



# ITT

## Industrial Process

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# Installation and Operation Manual

Advantage<sup>®</sup> Actuator



Provided by:

**Holland<sup>®</sup>**  
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# Introduction and Safety

## Safety message levels

**Table 1: Definitions**

Safety message level	Indication
 <b>Danger:</b>	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>Warning:</b>	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 <b>Caution:</b>	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 <b>Electrical Hazard:</b>	Indicates the possibility of electrical risks if instructions are not followed in a proper manner.
<b>Note:</b>	Indicates a potential situation which, if not avoided, may result in undesirable results or state. Indicates a practice not related to personal injury.

## Warning



### Warning:

This valve product is designed and manufactured using good workmanship and materials, and meets all applicable industry standards. This product should be used only as recommended by a company engineer.

Misapplication of this product can result in injury or property damage. It is important to select valves and valve components of the proper material and that are consistent with the particular performance requirements for your needs. Misapplication of this product includes use in an application in which the pressure/temperature rating for the product is exceeded, failure to maintain this product or any related products as recommended, or use of this product or any related products to handle caustic and/or hazardous substances that they are not designed to handle.

If the product exhibits any indication of leakage, do not operate. Isolate the valve and either repair it or replace it.

## Safety

### 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 product 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. The latest edition of this manual can be found on the web site listed within this manual.

**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 product. 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 product/plant.
- Endangering of lives by electrical, mechanical and chemical influences.
- Endangering the environment through leakage of dangerous materials.
- Personal injury or property damage.

**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.

**Safety precautions for the operating company/individual operator**

- If hot or cold components of the product are a source of danger, these components must be secured against contact by operating company.
- Contact guard for moving parts may not be removed when product is in operation.
- Do not hang items off the product. Any accessories must be firmly or permanently attached.
- Do not use the product as a step or hand hold.
- Do not paint over identification tag, warnings, notices or other identification marks associated with the product.
- PTFE diaphragms emit toxic fumes due to thermal decomposition at temperatures of 716°F (380°C) or greater.

**Safety precautions for maintenance, inspection and assembly**

Work on externally actuated valves should only be carried out when the valve is removed from service. Product that has been exposed to harmful media such as caustic chemicals 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 the following sections.

**Unauthorized reconstruction, manufacture and use of spare parts**

Reconstruction or modification of the product is only admissible after consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer serve to maintain safety. The use of diaphragms other than genuine IIT diaphragms violates diaphragm valve industry standard MSS SP88. Valve pressure, temperature and overall performance can not be guaranteed. Use of non-genuine IIT diaphragms or parts can annul all liability for the consequences. Manufacturer's parts are not to be used in conjunction with products not supplied by the manufacturer. The use of manufacturer's parts with products not supplied by the manufacturer can annul all liability for the consequences.

**Inadmissible modes of operation**

The operational reliability of the product supplied is only guaranteed when used as designated. The operating limits given on the identification tag and in the data sheet may not be exceeded under any circumstances. If the identification tag is missing or worn contact manufacturer at the address listed within this manual for specific instructions.

# Product Description

## Advantage actuator model number

The Advantage actuator is a spring or double acting pneumatic actuator. The actuator model number is located on the ITT identification tag. The model number is a four digit number defining the actuator as follows:

A = Advantage Actuator

Mode of Operation

- 1 = Fail Open (spring to open, air to close) (Direct Acting)
- 2 = Fail Close (spring to close, air to open) (Reverse Acting)
- 3 = Double Acting (air to open, air to close)

Actuator Series Size

- 3 (03, 04)
- 5 (05, 06)
- 8 (08, 09)
- 16 (15, 16, 17)
- 33 (32, 33, 34, 35)
- 47 (47, 48)

Values in parentheses are specific spring combinations for fail close actuators.

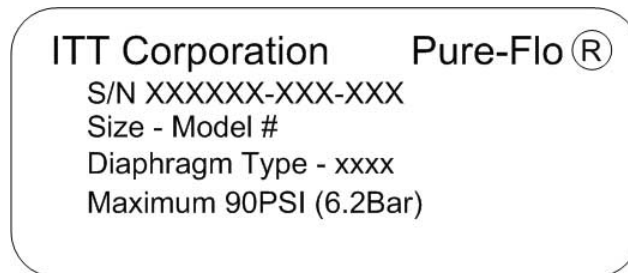
Series size 3, 5, 8, etc. equates to diaphragm effective area.

Examples:

Model # A308 = double acting actuator series 8

Model # A232 = fail close actuator series 33 with a 32 spring set

## Identification tag



Line 1 — Valve serial number

Line 2 — Valve size and model number

Line 3 — Valve diaphragm type

Line 4 — Maximum recommended actuation pressure

## Non-sealed and sealed bonnet description

The non-sealed bonnet has a weep hole that permits leakage of the process fluid if the diaphragm ruptures. The sealed bonnet uses a special “v-notch” vent plug, which permits inspection for diaphragm rupture.

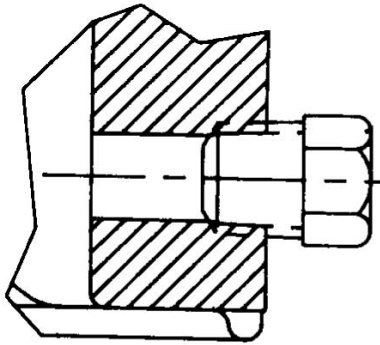
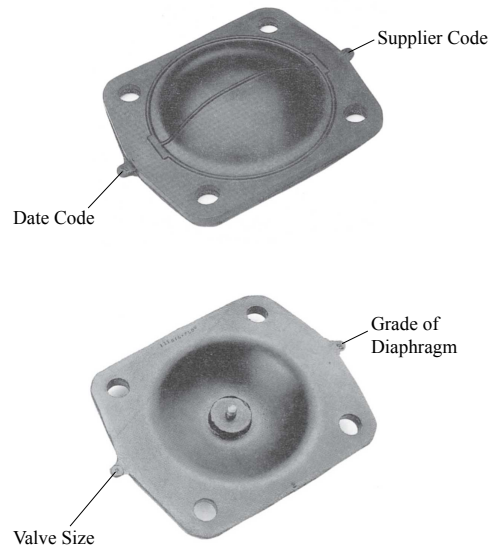


Figure 1: V-notch vent plug

## Valve diaphragm identification

### Diaphragm tab codes

All diaphragm materials and physical properties are batch traceable via permanent codes molded into the diaphragm tabs. The molding date, grade of diaphragm, and valve size provide traceability to original batch records.



# Transportation and Storage

## Transport and store the product



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**Caution:** Always observe the universally recognized technical standards and the regulations regarding the prevention of accidents when handling valves.

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**Caution:** The operator of valves used for aggressive or toxic media such as caustic chemicals must ensure that these are well flushed and cleaned before being handed to the maintenance personnel. This is particularly important when returning to the product manufacturer, disposing of or recycling the product or its component parts. MSDS are required for authorization to return valves to the manufacturer.

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1. The goods have to be carefully handled during transport in order to prevent damage.
2. The caps supplied are to be fitted to the product as applicable.
3. Unpack the shipment, check to make sure that all contents are present and undamaged.
4. If the product is not to be installed immediately following delivery, it must be properly stored.
  - a) Storage should be in a dry room at a temperature as constant as possible.
  - b) Product should not be stacked on top of one another.
  - c) Storage over a longer period may necessitate individual moisture proof packing. This is dependent on the local conditions.
5. The personnel responsible for disposal of the product or associated components are to comply with federal, state and local requirements.
6. If the return shipment is required, contact manufacturer at the address listed within this manual for specific instructions.



# Installation

## Install the valve and Advantage actuator

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**Note:** The actuator size and configuration can limit the actual operating pressure. Consult the engineering catalog for actuator sizing. Consult the factory or engineering catalog for vacuum operation.

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Consider the following information before installing the actuator:

- The series 3, 5, 8, or 16 stainless steel bonnet Advantage Actuator can have the air inlets positioned in any quadrant.
- Maximum valve operating pressure is 150 PSIG (10.34 bar). This pressure is applicable up to 100° F (38° C). Valves at maximum pressure cannot be used at maximum temperatures.

To install the valve and Advantage Actuator, complete the following procedure:

1. If welding manually, remove the actuator.
2. If welding end valves for schedule 10 or heavier pipe, remove the actuator prior to welding in line.
3. If welding end valves for schedule 5 or lighter pipe and tubing, welding with automatic equipment is acceptable. In this situation, complete the following steps prior to performing the weld.
  - a) Do not remove the actuator.
  - b) Set the valve to the open position.
  - c) Properly purge the valve with an inert gas.
4. Install the valve stem between 0 and 30 degrees above horizontal for horizontal piping systems to be drained through the valve.

The proper valve orientation differs depending upon the valve type.

- Dia-Flo diaphragm valves can be installed in any orientation.
  - Pure-Flo valves have either raised hash marks (castings) or small machined dots (forgings) on the valve body to indicate the correct drain angle. Position these marks at the 12 o'clock position to achieve the optimum drain angle.
5. Prior to pressurization (with the valve slightly open), follow the steps in the **Tighten the bonnet fasteners**.
  6. For series 33 and 47 actuators, prepare an eye bolt with a 0.625" -18 female thread to attach to the adjusting bushing.

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**Note:** Do not lift series 33 and 47 actuators by their air fittings.

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**Note:** If the actuator is a series 47 actuator, use a hoist to lift the valve.

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7. Connect the air line.  
Connection size is 1/8" NPT for series 3, 5, 8 and 16 actuators and 1/4" NPT for series 33 and 47 actuators.

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**Note:** Air line connections should be made with care so as not to damage the plastic actuator covers.

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8. Cycle the valve two to three times to verify smooth operation.

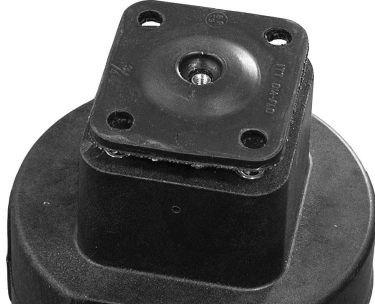
## Install diaphragm

1. Unscrew the diaphragm from the compressor by turning counterclockwise.
  - a) Periodically inspect the valve compressor pin for excessive wear. Replace the pin or compressor if excessive wear or axial pin movement is found.

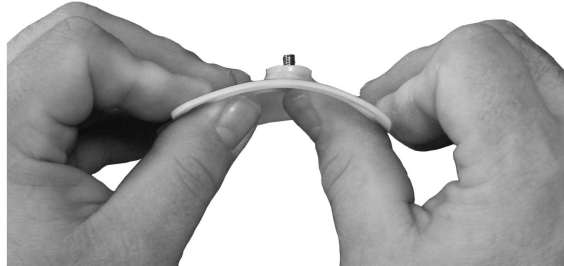
The replacement diaphragm should be identical in size and grade to the original diaphragm.

2. For PTFE assemblies only:

- a) Install the new elastomer backing cushion over the tube nut.



- b) Invert the PTFE diaphragm by pressing the center of the diaphragm face with your thumbs while holding the edge of the diaphragm with your fingers.



- c) Engage the threads of the diaphragm into the tube nut by rotating clockwise.



- d) Continue rotating the PTFE diaphragm clockwise into the compressor while securing the backing cushion from rotating.



3. Rotate the diaphragm until hard stop or heavy resistance is achieved and additional force does not significantly rotate the diaphragm into the compressor.



4. For PTFE assemblies only reinvert diaphragm.



5. Back off (no more than 1/2 turn) until the bolt holes in diaphragm and the bonnet flange align.



## Mount the Advantage actuator to the valve

1. Regulate air pressure

Options	Description
<b>If the actuator mode of operation is ...</b>	then ...
<b>1 or 3</b>	regulate the air pressure in the upper cover to extend the compressor.
<b>2</b>	regulate the air pressure in the lower cover to properly position the valve diaphragm.

2. Follow steps in **Install diaphragm**.
3. Assemble the valve body following the steps in **Tighten the bonnet fasteners**.
4. Travel stop, if equipped, must be reset at this time to ensure proper closure. Follow steps in **Adjust the travel (closing) stop**.

## Tighten the bonnet fasteners



**Caution:** Do not tighten fasteners while the system is pressurized or at elevated temperatures (> 100°F/ 38°C).

1. Depressurize the system.
2. Use regulated air pressure to position diaphragm so that valve is slightly open. It may be necessary to use air pressure to actuate the valve.
3. Tighten the bonnet fasteners in a crisscross pattern in accordance with the **Fastener torque table for valve body to actuator**.
4. Make multiple criss-cross passes to build up torque to the final table value. Make additional criss-cross passes using final table values to evenly tighten each fastener to within 5% of torque value.
5. Retighten the bonnet fasteners as noted above at ambient conditions after the system has cycled through operating pressure and temperature.
6. Monitor the valve for leakage.

If ...	then ...
<b>leakage occurs at the body/bonnet flange sealing area</b>	depressurize the system and retighten the bonnet fasteners as noted above.
<b>leakage continues</b>	follow the steps in <b>Replace valve diaphragm</b> .

## Fastener torque table for valve body to actuator

Valve Size		Bolt Size		PTFE Diaphragm		Elastomer Diaphragm	
Inch	DN	Imperial	Metric	in-lb	N-m	in-lb	N-m
Bio-Tek (1/4, 3/8, 1/2")	Bio-Tek (8, 10, 15)	#6	M4	20-25	2.3-2.8	20-25	2.3-2.8
1/2"	15	1/4"	M6	25-60	2.8-6.8	20-40	2.3-4.5
3/4"	20	1/4"	M6	50-65	5.7-9.1	20-50	2.3-5.7
1"	25	5/16"	M8	65-90	7.4-11.3	45-70	5.1-7.9

Valve Size		Bolt Size		PTFE Diaphragm		Elastomer Diaphragm	
Inch	DN	Imperial	Metric	in-lb	N-m	in-lb	N-m
1 1/2"	40	3/8"	M10	200-225	23-25	75-130	8.5-14.7
2"	50	7/16"	M12	225-275	25-31	100-180	11-20
3"	80	5/8"	M16	750-1000	85-113	300-420	34-48
4"	100	1/2"	M12	540-600	61-83	190-230	22-26

Values given are for lubricated fasteners.

Minimum values given will provide longer diaphragm cycle life for valves in non-autoclave and low thermal cycle conditions.

Maximum values given may be necessary for autoclave conditions and for high thermal cycle conditions.

Torques should be applied at near ambient conditions (< 100°F/ 38°C).

## Actuator operating pressure

Maximum permitted air supply pressure is 90 psig (6.2 bar, 620 kPa).

The actuator has a pressure rating of 90 psig. However, the actuator will withstand pressures well in excess of the rated pressure without risk of bursting. Maintaining operating pressure at or below 90 psig will ensure optimum life of the operating components, such as the actuator diaphragm. However, operation at pressures up to 100 psig (6.9 bar), for limited periods of time, will not noticeably affect the life of these components.

## Set the adjustable opening stop

These instructions are for series 3, 5, 8, 16 actuators.

1. Remove the switch package, if present.
2. Using air pressure and a bleed type regulator, open the valve to the desired position.
3. Rotate the adjusting bushing counterclockwise until resistance is felt. The opening stop is now set.
4. Adjust the valve closed switch.

## Set the adjustable opening stop

These instructions are for series 47 actuators.

1. Remove the switch package, if present.
2. Remove the clear plastic cap.
3. Using air pressure and a bleed type regulator, open the valve to desired position.
4. Rotate the adjusting bushing counterclockwise until resistance is felt. Count and record the number of turns.
5. Loosen the two jam nuts and turn the lower nut clockwise the same number of turns as recorded above.
6. Lock the nuts together.
7. Adjust the travel stop. Follow steps in **Adjust the travel (closing) stop**.
8. Replace the clear plastic cap.

## Set the manual over-ride (close)

For series 47 actuator, fail open and double acting only. Wrench closing not available on series 3, 5, 8, 16, or 33.

1. Remove the switch package, if present.

2. Release any air pressure in the bottom cover.
3. Remove the clear plastic cap.
4. Use a wrench to turn the adjusting bushing counter clockwise to close the valve. Count and record the number of turns.
5. Turn the adjusting bushing clockwise the recorded number of turns to return the valve to the open position.
6. Tighten the travel stop nuts and assemble the clear plastic cap.

## Set the manual over-ride (open)

This procedure is for series 47 actuators only.

1. Remove the switch package, if present.
2. Release any air pressure in the top cover.
3. Remove the clear plastic cap and loosen the jam nuts.
4. Use a wrench to hold the adjusting bushing from rotating and turn the lowest jam nut clockwise. This opens the valve 0.056" (1.42 mm) per rotation.
5. Rotate the nut counterclockwise to return the valve to the closed position.
6. Adjust the travel stop. Follow steps in **Adjust the travel (closing) stop**.
7. Tighten the jam nuts together and assemble the clear plastic cap.





# ITT

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