

REACTOR™ H-VR

313540L
EN

**Hydraulic Variable Ratio, Heated, Plural-Component Proportioner
For spraying polyurethane foam and polyurea coatings.
Not for use in explosive atmospheres.**

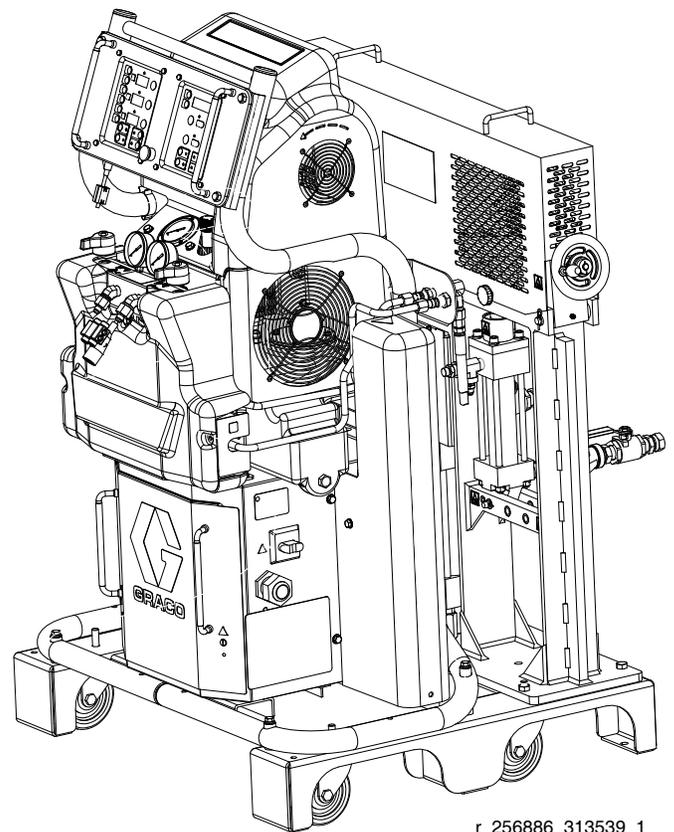


Important Safety Instructions

Read all warnings and instructions in this manual.
Save these instructions.

See page 3 for model information, including maximum working pressure and approvals.

U.S. Patent Pending
Russian Patent No. 2359181



r_256886_313539_1



8802471
Conforms to ANSI/UL
Std. 499 Certified to
CAN/CSA Std.
C22.2 No. 88

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Models

H-VR SERIES

Part, Series	Full Load Peak Amps* Per Phase	Voltage (phase)	System Watts†	Primary Heater Watts	Max Flow Rate◆ lb/min (kg/min)	Approximate Output per Cycle (A+B) gal. (liter)	Hydraulic Pressure Ratio	Maximum Fluid Working Pressure psi (MPa, bar)
256886	71	230V (3)	26,600	15,300	30 (13.6)	Variable	Variable	3500 (24.1, 241)
256887	41	400V (3)	26,600	15,300	30 (13.6)	Variable	Variable	3500 (24.1, 241)

- * Full load amps with all devices operating at maximum capabilities. Fuse requirements at various flow rates and mix chamber sizes may be less.
- ◆ Maximum flow rate given for 60 Hz operation. For 50 Hz operation, maximum flow rate is 5/6 of 60 Hz maximum flow.

Supplied Manuals

The following manuals are used with the Reactor™ HV-R Proportioner. Refer to these manuals for detailed equipment information.

Order Part 15M334 for a compact disk of Reactor manuals.

Reactor Hydraulic Proportioner	
Part	Description
313539	Reactor H-VR Proportioner, Operation Manual (English)
Reactor Electrical Diagrams	
Part	Description
312064	Reactor Hydraulic Proportioner, Electrical Diagrams (English)
Fluid Pump	
Part	Description
313485	Pump Instructions-Parts Manual (English)

Related Manuals

The following manuals are for accessories used with the Reactor™.

Feed Pump Kits	
Part	Description
309815	Instruction-Parts Manual (English)
Air Supply Kit	
Part	Description
309827	Instruction-Parts Manual (English) for Feed Pump Air Supply Kit
Circulation and Return Tube Kits	
Part	Description
309852	Instruction-Parts Manual (English)
Heated Hose	
Part	Description
309572	Instruction-Parts Manual (English)
Circulation Kit	
Part	Description
309818	Instruction-Parts Manual (English)
Circulation Valve Kit	
Part	Description
312070	Instruction-Parts Manual (English)
Data Reporting Kit	
Part	Description
309867	Instruction-Parts Manual (English)
Rupture Disk Assembly Kit	
Part	Description
309969	Instruction-Parts Manual (English)

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 symbol refers to procedure-specific risk. Refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

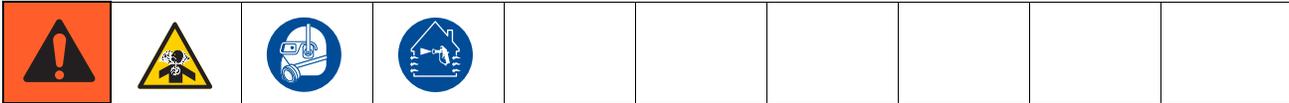
 WARNING	
	<p>ELECTRIC SHOCK HAZARD</p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> • Turn off and disconnect power cord before servicing equipment. • Use only grounded electrical outlets. • Use only 3-wire extension cords. • Ensure ground prongs are intact on power and extension cords. • Do not expose to rain. Store indoors.
 	<p>TOXIC FLUID OR FUMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled or swallowed.</p> <ul style="list-style-type: none"> • Read Safety Data Sheet (SDS) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure. • When spraying, servicing equipment, or when in the work area, always keep work area well ventilated and always wear appropriate personal protective equipment. See Personal Protective Equipment warnings in this manual. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
	<p>PERSONAL PROTECTIVE EQUIPMENT</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"> • 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. • Protective eyewear and hearing protection.
  	<p>SKIN INJECTION HAZARD</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. Get immediate surgical treatment.</p> <ul style="list-style-type: none"> • Do not point gun at anyone or at any part of the body. • Do not put your hand over the spray tip. • Do not stop or deflect leaks with your hand, body, glove, or rag. • Do not spray without tip guard and trigger guard installed. • Engage trigger lock when not spraying. • Follow Pressure Relief Procedure in this manual, when you stop spraying and before cleaning, checking, or servicing equipment.


WARNING

	<p>FIRE AND EXPLOSION HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Use equipment only in well ventilated area. • Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc). • Keep work area free of debris, including solvent, rags and gasoline. • Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present. • Ground all equipment in the work area. • Use only grounded hoses. • Hold gun firmly to side of grounded pail when triggering into pail. • If there is static sparking or you feel a shock, stop operation immediately. Do not use equipment until you identify and correct the problem. • Keep a working fire extinguisher in the work area.
	<p>PRESSURIZED ALUMINUM PARTS HAZARD</p> <p>Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use can cause serious chemical reaction and equipment rupture, and result in death, serious injury, and property damage.</p>
	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • Do not operate the unit when fatigued or under the influence of drugs or alcohol. • Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Data in all equipment manuals. • Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the Pressure Relief Procedure in this manual 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. • 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.
 <p>OR</p> 	<p>MOVING PARTS HAZARD</p> <p>Moving parts can pinch or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure in this manual. Disconnect power or air supply.
	<p>BURN HAZARD</p> <p>Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> • Do not touch hot fluid or equipment. • Wait until equipment/fluid has cooled completely.

Important Two-Component Material Information

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 Sheet (SDS) 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 SDS.
- 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 SDS.
- 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:

 WARNING	
	TOXIC FUMES HAZARD
DO NOT ENTER DURING SPRAY FOAM APPLICATION OR FOR ___ HOURS AFTER APPLICATION IS COMPLETE	
DO NOT ENTER UNTIL:	
DATE: _____	
TIME: _____	

For all applications except spray foam



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 Sheet (SDS) 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 SDS.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material. 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 SDS.
- 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.

Material Self-ignition



Some materials may become self-igniting if applied too thick. Read material manufacturer’s warnings and Safety Data Sheet (SDS).

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:

- **Never** interchange component A and component B wetted parts.
- Never use solvent on one side if it has been contaminated from the other side.

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.

NOTICE

Partially cured ISO will reduce performance and the life of all wetted parts.

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- 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.
- Use only moisture-proof hoses compatible with ISO.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

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

NOTICE

Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.

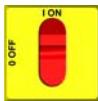
- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- When changing between epoxies and urethanes or polyureas, disassemble and clean all fluid components and change hoses. Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.

Temperature Control Diagnostic Codes

Temperature control diagnostic codes appear on temperature display.

These alarms turn off heat. E99 clears automatically when communication is regained. Codes E03 through

E06 can be cleared by pressing . For other codes,

turn main power OFF  then ON  to clear.

Code	Code Name	Alarm Zone	Corrective Action page
01	High fluid temperature	Individual	10
02	High zone current	Individual	11
03	No zone current with hose heater on	Individual	11
04	FTS not connected	Individual	12
05	Board overtemperature	Individual	12
06	Communication cable unplugged from module	Individual	12
99	Loss of communication	A	16

NOTE: For hose zone only, if FTS is disconnected at startup, display will show hose current 0A.

E01: High fluid temperature

Causes of E01 Errors

- Thermocouple A or B (310) senses a fluid temperature above 230°F (110°C).
- Fluid temperature sensor (FTS) senses a fluid temperature above 230°F (110°C).
- Overtemperature switch A or B (408) senses a fluid temperature above 230°F (110°C) and opens. At 190°F (87°C) the switch closes again.
- Thermocouple A or B (410) fails, is damaged, is not touching the heater element (407), or has a poor connection to the temperature control board.
- Overtemperature switch A or B (408) fails in the open position.
- The temperature control board fails to turn off any heat zone.
- Zone power wires or thermocouples are switched from one zone to another.
- Failed heater element where thermocouple is installed.
- Loose wire

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 and relieve all pressure (see Pressure Relief Procedure, page 28) before repairing.</p>						

Check which zone is displaying the E01 error.

1. Check that connector B is firmly plugged into temperature control module (see FIG. 9, page 36).
2. Clean and re-plug connections.
3. Check connections between the temperature control module and overtemperature switches A and B (308), and between temperature control module and thermocouples A and B (410) or FTS (21) [depending on which zone is displaying E01]. See TABLE 6, page 36. Ensure that all wires are securely connected to connector B.

4. Remove connector B from temperature control module, and check continuity of overtemperature switches A and B, thermocouples A and B, or FTS by measuring resistance across the pins on the plug end; see TABLE 1.

NOTE: Before doing the following checks, note which zone (A, B, FTS, or all) has high fluid temperature.

Table 1: Sensor Connector Continuity Checks

Pins	Description	Reading
1 & 2	OT switch A	nearly 0 ohms
3 & 4	OT switch B	nearly 0 ohms
5 & 6	Thermocouple A	4-6 ohms
8 & 9	Thermocouple B	4-6 ohms
11 & 12	FTS	approximately 35 ohms per 50 ft (15.2 m) of hose, plus approximately 10 ohms for FTS
10 & 12	FTS	open

5. Verify fluid temperature, using an external temperature sensing device.
 - **If temperature *is* too high (sensor reading is 229°F [109°C] or above):**
6. Check if thermocouples A and B are damaged, or not contacting the heater element, page 39.
7. To test that temperature control module turns off when equipment reaches temperature setpoint:
 - a. Set temperature setpoints far below displayed temperature.
 - b. Turn zone on. If temperature rises steadily, power board is failing.
 - c. Verify by swapping with another power module. See **Replacing Temperature Control Assembly Modules**, page 37.
 - d. If the swapped module does not fix the problem, the power module is not the cause.
8. Verify continuity of heater elements with an ohmmeter, see page 38.

E02: High zone current

1. Check hose connections for electrical short, page 40.
2. Exchange zone module with another one. Turn zone on and check for error (see page 37). If error disappears, replace faulty module.
 - a. *For hose zone:* If error still occurs, perform **Transformer Primary Check** and **Transformer Secondary Check**, starting on page 42.

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

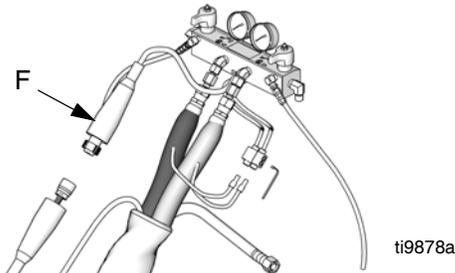
E03: No zone current

1. Check for tripped circuit breaker inside electrical cabinet or at power source for that zone. Replace circuit breaker if it trips habitually.
2. Check for loose or broken connection at that zone.
3. Exchange zone module with another one. Turn zone on and check for error (see page 37). If error disappears, replace faulty module.
4. If E03 occurs for all zones, the contactor may not be closing. Verify wiring from heater control to contactor coil.
 - a. *Hose zone:* test hose continuity, page 40.
 - b. Perform **Transformer Primary Check** and **Transformer Secondary Check**, starting on page 42.

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

E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected

1. Check temperature sensor connections to long green connector (B) on temperature control module, page 35. Unplug and re-plug sensor wires.
2. Test fluid temperature sensor continuity with ohmmeter, page 10.
3. If an error occurred for the hose zone, check FTS connections at each section of hose.
4. If an error occurred for the hose zone, test FTS by plugging directly into machine.



5. To verify heater control module is not causing the problem, use a wire to short-circuit the two pins corresponding to the FTS (red and yellow for A or B zone, red and purple for hose). The display will show the control heater module temperature.
6. If an error occurred for the hose zone, temporarily use the current control mode. Refer to Reactor H-VR Operation manual 313539.

E05: Circuit board overheated

NOTE: Each module has an on-board temperature sensor. Heat is turned off if module temperature exceeds 185°F (85°C) within the heater module.

1. Check that fan above electrical cabinet is operating.
2. Check that electrical cabinet door is properly installed.
3. Check for obstructions blocking cooling holes in bottom of electrical cabinet.
4. Clean heatsink fins behind heater control modules.
5. Ambient temperature may be too high. Allow Reactor to cool by moving to a cooler location.

E06: Communication cable unplugged

1. Unplug and re-plug cable that connects heater control module to heater module.
2. Replace communication cable if problem persists.

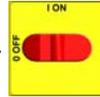
Motor Control Diagnostic Codes

Motor control diagnostic codes E21 through E27 appear on pressure display.

There are two types of motor control codes: alarms and warnings. Alarms take priority over warnings.

Alarms

Alarms turn off Reactor. Turn main power OFF



then ON



to clear.

NOTE: Alarms can also be cleared, except for code

23, by pressing .

Warnings

Reactor will continue to run. Press  to clear. A warning will not recur for a predetermined amount of time (varies for different warnings), or until main power

is turned OFF



then ON



Code	Code Name	Alarm (A) or Warning (W)	Corrective Action page
21	No transducer (component A)	A	13
22	No transducer (component B)	A	13
23	High fluid pressure	A	13
24	Pressure imbalance	A/W (to select, see page 33)	14
27	High motor temperature	A	15
30	Momentary loss of communication	A	16
31	Pumpline reversing switch failure/high cycle rate	A	16

Code	Code Name	Alarm (A) or Warning (W)	Corrective Action page
99	Loss of communication	A	16

E21: No component A transducer

1. Check transducer A connection at J3 on motor control board, page 34, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer B (E22), replace transducer A, page 13. If error does not move, replace motor control board, page 33.

E22: No component B transducer

1. Check transducer B connection at J8 on motor control board, page 34, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer A (E21), replace transducer B, page 13. If error does not move, replace motor control board, page 33.

E23: High fluid pressure

1. Relieve pressure. Verify low pressure with analog

gauges. Turn main power OFF



then ON



. If error persists, do checks below.

2. If pressure imbalance is set to Warning instead of Alarm (see page 33), an E23 will occur. See **E24: Pressure imbalance** for causes and checks.
3. Ensure at least one pump is in the number 1 position. See Setup section of Reactor H-VR Operation manual 313539.
4. If error still persists, reduce hydraulic pressure.

E24: Pressure imbalance

NOTE: Upon initial start-up this diagnostic code will not cause an alarm for 2 minutes.

NOTE: If the pressure difference between components A and B exceeds 500 psi (3.5 MPa, 35 bar), an E24 will occur. This default value is adjustable; see the operation manual.

NOTE: If spraying at a ratio other than 1:1, an E24 may occur. Size hoses and mix chamber appropriately to avoid pressure imbalance.

NOTE: E24 can be an alarm or a warning, as desired. Set DIP switch on motor control board ON for alarm, OFF for warning. See page 33.

Fast E24 Errors

Fast E24 errors occur:

- within 10 seconds of turning the pumps on, or
- as soon as you trigger the gun.

Causes of Fast E24 Errors

- one side of the gun is plugged.
- a pressure transducer has failed.
- damaged pump seals or check valve.
- no feed pressure or empty material drum.
- plugged heater.
- plugged hose.
- plugged manifold.
- one PRESSURE RELIEF/SPRAY valve is leaking or

is set to PRESSURE RELIEF/CIRCULATION .

Checks for Fast E24 Errors

NOTE: If a fast E24 error occurs, first check the readings of the analog gauges.

- **If the gauge readings are very close:**
 1. Clear the error (page 13) and try running the unit again.
 2. If E24 recurs and the gauge readings are still very close, a pressure transducer has failed.

The digital display always shows the higher of the two pressures. As soon as the higher analog pressure drops below the lower analog pressure, the display changes to the new higher reading. Knowing this, the following checks will show which transducer has failed, or if the motor control board has failed.

3. For testing purposes only, set DIP switch 2 on the motor control board to OFF. See page 33. This will allow the Reactor to continue to run with a pressure imbalance.
 - c. Run the unit until pressure is 1000-1500 psi (7-10.5 MPa, 70-105 bar). Shut down the unit, clear the alarm, and power back up, but do not depressurize the unit.
 - d. Check the analog gauges to see which pressure is higher, and check if the display matches.

If the higher gauge and display match, that transducer is communicating with the motor control board. Continue with step e.

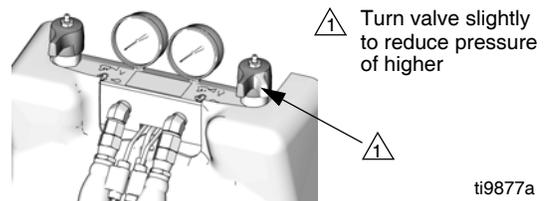
If the higher gauge and display do not match, that transducer is not communicating with the motor control board. Check wire connections and replace transducer, page 35.

- e. Turn pumps off. Reduce pressure of higher component by **slightly** turning PRESSURE RELIEF/SPRAY valve for that component toward PRESSURE RELIEF/CIRCULATION



, while watching the display and the analog gauges. As soon as the higher analog pressure drops below the lower analog pressure, the display should change to the new higher reading. Continue reducing the original higher pressure an additional 200 psi (1.4 MPa, 14 bar); digital display should stop dropping.

- f. Repeat for the other side, to check the other transducer.

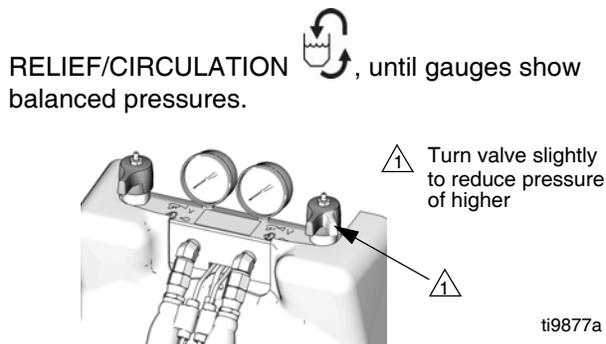


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4. To test if the failure is with the transducer or the socket on the motor control board:
 - a. Reverse connections at J3 and J8 on the motor control board.
 - b. Run the unit until pressure is 1000-1500 psi (7-10.5 MPa, 70-105 bar).
 - c. If the problem stays on the same side as before, replace the motor control board. If the problem appears to move to the other side, replace the transducer.

• **If the gauge readings are not very close:**

1. Secure bleed lines in grounded waste containers, or route back to respective component A or B supply drum. Reduce pressure of higher component by **slightly** turning PRESSURE RELIEF/SPRAY valve for that component toward PRESSURE



NOTE: Turn PRESSURE RELIEF/SPRAY valve only enough to balance pressure. If you turn it completely, all pressure will bleed off.

2. If you cannot get the pressures to balance:
 - a. Check for damaged pump seals or check valves.
 - b. Check if you've run out of material.
 - c. Check for a plugged fluid path by using the feed pump to push fluid through the gun manifold.
3. If you are able to balance pressures, try running the unit.
4. If a fast E24 error occurs again, and the gauges readings are not very close:

- a. Check and clean the gun inlet screens.
- b. Check and clean the gun mix chamber impingement ports and center port. See gun manual.

NOTE: Some mix chambers have counter bored impingement ports, requiring two drill sizes to clean completely.

Slow E24 Errors

Slow E24 errors occur gradually. The pressures are balanced when you begin spraying, but slowly become imbalanced until an E24 occurs.

NOTE: If spraying at a ratio other than 1:1, an E24 may occur. Size hoses and mix chamber appropriately to avoid pressure imbalance.

Causes of Slow E24 Errors

- one side of the gun is partially plugged.
- the A or B proportioner pump has failed.
- the A or B feed pump has failed.
- the A or B feed pump pressure is set too high.
- the hose is not heating properly.
- kinked supply hose.
- bottom of drum is damaged, causing blockage of feed pump inlet.
- drum is not vented.

E27: High motor temperature

Causes of E27 Errors

- Motor temperature is too high. Reduce pressure, gun tip size, or move Reactor to a cooler location. Allow 1 hour for cooling.
- Make sure there is no obstruction to fan airflow. Ensure that the motor/fan shroud is installed.
- Check that the motor overtemperature wire assembly is plugged into J9 on the motor control board, page 34.
- If the preceding checks do not correct the problem, perform the following tests:

1. Turn main power OFF .

2. Allow motor to cool completely. Check continuity between pins 1 and 2 on connector J9 on the motor control board, page 33. If the resistance is infinity, the motor thermal switch or the wire harness is bad. Check wiring, measure thermal switch continuity at motor, and replace failed part.
3. Unplug motor from J9 on motor control board. Install jumper across pins 1 and 2 on board. If error still occurs, replace motor control board.
4. If the E27 error is still occurring, the problem is with the motor control board.

E30: Momentary loss of communication

If communication is lost between the display and the motor control board, the display will normally show E99. The motor control board will register E30 (the red LED will blink 30 times). When communications are reconnected, the display may show E30 briefly (no more than 2 seconds). If the display shows E30 continuously, there is a loose connection causing the display and board to repeatedly lose and regain communication.

E31: Pumpline reversing switch failure/high cycle rate

Failure of a pumpline switch or switch mechanism may result in a high cycle rate, causing an E31 to occur. Replace the switch or switch mechanism. See **Pumps Do Not Reverse Direction**, page 27.

E31 may also occur if the system is modified to produce a higher flow rate.

E99: Loss of communication

If communication is lost between the motor control display and the motor control board, or the temperature control display and the temperature control module, the affected display will show E99.

1. Check all wiring between the display and the motor control board and the temperature control module. Pay close attention to the wire crimping at J13 on the motor control board (page 34) and (C) on the temperature control module (page 36). Unplug and re-plug connectors.
 2. Incoming voltage should be 230 Vac. Check the temperature control module voltage at terminal block (805) on the circuit breaker module (see page 65). Check the motor control board voltage at motor/pumps circuit breaker (813), see page 31.
- **Check if temperature control module or motor control board is causing error:**
3. Swap display connection on temperature control module (C) with display connection on motor control board (J13).
 4. If error no longer occurs, the board or module was at fault. Switch connections back to ensure connector was not poorly connected.

Troubleshooting

Reactor Electronics



Before performing any troubleshooting procedures:

1. Relieve pressure, page 28.

2. Turn main power OFF



3. Allow 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
Both sides of display do not illuminate.	No power.	Plug in power cord. Turn disconnect ON 
	Low voltage.	Ensure input voltage is within specifications, page 43.
	Loose wire.	Check connections, page 43.
	Display disconnected.	Check cable connections, page 43.
Temperature display does not illuminate.	Display disconnected.	Check cable connections, page 43.
	Display cable damaged or corroded.	Clean connections; replace cable if is damaged.
	Defective circuit board.	Swap display connection to motor control board with connection to heater control board. If temperature display illuminates, heater control board is causing problem. Otherwise, display cable or display is failing.
Pressure display does not illuminate.	Display disconnected.	Check cable connections, page 43.
	Display cable damaged or corroded.	Clean connections; replace cable if is damaged.
	Defective circuit board.	Swap display connection to motor control board with connection to heater control board. If pressure display illuminates, motor control board is causing problem. Otherwise, display cable or display is failing.
Erratic display; display turns on and off.	Low voltage.	Ensure input voltage is within specifications, page 43.
	Poor display connection.	Check cable connections, page 43. Replace damaged cable.
	Display cable damaged or corroded.	Clean connections; replace cable if is damaged.
	Display cable not grounded.	Ground cable, page 43.
	Display extension cable too long.	Must not exceed 100 ft (30.5 m)

PROBLEM	CAUSE	SOLUTION
Hose display reads OA at startup.	FTS disconnected or not installed.	Verify proper installation of FTS (see H-VR Operation manual 313539), or adjust FTS to desired current setting.
Display does not respond properly to button pushes.	Poor display connection.	Check cable connections, page 43. Replace damaged cable.
	Display cable damaged or corroded.	Clean connections; replace cable if is damaged.
	Ribbon cable on display circuit board disconnected or broken.	Connect cable (page 43) or replace.
	Broken display button.	Replace, page 43.
Red stop button does not work.	Broken button (fused contact).	Replace, page 43.
	Loose wire.	Check connections, page 43.
Fan not working.	Blown fuse.	Verify with ohmmeter; replace if necessary (page 43).
	Loose wire.	Check fan wire.
	Defective fan.	Replace, page 43.

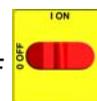
Primary Heaters (A and B)



Before performing any troubleshooting procedures:

1. Relieve pressure, page 28.

2. Turn main power OFF



3. Allow equipment to cool.

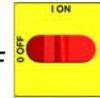
Try the recommended solutions in the order given for each problem, to avoid unnecessary repairs. Also, determine that all circuit breakers, switches, and controls are properly set and wiring is correct before assuming there is a problem.

PROBLEM	CAUSE	SOLUTION
Primary heater(s) does not heat.	Heat turned off.	Press A or B zone I keys.
	Temperature control alarm.	Check temperature display for diagnostic code, page 10.
	Signal failure from thermocouple.	See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 12.
Control of primary heat is abnormal; high temperature overshoots or E01 error occurs intermittently.	Dirty thermocouple connections.	Examine connection of thermocouples to long green plug on heater control board. Unplug and re-plug thermocouple wires, cleaning off any debris. Unplug and re-plug long green connector.
	Thermocouple not contacting heater element.	Loosen ferrule nut (N), push in thermocouple (410) so tip (T) contacts heater element (407). Holding thermocouple tip (T) against heater element, tighten ferrule nut (N) 1/4 turn past tight. See page 39 for illustration.
	Failed heater element.	See Primary Heaters, page 19.
	Signal failure from thermocouple.	See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 12.
	Thermocouple wired incorrectly.	See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 12. Power up zones one at a time and verify that temperature for each zone rises.

Hose Heat System



2. Turn main power OFF



3. Allow equipment to cool.

Before performing any troubleshooting procedures:

1. Relieve pressure, page 28.

Problems

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
Hose heats but heats slower than usual or it does not reach temperature.	Ambient temperature is too cold.	Use auxiliary hose heat system.
	FTS failed or not installed correctly.	Check FTS, page 12.
	Low supply voltage.	Verify line voltage. Low line voltage significantly reduces power available to hose heat system, affecting longer hose lengths.
Hose does not maintain temperature while spraying.	A and B setpoints too low.	Increase A and B setpoints. Hose is designed to maintain temperature, not to increase it.
	Ambient temperature is too cold.	Increase A and B setpoints to increase fluid temperature and keep it steady.
	Flow too high.	Use smaller mix chamber. Decrease pressure.
	Hose was not fully preheated.	Wait for hose to heat to correct temperature before spraying.
	Low supply voltage.	Verify line voltage. Low line voltage significantly reduces power available to hose heat system, affecting longer hose lengths.
Hose temperature exceeds setpoint.	A and/or B heaters are overheating material.	Check primary heaters for either a thermocouple problem or a failed element attached to thermocouple, page 12.
	Faulty thermocouple connections.	Verify that all FTS connections are snug and that pins of connectors are clean. Examine connection of thermocouples to long green plug on heater control board. Unplug and re-plug thermocouple wires, cleaning off any debris. Unplug and re-plug long green connector on heater control board.

PROBLEM	CAUSE	SOLUTION
Erratic hose temperature.	Faulty thermocouple connections.	Verify that all FTS connections are snug and that pins of connectors are clean. Examine connection of thermocouples to long green plug on heater control board. Unplug and re-plug thermocouple wires, cleaning off any debris. Unplug and re-plug long green connector.
	FTS not installed correctly.	FTS should be installed close to end of hose in same environment as gun. Verify FTS installation, page 40.
Hose does not heat.	FTS failed or is not contacting correctly.	Check FTS, page 40.
	FTS not installed correctly.	FTS should be installed close to end of hose in same environment as gun. Verify FTS installation, page 40.
	Temperature control alarm.	Check temperature display or diagnostic code, page 40.
Hoses near Reactor are warm, but hoses downstream are cold.	Shorted connection or failed hose heating element.	<p>With hose heat on and temperature setpoint above displayed hose zone temperature, verify voltage between connectors at each section of hose.</p> <p>Voltage should drop incrementally for each section of hose further from Reactor. Use safety precautions when hose heat is turned on.</p>

Hydraulic Drive System



Before performing any troubleshooting procedures:

1. Relieve pressure, page 28.

2. Turn main power OFF



3. Allow equipment to cool.

Problems

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.

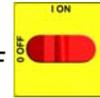
PROBLEM	CAUSE	SOLUTION
Electric motor will not start or stops during operation.	Loose connections.	Check connections at motor control board.
	Circuit breaker tripped.	Reset breaker (813); see Circuit Breaker Module , page 31. Check 230 Vac at output of breaker.
	Damaged motor control board.	Replace board. See Motor Control Board , page 33.

PROBLEM	CAUSE	SOLUTION
<p>Hydraulic pump does not develop pressure. Low or zero pressure with screeching noise.</p>	<p>Pump is not primed or lost its prime.</p>	<p>Check electric motor rotation. Both motor and hydraulic pump must rotate counterclockwise when viewed from shaft end. If rotation is incorrect, reverse leads L1 and L2. See Connect Electrical Cord in Reactor H-VR Operation manual 313539.</p>
		<p>Check dipstick to ensure that hydraulic reservoir is properly filled (see H-VR Operation manual 313539).</p>
		<p>Check that inlet fitting is fully tight, to ensure no air is leaking into the pump inlet.</p>
		<p>To prime pump, run unit at lowest pressure setting and slowly increase pressure. In some cases it may be necessary to remove motor cover and drive belt to allow for manual (counterclockwise) rotation of hydraulic pump. Turn fan pulley by hand. Verify oil flow by removing oil filter to see flow into filter manifold. Reinstall oil filter. Do NOT operate unit without a properly installed oil filter.</p>
	<p>Screeching noise is characteristic of cavitation and is normal at initial startup for a maximum of 30 seconds.</p>	<p>If noise continues longer than 30 seconds, press motor  key to shut off the motor. Check that the inlet fittings are tight and that the pump has not lost its prime.</p>
	<p>Hydraulic fluid is too hot.</p>	<p>Ensure that the reservoir is properly serviced. Improve ventilation to allow more efficient heat dissipation.</p>
	<p>Electric motor operating in wrong direction for 3 Phase system.</p>	<p>Motor must operate counter-clockwise from pulley end.</p>
	<p>Drive belt loose or broken.</p>	<p>Check drive belt condition. Replace if broken.</p>

Proportioning System



2. Turn main power OFF



3. Allow equipment to cool.

Before performing any troubleshooting procedures:

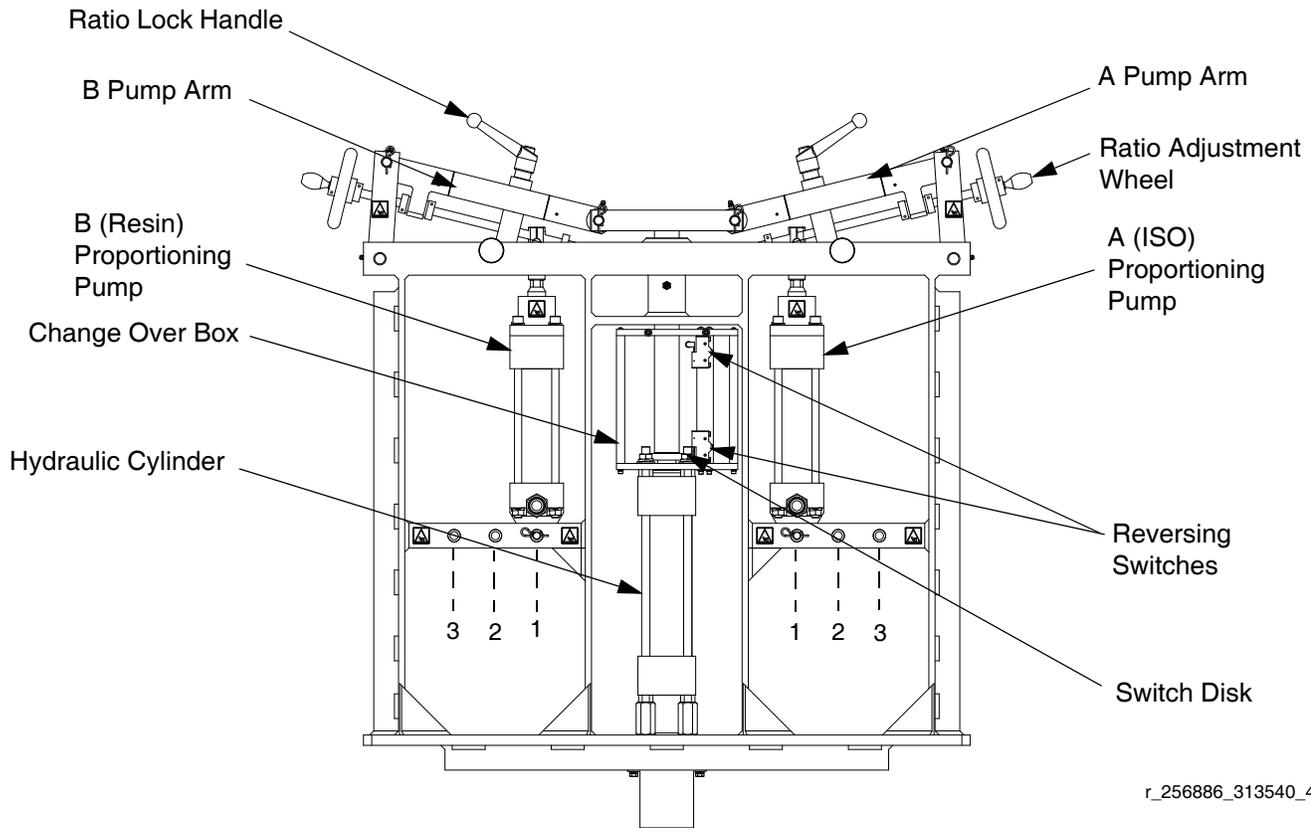
1. Relieve pressure, page 28.

Problems

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
Proportioning pump does not hold pressure when stalled.	Pump piston or intake valve leaking.	<ol style="list-style-type: none"> 1. Observe gauges to determine which pump is losing pressure. 2. Determine in which direction the pump has stalled by observing which directional valve indicator light is on. See Table 2, page 26 to isolate the problem. 3. Repair the valve; see pump manual 313485.
Material imbalance. See Pressure/Material Imbalance , page 26.	Restriction at the gun.	Clean the gun; see Pumps Do Not Reverse Direction , page 27.
	Inadequate flow from pump; cavitation.	Increase fluid supply to proportioning pump: <ul style="list-style-type: none"> • Use 2:1 supply pump • Use minimum 3/4 in. (19 mm) ID supply hose, as short as practical
		Fluid is too thick. Consult your material supplier for the recommended fluid temperature to maintain a viscosity of 250 to 1500 centipoise.
	Worn pump inlet valve ball/seat or gasket. Replace; see pump manual 313485.	
Pressure relief/circulation valve leaking back to supply.	Remove return line and determine if flow is present while in SPRAY  mode.	
Spraying at a ratio other than 1:1 can cause pressure imbalance.	Size hoses and mix chamber appropriately.	

PROBLEM	CAUSE	SOLUTION
Pumps do not reverse direction or pumps do not move.	Damaged reversing switch assembly.	See Pumps Do Not Reverse Direction , page 27.
	Faulty directional valve.	See Pumps Do Not Reverse Direction , page 27.
Erratic pump movement.	Pump cavitation.	Feed pump pressure is too low. Adjust pressure to maintain 100 psi (0.7 MPa, 7 bar) minimum.
		Fluid is too thick. Consult your material supplier for recommended fluid temperature to maintain a viscosity of 250 to 1500 centipoise.
	Faulty reversing switch connection.	See Pumps Do Not Reverse Direction , page 27.
	Faulty directional valve.	Replace directional valve; see Pumps Do Not Reverse Direction , page 27.
Pump output low.	Obstructed fluid hose or gun; fluid hose ID too small.	Open, clear; use hose with larger ID.
	Worn piston valve or intake valve in displacement pump.	See pump manual 313485.
	Inadequate feed pump pressure.	Check feed pump pressure and adjust to 100 psi (0.7 MPa, 7 bar) minimum.
	One pump is not in position "1".	Move pump to position "1".
Fluid leak at pump rod seal.	Worn throat seals.	Replace. See pump manual 313485.
No pressure on one side.	Fluid leaking from pump outlet rupture disk (274).	Check if heater (2) and PRESSURE RELIEF/SPRAY valve (SA or SB) are plugged. Clear. Replace rupture disk (274) with a new one; do not replace with a pipe plug.
	Inadequate feed pump pressure.	Check feed pump pressure and adjust to 100 psi (0.7 MPa, 7 bar) minimum.



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FIG. 1. Pump Line when viewed from rear of machine

Table 2. Directional Valve Indicator Status

Left Pump Directional Indicator Lighted	Right Pump Directional Indicator Lighted
B-side pump piston valve dirty or damaged	B-side pump inlet valve dirty or damaged
A-side pump inlet valve dirty or damaged	A-side pump piston valve dirty or damaged

Pressure/Material Imbalance

To determine which component is out of balance, check the color of some sprayed material. Two-component materials are usually a mix of light and dark fluids, so the under-proportioned component can often be readily determined.

When you have determined which component is under-proportioned, spray off-target, focusing on the pressure gauge for that component.

For example: if component B is under-proportioned, focus on the B-side pressure gauge. If the B gauge reads considerably higher than the A gauge, the problem is at the gun. If the B gauge reads considerably lower than the A gauge, the problem is at the pump.

Pumps Do Not Reverse Direction

1. For the proportioning pumps to reverse direction, the switch disk must contact the reversing switches. Ensure that the change over box is assembled correctly and that none of the components are damaged. See FIG. 1 (page 26) and **Parts** (page 59).
2. Check the function of the directional valve. Direction indication lights should switch on and off based on the position of the reversing switches (199). LEDs D19 and D20 (near J5 reversing switch connector on motor board, see FIG. 6) should alternately illuminate when each switch is activated.

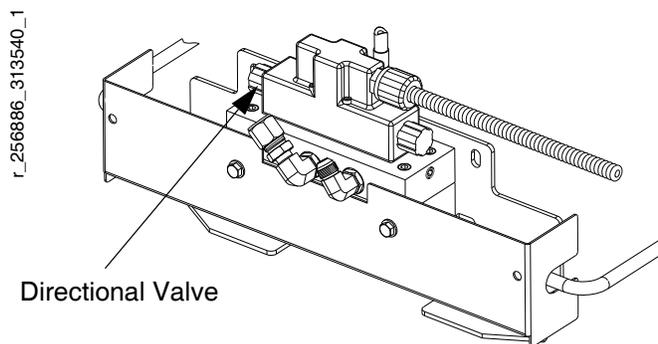


FIG. 2: Hydraulic Directional Valve Assembly

There are two possible problems with the directional valve:

- a. If D19 and D20 do not alternately illuminate, the possible causes include:
 - faulty reversing switch wiring,
 - faulty reversing switch, or
 - faulty motor board.

To resolve this problem:

- verify that the reversing switch cable is connected at the bulkhead bracket and that it is plugged into the J5 connector on the motor board.

- verify reversing switches. Unplug the J5 reversing switch connector. Verify that when the switches are not triggered there is continuity between 1150-NC and 1160-T-COM, and between 1150-NC and 1170-B-COM.

Toggle reversing switches. Ensure that continuity between 1150-NC and 1160-T-COM, and between 1150-NC and 1170-B-COM is lost. Refer to the Electrical Diagrams manual 312064 (Detailed Schematic, Motor Controls (3-Phase Motor)). If these four conditions are not verified, replace reversing switches.

- if the reversing switch and wiring are not the cause, and D19 and D20 will not alternately illuminate, replace the motor board.

- b. If D19 and D20 do illuminate but the direction indication lights do not, the possible causes include:

- faulty motor board,
- faulty directional valve wiring, or
- faulty directional valve.

To resolve this problem:

- verify the motor board output voltages at the J18 directional valve connector. When the reversing switch is toggled one direction, there should be 230V output between pins 1 and 2 (A+ and A-). When it is toggled the other direction, there should be 230V output between pins 3 and 4 (B+ and B-). If output voltages are not present, replace the motor board.
- verify continuity of each directional valve wire and verify wiring connections (see Electrical Diagrams manual 312064).
- if motor board and wiring are not the cause, replace the directional valve.

NOTE: For diagnostic purposes, it is possible to manually override the directional valve by using a small screwdriver to depress the button in the center of either directional valve end cap.

Repair

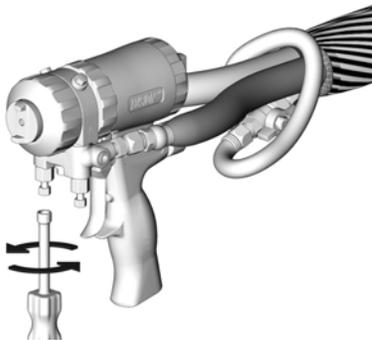


Repairing this equipment requires access to parts that may cause electric shock or other serious injury if work is not performed properly. Have a qualified electrician connect power and ground to main power switch terminals, see operation manual. Be sure to shut off all power to the equipment before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

Pressure Relief Procedure



1. Relieve pressure in gun and perform gun shutdown procedure. See gun manual.
2. Close gun fluid manifold valves A and B.

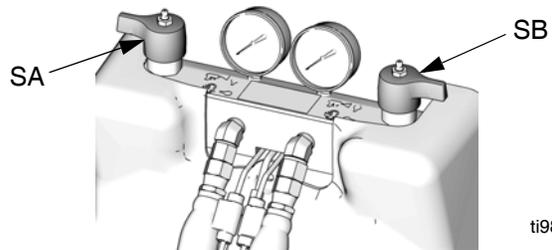


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3. Shut off feed pumps and agitator, if used.

4. Turn PRESSURE RELIEF/SPRAY valves (SA, SB)

to PRESSURE RELIEF/CIRCULATION . Route fluid to waste containers or supply tanks. Ensure gauges drop to 0.



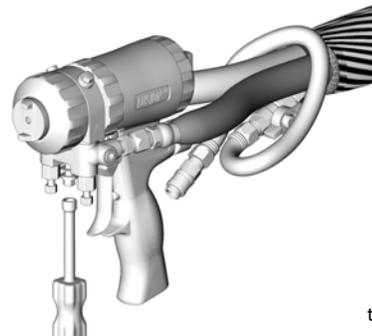
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5. Engage gun piston safety lock.



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6. Disconnect gun air line and remove gun fluid manifold.



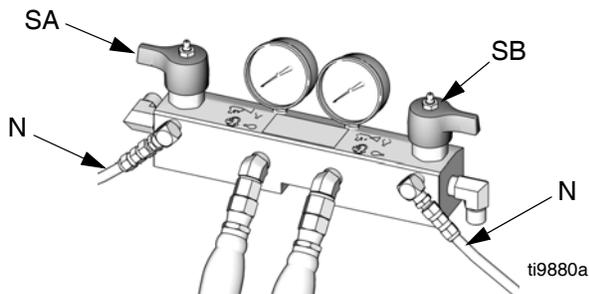
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Flushing

					
Flush equipment only in a well-ventilated area. Do not spray flammable fluids. Do not turn on heaters while flushing with flammable solvents.					

- Flush out old fluid with new fluid, or flush out old fluid with a compatible solvent before introducing new fluid.
- Use the lowest possible pressure when flushing.
- All fluid components are compatible with common solvents. Use only moisture-free solvents.
- To flush feed hoses, pumps, and heaters separately from heated hoses, set PRESSURE RELIEF/SPRAY valves (SA, SB) to PRESSURE

RELIEF/CIRCULATION . Flush through bleed lines (N).



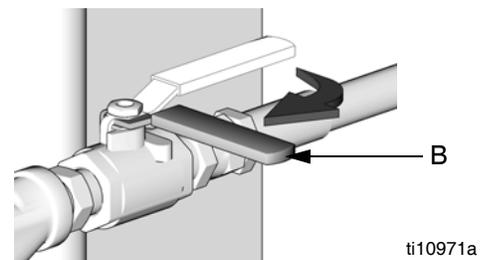
- To flush entire system, circulate through gun fluid manifold (with manifold removed from gun).
- To prevent moisture from reacting with isocyanate, always leave the system dry or filled with a moisture-free plasticizer or oil. Do not use water.

Proportioning Pumps

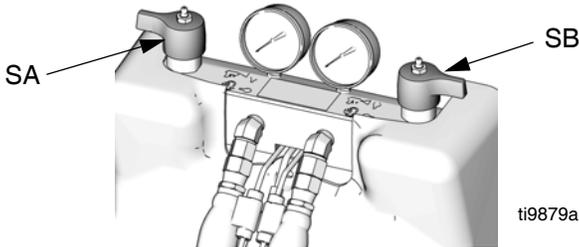
					
To avoid injury and damage to pump arms and ratio adjustment screws, relieve all pressure and shut off all power before repairing proportioning pumps.					

NOTE: See manual 313485 for pump repair instructions.

1. Shut off **A** , **B** , and  heat zones.
2. Flush, page 29.
3. If pumps are not parked, press  Trigger gun until pumps stop.
4. Turn main power OFF . Disconnect power supply.
5. Shut off both feed pumps. Close both fluid inlet ball valves (B).



- Turn both PRESSURE RELIEF/SPRAY valves (SA, SB) to PRESSURE RELIEF/CIRCULATION . Route fluid to waste containers or supply tanks. Ensure gauges drop to 0.



NOTE: Use a drop cloth or rags to protect Reactor H-VR and surrounding area from spills.

- Remove guard. Loosen all four clamping knobs (190), and remove guard (180).

						
To avoid injury, never remove guard unless all pressure is relieved and all power is shut off.						

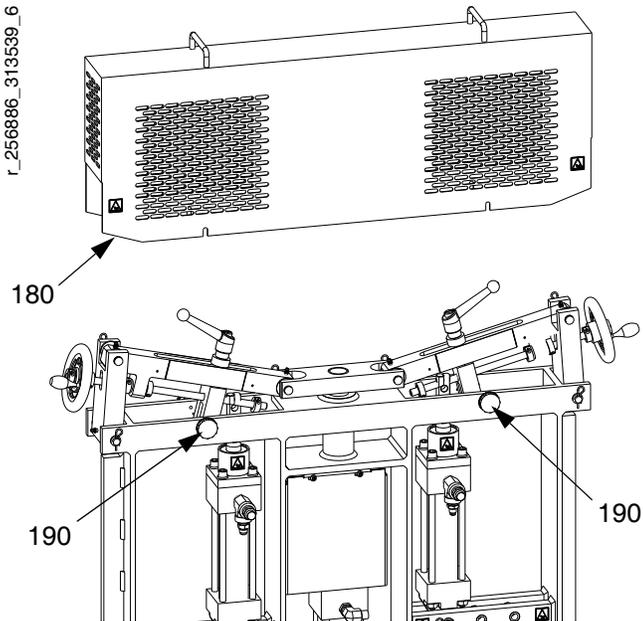


FIG. 3: Remove Guard

- Disconnect all fluid hoses connected to pumps.
- Remove pump base pin (183) and top pin (255) on both pumps. See page 58.

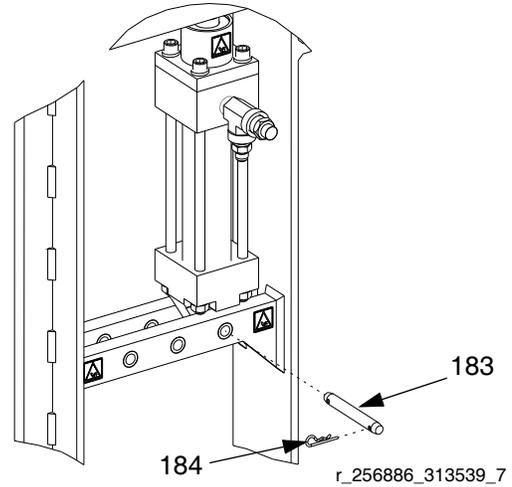


FIG. 4: Remove Pump Pins

- Remove pump assemblies and take to a workbench.
- See manual 313485 for pump repair instructions.
- Reconnect pump in reverse order

NOTE: Insert pump top pin (255) before base pin (183) when reconnecting pump.

- Replace guard (180) and tighten all four clamping knobs (190). Ensure warning label on guard faces outward on machine.

Circuit Breaker Module

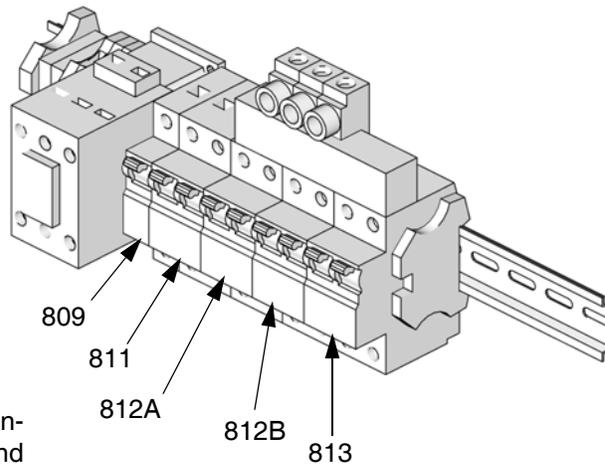
1. Turn main power OFF . Disconnect power supply. Turn circuit breakers on to test.



2. Relieve pressure, page 28.
3. Using an ohmmeter, check for continuity across circuit breaker (top to bottom). If no continuity, trip breaker, reset, and retest. If still no continuity, replace breaker as follows:
 - a. Refer to electrical diagrams and to TABLE 3. Disconnect wires and remove bad breaker.
 - b. Install new breaker and reconnect wires.

Table 3: Circuit Breakers, see FIG. 5

Ref.	Size	Component
809	50A	Hose/Transformer Secondary Side
811	40A	Transformer Primary
812A	50A	Heater A
812B	50A	Heater B
813	20A	Motor/Pumps



NOTE: To reference cables and connectors, see the electrical diagrams and the parts drawings on page 65.

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FIG. 5. Circuit Breaker Module

Electric Motor

Removal

1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 28.
3. Remove motor shroud.
4. Disconnect motor cables as follows:
 - a. Refer to electrical diagrams in the Reactor Electrical Diagram manual 312064. Motor control board is on right side inside cabinet, see page 33.
 - b. Remove motor electric junction box cover.
 - c. Make a note of or label the wire connections. Refer to the Reactor Electrical Diagram manual 312064 and the diagram inside the motor junction box cover. The motor must operate counterclockwise when looking at the output shaft.

NOTICE

Motor is heavy. Two people may be required to lift.

5. Remove screws holding motor to bracket. Lift motor off unit.

Installation

1. Place motor on unit.
2. Fasten motor with screws.
3. Connect the wires, using wire nuts. Refer to the Reactor Electrical Diagram manual 312064 and the diagram inside the motor junction box cover. The motor must operate counterclockwise when looking at the output shaft.

NOTE: 3-Phase Motors: motor must rotate counterclockwise when viewed from shaft end. If rotation is incorrect, reverse power leads L1 and L2. See Reactor H-VR Operation manual 313539, Connect Electrical Cord.

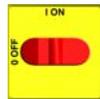
4. Return to service.

Motor Control Board

NOTE: Motor control board has one red LED (D11). Power must be on to check. See FIG. 6 for location. Function is:

- **Startup:** 1 blink for 60 Hz, 2 blinks for 50 Hz.
- **Motor running:** LED on.
- **Motor not running:** LED off.
- **Diagnostic code (motor not running):** LED blinks diagnostic code, pauses, then repeats (for example, E21=21 blinks, pause, 21 blinks).

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



1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 28.
3. Refer to electrical diagrams. Motor control board is on right side inside cabinet.
4. Put on static conductive wrist strap.
5. Disconnect all cables and connectors from board.
6. Remove nuts (40) and take entire motor control assembly to workbench.
7. Remove screws and take board off heatsink.
8. Set DIP switch (SW2) on new board. See TABLE 4 for factory settings. See FIG. 6 for location on board.

Table 4: DIP Switch (SW2) Settings

DIP Switch	ON (up)	OFF (down)
Switch 1	Motor soft start ON (factory default)	(Not applicable to 3-phase motors)
Switch 2	ON for pressure imbalance alarm (factory default)	OFF for pressure imbalance warning
Switch 3	Standby ON	Standby OFF (factory default)
Switch 4	N/A	OFF

9. Install new board in reverse order. Apply thermal heatsink compound to mating surfaces of board and heatsink.

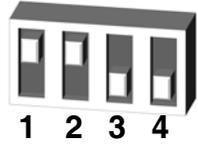
NOTE: Order Part 110009 Thermal Compound.

Table 5: Motor Control Board Connectors

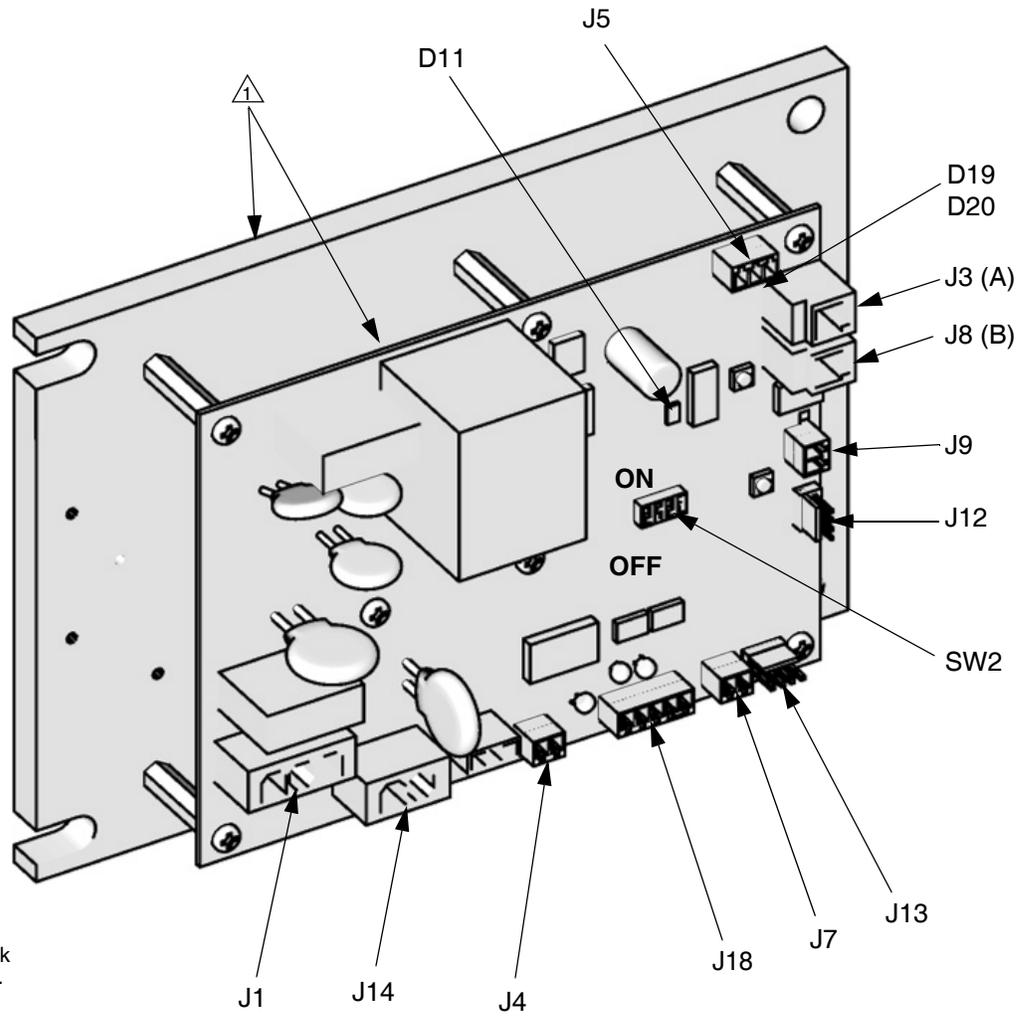
Connector	Pin	Description
J1	n/a	Main power
J3	n/a	Transducer A
J4	n/a	Not used
J7	n/a	Not used
J8	n/a	Transducer B
J9	n/a	Motor thermostat (NC)
J10	n/a	Not used
J12	n/a	Data reporting
J13	n/a	To display board
J14	n/a	Motor power
J18	1	Directional valve, A+
	2	Directional valve, A-
	3	Directional valve, B+
	4	Directional valve, B-
	5	GND
J5	1	Pumpline reversing switch (1150-NC)
	2	Pumpline reversing switch (1160-T-COM)
	3	Pumpline reversing switch (1170-B-COM)

Motor Control

ON



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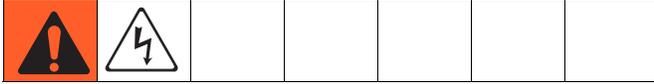


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FIG. 6. Motor Control Board

Transducers

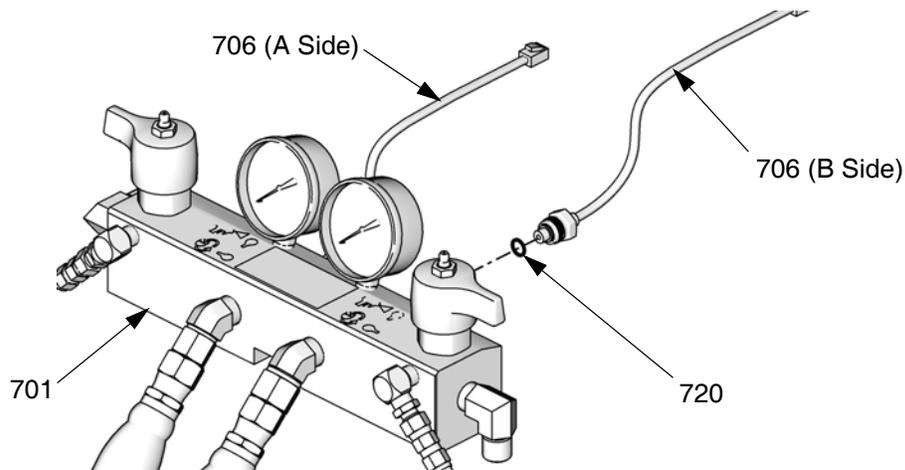
1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 28.
3. Refer to electrical diagrams. Motor control board is on right side inside cabinet.
4. Disconnect transducer cables at board; see FIG. 6, page 34. Reverse A and B connections and check if

diagnostic code follows; see **E21: No component A transducer**, page 13.

5. If transducer fails test, thread cable through top of cabinet. Note path as cable must be replaced in same way.
6. Install o-ring (720) on new transducer (706), FIG. 7.
7. Install transducer in manifold. Mark end of cable with tape (red=transducer A, blue=transducer B).
8. Route cable into cabinet and thread into bundle as before.
9. Connect transducer cable at board; see FIG. 6, page 34.



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FIG. 7. Transducers

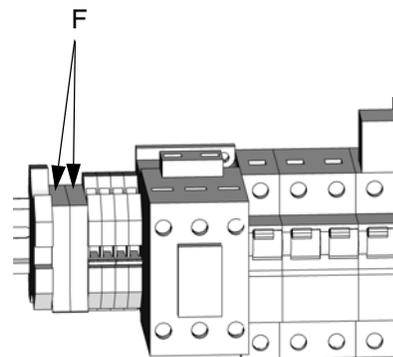
Electric Fan

1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 28.
3. Check fuses (F) at left of breaker module, FIG. 8. Replace if blown. If good, continue with step 4.
4. Refer to electrical diagrams. Disconnect fan wires from fuses (F).

5. Remove fan.
6. Install fan in reverse order.



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FIG. 8. Fan Fuses

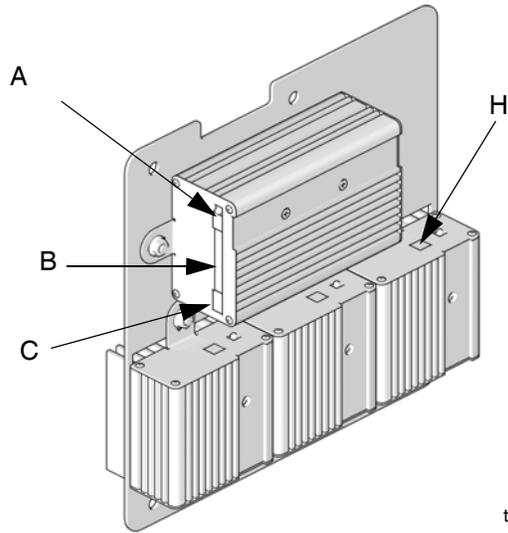
Temperature Control Module

Table 6: Temperature Control Module Connections

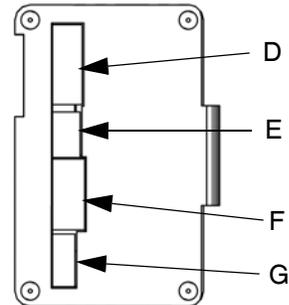
Connector	Description	
DATA (A)	Data reporting	
SENSOR (B)	PIN	
	12	HOSE T/C P; FTS (purple)
	11	HOSE T/C R; FTS (red)
	10	HOSE T/C S; FTS (silver (unshielded bare wire))
	9	HEATER T/C B, Y; Thermocouple (yellow)
	8	HEATER T/C B, R; Thermocouple (red)
	7	Not used
	6	HEATER T/C A, Y; Thermocouple (yellow)
	5	HEATER T/C A, R; Thermocouple (red)
	4, 3	OVERTEMPERATURE B; Overtemperature switch B
2, 1	OVERTEMPERATURE A; Overtemperature switch A	
DISPLAY (C)	Display	
COMMUNICATION (D)	Communication to power boards	
PROGRAM (E)	Software programming	
BOOT (F)	Software bootloader	
POWER/RELAY (G)	Circuit board power input and contactor control output	

Table 7: Temperature Power Module Connections

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

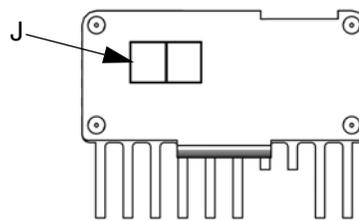


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Right Side of Control Heater Module



ti9843a4

Bottom of Power Modules

FIG. 9: Temperature Control Module Connections

Test SCR Circuit

1. Test the SCR circuit in the on position:

a. Make sure everything is connected, including the hose.

b. Turn main power ON  .

c. Adjust the hose heat setpoint **above** the ambient hose temperature.

d. Turn on  heat zone by pressing  .

e. Hold down  to view electrical current.
 Hose current should ramp up to 45A. If there is no hose current, see **E03: No zone current**, page 11. If hose current exceeds 45A, see **E02: High zone current**, page 11. If hose current stays several amps below 45A, hose is too long or voltage is too low.

2. Test the SCR circuit in the off position:

a. Make sure everything is connected, including the hose.

b. Turn main power ON  .

c. Adjust the hose heat setpoint **below** the ambient hose temperature.

d. Turn on  heat zone by pressing  .

e. Using a voltmeter, carefully measure the voltage at the hose connector. You should not get a voltage reading. If you do, the SCR on the temperature control board is bad. Replace the temperature control assembly.

Replacing Temperature Control Assembly Modules

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

1. Turn main power OFF  . Disconnect power supply.



2. Relieve pressure, page 28.
3. Refer to electrical diagrams; see Electrical Diagrams manual 312064. Temperature control assembly is on left side inside cabinet.
4. Remove bolts that secure transformer assembly and slide assembly to side in cabinet.
5. Put on static conductive wrist strap.
6. Disconnect all cables and connectors from assembly; see **Temperature Control**, page 63.
7. Remove nuts and take entire temperature control assembly to workbench.
8. Replace defective module.
9. Install assembly in reverse order.

Primary Heaters

Heater Element



1. Turn main power OFF  . Disconnect power supply.
2. Relieve pressure, page 28.
3. Wait for heaters to cool.
4. Remove heater shroud.
5. See page 61 for parts. Disconnect heater element wires from heater wire connector. Test with ohmmeter.

Total Heater Wattage	Element	Ohms
7,650	2550	18-21

6. To remove heater element, first remove thermocouple (410) to avoid damage, see step 7, page 39.
7. Remove heater element (407) from housing (401). Be careful not to spill any fluid left in housing.
8. Inspect element. It should be relatively smooth and shiny. If there is a crusted, burnt, ash-like material adhered to element or sheath shows pitting marks, replace element.
9. Install new heater element (407), holding mixer (409) so it does not block thermocouple port (P).
10. Reinstall thermocouple, page 39.
11. Reconnect heater element leadwires to heater wire connector.
12. Replace heater shroud.

Line Voltage

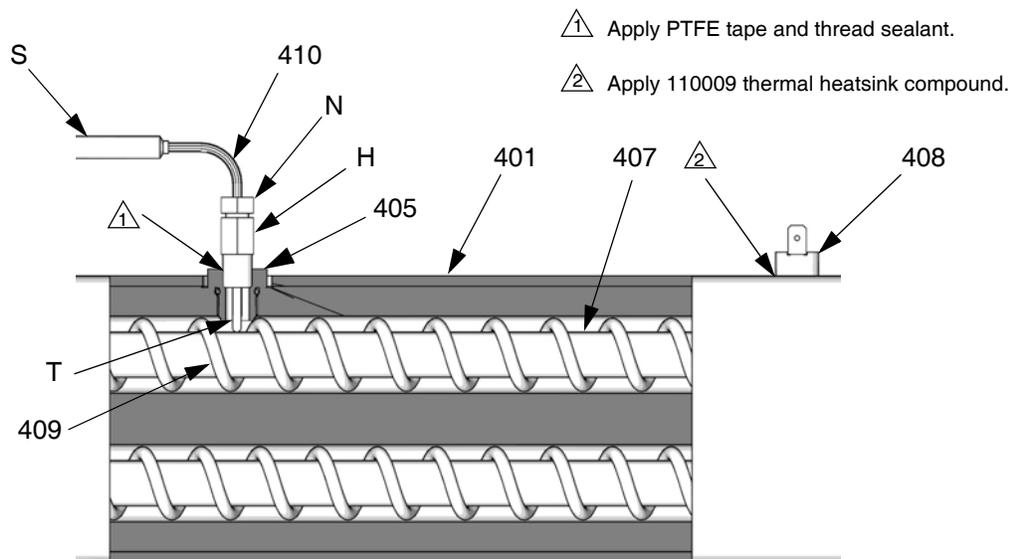
The primary heaters output their rated wattage at 230 Vac. Low line voltage will reduce power available and the heaters will not perform at full capability.

Thermocouple

1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.



3. Wait for heaters to cool.
4. Remove heater shroud.
5. Disconnect thermocouple wires from B on temperature control module. See TABLE 6, page 36 and FIG. 9, page 36.
6. Feed thermocouple wires out of cabinet. Note path as wires must be replaced in the same way.
7. See FIG. 10. Loosen ferrule nut (N). Remove thermocouple (410) from heater housing (401), then remove thermocouple housing (H). Do not remove the thermocouple adapter (405) unless necessary. If adapter must be removed, ensure that mixer (409) is out of the way when replacing the adapter.
8. Replace thermocouple, FIG. 10.
 - a. Remove protective tape from thermocouple tip (T).
 - b. Apply PTFE tape and thread sealant to male threads and tighten thermocouple housing (H) into adapter (405).
 - c. Push in thermocouple (410) so tip (T) contacts heater element (407).
 - d. Holding thermocouple (T) against heater element, tighten ferrule nut (N) 1/4 turn past tight.
9. Route wires (S) into cabinet and thread into bundle as before. Reconnect wires to board.
10. Replace heater shroud.
11. Turn on heaters A and B simultaneously to test. Temperatures should rise at same rate. If one heater is low, loosen ferrule nut (N) and tighten thermocouple housing (H) to ensure thermocouple tip (T) contacts element (407).



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FIG. 10. Thermocouple

Overtemperature Switch

1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.



3. Wait for heaters to cool.
4. Remove heater shroud.
5. Disconnect one leadwire from overtemperature switch (408), FIG. 10. Test across switch with ohmmeter. Resistance must be approximately 0 ohms.
6. If switch fails test, remove wires and screws. Discard failed switch. Apply thermal compound 110009, install new switch in same location on housing (401), and secure with screws (411). Reconnect wires.

NOTE: If wires need replacement, disconnect from temperature control board. See TABLE 6, page 36 and FIG. 9, page 36.

Heated Hose

NOTE: Refer to the heated hose manual 309572 for hose replacement parts.

Check Hose Connectors

1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.

NOTE: Whip hose must be connected.

3. Disconnect hose connector (D) at Reactor, FIG. 11.
4. Using an ohmmeter, check between the two terminals of the connector (D). There should be continuity.

5. If hose fails test, retest at each length of hose, including whip hose, until failure is isolated.

Check FTS Cables

1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.
3. Disconnect FTS cable (F) at Reactor, FIG. 11.

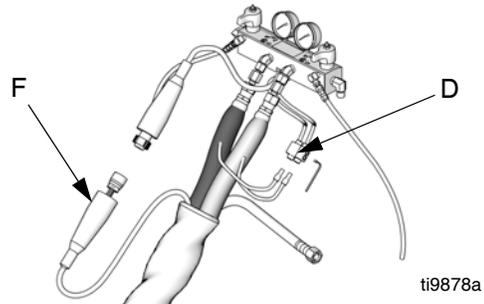


FIG. 11. Heated Hose

4. Test with ohmmeter between pins of cable connector.

Pins	Result
1 to 2	approximately 35 ohms per 50 ft (15.2 m) of hose, plus approximately 10 ohms for FTS
1 to 3	infinity

5. If cable fails test, retest at FTS, page 40.

Fluid Temperature Sensor (FTS)

Test/Removal

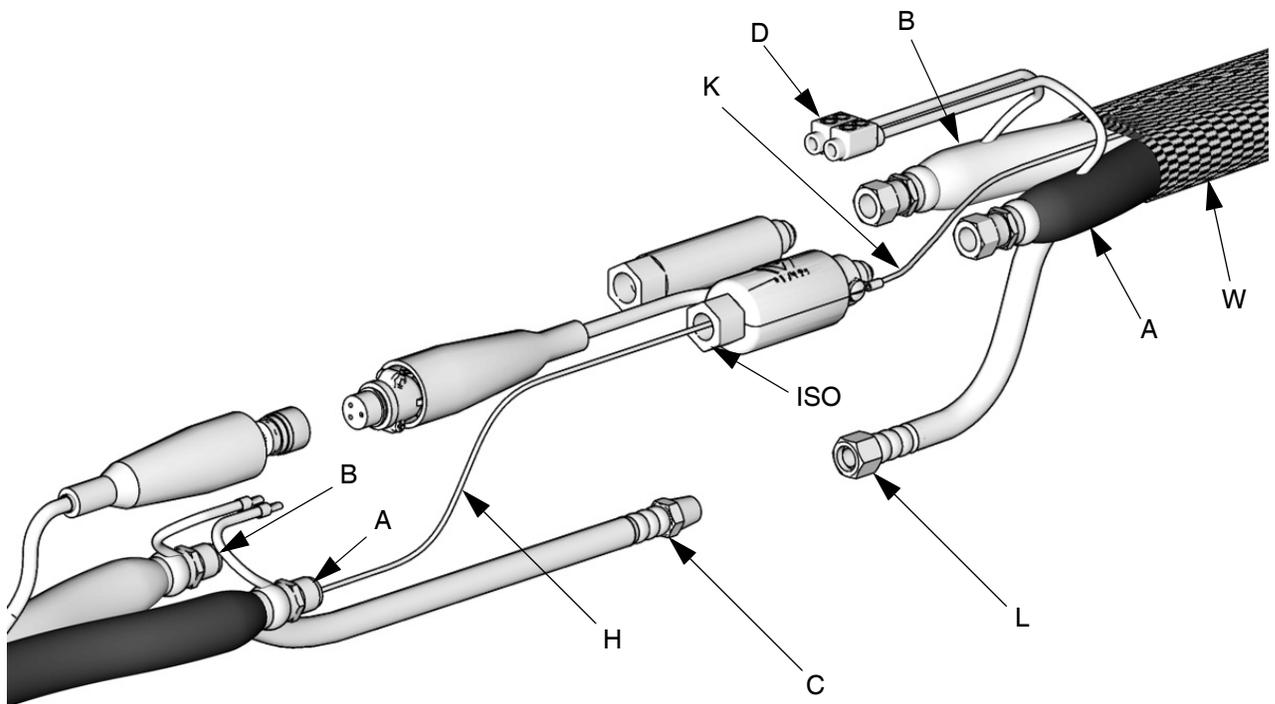
1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.
3. Remove tape and protective covering from FTS (21), FIG. 11. Disconnect hose cable (F). Test with ohmmeter between pins of cable connector.

Pins	Result
1 to 2	approximately 10 ohms
1 to 3	infinity
3 to FTS groundscrew	0 ohms
1 to FTS component A fitting (ISO)	infinity

4. If FTS fails any test, replace FTS.
5. Disconnect air hoses (C, L), and electrical connectors (D).
6. Disconnect FTS from whip hose (W) and fluid hoses (A, B).
7. Remove ground wire (K) from ground screw on underside of FTS.
8. Remove FTS probe (H) from component A (ISO) side of hose.

Installation

The Fluid Temperature Sensor (FTS) is supplied. Install FTS between main hose and whip hose. See Heated Hose manual 309572 for instructions.



ti9581c

FIG. 12: Fluid Temperature Sensor and Heated Hoses

Transformer Primary Check

1. Turn main power OFF .
2. Locate the two smaller (10 AWG) wires coming out of transformer. Trace these wires back to contactor and circuit breaker (811). Use an ohmmeter to test for continuity between two wires; there should be continuity.

Transformer Secondary Check

1. Turn main power OFF .
2. Locate the two larger (6 AWG) wires coming out of transformer. Trace these wires back to large green connector under hose control module and circuit breaker (809). Use an ohmmeter to test for continuity between two wires; there should be continuity.

If you are not sure which wire in green plug under hose module connects to transformer, test both wires. One wire should have continuity with the other transformer wire in breaker (809) and the other wire should not.

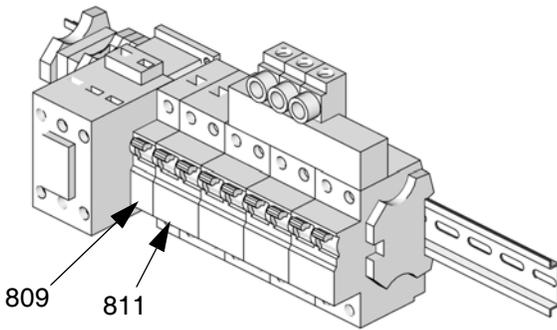


FIG. 13: Circuit Breaker Module

3. To verify transformer voltage, turn on hose zone. Measure voltage from 18CB-2 to POD-HOSE-P15-2; see Reactor Electrical Diagrams manual 312064.

Model	Secondary Voltage
310 ft.	90 Vac*
410 ft.	120 Vac*

* For 230 Vac line voltage.

Replace Transformer

NOTE: Use this procedure to replace transformer.

1. Turn main power OFF . Disconnect power supply.



2. Open Reactor cabinet.
3. Remove bolts holding transformer to cabinet floor. Slide transformer forward.
4. Disconnect the transformer wires; see Reactor Electrical Diagrams manual 312064.
5. Remove transformer from cabinet.
6. Install new transformer in reverse order.

Display Module

Temperature and Pressure Displays

NOTICE

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

1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 28.
3. Refer to electrical diagrams.
4. Put on static conductive wrist strap.
5. Disconnect main display cable (20) at lower left corner of display module; see FIG. 14.
6. Remove screws (509, 510) and cover (504); see FIG. 14.

 If replacing both displays, label temperature display cables TEMP and pressure display cables PUMP before disconnecting.

7. Disconnect cable connectors (506 and 511) from back of temperature display (501) or pressure display (502); see FIG. 14.
8. Disconnect ribbon cable(s) (R) from back of display; see FIG. 14.
9. Remove nuts (508) and plate (505).
10. Disassemble display, see detail in FIG. 14.
11. Replace board (501a or 502a) or membrane switch (501b or 502b) as necessary.
12. Reassemble in reverse order, see FIG. 14. Apply medium strength thread sealant where shown. Be sure display cable ground wire (G) is secured between cable bushing and cover (504) with screws (512).

Red Stop Button

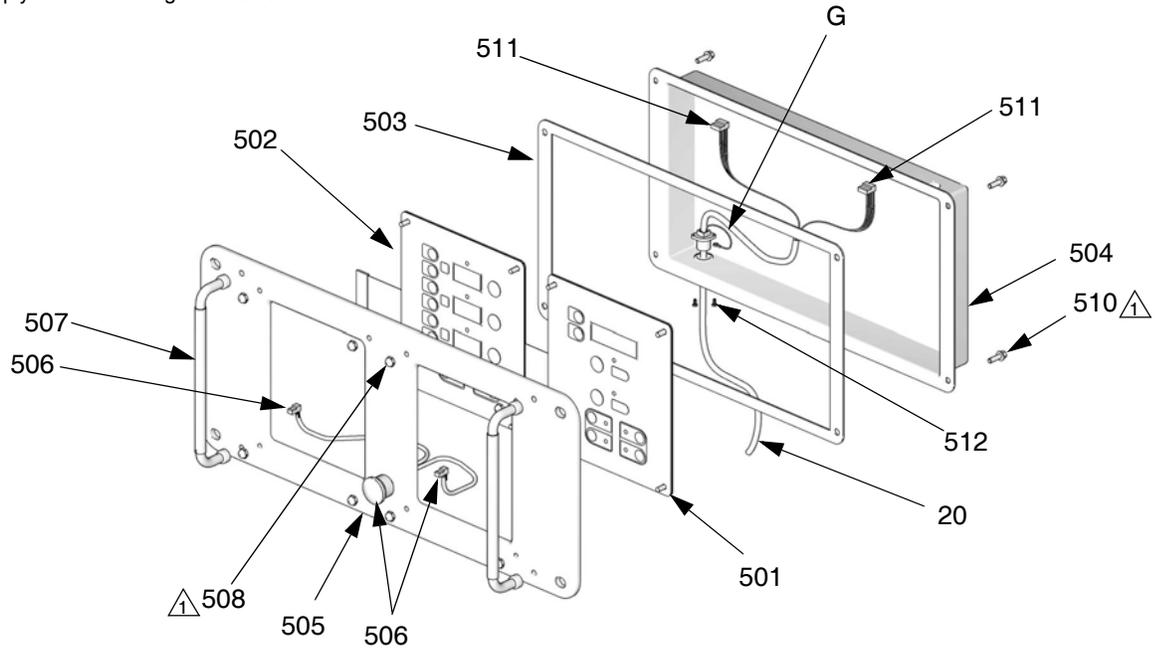
NOTICE

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



1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 28.
3. Refer to electrical diagrams.
4. Put on static conductive wrist strap.
5. Remove screws (509, 510) and cover (504), FIG. 14.
6. Disconnect button cable connectors (506) from back of temperature display (501) and pressure display (502).
7. Remove red stop button (506).
8. Reassemble in reverse order. Be sure display cable ground wire (G) is secured between cable bushing and cover (504) with screws (512).

 Apply medium strength thread sealant.

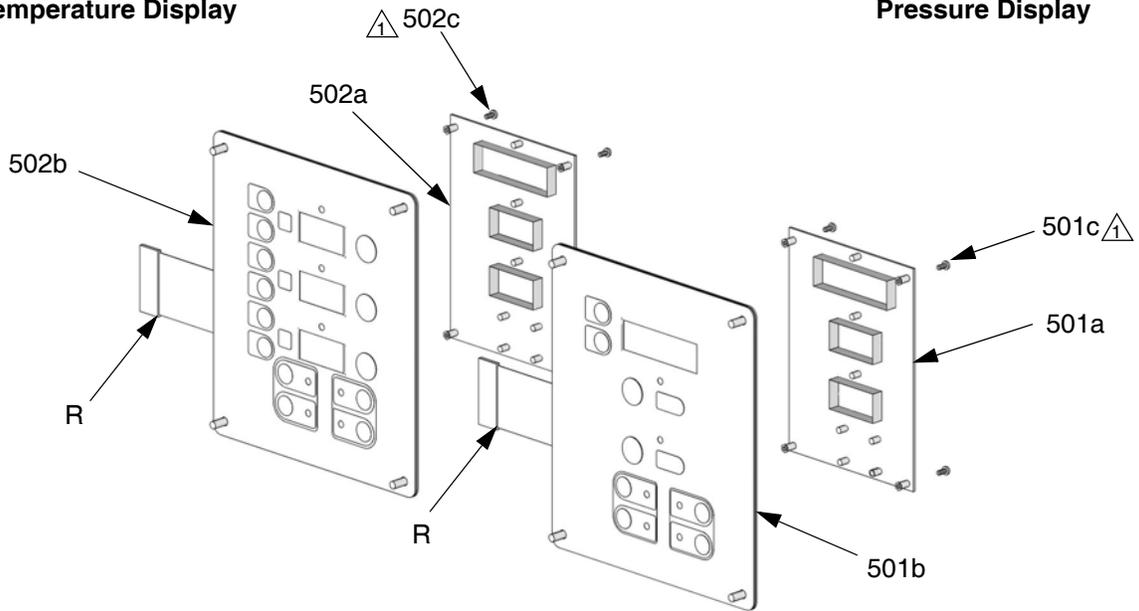


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Detail of Membrane Switches and Display Boards

Temperature Display

Pressure Display



ti3172a

FIG. 14. Display Module

Inlet Fluid Strainer Screen



The inlet strainer at each proportioning pump filters out solid matter that can plug the inlet check valves. Inspect the screens daily as part of the startup routine, and clean as required.

Isocyanate can crystallize from moisture contamination or from freezing. If the chemicals used are clean and proper storage, transfer, and operating procedures are followed, there should be minimal contamination of the A-side screen.

NOTE: Clean the A-side screen only during daily startup. This minimizes moisture contamination by immediately flushing out any isocyanate residue at the start of dispensing operations.

1. Close the material supply valve at the pump inlet to prevent material from being pumped while the strainer plug (C) is removed.
2. Place a container under the strainer base to catch drain off when removing the strainer plug.
3. Remove the screen (A) from the strainer manifold. Thoroughly flush the screen with gun cleaner and shake it dry. Inspect the screen for blockage. No more than 25% of the mesh should be restricted. If more than 25% is blocked, replace the screen. Inspect the strainer gasket (B) and replace as required.
4. Ensure the pipe plug (D) is securely screwed into the strainer plug (C). Install the strainer plug with the screen (A) and gasket (B) in place and tighten. Do not overtighten. Let the gasket make the seal.
5. Open the material supply valve, ensure that there are no leaks, and wipe the equipment clean.
6. Proceed with operation.

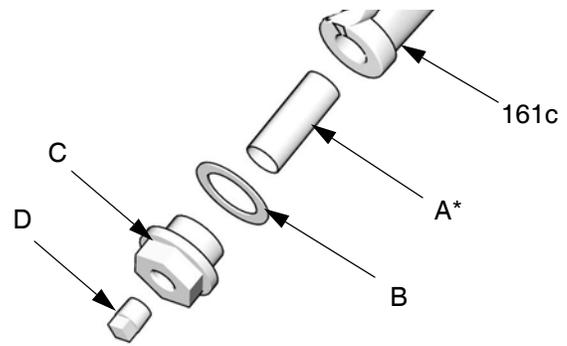


FIG. 15. Y Strainer Components

* Fluid filter screen (within 161c) replacements:

Part	Description
26A349	KIT, filter, replacement; 2 pack
26A350	KIT, filter, replacement; 10 pack
187758	Replacement gasket

Change Hydraulic Fluid and Filter



See Table 8 for recommended frequency of oil changes.

NOTE: Change break-in oil in a new unit after first 250 hours of operation or within 3 months, whichever comes first.

Table 8: Frequency of Oil Changes

Ambient Temperature	Recommended Frequency
0 to 90°F (-17 to 32°C)	1000 hours or 12 months, whichever comes first
90°F and above (32°C and above)	500 hours or 6 months, whichever comes first

1. Relieve pressure, page 28.
2. Allow hydraulic fluid to cool.

Repair

3. Place a pan under reservoir drain plug (110k) to catch oil.

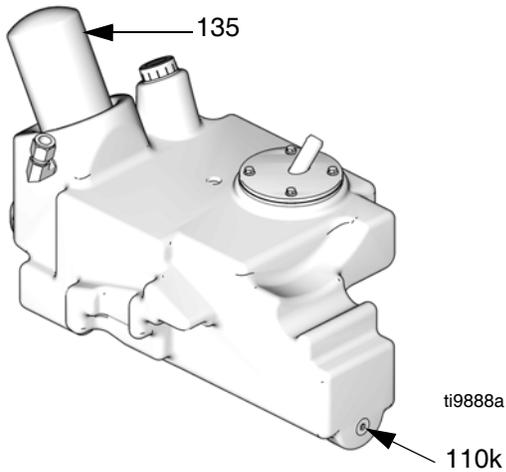


FIG. 16: Change Hydraulic Fluid and Filter

4. Remove drain plug (110k).

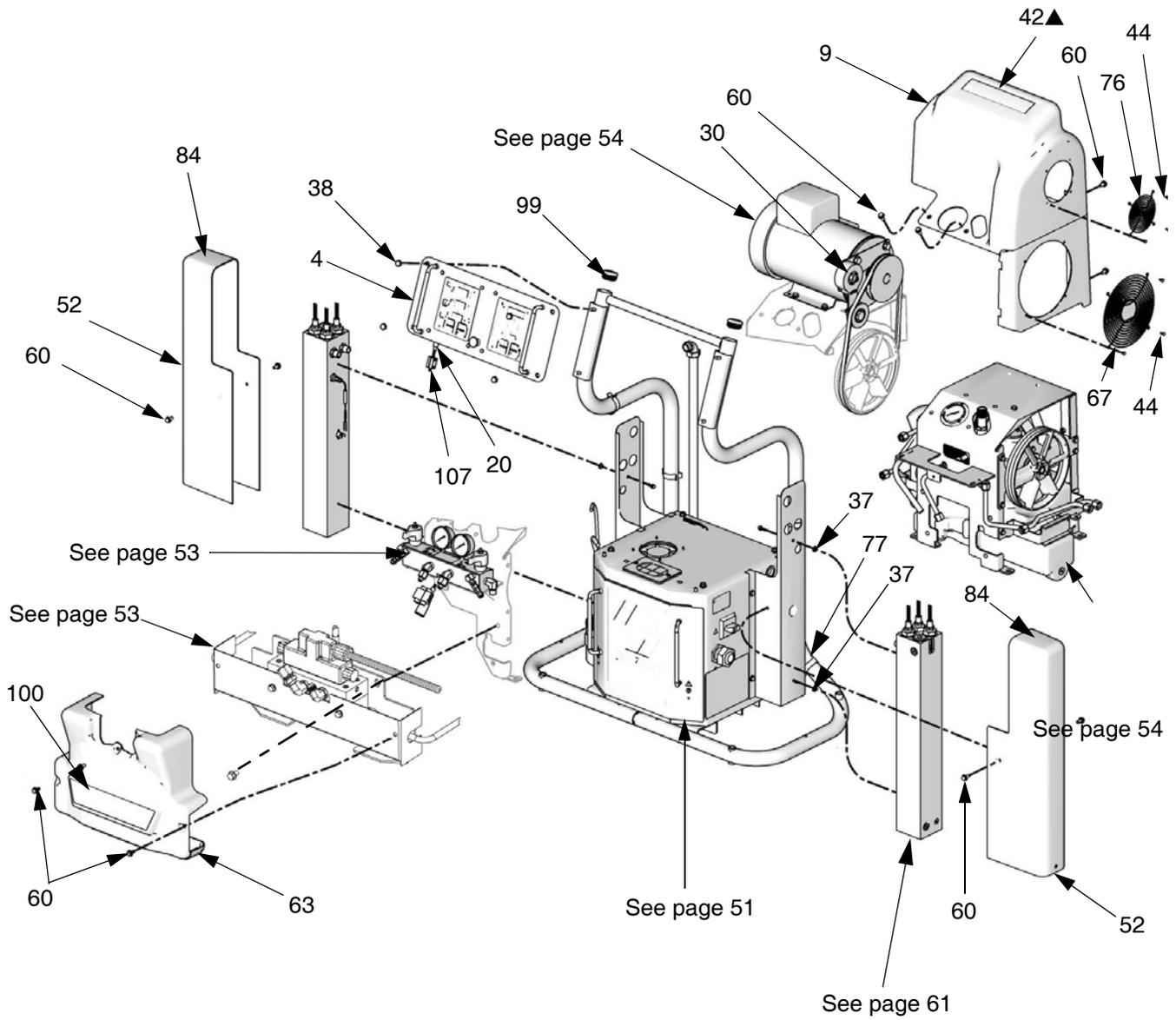
5. Place a rag around base of oil filter (135) to prevent oil from spilling. Unscrew filter 1/4-3/4 turn to break air lock in filter. Wait five minutes to allow oil in filter to drain back into reservoir. Unscrew filter and remove.
6. Reinstall drain plug (110k).
7. Replace filter (135):
 - a. Coat filter seal with fresh oil.
 - b. Screw filter on snug, then an additional 1/4 turn.
8. Refill reservoir with approved hydraulic fluid. See Table 9.
9. Proceed with normal operation.

NOTE: Upon starting motor, hydraulic pump may make a screeching noise until primed. If this noise continues for more than 30 seconds, switch off motor control. See Hydraulic Drive System, page 22.

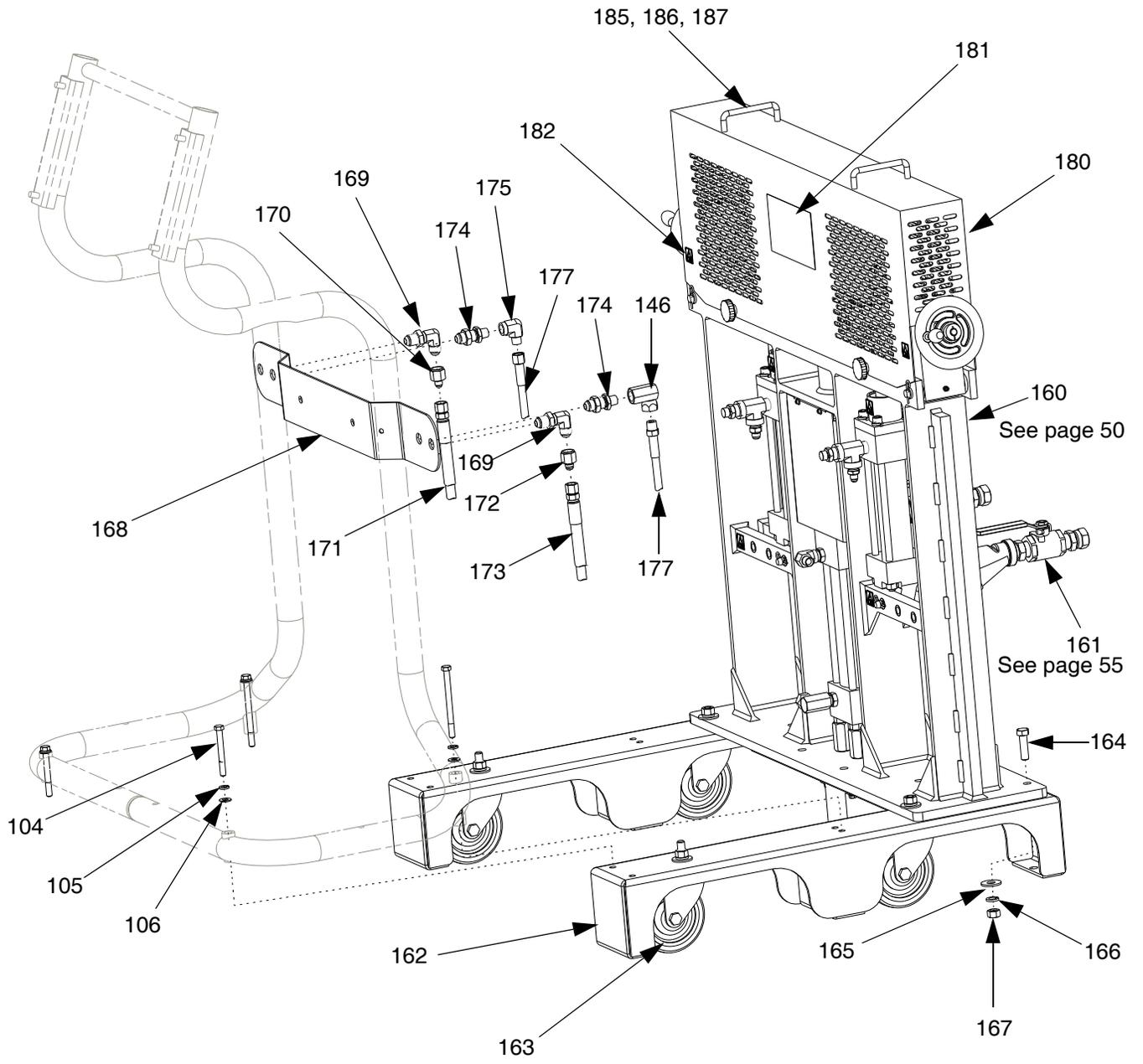
Table 9: Approved Anti-Wear (AW) Hydraulic Oils

Supplier	Name
Citgo	A/W ISO Grade 46
Amsoil	AWI ISO Grade 46 (synthetic*)
BP Oil International	Energol [®] HLP-HM, ISO Grade 46
Carl Bechem GmbH	Staroil HVI 46
Castrol	Hyspin AWS 46
Chevron	Rykon [®] AW, ISO 46
Exxon	Humble Hydraulic H, ISO Grade 46
Mobil	Mobil DTE 25, ISO Grade 46
Shell	Shell Tellus, ISO Grade 46
Texaco	Texaco AW Hydraulic, ISO Grade 46
* Note: Do not mix mineral-based and synthetic hydraulic oils. Completely drain oil from reservoir and pump prior to converting between oils.	
If the approved oils are not available in your area, use an alternative hydraulic oil meeting the following requirements:	
Oil Type:	Anti-Wear (AW) Hydraulic
ISO Grade:	46
Viscosity, cSt at 40°C:	43.0-47.0
Viscosity, cSt at 100°C:	6.5-9.0
Viscosity Index:	95 or higher
Pour Point, ASTM D 97:	-15°F (-26°C) or lower
Other essential properties:	Formulated for anti-wear, anti-foaming, oxidation stability, corrosion protection, and water separation

Parts

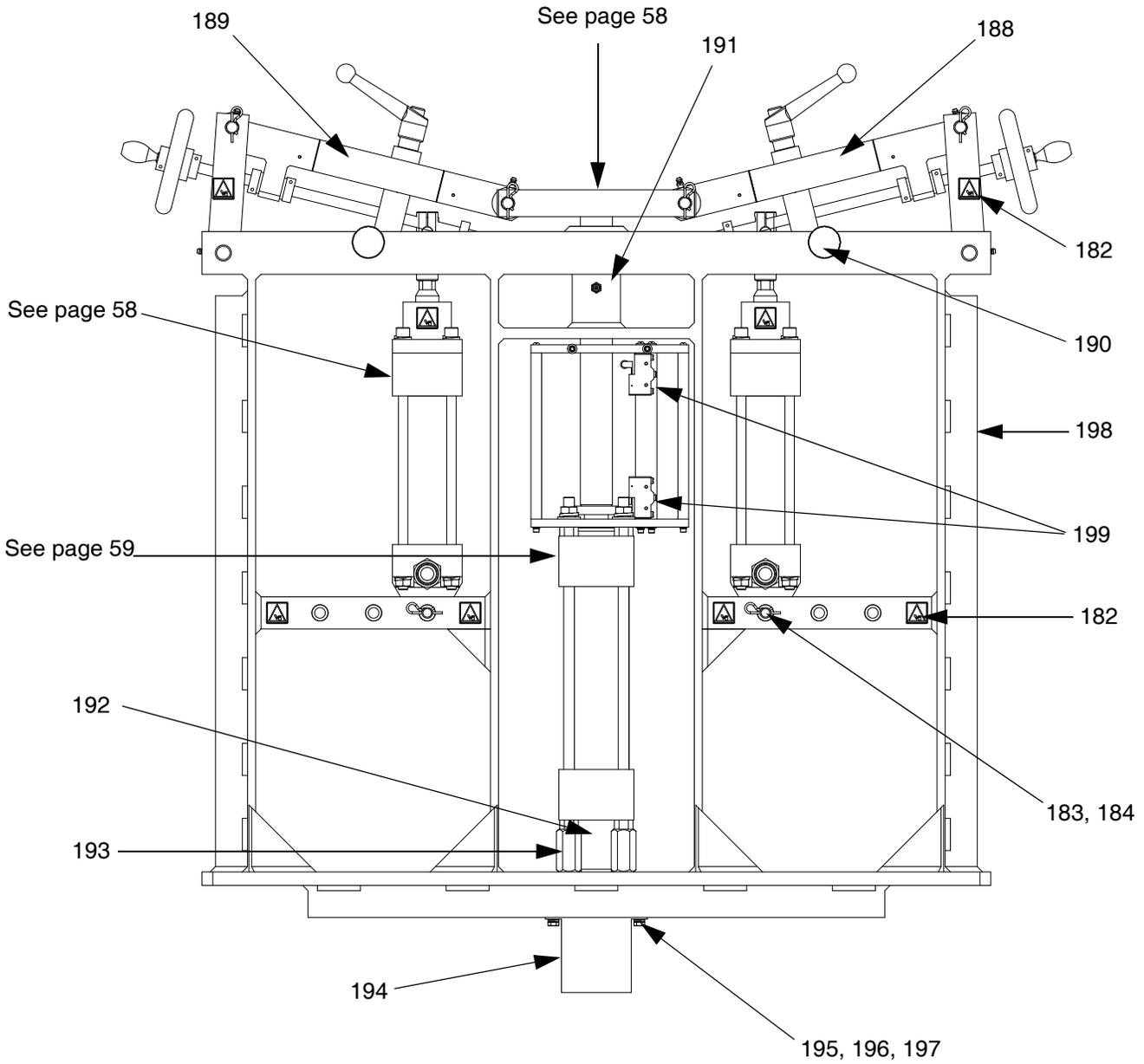


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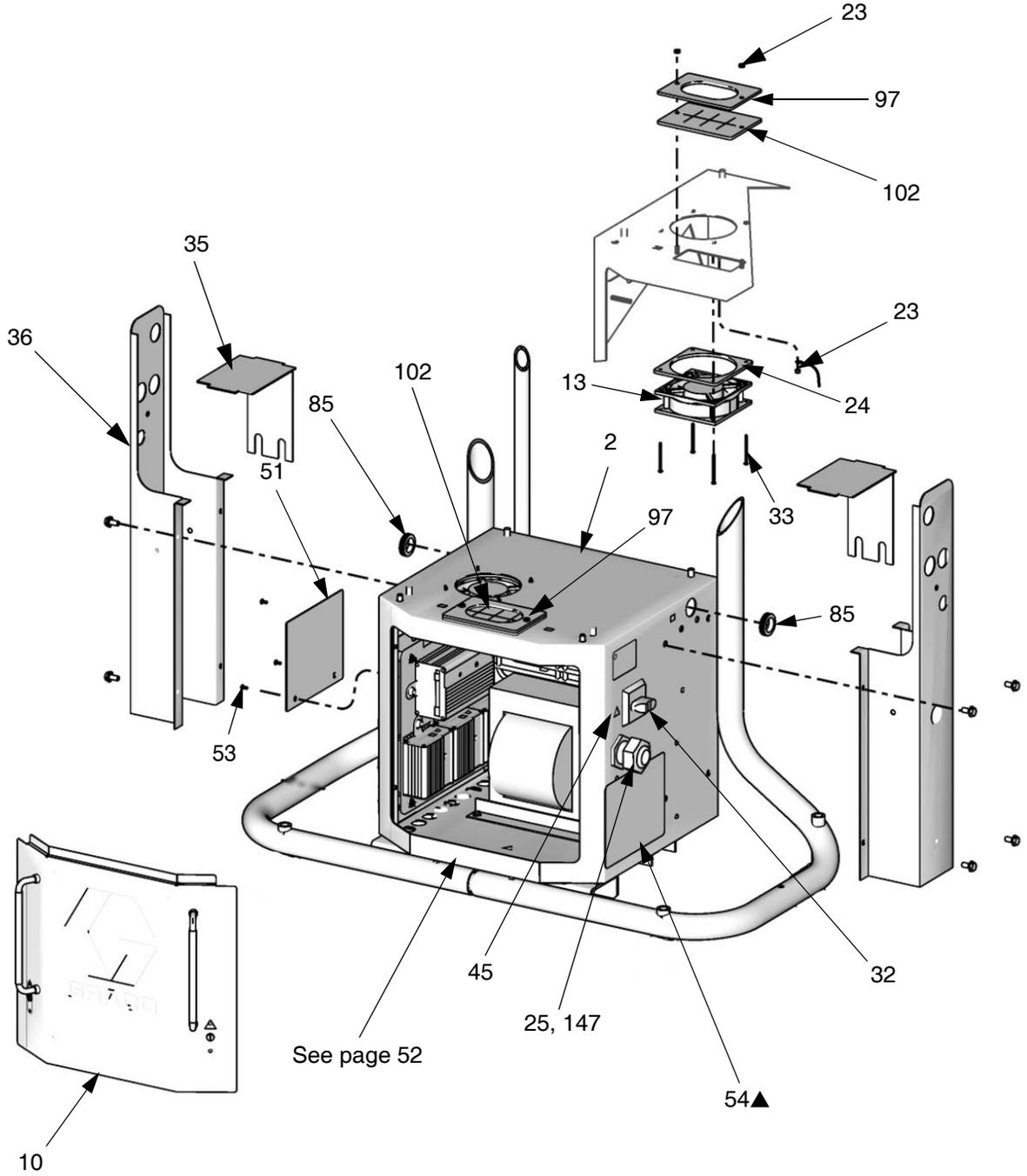
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Pump Assembly Overview



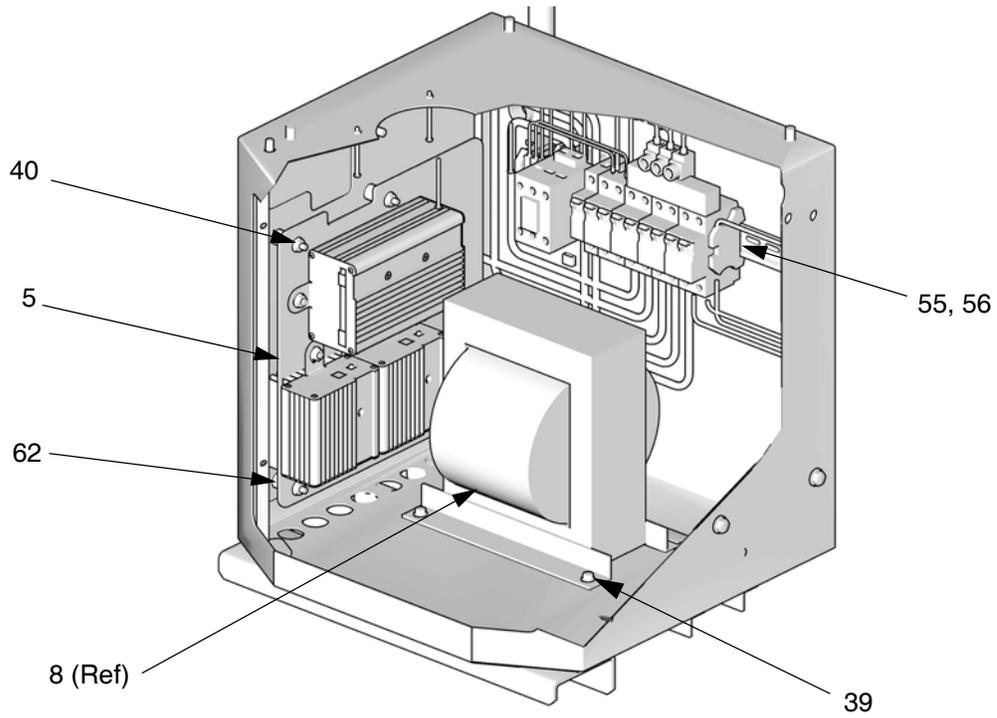
r_256886_313540_4

Detail of Cabinet Area



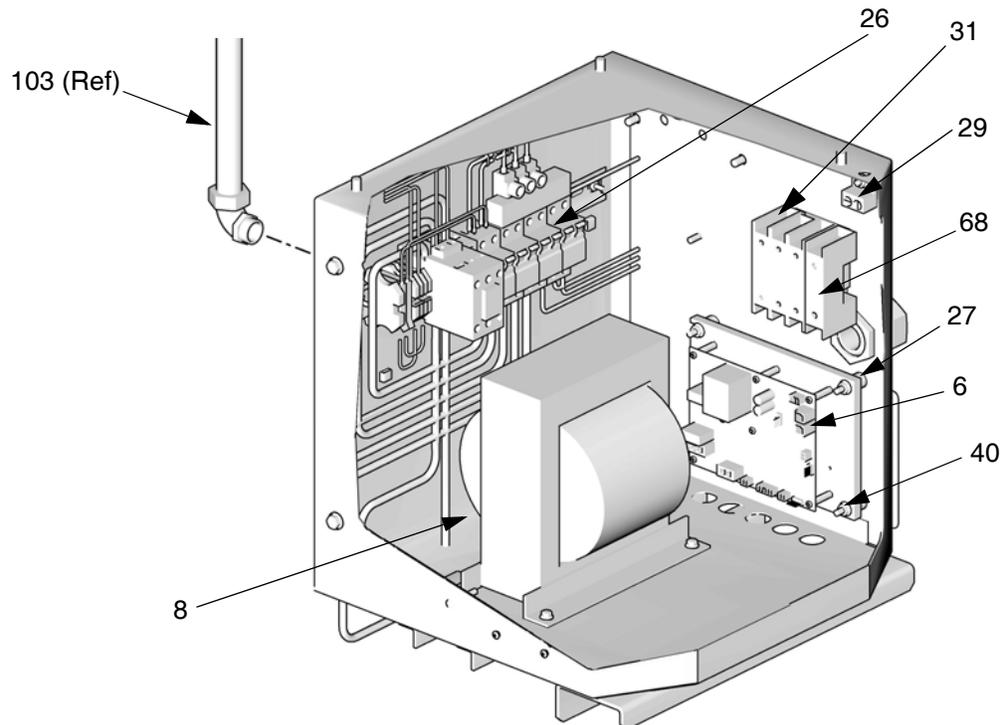
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Left Side of Cabinet



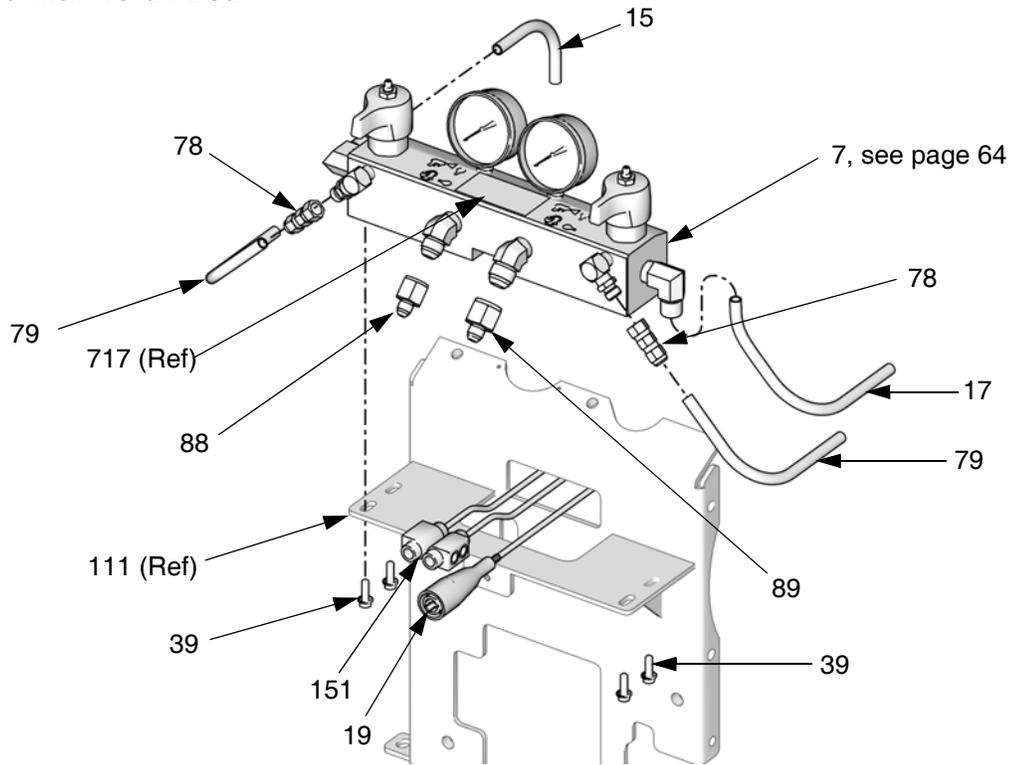
TI9835a

Right Side of Cabinet



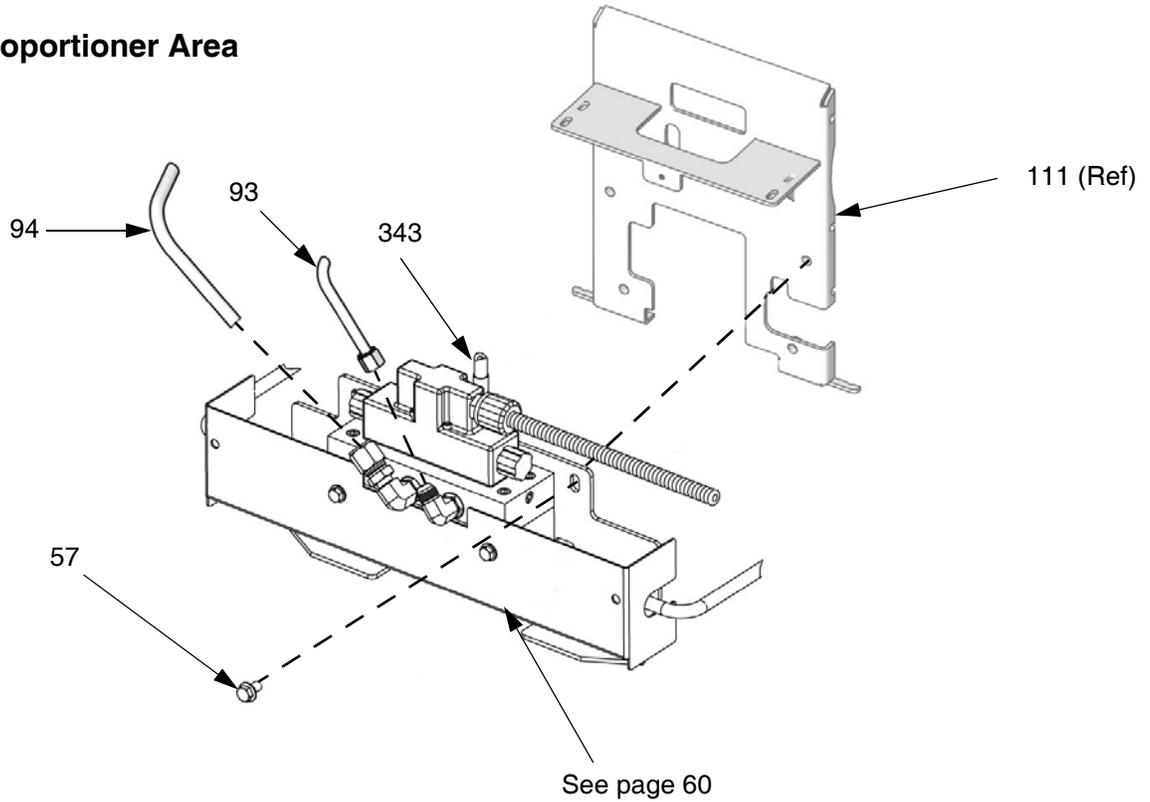
TI9836a

Detail, Fluid Manifold Area

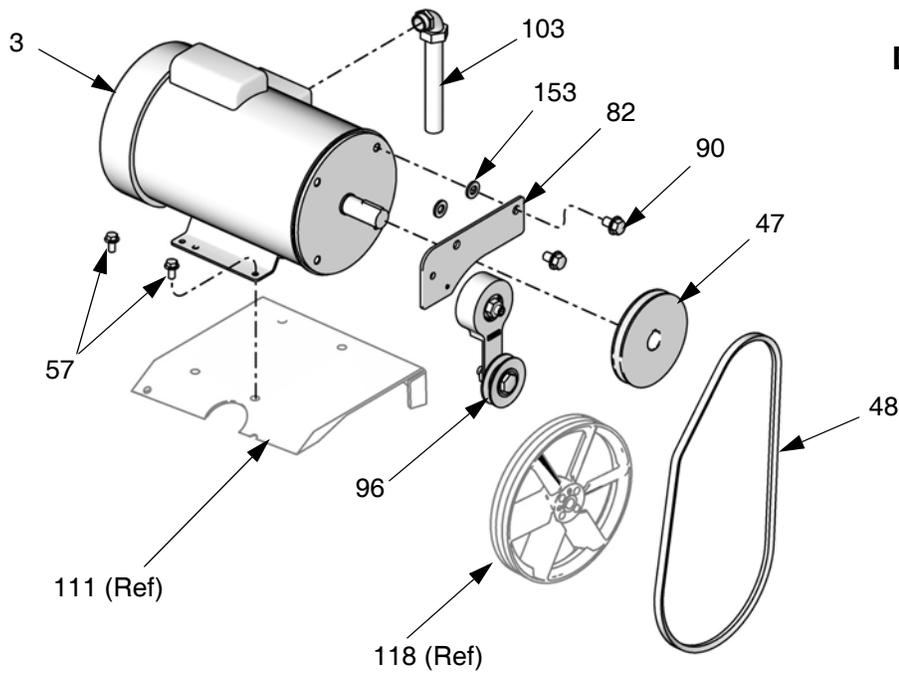


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Detail, Proportioner Area

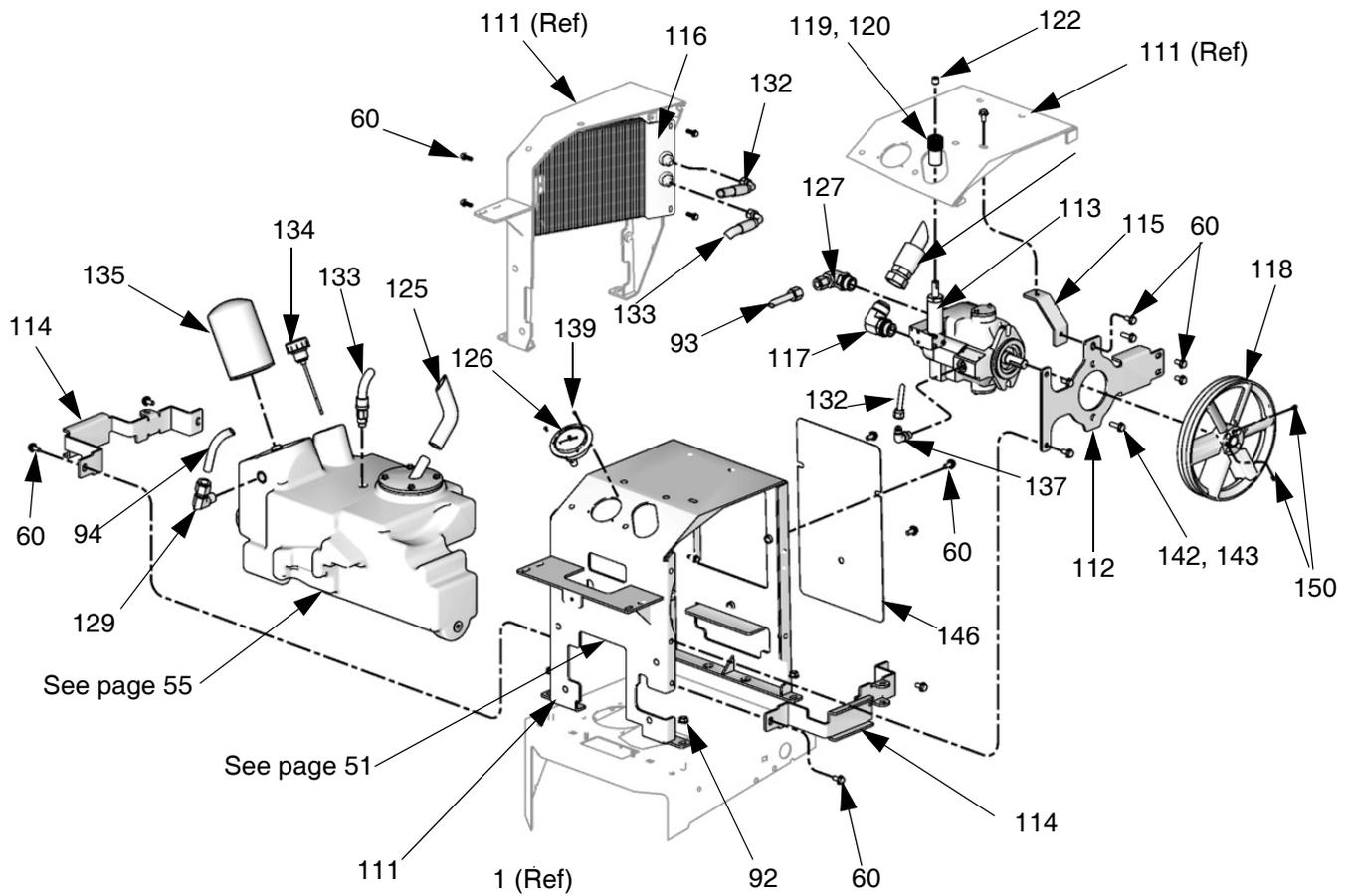


Detail, Electric Motor Area



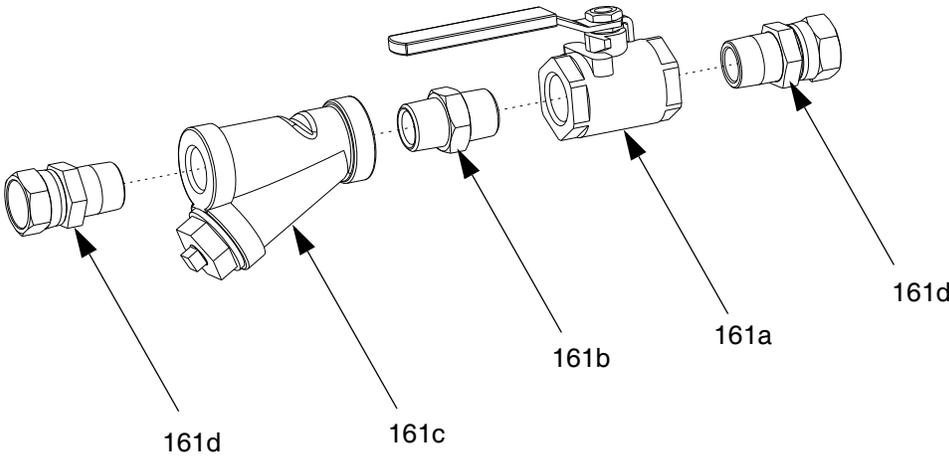
ti7709a

Detail, Hydraulic Reservoir Area



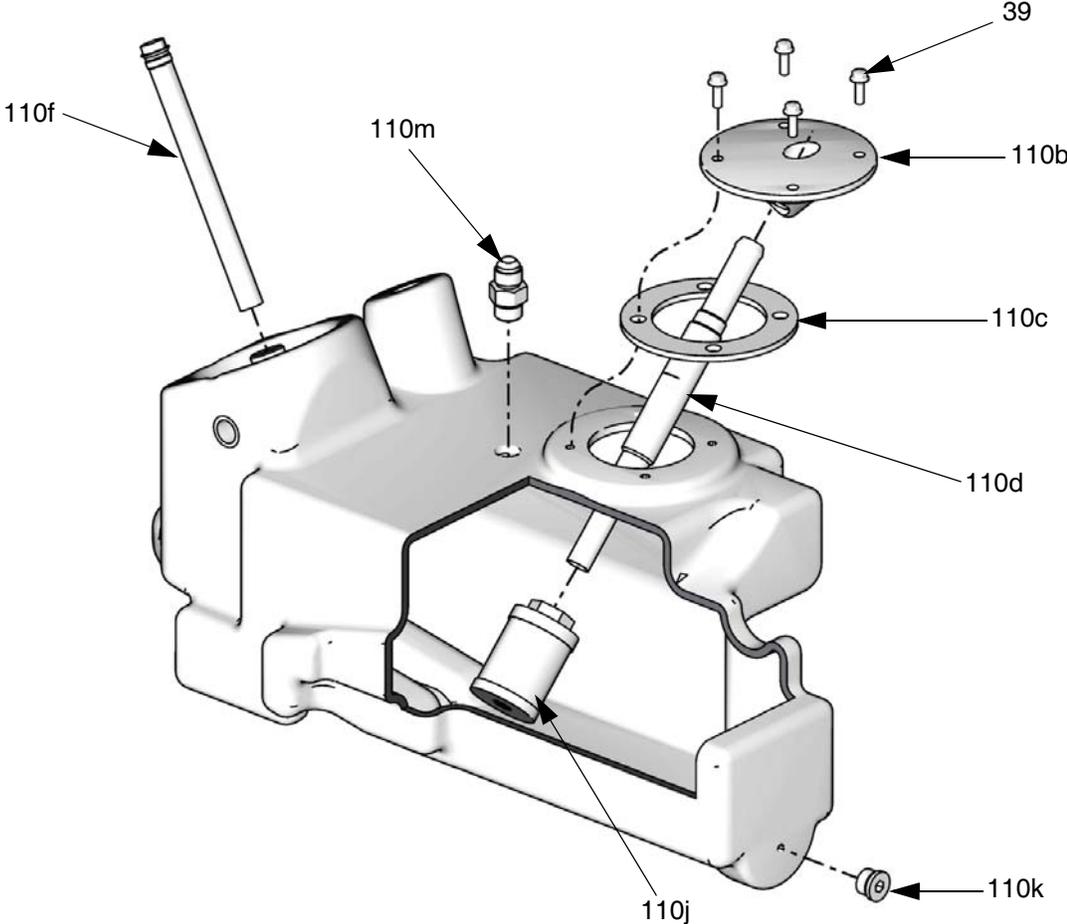
T19832b

Ref. 161, Fluid Inlet Kit



r_256886_313540_7

Ref. 110, Hydraulic Reservoir



ti9840a

Parts

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
2	247813	HEATER	2	58★		STRAP, tie, wire	20
3	247785	MOTOR	1	60	111800	SCREW, cap, hex hd	35
4	245974	DISPLAY; see page 62	1	62	247782	SPACER	4
5		CONTROL, temperature; see page 63	1	63	247850	COVER, front	1
6	247835	BOARD, circuit, motor control	1	67	117284	GRILL, fan guard	1
7	247823	MANIFOLD, fluid; see page 64	1	68†	117553	SWITCH, added pole	1
8	247786	TRANSFORMER	1	74★	206995	THROAT SEAL LIQUID; 1 quart	1
9	247832	COVER, motor	1	76	115836	GUARD, finger	1
10	246976	COVER, main cabinet	1	77	186494	CLIP, spring	5
11		PUMP, proportioning; see page 60	1	78	205447	COUPLING, hose	2
13	115834	FAN, cooling	1	79	054826	TUBE, PTFE; 1/4 in. (6 mm) ID; 8 ft (2.4 m)	8
14	15X243	TUBE, inlet, component A	1	82	15H207	BRACKET, tensioner	1
15	247775	TUBE, outlet, component A	1	84▲	189285	LABEL, caution	2
16	15X241	TUBE, inlet, component B	1	85	114269	GROMMET, rubber	2
17	247774	TUBE, outlet, component B	1	88	247851	FITTING, reducer #5 x #8 JIC	1
18★	247787	CABLE, harness, heater overtemp., includes 12-pin connector	1	89	247852	FITTING, reducer #6 x #10 JIC	1
19	15B380	CABLE, hose, control; see manual 312064	1	90	111802	SCREW, cap, hex hd; 1/2-13 x 3/4 in. (19 mm)	2
20	15B383	CABLE, display	1	93	15T895	HOSE, supply	1
21★	261669	KIT, fluid temp sensor, coupler	1	94	247784	TUBE, return	1
23	103181	WASHER, lock ext	1	96	247853	ADJUSTER, belt, tensioner	1
24	15B360	GASKET, fan	1	97	15G816	COVER, plate, wire way	1
25	255047	STRAIN RELIEF, M40 thread	1	99	112125	PLUG, tube	2
26		MODULE, breaker; see page 65	1	100	247780	LABEL	1
27	116149	SPACER	4	102	15H189	BOOT, wire feed through	1
29	117666	TERMINAL, ground	1	103	247790	CONDUIT, assembly, motor power	1
30	C19843	SCREW, CAP, socket hd	1	104	100560	SCREW, cap, hex hd; 3/8-16	4
31	123969	SWITCH, disconnect	1	105	100133	WASHER, lock; 3/8 in.	4
32	123967	KNOB, operator disconnect	1	106	100731	WASHER; 3/8 in.	4
33	117723	SCREW, mach, slotted hd	4	107	119253	SUPPRESSOR, ferrite; 151 ohm	1
34	C20487	NIPPLE, hex	2	110	247826	RESERVOIR, hydraulic; includes 110b-110m; see page 55	1
35	247502	COVER, heater wire	2	110b	247778	. HOUSING, inlet	1
36	247843	BRACKET, heater	2	110c	247771	. GASKET, inlet	1
37	167002	INSULATOR, heat	4	110d	247777	. TUBE, inlet	1
38	117623	NUT, cap (3/8-16)	4	110f	247770	. TUBE, return	1
39	113796	SCREW, flanged, hex hd	14	110j	25D893	. FILTER, inlet	1
40	115942	NUT, hex, flange head	9	110k	255032	. PLUG	1
42	15K817	LABEL, fault codes	1	110m	255021	. FITTING, straight	1
44		RIVET, pop; 3/16 in. (5 mm) x 0.4 in. (10 mm)	8	111	247822	BRACKET, motor mount	1
45▲	189930	LABEL, caution	2	112	247819	BRACKET, mounting, pump	1
47	247845	PULLEY, drive	1	113	255019	PUMP, hydraulic	1
48	803889	BELT	1	114	247821	BRACKET, reservoir, hydraulic	2
49★	15B593	SHIELD, membrane switch	1	115	247820	BRACKET, support, pumpmount	1
50★	308212	PAD, pamphlet safety	1	116	247829	COOLER, hydraulic	1
51	15B775	COVER, wire access	1	117	255020	ELBOW; 1-1/16 npt(m) x 1/2 in. (13 mm) tube	1
52	247846	COVER, heater	2				
53		SCREW, machine, pan hd; 8-32 x 3/8	3				
54▲	15G280	LABEL, warning	1				
55	113505	NUT, KEPS, hex hd	4				
56	112776	WASHER, plain	2				
57	113802	SCREW, hex hd, flanged	8				

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
118	247856	PULLEY, fan	1	186	GC2108	WASHER, lock, spring, #10	4
119	15H512	LABEL, control	1	187	GC2188	SCREW, socket hd	4
120	15H204	KNOB, pressure	1	188	GC0530	LABEL, calibration, right	2
122	117560	SCREW, set, socket hd	1	189	GC0531	LABEL, calibration, left	2
125	247793	HOSE, inlet, coupled	1	190	GC0541	KNOB, clamping	4
126	255029	GAUGE, pressure, fluid, panel mount	1	191	GC1196	FITTING, lube; 1/8 npt	1
127	121320	ELBOW	1	192	GC1139	SHAFT, guard	1
129	255036	ELBOW, male	1	193	GC1126	EXTENSION, standoff, hex; 1 in. x 2 in.	4
130★	117792	GUN, grease	1	194	GC1137	SHAFT, cylinder, hydraulic	1
131★	117773	GREASE, lubricant	1	195	GC2109	WASHER, lock, spring; 1/4 in.	4
132	15G782	HOSE, coupled	1	196	100270	SCREW, cap, hex hd	4
133	15G784	HOSE, coupled	1	197	GC2042	WASHER, flat, fender; 1/4 in.	4
134	116915	DIPSTICK with breather cap	1	198		FRAME	1
135	247792	FILTER, oil, 18-23 psi bypass	1	199	15W005	WIRE, switch, cable	1
137	116793	FITTING	1				
139	107156	SCREW, cap socket head	3				
142	112586	SCREW, cap, hex hd	2				
143	110996	NUT, hex, flange hd; 5/16-18	2				
144	C19862	NUT, lock, hex	1				
146	247836	COVER, access	1				
147	255048	NUT, strain relief, M40 thread	1				
148★	255039	CONNECTOR, heater	1				
150		SCREW, set; 1/4 x 1/2 (13 mm)	2				
151	261821	CONNECTOR, wire, 6 AWG (pair)	1				
153	104373	WASHER, thrust	2				
160		PUMP, assy.; see page 58	1				
161	255653	KIT, fluid inlet; each kit includes 161a-161d	2				
161a		VALVE, ball; 3/4 in.	1				
161b		NIPPLE, hex	1				
161c		Y-STRAINER	1				
161d		FITTING, union, swivel; 3/4 in.	2				
162		KIT, skid	1				
163	257543	KIT, caster; includes 4 casters	1				
164	100060	SCREW, cap, hex hd	4				
165	101044	WASHER, plain	4				
166	100018	WASHER, lock, spring	4				
167	100321	NUT	4				
168	15W350	BRACKET	1				
169	122400	ELBOW, bulkhead; #8 JIC	2				
170	117502	REDUCER; #5 x #8 JIC	1				
171☼		HOSE, moisture lock, assy., A; 3 ft.	1				
172	122398	REDUCER; #6 x #8 JIC	1				
173☼		HOSE, moisture lock, assy., B; 3 ft.	1				
174	122401	ADAPTER, bulkhead; #8 JIC - #6 nptf	2				
175	111856	ELBOW, street; 3/8-18 npt	1				
176	155677	ADAPTER, union, 90 deg.; 3/8 nptf x 3/8 npsm	1				
177	15X244	HOSE, coupled; 5600 psi	2				
180	15X710	GUARD	1				
181▲	15W800	LABEL, warning	1				
182▲	15W349	LABEL, caution, pinch point	16				
183✘		PIN, base, fluid pump	2				
184✘		PIN, hitch	14				
185	15X743	HANDLE, round	2				

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

† Model 256887 only.

☼ Available with fluid hose kit 257791.

✘ Available with pin and bearing kit 257794.

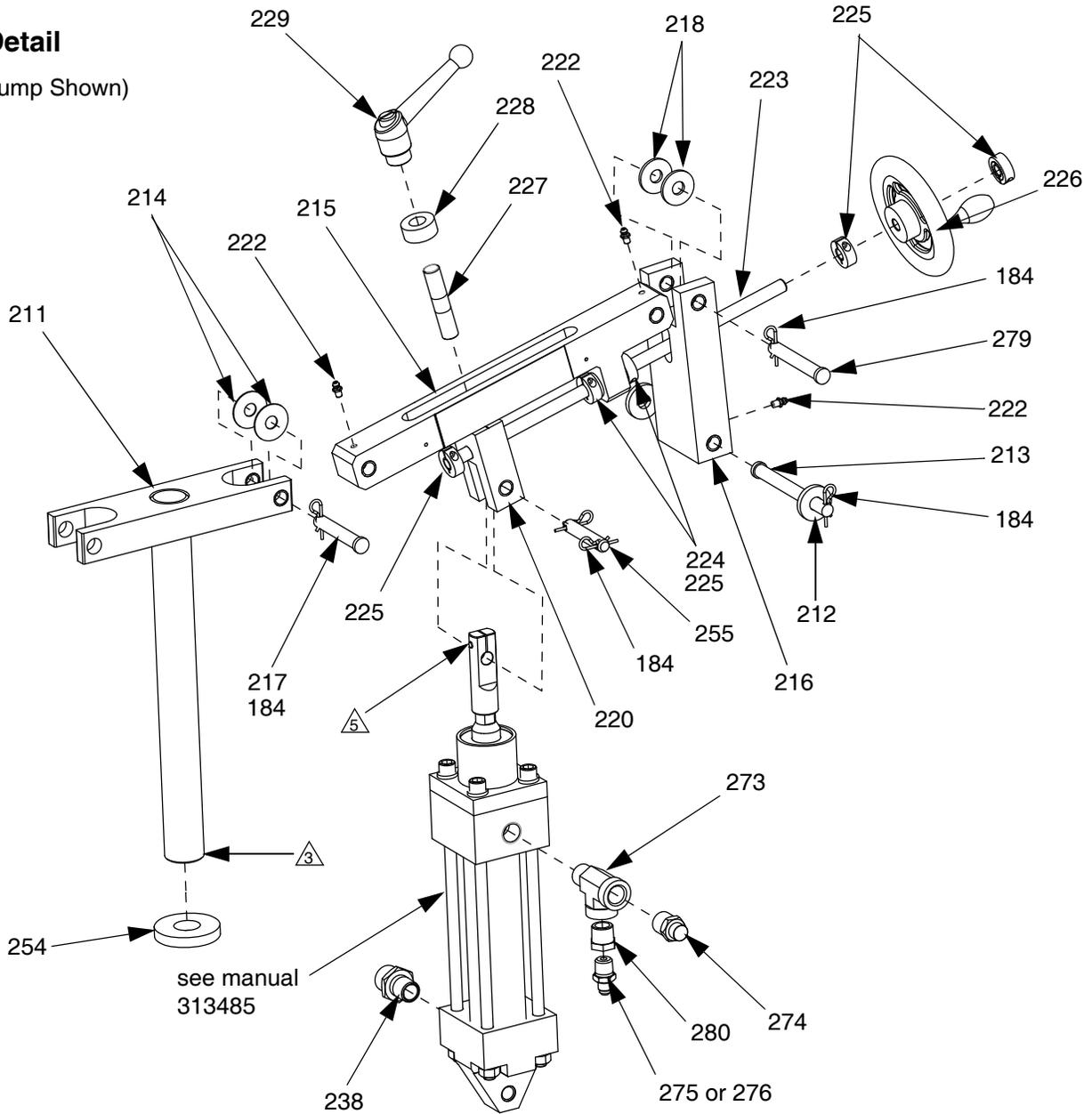
★ Not shown.

Sub Assemblies

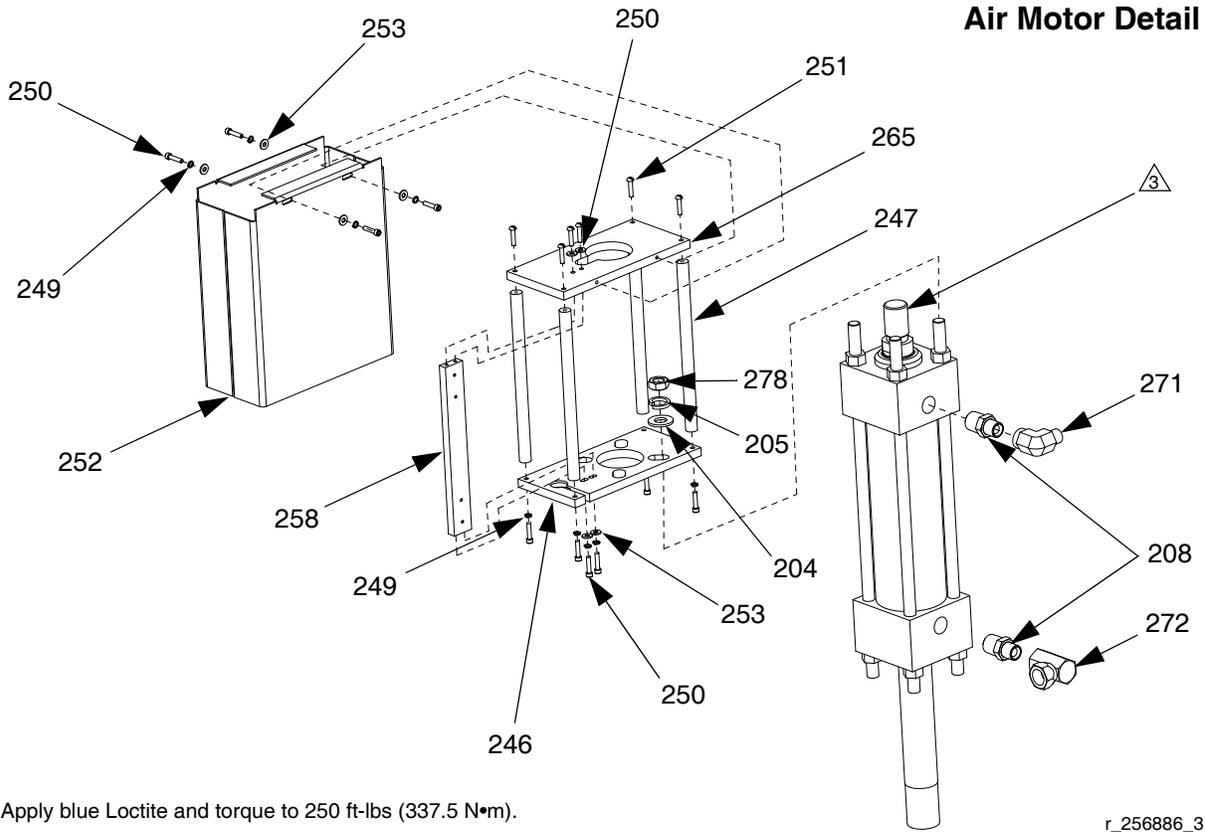
Pump Assembly

Pump Detail

(A Side Pump Shown)



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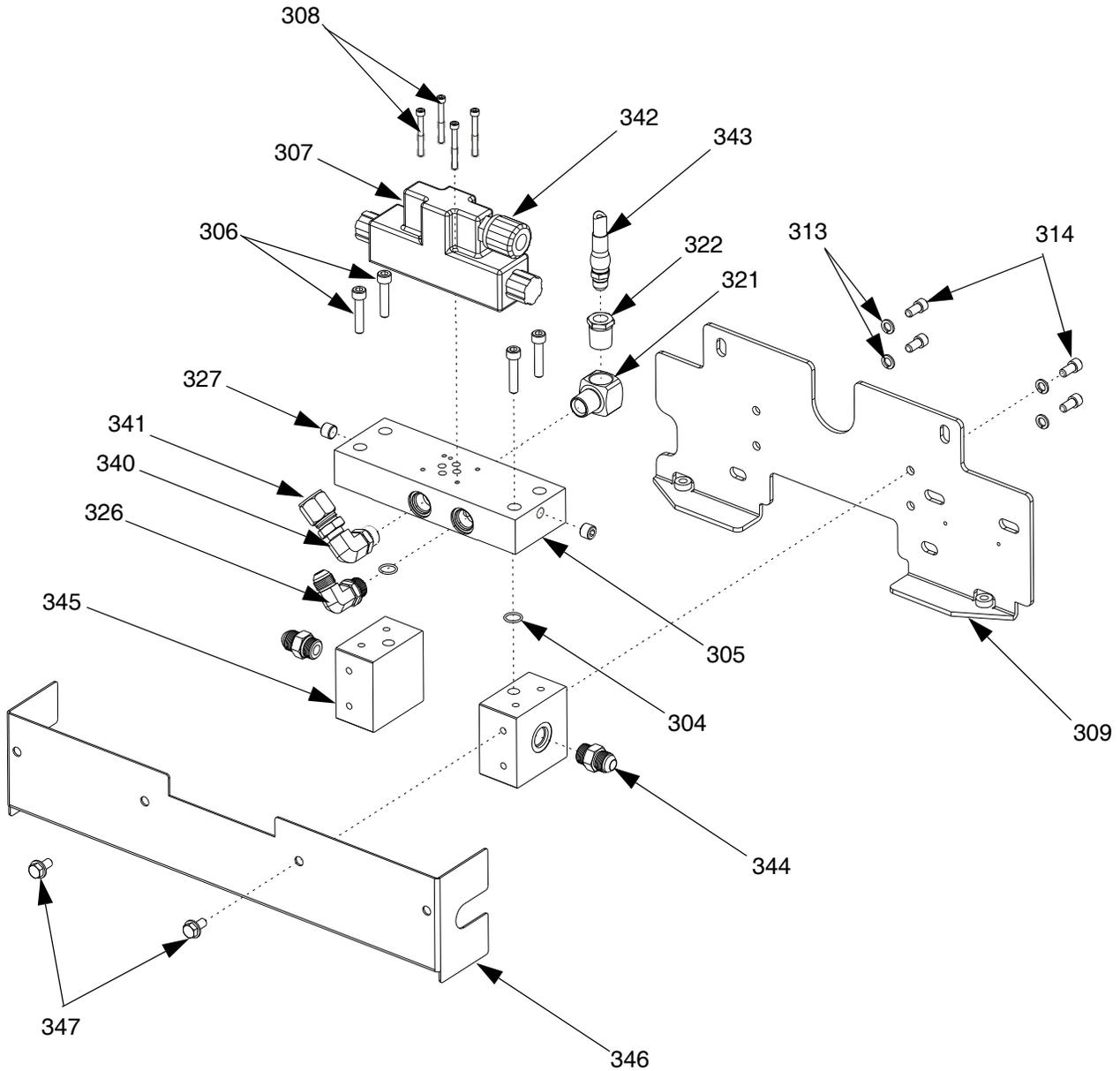
 Apply blue Loctite and torque to 250 ft-lbs (337.5 N*m).

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Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
204	GC2041	WASHER, flat, std; 1/2 in.	8	247	GC1132	EXTENSION, stndoff, change over	4
205	GC2112	WASHER, lock, spring; 1/2 in,	8	249	GC2107	WASHER, lock, spring; #8	10
208	159239	NIPPLE, pipe	2	250	GC2194	SCREW, shdc; SST, 0.164-32 x 0.0750 SST	10
211	GC0518	YOKE, guide rod	1	251	GC2118	SCREW, rdhd; CS, 0.164-32 x 0.750 zp	6
212	GC0527	WASHER, flat	4	252	15X708	GUARD, change over box	2
213*		PIN, clevis; 1/2 in.	2	253	GC2052	WASHER, flat, std; #8	8
214	GC0419	WASHER, flat	4	254	15W983	DISK, switch	1
215	GC0519	LINK, drive, pump	2	255*		PIN, 2.75 in. base, fluid pump	2
216	GC0521	BRACKET, pivot	2	256	GC1137	SHAFT, cylinder, hydraulic	1
217*		PIN, clevis; 1/2 in.	2	258	15W340	BRACKET, limit switch	1
218	GC0420	WASHER, flat	4	265	15X711	PLATE, change over, top	1
220	GC0520	ADAPTER, pump	2	271	111856	ELBOW, street	1
222	GC1195	FITTING, lube; 1/4-28	6	272	155677	ADAPTER, union, 90 deg	1
223	GC0524	SCREW, adjustment; 1/2-20	2	273	108126	FITTING, tee, street	2
224	GC0421	WASHER, flat	4	274	248187	HOUSING, rupture, disc	2
225	GC0526	SHAFT, locking	10	275	117832	ADAPTER; 9/16-18 JIC x 3/8 npt	1
226	GC0532	WHEEL, hand, aluminum	2	276	122406	ADAPTER; 1/2-20 JIC x 3/8 npt	1
227	GC0536	STUD; 5/8-11 x 3 in.	2	278	192348	NUT, head	4
228	GC0912	SPACER; 1 5/16 in. diameter, 9/16 in.	2	279*		PIN, clevis; 1/2 in.	2
229	GC0535	HANDLE	2	280	100081	BUSHING, pipe	2
238	157191	FITTING, adapter (1/2 npt x 3/4 npt)	2				
241	GC1147	PUMP, assy., fluid	2				
246	15X709	PLATE, change over, bottom	1				

* Available with pin and bearing kit 257794.

Hydraulic Directional Valve Assembly



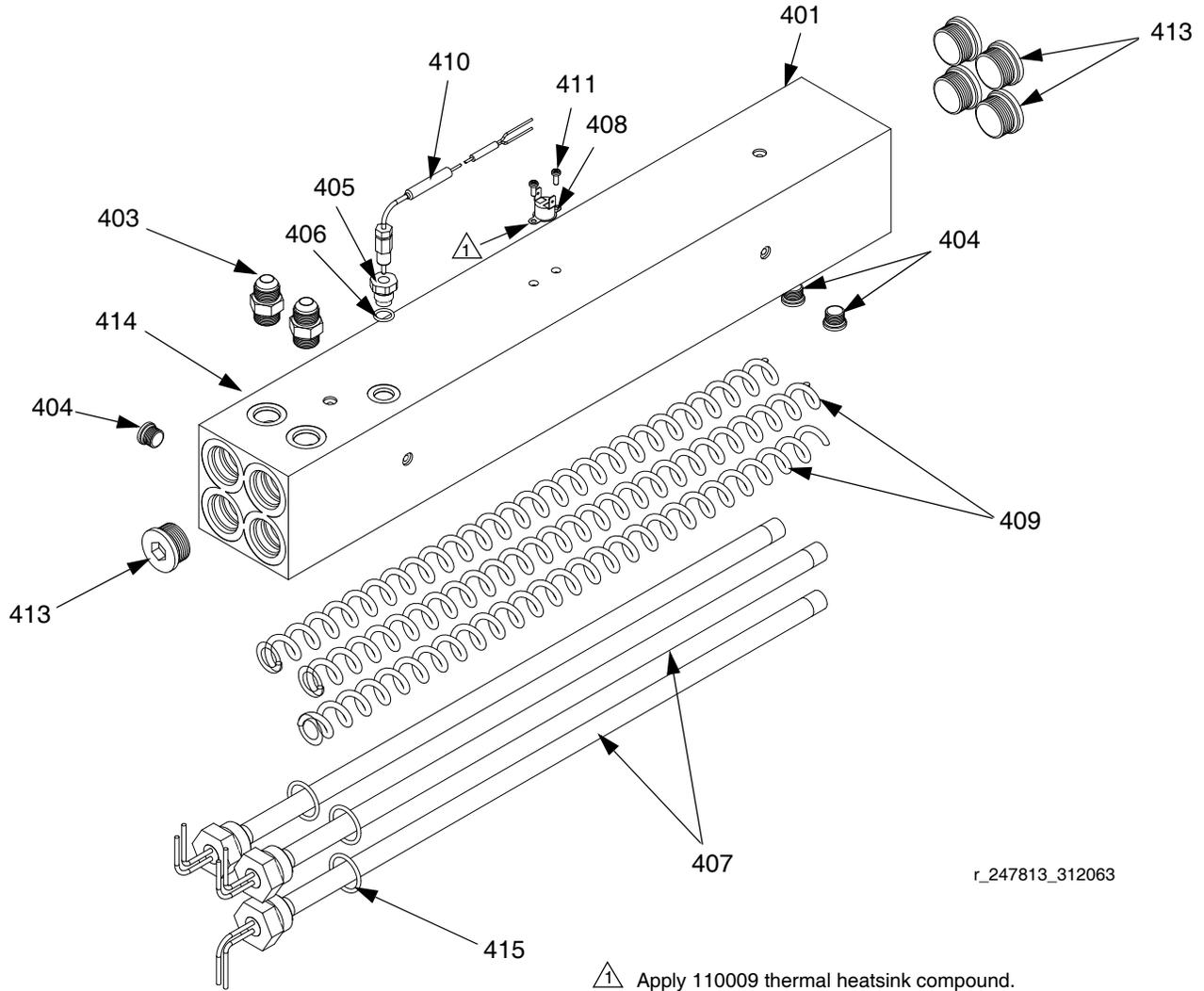
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Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
304	106258	O-RING	2	327	295225	PLUG, pipe, flush	2
305	298040	MANIFOLD, hydraulic	1	340	255037	ELBOW; 3/4 nptf	1
306	113467	SCREW, socket head	4	341	255038	CONNECTOR	1
307	120299	VALVE, directional, hydraulic	1	342	15H184	WIRE, bi-directional cable, assy.	1
308	C19986	SCREW, socket head	4	343	15H253	HOSE, gauge, hydraulic, 3000 psi	1
309	247817	BRACKET, mounting	1	344	121309	CONNETOR; 3/4 SAE x 1/2 JIC	2
313	100214	WASHER, lock	4	345	15W003	BLOCK, port	2
314	108751	SCREW, socket head	4	346	15X237	BRACKET, shroud	1
321	158683	ELBOW, 90 deg.	1	347	111800	SCREW, cap, hex hd	2
322	100206	BUSHING, pipe	1				
326	121312	ELBOW; 3/4 SAE x 1/2 JIC	1				

7.65 kW Single Zone Heater

(Two Per Machine)

Part 247813

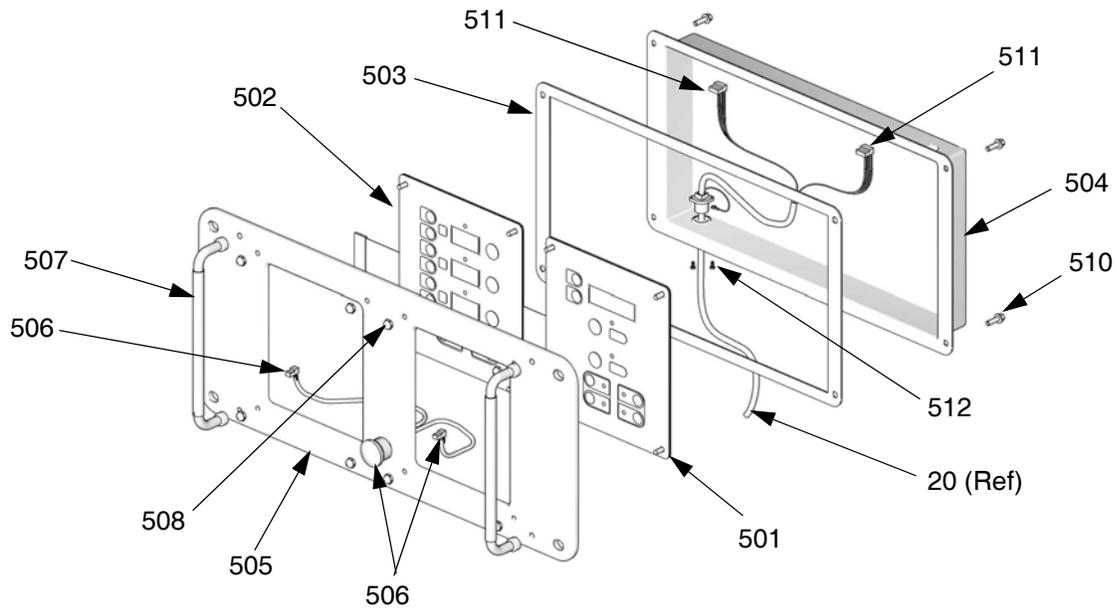


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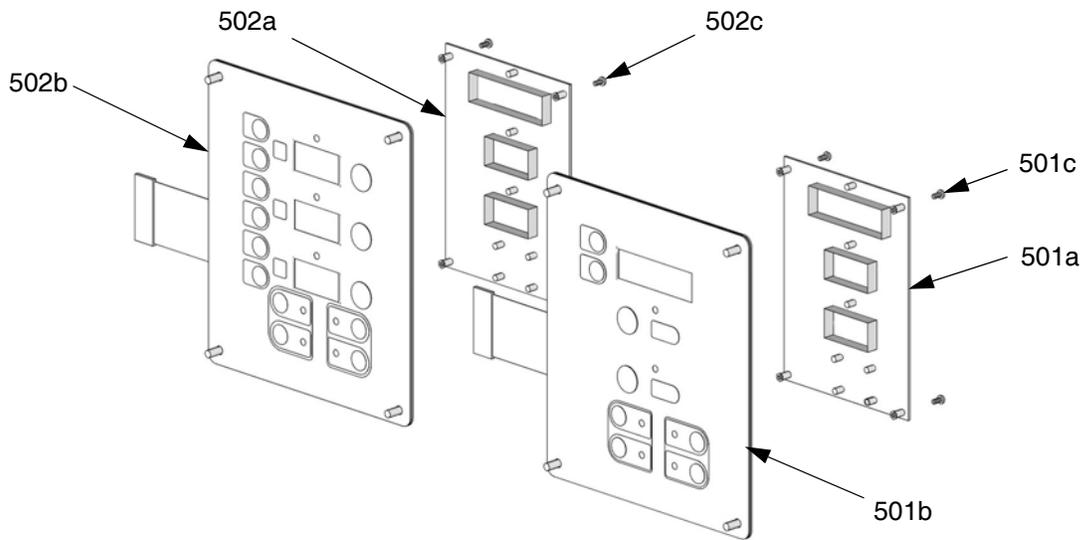
Apply 110009 thermal heatsink compound.

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
401		HOUSING, heater	1	410	117484	SENSOR	1
403	121309	ADAPTER, 3/4 SAE-ORB x 1/2 in. JIC	2	411	100518	SCREW, machine, pan hd	2
404	15H304	PLUG	3	413	15H305	PLUG, hollow	5
405	15H306	ADAPTER, thermocouple	1	414	295607	PLUG, not shown	1
406	120336	O-RING; fluoroelastomer	1	415	124132	O-RING	3
407	15B138	HEATER, immersion; 2550 W	3				
408	15B137	SWITCH, overtemperature	1				
409	15B135	MIXER, immersion heater	3				

Display



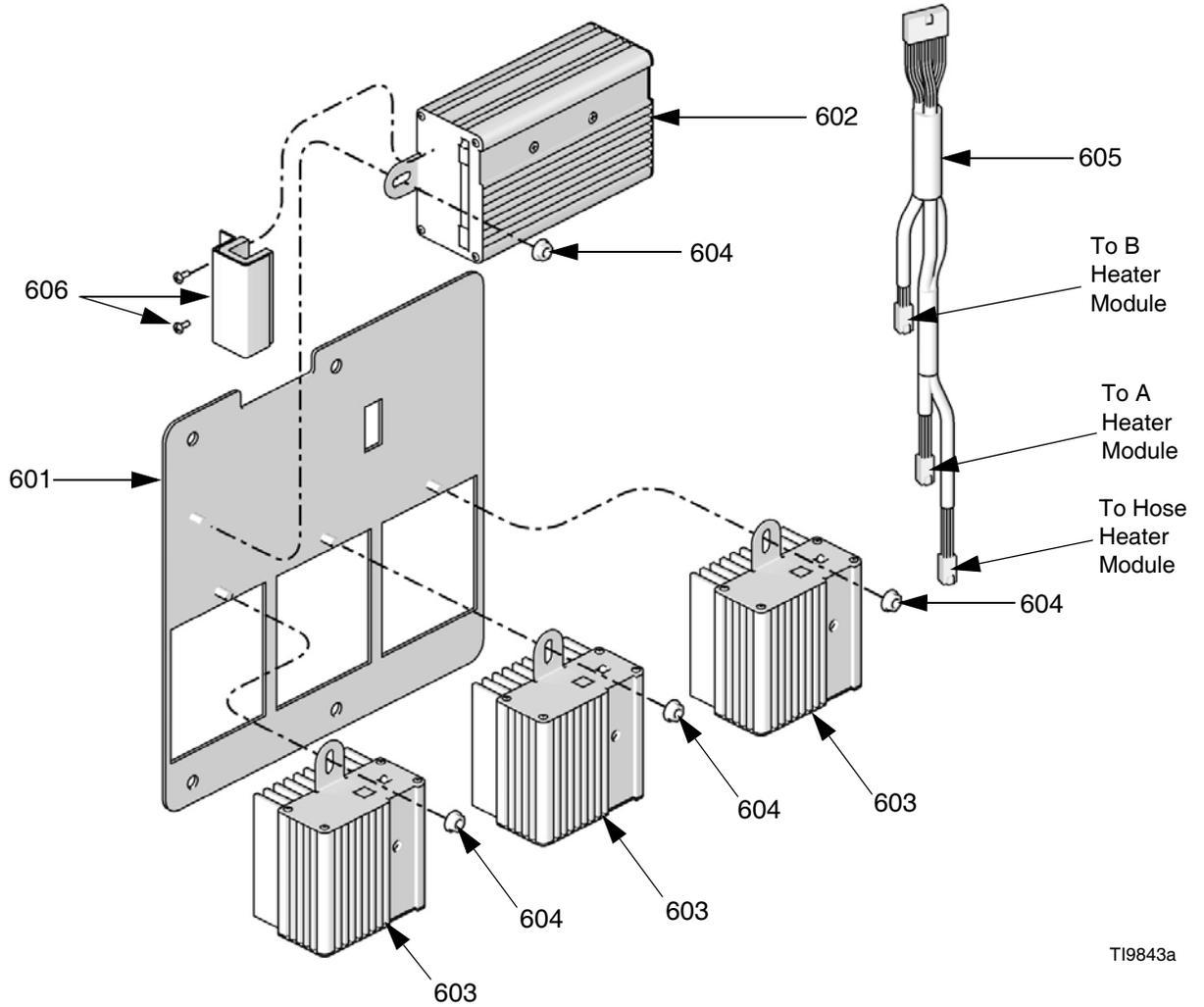
ti2574a



ti3172a

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
501	245978	DISPLAY, pressure; includes 501a-501c	1	504	15B292	COVER	1
501a	246130	.BOARD, circuit	1	505	15B291	PLATE	1
501b	246478	.SWITCH, membrane	1	506	246287	HARNESS, wire, red stop button	1
501c	112324	.SCREW	4	507	117499	HANDLE	2
502	245977	DISPLAY, temperature; includes 502a-502c	1	508	117523	NUT, cap; 10-24	8
502a	246130	.BOARD, circuit	1	510		SCREW, machine, pan-hd; M5 x 0.8; 16 mm	4
502b	246479	.SWITCH, membrane	1	511	15B386	CABLE, display	1
502c	112324	.SCREW	4	512	195853	SCREW, machine; M2.5 x 6	2
503	15B293	GASKET	1				

Temperature Control



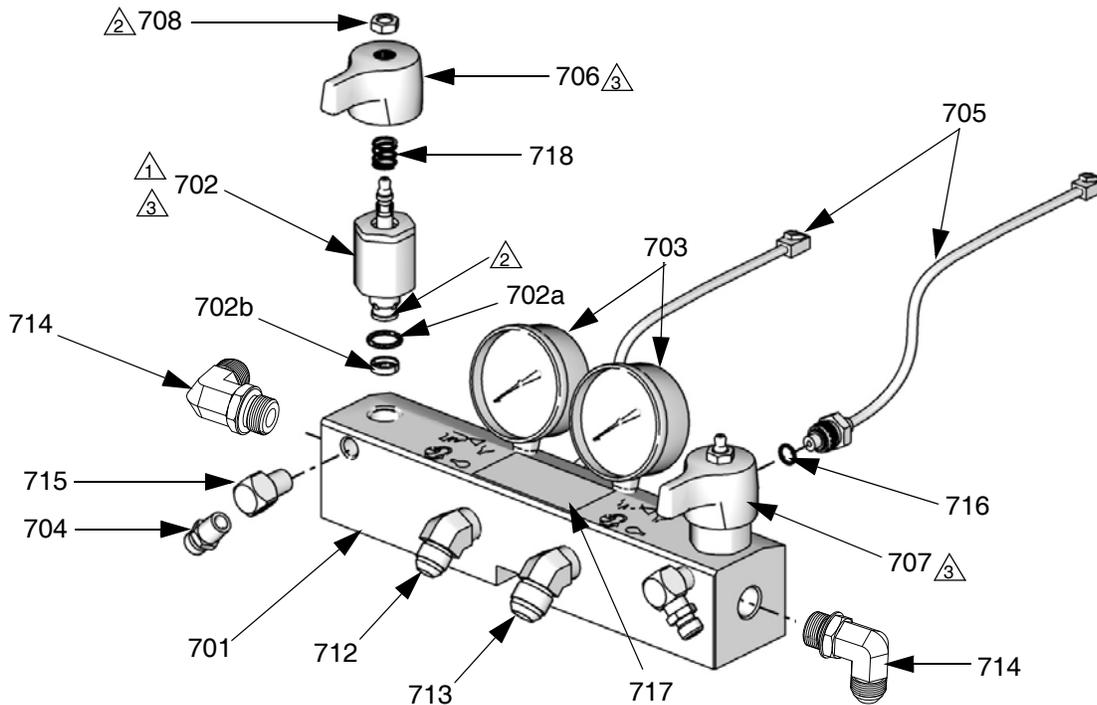
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Ref.	Part	Description	Qty
601	247772	PANEL, module mounting	1
602	247827	HOUSING, control module	1
603	247828	HOUSING, heater module	3
604	115942	NUT, hex	4
605	247801	CABLE, communication	1
606	247825	KIT, cover, connector with screws	1

Fluid Manifold

- ① Torque to 355-395 in-lb (40.1-44.6 N•m).
- ② Apply sealant (113500) to threads.
- ③ Valve must be closed with handle position as shown on drawing.

** Apply PTFE tape or thread sealant to tapered threads.



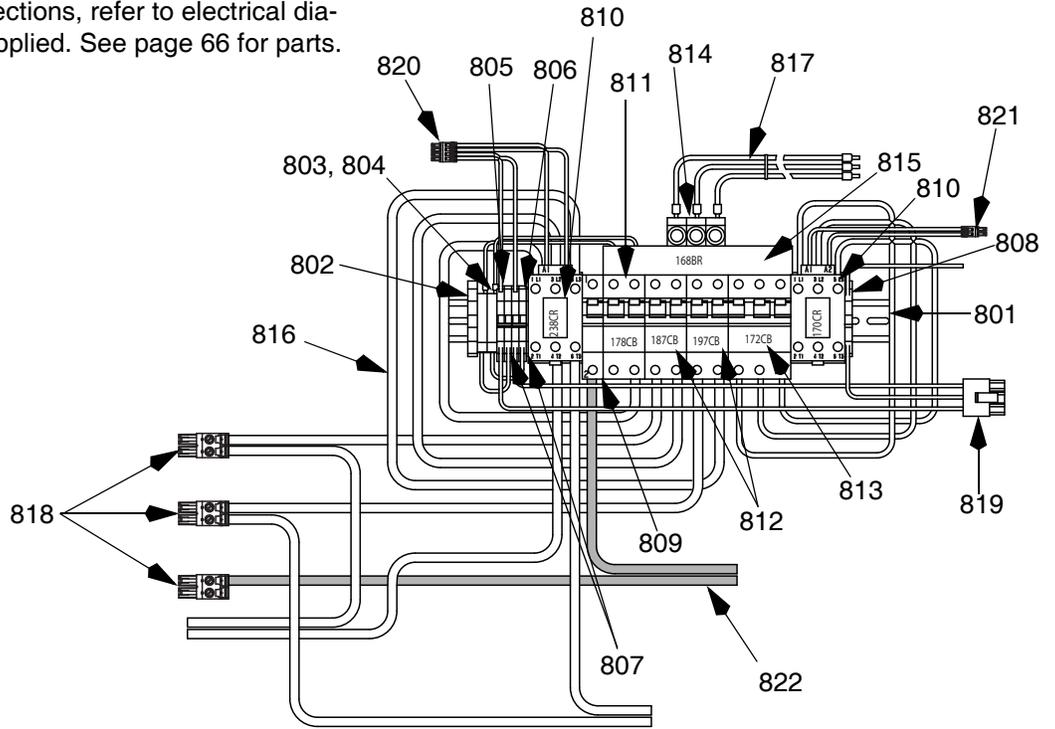
T19839b

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
701	247837	MANIFOLD, fluid	1	714	121312	ELBOW, 90 degrees	2
702†	247824	VALVE, drain cartridge	2	715	100840	ELBOW, street; 1/4 npsm x 1/4 npt	2
702a†	158674	O-RING	1	716	111457	O-RING, PTFE	2
702b†	247779	SEAL, seat, valve	1	717▲	189285	LABEL, caution	1
703	102814	GAUGE, pressure, fluid	2	718†	150829	SPRING, compression	2
704	162453	FITTING, 1/4 npsm x 1/4 npt	2	▲ Replacement Warning labels, signs, tags, and cards are available at no cost.			
705	24K999	TRANSDUCER, pressure, control	2	† Included in the following complete valve kits*: ISO Valve Kit (left/red handle) 255149. Resin Valve Kit (right/blue handle) 255150. Valve Set Kit (both handles and grease gun) 255148.			
706	247788	HANDLE, red	1	* Complete valve kits also include thread sealant. (Purchase kits separately).			
707	247789	HANDLE, blue	1				
708†	112309	NUT, hex, jam	2				
712	117556	NIPPLE, #8 JIC x 1/2 npt	1				
713	117557	NIPPLE, #10 JIC x 1/2 npt	1				

Circuit Breaker Modules

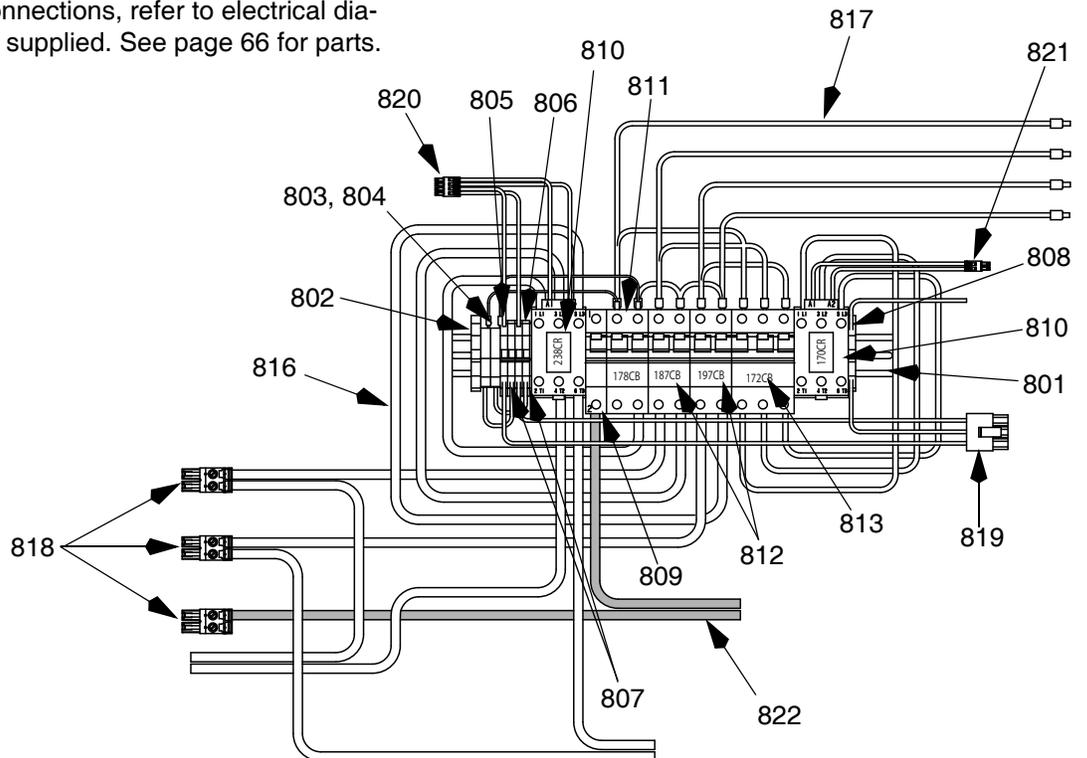
A - 230V, 3 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 66 for parts.



B - 400V, 3 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 66 for parts.



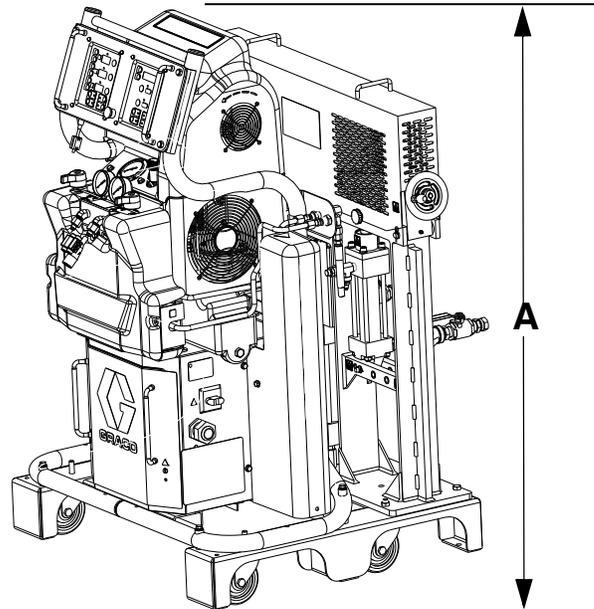
Circuit Breaker Modules Parts List

Ref.	Description	Breaker Modules		Qty
		A 230V, 3 phase	B 400V, 3 phase	
801	RAIL, mounting	255028	255028	1
802	CLAMP, block, end	255045	255045	1
803	HOLDER, fuse terminal, block	255043	255043	2
804	FUSE	255023	255023	2
805	TERMINAL, block	255042	255042	4
807	BRIDGE, plug in, jumper	255044	255044	2
808	BLOCK, terminal ground	255046	255046	1
809	BREAKER, 1 pole, 50A	255026	255026	1
810	CONTACTOR, relay, 65A	255022	255022	2
811	BREAKER, 2 phase, 40A	247768	247768	1
812	BREAKER, 2 phase, 50A	120579	120579	2
813	BREAKER, 3 pole, 20A	255025	255025	1
814	CONNECTOR, power lug	117679		3
815	BAR, power buss, 3 phase, 3x3	255024		1
816	CABLE, harness lower	247803	247803	1
817	CABLE, harness upper	247808	247807	1
818	CONNECTOR, 2 pin large	255027	255027	3
819	CONNECTOR, 3 pin	120895	120895	1
820	CONNECTOR, 4 pin	255031	255031	1
821	CONNECTOR, 2 pin small	255030	255030	1
822	CABLE, harness, hose wire	247791	247791	1

Dimensions

Dimension	in. (mm)
A (height)	57.3 (1455.4)
B (width)	37.9 (961.6)
C (depth)	33.0 (838.2)

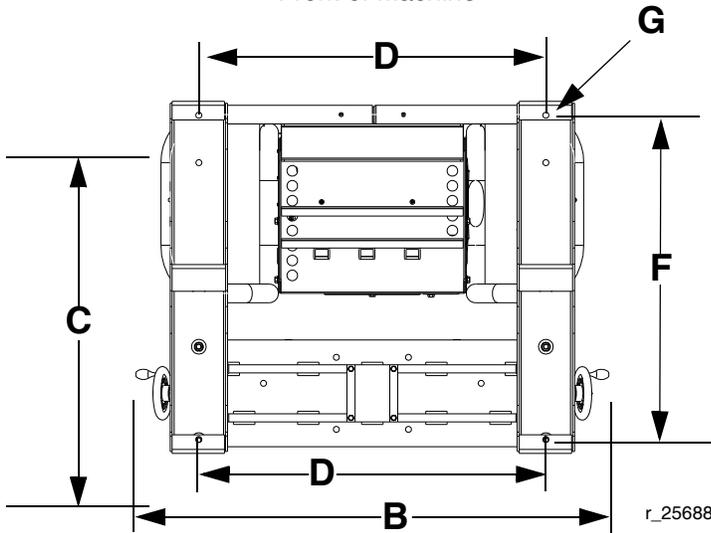
Dimension	in. (mm)
D (front and rear mounting holes)	32.5 (825.5)
F (side mounting holes)	30.4 (771.6)
G (mounting post inner diameter)	0.44 (11.2)



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Top View

Front of Machine



r_256886_313539_4

Rear of Machine

Technical Data

Category	Data
Maximum Fluid Working Pressure	3500 psi (24.1 MPa, 241 bar)
Fluid Inlets	3/4 npsm union in 1 in. npt(f) ball valve
Fluid Outlets	Component A (ISO): #8 (1/2 in.) JIC, with #5 (5/16 in.) JIC adapter Component B (RES): #10 (5/8 in.) JIC, with #6 (3/8 in.) JIC adapter
Fluid Circulation Ports	1/4 npsm(m), with plastic tubing, 250 psi (1.75 MPa, 17.5 bar) maximum
Maximum Fluid Temperature	190°F (88°C)
Maximum Output (10 weight oil at ambient temperature)	3.0 gpm (11.4 liter/min) (60 Hz)
Line Voltage Requirement	230V 3 phase units: 195-264 Vac, 50/60 Hz 400V 3 phase units: 338-457 Vac, 50/60 Hz
Amperage Requirement	See Models , page 3.
Heater Power (A and B heaters total, no hose)	See Models , page 3.
Hydraulic reservoir capacity	3.5 gal. (13.6 liters)
Recommended hydraulic fluid	Citgo A/W Hydraulic Oil, ISO Grade 46
Sound power, per ISO 9614-2	90.9 dB(A)
Sound pressure, 1 m from equipment	84.0 dB(A)
Weight	955 lb (433 kg)
Wetted Parts	Aluminum, stainless steel, zinc-plated carbon steel, brass, carbide, chrome, fluoroelastomer, PTFE, ultra-high molecular weight polyethylene, chemically resistant o-rings

All other brand names or marks are used for identification purposes and are trademarks of their respective owners.

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Original instructions. This manual contains English. MM 313540

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