



COMMON PRECAUTIONS

Data Sheet - Be Sure To Read Before Handling

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These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 Note 1, JIS B 8370 Note 2 and other safety practices.



CAUTION: Operator error could result in injury or equipment damage.



WARNING: Operator error could result in serious injury or loss of life.



DANGER: In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1 - ISO 4414: Pneumatic fluid power--General rules relating to systems.

Note 2 - JIS B 8370: General Rules for Pneumatic Equipment

WARNING:

1. 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. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest information with a view to giving due consideration to any possibility of equipment failure when configuring a system.
2. 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.
3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.
 - a. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
 - b. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
 - c. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.
4. Contact Caladen if the product is to be used in any of the following conditions:
 - a. Conditions and environments beyond the given specifications, or if product is used outdoors.
 - b. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
 - c. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

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SELECTION WARNING:

Confirm the specifications.

Products are designed for use in compressed air applications only, unless otherwise indicated.

Do not use the product outside their design parameters.

Please contact Caladen when using the products in applications other than compressed air.



MOUNTING WARNING:

Instructions

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

Securing the space for maintenance

When installing the products, please allow access for maintenance.



PIPING CAUTION:

Before piping

Make sure that all debris, cutting oil, dust, etc, are removed from the piping.

Installing piping

When inserting piping or fittings into ports, ensure that dirt or foreign material do not get inside the piping. Always inspect the fitting prior to installation to check for blockage.



AIR SUPPLY WARNING:

Operating fluid

Please consult with Caladen when using the product in applications other than compressed air (including vacuum). Regarding products for general fluid, please ask Caladen about applicable fluids.

Install an air dryer, aftercooler, etc.

Excessive condensate in a compressed air system may cause valves and other pneumatic equipment to malfunction. Installation of an air dryer, after cooler etc. is recommended.

Drain flushing

If condensate in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensate to enter the compressed air lines.

If the drain bowl is difficult to check and remove, it is recommended that a drain bowl with the auto-drain option be installed.

Use clean air

If the compressed air supply is contaminated with chemicals, synthetic materials, corrosive gas, etc., it may lead to break down or malfunction.

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OPERATING ENVIRONMENT WARNING:

Do not use in environments where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.

Do not expose the product to direct sunlight for an extended period of time.

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

Do not mount the product in locations where it is exposed to radiant heat.



MAINTENANCE WARNING:

Maintenance procedures are outlined in the operation manual.

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

Maintenance work

If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic systems should be performed by qualified personnel only.

Drain flushing

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

Shut-down before maintenance

Before attempting any kind of maintenance make sure the supply pressure is shut of and all residual air pressure is released from the system to be worked on.

Start-up after maintenance and inspection

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 modifications to be product.

Do not take the product apart.





FITTINGS & TUBING PRECAUTIONS

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SELECTION CAUTION:

1. Keep the connection part of fittings and tubes from rotating to prevent cracking.
2. The tube bending radius in the vicinity of the fitting should be at least the minimum bending radius of the tube. If bent more than the min. bending radius, tubing may fail or be crushed.

The minimum bending radius is measured as following in accordance with JIS B 8381-1995.

JIS specifies the tubing deformation ratio measured at the minimum bending ratio to be 25% or less.

Tube deformation ratio at the minimum bending radius is obtained through the following formula, based on tubing diameter and mandrel diameter by wrapping the same radius mandrel tube.

$$I = \left(1 - \frac{L - D}{2d} \right) \times 100$$

I: Deformation ration (%)

d: Tube diameter (mm)

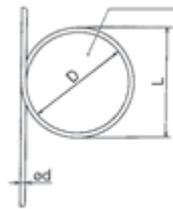
L: Measured length (mm)

D: Mandrel diameter (mm)

(Twice against the minimum bending radius)

Test temperature: 20 ± 5°C

Relative humidity: 65 ± 5%.



Tube deformation ratio at the minimum bending radius

3. Applicable for general industry air. Please consult with Caladen if using fluids other than water. Surge pressure must be under the max. operating pressure. If surge pressure exceeds the max. operating pressure, fitting or tubing may be damaged.
4. Applicable for general industry air. Please consult with Caladen if using fluids other than water. Surge voltage pressure must be under the max. operating pressure. If surge voltage pressure exceeds the max. operating pressure, fitting or tubing may be damaged.



MOUNTING CAUTION:

1. Check tubing for damage before installing. Confirm model size, etc.
2. Do not apply unnecessary forces such as twisting, pulling, moment loads, etc. on fittings or tubing. This will cause damage to fittings and will crush, burst or release tubing.
3. Tubing, with the exception of coiled tubing, requires stationary installation. Do not use standard tubing (non-coiled) in applications where tubing is required to travel. Tubing that travels may sustain abrasion, extention, or severance due to tensile force, or may result in removal of tubing from fitting. Use caution prior to use for proper application.

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TOLERANCE CAUTION:

1. When using tubing, be careful of the tolerance of the tube's O.D.

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

When the tolerance of the tube's O.D. is out of the range mentioned above, do not use the tube as this may cause air leakage or tubing to come out after installation.



OPERATING ENVIRONMENT CAUTION:

1. Do not use the usual fittings and tubes in locations where static electricity would be problematic; it may result in the system failure.
2. Do not use the ordinary One-touch fittings in locations where spatter is generated. Spattering may result in a fire hazard. In such a place, use of flame resistant fittings and tubing are recommended.
3. Do not use in an environment where the product is directly exposed to cutting oil, lubricant or coolant oil, etc. Please contact Caladen if using for an environment exposed to cutting oil, lubricant or coolant oil, etc.



MAINTENANCE CAUTION:

1. Replace fittings or tubing having the following problems.
 - a) Cracks, gouges, wearing, corrosion
 - b) Air leakage
 - c) Twists or crushing of tubing
 - d) Hardening, deterioration, softening of tubing
2. Do not reuse damaged fittings/tubing.



HANDLING OF ONE-TOUCH FITTINGS CAUTION:

1. Tube insertion and removal from One-touch fittings

Attaching of tube

- a) Cut the tube perpendicularly, being careful not to damage the outside surface. Use a tube cutter. Do not cut the tube with pliers, nippers, scissors, etc., otherwise, the tube will be deformed and troubles may result.
- b) Outside diameter of polyurethane tubing is swelled by applying internal pressure. As such, it may be that the tubing cannot be re-inserted into One-touch fittings. Make sure to confirm the tubing outside diameter, and when the accuracy of the outside diameter is more than + 0.15, insert into One-touch fitting again, not cutting the tubing to use it. When tubing is re-inserted into One-touch fitting, make sure to confirm that the tubing was able to go through the release bush smoothly.
- c) Grasp the tube, slowly push it into the One-touch fittings until it comes to a stop.
- d) Pull the tubing back gently to make sure it has a positive seal. Insufficient installation may cause air to leak or the tube to release.

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Removing of tube

- a) Push in evenly on the collet to release.
- b) Pull out the tube while keeping the collet depressed. If the collet is not held down, the tube cannot be withdrawn.
- c) To reuse the tubing, cut off the previously lodged portion of the tube.

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