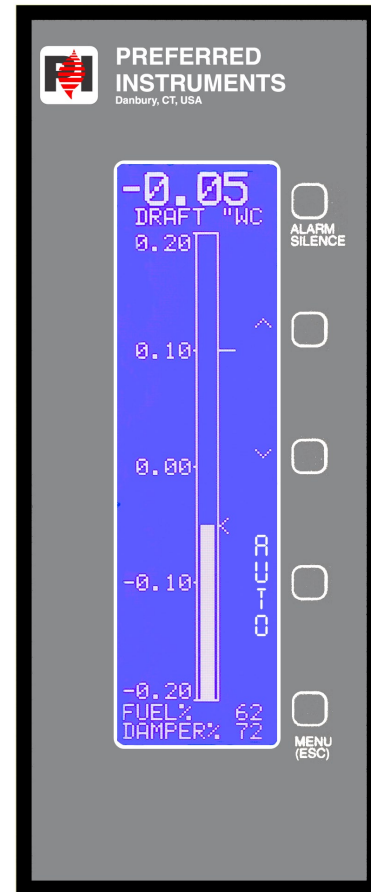


- Automatic Draft Control for increased boiler efficiency and reliability
- Precise Outlet Draft Control for induced FGR applications. Characterizable firing rate feedforward to assure stable draft during load changes and “GAP” PID Draft Control for improved stability
- Floating Draft Control for retrofit applications when accurate draft control is not required. Actuator feedback and firing rate potentiometers are not required
- Damper Automatically Positioned for purge, lightoff, post purge & burner shutdown. Outlet damper directed to close when off line to reduce energy waste
- Adjustable Outlet Damper Start Position for high draft conditions
- Low Draft Alarm Message and Contact
- Flexible Communications for Data Logging:
  - 4-20 mA Draft Re-transmission
  - RS-485 Modbus Interface



JC-22D shown in “AUTO” mode

## Description

Automatic draft control systems increase boiler efficiency in two ways: First, reducing the air infiltrating into the furnace reduces heat lost up the stack. Uncontrolled furnace draft results in a more negative furnace pressure and more cold air being drawn into the furnace. Second, 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 the burner will increase as furnace draft goes more negative. The automatic draft control system maintains a stable and optimum boiler draft despite changes in ambient air temperature, wind velocities, firing rates, and flue pass sooting conditions. The **JC-22D Furnace Draft Controller** is a microprocessor-based draft controller, indicating instrument, and alarm monitor. Preferred Instruments also offers the **E-Link** Draft Control System which combines the JC-22D, boiler outlet damper assembly, electric damper actuator, furnace draft transmitter, independent high flue gas pressure (low draft) cutout switch and boiler firing rate feedback potentiometer.

The **JC-22D Furnace Draft Controller** directly accepts a 4-20 mA draft transmitter signal, 120 Vac flame safeguard

and boiler firing rate potentiometer signals, and outputs a solid state switching (triac) outlet damper actuator control signal. Furnace draft is continuously displayed using a highly visible backlit LCD display. An intuitive bargraph display and alarm message provide clear furnace draft status. The outlet damper may be controlled in “Auto” or “Manual” mode and will automatically sequence through purge, lightoff, post purge & burner shutdown in response to flame safeguard system inputs. All adjustment can be made directly from the faceplate of the instruments by scrolling through user friendly, English-language menus.

## Operation

The JC-22D automatically positions the outlet damper according to burner operation. The JC-22D has field selectable Basic or Adjustable Starting draft sequence options:

### Basic Draft Sequence

During burner “off” periods the draft control damper remains closed to hold residual heat within the boiler. On a call for burner operation the outlet damper is driven open for pre-purge. To prevent pressurizing the boiler, the burner fan

starts when the damper is wide open. The damper remains open for burner light-off. When the fuel valve opens, the draft control damper is released from the open position and is modulated as required by the draft setpoint. During normal burner shut-down the damper is driven open during the post-purge period and then closed when the fan stops. Abnormal burner shut-down (safety lock-out of flame safeguard control) causes the damper to drive open where it remains until the flame safeguard is reset.

Adjustable Starting Draft Sequence:

Boilers with very tall stacks, oversized ID fans, or wide turndown Low NOx burners may not be able to light off with the outlet damper wide open. This strategy opens the outlet damper 100% for purge and then closes the damper to a pre-determined position for light-off. Each fuel has an independent Light-off position. The JC-22D will not close it's light-off interlock contact output unless the damper is at the proper position and the pressure is not above the high alarm point.

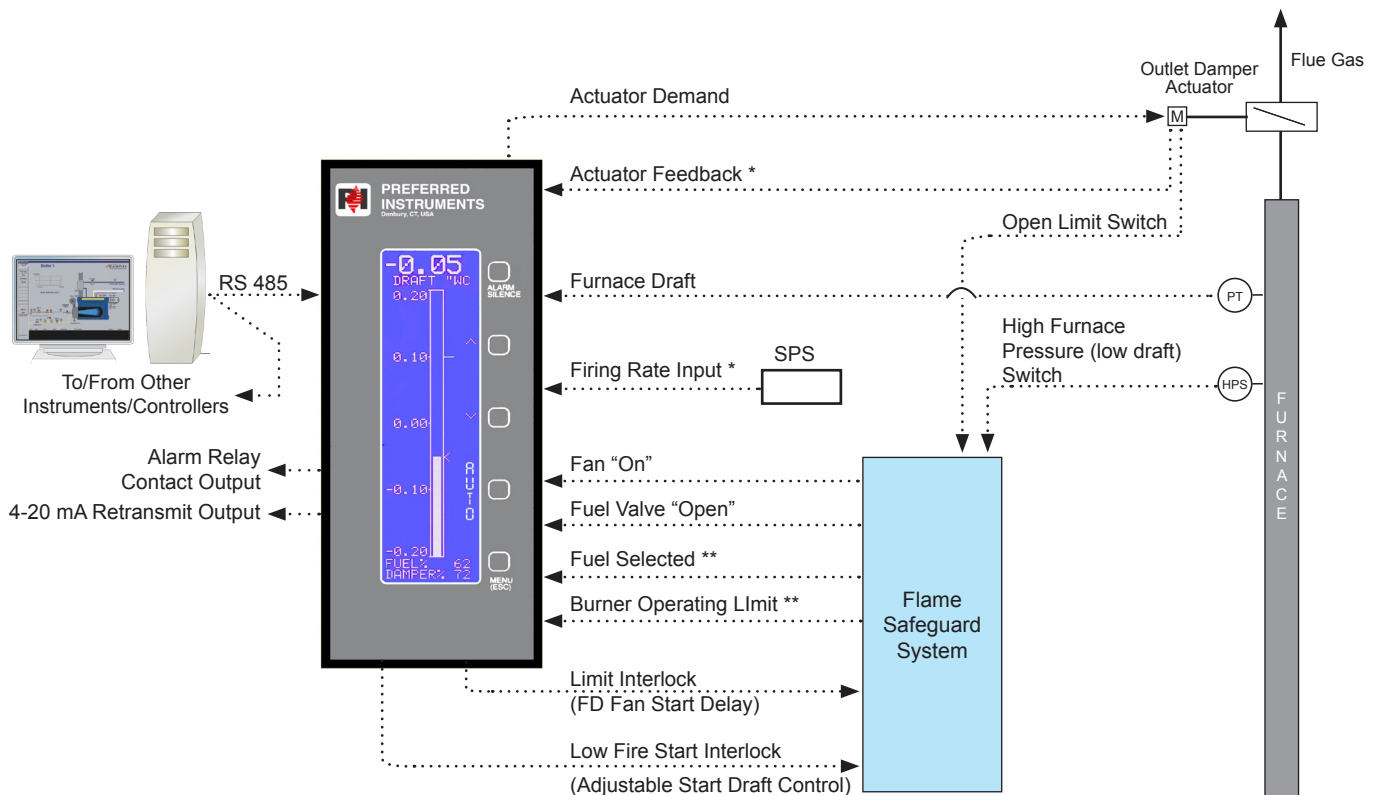
The JC-22D Furnace Draft Controller has Floating and "GAP" PID Draft Control options:

Floating Draft Control:

The JC-22D may be applied on existing burners that have outlet damper actuators without feedback pots. JC-22D uses proportional control to pulse it's triac outputs up or down until the draft returns to setpoint. The adjustable starting sequence is not available in this mode. Floating Draft mode is less accurate and has longer response time to firing rate changes than "GAP" PID mode.

"GAP" PID Draft Control with Firing Rate Feedforward:

Boiler flue gas pressure (i.e.: "draft") is a very noisy signal due to the normal flame pulsations that occur in the furnace. "GAP" PID provides a simple dual gain strategy (i.e.: lower gain near setpoint, higher gain farther away from setpoint). This feature provides precise control without excessive hunting. Additionally, the firing rate feedforward control strategy allows the controller to instantly respond to changes in firing rate demand without waiting for the outlet pressure to deviate from the acceptable range. The controller receives a feed-forward signal from boiler SPS firing rate sensor or a burner 4-20 mA demand signal. Independent curves are provided for the selected fuel. This is especially important for outlet draft control on boilers with Induced Flue Gas Recirculation (FGR) NOx reduction.



Typical Arrangement

**Note**

\* Signals required for "GAP" PID Draft Control OR Adjustable Start Draft Sequence

\*\* Signals required for Adjustable Start Draft Sequence

## Suggested Specifications

Provide an automatic, microprocessor-based draft controller for each boiler. The controller shall be a JC-22D Draft Control System as manufactured by Preferred Instruments, Danbury, CT.

- 1) The controller shall provide boiler outlet damper modulating control based on characterizable firing rate feed-forward signal to assure stable draft during load changes and "GAP" PID Draft Control for improved stability. The control system shall include all necessary logic to interface with the boiler flame safeguard system, ensuring that pre-purge, post-purge, light off and burner modulation cycles function properly.
- 2) The controller shall have the following features:
  - a) Digital display of outlet damper position, boiler draft, boiler draft setpoint and boiler firing rate. The control shall provide both automatic and manual damper control.
  - b) Provide an integral or separate 4 inch, 0.5% resolution (minimum) bargraph display in engineering units with visual alarm indication.
  - c) Provide a high furnace pressure (low boiler draft) alarm and alarm silence pushbutton. Relay output shall be provided for a remote alarm horn.
  - d) RS-485 Modbus network interface to communicate all signals within the unit to future data acquisition or building management systems.
  - e) The controller shall be capable of being completely configured from the Controller faceplate. No external configuration tools shall be required.
  - f) The controller shall be NRTL approved for installation in the United States be CSA approved for installations in Canada.
- 3) Draft Transmitter: Provide a differential pressure draft transmitter for measuring furnace draft. Transmitter shall be field calibrated and provide a 4-20 mA signal.
- 4) Provide a firing rate input to the controller. Equipment shall be Model SPS firing rate potentiometer as manufactured by Preferred Instruments or firing rate output from the firing rate controller.

## Specifications

<b>Power Supply:</b>	120 Vac, +/- 15%, 50/60Hz 15 VA
<b>Ambient Temp.:</b>	+32 to +122° F
<b>Displays:</b>	High Contrast LCD Display
<b>Display Range:</b>	-1.00 to +1.00" H <sub>2</sub> O Numeric Display 4" high, 0.5 % Resolution Bargraph
<b>Draft Input:</b>	4-20 mA Digital filtered
<b>Firing Rate Input:</b>	135 ohm (minimum) or 4-20 mA
<b>Discrete Inputs:</b>	Five, Optically isolated 120 Vac, 10 mA load
<b>Alarm Setpoint:</b>	One (1) adjustable with adjustable time delay
<b>Relay Outputs:</b>	Three SPDT Relays 10 A Resistive, 8 FLA, ½ Hp, 120 Vac
<b>Triac Outputs:</b>	One Pair, 2 FLA / 24-120 Vac Drives Reversible Actuators
<b>Actuator Feedback:</b>	135 ohm min feedback pot (required for GAP PID Control Mode)
<b>Output:</b>	4-20 mA, Draft re-transmit, 650 ohm load max <u>and</u> RS-485 Modbus Interface
<b>Enclosure:</b>	NEMA 4 faceplate
<b>Draft Transmitter:</b>	Field Mounted, 4-20 mA, digital filtered -1" to +1" H <sub>2</sub> O, 0.5% accuracy

## Ordering Information

- 1) **JC-22D** Furnace Draft Controller

## Optional Accessories

- 1) Draft Transmitter
- 2) Outlet Damper Actuators
- 3) Outlet Damper Assemblies
- 4) High Flue Gas Pressure (low draft) Switch
- 5) SPS Firing Rate Feedback Potentiometer

