

# Series AP directly operated proportional valves

2/2-way proportional valves, NC  
Sizes: 16 - 22 mm



- » PWM or current operation
- » Open loop flow control
- » Also suitable for use with vacuum

Several versions available:

- » with body in PVDF (size 16mm only),
- » with rear flanged bodies
- » with lower flanged bodies,
- » suitable for use with oxygen
- » Seals in FKM, NBR and EPDM

Series AP directly operated 2/2-way proportional solenoid valves, NC, with nominal diameters range from 0.8 to 2.4 mm, can be used where an open loop flow control is required, with gas mixtures, to control free flows or blows, or emptying chambers using vacuum.

Series AP proportional valves have been manufactured to optimize and reduce friction and stick-slip effects. The output flow is proportional to the control signal. As they can work also in vacuum, a minimum working pressure is not required.

## GENERAL DATA

<b>Function</b>	2/2 NC			
<b>Operation</b>	proportional directly operated			
<b>Ports</b>	M5 - G1/8 - with rear flanges - with lower flanges			
<b>Hysteresis</b>	Size 16mm: 12% FS - Size 22mm: 10% FS			
<b>Repeatability</b>	Size 16mm: 7% FS - Size 22mm: 7% FS			
<b>Operating temperature</b>	0 ÷ 60°C			
<b>Medium</b>	filtered compressed air, unlubricated, according to ISO 8573-1 class 3.4.3, inert gas. All the valves are suitable for use with oxygen.			
<b>Installation</b>	any position			
<b>Materials</b>	body = brass / PVDF (size 16mm only) seals = NBR, FKM, EPDM			
<b>Nominal resistance</b>	GP7	GPH	U711	U712
<b>Rated current</b>	193 ohm	48 ohm	85 ohm	22 ohm
	125 mA	250 mA	271 mA	542 mA

NOTE: Having a counterpressure on the outlet connection of at least 25% of the inlet pressure ensures the good functioning of the valve and improves its performance. Example: with inlet Pressure = 1 bar on the outlet connection, a min. counterpressure of 250 mbar is recommended.

**CODING EXAMPLE**

<b>AP</b>	<b>-</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>L</b>	<b>R</b>	<b>2</b>	<b>-</b>	<b>U</b>	<b>7</b>	<b>11</b>	<b>OX2</b>
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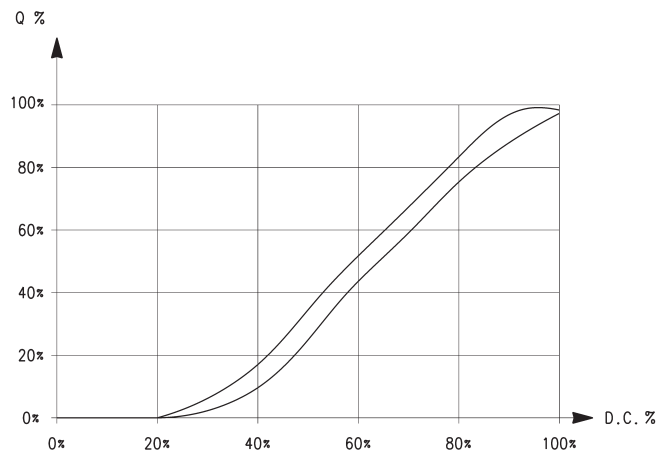
<b>AP</b>	SERIES		
<b>7</b>	BODY: 6 = size 16mm		7 = size 22mm
<b>2</b>	NUMBER OF WAYS: 2 = 2-way		
<b>1</b>	VALVE FUNCTION: 1 = NC		
<b>1</b>	PORTS: 0 = M5 (size 16mm only) 1 = G1/8 (size 22mm only)	4 = with rear flanges (size 16mm only) 5 = with lower flanges	L = male hose adaptor (for body in PVDF only, size 16mm)
<b>L</b>	ORIFICE: D = $\varnothing$ 0.8 mm (size 16mm only) F = $\varnothing$ 1 mm	H = $\varnothing$ 1.2 mm L = $\varnothing$ 1.6 mm	N = $\varnothing$ 2 mm (size 22mm only) Q = $\varnothing$ 2.4 mm (size 22mm only)
<b>R</b>	SEAL MATERIAL: R = NBR	W = FKM	E = EPDM
<b>2</b>	BODY MATERIAL: 2 = brass		
<b>U</b>	ENCAPSULATING MATERIAL: G = PA (size 16mm only)		U = PET (size 22mm only)
<b>7</b>	SOLENOID DIMENSIONS: P = 16x26 DIN EN 175301-803-C (size 16mm only)		7 = 22x22 DIN 43650 B (size 22mm only)
<b>11</b>	SOLENOID VOLTAGE: H = 12 V DC 3 W (size 16mm only) 7 = 24 V DC 3 W (size 16mm only)		11 = 24 V DC 6.5 W (size 22mm only) 12 = 12 V DC 6.5 W (size 22mm only)
COIL ORIENTATION: = fastons opposite to pneumatic ports/same side of the outlet 5 = fastons towards pneumatic ports/same side of the inlet			
<b>OX2</b>	VERSION: OX2 = version with ASTM G93-03 Certification Level B (FKM seals only) = non-certified version		

SERIES AP PROPORTIONAL VALVES

**FLOW GRAPH**

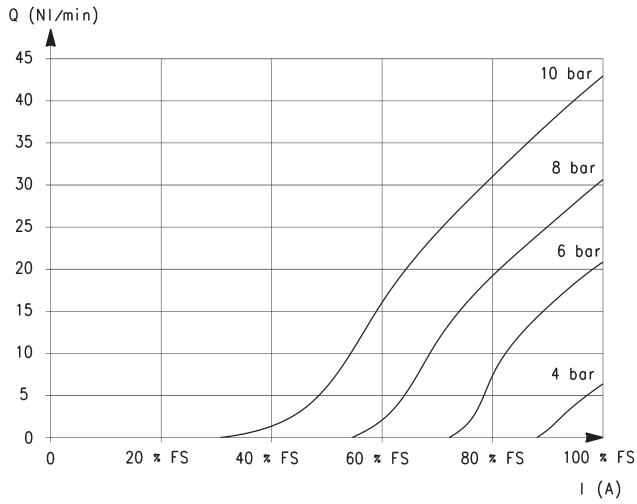
Flow characteristic curve of a proportional valve

Q = flow  
D.C. = duty cycle



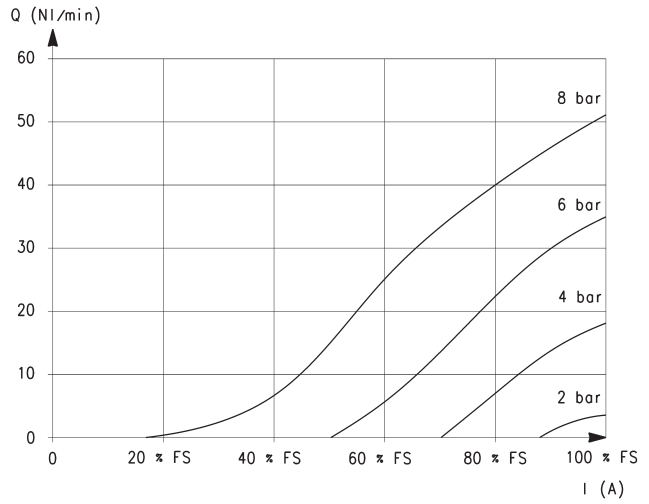
**FLOW DIAGRAMS - size 16mm**

SERIES AP PROPORTIONAL VALVES



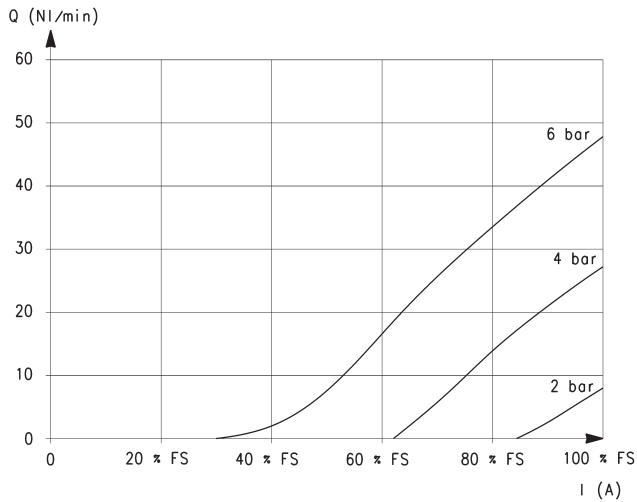
**Nozzle 0.8mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale



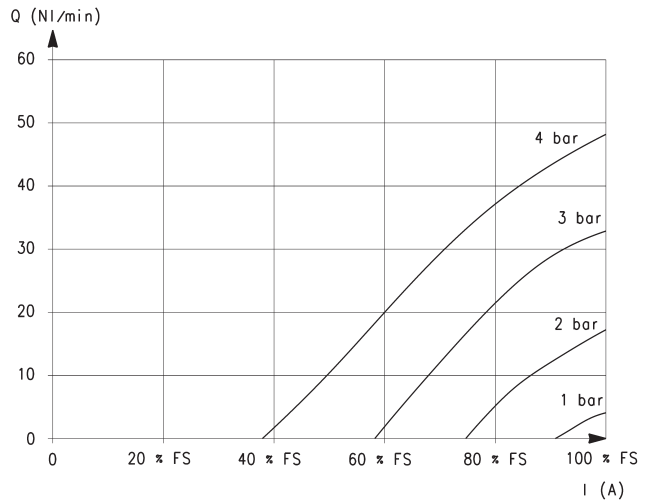
**Nozzle 1mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale



**Nozzle 1.2mm**

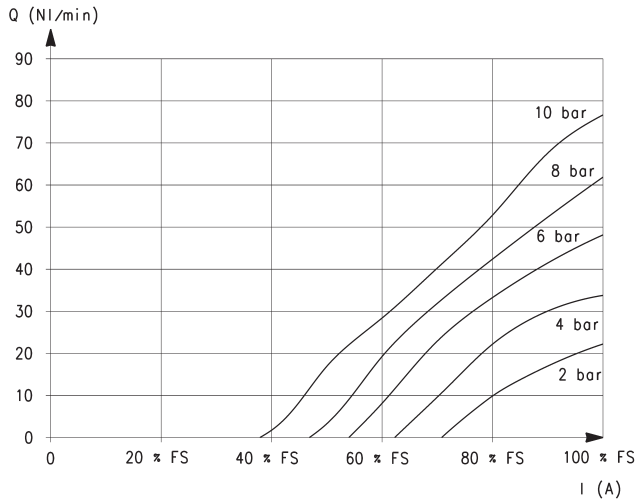
Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale



**Nozzle 1.6mm**

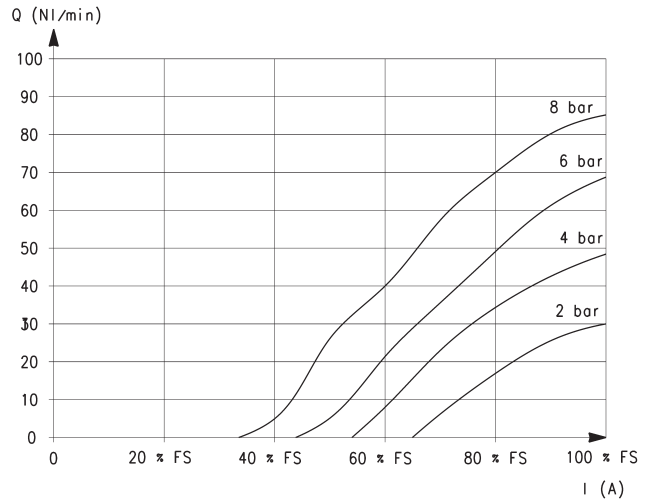
Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale

**FLOW DIAGRAMS - size 22mm**



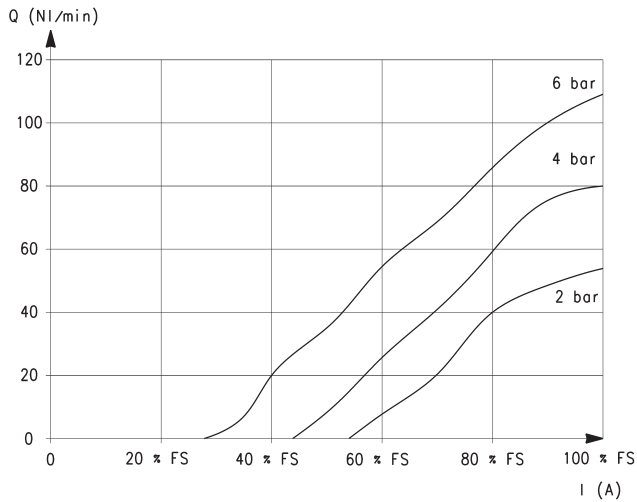
**Nozzle 1mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale



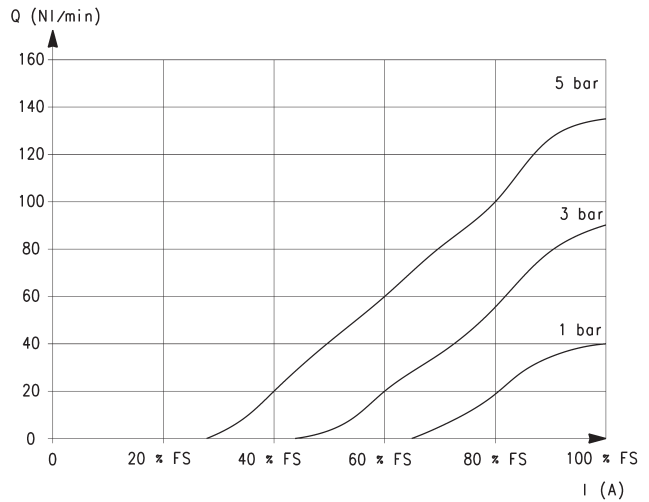
**Nozzle 1.2mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale



**Nozzle 1.6mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale

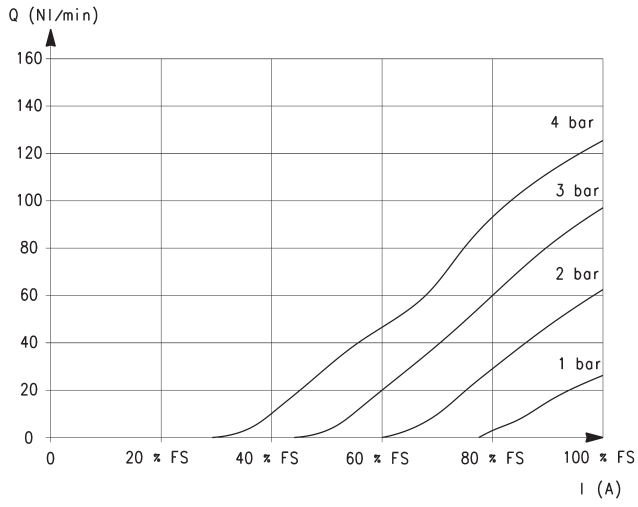


**Nozzle 2mm**

Q = Flow (NL/min)  
I = Current (A)  
FS = Full scale

**FLOW DIAGRAM - size 22mm**

SERIES AP PROPORTIONAL VALVES



Nozzle 2.4mm

Q = Flow (NL/min)

I = Current (A)

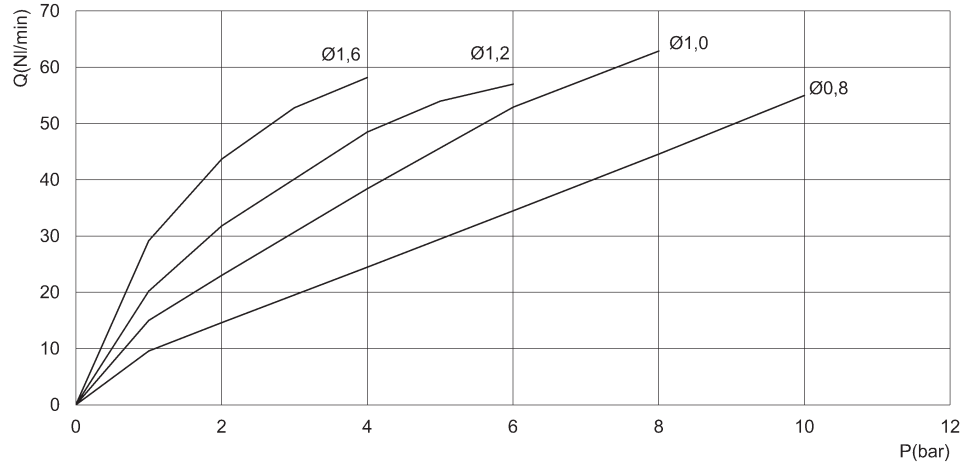
FS = Full scale

### MAXIMUM FLOW AND RESPONSE TIMES - size 16mm

Maximum flow according to the set pressure, for each orifice.

DIAGRAM LEGEND:

Q = flow (NL/min)  
P = set pressure (bar)



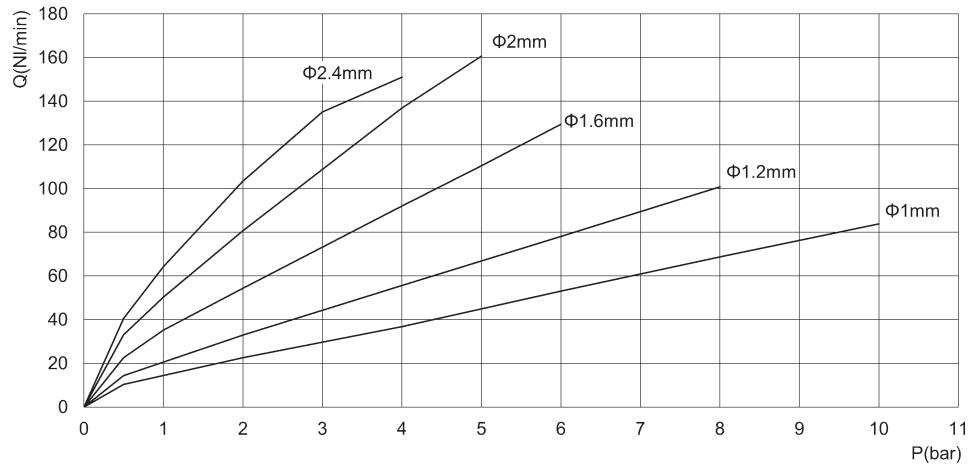
RESPONSE TIMES calculated according to the maximum flow at each operating pressure. [ Electromechanical response time: 10 ms ]							
ø	Pin [bar]	Load response time [ms]			Exhaust response time [ ms ]		
		0% - 10%	0% - 90%	10% - 90%	100% - 90%	100% - 10%	90% - 10%
0.8 mm	10	12	43	31	11	39	28
1 mm	8	12	42	30	11	38	27
1.2 mm	6	10	41	31	11	41	30
1.6 mm	4	10	40	30	11	40	29

### MAXIMUM FLOW AND RESPONSE TIMES - size 22mm

Maximum flow according to the set pressure, for each orifice.

DIAGRAM LEGEND:

Q = flow (NL/min)  
P = set pressure (bar)

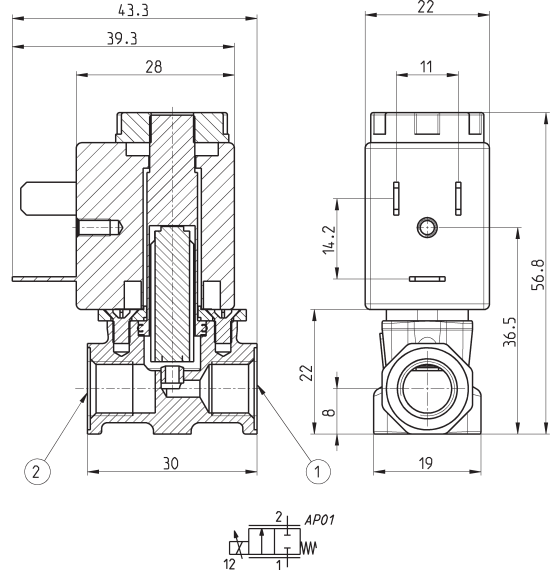
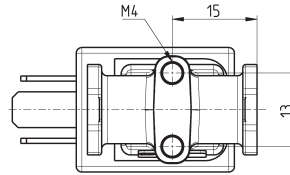


RESPONSE TIMES calculated according to the maximum flow at each operating pressure. [ Electromechanical response time: 10 ms ]							
ø	Pin [bar]	Load response time [ms]			Exhaust response time [ ms ]		
		0% - 10%	0% - 90%	10% - 90%	100% - 90%	100% - 10%	90% - 10%
1 mm	10	10	36	26	10	36	26
1.2 mm	8	10	45	35	12	38	26
1.6 mm	6	12	45	33	12	40	28
2 mm	5	12	42	30	11	34	26
2.4 mm	4	11	45	34	12	44	32

**Series AP proportional valves - 22mm, body with threaded ports**



For the use with vacuum connect the line to port 2.



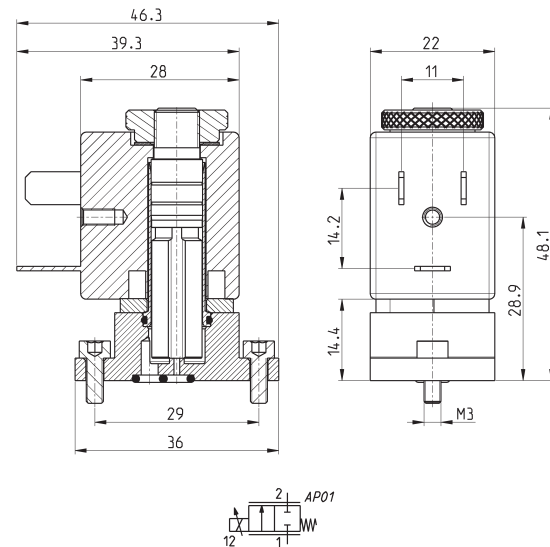
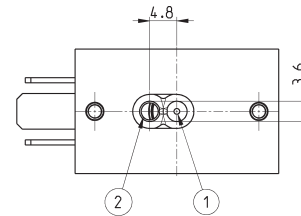
Mod.	Port 1	Port 2	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NL/min)
AP-7211-FR2-U7*	G1/8	G1/8	2/2 NC	1	0.5	10	75
AP-7211-HR2-U7*	G1/8	G1/8	2/2 NC	1.2	0.7	8	85
AP-7211-LR2-U7*	G1/8	G1/8	2/2 NC	1.6	1.2	6	110
AP-7211-NR2-U7*	G1/8	G1/8	2/2 NC	2	1.7	5	135
AP-7211-QR2-U7*	G1/8	G1/8	2/2 NC	2.4	1.7	4	113
AP-7211-FW2-U7*OX2	G1/8	G1/8	2/2 NC	1	0.5	10	75
AP-7211-HW2-U7*OX2	G1/8	G1/8	2/2 NC	1.2	0.7	8	85
AP-7211-LW2-U7*OX2	G1/8	G1/8	2/2 NC	1.6	1.2	6	110
AP-7211-NW2-U7*OX2	G1/8	G1/8	2/2 NC	2	1.7	5	135
AP-7211-QW2-U7*OX2	G1/8	G1/8	2/2 NC	2.4	1.7	4	113

\* choose the desired voltage

**Series AP proportional valves - size 22mm, low flanged body**



For the use with vacuum connect the line to port 2.



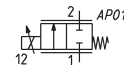
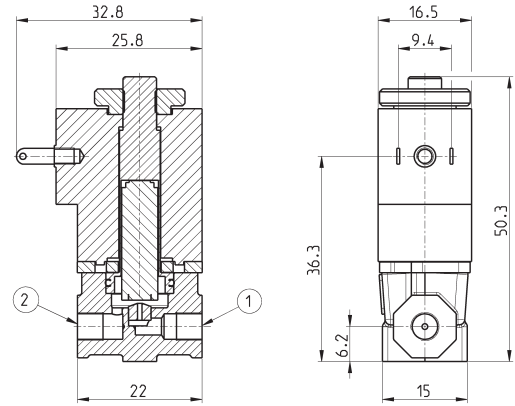
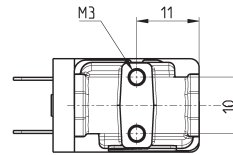
Mod.	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NL/min)
AP-7215-FR2-U7*	2/2 NC	1	0.5	10	75
AP-7215-HR2-U7*	2/2 NC	1.2	0.7	8	85
AP-7215-LR2-U7*	2/2 NC	1.6	1.2	6	110
AP-7215-NR2-U7*	2/2 NC	2	1.7	5	135
AP-7215-QR2-U7*	2/2 NC	2.4	1.7	4	113
AP-7215-FW2-U7*OX2	2/2 NC	1	0.5	10	75
AP-7215-HW2-U7*OX2	2/2 NC	1.2	0.7	8	85
AP-7215-LW2-U7*OX2	2/2 NC	1.6	1.2	6	110
AP-7215-NW2-U7*OX2	2/2 NC	2	1.7	5	135
AP-7215-QW2-U7*OX2	2/2 NC	2.4	1.7	4	113

\* choose the desired voltage

### Series AP proportional valves - 16mm, body with threaded ports



For the use with vacuum connect the line to port 2.



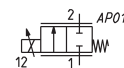
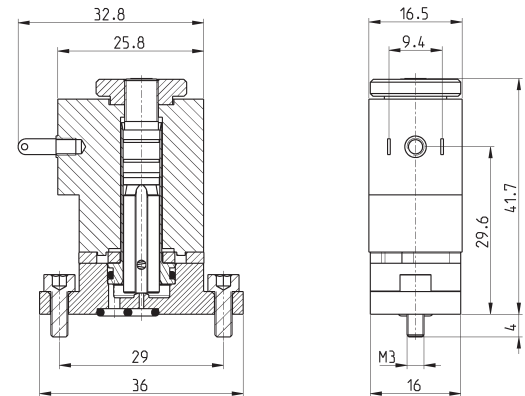
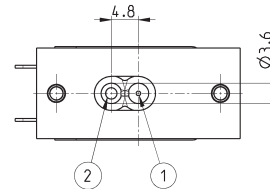
\* choose the desired voltage

Mod.	Port 1	Port 2	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NI/min)
AP-6210-DR2-GP*	M5	M5	2/2 NC	0.8	0.3	10	43
AP-6210-FR2-GP*	M5	M5	2/2 NC	1	0.45	8	53
AP-6210-HR2-GP*	M5	M5	2/2 NC	1.2	0.57	6	53
AP-6210-LR2-GP*	M5	M5	2/2 NC	1.6	0.78	4	52
AP-6210-DW2-GP*OX2	M5	M5	2/2 NC	0.8	0.3	10	43
AP-6210-FW2-GP*OX2	M5	M5	2/2 NC	1	0.45	8	53
AP-6210-HW2-GP*OX2	M5	M5	2/2 NC	1.2	0.57	6	53
AP-6210-LW2-GP*OX2	M5	M5	2/2 NC	1.6	0.78	4	52

### Series AP proportional valves - 16mm, low flanged body



For the use with vacuum connect the line to port 2.



\* choose the desired voltage

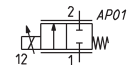
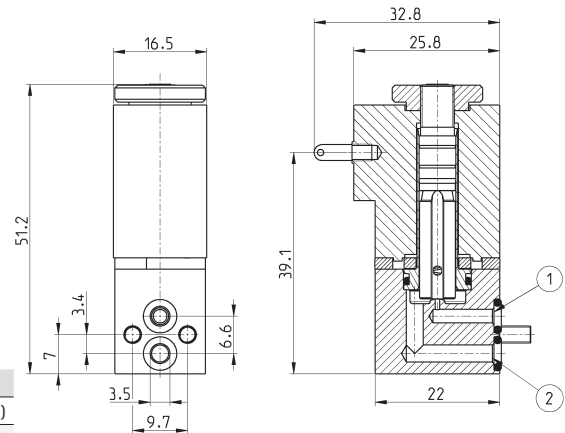
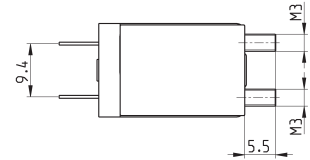
Mod.	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NI/min)
AP-6215-DR2-GP*	2/2 NC	0.8	0.3	10	43
AP-6215-FR2-GP*	2/2 NC	1	0.45	8	53
AP-6215-HR2-GP*	2/2 NC	1.2	0.57	6	53
AP-6215-LR2-GP*	2/2 NC	1.6	0.78	4	52
AP-6215-DW2-GP*OX2	2/2 NC	0.8	0.3	10	43
AP-6215-FW2-GP*OX2	2/2 NC	1	0.45	8	53
AP-6215-HW2-GP*OX2	2/2 NC	1.2	0.57	6	53
AP-6215-LW2-GP*OX2	2/2 NC	1.6	0.78	4	52



**Series AP proportional valves - 16mm, rear flanged body**



For the use with vacuum connect the line to port 2.



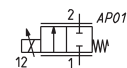
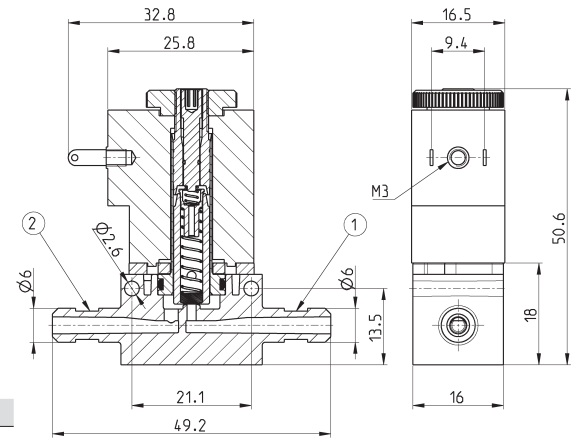
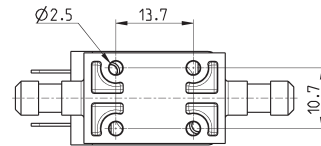
\* choose the desired voltage

Mod.	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NI/min)
AP-6214-DR2-GP*	2/2 NC	0.8	0.3	10	43
AP-6214-FR2-GP*	2/2 NC	1	0.45	8	53
AP-6214-HR2-GP*	2/2 NC	1.2	0.57	6	53
AP-6214-LR2-GP*	2/2 NC	1.6	0.78	4	52
AP-6214-DW2-GP*OX2	2/2 NC	0.8	0.3	10	43
AP-6214-FW2-GP*OX2	2/2 NC	1	0.45	8	53
AP-6214-HW2-GP*OX2	2/2 NC	1.2	0.57	6	53
AP-6214-LW2-GP*OX2	2/2 NC	1.6	0.78	4	52

**Series AP proportional valves, size 16mm - body in PVDF**



For the use with vacuum connect the line to port 2.



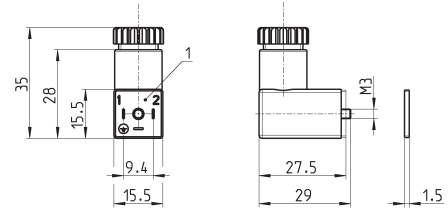
\* choose the desired voltage  
\*\* pneumatic connection with tube and clamps

Mod.	Port 1	Port 2	Function	Orifice Ø (mm)	kv (l/min)	Max pressure (bar)	Max flow (NI/min)
AP-6211-DR3-GP*	Ø6 **	Ø6 **	2/2 NC	0.8	0.3	10	43
AP-6211-FR3-GP*	Ø6 **	Ø6 **	2/2 NC	1	0.45	8	53
AP-6211-HR3-GP*	Ø6 **	Ø6 **	2/2 NC	1.2	0.57	6	53
AP-6211-LR3-GP*	Ø6 **	Ø6 **	2/2 NC	1.6	0.78	4	52
AP-6211-DW3-U7*OX2	Ø6 **	Ø6 **	2/2 NC	0.8	0.3	10	43
AP-6211-FW3-U7*OX2	Ø6 **	Ø6 **	2/2 NC	1	0.45	8	53
AP-6211-HW3-U7*OX2	Ø6 **	Ø6 **	2/2 NC	1.2	0.57	6	53
AP-6211-LW3-U7*OX2	Ø6 **	Ø6 **	2/2 NC	1.6	0.78	4	52

### Connector Mod. 125-800 DIN 43650 pitch 9.4 mm



For size 16 mm only



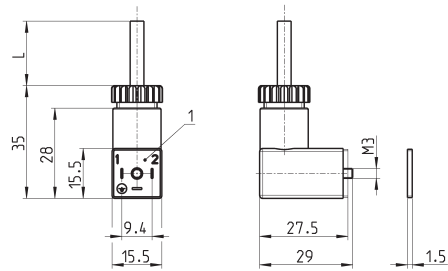
Mod.	description	colour	working voltage	cable holding	tightening torque
125-800	connector, without electronics	black	-	PG7	0.3 Nm

1 = 90° adjustable connector

### Connector Mod. 125-550- DIN 43650 pitch 9.4 mm with cable



For size 16 mm only

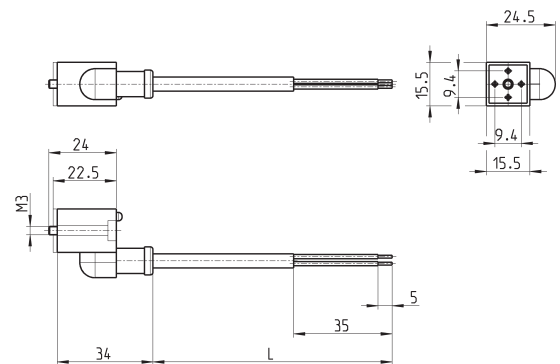


Mod.	description	colour	working voltage	cable length [L]	cable holding	tightening torque
125-550-1	moulded cable, without electronics	black	-	1000 mm	-	0.3 Nm

1 = 90° adjustable connector

### In-line connectors with cable Mod. 125-553

For size 16 mm only



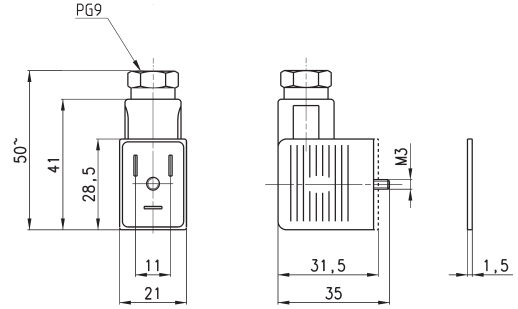
Mod.	description	colour	working voltage	cable length [L]	cable holding	tightening torque
125-553-2	in-line moulded cable, without electronics	black	-	2000 mm	-	0.3 Nm
125-553-5	in-line moulded cable, without electronics	black	-	5000 mm	-	0.3 Nm

### Connectors Mod. 122-800 DIN 43650



For size 22 mm only

Mod. 122-800EX:  
for ATEX certified solenoids Mod. U7\*EX,  
with anti-screwing off screw Mod. TORX.

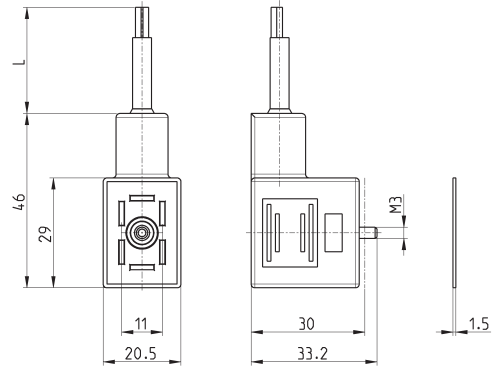


Mod.	description	colour	working voltage	cable holding	tightening torque
122-800	connector, without electronics	black	-	PG9	0.5 Nm
122-800EX	connector, without electronics	black	-	PG9	0.5 Nm

### Connectors Mod. 122-550 DIN 43650 with cable



For size 22 mm only



Mod.	description	colour	working voltage	cable length [L]	cable holding	tightening torque
122-550-1	moulded cable, without electronics	black	-	1000 mm	-	0.5 Nm
122-550-5	moulded cable, without electronics	black	-	5000 mm	-	0.5 Nm