

# Reactor<sup>®</sup> E-10hp

332144J

EN

***For spraying or dispensing polyurea coatings and polyurethane foam. For professional use only.***

**Not approved for use in explosive atmospheres or hazardous locations.**

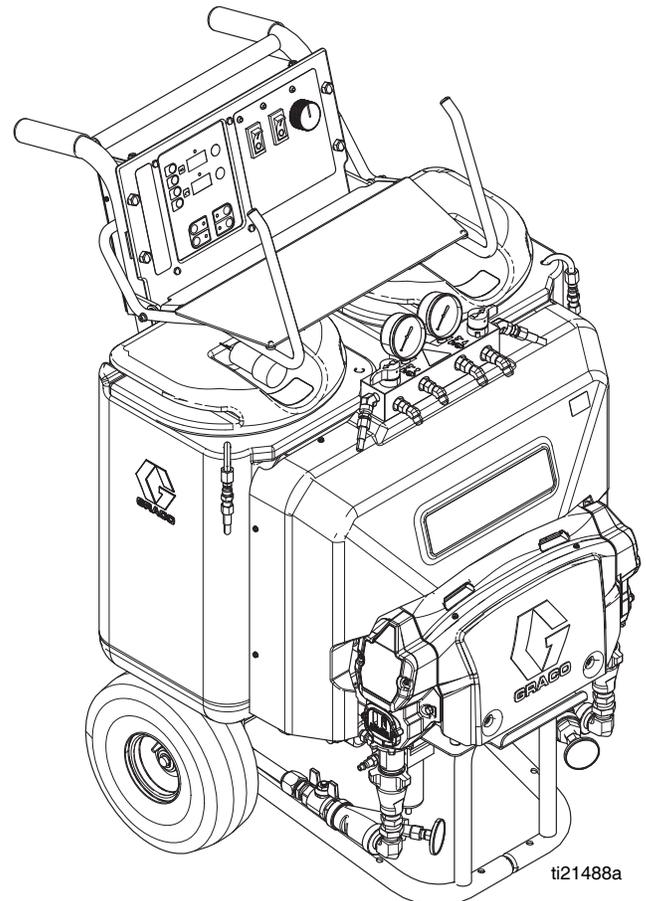
*3000 psi (21 MPa, 207 bar) Maximum Working Pressure*

For model information, see page 9.



## **Important Safety Instructions**

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



# Contents

<b>Warnings</b> .....	<b>3</b>	<b>Troubleshooting</b> .....	<b>28</b>
<b>Important Isocyanate (ISO) Information</b> .....	<b>7</b>	Pump Control Status Codes .....	28
Isocyanate Conditions .....	7	DIP Switch Settings .....	30
Material Self-Ignition .....	8	Heat Control Diagnostic Codes .....	32
Keep Components A and B Separate .....	8	Reactor Electronics .....	34
Moisture Sensitivity of Isocyanates .....	8	Heaters .....	35
Foam Resins with 245 fa Blowing Agents .....	8	Proportioner .....	36
Changing Materials .....	8	<b>Repair</b> .....	<b>39</b>
<b>Systems</b> .....	<b>9</b>	Before Beginning Repair .....	39
<b>Models</b> .....	<b>9</b>	Remove Supply Tank .....	39
<b>Related Manuals</b> .....	<b>10</b>	Replace Spray Valves .....	40
<b>Overview</b> .....	<b>11</b>	Displacement Pump .....	41
<b>Component Identification</b> .....	<b>12</b>	Control Panel .....	42
<b>Controls and Indicators</b> .....	<b>13</b>	Motor Control .....	44
Heater Controls .....	13	Heater .....	48
System Controls .....	13	Pressure Transducers .....	50
Controls and Indicators .....	14	Drive Housing .....	51
<b>Setup</b> .....	<b>16</b>	Replace Cycle Counter Switch .....	52
Locate Reactor .....	16	Electric Motor .....	53
Electrical Requirements .....	16	Motor Brushes .....	54
Grounding .....	17	Fans .....	54
Connect Fluid Hoses .....	17	Tank Fluid Level Sensors .....	55
Connect Gun Air Hose .....	17	<b>Parts</b> .....	<b>57</b>
Connect Main Air Supply .....	17	System Packages .....	57
Flush Before First Use .....	17	E-10hp Proportioners .....	58
Fill Wet-Cups .....	18	24T954, 100-120VAC and 200-40VAC Bare	
Fill Fluid Tanks .....	18	Proportioner .....	64
Purge Air and Flush Fluid From Lines .....	19	24U009, 100-120VAC Heater	
<b>Startup</b> .....	<b>20</b>	24T955, 200-240VAC Heater .....	66
Heatup Guidelines .....	21	24T962, Display .....	67
Heat Management Tips .....	21	Fluid Inlets .....	68
<b>Operation</b> .....	<b>22</b>	24T960, Fluid Manifold .....	69
Spraying .....	22	25R000, Insulated Hose Bundle with	
Pause .....	23	Recirculation Lines .....	70
Refill Tanks .....	23	Outlet Manifold .....	70
Pressure Relief Procedure .....	24	<b>Suggested Replacement Parts</b> .....	<b>73</b>
<b>Shutdown</b> .....	<b>24</b>	<b>Accessories</b> .....	<b>73</b>
<b>Maintenance</b> .....	<b>25</b>	<b>Dimensions</b> .....	<b>73</b>
<b>Flushing</b> .....	<b>26</b>	<b>Technical Specifications</b> .....	<b>74</b>
Purge Hoses .....	27	<b>California Proposition 65</b> .....	<b>75</b>
		<b>Graco Standard Warranty</b> .....	<b>76</b>

# Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 <h2 style="margin: 0;">WARNING</h2>	
 	<p><b>ELECTRIC SHOCK HAZARD</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>• Use only 3-wire extension cords.</li> <li>• Ensure ground prongs are intact on power and extension cords.</li> <li>• Do not expose to rain. Store indoors.</li> </ul>
	<p><b>TOXIC FLUID OR FUMES HAZARD</b></p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled or swallowed.</p> <ul style="list-style-type: none"> <li>• Read Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure.</li> <li>• When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See <b>Personal Protective Equipment</b> warnings in this manual.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> </ul>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <p>Always wear appropriate personal protective equipment and cover all skin when spraying, servicing equipment, or when in the work area. Protective equipment helps prevent serious injury, including long-term exposure; inhalation of toxic fumes, mists or vapors; allergic reaction; burns; eye injury and hearing loss. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• A properly fitting respirator, which may include a supplied-air respirator, chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority.</li> <li>• Protective eyewear and hearing protection.</li> </ul>

# **WARNING**

    	<p><b>SKIN INJECTION HAZARD</b></p> <p>High-pressure fluid from gun, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. <b>Get immediate surgical treatment.</b></p> <ul style="list-style-type: none"> <li>• Engage trigger lock when not spraying.</li> <li>• Do not point gun at anyone or at any part of the body.</li> <li>• Do not put your hand over the spray tip.</li> <li>• Do not stop or deflect leaks with your hand, body, glove, or rag.</li> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
   	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Flammable fumes, such as solvent and paint fumes, in <b>work area</b> can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well-ventilated area.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).</li> <li>• Ground all equipment in the work area. See <b>Grounding</b> instructions.</li> <li>• Never spray or flush solvent at high pressure.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.</li> <li>• Use only grounded hoses.</li> <li>• Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul>

# ! WARNING



## 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.



## 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.



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



# WARNING



## 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.



## BURN HAZARD

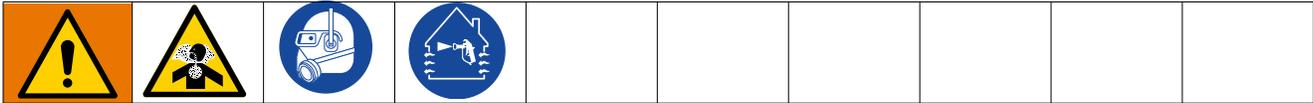
Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.

# Important Isocyanate (ISO) Information

Isocyanates (ISO) are catalysts used in two component materials.

## Isocyanate Conditions



Spraying or dispensing fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates.

- Read and understand the fluid manufacturer’s warnings and Safety Data Sheets (SDSs) to know specific hazards and precautions related to isocyanates.
- Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer’s application instructions and SDSs.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material, which could cause off gassing and offensive odors. Equipment must be carefully maintained and adjusted according to instructions in the manual.
- To prevent inhalation of isocyanate mists, vapors and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer’s SDSs.
- Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.
- Hazard from exposure to isocyanates continues after spraying. Anyone without appropriate personal protective equipment must stay out of the work area during application and after application for the time period specified by the fluid manufacturer. Generally this time period is at least 24 hours.
- Warn others who may enter work area of hazard from exposure to isocyanates. Follow the recommendations of the fluid manufacturer and local regulatory authority. Posting a placard such as the following outside the work area is recommended:



## Material Self-Ignition

				
Some materials may become self-igniting if applied too thick. Read material manufacturer's warnings and Safety Data Sheets (SDSs).				

## Keep Components A and B Separate

				
Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination:				
<ul style="list-style-type: none"><li>• <b>Never</b> interchange component A and component B wetted parts.</li><li>• Never use solvent on one side if it has been contaminated from the other side.</li></ul>				

## Moisture Sensitivity of Isocyanates

Exposure to moisture (such as humidity) will cause ISO to partially cure, forming small, hard, abrasive crystal that become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity.

<b>NOTICE</b>
Partially cured ISO will reduce performance and the life of all wetted parts.
<ul style="list-style-type: none"><li>• Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. <b>Never</b> store ISO in an open container.</li><li>• Keep the ISO pump wet cup or reservoir (if installed) filled with appropriate lubricant. The lubricant creates a barrier between the ISO and the atmosphere.</li><li>• Use only moisture-proof hoses compatible with ISO.</li><li>• Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.</li><li>• Always lubricate threaded parts with an appropriate lubricant when reassembling.</li></ul>

**NOTE:** The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

## Foam Resins with 245 fa Blowing Agents

Some foam blowing agents will froth at temperatures above 90°F (33°C) when not under pressure, especially if agitated. To reduce frothing, minimize preheating in a circulation system.

## Changing Materials

<b>NOTICE</b>
Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.
<ul style="list-style-type: none"><li>• When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.</li><li>• Always clean the fluid inlet strainers after flushing.</li><li>• Check with your material manufacturer for chemical compatibility.</li><li>• When changing between epoxies and urethanes or polyureas, disassemble and clean all fluid components and change hoses. Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.</li></ul>

# Systems

Part	Maximum Working Pressure, psi (MPa, bar)	Volts	Proportioner Model	Unheated Hose 35 ft (10.6 m)	Cord Adapter	Gun	
						Model	Part
APT100	3000 (21, 207)	100-120 VAC	24T100	25R000	---	Fusion® Air Purge	249810
P2T100	3000 (21, 207)	100-120 ProblerVAC	24T100	25R000	---	Probler® P2	GCP2RA
APT900	3000 (21, 207)	200-240 VAC	24R900	25R000	North America	Fusion® Air Purge	249810
APT901	3000 (21, 207)	200-240 VAC	24R900	25R000	Europe	Fusion® Air Purge	249810
APT902	3000 (21, 207)	200-240 VAC	24R900	25R000	Australia/Asia	Fusion® Air Purge	249810
P2T900	3000 (21, 207)	200-240 VAC	24R900	25R000	North America	Probler® P2	GCP2RA
P2T901	3000 (21, 207)	200-240 VAC	24R900	25R000	Europe	Probler® P2	GCP2RA
P2T902	3000 (21, 207)	200-240 VAC	24R900	25R000	Australia/Asia	Probler® P2	GCP2RA
24T900	3000 (21, 207)	200-240 VAC	24R900	---	North America	---	---
24T901	3000 (21, 207)	200-240 VAC	24R900	---	Europe	---	---
24T902	3000 (21, 207)	200-240 VAC	24R900	---	Australia/Asia	---	---

## Models

The model number, series letter, and serial number are located on the back of the cart. For faster assistance, please have that information ready before calling Customer Service.

Bare Proportioner Part, Series	Volts	* Electrical Connection	Maximum Working Pressure, psi (MPa, bar)	Approvals
24T100, A	100-120 VAC	20 A cord (motor) 20 A cord (heaters)	3000 (21, 207)	  <b>Intertek</b> 9902471 Conforms to ANSI/UL Std. 499 Certified to CAN/CSA Std. C22.2 Number 88
24R900, A	200-240 VAC	15 A cord (motor) 15 A cord (heaters)	3000 (21, 207)	

\* See page 16 for detailed electrical requirements.

# Related Manuals

The following manuals are for Reactor E-10hp components and accessories. Some are supplied with your package, depending on its configuration. Manuals are also available at [www.graco.com](http://www.graco.com).

Manual in English	Description
<b>Displacement Pump</b>	
311076	Instruction-Parts Manual
<b>Fusion Air Purge Spray Gun</b>	
309550	Instruction-Parts Manual
<b>Probler P2 Spray Gun</b>	
313213	Instruction-Parts Manual
<b>Probler P2 Recirculation Kit</b>	
406842	Instruction-Parts Manual
<b>Lift Ring Kit</b>	
332977	Instruction-Parts Manual

# Overview

The Reactor E-10hp is a portable, electric-powered, 1:1 mix ratio proportioner for use with:

- Polyurea
- Polyurea hybrid coatings
- Polyurethane foam

Material may be applied with impingement mix spray guns.

The Reactor E-10hp is gravity-fed from 6 gal. (22.7 liter) supply tanks mounted on the unit.

Severe duty, positive displacement reciprocating piston pumps meter fluid flow to the gun for mixing and applying. When set to recirculation mode, the Reactor E-10hp will circulate fluids back to the supply tanks.

The Reactor E-10hp uses primary heating rods and boost heating rods, for each fluid, and an insulated hose bundle with circulation return hoses. This allows the hoses and gun to be preheated to the desired temperature before spraying. The boost heating rods are used during circulation mode to reduce heatup time. Digital displays show the temperatures of the two fluids.

Electronic controls monitor fluid pressures, drive the motor, and alerts the operator if errors occur. See **Motor/Pump Status Codes**, page 15, for further information.

The Reactor E-10hp has two recirculation speeds, slow and fast, and an adjustable pressure output.

## Slow Recirculation

- Slow circulation results in a higher temperature transfer in the heater, so hoses and gun heat up quicker.
- Good for touchup or low flow spraying, up to moderate temperature.
- Not used to circulate full tanks up to temperature.
- Use with 245 fa blowing agent foams, to minimize heat returned to tank and reduce frothing.

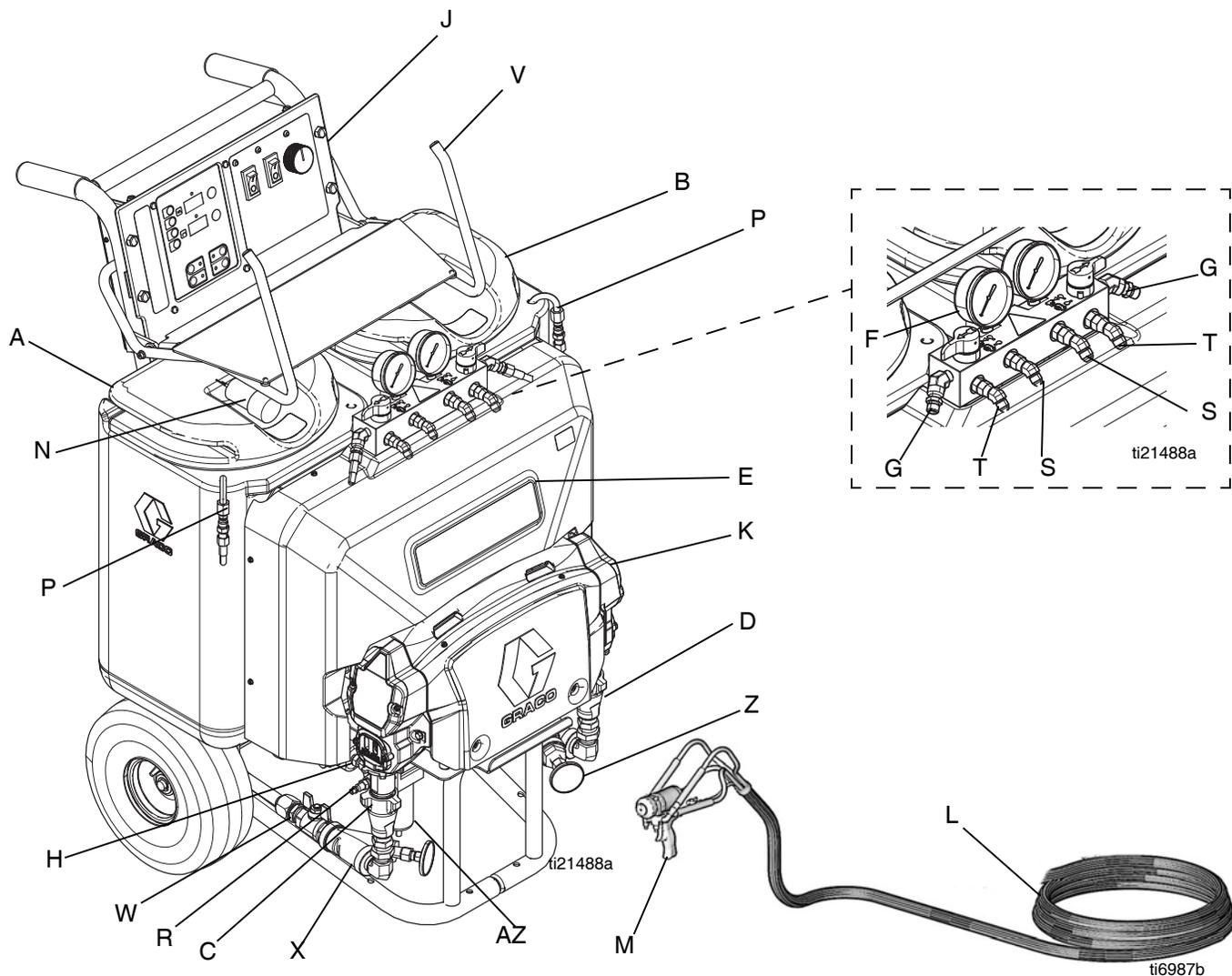
## Fast Recirculation

- Use to support higher flow rates or higher temperatures by preheating the tanks.
- Agitates fluid within tanks, to avoid heating only the fluid at the top of the tank.
- Use for flushing.

## Pressure Adjust

- Automatically maintains selected pressure output for dispensing or spraying.

# Component Identification



**FIG. 1 Component Identification**

**Key**

- A Supply Tank (ISO)
- B Supply Tank (RES)
- C Pump (ISO)
- D Pump (RES)
- E Heater (under shroud)
- F Fluid Pressure Gauges
- G Spray and Overpressure Relief Valves
- H Tank Level Sensors (bottom of tanks)
- J Control Panel; see FIG. 2, page 13
- K Electric Motor and Drive Housings
- L Insulated Hose Bundle (includes circulation return hoses)
- M Fusion Air Purge Spray Gun

**Key**

- N Desiccant Dryer
- P Recirculation Tubes
- R Air Line Inlet (quick-disconnect fitting)
- S Outlet Hose Connections
- T Return Hose Connections
- U Fluid Temperature Sensors (located on heater assembly, under shroud)
- V Hose Rack and Control Shield
- W Fluid Inlet Ball Valves (each side)
- X Fluid Inlet Strainers (each side)
- Y Power Cords (not shown)
- Z Fluid Temperature Gauges (each side)
- AZ Air Filter/Moisture Separator

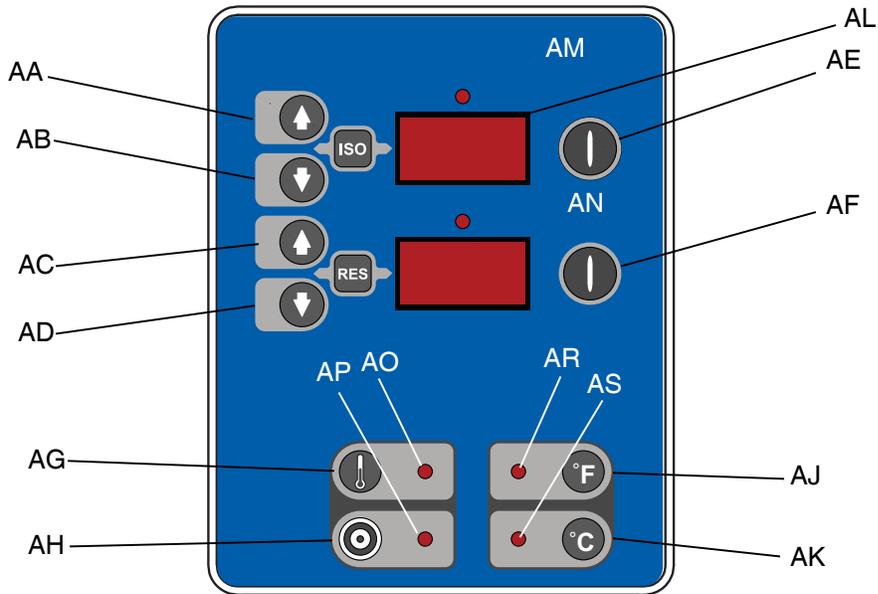
# Controls and Indicators

See **Controls and Indicators** identification table, page 14.

**NOTICE**

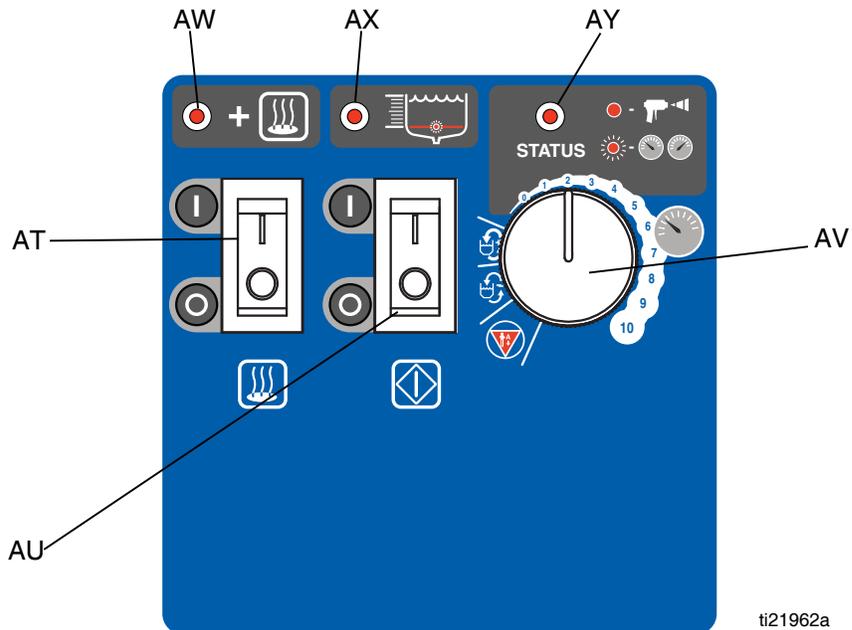
To prevent damage to the soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.

## Heater Controls



**FIG. 2 Heater Controls and Indicators**

## System Controls



ti21962a

**FIG. 3 System Controls and Indicators**

## Controls and Indicators

Key	Name	Description
<b>Heater Controls</b>		
AA	ISO Setpoint Increase	Increases the temperature setpoint by one degree in the units selected within the setpoint limits. Press target key prior to adjusting.
AB	ISO Setpoint Decrease	Decreases the temperature setpoint by one degree in the units selected within the setpoint limits. Press target key prior to adjusting.
AC	RES Setpoint Increase	Increases the temperature setpoint by one degree in the units selected within the setpoint limits. Press target key prior to adjusting.
AD	RES Setpoint Decrease	Decreases the temperature setpoint by one degree in the units selected within the setpoint limits. Press target key prior to adjusting.
AE	ISO Heater On/Off Key	Turns the heater on or off for ISO zone. Also clears heater zone diagnostic codes, see page 32.
AF	RES Heater On/Off Key	Turns the heater on or off for RES zone. Also clears heater zone diagnostic codes, see page 32.
AG	Actual Temperature Key	Press to display the actual temperature. Press and hold to display the electrical current.
AH	Target Temperature Key	Press to display the target temperature. Press and hold to display the heater control circuit board temperature.
AJ	Temperature Scale Key °F	Press to change the temperature scale to degrees Fahrenheit.
AK	Temperature Scale Key °C	Press to change the temperature scale to degrees Celsius.
AL	Temperature Display	Show the actual temperature or target temperature of the heater zones, depending on the selected mode. Defaults to actual at startup. The range is 32-170°F (0-77°C) for ISO and RES.
<b>Heater Indicators</b>		
AM	ISO Heater Activity	The LEDs flash when heater zones are on. The duration of each flash shows the extent that the heater is turned on.
AN	RES Heater Activity	The LEDs flash when heater zones are on. The duration of each flash shows the extent that the heater is turned on.
AO	Actual Temperatures Active	The actual temperatures are displayed.
AP	Target Temperatures Active	The target temperatures are displayed.
AR	Fahrenheit Units Active	Indicates that temperatures are displayed in °F.
AS	Celsius Units Active	Indicates that temperatures are displayed in °C.
<b>System Controls</b>		
AT	Heater Power	Enables heater control. The switch includes a 20 A circuit breaker.
AU	Motor Power	Enables motor. The switch includes a 20 A circuit breaker.
AV	Motor Pump Control Function Knob	Selects operation mode / pressure setpoint. See <b>Motor/Pump Control Function Knob</b> , page 15.
<b>System Indicators</b>		
AW	Boost Heat Indicator	Indicates that the boost heat is active.
AX	Tank Level Indicator	See <b>Tank Level Sensor LED</b> , page 15.
AY	System Status Indicator	Flashes an error code if alarm or deviation is active. See <b>Motor/Pump Status Codes</b> , page 15.

## Motor/Pump Control Function Knob

Use the knob (AV) to select desired function.

Icon	Setting	Function
	Park	Stops motor and automatically parks pumps.
	Slow Recirculation	Slow recirculation speed.
	Fast Recirculation	Fast recirculation speed.
	Pressure Adjust	Adjusts fluid pressure to gun in spray mode.

## Motor/Pump Status Codes

If error occurs, the status indicator (AY) will blink 1 to 19 times to indicate the status code, pause, then repeat, or will blink other active error codes. See TABLE 1 for a brief description of status codes.

**Table 1: Motor/Pump Status Codes**

Number	Name
1	Pressure imbalance between ISO and RES sides
2	Pressure deviation from setpoint
3	Pressure transducer ISO failure
4	Pressure transducer RES failure
5	Excessive current draw
6	High motor temperature
7	No cycle counter switch input
8	High cycle rate deviation (more than 1.0 GPM)
	High cycle rate shutdown (more than 1.1 GPM)
9	Low tank level
10	Not used
11	Locked motor rotor
12	Motor controller bus overvoltage
13	Motor controller bus undervoltage
14	Motor controller high temperature
15-19	Motor controller fault

**NOTE:** The default is to shut down if a status code indication occurs.

## Heater Control Diagnostic Codes

Heater control diagnostic codes appear on the temperature display. These alarms turn off heat.

**Table 2: Heater Control Diagnostic Codes**

Code	Name	Alarm Zone
01	High fluid temperature	Individual
02	High zone current	Individual
03	No zone current with heater on	Individual
04	Thermocouple not connected	Individual
05	High controller temperature	Individual
06	No communications with zone pod	Individual
09	Display is missing	Individual
99	No communication with heater control module	Individual

## Tank Level Sensor LED

The tank level sensor LED (AX) is triggered when chemical is not present in either tank.

**Table 3: Tank Level Indicator (AX)**

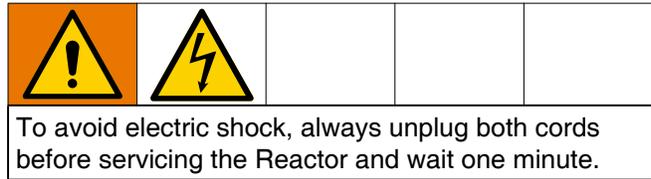
Chemical	Status
> 1 gallon	Off
< 1 gallon	Flashing

# Setup

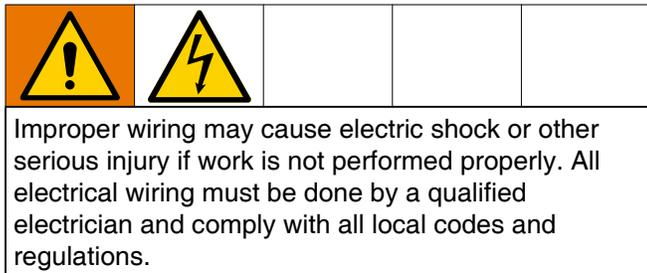
## Locate Reactor

Locate the Reactor on a level surface.

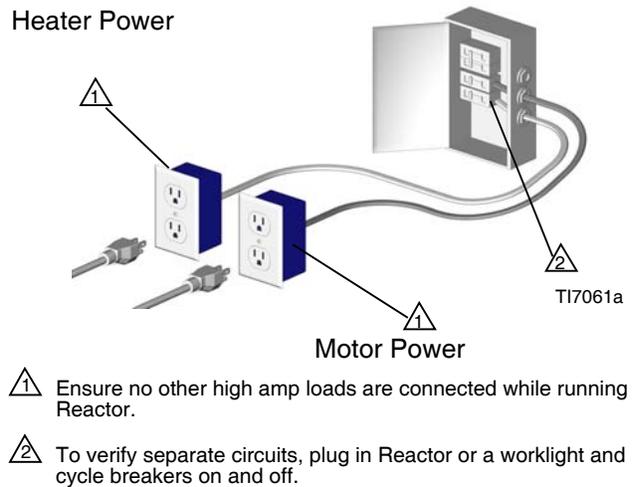
**NOTE:** Do not expose the Reactor to rain.



## Electrical Requirements



1. Connect the Reactor to the correct power source for your model. See TABLE 4. Power cords must be connected to two separate, dedicated circuits. See FIG. 4.
2. Some models include cord adapters for use outside North America. Connect the appropriate adapter to the unit's power cord before connecting to your power source.



**FIG. 4 Use Two Separate Circuits**

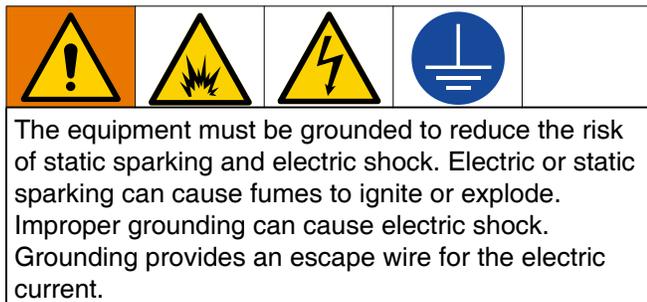
**Table 4: Electrical Requirements**

Model	Required Power Source	Power Cord Connectors	Supplied Local Adapters
200-240VAC, 1 phase, 50/60 Hz, two 15 ft (4.5 m) power cords	Two separate, dedicated circuits rated at minimum of 15 A each	 Two IEC 3-20 C20 Plugs	 NEMA 6-15P (North America)  Euro CEE74 (Europe)  YP-39 AS3112 (Australia/Asia)
100-120VAC, 50/60 Hz, two 15 ft (4.5 m) power cords	Two separate dedicated circuits rated at minimum of 20 A each	 Two NEMA 5-20P Plugs	

**Table 5: Extension Cord Requirements**

Model	Required Wire Size	
	Up to 50 ft (15 m)	Up to 100 ft (30 m)
All models	AWG 12	AWG 10
Cords must be 3-conductor grounded, rated for your environment.		

## Grounding



**Reactor:** grounded through the power cord.

**Generator (if used):** follow your local code. Start and stop the generator with the power cord(s) disconnected.

**Spray gun:** grounded through the supplied fluid hoses, connected to a properly grounded Reactor. Do not operate without at least one grounded fluid hose.

**Object being sprayed:** follow your local code.

**Solvent pails used when flushing:** follow your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place pail on a nonconductive surface, such as paper, plastic, or cardboard, which interrupts grounding continuity.

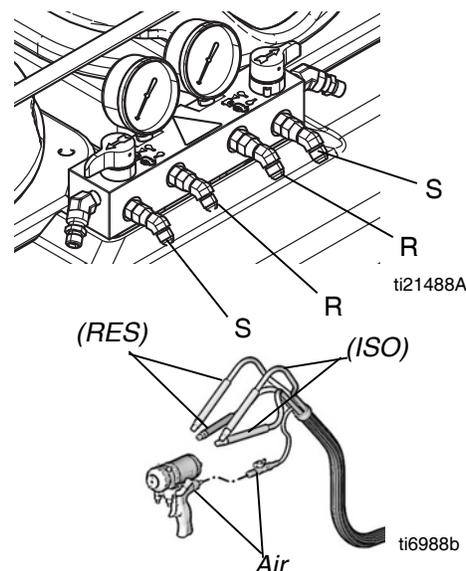
**To maintain grounding continuity when flushing or relieving pressure:** hold a metal part of spray gun firmly to the side of a grounded metal pail, then trigger gun.

## Connect Fluid Hoses

1. Connect the fluid supply hoses to the outlet hose connections (R, FIG. 5). Red hoses for ISO, blue for RES. Fittings are sized to prevent connection errors. Connect the other end of hoses to ISO and RES inputs of gun.

**NOTE:** Probler guns use a Probler P2 recirculation accessory kit.

2. Connect the recirculation hoses from the gun recirculation ports to the connections (S).



**FIG. 5 Connect the Recirculation Hoses**

## Connect Gun Air Hose

1. Connect the gun air hose to the gun air input and to the air filter outlet (Z). If you are using more than one hose bundle, join the air hoses with the nipple provided with the hose bundle.
2. On units with Fusion guns, connect the supplied ball valve and quick-disconnect coupler to the gun air hose, then connect the coupler to the gun air fitting.

## Connect Main Air Supply

Connect the main air supply to the quick disconnect fitting (Q) on the unit. The air supply hose must be at least 5/16 in. (8 mm) ID up to 50 ft (15 m) or 3/8 in. (10 mm) ID up to 100 ft (30 m).

**NOTE:** An air Filter/Moisture Separator (Z) is equipped with an automatic moisture drain.

## Flush Before First Use

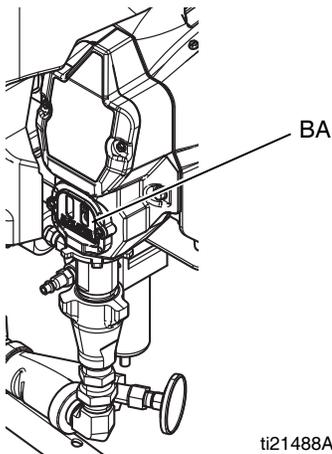
The Reactor is tested with a plasticizer oil at the factory. Flush out the oil with a compatible solvent before spraying. See **Flushing**, page 26.

## Fill Wet-Cups

Keep the felt washers in the pump wet-cups saturated with ISO pump oil. The lubricant creates a barrier between the ISO and the atmosphere.

				
<p>The pump rod and connecting rod move during operation. Moving parts can cause serious injury such as pinching or amputation. Keep hands and fingers away from wet-cup during operation. Shut off Motor Power before filling the wet-cup.</p>				

Fill the wet-cups through slots in the plate (BA), or loosen the screws and swing the plate aside.



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## Fill Fluid Tanks



### NOTICE

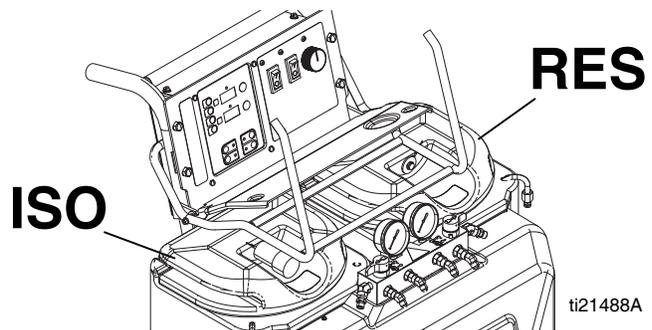
To prevent cross-contamination of fluids and equipment parts, **never** interchange (isocyanate) and (resin) parts or containers.

Have at least two 5 gal. (19 liter) pails to transfer fluid from drums to supply tanks. Label one pail "ISO" and the other "RES", using the red and blue labels provided. Always double-check which material you have before pouring it in the supply tanks. Pouring is easier if pails are not filled to the top.

Open only one supply tank at a time, to avoid splashing material from one tank into the other when filling.

**NOTE:** Using a drill and mixing blade, mix filled or separated materials in the pail before adding to the tanks. Material left in the tanks overnight may need to be remixed in the tanks.

1. Lift the hose rack. Remove the tank cover and pour ISO into the tank (red side, with the desiccant filter in cover). Replace the cover .



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1. Add a thin coating of grease lubricant to the tank o-ring if the lid is difficult to attach to the tank.

**NOTE:** The desiccant filter is blue when fresh, and turns pink when saturated. Be sure the shipping plugs are removed from openings on the desiccant filter.

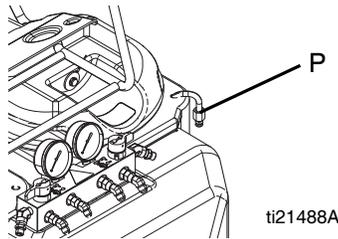
2. Remove the tank cover and pour resin into RES tank (blue side). Replace the cover.

**NOTE:** Add thin coating of grease lubricant to tank o-ring if lid is difficult to assemble to tank.

# Purge Air and Flush Fluid From Lines

<p>To avoid fire and explosion:</p> <ul style="list-style-type: none"> <li>Flush equipment only in a well-ventilated area.</li> <li>Ensure main power is off and heater is cool before flushing.</li> <li>Do not turn on heater until fluid lines are clear of solvent.</li> </ul>				

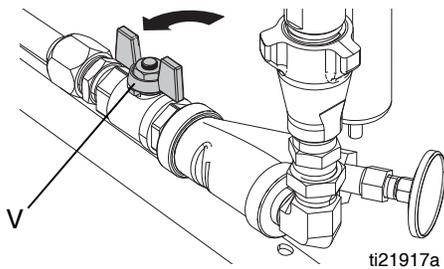
1. Remove both recirculation tubes (P) from the tanks and secure each one in a dedicated waste container.



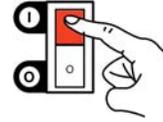
2. Set function knob to Stop/Park



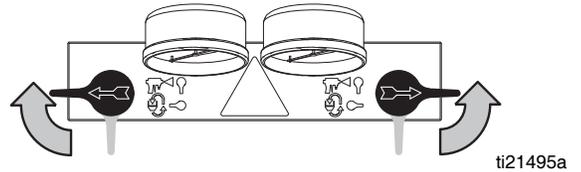
3. Plug in power cords(s). See Table 2, page 16.
4. Open both pump fluid inlet valves (V, shown in open position).



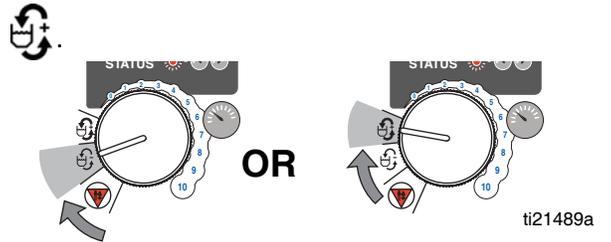
5. Turn on Motor Power. System status indicator (AY) should turn on.



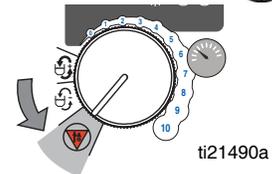
6. Set Recirc/Spray valves to Recirc.



7. Set function knob to Slow Recirc or Fast Recirc



8. When clean fluids exit both recirculation tubes (P), set function knob to Stop/Park .



9. Replace the recirculation tubes (P) in the supply tanks.

# Startup



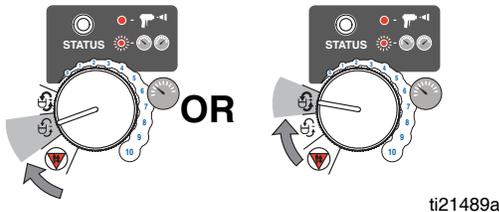


Heated fluid can cause equipment surfaces to become very hot. To avoid severe burns:

- Do not operate Reactor without all covers and shrouds in place.
- Do not touch hot fluid or equipment.
- Allow equipment to cool completely before touching it.

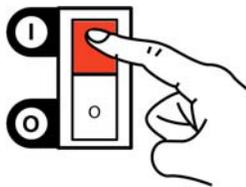
1. Perform **Setup**, page 16.

2. Set the function knob to Slow Recirc  or Fast Recirc .



3. See **Heatup Guidelines**, page 21, then continue with steps 3-6.

4. Turn on Heater Power.



5. Set temperatures:

a. Press  or  to change the temperature scale.

b. Press  to display target temperatures.

c. To set **ISO** heat zone target temperature, press  or  until the display shows desired temperature. Repeat for **RES** zone.

d. Press  to display actual temperatures.

6. Circulate through the heater until temperature readouts display desired temperature. See TABLE 6.

7. Adjust the heat controls as necessary for a stable spray temperature.

**Table 6: Approximate heatup time for starting a cold machine with 5 gallons (19 liters) per side**

Fluid Spray Target Temperature	120VAC	230VAC
	35 ft (10.7 m) Hose (1 bundle)	
125°F (52°C)	15 minutes	10 minutes
170°F (77°C)	40 minutes	20 minutes

**NOTE:** Heatup times are based on 70°F (21°C) starting material temperature and 70°F (21°C) ambient temperature.

**NOTE:** Different fluids will absorb heat at different rates. When refilling a warm machine, heatup times will be less.

## Heatup Guidelines

The fluids must be circulated from the pumps through the heater, hoses, and back to the tanks to ensure warm fluids are supplied to the gun.

### Slow Recirculation

- Slow Recirc results in a higher temperature transfer in the heater, so hoses and gun heat up quicker.
- Good for touchup or low flow spraying, up to moderate temperature.

### Fast Recirculation

Fast Recirc keeps heaters on full-time to bring fluid tanks up to temperature. The higher your flow rate, the more heat needed in the tanks before spraying.

- **For 200-240VAC systems:** Use Fast Recirc until the pump inlet fluid temperature gauges (Y) are within 45°F (25°C) of target outlet temperature.
- **For 100-120VAC systems:** Use Fast Recirc until the pump inlet fluid temperature gauges (Y) are within 30°F (17°C) of target temperature.
- **Volume in tanks:** Use only what you need. For example, 2.5 gal. (10 l) in each tank will heat up almost twice as fast as 5 gal. (20 l).
- Mixes fluid within tanks, to avoid heating only the fluid at the top of the tank.
- Use for flushing.

## Heat Management Tips

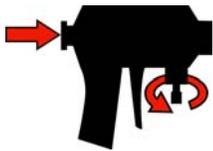
- Heaters perform better with lower flow rates or smaller mix modules.
- Triggering the gun for short periods helps maintain efficient heat transfer, keeping material at the desired temperature. Triggering the gun for a long period may not allow enough heating time, depending on material temperature in tanks.
- If the temperature displays fall below acceptable limits, set the function knob to Slow Recirc  and circulate again to bring temperatures back up.
- Each 35 ft (10.7 m) hose bundle adds about 5 minutes to heatup time, with most materials. The maximum recommended hose length is 105 ft (32 m).
- For a quicker start, do initial heatup circulation with the tanks 1/4 to 1/3 filled, then add more material.

# Operation

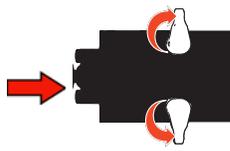
## Spraying



**NOTE:** Air is supplied to the spray gun with the gun piston safety lock or trigger safety lock engaged and the gun fluid manifold valves closed (if present).

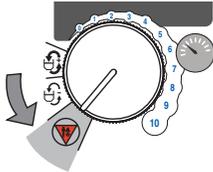


Fusion



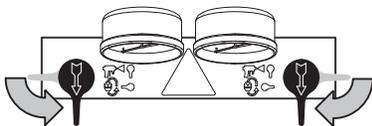
Probler

1. Set function knob to Stop/Park . Verify system status indicator LED is on.



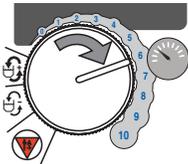
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2. Set Recirc/Spray valves to Spray.



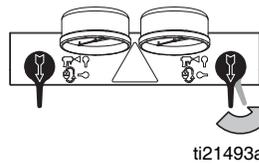
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3. Turn function knob to Pressure Adjust . Keep turning to the right until fluid pressure gauges show desired pressure.



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4. Check fluid pressure gauges to ensure proper pressure balance. If imbalanced, reduce pressure of higher component by **slightly** turning Recirc/Spray valve for that component toward Recirc, until gauges show balanced pressures. The pressure imbalance alarm (Status Code 1) is inactive for 10 seconds after entering spray pressure mode, to allow time to balance pressures.



*In this example, RES side pressure is higher, so use the RES side valve to balance pressures.*

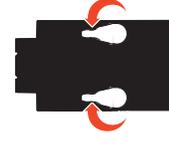
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**NOTE:** Watch gauges for 10 seconds to be sure pressure holds on both sides and pumps are not moving.

5. Open gun fluid manifold valves (impingement mix guns only).



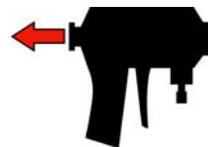
Fusion



Probler

**NOTE:** On impingement guns, never open fluid manifold valves or trigger gun if pressure are imbalanced.

6. Disengage piston safety lock or trigger safety lock.



Fusion



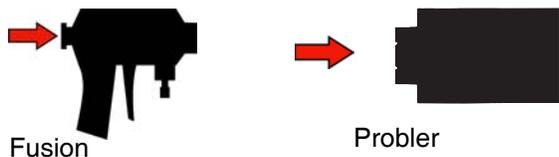
Probler

7. Test spray onto cardboard or plastic sheet. Verify that material fully cures in the required length of time, and is the correct color. Adjust pressure and temperature to get desired results. Equipment is ready to spray.

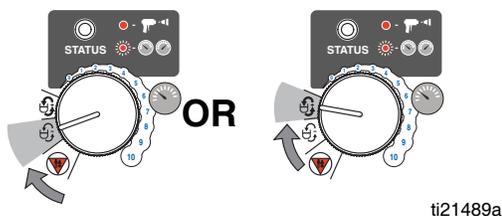
## Pause

To bring the hose and gun back to spray temperature after a brief break, use the following procedure.

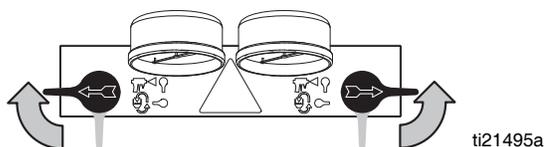
1. Engage the piston safety lock or trigger safety lock.



2. Set the function knob to Slow Recirc .



3. Set the Spray valves to Recirc until the temperature readouts come back up.



**NOTE:** If you stop spraying for more than 2 minutes when using an impingement mix gun, close gun fluid valves. Doing this will keep the internal parts of the gun cleaner and prevent crossover.



## Refill Tanks

Material can be added to the tanks at any time. See **Fill Fluid Tanks**, page 18.

If you are operating at high temperatures or flow rates, follow **Pause** instructions, page 23, to bring the tanks up to temperature.

### NOTICE

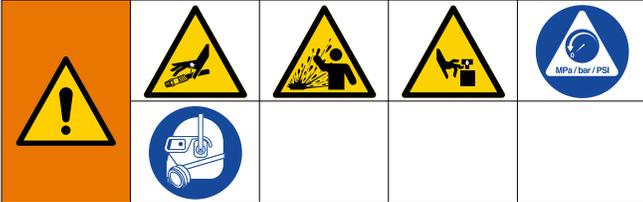
To prevent cross-contamination of fluids and equipment parts, **never** interchange ISO and RES parts or containers.

Have at least two 5 gal. (19 liter) pails to transfer fluid from drums to supply tanks. Label one pail "ISO" and the other "RES", using the red and blue labels provided. Always double-check which material you have before pouring it in the supply tanks. Pouring is easier if pails are not filled to the top.

Open only one supply tank at a time, to avoid splashing material from one tank into the other when filling.

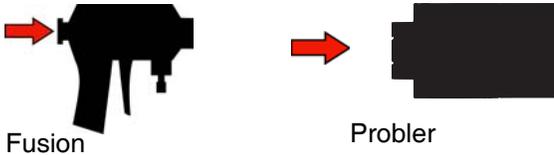
## Pressure Relief Procedure

 Follow the Pressure Relief Procedure whenever you see this symbol.

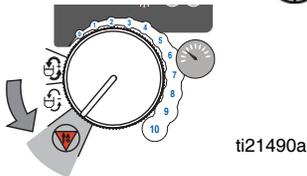


This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

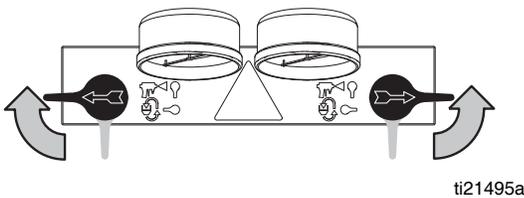
1. Engage piston safety lock or trigger safety lock.



2. Set function knob to Stop/Park .



3. Turn Recirc/Spray valves to Recirc. Fluid will be dumped to supply tanks. Pumps will move to the bottom of their stroke. Ensure gauges drop to 0.



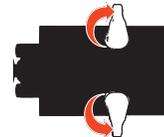
## Shutdown

For longer breaks (more than 10 minutes) use the following procedure. If you will be shutdown for more than 3 days, first see **Flushing**, page 26.

1. Shut off Heater Power.
2. Shut off Motor Power.
3. Follow all steps of the **Pressure Relief Procedure**, page 24.
4. Close the gun fluid valves ISO and RES. Doing this will keep the internal parts of the gun cleaner and prevent crossover.



Fusion

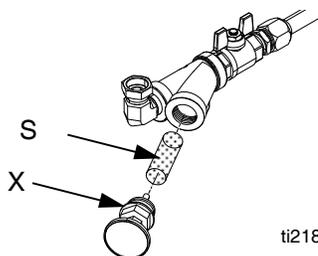


Probler

5. Refer to your separate gun manual and perform **Shutdown** procedure.

# Maintenance

- Check pump wet-cups fluid level daily, page 18.
- Throat u-cup is not adjustable. Do not overtighten packing nut/wet-cup.
- Keep component ISO from exposure to moisture in atmosphere, to prevent crystallization.
- Wipe supply tank lid o-ring, inner rim, and inner tank walls daily to prevent ISO crystallization. Keep film of grease on o-ring and inside of lid.
- Check desiccant filter weekly. Filter is blue when fresh, and turns pink when saturated.
- Remove plug (X) and clean fluid inlet strainer (S) as needed. Always clean the fluid inlet strainers after flushing.



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- Generally, flush if you will shutdown for more than three days. Flush more often if material is moisture sensitive and humidity is high in the storage area, or if material may separate or settle out over time.
- **If using an impingement mix gun**, close gun fluid valves when not spraying. Doing this will keep the internal parts of the gun cleaner and prevent crossover. Clean gun mix chamber ports and check valve screens regularly. See gun manual.



Fusion



Probler

- **If using an Fusion Air Purge impingement mix gun**, always grease the gun after use until purge air carries grease mist out the front of the gun. See your gun manual.

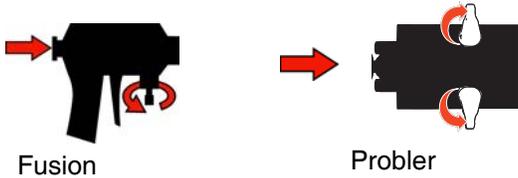
# Flushing



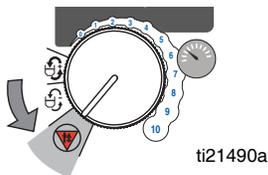
To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure. Hot solvent may ignite. To avoid fire and explosion:

- Flush equipment only in a well-ventilated area
- Ensure main power is off and heater is cool before flushing
- Do not turn on heater until fluid lines are clear of solvent

- Flush if you will be shut down for more than 3 days. Flush more often if material is moisture sensitive and humidity is high in the storage area, or if material may separate or settle out over time.
  - For long term storage, flush out the solvent with a storage fluid or, at minimum, clean motor oil
  - Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.
  - Always leave some type of fluid in system. Do not use water.
1. Engage piston safety lock or trigger safety lock. Close fluid valves ISO and RES. Leave air on.



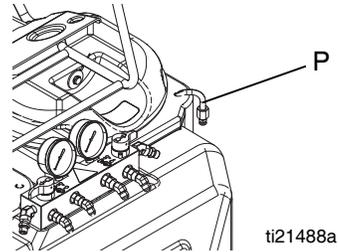
2. Set function knob to Stop/Park



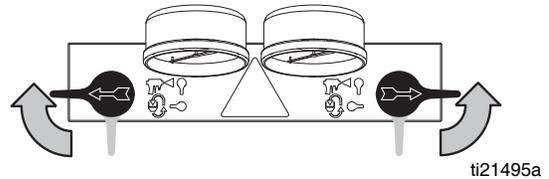
3. Shut off Heater Power. Allow system to cool.



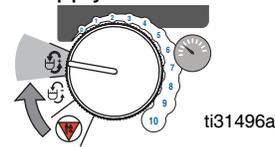
4. Remove recirculation tubes (P) from supply tanks and place in original containers or waste containers.



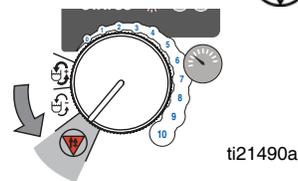
5. Turn Recirc/Spray valves to Recirc.



6. Set function knob to Fast Recirc . Pump material from supply tanks until no more comes out.

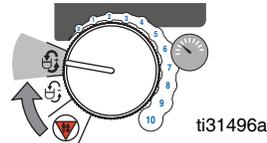


7. Set function knob to Stop/Park

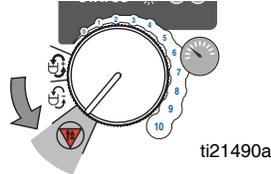


8. Wipe out any remaining material from the supply tanks. Fill each supply tank with 1-2 gal. (3.8-7.6 l) of solvent recommended by your material manufacturer.

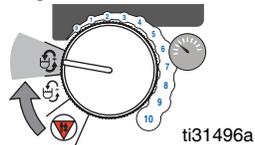
9. Set function knob to Fast Recirc . Pump solvent through system to waste containers.



10. When nearly clear solvent comes from recirculation tubes, set function knob to Stop/Park . Return recirculation tubes to supply tanks.



11. Set function knob to Fast Recirc . Circulate solvent through system for 10-20 minutes to ensure thorough cleaning.

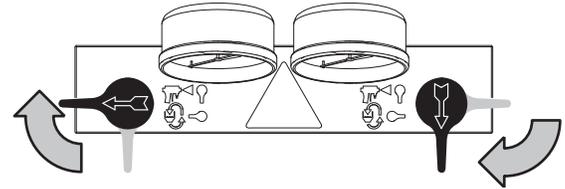


12. To flush the gun, refer to your gun instruction manual.

## Purge Hoses

Disconnect hoses from gun and secure back into the tanks for thorough cleaning with solvent.

- Turn Spray valve ISO to Spray.



- Open the gun into a waste ISO container.
- Set the function knob to Slow Recirc  until hose is flushed.
- Set the function knob to Park .
- Repeat for the RES side.

13. Set the function knob to Park .

14. Solvent flushing is a two step process. Go back to step 4, drain the solvent, and flush again with fresh solvent.

15. Leave unit filled with solvent, plasticizer, clean motor oil, or refill supply tanks with new material and reprime.

**NOTE:** Never leave the unit dry unless it has been disassembled and cleaned. If fluid residue dries in the pumps, the ball checks may stick the next time you use the unit.

# Troubleshooting

## Pump Control Status Codes

Determine the status code by counting the number of times the system status indicator blinks. The status indicator will blink 1-19 times to indicate a status code.

Multiple active status codes are separated by a longer duration pause.

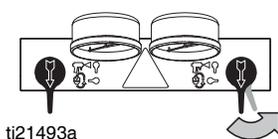
### Status Code 1: Pressure Imbalance

The unit does not check for pressure imbalance at setpoints less than 300 psi (2.1 MPa, 21 bar).

The unit does not check for pressure imbalance for 10 sec after entering pressure mode.

The unit senses pressure imbalance between components ISO and RES, and warns or shuts down, depending on settings of DIP switches 1 and 2. To turn off automatic shutdown and/or tighten pressure tolerances for status code 1, see **DIP Switch Settings**, page 30.

1. Reduce pressure of higher component by **slightly** turning Recirc/Spray valve for that component toward Recirc, until gauges show balanced pressures.



*In this example, RES side pressure is higher, so use the RES side valve to balance pressures.*

2. If pressure imbalance continues, see **Proportioner**, page 36.

### Status Code 2: Pressure Deviation from Setpoint

The unit does not check for pressure deviation at setpoint less than 400 psi (2.8 MPa, 28 bar).

The unit senses pressure deviation from a setpoint, and warns or shuts down, depending on the settings of DIP switches 3 and 4. If the equipment cannot maintain enough pressure for a good mix with an impingement mix gun, try using a smaller mix chamber or nozzle.

To turn off automatic shutdown and/or change pressure tolerances for status code 2, see **DIP Switch Settings**, page 30.

Deviation can occur if power is turned on if the function knob (AV) is not set to Park. Leave knob in Park mode until the status indicator LED turns on.

### Status Code 3: Pressure Transducer ISO Failure

1. Check transducer ISO electrical connection (J11) at the board, FIG. 12, page 45.
2. Reverse ISO and RES transducer electrical connections at the board, FIG. 12, page 45. If the error moves to transducer RES (Status Code 4), replace transducer ISO. See **Pressure Transducers**, page 50.

### Status Code 4: Pressure Transducer RES failure

1. Check transducer RES electrical connection (J12) at the board, FIG. 12, page 45.
2. Reverse ISO and RES transducer electrical connections at the board, FIG. 12, page 45. If the error moves to transducer ISO (Status Code 3), replace transducer RES. See **Pressure Transducers**, page 50.

### Status Code 5: Excessive Current Draw

1. Shut off the unit and retry operation. The brushes may not be fully seated.
2. Check fan operation. Elevated temperature can cause excessive current draw.
3. Locked rotor; motor unable to turn. Replace the motor. See **Electric Motor**, page 53.
4. Short on the control board. Replace the board. See **Motor Control**, page 44.
5. Worn or hung up motor brush causing arcing of brush at the commutator. Replace the brushes. See **Motor Brushes**, page 54.
6. Disconnect motor connections from the control board. Cycle power.

- a. If status code 5 is still present, replace the board.
- b. If status code 5 is not active, test the motor. See **Test Motor**, page 53.

### Status Code 6: High Motor Temperature

The motor is running too hot.

- 1. Reduce the pressure duty cycle, gun tip size, or move the Reactor to a cooler location. Allow 1 hour for cooling.
- 2. Check the fan operation. Clean the fan and motor housing.
- 3. Check J9 overtemperature connector on the control board.

### Status Code 7: No Cycle Counter Switch Input

Have not received input from cycle counter switch for 10 seconds after selecting Recirc mode or unit is unable to park within 15 seconds of entering park mode.

- 1. Verify that the recirc valves are open and the unit is set to Recirc mode.
- 2. Check the cycle counter switch connection to the board (J10), see FIG. 12, page 45.
- 3. Check that the magnet (224) and cycle counter switch (223) are in place under the RES side motor end cover (229). Replace if necessary.

### Status Code 8: High Cycle Rate

The system is spraying more than 1 gpm. The system will shutdown if spraying more than 1.1 gpm.

- 1. Reduce the pressure and/or gun tip size.

### Status Code 9: Low Tank Level

The tank level sensors sense ISO and RES material density inside the tank, and warns or shuts down, depending on settings of DIP switch 5. See **DIP Switch Settings**, page 30.

- 1. Add material to the supply tank, if necessary.

- 2. Check that the tank level sensor is in contact with the surface of the tank. Replace if necessary. See **Tank Fluid Level Sensors**, page 55.
- 3. Check J6 connections on the control board. TABLE 8, page 45.

Level Sensor LED	Status
Green - on	Sensor is powered
Green - off	Sensor is not powered
Yellow - on	Sensor detects material
Yellow - off	Sensor does not detect material

### Status Code 11: Locked Motor Rotor

Verify that the pumps are not seized and move freely. The motor is unable to turn. Replace the motor, page 53.

Shut off the unit and contact your distributor before resuming operation.

### Status Code 12: Motor Controller Overvoltage

Too much voltage connected to the control board. See , page 73, for power requirements.

Cycle the power and check the status indicator to see if the error is still active.

### Status Code 13: Motor Controller Undervoltage

Not enough voltage connected to the control board. See page 73, for power requirements.

Cycle the power and check the status indicator to see if the error is still active.

### Status Code 14: Motor Controller High Temperature

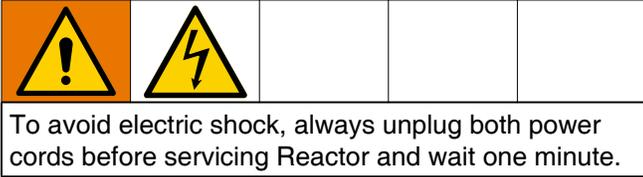
The motor control board is too hot.

Shutdown and move the Reactor to a cooler location. Allow 1 hour for cooling.

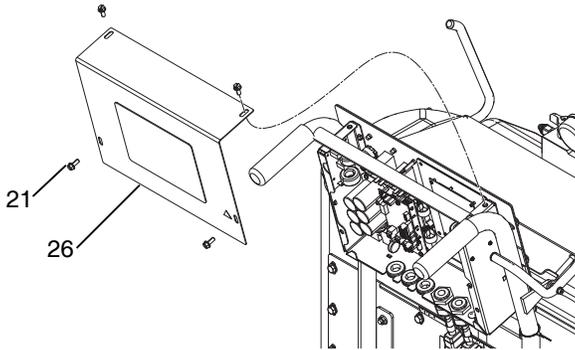
### Status Code 15-19: Motor Controller Faults

Cycle power. If the error is still present, replace the board. See **Motor Control**, page 44.

## DIP Switch Settings



1. Turn power off and unplug the power cords from the wall outlets.
2. Remove the screws (21) and display cover (26).



3. Locate the DIP switch on the control board.



FIG. 6 DIP Switch

4. Set the DIP switches to the desired positions. See **DIP Switch Settings and Functions**, page 31
5. Replace the display cover (26) and plug in the unit.
6. Cycle the power switch to activate changes to the DIP switch.

## DIP Switch Settings and Functions

DIP Switch Settings and Functions		
DIP Switch and Function	OFF	ON
<b>DIP Switch 1</b> If selected, displays a status code or displays a status code and causes shutdown if the pressure imbalance exceeds selection made in DIP Switch 2.	DEVIATION	DEVIATION AND SHUTDOWN
<b>DIP Switch 2</b> Select pressure imbalance limits, that if exceeded, will cause a deviation and a shutdown (if enabled).	See <b>Dip Switch 1 and 2 Settings</b> table, page 31	
<b>DIP Switch 3</b> If selected, causes shutdown or displays a status code due to deviation of pressure from setpoint exceeds selection made in DIP Switch 4.	DEVIATION	*SHUTDOWN
<b>DIP Switch 4</b> Causes deviation if pressure setpoint is greater than:	300 psi (2.1 MPa, 21 bar)  (25% if < 800 psi [5.6 MPa, 56 bar])	*500 psi (3.5 MPa, 35 bar)  (40% if < 800 psi [5.6 MPa, 56 bar])
<b>DIP Switch 5</b> Causes shutdown or displays a status code for low fluid level in tanks.	*DEVIATION	SHUTDOWN
<b>DIP Switch 6</b> Enables or disables boost heat.	DISABLE	*ENABLE
<b>DIP Switch 7</b>	Not used	
<b>DIP Switch 8</b>	Not used	

\* *Default DIP Switch Settings*

DIP Switch 1 and 2 Settings			
DIP Switch 1	DIP Switch 2	Deviation	Shutdown
Off	Off	300 psi (2.1 MPa, 21 bar)	---
Off	*On	500 psi (3.5 MPa, 35 bar)	---
*On	Off	300 psi (2.1 MPa, 21 bar)	500 psi (3.5 MPa, 35 bar)
*On	*On	500 psi (3.5 MPa, 35 bar)	800 psi (5.6 MPa, 56 bar)

## Heat Control Diagnostic Codes

Heat control diagnostic codes appear on the temperature display.

These alarms turn off heat. Codes E03 and E04 can be cleared by pressing . To clear other codes:

1. Shut off Heater Power.



2. Shut off Motor Power.



3. Turn on Motor Power and Heater power to clear.

Code	Code Name	Alarm Zone	Corrective Action page
01	High fluid temperature	Individual	32
02	High zone current	Individual	33
03	No zone current	Individual	33
04	Thermocouple not connected	Individual	33

## E01: High Fluid Temperature

- The thermocouple ISO or RES (310) senses a fluid temperature above 260°F (71°C).
- The overtemperature switch ISO or RES (308) senses a fluid temperature above 230°F (110°C) and opens. At 190°F (87°C) the switch closes again.
- The thermocouple ISO or RES (310) fails, is damaged, is not touching the heater element (307), or has a poor connection to the temperature control board.
- The overtemperature switch (308) fails in the open position.
- The temperature control board fails to turn off any heat zone.
- The zone power wires or thermocouples are switched from one zone to another.
- Failed heater element where thermocouple is installed.
- A loose wire

### E01 Checks

					
<p>Troubleshooting this equipment requires access to parts that may cause electric shock or other serious injury if work is not performed properly. Have a qualified electrician perform all electrical troubleshooting. Be sure to shut off all power to the equipment before repairing.</p>					

Before checking the thermocouple, note which zone (ISO or RES) has high fluid temperature.

1. Check that connector B is firmly plugged into the heater control module. See **Temperature Control Modules Connections**, page 47.
2. Clean and re-plug the connections.
3. Check the connections between the temperature control module and overtemperature switch, and between the temperature control module and thermocouples. Ensure all wires are securely connected to connector B on heater control module. See TABLE 7, page 33.
4. Remove connector B from heater control module and check continuity of thermocouples by measuring resistance across pins on the plug end.

- Verify fluid temperature, using an external temperature sensing device.

**Table 7: Connector B Resistance Measurements**

120V		230V		Description	Reading
Connector	Pin	Connector	Pin		
B1	1, 2	B1	1, 2	Overtemperature Switch	nearly 0 ohms
B2	1	B1	5	Thermocouple ISO, R (red)	4-6 ohms
B2	2	B1	6	Thermocouple ISO, Y (yellow)	
B2	4	B1	8	Thermocouple RES, R (red)	4-6 ohms
B2	5	B1	9	Thermocouple RES, Y (yellow)	
B2	3	B1	3-4,7,10	Unused	N/A

**If temperature is too high (sensor reading is 260°F [127°C] or above):**

- Check if the thermocouples are damaged, or not contacting the heater element, see FIG. 16, page 49.
- Check if the temperature control module turns off when the equipment reaches the temperature setpoint:
  - Set the temperature setpoints far below the displayed temperature.
  - Turn the zone on. If the temperature rises steadily, the power board is failing.
  - Verify by exchanging with another power module. See **Replace Temperature Control Modules**, page 46.
  - If the exchanged module does not fix the problem, the power module is not the cause.
- Verify the continuity of heater elements with an ohmmeter. See **Test Heater Element**, page 48.

**E02: High zone current**

When there is a high current error, the LED on that zone’s module will turn red while the error is displayed.

- See **Before Beginning Repair**, page 39.
- Exchange the zone module with another one. Turn the zone on and check for an error. If the error disappears, replace the faulty module.

**E03: No zone current**

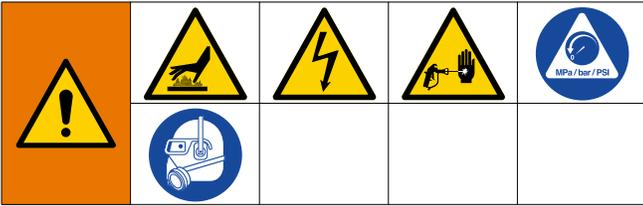
When a no current error occurs, the LED on the specific zone’s module turns red when the error is displayed.

- Check for a tripped circuit breaker on the Reactor or at the power source of that zone. Replace the circuit breaker if it trips habitually.
- Check for a loose or broken connection at that zone.
- Exchange the zone module with another one. Turn the zone on and check for an error. See **Replace Temperature Control Modules**, page 46. If the error disappears, replace faulty module.
- If E03 occurs for all zones, the contactor may not be closing. Verify wiring from the heater control to the contactor coil.

**E04: Thermocouple disconnected**

- Check the temperature sensor connections to the green connectors (B) on the temperature control module. See **Temperature Control Modules Connections**, page 47.
- Unplug and re-plug the sensor wires.

## Reactor Electronics



Before performing any troubleshooting procedures:

1. Shut off Heater Power.



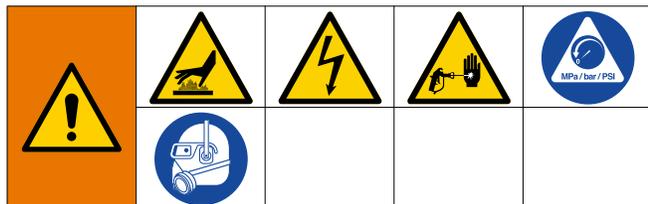
2. Shut off Motor Power.



3. Relieve the pressure. Follow **Pressure Relief Procedure**, page 24.
4. Allow the equipment to cool.
5. Try the recommended solutions in the order given for each problem to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem.

PROBLEM	CAUSE	SOLUTION
Temperature display does not illuminate.	Display disconnected.	Check the cable connections, FIG. 12, page 45.
	Display cable damaged or corroded.	Clean the connections; replace the cable if it is damaged.
	Blown fuse.	Replace the fuse (73) in the fuse holder on the DIN rail assembly located under the electronics cover (55).
	Failed circuit board.	The display is failing. Replace.
	Loose display cables on control board.	Check the cable connections to each display, FIG. 23 on page 71.
	Failed control board (displays get power from control board).	Remove the access panel. Check if board LED is lighted. If not, replace the board. See <b>Motor Control</b> , page 44.
	Inadequate power to control board.	Check that the power supply meets requirements.
	Loose power cable.	Check the cable connections, FIG. 23, page 71.
	Heater power switch circuit breaker tripped.	Display is powered from heater power circuit breaker. Cycle heater power off  , then on  to reset breaker.
Erratic display; display turns on and off.	Low voltage.	Ensure the input voltage is within specifications, , page 73.
	Poor display connection.	Check the cable connections, FIG. 23, page 71. Replace the damaged cable.
	Display cable damaged or corroded.	Clean connections; replace the cable if is damaged.
Display does not respond properly to button pushes.	Poor display connection.	Check the cable connections, FIG. 23, page 71. Replace the damaged cable.
	Display cable damaged or corroded.	Clean connections, FIG. 23, page 71. Replace the damaged cable.
	Ribbon cable on display circuit board disconnected or broken.	Connect the cable, FIG. 23, page 71, or replace.
	Broken display button.	Replace. See <b>Control Panel</b> , page 42.
Fan not working.	Loose wire.	Check the fan wire.
	Defective fan.	Replace. See <b>Fans</b> , page 54.

# Heaters



Before performing any troubleshooting procedures:

1. Shut off Heater Power.



2. Shut off Motor Power.

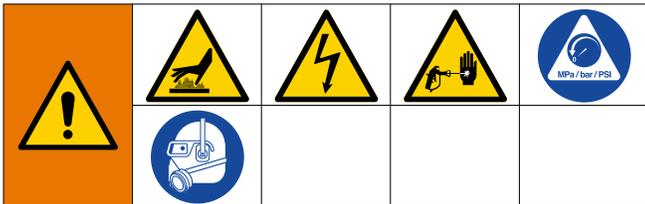


3. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 24.
4. Allow the equipment to cool.

Try the recommended solutions in the order given for each problem, to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem.

PROBLEM	CAUSE	SOLUTION
Primary heater(s) does not heat.	Heat turned off.	Press <b>ISO</b> or <b>RES</b> zone  keys.
	Temperature control alarm.	Check the temperature display for diagnostic code. See <b>Heat Control Diagnostic Codes</b> , page 32.
	Signal failure from thermocouple.	See <b>E04: Thermocouple disconnected</b> , page 33.
	Failed heater element.	Check the resistance of the heater elements. See <b>Test Heater Element</b> , page 48.
Control of primary heat is abnormal; high temperature overshoots or E01 error occurs intermittently.	Dirty thermocouple connections.	Examine the connection of the thermocouples to long the green plug on the heater control board. Unplug and re-plug the thermocouple wires, cleaning off any debris. For 100-120VAC, unplug and re-plug the long green connector. For 200-240V, unplug and re-plug the green connector(s) B.
	Thermocouple not contacting heater element.	Loosen the ferrule nut (N), push in the thermocouple (310) so tip (T) contacts the heater element (307). Holding the thermocouple tip (T) against the heater element, tighten the ferrule nut (N) 1/4 turn past tight. See FIG. 16, page 49 for illustration.
	Failed heater element.	See <b>Heaters</b> , page 35.
	Signal failure from thermocouple.	See <b>E04: Thermocouple disconnected</b> , page 33.
	Thermocouple wired incorrectly.	See <b>E04: Thermocouple disconnected</b> , page 33. Power up the zones one at a time and verify that the temperature for each zone rises.

## Proportioner



Before performing any troubleshooting procedures:

1. Shut off Heater Power.



2. Shut off Motor Power.



3. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 24.
4. Allow the equipment to cool.

Try the recommended solutions in the order given for each problem, to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem.

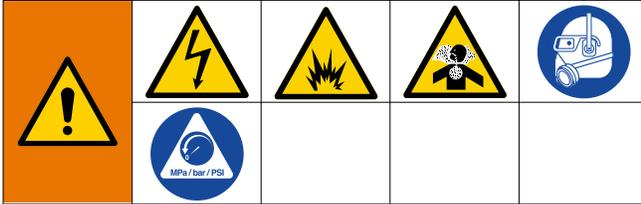
PROBLEM	CAUSE	SOLUTION
The Reactor does not operate.	No power.	Plug in both power cords.
		Cycle Motor Power and Heater Power off  , then on  to reset both breakers.
The motor does not operate.	Power turned on while function knob set to a run position.	Set the function knob to Park  , once status LED turns on. Then select the desired function.
	Loose connection on control board.	Check the connection at the motor power connections on the bottom board. See FIG. 12, page 45.
	Worn brushes.	Check both sides. Replace brushes worn to less than 1/2 in. (13 mm). See <b>Motor Control</b> , page 54.
	Broken or misaligned brush springs.	Realign or replace. See <b>Motor Brushes</b> , page 54.
	Brushes or springs binding in brush holder.	Clean the brush holder and align the brush leads for free movement.
	Shorted armature.	Replace motor. <b>Electric Motor</b> , page 53.
	Check motor commutator for burn spots, black pitting, or other damage.	Remove the motor. Have a motor shop resurface the commutator, or replace the motor. See <b>Electric Motor</b> , page 53.
	Failed control board.	Replace the board. See <b>Motor Control</b> , page 44.
The pump output is low.	Plugged fluid inlet strainer.	Clear. See <b>Maintenance</b> , page 25.
	Leaking or plugged piston valve or intake valve in displacement pump.	Check the valves. See your pump manual.

PROBLEM	CAUSE	SOLUTION
One side doesn't come up to pressure in spray mode.	Low fluid in the tank.	Refill.
	Dirty or damaged Spray valve.	Clean or repair. See <b>Replace Spray Valves</b> , page 40.
	Plugged fluid inlet strainer.	Clear. See <b>Maintenance</b> , page 25.
	Pump intake valve plugged or stuck open.	Clean the pump intake valve. See <b>Remove Intake Valve Only</b> , page 41.
	Material is too viscous to pump.	Warm the material before adding to the tanks.
Pressure is higher on one side when setting pressure with function knob.	Pump intake valve partially plugged.	Clean the pump intake valve. See <b>Remove Intake Valve Only</b> , page 41.
	Air in hose. Fluid is compressible.	Purge air from the hose.
	Unequal size hoses or unequal hose construction.	Use matching hoses, or balance pressures before spraying.
Pressures are not balanced when running, but pressure is generated and holds on both strokes.	Unequal viscosities.	Change the temperature setting to balance viscosities.
		Change the restrictor at mix point to balance back pressure.
	Restriction on one side.	Clean the mix module or restrictor at the mix manifold.
		Clean the gun check valve screens.
Fluid leak in pump packing nut area.	Worn throat seals.	Replace. See pump manual.
Pressure doesn't hold when stalled against gun in spray mode.	Leaking Spray valve.	Repair. See <b>Replace Spray Valves</b> , page 40.
	Leaking piston valve or intake valve in displacement pump.	Repair. See you pump manual.
	Leaking gun shutoff.	Repair. See you gun manual.
Pressure is higher on RES side during startup of recirculation, especially in High Recirc mode.	This is normal. RES is typically higher viscosity than ISO until the material is heated during recirculation.	No action required.
One gauge shows half as many pulses as the other when pumps are cycling.	Loss of pressure on downstroke.	The intake valve is leaking or not closing. Clean or replace valve. See <b>Replace Spray Valves</b> , page 40.
	Loss of pressure on upstroke.	The piston valve is leaking or not closing. Clean or replace the valve or packings. See <b>Replace Spray Valves</b> , page 40.
Status indicator not lit.	The function knob is not set to Park when power is applied.	Turn the function knob to Park.
	Loose indicator cable.	Check that the cable is connected at J3 on the top motor control board. See FIG. 12, page 45.
	Failed control board.	Replace the board. See <b>Motor Control</b> , page 44.
	Shorted pressure transducer or potentiometer input.	See <b>Control Board LEDs</b> , page 44 for troubleshooting.
ISO side rich; lack of RES side.	ISO side gauge is low.	RES side restriction downstream of the gauge. Check the gun check valve screen, mix module, or mix manifold restrictor.
	RES side gauge is low.	RES side material supply problem. Check RES side inlet strainer and pump intake valve.

PROBLEM	CAUSE	SOLUTION
RES side rich; lack of ISO side.	ISO side gauge is low.	ISO side material supply problem. Check ISO side inlet strainer and pump intake valve.
	RES side gauge is low.	ISO side restriction downstream of gauge. Check gun check valve screen, mix module, or mix manifold restrictor.
Tank level sensor does not sense empty tank (indicator LED on control panel never blinks).	Material build up.	Flush and clean the inside of the tanks. Clean the outside of the sensor and recessed area on tank.
	LED wires disconnected inside control panel.	Reconnect the LED wires.
	Tank level sensor sensitivity is too high.	Reset the tank fluid level sensor sensitivity. See <b>Reset Sensitivity</b> , page 56.
Tank level sensor does not sense full tank (indicator LED on control panel always blinking).	Tank level sensor is too far away from tank.	Check the position of both tank level sensors. See <b>Tank Fluid Level Sensors</b> , page 55.
	Sensor wires disconnected.	Reconnect the sensor wires in the display panel.
	Tank level sensor sensitivity is too low.	Reset the tank fluid level sensor sensitivity. See <b>Reset Sensitivity</b> , page 56.

# Repair

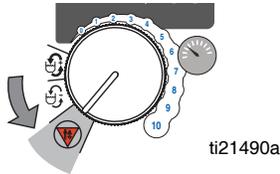
## Before Beginning Repair



Repairing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly. Have a qualified electrician connect power and ground to main power switch terminals, see page 16. Be sure to shut off all power to the equipment before repairing

1. Flush if possible, see page 26. If not possible, clean all parts with solvent immediately after removal, to prevent isocyanate from crystallizing due to moisture in the atmosphere.

2. Set function knob to Stop/Park .



3. Shut off Motor Power.



4. Shut off Heater Power. Allow system to cool.

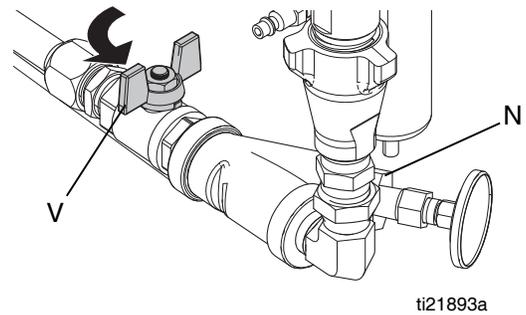


5. Relieve the pressure. Follow **Pressure Relief Procedure**, page 24.
6. Disconnect the heater and motor power cords.

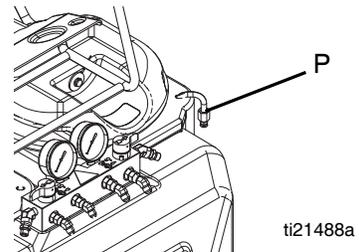
## Remove Supply Tank



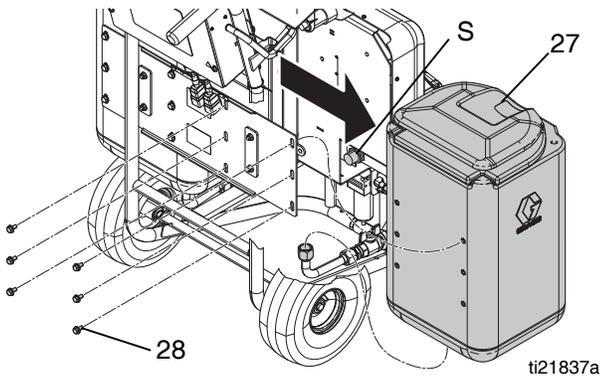
1. See **Before Beginning Repair**, page 39.
2. Relieve the pressure, **Pressure Relief Procedure**, page 24.
3. Flush the system. Refer to **Flushing**, page 26.
4. Place a waste container under the y-strainer.
5. Close the fluid valve (V).



6. Remove the filter drain hex nut (N) and drain material.
7. Remove recirculation tubes (P) and place in waste containers.



8. Disconnect the swivel elbow at the pump fluid inlet.
9. Remove the six screws (28) holding the tank (27) to the cart frame.

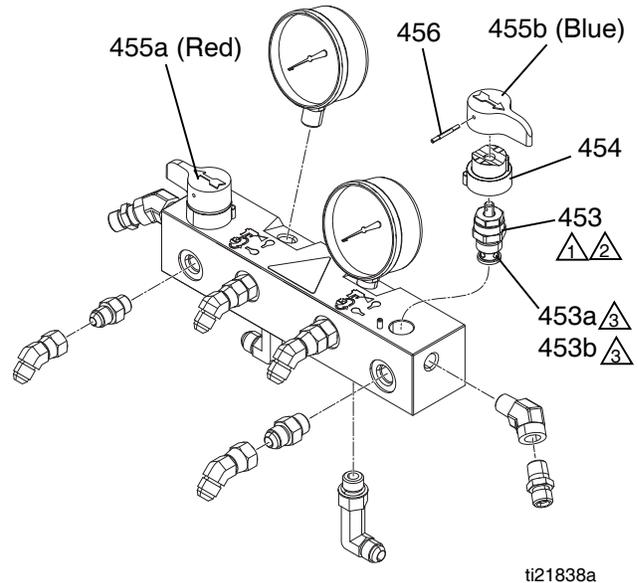


10. Loosen the nut and slide the tank level sensor (S) away from the tank.
11. Pivot the top of tank to the side and remove the tank with fluid inlet fittings, off the cart.
12. Reinstall in reverse order. Torque the screws (28) to 125 in.-lb (14 N•m).

## Replace Spray Valves



1. See **Before Beginning Repair**, page 39.
2. Relieve the pressure. Follow **Pressure Relief Procedure**, page 24.
3. See FIG. 7, page 40. Disassemble the Spray valves. Clean and inspect all parts for damage.
4. Ensure that the seat (453a) and gasket (453b) are positioned inside each valve cartridge (453).
5. Apply PTFE pipe sealant to all tapered pipe threads before reassembling.
6. Reassemble in reverse order, following all notes in FIG. 7, page 40.



- 1 Torque to 250 in-lb (28 N•m).
- 2 Use blue threadlocker on valve cartridge threads into manifold.
- 3 Part of item 453.

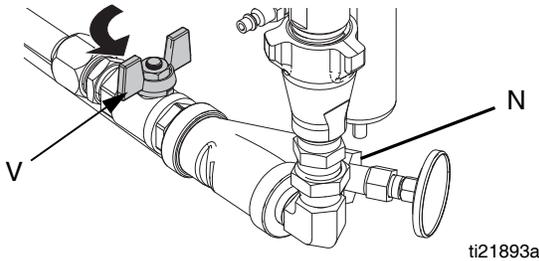
**FIG. 7 Spray Valves**

## Displacement Pump



**NOTE:** Use a dropcloth or rags to protect the Reactor and surrounding area from spills.

1. See **Before Beginning Repair**, page 39.
2. Relieve the pressure. Follow **Pressure Relief Procedure**, page 24.
3. Close both fluid valves (V).



**NOTE:** Use dropcloth or rags to protect Reactor and surrounding area from spills.

4. Open the filter drain hex nut (N) on the y-strainer.

### Remove Intake Valve Only

If the pump is not generating any pressure, the intake ball check may be stuck closed with dried material.

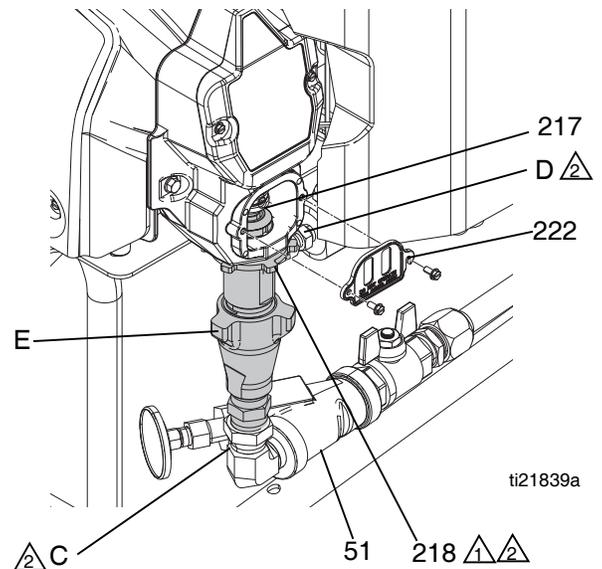
If the pump is not generating pressure on the downstroke, intake ball check may be stuck open.

Either of these conditions can be serviced with the pump in place.

5. Disconnect the fluid inlet (C) and swing it aside.
6. Remove the intake valve by the hitting ears (E) firmly, right-to-left, with a non-sparking hammer. Unscrew from the pump. See your displacement pump manual for repair and parts information.

### Remove Entire Pump Assembly

7. Disconnect the fluid inlet (C) and outlet (D) lines. Also disconnect the steel outlet tube (46) from the heater inlet.
8. Remove the pump rod cover (222). Push the clip up in back and push pin (217) out. Loosen the locknut (218) by hitting firmly right-to-left with a non-sparking hammer. Unscrew the pump. Refer to your pump manual for repair instructions and parts.
9. Install the pump in reverse order of disassembly, following all notes in FIG. 8, page 41. Clean strainer (51). Reconnect the fluid inlet (C) and outlet (D) lines.
10. Tighten the fluid outlet fitting (D), then tighten the locknut (218) by hitting firmly with a non-sparking hammer.
11. Set the function knob to Slow Recirc . Purge air and prime. See **Purge Air and Flush Fluid From Lines**, page 19.



 Flat side faces up. Tighten by hitting firmly with non-sparking hammer.

 Lubricate threads with ISO oil or grease.

**Fig. 8 Displacement Pump**

## Control Panel

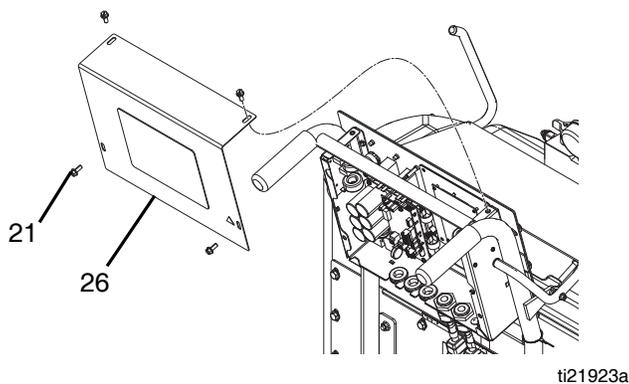
### Replace Temperature Display



#### NOTICE

Before handling the board, put on a static conductive wrist strap to protect against static discharge which can damage the board. Follow the instructions provided with your wrist strap.

1. See **Before Beginning Repair**, page 39.
2. Remove screws (21) and display cover (26).



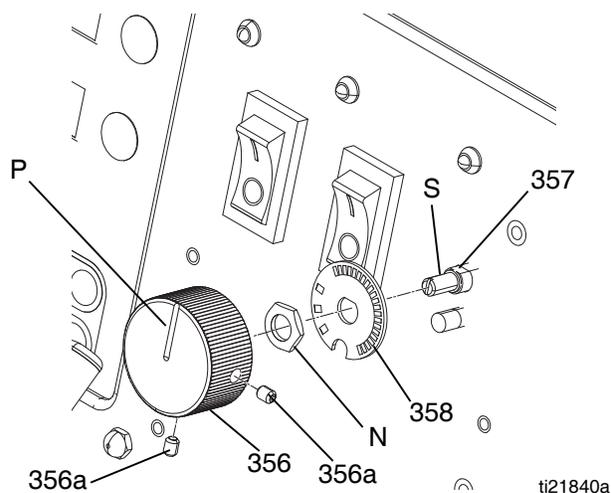
3. Put on a static conductive wrist strap.
4. Disconnect the main display cable (81) from the upper right corner of the temperature display (353). See FIG. 10, page 43.
5. Remove the jumper (373) from the back of the display (353). Set aside and install the jumper on the new display.
6. Disconnect the ribbon cable(s) (R) from the back of the display; see FIG. 10, page 43.
7. Remove the nuts (360) from the plate (351).
8. Disassemble the display (353), see detail in FIG. 10, page 43.

9. Reassemble in reverse order, see FIG. 10, page 43. Apply medium strength thread sealant where shown.

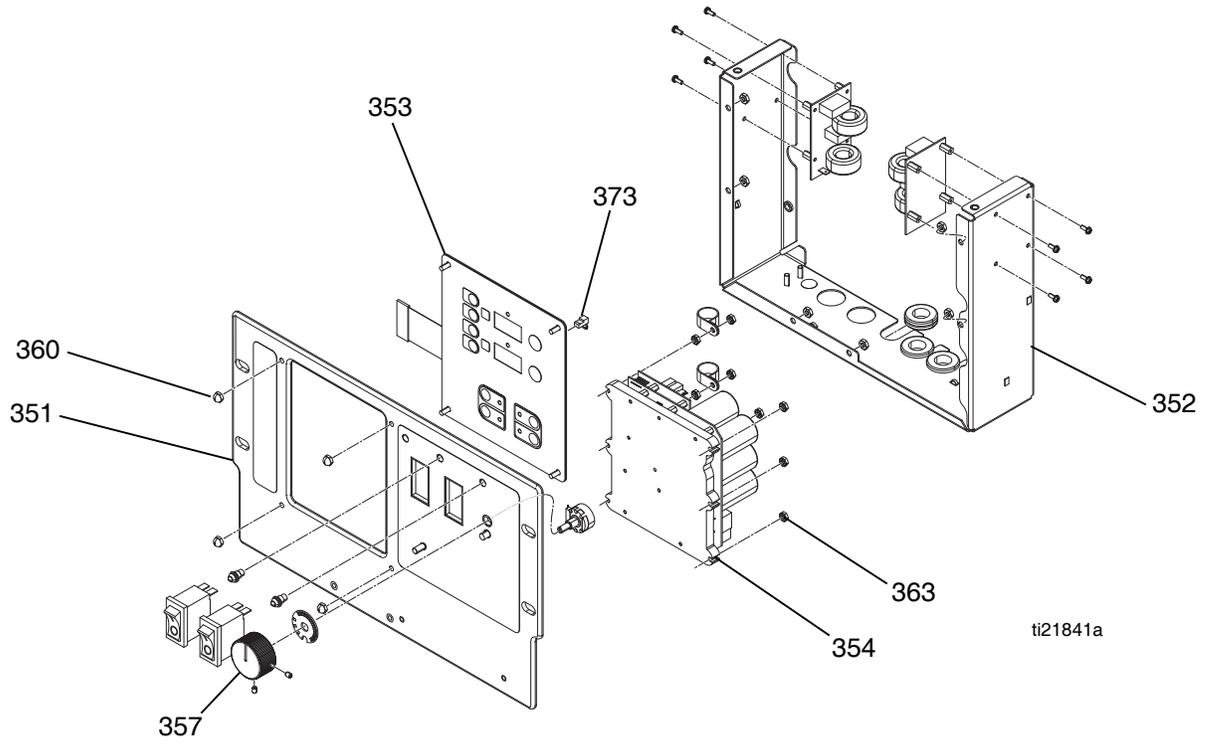
### Replace Function Knob/Potentiometer



1. See **Before Beginning Repair**, page 39.
2. Remove the screws (21) and the back cover (26).
3. Disconnect the potentiometer wires from J5 on the motor control board (354). See FIG. 12, page 45.
4. See FIG. 9. Remove two setscrews (356a) and pull the function knob (356) off of the potentiometer (357) shaft.
5. Remove the nut (N, part of 357) and the detent plate (358).
6. Install the new potentiometer (357) in reverse order. Position the potentiometer so the slot (S) is horizontal. Position the knob (356) so the pointer (P) faces up. Install the knob on the shaft so the slot (S) engages the alignment pin in the knob. Push the knob onto the shaft against the detent spring before tightening the setscrews (356a).
7. Reconnect the potentiometer wires to J5.



**FIG. 9 Function Knob/Potentiometer**



**FIG. 10 Control Panel**

# Motor Control

## Power Bootup Check

Power must be on to check. See FIG. 11 or location.  
Function is:

- Motor ready: LED on.
- Motor not ready: LED off.
- Status code (motor not running): LED blinks status code.
- Multiple status codes are separated by a longer LED off duration.

## Control Board LEDs

If LEDs on the bottom board are on and the top board LEDs are off, the following may have occurred:

- A pressure transducer shorted out.
- A short occurred between the power and ground pin of the potentiometer.

Board	LED	State	Description
Top	R4	Red: on	Hardware or software failure
	G1	Green: on	Power on
Bottom	D4	Red: on	Hardware or software failure
	D16	Green: on	Power on

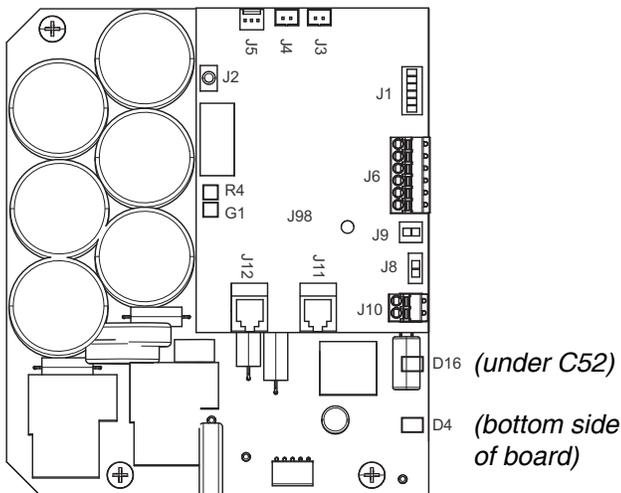


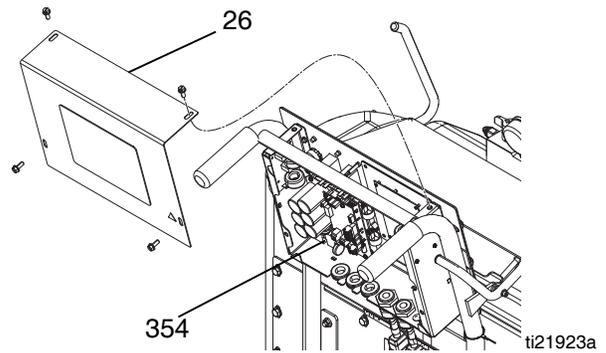
FIG. 11

# Replace Control Board



Check the motor before replacing the board. See **Test Motor**, page 53.

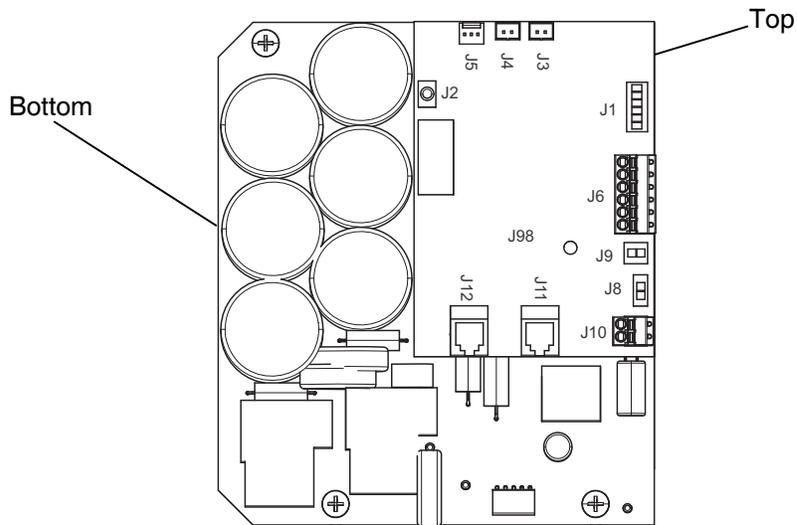
1. See **Before Beginning Repair**, page 39.
2. Remove the display cover (26) on back of the cart to expose the control board (354).



3. Disconnect all cables and connectors from the board (354). See Table 8, page 45.
4. Remove the six nuts (363) and remove the board from the control board (354). See FIG. 10, page 43.
5. Install the new board in reverse order.

**Table 8: Control Board Connectors (see FIG. 12)**

Top Board Connectors			Bottom Board Connectors	
Board Jack	Pin	Description	Connector	Description
J1	n/a	Not Used	Female Quick Connect Terminals	Power
J2	n/a	Not Used	Plug Housing with Male Blades	Motor Power
J3	n/a	Error LED		
J4	n/a	Tank Level LED		
J5	n/a	Function Knob		
J6	1	Brown - ISO Sensor V+		
	2	Blue - ISO Sensor V-		
	3	Black - ISO Sensor Signal		
	4	Brown - RES Sensor V+		
	5	Blue - RES Sensor V-		
	6	Black - RES Sensor Signal		
J8	n/a	Boost Power Relay		
J9	n/a	Motor Overtemperature		
J10	n/a	Cycle Switch		
J11	n/a	ISO Pressure Transducer		
J12	n/a	RES Pressure Transducer		



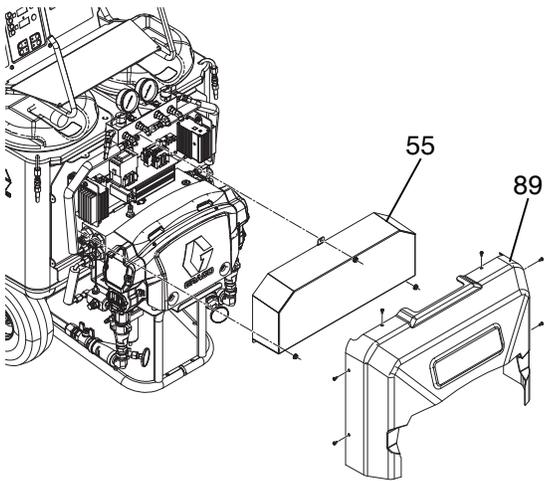
**FIG. 12 Wiring Connections**

## Replace Temperature Control Modules

### NOTICE

Before handling the assembly put on a static conductive wrist strap to protect against discharge which can damage the assembly. Follow the instructions provided with your wrist strap.

1. See **Before Beginning Repair**, page 39.
2. Remove the heater shroud (89) and the electronics cover (55).



3. Put on a static conductive wrist strap.
4. Disconnect all cables and connectors from the temperature control module (59).

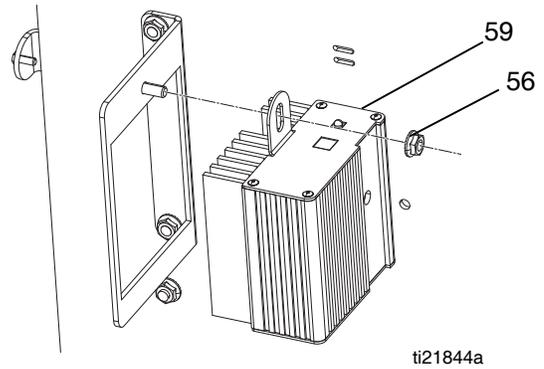


FIG. 13

5. Remove the hex nut (56) and replace the defective module.
6. Install the new module in reverse order. Connect all cables and connectors.

### Temperature Control Modules Connections

Table 9: Heater Control Module Connections

Connector	Description	
	100-120VAC	200-240VAC
DATA (A)	Not used	
Sensor (B)	See Table 11	
DISPLAY (C)	Display	
COMMUNICATION (D)	Communication to power boards	
PROGRAM (E)	Software programming	
BOOT (F)	Software bootloader	

Table 9: Heater Control Module Connections

Connector	Description	
	100-120VAC	200-240VAC
POWER/RELAY (G)	Circuit board power input and contactor control output	

Table 10: Temperature Power Module Connections

Connector	Description
COMMUNICATION (H)	Communication to control board
POWER (J)	Power to heater

Table 11: Sensor B Connections

100-120VAC		200-240VAC		Description
Connector	Pin	Connector	Pin	
B1	1, 2	B1	1, 2	Overtemperature Switch
B2	1	B1	5	Thermocouple ISO, R (red)
B2	2	B1	6	Thermocouple ISO, Y (yellow)
B2	4	B1	8	Thermocouple RES, R (red)
B2	5	B1	9	Thermocouple RES, Y (yellow)
B2	3	B1	3-4,7,10	Unused

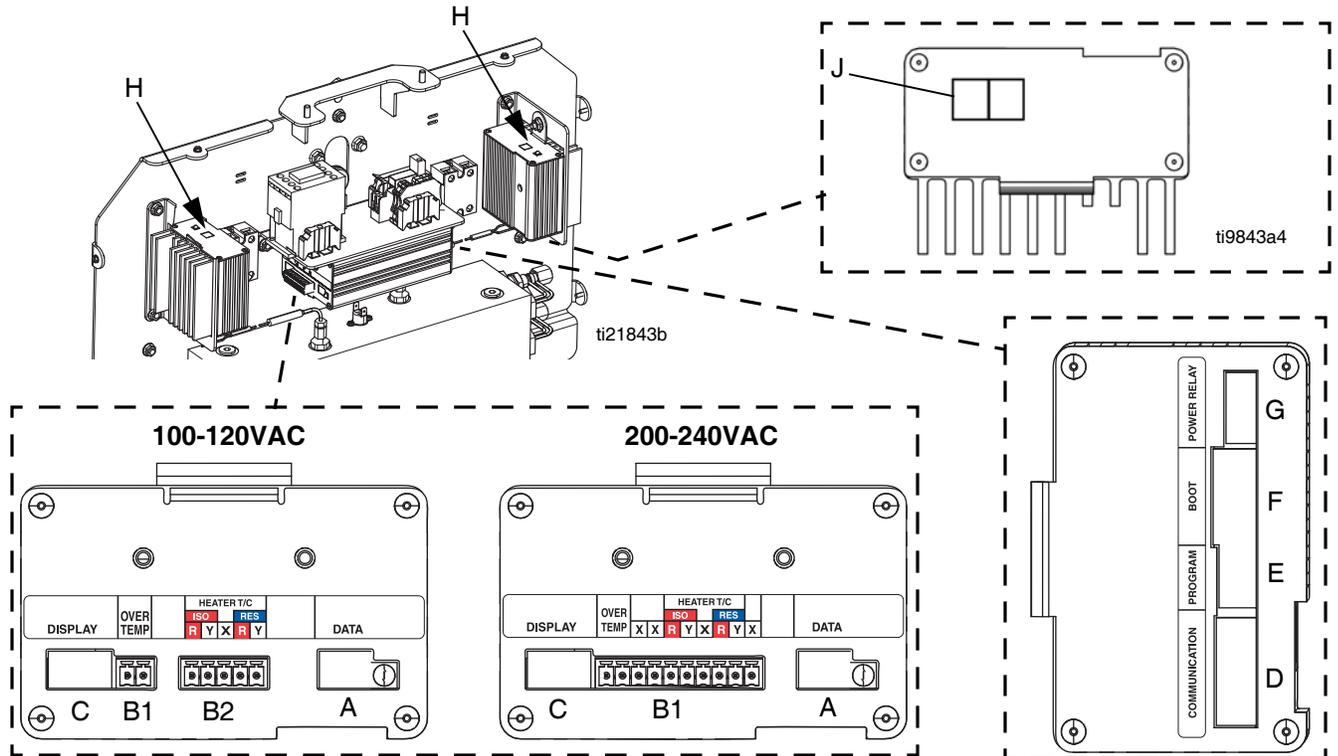
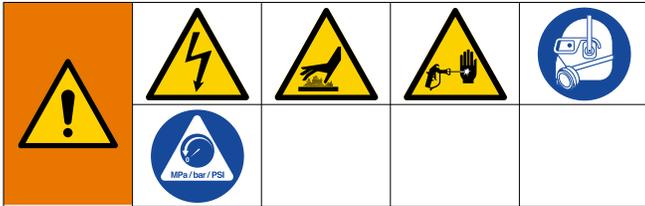


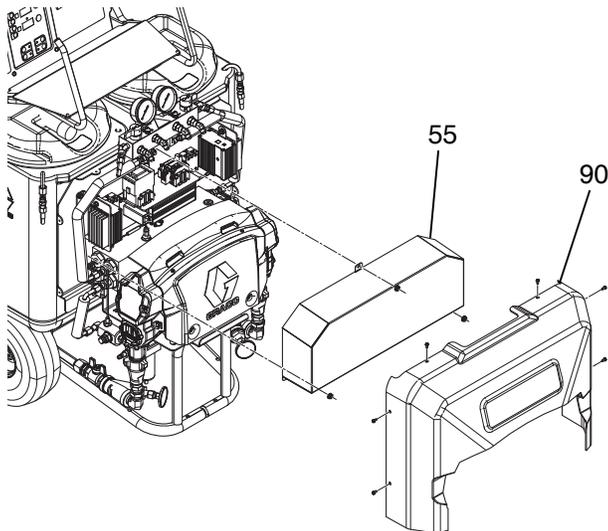
FIG. 14 Temperature Control Module Connections

# Heater

## Test Heater Element



1. See **Before Beginning Repair**, page 39.
2. Wait for the heater to cool.
3. Remove heater shroud (90) and electronics cover (55).



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**FIG. 15**

4. Disconnect the heater element wires from the heater wire connector. Test with an ohmmeter. Replace the heater element if the resistance reading does not fall within the range.

Nominal Heater Voltage	Heater Wattage Per Zone	Element Wattage	Ohms
120	1500	500	24-32
		1000	12-16
230	2000	620	73-94
		1380	32-43

## Remove Heater Element

1. To remove the heater element (307), first remove the thermocouple (310) to avoid damage, see step 7, page 49.
2. Remove the heater element (307 or 316) from the housing (301). Be careful not to spill any fluid left in the housing.
3. Inspect the element.

It should be relatively smooth and shiny. If there is a crusted, burnt, ash-like material adhered to the element or sheath shows pitting marks, replace the element.

4. Install the new heater element (307 or 316). Hold the mixer (309) so it does not block the thermocouple port (P), for (307) only.
5. Reinstall the thermocouple. See step 8, page 49.
6. Reconnect the heater element leadwires to the heater wire connector.
7. Replace the heater shroud (90) and the electronics cover (55).

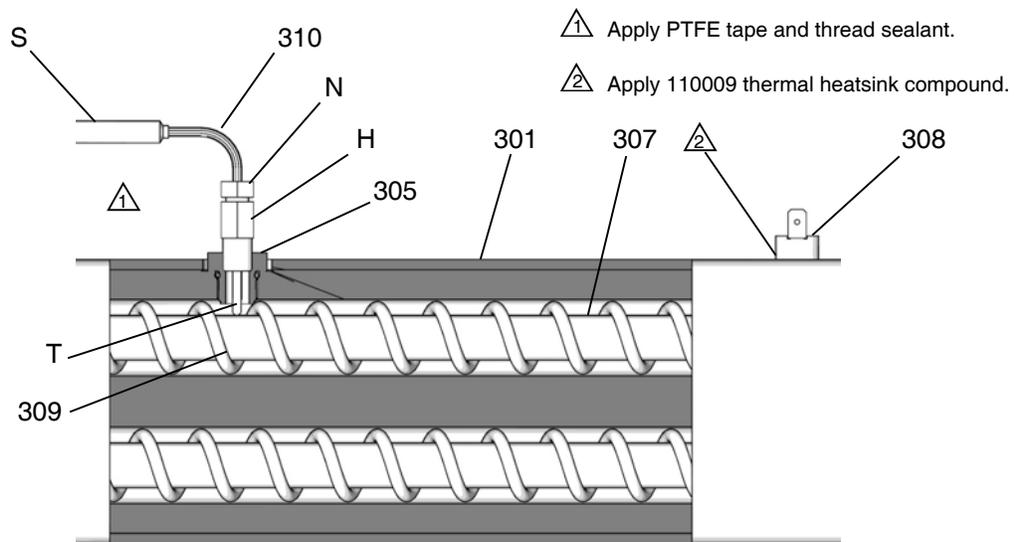
## Line Voltage

The primary heaters output their rated wattage at their nominal voltage of either 120VAC or 230VAC, depending on system. Low line voltage will reduce power available and the heaters will not perform at full capability.

## Thermocouple



1. See **Before Beginning Repair**, page 39.
2. Wait for the heaters to cool.
3. Remove the heater shroud (90) and the electronics cover (55). See FIG. 13, page 46.
4. Loosen and remove the temperature control module bracket mounting fasteners (56). Move the control module up and out of the way to access the thermocouple.
5. Disconnect the thermocouple wires from B on the temperature control module. See **Temperature Control Modules Connections**, page 47.
6. Clip the cable ties as necessary. Note the path as wires must be replaced in the same way.
7. See FIG. 16. Loosen the ferrule nut (N). Remove the thermocouple (310) from the heater housing (301), then remove thermocouple housing (H). Do not remove the thermocouple adapter (305) unless necessary. If the adapter must be removed, ensure that the mixer (309) is out of the way when replacing the adapter.
8. Replace the thermocouple, FIG. 16.
  - a. Remove the protective tape from the thermocouple tip (T).
  - b. Apply PTFE tape and thread sealant to male threads and tighten the thermocouple housing (H) into the adapter (305).
  - c. Push in the thermocouple (310) so the tip (T) contacts the heater element (307).
  - d. Holding the thermocouple (T) against the heater element, tighten the ferrule nut (N) 1/4 turn past tight.
9. Route the wires (S) into the cart and thread into a bundle as before. Reconnect the wires to the board.
10. Replace the heater shroud (90) and the electronics cover (55). See FIG. 13, page 46.
11. Turn on the heaters ISO and RES simultaneously to test. Temperatures should rise at same rate. If one heater is low, loosen the ferrule nut (N) and tighten the thermocouple housing (H) to ensure the thermocouple tip (T) contacts the element (307).



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**FIG. 16 Thermocouple**

## Overtemperature Switch



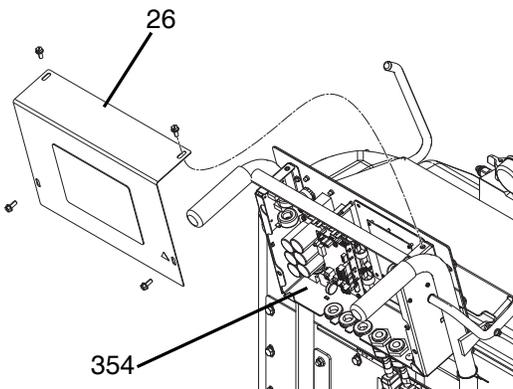
1. See **Before Beginning Repair**, page 39.
2. Wait for the heaters to cool.
3. Remove the heater shroud (90) and the electronics cover (55). See FIG. 13, page 46.
4. Disconnect one leadwire from the overtemperature switch (308), FIG. 16, page 49. Test across the switch with an ohmmeter. Resistance must be approximately 0 ohms.
5. If the switch fails test, remove the wires and screws. Discard the failed switch. Apply thermal compound, install the new switch in the same location on the housing (301), and secure with screws (311). Reconnect the wires.

If wires need replacement, disconnect from the heater control module. See FIG. 24 on page 72.

## Pressure Transducers



1. See **Before Beginning Repair**, page 39.
2. Remove back cover (26).



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3. Disconnect the transducer cables from J11 and J12 connectors. Reverse ISO and RES transducer connections and check if status codes follows the bad transducer.
4. Replace the transducer if the transducer fails the test.
  - a. Remove the supply tank. See **Remove Supply Tank**, page 39.
  - b. Follow the transducer cable on the cart frame and cut the zip ties. Disconnect the transducer from the pump outlet manifold.
  - c. Install an o-ring (553) on the new transducer (554). Apply lubricant to the o-ring (553).
  - d. Install the transducer (554) in manifold. Mark the end of the cable with tape (red = ISO, blue = RES).
  - e. Route the cable back through the cart frame to the control board. See FIG. 12, page 45.
  - f. Install the supply tank.

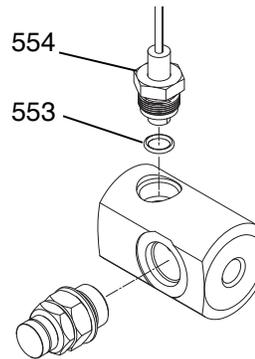


FIG. 17 Transducer

## Drive Housing



### Removal

1. See **Before Beginning Repair**, page 39.
2. Remove the screws (207) and end covers (229), see FIG. 18, page 52.

Examine the connecting rod (216). If the rod needs replacing, first remove the pump (219). See **Displacement Pump**, page 41.

#### NOTICE

To prevent equipment damage, do not drop the gear reducer (214) and crankshaft (210) when removing the drive housing (215). These parts may stay engaged in the motor end bell (MB) or may pull away with the drive housing.

3. Disconnect pump inlet and outlet lines. Remove screws (220) and pull drive housing (215) off motor (201). Connecting rod (216) will disengage from crankshaft (210).
4. Examine crankshaft (210), gear reducer (214), thrust washers (208, 212), and bearings (209, 211, 213).

### Installation

1. Apply grease liberally to the washers (208, 212), bearings (209, 211, 213), gear reducer (214), crankshaft (210), and inside the drive housing (215). Grease is supplied with the replacement parts kits.

**NOTE:** The RES side crankshaft (210) includes the cycle counter magnet (224). When reassembling, be sure to install the crankshaft with the magnet on RES side.

If replacing the crankshaft, remove the magnet (224). Reinstall the magnet in the center of the offset shaft on the new crankshaft. Position the shaft in the Park position.

2. Install the bronze bearings (211, 213) in the drive housing (215), as shown.
3. Install the bronze bearings (209, 211) and steel washer (208) on the crankshaft (210). Install the bronze bearing (213) and steel washer (212) on the gear reducer (214).
4. Install the gear reducer (214) and crankshaft (210) into the motor end bell (MB).

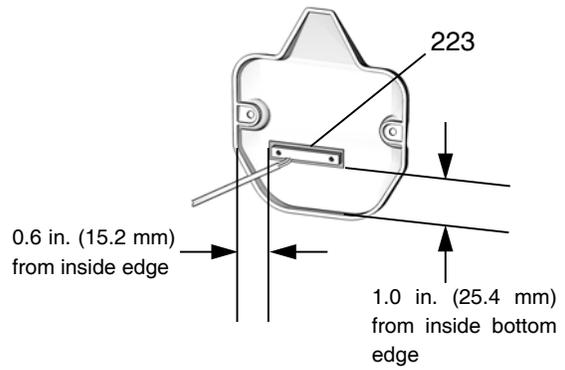
**NOTE:** The crankshaft (210) must be in line with the crankshaft at other end of the motor. The pumps will move up and down together.

**NOTE:** If the connecting rod (216) or pump (219) were removed, reassemble the rod in housing and install the pump. See page **Displacement Pump**, page 41.

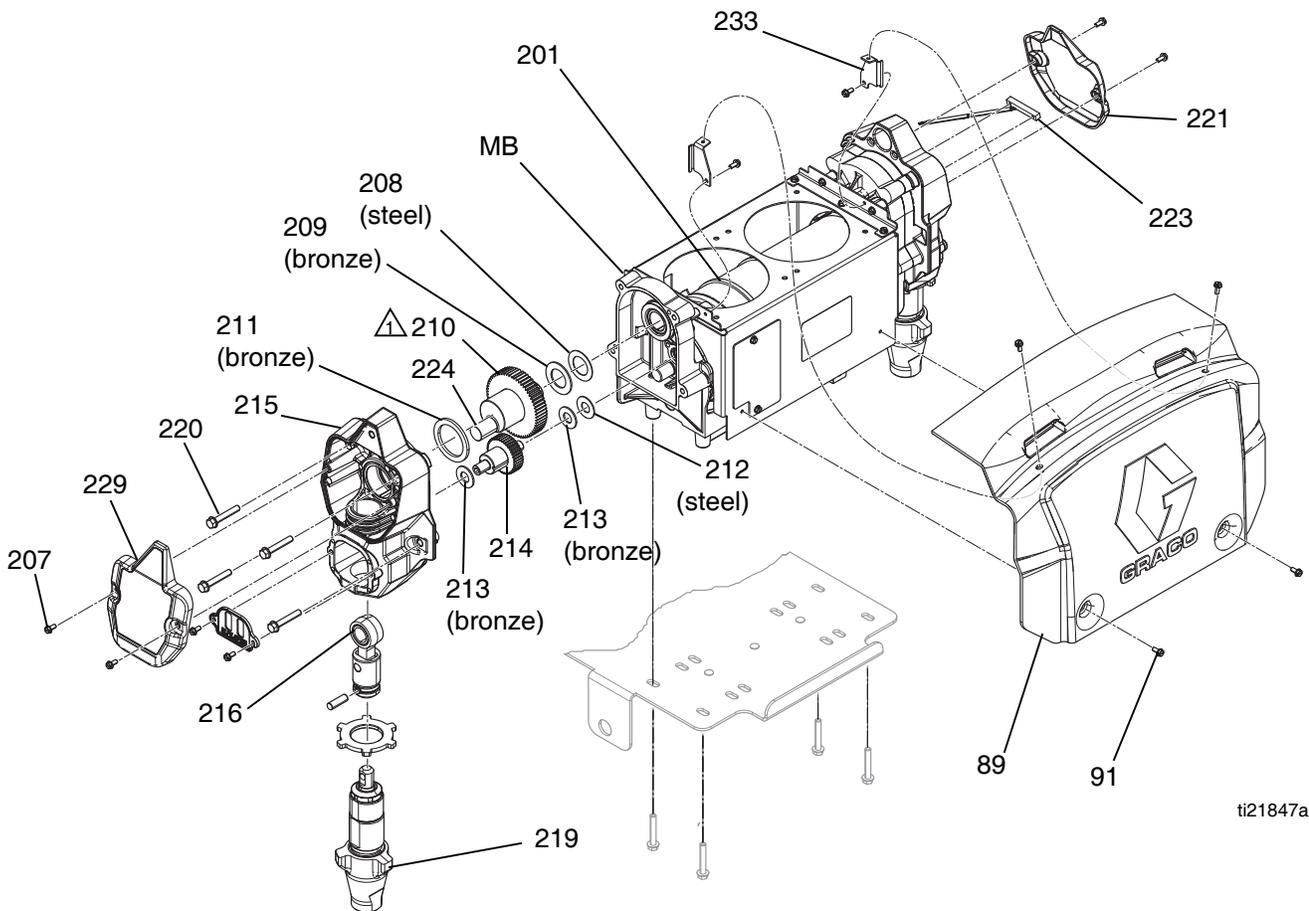
5. Push the drive housing (215) onto the motor (201). Install the screws (220).
6. Install the drive housing covers (229) and screws (207). The pumps must be in phase (both at same position in stroke).

## Replace Cycle Counter Switch

The RES side drive housing cover (229) includes the cycle counter switch (223), mounted in the cover. When reassembling, be sure to install the cover with the switch on RES side.



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 Crankshaft must be in line with crankshaft at other end of motor, so pumps move up and down in unison.

**FIG. 18 Drive Housing**

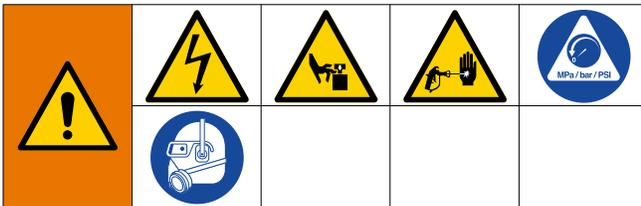
## Electric Motor

### Test Motor

If the motor is not locked up by the pumps, it can be tested using a 9 V battery.

1. Open the recirculating valves.
2. Disconnect the motor connections from the control board, see FIG. 12, page 45. Touch jumpers from battery to the motor connections. The motor should turn slowly and smoothly.

### Removal



See wiring schematic, page 45.

1. See **Before Beginning Repair**, page 39.
2. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 24
3. Remove the four screws (91), shroud (89), and mounting brackets (233). See FIG. 18.
4. Remove the fans (16) and disconnect the cable (80). See FIG. 20.
5. Remove the drive housing. See **Drive Housing**, page 51.
6. Remove the display control cover (26). Disconnect the motor cables as follows:
  - a. Unplug the motor power connector before the ferrite (88).
  - b. Unplug the motor temp switch harness from connector J9 and remove the grounding cable from the grounding screw.
7. Remove the RES supply tank. See **Remove Supply Tank**, page 39.
8. Cut the zip ties.
9. Thread the motor power switch harness and over the temp switch out the bottom of the control module and cable channel to free the motor.

#### NOTICE

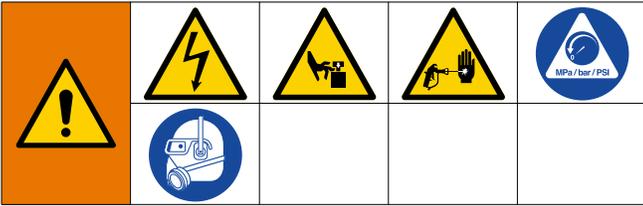
Dropping the motor could cause damage to the motor. To prevent dropping the motor, two people may be required to lift.

10. Remove the screws (15) holding the motor (201) to the bracket. Lift the motor off the unit.
11. If replacing the motor, remove the shroud mounting bolts (207) and brackets (233) and set aside.

### Installation

1. If replacing the motor, install the fan assemblies (16) and shroud mounting brackets (233) on the new motor (201).
2. Place the motor (201) and fans (16) on the unit. Thread the motor switch harness through the grommets in the cart and into the back of the display. See FIG. 24, page 72.
3. Fasten the motor (201) with the screws (15) underneath. Do not tighten yet.
4. Plug the motor temp switch harness to connector J9 and the grounding cable from the grounding screw.
5. Plug in the motor power connector.
6. Secure all cables to the cart frame with zip ties.
7. Install the display control cover (26).
8. Install the supply tank.
9. Install the drive housing. See **Drive Housing**, page 51. Reconnect the inlet assemblies to the pumps.
10. Torque the screws (15) to 150 in.-lb (17 N•m).
11. Return to service.

## Motor Brushes



Replace brushes worn to less than 1/2 in. (13 mm). Brushes wear differently on each side of motor; check both sides.

The motor commutator should be smooth. If not, resurface the commutator or replace the motor.

1. See **Before Beginning Repair**, page 39.
2. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 24.
3. Remove the four screws (91) and the motor shroud (89). See FIG. 18, page 52.
4. Remove the fans (16) and disconnect the cable (80). See FIG. 20, page 54.
5. Loosen the pump inlet and outlet connections.
6. Remove the display control cover (26). Disconnect the motor cables as follows:
  - a. Unplug the motor power connector.
  - b. Unplug the motor temp switch harness from connector J9. Disconnect the grounding cable from the grounding screw.
7. To replace the front motor brush:
  - a. Remove the two bolts and access the cover plate. See FIG. 19, page 54.
  - b. Remove the old brushes and install the new ones supplied in kit.
8. To replace the rear motor brush:
  - a. Remove the motor mounting bolts. Slide the motor forward and lean on the cart frame.
  - a. Remove the two bolts and access cover plate. See FIG. 19, page 54.
- b. Remove the old brushes and install the new ones supplied in kit.
9. See the instruction sheet included with your brush repair kit.

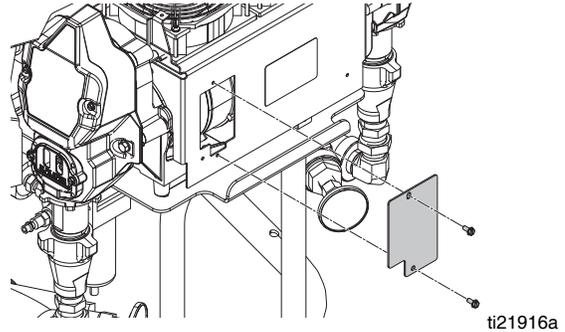


FIG. 19 Motor Brushes

## Fans

1. Disconnect the fan cable (80) from the fan (16). With Motor Power on, test the cable connector for line voltage (100-120VAC or 200-240VAC).
2. **If voltage is within the described range for that system**, the fan is defective. Remove the screws holding the fan to the shield (17). Install the new fan in reverse order.
3. **If voltage is not within the appropriate range**, check the fan cable connection at terminal blocks 1 and 2; see FIG. 23 on page 71.

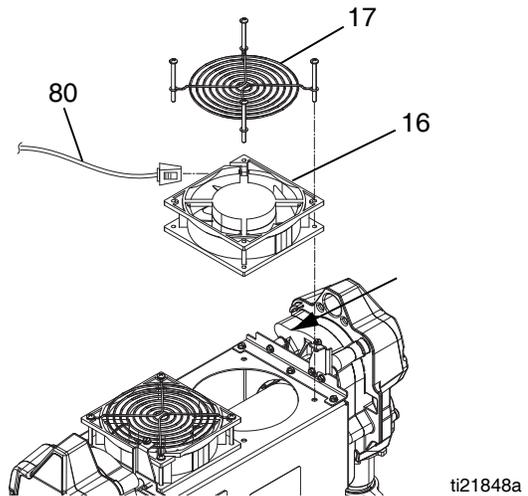


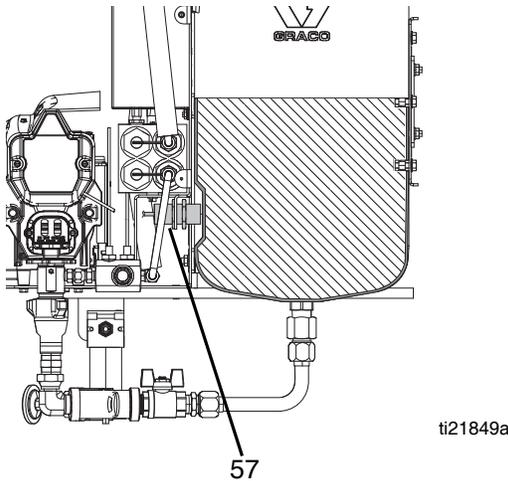
FIG. 20 Fans

# Tank Fluid Level Sensors

## Adjust

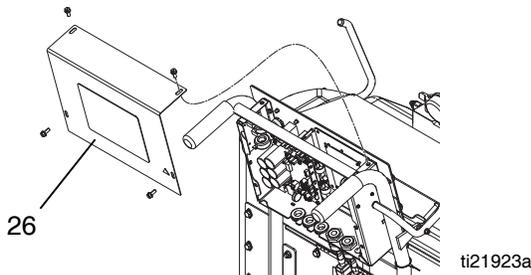
Adjust the position of the tank fluid level sensor (57) so that the sensor contacts the surface of the tank.

1. Loosen the sensor jam nuts and the press sensor (57) against the tank.
2. Spin on the inner jam nut until flush, then tighten the inner jam nut one more turn.
3. Retighten outer jam nut.



## Replace

1. Loosen the jam nuts and remove the level sensor assembly (57).
2. Remove the supply tank. See **Remove Supply Tank**, page 39.
3. Cut the zip ties securing the sensor cable to the cart.
4. Remove the display control cover (26).

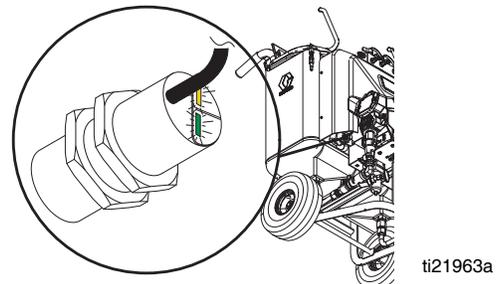


5. Disconnect the level sensor connector from J6 on the control board. See FIG. 12, page 45.

6. Route the new tank level sensor cable through the grommet on the bottom of the cart and through the grommet on the bottom of the control panel. Connect the new level sensor (57) to J6.
7. Install the display control cover (26).
8. Zip tie the tank level sensor cable with other low voltage cables.
9. Reinstall the supply tank. See **Remove Supply Tank**, page 39.
10. Adjust the position of the level sensor assembly (57). See **Adjust**, page 55.
11. Set the sensitivity. See **Reset Sensitivity**, page 56.
12. Check the operation of both sensors.
  - a. Hold one hand inside both tanks for 5 seconds, near the inner wall, where the tank level sensor is located.
  - b. The tank level indicator LED on the control panel will stop flashing when it senses both of your hands.
  - c. The tank level indicator LED will flash if either tank sensor indicates that it is low. Alternately, remove each hand away from inner wall for 5 seconds. The tank level indicator LED on the control panel will flash.

**Table 12: Sensor LED Identification**

LED	Status
Green - on	Sensor is powered
Green - off	Sensor is not powered
Yellow - on	Sensor detects material (immediate, no 5 second display)
Yellow - off	Sensor does not detect material



**FIG. 21 Sensor LEDs**

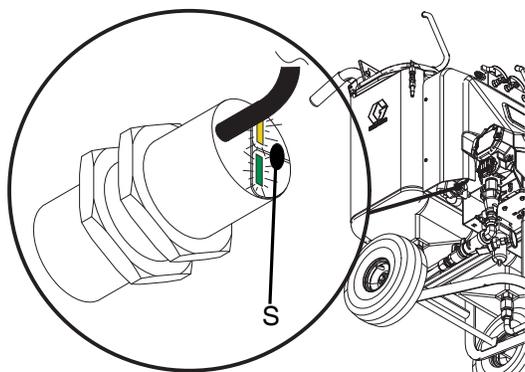
## Reset Sensitivity

The tank fluid level sensor sensitivity may need to be adjusted when:

- A new tank has a different insulation density than the previous tank.
- Material build-up is on the inside or outside of the tank. Adjust sensitivity rather than thoroughly cleaning the tank.
- Level sensor sensitivity comes out of alignment through misuse or harsh environment.
- Material density is less than normally pumped materials.

1. Ensure that the tank is completely empty.
2. Remove the shroud (89) to expose the sensors.
3. Ensure that the sensor (57) and tank are properly installed. See **Adjust**, page 55.
4. Locate the adjustment screw (S) above the green and yellow LEDs.

**NOTE:** The adjustment screw on some tank level sensors is covered by white tape. Remove the white tape to access the adjustment screw.



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**FIG. 22 Adjustment Screw**

5. Use a small flathead screwdriver and slowly turn the adjustment screw (S) clockwise until the yellow LED turns on.
6. Slowly turn the adjustment screw (S) counterclockwise until the yellow LED barely turns off.
7. Slowly turn the adjustment screw (S) counterclockwise an additional 1/2 turn.

**NOTE:** The yellow LED should stay turned off.

8. Fill the tank with desired material and verify that the sensor detects material. The yellow LED will turn on when the material reaches the one gallon mark.

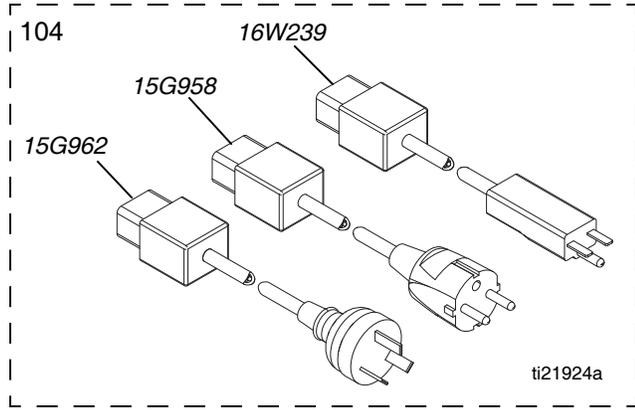
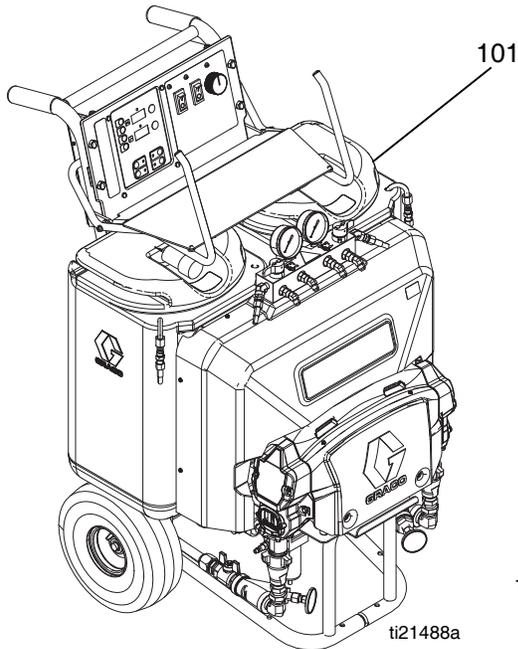
**NOTE:** If the yellow LED does not turn on after two gallons of the material, then the material density may be too low and is not detected by the sensor. Turn the adjustment screw clockwise in 1/8 turn increments until sensor detects the material and the yellow LED turns on.

If the adjustment screw is turned a total 1/2 turn, then it will not detect an empty tank.

9. Reinstall the shroud (89).

# Parts

## System Packages



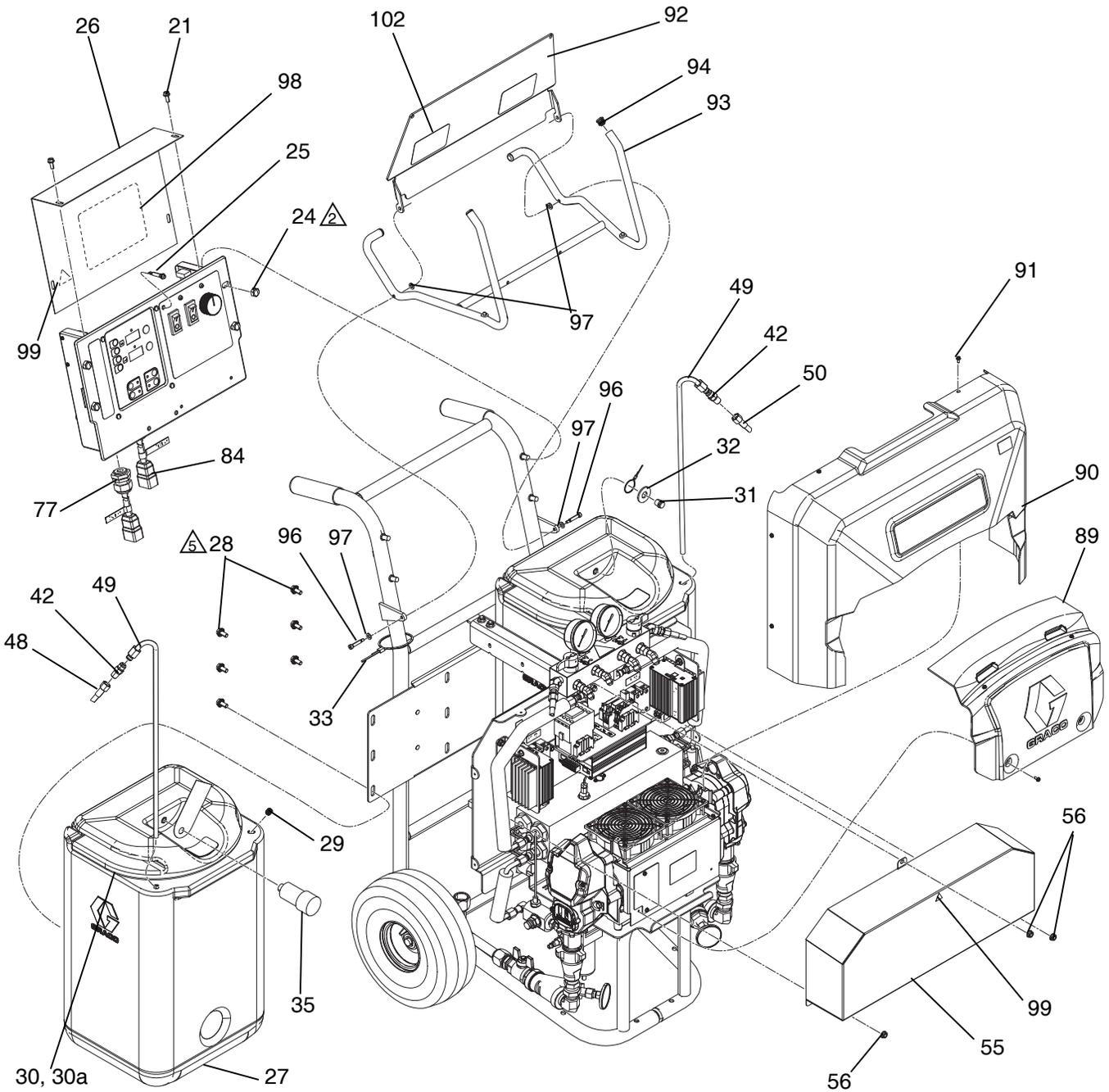
System Package	Proportioner	Hose	Gun	Power Cord Adapter	
	101 see page 58	102 see page 70	103	104	
				Part Number	Region
APT100	24T100	25R000	249810	✘	✘
P2T100	24T100	25R000	GCP2RA*	✘	✘
APT900	24R900	25R000	249810	16W239	North America
APT901	24R900	25R000	249810	15G958	Europe
APT902	24R900	25R000	249810	15G962	Australia/Asia
P2T900	24R900	25R000	GCP2RA*	16W239	North America
P2T901	24R900	25R000	GCP2RA*	15G958	Europe
P2T902	24R900	25R000	GCP2RA*	15G962	Australia/Asia

\* Probler packages use recirc accessory kit 24E727.

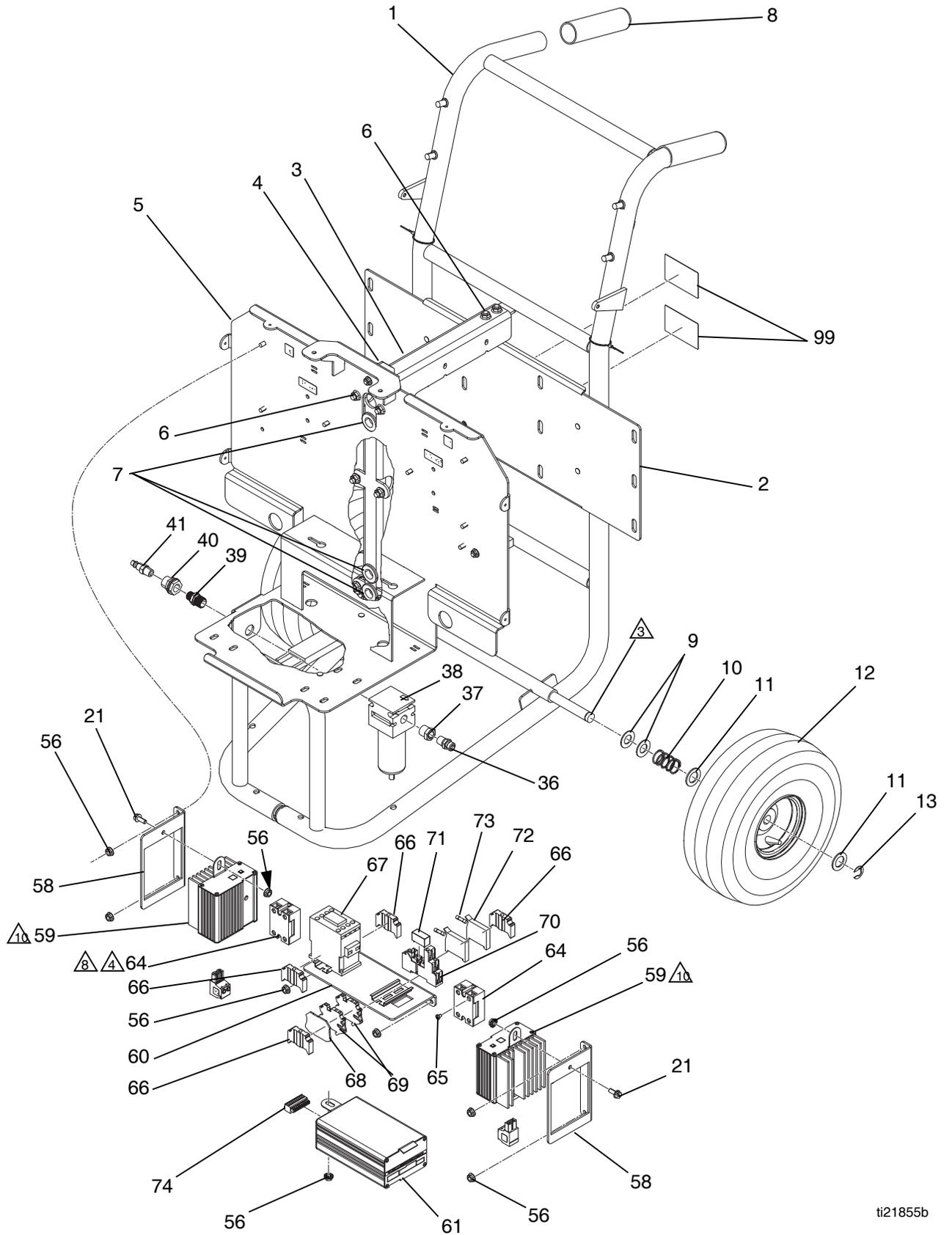
✘ Not included.

# E-10hp Proportioners

24T100, 100-120VAC, Proportioner  
24R900, 200-240VAC, Proportioner

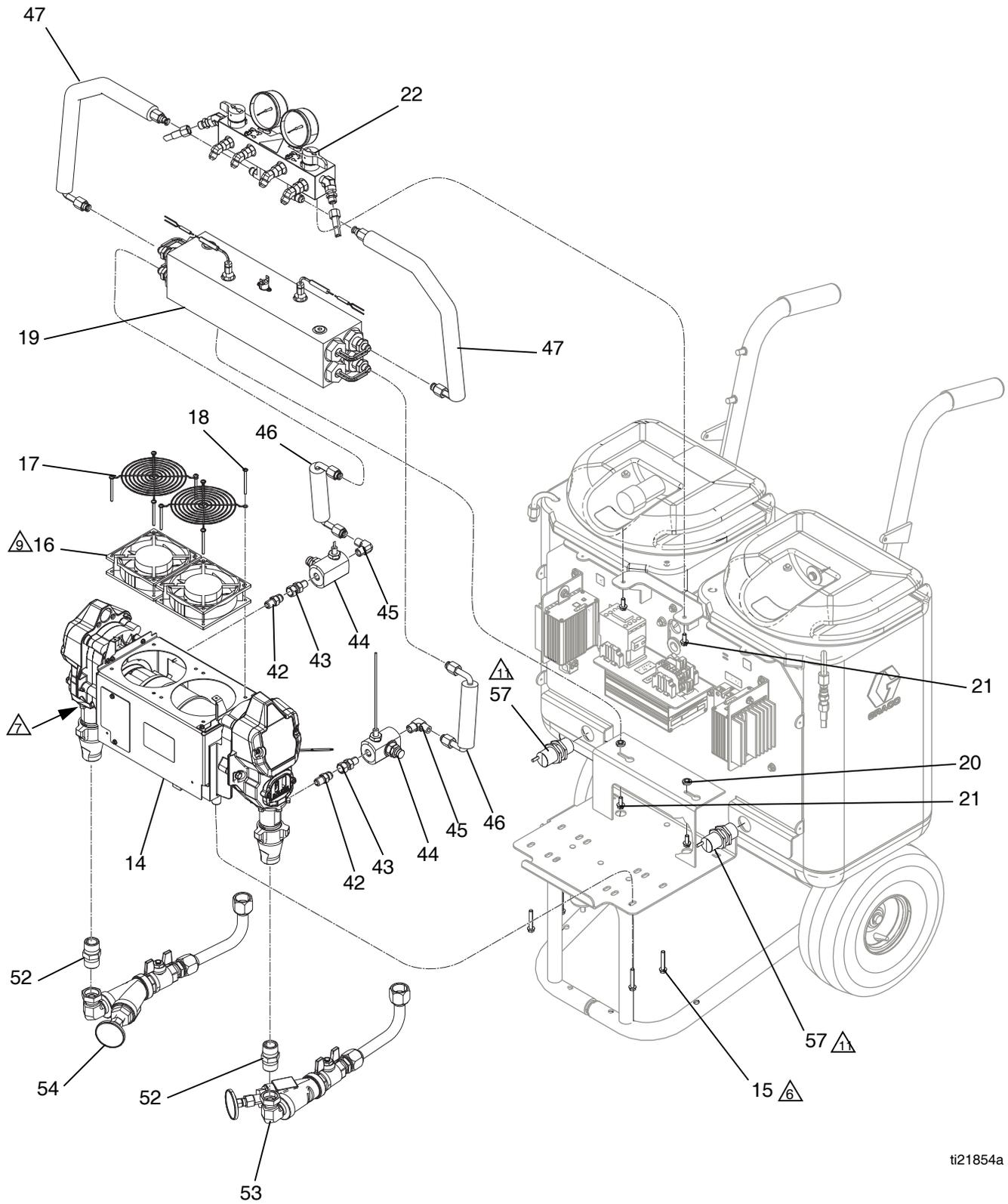


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Parts



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- 1 Apply sealant to all non-swiveling pipe threads.  
 2 Apply sealant to threads of nut cap.  
 3 Apply lubricant to thread and axle of cart.  
 4 Apply even distribution of thermal grease on bottom of metal surface of solid state relays.  
 5 Torque to 125 in-lb (14 N•m).  
 6 Torque to 150 in-lb (17 N•m).  
 7 Assemble nut to finger tight only.
- 8 Orient SSR with terminals 1 and 2 towards the top.  
 9 Orient fan to flow down and connector plug towards the back.  
 10 Orient heater module with fins outwards.  
 11 Assemble sensor flush to tank surface.  
 12 Install clamp-on ferrite near termination of transducer wires. See FIG. 24, page 72.  
 13 Install clamp-on ferrite on black and red motor power wires. See FIG. 24, page 72.

### 24T100, 100-120VAC, Proportioner 24R900, 200-240VAC, Proportioner

Ref.	Part	Description	Quantity	
			24T100, 100-120 VAC	24R900, 200-240 VAC
1	---	CART	1	1
2	24T950	BRACKET, tank mount	1	1
3	24T951	BRACKET, crossbar	1	1
4	24T952	BRACKET, gusset, cart	1	1
5	24T953	BRACKET, motor mount	1	1
6	110996	NUT, hex, flange head	18	18
7	101765	GROMMET	3	3
8	119975	GRIP, vinyl, gray; 1.25 in.	2	2
9	154636	WASHER, flat	4	4
10	116411	SPRING, compression	2	2
11	116477	WASHER, flat, nylon	4	4
12	116478	WHEEL, pneumatic	2	2
13	101242	RING, retaining, ext.	2	2
14	24T954	PROPORTIONER, see page 64	1	1
15	117493	SCREW, mach, hex washer hd; 1/4-20	4	4
16	24K985	FAN, cooling, 120 VAC	2	
	24K986	FAN, cooling, 230 V		2
17	115836	GUARD, finger	2	2
18	120094	SCREW, pan hd, phil, zinc	8	8
19	24U009	HEATER, assy; 120V, 1000W; see page 66	1	
	24T955	HEATER, assy; see page 66		1
20	167002	INSULATOR, heat	2	2
21	108296	SCREW, mach, hex wash hd	10	10
22	24T960	MANIFOLD, outlet/recirc; see page 69	1	1
23	24T962	DISPLAY, control; see page 67	1	1
24	117623	NUT, cap; 3/8-16	4	4
25	24U005	DIODE, light-emitting, 120 V	1	
	24T970	DIODE, light-emitting, 230 V		1
26	24R648	COVER, display	1	1

## Parts

Ref.	Part	Description	Quantity	
			24T100, 100-120 VAC	24R900, 200-240 VAC
27	24T973	TANK	2	2
28	111800	SCREW, cap, hex hd	12	12
29	127148	SCREW, set, 7/16-14, 1/2, black	2	2
30	24T975	LID; includes o-ring (30a)	2	2
30a	24T974	O-RING	2	2
31	24K976	MUFFLER, 1/4 NPT	1	1
32	101044	WASHER, plain	1	1
33	119973	CABLE, sst lanyard; 14 in.	2	2
35	24K984	DRYER, desiccant, mini in-line	1	1
36	162453	FITTING; 1/4 npsm x 1/4 npt	1	1
37	100176	BUSHING, hex	1	1
38	24K977	FILTER, regulator, air; with 3/8 npt auto drain; includes 64a	1	1
38a	15D909	ELEMENT, 5 micron; polypropylene; not shown	1	1
39	157350	ADAPTER	1	1
40	104641	FITTING, bulkhead	1	1
41	169970	FITTING, line air; 1/4-18 npt	1	1
42	116704	ADAPTER, 9/16-18 JIC x 1/4 NPT	4	4
43	117506	FITTING, swivel, 1/4 npt x #6 JIC	2	2
44	---	MANIFOLD, assembly, outlet; see page 70	2	2
45	556765	FITTING, #6 JIC 1/4PM	2	2
46	24T977	TUBE, pump outlet, ISO	2	2
47	24T978	TUBE, heater outlet, ISO	2	2
48	24T979	HOSE, coupled, recirc, ISO	1	1
49	24T980	TUBE, recirculation	2	2
50	24T981	HOSE, coupled, recirc, RES	1	1
51	114225	TRIM, edge protection	1	1
52	119992	FITTING, pipe, nipple, 3/4 x 3/4 npt	2	2
53	24T982	MANIFOLD, inlet, RES; see page 68	1	1
54	24T986	MANIFOLD, inlet, ISO; see page 68	1	1
55	24T987	COVER, electronics	1	1
56	115942	NUT, hex, flange head	12	12
57	24T988	SENSOR, tank level	2	2
58	24T990	PANEL, heater control mount	2	2
59	247828	MODULE, heater	2	2
60	24T989	PANEL, logic control mount	1	1
61	24T308	MODULE, heater control, 120 V	1	
	24T307	MODULE, heater control, 230V		1
64	24U006	RELAY, SSR, 120 V	2	
	24T991	RELAY, SSR, 230 V		2
65	112144	SCREW, mach, pan hd	4	4
66	126811	BLOCK, clamp end	4	4

Ref.	Part	Description	Quantity	
			24T100, 100-120 VAC	24R900, 200-240 VAC
67	24U007	CONNECTOR, contactor; 120 V	1	
	24T992	CONNECTOR, contactor; 230 V		1
68	126817	COVER, end	1	1
69	126818	BLOCK, terminal 3-wire	2	2
70	126810	RELAY, cradle	1	1
71	24T993	RELAY, 12V	1	1
72	255043	HOLDER, fuse terminal block; 5 x 20mm	2	2
73	255023	FUSE, 5A, 5 x 20 mm	2	2
74†	127239	CONNECTOR, 5 pin	1	
	127240	CONNECTOR, 10 pin		1
75†	120748	CONNECTOR, 2 pin	2	1
76	127237	CONNECTOR, 6 pin	1	1
77	116171	BUSHING, strain relief	2	
	16W761	BUSHING, strain relief		2
78✘†	24T994	HARNESS, POWER; see FIG. 23 on page 71.	1	1
79✘†	24T995	CABLE, communication, heater control module	1	1
80✘†	24T996	CABLE, FAN, 29 in. (736.6 mm)	2	2
81✘†	24T997	CABLE, control, display	1	1
82✘†	24T998	CABLE, harness, overtemperature	1	1
83	24T999	CONNECTOR, jumper	2	2
84	24U008	CORD, 20A, 120 V	2	
	24U000	CORD, 16A, 230 V		2
85	113505	NUT, keps, hex hd	2	2
88✘†	125835	CLIP, ferrite bead	2	2
89	24U001	COVER, proportioner, lower	1	1
90	24U002	COVER, proportioner, upper	1	1
91	115492	SCREW, mach, slot hex wash hd	10	10
92	24U003	GUARD, splash, hose rack	1	1
93	24U004	RACK, hose	1	1
94	120008	PLUG, tube	4	4
95	120150	ISOLATOR, pad, rubber	2	2
96	119999	BOLT, shoulder	2	2
97	110533	WASHER, flat, nylon, 1/4	4	4
98▲	15G280	LABEL, safety, warning, multiple	1	1
99▲	189930	LABEL, electric shock	2	2
104	217374	LUBRICANT, ISO pump	1	1

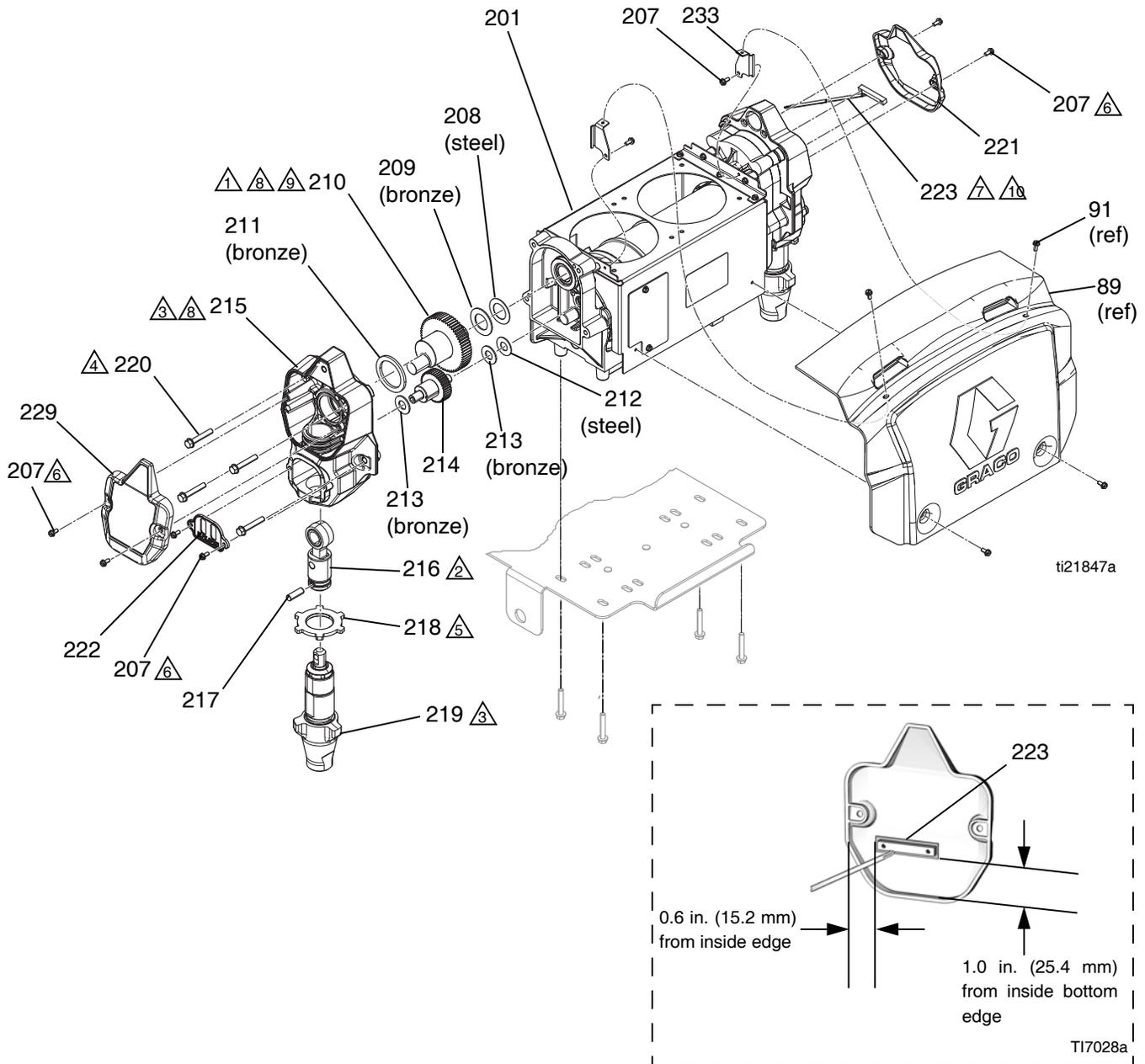
▲ Replacement safety labels, tags, and cards are available at no cost.

✘ Not shown.

† See FIG. 23 on page 71.

--- Not available for purchase.

## 24T954, 100-120VAC and 200-40VAC Bare Proportioner



- ⚠️ Apply lubricant to all gear teeth, motor pinion, and motor endbell on both sides of motor.
- ⚠️ Apply lubricant to rectangular cavity on connecting link.
- ⚠️ Apply lubricant to threads of pump cylinder before assembly into housing. Align top of cylinder flush within 0.06 to inside bottom of pump mounting hole.
- ⚠️ Torque fasteners to 140-160 in-lb (15-18 N•m).
- ⚠️ Assemble nut to finger tight only.

- ⚠️ Torque fasteners to 30-35 in-lb. Applies only when fasteners are assembled in plastic housings (215).
- ⚠️ Switch mounts to cover opposite brush end of motor only.
- ⚠️ Housing must be installed on motor with crankshafts aligned with each other.
- ⚠️ Assemble magnet to center of offset crankshaft on switch cover side of motor and adjust for park location.
- ⚠️ Affix switch to motor cover with double-sided tape. Cut to 2 in. (50.8 mm). Mount cover on side opposite brush end of motor.

Ref.	Part	Description	Qty
201	24T758	MOTOR, electric	1
207 ‡	115492	SCREW, mach, slot hex wash hd	10
208*	116074	WASHER, thrust	2
209*	107434	BEARING, thrust	2
210*	300001	KIT, crankshaft	2
211*	180131	BEARING, thrust	2
212 †	116073	WASHER, thrust	2
213 †	116079	BEARING, thrust	4
214 †	244242	GEAR, reducer (first stage)	2
215 ‡	287055	HOUSING, drive	2
216 ◆	287053	KIT, repair, connecting, rod	2
217 ◆	196762	PIN, straight	2
218	195150	NUT, jam, pump	2
219	24L006	PUMP, displacement	2
220 ‡	117493	SCREW, mach, hex washer hd	8
221 ‡	300002	KIT, cover; includes switch	1
222 ‡	15B589	COVER, pump rod	2
223	117770	SWITCH, reed with cable	1
224	24K982	MAGNET, disc, 0.38 dia., 0.100 thick; not shown	1
227	115711	TAPE, foam, 1/2 wide	1
229	300003	KIT, cover	1
233	16W162	BRACKET, shroud tab	2

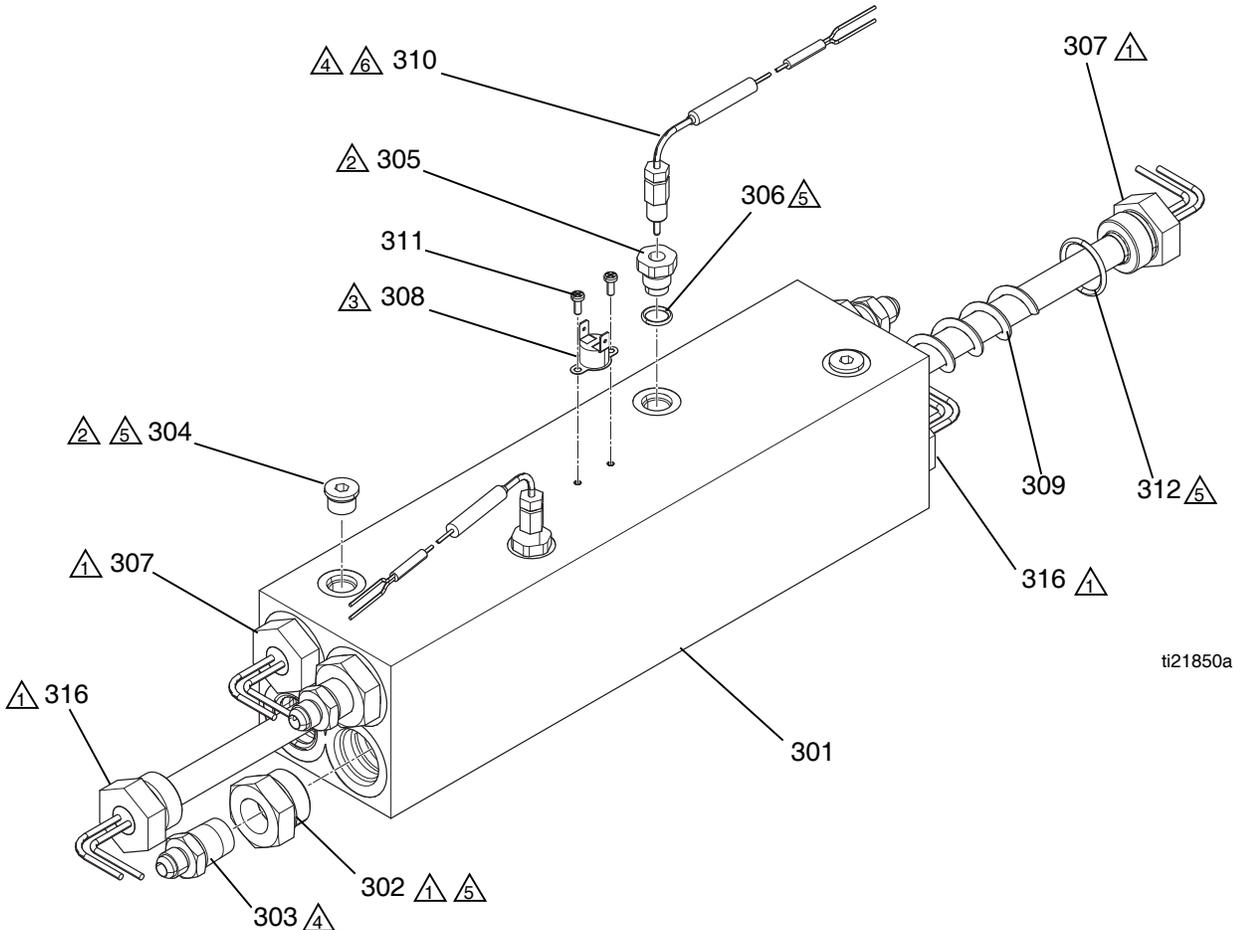
\* Included in 300001 Crankshaft Kit (210).

† Included in 244242 Gear Reducer Kit (214).

‡ Included in 287055 Drive Housing Kit (215).

◆ Included in 287053 Connecting Rod Kit (216).

# 24U009, 100-120VAC Heater 24T955, 200-240VAC Heater



- ⚠ Torque to 120 ft-lb (163 N•m).
- ⚠ Torque to 23 ft-lb (31 N•m).
- ⚠ Apply 110009 thermal heat sink compound.
- ⚠ Apply sealant and tape to all non-swiveling and threads without o-rings.

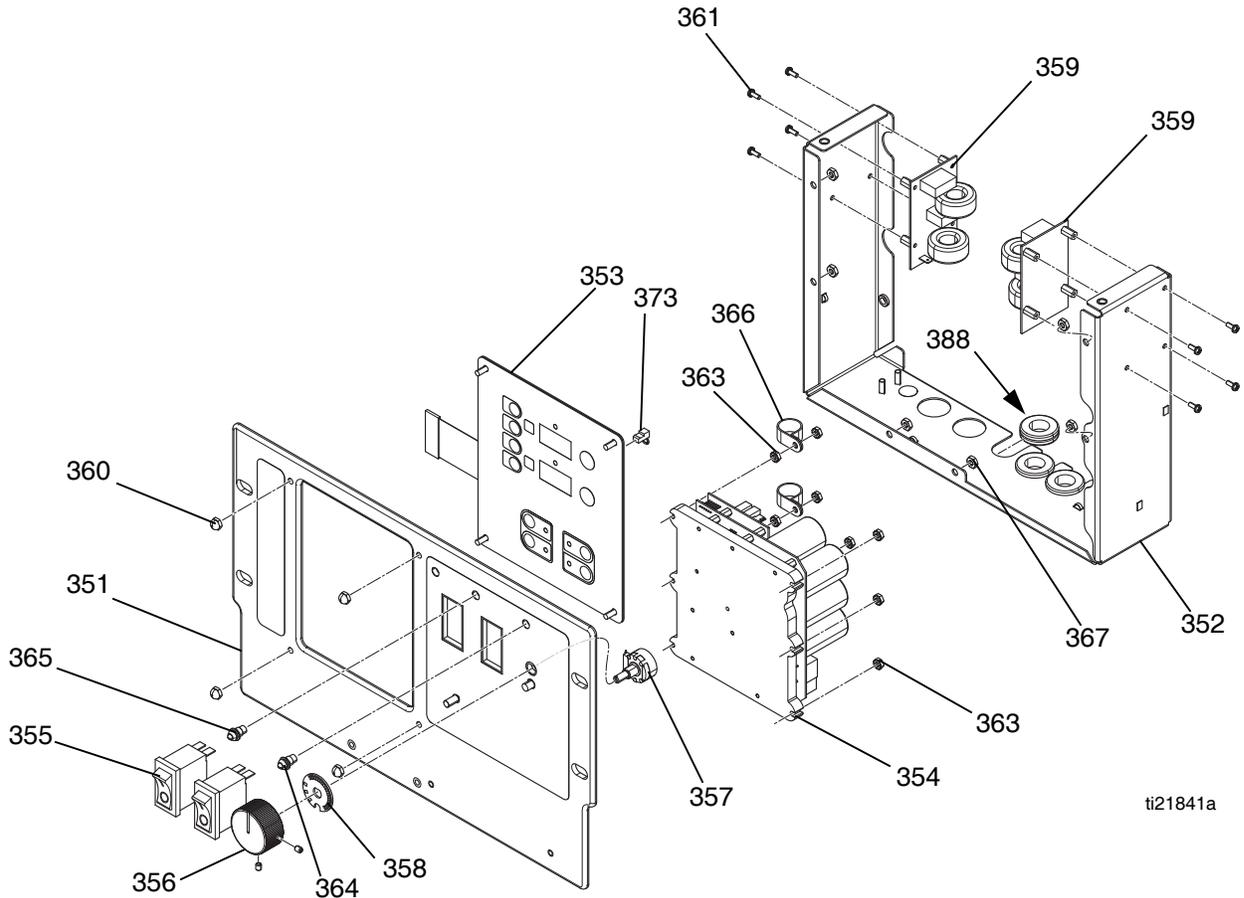
- ⚠ Apply lubricant to o-rings before assembling in heater housing.
- ⚠ Tighten NPT fitting from sensor to heater housing as shown. Remove tape from probe tip prior to inserting. Insert probe until tip bottoms on heater element. Tip must touch heating element. Insert ferrule and tighten ferrule nut to sensor probe. Orient sensor as shown and torque 1/4 turn past tight.

Ref.	Part	Description	Qty.
301	---	BLOCK, heater	1
302	15H302	FITTING, reducer 1-3/16 SAE x 1/2 npt	4
303	16V432	FITTING, adapter, #6 JIC x npt, mxm	4
304	15H304	FITTING, plug, 9/16 SAE	2
305	15H306	ADAPTER, thermocouple, 9/16 x 1/8	2
306	120336	O-RING, packing	2
307	24T958	HEATER, fire rod, 230 V, 24T955 only	2
	24U012	HEATER, fire rod, 120 V, 24U009 only	2

Ref.	Part	Description	Qty.
308	15B137	SWITCH, overtemperature	1
309	16U940	MIXER, heater	4
310	117484	SENSOR,	2
311	---	SCREW, mach; #6-32	2
312	124132	O-RING	4
316	24T959	HEATER, fire rod, 230 V; 24T955 only	2
	24U014	HEATER, fire rod, 120 V; 24U009 only	2

--- Not available for purchase.

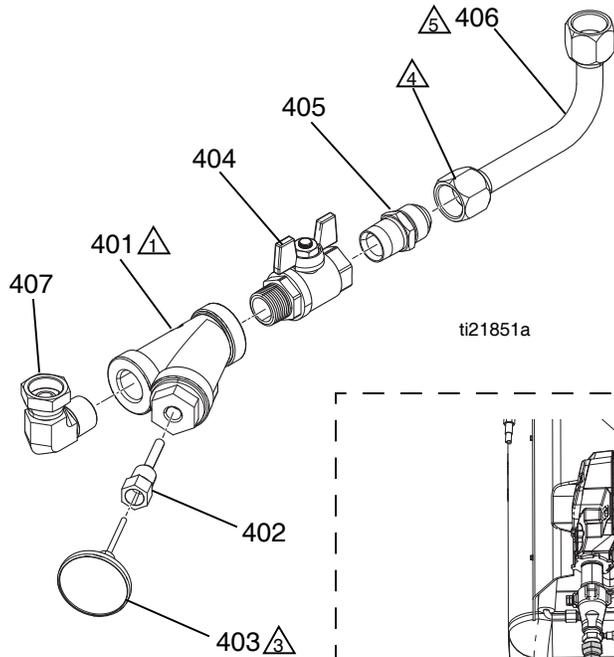
# 24T962, Display



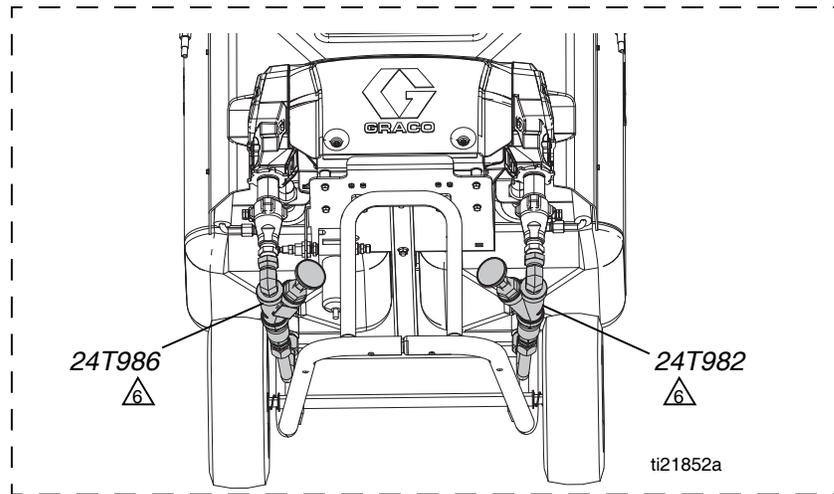
Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
351	24T963	PLATE, display, front	1	360	117523	NUT, cap (#10)	4
352	24T964	ENCLOSURE, control	1	361	127157	SCREW, mach, captive, #8	8
353	24T966	DISPLAY, heat two zone	1	363	127158	NUT, captive, #8	8
354	24T967	CONTROL, board, assy	1	364	24T968	DIODE, light-emitting, red	1
355	24K983	SWITCH, rocker, w/breaker, 240v, 20a	2	365	24T971	DIODE, light-emitting, yellow	1
356	24L001	KNOB, control, w/ball plunger	1	366	---	CLAMP, cable	2
357	24L002	POTENTIOMETR, adjustment, pressure	1	367	113505	NUT, keps, hex hd	6
358	15G053	PLATE, detent, display	1	368	101765	GROMMET	3
359	300005	FILTER, board	2	373	127019	CONNECTOR, jumper, e-stop	1
						--- Not available for purchase.	

## Fluid Inlets

24T986, ISO Inlet  
24T982, RES Inlet

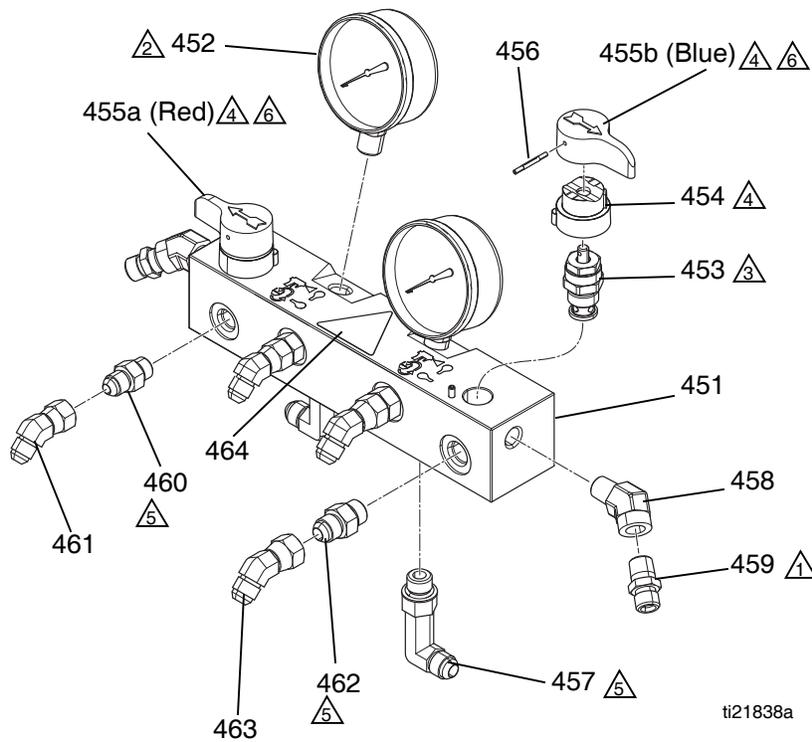


- ① Align Y-strainer as shown
- ② Apply sealant to all npt threads. Do not apply to JIC threads.
- ③ Apply thermal lubricant to thermometer probe.
- ④ Torque fitting of bent tube to 45-50 ft-lb (61-67 N•m).
- ⑤ Align bent tube to fitting within 2°.
- ⑥ Align thermometer dial as shown.



Ref. Part	Description	Qty.
401 101078	STRAINER, Y	1
402 15D757	HOUSING, thermometer, Viscon HP	1
403 102124	THERMOMETER, dial	1
404 24T983	VALVE, ball, 3/4 npt, mxf, T-handle	1
405 24T984	FITTING, adapter JIC-12 X 3/4 npt, mxm	1
406 24T985	TUBE, assy, inlet	1
407 160327	FITTING, union adapter, 90°	1

# 24T960, Fluid Manifold

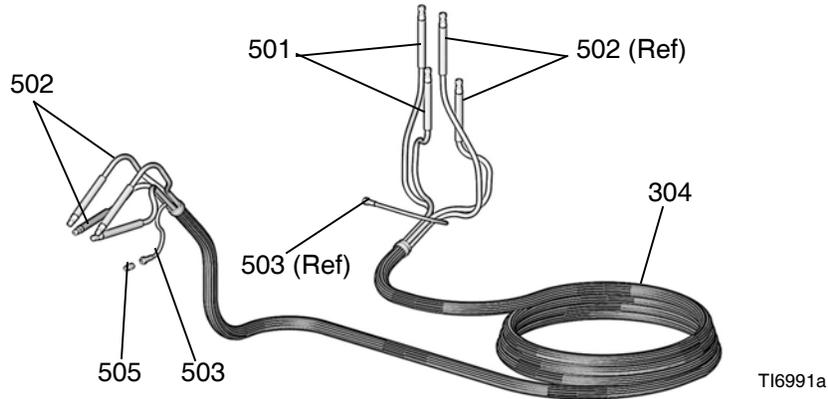


- ▲1 Apply sealant to assembled non-swiveling pipe threads.
- ▲2 Apply sealant and PTFE tape to threads.
- ▲3 Apply sealant to valve threads. Torque to 240-260 in-lb (27-29 N•m).
- ▲4 Apply lubricant to mating surfaces of valve base and handle.
- ▲5 Apply lubricant to o-rings on fittings. Torque to 16-20 ft-lb (22-27 N•m).
- ▲6 Align handles as shown when open.

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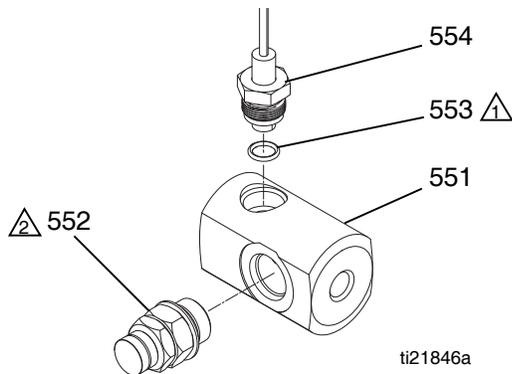
Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
451	24T961	MANIFOLD, fluid	1	460	127130	FITTING, straight, JIC-5 x SAE-ORB	2
452	102814	GAUGE, pressure, fluid	2	461	127128	FITTING, 45° elbow, JIC-5, mxf, swivel	2
453	239914	VALVE, drain	2	462	127131	FITTING, straight, JIC-6 x SAE-ORB	2
453a	15E022	SEAT	1	463	127129	FITTING, 45° elbow, JIC-6, mxf, SWIVEL	2
453b	111699	GASKET	1	464▲	189285	LABEL, warning, hot surface	1
454	224807	BASE, valve	2			▲ Replacement safety labels, tags, and cards are available at no cost.	
455a	17X499	HANDLE, valve, drain, red	1				
455b	17X521	HANDLE, valve, drain, blue	1				
456	111600	PIN, grooved	2				
457	16V434	FITTING, 90 elbow, JIC-6 x SAE-ORB	2				
458	119789	FITTING, elbow, street, 45°	2				
459	162453	FITTING; 1/4 npsm x 1/4 npt	2				

## 25R000, Insulated Hose Bundle with Recirculation Lines



Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
501	24R996	HOSE, fluid (component ISO), moisture guard; 1/4 in. (6 mm) ID; number 5 JIC fittings (mx); 35 ft (10.7 m)	2	503	15G342	HOSE, air; 1/4 in. (6 mm) ID; 1/4 npsm (f); 35 ft (10.7 m)	1
502	24R997	HOSE, fluid (component RES); 1/4 in. (6 mm) ID; number 6 JIC fittings (mx); 35 ft (10.7 m)	2	504	buy locally	TUBE, foam, insulated; 1-3/8 in. (35 mm) ID; 31 ft (9.5 m)	1
				505	156971	NIPPLE; 1/4 npt; for joining air line to another hose bundle	1

## Outlet Manifold



⚠ Apply lubricant to o-rings.

⚠ Orient housing with exhaust hole pointing down.

Ref.	Part	Description	Qty.
551	24T976	MANIFOLD, fluid, pump, outlet	1
552	247520	HOUSING, rupture disc	1
553	111457	PACKING, o-ring	1
554	24K999	TRANSDUCER, pressure, control	1

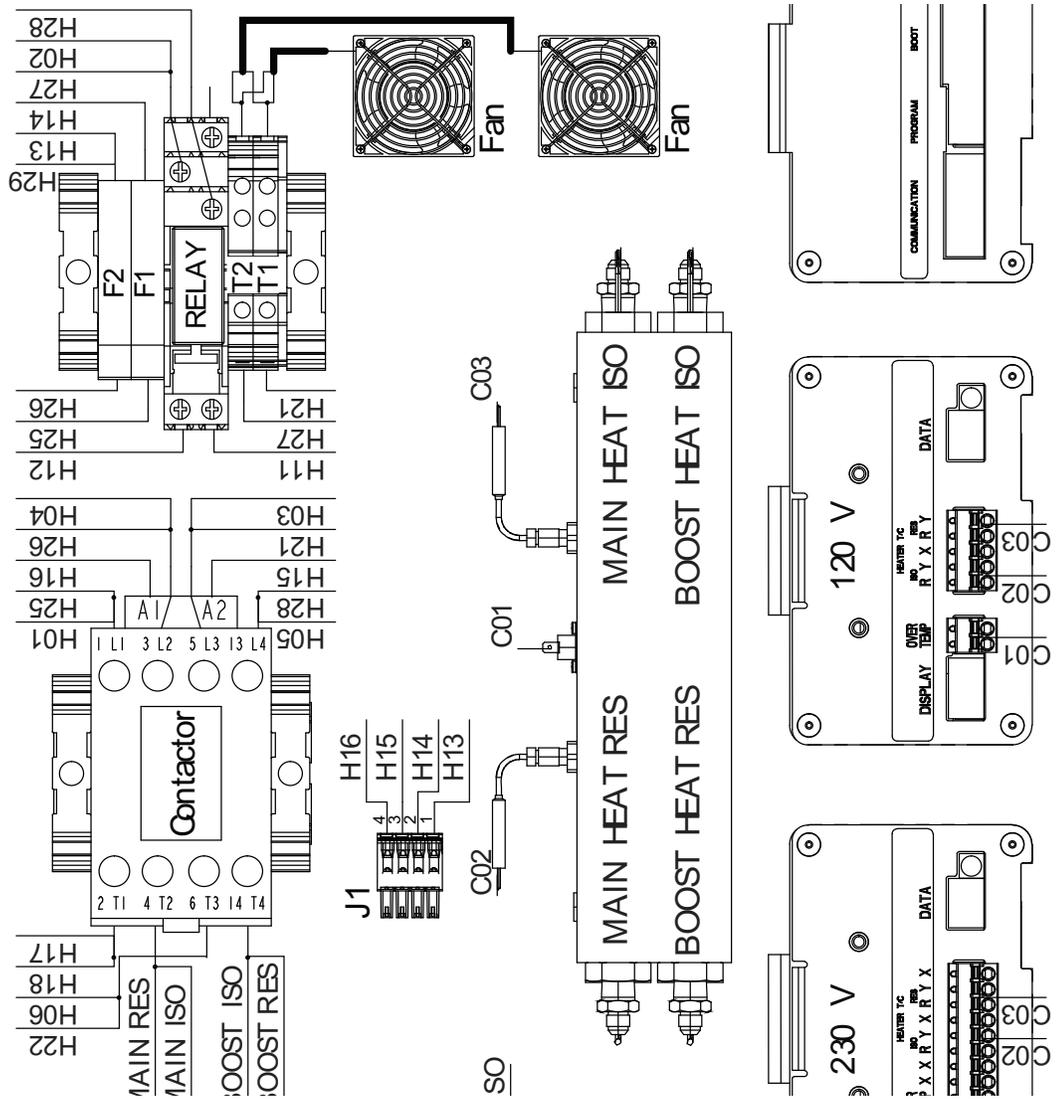


FIG. 23 Power Harness (78) Wire Identification

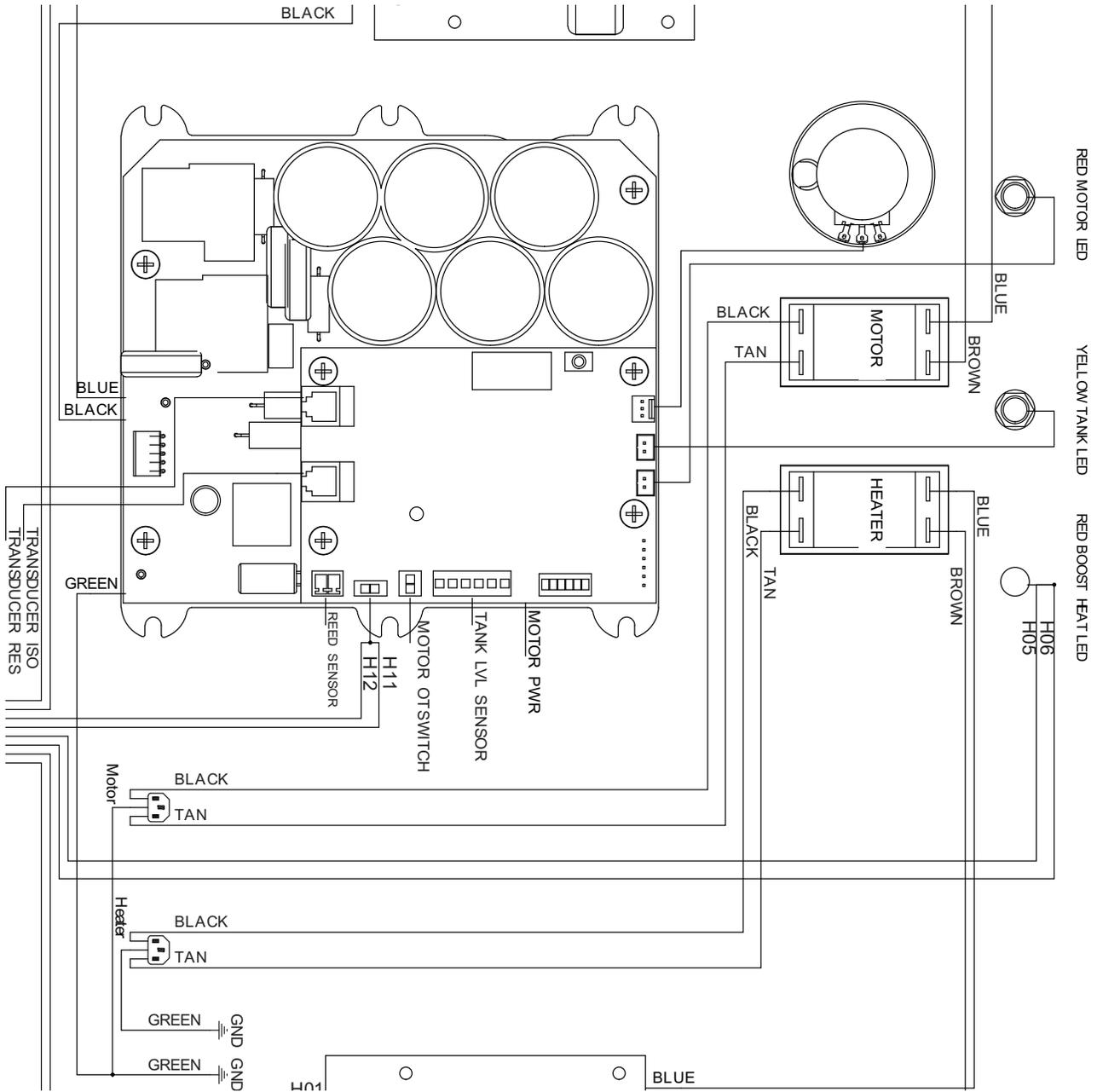


Fig. 24

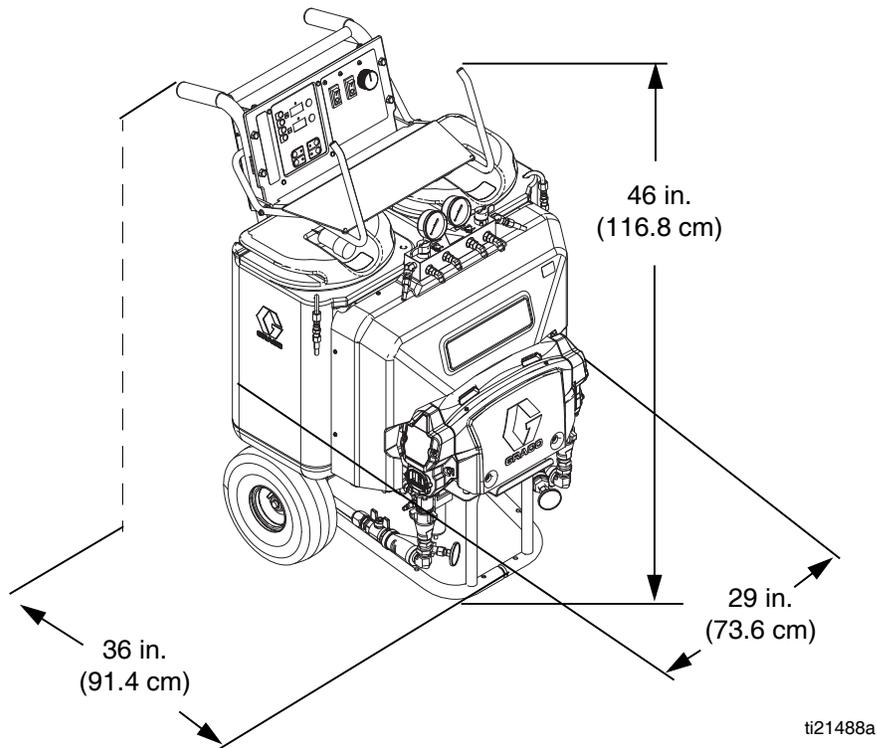
## Suggested Replacement Parts

Part	Description
24K984	DRYER, desiccant
24K983	SWITCH, motor or heater power, with circuit breaker
101078	Y-STRAINER
26A349	KIT, filter, replacement (2 pack)
26A350	KIT, filter replacement (10 pack)
15D909	ELEMENT, air filter, 5 micron; polypropylene
239914	VALVE, spray; includes seat and gasket
24L002	POTENTIOMETER, control knob
24K999	TRANSDUCER, pressure
24L006	PUMP, displacement; fits either side
249855	REPAIR KIT, displacement pump; includes seals, balls, bearings, intake seat)
24T974	O-RING, tank lid

## Accessories

Part	Description
24E727	Probler Recirc Kit
24U342	Lift Ring Kit
25M269	DataTrak Control Kit
25P193	DataTrak Control Kit (for sale in Europe)

## Dimensions



# Technical Specifications

<b>Reactor E-10hp</b>		
	<b>US</b>	<b>Metric</b>
Maximum fluid working pressure	3000 psi	20.6 MPa, 206 bar
Maximum spray pressure: 120 V	2200 psi	15.2 MPa, 152 bar
Maximum spray pressure: 230 V	2500 psi	17.2 MPa, 172 bar
Maximum fluid temperature	170°F	77°C
Maximum ambient temperature	120°F	48°C
Maximum output	1 gal./min	3.8 liters/min
Output per cycle (ISO and RES)	0.0038 gallons/cycle	0.014 liters/cycle
Air inlet	1/4 in. quick-disconnect industrial type pin fitting	
Air outlet	1/4 npsm(m)	
Overpressure relief	Spray valves automatically relieve excessive fluid pressure back to supply tanks	
Gun compressed air requirements	Fusion Gun (purge air and operating air): 4 scfm (0.112 m <sup>3</sup> /min)	
Maximum hose length	105 ft	32 m
Tank capacity each (nominal)	6 gal.	22.7 liters
Weight (empty)	239 lb	108 kg
<b>Recommended Mix Chamber Sizes</b>		
Fusion <sup>®</sup> Air Purge	000, AW2222 (00 and 01 at reduced spray pressure)	
Probler <sup>®</sup> P2	AA (00 and 01 at reduced spray pressure)	
<b>Electrical Requirements</b>		
120 V	100-120VAC, 1 phase, 50/60 Hz, 3840 W; requires two separate, dedicated 20 A circuits. Full load peak amperage 16 A per circuit.	
230 V	200-240VAC, 1 phase, 50/60 Hz, 5520 W; requires two separate, dedicated 15 A circuits. Full load peak amperage 12 A per circuit.	
<b>Generator Size</b>		
120 V	5000 W minimum	
230 V	7500 W minimum	
<b>Heater Power</b>		
120 V	3000 W during recirculation, 2000 W during pressure spray mode	
230 V	4000 W during recirculation, 2760 W during pressure spray mode	
<b>Sound Pressure</b>		
In fast recirculation mode	71.3 dB(A)	
Measure at 2500 psi (17 MPa, 172 bar), 1 gpm (3.8 lpm)	85.6 dB(A)	

<b>Reactor E-10hp</b>		
	<b>US</b>	<b>Metric</b>
<b>Sound Power*</b>		
In fast recirculation mode	79.9 dB(A)	
Measure at 2500 psi (17 MPa, 172 bar), 1 gpm (3.8 lpm)	93.3 dB(A)	
<b>Fluid Outlets</b>		
ISO Side	-5 JIC male	
RES Side	-6 JIC male	
<b>Fluid Circulation Returns</b>		
ISO side	-5 JIC male	
RES side	-6 JIC male	
<b>Hose Markings</b>		
ISO side	Red	
RES side	Blue	
<b>Wetted Parts</b>		
Wetted parts on all models	Aluminum, stainless steel, carbon steel, brass, carbide, chrome, chemically resistant o-rings, PTFE, ultra-high molecular weight polyethylene	
<b>Notes</b>		
* <i>Sound power measured per ISO-9614-2.</i>		
All trademarks or registered trademarks are the property of their respective owners.		

## California Proposition 65

### CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – [www.P65warnings.ca.gov](http://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.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

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# Graco Information

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TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.

**Phone:** 612-623-6921 **or Toll Free:** 1-800-328-0211, **Fax:** 612-378-3505

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