

BurnerMate®

Metered Control + SCADA Workstation + Flame Safeguard



PREFERRED INSTRUMENTS



Features & Benefits

- +Fully Metered
 - Superior control
 - 10:1 turndown
- +Oxygen Trim
 - Reduced fuel cost
 - Minimize NOx
- +Flame Safeguard
 - Single or dual fuel
 - Microprocessor-based
 - Easy troubleshooting
- + SCADA Workstation
 - PC based monitoring and operation
 - Expandable
- + Integrated System
 - Pre-configured
 - Factory wired & tested
- +Combustion Focus
 - 1000 Similar installations
- +Low cost, full scope

Integrated Combustion Management

The BurnerMate is a combined combustion control, flame safeguard, and SCADA monitoring and control system. It incorporates Preferred's high quality PCC-III Multiple Loop Controller for combustion control functions, an industrial hardened microprocessor for flame safeguard functions and a PC based SCADA workstation for graphical monitoring and operation. BurnerMate is a full scope control package, that assures safe and efficient control with undivided system integration responsibility.

Flexible & Expandable

A second, optional PCC-III Multiple Loop Controller can be supplied to provide draft and drum level control loops and balance of plant monitoring with up to 15 analog inputs, 6 analog outputs, 7 triac outputs, 6 relay outputs, 13 digital 120Vac inputs or combinations of these. BurnerMate can be expanded to monitor multiple boilers or to allow networking of multiple workstations.

Preferred Instruments Experience

Preferred Instruments engineers and manufactures instrumentation and control systems for steam and hot water generator applications. Preferred's focus on combustion applications brings the experience of over **1000 boiler control system** installations to the design of this product.

Improved Control with Fully Metered Systems

The BurnerMate system uses a fully metered combustion control strategy with oxygen trim. This combination offers the best opportunity to save fuel dollars with a control system upgrade. With fully metered systems both the fuel flow and the combustion air flow are measured. PID control is used for both fuel and air flow control, assuring the accurate maintenance of fuel and air flow setpoints.

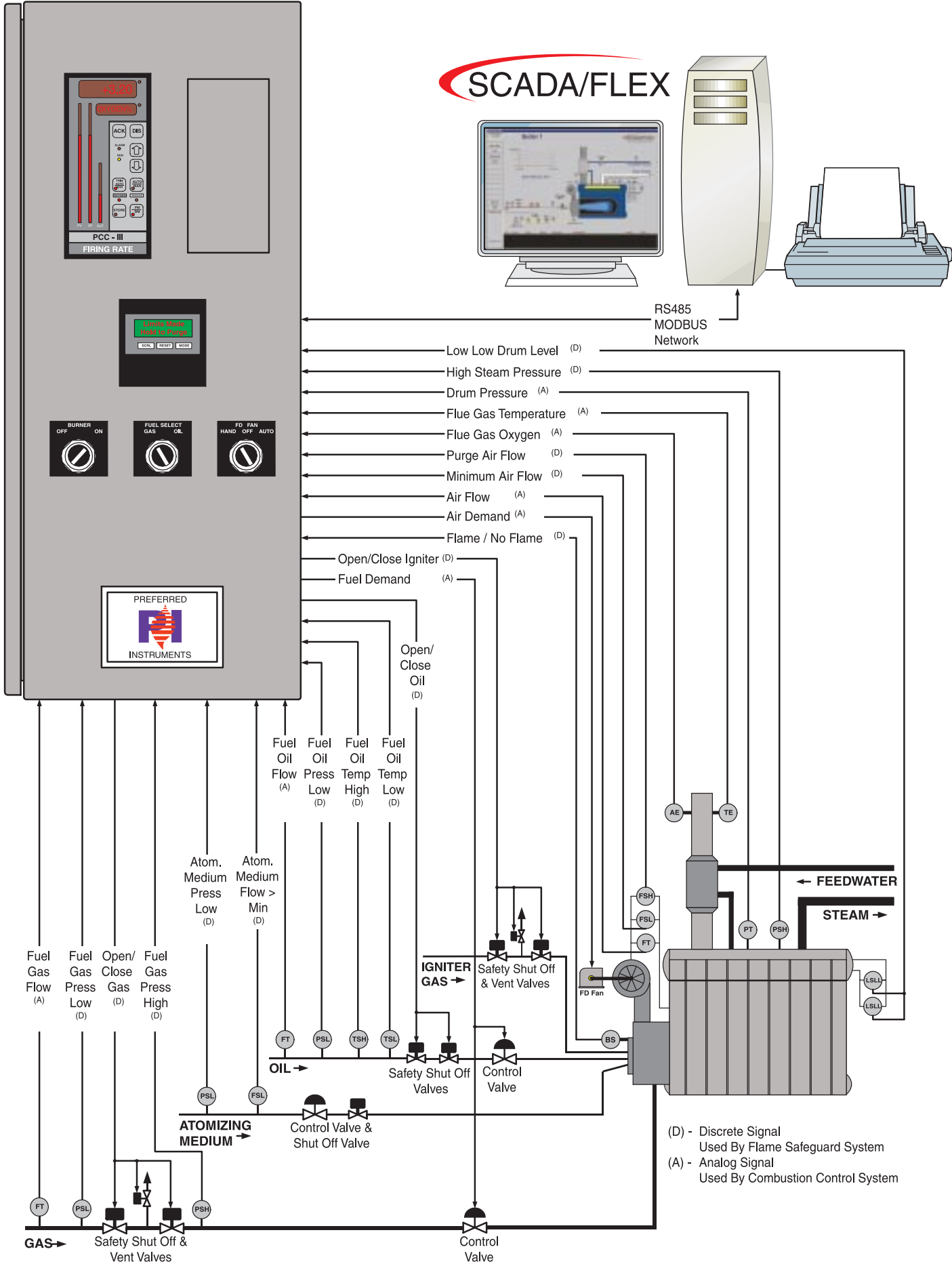
Parallel positioning and jackshaft systems do not control fuel and air flows based on actual flow measurements and as a result require fuel wasting "extra" excess air to compensate for control system errors. Parallel positioning and jackshaft systems cannot compensate for draft and air temperature changes, control valve and pressure regulator hysteresis, or pressure changes in combustion air or fuel pressure. Parallel positioning systems also depend on feedback potentiometers that have moving parts which wear over time. Fully metered systems use passive flow meters that are more reliable.

The best way to ensure efficient combustion with dependable availability is with a fully metered combustion control system.



Application Example

Local and Remote monitoring of fuel and air flow and igniter gas, oil and gas safety shut off valves



Clear, Safe Burner Management

Status

Easy to understand display of current burner operating status includes:

- Flame signal
- Sequence of operation messages
- Diagnostics messages
- “First Out” cause of lockout messages

Historical

User-selectable historical displays includes:

- The last six lockout conditions
- Number of burner cycles
- Burner hours



Message Display

An externally-mounted LCD backlit display has two lines of sixteen characters each. The display provides burner status and historical information. Operation, troubleshooting and maintenance information is at the boiler front, where it is needed.

Flame Safeguard System

The BurnerMate system is engineered to be in compliance with the latest Factory Mutual and NFPA 8501 standards. The systems are manufactured, tested and labeled according to UL 508 standards.

Features

- The Flame Safeguard System provides the proper burner sequencing, ignition and flame monitoring protection on single burner, automatically ignited oil or gas fired boilers.
- The system uses a fail-safe, “de-energize” to trip design. Upon the loss of system power the fuel safety shutoff valves are automatically closed and ignition components are de-energized.
- On a safety shutdown, the message display will advise the operator that the control is in “Lockout” and will indicate the specific cause and the state in the operating sequence where the shutdown occurred.
- Proof of purge, low fire position interlocks, and fuel valve end switch safety checks are also included.
- A drum level conductivity probe relay is incorporated for an auxiliary Low Water Cut-out safety interlock.

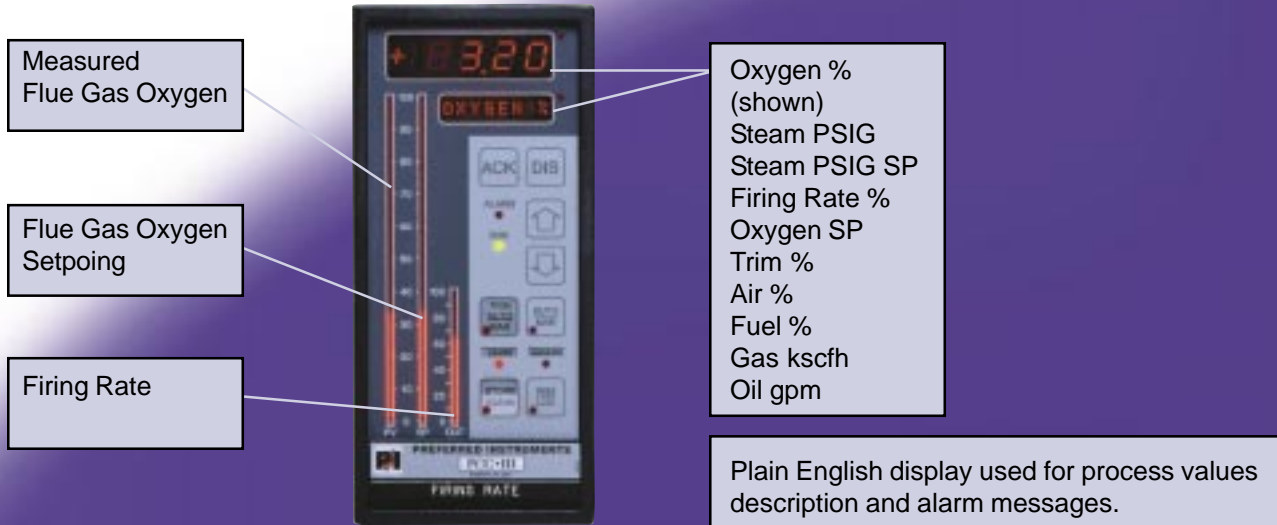
Microprocessor-based Controller

The Flame Safeguard System is microprocessor-based, with self-diagnostics and non-volatile memory.

Flame Scanners

An infrared (IR) flame scanner is provided as a standard for water-wall furnaces. An ultraviolet (UV) self checking flame scanner is an available option for refractory lined furnaces.

Local Combustion Control Backed by SCADA Remote Operation



Combustion Control

The BurnerMate system uses a single PCC-III Multiple Loop Controller to provide single burner, dual fuel, fully metered combustion control. The package includes boiler submaster, air flow, fuel flow and oxygen trim logic using four PID loops.

Features

- Air flow, fuel flow, and flue gas oxygen are continuously monitored and displayed.
- Six separate eleven point characterizing curves are used for establishing the gas & oil firing air/fuel ratio and oxygen trim setpoints.
- Real time boiler efficiency is calculated, allowing the boiler operator to instantly identify inefficiencies and potential operational problems.
- Differential Cross Limiting is used to prevent the burner from becoming fuel rich and air rich.
- Multi-mode auto select air flow control logic enables "10:1" turn down.
- The air and fuel control outputs are interlocked with the flame safeguard system to automatically cause the air and fuel control drives to go to purge & light-off positions.
- The system is suitable for use with variable speed drive fans for further cost savings.

As a result of the tighter fuel and air control, major burner manufacturers recommend fully metered systems for low NOx and low excess air burners.

Oxygen Trim

The BurnerMate System includes a zirconia oxide 'in-situ' oxygen analyzer and oxygen trim control logic. Flue gas oxygen is measured and compared against setpoint to continuously adjust (trim) the fuel/air ratio. Oxygen trim enables the boiler to operate safely and reliably at reduced levels of excess air throughout the boiler operating range.

PCC-III Multiple Loop Controller

With thousands installed, Preferred Instruments' loop controllers have proven to be durable and reliable. Special attention to technology and safety features has made the PCC-III controller one of the safest and most reliable in the industry.

Features

- Easy to understand and use "Blockware" configuration language.
- True multiple loop control with large 160 block memory and unlimited characterizer curves.
- Non-volatile, redundant memory modules protect configuration data, tuning parameters and operating status information.
- "Examine" and "Block Force" modes allow rapid system troubleshooting.
- "Learn Mode" provides automated characterizer curve setup for rapid, error-free burner setup.
- Commissioning is easily accomplished via the front panel or optional laptop.

Remote Control & Monitoring System

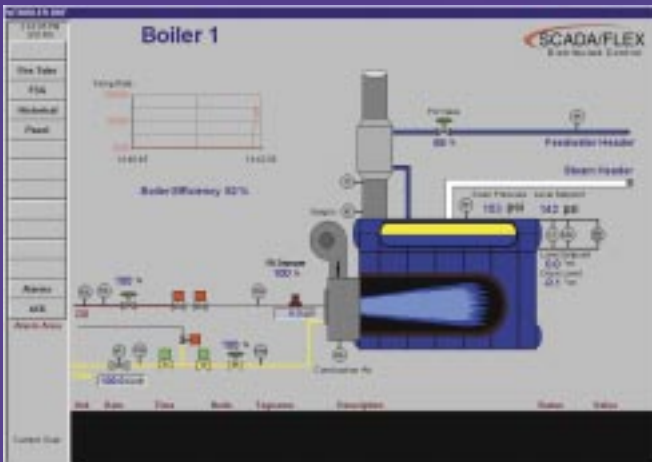
The SCADA/FLEX Remote Control and Monitoring System is an integral part of the BurnerMate package. The system is networked to the Combustion Control and Flame Safeguard Systems. It provides remote operation, graphic displays of information, alarm message displays, alarm printing, and remote boiler tuning capabilities.

Safety and reliability are inherent with the SCADA/FLEX Remote Control and Monitoring System. Control logic is executed locally at

each controller, enabling the system to continue full automatic operation even if the computer workstation is shutdown or malfunctioning.

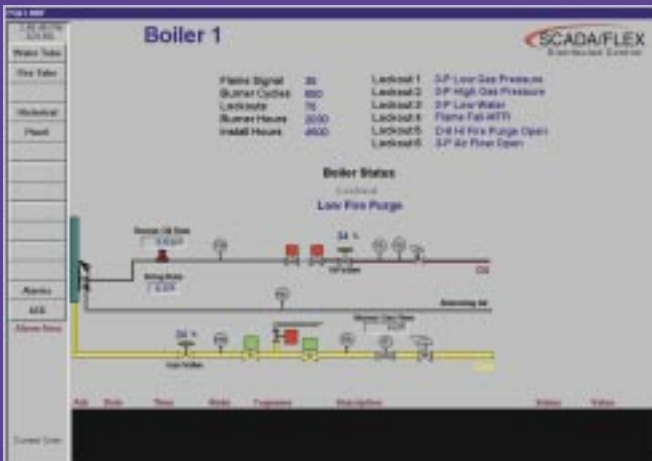
Features

- Optically isolated RS-485 Modbus data highway ensures safe & reliable communications.
- Historical Trending allows for comparison of energy use in relation to historical data.
- Off site Monitoring brings all operations to a convenient, central location (optional).
- Integrated Logging enables improved maintenance planning.
- Remote Boiler Tuning displays bring necessary information together to make the job easy.



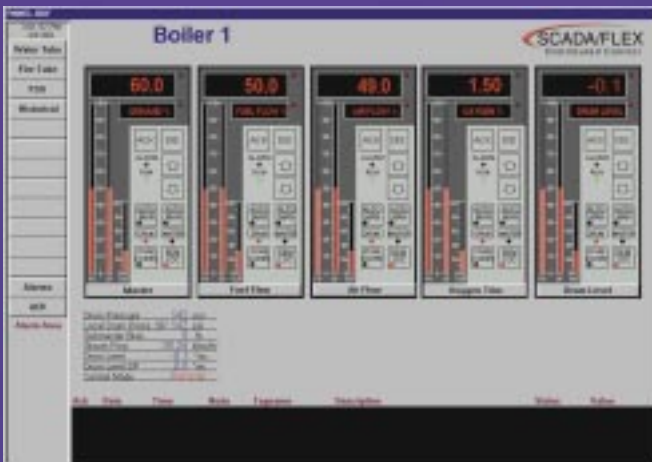
Boiler Overview Display

The boiler overview display provides a quick, intuitive view of key process conditions.



Flame Safeguard Display

The Flame Safeguard display reduces downtime spent troubleshooting equipment malfunctions by pinpointing possible problem areas.



Face Plate Display

The Face Plate Display allows an expanded operator view of the fully metered combustion control strategy. Traditional faceplate displays are provided for boiler submaster, air flow, fuel flow and oxygen trim as a standard. The faceplate buttons are soft, allowing complete remote operation.

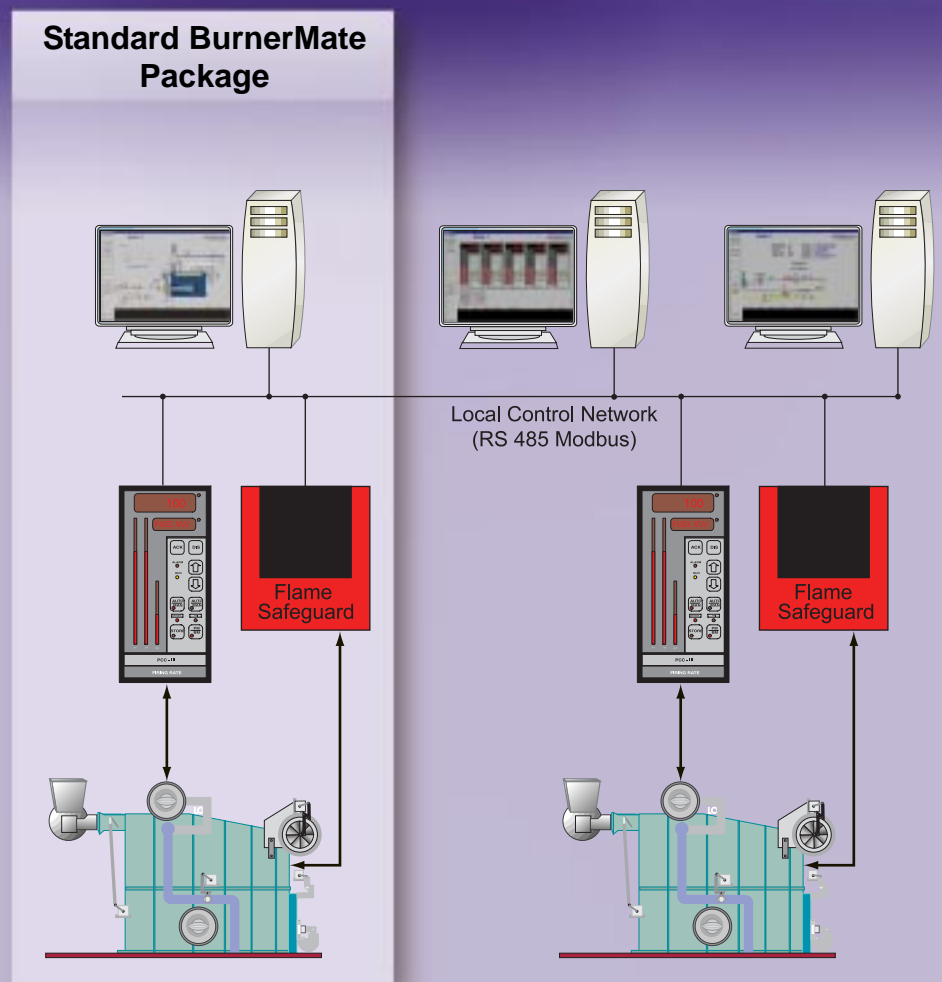


The **BurnerMate** package includes a pre-wired combustion control/Flame Safeguard control cabinet, an infrared flame scanner, an oxygen analyzer, a SCADA/FLEX workstation, and an alarm printer.

Plant Monitoring

The SCADA/FLEX architecture is built on a standard RS-485 Modbus network and is ready for additional inputs from your plant. Multiple boilers, chillers, storage tanks, and other data acquisition inputs can be added to create a truly integrated remote plant monitoring system.

Central plant control and monitoring with the SCADA/FLEX system allows for comparison of energy use in relation to historical data which is beneficial for establishing whether or not there are operational problems, and therefore the need for any upcoming maintenance requirements.



BurnerMate® Specifications

Enclosure

The BurnerMate control system is packaged in a wall or windbox mounted weather-proof enclosure. The system is delivered to the site pre-wired, pre-programmed and fully tested.

Mechanical

- 30" H X 12" W X 30" D Enclosure Size (shown)
- 30" H X 30" W X 12" D is an available option
- Weather-proof

Environmental

- 32° to 130° F (0° to 54° C) Operating Temperature
- -20° to 150° F (-28° to 65° C) Storage Temperature

Network Communication

- Modbus (ASCII or RTU mode)
- RS-485, Optically Isolated

Input Power

- 120 Vac (+/- 15%)

Design Standards

- UL 508
- NFPA, Factory Mutual and Industrial Risk Insurers

Input / Output

- 4-20MA, 1-5Vdc, 0-10Vdc, 100 to 10K ohm Analog Inputs
- 4-20MA, 800 ohm Analog Outputs
- 120 Vac Discrete Inputs, relay contact Discrete Outputs
- Optional 2A 24-120 Vac, TRIAC Outputs

Flame Safeguard

- Independent, industrial-hardened microprocessor
- Automatic single burner, dual fuel, gas or oil firing, sequencing, ignition and flame monitoring protection
- LCD backlit display with two (2) lines of sixteen (16) characters
- Operator interface includes burner "RESET" pushbutton and FD Fan "HAND" - "OFF" - "AUTO", Fuel Select "GAS" - "OIL" and Burner "OFF" - "ON" control switches
- Auxiliary Low Water Cutout drum level conductivity probe relay
- IR Flame Scanner with 8' shielded cable

Combustion Control

- One PCC-III Multiple Loop Controller configured as a dual fuel, fully metered combustion controller with boiler submaster, air flow, fuel flow and oxygen trim control capabilities

Oxygen Analyzer

- In-Situ, Zirconia Oxide Probe with weather-proof housing
- Maximum flue gas temperature: 1,150° F (600° C)
- 3 inch flange mounting
- Probe length: 12" standard
- Optional probe lengths up to 100"

Remote Monitoring And Control

- Desktop Pentium III (or higher) workstation with 15" color monitor and Windows NT/Windows 2000 operating system with 150 I/O points
 - Dot matrix alarm printer
 - UPS backup power system
 - Optional expansion up to 2000 I/O points
- Remote monitoring of flame safeguard functions and control of the following combustion control functions:
- Manual/Automatic mode selection
 - Controller PID tuning parameters
 - Controller setpoint values
 - Controller output when in "Manual" mode

Additional Control Loops and Balance of Plant Monitoring

Optional PCC-III Controller

An additional PCC-III Multiple Loop Controller may be added for Plant Monitoring and additional Control Loops. Standard control loops for Drum Level, FGR, Draft and Variable Speed Drive Control are available. Typical plant monitoring input options are as follows:

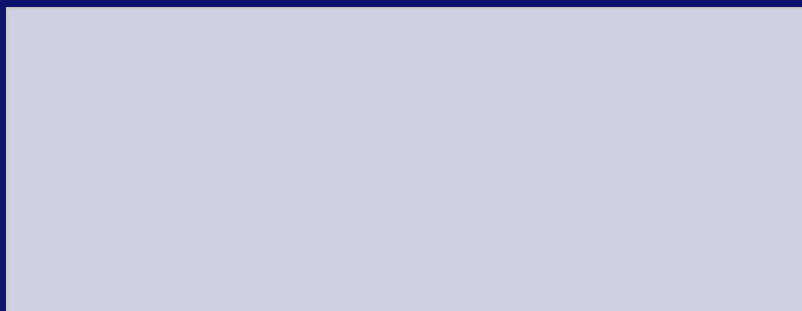
- Fifteen 4-20mA Analog Inputs & five 120Vac Discrete Inputs
- Five 4-20mA Analog Inputs & thirteen 120Vac Discrete Inputs

Optional Field Equipment

The following field equipment is also available:

- Pressure transmitter, "Smart", with 2-valve manifold and loop syphon (when steam application)
- Gas flow meter, thermal type
- Oil flow meter, gear type
- Air flow transmitter, (burner differential pressure), "Smart", with 3-valve manifold (Suitable for fixed geometry windboxes)
- UV self checking flame scanner, (As a substitute for the base system IR scanner)

Distributed By:



PREFERRED INSTRUMENTS

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