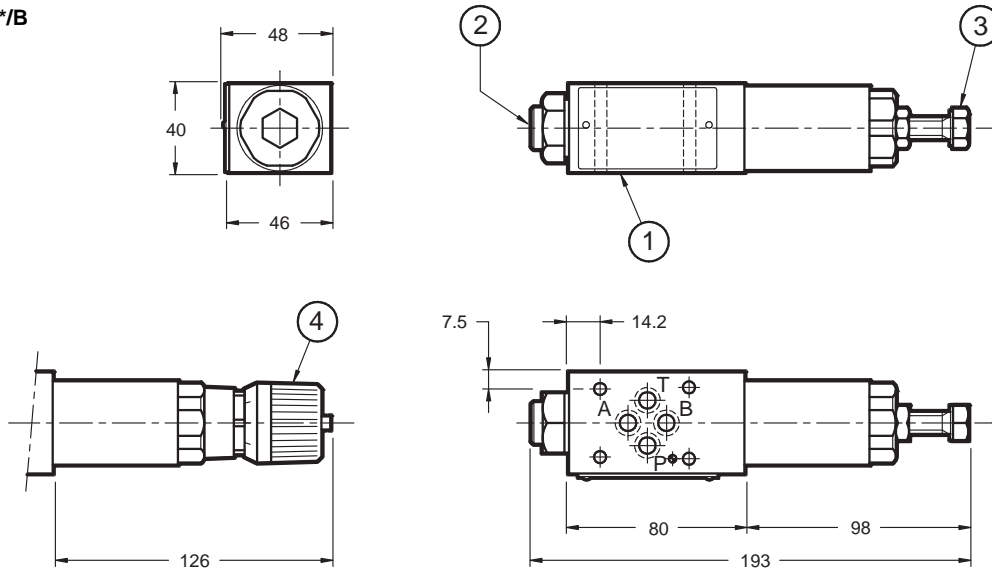
MZD-*/B

4 - HYDRAULIC FLUIDS

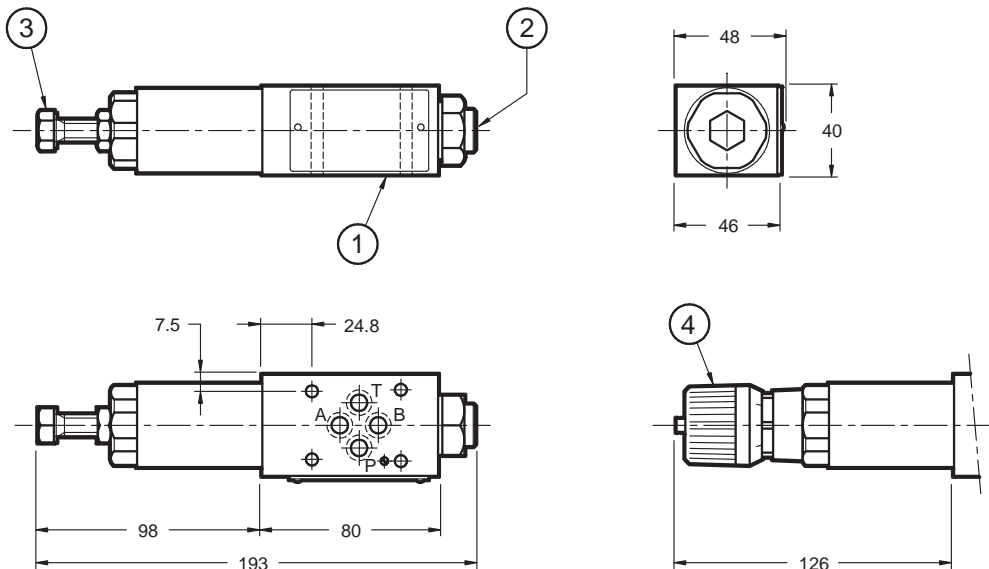
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

5 - OVERALL AND MOUNTING DIMENSIONS VARIABLE ADJUSTMENT VERSION

MZD*
MZD*/A
MZD*/B



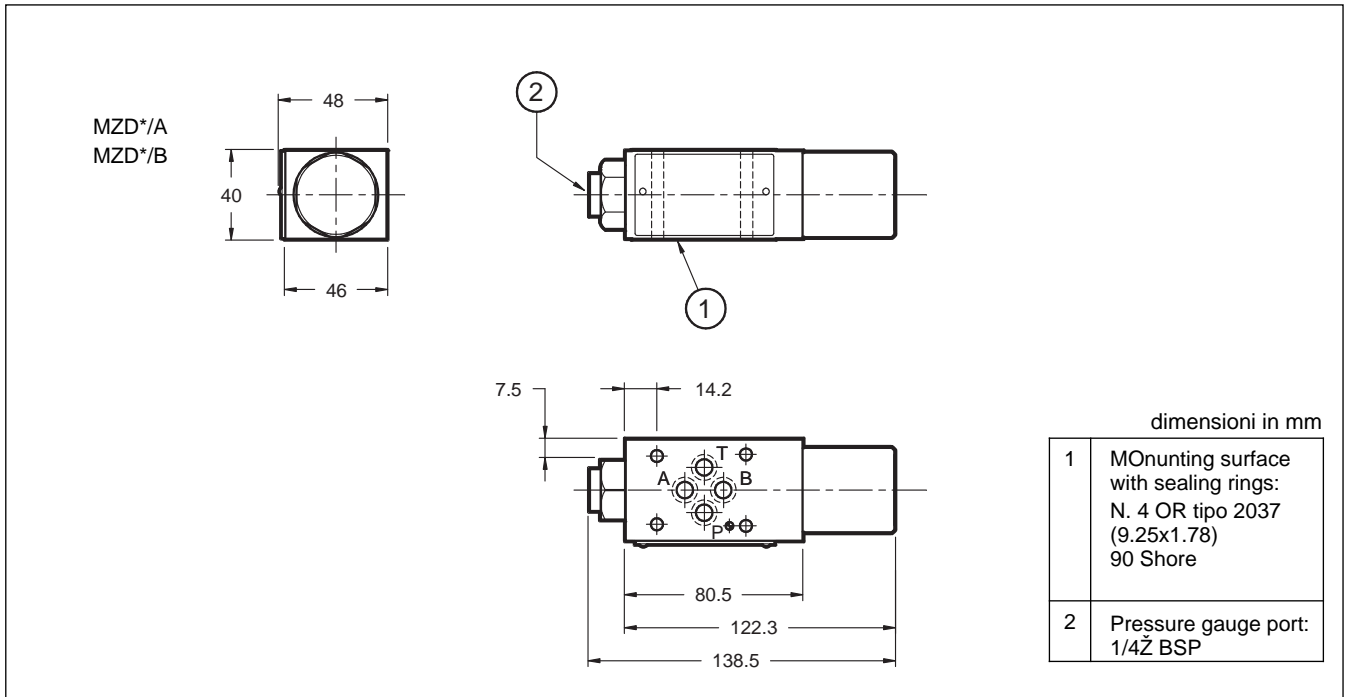
MZD*/RP
MZD*/RA
MZD*/RB



dimensions in mm

1	Mounting surface with sealing rings: 4 OR type 2037 (9.25x1.78) 90 Shore
2	Pressure gauge port 1/4" BSP
3	Hexagonal head adjustment screw. Spanner 17. Rotate clockwise to increase pressure
4	SICBLOC knob. To operate, push and rotate at the same time.

6 - OVERALL AND MOUNTING DIMENSIONS FIXED ADJUSTMENT VERSION





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Z4M

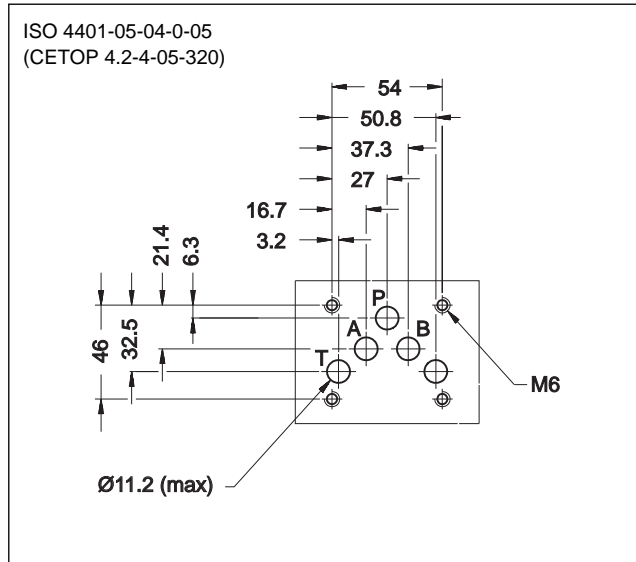
PILOT OPERATED PRESSURE REDUCING VALVE

SERIES 50

MODULAR VERSION
ISO 4401-05 (CETOP 05)

p max **320** bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE

- „ The Z4M valve is a piloted pressure reducing valve made as a modular version with mounting surface according to the ISO 4401 (CETOP PR 121H) standards.
- „ It is used to reduce pressure on secondary circuit branches, assuring stability of the controlled pressure and even changing the flow that travels through the valve.
- „ It can be assembled quickly under the ISO 4401-05 (CETOP 05) directional solenoid valves without use of pipes.
- „ It is normally supplied with a countersunk hex adjustment screw, locking nut and maximum adjustment travel limiting device.
- „ It is available in four different pressure adjustment ranges up to 320 bar.

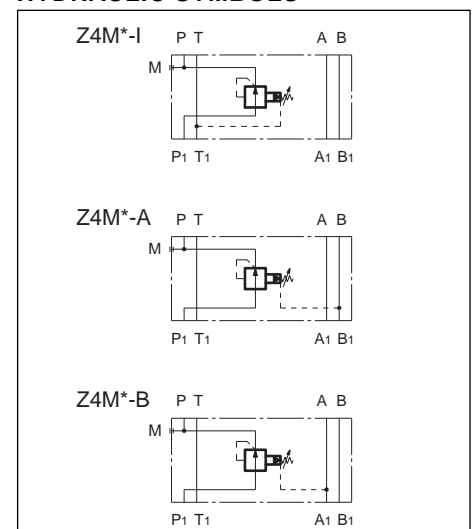
CONFIGURATIONS (see Hydraulic symbols table)

- „ Z4M*-I: pressure reduction on line P - drainage connected to line T.
- „ Z4M*-A: pressure reduction on line A and full pressure on line B.
- „ Z4M*-B: pressure reduction on line B and full pressure on line A.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	320
Maximum flow rate in the controlled line P		80
Maximum flow rate in the free lines	l/min	100
Drainage flow rate		0,07
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	2,7

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

Z	4	M	-	/	/ 50 /	
----------	----------	----------	----------	----------	---------------	--

Pressure reducing valve ————

Size: ISO 4401-05 (CETOP 05) ————

Modular version ————

Pressure adjustment range: ————

3 = 5 ÷ 70 bar
4 = 8 ÷ 140 bar
5 = 10 ÷ 210 bar
6 = 15 ÷ 320 bar

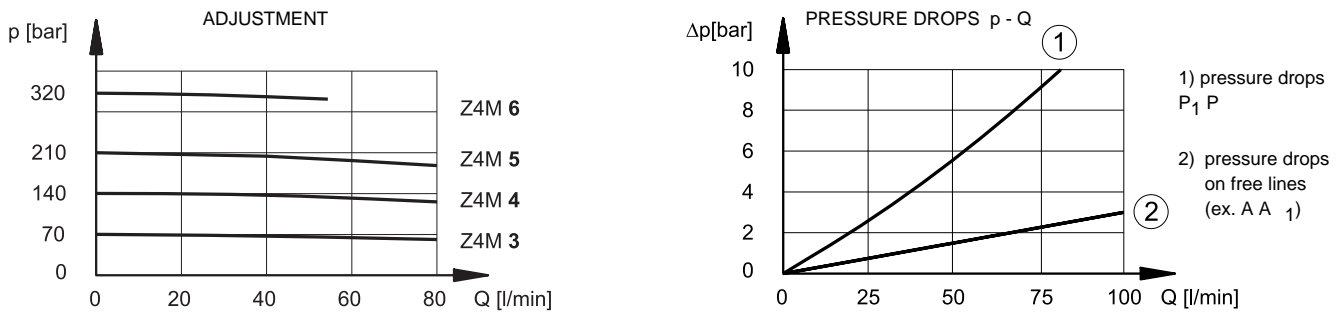
Seals: omit for mineral oils
V = viton for special fluids

Series No. (the overall and mounting dimensions remain unchanged from 50 to 59)

M1 = Adjustment knob
(omit for adjustment with countersunk hex screw)

Configurations: **I**: pressure reduction on line P. Internal drainage connected to line T
A: pressure reduction on line A and full pressure on line B
B: pressure reduction on line B and full pressure on line A

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



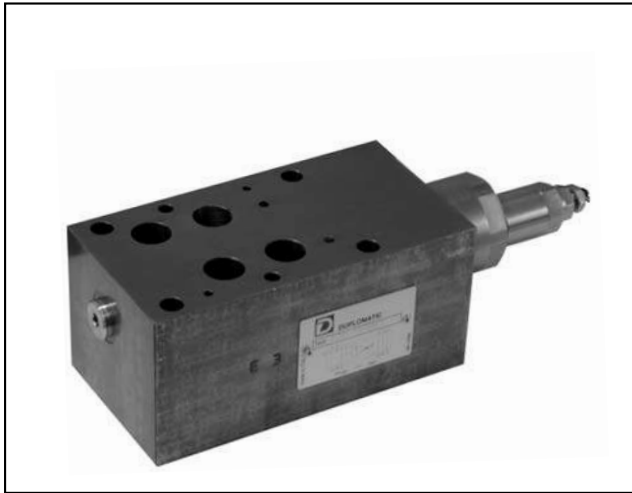
3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Locking nut spanner 17
2	Countersunk hex adjustment screw: Spanner 5. Rotate clockwise to increase pressure
3	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) 90 Shore
4	Pressure gauge port 1/4" BSP



PZM7

PRESSURE REDUCING VALVE

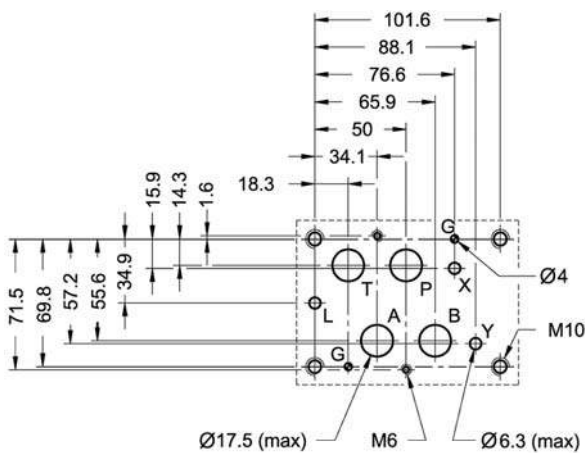
SERIES 10

MODULAR VERSION
ISO 4401-07 (CETOP 07)

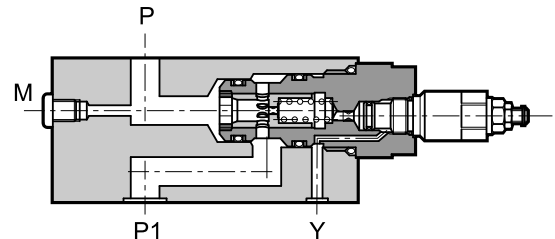
p max **350** bar
Q max **250** l/min

MOUNTING INTERFACE

ISO 4401-07-07-0-05
(CETOP 4.2-4-07)



OPERATING PRINCIPLE



- „ The PZM7 valve is made as a modular valve and has a mounting surface according to the ISO 4401 (CETOP RP 121H) standards.
- „ It is a two-stage type and is used to assure stability of the controlled pressure, even changing the flow that travels through the valve.
- „ The PZM7M valve can be assembled quickly under the DSP7 directional valves (see catalogue 41 420) without use of pipes, using suitable tie-rods or bolts, forming compact modular groups.
- ... It is normally supplied with an adjustment knob.

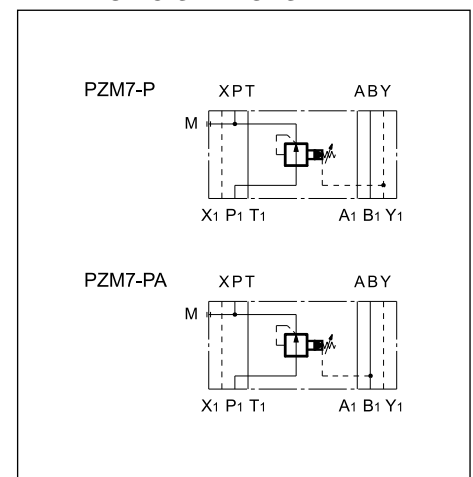
CONFIGURATIONS (see Hydraulic symbols table)

- „ Configuration •PZM7-PŽ: pressure reduction on line P - external drainage.
- „ Configuration •PZM7-PAŽ: pressure reduction on line A and valve on line P.

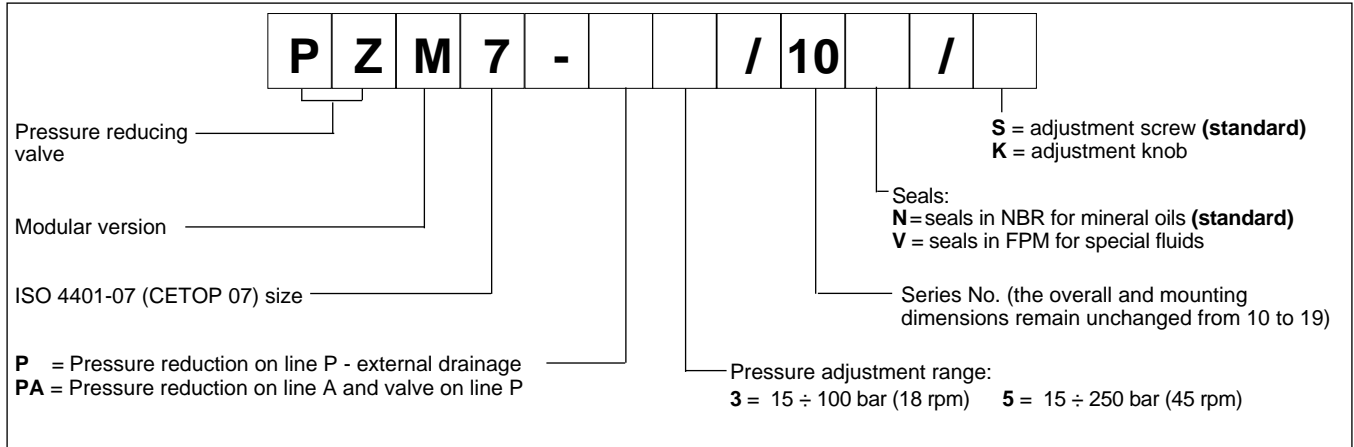
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	250
Drainage flow rate	l/min	0,8
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	Secondo ISO 4406:1999 classe 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	8,65

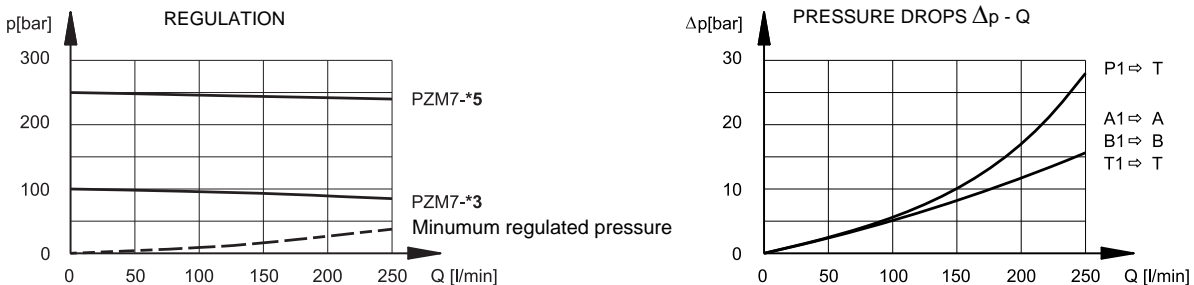
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



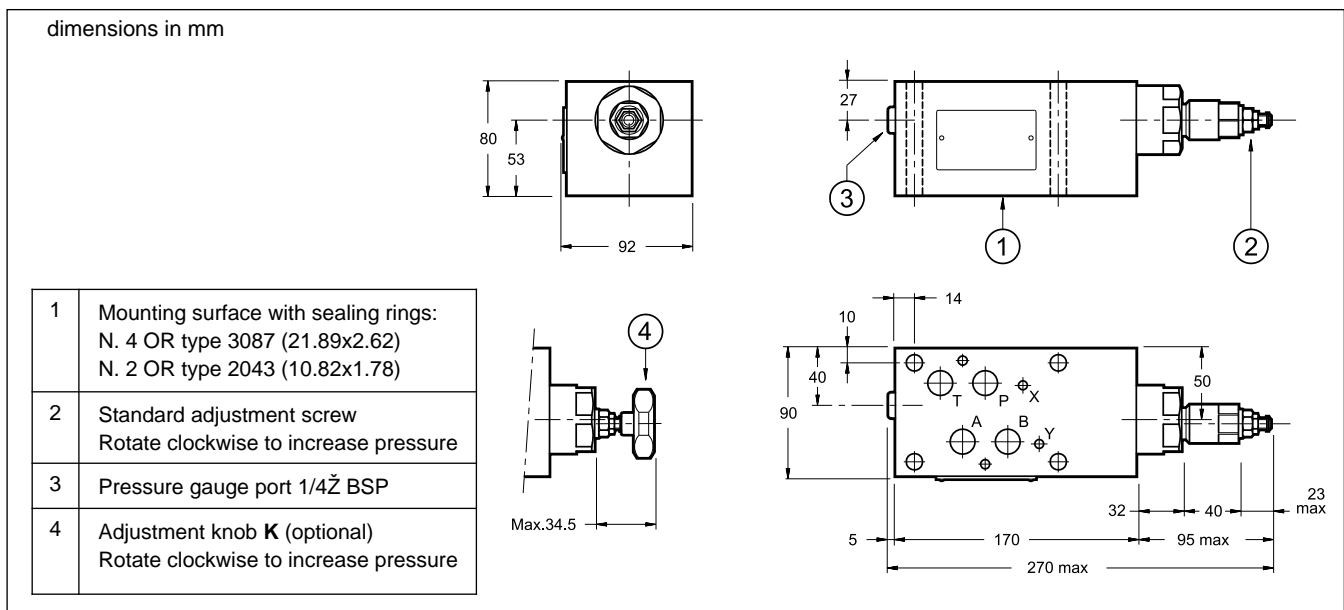
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





MSD

DIRECT OPERATED SEQUENCE VALVE

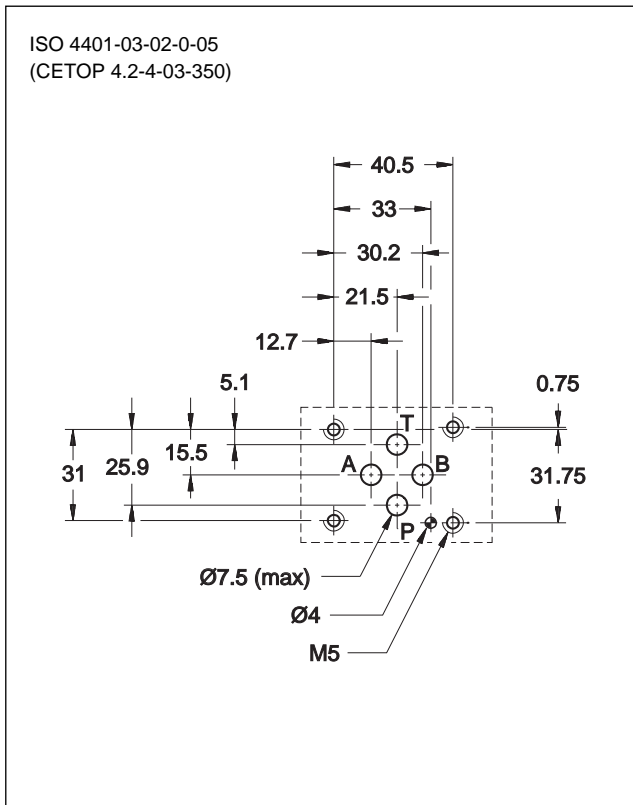
SERIES 50

MODULAR VERSION

ISO 4401-03 (CETOP 03)

p max **350** bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE

„ The MSD valve is a direct operated sequence valve of the spool type and is used to control two or more actuators in succession.

At rest position, it is normally closed and the spool is subject to pressure in line P1 on one side and to the adjustment screw on the other side. When the pressure in line P1 reaches the set value of the screw, the valve opens and allows passage of the fluid in the pressure line of the main circuit.

The valve stays open until the pressure in the circuit drops below the calibrated value set by the spring.

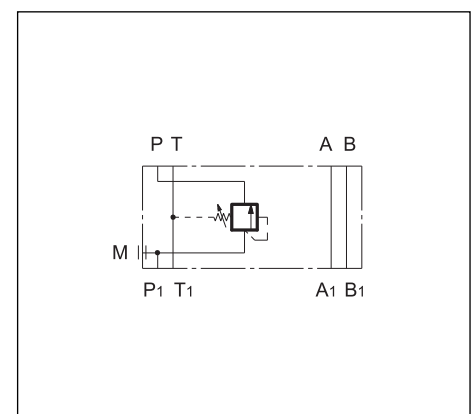
„ It is made as a modular version with ports according to the ISO 4401 (CETOP PR 121H) standards and can be assembled quickly without the use of pipes under the ISO 4401-03 (CETOP 03) directional solenoid valves.

„ It is normally supplied with a hexagonal head adjustment screw. Upon request, it can be equipped with a SICBLOC adjustment knob with micrometric indication and automatic locking.

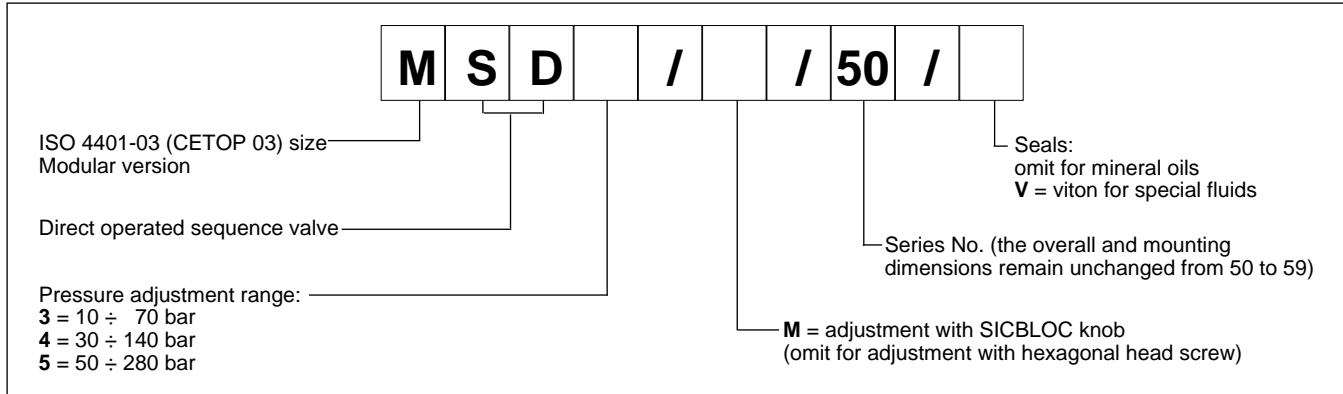
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure maximum pressure on port T	bar	350 10
Maximum flow rate in the controlled lines Maximum flow rate in the free lines	l/min	50 75
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,4

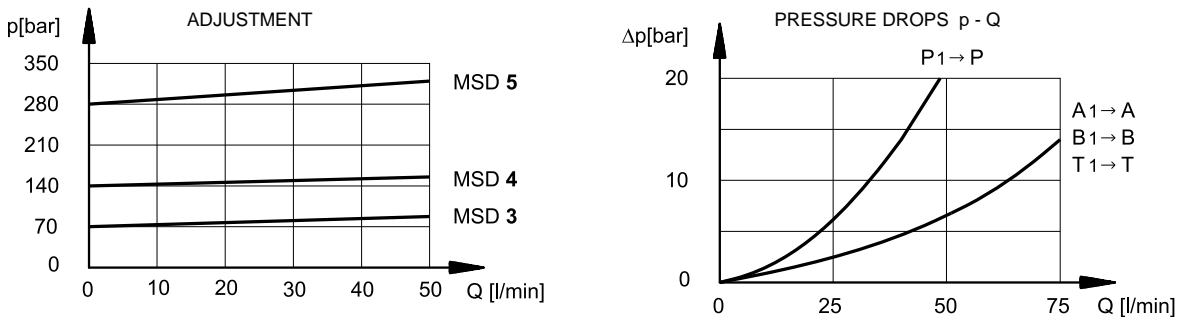
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



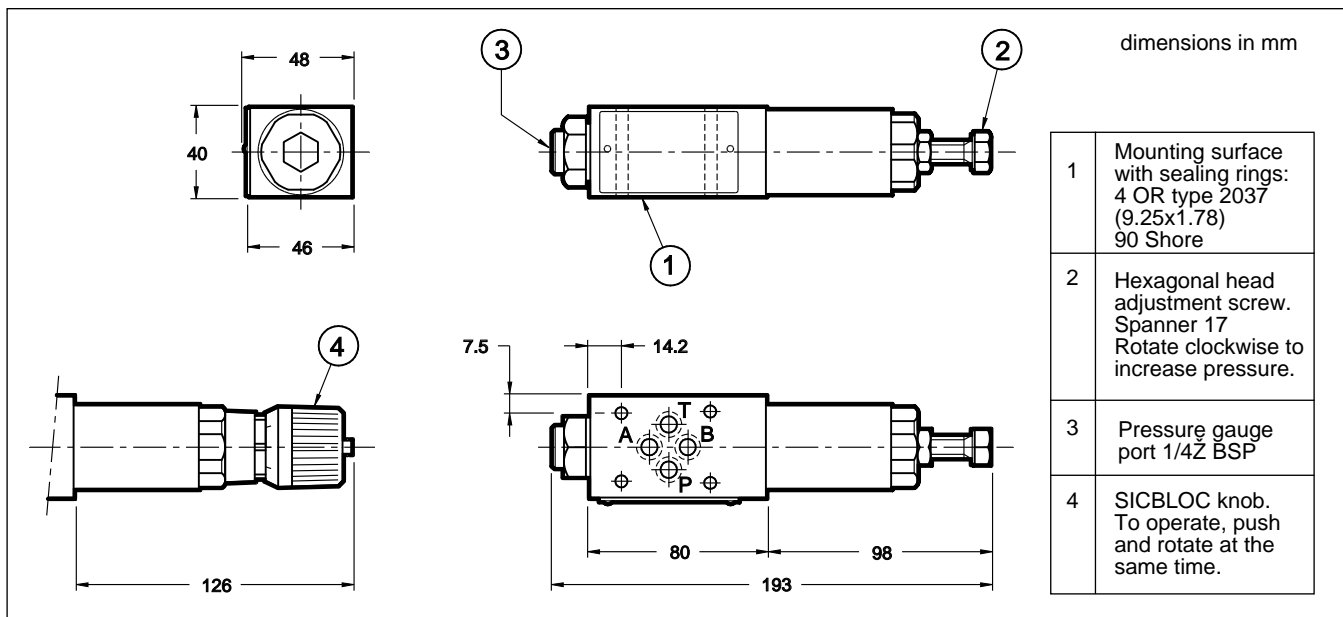
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





SD4M

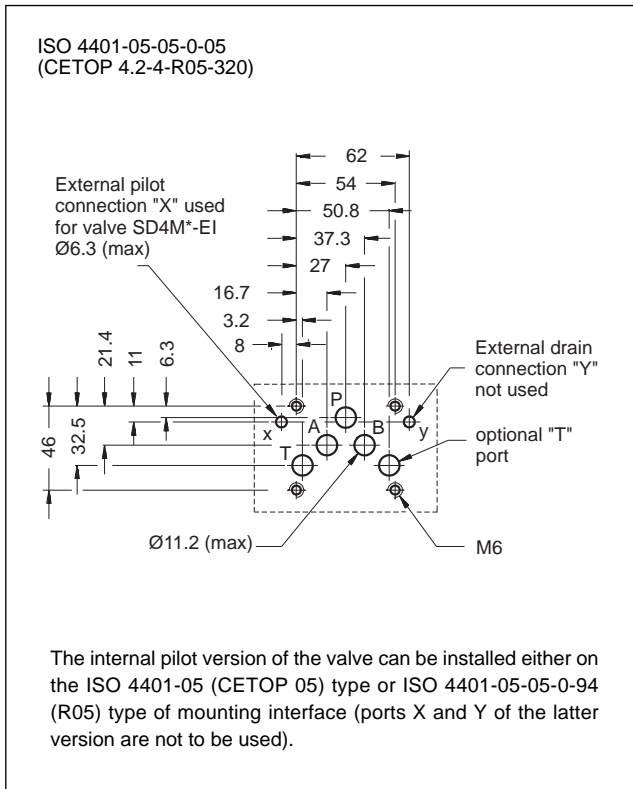
DIRECT OPERATED SEQUENCE VALVE

SERIES 50

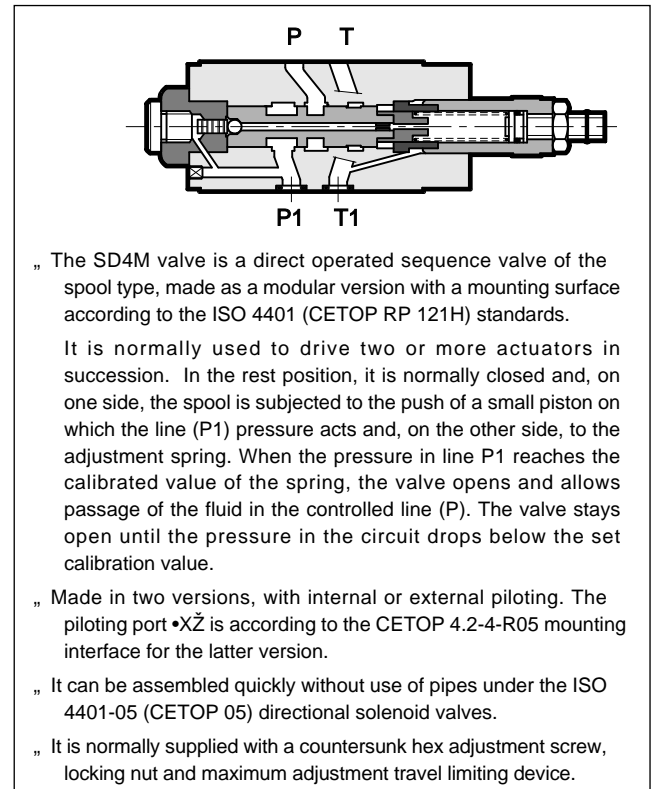
MODULAR VERSION ISO 4401-05 (CETOP 05)

p max 320 bar
Q max (see table of performances)

MOUNTING INTERFACE



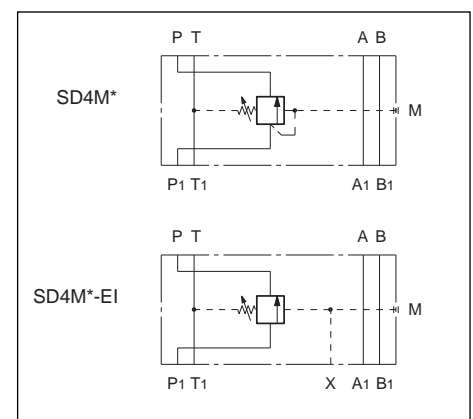
OPERATING PRINCIPLE



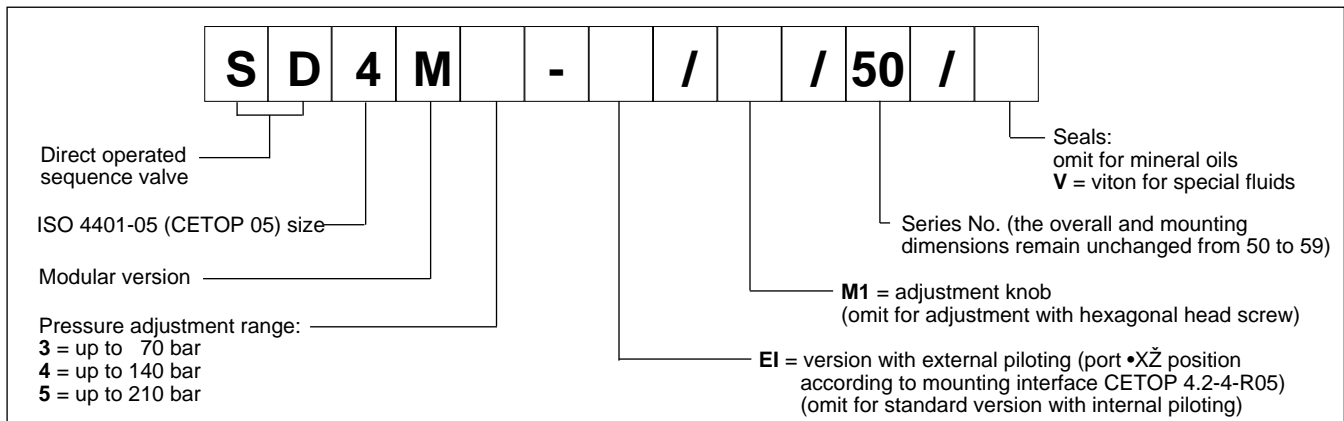
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure maximum pressure on port T	bar	320 10
Maximum flow rate in the controlled lines Maximum flow rate in the free lines	l/min	80 100
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	2,7

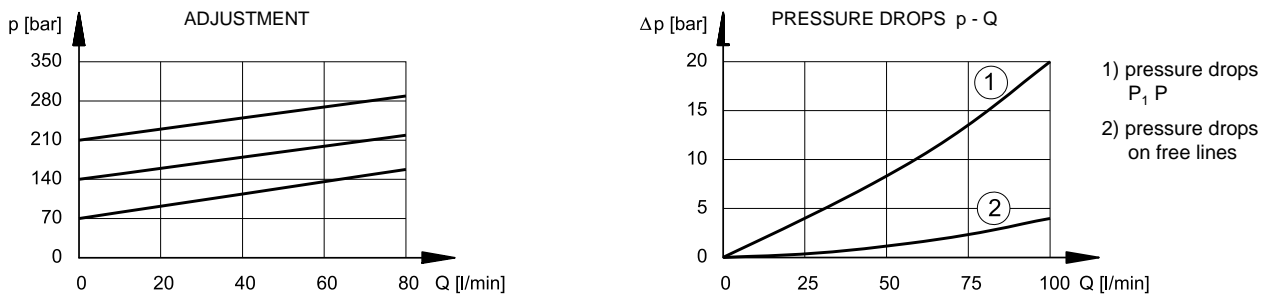
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



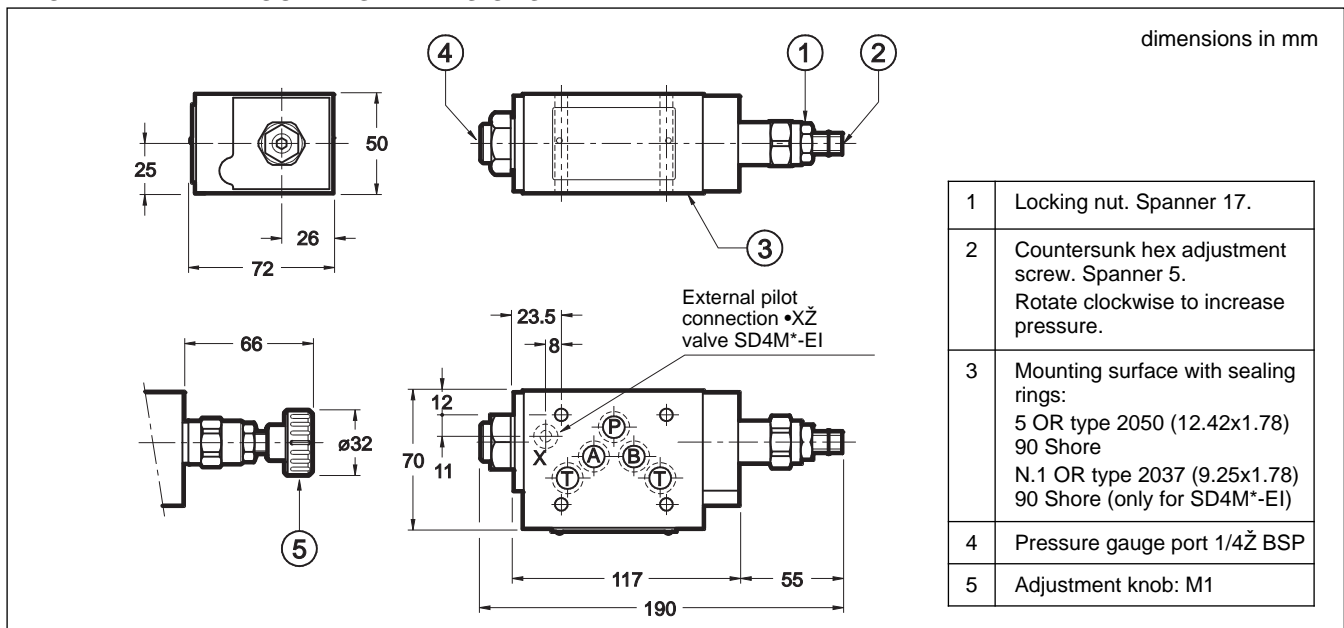
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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 fluids 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.

4 - OVERALL AND MOUNTING DIMENSIONS





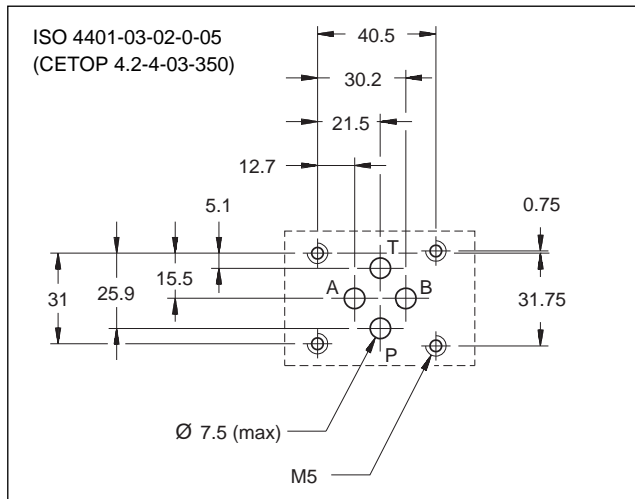
PCM3

TWO AND THREE-WAY PRESSURE COMPENSATOR WITH FIXED OR VARIABLE ADJUSTMENT SERIES 10

MODULAR VERSION
ISO 4401-03 (CETOP 03)

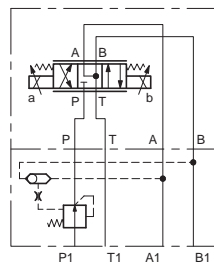
p max **350** bar
Q max **40** l/min

MOUNTING INTERFACE

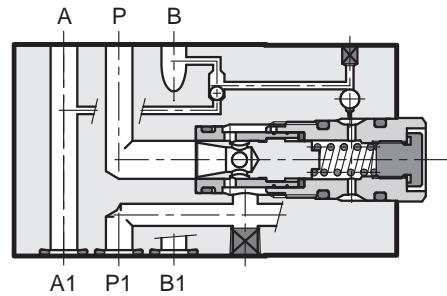


APPLICATION EXAMPLES

Two-way compensator with fixed adjustment, combined with a proportional valve type DSE3-A*



OPERATING PRINCIPLE

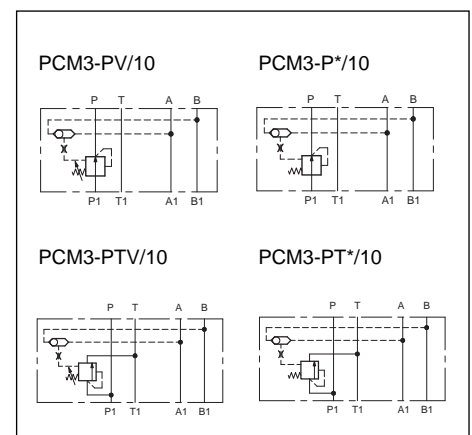


- „ The PCM3 valve is a two or three-way pressure compensator, developed as a modular version with mounting surface according to the ISO 4401 (CETOP RP121H).
- „ Its aim is to keep the pressure drop setting (characteristic *p*) between the line P and alternatively the lines A and B, at a constant level.
- „ It is normally used together with proportional directional valves, in order to control the flow rate independently of the pressure variations.
- „ The selection of the piloting pressure on the lines A and B is carried out automatically via a shuttle check valve built into the compensator.
- „ The setting of the variable adjustment compensator (characteristic *p*) can be varied from 7 to 33 bar, via a countersunk hex adjustment screw or via an adjustment knob.
- „ The fixed adjustment compensator is available with setting (characteristic *p*) of 4 and 8 bar.

PERFORMANCES (working with mineral oil of viscosity of 36 cSt at 50°C)

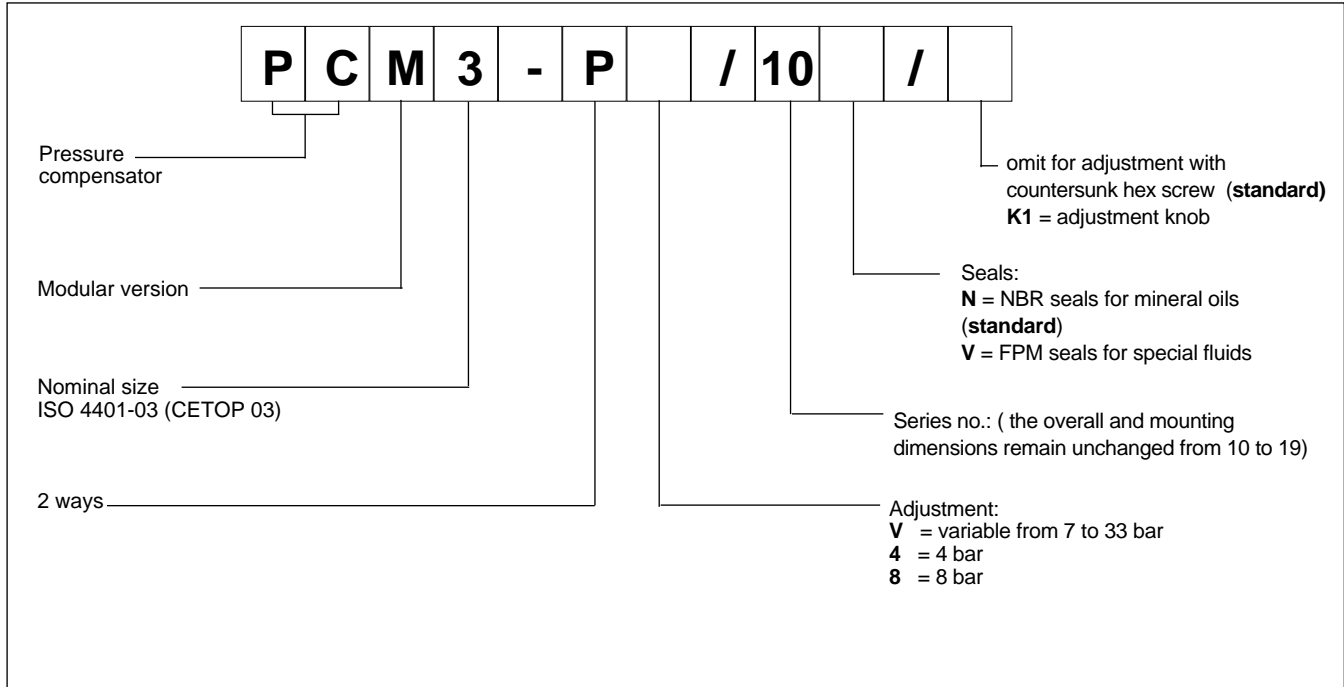
Max operating pressure	bar	350
Characteristic <i>p</i> : fixed adjustment variable adjustment	bar	4 - 8 7 ÷ 33
Max flow rate	l/min	40
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	1,5

HYDRAULIC SYMBOLS

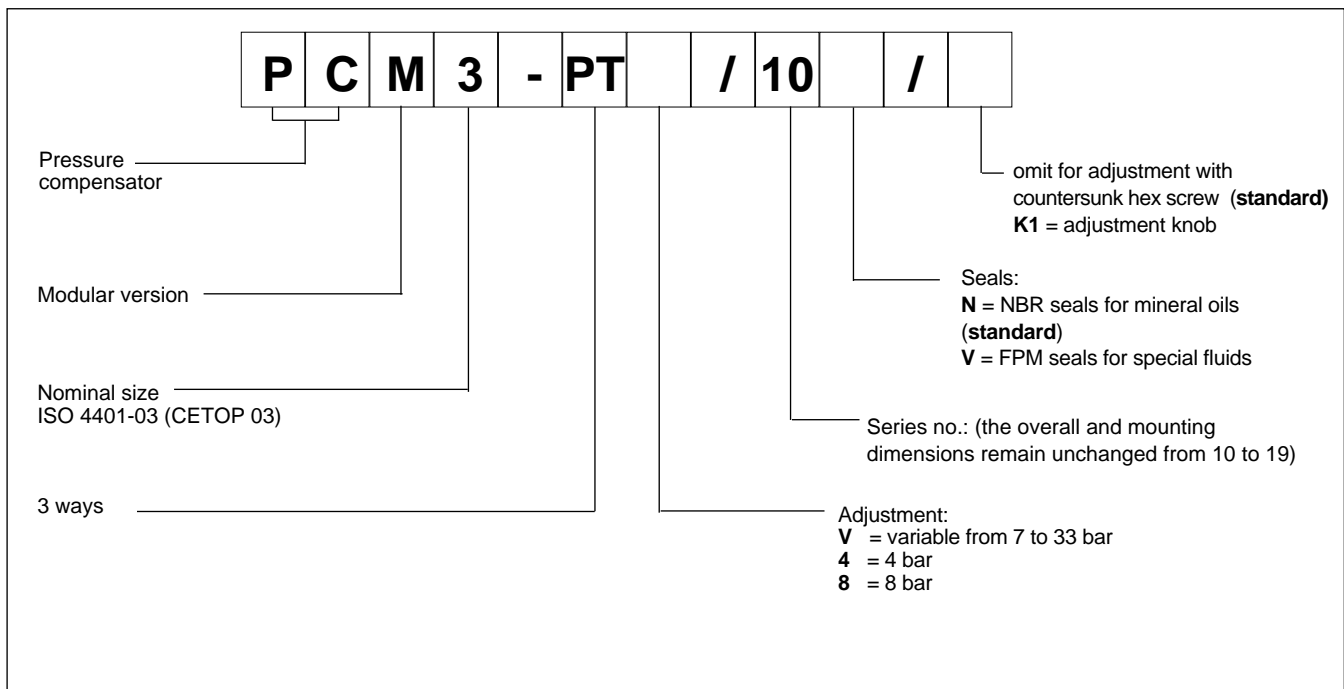


1 - IDENTIFICATION CODE

1.1 - Two-way compensator identification code



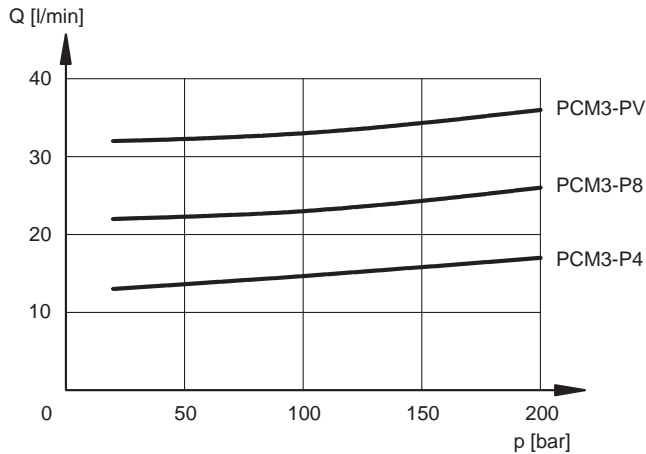
1.2 - Three-way compensator identification code



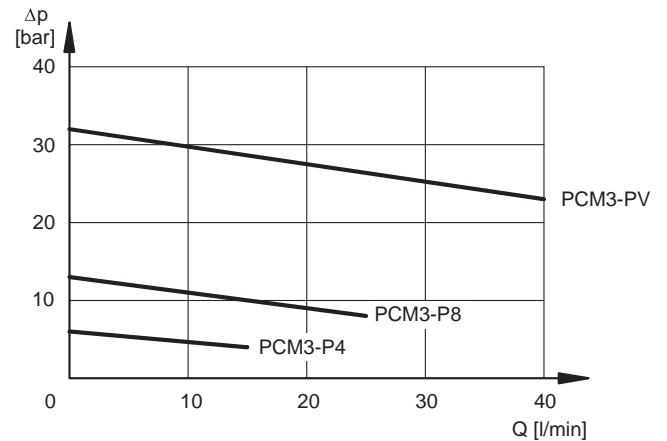
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

2.1 - Two-way compensator characteristic curves

FLOW RATE - PRESSURE $Q = f(p)$

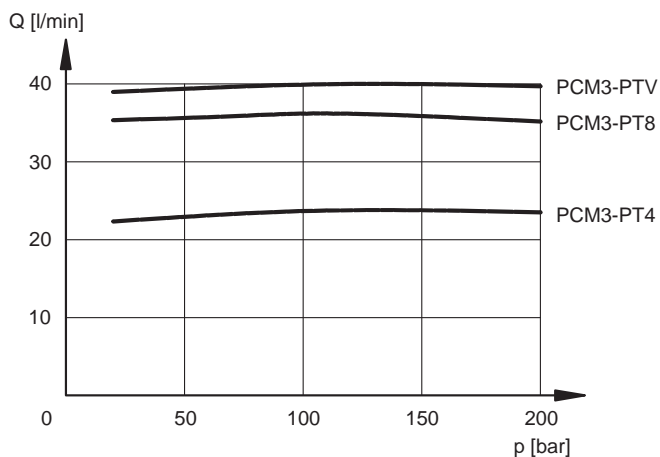


PRESSURE DROPS $p = f(Q)$

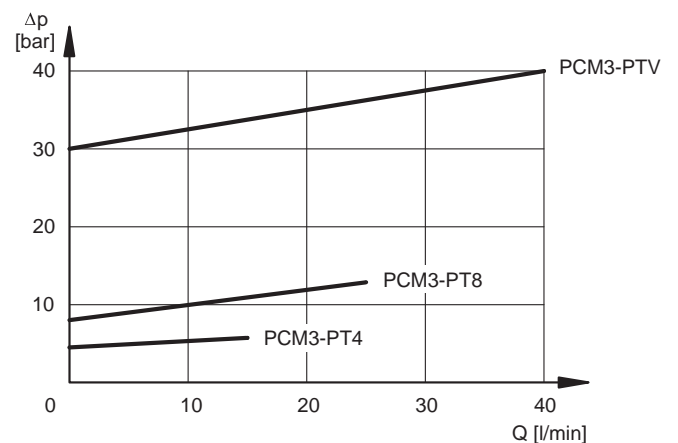


2.2 - Three-way compensator characteristic curves

FLOW RATE - PRESSURE $Q = f(p)$



PRESSURE DROPS $p = f(Q)$



3 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. With this kind of fluids, use NBR seals type. With fluids HFDR type (phosphate esters) use FPM seals (code V).

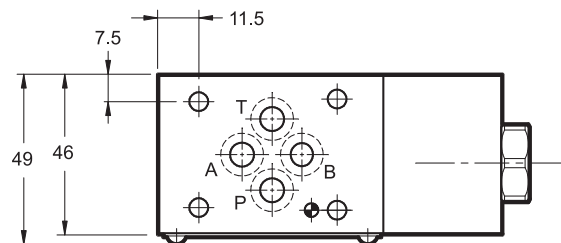
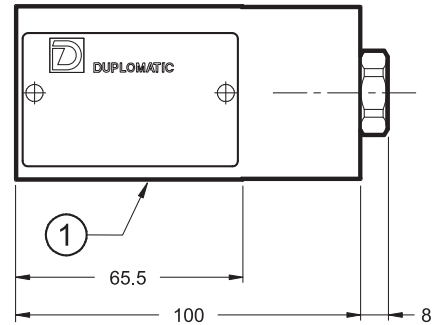
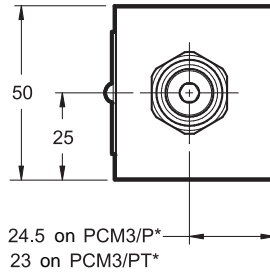
Using other fluid types such as HFA, HFB, HFC, please consult our technical department.

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

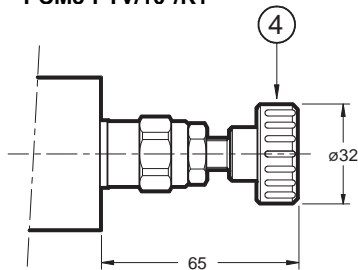
The fluid must be preserved in its physical and chemical characteristics.

4 - OVERALL AND MOUNTING DIMENSIONS

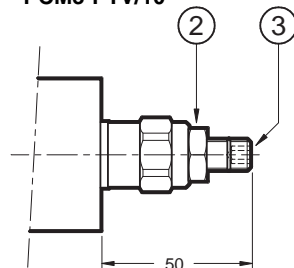
PCM3-P*/10
PCM3-PT*/10



PCM3-PV/10*/K1
PCM3-PTV/10*/K1



PCM3-PV/10
PCM3-PTV/10



dimensions in mm

1	Mounting surface with sealing rings: 4 OR type 2037 - (9.25x1.78) 90 shore
2	Locking nut: spanner 17
3	Countersunk hex adjustment screw: spanner 5 Clockwise rotation to increase pressure
4	Adjustment knob: K1



PCM5

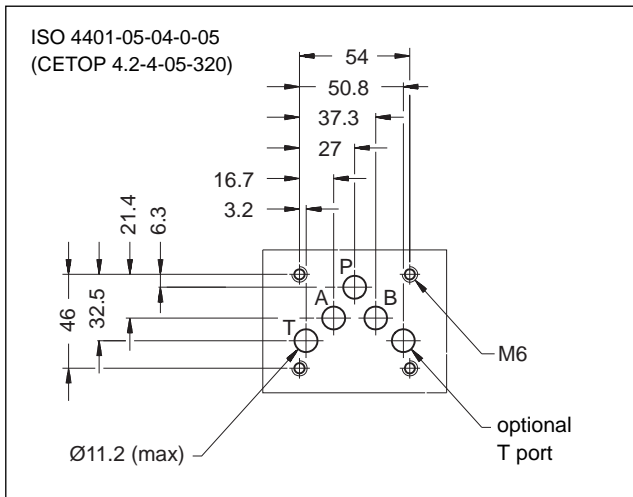
TWO- AND THREE-WAY PRESSURE COMPENSATOR WITH FIXED ADJUSTMENT

SERIES 11

MODULAR VERSION
ISO 4401-05 (CETOP 05)

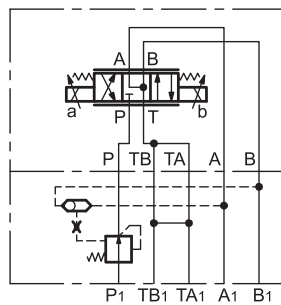
p max **320** bar
Q max **100** l/min

MOUNTING INTERFACE

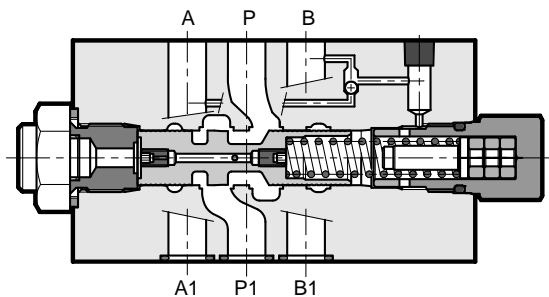


APPLICATION EXAMPLES

2-way compensator combined with a proportional valve type DSE5-A*



OPERATING PRINCIPLE

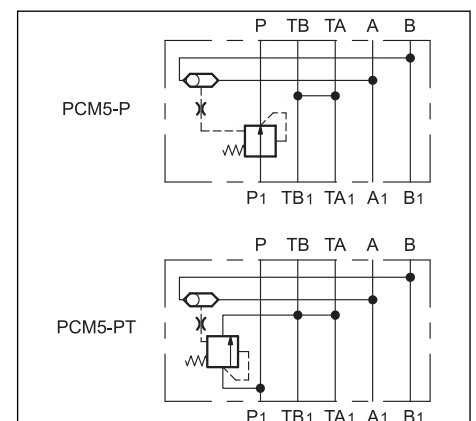


- „ The PCM5 valve is a two- or three- way pressure compensator, designed as a modular version with mounting surface according to ISO 4401-05 (CETOP RP121H).
- „ It keeps the pressure drop setting (characteristic p) between the line P and alternatively the lines A and B at a constant level.
- „ It is used together with proportional directional valves, in order to control the flow rate independently of the pressure variations.
- „ The selection of the piloting pressure on the lines A and B is carried out automatically via a shuttle check valve built into the compensator.

PERFORMANCES (working with mineral oil of viscosity of 36 cSt at 50°C)

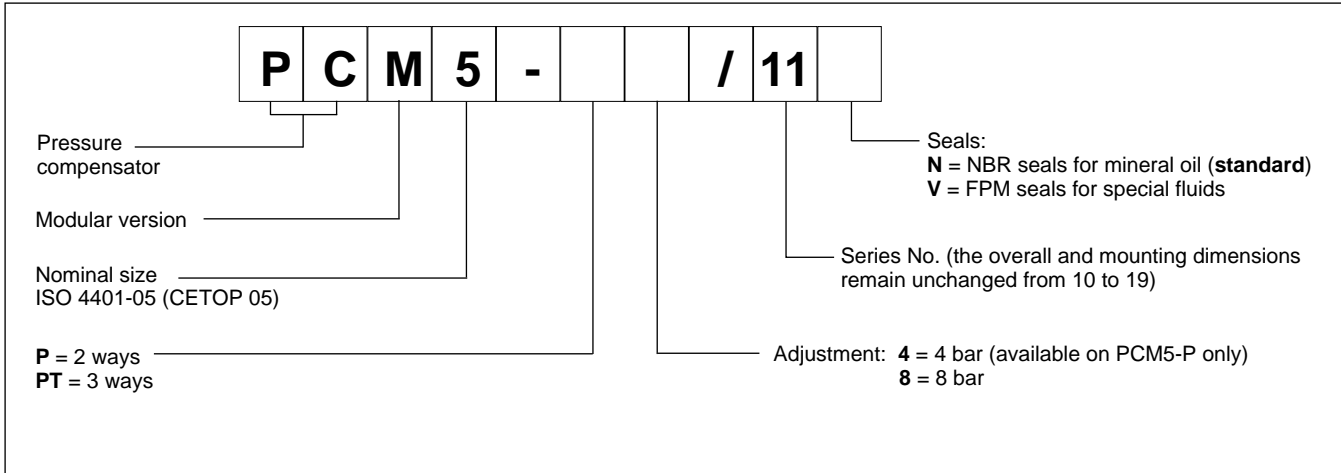
Max operating pressure	bar	320
Characteristic p	bar	4 - 8
Max flow rate	l/min	100
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	2,7

HYDRAULIC SYMBOL

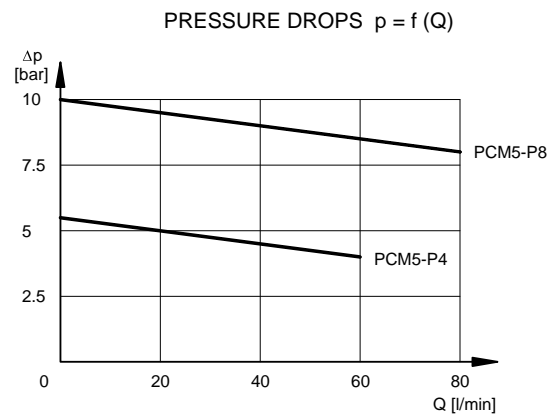
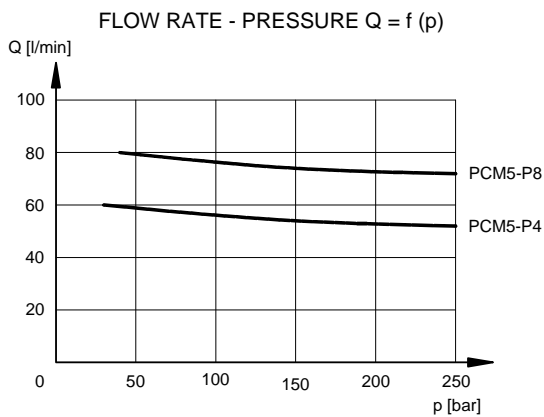




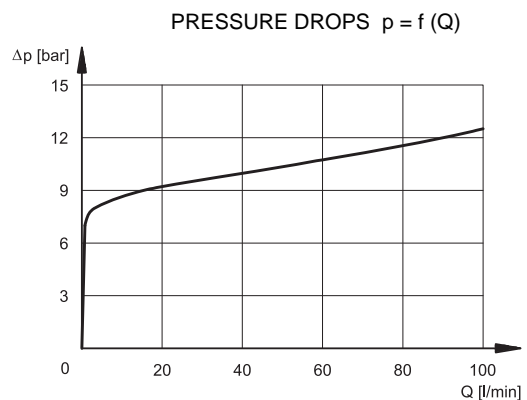
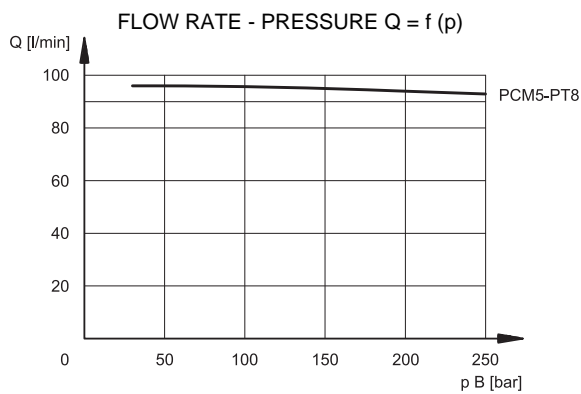
1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES PCM5-P* (2-way) (values obtained with viscosity of 36 cSt at 50°C)



3 - CHARACTERISTIC CURVES PCM5-PT8 (3-way) (values obtained with viscosity of 36 cSt at 50°C)

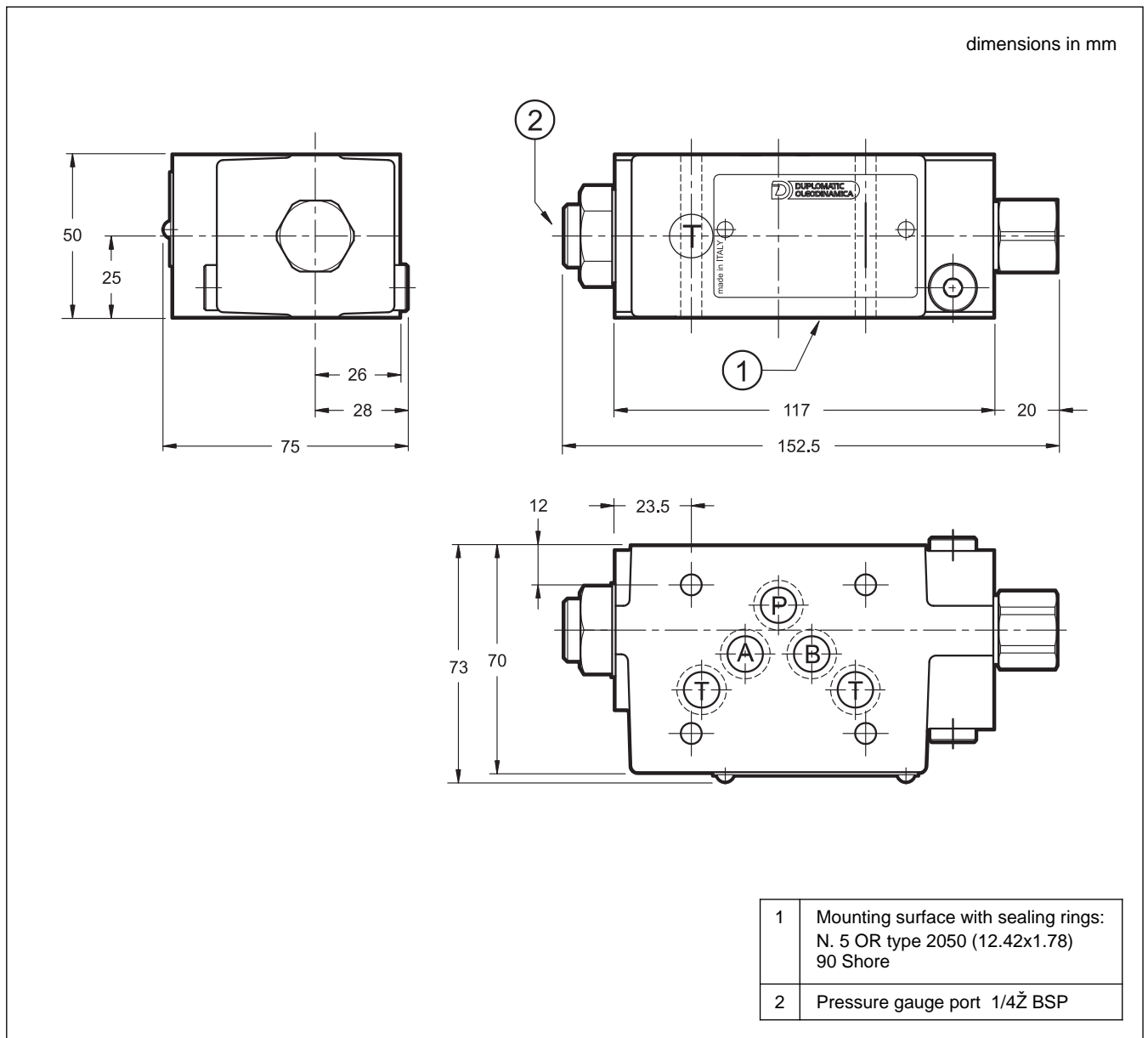


4 - HYDRAULIC FLUIDS

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.

5 - OVERALL AND MOUNTING DIMENSIONS





PCM5

SERIES 11



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





PCM8

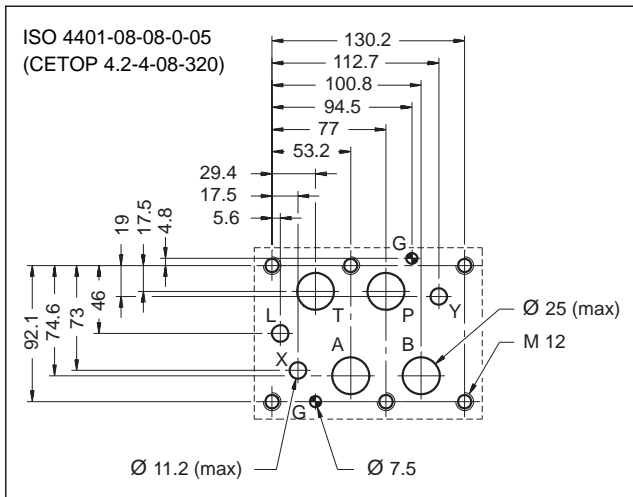
TWO- AND THREE-WAY PRESSURE COMPENSATOR WITH FIXED ADJUSTMENT

SERIES 10

MODULAR VERSION
ISO 4401-08 (CETOP 08)

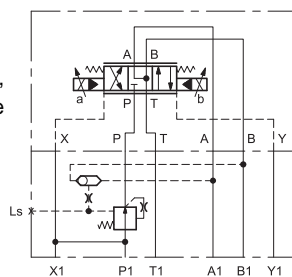
p max **320** bar
Q max **300** l/min

MOUNTING INTERFACE



APPLICATION EXAMPLES

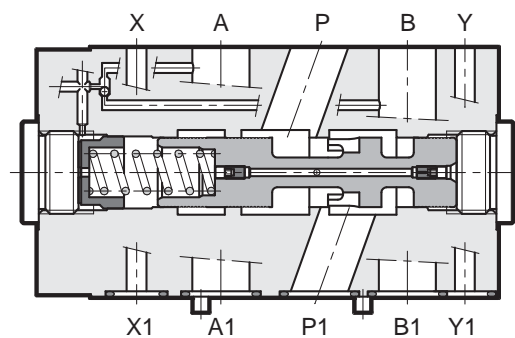
Two-way compensator with fixed adjustment and internal piloting, combined with a proportional valve type E5E-S9*/E



PERFORMANCES (with mineral oil of viscosity of 36 cSt at 50°C)

Max operating pressure	bar	320
Characteristic p:	bar	4 - 8
Max flow rate	l/min	300
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	13,5

OPERATING PRINCIPLE



„ The PCM8 valve is a two or three-way pressure compensator, developed as a modular version with mounting surface according to ISO 4401 (CETOP RP 121H).

„ Its function is to keep the pressure drop setting (characteristic p) between the line P and alternatively the lines A and B at a constant level.

„ It is normally used together with proportional directional valves, in order to control the flow rate independently of the pressure variations.

„ The selection of the piloting pressure on the lines A and B is carried out automatically via a shuttle check valve built into the compensator.

„ They are available with fixed adjustment (characteristic p) of 4 and 8 bar.

„ The load sensing port can also be used as pressure gauge port or as remote pressure control.

1 - IDENTIFICATION CODE

1.1 - Two-way compensator identification code

	P	C	M	8	-	P	/	E	/	10	
--	----------	----------	----------	----------	----------	----------	----------	----------	----------	-----------	--

Pressure compensator

Modular version

Nominal size
ISO 4401-08 (CETOP 08)

2 ways

Adjustment: **4** = 4 bar
8 = 8 bar

Piloting: (relevant to the combined directional valve, that must always have external piloting)
I = internal (withdrawn inside the compensator, upstream the narrowing)
E = external (passing line X)

Seals:
N = NBRseals for mineral oils
(standard)
V = FPM seals for special fluids

Series no.:
(the overall and mounting dimensions remain unchanged from 10 to 19)

External drain (passing line Y)

Hydraulic symbols

PCM8-P*/IE/10 PCM8-P*/EE/10

1.2 - Three-way compensator identification code

	P	C	M	8	-	PT	/	E	/	10	
--	----------	----------	----------	----------	----------	-----------	----------	----------	----------	-----------	--

Pressure compensator

Modular version

Nominal size
ISO 4401-08 (CETOP 08)

3 ways

Adjustment: **4** = 4 bar
8 = 8 bar

Piloting: (relevant to the combined directional valve, that must always have external piloting)
I = internal (withdrawn inside the compensator, upstream the narrowing)
E = external (passing line X)

Seals:
N = NBRseals for mineral oils
(standard)
V = FPM seals for special fluids

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

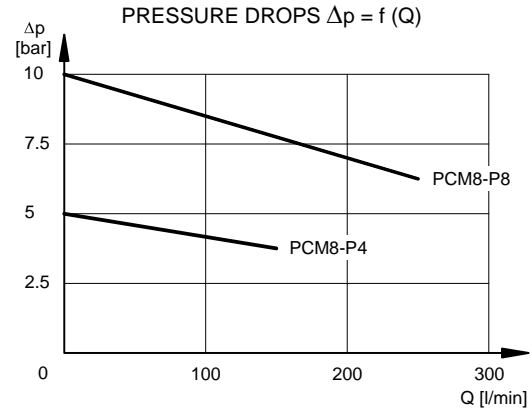
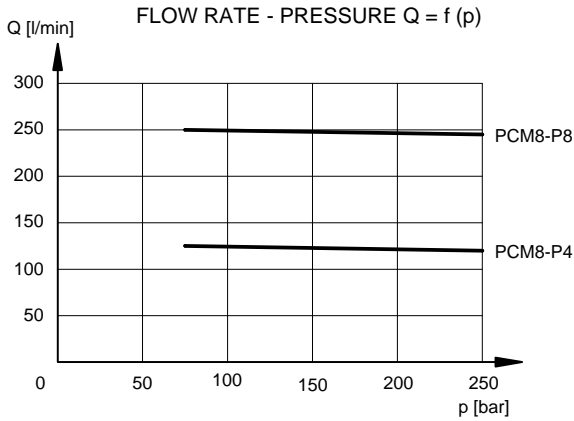
External drain (passing line Y)

Hydraulic symbols

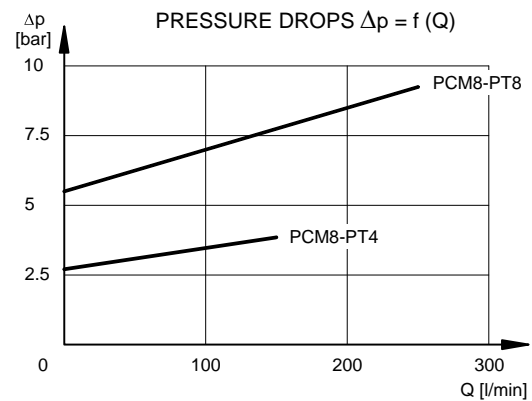
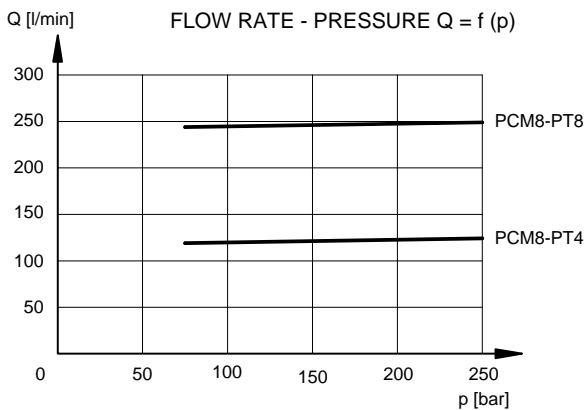
PCM8-PT*/IE/10 PCM8-PT*/EE/10

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

2.1 - Two-way compensator characteristic curves



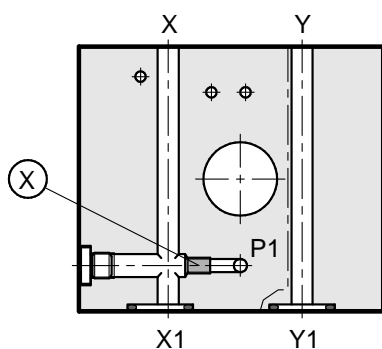
2.2 - Three-way compensator characteristic curves



3 - 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.

4 - PILOTING AND DRAINAGE



X: plug M6x10 for external piloting
Drainage always external

The PCM8 compensators are available with the X piloting line both internal and external. The internal piloting line is withdrawn from the P1 line, upstream the narrowing of the compensator, while the external piloting line comes from a separate piloting circuit. Drainage is always external (passing line Y).

The combined directional valve must always have an external piloting configuration. Drainage can be both internal and external.

VALVE TYPE		X plug
PCM8-P*/IE	INTERNAL PILOTING AND EXTERNAL DRAINAGE	NO
PCM8-P*/EE	INTERNAL PILOTING AND EXTERNAL DRAINAGE	YES



QTM2

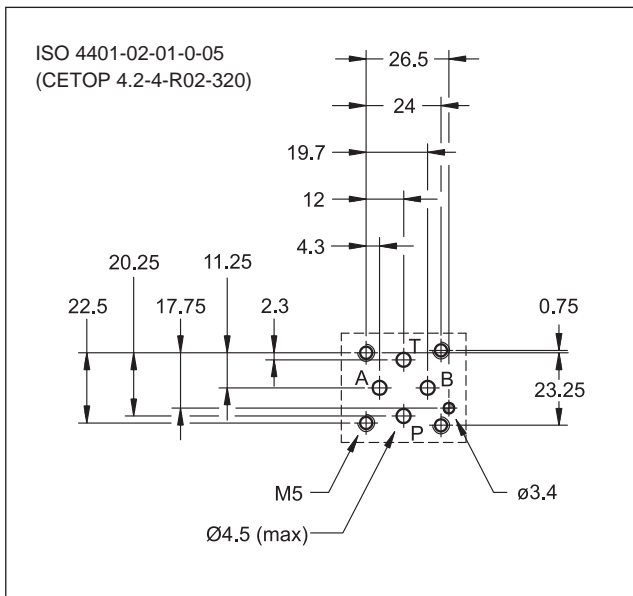
FLOW RESTRICTOR VALVE

SERIES 10

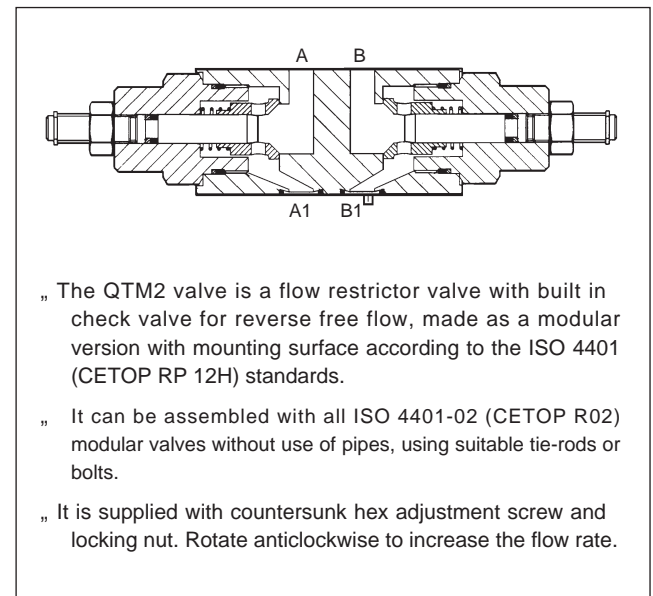
MODULAR VERSION
ISO 4401-02 (CETOP R02)

p max **320** bar
Q max **30** l/min

MOUNTING SURFACE



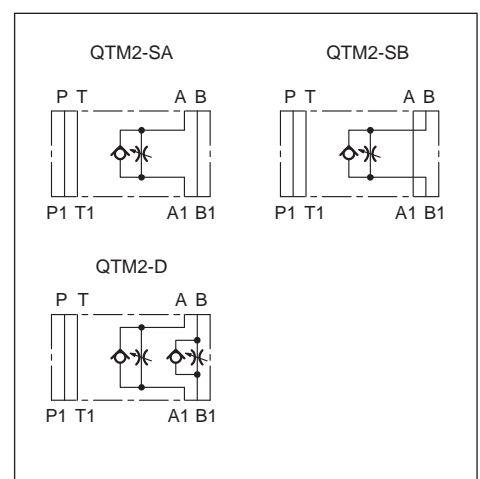
OPERATING PRINCIPLE



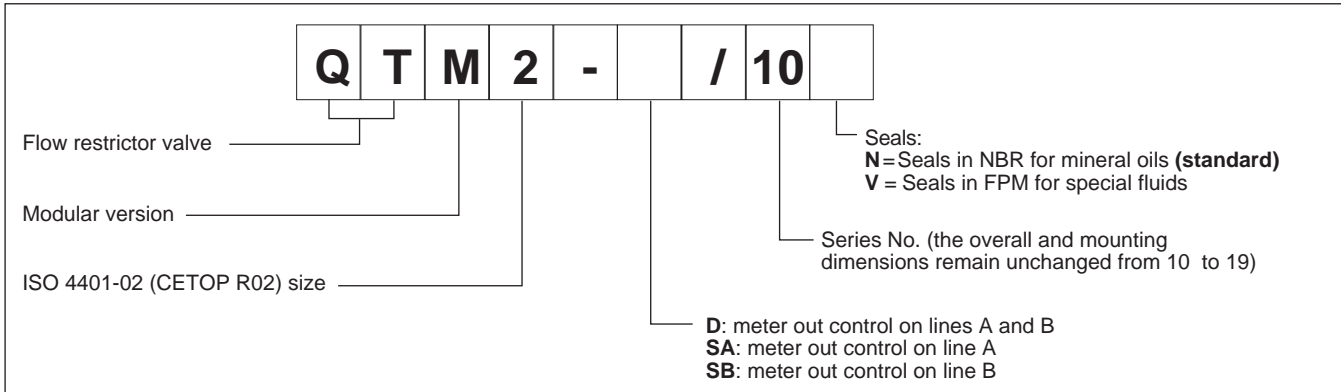
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	320
Maximum flow rate	l/min	30
Ambient temperature range	°C	-20 / +50
Check valve opening pressure	bar	0,4
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,8

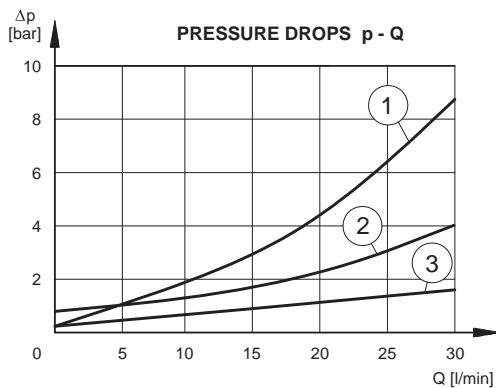
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



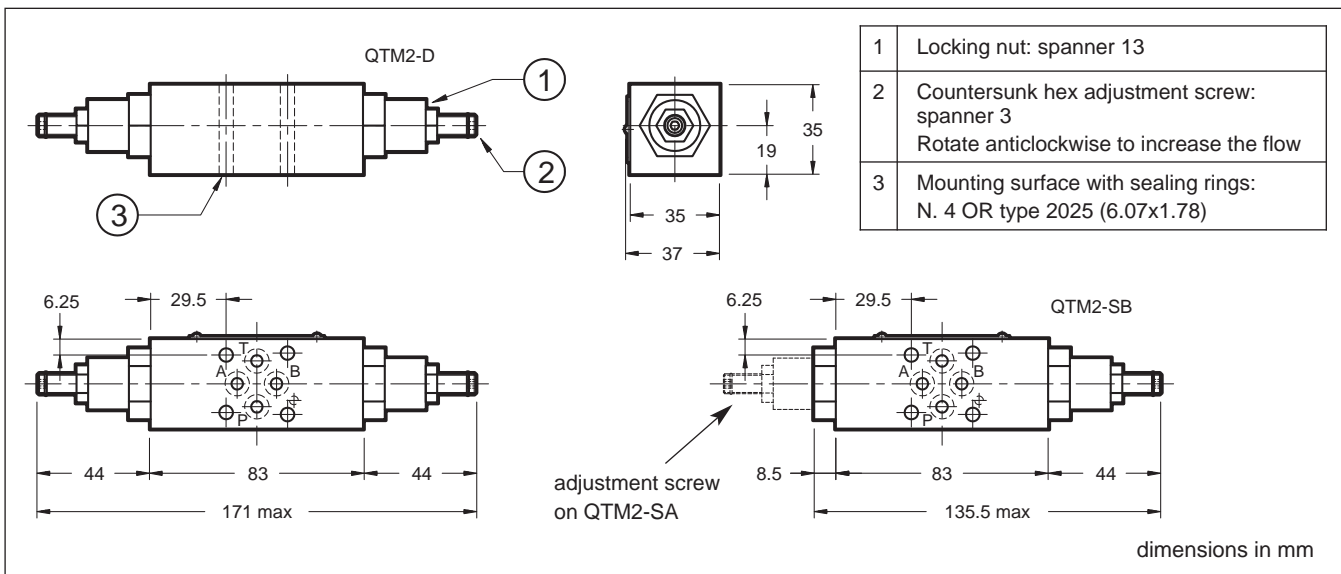
Typical p - Q curves obtained with QTM2-D valve, with throttling axis at full retraction.

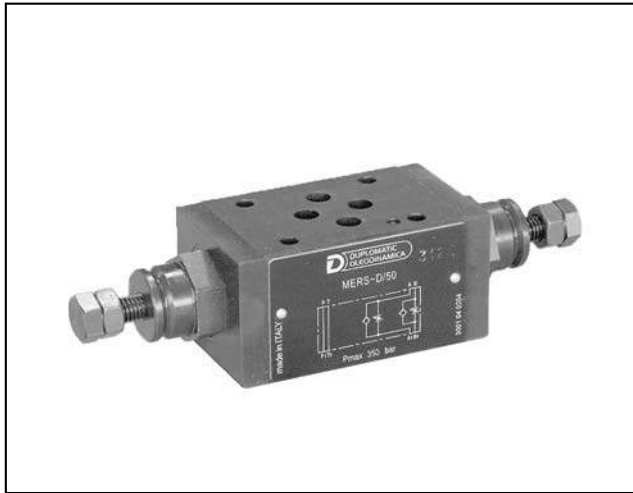
- 1) pressure drops A₁ - A (B₁ - B)
- 2) pressure drops A - A₁ (B - B₁)
- 3) pressure drops through the free ports

3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





MERS

FLOW RESTRICTOR VALVE

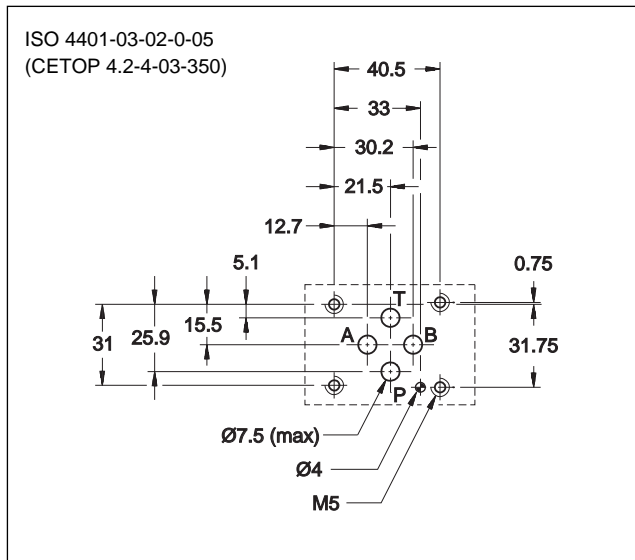
SERIES 50

MODULAR VERSION

ISO 4401-03 (CETOP 03)

p max 350 bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE

- „ This is a non-compensated flow control valve with a check valve for reverse free flow. It is made in the modular version and with mounting surface according to the ISO 4401 (CETOP RP 121 H) standards; it can be assembled quickly without use of pipes, but using only suitable tie-rods or bolts, thus forming compact modular groups.
- „ It is also available as a reversible valve (G* versions). Meter-in or meter-out control depending on the way of assembly the valve on the OR subplate.
- „ All the configurations have an incorporated check valve that allows reverse free flow (cracking pressure of 0,5 bar).
- „ It is normally supplied with a hexagonal head adjustment screw.

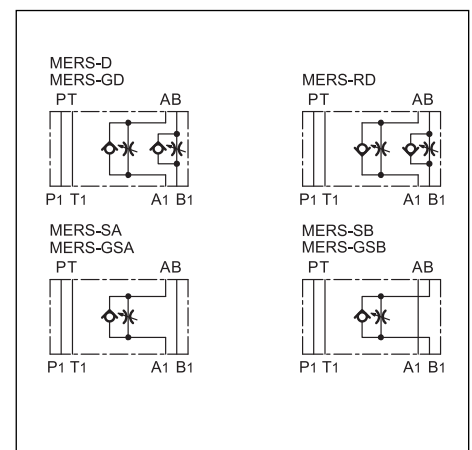
CONFIGURATIONS (see hydraulic symbols table)

- „ •SAŽ: control of the flow exiting from the actuator on line A .
- „ •SBŽ: control of the flow exiting from the actuator on line B.
- „ •DŽ: Allows an independent flow control exiting from the two chambers of the actuator. (Standard)
- „ •RDŽ: Allows an independent flow control entering in the two chambers of the actuator.
- „ •G*Ž: Reversible valve. See at par. 1

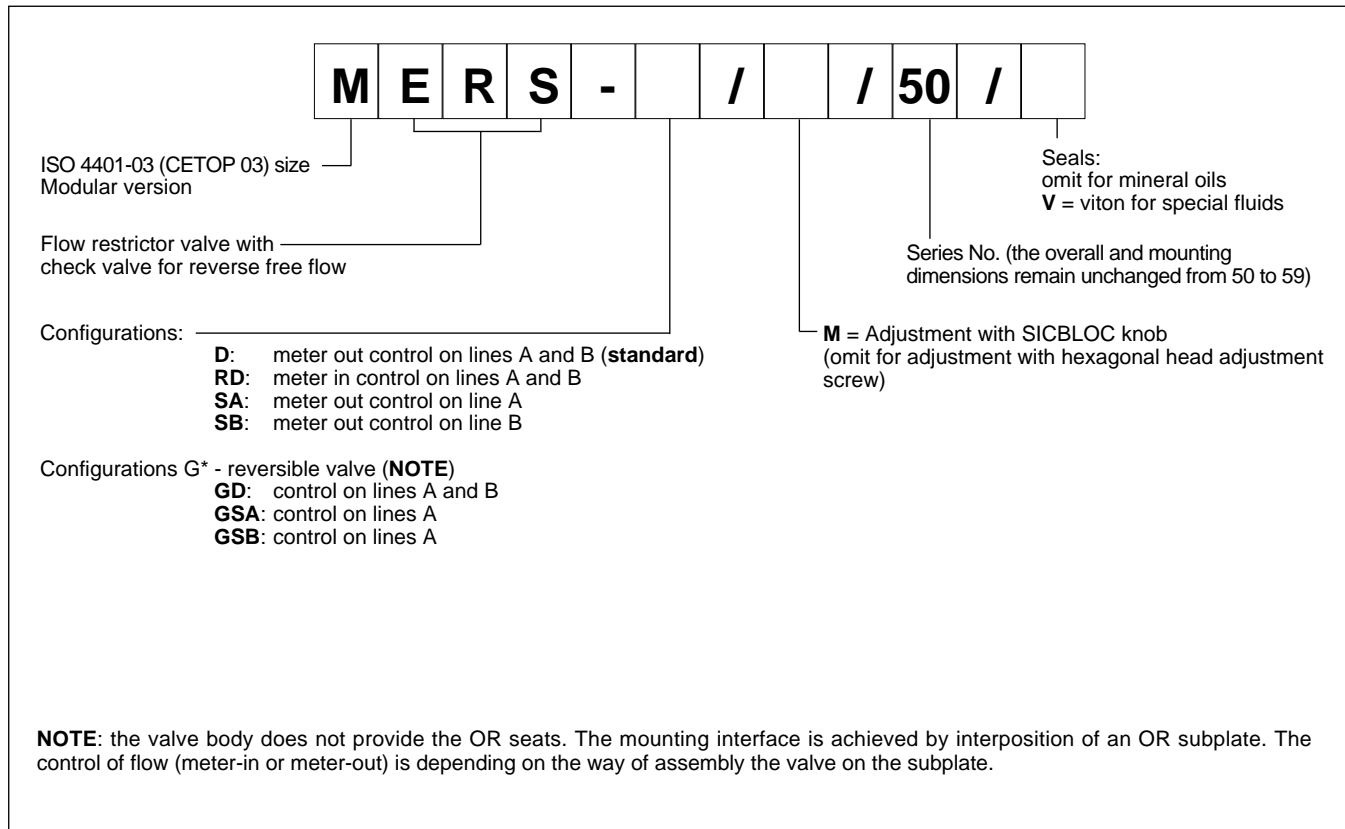
PERFORMANCES (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	350
Check valve cracking pressure		0,5
Maximum flow rate in the controlled lines	l/min	50
Maximum flow rate in the free lines		75
Min. controlled flowrate with p 10 bar		0,060
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	1,3

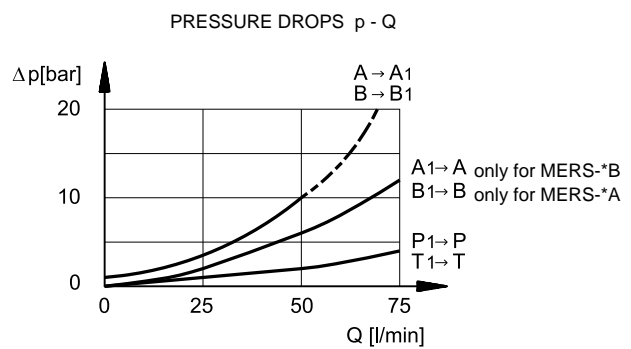
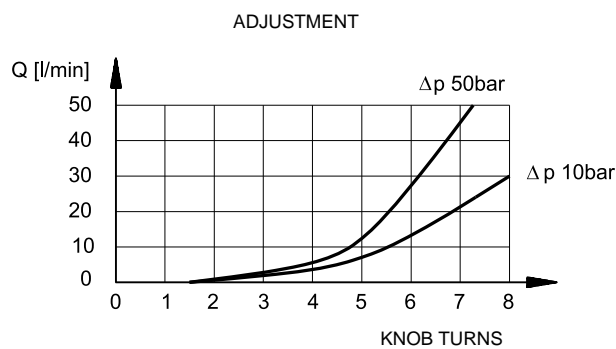
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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

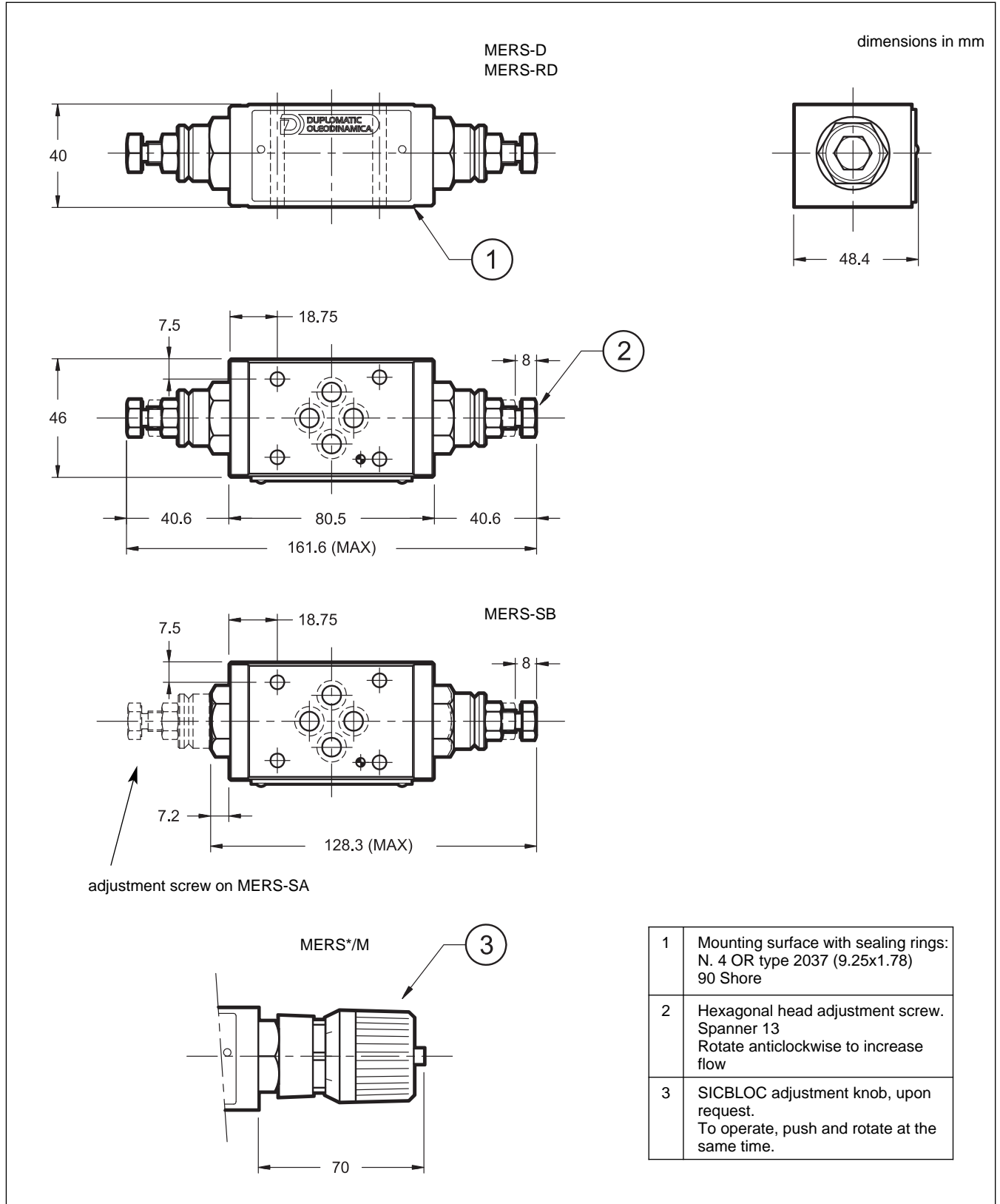


3 - HYDRAULIC FLUIDS

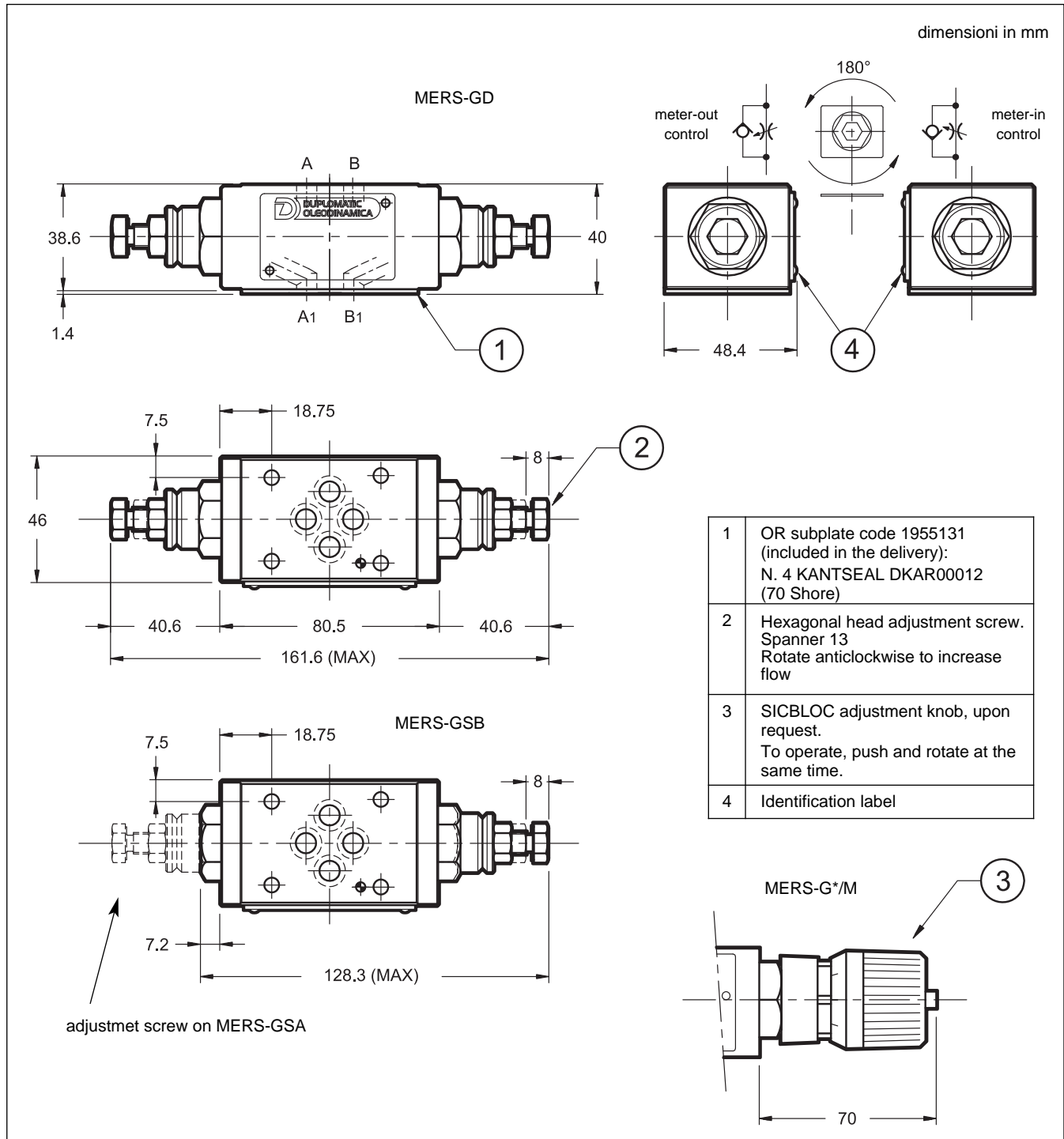
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures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

4 - OVERALL AND MOUNTING DIMENSIONS MERS -D, -RD and -S*



4 - OVERALL AND MOUNTING DIMENSIONS MERS-G*





QTM5

FLOW RESTRICTOR VALVE

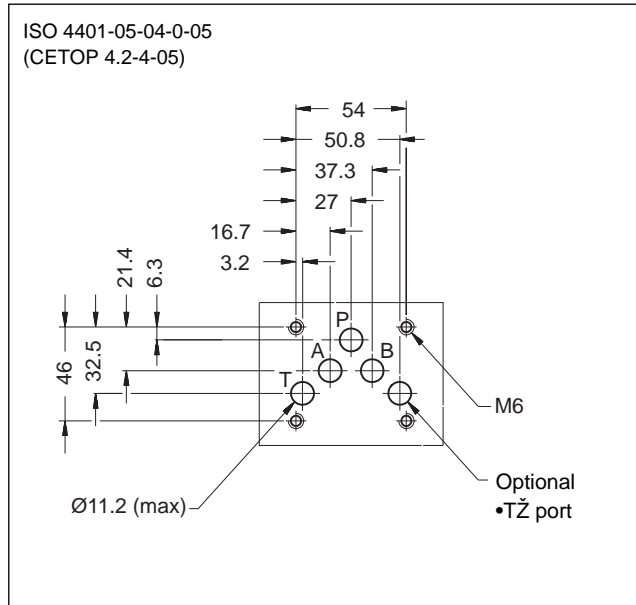
SERIES 10

MODULAR VERSION

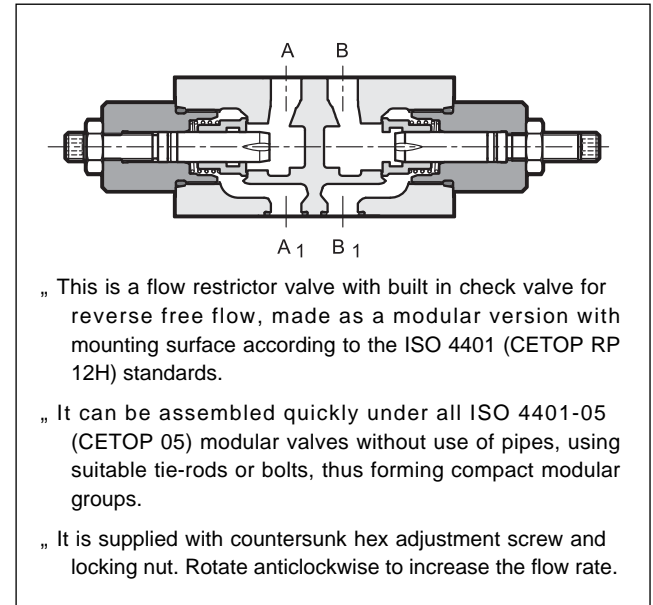
ISO 4401-05 (CETOP 05)

p max **350** bar
Q max **120** l/min

MOUNTING INTERFACE



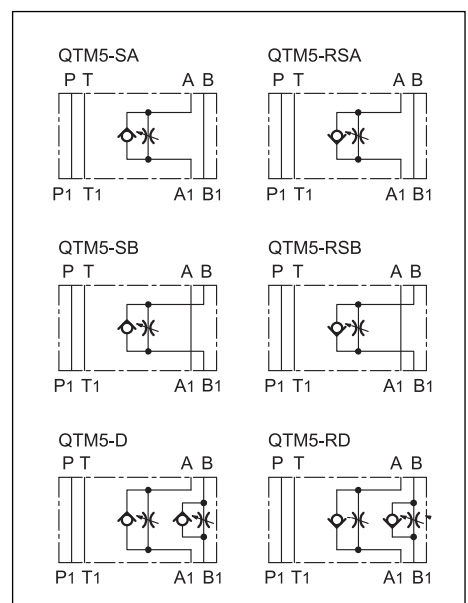
OPERATING PRINCIPLE



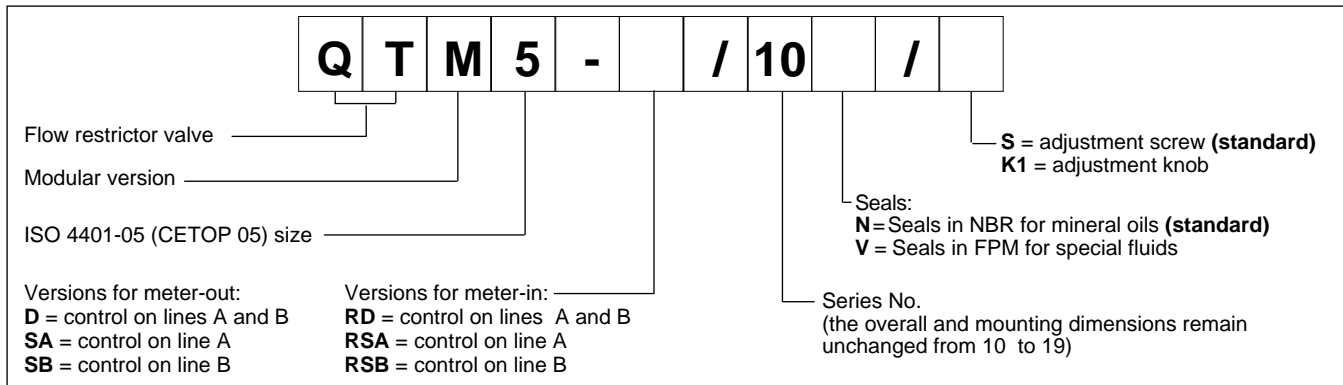
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	120
Cracking pressure	bar	0,5
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Recommended viscosity	cSt	25
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Mass: QTM5-SA, -SB, -RSA, -RSB	kg	2,3
QTM5-D, -RD		2,5

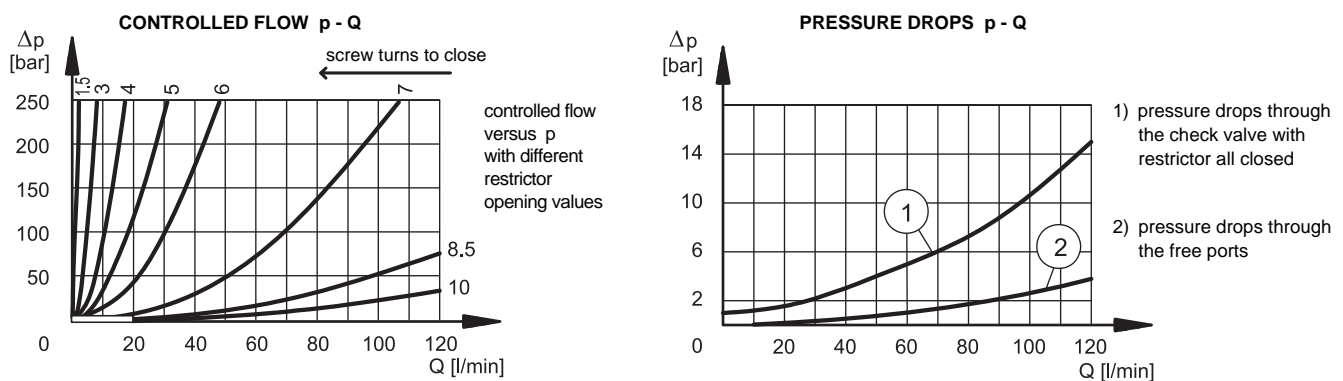
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



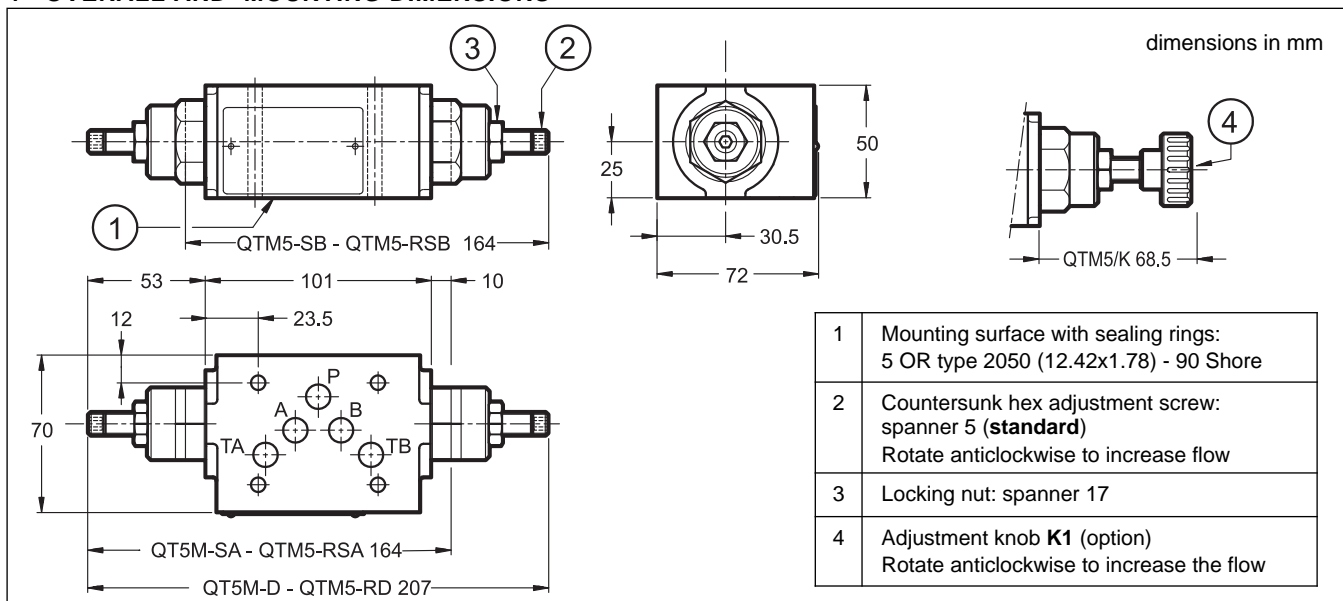
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

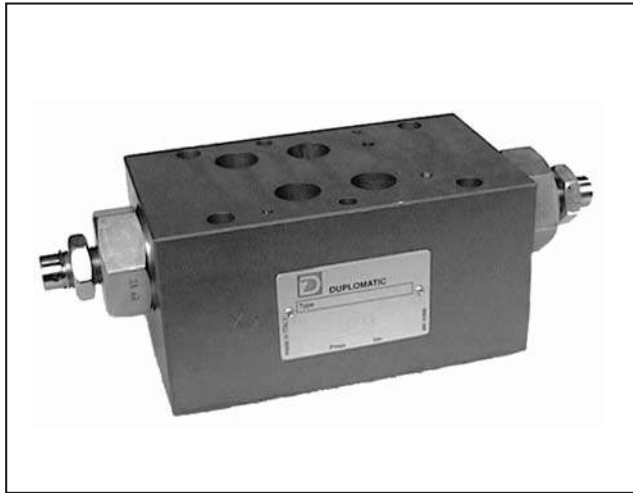


3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS





QTM7

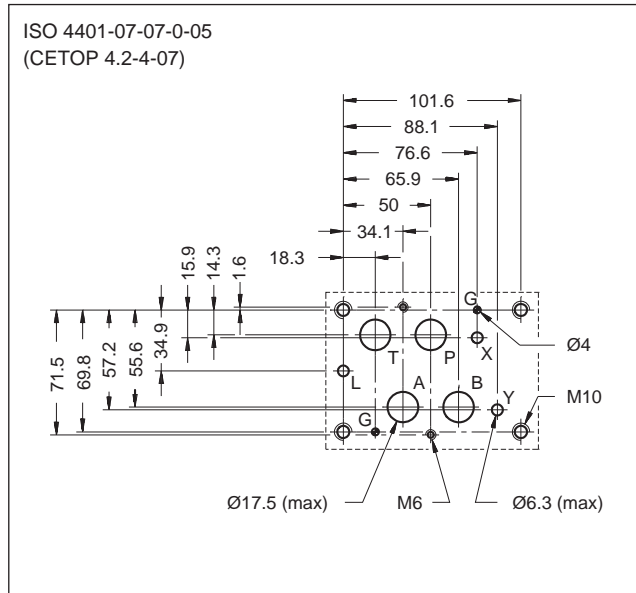
FLOW RESTRICTOR VALVE

SERIES 10

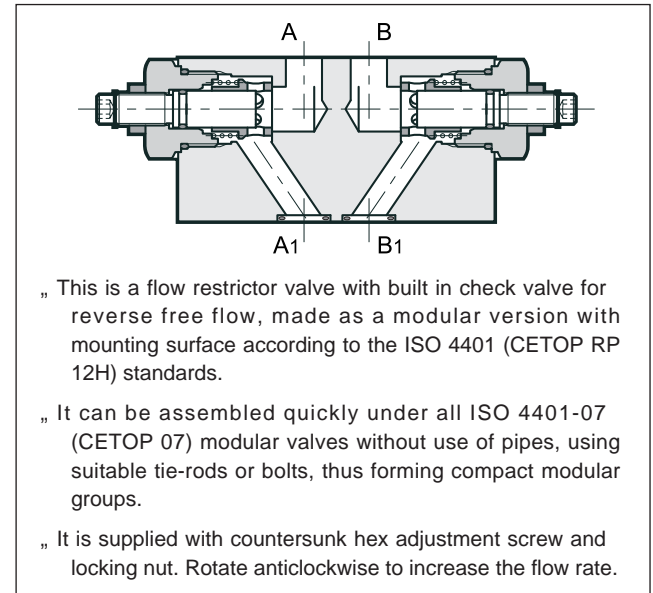
MODULAR VERSION
ISO 4401-07 (CETOP 07)

p max **350** bar
Q max **250** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



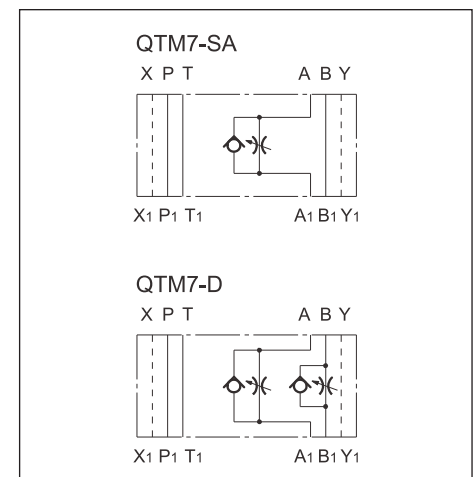
CONFIGURATIONS (see hydraulic symbols table)

- „ Configuration •SAŽ: Allows the flow control exiting from the actuator on line A.
- „ Configuration •DŽ: Allows independent control of the flow exiting from the chambers A and B of the actuator.
- „ All the configurations have a built-in check valve that allows free reverse flow (cracking pressure of 0,7 bar).

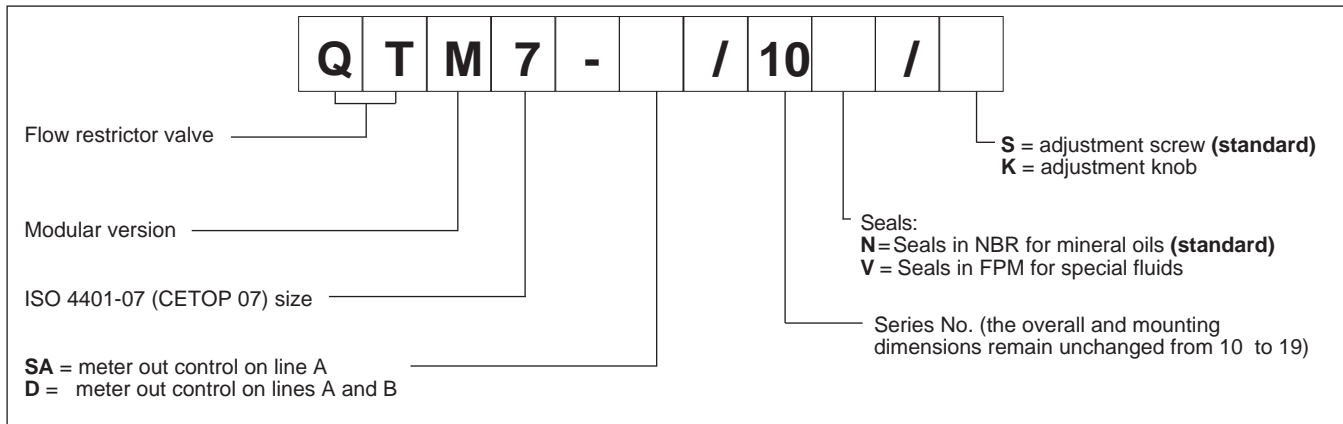
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate	l/min	250
Leakage flow with restrictor closed	l/min	0,5
Check valve opening pressure	bar	0,7
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 20/18/15	
Recommended viscosity	cSt	25
Mass: QTM7-SA	kg	7,35
QTM7-D	kg	7,7

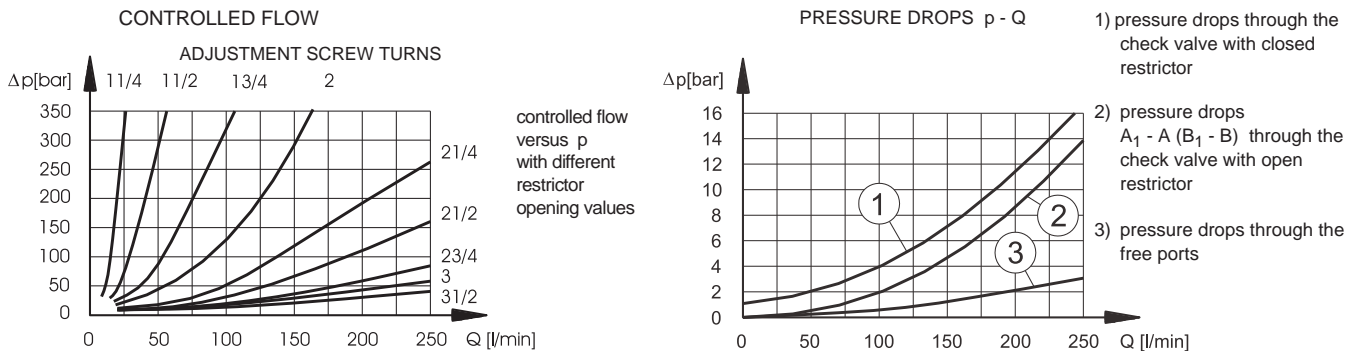
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



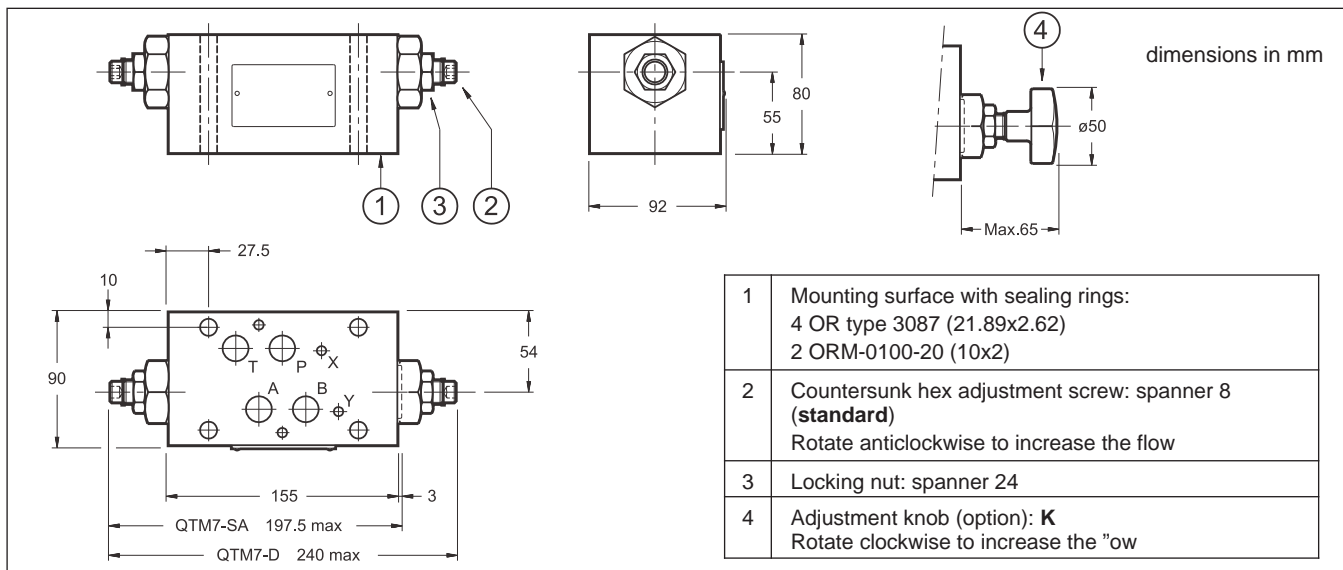
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





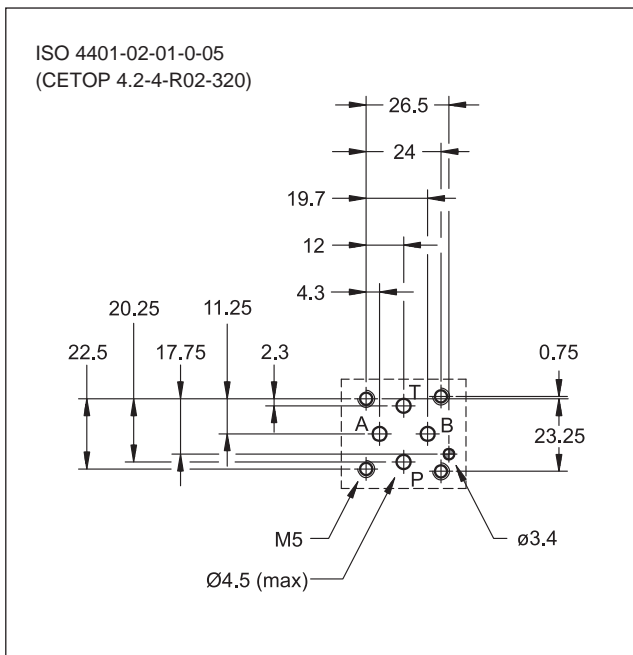
CHM2

PILOT OPERATED CHECK VALVE SERIES 10

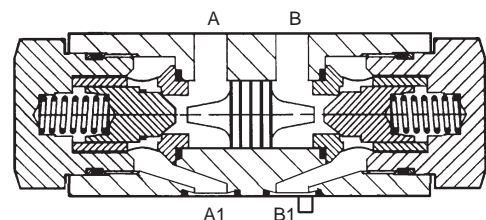
MODULAR VERSION ISO 4401-02 (CETOP R02)

p max 320 bar
Q max 30 l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



„ The CHM2 valve is a hydraulically released check valve with spring closing and with cone on edge seals; the mounting surface is according to the ISO 4401 (CETOP RP 121H) standards.

„ Its use allows:

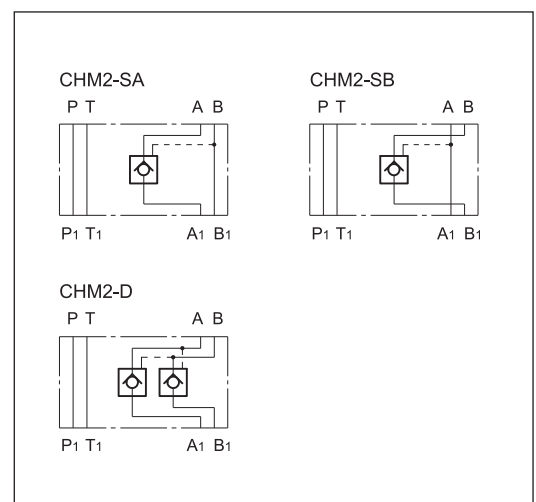
- prevention of flow in one direction;
- flow in the same direction, if opened by a pilot pressure;
- free flow in the other direction.

„ The CHM2 valves are always mounted downstream of the DL2 type directional solenoid valves (see cat. 41 100) and can be assembled with all other ISO 4401-02 (CETOP R02) valves.

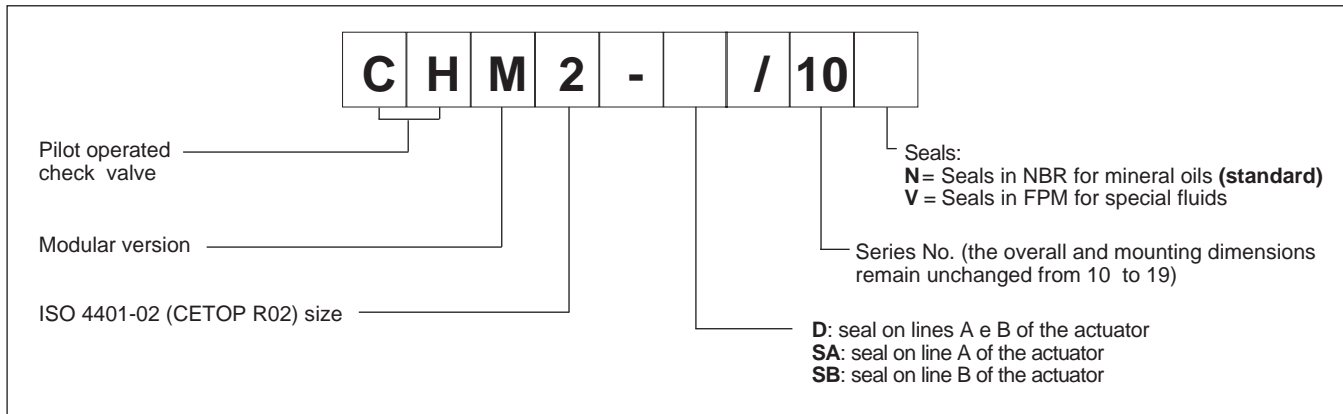
PERFORMANCE RATINGS (measured with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure	bar	320
Maximum flow rate	l/min	30
Ratio between pressure of the sealed chamber and the piloting pressure		3.5:1
Opening pressure	bar	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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0.75

HYDRAULIC SYMBOLS

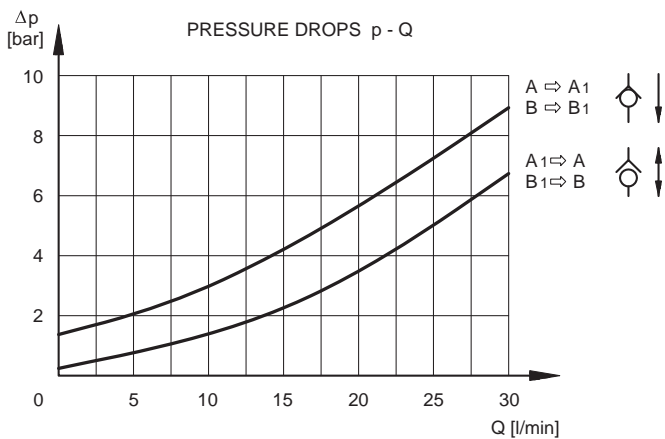


1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES

(values obtained with viscosity of 36 cSt at 50°C)



3 - HYDRAULIC FLUIDS

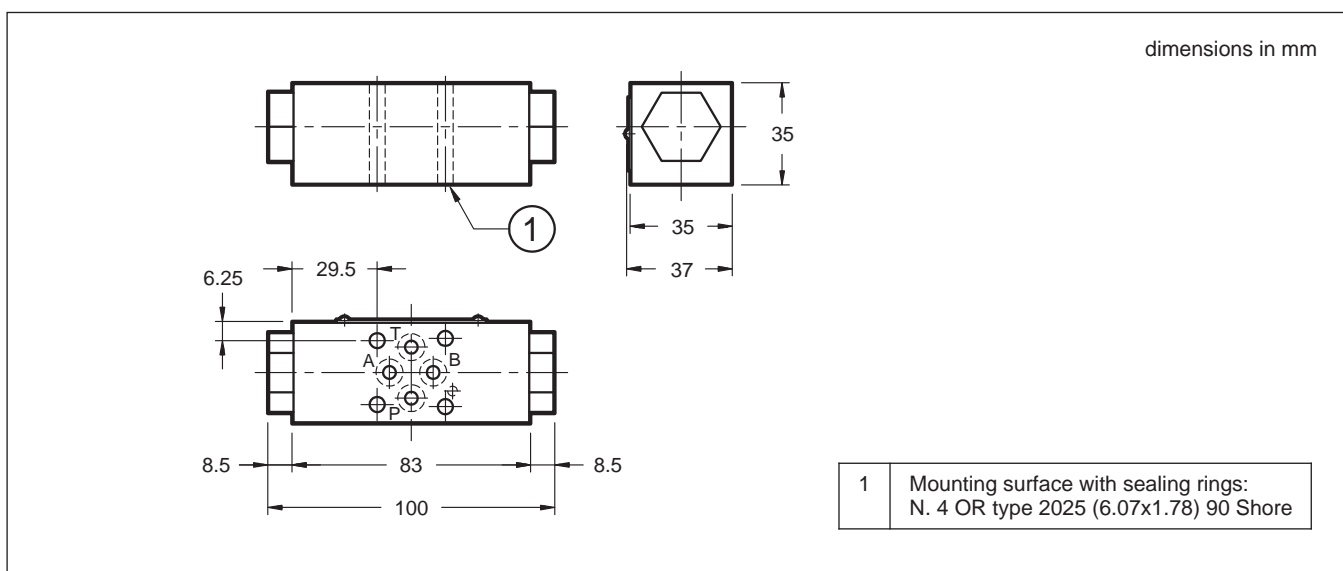
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. With this kind of fluids, use NBR seals type (code N). With HFDR fluids type (phosphate esters) use FPM seals (code V).

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 itself and of the seals characteristics.

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

4 - OVERALL AND MOUNTING DIMENSIONS





MVR

DIRECT CHECK VALVE

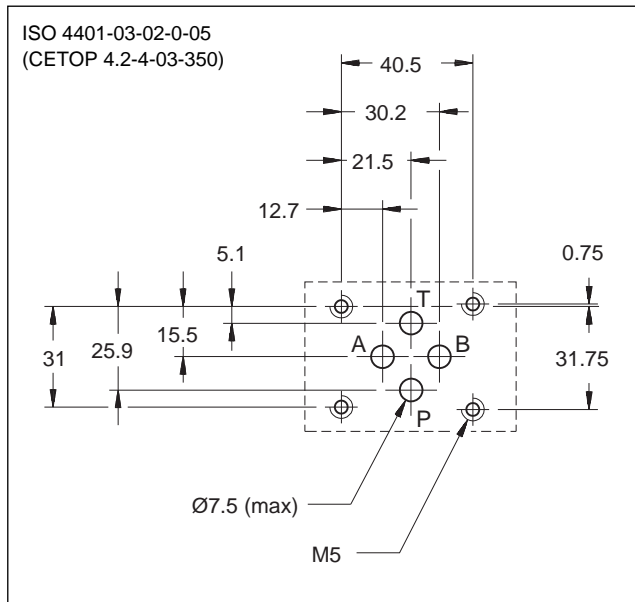
SERIES 51

MODULAR VERSION

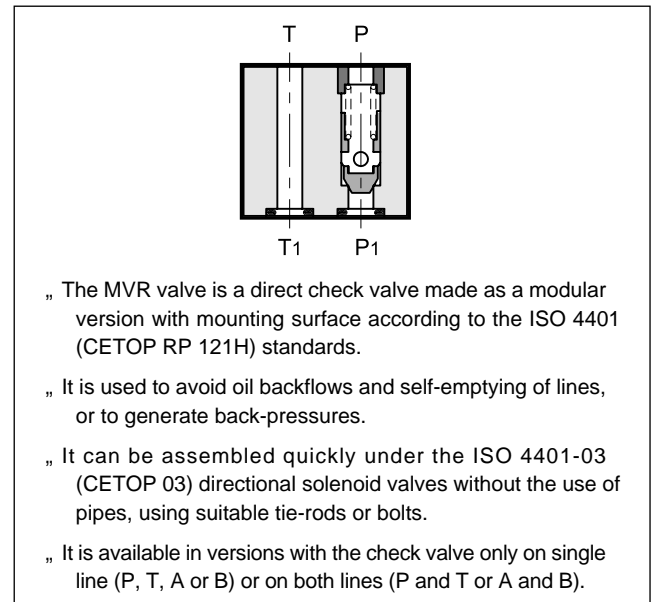
ISO 4401-03 (CETOP 03)

p max **350** bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE



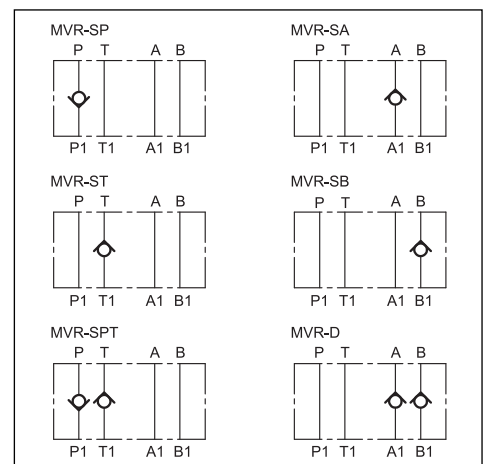
CONFIGURATIONS (see Hydraulic symbols table)

- „ MVR-SP: check valve on line P.
- „ MVR-SA: check valve on line A.
- „ MVR-ST: check valve on line T.
- „ MVR-SB: check valve on line B.
- „ MVR-SPT: check valve on lines P and T.
- „ MVR-D: check valve on lines A and B.

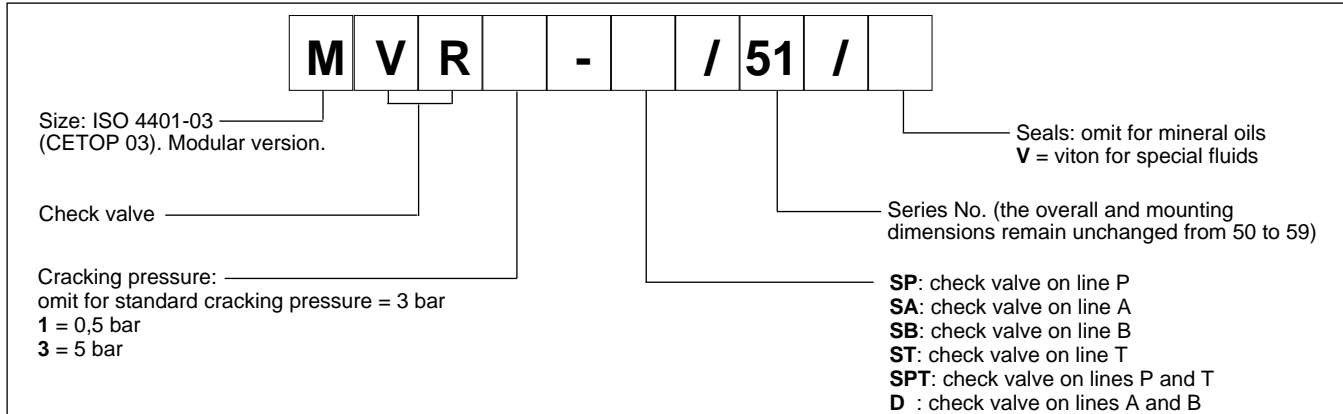
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Check valve cracking pressure	bar	3 - 0,5 - 5
Maximum flow rate in controlled lines	l/min	50
Maximum flow rate in the free lines	l/min	75
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1

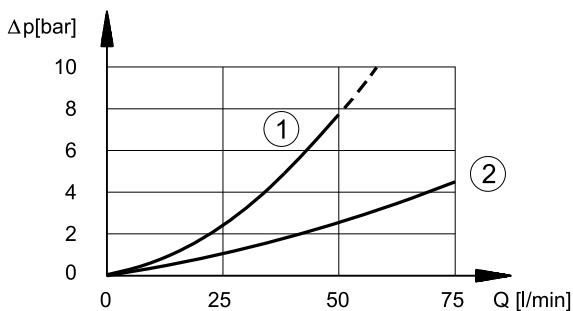
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



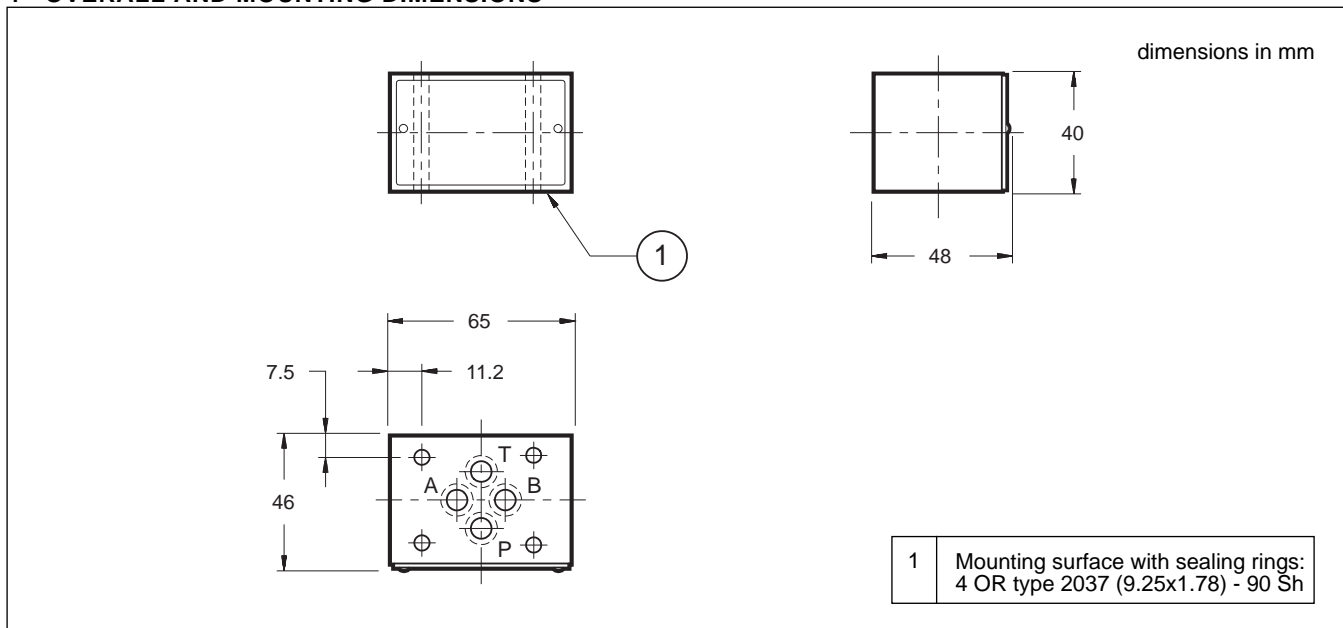
- 1) pressure drops on controlled lines
- 2) pressure drops on free lines

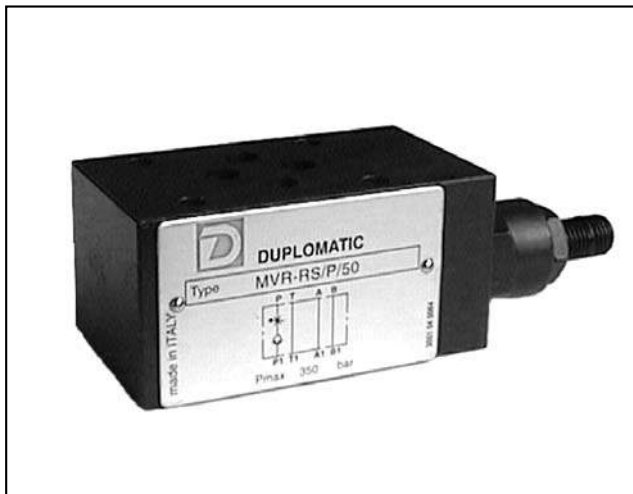
NOTE: check valve cracking pressure must be added to the values indicated in the curve 1 in the diagram

3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





MVR-RS/P

DIRECT CHECK VALVE WITH FLOW RESTRICTOR

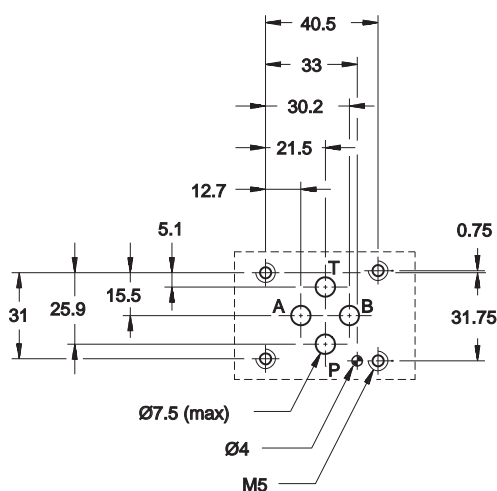
SERIES 50

MODULAR VERSION
ISO 4401-03 (CETOP 03)

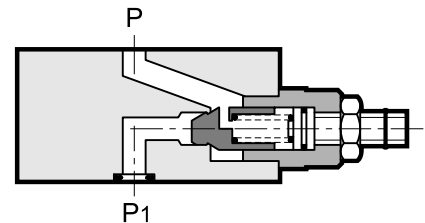
p max **350** bar
Q max (see table of performances)

MOUNTING INTERFACE

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



OPERATING PRINCIPLE

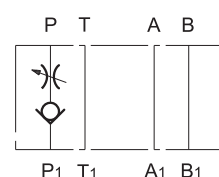


- „ The MVR-RS/P valve is a check valve that incorporates also the function of flow restriction.
- „ It is made as a modular version with mounting surface according to the ISO 4401 (CETOP RP 121H) standards.
- „ It can be quickly assembled under the ISO 4401-03 (CETOP 03) directional solenoid valves and modular valves, without use of pipes and using suitable tie-rods or bolts.
- „ It is used when it is necessary to control the flow in a direction and to avoid backflows or the self-emptying of the lines in the opposite direction.
- „ Control of the flow is obtained with a countersunk hex screw with locking nut.

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Check valve cracking pressure		1
Maximum flow rate in controlled lines	l/min	50
Maximum flow rate in the free lines		75
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,1

HYDRAULIC SYMBOL

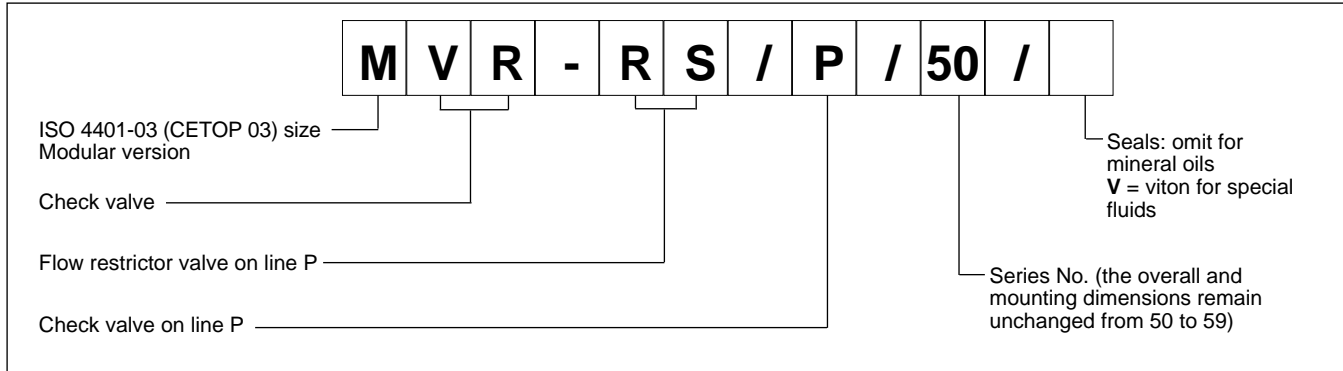




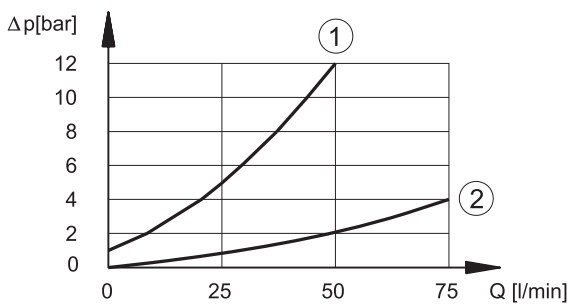
MVR-RS/P

SERIES 50

1 - IDENTIFICATION CODE



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

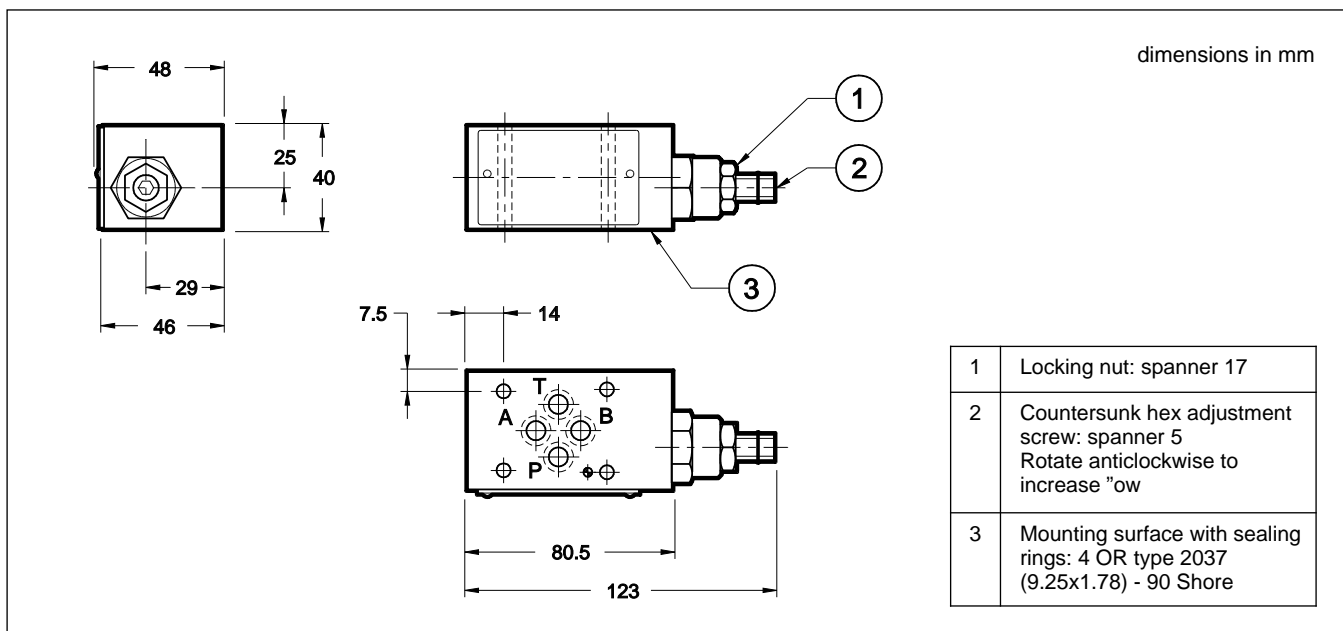


- 1) pressure drops P₁ P
- 2) pressure drops on free lines (ex. A A₁)

3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS



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 Fax +39 0331.895.339
 www.diplomatic.com • e-mail: sales.exp@diplomatic.com



MVPP

PILOT OPERATED CHECK VALVE

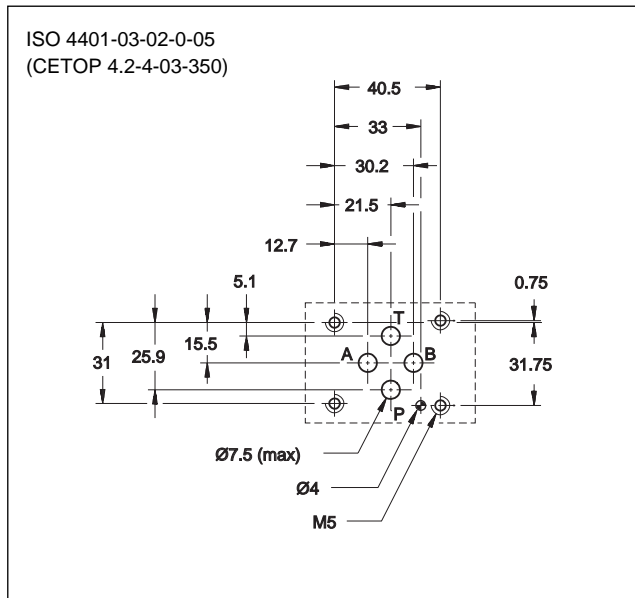
SERIES 50

MODULAR VERSION

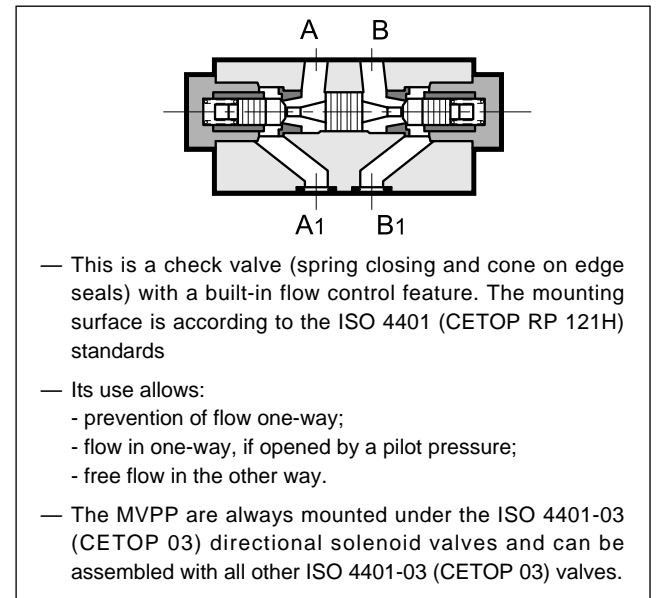
ISO 4401-03 (CETOP 03)

p max 350 bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE



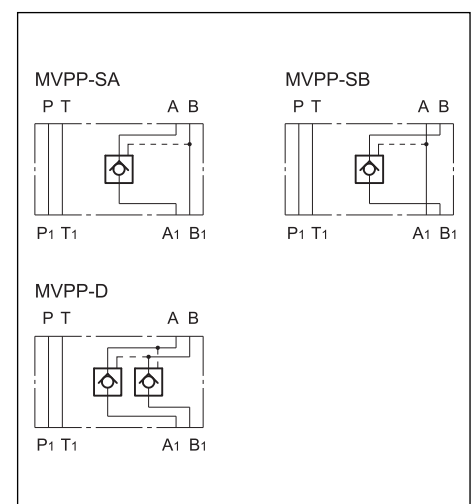
CONFIGURATIONS (see hydraulic symbols table)

- Configurations “SA” - “SB”: are used to lock the actuator in one direction.
- Configuration “D”: is used to lock the position of the actuator in both directions.

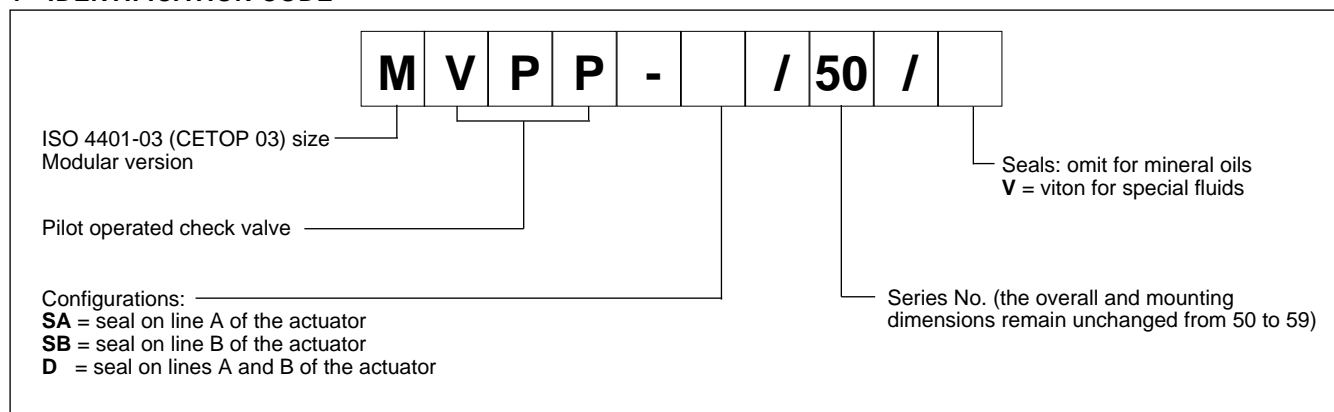
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Check valve cracking pressure		3
Maximum flow rate in controlled lines	l/min	50
Maximum flow rate in the free lines		75
Ratio between the pressure in the locked chambers and the piloting pressure		3,4:1
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 20/18/15	
Recommended viscosity	cSt	25
Mass:	kg	1,3

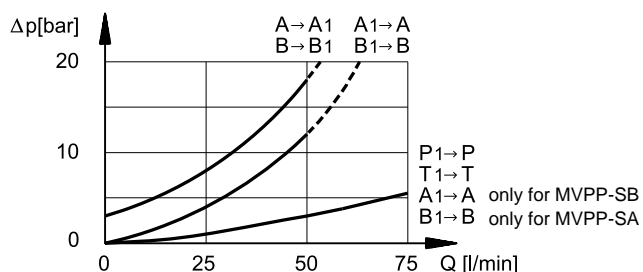
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



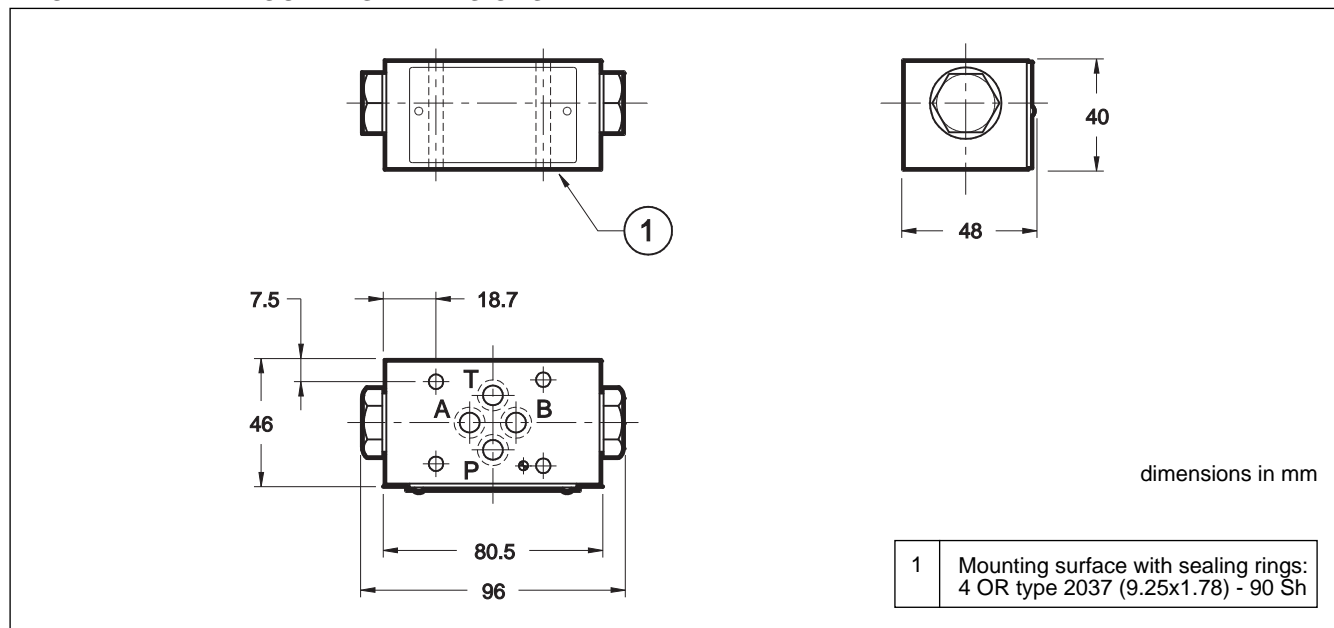
2 - CHARACTERISTIC CURVES (values obtained with viscosity of 36 cSt at 50°C)

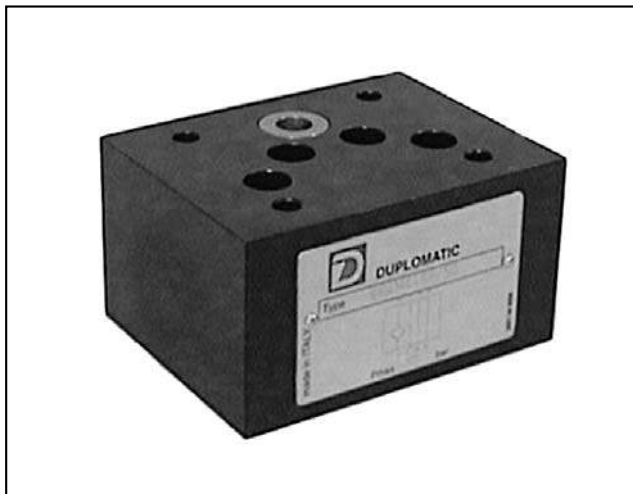


3 - HYDRAULIC FLUIDS

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.

4 - OVERALL AND MOUNTING DIMENSIONS





VR4M

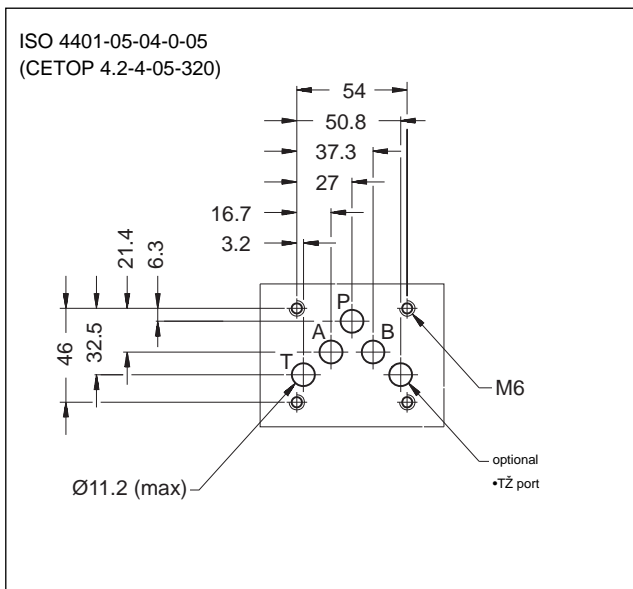
DIRECT CHECK VALVE

SERIES 50

MODULAR VERSION
ISO 4401-05 (CETOP 05)

p max **320** bar
Q max **100** l/min

MOUNTING INTERFACE



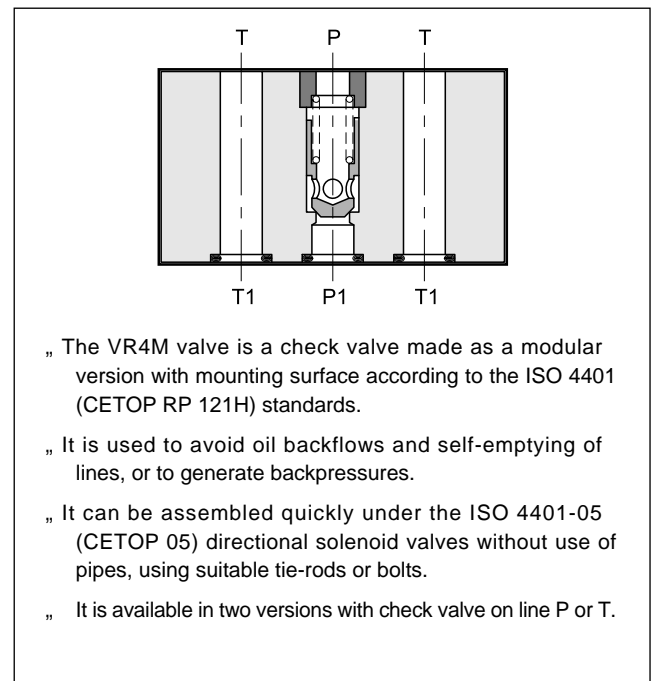
CONFIGURATIONS (see Hydraulic symbols table)

- „ VR4M-SP: check valve on line P.
- „ VR4M-ST: check valve on line T.

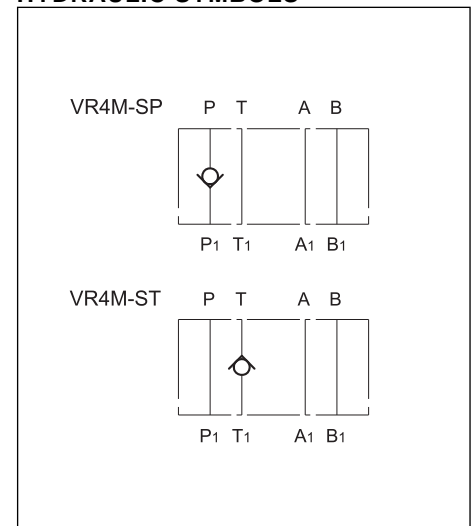
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	320
Check valve cracking pressure	bar	0,5 - 8
Maximum flow rate in the controlled lines and in the free lines	l/min	100
Ambient temperature range	°C	...20 / +50
Fluid temperature range	°C	...20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Recommended viscosity	cSt	25
Degree of fluid contamination	According to ISO 4406:1999 class 20/18/15	
Mass	kg	2,3

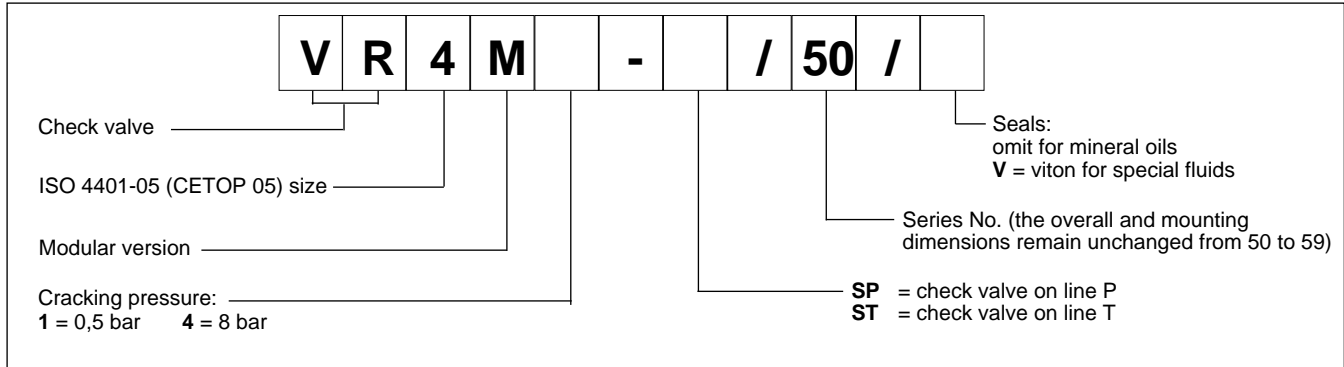
OPERATING PRINCIPLE



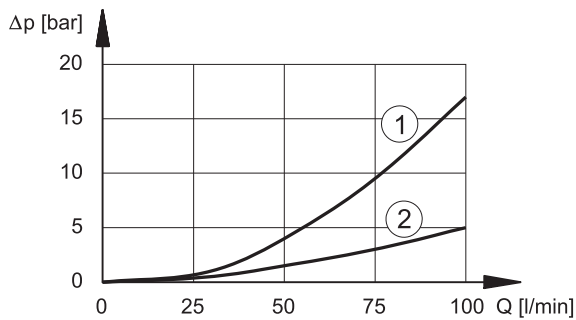
HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE



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



1) pressure drops P₁ P and T T₁ (controlled lines)

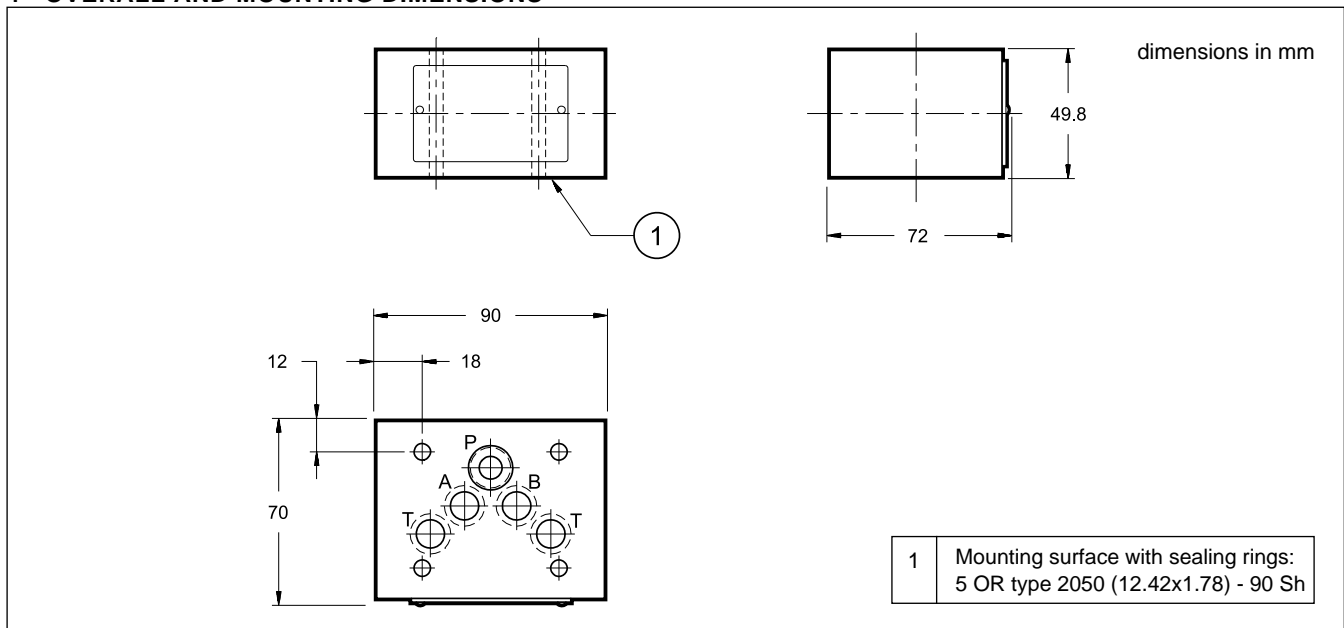
2) pressure drops on free lines (ex. A A₁)

NOTE: Add the valve cracking pressure to the values shown by the curve 1 of the diagram

3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS





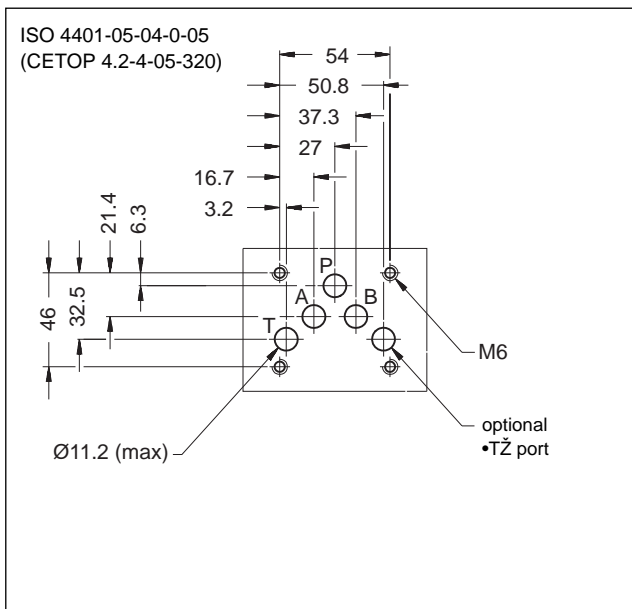
CHM5

PILOT OPERATED CHECK VALVE SERIES 10

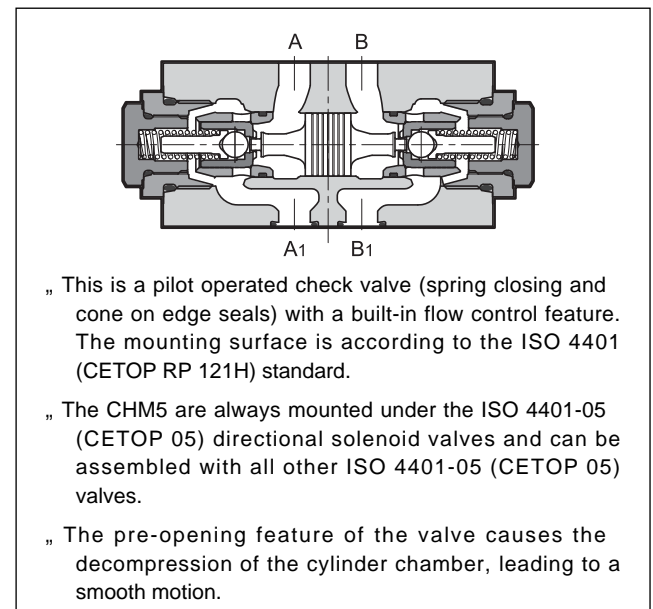
MODULAR VERSION ISO 4401-05 (CETOP 05)

p max 320 bar
Q max 120 l/min

MOUNTING INTERFACE



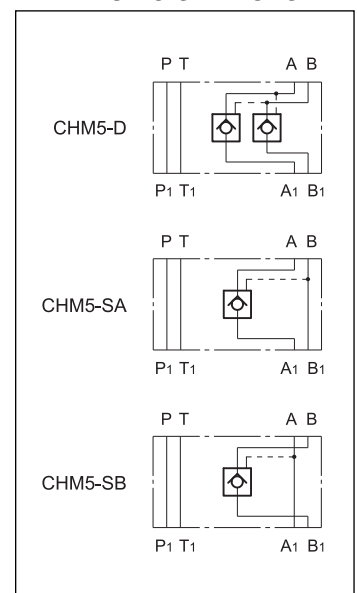
OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

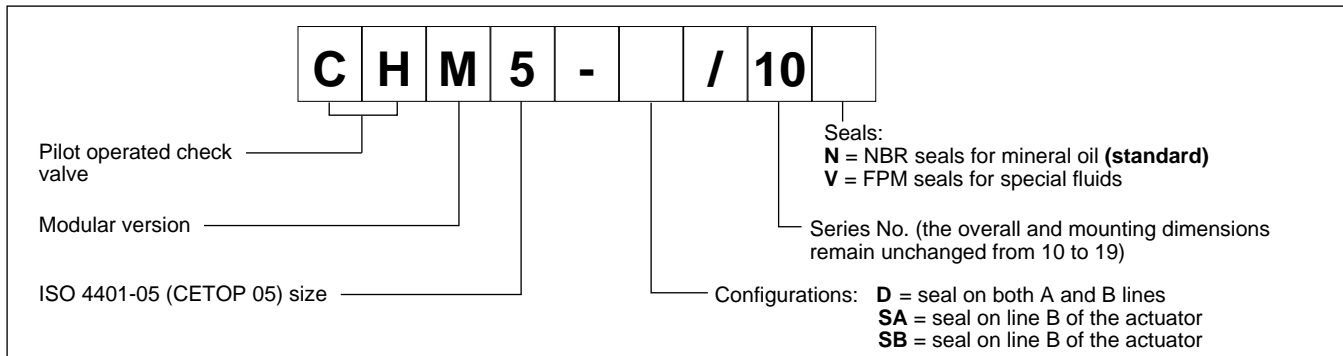
Maximum operating pressure	bar	320
Maximum flow rate	l/min	120
Decompression ratio		14,9:1
Piloting ratio		2,3:1
Check valve cracking pressure	bar	2
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Recommended viscosity	cSt	25
Fluid contamination degree		According to ISO 4406:1999 class 20/18/15
Mass: CHM5-D	kg	2,2
CHM5-SA e CHM5-SB		1,9

HYDRAULIC SYMBOLS

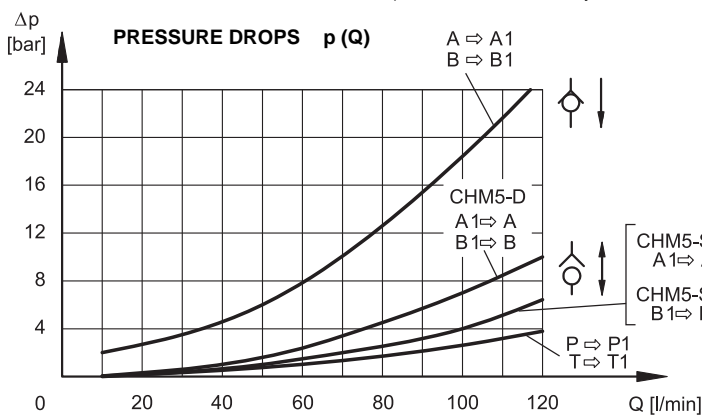




1 - IDENTIFICATION CODE



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



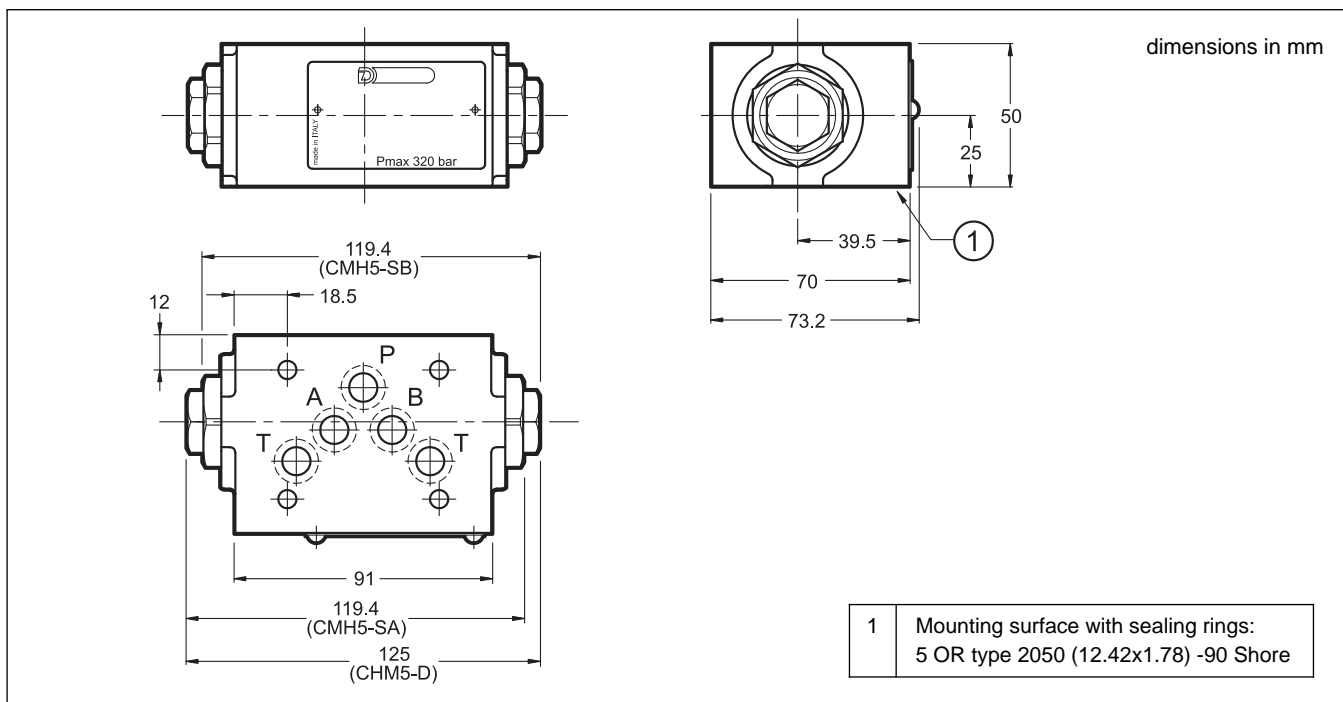
3 - HYDRAULIC FLUIDS

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.

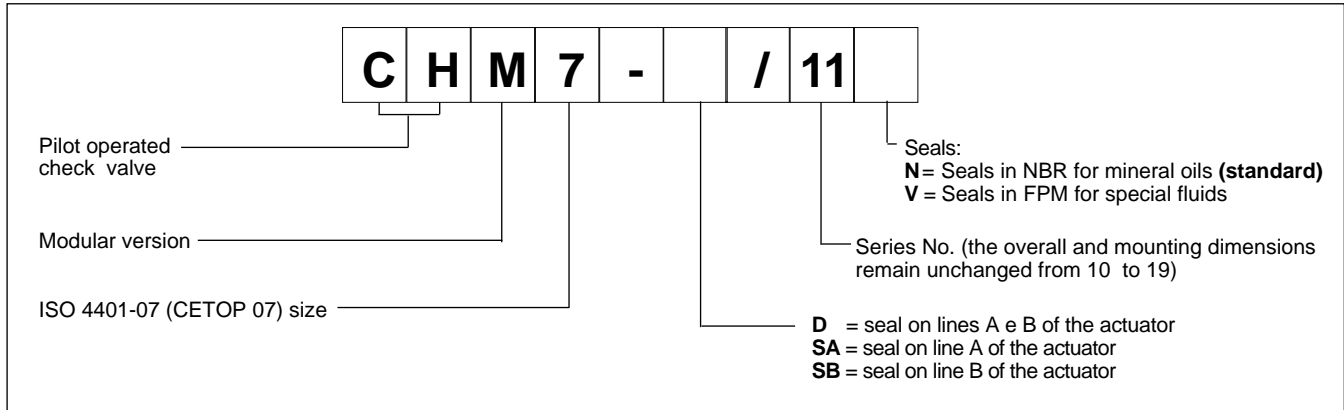
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

4 - OVERALL AND MOUNTING DIMENSIONS



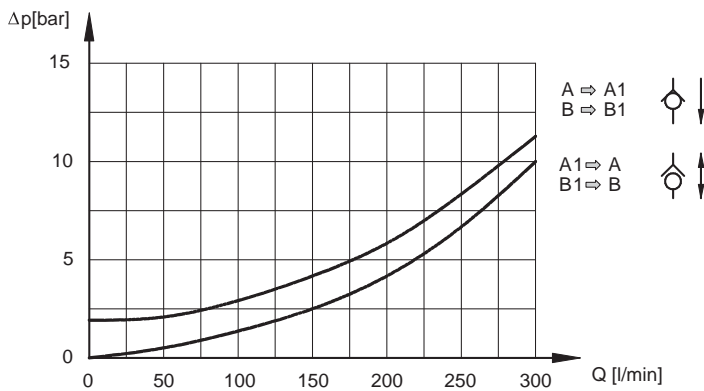
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1 - IDENTIFICATION CODE



2 - CHARACTERISTIC CURVES

(values obtained with viscosity of 36 cSt at 50°C)



3 - HYDRAULIC FLUIDS

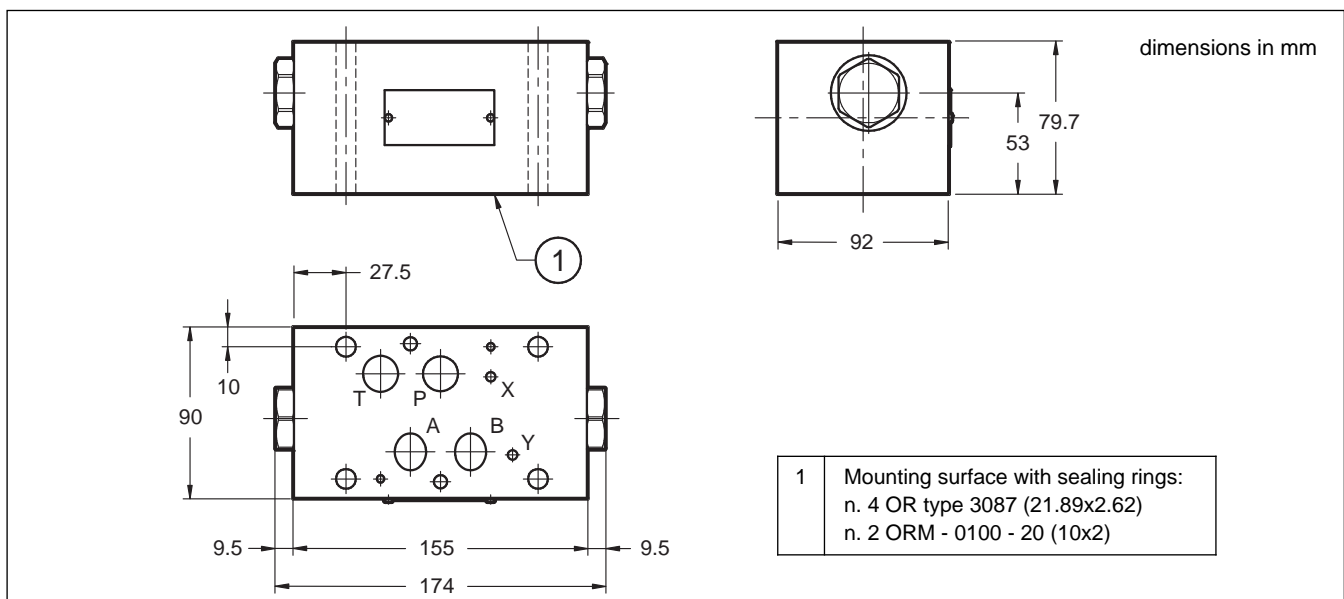
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. With this kind of fluids, use NBR seals type (code N). With HFDRfluids type (phosphate esters) use FPM seals (code V).

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 itself and of the seals characteristics.

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

4 - OVERALL AND MOUNTING DIMENSIONS





RPC1*/M

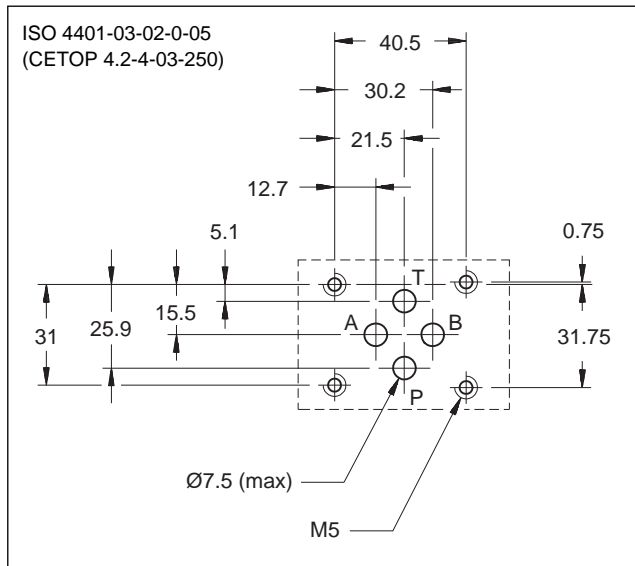
FLOW CONTROL VALVE

SERIES 10

MODULAR VERSION
ISO 4401-03 (CETOP 03)

p max **250** bar
Q max (see table of performances)

MOUNTING INTERFACE



CONFIGURATIONS

(see Hydraulic symbols table and Identification Code - par. 1)

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

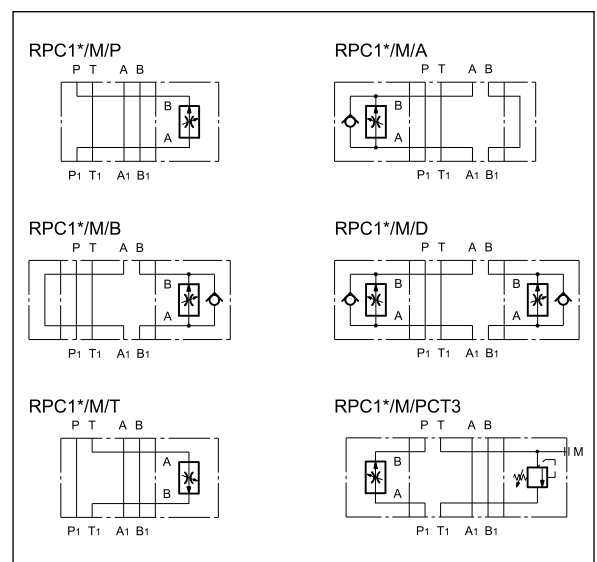
Maximum operating pressure	bar	250
Maximum flow rate in controlled lines		1-4-10-16-22-30
Maximum flow rate in the free lines	l/min	65
Reverse free flow maximum flowrate		40
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	According to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass: RPC1-*/M/ A-B-T-P		3
RPC1-*/M/ D		4,1
RPC1-*/M/PCT3		3,7
only modular block ISO 4401-03 without flow control valves:	kg	
RPC1-K/M/*		1,5
RPC1-K/M/PCT3		2,4

NOTE: for detailed information regarding the RPC1 flow control valve, see catalogue 32 200

OPERATING PRINCIPLE

- „ The RPC1*/M valve is a flow control valve with pressure and temperature compensation, made as a modular version with mounting surface according to the ISO 4401 (CETOP RP 121H) standards.
- „ It can be assembled quickly under the ISO 4401-03 (CETOP 03) directional solenoid valves and allows easy execution of hydraulic circuits where control of the speed of the actuators is required.
- „ It is available in six flow adjustment ranges up to 30 l/min.
- „ Combined with MDD44 type solenoid operated directional control valves (see cat. 41 250), it's possible to obtain circuits for the fast/slow control of the work actuators.

HYDRAULIC SYMBOLS



1 - IDENTIFICATION CODE

R	P	C	1	-		/	M	/		-		/	10	/	
----------	----------	----------	----------	----------	--	----------	----------	----------	--	----------	--	----------	-----------	----------	--

Pressure and temperature compensated flow control valve

Flow adjustment range:
1 = 1 l/min **16** = 16 l/min
4 = 4 l/min **22** = 22 l/min
10 = 10 l/min **30** = 30 l/min
K = only ISO 4401-03 (CETOP 03) modular block supplied without flow control valve

Modular version _____
size ISO 4401-03 (CETOP 03)

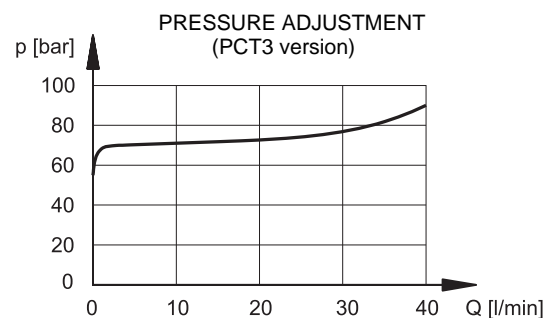
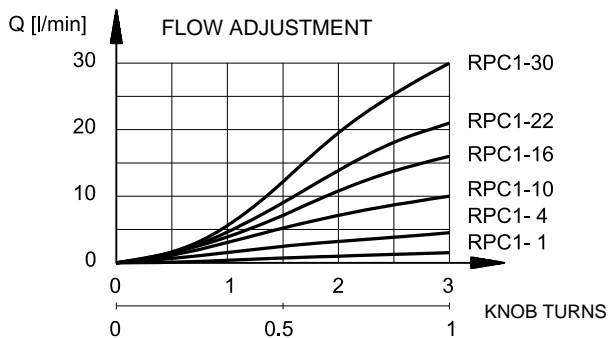
Seals: omit for mineral oils
V = viton for special fluids

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

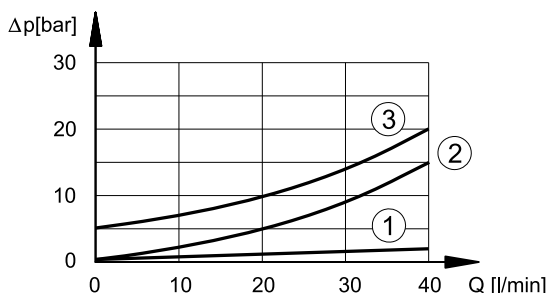
M1 = adjustment knob only for PCT3 version (omit for adjustment with countersunk hex screw)

Configurations:
P = meter in control on line P
A = control from chamber A of the actuator
B = control from chamber B of the actuator
D = control from chambers A and B of the actuator
T = meter out control on line T
PCT3 = meter in control on line P with backpressure adjustable on line T up to 70 bar
(A and B configurations are not available in **K** version)

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



PRESSURE DROPS p - Q



- 1) pressure drops on free lines
- 2) pressure drops through check valve
- 3) pressure drops through the backpressure valve (PCT3 version)

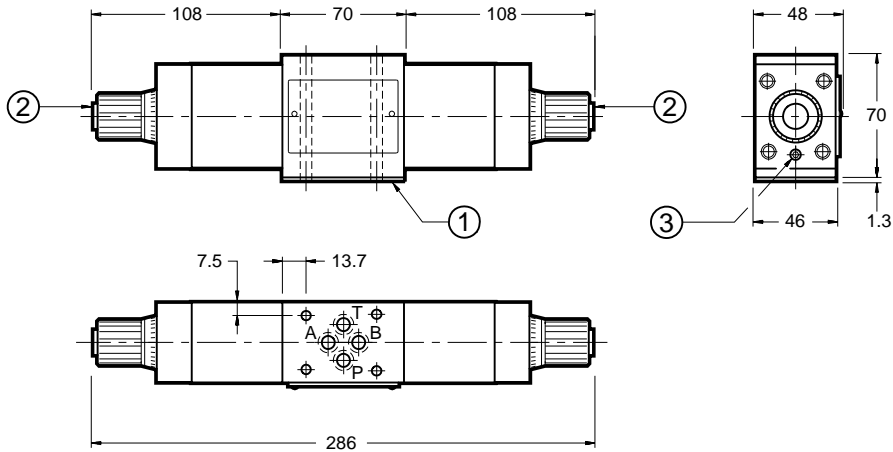
3 - HYDRAULIC FLUIDS

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.

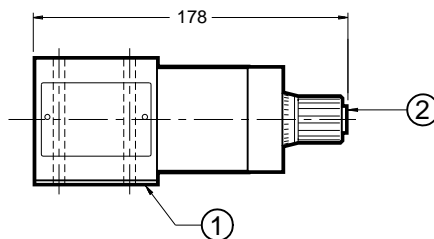
4 - OVERALL AND MOUNTING DIMENSIONS RPC1*/M VALVES

dimensions in mm

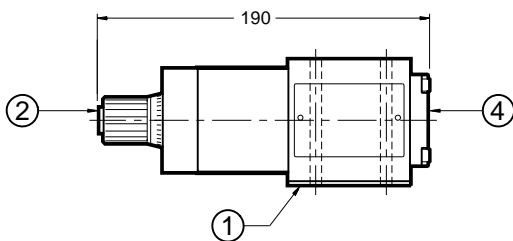
RPC1*/M/D



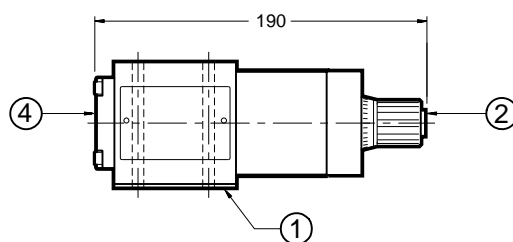
RPC1*/M/P
RPC1*/M/T



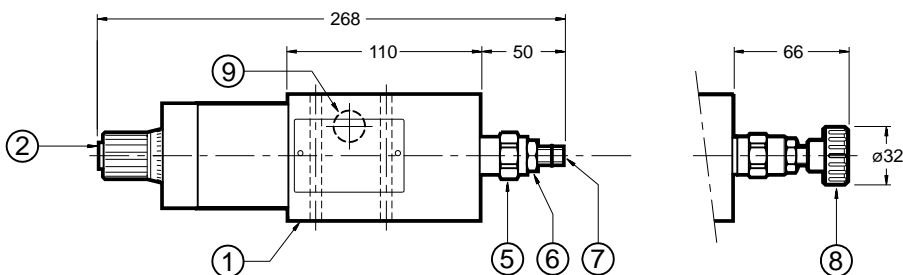
RPC1*/M/A



RPC1*/M/B



RPC1*/M/PCT3

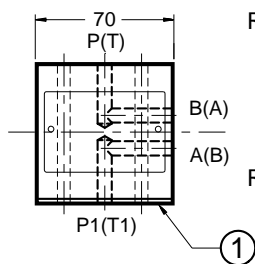
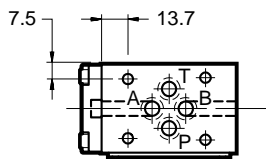
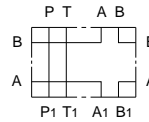
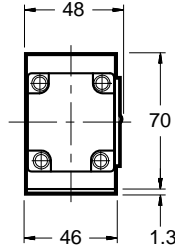
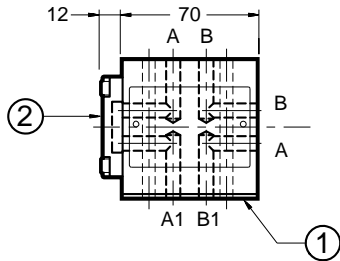


1	Mounting plate with sealing rings: P-OR1L/20N (NBR seals) P-OR1L/20V (Viton seals) For RPC1*/M/PCT3 without mounting plate: 4 OR 2037 (9.25x1.78) - 90 Shore
2	Flow adjustment knob (3 turns total) Rotate anticlockwise to increase flow.
3	Knob locking screw
4	Cross-connection cover
5	Backpressure valve on line T. Pressure adjustment range up to 70 bar
6	Locking nut: spanner 17
7	Countersunk hex screw: spanner 5 Rotate clockwise to increase pressure
8	Adjustment knob: M1
9	Pressure gauge port 1/4" BSP

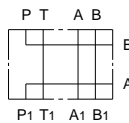
5 - OVERALL AND MOUNTING DIMENSIONS OF BLOCKS WITHOUT FLOW CONTROL VALVE

dimensions in mm

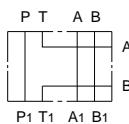
RPC1-K/M/D



RPC1-K/M/P

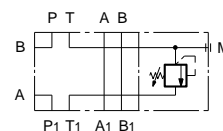
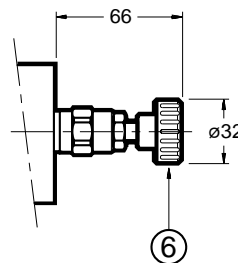
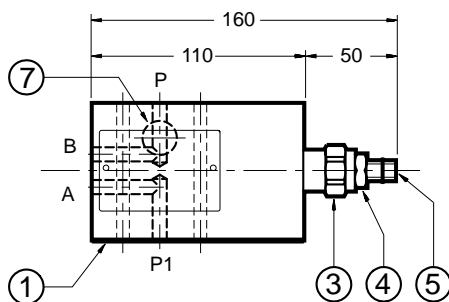


RPC1-K/M/T



1	Mounting plate with sealing rings: P-OR1L/20N (NBR seals) P-OR1L/20V (Viton seals) For RPC1-*/M/PCT3 without mounting plate: 4 OR 2037 (9.25x1.78) - 90 Shore
2	Cross-connection cover
3	Backpressure valve on line T. Pressure adjustment range up to 70 bar
4	Locking nut: spanner 17
5	Countersunk hex screw: spanner 5 Rotate clockwise to increase pressure
6	Adjustment knob: M1
7	Pressure gauge port 1/4" BSP

RPC1-K/M/PCT3





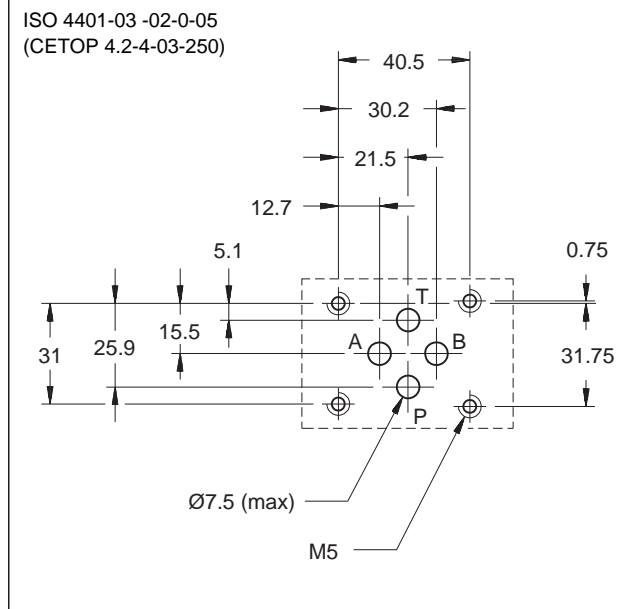
RLM3

ELECTRIC FAST / SLOW SPEED SELECTION VALVE SERIES 10

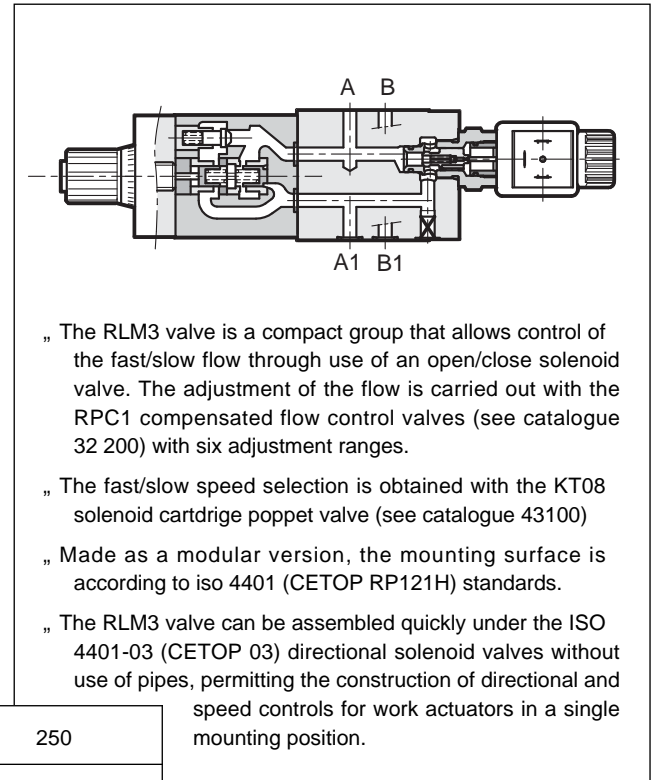
MODULAR VERSION ISO 4401-03 (CETOP 03)

p max 250 bar
Q max (see table of performances)

MOUNTING SURFACE



OPERATING PRINCIPLE



PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	250
Maximum flow rate in controlled lines Maximum flow rate in the free lines	l/min	1 - 4 - 10 - 16 - 22 - 30 65
Minimum controlled flow rate	l/min	0,025
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	3,1

CONFIGURATIONS

(see Hydraulic symbols)

- „ Configuration •AŽ: meter-out control from the actuator on chamber A.
- „ Configuration •TŽ: control on discharge T of the directional solenoid valve for speed control in both directions of movement.

1 - IDENTIFICATION CODE

R	L	M	3	-		/	10	-		/	
----------	----------	----------	----------	----------	--	----------	-----------	----------	--	----------	--

Electric fast/ slow speed selection valve

Modular version

Size ISO 4401-03 (CETOP 03)

Adjustments:
A = adjustment on chamber A of the actuator;
T = adjustment on discharge T of the directional solenoid valve

A = normally open solenoid valve
C = normally closed solenoid valve

Flow adjustment range:
01 = 1 l/min **16** = 16 l/min
04 = 4 l/min **22** = 22 l/min
10 = 10 l/min **30** = 30 l/min

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

See **NOTE 2**

Coil electrical connection (see paragraph 8)
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL

Coil type:
D12 = 12 V } direct current (**standard**)
D24 = 24 V }
R110 = 110 V } rectified current
R230 = 230 V }
D00 = valve without coil (see **NOTE 1**))

Seals:
N = NBR for mineral oils
V = viton for special fluids

NOTE 1: The coil locking ring and the relevant seals are included in the supply.
NOTE 2: The manual override **CM** is available as an option (see paragraph 8).

N.B. : For further informations about the flow control valve see catalogue 32 200; For further informations about the cartridge poppet valve see catalogue 43 100.

NOTE: The solenoid valves are never supplied with connector. Connectors must be ordered separately. To find out the type of connector to be ordered, please see catalogue 49 000.

1.1 - Coil identification code

C14L3	-				/	10
--------------	----------	--	--	--	----------	-----------

Power supply

D12 = 12 V } direct current
D24 = 24 V } (**standard**)
R110 = 110 V } rectified
R230 = 230 V } current

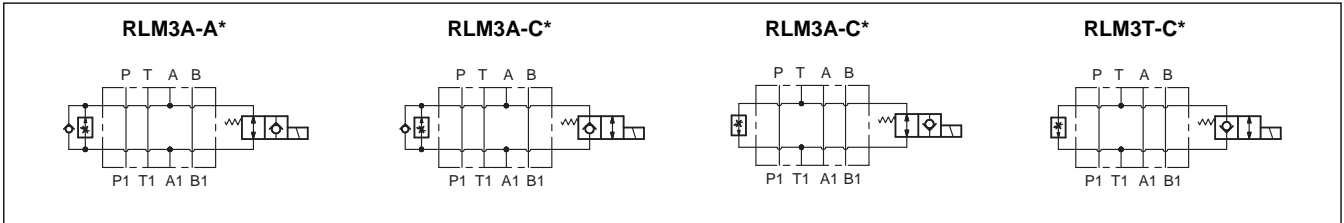
Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

Coil electrical connection (see paragraph 10)
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL

3 - HYDRAULIC FLUIDS

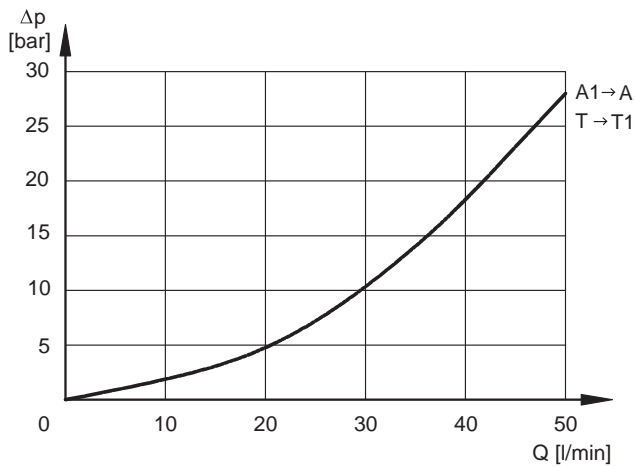
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at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

3 - HYDRAULIC SYMBOLS



4 - PRESSURE DROPS p-Q

(obtained with viscosity of 36 cSt at 50 °C)



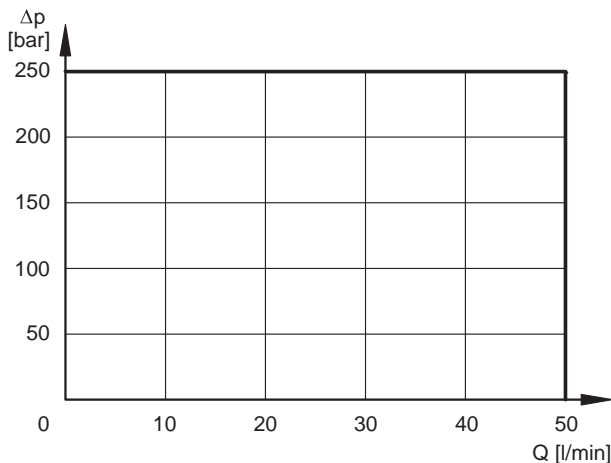
The values in graphs refer to the fast flow through the solenoid valve and are equal for A (normally open) and C (normally closed) versions.

5 - SWITCHING TIME

The values are obtained according to the ISO 6403 standard, with mineral oil at 50°C, with viscosity of 36 cSt.

TIMES [ms]	ENERGIZING	DE-ENERGIZING
RLM3*-A*	85	60
RLM3*-C*	60	85

6 - OPERATING LIMITS



The curves define the flow rate operating fields according to the valve pressure of the different versions.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

5 - ELECTRICAL FEATURES

5.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded onto the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded nut, and can be rotated according to the available space.

The interchangeability of coils of different voltages both D or R type is possible without removing the tube.

Protection according CEI EN 60529 - atmospheric agents

Connector	IP 65	IP 67	IP 69 K
K1 DIN 43650	x		
K2 AMP JUNIOR	x	x	
K4 outgoing cables	x	x	
K7 DEUTSCH DT04 male	x	x	x
K8 AMP SUPER SEAL	x	x	x

NOTE: The protection degree is guaranteed only with the connector correctly connected and installed.

VOLTAGE SUPPLY FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95/CE
CLASS OF PROTECTION: Atmospheric agents (CEI EN 60529) Coil insulation (VDE 0580) Impregnation:	IP 65 (NOTE 2) class H class H

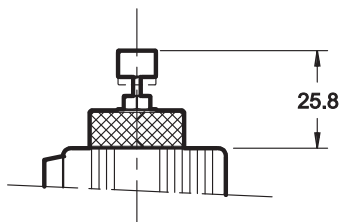
5.2 Current and absorbed power

In the table are shown current and power consumption values relevant to the different coil types. •RŽ coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the •DŽ type connector(see cat. 49 000).

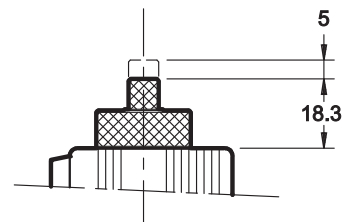
	Resistance at 20°C [Ω] (±1%)	Absorbed current [A] (±5%)	Absorbed power (±5%)		Coil code				
			[W]	[VA]	K1	K2	K4	K7	K8
C14L3-D12*	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
C14L3-D24*	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
C14L3-R110*	363	0,25		27,2	1902742				
C14L3-R230*	1640	0,11		26,4	1902743				

8 - MANUAL OVERRIDE

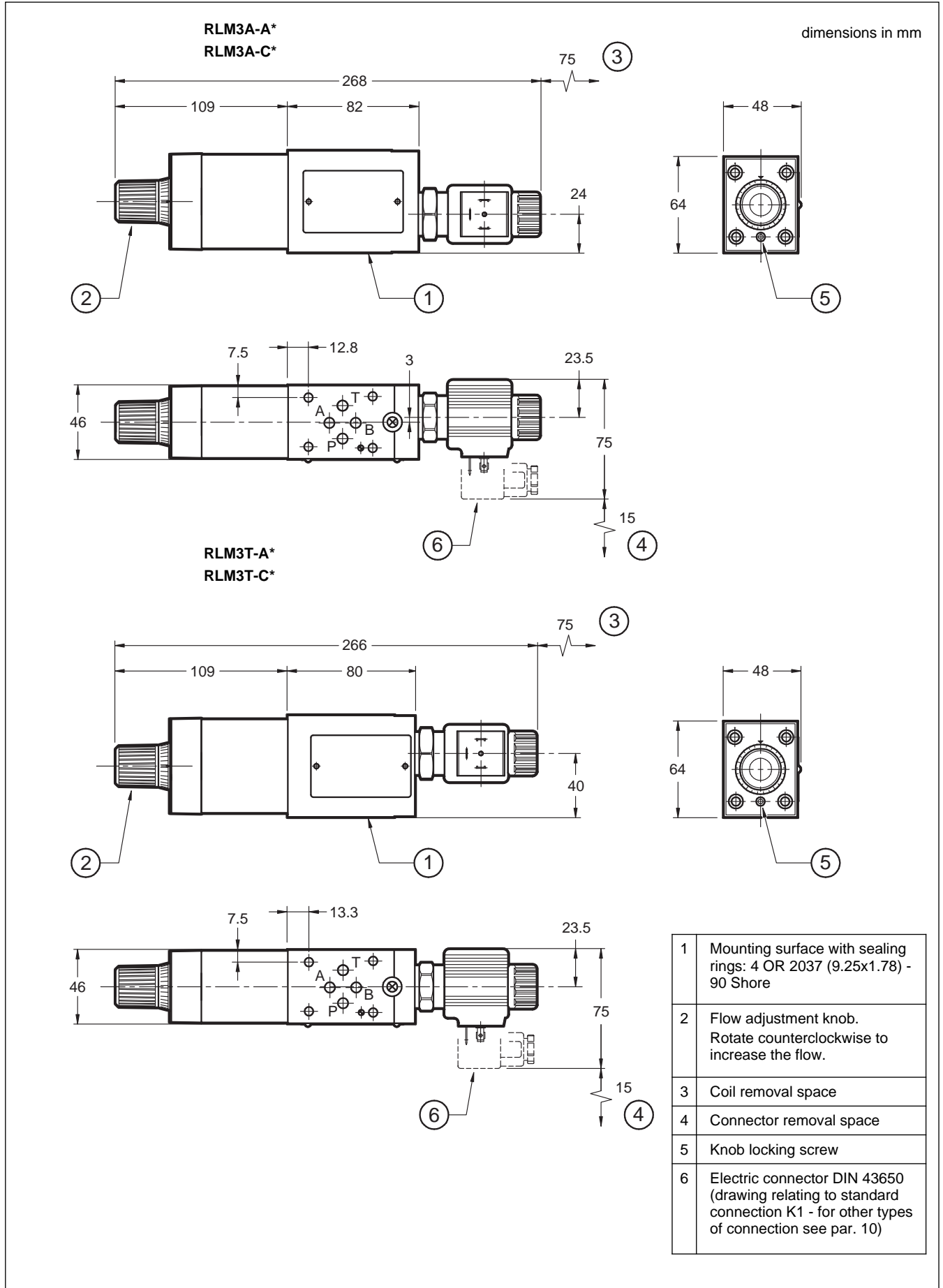
CM for NO version (pushing type)



CM for NC version (screw type)

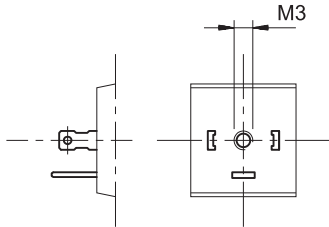


9 - OVERALL AND MOUNTING DIMENSIONS

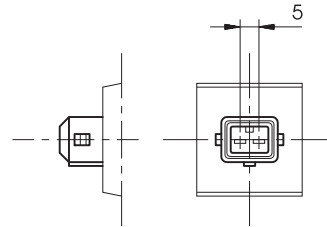


10 - ELECTRIC CONNECTIONS

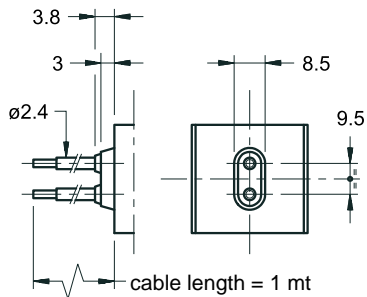
connection for DIN 43650 connector
code **K1 (standard)**



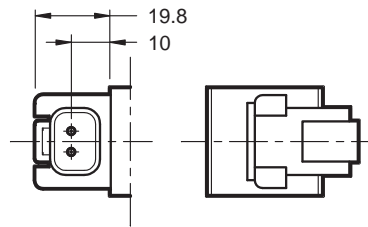
connection for AMP JUNIOR connector
code **K2**



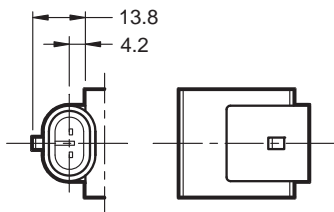
outgoing cables connection
code **K4**



connection for DEUTSCH DT04-2P male connector
code **K7**



connection for AMP SUPER SEAL connector (two contacts)
code **K8**



11 - ELECTRIC CONNECTORS

The solenoid valves are supplied without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see catalog 49 000. For K2, K7 and K8 connection type the relative connectors are not available.



RPC1-*/4M

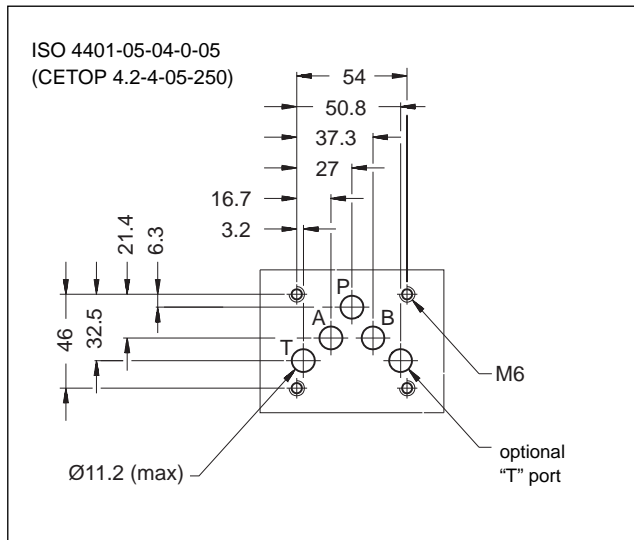
FLOW CONTROL VALVE

SERIES 10

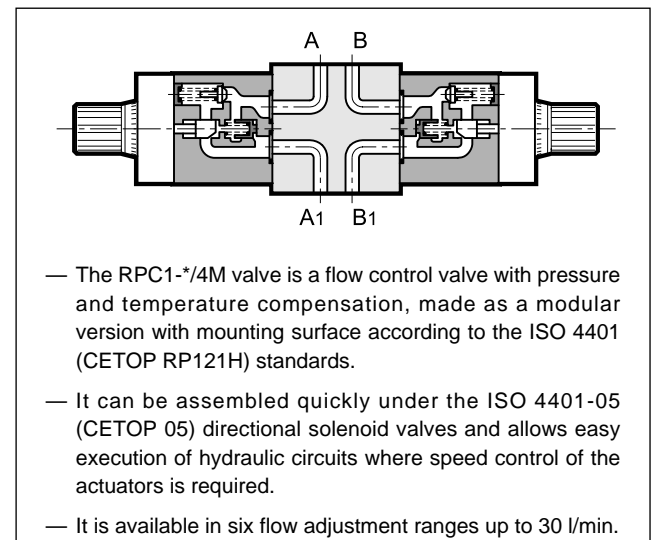
MODULAR VERSION
ISO 4401-05 (CETOP 05)

p max **250** bar
Q max (see table of performances)

MOUNTING INTERFACE



OPERATING PRINCIPLE

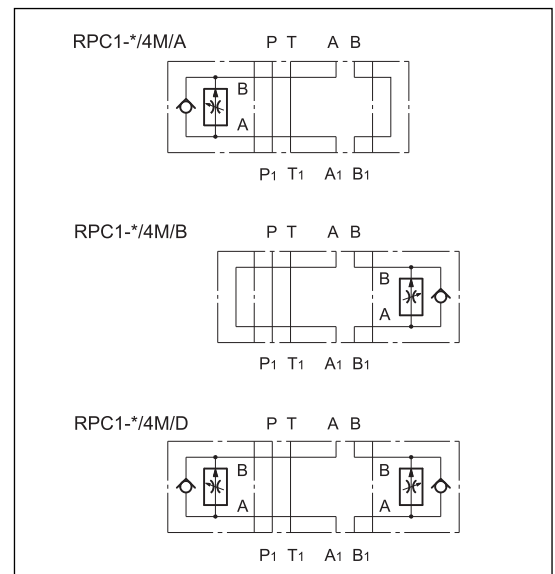


CONFIGURATIONS (see Hydraulic symbols table and Identification Code - par. 1)

PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	250
Maximum flow rate in controlled lines	l/min	1-4-10-16-22-30
Maximum flow rate in the free lines		100
Reverse free flow maximum flowrate		40
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 20/18/15	
Recommended viscosity	cSt	25
Mass: RPC1-*/4M/ A-B	kg	4,3
RPC1-*/4M/ D		5,6
only modular block ISO 4401-05 without flow control valves: RPC1-K/4M/D		3

HYDRAULIC SYMBOLS



NOTE: for detailed information regarding the RPC1 flow control valve, see catalogue 32 200.



RPC1*/4M

SERIES 10

1 - IDENTIFICATION CODE

R	P	C	1	-	/	4	M	/	/	10	/	
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	-----------	----------	--

Pressure and temperature compensated flow control valve

Flow adjustment range:

1 = 1 l/min	16 = 16 l/min
4 = 4 l/min	22 = 22 l/min
10 = 10 l/min	30 = 30 l/min

K = only for ISO 4401-05 (CETOP 05) modular block supplied without flow control valves

Modular version _____
ISO 4401-05 (CETOP 05) size

Seals: omit for mineral oils
V = viton for special fluids

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

A = control from chamber A of the actuator
B = control from chamber B of the actuator
D = control from chambers A and B of the actuator
(A and B configurations are not available in K version)

2 - 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.

3 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1	Mounting surface with sealing rings: 5 OR type 2050 (12.42x1.78) - 90 Shore
2	Adjustment knob. Adjustment in 3 turns of the knob. Rotate anticlockwise to increase flow.
3	Knob locking screw
4	Side locking plate



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Tel. +39 0331.895.111
Fax +39 0331.895.339
www.diplomatic.com • e-mail: sales.exp@diplomatic.com



VSM3

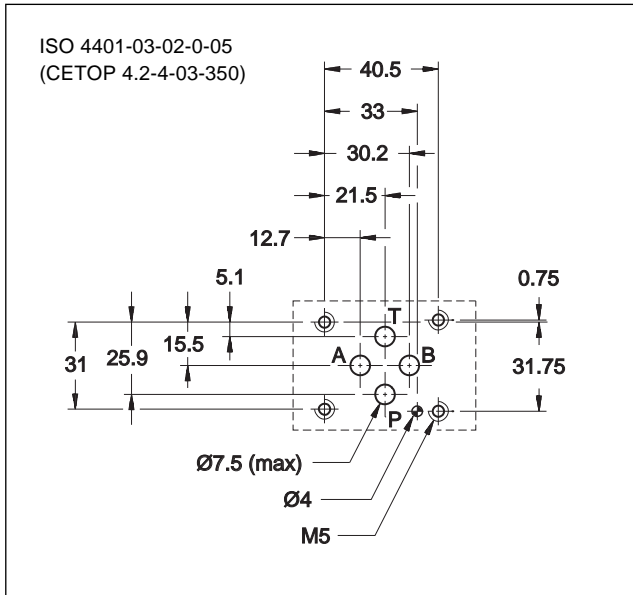
SHUTTLE VALVE

SERIES 10

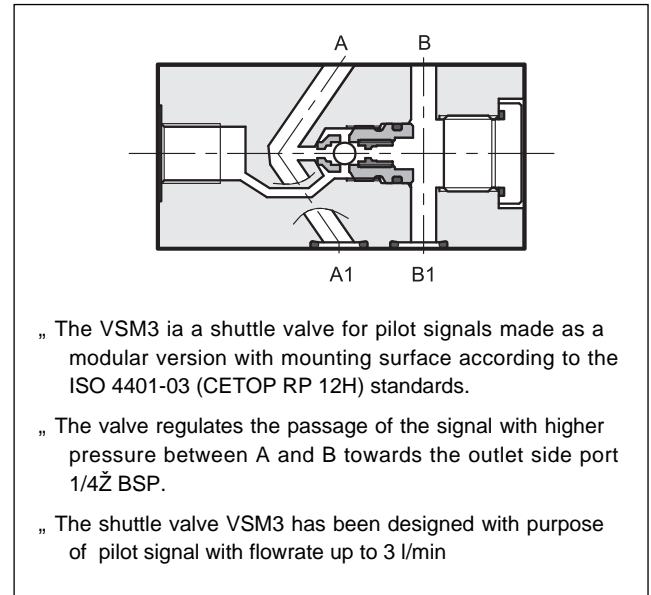
MODULAR VERSION
ISO 4401-03 (CETOP 03)

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

MOUNTING SURFACE



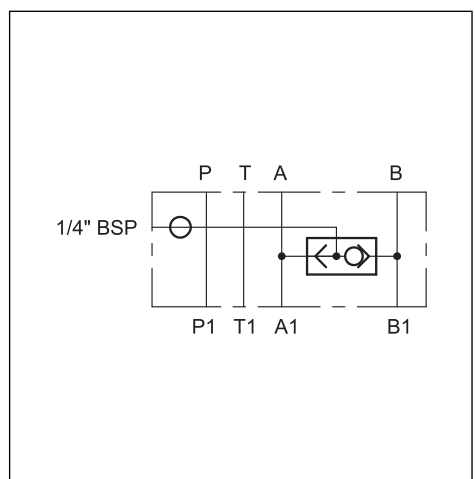
OPERATING PRINCIPLE



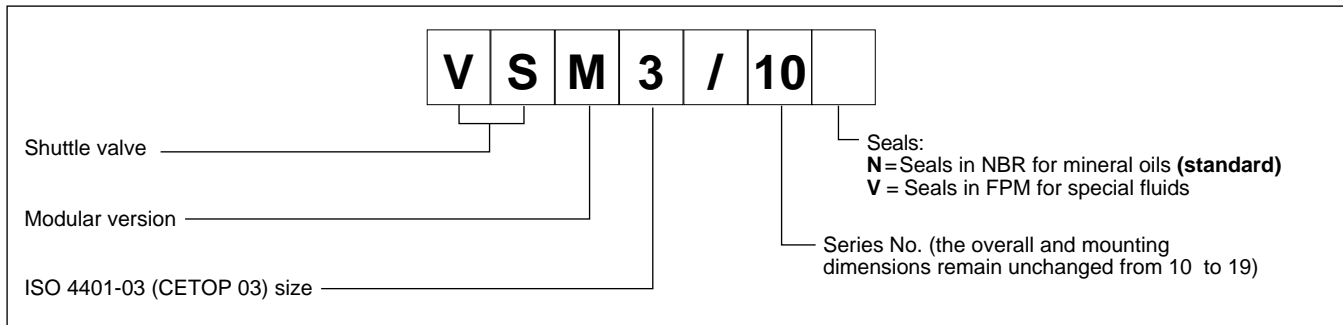
PERFORMANCES (measured with mineral oil of viscosity 36cSt at 50°C)

Maximum operating pressure	bar	350
Maximum flow rate through the cartridge	l/min	3
Maximum flow rate to A, B, P and T port	l/min	40
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 20/18/15	
Recommended viscosity	cSt	25
Mass	kg	0,95

HYDRAULIC SYMBOL

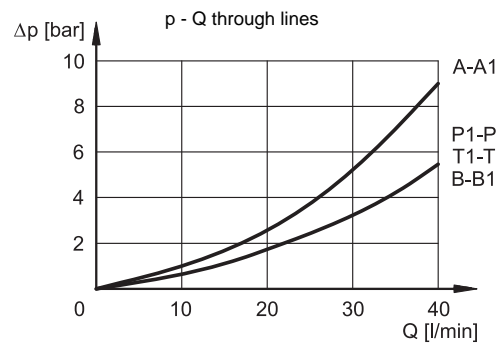
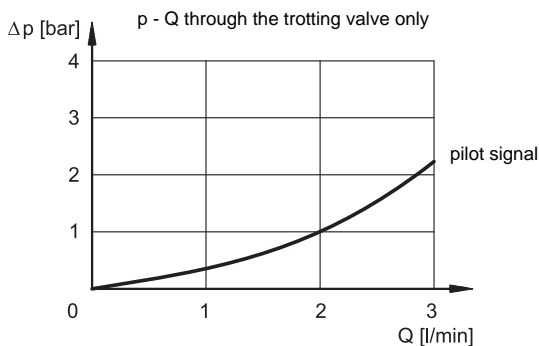


1 - IDENTIFICATION CODE



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

PRESSURE DROPS p - Q



3 - 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.

4 - OVERALL AND MOUNTING DIMENSIONS

