

Part number:

HYDROMA

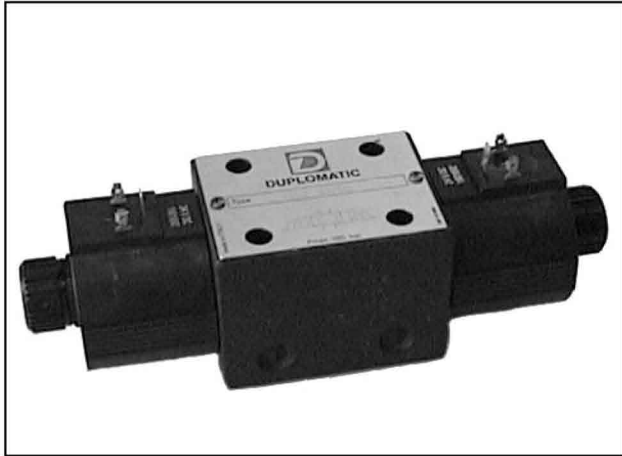
HYDRAULICKÉ SYSTÉMY

**HIDROMA
SISTEMS**

UKŁADY HYDRAULICZNE

HYDROMA

ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ



D4D

SOLENOID OPERATED DIRECTIONAL CONTROL VALVES DIRECT CURRENT - SERIES 50 ALTERNATING CURRENT - SERIES 60

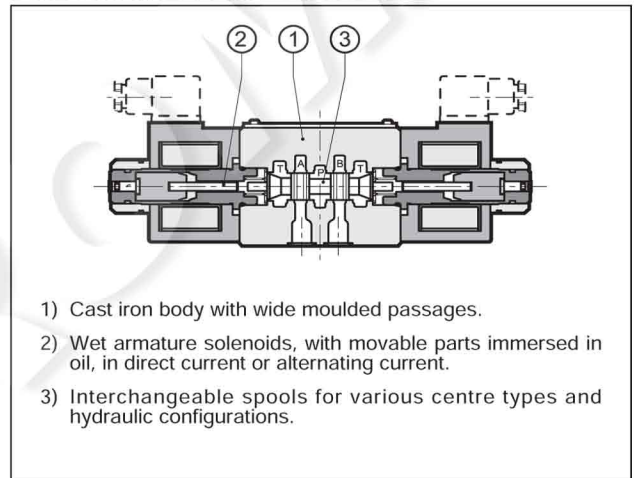
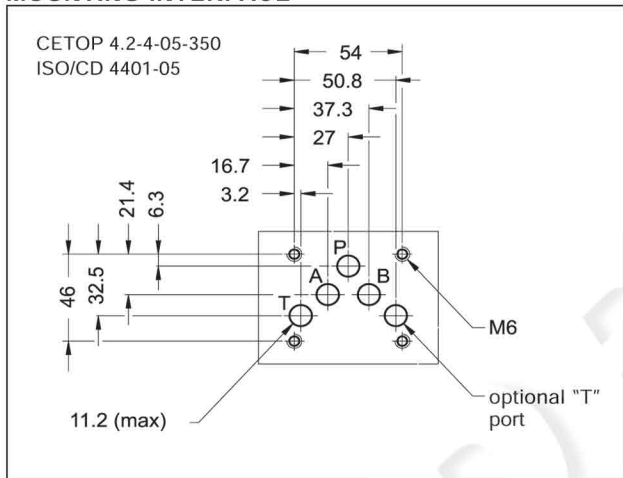
CETOP 05

p max 350 bar

Q max 100 l/min

**DIRECT-ACTING SOLENOID OPERATED
DIRECTIONAL CONTROL VALVES**

MOUNTING INTERFACE



A wide range of versions, with different spool positions at rest, are available:

- Type S: 4-way, 3-position directional valve, with two solenoids; positioning of spool at rest is obtained with centering springs.
- Type TA/TC: 4-way, 2-position directional valve, with one solenoid; positioning of spool at rest is obtained by means of a return spring.

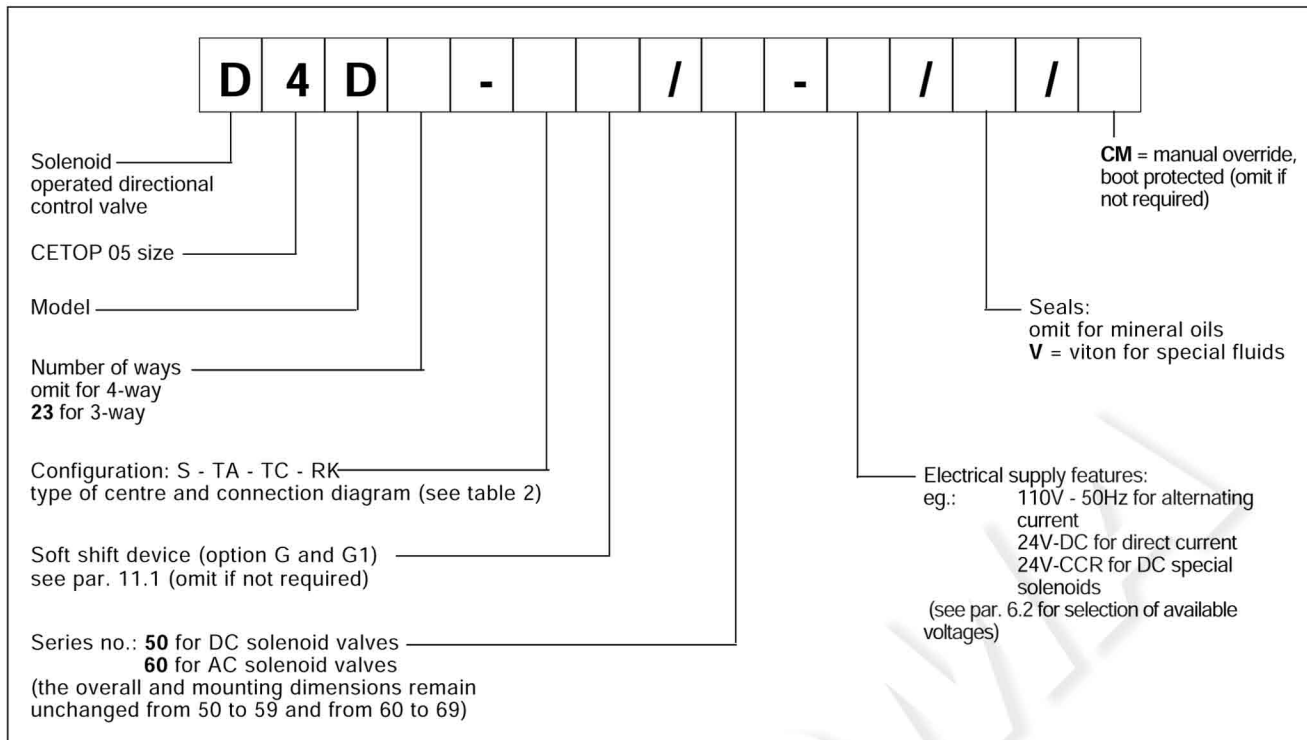
– Type RK: 4-way, 2-position directional valve, with two solenoids; with mechanical detent of the extreme spool positions when solenoids are de-energized.

– Version 23: 3-way, 2-position directional valve, with one solenoid; positioning of spool at rest is obtained with a return spring.

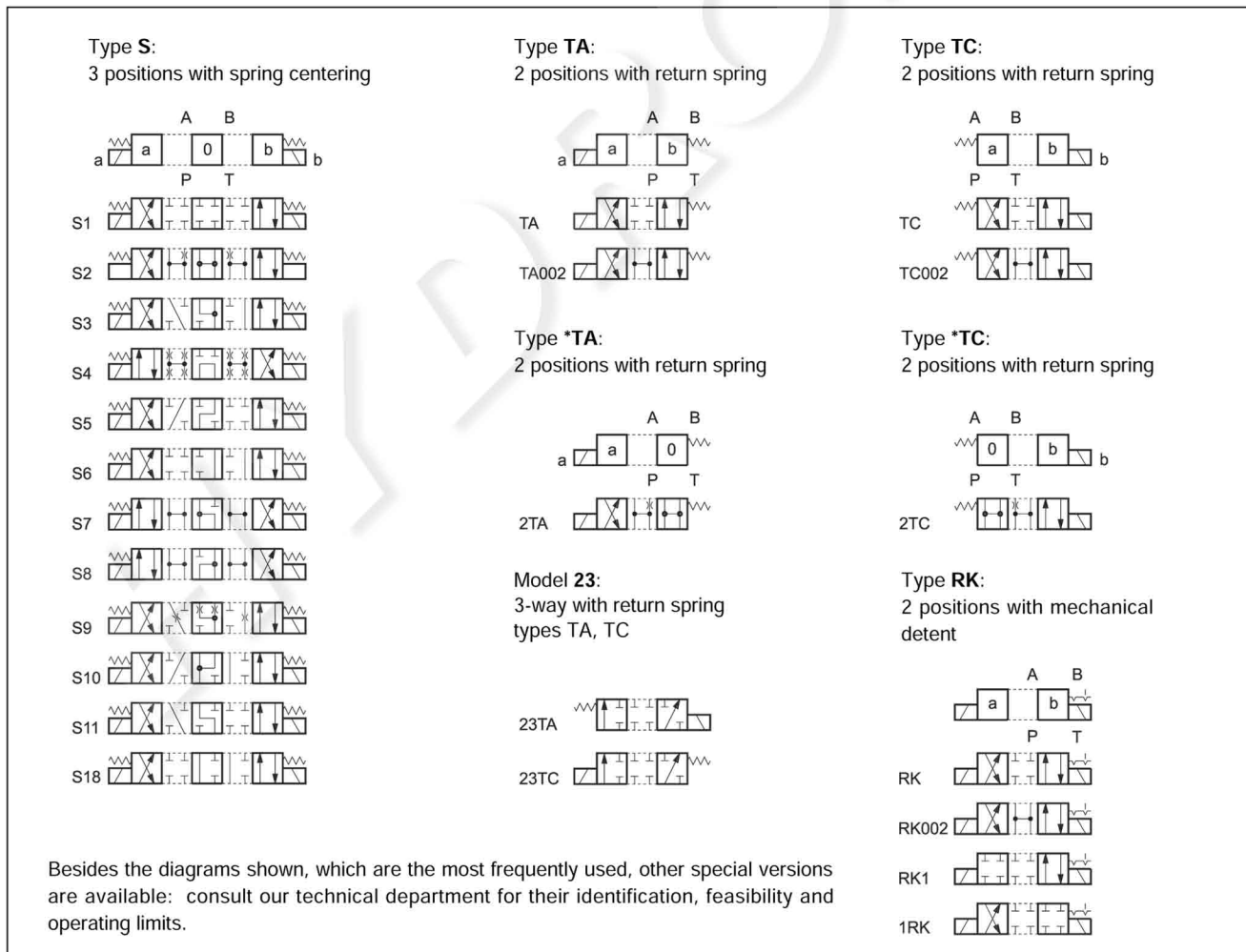
PERFORMANCE RATINGS (working with mineral oil of viscosity of 36 cSt at 50°C)

Maximum operating pressure:	– ports P A B – port T	bar bar	350 140 (series 50); 100 (series 60)
Maximum flow rate		l/min	100
Ambient temperature range		°C	–20 ÷ +50
Fluid temperature range		°C	–20 ÷ +70
Fluid viscosity range		cSt	2,8 ÷ 380
Recommended filtration		µm absolute	≤ 25
Recommended viscosity		cSt	25
Mass:	D4D-S, RK D4D-TA/TC	kg kg	4,5 3,6

1 - IDENTIFICATION CODE



2 - CONFIGURATIONS



3 - HYDRAULIC FLUIDS

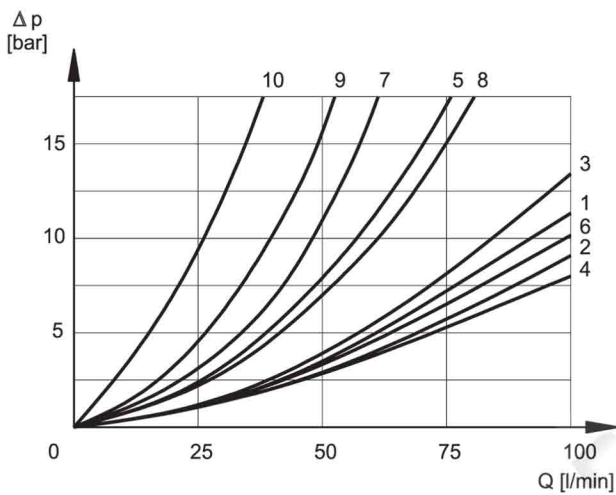
Use mineral oil-based hydraulic fluids, with the addition of suitable anti-frothing and anti-oxidising agents.

For the use of other fluid types (water glycol, phosphate esters and others), please consult our technical department.

Using fluids at temperatures higher than 70°C causes a faster degrading of the fluid's characteristics and of the seals.

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

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



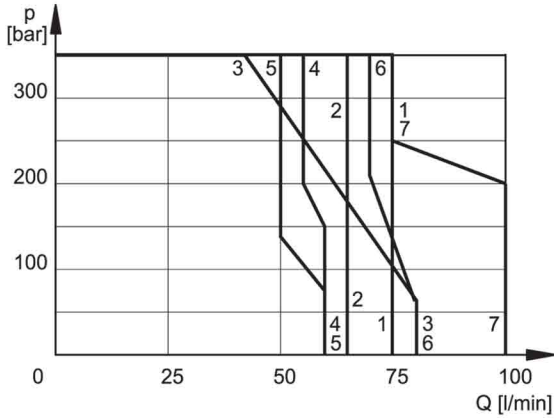
SPOOL TYPE	SPOOL POSITION	CONNECTIONS				
		P→A	P→B	A→T	B→T	P→T
S1	Energized	1	1	2	2	
S2	De-energized Energized	6	6	4	4	5*
S3	De-energized Energized	3	3	10• 4	10° 4	
S4	De-energized Energized	7	7	8	8	8
S5	De-energized Energized	3	9 6	2	2	
S6	De-energized Energized	3	3	2	5 4	
S7	De-energized Energized	7	7	8	8	8°
S8	De-energized Energized	7	7	8	8	8•
S9	Energized	3	3	2	2	
S10	De-energized Energized	8• 6	8° 6	2	2	
S11	De-energized Energized	3	3	5 4	2	
S18	De-energized Energized	5 6	3	2	2	
TA	De-energized Energized	3	3	6	6	
23TA	De-energized Energized	9	9			
RK	Energized	3	3	6	6	

* A-B blocked • B blocked ° A blocked

5 - OPERATING LIMITS

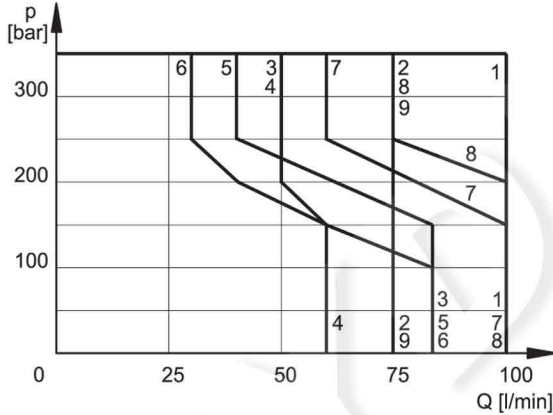
The curves define the flow rate operating fields according to the solenoid valve pressure with DC and AC solenoids. The values have been obtained with viscosity 36 cSt, temperature 50°C, filtration 25 µm and with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

DC SOLENOID VALVES



curve	type	curve	type
1	S1, S5, S9, RK, TA, S18	5	S6, S7, S8, S11
2	S2	6	S10
3	S3	7	23
4	S4		

AC SOLENOID VALVES



curve	type	curve	type
1	S1, S5, S18, S10, RK	6	S7, S8
2	S2	7	S9
3	S3	8	23
4	S4	9	TA
5	S6, S11		

The values indicated in the graphs can be considerably reduced if a 4-way valve is used with port A or B plugged.

5.1 Switching times

The values indicated refer to an S1 solenoid valve for Q=75 l/min, p=150 bar working with mineral oil at a temperature of 50°C, a viscosity of 36 cSt and with PA and BT connections. The switch on times are obtained at the time the spool switches over. The switch off times are measured at the time pressure variation occurs on the line.

TIMES (±10%)	ENERGIZING	DE-ENERGIZING
AC solenoid	30 ms	50 ms
DC solenoid	60 ms	50 ms

6 - ELECTRICAL FEATURES

6.1 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 tubes for alternating current supply are different than those for direct current and are recognizable by the letter "A" stamped on the rear, on the manual override side.

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

The interchangeability of coils of different voltages is allowed within the same type of supply current; alternating or direct (AC or DC / CCR).

SUPPLY VOLTAGE FLUCTUATION	+5% - 10% Vnom
MAX. SWITCH-ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) EMISSIONS (see note 1) IMMUNITIES	EN 50081-1 EN 50082-2
LOW VOLTAGE	in compliance with 73/23/CEE 96/68/CEE
Class of protection according to IEC 144 standard: Atmospheric agents Coil insulation Impregnation	IP 65 class H class F

Note 1: In order to further reduce the emissions, use of type H connectors (for DC or AC supply) is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see par. 10)

6.2 Available voltages

Besides the standard voltages shown in the table, other special configurations can be supplied upon request.

The CCR coils must be used when rectified current is used to supply a valve equipped with a DC tube.

Rectified current supply takes place by fitting a rectifier bridge, externally or fitted within the "D" type connectors, between the alternating current source (24 V or 110 V, /50 or /60 Hz) and the coil.

ALTERNATING CURRENT COILS:			
24V 50Hz	110V 50Hz	110V 60Hz	
48V 50Hz	220V 50Hz	220V 60Hz	
DIRECT CURRENT COILS:			
12VCC	24VCC	48VCC	110VCC
CCR COILS:			
24VCCR		110VCCR	

6.3 Current and power consumption

Energizing of a solenoid valve takes place with different electrical transients depending on whether the supply is in AC or DC.

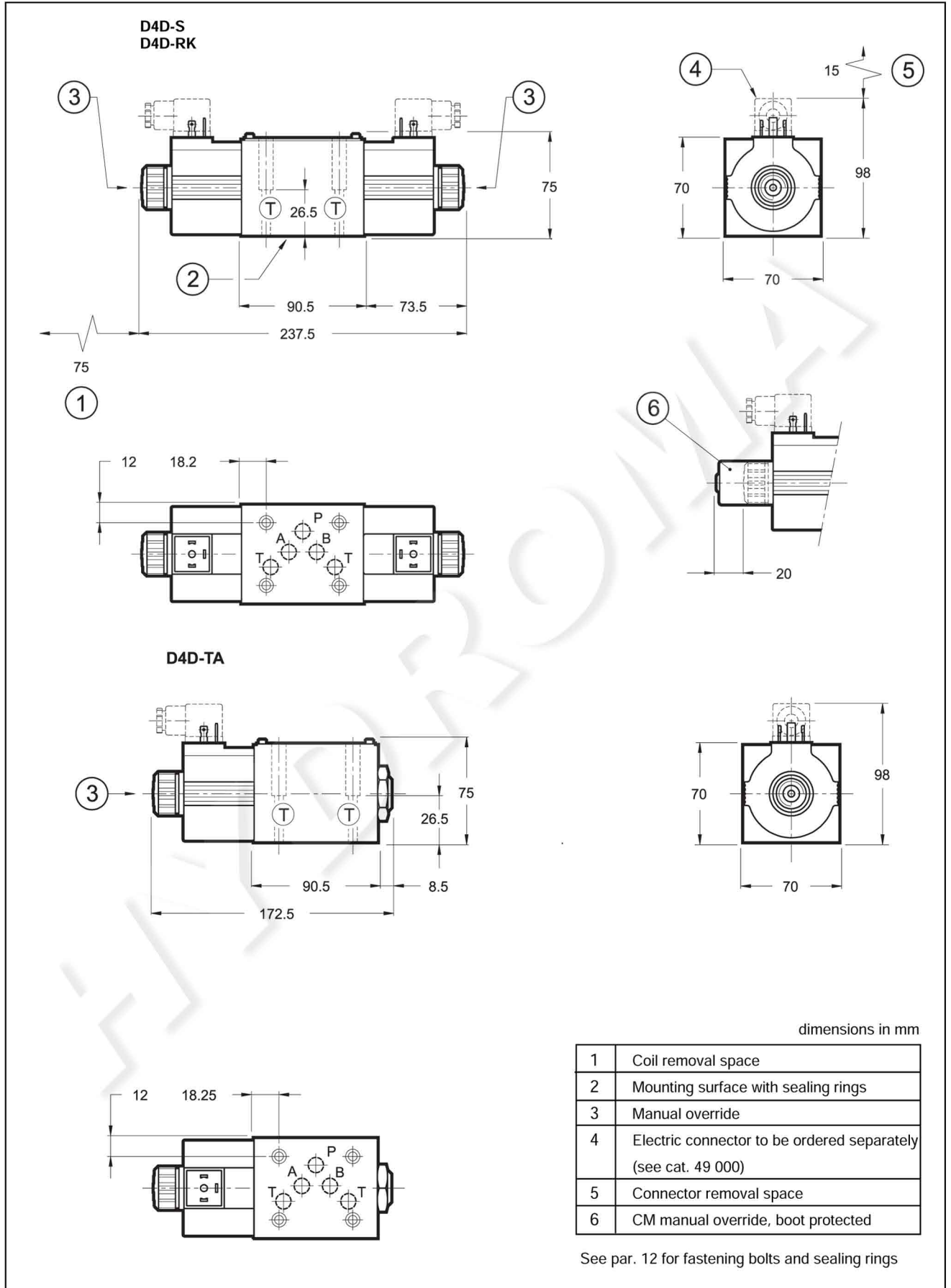
In alternating current energizing, an initial phase (maximum movement) is seen, during which the solenoid consumes elevated value currents (inrush current); the current values diminish during the plunger stroke until it reaches the minimum values (holding current) when the plunger reaches the stroke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

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law:

$$V = R \times I$$

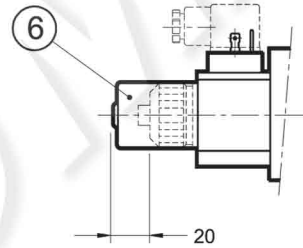
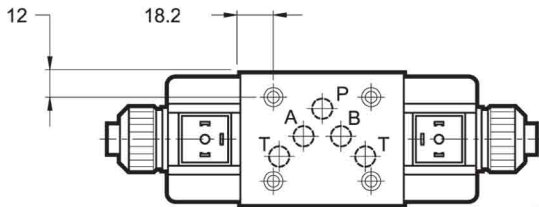
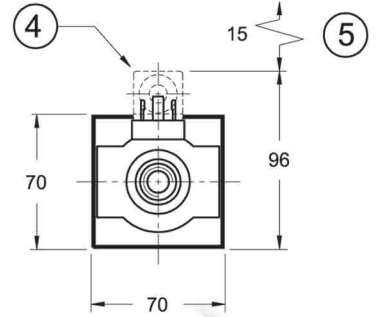
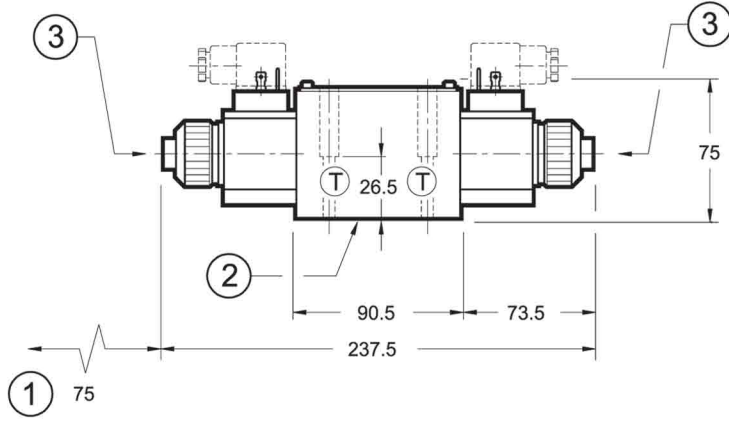
Nominal voltage and frequency		Current consumption at inrush	Current consumption at holding	Power consumption at inrush	Power consumption at holding
V	Hz	A (± 5%)		VA (± 5%)	
24	50	19.1	3.75	460	90
48	50	9.5	1.85	456	88.8
110	50	4.4	0.8	484	88
220	50	2.2	0.39	484	85.8
110	60	5.3	0.94	583	103.4
220	60	2.65	0.48	583	105.6
V		Consumed current A (± 5%)		Power W (± 5%)	
12	DC	3.7		44.4	
24	DC	1.83		43.9	
48	DC	0.91		43.6	
110	DC	0.4		44	

7 - OVERALL AND MOUNTING DIMENSIONS OF DIRECT CURRENT SOLENOID VALVE

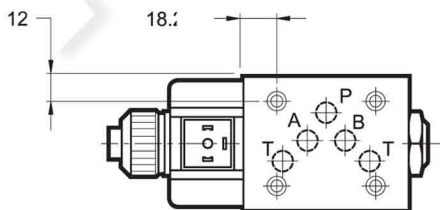
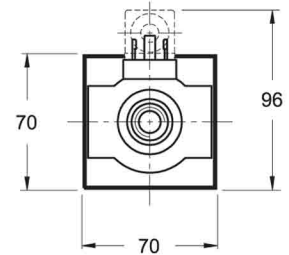
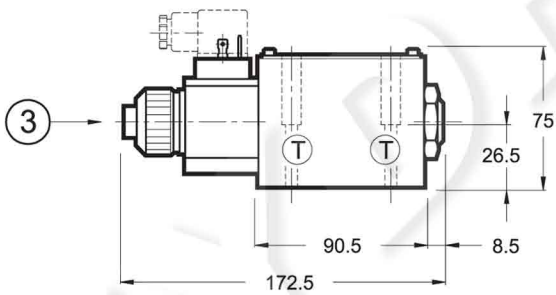


8 - OVERALL AND MOUNTING DIMENSIONS OF ALTERNATING CURRENT SOLENOID VALVE

D4D-S
D4D-RK



D4D-TA



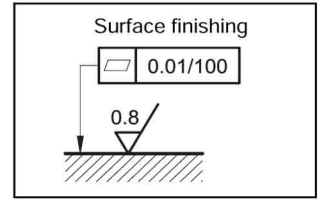
dimensions in mm

1	Coil removal space
2	Mounting surface with sealing rings
3	Manual override
4	Electric connectors to be ordered separately (see cat. 49 000)
5	Connector removal space
6	CM manual override, boot protected

See par. 12 for fastening bolts and sealing rings

9 - 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, 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 and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur. For use in tropical climates, it is necessary to include the CM option.



10 - 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.

11 - SPECIAL CONFIGURATIONS

11.1 D4D solenoid valve with soft shift device (option G and G1)

When the valve switching from one connection configuration to another is required to have a smooth change-over, the valves can be fitted with a soft shift device of the spool movement.

These valves are particularly useful to smoothen the start, the stop and the changeover of motion of an actuator, reducing pressure shocks.

The energising times are: option G = 120 ÷ 180 ms; option G1 = 80 ÷ 100 ms (obtained with viscosity 36 cSt at 50 °C).

The valve response times are influenced not only by the working hydraulic conditions (flow rate and pressure), but also by the hydraulic fluid temperature and viscosity. Consult our technical department.

This solution is possible, however, only with direct current solenoids (12V - 24V DC).

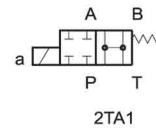
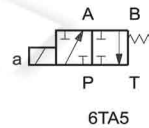
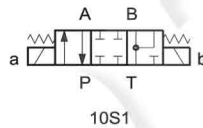
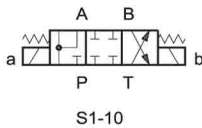
In order to improve the valve soft shift effect, use of spools with choked openings is recommended: type S12 (hydraulic diagram like S1).

Valve code example: D4D- S12/G/50-24VDC.

11.2 D4D solenoid valve with special spools

Besides the standard spool configurations (see table 2), Duplomatic can develop, on request, connection diagrams with special spools for a wide range of applications: consult our technical department for their identification, feasibility and operating limits.

Examples:



12 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 bolts M6x35
Tightening torque: 8 Nm
Threads of mounting holes: M6x10
Sealing rings: 5 OR type 2050

13 - SUBPLATES (See catalogue 51 000)

Type PMD4-AI4G with rear ports
Type PMD4-AL4G with side ports
P, T, A, B threading of ports : 1/2" BSP