Doc. No.VG300**-OMH0002-B

Operation Manual

3 Port Solenoid Valve

PRODUCT NAME

VG342 Series

MODEL/ Series

SMC Corporation

Contents

Safety Instructions ---------- 2,3

Precautions on Design ---------- 4,5

Selection ---------- 4,5

Mounting ---------- 5

Piping ---------- 5,6

Wiring ---------- 6

Lubrication ---------- 6

Air Supply ---------- 6

Operating Environment ---------- 7

Maintenance ---------- 7

Specific Product Precautions ---------- 8, 9

Trouble shooting ---------- 10

Remedy ---------- 11

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage.
These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1) , and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
ISO 4413: Hydraulic fluid power -- General rules relating to systems
IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
etc.

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

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1.The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2.When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4.Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

⚠ Caution

1.The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.∗2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

∗2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. **The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.**
2. **The exports of SMC products or technology from one country to another are govemed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules goveming that export are known and followed.**

3 Port Solenoid Valve / Precautions 1

Be sure to read before handling.

Design ／ Selection

⚠ Warning

1. Confirm the specifications

Products represented in this manual are designed only for use in compressed air systems (including vacuum).

Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

Please contact SMC when using a fluid other than compressed air (including vacuum).

We do not guarantee against any damage if the product is used outside of the specification range.

2. Actuator drive

When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures (cover installation or approach prohibition) to prevent potential danger caused by actuator operation.

3. Holding pressure (including vacuum)

Since the valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a pressure vessel.

4. Not suitable for use as an emergency shutoff valve, etc.

The valves listed in this manual are not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measures should be adopted.

5. Release of residual pressure

For maintenance purposes install a system for releasing residual pressure.

6. Operation in a vacuum condition

When a valve is used for switching a vacuum, take measures to install a suction filter or similar to prevent external dust or other foreign matter from entering inside the valve.

In addition, at the time of vacuum adsorption, be sure to vacuum at all times. Failure to do so may result in foreign matter sticking to the adsorption pad, or air leakage causing the workpiece to drop.

7. Regarding a vacuum switch valve and a vacuum release valve

If a non-vacuum valve is installed in the middle of piping system having a vacuum, the vacuum condition will not be maintained. Use a valve designed for use under vacuum condition.

8. Ventilation

Provide ventilation when using a valve in a confined area, such as in a closed control panel. For example, install a ventilation opening, etc. in order to prevent pressure from increasing inside of the confined area and to release the heat generated by the valve.

9. Extended periods of continuous energization

- If a valve will be continuously energized for an extended period of time, the temperature of the valve will increase due to the heat generated by the coil. This will likely adversely affect the performance of the solenoid valve and any nearby peripheral equipment. Therefore, when it is continuously energized or the energized period per day is longer than the de-energized period use continuous energization type.
- For applications such as mounting a valve on a control panel, incorporate measure to limit the heat radiation so that it is within the operating temperature range.

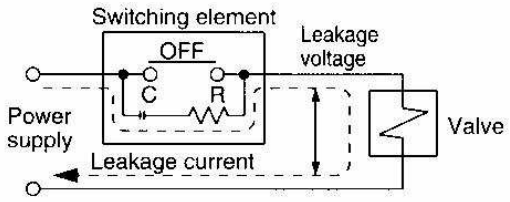
10. Do not disassemble the product or make any modifications, including additional machining.

It may cause human injury and/or an accident.

⚠ Caution

1. Leakage voltage

Take note that the leakage voltage will increase when a resistor is used in parallel with switching element or a C-R circuit (surge voltage suppressor) is used for protecting a switching device because of the passing leakage voltage through the C-R circuit. The suppressor residual leakage voltage should be as follows.



DC coil: 3% or less of rated voltage
AC coil:15% or less of rated voltage

3 Port Solenoid Valve / Precautions 2

Be sure to read before handling.

Design / Selection

⚠ Caution

2. Solenoid valve drive for AC with a solid state output (SSR, TRIAC output, etc.)

1) Current leakage

When using a snubber circuit (C-R element) for surge protection of the output, a very small amount of electrical current will continue to flow even during the OFF state.

This results in the valve not returning. In a situation where the tolerance is exceeded, as in the above case, take measures to install a bleeder resistor.

2) Minimum allowable load amount (Min. load current)

When the consumption current of a valve is less than the output's minimum allowable load volume or the margin is small, the output may not switch normally. Please contact SMC.

3. Surge voltage suppressor

If a surge protection circuits contains nonstandard diodes, such as Zener diodes or varistor, a residual voltage that is in proportion to the protective circuit and the rated voltage will remain. Therefore, take into consideration the surge voltage protection of the controller.

In the case of diodes, the residual voltage is approximately 1V.

4. Operation in a low temperature condition

It is possible to operate a valve in extreme temperature, as low as -10°C. Take appropriate measures to avoid freezing of drainage, moisture etc. in low temperature.

5. Operation for air blowing

When using a solenoid valve for air blowing, use an external pilot type.

Additionally, when compressed air within the pressure range of the established specifications is supplied to the external pilot type valve's port.

6. Mounting orientation

Mounting orientation is free.

Mounting

⚠ Warning

1. Operation manual

Install the products and operate them only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

2. Ensure sufficient space for maintenance activities

When installing the products, allow access for maintenance.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

4. If air leakage increases or equipment does not operate properly, stop operation.

Check mounting conditions when air and power supplies are connected. Initial function and leakage tests should be preformed after installation.

5. Painting and coating

Warnings or specifications printed or affixed to the product should not be erased, removed or covered up.

Please consult with SMC before applying paint to resinous parts, as this may have an adverse effect due to the solvent in the paint.

Piping

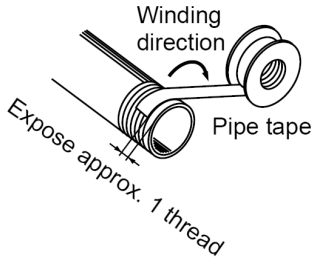
⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if pipe tape is used, leave 1 thread ridge exposed at the end of the threads.



3 Port Solenoid Valve / Precautions 3

Be sure to read before handling.

Piping

⚠ Caution

3. Connection of fittings

When screwing fittings into valves, tighten as follows.

Rc

Tighten with the proper torque shown below.

Tightening Torque for Piping

Connection thread	Proper tightening torque (N・m)
Rc1/8	7 to 9
Rc1/2	28 to 30
Rc3/4	28 to 30
Rc1	36 to 38

Follow the procedure of the manufacturer when fittings other than SMC is used.

Wiring

⚠ Caution

1. Polarity

When connecting power to a solenoid valve with a DC specification and equipped with a light or surge voltage suppressor, check for polarity.

If polarity connection is wrong, the valve does not operate.

2. Applied voltage

When electric power is connected to a solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

3. Check the connections.

Check if the connections are correct after completing all wiring.

Lubrication

⚠ Warning

1. Lubrication

1) The valve has been lubricated for life by the factory and does not require any further.
2) If a lubricant is used in the system, use class 1 turbine oil (no additive), ISO VG32.

   Once a lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

   If turbine oil is used, refer to the Material Safety Data Sheet (MSDS) of the oil.
3) Please contact SMC regarding class 2 turbine oil (with additives), ISO VG32.

Air Supply

⚠ Warning

1. Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

2. When there is a large amount of drainage.

Compressed air containing a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.

3. Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malufunction of pneumatic equipment.

If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.

For compressed air quality, refer to SMC's Best Pneumatics catalog,

4. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

⚠ Caution

1. When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.

2. Install an air filter.

Install an air filter upstream near the valve. Select an air filter with a filtration size of 5μm or smaller.

3. Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.

Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

4. If excessive carbon powder is seen, install a mist separator on the upstream side of the valve.

If excessive carbon powder is generated by the compressor, it may adhere to the inside of a valve and cause it to malfunction.

For compressed air quality, refer to SMC's Best Pneumatics catalog.



VG342 Series

3 Port Solenoid Valve / Precautions 4

Be sure to read before handling.

Operating Environment

⚠ Warning

1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.

2. Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion proof construction.

3. Do not use in a place subject to heavy vibration and/or shock.

4. The valve should not be exposed to prolonged sunlight. Use a protective cover.

5. Remove any sources of excessive heat.

6. If it is used in an environment where there is possible contact with oil, weld spatter, etc., exercise preventive measures.

7. When the solenoid valve is mounted in a control panel or its energized for a long time, make sure ambient temperatures is within the specification of the valve.

Maintenance

⚠ Warning

1. Perform maintenance inspection according to the procedures indicated in the operation manual.

If handled Improperly, malfunction and damage of machinery or equipment may occur.

2. Removal of equipment, and supply / exhaust of compressed air

When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

When the equipment is operated after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc. Then, confirm that the equipment is operating normally.

3. Low frequency operation

Valves should be operated at least once every 30 days to prevent malfunction. (Use caution regarding the air supply.)

4. Manual override

When the manual override is operated, equipment will be actuated.

Operate after safety is confirmed.

⚠ Caution

1. Drain flushing

Remove drainage from the air filters regularly.

2. Lubrication

Once lubrication has been started, it must be continued.

Use class 1 turbine oil (with no additive), ISO VG32 because if other lubricant oil is used, it may cause malfunction. Please contact SMC for suggested class 2 turbine oil (with additive), ISO VG32.

VG342 Series

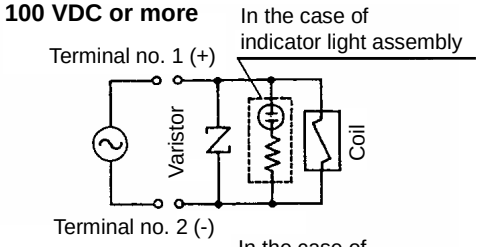
3 Port Solenoid Valve / Specific Product 1

Be sure to read before handling.

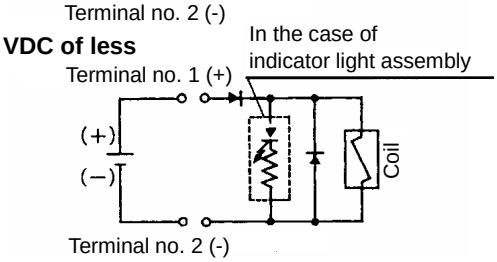
Light/Surge Voltage Suppressor

⚠ Caution

AC, 100 VDC or more

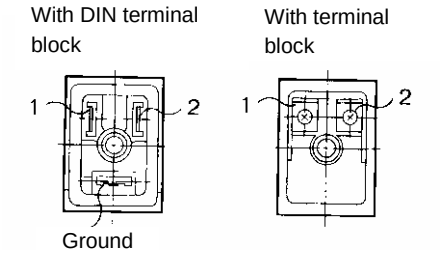


48 VDC of less



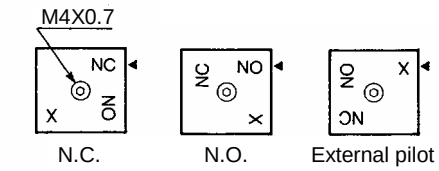
Electrical Connection

In the case of DIN terminal and terminal (with light/surge voltage suppressor), the connection is as follows. Connect each to the power supply side.



Terminal no.	1	2
DIN terminal	+	-
Terminal	+	-

How to Change Passage State



When change the passage state, confirm that pressure has been removed from the valve.

Unscrew the M4 x 0.7 hexagon socket head cap screw in the changeover plate and match the ◂ mark on the adapter plate with the character on the changeover plate.

Piping is as follows.

Mounting Screw Tightening Torques M4:1.4N·m

Piping

Port / Passage	P	A	R
N.C.	Inlet	Outlet	Exhaust side (Plug, in case of 2 port valve)
N.O.	Exhaust side (Plug, in case of 2 port valve)	Outlet	Inlet
External	Universal porting (Piping of inlet pressure side is possible anywhere)		

Note 1) In the case of internal pilot, confirm that a plug is inserted to X port. If not, insert a R1/8 plug.

Note 2) In the case of external pilot, supply air pressure from X port.

Confirm the safety sufficiently and conduct carefully when changing the passage state or restarting after changes.

Precautions

1. Since PE port is the exhaust port of the pilot valve, do not attach a plug or reduce the port diameter.
2. X port is the pressure supply port of the pilot valve and PE port is the exhaust port of the pilot valve. Avoid mismatching when piping.
3. The manual portion contains a breather hole for the core. Take proper measures to prevent dust or foreign matter from accumulating in this area.

3 Port Solenoid Valve / Specific Product 2

Be sure to read before handling.

Continuous Duty

⚠Caution

If energizing the valve for a long time, use "VG342□-□□□-□□□-E" (Pilot valve assembly: "VO307E-□□□-X84").

1. This model is for continuous duty, not for high cycle rates. But even in low cycle rates, if energizing the valve more than once a day, please consult with SMC.
2. Make sure to cycle valve at least once every 30 days.

How to Use DIN Terminal

1. Disassembly

1) After loosening the screw (1), then if the housing (2) is pulled in the direction of the screw, the connector will be removed from the body of equipment (solenoid, etc.).
2) Pull the screw (1) out of the housing (2).
3) On the bottom part of the terminal block (3), there's a cut-off part (9). If a small flat head screwdriver is inserted between the opening in the bottom, terminal block (3) will be removed from the housing (2). (Refer to Figure-1.)
4) Remove the cable gland (4) and plain washer (5) and rubber seal (6).

2. Wiring

1) Pass them through the cable (7) in the order of cable ground (4), washer (5), rubber seal (6), and then insert into the housing (2).
2) From the terminal block (3), loosen the screw (11), then pass the lead wire (10) through, then again tighten the screw (11).

Note 1) Tighten within the tightening torque of 0.5 N·m +/-15%.

Note 2) Cable (7) external: ϕ6 to ϕ8 mm

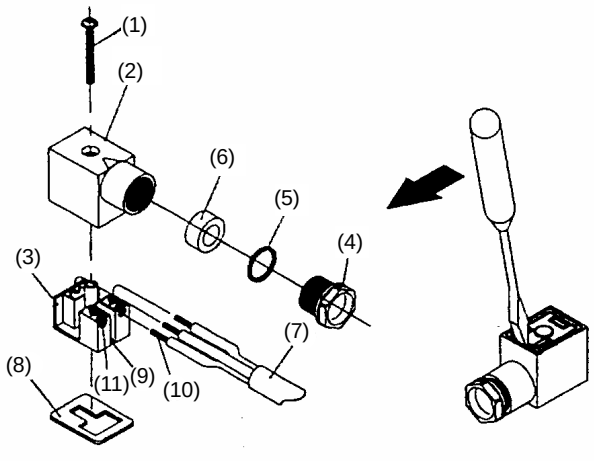


Figure-1

3. Assembly

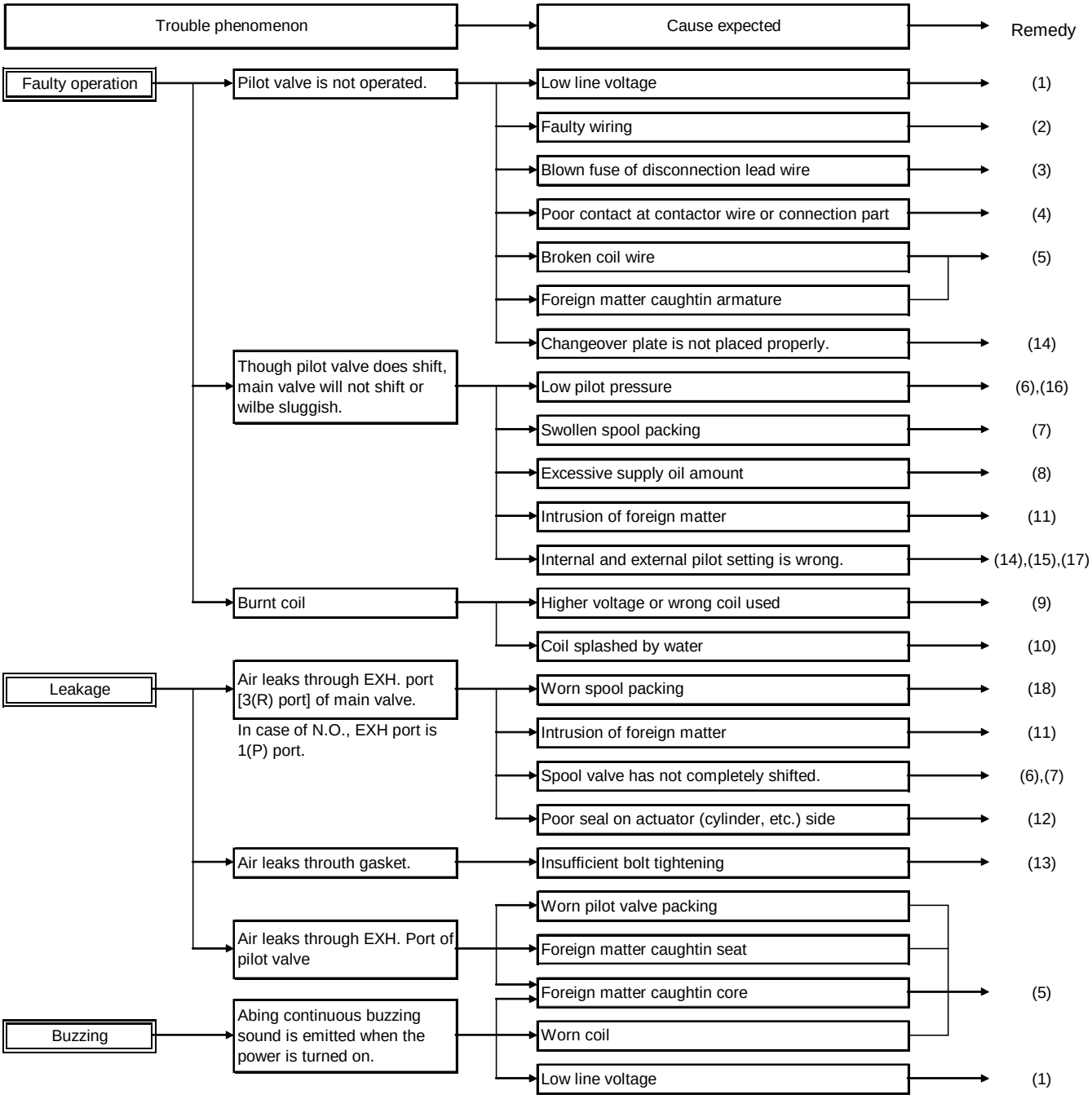
1) Passing through the cable (7), the cable gland (4), plain washer (5), and rubber seal (6), housing (2) in this order, and then connect with the terminal block (3). After that, set the terminal block (3) on the housing (2). (Push it down until you hear the click sound.)
2) Putting rubber seal (6), plain washer (5), in this order into the cable introducing slit on the housing (2), then further tighten the cable gland (4) securely.
3) Insert the gasket (8) or between the bottom part of terminal block (3) and a plug attached to equipment, and then screw (1) in from the top of the housing (2) to tighten it.

Note 1) Tighten within the tightening torque of 0.5 N·m +/-20%.

Note 2) Connector orientation can be changed by 180 degrees depending on how to assemble the housing (2) and the terminal block (3).

TROUBLE SHOOTING

Should any trouble be found during operation, trace the source of the trouble in the following or der and take correcitve action.



REMEDY

No.	Remedy
(1)	Regulate voltage, so that the voltage at the time of the operationbecomes specifications range.
(2)	Re-wire correctly.
(3)	Replace part.
(4)	Replace part or re-wire positively.
(5)	Replace pilot valve assembly.
(6)	Adjust pressure so that pilot pressure will fall within operating pressure range during opretation.
(7)	-If worng oil used, completely air blow to remove oil and replace valve. After valve is replaced, use turbine oil class 1 (ISO VG32). -When a large quantity of drain is given and cannot carry out drain omission surely, install either an auto-drain or a dryer. The valve should be replaced.
(8)	Lessen the oil supply amount to the degree that oill does not spout out of the exhaust port [3(R)* , PE port]. *In the case of N.O. specification, 1(P) port.
(9)	Check voltage. Replace pilot valve assembly.
(10)	Protect the valve so that water does not splash the coil. Replace pilot valve assembly.
(11)	To remove foreign matter, clean the pipe by air blow. Replace valve.
(12)	Repair or replace actuators.
(13)	Isolate the valve and re-tighten the bolts.
(14)	Place the changeover plates to the proper position.
(15)	Arrange the piping again. Especially, check P, A and X ports.
(16)	In the case of external pilot specification, supply specified pressure (0.2 to 0.9 MPa) to X port.
(17)	In the case of internal pilot specification, plug X port.
(18)	Replace valve.

If no improvement is achieced in spite of the above countermeasure, inside of the valve may have some abnomality. In this case, stop using the balbe immediately.

If any of followings are carried out, inside of the valve may have some failure. In this case, stop usig the valve immediately.

1. Voltage out of rated voltage has been used.
2. Oil other than specified one has been lubricated.
3. Lubrication has been stopped intermediately, or lubrication was suspended temporary.
4. Water splashed directely.
5. Strong impact was given.
6. Alien substance such as drain and particle got into. Drainor garbage invaded a valve.
7. Prohibitted way of using the balbe which is written at "Precautions" section in this operation manual was carride out excluding above -mentioned.

In addition, in the case of trouble, please send it back to the supplier for repair or replacement.

Record of changes	
A Renewal	MY
B Safety Instructions	PQ

1st printing HT

SMC Corporation
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN
Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL http://www.smcworld.com

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
© 2008 SMC Corporation All Rights Reserved