Industrial Boiler MACT: CEM Requirements

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Overview: Boiler MACT

Boiler MACT
Testing and Monitoring Requirement

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- Testing
  - Initial compliance tests (PM, HCl, Mercury, THC and Dioxins)
  - Annual performance tests
  - Annual tune-up for units < 10 MM Btu/hour in size and units in Gas 1 and Metal Process Furnaces subcategories
  - Allows emission averaging among existing units in same subcategory

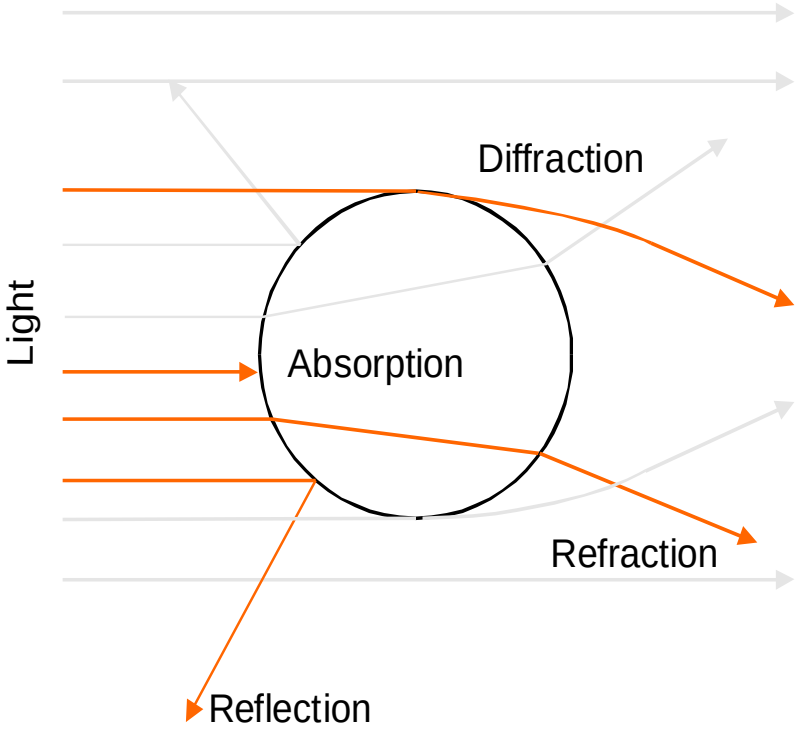
- Monitoring
  - **CO CEMs** for units with heat input capacity of 100 MM Btu/hour or greater
  - **PM CEMs** for units combusting coal, biomass, or residual oil and having a heat input capacity of 250 MM Btu/hour or greater
  - Process parameters (opacity, pressure drop, sorbent injection rate, fuel, etc.)

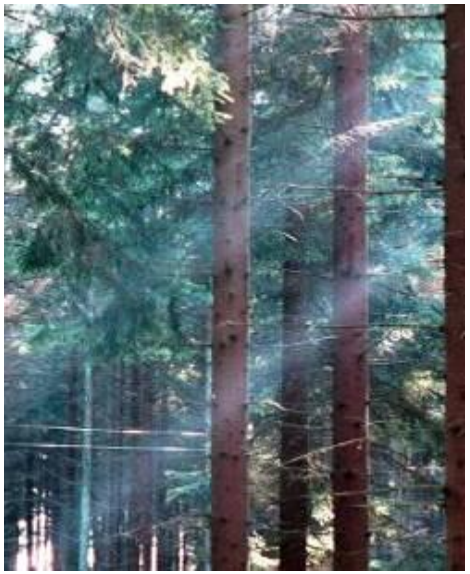
- Continuous Compliance
  - Demonstrated by maintaining operating limits (process parameters)
  - Demonstrated by maintaining CEMs values (30 day average) below emission limits

PM CEMs in Wet and Dry Applications

Measuring Principle
Scattered light

- Optical principle
- When light hits the particle, it is scattered
- Relation between the scattered light intensity and dust concentration
- Usable for low to medium dust concentrations





Measuring Principle
Scattered light

- Light attenuation depends on different application parameters (E.g.: grain size, dust density, dust dispersion)
- Application specific regression curve through a gravimetric comparison measurement: $cc2E^2 + cc1E + cc0$
  - Relationship between mA and dust concentration
- Data imported into dust measurement device

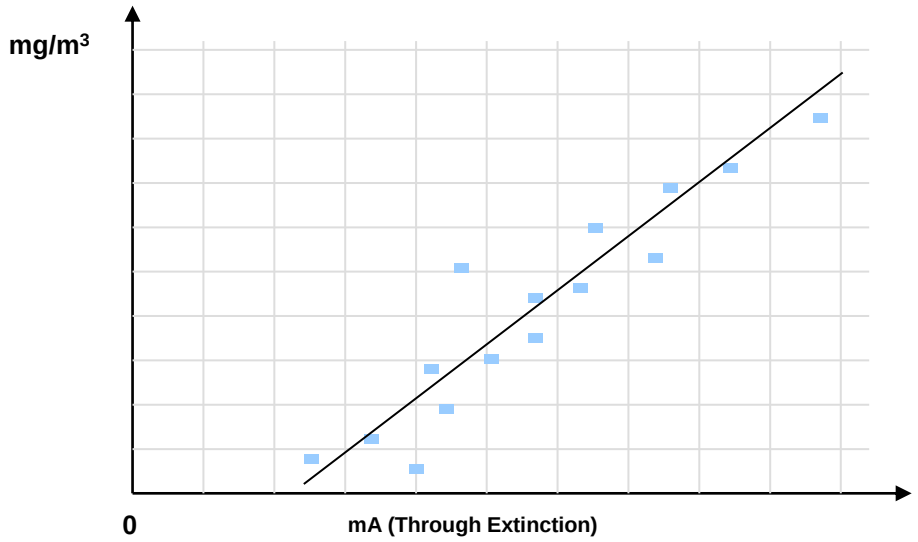
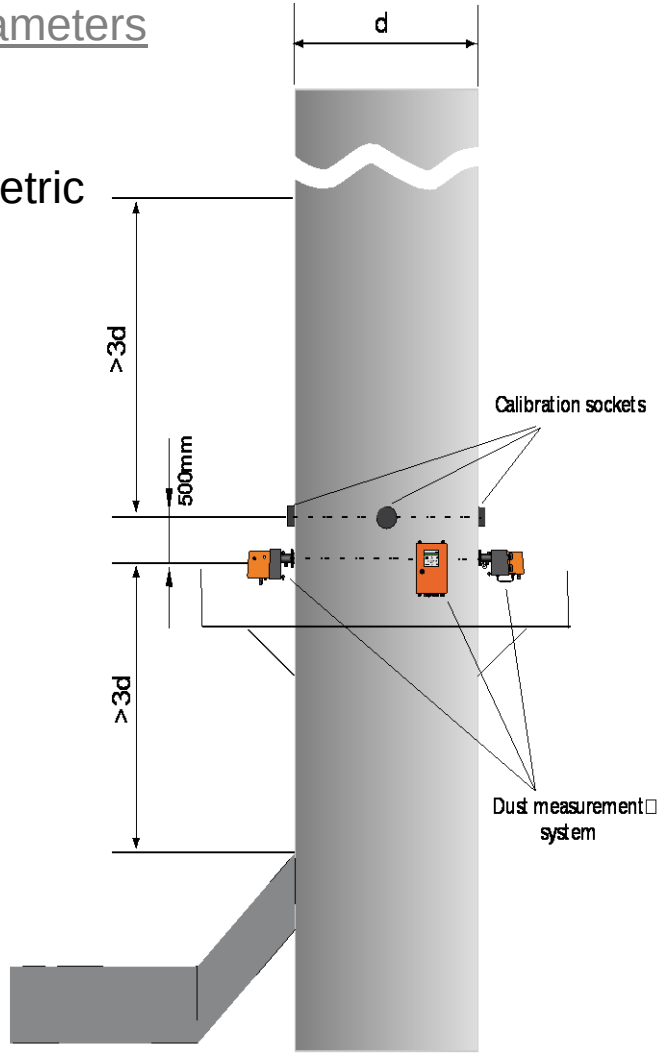
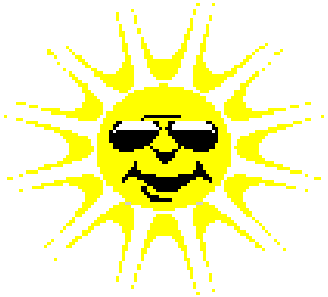


Fig.: Regression curve (Schematic)



PM CEMs in Wet and Dry Applications

Dry gas

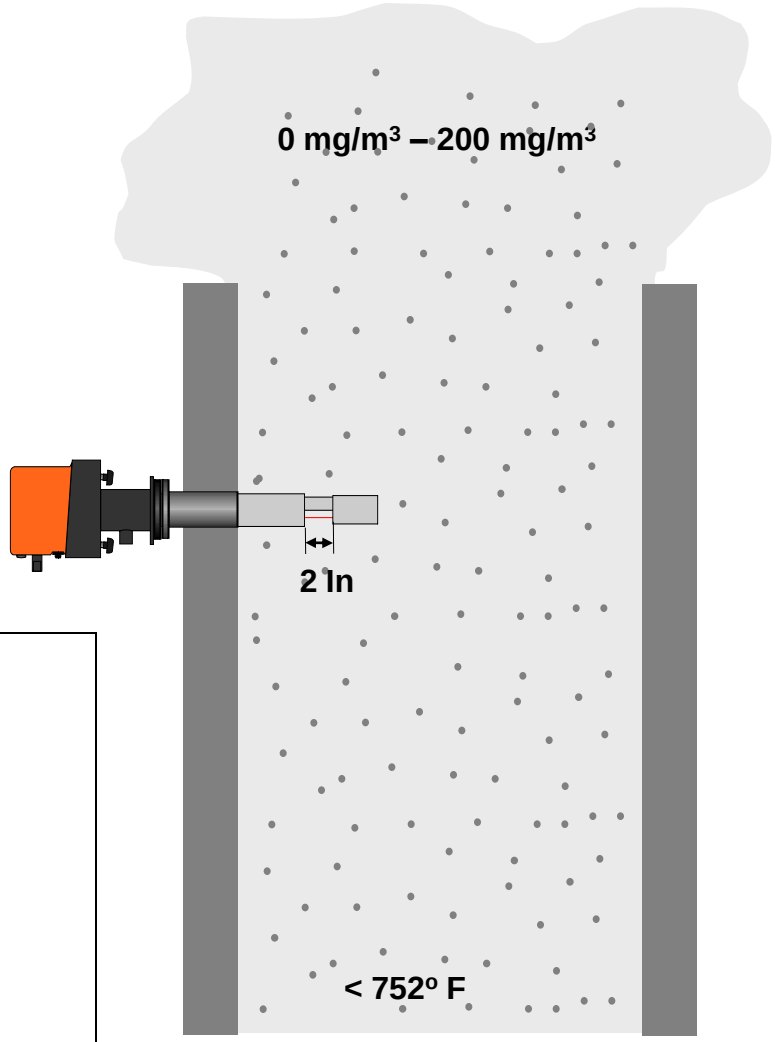


SP100

FWE200

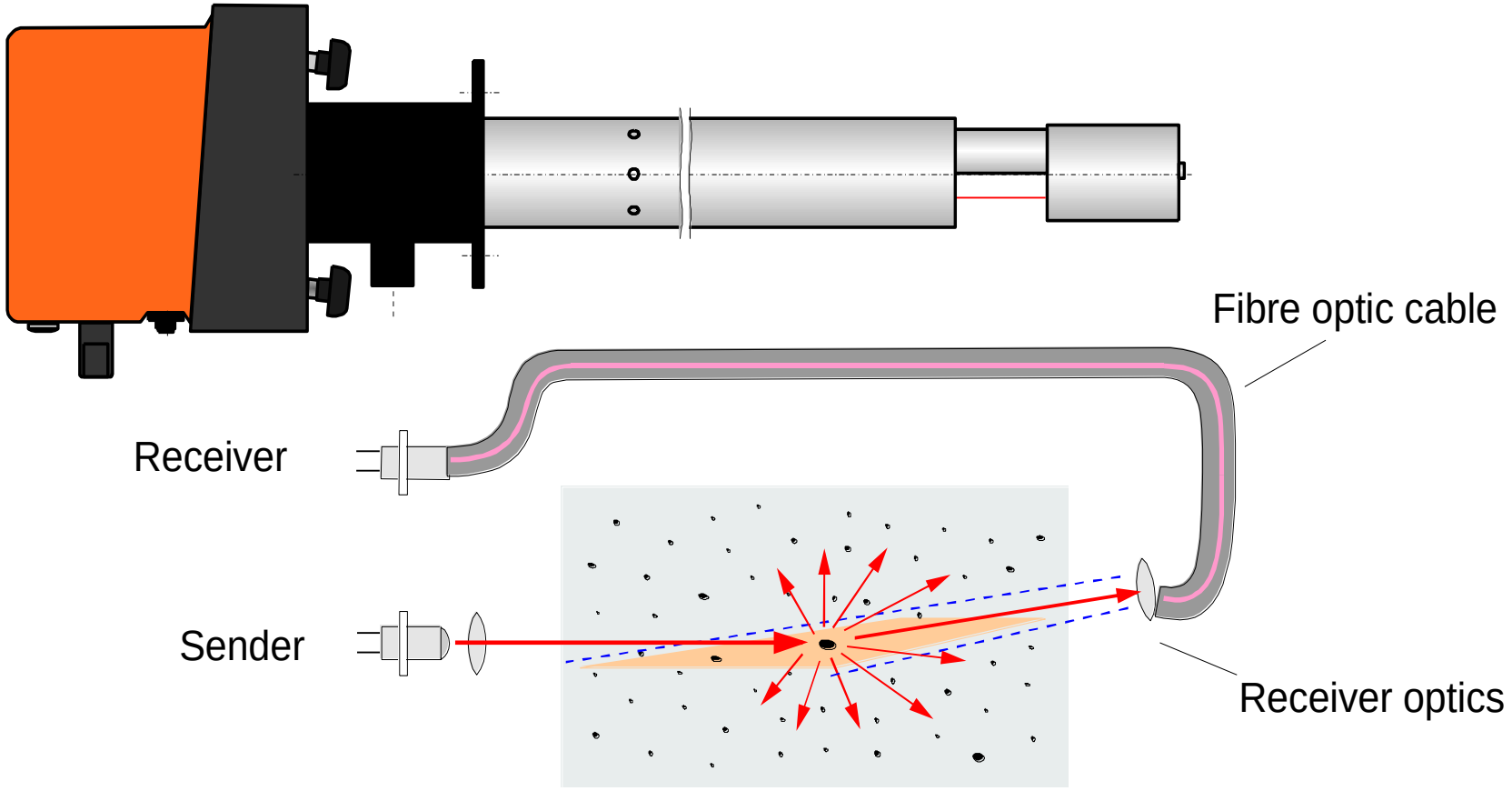
Wet gas

Dry Stack Application:
Forward Scatter - Probe



- : **Different probe lengths available**
- : **High gas temperatures (up to 752° F)**
- : **HASTELLOY material for Corrosive gases**
- : **Maintenance interval of 3 months**
- : **Powder coated stainless steel housing**
- : **Meets EPA Performance Spec 11**

Dry Stack Application:
Forward Scatter - Probe



Wet Stack Application
Scatter Forward Probe w/ bypass system

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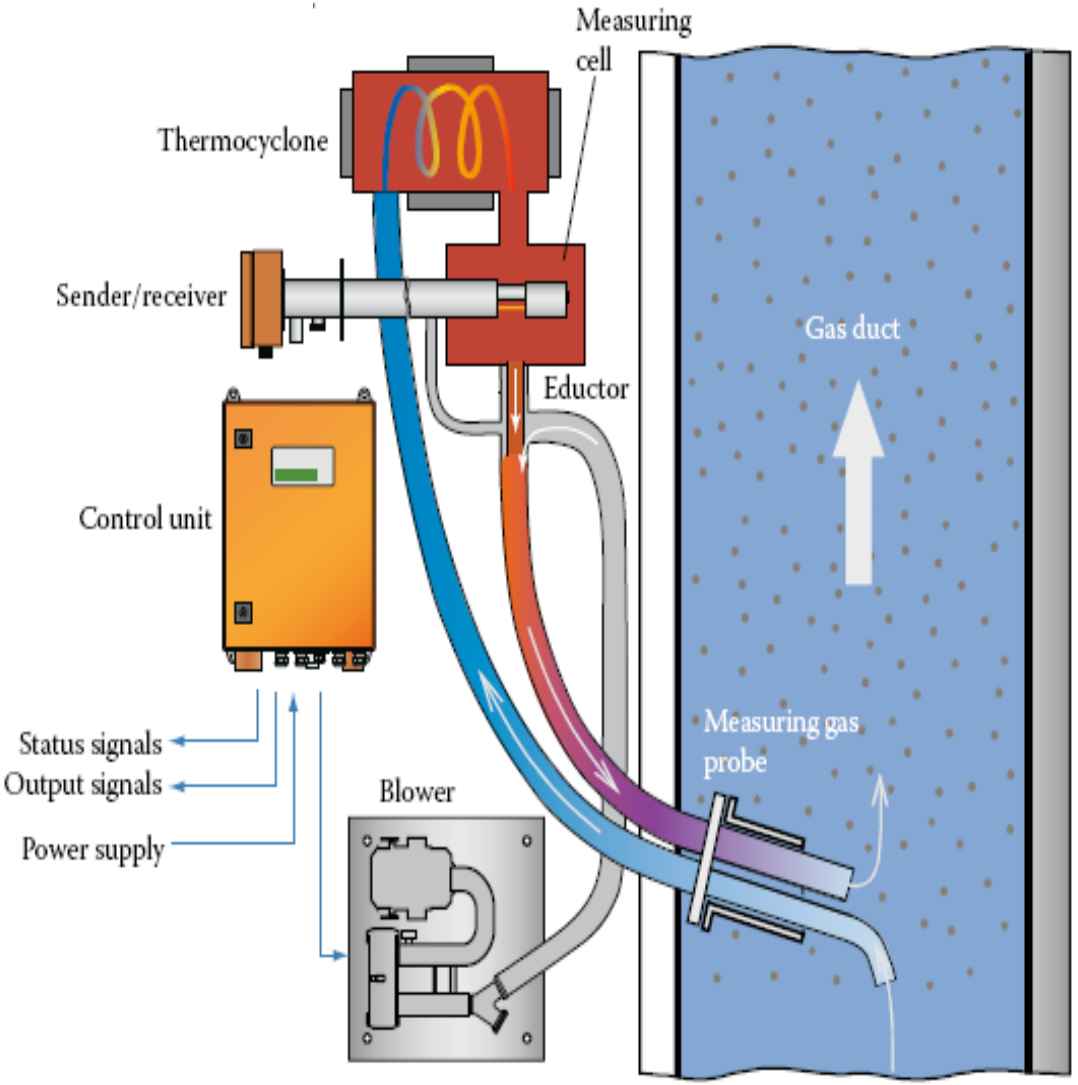
Why a Bypass System?

: **The light of the monitor attenuated through particles in the light beam.**

: **The water droplets must be eliminated.**

: **The heated Bypass System is the solution for a correct PM measurement in wet stacks.**



Wet Stack Application
Scatter Forward Probe w/ bypass system

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Sample Probe:

Gas temperature: **250 F for PVDF Probe**

430 F for Hastelloy Probe

Wet Stack Application
Scatter Forward Probe w/ bypass system

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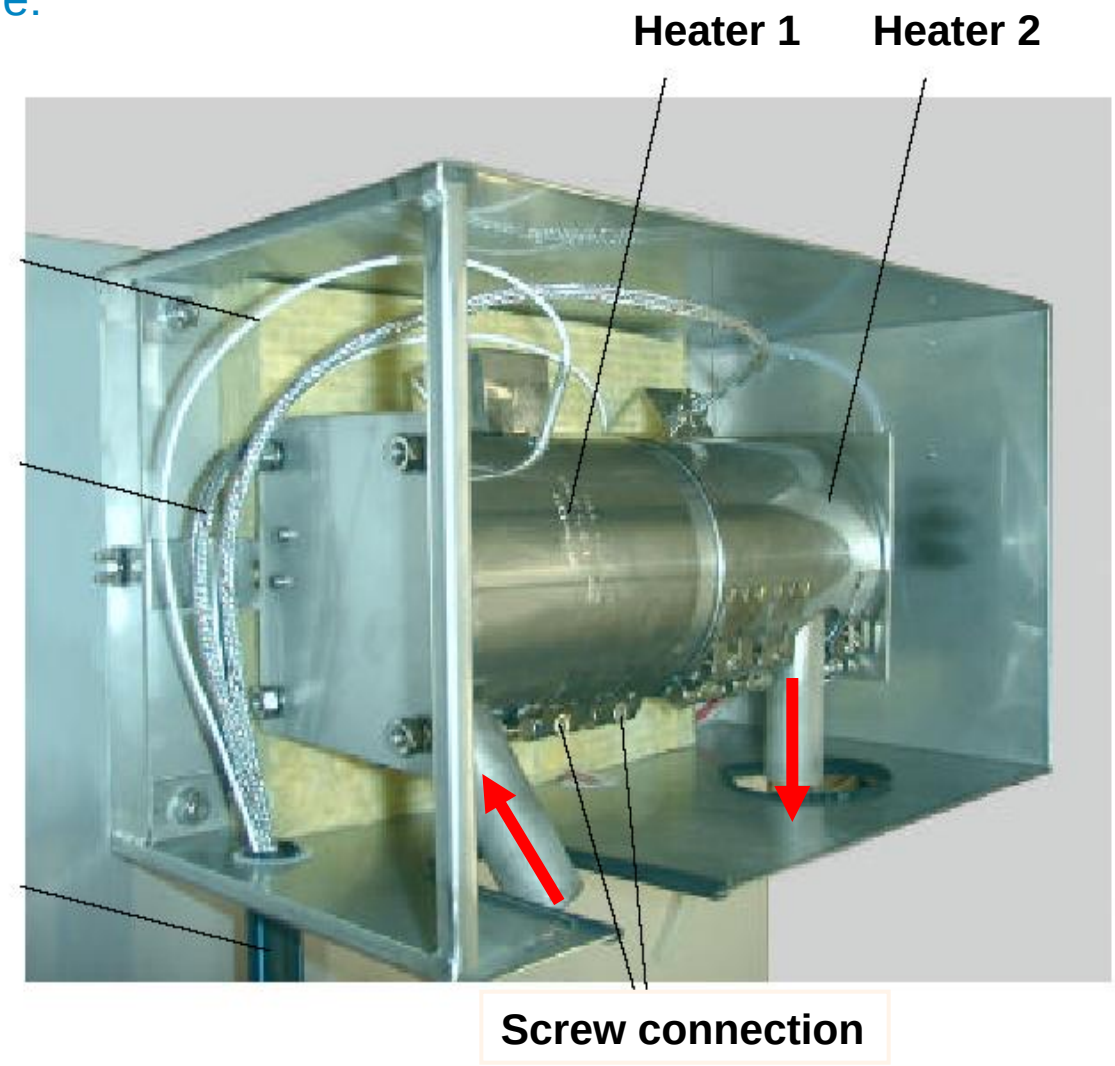
Thermo cyclone:



Wet Stack Application
Scatter Forward Probe w/ bypass system

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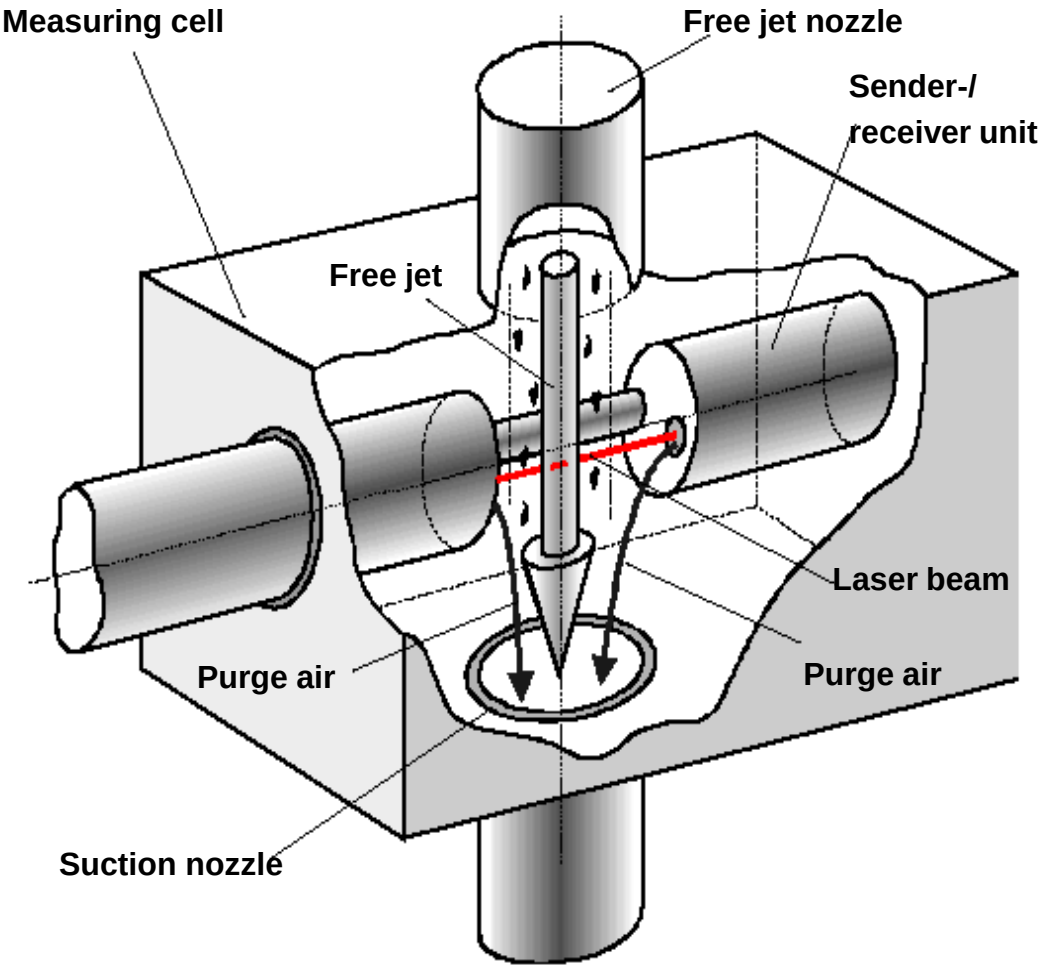
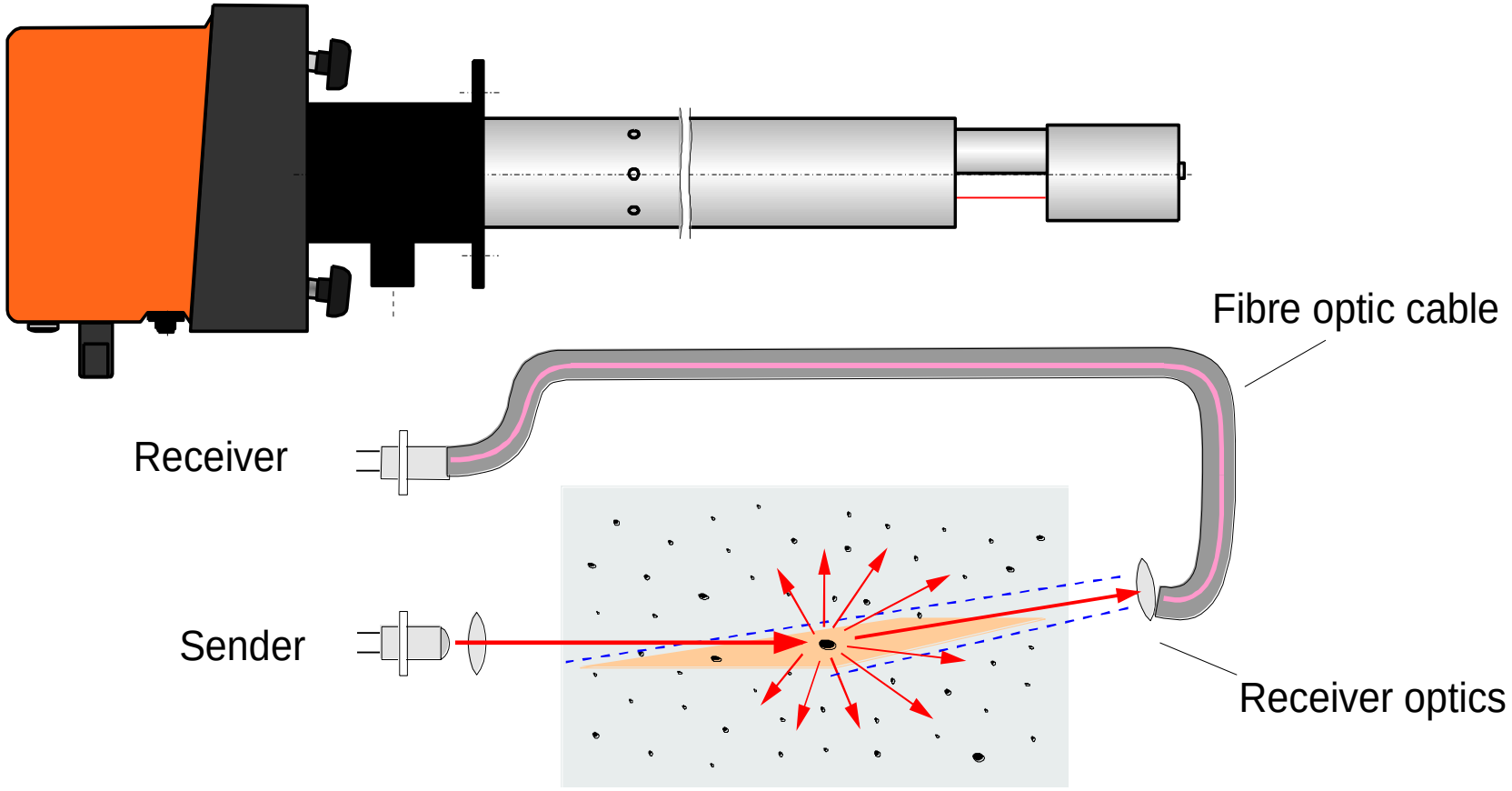
Function of the measuring cell:



Wet Stack Application

Scatter Forward Probe w/ bypass system



PM CEMs in Wet and Dry Applications

: **Proven technology**

: **Over 15 years experience with scattered light devices.**

: **Continuous measurement**

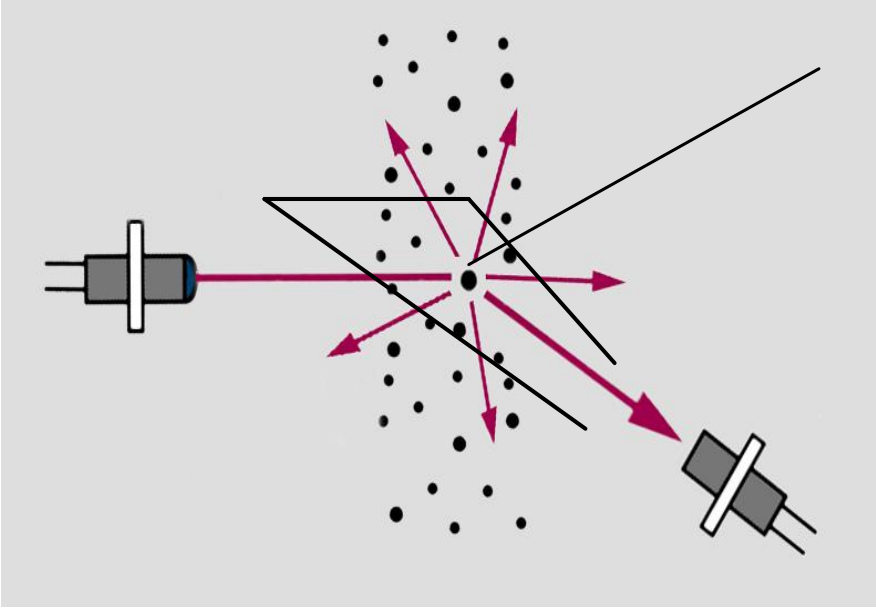
- **„real time“ not „mean time measurement**

: **Sensitive to low levels of dust concentration**

- **< 5mg/m³**
- **< 1 µm particle size**

: **Usable wet stacks by utilizing a bypass system**

Scatter Light:



- **Forward scattering light**
- **Scattering light angle: 15**

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CO CEM

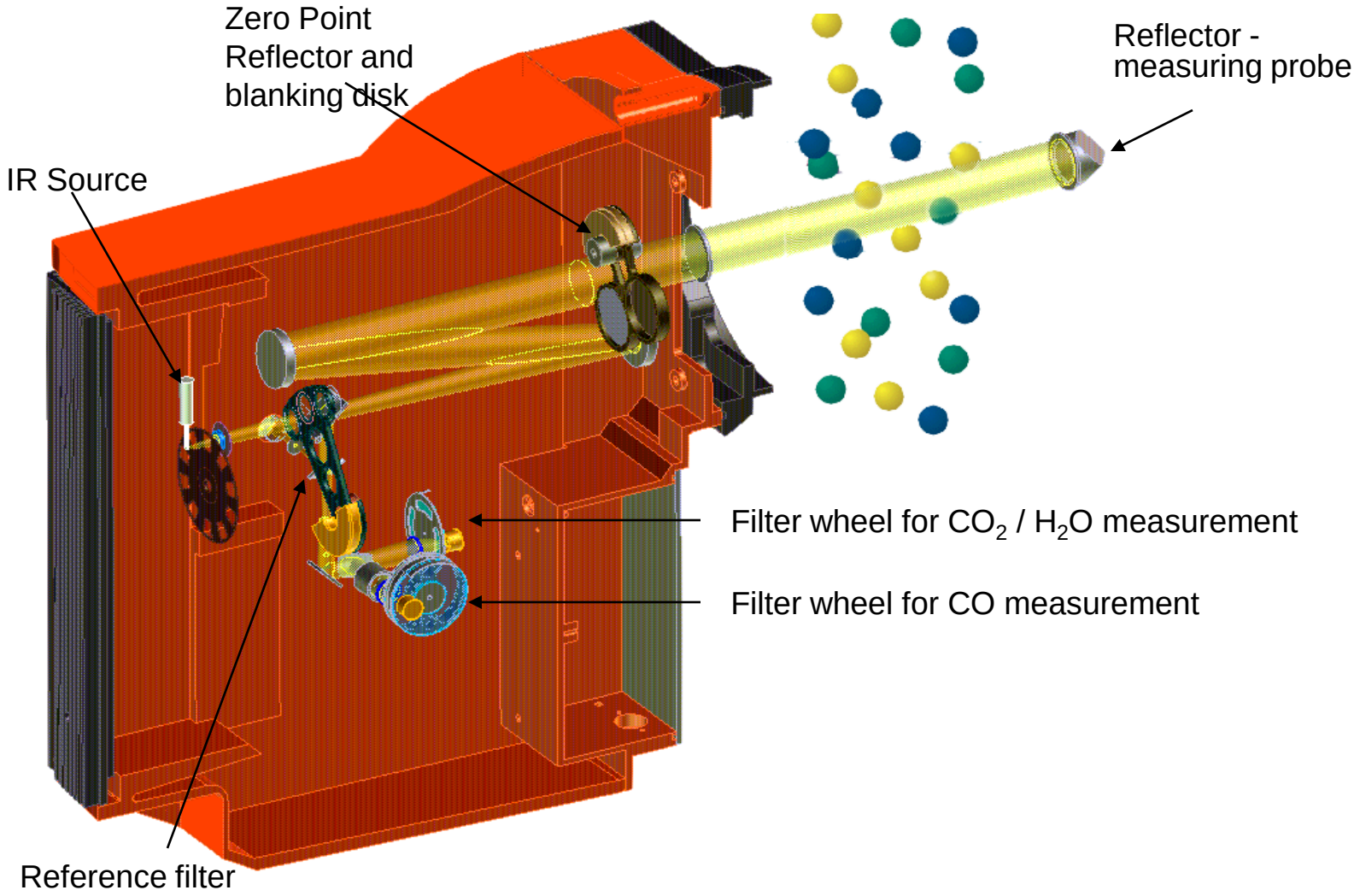
CO CEMs
In-situ

SICK
Sensor Intelligence.

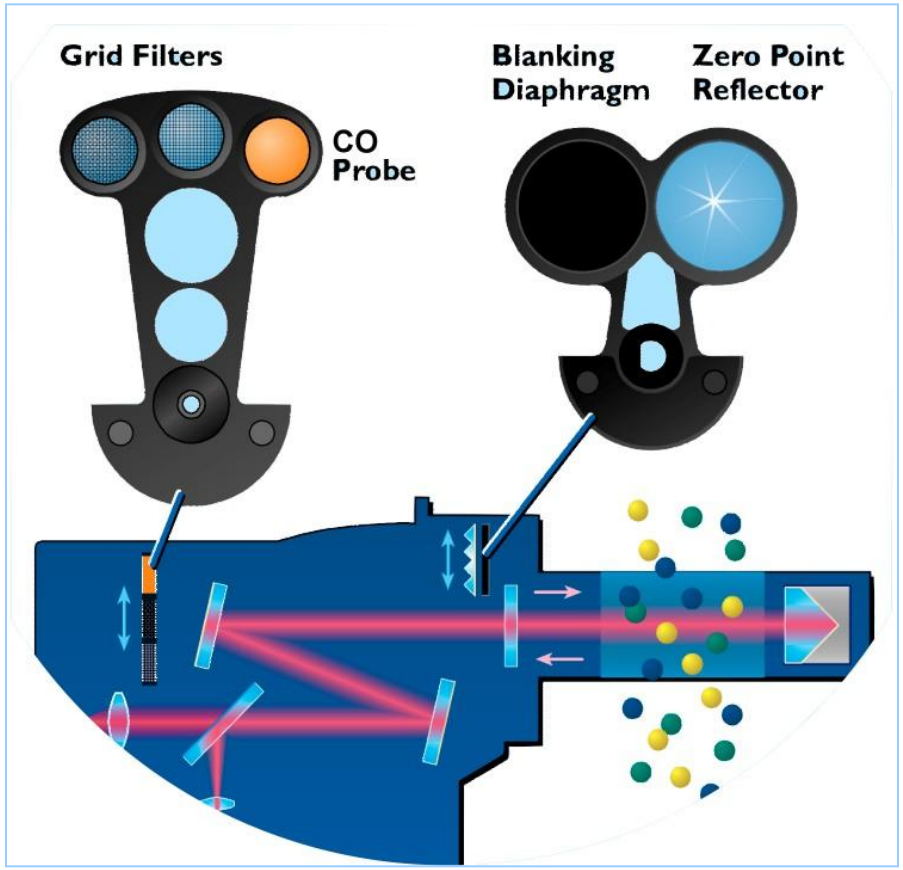
Analyzer Versions

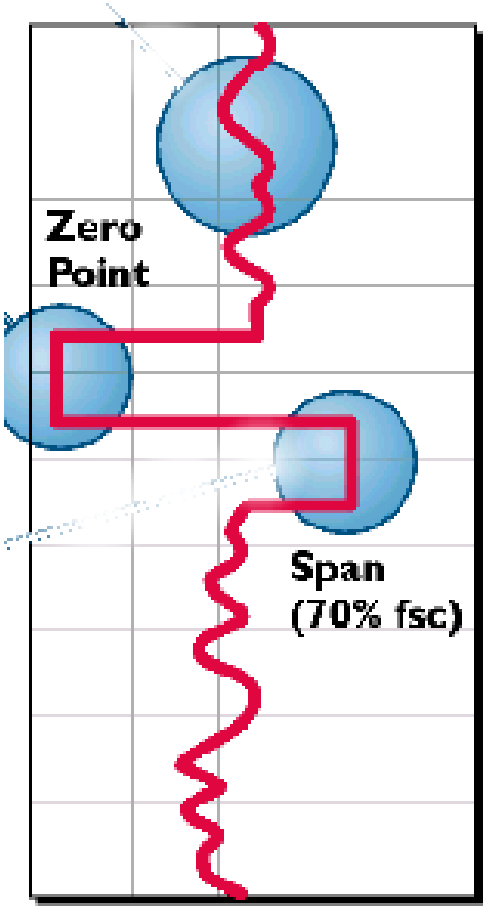
Model	Component
All	Temperature
GM 35 - 1	**CO**
GM 35 - 2	**CO, H_2O**
GM 35 - 3	CO, H_2O, CO_2
GM 35 - 4	CO, CO_2
GM 35 - 5	H_2O, CO_2
GM 35 - 6	H_2O
GM 35 - 7	CO_2

CO CEMs
In-situ



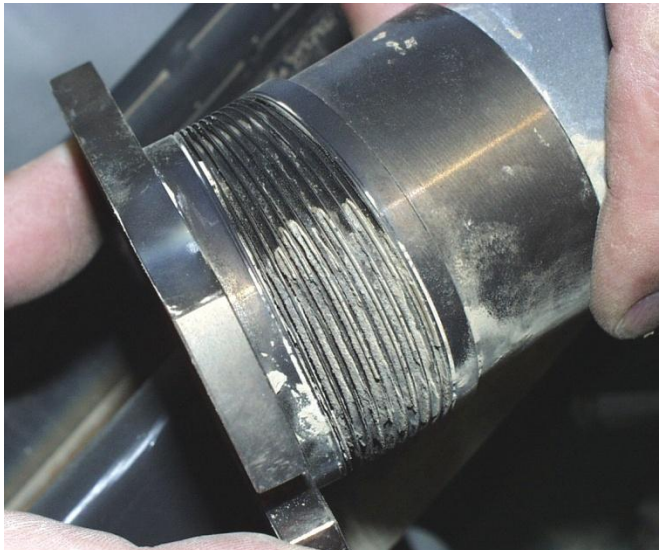
Analyzer Self Test: Check Cycle





Display on Recorder

GPP Probe (Gas Permeable Probe)



Bellows for filter protection

Features:

- : Temperature measurement
- : Pressure measurement
- : Heater controller with special features
- : Preheated test gas “routing”

CO CEMs
In-situ

- **Proven technology**
  - **Large installed base in US emissions applications**
- **Quick, reliable response**
  - **No lag time due to sample transport**
  - **No loss in sample system**
- **No sample system to maintain**
- **Integral zero and span capability saves money on cal gas**

Questions?

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