

REACTOR™

312063C

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

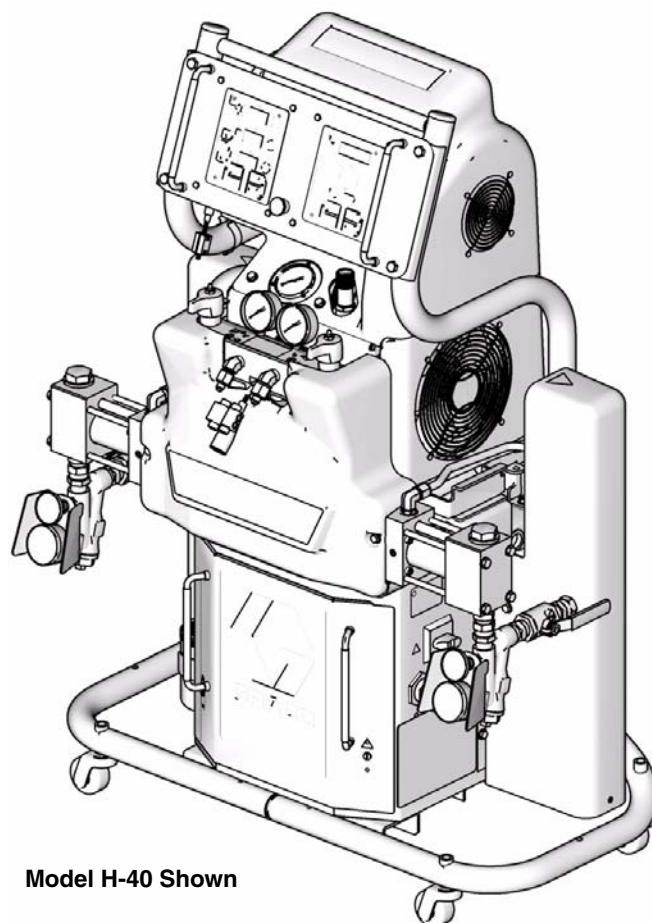
U.S. Patent Pending



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.



Model H-40 Shown

TI9830a

PROVEN QUALITY. LEADING TECHNOLOGY.

Contents

| | | | |
|---|-----------|---|-----------|
| Models | 3 | Repair | 26 |
| Supplied Manuals | 4 | Pressure Relief Procedure | 26 |
| Related Manuals | 4 | Flushing | 27 |
| Warnings | 5 | Proportioning Pumps | 28 |
| Temperature Control Diagnostic Codes | 7 | Circuit Breaker Module | 29 |
| E01: High fluid temperature | 7 | Electric Motor | 30 |
| E02: High zone current | 9 | Motor Control Board | 31 |
| E03: No zone current | 9 | Transducers | 33 |
| E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected | 9 | Electric Fan | 33 |
| E05: Circuit board overheated | 9 | Temperature Control Module | 34 |
| E06: Communication cable unplugged | 9 | Primary Heaters | 36 |
| Motor Control Diagnostic Codes | 10 | Heated Hose | 38 |
| Alarms | 10 | Fluid Temperature Sensor (FTS) | 39 |
| Warnings | 10 | Display Module | 41 |
| E21: No component A transducer | 11 | Inlet Fluid Strainer Screen | 43 |
| E22: No component B transducer | 11 | Pump Lubrication System | 43 |
| E23: High fluid pressure | 11 | Change Hydraulic Fluid and Filter | 44 |
| E24: Pressure imbalance | 11 | Parts | 46 |
| E27: High motor temperature | 13 | Parts Used on All Models | 52 |
| E30: Momentary loss of communication | 13 | Parts that Vary by Model | 54 |
| E31: Pumpline reversing switch failure/high cycle rate | 13 | Sub Assemblies | 56 |
| E99: Loss of communication | 14 | Proportioner Assembly | 56 |
| Troubleshooting | 15 | 10.4 kW and 6.0 kW Heaters | 58 |
| Reactor Electronics | 15 | 8.0 kW Dual Zone Heater | 59 |
| Primary Heaters (A and B) | 17 | 7.65 kW Single Zone Heater | 60 |
| Hose Heat System | 18 | Hydraulic Cylinder | 61 |
| Hydraulic Drive System | 20 | Display | 62 |
| Proportioning System | 22 | Temperature Control | 63 |
| | | Fluid Manifold | 64 |
| | | Circuit Breaker Modules | 65 |
| | | Dimensions | 70 |
| | | Technical Data | 71 |
| | | Graco Standard Warranty | 72 |
| | | Graco Information | 72 |

Models

H-25 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) |
|--------------|--------------------------------|-----------------|---------------|----------------------|--------------------------------|---|--------------------------|---|
| 255400, A | 69 | 230V (1) | 15,960 | 8,000 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 255401, A | 46 | 230V (3) | 15,960 | 8,000 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 255402, A | 35 | 400V (3) | 15,960 | 8,000 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 255406, A | 100 | 230V (1) | 23,260 | 15,300 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 255407, A | 59 | 230V (3) | 23,260 | 15,300 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 255408, A | 35 | 400V (3) | 23,260 | 15,300 | 22 (10) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |

H-40 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) |
|--------------|--------------------------------|-----------------|---------------|----------------------|--------------------------------|---|--------------------------|---|
| ★253400, A | 100 | 230V (1) | 23,100 | 12,000 | 45 (20) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 253401, A | 71 | 230V (3) | 26,600 | 15,300 | 45 (20) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 253402, A | 41 | 400V (3) | 26,600 | 15,300 | 45 (20) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 253407, A | 90 | 230V (3) | 31,700 | 20,400 | 45 (20) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |
| 253408, A | 52 | 400V (3) | 31,700 | 20,400 | 45 (20) | 0.063 (0.24) | 1.91:1 | 2000 (13.8, 138) |

H-XP2 SERIES

| Part, Series | Full Load Peak Amps* Per Phase | Voltage (phase) | System Watts† | Primary Heater Watts | Max Flow Rate◆ gpm (lpm) | Approximate Output per Cycle (A+B) gal. (liter) | Hydraulic Pressure Ratio | Maximum Fluid Working Pressure psi (MPa, bar) |
|--------------|--------------------------------|-----------------|---------------|----------------------|--------------------------|---|--------------------------|---|
| 255403, A | 100 | 230V (1) | 23,260 | 15,300 | 1.5 (5.7) | 0.042 (0.16) | 2.79:1 | 3500 (24.1, 241) |
| 255404, A | 59 | 230V (3) | 23,260 | 15,300 | 1.5 (5.7) | 0.042 (0.16) | 2.79:1 | 3500 (24.1, 241) |
| 255405, A | 35 | 400V (3) | 23,260 | 15,300 | 1.5 (5.7) | 0.042 (0.16) | 2.79:1 | 3500 (24.1, 241) |

H-XP3 SERIES

| Part, Series | Full Load Peak Amps* Per Phase | Voltage (phase) | System Watts† | Primary Heater Watts | Max Flow Rate◆ gpm (lpm) | Approximate Output per Cycle (A+B) gal. (liter) | Hydraulic Pressure Ratio | Maximum Fluid Working Pressure psi (MPa, bar) |
|--------------|--------------------------------|-----------------|---------------|----------------------|--------------------------|---|--------------------------|---|
| ★253403, A | 100 | 230V (1) | 23,100 | 12,000 | 2.8 (10.6) | 0.042 (0.16) | 2.79:1 | 3500 (24.1, 241) |
| 253404, A | 90 | 230V (3) | 31,700 | 20,400 | 2.8 (10.6) | 0.042 (0.16) | 2.79:1 | 3500 (24.1, 241) |
| 253405, A | 52 | 400V (3) | 31,700 | 20,400 | 2.8 (10.6) | 0.042 (0.16) | 2.79:1 | 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.

† Total system watts, based on maximum hose length for each unit:

- Parts 255400 through 255408, 310 ft (94.6 m) maximum heated hose length, including whip hose.
- Parts 253400 through 253408, 410 ft (125 m) maximum heated hose length, including whip hose.

◆ Maximum flow rate given for 60 Hz operation. For 50 Hz operation, maximum flow rate is 5/6 of 60 Hz maximum flow.

★ CE approval does not apply.

Supplied Manuals

The following manuals are shipped with the Reactor™ Proportioner. Refer to these manuals for detailed equipment information.

Order Part 15M334 for a compact disk of Reactor manuals translated in several languages.

Manuals are also available at www.graco.com.

| Reactor Hydraulic Proportioner | |
|--------------------------------|---|
| Part | Description |
| 312062 | Reactor Hydraulic Proportioner, Operation Manual (English) |
| Reactor Electrical Diagrams | |
| Part | Description |
| 312064 | Reactor Hydraulic Proportioner, Electrical Diagrams (English) |
| Proportioning Pump | |
| Part | Description |
| 312068 | Proportioning Pump Repair-Parts Manual (English) |

Translations

The Reactor Repair-Parts manual is available in the following languages. See the following chart for specific languages and corresponding part numbers.

| Part | Language |
|--------|----------|
| 312063 | English |
| 312428 | Chinese |
| 312429 | Dutch |
| 312430 | French |
| 312431 | German |
| 312432 | Italian |
| 312433 | Japanese |
| 312434 | Korean |
| 312435 | Russian |
| 312436 | Spanish |

Related Manuals






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







Order Part 15M334 for a compact disk of Reactor manuals translated in several languages. Order Part 15B381 for a compact disk of Fusion manual translated in several languages.

| 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) |
| Proportioning Pump Repair Kits | |
| Part | Description |
| 312071 | Seal Kits 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>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 sprayer 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 MSDS's to know the specific hazards of the fluids you are using. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines. • Always wear impervious gloves when spraying or cleaning equipment. |
|  | <p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, inhalation of toxic fumes, burns, and hearing loss. This equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear • Clothing and respirator as recommended by the fluid and solvent manufacturer • Gloves • 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 and clean 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 lights on or off when flammable fumes are present. • Ground equipment, personnel, object being sprayed, and conductive objects in work area. See Grounding instructions. • Use only Graco grounded hoses. • Check gun resistance daily. • If there is static sparking or you feel a shock, stop operation immediately. Do not use equipment until you identify and correct the problem. • Do not flush with gun electrostatics on. Do not turn on electrostatics until all solvent is removed from system. • 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. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS forms from distributor or retailer. • 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>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, do not touch hot fluid or equipment. Wait until equipment/fluid has cooled completely.</p> |

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 | 7 |
| 02 | High zone current | Individual | 9 |
| 03 | No zone current with hose heater on | Individual | 9 |
| 04 | FTS not connected | Individual | 9 |
| 05 | Board overtemperature | Individual | 9 |
| 06 | Communication cable unplugged from module | Individual | 9 |
| 99 | Loss of communication | A | 14 |





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 (308) senses a fluid temperature above 230°F (110°C) and opens. At 190°F (87°C) the switch closes again.
- Thermocouple A or B (310) fails, is damaged, is not touching the heater element (307), or has a poor connection to the temperature control board.
- Overtemperature switch A or B (308) 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.

Checks

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

Check which zone is displaying the E01 error.

1. Check that connector A is firmly plugged into temperature control board (see FIG. 8, page 34).
2. Clean and re-plug connections.
3. Check connections between the temperature control board and overtemperature switches A and B (308), and between temperature control board and thermocouples A and B (310) or FTS (21) [depending on which zone is displaying E01]. See TABLE 6, page 34. 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.



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 | 100k ohms |

5. Verify fluid temperature, using an external temperature sensing device.
6. Check if thermocouples A and B are damaged, or not contacting the heater element, page 37.
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 35.
 - 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 35.


E02: High zone current

1. Check connections for electrical short, page 38.
2. Exchange zone module with another one. Turn zone on and check for error (see page 35). 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 40.

 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

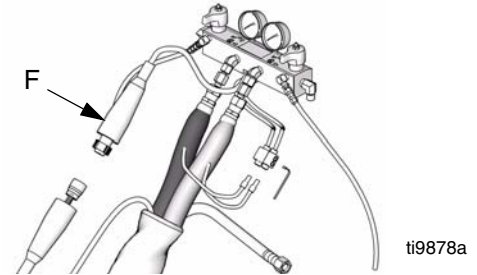
1. Check for tripped circuit breaker inside electrical cabinet or at power source for that zone. Replace circuit breaker if it trips habitually.
2. Check for loose or broken connection at that zone.
3. Exchange zone module with another one. Turn zone on and check for error (see page 35). If error disappears, 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 38.
 - b. Perform **Transformer Primary Check** and **Transformer Secondary Check**, starting on page 40.

 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 on temperature control module, page 34. Unplug and re-plug sensor wires.
2. Test fluid temperature sensor continuity with ohmmeter, page 7.

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 Operation manual 312062.

E05: Circuit board overheated

 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.

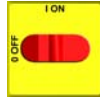
Motor Control Diagnostic Codes

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.




Alarms can also be cleared, except for code 23, by

pressing



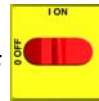
.

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 | 11 |
| 22 | No transducer (component B) | A | 11 |
| 23 | High fluid pressure | A | 11 |
| 24 | Pressure imbalance | A/W (to select, see page 31) | 11 |
| 27 | High motor temperature | A | 13 |
| 30 | Momentary loss of communication | A | 13 |
| 31 | Pumpline reversing switch failure/high cycle rate | A | 13 |
| 99 | Loss of communication | A | 14 |

E21: No component A transducer

1. Check transducer A connection at J3 on motor control board, page 32, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer B (E22), replace transducer A, page 33. If error does not move, replace motor control board, page 31.

E22: No component B transducer

1. Check transducer B connection at J8 on motor control board, page 32, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer A (E21), replace transducer B, page 33. If error does not move, replace motor control board, page 31.

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 31), an E23 will occur. See **E24: Pressure imbalance** for causes and checks.

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

E24: Pressure imbalance

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

 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.

 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 31.

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

 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 10) and try running the unit again.
2. If E24 recurs and the gauge readings are still very close, a pressure transducer has failed.


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 31. 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.

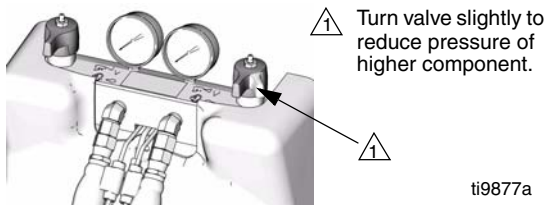
If the higher gauge and display match, that transducer is communicating with the motor control board. Continue with step e.

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 33.

- 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.



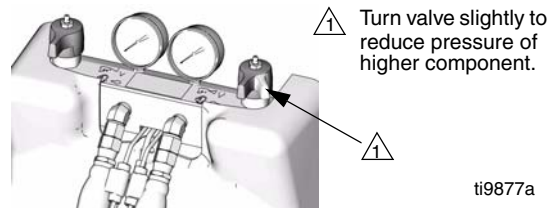
4. To test if the failure is with the transducer or the socket on the motor control board:


- 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

RELIEF/CIRCULATION , until gauges show balanced pressures.



 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.



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.

Causes of Slow E24 Errors

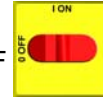
- one side of the gun is partially plugged.
- the A or B proportioner pump has failed.
- the A or B feed pump has failed.
- the A or B feed pump pressure is set too high.
- the A or B proportioner pump inlet screen is plugged.
- the hose is not heating properly.
- kinked supply hose.
- bottom of drum 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 32.
- 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 31. 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 25.

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 32) and (C) on the temperature control module (page 34). 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 29.
- **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

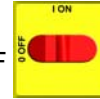
Reactor Electronics



Before performing any troubleshooting procedures:


1. Relieve pressure, page 26.

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 41. |
| | Loose wire. | Check connections, page 41. |
| Temperature display does not illuminate. | Display disconnected. | Check cable connections, page 41. |
| | 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 41. |
| | 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 41. |
| | Poor display connection. | Check cable connections, page 41. Replace damaged cable. |
| | Display cable damaged or corroded. | Clean connections; replace cable if is damaged. |
| | Display cable not grounded. | Ground cable, page 41. |
| | 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 Operation manual 312062), or adjust FTS to desired current setting. |
| Display does not respond properly to button pushes. | Poor display connection. | Check cable connections, page 41. 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 41) or replace. |
| | Broken display button. | Replace, page 41. |
| Red stop button does not work. | Broken button (fused contact). | Replace, page 41. |
| | Loose wire. | Check connections, page 41. |
| Fan not working. | Blown fuse. | Verify with ohmmeter; replace if necessary (page 41). |
| | Loose wire. | Check fan wire. |
| | Defective fan. | Replace, page 41. |

Primary Heaters (A and B)



Before performing any troubleshooting procedures:

1. Relieve pressure, page 26.

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 7. |
| | Signal failure from thermocouple. | See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 9. |
| 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 (310) so tip (T) contacts heater element (307). Holding thermocouple tip (T) against heater element, tighten ferrule nut (N) 1/4 turn past tight. See page 37 for illustration. |
| | Failed heater element. | See Primary Heaters, page 36. |
| | Signal failure from thermocouple. | See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 9. |
| | Thermocouple wired incorrectly. | See E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected , page 9. Power up zones one at a time and verify that temperature for each zone rises. |

Hose Heat System



Before performing any troubleshooting procedures:

1. Relieve pressure, page 26.

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 |
|--|--|--|
| 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 9. |
| | 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 9. |
| | 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 39. |
| Hose does not heat. | FTS failed or is not contacting correctly. | Check FTS, page 39. |
| | FTS not installed correctly. | FTS should be installed close to end of hose in same environment as gun. Verify FTS installation, page 39. |
| | Temperature control alarm. | Check temperature display or diagnostic code, page 39. |
| 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 26.

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 (813B); see Circuit Breaker Module , page 29. Check 230 Vac at output of breaker. |
| | Damaged motor control board. | Replace board. See Motor Control Board , page 31. |

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| Hydraulic pump does not develop pressure. Low or zero pressure with screeching noise. | Pump is not primed or lost its prime. | 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 Operation manual 312602. |
| | | Check dipstick to ensure that hydraulic reservoir is properly filled (see Operation manual). |
| | | Check that inlet fitting is fully tight, to ensure no air is leaking into the pump inlet. |
| | | 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. |
| | Screeching noise is characteristic of cavitation and is normal at initial start-up for a maximum of 30 seconds. | 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. |
| | Hydraulic fluid is too hot. | Ensure that the reservoir is properly serviced. Improve ventilation to allow more efficient heat dissipation. |
| | Electric motor operating in wrong direction for 3 Phase system. | Motor must operate counter-clockwise from pulley end. |
| | Drive belt loose or broken. | Check drive belt condition. Replace if broken. |

Proportioning System



Before performing any troubleshooting procedures:

1. Relieve pressure, page 26.


2. Turn main power OFF



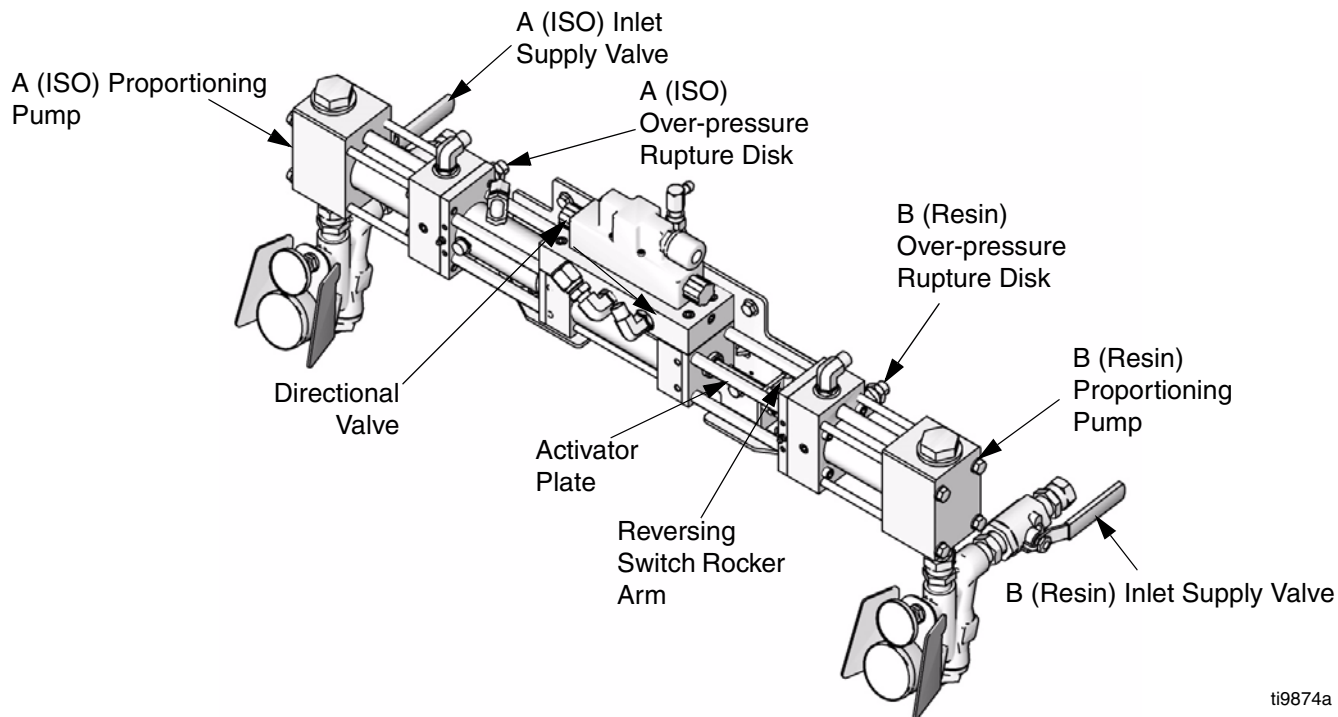
3. Allow equipment to cool.

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 |
|---|---|--|
| 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 24 to isolate the problem. 3. Repair the valve; see pump manual 312068. |
| Material imbalance. See Pressure/Material Imbalance , page 24. | Restriction at the gun. | Clean the gun; see your separate gun manual. |
| | 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. |
| | | Clean inlet strainer screen, page 43. |
| | | Worn pump inlet valve ball/seat or gasket. Replace, see pump manual 312068. |
| | Pressure relief/circulation valve leaking back to supply. | Remove return line and determine if flow is present while in SPRAY  mode. |

| PROBLEM | CAUSE | SOLUTION |
|--|---|--|
| Pumps do not reverse direction or pumps do not move. | Bent or loose activator plate, rocker arm, or reversing switch. | See Pumps Do Not Reverse Direction , page 25. |
| | Loose piston packing bolt. | See Pumps Do Not Reverse Direction , page 25. |
| | Faulty directional valve. | See Pumps Do Not Reverse Direction , page 25. |
| 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. |
| | Loose activator plate, rocker arm, or reversing switch. | See Pumps Do Not Reverse Direction , page 25. |
| | Faulty directional valve. | Replace directional valve. |
| 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 312068. |
| | Inadequate feed pump pressure. | Check feed pump pressure and adjust to 100 psi (0.7 MPa, 7 bar) minimum. |
| Fluid leak at pump rod seal. | Worn throat seals. | Replace. See pump manual 312068. |
| No pressure on one side. | Fluid leaking from pump outlet rupture disk (216). | Check if heater (2) and PRESSURE RELIEF/SPRAY valve (SA or SB) are plugged. Clear. Replace rupture disk (216) 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. |



ti9874a

FIG. 1. Proportioning System

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 |

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.

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.

Pumps Do Not Reverse Direction

1. For the proportioning pumps to reverse direction, the activator plate (219) must contact the rocker arm to activate the reversing switch (210). Check for a bent or loose activator plate, rocker arm, or reversing switch. See FIG. 1 on page 24, and the parts drawing on page 56.
2. Check the function of the directional valve. Direction indication lights should switch on and off based on the reversing switch (210) position. LEDs D19 and D20 (near J5 reversing switch connector on motor board) should alternately illuminate based on the reversing switch position.

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 the continuity of each reversing switch wire. Replace faulty wires.
- verify reversing switch. Unplug the J5 reversing switch connector. Verify that continuity alternates between NC2 to com and N03 to com by toggling the reversing switch (see Electrical Diagrams manual 312064). If continuity does not alternate, replace the reversing switch and reconnect the J5 reversing switch connector.
- 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.



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. Depressing the button in the right end cap should cause the pump to travel to the right. Depressing the left button should cause the pump to travel to the left.

3. If you have determined that the cause is none of the above, check for a loose piston packing retaining bolt. This causes the piston to contact the inner face of the pump inlet flange before the activator plate contacts the rocker arm. Shut down the unit and disassemble the appropriate pump for repair.

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.

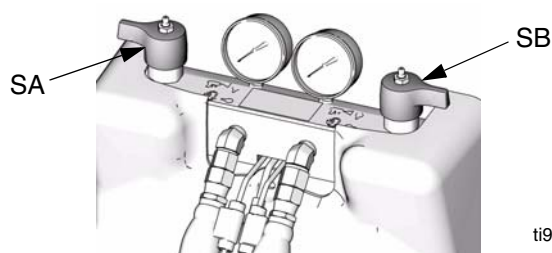


ti2421a

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.



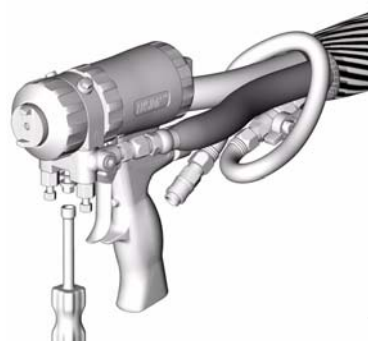
ti9879a

5. Engage gun piston safety lock.



ti2409a

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



ti2554a

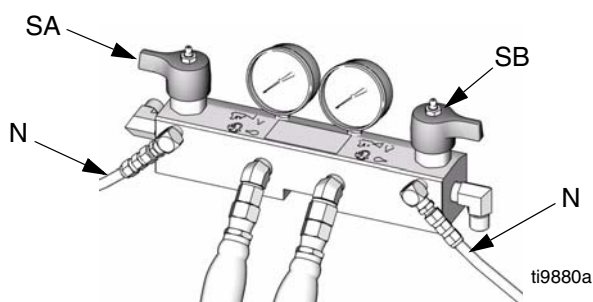
Flushing

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

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).



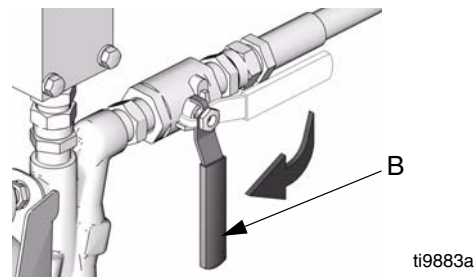
- To flush entire system, circulate through gun fluid manifold (with manifold removed from gun).
- To prevent moisture from reacting with isocyanate, always leave the system dry or filled with a moisture-free plasticizer or oil. Do not use water.

Proportioning Pumps

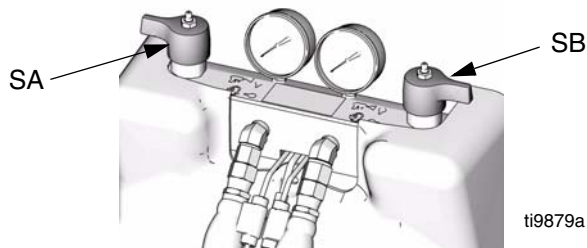
| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|


See manual 312068 for pump repair instructions.

1. Shut off **A** , **B** , and heat zones.
2. Flush, page 27.
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).



6. 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.



 Use drop cloth or rags to protect Reactor and surrounding area from spills.

7. See FIG. 2. Disconnect the B (Resin) side pump inlet and outlet lines. Remove the pin (219) from the clevis (218) to disconnect the pump from the hydraulic cylinder (201). Remove the four screws (203) holding the pump to the spacers (413) of the cylinder. Take the pump assembly to a workbench.

 Torque to 200 in-lb (22.6 N•m).

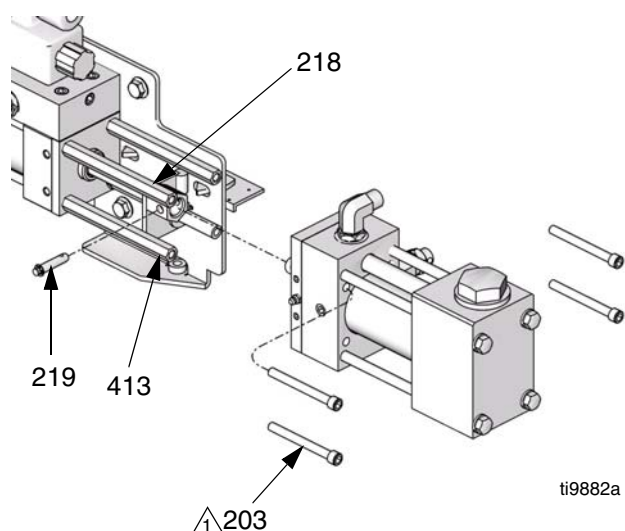


FIG. 2: Proportioning Pump - B Side

8. See FIG. 3. Disconnect the A (ISO) side pump inlet and outlet lines. Use the pin extractor tool (244) to remove the pin (219), which disconnects the pump from the hydraulic cylinder (201). Remove the four screws (203) holding the pump to the spacers (413) of the cylinder. Take the pump assembly to a workbench.

 Torque to 200 in-lb (22.6 N•m).

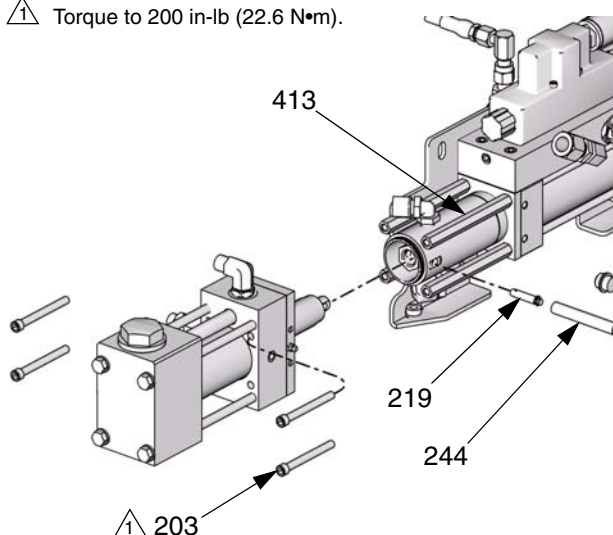

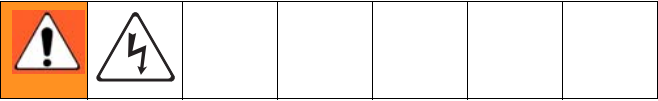


FIG. 3: Proportioning Pump - A Side

9. See manual 312068 for pump repair instructions.
10. Reconnect the pump in the reverse order. Torque the screws (203) to 200 in-lb (22.6 N•m).

Circuit Breaker Module

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



2. Relieve pressure, page 26.
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:

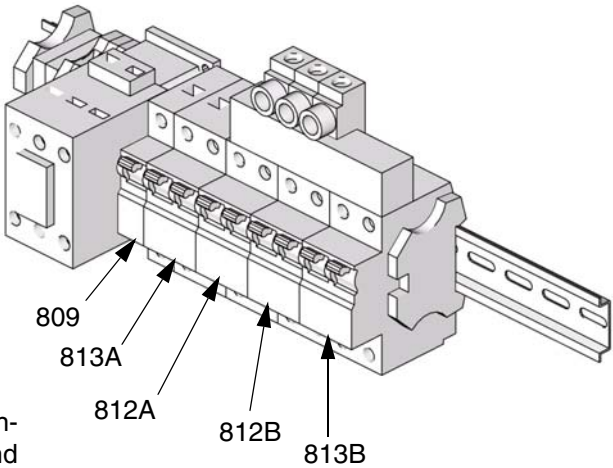
a. Refer to electrical diagrams and to TABLE 3. Disconnect wires and remove bad breaker.

b. Install new breaker and reconnect wires.

Table 3: Circuit Breakers, see FIG. 4

| Ref. | Size | Component |
|------|-------------------|---------------------------------|
| 809 | 50A | Hose/Transformer Secondary Side |
| 813A | 40A | Transformer Primary |
| 812A | 25A, 40A, or 50A* | Heater A |
| 812B | 25A, 40A, or 50A* | Heater B |
| 813B | 20A or 30A* | Motor/Pumps |

* Depending on model.



NOTE: To reference cables and connectors, see the electrical diagrams and the parts drawings on pages 65-66.

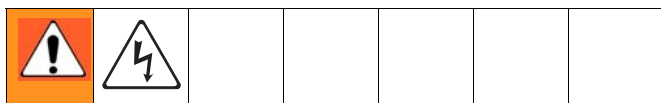
ti9884a

FIG. 4. Circuit Breaker Module

Electric Motor

Removal

1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 26.
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 31.
 - 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.

CAUTION

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.



3-Phase Motors: motor must rotate counterclockwise when viewed from shaft end. If rotation is incorrect, reverse power leads L1 and L2. See Reactor Operation manual 312062, Connect Electrical Cord.

4. Return to service.

Motor Control Board

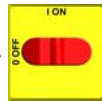


Motor control board has one red LED (D11). Power must be on to check. See FIG. 5 for location. Function is:

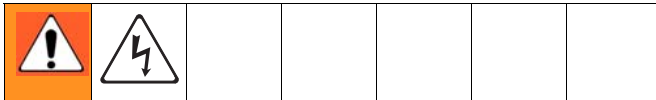
- Startup: 1 blink for 60 Hz, 2 blinks for 50 Hz.
- Motor running: LED on.
- Motor not running: LED off.
- Diagnostic code (motor not running): LED blinks diagnostic code, pauses, then repeats (for example, E21=21 blinks, pause, 21 blinks).

CAUTION

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 26.
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. 5 for location on board.

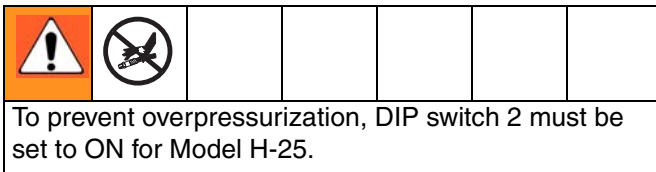


Table 4: DIP Switch (SW2) Settings

| DIP Switch | ON (up) | OFF (down) |
|------------|---|---|
| Switch 1 | Motor soft start ON (factory default) | Motor soft start OFF (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 | ON for Models H-25 and H-40 (system dependent) | OFF for Models H-XP2 and H-XP3 (system dependent) |

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



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 | Unused (VDD) |
| | 2 | Pumpline reversing switch (COM) |
| | 3 | Pumpline reversing switch (NC) |
| | 4 | Pumpline reversing switch (NO) |

Motor Control

DIP Switch (SW2) Settings

Models H-25 & H-40

ON



1 2 3 4

ti3178c-3


Models H-XP2 & H-XP3

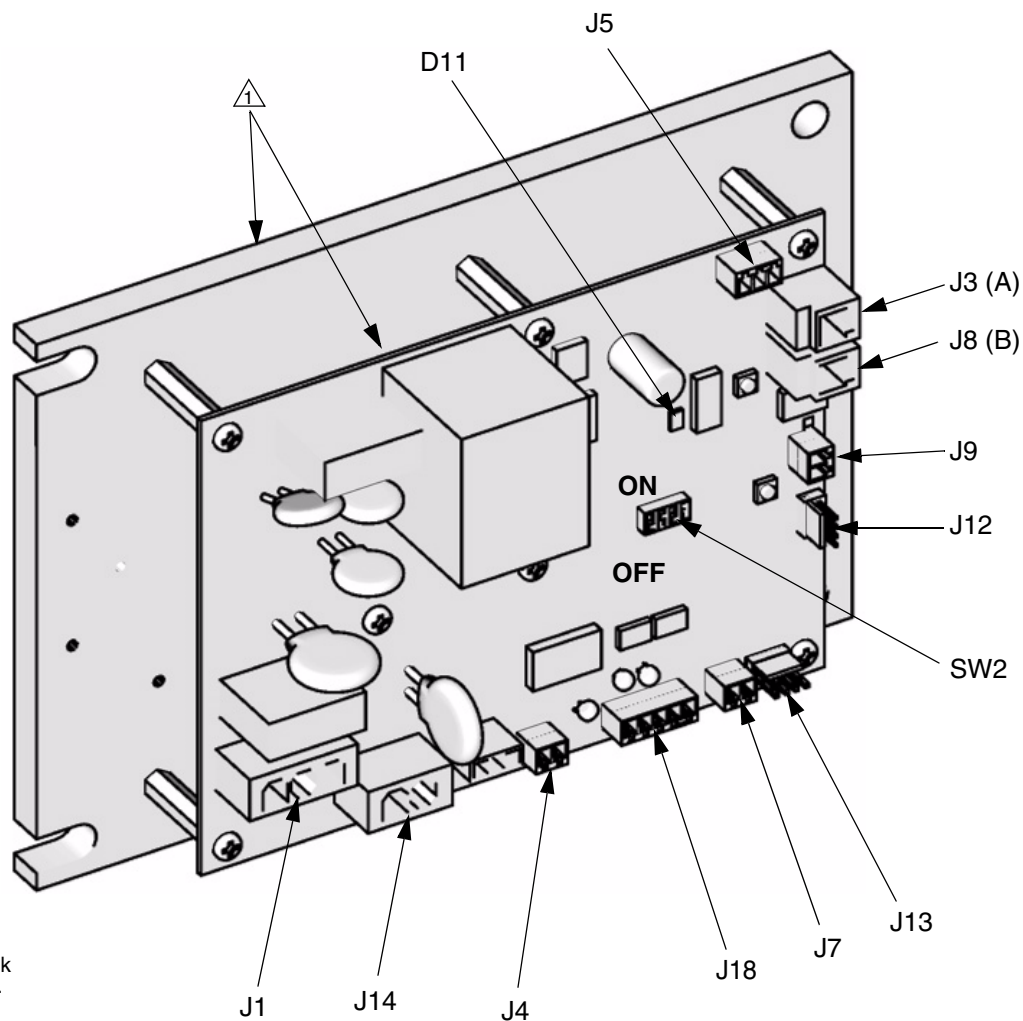
ON



1 2 3 4

ti3178c-4

 Apply 110009 thermal heatsink compound to mating surfaces.

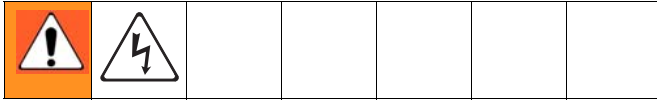


ti7724a

FIG. 5. Motor Control Board

Transducers

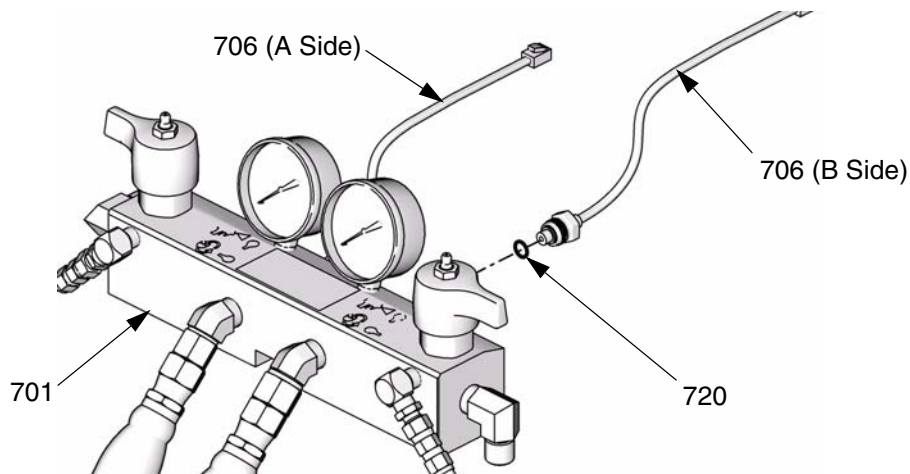
1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 26.
3. Refer to electrical diagrams. Motor control board is on right side inside cabinet.
4. Disconnect transducer cables at board; see FIG. 5, page 32. Reverse A and B connections and check if

diagnostic code follows; see **E21: No component A transducer**, page 11.

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. 6.
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. 5, page 32.

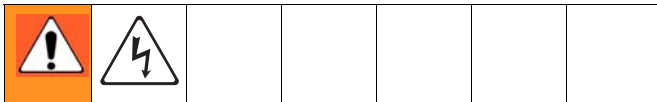


ti9885a

FIG. 6. Transducers

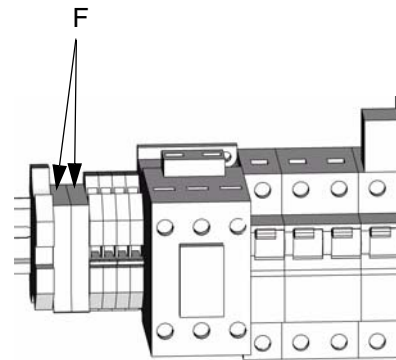
Electric Fan

1. Turn main power OFF . Disconnect power supply.



2. Relieve pressure, page 26.
3. Check fuses (F) at left of breaker module, FIG. 7. 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.



ti9884a-1

FIG. 7. Fan Fuses

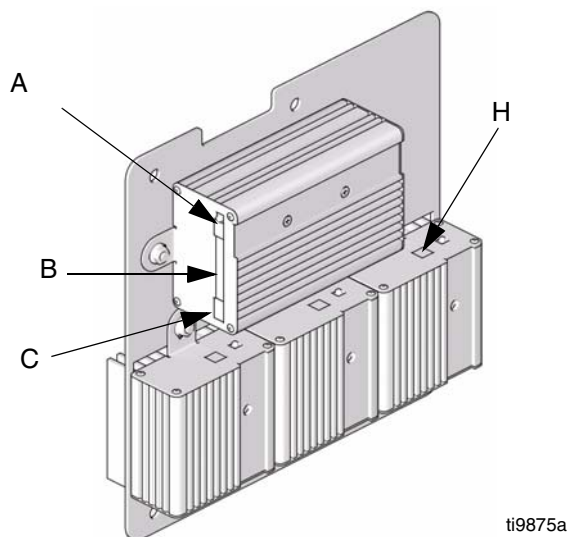
Temperature Control Module

Table 6: Temperature Control Module Connections

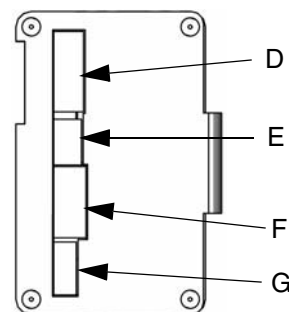
| Connector | | Description |
|-------------------|------|--|
| DATA (A) | | Data reporting |
| SENSOR (B) | PIN | |
| | 12 | HOSE T/C P; FTS (purple) |
| | 11 | HOSE T/C R; FTS (red) |
| | 10 | HOSE T/C S; FTS (silver (unshielded bare wire)) |
| | 9 | HEATER T/C B, Y; Thermocouple (yellow) |
| | 8 | 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 |

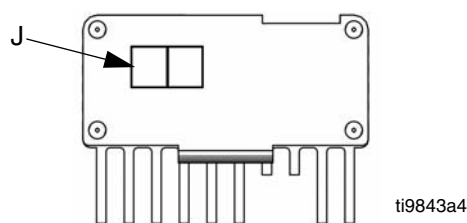


ti9875a



ti9843a1

Right Side of Control Heater Module



ti9843a4


Bottom of Power Modules

FIG. 8: Temperature Control Module Connections



Test SCR Circuit


1. Test the SCR circuit in the on position:

- Make sure everything is connected, including the hose.

- Turn main power ON .

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

- Turn on  heat zone by pressing .

- 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 9. If hose current exceeds 45A, see **E02: High zone current**, page 9. 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:

- Make sure everything is connected, including the hose.

- Turn main power ON .

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

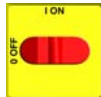
- Turn on  heat zone by pressing .

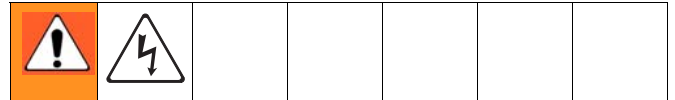
- Using a voltmeter, carefully measure the voltage at the hose connector. You should not get a voltage reading. If you do, the SCR on the temperature control board is bad. Replace the temperature control assembly.

Replacing Temperature Control Assembly Modules

CAUTION

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.

- Turn main power OFF . Disconnect power supply.




- Relieve pressure, page 26.
- Refer to electrical diagrams; see Electrical Diagrams manual 312064. Temperature control assembly is on left side inside cabinet.
- Remove bolts that secure transformer assembly and slide assembly to side in cabinet.
- Put on static conductive wrist strap.
- Disconnect all cables and connectors from assembly; see **Parts - Temperature Control**, page 63.
- Remove nuts and take entire temperature control assembly to workbench.
- Replace defective module.
- Install assembly in reverse order.

Primary Heaters

Heater Element



1. Turn main power OFF  . Disconnect power supply.
2. Relieve pressure, page 26.
3. Wait for heaters to cool.
4. Remove heater shroud.
5. See pages 58-60 for illustrations of each heater. Disconnect heater element wires from heater wire connector. Test with ohmmeter.


| Total Heater Wattage | Element | Ohms |
|----------------------|---------|-------|
| 6,000 | 1500 | 30-35 |
| 7,650 | 2550 | 18-21 |
| 8,000 | 2000 | 23-26 |
| 10,200 | 2550 | 18-21 |

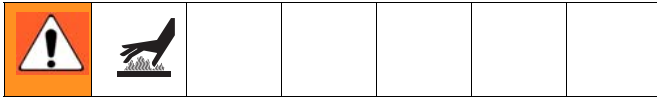
6. To remove heater element, first remove thermocouple (310) to avoid damage, see step 7, page 37.
7. Unscrew heater element (307) from fitting (302). Remove heater element (307) from housing (301). Be careful not to spill any fluid left in housing.
8. Inspect element. It should be relatively smooth and shiny. If there is a crusted, burnt, ash-like material adhered to element or sheath shows pitting marks, replace element.
9. Apply thread sealant to heater element threads and install new heater element (307), holding mixer (309) so it does not block thermocouple port (P).
10. Reinstall thermocouple, page 37.
11. Reconnect heater element leadwires to heater wire connector.
12. Replace heater shroud.

Line Voltage

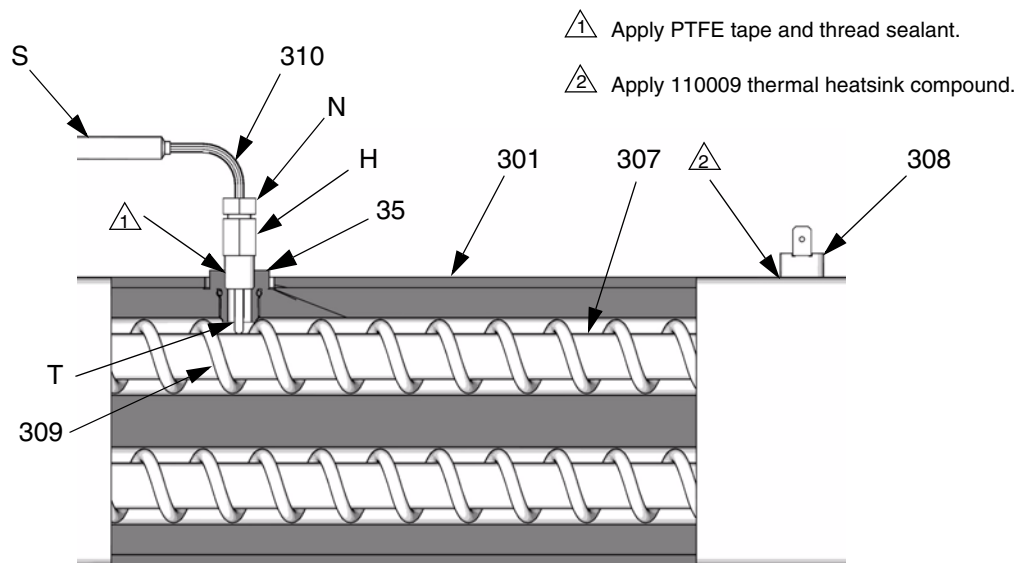
The primary heaters output their rated wattage at 230 Vac. Low line voltage will reduce power available and the heaters will not perform at full capability.

Thermocouple

1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 26.




3. Wait for heaters to cool.
4. Remove heater shroud.
5. Disconnect thermocouple wires from B on temperature control module. See TABLE 6, page 34 and FIG. 8, page 34.
6. Feed thermocouple wires out of cabinet. Note path as wires must be replaced in the same way.
7. See FIG. 9. Loosen ferrule nut (N). Remove thermocouple (310) from heater housing (301), then remove thermocouple housing (H). Do not remove the thermocouple adapter (305) unless necessary. If adapter must be removed, ensure that mixer (309) is out of the way when replacing the adapter.
8. Replace thermocouple, FIG. 9.
 - 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 (305).
 - c. Push in thermocouple (310) so tip (T) contacts heater element (307).
 - 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 (307).

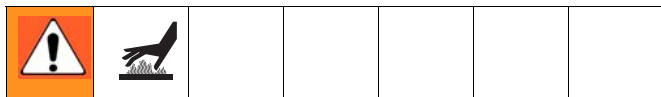


ti7924a


FIG. 9. Thermocouple

Overtemperature Switch


1. Turn main power OFF . Disconnect power supply.
2. Relieve pressure, page 26.




3. Wait for heaters to cool.
4. Remove heater shroud.
5. Disconnect one leadwire from overtemperature switch (308), FIG. 9. 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 (301), and secure with screws (311). Reconnect wires.


 If wires need replacement, disconnect from temperature control board. See TABLE 6, page 34 and FIG. 8, page 34.

Heated Hose

 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 26.

 Whip hose must be connected.

3. Disconnect hose connector (D) at Reactor, FIG. 10.
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 26.
3. Disconnect FTS cable (F) at Reactor, FIG. 10.

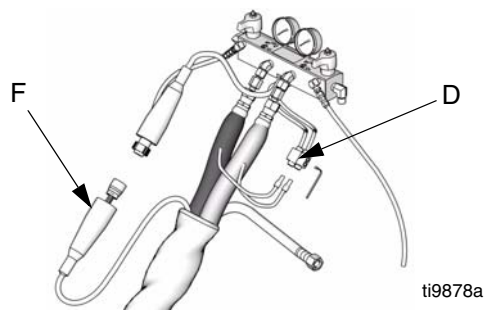


FIG. 10. Heated Hose


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 39.

Fluid Temperature Sensor (FTS)

Test/Removal

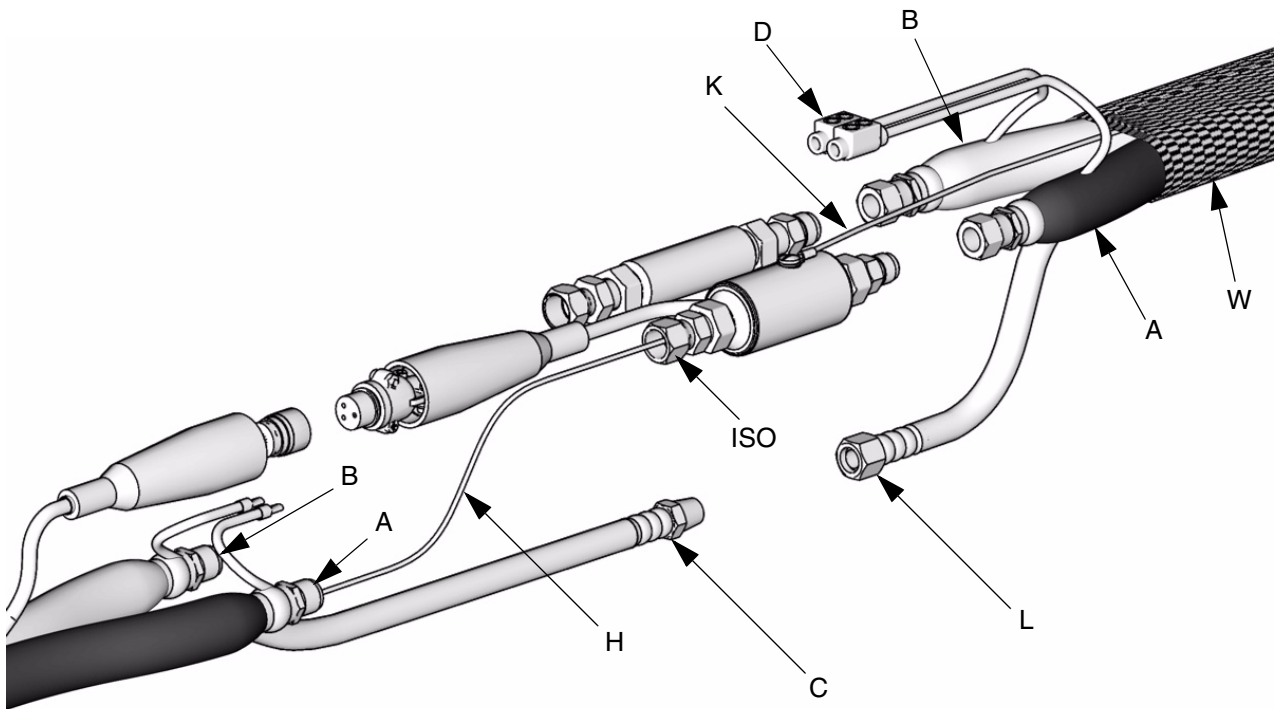
1. Turn main power OFF  . Disconnect power supply.
2. Relieve pressure, page 26.
3. Remove tape and protective covering from FTS (21), FIG. 10. Disconnect hose cable (F). Test with ohmmeter between pins of cable connector.

| 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.




ti9581b

FIG. 11: 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 (813A). 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.

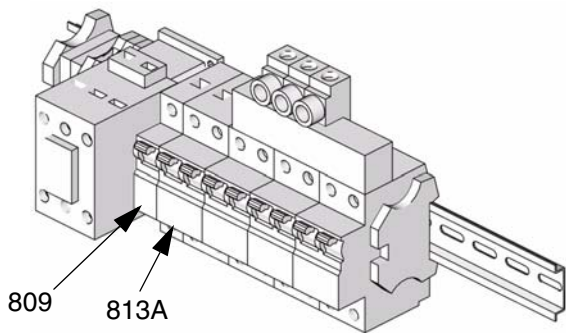



FIG. 12: Circuit Breaker Module


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.

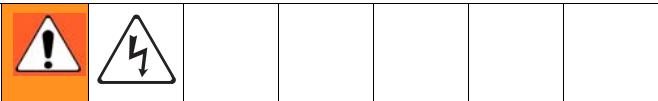
| Model | Secondary Voltage |
|---------|-------------------|
| 310 ft. | 90 Vac* |
| 410 ft. | 120 Vac* |

* For 230 Vac line voltage.

Replace Transformer

 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.

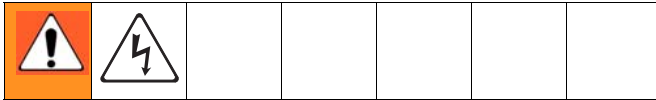
Display Module

Temperature and Pressure Displays


CAUTION

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 26.
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. 13.
6. Remove screws (509, 510) and cover (504); see FIG. 13.

 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. 13.
8. Disconnect ribbon cable(s) (R) from back of display; see FIG. 13.


9. Remove nuts (508) and plate (505).
10. Disassemble display, see detail in FIG. 13.
11. Replace board (501a or 502a) or membrane switch (501b or 502b) as necessary.
12. Reassemble in reverse order, see FIG. 13. 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).

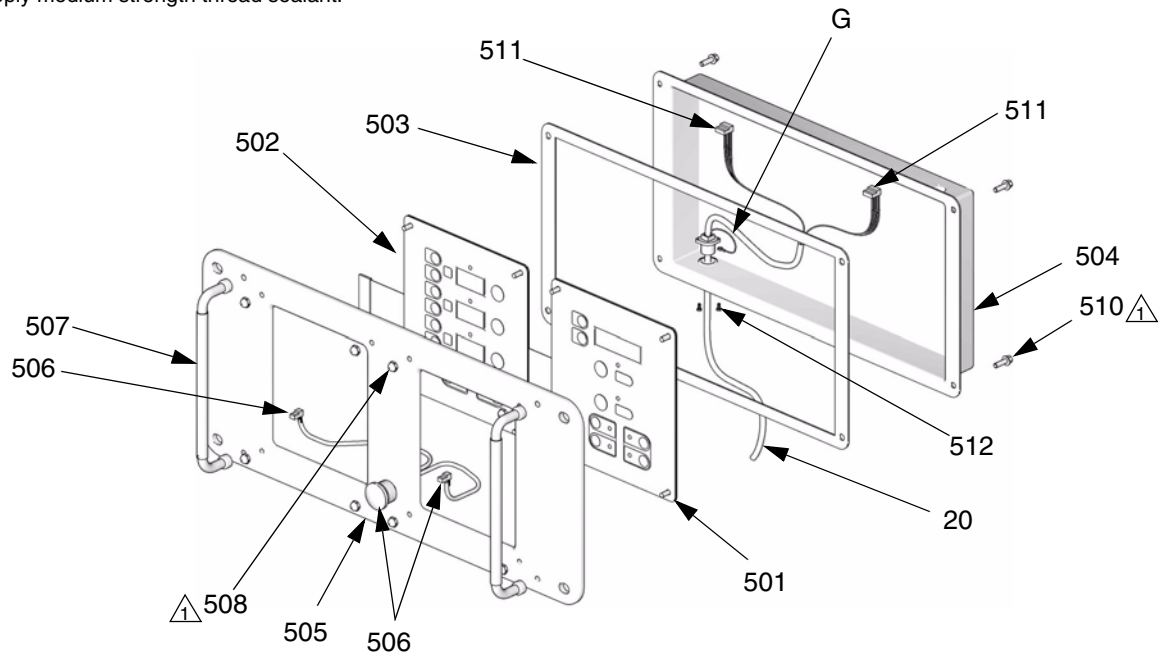
Red Stop Button

CAUTION

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 26.
3. Refer to electrical diagrams.
4. Put on static conductive wrist strap.
5. Remove screws (509, 510) and cover (504), FIG. 13.
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.



Detail of Membrane Switches and Display Boards

Temperature Display

Pressure Display

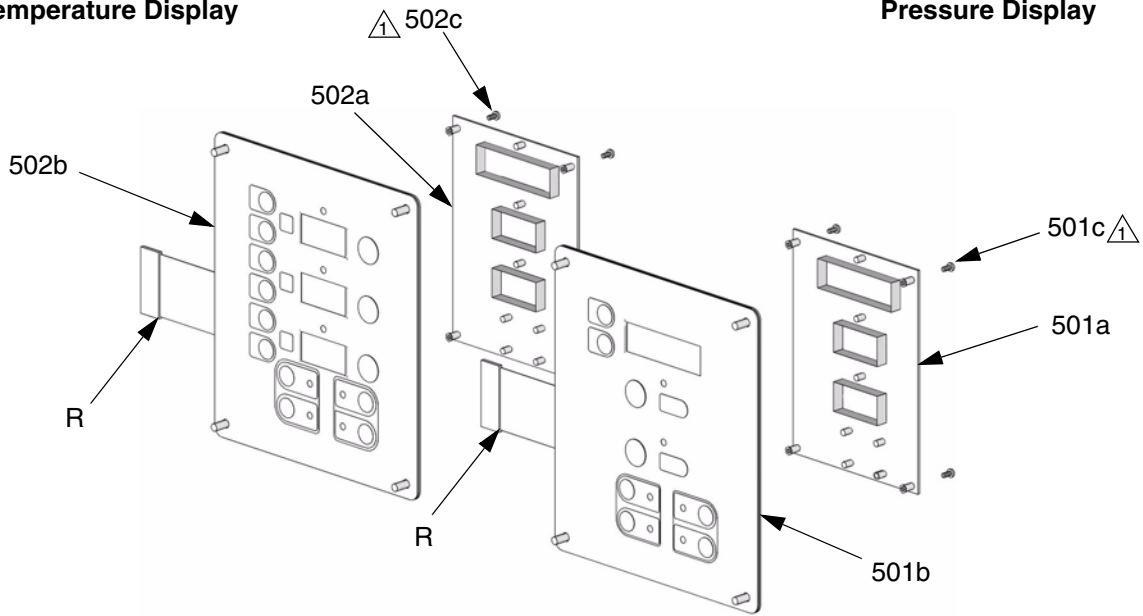
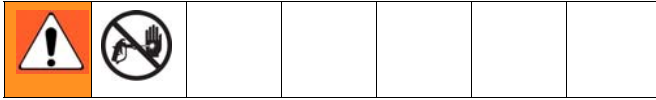



FIG. 13. Display Module

Inlet Fluid Strainer Screen

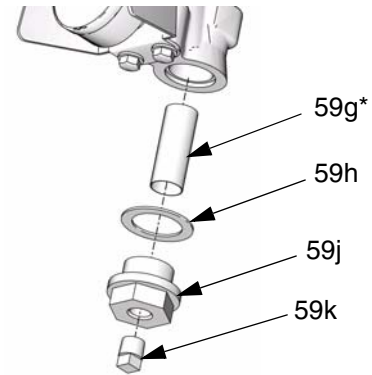


The inlet strainer at each proportioning pump filters out solid matter that can plug the inlet check valves. Inspect the screens daily as part of the startup routine, and clean as required.

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.

 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 (59j) is removed.
2. Place a container under the strainer base to catch drain off when removing the strainer plug.
3. Remove the screen (59g) 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 (59h) and replace as required.
4. Ensure the pipe plug (59k) is securely screwed into the strainer plug (59j). Install the strainer plug with the screen (59g) and gasket (59h) 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.



ti9886a

FIG. 14. Y Strainer Components

* Fluid filter screen (59g) replacements:

| Part | Description |
|--------|-----------------------------|
| 180199 | 20 mesh (standard); 1 pack |
| 255082 | 80 mesh (optional); 2 pack |
| 255083 | 80 mesh (optional); 10 pack |

Pump Lubrication System



Check the condition of the ISO pump lubricant daily. Change the lubricant if it becomes a gel, its color darkens, or it becomes diluted with isocyanate.


Gel formation is due to moisture absorption by the pump lubricant. The interval between changes depends on the environment in which the equipment is operating. The pump lubrication system minimizes exposure to moisture, but some contamination is still possible.

Lubricant discoloration is due to continual seepage of small amounts of isocyanate past the pump packings during operation. If the packings are operating properly, lubricant replacement due to discoloration should not be necessary more often than every 3 or 4 weeks.

To change pump lubricant:

1. Relieve pressure, page 26.
2. Lift the lubricant reservoir (LR) out of the bracket (RB) and remove the container from the cap. Holding the cap over a suitable container, remove the check valve and allow the lubricant to drain. Reattach the check valve to the inlet hose. See FIG. 15.

3. Drain the reservoir and flush it with clean lubricant.
4. When the reservoir is flushed clean, fill with fresh lubricant.
5. Thread the reservoir onto the cap assembly and place it into the bracket.
6. Push the larger diameter supply tube (ST) approximately 1/3 of the way into the reservoir.
7. Push the smaller diameter return tube (RT) into the reservoir until it reaches the bottom.

 **Important:** The return tube (RT) must reach the bottom of the reservoir, to ensure that isocyanate crystals will settle to the bottom and not be siphoned into the supply tube (ST) and returned to the pump.

8. The lubrication system is ready for operation. No priming is required.

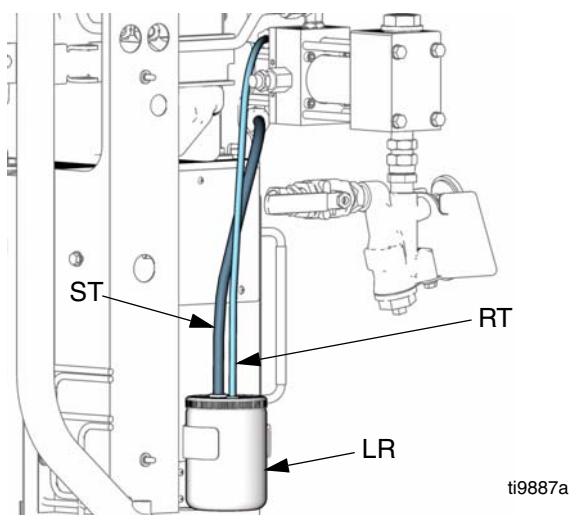
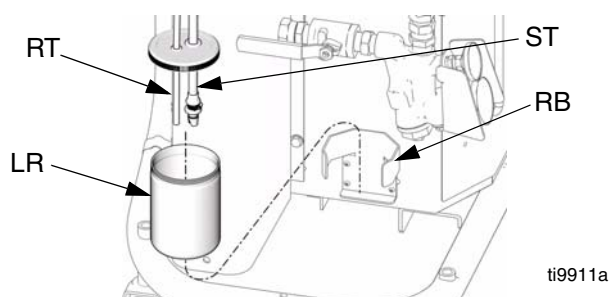
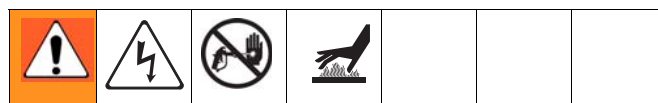


FIG. 15. Pump Lubrication System

Change Hydraulic Fluid and Filter



See Table 8 for recommended frequency of oil changes.


 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 26.
2. Allow hydraulic fluid to cool.
3. Place a pan under reservoir drain plug (110k) to catch oil.

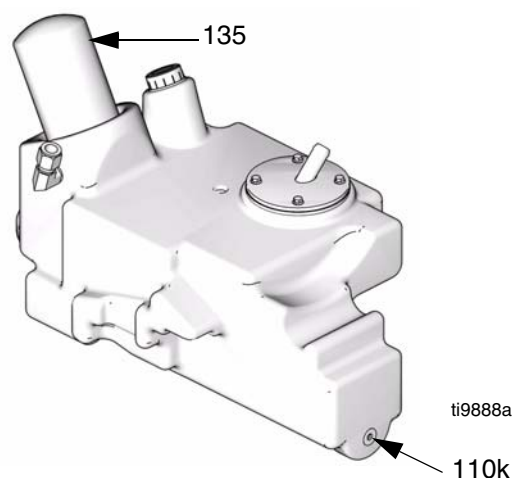


FIG. 16: Change Hydraulic Fluid and Filter

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 airlock 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.

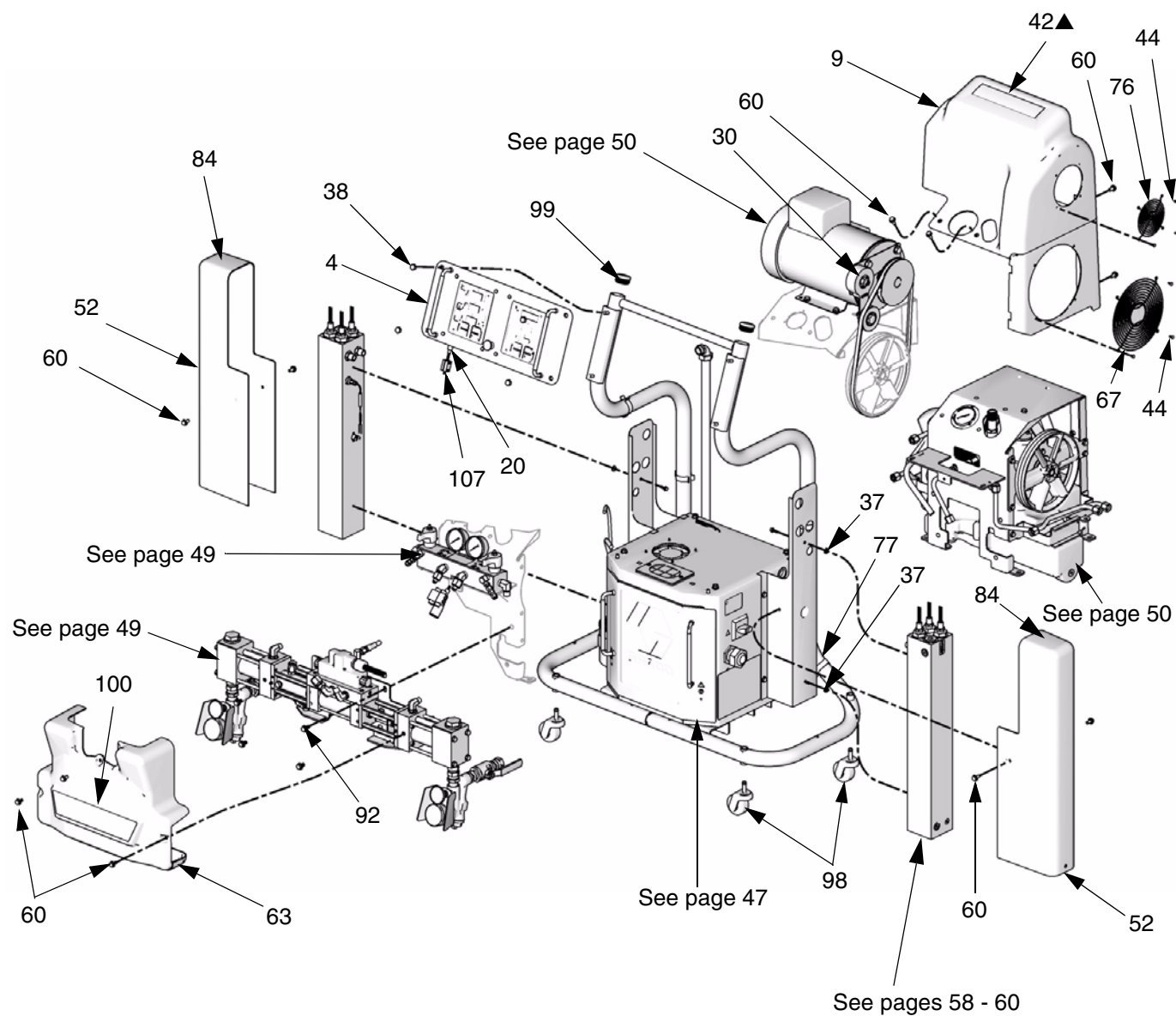


Upon starting motor, hydraulic pump may make a screeching noise until primed. If this noise continues for more than 30 seconds, switch off motor control. See **Hydraulic Drive System**, page 20.

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 | Energo [®] 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 | |

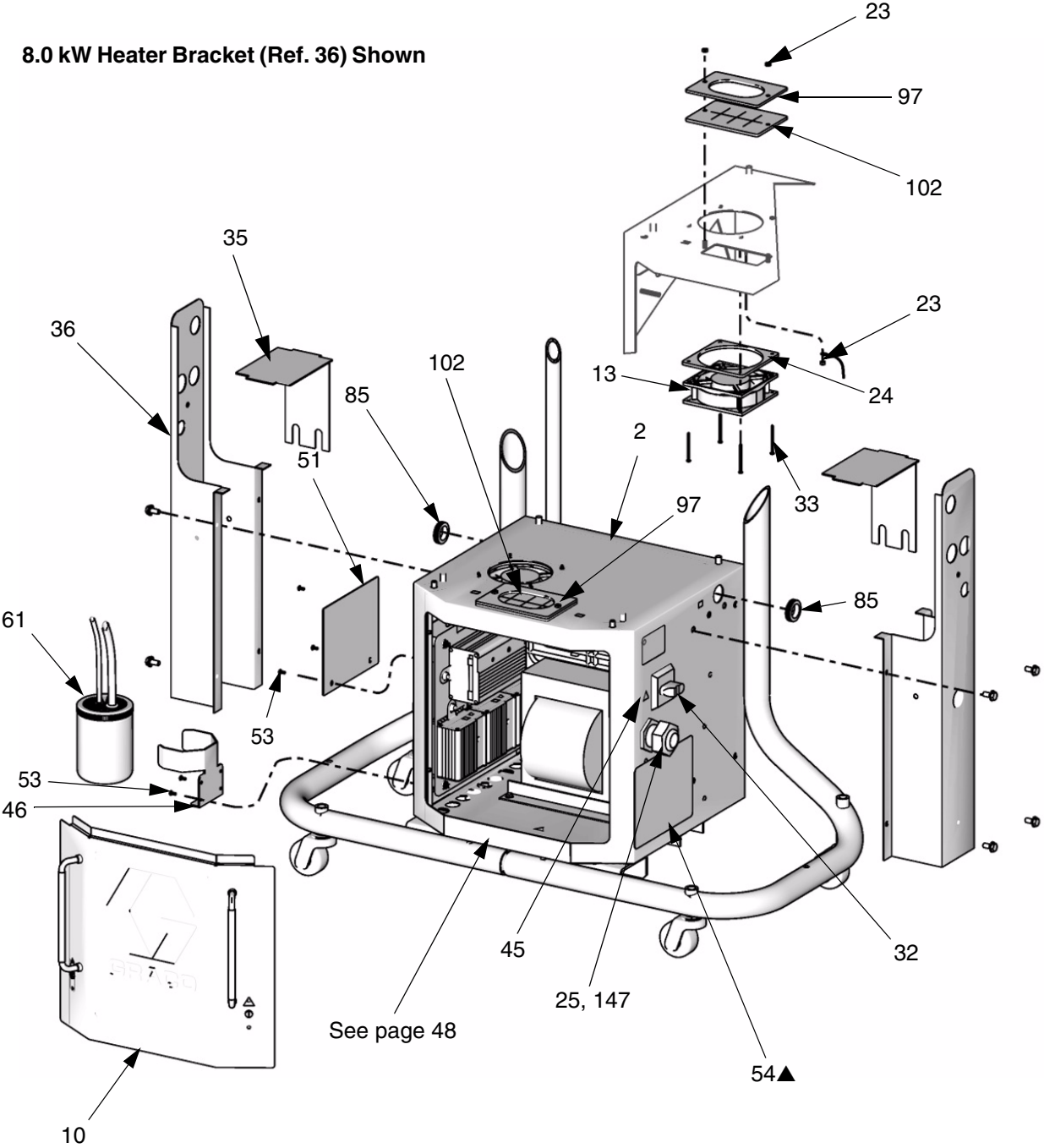
Parts



ti9831a

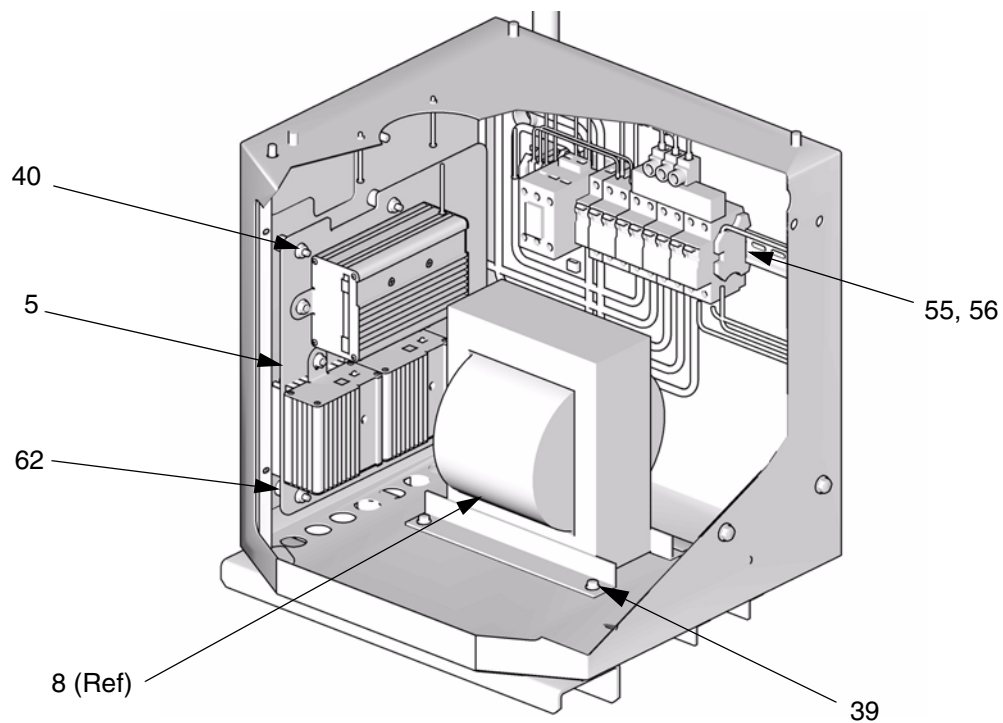
Detail of Cabinet Area

8.0 kW Heater Bracket (Ref. 36) Shown



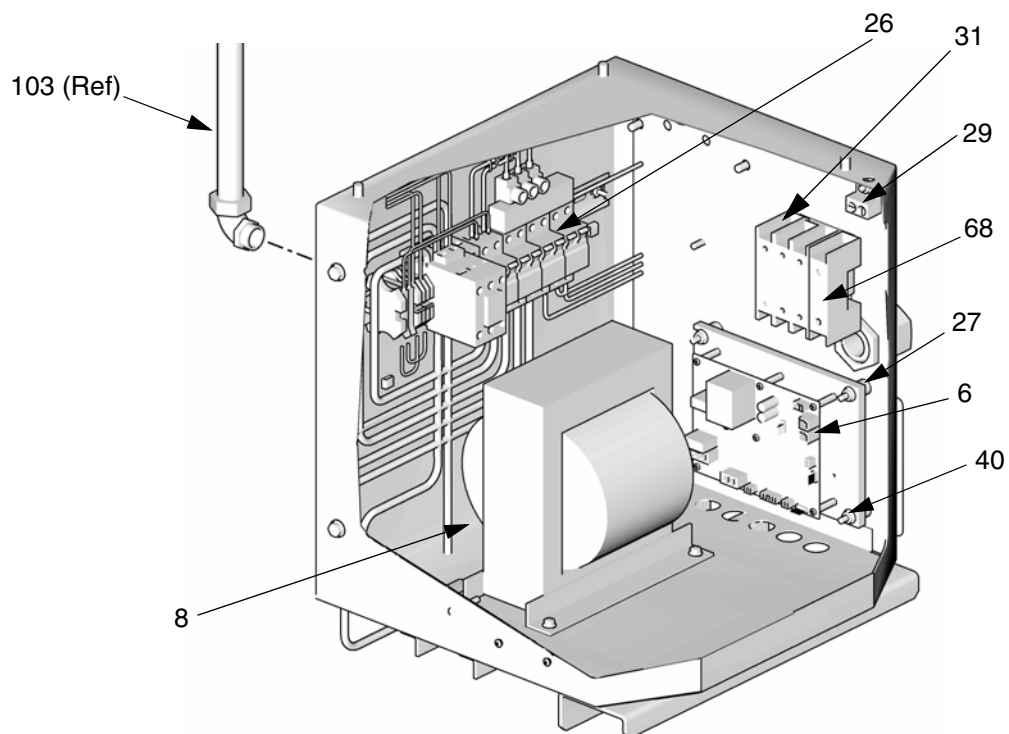
TI9834a

Left Side of Cabinet



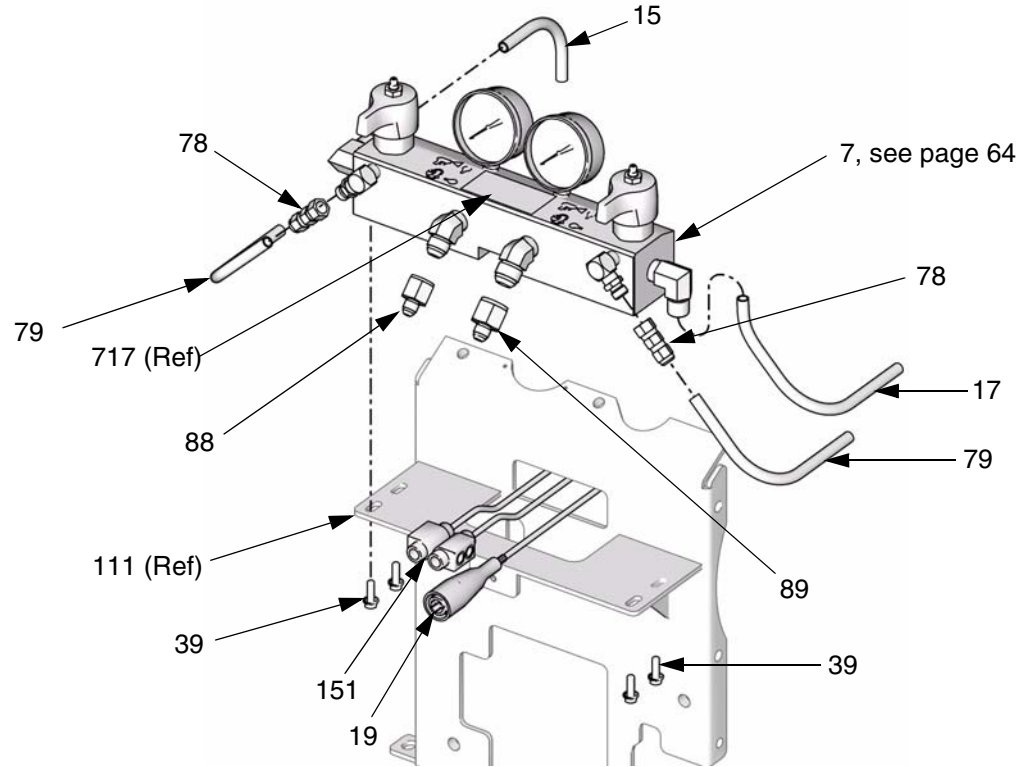
TI9835a

Right Side of Cabinet



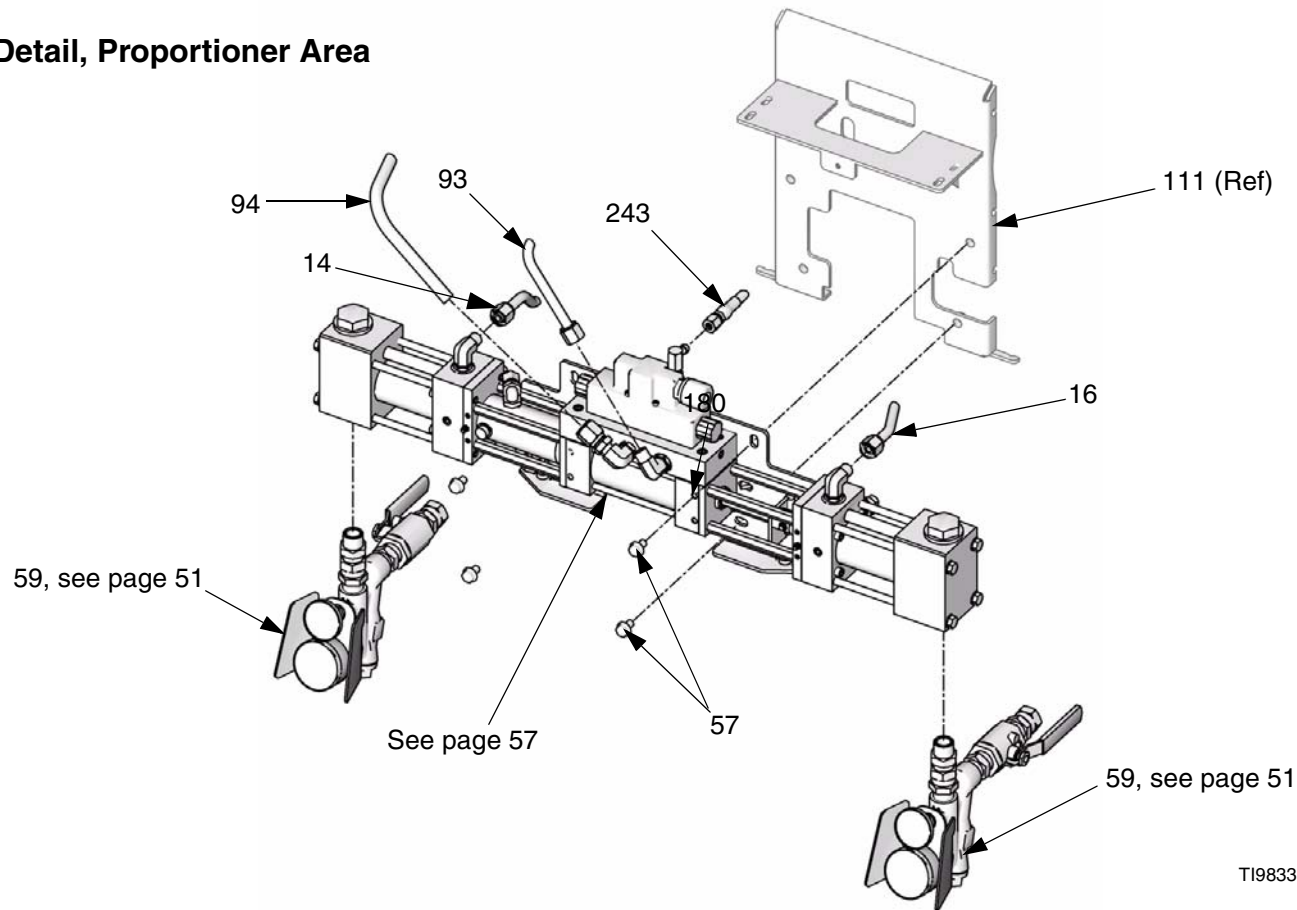
TI9836a

Detail, Fluid Manifold Area



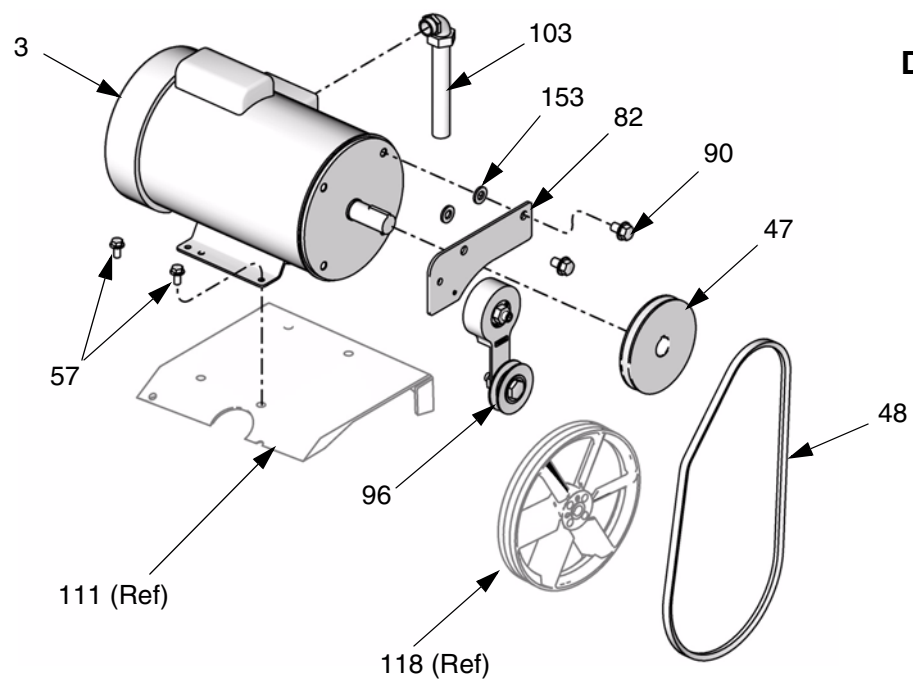
TI9838a

Detail, Proportioner Area



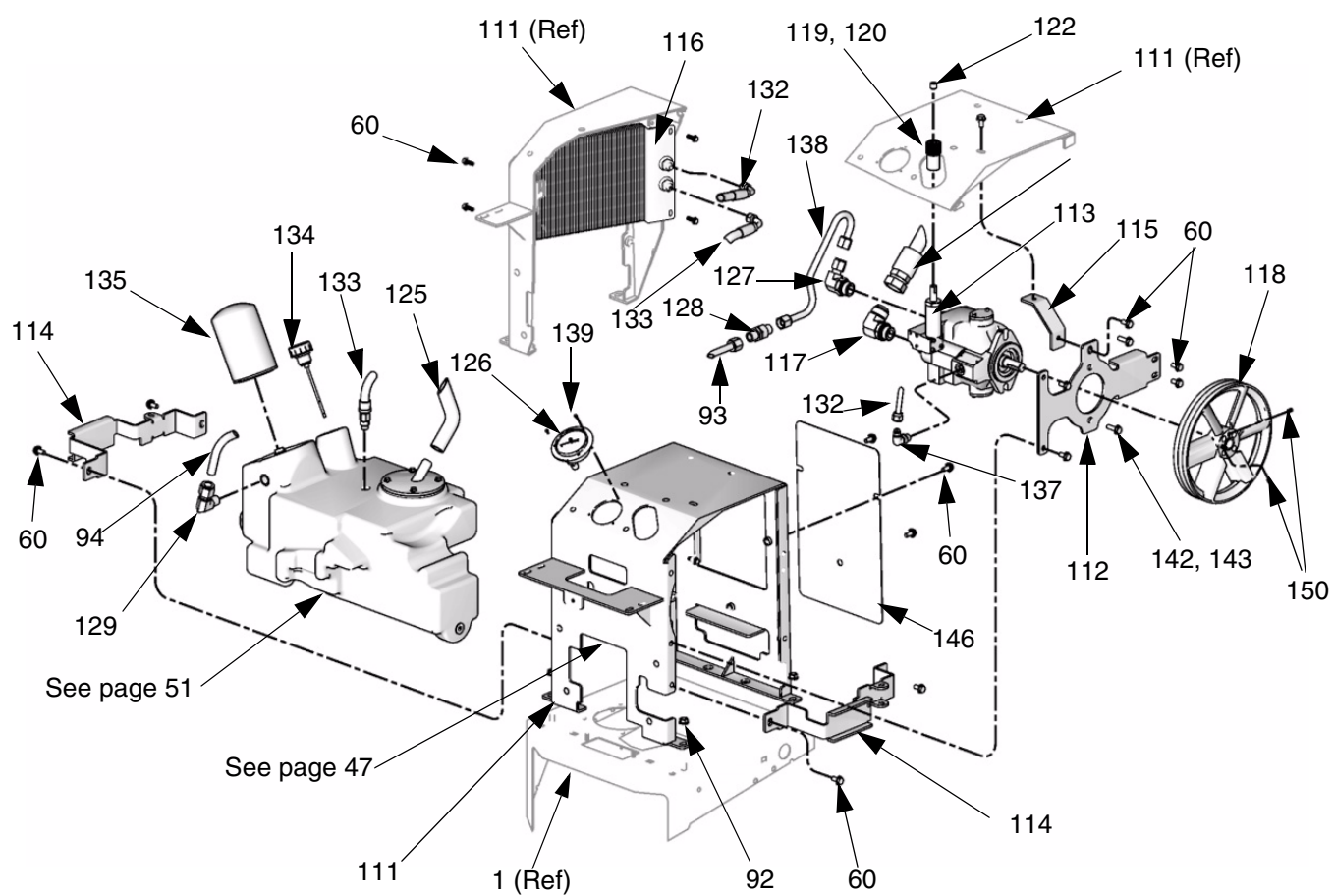
TI9833a

Detail, Electric Motor Area



ti7709a

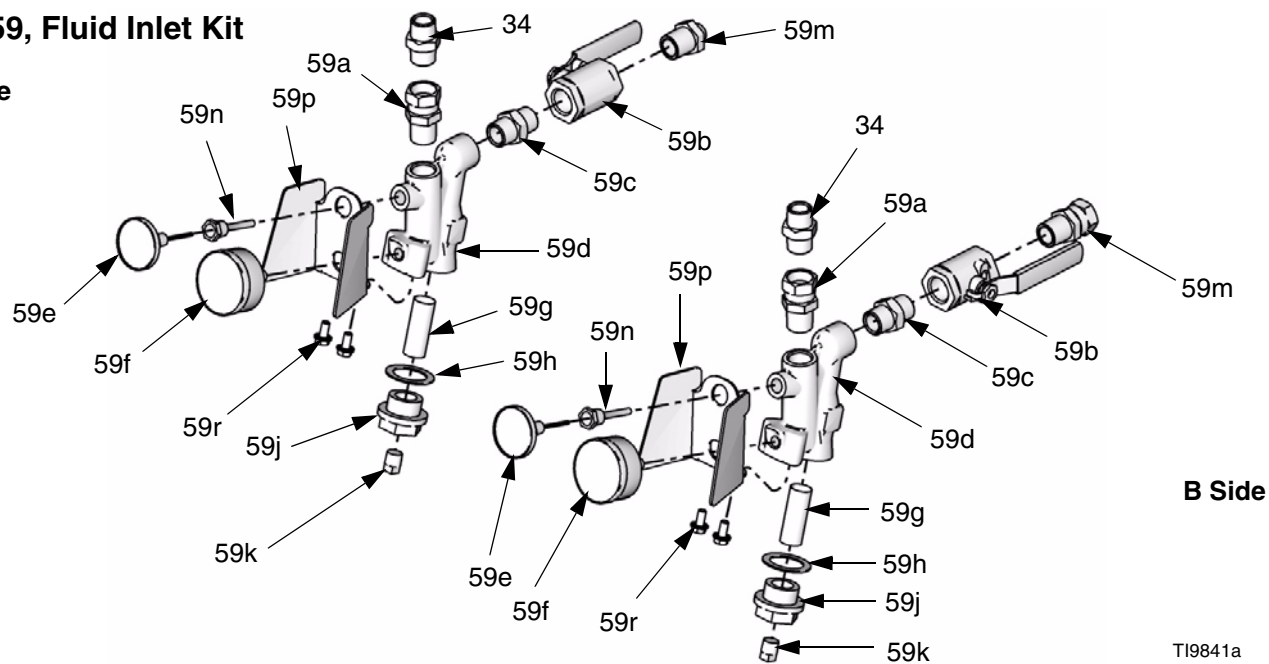
Detail, Hydraulic Reservoir Area



TI9832a

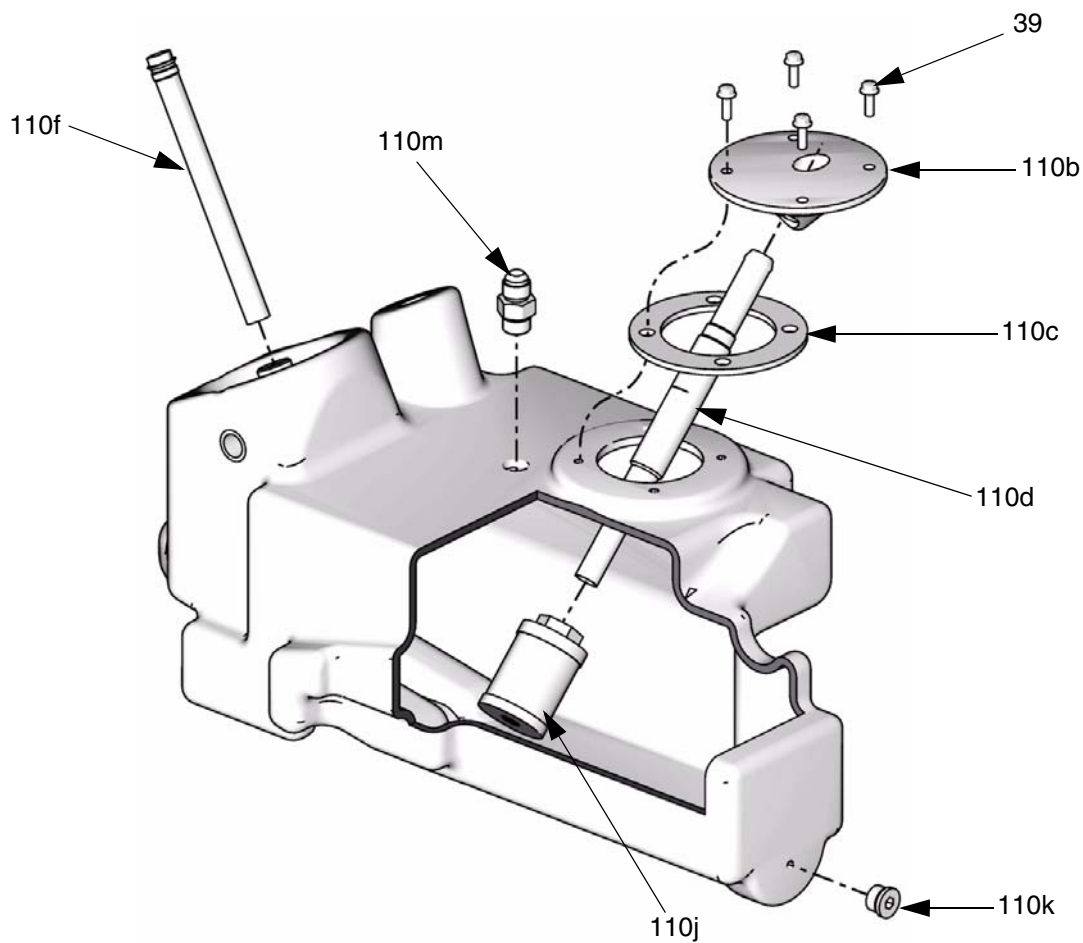
Ref. 59, Fluid Inlet Kit

A Side



T19841a

Ref. 110, Hydraulic Reservoir



ti9840a

Parts Used on All Models

| Ref | Part | Description | Qty. | Ref | Part | Description | Qty. |
|-----|--------|---|------|-----|--------|---|------|
| 2 | | HEATER; see page 54 for part numbers | 2 | 45▲ | 189930 | LABEL, caution | 2 |
| 3 | | MOTOR; see page 54 for part numbers | 1 | 46 | 247844 | BRACKET, reservoir, lube | 1 |
| 4 | 245974 | DISPLAY; page 62 | 1 | 47 | 247845 | PULLEY, drive | 1 |
| 5 | | CONTROL, temperature; see page 54 for part numbers | 1 | 48 | 803889 | BELT | 1 |
| 6 | | BOARD, circuit, motor control; see page 54 for part numbers | 1 | 49★ | 15B593 | SHIELD, membrane switch | 1 |
| 7 | 247823 | MANIFOLD, fluid; page 64 | 1 | 50★ | 308212 | PAD, pamphlet safety | 1 |
| 8 | | TRANSFORMER; see page 54 for part numbers | 1 | 51 | 15B775 | COVER, wire access | 1 |
| 9 | 247832 | COVER, motor | 1 | 52 | | COVER, heater; see page 54 for part numbers | 2 |
| 10 | 246976 | COVER, main cabinet | 1 | 53 | | SCREW, machine, pan hd; 8-32 x 3/8 | 7 |
| 11 | | PUMP, proportioning; see page 54 for part numbers | 1 | 54▲ | 15G280 | LABEL, warning | 1 |
| 13 | 115834 | FAN, cooling | 1 | 55 | 113505 | NUT, KEPS, hex hd | 4 |
| 14 | | TUBE, inlet, component A; see page 54 for part numbers | 1 | 56 | 112776 | WASHER, plain | 2 |
| 15 | | TUBE, outlet, component A; see page 54 for part numbers | 1 | 57 | 113802 | SCREW, hex hd, flanged | 8 |
| 16 | | TUBE, inlet, component B; see page 54 for part numbers | 1 | 58★ | | STRAP, tie, wire | 20 |
| 17 | | TUBE, outlet, component B; see page 54 for part numbers | 1 | 59 | 255159 | KIT, inlet, fluid; includes 59a-59r; see page 51 | 1 |
| 18★ | 247787 | CABLE, harness, heater overtemp., includes 12-pin connector | 1 | 59a | | . UNION, swivel; 3/4 npt(m) x 3/4 npsm(f) | 3 |
| 19 | 15B380 | CABLE, hose, control; see manual 312064 | 1 | 59b | | . VALVE, ball; 3/4 npt (fbe) | 2 |
| 20 | 15B383 | CABLE, display | 1 | 59c | | . NIPPLE; 3/4 npt | 2 |
| 21★ | 261669 | KIT, fluid temp sensor, coupler | 1 | 59d | 247503 | . MANIFOLD, strainer, inlet | 2 |
| 23 | 103181 | WASHER, lock ext | 1 | 59e | 102124 | . THERMOMETER, dial | 2 |
| 24 | 15B360 | GASKET, fan | 1 | 59f | 120300 | . GAUGE, pressure, fluid | 2 |
| 25 | 255047 | STRAIN RELIEF, M40 thread | 1 | 59g | 180199 | . ELEMENT, filter; 20 mesh (standard) | 2 |
| 26 | | MODULE; see page 54 for part numbers | 1 | 59h | 15H200 | . GASKET, strainer; PTFE | 2 |
| 27 | 116149 | SPACER | 4 | 59j | 15H199 | . PLUG, strainer | 2 |
| 29 | 117666 | TERMINAL, ground | 1 | 59k | | . PLUG, pipe; 3/8 npt | 2 |
| 30 | C19843 | SCREW, CAP, socket hd | 1 | 59m | | . UNION, swivel; 3/4 npt(m) x 1/2 npt(f); A side only | 1 |
| 31 | 247841 | SWITCH, disconnect | 1 | 59n | 15D757 | . HOUSING, thermometer | 2 |
| 32 | 247842 | KNOB, operator disconnect | 1 | 59p | 253481 | . GUARD, gauge | 2 |
| 33 | 117723 | SCREW, mach, slotted hd | 4 | 59r | 111800 | . SCREW, cap, hex hd; 5/16-18 x 5/8 in. (16 mm) | 4 |
| 34 | C20487 | NIPPLE, hex | 2 | 60 | 111800 | SCREW, cap, hex hd | 35 |
| 35 | | COVER, heater wire; see page 54 for part numbers | 2 | 61 | 247849 | RESERVOIR, lube hose assy | 1 |
| 36 | | BRACKET, heater; see page 54 for part numbers | 2 | 62 | 247782 | SPACER | 4 |
| 37 | 167002 | INSULATOR, heat | 4 | 63 | 247850 | COVER, front | 1 |
| 38 | 117623 | NUT, cap (3/8-16) | 4 | 65 | 15H185 | WIRE, mechanical switch cable; see page 56 | 1 |
| 39 | 113796 | SCREW, flanged, hex hd | 14 | 66★ | | CONNECTOR, 2 PIN, motor power; see page 54 for part numbers | 1 |
| 40 | 115942 | NUT, hex, flange head | 9 | 67 | 117284 | GRILL, fan guard | 1 |
| 42 | 15K817 | LABEL, fault codes | 1 | 68 | | SWITCH, added pole; see page 54 for part numbers | 1 |
| 44 | | RIVET, pop; 3/16 in. (5 mm) x 0.4 in. (10 mm) | 8 | 74★ | 206995 | THROAT SEAL LIQUID; 1 quart | 1 |
| | | | | 76 | 115836 | GUARD, finger | 1 |
| | | | | 77 | 186494 | CLIP, spring | 5 |
| | | | | 78 | 205447 | COUPLING, hose | 2 |
| | | | | 79 | 054826 | TUBE, PTFE; 1/4 in. (6 mm) ID; 8 ft (2.4 m) | 8 |

| Ref | Part | Description | Qty. | Ref | Part | Description | Qty. |
|------|--------|--|------|------|--------|---|------|
| 82 | 15H207 | BRACKET, tensioner | 1 | 119 | 15H512 | LABEL, control | 1 |
| 84▲ | 189285 | LABEL, caution | 2 | 120 | 15H204 | KNOB, pressure | 1 |
| 85 | 114269 | GROMMET, rubber | 2 | 122 | 117560 | SCREW, set, socket hd | 1 |
| 88 | 247851 | FITTING, reducer #5 x #8 JIC | 1 | 125 | 247793 | HOSE, inlet, coupled | 1 |
| 89 | 247852 | FITTING, reducer #6 x #10 JIC | 1 | 126 | 255029 | GAUGE, pressure, fluid, panel | 1 |
| 90 | 111802 | SCREW, cap, hex hd; 1/2-13 x 3/4 in. (19 mm) | 2 | 127 | | mount | |
| 92 | 112958 | NUT, hex, flanged; 3/8-16 | 4 | | | ELBOW | 1 |
| 93 | 247809 | TUBE, supply, pumpline | 1 | | 255033 | H-40, H-XP3 models only | |
| 94 | 247784 | TUBE, return | 1 | | 120309 | H-25, H-XP2 models only | |
| 96 | 247853 | ADJUSTER, belt, tensioner | 1 | 128 | 255034 | FITTING, union, bulkhead; 3/4-16 x 1/2 in. (13 mm) OD tube | 1 |
| 97 | 15G816 | COVER, plate, wire way | 1 | 129 | 255036 | ELBOW, male | 1 |
| 98 | 120302 | CASTER | 4 | 130★ | 117792 | GUN, grease | 1 |
| 99 | 112125 | PLUG, tube | 2 | 131★ | 117773 | GREASE, lubricant | 1 |
| 100 | | LABEL; see page 54 for part numbers | 1 | 132 | 15G782 | HOSE, coupled | 1 |
| 102 | 15H189 | BOOT, wire feed through | 1 | 133 | 15G784 | HOSE, coupled | 1 |
| 103 | | CONDUIT, assembly, motor power; see page 54 for part numbers | 1 | 134 | 116915 | DIPSTICK with breather cap | 1 |
| 107 | 119253 | SUPPRESSOR, ferrite; 151 ohm | 1 | 135 | 247792 | FILTER, oil, 18-23 psi bypass | 1 |
| 110 | 247826 | RESERVOIR, hydraulic; includes 110b-110m; see page 51 | 1 | 137 | | FITTING | 1 |
| 110b | 247778 | . HOUSING, inlet | 1 | | 116793 | H-40, H-XP3 models only | |
| 110c | 247771 | . GASKET, inlet | 1 | | 110792 | H-25, H-XP2 models only | |
| 110d | 247777 | . TUBE, inlet | 1 | 138 | | TUBE, supply | 1 |
| 110f | 247770 | . TUBE, return | 1 | | 247783 | H-40, H-XP3 models only | |
| 110j | 116919 | . FILTER, inlet | 1 | | 247800 | H-25, H-XP2 models only | |
| 110k | 255032 | . PLUG | 1 | 139 | 107156 | SCREW, cap socket head | 3 |
| 110m | 255021 | . FITTING, straight | 1 | 140★ | 115764 | FITTING, npt (part of hydraulic pump assembly); H-25, H-XP2 models only | 1 |
| 111 | 247822 | BRACKET, motor mount | 1 | 141★ | 112161 | SCREW (part of hydraulic pump assembly); H-25, H-XP2 models only | 2 |
| 112 | | BRACKET, mounting, pump | 1 | 142 | 112586 | SCREW, cap, hex hd | 2 |
| | 247819 | H-40, H-XP3 models only | | 143 | 110996 | NUT, hex, flange hd; 5/16-18 | 2 |
| | 247830 | H-25, H-XP2 models only | | 144 | C19862 | NUT, lock, hex | 1 |
| 113 | | PUMP, hydraulic | 1 | 146 | 247836 | COVER, access | 1 |
| | 255019 | H-40, H-XP3 models only | | 147 | 255048 | NUT, strain relief, M40 thread | 1 |
| | 247855 | H-25, H-XP2 models only | | 148★ | 255039 | CONNECTOR, heater | 1 |
| 114 | 247821 | BRACKET, reservoir, hydraulic | 2 | 150 | 120087 | SCREW, set; 1/4 x 1/2 (13 mm) | 2 |
| 115 | 247820 | BRACKET, support, pumpmount | 1 | 151 | 261821 | CONNECTOR, wire, 6 AWG (pair) | 1 |
| 116 | 247829 | COOLER, hydraulic | 1 | 153 | 104373 | WASHER, thrust | 2 |
| 117 | | ELBOW; 1-1/16 npt(m) x 1/2 in. (13 mm) tube | 1 | | | | |
| | 255020 | H-40, H-XP3 models only | | | | | |
| | 255035 | H-25, H-XP2 models only | | | | | |
| 118 | | PULLEY, fan | 1 | | | | |
| | 247856 | H-40, H-XP3 models only | | | | | |
| | 247857 | H-25, H-XP2 models only | | | | | |

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

★ Not shown.

Parts that Vary by Model

Use the following tables to find parts that vary by model. See **Parts**, starting on page 46 for parts used on all models.

H-25 and H-XP2 Models

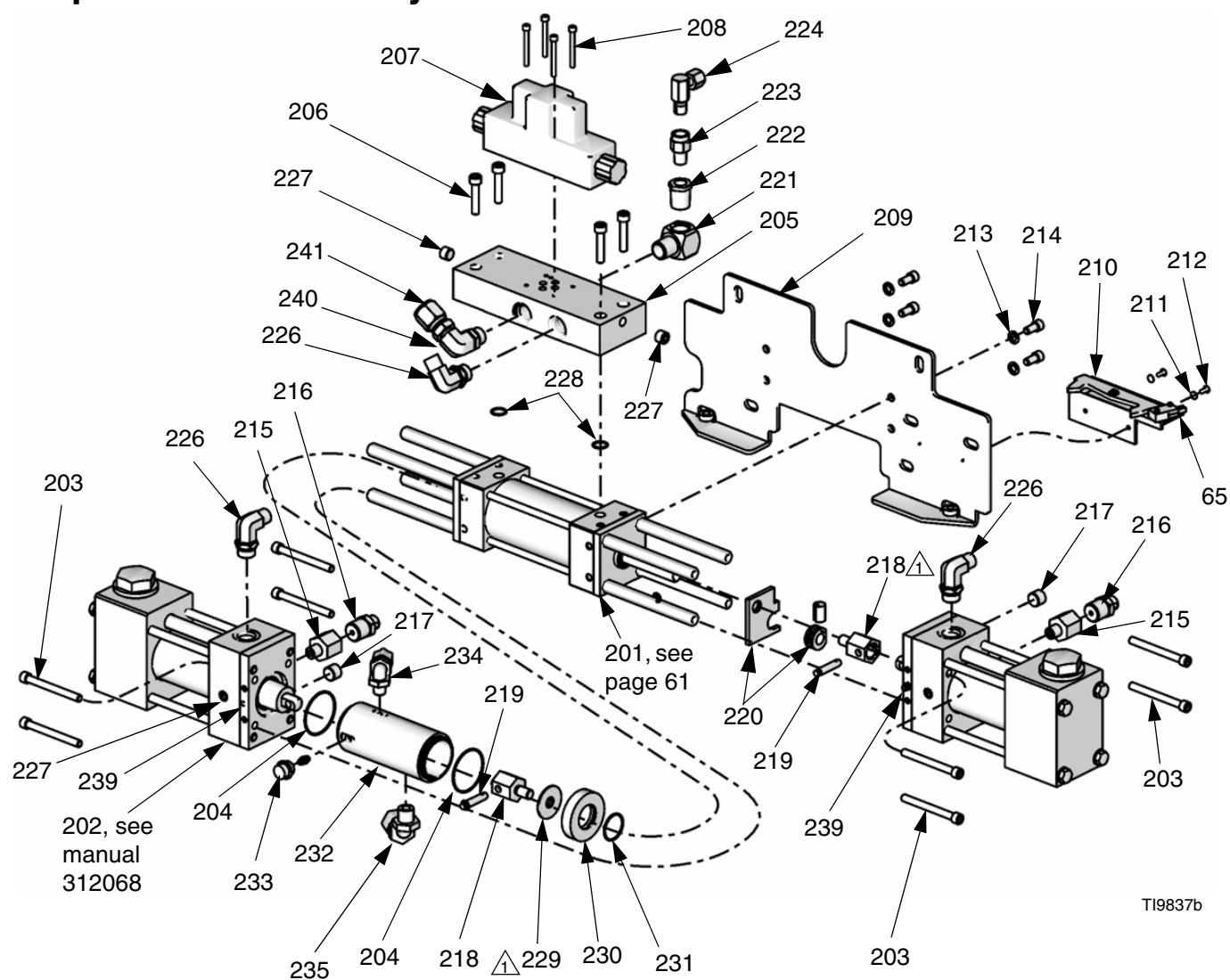
| Ref | Description | 255400 H-25 8.0 kW (230V, 1 phase) | 255401 H-25 8.0 kW (230V, 3 phase) | 255402 H-25 8.0 kW (400V, 3 phase) | 255403 H-XP2 15.3 kW (230V, 1 phase) | 255404 H-XP2 15.3 kW (230V, 3 phase) | 255405 H-XP2 15.3 kW (400V, 3 phase) | 255406 H-25 15.3 kW (230V, 1 phase) | 255407 H-25 15.3 kW (230V, 3 phase) | 255408 H-25 15.3 kW (400V, 3 phase) | Qty |
|-----|------------------------------------|--|--|--|--|--|--|---|---|---|-----|
| 2 | HEATER; pages 58-60 | 247815 (Qty. 1) | 247815 (Qty. 1) | 247815 (Qty. 1) | 247813 (Qty. 2) | 247813 (Qty. 2) | 247813 (Qty. 2) | 247813 (Qty. 2) | 247813 (Qty. 2) | 247813 (Qty. 2) | |
| 3 | MOTOR; page 50 | 247816 | 247816 | 247816 | 247816 | 247816 | 247816 | 247816 | 247816 | 247816 | 1 |
| 6 | BOARD, motor control; page 48 | 247839 | 247839 | 247839 | 247839 | 247839 | 247839 | 247839 | 247839 | 247839 | 1 |
| 8 | TRANSFORMER; page 48 | 247812 | 247812 | 247812 | 247812 | 247812 | 247812 | 247812 | 247812 | 247812 | 1 |
| 11 | PUMP, proportioning; page 56 | Model 120 | Model 120 | Model 120 | Model 80 | Model 80 | Model 80 | Model 120 | Model 120 | Model 120 | 1 |
| 14 | TUBE, inlet, component A; page 49 | 247795 | 247795 | 247795 | 247776 | 247776 | 247776 | 247776 | 247776 | 247776 | 1 |
| 15 | TUBE, outlet, component A; page 49 | 247796 | 247796 | 247796 | 247775 | 247775 | 247775 | 247775 | 247775 | 247775 | 1 |
| 16 | TUBE, inlet, component B; page 49 | 247797 | 247797 | 247797 | 247773 | 247773 | 247773 | 247773 | 247773 | 247773 | 1 |
| 17 | TUBE, outlet, component B; page 49 | 247798 | 247798 | 247798 | 247774 | 247774 | 247774 | 247774 | 247774 | 247774 | 1 |
| 26 | MODULE, breaker; page 65 | C | A | B | C | A | B | C | A | B | 1 |
| 35 | COVER, heater wire | | | | 247502 | 247502 | 247502 | 247502 | 247502 | 247502 | 2 |
| 36 | BRACKET, heater; page 46 | 247831 | 247831 | 247831 | 247843 | 247843 | 247843 | 247843 | 247843 | 247843 | 2 |
| 52 | COVER, heater | 247847 | 247847 | 247847 | 247846 | 247846 | 247846 | 247846 | 247846 | 247846 | 2 |
| 66 | CONNECTOR, 2-pin, motor power | 120871 | 120871 | 120871 | 120871 | 120871 | 120871 | 120871 | 120871 | 120871 | 1 |
| 68 | SWITCH, added pole; 400V only | | | 117553 | | | 117553 | | | 117553 | 1 |
| 100 | LABEL | 15H194 | 15H194 | 15H194 | 15H195 | 15H195 | 15H195 | 15H194 | 15H194 | 15H194 | 1 |
| 103 | CONDUIT, assy, motor power | 247814 | 247814 | 247814 | 247814 | 247814 | 247814 | 247814 | 247814 | 247814 | 1 |

H-40 and H-XP3 Models

| Ref | Description | 253400 H-40 12.0 kW (230V, 1 phase) | 253401 H-40 15.3 kW (230V, 3 phase) | 253402 H-40 15.3 kW (400V, 3 phase) | 253403 H-XP3 12.0 kW (230V, 1 phase) | 253404 H-XP3 20.0 kW (230V, 3 phase) | 253405 H-XP3 20.0 kW (400V, 3 phase) | 253407 H-40 20.4 kW (230V, 3 phase) | 253408 H-40 20.4 kW (400V, 3 phase) | Qty |
|-----|--|---|---|---|--|--|--|---|---|-----|
| 2 | HEATER; pages 58-60 | 247834 | 247813 | 247813 | 247834 | 247833 | 247833 | 247833 | 247833 | 2 |
| 3 | MOTOR; page 50 | 247810 | 247785 | 247785 | 247810 | 247785 | 247785 | 247785 | 247785 | 1 |
| 6 | BOARD, motor control; page 48 | 247835 | 247835 | 247835 | 247835 | 247835 | 247835 | 247835 | 247835 | 1 |
| 8 | TRANS- FORMER; page 48 | 247786 | 247786 | 247786 | 247786 | 247786 | 247786 | 247786 | 247786 | 1 |
| 11 | PUMP, proportioning; page 56 | Model 120 | Model 120 | Model 120 | Model 80 | Model 80 | Model 80 | Model 120 | Model 120 | 1 |
| 14 | TUBE, inlet, component A; page 49 | 247776 | 247776 | 247776 | 247776 | 247776 | 247776 | 247776 | 247776 | 1 |
| 15 | TUBE, outlet, component A; page 49 | 247775 | 247775 | 247775 | 247775 | 247775 | 247775 | 247775 | 247775 | 1 |
| 16 | TUBE, inlet, component B; page 49 | 247773 | 247773 | 247773 | 247773 | 247773 | 247773 | 247773 | 247773 | 1 |
| 17 | TUBE, outlet, component B; page 49 | 247774 | 247774 | 247774 | 247774 | 247774 | 247774 | 247774 | 247774 | 1 |
| 26 | MODULE, breaker; page 65 | C | D | E | C | D | E | D | E | 1 |
| 35 | COVER, heater wire | 247502 | 247502 | 247502 | 247502 | 247502 | 247502 | 247502 | 247502 | 2 |
| 36 | BRACKET, heater; page 46 | 247843 | 247843 | 247843 | 247843 | 247843 | 247843 | 247843 | 247843 | 2 |
| 52 | COVER, heater | 247846 | 247846 | 247846 | 247846 | 247846 | 247846 | 247846 | 247846 | 2 |
| 66 | CONNEC- TOR, 2-pin, motor power | 120871 | | | 120871 | | | | | 1 |
| 68 | SWITCH, added pole; 400V only | | | 117553 | | | 117553 | | 117553 | 1 |
| 100 | LABEL | 247780 | 247780 | 247780 | 247781 | 247781 | 247781 | 247780 | 247780 | 1 |
| 103 | CONDUIT, assy, motor power | 247814 | 247790 | 247790 | 247814 | 247790 | 247790 | 247790 | 247790 | 1 |

Sub Assemblies

Proportioner Assembly



△ Torque to 10-15 ft-lb (13.6 - 20.3 N•m).

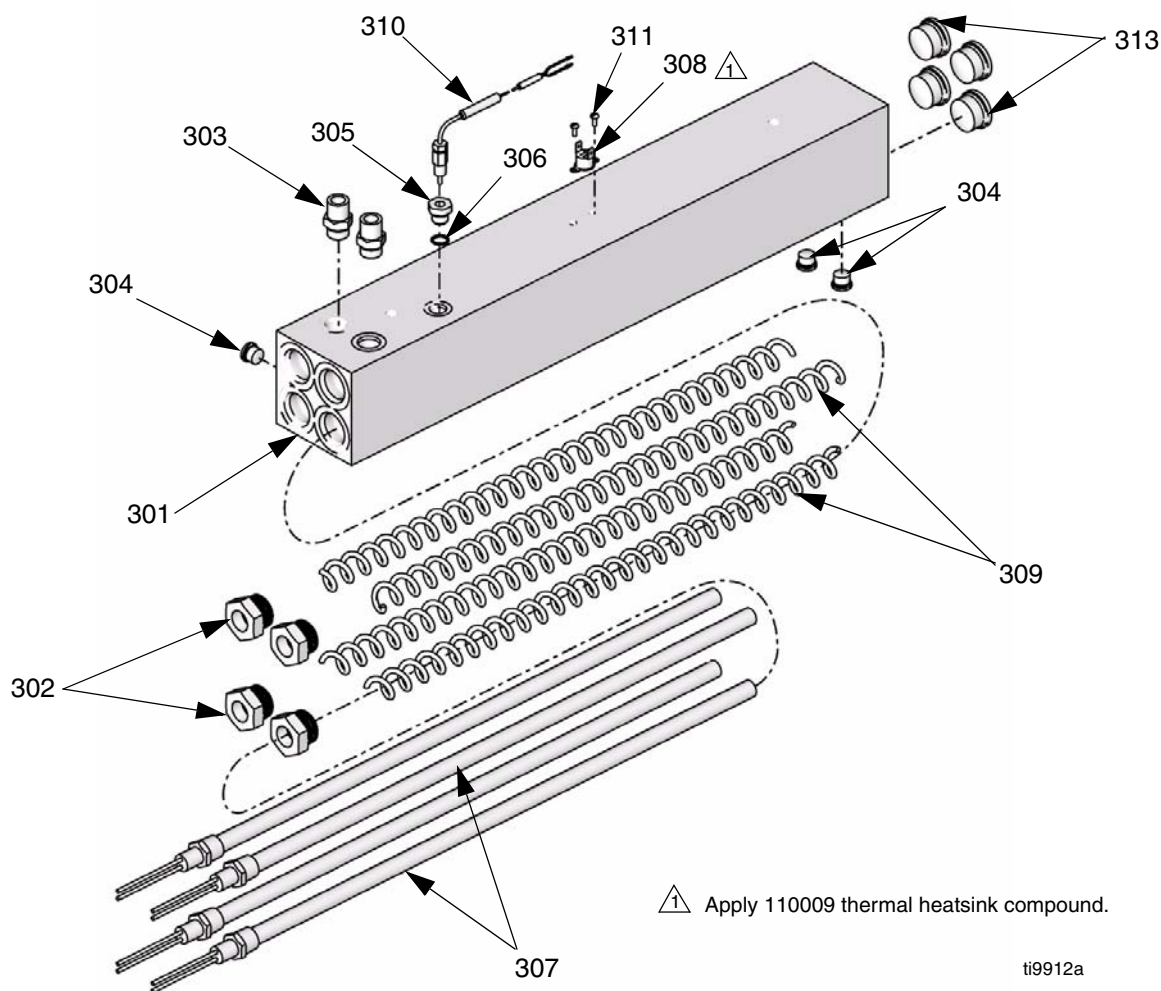
Proportioner Assembly

| Ref | Part | Description | Qty. | Ref | Part | Description | Qty. |
|------------|-------------|---|-------------|--------------|-------------|---|-------------|
| 201 | 295027 | CYLINDER, hydraulic, w/spacers; see page 61 for parts | 1 | 222 | 100206 | BUSHING | 1 |
| 202 | | PUMP; see manual 312068 | 2 | 223 | 15H524 | ACCUMULATOR, pressure; 1/4 npt | 1 |
| 203 | 295824 | SCREW, socket hd; 5/16-24 x 3 in. (76 mm) | 8 | 224 | 155541 | FITTING, union, swivel, 90 degrees | 1 |
| 204 | 106258 | O-RING | 2 | 226 | 120401 | ELBOW; 3/4 npt(m) x 1/2 in. (13 mm) OD tube | 3 |
| 205 | 298040 | MANIFOLD, hydraulic | 1 | 227 | 295225 | PLUG, pipe, flush | 4 |
| 206 | 113467 | SCREW, socket hd | 4 | 228 | 112793 | O-RING | 2 |
| 207 | 120299 | VALVE, directional, hydraulic | 1 | 229 | 295852 | NUT | 1 |
| 208 | C19986 | SCREW, socket hd | 4 | 230 | 298111 | ADAPTER, lube, cylinder | 1 |
| 209 | 247817 | BRACKET, mounting | 1 | 231 | 177156 | O-RING | 1 |
| 210 | 247818 | SWITCH, reversing | 1 | 232 | 298107 | CYLINDER, lube | 1 |
| 211 | 157021 | WASHER, lock | 2 | 233 | 295829 | PLUG; 3/8 mpt x 0.343 in. | 1 |
| 212 | | SCREW, pan hd; 8-32 x 3/8 | 2 | 234 | 295826 | ELBOW, 90 degree; 1/4 npt(m) x 3/8 in. (9.5 mm) OD tube | 1 |
| 213 | 100214 | WASHER, lock | 4 | 235 | 295397 | ELBOW; 3/4 npt(m) x 1/2 in. (13 mm) OD tube | 1 |
| 214 | 108751 | SCREW, socket hd | 4 | 239 | 295229 | FITTING, grease; 1/4-28 | 2 |
| 215 | 159842 | ADAPTER | 2 | 240 | 255037 | ELBOW; 3/4 npt(f) | 1 |
| 216 | 248187 | HOUSING, rupture, disc; kit, see manual 309969 | 2 | 241 | 255038 | CONNECTOR | 1 |
| 217 | M70430 | SCREW, socket hd; 1/4-28 x 0.19 | 2 | 242★ | 15H184 | WIRE, bidirectional cable assy | 1 |
| 218 | 261864 | CLEVIS, hex | 2 | 243 | 15H253 | HOSE, gauge, hydraulic, 3000 psi; shown on page 49 | 1 |
| 219 | 296653 | PIN, clevis | 2 | 244★ | 296607 | TOOL, clevis pin, extractor | 1 |
| 220 | 261862 | KIT, activator and bushing | 1 | ★ Not shown. | | | |
| 221 | 158683 | ELBOW, 90 degree | 1 | | | | |

10.4 kW and 6.0 kW Heaters

(Two Per Machine)

Parts 247833 and 247834

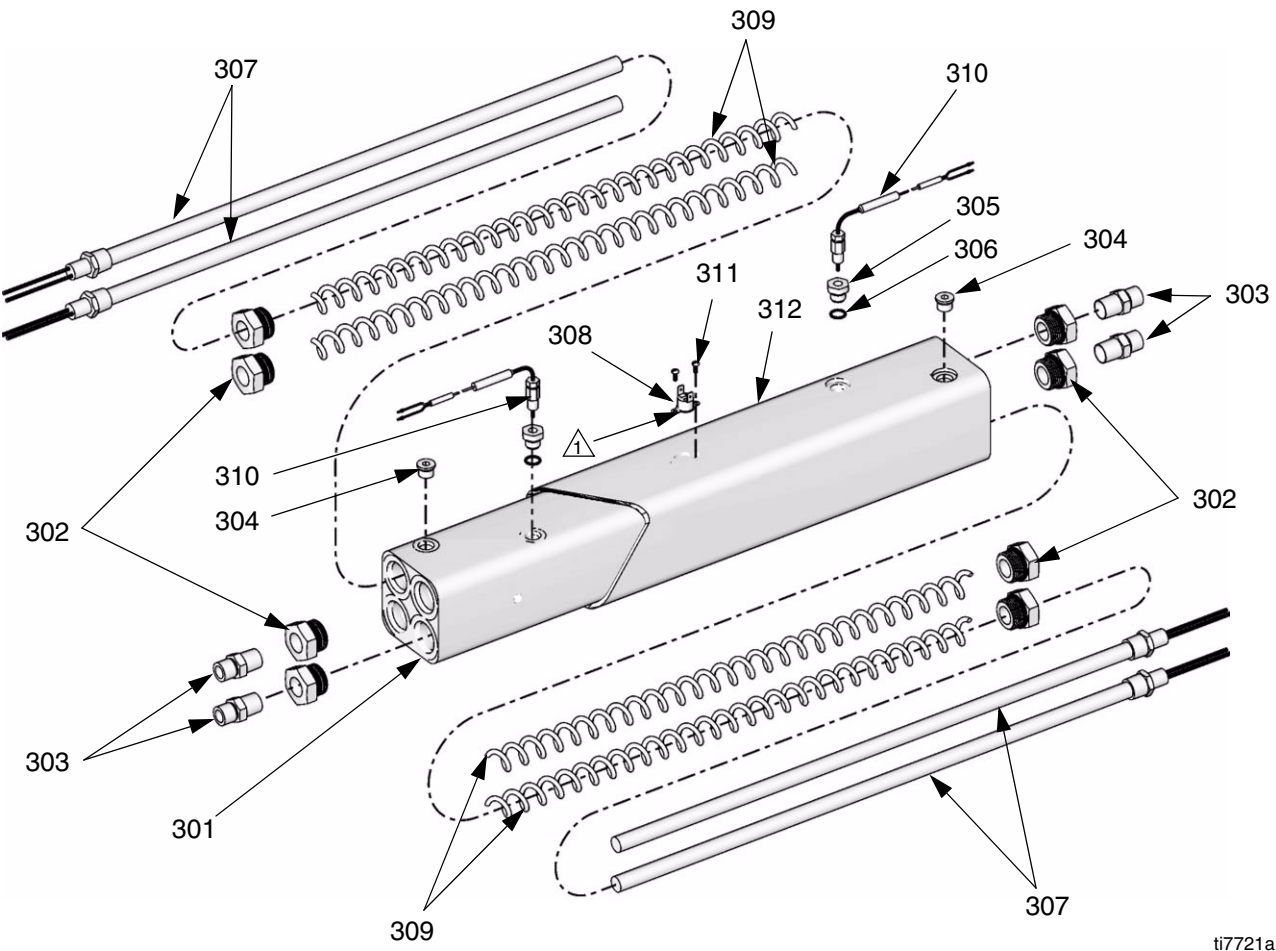


| Ref | Part | Description | Qty. | Ref | Part | Description | Qty. |
|-----|--------|---|------|--------|----------------------------|-------------------------|------|
| 301 | 15J090 | HOUSING, heater | 1 | 15B138 | 2550W; 10.4 kW heater only | | |
| 302 | 15H302 | FITTING, reducer | 4 | 15B140 | 1500 W; 6.0 kW heater only | | |
| 303 | 15H307 | ADAPTER, 3/4 npt(m) x 1/2 in. (13 mm) OD tube | 2 | 308 | 15B137 | SWITCH, overtemperature | 1 |
| 304 | 15H304 | PLUG | 4 | 309 | 15B135 | MIXER, immersion heater | 4 |
| 305 | 15H306 | ADAPTER, thermocouple | 1 | 310 | 117484 | SENSOR | 1 |
| 306 | 120336 | O-RING; fluoroelastomer | 1 | 311 | 100518 | SCREW, machine, pan hd | 2 |
| 307 | | HEATER, immersion | 4 | 313 | 15H305 | PLUG, hollow | 4 |


8.0 kW Dual Zone Heater

(One Per Machine)

Part 247815



ti7721a

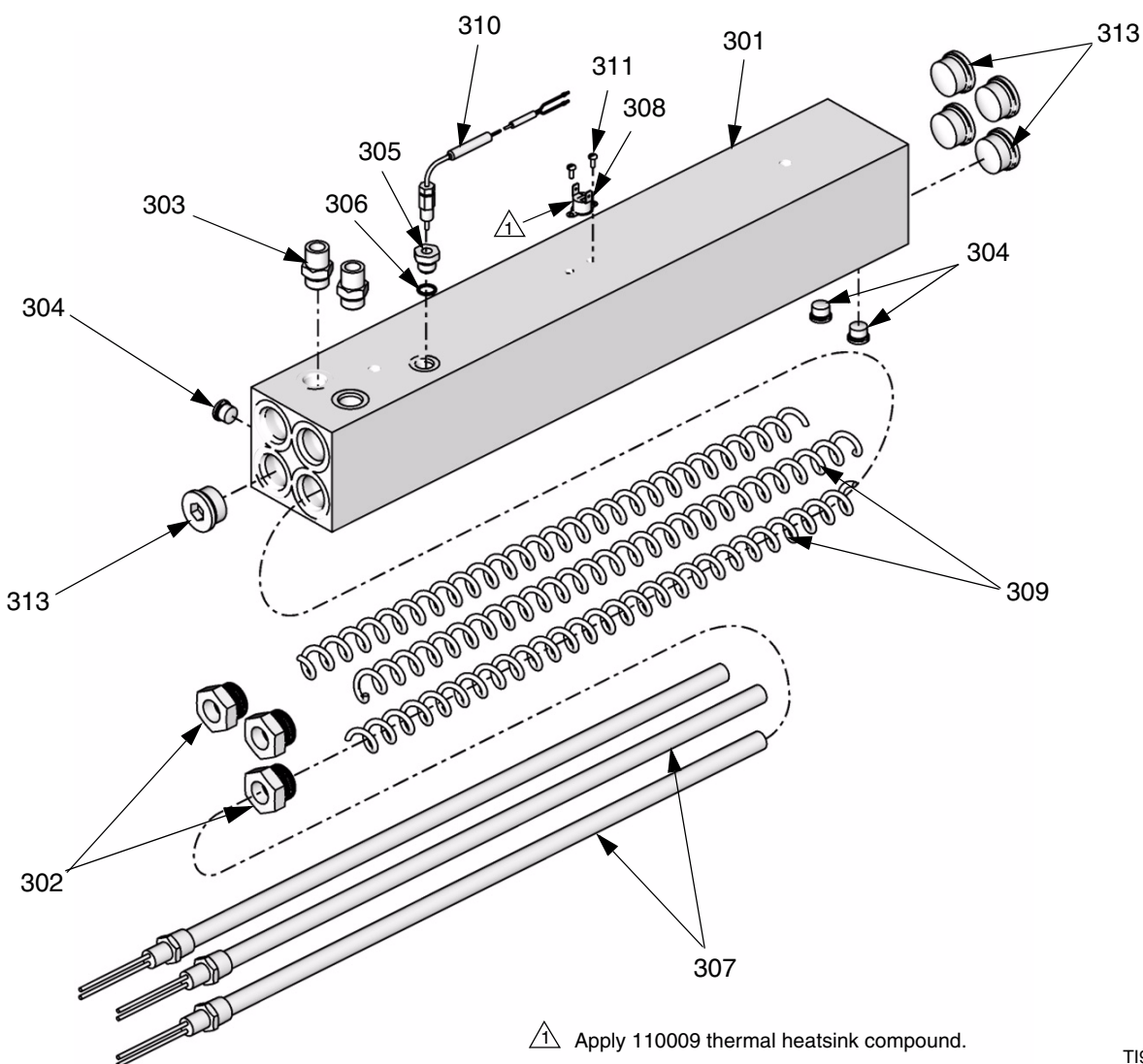
 Apply 110009 thermal heatsink compound.


| Ref. | Part | Description | Qty. | Ref. | Part | Description | Qty. |
|------|--------|---|------|------|--------|---------------------------|------|
| 301 | 15H242 | HOUSING, heater | 1 | 306 | 120336 | O-RING; fluoroelastomer | 2 |
| 302 | 15H302 | FITTING, reducer | 8 | 307 | 15B139 | HEATER, immersion; 2000 W | 4 |
| 303 | 15H303 | ADAPTER, 1/2 npt(m) x 1/2 in. (13 mm) OD tube | 4 | 308 | 15B137 | SWITCH, over temperature | 1 |
| 304 | 15H304 | PLUG | 2 | 309 | 15B135 | MIXER, immersion heater | 4 |
| 305 | 15H306 | ADAPTER, thermocouple | 2 | 310 | 117484 | SENSOR | 2 |
| | | | | 311 | 100518 | SCREW, machine, pan hd | 2 |
| | | | | 312 | 15H205 | INSULATOR | 1 |

7.65 kW Single Zone Heater

(Two Per Machine)

Part 247813

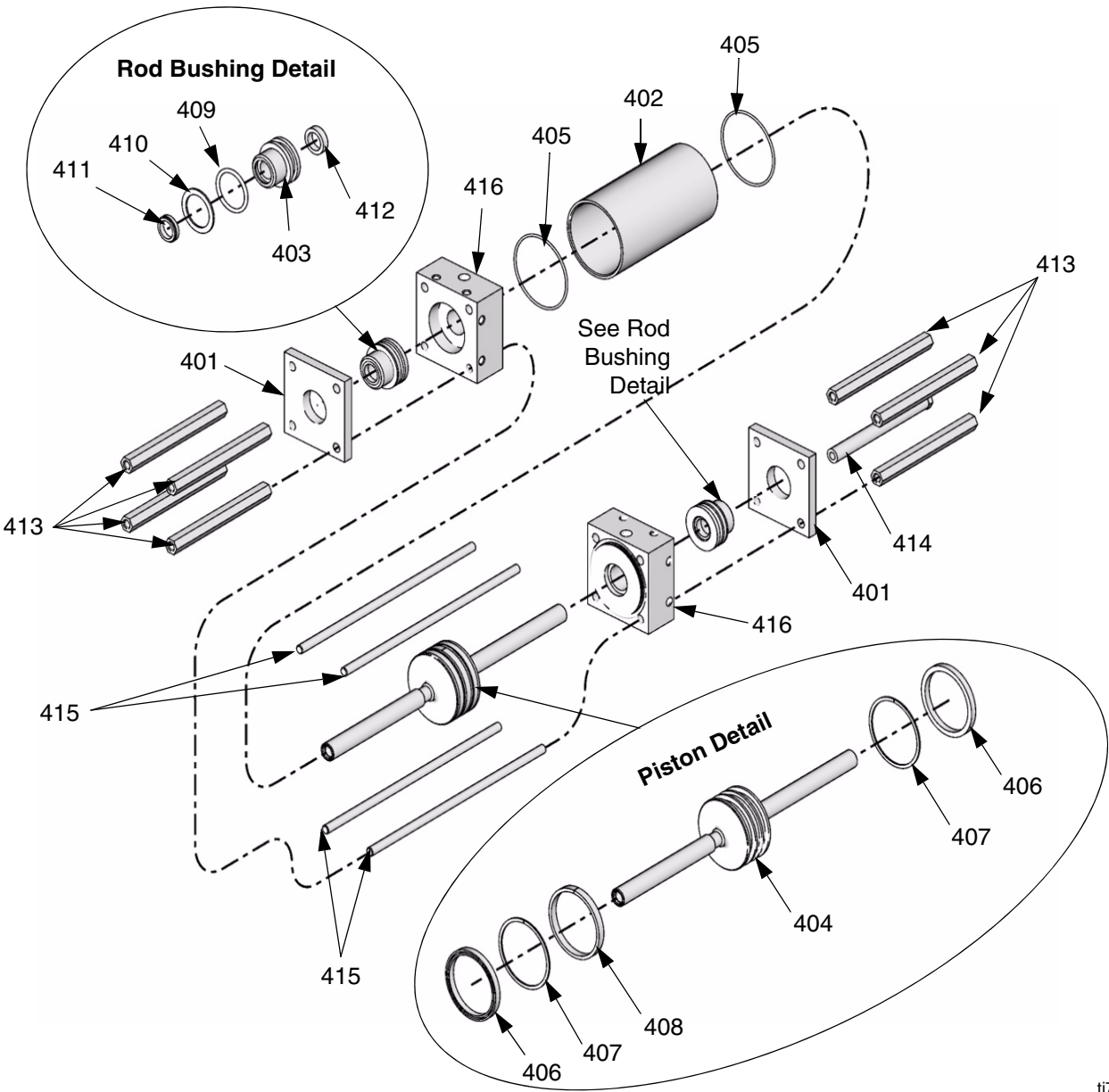


 Apply 110009 thermal heatsink compound.

TI9842a

| Ref. | Part | Description | Qty | Ref. | Part | Description | Qty |
|------|--------|---|-----|------|--------|---------------------------|-----|
| 301 | 15J090 | HOUSING, heater | 1 | 307 | 15B138 | HEATER, immersion; 2550 W | 3 |
| 302 | 15H302 | FITTING, reducer | 3 | 308 | 15B137 | SWITCH, overtemperature | 1 |
| 303 | 15H307 | ADAPTER, 3/4 npt(m) x 1/2 in. (13 mm) OD tube | 2 | 309 | 15B135 | MIXER, immersion heater | 3 |
| 304 | 15H304 | PLUG | 3 | 310 | 117484 | SENSOR | 1 |
| 305 | 15H306 | ADAPTER, thermocouple | 1 | 311 | 100518 | SCREW, machine, pan hd | 2 |
| 306 | 120336 | O-RING; fluoroelastomer | 1 | 313 | 15H305 | PLUG, hollow | 5 |

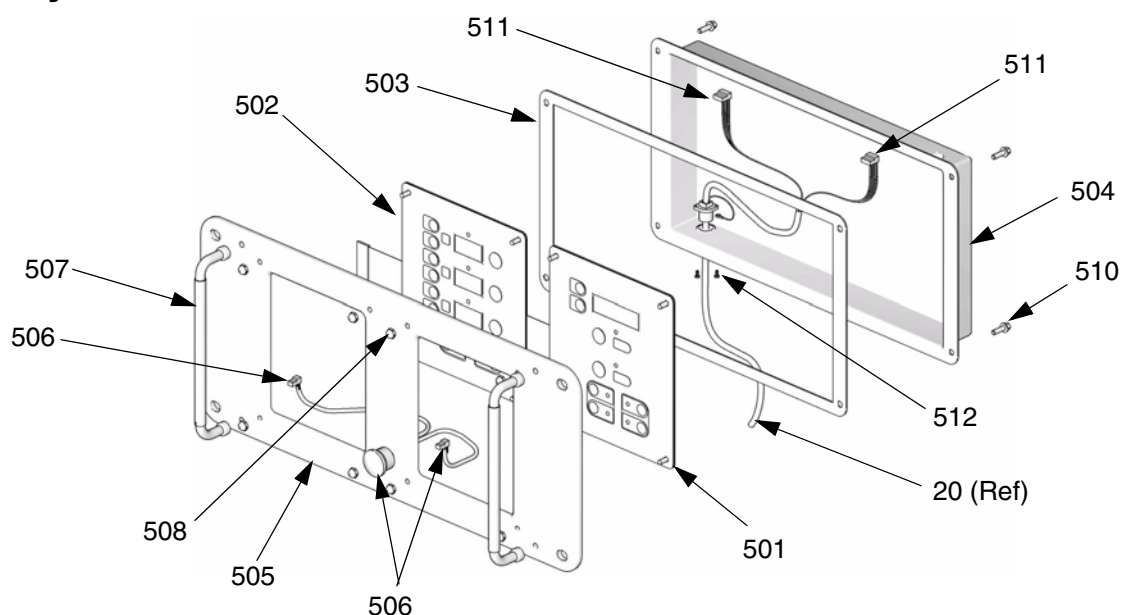
Hydraulic Cylinder



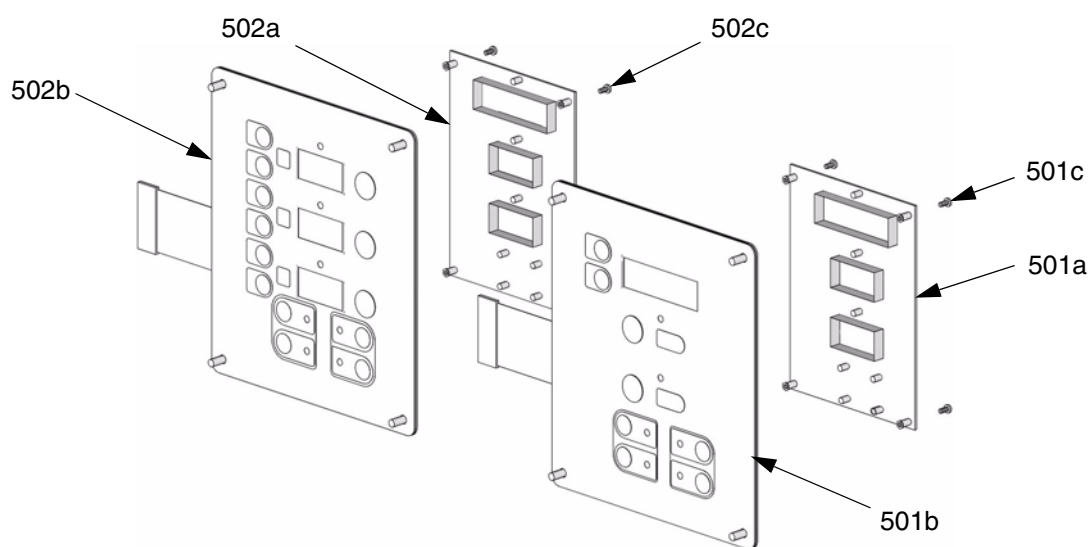
ti7727a

| Ref. | Part | Description | Qty. | Ref. | Part | Description | Qty. |
|------|--------|-----------------|------|------|--------|----------------------------|------|
| 401 | 295029 | PLATE, retainer | 2 | 409 | 158776 | O-RING | 2 |
| 402 | 295030 | CYLINDER | 1 | 410 | 295644 | RING, backup | 2 |
| 403 | 295031 | BUSHING, rod | 2 | 411 | 295645 | WIPER, rod | 2 |
| 404 | 296642 | PISTON | 1 | 412 | 296644 | SEAL, shaft | 2 |
| 405 | 295640 | O-RING | 2 | 413 | 295032 | SPACER, proportioning pump | 7 |
| 406 | 295641 | U-CUP | 2 | 414 | 261861 | SPACER, reverse switch | 1 |
| 407 | 295642 | RING, backup | 2 | 415 | 295034 | ROD, tie | 4 |
| 408 | 296643 | RING, wear | 1 | 416 | 295035 | BLOCK, port | 2 |

Display



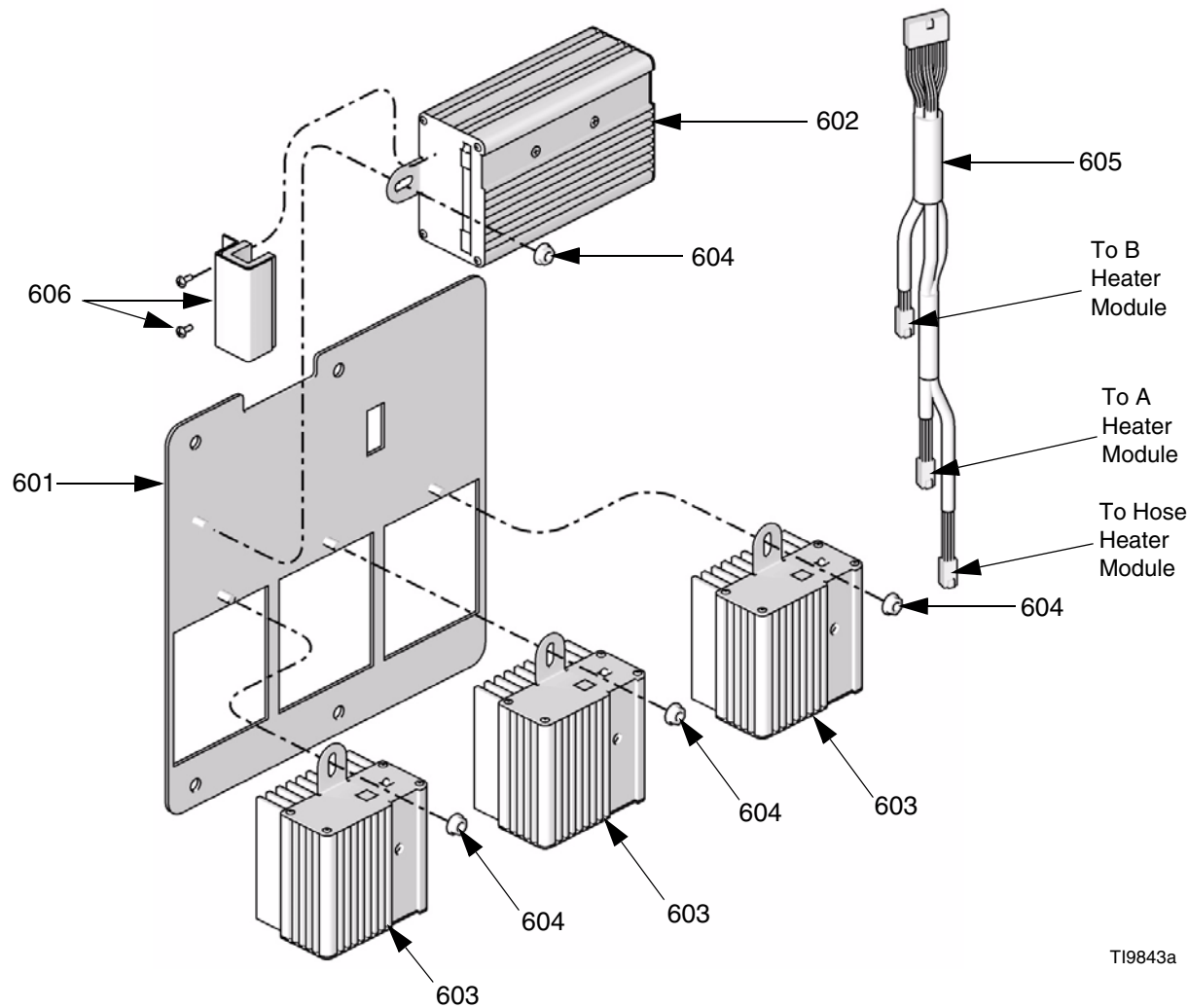
ti2574a



ti3172a

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

Temperature Control



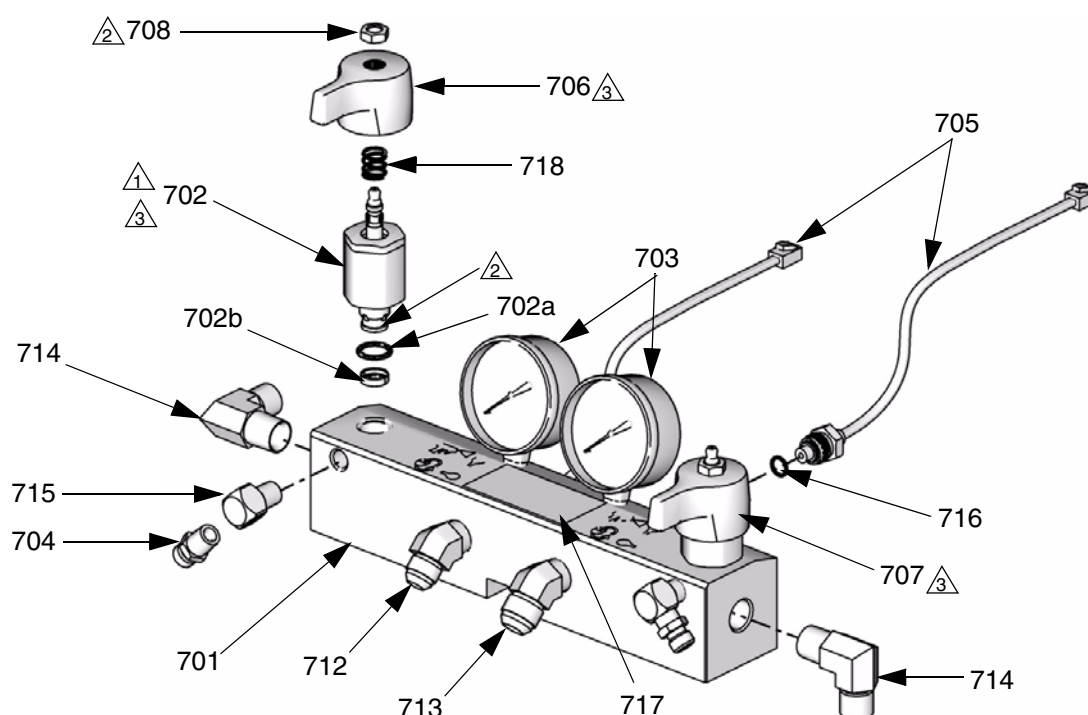
TI9843a

| 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.



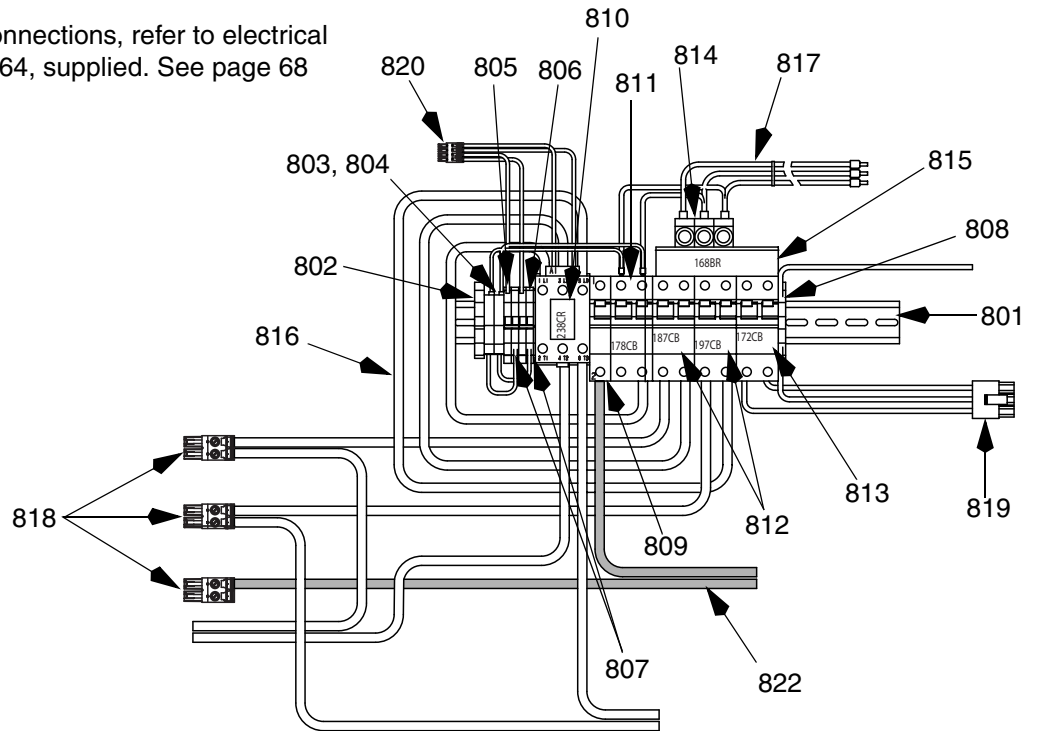
TI9839a

| Ref. | Part | Description | Qty. | Ref. | Part | Description | Qty. |
|-------|--------|-------------------------------|------|--|--------|-----------------------------------|------|
| 701 | 247837 | MANIFOLD, fluid | 1 | 714 | 117532 | 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 | 246123 | 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

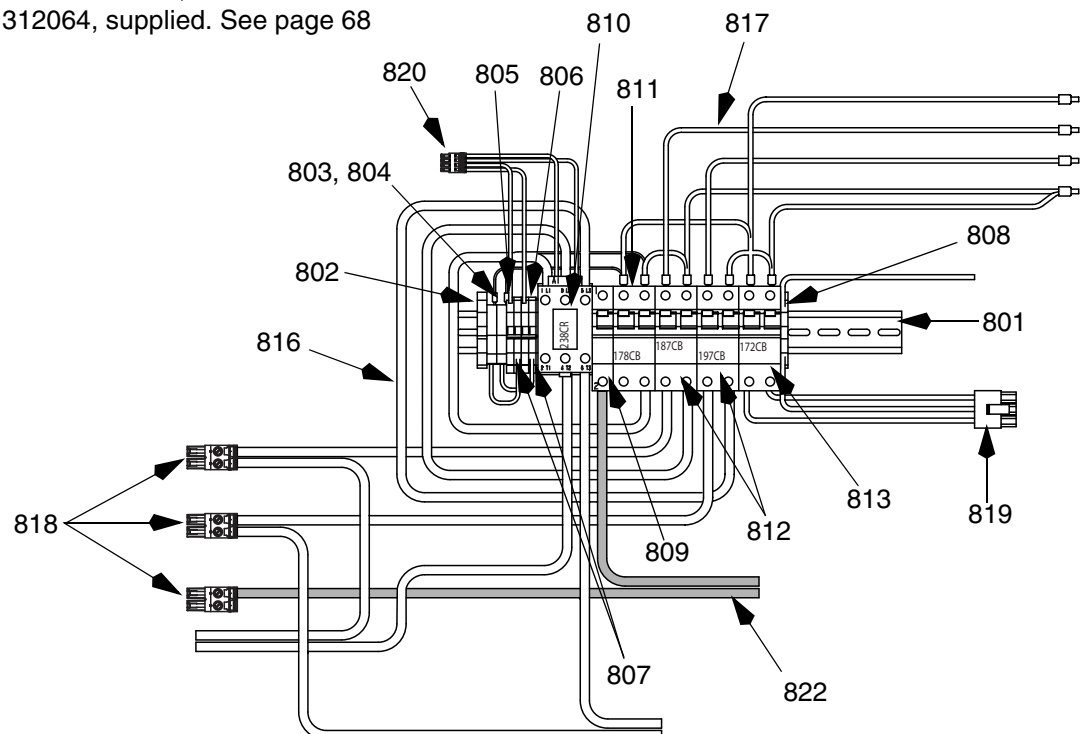
A - 230V, 3 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 68 for parts.



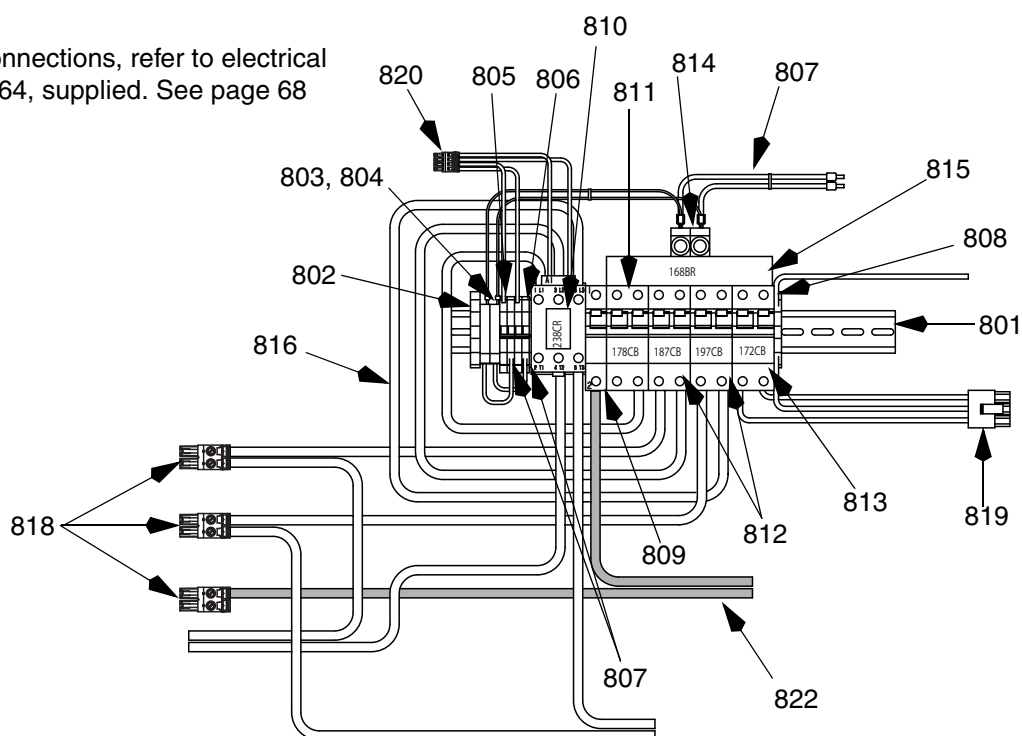
B - 400V, 3 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 68 for parts.



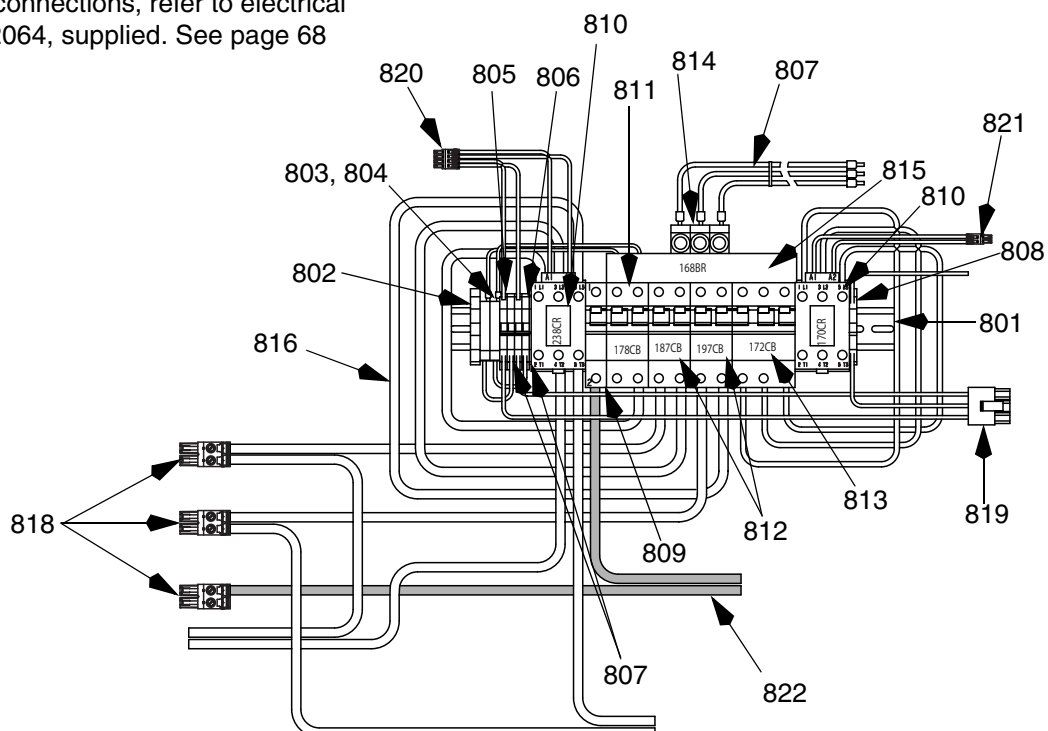
C - 230V, 1 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 68 for parts.




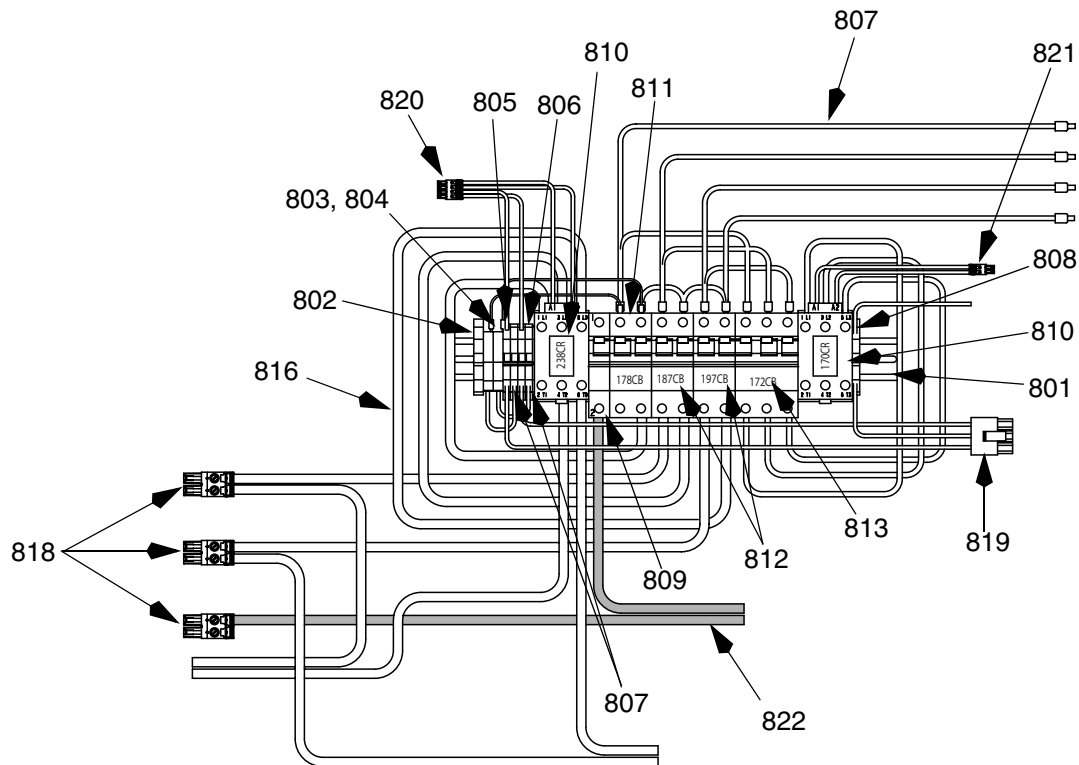
D - 230V, 3 Phase Circuit Breaker Modules

For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 68 for parts.



E - 400V, 3 Phase Circuit Breaker Modules

 For wiring and cable connections, refer to electrical diagrams manual 312064, supplied. See page 68 for parts.



Circuit Breaker Modules Parts List

| Ref. | Description | Breaker Modules | | | | | Qty |
|------|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----|
| | | A 230V, 3 phase | B 400V, 3 phase | C 230V, 1 phase | D 230V, 3 phase | E 400V, 3 phase | |
| 801 | RAIL, mounting | 255028 | 255028 | 255028 | 255028 | 255028 | 1 |
| 802 | CLAMP, block, end | 255045 | 255045 | 255045 | 255045 | 255045 | 1 |
| 803 | HOLDER, fuse terminal, block | 255043 | 255043 | 255043 | 255043 | 255043 | 2 |
| 804 | FUSE | 255023 | 255023 | 255023 | 255023 | 255023 | 2 |
| 805 | TERMINAL, block | 255042 | 255042 | 255042 | 255042 | 255042 | 4 |
| 806 | TERMINAL, end cover | 120894 | 120894 | 120894 | 120894 | 120894 | 1 |
| 807 | BRIDGE, plug in, jumper | 255044 | 255044 | 255044 | 255044 | 255044 | 2 |
| 808 | BLOCK, terminal ground | 255046 | 255046 | 255046 | 255046 | 255046 | 1 |
| 809 | BREAKER, 1 pole, 50A | 255026 | 255026 | 255026 | 255026 | 255026 | 1 |
| 810 | CONTACTOR, relay, 65A | 255022 | 255022 | 255022 | | | 1 |
| | CONTACTOR, relay, 65A | | | | 255022 | 255022 | 2 |
| 811 | BREAKER, 2 phase, 40A | 247768 | 247768 | 247768 | 247768 | 247768 | 1 |
| 812 | BREAKER, 2 phase, 25A | *255050 | *255050 | *255050 | | | 2 |
| | BREAKER, 2 phase, 40A | †247768 | †247768 | †*247768 | | | 2 |
| | BREAKER, 2 phase, 50A | | | | 120579 | 120579 | 2 |
| 813 | BREAKER, 2 phase, 20A | 255049 | 255049 | *†255049 | | | 1 |
| | BREAKER, 3 pole, 20A | | | | 255025 | 255025 | 1 |
| | BREAKER, 2 phase, 30A | | | ※255041 | | | 1 |
| 814 | CONNECTOR, power lug | 117679 | | | 117679 | | 3 |
| | CONNECTOR, power lug | | | 117679 | | | 2 |
| 815 | BAR, power buss, 3 phase | 117805 | | | | | 1 |
| | BAR, power buss, 1 phase | | | 117678 | | | 1 |
| | BAR, power buss, 3 phase, 3x3 | | | | 255024 | | 1 |
| 816 | CABLE, harness lower | 247802 | 247802 | 247802 | 247803 | 247803 | 1 |
| 817 | CABLE, harness upper | 247805 | 247806 | 247804 | 247808 | 247807 | 1 |
| 818 | CONNECTOR, 2 pin large | 255027 | 255027 | 255027 | 255027 | 255027 | 3 |
| 819 | CONNECTOR, 3 pin | 120895 | 120895 | 120895 | 120895 | 120895 | 1 |
| 820 | CONNECTOR, 4 pin | 255031 | 255031 | 255031 | 255031 | 255031 | 1 |
| 821 | CONNECTOR, 2 pin small | | | | 255030 | 255030 | 1 |
| 822 | CABLE, harness, hose wire | 247791 | 247791 | 247791 | 247791 | 247791 | 1 |

* 8 kW H-25 models only.

※ 12kW H-40 models only.

† 15.3 kW H-25, H-XP2, H-40 models only.

[illegible]

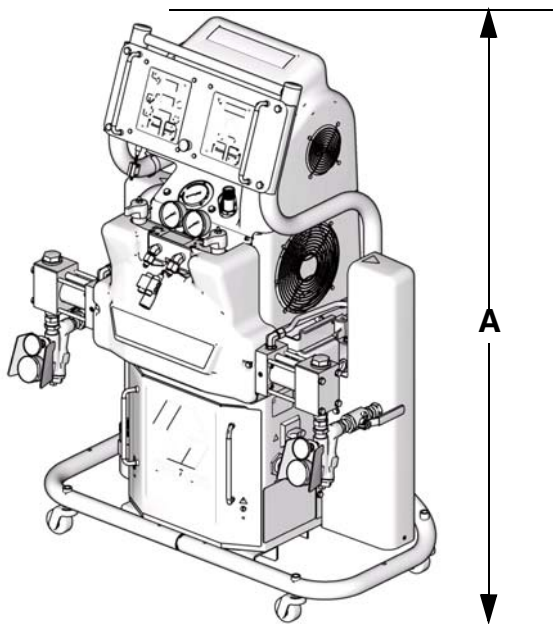
Dimensions

Dimension

| | |
|--------------------------|-------------|
| A (height) | 55.0 (1397) |
| B (width) | 39.6 (1006) |
| C (depth) | 18.5 (470) |
| D (front mounting holes) | 29.34 (745) |
| E (rear mounting holes) | 33.6 (853) |

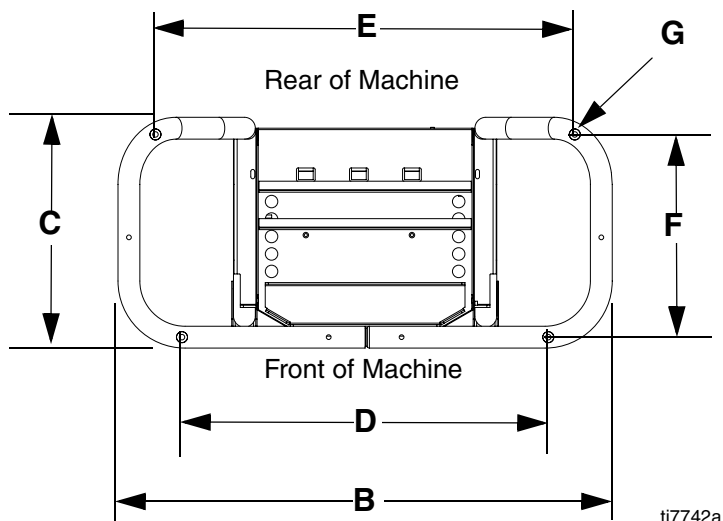
Dimension

| | |
|----------------------------------|-------------|
| F (side mounting holes) | 16.25 (413) |
| G (mounting post inner diameter) | 0.44 (11) |
| H (front mounting post height) | 2.0 (51) |
| J (rear mounting post height) | 3.6 (92) |



ti9830a

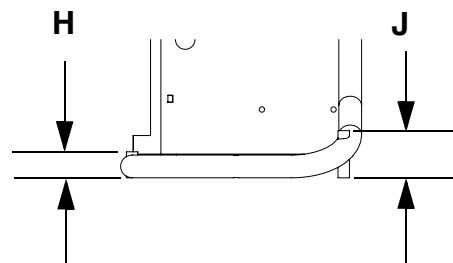
Top View



ti7742a

Side View

Detail of mounting post height, to correctly size mounting bolts



ti7743a

Technical Data

| Category | Data |
|---|--|
| Maximum Fluid Working Pressure | Models H-25 and H-40: 2000 psi (13.8 MPa, 138 bar) Models H-XP2 and H-XP3: 3500 psi (24.1 MPa, 241 bar) |
| Fluid:Oil Pressure Ratio | Models H-25 and H-40: 1.91:1 Models H-XP2 and H-XP3: 2.79:1 |
| Fluid Inlets | Component A (ISO): 1/2 npt(f), 250 psi (1.75 MPa, 17.5 bar) maximum Component B (RES): 3/4 npt(f), 250 psi (1.75 MPa, 17.5 bar) maximum |
| Fluid Outlets | Component A (ISO): #8 JIC (3/4-16 unf), with #5 JIC adapter Component B (RES): #10 JIC (7/8-14 unf), with #6 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) | Model H-25: 22 lb/min (10 kg/min) (60 Hz) Model H-XP2: 1.5 gpm (5.7 liter/min) (60 Hz) Model H-40: 45 lb/min (20 kg/min) (60 Hz) Model H-XP3: 2.8 gpm (10.6 liter/min) (60 Hz) |
| Output per Cycle (A and B) | Models H-25 and H-40: 0.063 gal. (0.23 liter) Models H-XP2 and H-XP3: 0.042 gal. (0.16 liter) |
| Line Voltage Requirement | 230V 1 phase and 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 | 90.2 dB(A) |
| Sound pressure, 1 m from equipment | 82.6 dB(A) |
| Weight | Units with 8.0 kW Heaters: 535 lb (243 kg) Units with 12.0 kW Heaters: 597 lb (271 kg) Units with 15.3 kW Heaters (H-25/H-XP2 models): 562 lb (255 kg) Units with 15.3 kW Heaters (H-40/H-XP3 models): 597 lb (271 kg) Units with 20.4 kW Heaters: 597 lb (271 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.

Graco Standard Warranty

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

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

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

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

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

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

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

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