



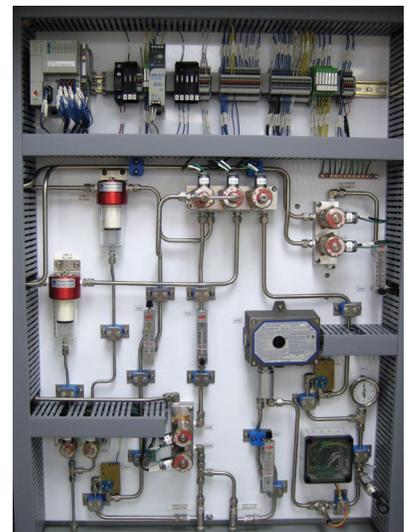
COMBUSTIBLE METHANE AND OXYGEN SAMPLING SYSTEM

Principal Technology Inc. offers a combustibles methane, other hydrocarbons, and oxygen sampling system (MOSS) designed to test the flue gas from process heaters during the pre-startup safety check. The Principal Technology MOSS, in conjunction with an integrated burner management system (BMS), ensures the safe operation of the process heater by sampling and verifying that the natural draft purge has cleared the heating chamber of potentially combustible gases prior to ignition. Utilizing a high-flow, rapid sample system, Principal Technology's MOSS reduces operational downtime by shortening the time necessary to conduct safety checks prior to igniting a process heater.

The Principal Technology MOSS:

- Operates in accordance to the National Fire Protection Agency (NFPA) 87 Recommended Practices for Fluid Heaters
- Interfaces with a standard BMS
- Uses an exclusive two-stage sampling system
- Pulls sample gases from the stack using an initial high flow rate
- Tests for combustible gases at the low flow rate required by the gas detection equipment
- Completes a typical combustible gas detection cycle in less than two minutes

If the MOSS sample results indicate the flammable vapor or gas concentration in the combustion chamber is 25% or less of the lower flammability limit (LFL) of the fuel in air, the sampling is deemed successful. A green "sample good" indicator will display on the methane monitor screen signaling the operator it's safe to engage the burner ignition. The "sample good" condition will expire at the end of a pre-determined countdown timer or after multiple failed ignition attempts, after which the operator is required to take another sample in order to start the burner.





Stack Sampling

Stack sampling prior to BMS ignition may begin once the initial setup and calibration is performed. The combination of opening the inlet dampers, outlet dampers, and completing a stack sample is the equivalent to performing a timed natural draft purge, with the added benefit of a combustible gas concentration measurement.

MOSS Stack Sampling Stages:

- **Periodic Bump Test**—Runs automatically prior to each pre-ignition sampling cycle or can be manually instigated
- **Combustible Gas Sensor Calibration**—Must be manually executed and successfully completed periodically based on the sensor manufacturer guidelines
- **Dampers Open**—All burner inlet and stack exhaust dampers must be in the fully open position
- **Sample Good Indicator**—Located on the Methane Monitor Screen, this display confirms that the sampling is successful
- **Sample Good Condition**—BMS is approved to ignite; expires at the end of a pre-determined timer or following a number of failed ignition attempts
- **Stack Sample Failure**—BMS will not ignite if there is an alarm or other malfunction until the operator proves stack is clear of combustible vapor

Operating Modes of the MOSS System

The Principal Technology MOSS contains multiple modes of operation, most of which are configured to occur automatically. Available operating modes include:

- Back Purge to Prevent Accumulation of Combustion Products in the MOSS Sample Lines
- Stack Sample
- O₂ Sample
- Combustible Gas Sensor Bump Test
- Sensor Calibration
- Post High Flammability Limit Alarm Sample System Purge
- Sample Filter and Condensate Traps

ADDITIONAL FEATURES

Oxygen Sample

Using the Principal Technology MOSS operators can enhance heater fuel efficiency by managing excess oxygen in the system. Excess combustion air can lead to higher fuel usage and operating costs. To address this issue, the system can alarm the operator if the stack oxygen concentration is too high or low so the inlet air dampers may be adjusted for optimum efficiency.

Sample Line Purge

Water vapor can collect in the sample lines when drawing a stack sample, so the Principal Technology MOSS also includes a back purge mode. Back purging the lines with instrument air dries the lines of accumulated water. Back purge operation runs automatically when other modes are not running.

Automatic Purge

To further promote reliable operation, in the event that a stack sample fails due to a high flammability limit alarm an automatic purge of the sample line will be initiated for at least 60 seconds. This will allow the methane sensor to be cleared of combustible gas and provide the operator time to locate and repair the source of the gas leak.

