# Integra® Pneumatically Operated Diaphragm Valves with Position Indication Option Assembly Procedures

*¼" Orifice, 3-way design*

## REPAIR INSTRUCTIONS

**For models:**

202-83-01, 202-84-01, 202-86-01, 202-87-01

## REPAIR PROCEDURE – DISASSEMBLY

**NOTE: The procedures included below describe how to first disassemble the normally closed operator side of this valve. After disassembly of the normally closed operator side has been completed, return to step 2 for procedures describing the disassembly of the normally open operator side.**

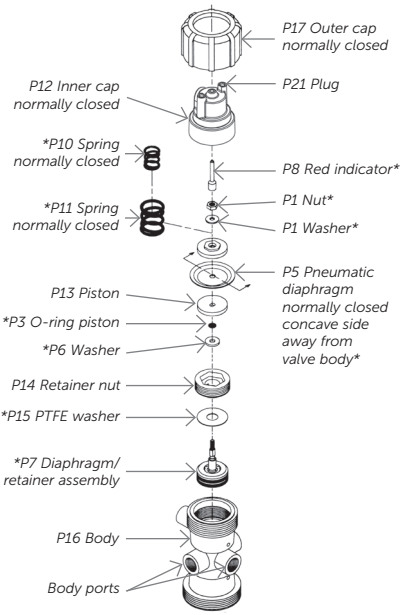
**NOTE: Some assembly procedures are specific to the normally open operator side.**

1. Refer to Figure 1 and begin disassembly of the normally closed operator side.
2. To prevent rotation, hold the inner cap (P12) with an adjustable wrench (S5) and turn the outer cap (P17) counterclockwise with the normally closed outer cap wrench (T1). Remove the outer cap (P17) and the inner cap (P12).

   For the normally open operator side, slowly turn the outer cap (P20) counterclockwise with the normally open outer cap wrench (T2). Remove the outer cap (P20) and the inner cap (P19).
3. On the normally closed operator side, remove the springs (P10 and P1 ) and discard.
4. While preventing the piston (P13) from rotating by holding the raised hex with an adjustable wrench (S5), remove the indicator (P8) by turning it counterclockwise with a pliers (S3). While still holding the piston (P13), remove the nut (P1) with the 5⁄16" socket (S9). Discard the nut (P1) and indicator (P8).
5. Remove and discard the washer (P2) and then remove the piston (P13) by pulling up on it.
6. On the normally closed operator side, remove the pneumatic diaphragm (P5) and discard.

   On the normally open operator side, remove the pneumatic diaphragm (P4) and discard.

Normally Closed




Normally Open

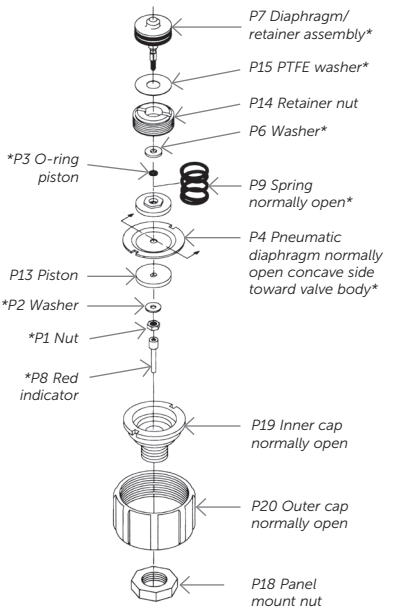



*Figure 1.*

7. Remove the lower piston (P13) on the normally close operator side by prying up on it with two flat blade screwdrivers (S4).

   On the normally open operator side, remove the lower piston (P13) and the spring (P9). Discard the spring (P9).

8. Remove the O-ring (P3) and the washer (P6) and discard both of these.

9. Refer to Figure 2, and use the ⅜" allen wrench (S6) to turn the adjusting screw on the diaphragm preload tool (T3) out 12.7 mm (½"). Now, place the diaphragm preload tool (T3) onto the retainer nut (P14). (See Figure 1.)

10. With the ⅞" socket (S7) and torque wrench (S2) turn the external hex on the diaphragm preload tool (T2) counterclockwise to remove the retainer nut (P14).

11. Remove the PTFE washer (P15) and discard.

12. Hold the stainless steel diaphragm stem with a pliers (S3) and pull out the diaphragm/retainer assembly (P7) and discard.

13. Repeat steps 2-12 to disassemble the normally open operator side. Disregard normally closed instructions.

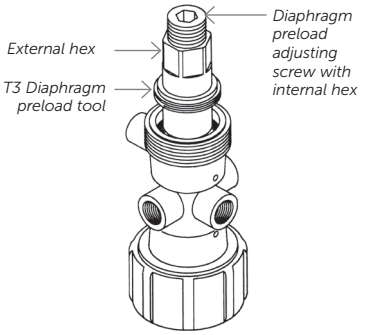



*Figure 2.*

## REPAIR PROCEDURE – ASSEMBLY

**NOTE: The procedures included below describe how to assemble the 3-way Integra® pneumatically actuated valve. The first step in this process is to assemble the normally closed operator side of this valve. After assembly of the normally closed operator side has been completed, you will return to step 2 and repeat the process for the normally open operator side.**

**NOTE: Some assembly procedures are specific to the normally open operator side.**

1. Before beginning assembly, clean the internal body surfaces (P16) and the customer supplied items as listed with isopropyl alcohol (S8).
2. Begin assembly by applying lubricant (S1) on the diaphragm/retainer assembly (P7) O-rings. (See Figure 3.)
3. Make sure the O-ring between the diaphragm and retainer is evenly in place (see Figure 3), and then install the diaphragm/retainer assembly (P7) in the valve body (P16) and push the retainer all the way down.

P7 Diaphragm/Retainer Assembly

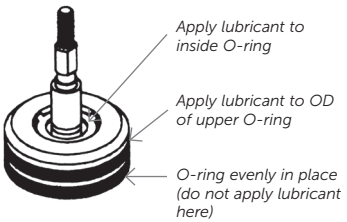



*Figure 3.*

4. Place the PTFE washer (P15) in place on top of the diaphragm/retainer assembly (P7).
5. Thread the retainer nut (P14), by hand, into the valve body (P16) until it contacts the PTFE washer (P15).
6. Place the washer (P6) on the diaphragm stem.
7. Refer to Figure 4, and make sure the diaphragm preload tool (T3) adjusting screw is out 12.7 mm (½"). Place the diaphragm preload tool (T3) onto the retainer nut (P14) and secure it in place with the outer cap (P17). (See Figure 4.)

   On normally open operator side, repair tool kit 213-102-3W is required to preload the diaphragm (T5). Using this tool kit, follow step 7 for normally closed side.
8. While holding the diaphragm preload tool (T3) external hex with an adjustable wrench (S5) to prevent it from rotating, turn the internal hex on top of the diaphragm preload tool (T3) with the ⅜" allen wrench (S6) clockwise until it is flush with the top surface of the diaphragm preload tool (T3). (See Figure 4.)

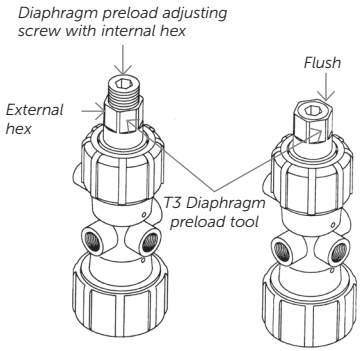



*Figure 4.*

9. Torque the external hex on the diaphragm preload tool (T3) to 2.82 N•m (25 in•lbs) with a torque wrench (S2) and a ⅞" socket (S7).
10. While holding the external hex to keep it from turning, turn the internal hex on top of the diaphragm preload tool (T3) counterclockwise until it is 12.7 mm (½") above the top surface of the diaphragm preload tool (T3). Remove the outer cap (P17) and then the diaphragm preload tool (T3).

11. Lubricate the O-ring (P3) with lubricant (S1) and place on top of the washer (P6).
12. On the normally open operator side place the spring (P9) inside the retainer nut (P14).
13. Put lower piston (P13) in place. Orient with the raised hexagonal surfaces facing away from the pneumatic diaphragm. (See Figure 1.)
14. On the normally closed operator side, place the pneumatic diaphragm (P5) onto the diaphragm stem with the concave side facing away from valve body. (See Figure 1.)

    On the normally open operator side, place the pneumatic diaphragm (P4) onto the diaphragm stem with the concave side facing toward valve body, properly aligning locating tabs. (See Figure 1, pneumatic diaphragm shown concave side up.)
15. Put upper piston (P13) in place. Orient with the raised hexagonal surfaces facing away from the pneumatic diaphragm (P5).

    (P4) for the normally open operator side. (See Figure 1.)
16. Place the washer (P2) onto the diaphragm stem.
17. While preventing the piston (P13) from rotating by holding the raised hex with an adjustable wrench (S5), install the nut (P1) by rotating it clockwise and torquing it to 0.85 N•m (7.5 in•lbs) with the torque wrench (S2) and the 5⁄16" socket (S9).
18. While preventing the piston (P13) from rotating by holding the raised hex with an adjustable wrench (S5), install the indicator (P8) by rotating it clockwise and tightening it with a pliers (S3) until it just contacts the nut (P1).
19. On the normally closed operator side, place the springs (P10 and P1 ) on the upper piston (P13).
20. On the normally closed operator side, place the inner cap (P12) on the springs (P10 and P1 ). Orient the inner cap vent over port 3.

    On the normally open operator side, place the inner cap (P19) on the pneumatic diaphragm (P4) properly aligning locating tabs.
21. On the normally closed operator side, place the outer cap (P17) on the inner cap (P12).

    On the normally open operator side, place the outer cap (P20) on the inner cap (P19).
22. On the normally closed operator side, push down on the inner cap (P12) and prevent it from rotating while threading the outer cap (P17) on the body (P16). To prevent damage to the pneumatic diaphragms, it is important to hold the inner cap (P12) and keep it from rotating.
23. On the normally closed operator side, continue to hold the inner cap (P12) to prevent it from rotating, and then torque the outer cap (P17) to 9.0 N•m (80 in•lbs) with the outer cap wrench (T1–normally closed) and torque wrench (S2).

    On the normally open operator side, torque the outer cap (P20) to 9.0 N•m (80 in•lbs) with the outer cap wrench (T2–normally open) and torque wrench (S2). (While torquing, valve must be actuated at 414 kPa (60 psig).
24. For the normally closed operator side, refer to *Indicator Stem Trim Procedure* and Figure 5.

    For the normally open operator side, the valve must be actuated with 483 kPa (70 psig) pneumatic pilot pressure, then trim normally open indicator flush to inner cap.
25. Repeat steps 2-25 to assemble the normally open operator side. Disregard normally closed operator instructions.

26. Assembly is now complete. See *Testing Procedures.*

**NOTE: Do not trim normally closed indicator at this time.**

## TESTING

The valve must be tested in the following ways:

### External Operator Leakage

To avoid drawing water into the vent ports, apply 483 kPa (70 psig) air pressure to the pneumatic supply port before submerging in water. No leakage should be seen from the body vent holes or from the top of the operators when the valve is submerged in water. Do not relieve pilot pressure until valve is removed from water.

### Inlet to Outlet Leakage

For normally closed operator side, plug port 3 and apply 449 kPa (65 psig) air pressure to port 1. No leakage should be seen at port 2 when it is submerged in water.

For the normally open operator side, apply 414 kPa (60 psig) pneumatic pressure to the pilot port before submerging in water. Plug port 1 and then apply 449 kPa (65 psig) air pressure to port 3. No leakage should be seen at port 2 when it is submerged in water. Do not relieve pilot pressure until valve is removed from water.

### External media leakage

To avoid drawing water into vent ports, plug port 2 with a taped plug or Flaretek® fitting cap. Apply 690 kPa (100 psig) air pressure to ports 1 and 3, and 483 kPa (70 psig) to pilot port. Submerge in water. No leakage at the body vent port should be observed. Do not relieve pilot pressure until valve is removed from water.

Testing is now complete. Continue to the *Indicator Stem Trim Procedure*.

## INDICATOR STEM TRIM PROCEDURE

1. Remove two plugs (P21) from on top of the inner cap (P12). Refer to Figure 5. Attach the indicator stem trim fixture (T4) to the inner cap (P12) using the two 8-32 screws provided.

   The trim fixture must be firmly attached, but take special care not to overtighten the screws and strip the plastic threads.

2. Apply 483 kPa (70 psig) to the pneumatic supply port. With the valve in the actuated, open position, cut off the indicator stem (P8) flush with the top of the trim fixture (T4).

3. Remove the trim fixture. If the valve does not have position sensing, install the two plugs in the inner cap (P12).

P8 Indicator Stem

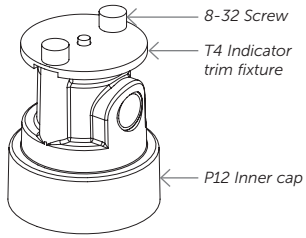



*Figure 5.*

## POSITION SENSING

If the valve is equipped with position sensing refer to installation instructions enclosed with the position sensor (1030-205).

## ORDERING INFORMATION

### Repair Parts Kit
(part numbers listed below)

| ITEM | DESCRIPTION | QUANTITY |
|---|---|---|
| P1 | Nut | 2 |
| P2 | Washer | 2 |
| P3 | O-ring (piston) | 2 |
| P4 | Pneumatic diaphragm, normally open | 1 |
| P5 | Pneumatic diaphragm, normally closed | 1 |
| P6 | Washer | 2 |
| P7 | Diaphragm/retainer assembly | 2 |
| P8 | Red indicator | 2 |
| P9 | Spring normally open | 1 |
| P10 | Spring normally closed | 1 |
| P11 | Spring normally closed | 1 |
| P15 | PTFE washer | 2 |
| P21 | Plug | 2 |

### Repair Parts Kit

Repair Parts Kit part number 202-161 is for all of the following valves:

202-83-01, 202-84-01, 202-86-01, 202-87-01

### Repair Tool Kits
for part numbers 213-102-01 and 213-102-3W

| ITEM | DESCRIPTION |
|---|---|
| T1 | Normally closed outer cap wrench |
| T2 | Normally open outer cap wrench |
| T3 | Diaphragm preload tool (normally closed side) |
| T4 | ¼" valve indicator stem trim fixture |
| T5 | Diaphragm preload tool (normally open side) |

### Customer Supplied Items

| ITEM | DESCRIPTION |
|---|---|
| S1 | Lubricant and brush for applying |
| S2 | Torque wrench, ½" drive, 6" extension, 11.3 N•m (100 in•lbs) scale |
| S3 | Pliers |
| S4 | (2) Screwdrivers, flat-blade style |
| S5 | Adjustable wrench to 39 mm (1½") or larger |
| S6 | Allen wrench (⅜") |
| S7 | Socket (⅞") ½" drive |
| S8 | Isopropyl alcohol |
| S9 | Socket (5⁄16") ¼" drive |
| S10 | Blade for trimming |

## FOR MORE INFORMATION

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