

QUANTM[™] Pumps, Industrial Models

3A8572J

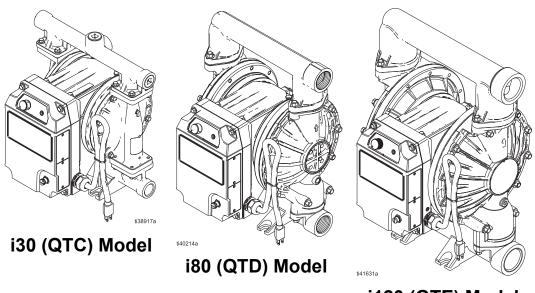
ΕN

Electric-operated diaphragm (EODD) pumps with an integral electric drive for fluid transfer applications. For professional use only.



Important Safety Instructions

Read all warnings and instructions in this manual and related manuals before using the equipment. Save these instructions.



i120 (QTE) Model

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Related Manuals

English Manual Number	Description	Reference
3A7637	QUANTM Electric Motor, Repair/Parts	Repair/Parts Manual
3A8946	QUANTM Pumps, Industrial Models, Parts	Parts Manual
3A8861	QUANTM Leak Sensor, Instruction	Kit Instructions
3A8982	QUANTM I/O Cable Kit (Hazardous Locations), Instruction	Kit Instructions

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			
	Cleaning Solvent Hazard			
4	Electric Shock Hazard			
	Entanglement Hazard			
	Equipment Misuse Hazard			
	Fire and Explosion Hazard			
	Moving Parts Hazard			
MPa/bar/PSI	Pressurized Equipment Hazard			
	Splash Hazard			
	Toxic Fluid or Fumes Hazard			

Symbol	Meaning
	Do Not Wipe with a Dry Cloth
	Eliminate Ignition Sources
MPa/bar/PSI	Follow Pressure Relief Procedure
	Ground Equipment
	Read Manual
7	Ventilate Work Area
	Wear Personal Protective Equipment



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.

A DANGER



SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.



Explosive Atmospheres or Hazardous (Classified) Locations Models (hard wired for permanent connection):

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect all power before disconnecting any cables and before servicing equipment.
- This equipment must be grounded. Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.
- · Store indoors.

Ordinary Locations Models (cord and plug connection):

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power cord before servicing equipment.
- · Connect only to grounded electrical outlets.
- Only use 3-wire extension cords for single-phase models. Only use 4-wire extension cords for 3-phase models.
- Ensure ground prongs are intact on power and extension cords.
- Store indoors.
- Wait five minutes after disconnecting power cord before servicing.

WARNING

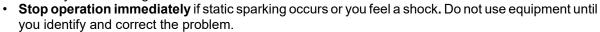


FIRE AND EXPLOSION HAZARD

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:



- 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.









Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable vapors. To help prevent fire and explosion:

- Clean plastic parts only in well-ventilated area.
- Do not clean with a dry cloth.

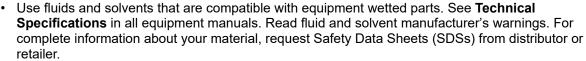


EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.



- 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.



- 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 fluid lines, cords, and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over-bend fluid lines, cords, or cables. Do not use fluid lines, cords, or cables to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

⚠ WARNING



PLASTIC PARTS CLEANING SOLVENT HAZARD

Many cleaning solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.



- 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.



PRESSURIZED EQUIPMENT HAZARD

Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.



- 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 fluid lines and connections daily. Replace worn or damaged parts immediately.



PRESSURIZED ALUMINUM PARTS HAZARD



Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.

- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.
- Do not use chlorine bleach.
- Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.



THERMAL EXPANSION HAZARD

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.



- Open a valve to relieve the fluid expansion during heating.
- Replace fluid lines proactively at regular intervals based on your operating conditions.



ENTANGLEMENT HAZARD

Rotating parts can cause serious injury.



- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Do not wear loose clothing, jewelry or long hair while operating equipment.
- Equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.

⚠ 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.



MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.



- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.



TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- · Read Safety Data Sheets (SDSs) to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



PERSONAL PROTECTIVE EQUIPMENT

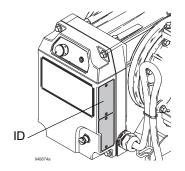
Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

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

Configuration Matrix

Record the model part number and configuration sequence found on the equipment identification plate (ID) to assist you when ordering replacement parts.

Model Part Number:	
Configuration Sequence:	_



Samp	Sample Configuration Sequence: QTC-ACFC2ACACBNBNA100									
Q	T	С	AC	FC2	AC	AC	BN	BN	A1	00
Brand	Application	Model	Wetted Section Material	Motor	Seat Material	Check Material	Diaphragm Material	Manifold Seal Material	Connection	Options

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

Br	and	Ар	plication	Мо	del	Wet	Wetted Section Material		
Q	QUANTM	Т	Industrial (i)	С	30 (1 in. port)	AL	Aluminum		
				D	D 80 (1-1/2 in. port)		Cast Iron		
				E	120 (2 in. port)	СР	Conductive Polypropylene		
						PP	Polypropylene		
							PVDF		
						SS	316 Stainless Steel		

Moto	Motor - Industrial Models						
Drive		Coat	Input Voltage	Phase	Location	Cord/Cable Termination	
FC1*	Aluminum Direct Drive	Black powder coat	200-240 V	3-Phase	Industrial, Ordinary Locations	Cord with plug	
FC2	Aluminum Direct Drive	Black powder coat	200–240 V	Single-Phase	Industrial, Ordinary Locations	Cord with plug	
FC3*	Aluminum Direct Drive	Black powder coat	200-240 V	3-Phase	Industrial, Hazardous (Classified) Locations	Cable with flying leads	
FC4	Aluminum Direct Drive	Black powder coat	200–240 V	Single-Phase	Industrial, Explosive Atmospheres	Cable with flying leads	
FC5	Aluminum Direct Drive	Black powder coat	100–120 V	Single-Phase	Industrial, Ordinary Locations	Cord with plug	
FC6	Aluminum Direct Drive	Black powder coat	100–120 V	Single-Phase	Industrial, Hazardous (Classified) Locations	Cable with flying leads	
FC7	Aluminum Direct Drive	Black powder coat	380–480 V	3-Phase	Industrial, Ordinary Locations (NA)	Cable with flying leads	

Motor - Industrial Models						
Drive		Coat	Input Voltage	Phase	Location	Cord/Cable Termination
FC8	Aluminum Direct Drive	Black powder coat	380–480 V	3-Phase	Industrial, Ordinary Locations (WW)	Cable with flying leads
FC9	Aluminum Direct Drive	Black powder coat	380–480 V	3-Phase	Industrial, Hazardous (Classified) Locations (NA)	Cable with flying leads
FCA	Aluminum Direct Drive	Black powder coat	380–480 V	3-Phase	Industrial, Explosive Atmospheres (WW)	Cable with flying leads
FE1*	Aluminum Direct Drive	FEP coat	200-240 V	3-Phase	Industrial, Ordinary Locations, Enhanced (Chemical)	Cord with plug
FE2	Aluminum Direct Drive	FEP coat	200–240 V	Single-Phase	Industrial, Ordinary Locations, Enhanced (Chemical)	Cord with plug
FE3*	Aluminum Direct Drive	FEP coat	200-240 V	3-Phase	Industrial, Hazardous (Classified) Locations, Enhanced (Chemical)	Cable with flying leads
FE4	Aluminum Direct Drive	FEP coat	200–240 V	Single-Phase	Industrial, Explosive Atmospheres, Enhanced (Chemical)	Cable with flying leads
FE5	Aluminum Direct Drive	FEP coat	100–120 V	Single-Phase	Industrial, Ordinary Locations, Enhanced (Chemical)	Cord with plug
FE6	Aluminum Direct Drive	FEP coat	100–120 V	Single-Phase	Industrial, Hazardous (Classified) Locations, Enhanced (Chemical)	Cable with flying leads
FE7	Aluminum Direct Drive	FEP coat	380–480 V	3-Phase	Industrial, Ordinary Locations (NA), Enhanced (Chemical)	Cable with flying leads
FE8	Aluminum Direct Drive	FEP coat	380–480 V	3-Phase	Industrial, Ordinary Locations (WW), Enhanced (Chemical)	Cable with flying leads
FE9	Aluminum Direct Drive	FEP coat	380–480 V	3-Phase	Industrial, Hazardous (Classified) Locations (NA), Enhanced (Chemical)	Cable with flying leads
FEA	Aluminum Direct Drive	FEP coat	380–480 V	3-Phase	Industrial, Explosive Atmospheres (WW) Enhanced (Chemical)	Cable with flying leads

^{*}Not available with i30 (QTC).

Sea	t Material	Check Material		Dia	ohragm Material	Manifold Seal Material	
AC	Acetal	AC	Acetal, ball	BN	Buna-N		None
AL	Aluminum	-B	Buna-N Overmold 303 Stainless Steel, flapper	СО	Polychloroprene Overmold	BN	Buna-N
BN*	Buna-N	BN	Buna-N, ball	CR	Polychloroprene	PT	PTFE
FB	303 Stainless Steel with Buna-N seals	CR	Polychloroprene, standard, ball	FK	Fluoroelastomer		
FK*	Fluoroelastomer	CW	Polychloroprene, weighted, ball	GE	Graco Engineered Thermoplastic		
GE	Graco Engineered Thermoplastic	FK	Fluoroelastomer, ball	РО	PTFE/EPDM Overmold		
PP	Polypropylene	GE	Graco Engineered Thermoplastic, ball	PS	PTFE/Santoprene, two-piece		
PV	PVDF	PT	PTFE	SP	Santoprene		
SA	17-4PH Stainless Steel with PTFE o-rings	SD	440C Stainless Steel, ball	TP	TPE		
SP	Santoprene	SP	Santoprene, ball				
TP*	TPE	TP	TPE, ball				

^{*} Models with BN, FK, or TP seats do not use manifold seals.

Cor	nection	Optio	ons
A1	Aluminum, standard ports, NPT	00	Standard
A2	Aluminum, standard ports, BSPT	LP	Large particle
C1	Conductive Polypropylene, center flange		
C2	Conductive Polypropylene, end flange		
F1	PVDF, center flange		
F2	PVDF, end flange		
I1	Iron, standard ports, NPT		
12	Iron, standard ports, BSP		
P1	Polypropylene, center flange		
P2	Polypropylene, end flange		
S1	Stainless Steel, standard ports, NPT		
S2	Stainless Steel, standard ports, BSPT		
S51	Stainless Steel, center flange, horizontal outlet		

Motor Drive Selection	on				
Industrial - North Ame	rica				
Model	Ordinary Location (NEMA Plug)	Hazardous Location (Flying Leads)	Voltage range/phase count		
i30 (QTC)	FC5	FC6	100–120 V/Single-Phase		
i80 (QTD)	FC1	FC3	200-240 V/3-Phase		
i120 (QTE)	FC1	FC3	200–240 V/3-Phase		
All	FC7 (Flying leads)	FC9	380–480 V/3-Phase		
Industrial - Internation	al				
Model	Ordinary Location (IEC Plug)	Hazardous Location (Flying Leads)	Voltage range/phase count		
i30 (QTC)	FC2	FC4	200–240 V/Single-Phase		
i80 (QTD)	FC2	FC4	200–240 V/Single-Phase		
i120 (QTE)	FC2	FC4	200–240 V/Single-Phase		
All	FC8 (Flying leads)	FCA	380–480 V/3-Phase		
Industrial - Enhanced	(Chemical) - North America				
Model	Ordinary Location (NEMA Plug)	Hazardous Location (Flying Leads)	Voltage range/phase count		
i30 (QTC)	FE5	FE6	100–120 V/Single-Phase		
i80 (QTD)	FE1	FE3	200–240 V/3-Phase		
i120 (QTE)	FE1	FE3	200–240 V/3-Phase		
All	FE7 (Flying leads)	FE9	380–480 V/3-Phase		
Industrial - Enhanced	(Chemical) - International				
Model	Ordinary Location (IEC Plug)	Hazardous Location (Flying Leads)	Voltage range/phase count		
i30 (QTC)	FE2	FE4	200–240 V/Single-Phase		
i80 (QTD)	FE2	FE4	200–240 V/Single-Phase		
i120 (QTE)	FE2	FE4	200–240 V/Single-Phase		
All	FE8 (Flying leads)	FEA	380–480 V/3-Phase		

Approvals

Model Information*	Approvals
Motors	For motor approvals, see related motor manual. See Related Manuals , page 3.
Pump models with motor code FC2, FE2, FC8, and FE8*	C E
Pump models with motor code FC4, FE4, FCA, and FEA*	II 2 G Ex db h IIB T4 Gb NOTE: Type of Protection "h" applied is constructional safety "c."

^{*} See **Configuration Matrix**, starting on page 9, for detailed descriptions.

Motor Module Series

The motor module series is identified in the serial number on the lower product tag on the side of the motor module. The series is identified by a letter in the fourth position from the left in the serial number.

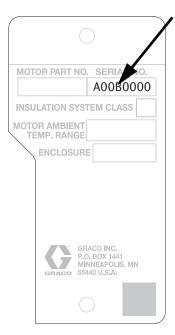


Fig. 1: Motor module serial number location

Component Identification

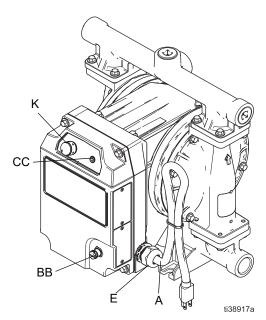


Fig. 2: Ordinary Locations Model (i30 (QTC) model shown) Ordinary Locations models include a cord with a plug and Input/Output (I/O) port.

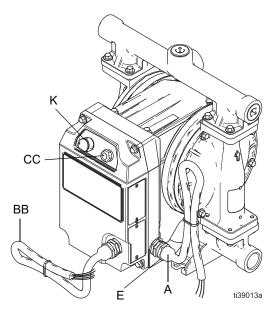


Fig. 3: Explosive Atmospheres or Hazardous (Classified) Locations Model (i30 (QTC) model shown)

Explosive Atmospheres or Hazardous (Classified) Locations models include flying leads on the power cable (for direct wiring to a power source).

Ref.	Component	Ordinary Locations Models	Explosive Atmospheres or Hazardous (Classified) Locations Models	
Α	Power Cord/Cable	15 ft (4.6 m) cord with plug*	15 ft (4.6 m) cable for hard-wiring [†]	
ВВ	I/O Port/Cable			
	On/Off Control, Digital Input		Cable (not supplied) for direct wiring to	
	Run Status, Digital Output	M12, 5-pin connector**	user-provided controls [‡]	
	Speed and Pressure Control, Analog Input			
СС	LED Indicator ^c	Standard	Reinforced	
E	External Ground Fastener, Ground Symbol	The equipment is marked per IE	EC 417, Symbol 5019:	
K	Control Knob	Turn clockwise (right) to increas	se fluid output	

^{*} See Required Power and Plugs, page 25.

^{**} See I/O Pin Connection, page 29.

 $^{^{\}dagger}$ See Wire Power Cables, page 26, and : Wiring for 3-Phase Models, page 27.

 $^{^{\}ddagger}$ I/O cable kits are available (purchase separately). See related motor manual. See **Related Manuals**, page 3.

^c See **LED Indicator**, page 36.

Typical Installation

General Information

Typical installations are shown for ball and flapper model pumps in ordinary and hazardous locations. The figures are only guides for selecting and installing system components. Contact your local distributor for assistance in planning a system to suit your needs. Always

use Genuine Graco Parts and accessories. Be sure all accessories are adequately sized and pressure-rated to meet the requirements of the system.

Reference letters in the text, for example, (A), refer to the callouts in the figures.

Typical Installation for Ball Models in Ordinary Locations

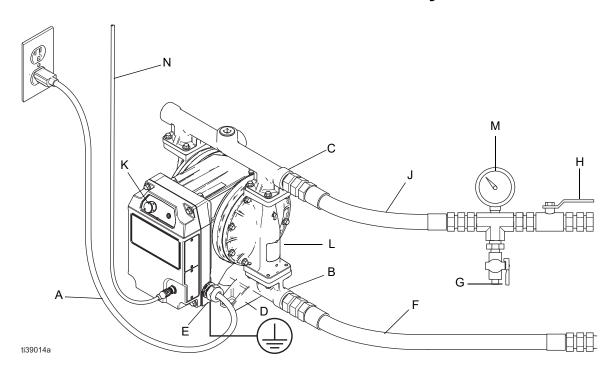


Fig. 4: Typical Installation for Models in Ordinary Locations (cord and plug connection) (i30 (QTC) model shown)

Pump Components

- A^c Power cord (some models have flying leads)
- **B** Fluid inlet port
- C Fluid outlet port
- **D** Mounting feet
- E Ground fastener
- K Fluid output control knob
- L^ê Diaphragm access ports (not shown)
- ^c Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.
- ^ê See Install Leak Sensor Hoses and Fittings, page 22, or Install Fluid Leak Line Accessories, page 22.

Accessories (Not Supplied)

- F* Conductive, flexible fluid supply line
- G* Fluid drain valve
- H Fluid shutoff valve
- J* Conductive, flexible fluid outlet line
- M Fluid pressure gauge
- N I/O Cable

^{*} Required, not supplied.

Typical Installation for Ball Models in Explosive Atmospheres or Hazardous (Classified) Locations

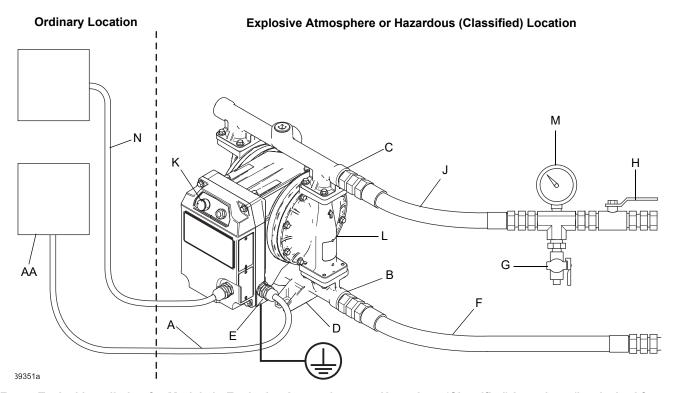


Fig. 5: Typical Installation for Models in Explosive Atmospheres or Hazardous (Classified) Locations (hard wired for permanent connection) (i30 (QTC) model shown)

Pump Components

- A^c Power cable
- B Fluid inlet port
- C Fluid outlet port
- D Mounting feet
- E Ground fastener
- K Fluid output control knob
- L^e Diaphragm access ports (not shown). Diaphragm access ports must not be open in hazardous locations. Ports must have installed either plugs (as shipped from the factory), or leak sensor kit. See leak sensor manual. See **Related Manuals**, page 3.

Accessories (Not Supplied)

- F* Conductive, flexible fluid supply line
- G* Fluid drain valve
- H Fluid shutoff valve
- J* Conductive, flexible fluid outlet line
- M Fluid pressure gauge
- N*[‡] I/O Cable
- AA Electrical disconnect

^c Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.

^ê See Install Leak Sensor Hoses and Fittings, page 22, or Install Fluid Leak Line Accessories, page 22.

^{*} Required, not supplied.

[‡] I/O cable kits are available (purchase separately). See related motor manual. See Related Manuals, page 3.

Typical Installation for i120 (QTE) Flapper Models in Ordinary Locations

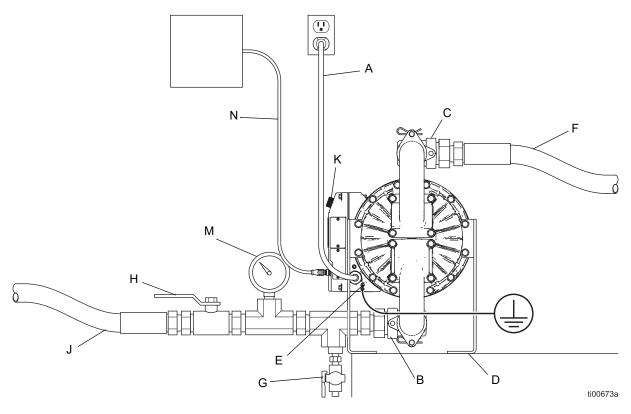


Fig. 6: Typical Installation for i120 (QTE) Flapper Models in Ordinary Locations (cord and plug connection)

Pump Components

- A^c Power cord (some models have flying leads)
- B Fluid outlet port
- C Fluid inlet port
- **D** Mounting feet
- E Ground fastener
- K Fluid output control knob
- L^ê Diaphragm access ports (not shown)
- ^c Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.
- ^ê See Install Leak Sensor Hoses and Fittings, page 22, or Install Fluid Leak Line Accessories, page 22.

Accessories (Not Supplied)

- F* Conductive, flexible fluid supply line
- G* Fluid drain valve
- H Fluid shutoff valve
- J* Conductive, flexible fluid outlet line
- M Fluid pressure gauge
- N I/O Cable

^{*} Required, not supplied.

Typical Installation for i120 (QTE) Flapper Models in Hazardous (Classified) Locations

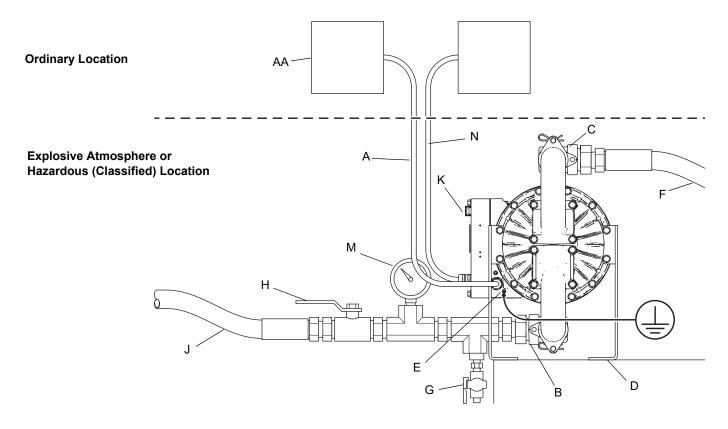


Fig. 7: Typical Installation for i120 (QTE) Flapper Models in Explosive Atmospheres or Hazardous (Classified) Locations (hard wired for permanent connection)

Pump Components

- **A**^c Power cable
- B Fluid outlet port
- C Fluid inlet port
- D Mounting feet
- E Ground fastener
- K Fluid output control knob
- Lê Diaphragm access ports (not shown). Diaphragm access ports must not be open in hazardous locations. Ports must have installed either plugs (as shipped from the factory), or leak sensor kit. See leak sensor manual. See **Related Manuals**, page 3.
- ^c Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.
- ^ê See Install Leak Sensor Hoses and Fittings, page 22, or Install Fluid Leak Line Accessories, page 22.

Accessories (Not Supplied)

- F* Conductive, flexible fluid supply line
- G* Fluid drain valve
- H Fluid shutoff valve
- J* Conductive, flexible fluid outlet line
- M Fluid pressure gauge
- N*[‡] I/O Cable
- AA Electrical disconnect

^{*} Required, not supplied.

[‡] I/O cable kits are available (purchase separately). See related motor manual. See **Related Manuals**, page 3.

Installation











DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Installation of this equipment involves potentially hazardous procedures. Only trained and qualified personnel who have read and who understand the information in this manual should install this equipment.

NOTICE

To avoid pump damage, mount the pump to the mounting surface using fasteners though each hole of the feet. See Fig. 8.

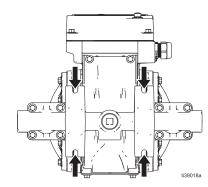


Fig. 8: Mounting Holes

Mount the Pump





The pump may be very heavy (see **Technical Specifications**, starting on page 80, for specific weights). Use at least two straps to evenly support the bottom of the pump, and appropriate lifting equipment, or have two people lift the pump. Do not use the upper manifold or port (C) alone to lift the pump.

Mount the pump to the mounting surface using fasteners through each hole of the feet. See Fig. 8.

- 1. Ensure that the mounting surface is level.
- 2. Ensure that the mounting surface and mounting hardware is strong enough to support the weight of the pump, fluid lines, accessories, and fluid, as well as the stress caused during operation.
- 3. For all mountings, be sure the pump is secured with fasteners through the mounting holes on the base. See Fig. 8. See **Dimensions**, starting on page 62.

NOTE: For ease of operation and service, mount the pump so the control knob (K), LED indicator (CC), I/O port/cable (BB), and fluid inlet and outlet ports (B, C) are easily accessible.

Orientation of Fluid Inlet and Outlet Ports

The fluid port of the center manifold can be rotated to either a vertical or horizontal position.

To change the fluid port orientation of the center manifold (54):

- 1. Remove the clevis and cotter pins (35, 36).
- 2. Rotate the center manifold (54) to the applicable vertical or horizontal position.
- 3. Install the clevis and cotter pins (35, 36).

KEY:

- 3 Fluid covers
- 54 Center manifold
- 35 Clevis pin
- 36 Cotter pin

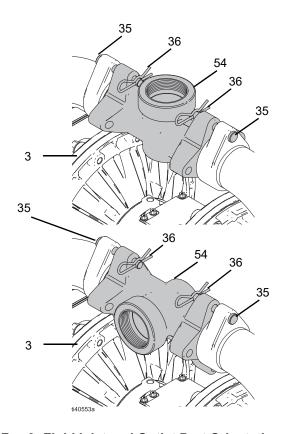


Fig. 9: Fluid Inlet and Outlet Port Orientation

Connect Fluid Lines

Use conductive, flexible fluid lines for fluid supply (F) and fluid outlet (J) lines.

NOTE: For proper priming, ensure the fluid outlet port (C) is mounted higher than the fluid inlet port (B). See Fig. 4 and Fig. 5.

- 1. Install conductive, flexible fluid lines (F and J).
- 2. Install a fluid drain valve (G) near the fluid outlet. See Fig. 4 and Fig. 5.









A fluid drain valve (G) is required to relieve pressure in the fluid outlet line. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin, when relieving pressure.

3. Install a fluid shutoff valve (H) in the fluid outlet line (J) downstream from the fluid drain valve (G).

NOTE: Install the equipment as close as possible to the material source. See **Technical Specifications**, starting on page 80, for maximum suction lift.

NOTICE

The pump can be damaged if flexible fluid lines are not used. If hard-plumbed fluid lines are used in the system, use a short length of conductive, flexible fluid line to connect to the pump.

Install Accessories

Install Leak Sensor Hoses and Fittings

The leak sensor monitors for leaks in the pump due to diaphragm rupture or other leaks in the equipment. If the sensor detects a leak, the LED indicator on the pump will flash and the pump will stop.

The leak sensor is installed in certain models at the factory or by the distributor. A leak sensor kit is available for initial installation or replacement. See the electric motor manual for Accessory Kits. See **Related Manuals**, page 3.

For models with a factory-installed leak sensor, you must install the external hoses and fittings before using the pump for the first time. See the Leak Sensor Instructions manual for instructions. See **Related Manuals**, page 3.

NOTICE

To avoid pump damage, install a leak sensor to detect leaks in the equipment due to diaphragm rupture.

Install Fluid Line Accessories

Install the following accessories in the order shown in Fig. 4 and Fig. 5, using adapters as needed.

- Fluid drain valve (G): Required. Relieves fluid pressure in the system.
- Fluid shutoff valve (H): Shuts off fluid flow.
- Fluid pressure gauge (M): For more precise adjustment of the fluid pressure.
- Fluid outlet line (J): Required. To dispense fluid.
- Fluid supply line (F): Required. Enables the equipment to draw fluid from a container.

Install Fluid Leak Line Accessories











If a leak sensor is not installed in the pump and the diaphragm ruptures, the equipment will fill with fluid or fluid will drain into the work area. To avoid injury from leaking fluid, toxic fluid, toxic fumes, splashing fluid, or hot fluid, install fluid leak lines to route fluid leaks due to diaphragm rupture.

NOTICE

To avoid pump damage due to diaphragm rupture, install a leak sensor to detect leaks in the equipment and automatically stop pump operation. See **Install Leak Sensor Hoses and Fittings**, page 22.

The fluid leak line (L2) routes fluid to a drain location if fluid leaks due to diaphragm rupture.

- 1. Remove the plugs (if applicable) in the diaphragm access ports (L).
- Install conductive, flexible fluid leak lines (L2) to the diaphragm access ports (L). Use adapters as needed.
- 3. Route the fluid leak lines (L2) to a grounded end container (L3) to catch leaking fluid. Follow local codes and regulations for grounding.











For Models in Explosive Atmospheres or Hazardous (Classified) Locations) without a leak sensor: To avoid injury from hazardous fluids, ensure that the end container is grounded and located in a non-explosive or non-hazardous environment. Diaphragm access ports must not be open in hazardous locations. Ports must have installed either plugs 128658 (as shipped from the factory), or leak sensor kit 25F109.

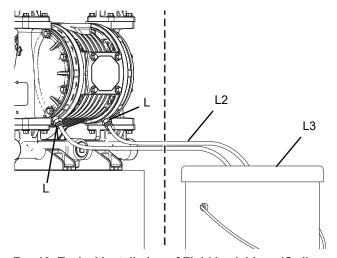


Fig. 10: Typical Installation of Fluid Leak Lines (Ordinary Locations)

Grounding









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.

- Always ground the entire fluid system as described in this section.
- Follow local codes and regulations.

Before operating the equipment, ground the system as follows.

Ground the Pump

Connect a Static Ground

See Fig. 11.

- 1. Loosen the ground fastener (E).
- 2. Insert one end of a 12-gauge or thicker ground wire behind the ground fastener and securely tighten the ground fastener (E).
- 3. Connect the clamp end of the ground wire to a true earth ground.

NOTE: A ground wire and clamp is available (purchase separately, see related parts manual).

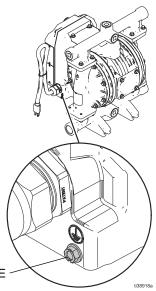


Fig. 11: Equipment Ground Fastener

Connect the Electrical Ground

For models with flying leads: Ground through the ground wire of the power cable to a true earth ground. Connect the ground wire of the power cable to a true earth ground. See **Electrical Connections and Wiring**, starting on page 25.

For models with plugs: Ground through the provided power cord and plug. Connect the plug to a power outlet that is properly installed and grounded to a true earth ground.

Ground the Fluid Lines

Use only conductive fluid lines with a maximum of 500 ft (150 m) combined line length to ensure grounding continuity. Check electrical resistance of the fluid lines.

Ground the Fluid Supply Container

Follow local codes and regulations.

Ground the Pails for Solvents and Sanitizing Solution Used when Flushing

Follow local codes and regulations. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts grounding continuity.

Verify Ground Continuity

Check the pump ground continuity after the initial installation. Set a regular schedule for checking ground continuity to maintain proper grounding. Do not exceed 1 ohm resistance from earth ground to the pump.

Before First Use

Tighten Fasteners

Before using the equipment for the first time, check and torque all fasteners. Follow **Torque Fasteners**, page 55.

After the first day of operation, re-torque the fasteners.

NOTICE

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

Tighten Connections

Check and tighten all fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all connections to avoid leaks and damage to equipment parts.

Flush the Equipment

Before using the equipment for the first time, flush the equipment. Follow **Flush the Equipment**, page 40.

The equipment was tested with water. If water could contaminate the fluid being dispensed, flush the equipment with a compatible solvent before first use.

Electrical Connections and Wiring

Required Power and Plugs









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

NOTE: For equipment provided with a cable and flying leads (no plug), install a main electrical disconnect per local codes and regulations.

NOTE: Use adapters as needed. Follow local codes and regulations.

Required Power and Plugs								
	Motor	Model	Power Requirements			Cord/Cable		
Location	Configuration Code*		Input Voltage	Phase [‡]	Hertz	Current	Termination	Plug
	FC1/FE1	i80 (QTD), i120 (QTE)	200–240 V	3	50/60 Hz	7.5 A	NEMA L15-20 Plug	
	FC2/FE2	i30 (QTC)	200–240 V	1	50/60 Hz	10 A	IEC 60320-C14 Plug ^ÿ	
Ordinary Locations	FG2/FE2	i80 (QTD), i120 (QTE)	200–240 V	1	50/60 Hz	15 A	IEC 60320-C20 Plug ^ÿ	
	FC5/FE5	i30 (QTC)	100–120 V	1	50/60 Hz	12 A	NEMA 5-15 Plug	
	FC7/FE7	All	380–480 V	3	50/60 Hz	5.3 A	Flying leads, see Fig. 14	N/A ⁹
	FC8/FE8	All	380–480 V	3	50/60 Hz	5.3 A	Flying leads, see Fig. 14	
Hazardous (Classified) Locations	FC3/FE3	i80 (QTD), i120 (QTE)	200–240 V	3	50/60 Hz	7.5 A	Flying leads, see Fig. 14	
	FC6/FE6	i30 (QTC)	100–120 V	1	50/60 Hz	12 A	Flying leads, see Fig. 13	
	FC9/FE9	All	380–480 V	3	50/60 Hz	5.3 A	Flying leads, see Fig. 14	

Required Power and Plugs								
Location	Motor Configuration Model Code*	Power Requirements			Cord/Cable			
		Model	Input Voltage	Phase [‡]	Hertz	Current	Termination	Plug
		i30 (QTC)	200–240 V	1	50/60 Hz	10 A	Flying leads, see	N/A ^g
Explosive Atmospheres	FC4/FE4	i80 (QTD), i120 (QTE)	200–240 V	1	50/60 Hz	15 A	Fig. 13	
	FCA/FEA	All	380–480 V	3	50/60 Hz	5.3 A	Flying leads, see Fig. 14	

^{*} See Configuration Matrix, starting on page 9, for detailed descriptions.

Wire Power Cables









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

For models with flying leads:

To connect a model with flying leads to a power source, complete one of the following:

- Hard wire the equipment to a power source.
- Supply a plug and socket. NOTE: for Explosive Atmospheres or Hazardous (Classified) Locations models, an interlocking device must also be provided and it must meet the requirements of EN 60079-0 or UL 674.

NOTE: See **Required Power and Plugs** for power requirements. Install a branch circuit protective device in each ungrounded phase.

A 15 ft (4.6 m) cable (either 3-conductor or 4-conductor) is provided with models with flying leads. Connect the cable directly to a panel with branch circuit protection and an electrical disconnect per local codes and regulations. If additional length of cable is required, connect additional cable through a junction box. Use the following table to select the minimum cable wire gauge based on length:

Length	Gauge	mm ²
50 ft (15.2 m)	12 AWG	3.3
100 ft (30.4 m)	10 AWG	5.3
200 ft (61 m)	8 AWG	13.3

NOTE: Ensure that the electrical disconnect (AA) is shut off and locked out before wiring. See Fig. 12.

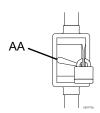


Fig. 12: Electrical Disconnect

[‡] Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.

⁹ See Wire Power Cables, page 26.

 $[\]ddot{y}$ Adapters are available (purchase separately). See **Adapters for Plugs and Cables**, page 28.

Wire Single-Phase Models

For models with flying leads, see Fig. 13. Make wire connections as follows:

Motors	L1	L2/Neutral	Ground
FC6, FE6	Black	White	Green
FC4, FE4	Brown	Blue	Green w/Yellow Stripe

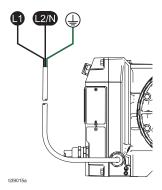


Fig. 13: Wiring for Single-Phase Models

Wire 3-Phase Models

For models with flying leads, see Fig. 14.

Make wire connections as follows:

Motors	L1	L2	L3	Ground
FC3, FE3,	Black	White	Red	Green
FC7, FE7,				
FC9, FE9				
FC8, FE8,	Brown	Black	Grey	Green w/Yellow
FCA, FEA				Stripe

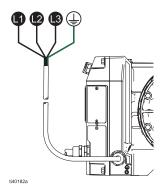


Fig. 14: Wiring for 3-Phase Models

Requirements for Cables and Conduits

For models in Explosive Atmospheres or Hazardous (Classified) Locations only.









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Do not modify or repair explosion proof joints. Modifying explosion proof joints may produce an explosion hazard.

Requirements for Explosion Proof Equipment

Use appropriate conduits, connectors, and cable glands rated for Class I, Division I, Group D. Follow all national, state, and local electric codes and regulations.

Cable rating requirement: 158°F (70°C) minimum (all cables)

Cable gland rating requirement: 158°F (70°C) minimum (all glands)

Requirements for Flame Proof Equipment

Use appropriate conduits, connectors, and cable glands rated for Ex II 2 G. Follow all national, state, and local electric codes and regulations.

Cable rating requirement: 158°F (70°C) minimum (all cables)

Cable gland rating requirement: 158°F (70°C) minimum (all glands)

Adapters for Plugs and Cables









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Use adapters as needed. Follow local codes and regulations

Adapters are available (purchase separately).

Plug Adapters				
Region	Part	Plug		
region	C14 Plugs C20 Plugs		Adapter	
Europe	242001	15G958		
Australia, China	242005	17A242		
Italy		15G959	000	
Italy	287121		(000)	
Switzerland	Kit contains all three C14	15G961	000	
Denmark	Plugs		•••	

Plug Retainer Clips	
Plug	Part
C14 Plugs	195551
C20 Plugs	121249

I/O Port Flying Lead Cable Adapters (for models in Ordinary Locations only)				
Cable Length Part				
6.5 ft (2 m)	123846			
50 ft (15 m)	17D160			
98 ft (30 m)	17B590			

I/O Pin Connection









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

For models in Ordinary Locations only.

NOTE: All I/O connectors are capable of 30 VDC (volts of direct current) and are reverse-polarity protected.

For wiring, see **Equivalent Electrical Circuits for I/O Pin Connection**, page 31.

I/O Con	I/O Connector Pinout (for Models in Ordinary Locations only)				
Pin	Connector Type	Description			
Pin 1	Digital Input	Used with Pin 3. Connect a switch to turn the pump on or off.			
(Brown		Digital input has an internal 5 VDC pull-up for dry-contact or current-sinking circuits. Digital input is internally clamped for push-pull outputs. Release or drive the input high to stop the equipment from running. Pull the input low to re-enable the equipment.			
Pin 2	Digital Output	Used with Pin 3. Tells an external device if the pump is or is not running.			
(White)	(Equipment Running)	Digital output is current-sinking with a current capacity up to 100 mA. Digital output is internally clamped for driving large inductive loads. The output is automatically pulled low when the equipment is running and automatically released when the equipment is not running.			
Pin 3 (Blue)	GND/Common	Earth ground, common connection.			
Pin 4 (Black)	Analog Input, 4-20mA +	Analog inputs are 4–20 mA current-controlled. When the analog input is connected and driving current, the equipment disables the control knob (K) and			
Pin 5 (Gray)	Analog Input, 4-20mA -	uses the analog input to control the speed and pressure of the equipment. The control knob (K) can still be used to shut off the equipment by turning the knob to off (0). To re-enable the equipment at the speed and pressure commanded by the analog input, turn the control knob up (clockwise).			
		To disable the analog input control and enable the control knob (K):			
		Disconnect power to the system.			
		2. Disconnect the analog input (Pin 4, Pin 5).			
		3. Connect the unit to a power source to turn on the equipment and enable the control knob (K) on the equipment.			

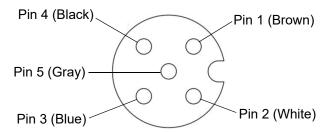
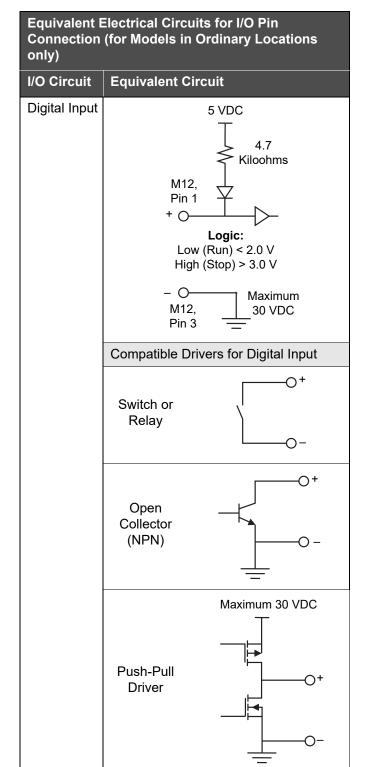
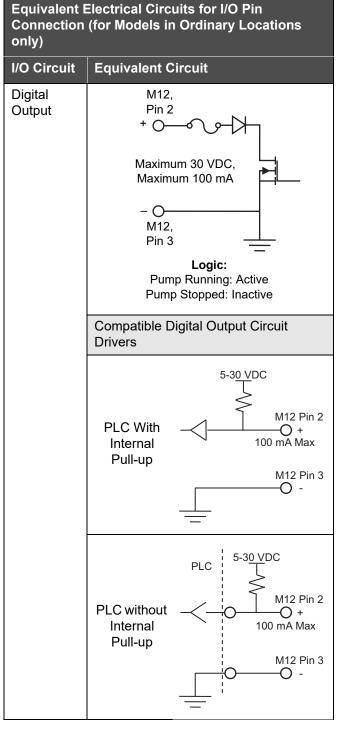


Fig. 15: M12, 5-pin Connector for Models in Ordinary Locations
Orientation: facing the connector on the pump body.

Equivalent Electrical Circuits for I/O Pin Connection





Equivalent Electrical Circuits for I/O Pin Connection (for Models in Ordinary Locations only)				
I/O Circuit	Equivalent Circuit			
Digital Output	Solenoid 5-30 VDC M12 Pin 100 mA Max M12 Pin M12 Pin O -	(
	5-30 VDC M12 Pin 100 mA Max M12 Pin	<		
	5-3 <u>0 VDC</u> M12 Pin + 100 mA Max Lamp M12 Pin	(
Analog Input	M12, Pin 4 + O Maximum 2.0 W M12, Maximum 30 VDC Maximum 30 VDC Maximum 2.0 W			

Operation

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.











This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid and moving parts, follow the **Pressure Relief Procedure** when you stop operating and before cleaning, checking, or servicing the equipment.

- Turn the fluid output control knob (K) to off (0) and disconnect power to the system.
- 2. Close the fluid shutoff valve (H).
- Open the fluid drain valve (G) to relieve fluid pressure. Prepare a container to catch the drainage.
- 4. Leave the fluid drain valve (G) open until the system is ready to be pressurized.

Before Each Use

Tighten Fasteners

Check and tighten all fasteners before operating the equipment. Re-torque as needed. Follow **Torque Fasteners**, page 55.

NOTICE

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

Tighten Connections

Check and tighten all fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all connections to avoid leaks and damage to equipment parts.

Flush the Equipment

Flush the equipment before each use. Determine whether to disassemble and clean individual parts or simply flush the equipment with a compatible solvent.

To simply flush the equipment with a compatible solvent, follow **Start the Equipment**, page 33, and **Flush the Equipment**, page 40.

To disassemble and clean individual parts, see the applicable repair procedure. See **Repair**, starting on page 45.

Start the Equipment







To prevent serious injury from splashing fluid, ensure the control knob (K) is set to off (0) before connecting the equipment to a power source.

Prepare the Equipment for Startup

- 1. Turn the control knob (K) to off (0).
- 2. Confirm that the equipment is properly grounded. See **Grounding**, page 23.
- Check and tighten all fasteners and connections before operating the equipment. Replace worn or damaged parts as needed.
- 4. Insert the suction end of the fluid supply line (F) into the fluid to be dispensed.
- 5. Insert the outlet end of the fluid outlet line (J) into the end container.
- 6. Close the fluid drain valve (G).
- 7. Ensure all fluid shutoff valves (H) are open.
- 8. If the fluid outlet line (J) has a dispensing device, hold the dispensing valve open into the end container.

Start and Adjust the Equipment

- 1. Follow Prepare the Equipment for Startup, page 33.
- Connect the equipment to a power source. See Electrical Connections and Wiring, starting on page 25.

NOTE: An alert beep will sound and the pump will automatically start cycling if the pump is connected to power and the control knob (K) is not set to off (0).

3. Turn the control knob on and allow the equipment to complete the startup sequence. See **LED Indicator Overview**, page 36.

The LED indicator light illuminates solid yellow while calibrating. The pump cycles slowly while adjusting and operates normally after fully calibrating.

The system stays calibrated as long as power to the system is connected. If power to the system is disconnected, the system will automatically recalibrate after power is restored.

- 4. Slowly increase the control knob (K) until the equipment is operating at the set output level.
- 5. If flushing, run the equipment long enough to thoroughly clean the equipment and lines.

Tips to Reduce Cavitation

NOTICE

Frequent or excessive cavitation can cause serious damage, including pitting and early wear of wetted parts, and may result in reduced efficiency of the equipment. Cavitation damage and reduced efficiency both result in increased operating costs.

Cavitation is the formation and collapse of air pockets in the fluid. Cavitation depends on the vapor pressure of the fluid, the system suction pressure, and the velocity pressure. Viscous fluids are more difficult to pump and more prone to cavitation than non-viscous fluids.

To improve equipment efficiency and reduce the cavitation:

- Reduce vapor pressure: Decrease the temperature of the fluid.
- 2. Increase suction pressure:
 - a. Position the equipment lower than the fluid level in the supply.

- b. Reduce the number of fittings on the suction lines to reduce friction length.
- c. Increase the diameter of the suction lines.
- d. Reduce the fluid inlet pressure. An inlet pressure supply of 3–5 psi (21–35 kPa, 0.2–0.3 bar) is adequate for most materials.

NOTICE

To avoid pump damage and inefficient operation, do not use a fluid inlet pressure greater than 25 percent of the outlet working pressure.

- e. Increase the Net Positive Suction Head (NPSH). See **Performance Charts**, page 59.
- Reduce liquid velocity: Slow the equipment cyclic rate.

Consider all the previously listed factors in system design. To maintain efficiency, operate the equipment at the lowest speed and pressure setting needed for the required flow.

Contact your local distributor for site-specific suggestions to improve equipment performance and reduce operating costs.

Select Control Mode

- Flow Control Mode is enabled by default. In this
 mode, adjustment of the control knob results in
 change to the speed of operation and therefore fluid
 flow of the pump. The stall pressure is always the
 maximum operation pressure of the pump.
- In Pressure Control Mode, adjustment of the control knob results in changes to both fluid flow and stall pressure of the pump.

To select the Control Mode:

- Follow Remove the Control Cover, in the control cover repair procedures in the motor manual. See Related Manuals on page 3.
- Verify that the equipment is turned off and power to the system is disconnected before performing any service or repair procedure.
- 3. Locate the control mode switch (1-CM).

- 4. Select the control mode:
 - a. For Pressure Control Mode, push the switch1-CM to the left position.
 - b. For Flow Control Mode, push the switch 1-CM to the right position.
- 5. Follow **Install the Control Cover** in the control cover repair procedures in the motor manual.

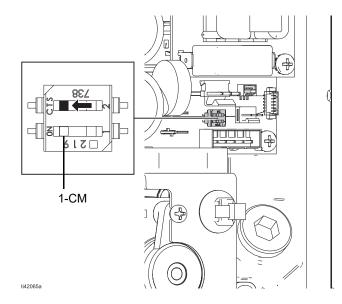


Fig. 16: Control Mode Switch

Disable Auto-Prime

The auto-prime sensor detects fluid while the equipment is operating. The equipment will run as long as fluid is detected. If fluid is not detected, the auto-prime sequence will restart.

Auto-prime is enabled by default. To disable auto-prime:

- Follow Remove the Control Cover, in the control cover repair procedures in the motor manual. See Related Manuals on page 3.
- 2. Verify that the equipment is turned off and power to the system is disconnected before performing any service or repair procedure.
- 3. Locate the auto-prime switch (2-AP).
- 4. Push the auto-prime switch (2-AP) to the left position to disable auto-prime.
- 5. Follow **Install the Control Cover** in the control cover repair procedures in the motor manual.

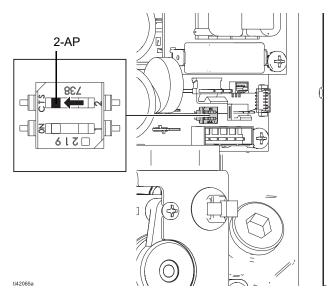


Fig. 17: Auto Prime Switch

Shut Down the Equipment



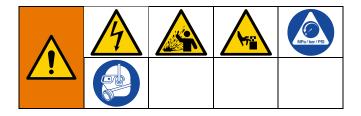
- 1. Follow Pressure Relief Procedure, page 33.
- 2. Follow Flush the Equipment, page 40.

LED Indicator

LED Indicator Overview

LED Indicator	Equipment Status	Notes
Red, solid	Powered on, speed set at 0 (zero), system not operating.	Be aware that the equipment is energized.
		To initiate equipment operation, follow Start the Equipment , page 33.
Red, solid, dim	Powering up, powering down, or power misconfigured.	Allow power up or power down sequence to complete. If power is applied and sequence does not complete within 10 seconds, check power wire connections. See Wire Power Cables , page 26.
Red, flashing	Motor fault, motor error.	See LED Indicator Event Errors, page 37.
Yellow, solid	Calibrating. Performing startup sequence.	No action. Allow equipment to finish startup sequence.
		Open the fluid drain valve (G) or fluid shutoff valve (H) to allow the equipment to cycle until the startup sequence is finished.
Yellow, flashing	Leak sensor alert.	See "Leak sensor alert" LED Indicator Event Errors , page 38.
Green, solid	Startup sequence complete.	To initiate equipment operation, follow Start the Equipment , page 33.
	Normal operation.	No action.
Green, flashing	Normal operation, stalled against pressure.	Be aware that the equipment is energized.
		Special-case action. See LED Indicator Event Errors , page 37.
No light (off)	System not powered.	See LED Indicator Event Errors, page 37.

LED Indicator Event Errors



If an event error occurs, the LED Indicator will blink a set number of times corresponding to the event code that needs acknowledged.

Follow the **Pressure Relief Procedure**, page 33, before checking or repairing the equipment.

Check all possible problems and causes before disassembling equipment.

LED Indicator Event Errors						
LED Indicator	Problem	Cause	Solution			
Red, flashing, one flash	Motor or controller overheating.	Hot operating environment or hot operating conditions.	Turn the control knob (K) to the off (0) position. Keep the system connected to power and allow the equipment to cool before returning to operation.			
			Inspect the fan. Repair or replace as needed. See related motor manual. See Related Manuals , page 3.			
Red, flashing, two flashes	Motor current error.	Special-case cause.	Turn the control knob down, then back up. If the problem persists, contact Technical Support.			
Red, flashing,	Voltage error or pump	Input voltage is too high, too low,	Check line power voltage.			
three flashes	priming failure.	or too noisy, or an operational parameter of the motor was exceeded while priming.	Check control board connections. See related motor manual. See Related Manuals, page 3.			
			If the pump has flapper check valves, reduce the output pressure of the pump via a valve or the control knob (K). Pumps with flapper check valves are unable to prime fluid against pressure. If the problem persists or if the pump has ball check valves, examine all check valves to ensure they are checking and opening correctly.			
Red, Flashing, four flashes			Ensure the motor sensor cable is properly installed. See related motor manual. See Related Manuals , page 3.			
		Motor sensor not functioning.	Replace the motor sensor. See related manuals. See related motor manual. See Related Manuals , page 3.			

LED Indicator Event Errors						
LED Indicator	Problem	Cause	Solution			
Red, flashing, five flashes	Special-case problem.	Special-case cause.	Power cycle the unit. If the error persists, contact Technical Support.			
Red, flashing, six flashes	Motor lead connection error.	One or more motor leads are connected incorrectly.	Check that all motor connections to the control board are correct.			
Red, flashing, seven flashes	Motor sensor recalibration failure.	A motor sensor recalibration sequence failed to spin the motor or reported an invalid value.	Ensure the motor shaft is completely unloaded and the diaphragms are removed, then run the sequence again. See motor recalibration instructions in related motor manual. See Related Manuals, page 3.			
Red, flashing, eight flashes	FC7, FC8, FC9, FCA, FE7, FE8, FE9, FEA models only: Cooling fan error.	The fan cannot spin at the required speed.	Inspect the fan. Repair or replace as needed. See related motor manual. See Related Manuals , page 3.			
Dim red, solid	Voltage detection	Power disconnected.	Check power connection.			
	error.	System powering down.	Allow equipment to finish shutdown.			
Yellow, flashing, continuous flash	Leak sensor alert.	Leak detected in the equipment.	Check the diaphragm for rupture or incorrect installation. Repair or replace. Ensure that the diaphragm is torqued to specification.			
		The leak sensor disconnected.	Ensure the leak sensor is properly installed. See related leak sensor manual. See Related Manuals , page 3.			
Green,	Equipment stalled	A valve downstream in the fluid	Open the valve.			
flashing, continuous flash	against pressure.	line is closed or clogged.	Follow the Pressure Relief Procedure , page 33, and clear the valve.			
			Special-case cause.	Be aware that the equipment is energized. Special-case action. See related motor manual. See Related Manuals , page 3.		
			Contact Technical Support.			
No light (off)	Voltage detection	System not powered.	Check power connection.			
	error.	Control failure.	Check the branch circuit for proper voltage.			
			Replace the control board. See related motor manual. See Related Manuals , page 3.			

Maintenance

Establish a Preventive Maintenance Schedule

NOTICE

Regularly maintain the equipment to avoid pump damage due to spills, leaks, or diaphragm failure.

Establish a preventive maintenance schedule based on the equipment service history.

Inspect the Equipment

Regularly inspect the equipment for worn or damaged parts. Replace as needed.

Tighten Fasteners

Regularly check and torque all fasteners. Follow **Torque Fasteners**, page 55.

NOTICE

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

Tighten Connections

Check and tighten all fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all connections to avoid leaks and damage to equipment parts.

Lubricate the Equipment

The equipment is lubricated at the factory. Re-lubricate the equipment when replacing diaphragms.

Lubricate the motor rotor when replacing diaphragms. See related motor manual. See **Related Manuals**, page 3.

NOTICE

Do not over-lubricate the equipment. Lubricant exhaust could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the equipment to malfunction.

Flush the Equipment











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

- Flush before fluid can dry or freeze in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connections for leaks and tighten as needed.
- Flush with a solvent that is compatible with the fluid being dispensed and the equipment wetted parts.

 Use a sanitary solution for hygienic applications.
- · Flushing schedule varies based on particular uses.
- Always cycle the equipment during the entire flushing process.
- 1. Follow Pressure Relief Procedure, page 33.
- 2. Insert the suction end of the fluid supply line (F) into a compatible solvent.
- 3. Close the fluid drain valve (G).
- Ensure the control knob (K) is turned to off (0).
- If the fluid outlet line (J) has a dispensing device, place a metal part of the dispensing device to a grounded metal container and hold the dispensing valve open.
- 6. Ensure all fluid shutoff valves (H) are open.
- 7. Connect the equipment to a power source. See **Electrical Connections and Wiring**, starting on page 25.
- Slowly increase the control knob (K) until the equipment is operating at the set output level.
- 9. Run the equipment for enough time to thoroughly clean the equipment and lines.
- 10. Turn the control knob (K) to off (0).
- 11. Follow Pressure Relief Procedure, page 33.

Store the Equipment







Always relieve the pressure and flush the equipment before storing the equipment for any length of time.

- 1. Follow Pressure Relief Procedure, page 33.
- 2. Follow Flush the Equipment, page 40.

NOTICE

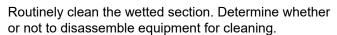
Store the equipment at 32°F (0°C) or higher. Exposure to extreme low temperatures may result in damage to plastic parts.

Clean the Wetted Section









- To clean the equipment without disassembling parts, follow Clean In-Place (CIP), page 41.
- To clean the equipment by disassembling parts, follow Clean Out-of-Place (COP), page 41.

Clean in accordance with applicable codes and local regulations for your compatible solvent.

Clean In-Place (CIP)

NOTICE

To avoid equipment damage, only use cleaning fluids that are compatible with materials of the wetted section. To avoid damage to stainless steel parts, do not use chlorinated cleaning fluids. Do not exceed the maximum fluid temperature for the materials of the wetted section. See **Fluid Temperature Range**, page 80.

- 1. Follow Pressure Relief Procedure, page 33.
- 2. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**, page 40.
- 3. Circulate the compatible solvent through the equipment. Slowly cycle the equipment as the compatible solvent is circulated.

NOTE: Thoroughly circulate the compatible solvent through the equipment and the system prior to use.

NOTICE

To avoid equipment damage, do not exceed a fluid inlet pressure of 15 psi (103 kPa, 1 bar) when cycling the equipment.

4. Follow Pressure Relief Procedure, page 33.

Clean Out-of-Place (COP)

- 1. Follow Pressure Relief Procedure, page 33.
- 2. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**, page 40.
- 3. Disassemble parts as needed. See **Repair**, starting on page 45.
- Inspect parts for wear or damage. Replace as needed.
- Using a brush or other COP methods, wash all wetted parts with a compatible solvent at the recommended temperature and concentration of the manufacturer.
- 6. Rinse the parts again with water and allow parts to completely dry.
- 7. Inspect the parts and re-clean any soiled parts.
- 8. Reassemble the equipment as needed. See **Repair**, starting on page 45.
- 9. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**, page 40.
- Circulate the compatible solvent through the equipment. Slowly cycle the equipment as the compatible solvent is circulated.

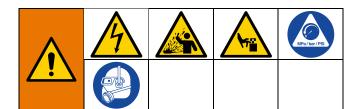
NOTE: Thoroughly circulate the compatible solvent through the equipment and the system prior to use.

NOTICE

To avoid equipment damage, do not exceed a fluid inlet pressure of 15 psi (103 kPa, 1 bar) when cycling the equipment.

11. Follow Pressure Relief Procedure, page 33.

Troubleshooting



Follow the **Pressure Relief Procedure**, page 33, before checking or repairing the equipment.

Check all possible problems and causes before disassembling equipment.

Problem	Cause	Solution	
Equipment emits beeping alert sound, LED light yellow	Pump starting automatic startup sequence. Pump is connected to a power source and the control knob (K) is not set to the off (0)	Turn the control knob (K) to the off (0) position or disconnect power to the system.	
	position.	If prepared to operate, allow the pump to complete the automatic startup sequence.	
LED light flashing	Equipment error; special-case cause.	See LED Indicator Event Errors , page 37.	
Equipment cycles, but does not prime or pump (It	Equipment running too fast, causing cavitation before prime.	Slow down the motor speed.	
is normal operation for auto-prime to run and then stop once the pump is primed).	Fluid not detected by the auto-prime sensor.	Ensure the suction end of the fluid supply line (F) is inserted into the fluid to be dispensed.	
p.i.iida).		Allow the auto-prime sequence to run for 30 seconds.	
	Check is worn or wedged in the seat or manifold.	Replace check and seat.	
	Worn seat.	Replace check and seat.	
	Restricted outlet or inlet port.	Remove restriction.	
	Loose inlet fittings or manifolds.	Tighten.	
	Damaged manifold seats.	Replace.	
Equipment does not hold	Worn check, seats, or seals.	Replace.	
fluid pressure at stall	Loose manifold connections or fluid connections.	Tighten.	
	Loose diaphragm shaft fastener.	Tighten.	
Equipment leaking fluid externally from joints [‡]	Loose manifold connections or fluid cover connections.	Tighten.	
	Worn manifold seats or seals.	Replace.	

Problem	Cause	Solution
Equipment leaks fluid externally from the joint	Worn or damaged gaskets (53).	Replace gaskets (53), see Reassemble the Check Valves , page 48.
between the center manifold and manifold.	Gasket (53) not installed properly.	Thoroughly grease the gasket (53) and the inner diameter of the manifold (5 or 4)
(Flapper pumps only)	Manifold (5 or 4) not fully installed at joint to the center manifold (54).	before assembling manifold.
		Ensure the gasket (53) is fully installed on the outer diameter of the center manifold (54).
		Ensure the manifold (5 or 4) is properly aligned to the equipment.
		Ensure the center manifold (54) and manifold (5 or 4) are fully connected at the joint.
		See Reassemble the Check Valves, page 48.
Equipment stalled, will not	Fluid line clogged or valves closed.	Inspect; clear.
cycle		Open valves downstream of the equipment.
	Motor or controller wired improperly.	Wire per instructions in related motor manual. See Related Manuals , page 3.
	Leak sensor tripped.	Check diaphragm for rupture or incorrect installation. Repair or replace.
Reduced performance	Fluid line clogged.	Inspect; clear.
	Checks are sticky or leaking.	Clean or replace.
	Diaphragm (or backup diaphragm, if applicable) ruptured.	Replace.
Air bubbles in fluid	Fluid line is loose.	Tighten.
	Diaphragm (or backup diaphragm, if applicable) ruptured.	Replace.
	Loose manifolds.	Tighten manifold fasteners or clamps.
	Damaged seats or seals.	Replace seats or seals.
	Loose diaphragm shaft fastener.	Tighten.
Fluid leaking from lower	Loose diaphragm shaft fastener.	Tighten.
ports on the equipment or fluid on the floor	Diaphragm rupture. Leak in the equipment.	Replace.
Equipment stalls at pressure below maximum pump operation pressure	Pressure Control Mode is selected.	Select Flow Control Mode. Select Control Mode, page 34.

Problem	Cause	Solution	
Equipment suddenly stops operating or shuts down.	Ground fault circuit interrupter (GFCI) tripped.	Remove controller from the GFCI circuit.	
	Poor supply power.	Check connections. Determine and fix the source of the problem with the supply power.	
	Exceeded operational parameters.	See LED Indicator Event Errors , page 37, for event codes.	
	Leak sensor alert. Leak detected in the equipment.	Check the diaphragm for rupture or incorrect installation. Repair or replace.	
	The leak sensor disconnected.	Ensure the leak sensor is properly installed. See related leak sensor manual.	









[‡] Do not modify or repair explosion proof joints. Modifying explosion proof joints will invalidate the Hazardous Location Certification of the equipment and may produce an explosion hazard.

Repair

NOTE: Repair kits are available (purchase separately).











This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid and moving parts, follow Pressure Relief Procedure when you stop operating and before cleaning, checking, or servicing the equipment.

To avoid severe burns, do not touch hot fluid or hot equipment.

Follow Prepare Equipment for Repair, page 45, before performing any service or repair to the equipment.

Prepare Equipment for Repair









DANGER SEVERE ELECTRIC SHOCK HAZARD

This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- · Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.







Models in Explosive Atmospheres or Hazardous (Classified) Locations: To avoid injury from fire and explosion, move the equipment to a non-explosive or non-hazardous location before performing any service or repair to the equipment.

Always complete the following procedure before performing any service or repair to the equipment.

- Follow Pressure Relief Procedure, page 33.
- 2. Follow Flush the Equipment, page 40.
- 3. Verify that the equipment is turned off and power to the system is disconnected before performing any service or repair procedure.
- 4. Disconnect all fluid lines.
- 5. Optional: Mount the back of the pump (opposite side from the motor) to the maintenance bracket stand (purchase separately). See related parts manual. See Related Manuals, Page 3. This positions the pump facing up, enabling easy working access to the pump and motor. The stand can be mounted to a workbench through the mounting holes on the feet. See Fig. 18.
 - a. Loosen the four bolts that hold the logo plate (if present) to the pump.
 - b. Slide the bracket stand behind the bolts.
 - Tighten the bolts.
 - d. After repairing the pump, remove the pump from the bracket stand and return it to service.

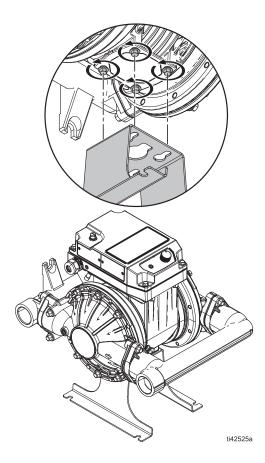


Fig. 18. Maintenance bracket stand

Repair the Check Valves (Ball Pumps)

Required Tools:

- 10 mm socket wrench (for all i30 (QTC) models, i80 (QTD) plastic models, and i120 (QTE) plastic models)
- 13 mm socket wrench (for i80 (QTD) metal models and i120 (QTE) metal models)

See Fig. 19.

Disassemble the Check Valves











To avoid severe burns, do not touch hot fluid or hot equipment.

- 1. Follow Prepare Equipment for Repair, page 45.
- 2. Drain the equipment.

NOTE: After draining, rotate the equipment to positions which will aid disassembly.

- 3. On the outlet manifold (4), remove all fasteners (6).
- 4. Remove the outlet manifold (4), seals (10, if applicable), guides (9b, if applicable), checks (9), and seats (8).

NOTE: Use care while removing manifolds to avoid damage to check valve components.

- 5. On the inlet manifold (5), remove all fasteners (6, 6b, if applicable).
- 6. Remove the inlet manifold (5), seals (10, if applicable), guides (9b, if applicable), checks (9), and seats (8).

NOTE: Use care while removing manifolds to avoid damage to check valve components.

7. Clean and inspect parts for wear or damage. Replace as needed.

Reassemble the Check Valves

- Align and place seats (8), checks (9), guides (9b, if applicable), seals (10, if applicable), and manifolds (4, 5), exactly as shown for your equipment model. See related parts manual. See **Related Manuals**, page 3.
- Use the fasteners (6, 6b, if applicable) to loosely attach the manifolds (4, 5) to the fluid covers (3).
 After all components are properly aligned, torque the fasteners (6, 6b, if applicable) on the manifolds (4, 5). See **Torque Fasteners**, page 55.

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See Torque Fasteners, page 55.

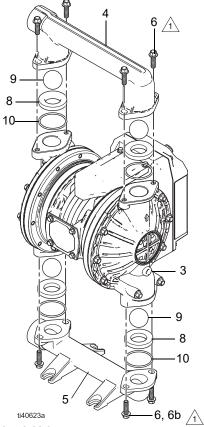


Fig. 19: Check Valves

Repair the Check Valves (Flapper Pumps)

Tools Required:

- Torque wrench
- · 4 mm hex key
- 15 mm socket wrench

See parts manual in **Related Manuals**, page 3, for available repair kits. Service the check valves as follows.

See Fig. 20.

Disassemble the Check Valves











To avoid severe burns, do not touch hot fluid or hot equipment.

- 1. Follow Prepare Equipment for Repair, page 45.
- 2. Remove clevis and cotter pins (35, 36) from manifolds (5, 4).
- 3. Remove bolts (6).
- 4. Remove manifolds from fluid covers (3).

NOTE: Use care while removing manifolds to avoid damage to check valve components.

5. Remove all check valve components and gaskets (53).

NOTE: Pay attention to the orientation of the check valve components for reassembly.

6. Clean and inspect all parts for wear or damage. Replace as needed.

NOTE: To ensure proper seating, always replace all gaskets, seats, and check valve components when performing check valve repairs.

Reassemble the Check Valves

 Install all check valve components in the correct orientation. See Fig. 20.

NOTE: Ensure that the check valves and seating areas are clean.

NOTE: Install the flapper valves with the solid rubber side facing toward the seat.

Install gaskets (53) onto the outer diameter of the center manifolds (54).

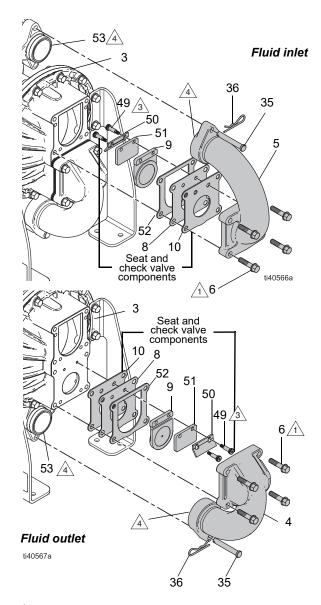
NOTE: Before reassembling manifolds, grease both surfaces of the gasket (53) and the mating inner diameter of the manifolds (5, 4).

NOTE: Always replace the manifold gaskets (53) when repairing the equipment.

- 2. Align manifolds (5, 4) with the fluid covers (3) and center manifold (54).
- 3. Simultaneously connect the manifolds (5, 4) to the joints at the fluid cover (3) and center manifold (54).

NOTE: For proper installation, ensure that the manifold joints are connected at the same time.

4. Insert screws (6) and torque. See **Torque Sequence**, page 55.



Apply medium-strength (blue) thread locker to the threads. Torque to 190–220 in-lb (21.5–24.9 N•m). See **Torque Sequence**, page 55.

Apply medium-strength (blue) thread locker to the threads. Torque to 20–25 in-lb (2.26–2.82 N•m).

∕₄\ Grease

Fig. 20: Check Valve Section

Repair the Standard Diaphragms

Required Tools:

- 10 mm socket wrench (for all i30 (QTC) models, i80 (QTD) plastic models, and i120 (QTE) plastic models)
- 13 mm socket wrench (for i80 (QTD) metal models and i120 (QTE) metal models)
- Torque wrench
- 25 mm open-end wrench
- Lubriplate[®] Synxtreme HD-2 grease (or equivalent NLGI Grade 2 synthetic grease with calcium sulfonate base)

See Fig. 21-Fig. 23.

NOTE: Lubricate the motor rotor when replacing diaphragms. See related motor manual. See **Related Manuals**, page 3.

Disassemble the Standard Diaphragms









To avoid severe burns, do not touch hot fluid or hot equipment.

- 1. Follow Prepare Equipment for Repair, page 45.
- 2. Follow Disassemble the Check Valves, page 47.
- 3. Remove all fasteners (7, 7b, if applicable) from the fluid covers (3). Remove the fluid covers (3).
- 4. Use an applicable wrench to firmly hold one diaphragm fastener (15) in place. At the same time, use an applicable wrench to loosen the fastener (15) on the opposite side.
- 5. Remove the fastener (15), seal (16, if applicable), fluid plate (11), diaphragm (13), and diaphragm backer (14) from the shaft (1a) on the side of the pump with the loosened fastener (15).
- 6. Loosen the remaining diaphragm fastener (15).

If the first loosened diaphragm fastener (15) is on the side of the shaft (1a) with the wrench flat:

a. Use an applicable wrench to firmly hold the flat of the shaft (1a) in place. At the same time, use an applicable wrench to loosen the remaining diaphragm fastener (15). See Fig. 23.

If the first loosened diaphragm fastener (15) is opposite the wrench flat on the shaft (1a):

- Follow the procedure to lubricate the rotor in related motor manual to access the flat of the shaft (1a). See **Related Manuals**, page 3.
- b. After the flat of the shaft (1a) is accessible, use an applicable wrench to firmly hold the flat of the shaft (1a) in place. At the same time, use an applicable wrench to loosen the remaining diaphragm fastener (15). See Fig. 23.
- 7. Remove the remaining fastener (15), seal (16, if applicable), fluid plate (11), diaphragm (13), and diaphragm backer (14), and air-side plate (21) from the shaft (1a).

NOTE: Do not remove the diaphragm shaft (1a) from the motor (1).

NOTICE

To avoid damage to the rotor or equipment, do not remove the shaft (1a) from the motor (1). Removing the shaft will cause the rotor balls to dislodge from the rotor and the rotor will not function properly.

- 8. Clean and inspect parts for wear or damage. Replace parts as needed.
- 9. Lubricate the rotor. See related motor manual. See **Related Manuals**, page 3.

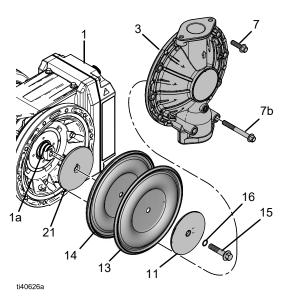


Fig. 21: Standard Diaphragms

Reassemble the Standard Diaphragms

NOTICE

After reassembly, allow the thread locker to cure for 12 hours, or per instructions of the manufacturer, prior to operating the equipment. The equipment will be damaged if the diaphragm shaft fastener loosens.

 Assemble the air-side plate (21), diaphragm backers (14), diaphragms (13), fluid side plates (11), and seals (16, if applicable) with the fasteners (15) exactly as shown for your equipment model. See related parts manual. See **Related Manuals**, page 3.

NOTE: Face the rounded side of the fluid side plate (11) toward the diaphragm (13).

NOTE: Regardless of any markings on the diaphragm backer (14), always assemble the diaphragm backer (14) so that the outer bead cups around (not away from) the outer bead of the diaphragm (13).

NOTE: Apply thread locker to the fastener (15) for all diaphragm assemblies.



Apply a medium-strength thread locker to the shaft side of the fastener to attach the diaphragm to the shaft.



Rounded side faces toward the diaphragm (13).

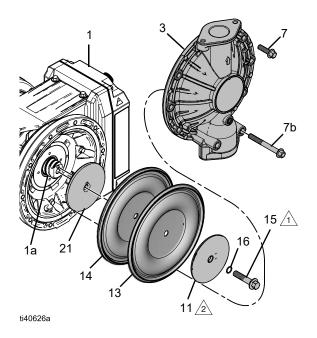


Fig. 22: Reassemble Standard Diaphragms

- 2. Install the assembled diaphragm assemblies into the shaft (1a) and hand-tighten the fasteners (15).
- 3. Use an applicable wrench to firmly hold one fastener (15) in place. At the same time, use an applicable wrench to torque the opposite fastener (15) to 50 ft-lb (68 N·m). See Fig. 23.

4 Torque to 50 ft-lb (68 N•m).



See Torque Fasteners, page 55.

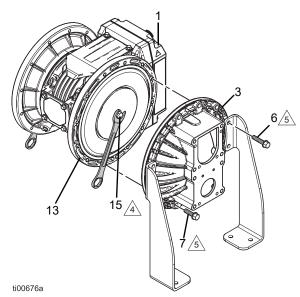


Fig. 23: Tighten Standard Diaphragms

4. Rotate the shaft of the motor to center it in the motor, so that neither diaphragm is extended away from the housing, which could inhibit installing the fluid covers.

NOTE: If it is not possible for both diaphragms to be in contact with the housing, choose one diaphragm to position first. Once the first fluid cover is fastened, slowly drive the motor so that the other diaphragm is in contact with the housing. Then fasten the second fluid cover.

5. Align the fluid covers (3) to the motor (1).

NOTE: On flapper covers, the circular outlet hole must be at the base of the equipment. See Fig. 23.

6. Install fasteners (7, 7b, if applicable) to hold the fluid covers (3) in place.

NOTE: To ensure proper spacing and alignment of the manifolds (4, 5), install fasteners (7, 7b, if applicable) loose enough to allow for fluid cover movement before securing the fluid covers (3) in place.

- 7. Torque all fasteners (6, 7, 7b, as applicable). Follow Torque Fasteners, page 55.
- 8. Reassemble the check valves and manifolds as explained in Reassemble the Check Valves. page 47.

Repair the Overmolded **Diaphragms**

Required Tools:

- 10 mm socket wrench (for all i30 (QTC) models, i80 (QTD) plastic models, and i120 (QTE) plastic models)
- 13 mm socket wrench (for i80 (QTD) metal models and i120 (QTE) metal models)
- Torque wrench
- 25 mm open-end wrench
- Lubriplate® Synxtreme HD-2 grease (or equivalent NLGI Grade 2 synthetic grease with calcium sulfonate base)

See Fig. 24-Fig. 26.

NOTE: Lubricate the motor rotor when replacing diaphragms. See related motor manual. See Related Manuals, page 3.

Disassemble the Overmolded Diaphragms









To avoid severe burns, do not touch hot fluid or hot equipment.

- 1. Follow Prepare Equipment for Repair, page 45.
- Follow Disassemble the Check Valves, page 47.
- 3. Remove all fasteners (7, 7b, if applicable) from the fluid covers (3). Remove the fluid covers (3).
- 4. Firmly grip the outer edge of a diaphragm (13) to hold in place. At the same time, securely grip the outer edge of the opposite diaphragm (13) and rotate counterclockwise to loosen. Remove the diaphragm (13).

NOTE: If needed, leave one fluid cover fastened. With one diaphragm exposed, use both hands to loosen the exposed diaphragm.

NOTE: Do not remove the diaphragm shaft (1a) from the motor (1).

NOTICE

To avoid damage to the rotor or equipment, do not remove the shaft (1a) from the motor (1). Removing the shaft will cause the rotor balls to dislodge from the rotor and the rotor will not function properly.

Remove the remaining diaphragm (13).

If the first loosened diaphragm (13) is on the side of the shaft (1a) with the wrench flat:

a. Use an applicable wrench to firmly hold the flat of the shaft (1a) in place. At the same time, securely grip the outer edge of the opposite diaphragm (13) and rotate counterclockwise to loosen.

If the first loosened diaphragm (13) is opposite the wrench flat on the shaft (1a):

- Follow the procedure to lubricate the rotor in related motor manual to access the flat of the shaft (1a). See Related Manuals, page 3.
- b. After the flat of the shaft (1a) is accessible, use an applicable wrench to firmly hold the flat of the shaft (1a) in place. At the same time, securely grip the outer edge of the opposite diaphragm (13) and rotate counterclockwise to loosen.
- 6. Clean and inspect parts for wear or damage. Replace parts as needed.
- 7. Lubricate the rotor. See related motor manual. See **Related Manuals**, page 3.

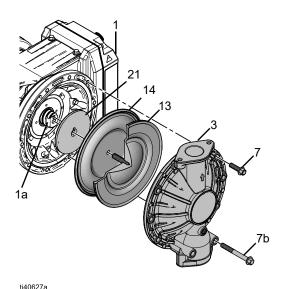


Fig. 24: Overmolded Diaphragms

Reassemble the Overmolded Diaphragms

NOTICE

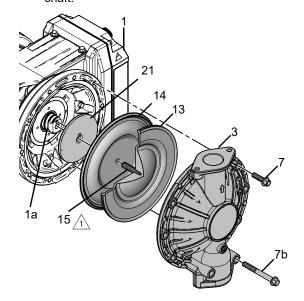
After reassembly, allow the thread locker to cure for 12 hours, or per instructions of the manufacturer, prior to operating the equipment. The equipment will be damaged if the diaphragm shaft fastener loosens.

 On the side of the shaft (1a) opposite of the wrench flat, install the air-side plate (21), diaphragm backer (14), and diaphragm assembly (13, 15) into the shaft (1a). Firmly tighten.

NOTE: Regardless of any markings on the diaphragm backer (14), always assemble the diaphragm backer (14) so that the outer bead cups around (not away from) the outer bead of the diaphragm (13).

NOTE: Apply thread locker to the fastener (15) for all diaphragm assemblies.

Apply a medium-strength thread locker to the shaft side of the fastener to attach the diaphragm to the



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Fig. 25: Reassemble Overmolded Diaphragms

- 2. Use an applicable wrench to hold flat of the shaft (1a) firmly in place. At the same time, grip the diaphragm (13) securely around the outer edge and rotate clockwise to firmly tighten.
- 3. Rotate the shaft (1a) until it is centered in the motor (1).

NOTE: If it is not possible for both diaphragms to be in contact with the housing, choose one diaphragm to position first. Once the first fluid cover is fastened, slowly drive the motor so that the other diaphragm is in contact with the housing. Then fasten the second fluid cover.

- 4. On the side of the equipment with the installed diaphragm, align the fluid cover (3) to the motor (1).
- 5. Loosely install the fasteners (7, 7b, if applicable) to hold the fluid cover (3) in place.
- 6. On the side of the shaft (1a) with the wrench flat, install the air-side plate (21), diaphragm backer (14), and diaphragm assembly (13, 15) into the shaft (1a). Firmly tighten.
- 7. Align the fluid cover (3) to the motor (1).
- 8. Loosely install the fasteners (7, 7b, if applicable) to hold the fluid cover (3) in place.

NOTE: To ensure proper spacing and alignment of the manifolds (4, 5), install fasteners (7, 7b, if applicable) loose enough to allow for fluid cover movement before securing the fluid covers (3) in place.

- Torque all fasteners (7, 7b, if applicable). Follow Torque Fasteners, page 55.
- 10. Reassemble the check valves and manifolds as explained in Reassemble the Check Valves, page 47.

5 See Torque Fasteners, page 55.

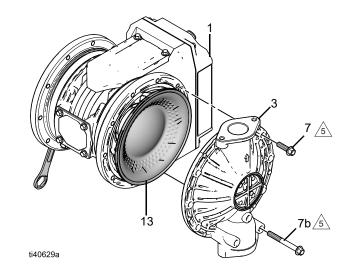


Fig. 26: Tighten Overmolded Diaphragms

Recycling and Disposal

End of Equipment Life

At the end of the useful life of the equipment, disassemble and recycle the equipment in a responsible manner.

- Follow Pressure Relief Procedure, page 33.
- Drain and dispose of fluids according to applicable regulations. See the Safety Data Sheet (SDS) of the material manufacturer.
- Remove motors, circuit boards, LCDs (liquid crystal displays), and other electronic components.
 Recycle according to applicable regulations.
- Do not dispose of electronic components with household or commercial waste.



Deliver remaining equipment to a recycling facility.

Torque Fasteners

Torque Instructions

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

- 1. Start all fasteners a few turns.
- Follow the torque sequence to turn down each fastener until each fastener is slightly under the specified torque. See **Torque Sequence**, page 55.
- 3. Follow the torque sequence to turn each fastener by 1/2 turn or less until each fastener is at the specified torque. See **Torque Sequence**, page 55.

Torque Sequence

Fully torque all fasteners (6, 7, 7b, as applicable) on the fluid covers (3) before torquing the fasteners (6, 6b, if applicable) on the manifolds (4, 5).

Follow Torque Instructions, page 55.

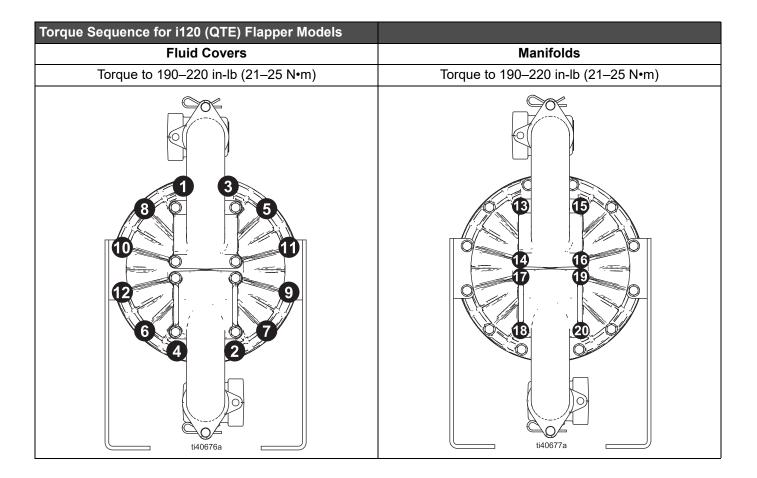
NOTICE

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

Fluid Covers (3)	Manifolds (4, 5)	
For i30 plastic models: Torque fasteners (7, 7b, if applicable) to 90 in-lb (10 N•m).	For i30 plastic models: Torque fasteners (6, 6b, if applicable) to 90 in-lb (10 N•m)	
For i30 metal models: Torque fasteners (7, 7b, if applicable) to 110 in-lb (12 N•m).	For i30 metal models: Torque fasteners (6, 6b, if applicable) to 110 in-lb (12 N•m).	
8 141702a	13 13 14 16 141703£	

Torque Sequence for i80 (QTD) Models	
Fluid Covers (3)	Manifolds (4, 5)
Torque fasteners (7, 7b, if applicable) to 190–220 in-lb (21–25 N•m).	For i80 (QTD) plastic models: Torque fasteners (6, 6b, if applicable) to 80–90 in-lb (9–10 N•m).
	For i80 (QTD) metal models: Torque fasteners (6, 6b, if applicable) to 120–150 in-lb (14–17 N•m).
3 3 5 141704a	ti41705a

Torque Sequence for i120 (QTE) Ball Models	
Fluid Covers (3)	Manifolds (4, 5)
Torque fasteners (7, 7b, if applicable) to 190–220 in-lb (21–25 N•m).	For i120 (QTE) plastic models: Torque fasteners (6, 6b, if applicable) to 150–160 in-lb (17–18 N•m).
	For i120 (QTE) aluminum models: Torque fasteners (6, 6b, if applicable) to 120–150 in-lb (14–17 N•m).
	For i120 (QTE) metal models, except aluminum: Torque fasteners (6, 6b, if applicable) to 190–220 in-lb (21–25 N•m).
1 3 6 4 9 9 1 i41706a	16 141707a

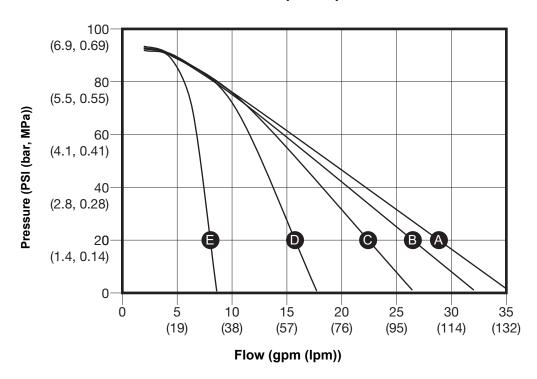


Performance Charts

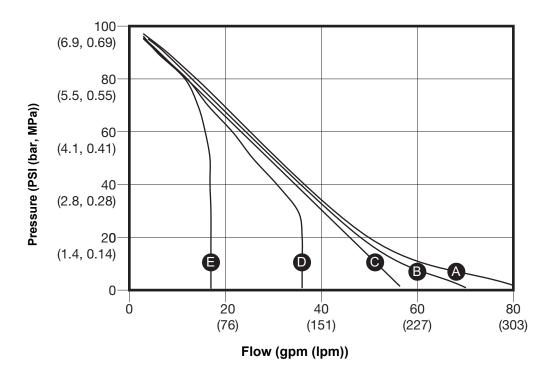
Performance may vary based on pump materials, suction condition, discharge pressure, and fluid type.

Reference	Control Knob Setting
Α	100%
В	80%
С	60%
D	40%
E	20%

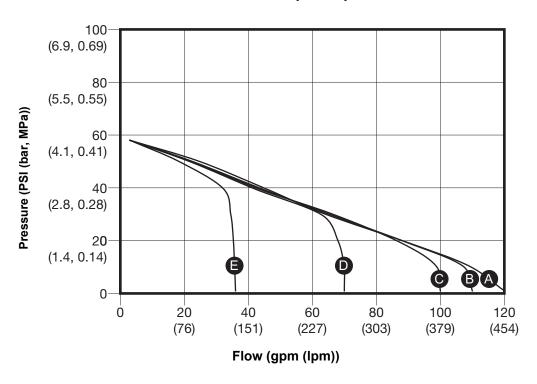
Performance Chart for i30 (QTC) Models



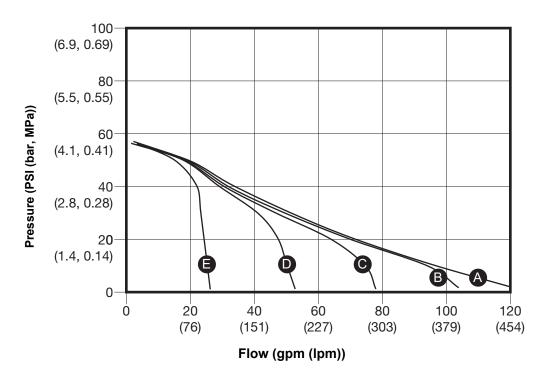
Performance Chart for i80 (QTD) Models



Performance Chart for i120 (QTE) Ball Models



Performance Charts for i120 (QTE) Flapper Models



Dimensions

Dimensions for i30 (QTC) Models

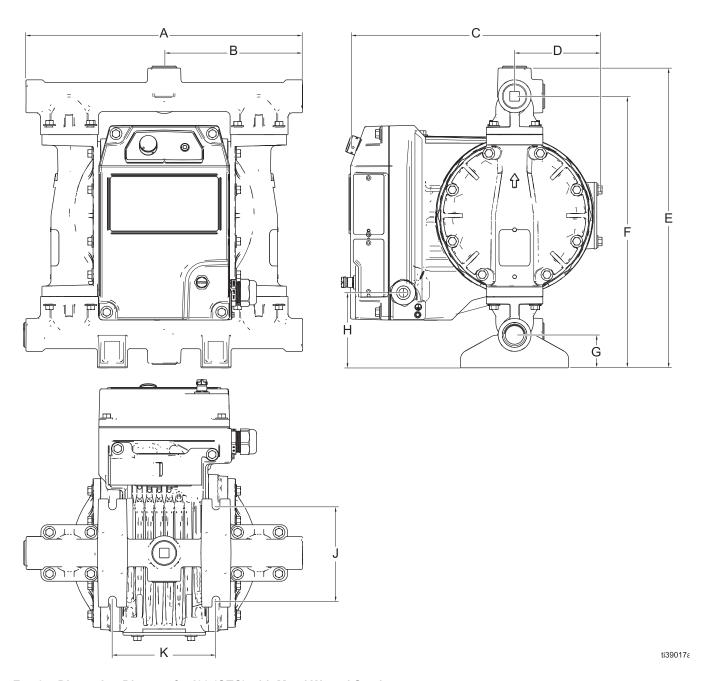


Fig. 27: Dimension Diagram for i30 (QTC) with Metal Wetted Section

Dimensions for i30 (QTC) Model with Metal Wetted Section						
	Wetted Section Material					
	AL		SS			
Ref.	in.	cm	in.	cm		
Α	14.70	37.34	13.90	35.31		
В	7.35	18.67	6.58	16.71		
С	13.25	33.66	13.25	33.66		
D	4.57	11.61	4.57	11.61		
E	15.94	40.49	13.70	34.80		
F	14.44	36.68	12.90	32.77		
G	1.76	4.47	1.10	2.79		
Н	3.70	9.40	2.20	5.59		
J	5.00	12.70	5.00	12.70		
K	5.50	13.97	5.50	13.97		

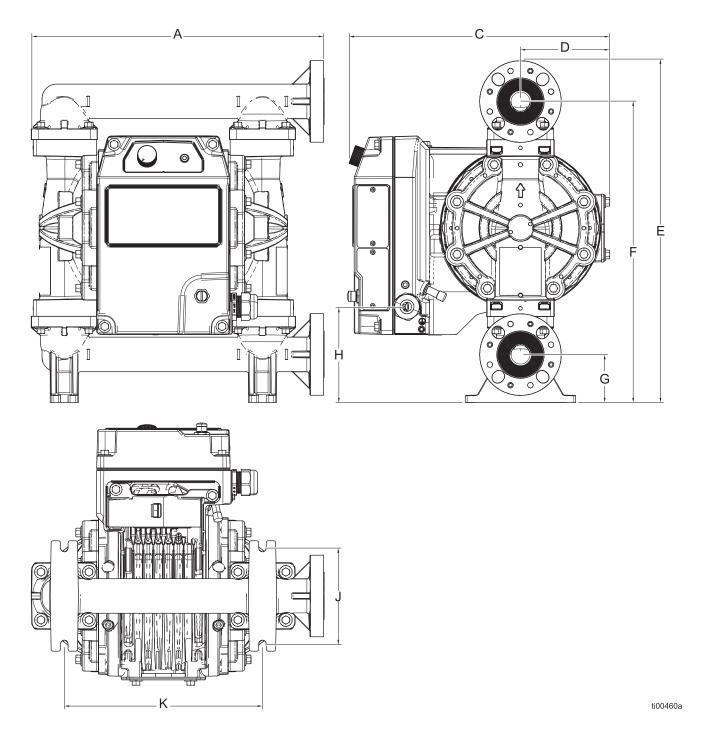


Fig. 28: Dimension Diagram for i30 (QTC) with Plastic Wetted Section, End Flange

Dimensio	Dimensions for i30 (QTC) Model with Plastic Wetted Section, End Flange								
Ref.	Wetted Se	Wetted Section Material							
	СР		PP	PP					
	in.	cm	in.	cm	in.	cm			
Α	15.20	38.61	15.20	38.61	15.20	38.61			
С	13.25	33.66	13.25	33.66	13.25	33.66			
D	4.57	11.61	4.57	11.61	4.57	11.61			
E	17.80	45.21	17.80	45.21	17.80	45.21			
F	15.70	39.88	15.70	39.88	15.70	39.88			
G	2.50	6.35	2.50	6.35	2.50	6.35			
Н	4.69	11.91	4.69	11.91	4.69	11.91			
J	5.00	12.70	5.00	12.70	5.00	12.70			
K	10.55	26.8	10.42	26.50	10.37	26.34			

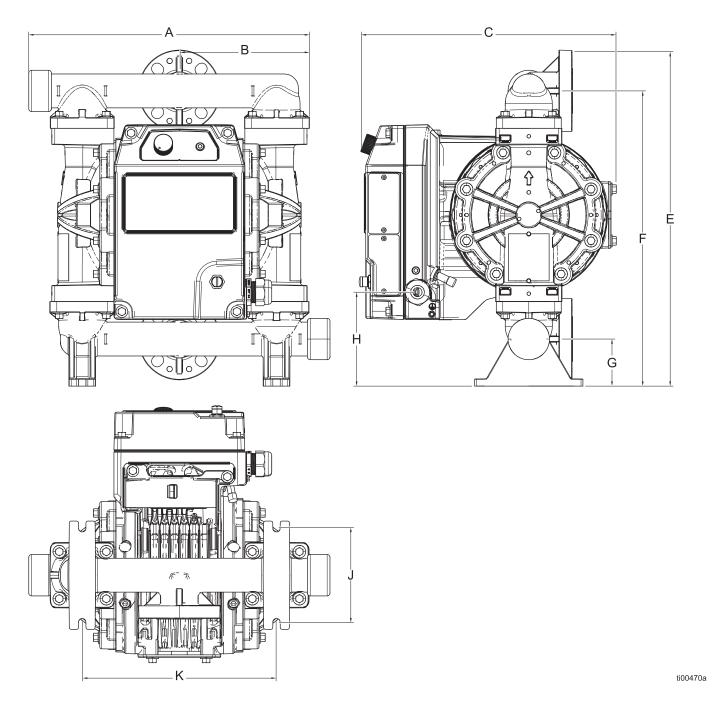


Fig. 29: Dimension Diagram for i30 (QTC) Model with Plastic Wetted Section, Center Flange

Dimensions for i30 (QTC) Model with Plastic Wetted Section, Center Flange							
Ref.	Wetted Section Material						
	СР		PP	PP			
	in.	cm	in.	cm	in.	cm	
Α	16.0	40.60	16.0	40.60	16.0	40.60	
В	8.00	20.32	8.00	20.32	8.00	20.32	
С	13.25	33.66	13.25	33.66	13.25	33.66	
D	4.57	11.61	4.57	11.61	4.57	11.61	
E	17.80	45.21	17.80	45.21	17.80	45.21	
F	15.70	39.88	15.70	39.88	15.70	39.88	
G	2.50	6.35	2.50	6.35	2.50	6.35	
Н	4.69	11.91	4.69	11.91	4.69	11.91	
J	5.00	12.70	5.00	12.70	5.00	12.70	
K	10.55	26.80	10.42	26.50	10.37	26.34	

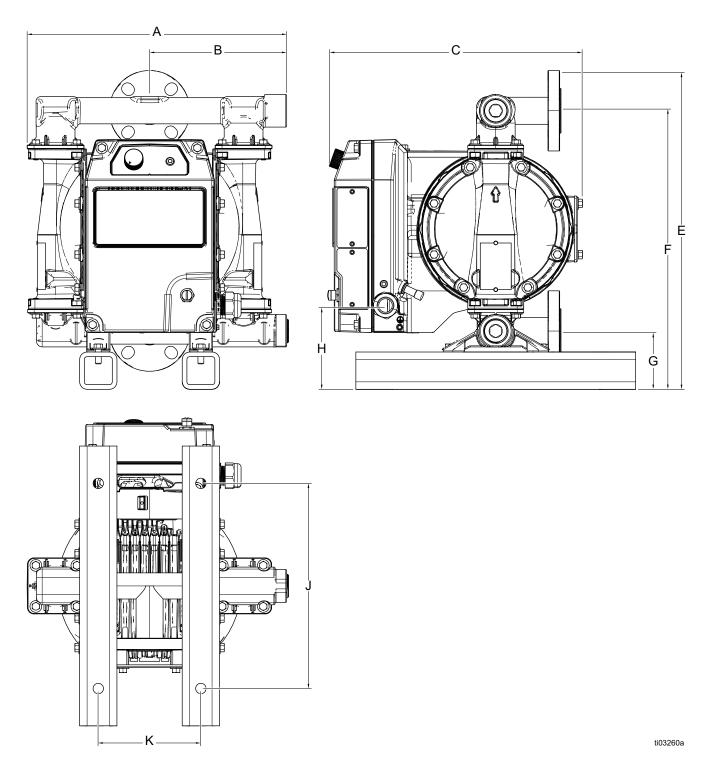


Fig. 30. Dimension Diagram for i30 Model (QTC) with Metal Wetted Section, Center Flange (shown at rear)

Dimensions for i30 (QTC) Model with Metal Wetted Section, Center Flange					
	Wetted Section Material				
	SS				
Ref.	in.	cm			
Α	13.92	35.36			
В	7.35	18.67			
С	13.66	34.70			
D	4.65	11.81			
E – flange at rear	17.09	43.41			
E – flange at top	18.44	46.84			
F	14.94	37.95			
G	3.13	7.95			
Н	4.49	11.40			
J	11.00	7.95			
К	5.50	13.97			

Dimensions for i80 (QTD) Models

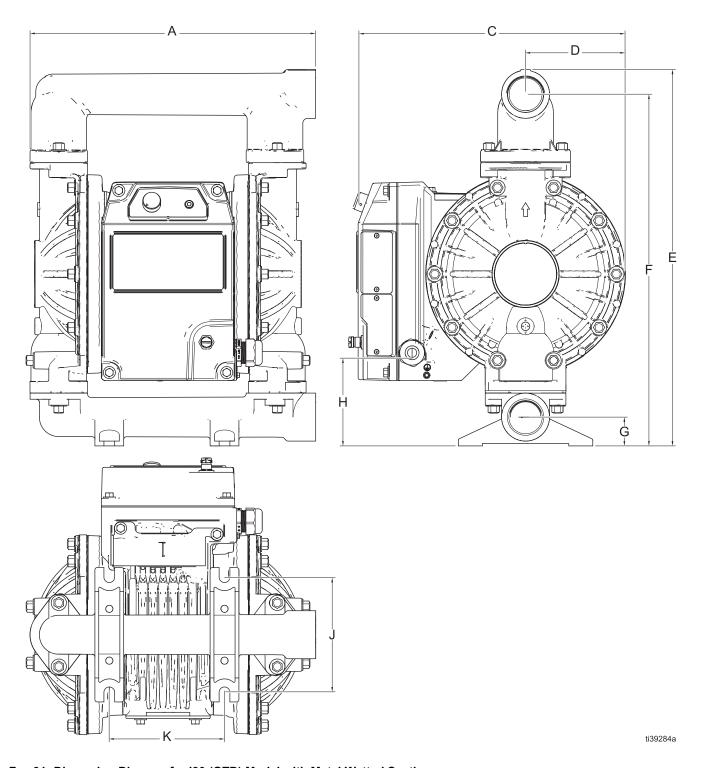


Fig. 31: Dimension Diagram for i80 (QTD) Model with Metal Wetted Section

Dimensions for i80 (QTD) Model with Metal Wetted Section						
	Wetted Section Material					
	AL		SS			
Ref.	in.	cm	in.	cm		
Α	15.07	38.28	16.10	40.89		
С	13.81	35.08	13.85	35.18		
D	5.17	13.13	5.21	13.23		
E	19.60	49.78	18.97	48.18		
F	18.30	46.48	17.75	45.09		
G	1.50	3.81	1.44	3.66		
Н	4.55	11.56	4.55	11.56		
J	6.00	15.24	6.00	15.24		
K	6.00	15.24	6.00	15.24		

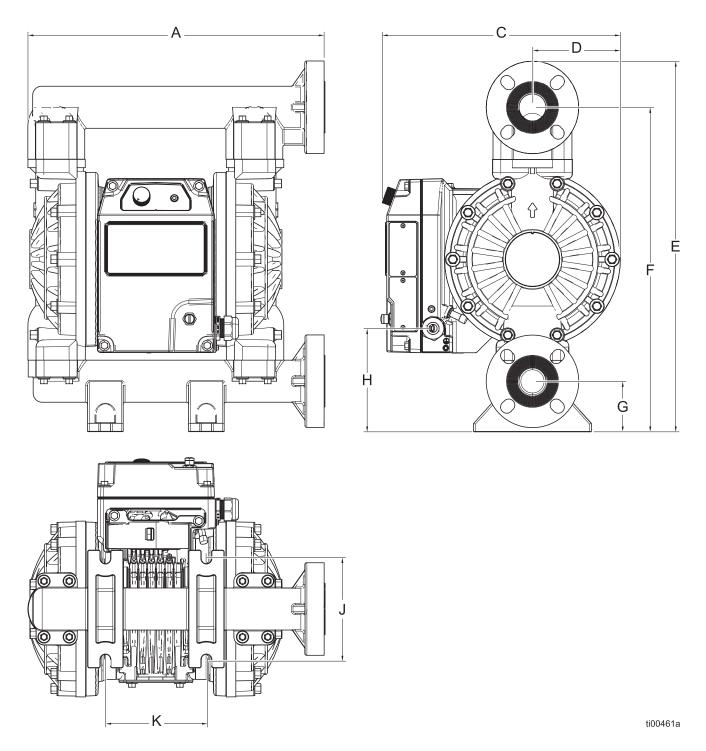


Fig. 32: Dimension Diagram for i80 Model (QTD) with Plastic Wetted Section

Dimensions for i80 (QTD) Model with Plastic Wetted Section				
	Wetted Section Material			
	PP, PV			
Ref.	in.	cm		
Α	17.60	44.70		
С	13.87	35.23		
D	5.23	13.28		
E	22.00	55.88		
F	19.30	49.02		
G	3.00	7.62		
Н	5.85	14.86		
J	6.00	15.24		
K	6.00	15.24		

Dimensions for i120 (QTE) Ball Models

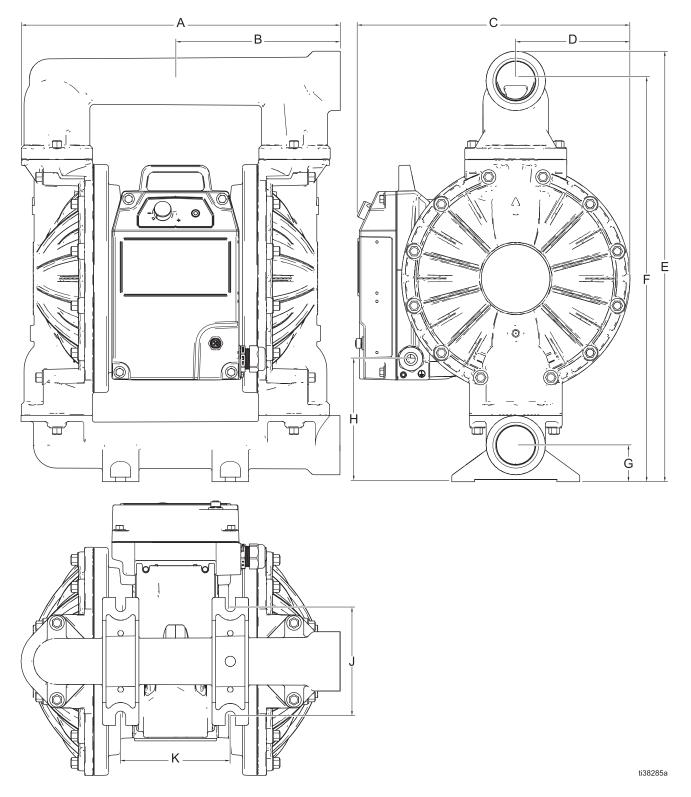


Fig. 33: Dimension Diagram for i120 (QTE) Ball Models with Metal Wetted Section

Dimensions fo	or i120 (QTE) Ba	all Model with M	etal Wetted Sec	ction
	Wetted Sectio	n Material		
	AL		CI, SS	
Ref.	in.	cm	in.	cm
Α	17.50	44.45	18.13	46.05
В	9.00	22.86	9.40	23.88
С	14.89	37.82	14.89	37.82
D	6.25	15.88	6.25	15.88
E	23.60	59.94	26.34	66.90
F	21.90	55.63	24.79	62.97
G	2.00	5.08	2.50	6.35
Н	6.72	17.07	9.01	22.89
J	6.00	15.24	6.00	15.24
K	6.00	15.24	6.50	16.51

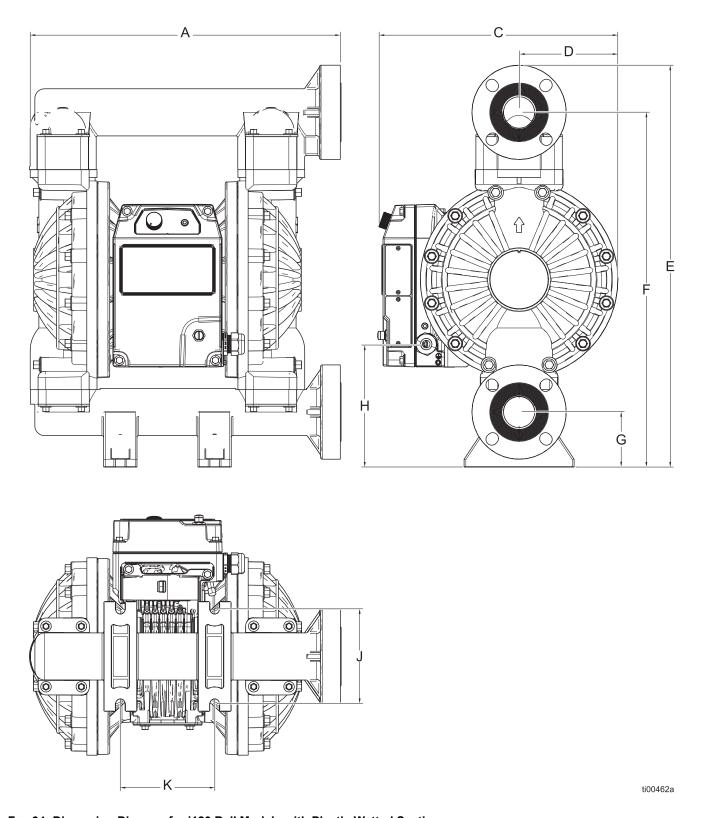


Fig. 34: Dimension Diagram for i120 Ball Models with Plastic Wetted Section

Dimensions for Wetted Section	i120 (QTE) Ball Mo	odel with Plastic		
	Wetted Section Material			
	CP, PP, PV			
Ref.	in.	cm		
Α	19.70	50.04		
С	14.89	37.82		
D	6.25	15.88		
E	25.70	65.28		
F	22.70	57.66		
G	3.50	8.89		
Н	7.53	19.13		
J	6.00	15.24		
K	6.00	15.24		

Dimensions for i120 (QTE) Flapper Models

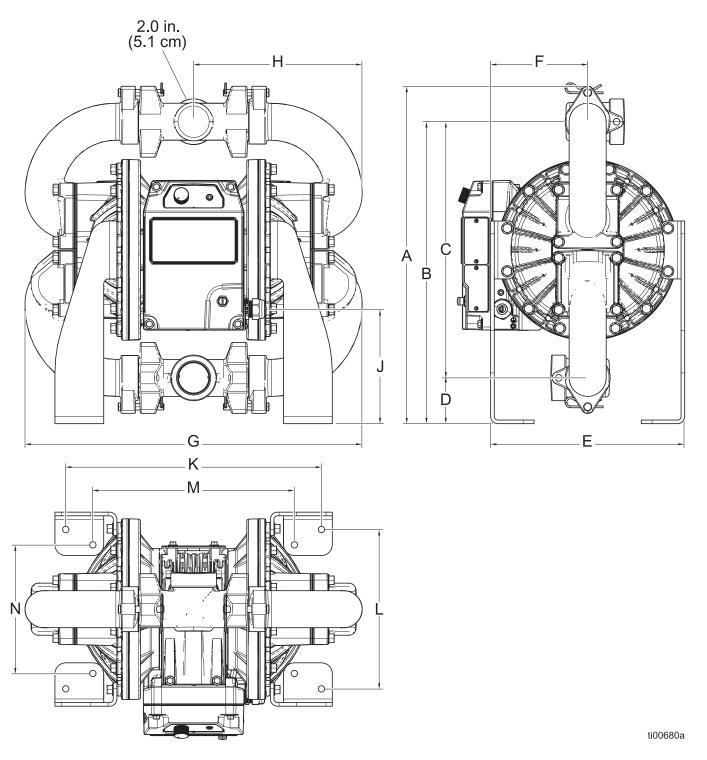


Fig. 35: Dimension Diagram for i120 (QTE) Flapper Models with Metal Wetted Section

Dimensions for Wetted Section		apper Model with Metal
	Wetted Sec	tion Material
	AL	
Ref.	in.	cm
Α	23.31	59.21
В	20.86	52.98
С	17.73	45.03
D	3.16	8.02
E	13.40	34.04
F	6.70	17.02
G*	23.29	59.16
H*	11.64	29.57
J	7.91	20.09
K*	17.89	45.44
L	11.01	27.97
M*	13.95	35.43
N	8.89	22.58

^{*} Dimensions can vary by up to 0.25 in. (6.3 mm) depending on the diaphragm material fitted in the equipment.

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 pump may cause equipment damage.

NOTE: The maximum fluid temperature for Hazardous units should not exceed 230°F (110°C) or the limitation based on the Wetted Section Materials, whichever is lower.

Not all materials in this table are available in all models.

Material of Wetted Contact	Fluid Tempera	ture Range by V	Vetted Section	on Material		
Section Parts (Seat, Check, Diaphragm)*	Metal (AL,Cl, C PH, SS, 3A)*	P, FG, HS, HT,	Plastic (PV)	*	Plastic (AC, CP, PP)*	
Diapinag.ii)	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
(AC) Acetal	–20° to 180°	–29° to 82°				
(AL) Aluminum	–60° to 275°	–51° to 135°				
(BN) Buna-N	10° to 180°	–12° to 82°				
(CO) Polychloroprene Overmold	10° to 180°	–12° to 82°	10° to 180°	-12° to 82°	32° to 150°	0° to 66°
(CR) Polychloroprene, standard, ball	10° to 180°	–12° to 82°				
(CW) Polychloroprene, weighted, ball	10° to 180°	-12° to 82°				
(EO) EPDM Overmolded	–40° to 250°	–40° to 121°	1			
(-B) Buna-N Overmold 303 Stainless Steel, flapper	10° to 180°	-12° to 82°	N	N/A		4
(FB) 303 Stainless Steel with Buna-N seals	10° to 180°	-12° to 82°	N	/A	N/A	
(FK) Fluoroelastomer	–40° to 275°	–40° to 135°				
(FL) Flapper (SS)	–60° to 275°	–51° to 135°	1			
(GE) Graco Engineered Thermoplastic	–40° to 180°	-40° to 82°	10° to 180°	-12° to 82°		
(PO) PTFE/EPDM Overmolded	–40° to 180°	–40° to 82°	1		32° to 150°	0° to 66°
(PP) Polypropylene	32° to 175°	0° to 79°	32° to 175°	0° to 79°		
(PS) PTFE/Santo 2-piece	–40° to 180°	–40° to 82°	10° to 180°	-12° to 82°		
(PV) PVDF	10° to 225°	-12° to 107°				

Material of Wetted Contact	Fluid Temperat	luid Temperature Range by Wetted Section Material				
Section Parts (Seat, Check, Diaphragm)*	Metal (AL,Cl, CP, FG, HS, HT, PH, SS, 3A)*		Plastic (PV)*		Plastic (AC, CP, PP)*	
Diapinagin,	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
(SA) 17-4PH SST w/PTFE o-rings	-40° to 220°	–40° to 104°				
(SD) 440C Stainless Steel	–40° to 220°	–40° to 104°				
(SO) Santoprene Overmolded	–40° to 180°	–40° to 82°	10° to 180°	–12° to 82°	32° to 150°	0° to 66°
(SP) Santoprene	–40° to 180°	–40° to 82°				
(SS) 316 Stainless Steel	–60° to 275°	–51° to 135°				
(TP) TPE	–20° to 150°	–29° to 66°	10° to 150°	-12° to 66°	32° to 150°	0° to 66°

^{*} See Configuration Matrix, starting on page 9, for detailed descriptions.

Technical Specifications for i30 (QTC) Models

	US		Metric	
Maximum fluid working pressure	100 psi		6.89 bar, 0.69 MPa	a
Maximum free-flow delivery	30 gpm		114 lpm	
Maximum size pumpable solids	0.125 in.		3.2 mm	
Fluid flow*	0.08 gal/cycle		0.30 l/cycle	
Environmental temperature range	–4° to 104°F		–20° to 40°C	
Maximum operating altitude	9842 ft		3000 m	
IP rating, ordinary locations models			IP66	
IP rating, explosive atmospheres or hazardous (classified) locations models			IP66	
Electrical ratings				
	Rated Voltage	Phase	Hertz	Current
i30 (QTC) models, FC2/FE2 motor	200–240 V	1	50/60 Hz	10 A
i30 (QTC) models, FC4/FE4 motor	200–240 V	1	50/60 Hz	10 A
i30 (QTC) models, FC5/FE5 motor	100–120 V	1	50/60 Hz	12 A
i30 (QTC) models, FC6/FE6 motor	100–120 V	1	50/60 Hz	12 A
i30 (QTC) models, FC7/FE7 motor	380–480 V	3	50/60 Hz	5.3 A
i30 (QTC) models, FC8/FE8 motor	380–480 V	3	50/60 Hz	5.3 A
i30 (QTC) models, FC9/FE9 motor	380–480 V	3	50/60 Hz	5.3 A
i30 (QTC) models, FCA/FEA motor	380–480 V	3	50/60 Hz	5.3 A
Circuit Protection				
Maximum Branch Circuit Protection Rating	20A, Inverse Time	Circuit Breal	ker	
Short Circuit Current Rating	5 kA			
Materials of construction				
See Configuration Matrix, starting on page 9, for ma	aterials of construct	ion for your e	quipment model.	
Fluid inlet/outlet sizes				
Models with wetted section materials coded:				
AL, SS, HT	-	1 in. r	npt(f) or 1 in. bspt	
CP, PP, PV, SS with S51 connection	n		PN10 025–1 in.	
		AN	ISI 150 1 NPS	
Maximum suction lift*				
We	t 29.0 ft		8.8 m	
Dry	7.9 ft		2.4 m	
Noise (dBa)	,			
Maximum sound power (ISO-9614-2)		86 dBa a	at full power and flow	
Sound power measured 1.6 feet (0.5 meter) from equ	uipment.			
Weight				
Models with wetted section materials coded:				
AL	62 lb		28.1 kg	
SS	79 lb		35.8 kg	
HT	79 lb		35.8 kg	
CP, PF			27.7 kg	
	67 lb		30.4 kg	
Notes	<u> </u>			

Technical Specifications for i80 (QTD) Models

	US		Metric	
Maximum fluid working pressure	100 psi		6.89 bar, 0.69 MPa	a
Maximum free-flow delivery	80 gpm		300 lpm	
Maximum size pumpable solids	0.19 in.		4.8 mm	
Fluid flow*	0.42 gal/cycle		1.59 l/cycle	
Environmental temperature range	-4° to 104°F		-20° to 40°C	
Maximum operating altitude	9842 ft		3000 m	
IP rating, ordinary locations models			IP66	
IP rating, explosive atmospheres or hazardous (classified) locations models			IP66	
Electrical ratings				
	Rated Voltage	Phase	Hertz	Current
i80 (QTD) models, FC1/FE1 motor	200–240 V	3	50/60 Hz	7.5 A
i80 (QTD) models, FC2/FE2 motor	200–240 V	1	50/60 Hz	15 A
i80 (QTD) models, FC3/FE3 motor	200–240 V	3	50/60 Hz	7.5 A
i80 (QTD) models, FC4/FE4 motor	200–240 V	1	50/60 Hz	15 A
i80 (QTD) models, FC7/FE7 motor	380–480 V	3	50/60 Hz	5.3 A
i80 (QTD) models, FC8/FE8 motor	380–480 V	3	50/60 Hz	5.3 A
i80 (QTD) models, FC9/FE9 motor	380–480 V	3	50/60 Hz	5.3 A
i80 (QTD) models, FCA/FEA motor	380–480 V	3	50/60 Hz	5.3 A
Circuit Protection				
Maximum Branch Circuit Protection Rating	20A, Inverse Time	Circuit Breal	ker	
Short Circuit Current Rating	5 kA			
Materials of construction				
See Configuration Matrix , starting on page 9, for	materials of constructi	on for your e	quipment model.	
Fluid inlet/outlet sizes				
Models with wetted section materials coded:				
AL, S			npt(f) or 1.5 in. bspt	
CP, PP, I	PV		N10 040–1-1/2 in.	
Ma		ANS	I 150 1-1/2 NPS	
Maximum suction lift*	Vot 20.0 ft		0.0 m	
	Vet 29.0 ft Dry 19.3 ft		8.8 m 5.9 m	
Noise (dBa)	וויס ונ		J.8 III	
Maximum sound power (ISO-9614-2)		84 dBa at	full power and full flow	M
Sound power measured 1.6 feet (0.5 meter) from e	auinment	04 UDA Al	iuii powei and iuli ilov	v
Weight	чиртоп.			
Models with wetted section materials coded:				
	AL 71 lb		32.2 kg	
	SS 112 lb		50.8 kg	
	PP 75 lb		34.0 kg	
•	PV 85 lb		38.5 kg	
· · · · · · · · · · · · · · · · · · ·				

Technical Specifications for i120 (QTE) Ball Models

QUANTM i120 (QTE) Ball Pumps				
	US		Metric	
Maximum fluid working pressure	60 psi		4.1 bar, 0.41 MPa	
Maximum free-flow delivery	120 gpm		454 lpm	
Maximum size pumpable solids	0.25 in.		6.35 mm	
Fluid flow*	0.56 gal/cycle		2.12 l/cycle	
Environmental temperature range	-4° to 104°F		-20° to 40°C	
Maximum operating altitude	9842 ft		3000 m	
IP rating, Ordinary Locations models	00.12.10		IP66	
IP rating, Explosive Atmospheres or Hazardous			IP66	
(Classified) Locations models			00	
Electrical ratings				
	Rated Voltage	Phase	Hertz	Current
i120 (QTE) models, FC1/FE1 motor	200–240 V	3	50/60 Hz	7.5 A
i120 (QTE) models, FC2/FE2 motor	200–240 V	1	50/60 Hz	15 A
i120 (QTE) models, FC3/FE3 motor	200–240 V	3	50/60 Hz	7.5 A
i120 (QTE) models, FC4/FE4 motor	200–240 V	1	50/60 Hz	15 A
i120 (QTE) models, FC7/FE7 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FC8/FE8 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FC9/FE9 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FCA/FEA motor	380–480 V	3	50/60 Hz	5.3 A
Circuit Protection	300 100 1		00/00112	0.071
Maximum Branch Circuit Protection Rating	20A, Inverse Time	Circuit Breal	ker	
Short Circuit Current Rating	5 kA	on our Broak		
Materials of construction	0 10 1			
See Configuration Matrix , starting on page 9, for m	aterials of construct	ion for your e	quipment model	
Fluid inlet/outlet sizes			44.14	
Inlet/Outlet size for models with wetted section				
materials coded:				
AL, CI. S	3	2 in. r	npt(f) or 2 in. bspt	
CP, PP, PV, SS with S51 connection	า		PN16 050—2 in.	
		AN	ISI 150 2 NPS	
			JIS 10K 50	
Maximum suction lift*				
	t 29.0 ft		8.8 m	
	y 15.9 ft		4.8 m	
Noise (dBa)				
Maximum sound power (ISO-9614-2)		89 dBa at	full power and full flow	N
Sound power measured 1.6 feet (0.5 meter) from eq	uipment.			
Weight				
Models with wetted section materials coded:				
	_ 99 lb	·	44.9 kg	
	1 165 lb		74.8 kg	
	6 162 lb		73.5 kg	
•	100 lb		45.4 kg	
	/ 117 lb		53.0 kg	
Notes				
 May vary based on pump materials, suction cond 	lition, discharge hea	d, pressure, a	and fluid type.	

Technical Specifications for i120 (QTE) Flapper Models

QUANTM i120 (QTE) Flapper Pumps				
	US		Metric	
Maximum fluid working pressure	60 psi		4.1 bar, 0.41 MPa	
Maximum free-flow delivery	120 gpm		454 lpm	
Maximum size pumpable solids	1.8 in.		46 mm	
Fluid flow*	0.5 gal/cycle		1.9 l/cycle	
Environmental temperature range	-4° to 104°F		-20° to 40°C	
Maximum operating altitude	9842 ft		3000 m	
P rating, Ordinary Locations models				
IP rating, Explosive Atmospheres or Hazardous (Classified) Locations models		IP66 IP66		
Electrical ratings				
	Rated Voltage	Phase	Hertz	Current
120 (QTE) models, FC1/FE1 motor	200–240 V	3	50/60 Hz	7.5 A
120 (QTE) models, FC2/FE2 motor	200–240 V	1	50/60 Hz	15 A
120 (QTE) models, FC3/FE3 motor	200–240 V	3	50/60 Hz	7.5 A
i120 (QTE) models, FC4/FE4 motor	200–240 V	1	50/60 Hz	15 A
i120 (QTE) models, FC7/FE7 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FC8/FE8 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FC9/FE9 motor	380–480 V	3	50/60 Hz	5.3 A
i120 (QTE) models, FCA/FEA motor	380–480 V	3	50/60 Hz	5.3 A
Circuit Protection				
Maximum Branch Circuit Protection Rating	20A, Inverse Tim	e Circuit Breal	ker	
Short Circuit Current Rating	5 kA			
Materials of construction				
See Configuration Matrix, starting on page 9, for	r materials of construc	tion for your e	quipment model.	
Fluid inlet/outlet sizes				
Inlet/Outlet size for models with wetted section materials coded:				
	AL	2 in. r	npt(f) or 2 in. bspt	
Maximum suction lift*				
1	Wet 29.0 ft		8.8 m	
	Dry 15.9 ft		4.8 m	
Noise (dBa)				
Maximum sound power (ISO-9614-2)		89 dBa at	full power and full flow	v
Sound power measured 1.6 feet (0.5 meter) from	equipment.			
Weight				
Models with wetted section materials coded:				
	AL 117 lb		53.1 kg	
Notes				
* May vary based on pump materials, suction co	ondition, discharge he	ad, pressure, a	and fluid type.	

California Proposition 65

CALIFORNIA RESIDENTS

MARNING: 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 3A8572

Graco Headquarters: Minneapolis International Offices: Belgium, China, Japan, Korea

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