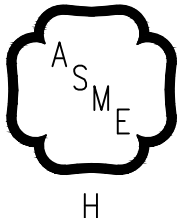


K2WT™

Residential

- Condensing
- High Efficiency
- Direct Vent
- Gas-Fired
- Water Boiler



As an ENERGY STAR® Partner, U.S. Boiler Company has determined that the K2WT™ Series meets the ENERGY STAR® guidelines for energy efficiency established by the United States Environmental Protection Agency (EPA).



TO THE INSTALLER:

Affix these instructions adjacent to boiler.

TO THE CONSUMER:

Retain these instructions for future reference.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury, or loss of life. For assistance or additional information, consult a qualified installer, service agency or the gas supplier. This boiler requires a special venting system. Read these instructions carefully before installing.

XIV. Troubleshooting



Electrical Shock Hazard. Turn off power to boiler before working on wiring.

A. Troubleshooting problems where no error code is displayed.

Condition	Possible Cause
Boiler not responding to call for heat, "Status" and "Priority" show "Standby".	Boiler is not seeing call for heat. Check thermostat or zone wiring for loose connection, miswiring, or defective thermostat/zone control.
Boiler not responding to a call for heat, "Status" shows "Standby" and "Priority" shows Central Heat or Domestic Hot Water.	Boiler is not firing, temperature is greater than setpoint. Water flow through boiler primary loop non-existent or too low.
Boiler Running but System or Boiler Circulator is not running	<ul style="list-style-type: none"> Check wiring for loose connection, miswiring. When there is a Domestic Hot Water Heat Request the System or Boiler pumps will be forced "off" when there "Run Pump for" parameter is set to "Central heat, off DHW demand" or "Central Heat, Optional Priority". This has been set to allow all of the heat to be provided for fast indirect water heater recovery. After one hour of "priority protection" or the end of the Domestic Hot Water Heat Request the system and boiler pumps will be free to run.
Home is cold during mild weather days	<ul style="list-style-type: none"> Increase Low Boiler Water Temperature parameter 5°F (2.8°C) per day.
Home is cold during cold weather days	<ul style="list-style-type: none"> Increase High Boiler Water Temperature parameter 5°F (2.8°C) per day

B. Display Faults:

Faults are investigated by selecting the "Help" button from the "Home" screen. When a fault is active the "Help" button flashes and the home screen turns a red color. Continue to select flashing buttons to be directed to the Fault cause.

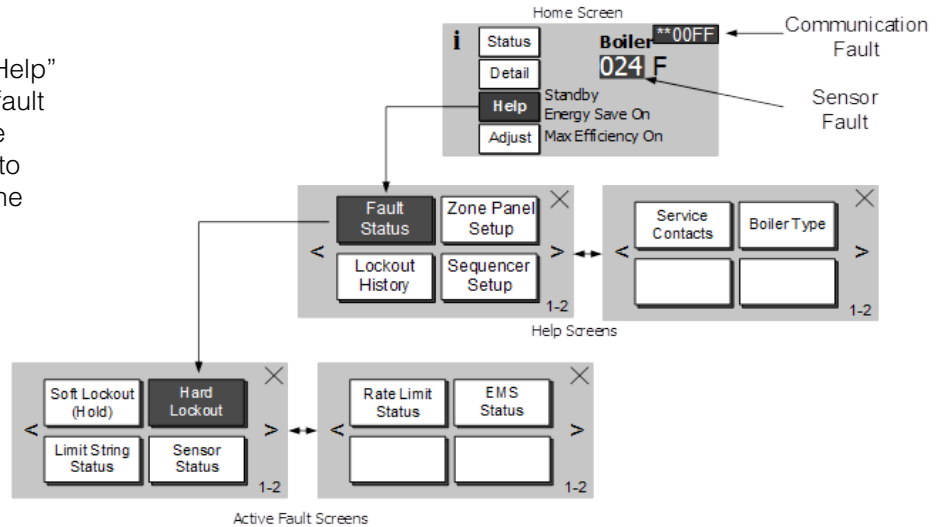


Figure 14.1: Help Menu

Indication	Condition	Possible Cause
Display Completely Dark Fan off, LWCO lights off, no green power light on Control	No 120Vac Power at Boiler	Check breaker and wiring between breaker panel and boiler. - Blown high voltage fuse, Replacement Fuse Kit, part number 105349-01.
Display Completely Dark, Fan running	No 24Vac Power to Control	- Loose 120Vac connection wiring between boiler J-Box and transformer - Loose 24 Vac connection wiring between transformer and Control. - Blown low voltage fuse, Replacement Fuse Kit, part number 105349-01.
Blinking Green power light on Control	Control Fault	- The green light is connected to internal power supply. The power supply is repeatedly starting and stopping (not normal) making the light flash. The microprocessors are not running. - Try disconnecting all terminals except 24VAC to power the Control. The green light should be steady. If it is not, then the control is defective. If steady, start plugging in all the connectors while watching the green light. When faulty wiring reconnected, green light will begin to flash.
Display Completely Dark but Boiler fires	No 5 Vdc Power to Display	- Loose 5 Vdc connection wiring between display and Control - Defective Display or Control.
**00FF or **ERFF	Display lost Communication with Control	- Loose or defective display harness - Defective Display - Defective Control
ER0011	Adjustment Mode Password Timeout	- The Control and Display are NOT defective. The password has timed out. Simply cycle power to the Display to restore operation.
ER0012	Control Failed	- Defective Control. Replace Sage.

XIV. Troubleshooting (continued)

C. Help Screen Faults

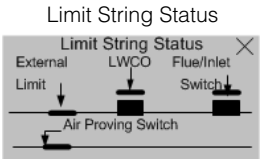
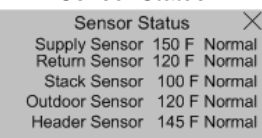
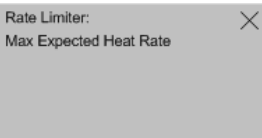
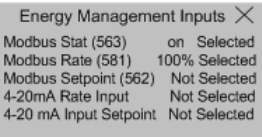
Indication	Condition	Possible Cause
<div style="background-color: black; color: white; padding: 5px; text-align: center;">Zone Panel Setup</div> <div style="background-color: black; color: white; padding: 5px; text-align: center;">Flashing</div>	<div style="background-color: black; color: white; padding: 5px; text-align: center;">Zone Panel 1 Setup</div> <div style="background-color: black; color: white; padding: 5px; text-align: center;">Flashing</div>	Zone Panel 1 communication lost, typical for Panel 1 through 4: The zone panel's communication was established and then lost. Check the following to correct the issue: <ul style="list-style-type: none"> • Wiring between panel and boiler. • Zone panel DIP switch settings have changed: <ul style="list-style-type: none"> - Set Master/Slave switch to "Master" - Set Zone Control switch ZC1 to "ON" - Cycle power
	<div style="background-color: black; color: white; padding: 5px; text-align: center;">Zone Panel Failure</div> <div style="background-color: black; color: white; padding: 5px; text-align: center;">Flashing</div>	Zone Panel Electronics Failure: A Zone Panel
	<div style="background-color: black; color: white; padding: 5px; text-align: center;">Duplicate Zone</div> <div style="background-color: black; color: white; padding: 5px; text-align: center;">Flashing</div>	Duplicate Zone: The Control has detected duplicate zone panel numbers. Check the following to correct: <ul style="list-style-type: none"> • Each Zone Control DIP Switch must be set to a Unique setting: <div style="text-align: center;"> </div> <p>Note that when multiple ZC switches are set on ON the Zone Panel is reported as Zone Panel 1.</p>
<div style="background-color: black; color: white; padding: 5px; text-align: center;">Sequencer Setup</div>	Sequencer Setup Fault	This alarm is active if the slave boiler has lost communication with the Sequence Master. Check the following: <ul style="list-style-type: none"> - RJ 45 peer-to-peer network disconnected - Sequencer Master was Enabled and then Disabled - Master's Boiler has been powered down. - To clear fault restore communication or cycle power
<div style="background-color: black; color: white; padding: 5px; text-align: center;">Boiler Size Setup</div>	Boiler Size Fault	<p style="text-align: center;">WARNING!</p> Boiler size setting may not match actual boiler size. The Boiler size setting determines min, max and light-off blower speeds. Incorrect boiler size can cause hazardous burner conditions and improper operation that may result in PROPERTY LOSS, PHYSICAL INJURY, OR DEATH. Refer to page 117 for boiler size setting instructions.

D. Help Screen Diagnostic Features

Indication	Possible Cause
<div style="background-color: #cccccc; padding: 5px;"> Lockout History 1 of 5 ✕ Lockout: 21 Status: Safe Startup Run Time Hr: 0 <div style="text-align: center; border: 1px solid black; padding: 2px;">Detail</div> </div>	Lockout History is stored in a first-in, first-out basis. Each History file is stored with boiler run hour of when the lockout occurred. The "When happened" and "Current" provide: <ul style="list-style-type: none"> - "Current" is the run hour and status the boiler just finished. - "When happened" is the run hour and status when the lockout occurred.
<div style="background-color: #cccccc; padding: 5px;"> For Service Contact: ✕ CONTRACTOR NAME CONTRACTOR ADDRESS 1 CONTRACTOR ADDRESS 2 PHONE NUMBER </div>	The user is given the contact information of the responsible service provider. Refer to page 124 for data entry instructions.

XIV. Troubleshooting (continued)

E. Active Fault Screen Faults

Indication	Condition	Possible Cause
 <p>Limit String Status</p> <p>Limit String Status X</p> <p>External Limit LWCO Flue/Inlet Switch</p> <p>Air Proving Switch</p>	Limit String Fault	<p>The Limit String Status screen shows the safety limit status. A contact icon, either “open” or “closed”, graphically represents each safety limit. The “closed” contact icon is steady; the “open” contact icon is blinking. For example, the screen shown to the left illustrates a “closed” external limit contact and an “open” LWCO contact.</p> <p>NOTE: Since the limit string items are wired in series, all limits downstream of the “open” limit will also appear on the screen as “open” (blinking) icons regardless of whether or not they are actually open. The Air Proving Switch is wired independent to all other limits. The Air Proving Switch is only required to be closed during boiler pre-purge. It is normal for it to be open during run mode.</p>
 <p>Sensor Status</p> <p>Sensor Status X</p> <p>Supply Sensor 150 F Normal</p> <p>Return Sensor 120 F Normal</p> <p>Stack Sensor 100 F Normal</p> <p>Outdoor Sensor 120 F Normal</p> <p>Header Sensor 145 F Normal</p>	Sensor Fault	<p>The Sensor Status screen shows the status of all sensors. Possible states include:</p> <p>None: Feature requiring this sensor has not been selected.</p> <p>Normal: Sensor is working normally.</p> <p>Shorted: Sensor is shorted or is defective.</p> <p>Open: There is a break in the wiring between the Control and the sensor or the sensor is defective</p> <p>Out of Range: Sensor is defective or is being subjected to electrical noise.</p> <p>Unreliable: Sensor is defective or is being subjected to electrical noise.</p> <p>When a sensor fails “opened” or “shorted” the value is changed to reverse video (background black and value white) “024” or “768” respectively to indicate that there is a fault with the sensor.</p>
 <p>Rate Limit</p> <p>Rate Limiter: X</p> <p>Max Expected Heat Rate</p>	Rate Limit	<p>The following messages appear when the firing rate is limited or reduced to help avoid a lockout or save energy.</p> <p>Refer to Hard Lockout section for corrective actions</p> <ul style="list-style-type: none"> - High Stack Temperature Limit - High Supply Temperature Limit - High Differential Temperature Limit <p>The following messages appear as part of normal start and stop sequences:</p> <ul style="list-style-type: none"> - Minimum Modulation (normal start/stop sequence) - Low Fire Hold Rate: Low fire hold rate is a normal start-up rate hold used to help ensure system temperature feedback prior to release to modulation. Low Fire Hold Time may be adjusted. Refer to the “Changing Adjustable Parameters”, Paragraph F, for additional information. - Maximum Expected Heat Rate: Maximum Expected Heat Rate limit is a normal start-up rate hold used to save energy. This limit helps reduce extra cycles and save energy. Boiler is free to modulate up to the sum of the active zones and domestic hot water expected heat rates. Each zone heat rate is adjustable and may be modified under the modulation menu. Refer to the “Changing Adjustable Parameters”, Paragraph F, for additional information.
 <p>EMS Status</p> <p>Energy Management Inputs X</p> <p>Modbus Stat (563) on Selected</p> <p>Modbus Rate (581) 100% Selected</p> <p>Modbus Setpoint (562) Not Selected</p> <p>4-20mA Rate Input Not Selected</p> <p>4-20 mA Input Setpoint Not Selected</p>	Energy Management System Fault	<p>The Energy Management System (EMS) fault screen provides input fault status. When an input is shown as “Not Selected” it is not required for this application or has not yet been selected. These options are selected under the “Energy Management” Adjust mode menu.</p> <p>Modbus Input Failure If a modbus input is selected and out of range or not present a “535” value is shown reverse video (background black and value white). To fix the problem check the input source and check that the input is properly connected.</p> <p>4-20mA Input Failure Failure status for the 4-20mA input is the same as shown under Sensor Fault.</p>

XIV. Troubleshooting (continued)

F. Troubleshooting problems where a Soft Lockout Code is displayed. When a soft lockout occurs, the boiler will shut down, the display will turn red and the “Help” button will “blink”. Select the “blinking” “Help” button to determine the cause of the soft lockout. The boiler will automatically restart once the condition that caused the lockout is corrected.

Soft Lockout Codes Displayed

Lockout Number	Condition	Possible Cause
2 Boiler Safety Limit Open	Boiler Safety Limit wired to terminals J6-1 or 3 OPEN: <ul style="list-style-type: none"> External Limit. Optional LWCO 	External Limit: <ul style="list-style-type: none"> Water temperature is higher than External Limit setting. See “Hard Lockout 4” for additional information. External device not used and jumper not installed. External Limit device is defective. Loose wiring to limit device Optional Low Water Cut Off (LWCO) <ul style="list-style-type: none"> If yellow light on LWCO is on, system is low on water. Ensure air vent is unobstructed and properly functioning as a blocked air vent can result in low water indication. If neither yellow or green light on LWCO is on, check LWCO harness.
3 Boiler Safety Limit Open	Blocked Flue/Inlet Switch wired to terminals J5-1 OPEN	<ul style="list-style-type: none"> Blocked Flue/Inlet Switch contact open - check for blocked flue/air intake. <p style="text-align: center;">NOTE Blocked Flue/Inlet Switch Special Note</p> <p>Before a call for heat the air pressure switch is closed. When there is a call for heat with a blocked vent the air pressure switch will open (due to excessive pressure of the blower against a blocked flue pipe) after the blower starts. The control stops the start sequence and stops the blower. After the blower stops the pressure switch re-closes and the cycle continues. The displays shows the cause of trip for only the time the pressure switch is open.</p>
7 Return sensor (10 KOHms) fault	Shorted or open return temperature sensor.	<ul style="list-style-type: none"> Shorted or mis-wired return sensor wiring. Defective return sensor.
8 Supply sensor (10 KOHms) fault	Shorted or open supply temperature sensor.	<ul style="list-style-type: none"> Shorted or mis-wired supply sensor wiring. Defective supply sensor.
10 Stack sensor (10 KOHms) fault	Shorted or open flue gas (stack) temperature sensor.	<ul style="list-style-type: none"> Shorted or mis-wired flue temperature sensor wiring. Defective flue temperature sensor.
11 Ignition failure	Flame failure after 5 tries to restart. Flame rod not detecting flame.	<ul style="list-style-type: none"> No gas pressure. Gas pressure under minimum value shown on rating plate. Gas line not completely purged of air. Gas valve rectifier switch off. Defective Electrode. Loose burner ground connection. Defective Ignition Cable. Defective gas valve (check for 24 Vac at harness during trial for ignition before replacing valve). Air-fuel mixture out of adjustment - consult factory. Defective or fouled electrode. Blocked vent Condensate trap plugged or dirty.

XIV. Troubleshooting (continued)

Soft Lockout Codes Displayed (continued)

Lockout Number	Condition	Possible Cause
13 Flame rod shorted to ground	<ul style="list-style-type: none"> Flame rod shorted to ground Condensate Trap plugged or dirty. 	<ul style="list-style-type: none"> Shorted or mis-wired flame rod wiring. Defective flame rod. Plugged or dirty drain line in trap.
14 Differential Temperature inlet/outlet high	Temperature rise between supply and return is too high.	<ul style="list-style-type: none"> Inadequate boiler water flow. Verify that circulator is operating and that circulator and piping are sized per Water Piping and Trim Section of this manual.
15 Return temp higher than supply	The Control is reading a return sensor temperature higher than the supply sensor temperature. Condition must be present for at least 75 seconds for this error code to appear.	<ul style="list-style-type: none"> Flow through boiler reversed. Verify correct piping and circulator orientation. No boiler water flow. Verify that system is purged of air and that appropriate valves are open. Supply or return sensor defective.
16 Supply temp has risen too quickly	Supply water temperature has risen too quickly.	<ul style="list-style-type: none"> See possible causes for "Hard Lockout 4". Inadequate boiler water flow. Verify that circulator is operating and that circulator and piping are sized per Water Piping and Trim Section of this manual.
17 Normal waiting for blower speed to match purge and light-off setpoint.	Normal waiting for blower speed to match purge and light-off setpoint.	
27 Undefined Fault	Undefined Fault	<ul style="list-style-type: none"> Consult Factory.
28 or 53 Air Proving Switch Failed to Close	Air Proving Switch Failed to Close	<p>The air proving switch has failed to close;</p> <ul style="list-style-type: none"> Check switch, check switch connection and wiring. Blocked vent, blocked inlet, blocked or disconnected air switch tube, blocked heat exchanger or burner. Something is blocking air/flue gas flow through boiler
54 Air Proving Switch Failed to Open	Air Proving Switch Failed to Open	<p>The air proving switch has failed closed, check switch is operating properly. The air proving switch is "Closed" when it should be "Open". The air proving switch is checked for proper function before the blower is started and the start sequence is allowed to continue. If the air switch is closed before the blower is started (when there is no air flow) first a soft lockout is initiated and then a manual reset hard lockout results. The possible cause of the air proving switch to be closed or fail to open is as follows:</p> <ul style="list-style-type: none"> The air proving switch is jumpered. The air proving switch is defective. The blower is running before the start sequence starts the blower. This can be caused by a loss of communication between the blower and Control. The blower goes to high speed when there is no communication between the Control and the blower. Possible cause of loss of communication is a defective wiring harness, blower or Control.

XIV. Troubleshooting (continued)

G. Troubleshooting problems where a Hard Lockout Code is displayed. When a hard lockout occurs, the boiler will shut down, the display will turn red and the “Help” button will “blink”. Select the “blinking” “Help” button to determine the cause of the Hard Lockout. Once the condition that caused the lockout is corrected, the boiler will need to be manually reset using the Reset button on the “Active Fault” display or located on the Control.

Alarm Output Contact

The Control includes an alarm output contact located on the low voltage terminal board. The alarm contact closes when the Control goes into a manual reset Hard Lockout. The list of Hard Lockouts is shown below.

Hard Lockout Codes Displayed

Lockout Number	Condition	Possible Cause
4 Supply High Limit	Control supply sensor detected temperatures in excess of 210°F.	<ul style="list-style-type: none"> Heating load at time of error was far below the minimum firing rate of the boiler. Defective system circulator or no flow in primary loop. Defective boiler circulator, no flow or insufficient flow in boiler loop. Control system miswired so that the boiler operation is permitted when no zones are calling.
6 Stack High Limit	Control Flue gas (Stack) sensor detected temperatures in excess of 214°F (101°C).	<ul style="list-style-type: none"> Heat exchanger needs to be cleaned. Boiler over-fired. Air-fuel mixture out of adjustment - consult factory.
12 Flame detected out of sequence	A flame signal was present when there should be no flame. <ul style="list-style-type: none"> Condensate trap plugged or dirty. 	<ul style="list-style-type: none"> Defective gas valve - make sure inlet pressure is below maximum on rating plate before replacing valve. Plugged or dirty drain line in trap.
18 Light off rate proving failed	Blower is not running at Light-off rate when it should or blower speed signal not being detected by Control.	<ul style="list-style-type: none"> Loose connection in 120 VAC blower wiring. Loose or miswired blower speed harness. Defective blower
19 Purge rate proving failed	Blower is not running at Purge rate when it should or blower speed signal not being detected by Control.	<ul style="list-style-type: none"> Loose connection in 120 VAC blower wiring. Loose or miswired blower speed harness. Defective blower
20 Invalid Safety Parameters	Unacceptable Control Safety related parameter detected.	Safety Parameter verification required. Contact factory.
21 Invalid Modulation Parameter	Unacceptable Control Modulation related parameter detected.	Reset the control.
22 Safety data verification needed	Safety related parameter change has been detected and a verification has not been completed.	Safety related Control parameter has been changed and verification has not been performed.
23 24VAC Voltage low/high	Control 24Vac control power is high or low.	<ul style="list-style-type: none"> Loose connection in 24Vac VAC power wiring. Loose or miswired 24Vac harness. Miswired wiring harness causing power supply short to ground. Defective transformer. Transformer frequency, voltage and VA do not meet specifications.
24 Fuel Valve Error	Power detected at fuel valve output when fuel valve should be off.	<ul style="list-style-type: none"> Reset the control. If problem reoccurs, replace the Control.
25 Hardware Fault	Internal control failure.	<ul style="list-style-type: none"> Reset the control. If problem reoccurs, replace the Control.
26 Internal Fault	Internal control failure.	<ul style="list-style-type: none"> Reset the control. If problem reoccurs, replace the Control.
27 Undefined Fault	Undefined Fault	<ul style="list-style-type: none"> Reset the Control. If problem reoccurs, replace the Control.
54 Air Proving Switch Failed to Open	Air Proving Switch Failed to Open	See Soft Lockout 54.