


**Troubleshooting guide**





See *System tests* on page 5-18 for detailed test procedures.





It is important to note, when troubleshooting a problem on the Powermax45, how the front panel LEDs operate. To help diagnose transient problems, an illuminated or blinking LED, including the bottom bar on the gas pressure bar, may continue to illuminate or blink for 10 to 20 seconds after the system is powered OFF. Once the system is powered ON, the LED should not illuminate or blink if the fault has been cleared.

Also, note that there is no static gas pressure reading. So the gas pressure LEDs may not indicate a low pressure situation if the gas was not connected when the system was powered ON. Attempting to fire the torch without the gas connected will cause the bottom yellow gas pressure LED to blink.

<b>Problem</b>	<b>This may mean</b>	<b>Cause</b>	<b>Solution</b>
<p>The ON/OFF power switch is set to ON (I), but the power ON LED is not illuminated.</p>	<p>There is insufficient voltage to the control circuits or a short-circuited power component.</p>	<ul style="list-style-type: none"> <li>▪ The system has no incoming voltage or an improper incoming voltage.</li> <li>▪ The power board is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check to see that the system is plugged into an appropriately-sized circuit and that the circuit breaker has not been tripped.</li> <li>▪ Perform <i>Test 1 – voltage input</i> on page 5-18 to check the incoming voltage and the power switch.</li> </ul>
<p>The power ON LED is illuminated, the fault LED is illuminated, and the bottom LED on the gas pressure bar is illuminated yellow and is blinking.</p> 	<p>There is insufficient gas pressure to the machine.</p>	<ul style="list-style-type: none"> <li>▪ There is no gas attached to the system.</li> <li>▪ The gas supply line has a restriction or the air filter element is dirty.</li> <li>▪ The reading at the pressure transducer is below the minimum acceptable gas pressure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure that the gas supply is connected correctly.</li> <li>▪ Check the gas supply line for restrictions or damage.</li> <li>▪ Check the air filter element and replace it if necessary.</li> <li>▪ Perform <i>Test 9 – pressure transducer</i> on page 5-28 to verify that the pressure transducer functions correctly.</li> </ul>

## TROUBLESHOOTING AND SYSTEM TESTS

Problem	This may mean	Cause	Solution
<p>The power ON LED is illuminated and the yellow temperature LED is illuminated.</p> 	<p>The internal system temperature is either over or under its operating range (approximately -30° C to 80° C).</p>	<ul style="list-style-type: none"> <li>▪ The power supply is too cold.</li> <li>▪ You have exceeded the duty cycle. (For more information about duty cycle, see the <i>Operation</i> section.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Allow the power supply to warm up if it has been extremely cold.</li> <li>▪ Check the area around the system to make sure that the air flow is not blocked.</li> <li>▪ If the duty cycle has been exceeded, let the system cool before using it again.</li> <li>▪ Perform <i>Test 8 – fan</i> on page 5-27 to make sure the fan is operating correctly.</li> </ul>
<p>The power ON LED is blinking.</p> 	<p>The incoming voltage is not correct.</p>	<ul style="list-style-type: none"> <li>▪ The incoming voltage is either too high or too low (a variance greater than ±15% of the rated voltage).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Perform <i>Test 1 – voltage input</i> on page 5-18 to check the incoming line voltage.</li> </ul>
<p>The power ON LED is illuminated and the torch cap LED is illuminated.</p> 	<p>The cap-sensing circuit is not satisfied.</p>	<ul style="list-style-type: none"> <li>▪ The consumables are loose, improperly installed, or missing.</li> <li>▪ The cap-sensor switch is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Correctly install the consumables.</li> <li>▪ Perform <i>Test 7 – torch cap sensor</i> on page 5-27 to test the cap-sensor switch.</li> </ul>
<p>The power ON LED is illuminated and the torch cap LED blinks.</p> 	<p>This indicates either a “torch stuck open” or “torch stuck closed” situation.</p>	<ul style="list-style-type: none"> <li>▪ The consumables are installed incorrectly, they are worn, or were removed while the power supply is ON.</li> <li>▪ The torch plunger is stuck.</li> <li>▪ The torch or lead has a broken wire.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check the consumables for wear and replace if necessary.</li> <li>▪ Make sure they are properly installed.</li> <li>▪ Verify that they are finger-tight. Try loosening them 1/8th of a turn and restarting the power supply.</li> <li>▪ Perform <i>Test 5 – torch stuck open (TSO) or torch stuck closed (TSC)</i> on page 5-25 and replace the torch head if necessary.</li> </ul>

Problem	This may mean	Cause	Solution
<p>The power ON LED is illuminated or is blinking and the fault LED is blinking.</p> 	<p>A major fault has occurred in the power supply.</p>	<ul style="list-style-type: none"> <li>▪ Any of the fan, solenoid valve, control board, or power board may be faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The error LED on the control board should be flashing. The number of times it flashes between pauses indicates which components to test. See <i>Control Board LEDs</i> on page 5-16.</li> </ul>
<p>The power ON LED is illuminated and the fault LED and the temperature LED alternately flash when the system is powered ON.</p> 	<p>The system was powered on while the plasma start signal was being sent.</p>	<ul style="list-style-type: none"> <li>▪ The system was powered on while the torch trigger was being pulled or the trigger was activated too soon after the system was powered on.</li> <li>▪ The start circuit is stuck closed.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Release the torch trigger and turn OFF the power supply and then turn it ON again to reset the unit. Be sure to allow time for the soft start circuit to be satisfied.</li> <li>▪ Perform <i>Test 6 – plasma start</i> on page 5-26 to test the start signal.</li> </ul>
<p>The power ON LED is illuminated and no fault LEDs are illuminated, but no gas flows when the torch trigger is pulled.</p> 	<p>The start signal is not reaching the control board.</p>	<ul style="list-style-type: none"> <li>▪ The torch or torch lead may be damaged.</li> <li>▪ The power board may be faulty.</li> <li>▪ The control board may be faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure that the gas is connected (gas pressure LED will illuminate yellow after the torch is activated).</li> <li>▪ Inspect the torch and torch lead for damage.</li> <li>▪ Verify that the control board start LED illuminates when the trigger is pulled. If it does not, perform <i>Test 6 – plasma start</i> on page 5-26 to check the start signal from the power board.</li> </ul>
<p>Gas flows when the system is powered ON.</p> 	<p>The incoming gas pressure is too high or the system is in gas test mode.</p>	<ul style="list-style-type: none"> <li>▪ Verify that the mode switch is not set to gas test mode.</li> <li>▪ The gas pressure from the compressor or cylinder may be too high.</li> <li>▪ The gas solenoid valve may be faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check the gas supply to make sure that it does not exceed 9.3 bar (135 psi). If necessary, reduce the pressure.</li> <li>▪ Perform <i>Test 4 – solenoid valve</i> on page 5-24 to verify that the gas solenoid valve is functioning correctly.</li> </ul>

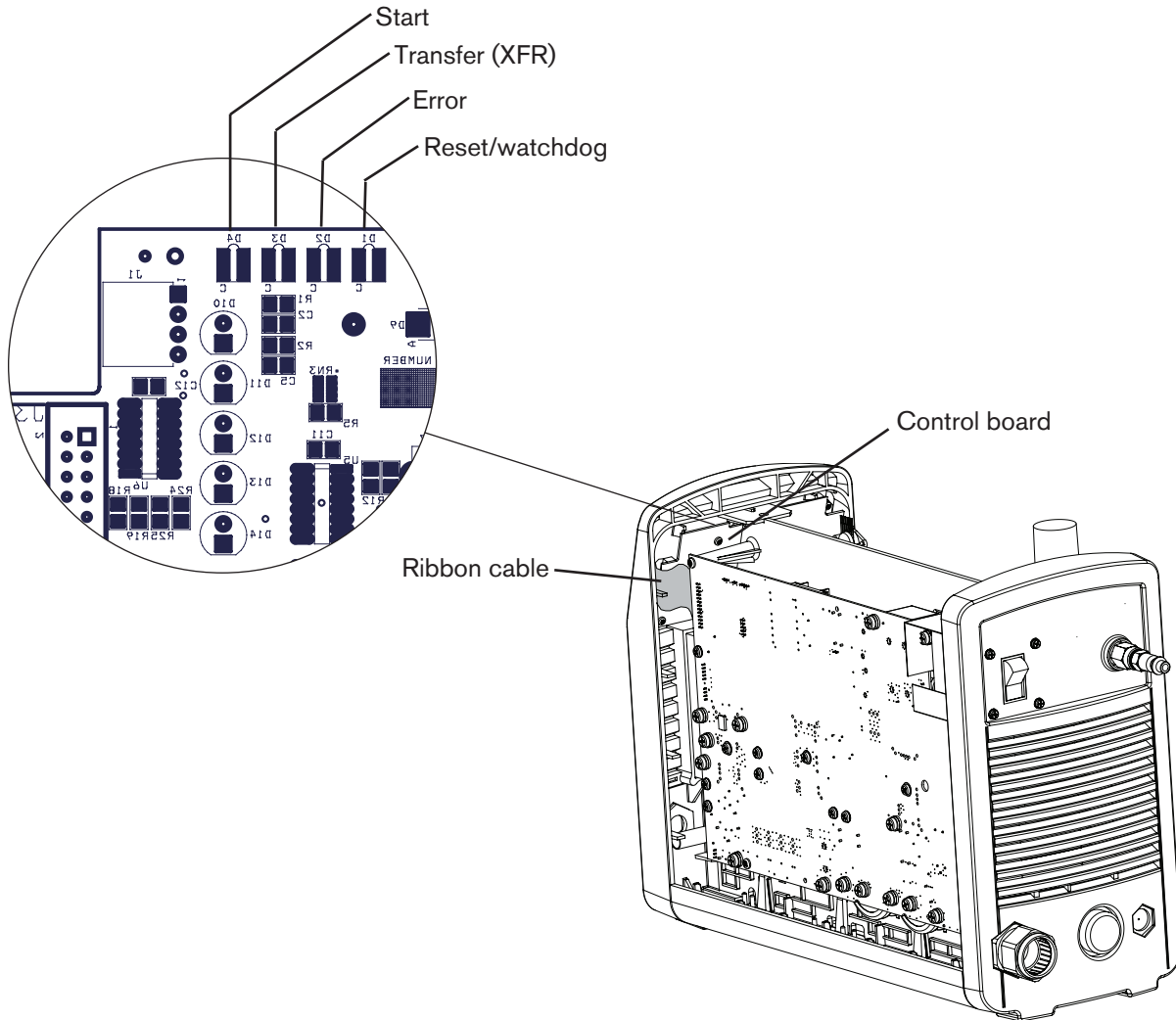
## TROUBLESHOOTING AND SYSTEM TESTS

Problem	This may mean	Cause	Solution
<p>When pulling the torch's trigger, gas flows from the torch, but the torch does not fire or fires only for a short period of time, or the pilot arc starts but extinguishes before the normal 5-second time-out period.</p>	<p>The consumables, torch, or torch lead are not functioning correctly, the gas pressure may be too low or too high, the air quality may be poor, or there is a voltage imbalance on the power board.</p>	<ul style="list-style-type: none"> <li>▪ The consumables may be worn or damaged.</li> <li>▪ The torch or torch lead may be damaged.</li> <li>▪ The gas pressure is too high or too low or the gas supply is restricted.</li> <li>▪ The gas filter element is dirty.</li> <li>▪ The power board is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Inspect the consumables, torch, and lead. Replace any damaged parts.</li> <li>▪ Verify that the gas supply is providing at least 4.5 bar (65 psi) and does not exceed 9.3 bar (135 psi).</li> <li>▪ Repair any restrictions in the supply line.</li> <li>▪ Replace the gas filter element if dirty.</li> <li>▪ Perform <i>Test 3 – VBUS and voltage balance</i> on page 5-20 to test the voltage balance on the power board.</li> </ul>
<p>Arc goes out while cutting or intermittently will not fire.</p>	<p>The arc lost contact with the workpiece.</p>	<ul style="list-style-type: none"> <li>▪ The work lead or work lead connection may be faulty.</li> <li>▪ The material being cut may require the use of continuous pilot arc mode.</li> </ul>	<ul style="list-style-type: none"> <li>▪ If you are cutting expanded metal, grate, or any metal with holes, set the mode switch to continuous pilot arc mode.</li> <li>▪ Check for loose connections at the work clamp and at the power supply.</li> <li>▪ Reposition the work lead on the workpiece.</li> <li>▪ Clean the cutting surface to ensure a better connection with the work lead.</li> </ul>
<p>The cut quality is poor or the cut does not sever the metal.</p>	<p>The consumables are worn, there is a poor work lead connection, the output from the power supply is too low, or the power board is producing low current.</p>	<ul style="list-style-type: none"> <li>▪ The consumables need to be replaced.</li> <li>▪ The work lead may be damaged or not properly connected to the work piece.</li> <li>▪ The amps adjustment knob may be set too low.</li> <li>▪ The power board may be faulty.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Inspect the consumables and replace if necessary.</li> <li>▪ Inspect the work lead for damage. Reposition it and clean the work surface to ensure good contact.</li> <li>▪ Check the amps adjustment knob setting. If your input circuit is 200 V, 34 A; 240 V, 28 A; 400 V, 10 A; or 480 V, 8.5 A, turn the knob to the highest setting.</li> </ul>

<b>Problem</b>	<b>This may mean</b>	<b>Cause</b>	<b>Solution</b>
The pilot arc extinguishes when you move the plasma arc off the work piece while still pulling the torch's trigger.	The continuous pilot arc feature is not working.	<ul style="list-style-type: none"><li>▪ The mode switch may be set incorrectly.</li><li>▪ The power board or the control board may be faulty.</li></ul>	<ul style="list-style-type: none"><li>▪ Verify that the mode switch is set to continuous pilot arc.</li><li>▪ Perform <i>Test 2 – power board voltage checks</i> on page 5-19 and <i>Test 3 – VBUS and voltage balance</i> on page 5-20 to verify that the power board is functioning properly. If the power board is faulty, replace it. Otherwise, replace the control board.</li></ul>

### Control Board LEDs

The Powermax45 control board (PCB1) has 4 diagnostic LEDs.



The control board LEDs are:

- Start – The power supply has a start signal. This LED illuminates when the power supply receives a start signal and remains illuminated during normal operation.
- Transfer – This LED illuminates when there is proper arc transfer between the torch and the workpiece, and will flash during continuous pilot arc operation (such as when cutting expanded metal or moving the arc off the plate and then back on).
- Error – The Error LED illuminates whenever there is a fault in the system. If the Fault LED on the front panel flashes and the Error LED on the control board also flashes, there is a major fault in the system. **The number of flashes between pauses indicates which component may have failed.**
- Reset – This LED illuminates when the reset circuit is active or the watchdog circuit fires.

During normal operation, the power ON LED on the front of the power supply and the Start and Transfer LEDs on the control board illuminate. When a problem occurs with the system, one or more of the LEDs on the front of the power supply and the Error LED or the Reset LED on the control board may illuminate or flash.

**Use the control board Error and Reset LEDs to troubleshoot**

The Error and Reset LEDs provide information to use when troubleshooting a system failure. If the LEDs on the front of the power supply are flashing, look at the Error LED on the control board to determine where the fault may be. Count the number of flashes and then look at the table below to determine the corrective action.

**Reset LED**

When the control board's Reset LED illuminates, the voltages on the power board may be incorrect. Perform the following tests at J7 on 200–240 V CSA power supplies and 230 V CE power supplies or J8 on 400 V CE and 480 V CSA power supplies (the pin numbers are the same for all power supplies) on the power board (see *Test 2 – power board voltage checks* on page 5-19):

- Test pin 25 to ground for 3.3 VDC ( $\pm 10\%$ ).
- Test pin 24 to ground for 5 VDC ( $\pm 10\%$ ).
- Test pin 12 to ground for 2.2 VDC ( $\pm 10\%$ ).

If the values you find are not within  $\pm 10\%$  of the above values, detach the control board's ribbon cable and perform the tests again. If you find the correct values the second time, replace the control board. Otherwise, replace the power board.

**Error LED**

The number of times the Error LED flashes indicates the problem detected. Each flash is a half-second long and each series of flashes is separated by a 2-second pause. See *System tests* on page 5-18 for detailed test procedures.

The following table shows the meaning associated with each set of flashes.

<b>Number of error LED flashes</b>	<b>Problem indicated</b>	<b>Solution</b>
1	Faulty control board	Replace the control board.
2	Faulty power board	Replace the power board.
3	Either a faulty power board or a faulty control board	<ul style="list-style-type: none"> <li>▪ Perform <i>Test 3 – VBUS and voltage balance</i> on page 5-20. If any of the values are incorrect, replace the power board.</li> <li>▪ Perform <i>Test 2 – power board voltage checks</i> on page 5-19. If any of the values for pins 5, 7, or 12 are incorrect, remove the control board and test again. If the values are correct, replace the control board.</li> <li>▪ When performing test 2, if the values for pins 5, 7, and 12 are correct, but any other values are incorrect, replace the power board.</li> </ul>
4	Faulty gas solenoid valve	Replace the gas solenoid valve.
5	Faulty fan	Replace the fan.
6	Machine motion relay fault	Replace the power board.