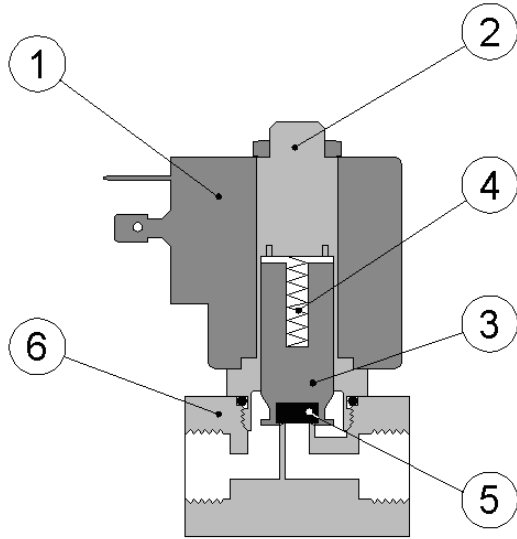


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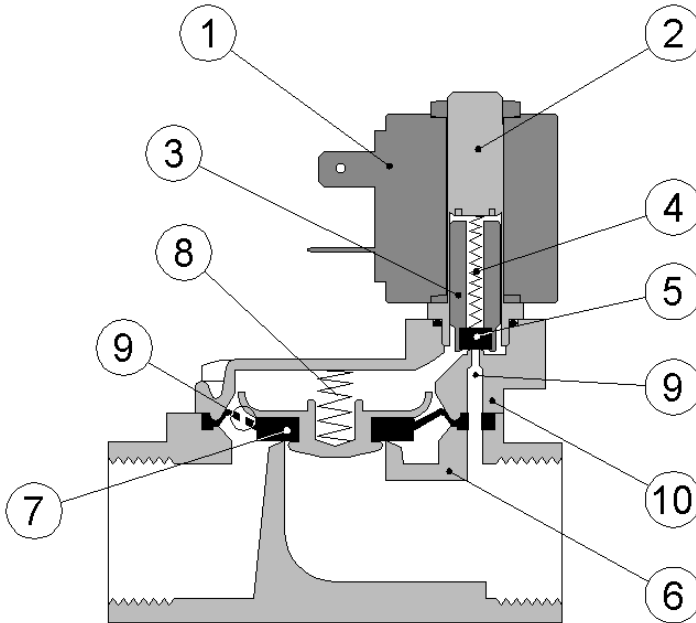
# SOLENOID VALVE TERMINOLOGY

## I. DIRECT ACTING VALVE

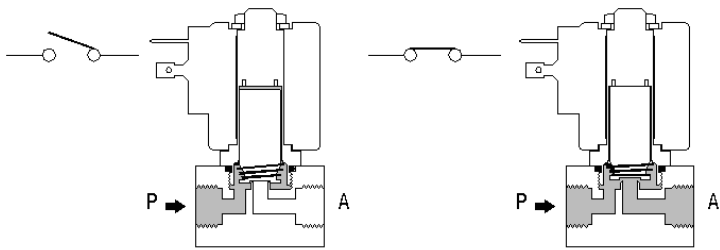


1. Coil
2. Solenoid base
3. Solenoid core
4. Core spring
5. Sealing disc
6. Valve body

## II. DIAPHRAGM (OR PISTON) VALVE

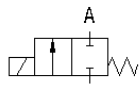


1. Coil
2. Solenoid base
3. Solenoid core
4. Core spring
5. Sealing disc
6. Valve body
7. Diaphragm (or piston)
8. Diaphragm (or piston) spring
9. Pilot orifice
10. Valve bonnet



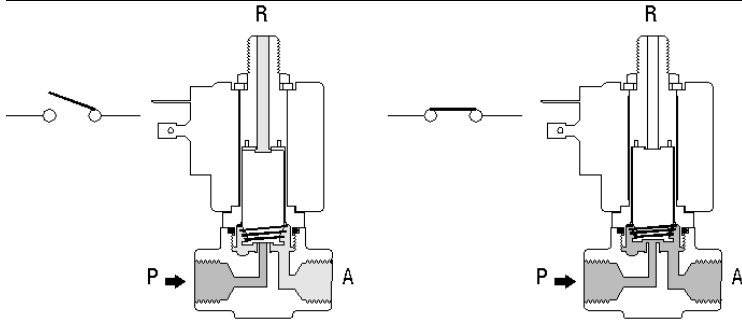
**2/2 CLOSED WHEN DE-ENERGISED (NC) DIRECT ACTING**

When the coil is energised the valve opens. The valve does not require minimum operating pressure differential. Maximum operating pressure depends on the orifice diameter and coil power. Due to the coil power limitations high flow rates cannot be achieved.



P

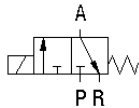
A



**3/2 CLOSED WHEN DE-ENERGISED (NC) DIRECT ACTING**

Valve function similar to 2/2 NC, only with 3 ports that allow 2 ways simultaneously: one open and the other closed. 3/2 valves are often used as cylinder activators.

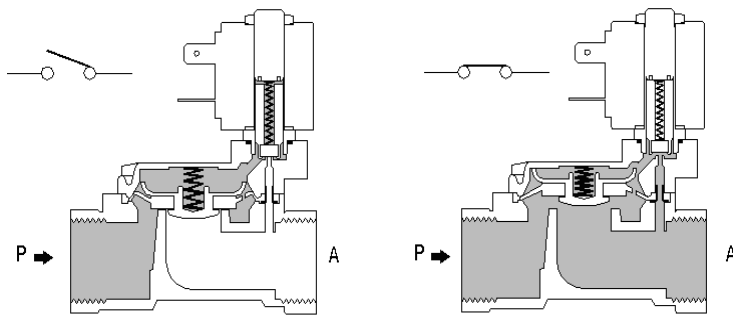
The same valve also allows NO function when properly connected.



P

R

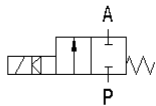
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**2/2 CLOSED WHEN DE-ENERGISED (NC) PILOT-OPERATED**

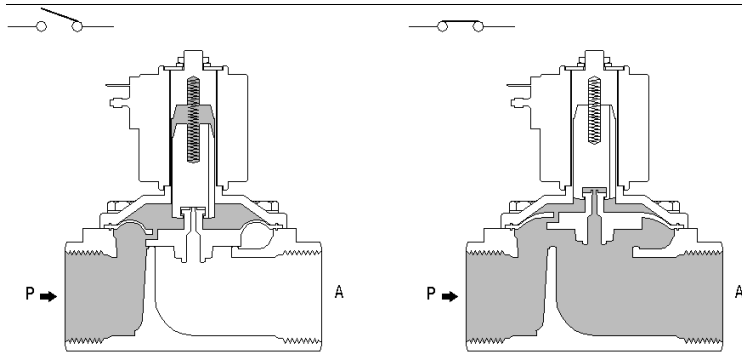
Valve orifice is closed by a diaphragm or a piston. A bypass connects the chamber above the diaphragm/piston and valve outlet. Bypass is closed by a solenoid core and opens when coil is energized. When this occurs, the pressure above the diaphragm/piston drops and the flow through the valve is established.

This principle of operation requires pressure difference between the valve inlet and outlet and is therefore not applicable at pressures near 0 bar.



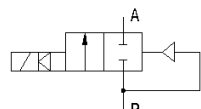
P

A



**2/2 CLOSED WHEN DE-ENERGISED (NC) COMBINED OPERATION**

Principle of operation combines direct acting and pilot. Valve diaphragm or piston is attached to the solenoid core and no pressure difference is required. This principle allows high flow rate at pressure near 0 bar.



P

A

## ENGINEERING MATERIALS

The choice of materials used depends on the type of fluid to be controlled.

### *Bodies*

are made of machined brass, bronze, thermoplasts, stainless steel or nickelized brass or bronze.

### *Seals - diaphragms*

are chosen according to mechanical, thermal and chemical requirements.

NBR is the standard material for use with neutral chemically fluids at temperatures up to 90°C.

At higher temperatures, EPDM, FPM and PTFE can be used.

In some cases (high temperature and high cycling rate) stainless steel can also be used.

### Characteristics of sealing materials

#### *NBR*

- high mechanical durability
- resistant to oil and grease
- tight shut-off
- temperature range: -10°C to +90°C
- fluids: water, fuel, mineral oil, air, argon, town gas, methane, propane, butane

#### *EPDM*

- resistant to acids and lyes of medium concentration
- **non-resistant to oil**
- tight shut-off
- temperature range: -40°C to +130°C
- fluids: hot water, wet steam, ozone, ethylene and methylene alcohol, acids and lyes

#### *FPM*

- excellent chemical resistance
- mechanical durability lower than NBR or EPDM
- tight shut-off
- temperature range: -15°C to +200°C
- fluids: hot and oiled air, acids, lyes and other fluids that do not allow use of NBR or EPDM

#### *PTFE*

- resistant to almost all chemicals
- non-resilient, shut-off with slight leakage
- temperature range: -200°C to +250°C
- fluids: various chemicals, refrigerants, ammonia, dry steam

## ELECTRICAL CHARACTERISTICS

All coils are designed for continuous duty (ED100%). Exceptions are marked on individual coil or valve types.

Wire insulation is class F (155°C) or H (180 or 200°C).

Voltage tolerance is  $\pm 10\%$  at AC and  $\pm 5\%$  at DC.

Power consumption is stated in watts (W) and equals:

- the product of measured DC voltage and current
- the product of measured AC voltage and current multiplied by 0.6

### Thermal conditions

When the coil has been energized for a period of time the temperature of the winding rises. Amount of heating is affected by ambient and fluid temperature.

In extreme cases the overheating causes damage to the wire insulation and the coil becomes defective.

Special coils for extreme thermal conditions are also available.

## Electrical protection - IP rating

Apart from standard coils, original explosion- and waterproof coils are also available, thus allowing the use of solenoid valves in practically any environment.

Standard coils are encapsulated in special thermoplastic resin which prevents the intrusion of damp and protects the winding from mechanical damage.

Explosionproof coils are encapsulated in epoxy resin.

Basic IP rating for a coil is IP00, whereas IP65 can be achieved with properly fitted plug (to DIN 43650).

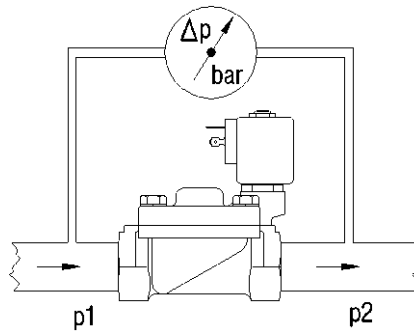
The TM35k type coil with IP67 rating is designed for extremely damp ambients (also water immersion).

## FLOW RATE AND Kv VALUE

Flow rate of any given valve depends on valve size, type of fluid and the pressure which forces the fluid through the valve.

Kv value is given for each valve type in the table. With known parameters the flow rate can be calculated according to the following formula:

$$Q = K_v \sqrt{\frac{\Delta p}{\rho}}$$
$$\Delta p = p_1 - p_2$$



- Q flow rate [l/min]
- Kv value given in the table for each valve type
- Δp difference between inlet and outlet pressure [bar]
- p1 pressure measured at valve inlet [bar]
- p2 pressure measured at valve outlet [bar]
- ρ specific mass of fluid [kg/dm<sup>3</sup>]  
(equals 1 for tap water)

Kv value is approximately the same for tap water and other fluids (e.g. oil) of viscosity not exceeding 21mm<sup>2</sup>/s. At higher viscosity a correction of Kv value is required.

## PRESSURE RATING

a) Maximum operating pressure differential is the maximum difference between valve inlet and outlet pressures at which the valve will still reliably operate. Values in tables (with tolerance ±10%) are given at ambient and coil temperature 22°C.

b) Minimum operating pressure differential is the minimum difference between valve inlet and outlet pressures at which the valve will still reliably OPEN. If required pressure difference is not achieved the valve will not open when activated.

c) Maximum static pressure is the highest fluid pressure endured by valve body and internal parts without damage.

## INSTALLATION AND RECOMMENDATIONS

Valves can be installed horizontally or vertically. Upright coil position is recommended to avoid accumulation of impurities in pilot which may result in faulty operation.

Before installation it is highly recommended to clean the pipeline to minimize the amount of impurities in fluid.

It is also recommended to install a strainer (40 micron mesh) in front of the valve.

AC coils should not be connected to the electrical circuit unless fitted properly on the stem as this will result in coil burning.

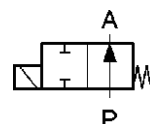
In very damp ambients the use of special coil sealing sets or TM35k type coil is necessary (available from your supplier).

**2/2****DIRECT ACTING VALVES****1/8" - 1/2"****Closed when de-energised (NC)**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Mass [kg]	Coil type	Model	Order code 230VAC NBR seal	Fig.
			Min	Max AC*						
G1/8	1.2	0.75	0	35	Brass	0.14	TM25	D210	<b>320611</b>	1
	1.5	0.85	0	20	Brass	0.14	TM25	D210	<b>320615</b>	1
	2	1.8	0	12	Brass	0.14	TM25	D211	<b>320608</b>	1
G1/8	1.4	0.85	0	75	Brass	0.35	TM30	D220	<b>320513</b>	3
	2	1.8	0	35	Brass	0.35	TM30	D221	<b>320201</b>	3
	3	3.6	0	10	Brass	0.35	TM30	D222	<b>320209</b>	3
G1/4	1	0.6	0	120	Brass	0.52	TM35	D220	<b>320712</b>	3
	1.2	0.75	0	150	Brass	0.52	TM35	D220	<b>320701</b>	3
	1.4	0.85	0	75	Brass	0.35	TM30	D220	<b>320510</b>	3
	2	1.8	0	35	Brass	0.35	TM30	D221	<b>320221</b>	3
	3	3.6	0	10	Brass	0.35	TM30	D222	<b>320229</b>	3
	3	3.6	0	25	Brass	0.52	TM35	D222	<b>320718</b>	3
	4.5	7.5	0	8	Brass	0.35	TM30	D223	<b>320237</b>	3
G1/4	4.5	7.5	0	25	Brass	0.52	TM35	D223	<b>320714</b>	3
	G3/8	4	7.2	0	8	PA	0.25	TM30	D223PA	<b>320598</b>
G3/8	7	13	0	7	Brass	0.52	TM35	D224	<b>320717</b>	3
G1/2	7	13	0	7	Brass	0.52	TM35	D224	<b>320780</b>	3
G1/2	10	25	0	1.2	Brass	0.42	TM30	D240	<b>340499</b>	4
	10	25	0	2	Brass	0.57	TM35	D240	<b>340481</b>	4
Ø6	2.2	1.8	0	10	Brass	0.15	TM25	D201	<b>320610</b>	2

**Open when de-energised (NO)**

G1/8	1.5	0.85	0	10	Brass	0.14	TM25	D21NO	<b>329612</b>	1
G1/8	2	1.8	0	15	Brass	0.35	TM30	D22NO	<b>329501</b>	3
G1/4	1.2	0.85	0	35	Brass	0.52	TM35	D22NO	<b>329712</b>	3
	2	1.8	0	10	Brass	0.35	TM30	D22NO	<b>329509</b>	3
	3	3.6	0	10	Brass	0.35	TM30	D22NO	<b>329505</b>	3
	4.5	7.5	0	8	Brass	0.52	TM35	D22NO	<b>329705</b>	3
G1/2	10	25	0	1	Brass	0.57	TM35	D240NO	<b>340442</b>	4

**Manifold valves (NC)**

2 x G1/4	4.5	4.6	0	2	Brass	0.37	TM25	XD402	<b>319442</b>	6
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\*Pressure is lower when DC coil is used!

**ORDERING:**Please state order code, seal material and voltage (e.g.: 320611 EPDM 24VAC) or consult our staff.  
For easier valve choice use QUESTIONNAIRE on page 36.**OPTIONS:**

- EEx me II explosionproof coil
- stainless steel valve body
- NPT ports

Other versions on request. Specifications are subject to change without notice.

**TECHNICAL DATA:**

Internal parts: stainless steel  
 Seals: NBR, EPDM, FPM, PTFE  
 Fluid temperature: -10°C to +90°C (NBR)  
 -10°C to +130°C (FPM, PTFE)  
 max +130°C (EPDM)  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: 10 to 20 ms  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: See chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: max 1000 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)

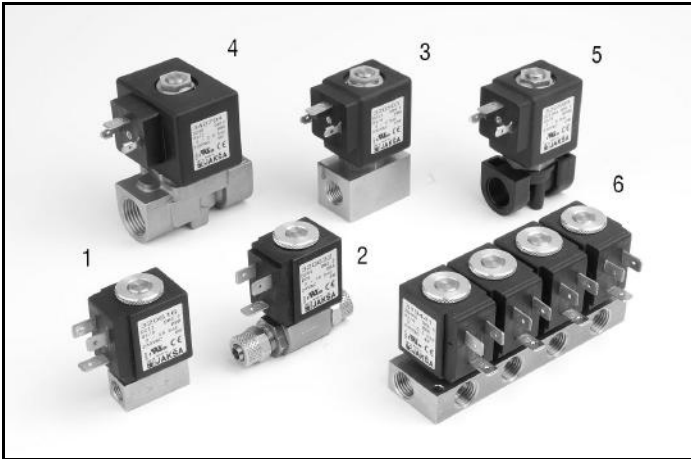


Fig. 2

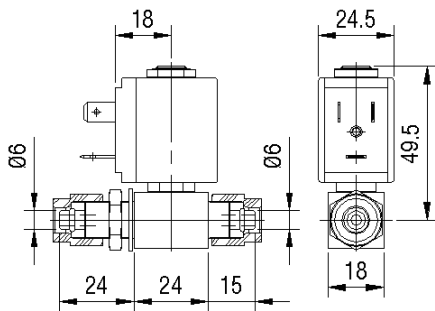
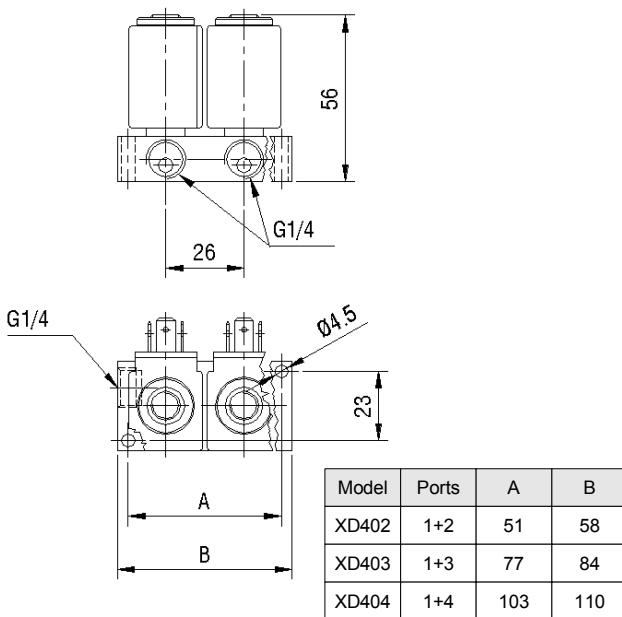


Fig. 6



**Dimensions [mm]:**

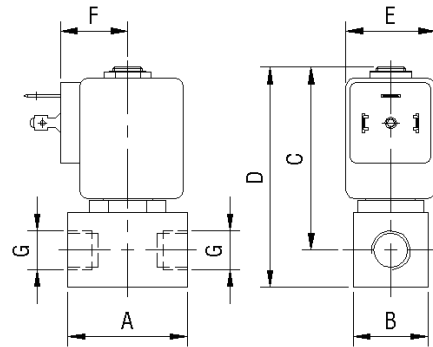
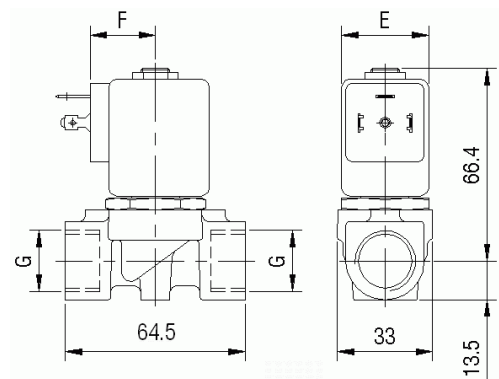


Fig.	A	B	C	D
1	30	14	47.5	54.5
3, 5	40/46*	25	61	74

\*G1/2

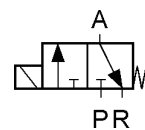
Coil	E	F
TM25	18	24
TM30	22.5	30
TM35	28	50

Fig. 4



### Closed when de-energised (NC)

Ports	Orifice [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Mass [kg]	Coil type	Model	Order code 230VAC NBR seal	Fig.
			Min	Max AC*						
G1/8	1	0.5	0	10	Brass	0.15	TM25	D305	<b>330611</b>	1
	1.2	0.75	0	10	Brass	0.15	TM25	D305	<b>330614</b>	1
	1.5	0.95	0	7	Brass	0.15	TM25	D305	<b>330616</b>	1
FL22	1	0.5	0	10	Brass	0.15	TM25	D305	<b>330618</b>	2
G1/8	1.8	1.5	0	10	Brass	0.35	TM30	D310	<b>330513</b>	3
G1/4	1.4	0.85	0	16	Brass	0.35	TM30	D320	<b>330510</b>	3
	1.8	1.5	0	10	Brass	0.35	TM30	D321	<b>330511</b>	3
	2.3	1.9	0	15	Brass	0.52	TM35	D384	<b>330710</b>	3
FL32	1.5	0.95	0	12	Brass	0.23	TM30	D381	<b>330518</b>	4A
	1.5	0.95	0	12	Brass	0.23	TM30	D383	<b>330514</b>	4B
2xG1/8	1.8	1.5	0	10	Brass	0.45	TM30	D500	<b>330480</b>	5
3xG1/8	1.8	1.5	0	10	Brass	0.68	TM30	D500	<b>330486</b>	5
4xG1/8	1.8	1.5	0	10	Brass	0.9	TM30	D500	<b>330487</b>	5
5xG1/8	1.8	1.5	0	10	Brass	1.13	TM30	D500	<b>330488</b>	5



\*Pressure is lower when DC coil is used!

### ORDERING:

Please state order code, seal material and voltage (e.g.: **330611 EPDM 24VAC**) or consult our staff.

For easier valve choice use **QUESTIONNAIRE** on page 36.

### OPTIONS:

- EEx me II explosionproof coils
- stainless steel valve body
- NPT ports

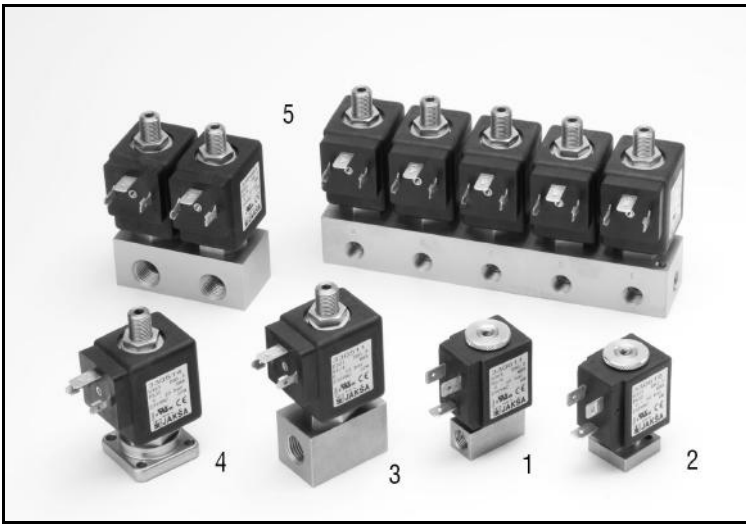
Other versions on request.

Specifications are subject to change without notice.

### TECHNICAL DATA:

Internal parts: stainless steel  
 Seals: NBR, EPDM, FPM, PTFE  
 Fluid temperature: -10°C to +90°C (NBR)  
 -10°C to +130°C (FPM, PTFE)  
 max +130°C (EPDM)  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: 10 to 20 ms  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: max 1000 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)





**Dimensions [mm]:**

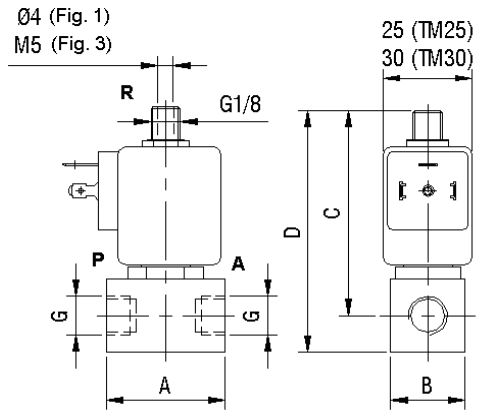


Fig.	A	B	C	D
1	30	14	47.5	54.5
3	40	25	72	74

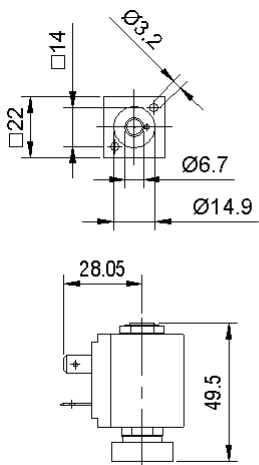
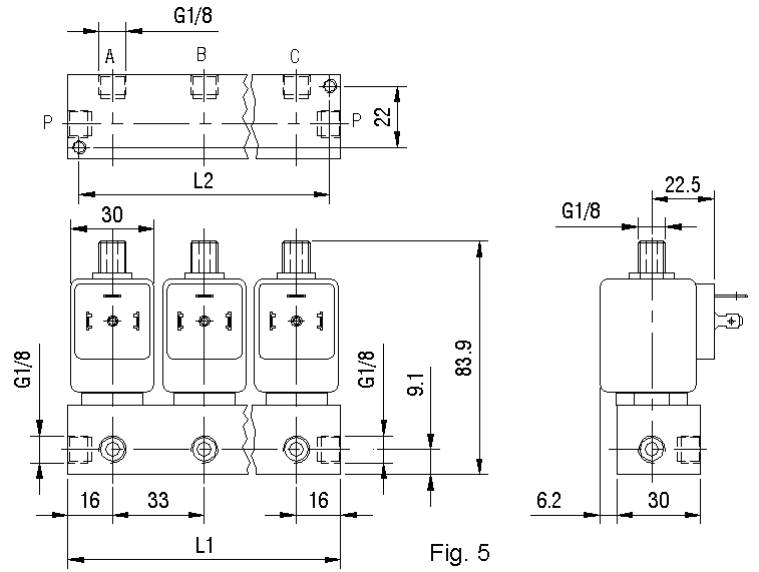
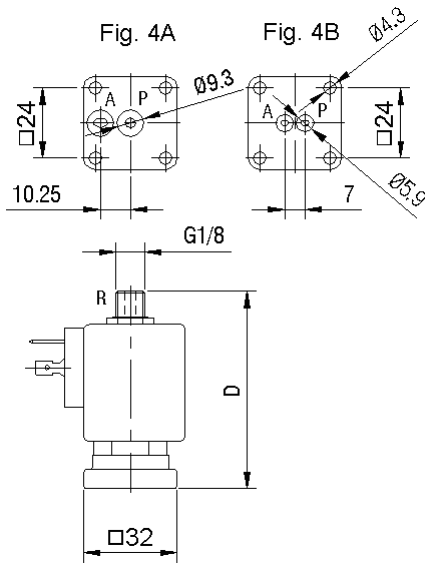
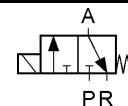


Fig. 2



### Closed when de-energised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Body	Seal	Mass [kg]	Coil type	Model	Voltage	Order code	Fig.
			Min	Max*								
G3/8	13	28	0	2	Brass	FPM	0.79	TM35	XD329	12 VDC	331762	1
										24 VDC	331761	1
G3/4	22	105	0	0.2	Brass	NBR	1.75	TM35	D327	24 VDC	331748	2
				2	Brass	NBR	1.75	TM35	XD327	24 VDC	331750	2

\*Max pressure in any direction (i.e. 1->2, 1->3 or 2->1, 3->1)

### ORDERING:

Please state order code.

For easier valve choice use QUESTIONNAIRE on page 36.

### OPTIONS:

- EEx me II explosionproof coils
- stainless steel valve body
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

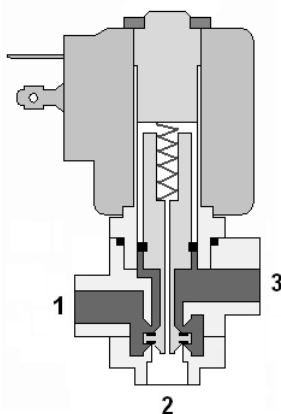
### TECHNICAL DATA:

Internal parts: stainless steel  
 Seals: NBR, EPDM, FPM, PTFE  
 Fluid temperature: -10°C to +85°C (NBR)  
 -10°C to +100°C (EPDM, FPM)  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response times: opening 0.05 to 1 s / closing 0.5 to 4 s  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)

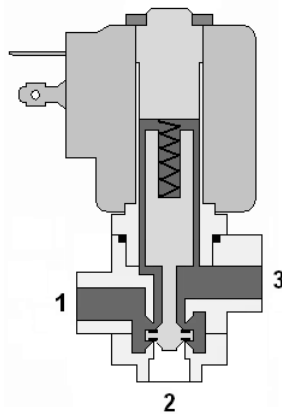
### FUNCTION:

Collector: Coil de-energised, 3-1 open, 2-1 closed;  
 Coil energised, 2-1 open, 3-1 closed

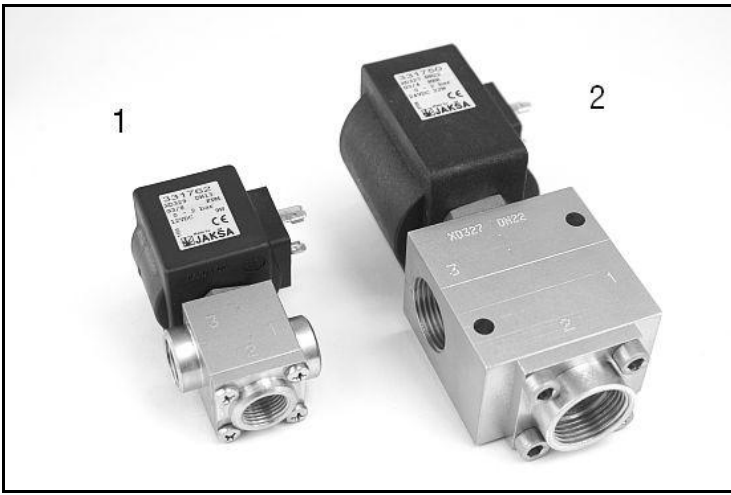
Diverter: Coil de-energised, 1-3 open, 1-2 closed;  
 Coil energised, 1-2 open, 1-3 closed



**XD327 / XD329**



**D327**



**Dimensions [mm]:**

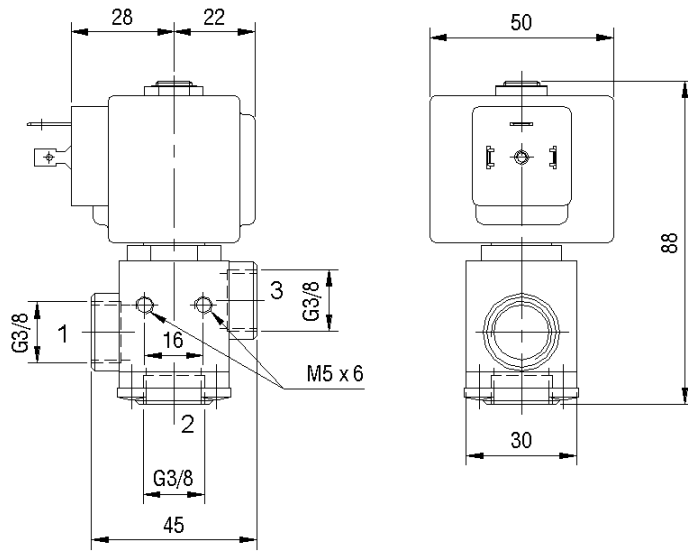


Fig. 1

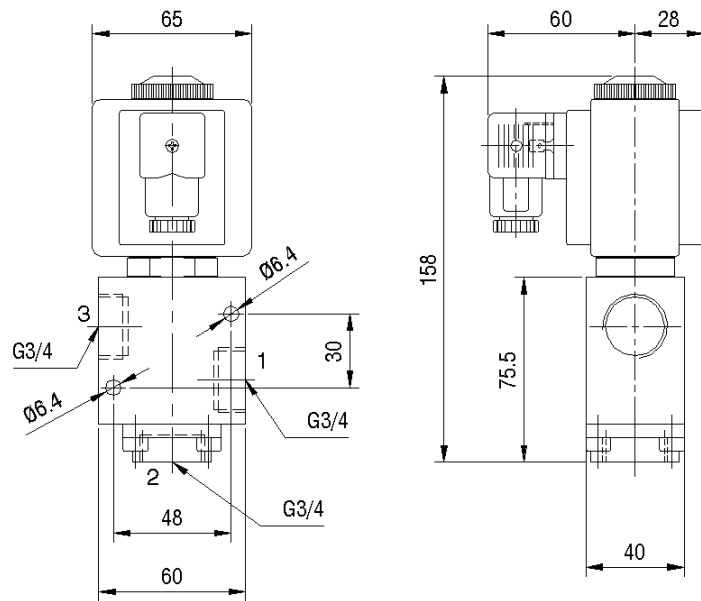
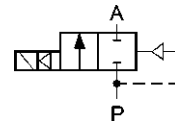


Fig. 2

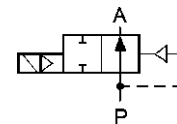
**Closed when de-energised (NC)**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Mass [kg]	Coil type	Model	Order code 230VAC NBR seal	Fig.
			Min	Max AC*						
G1/2	10	20	0.3	10	Brass	0.34	TM25	M2401	<b>341600</b>	1
	10	20	0.3	12	Brass	0.42	TM30	M24K	<b>340506</b>	2
	10	20	0.3	12	INOX	0.42	TM30	M24KN	<b>386210</b>	3
G3/8	10	20	0.3	12	Brass	0.43	TM30	M24K	<b>341505</b>	2
G3/4-Ø20	18	90	0.3	10	PA	0.46	TM25	M255C	<b>352612</b>	4
G3/4	18	90	0.3	10	PA	0.46	TM25	M255	<b>352611</b>	4
	18	90	0.3	10	Brass/PA	0.46	TM25	M254	<b>350619</b>	5
	18	90	0.3	12	Brass	0.57	TM25	M251	<b>350613</b>	5
	18	90	0.3	16	Brass	0.66	TM30	M250	<b>350510</b>	5
G1	25	180	0.3	12	Brass	1.1	TM25	M261	<b>360613</b>	6
	25	180	0.3	12	Brass	1.2	TM30	M260	<b>360518</b>	6
	25	180	0.3	16	Brass	1.2	TM30	M260	<b>360513</b>	6
G6/4	40	350	0.3	12	Brass	2.3	TM25	M271	<b>370610</b>	7
	40	350	0.3	12	Brass	2.4	TM30	M270	<b>370511</b>	7
	40	350	0.3	16	Brass	2.53	TM30	M270	<b>370512</b>	7
	40	350	0.3	16	Brass	2.53	TM30	M270R**	<b>370510</b>	7
G2	50	630	0.5	16	Brass	4.5	TM30	M286	<b>390510</b>	8



**Open when de-energised (NO)**

G1/2	10	20	0.3	10	Brass	0.34	TM25	M24NO	<b>349600</b>	1
	10	20	0.3	12	Brass	0.42	TM30	M24KNO	<b>349516</b>	2
G3/8	10	20	0.3	12	Brass	0.42	TM30	M24KNO	<b>349518</b>	2
G3/4	18	90	0.3	12	Brass	0.66	TM30	M250NO	<b>359511</b>	5
G1	25	180	0.3	16	Brass	1.2	TM30	M260NO	<b>369512</b>	6
G6/4	40	350	0.3	16	Brass	2.4	TM30	M270NO	<b>379512</b>	7
G2	50	630	0.5	16	Brass	4.5	TM30	M286NO	<b>391510</b>	8



**With latching coil**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Mass [kg]	Coil type	Model	Voltage	Order code NBR seal	Fig.
			Min	Max DC							
G1/2	10	20	0.3	8	Brass	0.34	TM25B	M240B	6VDC	<b>340699</b>	1
	10	20	0.3	8	Brass	0.34	TM25B	M240B	9VDC	<b>340698</b>	1

\*Pressure is lower when DC coil is used!  
\*\*With adjustable shut-off speed

**ORDERING:**

Please state order code, seal and voltage (e.g.: 341607 EPDM 24VAC) or consult our staff.  
For easier valve choice use QUESTIONNAIRE on page 36.

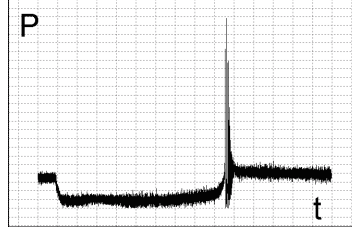
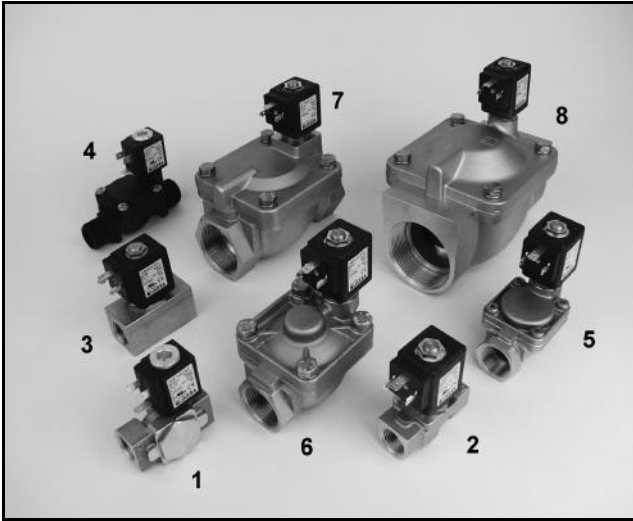
**OPTIONS:**

- EEx me II explosionproof coils
- stainless steel valve body
- NPT ports

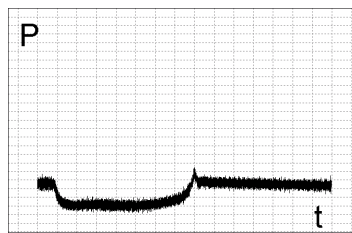
Other versions on request.  
Specifications are subject to change without notice.

**TECHNICAL DATA:**

Internal parts: stainless steel  
 Seals: NBR, EPDM, FPM, PTFE  
 Fluid temperature: -10°C to +85°C (NBR)  
 -10°C to +100°C (EPDM, FPM)  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response times: opening 0.05 to 1 s / closing 0.5 to 4 s  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)



Ordinary diaphragm valve shut-off diagram – **EXCESSIVE WATERHAMMER**



JAKŠA diaphragm valve shut-off diagram – **NO WATERHAMMER**

**Dimensions [mm]:**

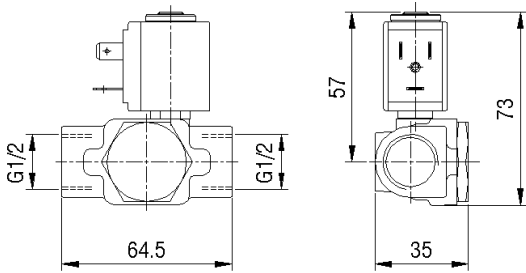


Fig. 1

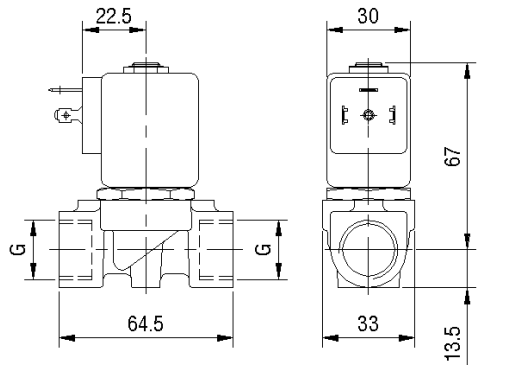


Fig. 2 + 3

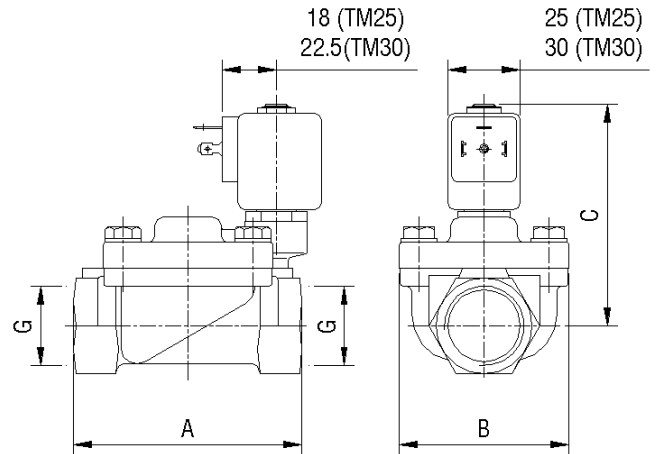


Fig.	A	B	C (TM25/TM30/NO)
5	78	212	78 / 86 / 98
6	95	230	84 / 92 / 102
7	132	95	103 / 111 / 121
8	160	112	120 / 130

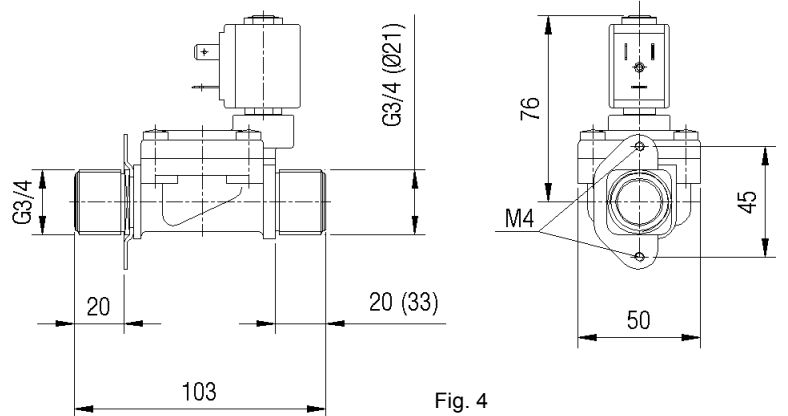
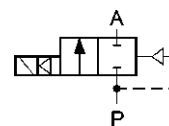


Fig. 4

**Closed when de-energised (NC)**

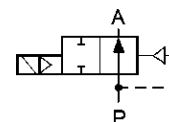
**(Brass body)**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Seals	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC*						
G1	25	180	1	20	PTFE	1.25	TM30	B26	<b>316401</b>	1
G6/4	40	350	1	20	PTFE	2.2	TM30	B26	<b>316451</b>	1
G2	50	630	1	20	PTFE	5.3	TM30	B26	<b>316481</b>	1
G1/2	10	20	0.3	50	PA	0.43	TM30	B27	<b>316595</b>	2
	10	20	0.3	50	PTFE	0.43	TM30	B27	<b>316600</b>	2
G1	25	180	2	60	PTFE	1.51	TM35	B27	<b>316261</b>	3
G6/4	40	350	2	50	PTFE	3.1	TM35	B27	<b>316271</b>	3
G2	50	630	2	35	PTFE	6.5	TM35	B27	<b>316291</b>	3
G3/8	8	30	0.8	100	PA	0.43	TM35	BS3	<b>316160</b>	5
G1/2	12	45	1.7	120	PA	1.4	TM35	BS4	<b>316240</b>	4
G3/4	18	110	1.7	80	PA	1.4	TM35	BS5	<b>316230</b>	4



**Open when de-energised (NO)**

G1	25	180	1	20	PTFE	1.25	TM30	B26NO	<b>316411</b>	1
G6/4	40	350	1	20	PTFE	2.2	TM30	B26NO	<b>316421</b>	1
G2	50	630	1	20	PTFE	5.3	TM30	B26NO	<b>316431</b>	1
G1/2	10	20	0.3	50	PA	0.43	TM30	B27NO	<b>316598</b>	2
	10	20	0.3	50	PTFE	0.43	TM30	B27NO	<b>316620</b>	2
G1	25	180	2	60	PTFE	1.51	TM35	B27NO	<b>316263</b>	3
G6/4	40	350	2	50	PTFE	3.1	TM35	B27NO	<b>316281</b>	3
G2	50	630	2	35	PTFE	6.5	TM35	B27NO	<b>316300</b>	3
G3/8	8	30	0.8	100	PA	0.43	TM35	BS3NO	<b>316158</b>	5
G1/2	12	45	1.7	120	PA	1.4	TM35	BS4NO	<b>316241</b>	4
G3/4	18	110	1.7	80	PA	1.4	TM35	BS5NO	<b>316221</b>	4



\*Pressure is lower when DC coil is used!

**ORDERING:**

Please state order code and voltage (e.g.: 316401 24VAC) or consult our staff.  
For easier valve choice use QUESTIONNAIRE on page 36.

**OPTIONS:**

- EEx me II explosionproof coils
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

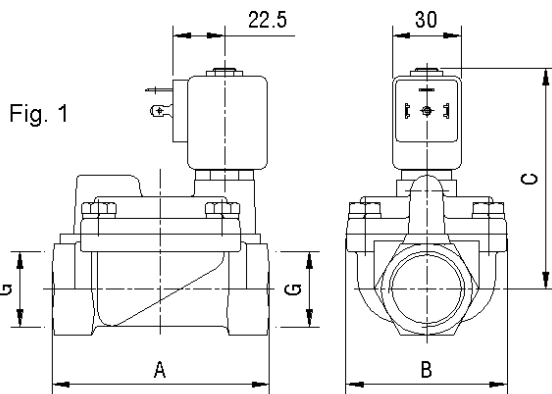
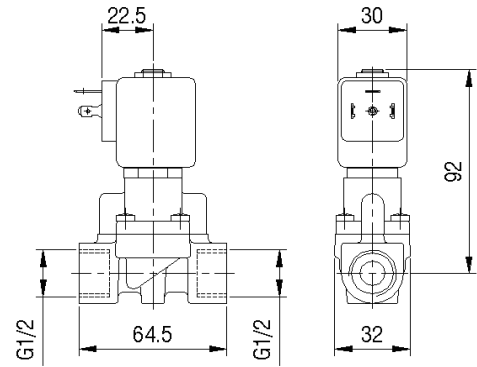
**TECHNICAL DATA:**

Valve body: Ms  
 Internal parts: stainless steel  
 Fluid temperature: -10°C to +100°C (PTFE)  
 -10°C to +90°C (PA)  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: opening 0.1 to 1 s / closing 0.5 to 5 s  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)



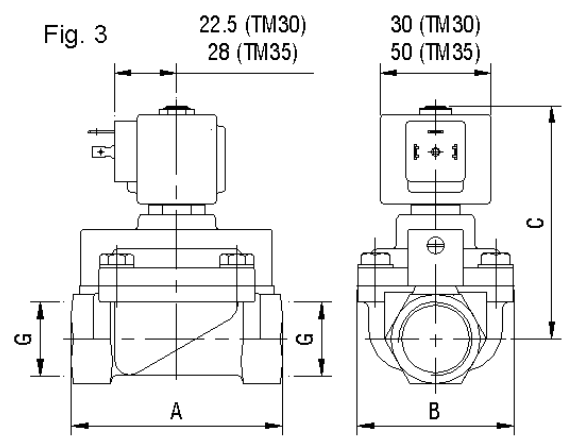
**Dimensions [mm]:**

Fig. 2



G	A	B	C
1"	95	70	97
6/4"	132	96	113
2"	160	112	129

Fig. 3



G	A	B	C
1"	95	70	106
6/4"	132	96	128
2"	160	112	129

Fig. 4

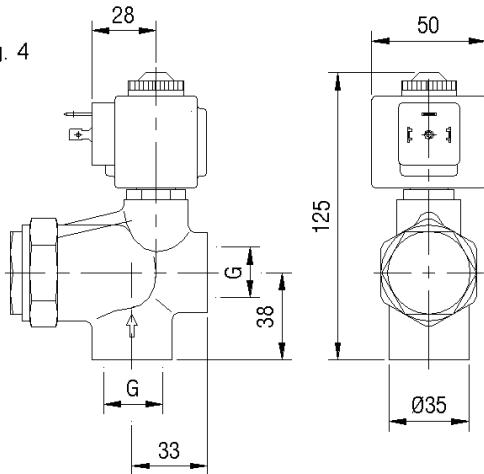
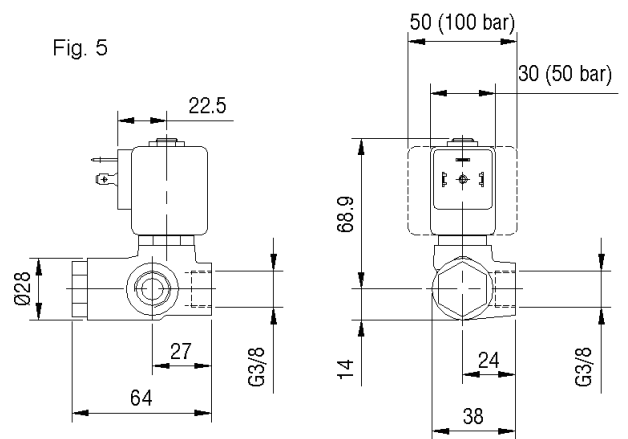


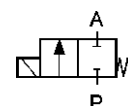
Fig. 5



# 2/2

# HIGH PRESSURE SERVICE VALVES

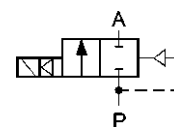
# 1/4" - 1/2"



## Direct acting, closed when de-energised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Material		Mass [kg]	Coil type	Valve type	Voltage	Power [W]	Order code	Fig.
			Min	Max	Body	Seal							
G1/4	0.9	0.48	0	400	AISI 303	PU	0.52	TM35	D22N	230 VAC	18	320852	1
	1	0.6	0	350	AISI 303	PU	0.52	TM35	D22N	230 VAC	18	320841	1
	1.2	0.75	0	250	AISI 303	PU	0.52	TM35	D22N	230 VAC	18	320756	1
	1.4	0.85	0	200	AISI 303	PU	0.52	TM35	D22N	230 VAC	18	320762	1
	2	1.8	0	150	AISI 303	PU	0.52	TM35	D22N	230 VAC	18	320816	1
	2.3	1.9	0	100	Brass	PU	0.52	TM35	D22	230 VAC	18	320886	1

Air and gas service only. Other fluids on request.



## Pilot operated piston valves, closed when de-energised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Material		Mass [kg]	Coil type	Valve type	Voltage	Power [W]	Order code	Fig.
			Min	Max	Body	Seal							
G1/4	5	7	0.8	500	AISI 303	PEEK	0.97	TM35	XBS2	12 VDC	18	316141	2
G3/8	8.5	30	10	350	AISI 303	PEEK	1.3	TM35	BH2	230 VAC	16	316185	3
	8.5	30	10	250	AISI 303	PEEK	1.5	TMEx35	BH2	230VAC/DC	10	316181	4
G1/2	15	70	1	120	AISI 303	PA	1.4	TM35	B4N	230 VAC	8	316190	5

### ORDERING:

Please state order code and voltage (e.g.: 316401 24VAC) or consult our staff. For easier valve choice use QUESTIONNAIRE on page 36.

### OPTIONS:

- EEx me II explosionproof coils
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

### TECHNICAL DATA:

Valve body: Brass or stainless steel (AISI 303 / 1.4305)

Internal parts: Stainless steel (AISI 303, AISI 430F)

Fluid temperature: -20°C to +250°C (PEEK)

-10°C to +90°C (PA)

-50°C to +70°C (PU)

Ambient temperature: max +55°C

Viscosity: max 21 mm<sup>2</sup>/s

Response time: opening 0.1 to 1 s / closing 0.5 to 5 s

Voltages: 230, 115, 48, 24 V 50/60 Hz

24, 12 V DC

Power consumption: see chapter »Coils«

Duty cycle: continuous (ED100%)

Cycling rate: 10 to 100 cpm

Electrical protection: IP65 (with plug to DIN 43650)





**Dimensions [mm]:**

Fig. 1

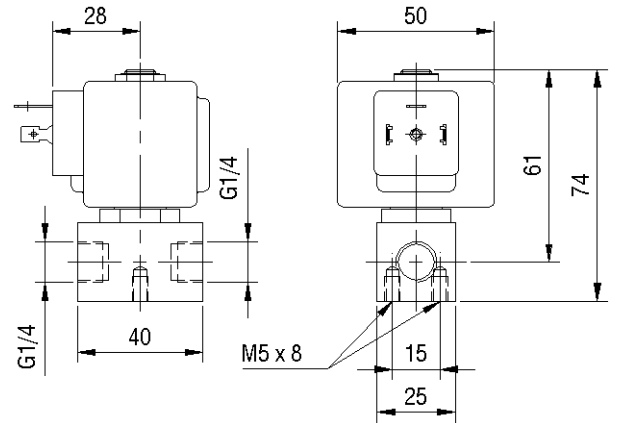


Fig. 2

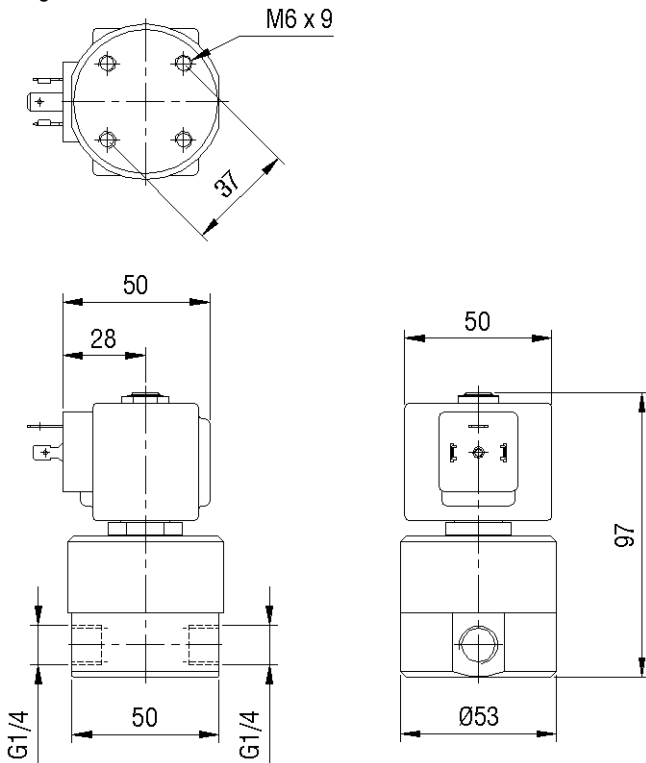


Fig. 3

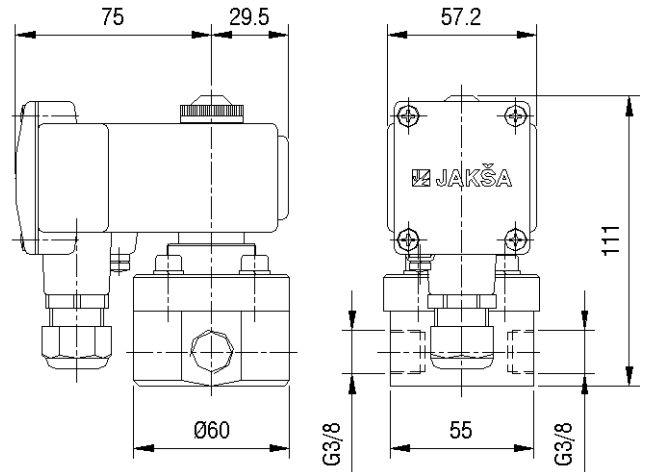


Fig. 4

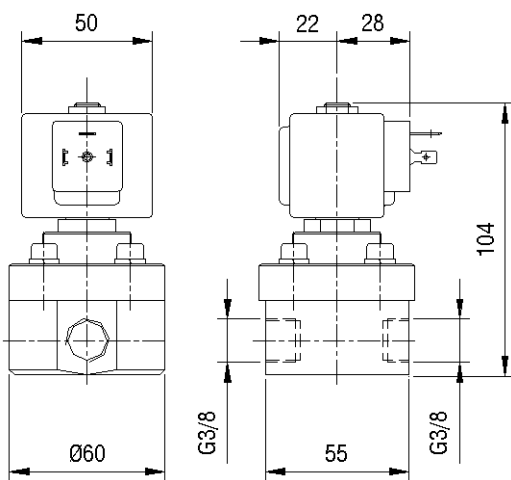
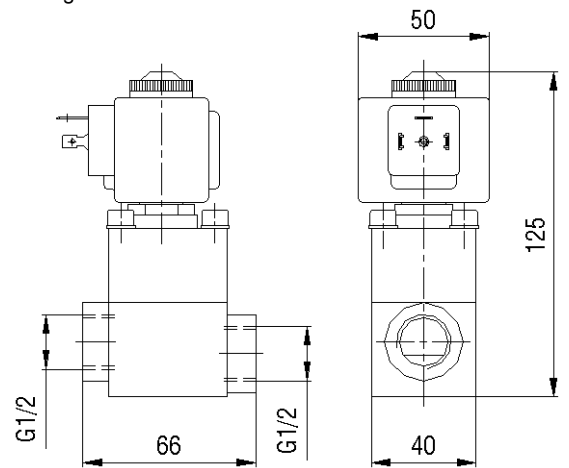
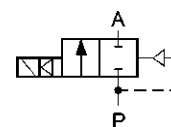


Fig. 5

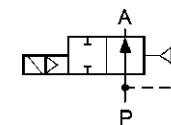


**Closed when de-energised (NC)**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Mass [kg]	Coil type	Model	Order code 230VAC NBR seal	Fig.
			Min	Max AC*						
G1/2	12	40	0	10	Brass	0.43	TM30	M2451	<b>301702</b>	1
G3/4	18	65	0	10	Brass	0.8	TM35	M2521	<b>301701</b>	2
G1	25	180	0	10	Brass	1.2	TM35	M2621	<b>301709</b>	3
G6/4	40	330	0	1	Brass	2.75	TM40	M275	<b>370810</b>	4
G2	50	630	0	1	Brass	5.9	TM40	M282	<b>391491</b>	5


**Open when de-energised (NO)**

G1/2	10	40	0	1	Brass	0.43	TM35	M2451NO	<b>301690</b>	1
G3/4	18	65	0	1	Brass	0.76	TM35	M2521NO	<b>301685</b>	2
G1	25	180	0	1	Brass	1.2	TM35	M2621NO	<b>301676</b>	3
G6/4	40	330	0	1	Brass	2.75	TM40	M275NO	<b>370850</b>	4
G2	50	630	0	1	Brass	5.9	TM40	M282NO	<b>391496</b>	5



\*Pressure is lower when DC coil is used!

**ORDERING:**

Please state order code and voltage (e.g.: 301702 24VAC) or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

**OPTIONS:**

- EEx me II explosionproof coils
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

**TECHNICAL DATA:**

Internal parts: stainless steel

Seals: NBR, EPDM, FPM

Fluid temperature: -10°C to +85°C (NBR)  
-10°C to +130°C (EPDM)  
-10°C to +100°C (FPM)

Ambient temperature: max +55°C

Viscosity: max 21 mm<sup>2</sup>/s

Response time: opening 0.1 to 1 s / closing 0.5 to 5 s

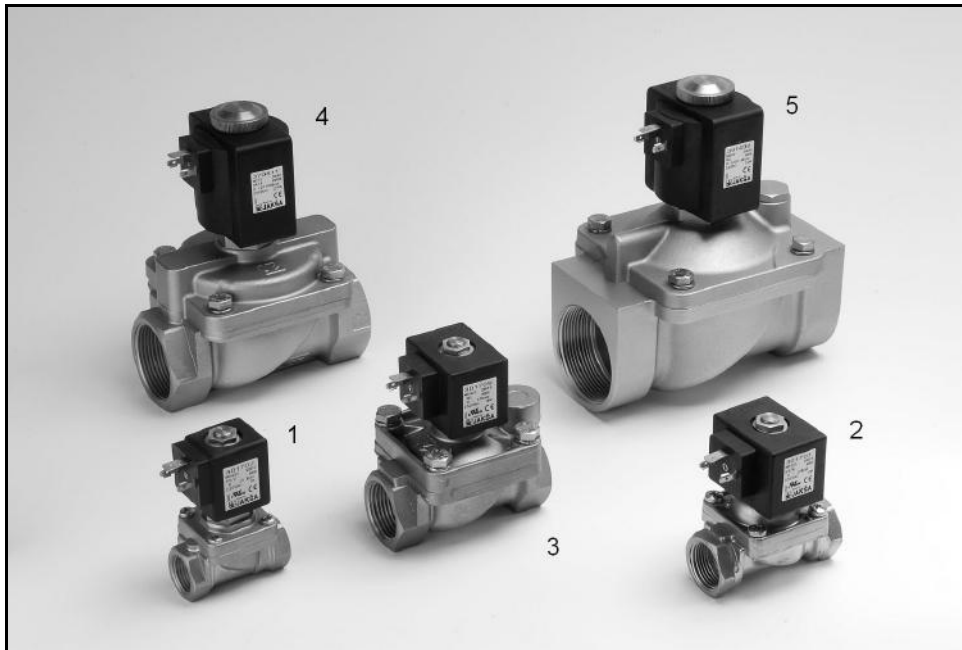
Voltages: 230, 115, 48, 24 V 50/60 Hz  
24, 12 V DC

Power consumption: see chapter »Coils«

Duty cycle: continuous (ED100%)

Cycling rate: 10 to 100 cpm

Electrical protection: IP65 (with plug to DIN 43650)



**Dimensions [mm]:**

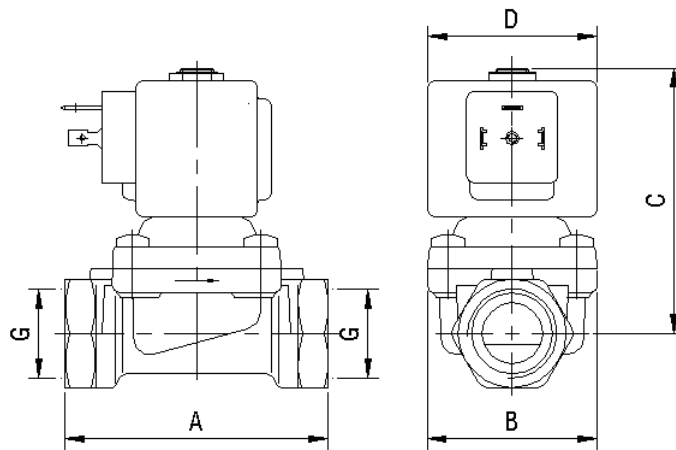


Fig.	G	A	B	C	D
1	1/2"	58	41	74	30
2	3/4"	78	50	78	50
3	1"	95	70	86	50
4	6/4"	132	96	129	65
5	2"	160	112	154	65

# 2/2

## AIR OPERATED VALVES

### Model D262 1/2" - 2"

#### Model D262N (Piston-type) - for AIR or STEAM [Fig. 1] Closed when de-pressurised (NC)

Ports	Orifice size [mm]	Kv value [l/min] (water at 1 bar)	Fluid pressure [bar]		Pilot pressure [bar]		Cylinder size [mm]	Flow direction	Order code
			Min	Max*	Min	Max			
G1/2	15	70	0	16	3.5	10	63	1 ► 2	<b>397531</b>
G3/4	20	130	0	16	3.5	10	63	1 ► 2	<b>397532</b>
G1	25	310	0	16	3.5	10	63	1 ► 2	<b>397533</b>
G6/4	40	700	0	10	3.5	10	63	1 ► 2	<b>397535</b>
G2	50	860	0	10	4.5	10	63	1 ► 2	<b>397536</b>

\*Max 10 bar with steam!

#### Model D262N (Piston-type) – for WATER and other liquids [Fig. 1] Closed when de-pressurised (NC)

Ports	Orifice size [mm]	Kv value [l/min] (water at 1 bar)	Fluid pressure [bar]		Pilot pressure [bar]		Cylinder size [mm]	Flow direction	Order code
			Min	Max	Min	Max			
G1/2	15	70	0	10	3.5	10	63	2 ► 1	<b>397531</b>
G3/4	20	130	0	10	3.5	10	63	2 ► 1	<b>397532</b>
G1	25	310	0	10	3.5	10	63	2 ► 1	<b>397533</b>
G6/4	40	700	0	10	3.5	10	90	2 ► 1	<b>397538</b>
G2	50	860	0	6	4.5	10	90	2 ► 1	<b>397540</b>

#### Model D301 (Diaphragm-type) – Water or air service [Fig. 2] Open when de-pressurised and de-energised

Ports	Orifice size [mm]	Kv value [l/min] (water at 1 bar)	Fluid pressure [bar]		Pilot pressure [bar]		Cylinder size [mm]	Flow direction	Order code
			Min	Max	Min	Max			
G1	25	180	0	6	3.5	8	TM30	10	<b>360517</b>
G6/4	40	350	0	6	3.5	8	TM30	10	<b>370900</b>
G2	50	630	0	6	3.5	8	TM30	10	<b>390599</b>

#### ORDERING:

Please state order code from above table or consult our staff.  
For easier valve choice use QUESTIONNAIRE on page 36.

#### OPTIONS:

- NO function (valve open when de-pressurised) – Model D262N only

Other versions on request.

Specifications are subject to change without notice.

#### TECHNICAL DATA:

Valve body: stainless steel (AISI 316L) – Model D262N  
Brass (Model D301)

Internal parts: stainless steel

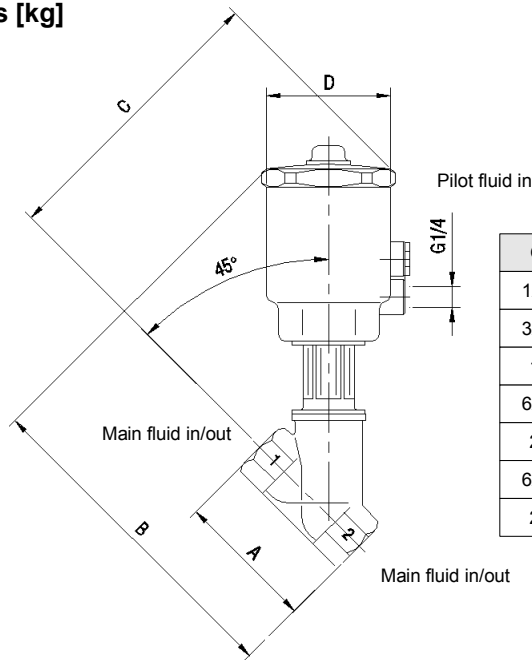
Seals: PTFE (Model D262N)  
NBR, EPDM (Model D301)

Fluids: neutral or aggressive

Fluid temperature: -10°C to +180°C (Model D262N)  
-10°C to +75°C (Model D301)

Pilot fluid: air, inert gases, water (max 60°C)

**Dimensions [mm] and masses [kg]**

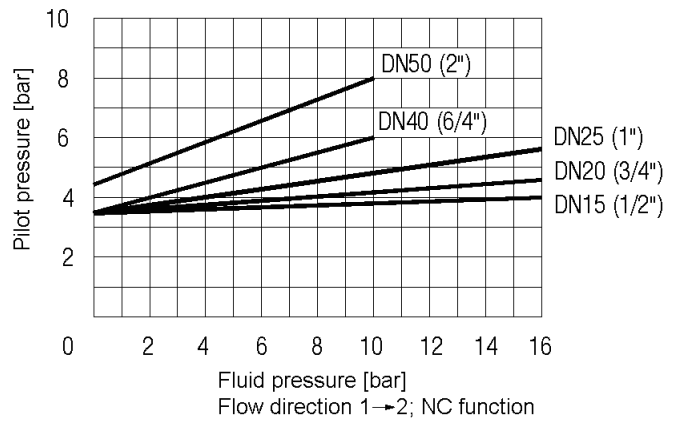


**Fig. 1 – Model D262N**

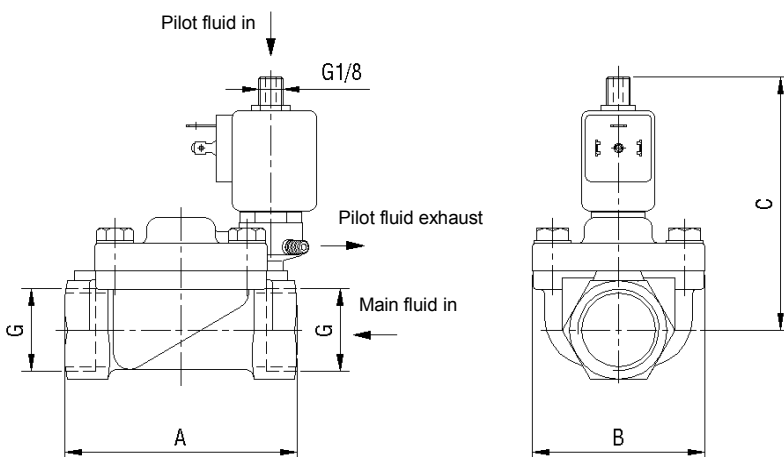
G	A	B	C	D	Mass
1/2"	65	192	171	80	1.4
3/4"	75	198	176	80	1.5
1"	90	212	185	80	1.9
6/4"	120	230	198	80	3
2"	150	248	207	80	3.7
6/4"	120	239	207	110	3.6
2"	150	257	216	110	4.3

**Pilot valve D321**  
(to be ordered separately)

Napetost Napon	Šifra
230 V AC	330511
24 V AC	330530
24 V DC	330540
48 V AC	330520
115 V AC	330560



**Fig. 2 – Model D301**



G	A	B	C
1"	95	70.4	102.5
6/4"	120	230	198
2"	150	248	207

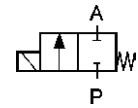
**2/2**  
**3/2**

**SEPARATING DIAPHRAGM VALVES**

**3/8" - 1/2"**

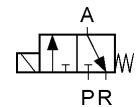
**2/2 Closed when de-energised (NC)**

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC*							
G3/8	6	14	0	0.4	PP	FPM	0.27	TM30	DL6	<b>339004</b>	2
	6	14	0	2.5	PP	FPM	0.38	TM35	DL6	<b>339002</b>	2
G3/8	11	38	0	0.15	PP	FPM	0.27	TM30	DL11	<b>339025</b>	2
G1/2	10	20	0	1.8	PP	EPDM	0.45	TM35	DL10	<b>339830</b>	5
	10	20	0	1.8	PP	FPM	0.45	TM35	DL10	<b>339820</b>	5
G1/2	8	15	0	1	PP	EPDM	0.47	TM35	D249	<b>312710</b>	4
	8	15	0	1	PP	FPM	0.47	TM35	D249	<b>312711</b>	4



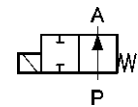
**3/2 Closed when de-energised (NC)**

G1/2	10	20	0	0.5	PP	EPDM	0.45	TM35	DL10R	<b>339852</b>	6
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**2/2 Open when de-energised (NO)**

G3/8	6	14	0	0.4	PP	FPM	0.43	TM35	DL6NO	<b>339680</b>	2
	11	38	0	0.15	PP	FPM	0.43	TM35	DL11NO	<b>339708</b>	2



\*Pressure is lower when DC coil is used!

**ORDERING:**

Please state order code and voltage (e.g.: 339003 24VAC) or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

**OPTIONS:**

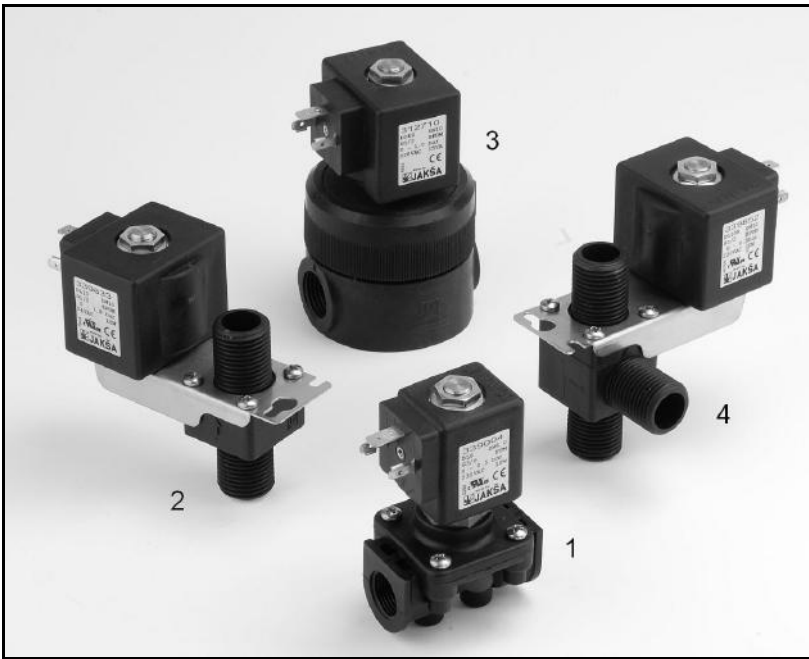
- EEx me II explosionproof coils

Other versions on request.

Specifications are subject to change without notice.

**TECHNICAL DATA:**

Internal parts: not in contact with fluid  
 Seals: NBR, EPDM, FPM  
 Fluids: aggressive  
 Fluid temperature: -10°C to +95°C  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: 10 to 20 ms  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)



Dimensions [mm]

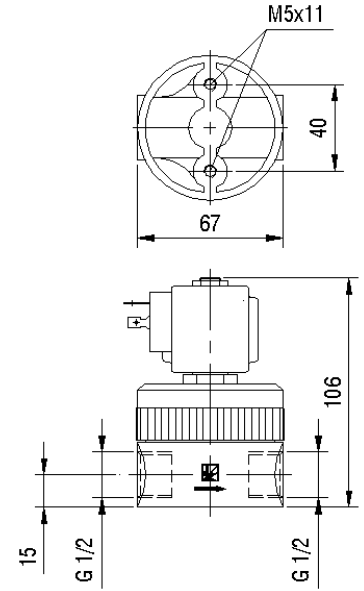


Fig. 2

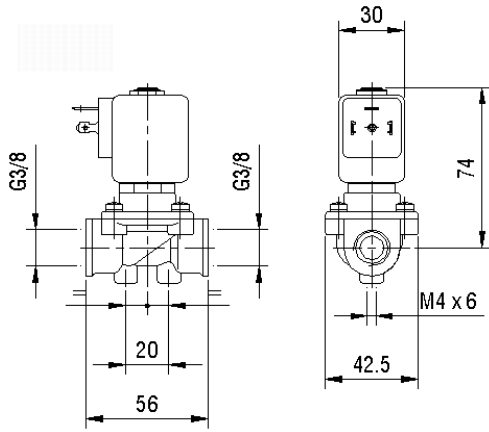


Fig. 1

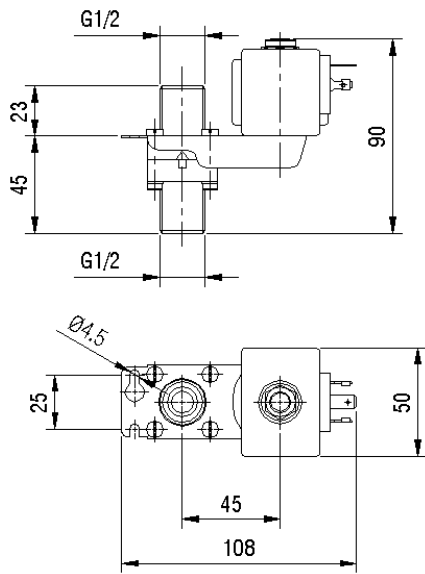


Fig. 3

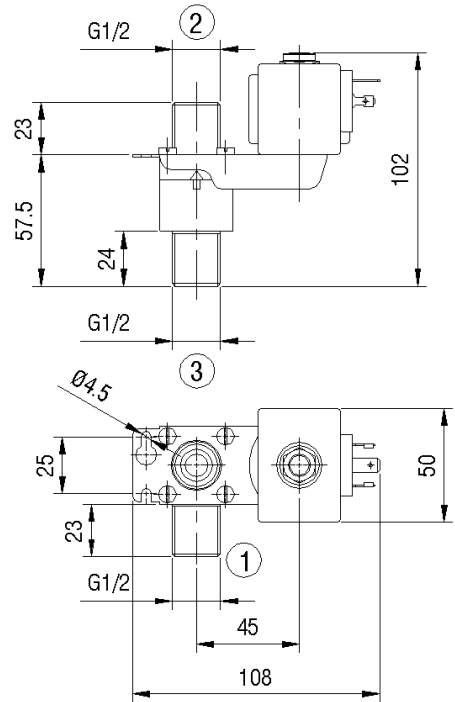


Fig. 4

# 2/2, 3/2 STEAM SERVICE VALVES 1/4" - 2"

## 2/2 Closed when de-energised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Fluid temperature max [°C]	Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC*								

### Direct acting

G1/4	2.3	2	0	8	180	Brass	EPDM	0.25	TM30	D224	<b>320511</b>	1
	2.3	2	0	8	180	Brass	EPDM	0.49	TM35	DP24	<b>320490</b>	1
	4.5	7.5	0	6	180	Brass	EPDM	0.49	TM35	DP25	<b>320491</b>	1

### Diaphragm – pilot operated

G1/2	10	20	0.5	9	180	Brass	PTFE	0.49	TM30	M246	<b>340610</b>	3
G1	18.5	155	0.5	9	180	Brass	PTFE	1.32	TM30	M263	<b>360514</b>	2

### Diaphragm – low pressure service

G1/2	12	40	0	10	130	Brass	EPDM	0.43	TM30	M2451	<b>301703</b>	3
G3/4	18	65	0	10	130	Brass	EPDM	0.76	TM35	M2521	<b>301706</b>	3
G1	25	160	0	10	130	Brass	EPDM	1.2	TM35	M2621	<b>301710</b>	3
G6/4	40	330	0	1	130	Brass	EPDM	2.75	TM40	M275	<b>370811</b>	3

## 3/2 Closed when de-energised (NC)

G1/4	1.8	1.5	0	10	165	Brass	EPDM	0.31	TM30	D321	<b>330519</b>	5
FL32	1.5	1.4	0	10	165	Brass	EPDM	0.23	TM30	D382	<b>330515</b>	6

\*Pressure is lower when DC coil is used!

## 2/2 Piston – air operated, closed when de-pressurised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Fluid pressure [bar]		Fluid temperature max [°C]	Valve body	Seals	Pilot pressure** [bar]		Flow direction	Model	Order code	Fig.
			Min	Max				Min	Max				
G1/2	15	70	0	10	180	INOX	PTFE	3.5	10	1 ► 2	D262N	<b>397531</b>	4
G3/4	20	130	0	10	180	INOX	PTFE	3.5	10	1 ► 2	D262N	<b>397532</b>	4
G1	25	310	0	10	180	INOX	PTFE	3.5	10	1 ► 2	D262N	<b>397533</b>	4
G6/4	40	700	0	10	180	INOX	PTFE	3.5	10	1 ► 2	D262N	<b>397535</b>	4
G2	50	860	0	4.5	180	INOX	PTFE	3.5	10	1 ► 2	D262N	<b>397536</b>	4

### ORDERING:

Please state order code and voltage (e.g.: 320511 24VAC) or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

### OPTIONS:

- EEx me II explosionproof coils

Other versions on request.

Specifications are subject to change without notice.

### TECHNICAL DATA:

Internal parts: stainless steel

Ambient temperature: max +55°C

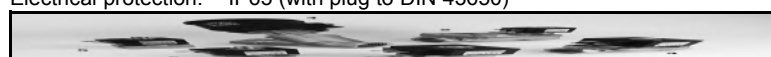
\*\*Pilot fluid: air, water (max 60°C)

Voltages: 230, 115, 48, 24 V 50/60 Hz  
24, 12 V DC

Power consumption: see chapter »Coils«

Duty cycle: continuous (ED100%)

Electrical protection: IP65 (with plug to DIN 43650)



### Dimensions [mm]





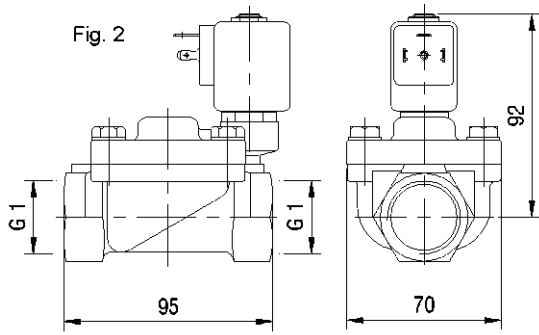


Fig. 6

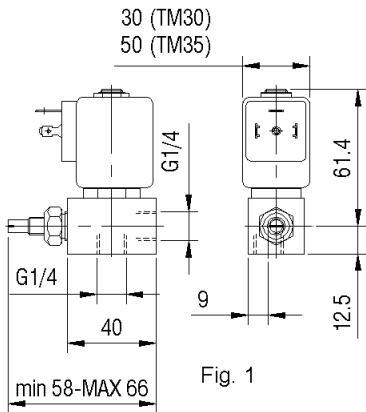
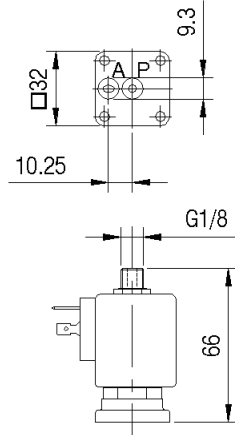


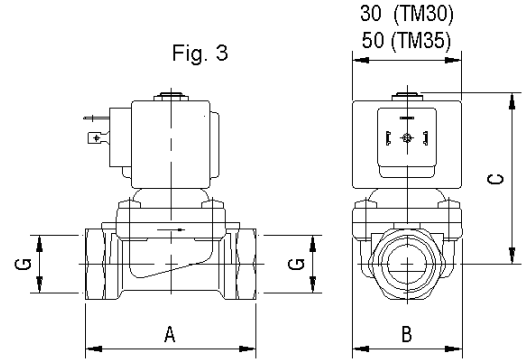
Fig. 1

320491 without flow adjustment!

Fig. 4

G	A	B	C	Mass
1/2"	65	192	171	1.4 kg
3/4"	75	198	176	1.5 kg
1"	90	212	185	1.9 kg
6/4"	120	230	198	3.0 kg
2"	150	248	207	3.7 kg

Fig. 3



G	A	B	C	D
1/2"	58	41	74	30
3/4"	78	50	80	50
1"	95	70	86	50
6/4"	132	96	129	65

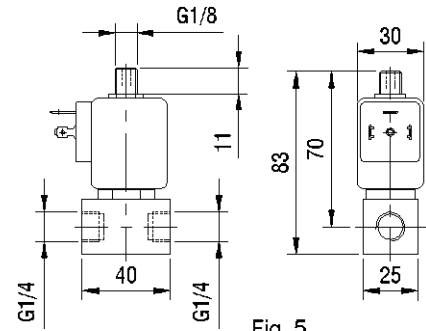


Fig. 5

Ports	Orifice size [mm]	Kv value (air at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC							

**Closed when de-energised (NC)**
**SAFETY SHUT-OFF VALVES**

G1/2	12	2.7	0	0.5	Brass	NBR	0.6	TM35	PV4NC	<b>350491</b>	1
G3/4	18	5.4	0	0.5	Brass	NBR	0.8	TM35	PV5NC	<b>350494</b>	1
G1	25	11	0	0.5	Brass	NBR	1.2	TM35	PV6NC	<b>350493</b>	1
G6/4	40	20.5	0	0.5	Brass	NBR	2.4	TM35	PV7NC	<b>350492</b>	1
G2	50	37.8	0	0.5	Brass	NBR	4.5	TM35	PV8NC	<b>350495</b>	1

**EN 161**  
**Certified**
**Open when de-energised (NO)**
**SAFETY SHUT-OFF VALVES**

G1/2	12	2.7	0	0.5	Brass	NBR	0.4	TM30	PV4NO	<b>350497</b>	1
G3/4	18	5.4	0	0.5	Brass	NBR	0.6	TM30	PV5NO	<b>350514</b>	1
G1	24	11	0	0.5	Brass	NBR	1	TM30	PV6NO	<b>350498</b>	1
G6/4	40	20.5	0	0.5	Brass	NBR	2.2	TM30	PV7NO	<b>350499</b>	1
G2	50	37.8	0	0.5	Brass	NBR	4.4	TM30	PV8NO	<b>350500</b>	1

**EN 161**  
**Certified**
**PV and PVNC valves are to be used with gas detectors exclusively!**
**Closed when de-energised (NC)**
**PROCESS VALVES**

G1/2	10	1.5	0	0.8	Brass	NBR	0.42	TM30	D240	<b>340498</b>	2
	10	1.5	0	1	Brass	NBR	0.57	TM35	D240	<b>340704</b>	2
G3/4	18	5.4	0	1	Brass	NBR	0.8	TM35	M2521	<b>301697</b>	3
G1	25	11	0	1	Brass	NBR	1.2	TM35	M2621	<b>301698</b>	3
G6/4	40	20.5	0	1	Brass	NBR	2.75	TM40	M275	<b>370810</b>	3
G2	50	37.8	0	1	Brass	NBR	5.9	TM40	M282	<b>391491</b>	3

**EN 161**  
**Certified**
**Closed when de-energised (NC)**
**FOR GAS BOTTLES**

*	2	100	0	10	Brass	NBR	0.6	TM30	PL10	<b>350486</b>	4
*	2	100	0	10	Brass	NBR	0.42	TM30	PL3	<b>350488</b>	5

**\* See drawing!**
**ORDERING:**

Please state order code or consult our staff.  
 For easier valve choice use QUESTIONNAIRE on page 36.

**OPTIONS:**

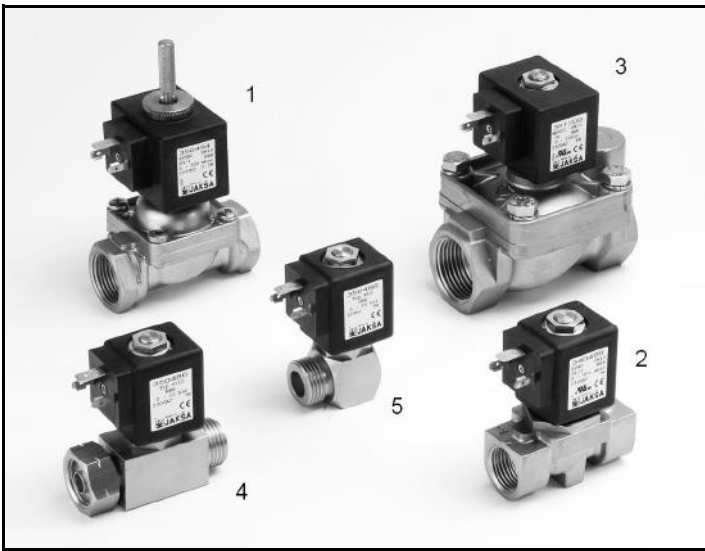
- EEx me II explosionproof coils

Other versions on request.

Specifications are subject to change without notice.

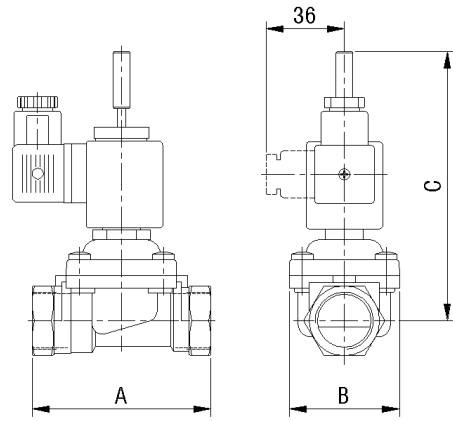
**TECHNICAL DATA:**

Internal parts: stainless steel  
 Seals: NBR  
 Fluid temperature: -10°C to +60°C  
 Ambient temperature: max +50°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: closing 10 to 30 ms / manual opening  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 PV and PVNC 230VAC only  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Electrical protection: IP65 (with plug to DIN 43650)



**Dimensions [mm]**

Fig. 1



Model	G	A	B	C
PV4NC/NO	1/2"	58	41	116
PV5NC/NO	3/4"	78	50	120
PV6NC/NO	1"	95	70	129
PV7NC/NO	6/4"	132	96	152
PV8NC/NO	2"	160	112	150

22.5 (TM30)  
28 (TM35)

30 (TM30)  
50 (TM35)

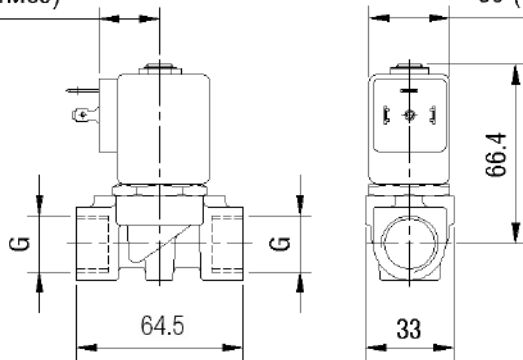
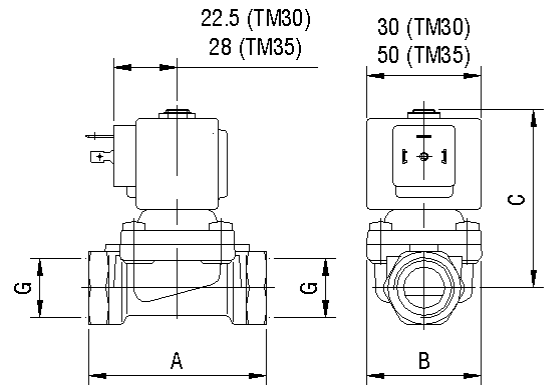


Fig. 2

Fig. 3



Model	G	A	B	C
M245	1/2"	58	41	116
M252	3/4"	78	50	120
M262	1"	95	70	129
M275	6/4"	132	96	152
M282	2"	160	112	150

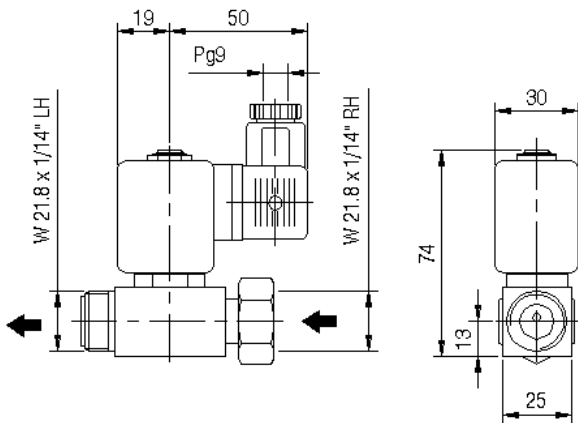


Fig. 4

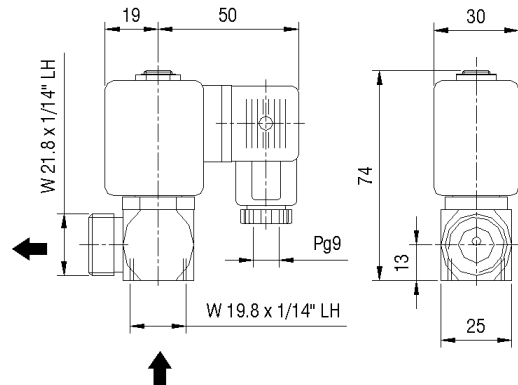


Fig. 5

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Minimum differential pressure ABSOLUTE	Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
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### 2/2 closed when de-energised (NC)

G3/8	7	13	15 mbar	Brass	NBR	0.52	TM35	D224	<b>320717</b>	1
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G1/2	10	25	15 mbar	Brass	NBR	0.57	TM35	D240	<b>340481</b>	2
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G1/2	12	40	15 mbar	Brass	NBR	0.43	TM30	M2451	<b>301702</b>	3
------	----	----	---------	-------	-----	------	------	-------	---------------	---

G3/4	18	65	15 mbar	Brass	NBR	0.76	TM35	M2521	<b>301701</b>	3
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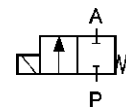
G1	25	180	15 mbar	Brass	NBR	1.2	TM35	M2621	<b>301709</b>	3
----	----	-----	---------	-------	-----	-----	------	-------	---------------	---

G6/4	40	330	15 mbar	Brass	NBR	2.75	TM40	M275	<b>370810</b>	3
------	----	-----	---------	-------	-----	------	------	------	---------------	---

G3/4	18	90	15 mbar	Brass	NBR	0.66	TM30	M250	<b>350510</b>	4
------	----	----	---------	-------	-----	------	------	------	---------------	---

G1	25	180	15 mbar	Brass	NBR	1.2	TM30	M260	<b>360518</b>	4
----	----	-----	---------	-------	-----	-----	------	------	---------------	---

G6/4	40	330	15 mbar	Brass	NBR	2.4	TM30	M270	<b>370511</b>	4
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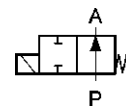


### 2/2 open when de-energised (NO)

G3/4	18	90	15 mbar	Brass	NBR	0.66	TM30	M250NO	<b>359511</b>	4
------	----	----	---------	-------	-----	------	------	--------	---------------	---

G1	25	180	15 mbar	Brass	NBR	1.2	TM30	M260NO	<b>369510</b>	4
----	----	-----	---------	-------	-----	-----	------	--------	---------------	---

G6/4	40	330	15 mbar	Brass	NBR	2.4	TM30	M270NO	<b>379510</b>	4
------	----	-----	---------	-------	-----	-----	------	--------	---------------	---

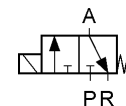


### 3/2 closed when de-energised (NC)

G1/4	4.5	7.5	15 mbar	Brass	NBR	0.52	TM35	D32NO/NC	<b>330742</b>	5
------	-----	-----	---------	-------	-----	------	------	----------	---------------	---

G3/8	13	28	15 mbar	Brass	FPM	0.79	TM35	XD329	<b>331762</b>	*
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G3/4	20	105	15 mbar	Brass	NBR	1.75	TM40	XD327	<b>331738</b>	*
------	----	-----	---------	-------	-----	------	------	-------	---------------	---



**\*See pages 10 and 11**

#### ORDERING:

Please state order code, seal and voltage (e.g.: 320717 FPM 24VAC)  
or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

#### OPTIONS:

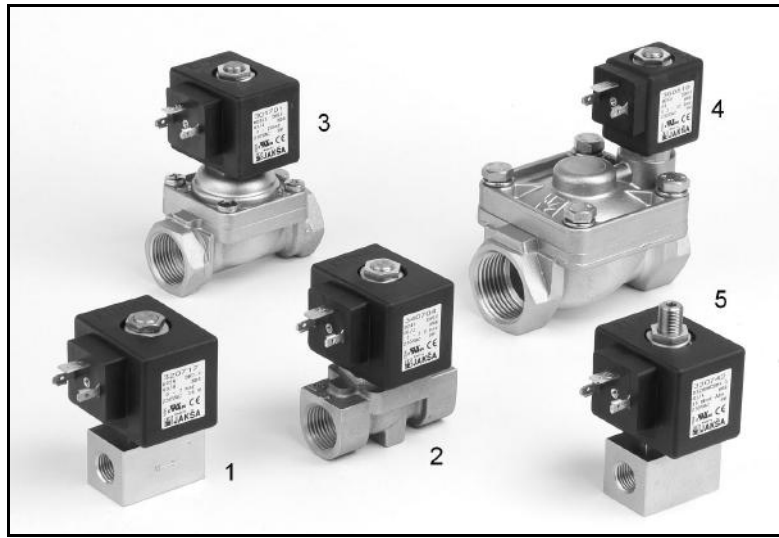
- EEx me II explosionproof coils
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

#### TECHNICAL DATA:

Internal parts:	stainless steel
Seals:	NBR, FPM
Fluid temperature:	-10°C to +90°C (NBR)
Ambient temperature:	max +60°C
Viscosity:	max 21 mm <sup>2</sup> /s
Response time:	5 to 120 ms
Voltage:	230, 115, 48, 24 V 50/60 Hz 24, 12 V DC
Power consumption:	see chapter »Coils«
Duty cycle:	continuous (ED100%)
Cycling rate:	250 to 800 cpm
Electrical protection:	IP65 (with plug to DIN 43650)



**Dimensions [mm]**

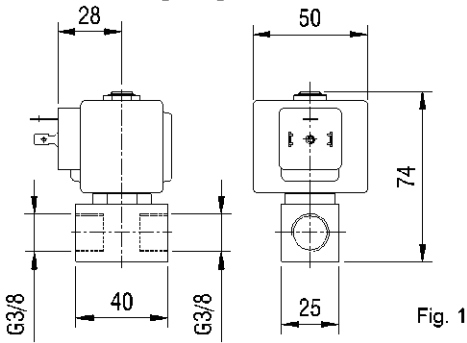


Fig. 1

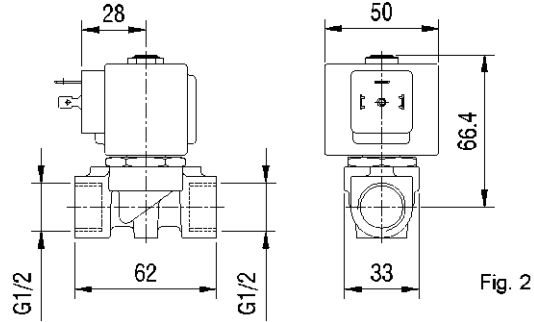


Fig. 2

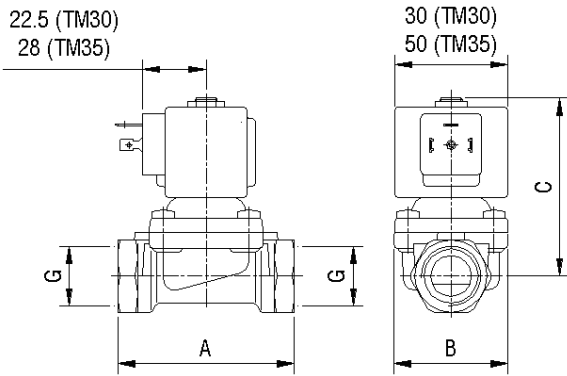


Fig. 3

Model	G	A	B	C
M245	1/2"	58	41	74
M252	3/4"	78	50	80
M262	1"	95	70	86
M275	6/4"	132	96	129

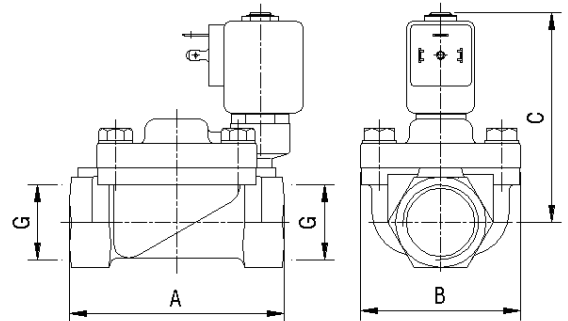


Fig. 4

Model	G	A	B	C
M250	3/4"	78	50	87
M260	1"	95	70	92
M270	6/4"	132	96	104

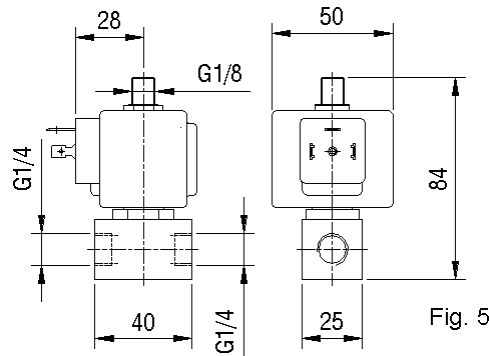


Fig. 5

# 2/2 CRYOGENIC SERVICE VALVES 1/4" - 1"

## LIQUID NITROGEN VALVES, 2/2 closed when de-energised (NC)

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC*							
G1/4	3	3.6	0	30	Brass	PTFE	0.52	TM35	D222	<b>320586</b>	1
	4.5	7.5	0	10	Brass	PTFE	0.52	TM35	D223	<b>320772</b>	1
G1/2	7	13	0	5	Brass	PTFE	0.52	TM35	D224	<b>320781</b>	1
	10	28	0	1.5	Brass	PTFE	0.57	TM35	XD24	<b>340459</b>	2
G1	25	180	0.35	15	Brass	PTFE	1.51	TM35	B26C	<b>316501</b>	3

\*Pressure is lower when DC coil is used!

**VALVES FOR OTHER APPLICATIONS AVAILABLE ON REQUEST. PLEASE CONSULT OUR STAFF.**

### ORDERING:

Please state order code and voltage (e.g.: 320722 24VAC) or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

### OPTIONS:

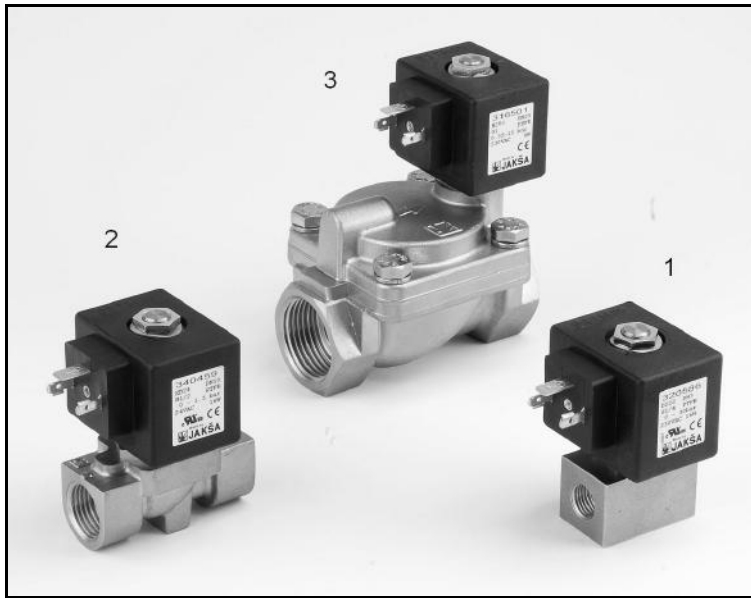
- EEx me II explosionproof coils
- NPT ports

Other versions on request.

Specifications are subject to change without notice.

### TECHNICAL DATA:

Internal parts: stainless steel  
 Seals: PTFE  
 Fluid temperature: -196°C to +90°C  
 Ambient temperature: max +50°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: closing 8 to 40 ms  
 Voltage: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)



**Dimensions [mm]**

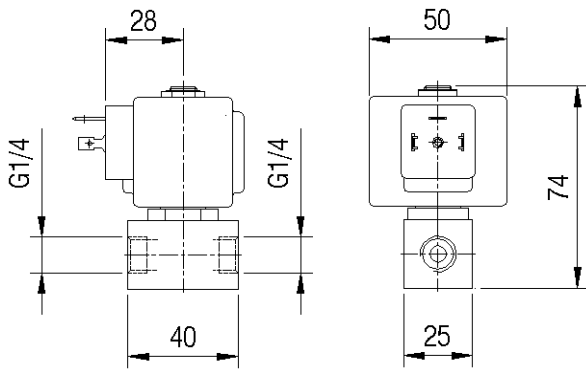


Fig. 1

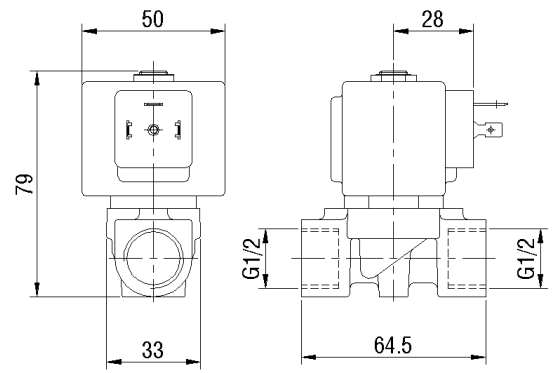


Fig. 2

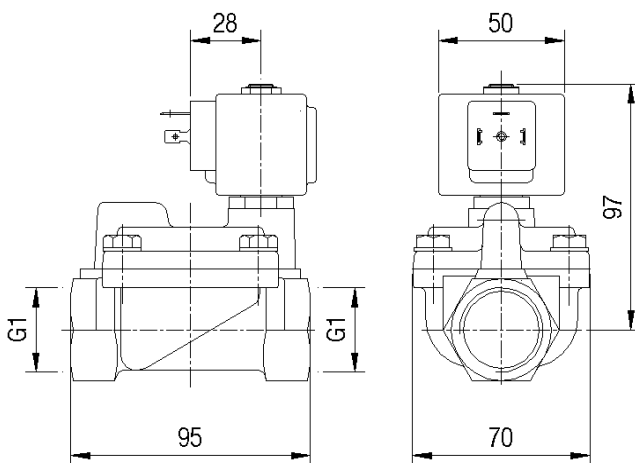
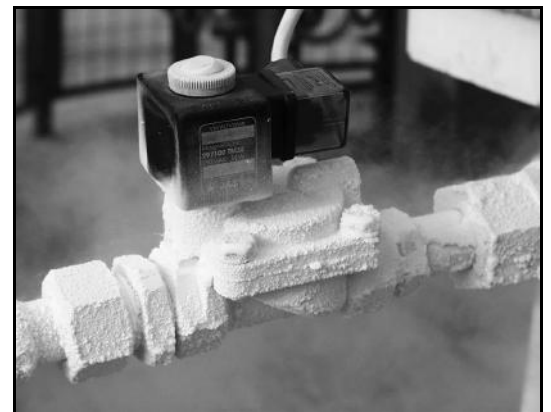


Fig. 3



Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Seal	Mass [kg]	Coil type	Model	Order code 230VAC	Fig.
			Min	Max AC*							

### Drain valves, closed when de-energised (NC)

G1/4	4.5	7.5	0	15	Brass	FPM	0.35	TM30	D4K	<b>321502</b>	1
G3/8	4.5	7.5	0	15	Brass	FPM	0.35	TM30	D4K	<b>321503</b>	1
G1/2	4.5	7.5	0	15	Brass	FPM	0.35	TM30	D4K	<b>321505</b>	1

### Air release valves, open when de-energised (NO)

G1/2	10	20	0	12	Brass	FPM	0.43	TM30	M34NO	<b>349514</b>	2
	10	20	1	20	Brass	PA	0.5	TM30	B24NO	<b>316322</b>	3
	10	20	1	50	Brass	PA	0.6	TM35	B27NO	<b>316312</b>	3

G1	25	180	1	20	Brass	PTFE	1.66	TM35	B26NO	<b>316350</b>	4
G6/4	40	350	1	20	Brass	PTFE	3.25	TM35	B26NO	<b>316362</b>	4
G2	50	630	1	20	Brass	PTFE	5.45	TM35	B26NO	<b>316374</b>	4

### Valves for air dryers, closed when de-energised (NC)

G1	25	180	1	20	Brass	PTFE	1.66	TM35	B26	<b>316502</b>	5
G6/4	40	350	1	20	Brass	PTFE	3.25	TM35	B26	<b>316522</b>	5
G2	50	630	1	20	Brass	PTFE	5.45	TM35	B26	<b>316542</b>	5

### Oil stop valves, closed when de-energised (NC)

G1	25	180	1	18	Brass	PTFE	1.66	TM30	B26	<b>316401</b>	5
G6/4	40	350	1	18	Brass	PTFE	3.25	TM30	B26	<b>316451</b>	5
G2	50	630	1	18	Brass	PTFE	5.45	TM30	B26	<b>316481</b>	5

\*Pressure is lower when DC coil is used!

#### ORDERING:

Please state order code and voltage (e.g.: 321508 24VAC) or consult our staff.

For easier valve choice use QUESTIONNAIRE on page 36.

#### OPTIONS:

- EEx me II explosionproof coils
- NPT ports

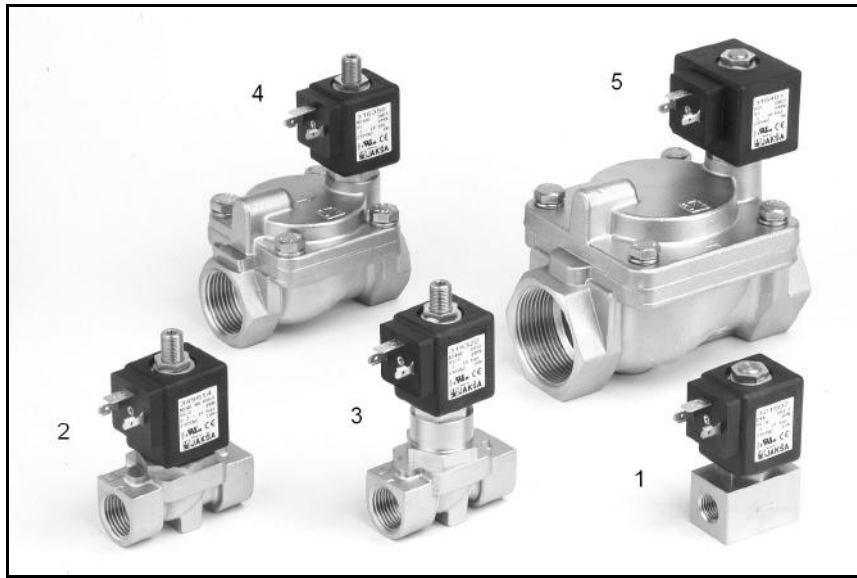
Other versions on request.

Specifications are subject to change without notice.

#### TECHNICAL DATA:

Internal parts: stainless steel  
 Seals: FPM, PTFE  
 Fluid temperature: -10°C to +110°C  
 Ambient temperature: max +55°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Response time: closing 10 to 30 ms  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP65 (with plug to DIN 43650)





**Dimensions [mm]**

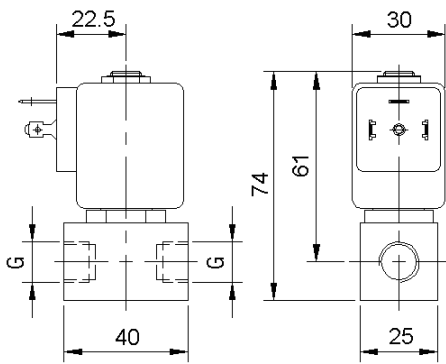


Fig. 1

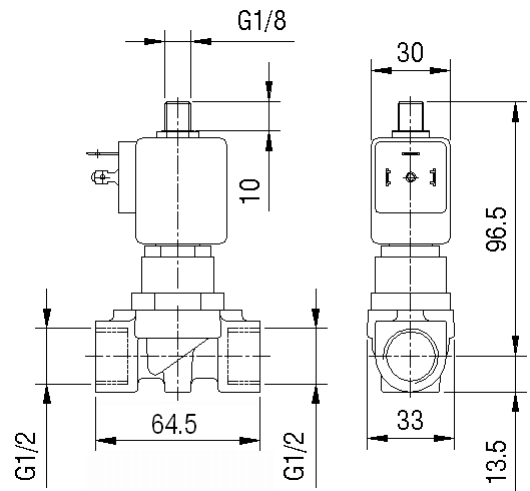


Fig. 3

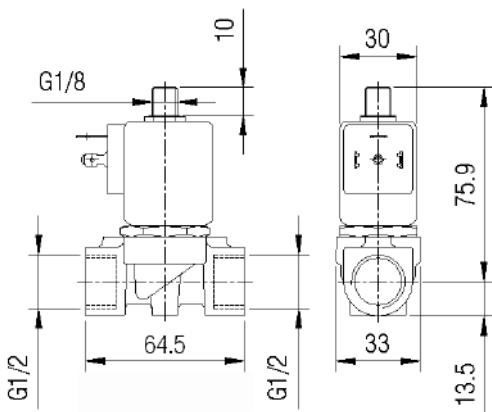


Fig. 2

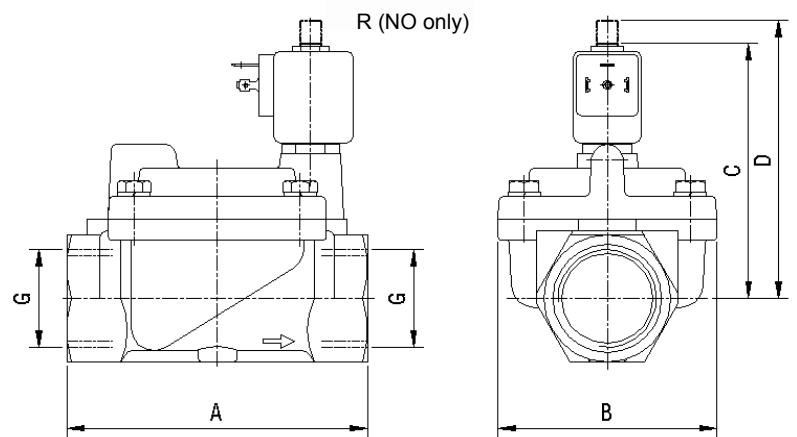


Fig. 4 + 5

G	A	B	C	D
1"	95	70	97	107
6/4"	132	96	113	123
2"	160	112	129	139

Ports	Orifice size [mm]	Kv value (water at 1 bar) [l/min]	Differential pressure [bar]		Valve body	Seal	Mass [kg]	Coil type	Voltage	Model	Order code	Fig.
			Min	Max AC*								

**Valves in plastic housings, pilot operated diaphragm, closed when de-energised (NC)**

G3/4	7.3	17	0.3	10	POM	EPDM	0.1	TM11	230VAC	1090	<b>311210</b>	1
	7.3	17	0.3	10	POM	EPDM	0.1	TM11	230VAC	1180	<b>312210</b>	2
M12x1	5.5	9.5	0.3	10	PA	EPDM	0.1	TM11	230VAC	1090	<b>311212</b>	3
	5.5	9.5	0.3	10	PA	EPDM	0.3	TM11	230VAC	3000	<b>315211</b>	4
G3/4	7.3	17	0.3	10	PA	EPDM	0.2	TM11	230VAC	2180	<b>314210</b>	5
	7.3	17	0.3	10	PA	EPDM	0.3	TM11	230VAC	3180	<b>316209</b>	6

**Beer tapping valve, direct acting, closed when de-energised (NC)**

G1/4	5	7.8	0	2	Ms	NBR	0.42	TM35	24VDC	D2P	<b>399856</b>	7
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**Valve for dental appliances, pilot operated diaphragm, closed when de-energised (NC)**

FL35	5	7.8	0.3	8	PA	NBR	0.15	TM25	24VDC	PA207	<b>301640</b>	8
------	---	-----	-----	---	----	-----	------	------	-------	-------	---------------	---

**Fuel supply shut-off valve, direct acting, closed when de-energised (NC)**

Ø6	4	5.9	0	2	Brass	NBR	0.26	TM30	12VDC	D115	<b>380051</b>	9
----	---	-----	---	---	-------	-----	------	------	-------	------	---------------	---

\*Pressure is lower when DC coil is used!

**ORDERING:**

Please state order code, seal and voltage (e.g.: 311210 NBR 24VAC)

or consult our staff.

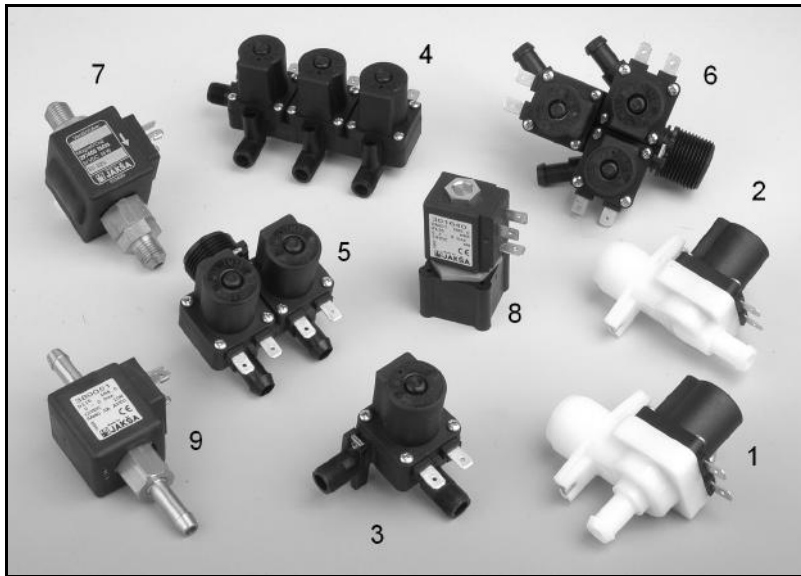
For easier valve choice use QUESTIONNAIRE on page 36.

Other versions on request.

Specifications are subject to change without notice.

**TECHNICAL DATA:**

Internal parts: stainless steel  
 Seals: NBR, EPDM  
 Fluid temperature: max +90°C  
 Ambient temperature: max +50°C  
 Viscosity: max 21 mm<sup>2</sup>/s  
 Voltages: 230, 115, 48, 24 V 50/60 Hz  
 24, 12 V DC  
 Power consumption: see chapter »Coils«  
 Duty cycle: continuous (ED100%)  
 Cycling rate: 10 to 100 cpm  
 Electrical protection: IP54



**Dimensions [mm]**

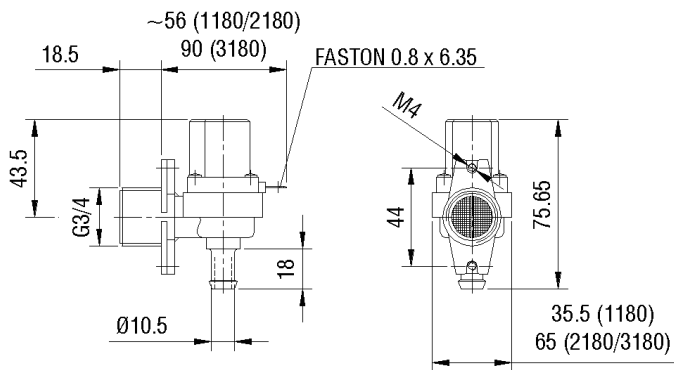


Fig. 1, 2, 5, 6

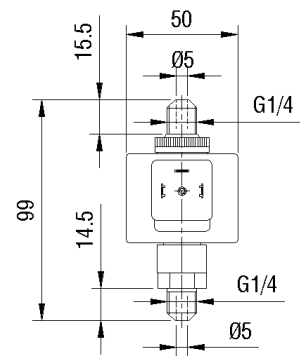


Fig. 7

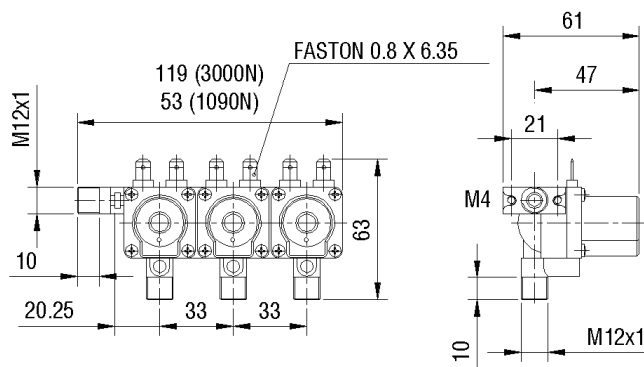


Fig. 3+4

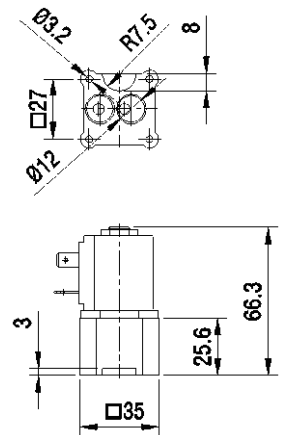


Fig. 8

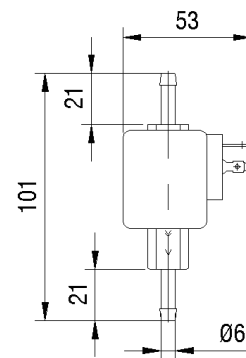
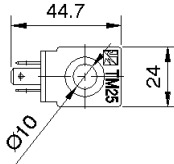
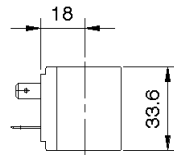


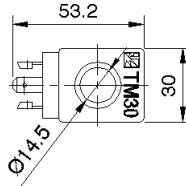
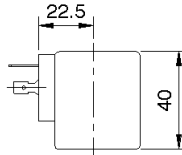
Fig. 9

# COILS

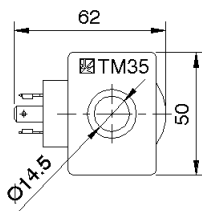
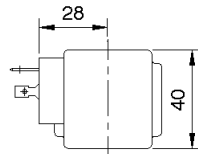
Voltage	TM25		TM25/S	
	Order code	Power	Order code	Power
230 VAC	296104	6 W	296105	4 W
115 VAC	296601	6 W	-	-
48 VAC	296201	6 W	296203	4 W
24 VAC	296301	6 W	296303	4 W
24 VDC	296400	6 W	296403	5 W
12 VDC	296501	9 W	296505	5 W
6 VDC	296850	1.5 W	Latch (Bi-stable)	
9 VDC	296852	1.5 W	Latch (Bi-stable)	



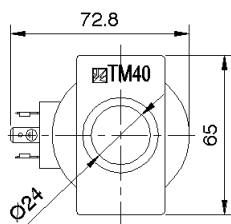
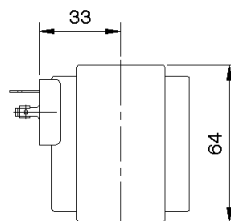
Voltage	TM30		TM30/S	
	Order code	Power	Order code	Power
230 VAC	295102	10 W	295104	7 W
115 VAC	295600	10 W	-	-
48 VAC	295200	10 W	295210	7 W
24 VAC	295300	10 W	295303	7 W
24 VDC	295401	10 W	295403	7 W
12 VDC	295500	10 W	-	-
380 VAC	-	-	295710	7 W



Voltage	TM35		TM35/S	
	Order code	Power	Order code	Power
230 VAC	297100	16 W	297102	8 W
115 VAC	297600	16 W	-	-
48 VAC	297202	16 W	-	-
24 VAC	297300	16 W	297302	8 W
24 VDC	297400	18 W	297410	12 W
12 VDC	297500	18 W	-	-
380 VAC	297710	16 W	-	-

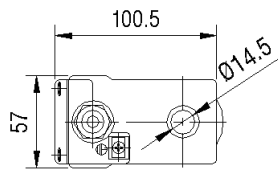


Voltage	TM40		TM40/S	
	Order code	Power	Order code	Power
200 VDC	298009	22 W	298012	11 W
24 VDC	298042	22 W	-	-



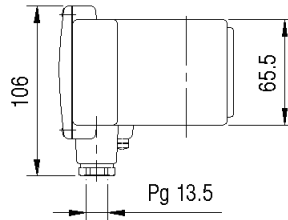
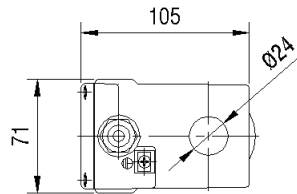
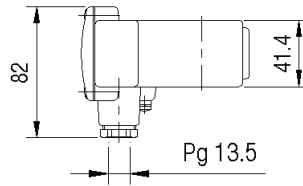
TMEx35		
Voltage	Order code	Power

230 VAC/DC	<b>290100</b>	10 W
115 VAC/DC	<b>290106</b>	10 W
48 VAC/DC	<b>290102</b>	10 W
24 VAC/DC	<b>290103</b>	10 W

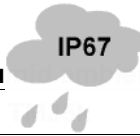


**Ex II 2 G EEx me II T4  
SIQ 04 ATEX 187X**

Voltage	Order code	Power
230 VAC/DC	<b>290110</b>	22 W
115 VAC/DC	<b>290116</b>	22 W
48 VAC/DC	<b>290112</b>	22 W
24 VAC/DC	<b>290113</b>	22 W

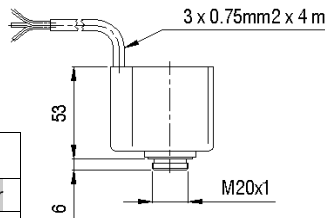
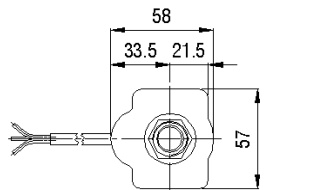


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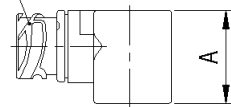
Low power – low heating

Voltage	Order code	Power
115 VDC	<b>297872</b>	4.5 W
24 VDC	<b>297870</b>	4.5 W



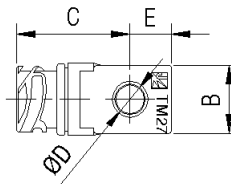
DIN 72585

Voltage	TM25b		TM30b	
	Order code	Power	Order code	Power
24 VDC	<b>296860</b>	6 W	<b>295860</b>	10 W
12 VDC	<b>296870</b>	6 W	<b>295870</b>	10 W



**Coil sealing sets for use in humid ambients**

Coil	Set order code
TM30; TM35; TMEEx35	298221 for 2/2 valves 298225 for 3/2 valves
TM40; TMEEx40	298227



	A	B	C	D	E
TM25b	33.6	24	41	10	15
TM30b	40	30	44	14.5	19

## 1. Pilot operated diaphragm and piston valves

<i>Problem</i>	<i>Probable cause</i>	<i>How to correct</i>
Valve does not open when coil is energised.	No voltage supply. Voltage may be too low or incorrect.	Check voltage; voltage must be within declared limits (AC $\pm 10\%$ ; DC $\pm 5\%$ ).
	Pilot orifice is blocked.	Deassemble valve and clean pilot orifice.
	Diaphragm or piston ring is ruptured.	Replace damaged part.
	Dirt or calcium deposits within solenoid base is blocking solenoid core.	Deassemble valve and clean thoroughly; install strainer on the inlet side of valve.
	Inlet pressure is too high.	Reduce pressure if possible; consult our staff over valve's suitability.
	Pressure difference is insufficient.	Valve may be oversized for your application; increase inlet pressure if valve permits or replace valve with smaller one,
	Solenoid base is damaged.	Replace damaged part.
Valve does not close when coil is de-energised.	Coil is still energised.	Check electrical circuit.
	Flow direction is incorrect.	Check valve orientation; arrow mark on valve body indicates flow direction.
	Pilot orifice is blocked.	Deassemble valve and clean pilot orifice.
	Dirt or calcium deposits within solenoid base is blocking solenoid core.	Deassemble valve and clean thoroughly; install strainer on the inlet side of valve.
	Solenoid base is damaged.	Replace damaged part.
Valve does not shut tightly or it leaks.	Damaged sealing disc / diaphragm / valve seat / solenoid core spring.	Replace damaged part; never stretch or shorten core spring!
	Pressure difference is insufficient.	Valve may be oversized for your application; increase inlet pressure if valve permits or replace valve with smaller one,

## 2. Direct acting valves

<i>Problem</i>	<i>Probable cause</i>	<i>How to correct</i>
Valve does not open when coil is energised.	No voltage supply. Voltage may be too low or incorrect.	Check voltage; voltage must be within declared limits (AC $\pm 10\%$ ; DC $\pm 5\%$ ).
	Inlet pressure is too high.	Reduce pressure if possible; consult our staff over valve's suitability.
	Dirt or calcium deposits within solenoid base is blocking solenoid core; solenoid base may be damaged.	Deassemble valve and clean thoroughly; replace damaged parts; install strainer on the inlet side of valve.
	Coil is burned.	Replace coil. Refer to section 3 for probable causes of coil burning.
Valve does not close when coil is de-energised.	Coil is still energised.	Check electrical circuit.
	Flow direction is incorrect.	Check valve orientation; arrow mark on valve body indicates flow direction.
	Dirt or calcium deposits within solenoid base is blocking solenoid core.	Deassemble valve and clean thoroughly; install strainer on the inlet side of valve.
	Solenoid base is damaged.	Replace damaged part.
Valve does not shut tightly or it leaks.	Damaged sealing disc / valve seat / solenoid core spring.	Replace damaged part; never stretch or shorten core spring!

## 3. Coils

<i>Problem</i>	<i>Probable cause</i>	<i>Prevention</i>
Coil is burned.	Dirt or calcium deposits within solenoid base blocking solenoid core.	Deassemble valve and clean thoroughly; install strainer on the inlet side of valve.
	There is moisture inside coil.	Seal and tighten cable gland; make sure that plug seals are in place; use sealing set or TM24 coil in humid environment (see page 33).
	Solenoid core does not move due to excessive fluid pressure.	Reduce pressure or install suitable valve; consult our staff over valve's suitability.
	Solenoid core is blocked due to damaged solenoid base or core spring.	Deassemble valve and clean thoroughly; replace damaged parts.
	Valve is missing parts or is not properly assembled.	Check valve assembly; replace missing parts if necessary.
	Supply voltage is too high or incorrect.	Check voltage; voltage must be within declared limits (AC $\pm 10\%$ ; DC $\pm 5\%$ ).
	Fluid and/or ambient temperature is too high.	Consult our staff over suitability of chosen valve/coil.

**Pressure conversion table**

bar	Mpa	PSI
0	0	0
0.001	0.0001	0.015
0.002	0.0002	0.029
0.003	0.0003	0.044
0.004	0.0004	0.058
0.005	0.0005	0.073
0.006	0.0006	0.087
0.007	0.0007	0.102
0.008	0.0008	0.116
0.009	0.0009	0.131
0.01	0.001	0.145
0.02	0.002	0.290
0.03	0.003	0.435
0.04	0.004	0.580
0.05	0.005	0.725
0.06	0.006	0.870
0.07	0.007	1.015
0.08	0.008	1.160
0.09	0.009	1.305
0.1	0.01	1.45
0.2	0.02	2.90
0.3	0.03	4.35
0.4	0.04	5.80
0.5	0.05	7.25
0.6	0.06	8.70
0.7	0.07	10.15
0.8	0.08	11.60
0.9	0.09	13.05
1	0.1	14.50
1.5	0.15	21.75
2	0.2	29.01
2.5	0.25	36.26
3	0.3	43.51
3.5	0.35	50.76
4	0.4	58.01
4.5	0.45	65.26
5	0.5	72.52
5.5	0.55	79.77

bar	Mpa	PSI
6	0.6	87.02
6.5	0.65	94.27
7	0.7	101.52
7.5	0.75	108.77
8	0.8	116.03
8.5	0.85	123.28
9	0.9	130.53
9.5	0.95	137.78
10	1	145.03
11	1.1	159.54
12	1.2	174.04
13	1.3	188.54
14	1.4	203.05
15	1.5	217.55
16	1.6	232.05
17	1.7	246.56
18	1.8	261.06
19	1.9	275.56
20	2	290.07
21	2.1	304.57
22	2.2	319.07
23	2.3	333.57
24	2.4	348.08
25	2.5	362.58
26	2.6	377.08
27	2.7	391.59
28	2.8	406.09
29	2.9	420.59
30	3	435.10
35	3.5	507.61
40	4	580.13
45	4.5	652.65
50	5	725.16
55	5.5	797.68
60	6	870.20
65	6.5	942.71
70	7	1015.23
75	7.5	1087.74

bar	Mpa	PSI
80	8	1160.26
85	8.5	1232.78
90	9	1305.29
95	9.5	1377.81
100	10	1450.33
105	10.5	1522.84
110	11	1595.36
115	11.5	1667.87
120	12	1740.39
125	12.5	1812.91
130	13	1885.42
135	13.5	1957.94
140	14	2030.46
145	14.5	2102.97
150	15	2175.49
155	15.5	2248.01
160	16	2320.52
165	16.5	2393.04
170	17	2465.55
175	17.5	2538.07
180	18	2610.59
185	18.5	2683.10
190	19	2755.62
195	19.5	2828.14
200	20	2900.65
210	21	3045.79
220	22	3190.83
230	23	3335.87
240	24	3480.91
250	25	3625.94
260	26	3770.98
270	27	3916.02
280	28	4061.06
290	29	4206.09
300	30	4351.13
400	40	5801.51
500	50	7251.89
1000	100	14503.77

**Orifice sizes with approximate inch equivalents**

mm	in.
1	5/128"
1.2	3/64"
1.4	7/128"
1.5	7/128"
1.6	1/16"
1.8	9/128"
2	5/64"
2.3	3/32"
2.5	13/128"
3	7/64"
4	5/32"
4.5	23/128"
5	25/128"
5.5	7/32"

mm	in.
6	15/64"
7	35/128"
7.3	37/128"
8	5/16"
10	25/64"
11	7/16"
12	61/128"
15	19/32"
18	91/128"
20	25/32"
23	29/32"
25	1"
40	1 1/2"
50	2"

**BASIC UNIT CONVERSIONS**

**Pressure**  
 1 bar = 14.50326 PSI  
 1 bar = 10 N/cm<sup>2</sup>  
 1 bar = 0.1 MPa  
 1 PSI = 0.06895 bar  
 1 kg/cm<sup>2</sup> = 0.981 bar

**Temperature**  
 °F = (°C x 9/5) + 32  
 °C = (°F - 32) x 5/9  
 K = °C + 273

**Flow rate**  
 1 l/min = 16.667 m<sup>3</sup>/h  
 1 l/min = 1.412579 x 10<sup>-3</sup> cu ft/min (CFM)  
 1 m<sup>3</sup>/h = 0.06 l/min

**Mass**  
 1 kg = 35.27399 oz.  
 1 kg = 2.2 lb  
 1 lb = 0.455 kg

# QUESTIONNAIRE

## 1. Application

Type of fluid

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Possible additives or impurities in fluid

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Maximum fluid temperature

Minimum fluid temperature

---

Viscosity

---

Operating pressure [bar]

Maximum

Minimum

Normal

---

Desired flow rate

[l/min; m<sup>3</sup>/h; kg/h]

---

Ambient temperature

Minimum

Maximum

---

## 2. Valve design

Ports

Orifice size

---

Valve body material

Seal material

---

Function

2/2 NC

2/2 NO

3/2 NC

3/2 NO

NC = closed when  
de-energised

Other

NO = open when  
de-energised

---

Voltage

---

Coil energised:

Continuously

Intermittently

Time ON

Time OFF

---

Ambient description (dry, humid, dusty, outdoor,...)

---

Quantity required:

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**JAKŠA d.o.o.**

Šlandrova ulica 8, SI-1231 Ljubljana-Črnuče, Slovenia

Fax: (+386) (0)1 5373067 Phone: (+386) (0)1 5373066

E-mail: info@jaksa.si