INFRARED PRODUCTS FOR MONITORING SMOKELESS FLARES, PILOTS, AND FLAME INTENSITY

Williamson

Where Wavelength Matters

Smokeless Flare Monitor (FM)

Smokeless flares incinerate flammable hazardous vent gas with the assistance of supplemental high-velocity air or steam to prevent the formation of soot or smoke. Excessive injection of air or steam reduces combustion efficiency resulting in the release of hazardous VOC gasses while inadequate injection of air or steam results in the formation of undesirable soot and smoke. Although modern flares are designed for high flow rates associated with an emergency condition, they most commonly operate at high-turn-down, low-flow rates, making it challenging for the flare to operate at optimal combustion efficiency.

Model FM-17-N4
NEMA4X / IP65 Housing

Model FM-17-EXP
Explosion Proof Housing

Model FM-17-EXPSS
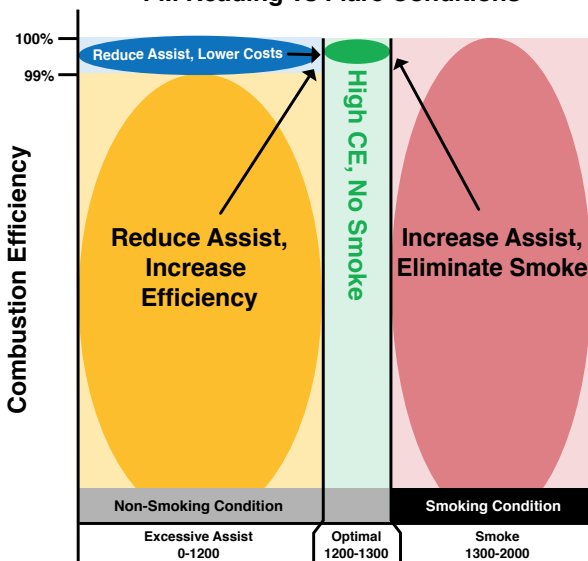Explosion Proof
Stainless Steel Housing

High Performance FM Sensors

The Williamson Flare Monitor (FM) utilizes proven dual-wavelength technology to monitor the ratio of carbon to available oxygen deep within the hot flare flame. This ratio value correlates to combustion efficiency and is used to adjust the flow of air or steam to smokeless flares, assuring smoke-free operation and maximum combustion efficiency.

- Assures smoke-free operation and maximum destruction of VOC gasses
- One control setpoint for all hydrocarbon (H-C) vent gasses means no on-site calibration
- Uninfluenced by flame size or position within the field of view
- Uninfluenced by flame composition for all H-C gasses
- Unaffected by stack configuration or presence of steam
- Includes extra measured parameter values for confirmation and diagnostics
- May be grade-mounted for easy access
- Used for Manual or Automatic feedback to control steam or air flow

FM Reading vs Flare Conditions

Combustion Efficiency

100%
99%

Reduce Assist, Lower Costs

High CE, No Smoke

Reduce Assist, Increase Efficiency

Increase Assist, Eliminate Smoke

Non-Smoking Condition

Smoking Condition

Excessive Assist
0-1200

Optimal
1200-1300

Smoke
1300-2000

Model FM Reading

Smokeless Flare Monitor Specifications	
Output Scale	0-2000, Dimensionless
Spectral Response	Proprietary narrow wavebands monitor the balance of carbon and oxygen within the flame
Optical Resolution	D/17
Maximum Distance	1800 feet, 550 m
Response Time	Adjustable 0.1 second to 24 seconds (1 second default setting)
Analog Outputs	4-20mA or 0-20mA output (max impedance 1000 ohms)
Alarms	Sensor: One SPST Relay Alarm Output 2A@120 or 250 Vac
Digital Interface	Bi-Directional RS485 and RS232 communications
Human Interface	Built-in menu system with access to signal conditioning, programmable outputs & alarms
Measured Parameters	Filtered signal, unfiltered signal, signal dilution, ambient temperature.
Input Power	Stand-Alone Sensor: 24 Vdc (300mA); with optional Interface Module or power supply: 90-260 Vac 50-60 Hz (0.13A)
Ambient Temperature Limits	Sensor: -40 to 150°F / -40 to 65°C
Environmental Rating	Sensor: NEMA4X, IP65 or optional EXP Explosion Proof housing See page 6 Part Code D for description of housing
Dimensions (L x W x H)	N4 Sensor: 16in x 7in x 8in (406mm x 178mm x 203mm) EXP Sensor: 10.7in x 5.4in x 10in diameter (272mm x 137mm x 254mm diameter)
Weight	N4 Sensor and Swivel Bracket: 7.8 lbs. (3.5 kg) EXP Sensor and Swivel Bracket: 11.6 lbs. (5.3 kg) EXPSS: 25 lbs. (11.3 kg)
Certification	Calibration certificate is standard with each sensor CE: EMI/ RFI for heavy industry; LVD (low voltage directive)
Warranty	2 years

Typical Configuration	
Part Number	**Area Classification**
FM-17-D-IM-N4	Non-Hazardous
FM-17-D-IM-EXP	Hazardous

Pilot Monitor (PM)

Flammable vent gasses are ignited by a pilot flame when released into the atmosphere by refineries, natural gas processing plants, and petrochemical plants. The proper incineration of these gasses is a critical safety and environmental concern. Therefore, it is essential to confirm that the pilot is lit at all times.

Monitoring via a thermocouple is common, however failures frequently occur and replacements can require costly process shutdowns. Remote sensing IR technology (PM) is the superior alternative.

Model PM-35-N4
Model PM-75-N4
NEMA4X / IP65 Housing

Model PM-35-EXP
Model PM-75-EXP
Explosion Proof Housing

Model PM-35-EXPSS
Model PM-75-EXPSS
Explosion Proof
Stainless Steel Housing

High Performance PM Sensors

The Williamson Pilot Monitor (PM) utilizes proven dual-wavelength technology to sense the presence of the small, distant pilot flame. This technology allows the pilot monitor to view clearly through severe weather conditions caused by fog, wind, rain, snow and sleet.

- Self-regulating means no on-site calibration
- May be grade-mounted for easy access
- 30% greater sensitivity means greater reliability
- Includes Signal Dilution output for measurement validation and diagnostics
- Large viewing area for easy alignment

Pilot Monitor Specifications	
Output Scale	0-100%
Spectral Response	Proprietary narrow wavebands
Optical Resolution	D/35 or D/75
Maximum Distance	2000 feet, 610 m
Response Time	Adjustable 0.1 second to 24 seconds (1 second default setting)
Analog Outputs	4-20mA or 0-20mA output (max impedance 1000 ohms)
Alarms	Sensor: One SPST Relay Alarm Output 2A@120 or 250 Vac
Digital Interface	Bi-Directional RS485 and RS232 communications
Human Interface	Built-in menu system with access to signal conditioning, programmable outputs & alarms
Measured Parameters	Filtered signal, unfiltered signal, signal dilution, ambient temperature.
Input Power	Stand-Alone Sensor: 24 Vdc (300mA); with optional Interface Module or power supply: 90-260 Vac 50-60 Hz (0.13A)
Ambient Temperature Limits	Sensor: -40 to 150°F / -40 to 65°C
Environmental Rating	Sensor: NEMA4X, IP65 or optional EXP Explosion Proof housing See page 6 Part Code D for description of housing
Dimensions (L x W x H)	N4 Sensor: 16in x 7in x 8in (406mm x 178mm x 203mm) EXP Sensor: 10.7in x 5.4in x 10in diameter (272mm x 137mm x 254mm diameter)
Weight	N4 Sensor and Swivel Bracket: 7.8 lbs. (3.5 kg) EXP Sensor and Swivel Bracket: 11.6 lbs. (5.3 kg) EXPSS: 25 lbs. (11.3 kg)
Certification	Calibration certificate is standard with each sensor CE: EMI/ RFI for heavy industry; LVD (low voltage directive)
Warranty	2 years

Typical Configuration	
Part Number	**Area Classification**
PM-35-A-N4	Non-Hazardous
PM-35-A-EXP	Hazardous

Flame Intensity Monitor (FI)

Williamson Flame Intensity Monitors (FI) are the single-wavelength sensors of choice for a variety of flare applications where the more sophisticated dual-wavelength flare products are not appropriate or are not required. Products specifically designated for flame intensity monitoring applications include:

Pilot Monitoring of Hydrogen, Ammonia or CO Flames
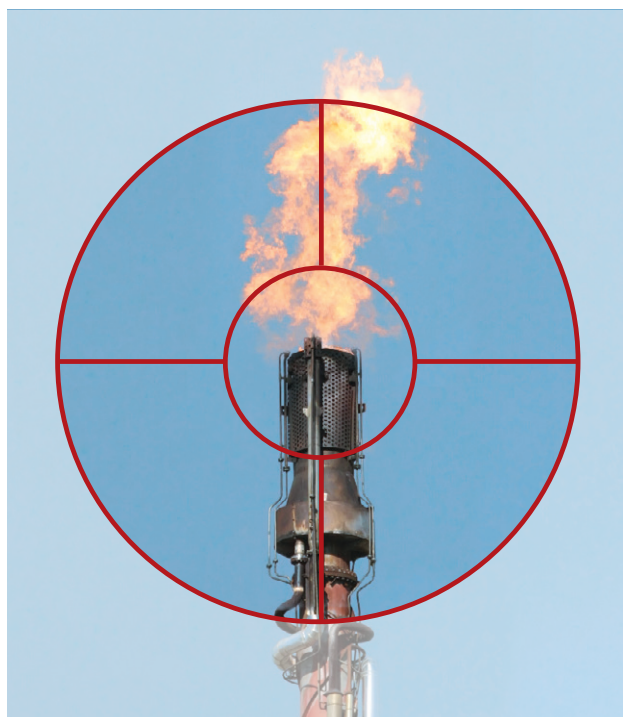**Pilot Monitoring of Ground Flares and Landfill Flares**
Flame Intensity Monitoring

Model FI2-35-N4
Model FI2-100-N4
Model FI2-200-N4
Model FI5-40-N4
NEMA4X / IP65 Housing

Model FI2-35-EXP
Model FI2-100-EXP
Model FI2-200-EXP
Explosion Proof Housing

Model FI2-35-EXPSS
Model FI2-100-EXPSS
Model FI2-200-EXPSS
Explosion Proof
Stainless Steel Housing

High Performance FI Sensors

The Williamson Flame Intensity Monitor utilizes single-wavelength technology and thoughtful wavelength selection to sense the presence and intensity of flames of all types. The FI class sensors are ideal when viewing hydrogen, ammonia, CO and other flames. This lower-cost technology is also commonly used as a pilot flame detector for ground flares and landfill flares where the viewing distance is less than about 300 feet or 100 meters.

- Thoughtful wavelength selection for maximum sensitivity

- Model FI2 is recommended for Hydrogen and Ammonia, Model FI5 is recommended for CO Flames

- Ideal as a Pilot Monitor for Ground Flares and Landfill Flares

- Increased sensitivity compared to UV flame detectors

- Adjustable Sensitivity for Optimum Performance

Flame Intensity Monitor Specifications	
Output Scale	0-1000, Dimensionless
Control Parameter	0-1000, Dimensionless
Spectral Response	Proprietary narrow waveband monitoring flame intensity
Optical Resolution	D/35, D/40, D/100, D/200
Maximum Distance	Pilot Monitoring: 300 feet, 90 m, Flame Intensity Monitoring: 1200 feet, 365 m
Response Time	Adjustable 0.1 second to 24 seconds (1 second default setting)
Analog Outputs	4-20mA or 0-20mA output (max impedance 1000 ohms)
Alarms	Sensor: One SPST Relay Alarm Output 2A@120 or 250 Vac
Digital Interface	Bi-Directional RS485 and RS232 communications
Human Interface	Built-in menu system with access to signal conditioning, programmable outputs and alarms
Measured Parameters	Filtered signal, unfiltered signal, ambient temperature.
Input Power	Stand-Alone Sensor: 24 Vdc (300mA) With optional Interface Module or Power Supply: 90-260 Vac 50-60 Hz , (0.13A)
Ambient Temperature Limits	Sensor: -40 to 150°F / -40 to 65°C
Environmental Rating	Sensor: NEMA4X, IP65 or optional EXP Explosion Proof housing See page 6 Part Code D for description of housing
Dimensions (L x W x H)	N4 Sensor: 16in x 7in x 8in (406mm x 178mm x 203mm) EXP Sensor: 10.7in x 5.4in x 10in diameter (272mm x 137mm x 254mm diameter)
Weight	N4 Sensor and Swivel Bracket: 7.8 lbs. (3.5 kg) EXP Sensor and Swivel Bracket: 11.6 lbs. (5.3 kg) EXPSS: 25 lbs. (11.3 kg)
Certification	Calibration certificate is standard with each sensor CE: EMI/ RFI for heavy industry; LVD (Low Voltage Directive)
Warranty	2 years

Typical Configuration		
Part Number	**Flame Type**	**Area Classification**
FI2-35-D-IM-N4	Hydrogen and Ammonia	Non-Hazardous
FI2-35-D-IM-EXP	Hydrogen, Ammonia and H-C	Hazardous
FI5-40-D-IM-N4	CO and H-C	Non-Hazardous

Easy to Install, Operate and Maintain

Sensors feature a variety of input, output, and alarm options to enable advanced process monitoring and control capabilities. Each sensor can be configured to operate as a four- or a six-wire stand-alone transmitter. When using the remote Interface Module (IM), a six-wire cable is required. Williamson recommends the six-wire Belden Cable #83606 or equivalent. Each sensor includes through-the-lens aiming, a built-in human interface and 3/4" NPT conduit connections.

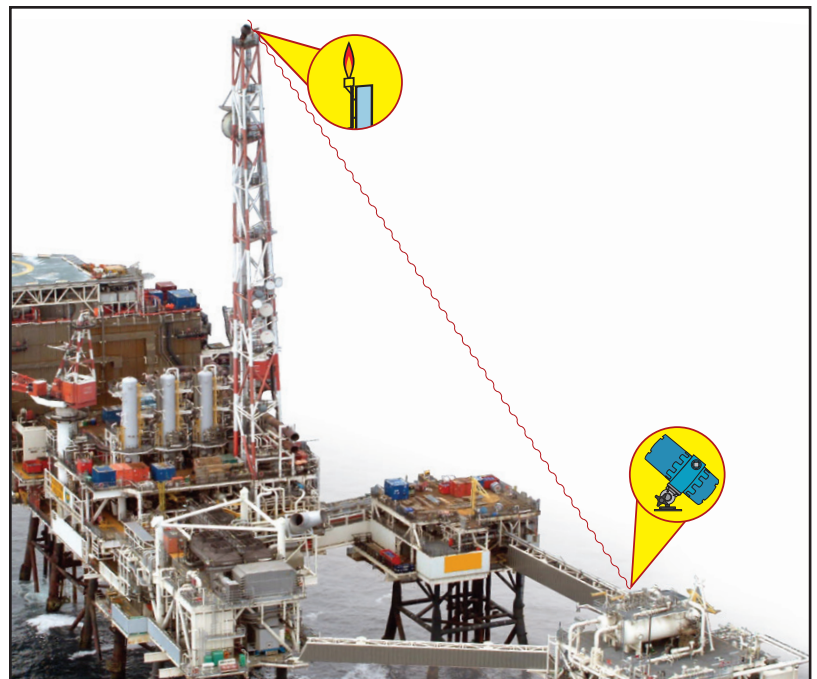| Interface Configurations	
Analog	
Four or Six-Wire Transmitter	• Power 24 Vdc, 300 mA • One Analog Signal • One Relay Alarm
Digital	
Six-Wire Stand-Alone	• Power 24 Vdc, 300 mA • Four Measured Parameters via RS485 Digital Communications
Six-Wire with IM	• Power 90-260 Vac (0.13A) • Two Analog Signals • Two Relay Alarms • One TTL Alarm • Four Measured Parameters via RS232 and RS485 Digital Communications

NEMA4X (N4)

The optional 1/4 DIN Interface Module (IM) includes an advanced human interface and complete communications capability. The Interface Module is recommended for improved ease of use, the ability to view multiple measured parameters at the same time, and compatibility with ProView PC-based software. Because it communicates with the sensor digitally, the Interface Module allows the operator to interact with the sensor from a control room as if standing in front of the sensor in the field.

Explosion Proof (EXP & EXPSS)

Interface Module (IM)

Explosion Proof Interface Module (IM-EXP)

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Select the part numbers from the table to configure a sensor for your application. Contact Williamson for custom options.

A - Sensor Model	B - Analog or Digital	C - Accessories	D - Housing
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Sample Part Number: FM-17-D-IM-EXP

Part Code A - Sensor Model			
Sensor Model	**Output Scale**	**Field of View**	**Description**
Flare Monitor (FM)			
FM-17	0 - 2000	17:1 Optics	Standard
Pilot Monitor (PM)			
PM-35	0 - 100%	35:1 Optics	Standard
PM-75	0 - 100%	75:1 Optics	Configuration for closely spaced flares
Flame Intensity Monitor (FI)			
FI2-35	0 - 1000	35:1 Optics	Configuration for Hydrogen, Ammonia, H-C flares
FI2-100	0 - 1000	100:1 Optics	Configuration for closely spaced flares
FI2-200	0 - 1000	200:1 Optics	Configuration for distant or closely spaced flares
FI5-40	0 - 1000	40:1 Optics	Configuration best for CO and H-C flares Not available in Explosion Proof Housing (EXP)

Part Code B – Analog or Digital	
Part No.	**Description**
A	• Stand Alone Sensor with built in display • 4-20mA or 0-20mA output (1000 ohm impedance max.) • SPST relay rated 2A@120 or 250 Vac • Input power of 24 Vdc (300mA)
D	• Bi-Directional RS485 communication • This configuration used with IM

Part Code C –Accessories	
Part No.	**Description**
PSD	• DIN Rail Mount Power Supply: 90-260 Vac 50-60 Hz to 24 Vdc (600mA)
PSN4	• Power Supply for Non-Hazardous Area Classification: 90-260 Vac 50-60 Hz to 24 Vdc (600mA) • Weight: 5.5 lbs. (2.5kg) • Dimensions: 6.5in x 6.5in x 4.5in (165mm x 165mm x 114mm)
PSEXP	• Hazardous Area Power Supply: 90-260 Vac 50-60 Hz to 24 Vdc (600mA) • Weight: 6 lbs. (2.7kg) • Dimensions: 5.5in x 5.5in x 7.2in (139mm x 140mm x 182mm)
IM	• Remote Interface Module with LED & LCD Displays, two analog outputs and two SPDT relays rated 2A@120 or 250 Vac • Power Supply: 90-260 Vac 50-60 Hz (0.13A) • Ambient Limit: 0 to 120°F / -17 to 50°C • Weight: 2 lbs. (0.9 kg) • 1/4 DIN Dimensions: 7.0in x 3.78in x 3.78in (178mm x 96mm x 96mm)
IMN4	• Weight: 7 lbs. (3.2kg) • Dimensions: 8in x 10in x 6in (203mm x 254mm x 152mm) See Part Code D - N4 for description of housing
IMEXP	• Weight: 20 lbs. (9.1kg) • Dimensions: 13.4in x 11.4in x 6.3in (340mm x 290mm x 160mm) See Part Code D - EXP for description of housing

Part Code D – Housing	
Part No.	**Description**
N4	Corrosion Resistant, Epoxy Powder Coated Cast Aluminum Enclosure with NEMA4X (IP65) Rating
EXP	Corrosion Resistant, Epoxy Powder Coated Cast Aluminum Enclosure with NEMA7/9 (IP66), Class I, Division I, Groups B, C, D and Class II Division I, Groups E, F, G, NEMA4X; ATEX, IECEx, FM, UL/cUL Ratings
EXPSS	Corrosion Resistant, Cast 316 Stainless Steel Enclosure Same ratings as EXP

Explosion Proof Certifications		
Product Type	**ATEX**	**IECEx**
Flare Products	⟨Ex⟩ II 2 G Ex db IIB+H2 T6 Gb IP66	Ex db IIB+H2 T6 Gb
Power Supplies	⟨Ex⟩ II 2 G Ex db IIC T6 Gb IP66	Ex db IIC T6 Gb
Interface Modules	⟨Ex⟩ II 2 G Ex db IIB +H2 T6 Gb IP66	Ex db IIB T6 Gb

WILLIAMSON CORPORATION
70 Domino Drive, Concord, Massachusetts 01742
TEL: +1-978-369-9607 • FAX: +1-978-369-5485
sales@williamsonir.com • www.williamsonir.com

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