

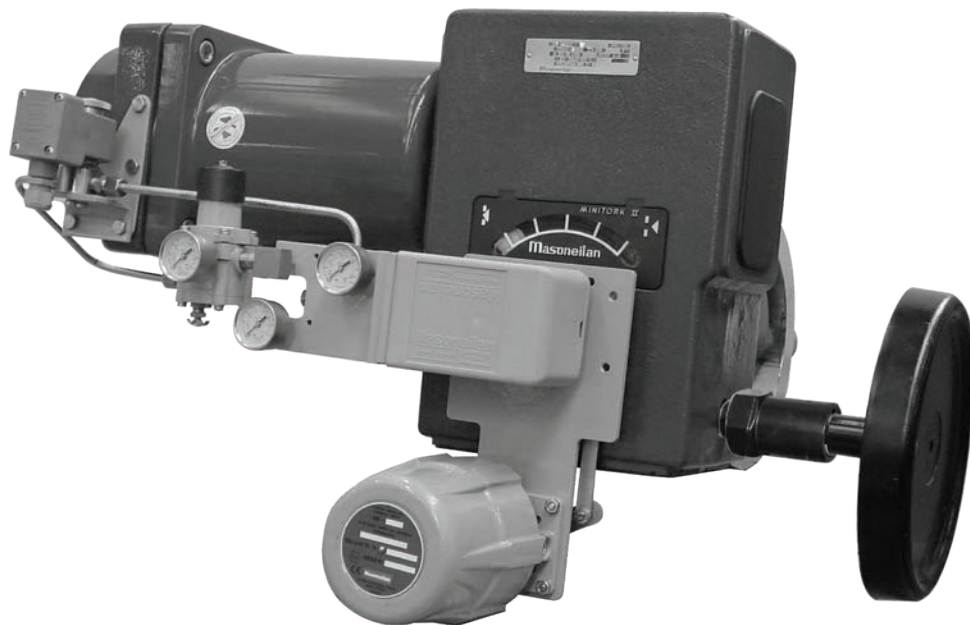
Masoneilan

a Baker Hughes business

37002 Series MiniTork™ II

Heavy Duty Control Butterfly Valve
with Actuator Model 35

Instruction Manual (Rev.A)



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Table of Contents

Safety Information	2
About this Manual	2
Useful Life Period	2
Warranty	2
Principle of Operation	3
Installation	3
Actuator	5
Changing Actuator Position Changing Valve Action.....	5
Air-To-Open / Air-To-Close	6
Actuator Stem Adjustment	6
Valve Maintenance	7
Body Disassembly and Reassembly.....	7
Packing Replacement.....	8
Figures	9
Parts Reference	10
Adding Packing	11
Lubrication.....	11
Actuator Maintenance	11
Diaphragm Replacement	11
Actuator Disassembly	11
Actuator Reassembly.....	11
Actuator Figures and Parts Reference.....	12

Safety Information

Important - Please read before installation

These instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your control valve. **DANGER** and **WARNING** hazards are related to personal injury. **CAUTION** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death. Total compliance with all **DANGER**, **WARNING**, and **CAUTION** notices is required for safe operation.



This is the safety alert symbol. It alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



When used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Note: Indicates important facts and conditions.

About this Manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Baker Hughes's written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the **Masoneilan™** 37002 Series MiniTork II control valves, and do not apply for other valves outside of this product line.

Useful Period

The current estimated useful life period for the 37002 Series MiniTork II control valves is 25+ years. To maximize the useful life of the product, it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. The specific operating conditions will also impact the useful life of the product. Consult the factory for guidance on specific applications if required prior to installation.

Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usages. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

Note: Prior to installation:

- The valve must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.

Principle of Operation

MiniTork is a compact, flangeless, butterfly valve, designed to reduce dynamic torque, bending of working parts and play. The low torque applied to the disk is symmetrical around the shaft. Fluid can flow through the valve in both directions owing to the symmetry of the valve body and the disk with reversed blades. The disk is driven by a stainless steel, monobloc shaft firmly supported by two bearings inside the body and a ball bearing in the support. The ball bearing takes up the axial thrust of the shaft resulting from the pressure in the piping and ensures that the disk is centered. Power is provided by a rotating diaphragm spring actuator (see Figure 1).

The actuator can be mounted either in air-to-close mode (the valve opens on air failure), or in air-to- open mode (the valve closes on air failure).

With its long bonnet built into the body, the MiniTork valve is capable of handling a wide range of temperatures. The bonnet offers a large radiant surface to normalize the packing temperature. This means that a single grade of self-lubricating packing (PTFE fibers braided around a kevlar core) can be used from -130°C to + 260°C (from -200°F to +500°F).

When insulating a valve, take care not to insulate the bonnet.

Installation

Preliminary Steps

Before installing the valve in the line, clean piping of all foreign material such as welding chips, scale, oil, grease or dirt.

Note the details given on the nameplate for reference at a later date. When ordering spare parts, always quote the serial number as well as the valve model number.

Valve Body

1. The MiniTork valve is flangeless and is designed to ANSI 300 lb class. It can be installed between flanges machined to the following standards:
ANSI: 125, 150, 250, and 300 lb.
AFNOR: PN 10, PN 16, PN 25 and PN 40.
DIN: ND 10, ND 16, ND 25 and ND 40.
2. Special bosses are provided on the body to help center the valve correctly in the line and prevent any rotation before tightening the flange bolts.
3. Use flat- or raised-face, welding-neck flanges with a bore size equal to the inner diameter of the line. When the valve is equipped with an elastomer sleeve, the flange bore equals the inner diameter of the sleeve and the flange faces must entirely cover the sleeve faces (see Figure 2).

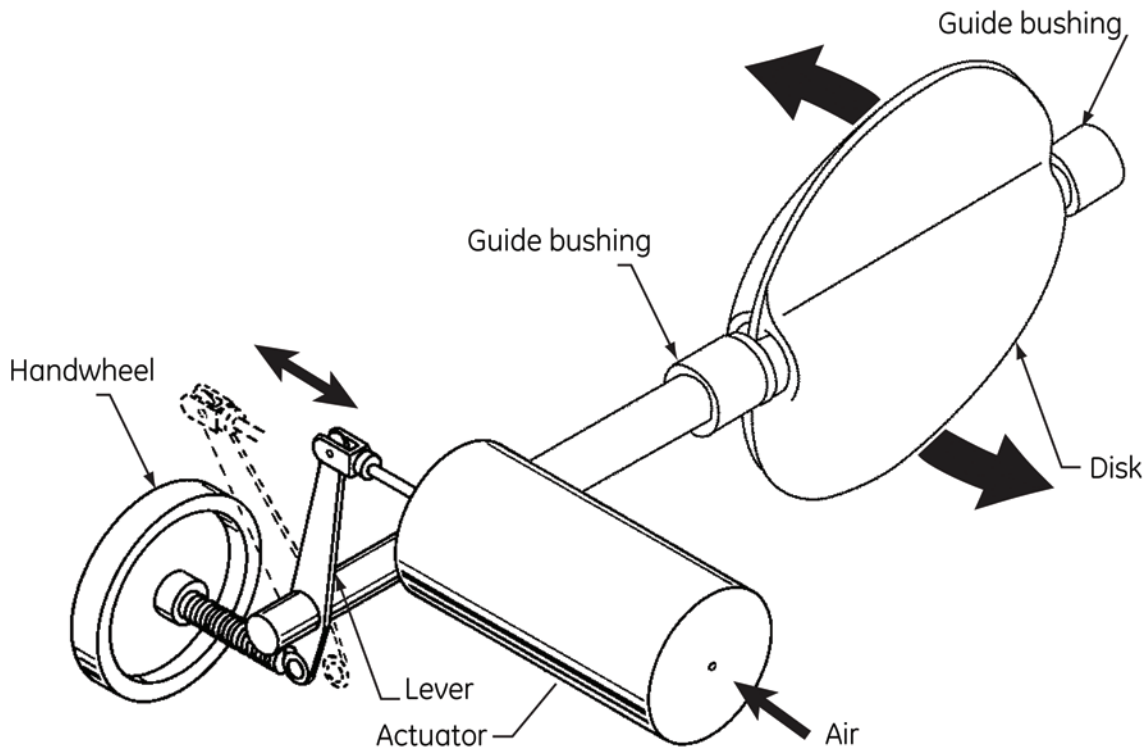


Figure 1 - Schematic Diagram

4. Before placing the valve in the line, install the lower flange bolting to provide a kind of cradle. This will help support the valve while installing the remaining bolts.
5. If the valve is installed in "air-to-close" mode, close it manually (using the handwheel) or by applying air pressure to the actuator.
6. Center the valve in the line (fit gaskets if the valve does not have a sleeve). Tighten the bolt nuts regularly and in a cross configuration. Although the elastomer sleeve does not have a lapped joint, it does provide perfect sealing.

Note: Valves with elastomer sleeves must be closed when they are installed to ensure even compression all over the sleeve.

7. Operation under negative pressure: The MiniTork sleeve is made of hard elastomer and cast on a steel ring. It slips into the body and can withstand negative pressures and high flow rates with no pressure equalizing line and with no bonding of any kind to the body.
8. For insulated installations, proceed as shown in Figure 3.
9. Turn the disk several times to check that it does not touch the flanges or piping.

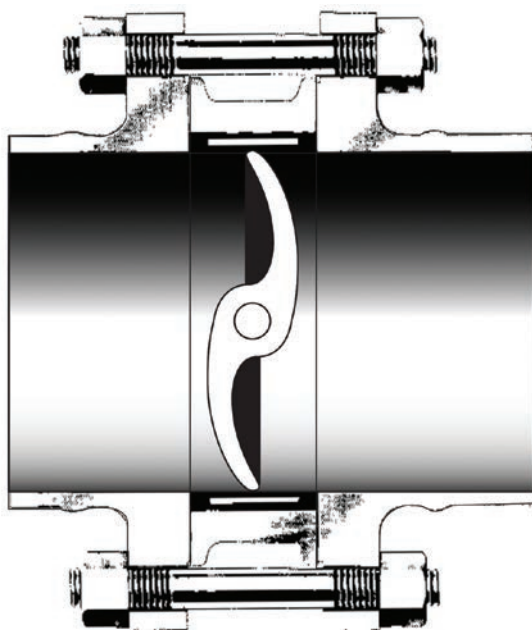


Figure 2
MiniTork with elastomer Sleeve

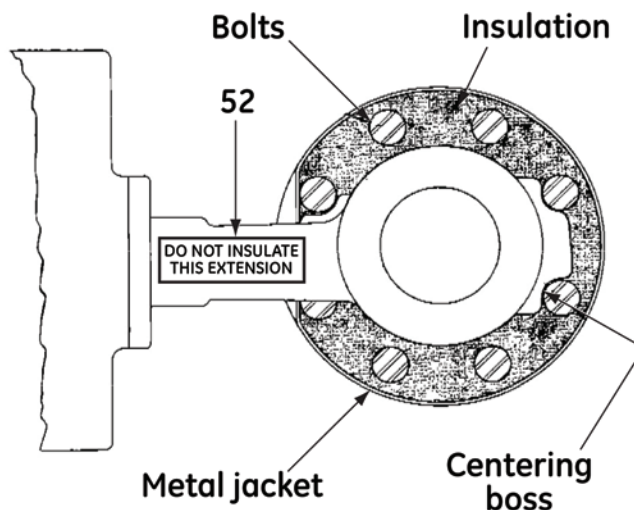


Figure 3
Insulation for a MiniTork Valve

Actuator

The actuator is mounted and adjusted as specified on the order and requires no further adjustment.

Note: *Before putting the valve into operation, back off the handwheel so that it will not interfere with the operation of the valve and tighten the handwheel lock (40).*

Changing Actuator Position

(Figure 4)

For each valve action (air-to-open or air-to-close) the actuator may be mounted in its standard position parallel to the pipe for lowest profile, or in any of three other positions (see Figure 4). Actuator position is usually determined by adjacent piping, obstacles of various types or air piping arrangements.

1. Bypass the MiniTork valve and relieve fluid pressure from the body.
2. In the case of an “air-to-open” valve, pressurize the actuator such that the lever (35) takes an intermediate position.
3. Remove bottom cover (30), front cover (21) and rear cover (18).
4. Remove clip (22) and back off the clevis pin (24). Loosen set screw (37).
5. Disconnect air (or electric) lines from the actuator (or its accessories).
6. If a positioner is mounted on the actuator, remove the cam. (Caution: see instructions for positioner before removing cam). If the valve is not supplied with a positioner, remove screw (27) and shaft cover (26).
7. Remove the nuts (13) from the packing box studs (17) and yoke studs (14).
8. Pull out together the yoke (34), packing box flange (16) and lever (35).
9. Refit the actuator and yoke assembly in the new position, chosen from one of four possible positions for each valve action.
Note: *If the actuator and yoke are to be rotated 90°, change the position of the packing box and yoke studs 90°. If the actuator and yoke are moved 180° from their original position, the packing box and yoke studs are not moved.*
10. Reassemble the yoke (34), packing box flange (16) and lever (35), adjusting their position relative to the actuator. Be sure that the lever has enough clearance to allow the plug to fully seat and unseat the valve. If necessary, adjust the lever accordingly.

11. Move lever (35) as far as possible along the shaft in the direction of the valve body. Tighten the set screw (37). Move the lever (35) and plug shaft (8) out until the shaft shoulders on the shaft bearing (25). Loosen set screw (37) and move the lever along the shaft until it contacts the shaft bearing. Retighten set screw (37). Hand tighten the two packing box stud nuts (13) to ensure even compression of packing flange (16). The two packing box nuts should be finger tightened plus one full turn.
12. Reconnect air lines to the actuator and pressurize it such that the lever (35) takes a position as outlined in the paragraph below: “Actuator Stem Adjustment”. Disconnect air lines from the actuator.
13. If a positioner is mounted on the valve, the cam must be refitted (see instruction sheet of positioner). If no positioner is mounted on the valve, refit shaft cover (26) with screw (27). Reconnect air (or electric) lines to the actuator (or its accessories). Refit covers (30), (18) and (21).
If necessary, refer to instruction sheet of positioner for calibration. Put the valve into operation.

Changing Valve Action

Proceed as follows:

1. By-pass the MiniTork valve and relieve fluid pressure from body. Remove the front cover (21), rear cover (18) and spring barrel boss cover (33).
2. Pressurize the actuator such that the lever (35) takes an intermediate position. Remove clevis pin clip (22) and clevis pin (24) and release the pressure.
3. Remove cap screws (101) and lock washers (102). Separate actuator and install it on opposite side of yoke (34) with cap screws (101) and lock washers (102), applying proper torques. Refer to table of Figure 5 for proper screw torque values according to actuator size.
4. Reverse the position of limit stop (11) on lever (35). The limit stop must always be fitted on the opposite side from the clevis (100). It is set to the 43 mm position (see Figure 6).
5. Remove retaining ring (38) and washer (39). Remove handwheel (41), handwheel lock (40) and handwheel thread plug (36). Install handwheel (41) and handwheel lock (40) on opposite side of yoke from actuator. Replace washer (39), retaining ring (38) and handwheel thread plug (36).
6. Connect an air line to the actuator and make a zero adjustment of actuator and lever (35) as outlined under “Actuator Stem Adjustment”.
7. Reconnect air (or electric) lines to the actuator or its accessories). Refit covers (18), (21) and (33).

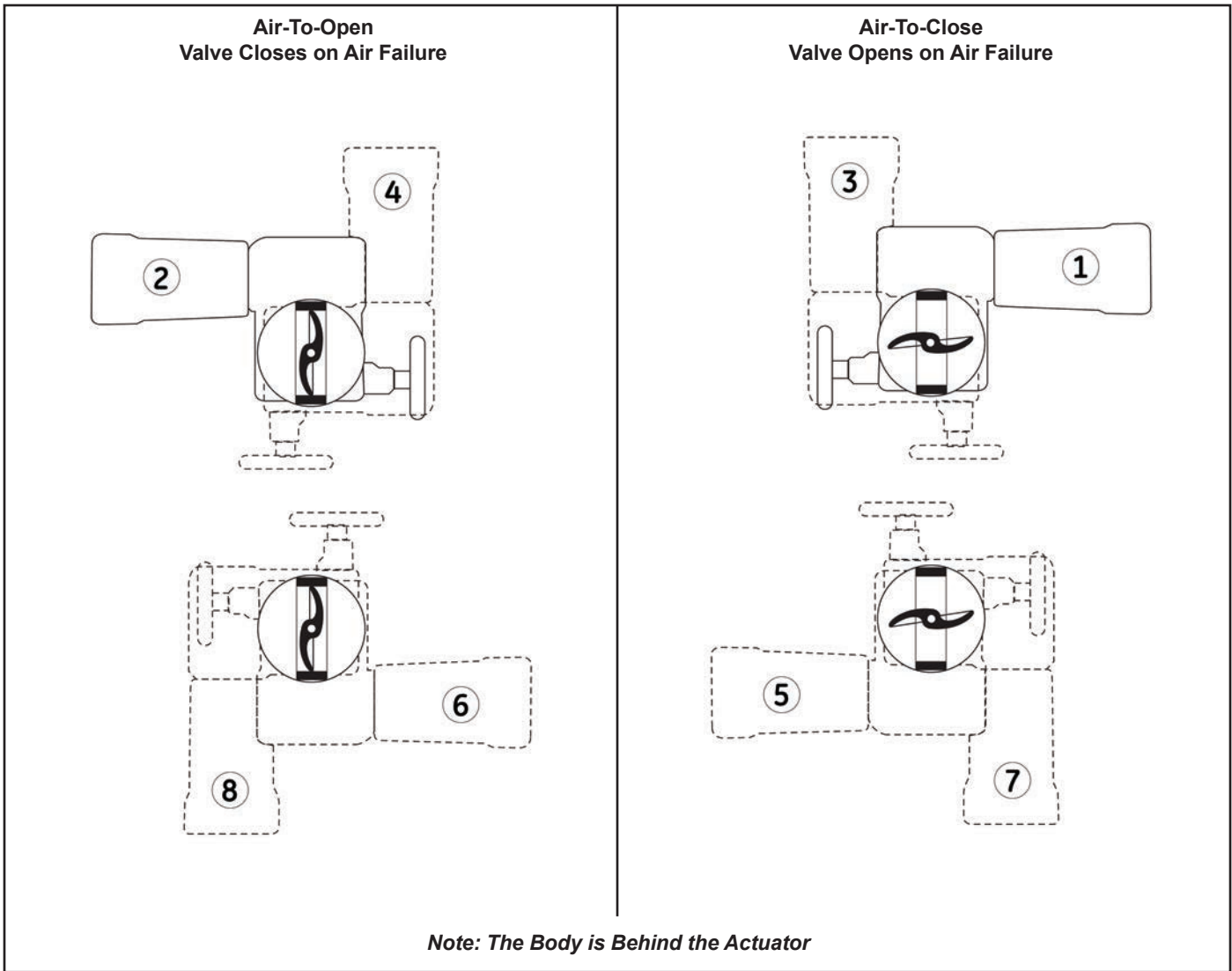


Figure 4
Changing Actuator Position

Actuator Stem Adjustment (Figure 6)

The position of the clevis (100) in relation to the actuator lever (35) is set in the factory and requires no further adjustment unless the type of valve action has been modified. If, when changing the position of the actuator-support assembly, the disk arm (35) is correctly positioned on the shaft, simply make a slight adjustment to the travel indicator (54).

If the clevis bore is not aligned with the disk arm bore when the valve is closed, loosen lock nut (111A) and screw or unscrew the clevis (100).

Valve Maintenance

MiniTork butterfly valves are a standard line of control valves, i.e. standard parts and materials cover a wide range of applications.

If emergency repairs ever become necessary, parts can probably be taken from any MiniTork valve of the same size in your stock.

In addition, some parts such as packing, bearings (for the same shaft diameter) are the same for Camflex, MiniTork and Ball valves

Body Disassembly

(Figures 5, 6, and 7)

1. Bypass the MiniTork valve and relieve fluid pressure from the body. Disconnect air (or electric lines) from the actuator (or its accessories) and remove the valve from the line

Note: In the case of an air-to-close valve, turn the handwheel or apply air pressure to set the disk to the closed position.

2. Remove front cover (21), rear cover (18) and bottom cover (30).
3. Remove clip (22) and back off the clevis pin (24). Remove air supplied at step 1.
4. If a positioner is mounted on the valve, disconnect the cam from the plug shaft (8) (Caution: see instruction sheet of positioner before removing cam). If the valve is not equipped with positioner, remove the screw (27) and the shaft cover (26). Remove screws (101) and lock washers (102), then remove the actuator from the yoke (34).
5. Before continuing the disassembly procedure, mark the exact position of the arm (35) on the shaft (light punch mark, pencil mark, etc.).

Note: the slot located at the end of the shaft indicates the position of the disk in the valve body.

6. Loosen the cap screw (37) and remove the nuts (13) from the packing box studs (17) and the yoke studs (14). Using a mallet, gently tap the side of the yoke on the body end and remove the yoke (34) and lever (35) assembly.
7. Drive out the disk studs (4) and remove the shaft from the valve body. If this proves difficult, remove the packing (10), then by using a pipe nipple of suitable size between the flange and disk arm tightened firmly on the shaft, and reversing the packing flange and nuts (13), the shaft may be drawn out of the body by unscrewing nuts (13) (See Figure 3).
8. Remove the valve body (4), the packing-box ring (9) and the spacer tube (7). **If the valve body has an elastomer sleeve (2)**, remove the sleeve and the two O-rings (3). Lastly, disengage the bearings (6) and the spring (50). (There is no spring (50) on valves with an elastomer sleeve. See Figure 5).
9. Examine all parts for damage due to erosion corrosion or wear. Replace all defective parts, pins (51) and all packing. Clean all reused parts thoroughly prior to reassembly.

Body Reassembly

(Figures 5 and 6)

1. Fit the spring (50) (**only on valve bodies without sleeve**) and the lower bearing in the body. Coat the shaft (8) with Molykote G (or equivalent) along the entire surface roughly corresponding to the spacer tube
2. **If the valve is equipped with a sleeve**, coat the two O-rings (3) with silicone grease and fit them inside the sleeve. Slide the sleeve into the body and align the shaft entry bore holes with those of the body (see Figure 5).
3. Slip the upper bearing and spacer tube onto the shaft. Place the disk in its normal position inside the body and feed the shaft all the way into the body, together with the parts previously fitted with it.

Note: The pin holes in the disk must be facing the packing box. If the valve is equipped with a sleeve, coat the perimeter of the disk with silicone grease so that the disk can be fitted more easily.

4. Secure the body assembly on a vise and lock the disk in the closed position (i.e. disk centerline on the plane of the body).

Note: If the shaft and disk are reused, check that the pin hole taper matches that of the shaft holes.

If reusing the shaft and disk, fasten the two parts together using new pins.

Note: When replacing a shaft, the old disk may be used as a guide for drilling and reaming the pin holes. If a new disk is required, the holes of the old shaft cannot be used. For this reason, a new disk may not be ordered without a shaft.

5. Install the packing box ring (9), the packing (10) and the packing gland (15). The oblique section of each ring must be shifted 120° in relation to that of the previous ring.
6. Slip the yoke (34) some of the way over the end of the shaft, at the same time fitting the following parts in the order shown below: packing box flange (16), disk arm (35) and ring (5). Lastly, finish fitting the yoke on the studs (14) by fitting the shaft into the bearing (25). Apply the lever (35) against the spacer tube (5) and tighten the yoke nuts (13). Screw the packing box nuts onto the studs (17) but do not tighten them.

Note:

- a) **During this operation, make sure that the position of the yoke on the studs complies with the action and position selected for the actuator.**
- b) **Also make sure that the arm (35) is in the correct position on the shaft. Refer to the markings made during disassembly. If parts have been replaced, assess their final relative position by holding them one in front of the other before fitting them. For this purpose, if the shaft or disk or both have been replaced and the two parts are not pinned together, remember to align the slot at the end of the shaft with the disk (the disk being locked in the closed position).**

7. Insert two identical shims between the disk and the valve body, on either side of the shaft (**except for valves equipped with a sleeve**). If a new disk and/or shaft has/have been fitted, pull the shaft until it shoulders on the ball bearing (25) using a washer of suitable dimensions and a socket head cap screw (dimensions given in Figure 7). Make sure that the slot at the end of the shaft is still aligned with the disk.
 8. Fit the actuator and tighten it using cap screws (101) and lock washers (102) to the torque value indicated in Figure 5.
 9. If the limit stop (11) has been removed, it must be refitted at the 43 mm setting, then locked using the nut (20) on the opposite side from the clevis (100) (see Figure 6).
 10. Couple the clevis and the actuator on the arm (35) as follows:
 - a) **For air-to-open valves:**
Place the lever (35) so that the disk (4) is in the closed position and fit the clevis (100) on the lever (35). Fit the clevis pin (24) and then the clips (22).
Lock the nut (111A) and screw (37).
 - b) **For air-to-close valves:**
Apply enough pressure to the actuator for the clevis to travel 184 mm.
Place the lever (35) so that the disk (4) is in the closed position and fit the clevis (100) on the lever (35).
Fit the clevis pin (24) and then the clips (22).
Lock the nut (111A) and screw (37)
 11. **When fitting a new disk and/or shaft**, pin the disk to the shaft as follows:
Drill and ream two holes through the disk and shaft following the indications given in the following table. Insert the pins (51) and drive them home using a press or hammer. Make sure that the disk is properly supported during this operation to avoid accidental shaft bending.
 12. Fasten the travel indicator (23) onto the lever (35) on two spacer tubes (29) using a screw (53).
Fit the front cover (21) and check the position of the indicator (23) with the valve closed.
Adjust if necessary.
 13. Remove the screw (27) and washer (26) from the end of the shaft.
If the valve is equipped with a positioner, refit and calibrate it. Otherwise, refit the shaft cover (26) using the screw (27).
 14. **For valves equipped with a handwheel:**
Remove the plug (36) and screw on the handwheel assembly. Refit the washer (39) and the handwheel Truarc pin (38).
The handwheel is always mounted on the opposite side from the actuator (see Figure 5).
 15. Refit the other covers.
 16. Refit the valve on the line and put into operation.
- Note: For air-to-close valves, set the disk to the closed position using the handwheel or by applying air pressure before refitting the valve.**

Packing Replacement

1. Disconnect air (or electric) lines from the actuator (or its accessories) and depressurize the valve.
2. Remove yoke (34), lever (35), actuator assembly and packing box flange (16) and gland (15) using procedure outlined under "Body Disassembly" above.
3. Extract worn packing using an extractor and replace with new packing, (see table below). Press down the packing.
4. Reassemble the actuator assembly, yoke, lever, and packing box gland and flange. Tighten packing box nuts evenly finger tight plus one full turn.

Rated Valve Sizes		Drilling Diameter (in.)	American Taper Reamer Reference
mm	in.		
50 to 150	2 to 6	No. 19(.166) Dia.	No. 2
200 to 300	8 to 12	1/4	No. 5

Figures

Actuator Size	Cap Screw (101) Required Torque (min. - max. daN. m)	Cap Screw (106) Required Torque (min. - max. daN. m)
7	4.0 - 11	4.0 - 11
9	7.0 - 10	7.0 - 10

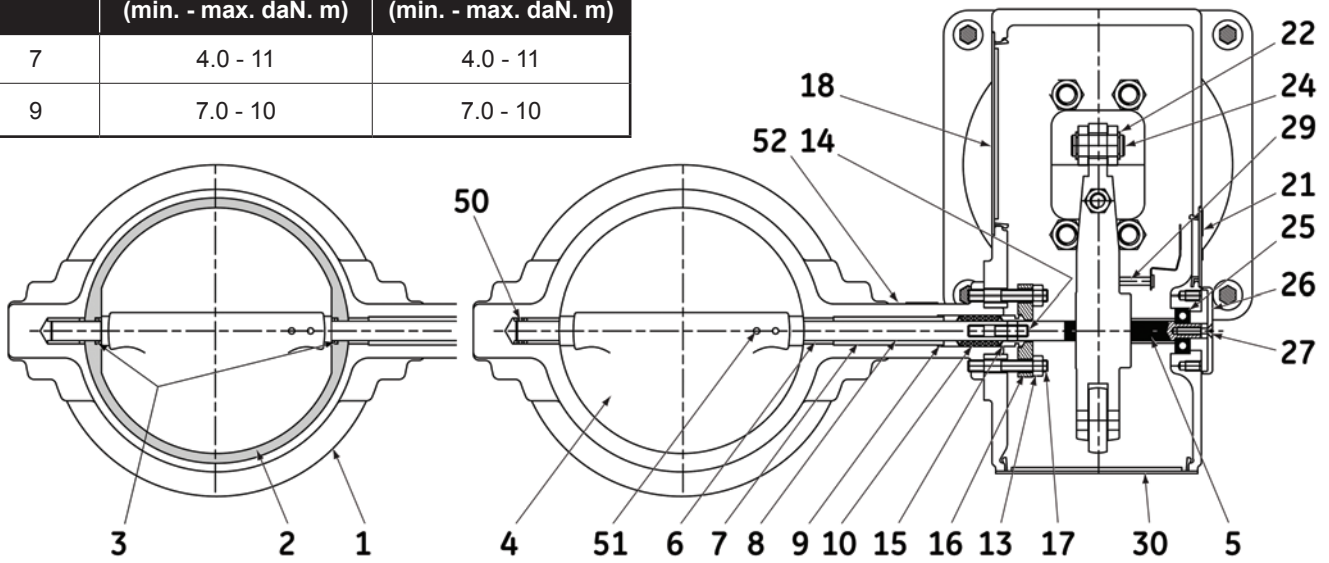


Figure 5
MiniTork Valve Body

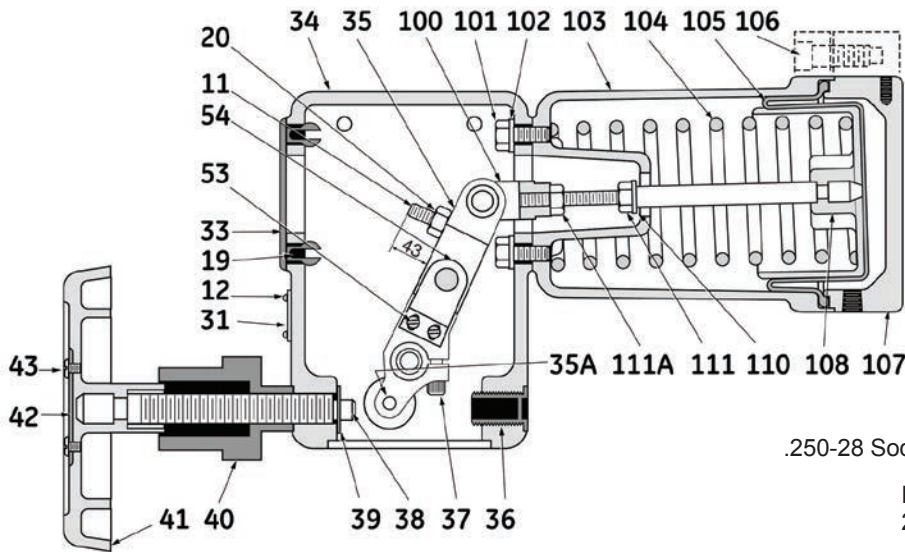


Figure 6
Yoke, Actuator and Handwheel

.250-28 Socket Head Cap Screw - .75 in. (19mm) long

Flat Washer: .25 in (6mm) thick
2.5 in. (65mm) O.D.: .266 in. (7mm) I.D.

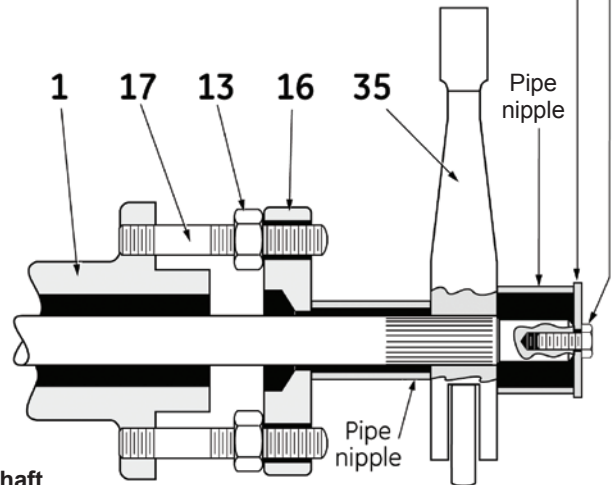


Figure 7
Extracting the Shaft

Parts Reference

Ref. No.	Qty	Part Name
1	1	Body
2	1	Sleeve
□ 3	2	O-ring
4	1	Disk
5	1	Lever Spacer Tube
6	2	Bearing
7	1	Spacer Tube
8	1	Shaft
9	1	Packing Box Ring
□ 10	1	Packing
11	1	Limit Stop
12	2	Plate Screw
13	4	Stud Nut
14	2	Yoke Stud
15	1	Packing Gland
16	1	Packing Flange
17	2	Packing Flange Stud
18	1	Rear Cover
□ 19	4	Cover Screw
20	1	Lock Nut
21	1	Front Cover S/A
22	2	Clevis Pin Clip
23	1	Indicator Dot
24	1	Clevis Pin
25	1	Ball Bearing
26	1	Shaft Cover
27	1	Cover Screw
29	2	Indicator Spacer Tube
30	1	Bottom Cover
31	1	Nameplate
33	1	Boss Cover

Ref. No.	Qty	Part Name
34	1	Yoke
35	1	Lever S/A
35A	1	Roller Bearing Pin
36	1	Handwheel Thread Plug
37	1	Lever Cap Screw
38	1	Handwheel Truarc Pin
39	1	Handwheel Washer
40	1	Handwheel Lock
41	1	Handwheel
42	1	Direction Plate
43	2	Plate Screw
□ 50	1	Spring
51	2	Pin
52	1	Warming Plate
53	2	Indicator Screw
54	1	Indicator
100	1	Clevis
101	4	Cap Screw
102	4	Lock Washer
103	1	Spring Barrel
104	1	Spring
□ 105	1	Diaphragm
106	4	Cap Screw
107	1	Diaphragm Case
108	1	Piston
110	1	Ring
111	1	Lock Nut
111A	4	Lock Nut

□ Recommended Spare Parts

□ Actuator No. 9 Only

□ Body with Sleeve

□ Body without Sleeve

Adding Packing

This operation can be done without removing the yoke and actuator assembly. It is necessary, as with packing replacement, to bypass the valve and remove pressure from the valve.

1. Remove packing box nuts and move the flange (16) and gland (15) close to the lever.
2. Insert new packing ring (10), retighten nuts and put the valve into operation.

Lubrication

Periodically lubricate the following parts with Molykote G or other suitable grease:

1. Roller bearing pin (35A).
2. Handwheel thread (41).

Note: Do not lubricate the external surface of the roller bearing in lever (35). Also the ball bearing (25) is permanently packed with grease and needs no further lubrication.

Actuator Maintenance

Diaphragm Replacement (Figures 8 to 10)

Actuator Disassembly

1. Bypass the valve and shut off stop valves.
2. Remove four cap screws (106) and remove diaphragm case (107). Remove diaphragm (105) and rubber cement, which holds diaphragm in place on the piston (108). Use an acetone-based diluent if necessary.

Actuator Reassembly

1. Apply coating of Neoprene glue (or similar) on the bead and on the inner face of the diaphragm (105), on the piston (108) and in the spring barrel lip (103). (The inner face of the diaphragm in contact with the piston is marked "Piston Side" ; be careful to keep coating of Neoprene within limits corresponding to flat part of piston (see Figure 9).
2. Center and place the diaphragm on the piston. Apply coating of talc to outer surface of diaphragm (see Figure 9).
3. Roll the diaphragm carefully inside the spring barrel (103) until the bead engages the spring barrel lip. Press the bead lightly and evenly to make the two Neoprene-coated parts stick together. Check that there is no twisting of diaphragm inside spring barrel (see Figure 10).
4. Fit diaphragm case (107) to the spring barrel after checking that air connection is on the correct side and that the threaded holes of the diaphragm case and the holes of the spring barrel line up. The bead must be clamped between lips of diaphragm case and spring barrel (see figure 11). Tighten four cap screws (106).

Valve Size (mm)	50	80	100	150	200	250	300
Number of Rings	7	7	7	7	6	6	6

Actuator Figures and Parts Reference

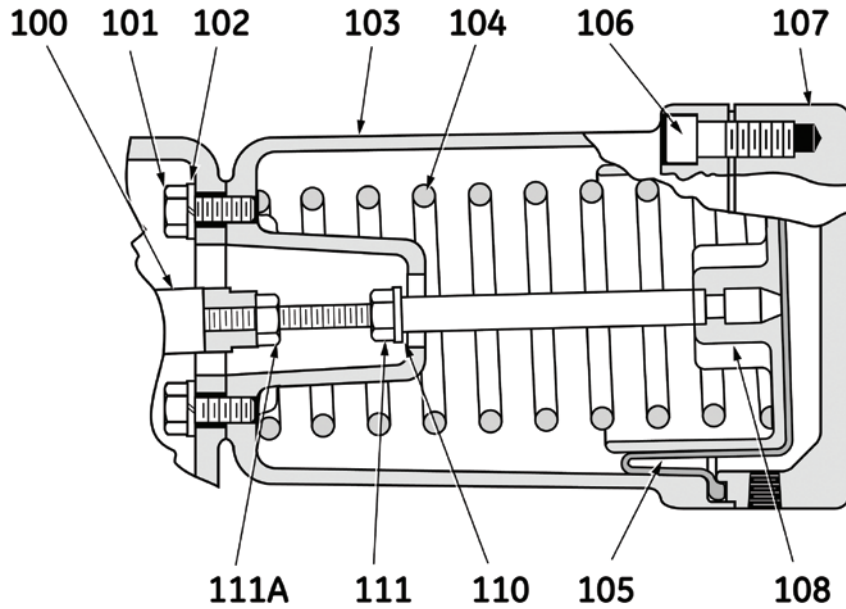


Figure 8 - Actuator Model 35

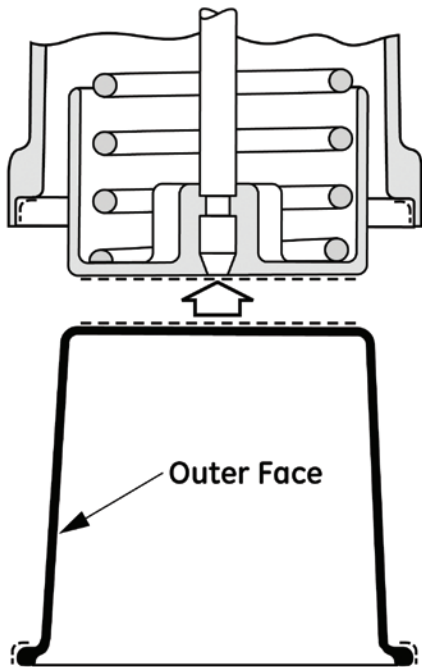


Figure 9

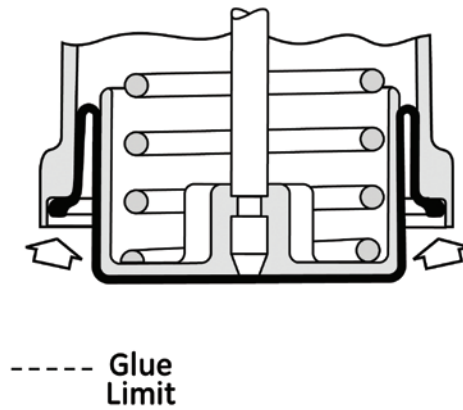


Figure 10

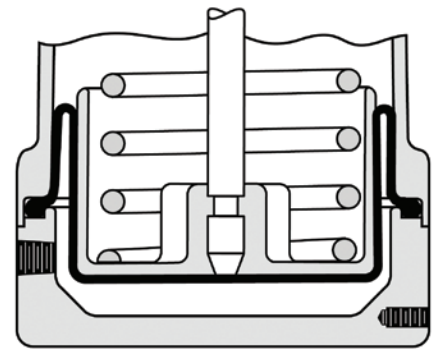


Figure 11

Ref.	Qty	Part Name
100	1	Clevis
101	4 □	Cap Screw
102	4 □	Lock Washer
103	1	Spring Barrel

Ref.	Qty	Part Name
104	1	Spring
□ 105	1	Diaphragm
106	4	Cap Screw
107	1	Diaphragm

Ref.	Qty	Part Name
108	1	Piston
110	1	Washer
111	1	Lock Nut
111A	1	Lock Nut

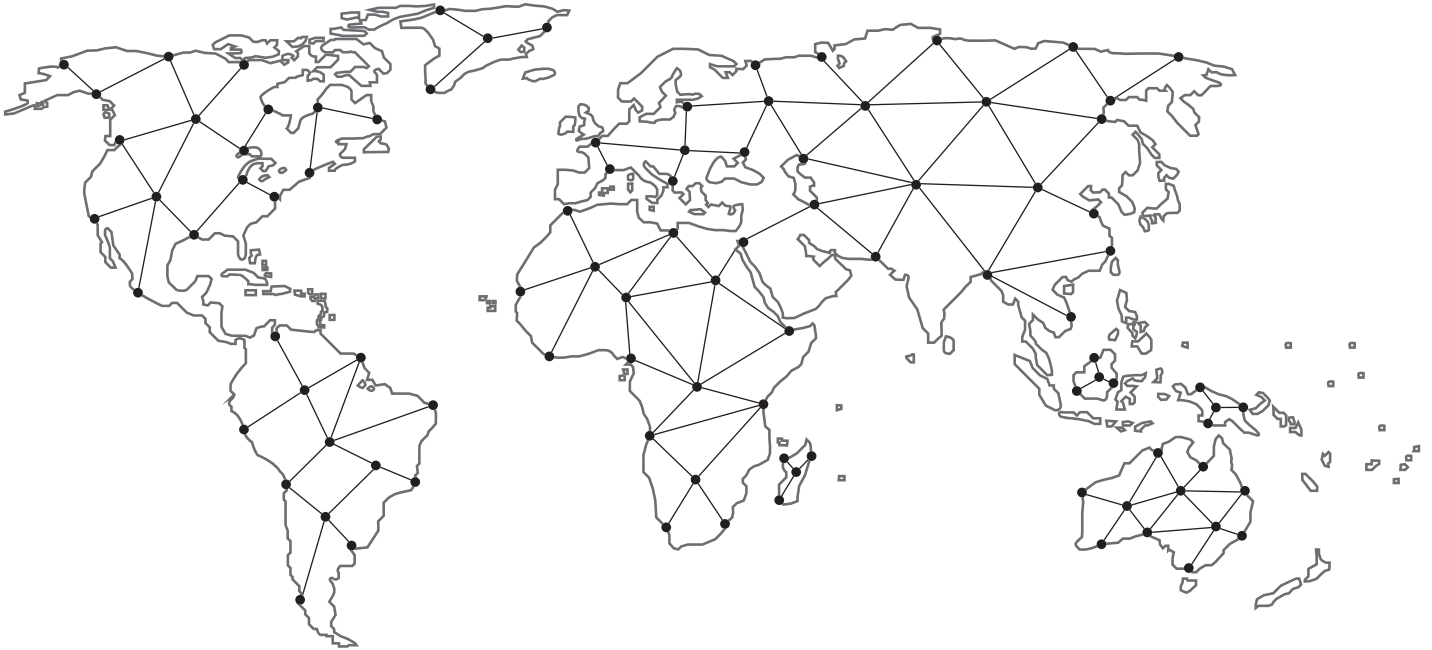
□ Recommended Spare Parts

□ Qty 4 on Valves with No. 6 or 7 actuator

Notes

Find the nearest local Channel Partner in your area:

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