INSTRUCTION MANUAL

Product: General Purpose 1 MPa, 3.5 MPa, 7 MPa, 10 MPa, 14 MPa, 16 MPa, and 21 MPa Hydraulic Cylinder

Strictly observe SAFETY PRECAUTIONS given in this manual.

This instruction manual describes precautionary requirements for compliance to prevent in advance harm or injury and damage to the property of the user of this product or other persons. To use the products safely, carefully read this instruction manual as well as other instruction manuals concerning the use of cylinder prior to operation. Keep the manuals near at hand with care to refer to whenever required.

Strictly observe warnings, cautions, notes, prohibited and compulsory requirements set forth in this manual. These requirements are described as follows. Contact us for any questions.

* The extent of injury and damage that occurs when the product is used incorrectly in disregard of the contents of precautionary instructions is classified and explained according to the following statements.

**WARNING**

This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and considerable material damage.

**CAUTION**

This symbol indicates a potentially hazardous situation which, if not avoided, may result in moderate injury and in material damage only.

* The following precautionary signs indicate the requirement for compliance.

**Prohibited actions**

This sign indicates the actions which must be prohibited.

**Compulsory actions**

This sign indicates the actions which must be carried out.

1. Accomplish the following before use

**CAUTION**

Prohibited action

The oil used for the hydraulic unit is inflammable.

Do not use fire near the cylinder or hydraulic equipment.

2. Methods of transportation and storage

**CAUTION**

Compulsory actions

When the cylinder mass exceeds 15 kg, use slinging tools and carrying equipment.

- Retract the piston rod into the cylinder and store the cylinder in a dry, cool place. Do not remove the cover of the port (oil port).
- Apply rust preventive oil to the portion where the piston rod tip screw and the piston rod protrude. Wrap vinyl tape, etc. around the piston rod tip screw for protection.
- Do not apply vibration or shock to the cylinder since damaged parts may result.
- Avoid storing the cylinder in a place close to a welding machine, motor and power line where strong magnetism exists.
- When storing the cylinder for one year or more is required, apply rust preventive oil to both inside and outside of the cylinder. Do not store the cylinder on the ground. When storing the cylinder horizontally, it is recommended that the cylinder be rotated to 90 degrees in a fixed direction every three months to prevent the permanent setting of packings.
2. Methods of mounting and removal

**CAUTION**

**Compulsory actions (for the following items)**

- Locking bolts of cylinder fitting must conform to the specified dimensions, strength category and clamping torque.

- The body for mounting the cylinder must be rigid to withstand the cylinder force.

- When the cylinder mass exceeds 15 kg, use slinging tools and carrying equipment.

- Before mounting and removing the cylinder, internal pressure must be reduced completely.

- Use the pin of the specified size for the oscillating metal of the oscillating cylinder. Be sure to apply lubricant to the bearing unit of the holding metal.

- Fixed cylinder must be aligned.

- Before mounting and removing the cylinder, be sure to read the following general precautions carefully.

**General precautions**

- Watch out for the piston rod which may move by the dead weight of the piston rod.

- Watch out for hot cylinder body before removing the cylinder immediately after stopping operation.

3. Piping

- Prevent dust or pipe chips and other foreign objects from entering the piping.

- When using a sealing tape (liquid packing), do not wind (coat) the first to the second threads from the tip.

- When laying piping, prevent air traps.

- Be sure to flush the piping. Before flushing, remove the cylinder from the piping to prevent the flushing liquid from entering the cylinder.

4. Preparation for operation

**CAUTION**

**(Example 1)**

**Prohibited actions**

- Do not turn the hexagon wrench more than one air vent area structure.

**(Example 2)**

**Compulsory actions (for the following items)**

- Verify that cylinder locking bolts, fittings, piping and joints are not loose or loosened.

- Verify that the supply pressure of the pressure source conforms to the planned pressure.

- Verify that the type of hydraulic oil complies with the cylinders specification.

- Carefully read the notes in Fig. 1 and that given outside the column and vent the air (from cylinder and piping).

**Air purging**

1) Feed the cylinder with low pressure oil at low speed (to move the cylinder at 10 mm/s), loosen the check plug (air vent plug) by turning it counterclockwise 1 to 2 turns (1 rotation), and purge the air in the oil through the check valve (air vent valve).

2) After purging the air, tighten the check plug (air vent valve) securely and verify that the oil does not leak.

- Tightening torque...
  - Check plug: 8 to 10 N.m (Example: Type 1)
  - Air vent plug: 6 to 8 N.m (Example: Type 2)

2) For mounting switch on the cylinder with switch, refer to the instruction manual of switches.
Prohibited actions

Donotloosen cushion (If loosened excessively, structure cushion valve, etc. may fly off or oil gushing can result.)

Compulsory actions (for the following items)

- For test running, operate the cylinder at the minimum pressure (Example 3) (with the piston speed less than 50 mm/s) required for cylinder operation and verify that the cylinder acts smoothly.
- Keep back from the cylinder before operating, and stop the cylinder immediately in case of any problem.
- Be sure to adjust the cushion because it has not been adjusted.
- To adjust the cushion, gradually increase the speed from less than 50 mm/s to the planned speed. Before turning the cushion valve, be sure to stop the cylinder.
- Ifequipped with switch, stop the cylinder, locate the switch and secure it.
- Carefully read and observe the following precautions.

Cushion adjustment

Adjust the cushion in the following manner while increasing the piston speed from 50 mm/s to the planned speed.

1) Loosenthecushionplug (locknut) 1/4 turn sand turn only the valve using a hexagon wrench (fillister headscrewdriver).

When turned to right (left): Cushioning effect is large (small).

2) After the valve adjustment, secure the valve using a hexagon wrench (fillister head screwdriver) to prevent the valve from moving, and tighten the plug or the lock nut.

Check for oil leakage.

Tightening torque: Cushion plug: 12 to 15 N.m, lock nut: 6 to 8 N.m

Reference: The cushioning mechanism incorporated in the cylinder is provided to prevent the cylinder against damage. For inertial force which cannot be absorbed by the cushioning mechanism, consider installation of external inertial force absorption unit or consider on the hydraulic circuit.

Method of operation

WARNING!

Prohibited actions- Donot come close to the cylinder while it is operating. You may be pinched or injured by the cylinder.

Compulsory actions - Before coming close to the cylinder, stop the cylinder first.

Compulsory actions - Whenthe cylinder operates unusually, stop the cylinder immediately. (unusual operations such as air leakage, excessive shock, vibration, insufficient stroke and excessive pressure rise)

CAUTION!

Compulsory actions (for the following items)

- Confirm that the pressure, speed and cushion of the cylinder has been adjusted as planned.
- Never operate the cylinder with a horizontal load applied to the piston rod. Air leakage and improper operation can result.
- Check for air leakage from any parts of the cylinder.
- Check for excessive elongation and deflection of the cylinder and cylinder mounting area.
- Ifequipped with switch, check that the load (programmable controller and relays, etc.) is actuating properly in response to the cylinder movement.
**Maintenance and Daily Inspection**

**WARNING**

- Prohibited actions: Do not come close to the cylinder while it is operating. You may be pinched or injured by the cylinder.

- Compulsory actions before entering the cylinder area: be sure to shut off the pressure source and stop the cylinder.

- When the cylinder operates unusually, stop the cylinder immediately.

  - (unusual operations such as air leakage, excessive shock, vibration, insufficient stroke and excessive pressure rise)

**CAUTION**

- Prohibited actions: Do not disassemble or assemble the cylinder on your own.

1) For daily inspection, check the following items and repair if necessary.

   1. Check for excessive noise, vibration or shock. (Also, check the area around the cylinder.)
   2. Check for excessive cylinder stroke.
   3. Check for air leakage. (Rod packing area, piping port area and other areas of piping)
   4. Check for excessive scratches, contamination or attachments on the rod.
   5. Check for loose or excessive deflection of the cylinder mounting frame.
   6. Check for loose cylinder mounting bolts and nuts.
   7. Check for foreign objects or harmful substances mixed in the hydraulic fluid.
   8. Check for proper temperature of the cylinder unit.
   9. Check for proper supply pressure.
   10. Also, check the following items for the cylinder with a switch.

      - Check that the switch or load is actuating properly.
      - Check for loose switch mounting screws.
      - Check for excessive vibration or shock applied to the switch.
      - Check if the switch cord has been pulled or bent forcefully.
      - Check for an unusual environment of the switch (attachment of iron powder chips and moisture or magnetizing of magnetic substances in the area)

9) Scrapping

  **CAUTION**

  - Compulsory actions: Resin and rubber type materials may generate poisonous gas during incineration. Scrap these materials as incombustibles.

  - Discharge the compressed air in the cylinder, disassemble, classify by material and then scrap.

  - (Iron type, copper type, aluminum type, resin and rubber type materials, etc.)

  - Consult the scrap contractor for hard chrome plated parts.

10) Reference material

- Troubleshooting
- Consumable parts list (packing list)

Please request our dealer for the above data.
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