

To Sense Breaks or Tears in Filter Bags, to Improve Product Quality,  
and to Eliminate related Environmental and Safety Risks

## *Triboelectric Dust Monitor*

PFM Series



# Excellent Sensor to Protect Life and the Environment

Particles in the air are a concern for the production lines of each and every industry. Leakage and mixing of particles such as dust are serious concerns for environmental quality, traceability of products, and improvements in productivity. Since dust deposits have been recently recognized as a safety issue, the timely detection of leaks and the continuous monitoring of dust concentrations are crucial. The Matsushima PFM dust monitors can be used to measure the concentration of dust and other air particles under various conditions.

## High Performance

**Produces the same high performance as optical systems at lower cost.**

- Nine monitoring levels of dust concentration.
- Detects solid particles with diameters from 0.3  $\mu\text{m}$  to 100  $\mu\text{m}$ .
- Provides level alarm signal (1C with compact type, 2C with remote type) as well as fault alarm signal (1C).
- Requires no additional equipment such as an air purge and cooling system (Max process temperature: 250°C)
- For high-pressure applications up to 200 kPa.

## Easy to use

**Requires no special training or skills.  
Easy to install and to adjust.**

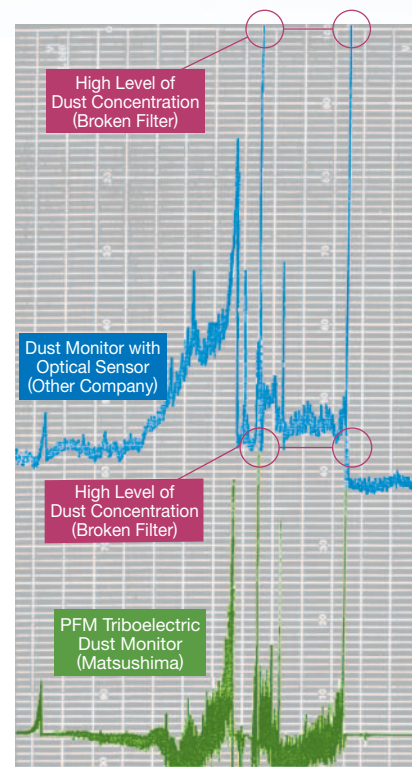
- Simply use the switches to select the monitoring level of dust concentration and to adjust the sensitivity.
- Easily adjust concentration monitoring levels with a digital display for viewing (standard).
- Two styles are available: a sensor with an integrated transducer or a non-integrated type.
- Changeable probe length from 300 mm to 1000 mm. (Can be extended to 1000 mm for special orders.)

\* : Measurement range, integration time, and contact output can be adjusted.

## Easy Maintenance

**All components are made in Japan for ensured high quality and excellent customer service.**

- Requires only periodic cleaning of the probe for maintenance. (Approximately every three months under normal operation conditions.)
- Uses advanced digital technology for high quality and reliability.
- Speedy and accurate service including calibration support.
- Easy replacement of damaged probes.

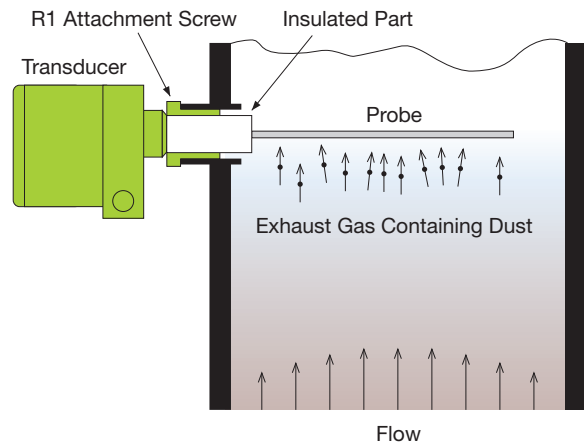


### ▲ Comparison of Dust Concentration Levels

The Matsushima PFM dust monitor can measure the dust concentration as accurately as a high-cost optical sensor under the same conditions.

## Operation Principles

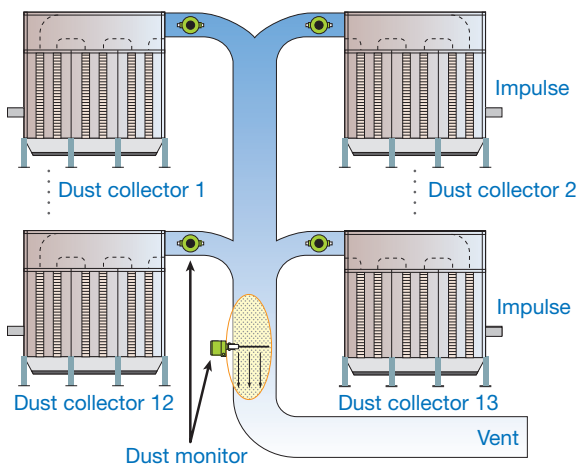
When solid particles such as dust in gas emissions come into contact or pass through the triboelectric probe, a charge transfer is produced in the probe. The charge is converted to a current signal, and a measurement signal ranging from 4 mA to 20 mA DC in proportion to the amount of particles is output.



## Applications for Dust-collecting Equipment and Others

### Possible to monitor multiple dust collectors

It is possible to monitor multiple dust collectors by utilizing timing of periodical backwashing impulse.



### Cement Factories

- For coal ash and other raw materials.
- For cement and concrete products.
- For kilns, AQC (Air-quality Control) systems, and other equipment.
- For slug- and fly ash.

### Ironworks

- For steel sintering.
- For casting.
- For coke ovens.
- For recycling-related facilities such as those for waste disposal of plastics.

### Chemical Factories

- For catalyzation.
- For smoke removal.

### Automobile Factories

- For casting.

### Waste incineration Plants

- For monitoring the environment.
- For incinerators.
- For fusion furnaces.
- For high-temperature incinerators used to cut emissions such as dioxins.

### Rubber and Carbon Factories

- For monitoring of dust accumulation in ducts.
- For handling raw materials.

### Fertilizer Plants

- For preventing mixture of fertilizers.

### Spice and Paint Factories

- For traceability-related equipment.

### Gas Extraction Equipment for Boilers

- For generators.

### Other Dust-collecting Equipment

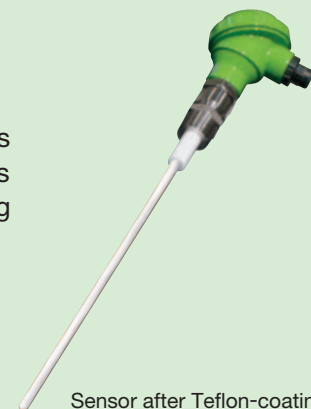
Optional probe

### Teflon-coated probe

## *Dramatically improved anti-corrosion performance*

Life of the probe can be extended dramatically with this teflon-coated probe even in emission of corrosive gas (chlorine, sulfurous, nitric acid, and others). Teflon coating is also effective for reducing dust adhesion.

Item	Details
Range of coating	Probe (part exposed to gases)
Coating material	Conductive Teflon
Coating thickness	40 μm



Sensor after Teflon-coating

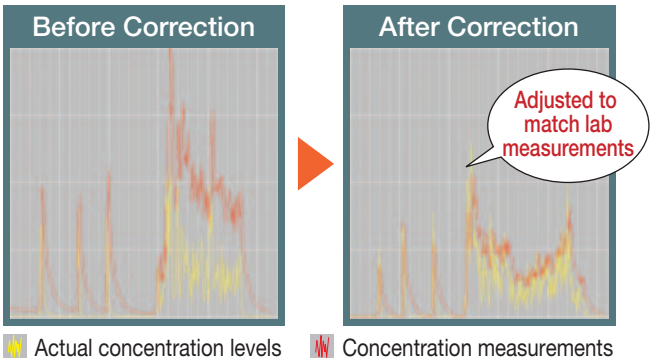


# Dust Monitor PFM Series

## Triboelectric dust monitor with concentration-level correction

### *Easy correction to a close approximation of values obtained by JIS-equivalent methods*

By simply entering a concentration correction factor to the current signal representing the amount of particles measured by the sensor, the output value can be corrected to an actual dust concentration level approximation that may be obtained by lab measurement standard. (Range of correction: 0.1 to 2.0 times) Continuous monitoring is possible at a lower cost compared with the lab and optical systems.

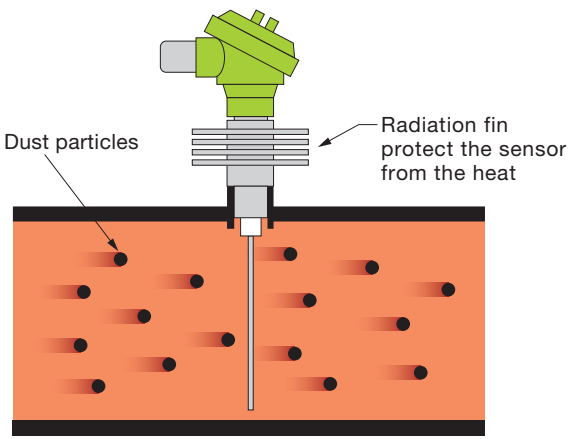


Transducer for Remote Type PFM-KCU12, PFM-KCU14

## Triboelectric dust monitor for high-temperature applications

### *Can be used in applications at a maximum process temperature of 400°C!*





Radiation fin protect the sensor from the heat, so the concentration levels of dust can be measured at a process temperature of 400°C. The probe can be used for dust collectors installed at waste incinerators and fusion furnaces where measuring dust is difficult.



Sensor for Remote PFM-M11PT




# Specifications

## ● Sensor

Sensor Type	Sensor with Integrated Transducer	Remote Type Sensor		
	Standard	Standard	High-temperature Applications	Explosion-Proof Type (Ex ib IIB T4)
Model Number	PFM-M01E	PFM-M11P	PFM-M11PT	PFM-M01PEX
				
Construction	Sensor with integrated transducer	Sensor and transducer are separately installed.		Sensor, transducer & Zener Barrier are separately installed
Approx. Mass	2.1 kg	1.3 kg	2.1 kg	1.3 kg
Power Supply	80 to 240 VAC 50/60 Hz			
Power Consumption	4VA	—		
Dedicated Signal Cable Length	—	5 m (standard). Can be extended to 100 m for special orders.		
Concentration Level Display	10-segment LED (Lights up at every change of 10%)	On remote transducer		
Contact Output	1a for limit 1b for fault Contact capacity: 250 VAC, 2 A 30 VDC, 2 A	From transducer		
Analog Output	4 mA to 20 mA DC (Load resistance: 500Ω max)	From transducer		
Enclosure	Protection rating: IP65			Dust-proof&drip-proof*
Ambient Temperature	-20 to +65°C (Without condensation)			-20 to +60°C (Without condensation)
Measurement environment	Particle Size	0.3 μm min.		
	Particle Concentration	0 to 1000 mg/m <sup>3</sup> (Reference concentration)		
	Process Temperature	250°C max.	400°C max.	60°C max.
	Gas Flow Velocity	4 m/s min. (Constant velocity)		
	Humidity	40% max.		
	Pressure	200 kPa max.		
Equipment	Measurement Range	9 levels	Use transducer to make settings	
	Data Averaging	Time setting up to 30 seconds	Use transducer to make settings	
	Probe Length	300 to 1000 mm (When length of insulator is 58mm)		
	Mounting	R1 screw with one-inch socket		


\*: Housing cover and lead outlet must be closed.

## ● Transducer for Remote type

Transducer Type		Standard	With Concentration-level Correction	
Model Number	Standard Explosion-Proof Type	PFM-KCU11 PFM-KCU01	PFM-KCU12 PFM-KCU02	PFM-KCU14 PFM-KCU04
				
Approx. Mass	0.7 kg			
Power Supply	110 VAC or 220 VAC, -15 to +10%, 50/60 Hz*			
Power Consumption	7 VA			
Ambient Temperature	-20 to +50°C (Without condensation)			
Enclosure	Protection rating: IP20			
Concentration Level Display	4 digit 7 seg LED			
Unit of measurement	%		mg/m <sup>3</sup>	
Contact Output	1cX2 for limit 1c for fault (Contact capacity: 250 VAC, 2 A)			
Analog Output	4 mA to 20 mA DC (Load resistance: 500Ω max)			
Correction Range	—	0.1 to 2.0 times (at 0.1 intervals)		
Equipment	Measurement Range	9 levels		
	Data Averaging	Time setting up to 30 seconds		
	Mounting	Wall or DIN rail mounting		

\*: Specify the power voltage when you order.

## ● Zener Barrier

Model Number	Z961/Z964
	
Explosion-proof enclosure	(Ex ia) IIB
Protection class	IP20
Ratings	U <sub>o</sub> = 17.4V I <sub>o</sub> = 190.3mA P <sub>o</sub> = 430mW U <sub>m</sub> = 250VAC 50/60Hz 250VDC
Ambient Temperature	-20°C ~ +60°C without condensation and freeze
Ambient humidity	5% ~ 95%RH
Mass	150g

Note:

For a single detector, 2 zener barriers are the system configuration of explosion-proof intrinsic safety. Connecting the earth of the zener barrier to the DIN rail & connect the earth separately by A-class grounding.

