



# Operation Manual

3 Port Solenoid Valve

PRODUCT NAME

VT317 Series

MODEL/ Series

**SMC Corporation**

# Contents

Safety Instructions	2,3
Precautions on Design	4
Selection	4
Mounting	5
Piping	5
Wiring	5
Lubrication	5
Air Supply	6
Operating Environment	6
Maintenance	6,7
Specific Product Precautions	8
Trouble shooting	9,10



# 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 governed 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 governing 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

The products presented 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).

Any damage attributed to the use beyond the specifications is not guaranteed.

#### 2. Actuator drive

When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.

#### 3. Holding of pressure (including vacuum)

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

#### 4. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this manual are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

#### 5. Vacuum applications

When the valve is used for switching vacuum, take measures such as the installation of a suction filter to prevent suction of external dust or other contaminants from the suction pad or exhaust port.

Also, it is necessary to continuously exhaust during vacuum suction. Otherwise, external dust or other contaminants entering into the suction pad or air leakage can result, which causes dropping of a work piece.

#### 6. Vacuum

When the valve is used for switching vacuum, take measures to prevent suction of external dust or other contaminants from the suction pad or exhaust port.

#### 7. About ventilation

When using the valve in closed control panel, etc., install a ventilating opening, etc. in order not to increase the pressure inside a control panel by ventilating air and not to pack the heat generated by valve.

#### 8. Extended periods of continuous energization

If the valve is energized for extended periods of time, the temperature rise due to the heat generated by the coil assembly can deteriorate the performance or life of the valve and have adverse effects on peripheral equipment near the valve. If the total energizing time per day is expected to be longer than the total de-energizing time per day, use a DC specification valve.

When the valve is mounted in a control panel or energized for an extended periods of time, employ measures to radiate excess heat so that temperatures remain within the specified range.

In particular, if three or more adjacent stations on the manifold are energized together for extended periods of time, special care should be given to a larger temperature rise.

#### 10. Disassembly and modification prohibited

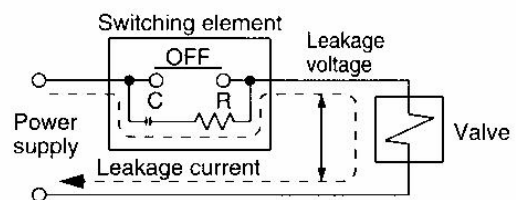
Do not modify or reconstruct (including additional machining) the product. An injury or failure can result.

### Caution

#### 1. Leakage voltage

When C-R device (Surge voltage suppressor) is used for the protection of switching device, note that voltage leakage will be increased by passing voltage leakage through C-R device.

Suppressor residual voltage leakage should be as follows.



DC coil: 2% or less of rated voltage

AC coil: 20% or less of rated voltage



## VT317 Series

# 3 Port Solenoid Valve / Precautions ②

Be sure to read before handling.

### 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. Maintenance space

The installation should provide with sufficient space for maintenance activities (removal of valve, etc.).

##### 3. Observe the tightening torque for screws.

Tighten the screws to the recommended torque for mounting the product.

##### 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 performed after installation.

##### 5. Painting and coating

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

Please consult with SMC if paint is to be applied to resinous parts,

### Piping

#### Caution

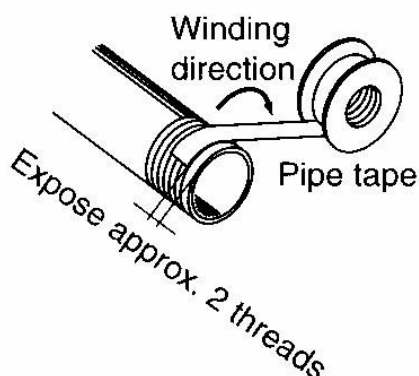
##### 1. Before piping

Before piping, 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 and sealing material do not get inside the valve.

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



#### 4. Connection of fittings

When screwing fittings into valves, tighten as follows.

##### Rc

Tighten with the proper tightening torque below.

Connection thread	Applicable tightening torque (N·m)
Rc1/4	12 to 14

### Wiring

#### Caution

##### 1. 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.

##### 2. Confirm the connections.

After completing the wiring, confirm that the connections are correct.

### Lubrication

#### Warning

##### Lubrication

- 1) The product has been lubricated for life at manufacturer, and does not require lubrication in service.
- 2) If a lubricant is used in the system, use turbine oil Class 1 (with 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.  
When turbine oil is used, refer to its Material Safety Datasheet (MSDS).
- 3) Please contact SMC regarding Class 2 turbine oil (with additives), ISO VG32.



## 3 Port Solenoid Valve / Precautions ③

Be sure to read before handling.

### Air Supply

#### Warning

##### 1. Type of fluids

The operating fluids must be compressed air. Contact SMC when using the product with other fluids.

##### 2. Large amount of drainage

Do not use compressed air containing a lot of condensate, which can cause the operating failure of pneumatic equipment. Install an air dryer or drain catch before the filter.

##### 3. Draining control

If an air filter is not drained, condensate will leak to the secondary side and cause the operation failure of pneumatic equipment. When it is difficult to control drainage, the use of a filter with an auto drain is recommended.

For the details of compressed air mentioned above, refer to SMC catalog "Compressed Air Purification System".

##### 4. Use clean air

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

#### Caution

1. If ultra dry air is used as a fluid, it can deteriorate the lubrication characteristics of equipment and affect the reliability (life) of equipment. Contact SMC beforehand.

##### 2. Install air filters.

Install air filters close to valves at their upstream side. A filtration degree of  $5\mu\text{m}$  or less should be selected.

##### 3. Install an aftercooler, air dryer, or drain catch before the filter and take appropriate measures.

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or drain catch, etc.

##### 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 valves and cause malfunction.

For the details of compressed air mentioned above, refer to SMC catalog "Compressed Air Purification System".

### Operating Environment

#### Warning

1. Do not use in atmospheres where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam.

2. Products with IP67 (based on IEC60529) are protected against dust and water, however, these products cannot be used in water.

3. Products compliant to IP67 satisfy the specification by mounting each product properly. Be sure to read the Precautions for each product.

4. Do not use in an explosive atmosphere.

5. Do not use in a place subject to heavy vibrations or shocks.

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

7. Remove the emissive heat when there is a source of heat around there.

8. If it is used in an atmosphere where there is possible contact with water droplets, oil, weld spatter, etc., take suitable preventive measures.

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

### Maintenance

#### Warning

1. Maintenance should be performed according to the procedure indicated in the Operation Manual.

Improper handling can cause an injury and damage and malfunction of equipment and machinery.

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

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

In the case of 3 position closed center type, exhaust the residual pressure between valve and cylinder.

When the equipment is to be started again after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc., and then confirm that the equipment is operating normally.



**VT317 Series**

## **3 Port Solenoid Valve / Precautions** ④

Be sure to read before handling.

### **Maintenance**

#### **Warning**

##### **3. Low frequency operation**

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

##### **4. Manual override operation**

When the manual override is operated, connected equipment will be actuated. Operate after safety is confirmed.

#### **Caution**

##### **1. Drain flushing**

Remove drainage from air filters regularly.

##### **2. Lubrication**

Be sure to continue to supply lubricant once it has been started.

And, use turbine oil Class 1 (with no additive) ISO VG32 for lubrication. If other lubricant oil is used, it may cause malfunction.

Please contact SMC for suggested turbine oil Class 2 (with additive), ISO VG32.





VT317 Series

## 3 Port Solenoid Valve / Specific Product

Be sure to read before handling.

### Manifold

#### ⚠ Caution

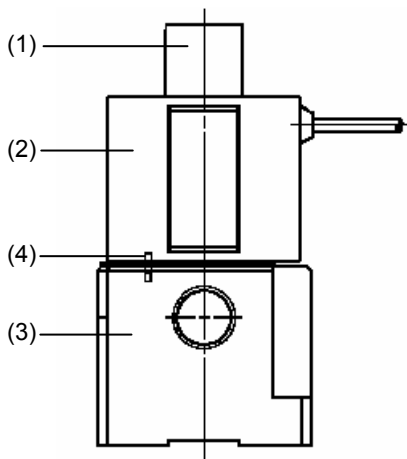
##### \* Changing from N.C. to N.O.

This product is delivered as N.O. valve. If N.O. Valve is needed, remove mounting screws of the required valve and turn the valve at 180°degrees. (Make sure that there are O-rings fixed on 4 positions of the valve surface.) then, tighten the mounting screws to fix the valve to the manifold base.

**Tightening torque of the mounting screw(M4):1.4N · m**

### Change of Electrical Entry Angle

1. Series VT317 can change electrical entry angle.  
(4 positions)
2. How to change: Loosen the nut(1),remove the coil(2) from the body assembly(3), place the positioning pin(4) at the required place, put back the coil(2)to its place, and tighten sufficiently with lock nut(1).



### Bleed port

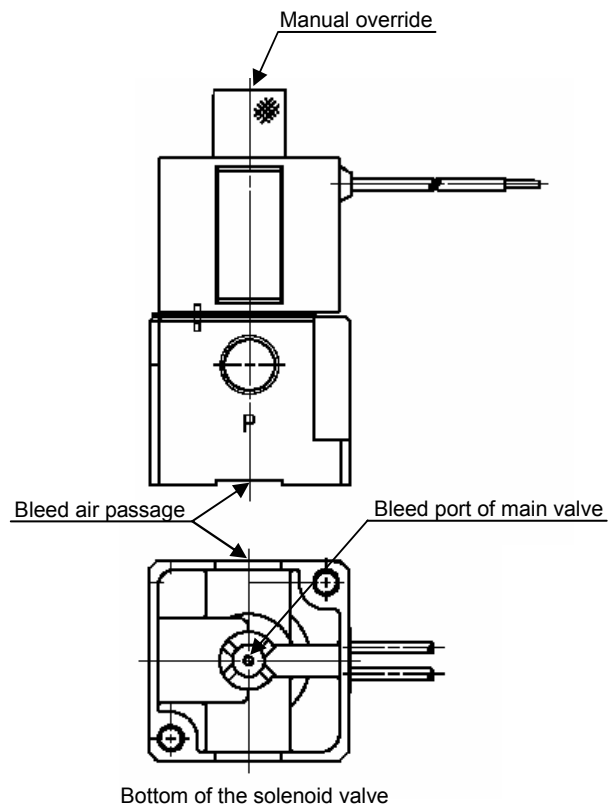
#### ⚠ Caution

1. A bleed port for the main valve is located at the bottom of the solenoid valve. Since blocking it causes malfunction, do not block it.

\*Ordinarily, when the solenoid valve is mounted on a metal surface, it can breathe through the breather hole, via the breather groove. However, in particular, if the surface to be mounted is made of the rubber, the rubber could deform and block the hole.

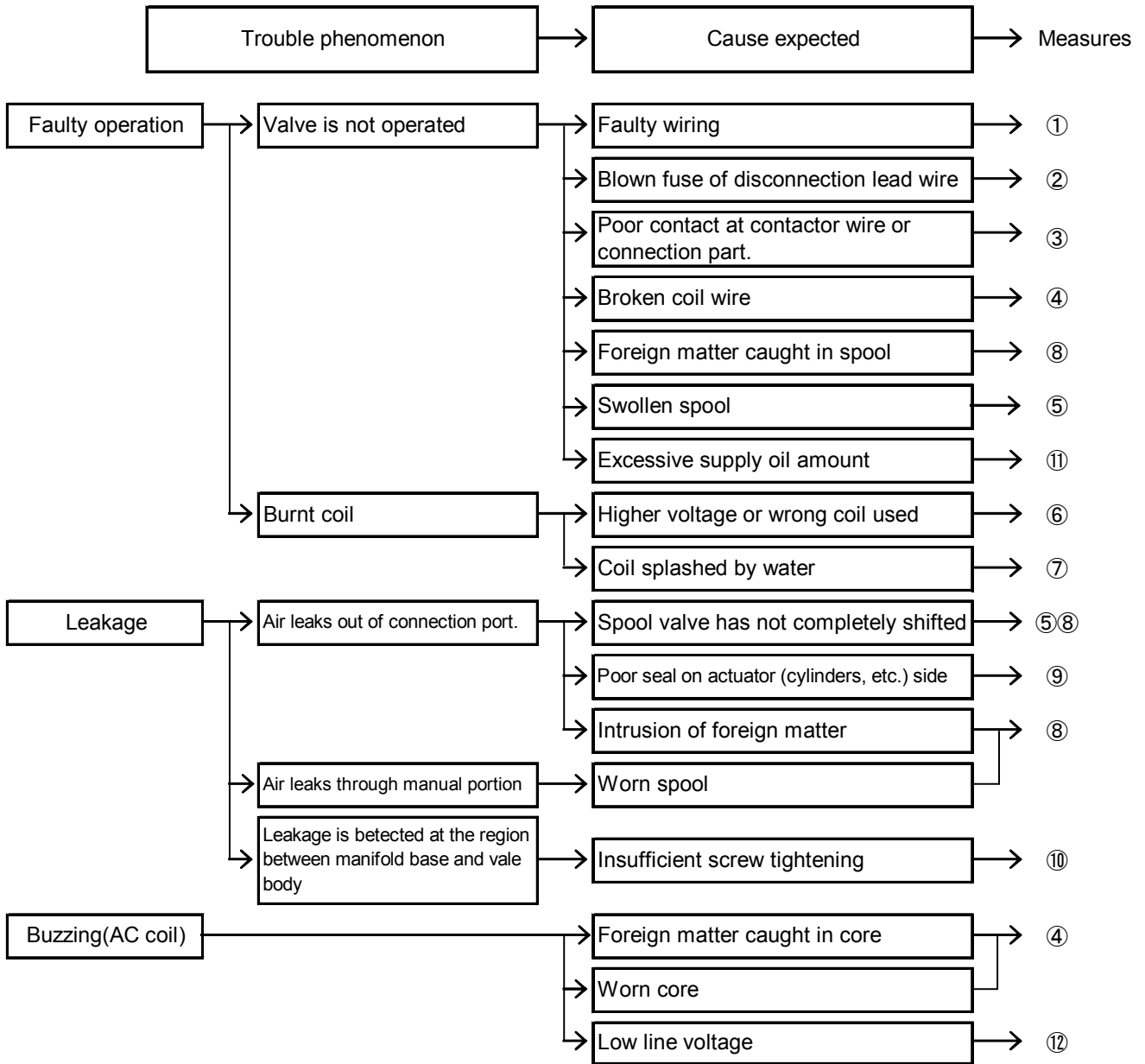
2. Make sure that dust and/or other foreign materials should not enter the valve from the unused port(e.g.exhaust port).

Also, since there is a bleed port for the armature in the manual override, do not allow accumulation of dust and/or other foreign materials to block bleed port.



## TROUBLESHOOTING

Should any trouble be found during operation, trace the source of the trouble in the following order and take corrective action.



## Remedy

No.	Remedy
①	Re-wire correctly.
②	Replace part.
③	Replace part or re-wire positively.
④	Replace valve.
⑤	·If wrong oil is 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.
⑥	Check voltage. Replace valve
⑦	Protect the valve so that water does not splash the coil. Replace valve
⑧	Replace worn spool. To remove foreign matter, air blow piping, then replace valve.
⑨	Repair or replace actuators.
⑩	Isolate the valve and re-tighten the bolts.
⑪	Lessen the oil supply amount to the degree that oil does not spout out of the exhaust port (R port)
⑫	Regulate voltage, so that the voltage at the time of the operation becomes specifications range.

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

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

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

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

Revision history	
A	Safety Instructions Po

1st printing: MX

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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