

## Best in class dust measurement technology

Scattered light and transmission dust measuring devices



# Why is it so important to measure dust?



Sustainable protection of the environment relies on the detection and accurate measurement of dust and particle emissions. Dust particles, in particular those produced by industrial plants, have a significant impact on humans and the natural environment that they live in. As a leading manufacturer of innovative and modern dust measuring devices, and with decades of experience in this field, we are making a valuable contribution to this endeavor. Offering an extensive product portfolio including everything from devices operating on the basis of both continuous and discontinuous measurement principles through equipment for dust measurement in wet exhaust gases, we are bound to be able to find the right solution even for complex measuring tasks.

## Directives, approval bodies, and organizations

### European and international directives and regulations

- EU directives and TÜV certifications setting out requirements for:
  - Large combustion plants and gas turbine plants (2001/80 / EC)
  - Waste incineration (2000/76 / EC)
  - Quality standards for automated measuring systems:
    - EN 14181 – Stationary source emissions, quality assurance of automated measuring systems
    - EN 15267 – Check and certification of automated measuring systems
    - EN 13284 – Stationary source emissions. Determination of low range mass concentration of dust
  - The new industrial emissions directive 2010/75 / EU for integrated prevention and reduction of environmental pollution
- MCERTS approval body for Great Britain

- U.S. EPA environmental agency with the American quality standards (EPA CFR 11 Part 60 and Part 75)
- Japanese standard JQA
- GOST standards organization for GUS standards and regulations
- Chinese EPA CEP
- EPA standards for many other countries

### German directives and regulations

- Federal Pollution Control Act (Bundes-Immissionsschutzgesetz – BImSchG)
- Federal Immission Control Act (Bundes-Immissionsschutzverordnungen – 17<sup>th</sup> BImSchV and 30<sup>th</sup> BImSchV)
- Technical Instructions on Air Quality Control (Technische Anleitung zur Reinhaltung der Luft – TA Luft)

# Best available measurement technology

For a measuring task to be implemented successfully, a wide range of factors and requirements must be taken into account. The greater the accuracy and level of detail in which requirements are identified and defined, the more reliable and cost-effective the implementation of the measuring task will be. This applies not only at procurement stage but for the entire operating time. It is precisely here that we excel – offering an extensive product portfolio and proven measuring technologies backed by decades of experience gained from many thousands of installations.

## Emission measurements in dry and wet exhaust gases

Incinerators play an important role in many industrial processes. Continuous measuring devices are used in dedusting plants. These applications place very high demands on the measuring devices including, for example, in relation to the composition, temperature, and moisture content of the exhaust gases. Depending on the medium and the operating

mode of the plant, the water or acid dew point might be undershot, causing corrosion of the parts of the measuring device that come into contact with the exhaust gas. Therefore, both dry and wet exhaust gases must be measured highly accurately – with maximum possible availability and low maintenance overheads.

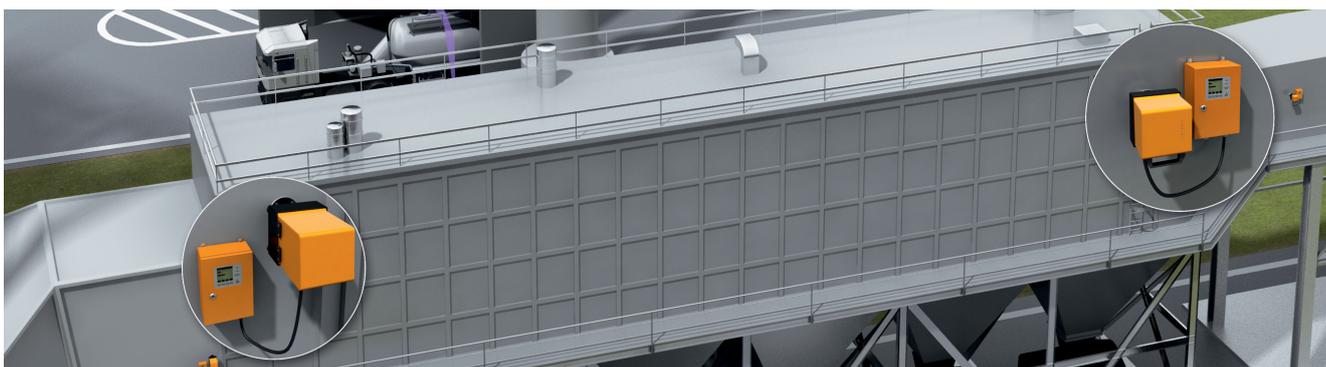


## Safe filter monitoring

For efficient control of filter performance and function monitoring, dust concentration is measured continuously directly downstream of the filter. The more sensitively and quickly a measuring device is able to react to a change in dust concentration, the better equipped the plant will be to operate without dust penetration. The DUSTHUNTER SP100 is ideal for this type of application, because it can be installed very easily from one side. The probe design renders mechanical adjustment and alignment with a particle-free measuring distance unnecessary.

## Filter monitoring synchronized with dedusting

It is important to identify a filter defect at an early stage so that permissible emission limit values are not exceeded. If only the defective bag or group of bags is to be replaced, the exact location of the defect must be located. To do this, dust concentration must be measured synchronized with the dedusting of the bags, so that filter defects can be detected through the occurrence of emission peaks. The DUSTHUNTER SP30 has a proven track record in rising to this particular challenge.



# Overview of dust measuring devices

Product	Measurement principle			Certification							Measuring conditions				
	Scattered light forward	Scattered light backwards	Transmission	EN 15267 <sup>1)</sup>	EN 15859	MCERTS	U.S. EPA	DNV	GOST	Ex, ATEX	Low concentrations (< 200 mg/m <sup>3</sup> )	High concentrations (> 200 mg/m <sup>3</sup> )	Damp gas	Aggressive gas	Inhomogeneous media density
Scattered light dust measuring devices															
	DUSTHUNTER SB100		■		■		■	■		■		■		■	■
	DUSTHUNTER SB30		■					■			■			■	■
	DUSTHUNTER SP30		■		■									■	
	DUSTHUNTER SP100, SP100 Ex	■			■		■		■	■	■			■	
	FWE200DH	■			■ <sup>1)</sup>		■	■			■		■	■	
Transmission dust measuring devices															
	DUSTHUNTER T200				■	■		■	■		■			■	■
	DUSTHUNTER T100				■	■		■	■		■			■	■

<sup>1)</sup> For plants requiring a permit according to, e.g., 2001/80 / EC (13<sup>th</sup> BImSchV), 2000/76 / EC (17<sup>th</sup> BImSchV), 27<sup>th</sup> BImSchV.

<sup>2)</sup> Pressure inside the duct: up to 10 kPa.

<sup>3)</sup> Version up to 200 kPa on request.

<sup>4)</sup> TÜV type-approved for plants requiring a permit according to TA Luft and 27<sup>th</sup> BImSchV.

<sup>5)</sup> Pressure inside the duct: -20 hPa ... +20 hPa.

Measuring conditions						Test functions			Duct diameter (meters)						
Pressure inside duct (-50 hPa ... +30 hPa)	Max. process temp. (+600 °C/+1112 °F)	Max. process temp. (+400 °C/+752 °F)	Max. process temp.	Max. process temp. (+220 °C/428 °F)		Automated check cycle	Manual linearity test	Contamination check	0.5 m	1 m	3 m	5 m	8 m	12 m	50 m
■	■					■	■	■	≥ 500 mm (19.7")						
■	■					■	■		≥ 500 mm (19.7")						
■						■	■		≥ 150 mm (5.9") ≥ 250 mm (9.8")						
■ <sup>2)</sup>		■		■		■	■	■	≥ 250 mm (9.8")						
■ <sup>5)</sup>				■		■	■	■	≥ 400 mm (15.7")						
■	■					■	■	■	0.5-2.5 m (1.6-8.2") 2-5 m (6.6-16.4") 4-12 m (13.1-39.4") 10-50 m (32.8-164.0")						
■	■					■	■	■	0.5-2.5 m (1.6-8.2") 2-5 m (6.6-16.4") 4-12 m (13.1-39.4")						

# Scattered light dust measuring devices



## DUSTHUNTER SB30

Continuous measurement of low and medium levels of dust concentration

### Technical data overview

Measured values	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)
Performance-tested measurands	–
Measurement principles	Light scattering backward
Certified measuring range	–
Hazardous area	–
Process temperature	–40 °C ... +600 °C (–40 °F ... +1112 °F)
Process pressure	With MCU-P control unit: –50 hPa ... 2 hPa With external purge air unit: –50 hPa ... 30 hPa
Duct diameter	≥ 500 mm
Conformities	TÜV type test China EPA compliant DNV Maritime type approval
Enclosure rating	IP 66, IP 54
Test functions	Automated self-test (linearity, drift, aging) Manual linearity test with reference filter Low-pressure monitor (switching point –35 hPa)

### At a glance

- For low to medium dust concentrations
- Easy installation from one side
- Automated check of zero and reference point
- For medium to large duct diameters
- Independent measuring device – with or without control unit

Detailed information [www.endress.com/dusthunter-sb30](http://www.endress.com/dusthunter-sb30)

\* SI = Scatter light intensity

**DUSTHUNTER SB100**

The type-approved dust measuring device with reverse scattered light measurement

**DUSTHUNTER SP30**

Measure intelligently. Reduce costs.

Scattered light intensity, dust concentration (according to gravimetric comparative measurements)

Scattered light intensity

Light scattering backward

0 ... 100 SI\* (100 SI = 15 mg/m<sup>3</sup>)

–

–40 °C ... +600 °C (–40 °F ... +1112 °F)

With MCU-P control unit: –50 hPa ... 2 hPa  
With external purge air unit: –50 hPa ... 30 hPa

≥ 500 mm (19.69")

Approved for plants requiring a permit, 2001/80 / EC (13<sup>th</sup> BImSchV), 2000/76 / EC (17<sup>th</sup> BImSchV), 27<sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU

IP 66, IP 54

Automated self-test (linearity, contamination, drift, aging), contamination limit values, manual linearity test with reference filter, low-pressure monitor (switching point –35 hPa)

- For very low to medium dust concentrations
- Installation from one side
- Contamination check
- Automated check of zero and reference point
- Automated compensation of background radiation, therefore no light absorber required
- For medium to large duct diameters

[www.endress.com/dusthunter-sb100](http://www.endress.com/dusthunter-sb100)

Scattered light intensity, dust concentration (according to gravimetric comparative measurements)

–

Light scattering forward

–

–

–40 °C ... +220 °C (–40 °F ... +428 °F)  
Option: up to 300 °C (572 °F)

With integrated purge air unit: –50 hPa ... 10 hPa  
With external purge air unit: –50 hPa ... 30 hPa  
With instrument air (from customer): –50 hPa ... 100 hPa  
Other ranges on request

TriClamp version, 1" thread version: ≥ 150 mm (5.9")  
Flange version: ≥ 250 mm (9.84")

TÜV type tested  
Suitability tested accord. EN15859 (2010).  
Certified for use as dust monitor or leakage monitor in filter monitoring applications

IP 66, IP 54

Automated self-test (linearity, drift, aging), manual linearity test with reference filter, low-pressure monitor (switching point –35 hPa)

- Independent measuring device – with or without control unit
- Automated monitoring of zero and reference point
- Integrated purge air unit as an option
- Installation from one side of a duct
- Rugged and compact structure
- No moving parts in the duct
- Coated options available
- Applicable also for aggressive gases
- Optional integrated LC display

[www.endress.com/dusthunter-sp30](http://www.endress.com/dusthunter-sp30)

**DUSTHUNTER SP100**

Probe design with forward scattered light measurement

**DUSTHUNTER SP100 Ex**

Probe design with forward scattered light measurement

**Technical data overview**

Measured values	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)
Performance-tested measurands	Scattered light intensity	Scattered light intensity
Measurement principles	Light scattering forward	Light scattering forward
Certified measuring range	0 ... 7.5 mg/m <sup>3</sup>	0 ... 7.5 mg/m <sup>3</sup>
Hazardous area		3G Gc 3D Dc , 2G Gb 2D Db
Process temperature	Depending on version: -40 °C ... +400 °C (-40 °F ... +752 °F)	Depending on version: -40 °C ... +400 °C (-40 °F ... +752 °F)
Process pressure	With MCU-P control unit: -50 hPa ... 10 hPa With external purge air unit: -50 hPa ... 30 hPa With onsite instrument air (from customer): -50 hPa ... 30 kPa	With instrument air (from customer): SP100 Ex 2K: 0 hPa ... 3,000 hPa SP100 Ex3K: -100 hPa ... 100 hPa (rel. Δ ambient pressure to gas duct pressure; 1 hPa = 1 mbar)
Duct diameter	≥ 0.25 m (98.43")	≥ 0.25 m (98.43")
Conformities	Approved for plants requiring a permit, 2001/80 / EC (13 <sup>th</sup> BImSchV), 2000/76 / EC (17 <sup>th</sup> BImSchV), 27 <sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU, U.S. EPA PS-11 compliant	Approved for plants requiring a permit, 2001/80 / EC (13 <sup>th</sup> BImSchV), 2000/76 / EC (17 <sup>th</sup> BImSchV), 27 <sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU, U.S. EPA PS-11 compliant
Enclosure rating	IP 66, IP 54	IP 66, IP 54
Test functions	Automated self-test (linearity, contamination, drift, aging), contamination limit values, manual linearity test with reference filter, low-pressure monitor (switching point -35 hPa)	Automated self-test (linearity, contamination, drift, aging), contamination limit values, manual linearity test with reference filter, low-pressure monitor (switching point -35 hPa)

**At a glance**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>■ Installation from one side</li> <li>■ For very low to medium dust concentrations</li> <li>■ Automated check of zero and reference point</li> <li>■ Contamination check</li> <li>■ Hastelloy probe available for corrosive gases</li> <li>■ For small to medium duct diameters</li> </ul> | <ul style="list-style-type: none"> <li>■ Installation from one side</li> <li>■ For very low to medium dust concentrations</li> <li>■ Automated check of zero and reference point</li> <li>■ Contamination check</li> <li>■ Hastelloy probe available for corrosive gases</li> <li>■ For small to medium duct diameters</li> <li>■ Device version for Ex zone 2/22 and ATEX/IEC EX for EX zone 1/21</li> </ul> |
|---|---|

Detailed information

[www.endress.com/dusthunter-sp100](http://www.endress.com/dusthunter-sp100)[www.endress.com/dusthunter-sp100](http://www.endress.com/dusthunter-sp100)

**FWE200DH**

Reliable dust measurement in wet gases

Scattered light intensity, dust concentration (according to gravimetric comparative measurements)

Dust concentration

Light scattering forward

0 ... 7.5 mg/m<sup>3</sup>

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PVDF probe: ≤ +120 °C (+248 °F), Hastelloy probe: ≤ +220 °C (+428 °F)

Versions for higher temperatures available on request

With SLV7 2BH1100 purge air unit: –20 hPa ... 20 hPa

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Approved for plants requiring a permit, 2001/80 / EC (13<sup>th</sup> BImSchV), 2000/76 / EC (17<sup>th</sup> BImSchV), 27<sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, U.S. EPA PS-11 compliant

Measuring device: IP 54

Control unit: IP 65, IP 54

Automated self-test (linearity, contamination, drift, aging)

Contamination limit values: warning at 30%; fault at 40%

Manual linearity test with reference filter

Low-pressure monitor (switching point –35 hPa)

- For very low to medium dust concentrations
- Gas sampling and return combined in one probe
- Contamination check
- Automated check of zero and reference point
- Simple parameterization and convenient operation – optionally via an additional remote display
- Integrated system monitoring to detect the need for maintenance at an early stage

# Transmission dust measuring devices



## DUSTHUNTER T100

The type-approved transmissiometer for emission monitoring

### Technical data overview

Measured values	Transmission, opacity, relative opacity, extinction, dust concentration
Performance-tested measurands	Dust concentration
Measurement principles	Transmission measurement
Certified measuring range	0 ... 0.1 Extinction ( $\cong 15 \text{ mg}/^3$ dust at 5 m measuring path length)
Process temperature	-40 °C ... +600 °C (-40 °F ... +1112 °F)
Process pressure	With MCU-P control unit: -50 hPa ... 2 hPa With external purge air unit: -50 hPa ... 30 hPa
Duct diameter	0.5 m ... 2.5 m (1.6 ft ... 8.2 ft) 2 m ... 5 m (6.5 ft ... 16.4 ft) 4 m ... 12 m (13.1 ft ... 39.4 ft)
Conformities	Approved for plants requiring a permit, 2001/80 / EC (13 <sup>th</sup> BImSchV), 2000/76 / EC (17 <sup>th</sup> BImSchV), 27 <sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU
Enclosure rating	IP 66, IP 54
Test functions	Automated self-test (linearity, contamination, drift, aging), contamination limit values: warning at 20%, fault at 30% Manual linearity test with reference filter Low-pressure monitor (switching point -35 hPa)

### At a glance

- For medium to high dust concentrations
- Integrated contamination check
- Automated check of zero and reference point
- For small to large measuring distances

Detailed information [www.endress.com/dusthunter-t100](http://www.endress.com/dusthunter-t100)



### DUSTHUNTER T200

The type-approved transmissiometer with self-alignment function

Transmission, opacity, relative opacity, extinction, dust concentration

Dust concentration

Transmission measurement

0 ... 0.1 Extinction ( $\cong 15 \text{ mg}/^3$  dust at 5 m measuring path length)

-40 °C ... +600 °C (-40 °F ... +1112 °F)

With MCU-P control unit: -50 hPa ... 2 hPa

With external purge air unit: -50 hPa ... 30 hPa

0.5 m ... 2.5 m (1.6 ft ... 8.2 ft)

2 m ... 5 m (6.5 ft ... 16.4 ft)

4 m ... 12 m (13.1 ft ... 39.4 ft)

10 m ... 50 m (32.8 ft ... 164.0 ft)

Approved for plants requiring a permit, 2001/80 / EC (13<sup>th</sup> BImSchV), 2000/76 / EC (17<sup>th</sup> BImSchV), 27<sup>th</sup> BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU, U.S. EPA PS-1 compliant

IP 66, IP 54

Automated self-test (linearity, contamination, drift, aging)

Contamination limit values: warning at 30%; fault at 40%

Manual linearity test with reference filter

Low-pressure monitor (switching point -35 hPa)

- Integrated soiling check for sender-receiver and reflector unit
- Automated self-alignment of the optical modules
- Automated check of zero and reference point
- For medium to high dust concentrations
- For small to large measuring distances

[www.endress.com/dusthunter-t200](http://www.endress.com/dusthunter-t200)

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