TROUBLESHOOTING QUICK-GUIDE

CONQUEST® GAS CONDENSING WATER HEATERS

Conquest Models 20 thru 30

Conquest Models 40 thru 80

Table of Contents **Page**

Top ↑

1. HOW TO CHANGE THE TEMPTRAC OPERATING TEMPERATURE SET POINT

To change the temperature set point:

a. Press the **SET** button to display the current set point value. The parameter **ST1** is shown along with its value.

b. Press the **SET** button again. As the value flashes use the **UP** or **Down** Arrow buttons to increase or decrease the temperature set point.

c. Press the **SET** button again to confirm the new value. To exit and return to the home screen, press the **SET** and **UP** buttons together or wait 15 seconds without pressing any key.

2. TEMPTRAC ALARMS

Message	Probable Cause	Troubleshooting / Corrective Action
"P1"	TP1 probe failure.	Inspect Probe 1 installed in the top of the tank, for an open or short. Check wire connections at screw terminals 14 & 17.
"P2"	TP2 probe failure.	Inspect Probe 2 installed in the middle of the tank, for an open or short. Check wire connections at screw terminals 15 & 17.
"P3"	TP3 probe failure.	Inspect Probe 3 installed in the flue outlet, for an open or short. Check wire connections at screw terminals 16 & 17.
"HA"	High-temperature alarm	Water temperature sensed at Probe 1 has exceeded the controls maximum **ALU** set point (215°F)
"LA"	Low-temperature alarm	Water temperature sensed at Probe 1 has dropped below the controls minimum **ALL** set point (35°F)
"AL2"	Ignition did not occur	**Do Not** immediately cycle power. See **Troubleshooting an AL2 Alarm Instructions**.
"Mn1"	Maintenance alert for first stage	Control has exceeded the maximum working hour's set point of 9999 hrs. Set parameter **oP1** to "**0**" to disable.
"Mn2"	Maintenance alert for second stage	Control has exceeded the maximum working hour's set point of 9999 hrs. Set parameter **oP2** to "**0**" to disable.
"Mn3"	Maintenance alert for freeze protection	Control has exceeded the maximum working hour's set point of 9999 hrs. Set parameter **oP3** to "**0**" to disable.
"rtc"	The real time clock has lost its setting	Program the real time clock.
"rtF"	Real time clock failure	Replace TempTrac control.

3. TROUBLESHOOTING A TEMPTRAC AL2 ALARM

The TempTrac control initiates an AL2 Alarm if after three (3) minutes the gas valve is not energized following a call-for-heat. An **AL2** alarm may be caused by one or more of the following fault conditions:

- A temperature limiting device is open.
- The air flow proving switch failed to close during the time required for ignition.
- A low water control or low water condition exists.
- A field connected interlock remained open during the time required for ignition.
- DPDT relay(s) in the alarm circuit is faulty.
- Or, Flame did not successfully establish during the time required for ignition.

Recommended Troubleshooting Steps:

To troubleshoot an AL2 alarm condition, **Do Not Immediately Cycle Power**. First, reset the TempTrac control by pressing any button. If a call-for-heat is present, the Conquest should attempt to restart.

Probable Cause	Troubleshooting / Corrective Action
A temperature limit condition is exceeded.	Check to confirm the high temperature limit thermostat is closed.
Air Proving Switch is open.	If the blower starts, check to confirm the air switch is closed. If the blower fails to start, check for a loss of power to the motor or for motor failure.
A low water control or low water condition exists.	Check to confirm the LWCO is energized. The LED should be ON.
A field interlock remained open during call-for-heat demand.	Check for continuity across Terminals C1-C2 if field connected interlock wiring is attached.
The alarm relay is faulty.	If the burner fires but the TempTrac AL2 alarm still initiates after 3 minutes, check both DPDT relays in the alarm circuit and replace if faulty. (See Temporarily Extending The Alarm Timing Function)

If no other faults are found, a **flame failure** may have occurred. **Now cycle power** to reset the ignition control by turning the water heater power switch off and then on.

Probable Cause	Troubleshooting / Corrective Action
Hot Surface Igniter	Check the Hot Surface Igniter (HSI) for proper amp draw: 3.5 to 5.0 amps is normal.
Gas Pressure	Check that the proper gas pressure is supplied to the burner.
Ignition Voltage	Check to confirm the ignition control is supplying 24 volts to valve Terminal V1.

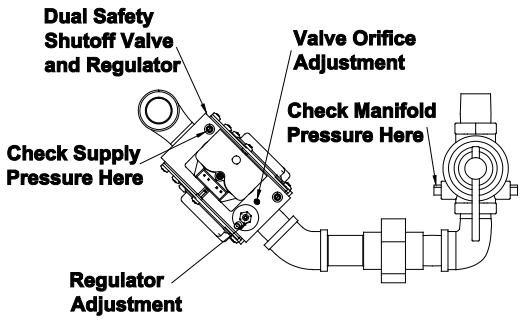
4. TEMPORARILY EXTENDING THE TEMPTRAC ALARM TIMING FUNCTION - UNTIL THE ALARM RELAY IS REPLACED

If a replacement DPDT alarm relay is not immediately available, the alarm timing function can be extended temporarily to eliminate nuisance shut downs until the relay is replaced. To temporarily extend the TempTrac alarm timing function:

1. Press the **SET** then **DOWN** buttons together for more than 3 seconds to enter the password protected programming menu. The name of the parameter is on the upper display and its value is on the lower display.
2. Press the **UP** button to select parameter"**PR2**" in the upper display. Its value "**PAS**" is shown in the lower display.
3. Press the **SET** button. The value "0--"is displayed and flashes. Use the **UP** or **DOWN** buttons to input the passkey **3-2-1** in the flashing value. Push the **SET** button after each entry.
4. Now use the **UP** or **DOWN** buttons to scroll to the"**i2d**"parameter.
5. Press the **SET** button and the value in the lower display will start blinking.
6. Use the **UP** button to change the **i2d** parameter value from **3** minutes to **250** minutes.
7. Press **SET** to store the new value.
8. To exit press the **SET** then **UP** buttons together, or wait **30** seconds without pressing a button to return to the home screen.
9. **Important**: Remember to return the "**i2d**" value to **3** minutes when the defective relay is replaced.

5. HOW TO CHECK COMBUSTION DURING STARTUP – NON-MODULATING MODELS with TEMPTRAC

Conquest Models 20 thru 40 uses an On-Off burner control system with a combination gas regulator and gas valve. If the CO2 level must be adjusted on this model, turn the slotted brass gas valve orifice screw counter-clockwise to increase gas flow and increase CO2, or clockwise to decrease gas flow and decrease CO2.



Conquest Non-modulating Models 20, 25, 30 & 40

6. HOW TO CHECK COMBUSTION DURING STARTUP – MODULATING MODELS with TEMPTRAC

Conquest models 50 thru 80 uses a modulating burner control system. The CO2 level on these models must be adjusted at both Low Fire and High Fire. The firing rate adjustment is done by first setting the TempTrac Control for manual modulation output:

Step 1

1. Push and hold the **EXT** button for more than 3 seconds. The LED switches ON and the PS4 parameter is displayed in the upper display, while the PAS label is shown in the lower display.
2. Release the button, and insert the password**: 3-2-1**. The PS4 modulation parameter value (**nu**) will be displayed in the lower display. **nu** means manual modulation output is Not Used (automatic operation).
3. To adjust modulation value, push the **SET** button. As the value flashes, use the **UP** or **DOWN** arrow buttons adjust the firing rate from **nu** to **0 = Low Fire; 100 = High Fire**

Step 2

With the burner firing and the TempTrac control manually adjusted to Low Fire:

Adjust the regulator screw clockwise to increase gas flow or counter clockwise to decrease flow. The desired CO2 in the combustion products should be between 8.5 and 9.5% for natural gas, 9.5% to 10.5% for LP gas.

Step 3

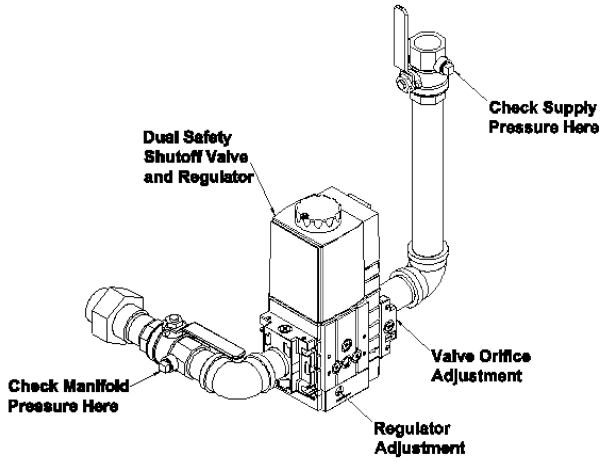
Once the desired combustion is achieved at Low Fire, manually adjust the TempTrac Control to raise the burner firing rate to High Fire:

Adjust the valve orifice clockwise to reduce gas flow and counter-clockwise to increase flow. The desired CO2 in the combustion products should be between 8.5 and 9.5% for natural gas, 9.5% to 10.5% for LP gas. `

Step 4

Return the TempTrac Control PS4 modulation parameter value to **nu** for automatic operation.

To exit press the SET then UP buttons together, or wait 30 seconds without pressing a button to return to the home screen.



Conquest Modulating Models 50, 60, 70 & 80

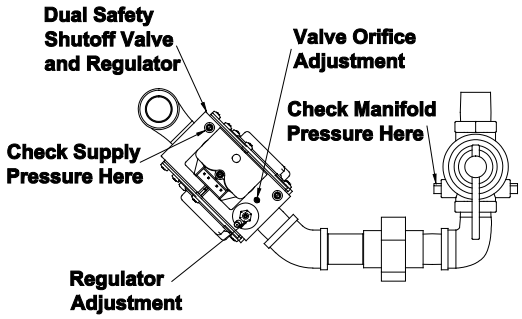
7. HOW TO CHANGE THE EOS OPERATING TEMPERATURE SET POINT (USER Level Access)

To Change the temperature set point:

1. From the EOS View Menu, press and hold the **Home Button** for 3 seconds to enter the Control System Menu. The first menu displayed is the **SETUP** Menu.
2. Touch the **ENTER** button to display the **SETPOINT** menu.
3. Use the **UP** and **DOWN** arrow buttons to adjust the set point value as per the parameter table shown.
4. To save the new value, touch the **NEXT ITEM** or **ITEM BACK** buttons or exit the menu by pressing the **HOME** button.

8. HOW TO CHECK COMBUSTION DURING STARTUP – NON-MODULATING MODELS with EOS CONTROLS

Conquest Models 20 thru 40 uses an On-Off burner control system with a combination gas regulator and gas valve. If the CO2 level must be adjusted on this model, turn the slotted brass gas valve orifice screw counter-clockwise to increase gas flow and increase CO2, or clockwise to decrease gas flow and decrease CO2.



Conquest Non-modulating Models 20, 25, 30 & 40

HTR MOD FIRING RATE / MODEL	50 L 130A-GCML	60 L 130A-GCML	70 L 130A-GCML	80 L 130A-GCML
MINIMUM	1	1	1	1
MAXIMUM	50	60	70	100

9. HOW TO CHECK COMBUSTION DURING STARTUP – MODULATING MODELS with EOS CONTROLS

Conquest models 50 thru 80 uses a modulating burner control system. The CO2 level on these models must be adjusted at both Low Fire and High Fire. The firing rate adjustments are made in the Manual Override Menu as follows:

Step 1

1. Press and hold the **Home** button for 3 seconds.
2. Touch the **Next Item** or **Item Back** buttons to navigate to the **TOOLBOX** menu.
3. Touch the **ENTER** button to display the **ACCESS** screen.
4. Now use the **UP** or **DOWN** arrow buttons to select the **ADVANCED** setting.
5. Exit the menu by pressing the **HOME** button.

Step 2

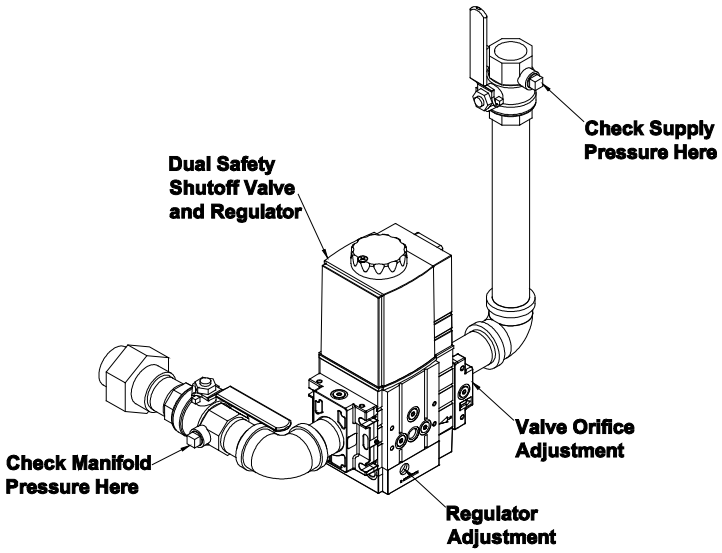
1. From the HOME screen, use the **Next Item** or **Item Back** buttons to navigate to the **OVERIDE** menu.
2. Touch the **Enter button** to display the **MANUAL OVERRIDE** screen and use **UP** or **DOWN** arrow buttons to select the **HAND** setting.
3. Use the **Next Item** or **Item Back** buttons to navigate to the **HEATER MODULATION (HTR MOD)** menu.

   Note: If the HTR MOD program is activated while the burner is firing, the burner will shut down and recycle.

Step 3

1. Using the **UP** or **DOWN** arrow buttons adjust the firing rate from **OFF** to the **minimum** (**Low Fire**) firing rate shown for the Conquest model shown in the table above:

   With the burner firing rate stabilized at Low Fire, adjust the **Gas Regulator Screw** clockwise to increase gas flow and increase CO2, or counter-clockwise to decrease flow and decrease CO2. **See Gas Train Illustrations for details.**



Conquest Modulating Models 50, 60, 70 & 80

2. Once the desired combustion levels are achieved at Low Fire, return to the Touch Screen and increase the **HTR MOD** firing rate to the **maximum High Fire** firing rate setting for the specific product:

   With the burner firing rate now stabilized at High Fire, first loosen the set screw on the side of the shutter valve body and turn the **Gas Valve Orifice Adjustment** screw clockwise to decrease gas flow and decrease CO2, or counter-clockwise to increase gas flow and increase CO2. Be sure to tighten the set screw on the valve body when adjustments are complete.

3. Once the desired combustion is reached at High Fire, return to Low Fire to confirm the settings again.

Step 4

Important!! When all combustion adjustments are complete, go back to the **MANUAL OVERRIDE** screen and return the function back to the "**AUTO"** setting.

10. BTCII ERROR CODES

Error Item (Message)	Probable Cause	PIM Terminal	Troubleshooting / Corrective Action
AIR FLOW (FAIL)	During blower purge periods the air flow proving switch is not closing this circuit.	J8-2/4	Check Blower operation and airflow switch.
CTL SETUP (FAIL)	Try resetting the defaults in the TOOL BOX menu.		If unable to correct, replace the control display
FLAME (FLSE)	A false flame signal is usually caused by a leaky gas valve which propagates a flame after the call for heat cycle has ended.		Check for leakage through the gas valve. If no mechanical cause can be found, replace flame control.
FLAME (FAIL)	Flame failure indicates that during the burner ignition process, the burner either failed to light or it did light but no flame signal was detected.		If the burner fails to light it is likely that the hot surface igniter (HSI) is faulty or the burner fuel/air mixture is too far out of adjustment to ignite. If the burner lights but immediately goes out, check for an inadequate gas supply, faulty gas valve or regulator or poorly adjusted combustion.
FLAME (LOSS)	Flame loss indicates that sometime after flame has been established and the burner is operating, the flame signal is lost.		This can be caused by a faulty igniter, damaged refractory or combustion that becomes poorly adjusted as the burner modulates to higher inputs.
HI LIMIT (ERR/OPEN/SHORT)	Indicates a problem with the high limit temperature sensor		Possibly a broken or shorted sensor wire or failed sensor. NOTE: The top sensor and the high limit sensor or located in the same probe body.
HIGASPRES (FAIL)	The high gas pressure safety switch (optional) may be in a tripped condition indicated by the manual reset button on the switch.	J8-5/6	The supply gas pressure should not exceed the max limit on the heater rating plate. If the gas pressure is within rated limit, check for a faulty pressure switch.
HTR BOT (ERR/OPEN/SHORT)	Indicates a problem with the bottom temperature sensor,		Possibly a broken or shorted sensor wire or failed sensor.
HTR MAX (ALRT)	The heater high limit temperature safety has exceeded its limit.		This condition may be caused by a sensor failure or a faulty control board.
HTR TOP (ERR/OPEN/SHORT)	Indicates a problem with the top temperature sensor.		Possibly a broken or shorted sensor wire or failed sensor. NOTE: The top sensor and the high limit sensor or located in the same probe body.
ID CARD (ERR)	An ID card error may occur when the original card is replaced with an incorrect card or has been disconnected from the PIM control board.		Confirm ID card is correct and connected to the PIM control board.

Top ↑

INTERNAL (FAIL)	The PIM control board may have failed.		Perform a power and system reset. If fault remains, replace the PIM.
LOGASPRES (FAIL)	The low gas pressure safety switch (optional) may be in a tripped condition indicated by the manual reset button on the switch.	J8-1/3	Check the inlet gas to ensure that the minimum is available. If the gas pressure is adequate check for fluctuating gas pressure or a faulty pressure switch.
LOW 24VAC (ERR)	The 24VAC supply to the PIM control is below the threshold for reliable control operation.		This may be caused by low voltage to the heater or a faulty 120/24VAC supply transformer.
LOW HIS (ERR)	The PIM control board is not sensing the correct amp draw from the HSI (Hot Surface Igniter).		Check HSI current. This is most likely caused by a faulty or disconnected igniter.
LOW WATER (FAIL)	The electronic low water cutoff is no longer sensing water at its probe.	J1-3/4	Check LWCO function. This could be caused by a faulty low water board or sensor.
REM PROV (FAIL)	Indicates a problem with the remote proving circuit.	J1-6/7	Check the operation of ancillary mechanical room equipment such as a fresh air damper or flow switch.
VENT (ERR/OPEN/SHORT)	Indicates a problem with the vent temperature sensor		Possibly a broken or shorted sensor wire or failed sensor.
VENT LIM (ALRT)	The vent temperature sensor is approaching the programmed limit.		Check for proper combustion. Check Inlet water temperature (should be less than 100°F for PVC set points).
VENT MAX (ALRT)	The vent temperature sensor is used to protect low temperature vent systems from damage caused by high flue gas temperatures.		First confirm that the vent material is suitable for the application as well as the limit setting for this control. When this product is operated with high return or inlet water temperature, the flue gas can exceed the rating of low temperature vent systems.

11. PIM LED ERROR CODES

LED Code	Possible Cause	Troubleshooting / Corrective Action
Off	Normal Operation	
Red LED Steady ON, Green Power LED OFF	ID Card Fault	Check that the proper ID card is securely connected. Perform a power and system reset.
Steady ON	Internal Control Failure	Perform a power and system reset. If fault remains, replace the PIM.
1 flash	Airflow Fault	Check Blower operation and airflow switch.
2 flashes	False Flame Error	Check for proper gas valve closure. Clean burner and electrodes.
3 flashes	Ignition Lockout Fault	Check the gas supply. See Table 6-1 for more information.
4 flashes	Ignition Proving Current Fault	Check HSI element. Replace with a new element of the proper rating.
5 flashes	Low Voltage Fault	Check the 24 VAC input voltage. The voltage must be above 18.0 VAC
6 flashes	Vent Temperature Fault	Check for a blocked flue. Check the vent sensor and connections.
7 flashes	Hi-Limit Fault	Check for proper water flow. Check hi-limit and outlet sensors.
8 flashes	Sensor Fault	See BTC_II for fault identification. Check sensors and wiring.
9 flashes	Safety #1 Fault	Check gas pressure. Verify proper safety switch operation.
10 flashes	Water Pressure Fault	Check piping for leaks. Check pressure switch and connections.
11 flashes	Blower Speed Fault	Verify tachometer signal and connection on J5.
12 flashes	LWCO Fault	Check LWCO switch and connections. Check the water level.
13 flashes	Hi-Temperature Delta Fault	Check pump operation. Confirm proper water flow across heat exchanger.
14 flashes	Ft-bus Communications Fault	Verify BTC_II is connected and operating. Check the cable between the BTC_II and PIM J4.
15 flashes	Safety #2 Fault	Check gas pressure. Verify proper safety switch operation.