

MANUAL NUMBER X063399 | REVISION A | ENGLISH (US)

QUANTM[®] i230 High Flow Pump

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

For professional use only. Not approved for use in explosive atmospheres or hazardous (classified) locations.

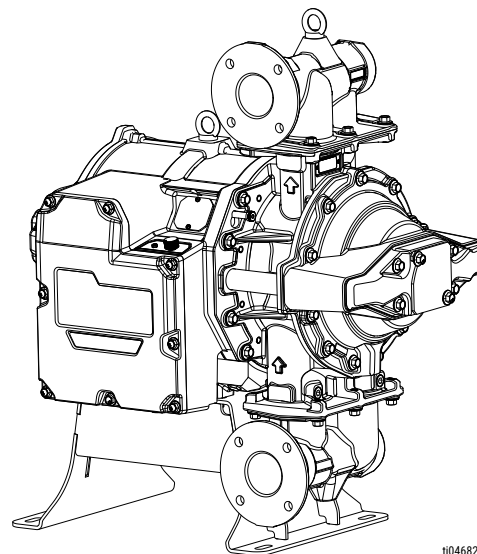


Important Safety Instructions

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



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MODELS AND APPROVALS

The maximum working pressure and approvals of the QUANTM® i230 pump are shown.

Maximum Working Pressure: 100 psi (6.89 bar, 0.69 MPa)

Table 1-1: QUANTM i230 Pump Approvals

APPROVALS	
LISTED MET C E115803 NRTL LISTED MET US E115803 COMPLIES WITH UL 1004-1 CSA C22.2 NO. 100	CE

RELATED MANUALS

Additional documents are available to support the operation, repair, and maintenance of the QUANTM® i230 pump. Find English manuals and any available translations at www.graco.com.

Table 2-1: Related Manuals for QUANTM i230 High Flow Pump Instruction Manual X063399

ENGLISH MANUAL	DESCRIPTION
X064570	QUANTM i230 High Flow Pump Repair/Parts Manual

SAFETY SYMBOLS

The symbols in this manual provide important safety information to help users operate and maintain the equipment safely and effectively. This table describes the meaning of each symbol.

SYMBOL	MEANING	SYMBOL	MEANING
	Burn Hazard		Splash Hazard
	Cleaning Solvent Hazard		Toxic Fluid or Fumes Hazard
	Crush Hazard		Do Not Wipe with a Dry Cloth
	Electric Shock Hazard		Eliminate Ignition Sources
	Entanglement Hazard		Follow Pressure Relief Procedure
	Equipment Misuse Hazard		Ground Equipment
	Fire and Explosion Hazard		Read Manual
	Moving Parts Hazard		Ventilate Work Area
	Pressurized Equipment Hazard		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.

DANGER



SEVERE ELECTRIC SHOCK HAZARD

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



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

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 and grounded hoses.
- **Stop operation immediately** if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.
- Route exhaust away from all ignition sources. If diaphragm ruptures, fluid may be exhausted with air.



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 areas.
- Do not clean with a dry cloth.



WARNING



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.
- Do not leave the work area while equipment is energized or under pressure.
- 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 hoses, fluid lines, cords, and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or overbend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



PLASTIC PARTS CLEANING SOLVENT HAZARD

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

- Use only compatible solvents to clean plastic structural or pressure-containing parts.
- See **Technical Specifications** in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.

 WARNING	
  	PRESSURIZED EQUIPMENT HAZARD Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury. • Follow the Pressure Relief Procedure when you stop spraying/dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.
	PRESSURIZED ALUMINUM PARTS HAZARD Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage. • Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents. • Do not use chlorine bleach. • Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.
  	THERMAL EXPANSION HAZARD Fluids subjected to heat in confined spaces, including hoses, can create a rapid rise in pressure due to the thermal expansion. Over-pressurization can result in equipment rupture and serious injury. • Open a valve to relieve the fluid expansion during heating. • Replace hoses proactively at regular intervals based on your operating conditions.
 	ENTANGLEMENT HAZARD Rotating parts can cause serious injury. • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Do not wear loose clothing, jewelry, or long hair while operating equipment. • Equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.

 WARNING	
	BURN HAZARD Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns: • Do not touch hot fluid or equipment.
 	MOVING PARTS HAZARD Moving parts can pinch, cut, or amputate fingers and other body parts. • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.
	TOXIC FLUID OR FUMES HAZARD Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed. • Read Safety Data Sheets (SDSs) to know the specific hazards of the fluids you are using. • Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted into the air. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
	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.

FLUID TEMPERATURE RANGE

The table lists operating temperature ranges by material of the wetted section of the QUANTM i230 pump.

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.

Table 5-1: Fluid Temperature Range of Wetted Section

MATERIAL OF WETTED CONTACT SECTION PARTS (SEAT, CHECK, DIAPHRAGM)	FLUID TEMPERATURE RANGE OF WETTED SECTION MATERIAL (AL)	
	US	METRIC
(AC) Acetal	-20° to 180°F	-29° to 82°C
(AL) Aluminum	-60° to 275°F	-51° to 135°C
(BN) Buna-N	10° to 180°F	-12° to 82°C
(CR) Polychloroprene, standard, ball	10° to 180°F	-12° to 82°C
(CW) Polychloroprene, weighted, ball	10° to 180°F	-12° to 82°C
(FK) Fluoroelastomer	-40° to 275°F	-40° to 135°C
(GE) Graco Engineered Thermoplastic	-40° to 180°F	-40° to 82°C
(PS) PTFE/Santo 2-piece	-40° to 180°F	-40° to 82°C
(PT) PTFE	-40° to 220°F	-40° to 104°C
(SP) Santoprene®	-40° to 180°F	-40° to 82°C
(SS) 316 Stainless Steel	-60° to 275°F	-51° to 135°C
(TP) TPE	-20° to 150°F	-29° to 66°C

TECHNICAL SPECIFICATIONS

The table provides technical specifications of the QUANTM® i230 pump, including product attributes and performance characteristics.

Table 6-1: Technical Specifications for QUANTM i230 Pump

	US	METRIC		
Maximum fluid working pressure	100 psi	6.89 bar, 0.69 MPa		
Maximum free-flow delivery	230 gpm	870 lpm		
Maximum size pumpable solids	3/8 in.	9.5 mm		
Fluid flow*	1.25 gal./cycle	4.73 l/cycle		
Environmental temperature range	−4° to 104°F	−20° to 40°C		
Maximum operating altitude	9842 ft	3000 m		
Enclosure rating	IP66/NEMA type 4			
Electrical Ratings				
	Rated Voltage	Phase	Frequency	Current
i230 models, CN1 motor	380–480 V	3	50/60 Hz	16 A
Circuit Protection				
Maximum branch circuit protection rating	20 A, Inverse Time Circuit Breaker			
Short circuit current rating	5 kA			
Fluid Inlet/Outlet Sizes				
Models with wetted section materials coded:				
AL	3 in. ANSI			
Maximum Suction Lift*				
Wet	28 ft	8.5 m		
Dry	10 ft	3 m		
Noise (dBa)				
Maximum sound pressure (ISO 3744)	81.5 dBa			
Maximum sound power (ISO 3744)	103.2 dBa			
Sound pressure measured 3.3 ft (1.0 m) from equipment.				
Weight				
AL fluid section	130 lb	59 kg		
Complete pump	388 lb	176 kg		

TECHNICAL SPECIFICATIONS

	US	METRIC
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.		

CONFIGURATION MATRIX

Record the model part number and configuration sequence from the Identification Plate (ID) on the side of the motor module. This information will enable you to order the correct replacement parts for the pump.

Model Part Number:

Configuration Sequence:

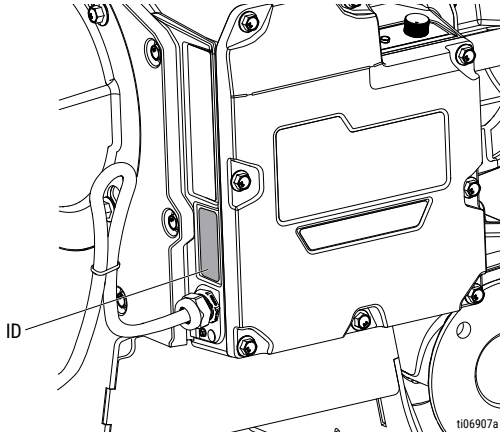


Figure 7-1: Identification Plate Location

Use the table to decode the Configuration Sequence.

CONFIGURATION MATRIX

Table 7-1: QUANTM i230 Configuration Codes

EXAMPLE SEQUENCE:		TE	230	C	N	1	AL	F	SP	SP	SP	--
Application												
TE Transfer												
Model												
230 230 (3 in. porting)												
Motor												
Drive												
C : Powder Coat Black												
Location												
N: Normal Location												
Input Voltage												
1: 380–480 V, 3-Phase												
Fluid Section												
AL Aluminum												
Connections												
F Flange												
Check Valve Seats												
SP Santoprene												
SS Stainless Steel												
BN Buna-N												
FK Fluoroelastomer												
GE Graco Engineered Thermoplastic												
TP TPE												
Check Valve Ball												
SP Santoprene												
CR Neoprene												
CW Weighted Neoprene												
BN Buna-N												

CONFIGURATION MATRIX

EXAMPLE SEQUENCE:		TE	230	C	N	1	AL	F	SP	SP	SP	--
FK	Fluoroelastomer											
GE	Graco Engineered Thermoplastic											
AC	Acetal											
PT	PTFE											
Diaphragm												
SP	Santoprene											
CR	Neoprene											
BN	Buna-N											
FK	Fluoroelastomer											
GE	Graco Engineered Thermoplastic											
TP	TPE											
PS	PTFE/Santoprene 2-piece											
Options												
--	None											

COMPONENT IDENTIFICATION

The diagram shows the components of the QUANTM® i230 pump.

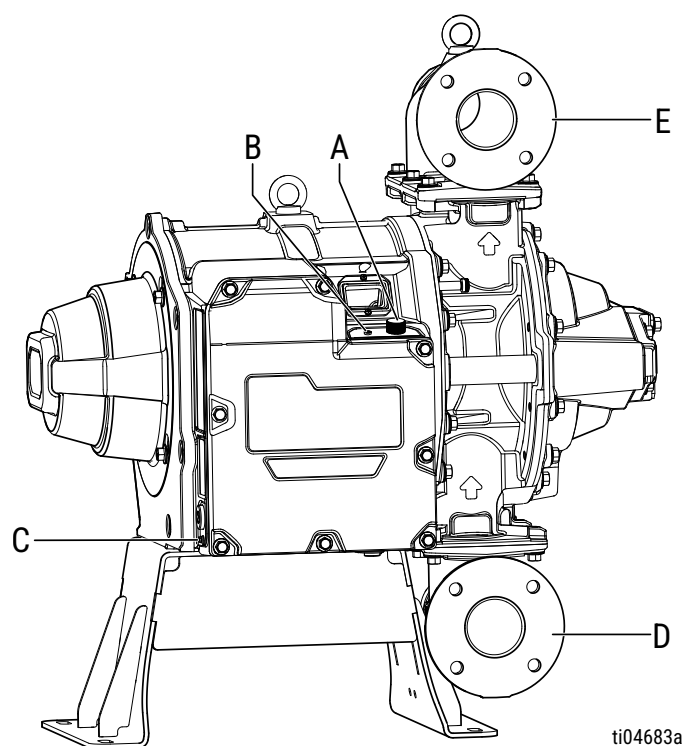


Figure 8-1: Component Identification

KEY

- A Control Knob
- B LED Indicator
- C External Ground Fastener
- D Fluid Inlet Port
- E Fluid Outlet Port

TYPICAL INSTALLATION

The diagram of a typical product installation is a general guideline for selecting and installing components for the QUANTM® i230 pump.

For specific installation requirements or product compatibility, contact a local distributor for professional assistance. Always use genuine Graco parts and accessories. Be sure that all accessories are adequately sized and pressure-rated to meet the requirements of the system.

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

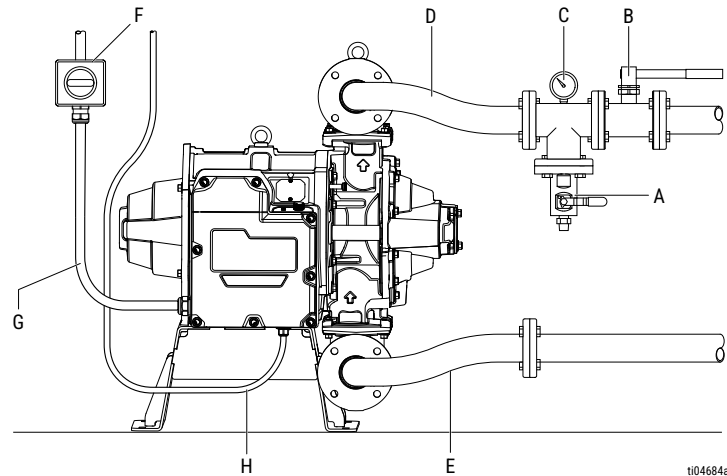


Figure 9-1: Typical Installation Diagram

ACCESSORIES (NOT SUPPLIED)

- A* Fluid Drain Valve
- B* Fluid Shutoff Valve
- C* Fluid Pressure Gauge
- D* Conductive, Flexible Fluid Outlet Line
- E* Conductive, Flexible Fluid Supply Line
- F* Electrical Disconnect
- G* Power Cable, 3-Wire with Ground
- H I/O cable (M12, 5-Pin Connector)**

* Required but not supplied.

** See [I/O Pin Connection, page 22](#).

INSTALLATION

Follow these instructions to correctly and safely install the QUANTM® i230 pump.

⚠ DANGER			
			
DANGER SEVERE ELECTRIC SHOCK HAZARD This equipment is 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

Attach the QUANTM® i230 pump to a stable surface with the provided fasteners to ensure safe and efficient operation.

⚠ WARNING			
			
The pump is heavy (see Technical Specifications for weights of the fluid section and complete pump). Use at least two straps and both lift rings on the pump with appropriate lifting equipment. Do not use the upper manifold or port alone to lift the pump. Mount the pump to the mounting surface using fasteners through each hole of the feet.			

1. Ensure that the mounting surface is level.
2. Ensure that the mounting surface and mounting hardware are strong enough to support the weight of the pump, fluid lines, accessories, and fluid, as well as the stress of operation.

3. Move the pump into position on the mounting surface. Use at least two straps and both lift rings on the pump with appropriate lifting equipment. Do not use the upper manifold or port alone to lift the pump.

NOTE:

For ease of operation and service, locate the pump so the Control Knob, LED Indicator, I/O port/cable, and Fluid Inlet Port and Fluid Outlet Port are easily accessible.

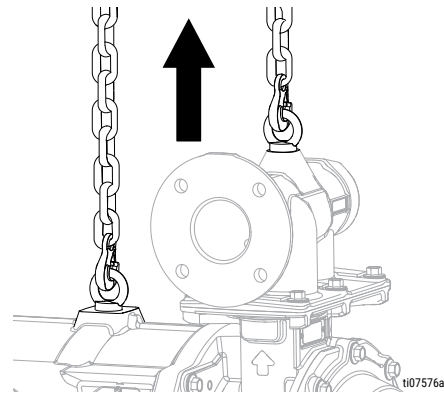


Figure 10-1: Using the Lift Rings

4. Secure the pump to the mounting surface.

NOTICE

To avoid pump damage, mount the pump to the mounting surface with fasteners through the mounting holes on the base.

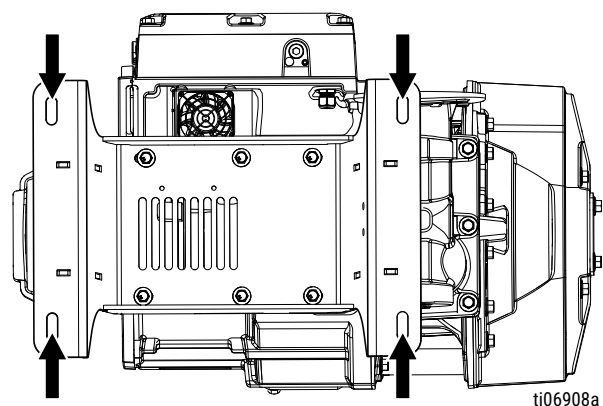


Figure 10-2: Mounting Holes

CONNECT FLUID LINES

Use conductive, flexible fluid lines to supply fluid to and dispense fluid from the pump.

1. Install a Fluid Drain Valve (A) near the fluid outlet. See **Typical Installation**.

WARNING				
				
A Fluid Drain Valve 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.				

2. Install a Fluid Shutoff Valve (B) in the fluid outlet line downstream from the Fluid Drain Valve.

NOTE:

Install the equipment as close as possible to the material source. See **Technical Specifications** 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.

3. Install a Fluid Pressure Gauge (C) for more precise adjustment of the fluid pressure.
4. Install a conductive, Flexible Fluid Line (D) to connect the outlet port of the pump to the fluid dispense point.
5. Install a conductive, Flexible Fluid Line (E) to connect the inlet port of the pump to the supply and shutoff valves.

GROUNDING

Before operating the QUANTM® i230 pump, ground the system as follows.

DANGER				
				
DANGER SEVERE ELECTRIC SHOCK HAZARD This equipment is 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. This equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current. • Always ground the entire fluid system as described in this section. • Follow local codes and regulations.				

INSTALLATION

GROUND THE PUMP

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

NOTE:

A ground wire and clamp are available (purchase separately). See your related repair/parts manual. See **Related Manuals**.

GROUND THE PAILS FOR SOLVENTS AND SANITIZING SOLUTION USED FOR FLUSHING

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

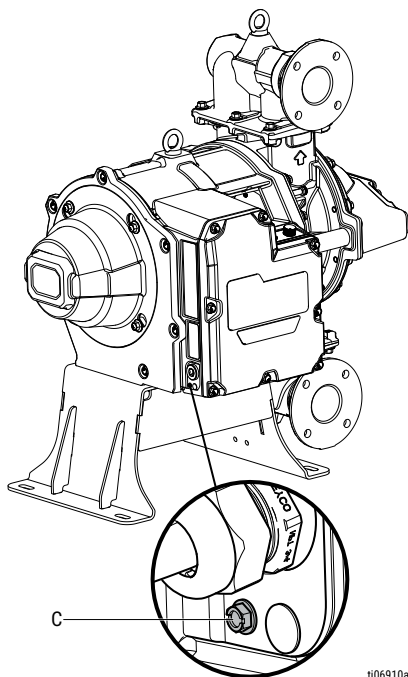


Figure 10-3: External Ground Fastener

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.

ELECTRICAL CONNECTIONS AND WIRING

POWER CABLE CONNECTION

The diagram shows how to connect the pump to 3-phase power with a user-supplied power cable.

⚠ DANGER				
				
DANGER SEVERE ELECTRIC SHOCK HAZARD This equipment is 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.				

Connect the equipment through a suitably rated branch circuit disconnecting device and branch circuit overcurrent protection device (ABB part number TEYL3020B or equivalent) provided by the installer in accordance with applicable electrical codes.

Installation and connection of the power supply conductors must be performed by a qualified electrician. Connect the equipment to a properly grounded 380–480 VAC, 3-phase, 50/60 Hz power source.

Some local regulations may require additional EMC (electromagnetic compatibility) measures. A snap-on ferrite core is supplied with the pump for installation on the power conductor to comply with these requirements.

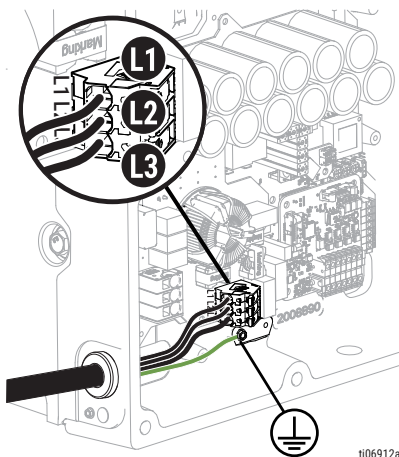


Figure 10-4: Wiring for 3-Phase Power

Power supply conductors (cables) are not provided with this equipment and must be supplied by the installer. Use only copper conductors rated for a minimum of 600 V and 167°F (75°C). Power supply conductors must be a minimum of 12 AWG (4 mm²) and selected and installed in accordance with all applicable local, national, and regional electrical codes and regulations.

I/O PIN CONNECTION

The diagrams show the input/output (I/O) cable pin connections for the QUANTM® i230 pump.

⚠ DANGER






DANGER

SEVERE ELECTRIC SHOCK HAZARD

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

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

NOTE:

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

The optional digital output signals require power from either an internal or external power supply. See table for details. When power for digital output is detected, the LED will illuminate.

- Internal power can be supplied by connecting pin 1 to pin 3, and pin 2 to pin 4.
- External power can be supplied by connecting pins 3 and 4 to the external source.

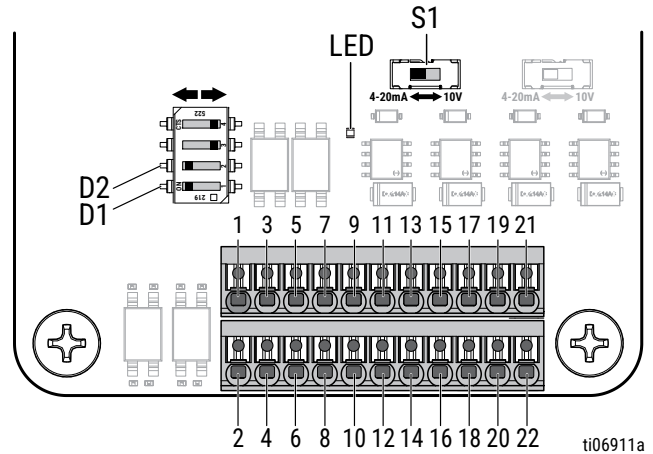


Figure 10-5: I/O Connectors and Switches

INSTALLATION

Table 10-1: I/O Connector Pinout

TERMINAL	SIGNAL	DESCRIPTION
Power Supply Connections		
1	24 V Power Out	Provides power for external devices 24 VDC, maximum 200 mA
2	24 V Power Common	Ground reference for Terminal 1
Digital Outputs		
3	Digital Output Power In	24 VDC supply input 12–24 VDC
4	Digital Output Common	Ground reference for Terminal 3
5	Digital Output Run	Activates when pump is operating 0.5 A output maximum
6*	Digital Output Common	Common for Terminal 5
7	Digital Output Cycle Pulse	Activates during outbound stroke 0.5 A output maximum
8*	Digital Output Common	Common for Terminal 7
9	Digital Output Fault	Activates during fault condition 0.5 A output maximum
10*	Digital Output Common	Common for Terminal 9
11	Digital Output Leak	Activates when leak is detected 0.5 A output maximum
12*	Digital Output Common	Common for Terminal 11
Digital Inputs		
13	Digital Input Run	Remote run/stop control
14	Digital Input Common	Common for Terminal 13
15	Not used	—
16	Digital Output Common	—
Analog Inputs		
17**	10 V Analog Power Out	Internal analog reference supply +10 VDC Reference
18**	10 V Analog Power Out	Ground for Terminal 17

INSTALLATION

TERMINAL	SIGNAL	DESCRIPTION
19	Analog In 1	Controls pump speed S1 selects between 4–20 mA (left toggle) and 0–10 V input (right toggle)
20†	Analog Common	Common for Terminal 19
21	Not used	–
22†	Analog Common	–

Notes

* Pins 6, 8, 10, and 12 are internally connected.

** Pins 17 and 18 are internally connected.

† Pins 20 and 22 are internally connected.

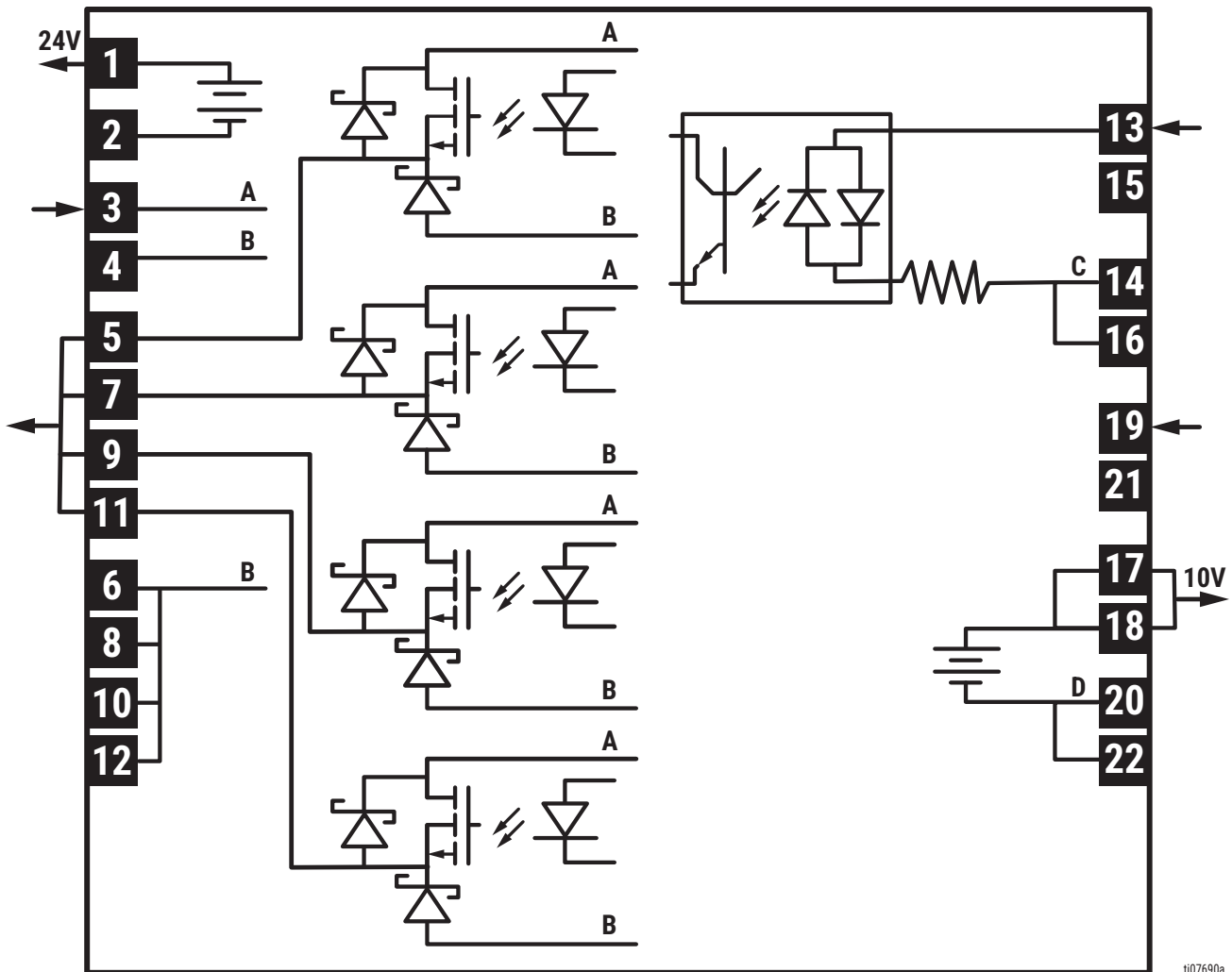


Figure 10-6: Equivalent Internal Circuit Diagram

INSTALLATION

KEY	
A	Digital Output Power
B	Digital Output Common
C	Digital Input Common
D	Analog Input Common

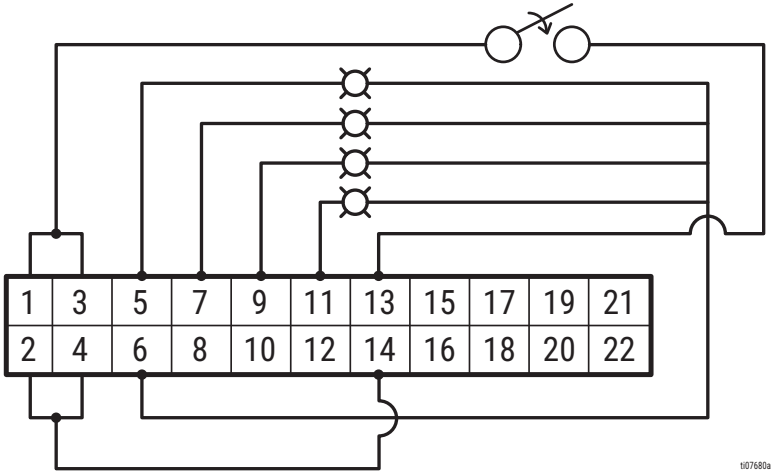


Figure 10-7: Digital I/O with Internal Power

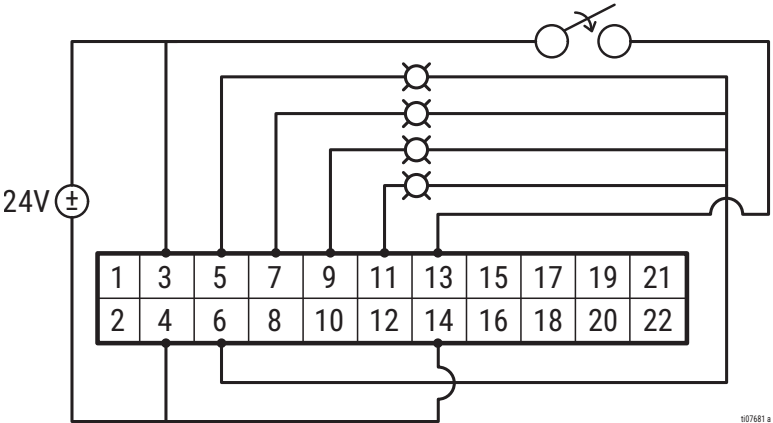


Figure 10-8: Digital I/O with External Power

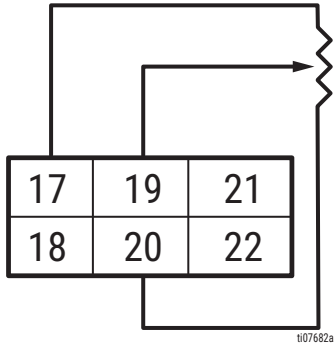


Figure 10-9: Option A: Analog Voltage Input

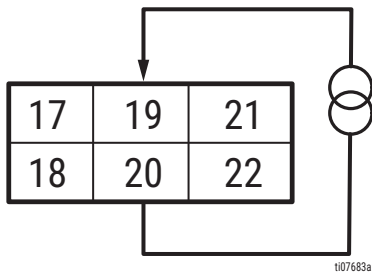


Figure 10-10: Option B: Analog Current Input

Table 10-2: Configuration Switches

SWITCH	NAME	FUNCTION
D1	Digital Input Enable / Disable	Enables (left toggle) or disables digital input
D2	Analog Input Enable / Disable	Enables (left toggle) analog speed control; disables local control knob when ON
S1	Analog Signal Type Selector	Selects between 4–20 mA current (left toggle) and 0–10 V input voltage (right toggle)

OPERATION

PRESSURE RELIEF PROCEDURE



Follow the Pressure Relief Procedure whenever you see this symbol.

 WARNING				
				
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 Control Knob to off and disconnect power to the system.
2. Close the Fluid Shutoff Valve.
3. Open the Fluid Drain Valve to relieve fluid pressure. Prepare a container to catch the drainage.
4. Leave the Fluid Drain Valve open until the system is ready to be pressurized.

BEFORE EACH USE

Prepare the equipment for initial operation by tightening fasteners and connections, and flushing the equipment.

TIGHTEN FASTENERS

Check and tighten all fasteners before using the equipment.

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

Flush the equipment before each use. See **Maintenance**.

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

START THE EQUIPMENT

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

PREPARE THE EQUIPMENT FOR STARTUP

1. Turn the Control Knob to off.
2. Confirm that the equipment is properly grounded. See **Grounding**.
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 into the fluid to be dispensed.
5. Insert the outlet end of the Fluid Outlet Line into the end container.
6. Close the Fluid Drain Valve.
7. Ensure that all Fluid Shutoff Valves are open.
8. If the Fluid Outlet Line has a dispensing device, open the dispensing valve to allow fluid to flow into the end container.

START AND ADJUST THE EQUIPMENT

1. Follow **Prepare the Equipment for Startup**.
2. Connect the equipment to a power source.

NOTE:

An alert beep will sound and the pump will start cycling if the Control Knob is not turned to off when you connect the pump to power.

3. Turn the Control Knob on and allow the equipment to complete the startup sequence. See **LED Indicator**.

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 until the equipment is operating at the set output level.
5. If flushing, run the equipment long enough to thoroughly clean the equipment and lines.

TIPS TO REDUCE CAVITATION

NOTICE

Cavitation in a double diaphragm pump is the formation and collapse of bubbles in the pumped liquid. Frequent or excessive cavitation can cause serious damage, including pitting and early wear of fluid chambers, balls, and seats. It may result in reduced efficiency of the pump. Cavitation damage and reduced efficiency both result in increased operating costs.

Cavitation depends on the vapor pressure of the pumped liquid, the system suction pressure, and the velocity pressure. It can be reduced by changing any of these factors.

- Reduce vapor pressure: Decrease the temperature of the pumped liquid.
- Increase suction pressure:
 - Lower the installed position of the pump relative to the liquid level in the supply.
 - Reduce the friction length of the suction piping. Remember that fittings add friction length to the piping. Reduce the number of fittings to reduce the friction length.
 - Increase the size of the suction piping.

NOTICE

To avoid pump damage and inefficient operation, ensure that the inlet fluid pressure does not exceed 25 percent of the outlet working pressure.

- Reduce liquid velocity: Slow the cyclic rate of the pump.

Viscous liquids are difficult to pump and are prone to cavitation. Viscosity is usually process-dependent and cannot be changed to reduce cavitation.

Take all these factors into account in your system design. To maintain pump efficiency, supply only enough power to the pump to achieve the required flow.

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

SHUT DOWN THE EQUIPMENT

⚠ WARNING				
				

1. Follow **Pressure Relief Procedure**.
2. Follow **Flush the Equipment**.

LED INDICATOR

The LED Indicator on the front of the pump reports equipment status and error conditions.

The LED Indicator light reports equipment status with color and flashing.

Table 12-1: LED Indicator Equipment Status

LED INDICATOR	EQUIPMENT STATUS	NOTES
Red, solid	Powered on, speed set at 0 (zero), system not operating.	Be aware that the equipment is energized. To initiate equipment operation, follow Start the Equipment .
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 Power Cable Connection .
Yellow, solid	Calibrating. Performing startup sequence.	No action. Allow equipment to finish startup sequence. Open the Fluid Drain Valve (G) or Fluid Shutoff Valve (H) to allow the equipment to cycle until the startup sequence is finished.
Green, solid	Startup sequence complete.	To initiate equipment operation, follow Start the Equipment .
	Normal operation.	No action.
Green, flashing	Normal operation, stalled against pressure.	Be aware that the equipment is energized. Special case action: see LED Indicator Event Errors .
Note: Red or yellow flashing lights or no light indicate an error. See LED Indicator Event Errors .		

MAINTENANCE

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

NOTICE

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

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 overtighten 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 drive when replacing diaphragms. See your related repair/parts manual. See **Related Manuals**.

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

WARNING



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**.
 2. Insert the suction end of the Fluid Supply Line into a compatible solvent.
 3. Close the Fluid Drain Valve.
 4. Ensure the Control Knob is turned to off (0).
 5. If the Fluid Outlet Line 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 are open.
 7. Connect the equipment to a power source.
 8. Slowly increase the Control Knob 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 to off.
 11. Follow **Pressure Relief Procedure**.

STORE THE EQUIPMENT

⚠ WARNING				
				

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

1. Follow **Pressure Relief Procedure**.
2. Follow **Flush the Equipment**.

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 of the pump.

⚠ WARNING				
				

Determine whether or not to disassemble equipment for cleaning. Clean in accordance with applicable codes and local regulations for your compatible solvent.

CLEAN IN - PLACE (CIP)

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

1. Follow **Pressure Relief Procedure**.
2. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**.

3. Circulate the compatible solvent through the equipment. Slowly cycle the equipment as the compatible solvent is circulated.

NOTE:

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

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

4. Follow **Pressure Relief Procedure**.

CLEAN OUT - OF - PLACE (COP)

1. Follow **Pressure Relief Procedure**.
2. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**.
3. Disassemble parts as needed. See your related repair/parts manual. See **Related Manuals**.
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 solvent at the recommended temperature and concentration of the manufacturer.
6. Rinse the parts again with water and allow parts to completely dry.
7. Inspect the parts and re-clean any soiled parts.
8. Reassemble the equipment as needed. See your related repair/parts manual.
9. Flush the equipment with a compatible solvent. Follow **Flush the Equipment**.
10. Circulate the compatible solvent through the equipment. Slowly cycle the equipment as the compatible solvent is circulated.

NOTE:

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

NOTICE

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

11. Follow **Pressure Relief Procedure**.

TROUBLESHOOTING

When problems occur, use the table to identify potential causes and solutions for the QUANTM® i230 pump.

⚠️ WARNING











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

Check all possible problems and causes before disassembling equipment.

For repair and replacement procedures, see your related repair/parts manual. See **Related Manuals**.

TROUBLESHOOTING

Table 14-1: Troubleshooting

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 is not set to the off position.	Turn the Control Knob to the off 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 LED Indicator Event Errors .
Equipment cycles, but does not prime or pump.	Equipment running too fast, causing cavitation before prime.	Slow down the motor speed.
	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 [‡]	Loose manifold connections or fluid cover connections.	Tighten.
	Worn manifold seats or seals.	Replace.
Equipment stalled, will not cycle	Fluid line clogged or valves closed.	Inspect, clear. Open valves downstream of the equipment.
	Motor or controller wired improperly.	See wiring instructions in Electrical Connections and Wiring and your related repair/parts manual. See Related Manuals .
	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.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Reduced performance	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 suddenly stops operating or shuts down.	Ground fault circuit interrupter (GFCI) tripped.	Remove controller from the GFCI circuit.
	Poor supply power.	Check connections. Determine and fix the source of the problem with the supply power.
	Exceeded operational parameters.	See LED Indicator Event Errors 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 is disconnected.	Ensure that the leak sensor is properly installed.

LED INDICATOR EVENT ERRORS

The LED Indicator light reports equipment errors with flashing colors, a dim red solid light, and no light.



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

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

Check all possible problems and causes before disassembling equipment.

For repair and replacement procedures, see your related repair/parts manual. See **Related Manuals**.

TROUBLESHOOTING

Table 14-2: LED Indicator Event Errors

LED INDICATOR	PROBLEM	CAUSE	SOLUTION
Red, flashing, one flash	Motor overheating, controller overheating, or cooling fan motor cannot run.	Hot operating environment, hot operating conditions, or cooling fan motor issue.	Turn the Control Knob to the off position. Keep the system connected to power and allow the equipment to cool before returning to operation.
			If the pump is able to run while the LED Indicator flashes red, replace the fan motor.
			Inspect the fan. Repair or replace as needed.
Red, flashing, two flashes	Motor current error.	Special-case cause.	Turn the Control Knob down, then back up. If the problem persists, contact Technical Support.
Red, flashing, 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.
			If the problem persists, 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.
		Motor sensor not functioning.	Replace the motor sensor.
Red, flashing, five flashes	Special-case problem.	Special-case cause.	Power cycle the unit. If the error persists, contact Technical Assistance.
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 your related repair/parts manual.
Red, flashing, eight flashes	Cooling fan error.	The fan cannot spin at the required speed.	Inspect the fan. Repair or replace as needed.
Dim red, solid	Voltage detection error.	Power disconnected.	Check power connection.
		System powering down.	Allow equipment to finish shutdown.

TROUBLESHOOTING

LED INDICATOR	PROBLEM	CAUSE	SOLUTION
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.
		Internal condensation is tripping the leak sensor.	Use fluid at temperatures above atmospheric dew point.
		The leak sensor disconnected.	Ensure the leak sensor is properly installed.
Green, flashing, continuous flash	Equipment stalled against pressure.	A valve downstream in the fluid line is closed or clogged.	Open the valve.
			Follow the Pressure Relief Procedure , and clear the valve.
		Special-case cause.	Be aware that the equipment is energized. Special-case action.
			Contact Technical Assistance.
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.

PERFORMANCE CHART

The performance curve shows the QUANTM® i230 pump pressure for a given flow rate.

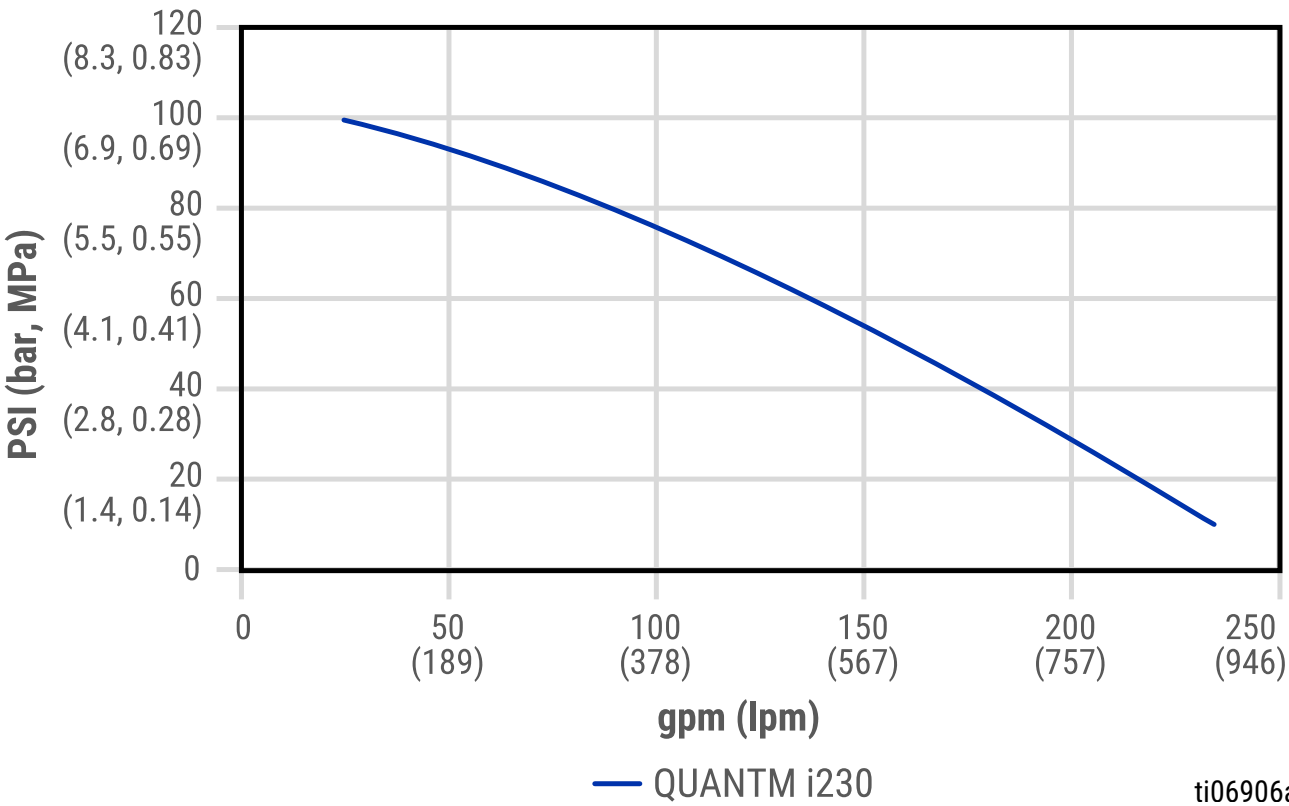
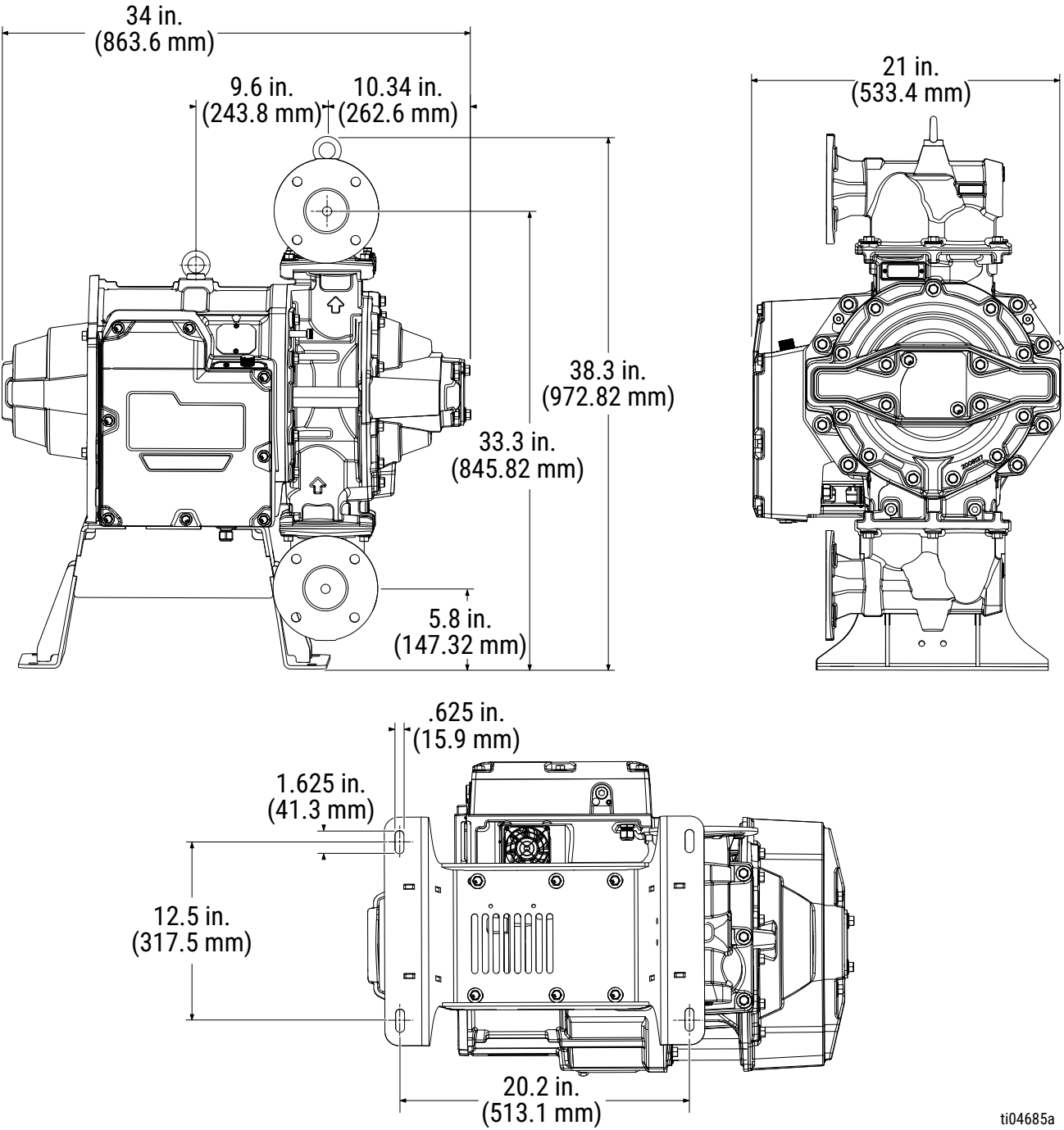


Figure 15-1: Performance Chart for QUANTM i230 Pump

DIMENSIONS

The diagram shows the dimensions of the QUANTM® i230 pump.



ti04685a

Figure 16-1: Dimension Diagram for QUANTM i230

CALIFORNIA PROPOSITION 65

CALIFORNIA RESIDENTS

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

GRACO STANDARD WARRANTY

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

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

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

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