Introduction

In a pulverized coal-fired boiler of a large power plant, an oxygen analyzer is essential for combustion control. Exhaust gases from the pulverized coal boiler contain a large quantity of dust and flow very fast. Oxygen analyzers that employ a sampling method may be subject to wear or clogging, resulting in increased maintenance workload and cost. A solution to this problem is the ZR22/ZR402 Direct In-Situ Zirconia Oxygen Analyzer that has no sampling system and utilizes a long-life sensor. A probe protector is attached to protect it against wear.

Expected Benefits

- Improves combustion efficiency for pulverized coal-fired boilers
- Ensures stable, continuous oxygen measurement
- Reduces operating cost
- Minimizes the need for equipment replacement

Process Overview

While oil is commonly used as a boiler fuel, coal is also used because it is inexpensive and readily available. Unlike oil, coal produces a large quantity of ashes when it is burned, necessitating pulverized coal-fired boilers to be equipped with an ash removal system such as a cyclone. Exhaust gases from these boilers contain a large quantity of dust (10 to 30 g/Nm³) and flow very fast as the result of the large volume of air being blown into the boiler. For oxygen measurement in large ducts, a probe with a long insertion length is used.
Solution Details

Field Data

Process Conditions
- Measurement point: economizer outlet
- Temperature: 300 to 400 °C
- Flow rate: ≤ 30 m/s
- Pressure: ±1.5 kPa
- Dust concentration: approx. 15 g/Nm³ or less
- Fuel: pulverized coal

Measurement System
- Detector: ZR22G-
- Probe protector: ZO21R-L
- Converter: ZR402G-
- Flow setting unit: ZA8F-
- Calibration gas unit: P/N G7013XF (inlet W22, outlet Rc1/4) or P/N G7014XF (inlet W22, outlet 1/4NPT)
- Case assembly for calibration gas cylinder: P/N E7044KF
  - Note: the calibration gas cylinder must be purchased locally

Utilities
- Power supply: 85 to 264 V AC, 50/60 Hz
- Instrument air (reference gas): pressure, 300 to 700 kPa

Notes
- A probe protector should be attached to the probe for protection against wear or damage. The probe protector should be mounted with the notch of the probe head pointing downstream in the gas flow.
- It is recommended that the detector be installed with the probe tip pointing downward. As shown in the figure below, it may be installed horizontally, too. The probe head tip should not point upstream in the gas flow.