INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

X-2™ Series

Cast Iron Gas - Fired Boiler

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Intertek
9700609

For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number	Boiler Serial Number	Installation Date
X-20		
Heating Contractor		Phone Number
Address		

U.S. Boiler Company

106636-01 - 10/15

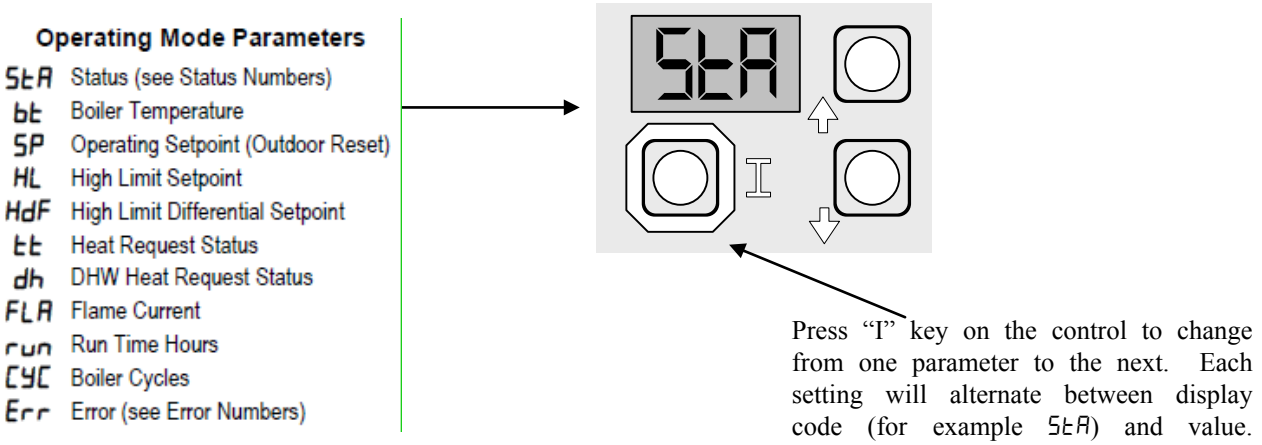
Price - $5.00

X. Troubleshooting

A. BEFORE TROUBLESHOOTING

The following pages contain trouble shooting tables for use in diagnosing control problems. When using these tables the following should be kept in mind:

1. This information is only meant to be used by a professional heating technician as an aid in diagnosing boiler problems.
2. In general, these tables assume that there are no loose or miswired electrical connections. Before using these tables inspect all electrical connections on the boiler to make sure that they are tight. Also, check the wiring on the boiler against the wiring diagram in Figures 8 and 9. Ensure that incoming 120 Vac power polarity is correct and that the boiler is properly grounded. Further, ensure that the control power supply is 24 VAC (minimum 18 VAC to maximum 30 VAC) and polarity is correct.
4. All controls on the X-2 Series are tested at least once in the manufacturing process and a defective control or component is generally the least likely cause. Before replacing a component, try to rule out all other possible causes.
5. When checking voltage across wiring harness pins be careful not to insert the meter probes into the pins. Doing so may damage the pin, resulting in a loose connection when the harness is reconnected.



When Err (error) is shown:

Value	Description
4	Flame current lower than threshold
6	Flame Out of Normal Sequence
18	Electronics Failure
23	Flame Sensed During Pre-purge
32	Temperature Sensor Failure
55	Damper Failed to Open
56	Damper Failed to Close
57	Flame Rod Shorted to Ground
58	AC Line Frequency
59	Line Voltage Error
60	Thermostat input higher than threshold
61	Line Voltage Unstable
63	Soft Lockout – Recycles Exceeded
64	Soft Lockout – Internal Failure

Possible StA (status) values:

Value	Description
1	Standby
4	Pre-purge
6	Spark
7	Flame Proving
8	Running
10	Retry/Recycle Delay
13	Soft Lockout
14	Hard Lockout
15	Waiting for Limit to Close
16	Flame Present Out of Sequence
17	Self Test
18	Waiting for Damper to Open
19	Waiting for Damper to Close
20	Damper Failure to Open
21	Damper Failure to Close

Figure 27: Using Control Display to Troubleshoot

X. Troubleshooting (continued)

B. USE CONTROL DISPLAY Err (ERROR) NUMBER TO DIRECT TROUBLESHOOTING EFFORTS

If the control detects an error it will flash "Err" (error) followed by a number. Use this number to identify the boiler problem and corrective action in the table below. If there is no Err display proceed to Paragraph C:

Display	Status	Recommended Corrective Action
Blank	Boiler or Control is not powered	No 120 Vac Power at boiler, check breaker and wiring between breaker panel and boiler
Err 4	Flame Current Lower than Threshold	Check pilot assembly. Refer to Troubleshooting Section, C6.
Err 6	Flame Sensed Out of Normal Sequence	Flame sensed out of normal sequence (before opening gas valve or after closing gas valve). Check the gas valve for proper operation.
Err 18	Electronics Failure	Cycle power to control. Replace control if problem persists.
Err 23	Flame Sensed During Pre-purge	Flame sensed during pre-purge (before gas valve signaled open). Check the gas valve for proper operation. Replace gas valve if problem persists.
Err 32	Temperature Sensor Failure	Temperature sensor or interface failure (open or short connection, increased connection resistance, dual sensor mismatch) or control hardware failure. - Check sensor is securely attached to control P7 connector. - Check sensor wire is not damaged. - If secure and in good condition, replace sensor. - If problem persists, replace control.
Err 55	Damper Failed to Open	Atmospheric Damper End Switch failed to close (end switch contacts stuck open). Refer to Troubleshooting Section, C5.
Err 56	Damper Failed to Close	Damper open. Voltage should not be present on P6-5. Control, vent damper or wire harness is defective. While the Err 56 is displayed by the control, perform the following tasks: • Remove the call for heat (adjust thermostat or remove wire from TT terminals. • Check for 24Vac between P6-5 and ground. • If voltage not present, attempt to start boiler again. • If 24Vac is present, unplug the vent damper harness from control. • With wire harness unplugged, check for 24Vac between P6-5 (on Control) and ground. • If voltage present, replace the control. • If voltage not present, failed vent damper or wiring harness. • Check wiring harness for shorts or mis-wiring. Replace if defective. • If harness not defective, replace vent damper.
Err 57	Flame Rod Shorted to Burner Ground	Flame Rod shorted to burner ground, this can result from excessive flue gas condensation. - Check for excessive condensate. Dry pilot. Adjust setpoint higher. - Check for loose or damaged ignition wire.
Err 58	AC Line Frequency	Error AC Signal is too noisy or frequency is incorrect. Check supply voltage. Check Sensor for Common shorted to ground.
Err 59	Line Voltage Error	AC voltage out of specification high or low. Check supply voltage.
Err 60	Thermostat Input Higher than Threshold	Check thermostat wiring.
Err 61	Line Voltage Unstable	Possibly too many heavy loads switching on and off cause erratic supply voltage. Check supply voltage.
Err 63	Soft Lockout – Maximum Recycles Exceeded	Maximum number of recycles exceeded. Refer to Troubleshooting Section, C6.
Err 64	Soft Lockout – Internal Failure	The electronics has detected an error. This can be caused by an actual controller internal fault or wiring fault: - Check vent damper, cycle power with vent damper disconnected. If error is cleared, reconnect the vent damper and refer to Recommended Corrective Action listed under SEA 20, damper failed to open. - Check pilot assembly, - If problem persists, replace the control.

X. Troubleshooting (continued)

C. USE STA (STATUS) NUMBER TO GUIDE TROUBLESHOOTING

The control will flash "STA" followed by a number. Use this number to identify the boiler problem in the table below:

1. Boiler and Circulator Off

Display / Status	Recommended Corrective Action
STA 1 Standby Burner off Circulator off	The boiler has not detected a call for heat (tt = oFF and dh = oFF). Check that the thermostat: - When a thermostat call for heat is detected control display "tt" will show "on" - Make sure thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for loose connection. Check the DHW demand: - When a domestic call for heat is detected "dh" will show "on" - Make sure the DHW aquastat contact is closed. Check for loose connection.

2. Circulator is On, But Boiler is Off

Display / Status	Recommended Corrective Action
STA 1 Circulator Pre-purge Burner off Circulator on	The boiler is warm and circulator is providing residual boiler heat to building: Check boiler temperature - The boiler will not start until boiler water temperature is less than the Setpoint (SP) minus differential (dF) - If boiler water temperature is higher than Start Temperature (St_, default = 140 F) and the Circulator Pre-purge (PP_, default = 2 minutes) time has not expired, boiler start will be delayed until water temperature drops or time expires. To permit the boiler to start sooner increase Start Temperature parameter. Refer to Operation Section for additional information.

3. Boiler is On, But Circulator is Off

Display / Status	Recommended Corrective Action
STA 8 Burner on Circulator off	Domestic Hot Water (DHW) Priority Forcing Circulator Off - When there is a DHW heat request wired to the Control's DHW terminal the System Circulator will be "forced off" for the duration of the DHW heat request. When the DHW heat request ends the System Circulator "force off" is removed, the circulator can respond normally. When the Priority Time, (Pt_) Parameter is set to "oFF" the System Circulator is not "forced off" for a DHW call for heat. Wiring / Circulator Issue: - Check wiring for loose connection, miswiring - Check circulator

4. Circulator is On But Damper is Not Open

Display / Status	Recommended Corrective Action
STA 15 Limit Open	Waiting for Limit to Open. - Check Blocked Vent Switch, in the event of a blocked vent or poor draft condition, the blocked vent switch will open interrupting power to control P5-4. The main burners will be extinguished immediately and the circulator will remain on until the thermostat is turned off. The source of blockage must be corrected by trained and skilled personnel from a qualified service agency before resetting switch. Blocked Vents are caused by a collapsed chimney resulting in full or partial blockage, chimney cross sectional area too small, height insufficient or cold chimney causing sustained poor draft. Always follow the recommendations in Section I, Figure 1 and Section IV, Venting. - Check Flame Rollout Switch, in the event of excessive blockage of the boiler section flue passageways is developed the flame rollout switch will open interrupting power to control P5-4. The main burners will be extinguished immediately and the circulator will remain on until the thermostat is turned off. If the flame rollout switch is activated, do not attempt to place the boiler in operation. The source of the blockage must be corrected and the identical flame rollout switch replaced by trained and skilled personnel from a qualified service agency. - Check External Limit.

X. Troubleshooting (continued)

5. Circulator is On But Damper is Not Open

Display / Status	Recommended Corrective Action
StA 20 Damper Failed to Open	The control is waiting for the damper to open. Damper end switch has failed to close (end switch contact is stuck open). Combustion can never take place unless the damper blade is in the fully open position. Check the following: - During status "StA 18" or "StA 20" the control terminal "P6 - 5" (yellow wire) is energized. - Check for loose connection between control and vent damper, check damper harness. - Check for obstruction in path of damper - When damper is open (end switch closed) control terminal "P6 – 2" should receive power from the vent damper. - Place jumper between control terminal P6-5 and P6-2. If error 55 does not clear, replace control. - Defective harness or vent damper.

6. Circulator is On, Damper is Open But Boiler Fails to Start

Display / Status	Description
StA 10 Retry / Recycle Delay	The Boiler is in "Retry Delay": - The burner failed to light (no flame signal). After a 5 minute delay, Control will attempt to light the burner again. There is no limit to the number of retries. Recycle Delay - The burner loses flame during running mode, ("StA 8"). After a 10 second delay, Control will attempt to light the burner again. If the burner loses flame during running mode, "StA 8" during the next six recycles, Control will progress to a soft lockout.
StA 13 Soft Lockout	When a soft lockout occurs, boiler will shut down. Boiler automatically restarts once condition that caused the lockout is corrected and the one-hour time delay is completed. Boiler can be restarted sooner than the time delay by using Adjustment Mode and selecting the reset button (see Adjustment Mode instructions) or by cycling power. Soft Lockout is caused by one of the following: - Err 63, Maximum Recycles Exceeded – The burner lost flame during running mode, "StA 8" six times in a row. Refer to recommended corrective actions on next page to help determine the cause of the problem. - Err 64, Internal Failure, refer to Error code listing for recommended corrective action. - Err 23, Flame sensed during post-purge (before gas valve signaled open). Check the gas valve for proper operation. Replace gas valve is problem persists.
StA 14 Hard Lockout	When a hard lockout occurs boiler shuts down.
StA 16 Flame Out of Sequence	If flame is detected in pre-purge Control goes to Flame Out of Sequence Before trial, "StA 16" and "Err 23" is reported. The control gives a flame 10 seconds to disappear. If flame goes away, control resumes heating cycle from the beginning. If it doesn't "Err 23" is cleared and "Err 6" is reported. When flame is off control goes to Soft Lockout and "Err 6" is cleared. Check the gas valve for proper operation.

X. Troubleshooting (continued)

6. Circulator is On, Damper is Open But Boiler Fails to Start (continued)

Display / Status	Recommended Corrective Action
StA 10 Retry / Recycle Delay StA 13 Soft Lockout	**1. No Spark** a. Can you hear sparking while StA 6 is displayed? - If there is no spark noise replace the control. b. If you can hear spark noise check the following: - Loose connection in ignition cable or ground wire - Continuity of ignition cable - Break in ignition cable insulation - Loose ground connection - Break in pilot ceramic insulator - Incorrect pilot spark gap
	2. No Pilot Flame a. If pilot does not light check the following: - All manual gas valves are open - Supply tubing is not plugged, kinked or leaking - Gas line pressures are good - Gas line is purged of air - Pilot orifice is not plugged (pilot gas is flowing) - Condensate quenching pilot **Note**: It may be necessary to recycle the "call for heat" more than once to clear the pilot supply tubes of air. b. If no gas flow check the following: - 24 volts across PV and MV/PV at gas valve, if voltage ok replace defective gas valve - Check for break in wiring harness to gas valve - 24 volts across control connector P5–2 and P5–5, if no voltage at control replace defective control
	3. Spark does Not Stop When Pilot Lights If the spark does not stop when the pilot lights check the following: - Loose connection in ignition cable or ground wire - Continuity of ignition cable - Clean flame rod - Pilot electrode porcelain cracked - Pilot flame covers flame rod and is steady and blue, if not adjust pilot flame - Low gas pressure at gas valve inlet - Defective control
	4. Main Flame Does Not Light If the main burners do not light check the following: - Check orifice size and/or blockage - 24 volts across control terminals P5-8 and P5-5? If no voltage while in StA 7 defective control. - 24 volts across MV and MV/PV at gas valve? Check for break in wiring harness to gas valve - Defective gas valve

D. FOR MODELS EQUIPPED WITH IDL 1200 LWCO:

1. **If the AMBER Light is On and the boiler is filled with water:** The amber "LOW WATER" light indicates the control is not sensing water in the boiler. If you are certain that the boiler is filled with water, remove the sensor from the well. Make sure that the metal clip is protruding enough to come in contact with the inside of the well tube. Check that the well does not have any heat transfer grease or other contaminants that may interfere with the metal sensor head contacting the well. If this does not resolve the problem, remove the well and examine for excessive residue build-up. Clean as needed and re-install.
2. **If the AMBER Light is blinking:** If the LOW WATER light is blinking, the IDL1200 is nearing the limit of its water detection range. This can occur as a result of a poor connection between the metal sensor head and the inside of the copper well or as a result of excessive residue build-up on the exterior of the well. To address this situation, follow the steps above under 'If the Amber Light is On.'