

KOSO HAMMEL DAHL

CONTROL VALVES

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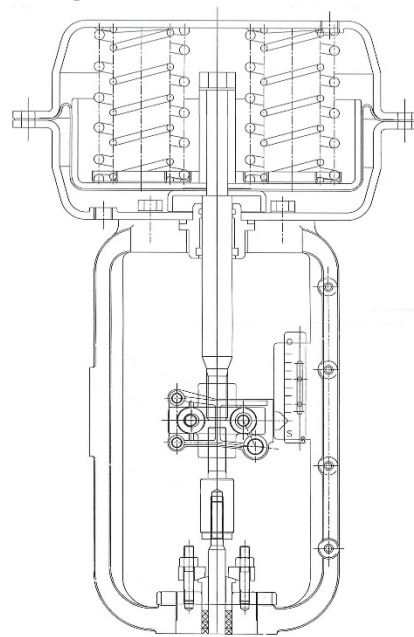
Installation, Maintenance & Operating Instructions

IMO – D52/R52

DIAPHRAGM-OPERATED ACTUATORS

STANDARD SPECIFICATIONS

Model	Diaphragm (Effective area in square inches)	Standard Strokes (in inches)
D52B / R52B	85	$\frac{3}{4}$, 1
D52C / R52C	145	$1\frac{1}{8}$, $1\frac{1}{2}$
D52D / R52D	325	$2\frac{1}{4}$, $3\frac{1}{2}$



Read these instructions carefully before installation or servicing.

WARNING!

FOR YOUR SAFETY AND PROTECTION, IT IS IMPORTANT THAT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVING THE VALVE FROM SERVICE OR BEFORE ANY DISASSEMBLY OF THE VALVE:

1. At all times during this procedure, keep hands out of the valve. A remotely actuated valve could close at any time and result in serious injury.
2. Know what media is in the line. If there is any doubt, check with the proper authority.
3. Wear any protective clothing or equipment normally required when working with the media involved.
4. Depressurize the line and valves as follows:
 - a. Open the valve and drain the line.
 - b. Close and open the valve to relieve any residual pressure that may be in the valve prior to removing the valve from service.
 - c. After removal and prior to any disassembly, drain any remaining media by placing the valve in a vertical position and carefully opening and closing the valve several times.
5. The practical and safe use of this product is determined by both the trim and body ratings. Read the name tags and check both ratings. This product is available with a variety of trim materials. Some of the trim materials have pressure ratings that are less than the body ratings. All the body and trim ratings are dependent on valve type and size, trim material, bolting material, and temperature. Do not exceed these ratings.

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These instructions provide information about safe handling and operation of the valve and are subject to change without notice.

Description

Direct Acting Actuator

Model D52 actuators are linear-motion spring-return pneumatic diaphragm actuators, primarily intended for use with rising stem type valves. In the “normal” position (no air pressure on the diaphragm), the direct actuator holds the stem in its retracted position by means of a mechanical spring. Increasing air pressure in the upper diaphragm chamber thrusts the actuator stem downward and compresses the spring.

Mounted on pull-stem-to-open valve body assemblies, the direct actuator closes the valve when increasing air pressure is applied to the upper diaphragm chamber. Mounted on push-stem-to-open valve body assemblies, the direct actuator opens the valve when increasing air pressure is applied to the upper diaphragm chamber. An external spring adjustment permits the spring compression to be changed within predetermined limits. These actuators are manufactured for and applied to meet the requirements of the valve and the service conditions as specified in the sales order and are ordinarily shipped mounted on the valve body subassembly and with all accessory equipment mounted, piped, and adjusted.

Reverse Acting Actuator

Model R52 actuators are linear-motion spring-return pneumatic diaphragm actuators, primarily intended for use with rising stem type valves. In the “normal” position (no air pressure on the diaphragm), the reverse actuator holds the stem in its extended position by means of a mechanical spring. Increasing air pressure in the lower diaphragm chamber thrusts the actuator stem upward and compresses the spring.

Mounted on pull-stem-to-open valve body assemblies, the reverse actuator opens the valve when increasing air pressure is applied to the lower diaphragm chamber. Mounted on push-stem-to-open valve body assemblies, the reverse actuator closes the valve when increasing air pressure is applied to the lower diaphragm chamber. An external spring adjustment permits the spring compression to be changed within predetermined limits. These actuators are manufactured for and applied to meet the requirements of the valve and the service conditions as specified in the sales order and are ordinarily shipped mounted on the valve body subassembly and with all accessory equipment mounted, piped, and adjusted.

Receiving and transportation

This actuator is heavy and therefore needs to be handled carefully and properly, following the instructions given below. Failure to observe these instructions may cause serious injuries.

- For hoisting up and down the package containing this actuator, use a suitable hoisting machine conforming to the Occupational Health and Safety Law. Do not allow any person to be beneath the package being hoisted up, nor operate the hoisting machine beneath the package being hoisted up.

-

Storage

- (1) It is recommended that the actuator is stored in an as-received packed state before installation.
- (2) Do not store it in a place:
 - a. Exposed to rainwater.
 - b. Where ambient temperature is higher than 140°F (60°C)
 - c. In a dusty environment
 - d. In a humid atmosphere
- (3) Even when the received actuator has been unpacked for acceptance inspection, it is recommended that the actuator is repacked as received and stored.
- (4) Do not remove the plugs or covers of the wiring port until wiring work is started.
- (5) To store the actuator after use, treat it as follows.
 - a. Apply rust preventive treatment to the parts that are liable to rust.
 - b. Insert plugs or other waterproof treatment to the air-pipe connecting ports and the wiring ports.

Unpacking

- When hoisting up the actuator from its packing, use a standard belt suited to lift the actuator. Use two pairs of lifting rings in a way that the load is applied to them equally. See Fig. 1. However, if the control valve is hoisted up with the actuator, do not use lifting rings, but hoist the control valve as illustrated in Fig. 2. Failure to observe these instructions may allow the hoisted control valve to drop and injure or may cause damage to the actuator.

After unpacking, observe the following precaution to maintain performance of the actuator.

- If accessories such as positioner, booster relay, solenoid valve and manual operation unit are attached to the actuator, take care not to apply the load from the lifting belts to them. When you put the actuator on a floor, do not allow the accessories and the manual operation unit to contact the floor directly to avoid them from bearing the load of the actuator.

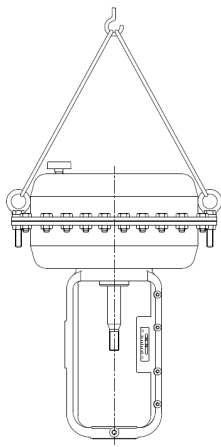


Fig. 1.

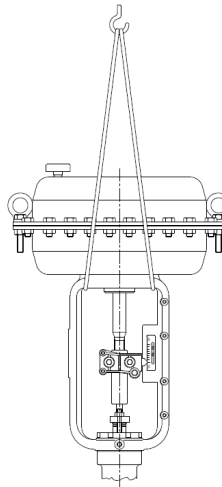


Fig. 2.

Installation

This actuator is heavy and therefore needs to be handled carefully and properly, following the instructions given below. Failure to observe these instructions may cause serious injuries.

- For installing it in your process piping, hoist it using a hoisting machine conforming to the Occupational Health and Safety Law. Do not allow any person to be beneath the package being hoisted up, nor operate the hoisting machine beneath the package being hoisted up.

Observe the following items to maintain the performance of this actuator.

- When hoisting up the actuator from its packing, use a standard belt suited to lift its weight. Observe the warning and cautions given in “Unpacking” Section.
- Do not remove the plugs from air-pipe connecting ports and wiring ports until the installation of it to the process piping is completed and the piping or wiring work is started.
- Be careful not to apply a strong impact to it by dropping or hitting while connecting to the process piping. Otherwise, it might cause failure or require readjustment.
- Secure a sufficient space for maintenance.
- Do not install the actuator in a place subject to strong vibration or where heavy load is applied to it.

Installation temperature at site

In the control valve specification sheet, which is submitted to you after your placement of the order, it is indicated in which temperature range specifications this actuator was produced. Based upon the indication, install the actuator in a place where the ambient temperature is within the following range.

If the ambient temperature does not fall within the permissible range because of radiant heat or direct sunlight, provide an appropriate shield or protect the actuator with heat insulator.

- | | | |
|----------------------------------|--------------|--------------|
| • Standard specification | -10 to +70°C | 14 to 158°F |
| • Low-temperature specification | -40 to +40°C | -40 to 104°F |
| • High-temperature specification | 0 to +100°C | 32 to 212°F |

Maintenance space

Above the control valve, secure a sufficient space for replacement of actuator as well as for inspection of the inside of the control valve. The dimension “H” does not include space required for lifting equipment such as a chain block and hook..

Actuator size / model	H
D52B / R52B	24 inches, or more
D52C / R52C	30 inches, or more
D52D / R52D	30 inches, or more

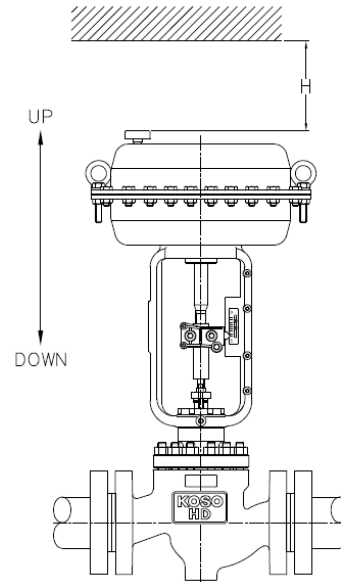


Fig. 3

Installation position

- As a rule, the position of the installed control valve should be vertical as illustrated in Fig. 3.
- Only when the vertical installation is impracticable, the control valve may be installed in a position within the range shown in Fig. 4. However, the exhaust port of the accessories are not tuned up which are attached to the actuator. If the installed control valve is liable to external vibration or forces, an appropriate support should be provided for the control valve or the piping.
- If your control valve is equipped with a manual override, the control valve should be installed in a position to ensure safe and easy operation.

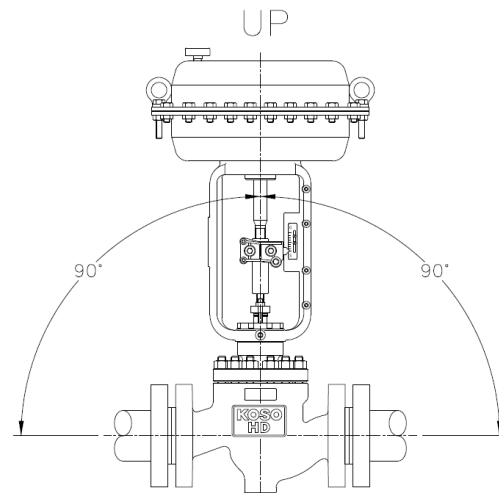


Fig. 4

Piping and Wiring work

- Use dry and clean instrument air for the operation source of the actuator.
 - An appropriate pipe diameter shall be used for instrument air supply piping to such instruments as positioner, booster relay, etc. so that air pressure will not decrease in piping.
 - If order was placed with requirement for mounting of such accessories as positioner, booster relay, solenoid valve, the air supply piping from these accessories to the actuator has been completed prior to shipment. So be careful not to damage the piping.
 - If the actuator is equipped with an accessory, follow the instructions in the operation manual of each device in instrument air supply piping and instrument wiring.
 - Do not use a seal tape for the instrument air supply piping port to an accessory because tape chips may clog in the piping, causing malfunction of accessory.
 - Do not install wiring on a rainy day or in an environment subject to splash of water to avoid electric leak or damage of the devices.
 - Use wires, which have sufficient capacity for keeping the good function of the accessories.
 - Perform reliable wiring work to prevent entry of water or rainwater from external cable inlets.
- (1) For direct connection of signals 3 ~ 14 psig (0.2 ~ 1.0kg/cm²G) from controller to the actuator
Connect an air piping to the instrument air inlet shown in the structural drawing in the "Structure" section.
- (2) For actuator fitted with accessories
Connect pipes and wires to the instruments, referring to the manuals for the accessories to the actuator.

Preparation for Operation and Operation

Preparation for operation

All the adjustments based on the order specification we received have been completed prior to the delivery from our factory. However, the adjustments might be out of alignment due to transportation or installation, check the operation of it in combined state with the on-off control circuit or the controller after completing the installation.

- If the actuator is equipped with accessories, do not prepare for operation on a rainy day or in an environment subject to splash of water to avoid electric leak or deterioration of performance.
- For the accessories which require power supply, before turning on the power, check that the power supply voltage is equivalent to the voltage displayed on the name plate of devices. If not, adjust the voltage to the value on it.
- Use dry and clean instrument air for the operation source of the actuator, and check that its air-pressure does not exceed the setting air-pressure indicated in the specifications. When you change it, please contact Koso America.
- Check that no air leaks from the joint portion of the instrument air piping and the diaphragm clamping section (the actuator circumference). If any leakage is found, follow the instructions in the "Disassembling the actuator" section to stop it.

(1) Adjustment of accessories:

When an adjustment is required for accessory, follow the instructions in the operation manual for each device for adjustment. Use a dial gauge or a stroke detector equivalent to it to detect a stroke for adjustment of the positioner.

(2) Adjustment of actuator off-balance (See Fig.12 for the encircled parts numbers)

This off-balance does not get out of order during transportation, storage, or installation. However, when the actuator is separated from the valve body for the convenience of installation work, follow the procedures shown below to adjust.

- Prepare an air-pressure reducing valve and a pressure gauge equivalent to ASME B40.100 class.
- Check the spring range and supply air pressure shown on the nameplate attached to the control valve.
- Keep the hex socket head screw 131, the connector 112 and the indicator 137 in the same disassembled state as they are when the actuator is separated from the valve body.
- Close the valve body stem 5.
- Apply the specified air-pressure through the instrument air connection port of the actuator with using the air-pressure reducing valve and the pressure gauge equivalent to ASME B40.100 class.
 - (a) Direct action actuator (the valve closes when the instrument air-pressure is increased.)
 - Apply the air-pressure, which is the maximum value of the spring range.
 - Lower the valve body stem so that the plug contacts the valve seat.
 - Engage the connector with the threaded portion of the actuator rod 106 and that of the valve stem and fix them firmly with the hex socket set screws. If they do not engage well with each other, slightly decrease the air-pressure from the maximum value of the spring range and engage them again.

- Changing air-pressure by the spring range, check that the rod moves as specified. When a positioner is attached, follow the instructions in the previous section (1) for adjustment and checking.
- (b) Reverse action actuator (the valve opens when the instrument air-pressure is increased.)
- Apply the air-pressure, which is the minimum value of the spring range.
 - Lower the valve body stem so that the plug contacts the valve seat.
 - Engage the connector with the threaded portion of the actuator rod 106 and that of the valve stem and fix them firmly with the hex socket set screws. If they do not engage well with each other, slightly increase the air-pressure from the minimum value of the spring range and engage them again.
 - Changing air-pressure by the spring range, check that the rod moves as specified. When a positioner is attached, follow the instructions in the previous section (1) for adjustment and checking.

Operation

Manual operation: This unit is an optional accessory used to open/close the valve unit when the air-pressure for operation is not available.

When manual operation is finished, be sure to return the handle shaft to its specified position (within the distance between a point about 1 mm away from the edge of the elongate hole on the MO cover and the edge as shown in Fig. 5 and 6). If it is not returned to the specified position, rod stroke will be insufficient during automatic operation.

If excessive force is applied when the handle is moved past the specified position, the manual override may be damaged.

- When the crank handle 205 is turned clockwise, the valve stem 5 moves toward the valve-closed position. When it is turned counter-clockwise, the valve stem moves toward the valve-open position.
- For operating the valve in the automatic operation mode, be sure to return the handle to the specified position as shown in Fig. 5 and 6.

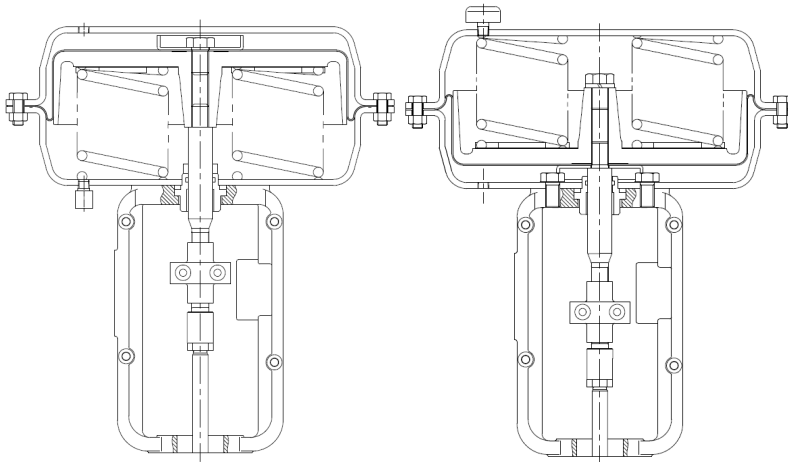


Fig. 5. Direct action (DA) type Fig.6. Reverse action (RA) type

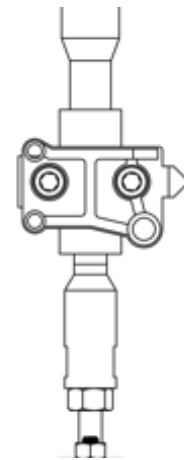


Fig.7. Stem adapter

Structure

Actuator without manual operation unit

In this actuator, the air-pressure signal from the controller or the air-pressure output from the positioner is received by the diaphragm and the intended output and positioning are achieved in force balance with the spring. This actuator consists mainly of the steel diaphragm case, diaphragm, multi-spring (4 to 8 pieces) and the output shaft.

For each size of the actuator, two types are available. One is the direct action (the valve closes when the air-pressure to the diaphragm chamber is increased), and the other is the reverse action (it opens when the air-pressure to the diaphragm chamber is increased).

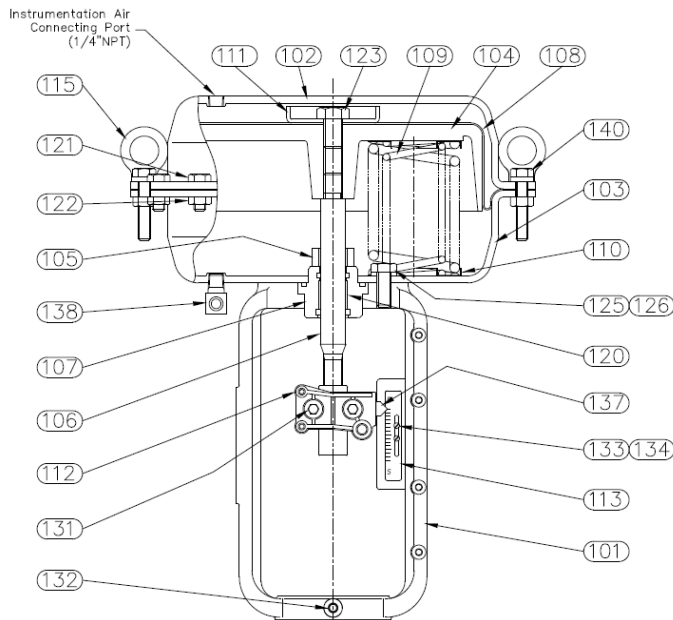


Fig. 8. D52B and D52C

Structure of direct-action type and part names

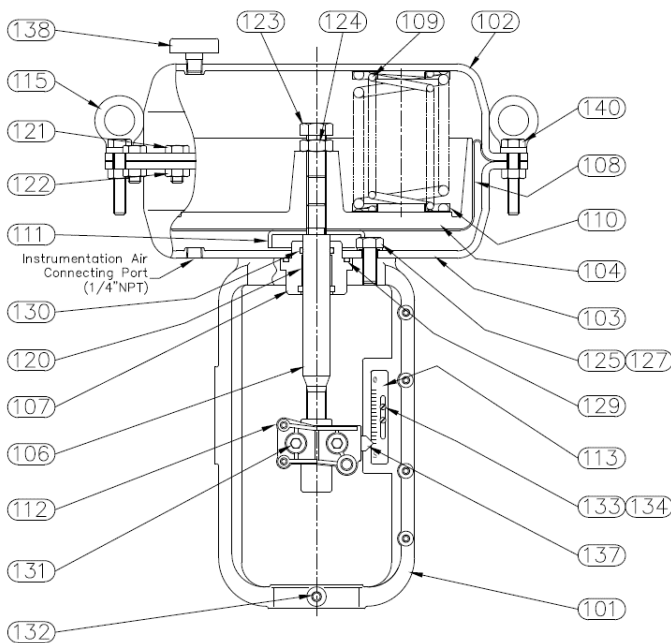


Fig. 9. R52B and R52C

Structure of reverse action type and part names

No.	Name
101	Yoke
102	Diaphragm upper case
103	Diaphragm lower case
104	Diaphragm plate
105	Stopper
106	Actuator rod
107	Guide holder
108	Diaphragm
109	Spring
110	Spring seat
111	Center plate
112	Connector
113	Scale plate
115	Hanging ring
120	Dry bearing
121	Hexagon bolt
122	Hexagon nut
123	Hexagon bolt
124	Hexagon nut
125	Hexagon bolt
126	Spring washer
127	Seal washer
129	O-ring
130	O-ring
131	Hexagon socket head bolt
132	Hexagon socket set screw
133	Small cap screw
134	Speed nut
137	Indicator
138	Exhaust plug
140	Hexagon bolt

Manual override

The manual operation unit is an optional accessory used to open and close this control valve when operational air supply is not available. The structure is shown in Fig. 10 and 11.

(1) Model: D52B/R52B, D52C/R52C

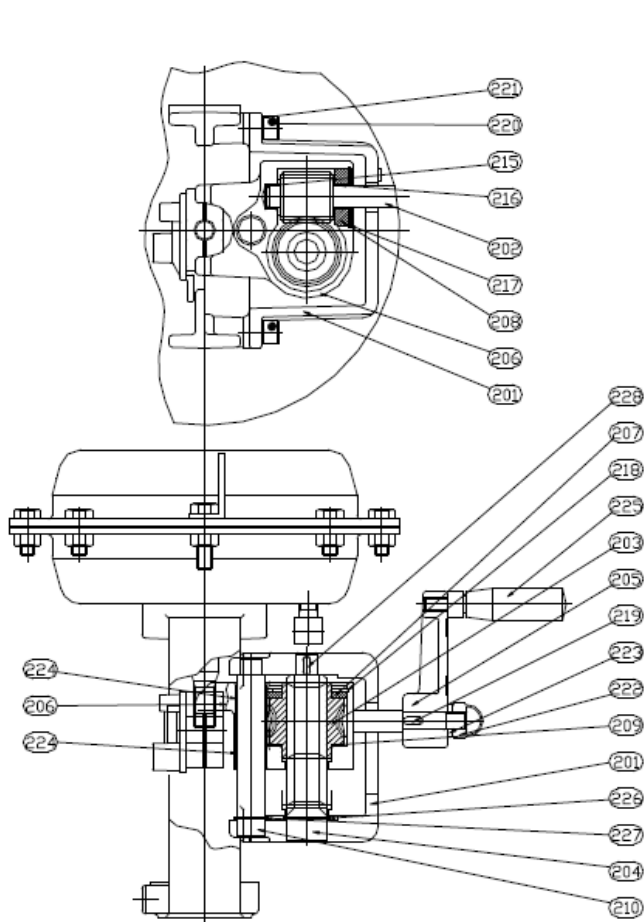


Fig. 10. Direct action type

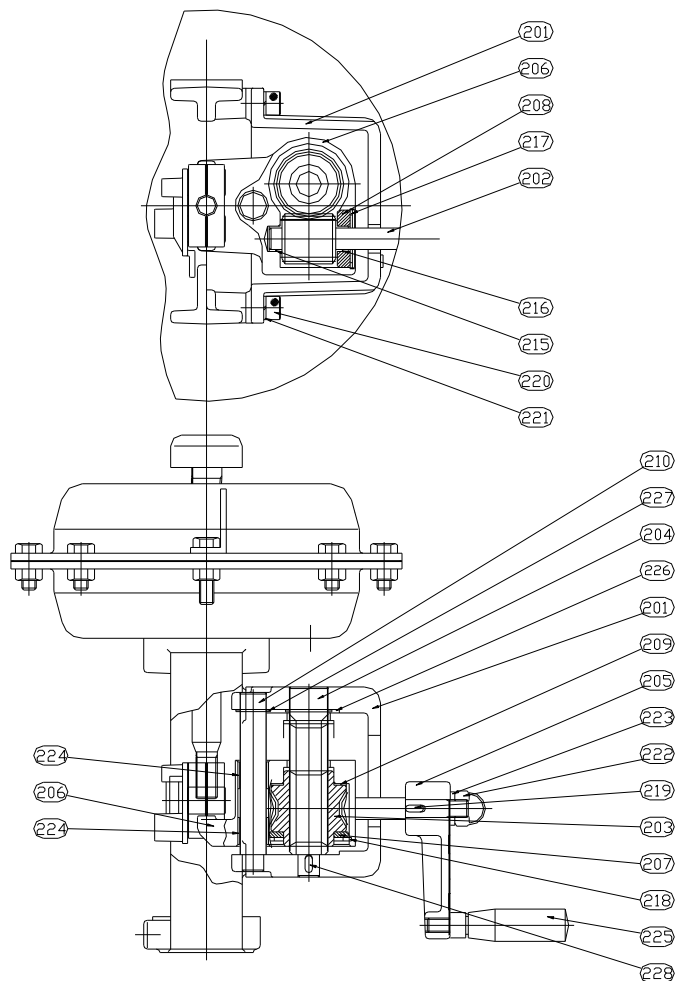


Fig. 11. Reverse action type

No.	Name	No.	Name	No.	Name
201	MO cover	209	Thrust ring	221	Conical washer for hex socket head
202	Worm and handle shaft	210	Guide shaft	222	U-nut with cap
203	Worm wheel	215	DU bushing	223	Spring washer
204	Screw rod	216	DU bushing	224	DU bushing
205	Crank handle	217	C-ring	225	Grip
206	Slide nut	218	C-ring	226	C-ring
207	Worm wheel guide	219	Key	227	C-ring
208	Worm guide holder	220	Hex socket head bolt	228	Key

Principle of Operation

See Fig.8, 9 and 12 for the encircled part numbers.

Direct operation

In the direct action (DA) type, the valve closes when the air-pressure to the diaphragm chamber increases. When air-pressure is supplied from the instrument air connecting portion the diaphragm upper case 102 to the diaphragm chamber, which consists of the diaphragm upper case, the diaphragm 108 and the diaphragm plate 104, both of which are closely set together, are activated to press down the spring 109 and move downward. At the same time, the actuator rod 106 fixed with the diaphragm and the diaphragm plate moves down.

Subsequently the movement of the actuator rod is transferred to the valve stem 5 via the connector 112 to move it to the valve-close position. Then when the air-pressure to the diaphragm chamber is decreased, the diaphragm, the diaphragm plate and the actuator rod move upward by means of the reaction force of the spring and the stem also moves toward the valve-open position.

Reverse operation

In the reverse action (RA) type, the valve opens when the air-pressure to the diaphragm chamber increases. When air-pressure is supplied from the instrument air connecting port on the diaphragm lower case 103 to the diaphragm chamber, which consists of the diaphragm lower case, the diaphragm 108 and the diaphragm plate 104, both of which are closely set together, are activated to press up the spring 109 and move upward. At the same time, the actuator rod 106 fixed with the diaphragm and the diaphragm plate moves upward.

Subsequently the movement of the actuator rod is transferred to the valve stem 5 via the connector 112 to move it to the valve-open position. Then when the air-pressure to the diaphragm chamber is decreased, the diaphragm, the diaphragm plate and the actuator rod move downward by means of the reaction force of the spring and the stem also moves toward the valve-closed position.

Daily Inspection and Periodic Inspection

Daily inspection

Perform daily inspection for the control valve are important for process operation.

- Check that air is not leaking from the instrument air pipe connecting port to prevent malfunction.
- If a positioner is provided, check that hunting is not occurring, and the movement of the stem is smooth.
- Check that abnormal noise and vibration is not occurring in the control valve and the piping.

If abnormality is found in daily inspection and yet countermeasures cannot be taken immediately, perform maintenance by disassembly when the plant can be suspended or ask KOSO's service representative in charge for repair.

Periodic inspection

Monthly or bimonthly inspection

Perform the following inspections for all the control valves.

- To prevent malfunction, check that air is not leaking from the instrument air pipe connecting port.
- If a positioner is provided, check that hunting is not occurring, and the movement of the stem is smooth.
- While making adjustment, check that abnormal noise and that vibration is not occurring in the control valve and the piping.

If abnormality is found in the inspection, and yet countermeasures cannot be taken immediately, perform maintenance by disassembly when the plant can be suspended, or ask KOSO's service representative in charge for repair.

Yearly or biennial inspection and maintenance

Perform inspection, check, lubrication, replacement, etc. for the following items.

- Lubricate the frictional section of the actuator rod and manual operation unit. Use plant approved lubricants. The factory used lithium grease. Consult factory for additional help.
- Check the O-rings, seal washer and dust seal (optional) for wear.
- Check that there is no flaws such as cracks on the diaphragm.
- Check the bolts and nuts for material loss from wear and corrosion.
- If any defective part is found, replace it with new one.

Troubleshooting and Remedies

Symptom	Cause	Remedy
No or slow operation	<ul style="list-style-type: none"> • Decrease of supply air-pressure 	<ul style="list-style-type: none"> • Supply the specified air-pressure.
	<ul style="list-style-type: none"> • Clogging or leakage from the air piping 	<ul style="list-style-type: none"> • Clean the piping, retighten the connecting portion or re-arrange the piping.
	<ul style="list-style-type: none"> • Air leakage from the clamping parts of diaphragm 	<ul style="list-style-type: none"> • Retightening, disassemble and repair (replacement)
	<ul style="list-style-type: none"> • Air leakage from the actuator rod unit 	<ul style="list-style-type: none"> • Disassemble it to replace the O-ring.
	<ul style="list-style-type: none"> • Issue with the accessories such as positioner, booster relay, solenoid valve and lock valve 	<ul style="list-style-type: none"> • Apply the specified air-pressure directly to the instrument air connecting port of the actuator, not through the accessories. If no anomaly is found with it, re-adjust the booster relay and positioner or check the accessories and replace them.
	<ul style="list-style-type: none"> • Issue with the actuator 	<ul style="list-style-type: none"> • Disassemble and repair the actuator.
	<ul style="list-style-type: none"> • The manual operation handle is set in the manual operation position. 	<ul style="list-style-type: none"> • Set the handle to the position shown in Fig. 5 or 6 in "Operation" section.
Instable operation (hunting)	<ul style="list-style-type: none"> • Sensitivity of the positioner is insufficient. 	<ul style="list-style-type: none"> • Follow the instructions in the operation manual for the positioner and replace the capacitor spring.
	<ul style="list-style-type: none"> • Load change by the control fluid (Insufficient output of the actuator) 	<ul style="list-style-type: none"> • Enlarge the size of the actuator.
	<ul style="list-style-type: none"> • Signal perturbation of the controller 	<ul style="list-style-type: none"> • Change the respective setting of the controller.
	<ul style="list-style-type: none"> • Fluctuation of supply air pressure 	<ul style="list-style-type: none"> • Re-check the diameter of supply air piping. Replace it.
	<ul style="list-style-type: none"> • Malfunction of the pressure reducing valve 	<ul style="list-style-type: none"> • Repair the pressure reducing valve or replace it.

Disassembly

Please follow below instructions when disassembling this actuator.

Separating the valve and actuator

Follow the procedure indicated below.

- Follow the instructions given below for separating, ensure not to damage the valve seat surface.
 - For the direct-action type, reduce the air-pressure within the diaphragm chamber to zero (valve-open state).
 - For the reverse action type, apply air-pressure to the diaphragm chamber and keep the valve 10 to 40% open.
- Loosen the hex socket head bolt 131, which fastens the connector 112 shown in Fig. 12, to remove the indicator 137. The state is to be as shown in Fig. 13.
- Apply a rectangle-tipped chisel to the concave section of the yoke nut 17 and hit it with a hammer to loosen the nut as shown in Fig. 14.
- When the hex socket set screw 132 in Fig. 14 is loosened, the actuator can be separated from the valve unit.

When installed on a Hammel Dahl control valve, the stem 5 will include a stem adapter as shown in Fig. 12A. When valve maintenance is required, remove the stem adapter 5A and hex jam nut 5B.

- Lower the hex jam nut, separating it from the stem adapter.

Unthread the stem adapter and then the jam nut, removing both from the valve stem 5.

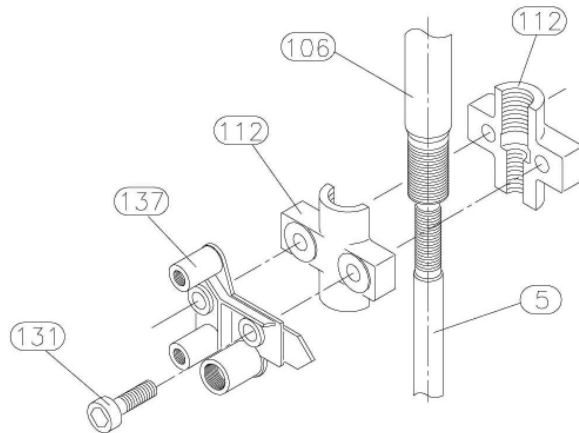


Fig. 12.

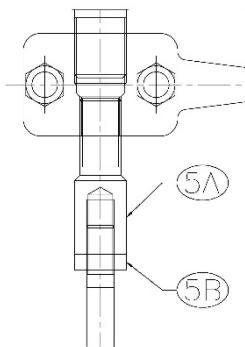


Fig. 12A.

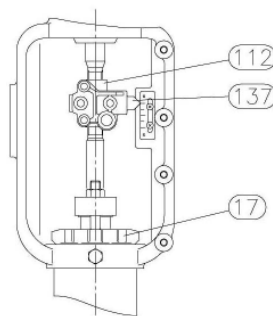


Fig. 13.

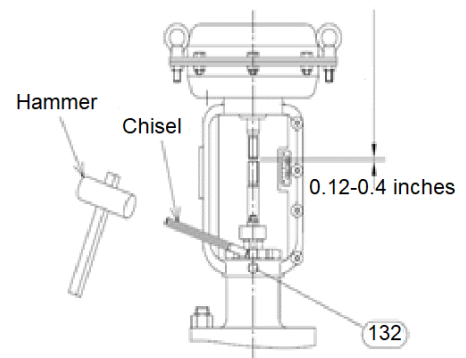


Fig. 14.

Disassembling the actuator

See Fig. 8 and 9 for circled part numbers.

Take care not to damage the diaphragm front/rear surfaces and the actuator rod surface during disassembly work.

Do not disassemble the assembly of the diaphragm and actuator rod unless any anomaly is found in a visual inspection of the following parts.

Parts to be inspected: The diaphragm front/rear surfaces and the actuator rod surface.

(1) Removing the accessories

When the accessories are mounted on the actuator, remove the air piping and electric wiring carefully and then the device itself.

(2) Disassembly of the direct-action type

- Do not loosen the hex nuts 122 to which the hanging ring 115 is attached. Loosen the other hex nuts 122 and remove the hex bolts 121.
- Loosen the hex nuts, which fasten the two long hex bolts 140, equally and remove these two bolts. These two pieces each of long hex bolts and nuts set the initial load of the spring. When these hex bolts are removed, the spring is at free length.
- Remove the diaphragm upper case 102.
- In this state, pull out the diaphragm/actuator rod assembly (the diaphragm 108, the diaphragm 104, the actuator rod 106, the center plate 111 and the hex bolt 123) from the guide holder 107.
- Remove the springs 109, the stopper 105 and the spring sheet 110.

When disassembling the diaphragm/actuator rod assembly, follow the instructions shown below.

- The joint between the hex bolt 123 and the actuator rod is coated with screw lock to prevent from loosening. For loosening the hex bolt, tighten the double hex nut on the threaded portion of the actuator rod for mounting the connector and loosen the hex bolt while fixing that nut with a spanner wrench. And then the diaphragm/actuator rod assembly can be disassembled.
- When the hex bolts 125 are loosened and removed, the diaphragm lower case 103, the spring washers 126 and the guide holder can be separated from the yoke 101.

Disassembly is completed with the above procedures. Check all the parts and replace them with new parts when any damage is found with them.

(3) Disassembly of the reserve action type

- Do not loosen the hex nuts 122 to which the hanging ring 115 is attached. The hex bolts 140 with the hanging rings 115 are longer than the other hex bolts 121. Loosen the other hex nuts 122 and remove the hex bolts 121.
- Loosen the hex nuts, which fasten the two long hex bolts 140, equally and remove these two bolts. These two pieces each of long hex bolts and nuts set the initial load of the spring. When these hex bolts are removed, the spring is at its free length.
- Remove the diaphragm upper case 102. Remove the spring and the spring seat 110.
- In this state, pull out the diaphragm/actuator rod assembly (the diaphragm 108, the diaphragm plate 104, the actuator rod 106, the center plate 111, the stopper 105, the hex bolt 123 and the spring washer or the hex nut 124) from the guide holder 107.
- Follow the instructions shown below for disassembling the diaphragm/actuator rod assembly.
- Threaded joint of the Diaphragm plate 104 and the actuator rod 106. Loosen the hex nut 124 and remove the hex bolt 123. Using a vise to hold the diaphragm plate, remove the hex

nut 124. Tighten the double hex nut on the threaded portion of the actuator rod for mounting the connector. And then loosen and remove the actuator rod 106 from the diaphragm plate 104 by utilizing the double hex nuts and fitting with a spanner wrench.

- When the hex bolts 125 are loosened and removed, the seal washers 127, the diaphragm lower case 103 and the guide holder 107 can be separated. The O-ring 130 attached to the guide holder can also be removed.

Disassembly is completed with the above procedures. Check all the parts and replace them with new ones if any damage is found.

(4) Disassembly of the manual operation unit

- When the hex socket head bolt 220 is removed, the manual operation unit can be removed from the yoke 101. The parts within it can be checked in this state. If no damage is found, it is not required to disassemble it. If any damage is found, contact our service department to repair it or replace it with a new one.
- When the U-nut with a cap 222 is removed, the crank handle 205 and the grip 225 can be removed.
- The C ring is removed and the guide axis 210 is removed from the MO cover 201.
- Slide nut assembly (the screw rod 204 and the key 228) can detach by removing C ring 226 from the MO cover 201.
- When the C-ring 217 of the slide nut assembly is removed, the worm guide holder 208 and the worm and handle shaft 202 can be disassembled.
- When the C-ring 218 of the slide nut assembly is removed, the worm guide holder 207 and the worm wheel 208 can be disassembled.

Disassembling is completed with the above procedures. Check all the parts and replace them with new ones if any damage is found.

Assembly

Assembling the actuator

When assembling the actuator, reverse the disassembling procedure found in “Disassembling the actuator” section. Replace the worn or damaged parts, if found, with new ones. Supply the lubricant, shown in the “Periodic Inspection” section, to the sliding surfaces of actuator rod, torque lever, roller unit and manual operation unit.

When assembling the diaphragm, be sure that the rubber side (KOSO mark side) is the side, to which air pressure is applied.

Be sure to use new parts for the o-ring 130.

Replace the diaphragm 108 and the packing 117 about every 5 years.

Assembling the actuator and the valve

Assemble the actuator and the valve unit as follows.

- Set the yoke in the same position as before disassembling it and fix it with the hex socket set screw 132. Then completely tighten the yoke nut to reverse direction as shown in Fig. 13. Use the same tools and procedure, which were used for separating them.
- Lower the stem 5 and check that the plug contacts the valve seat surface.
 - When installed on a Hammel Dahl control valve, the stem 5 will require a stem adapter as shown in Fig. 12A. Prior to installing the stem connector, install the stem adapter and locking nut.
 - Thread the locking jam nut to the bottom of the valve stem thread, allowing the nut to remain loosely fitted.
 - Thread the stem adapter onto the valve stem completely. No additional torque is required.
 - Thread the locking jam nut toward the stem adapter, contacting the stem adapter and with sufficient force to lock the adapter in place.
- Follow the instructions given in the “Operation” section-(2) “Adjustment of actuator off-balance”.

Adjustment after Assembly

On completion of the assembly, check the following. If there are any trouble, disassemble the unit, find and remove the cause, and then reassemble it again.

- Apply the specified air-pressure to the actuator and check that it operates smoothly.
- Check that the leakage quantity of the valve seat is within the specified value.
- Check the hysteresis and linearity are within the specified values.

Follow the instructions in “Installation” for mounting the assembly on the piping after adjustment of it.

Disposal of Product or Parts

Dispose of the product or its parts, consigning it to an industrial waste treatment services authorized by the governor of prefectural governments, or to a local municipal entity undertaking the disposal, according to the "Waste Disposal and Public Cleansing Law."

Maintenance Parts

Maintenance parts or expendables for replacing worn or damaged parts are available by ordering to any local distributors of our representatives listed below.

KOSO HAMMEL DAHL
253 Pleasant Street
W. Bridgewater MA 02379

Telephone: 774.517.5300
www.hammeldahl.com

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