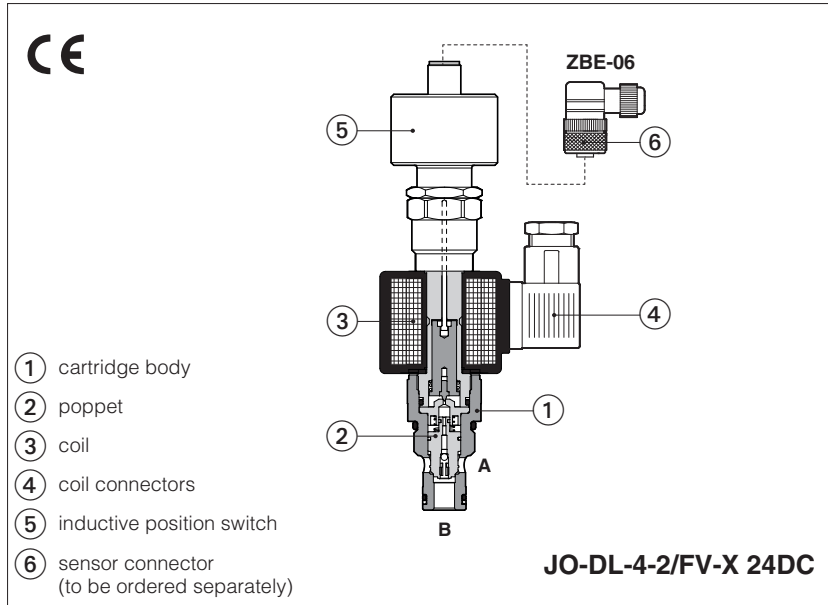


# Safety cartridge valves with optional poppet position monitoring

screw-in, 2-way, poppet type, leak free, conforming to Machine Directive 2006/42/CE - certified by 



- ① cartridge body
- ② poppet
- ③ coil
- ④ coil connectors
- ⑤ inductive position switch
- ⑥ sensor connector (to be ordered separately)

**JO-DL** are leak free, poppet type solenoid cartridges in screw-in execution normally used to cut off the hydraulic power supply line. They are available in normally closed NC, or normally open one NO configurations.

The **/FV** version integrates an inductive position switch (double contact NC/NO) ⑤ which supplies the output electrical on-off signal indicating the poppet ② position (open/closed), and therefore they can be used as safety valves for emergency conditions.

They are **CE** marked and certified by **TÜV** in accordance with safety requirements of Machine Directive 2006/42/CE.

**Certification**

The **TÜV** certificate can be downloaded from [www.atos.com](http://www.atos.com), catalog on line, technical information section.

Max flow: **300 l/min**  
Max pressure: **350 bar**

**1 MODEL CODE**

<b>JO</b>	-	<b>D</b>		<b>L</b>	-	<b>4</b>	-	<b>2</b>	/	<b>NC</b>	-	<b>X</b>		<b>24 DC</b>		<b>**</b>	/	<b>*</b>	
Cartridge valve screw-in type UNF		D = Directional control		L = Poppet type		Size: 4 = 3/4"-16UNF-2A 6 = 7/8"-14UNF-2A 10 = 1 5/16"-12UNF-2A		2 = Two-way		Note (1): not for version /FV		X = Without connector, see section 5 for available connector		Voltage code: 12DC = 12 VDC 24DC = 24 VDC		Series number: 20 for FV 40 for NC and NO		Seals material, see section 4: - = NBR PE = FKM BT = HNBR (1)	

**Version:**

- NC** = normally closed in rest position
- NO** = normally open in rest position
- FV** = normally closed in rest position, with inductive position switch (double contact)

**2 HYDRAULIC CHARACTERISTICS**

Hydraulic symbols		<b>/NO</b>		<b>/NC</b>		<b>/FV</b>	
Model		<b>JO-DL-4-2/NC</b> <b>JO-DL-4-2/FV</b>	<b>JO-DL-4-2/NO</b>	<b>JO-DL-6-2/NC</b> <b>JO-DL-6-2/FV</b>	<b>JO-DL-6-2/NO</b>	<b>JO-DL-10-2/NC</b> <b>JO-DL-10-2/FV</b>	<b>JO-DL-10-2/NO</b>
Operating pressure [bar]		Ports A and B <b>350</b>					
Max flow [l/min]		40		75		300	
Response time: energizing [ms]		35	50	30	50	35	150
Response time: de-energizing [ms]		50	35	60	35	70	35
Internal leakage		less than 5 drops/min (≤ 0,36 cm³/min) max at 350 bar					

### 3 GENERAL CHARACTERISTICS

Installation position	Any position
Cavity	JO-DL-4 = SAE-08-2N; JO-DL-6 = SAE-10-2N; JO-DL-10 = SAE-16-2N
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Ambient temperature	<b>Standard</b> execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C - not for version /FV

### 4 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult Atos Technical Office

Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	15 ÷ 100 mm <sup>2</sup> /s - max allowed range 2.8 ÷ 500 mm <sup>2</sup> /s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 µm (β10 ≥75 recommended)		
<b>Hydraulic fluid</b>	<b>Suitable seals type</b>	<b>Classification</b>	<b>Ref. Standard</b>
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

### 5 ELECTRIC CHARACTERISTICS

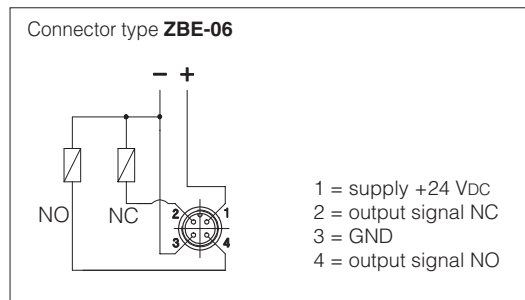
Relative duty factor	100%	
Supply voltage	See model code at section 11	
Supply voltage tolerance	±10%	
Max power	19 Watt	
Power connector	666 (plastic - black); 3 pins, cable clamp PG11, cable max ø 11 mm	<b>to be ordered separately</b>
Type of connector for /FV version	Type ZBE-06 (plastic); 4 pins, cable clamp PG9, cable max ø 8 mm	
Connectors features	666: DIN 43650 - ISO 4400; IP65 (DIN 40050); VDE 0110C ZBE-06: M12 - IEC60947-5-2; IP67 (DIN 40050)	

### 6 INSTALLATION NOTES

- The assembling of cartridges inside manifolds must be done tightening the valve exagonal ring (for tightening torque, see section 10). Excessive values can cause anomalous deformation and poppet sticking.  
For the /FV versions avoid to tighten through the position sensor.
- The CE certification is valid only with shielded electric cables and connector. Consult also tab. P004.  
These safety valves must be supplied only and always as one complete component, proximity sensor is factory adjusted.  
The supply of subcomponents invalidates the certification.

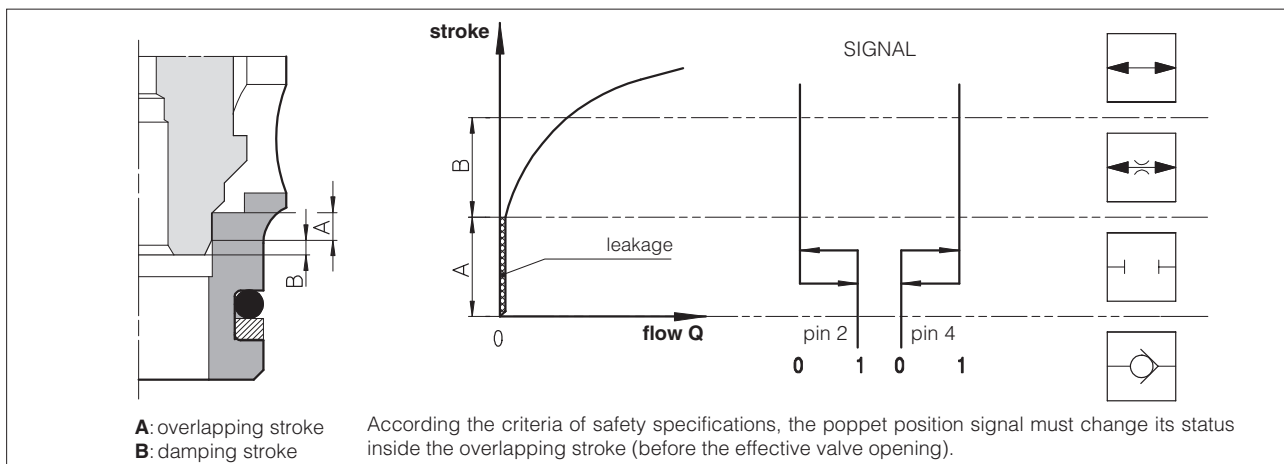
### 7 TECHNICAL CHARACTERISTICS AND CONNECTING SCHEME OF INDUCTIVE POSITION SWITCH /FV

Type of switch	position switch /FV	
Supply voltage [V]	20 ÷ 32	
Ripple max [%]	≤ 10	
Max current [mA]	400	
Max peak pressure [bar]	400	
Mechanical life	virtually infinite	
Switch logic	PNP	



**NOTE:** the /FV position switch are not provided with a protective earth connection

### 8 SIGNAL STATUS - VERSIONS /FV

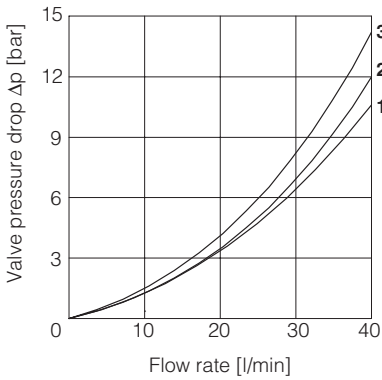


**9 DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

**9.1 JO-DL-4**

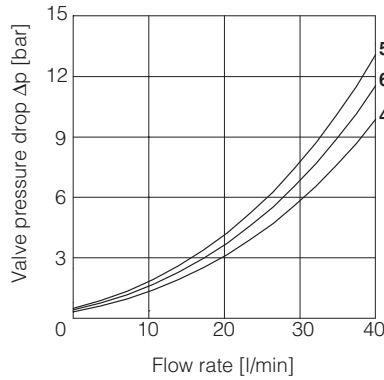
Valve pressure drop - NO version

- 1 = A → B de-energized
- 2 = B → A de-energized
- 3 = B → A energized



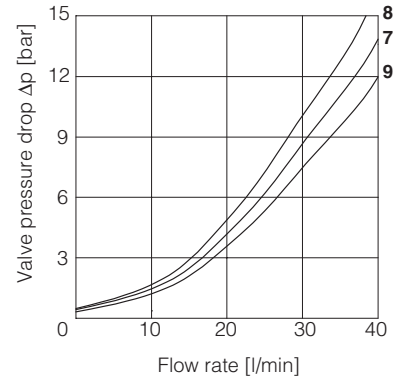
Valve pressure drop - NC version

- 4 = A → B energized
- 5 = B → A de-energized
- 6 = B → A energized



Valve pressure drop - FV version

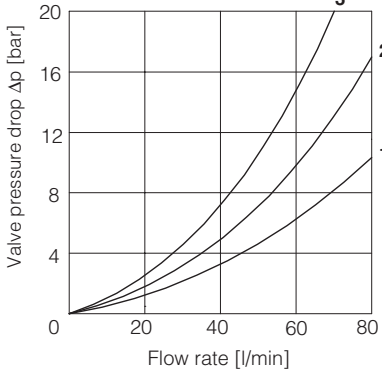
- 7 = A → B energized
- 8 = B → A de-energized
- 9 = B → A energized



**9.2 JO-DL-6**

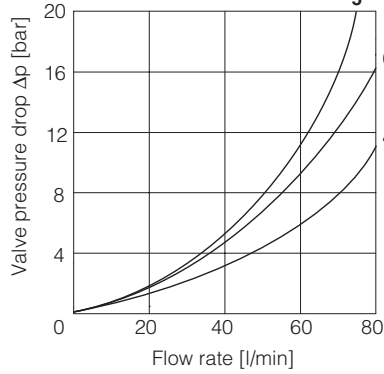
Valve pressure drop - NO version

- 1 = A → B de-energized
- 2 = B → A de-energized
- 3 = B → A energized



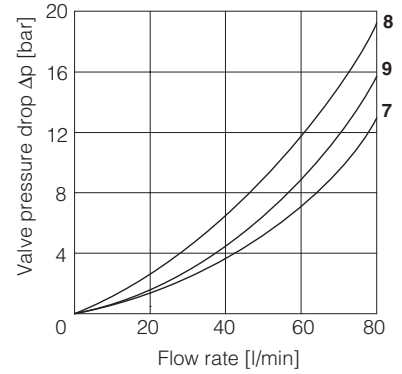
Valve pressure drop - NC version

- 4 = A → B energized
- 5 = B → A de-energized
- 6 = B → A energized



Valve pressure drop - FV version

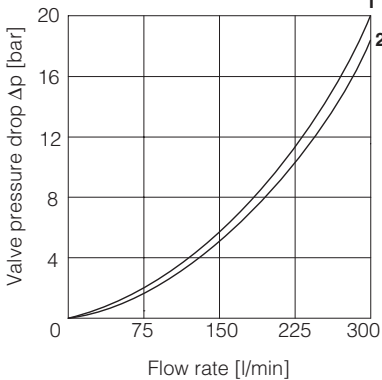
- 7 = A → B energized
- 8 = B → A de-energized
- 9 = B → A energized



**9.3 JO-DL-10**

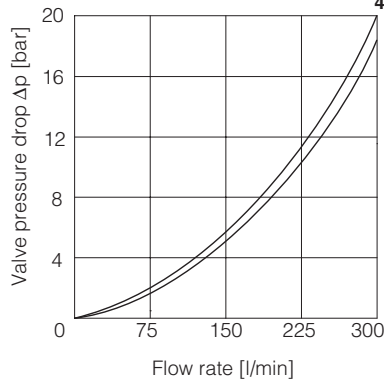
Valve pressure drop - NO version

- 1 = A → B de-energized
- 2 = B → A de-energized
- 3 = B → A energized



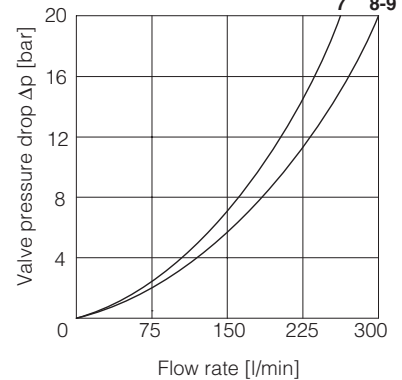
Valve pressure drop - NC version

- 4 = A → B energized
- 5 = B → A de-energized
- 6 = B → A energized



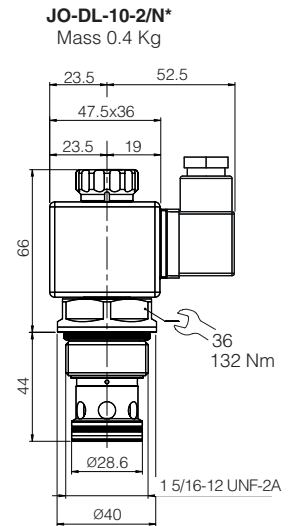
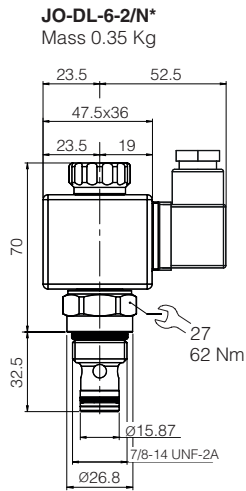
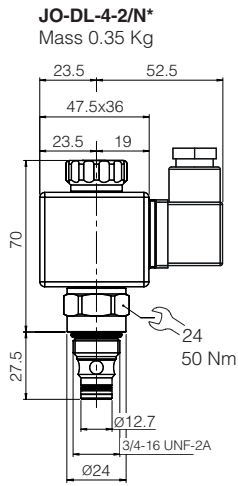
Valve pressure drop - FV version

- 7 = A → B energized
- 8 = B → A de-energized
- 9 = B → A energized

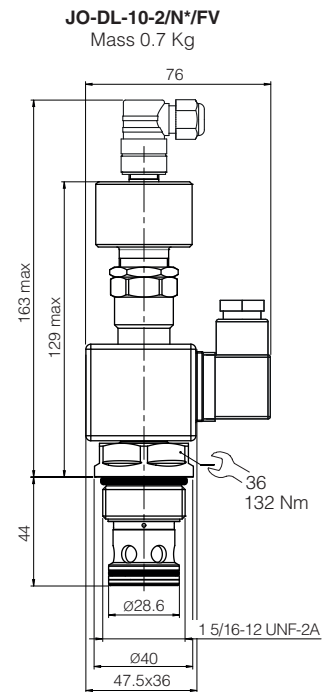
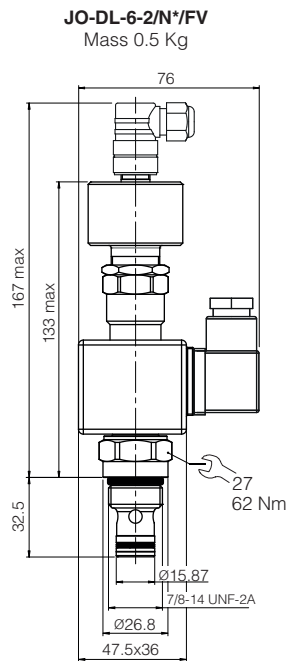
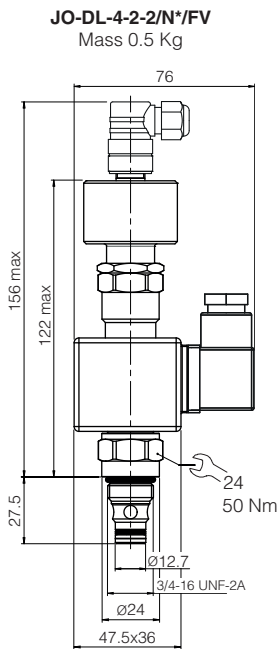


10 DIMENSIONS [mm]

Version /NO and /NC

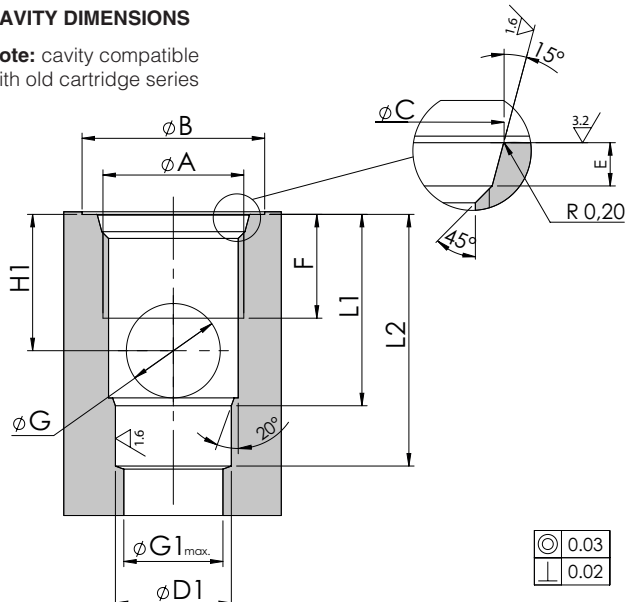


Version /FV



CAVITY DIMENSIONS

Note: cavity compatible with old cartridge series



	SAE-08-2N	SAE-10-2N	SAE-16-2N
A	3/4-16 UNF	7/8-14 UNF	1 5/16-12 UNF
B	26	30	42
C	20.6 <sup>+0.1</sup> <sub>0</sub>	23.9 <sup>+0.1</sup> <sub>0</sub>	35.5 <sup>+0.1</sup> <sub>0</sub>
D1	12.7 <sup>+0.05</sup> <sub>0</sub>	15.87 <sup>+0.05</sup> <sub>0</sub>	28.60 <sup>+0.05</sup> <sub>0</sub>
E	2.6 <sup>+0.3</sup> <sub>0</sub>	2.6 <sup>+0.3</sup> <sub>0</sub>	3.3 <sup>+0.3</sup> <sub>0</sub>
F	13	15	20
G	9	12	19
G1	12	15	24
H1	14	18	25
L1	20.5	25.5	36
L2	29	34.5	49