PRODUCT GUIDE
SPECIFICATION

FIREYE BurnerLogix

FLAME SAFEGUARD BURNER MANAGEMENT with INTEGRATED BOILER CONTROL

1. GENERAL

1.1 OVERVIEW

Each burner shall be equipped with a micro-processor based burner management flame safeguard control with integrated boiler control functions.

1.1.1 The control system shall be provided by Fireye, Inc. or written approved equal.

1.2 BOILER CONTROL

The control shall utilize signal inputs from solid state sensors as inputs for boiler steam pressure or boiler water temperature for on/off control, modulation with PID control, and high and low alarm limits of the appropriate pressure and temperature sensors.

1.3 FLAME SAFEGUARD CONTROL

The burner management control system shall include flame safeguard functions to provide: (1) automatic sequencing of the boiler system through pre-purge, pilot trial for ignition (PTFI), main trial for ignition (MTFI), run (AUTO), and post purge. (2) flame proving and lockout on flame failure during PTFI, MTFI, and run.

1.4 CODES AND STANDARDS

The control shall be listed by Underwriters Laboratories in accordance with US and Canadian standards and Factory Mutual for its intended purposes.

2. SYSTEM HARDWARE

2.1 FLAME SAFEGUARD WITH INTEGRATED BOILER CONTROL

Major functions of the boiler management system shall have the following capabilities to provide:

2.1.1 User selectable burner operating parameters such as purge time, PTFI & MTFI time, post purge time, and specific operation of the various interlocks.

2.1.1.1 All burner operating parameters become permanent after 8 hours of burner on time.

2.1.2 User configurable boiler parameters such as setpoint, thermal shock, standby water, LAG1 and LAG2.

2.1.2.1 Boiler operating parameters are password protected.

2.1.3 An adaptive Infrared flame scanning detection system where the characteristics of the pilot and main flames are separately learned in order to set the on/off thresholds and optimizing safety.

2.1.4 Flame proving and lockout on flame failure during PTFI, MTFI and run.

2.1.5 The control shall provide a check-run switch to allow a qualified service technician to halt the burner sequence in any of five different positions:
- High fire purge
- Low fire purge
- Pilot trial for ignition
- Main trial for ignition
- Low fire (burner on)

2.1.6 Full modulating control of fuel and combustion air that are mechanically linked.

2.1.7 Modulation of the firing rate motor to meet system demand using Proportional, Integral and Derivative control.

2.1.8 Two (2) inputs to provide the following user selectable functions:
- Select Lead/Lag1 operation.
- Select Lead/Lag2 operation.
- Revert to pilot operation.
- Halt the sequence in pilot only mode.
- Low fire only operation.
- Forced on operation.

These inputs shall be line voltage powered.

2.1.9 Line voltage terminal inputs for lockout, pre-ignition, recycle limits and interlocks.

2.1.10 Three (3) analog inputs user configurable to monitor:
- Steam Pressure
- Boiler water Temperature
- Stack Temperature
- Outdoor Temperature

The input control signal shall be 4-20 mA.

2.1.11 One (1) proportional analog output for modulation control of firing rate damper motor.
The proportional output shall be 4-20 ma.

2.1.12 Alpha-numeric multi-line LCD or VFD display to continually indicate operating parameters as well as first out annunciation.

2.1.13 Status light emitting diodes (LED's) to provide operating status as well as lockout code identification.

2.1.14 Thermal stress delayed release to modulation.

2.1.15 Damper motor high and low fire damper motor position proving.

2.1.16 Non-volatile lockout and history files with the last 10 lockouts readable through the optional display.

2.1.17 Field replaceable 10 amp fuse in the valve and ignition circuit for short circuit protection.

2.1.18 The control system shall operate within the following limits:
- Temperature: -40°F to 140°F (-40°C to 60°C)
- Humidity: 0% to 85% Non-condensing
- Voltage: 120 VAC (+10%, -15%) 50/60 Hz

- Power Consumption: 20 VA maximum
- 2000 VA maximum connected load
- 0.5G continuous vibration

2.1.19 The control shall have the following storage temperature limits:
- Temperature: -40°F to 158°F (-40°C to 70°C)
- Humidity: 0% to 85% Non-condensing

2.2 WIRING BASE

A pre-wired or terminal block wiring base shall be provided which will allow for all system terminations to be completely wired prior to the installation of the control. The control shall be removable or replaceable without removing any wiring terminations.

2.3 KEYPAD/DISPLAY MODULE

A plug-in module shall be provided to program and/or review all system setpoints as well as all system operating parameters (eg: values of the analog and digital inputs and outputs).

2.3.1 The module shall consist of a two (2) line with sixteen (16) characters per line liquid crystal (LCD) or vacuum fluorescent (VFD) display and multi-functional 4-key, positive action keypad.

2.3.2 Descriptive mnemonic codes shall be provided for all system setpoints and operating parameters.

2.3.3 The LCD keypad/display module shall operate within the following temperature limits: -4°F to 140°F (-20°C to 60°C).

2.3.4 The VFD keypad/display module shall operate within the following temperature limits: -40°F to 140°F (-40C to 60°C).

2.3.5 The keypad/display module shall have the capability to be remotely mounted to a distance of 8 feet (2.43 meters).

2.3.6 When remotely mounted, both the LCD and VFD display modules shall provide NEMA 4 protection.

2.4 PRESSURE SENSORS

All pressure sensors shall be factory calibrated to provide accurate pressure control over the entire pressure range of the sensor. No field calibration or adjustment is required.

2.4.1 All pressure sensors shall provide a 4-20 mA output signal over the full range.

2.4.2 The following pressure ranges shall be available:

- 0 to 15 PSI
- 0 to 30 PSI
- 0 to 200 PSI
- 0 to 300 PSI

2.5 TEMPERATURE SENSORS

All temperature sensors shall be factory calibrated to provide accurate temperature control over the entire temperature range of the sensor. No field calibration or adjustment is required.

2.5.1 All temperature sensors shall provide a 4-20 mA output signal over the full range.

2.5.2 The following temperature range shall be available:
- 32°F to 350°F (0°C - 167°C)
- 32°F to 752°F (0°C - 400°C)

3. SYSTEM SOFTWARE

3.1 SYSTEM SETPOINTS

The control shall have user configurable setpoints to meet all requirements. These setpoints shall include but not limited to: steam pressure setpoint, water temperature setpoint, boiler cut in, boiler cut out, modulating range, maximum firing rate position, marginal high and high limit steam pressure alarm, marginal high and high limit water temperature alarm, standby water setpoints, LAG1 and LAG2 setpoints, thermal shock method, thermal shock start point, thermal shock exit point, etc.

3.1.1 A software password protection (two levels of security with 64,000 possible combinations) shall restrict unauthorized entry and modification of system setpoints and operating parameters.

3.2 SEQUENCE OF OPERATION

The control shall maintain the steam pressure (or water temperature) setpoint by monitoring the connected pressure or temperature sensors, initiate a burner startup sequence, perform pre-purge, PTFI, MTFI and when in the run position, modulate the firing rate damper motor to meet system demand.

3.2.1 The control shall provide cold start thermal shock to slowly increase the burner firing rate on a cold start to limit mechanical stress due to thermal differences.

3.2.1.1 The control shall offer two methods of thermal shock protection (low fire and segment).

3.2.1.2 Low fire method shall hold the firing rate motor at low fire until the thermal shock exit point is reached. This

exit point is user defined.

3.2.1.3 Segment method shall go from low fire to high fire in 16 separate segments, increasing to the next segment based on increasing steam pressure (or water temperature) values, or a user defined timed override (1-60 minutes).

3.2.1.4 Segment method shall provide user defined start point and exit point.

3.2.2 The user shall be able to define the maximum firing rate motor position.

3.2.3 The user shall be able to shift from automatic modulation to manual modulation and control the position of the firing rate motor.

3.2.4 The control shall provide LEAD/LAG control of two or more boilers with LAG1 and LSG2, each boiler equipped with its own control.

3.2.4.1 The user shall define steam pressure (or water temperature) setpoint, boiler cut in, boiler cut out, modulating range, lead to lag time delay, and lag start time delay for Lag Boiler operation.

3.2.4.2 Lead or Lag boiler status is determined by the status of separate line voltage inputs and shall be indicated on the display.

3.2.5 The control shall be able to monitor the boiler water temperature of a steam boiler and use this input to control the boiler during standby operation, cold start thermal shock, or standby operation of the Lag boiler. (eg: maintain the boiler water at a "standby temperature" so the boiler is ready and available to come on-line and deliver steam to support the Lead boiler).

3.3 HIGH/LOW ALARM LIMITS

The control shall utilize the signal inputs from solid state sensors to provide the high and low safety limit functions.

The electro-mechanical steam pressure (or water temperature) high limit remains in the running interlock circuit.

3.3.1 The following alarm limits are user defined:
- High steam pressure.
- High water temperature.
- High stack temperature.

3.3.2 In the event any of the above alarm limits are

exceeded, the control shall energize its alarm output, open its safety interlock circuit and display an appropriate alarm message.

3.3.3 High and low marginal alarm limits for all sensor inputs (see 3.3.1) shall also be user defined to annunciate approaching alarm limits. When the marginal alarm limits are exceeded, the control shall energize its alarm output circuit but remain on line.

3.4 **SAFETY PROVISIONS**

The control shall continually perform internal checks for proper circuit operation and open its safety interlock should any test fail.

3.4.1 The control shall examine all load terminals to determine correct status of external controls, limits and interlocks, shutting down in lockout on failed tests.

3.4.2 The control shall perform Logic test of all safety critical loads (oil main valve, gas main valve, ignition transformer and pilot valve) and must be able to lockout if any is identified as working improperly.

3.4.3 The control shall perform a safe start check to include monitoring flame signal during standby and pre-purge.

3.4.4 The control shall perform over and under range detection on all connected solid state sensors.

3.4.5 The control shall automatically return the burner to the low fire position before shutting off when power is interrupted.

4. ANNUNCIATION AND DIAGNOSTICS

4.1 First out annunciation with burner sequence position indication.

4.2 Indication of failures at start up or during normal sequence operation.

4.3 Test itself for failure, detect and isolate an alarm, and report internal circuit faults.

4.4 Multiple language text description of system fault.

4.5 Maintain the last 10 faults with burner hour and burner cycle stamp in historical memory, accessible through the display or remote communications.

5. REMOTE COMMUNICATIONS

5.1 The boiler management control shall operate either as an independent stand alone control, or as part of a distributed system network. In a distributed system network, multiple controllers are connected via a data link (a single, twisted shielded pair wire) to a Supervisory Master Controller (eg: personal computer, PLC, building management system).

5.2 Up to 31 boiler management controls can be connected together in a multi-drop configuration on a single data link.

5.3 The communication protocol for the distributed system network shall be MODBUS-RTU.

5.4 The distributed system network shall offer selectable baud rates, 4800, 9600 or 19200.

5.5 The built in communications protocol shall allow the Master Controller to:
– Review or program system setpoints and operating parameters.
– Review the status of all system inputs and outputs.
– Program and review high and low alarm limits.

5.6 The Supervisory Master Controller shall also be able to communicate with the Boiler Management Control over standard voice grade telephone lines.

6. WIRING

6.1 All wiring shall be in accordance with the National Electrical Code and local electrical codes.

6.2 The installing contractor shall be responsible for insuring that the conduit size and wire size, type, and quantities are applicable for the installation and equipment supplied.

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7. PRODUCT INFORMATION

Part Number   **Description:**
ZB110YY   Flame Safeguard with Integrated Boiler Room Control. Includes Chassis and Amplifier type. (Specify IR for infrared, UV for non self-check UV, UVSC for self-check UV).
YP1XX   Programmer Module for Boiler Room Control. (Specify YP100, YP102, YP138 or YP113 to meet application requirements).
60-2850-1   Pre-wired wiring base for Boiler Room Control (surface mounted - UL listed).
60-2854-1   Terminal block wiring base for Boiler Room Control (cabinet mounted - UL recognized).
BLL510   LCD Keypad/Display Module.
BLV512   VFD Keypad/Display Module.

BLPS-15   Pressure Sensor Range: 0 to 15 PSI.
BLPS-30   Pressure Sensor Range: 0 to 30 PSI.
BLPS-200   Pressure Sensor Range: 0 to 200 PSI.
BLPS-300   Pressure Sensor Range: 0 to 300 PSI.

TS350-2   Temperature Sensor Range: 32°F to 350°F / 0°C to 167°C, 2" Probe Length.
TS350-4   Temperature Sensor Range: 32°F to 350°F / 0°C to 167°C, 4" Probe Length.
TS350-8   Temperature Sensor Range: 32°F to 350°F / 0°C to 167°C, 8" Probe Length.

TS752-2   Temperature Sensor Range: 32°F to 752°F / 0°C to 400°C, 2" Probe Length.
TS752-4   Temperature Sensor Range: 32°F to 752°F / 0°C to 400°C, 4" Probe Length.
TS752-8   Temperature Sensor Range: 32°F to 752°F / 0°C to 400°C, 8" Probe Length.