

North American 8200 Combustion Process Controller

Control Your Combustion Process Parameters in a Single Controller

- Process control loop with milliamp, thermocouple input, or external demand input.
- Two air control loops for separate or simultaneous use with two oxidants
- Two fuel control loops for separate or simultaneous use
- Flexible fuel - air ratio control
- Oxygen trim input
- Furnace pressure control
- Remote or Key-in process control set-point
- Touch screen display in engineering units with text diagnostics



can change the operating state to reflect process conditions. Discrete outputs are available to act as process permissives.

- Low operating costs are achieved through the above performance, within one attractively priced instrument. Its built-in diagnostics effect quick return to service and its touchscreen display simplifies its use.

INTRODUCTION

In industrial processes, a precise mix of fuel and air for combustion is required for maximum efficiency, low emissions, and low operating costs. The North American **8200 Combustion Process Controller** is designed to effectively regulate these variables in industrial furnaces, kilns, dryers, boilers, etc.

OVERVIEW

The 8200 provides process and ratio control of industrial combustion applications in a single easy-to-use unit. Here is how it accomplishes the key benefits.

- Maximum efficiency comes from optimum ratio setting, reduced excess air, and the use of flue gas oxygen measurement as a ratio trim to adjust for fuel or other process variations.
- Tight flow control in proper ratio contributes to reduced emissions to meet the strictest of environmental regulations.
- Proper operation is maintained by fault detection and predefined actions. If the unit discovers a fault, the control loops will drive to predefined states. Discrete inputs

The functions include:

1. Control of a temperature, pressure or other process variable with proportional-integral (PI) control software.
2. Oxygen or air as the oxidant
3. Two fuel flows and two air/O₂ flows.
4. Air 2 can be Flue Gas Recirculation (FGR)
5. Up to 2 air and 2 fuel control loops
6. Furnace pressure PI control available.
7. Oxygen trim on the ratio.

Digital event outputs from the unit can notify the operator of thresholds in operating conditions or trigger changes in the process, such as opening a second fuel valve when the process reaches a certain temperature.

Discrete inputs read by the controller change its operating state to match furnace conditions (purge, low fire, or hold, etc.). The unit and inputs associated with the process are alarmed. An alarm triggers a display of abnormal condition and defaults the unit to an operating mode to assure process safety: hold, shut down, etc.

PROCESS CONTROL

The North American 8200 main process control loop accepts a 4-20 mA or thermocouple input signal and executes a PI control loop. The unit can be configured for J, K, N, R, and S type thermocouples operating as a temperature control displayed in degrees F or C. It can alternately read a 4-20mA signal acting as a pressure control (displayed in psig or kPa) or a temperature control (displayed in F or C). The 4-20 mA input can also be treated as a generic signal with any range up to 0-99999.

If the application only calls for ratio control of flows, the input signal can be set up as a milliamp demand input. In this case, the demand signal acts as setpoint for the firing rate.

AIR, OXYGEN and FGR

Air or oxygen can be used as oxidant. The 8200 receives up to two oxidant flow inputs, each with an available thermocouple input for temperature compensation. Proper application can enable the user to have 1 or 2 air flows, 1 or 2 oxygen flows or one of each. One of the inputs can also be configured for FGR flow. The 8200 can use one drive output to control all oxidant flows or two air drive outputs, one for each. Discrete inputs are used to select which air input(s) are actively used in ratio calculations, allowing them to switch on or off at any time.

FUEL FLOW

Up to two fuel inputs are available on the 8200. The system can use the fuel inputs one at a time or simultaneously. The 8200 can use one drive output to control all fuel flows or two fuel drive outputs, one for each. Discrete inputs are used to select which fuel input(s) are actively used in ratio calculations, allowing them to switch on or off at any time. Fuel totalizing is available.

RATIO

The ratio function is very flexible. The ratio calculations are based on heat flow allowing for any combination of oxidant and fuel flows. All flows are configured and displayed in engineering units and the ratio setpoint is expressed as percent excess air. Full anti-lean, anti-rich cross limiting prevents ratio excursions beyond configured limits.

OXYGEN TRIM

With the oxygen trim input the ratio can be automatically adjusted to maintain a configured oxygen level. The oxygen trim input can be configured as a transmitter input or a controller input. When used as a transmitter input, the 8200 uses a PI controller to adjust the ratio. When used as a controller input, the 8200 uses the input directly as the ratio adjustment. The ratio adjustment is made by biasing the fuel heating values used in the calculations. A discrete input is used to select when the trim function is active.

FURNACE PRESSURE

The 8200 includes a furnace pressure control loop with a configurable transmitter input, alarm functions and loop tuning parameters. An analog output is available to be configured as the drive for this loop.

REMOTE SETPOINT

A 4-20 mA input is available as a remote setpoint which can be configured as a Process or Ratio setpoint. A discrete input is used to select local or remote setpoint operation.

ANALOG OUTPUTS

There are four analog outputs available on the 8200. Two are reserved as the Air1 and Fuel1 drive outputs. Two analog outputs are configurable and each can be used as a Furnace Pressure drive, Air2 drive, Fuel2 Drive, or retransmission of a selected variable.

LOGIC INPUTS

Several logic inputs cause the 8200 to assume different operating states or to perform specific functions.

- Purge commands the air loop(s) to the purge flow setpoints (disabled if configured for oxygen service) and the fuel loop(s) to their minimum positions.
- Hold locks all control loops at their current outputs.
- Excess air drives the air loop(s) to the maximum setpoint, resulting in fuel only control.
- Low fire forces the process loop to its minimum output, resulting in the minimum firing rate with the flow control loops maintaining their setpoints.
- Light off forces the control loops to their configured light off outputs.
- Remote alarm reset allows the 8200 alarms to be reset by an external device.
- O₂ Select enable/disables the O₂ trim function.

EVENT OUTPUTS

Four Event outputs are available on the 8200. These output contacts respond based on the specific event configuration. The outputs can be 5 to 30 VDC or 5 to 120 VAC depending on the system wiring.

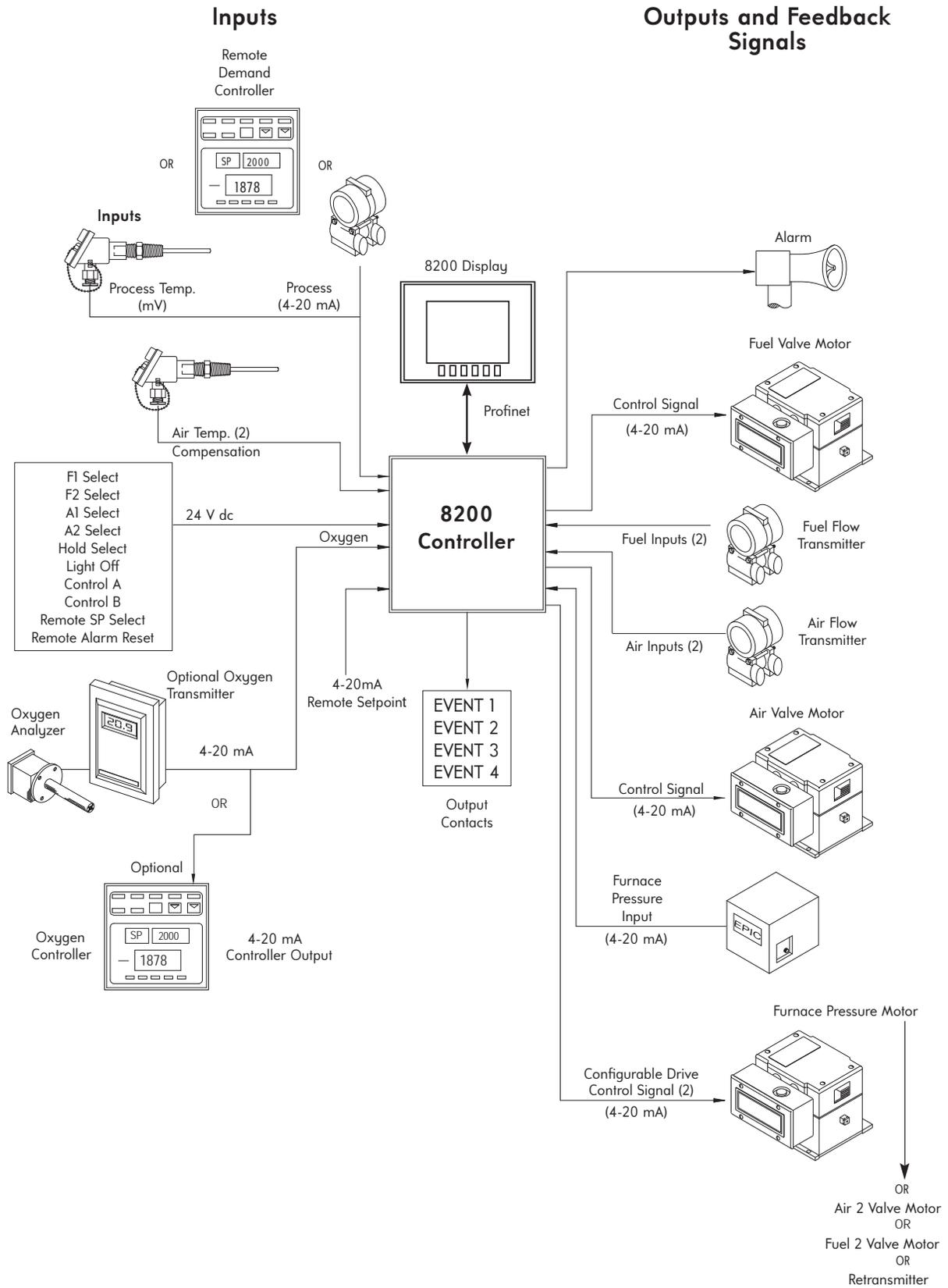
ALARM OUTPUTS

The 8200 provides three discrete outputs to report system status and alarms. The System Ready output will only be energized when the processor is running normally and all required analog inputs are in range. The No Alarm output is energized when no alarms are present. The Alarm output is energized when any alarm is annunciated. Any detected alarm is annunciated with a diagnostic message on the display.

COMMUNICATIONS

- The 8200 controllers use Profinet for network communications.
- The 8200 is only configured for Profinet communications.
- The 8200C includes a gateway device to allow direct communications with an Ethernet I/P network.

TYPICAL 8200 SYSTEM



SPECIFICATIONS

Processor and I/O (Panel Mounted)

Operating temperature: 0 to 130 F (-17 to 55 C)
Approvals: CE, CSA, UL, CUL
Power supply - Voltage: 85 to 264 VAC
Power Supply - Current: 0.3 A at 120 VAC (0.15 A at 240 VAC)
Line Frequency: 50/60 Hz
Power Dissipation: 18.5 W
Built in 24VDC Power Supply: 400mA Max (not for customer use)
Dimensions: 9.75" x 4.57" x 3" (248 x 116 x 75 mm)
Profinet Port Address: 10.1.220.198

Operator Interface Terminal (Door Mounted)

Operating Temperature: 32 to 122 F (0 to 50 C)
Enclosure Type 4X (Indoor use only)
Approvals: CE, CSA, UL, CUL Listed 74D7
Power Supply Voltage: 24 VDC (19.2 to 28.8 VDC)
Power Supply Current: 0.35 A
Dimensions - Front Panel: 8.424" x 6.22" (214 x 158 mm)
Dimensions - Panel Cutout: 7.756" x 5.551" (197 x 141 mm)
Display: 6" Touch screen with 6 pushbuttons
Profinet Port Address: 10.1.220.199

X-Gateway Module for 8200C Only (Panel Mounted)

Operating Temperature: 0 to 149 F (-17 to 65 C)
Approvals: CE, UL, CUL Listed 67AM
Power Supply Voltage: 24 VDC +/-10%
Power Supply Current: 400 mA max
Dimensions: 4.375" x 5.25" x 2" (112 x 134 x 51 mm)
DIP Switch Settings: All Off
Profinet Port Address: 10.1.220.195 (Must not be changed)
Ethernet Port Address: 10.1.220.196 (Can be changed)

Thermocouple Inputs (Quantity 3)

Range: Available type selection and the corresponding ranges are listed below:

T/C Type	T/C Range (°F)	T/C Range (°C)
J	-100 - 1400	-73 - 760
K	-100 - 2500	-73 - 1371
N	-100 - 2372	-73 - 1300
R	0 - 3214	-18 - 1768
S	0 - 3214	-18 - 1768

Digital Inputs (Quantity 11)

Voltage: 24 VDC
Current: 4 mA nominal

Digital Outputs (Quantity 7)

Type: Relay, Dry Contact
Voltage: 5 to 30 VDC or 5 to 250 VAC
Current: 2.0 A max

Analog Inputs - Current (Quantity 8)

Range: 0 to 20 m A
Impedance: 250 ohm
Max Voltage: +/-35 VDC
Max Current: +/-40 mA
Cable Length: 100 meters twisted and shielded

Analog Outputs (Quantity 4)

Range: 0 to 20 mA
Load Impedance: <600 ohms
Cable Length: 100 meters twisted and shielded

Control Valve Actuators

Modulating Accuracy: Minimum 160 repositions through 90 degrees of travel are recommended (North American 1615 series or similar).

Note: Low accuracy actuators will likely produce large flow variations and continuous hunting. Models with 55 repositions through 90 degrees of travel are not recommended.

External 24 VDC Power Supply (Required)

Power Supply - Voltage: 19.2 to 28.8 VDC
Power Supply - Current : 0.55 Amp (minimum)

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American Combustion, Inc. urges compliance with National Safety Standards and Insurance Underwriters' recommendations, and care in operation.