

# QUANTM<sup>TM</sup> Pumps, Hygienic Models

3A9286G

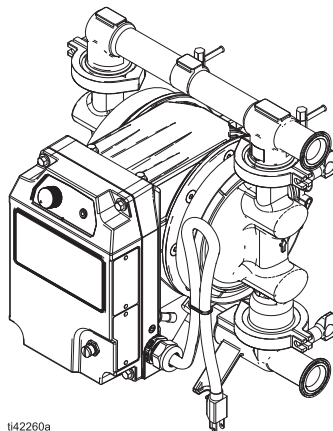
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*Electric-operated diaphragm (EODD) pumps with an integral electric drive for fluid transfer applications. For professional use only.*



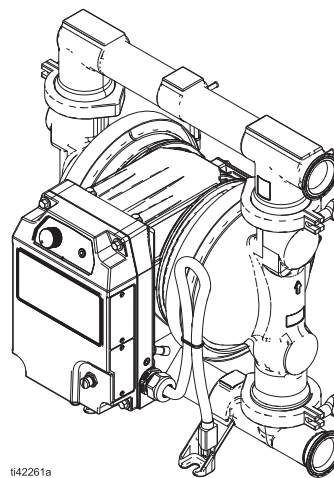
## Important Safety Instructions

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



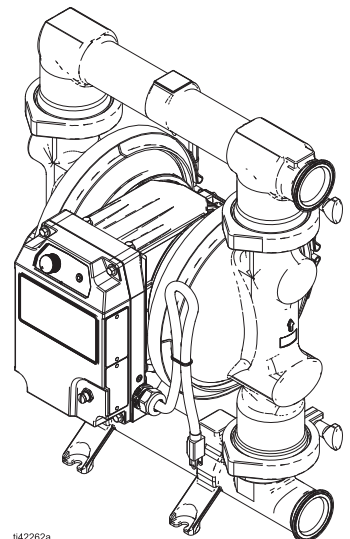
ti42260a

**h30 (QHC) Model**



ti42261a

**h80 (QHD) Model**



ti42262a

**h120 (QHE) Model**

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## Related Manuals

| English Manual Number | Description                                | Reference        |
|-----------------------|--|------------------|
| 3A7637                | QUANTM Electric Motor, Repair-Parts        | Motor Manual     |
| 3A9287                | QUANTM Pumps, Hygienic Models, Parts       | Parts Manual     |
| 3A8861                | QUANTM Leak Sensor, Instruction            | Kit Instructions |
| 3A8982                | QUANTM I/O Cable Kit (Hazardous Locations) | 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      |
|    | Electric Shock Hazard        |
|   | Entanglement Hazard          |
|  | Equipment Misuse Hazard      |
|  | Fire and Explosion Hazard    |
|  | Moving Parts Hazard          |
|  | Pressurized Equipment Hazard |
|  | Splash Hazard                |
|  | Toxic Fluid or Fumes Hazard  |

| Symbol  | Meaning                            |
|---|------------------------------------|
|    | Do Not Wipe with a Dry Cloth       |
|    | Eliminate Ignition Sources         |
|    | Follow Pressure Relief Procedure   |
|    | Ground Equipment                   |
|  | Read Manual                        |
|  | 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.

|   |  |
|---|--|
|  <b>DANGER</b>   |  |
|   | <p><b>SEVERE ELECTRIC SHOCK HAZARD</b></p> <p>This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.</p>  |
|   | <p><b>Explosive Atmospheres or Hazardous (Classified) Locations Models (hard wired for permanent connection):</b></p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> <li>• Turn off and disconnect all power before disconnecting any cables and before servicing equipment.</li> <li>• This equipment must be grounded. Connect only to grounded power source.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> <li>• Store indoors.</li> </ul> <p><b>Ordinary Locations Models (cord and plug connection):</b></p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> <li>• Turn off and disconnect power cord before servicing equipment.</li> <li>• Connect only to grounded electrical outlets.</li> <li>• Only use 3-wire extension cords for single-phase models. Only use 4-wire extension cords for 3-phase models.</li> <li>• Ensure ground prongs are intact on power and extension cords.</li> <li>• Store indoors.</li> <li>• Wait five minutes after disconnecting power cord before servicing.</li> </ul> |



# 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.
- **Stop operation immediately** if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.



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.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route 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.

|  <b>WARNING</b>  |  |
|---|--|
|     | <b>PLASTIC PARTS CLEANING SOLVENT HAZARD</b><br>Many cleaning solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage. <ul style="list-style-type: none"> <li>• Use only compatible solvents to clean plastic structural or pressure-containing parts.</li> <li>• See <b>Technical Specifications</b> in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.</li> </ul>  |
|    | <b>PRESSURIZED EQUIPMENT HAZARD</b><br>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury. <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check fluid lines and connections daily. Replace worn or damaged parts immediately.</li> </ul>  |
|    | <b>PRESSURIZED ALUMINUM PARTS HAZARD</b><br>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. <ul style="list-style-type: none"> <li>• Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.</li> <li>• Do not use chlorine bleach.</li> <li>• Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.</li> </ul> |
|     | <b>THERMAL EXPANSION HAZARD</b><br>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. <ul style="list-style-type: none"> <li>• Open a valve to relieve the fluid expansion during heating.</li> <li>• Replace fluid lines proactively at regular intervals based on your operating conditions.</li> </ul>   |
|     | <b>ENTANGLEMENT HAZARD</b><br>Rotating parts can cause serious injury. <ul style="list-style-type: none"> <li>• Keep clear of moving parts.</li> <li>• Do not operate equipment with protective guards or covers removed.</li> <li>• Do not wear loose clothing, jewelry or long hair while operating equipment.</li> <li>• Equipment can start without warning. Before checking, moving, or servicing equipment, follow the <b>Pressure Relief Procedure</b> and disconnect all power sources.</li> </ul>   |



# 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.

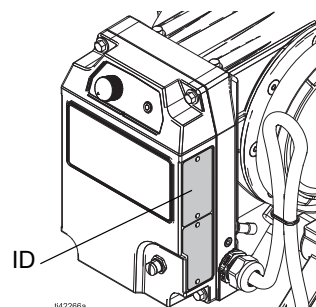


# Configuration Matrix

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:**



**Sample Configuration Sequence: QHC-FGFF1ACACBNBNA10021**

| Q     | H           | C     | FG                      | FF1   | AC            | AC             | BN                 | BN                     | A1         | 00      | 21                      |
|-------|-------------|-------|-------------------------|-------|---------------|----------------|--------------------|------------------------|------------|---------|-------------------------|
| Brand | Application | Model | Wetted Section Material | Motor | Seat Material | Check Material | Diaphragm Material | Manifold Seal Material | Connection | Options | Material Certifications |

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

| Brand |        | Application |              | Model |                     | Wetted Section Material |   |
|-------|--------|-------------|--------------|-------|---------------------|-------------------------|---|
| Q     | QUANTM | H           | Hygienic (h) | C     | 30 (1 in. port)     | FG                      | Food Grade, Stainless Steel, 125 micro finish (cast CF8M) |
|       |        |             |              | D     | 80 (1-1/2 in. port) | HS                      | Hygienic, Stainless Steel, 32 micro finish                |
|       |        |             |              | E     | 120 (2 in. port)    | PH                      | Pharmaceutical, Stainless Steel, 20 micro finish          |
|       |        |             |              | F     | 120 (3 in. port)    | 3A                      | 3-A Hygienic, Stainless Steel, 32 micro finish            |

## Motor - Hygienic Models

| Drive |                       | Coat                                      | Input Voltage | Phase        | Location                                   | Cord/Cable Termination  |
|-------|-----------------------|---|---------------|--------------|--|-------------------------|
| FF1   | Aluminum Direct Drive | Fluorinated ethylene propylene (FEP) coat | 200–240 V     | 3-Phase      | Hygienic, Ordinary Locations               | Cord with plug          |
| FF2   | Aluminum Direct Drive | FEP coat                                  | 200–240 V     | Single-Phase | Hygienic, Ordinary Locations               | Cord with plug          |
| FF3   | Aluminum Direct Drive | FEP coat                                  | 200–240 V     | 3-Phase      | Hygienic, Hazardous (Classified) Locations | Cable with flying leads |
| FF4   | Aluminum Direct Drive | FEP coat                                  | 200–240 V     | Single-Phase | Hygienic, Explosive Atmospheres            | Cable with flying leads |
| FF5   | Aluminum Direct Drive | FEP coat                                  | 100–120 V     | Single-Phase | Hygienic, Ordinary Locations               | Cord with plug          |
| FF6   | Aluminum Direct Drive | FEP coat                                  | 100–120 V     | Single-Phase | Hygienic, Hazardous (Classified) Locations | Cable with flying leads |






| Motor - Hygienic Models |                       |          |               |         |   |                         |
|-------------------------|-----------------------|----------|---------------|---------|---|-------------------------|
| Drive                   |                       | Coat     | Input Voltage | Phase   | Location  | Cord/Cable Termination  |
| <b>FF7</b>              | Aluminum Direct Drive | FEP coat | 380–480 V     | 3-Phase | Hygienic, Ordinary Locations (NA)               | Cable with flying leads |
| <b>FF8</b>              | Aluminum Direct Drive | FEP coat | 380–480 V     | 3-Phase | Hygienic, Ordinary Locations (WW)               | Cable with flying leads |
| <b>FF9</b>              | Aluminum Direct Drive | FEP coat | 380–480 V     | 3-Phase | Hygienic, Hazardous (Classified) Locations (NA) | Cable with flying leads |
| <b>FFA</b>              | Aluminum Direct Drive | FEP coat | 380–480 V     | 3-Phase | Hygienic, Explosive Atmospheres (WW)            | Cable with flying leads |

| Seat Material |                                   | Check Material |                                 | Diaphragm Material |                            | Manifold Seal Material |                 |
|---------------|-----------------------------------|----------------|---------------------------------|--------------------|----------------------------|------------------------|-----------------|
| <b>FL</b>     | Flapper, for hygienic models only | <b>BN</b>      | Buna-N, ball                    | <b>BN</b>          | Buna-N                     | --                     | None            |
| <b>SS</b>     | 316 Stainless Steel               | <b>CW</b>      | Polychloroprene, weighted, ball | <b>EO</b>          | EPDM Overmold              | <b>BN</b>              | Buna-N          |
|               |                                   | <b>EP</b>      | EPDM, ball                      | <b>FK</b>          | Fluoroelastomer            | <b>EP</b>              | EPDM            |
|               |                                   | <b>FK</b>      | Fluoroelastomer, ball           | <b>PO</b>          | PTFE/EPDM Overmold         | <b>FK</b>              | Fluoroelastomer |
|               |                                   | <b>FL</b>      | Flapper, Stainless Steel        | <b>PS</b>          | PTFE/Santoprene, two-piece | <b>PT</b>              | PTFE            |
|               |                                   | <b>PT</b>      | PTFE, ball                      | <b>SP</b>          | Santoprene                 |                        |                 |
|               |                                   | <b>SP</b>      | Santoprene, ball                |                    |                            |                        |                 |

| Connection |   | Options   |                  | Material Certifications |                   |
|------------|---|-----------|------------------|-------------------------|-------------------|
| <b>S13</b> | Stainless Steel, standard ports, hygienic clamp | <b>00</b> | Standard         | <b>21</b>               | EN 10204 type 2.1 |
| <b>S14</b> | Stainless Steel, standard ports, DIN            | <b>SF</b> | Sanitary Flapper | <b>31</b>               | EN 10204 type 3.1 |
| <b>SSA</b> | Center-ported tri-clamp                         |           |                  |                         |                   |
| <b>SSB</b> | Center-ported DIN                               |           |                  |                         |                   |
| <b>SSE</b> | Horizontal Wye Manifold Tri-Clamp               |           |                  |                         |                   |
| <b>SSG</b> | Horizontal No Manifold                          |           |                  |                         |                   |

| Motor Drive Selection            |                                  |                                      |   |
|----------------------------------|----------------------------------|--------------------------------------|---|
| Hygienic - North America         |                                  |                                      |   |
| Model                            | Ordinary Location<br>(NEMA Plug) | Hazardous Location<br>(Flying Leads) | Voltage range/phase count                   |
| h30 (QHC)                        | FF1, FF5                         | FF3, FF6                             | 200–240 V/3-Phase<br>100–120 V/Single-Phase |
| h80 (QHD)                        | FF1                              | FF3                                  | 200–240 V/3-Phase                           |
| h120 (QHE/QHF)                   | FF1                              | FF3                                  | 200–240 V/3-Phase                           |
| h30 (QHC), h80 (QHD), h120 (QHE) | FF7 (Flying leads)               | FF9                                  | 380–480 V/3-Phase                           |
| Hygienic - International         |                                  |                                      |   |
| Model                            | Ordinary Location<br>(IEC Plug)  | Hazardous Location<br>(Flying Leads) | Voltage range/phase count                   |
| h30 (QHC)                        | FF2                              | FF4                                  | 200–240 V/Single-Phase                      |
| h80 (QHD)                        | FF2                              | FF4                                  | 200–240 V/Single-Phase                      |
| h120 (QHE/QHF)                   | FF2                              | FF4                                  | 200–240 V/Single-Phase                      |
| h30 (QHC), h80 (QHD), h120 (QHE) | FF8 (Flying leads)               | FFA                                  | 380–480 V/3-Phase                           |

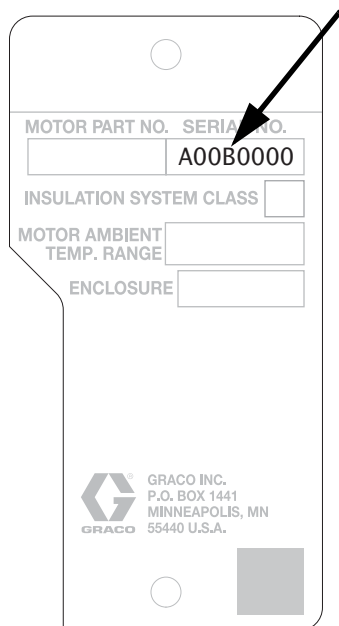
# Approvals

| Model Information*   | Approvals  |
|--|--|
| Motors   | For motor approvals, see related motor manual. See <b>Related Manuals</b> , page 3.  |
| Pump models with motor code FF2, FF8   |   |
| Pump models with motor code FF4, FFA   | <br> <b>II 2 G</b><br><b>Ex db h IIB T4 Gb</b><br>NOTE: Type of Protection “h” applied is constructional safety “c.” |
| Hygienic (QH) models with diaphragm materials coded EO, PO, or PS combined with EP, PT, or FL checks comply with:                        |  EC 1935/2004<br> Class VI  |
| Wetted contact section materials in Hygienic (QH) models are FDA-compliant and meet the United States Code of Federal Regulations (CFR). |  |

\* See **Configuration Matrix**, starting on page 9, for detailed descriptions.

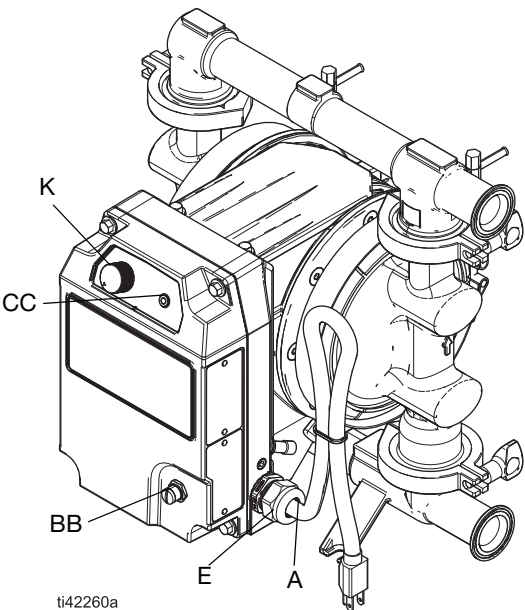
# Motor Module Series

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.



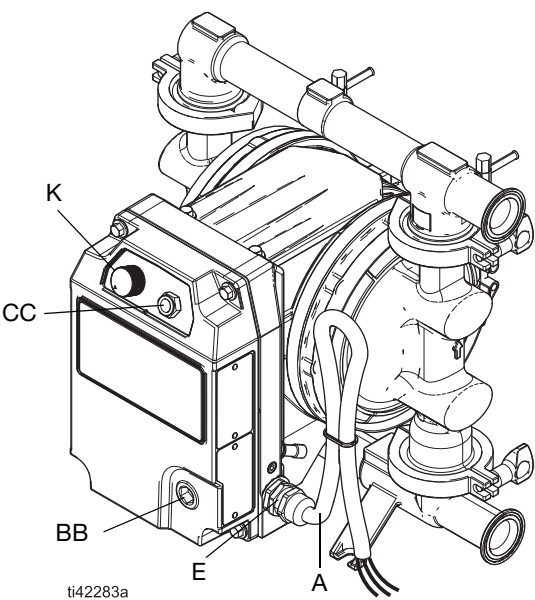
**FIG. 1: Motor module serial number location**

# Component Identification




**FIG. 2: Ordinary Locations Model (h30 (QHC) 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 (h30 (QHC) 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  |
|------|--|--|---|
| A    | Power Cord/Cable                         | 15 ft (4.6 m) cord with plug*  | 15 ft (4.6 m) cable for hard-wiring†                              |
| BB   | I/O Port/Cable                           | M12, 5-pin connector**   | Cable (not supplied) for direct wiring to user-provided controls‡ |
|      | On/Off Control, Digital Input            |  |   |
|      | Run Status, Digital Output               |  |   |
|      | Speed and Pressure Control, Analog Input |  |   |
| CC   | LED Indicator♦                           | Standard   | Reinforced  |
| E    | External Ground Fastener, Ground Symbol  | The equipment is marked per IEC 417, Symbol 5019: <div></div> |   |
| K    | Control Knob                             | Turn clockwise (right) to increase fluid output  |   |

\* See **Required Power and Plugs**, page 21.

\*\* See **I/O Pin Connection**, page 26.

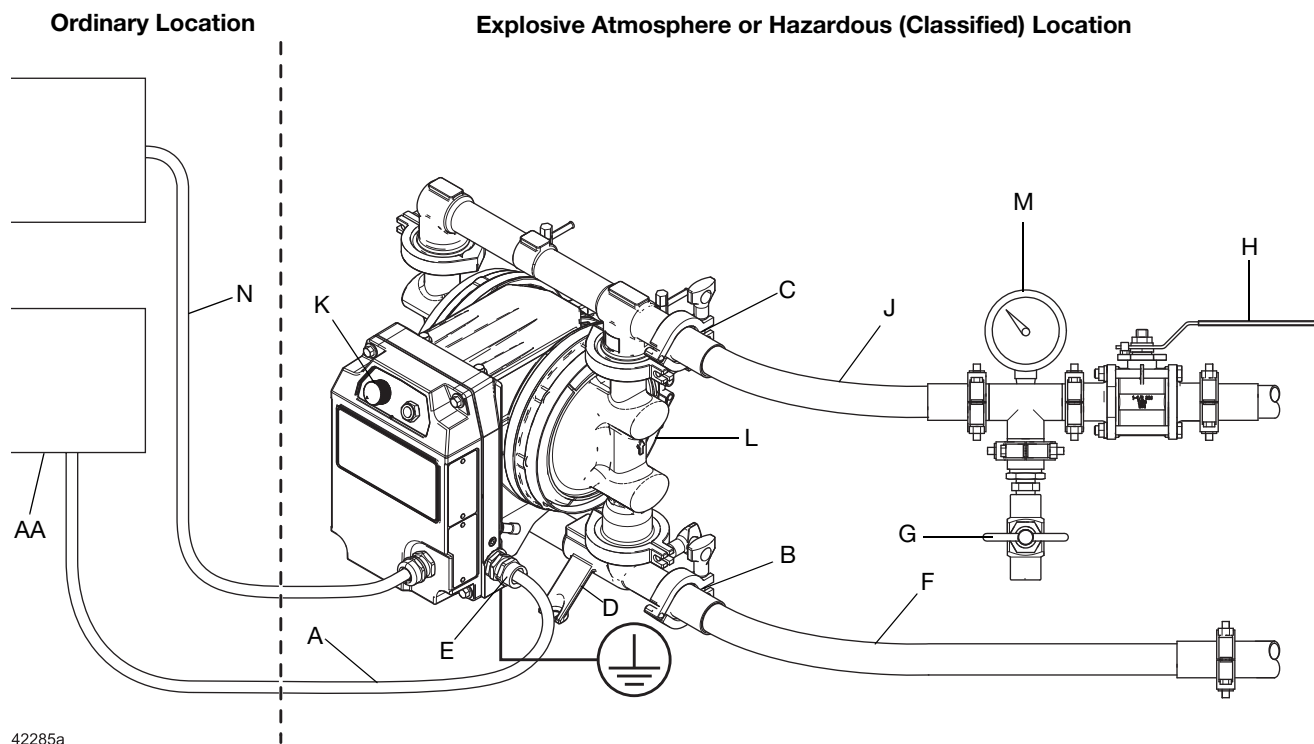
† See **Wire Power Cables**, page 23, and **Requirements for Cables and Conduits**, page 24.

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

♦ See **LED Indicator**, page 33.

## 3A9286G

## Typical Installation for 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) (h30 (QHC) model shown)**

### Pump Components

- A** ♦ Power cable
- B** Fluid inlet port
- C** Fluid outlet port
- D** Mounting feet
- E** Ground fastener
- K** Fluid output control knob
- L** ▼ 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

\* Required, not supplied.

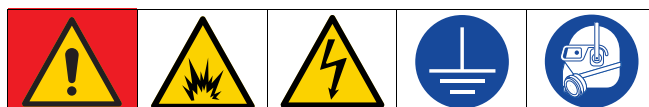
† I/O cable kits are available (purchase separately). See **Related Manuals**, page 3.

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

▼ See **Install Leak Sensor Hoses and Fittings**, page 18, or **Install Fluid Leak Line Accessories**, page 18.



# 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.

## Mount the Pump



The pump may be very heavy (see **Technical Specifications**, starting on page 69, 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. 6.

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. 6. See **Dimensions**, starting on page 58.

**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.

## NOTICE

To avoid pump damage, mount the pump to the mounting surface using fasteners through each hole of the feet. See FIG. 6.

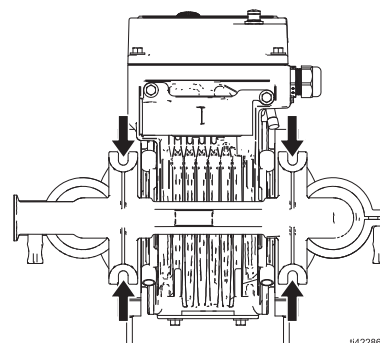


FIG. 6: Mounting Holes

## 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 69, 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 drain 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 18.

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).
2. 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.

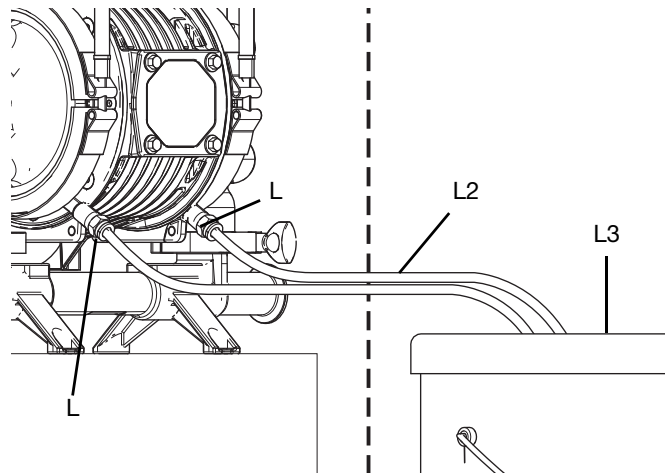


FIG. 7: Typical Installation of Fluid Leak Lines (Ordinary Locations)

## Grounding

|   |  |  |  |  |
|---|--|--|--|--|
|   |  |  |  |  |
| <p><b>DANGER</b><br/> <b>SEVERE ELECTRIC SHOCK HAZARD</b></p> <p>This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Turn off and disconnect power before servicing or repairing equipment.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> </ul> <p>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.</p> <ul style="list-style-type: none"> <li>• Always ground the entire fluid system as described in this section.</li> <li>• Follow local codes and regulations.</li> </ul> |  |  |  |  |

Before operating the equipment, ground the system as follows.

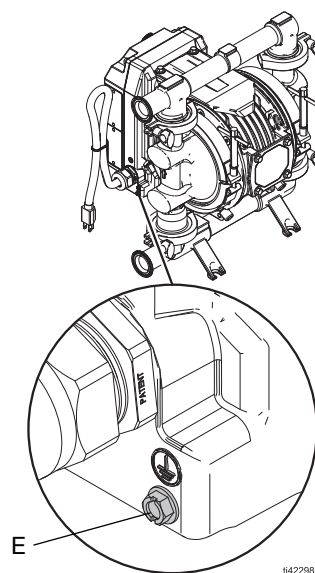
### Ground the Pump

#### Connect a Static Ground

See FIG. 8.

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. 8: 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**, page 21.

**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 Compatible 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 tighten all fasteners.

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

#### NOTICE

To avoid pump damage, do not over-tighten 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 37.

The equipment was tested using a food grade lubricant. If a food grade lubricant could contaminate the fluid being dispensed, flush the equipment thoroughly with a compatible sanitizing solution before first use.





# Electrical Connections and Wiring

## Required Power and Plugs

|   |   |   |   |  |
|---|---|---|---|--|
|    |  |  |  |  |
| <p><b>DANGER</b><br/><b>SEVERE ELECTRIC SHOCK HAZARD</b></p> <p>This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.</p> <ul style="list-style-type: none"><li>• Turn off and disconnect power before servicing or repairing equipment.</li><li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li></ul> |   |   |   |  |

**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         |                           |  |                    |                    |          |         |                                 |   |
|----------------------------------|---------------------------|--|--------------------|--------------------|----------|---------|---------------------------------|---|
| Location                         | Motor Configuration Code* | Model                                  | Power Requirements |                    |          |         | Cord/Cable Termination          | Plug  |
|                                  |                           |  | Input Voltage      | Phase <sup>‡</sup> | Hertz    | Current |                                 |   |
| Ordinary Locations               | FF1                       | h30 (QUC),<br>h80 (QHD),<br>h120 (QHE) | 200–240 V          | 3                  | 50/60 Hz | 7.5 A   | NEMA L15-20 Plug                |  |
|                                  | FF2                       | h30 (QHC)                              | 200–240 V          | 1                  | 50/60 Hz | 10 A    | IEC 60320-C14 Plug <sup>♦</sup> |  |
|                                  |                           | h80 (QHD),<br>h120 (QHE)               | 200–240 V          | 1                  | 50/60 Hz | 15 A    | IEC 60320-C20 Plug <sup>♦</sup> |  |
|                                  | FF5                       | h30 (QHC)                              | 100–120 V          | 1                  | 50/60 Hz | 12 A    | NEMA 5-15 Plug                  |  |
|                                  | FF7                       | All                                    | 380–480 V          | 3                  | 50/60 Hz | 5.3 A   | Flying Leads, see Fig. 11       | N/A <sup>■</sup>  |
|                                  | FF8                       | All                                    | 380–480 V          | 3                  | 50/60 Hz | 5.3 A   | Flying Leads, see Fig. 11       |   |
| Hazardous (Classified) Locations | FF3                       | h30 (QHC),<br>h80 (QHD),<br>h120 (QHE) | 200–240 V          | 3                  | 50/60 Hz | 7.5 A   | Flying Leads, see Fig. 11       |   |
|                                  | FF6                       | h30 (QHC)                              | 100–120 V          | 1                  | 50/60 Hz | 12 A    | Flying Leads, see Fig. 10       |   |
|                                  | FF9                       | All                                    | 380–480 V          | 3                  | 50/60 Hz | 5.3 A   | Flying Leads, see Fig. 11       |   |
| Explosive Atmospheres            | FF4                       | h30 (QHC)                              | 200–240 V          | 1                  | 50/60 Hz | 10 A    | Flying Leads, see Fig. 10       | N/A <sup>■</sup>  |
|                                  |                           | h80 (QHD),<br>h120 (QHE)               | 200–240 V          | 1                  | 50/60 Hz | 15 A    |                                 |   |
|                                  | FFA                       | All                                    | 380–480 V          | 3                  | 50/60 Hz | 5.3 A   | Flying Leads, see Fig. 11       |   |


\* See **Configuration Matrix**, starting on page 9, for detailed descriptions.

<sup>‡</sup> Connect to a circuit with a main electrical disconnect. Install a branch circuit protective device in each ungrounded phase. Follow local codes and regulations.

■ See **Wire Power Cables**, page 23.

♦ Adapters are available (purchase separately). See **Adapters for Plugs and Cables**, page 25.

## 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 <sup>2</sup> |
|-----------------|--------|-----------------|
| 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. 9.

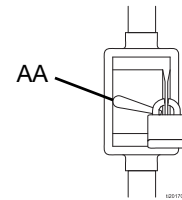


FIG. 9: Electrical Disconnect

## Wire Single-Phase Models

For models with flying leads, see FIG. 10. Make wire connections as follows:

| Motors | L1    | L2/Neutral | Ground                |
|--------|-------|------------|-----------------------|
| FF6    | Black | White      | Green                 |
| FF4    | Brown | Blue       | Green w/Yellow Stripe |

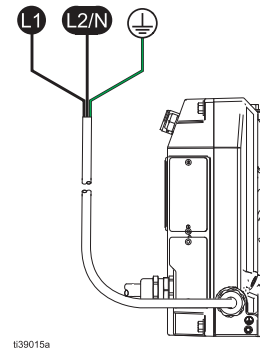


FIG. 10: Wiring for Single-Phase Models

Wire 3-Phase Models

For models with flying leads, see FIG. 11.

Make wire connections as follows:

| Motors        | L1    | L2    | L3   | Ground                |
|---------------|-------|-------|------|-----------------------|
| FF3, FF7, FF9 | Black | White | Red  | Green                 |
| FF8, FFA      | Brown | Black | Grey | Green w/Yellow Stripe |

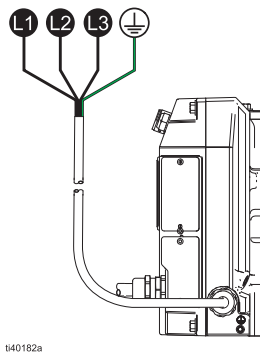



FIG. 11: Wiring for 3-Phase Models

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



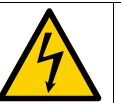

Use appropriate conduits, connectors, and cable glands rated for Ex II 2 G. Follow all national, state, and local electric codes and regulations.

**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**

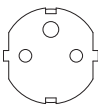





This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.

- 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).

| 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 |

| Plug Adapters    |  |           |   |
|------------------|--|-----------|---|
| Region           | Part                                       |           | Plug Adapter  |
|                  | C14 Plugs                                  | C20 Plugs |   |
| Europe           | 242001                                     | 15G958    |  |
| Australia, China | 242005                                     | 17A242    |  |
| Italy            | ---  | 15G959    |  |
| Italy            | 287121<br>Kit contains all three C14 Plugs | ---       |  |
| Switzerland      |  | 15G961    |  |
| Denmark          |  | ---       |  |

| Plug Retainer Clips |        |
|---------------------|--------|
| Plug                | Part   |
| C14 Plugs           | 195551 |
| C20 Plugs           | 121249 |

## I/O Pin Connection

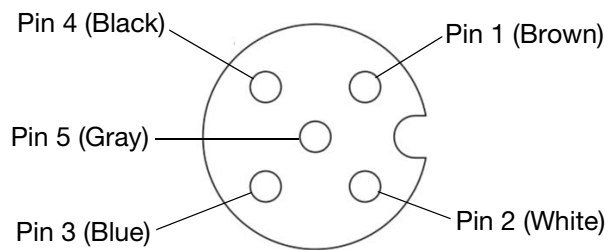
|   |   |   |   |  |
|---|---|---|---|--|
|    |  |  |  |  |
| <p><b>DANGER</b><br/> <b>SEVERE ELECTRIC SHOCK HAZARD</b></p> <p>This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Turn off and disconnect power before servicing or repairing equipment.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> </ul> |   |   |   |  |

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 28.

| I/O Connector Pinout (for Models in Ordinary Locations only) |                                       |  |
|--|---------------------------------------|--|
| Pin  | Connector Type                        | Description  |
| Pin 1<br>(Brown)   | Digital Input                         | 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<br>(White)   | Digital Output<br>(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<br>(Blue)  | GND/Common                            | Earth ground, common connection.   |
| Pin 4<br>(Black)   | Analog Input, Positive                | <p>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 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).</p> <p>To disable the analog input control and enable the control knob (K):</p> <ol style="list-style-type: none"> <li>1. Shut down the equipment. See <b>Shut Down the Equipment</b>, page 32. Ensure the LED indicator is off (no light).</li> <li>2. Disconnect power to the system.</li> <li>3. Disconnect the analog input (Pin 4, Pin 5).</li> <li>4. Connect the unit to a power source to turn on the equipment and enable the control knob (K) on the equipment.</li> </ol> |
| Pin 5<br>(Gray)  | Analog Input, Negative                |  |



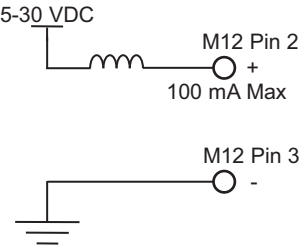
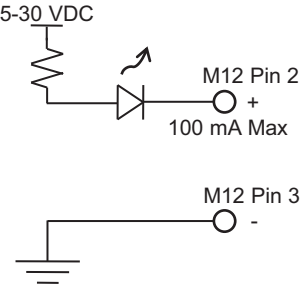
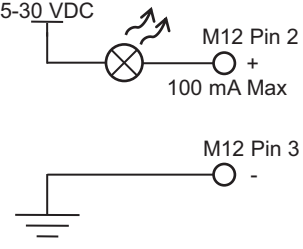
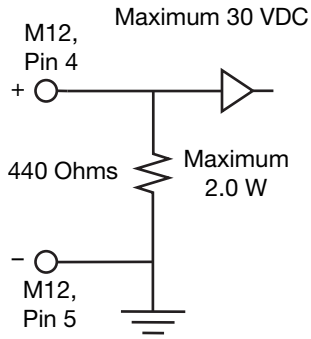
**FIG. 12: M12, 5-pin Connector for Models in Ordinary Locations**

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 Input   | <p>5 VDC</p> <p>4.7 Kiloohms</p> <p>M12, Pin 1</p> <p>+</p> <p>Logic:</p> <p>Low (Run) &lt; 2.0 V</p> <p>High (Stop) &gt; 3.0 V</p> <p>Maximum 30 VDC</p> <p>M12, Pin 3</p> |
|   | Compatible Drivers for Digital Input  |
|   | Switch or Relay   |
|   | Open Collector (NPN)  |
|   | Push-Pull Driver  |

| Equivalent Electrical Circuits for I/O Pin Connection (for Models in Ordinary Locations only) |  |
|---|--|
| I/O Circuit   | Equivalent Circuit   |
| Digital Output  | <p>M12, Pin 2</p> <p>+</p> <p>Maximum 30 VDC, Maximum 100 mA</p> <p>M12, Pin 3</p> <p>Logic:</p> <p>Pump Running: Active</p> <p>Pump Stopped: Inactive</p> |
|   | Compatible Digital Output Circuit Drivers  |
|   | <p>5-30 VDC</p> <p>PLC With Internal Pull-up</p> <p>M12 Pin 2 +</p> <p>100 mA Max</p> <p>M12 Pin 3 -</p>   |
|   | <p>5-30 VDC</p> <p>PLC without Internal Pull-up</p> <p>M12 Pin 2 +</p> <p>100 mA Max</p> <p>M12 Pin 3 -</p>  |

| Equivalent Electrical Circuits for I/O Pin Connection (for Models in Ordinary Locations only) |  |
|---|--|
| I/O Circuit   | Equivalent Circuit   |
| Digital Output  | <p>Relay or Solenoid</p>  |
|   | <p>LED</p>                |
|   | <p>Lamp</p>             |
| Analog Input  | <p>Maximum 30 VDC</p>   |

# 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.

1. Turn the fluid output control knob (K) to off (O) and disconnect power to the system.
2. Close the fluid shutoff valve (H).
3. 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.

#### NOTICE

To avoid pump damage, do not over-tighten 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 sanitizing solution.

To simply flush the equipment with a compatible sanitizing solution, follow **Start the Equipment**, page 30, and **Flush the Equipment**, page 37.

To disassemble and clean individual parts, see the applicable repair procedure. See **Repair**, starting on page 42.

## Start the Equipment



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

## Prepare the Equipment for Startup

1. Turn the control knob (K) to off (O).
2. Confirm that the equipment is properly grounded. See **Grounding**, page 19.
3. 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 30.
2. Connect the equipment to a power source. See **Electrical Connections and Wiring**, starting on page 21.

**NOTE:** 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. After the alert beep sounds, allow the equipment to complete the startup sequence. See **LED Indicator Overview**, page 33.

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.

- 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 54.

3. **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.

## 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:

1. **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.

## Select Control Mode

- **Flow Control Mode** is enabled by default (Series C motor modules or later). 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. This is the permanent mode and cannot be changed for Series B or earlier motor modules.

To identify the Series of the motor module, see **Motor Module Series**, page 13.

To select the Control Mode:

1. 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 control mode switch (1-CM). See FIG. 14.
- NOTE:** In motor module Series B and earlier, switch 1-CM controls the leak sensor. For details, see an earlier revision of this Instruction Manual.
4. Select the control mode:
  - a. For Pressure Control Mode, push the switch 1-CM to the right (on) position.
  - b. For Flow Control Mode, push the switch 1-CM to the left (off) position.
5. Follow **Install the Control Cover** in the control cover repair procedures in the motor manual.

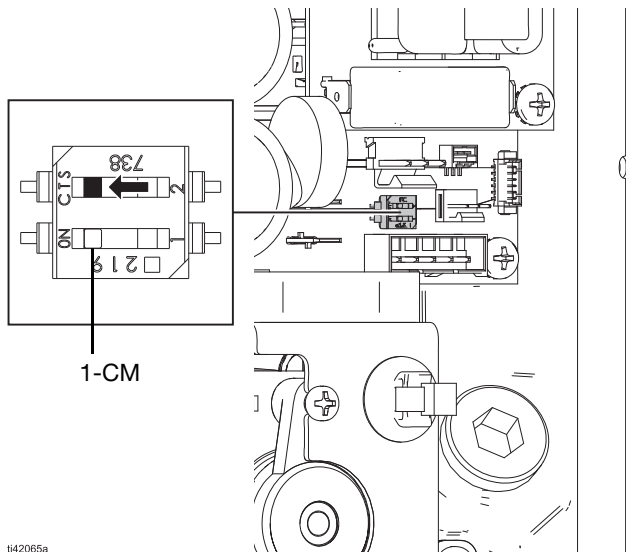


FIG. 13: Control Mode Switch

## 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:

1. 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). See FIG. 14 or **Electrical Schematics** in the motor manual.
4. Push the auto-prime switch (2-AP) to the left (off) position.
5. Follow **Install the Control Cover** in the control cover repair procedures in the motor manual.

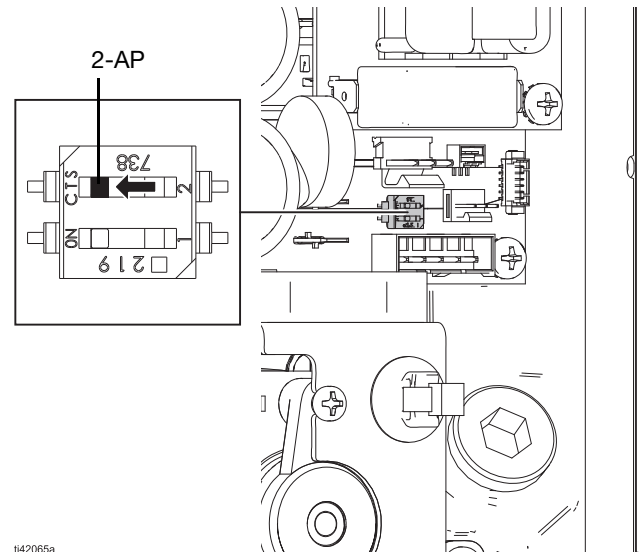


FIG. 14: Auto-Prime Switch

## Shut Down the Equipment



1. Follow **Pressure Relief Procedure**, page 30.
2. Follow **Flush the Equipment**, page 37.

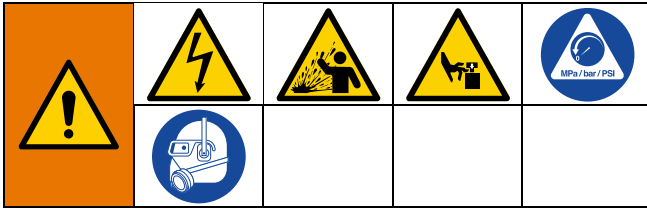


# LED Indicator

## 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.<br>To initiate equipment operation, follow <b>Start the Equipment</b> , page 30.  |
| 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 <b>Wire Power Cables</b> , page 23.  |
| Red, flashing    | Motor fault, motor error.                                | See <b>LED Indicator Event Errors</b> , page 34.  |
| Yellow, solid    | Calibrating. Performing startup sequence.                | No action. Allow equipment to finish startup sequence.<br><br>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” in <b>LED Indicator Event Errors</b> , page 35.   |
| Green, solid     | Startup sequence complete.                               | To initiate equipment operation, follow <b>Start the Equipment</b> , page 30.   |
|                  | Normal operation.  | No action.  |
| Green, flashing  | Normal operation, stalled against pressure.              | Be aware that the equipment is energized.<br><br>Special-case action. See <b>LED Indicator Event Errors</b> , page 34.  |
| No light (off)   | System not powered.                                      | See <b>LED Indicator Event Errors</b> , page 34.  |

## 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 30, 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 <b>Related Manuals</b> , page 3.  |
| Red, flashing, two flashes   | Motor current error.                   | Special-case cause.  | Turn control knob down, the back up. If the problem persists, contact Technical Support.  |
| Red, flashing, three flashes | Voltage error or pump priming failure. | Input voltage is too high, too low, or too noisy, or an operational parameter of the motor was exceeded while priming. | Check line power voltage.   |
|                              |  |  | Check control board connections. See related motor manual. See <b>Related Manuals</b> , 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  | Motor sensor error.                    | Motor sensor disconnected.   | Ensure the motor sensor cable is properly installed. See related motor manual. See <b>Related Manuals</b> , page 3.   |
|                              |  | Motor sensor not functioning.  | Replace the motor sensor. See related motor manual. See <b>Related Manuals</b> , 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 <b>Related Manuals</b> , page 3. |
| Red, flashing, eight flashes       | FF7, FF8, FF9, FFA 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 <b>Related Manuals</b> , page 3.  |
| Dim red, solid                     | Voltage detection error.                           | Power disconnected.  | Check power connection.   |
|                                    |  | 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 <b>Related Manuals</b> , page 3.  |
| Green, flashing, continuous flash  | Equipment stalled against pressure.                | A valve downstream in the fluid line is closed or clogged.                                   | Open the valve.   |
|                                    |  |  | Follow the <b>Pressure Relief Procedure</b> , page 30, and clear the valve.   |
|                                    |  | Special-case cause.  | Be aware that the equipment is energized. Special-case action. See related motor manual. See <b>Related Manuals</b> , page 3.   |
|                                    |  |  | Contact Technical Support.  |

| LED Indicator Event Errors |                          |                     |   |
|----------------------------|--------------------------|---------------------|---|
| LED Indicator              | Problem                  | Cause               | Solution  |
| No light (off)             | Voltage detection error. | System not powered. | Check power connection.   |
|                            |                          | Control failure.    | Check the branch circuit for proper voltage.  |
|                            |                          |                     | Replace the control board. See related motor manual. See <b>Related Manuals</b> , 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 tighten all fasteners.

### NOTICE

To avoid pump damage, do not over-tighten 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

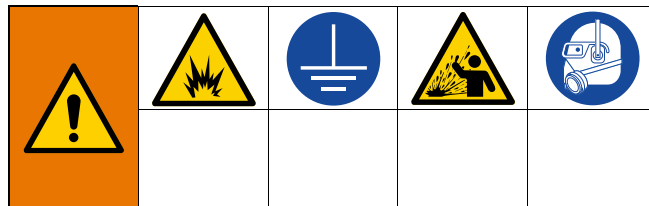
The equipment is lubricated at the factory. Re-lubricate the equipment when replacing diaphragms.

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 30.
  2. Insert the suction end of the fluid supply line (F) into a compatible sanitizing solution.
  3. Close the fluid drain valve (G).
  4. Ensure the control knob (K) is turned to off (0).
  5. 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 21.
  8. 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 30.

## 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 30.
2. Follow **Flush the Equipment**, page 37.

### 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



Routinely clean the wetted section. Determine whether or not to disassemble equipment for cleaning.

- To clean the equipment without disassembling parts, follow **Clean In-Place (CIP)**, page 38.
- To clean the equipment by disassembling parts, follow **Clean Out-of-Place (COP)**, page 38.

Clean in accordance with applicable sanitary standard codes and local regulations.

### 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 69.

1. Follow **Pressure Relief Procedure**, page 30.
2. Flush the equipment with a compatible sanitizing solution. Follow **Flush the Equipment**, page 37.
3. Circulate the compatible sanitizing solution through the equipment. Slowly cycle the equipment as the compatible sanitizing solution is circulated.

**NOTE:** Thoroughly circulate the compatible sanitizing solution 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 30.

### Clean Out-of-Place (COP)

1. Follow **Pressure Relief Procedure**, page 30.
2. Flush the equipment with a compatible sanitizing solution. Follow **Flush the Equipment**, page 37.
3. Disassemble parts as needed. See **Repair**, starting on page 42.
4. Inspect parts for wear or damage. Replace as needed.
5. Using a brush or other COP methods, wash all wetted parts with a compatible sanitizing solution 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. Immerse all wetted parts in an approved sanitizer before assembly. Leave the parts in the sanitizer, and only remove the parts one by one as needed for assembly.
9. Reassemble the equipment as needed. See **Repair**, starting on page 42.
10. Flush the equipment with a compatible sanitizing solution. Follow **Flush the Equipment**, page 37.
11. Circulate the compatible sanitizing solution through the equipment. Slowly cycle the equipment as the compatible sanitizing solution is circulated.

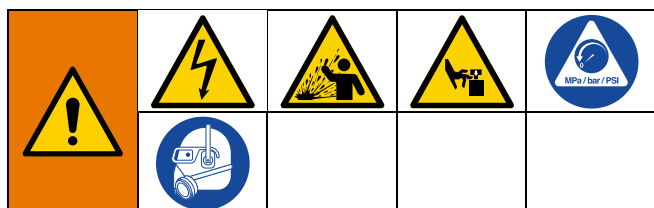
**NOTE:** Thoroughly circulate the compatible sanitizing solution through the equipment and the system prior to use.

### NOTICE

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

12. Follow **Pressure Relief Procedure**, page 30.

# Troubleshooting



Follow the **Pressure Relief Procedure**, page 30, 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) position. | Turn the control knob (K) to the off (0) position or disconnect power to the system.  |
|  |  | If prepared to operate, allow the pump to complete the automatic startup sequence.  |
| LED light flashing   | Equipment error; special-case cause.   | See <b>LED Indicator Event Errors</b> , page 34.  |
| Equipment cycles, but does not prime or pump (It is normal operation for auto-prime to run and then stop once the pump is primed). | Equipment running too fast, causing cavitation before prime.   | Slow down the motor speed.  |
|  | 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.<br><br>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 fluid pressure at stall  | Worn check, seats, or seals.   | Replace.  |
|  | Loose manifold connections or fluid connections.   | Tighten.  |
|  | Loose diaphragm shaft fastener.  | Tighten.  |
| Equipment leaking fluid externally from joints <sup>‡</sup>  | Loose manifold connections or fluid cover connections.   | Tighten.  |
|  | Worn manifold seats or seals.  | Replace.  |

| Problem  | Cause  | Solution  |
|--|--|---|
| Equipment leaks fluid externally from the joint between the center manifold and manifold. (Flapper pumps only) | Worn or damaged gaskets (53).  | Replace gaskets (53), see <b>Reassemble the Check Valves</b> , page 47.   |
|  | Gasket (53) not installed properly.<br><br>Manifold (5 or 4) not fully installed at joint to the center manifold (54). | Thoroughly grease the gasket (53) and the inner diameter of the manifold (5 or 4) before assembling manifold.<br><br>Ensure the gasket (53) is fully installed on the outer diameter of the center manifold (54).<br><br>Ensure the manifold (5 or 4) is properly aligned to the equipment.<br><br>Ensure the center manifold (54) and manifold (5 or 4) are fully connected at the joint.<br><br>See <b>Reassemble the Check Valves</b> , page 47. |
| Equipment stalled, will not cycle  | Fluid line clogged or valves closed.   | Inspect; clear.<br><br>Open valves downstream of the equipment.   |
|  | Motor or controller wired improperly.  | Wire per instructions in related motor manual. See <b>Related Manuals</b> , 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 ports on the equipment or fluid on the floor.   | Loose diaphragm shaft fastener.  | Tighten.  |
|  | 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. <b>Select Control Mode</b> , page 31.   |



| 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 <b>LED Indicator Event Errors</b> , page 34, 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 42, before performing any service or repair to the equipment.

1. Follow **Pressure Relief Procedure**, page 30.
2. Follow **Flush the Equipment**, page 37.
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). 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. 15.
  - a. Loosen the four bolts that hold the logo plate (if present) to the pump.
  - b. Slide the bracket stand behind the bolts.
  - c. Tighten the bolts.

## 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.

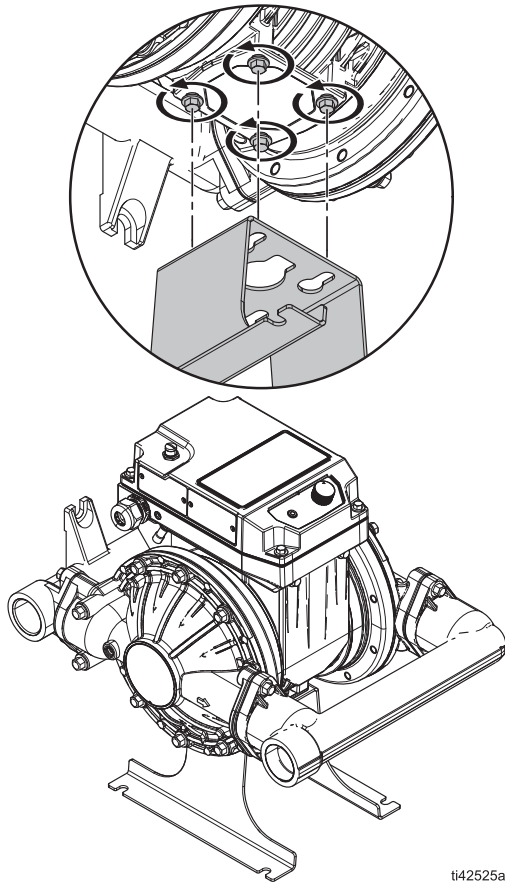
- Turn off and disconnect power before servicing or repairing equipment.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.



**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.

- d. After repairing the pump, remove the pump from the bracket stand and return it to service.



ti42525a

**FIG. 15. Maintenance bracket stand**

# Repair the Check Valves (Ball Pumps)

## Disassemble the Check Valves



1. Follow **Prepare Equipment for Repair**, page 42.
2. Drain the equipment.

**For equipment with a rotating stand:** Remove the quick-release pins (29b) and rotate the equipment to drain. See FIG. 16.

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

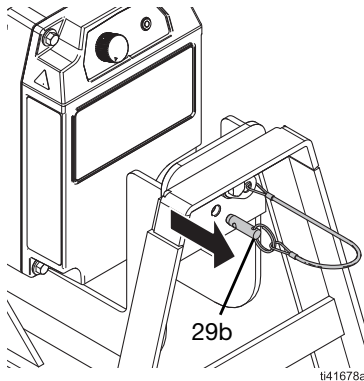


FIG. 16: Quick Release Pin, Rotating Stand

3. On the outlet manifold (4), remove all clamps (7a).
4. Remove the outlet manifold (4), seals (10, if applicable), checks (9 or 9c), and seats (8, if applicable).

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


5. On the inlet manifold (5), remove all clamps (7a).
6. Remove the inlet manifold (5), seals (10, if applicable), checks (9 or 9c), and seats (8, if applicable).

**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

1. Align and place seats (8, if applicable), checks (9 or 9c), seals (10, if applicable), and manifolds (4, 5), exactly as shown for your equipment model. See related parts manual. See **Related Manuals**, page 3.
2. Use the clamps (7a) to loosely attach the manifolds (4, 5) to the fluid covers (3). After all components are properly aligned, securely tighten the clamps (7a).

 Lubricate clamps (7a) and seals (10) with a waterproof, sanitary lubricant.

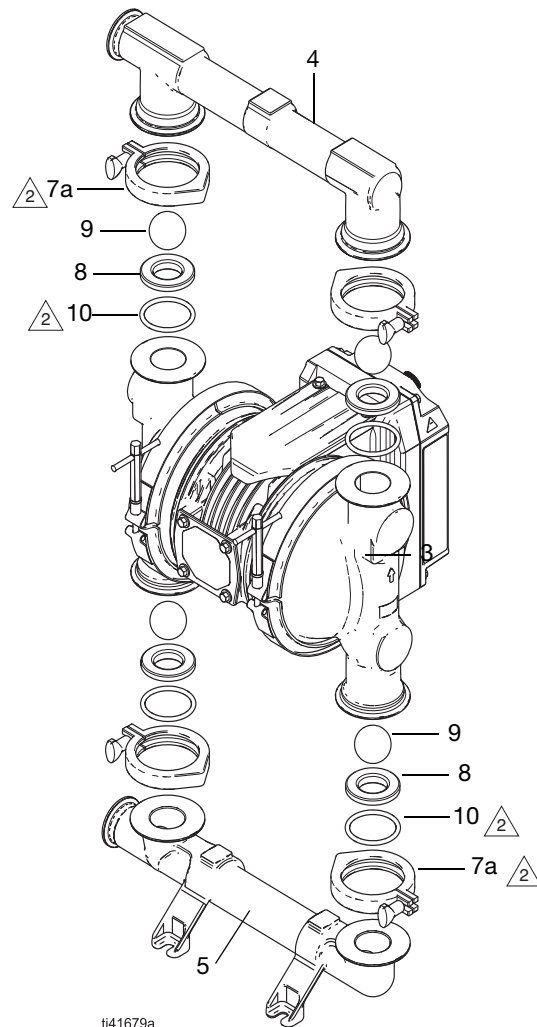


FIG. 17. Check Valves (FG Ball Pumps)

- 1 Lubricate clamps (7a) and seals (10) with a waterproof, sanitary lubricant.

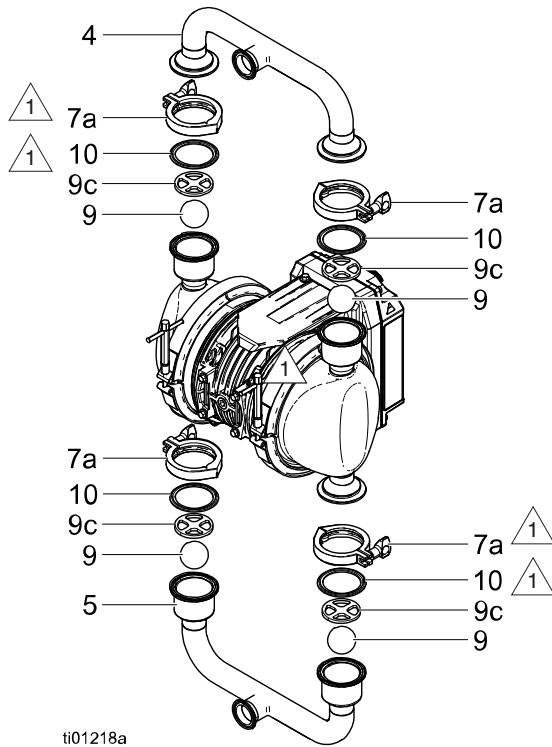


FIG. 18: Check Valves (HS Ball Pumps)

## Repair the Check Valves (Flapper Pumps)

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

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 42.
2. Drain the equipment.

**For equipment with a rotating stand:** Remove the quick-release pins (29b) and rotate the equipment to drain. See FIG. 16.

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

3. Remove the clamps (7a) on the outlet manifold and remove the manifold (4), see FIG. 19, or remove manifold (4) assembly, see FIG. 20.
4. Remove remaining clamps, manifolds, gaskets and check valves.
5. Remove gaskets and check valves, disassembling the manifold assemblies as necessary.

**NOTE:** Inspect all components for any damage and replace as necessary.

6. To continue with diaphragm disassembly, see **Repair the Standard Diaphragms**, page 47.

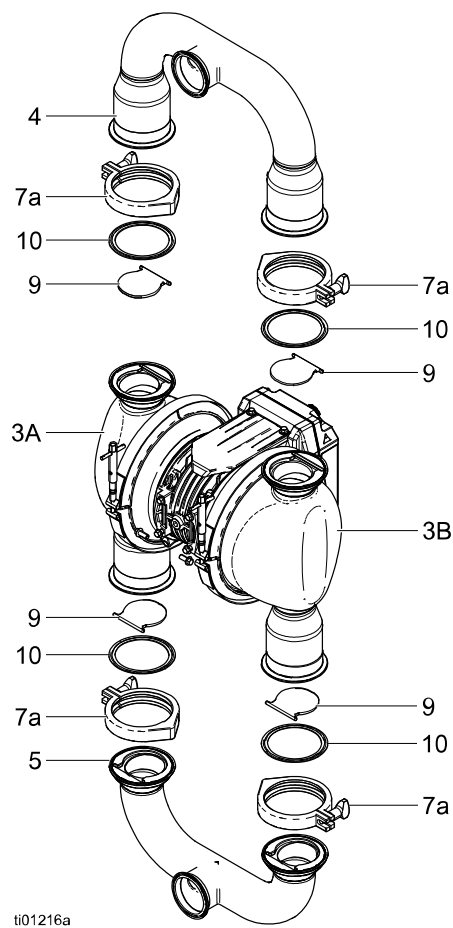


FIG. 19. Check Valves (Vertical Flapper Pump)

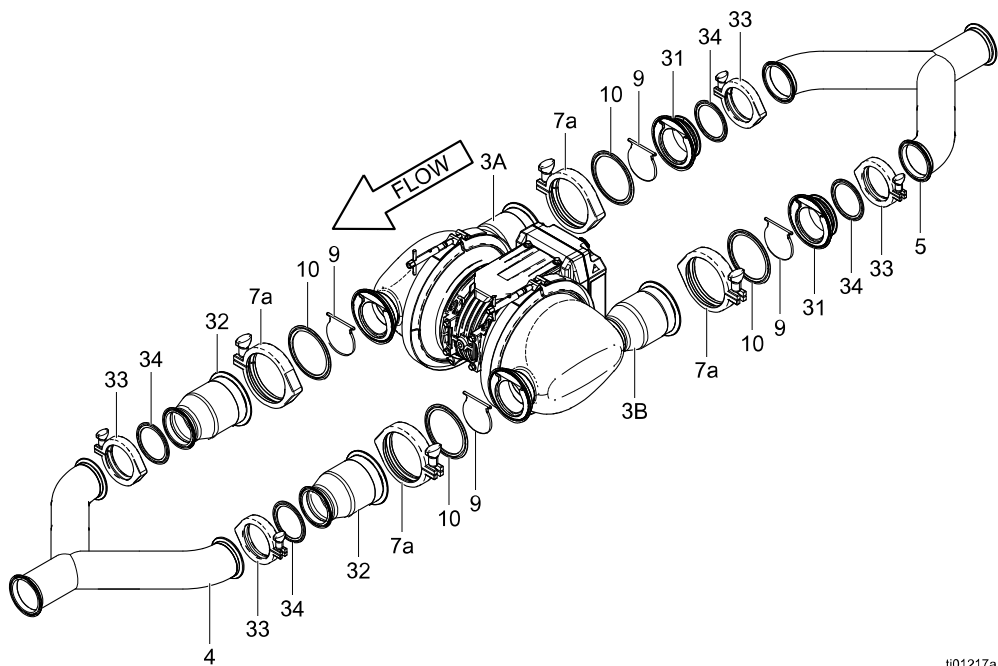
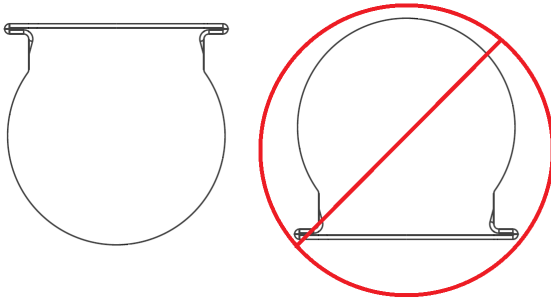


FIG. 20. Check Valves (Horizontal Flapper Pump)

## Reassemble the Check Valves

1. Lubricate clamps and clamping surfaces with waterproof, sanitary lubricant.
2. Reassemble check assembly in reverse order of disassembly.
3. Loosely attach the manifolds to the fluid covers. Once all components are properly aligned, tighten clamps hand tight.

**NOTE:** Flapper fluid covers are not interchangeable, and their orientation is critical on horizontal pumps. Horizontal pump fluid covers must be positioned so that the flappers hang down from the hinge pin when placed in the fluid cover. Install the flapper valves (8) with the text side facing the seat.



## Repair the Standard Diaphragms

### Required Tools:

- Torque wrench
- 25 mm open-end wrench
- Lubriplate Synxtreme HD-2 grease or equivalent NLGI Grade 2 synthetic grease with calcium sulfonate base. See related parts manual. See **Related Manuals**, page 3.
- 15 mm hex wrench

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



1. Follow **Prepare Equipment for Repair**, page 42.
2. Follow **Disassemble the Check Valves**, page 44.
3. Remove all clamps (6a) 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):**

- a. 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 (30) 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.

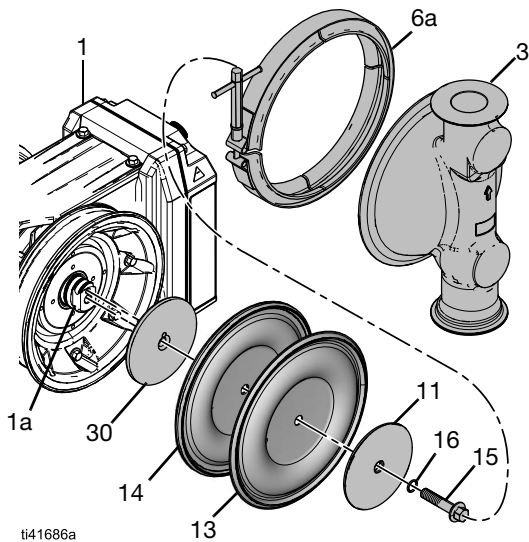


FIG. 21: Standard Diaphragms



## 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.

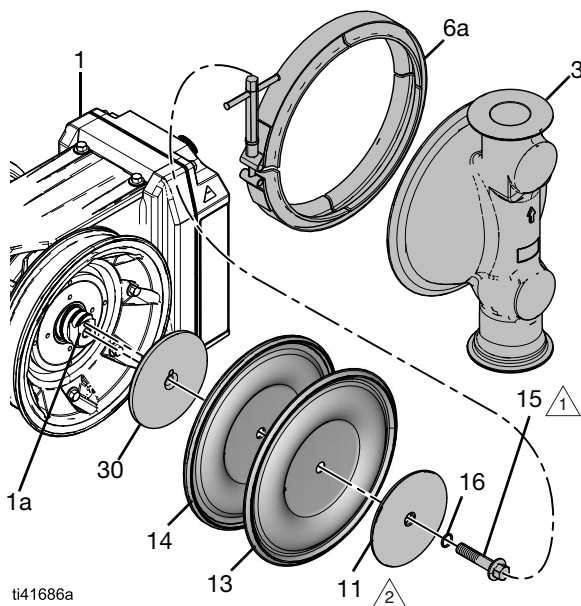
1. Assemble the air-side plates (30) diaphragm backers (14), diaphragms (13), fluid side plates (11), and seals (16, if applicable) with the fasteners (15) exactly as shown for your equipment model. See related parts manual. See **Related Manuals**, page 3.

**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.

- 1 Apply a medium-strength thread locker to the shaft side of the fastener to attach the diaphragm to the shaft.
- 2 Rounded side faces toward the diaphragm (13).

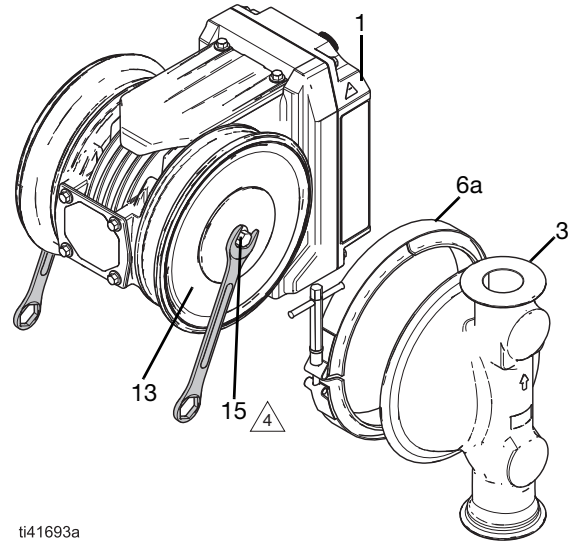


**FIG. 22: Reassemble Standard Diaphragms (Hygienic Model Shown)**

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).



**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).
6. Install clamps (6a) to hold the fluid covers (3) in place.

**NOTE:** To ensure proper spacing and alignment of the manifolds, install clamps (6a) loose enough to allow for fluid cover movement before securing the fluid covers in place.

7. Reassemble the check valves and manifolds as explained in **Reassemble the Check Valves**, page 44.

## Repair the Overmolded Diaphragms

### Required Tools:

- Torque wrench
- 25 mm open-end wrench
- Lubriplate Synxtreme HD-2 grease or equivalent NLGI Grade 2 synthetic grease with calcium sulfonate base. See related parts manual. See **Related Manuals**, page 3.

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



1. Follow **Prepare Equipment for Repair**, page 42.
2. Follow **Disassemble the Check Valves**, page 44.
3. Remove all clamps (7) 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.

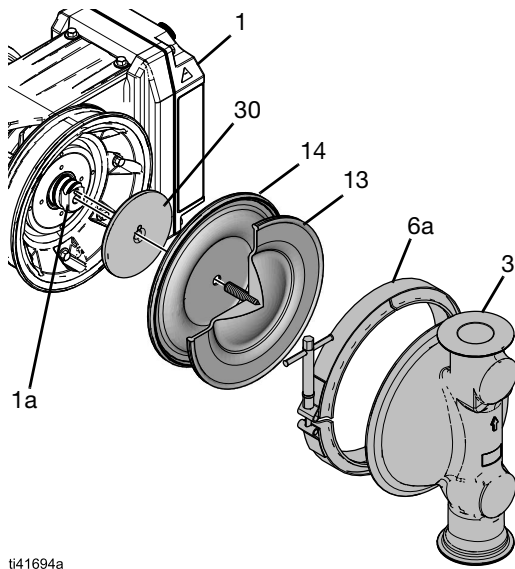
5. Remove the remaining diaphragm (13).

#### **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):**

- a. 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.



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**FIG. 24: Overmolded Diaphragms**

## Reassemble the Overmolded Diaphragms

### NOTICE

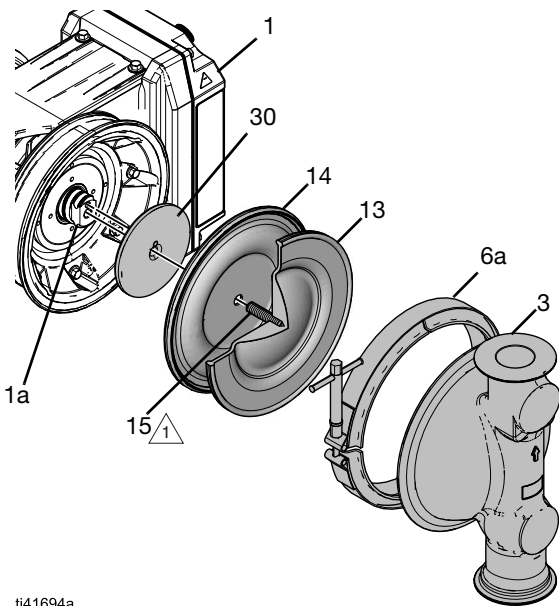
After reassembly, allow the thread locker to cure for 12 hours, or per instructions of the manufacturer, prior to operating the equipment. The equipment will be damaged if the diaphragm shaft fastener loosens.

1. On the side of the shaft (1a) opposite of the wrench flat, install the air-side plate (30), 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.

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



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**FIG. 25: Reassemble Overmolded Diaphragms**

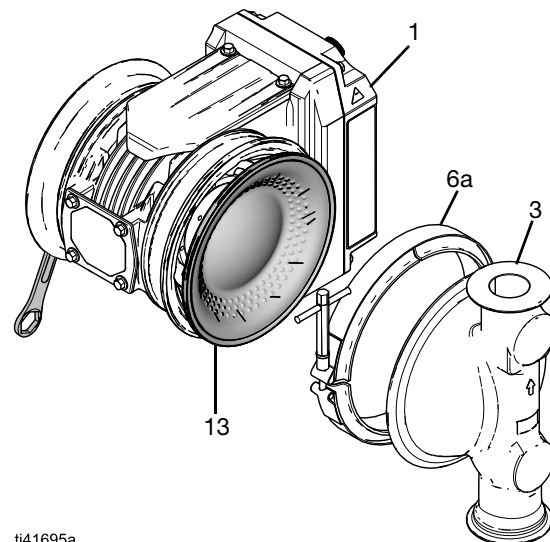
2. Use an applicable wrench to hold flat of the shaft (1a) firmly in place. At the same time, grip the diaphragm (13) securely around the outer edge and rotate clockwise to firmly tighten.
3. Rotate the shaft (1a) until it is centered in the motor (1).

**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 clamp (6a) 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 (30), 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 clamp (6a) to hold the fluid cover (3) in place.

**NOTE:** To ensure proper spacing and alignment of the manifolds (4, 5), install clamps (6a) loose enough to allow for fluid cover movement before securing the fluid covers (3) in place.

9. Securely tighten the clamps (6a).
10. Reassemble the check valves and manifolds as explained in **Reassemble the Check Valves**, page 44.



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**FIG. 26: Tighten Overmolded Diaphragms**

# Recycling and Disposal

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

- Follow **Pressure Relief Procedure**, page 30.
- 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.



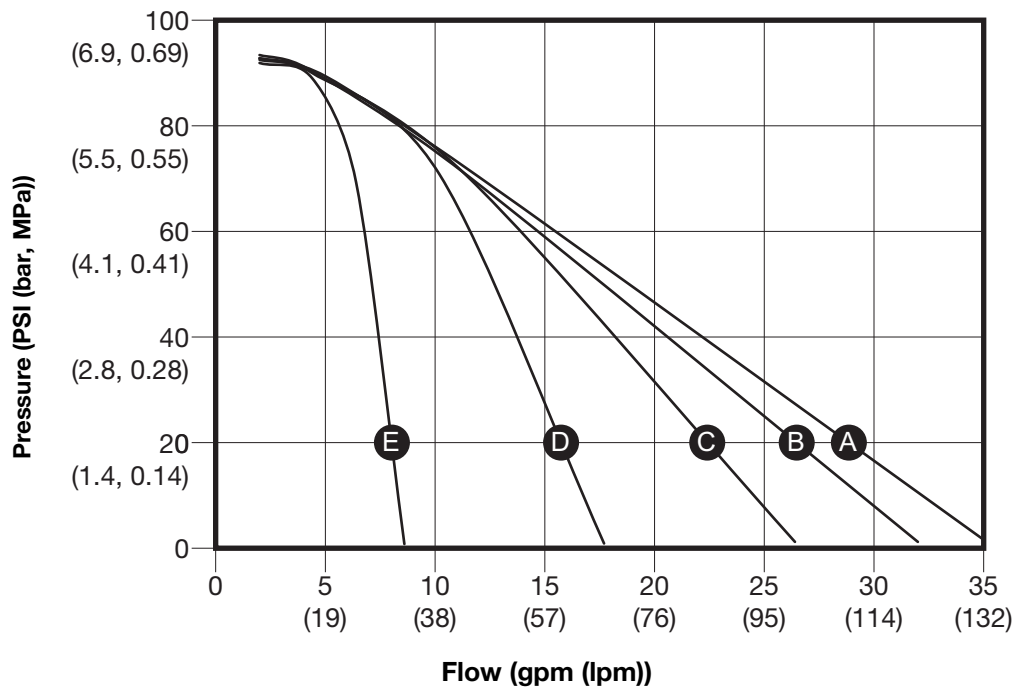
- Deliver remaining equipment to a recycling facility.

# Performance Charts

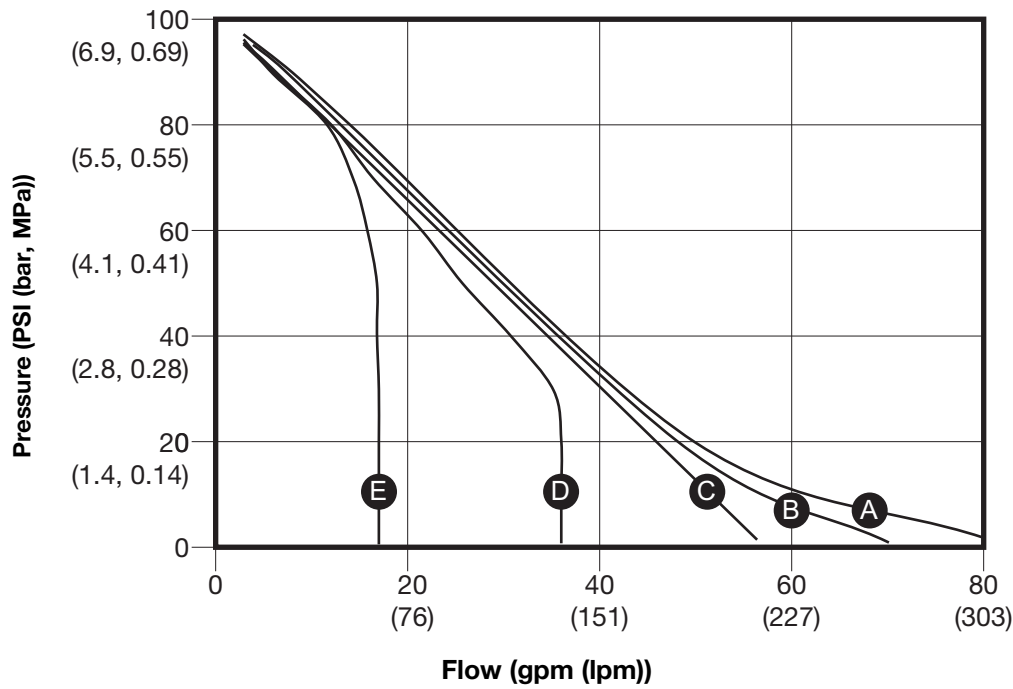
Performance may vary based on pump materials, suction condition, discharge pressure, and fluid type.

| Reference | Control Knob Setting |
|-----------|----------------------|
| A         | 100%                 |
| B         | 80%                  |
| C         | 60%                  |
| D         | 40%                  |
| E         | 20%                  |

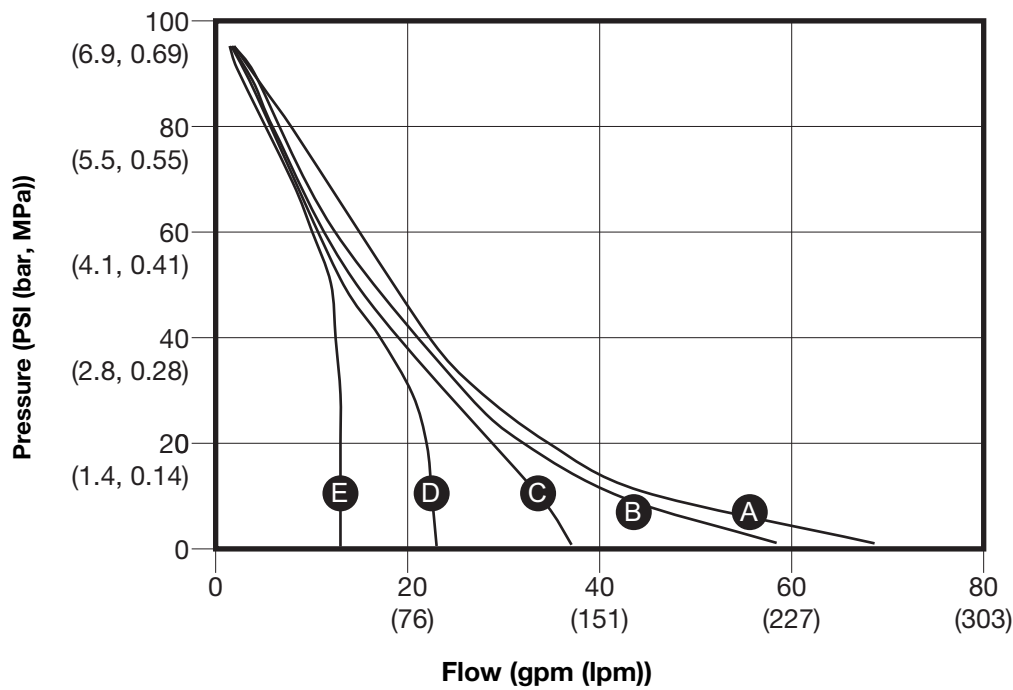
Performance Chart for h30 (QHC) Models



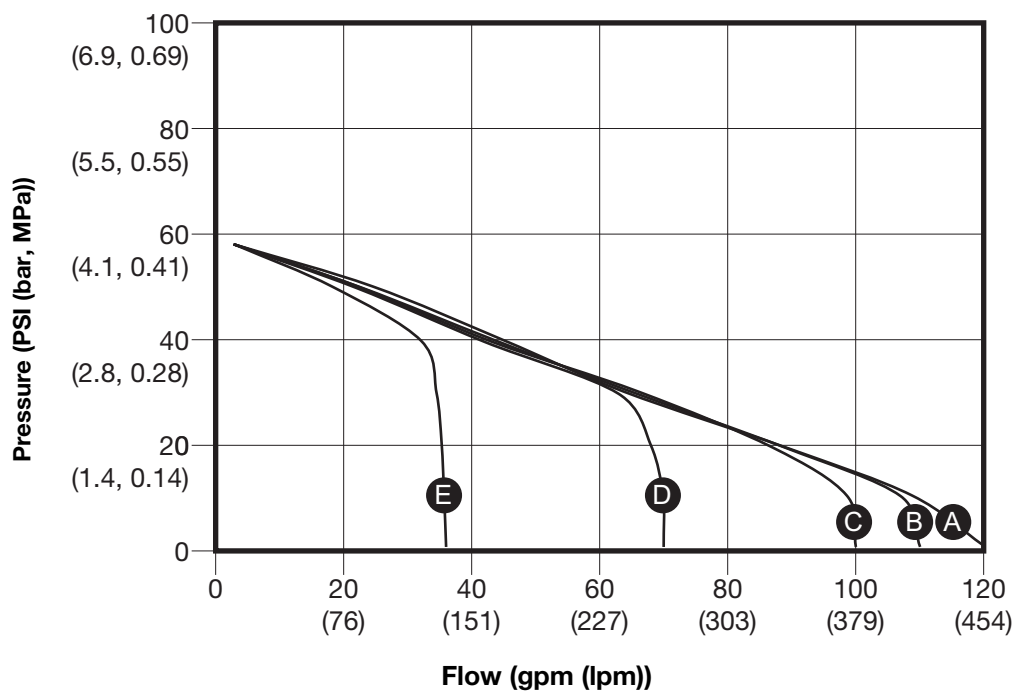
Performance Chart for h80 (QHD) Ball Models



Performance Chart for h80 (QHD) Flapper Models

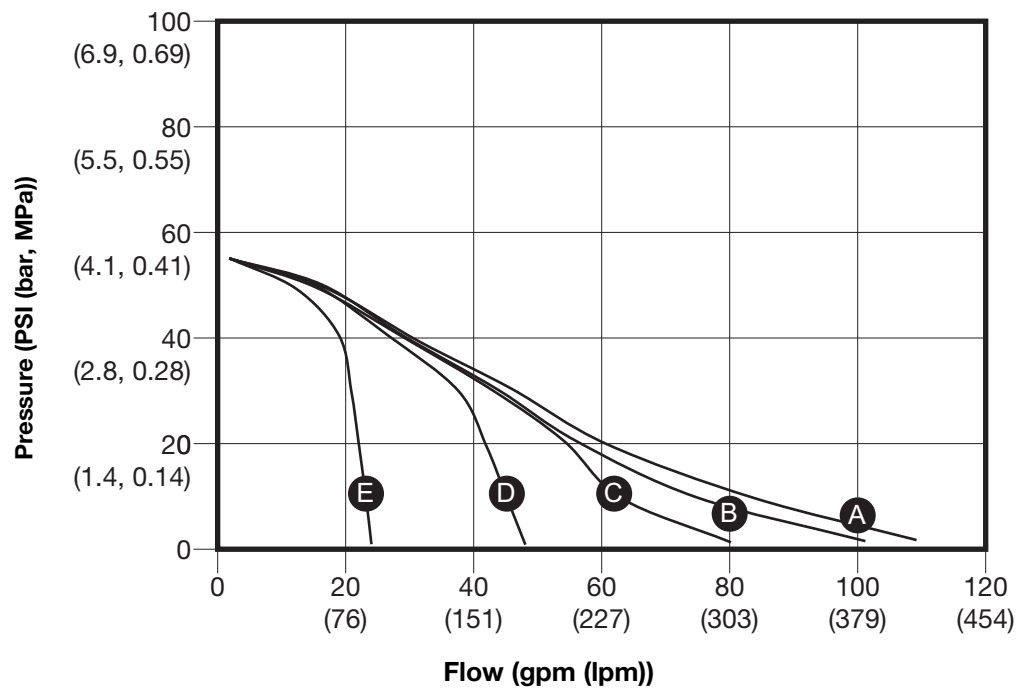


Performance Chart for h120 (QHE) Ball Models



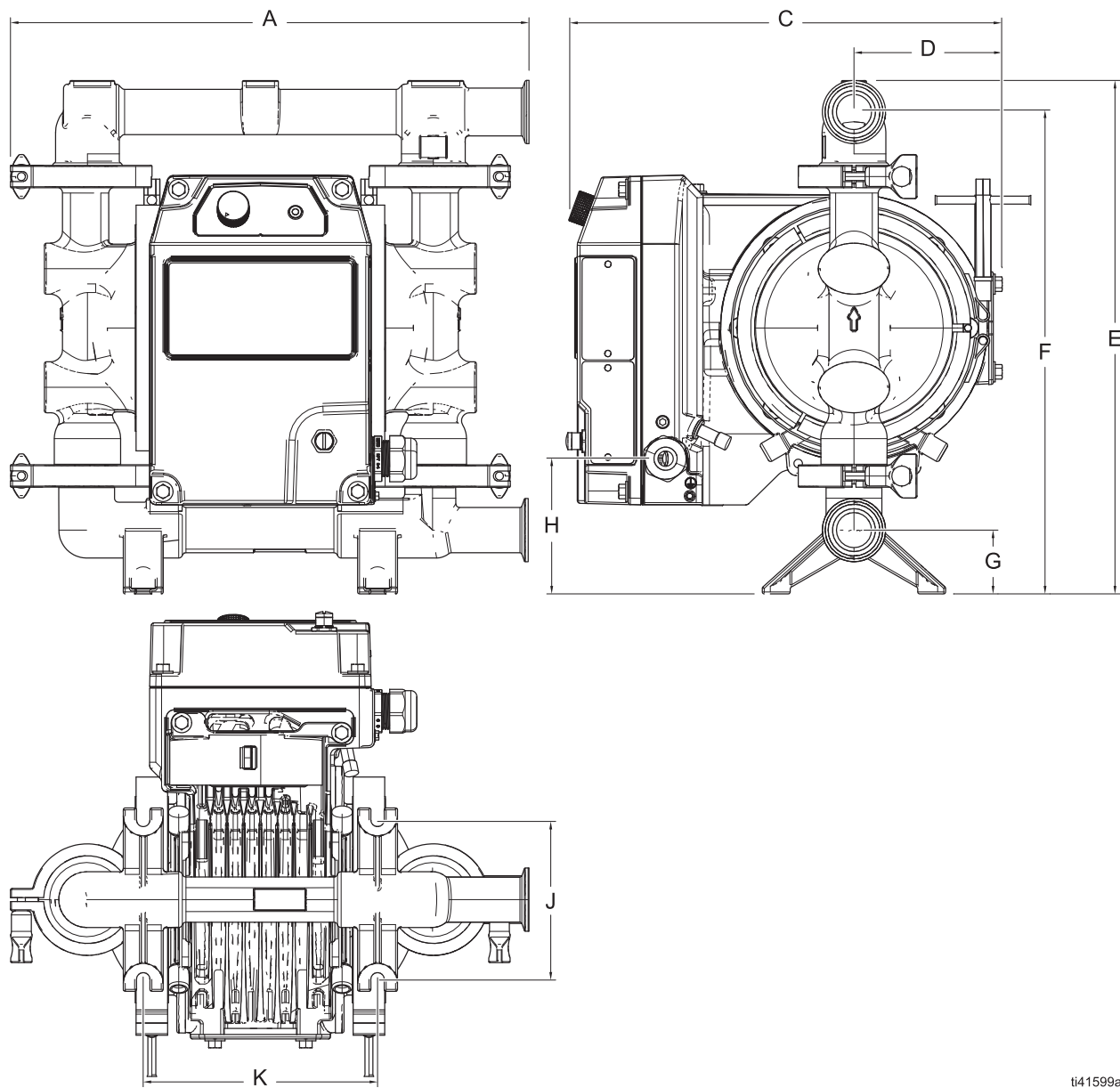


## Performance Chart for h120 (QHE) Flapper Models



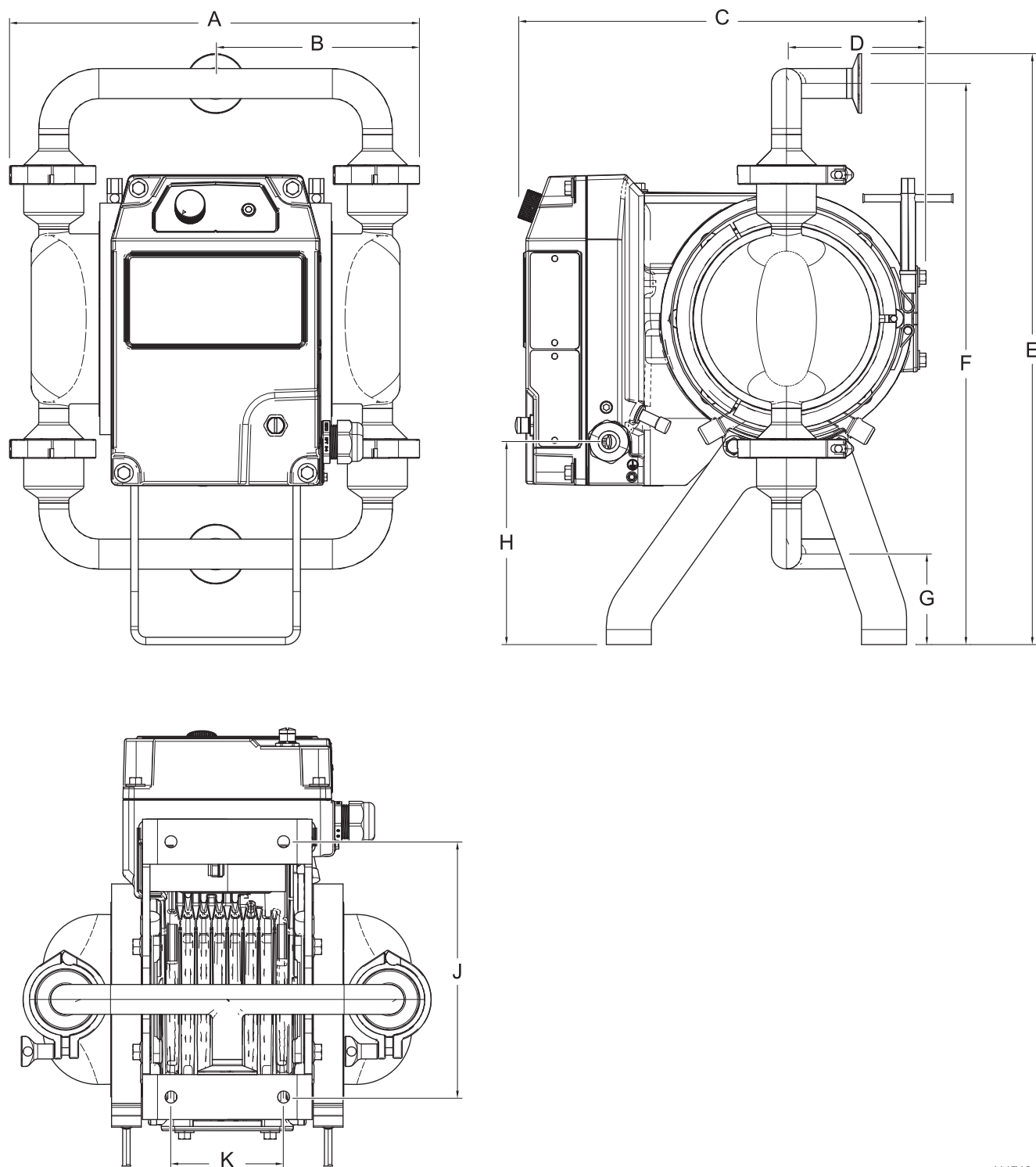
# Dimensions

## Dimensions for h30 (QHC) Models



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FIG. 27: h30 (QHC) Hygienic Model Dimensions (FG model shown)

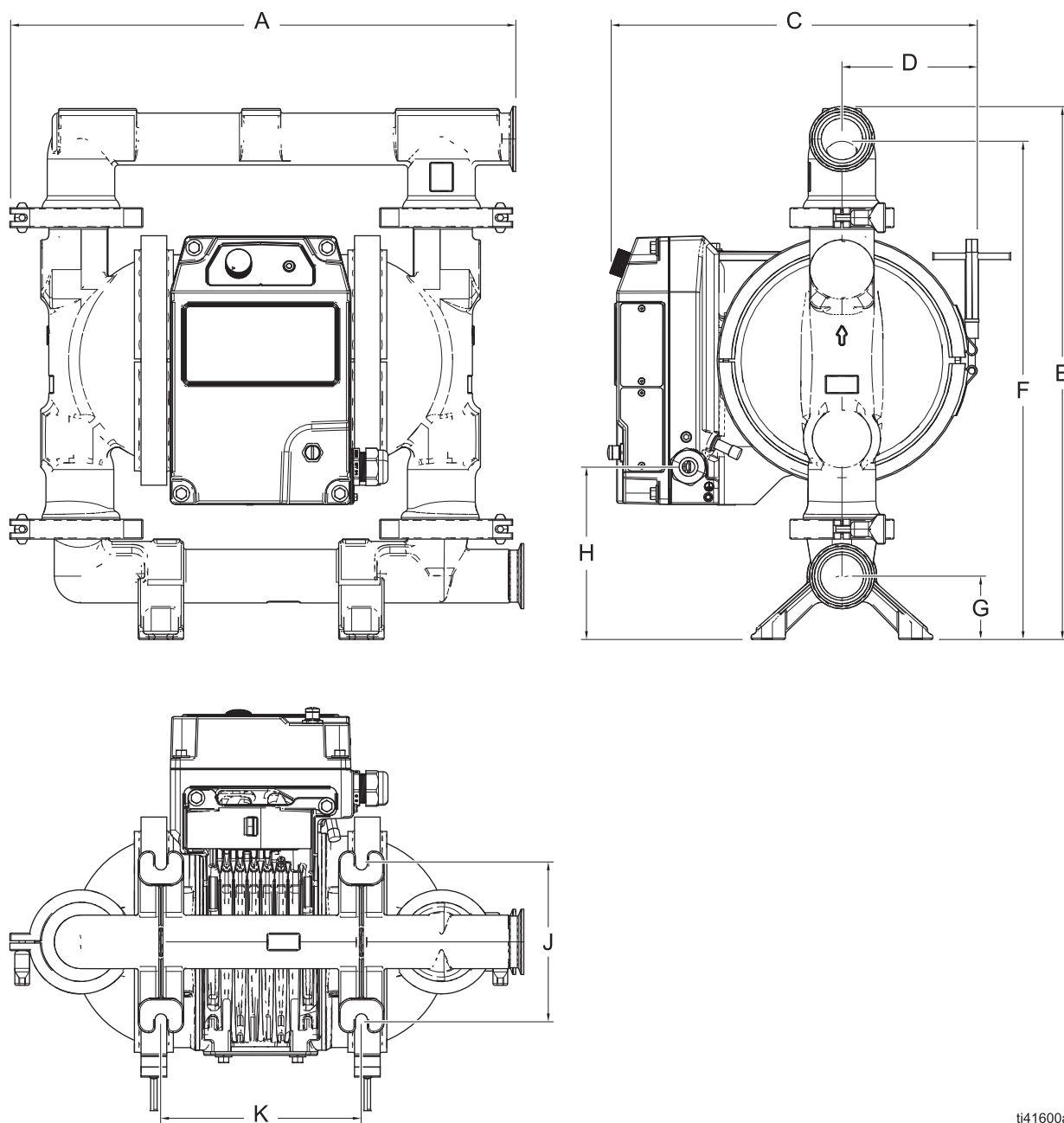


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**Fig. 28: h30 (QHC) Model Dimensions (HS model shown)**

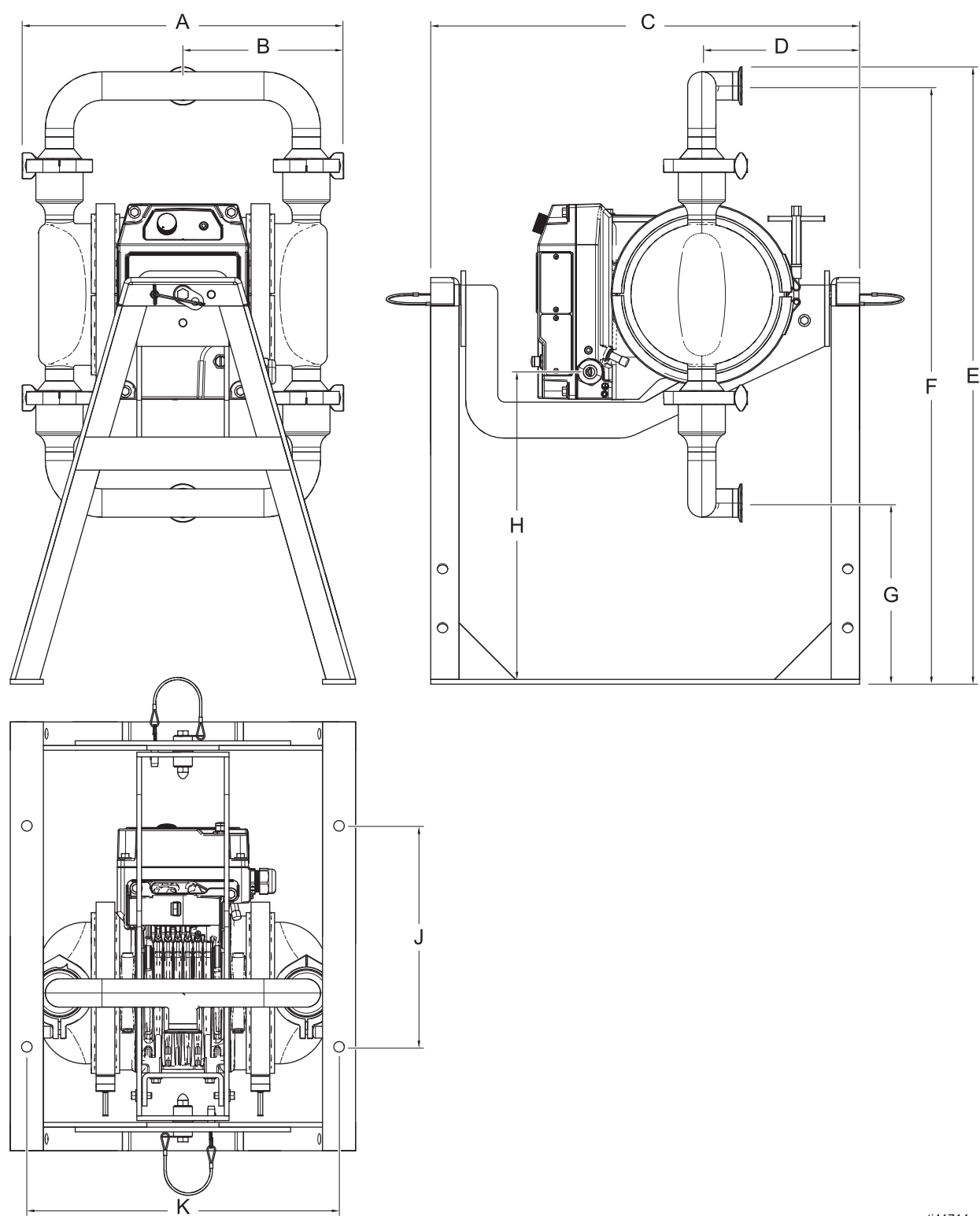
| <b>h30 (QHC) Model Dimensions</b> |                                |           |                   |           |
|-----------------------------------|--------------------------------|-----------|-------------------|-----------|
| <b>Ref.</b>                       | <b>Wetted Section Material</b> |           |                   |           |
|                                   | <b>FG</b>                      |           | <b>HS, PH, 3A</b> |           |
|                                   | <b>in.</b>                     | <b>cm</b> | <b>in.</b>        | <b>cm</b> |
| <b>A</b>                          | 16.30                          | 41.40     | 14.70             | 37.34     |
| <b>B</b>                          | — — —                          | — — —     | 7.35              | 18.67     |
| <b>C</b>                          | 13.60                          | 34.54     | 13.60             | 34.54     |
| <b>D</b>                          | 4.65                           | 11.81     | 9.10              | 23.11     |
| <b>E</b>                          | 16.10                          | 40.90     | 19.68             | 49.99     |
| <b>F</b>                          | 15.12                          | 38.40     | 18.68             | 47.45     |
| <b>G</b>                          | 2.00                           | 5.08      | 3.02              | 7.67      |
| <b>H</b>                          | 4.24                           | 10.77     | 6.75              | 17.15     |
| <b>J</b>                          | 5.00                           | 12.70     | 8.50              | 21.59     |
| <b>K</b>                          | 7.35                           | 18.67     | 3.75              | 9.53      |

## Dimensions for h80 (QHD) Models



ti41600a

**FIG. 29: h80 (QHD) Model Dimensions (FG model shown)**

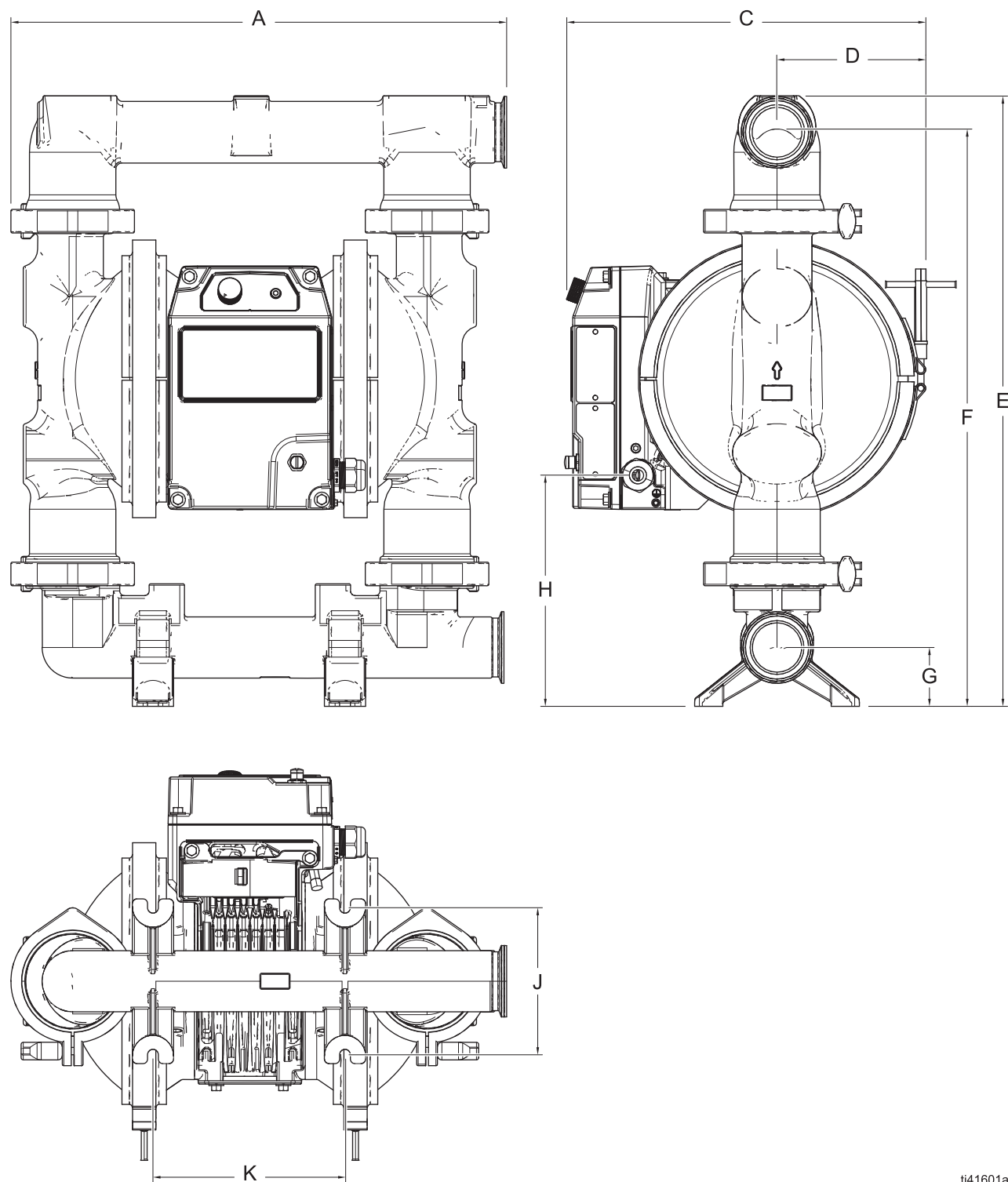


ti41714a

FIG. 30: h80 (QHD) Model Dimensions (HS model shown)

| h80 (QHD) Model Dimensions |                         |       |            |               |           |              |
|----------------------------|-------------------------|-------|------------|---------------|-----------|--------------|
| Ref.                       | Wetted Section Material |       |            |               |           |              |
|                            | FG                      |       | HS, PH, 3A |               |           |              |
|                            | in.                     | cm    | in. (Ball) | in. (Flapper) | cm (Ball) | cm (Flapper) |
| <b>A</b>                   | 19.50                   | 49.53 | 17.90      | 17.90         | 45.47     | 45.47        |
| <b>B</b>                   | — — —                   | — — — | 8.95       | 8.95          | 22.73     | 22.73        |
| <b>C</b>                   | 14.17                   | 36.00 | 22.70      | 22.70         | 57.66     | 57.66        |
| <b>D</b>                   | 5.22                    | 13.26 | 9.10       | 9.10          | 23.11     | 23.11        |
| <b>E</b>                   | 20.54                   | 52.17 | 32.68      | 32.18         | 83.00     | 81.74        |
| <b>F</b>                   | 19.28                   | 48.97 | 31.67      | 31.17         | 80.44     | 79.17        |
| <b>G</b>                   | 2.44                    | 6.20  | 9.67       | 10.09         | 24.56     | 25.63        |
| <b>H</b>                   | 6.65                    | 16.90 | 16.53      | 16.53         | 41.99     | 41.99        |
| <b>J</b>                   | 6.00                    | 15.24 | 11.70      | 11.70         | 29.72     | 29.72        |
| <b>K</b>                   | 7.73                    | 19.63 | 16.52      | 16.52         | 41.96     | 41.96        |

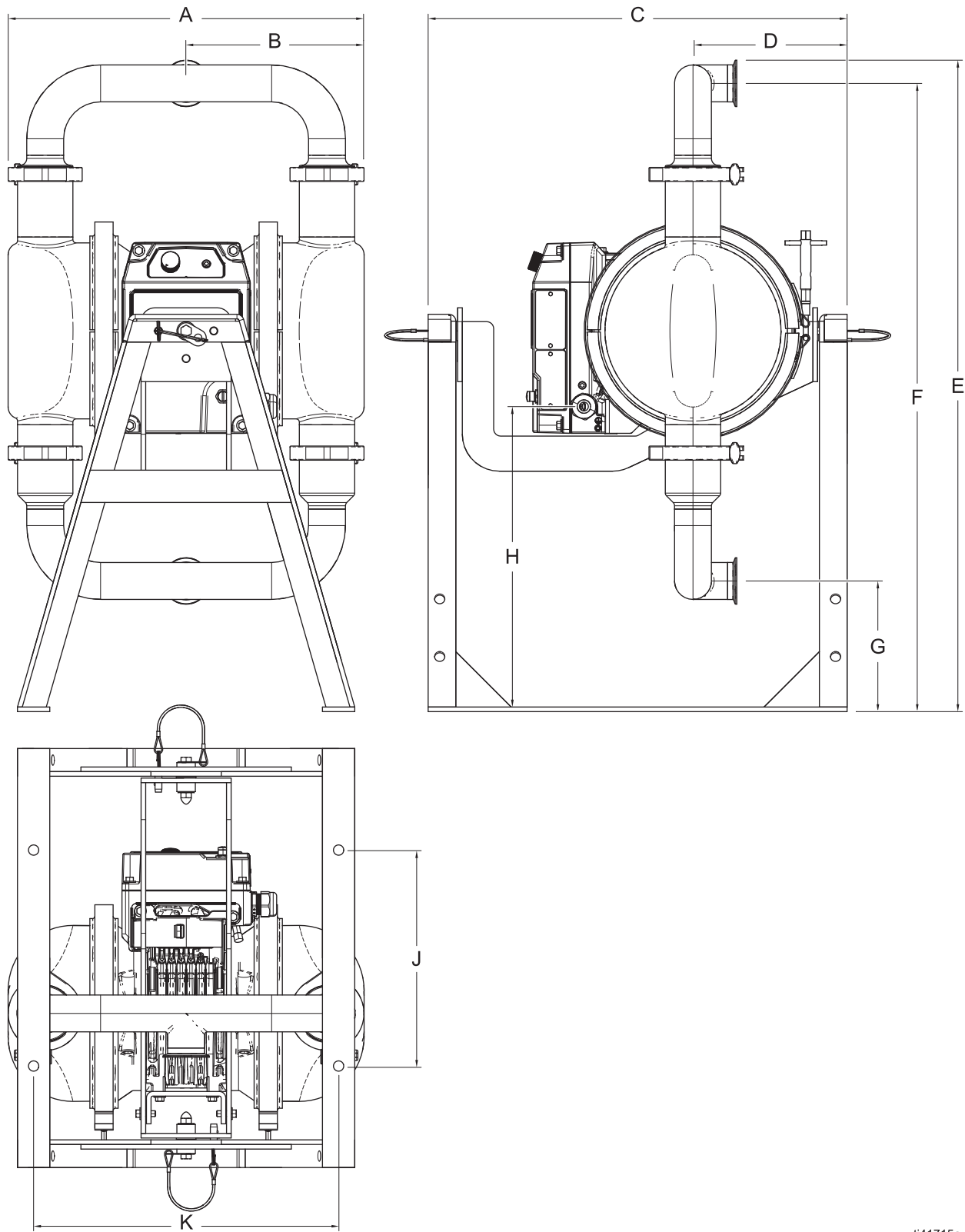
Dimensions for h120 (QHE) Ball Models



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FIG. 31: h120 (QHE) Ball Model Dimensions (FG model shown)





ti41715a

**FIG. 32: h120 (QHE Ball and QHF Vertical Flapper) Model Dimensions (HS model shown)**

| h120 (QHE) Ball Model Dimensions |                         |       |            |       |
|----------------------------------|-------------------------|-------|------------|-------|
| Ref.                             | Wetted Section Material |       |            |       |
|                                  | FG                      |       | HS, PH, 3A |       |
|                                  | in.                     | cm    | in.        | cm    |
| <b>A</b>                         | 22.03                   | 55.96 | 20.75      | 52.71 |
| <b>B</b>                         | ---                     | ---   | 10.37      | 26.34 |
| <b>C</b>                         | 15.28                   | 38.81 | 22.70      | 57.66 |
| <b>D</b>                         | 6.33                    | 16.08 | 9.10       | 23.11 |
| <b>E</b>                         | 25.95                   | 65.91 | 35.31      | 89.69 |
| <b>F</b>                         | 24.40                   | 61.98 | 34.05      | 86.49 |
| <b>G</b>                         | 2.50                    | 6.35  | 7.09       | 18.01 |
| <b>H</b>                         | 9.82                    | 24.94 | 16.53      | 41.99 |
| <b>J</b>                         | 6.25                    | 15.88 | 11.70      | 29.72 |
| <b>K</b>                         | 8.16                    | 20.73 | 16.52      | 41.96 |

## Dimensions for h120 (QHF) Flapper Models

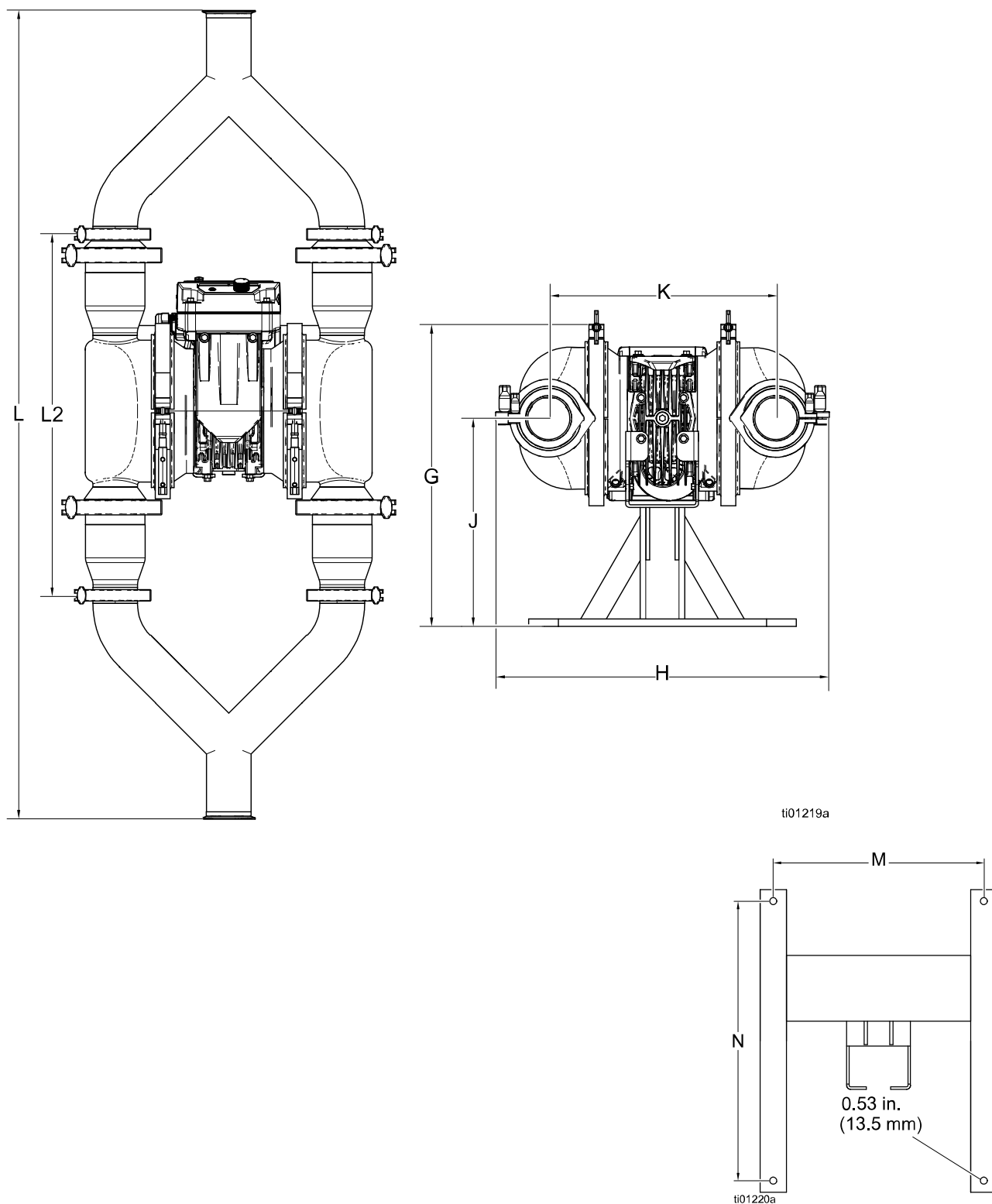


FIG. 33. h120 (QHF) Horizontal Flapper Model Dimensions (SSE model shown)

| <b>h120 (QHF) Flapper Model Dimensions</b> |   |           |   |           |
|--|---|-----------|---|-----------|
|  | <b>Vertical Flapper (SSA and SSB connections), see FIG. 32.</b> |           | <b>Horizontal Flapper (SSE and SSG connections), see FIG. 33.</b> |           |
|  | <b>in.</b>  | <b>cm</b> | <b>in.</b>  | <b>cm</b> |
| <b>A</b>                                   | 22.4  | 57.0      | ---   | ---       |
| <b>B</b>                                   | 11.2  | 28.5      | ---   | ---       |
| <b>C</b>                                   | 22.7  | 57.7      | ---   | ---       |
| <b>D</b>                                   | 9.1   | 23.1      | ---   | ---       |
| <b>E</b>                                   | 38.8  | 99.0      | ---   | ---       |
| <b>F</b>                                   | 37.2  | 94.4      | ---   | ---       |
| <b>G</b>                                   | 4.1   | 10.3      | 19.9  | 50.5      |
| <b>H</b>                                   | 16.5  | 42.0      | 22.4  | 56.9      |
| <b>J</b>                                   | 11.7  | 29.7      | 14.0  | 35.6      |
| <b>K</b>                                   | 16.5  | 42.0      | 15.2  | 38.6      |
| <b>L</b>                                   | ---   | ---       | 54.5  | 138.4     |
| <b>L2</b>                                  | ---   | ---       | 24.3  | 61.7      |
| <b>M</b>                                   | ---   | ---       | 16.0  | 40.6      |
| <b>N</b>                                   | ---   | ---       | 21.2  | 53.8      |

# 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.

| Material of Wetted<br>Contact Section Parts<br>(Seat, Check,<br>Diaphragm)* | Fluid Temperature Range by Wetted Section Material |              |               |             |                   |           |
|---|--|--------------|---------------|-------------|-------------------|-----------|
|   | Metal (AL,FG, HS, PH, SS, 3A)*                     |              | Plastic (PV)* |             | Plastic (AC, PP)* |           |
|   | Fahrenheit   | Celsius      | Fahrenheit    | Celsius     | Fahrenheit        | Celsius   |
| (3A) 3-A Hygienic, Stainless Steel  | −60° to 275°                                       | −51° to 135° | 10° to 180°   | −12° to 82° | 32° to 150°       | 0° to 66° |
| (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°  |               |             |                   |           |
| (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° |               |             |                   |           |
| (EP) EPDM   | −60° to 275°                                       | −51° to 135° |               |             |                   |           |
| (FG) Food Grade, Stainless Steel  | −60° to 275°                                       | −51° to 135° |               |             |                   |           |
| (FK) Fluoroelastomer  | −40° to 275°                                       | −40° to 135° |               |             |                   |           |
| (FL) Flapper (SS)   | −60° to 275°                                       | −51° to 135° |               |             |                   |           |
| (GE) Graco Engineered Thermoplastic   | −40° to 180°                                       | −40° to 82°  |               |             |                   |           |
| (HS) Hygienic, Stainless Steel  | −60° to 275°                                       | −51° to 135° |               |             |                   |           |
| (PH) Pharmaceutical, Stainless Steel  | −60° to 275°                                       | −51° to 135° |               |             |                   |           |
| (PO) PTFE/EPDM Overmolded   | −40° to 180°                                       | −40° to 82°  |               |             |                   |           |
| (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° |                   |           |
| (PT) PTFE   | −40° to 220°                                       | −40° to 104° |               |             |                   |           |
| (PV) PVDF   | 10° to 225°  | −12° to 107° |               |             |                   |           |
| (SD) 440c Stainless Steel   | −40° to 220°                                       | −40° to 104° |               |             |                   |           |

| Material of Wetted<br>Contact Section Parts<br>(Seat, Check,<br>Diaphragm)* | Fluid Temperature Range by Wetted Section Material |              |               |             |                   |           |
|---|--|--------------|---------------|-------------|-------------------|-----------|
|   | Metal (AL,FG, HS, PH, SS, 3A)*                     |              | Plastic (PV)* |             | Plastic (AC, PP)* |           |
|   | Fahrenheit   | Celsius      | Fahrenheit    | Celsius     | Fahrenheit        | Celsius   |
| <b>(SO)</b> Santoprene<br>Overmolded  | –40° to 180°                                       | –40° to 82°  | 10° to 180°   | –12° to 82° | 32° to 150°       | 0° to 66° |
| <b>(SP)</b> Santoprene  | –40° to 180°                                       | –40° to 82°  |               |             |                   |           |
| <b>(SS)</b> 316 Stainless Steel   | –60° to 275°                                       | –51° to 135° |               |             |                   |           |
| <b>(TP)</b> TPE   | –20° to 150°                                       | –29° to 66°  |               |             |                   |           |

\* See Configuration Matrix, starting on page 9, for detailed descriptions.

## Technical Specifications for h30 (QHC) Models

| QUANTM h30 (QHC) Pumps  |   |                       |                    |         |
|---|---|-----------------------|--------------------|---------|
|   | US  |                       | Metric             |         |
| Maximum fluid working pressure  | 100 psi                                       |                       | 6.89 bar, 0.69 MPa |         |
| Maximum free-flow delivery  | 30 gpm  |                       | 114 lpm            |         |
| Maximum size pumpable solids  | HS, PH, 3A<br>FG                              | 0.42 in.<br>0.125 in. | 10.7 mm<br>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 |
| h30 (QHC) models, FF1 motor   | 200–240 V                                     | 3                     | 50/60 Hz           | 7.5 A   |
| h30 (QHC) models, FF2 motor   | 200–240 V                                     | 1                     | 50/60 Hz           | 10 A    |
| h30 (QHC) models, FF3 motor   | 200–240 V                                     | 3                     | 50/60 Hz           | 7.5 A   |
| h30 (QHC) models, FF4 motor   | 200–240 V                                     | 1                     | 50/60 Hz           | 10 A    |
| h30 (QHC) models, FF5 motor   | 100–120 V                                     | 1                     | 50/60 Hz           | 12 A    |
| h30 (QHC) models, FF6 motor   | 100–120 V                                     | 1                     | 50/60 Hz           | 12 A    |
| h30 (QHC) models, FF7 motor   | 380–480 V                                     | 3                     | 50/60 Hz           | 5.3 A   |
| h30 (QHC) models, FF8 motor   | 380–480 V                                     | 3                     | 50/60 Hz           | 5.3 A   |
| h30 (QHC) models, FF9 motor   | 380–480 V                                     | 3                     | 50/60 Hz           | 5.3 A   |
| h30 (QHC) models, FFA motor   | 380–480 V                                     | 3                     | 50/60 Hz           | 5.3 A   |
| Materials of construction   |   |                       |                    |         |
| See <b>Configuration Matrix</b> , starting on page 9, for materials of construction for your equipment model. |   |                       |                    |         |
| Fluid inlet/outlet sizes  |   |                       |                    |         |
| Models with wetted section materials coded:   |   |                       |                    |         |
| FG  | 1.5 in. sanitary tri-clamp or 40 mm DIN 11851 |                       |                    |         |
| HS, PH, 3A  | 1.0 in sanitary tri-clamp or RD52 x 1/6 DIN   |                       |                    |         |
| Maximum suction lift*   |   |                       |                    |         |
| Wet   | 29.0 ft                                       | 8.84 m                |                    |         |
| Dry   | 7.9 ft  | 2.41 m                |                    |         |
| Noise (dBa)   |   |                       |                    |         |
| Maximum sound power (ISO-9614-2)  | 86 dBa at full power and flow                 |                       |                    |         |
| Sound power measured 1.6 feet (0.5 meter) from equipment.   |   |                       |                    |         |
| Weight  |   |                       |                    |         |
| Models with wetted section materials coded:   |   |                       |                    |         |
| FG  | 88 lb   | 39.9 kg               |                    |         |
| HS, PH, 3A  | 77 lb   | 34.9 kg               |                    |         |
| Notes   |   |                       |                    |         |
| * May vary based on pump materials, suction condition, discharge head, pressure, and fluid type.              |   |                       |                    |         |
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## Technical Specifications for h80 (QHD) Ball Models

| QUANTM h80 (QHD) Ball Pumps   |                                    |  |                    |         |
|---|------------------------------------|--|--------------------|---------|
|   | US                                 |  | Metric             |         |
| Maximum fluid working pressure  | 100 psi                            |  | 6.89 bar, 0.69 MPa |         |
| Maximum free-flow delivery  | 80 gpm                             |  | 300 lpm            |         |
| Maximum size pumpable solids  |                                    |  |                    |         |
|   | HS, PH, 3A                         | 0.5 in.  | 12.7 mm            |         |
|   | FG                                 | 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 |
| h80 (QHD) models, FF1 motor   | 200–240 V                          | 3  | 50/60 Hz           | 7.5 A   |
| h80 (QHD) models, FF2 motor   | 200–240 V                          | 1  | 50/60 Hz           | 15 A    |
| h80 (QHD) models, FF3 motor   | 200–240 V                          | 3  | 50/60 Hz           | 7.5 A   |
| h80 (QHD) models, FF4 motor   | 200–240 V                          | 1  | 50/60 Hz           | 15 A    |
| h80 (QHD) models, FF7 motor   | 380–480 V                          | 3  | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FF8 motor   | 380–480 V                          | 3  | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FF9 motor   | 380–480 V                          | 3  | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FFA motor   | 380–480 V                          | 3  | 50/60 Hz           | 5.3 A   |
| Materials of construction   |                                    |  |                    |         |
| See <b>Configuration Matrix</b> , starting on page 9, for materials of construction for your equipment model. |                                    |  |                    |         |
| Fluid inlet/outlet sizes  |                                    |  |                    |         |
| Models with wetted section materials coded:   |                                    |  |                    |         |
|   | FG                                 | 2.0 in. sanitary tri-clamp or 50 mm DIN 11851              |                    |         |
|   | HS, PH, 3A                         | 1.5 in. sanitary tri-clamp or 40 mm DIN 11851, male thread |                    |         |
| Maximum suction lift*   |                                    |  |                    |         |
|   | Wet                                | 29.0 ft  | 8.84 m             |         |
|   | Dry                                | 19.3 ft  | 5.90 m             |         |
| Noise (dBa)   |                                    |  |                    |         |
| Maximum sound power (ISO-9614-2)  | 84 dBa at full power and full flow |  |                    |         |
| Sound power measured 1.6 feet (0.5 meter) from equipment.   |                                    |  |                    |         |
| Weight  |                                    |  |                    |         |
| Models with wetted section materials coded:   |                                    |  |                    |         |
|   | FG                                 | 120 lb   | 54.4 kg            |         |
|   | HS, PH, 3A                         | 98 lb  | 44.5               |         |
| Notes   |                                    |  |                    |         |
| * May vary based on pump materials, suction condition, discharge head, pressure, and fluid type.              |                                    |  |                    |         |
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## Technical Specifications for h80 (QHD) Flapper Models

| QUANTM h80 (QHD) Flapper Pumps  |  |                |                    |         |
|---|--|----------------|--------------------|---------|
|   | US   |                | Metric             |         |
| Maximum fluid working pressure  | 100 psi  |                | 6.89 bar, 0.69 MPa |         |
| Maximum free-flow delivery  | 65 gpm   |                | 245 lpm            |         |
| Maximum size pumpable solids  | HS   | 1.2 in.        | 30.5 mm            |         |
| Fluid flow*   |  | 0.67 gal/cycle | 2.54 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 |
| h80 (QHD) models, FF1 motor   | 200–240 V  | 3              | 50/60 Hz           | 7.5 A   |
| h80 (QHD) models, FF2 motor   | 200–240 V  | 1              | 50/60 Hz           | 15 A    |
| h80 (QHD) models, FF3 motor   | 200–240 V  | 3              | 50/60 Hz           | 7.5 A   |
| h80 (QHD) models, FF4 motor   | 200–240 V  | 1              | 50/60 Hz           | 15 A    |
| h80 (QHD) models, FF7 motor   | 380–480 V  | 3              | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FF8 motor   | 380–480 V  | 3              | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FF9 motor   | 380–480 V  | 3              | 50/60 Hz           | 5.3 A   |
| h80 (QHD) models, FFA motor   | 380–480 V  | 3              | 50/60 Hz           | 5.3 A   |
| Materials of construction   |  |                |                    |         |
| See <b>Configuration Matrix</b> , starting on page 9, for materials of construction for your equipment model. |  |                |                    |         |
| Fluid inlet/outlet sizes  |  |                |                    |         |
| Models with wetted section materials coded:   |  |                |                    |         |
| HS  | 1.5 in. sanitary tri-clamp or 40 mm DIN 11851, male thread |                |                    |         |
| Maximum suction lift*   |  |                |                    |         |
|   | Wet  | 18.0 ft        | 5.48 m             |         |
|   | Dry  | 14.7 ft        | 4.48 m             |         |
| Noise (dBa)   |  |                |                    |         |
| Maximum sound power (ISO-9614-2)  | 72 dBa at full power and full flow                         |                |                    |         |
| Sound pressure measured 1.6 feet (0.5 meter) from equipment.  |  |                |                    |         |
| Weight  |  |                |                    |         |
| Models with wetted section materials coded:   |  |                |                    |         |
| HS  | 98 lb  | 44.5           |                    |         |
| Notes   |  |                |                    |         |
| * May vary based on pump materials, suction condition, discharge head, pressure, and fluid type.              |  |                |                    |         |
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# Technical Specifications for h120 (QHE) Ball Models

| QUANTM h120 (QHE) 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  | HS, PH, 3A<br>FG  | 0.5 in.<br>0.25 in. | 12.7 mm<br>6.4 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  | IP66  |                     |                   |         |
| IP rating, explosive atmospheres or hazardous (classified) locations models                                   | IP66  |                     |                   |         |
| Electrical ratings  |   |                     |                   |         |
|   | Rated Voltage   | Phase               | Hertz             | Current |
| h120 (QHE) models, FF1 motor  | 200–240 V   | 3                   | 50/60 Hz          | 7.5 A   |
| h120 (QHE) models, FF2 motor  | 200–240 V   | 1                   | 50/60 Hz          | 15 A    |
| h120 (QHE) models, FF3 motor  | 200–240 V   | 3                   | 50/60 Hz          | 7.5 A   |
| h120 (QHE) models, FF4 motor  | 200–240 V   | 1                   | 50/60 Hz          | 15 A    |
| h120 (QHE) models, FF7 motor  | 380–480 V   | 3                   | 50/60 Hz          | 5.3 A   |
| h120 (QHE) models, FF8 motor  | 380–480 V   | 3                   | 50/60 Hz          | 5.3 A   |
| h120 (QHE) models, FF9 motor  | 380–480 V   | 3                   | 50/60 Hz          | 5.3 A   |
| h120 (QHE) models, FFA motor  | 380–480 V   | 3                   | 50/60 Hz          | 5.3 A   |
| Materials of construction   |   |                     |                   |         |
| See <b>Configuration Matrix</b> , starting on page 9, for materials of construction for your equipment model. |   |                     |                   |         |
| Fluid inlet/outlet sizes  |   |                     |                   |         |
| Models with wetted section materials coded:   |   |                     |                   |         |
| HS, PH, 3A  | 2 in. sanitary tri-clamp or 50 mm DIN 11851, male threads |                     |                   |         |
| FG  | 2.5 in. sanitary tri-clamp or 65 mm DIN 11851             |                     |                   |         |
| Maximum suction lift*   |   |                     |                   |         |
| Wet   | 29.0 ft   | 8.84 m              |                   |         |
| Dry   | 15.9 ft   | 4.85 m              |                   |         |
| Noise (dBa)   |   |                     |                   |         |
| Maximum sound power (ISO-9614-2)  | 89 dBa at full power and full flow                        |                     |                   |         |
| Sound power measured 1.6 feet (0.5 meter) from equipment.   |   |                     |                   |         |
| Weight  |   |                     |                   |         |
| Models with wetted section materials coded:   |   |                     |                   |         |
| FG  | 170 lb  | 77.1 kg             |                   |         |
| HS, PH, 3A  | 143 lb  | 64.9 kg             |                   |         |
| Notes   |   |                     |                   |         |
| * May vary based on pump materials, suction condition, discharge head, pressure, and fluid type.              |   |                     |                   |         |
| All trademarks or registered trademarks are the property of their respective owners.                          |   |                     |                   |         |

## Technical Specifications for h120 (QHE) Flapper Models

| QUANTM h120 (QHE) Flapper Pumps   |   |                |                   |              |
|---|---|----------------|-------------------|--------------|
|   | US  |                | Metric            |              |
| Maximum fluid working pressure  | 60 psi  |                | 4.1 bar, 0.41 MPa |              |
| Maximum free-flow delivery  | 105 gpm   |                | 397 lpm           |              |
| Maximum size pumpable solids  | HS  | 2.46 in.       |                   | 62.5 mm      |
| Fluid flow*   |   | 0.91 gal/cycle |                   | 3.44 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      |
| h120 (QHE) models, FF1 motor  | 200–240 V   | 3              | 50/60 Hz          | 7.5 A        |
| h120 (QHE) models, FF2 motor  | 200–240 V   | 1              | 50/60 Hz          | 15 A         |
| h120 (QHE) models, FF3 motor  | 200–240 V   | 3              | 50/60 Hz          | 7.5 A        |
| h120 (QHE) models, FF4 motor  | 200–240 V   | 1              | 50/60 Hz          | 15 A         |
| h120 (QHE) models, FF7 motor  | 380–480 V   | 3              | 50/60 Hz          | 5.3 A        |
| h120 (QHE) models, FF8 motor  | 380–480 V   | 3              | 50/60 Hz          | 5.3 A        |
| h120 (QHE) models, FF9 motor  | 380–480 V   | 3              | 50/60 Hz          | 5.3 A        |
| h120 (QHE) models, FFA motor  | 380–480 V   | 3              | 50/60 Hz          | 5.3 A        |
| Circuit Protection  |   |                |                   |              |
| Maximum Branch Circuit Protection Rating  | 20A, Inverse Time Circuit Breaker                         |                |                   |              |
| Short Circuit Current Rating  | 5 kA  |                |                   |              |
| Materials of construction   |   |                |                   |              |
| See <b>Configuration Matrix</b> , starting on page 9, for materials of construction for your equipment model. |   |                |                   |              |
| Fluid inlet/outlet sizes  |   |                |                   |              |
| Models with wetted section materials coded:   |   |                |                   |              |
| HS  | 3 in. sanitary tri-clamp or 80 mm DIN 11851, male threads |                |                   |              |
| Maximum suction lift*   |   |                |                   |              |
| Wet   | 18.0 ft   | 5.48 m         |                   |              |
| Dry   | 12.5 ft   | 3.81 m         |                   |              |
| Noise (dBa)   |   |                |                   |              |
| Maximum sound power (ISO-9614-2)  | 89 dBa at full power and full flow                        |                |                   |              |
| Sound power measured 1.6 feet (0.5 meter) from equipment.   |   |                |                   |              |
| Weight  |   |                |                   |              |
| Models with wetted section materials coded:   |   |                |                   |              |
| HS  | 143 lb  | 64.9 kg        |                   |              |
| Notes   |   |                |                   |              |
| * May vary based on pump materials, suction condition, discharge head, pressure, and fluid type.              |   |                |                   |              |
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# California Proposition 65

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