

PURE-FLO®

Diaphragm Valves

Installation, Operation and Maintenance Manual Handwheel Operated Valves 950 (PBT) & 970 (SS)

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.

0.0 GENERAL

This manual provides installation and maintenance instructions for manually operated PURE-FLO diaphragm valves. If additional information is required, or if your valves have pneumatic, electric, or any type of power actuation, contact:

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

0.1 Product Data & Tagging**0.2 Safety****CAUTION!**

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

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.

0.2.8 Application

The PBT bonnet is not to be used in applications where the line fluid is sodium hydroxide at concentrations greater than 5% (PAS or stainless steel bonnet is recommended).

**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 0.0 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!

WELD END VALVES

Weld end valves for schedule 10 and heavier pipe require bonnet and diaphragm removal prior to welding in line. See Section 3.4, steps 1-3, 6-10. 2.0mm and lighter pipe and tubing may be welded with automatic equipment without removing the diaphragm. Manual welding requires diaphragm removal for all pipe wall thickness.

- 1.1 Pure-Flo diaphragm valves may be installed in any orientation. To ensure optimum draining in horizontal pipelines, the valve should be installed so that one of the drain marks on either valve end is precisely in the 12 o'clock position.

Note: According to good practice, horizontal pipework should be sloped toward the drain point to ensure optimum draining.

- 1.2 **CAUTION!** Prior to pressurization (with the valve open), tighten the bonnet nuts in a crisscross pattern in accordance with Table 1.

Re-tightening 24 hours after the system reaches operating temperature and pressure is recommended. If leakage occurs at the body-diaphragm seating area, immediately depressurize system and tighten bonnet nuts as noted above. If leakage continues, diaphragm replacement is required. See Section 3.4.

- 1.3 The travel stop is factory set and should not require adjustment at time of installation. However, if adjustment is required, see Section 2.3.

2.0 OPERATION AND ADJUSTMENT

2.1 General.

The valve is closed with a clockwise rotation of the handwheel. See Table 2 for stroke length and number of turns information.

2.2 NON-SEALED BONNET (Fig. 1)



The bonnet is a non-sealed design and 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 diaphragm immediately.

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

NOTE: The o-ring provided in the bonnet assembly is strictly for wash-down protection only. It is not designed for pressure containment.

2.3 TRAVEL STOP

The purpose of the travel stop is to prevent over closing of the valve, thus prolonging diaphragm life. For bonnets delivered with valve bodies, the travel stop is set at the factory and should not require further adjustment; however, if adjustment is necessary, the following procedure should be followed:

The first (and preferred) option is to install the valve in a test fixture (Figure 3) with the travel stop screw (Figure 1) removed. Supply air pressure equal to the system operating pressure to one side of the valve. Cap the other side of the valve and install a venting rubber or plastic tube. Hold the tube in a container of water. Air bubbles indicate leakage. Turn handwheel closed until the leakage stops. Push down on handwheel until it bottoms on travel stop surface of bonnet. Install & tighten travel stop screw.

If a test fixture is not available, the following procedure may be used.

FOR ELASTOMER DIAPHRAGMS:

1. Remove pressure from the line containing the valve.
2. Remove bonnet bolts and nuts. Remove the bonnet and unscrew the diaphragm from the compressor, but leave the compressor on the spindle.
3. Replace the bonnet on the valve body (without a diaphragm).
4. Replace two bonnet bolts and nuts on opposite sides of the bonnet, hand tight.
5. Turn the handwheel until the compressor touches the weir. The valve will not close further.
6. Push down on handwheel until it bottoms on travel stop surface of bonnet. Install & tighten travel stop screw. The travel stop is now adjusted.
7. Remove the bonnet from the valve body. Screw a diaphragm into the compressor hand tight. Then back it off until the bolt holes in the diaphragm and bonnet flange register. Assemble compressor onto spindle.
8. Rotate the handwheel counterclockwise just enough to permit flange area of diaphragm to rest flat against flange area of bonnet.
9. Replace the bonnet, which now includes the diaphragm, on the valve body. The bonnet should be opened one-half to one turn of the handwheel. Tighten the bonnet nuts in accordance with Section 1.2.

FOR PTFE DIAPHRAGMS:

If a test fixture is not available for valves with PTFE diaphragms, use the following procedure:

1. Remove travel stop screw.
2. Turn handwheel clockwise until the initial resistance of the diaphragm seating is felt. From this point, turn the handwheel another 5/8 turn.
3. Push down on the handwheel until it bottoms on travel stop surface of bonnet. Install & tighten travel stop screw.

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 bonnet nuts 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:

1. Remove pressure from line containing valve. Rotate handwheel clockwise to just close valve.
2. Remove bonnet nuts.
3. Lift off bonnet, rotate handwheel to lower compressor diaphragm assembly, remove diaphragm compressor assembly and unscrew diaphragm from compressor by turning counter-clockwise.

NOTE: For PTFE diaphragms, the tube nut must be held from turning in order to remove diaphragm.

4. Replacement diaphragm should be identical size and grade as original diaphragm. See Figure 2 for location of size and grade marking. Thread new diaphragm into compressor hand tight, then back off until bolt holes in diaphragm register with bolt holes in bonnet flange.

NOTE: For PTFE plastic diaphragms, remove elastomer backing cushion with plastic diaphragm. Replace elastomer backing cushion with each new plastic diaphragm.

PTFE diaphragms are molded in the closed position, but should be inverted to the open position prior to installation to ensure completed (correct) thread engagement. To invert, press with thumbs at center bottom of diaphragm edge.

5. Lubrication should be applied to the end face of the spindle (see Section 3.5). Assemble compressor onto spindle.
6. Rotate handwheel counterclockwise just enough to permit flange area of diaphragm to rest flat against flange area of bonnet.
7. Replace valve bonnet on body and tighten bonnet nuts hand tight.
8. Close valve fully by rotating handwheel clockwise; then back off one-half to one full turn of handwheel. Tighten bonnet nuts evenly with a wrench (see Section 1.2).
9. Open valve and check bonnet nuts to ensure they are evenly tightened.
10. If diaphragm leaks at body/bonnet joint after reaching temperature and pressure, depressurize system and retighten nuts in accordance with Section 1.2.

3.5 LUBRICATION

CAUTION! Standard lubricants are as outlined below. Special lubricants may be required for oxygen or other unique services. Contact ITT Industries for evaluation of non-standard lubricants.

- 3.5.1 Bonnets are not equipped with grease fittings and must be disassembled to be lubricated. Under normal operation, lubrication is not necessary. However, adequate lubrication should be verified at diaphragm replacement.
- 3.5.2 Surfaces requiring lubrication are as follows:
 - spindle threads
 - lower spindle face and neck where it interfaces with the compressor
 - o-ring
- 3.5.3 Where valves are exposed to corrosive atmospheres or weather conditions, contacting surfaces of the handwheel and bonnet shell should be lubricated.
- 3.5.4 Standard lubricant is Chevron Poly FM2.

3.6 O-RING REPLACEMENT (Fig. 2)

1. Remove travel stop screw.
2. Remove handwheel.
3. Remove o-ring from groove in bonnet.
4. Clean o-ring groove.
5. Install correct size o-ring into groove.
6. Apply lubricant to o-ring.
7. Re-install handwheel and re-set travel stop per Section 2.3.

3.7 CHANGE DIAPHRAGM TYPE

To change from an elastomer diaphragm to PTFE, the compressor must be changed, and a tube nut must be installed.

1. Remove bonnet nuts and lift off bonnet.
2. Remove travel stop screw.
3. Turn handwheel clockwise to lower compressor low enough to slide the compressor off the spindle.
4. Install tube nut into hexagonal hole in new compressor. Lubricate the spindle end where it interfaces with the compressor. Then locate the new compressor on the spindle, turn handwheel counter clockwise to raise assembly into bonnet. Follow Section 3.4.

To change from a PTFE diaphragm to elastomer, the compressor must be changed. The procedure is the same as above, except a tube nut is not required.

Bonnet Bolt Torques

Size	Bonnet Bolt Torque in-lbs (N-m)
1/2" DN15	18 (2.0)
3/4" DN20	38 (4.3)
1" DN25	45 (5.1)
1-1/2" DN40	145 (16.4)
2" DN50	200 (22.6)

TABLE 1

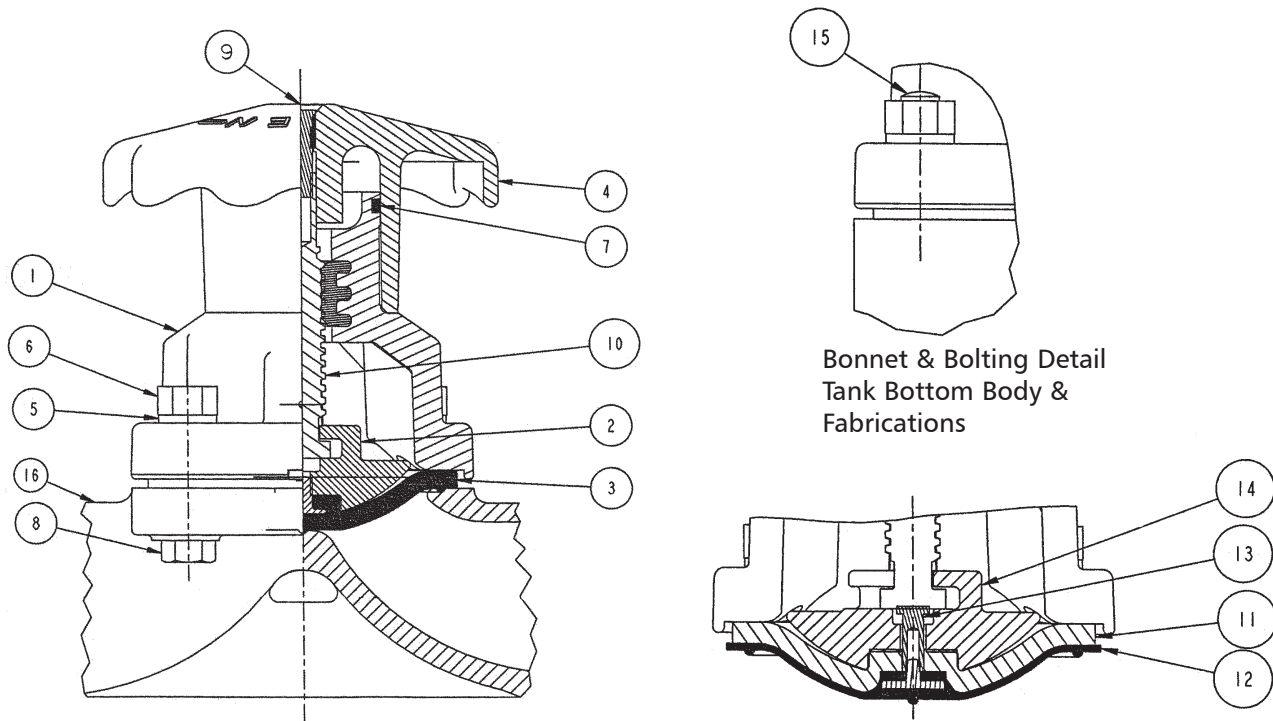
Valve Travel and No. of Turns

SIZE	STEM TRAVEL	NO. OF TURNS
1/2" DN15	.25 (6.4)	2
3/4" DN20	.38 (9.6)	3
1" DN25	.5 (12.7)	4
1-1/2" DN40	.81 (20.6)	4.9
2" DN50	1.12 (28.4)	6.8

TABLE 2

CAUTION!

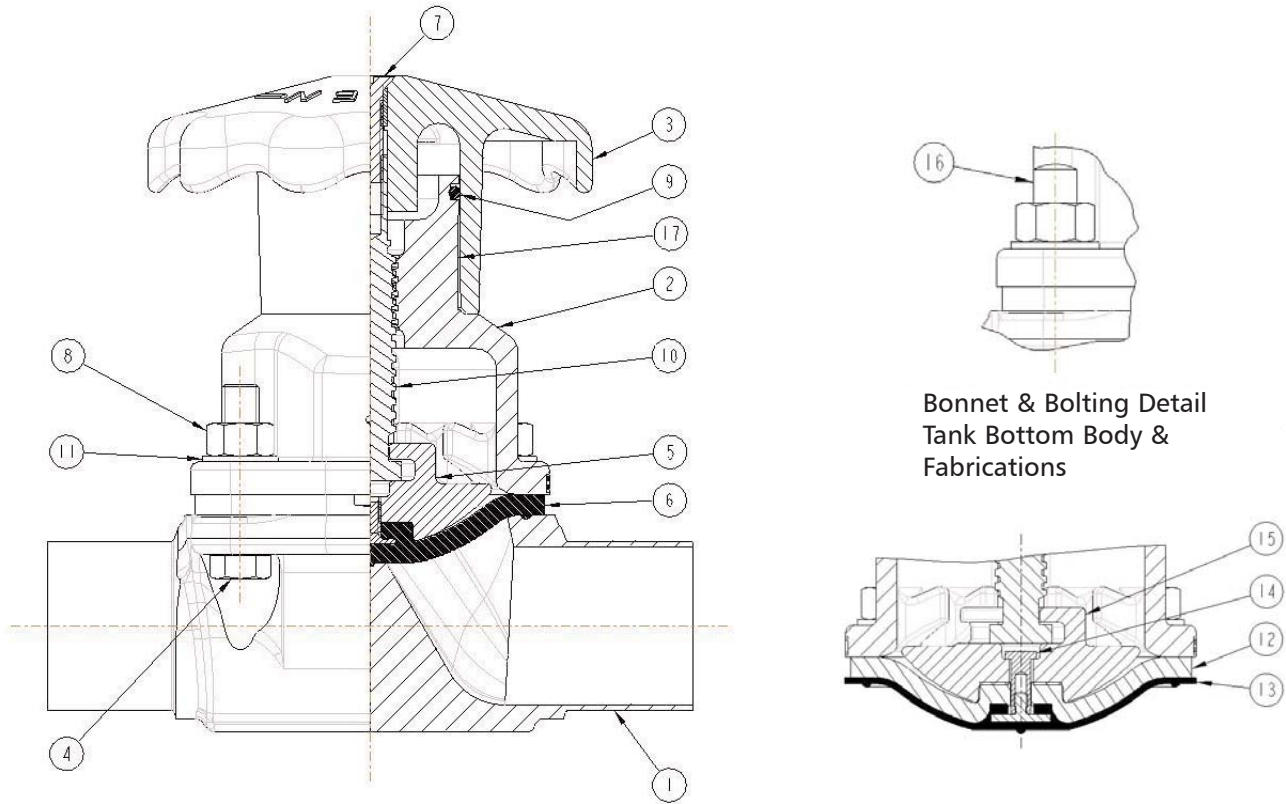
Torques should not exceed these values by more than 10%.



Materials of Construction			
Item	Description	Material	Quantity
1	Bonnet	30% Glass Reinforced Polyester (PBT)	1
2	Compressor	Bronze, ASTM B584, C84400	1
3	Standard ITT Elastomer Diaphragms	EPDM, BUNA-N	1
4	Handwheel	30% GLASS Reinforced Polyester (PBT)	1
5	Washer, Plain	Stainless Steel 18-8	4
6	Nut, Hex	Stainless Steel 18-8	4
7	"O" Ring	BUNA-N (FDA)	1
8	Screw Hex Head, Cap	Stainless Steel 18-8	4
9	Travel Stop Screw	Stainless Steel 18-8	1
10	Spindle	ASTM A108, 12L14 Zinc plated or Stainless Steel, ASTM A582, Type 303	1
11	Backing Cushion	EPDM	1
12	Standard ITT Plastic Diaphragms	PTFE, Grade TM Or R2	1
13	Tube Nut	Brass, B-16	1
14	Compressor	Bronze, ASTM B584, C84400	1
15	Stud	Stainless Steel, SA-193-B8*, 18-8	AR
16	Standard ITT Body	Stainless Steel, 316L	1

ASME Grade fasteners available only on Tank Bottom Valve

**PBT Bonnet - 950
Figure 1a**



Bonnet & Bolting Detail
Tank Bottom Body &
Fabrications

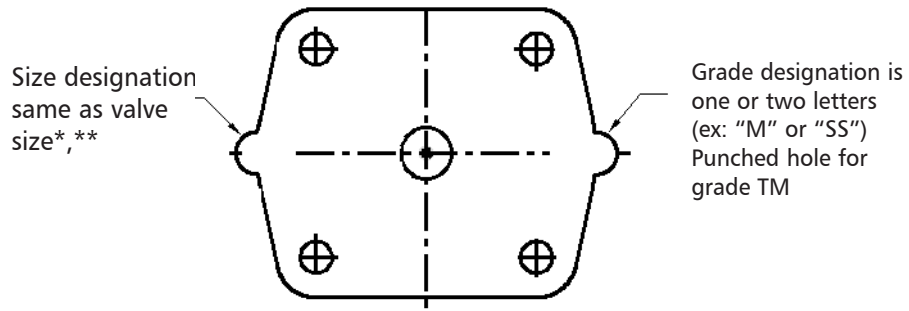
Materials of Construction			
Item	Description	Material	Quantity
1	Body	Stainless Steel, 316L	1
2	Bonnet	Stainless Steel, 316	1
3	Handwheel	PAS	1
4	Screw - Hex Head Cap	Stainless Steel 18-8	4
5	Compressor for Elastomer	Bronze	1
6	Elastomer Diaphragms	EPDM, BUNA-N	1
7	Travel Stop Screw	Stainless Steel 18-8	1
8	Nut - Hex	Stainless Steel 18-8	4
9	"O" Ring	FKM, (FDA)	1
10	Spindle	Stainless Steel	1
11	Washer - Plain	Stainless Steel, 18-8	4
12	Backing Cushion	EPDM	1
13	Plastic Diaphragms	PTFE, Grade TM	1
14	Tube Nut	Brass	1
15	Compressor - for Plastic	Bronze	1
16	Stud	Stainless Steel, SA-193-B8*, 18-8	AR
17	Label - Indicating	Mylar	1

ASME Grade fasteners available only on Tank Bottom Valve.

Stainless Steel Bonnet - 970
Figure 1b

Valve Diaphragm Identification

Elastomer - 1 piece, made of rubber, with molded-in stud.
(See tabs)



R2,TM (PTFE)

These diaphragms are two-piece, white plastic with a black elastomer backing.

* For 00.75 with flanged ends use 01.00 diaphragm except for solid plastic.

** For 01.25 solid plastic uses 01.50 diaphragm.

Figure 2

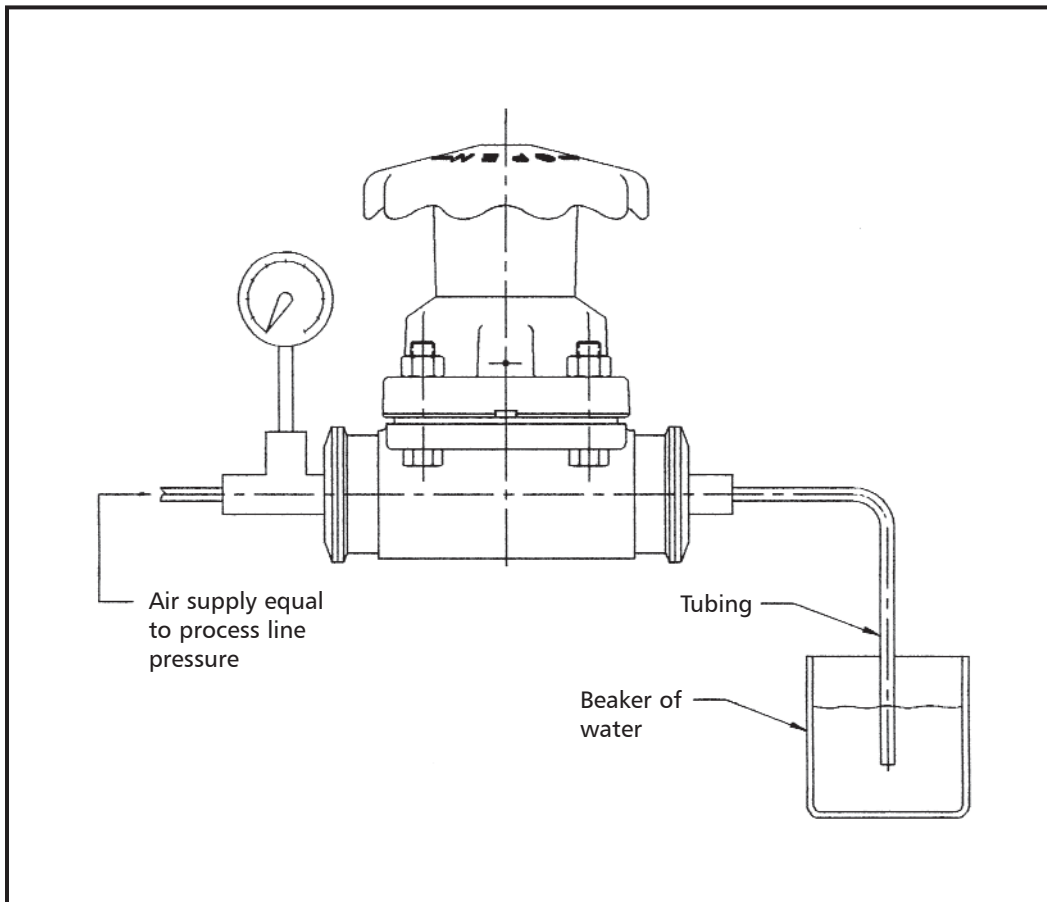


Figure 3

Pure-Flo Solutions Group

For more information, please contact:

Pure-Flo Solutions Group

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Lancaster, PA 17603-2064 USA

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