Installation and Maintenance Manual
Series 55-VPA300/500/700
3 Port Air Operated Valve

Marking description:

II 2GD c T85°C (T5) -10°C ≤ Ta ≤ +50°C

Group II
Category 2GD
Suitable for Gas (Zone 1, 2) and Dust environment (Zone 21, 22)
Type of Protection "constructional safety"

1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

⚠ **Caution**	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
⚠ **Warning**	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
⚠ **Danger**	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

⚠ Warning

- The compatibility of equipment is the responsibility of the person who designs the system or decides its specifications.
  Since the products specified here can be used in various operating conditions, their compatibility with a specific system must be based on specifications or after analysis and/or tests to meet specific requirements.
- **Only trained personnel should operate pneumatically operated machinery and equipment.**
  Compressed air can be dangerous if handled incorrectly. Assembly, handling or maintenance of the system should be performed by trained and experienced personnel.
- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
  1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
  2) When equipment is to be removed, confirm the safety processes as mentioned above Switch off air and electrical supplies and exhaust all residual compressed air in the system.
  3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
  1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.

1 Safety Instructions (continued)

2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

1.1 Conformity to Standard

This product is certified to and complies with the following standards:

Non-Electrical Equipment for Potentially Explosive Atmospheres. Part 1 Basic method and requirements	EN13463-1: 2009
Non-Electrical Equipment for Potentially Explosive Atmospheres. Part 5 Protection by constructional safety 'c'	EN13463-5: 2003

1.2 Specific recommendations:

⚠ Warning

- Not suitable for Zones 0 and 20.
- Suitable for Zones 1, 2, 21 and 22.
- Read the specification on the product label.

⚠ Caution

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 General Specifications

Valve

Fluid	Air	
Actuation style	Normally Closed or Normally Open (possible to exchange)	
Operating pressure range	Standard	0.2 to 0.8 MPa
	Vacuum	-101.2kPa to 0.2MPa
Pilot pressure	Same as operating pressure (Min. 0.2MPa)	
Ambient and fluid temperature	-10ºC to 50ºC	
Lubrication	Not required (Use turbine oil class1 ISO VG32 if lubricating)	
Mounting	Free	
Impact/vibration resistance(1)	300/50 m/s^2	

Note 1) Impact resistance: There should be no malfunction of the valve after testing using a drop impact tester along the valve axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised (Value at initial stage).
Vibration resistance: There should be no malfunction of the valve after testing using an 8.3 to 2000Hz sweep along the valve axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised (Value at initial stage).

2 Specifications (continued)

2.2 Production Batch Codes

- The production batch code printed on the label indicates the month and year of manufacture as in the following table.

Month \ Year		2010	2011	2012	…..	2021	2022	2023	…..
		o	P	Q	…..	Z	A	B	…..
Jan	o	oo	Po	Qo	…..	Zo	Ao	Bo	…..
Feb	P	oP	PP	QP	…..	ZP	AP	BP	…..
Mar	Q	oQ	PQ	QQ	…..	ZQ	AQ	BQ	…..
Apr	R	oR	PR	QR	…..	ZR	AR	BR	…..
May	S	oS	PS	QS	…..	ZS	AS	BS	…..
Jun	T	oT	PT	QT	…..	ZT	AT	BT	…..
Jul	U	oU	PU	QU	…..	ZU	AU	BU	…..
Aug	V	oV	PV	QV	…..	ZV	AV	BV	…..
Sep	W	oW	PW	QW	…..	ZW	AW	BW	…..
Oct	X	oX	PX	QX	…..	ZX	AX	BX	…..
Nov	y	oy	Py	Qy	…..	Zy	Ay	By	…..
Dec	Z	oZ	PZ	QZ	…..	ZZ	AZ	BZ	…..

2.3 Dimensions

- **55-VPA#42 Body ported**

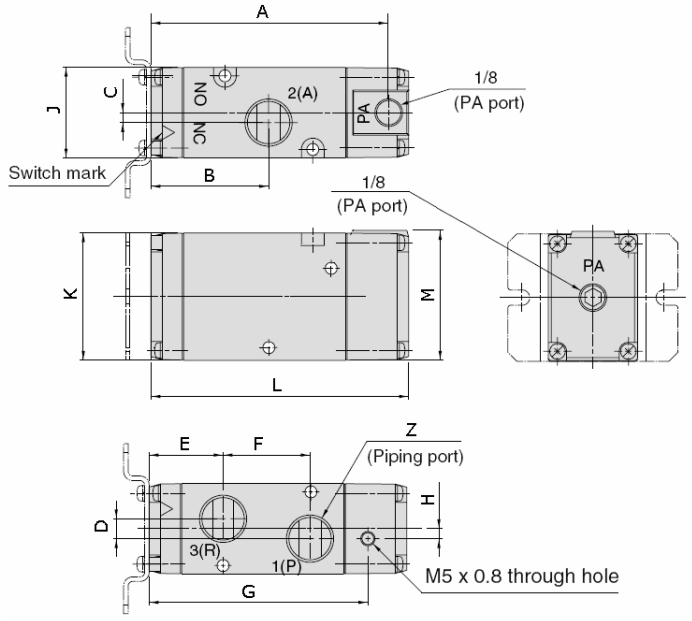


Figure 1

Model	mm						
	A	B	C	D	E	F	G
55-VPA342	58.6	26.7	2.25	4.5	16.5	20.4	54.4
55-VPA542	83.9	41.5	3.5	7	26.1	30.7	77.2
55-VPA742	112.5	52	4.5	9	31	42	108.5

	H	J	K	L	M	Z - Port Thread
55-VPA342	5	26.5	35	65.6	36	1/4, 1/8
55-VPA542	3.5	32	45	90.9	45.9	1/4, 3/8
55-VPA742	3.5	40	63	119.5	63.9	3/8, 1/2

Table 1

2 Specifications (continued)

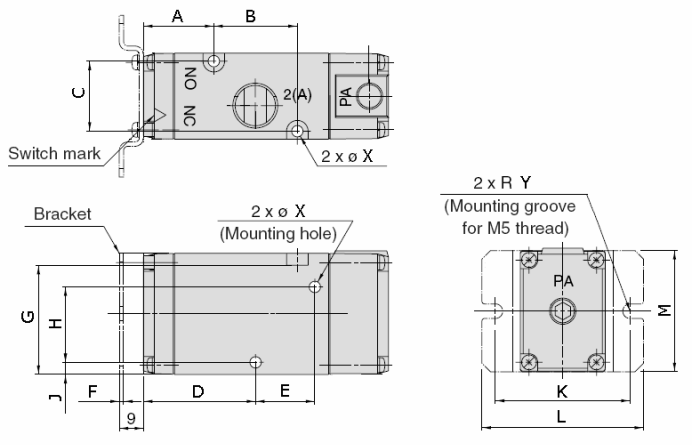


Figure 2

Model	mm						
	A	B	C	D	E	F	G
55-VPA342	16	20.4	21.5	26.7	15	1.6	31
55-VPA542	26.1	31	26	41.6	22	1.6	40.5
55-VPA742	31.5	41	33	52	31	2	56.5

	H	J	K	L	M	X	Y
55-VPA342	21.5	3.5	45	54.5	35	3.2	2.7
55-VPA542	28	4.5	50	60	45	4.2	2.7
55-VPA742	38.5	5.5	60	74	63	5.2	3.2

Table 2

- **55-VPA#44 Base mounted**

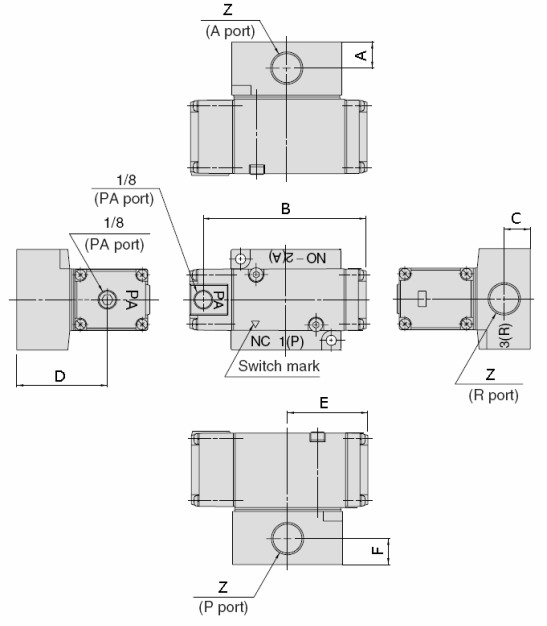


Figure 3

Model	mm			
	A	B	C	D
55-VPA344	12	58.6	12	39.2
55-VPA544	13.5	84.4	13.5	47
55-VPA744	16	112.5	16	55.8

	E	F	Z - Port Thread
55-VPA344	26.7	12	1/8, 1/4
55-VPA544	41.6	13.5	1/4, 3/8
55-VPA744	52	16	3/8, 1/2

Table 3

2 Specifications (continued)

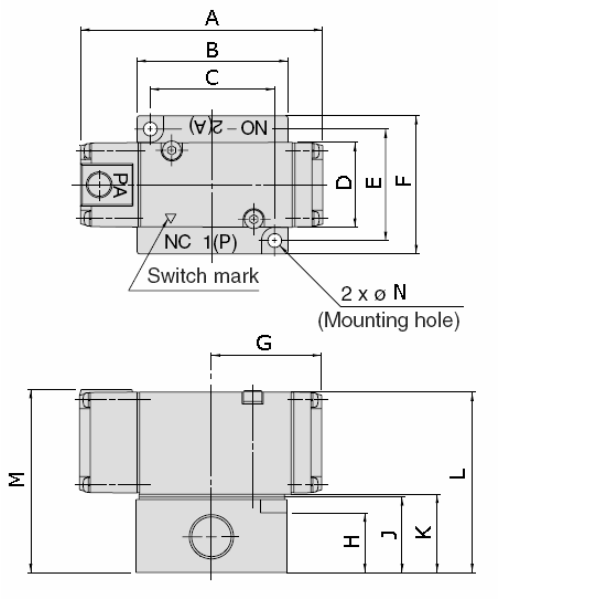


Figure 4

Model	mm						
	A	B	C	D	E	F	G
55-VPA344	65.6	39	30	26.5	35	43	26.7
55-VPA544	91.4	57	47	32	42	52	41.6
55-VPA744	119.5	80	67	40	53	66	52

	H	J	K	L	M	N
55-VPA344	18.5	24	25	55.9	56.9	4.5
55-VPA544	22.5	28.5	29.5	68	69	5.2
55-VPA744	24	32.5	33.5	81.5	82.3	6.2

Table 4

- **55-VPA#44 Manifold mounted – Common Exhaust (VV3PA#-41)**

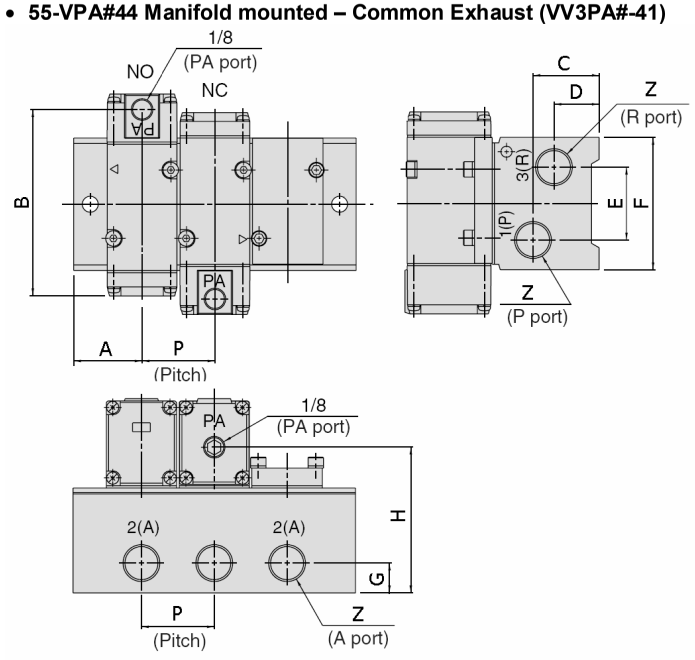


Figure 5

Model	mm					
	A	B	C	D	E	F
VV3PA3-41	28	56.8	24	13.5	27	50
VV3PA5-41	31	84.4	30	20.5	33	60
VV3PA7-41	37	112.5	40	24	48	86

	G	H	P	Z - Port Thread
VV3PA3-41	11	52.7	27.5	1/4
VV3PA5-41	13.5	66	33	3/8
VV3PA7-41	19	78.3	41	1/2

Table 5

2 Specifications (continued)

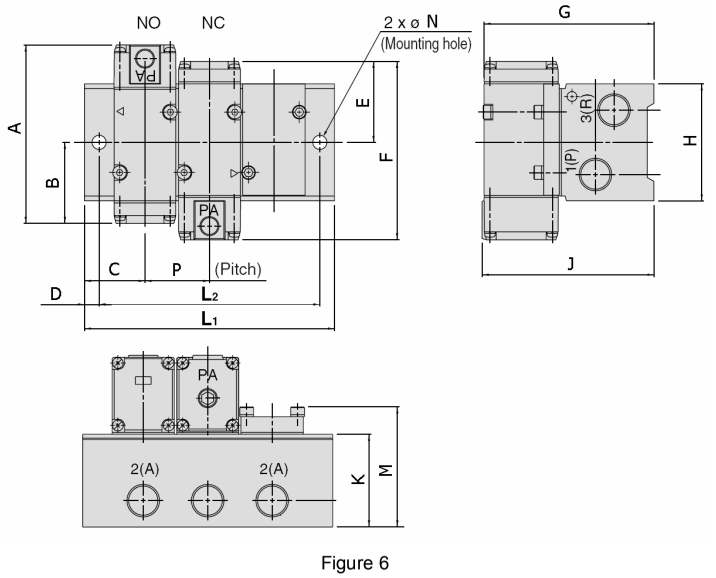


Figure 6

Model	mm						
	A	B	C	D	E	F	G
VV3PA3-41	65.6	26.7	28	7.5	26.7	65.6	69.4
VV3PA5-41	91.4	41.5	31	7.5	41.5	91.4	87
VV3PA7-41	119.5	52	37	8	52	119.5	112

	H	J	K	M	N	P
VV3PA3-41	50	70.4	37.5	50	6.5	27.5
VV3PA5-41	60	88	47.5	61.5	7.2	33
VV3PA7-41	86	112.8	63	78.3	8.5	41

Table 6

Model	VV3PA3-41		VV3PA5-41		VV3PA7-41	
	mm		mm		mm	
Station n	L1	L2	L1	L2	L1	L2
2	83.5	68.5	95	80	115	99
3	111	96	128	113	156	140
4	138.5	123.5	161	146	197	181
5	166	151	194	179	238	222
6	193.5	178.5	227	212	279	263
7	221	206	260	245	320	304
8	248.5	233.5	293	278	361	345
9	276	261	326	311	402	386
10	303.5	288.5	359	344	443	427

Table 7

Note 1) n = Number of valves
Note 2) L1 = n x 27.5 + 28.5; L2 = n x 27.5 + 13.5 for V3PA3-41
L1 = n x 33 + 29; L2 = n x 33 + 14 for V3PA5-41
L1 = n x 41 + 33; L2 = n x 41 + 17 for V3PA7-41

2 Specifications (continued)

- **55-VPA#44 Manifold mounted – Individual Exhaust (VV3PA#-42)**

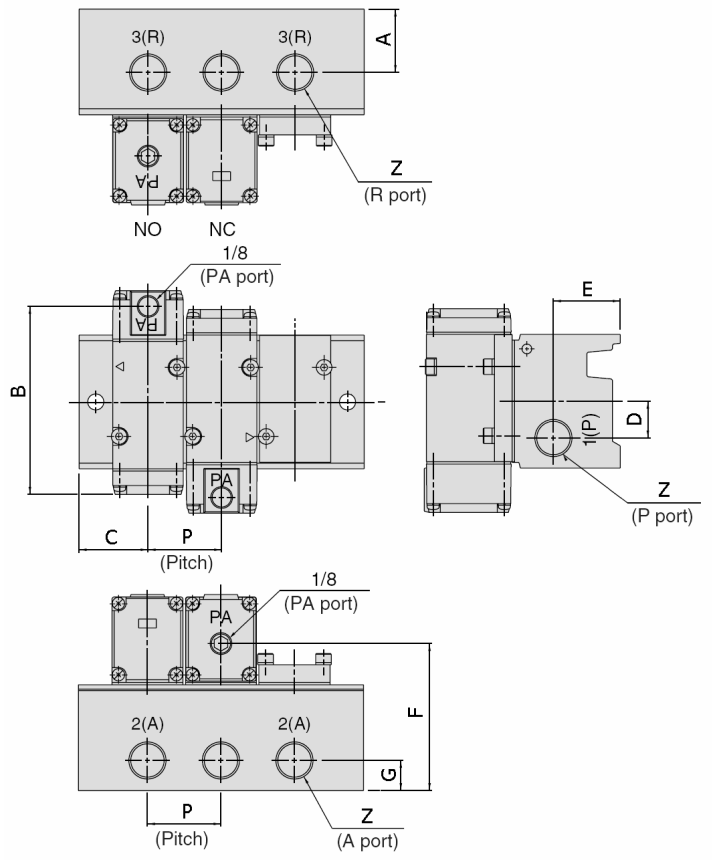


Figure 7

Model	mm				
	A	B	C	D	E
VV3PA3-42	18.5	58.6	28	13.5	24
VV3PA5-42	28.5	84.4	31	16.6	30
VV3PA7-42	34	112.5	37	24	40

	F	G	P	Z - Port Thread
VV3PA3-42	52.7	11	27.5	1/4
VV3PA5-42	66	13.5	33	3/8
VV3PA7-42	86.3	19	41	1/2

Table 8

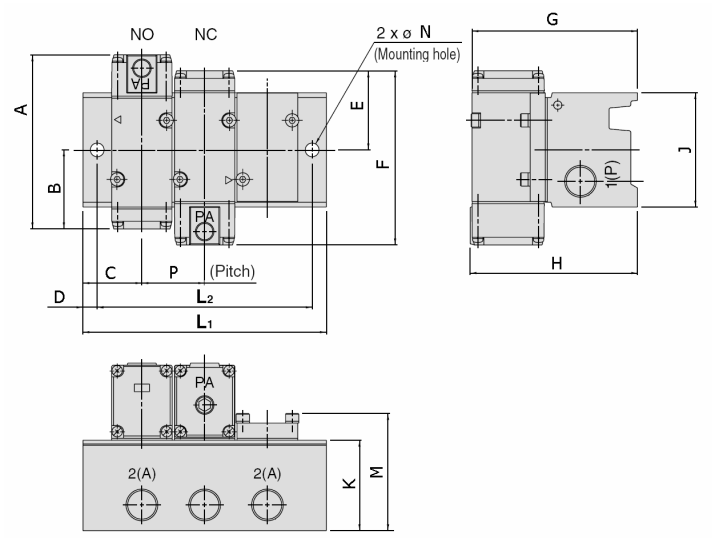


Figure 8

2 Specifications (continued)

Model	mm						
	A	B	C	D	E	F	G
VV3PA3-42	65.6	26.7	28	7.5	26.7	65.6	69.4
VV3PA5-42	91.4	41.5	31	7.5	41.5	91.4	87
VV3PA7-42	119.5	52	37	8	52	119.5	112

	H	J	K	M	N	P
VV3PA3-42	50	70.4	37.5	50	6.5	27.5
VV3PA5-42	60	88	47.5	61.5	7.2	33
VV3PA7-42	86	112.8	63	78.3	8.5	41

Table 9

Model	VV3PA3-42		VV3PA5-42		VV3PA7-42	
	mm		mm		mm	
Station n	L1	L2	L1	L2	L1	L2
2	83.5	68.5	95	80	115	99
3	111	96	128	113	156	140
4	138.5	123.5	161	146	197	181
5	166	151	194	179	238	222
6	193.5	178.5	227	212	279	263
7	221	206	260	245	320	304
8	248.5	233.5	293	278	361	345
9	276	261	326	311	402	386
10	303.5	288.5	359	344	443	427

Table 10

Note 1) n = Number of valves
Note 2) L1 = n x 27.5 + 28.5; L2 = n x 27.5 + 13.5 for V3PA3-42
L1 = n x 33 + 29; L2 = n x 33 + 14 for V3PA5-42
L1 = n x 41 + 33; L2 = n x 41 + 17 for V3PA7-42

3 Installation

⚠ Danger

- Impact and friction sparks on light metals can form ignition sources, therefore:
  Do not use tools with corroded surfaces.
  Protect this product from impact of friction from other objects.
- Prevent dust penetration through the ports into the internal of the valve. This could damage the seals and will damage the valve.
- Never add or remove a valve from the manifold when pressurised.

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.
- If air leakage increases or equipment does not operate properly, stop operation.

3.1 Mounting

- Any mounting position is possible.
- The installation should allow sufficient space for maintenance and inspection activities.
- Painting and coating;
  Warnings or specifications printed or labelled on the product should not be erased, removed or covered up.
- After mounting is completed, confirm that is has been done correctly by performing a suitable function test.

3.2 Mounting interface

Body ported type

- See Figure 2 for mounting holes.

Sub base type

- See Figure 4 for mounting holes.

Manifold type

- See Figure 6 and Figure 8 for mounting holes.

3 Installation (continued)

3.3 Tightening torque for valves mounted on sub-base and manifold

- The valve is attached to the manifold/sub-base with 2 mounting screws.
- Tighten mounting screws to appropriate tightening torque shown in Table 11

Valve	Appropriate tightening torque (Nm)
55-VPA300	0.6 ± 0.1
55-VPA500	1.4 ± 0.1
55-VPA700	2.9 ± 0.1

Table 11

3.4 Environment

Warning

- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere, except the specified Zones and Explosion Groups.
  (Refer to “Marking description” at the beginning of this manual)
- The product should not be exposed to prolonged sunlight. Use a protective cover.
- Do not mount the product in a location where it is subject to excessive vibrations.
- Do not mount the product in a location exposed to radiant heat.

3.5 Piping

Caution

- Before piping is connected, it should be thoroughly blown out with air or washed to remove chips, cutting oil, dust and other debris from inside the piping.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.
- In applications such as vacuum and non-leak specifications, use caution against contamination of foreign objects and air tightness of fittings.
- When using a body ported type valve, connect the piping as shown in Table 12

Model	1(P)	2(A)	3(R)
N.C.	Upstream	Downstream	Exhaust side
N.O.	Exhaust side	Downstream	Upstream

Table 12

Body ported and sub-base type - threaded fitting size

Valve	Threaded Fitting Size	
	Port - P, A, R	Pilot port - PA
55-VPA300	1/8, 1/4	1/8
55-VPA500	1/4, 3/8	1/8
55-VPA700	3/8, 1/2	1/8

Table 13

Tightening torque for fittings

Thread	Tightening Torque (Nm)
M5	By hand + 1/6 turn with the wrench (1/4 turn for miniature fittings)
1/8	7 to 9
1/4	12 to 14
3/8	22 to 24
1/2	28 to 30

Table 14

3 Installation (continued)

3.6 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

4 Settings

4.1 Change of Actuation

- The actuation of the valve can be switched from normally open to normally closed, by changing the mounting orientation of the valve on the manifold or sub-base.

Manifold Base

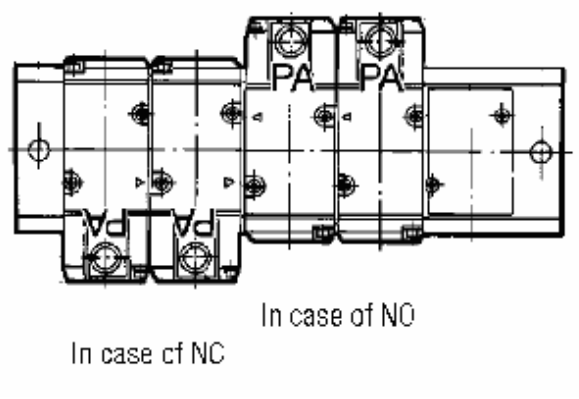


Figure 9

Sub-base

- When changing the actuation from normally closed to normally open, remove the valve from the sub-base and reset " ∇" mark on the body to correspond with the ‘NO’ mark on the sub-base.

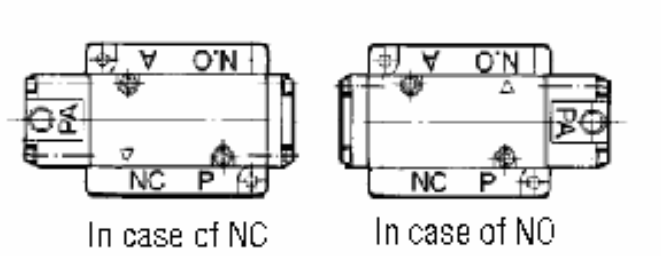


Figure 10

5 Circuit symbols

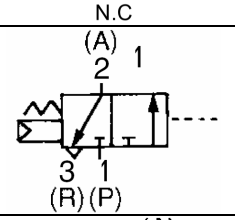
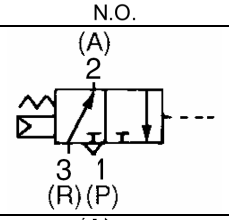
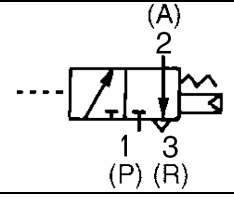
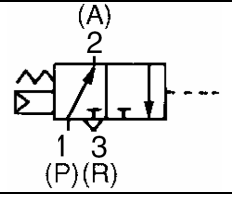
Valve	Valve type	
	N.C	N.O.
342 55-VPA542 742		
344 55-VPA544 744		

Table 15

6 How to Order

Refer to the catalogue for this product.

7 Outline Dimensions (mm)

Refer to the catalogue for this product.

8 Maintenance

Warning

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- Maintenance should be performed in accordance with the procedures in the instruction manual. Incorrect handling can cause damage or malfunction of machinery and equipment, etc.
- Before removing equipment or compressed air supply/exhaust devices, shut off the air and power supplies, and exhaust compressed air from the system. Further, when restarting equipment after remounting or replacement, first confirm safety and then check the equipment for normal operation.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- In order to obtain optimum performance from valves, perform periodic inspections to confirm that there are no leaks from valves or fittings.
- Drain: remove condensate from the filter bowl on regular basis.
- After a long period of non-use, perform a test before beginning regular operation.
- Clean the product regularly to avoid dust deposits.

8.1 Replacing a Base Mounted Valve

- Remove the pilot valve fitting on the valve to be re-placed.
- Remove the two mounting screws and lift the valve from the sub-base or manifold.
- Before assembling valve, ensure the gasket is correctly positioned.
- Fit the replacement valve, ensuring the correct orientation, depending on the type of actuation required.
- Tighten the two mounting screws to the appropriate torque, see Table 11.
- Re-connect the pilot valve fitting.

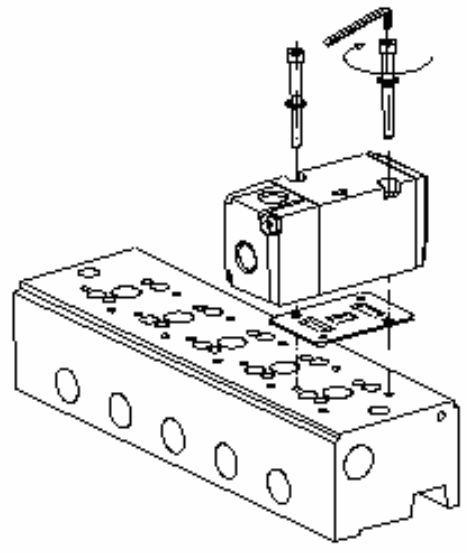


Figure 11

8 Maintenance (continued)

8.2 Blanking plate

- A blanking plate must be fitted to an unused manifold station.
- Ensure gasket is correctly fitted to the manifold.
- Assemble blanking plate to manifold and tighten the two mounting screws to the appropriate torque, see Table 11.
- Removal is the reversal of above. Ensure gasket is retained.

9 Limitations of Use

Danger

- Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.

9.1 Pilot air

- Use clean air.
- Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as this may cause damage or malfunction.
- Install air filters.
  Install air filters upstream, close to the valves. A filtration of 5 μm or less should be selected.
- Install an air dryer or after cooler.
  Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air drier or after cooler.
- If excessive carbon powder is seen, install a mist separator on the upstream side of the valve. If excessive carbon powder is generated, it may adhere to the inside of the valve and cause malfunction.

10 Contacts

AUSTRIA	(43) 2262 62280-0	**LATVIA**	(371) 781 77 00
BELGIUM	(32) 3 355 1464	**LITHUANIA**	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	**NETHERLANDS**	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	**NORWAY**	(47) 67 12 90 20
DENMARK	(45) 7025 2900	**POLAND**	(48) 22 211 9600
ESTONIA	(372) 651 0370	**PORTUGAL**	(351) 21 471 1880
FINLAND	(358) 207 513513	**ROMANIA**	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	**SLOVAKIA**	(421) 2 444 56725
GERMANY	(49) 6103 4020	**SLOVENIA**	(386) 73 885 412
GREECE	(30) 210 271 7265	**SPAIN**	(34) 945 184 100
HUNGARY	(36) 23 511 390	**SWEDEN**	(46) 8 603 1200
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