How to Specify

CC-700 Combined Boiler Master & Oxygen Trim Control

Steam and Hot Water Systems

General Operation

The supplier shall provide a Century Controls Model CC-700 Oxygen Control and Master Control/Sequencer to continually adjust the air/fuel ratio, manage firing rates, warm idle boilers and control boiler pressure or temperature. The control shall analyze the oxygen level and compare it to the programmed set points correcting as needed to achieve the most efficient combustion.

The control shall also analyze the process variable load (pressure/temperature) versus the set point to match the load demand.

Control Design Features

The control requires Underwriters Laboratories approval with appropriate UL labeling.

The control shall be a programmable logic controller-based unit designed for multiple boilers.

The control shall utilize a variable correction rate algorithm that has fast response without overshooting the set point.

The oxygen control shall have a minimum of ten (10) adjustable set points across the firing range adjustable for each of two fuels. Automatic interpolation between set points must be standard. Fixed points with no interpolation will not be acceptable.

The oxygen control system shall include adjustable "fine" trim near the set point and “fast” when in excess of one percent oxygen from dead-band.

The system shall include adjustable alarms for low oxygen level.

Oxygen levels shall be measured by an Insitu analyzer. Oxygen sensors with external sensors and a sampling pump are not permitted.

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The oxygen system shall be equipped with a compact electromechanical actuator. This actuator must have a "no backlash" feature eliminating the introduction of additional hysteresis into the burner linkage.

The sequencer controller shall add or shed boilers based on the firing rate of the previous boilers in the sequence. Individual add and shed set points are required for each boiler. The sequence controller shall utilize override pressure set points and timers to bypass standard delays to speed up response to large load changes.

The sequencer control shall start boilers as they are required gently raising the firing rate to meet the load demand. The sequencer control shall also utilize an algorithm that prevents the boiler from firing at a greater rate than the load demand requires. Controls that allow immediate advancement to high fire or merely implement low fire hold by time or temperature will not be acceptable.

The boilers are to be warmed at low fire via a time schedule. However, the control must not allow more than one boiler to warm at once. The controller will select lag boiler addition by true load. When the firing rate of the lead boiler exceeds a programmed value representing true load, the second boiler shall be started after an adjustable delay.

When multiple boilers are in use, they shall operate at the same general firing rate, not permitting any boiler to reach high fire ahead of the other, to prevent "carryover" problems. As the load demand decreases and the firing rates drop to the lower programmed value, the operational cycle is reversed, the last lag boiler in the sequence, after an adjustable time delay, will modulate downward to low fire, then shut down.

The lead/lag sequence shall be changed manually at the HMI touch screen or using the optional automatic alternation feature. The control shall have the capability of two (pressure or temperature) set points within the program. This permits a lower set point during day, night, and weekend operations.

The control panel shall display boiler number, type of fuel, stack oxygen percentage, firing rate, and system pressure (or temperature) set point.

Communications

The controller shall have the capability of communicating to a building management system utilizing Lon, Modbus, Modbus TCP, BACnet MSTP, BACnet IP or JCI Metasys Integrator.

Technical Specifications

Control

Display	8-inch or 10-inch color touch-screen display
Range	0-999 Eng. units settable to match transducer
Alarms	Hi and low process variable, no light off
Input	4-20 mA or 1 to 5 volts DC
Memory	Non-volatile, battery back-up included
Power Requirement	120 VAC, 50/60 Hz
Enclosure	NEMA 12 panel
Outputs	Time proportioning or pneumatic bias
Auxiliary Outputs	0-135 OHM, 4-20 mA, 1-5 volts, teleprinter, RS-232, common alarm
Deadband	Adjustable
Set Points	Adjustable, minimum ten different O2 set points along firing rate curve
UL/CUL	Approved
Warranty	Two-Years
Temperature Limits	0-140 degrees F
Pressure Transducer	1 to 5 volts, psig range 0-30, 0-200, etc
Temperature Probe	RTD 100 Ohm, platinum 3 wire, Thermocouple
Combustion Efficiency	Calculation and real-time HMI display available if stack temperature sensors are present
Communication Protocols	Lon, BACnet IP, BACnet MS/TP, Modbus, Modbus TCP and JCI Metasys Integrator
Parallel Positioning Interface	Siemens LMV 51 and LMV 52 (sequence control only)

Oxygen Analyzer

Enclosure	NEMA 4X, probe is RA330
Accuracy	+/- 3% of measured value
Repeatability	+/- 1% of measured value
Drift	Less than 1% of cell output per month
Cell Response	1 millisecond
Overall Response	Less than six seconds for 63% change
Process Gas Temp	Up to 1,250 degrees F
Calibration	Calibration port for certified gases
Power	120/220 VAC, 60-50 Hz

Trim Actuator

Output	+/- ¾" adjustable linear travel, threadless screw type with mechanical stops
Thrust	5-40 lb. adjustable with unique slip ability
Temperature	0-150 degrees F
Installation	In-line with existing linkage