

PROPORTIONAL 4-WAY CONTROL VALVES Ex - proof II 2 GD, Ex db T5 Gb & Ex tb T100 °C Db
HD3-PX-*25
32 l/min 25 MPa (250 bar)

1 DESCRIPTION

Valves HD3-PX are ATEX proportional directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03). The design of the body is an high quality five chamber casting. The valve is available with ATEX metallic DC and AC solenoids. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227 . Enhanced surface protection for specific applications is available (ISO 9227, 520 h salt spray).



2 ORDERING CODE

(1)	(2)	(3)	(4)	(5)	(6)	(7)
HD3	-	PX	-	-	-	/ 25

(1) HD3 : 4-way directional valve Cetop 03 – Pressure 25 Mpa (250 bar)

(2) PX : Proportional electric control, Ex-proof solenoid (see 7)

(3) Functional spool type (see 5)

- number:

1 : closed center (P, A, B, T blocked)

3 : P blocked, A, B, T connected

-spool nominal flow:

P : 32 l/min with P = 1 Mpa (10 bar) (PA+BT or PB+AT)

R : 16 l/min with P = 1 Mpa (10 bar) (PA+BT or PB+AT)

05 : 05 l/min with P = 1 Mpa (10 bar) (PA+BT or PB+AT)

D : differential $Q_b = 2Q_a$: 32/16 l/min with P = 1 Mpa (10 bar)

(4) Solenoids and springs arrangements (see 5)

C : 2 sol., spool is springs centered

ML : 1 sol. ("a") spool is centered + 1 end position

MLb : 1 sol. ("b") spool is centered + 1 end position

(5) Options and variants

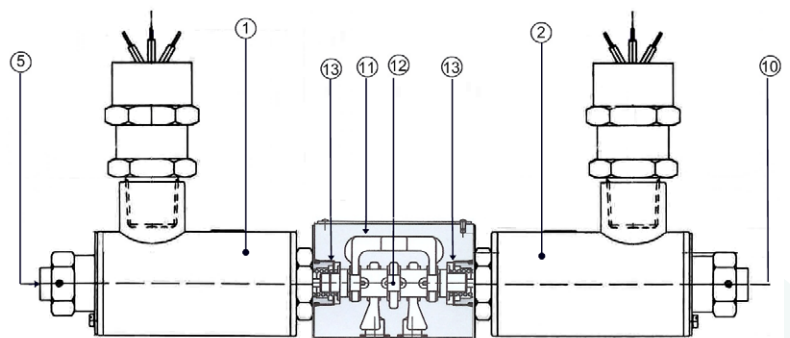
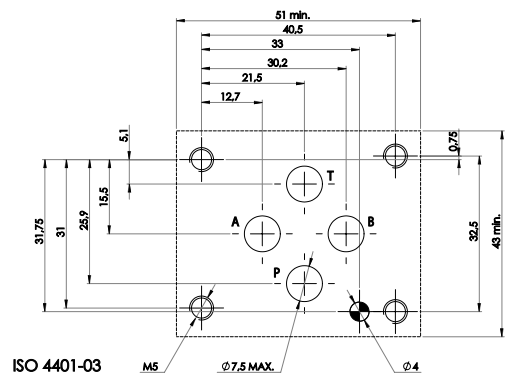
ZN : zinc nichel plated valves (see 10)

(6) Type of coil(s) and supply voltages (see 7)

R2 : standard V12DC (R=11,3 Ω)

R4 : standard V24DC (R=45,3 Ω)

(7) Design number (progressive) of the valve.



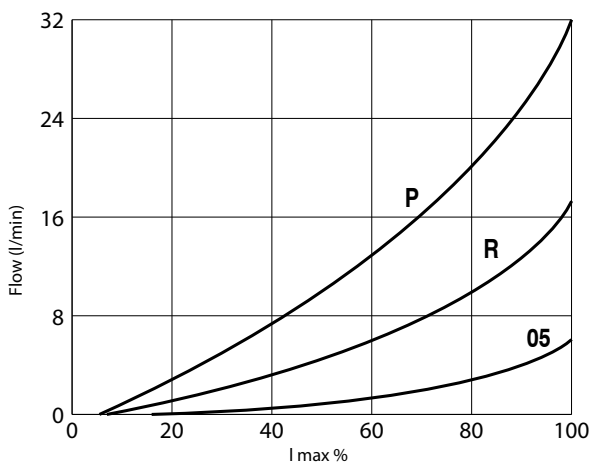
The spool 12 shifts in to the valves body 11 subject to the action of springs 13 and proportional solenoids 1 and 2. Spool 12, depending from its shape and its position in the valves body 11, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoids 1 and 2 and are energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

3 TECHNICAL DATA

Nominal flow rates	5, 16, 32 l/min	Electric characteristics: Valves type HD3-PX-* are valves operated by Ex-proof proportional solenoids ATEX qualified for class Ex tb IIIC T5 Db IP66/67 & Ex db IIIC T5 Gb On valves type HD3-PX-*, the max permissible power consumption on each solenoid is 11w and, therefore, the currents to solenoids have to be limited to: • I max = 0,92 A for coils R2 (R=11,3) • I max = 0,46 A for coils R4 (R=45,3) Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current – see 14.
Maximum nominal pressure (P,A,B)	25 Mpa (250 bar)	
Maximum pressure at T port	25 Mpa (250 bar)	
Maximum rec. Pressure drops	5 Mpa (50 bar) (see 5)	
Protection to DIN 40050	IP 67	
Duty cycle	100%	
Service life	> 10 ⁷ cycles	
Dimensions and installation	(see 8)	
Mass	Approx 2,6 / 3,7 kg	

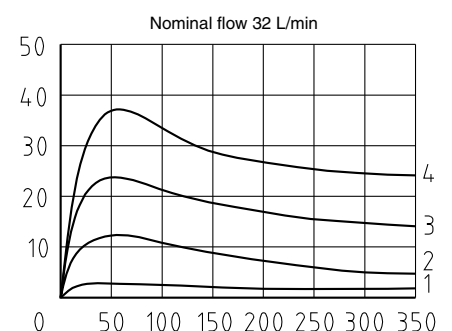
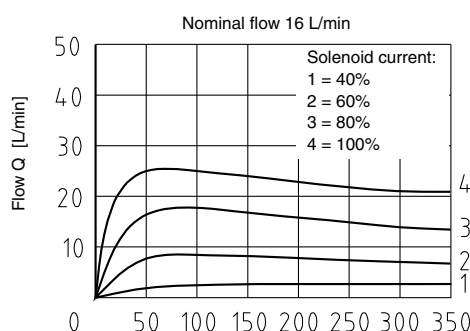
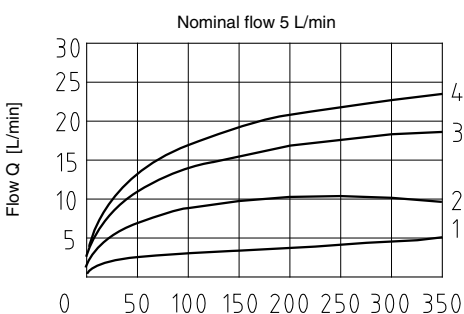
4 TYPICAL DIAGRAMS

Typical flow curves of valves HD3-PX-* in standard configuration measured with mineral oil at 36 cSt and at 50°C at ΔP=01 Mpa (10 bar) for flow P -> B, A -> T

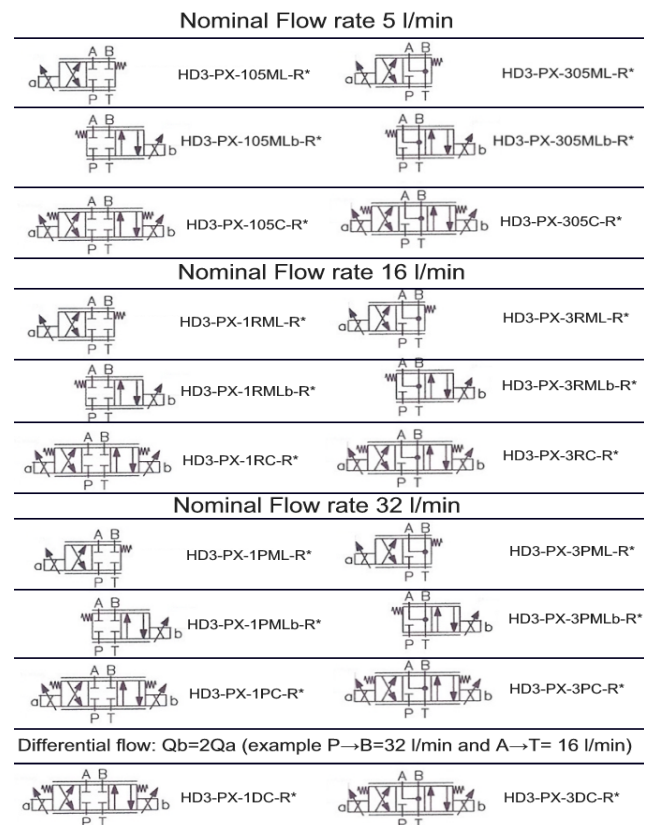


6 FLOW RATES AND PRESSURE DIFFERENTIAL

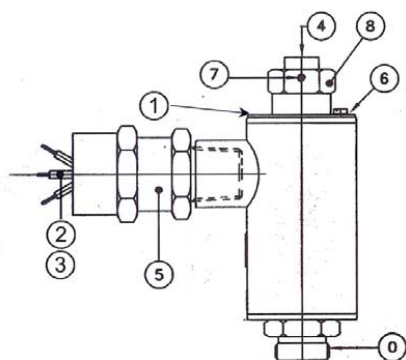
For a given ΔP on a given valve the flow rates are proportional to the driving current (see 4); for a given driving current on a given valve, the flow rates increase with the increasing of the ΔP up to certain limits. Typical limit curves are:



5 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

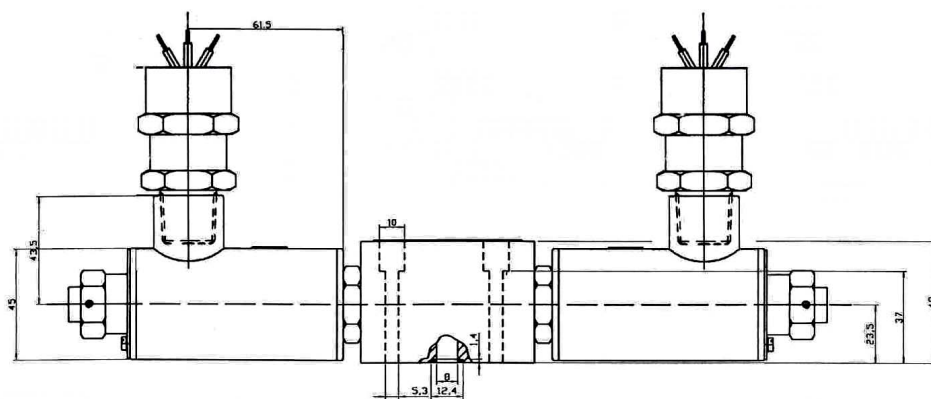
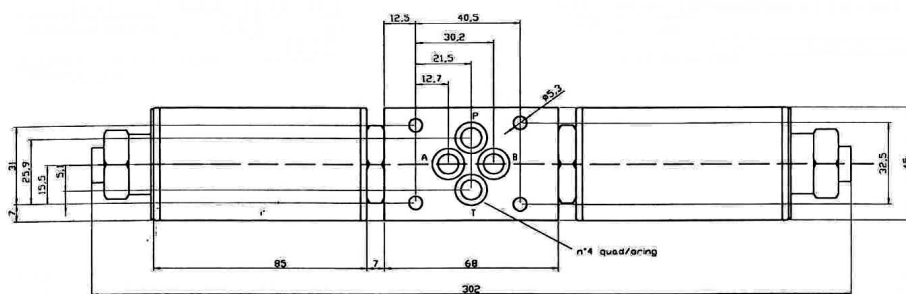


7 EXPLOSION PROOF SOLENOID TYPE GMA-6/PX SERIES 271



- 0: Ex proof solenoid according to ATEX 94/9/CE.
Class Ex db T5 Gb & Ex tb T 100 °C Db IP 68/67
Solenoid outside surfaces are nickel plated, with 7 μ m minimum thickness
 - 1: Solenoid label indicates supply voltage, protection class EExd, certification number by INERIS and maximum power.
 - 2: 3-wires cable, according to CEI 20-22, of standard length of 1,5 m, is fastened to the coil and locked by cable gland 5.
 - 3: Wires have 1,5 mm² section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
 - 4: Manual override operation is by pushing the extended pin.
 - 5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment 1/2" conical – ISO 7/1
 - 6: Earth connection screw
 - 7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
 - 8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.
- Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

8 INSTALLATION DIMENSIONS (mm)



All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5 X 45 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Of special interest is the mounting of pressure compensator modules with HD3-P proportional valves – see 15. 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.

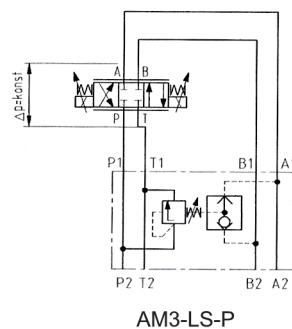
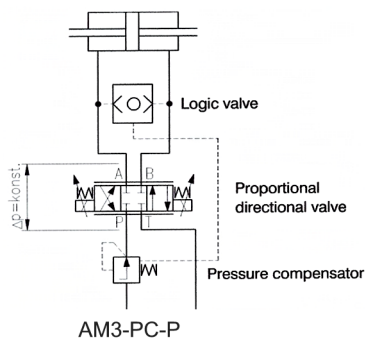
9 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD3-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and anti-oxidizing 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.

10 VERSION "ZN": ZINC NICHEL PLATED

Solenoid valves according to "ZN" version have central body zinc-nickel plated and protected against every type of corrosion due to saline ambience or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 μm .

11 PRESSURE COMPENSATOR MODULES



2-way pressure compensator for meter-in application type AM3-PCP – see table AM-391. When using the 2-way pressure compensators in meter-in application, shown in the circuit diagram, a constant pressure difference across the metering edge of the proportional directional valve is held. In this case, the pressure variations due to loading changes, as well as pump pressure changes, are compensated. That means that a pressure change cannot result in flow increase. 3-way pressure compensator type AM3-LS-P is able to operate as "load sensing" device, by discharging at T port, at the same pressure of the user, the flow that exceeds the flow rates required by the controlled opening of the proportional 4-way valve.