

# PURE-FLO®

## Diaphragm Valves

### Installation, Operation and Maintenance Manual

## Radial Seated Tank Bottom Diaphragm Valve

#### WARNING

ITT INDUSTRIES VALVES AND VALVE ACTUATORS ARE DESIGNED AND MANUFACTURED USING GOOD WORKMANSHIP AND MATERIALS, AND THEY MEET ALL APPLICABLE INDUSTRY STANDARDS. THESE VALVES ARE AVAILABLE WITH COMPONENTS OF VARIOUS MATERIALS, AND THEY SHOULD BE USED ONLY IN SERVICES RECOMMENDED IN OUR PRODUCT CATALOG OR BY A COMPANY VALVE ENGINEER.

MISAPPLICATION OF THE PRODUCT MAY RESULT IN INJURIES OR PROPERTY DAMAGE. A SELECTION OF VALVE COMPONENTS OF THE PROPER MATERIAL CONSISTENT WITH THE PARTICULAR PERFORMANCE REQUIREMENTS, IS IMPORTANT FOR PROPER APPLICATION.

EXAMPLES OF THE MISAPPLICATION OR MISUSE OF ITT INDUSTRIES VALVES INCLUDE USE IN AN APPLICATION IN WHICH THE PRESSURE/TEMPERATURE RATING IS EXCEEDED OR FAILURE TO MAINTAIN VALVES AS RECOMMENDED.

IF VALVE EXHIBITS ANY INDICATION OF LEAKAGE, DO NOT OPERATE. ISOLATE VALVE AND EITHER REPAIR OR REPLACE.

#### 0.1 General

This manual provides installation and maintenance instructions for PURE-FLO Radial Seated Tank Bottom Valves. If additional information is required, contact:

ITT Industries  
33 Centerville Rd.  
Lancaster, PA 17603  
(717) 509-2200  
Attention: Sales Department

#### 0.2 Safety



The safety precautions in these operating instructions are specially marked with the standard symbol for danger when non-observance could endanger lives.

#### CAUTION!

Non-observance of these safety precautions can endanger the valve and its functions.

##### 0.2.1 Qualifications and training of personnel

The personnel responsible for operation, maintenance, inspection and assembly must be appropriately qualified. The operating company must precisely define the responsibilities, competence and supervision of the personnel. If the personnel lack the necessary knowledge, they are to be trained and instructed. If required, this can be carried out by the manufacturer/supplier of the valve by order of the operating company. Furthermore, the operating company is to ensure that the contents of the operating instructions have been fully understood by the personnel.

##### 0.2.2 Dangers through non-observance of the safety precautions

The non-observance of the safety precautions can result in the endangering of lives as well as the environment and the valve. The non-observance of the safety precautions can lead to the loss of all claims for damages.

Non-observance can result in the following:

- failure of important functions of the valve/plant
- endangering of lives by electrical, mechanical and chemical influences
- endangering the environment through leakage of dangerous materials

##### 0.2.3 Safety awareness at work

Attention must be paid to the safety precautions in these operating instructions, the current national regulations concerning the prevention of accidents as well as any labor, company, and safety-regulations of the operating company.

##### 0.2.4 Safety precautions for the operating company / individual operator

- If hot or cold components of the valves are a source of danger, these components must be secured against contact by the operating company.
- Contact guard for moving parts may not be removed when valve is in operation.

##### 0.2.5 Safety precautions for maintenance, inspection and assembly

Work on externally actuated valves should only be carried out when the valve is removed from service. Valves which have been exposed to harmful media must be decontaminated.

On completion of work, all safety and protective equipment must immediately be fitted again or reactivated.

Before the re-operation, attention should be paid to the points in section 1.0.

##### 0.2.6 Unauthorized reconstruction and manufacture of spare parts

Reconstruction or modification of the valve is only admissible after consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer serve to maintain safety. The use of other parts can annul all liability for the consequences.

##### 0.2.7 Inadmissible modes of operation

The operational reliability of the valve supplied is only guaranteed when used as designated, as laid down in section 1.0 of the operating instructions. The operating limits given on the identification plate and in the data sheet may not be exceeded under any circumstances.

#### 0.3 Transport and storage



The universally recognized technical standards and the regulations regarding prevention of accidents

have to be observed at all times when handling.

##### 0.3.1 Transport

The goods have to be carefully handled in order to prevent damage.

The end and bonnet flange caps supplied are to be fitted to the valve as applicable.

##### 0.3.2 Unpacking

Having been unpacked the shipment is to be checked in respect of entirety and possible damage.

### 0.3.3 Storage

If the valve is not to be installed immediately following delivery, it must be properly stored. Storage should be in a dry room at a temperature as constant as possible. Storage over a longer period may necessitate individual moisture proof packing. This is dependent on the local conditions.

Consult manufacturer for recommendations.

### 0.3.4 Return shipment

If the return shipment is required, contact manufacturer at the address listed in 0.1 for specific instructions.



The operator of valves used for aggressive or toxic media must ensure that these are well flushed and cleaned before being handed to the maintenance personnel. This is particularly important when returning to the manufacturer. MSDS are required for authorization to return valves to the manufacturer.

## 1.0 Installation

### CAUTION!

It is critical that proper welding procedures are followed to insure the valve seat is not deformed during welding.

### 1.1 Welding the valve to a tank requires the removal of the bonnet/diaphragm subassembly from the body.

For manual valves, slightly open the valve prior to unscrewing the locking nut with a spanner wrench to protect the diaphragm. For actuated valves, all actuators are reverse acting, apply adequate air pressure to the cylinder to lift the diaphragm off the seat prior to unscrewing the locking nut.

- 1.2 **CAUTION!** Prior to system pressurization, with the valve slightly open, tighten the locking nut with a spanner wrench. Re-tightening 24 hours after the system reaches operating pressure and temperature is recommended. If leakage occurs at the body/bonnet joint, immediately depressurize the system and tighten the locking nut as noted above. If leakage continues, diaphragm replacement is required. See section 3.4.

## 2.0 Operation and Adjustment

### 2.1 General.

The manual valve is closed with a clockwise rotation of the handwheel. As the valve is opened, a bright yellow indicator is exposed under the handwheel that indicates the "open position"

The actuated valve is closed by removal of the air supply to the cylinder permitting the spring to close the valve. Valve position is indicated by the shaft extending out of the actuator.

### 2.2 Bonnet



**Non Sealed Bonnet:** The standard product is a non sealed bonnet with weep hole. This means the bonnet does not provide secondary containment of process fluids in the event of a diaphragm failure. Each bonnet is equipped with a weep hole to allow fluid seepage indicating a diaphragm failure. Replace the diaphragm immediately.

**Sealed Bonnet:** When the process fluid is a hazardous or corrosive material, extra precautions should be taken. The user should be prepared to control an external leak or spill of the process fluid. The sealed bonnet is equipped with an O ring seal that prevents external leakage in the event of a diaphragm

failure. The sealed bonnet has a decal indicating the bonnet is "Sealed".

Failure to follow these instructions could result in serious personal injury or death, and property damage.

## 2.3 Travel Stop

The manual valve uses a combination of belleville washers as well as a metal to metal internal travel stop to protect the diaphragm from overclosure and does not require adjustment. The actuated valve force on the diaphragm is limited by the spring loads.

## 3.0 Maintenance

3.1 Periodically inspect condition of external valve parts. Replace all parts showing excessive wear or corrosion.



When the process fluid is hazardous or corrosive, extra precautions should be taken. The user should employ appropriate safety devices and should be prepared to control a leak of the process fluid. Fluid seeping from the weep hole indicates a diaphragm failure. Replace diaphragm immediately. Failure to follow these instructions could result in serious personal injury or death, and property damage.

3.2 If body-diaphragm seating area leaks, depressurize system and open valve slightly. Tighten locking nut as described in Section 1.2. If leakage continues, diaphragm replacement is required.

3.3 If leakage is occurring around the handwheel, spindle, or through a bonnet weep hole, the diaphragm is ruptured and must be replaced.

## 3.4 Diaphragm Replacement:

### Manual Valve

1. Remove pressure from tank containing the valve as well as the valve.
2. Insure the valve is in a partially open to full open position.
3. Unthread the bonnet locking nut using a spanner wrench and lift off the bonnet/diaphragm subassembly. If possible, take to a bench to replace the diaphragm.

### CAUTION!

Keep the bonnet/diaphragm subassembly either horizontal or keep the diaphragm upward during disassembly. Once the handwheel is removed, the diaphragm, compressor and internal spindle are not restrained in the bonnet and can fall out if tilted downward. The belleville washers can also fall out of the bonnet.

4. Remove the handwheel screw and lift off the handwheel.
5. Carefully lift the diaphragm, compressor and internal spindle out of the bonnet.
6. Slip the diaphragm/compressor subassembly off of the internal spindle, it is a T slot connection. Remove the O ring adjacent to the diaphragm from the bonnet.
7. Replace the diaphragm/compressor subassembly as well as O ring with new components.
8. Slide these on the internal spindle. Position bonnet in vertical position, with the opening facing upward.
9. Insert the internal spindle/compressor/diaphragm into the bonnet, align the male hex of the internal spindle with the female hex of the main spindle. It may be necessary to lightly tap the subassembly spindle on a flat surface to insure the internal spindle end is positioned near the end of the main spindle.
10. Place the handwheel on the spindle, align the flats.
11. Assemble the handwheel screw. Start the screw lightly for force can push the internal spindle away from the screw.

12. Open and close the valve to insure smooth operation.

13. Insure the valve is partially open and assemble to the body.

#### Actuated Valve:

14. Remove pressure from tank containing the valve as well as the valve.
15. Insure the valve is in a partially open to full open position. This requires air pressure in the actuator.
16. Unthread the bonnet locking nut using a spanner wrench and lift off the actuator/diaphragm subassembly. If possible, take to a bench to replace the diaphragm.
17. Unthread the diaphragm/compressor subassembly. If it does not easily unthread, with air removed from actuator, insert a lever into the bonnet weep hole, insure that it also engages the hole in the compressor.
18. Using a wrench, turn the actuator shaft ¼ turn counterclockwise.
19. Remove the lever and unscrew the diaphragm. Remove the diaphragm/compressor and O ring adjacent to the diaphragm.
20. Assemble in reverse with a new diaphragm, compressor and O ring.
21. Open and close the actuator to insure smooth operation.
22. Insure the valve is partially open and assemble to the body.

#### 3.5 Converting to a sealed bonnet;

#### Manual Valve:

1. Remove pressure from the tank containing the valve as well as the valve.
2. Insure the valve is in a slightly open to full open position.
3. Unthread the locking nut using a spanner wrench and lift off the bonnet/diaphragm subassembly. If possible, take to a bench to replace the diaphragm.

#### **CAUTION!**

Keep the bonnet/diaphragm sub assembly either horizontal or keep the diaphragm upward during disassembly. Once the handwheel is removed, the diaphragm, compressor and internal spindle are not restrained in the bonnet and can fall out if tilted downward. The belleville washers can also fall out of the bonnet.

4. Remove the handwheel screw and lift off the handwheel.
5. Carefully lift the diaphragm, compressor and internal spindle out of the bonnet.
6. Lubricate the new O ring with Dow 111, insert into the groove located in the bonnet.
7. Position bonnet in vertical position, with the opening facing upward.
8. Insert into the bonnet the diaphragm, compressor and internal spindle, align the male hex of the internal spindle with the female hex of the main spindle. It may be necessary to lightly tap the subassembly spindle on a flat surface to insure the internal spindle end is positioned near the end of the main spindle.
9. Place the handwheel on the spindle, align the flats.
10. Assemble the handwheel screw. Start the screw lightly for force can push the internal spindle away from the screw.
11. Open and close the valve to insure smooth operation.
12. Insure the valve is partially open and assemble to the body.

#### Actuated Valve:

1. Remove pressure from the tank containing the valve as well as the valve.
2. Insure the valve is in a slightly open to full open position. This requires air pressure in the actuator.
3. Unthread the bonnet locking nut using a spanner wrench and lift off the actuator/diaphragm subassembly. If possible, take to a bench to replace the diaphragm.
4. Unthread the diaphragm/compressor subassembly. If it does not easily unthread, with air removed from actuator,

insert a lever into the bonnet weep hole, insure that it also engages the hole in the compressor.

5. Using a wrench, turn the actuator shaft ¼ turn counterclockwise.
6. Remove the lever and unscrew the diaphragm. Remove the diaphragm/compressor and O ring adjacent to the diaphragm.
7. Lubricate the new O ring with Dow 111, insert into the groove, located in the bonnet.
9. Assemble in reverse.
10. Open and close the valve to insure smooth operation.
11. Insure the valve is partially open and assemble to the body.

#### 3.6 Replacing Actuator Gaskets:

1. Disassemble the bonnet from the body as described above.
2. Insert lever in the bonnet hole and valve compressor.
3. Manually unscrew the actuator housing



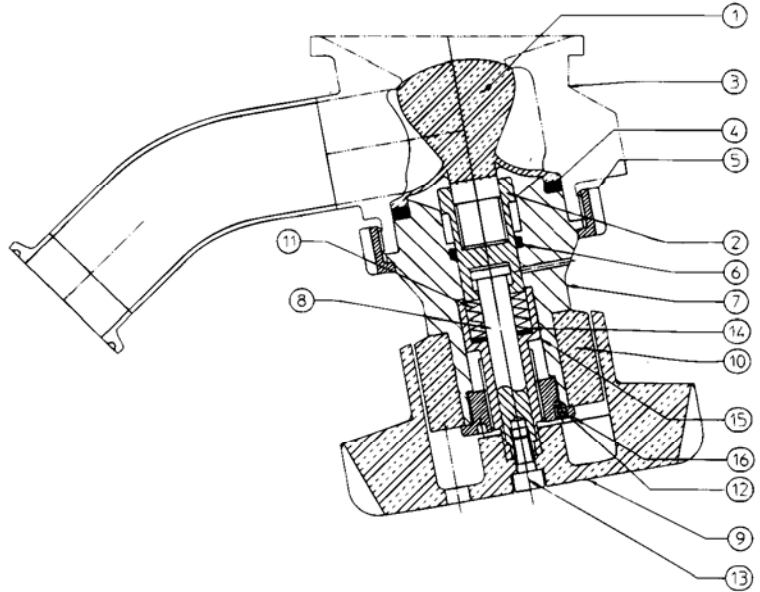
The piston / spring assembly must not be disassembled as the pre loaded spring could release posing a danger to the operator.

4. Replace all Orings and gaskets, applying a thin film of lubricant
5. Reassemble the actuator.
6. Open and close the actuator to insure smooth operation.
7. Insure the valve is partially open and assemble to the body.

# MANUAL

## MATERIALS OF CONSTRUCTION

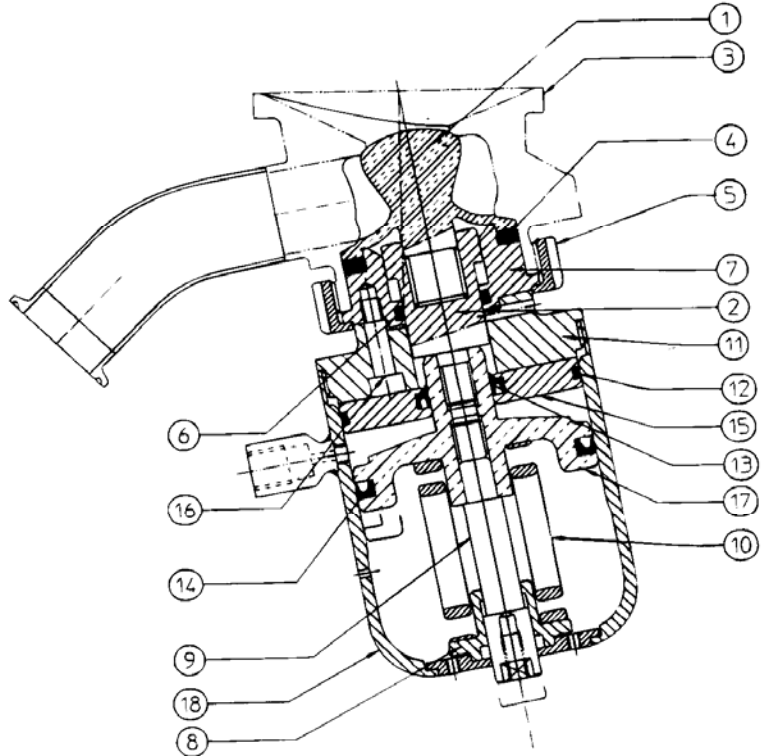
ITEM	DESCRIPTION	MATERIAL	QUANTITY
1	Diaphragm	PTFE	1
2	Compressor	Brass	1
3	Valve Body	STN. STL., ASME SA 479, 316L	1
4	"O" Ring	EPDM (FDA)	1
5	Locking Nut	STN. STL.	1
6	"O" Ring (Opt.)	EPDM (FDA)	1
7	Bonnet	STN. STL.	1
8	Internal Spindle	STN. STL.	1
9	Handwheel	Thermoplastic	1
10	Indicator	Polyamide	1
11	Belleville Washer	STL.	as required
12	Screw	STN. STL.	1
13	Screw	STN. STL.	1
14	Washer	STL.	1
15	Spindle	STN. STL.	1
16	Bushing	Bronze	1



# ACTUATED

## MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL	QUANTITY
1	Diaphragm	PTFE	1
2	Compressor	Brass	1
3	Valve Body	STN. STL. ASME SA 479, 316L	1
4	"O" Ring	EPDM (FDA)	1
5	Locking Nut	STN. STL.	1
6	"O" Ring (Opt.)	EPDM (FDA)	1
7	Lower Bonnet	STN. STL.	1
8	Retainer	Brass	1
9	Spindle	STN. STL.	1
10	Springs	STL.	1
11	Upper Bonnet	STN. STL.	1
12	"O" Ring	EPDM (FDA)	1
13	Gasket	Fluorocarbon Rubber	1
14	Gasket	Fluorocarbon Rubber	1
15	Cyl. Base Plate	ANODIZ. Al	1
16	Screw	STN. STL.	3
17	Piston	ANODIZ. Al	1
18	Actuator Housing	STN. STL.	1



## Pure-Flo Solutions Group

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### OFFICE LOCATIONS

For more information, please contact:  
Engineered Valves Headquarters  
33 Centerville Road, P.O. Box 6164  
Lancaster, PA 17603-2064 USA  
or call: (800) 366-1111  
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Website: [www.engvalves.com](http://www.engvalves.com)  
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