

**Blakeborough Control Valves****Installation, Operation & Maintenance Manual****A60, A61 Diaphragm Actuator (Multi -spring)****SAFETY**

**Safety** - consult Blakeborough publication 'Safety' before starting any maintenance work.

The valve and actuator should be handled and installed with care. Consult publication 'Good Installation Practices' for details.

Before any maintenance work it is essential to ensure that the actuator is isolated and depressurised.

**GENERAL**

In the 'normal' position (no air pressure on the diaphragm) the stem of the direct acting actuator is held in a fully retracted position by means of the spring. An increase in air pressure in the upper diaphragm chamber pushes the actuator stem assembly downwards and compresses the spring; decreasing the air pressure allows the spring to return the stem and diaphragm assembly back to its normal position.

- When mounted on pull-stem-to-open valves, the direct acting diaphragm actuator closes the valve upon increasing the air pressure in the upper diaphragm chamber.
- When mounted on push-stem-to-open valves, the direct acting diaphragm actuator opens the valve upon increasing the air pressure in the upper diaphragm chamber.

Raised metal pads on the yoke casting are provided for the mounting of accessories. All accessories should be removed before dismantling the actuator. Remove the actuator from the valve bonnet assembly as outlined in the basic instruction book covering the valve in use.

**ACTUATOR DISASSEMBLY**

To remove the diaphragm and actuator stem:

1. Stand the actuator on the yoke (24) and clamp to a bench or the floor.
2. Relieve spring compression
  - (a) Unscrew a pair of case bolts & nuts (2, 3, 7, 8) on opposite sides of the top case (1).
  - (b) Replace these with the long bolts & nuts (31).

(c) Remove all case bolts & nuts (2, 3, 7, 8) excluding the long bolt set (31).

(d) Unscrew the long bolt set (31) alternately to release spring tension with balance.

3. Remove the top case (1).
4. Remove the spring holder (9) and the spring (6)
5. Unscrew stopper lock bolt (15) and stopper (14) and remove teflon ring (17), diaphragm plate (5), diaphragm (4), and spacer (16) in regular sequence.
6. Remove the actuator stem (18).
7. Unscrew hexagon groove bolts (11) and remove copper rings (12).
8. Remove the bottom case (10).
9. Remove the guide bush (22) from the yoke (24). Check the O-ring (20), seal (21), and DU bushing (23) for wear.

**ACTUATOR ASSEMBLY**

*Before assembling the actuator, inspect all seals, O-rings, washers and bushes and replace if necessary.*

1. Place O-ring (21) and DU bushing (23) into the guide bush (22). Place the O-ring (20) onto the guide bush (22).
2. Place the bottom case (10) on top of the yoke (24) pay careful attention to the location of air connector (13). Air connector (13) shall be in the backside of the yoke front.
3. Screw hexagon groove bolts (11) together with the copper ring (12)
4. Slide the actuator stem (18) through the guide bush (22).
5. Fit spacer (16), diaphragm (4), diaphragm plate (5), and teflon ring (17) over the actuator stem (18) in sequence. Dust the diaphragm thoroughly with talcum to prevent abrasion.
6. Screw the stopper (14) to the actuator stem (18) and secure with the stopper lock bolt (15).

**Blakeborough Control Valves****Installation, Operation & Maintenance Manual****A60, A61 Diaphragm Actuator (Multi -spring)**

7. Place the spring (6) on the diaphragm plate (5).
8. Fit the spring holder (9) on the spring (6).
9. Place the top case (1) on the spring holder (9) and align top case bolt holes with those in the diaphragm (4) and the bottom case (10).
10. Insert the long bolt set (31) into case bolt holes on opposite sides of the top case (1) and tighten a pair of long bolts & nuts alternately with balance to give tension to spring (6).
11. Insert the case bolt and nuts (2, 3, 7, 8) and tighten all nuts evenly and securely to ensure a tight diaphragm seal.
12. Unscrew the long bolt (31) if necessary. Replace it with the case bolt & nut (2, 3, 7, 8) and tighten.
13. Screw the air vent cap (32) onto the top case (1).

**A60 (DIRECT TYPE)****SAFETY**

**Safety** - consult Blakeborough publication 'Safety' before starting any maintenance work.

The valve and actuator should be handled and installed with care. Consult publication 'Good Installation Practices' for details.

Before any maintenance work it is essential to ensure that the actuator is isolated and depressurised.

**GENERAL**

In the 'normal' position (no air pressure on the diaphragm) the stem of the direct acting actuator is held in a fully retracted position by means of the spring. An increase in air pressure in the upper diaphragm chamber pushes the actuator stem assembly downwards and compresses the spring; decreasing the air pressure allows the spring to return the stem and diaphragm assembly back to its normal position.

- When mounted on pull-stem-to-open valves, the direct acting diaphragm

actuator closes the valve upon increasing the air pressure in the upper diaphragm chamber.

- When mounted on push-stem-to-open valves, the direct acting diaphragm actuator opens the valve upon increasing the air pressure in the upper diaphragm chamber.

Raised metal pads on the yoke casting are provided for the mounting of accessories. All accessories should be removed before dismantling the actuator. Remove the actuator from the valve bonnet assembly as outlined in the basic instruction book covering the valve in use.

**ACTUATOR DISASSEMBLY**

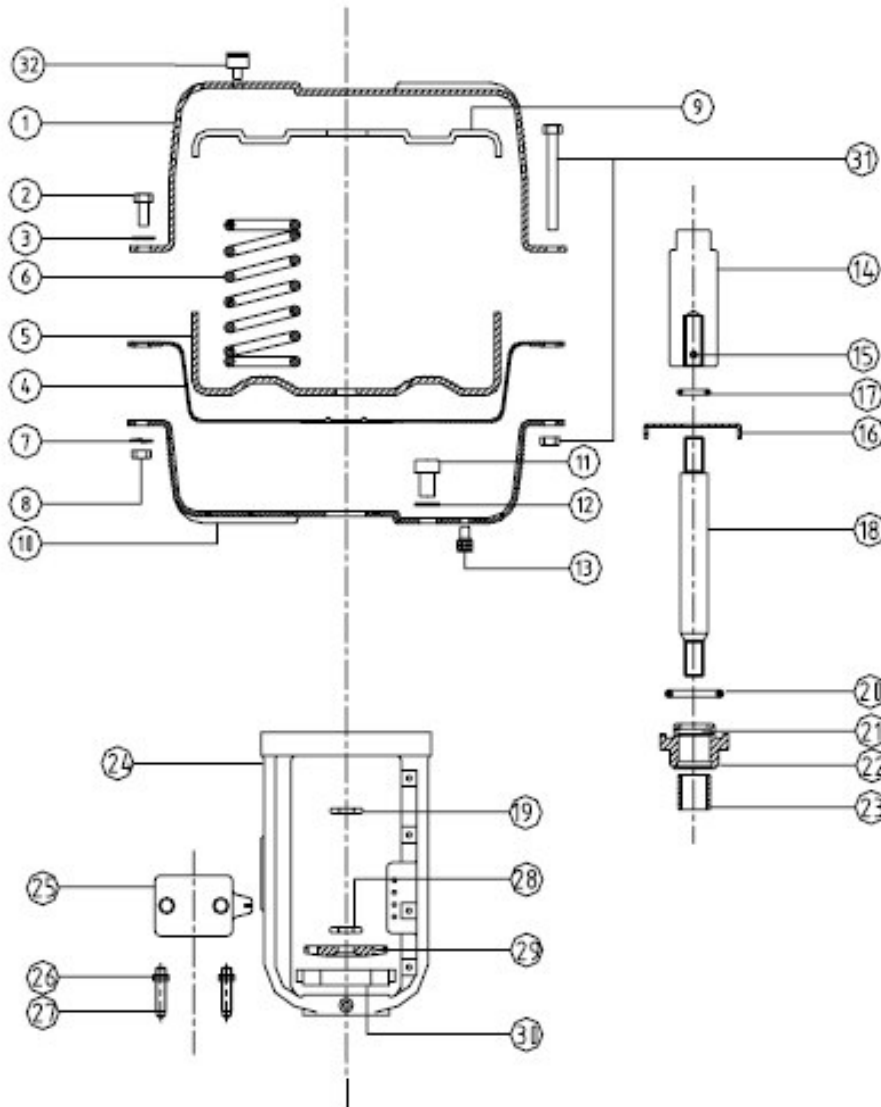
1. Stand the actuator on the yoke (24) and clamp to a bench or the floor.
2. Relieve spring compression
  - (a) Unscrew a pair of case bolts & nuts (2, 3, 7, 8) on opposite sides of the top case (1).
  - (b) Replace these with the long bolts & nuts (31).
  - (c) Remove all case bolts & nuts (2, 3, 7, 8) excluding the long bolt set (31)
  - (d) Unscrew the long bolt set (31) alternately to release spring tension with balance.
3. Remove the top case (1).
4. Unscrew the spacer lock nut (14) and remove the spacer s/w (15), spacer (15), diaphragm (4), diaphragm plate (5), and teflon ring (17) in regular sequence.
5. Remove the spring (6) and the spring holder (9)
6. Remove the actuator stem (18).
7. Unscrew yoke lynch bolts (11) and remove copper rings (12).
8. Remove the bottom case (10).
9. Remove the guide bush (22) from the yoke (24). Check the O-ring (20), seal (21), and DU bushing (23) for wear.

**ACTUATOR ASSEMBLY**

Before assembling the actuator, inspect all seals, O-rings, washers and bushes and replace if necessary.

1. Place O-rings (21) and DU busing (23) into the guide bush (22). Place the O-ring (20) onto the guide bush (22).
2. Place the bottom case (10) on top of the yoke (24). Pay careful attention to the location of air vent cap (32) Air vent cap (32) shall be in the backside of the yoke front.
3. Screw yoke lynch bolts (11) together with the copper ring (12).
4. Slide the actuator stem (18) through the guide bush (22).
5. Place the spring holder (9) on the bottom case (10).
6. Fit the spring (6) on the spring holder (9).
7. Fit the teflon ring (17), diaphragm plate (5), diaphragm (4), spacer (16) over the actuator stem (18) in sequence. Dust the diaphragm thoroughly with talcum to prevent abrasion.
8. Fit the spacer s/w (15) and screw the spacer lock nut (14) to the actuator stem (18)
9. Place the top case (1) on the spacer (16) and align top case bolt holes with those in the diaphragm (4) and the bottom case (10).
10. Insert the long bolt set (31) into case bolt holes on opposite sides of the top case (1) and tighten a pair of long bolts & nuts alternately with balance to give tension to the springs (6).
11. Insert the case bolt and nuts (2, 3, 7, 8) and tighten all nuts evenly and securely to ensure a tight diaphragm seal.
12. Unscrew the long bolt set (31) if necessary. Replace it with the case bolt & nuts (2, 3, 7, 8) and tighten.
13. Screw the air vent cap (32) onto the top case (1).

REVERS ACTING DIAPHRAGM ACTUATOR PARTS DRAWING



REF	DESCRIPTION	QUANTITY				REF	DESCRIPTION	QUANTITY			
		320	550	950	1450			320	550	950	1450
1	TOP CASE				1	17	TEFLON RING				1
2	CASE BOLT	12	16	20	24	18	ACTUATOR STEM				1
3	CASE P/W	12	16	20	24	19	LOCK NUT				1
4	DIAPHRAGM				1	20	O-RING				1
5	DIAPHRAGM PLATE				1	21	O-RING				1
6	SPRING	4	4	4	6	22	GUIDE BUSH				1
7	CASE S/W	12	16	20	24	23	DU BUSHING				1
8	CASE NUT	12	16	20	24	24	YOKE				1
9	SPRING HOLDER				1	25	STEM CLAMP				1
10	BOTTOM CASE				1	26	PACKING STUD NUT				4
11	HEXAGON GROOVE BOLT	4	4	4	6	27	PACKING STUD				2
12	COPPER RING	4	4	4	6	28	COUPLING NUT				1
13	AIR CONNECTOR				1	29	PACKING FLANGE				1
14	STOPPER				1	30	CLAMP NUT				1
15	STOPPER LOCK BOLT				1	31	LONG BOLT SET				2
16	SPACER				1	32	AIR VENT CAP				1