

## Temperature Control Diagnostic Codes

### NOTICE

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

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	8
02	High zone current	Individual	9
03	No zone current with hose heater on	Individual	9
04	FTS not connected	Individual	10
05	Board overtemperature	Individual	10
06	Communication cable unplugged from module	Individual	10
99	Loss of communication	A	15



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.
- Loose wire
- On 8 kW heater models only: Jumper wire on J1 connector, between module (3) and display (4), is loose or incorrectly wired.

### Checks

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

Check which zone is displaying the E01 error.

1. Check that connector B is firmly plugged into temperature control module (see FIG. 8, page 35).
2. Clean and re-plug connections.
3. Check connections between the temperature control module and overtemperature switches A and B (308), and between temperature control module and thermocouples A and B (310) or FTS (21) [depending on which zone is displaying E01]. See TABLE 6, page 35. Ensure that all wires are securely connected to connector B.

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Temperature Control Diagnostic Codes

- 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	open

- Verify fluid temperature, using an external temperature sensing device.
- If temperature *is* too high (sensor reading is 229°F [109°C] or above):
- Check if thermocouples A and B are damaged, or not contacting the heater element, page 38.
- To test that temperature control module turns off when equipment reaches temperature setpoint:
  - Set temperature setpoints far below displayed temperature.
  - Turn zone on. If temperature rises steadily, power board is failing.
  - Verify by swapping with another power module. See **Replacing Temperature Control Assembly Modules**, page 36.
  - If the swapped module does not fix the problem, the power module is not the cause.
- Verify continuity of heater elements with an ohmmeter, see page 37.

## E02: High zone current



- Turn main power OFF .
- Relieve pressure, page 27.
-  Disconnect whip hose.
- Disconnect hose connector (D) at Reactor.
- Using an ohmmeter, check between the two terminals of the connector (D). There should be no continuity.
- Exchange zone module with another one. Turn zone on and check for error. If error disappears, replace faulty module.

*For hose zone:* If error still occurs, perform **Transformer Primary Check** and **Transformer Secondary Check** starting on page 41.

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

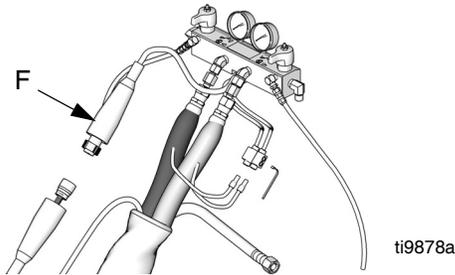
## E03: No zone current

- Check for tripped circuit breaker inside electrical cabinet or at power source for that zone. Replace circuit breaker if it trips habitually.
- Check for loose or broken connection at that zone.
- Exchange zone module with another one. Turn zone on and check for error (see page 36). If error disappears, replace faulty module.
- If E03 occurs for all zones, the contactor may not be closing. Verify wiring from heater control to contactor coil.
  - Hose zone:* test hose continuity, page 39.
  - Perform **Transformer Primary Check** and **Transformer Secondary Check**, starting on page 41.

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

## E04: Fluid Temperature Sensor (FTS) or thermocouple disconnected

1. Check temperature sensor connections to long green connector (B) on temperature control module, page 35. Unplug and re-plug sensor wires.
2. Test fluid temperature sensor continuity with ohmmeter, page 8.
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	12
22	No transducer (component B)	A	12
23	High fluid pressure	A	12
24	Pressure imbalance	A/W (to select, see page 32)	12
27	High motor temperature	A	14
30	Momentary loss of communication	A	14
31	Pumpline reversing switch failure/high cycle rate	A	14
99	Loss of communication	A	15

# Hydraulic Reactors - Troubleshooting - Error Codes

Motor Control Diagnostic Codes

## E21: No component A transducer

1. Check transducer A connection at J3 on motor control board, page 33, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer B (E22), replace transducer A, page 34. If error does not move, replace motor control board, page 32.

## E22: No component B transducer

1. Check transducer B connection at J8 on motor control board, page 33, and clean contacts.
2. Reverse A and B transducer connections. If error moves to transducer A (E21), replace transducer B, page 34. If error does not move, replace motor control board, page 32.

## E23: High fluid pressure

1. Relieve pressure. Verify low pressure with analog gauges. Turn main power OFF



. If error persists, do checks below.



then ON

2. If pressure imbalance is set to Warning instead of Alarm (see page 32), an E23 will occur. See **E24: Pressure imbalance** for causes and checks.

## 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 32.

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

# Hydraulic Reactors - Troubleshooting - Error Codes

Motor Control Diagnostic Codes

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

3. For testing purposes only, set DIP switch 2 on the motor control board to OFF. See page 32. 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.

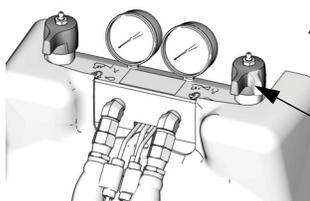
**If the higher gauge and display do not match**, that transducer is not communicating with the motor control board. Check wire connections and replace transducer, page 34.

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



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

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



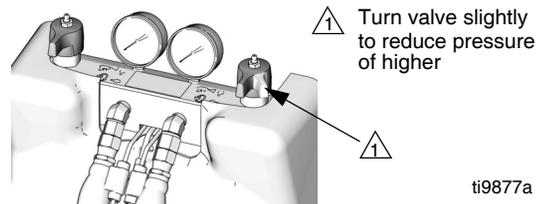
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4. To test if the failure is with the transducer or the socket on the motor control board:
  - a. Reverse connections at J3 and J8 on the motor control board.
  - b. Run the unit until pressure is 1000-1500 psi (7-10.5 MPa, 70-105 bar).
  - c. If the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

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

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

RELIEF/CIRCULATION , until gauges show balanced pressures.



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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.

# Hydraulic Reactors - Troubleshooting - Error Codes

## Motor Control Diagnostic Codes

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 33.
- 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 32. 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 26.

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

## **E99: Loss of communication**

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

1. Check all wiring between the display and the motor control board and the temperature control module. Pay close attention to the wire crimping at J13 on the motor control board (page 33) and (C) on the temperature control module (page 35). 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 68). Check the motor control board voltage at motor/pumps circuit breaker (813), see page 30.
- **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.