



# DUST MEASURING DEVICES

INNOVATIVE SOLUTIONS FOR MEASURING DUST

Scattered light, transmittance, and gravimetric dust measuring devices

**SICK**  
Sensor Intelligence.

## 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, SICK is 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, SICK is 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

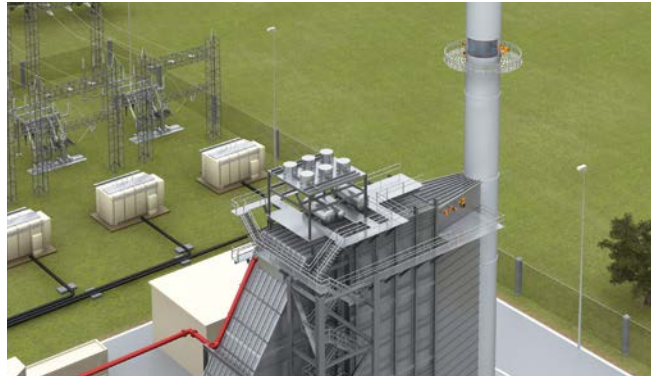
- Federal Pollution Control Act (Bundes-Immissionsschutzgesetz – **BImSchG**)
- Federal Immission Control Act (Bundes-Immissionsschutzverordnungen – **17th BImSchV** and **30th BImSchV**)
- Technical Instructions on Air Quality Control (Technische Anleitung zur Reinhaltung der Luft – **TA Luft**)

## 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 SICK excels – 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

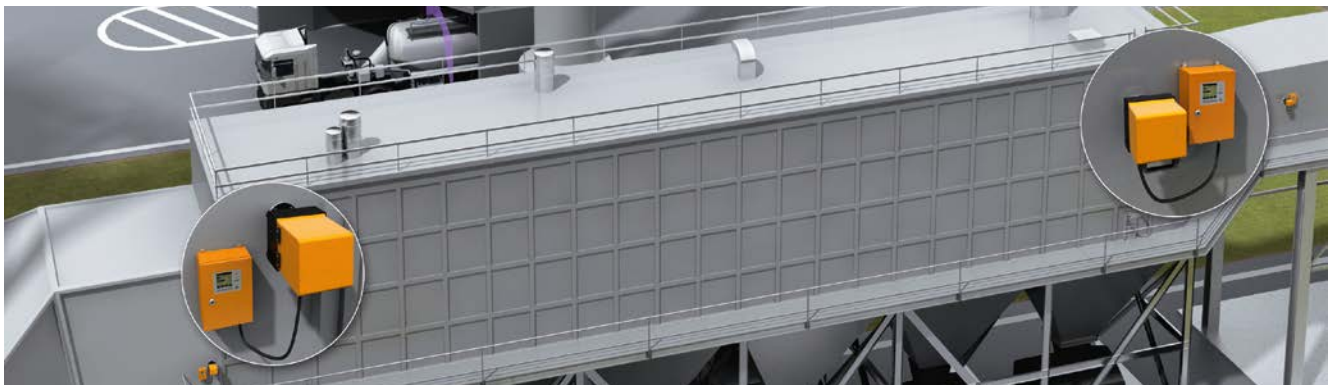
Incinerators play an important role in many industrial processes. Continuous measuring devices are used in dedusting plants. These applications place very high demands on the measuring devices including, for example, in relation to the composition, temperature, and moisture content of the exhaust gases. 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 reverse	Transmission	Gravimetric analysis	EN 15267 <sup>1)</sup>	EN 13284	EN 15859	MCERTS	U.S. EPA	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
<b>Scattered light dust measuring devices</b>																	
	DUSTHUNTER SB100		■			■			■	■	■		■			■	■
	DUSTHUNTER SB50		■							■		■				■	■
	DUSTHUNTER SB30		■									■				■	■
	DUSTHUNTER SP30	■						■									
	DUSTHUNTER SP100, SP100 Ex	■				■			■	■	■	■				■	
	FWE200DH	■				■ <sup>1)</sup>			■	■		■		■	■		
<b>Transmittance dust measuring devices</b>																	
	DUSTHUNTER T200			■		■			■	■	■		■			■	■
	DUSTHUNTER T100			■		■			■	■	■		■			■	■
	DUSTHUNTER T50			■						■		■				■	■
<b>Gravimetric dust measurement devices</b>																	
	SHC500 Gravimat				■		■		■	■		■	■				

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

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

Measuring conditions						Test functions			Duct diameter						
Pressure inside duct (-50 hPa ... +30 hPa)	Max. process temperature (+600 °C)	Max. process temperature (+400 °C)	Max. process temperature (+300 °C)	Max. process temperature (+220 °C)		Automated check cycle	Manual linearity test	Contamination check	0.5	1	3	5	8	12	50

■	■					■	■	■	≥ 500 mm						
■	■					■	■		≥ 500 mm						
■	■					■	■		≥ 500 mm						
■					■	■			≥ 250 mm						
■ <sup>2)3)</sup>		■			■	■	■	■	≥ 250 mm						
■ <sup>5)</sup>					■	■	■	■	≥ 400 mm						

■	■					■	■	■	0.5 ... 2.5 m						
■	■					■	■	■	2 ... 5 m						
■	■					■	■		4 ... 12 m						
■	■					■	■	■	10 ... 50 m						
■	■					■	■	■	0.5 ... 2.5 m						
■	■					■	■	■	2 ... 5 m						
■	■					■	■		4 ... 12 m						
■	■					■	■		0.5 ... 2.5 m						
■	■					■	■	■	2 ... 5 m						
■	■					■	■		4 ... 8 m						

■	■								≥ 150 mm						
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	 <p><b>DUSTHUNTER SB30</b></p>	 <p><b>DUSTHUNTER SB50</b></p>	
	<p>Continuous measurement of low and medium levels of dust concentration</p>	<p>The dust measuring device with reverse scattered light measurement</p>	

Technical data overview			
<b>Measurands</b>	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)	
<b>Type-approved measurands</b>	-	-	
<b>Measurement principles</b>	Light scattering backward	Light scattering backward	
<b>Hazardous area</b>	-	-	
<b>Process temperature</b>	-40 °C ... +600 °C	-40 °C ... +600 °C	
<b>Process pressure</b>	With MCU-P control unit: -50 hPa ... 2 hPa With external purge air unit: -50 hPa ... 30 hPa	With MCU-P control unit: -50 hPa ... 2 hPa With external purge air unit: -50 hPa ... 30 hPa	
<b>Duct diameter</b>	≥ 500 mm	≥ 500 mm	
<b>Conformities</b>	TÜV type test, China EPA compliant	-	
<b>Enclosure rating</b>	IP66, IP54	IP66, IP54	
<b>Test functions</b>	Automated self-test (linearity, drift, aging) Manual linearity test with reference filter Low-pressure monitor (switching point -35 hPa)	Automated self-test (linearity, drift, aging) Manual linearity test with reference filter Low-pressure monitor (switching point -35 hPa)	

At a glance			
	<ul style="list-style-type: none"> <li>• For low to medium dust concentrations</li> <li>• Easy installation from one side</li> <li>• Automated check of zero and reference point</li> <li>• For medium to large duct diameters</li> </ul>	<ul style="list-style-type: none"> <li>• For low to medium dust concentrations</li> <li>• Installation from one side</li> <li>• Automated check of zero and reference point</li> <li>• Automated compensation of background radiation, therefore no light absorber required</li> <li>• For medium to large duct diameters</li> </ul>	

<p>Detailed information</p>	<p>→ <a href="http://www.sick.com/DUSTHUNTER_SB30">www.sick.com/DUSTHUNTER_SB30</a></p>	<p>→ <a href="http://www.sick.com/DUSTHUNTER_SB50">www.sick.com/DUSTHUNTER_SB50</a></p>	
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**DUSTHUNTER SB100**

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



**DUSTHUNTER SP30**

Measure intelligently. Reduce costs.



**DUSTHUNTER SP100**

Probe design with forward scattered light measurement

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

Scattered light intensity

Light scattering backward

-

-40 °C ... +600 °C

With MCU-P control unit:

-50 hPa ... 2 hPa

With external purge air unit:

-50 hPa ... 30 hPa

≥ 500 mm

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

IP66, IP54

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

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

-

Light scattering forward

-

-40 °C ... +220 °C

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

Depending on version: ≥ 150 mm

TÜV type test

IP65, IP54

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

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

Scattered light intensity

Light scattering forward

3G, Gc, 3D, Dc

Depending on version: -15 °C ... +400 °C

With MCU-P control unit:

-50 hPa ... 10 hPa

With external purge air unit:

-50 hPa ... 30 hPa

With instrument air (from customer):

-100 hPa ... 100 hPa

≥ 0.25 m

Approved for plants requiring a permit, 2001/80 / EC (13th BImSchV), 2000/76 / EC (17th BImSchV), 27th BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU, U.S. EPA PS-11 compliant

IP66, IP54

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

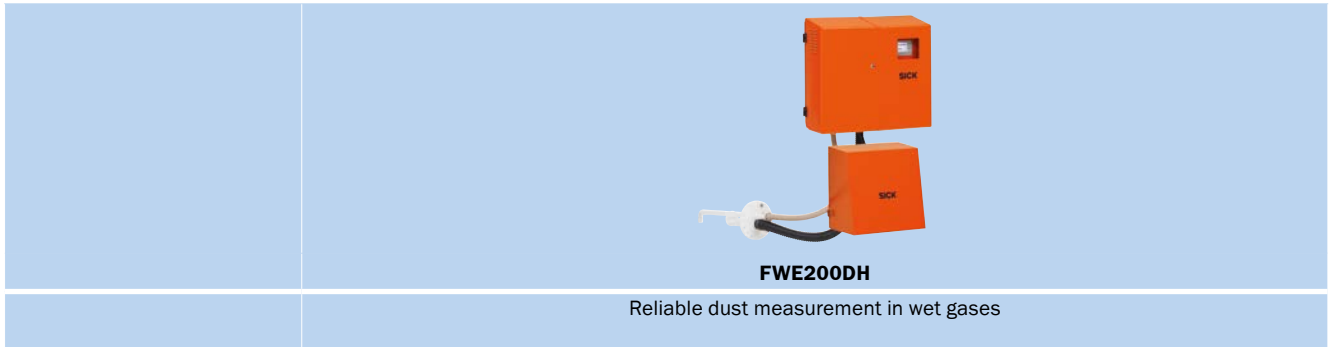
- Independent measuring device – with or without control unit
- Automated monitoring of zero and reference point
- Integrated purge air unit as an option
- Installation from one side of a duct
- Rugged and compact structure
- No moving parts in the duct

- Installation from one side
- For very low to medium dust concentrations
- Automated check of zero and reference point
- Contamination check
- Hastelloy probe available for corrosive gases
- For small to medium duct diameters
- Device version for Ex zone 2

→ [www.sick.com/DUSTHUNTER\\_SB100](http://www.sick.com/DUSTHUNTER_SB100)

→ [www.sick.com/DUSTHUNTER\\_SP30](http://www.sick.com/DUSTHUNTER_SP30)

→ [www.sick.com/DUSTHUNTER\\_SP100](http://www.sick.com/DUSTHUNTER_SP100)



Technical data overview	
<b>Measurands</b>	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)
<b>Type-approved measurands</b>	Dust concentration
<b>Measurement principles</b>	Light scattering forward
<b>Process temperature</b>	PVDF probe: ≤ +120 °C Hastelloy probe: ≤ +220 °C Versions for higher temperatures available on request
<b>Process pressure</b>	With SLV7 2BH1100 purge air unit: -20 hPa ... 20 hPa
<b>Conformities</b>	Approved for plants requiring a permit, 2001/80 / EC (13th BImSchV), 2000/76 / EC (17th BImSchV), 27th BImSchV, TA Luft, EN 15267, EN 14181, U.S. EPA PS-11 compliant
<b>Enclosure rating</b>	System: IP54 Control unit: IP65, IP54
<b>Test functions</b>	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)

At a glance	
	<ul style="list-style-type: none"> <li>• For very low to medium dust concentrations</li> <li>• Gas sampling and return combined in one probe</li> <li>• Contamination check</li> <li>• Automated check of zero and reference point</li> <li>• Simple parameterization and convenient operation – optionally via an additional remote display</li> <li>• Integrated system monitoring to detect the need for maintenance at an early stage</li> </ul>

Detailed information → [www.sick.com/FWE200DH](http://www.sick.com/FWE200DH)





**SHC500 Gravimat**

Mobile measurement system for gravimetric dust concentration measurements

**Technical data overview**



<b>Measurands</b>	Dust concentration
<b>Process temperature</b>	Without air cooling: ≤ +250 °C With air cooling: ≤ +400 °C High-temperature version: ≤ +600 °C
<b>Process pressure</b>	-50 hPa ... 50 hPa
<b>Conformities</b>	EN 13284-1, U.S. EPA compliant
<b>Enclosure rating</b>	Closed: IP65 Open: IP54

**At a glance**

- Hardly any dust loss due to optimized sampling system
- Automated data recording and system control
- Isokinetic control in real time
- Automated storage and evaluation of the measuring values
- Automated measurement of the flow angle and detection of swirl effects

Detailed information

→ [www.sick.com/SHC500\\_Gravimat](http://www.sick.com/SHC500_Gravimat)

	 <p><b>DUSTHUNTER T50</b></p>	 <p><b>DUSTHUNTER T100</b></p>	
	The transmissiometer for monitoring dust concentration levels	The type-approved transmissiometer for emission monitoring	

Technical data overview			
<b>Measurands</b>	Transmission, opacity, relative opacity, extinction, dust concentration	Transmission, opacity, relative opacity, extinction, dust concentration	
<b>Type-approved measurands</b>	-	Dust concentration	
<b>Measurement principles</b>	Transmittance measurement	Transmittance measurement	
<b>Process temperature</b>	-40 °C ... +600 °C	-40 °C ... +600 °C	
<b>Process pressure</b>	With MCU-P control unit: -50 hPa ... 2 hPa With external purge air unit: -50 hPa ... 30 hPa	With MCU-P control unit: -50 hPa ... 2 hPa With external purge air unit: -50 hPa ... 30 hPa	
<b>Duct diameter</b>	0.5 m ... 2.5 m 2 m ... 5 m 4 m ... 8 m	0.5 m ... 2.5 m 2 m ... 5 m 4 m ... 12 m	
<b>Conformities</b>	-	Approved for plants requiring a permit, 2001/80 / EC (13th BImSchV), 2000/76 / EC (17th BImSchV), 27th BImSchV, TA Luft, EN 15267, EN 14181, MCERTS, 2010/75 / EU	
<b>Enclosure rating</b>	IP66, IP54	IP66, IP54	
<b>Test functions</b>	Automated self-test (linearity, drift, aging) Manual linearity test with reference filter Low-pressure monitor (switching point -35 hPa)	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			
	<ul style="list-style-type: none"> <li>• For medium to high dust concentrations</li> <li>• Automated check of zero and reference point</li> <li>• For low to medium measuring distances</li> </ul>	<ul style="list-style-type: none"> <li>• For medium to high dust concentrations</li> <li>• Integrated contamination check</li> <li>• Automated check of zero and reference point</li> <li>• For small to large measuring distances</li> </ul>	

<a href="#">Detailed information</a>	<a href="http://www.sick.com/DUSTHUNTER_T50">→ www.sick.com/DUSTHUNTER_T50</a>	<a href="http://www.sick.com/DUSTHUNTER_T100">→ www.sick.com/DUSTHUNTER_T100</a>	
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**DUSTHUNTER T200**

The type-approved transmissiometer with self-alignment function

Transmission, opacity, relative opacity, extinction, dust concentration

Dust concentration

Transmittance measurement

-40 °C ... +600 °C

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

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

0.5 m ... 2.5 m

2 m ... 5 m

4 m ... 12 m

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

IP66, IP54

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

## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**That is “Sensor Intelligence.”**

### **Worldwide presence:**

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → [www.sick.com](http://www.sick.com)