BURNERMATE TS MODEL BMTS-AC

Drum Level (Feedwater) Control, Draft Control, and/or Flue Gas Recirculation Control

Application

The BurnerMate TS **Model BMTS-AC** provides automatic control for drum level, boiler draft and Flue Gas Recirculation (FGR) for new or existing boilers. A feedwater valve that is swinging from closed to open will cause the steam header pressure to swing up and down, even when the plant load is absolutely constant. This will in turn cause the burner firing rate to swing up and down. Burner load swings cause combustion control systems to operate the burner with extra excess air, thus lowering efficiency. Draft controllers modulate the boiler outlet damper in order to maintain a constant pressure in the combustion chamber. Any boiler that will be operated at a negative draft should have a draft control system. Positioning burner control systems can operate with less extra excess air if the furnace pressure is constant. At a given F.D. fan inlet damper position, the air flow through a burner will increase when the boiler draft goes more negative.

Key Features

- Precise Draft Control - "GAP" PID Draft Control and firing rate feedforward assure stable draft even during load changes. This is especially important for outlet draft control on boilers with Induced Flue Gas Recirculation (FGR) NOx reduction.
- Single Element Drum Level Control - A drum level sensor causes the feedwater valve to open or close in proportion to the deviation from desired drum level. Suitable for firetube boilers with moderate load swings and watertube boilers with slowly changing loads. Variations in the feedwater supply pressure will cause the drum level to change when the load is steady. This control strategy does not respond well to shrink and swell.
- Two Element Drum Level Control - A drum level sensor is the primary controller input, a steam flow sensor is a feedforward controller input. The steam flow signal allows the controller to respond properly during shrink and swell. Feedwater pressure variations also upset the drum level. Suitable for watertube boilers with substantial load swings if the feedwater pressure is repeatable.
- Three Element Drum Level Control - A feedwater flow sensor is added to allow the controller to compensate for variations in feedwater supply pressure. Suitable for watertube boilers with substantial load swings and unrepeatable feedwater pressure.
- Flue Gas Recirculation (FGR) Control - FGR flow rate is controller in response to boiler load.

Ordering Information

Optional Features	Add Suffix to BurnerMate TS Catalog Number
Draft Control	add "-**DR***" suffix
Drum Level (Feedwater) Control "X" = Feedwater (1,2, or 3) Element	add "-**x-FW***" suffix
Flue Gas Recirculation (FGR) Control	add "-**FGR***" suffix

*Add "C" or "T" to denote a Current (4-20 mADC) or Triac Control Output

Refer to the Plant Engineering Data section for the "Control Signal" diagrams

Order Sensors Separately (Optional)	Catalog Number
E-link Draft Damper Assembly	**Consult Factory**
Draft Transmitter, 4-20 mADC, NEMA 4, Smart with three valve manifold	**Consult Factory**
Drum Level Transmitter, 4-20 mADC, NEMA 4, Smart with three valve manifold	**Consult Factory**
Steam Flow, Vortex Shedding type, 4-20 mADC	**Consult Factory**
Feedwater Flow Meter, Turbine type	**Consult Factory**

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Suggested Specifications

1. Application
Supply a self-contained Boiler Control System with 10" (or 15") color touch screen to provide drum level, boiler outlet draft and flue gas recirculation control. The control components shall be located in the combustion control cabinet and shall be fully integrated for automatic sequencing of light-off and shutdown.

2. Drum Level (Feedwater) Control (when required)
The Drum Level control system shall be designed to maintain boiler drum level. Drum level shall be controlled by modulating the feedwater control valve in either a single element or three element mode. In the single element mode only drum level measurement is used. In the three element mode drum level, steam flow and feedwater flow measurements are used.

3. Draft Control (when required)
Boiler Draft shall be controlled in response to changing furnace pressure, and a feed-forward signal of boiler load. The controller shall have a characterizable set-point curve for the feed-forward signal. Alarm shall be provided for low draft. All the logic required to insure that pre-purge, postpurge, light-off, and burner modulate cycles are automated shall be provided within the controller.

4. Flue Gas Recirculation Control (when required)
Flue gas recirculation (FGR) flow rate shall be controlled in response to boiler load. The controller shall have a characterizable setpoint curve for damper output signal. All the logic required to insure that pre-purge, postpurge, light-off, and burner modulate cycles are automated shall be provided within the controller.

5. Boiler Controllers
To assure system integrity, a pre-wired and factory-tested, microprocessor-based, multiple loop controller system shall be provided. The controller shall include process variable and "first -out" annunciator displays. Configuration and calibration data shall be stored on redundant non-volatile EEPROM memory modules. The backup memory module shall automatically download into the primary memory in the event of primary memory data corruption. All control logic, tuning, and fuel/air ratio curves shall be field configurable. If required to allow field modifications to the controller logic, provide one configuration tool or laptop personal computer per facility. The following color touch screen graphic pages shall be dedicated to each boiler control loop including drum level control, draft control, and FGR control, when applicable.

6. Communication
Each controller shall be equipped with an optically isolated RS485 modbus communications data highway connection to the color touch screen. The touch screen shall communicate with the plant BAS, EMS, or DCS by a Modbus over Ethernet communications data highway and shall allow: Auto/Manual mode change, setpoint change, variation of the manual output, sensing and silencing of alarms, change of any configuration parameter (including PID tuning constants), change of timers, etc. Provide all equipment capabilities specified in this paragraph, even if a connecting SCADA system is not included in this project.

7. Quality Assurance
A single Control System manufacturer with a minimum of 10 years experience manufacturing similar Combustion Control Systems shall provide the specified control system complete with Oxygen analyzers, variable speed drive, transmitters, and actuators. The manufacturer's authorized representative shall provide experienced combustion control technicians that have been trained by the manufacturer for variable speed fan Oxygen trim systems start-up and operator training. The system shall be factory manufactured and tested according to UL508A requirements (CSA C22.2 #14 for use in Canada). The control system shall be a Preferred Instruments, Danbury, CT, **BurnerMate TS Model BMTS-AC [-DRx] [-1, -2, or -3] [-FWx] [-FGRx]** ('x' = "C" or "T" to denote a Current or Triac Control Output).

Specifications

BurnerMate TS Control Panel	
Touchscreen:	OIT-10 or OIT-15
Controller:	**DCS-III**
Input Power:	120 VAC (+/- 15%)
Inputs	
Draft	4-20 mADC (optional)
Firing Rate	4-20 mADC (optional)
Drum Level	4-20 mADC (optional)
Drum Pressure	4-20 mADC (optional)
Feedwater Flow	4-20 mADC (optional)
Steam Flow	4-20 mADC (optional)
Outlet Damper Feedback	Potentiometer (optional)*
FGR Damper Feedback	Potentiometer (optional)*
Feedwater Valve Feedback	Potentiometer (optional)*
Outputs	
Outlet Damper	Triac or 4-20 mADC (optional)
FGR Damper	Triac or 4-20 mADC (optional)
Feedwater Valve	Triac or 4-20 mADC (optional)

* These signals are only required if Triac output is selected.