

Pulsation Dampener

3A7672C

EN

For control of pressure fluctuations and acceleration loss, preventing cavitation. For use with low-pressure positive displacement pumps. For professional use only.

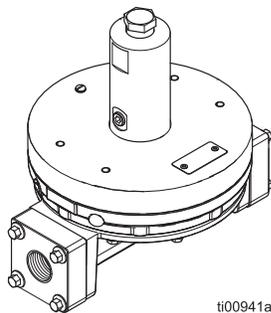
See Technical Specifications for Maximum Fluid Working Pressure and Maximum Air Input Pressure.

See page 3 for model information and page 6 for approvals.



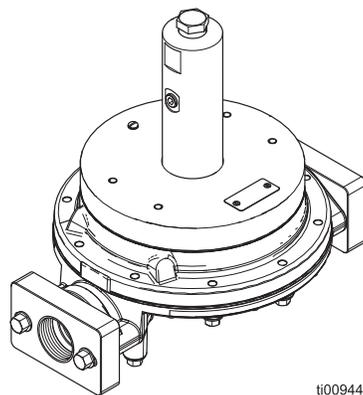
Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment. Be familiar with the proper control and usage of the equipment. Save these instructions.



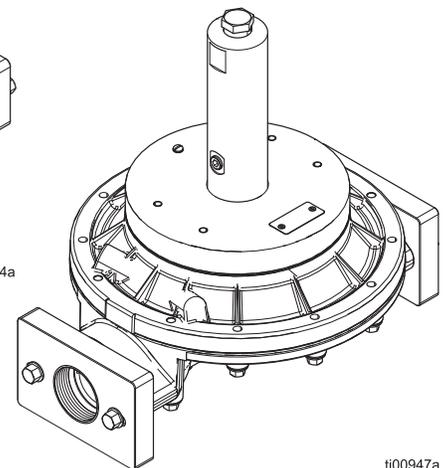
ti00941a

i100 (DTC) Model



ti00944a

i150 (DTD) Model



ti00947a

i200 (DTE) Model

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Related Manuals

Manual Number	Description
3A9406	Pulsation Dampener Diaphragm Kit – Parts
2004230	Pulsation Dampener Spool Seal Kit - Parts

Models

i100 (DTC) – 1 in. Port

Model i100A – 1 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
AL	2000437	SS	SP	PTFE	A1 1 in.–11 NPT
	26D875	SS	PTFE + SP	PTFE	
	2000440	SS	BN	PTFE	
	2000880	SS	PO	PTFE	
	2000452	SS	SP	PTFE	A2 1 in.–11 BSPT
	2000454	SS	PTFE + SP	PTFE	
	2000455	SS	BN	PTFE	
	2000881	SS	PO	PTFE	
Model i100P – 1 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
PP	2000462	PP	SP	PTFE	P1 1 in. RF ANSI/DIN flg
	26D885	PP	PTFE + SP	PTFE	
	2000463	PP	BN	PTFE	

i150 (DTD) – 1-1/2 in. Port

Model i150A – 1-1/2 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
AL	2000464	SS	SP	PTFE	A1 1-1/2 in.–11 NPT
	26D877	SS	PTFE + SP	PTFE	
	2000465	SS	BN	PTFE	
	2000882	SS	PO	PTFE	
	2000466	SS	SP	PTFE	A2 1-1/2 in.–11.5 BSPT
	2000467	SS	PTFE + SP	PTFE	
	2000468	SS	BN	PTFE	
	2000883	SS	PO	PTFE	
Model i150P – 1-1/2 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
PP	2000469	PP	SP	PTFE	P1 1-1/2 in. RF ANSI/DIN flg
	26D886	PP	PTFE + SP	PTFE	
	2000470	PP	BN	PTFE	

i200 (DTE) – 2 in. Port

Model i200A – 2 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
AL	2000471	SS	SP	PTFE	A1 2 in.–11.5 NPT
	26D878	SS	PS	PTFE	
	2000472	SS	BN	PTFE	
	2000884	SS	PO	PTFE	
	2000473	SS	SP	PTFE	A2 2 in.–11.5 BSPT
	2000474	SS	PS	PTFE	
	2000475	SS	BN	PTFE	
	2000885	SS	PO	PTFE	
Model i200P – 2 in. Port					
Fluid Sec. Material	Part Number				Connections
		Seat	Diaphragm	Seat Seal	
PP	2000476	PP	SP	PTFE	P1 2 in. RF ANSI/DIN flg
	26D887	PP	PS	PTFE	
	2000477	PP	BN	PTFE	

Configuration Matrix

Sample Configuration Sequence: DTE-ALSPSPA1							
D	T	E	AL	SP	SP	A1	N/A
Brand	Application	Model	Wetted Section Material	Seat Material	Diaphragm Material	Connection	Options

Note: Some combinations are not possible. Check with your local distributor.

Brand		Application		Model		Wetted Section Material	
D	Dampener	T	Industrial (i)	C	i100 (1 in. port)	AL	Aluminum
				D	i150 (1-1/2 in. port)	PP	Polypropylene
				E	i200 (2 in. port)		

Seat Material		Diaphragm Material	
PP	Polypropylene	BN	Buna-N
SS	316 Stainless Steel	PO	PTFE/EPDM Overmold
		PS	PTFE/Santoprene, two-piece
		SP	Santoprene

*Models with BN seats do not use seat seals.

Connection		Options	
A1	Aluminum, NPT	00	Standard
A2	Aluminum, BSPT		
P1	Polypropylene, ANSI/DIN flange		

Approvals

Model*	Approvals
i100A, i150A, i200A (AL)	 <p>II 2 GD Ex h IIC 66°C...135°C Gb Ex h IIIC T135°C Db</p> <p>Note: Type of Protection “h” applied is constructional safety “c.”</p> <p>ATEX code is dependent on the temperature of the fluid being pumped. Fluid temperature is limited by the materials of the pump interior wetted parts. See Technical Specifications, page 34, for the maximum fluid operating temperature for your specific pump model.</p>
All models	

* See **Models**, page 3, for detailed descriptions.

Safety Symbols

The following safety symbols appear throughout this manual and on warning labels. Read the table below to understand what each symbol means.

Symbol	Meaning
	Burn Hazard
	Chemical Hazard
	Equipment Misuse Hazard
	Fire and Explosion Hazard
	Flying Debris Hazard
	Pressurized Equipment Hazard
	Skin Injection from Hose Hazard
	Splash Hazard

Symbol	Meaning
	Toxic Fluid or Fumes Hazard
	Ground Equipment
	Follow Pressure Relief Procedure
	Ventilate Work Area
	Wear Personal Protective Equipment
	Do Not Wipe with Dry Cloth
	Eliminate Ignition Sources



Safety Alert Symbol

This symbol indicates: Attention! Become Alert! Look for this symbol throughout the manual to indicate important safety messages.

Warnings

The following warnings apply throughout this manual. Read, understand, and follow the warnings before using this equipment. Failure to follow these warnings can result in serious injury.

 <h1 style="margin: 0;">WARNING</h1>	
    	<p>FIRE AND EXPLOSION HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Use equipment only in well-ventilated area. • Eliminate all ignition sources, such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking). • Ground all equipment in the work area. See Grounding instructions. • Keep work area free of debris, including solvent, rags and gasoline. • Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present. • Use only conductive grounded fluid lines. • Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem. • Keep a working fire extinguisher in the work area. • Route exhaust away from all ignition sources. If diaphragm ruptures, fluid may be exhausted with air. <p>Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable vapors. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Clean plastic parts only in well-ventilated area. • Do not clean with a dry cloth.
 	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • Do not operate the unit when fatigued or under the influence of drugs or alcohol. • Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Specifications in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Specifications in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • Use equipment only for its intended purpose. Call your distributor for information. • Route lines and cables away from traffic areas, sharp edges, moving parts, and hot surfaces. • Do not kink or over bend lines or use lines to pull equipment. • Keep children and animals away from work area. • Comply with all applicable safety regulations.

 <h1 style="margin: 0;">WARNING</h1>	
	<p>TOXIC FLUID OR FLAMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> • Read Safety Data Sheets (SDSs) to know the specific hazards of the fluids you are using. • Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted into the air. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
  	<p>PRESSURIZED EQUIPMENT HAZARD</p> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> • Follow the Pressure Relief Procedure when you stop spraying/dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check lines, tubes, and couplings daily. Replace worn or damaged parts immediately.
 	<p>PLASTIC PARTS CLEANING SOLVENT HAZARD</p> <p>Many cleaning solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.</p> <ul style="list-style-type: none"> • Use only compatible solvents to clean plastic structural or pressure-containing parts. • See Technical Specifications in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.
  	<p>THERMAL EXPANSION HAZARD</p> <p>Fluids subjected to heat in confined spaces, including fluid lines, can create a rapid rise in pressure due to the thermal expansion. Over-pressurization can result in equipment rupture and serious injury.</p> <ul style="list-style-type: none"> • Open a valve to relieve the fluid expansion during heating. • Replace fluid lines proactively at regular intervals based on your operating conditions.



WARNING



BURN HAZARD

Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.



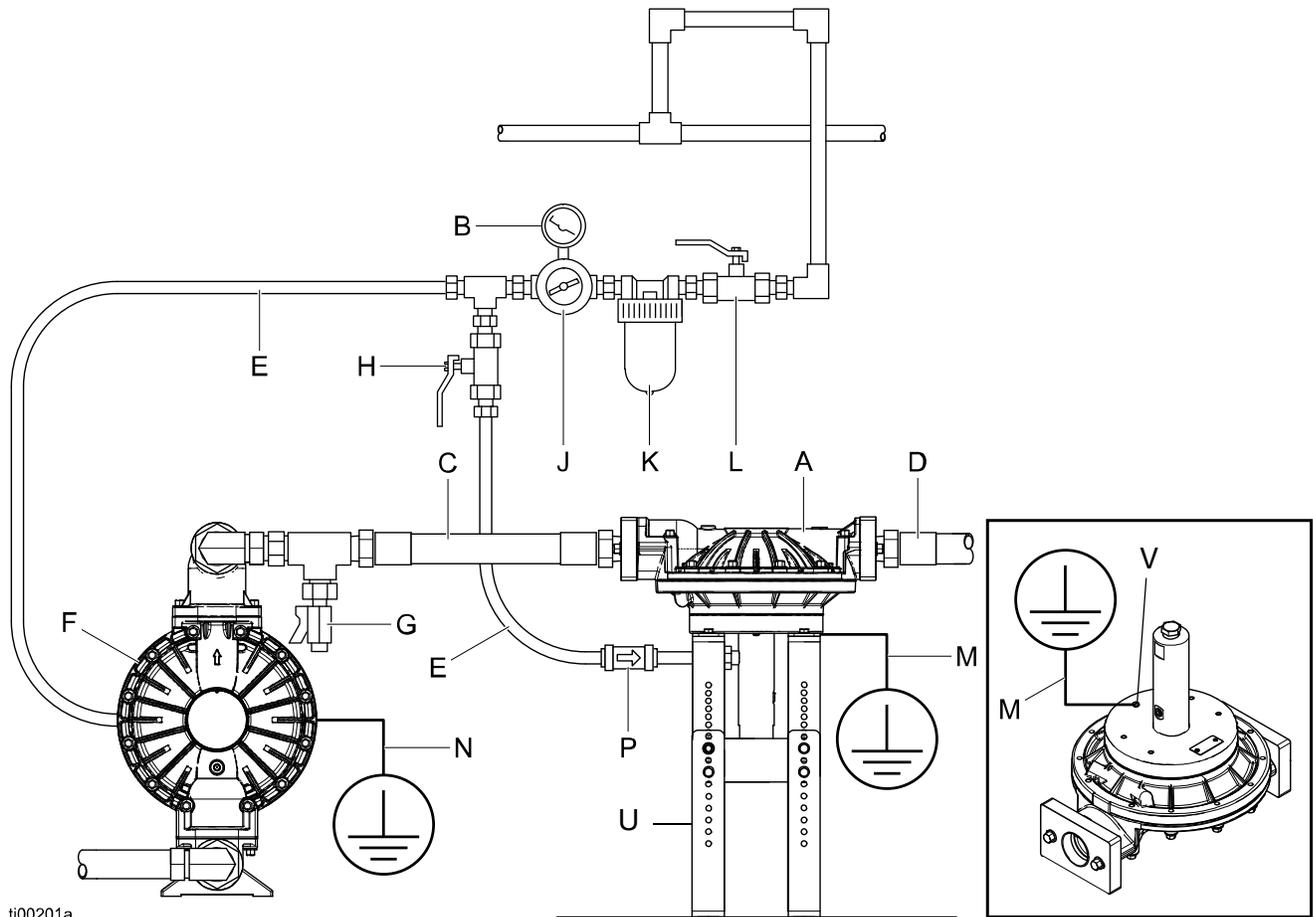
PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

- Protective eyewear and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Typical Installation

The installation shown below is only a guide for selecting and installing system components; it is not an actual system design. Contact your Graco distributor for assistance in planning a system to suit your needs.



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- | | |
|---|--|
| A Pulsation dampener | J Air regulator |
| B Air pressure gauge | K Air filter |
| C Fluid supply line | L Bleed-type master air valve |
| D Fluid outlet line | M Pulsation dampener ground wire (required) |
| E Air supply line | N Pump ground wire (required) |
| F Pump | P One-way check valve |
| G Fluid drain valve | U Stand |
| H Bleed-type master air valve (required for pump and pulsation dampener) | V Grounding screw |

FIG. 1. Typical Installation

Installation

System Pressure

Refer to the **Technical Specifications**, page 34, for working pressure ratings assigned to specific models. Never exceed the associated working fluid or air pressure for the equipment. Do not exceed the maximum working pressure of any component or accessory used in the system.

Grounding

				
<p>The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.</p>				

Static electricity is created by the fluid flowing through the pump and fluid lines. If the equipment is not properly grounded, sparking may occur, and the system may become hazardous. Sparks can ignite fumes from solvents and the fluid being pumped, dust particles, and other flammable substances, whether you are pumping indoors or outdoors, and can cause a fire or explosion and serious bodily injury and property damage.

Check the ground continuity after initial installation. Set a regular schedule for checking ground continuity to maintain proper grounding.

If you experience any static sparking or even a slight shock while using this equipment, stop pumping immediately. Do not use the system again until the problem has been identified and corrected.

To reduce the risk of static sparking, ground the pump, pulsation dampener, and all other equipment used or located in the pumping area. Check your local electrical code for detailed grounding instructions for your area and type of equipment. Before operating the equipment, ground all parts of the system as follows:

- Pump: See your separate pump instruction manual.
- Pulsation dampener: Secure a ground wire (M) to the pulsation dampener with the grounding screw (V) located on the side of the housing. See FIG. 1. Connect the clamp end of the ground wire to a true earth ground.
- Air and fluid lines: Use only conductive lines with a maximum of 500 ft (150 m) combined line length to ensure grounding continuity. Check the electrical resistance of the air and fluid lines. If total resistance to ground exceeds 29 megohms, replace line immediately.
- Air compressor: Follow the manufacturer's recommendations.
- Fluid supply container: Follow local codes and regulations.
- All solvent pails used when flushing: Follow the local codes and regulations. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.
- Fluid supply container: Follow local codes and regulations.

Mounting

Place the pulsation dampener on the floor or other solid, level surface near the pump. For optimal performance, mount the dampener on a stand to locate its inlet at the same elevation as the pump outlet. Use the mounting holes on the pulsation dampener to fasten it in place.

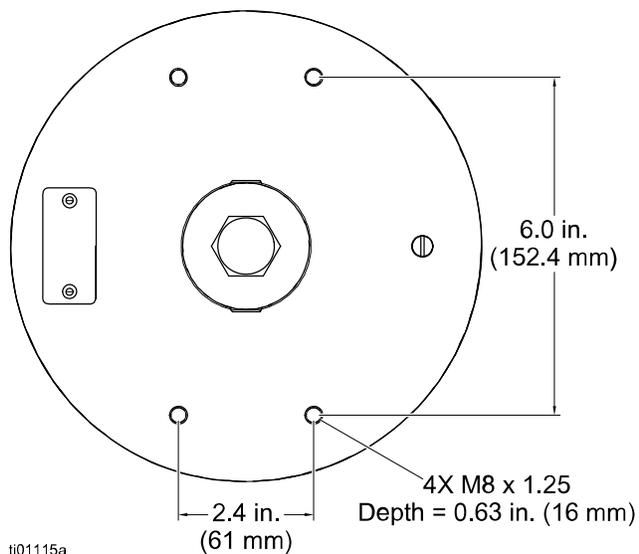


FIG. 2: Mounting thread dimensions

Connect the Pulsation Dampener to the Pump

1. Connect the pulsation dampener inlet to the pump outlet with a conductive, flexible fluid supply line (C), see FIG. 1.

NOTICE

Do not plumb the pulsation dampener directly onto the fluid outlet of the pump without sufficient additional support. The pump cannot support the weight of the pulsation dampener and will suffer damage or rupture.

The air inlet to the pulsation dampener is the lower 1/4 NPT female port on the spool housing (5), closest to the spool housing flange (3) when assembled.

The air supply from the dampener can be teed off from the pump air supply without using a separate air regulator (J).

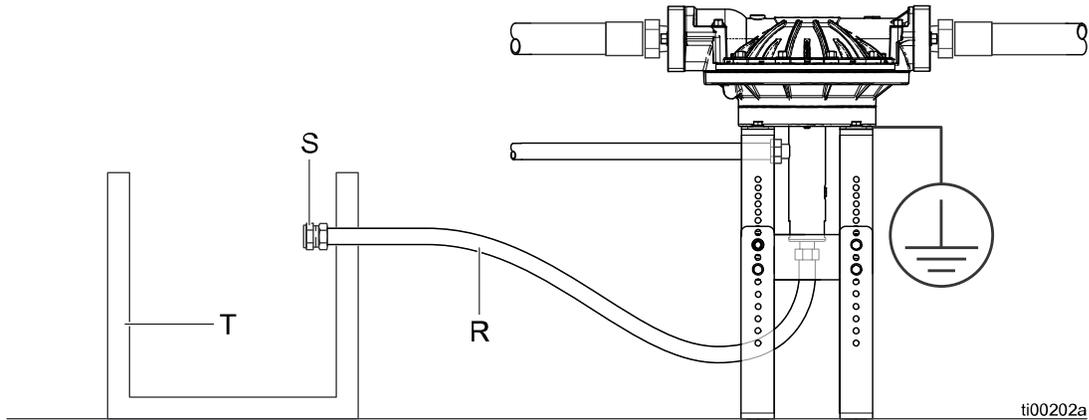
A minimum 3/8 in. (9.5 mm) air line (E) is required for the air supply. Ensure the air supply line to the dampener is conductive (or properly grounded).

2. Install a self-relieving air valve (H) as close as possible to the dampener to relieve any trapped air when not in operation. Be sure the valve is easily accessible and downstream from the air supply regulator.
3. Install an air line filter (K) to remove harmful dirt and moisture from the compressed air supply.
4. Install a one-way check valve (P) in the air supply line to prevent air line contamination in the event of a diaphragm failure.
5. Use a compatible liquid thread sealant on all male threads. Tighten all connections firmly to avoid air or fluid leaks.

NOTICE

To avoid damage to the pulsation dampener, do not overtighten the connections.

Ventilate Air Exhaust



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- R** Conductive air exhaust line **T** Conductive container for remote air exhaust
S Air breather

FIG. 3: Air Exhaust Ventilation to a Remote Container

<p>To avoid toxic fluid hazard and a fire and explosion hazard, be sure the system is properly ventilated for your type of installation. When pumping flammable or hazardous fluids, you must vent the pulsation dampener exhaust air to a safe place, away from people, animals, food handling areas, and all sources of ignition. If the diaphragm ruptures, the fluid will be exhausted along with the air. Place a container at the end of the air exhaust line to catch the fluid. See FIG. 3.</p>				

2. Place a conductive container at the end of the conductive air exhaust line to catch fluid in case the diaphragm ruptures.

<p>To avoid a hazard from flying debris, never operate the pulsation dampener without the air breather or an air exhaust line installed in the air exhaust port. If the air exhaust port is left open and the diaphragm shaft works loose from the bolt, the shaft could be propelled out of the housing, causing injury.</p>				

The minimum size for the air exhaust line is 3/8 in. (10 mm) ID x 15 ft (4.6 m). If a longer line is required, use a larger diameter line.

1. Remove the air breather from the pulsation dampener exhaust port. Install a conductive exhaust line in the exhaust port (3/4 in. NPT), and connect the air breather to the other end of the line. Avoid sharp bends or kinks in the line. See FIG. 3.

Before First Use

The equipment was tested in water. If water could contaminate the fluid you are pumping, flush it thoroughly with a compatible solvent. Follow the steps in **Flushing the System**, page 16.

Operation

General Information

The pulsation dampener uses air pressure and a diaphragm to maintain a consistent fluid outlet pressure from a double diaphragm or low-pressure reciprocating pump. During normal flow, the pulsation dampener air pressure and fluid pressure are in equilibrium. A sharp increase in fluid pressure causes the air inlet port to open, increasing air pressure on the diaphragm and returning the system to equilibrium.

Conversely, a sharp decrease in fluid pressure causes the air exhaust port to open, decreasing air pressure on the diaphragm and allowing the system to return to equilibrium.

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.

<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the Pressure Relief Procedure before cleaning, checking, or servicing the equipment.</p>				

1. Close the bleed-type master air valve (H) to shut off the air to the equipment.
2. Open the dispensing valve, if used.
3. Open the fluid drain valve (G) to relieve all fluid pressure. Have a container ready to catch the drainage.

Fluid Compatibility

Be sure all fluids and solvents used are chemically compatible with the wetted parts and non-wetted parts shown in the **Technical Specifications**, page 34. Failure of the diaphragm may cause non-wetted parts to be exposed to fluid. Always read the fluid and solvent manufacturer's literature before using them with this equipment.

Operating the Pulsation Dampener

1. Check all connections to be sure they are tight. Be sure to use a compatible liquid thread sealant on all male threads, and do not overtighten the connections.
2. Check that the air breather or air exhaust line is securely connected to the air exhaust port on the top of the dampener.

<p>To avoid a hazard from flying debris, never operate the pulsation dampener without the air breather or an air exhaust line installed in the air exhaust port. If the air exhaust port is left open and the diaphragm shaft works loose from the bolt, the shaft could be propelled out of the housing, causing injury.</p>				

3. For best performance, set the air supply pressure to the pulsation dampener to at least 10 psig (0.07 MPa, 0.7 bar) above the mean liquid discharge pressure as measured at the pump outlet.
4. Start the pump as explained in your separate pump manual. In systems using a 1:1 ratio pump, the air pressure supplied to the pulsation dampener will be the same as that supplied to the pump.
5. Allow the pump to cycle slowly until all air is pushed out of the pulsation dampener and lines, and the pump is primed. The system is now ready for normal operation.

When using a pump with a ratio greater than 1:1, the air pressure supplied to the pulsation dampener and the air pressure supplied to the pump must be at the same ratio as the pump to prevent overpressurization of the pulsation dampener. See the following examples.

- **In a system using a 2:1 ratio pump**, air pressure supplied to the pulsation dampener should be twice as high as air pressure to the pump. If the air pressure supplied to the pump is 50 psig (0.34 MPa, 3.4 bar), you should supply 100 psig (0.7 MPa, 7 bar) air pressure to the pulsation dampener.

- **In a system using a 4:1 ratio pump**, air pressure supplied to the pulsation dampener should be four times as high as air pressure to the pump. If the air pressure supplied to the pump is 25 psig (0.17 MPa, 1.7 bar), you should supply 100 psig (0.7 MPa, 7 bar) air pressure to the pulsation dampener.

				
<p>To prevent injury from pressurized fluid, such as splashing fluid, never exceed the maximum process liquid pressure and air supply pressure specified in the Technical Specifications, page 34, for your specific dampener model. In systems using pumps with a ratio greater than 1:1, reduce the air inlet pressure to the pump as necessary to keep the fluid and air inlet pressures to the pulsation dampener within these limits.</p>				

NOTICE
<p>In systems using pumps with a ratio greater than 1:1, fluid may escape into the pulsation dampener air line and contaminate the air supply if the diaphragm fails. Installation of a check valve in the air line will prevent fluid contamination of the air line and damage to the equipment.</p>

Flushing the System

				
				
<p>To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.</p>				

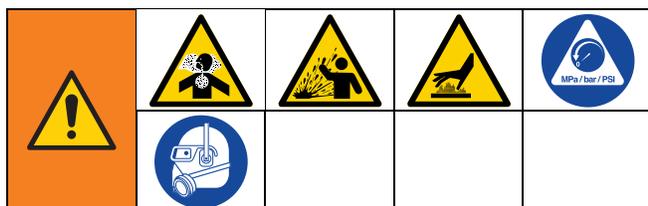
Flush the system regularly, using a compatible solvent. Do not allow fluid to dry in the pump or pulsation dampener. Always flush the pump and pulsation dampener before storing them for any length of time.

1. Place the pump suction line in the conductive solvent container.
2. Run the pump long enough to thoroughly clean it, the pulsation dampener, fluid lines, and any guns or valves used in the system.
3. Close the pump air regulator.
4. Remove the suction line from the solvent container.
5. Run the pump until the solvent is forced out of the system.
6. Shut off the air supply.

Shutdown

Remove the suction line from the fluid container and run the pump until the fluid is forced out of the system. Then shut off the air supply.

Troubleshooting



Follow the **Pressure Relief Procedure**, page 15, before checking or repairing the equipment.

Note: Check all possible problems and causes before disassembling equipment.

Problem	Cause	Solution
External fluid leak	Insufficient fastener torque.	Tighten fastener(s).
	Worn seal.	Replace seal. See Service the Fluid Connections , page 20.
	Diaphragm bead not seated.	Ensure diaphragm bead is fully seated on both sides.
	Leak path through component.	Replace component if leaking.
External air leak (other than through air breather)	Insufficient fastener or spool housing torque.	Tighten fastener(s).
	Worn or damaged spool housing seal/connections.	Replace seal(s) and/or connection(s). See Service the Fluid Connections , page 20
Too much pulsation	Missing or damaged spool seal (o-ring).	Replace seal(s). Service the Fluid Connections , page 20
	Insufficient spool lubrication (grease).	Apply grease liberally to spool seals, ensuring complete coverage.
	Grease contamination by water or other substance causing spool to stick in housing	Ensure diaphragm nut (10) is properly torqued according to Torque Instructions , page 27. Remove contamination source. Fully disassemble unit and remove all contaminated grease. Thoroughly clean internal parts and surfaces, and re-apply new, compatible lithium grease (ideally NLGI #1) with full coverage on all spool seals. Reduce contaminant and water content of air supply if necessary.
	Incorrect spool seal lubrication (grease).	Remove spool seals (o-rings); remove all incorrect grease; install new spool seals; apply correct grease liberally to spool seals, ensuring complete coverage. See Replace the Spool O-Rings , page 19.
	Insufficient air pressure.	Increase air pressure to the pulsation dampener.

Problem	Cause	Solution
Excessive supply air flow-rate (without external air leakage)	Missing or damaged spool seal (o-ring).	Replace seal(s).
Liquid (water) in exhaust	Diaphragm bead not seated.	Ensure diaphragm bead is fully seated on both sides.
	Loose diaphragm bolt/stud.	Ensure air-side nut is sufficiently torqued onto diaphragm bolt/stud.
	Missing diaphragm assembly components.	Ensure assembly is complete.
	Diaphragm ruptured.	Replace diaphragm.

Maintenance

Replace the Spool O-Rings

				
<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the Pressure Relief Procedure before cleaning, checking, or servicing the equipment.</p>				

1. Relieve the pressure. Follow **Pressure Relief Procedure**, page 15.
2. Place a conductive container under the pulsation dampener to catch the draining process fluid, disconnect the process fluid lines, and turn the pulsation dampener on end to drain the fluid.
3. Remove the fluid cover bolts (18) if applicable and (19). See **Parts**, page 22.
4. Separate the dampener cap (1) from the cover (17).
5. Pull the diaphragm and spool out of the housing. See **Parts**, page 22.
6. Remove the three o-rings (9) from the spool (8).
7. Install three new o-rings (9), one in each spool o-ring groove.
8. Apply lithium-based grease with full coverage on all three spool o-rings.
9. Slide the diaphragm and spool assembly into the assembled spool housing (5) OR seat the diaphragm outer bead into the fluid cover (17) outer bead groove, and install the assembled spool housing over the spool and diaphragm assembly.
10. Install and tighten the bolts (18) and (19) through the fluid cover (17) into the dampener cap (1) and torque in a star pattern to the torque specified in **Torque Instructions**, page 27. See **Parts**, page 22.

Service the Diaphragm and Spool

				
<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the Pressure Relief Procedure before cleaning, checking, or servicing the equipment.</p>				

1. Relieve the pressure. Follow **Pressure Relief Procedure**, page 15.
2. Place a conductive container under the pulsation dampener to catch the draining process fluid, disconnect the process fluid lines, and turn the pulsation dampener on end to drain the fluid.
3. Remove the fluid cover bolts (18) if applicable and (19). See **Parts**, page 22.
4. Separate the air-side assembly from the fluid cover (17) to expose the diaphragm and spool assembly. Pull the diaphragm and spool out of the housing. See **Parts**, page 22.
5. Hold the bolt or fluid plate (16) steady with a wrench. Unscrew the spool (8) from the bolt using the spool wrench flats.
6. Remove the nut (10), air-side diaphragm plate (11), diaphragm (12), PTFE diaphragm (13, if applicable), fluid-side diaphragm plate (14), and o-ring (15, if applicable) from the bolt. Clean and inspect all parts for wear or damage.
7. For assemblies with aluminum fluid covers, place the o-ring (15) on the bolt (16). Install the fluid-side diaphragm plate (14) with the flat side facing away from the diaphragm(s).
8. Install the diaphragm (12), making certain that the side marked AIR SIDE is facing away from the bolt head. If applicable, install the fluid side diaphragm (12) first, then the backup diaphragm (13).

9. Install the air-side diaphragm plate (11) with the flat side facing away from the diaphragm(s).
10. Apply thread sealant to the bolt (16).
11. Hold the bolt steady with a wrench, and screw the nut (10) onto the bolt (16). Torque according to **Torque Instructions**, page 27.
12. Use the spool wrench flats to screw the spool (8) onto the bolt (16). Torque according to **Torque Instructions**, page 27.
13. Thoroughly lubricate the spool o-rings (9) with lithium-based grease. Slide the spool and diaphragm assembly into the assembled housing (5).
14. Place the fluid cover (17) on the air-side assembly.
15. Install and tighten the bolts (18) and (19) through the fluid cover (17) into the dampener cap (1) and torque in a star pattern to the torque specified in **Torque Instructions**, page 27.

Service the Fluid Connections

				
<p>This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the Pressure Relief Procedure before cleaning, checking, or servicing the equipment.</p>				

1. Relieve the pressure. Follow **Pressure Relief Procedure**, page 15.
2. Place a conductive container under the pulsation dampener to catch the draining process fluid, disconnect the process fluid lines, and turn the pulsation dampener on end to drain the fluid.
3. Remove the bolts (24), and washers (32) for i150P and i200P models, holding one flange adaptor (22) to the fluid cover (17). Repeat for the flange adaptor on the other side. See **Parts**, page 22, 23, and 24.
4. Remove the seat (20) and seal (21) from one side of the fluid cover (17) and the other seat and seal from the flange adaptor with seat bore (22) for i150 and i200 models, or from both sides of the fluid cover for i100 models. Clean and inspect all parts for wear or damage.
5. Fully install one seat (20) into the fluid cover (17) seat bore with seat o-ring groove facing away from the fluid cover. Fully install another seat (20) into the seat bore within the flange adaptor (22), with seat o-ring groove facing away from the flange adaptor.
 - a. For i100 models, both seats (20) install into the fluid cover (17). For i150 and i200 models, one seat installs into the fluid cover, and the other seat installs into the flange adaptor with seat bore (22).
6. Install one seat seal (21) onto each assembled seat, before assembling each flange adaptor onto the fluid cover. For threaded flange adaptors, install with thread chamfer facing outwards. Torque bolts (24) to corresponding model specification in **Torque Instructions**, page 27.

Service the Air-Side Assembly

Normally the air-side assembly (1, 2, 3, 4, 5, 6, 7, 25, 26, 27) should not require maintenance, but if disassembly and/or repair is required, follow these steps:

Disassembly

1. Remove the fluid cover (17) by loosening and removing the bolts (18, if applicable) and (19).
2. Remove the diaphragm and spool assembly (8, 9, 10, 11, 12, 13 if applicable, 14, 15 if applicable, and 16) by sliding it out of the spool housing bore (5).
3. Remove the dampener cap (1) from the spool housing flange (3) by loosening bolts (4).
4. Inspect gasket (2) and replace if needed upon re-assembly.
5. Remove the spool housing (5) from the spool housing flange (3) by turning it counter-clockwise,

using the housing wrench flats if needed. Inspect spool housing bore for contaminants and clean thoroughly if required.

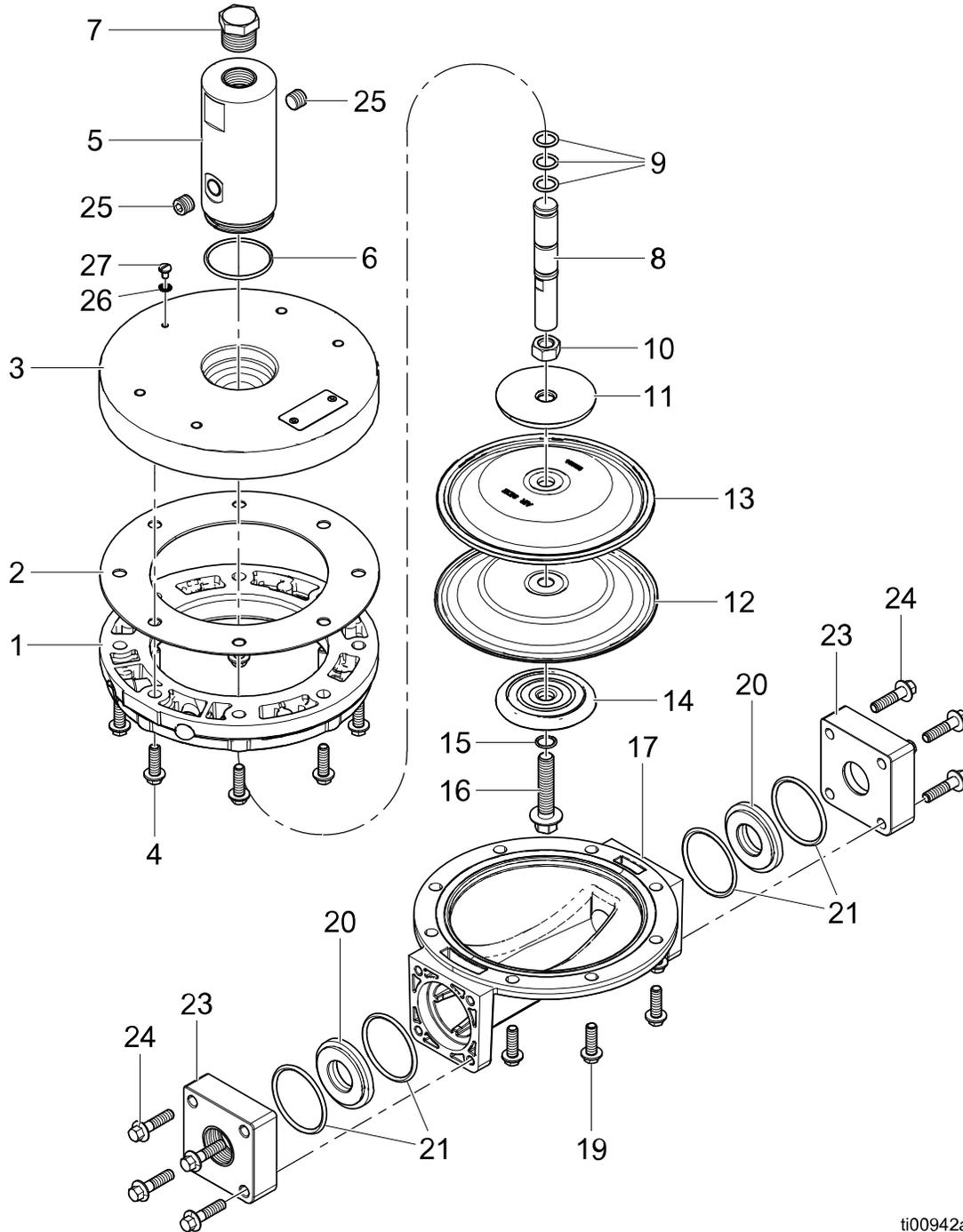
6. Replace spool housing seal (6) if needed.

Assembly

1. Assemble spool housing (5) with installed seal (6) by turning into spool housing flange (3), using the correct torque specification.
2. Align dampener cap (1) clearance holes with small gasket holes (2) and threaded holes in spool housing flange (3) so all three parts are as centered as possible.
3. Assemble dampener cap onto gasket (2) and spool housing flange (3) by using fasteners (4) according to the correct torque specification shown in this manual.

Parts

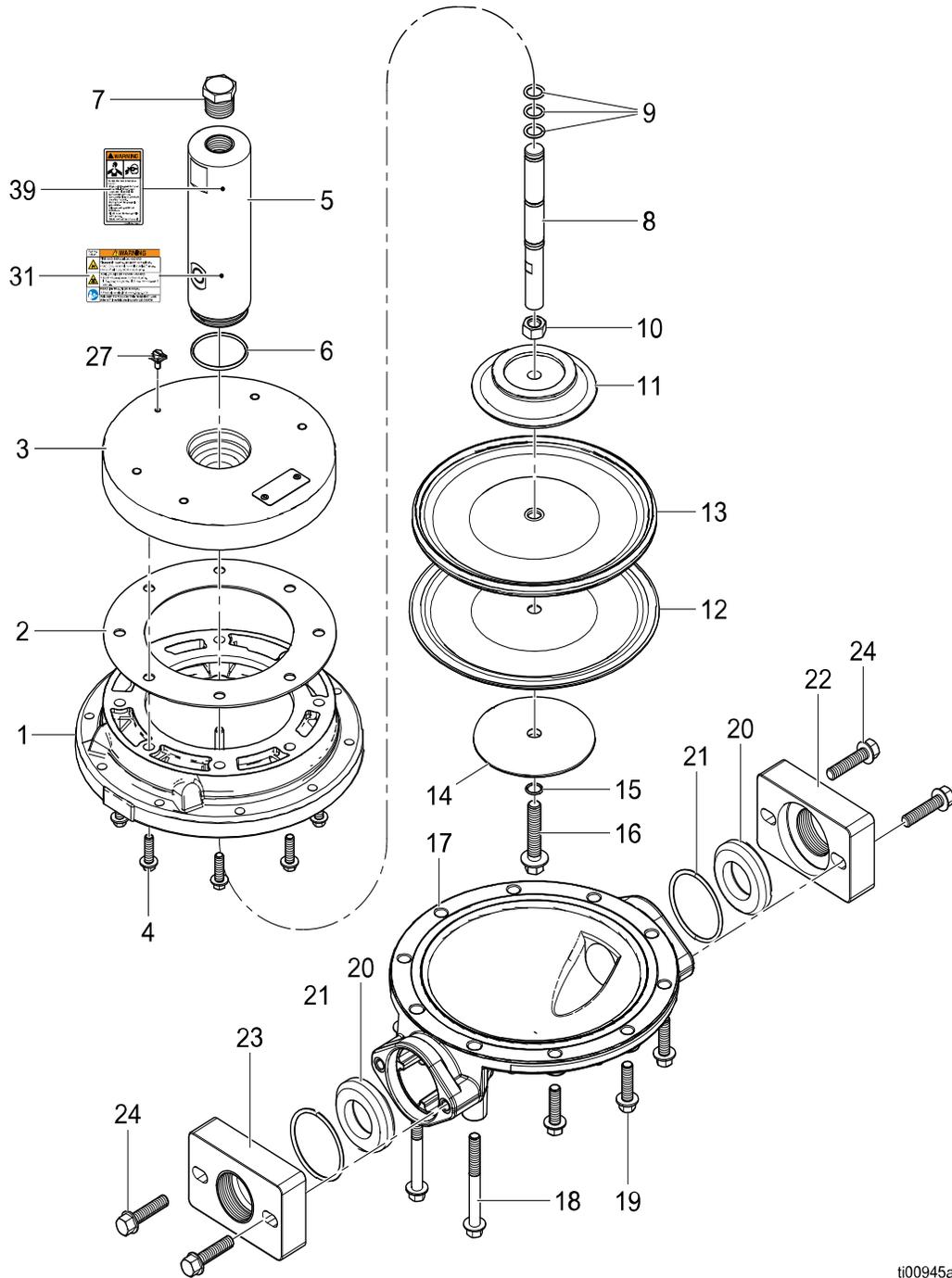
i100 (DTC) Models



ti00942a

FIG. 4. i100 (DTC) parts exploded view, aluminum model shown

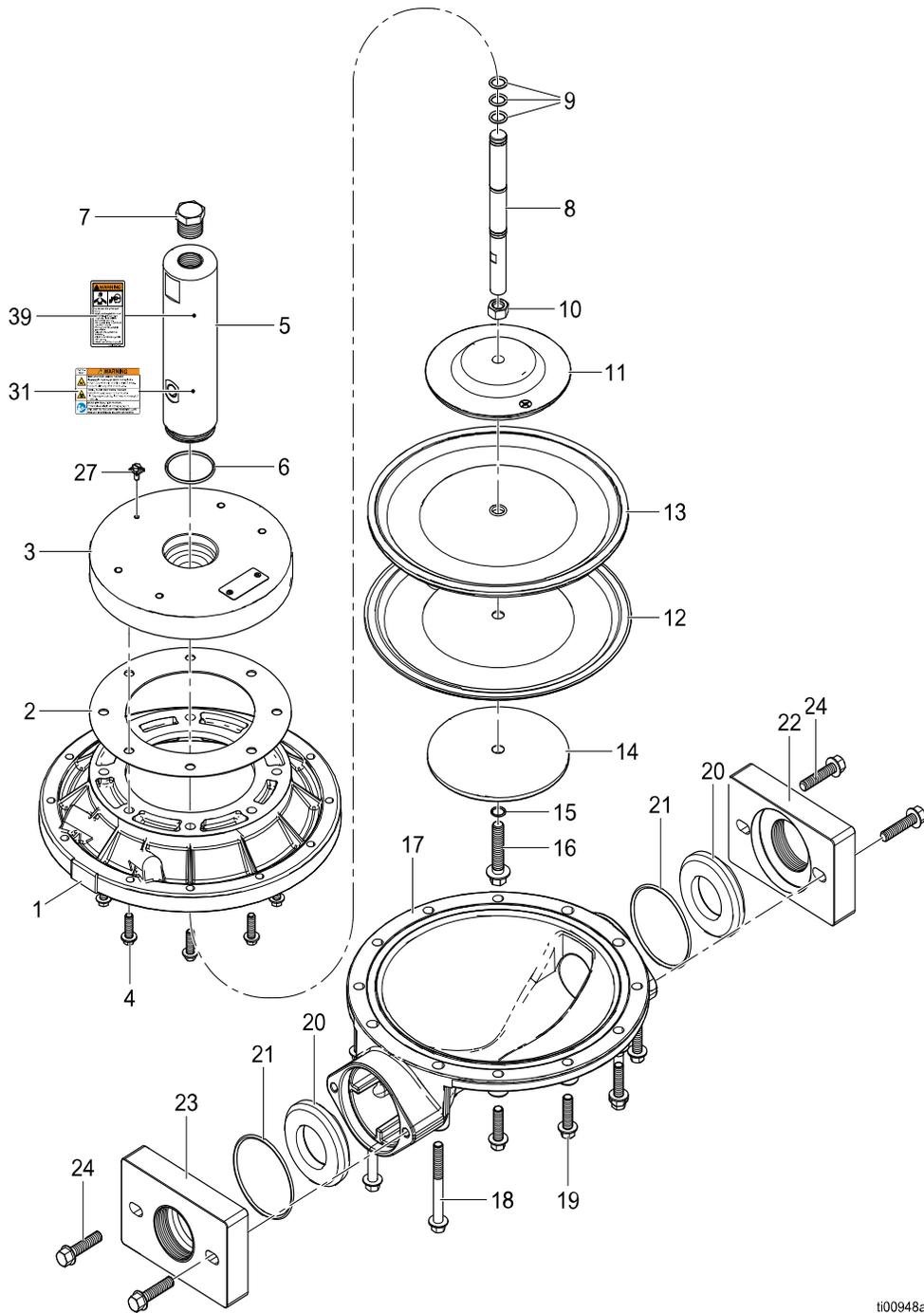
i150 (DTD) Models



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FIG. 5. i150 (DTD) parts, exploded view, aluminum model shown

i200 (DTE) Models



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FIG. 6. i200 (DTE) parts exploded view, aluminum model shown

Parts List

Ref.	Description	Quantity per Assembly
Air-Side Assembly		
1	CAP, dampener	1
2	GASKET, cap	1
3	FLANGE, housing	1
4	FASTENER, cap	8
5	HOUSING, spool	1
6	o-ring	1
7	breather	1
25	PLUG, housing	2
26	WASHER, grounding	1
27	SCREW, grounding	1
Fluid-Side Assembly		
8	SPOOL	1
9	o-ring	3
10	nut	1
11	PLATE, air	1
12	DIAPHRAGM	1
13	DIAPHRAGM, backer	1
14	PLATE, fluid	1
15	SEAL, packing	0 or 1

Ref.	Description	Quantity per Assembly
16	FASTENER, diaphragm	1
17	COVER, fluid	1
18	FASTENER, fluid cover, long	0 or 2 or 4
19	FASTENER, fluid cover, short	0 or 8
20	SEAT	2
21	SEAL, seal	2 or 4
22	ADAPTOR, flange, seat bore	1
23	ADAPTOR, flange, flat	1
24	FASTENER, flange adaptor	4 or 8
32	WASHER, flange adaptor	0 or 4 or 8
Labels		
31▲	LABELS, safety	1
	188621 LABEL, safety, English	
	198382 LABEL, safety, multiple languages	
	189220 LABEL, warning	
	2003039 LABEL, ATEX	
34	LABEL, logo	1

▲ Replacement safety labels, tags, and cards are available at no cost.

Repair Kits

See **Configuration Matrix**, page 5 for definitions of the wetted section, diaphragm, and seat materials.

As applicable, all Repair Kits include:

- 1 or 2 diaphragms
- 1 o-ring
- 1 or 2 seats
- 1 or 4 o-rings
- 1 or 2 o-rings
- 3 o-rings
- 2 o-rings
- 1 package, adhesive
- 1 set screw

Kit Part Number	Material		
	Wetted	Diaphragm	Seat
i100 (1 in.)			
2002721	AL	PS (PT + SP)	SS
2003013	PP	PS (PT + SP)	PP
2002749	AL	SP	SS
2003015	PP	SP	PP
2002750	AL	BN	SS
2003017	PP	BN	PP
2002751	AL	PO	SS

Kit Part Number	Material		
	Wetted	Diaphragm	Seat
i150 (1-1/2 in.)			
2002760	AL	PS (PT + SP)	SS
2003019	PP	PS (PT + SP)	PP
2002762	AL	SP	SS
2003020	PP	SP	PP
2002765	AL	BN	SS
2003021	PP	BN	PP
2002768	AL	PO	SS
i200 (2 in.)			
2002769	AL	PS (PT + SP)	SS
2003022	PP	PS (PT + SP)	PP
2002770	AL	SP	SS
2003023	PP	SP	PP
2002771	AL	BN	SS
2003024	PP	BN	PP
2002772	AL	PO	SS

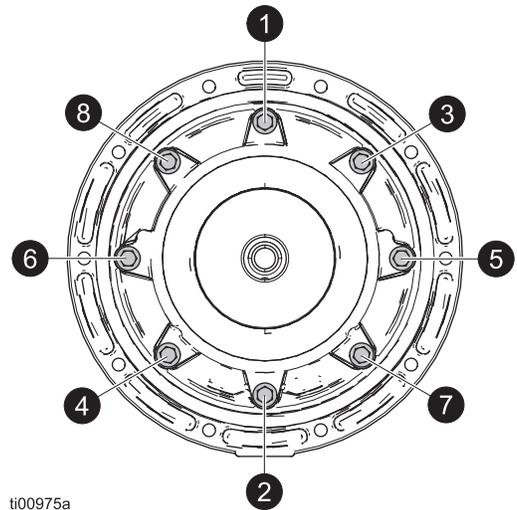
Torque Instructions

To ensure proper sealing, torque fasteners using the following procedure.

1. Start all fasteners a few turns.
2. Follow the torque sequence to turn down each fastener until each is slightly under the specified torque.
3. Follow the torque sequence to turn each fastener by 1/2 turn or less until each is at the specified torque.

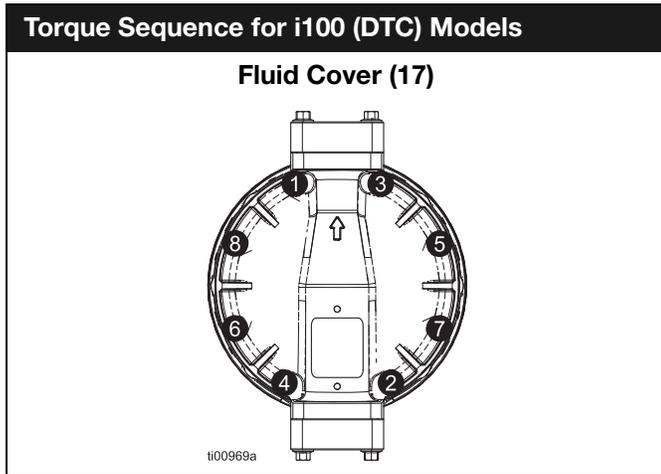
NOTICE

To avoid damage to the equipment, do not over-torque the fasteners.



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i100 (DTC) Torque Sequence

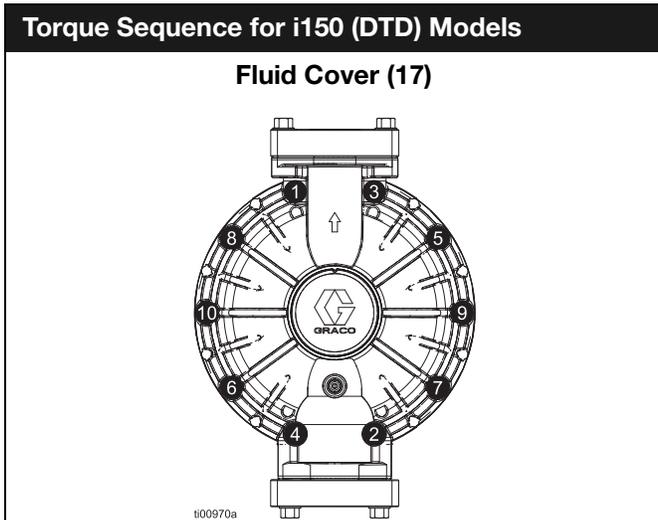


i100 (DTC) Torque Specifications

i100A (DTC) AL			
Item	Imp (in.-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	270 ± 24	30.5 ± 2.7	19 mm hex
18	n/a	n/a	n/a
4	110 ± 5	12.4 ± 0.6	10 mm hex
24	110 ± 5	12.4 ± 0.6	10 mm hex
25	12.5 ± 2.5	1.2 - 1.7	1/4 in. hex key
27	12.5 ± 2.5	1.2 - 1.7	.055 max thk flat

i100P (DTC) PP			
Item	Imp (in.-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	270 ± 30	30.5 ± 3.4	19 mm hex
18	n/a	n/a	n/a
19	90 ± 5	10.2 ± 0.6	10 mm hex
24	90 ± 5	10.2 ± 0.6	10 mm hex
25	12.5 ± 2.5	1.2 - 1.7	1/4 in. hex key
27	12.5 ± 2.5	1.2 - 1.7	.055 max thk flat

i150 (DTD) Torque Sequence

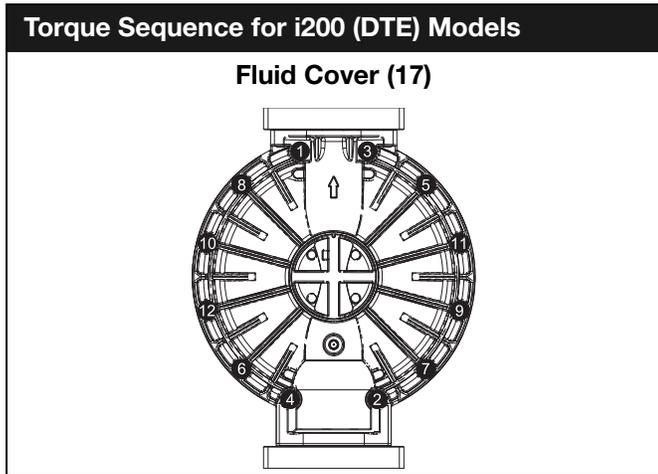


i150 (DTD) Torque Specifications

i150A (DTD) AL			
Item	Imp (in-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	510 ± 30	57.6 ± 3.4	19 mm hex
18	205 ± 15	23.2 ± 1.7	13 mm hex
19	205 ± 15	23.2 ± 1.7	13 mm hex
24	85 ± 5	9.6 ± 0.6	15 mm hex
25	12.5 ± 2.5	1.2 - 1.7	1/4 in. hex key
27	12.5 ± 2.5	1.2 - 1.7	.055 max thk flat

i150P (DTD) PP			
Item	Imp (in-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	270 ± 30	30.5 ± 3.4	19 mm hex
18	205 ± 15	23.2 ± 1.7	13 mm hex
19	205 ± 15	23.2 ± 1.7	13 mm hex
24	135 ± 15	15.3 ± 1.7	10 mm hex
25	12.5 ± 2.5	1.2 - 1.7	1/4 in. hex key
27	12.5 ± 2.5	1.2 - 1.7	.055 max thk flat

i200 (DTE) Torque Sequence



i200 (DTE) Torque Specifications

i200A (DTE) AL			
Item	Imp (in-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	510 ± 30	57.6 ± 3.4	19 mm hex
18	205 ± 15	21.5 - 24.9	13 mm hex
19	205 ± 15	21.5 - 24.9	13 mm hex
24	135 ± 15	13.6-17.0	15 mm hex
25	12.5 ± 2.5	1.2 - 1.7	1/4 in. hex key
27	12.5 ± 2.5	1.2 - 1.7	.055 max thk flat

i200P (DTE) PP			
Item	Imp (in-lb)	N-m	Drive
4	110 ± 10	12.4 ± 1.2	10 mm hex
5	240 ± 24	27.1 ± 2.7	2-1/8 in. crowfoot
7	12.5 ± 2.5	1.2 - 1.7	1-1/16 in. hex
8	12.5 ± 2.5	1.2 - 1.7	1-9/16 in. crowfoot
10	270 ± 30	30.5 ± 3.4	19 mm hex
18	205 ± 15	23.2 ± 1.7	13 mm hex
19	205 ± 15	23.2 ± 1.7	13 mm hex
24	155 ± 15	17.5 ± 1.7	10 mm hex
25	12.5 ± 2.5	17.5 ± 0.7	1/4 in. hex key
27	12.5 ± 2.5	17.5 ± 0.8	.055 max thk flat

Dimensions

Dimensions for i100 (DTC) Model

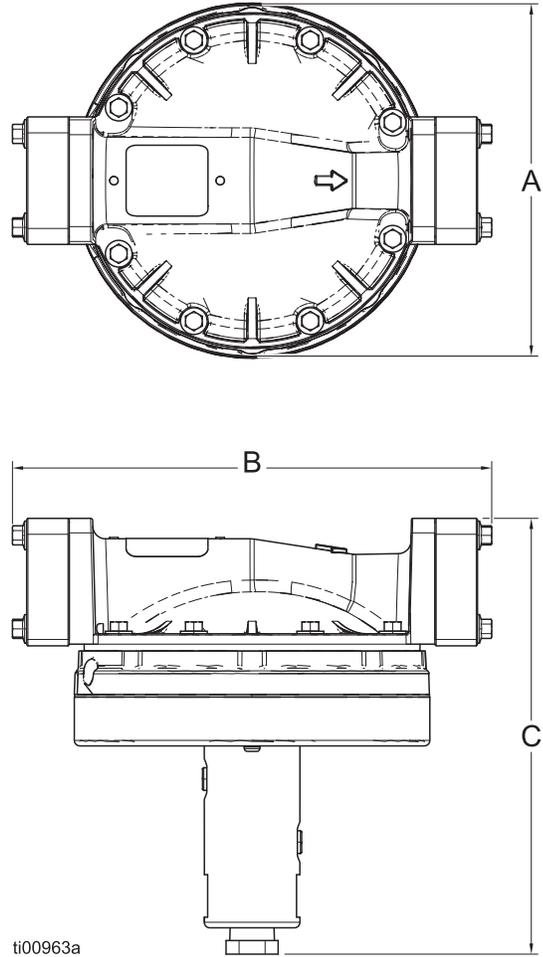


FIG. 7. Dimension Diagram for i100 (DTC)

Dimensions for i100 (QTC) Model				
Ref.	Fluid Cover Material			
	AL		PP	
	in.	cm	in.	cm
A	8.4	21.3	8.4	21.4
B	11.3	28.7	16.3	41.4
C	10.3	26.2	11.0	28.0

Dimensions for i150 (DTD) Model

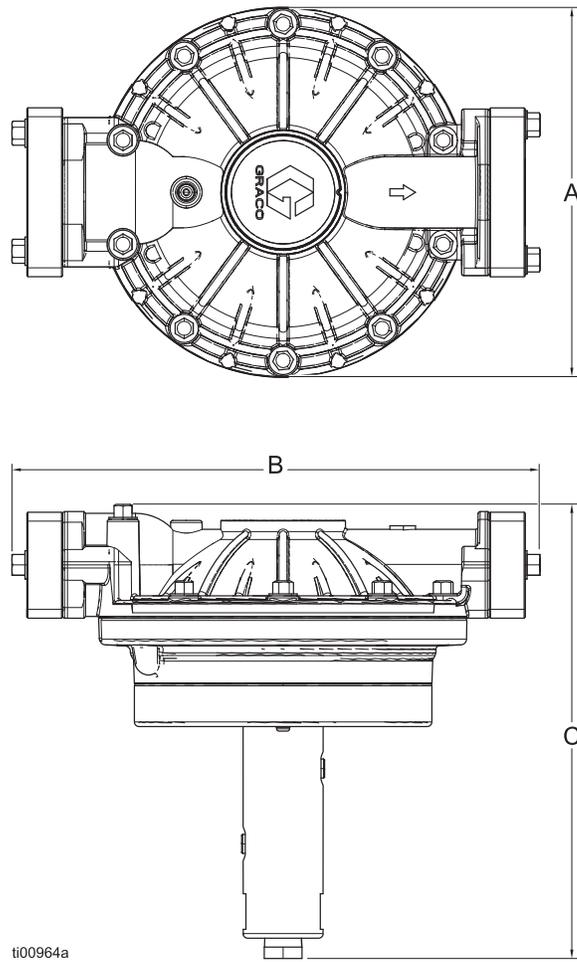


FIG. 8. Dimension Diagram for i150 (DTD)

Dimensions for i150 (DTD) Model				
Ref.	Fluid Cover Material			
	AL		PP	
	in.	cm	in.	cm
A	10.5	26.7	10.5	26.7
B	15.4	39.1	21.4	54.4
C	12.8	32.5	14.2	36.1

Dimensions for i200 (DTE) Model

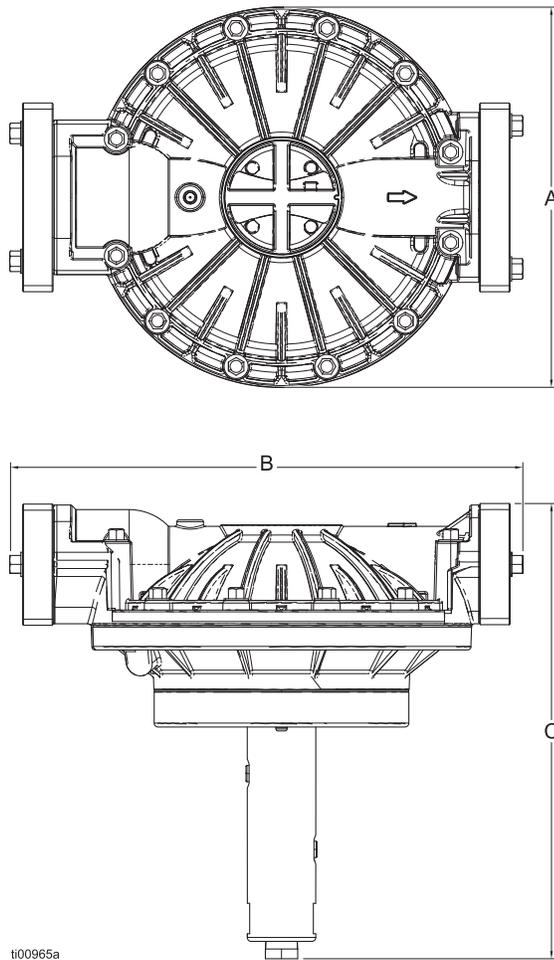


FIG. 9. Dimension Diagram for i200 (DTE)

Dimensions for i200 (DTE) Model				
Ref.	Fluid Cover Material			
	AL		PP	
	in.	cm	in.	cm
A	12.6	32.0	12.6	32.0
B	17.4	44.2	23.8	60.5
C	15.0	38.1	16.1	40.9

Technical Specifications

Fluid Temperature Range

NOTICE

Temperature limits are based on mechanical stress only. Certain chemicals will further limit the fluid temperature range. Stay within the temperature range of the most-restricted wetted component. Operating at a fluid temperature that is too high or too low for the components of your equipment may cause equipment damage.

Diaphragm or Seat Material	Fluid Temperature Range by Wetted Section Material			
	Metal (AL)*		Plastic (PP)*	
	Fahrenheit	Celsius	Fahrenheit	Celsius
(SS) 316 Stainless Steel	-60° to 275°	-51° to 135°	32° to 150°	0° to 66°
(AL) Aluminum	-60° to 275°	-51 to 135°		
(BN) Buna-N	10° to 180°	-12° to 82°		
(PP) Polypropylene	32° to 175°	0° to 79°		
(PS) PTFE/Santoprene	-40° to 220°	-40° to 104°		
(PO) PTFE/EPDM Overmold	-40° to 180°	-40° to 82°		
(SP) Santoprene	-40° to 180°	-40° to 82°		

* See **Configuration Matrix**, page 5, for detailed descriptions.

Technical Specifications for i100 (DTC) Models

i100A (DTC) Pulsation Dampeners with Aluminum Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	125 psig	0.86 MPa, 8.6 bar
Air pressure operating range	25 to 125 psig	0.18 to 0.86 MPa, 1.8 to 8.6 bar
Maximum free flow delivery (1 in.)	50 gpm	189 lpm
Fluid inlet/outlet size (1 in.)	1 NPT (<i>female</i>)	1 BSPT (<i>female</i>)
Assembly weight	15.0 lb	6.8 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	20 SCFH	
Air consumption at 70 psig (0.48 Mpa)	7.5 SCFH	
Materials of construction		
See Configuration Matrix , page 5, for materials of construction for your equipment model.		

i100P (DTC) Pulsation Dampeners with Polypropylene Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	100 psig	0.69 MPa, 6.9 bar
Air pressure operating range	25 to 100 psig	0.18 to 0.69 MPa, 1.8 to 6.9 bar
Maximum free flow delivery (1 in.)	50 gpm	189 lpm
Fluid inlet/outlet size (1 in.)	1 in. ANSI/DIN Raised Face Flange	
Assembly weight	15.0 lb	6.8 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	20 SCFH	
Air consumption at 70 psig (0.48 Mpa)	7.5 SCFH	
Materials of construction		
See Configuration Matrix , page 5, for materials of construction for your equipment model.		

Technical Specifications for i150 (DTD) Models

i150A (DTD) Pulsation Dampeners with Aluminum Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	120 psig	0.83 MPa, 8.3 bar
Air pressure operating range	25 to 120 psig	0.18 to 0.83 MPa, 1.8 to 8.3 bar
Maximum free flow delivery (1.5 in.)	90 gpm	340 lpm
Fluid inlet/outlet size (1.5 in.)	1-1/2 NPT	1-1/2 BSPT
Assembly weight	25.0 lb	11.4 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	25 SCFH	
Air consumption at 70 psig (0.48 Mpa)	12 SCFH	
Materials of construction		
See Configuration Matrix , page 5, for materials of construction for your equipment model.		

i150P (DTD) Pulsation Dampeners with Polypropylene Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	100 psig	0.69 MPa, 6.9 bar
Air pressure operating range	25 to 100 psig	0.18 to 0.69 MPa, 1.8 to 6.9 bar
Maximum free flow delivery (1.5 in.)	90 gpm	340 lpm
Fluid inlet/outlet size (1.5 in.)	1.5 in. ANSI/DIN Raised Face Flange	
Assembly weight	25.0 lb	11.4 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	25 SCFH	
Air consumption at 70 psig (0.48 Mpa)	12 SCFH	
Materials of construction		
See Configuration Matrix , page 5, for materials of construction for your equipment model.		

Technical Specifications for i200 (DTE) Models

i200A (DTE) Pulsation Dampeners with Aluminum Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	120 psig	0.83 MPa, 8.3 bar
Air pressure operating range	25 to 120 psig	0.18 to 0.83 MPa, 1.8 to 8.3 bar
Maximum free flow delivery (2 in.)	150 gpm	568 lpm
Fluid inlet/outlet size (2 in.)	2 NPT	2 BSPT
Assembly weight	35.0 lb	15.9 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	30 SCFH	
Air consumption at 70 psig (0.48 Mpa)	15 SCFH	
Materials of construction		
See Configuration Matrix , page 4, for materials of construction for your equipment model.		

i200P (DTE) Pulsation Dampeners with Polypropylene Fluid Covers		
	US (Imperial)	Metric (SI)
Maximum fluid working pressure	100 psig	0.69 MPa, 6.9 bar
Air pressure operating range	25 to 100 psig	0.18 to 0.69 MPa, 1.8 to 6.9 bar
Maximum free flow delivery (2 in.)	150 gpm	568 lpm
Fluid inlet/outlet size (2 in.)	2 in. ANSI/DIN Raised Face Flange	
Assembly weight	35.0 lb	15.9 kg
Air inlet	1/4 NPT (<i>female</i>)	
Air exhaust	3/4 NPT (<i>female</i>)	
Maximum air consumption	30 SCFH	
Air consumption at 70 psig (0.48 Mpa)	15 SCFH	
Materials of construction		
See Configuration Matrix , page 4, for materials of construction for your equipment model.		

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Original instructions. This manual contains English. MM 3A7672

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