

FEGT SYSTEM

Furnace exit-gas temperature measurement system to optimize the overall performance of boilers and furnaces under varying conditions of coal quality, load, ash fouling, and slagging.



The furnace exit-gas temperature (FEGT) system utilizes the Impac® IPE 140/45 infrared thermometer, specifically designed for reliable, continuous non-contact temperature measurement of hot combustion gas containing CO₂ and to monitor the combustion temperature.

PRODUCT HIGHLIGHTS

- Prevent failures by proactively monitoring the furnace temperature
- Determine precisely when to perform soot-blowing
- Set trigger alarms to take quick corrective actions when gas temperatures approach slagging/fouling limits with continuous online monitoring
- Measure and quantify trade-offs of heat rate and NO_x and SO₂ emissions
- Optimize heat transfer by controlling FEGT under varying conditions
- Prevent unwanted slag accumulation at inlet pendants by controlling FEGT below ash fusion temperatures
- Reduce down time due to failures by prevention
- Easily install and maintain while boiler is online

SYSTEM COMPONENTS

- Infrared temperature sensor
- Protective sealed jacket assembly
- Protective cooling jacket
- Vortex air cooler
- Removable CaF₂ window assembly (window slide)
- Air purge assembly
- Extended site tube
- Mounting flange (ball flange)
- Air filter for vortex air cooler

AT A GLANCE

Temperature Range

400 to 2000°C (752 to 3632°F)

Spectral Range

CO₂ absorption band for hot CO₂ gas

Measurement Uncertainty

< 1300°C: 0.6% of reading
> 1300°C: 0.8% of reading

Repeatability

0.1% of reading in °C + 1°C

Optics

Focusable

Alignment

Laser targeting light or through lens sighting

FEGT SYSTEM

OVERVIEW

In many combustion processes, one of the main combustion gases is CO₂. Therefore, measuring the CO₂ gas temperature is a reliable measurement of the combustion temperature.

Our combustion monitoring solution is a cost-effective system that utilizes the IPE 140/45 pyrometer. This is a pyrometer specifically designed for reliable

non-contact temperature measurement of hot combustion gas containing CO₂ based on the principle of infrared radiation.

The system is easy to install and maintain even while the boiler is online. It allows for quick reaction to undesirable conditions with continuous online monitoring of the combustion temperature.

TECHNICAL DATA

Measurement Specifications	
Temperature Range	400 to 2000°C (752 to 3632°F) (MB 20)
Spectral Range ¹	CO ₂ absorption band for hot CO ₂ gas
Measurement Uncertainty (T _{amb.} = 25°C, ε=1, T ₉₀ =1s)	Up to 1300°C: 0.6% of reading in °C
	Above 1300°C: 0.8% of reading in °C
Repeatability	0.1% of reading in °C + 1°C
Analog Output	Linear 0 to 20 mA or 4 to 20 mA, DC, switchable; load max. 500 Ohm

Electrical Specifications	
Power Supply	24 VAC/DC (14 to 30 VAC/DC), (AC: 48 to 62 Hz)
Power Consumption	6 VA

Environmental Specifications	
Protection Class (pyrometer)	IP65 (DIN 40 050)
Operating Temperature	0 to 53°C (32 to 127°F) at pyrometer housing
Storage Temperature	-20 to 60°C (-4 to 140°F)
Relative Humidity	Non-condensing conditions

FEGT System Specifications	
Max Air Purge Temperature	75°C (into cooler)
Max Enclosure Temperature	90°C (ambient)
Weight	Approx. 6 kg (13 lbs)
Air Filtering	5 µm filter

Vortex Cooler Specifications	
Model	208-25-HSS
Material	Stainless Steel
Inlet	1/4 inch
Cooling Capacity	440 W
Air Consumption @ 6.9 bar	708 slpm / male inlet

¹The pyrometer is able to measure hot combustion gas (with typically approx. 10% CO₂) with a thickness of 40 cm.

OPTICS

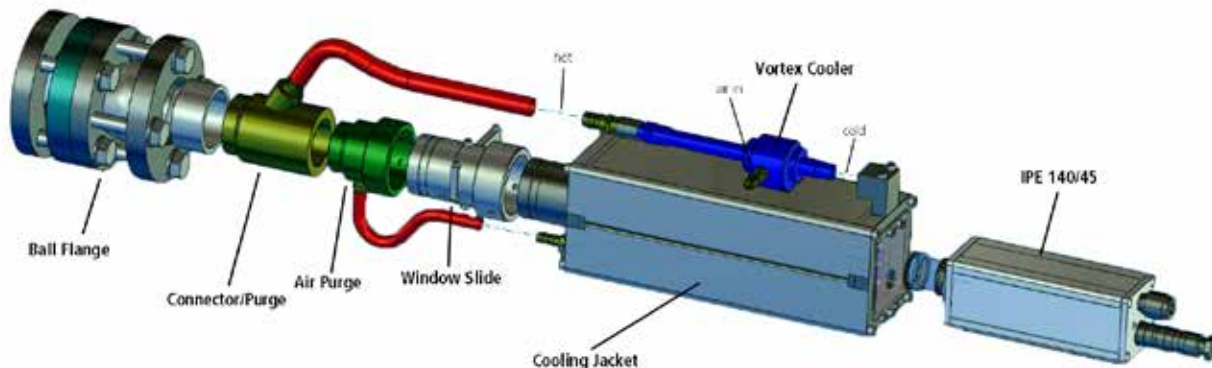
The pyrometers are available with different focusable optics. They offer the smallest possible spot size at any distance. The adjustment can be done easily without additional tools with help of the "turn and clamp" mechanism (one hand).

The spot sizes are shown in the following table (all distances are measured from the front of the lens).

The different optics are exchangeable without recalibration of the pyrometer. For spot sizes between those in the table, values can be found by interpolation.

Optics	Measuring Distance a [mm]	Spot Size M_{90} [mm]	Objective Length S [mm]
1-PE	115	1.1	26
	135	1.3	13
	170	1.6	0
2-PE	210	1.8	26
	280	2.6	13
	500	4.9	0
3-PE	360	3	26
	625	5.6	13
	2000	20	4
	10,000	100	0

SYSTEM SCHEMATIC



ORDERING AND CONFIGURATION DETAILS

COMPLETE SYSTEM

For a complete system, a minimum of four components must be ordered:

- **Pyrometer** (IPE 140/45)
- **FEGT Housing Assembly**
- **Connection Cable** (high temperature cable with a straight connector is highly recommended)
- **Power Supply** (for the pyrometer)

SERVICE OFFERINGS

- Installation and commissioning
- Preventative maintenance
- Training
- Extended warranty

REFERENCE NUMBERS

PN	Description
3 875 880	IPE 140/45, MB 20, 400 to 2000°C, laser targeting, focusable optics
3 875 890	IPE 140/45, MB 20, 400 to 2000°C, through lens sighting, focusable optics
3 821 270	Electrical connection cable high temperature, 10 m, with straight plug
3 837 520	FEGT air cooling jacket for Series 140, Includes: vortex air cooler, tube, ball flange, air filtering system, window slide, CaF ₂ window, hoses (for purge air flow within system)

ACCESSORIES

PN	Description
3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 VAC ⇒ 24 VDC, 1 A
3 852 540	Power supply NG 0D 85 to 265 VAC ⇒ 24 VDC, 600 mA with 2 settable limit switches
3 852 550	Power supply NG 2D fro DIN rail mounting; 85 to 265 VAC ⇒ 24 VDC, 600 mA with 2 settable limit switches



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PRECISION | POWER | PERFORMANCE

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