APPLICATION DATA

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PAC 353™ COMBUSTION MANAGEMENT SOLUTIONS
SINGLE POINT POSITIONING CONTROL

INTRODUCTION

This paper is one in a series that discusses Moore Products Co.'s Combustion Management Solutions. This installment discusses Single Point Positioning Control.

BACKGROUND

The primary function of combustion control is to deliver air and fuel to the burner at a rate that satisfies the firing rate demand and results in a mixture (air/fuel ratio) that provides safe, efficient combustion. Insufficient air flow wastes fuel due to incomplete combustion and the overly rich mixture can be ignited explosively by hot spots in the furnace. Too much air flow wastes fuel by carrying excess heat up the stack. Combustion controls are designed to achieve the optimum air/fuel ratio while guarding against the hazard caused by insufficient air flow.

The simplest control system which can be applied to boilers is single-point positioning, often referred to as jackshaft control. A single-point positioning system uses a mechanical linkage to manipulate the fuel control valve and the combustion air flow damper in a fixed relationship. The alignment of the fuel valve and air damper positioners are critical for this type of control. Because fuel valves and air dampers have different flow characteristics, it is necessary to linearize these flow characteristics. Typically, the air flow characteristic is linearized first, and then the fuel flow characteristic is linearized to match the air flow. When properly aligned, the percentage of fuel and air flow will match the percentage demanded by the single control output.

MEASUREMENT

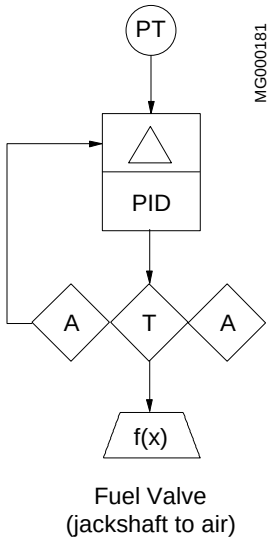
In a single point positioning control strategy only one measurement is used. This is either the steam header pressure or the hot water outlet temperature, depending upon the type of boiler. Both the fuel control valve and the air damper are positioned based on this signal.

Steam Header Pressure
The steam header pressure measurement can be made using a gauge pressure transmitter. Select a transmitter with significant over-pressure protection to avoid damage from pressure spikes.

Hot Water Outlet Temperature
Temperature measurements can be made using either a thermocouple or resistance temperature detector and a smart transmitter. Select a transmitter that has a universal input and can accept many different types of T/Cs and RTDs.

CONTROL

Steam Header Pressure



Fuel Valve
(jackshaft to air)

Single point positioning control is commonly used on firetube and small watertube boilers. The process input is typically the steam header pressure or the hot water outlet temperature in the case of a hot water boiler. The adjacent figure shows the simple feedback control scheme used in single point positioning.

The table below lists typical instruments for a single point positioning control system. This list is a guide. Consult your Moore representative for more information.

Instrumentation List

ITEM	MODEL
Steam Header Pressure Transmitter	340GGBHAAB5N113
Controller	353A2FNNNNNNNA4
Water Temperature Transmitter	344BN5N11G

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