

## Continuous Dust Monitoring of Exhaust Gases for Efficient ESP Operation

**Industry:** Power  
**Product:** Dust Monitor

### Introduction

Exhaust gases from a pulverized coal-fired boiler contain a large quantity of dust. To prevent this from being released into the atmosphere, an electrostatic precipitator (ESP) is used to remove the dust. To maintain the collection efficiency of an ESP and prevent dust emissions, abnormalities must be detected immediately. For this purpose, continuous monitoring of the dust content in the exhaust gases is required.

Conventional dust measurement using an optical device is affected by dust buildup on the window and deviation of the light axis, necessitating frequent maintenance. The DT450G Dust Monitor utilizes triboelectric technology, is easy to install, and is

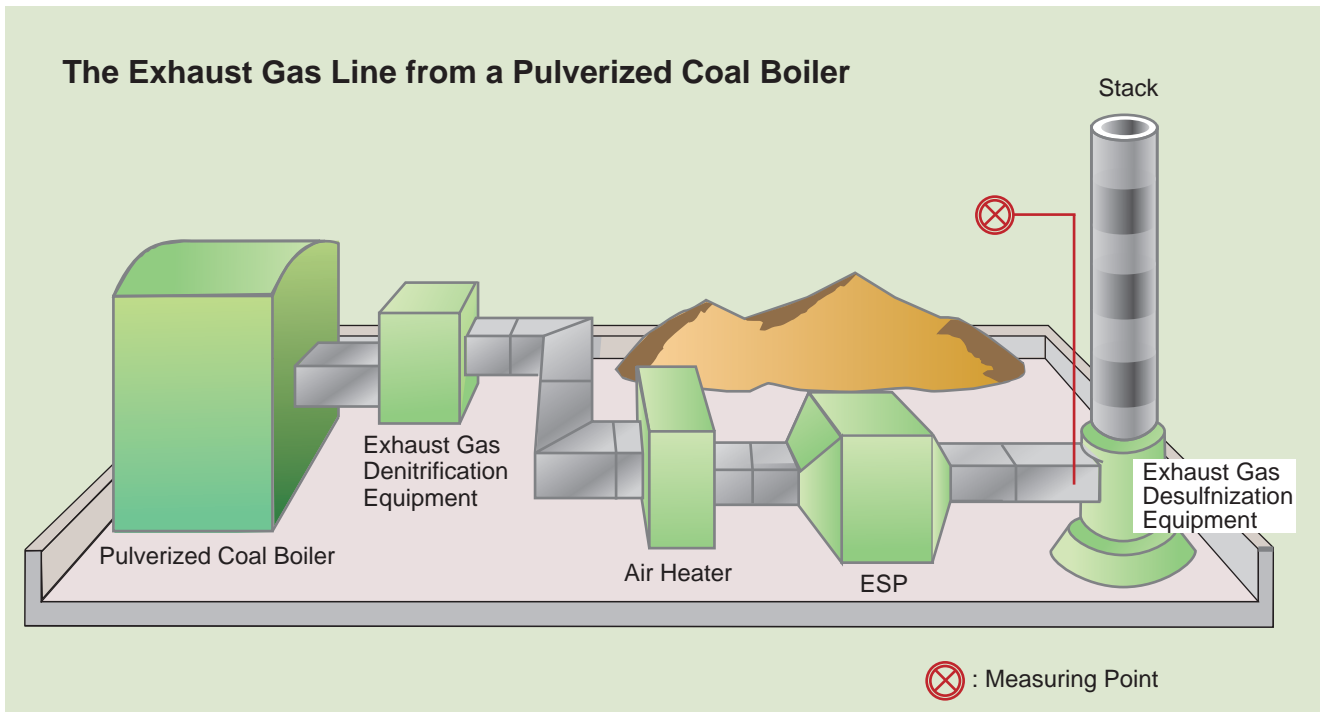
not affected by dust accumulation on the sensor. This makes the instrument ideal for continuous dust monitoring.

### Expected Benefits

- Monitors the operating condition of ESPs
- Reduces the bag filter maintenance and running cost

### Process Overview

The figure below shows the exhaust gas treatment system between the boiler and the stack, and the dust measurement point.



## Solution Details

### Monitoring System

DT450G-5-5-05-1-A-E-□-A/□

### Utilities

- Power supply: 100 – 120 V AC or 200 – 240 V AC, 50/60 Hz
- Power consumption: approx. 3 VA
- Air purge: clean, dry air equivalent to instrument air  
Pneumatic pressure: process pressure + 50 kPa (continuous purge)  
Air consumption: approx. 50 NI/min

### Process Conditions

Dust concentration: Approx. 17 mg/Nm<sup>3</sup>  
 Gas flow rate: 15 m/s  
 Humidity: 10 vol%  
 Temperature: 189 °C



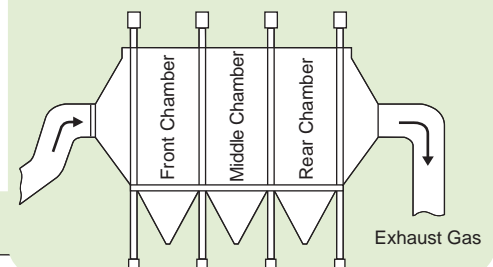
DT450G Dust Monitor

## Field Test Result

Accumulated dust on the electrode of an ESP is removed periodically by hammering. Instead of falling into the hopper, some of the dust stirred up by this process may circulate toward the exit, resulting in an increase in dust content. Hammering is performed sequentially in the front, middle, and rear chambers. The graph below indicates the increases in the dust content during these hammering operations, clearly showing them as peaks in the signal output by the instrument. This demonstrates that the DT450G is ideal for monitoring the efficiency and the operating conditions of ESPs.

The collection capability of an ESP varies depending on the voltage applied to the electrode. Based on the output signals of the DT450G, the applied voltage can be adjusted to maintain efficient collection.

### Electrostatic Precipitator



### DT450G Measurement Example

