

Pilot Operated 2-Port Solenoid Valve JSXD Series

CE UK
CA
Differs depending on the voltage
and electrical entry. For details,
refer to table 8 below.

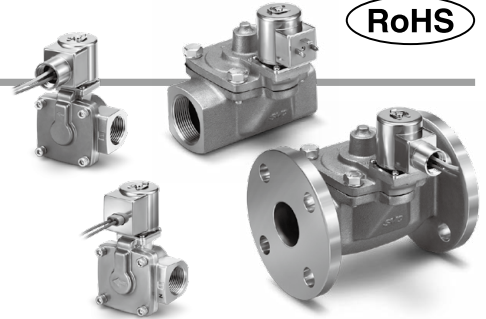


RoHS

How to Order

JSXD **3** **1** - **C** **N** **02** **R** - **5** **G** - **D** - **B**

1 2 3 4 5 6 7 8 9 10



1 Size

Symbol	Size
3	30
4	40
5	50
6	60
7	70
8	80
9	90

2 Valve type

Symbol	Valve type
1	N.C.

3 Body material

Symbol	Body material	Size		
		30	40, 50, 60	70, 80, 90
C	Brass	●	●	—
S	Stainless steel	●	●	—
B	Bronze	—	—	●
A	Aluminum	●	—	—

4 Seal material

Symbol	Seal material
N	NBR
F	FKM
E*1	EPDM

*1 Cannot be used in combination with the aluminum body

5 Port size

Symbol	Connection	Port size	Size						
			30	40	50	60	70	80	90
02	Thread	1/4	●	—	—	—	—	—	—
03		3/8	●	●	—	—	—	—	—
04		1/2	●	●	—	—	—	—	—
06		3/4	—	—	●	—	—	—	—
10		1	—	—	—	●	—	—	—
12		1 1/4	—	—	—	—	●	—	—
14		1 1/2	—	—	—	—	—	●	—
20		2	—	—	—	—	—	—	●
32	Flange	32A	—	—	—	—	●	—	—
40		40A	—	—	—	—	—	●	—
50		50A	—	—	—	—	—	—	●

6 Thread type

Symbol	Thread type	Connection
R	Rc	Thread
N	NPT	
F	G	
Nil	—	Flange

7 Rated voltage

AC				DC	
Symbol	Rated voltage	Symbol	Rated voltage	Symbol	Rated voltage
1	100 VAC	7	240 VAC	5	24 VDC
2	200 VAC	8	48 VAC	6	12 VDC
3	120 (110) VAC	B	24 VAC		
4	220 VAC	J	230 VAC		

9 Oil-free option

Symbol	Option
Nil	None
D	Oil-free

10 Bracket

Symbol	With bracket	Size			
		30	40, 50, 60	70, 80, 90	
Nil	None	●	●	●	
B	With bracket	●	●	—*1	

*1 Sizes 70 to 90 are not available with a bracket.

8 Electrical entry

Symbol	Electrical entry	CE/UKCA-compliant	UL Standards
G	Grommet*1	12 VDC 24 VDC	Refer to pages 47 to 50.
GS	Grommet with PCB (With surge voltage suppressor)	100 VAC 24 VDC 12 VDC 48 VAC 24 VAC	
CS	Conduit (With surge voltage suppressor)	All voltages	
DS	DIN terminal (With surge voltage suppressor)	All voltages	
DZ	DIN terminal with light (With surge voltage suppressor)	All voltages	
DN	DIN terminal without connector (With surge voltage suppressor)	All voltages	
WN	M12 connector without cable (With surge voltage suppressor)*2	All voltages	

*1 DC voltage only

*2 A cable for the M12 connector is not included with the product. Refer to the "Option" on page 51 to order it separately.

Flow Rate Characteristics

Size	Body material	Port size	Orifice diameter [mmø]	Flow rate characteristics*1						Min. operating pressure differential [MPa]	Max. operating pressure differential [MPa]	Model	Weight*2 [g]
				Air				Water, Oil					
				C [dm³/(s·bar)]	b	Cv	Effective area [mm²]	Kv	Conversion Cv				
30	Aluminum	1/4	10	8.5	0.35	2.0	—	—		0.02	1.0	JSXD31-A□02	410
		3/8		9.2		2.4						JSXD31-A□03	410
		1/2		9.2		2.4						JSXD31-A□04	410
	Brass Stainless steel	1/4		8.5	0.35	2.0		1.6	1.9			JSXD31-C□02	500
		3/8		9.2		2.4		2.0	2.4			JSXD31-C□03	500
		1/2		9.2		2.4		2.0	2.4			JSXD31-C□04	500
				3/8		18		0.35	5.0			3.9	4.5
1/2	20	5.5	4.6	5.5	JSXD41-C□04	720							
40	Brass Stainless steel	3/8	15	38	0.30	9.5		8.2	9.5	JSXD51-C□06	880		
50	Brass/Stainless steel	3/4		20		225		11.0	13.0	JSXD61-C□10	1460		
60	Brass/Stainless steel	1	25	—			415	19.6	23.0	0.03	1.0	JSXD71-B□(12, 32)	5500/3000
70	Bronze	1 1/4, 32A	35				560	26.4	31.0			JSXD81-B□(14, 40)	6900/4100
80	Bronze	1 1/2, 40A	40				880	42.8	49.0			JSXD91-B□(20, 50)	8500/5500
90	Bronze	2, 50A	50										

*1 The flow rate characteristics of this product vary.

*2 Indicates case of grommet type

Add 20 g for the grommet type with PCB, 70 g for the conduit type, 50 g for the DIN terminal type, and 15 g for the M12 connector type.
For sizes 70, 80, and 90, the weight on the left is for the flange type, and the weight on the right is for the thread type.

Applicable Fluid Checklist

Applicable fluid	Seal material		
	NBR	FKM	EPDM
Air	●	●	●
Water	●	●	●
Oil	—	●	—

* The list shows the compatibility between general fluids and the seal materials. Consider the operating environment and application sufficiently before selecting the seal material. Fluid and component compatibility should be checked before use. If something is not clear, please contact SMC.

Common Specifications

Size		30		40	50	60	70	80	90
Valve specifications	Body material		Aluminum	Brass, Stainless steel	Brass, Stainless steel			Bronze	
	Valve construction		Pilot operated diaphragm						
	Valve type		Normally closed (N.C.)						
	Fluid and fluid temperature	Air*1	-10 to 60°C						
		Water, Oil	—	Water: 1 to 60°C (No freezing), Oil: -5 to 60°C (Kinematic viscosity: 50 mm²/s or less)					
	Withstand pressure		2 MPa						
	Max. system pressure		1 MPa						
	Ambient temperature		-20 to 60°C						
	Valve leakage*2	Air	15 cm³/min (ANR) or less	2 cm³/min (ANR) or less			10 cm³/min (ANR) or less		
		Water, Oil	—	0.2 cm³/min or less			1 cm³/min or less		
	External leakage*2	Air	15 cm³/min (ANR) or less	1 cm³/min (ANR) or less					
		Water, Oil	—	0.1 cm³/min or less					
	Mounting orientation		Unrestricted						
	Enclosure*3		IP67 (IP65 for the DIN terminal)						
	Standards*4		CE/UKCA						
Operating environment		Location without the presence of corrosive gases, explosive gases, or constant water adhesion							
Seal material		NBR, FKM, EPDM							
Coil specifications	Rated voltage	AC	24 V, 48 V, 100 V, 110 V, 120 V, 200 V, 220 V, 230 V, 240 V						
		DC	12 V, 24 V						
	Allowable voltage fluctuation		±10% of the rated voltage						
	Allowable leakage voltage	AC	5% or less of the rated voltage						
		DC	2% or less of the rated voltage						
	Apparent power*5, *6	AC	8 VA				9.5 VA		
	Power consumption*5	DC	6 W				8 W		
	Temperature rise*7		AC/DC	70/65°C					

*1 Dew point temperature: —10°C or less

*2 Leakage: The value at a differential pressure the same as or higher than the min. operating pressure differential, and an ambient temperature of 20°C

*3 This product has an IP67 enclosure, but if water enters the product, it may result in malfunction or breakage.

Therefore, take appropriate measures to prevent water from entering the product when using in an environment where it is constantly exposed to water.

*4 Standards compliance varies depending on the model. For details, refer to page 25.

*5 Power consumption/Apparent power: The value at an ambient temperature of 20°C and when the rated voltage is applied (Variation: ±10%)

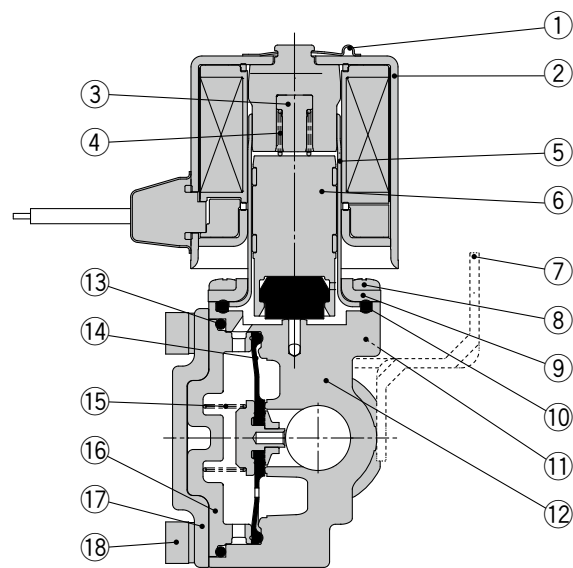
*6 There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.

*7 Temperature rise: The value at an ambient temperature of 20°C and when the rated voltage is applied. Use this value as a reference as the actual value varies depending on the ambient environment.

Be sure to read the “Specific Product Precautions” before handling the product.

Construction

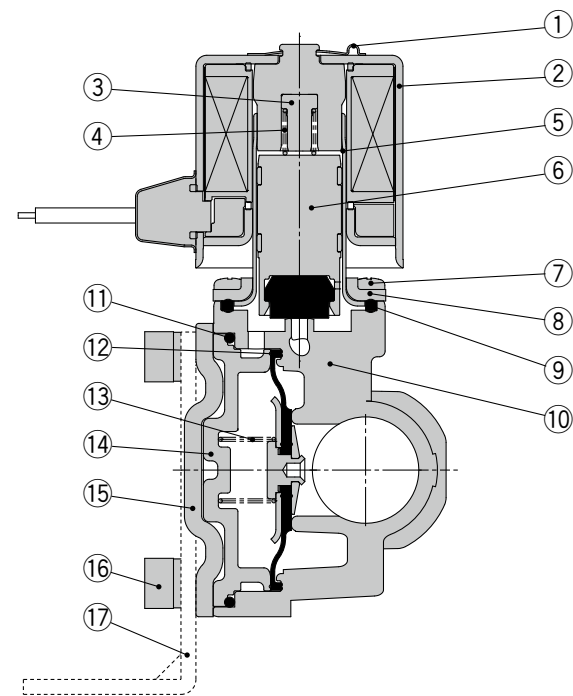
JSXD30, Normally closed (N.C.)
Body material: Brass, Stainless steel, Aluminum



Component Parts

No.	Description	Material		
		Brass	Stainless steel	Aluminum
1	Clip	Stainless steel		
2	Solenoid coil	Stainless steel, Cu, Resin		
3	Stopper	PPS		
4	Spring	Stainless steel		
5	Tube assembly	Stainless steel		
6	Armature assembly	Stainless steel, PPS, NBR, (FKM, EPDM)		Stainless steel, PPS, NBR, (FKM)
7	Bracket	Fe		
8	Mounting screw	Fe		
9	Bonnet	Stainless steel		
10	Gasket	NBR, (FKM, EPDM)		NBR, (FKM)
11	Bolt	Fe		
12	Body	Brass	Stainless steel	Aluminum
13	O-ring	NBR, (FKM, EPDM)		NBR, (FKM)
14	Diaphragm assembly	Stainless steel, NBR, (FKM, EPDM)		Stainless steel, NBR, (FKM)
15	Valve spring	Stainless steel		
16	Buffer	PPS		
17	Bonnet	Stainless steel		
18	Bolt	Fe		

JSXD40, Normally closed (N.C.)
Body material: Brass, Stainless steel

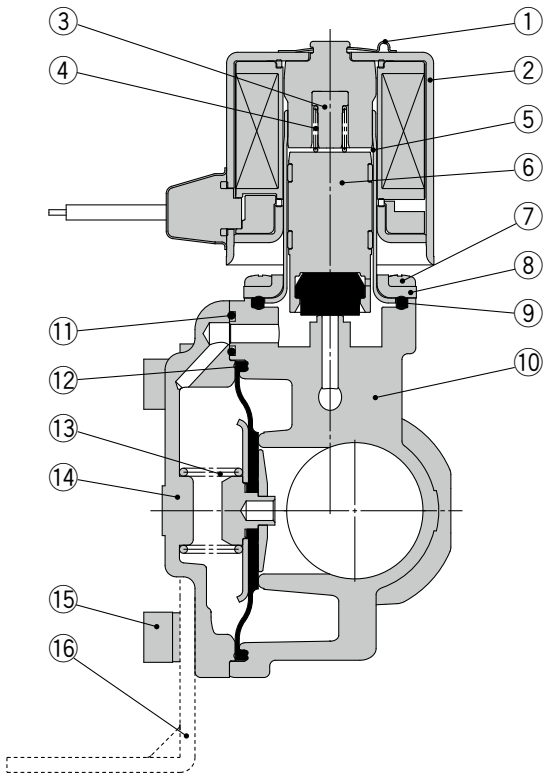


Component Parts

No.	Description	Material	
		Brass	Stainless steel
1	Clip	Stainless steel	
2	Solenoid coil	Stainless steel, Cu, Resin	
3	Stopper	PPS	
4	Spring	Stainless steel	
5	Tube assembly	Stainless steel	
6	Armature assembly	Stainless steel, PPS, NBR, (FKM, EPDM)	
7	Mounting screw	Fe	
8	Bonnet	Stainless steel	
9	Gasket	NBR, (FKM, EPDM)	
10	Body	Brass	Stainless steel
11	O-ring	NBR, (FKM, EPDM)	
12	Diaphragm assembly	Stainless steel, NBR, (FKM, EPDM)	
13	Valve spring	Stainless steel	
14	Buffer	PPS	
15	Bonnet	Stainless steel	
16	Bolt	Fe	
17	Bracket	Fe	

Construction

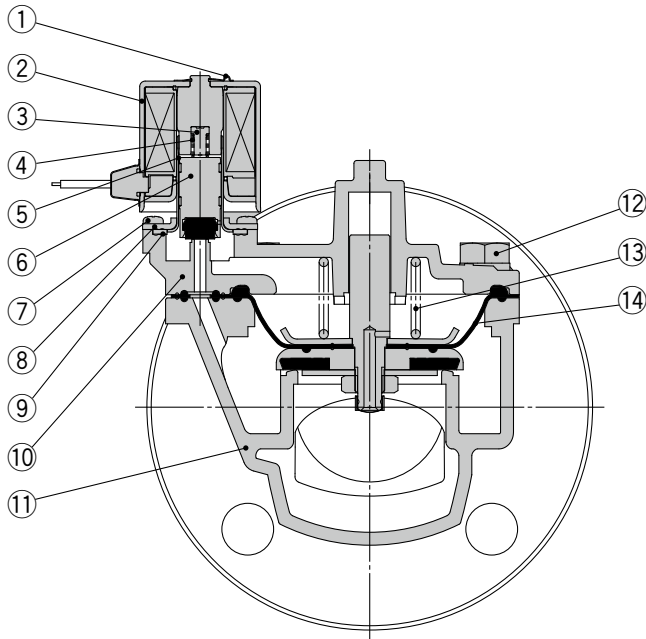
JSXD50, 60, Normally closed (N.C.)
Body material: Brass, Stainless steel



Component Parts

No.	Description	Material	
		Brass	Stainless steel
1	Clip	Stainless steel	
2	Solenoid coil	Stainless steel, Cu, Resin	
3	Stopper	PPS	
4	Spring	Stainless steel	
5	Tube assembly	Stainless steel	
6	Armature assembly	Stainless steel, PPS, NBR, (FKM, EPDM)	
7	Mounting screw	Fe	
8	Bonnet	Stainless steel	
9	Gasket	NBR, (FKM, EPDM)	
10	Body	Brass	Stainless steel
11	O-ring	NBR, (FKM, EPDM)	
12	Diaphragm assembly	Stainless steel, NBR, (FKM, EPDM)	
13	Valve spring	Stainless steel	
14	Bonnet	Brass	Stainless steel
15	Bolt	Fe	
16	Bracket	Fe	

JSXD70, 80, 90, Normally closed (N.C.)
Body material: Bronze



Component Parts

No.	Description	Material	
		Brass	Stainless steel
1	Clip	Stainless steel	
2	Solenoid coil	Stainless steel, Cu, Resin	
3	Stopper	PPS	
4	Spring	Stainless steel	
5	Tube assembly	Stainless steel	
6	Armature assembly	Stainless steel, PPS, NBR, (FKM, EPDM)	
7	Mounting screw	Fe	
8	Bonnet	Stainless steel	
9	Gasket	NBR, (FKM, EPDM)	
10	Bonnet	Bronze	
11	Body	Bronze	
12	Bolt	Fe	
13	Valve spring	Stainless steel	
14	Diaphragm assembly	Stainless steel, NBR, (FKM, EPDM)	

JSX Series

JSXD Series

JSXZ Series

JSXM Series

Table of UL-compliant Products

Option

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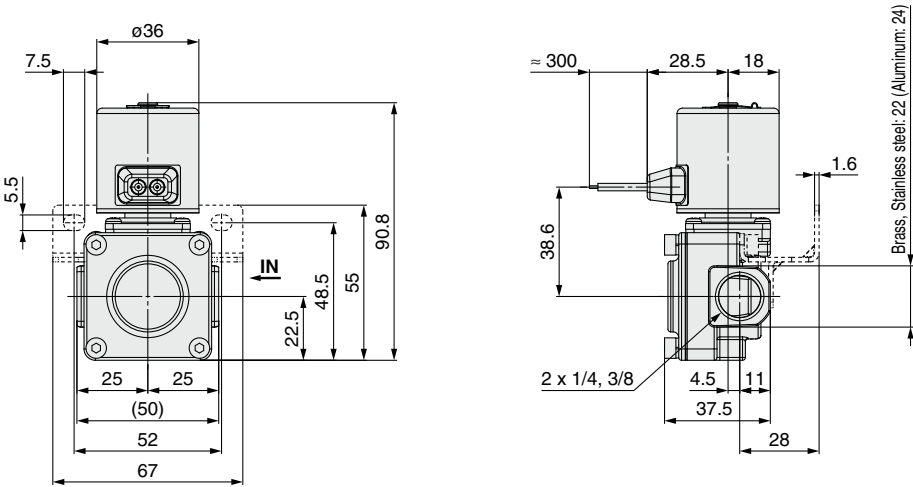
JSXD Series

Dimensions: JSXD**30**

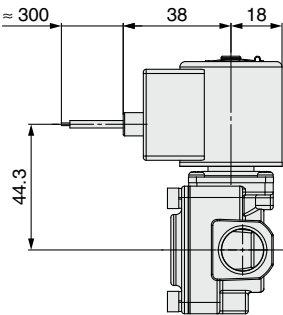
Port Size **1/4, 3/8**

Body Material **Aluminum, Brass, Stainless Steel**

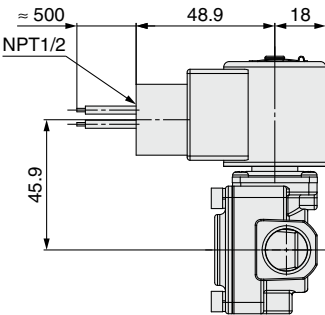
G: Grommet



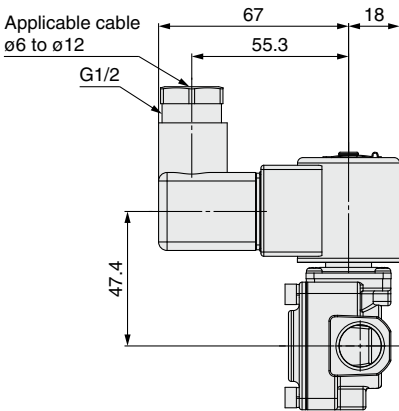
GS: Grommet with PCB



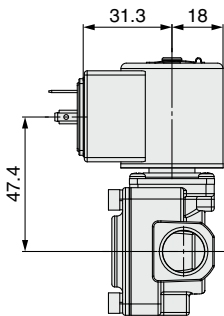
CS: Conduit



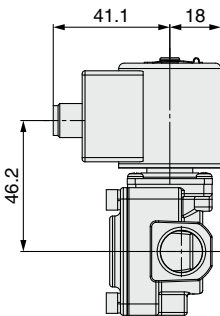
DS: DIN terminal
DZ: DIN terminal with light



DN: DIN terminal without connector

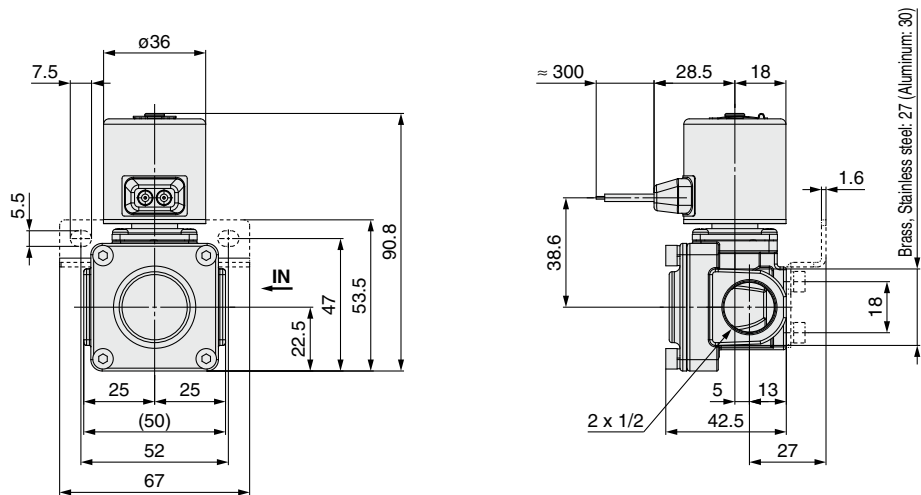


WN: M12 connector

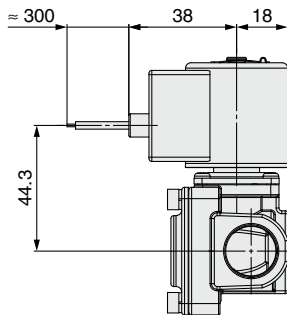


Dimensions: **JSXD30** Port Size **1/2** Body Material **Aluminum, Brass, Stainless Steel**

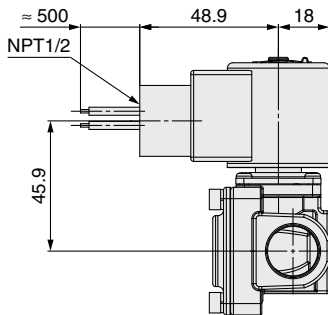
G: Grommet



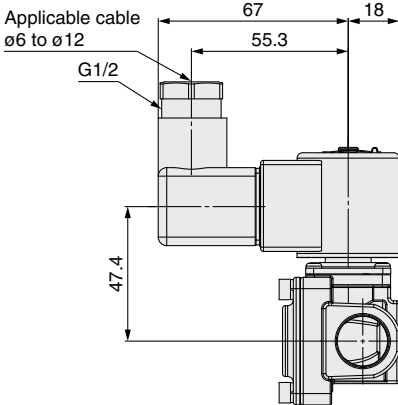
GS: Grommet with PCB



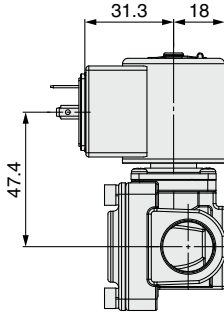
CS: Conduit



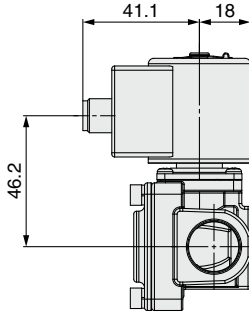
DS: DIN terminal
DZ: DIN terminal with light



DN: DIN terminal without connector



WN: M12 connector



JSXD31-□□04

* Only the JSXD31 with port size of 04 (1/2) has threads on the bottom of the body.

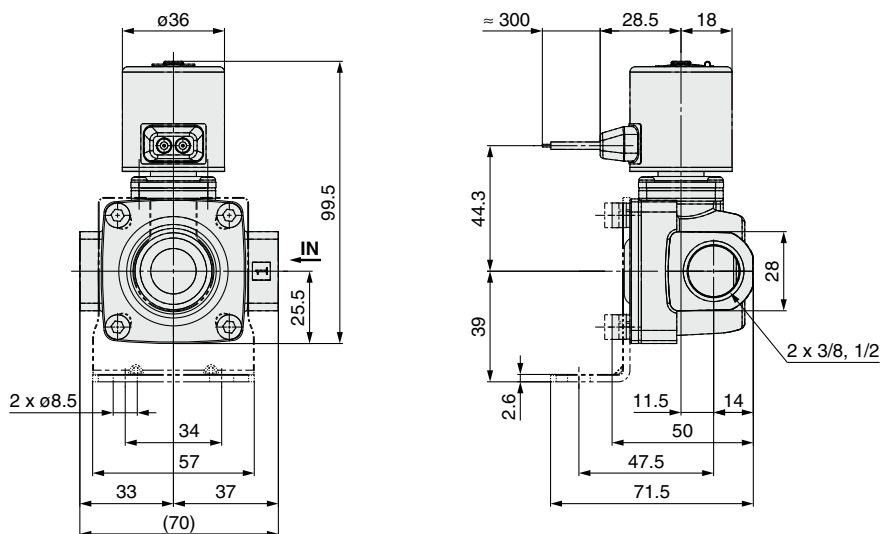
Technical drawing of the JSXD31-□□04 valve showing 2 x M4 x 0.7 Thread depth 8. The valve has a height of 18mm.

JSX Series
JSXD Series
JSXZ Series
JSXM Series
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JSXD Series

Dimensions: JSXD**40** Port Size **3/8, 1/2** Body Material **Brass, Stainless Steel**

G: Grommet

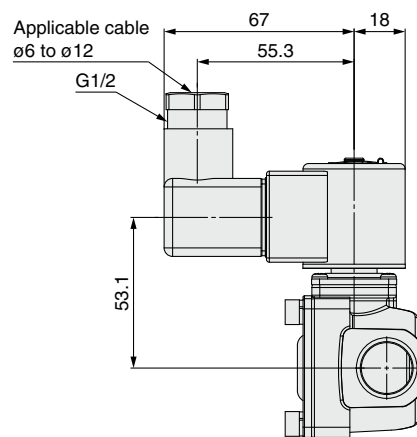
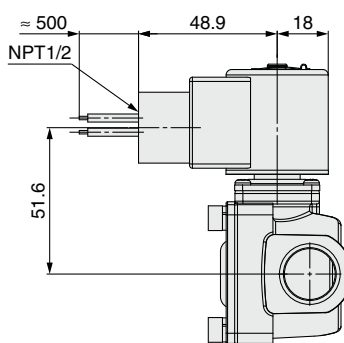
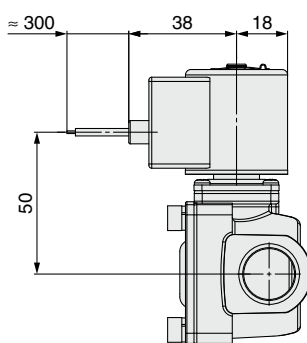


GS: Grommet with PCB

CS: Conduit

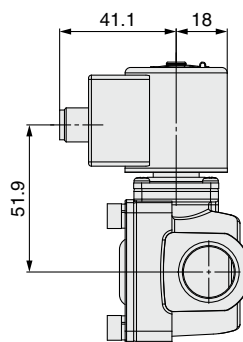
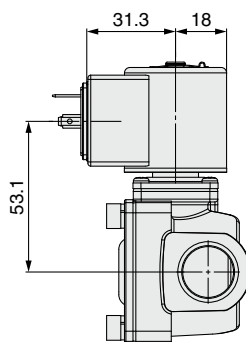
DS: DIN terminal

DZ: DIN terminal with light



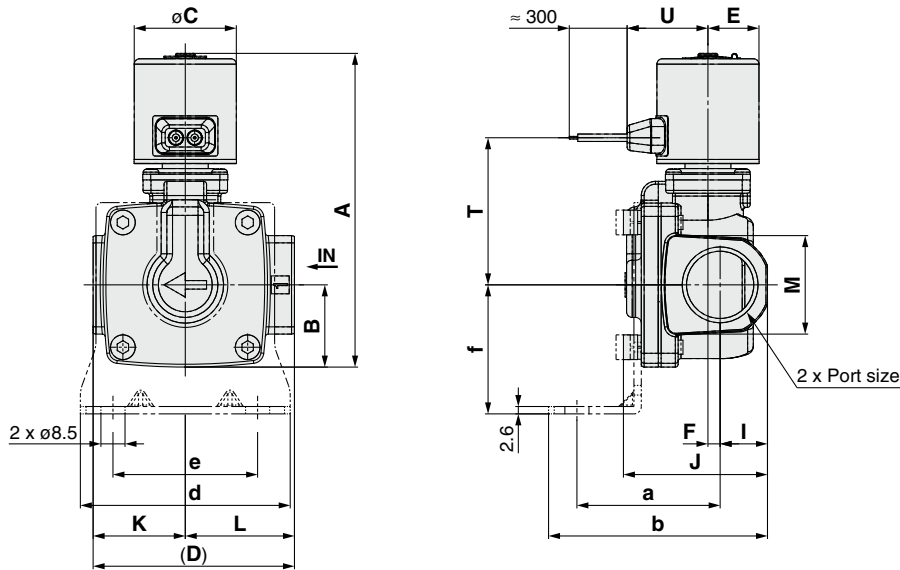
DN: DIN terminal without connector

WN: M12 connector



Dimensions: JSXD**50, 60** Port Size **3/4, 1** Body Material **Brass, Stainless Steel**

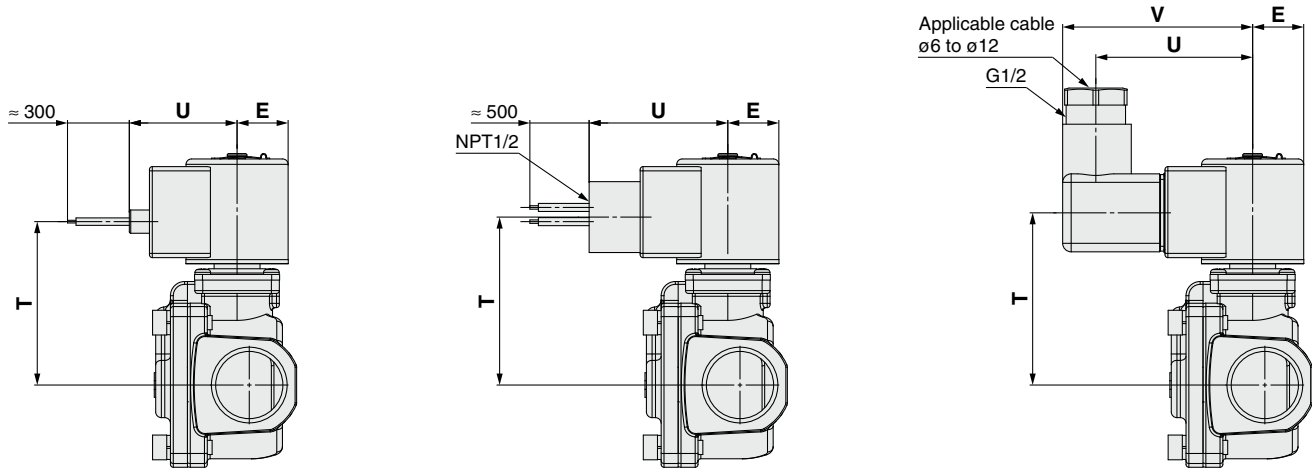
G: Grommet



GS: Grommet with PCB

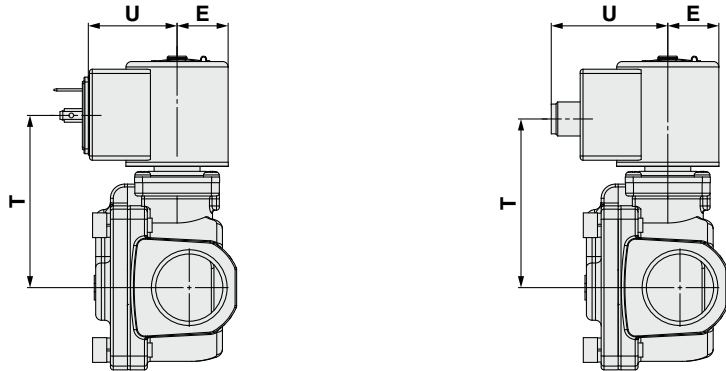
CS: Conduit

DS: DIN terminal
DZ: DIN terminal with light



DN: DIN terminal without connector

WN: M12 connector



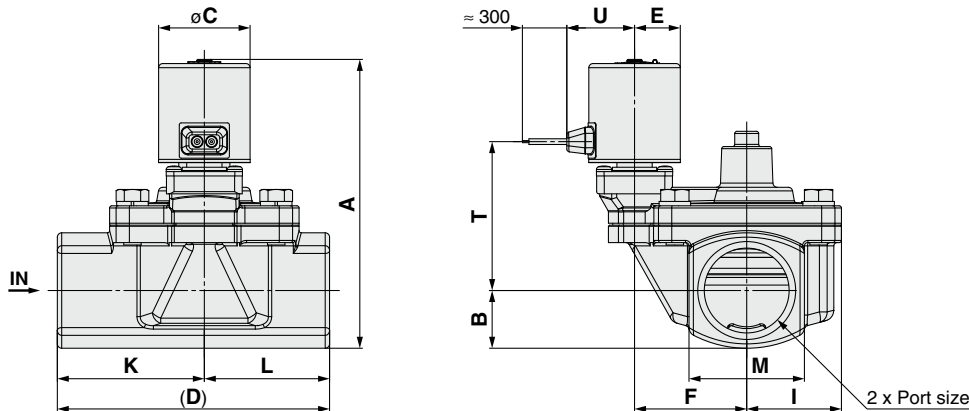
Size	Port size	A	B	C	D	E	F	I	J	K	L	M	[mm]			
													Grommet		Grommet with PCB	
		T	U	T	U	T	U	T	U	T	U	T	T	U	T	U
50	3/4	110.6	29	36	71	18	4.5	17	51	32.5	38.5	35	51.9	28.5	57.6	38
60	1	131	33	42	95	21	4.5	20	59.5	45.5	49.5	42	60.4	31.1	66	41

Size	Port size	Conduit		DIN terminal		DIN terminal without connector		M12 connector		Bracket mount dimensions					
		T	U	T	U	V	T	U	T	U	a	b	d	e	f
50	3/4	59.2	48.9	60.7	55.3	67	60.7	31.3	59.5	41.1	50.5	77.5	74	51	45.5
60	1	67.6	51.9	69.1	58.3	70	69.1	34.3	67.9	44.1	55.5	85.5	81	58	49.5

JSXD Series

Dimensions: JSXD**70, 80, 90** Port Size **1 1/4, 1 1/2, 2** Body Material **Bronze**

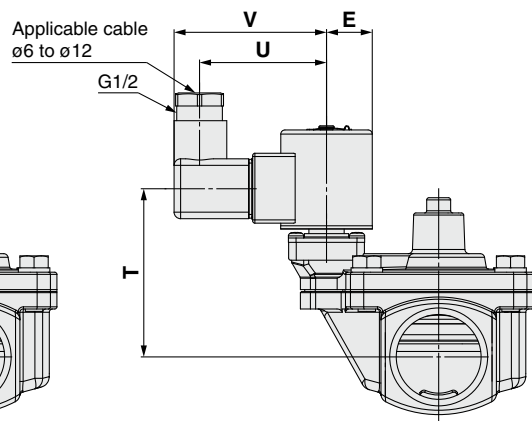
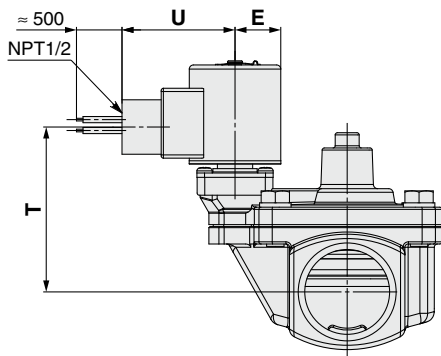
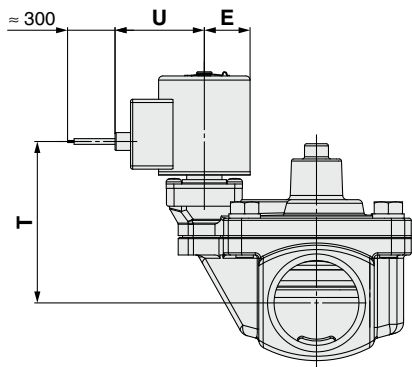
G: Grommet



GS: Grommet with PCB

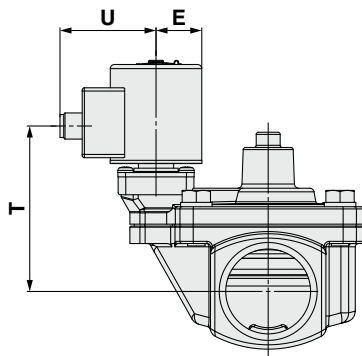
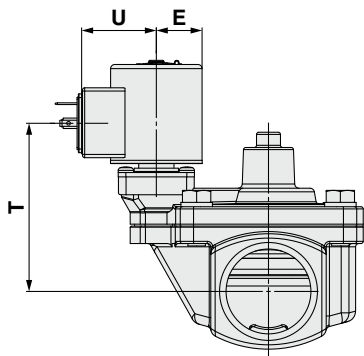
CS: Conduit

DS: DIN terminal
DZ: DIN terminal with light



DN: DIN terminal without connector

WN: M12 connector

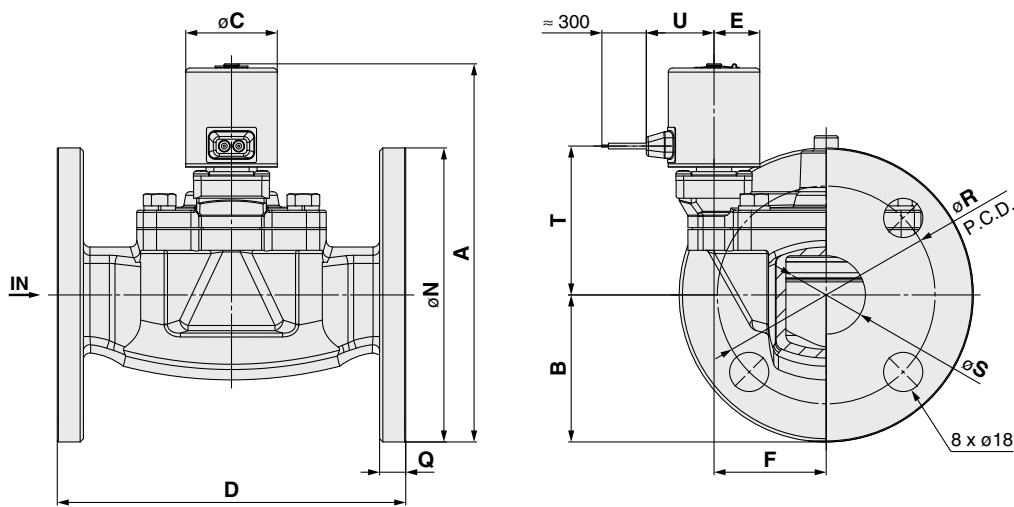


[mm]											
Size	Port size	A	B	C	D	E	F	I	K	L	M
70	1 1/4	132.6	26.5	42	125	21	51.5	43.5	67.5	57.5	53
80	1 1/2	139.3	30	42	132	21	54.5	46.5	72	60	60
90	2	150.3	35.5	42	150	21	59	52	81	69	71

Size	Port size	Grommet		Grommet with PCB		Conduit		DIN terminal			DIN terminal without connector		M12 connector	
		T	U	T	U	T	U	T	U	V	T	U	T	U
70	1 1/4	68.4	31.1	74.1	41	75.7	51.9	77.2	58.3	70	77.2	34.3	76	44.1
80	1 1/2	71.6	31.1	77.3	41	78.9	51.9	80.4	58.3	70	80.4	34.3	79.2	44.1
90	2	77.1	31.1	82.8	41	84.4	51.9	85.9	58.3	70	85.9	34.3	84.7	44.1

Dimensions: JSXD**70, 80, 90** Applicable Flange **32A, 40A, 50A** Body Material **Bronze**

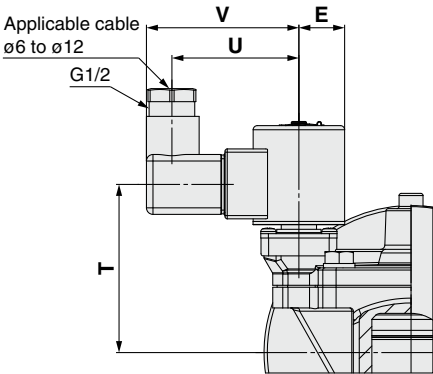
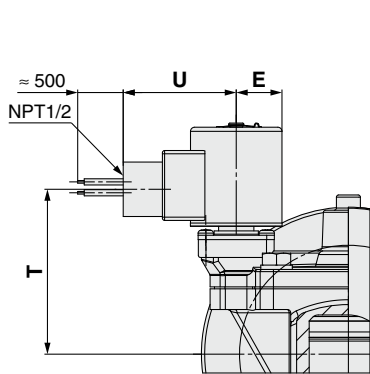
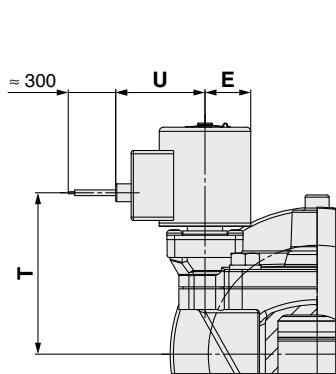
G: Grommet



GS: Grommet with PCB

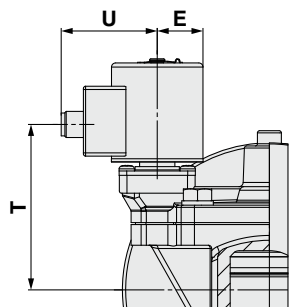
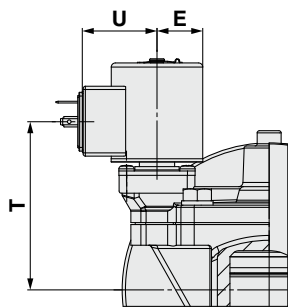
CS: Conduit

DS: DIN terminal
DZ: DIN terminal with light



DN: DIN terminal without connector

WN: M12 connector



[mm]											
Size	Applicable flange	A	B	C	D	E	F	N	Q	R	S
70	32A	173.6	67.5	42	160	21	51.5	135	12	100	36
80	40A	179.3	70	42	170	21	54.5	140	14	105	42
90	50A	192.3	77.5	42	180	21	59	155	14	120	52

Size	Applicable flange	Grommet		Grommet with PCB		Conduit		DIN terminal			DIN terminal without connector		M12 connector	
		T	U	T	U	T	U	T	U	V	T	U	T	U
70	32A	68.4	31.1	74.1	41	75.7	51.9	77.2	58.3	70	77.2	34.3	76	44.1
80	40A	71.6	31.1	77.3	41	78.9	51.9	80.4	58.3	70	80.4	34.3	79.2	44.1
90	50A	77.1	31.1	82.8	41	84.4	51.9	85.9	58.3	70	85.9	34.3	84.7	44.1

JSX10, 20, 30 Series

Table of UL-compliant Products

* Refer to the table below for UL-compliant products.



Recognized

G
Grommet



GS
Grommet
with PCB



DN
DIN terminal
without connector



WN
M12 connector/
Without connector cable



JSX11	Series/Valve type	Body material	Seal material	Orifice diameter/Port size	Thread type	Rated voltage	Electrical entry	Option
	JSX11	S	N	101	R	1	G*1	*
			F	201	N	2	GS	
			E		F	3	DN	
						4	WN	
						5		
						6		
						7		
						8		
						B		
						J		

JSX21	Series/Valve type	Body material	Seal material	Orifice diameter/Port size	Thread type	Rated voltage	Electrical entry	Option
	JSX21	S	N	301	R	1	G*1	*
			F	302	N	2	GS	
			E	303	F	3	DN	
				402		4	WN	
				403		5		
				502		6		
				503		7		
				702		8		
				703		B		
						J		

JSX31	Series/Valve type	Body material	Seal material	Orifice diameter/Port size	Thread type	Rated voltage	Electrical entry	Option
	JSX31	S	N	402	R	1	G*1	*
			F	403	N	2	GS	
			E	502	F	3	DN	
				503		4	WN	
				702		5		
				703		6		
						7		
						8		
						B		
						J		

*1 Only applicable to rated voltage symbols "5" and "6"



Listed

CS
Conduit



JSX21	Series/Valve type	Body material	Seal material	Orifice diameter/Port size	Thread type	Rated voltage	Electrical entry	Option
	JSX21	S	N	301	R	1	CS	*
			F	302	N	2		
			E	303	F	3		
				402		4		
				403		5		
				502		6		
				503		7		
				702		8		
				703		B		
						J		

JSX31	Series/Valve type	Body material	Seal material	Orifice diameter/Port size	Thread type	Rated voltage	Electrical entry	Option
	JSX31	S	N	402	R	1	CS	*
			F	403	N	2		
			E	502	F	3		
				503		4		
				702		5		
				703		6		
						7		
						8		
						B		
						J		

JSXD30, 40, 50, 60, 70, 80, 90 Series

Table of UL-compliant Products

* Refer to the table below for UL-compliant products.



Recognized

G*1
Grommet



*1 Only applicable to rated voltage symbols "5" and "6"

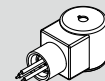
GS
Grommet with PCB



DN
Without DIN connector



CS*2
Conduit



*2 Only applicable to the flange type in sizes 70, 80, and 90

WN
M12 connector/
Without connector cable



JSXD31	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD31	C	N	02	R	1	G	None	None
		S	F	03	N	2	GS	D	B
		A	E*3	04	F	3	DN		
						4	WN		
						5			
						6			
						7			
						8			
						B			
						J			

*3 Cannot be used in combination with body material symbol "A"

JSXD41	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD41	C	N	03	R	1	G	None	None
		S	F	04	N	2	GS	D	B
			E		F	3	DN		
						4	WN		
						5			
						6			
						7			
						8			
						B			
						J			

JSXD51	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD51	C	N	06	R	1	G	None	None
		S	F		N	2	GS	D	B
			E		F	3	DN		
						4	WN		
						5			
						6			
						7			
						8			
						B			
						J			

JSXD61	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD61	C	N	10	R	1	G	None	None
		S	F		N	2	GS	D	B
			E		F	3	DN		
						4	WN		
						5			
						6			
						7			
						8			
						B			
						J			

JSXD71	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option
	JSXD71	B	N	12	R	1	G	None
			F		N	2	GS	D
			E		F	3	DN	
						4	WN	
						5		
						6		
						7		
						8		
						B		
						J		

JSXD30, 40, 50, 60, 70, 80, 90 Series

Table of UL-compliant Products

* Refer to the table below for UL-compliant products.



Recognized

G*1
Grommet



*1 Only applicable to rated voltage symbols "5" and "6"

GS
Grommet with PCB



DN
Without DIN connector



CS*2
Conduit



*2 Only applicable to the flange type in sizes 70, 80, and 90

WN
M12 connector/
Without connector cable



JSXD71

Series/ Valve type	Body material	Seal material	Port size
JSXD71	B	N	32
		F	
		E	

Rated voltage	Electrical entry	Oil-free option
1	G	None
2	GS	D
3	DN	
4	CS	
5	WN	
6		
7		
8		
B		
J		

JSXD81

Series/ Valve type	Body material	Seal material	Port size	Thread type
JSXD81	B	N	14	R
		F		N
		E		F

Rated voltage	Electrical entry	Oil-free option
1	G	None
2	GS	D
3	DN	
4	WN	
5		
6		
7		
8		
B		
J		

JSXD81

Series/ Valve type	Body material	Seal material	Port size
JSXD81	B	N	40
		F	
		E	

Rated voltage	Electrical entry	Oil-free option
1	G	None
2	GS	D
3	DN	
4	CS	
5	WN	
6		
7		
8		
B		
J		

JSXD91

Series/ Valve type	Body material	Seal material	Port size	Thread type
JSXD91	B	N	20	R
		F		N
		E		F

Rated voltage	Electrical entry	Oil-free option
1	G	None
2	GS	D
3	DN	
4	WN	
5		
6		
7		
8		
B		
J		

JSXD91

Series/ Valve type	Body material	Seal material	Port size
JSXD91	B	N	50
		F	
		E	

Rated voltage	Electrical entry	Oil-free option
1	G	None
2	GS	D
3	DN	
4	CS	
5	WN	
6		
7		
8		
B		
J		

JSX Series

JSXD Series

JSXZ Series

JSXM Series

Table of UL-compliant
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JSXD30, 40, 50, 60, 70, 80, 90 Series

Table of UL-compliant Products

* Refer to the table below for UL-compliant products.



Listed

CS*1
Conduit



*1 Excludes the flange type
in sizes 70, 80, and 90

JSXD31	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD31	C	N	02	R	1	CS	None	None
		S	F	03	N	2		D	B
		A	E*2	04	F	3			
						4			
						5			
						6			
						7			
						8			
						B			
						J			
*2 Cannot be used in combination with body material symbol "A"									
JSXD41	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD41	C	N	03	R	1	CS	None	None
		S	F	04	N	2		D	B
			E		F	3			
						4			
						5			
						6			
						7			
						8			
						B			
						J			
JSXD51	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD51	C	N	06	R	1	CS	None	None
		S	F		N	2		D	B
			E		F	3			
						4			
						5			
						6			
						7			
						8			
						B			
						J			
JSXD61	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	Bracket option
	JSXD61	C	N	10	R	1	CS	None	None
		S	F		N	2		D	B
			E		F	3			
						4			
						5			
						6			
						7			
						8			
						B			
						J			
JSXD71	Series/Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option	
	JSXD71	B	N	12	R	1	CS	None	
			F		N	2		D	
			E		F	3			
						4			
						5			
						6			
						7			
						8			
						B			
						J			



Listed

CS*1
Conduit



*1 Excludes the flange type
in sizes 70, 80, and 90

JSXD81	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option
	JSXD81	B	N	14	R	1	CS	None
			F		N	2		D
			E		F	3		
						4		
						5		
						6		
						7		
						8		
						B		
						J		
JSXD91	Series/ Valve type	Body material	Seal material	Port size	Thread type	Rated voltage	Electrical entry	Oil-free option
	JSXD91	B	N	20	R	1	CS	None
			F		N	2		D
			E		F	3		
						4		
						5		
						6		
						7		
						8		
						B		
						J		

JSX Series
JSXD Series
JSXZ Series
JSXM Series
Table of UL-compliant Products
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JSX/JSX□ Series Option

Cable for M12 Connector (Female Connector with Cable)

The solenoid valve does not come with a cable for the M12 connector.
Please order it separately if necessary.

JSX022-30-1-1

Specification

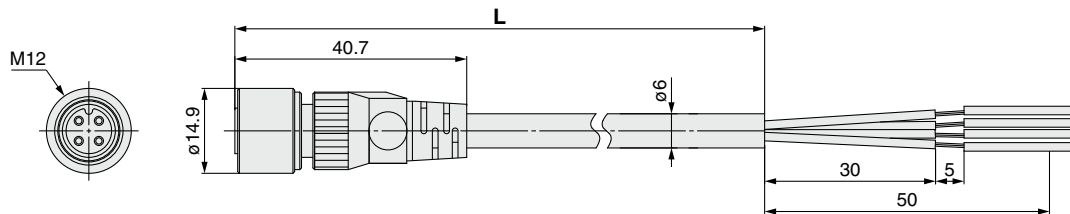
1	For DC voltages
2	For AC voltages

Cable length L [mm]

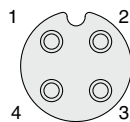
1	1000
2	2000
5	5000

Specifications

Part number		JSX022-30-1-□	JSX022-30-2-□
Key type		A-coded	B-coded
Rating/Performance	Rated current	4 A	
	Rated voltage	250 V	
	Contact resistance	40 mΩ or less	
	Insulation resistance	1000 MΩ or more	
	Withstand voltage	1500 VAC	
	Operating temperature range	-25 to 70°C	
	Min. bending radius (Fixed)	50 mm	
	Protection class	IP67 (Only with screw tightened)	
Material	Allowable repeated insertion/withdrawal	200	
	Material of knurl	Brass (Ni plating)	
	Contact (Surface treatment)	Copper alloy (Au plating)	
	Connector material	PBT	
	Cover	Soft PBT	

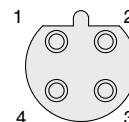


For DC voltages (A-coded)

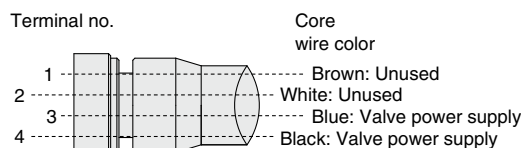


Socket connector
pin arrangement

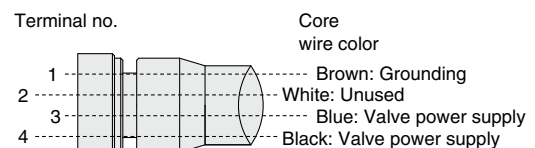
For AC voltages (B-coded)



Socket connector
pin arrangement



Connections



Connections

* The solenoid valve has no polarity for DC voltages.
However, the high flow/ power saving type has
polarity. Refer to the "Electrical Circuits" on page 66.

JSX/JSX□ Series Replacement Parts

Solenoid Coil Assembly (Applicable to the JSX, JSXD, JSXZ, and JSXM series)

When ordering, be sure to add the “-KT1” suffix to the end of the part number of the valve currently in use.

JSX 2 1 - S N 101 R - 5 G - B - KT1

● Enter the standard product number.

JSX (Stainless steel/Brass)	p. 7
JSX (Aluminum)	p. 9
JSX (High flow/ Power saving)	p. 11
JSXD	p. 25
JSXZ	p. 35
JSXM	p. 39

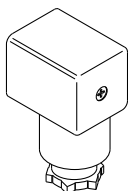
The solenoid coil assembly is shipped with a name plate with the valve part number printed on it. In addition, the name plate has the marks of all applicable standards printed on it.

For the solenoid coil assembly, eligibility for CE/UKCA marking and UL/CSA standard certification varies depending on the electrical entry type and the rated voltage.

When ordering a solenoid coil assembly with different specifications than the valve currently in use, refer to the “How to Order” in the catalog to confirm the status of standard compliance.

For solenoid coil replacement instructions, refer to the “Specific Product Precautions 8” on page 68.

DIN Connector Part No.



<For JSX20/30, JSXD, JSXM>

Electrical option	Rated voltage	Connector part no.
None	24 VDC	3G-GDM2A
	12 VDC	
	100 VAC	
	120 (110) VAC	
	200 VAC	
	220 VAC	
	230 VAC	
	240 VAC	
With light	24 VAC	GDM2A-L5
	48 VAC	
	24 VDC	
	12 VDC	
	100 VAC	
	120 (110) VAC	
	200 VAC	
	220 VAC	
	230 VAC	GDM2A-L2
	240 VAC	
	24 VAC	
	48 VAC	
	24 VDC	
	12 VDC	
	100 VAC	
	120 (110) VAC	

* Contact SMC for details on the type for the JSXZ series.

<For JSX10>

Electrical option	Rated voltage	Connector part no.
None	24 VDC	JSX021-1-18
	12 VDC	
	100 VAC	
	120 (110) VAC	
	200 VAC	
	220 VAC	
	230 VAC	
	240 VAC	
With light	24 VAC	SY100-82-3-05
	48 VAC	
	24 VDC	
	12 VDC	
	100 VAC	
	120 (110) VAC	
	200 VAC	
	220 VAC	
	230 VAC	SY100-82-2-04
	240 VAC	

* Contact SMC for details on the 24 and 48 VAC types with a light for the JSX10.

Gasket Part No. for DIN Connector

VCW20-1-29-1 (For JSX20/30, JSXD, JSXM)

* Contact SMC for details on the type for the JSXZ or JSX10.

Clip (Applicable to the JSX, JSXD, JSXZ, and JSXM series)

For JSX10 VDW20-10

For JSX20/30, JSXD, JSXZ, JSXM VX021N-10S

Glossary of Terms

Pressure Terminology

1. Max. operating pressure differential

The max. pressure differential (the difference between the inlet and outlet pressure) which is allowed for operation. When the outlet pressure is 0 MPa, this becomes the max. operating pressure.

2. Min. operating pressure differential

The min. pressure differential (the difference between the inlet pressure and outlet pressure) required to keep the main valve fully open.

3. Max. system pressure

The max. pressure that can be applied inside the pipelines (line pressure).

[The pressure differential of the solenoid valve portion must not exceed the max. operating pressure differential.]

4. Withstand pressure

The pressure in which the valve must be withstood without a drop in performance after holding for one minute under prescribed pressure and returning to the operating pressure range. (value under the prescribed conditions)

Electrical Terminology

1. Apparent power (VA)

Volt-ampere is the product of voltage (V) and current (A).

Power consumption (W): For AC, $W = V \cdot A \cdot \cos \theta$.

For DC, $W = V \cdot A$.

* $\cos \theta$ shows power factor. $\cos \theta \approx 0.9$

2. Surge voltage

A high-voltage which is momentarily generated by shutting off the power in the shut-off area.

3. Degrees of protection

A degree defined in the "JIS C 0920: Waterproof test of electric machinery/appliance and the degree of protection against the intrusion of solid foreign objects."

IP — □ □

First digit • Second digit

● First Digit:

Degree of protection against solid foreign objects

0	Not protected
1	Protected against solid foreign objects of 50 mmø and larger
2	Protected against solid foreign objects of 12 mmø and larger
3	Protected against solid foreign objects of 2.5 mmø and larger
4	Protected against solid foreign objects of 1.0 mmø and larger
5	Dust protected
6	Dust-tight

● Second Digit:

Degree of protection against water

0	Not protected	—
1	Protected against vertically falling water droplets	Dripproof type 1
2	Protected against vertically falling water droplets when enclosure is tilted up to 15°	Dripproof type 2
3	Protected against rainfall when enclosure is tilted up to 60°	Rainproof type
4	Protected against splashing water	Splashproof type
5	Protected against water jets	Water-jet-proof type
6	Protected against powerful water jets	Powerful water-jet-proof type
7	Protected against the effects of temporary immersion in water	Immersible type
8	Protected against the effects of continuous immersion in water	Submersible type

Others

1. Material

NBR: Nitrile rubber

FKM: Fluororubber

EPDM: Ethylene propylene rubber

2. Symbol

In the symbol () , when the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Solenoid Valve Flow Rate Characteristics

(How to indicate flow rate characteristics)

Scan the QR code to access software
for easy flow rate calculation.
For details ▶



1. Indication of flow rate characteristics

The flow rate characteristics of equipment, such as a solenoid valve, etc., are indicated in their specifications as shown in Table (1).

Table (1) Indication of Flow Rate Characteristics

Corresponding equipment	Indication by international standard	Other indications	Compliant standards
Pneumatic equipment	C, b	—	ISO 6358:1989 JIS B 8390:2000
	—	S	JIS B 8390:2000 Equipment: JIS B 8379, 8381-1, 8381-2
	—	Cv	ANSI/(NFPA)T3.21.3 R1-2008
Process fluid control equipment	Kv	—	IEC 60534-1:2005 IEC 60534-2-3:1997 JIS B 2005-1:2012
	—	Cv	JIS B 2005-2-3:2004 Equipment: JIS B 8471, 8472, 8473

2. Pneumatic equipment

2.1 Indication according to the international standards

(1) Compliant standards

ISO 6358:1989 : Pneumatic fluid power—Components using compressible fluids—Determination of flow rate characteristics

JIS B 8390:2000 : Pneumatic fluid power—Components using compressible fluids—How to test flow rate characteristics

(2) Definition of flow rate characteristics

The flow rate characteristics are indicated as a result of a comparison between the sonic conductance **C** and the critical pressure ratio **b**.

Sonic conductance C : Value which divides the passing mass flow rate of a piece of equipment in a choked flow condition by the product of the upstream absolute pressure and the density in a standard condition.

Critical pressure ratio b : Pressure ratio (downstream pressure/upstream pressure) which will turn to a choked flow when the value is smaller than this ratio.

Choked flow : Flow in which the upstream pressure is higher than the downstream pressure and where sonic speed in a certain part of a piece of equipment is reached.

Gaseous mass flow rate is in proportion to the upstream pressure and not dependent on the downstream pressure.

Subsonic flow : Flow greater than the critical pressure ratio.

Standard condition : Air in a temperature state of 20°C, absolute pressure 0.1 MPa (= 100 kPa = 1 bar), relative humidity 65%.

It is stipulated by adding the "(ANR)" after the unit depicting air volume.

(Standard reference atmosphere)

Compliant standards: ISO 8778:1990 Pneumatic fluid power—Standard reference

atmosphere, JIS B 8393:2000: Pneumatic fluid power—Standard reference atmosphere

(3) Formula for flow rate

It is described by the practical units as following.

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} \leq b, \text{ choked flow}$$

$$Q = 600 \times C (P_1 + 0.1) \sqrt{\frac{293}{273 + T}} \quad \text{.....(1)}$$

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} > b, \text{ subsonic flow}$$

$$Q = 600 \times C (P_1 + 0.1) \sqrt{1 - \left[\frac{P_2 + 0.1}{P_1 + 0.1} - b \right]^2} \sqrt{\frac{293}{273 + T}} \quad \text{.....(2)}$$

Q : Air flow rate [L/min (ANR)]

C : Sonic conductance [$\text{dm}^3/(\text{s} \cdot \text{bar})$], dm^3 (Cubic decimeter) of SI units = L (liter)

b : Critical pressure ratio [—]

P₁ : Upstream pressure [MPa]

P₂ : Downstream pressure [MPa]

T : Temperature [$^{\circ}\text{C}$]

* Formula of subsonic flow is the elliptic analogous curve.

Flow rate characteristics are shown in Graph (1). For details, please use the calculation software available from the SMC website.

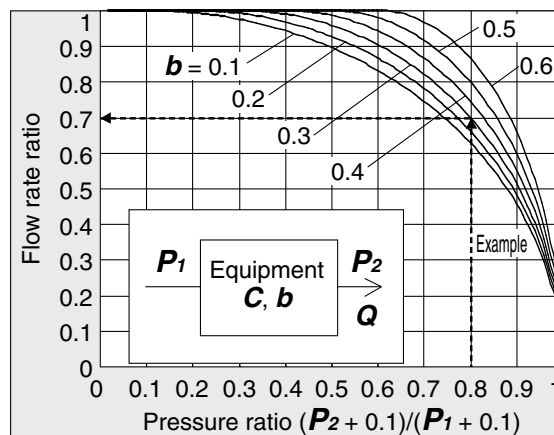
Example)

Obtain the air flow rate for **P₁** = 0.4 [MPa], **P₂** = 0.3 [MPa], **T** = 20 [$^{\circ}\text{C}$] when a solenoid valve is performed in **C** = 2 [$\text{dm}^3/(\text{s} \cdot \text{bar})$] and **b** = 0.3.

According to formula 1, the max. flow rate = $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600$ [L/min (ANR)]

Pressure ratio = $\frac{0.3 + 0.1}{0.4 + 0.1} = 0.8$

Based on Graph (1), it will be 0.7 if the pressure ratio is 0.8 and the flow rate ratio is **b** = 0.3.
Hence, the flow rate = Max. flow x flow ratio = $600 \times 0.7 = 420$ [L/min (ANR)]



Graph (1) Flow rate characteristics

(4) Test method

Connect the piece of test equipment to the test circuit as shown in Fig. (1). While maintaining the upstream pressure at a fixed value above 0.3 MPa, measure the max. flow to be saturated initially. Next, measure this flow rate at 80%, 60%, 40%, and 20%, as well as the upstream and downstream pressure. The sonic conductance **C** can be calculated based on this max. flow rate. Use the data of the others and the subsonic flow formula to find **b**, and calculate the critical pressure ratio **b** from that average.

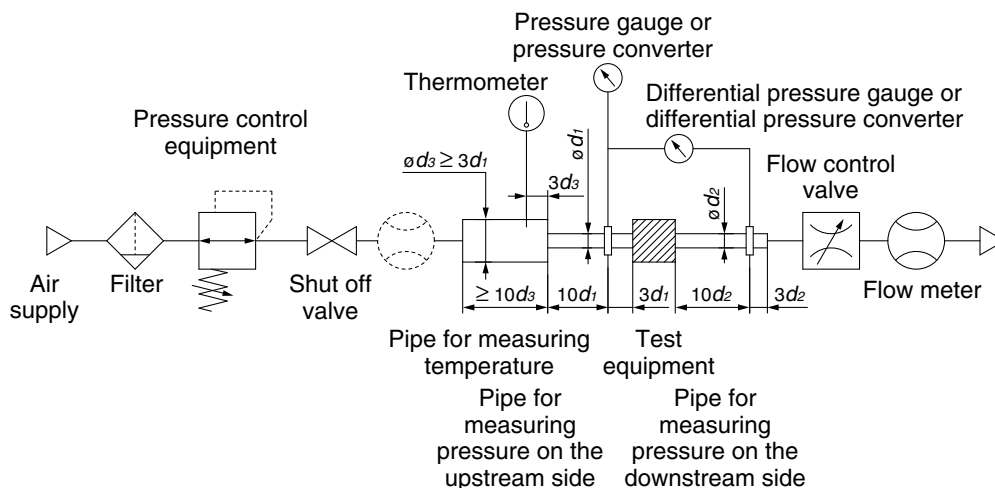


Fig. (1) Test circuit based on ISO 6358:1989, JIS B 8390:2000

2.2 Effective area **S**

(1) Compliant standards

**JIS B 8390:2000: Pneumatic fluid power—Components using compressible fluids—
How to test flow rate characteristics**

Equipment standards: **JIS B 8373: Solenoid valve for pneumatics**

JIS B 8379: Silencer for pneumatics

JIS B 8381-1: Fittings for pneumatics—Part 1: Push-in fittings for thermoplastic resin tubing

JIS B 8381-2: Fittings for pneumatics—Part 2: Compression fittings for thermoplastic resin tubing

(2) Definition of flow rate characteristics

Effective area **S**: Cross-sectional area that has an ideal throttle without friction or reduced flow. The value is derived by calculating pressure changes inside of an air tank when the compressed air is discharged from a piece of equipment mounted on the tank in a choked flow. The value of the effective area **S**, like that of sonic conductance **C**, expresses the “ease of flow.”

(3) Formula for flow rate

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} \leq 0.5, \text{ choked flow}$$

$$Q = 120 \times S (P_1 + 0.1) \sqrt{\frac{293}{273 + T}} \dots\dots\dots(3)$$

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} > 0.5, \text{ subsonic flow}$$

$$Q = 240 \times S \sqrt{(P_2 + 0.1) (P_1 - P_2)} \sqrt{\frac{293}{273 + T}} \dots\dots\dots(4)$$

Conversion with sonic conductance **C**:

$$S = 5.0 \times C \dots\dots\dots(5)$$

Q : Air flow rate [L/min (ANR)]

S : Effective area [mm²]

P₁ : Upstream pressure [MPa]

P₂ : Downstream pressure [MPa]

T : Temperature [°C]

* The formula for subsonic flow (4) is only applicable when the critical pressure ratio **b** is the unknown piece of equipment. In the sonic conductance **C** formula (2), it is the same formula as when **b** = 0.5.

(4) Test method

Connect the piece of test equipment to the test circuit as shown in Fig. (2). Discharge the air from the air tank filled with compressed air at a fixed value above 0.6 MPa (0.5 MPa) into the atmosphere until the pressure inside the tank falls to 0.25 MPa (0.2 MPa). Measure the discharge time and the residual pressure inside the tank after discharging until it has returned to the normal value. Then, calculate the effective area **S** using the following formula. Select an air tank with a volume within the specified range of the test equipment's effective area. For JIS B 8379, the pressure values are in parentheses and the coefficient of the formula is 12.9.

$$S = 12.1 \frac{V}{t} \log_{10} \left(\frac{P_s + 0.1}{P + 0.1} \right) \sqrt{\frac{293}{T}} \dots\dots\dots(6)$$

S : Effective area [mm²]

V : Air tank capacity [L]

t : Discharging time [s]

P_s : Pressure inside air tank before discharging [MPa]

P : Residual pressure inside air tank after discharging [MPa]

T : Temperature inside air tank before discharging [K]

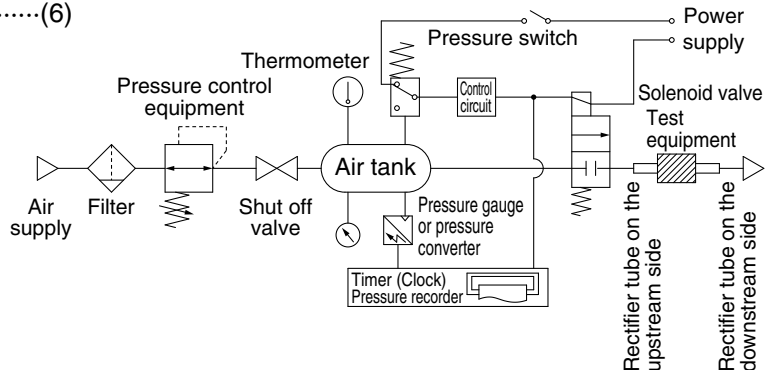


Fig. (2) Test circuit based on JIS B 8390:2000

2.3 Flow coefficient C_v factor

The United States Standard ANSI/(NFPA)T3.21.3:R1-2008R: Pneumatic fluid power—Flow rating test procedure and reporting method for fixed orifice components

This standard defines the C_v factor of the flow coefficient by the following formula that is based on the test conducted by the test circuit analogous to ISO 6358.

$$C_v = \frac{Q}{114.5 \sqrt{\frac{\Delta P (P_2 + P_a)}{T_1}}} \quad (7)$$

ΔP : Pressure drop between the static pressure tapping ports [bar]

P_1 : Pressure of the upstream tapping port [bar gauge]

P_2 : Pressure of the downstream tapping port [bar gauge]: $P_2 = P_1 - \Delta P$

Q : Flow rate [L/s standard condition]

P_a : Atmospheric pressure [bar absolute]

T_1 : Upstream absolute temperature [K]

The test conditions are $P_1 + P_a = 6.5 \pm 0.2$ bar absolute, $T_1 = 297 \pm 5$ K, $0.07 \text{ bar} \leq \Delta P \leq 0.14 \text{ bar}$.

This is the same concept as the effective area A which ISO 6358 stipulates as being applicable only when the pressure drop is smaller than the upstream pressure and the compression of air does not become a problem.

3. Process fluid control equipment

(1) Compliant standards

IEC 60534-1:2005: Industrial-process control valves. Part 1: Control valve terminology and general considerations

IEC 60534-2-3:1997: Industrial-process control valves. Part 2: Flow capacity, Section Three-Test procedures

JIS B 2005-1:2012: Industrial-process control valves – Part 1: Control valve terminology and general considerations

JIS B 2005-2-3:2004: Industrial-process control valves – Part 2: Flow capacity – Section 3: Test procedures

Equipment standards: JIS B 8471: Solenoid valve for water

JIS B 8472: Solenoid valve for steam

JIS B 8473: Solenoid valve for fuel oil

(2) Definition of flow rate characteristics

K_v factor: Value of the clean water flow rate (represented by m^3/h) which runs through a valve (test equipment) at 5 to 40°C when the pressure difference is $1 \times 10^5 \text{ Pa}$ (1 bar). It is calculated using the following formula.

$$K_v = Q \sqrt{\frac{1 \times 10^5}{\Delta P} \cdot \frac{\rho}{1000}} \quad (8)$$

K_v : Flow coefficient [m^3/h]

Q : Flow rate [m^3/h]

ΔP : Pressure difference [Pa]

ρ : Density of fluid [kg/m^3]

(3) Formula of flow rate

It is described by practical units. Also, the flow rate characteristics are shown in Graph (2).

In the case of liquids:

$$Q = 53 K_v \sqrt{\frac{\Delta P}{G}} \quad (9)$$

Q : Flow rate [L/min]

K_v : Flow coefficient [m^3/h]

ΔP : Pressure difference [MPa]

G : Relative density [water = 1]

In the case of saturated aqueous vapor:

$$Q = 232 K_v \sqrt{\Delta P (P_2 + 0.1)} \quad (10)$$

Q : Flow rate [kg/h]

K_v : Flow coefficient [m^3/h]

ΔP : Pressure difference [MPa]

P_1 : Upstream pressure [MPa]: $\Delta P = P_1 - P_2$

P_2 : Downstream pressure [MPa]

Conversion of flow coefficient:

$$Kv = 0.865 Cv \dots\dots\dots(11)$$

Here,

Cv factor: Value of the clean water flow rate (represented by US gal/min) which runs through a valve at 40 to 100°F when the pressure difference is 1 lbf/in² (psi)

The values of **Kv** and **Cv** factors for pneumatic purposes are different due to different test methods.

(4) Test method

Connect the piece of test equipment to the test circuit as shown in Fig. (3), and run water at 5 to 40°C. Then, measure the flow rate with a pressure difference where vaporization does not occur in a turbulent flow (pressure difference of 0.035 MPa to 0.075 MPa when the inlet pressure is within 0.15 MPa to 0.6 MPa). However, as the turbulent flow is definitely caused, the pressure difference needs to be set with a large enough difference so that the Reynolds number does not fall below 1×10^5 , and the inlet pressure needs to be set slightly higher to prevent vaporization of the liquid. Substitute the measurement results in formula (8) to calculate **Kv**.

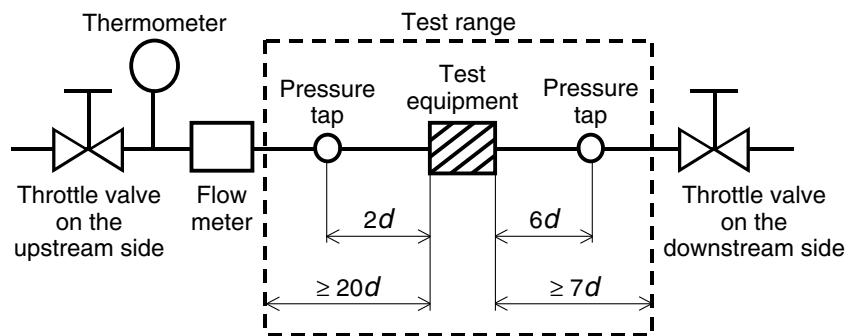
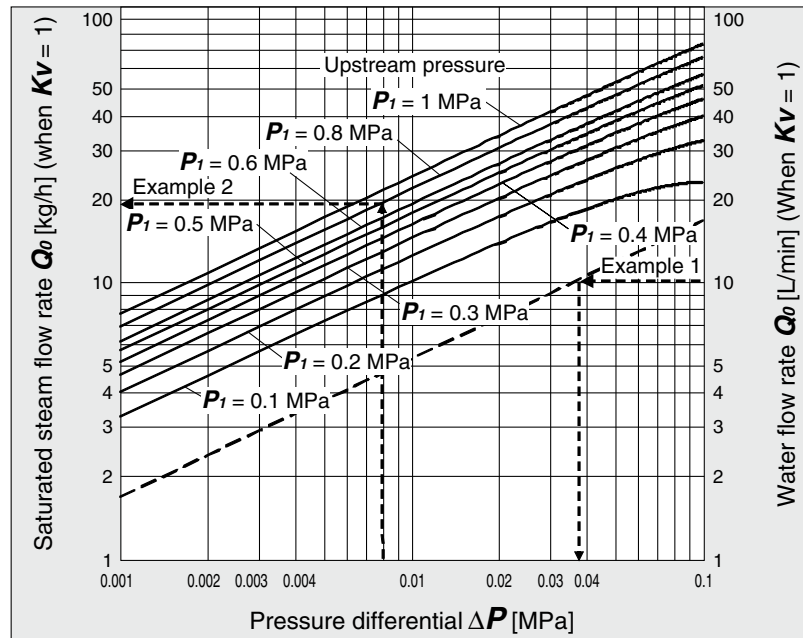


Fig. (3) Test circuit based on IEC 60534-2-3, JIS B 2005-2-3



Graph (2) Flow rate characteristics

Example 1)

Obtain the pressure difference when 15 [L/min] of water runs through a solenoid valve with a **Kv** = 1.5 [m³/h]. As the flow rate when **Kv** = 1 is calculated as the formula: $Q_0 = 15 \times 1/1.5 = 10$ [L/min], read off ΔP when Q_0 is 10 [L/min] in Graph (2). The reading is 0.036 [MPa].

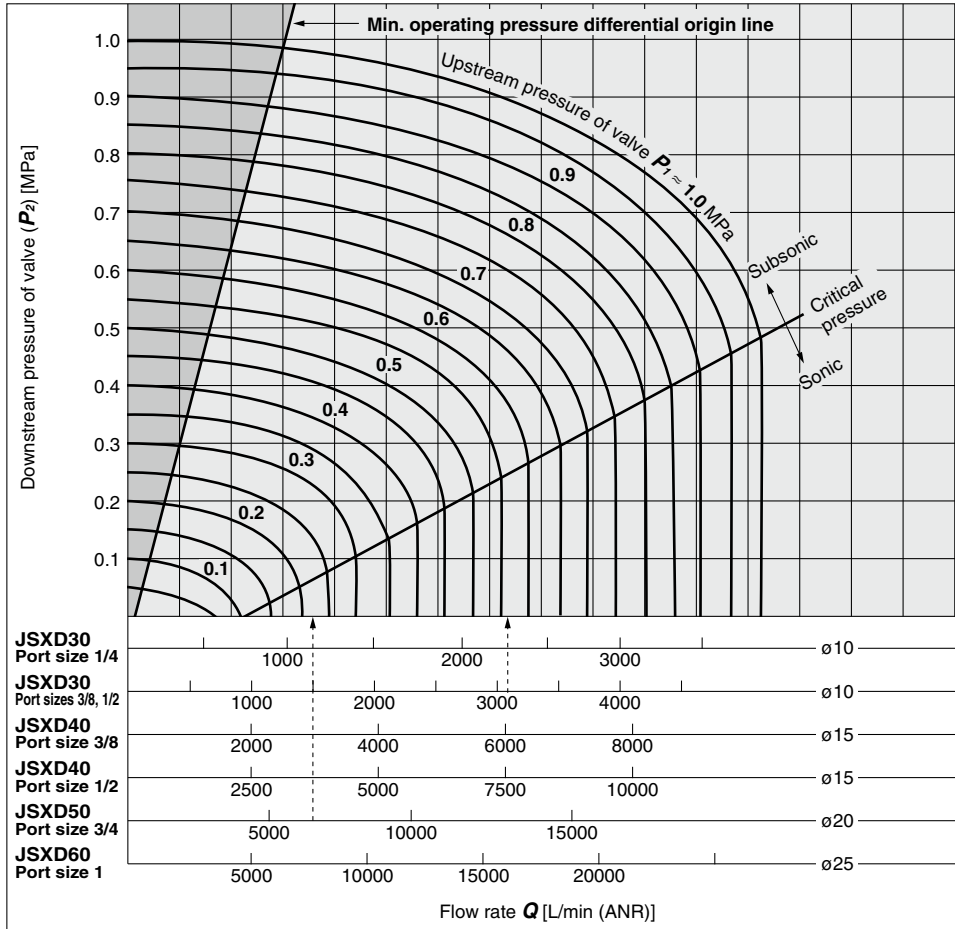
Example 2)

Obtain the saturated steam flow rate when $P_1 = 0.8$ [MPa] and $\Delta P = 0.008$ [MPa] with a solenoid valve with a **Kv** = 0.05 [m³/h]. Read off Q_0 when P_1 is 0.8 and ΔP is 0.008 in Graph (2), the reading is 20 [kg/h]. Therefore, the flow rate is calculated as the formula: $Q = 0.05/1 \times 20 = 1$ [kg/h].

Flow Rate Characteristics

* Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 54 to 58.

For Air (Orifice diameter: $\phi 10$ mm, $\phi 15$ mm, $\phi 20$ mm, $\phi 25$ mm)



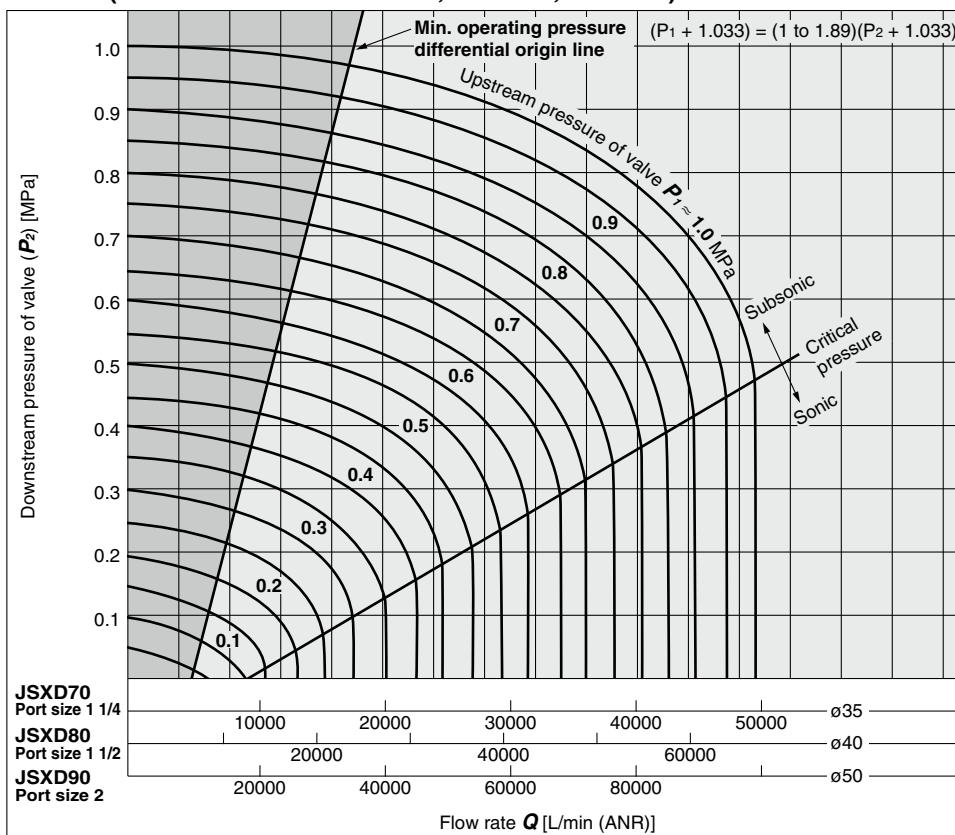
How to read the graph

The sonic range pressure to generate a flow rate of 6000 L/min (ANR) is as follows.
For a $\phi 15$ orifice (JSXD40/Port size 3/8), $P_1 \approx 0.57$ MPa,
for a $\phi 20$ orifice (JSXD50/Port size 3/4), $P_1 \approx 0.22$ MPa

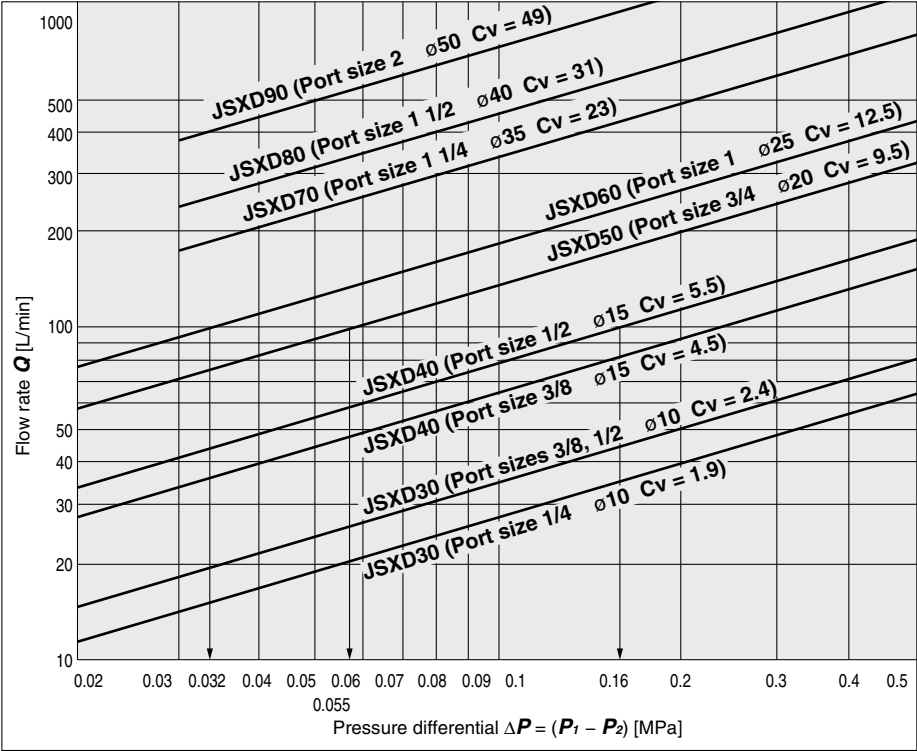
Warning

In the area located left to the min. operating pressure differential origin line in the flow rate characteristics table, the min. operating pressure is not generated. Do not use the product in this area as this may cause operation failure (valve opening failure, valve closing failure) or damage of the valve. Select valves with suitable size.

For Air (Orifice diameter: $\phi 35$ mm, $\phi 40$ mm, $\phi 50$ mm)



For Water



How to read the graph

The pressure differential to generate a flow rate of 100 L/min water is as follows.
For a $\phi 15$ orifice (JSXD40/Port size 1/2), $\Delta P \approx 0.16$ MPa,
for a $\phi 20$ orifice (JSXD50), $\Delta P \approx 0.055$ MPa,
for a $\phi 25$ orifice (JSXD60), $\Delta P \approx 0.032$ MPa

JSX Series

JSXD Series

JSXZ Series

JSXM Series

Table of UL-compliant Products

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