



Installation and Maintenance Manual

Series 56-EVS7-6, 56-EVS7-8 & 56-EVS7-10 CNOMO Solenoid Valve



II 3G - Ex nA IIB T5 Gc X

II 3D - Ex tc IIIC T90°C Dc X IP65

Marking description

II 3G - Ex nA IIB T5 Gc X Ta -10°C to +60°C (VDC)

II 3D - Ex tc IIIC T90°C Dc X IP65

II 3G - Ex nA IIB T5 Gc X Ta -10°C to +40°C (VAC)

II 3D - Ex tc IIIC T90°C Dc X IP65

Group II

Category 3

Gas group IIB

Dust group IIIC

Suitable for Gas and Dust environment

Type of Protection: nA "non-sparking", tc "enclosure"

'X' Protect from impacts with ATEX enclosure

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 pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications. Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic 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 an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced personnel.
- Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
 - 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:**
 - Conditions and environments beyond the given specifications, or if the product is to be used outdoors.

1 Safety Instructions (continued)

- 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.
- An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

• Specific recommendations:

Danger

- Protect from impacts using an ATEX enclosure suitable for impacts.

Warning

- Not suitable for Zones 0/20 and 1/21. Only suitable for Zones 2/22.
- Do not open when energised.
- Do not energise both solenoids at the same time, as this can cause higher surface temperatures than under normal operating conditions.

Caution

This product has components made of aluminium alloy. When mounting this product, it must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

Caution

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

• Conformity to standards:

This product conforms to the following ATEX standards

Electrical Apparatus for Explosive Gas Atmospheres	EN 60079-0 : 2009, EN 60079-15 : 2010
Electrical Apparatus for use in the presence of Combustible Dust	EN 60079-31 : 2009

2 Specifications

2.1 Valve Specification

Fluid	Air and inert gas		
Fluid and Ambient Temperature	-10 to 60°C (VDC) (1) -10 to 40°C (VAC)		
Operation Pressure Range	Single	2 position	0.1 to 1.0MPa
		2 position	0.1 to 1.0MPa
		3 position	0.1 to 1.0MPa
Manual operation	Non-locking & locking type		
Electrical entry	DIN43650 connector		
Lubrication	Unnecessary (Turbine oil class 1 – ISO VG32 if used)		
Environmental protection rating	IP65		
Shock/vibration resistance (2)	300/50m/s ²		

Note 1) No freezing.

2) Shock resistance: No malfunction resulted from the impact test using a drop impact tester.

The test was performed on the axis and right angle direction of the main valve and armature, for both energized and de-energized states.

Vibration resistance: No malfunction occurred in a one-sweep test between 8.3 and 2000Hz.

Test was performed at both energized and de-energized state to the axis and right angles direction of the main valve and armature. (valve in the initial stage).

2.2 Pilot Valve Specification

Coil Rated Voltage (V)	DC	12, 24
	AC (50/60Hz)	100, 200, 110, 220, 230,
Power consumption	DC (W)	1.8
	AC Inrush current (VA)	5.4
	AC Holding current (VA)	3.6
Coil Voltage Tolerance (V)	-15% to +10% of rated voltage	
Coil insulation	Class B (130°C) or equivalent	

2 Specifications (continued)

2.3 Manifold Specification

Manifold Block Size	ISO Size 1	ISO Size 2	
Applicable Solenoid Valve	56-EVS7-6 Series	56-EVS7-8 Series	
Number of Stations	1 to 10	1 to 10	
Piping	A, B - Port	1/4, 3/8, One-touch Fitting: Ø6, Ø8, Ø10	3/8, 1/2
	P, R1, R2 - Port	1/4, 3/8, One-touch Fitting: Ø12	1/2, 3/4
Individual SUP Spacer	VV71-P-#(02: 1/4, 03:3/8, C10:Ø10)	VV72-P-(03: 3/8, 04:1/2)#	
Individual EXH Spacer	VV71-R-#(02: 1/4, 03:3/8, C12:Ø12)	VV72-R-(03: 3/8, 04:1/2)#	
Gallery Blank Disc (Differential pressure style)	AXT502-14	AXT512-14-1A (for P Port)	
		AXT512-14-2A (for R1, R2 Port)	

2.4 Port Sizes

Valve series ISO Size 1, 2 and 3 can be mounted on a sub-plate.

Valve series ISO Size 1 and 2 can be mounted on a manifold.

2.4.1

2.4.2 Sub-plate

- Side-Ported ISO Size 1, 2 and 3

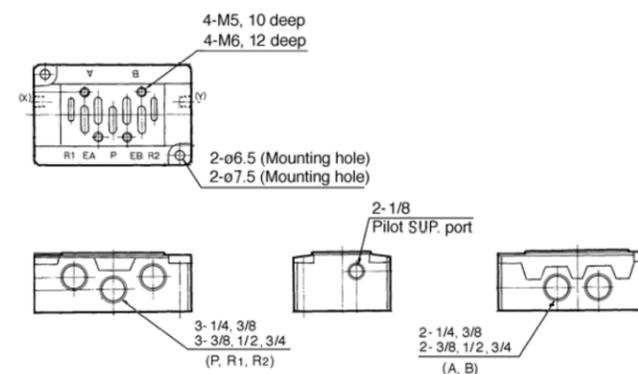


Figure 1

- Bottom ported ISO Size 1, 2 and 3

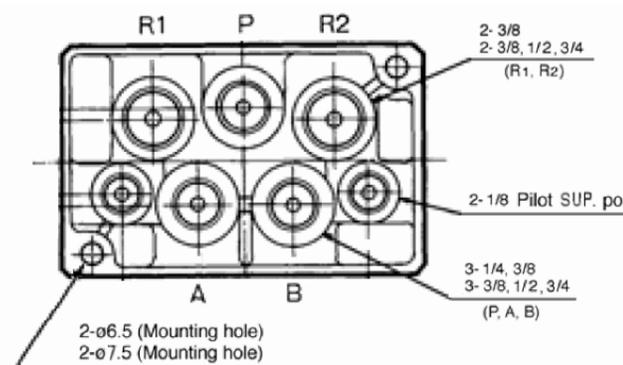


Figure 2

2 Specifications (continued)

Sub-Plate	Piping	Port 1(P), 2(B), 4(A)	Port 5(R1), 3(R2)	Port 12(Y) Port 14(X) (External Pilot)
		Threaded Fitting size (1)	Threaded Fitting size (1)	Threaded Fitting size (Rc)
EVS7-1-AO2□	Side	1/4	3/8	1/8
EVS7-1-AO3□	Side	3/8	3/8	1/8
EVS7-1-BO2□	Bottom	3/8	3/8	1/8
EVS7-1-BO3□	Bottom	1/4	3/8	1/8
EVS7-2-AO3□	Side	3/8	3/8	1/8
EVS7-2-AO4□	Side	1/2	1/2	1/8
EVS7-2-AO6□	Side	3/4	3/4	1/8
EVS7-2-BO3□	Bottom	3/8	3/8	1/8
EVS7-2-BO4□	Bottom	1/2	1/2	1/8
EVS7-2-BO6□	Bottom	3/4	3/4	1/8
EVS7-3-AO6□	Side	3/4	3/4	1/8
EVS7-3-A1O□	Side	1	1	1/8
EVS7-3-BO6□	Bottom	3/4	3/4	1/8

Note 1) Rc, G, NPT or NPTF

Table 1

2.4.3 Manifold

- ISO Size 1

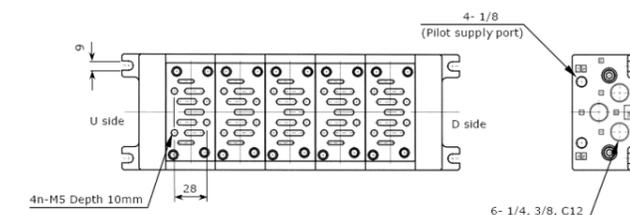


Figure 3

- ISO Size 2

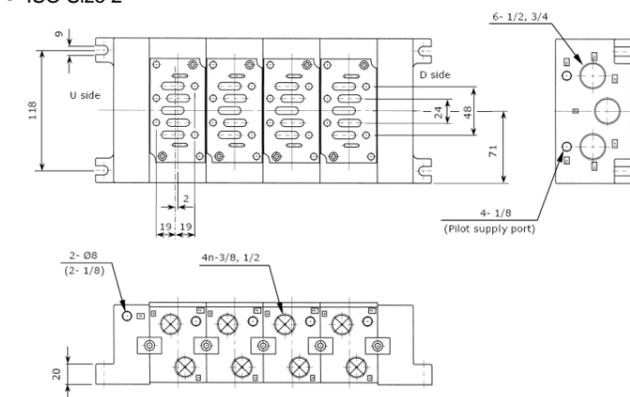


Figure 4

2 Specifications (continued)

- Bottom ported ISO size 1

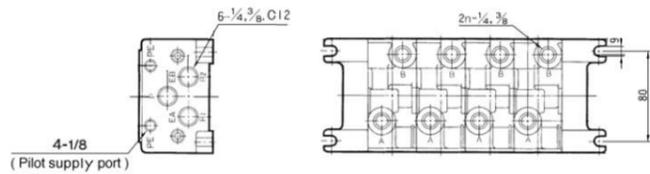


Figure 5

- Bottom ported ISO size 2

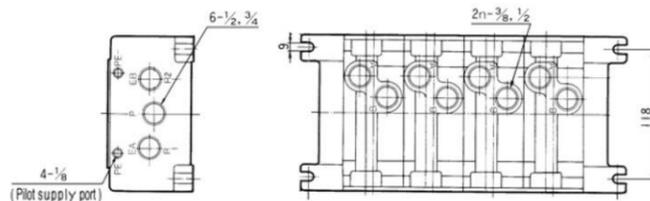


Figure 6

Manifold	Piping	Port 4(A), 2(B),	Port 1(P), 5(R1), 3(R2)	Port 12, 14, (External pilot)	Port
		Threaded Fitting size (1)	Threaded Fitting size (1)	Threaded Fitting size (Rc)	Threaded Fitting size (Rc)
EVS71 ISO Size 1	Side	1/4, 3/8, C6, C8, C10	1/4, 3/8, C12	1/8	-
	Bottom	1/4, 3/8	-	-	-
	EXH Spacer	-	-	-	1/4, 3/8, C12
	SUP Spacer	-	-	-	1/4, 3/8, C10
EVS72 ISO Size 2	Side	3/8, 1/2	1/2, 3/4 (2)	1/8	-
	Bottom	-	-	-	-
	EXH Spacer	-	-	-	3/8, 1/2
	SUP Spacer	-	-	-	3/8, 1/2

Note 1) Rc, G, NPT or NPTF

Note 2) External Pilot port cannot be used when 3/4 piping is selected.

Table 2

2.5 Circuit Symbols

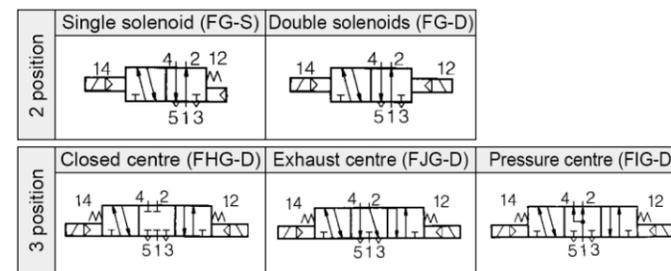


Figure 7

3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.

3 Installation (continued)

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere, except Zones 2/22.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

3.3 Piping

Warning

- Before piping make sure to clean up chips, cutting oil, dust etc.
- 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.
- Tighten fittings to the specified tightening torque.

Thread	Tightening Torque
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30
Rc 3/4	28 to 30
Rc 1	36 to 38
Rc 1 1/4	40 to 42
Rc 1 1/2	48 to 50
Rc 2	48 to 50

Table 3

Caution

One-touch fittings:

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 pliers, 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 what has been chewed before re-using it. If the chewed portion of the tube is used as is, this can cause problems such as air leakage or difficulty in removing the tube from the fitting.

Precautions on other tube brands

- 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 Installation (continued)

3.4 Electrical Connection

Caution

- Ensure power is off before connecting.

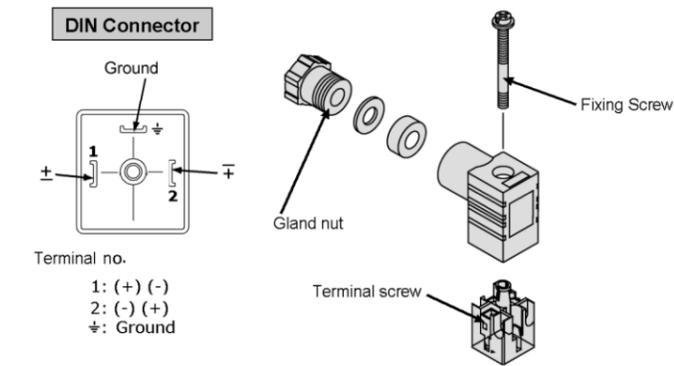


Figure 8

DIN Connector (see Figure 8):

- Loosen the fixing screw and remove the connector housing from the terminal spades on the solenoid.
- Remove the housing screw and insert a screwdriver into the slot on the underside of the DIN cap and carefully remove the block.
- Insert the cable through the gland nut, washer, grommet and housing.
- Loosen the terminal screws on the block and insert the stripped ends of the leads. Secure each lead by re-tightening the appropriate terminal screw to a torque of 0.4 to 0.5 Nm.
- Tighten the housing gland nut to secure the cable to a torque of 2.5 to 3.5 Nm.
- Re-assemble the DIN connector in reverse order of removal, ensuring the special gasket provided is used. Tighten the fixing screw to a torque of 0.5 to 0.6 Nm.

3.5 Electrical circuit - Valve

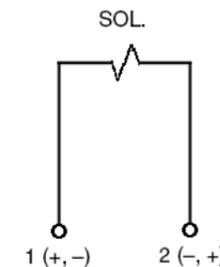


Figure 9

3.6 Mounting

Valve series ISO Size 1 and 2 can be mounted on a sub-plate or manifold. Valve series ISO Size 3 can be mounted on a sub-plate.

Danger

- Never add or remove a valve from the manifold when energised.
- Never disconnect or reconnect cables or connectors when power is connected to valves.
- Be sure to cut off power and the air supply and confirm that no air is left in actuators, piping and manifolds before disassembling, as remaining air may cause an accident.
- If the connection between blocks or 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 secured in order to ensure air supply without leakage.

3 Installation (continued)

- 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.

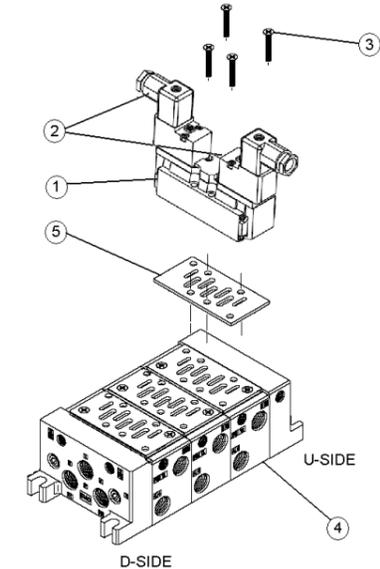


Figure 10

3.6.1 Removal/Assembly of a valve

- Remove DIN connector(s), Item 2, from valve, Item 1.
- Remove bolts, Item 3, and gently lift valve from sub-plate or manifold, Item 4.
- Ensure seal, Item 5, is present before re-assembling valve. Torque tighten bolts (Item 3) as shown in table.
- Re-assemble DIN connector(s), ensuring gasket is assembled.

Thread	Appropriate tightening torque (Nm)
M4	5 to 7
M5	7 to 9
M6	12 to 14

Table 4

3.6.2 Removal and adding stations

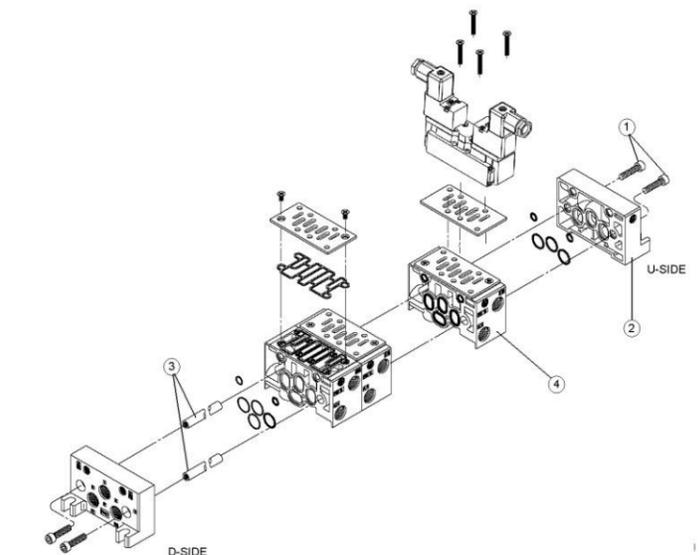


Figure 11

- ISO Size 1 Valves (see Figure 11)

3 Installation (continued)

- To add another station, loosen bolts, Item 1, on the U side to dismount the end plate assembly, Item 2, (maximum number of stations is 10).
- Replace the existing tie rods with the required tie-rods, Item 3, for the number of stations.
- Ensure all seals are present and add the additional manifold block assembly, Item 4, to the manifold assembly, tightening the bolts (Item 1) to torque shown in table.

Note: For reducing the number of stations, order the required tie-rods (Item 3) for the reduced manifold.

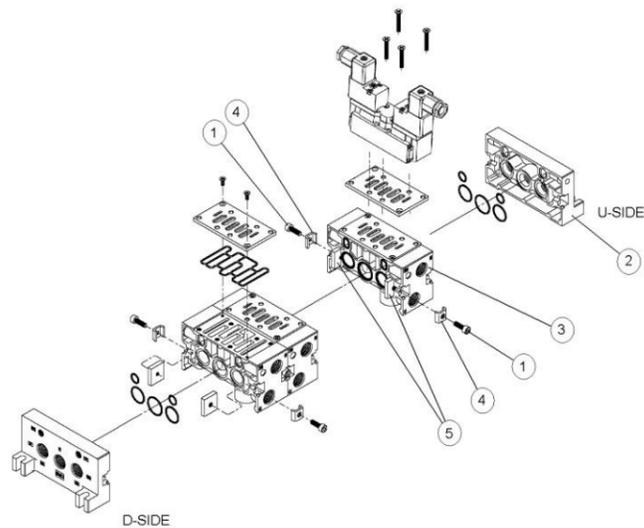


Figure 12

ISO Size 2 Valves (see Figure 12)

- To add another station, loosen bolts, Item 1, on the U side to dismount the end plate assembly, Item 2, (maximum number of stations is 10).
- Ensure all seals are present and add the additional manifold block assembly, Item 3, to the manifold assembly, ensuring connection fittings A, Item 4, and B, Item 5, are positioned correctly and tightening the bolts (Item 1) to torque shown in table.
- Re-assemble the end plate assembly, ensuring all seals are present and connection fittings A (Item 4) and B (Item 5) are positioned correctly and tightening the bolts (Item 1) to torque shown in table.

Thread	Appropriate tightening torque (Nm)
M4	5 to 7
M5	7 to 9
M6	12 to 14

Table 5

3.7 Manifold options

The manifold has optional parts that can be added:

Name	Part number for ISO Size 1 - 56-EVS7-6	Part number for ISO Size 2 - 56-EVS7-8
Blanking plate assembly	AXT502-9A	AXT512-9A
Individual SUP spacer	VV71-P-###	VV72-P-###
Individual EXH spacer	VV71-R-###	VV72-R-###
SUP block plate	AXT502-14	AXT512-14-1A
EXH block plate		AXT512-14-2A
Pilot EXH block plate	AZ503-53A	AZ512-59A
Throttle valve spacer	AXT503-23A	AXT510-32A
Reverse pressure spacer	AXT502-21A-1#	AXT519-19A-##
R1, R2 Individual EXH spacer	VV71-R2-03#	VV72-R2-04#
Conversion adapter plate	Not available	VV72-V-1
Main exhaust back pressure check plate	AXT503-37A	AXT512-25A
Adapter plate for locked-up cylinder	AXT502-26A#	AXT602-6A#
Individual SUP spacer with residual pressure release valve	VV71-PR-###	Not available

Residual pressure release valve spacer	VV71-R-AB	Not available
Release valve spacer	AXT502-17A#	AXT512-17A#
Residual pressure release valve spacer	AZ503-82#	AZ512-59#
Double check spacer	VV71-FPG	VV72-FPG
Double check spacer with residual pressure release valve	VV71-FPGR	Not available
Silencer box	VV71-###-##-SB	VV72-###-##-SB

Table 6

3.7.1 Installing interface options

Caution

- Before installing option, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- Remove valve, Item 1, as instructed.
- Assemble option, Item 2, ensuring all seals and gaskets, Items 4 and 5, are present and using bolts, Item 3, supplied with option.
- Torque tighten bolts (Item 3) in accordance with Table 4.
- Re-assemble DIN connector(s).

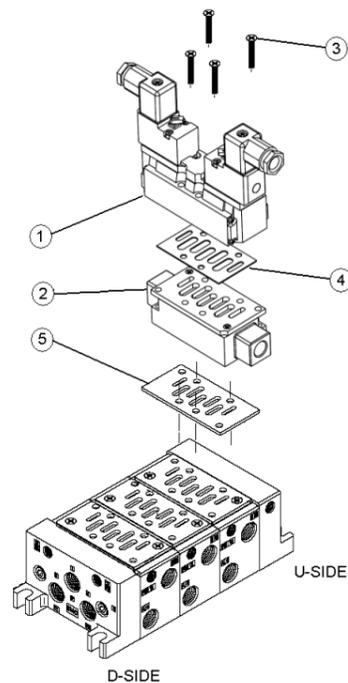


Figure 13

3.7.2 Installing Block Plate

Caution

- Before installing block plate, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- Disassemble manifold at required station, as instructed, ensuring gaskets and seals are retained.
- Assemble appropriate block plate in required passage.

3 Installation (continued)

- Re-assemble manifold as instructed.
- Torque tighten bolts in accordance with Table 4.

3.8 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 Manual Override

Warning

- Ensure conditions are safe, since connected equipment will operate when manual override is performed.

Non-locking push type (see Figure 14)

- Push on the manual override button using a small-bladed screwdriver or suitable tool until it stops ON.
- Hold this position for the duration of the check (ON position).
- Release the button and the override will re-set to OFF position.

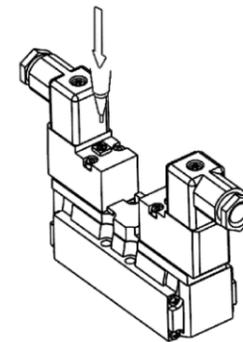


Figure 14

Push-locking slotted type (see Figure 15)

To lock :

- Using a small-bladed screwdriver in the slot, push the manual override button down until it stops.
- Turn the override button 90° in the direction of the arrow until it stops (ON position).
- Remove the screwdriver.

Warning

In this position the manual override is in the locked 'ON' position.

To unlock :

- Place a small-bladed screwdriver in the slot, push the manual override button.
- Turn the override button 90° in the reverse direction of the arrow.
- Remove the screwdriver and the manual override will re-set to the OFF position.

4 Settings (continued)

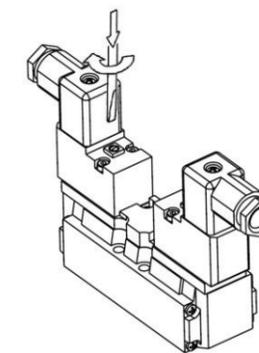


Figure 15

Locking lever (slotted) type (see Figure 16)

To lock

- Push the manual override lever down until it stops.
- Manually turn the lever 90° in the direction of the arrow until it stops (ON position).
- A small-bladed screwdriver may be used in the slot, if needed.

Warning

In this position the manual override is in the locked 'ON' position.

To unlock

- Push the manual override lever down.
- Manually turn the override lever 90° in the reverse direction of the arrow
- The manual override will re-set to the OFF position.

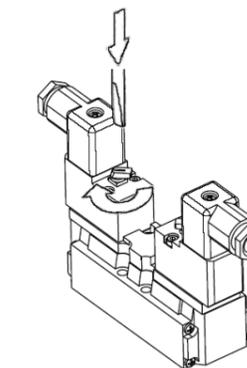


Figure 16

4.2 Pilot switch – Function Plate (see Figure 17)

- When the valve is mounted on sub-plate or manifold, it is possible to switch from internal pilot to external pilot.
- Remove M3 screws, Item 1, securing pilot valve mounting plate, Item 2, to valve and carefully remove mounting plate, ensuring gaskets, Item 3, and function plate, Item 4, are not misplaced.
- Turn over function plate (Item 4) to change from internal pilot ('I') to external pilot ('R').
- Replace pilot valve mounting plate (Item 2) ensuring gaskets (Item 3) and function plate (Item 4) are correctly positioned.
- Tighten screws (Item 1) to torque of 3 to 5 Nm.

4 Settings (continued)

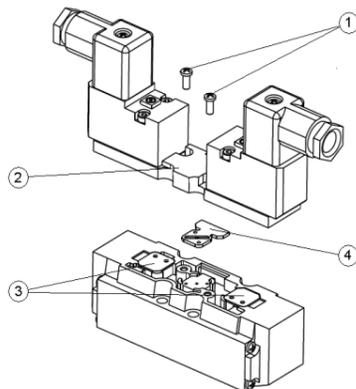


Figure 17

5 How to Order

Refer to the catalogue for this product.

6 Outline Dimensions (mm)

Refer to the catalogue for this product.

7 Maintenance

7.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance

- of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

7.2 Replacing Spare Parts

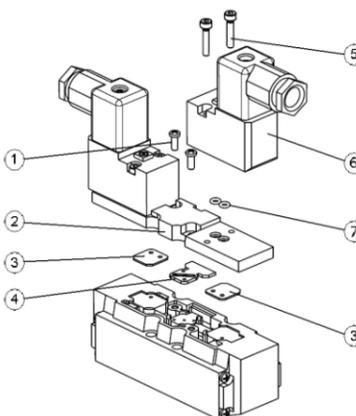


Figure 18

Item No.	Item	Part Number
3	Gasket	EAXT518-14
4	Function plate	EAXT518-13A
5,6,7	Pilot valve assembly	56-EAXT518A-##-X3

Table 7

7 Maintenance (continued)

7.2.1 Replacing Function Plate (see Figure 18)

- Remove M3 screws, Item 1, securing pilot valve mounting plate, Item 2, to valve and carefully remove mounting plate, ensuring gaskets, Item 3, are not misplaced.
- Replace function plate, Item 4. Ensure it is mounted the right way up depending if internal ('I') or external ('R') pilot is required.
- Replace pilot valve mounting plate (Item 2) ensuring gaskets (Item 3) and function plate (Item 4) are correctly positioned.
- Tighten screws (Item 1) to torque of 3 to 5 Nm.

7.2.2 Replacing Seals (see Figure 18)

- Remove M3 screws, Item 1, securing pilot valve mounting plate, Item 2, to valve and carefully remove mounting plate, ensuring function plate, Item 4, is not misplaced.
- Replace gaskets, Item 3.
- Replace pilot valve mounting plate (Item 2) ensuring gaskets (Item 3) and function plate (Item 4) are correctly positioned.
- Tighten screws (Item 1) to torque of 3 to 5 Nm.

7.2.3 Replacing Pilot Valve (see Figure 18)

- Remove pilot valve mounting screws (Item 5).
- Remove pilot valve assembly (Item 6).
- Replace O-rings (Item 7) from the pilot valve mounting plate (Item 2).
- Fitting of new pilot valve assembly (with DIN plug and the special gasket provided) is the reverse of removal (use correct tightening torque). Ensure O-rings are correctly fitted.
- Tighten screws (Item 5) to torque of 3 to 5 Nm.

8 Limitations of Use

Danger

- Do not exceed any of the specifications laid out in section 2 of this

document or the specific product catalogue.

Filters and strainers:

- Be careful regarding clogging of filters and strainers.
- Replace filter elements after one year of use, or earlier, if the pressure drop reaches 0.1MPa.
- Clean strainers when the pressure drop reaches 0.1MPa.

Drain flushing:

- Remove drainage from air filters regularly. (Refer to the specifications).

Lubrication – Pilot air line:

- Once lubrication has begun, lubrication must be continued.

Multiple Pressure SUP Type:

- When 2 or more different pressures are required, install a gallery blank disc (AXT502-14/AXT512-14-1A) between the stations to operate at different pressures.
- A dual pressure supply can be supplied from both left and right sides of the manifold.
- If 3 or more pressures are supplied, the individual SUP spacer should be used.

Main EXH Back Pressure Block Type:

- If there are many valve stations operating at the same time, main EXH back pressure may cause problems, mount back pressure block plate (AXT503-37A/AXT512-25A) to prevent effects of main EXH back pressure.

9 Contacts

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BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
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ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
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