



Installation and Maintenance Manual

Vacuum Ejector / Pump system

ZQ Series



1 Safety Instructions

1.1 General Recommendation

- 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 "DANGER", "WARNING" or "CAUTION", followed by important safety information which must be carefully followed.
- To ensure safety ISO4414: Pneumatic fluid power and JIS B 8370: Pneumatic system axiom must be observed, along with other relevant safety practices.

⚠ DANGER	In extreme conditions, there is a possible result of serious injury or loss of life.
⚠ WARNING	Operator error could result in serious injury or loss of life.
⚠ CAUTION	Operator error could result in injury or equipment damage.

⚠ 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 are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your 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 operators.

- 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. (Bleed air into the system gradually to create backpressure, i.e. incorporate a soft-start valve).

- Do not use the product outside of the specifications. Contact SMC if the product is to be used in any of the following conditions:**

- Conditions and environments beyond the given specifications, or if product is used outdoors.
- Installations on equipment 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.

1 Safety Instructions (cont.)

⚠ CAUTION

Ensure that the air supply system is filtered to 5 micron.

Design & Selection

⚠ WARNING

- Check the specifications.

The vacuum ejectors specified in this operation manual are designed for use in industrial compressed air systems (including vacuum). If the products are used in conditions where pressure, temperature, etc. are outside of SMC's specified limits, damage and/or malfunction may be caused. Please consult with SMC when using the product in applications other than compressed air (including vacuum).

- Ensure system is designed to fail safe in the event of vacuum pressure loss, power failure or faulty air supply.
- Consider suction flow rate for selection of the vacuum ejector.
- Ensure the type of valve used for vacuum switching or vacuum breaking is suitable for vacuum applications. If the valve used is unsuitable for vacuum applications and it is placed within the vacuum system then vacuum leakage of the system will occur.
- Ideally only one vacuum pad should be used per vacuum ejector. If multiple pads are used with one vacuum ejector and one of the pads does not adsorb the work piece correctly it may subsequently cause the other vacuum pads to fail.
- Secure the effective sectional area for the piping.

The piping for the vacuum needs to have an effective sectional area to ensure that the vacuum ejector is able to pass its maximum suction flow rate. Also make sure that the piping does not have unnecessary restrictions or leakages. The piping for the airside of the ejector needs to be selected relevant to the amount of air consumed by the ejector. The effective sectional area of tubing, fittings, valves, etc. should be suitably sized to ensure that the pressure loss is kept to a minimum. Furthermore the maximum air consumption of any other pneumatic circuits should be considered while selecting a suitable air source.

- Sucking time and vacuum releasing time may be slower than the initial condition when there is an accumulation of dust inside of the unit. Therefore, set the sucking and vacuum releasing time by taking into consideration this delay.

Mounting

⚠ WARNING

- Be sure to read and understand the operation manual before mounting the vacuum ejector. Remember to keep the manual readily accessible so it can be referred to whenever necessary.
- Leave room for maintenance.
Ensure that there is enough space around the vacuum ejector in order to perform maintenance.
- Tighten the screw with specified method and torque.
Secure the vacuum ejector by tightening the screws to the recommended torque. For the manifold type, place the attached square washer between the screw and ejector and then tighten the screw to the recommended torque. Recommended tightening torque: 0.6±0.06Nm.
- Do not block the exhaust opening of the ejector.
If the exhaust opening is obstructed when mounting the ejector, then it will be unable to generate a suitable vacuum.
- Ensure that the vacuum ejector cannot be used when the connected equipment doesn't operate properly.
- Do not drop or hit the vacuum ejector.

Piping

⚠ CAUTION

- Preparation before piping.
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove cutting chips, cutting oil and other debris from inside the pipe.
- Wrapping of sealing tape.
When piping or a fitting is connected, make sure that cutting chips from the pipe threads and sealing material do not get inside the piping.

1 Safety Instructions (cont.)

Also, when sealing tape is used, leave 1.5 to 2 thread ridges exposed at the end of the thread.

- Do not make the piping spiral.
- Ensure the piping isn't flawed or collapsed due to excessive bending.

Air supply

⚠ CAUTION

- Please consult with SMC when using the product in applications other than compressed air (including vacuum). Regarding the vacuum ejector for general fluid, please ask SMC about applicable fluids.
- Air that includes excessive condensation may cause malfunction of the pneumatic equipment. Installation of an air dryer, drain, etc. is recommended before the air filter.
- Control of draining.
If the air filter is not drained on a regular basis, the drain will leak into the secondary side of the filter, which may cause the equipment to malfunction. If it is difficult to ensure draining, the use of filter with auto drain is recommended. For further information of compressed air quality, refer to SMC's "Air Cleaning Equipment" catalogue.
- Do not use compressed air that contains chemical, synthetic oil including organic solvent, salt, corrosive gas etc., as it may lead to breakage or malfunction of the equipment.

Environment

- Do not use in explosive environment.
- Do not use in environments where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- When this unit is operating, ambient air is drawn in around the part where the suction is being performed. If the ambient air includes any solid objects, liquids, or gases, other than the air itself, performance may deteriorate or breakage may occur due to clogging. Therefore, operate the unit in a clean environment. If the unit must be operated in an environment where there is foreign matter, a filter suitable for the application should be selected and installed. The effectiveness of the filter should be verified by

the customer.

- Do not use in a place subject to heavy vibrations and/or shocks.
- Do not expose the product to direct sunlight for an extended period of time.
- Do not mount the product in locations where it is exposed to radiant heat.
- Do not use in locations where voltage surges occur.

Maintenance

⚠ WARNING

Follow the proper procedures described in the operation manual for maintenance to avoid mishandling and subsequent damage and malfunction of the machinery/equipment.

- Maintenance work
If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic systems should be performed by qualified personnel only.
- Draining
Drain the air filter etc. on regular basis.
- Perform cleaning of the suction filter and silencer periodically
If the filter or silencer is clogged, the vacuum ejector becomes unable to perform correctly. In environments where there are large quantities of dust, a filter with a large capacity needs to be installed.
- Check before maintenance
Before attempting any kind of maintenance make sure the power supply and air supply is shut off and all residual pressure is released from the system to be worked on.
- Check after maintenance
After any maintenance has been completed apply operating pressure and power to the equipment and check for correct operation and possible air leaks. If there is a leakage confirm the connection and repair before starting the actual operation.
- Pay special attention to use in interlock circuit
If the vacuum ejector is used in an interlock circuit, incorporate several separate interlock circuits to avoid interlock failure due to breakage of a circuit. Also these circuits should be periodically checked to ensure correct operation.

Do not disassemble and retrofit the vacuum ejector.

1 Safety Instructions (cont.)

Handling

⚠ WARNING

- Operating supply pressure
Operate the vacuum equipment within the specified operating pressure. Operating this equipment outside of this pressure range is very dangerous and may cause operating failure or damage to the vacuum equipment.
- Check valve
SMC does not guarantee operation of an ejector if the ejector absorbs and holds a work piece using a check valve. In order to prevent a work piece from being dropped due to a power failure countermeasures such as drop prevention guides should be used. Please consult SMC if you intend to use a check valve to prevent an attached ejector from exhausting.
- Exhaust port (EXH port) of vacuum ejector
Do not block an exhaust port in order to reduce the separation time of a work piece as this may damage the product.
- Open the fully closed adjusting needle by a quarter turn to allow the work piece to positively separate during the on-time of the release valve. Do not supply compressed air to this product when adjusting this needle. After adjustment, fix the needle securely with the lock nut.

Precautions for vacuum switch

Handling

⚠ WARNING

- Do not drop, hit and give excessive impact (980m/s) to the vacuum switch during handling. Breakage of the internal components, not the body of the switch may occur and cause malfunction.
- Tensile strength of the cable is 49N (5kgf). If the cable is pulled by a force over that value, the switch may explode. Be sure not to give excessive tensile force to the cable.

Environment

⚠ WARNING

- With the vacuum switch opened avoid an environment with the possibility of water and oil splashes.
- The vacuum switch is not explosion proof and may come to explode if used in an environment containing explosive gas. Be sure to avoid use in such an environment.

Wiring

⚠ WARNING

- Confirm the colour and terminal no. in the operation manual to connect each wire correctly and to avoid breakage, failure and malfunction of the vacuum switch due to incorrect wiring.
- Connection that gives repeated bending stress and tensile force to the lead wire may cause breakage of the wire.
- Avoid insulation failure (including mixture with other circuit, ground short, insulation failure between terminals etc.) with wiring to prevent over current to the switch and subsequent breakage.
- Separate the line for drive from the line for power. If these lines touch, the control circuit including the switch may explode.

Design & Selection

⚠ WARNING

- Ensure the power supply is correct. Incorrect voltage may cause fire and electrical shock.
- Avoid application of current and voltage over rated value to input and output terminal. If it is applied, the switch may break or end after short period.
- Do not use a supply that generates a voltage surge. If the relay or solenoid valve representative of the supply is driven directly by the vacuum switch, the type with surge suppressor built in should be used.

1 Safety Instructions (cont.)

- If the machinery/equipment that generates large surge voltage (including solenoid operated lifter, high freq. induction furnace, motor etc.) is located near the vacuum switch, make prevention for the surge at the machinery/equipment.
- Be sure to keep each range of set pressure and operating pressure. The use of pressure out of range may cause failure. Also, the pressure over max. allowable value may break the switch.
- Do not use the vacuum switch with corrosive and flammable fluid.

Maintenance

⚠ WARNING

- Perform periodical checks on the vacuum switch and ensure it operates properly. Movement or mishandling of the switch loses safety.
- Pay special attention to use in interlock circuit.
If the vacuum ejector is used in an interlock circuit, incorporate several separate interlock circuits to avoid interlock failure due to breakage of a circuit. Also these circuits should be periodically checked to ensure correct operation.

2 Intended Conditions of Use

2.1 Specifications

Specification of ejector

Unit part no.	ZQ105	ZQ107	ZQ110
Nozzle dia. mm phi	0.5	0.7	1.0
Max. suction flow rate L/min (ANR)	5	10	22
Air consumption L/min(ANR)	14	23	46
Max. vacuum pressure	-80kPa		
Supply pressure range	0.3 to 0.5MPa (Normally closed type: 0.3~0.45MPa)		
Standard supply pressure	0.35MPa	0.43MPa	
Operating temp. range	5 to 50 deg. C		
Fluid	Air		
Enclosure	IP30		

Specifications of vacuum pump system

Vacuum/release valve operation		Pilot type
Supply pressure range	Vacuum pressure supply port(PV)	0 to 101.3kPa
	Vacuum and Release valve Supply pressure port(PS)	0.3 to 0.5MPa
	Release pressure supply port(PD)	0.3 to 0.5MPa PD <= PS
Operating temp. range	5 to 50 deg. C	
Fluid	Air	
Enclosure	IP30	

Specifications of solenoid valve

Item	Specifications	1 wattage specifications	0.5 wattage specifications
Coil rated voltage		24VDC, 12VDC	
Allowable voltage		10% of rated voltage	
Type of coil insulation		Class B	
Power consumption		1WDC	0.5WDC

Specifications of vacuum switch

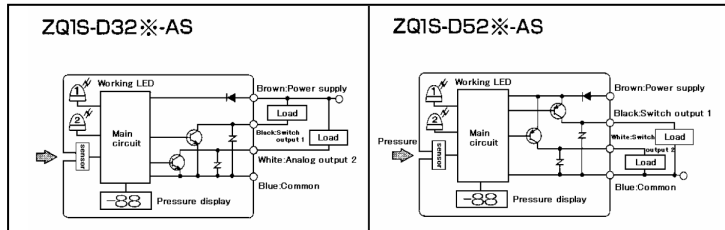
Common specification

Rated pressure range	0 to ~100kPa
Set pressure range	0 to ~99kPa
Proof pressure	0.2MPa
Applicable fluid	Air, non-corrosive and non-flammable gas
Power supply voltage	DC12 to 24V±10%
Current consumption	35mA or less [at power supply voltage DC24V and switch output ON (no load)]
Ambient temp. range	5 to 50 deg. C (no freezing and dew condensation)
Ambient humidity range	35 to 85% RH for operation and storage (no dew condensation)
Withstand voltage	500V, AC for one min.
Insulation resistance	50Mohm or more (applied between external terminal and case and measured by DC500V mega meter)

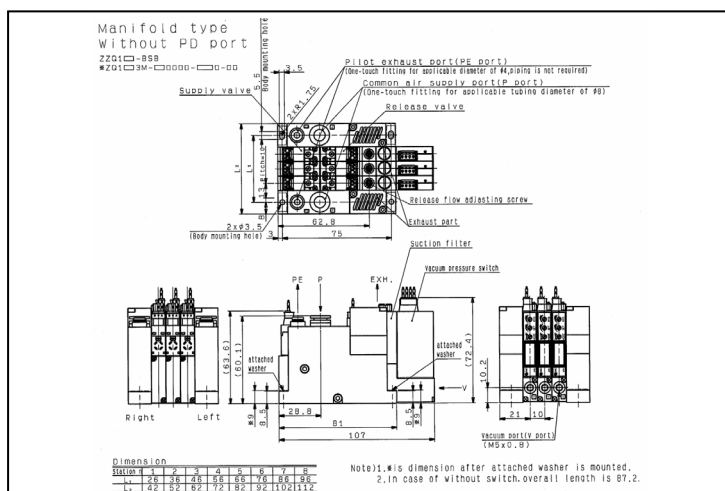
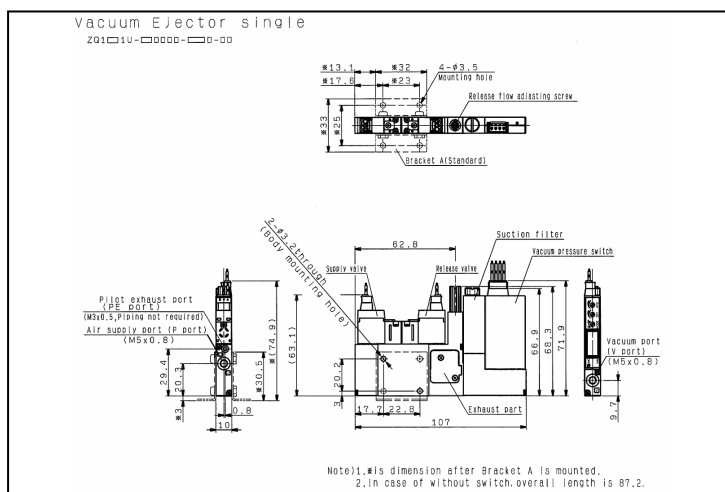
2 Intended Conditions of Use (cont.)

Output/indication spec

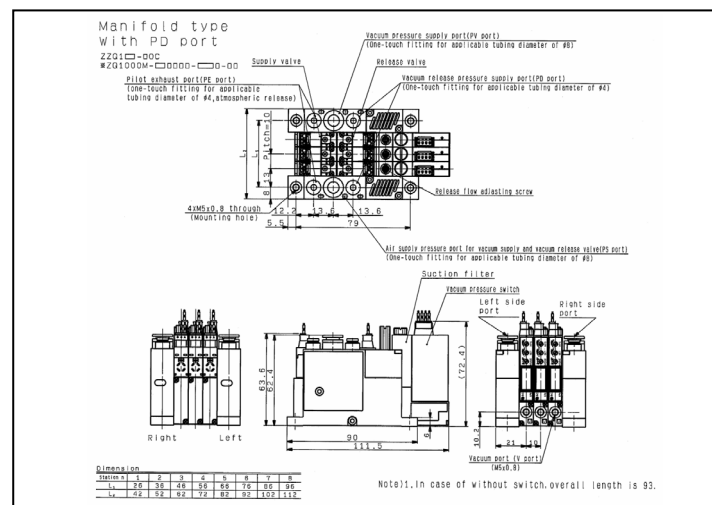
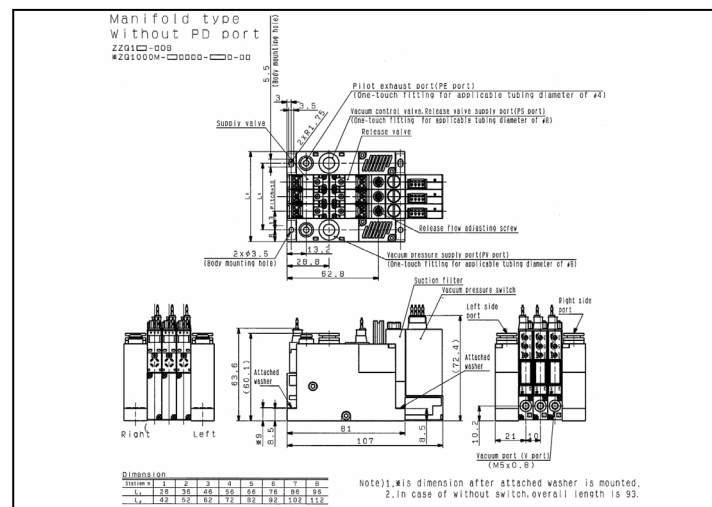
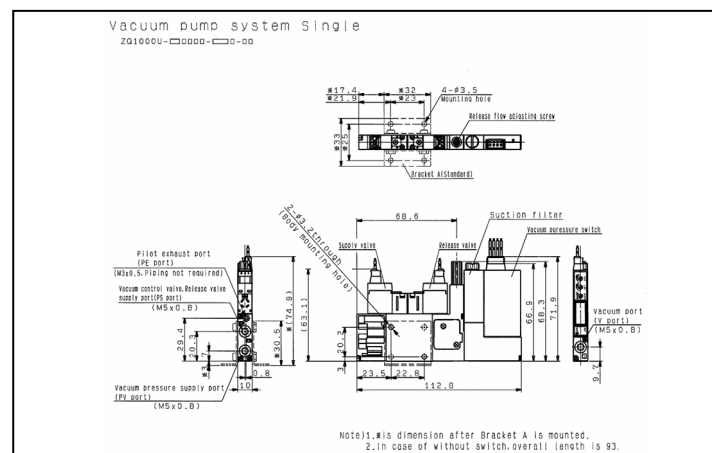
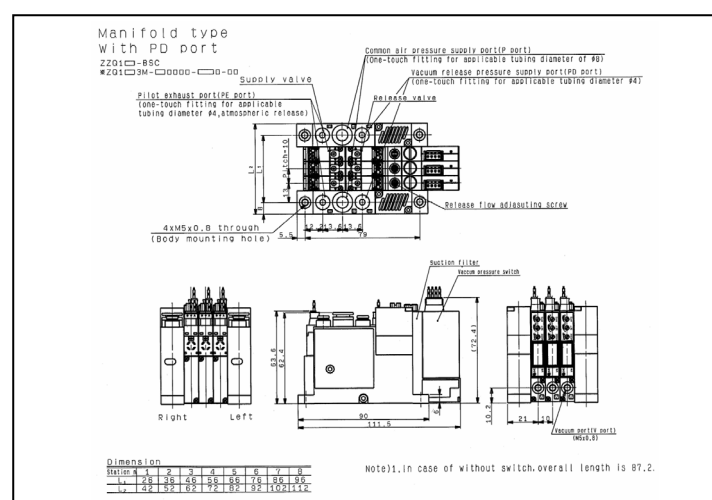
Model	ZQ1S-D32*-AS	ZQ1S-D52*-AS
Switch output	2 NPN	2 PNP
Max. load current	80mA per output	
Max. Applied voltage	30V (at NPN)	
Residual voltage	NPN: 0.8V or less (at charge current 80mA) PNP: 1.2V or less (at discharge current 80mA)	
Response time	2ms or less	
Hysteresis	2%F.S. or less (fixed)	
Indication	2 digits red LED	
Indication accuracy	±3%F.S.±2 digits	
LED	Output 1 ON: Red LED lights up Output 2 ON: Green LED lights up..	



2.2 Piping

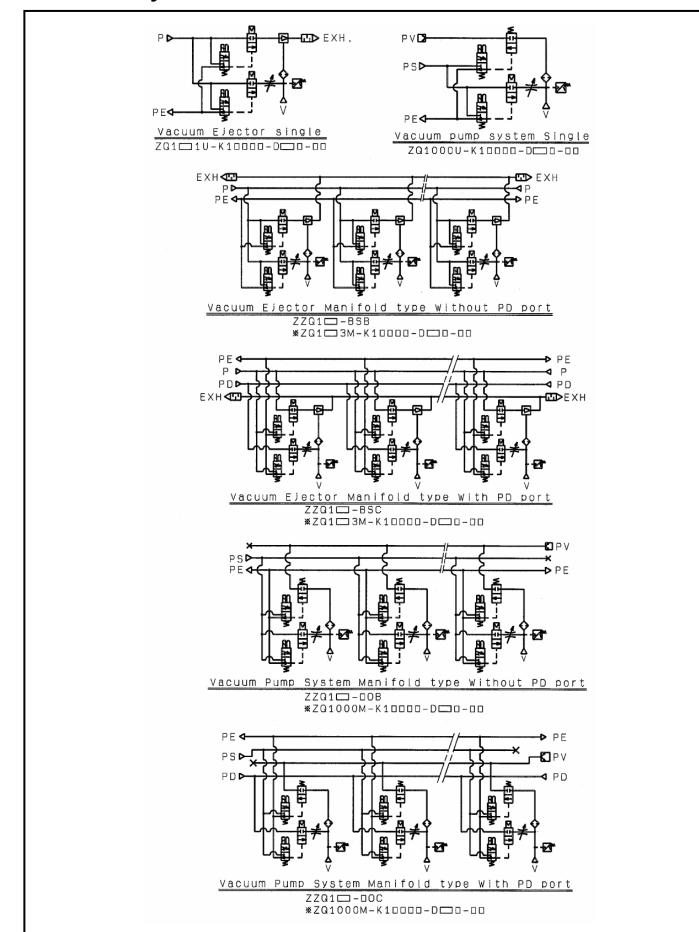


2 Intended Conditions of Use (cont.)



2 Intended Conditions of Use (cont.)

2.3 Circuit Symbols



3 Installation

⚠ WARNING

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

3.1 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.
- 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 strong vibrations and/or shock. Check the product specifications for above ratings.
- Do not mount the product in a location where it is exposed to radiant heat.

3.2 Piping

⚠ CAUTION

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fitting into a port, ensure that sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of pipe/fitting.

Thread	Appropriate tightening torque (Nm)
M3	By hand + 1/4 turn with the wrench
M5	By hand + 1/6 turn with the wrench (1/4 turn for miniature fittings)

3 Installation (cont.)

3.3 Electrical connection

CAUTION

- When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.
- For polarity indications:
 - No diode to protect polarity: if polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.
 - With diode to protect polarity: if polarity connection is wrong, the valve does not switch.

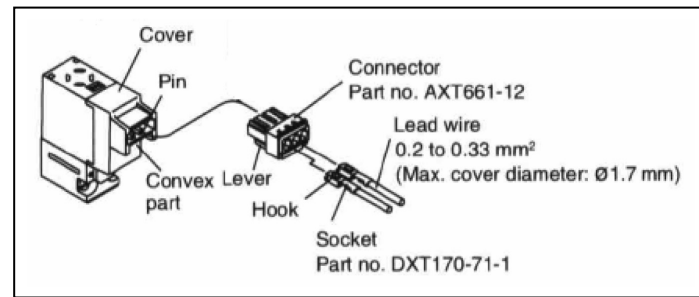
Solenoid connection and disconnection of plug connector

To connect: Push the connector, in a straight line, onto the pins of the solenoid, ensuring that the lip of the lever is securely positioned in the groove of the solenoid cover.

To disconnect: Press the lever against the connector and pull the connector away from the solenoid.

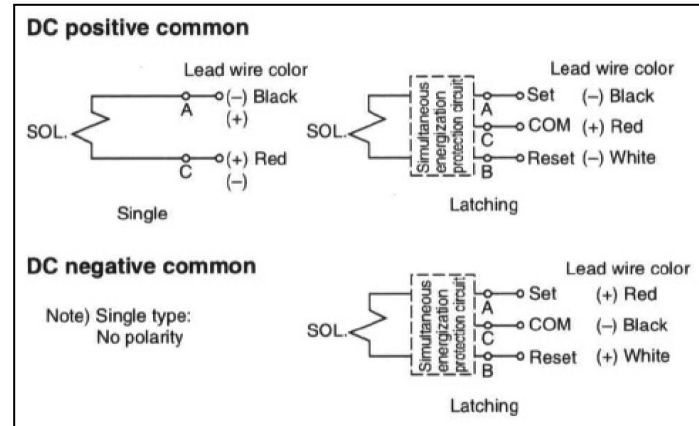
CAUTION

Do not exert excessive force on the wires, as this may cause contact failure.



Solenoid wiring specifications

The lead wires are connected to the valve as shown below. Connect each to the power supply side.



Solenoid manual override

WARNING

Exercise extreme CAUTION when operating solenoid manual overrides, as connected equipment will commence operation.

Push non-locking type

Push down on manual override button (1) until it stops (ON). Hold this position whilst carrying out function checks. Release the manual override button and the re-set to the OFF position.

Locking type manual override

Turn the manual override clockwise through 180° using a small slotted screwdriver until the mark ► lines up with the No.1. Push down on the button until the override locks (ON).

3 Installation (cont.)

WARNING

In this position the manual override is mechanically locked ON.

Un-locking

Turn the manual override anti-clockwise through 180° using a small slotted screwdriver until the mark ► lines up with the No.0. Remove the screwdriver and the manual override will re-set to the (OFF) position.

Latching type, Locking

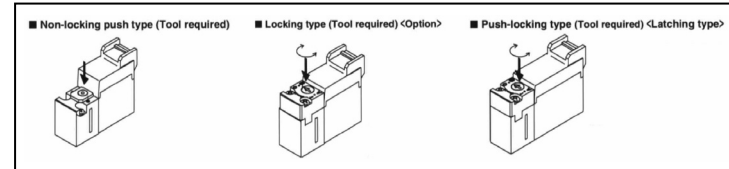
Turn the manual override clockwise through 180° using a small slotted screwdriver until the mark ► lines up with the letter A. Push the override button down until it locks in position (ON).

WARNING

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

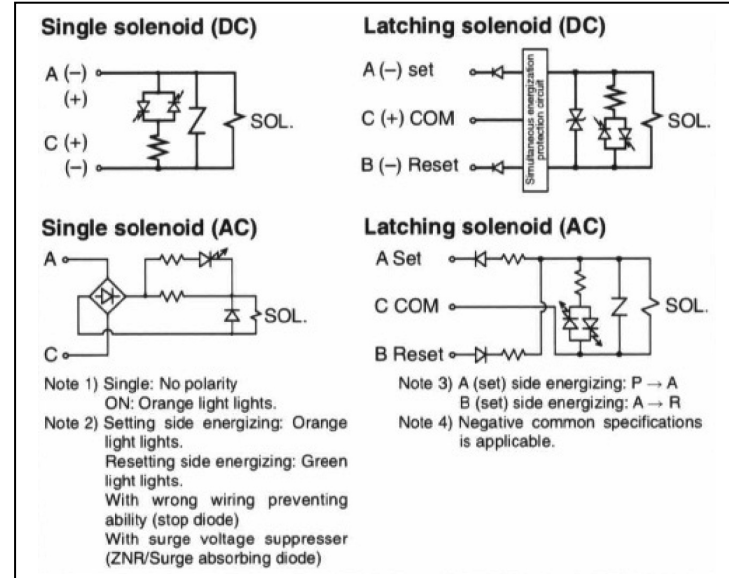
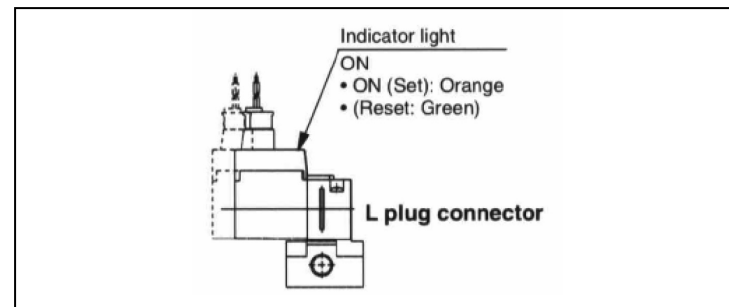
Un-locking

Turn the manual override anti-clockwise through 180° using a small slotted screwdriver until the mark ► lines up with the letter B. Remove the screwdriver and the Manual override will re-set to the OFF position.



Solenoid indicator light and surge suppressor

In the latching type, A (set) side and B (re-set) side energisation is indicated by two colours, which match the colours of the manual override buttons. See below.



3 Installation (cont.)

Solenoid wiring specifications

WARNING

Latching solenoid

The latching solenoid is equipped with a self-holding mechanism which permits a moveable iron core (4) in the solenoid to hold the "set" position.

CAUTION

- Do not employ simultaneous ON and OFF signals, as a 10ms-energisation time is required for self-latching.
- Avoid using these valves in applications involving excessive vibration (10G or more).
- Do not use in high magnetic fields.
- At despatch the valve is set in the "un-latched" mode. However it is possible that it could move to the "latch" position during transit. Before operating this valve ensure that it is set to the "un-latch" position. See chart below.

Latching	Passage	Indicator light
A-C ON (Set)	1(P) ► 2(A)	Orange
B-C ON (Reset)	2(A) ► 3(R)	Green

Single	Passage	Indicator light
A-C ON (Set)	1(P) ► 2(A)	Orange
OFF	2(A) ► 3(R)	-

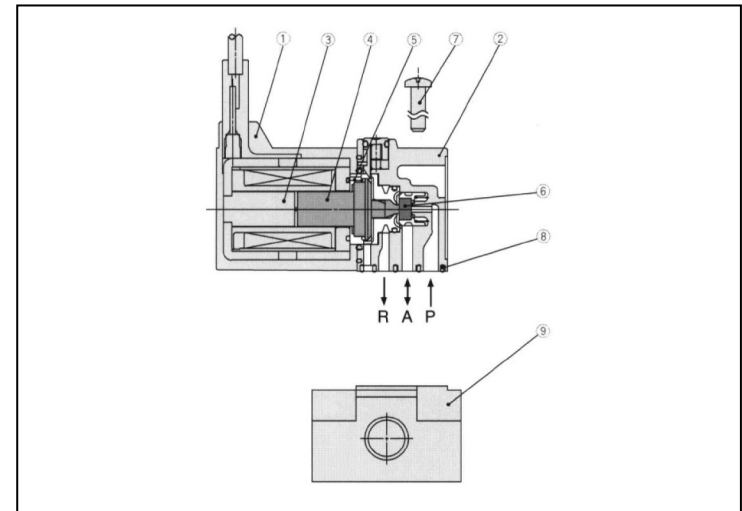
Solenoid maintenance

Before carrying out any form of maintenance ensure all air and power supplies are isolated.

Removing a valve from the main body.

Disconnect the electrical connector. (see Solenoid connection of plug connector)

- Remove the valve holding screws (7).
- Retain the gasket.



Refitting a valve to a main body.

- Refit the gasket to the sub-base ensuring correct orientation.
- Replace the valve.
- Refit the valve holding screws.
- Tighten screws to the following torque: 1.2kgf/cm.

3 Installation (cont.)

3.4 Lubrication

CAUTION

- SMC products have been lubricated for life at manufacturer, 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 as the original applied during manufacturing will be washed away.

4 Settings and Programming

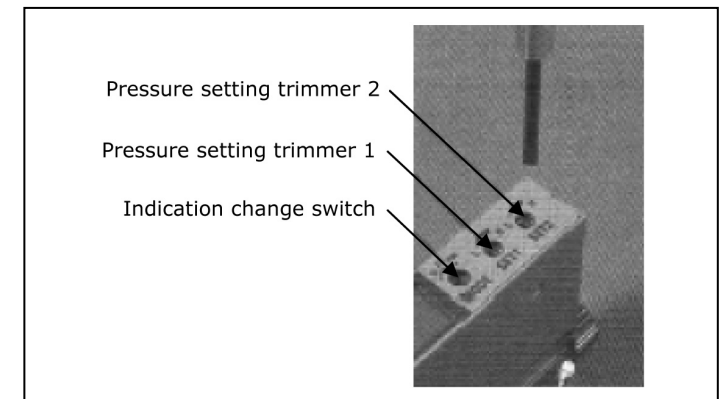
CAUTION

Typical internal circuit and wiring

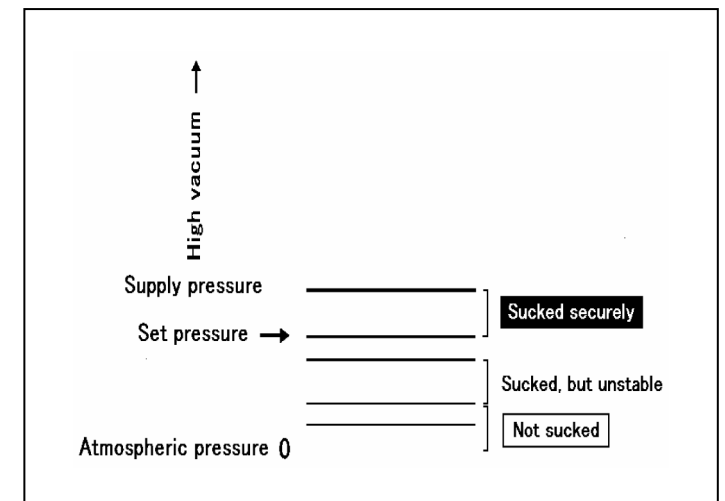
- Set ON pressure with specific trimmer. Rotate trimmer clockwise to achieve high vacuum.
- The trimmer should be rotated slightly using a flat screwdriver to set pressure. (Tightening torque: 0.025N·m or less.)

ZQ1S-D32/D52-AS

- Change indication switch (MODE) to "S1".
- Rotate pressure setting trimmer 1 (SET1) to set pressure that starts the switch 1. (The pressure set here is indicated on display.)
- Change indication switch (MODE) to "S2".
- Rotate pressure setting trimmer 2 (SET2) to set pressure that starts the switch 2. (The pressure set here is indicated on display.)
- Return indication switch (MODE) to "RUN". (The pressure at vacuum piping port is indicated on display.)



If the switch is used to check suction, the pressure should be set to min. vacuum value necessary for suction. If the pressure is set below, the switch is turned on even when the suction is not correct. If the pressure is set too high, the switch may not be turned on.



5 Maintenance

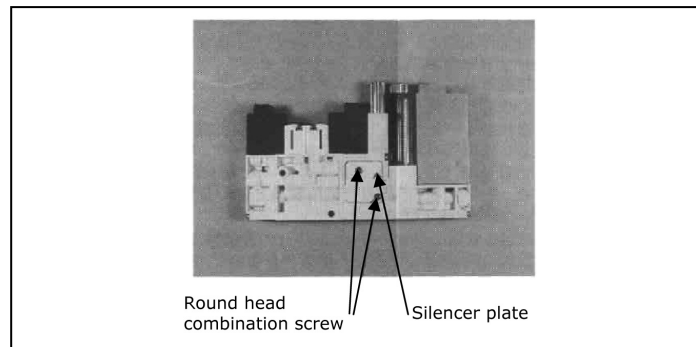
WARNING

- Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.
- 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 pressure is shut off and all residual 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 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.

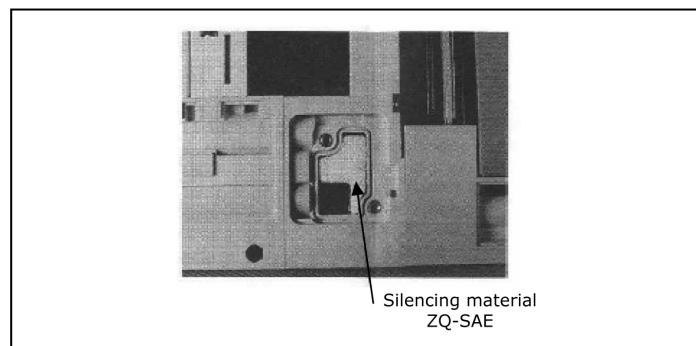
How to replace silencing element

Single type

- 1) Loosen round head combination screws (2pcs) and remove silencer plate.



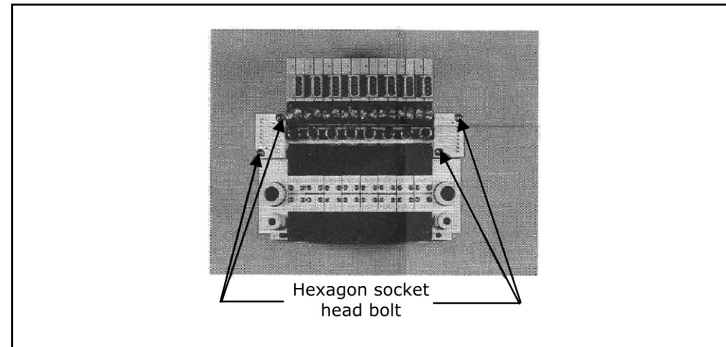
- 2) Replace silencing material (ZQ-SAE) with attention to direction of the material.
- 3) Fix silencer plate by tightening round head combination screws. (Torque: 0.12±0.01N·m)



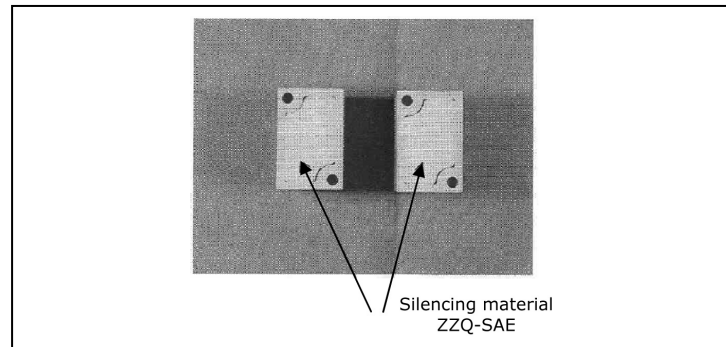
5 Maintenance

Manifold type

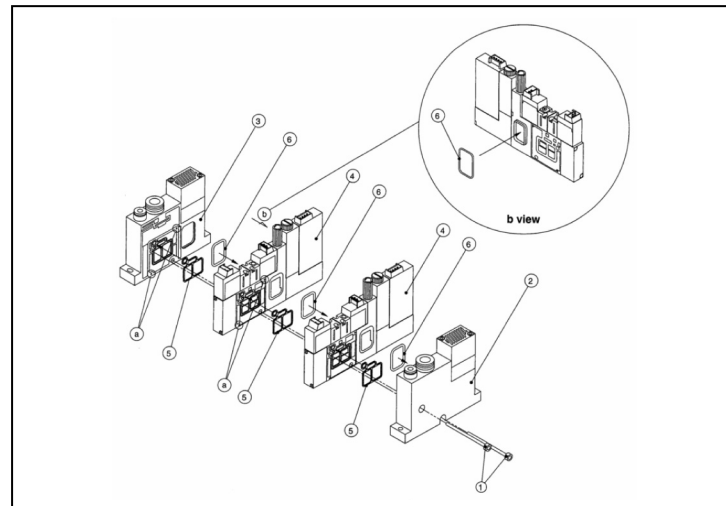
- 1) Loosen hexagon socket head bolts (4pcs) and remove silencer block (2pcs).



- 2) Replace silencing material inside silencer block (ZZQ-SAE).
- 3) Fix silencer block by tightening hexagon socket head bolts. (Torque: 0.28±0.03Nm)



Changing number of ejectors on manifold type station.



No.	Description	Part No.
1	Hexagon socket head bolt	ZQ-STB-**
2	End block L	Refer to the following table
3	End block R	Refer to the following table
4	Unit assembly	ZQ1**3M-****-****-** ZQ1000M-****-****-**
5	Ejector body gasket for manifold	ZQ-3-005-10AS
6	Gasket for exhaust block (Not use it for vacuum pump system)	ZQ-3-009-10AS

Table 1. End block description for Vacuum ejector

Description	Without PD port	With PD port
End block R	ZQ1R-1-BSB-AS	ZQ1R-2-BSB-AS
End block L	ZQ1L-1-BSB-AS	ZQ1L-2-BSB-AS

5 Maintenance (cont.)

Table 2. End block R description for Vacuum pump unit

PS port position (Note)	PD port specification	With PD port	Without PD port
Right		ZQ1R-0-VOC	ZQ1R-0-VOB
Left		ZQ1R-0-SOC	ZQ1R-0-SOB

Table 3. End block L description for Vacuum pump unit

PS port position (Note)	PD port specification	With PD port	Without PD port
Right		ZQ1L-0-VOC	ZQ1L-0-VOB
Left		ZQ1L-0-SOC	ZQ1L-0-SOB

(Note) Viewed from the front side of V port.

Disassembly

- 1) Loosen and remove hexagon socket head bolt (1)

Assembly

- 1) Mount ejector body gasket for manifold (5) into mating groove on each ejector Ass'y (4) and mount exhaust block gasket (6) along with external face of convex.
- 2) Mount gasket for exhaust block (6) along with external face of convex of end block R (2).
- 3) Mount ejector body gasket for manifold (5) into mating groove on end block L (3).
- 4) Meet each ejector Ass'y (4), end block R (2) and ejector block L (3) with dwell pins (2pcs at part A) and tighten by hexagon socket head bolts (2pcs) (1). (Tightening torque: 0.6±0.06Nm)

How to order of Hexagon socket head bolt

ZQ-STB**
-01: 1 station
-02: 2 stations
-*
-*
-*
-08: 8 stations

(Note) This is a product number of one set that consists of 2pcs.

6 Limitations of Use

WARNING

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

7 Contacts

AUSTRIA	(43) 2262-62 280	ITALY	(39) 02-92711
BELGIUM	(32) 3-355 1464	NETHERLANDS	(31) 20-531 8888
CZECH REP.	(420) 5-414 24611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 70 25 29 00	POLAND	(48) 22-548 50 85
FINLAND	(358) 207-513 513	PORTUGAL	(351) 2 610 89 22
FRANCE	(33) 1-64 76 1000	SPAIN	(34) 945-18 4100
GERMANY	(49) 6103 4020	SWEDEN	(46) 8-603 0700
GREECE	30) 1- 342 6076	SWITZERLAND	(41) 52-396 3131
HUNGARY	(36) 1-371 1343	TURKEY	(90) 212 221 1512
IRELAND	(353) 1-403 9000	UNITED KINGDOM	(44) 1908-56 3888

SMC Corporation www.smcworld.com (Global) www.smceu.com (Europe)

Specifications are subject to change without prior notice from the manufacturer. The descriptions of products in this document may be used by other companies.

© SMC Corporation All Rights Reserved.