



FW100 Dust Measurement Device

Preventing fine dust polluting the air
by using scattered-light technology

FW100 – Using Scattered Light Technology for the Monitoring of Dust Concentrations



The FW100 series is designed to conduct continuous measurements of very low (0.1 mg/m^3) to medium (200 mg/m^3) dust concentrations – independent of the gas velocity, humidity, or charge of the particles involved. The probe design is particularly suitable for mounting on one side of the gas duct and does not re-

quire any mechanical adjustment or calibration with a dust-free measurement path. The measuring device can be used for a wide range of applications, including gas ducts with extremely small or large diameters, as well as thick and thin-walled stacks.

At home in many industries Wide range of application:

- Power supply: power stations
 - Waste disposal: refuse incineration plants
 - Process engineering: grinding and metering plants
 - Metal processing: steel- and aluminum processing
 - Foodstuff industry: filling bulk materials
 - Brake linings and eternit production
- In pure gas, downstream of electrostatic precipitators
 - Continuous measurement and monitoring of dust concentrations
 - Protection of flue gas desulfurization plants at too high dust load
 - In pure gas, downstream of modern fabric filters
 - Monitoring, detection, and identification of defective filters and bags
- Prevention of the release of expensive production materials and toxic contents in continuous processes
 - For monitoring and/or closed-loop control purposes in exhaust/intake air systems

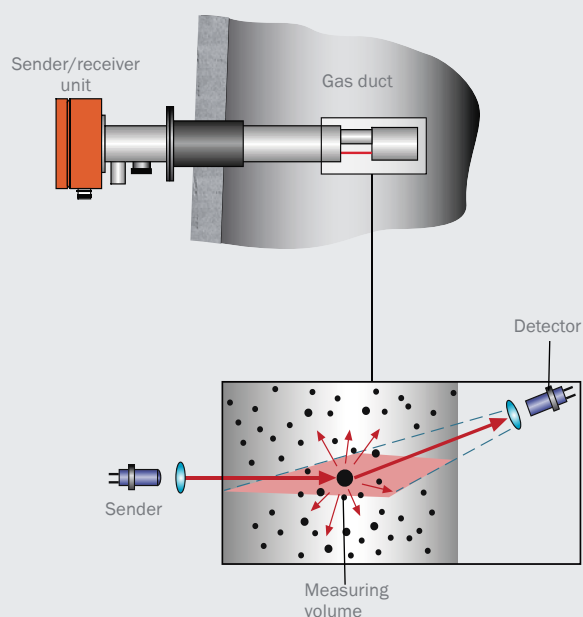
How does it work?

Measuring principle

The FW100 operates according to the scattered light measurement principle (forward scattering). Since it is extremely sensitive, this principle is particularly suitable for measuring very small particle concentrations.

A laser diode directs a beam of modulated light (in the visible range) at the dust particles in the gas flow. The light scattered by the particles is recorded by a highly sensitive detector.

The point of intersection between the transmitted beam and the receiver aperture defines the measuring volume in the gas duct. The measured scattered light intensity is proportional to the dust concentration. After a gravimetric comparison measurement, for example according to EN 13284-1 and VDI 2066, therefore, a measurement signal that is directly proportional to the dust concentration can be output.

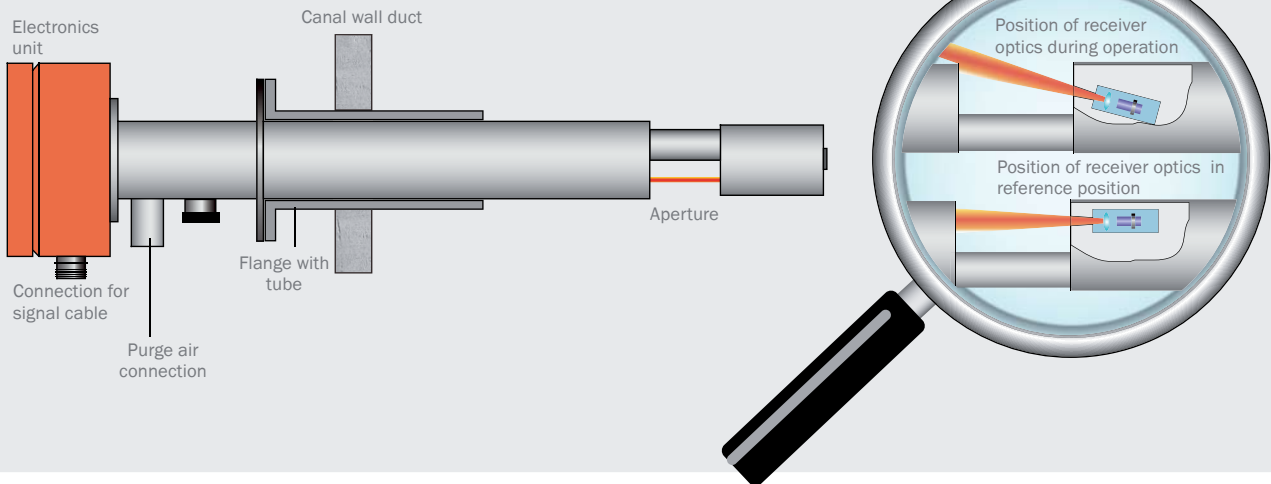




Two versions of the FW100

FW101	FW102
for gas ducts > 500 mm (19.7 in)	for gas ducts > 150 mm (5.9 in)
Check cycle comprises a <ul style="list-style-type: none"> • contamination measurement on the optical boundary surfaces • zero-point measurement • check-point measurement • duration: 310 s 	Check cycle comprises a <ul style="list-style-type: none"> • zero-point measurement • check-point measurement • duration: 200 s

Taking a closer look at the FW101



Contamination Measurement

In order to measure the contamination on the optical boundary surfaces, the FW101 moves the receiver optics mechanically to a reference position. As a result, the optics measure the light emitted by the laser diode directly. The intensity value measured during the movement is compared with the factory settings to calculate a correction factor. In this way, the FW101 can fully compensate for any contamination levels.

Check-Point Measurement

The check-point is measured with the receiver optics in reference position. Once a reference measurement has been carried out with a light intensity of 100 %, the FW101 reduces the intensity of the laser diode to 70 % and compares the value measured by the receiver with the expected value. If these two values deviate more than the specified range, the device generates an error signal.

Zero-Point measurement

In order to monitor the zero-point, the FW101 deactivates the laser diode, and the reception signal must also be zero. In this way, drifts or zero-point deviations in the entire system (e.g. caused by an electronic defect) can be reliably detected. If the “zero-value” deviation is outside the specified range, an error signal is generated.

Interfaces for Customized Processes



Interfaces of the FW100 system

Ease of use and enhanced flexibility regarding application plays an important role in the development of SICK MAIHAK measuring devices. By using a connection unit the customer is offered a choice between the following in- and outputs

- Relay outputs for status signals, malfunction, limit value and maintenance
- Analog output, 0/2/4 up to 20 mA
- Serial interface RS232 for setting of parameters with MEPA FW100
- Binary input for connection of a maintenance switch with floating contact

Appropriate purge air for the duct pressure

Long servicing intervals are achieved by constant cleaning of the optical boundary surfaces, unrelated to the pressure, temperature and the degree of contamination of the measuring gas. This ensures continuous pin-point accuracy of measuring values. There are 3 options of purge air cleaning systems for the FW100:

- Integrated purge-air unit at duct pressure from -50 up to +10 mbar
- External purge-air unit at duct pressure from -50 up to +70 mbar
- Instrument air at duct pressure from -50 up to +1 mbar

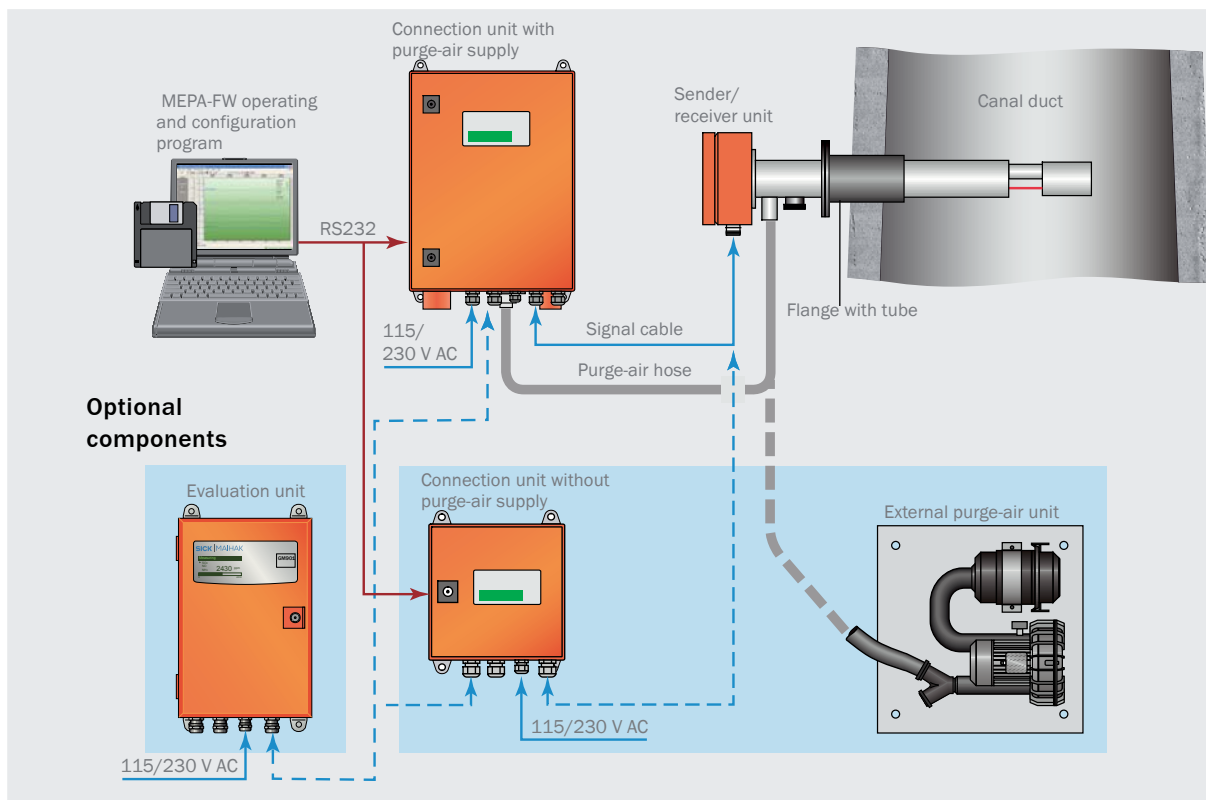
Optional: Evaluation unit

The optional evaluation unit is part of the FW100 device range from SICK MAIHAK and is designed for the following applications:

- Remote operation of a FW100 dust monitor
- Connecting up to 3 FW100 dust monitors

It controls the exchange of data with the FW100, signals their operating statuses, and outputs measured values. It contains the inputs/outputs to the peripheral devices and data interfaces (CAN Bus) to the system components.

System components and their interfaces





A suitable sender/receiver unit for your application

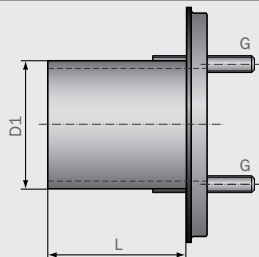
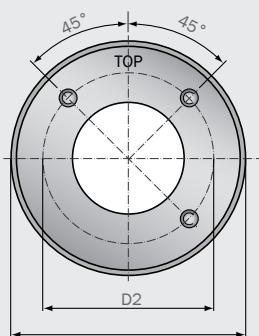
Duct diameter in mm (in)	Wall- a. insulation thickness		Exhaust gas and -air		Type of sender/receiver unit	
	mm	in	Max. temperature in °C	Consistence in °F		
> 150 (> 5.90 in)	max.10	max. 0.39	220	428	hardly corrosive	FWSE102 1" NL180
		FWSE102 Tri-Clamp® NL180				
	max.100	max. 3.94	220	428		FWSE102 1" NL280"
		FWSE102 Tri-Clamp® NL280				
> 250 (> 9.84 in)	max.150	max. 5.90	220	428	hardly corrosive	FWSE101NL435, up to 220 °C
					strongly corrosive	FWSE101NL435 Hastelloy, up to 220 °C
			400	752		FWSE100NL435, up to 400 °C
> 300 (> 11.81 in)	max. 400	max. 15.74	220	428	hardly corrosive	FWSE101NL735, up to 220 °C
					strongly corrosive	FWSE101NL735, Hastelloy, up to 220 °C
			400	752		FWSE101NL735, up to 400 °C
	400 ... 720	15.74 ... 28.35	220	428	hardly corrosive	FWSE101NL1035, up to 220 °C
						400
	700 ... 1020	28.35 ... 40.16	220	428	hardly corrosive	FWSE101NL1335, up to 220 °C
						400

NL = Nominal length

Mounting of FW101 with :

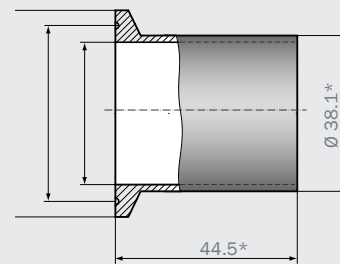
- A flange with tube

Dim	Flange with tube			
	D100		D150	
	mm	in	mm	in
D1 Ø	76	2.99	127	5.0
D2 Ø	100	3.94	150	5.90
D3 Ø	130	5.12	190	7.48
L	240, 500	9.45, 19.68	800, 1,100	31.49, 43.31
G	M10		M12	



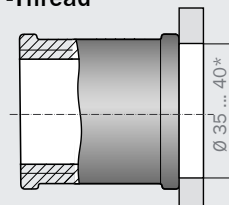
Mounting of FW102 with :

- A Tri-Clamp® flange for a quick-release lock



Alternatively

- 1"-Thread



*Dimensions in mm

Technical Data – FW100

Technical data FW100							
Measurement data							
Measurement variable	Scattered light intensity dust concentration in mg/m ³ after gravimetric comparison measurement						
Measurement range	Minimum range: 0 ... 5 mg/m ³ Maximum range: 0 ... 200 mg/m ³		higher ranges available on request continuously variable				
Measurement accuracy	±2 % of upper range limit (full scale)						
Plant data							
Gas temperature (above dew point)	Standard version FW101, FW102 High-temperature version FW101			-20 ... 220 °C (-4 ... 428 °F) -20 ... 400 °C (-4 ... 750 °F)			
Duct pressure	Connection unit with purge-air supply Configuration with ext. purge-air unit Configuration with instrument air			-50 hPa ... +10 hPa (-0.73 ... 0.15 psi) -50 hPa ... +70 hPa (-0.73 ... 1.0 psi) -50 hPa ... +1 Pa (-0.73 ... 14.5 psi)			
Ambient temperature	Sender/receiver unit Connection unit with purge-air supply; Intake temperature of purge-air			-20 ... +50 °C (-4 ... 120 °F) -20 ... +45 °C (-4 ... 113 °F)			
Device data	NL		L		(W x H x D)		
Dimensions	mm	in	mm	in	mm x mm x mm	in x in x in	
• Transmitter/ receiver unit	FW101	435	17.1	300	11.8	150 x 150 x 645	5.9 x 5.9 x 25.4
		735	28.9	600	23.6	150 x 150 x 945	5.9 x 5.9 x 37.2
		1035	40.7	900	35.4	150 x 150 x 1245	5.9 x 5.9 x 49
		1335	52.6	1200	47.2	150 x 150 x 1545	5.9 x 5.9 x 60.8
• Connection unit	FW102	Without purge-air supply			200 x 200 x 130	7.9 x 7.9 x 5.1	
		With integrated purge-air supply			300 x 400 x 220	11.8 x 15.7 x 8.7	
• Optional external purge-air unit SLV4	550 mm x 550 mm x 258 mm (21.7 in x 21.7 in x 10.2 in)						
Weight	NL mm		NL inch		kg	lb	
• Sender/receiver unit	FW101	435	17.1	5.0	11		
		735	28.9	6.3	14		
		1035	40.7	8.0	17		
		1335	52.6	9.5	21		
• Connection unit	FW102	Without purge-air supply			3.7	8	
		With integrated purge-air supply			13.5	30	
• Optional external purge-air unit					14.0	31	
Power supply							
• Connection unit	100 ... 240 V AC, 47 ... 63 Hz; opt. 24 V, DC ± 2 V, Power consumption						
	Without purge-air supply				max. 15 W		
With integrated purge-air supply				max. 70 W			
• Sender/receiver unit	24 V from connection unit						
Power consumption				max. 4 W			



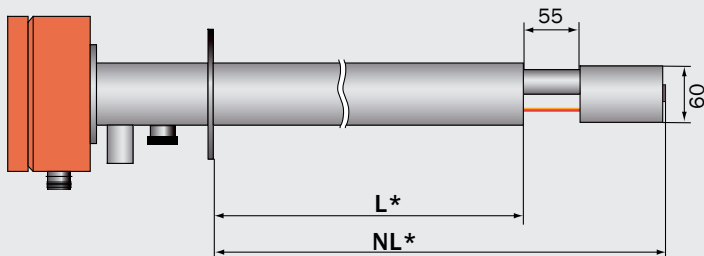
FW101



FW102

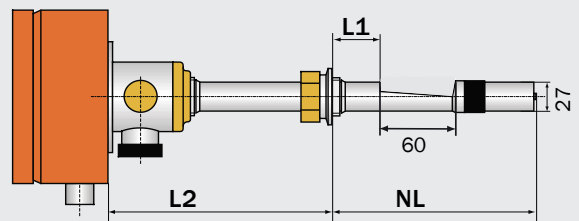
Interfaces and Signals	
Interfaces	RS232 for laptop/PC
• Analog output	• 0/2/4 ... 20 mA, max. load 750 Ω, electrically isolated, • separate parameter setting possible
• Relay output	• Output 1: malfunction (error) • Output 2: limit value • Output 3: maintenance; capacity: max 48 V, 1 A DC; free floating (more relay outputs with the optional LC display)
• Digital input	• Connection for maintenance switch with free floating contact
• Optional	• 2-row LC display for the measured variables, as well as warning and malfunction mes- sages. With additional relay outputs for maintenance, second limit value, check cycle • 2nd analog output: electrically isolated, 0/2/4 ... 20 mA, max. load 750 Ω; parameter can be set separately • CAN-Module: for connecting the FW100 to an evaluation unit • Data memory/event memory: for storing and displaying of up to 7,280 measured va- lues and 100 events

FW101

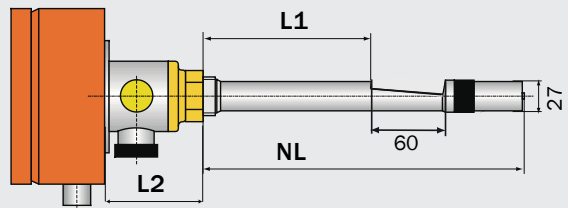


*see data table on page 6

FW102-Tri-Clamp® or



1" - version



NL	L1	L2
180	50	179
280	150	79

Dimensions in mm

NL = Nominal length

Government legislation provides our base line



TUV
approved



small
plants



Crematory



Waste
incineration
plants



Power stations

Complies with new Waste Incineration Directive and
Large Combustion Plant Directive EN-13284-Z/
EN-14181 (Europe) and PS-11 (US).

ANALYZERS AND PROCESS INSTRUMENTATION

AT HOME IN THE INDUSTRIAL SECTOR

We can build on years of experience in the field of Analyzers and Process Instrumentation. That is why we are at home in the world of cement and power plants as well as in the chemical and petrochemical sector. Be it emission control at the waste treatment or process optimization for steel manufacturing, SICK MAIHAK offers tailor-made solutions.



WE OFFER YOU A CHOICE AROUND THE WORLD TO YOUR SERVICE

SICK MAIHAK offers a number of sensor-based techniques for analysis, ranging from the continuous gas and dust measurement to specialized applications for water and liquid analysis. Within the process measurement technology SICK MAIHAK products play a central role in determining volume flow of gases and level of bulk materials.



Where ever you are, our global network of subsidiaries and representatives is able to supply qualified support when you need it. We deliver the equipment for your measuring tasks, provide documentation and training. Our highly skilled service staff offers support during installation, commissioning and maintenance of the appliances.



SICK GROUP

SICK MAIHAK represents the process automation segment of the SICK group, one of the worlds leading manufacturer of intelligent sensors and sensor solutions. With its 4,000 employees, SICK is able to offer an extensive portfolio of products and services on the market of factory automation. www.sick.com

