VV#CC-TFL10GB-A

Installation and Maintenance Manual
Series VCC
2 and 3 Port Air operated Valve for Water/Solvents
Manifold and Single unit

Marking description:

II 2GD c 75℃ T6 X +5℃ ≤ Ta ≤ +50℃

Group II
Category 2GD
Suitable for Gas (Zone 1, 2) and Dust environment (Zone 21, 22)
Type of Protection "constructional safety"
Special condition 'X' Temperature rise test performed in horizontal position only

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.**
  The fluid 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. Release the fluid pressure and be certain there is no danger from fluid leakage or fluid remaining in the system. Switch off electrical supplies.
  3) Before machinery/equipment is re-started, ensure all safety measures are being implemented.
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**

1 Safety Instructions (continued)

1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
2) With fluids whose application causes concern due to the type of fluid or additives, etc.
3) 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.
4) 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.
- If applying high voltage to fluid, ensure manifold is earthed via the manifold mounting bolts. Do not use sealing tape on fittings and piping, as it may insulate.

⚠ Caution

- Ensure that the air supply system is filtered to 5 microns.
- Ensure the fluid is filtered to 150 microns to avoid valve failure.

2 Specifications

2.1 General Specifications

Series VCC Air-Operated Valves
Standard type/special fluoro resin sliding type

Item \ Model	VCC12 – 2 port	VCC13 – 3 port
Construction (Wetted material)	Poppet seal (PEEK resin + Stainless steel)+ special fluoro resin sliding part	
Fluids used	Water/Chemical base paints, Ink, Cleaning solvents (water, butyl acetate), Air	
Operating pressure range MPa	0 to 1.0 (Instantaneous pulsation pressure 1.2)	
Proof pressure MPa	2	
Pilot pressure MPa	0.4 to 0.7	
Orifice diameter mm	Ø3.8	
Effective area mm^2	6	
Fluid temperature ℃	5 to 50	
Ambient temperature ℃	5 to 50	
Lubrication	Non-lube (Initial lubricant: white petroleum jelly used)	
Mounting orientation	Unrestricted	
Valve leakage[1] cm^3/min	1 or less (3 port valve IN ⇒ RETURN: 20 or less)	

Note 1) Valve leakage when supply pressure = 1.2MPa (for air).

2 Specifications (continued)

Diaphragm type / 2 colour painting type

Item \ Model	VCC12D – 2 port (Diaphragm type)
Construction (Wetted material)	Diaphragm type/ Poppet seal (PEEK resin + Stainless steel) + Special fluoro resin diaphragm
Fluids used	Water/Chemical base paints, Ink, Cleaning solvents (water, butyl acetate), Air
Operating pressure range MPa	0 to 0.7 (Instantaneous pulsation pressure 0.9)
Proof pressure MPa	1.5
Pilot pressure MPa	0.4 to 0.7
Orifice diameter mm	Ø3.8
Effective area mm^2	6
Fluid temperature ℃	5 to 50
Ambient temperature ℃	5 to 50
Lubrication	Non-lube (Initial lubricant: white petroleum jelly used)
Mounting orientation	Unrestricted
Valve leakage[1] cm^3/min	1 or less

Note 1) Valve leakage when supply pressure = 0.9MPa (for air).

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 Specifications (continued)

2.3 Dimensions

- **2 Port Valve single unit**

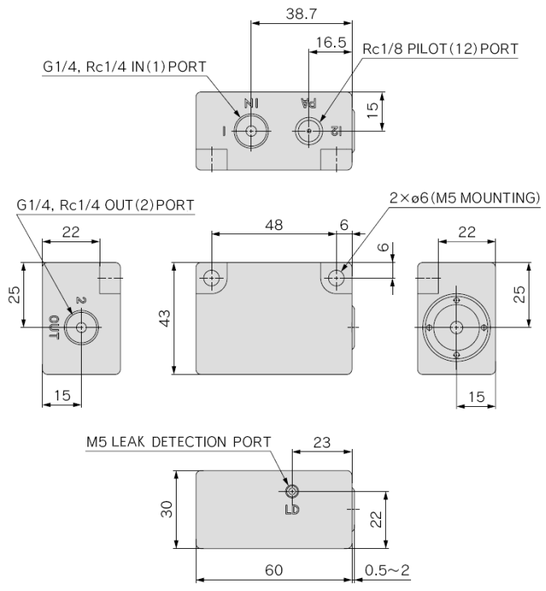


Figure 1

- **3 Port Valve single unit**

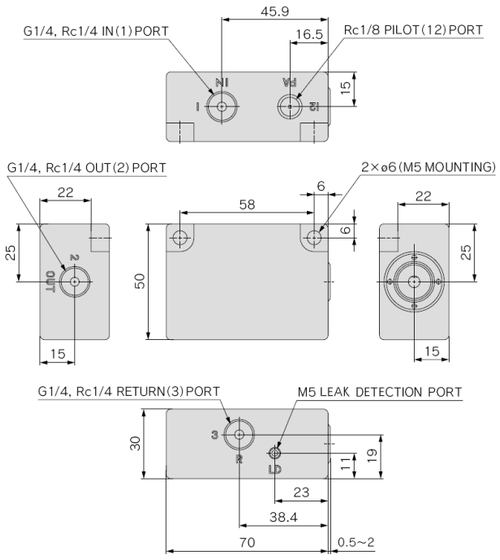


Figure 2

2 Specifications (continued)

- **Manifold**

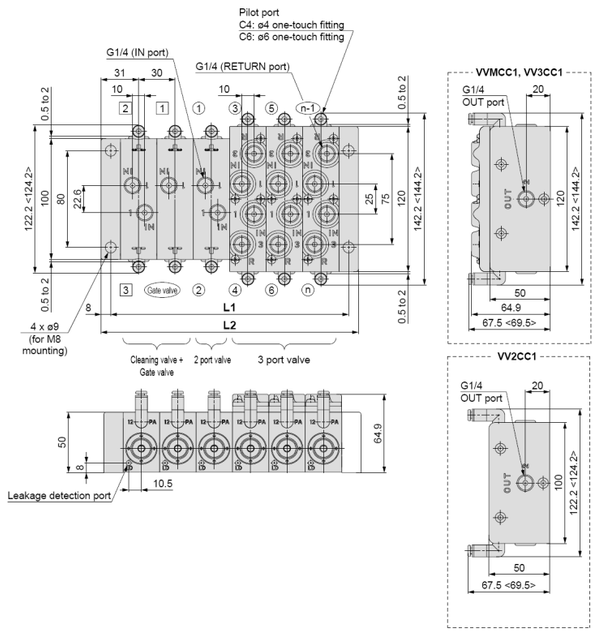


Figure 3

	mm						
n valves	**2**	**4**	**6**	**8**	**10**	**12**	**14**
L1	46	76	106	136	166	196	226
L2	62	92	122	152	182	212	242
n valves	**16**	**18**	**20**	**22**	**24**	**26**	**28**
L1	256	286	316	346	376	406	436
L2	272	302	332	362	392	422	452
n valves	**30**	**32**	**34**	**36**	**38**	**40**	
L1	466	496	526	556	586	616	
L2	482	512	542	572	602	632	

Note 1) n = Number of valves (cleaning valve + gate valve + other valves)
Note 2) Number of manifold blocks = n/2
Note 3) L1 = n/2 x 30 + 16; L2 = n/2 x 30 + 32

Table 1

- **Port sizes**

Model	Ports		
	IN and OUT	**RETURN**	**PA**
VCC12(D)-02#	Rc 1/4, G 1/4	N/A	Rc 1/8
VCC13-02#	Rc 1/4, G 1/4	Rc 1/4, G 1/4	Rc 1/8
VV2CC1-####-##	G 1/4	N/A	C4, C6
VV3CC1-####-##	G 1/4	G 1/4	C4, C6
VVMCC1-####-##	G 1/4	G 1/4	C4, C6

Table 2

3 Installation

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 Installation (continued)

3.1 Environment

Warning

- Do not mount in a location where it can be subject to impact.
- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- Ensure that the fluid does not touch the external surface of the product.
- Operate within the allowable ambient temperature range. Confirm the compatibility between the products composition materials and the ambient atmosphere.
- 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.

3.2 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 or manifold body.
- To use the piping with high temperature fluid, use heat resistant fittings and tubing.

Tighten mounting screws to appropriate tightening torque shown in Table 3

Thread	Appropriate tightening torque (Nm)
Rc 1/8	7 to 9
Rc 1/4	12 to 14
G 1/4	9 to 11

Table 3

One-touch fittings:

Caution

Tube attachment

- Take a tube having no flaws on its periphery and cut it off at a right angle. When cutting the tube, use tube cutters TK-1, 2 or 3. Do not use pincers, nippers or scissors etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened etc., making a secure installation impossible, and causing problems such as the tube pulling out after installation or air leakage. Allow some extra length in the tube.
- Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
- After inserting the tube, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting this can cause problems such as air leakage or the tube pulling out.

Tube detachment

- Push in the release bushing sufficiently and push the collar at the same time.
- Pull out the tube while holding down the release bushing so that it does not come out. If the release bushing is not pressed down sufficiently there will be increased bite on the tube and it will become more difficult to pull out.
- When the removed tube is to be used again, cut off the portion which has been chewed before re-using it. If the chewed portion of the tube is used as is, this can cause trouble such as air leakage or difficulty in removing the tube from the fitting.

3 Installation (continued)

Precautions on other tube brands

Caution

- When using other than SMC brand tubes, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tube.

Nylon tube	±0.1mm
Soft nylon tube	±0.1mm
Polyurethane tube	+0.15mm - 0.2mm

- Do not use tubes that do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other problems, such as air leakage or the tube pulling out after connection.

3.3 Mounting

- Any mounting position is possible.
- The installation should allow sufficient space for maintenance and inspection activities.
- Avoid sources of vibration, or adjust the distance from the body to a minimum length so that resonance will not occur.
- 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.

Danger

- Never add or remove a valve from the manifold when pressurised.
- Never add or remove a valve when an explosive atmosphere is present.
- Never disconnect or reconnect tubing or connectors when pressure is supplied to manifold.

Caution

- Be sure to cut off power and the fluid and air supply and confirm that no fluid or air is left in actuators, piping and manifolds before disassembling, as remaining air may cause an accident.
- If the tightening of the tie-rod screws is insufficient, it may cause air leakage. Before supplying air, check that there is no clearance between the blocks, and the manifold blocks are firmly mounted in order to ensure air supply without leakage.
- Before assembly and installations, confirm that rubber parts such as gaskets and O-rings are assembled to every block. If rubber parts are missing, air leakage may occur.

Removal/assembly of valve

- Unscrew ① and detach the mounting nut using tool VCC-G-A (or socket tool VCC-G-B). See Figure 4.
- Remove the indicator cover.
- Reverse the tool (VCC-G-A) and attach to valve and turn 45° to 90° clockwise ② (to release the O-rings) and extract the valve out straight ③. See Figure 5.
- Wipe off any residual paint etc. on valve and inner surfaces of the manifold base using a suitable cleaning agent.
- Replace the O-rings on the valve and lightly grease with white petroleum jelly before re-assembling valve.
- Slowly insert the valve straight ④ into the manifold, see Figure 6, and ensure the arrow on the valve is within 15° of the IN port (see Figure 8).
- Ensure the indicator cover is assembled and assemble the mounting nut using tool VCC-G-B ⑤. See Figure 7.
- Tighten mounting nut to a torque of 2.5 to 3.5 Nm.

3 Installation (continued)

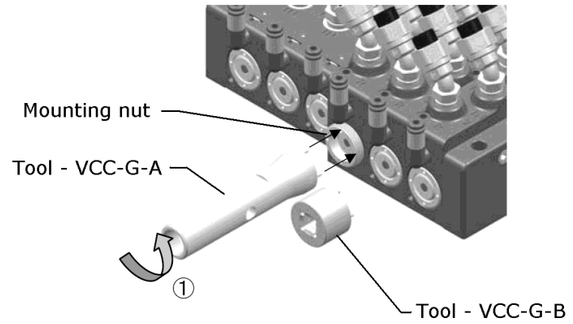


Figure 4

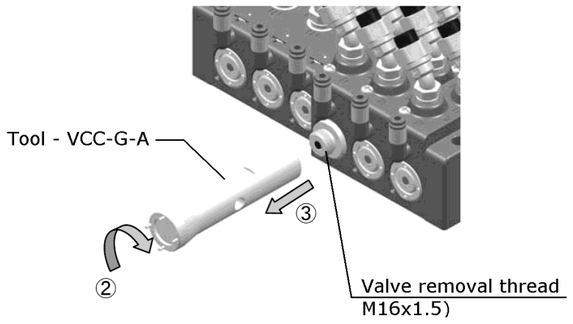


Figure 5

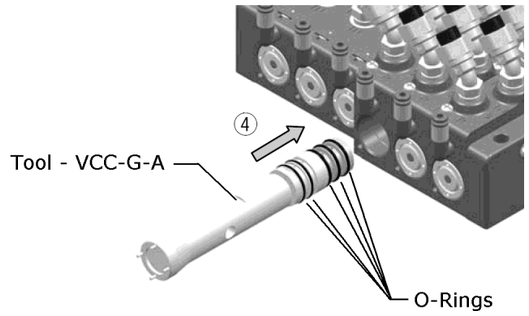


Figure 6

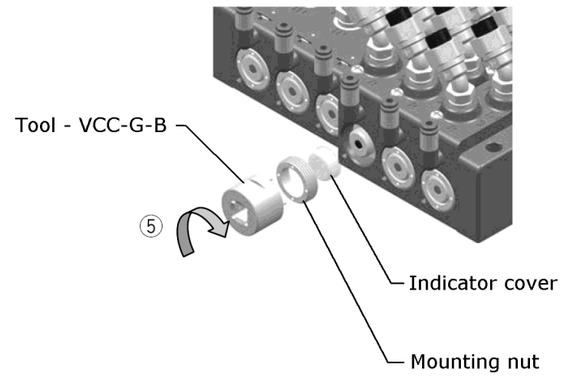


Figure 7

3 Installation (continued)

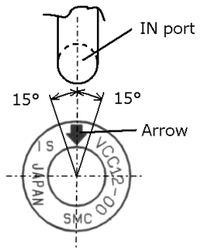


Figure 8

Removal/assembly of Manifold block assemblies. See Figure 9

- To add another manifold block assembly, unscrew the three hexagon socket cap head bolts and dismount the end plate (D side) and adjacent manifold block assembly.
- Screw in the required additional tie-rods until there is no clearance between the tie-rods.
- Ensure all the seals are present and assemble the additional manifold block assemblies, the adjacent manifold block assembly and the end plate.
- Re-assemble the bolts and washers and tighten to a torque of 3.0 to 4.0 Nm.
- Tighten on a flat surface to ensure there is no distortion of the end plates at either end.

Note: Each manifold block assembly has 2 stations (valves). If only one station is required, use blanking plug to seal the other station.

⚠ Caution

- Be sure to keep the end plate (D-side) and adjacent manifold block together, as the adjacent manifold block has a plug in the outlet port adjacent to the end plate.
- Ensure the manifold blocks are assembled in the correct orientation.
- If gate valve manifold block is present, ensure the new manifold block is positioned on the required side of the gate valve.
- Keep 2 port and 3 port manifold blocks together.

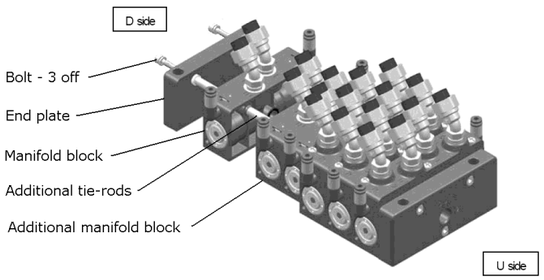


Figure 9

3.4 Lubrication

⚠ Caution

- SMC products have been lubricated for life at manufacturer, and do not require lubrication in service.
- The valve uses white petroleum jelly as a lubricant.

4 Settings

4.1 Mechanical Indicator

⚠ Caution

- The mechanical indicator protrudes from the valve when the valve is open.
- For VCC12 and VCC13 valves the indicator colour is blue. For VCC12D valves the indicator colour is red.

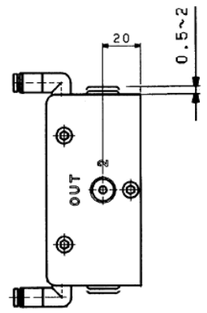


Figure 10

⚠ Warning

4.2 Leak Detection port

- The valve has a leak detection area what separates the fluid area from the pilot pressure area, See Figure 12.
- A leak detection port is provided on the manifold/single manifold to warn of valve seal failure. See Figure 11.
- If leakage is found, valve replacement and maintenance are necessary immediately as the fluid can leak into the pneumatic part of the valve.
- Fluids that solidify or cure may block the leak detection port preventing the leak from being detected.

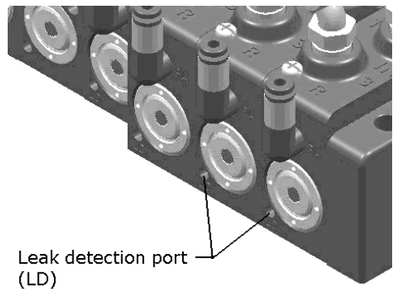


Figure 11

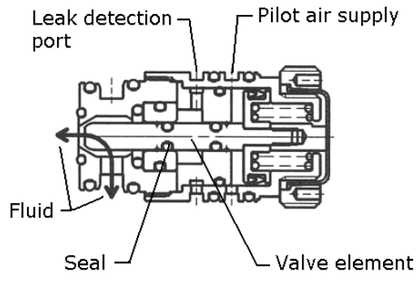


Figure 12

5 Circuit symbols

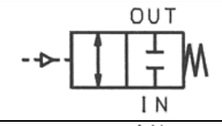
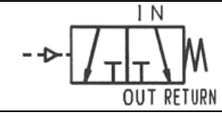
Valve	N.C. Normally closed
VCC12-00	
VCC13-00	

Table 4

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.
- If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic system should be performed by qualified personnel only.
- Drain: remove condensate from the filter bowl on a regular basis.
- Shut-down before maintenance: before attempting any kind of maintenance make sure the supply fluid and air pressure is shut off and all residual fluid and air pressure is released from the system to be worked on.
- Start-up after maintenance: apply operating pressure and power to the equipment and check for proper operation and possible air and/or fluid leaks. If operation is abnormal, please verify product set-up parameters.
- Do not make any modification to the product
- Do not disassemble the product, unless required by installation or maintenance instructions.

⚠ Caution

- Switch valves at least once every 30 days to prevent malfunction. Also conduct a regular inspection once every six months.
- When the valves are not being used for a long time, clean the valves so the fluid (paint, ink, etc.) does not solidify or cure.

8.1 Disassembly/assembly of valve element

After removing valve from manifold, the 2 port and 3 port valves may be disassembled for cleaning.

- Unscrew and detach the orifice body assembly from the valve body using tool VCC-G-C, ensuring the appropriate end is used depending on the valve type. See Figure 13
- Discard the orifice body assembly and replace with new part.
- Clean the valve with a suitable cleaning fluid.
- Ensure all seals are present before re-assembling.
- To re-assemble the orifice body, press the orifice body with a force of around 100 to 200N into the valve body and engage the thread, then screw the orifice body into the valve body until it stops.
- Adjust the total length of the valve as shown in Figure 14. For reference, the tightening torque is 1 to 2 Nm for 2 port valve and 0.5 to 1 Nm for 3 port valve. Over-tightening may damage the thread.

8 Maintenance (continued)

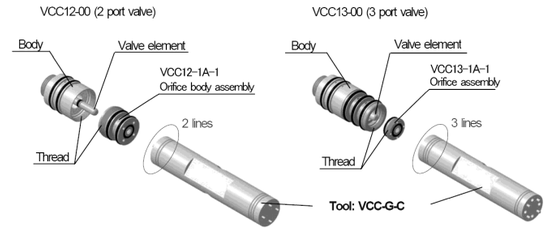


Figure 13

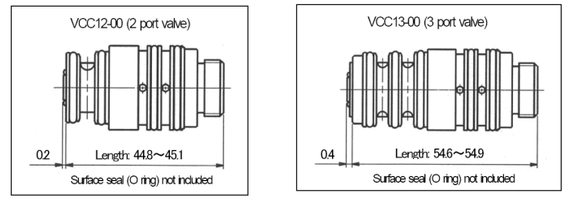


Figure 14

8.2 Fittings

Three types of fittings;

VCKH – straight connector
VCKK – 50° swivel elbow connector
VCKL – 90° swivel elbow connector

- When installing fittings, ensure seal is present.
- Tightening torque is 9 to 11 Nm.

Attaching/detaching piping on fittings

- When attaching piping to fitting, tighten union nut by hand, then 1.5 to 2 turns using tool VCC-G-D-1 or -2. See Figure 15

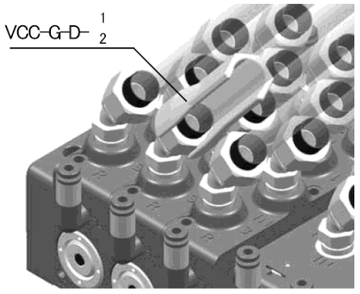


Figure 15

8.3 Blanking plugs

Use blanking plugs (2 port or 3 port) to seal off ports and valve positions not used. See Figure 16

- Tighten valve blanking plug to torque 1 to 2 Nm for 2 port valve position and 0.5 to 1 Nm for 3 port valve position. Over-tightening may damage the thread.
- Tighten port blanking plug to torque 9 to 11 Nm.

8 Maintenance (continued)

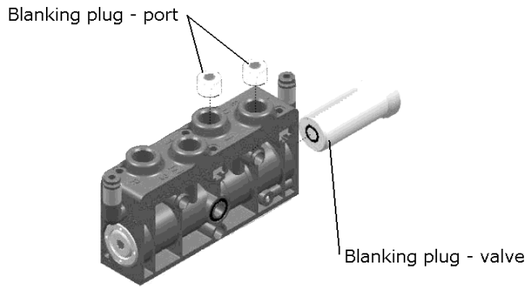


Figure 16

8.4 Replacement parts

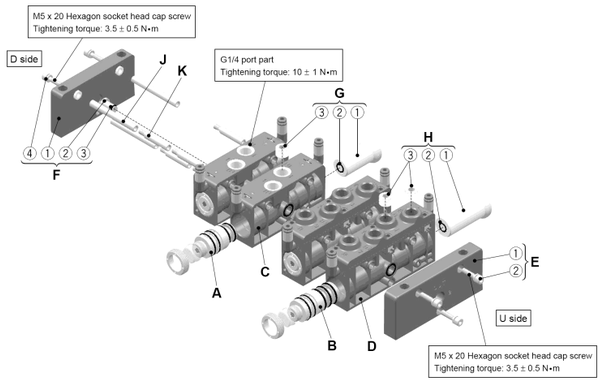


Figure 17

Model	Symbol	Part no.	Description	Symbol	Description
For 2 port valve	A	VCC12(D)-00	2 port valve	—	—
	C	VVCC12-1G-02F$^{C4}_{C6}$	Manifold block	—	—
	E	VVCC12-2A-02F	U-side end plate assembly for 2 port valve	①	U-side end plate
				②	Hexagon socket head cap screw with M5 x 20 SW
	F	VVCC12-3A-1	D-side end plate assembly for 2 port valve	①	D-side end plate
				②	Plug
				③	O-ring
				④	Hexagon socket head cap screw with M5 x 20 SW
	G	VVCC12-10A-1	Blanking plug assembly for 2 port valve	①	Blanking plug
				②	O-ring
				③	R1/4 Hexagon socket head plug
For 3 port valve	B	VCC13-00	3 port valve	—	—
	D	VVCC13-1A-02F$^{C4}_{C6}$	Manifold block	—	—
	E	VVCC13-2A-02F	U-side end plate assembly for 3 port valve	①	U-side end plate
				②	Hexagon socket head cap screw with M5 x 20 SW
	F	VVCC13-3A-1	D-side end plate assembly for 3 port valve	①	D-side end plate
				②	Plug
				③	O-ring
				④	Hexagon socket head cap screw with M5 x 20 SW
	H	VVCC13-10A-1	Blanking plug assembly for 3 port valve	①	Blanking plug
				②	O-ring
				③	R1/4 Hexagon socket head plug
Common	J	VVCC12-20A-□	Tie-rod	—	—
	K	VVCC12-21A	Tie-rod for adding stations	—	—

Table 5

8 Maintenance (continued)

C: 2 port valve manifold block assembly
Manifold block assembly for gate valve

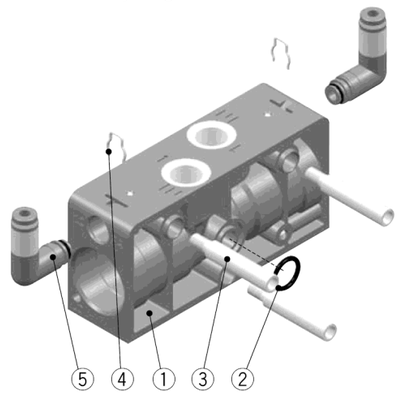


Figure 18

Component parts

Model	Symbol	Part no.	Symbol	Description
For 2 port valve	C	VVCC12-1A-02F$^{C4}_{C6}$ * Pilot port C4: ø4 piping C6: ø6 piping	①	Manifold block
		VVCC12-1G-02F$^{C4}_{C6}$ * Pilot port C4: ø4 piping C6: ø6 piping	②	O-ring
			③	Tie-rod for adding stations
			④	Clip
			⑤	One-touch fitting

Table 6

D: 3 port valve manifold block assembly

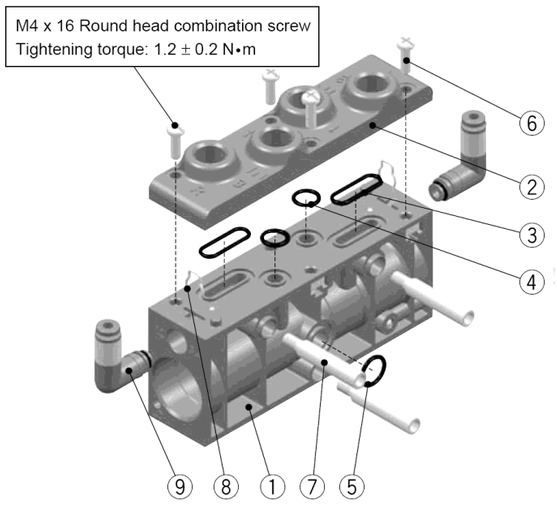


Figure 19

8 Maintenance (continued)

Component parts

Model	Symbol	Part no.	Symbol	Description
For 2 port valve	D	VVCC13-1A-02F$^{C4}_{C6}$ * Pilot port C4: ø4 piping C6: ø6 piping	①	Manifold block
			②	Port block
			③	O-ring
			④	O-ring
			⑤	O-ring
			⑥	Round head combination screw with M4 x 16 SW
			⑦	Tie-rod for adding stations
			⑧	Clip
			⑨	One-touch fitting

Table 7

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.
- Ensure all fluid, air and power supplies are ISOLATED before commencing installation.
- Do not use in atmosphere where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam.
- If it is intended to energise a valve for an extended period of time, please consult SMC.
- These valves are NOT intended to be used as emergency shut-off valves.
- DO NOT use these valves below +5℃.
- Ensure valves are operated within the specification range.

10 Contacts

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