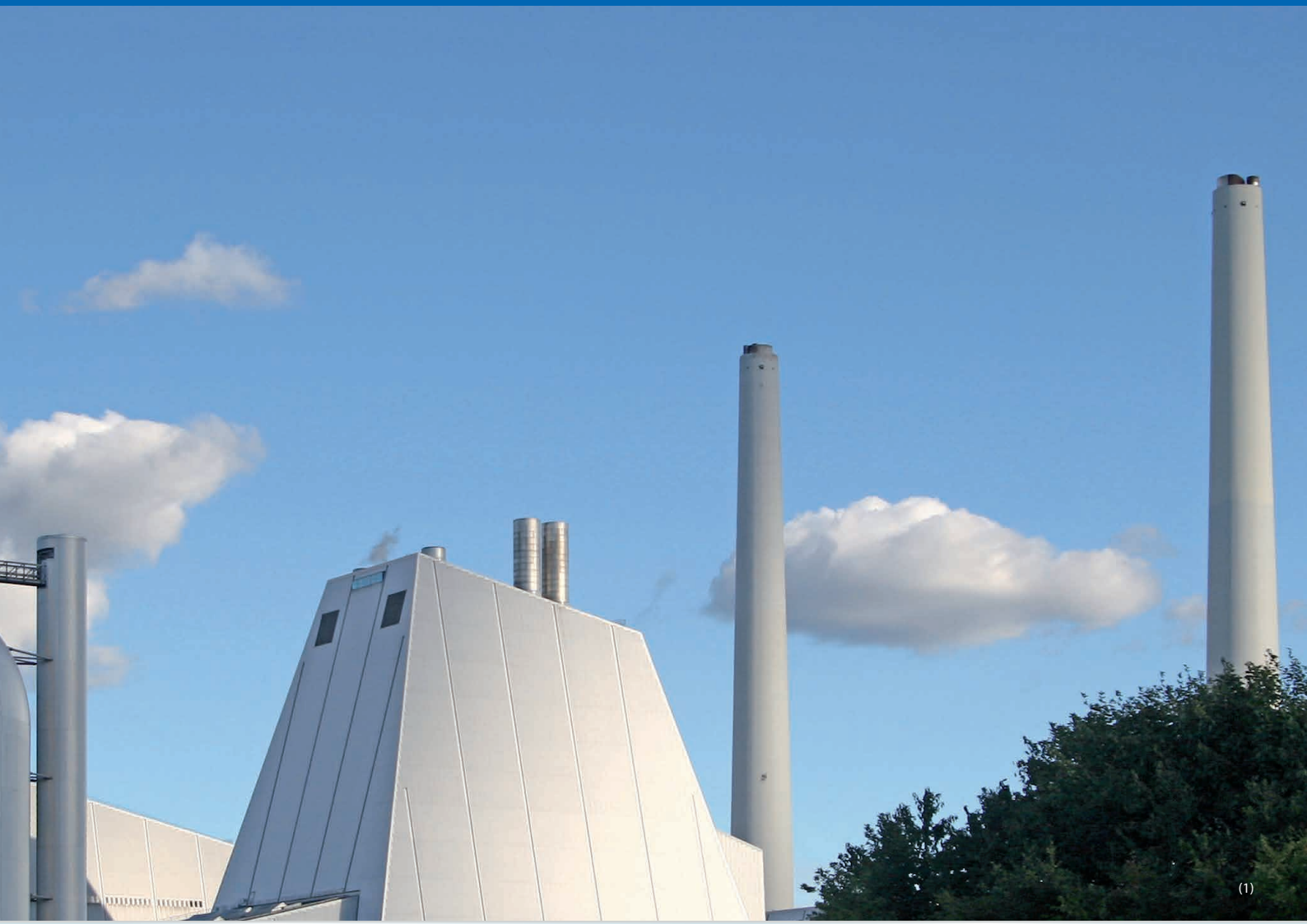
DURAG GROUP

Product Overview

Emission Monitoring
Ambient Monitoring
Environmental and Process Data Management Systems

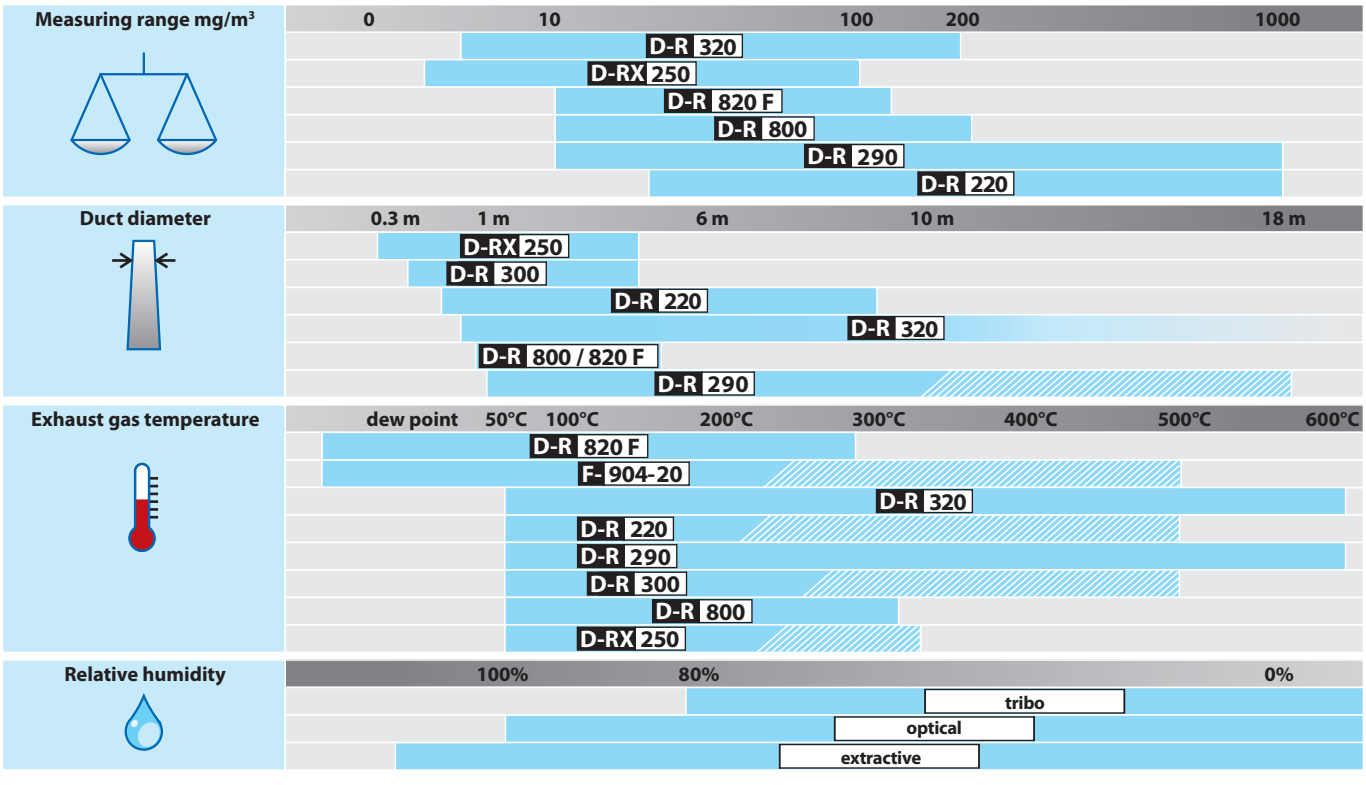


(1)

Devices for measuring emissions and immissions

Measurement	Dust/ Opacity		Dust	Soot	Dust		Dust	Dust	Total Mercury	Ambient Dust
Measuring principle	Transmission		Backward Scattering		Forward Scattering		Tribo	Beta	UV Photo-meter	Beta
DURAG Group Device	D-R 220	D-R 290	D-R 320	D-R 300	D-R 800	D-R 820 F	D-RX 250	F-904-20	HM-1400 TRX	F-701-20
TÜV		●	●	●	●	●	●	●	●	●
DIN EN 15267-3		●	●		●	●			●	
US EPA		●	●		●				●	
GOST / EAC	●	●	●	●	●	●	●	●	●	
MCERTS		●	●		●	●	●		●	
Korean		●						●		
in-situ	●	●	●	●	●	●	●			
extractive						●		●	●	●
Automatic zero and control point		●	●	●	●	●	●	●	●	●
Automatic soiling correction		●	●	●	●	●	N/A	N/A	N/A	N/A
Fail safe shutters		●	●	●			N/A	N/A	N/A	N/A
Range switching		●						●	●	●
Remote control unit	●	●	●		●		●			
Calibratable in	mg/m³ wet	mg/m³ wet	mg/m³ wet	smoke spot number	mg/m³ wet	mg/m³ wet	mg/m³ wet	mg/m³	mg/m³	mg/m³
Measuring ranges	0-0.2...1.6 Ext	0-0.1...1.6 Ext 0-20...100%	0–5...200 mg/m³	3 RZ	0-10...200 mg/m³	0-15...100 mg/m³	0-2...100 mg/m³ wet	0-1...0-1000 mg/m³	0-45...500 µg/Nm³	0-0.1...10 mg/m³
Detection limit @ stack Ø 1 m	20 mg/m³	10 mg/m³	0,07 mg/m³	0.06 RZ	0.2 mg/m³	0.2 mg/m³		0.01 mg/m³	0.5 µg/Nm³	N/A
Detection limit @ stack Ø 5 m	8 mg/m³	2 mg/m³	0,07 mg/m³	0.06 RZ	0.2 mg/m³	0.2 mg/m³		0.01 mg/m³	0.5 µg/Nm³	N/A
Sample collection/ heavy metal analysis								●		●

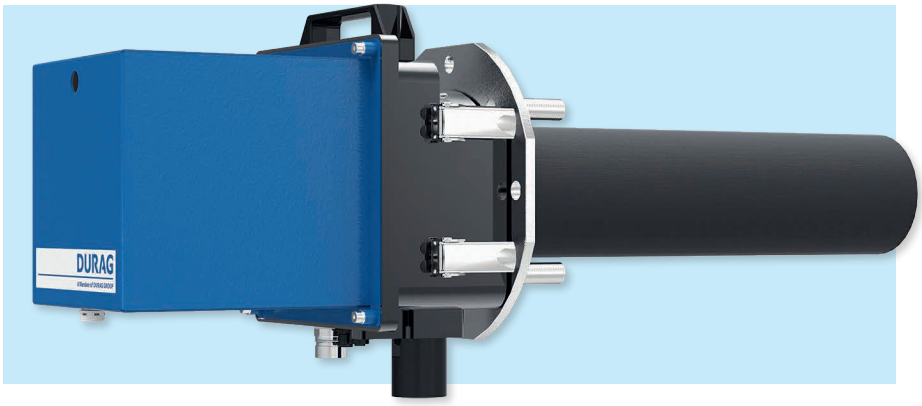
Comparison of emission dust monitors according to application criteria



Option

Dust monitor

New generation stray light dust monitor for low to medium dust concentrations



Features

- Easy installation on standard flange
- Easy start-up without adjustment
- Automatic background compensation without light absorber
- Automatic zero and reference point check
- Automatic contamination control and correction
- Integrated purge air monitoring and purge air control
- Minimum maintenance
- Remote access possible
- Digital interface according to VDI 4201-3

Applications

- Waste incineration plants
- Cement manufacturing plants
- Power plants with gas, oil, coal or co-firing
- Monitoring of ventilation systems
- Monitoring of filter systems

Approvals

- Suitability-tested by the TUV Cologne, test report 936/21217455/A
- Approved and certified acc. to EN 15267-3, certified measuring range: Dust concentration 0...7.5 mg/Nm³
- MCERTS

Measuring principle

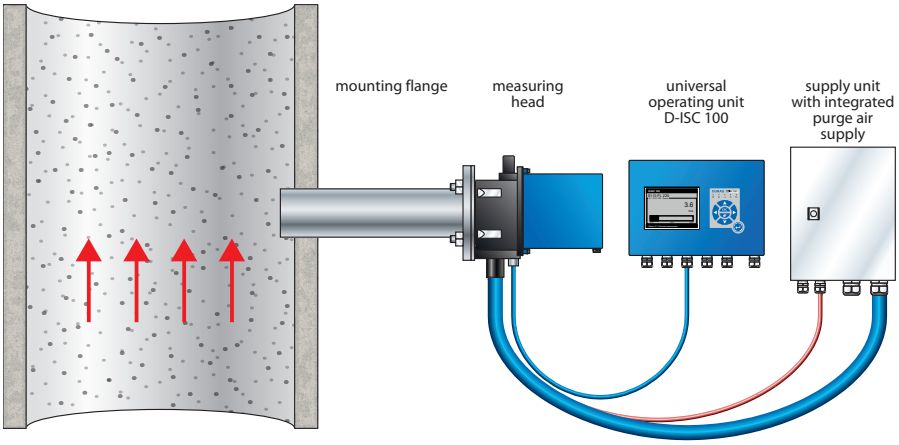
The D-R 320 is based on the back-scattered light principle. Thereby the light of a red laser diode illuminates the dust particles in the measuring volume of the flue gas duct. The light scattered backward by these particles is detected and evaluated.
A unique feature of the D-R 320 is the automatic background light compensation with means of a patented optical system with dual detectors. This allows for an easy and quick installation without any adjustment. A light trap is not required.

System components

- Measuring head
- Mounting flange
- Supply unit with integrated purge air supply
- Universal operating unit D-ISC 100

Options

- Weather protection covers
- Fully integrated failsafe shutter as protection for the measuring device in case of a purge air failure
- Service software D-ESI 100
- Filter set for linearity check
- Version for explosion proof areas



EPA Compliant PS11
Procedure 2

measurements	dust concentration	**digital outputs**	2 relay outputs, permissible load 60 VDC/ 30 VAC/ 0.5 A
measuring ranges	min: 0 ... 5 mg/m³, max: 0 ... 200 mg/m³	**power supply**	24 VDC, 0.5 A
measuring principle	backward scattering	**dimensions (h x w x d)**	200 x 190 x 260/ 410 mm
flue gas temperature	above dew point up to 600 °C	**weight**	15 kg
flue gas pressure	-50 ... +50 hPa	**supply unit**	
duct diameter	>0.7 m	**purge air supply**	integrated blower
ambient temperature	-40 ... +60 °C	**power supply**	115/ 230 VAC, 50/ 60 Hz, 0.37/ 0.43 kW
protection	IP65	**dimensions (h x w x d)**	480 x 450 x 320 mm
measuring outputs	0/ 4 ... 20 mA/ 400 Ohm, Modbus RTU bi-directional	**weight**	12 kg
		protection	IP65

DURAG GROUP smart solutions for combustion and environment

Measuring device for smoke spot number

Extremely sensitive device for measuring smoke spot number

Measuring principle

The D-R 300 operates according to the scattered light method. The modulated light from a halogen lamp illuminates the dust particles in the exhaust duct. The scattered light reflected from these particles is measured and assessed.

Specifications

- Measuring range: smoke spot number 0-3. Limit value II can be set as delayed disconnected contact
- Calibration: VDI 2066, part 8.

Features

- In-situ measurement directly in the flue gas flow
- Automatic system tests and correction of measured values
- Self-calibration in 4-h cycle
- Optics and electronics in a hermetically sealed unit - no smoke gas can enter device
- Maintenance-friendly, thanks to optimal purge air conduction in front of the heated optical end plates
- Direct access to all parameters via the operator display

Applications

- Smoke spot number measurement in furnaces designed for light fuel oil

Approvals

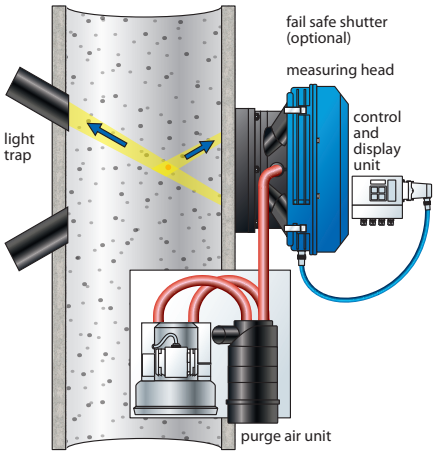
- Suitability-tested by the TÜV Cologne, test report 936/800002
- MCERTS

System components

- Measuring head
- Mounting flange
- Control and display unit
- Light traps
- Purge air unit

Options

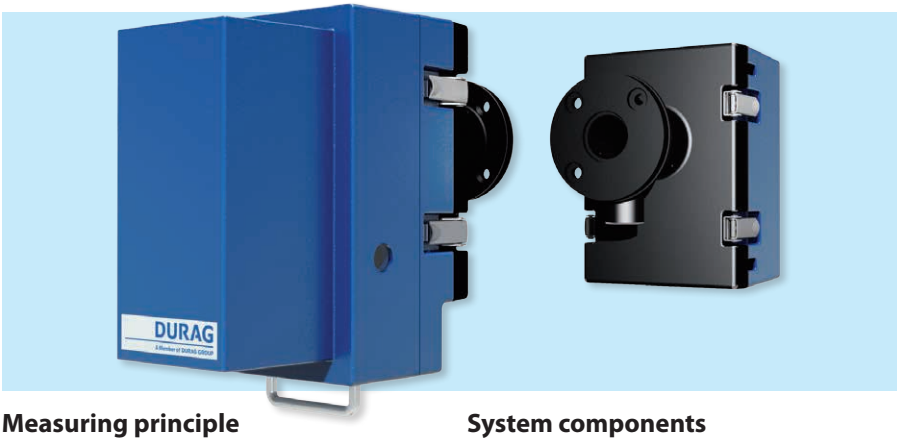
- Weather protection covers
- Fail safe shutter to protect measuring device in the event of failure of the purge air supply
- Halar flange coating
- High temperature option up to 500 °C with additional redundant blowers



measurements	smoke spot number	**detection limit**	<1% measuring range
measuring ranges	smoke spot number 1...3 (5)	**power supply**	115/ 230 VAC, 50/ 60 Hz, 50 VA
measuring principle	back scattering	**dimensions (h x w x d)**	measuring head 565 x 310 x 200 mm
flue gas temperature	above dew point up to 320 °C, optionally higher	**weight**	18 kg
flue gas pressure	-50 ... +20 hPa	**purge air supply**	
duct diameter	0.3 to 4 m	**purge air quantity**	approx. 80 m³/h
ambient temperature	-20 ... +50 °C	**power supply**	115/ 230 VAC, 50/ 60 Hz, 0.37/ 0.43 kW
protection	IP65		
measuring outputs	2x 0/ 4 ... 20 mA/ 500 Ohm, optional measuring range switching	**dimensions (h x w x d)**	350 x 550 x 500 mm
digital outputs	3 relay outputs, permissible load 48 V/ 0.5 A	**weight**	12 kg
digital inputs	1 potential free input	**protection**	IP55

Dust and opacity monitor

Standard system for plants with small to medium dust concentrations



Features

- Contactless measurement
- Extremely powerful and stable super-wide band diode (SWBD) light source
- New SMD electronics with digital Modbus RTU interface
- Automatic zero and reference point check
- Automatic contamination control and correction
- Easy adjustment without additional equipment
- Extremely low maintenance
- Remote access possible

Applications

- Furnace plants with semi-anthracite coal, brown coal, fuel oil and combined heating
- Converter plants, asphalt mixing plants
- Plants for cement manufacture

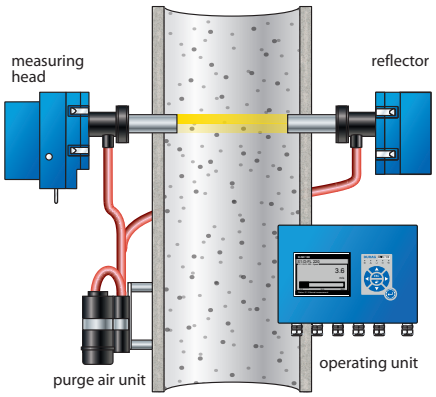
Approvals

- Suitability-tested by the TÜV Cologne, test report 936/801017
- Approved and certified acc. to EN 15267-3
- MCERTS

EPA Compliant PS1 ASTM 6216-98 Procedure 3

Measuring principle

The device operates using the double-pass method according to the auto-collimation principle. The light beam traverses the measuring distance twice. The attenuation of the light beam by the dust content in the measuring section is measured and evaluated. As light source a super-wide band diode (SWBD) is used which provides more stable measurements in comparison to conventional LEDs.



System components

- Measuring head
- Reflector
- Universal operating unit D-ISC 100
- Purge air unit
- Mounting flanges

Options

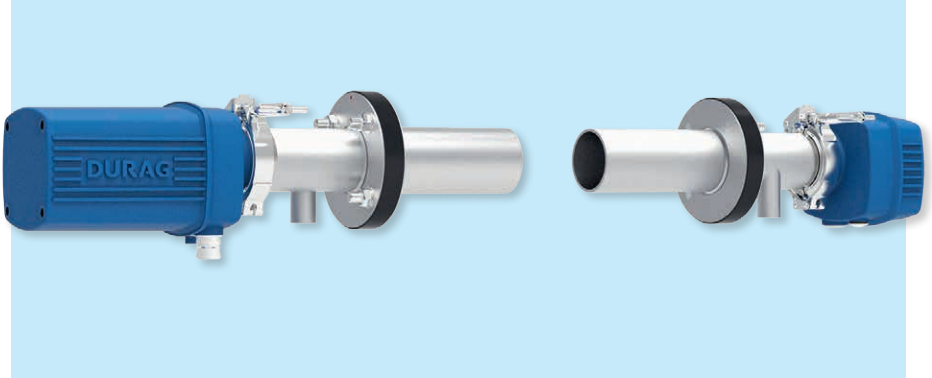
- Automatic fail-safe shutters to protect the measuring head and the reflector in the event of failure of the purge air
- Weather protection covers
- Explosion proof design for EEx p, Zone 1 or Zone 2
- Special model for measuring distances up to 18 m with 2 purge air units
- Filter set for linearity control
- Service software D-ESI 100

measurements	dust concentration, opacity	**detection limit**	0.75% @ extinction 0–0.1
measuring ranges	opacity: 0 ... 100 % extinction: 0 ... 2.0 dust: 0 ... 80 mg/m³ ... 0 ... 5000 mg/m³ [1)]	**power supply**	24 VDC, 0.5 A
measuring principle	transmission	**dimensions (h x w x d)**	measuring head 363 x 185 x 398 mm
flue gas temperature	above dew point up to 250 °C, optional up to 1000 °C, depending on application	**weight**	17 kg
flue gas pressure	-50 ... +20 hPa	**remarks**	[1)] with reference to one meter of path length after gravimetric calibration
duct diameter	1...18 m	**purge air supply**	
ambient temperature	-40 ... +60 °C	**purge air quantity**	approx. 80 m³/h
protection	IP65, Ex optional	**power supply**	115/ 230 VAC, 50/ 60 Hz, 0.37/ 0.43 kW
measuring outputs	0/ 4 ... 20 mA/ 400 Ohm, Modbus RTU bi-directional	**dimensions (h x w x d)**	350 x 550 x 500 mm
digital outputs	2 relay outputs permissible load 60 VDC/ 30 VAC/ 0.5 A	**weight**	12 kg
		protection	IP55

DURAG GROUP smart solutions for combustion and environment

Dust and opacity monitor

Ideally suited for monitoring medium to high dust concentration on smaller plants and in process applications



Features

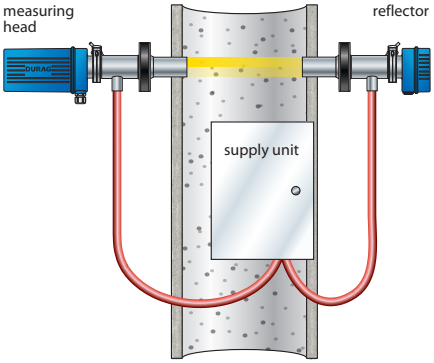
- Automatic self check
- Extremely low maintenance thanks to durable LED
- Remote access possible
- Cost-efficient and space-saving measuring system in the well-known DURAG quality

Applications

- Non-compliant device for monitoring dust concentration in processes or smaller plants
- Incineration plants, heating stations, power stations
- Boiler plants in industry, barracks, hospitals, schools
- Dedusting and filter plants
- Process monitoring

Measuring principle

The device operates using the double-pass method according to the auto-collimation principle. The light beam traverses the measuring distance twice. The attenuation of the light beam by the dust content in the measuring section is measured and evaluated. A durable LED serves as light source.



System components

- Measuring head
- Reflector
- Mounting flanges
- Supply unit with purge air unit

Options

- Filter set for linearity control
- Sighting scope
- Universal operating unit D-ISC 100
- Service software D-ESI 100
- Zero point reflector

measurements	opacity, extinction	**detection limit**	<2% of measuring range
measuring ranges	0...100% OP 0...1.6 Ext 0 ... 10000 mg/m³ dust[1)]	**power supply**	24 VDC, 0.4 A from supply unit
measuring principle	transmission	**dimensions (h x w x d)**	measuring head 160 x 150 x 314 mm
flue gas temperature	above dew point up to 200 °C, optional up to 500 °C	**weight**	measuring head 2.7 kg reflector 1.6 kg
flue gas pressure	-50 ... +10 hPa, optional higher		
duct diameter	0.4 ... 10 m	**supply box**	
ambient temperature	-20 ... +50 °C	**purge air supply**	integrated
protection	IP65	**power supply**	85 ... 264 VAC, 46 ... 63 Hz, 50 VA
measuring output	0/ 4 ... 20 mA/ 400 Ohm, Modbus RTU bi-directional	**dimensions (h x w x d)**	210 x 300 x 380 mm
digital outputs	2 relay outputs 30 VA, max. 48 V/ 0.5A	**weight**	13 kg
		protection	IP54
remarks	[1)] with reference to one meter of path length after gravimetric calibration		

Dust monitor

Scattered light dust monitor to measure small to medium dust emissions

Features

- Easy installation on one side of the duct
- Easy installation, no alignment needed
- Long lifetime as there are no moving parts inside the duct
- Probe with corrosion resistant nano-tech coating
- Automatic zero and reference point check
- Automatic contamination control and correction

Applications

- Power stations
- Cement plants, the metallurgy and wood industries, chemical industry etc.
- Waste incineration plants
- Monitoring of dust filter plants

Approvals

- Suitability-tested by the TÜV Cologne, test report 936/21205307/A
- MCERTS
- Approved and certified acc. to EN 15267-3

Measuring principle

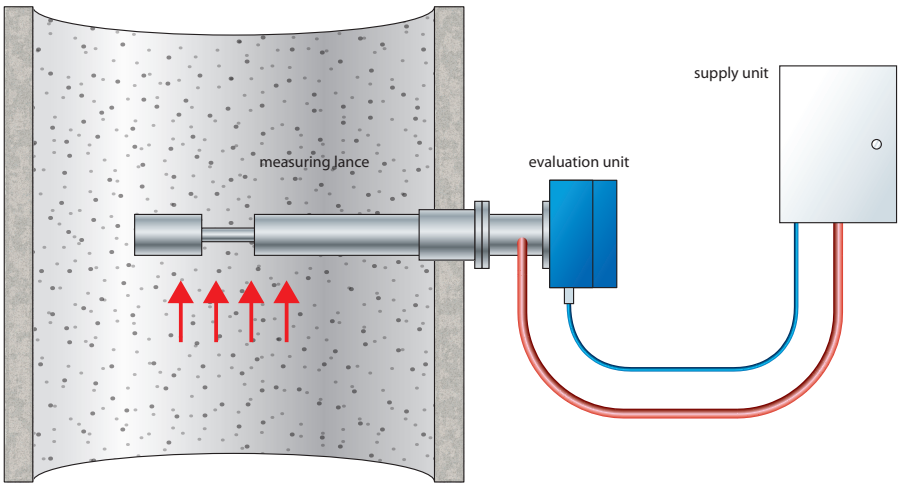
The D-R 800 works according to the principle of forward scattering. The concentrated and modulated light of a laser diode penetrates the measuring volume. The forward-scattered light largely reflected from dust particles is measured and assessed.

System components

- Measuring lance
- Supply unit with integrated purge air supply
- Mounting flange

Options

- Weather protection cover
- Hastelloy probe



measurements	dust concentration	**digital inputs**	2 potential free inputs, programmable
measuring ranges	0 ... 10 mg/m³ ... 0 ... 200 mg/m³ [1)]		
measuring principle	forward scattering	**detection limit**	<0.5% measuring range
flue gas temperature	above dew point up to 350 °C	**power supply**	85 ... 264 VAC, 47 ... 63 Hz, 50 VA
flue gas pressure	-50 ... +10 hPa	**dimensions (h x w x d)**	measuring lance: 160 x 160 x 600/ 1000 mm supply unit: 380 x 300 x 210 mm
duct diameter	0.4 ... 8 m		
probe length (from flange)	400/ 800 mm		
ambient temperature	-20 ... +50 °C	**weight**	measuring lance: 7 kg supply unit: 13 kg
protection	IP65		
measuring outputs	2x 0/ 4 ... 20 mA/ 500 Ohm, Modbus RTU (RS485)	**purge air supply**	integrated into supply unit
digital outputs	4 relay outputs, programmable, permissible load 48 V/ 0.5 A	**remarks**	[1)] after gravimetric calibration

EPA Compliant PS11 Procedure 2

EAC

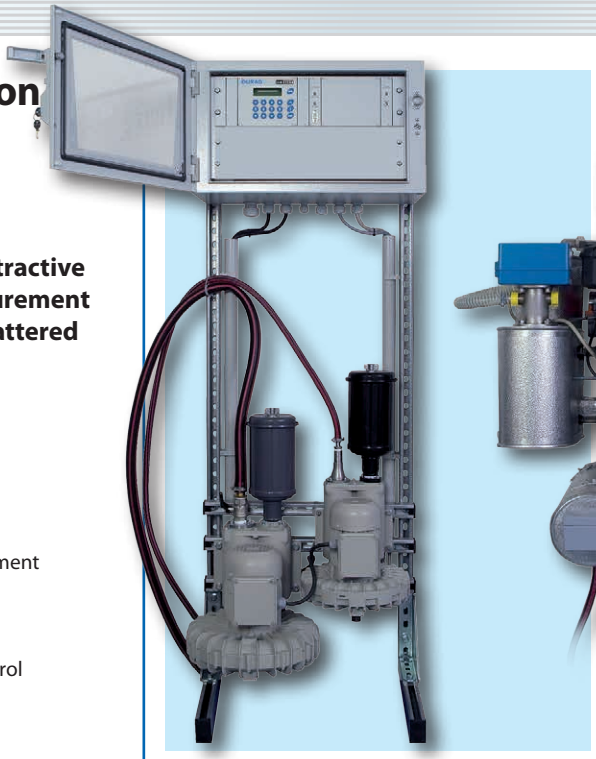
MCERTS

CE

TÜVRheinland CERTIFIED

DURAG GROUP smart solutions for combustion and environment

Dust concentration monitor for wet gases



System for continuous extractive dust concentration measurement in accordance with the scattered light principle

Features

- Compact design
- Very low maintenance requirement
- High sensitivity
- Automatic zero and reference point check
- Automatic contamination control and correction

Applications

The D-R 820 F is used for measuring dust concentration in wet gases.
Potential applications e.g.:

- Measurements in saturated gas downstream of desulfurization plants
- Downstream of wet cleaning plants
- Waste incineration plants
- Technological processes

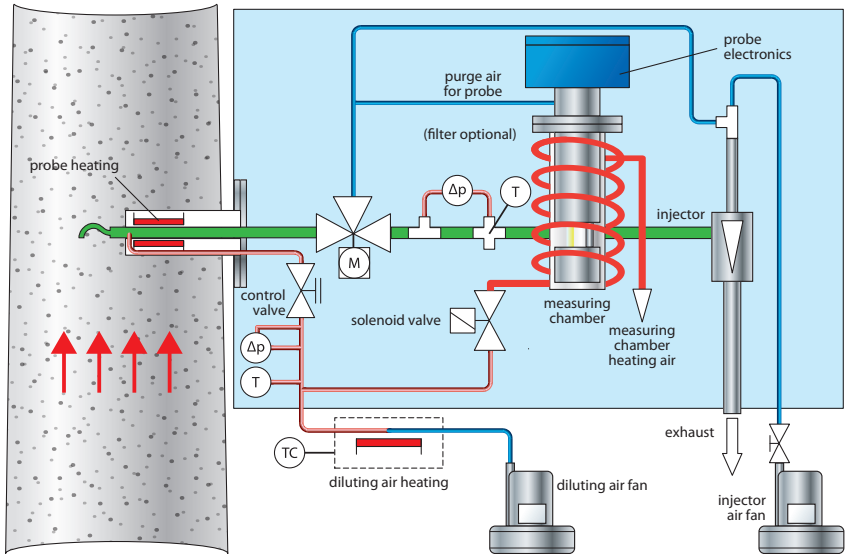
Approvals

- Approved and certified acc. to EN 15267-3
- Suitability-tested by the TÜV Cologne, test report 936/21210225/A
- MCERTS

Measuring principle

A defined partial current is withdrawn from the exhaust gas current. This partial current is continuously heated and diluted with clean, heated air directly in the sampling probe. This immediately lowers the relative moisture and aerosols get evaporated in the heated probe. The partial current is optically measured in the measuring chamber. The signal is corrected by the measured dilution ratio and is thus a measure of the dust content of the exhaust gas.
The system comprises a special sampling probe, the laser dust monitor, a gas conditioning unit (dilution, tempering), an injector, two fans and an electronic evaluation unit.
The sampling probe and the measuring chamber form an assembly. The electronic evaluation unit and one blower for operating the injector and one for generating the diluting air are mounted together on a rack frame.

System components

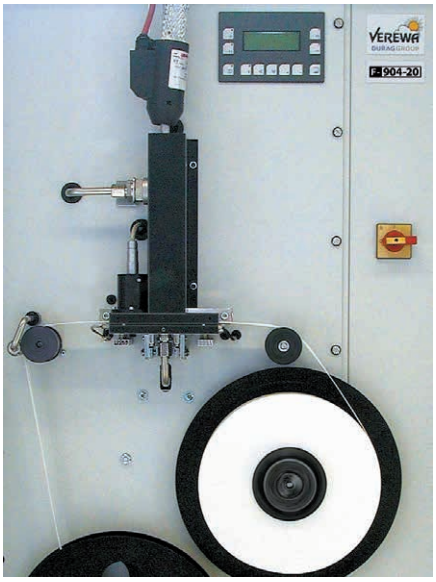


Measuring range		Rack frame with control unit	
dust in operation	0 ... 15 (max. 100) mg/m³ higher on request	dimensions (w x h x d)	600 x 1750 x 550 mm
exhaust gas moisture limit value	>100 % relative humidity, max. 30g/m³ H_2O as aerosol	space requirements (w x h x d)	1100 x 1750 x 1100 mm
Probe unit		weight	approx. 90 kg
dimensions including probe (w x h x d) length	600 x 1050 x 1500 mm 1000 mm	protection class	IP55
weight	approx. 40 kg	ambient temperature	-20 ... 50 °C
probe material	stainless steel, Hastelloy as option	power supply	230/ 400 V, 50 Hz, 3x 16 A, 3 L, N, PE others optional
protection class	IP65	Connections on control unit	
ambient temperature	-20 ... 50 °C	current outputs	4x 4 ... 20 mA/ 1 kOhm
measuring gas temperature	max. 280 °C		
measuring air flow rate	8 ... 10 m³/h	digital contacts	6x max. 35 V, 0.4 A
flange	DN 80 PN 6 special version tube Ø100 mm	digital input	optional via switching contact to externally change between measuring/ purging

DURAG GROUP smart solutions for combustion and environment

Extractive dust concentration monitor

Dust monitor especially for wet flue gases and for the monitoring of blast furnace gas



Features

- Automatic zero correction
- Pre-calibrated, unaffected by particle size, colour or moisture
- Isokinetic sampling
- Measurement of very low dust concentrations

Applications

- Emission dust measurement after wet scrubbers or in very wet exhaust gases
- Coal and oil-fired power stations
- Waste incineration plants (municipal waste, industrial waste and hazardous waste)
- Sewage sludge incineration plants
- Heavy metal analysis
- Emission dust measurement in inaccessible flues with small diameter
- Dust concentration measurements in process applications

Approvals

- Suitability-tested by the RW TÜV, test reports 3.5.2/209/88-338529 and 252/740/94577412

Measuring principle

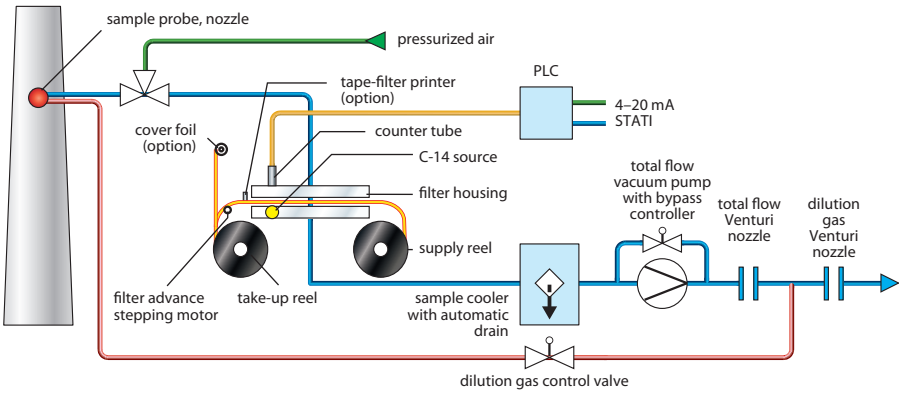
Exhaust gas laden with particles is extracted from the duct and diluted. The sampling gas passes a filter. A ^{14}C source irradiates the particle laden filter spot. The absorption by the dust is measured and compared with the empty filter spot.

System components

- Measuring device with PLC control in protective cabinet
- Heated sample probe with titanium sample nozzle
- Heated sampling line
- Filter tape in gas-proof filter holder

Options

- Heated dilution line for high dust concentrations or after wet scrubbers
- Dust sampling option for heavy metal analysis
- Special design **F-904-20/BFG** for measurement of the dust concentration in toxic and explosive blast-furnace or converter gas with shut-off valves for the sample gas during filter transport and with purge gas (usually nitrogen) for line back purging



measurements	dust concentration	**digital outputs**	11 relay outputs, permissible load 24 V/ 25 VA
measuring ranges	0 ... 500 mg/Nm³	**digital inputs**	2 potential free inputs
measuring principle	beta ray absorption	**detection limit**	<0.1 mg/Nm³
flue gas temperature	0 ... 250 °C, optional up to 500 °C	**power supply**	115/ 230 VAC, 50/ 60 Hz
flue gas pressure	-100 ... +100 hPa		
duct diameter	>0.5 m	**dimensions (h x w x d)**	1600 x 800 x 800 mm
ambient temperature	0 ... +40 °C		
protection	IP43 (with filter blower)	**weight**	250 kg
measuring outputs	2x 0/ 4..20 mA/ 500 Ohm	**purge air supply**	pressurized air 6 ... 8 bar

TÜV

CE

DURAG GROUP smart solutions for combustion and environment

Filter monitor

Filter monitor for efficiency monitoring after filter plants and for continuous dust measuring in dry emissions

Features

- Compact and rugged design
- Good price/performance ratio
- Ideal for monitoring bag filters
- Minimal maintenance required
- Early detection of filter malfunctions
- Savings in cost, as no preventative filter exchange is necessary

Applications

- Power stations
- Bag filter plants of all types
- Dust extraction plants in the production industry
- Waste incineration plants
- Crematoriums
- ✖ Not suitable for use directly behind electrostatic precipitators

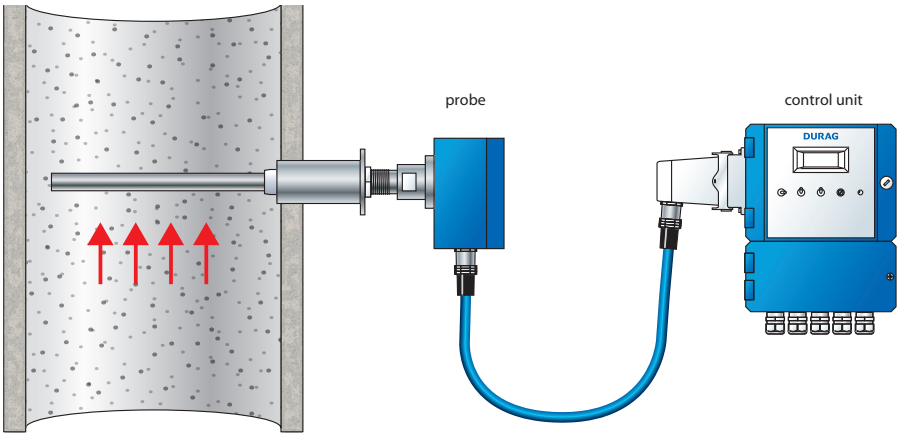
Approvals

- Suitability-tested by the TÜV Hamburg, test report 98CU026

Measuring principle

The filter monitor uses the triboelectric effect to determine dust loads in flowing gases. The electrical charge which the dust particles experience due to friction is picked up by a probe protruding into the dust channel and converted into a measuring signal by electronics. The measuring signal is proportional to the dust concentration and is calibratable at a constant gas speed.

System components



Options

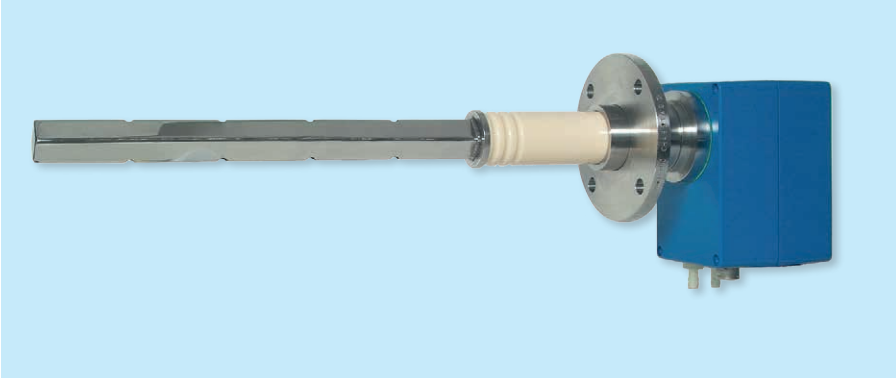
- Measuring gas temperature up to 500 °C
- Ex version **D-FW 240/Ex**
- Weather protection cover
- Various mounting options (flange, connection piece)
- Probe rod lengths 80, 250, 700, 1000 mm
- control unit with digital display

measurements	dust mass flow	**digital outputs***	1 relay output, permissible load 250 V/ 100 VA
measuring ranges	0 ... 100% (flue gas velocity >5 m/s)	**digital inputs***	2 potential free inputs
measuring principle	tribo electric	**detection limit**	<2% of measuring range/month
flue gas temperature	above dew point up to 200 °C, optional up to 500 °C, flue gas humidity <80%	**power supply**	24 VDC, 5 VA 115/ 230 VAC, 50/ 60 Hz, 10 VA*
flue gas pressure	-500 ... +500 hPa	**dimensions (h x w x d) probe length**	probe: 180 x 80 x (270 + probe length) mm 80, 250, 400, 700 mm
duct diameter	0.3...4 m		
ambient temperature	-20 ... +50 °C		
protection	IP65	**weight**	probe: max. 4.5 kg control unit: 3 kg
measuring outputs	0/ 4 ... 20 mA/ 500 Ohm	**remarks**	* with operating unit only

DURAG GROUP smart solutions for combustion and environment

Combined probe sensor

Single rod measurement probe for simultaneous measurement of
- Dust concentration [mg/Nm³]
- Volume flow [Nm³/h]
- Temperature [°C]
- Absolute pressure [hPa]



Features

- Only one probe/ installation opening in the exhaust gas channel
- Compact design
- No moving parts
- Automatic zero and reference point check

Applications

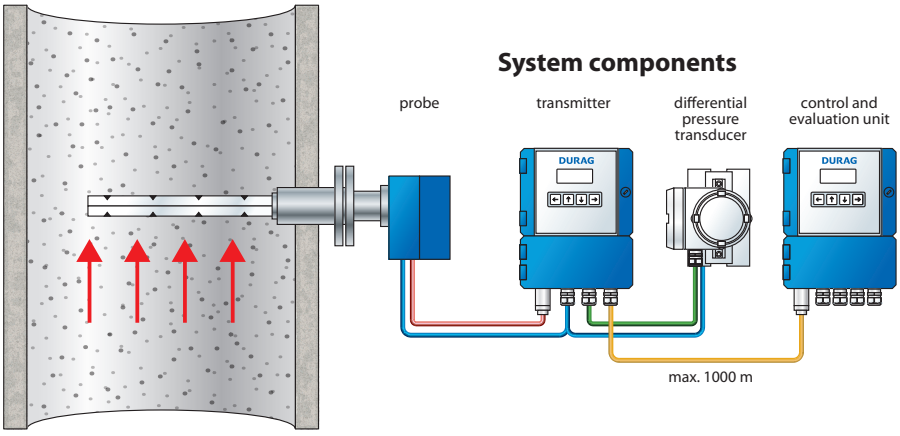
- For measurements in accordance with TI Air (Technical Instructions for Maintaining Air Purity), 13., 17. and 27. BImSchV
- ✖ Not suitable for use behind electrostatic precipitators. Please consult us

Approvals

- Suitability-tested by the TÜV Cologne, test report 936/800006/A
- MCERTS

Measuring principle

- The **dust concentration** is determined according to the triboelectric measuring principle. The tribo probe measures the electric charge of the impinging particles.
- The measurement of the **volume flow** is based on the mechanical action principle. The probe has two separate chambers, between which a differential pressure builds up under flow.
- The **absolute pressure** in the flue gas is measured by a pressure transmitter in one chamber of the probe
- The **temperature** is measured directly in the centre of the flue gas flow in a separate chamber within the probe with a temperature sensor.



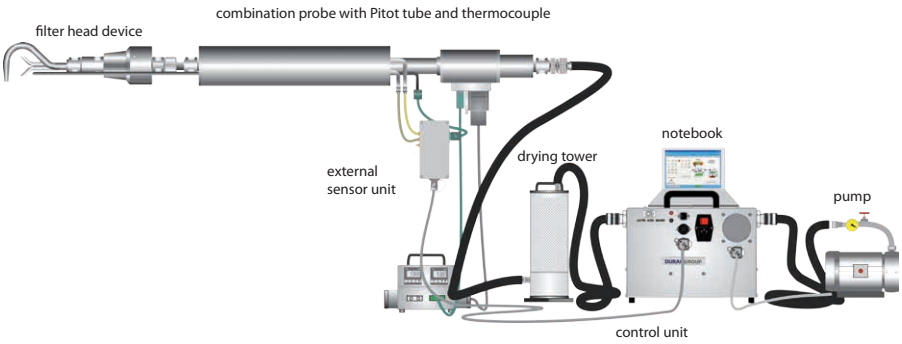
Options

- Weather protection cover
- Switch-over cock for back purging/ zero point control
- Automatic cyclic probe back purging for high dust concentrations
- Hastelloy probes for corrosive gases
- Purge air connection at flange

measurements	dust concentration, volume flow, absolute pressure, temperature	**digital inputs**	6 potential free inputs
measuring ranges	0 ... 10 ... 0 ... 500 mg/Nm³ 0 ... 9,999,999 Nm³/h [1] 0 ... 200 °C, optional 0 ... 350 °C 800 ... 1,300 hPa	**detection limit**	<2% of measuring range
measuring principle	dust: tribo electric volume flow: differential pressure	**power supply**	115/ 230 VAC, 50/ 60 Hz, 50 VA
flue gas temperature	above dew point up to 200 °C, optional up to 350 °C, flue gas humidity <80%	**dimensions (h x w x d)** **probe length**	probes: 180 x 180 x (340 + probe length) mm 250, 400, 700, 1000 mm
flue gas pressure	-200 ... 200 hPa	**weight**	probe 9.5 kg electronics 22 kg
duct diameter	0.3 ... 5 m		
ambient temperature	-20 ... +50 °C	**probe back purging (option)**	purge air supply 3 bar
protection	IP65	**insulator purging (option)**	continuous purge air supply approx. 2 m³/h
measuring outputs	4x 0/ 4 ... 20 mA/ 500 Ohm, Modbus RTU (RS485)	**remarks**	[1] flue gas velocity >5 m/s concentration after gravimetric calibration
digital outputs	7 relay outputs, permissible load 48 V/ 0.5 A		

DURAG GROUP smart solutions for combustion and environment

Automatic sampling device for gravimetric dust measurements



Features

- Portable system
- Easy handling
- Automatic isokinetic control
- Suitable for in- and out-stack sampling
- Highest measuring accuracy
- Available in stainless steel and titanium
- Compliant to EN 13284-1, VDI 2066, EN ISO 9096 and US-EPA Method 5

Applications

- Calibration of dust monitors
- Control measurements
- Measurement at filter plants

Measuring principle

The D-RC 120 extracts isokinetically a partial gas stream from the measuring gas duct whereas the extraction is controlled fully automatically. The device can be conveniently operated via Windows software. The partial gas stream is sucked through a filter in which the contained dust is deposited.

The dust concentration is determined by weighing the filter before and after the extraction.

In parallel to the gas sampling, the measurements of the dust monitor under test can be recorded and averaged.

System components

- D-RC 120 MD consisting of control unit, pump, drying tower, external sensor unit, software and accessories
- D-RC 120 FD filter head device suitable for plane or tubular filters
- D-RC 120 P combination probe, heatable incl. gooseneck with nozzles

Option

- Filter head device heater for out-stack sampling
- Humidity sensor to determine the residual humidity in the flue gas

measuring principle	gravimetric analysis	**Control unit**	
measurements	dust concentration	**power supply**	230 VAC, 50/ 60 Hz, optional 115 VAC, 50/ 60 Hz
sampling	In-stack, out-stack		
measuring range	dust concentration: 0.1 ... 2000 mg/m³ differential pressure: 0.01 ... 10 hPa absolute pressure: 400 ... 1300 hPa temperature: 0 ... 500 °C Sample volumetric flow rate: 0.5 ... 4m³/h	**ambient temperature**	-10 ... 60 °C
		protection	IP33
Sample Gas		**electrical interfaces**	1x 12 V output for audible signal 1x 4 ... 20 mA input, e.g. for dust monitor 1x RS 485 with USB converter
temperature	0 ... 500 °C		
velocity	2 ... 39 m/s		
pressure	-200 ... +20 hPa		
relative humidity	0 ... 95 % relative humidity, optional measurement in saturated gas below the dew point	**operation**	operating software, requires netbook/ notebook (not scope of delivery) with Microsoft Windows® operating system
Probe			
length	1000 ... 3000 mm, others on request		
diameter	70 mm, quick release mounting for 3“ port	**dimensions (h x w x d)**	approx. 350 x 280 x 250 mm
weight	1.5 kg + 5.4 kg/m	**weight**	approx. 8.5 kg
probe material	stainless steel, optional titanium		

Total mercury analyser

Measuring device for fully-automatic and continuous mercury analysis in smoke gas

Measuring principle

In the HM-1400 TRX total mercury analyser the sample gas is converted into mercury vapour by a combination of thermal and dry chemical treatment. This is then continuously measured in a photometer. The probe gas flow is measured after a gas cooler at 2 °C. The concentration is calculated and displayed as „dry flue gas".

System components

- Sampling probe
- Sampling line
- Measuring device

Options

- Automatic calibration module
- Heated sample pipe 0.6 m, 1.0 m, 1.5 m; 600 VA, 800 VA, 1200 VA

Features

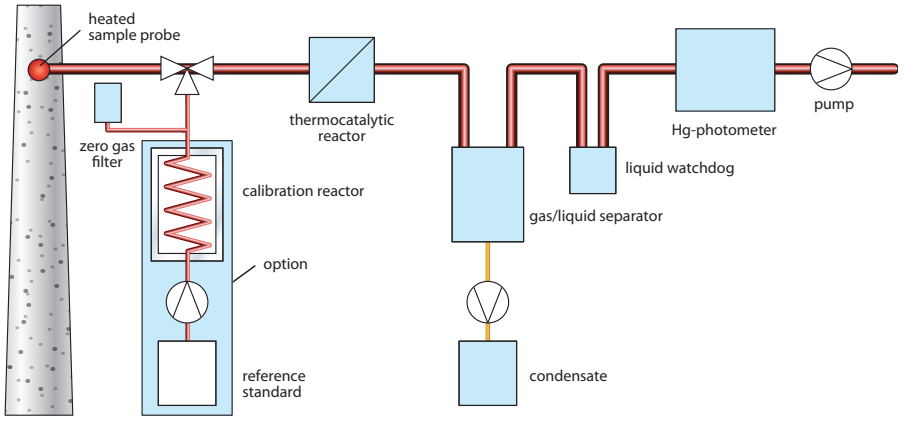
- High operational safety
- Easy maintenance
- Low cross sensitivities
- Remote access possible
- Speciation module for separate measurement of elemental and ionic Hg as option
- Automatic calibration module as option

Applications

- Waste incinerations (municipal waste, industrial waste, hospital waste)
- Sewage sludge incineration
- Hazardous waste incineration
- Steel plants with scrap metal preparation
- Contaminated soil burning plants
- Crematoriums
- Mercury mines and refineries
- Fluorescent light bulb recycling plants

Approvals

- Suitability-tested by the TÜV Hamburg, test report GMT007/8000632287 from 30.06.11
- Approved and certified acc. to EN 15267-3
- MCERTS



measurements	total mercury	**digital outputs**	4 relay outputs permissible load 250 V, 100 VA
measuring ranges	0 ... 45, 0 ... 75 up to 0 ... 500 µg/Nm³	**digital inputs**	1 potential free outputs
measuring principle	UV-absorption	**detection limit**	<0.1 µg/Nm³
flue gas temperature	0 ... 250 °C	**power supply**	230/ 400 VAC, 50 Hz, 3x L, N, PE instrument: 1200 VA sample probe: 650 VA sample line: 100 VA/m heated sample pipe: 600 VA, 800 VA, 1200 VA
flue gas pressure	-50 ... +50 hPa		
duct diameter	>0.5 m		
ambient temperature	+5 ... +30 °C	**dimensions (h x w x d)**	cabinet 1700 x 800 x 500 mm
protection	IP40 (IP54)	**weight**	220 kg
measuring outputs	2x 0/ 4 ... 20 mA/ 500 Ohm	**purge air supply**	pressurized air 6–8 bar (for reference gas generator only)

EPA Compliant PS12a

EAC

MCERTS

CE

TÜVRheinland CERTIFIED

DURAG GROUP smart solutions for combustion and environment

Ambient air dust concentration monitor

A measuring device for the continuous monitoring of the smallest concentration of particles in the ambient air (fine dust)

Features

- EN15267 certified PM2.5 or PM10 measurement
- Cost efficient due to low filter tape consumption
- Extended serial interface Bayern-Hessen protocol
- Pre-calibrated measuring device allows accurate results without on-site calibration
- Easy integration into existing air quality monitoring networks
- Collected particles available for compositional analysis
- Cost savings through low maintenance requirements and remote access

Applications

- Ambient air measuring systems for monitoring fine dust
- Mobile air pollution monitoring
- Indoor dust measurement
- Measurement and collection of dust particles for compositional analysis
- Long-term background studies of ambient dust concentration
- Dust measurement and collection at inherited waste sites and repositories
- Dust measurement in supply air- and exhaust ducts

Approvals

- TÜV Rheinland suitability tested. Complying with 2008/50/EC, EN15267 regular surveillance, ID 0000040337 (PM2.5) and ID 0000043528 (PM10)

Measuring principle

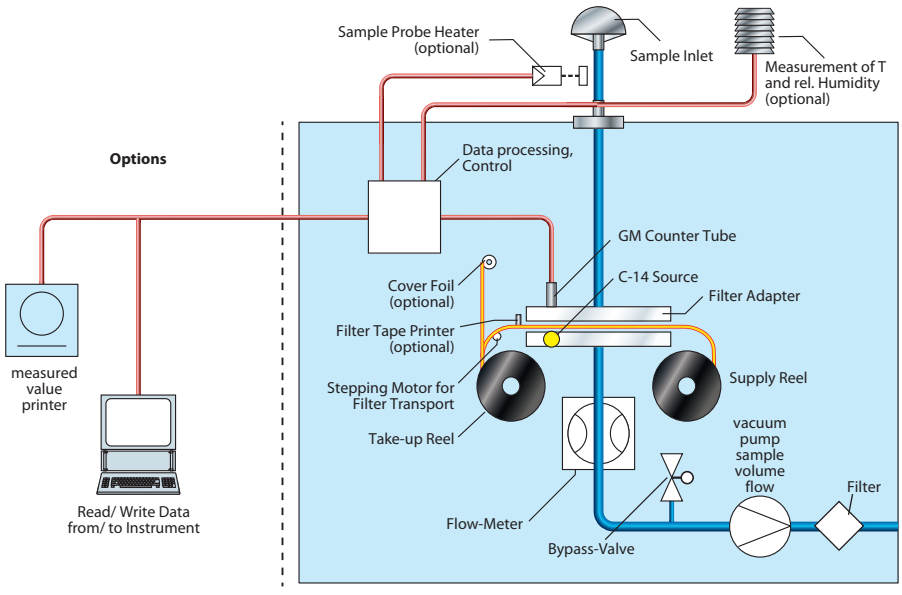
The measuring principle of the F-701-20 ambient dust monitor is based on the absorption of the beta rays (electrons) emitted by a radioactive emitter through particles collected from an ambient air flow. In the F-701-20 the count rate of the unloaded filter tape is measured before each collecting cycle, then dust is collected on this precise filter spot over a pre-defined period, and finally the count rate of the loaded filter tape is measured. The difference between the two count rates is evaluated in the device and displayed as dust concentration in µg/m³.

Sampling heads

PM 2.5, choice of
- EN14907:2005
- EN12341:2014
- US EPA 40CFR p.50

PM 10, choice of
- EN12341:1999
- EN12341:2014
- US EPA 40CFR p.50

Total dust
- VDI 2463



measurements	dust concentration in ambient air PM2.5, PM10, TSP	**digital interface**	RS 232
measuring ranges	0 ... 10000 µg/m³	**detection limit**	<1 µg/m³
measuring principle	beta-ray absorption	**zero point drift**	none (relative measurement procedure)
ambient temperature	device: 0 ... +40 °C sample inlet: -20 ... 50 °C	**power supply**	230 V, 50/ 60 Hz, 2,9 A 115 V, 50/ 60 Hz, 5,8 A
filter tape	glass fiber, up to 1.5 years per roll	**dimensions (h x w x d)**	320 x 450 x 500 mm, 19"-rack mount or desk unit
measuring outputs	2x 0/ 4 ... 20 mA/ 500 ... Ohm, Gesytech (via RS232)	**weight**	31 kg
digital outputs	8 relay outputs, permissible load 24 V, 12 VA	**probe tube length**	standard 2 m 0.5 ... 3 m possible
digital inputs	3 potential free inputs	**data storage**	integrated, up to 9 months

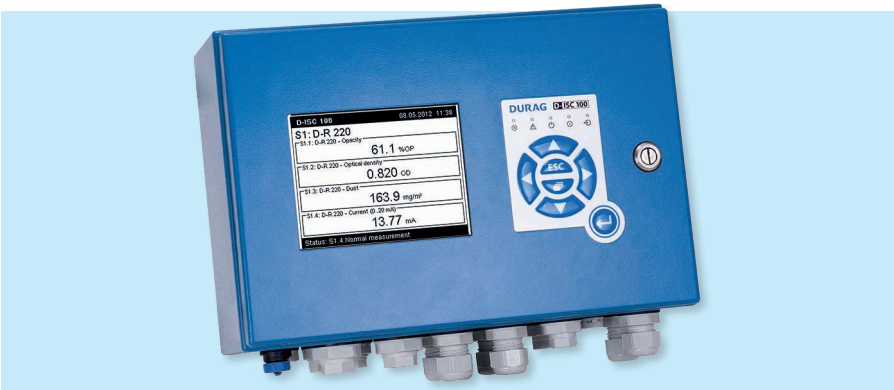
TÜVRheinland CERTIFIED

CE

DURAG GROUP smart solutions for combustion and environment

D-ISC 100

Universal operating and display unit in stainless steel field housing for the new generation sensors from DURAG, e.g. D-FL 100, D-FL 220, D-R 220, D-R 290 or D-R 320



Features

- Easy set-up and automatic detection of up to eight connected sensors
- Uniform operation of various sensors
- Large LC Display for measured value display
- Comfortable operation and handling via keypad
- USB interface for local device operation
- Remote support via intranet/ internet
- Modular design, expansion slots and slot for external converter available
- Easy update via SD memory card
- Power supply 24 VDC/2A for one directly connected sensor

Application

The universal operating and display unit D-ISC 100 allows the connection of up to eight measuring devices as for instance dust and volume flow monitors.
It offers access via the built-in panel, a connected PC or remote access via the intranet/internet and easy parameterisation of the connected DURAG devices.
The display allows direct view of the current measuring values.

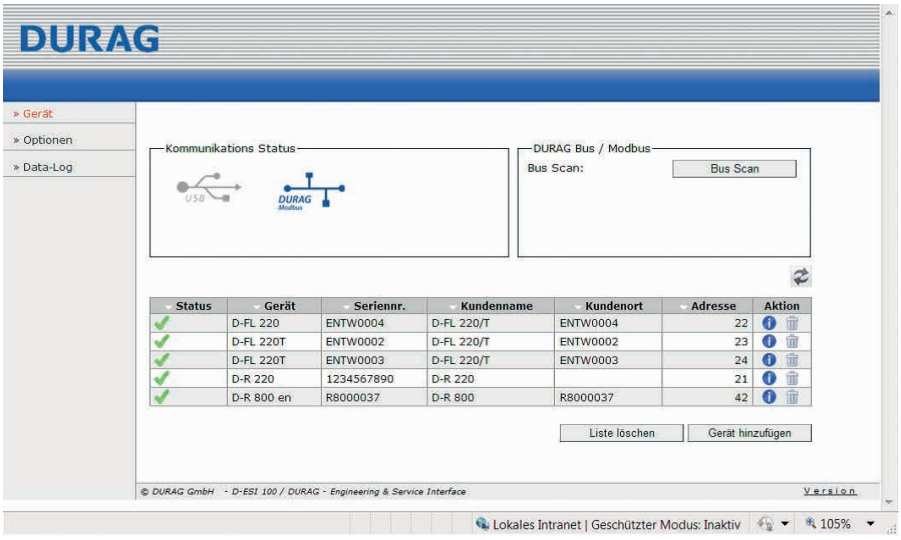
Options

- 4 slots for expansion modules:
  - Modbus RTU interface acc. to VDI4201-3
  - 4 analogue outputs 0/ 4-20mA/ 500 Ohm
  - 4 analogue inputs 0-20mA/ 100 Ohm
  - 4 digital inputs
  - 4 relay outputs 48 V/ 0.5A
- Interface converters, e.g. for
  - Profibus DP
- Software modules, e.g. Modbus TCP acc. to VDI 4201-3

analogue output	0/ 4 ... 20 mA/ 500 Ohm	**housing**	Stainless steel 304, RAL 5017
digital outputs	3 relay outputs 48 V/ 0.5 A	**dimensions (h x w x d)**	112 x 330 x 220 mm
digital input	1 digital input, operation via potential-free contact	**weight**	5 kg
ambient temperature	-20 up to +50 °C, -40 up to +60 °C optional	**protection rating**	IP65
service-Interface	USB, TCP/IP	**power supply**	90 ... 264 VAC, 48 ... 62 Hz

D-ESI 100

Service- and Parameterisation Software



Features

- Easy set-up and automatic detection of the connected sensors
- Uniform parameterisation of various sensors
- Remote support via Intranet/ Internet
- Communication via USB, DURAG-Modbus or Modbus TCP

Application

D-ESI 100 is a graphical interface for operation, parameterisation and management of the connected sensors.
It offers access to the parameters of the connected sensors via USB interface, the Modbus RTU interface or via Modbus TCP.

Requirements

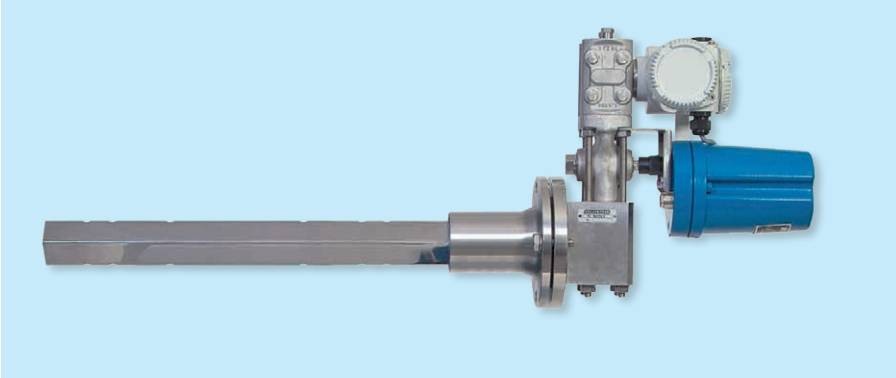
- PC with Microsoft Windows® operating system 7 or 8
- USB interface
- Serial interface RS485
- Ethernet interface

EAC CE mCERTS TÜVRheinland CERTIFIED

DURAG GROUP smart solutions for combustion and environment

Volume flow measuring system

Measuring system to measure flow rate in dry emissions with a probe using the differential pressure principle



Features

- Reliable measurement of the gas velocity even at high temperatures
- Calculation of volume flow at standard conditions
- Automatic zero check option
- Certified, cost effective measuring system
- Versions with or without counter-support and for point measurement
- Extremely low maintenance, maintenance interval 6 months
- Convenient operation via remote access with web interface

Applications

- Volume flow measurement at high temperatures
- Plants with large or small flue cross-sections
- Volume flow measurement at high pressure

Approvals

- Suitability-tested by the TÜV Cologne, test report 936/21218492/A
- Approved and certified acc. to EN 15267-3
- MCERTS

Measuring principle

The D-FL 100 measuring system operates according to the differential pressure principle. The probe has two separate chambers between which the flow builds up a differential pressure. The evaluation unit determines the gas velocity and the volume flow (norm conditions or standard conditions) from the differential pressure, taking into account gas temperature and gas pressure.

System components

- Flow probe
- Mounting flange
- Differential pressure transducer
- Cross-over cock
- Probe adapter
- Evaluation unit D-FL100-20
- Absolute pressure transducer
- Temperature transducer
- Counter-support (option)

Models

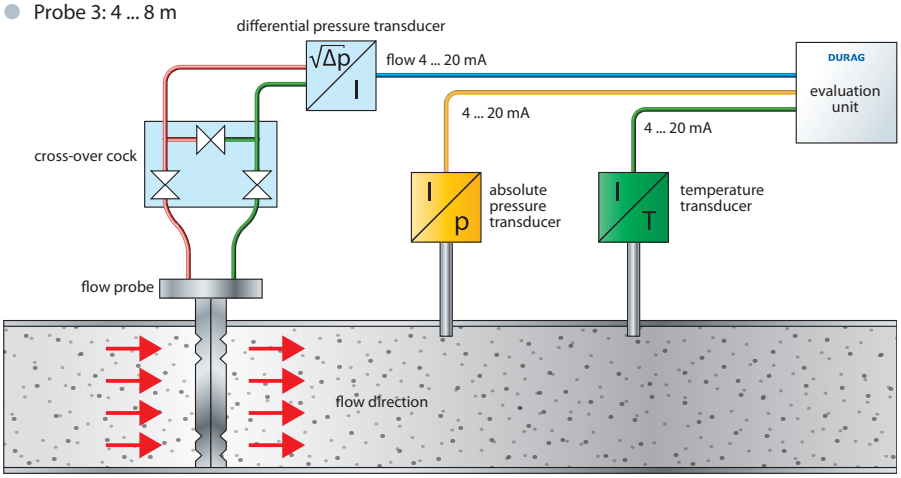
- **D-FL 100 probe assembly** with assembly of measuring transducer on the probe
- **D-FL 100 hose assembly** with the measuring transducer connection via hose line

Options

- Universal operating unit D-ISC 100
- Service software D-ESI 100
- Weather protection covers
- Automatic back purging device
- Special designs in other materials for applications with particularly aggressive exhaust gases or high gas temperatures
- Differential pressure transducer in Ex-version

Probes

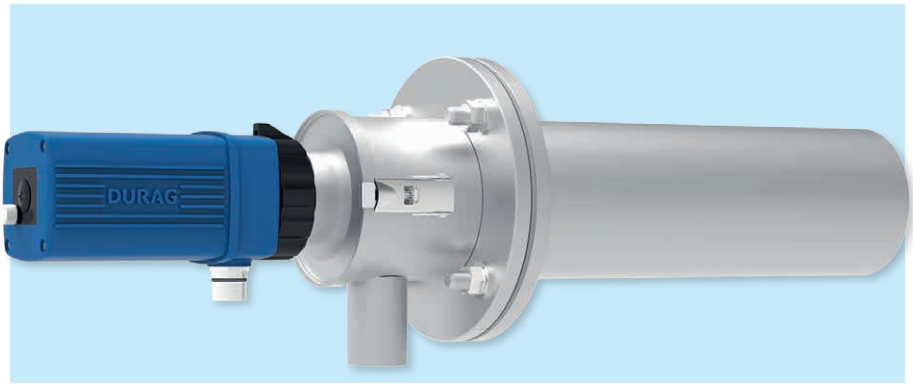
- Probe 1: 0.4 ... 2 m
- Probe 2: 2 ... 4 m
- Probe 3: 4 ... 8 m



measurements	flue gas velocity, volume flow	**digital outputs**	2 relay outputs, permissible load 48 V / 0.5 A
measuring ranges	0 ... 3000000 m³/h / 2 ... 50 m/s	**measuring outputs**	0/ 4 ... 20 mA/ 500 Ohm, Modbus RTU, RS485
measuring principle	differential pressure	**zero point drift**	<0.5% of measuring range
flue gas temperature	above dew point, -20 ... 450 °C	**power supply**	Sensor power supply 24 VDC ±10%, 0,5 A, 90 ... 264 VAC, 48 ... 62 Hz (option)
flue gas pressure	±200 hPa		
duct diameter	0.4...8 m	**dimensions (h x w x d)**	probe: 380 x 160 x (300 + probe length) mm
ambient temperature	-20 ... +50 °C		
protection	IP65, Ex optional	**weight**	32 kg + 6,8 kg/m probe length

Volume flow measuring system

Measuring system for ultra-sonic measuring of flow and volume flow, especially for wet and aggressive smoke emissions



Features

- Non-contact measuring method
- Measurement possible below dew point and for high dust concentrations
- Continuous measurement of normal volume flow and gas velocity
- Automatic zero point and reference point control
- Convenient operation via remote access with web interface
- Operation with or without control unit
- Very low maintenance

Applications

- Volume flow measuring at low speeds
- Plants with damp and/or aggressive exhaust gas, e.g. in waste incineration plants
- Volume flow measurement at high dust content

Approvals

- Suitability-tested by the TÜV Cologne, test report 936/21218490/A
- Approved and certified acc. to EN 15267-3
- MCERTS

Measuring principle

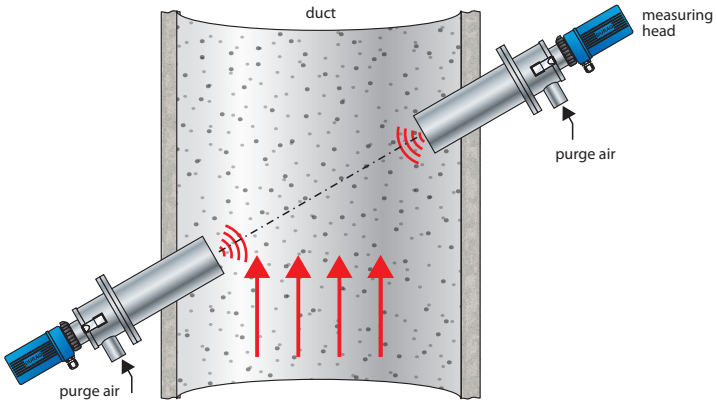
The D-FL 220 measuring system works according to the acoustic transit time differential method. Two identical transducers mutually send and receive short ultrasonic pulses. The system calculates the precise gas velocity from the direction-dependent transit time difference. The flow velocity respective volume flow of the waste gas is precisely calculated from the transit time difference dependent on the direction.

Options

- Temperature transducer
- Absolute pressure transducer
- Universal operating unit D-ISC 100
- D-ESI 100 Service- and Parameterisation Software

System components

- 2 Measuring heads
- 2 Purge air flanges
- 2 Mounting flanges
- Purge air unit
- Terminal Box for power supply



measurements	gas velocity and direction, volume flow in norm conditions or operational conditions	**detection limit**	<0.3% of measuring range
measuring ranges	0 ... 3000000 m³/h / 0 ... 40 m/s	**power supply**	24 VDC, 0.5 A
measuring principle	acoustic propagation delay	**dimensions (h x w x d)**	measuring head housing: 113 x 84 x 188 mm
flue gas temperature	0 ... 300 °C	**weight**	17 kg
flue gas pressure	-50 ... +20 hPa	**purge air supply**	
duct diameter	0.5 ... 13 m, temperature dependent	**purge air quantity**	40 m³/h (50 hPa) / 60 m³/h (25 hPa)
ambient temperature	-20 ... +50 °C measuring head -40 ... +70 °C	**power supply**	115/ 230 V, 50/ 60 Hz, 0.37/ 0.43 kW
protection	IP65	**dimensions (h x w x d)**	350 x 550 x 500 mm
measuring outputs	0/ 4 ... 20 mA/ 400 Ohm, Modbus RTU bi-directional	**weight**	12 kg
digital outputs	2 relay outputs, permissible load 48 V/ 0.5 A	**protection**	IP55

EPA Compliant PS6

MCERTS

TÜVRheinland CERTIFIED

DURAG GROUP smart solutions for combustion and environment

Data acquisition and handling system

family of modular DAHS systems for management of environmental and process data

D-EMS 2000

- QAL 1 certified according to EN 15267
- MCERTS certified

D-EMS 2000 CS

- QAL 1 certified according to EN 15267
- MCERTS certified

D-DAS 2010

- Cost effective system
- MCERTS certified

D-DAS 2000

- Cost effective system
- Excellent cost/performance ratio

Data acquisition, evaluation and reporting according to:

- German regulations for all plants requiring approval
- European Industrial Emissions Directive (IED) 2010/75/EU
- US EPA 40 CFR Part 60 & 75
- GHG Emission Monitoring (European-, UNFCCC-Guidelines, etc.)
- Country-specific requirements

Approvals

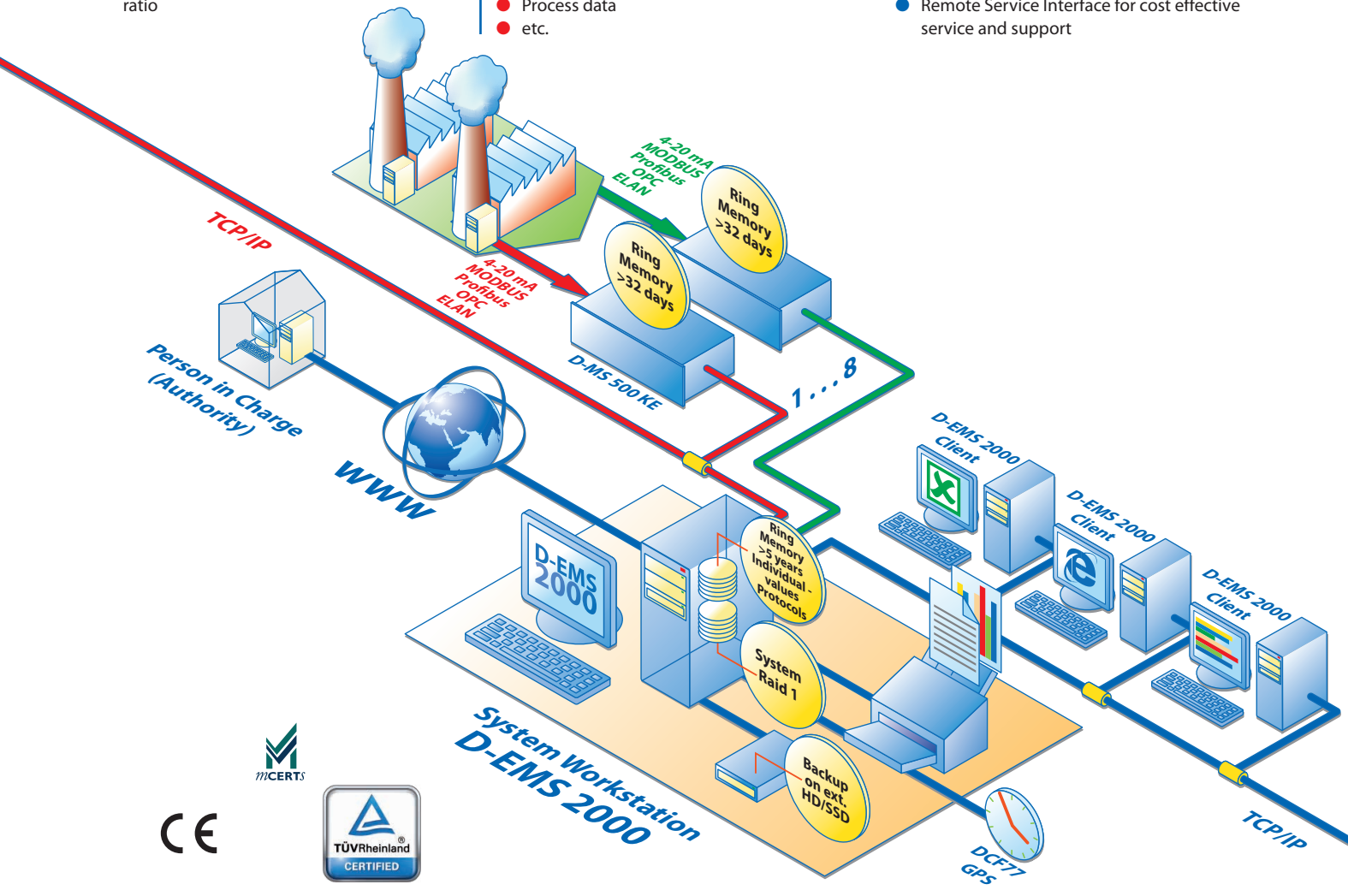
- Suitability-tested by TÜV in accordance with German TA-Luft, 1., 2.,13., 17., 27. 30. and 31.BImSchV as well as the European Directives 2010/75/EU, 2000/76/EC and 2001/80/EC considering EN 14181
- Approved and certified acc. to EN 15267-2
- MCERTS certified

Management for:

- Emission data
- Water data
- Greenhouse gas (GHG) data
- Ambient Air data
- Meteorological data
- Process data
- etc.

Main Features

- Windows based DAHS with modern designed software running on a standard pc
- User friendly, menu-driven software available in 19 languages
- Data communication unit with internal data storage system for up to 96 days for high data availability
- Handling of up to 320 analogue/ 640 binary in- and outputs, resolution 1 second
- Interfaces for hardwired 0(4) to 20 mA and/ or bus communications TCP/ IP, OPC UA, Modbus, PROFIBUS, Elan etc.
- Encrypted database on 2 Hard Disk Drive/ Solid State Drive as Raid-1-Array
- Menu leaded screens for representation of current, prognostic and historic measured data in bar graph/ chart form
- Free configurable screen masks, time diagrams and reports on customer request
- Automatic alarm and information system with comment functionality
- Communication with customer data network incl. interface to MS-Excel
- Automatic data transfer to authority via standard remote communication if required
- Providing of relevant data in the internet/ Intranet for person in charge, authority or public
- Remote Service Interface for cost effective service and support



mCERTS

TÜVRheinland CERTIFIED

DURAG GROUP smart solutions for combustion and environment

Data acquisition and handling system

Price effective compact system for small and middle sized plants

Features

- Compact system, no additional evaluation PC required
- Modern flash memory technology instead of hard disks
- Independently operating module for acquisition, long-term storage, calculation and visualisation of environmental and process data
- Instrument for monitoring officially prescribed limit values with automatic logging
- Continuous monitoring of 1 to 12 components connected via bus communication or hard wired

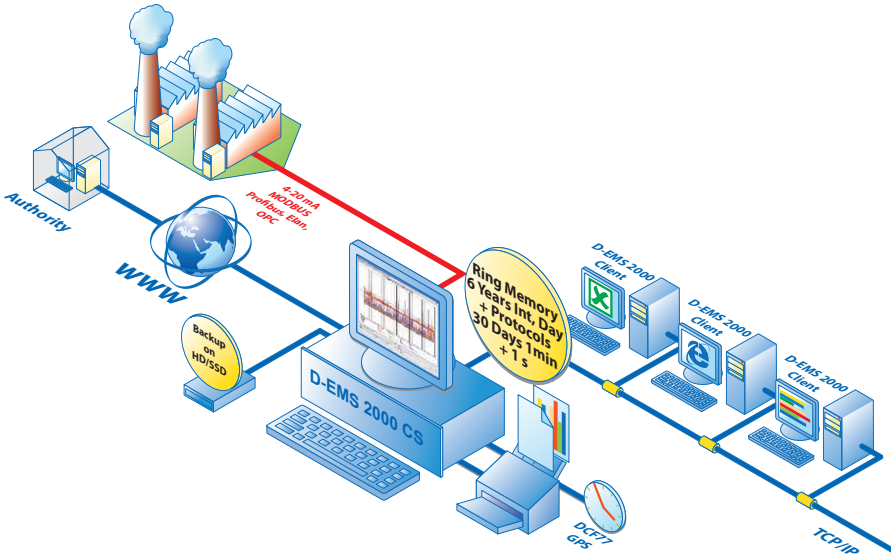
Options

Three device types are available:

- 19" 3HU rack with monitor/ keyboard/ mouse
- 19" 1HU unit with slide-in keyboard and retractable monitor
- Desktop version with monitor/ keyboard/ mouse

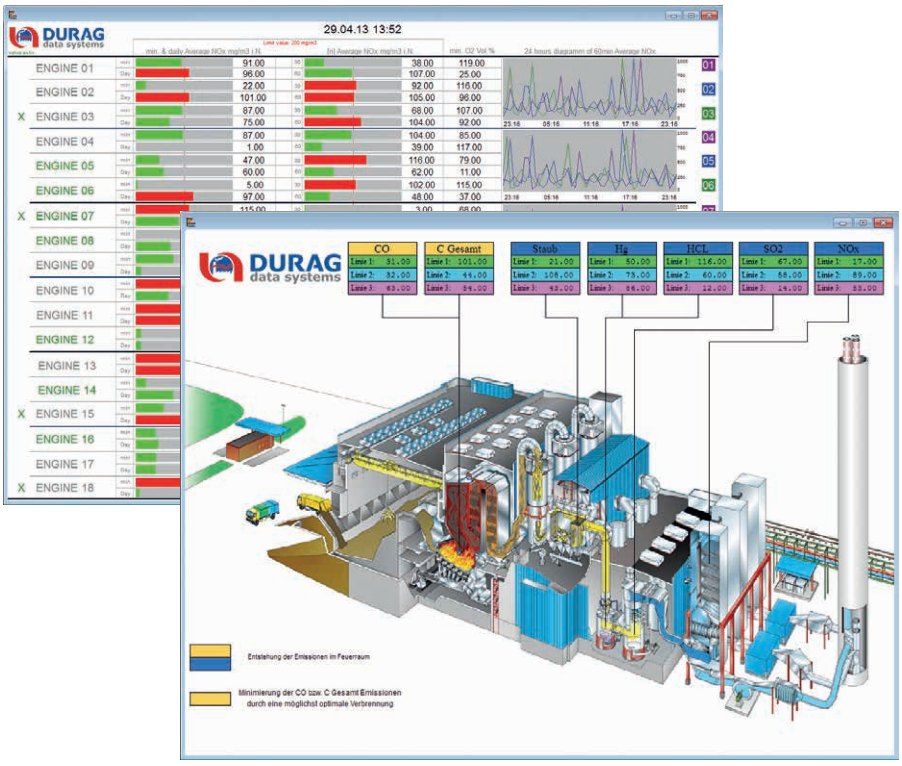
Applications

- Emissions evaluation computer for small to medium-sized installations in all types of plants and industries



Main features

- Windows based and certified D-EMS 2000 software
- All modules from the D-EMS 2000 system are usable
- Excellent cost/performance ratio



computer	Intel based Dual core PC with Windows 7 & 8, 2 GB Ram and > 100 GB SSD
inputs / outputs	up to 3 cards: combined card: 4 AI / 8 DI / 2 AO / 4 DO input card: 8 AI / 15 DI output card: 8 AO output card: 16 DO
bus system connections	Modbus RTU/ TCP, PROFIBUS, Elan, OPC UA Analogue-/ digital inputs: 12/ 24 Analogue-/ digital outputs: 12/ 24
interfaces	1x VGA, 2x USB, 1x RJ 45, 3x serial (RS232 or RS485), BNC for DCF 77- radio clock
ambient temperature	5 up to +40 °C
protection	IP20
operating voltage	115/ 230 VAC, 50/ 60 Hz, 100 VA

DURAG
DURAG GmbH
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: info@durag.de

VEREWA
A Brand of
DURAG GmbH

DURAG process & systems technology
A Brand of
DURAG GmbH

DURAG data systems
DURAG data systems GmbH
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-3000
Fax +49 40 55 42 18-3099
E-Mail: info@durag-data.de

UTAS DR LASINGER
A Brand of
DURAG data systems GmbH
Branch Office Austria
Lastenstraße 36, City Tower 2
4020 Linz, Austria
Tel. +43 732 60 99 60-0
Fax +43 732 60 99 60-4
E-Mail: office@utas.at

DURAG SIENA
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
E-Mail: info@duragsiena.com.br

Hegwein
Hegwein GmbH
Am Boschwerk 7
70469 Stuttgart
Germany
Tel. +49 711 135 788-0
Fax +49 711 135 788-5
E-Mail: info@hegwein.de

SMITSVONK
SMITSVONK Holland B.V.
P.O. Box 180, 2700 AD Zoetermeer
Goudstraat 6, 2718 RC Zoetermeer
Netherlands
Tel. +31 79 361 35 33
Fax +31 79 361 13 78
E-Mail: sales@smitsvonk.nl

GRIMM
GRIMM Aerosol Technik GmbH & Co. KG
Dorfstraße 9
83404 Ainring, Germany
Tel. +49 8654 578-0
Fax +49 8654 578-35
E-Mail: info@grimm-aerosol.com

DURAG GROUP SALES

DURAG Sales and Marketing GmbH & Co. KG
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: info@durag.de

DURAG Brazil
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
E-Mail: info@duragsiena.com.br

DURAG France S.a.r.l.
Parc GIP Charles de Gaulle
49, rue Léonard de Vinci, BP 70166
95691 Goussainville CEDEX
France
Tel. +33 1 301 811 80
Fax +33 1 393 383 60
E-Mail: info@durag-france.fr

DURAG, Inc.
1355 Mendota Heights Road
Suite 200
Mendota Heights
MN 55120, USA
Tel. +1 651 451-1710
Fax +1 651 457-7684
E-Mail: durag@durag.com

DURAG India Instrumentation Private Limited
#27/30, 2nd Main Road
Industrial Town, Rajajinagar
Bengaluru 560 044, India
Tel. +91 80 2314 5626, 2301 1700
Fax +91 80 2314 5627
E-Mail: info@duragindia.com

DURAG Instrumentation (Shanghai) Co., Ltd.
Room 706, Dibao Plaza, No. 3998
Hongxin Rd., Minhang District
Shanghai, 201103 PR China
Tel. +86 21 60732979-200
Fax +86 21 60732980-205
E-Mail: info@durag-cn.com

DURAG Italia S.r.l.
Via Carlo Panseri, 118
CIM uffici, P. secondo
28100 Novara
Italy
Tel. +39 0321 679569
Fax +39 0321 474165
E-Mail: info@durag.it

DURAG Japan Office
c/o TMS Planning Inc.
291-2 Umena, Mishima-shi
Shizuoka-ken
411-0816 Japan
Tel. +81 55 977 3994
Fax +81 55 977 3994
E-Mail: info@durag.jp

DURAG Korea Office
RM #1131, Manhattan Building
36-2, Yeouido-Dong
Yeongdeungpo-Gu, Seoul
Korea
Tel. +82 2 761 8970
Fax +82 2 761 8971
E-Mail: info@durag-group.co.kr

DURAG Middle East (Branch)
Dubai Airport Free Zone
5 West Wing, Office 124
Dubai, UAE
P.O. Box 371555
Tel. +971 4260251 0
E-Mail: dme@durag.de

DURAG RUSS OOO
Andropova avenue 18/6
Office 5-09
115432 Moscow
Russia
Tel. +7 499 4180090
Fax +7 499 4180091
E-Mail: info@durag-group.ru

DURAG UK GmbH
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire
DE15 0YZ
Great Britain
Tel. +44 1283 553 481
Fax +44 1283 553 482
E-Mail: durag.uk@durag.de

DURAG Branch North
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: durag-nord@durag.de

DURAG Branch East
Halsbrücker Straße 34
09599 Freiberg, Germany
Tel. +49 3731 30 04-0
Fax +49 3731 30 04-22
E-Mail: durag-ost@durag.de

DURAG Branch South
Weidenweg 16
73087 Bad Boll, Germany
Tel. +49 7164 912 25-0
Fax +49 7164 912 25-50
E-Mail: durag-sued@durag.de

DURAG Branch West
An der Pönt 53a
40885 Ratingen, Germany
Tel. +49 2102 74 00-0
Fax +49 2102 74 00 28
E-Mail: durag-west@durag.de

Credits: shutterstock.com: (1) Jean Schweitzer

www.durag.com