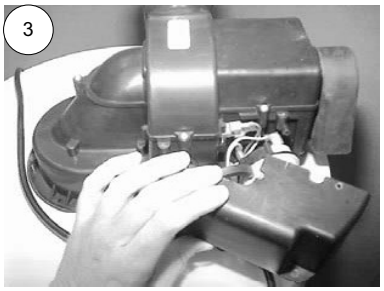
Pressure Switch Replacement

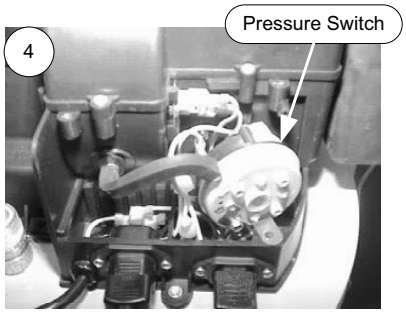
⚠ WARNING
115 volt potential exposure. Use caution to avoid personal injury.

Step 1. Position gas control power switch to "OFF" position.

Step 2. Remove the three screws (Phillips screw driver) from control access cover on blower assembly and remove cover (see photo 3).

Step 3. Carefully remove pressure switch from blower housing (see photo 4)

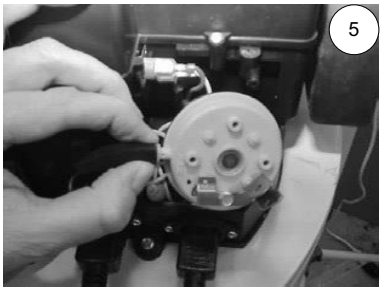




Slide pressure switch in direction of arrow while tilting slightly away from blower housing.

Step 4. Disconnect tubing from pressure switch. (see photo 5)

Step 5. Disconnect yellow wires from pressure switch (see photo 6)



Step 6. Reconnect wires from step 5 to new pressure switch.

Step 7. Reconnect tubing to new pressure switch.

Step 8. Carefully position pressure switch into blower housing.

Step 9. Position gas control power switch to "ON" position and verify proper heater operation.

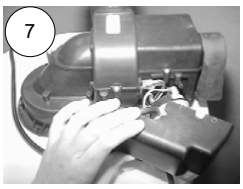
Step 10. Replace control access cover from step 2.

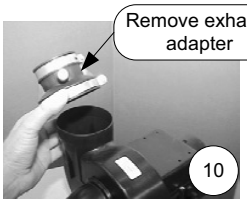
Blower Testing

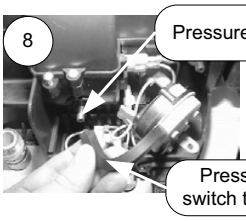
⚠ WARNING
115 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

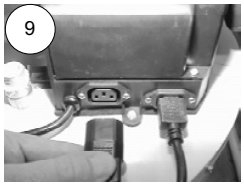
Step 1. Position gas control power switch to "ON" position and adjust control to call for heat.

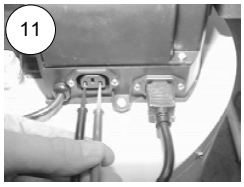
Step 2. Remove the three screws (Phillips Screw driver) from control access cover on blower assembly and remove cover (see photo 7).

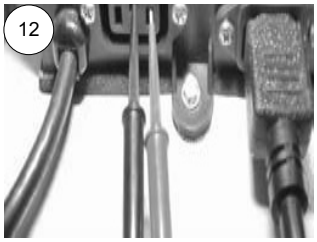


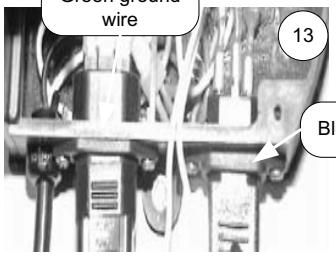












Shown with pressure switch removed.

Gas Control Testing

See pages 29 & 30 for gas control voltage testing.

Thermal Well Testing

If Control has gone into TCO lockout due to excessive tank temperature (four flash, 3 second pause) reset control by rotating knob of temperature control to the minimum setting for at least 6 seconds before returning to desired temperature setting.

↓

Observe heater operation. If control continues to lockout due to excessive tank temperature, proceed to thermal well testing to determine cause.

↓

Thermal well testing
Position gas control power switch to the "OFF" position and disconnect thermal well harness from gas control.

↓

Using a multi-meter set to the Ohms setting, determine the resistance of thermal well sensor (see caution photos 19 & 20)

↓

Once the thermal well resistance values are known, the water temperature must also be known to determine if the resistance values are correct. See page 25 to obtain water temperature.

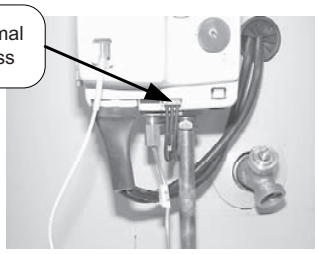
Are thermal well resistance values correct?

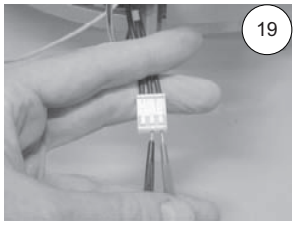
N → Replace thermal well (see page 26)

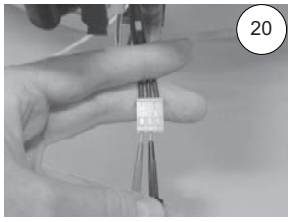
Y ↓

Replace gas control (see page 26)

Disconnect thermal well wire harness







⚠ CAUTION
DO NOT use standard multimeter probes for this test. Doing so will damage connector. Use special pin type electronic probes or small diameter wire pins inserted into connector.

Using a multi-meter set to the ohms setting, insert one meter probe (see caution) into center wire position of thermal well connector, insert the second probe (see caution) into either of the outside wire positions (see photo 19).

Alternate the probe on the outside position to the opposite outside wire position (see photo 20).

⚠ WARNING
Stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

Determine Water Temperature Inside Tank

Note: It is important to understand once the resistance for the thermal well is determined from page 24, water flow through the heater should not occur. Prior to performing the steps below, turn off the cold water supply to the water heater. This will prevent cold water flow into the tank affecting the resistance value of thermal well.

Step 1. Position gas control power switch to "OFF" position.

Step 2. Draw approximately 1 quart of water from drain valve into container and immediately measure water temperature using an accurate thermometer. It may be necessary to open a hot water faucet to allow heater to drain.

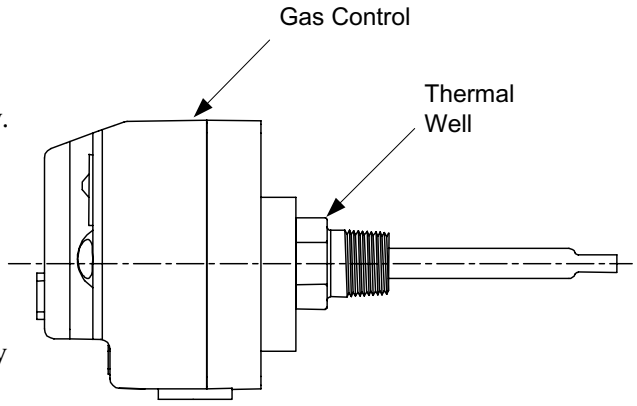
Step 3. Using the chart below, determine correct resistance value for the water temperature from step 2.

Example: If temperature of water is 84°F, then the resistance through the sensor would be 8449 (see shaded area). NOTE: Sensor resistance increases as the temperature falls.

Sensor Resistance at Various Temperatures

In Degrees F										
°F	0	1	2	3	4	5	6	7	8	9
40	26109	25400	24712	24045	23399	22771	22163	21573	21000	20445
50	19906	19383	18876	18383	17905	17440	16990	16553	16128	15715
60	15314	14925	14548	14180	13823	13477	13140	12812	12494	12185
70	11884	11592	11308	11032	10763	10502	10248	1000	9760	9526
80	9299	9078	8862	8653	8449	8250	8057	7869	7685	7507
90	7333	7165	7000	6839	6683	6531	6383	6238	6098	5961
100	5827	5697	5570	5446	5326	5208	5094	4982	4873	4767
110	4663	4562	4464	4368	4274	4183	4094	4006	3922	3839
120	3758	3679	3602	3527	3453	3382	3312	3244	3177	3112
130	3048	2986	2925	2866	2808	2752	2697	2643	2590	2538
140	2488	2439	2391	2344	2298	2253	2209	2166	2124	2083
150	2043	2004	1966	1928	1891	1856	1820	1786	1753	1720
160	1688	1656	1625	1595	1566	1537	1509	1481	1454	1427
170	1402	1376	1351	1327	1303	1280	1257	1235	1213	1191
180	1170	1150	1129	1110	1090	1071	1053	1035	1017	999
190	982	965	949	933	917	901	886	871	857	842
200	828	814	801	788	775	762	749	737	725	713

Gas Control & Thermal Well Removal From Water Heater



Step 1. Position gas valve power switch to the "OFF" position and Unplug Heater from power supply.

Step 2. Drain heater to a point below the gas control level.

Step 3. Turn off gas supply to water heater and disconnect gas piping from gas control.

Step 4. Disconnect wire harnesses and burner assembly from gas control.

Step 5. Remove gas control & thermal well by rotating flats of Thermal Well counter clockwise (1-5/16"wrench).

Gas Control Removal From Thermal Well

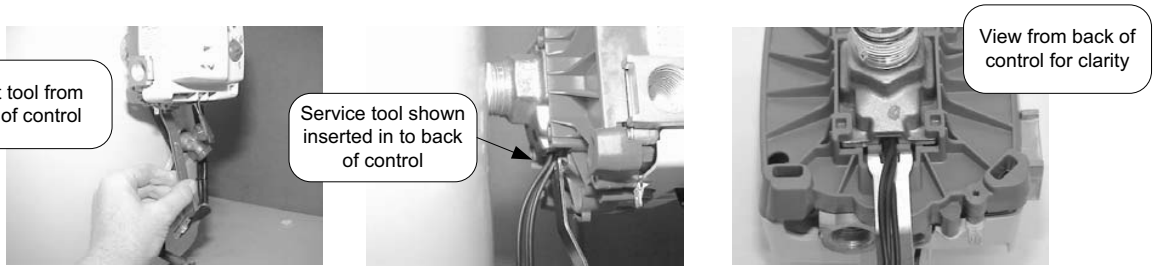
Follow the steps below allows removal gas control from thermal well without removing thermal well from tank.

Step 1. Position gas control power switch to the "OFF" position and unplug water heater from power supply.

Step 2. Turn off gas supply to water heater and disconnect gas piping from gas control.

Step 3. Disconnect wire harnesses & burner assembly from gas control.

Step 4. Using gas control service tool (239-45991-00) available from your BWC parts supplier, Insert tool into back of gas control (see photos below)



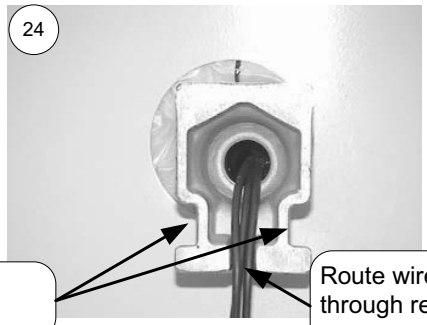
Step 5. Pivot tool towards heater as far as possible (see photo below). Lift straight up on gas control. The control should move about 1/8". At this point, remove tool not allowing the control to fall back. With tool removed, lift straight up on control to remove completely from Thermal Well.

Gas Control Assembly to Thermal Well

Step 1. Install threaded end of thermal well into tank. Be sure thermal well flange is positioned as shown in photo 24 for proper control alignment.

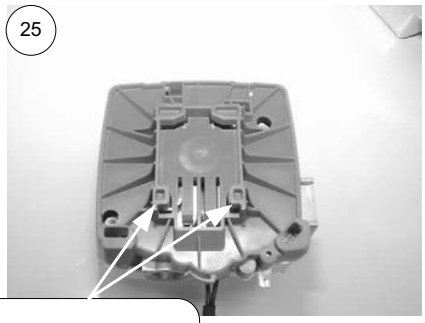
Step 2. Route wire leads back into relief opening. (see photo 24)

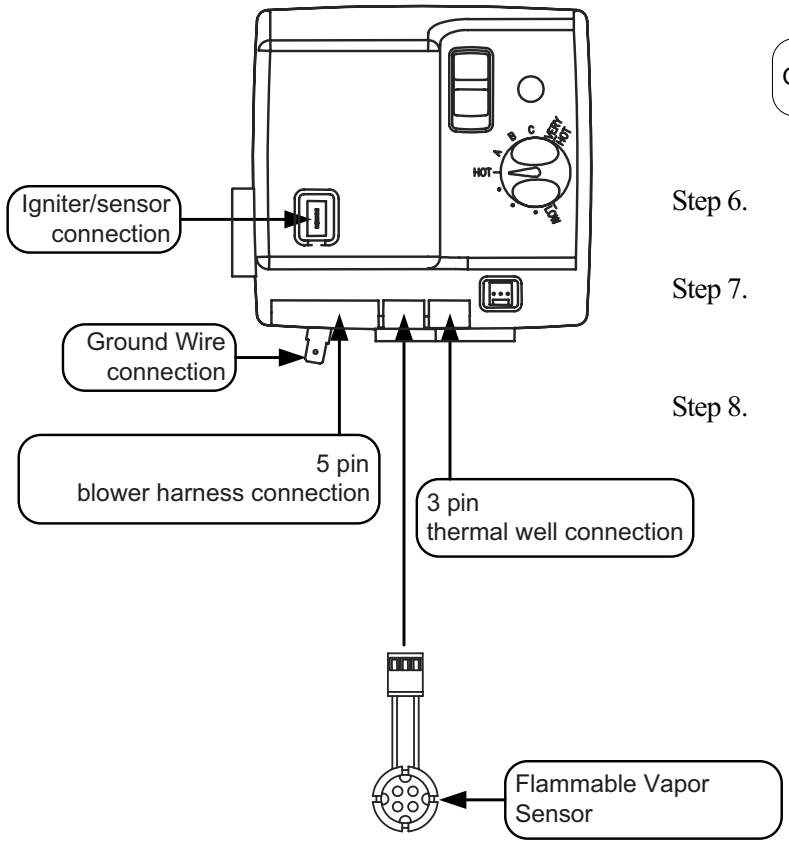
Step 3. Align slots located on thermal well flange with tabs located on back of gas control (see photos 24 & 25)



Step 4. Carefully push control back onto thermal well flange as far as possible towards water heater. Slide control down to lock into position.

Step 5. Install burner and connect pilot and feedline to gas control.





Step 6. Reconnect wire harnesses to gas control per the illustration.

Step 7. Reconnect gas piping to gas control. Restore gas supply and check for gas leaks.

Step 8. To resume operation, follow the instruction located on the lighting instruction label or the lighting instruction located in the installation and operation manual.

Safety Circuit Voltage Trace

⚠ WARNING
115 volt potential exposure. Use caution making voltage checks to avoid personal injury.

NOTE: This procedure assumes a cool tank.

Remove three screws (Phillips Screw driver) from control access cover on blower and remove cover (see photo 26).

Position gas control switch to the "ON" position and adjust thermostat dial to call for heat, Is there 10 to 13 VAC between red wire leading to blower temperature switch and green ground wire? Blower must be running during this voltage check. (see photo 27)

N → Is LED on gas valve flashing the "heartbeat" code (alternating bright/dim)

Y → No voltage from gas control, call for technical support.

N → Verify 115VAC to gas control (see page 30)

Y → Is there 10 to 13 VAC between yellow wire leading from pressure switch and green ground wire? (see photo 27)

N → Is there continuity through blower temperature switch? (see page 22)

Y → Check for loose or broken wire connection at switch terminals

N → Determine cause of blower temperature switch activation and correct.

Y → Do you hear or can you see the igniter sparking?

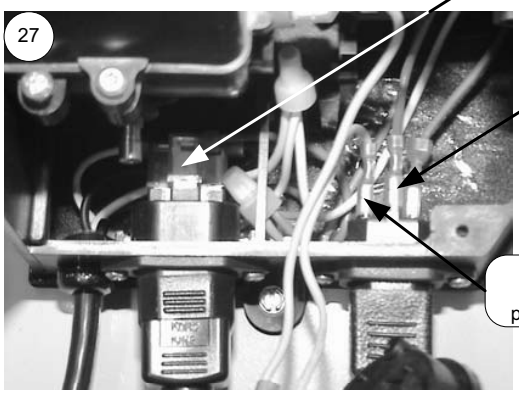
N → Check igniter/sensor (see page 17) is igniter/sensor OK?

Y → Faulty cord set or gas control.

Correct igniter/ sensor problem.

Y → Safety circuit voltage is OK.

If burner does not light, observe LED flash code on gas valve and refer to troubleshooting section on page 13



115 VAC Circuit Trace

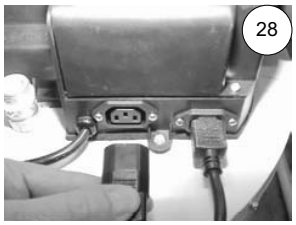
⚠ WARNING
115 volt potential exposure. Use caution making voltage checks to avoid personal injury.

Step 1. Verify 115VAC and proper polarity at wall outlet.

Step 2. With unit plugged in and control power switch in the “ON” position verify LED status.

LED status
None, Control LED not on or flashing.

Disconnect cord set as shown in photo 28



Using a volt meter set to volts AC, is there 115VAC across terminals shown in photo 29 ?

N

Check for damage to AC supply power cord.

Y

Repair damage

N

Replace Blower

Y

Is there 115VAC across terminals shown in photo 30 ?

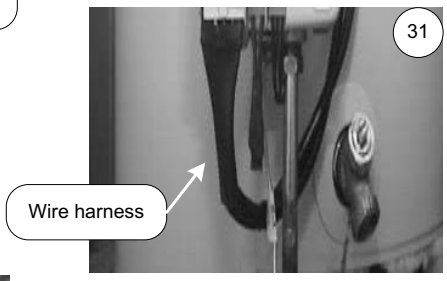
Y

Reconnect cord set shown in photo 28.

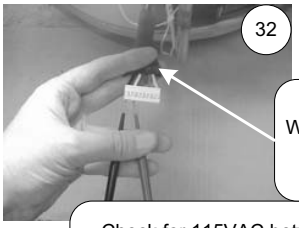
N

Incorrect supply voltage polarity

Disconnect wire harness from gas control (see photo 31).



Locate black & white wires at connector, It may be necessary to pull back wire sheath to identify wire colors. (see photo 32)



Is there 115VAC across black & white wires as shown in photo 32?

Y

Replace gas control.

N

Call for technical support.

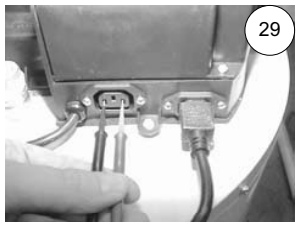
Check for 115VAC between black & white wires.
-NOTE-
Electronic meter probes required. Use care not to damage connector during this check.

LED status
Short flash, once every four seconds.

Waiting for call for heat.

LED status
“Heartbeat”, alternates bright/dim.

Thermostat calling for heat



LED status
Various flashing error codes.

Verify error code as listed on page 13