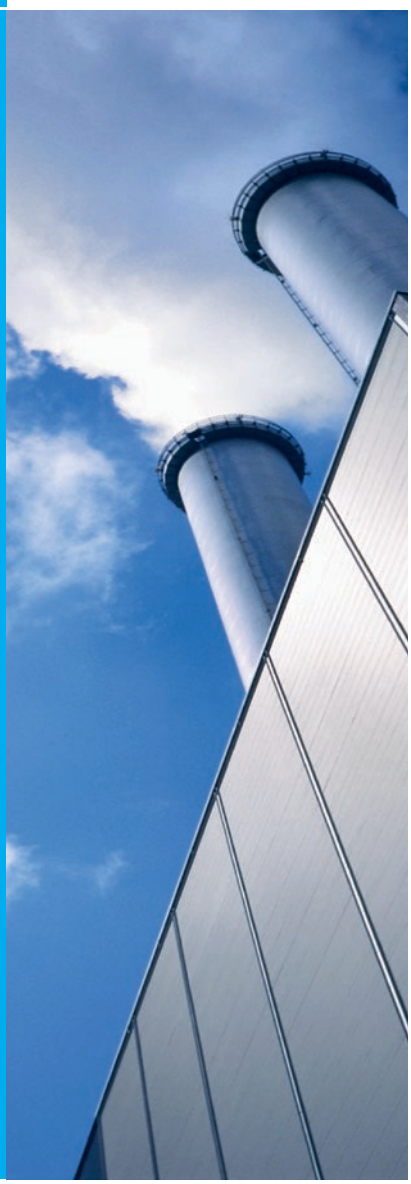
Best in class dust measurement technology

Scattered light and transmittance dust measuring devices



Endress+Hauser

People for Process Automation

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 – 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 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

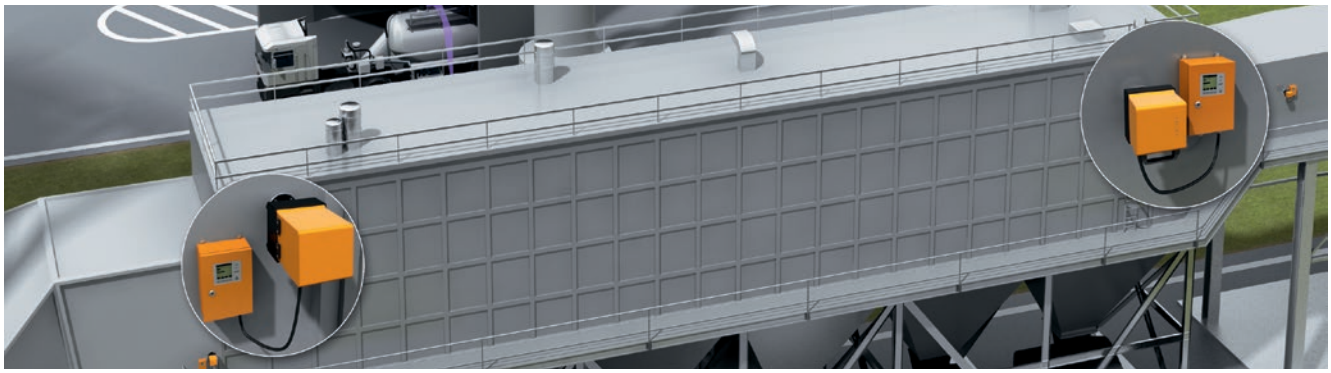
Incinerators play an important role in many industrial processes. Continuous measuring devices are used in dedusting plants. These applications place very high demands on the measuring devices including, for example, in relation to the composition, temperature, and moisture content of the exhaust gases.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

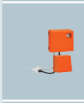
For efficient control of filter performance and function monitoring, dust concentration is measured continuously directly downstream of the filter. The more sensitively and quickly a measuring device is able to react to a change in dust concentration, the better equipped the plant will be to operate 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

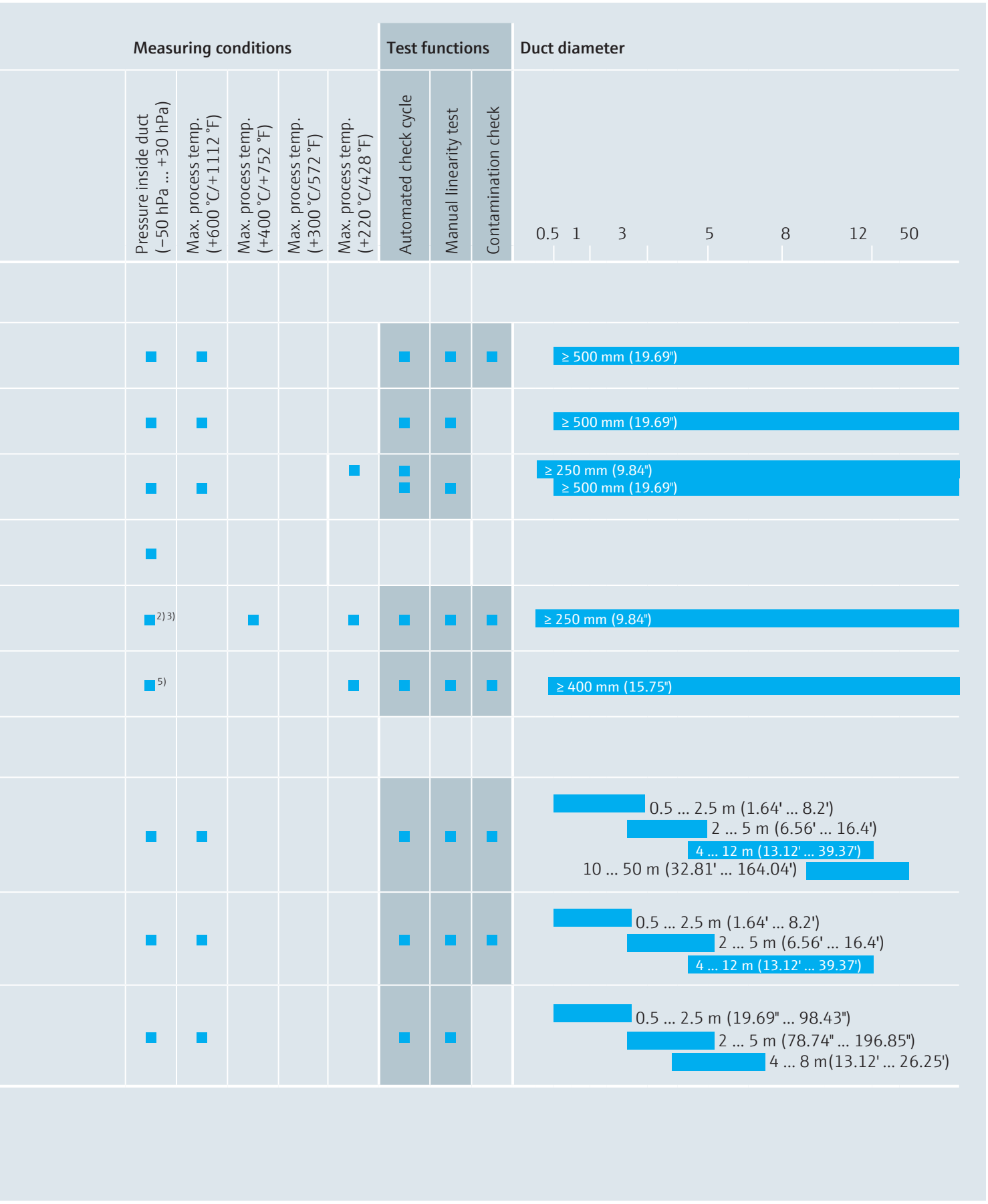
It is important to identify a filter defect at an early stage so that permissible emission limit values are not exceeded. If only the defective bag or group of bags is to be replaced, the exact location of the defect must be located.
To do this, dust concentration must be measured synchronized with the 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

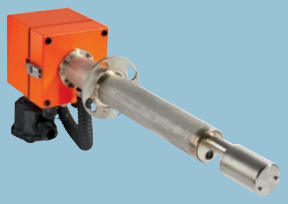
Product		Measurement principle				Certification							Measuring conditions					
		Scattered light forward	Scattered light reverse	Transmission	Gravimetric analysis	EN 15267 [1]	EN 13284	EN 15859	MCERTS	U.S. EPA	GOST	Ex, ATEX	Low concentrations (< 200 mg/m³)	High concentrations (> 200 mg/m³)	Damp gas	Aggressive gas	Inhomogeneous media density	
Scattered light dust measuring devices																		
	DUSTHUNTER SB100		■			■			■	■	■		■			■	■	
	DUSTHUNTER SB50		■								■		■			■	■	
	DUSTHUNTER SB30	■	■										■			■	■	
	DUSTHUNTER SP30							■										
	DUSTHUNTER SP100, SP100 Ex	■				■			■	■	■	■	■			■		
	FWE200DH	■				■ [1]			■	■			■		■	■		
Transmittance dust measuring devices																		
	DUSTHUNTER T200			■		■			■	■	■			■		■	■	
	DUSTHUNTER T100			■		■			■	■	■			■		■	■	
	DUSTHUNTER T50			■							■			■		■	■	

[1] For plants requiring a permit according to, e.g., 2001/80 / EC (13th BImSchV), 2000/76 / EG (17th BImSchV), 27th BImSchV.
[2] Pressure inside the duct: up to 10 kPa.
[3] Version up to 200 kPa on request.
[4] TÜV type-approved for plants requiring a permit according to TA Luft and 27th BImSchV.
[5] Pressure inside the duct: –20 hPA ... +20 hPa.


Measuring conditions
Test functions
Duct diameter
Pressure inside duct (−50 hPa ... +30 hPa)
Max. process temp. (+600 °C/+1112 °F)
Max. process temp. (+400 °C/+752 °F)
Max. process temp. (+300 °C/572 °F)
Max. process temp. (+220 °C/428 °F)
Automated check cycle
Manual linearity test
Contamination check
0.5 1 3 5 8 12 50
≥ 500 mm (19.69")
≥ 500 mm (19.69")
≥ 250 mm (9.84")
≥ 500 mm (19.69")
2) 3)
≥ 250 mm (9.84")
5)
≥ 400 mm (15.75")
0.5 ... 2.5 m (1.64' ... 8.2')
2 ... 5 m (6.56' ... 16.4')
4 ... 12 m (13.12' ... 39.37')
10 ... 50 m (32.81' ... 164.04')
0.5 ... 2.5 m (1.64' ... 8.2')
2 ... 5 m (6.56' ... 16.4')
4 ... 12 m (13.12' ... 39.37')
0.5 ... 2.5 m (19.69" ... 98.43")
2 ... 5 m (78.74" ... 196.85")
4 ... 8 m(13.12' ... 26.25')

Scattered light dust measuring devices

	DUSTHUNTER SB30	DUSTHUNTER SB50
	Continuous measurement of low and mediu m levels of dust concentration	The dust measuring device with reverse 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	–	–
Measurement principles	Light scattering backward	Light scattering backward
Hazardous area	–	–
Process temperature	–40 °C ... +600 °C (–40 °F ... +1112 °F)	–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	With MCU-P control unit: –50 hPa ... 2 hPa With external purge air unit: –50 hPa ... 30 hPa
Duct diameter	≥ 500 mm	≥ 500 mm (19.69")
Conformities	TÜV type test, China EPA compliant	–
Enclosure rating	IP66, IP54	IP66, IP54
Test functions	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		
	▪ For low to medium dust concentrations ▪ Easy installation from one side ▪ Automated check of zero and reference point ▪ For medium to large duct diameters	▪ For low to medium dust concentrations ▪ Installation from one side ▪ Automated check of zero and reference point ▪ Automated compensation of background radiation, therefore no light absorber required ▪ For medium to large duct diameters
Detailed information	www.endress.com/dusthunter-sb30	www.endress.com/dusthunter-sb50

	DUSTHUNTER SB100	DUSTHUNTER SP30
		
	The type-approved dust measuring device with reverse scattered light measurement	Measure intelligently. Reduce costs.
	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)	Scattered light intensity, dust concentration (according to gravimetric comparative measurements)
	Scattered light intensity	–
	Light scattering backward	Light scattering forward
	–	–
	–40 °C ... +600 °C (–40 °F ... +1112 °F)	–40 °C ... +220 °C (–40 °F ... +428 °F)
	With MCU-P control unit: –50 hPa ... 2 hPa With external purge air unit: –50 hPa ... 30 hPa	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
	≥ 500 mm (19.69")	Depending on version: ≥ 150 mm (5.91")
	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	TÜV type test
	IP66, IP54	IP65, IP54
	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, drift, aging), 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
	www.endress.com/dusthunter-sb100	www.endress.com/dusthunter-sp30

	DUSTHUNTER SP100	DUSTHUNTER SP100 Ex
	Probe design with forward scattered light measurement	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
Hazardous area		3G, Gc, 3D, Dc
Process temperature	Depending on version: −15 °C ... +400 °C (5 °F ... +752 °F)	Depending on version: −15 °C ... +400 °C (5 °F ... +752 °F)
Process pressure	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	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
Duct diameter	≥ 0.25 m (98.43")	≥ 0.25 m (98.43")
Conformities	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	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
Enclosure rating	IP66, IP54	IP66, IP54
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		
	▪ 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	▪ 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
Detailed information	www.endress.com/dusthunter-sp100	www.endress.com/dusthunter-sp100ex

FWE200DH

Reliable dust measurement in wet gases

Scattered light intensity, dust concentration (according to gravimetric comparative measurements)
Dust concentration
Light scattering forward
–
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
–
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
Measuring device: IP54 Control unit: IP65, 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)

- 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

www.endress.com/fwe200dh

Transmittance dust measuring devices

	DUSTHUNTER T50	DUSTHUNTER T100
	The transmissiometer for monitoring dust concentration levels	The type-approved transmissiometer for emission monitoring
Technical data overview		
Measured values	Transmission, opacity, relative opacity, extinction, dust concentration	Transmission, opacity, relative opacity, extinction, dust concentration
Performance-tested measurands	–	Dust concentration
Measurement principles	Transmittance measurement	Transmittance measurement
Process temperature	–40 °C ... +600 °C (–40 °F ... +1112 °F)	–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	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 2 m ... 5 m 4 m ... 8 m	0.5 m ... 2.5 m 2 m ... 5 m 4 m ... 12 m
Conformities	–	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
Enclosure rating	IP66, IP54	IP66, IP54
Test functions	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		
	▪ For medium to high dust concentrations ▪ Automated check of zero and reference point ▪ For low to medium measuring distances	▪ 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-t50	www.endress.com/dusthunter-t100

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 (–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
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

www.endress.com/dusthunter-t200

www.addresses.endress.com

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IN8030014/EHS/EN/03.00

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