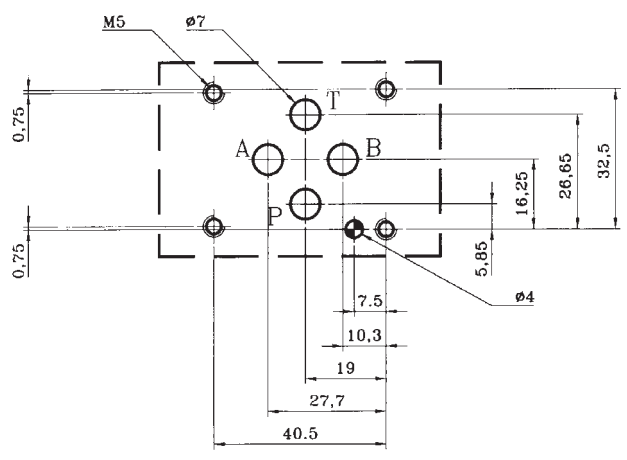




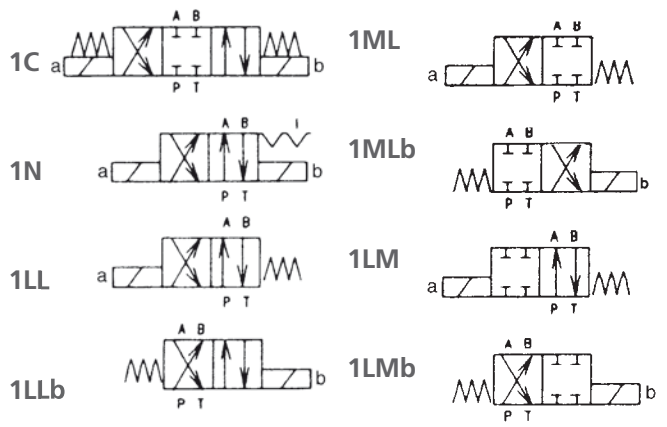
FT3 ES*



1 HOW TO READ THE MODEL CODE FOR VALVES FT3 - ES - *

FT3 - ES - (1) (C) - * - (024C) / 10						
1	2	3	4	5	6	7
1	FT3	4-way directional control valve Cetop 03 - Pressure 32 Mpa (320 bar)				
2	ES	electrically controlled, standard				
3	(1)	spool type (see 7)				
4	(C)	solenoid(s) and spring(s) arrangement, see also functional symbols 2 C 2 sol., spool is spring centered (3 position) N 2 sol., spool is detented (2 position) see 13 LL 1 sol. (a), spool is spring offset (2 position, end to end) ML 1 sol. (a), spool is spring offset (2 position, middle to end) LM 1 sol. (a), spool is spring offset (2 position, end to middle)				
5	*	Code reserved for option and variants b only for version LL, ML, LM sol. b installed (instead of sol. a) T soft shifting device, see 14 S-** calibrated orifice on P port, see 15 K water proof caps on emergency pin, see 16 ZC zinc plated valve, see 17				
6	(024C)	Electric voltage and solenoid coils 0000 no coil(s) 012C coil(s) for V12DC 024C coil(s) for V24DC 115A coil(s) for V110/50 - V 115/60 AC 230A coil(s) for V220/50 - V 230/60 AC See also electric characteristics 6				
7	Design number (progressive) of the valves					

2 FUNCTIONAL SYMBOLS



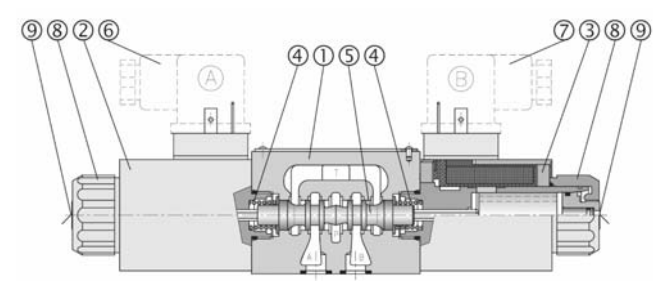
3 DESCRIPTION

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - CETOP 03 TYPE FT3 - ES - *

The spool ⑫ shifts in to the valves body ⑪ subject to the action of springs ⑬ and solenoids ① ②.

Spool ⑫, depending from its shape and its position in the valves body ⑪, opens and/or closes passages between P, A, B, T ports, thus controlling the direction of the hydraulic flow.

Solenoids ① and ② are energized by electric current flowing-in through connectors ③ and ④; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins ⑤, located at the end of the solenoids and accessible through the retaining nuts ⑩.





4 SPOOL TYPE AND INTERMEDIATE POSITION TRANSITORIES

0C			0LL		
1C			1LL		
3C			1LLb		
4C			2LL		
55C			0ML		
7C			1ML		
8C			3ML		
1N			4ML		
2N			8ML		
19C			18ML		
42C			13ML		
56C			56ML		
38C			56MLb		

5 TECHNICAL DATA

Maximum nominal flow	1dm ³ /s (60 l/min)
Maximum rec. flow rate	see 9
Maximum nominal pressure (P, A, B)	32 Mpa (320 bar)
Maximum pressure at T port	16 Mpa (160 bar)
Pressure drops	see 4
Electric characteristics	see 6
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	≥ 107 cycles
Dimensions	see 10
Installation	see 11
Mass	approx. 1,6/2,1 kg

6 INSTALLATION

All valves FT3 - * conform ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve FT3 - * must be fastened with 4 bolts M5 x 45 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 9,25x1,68x1,68. Solenoid valves can be supplied without electric coils, as FT3 - ES - ** - 0000 - . Coils are supplied separately; standard, 3 electric pins, coils are BO3 - 012C, BO3 - 024C, BO3 - 115A and BO3 - 230A. Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like - signal led - voltage surge suppressor, etc.

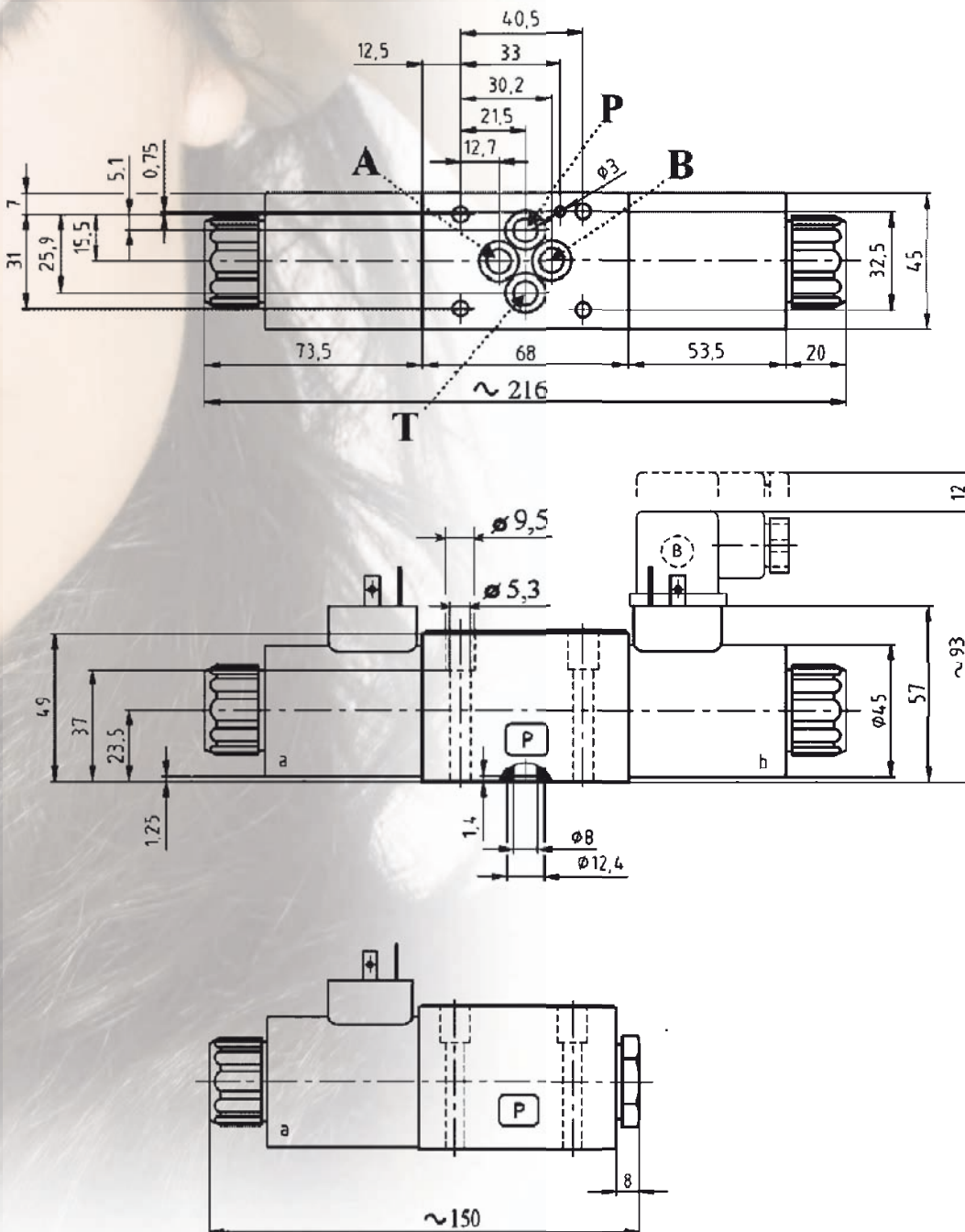
7 HYDRAULIC FLUIDS

Seals and materials used on standard valves FT3 - * are fully compatible with hydraulics fluids of mineral oil base, upgrade with antifoaming and antioxidant agents.

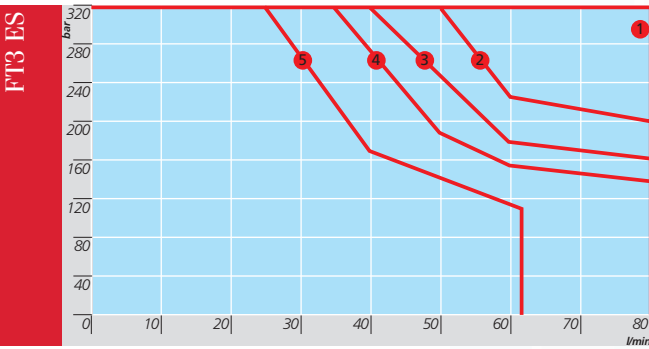
The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

8 INSTALLATION DIMENSIONS

All dimensions are mm



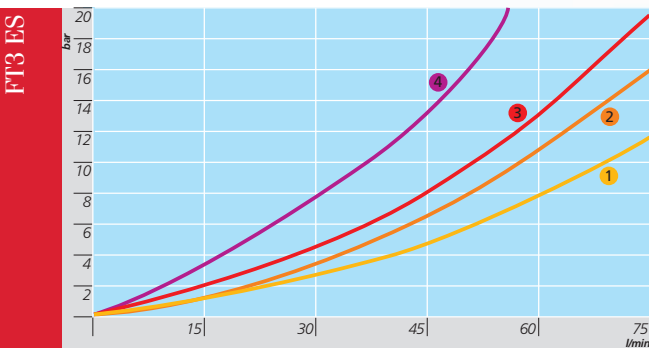
9 HYDRAULIC LIMITS OF USE



P/Q characteristics limits for safe use of FT3 - ES - * solenoid operated valves.
Limit curves apply to sol. valves energized with rated voltage - 5% and flush

- ① = FT3 - ES - 0C; - 1C; - 1N; - 1ML; - 8C
- ② = FT3 - ES - 3C; - 2
- ③ = FT3 - ES - 1LL; - 1LLb
- ④ = FT3 - ES - 0LL
- ⑤ = FT3 - ES - 4C

10 TYPICAL DIAGRAMS



Typical Δp -Q curves for valves HD3-ES in standard configuration with mineral oil at $v=32\text{mm}^2/\text{s}$ and $t=40^\circ\text{C}$.

Spool	P-A	P-B	A-T	B-T	P-T
0C	1	1	2	2	1
0LL	1	1	2	2	-
0ML	-	1	2	-	1
1C	1	1	2	2	-
1LL	1	1	2	2	-
1LLb	1	1	2	2	-
1ML	-	1	2	-	-
1N	1	1	2	2	-
3C	1	1	2	2	-
4C	3	3	4	4	1
8C	1	1	2	2	-

11 SOLENOIDS

Solenoid valves can be supplied without electric coils, as HD3-ES*-0000.

Coils are supplied separately ; standard, 3 electric pins, coils are :

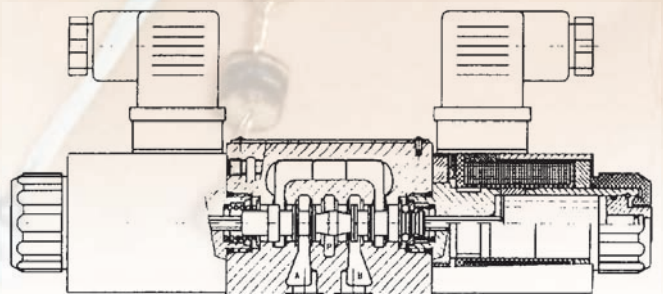
- BO3 - 012 C
- BO3 - 024C
- BO3 - 115A
- BO3 - 230A

Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like :

- Signal led
- Voltage surge suppressor, etc...

12 VERSION "N": MECHANICAL DETENT ON SPOOL

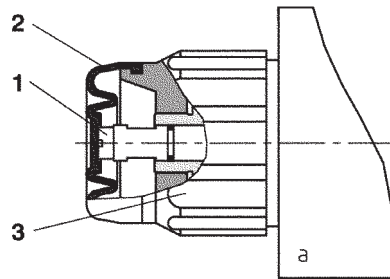
Solenoid valves with detent typically are 2 position, 2 solenoid, no-spring valve where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by its position regardless of forces due to hydrodynamics or gravitation/inertial effects (vibrations).



13 VERSION "T": SOFT SHIFTING

Solenoid valves with "soft shifting" devices are 2 or 3 position valves controlled by solenoids A and C which incorporate calibrated orifices in the armature plungers.

The hydraulic controls on the shifting speed of the plunger, and therefore of the spool (129 in the valve's body, permit progressive transitories, thus reducing, thus reducing or eliminating water hammer effects in the circuit. Typically the shifting time of a "T" version solenoid valve is, when energized, in the order of 300_500 ms (versus 30_50 ms of a standard valve) provided that the armature plunger properly works in the bleeding the air from the solenoid acting on purge's valve Ö, which is protected by cover (15), and by assuring a minimum counter pressure on T line.



14 VERSION "S": CALIBRATED ORIFICE ON P PORT

Option "S*" is represented by elements ②, suitably shaped to be inserted on p port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, at the requested ΔP value, the flow rate entering the solenoid valve.

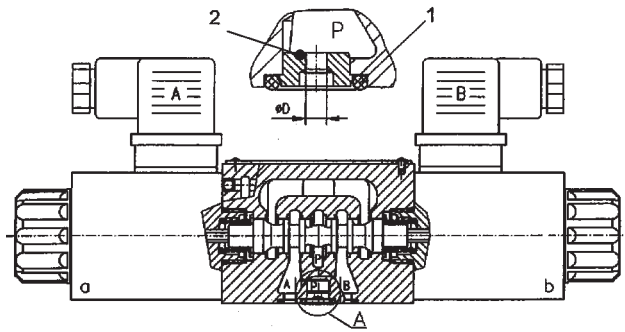
Those elements have following orifice diameter:

3S - 10 $\rightarrow D = 1 \text{ mm}$

3S - 20 $\rightarrow D = 2 \text{ mm}$

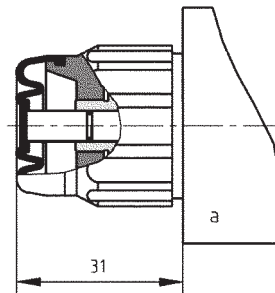
3S - 25 $\rightarrow D = 2,5 \text{ mm}$

and are kept sealed on the P port of the valve by an OR ① of 9,25x1,78 mm sizes (example OR 110 - 2037).



15 VERSION "K": EXTENDED EMERGENCY PIN

Solenoid valves according to "K" version have extended emergency actuator pins protruding from the solenoid shape, that permit a quick and easy "hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy operation and protects from moisture and water splashes.



16 ANTICORROSION OPTIONS

On HD3-ES-* standard valves the body is phosphate coated, the solenoid tubes are not treated and coils mantel and irons are zinc trivalent plated.

To increase the resistance to corrosive agents different variants are available :

ZT Body, solenoid tubes and coils irons are zinc trivalent plated

ZL Body is coated with special TEMADUR 40 zinc painting

Solenoids have 8-12 μm zinc plating

ZK Body is coated with special TEMADUR 40 zinc painting

Solenoids tube and coils irons are "zinc-nickel" plated