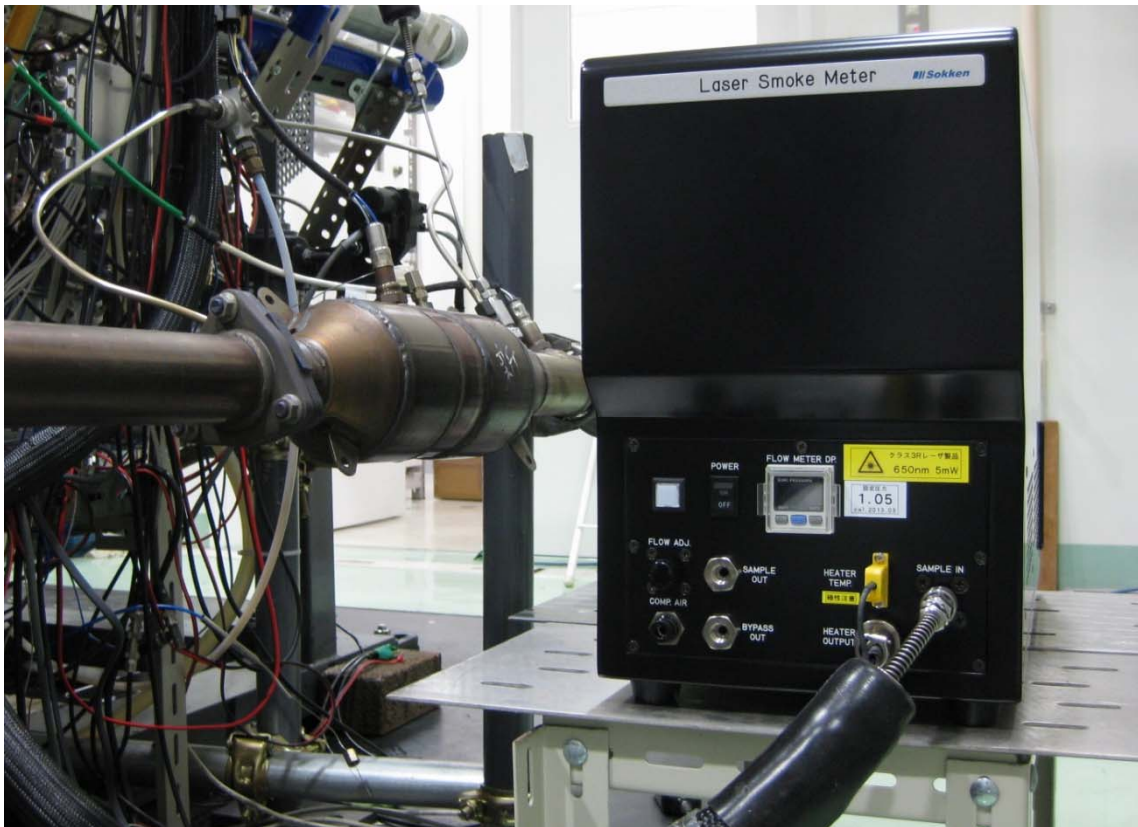


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Laser Smoke Meter

MODEL **LEX-635s**



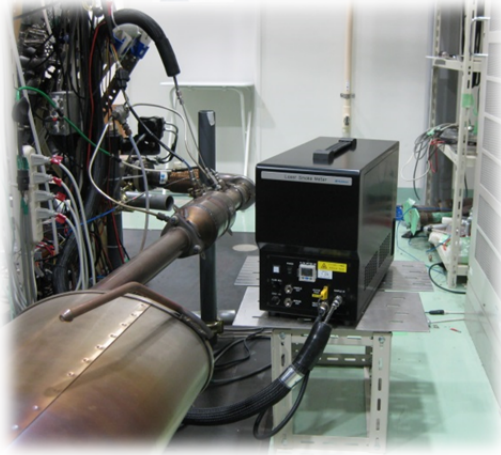
Overview

The laser smoke meter model LEX-635s measures soot mass concentration continuously in exhaust from engines. LEX-635s emits a laser beam into exhaust and calculates soot mass concentration by measuring scattering light intensity from soot particles and extinction of transmitted light. LEX-635s provides wide measurement range and fast response for low soot concentration and transient test measurements.

Features

- Wide measurement range: 0.01 ~ 1000mg/m³
- Fast response: T₁₀₋₉₀ = 300ms
- Portable and fit to on-board measurement

Applications and advantages



Laboratory testing



On-board testing

LEX-635s was developed for various applications in laboratory and on-board testing. Many advantages in LEX-635s will promote your R&D.

Wide measurement range: LEX-635s provides continuous measurements in a range of 0.01 ~ 1000mg/m³ are available by a combination of the extinction and the scattering methods.

Direct sampling: Direct sampling is available in high pressure (up to +100kPa) and high temperature (up to 600°C) conditions.

Fast response: Transfer time (physical delay time) to raise soot concentration is 0.6s and rise time 10 - 90% (physical response time) is 0.3s. LEX-635s is available in transient test cycle.

Low NO₂ interference: LEX-635s adopts a 650nm laser source and hardly detects NO₂ compared with conventional opacity meter. LEX-635s can make stable measurements even in high NO₂ concentration at the exit of diesel oxidation catalyst.

Easy maintenance: Automated purge and cleaning system release you from complicated maintenance work.

External control: External control is available by a serial communication port (RS-232C). The communication command includes start & stop of sampling and data acquisition.

On-board measurement: LEX-635s requires no dilution system and is operated only by an AC power supply. LEX-635s is really portable and fits to on-board emission measurement.



Sample probe

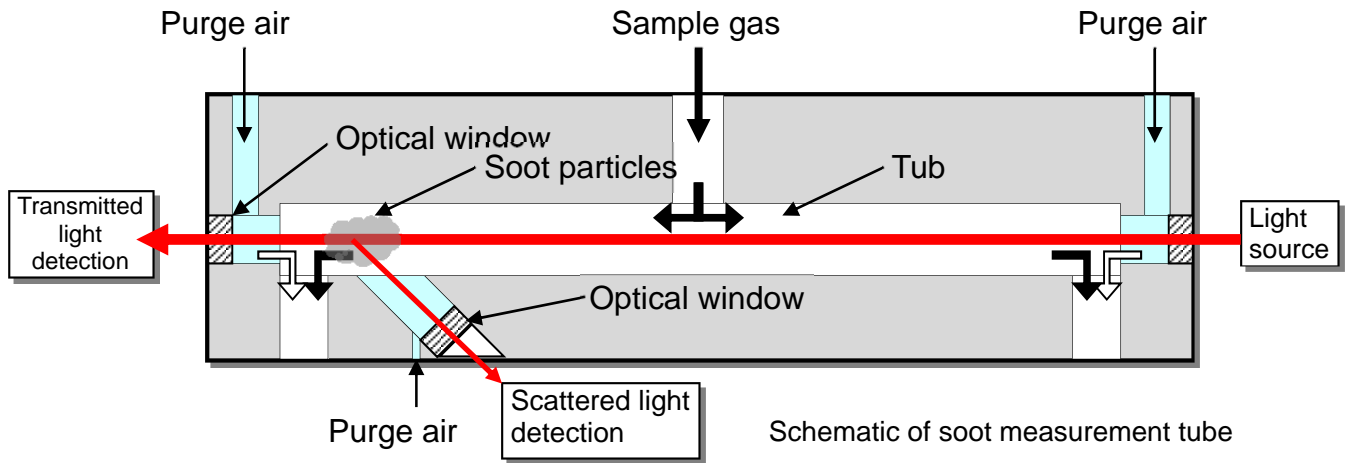


Operation unit (touch panel)

SMPL	
Soot conc.	1.58 mg/m ³
Chamber press. 100.8 kPa	
▲	▶
STBY	SMPL
PURG	ZERO

Operation screen

Measurement Principle



LEX-635s is based on light extinction and light scattering.

$$\text{Light extinction: } C_m = -\frac{\ln \tau}{L \times \sigma_{EXT}}$$

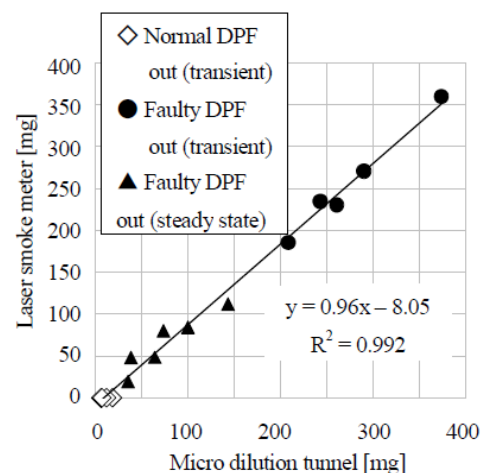
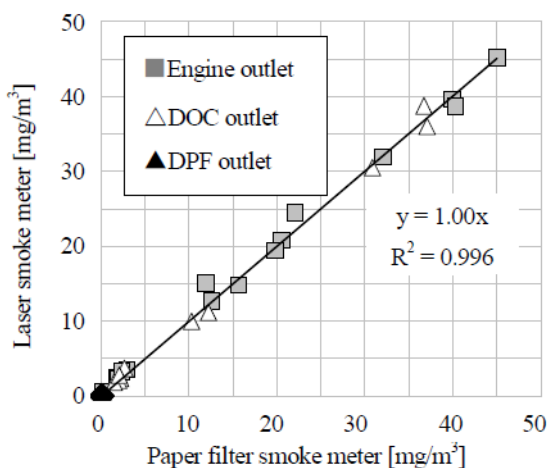
$$\text{Light scattering: } C_m = A \times I_s$$

C_m : Soot mass concentration, A : Proportionally coefficient, I_s : Scattered light intensity

τ : Transmittance, L : Optical length, σ_{ext} : the specific extinction

A continuous measurement in the range of 0.01 ~ 1000mg/m³ is achieved by coupling the extinction method in high concentration range and the scattering methods in low concentration range. The change of measurement methods does not include any physical operation in the instrument, and soot mass concentration signal is output without interruption.

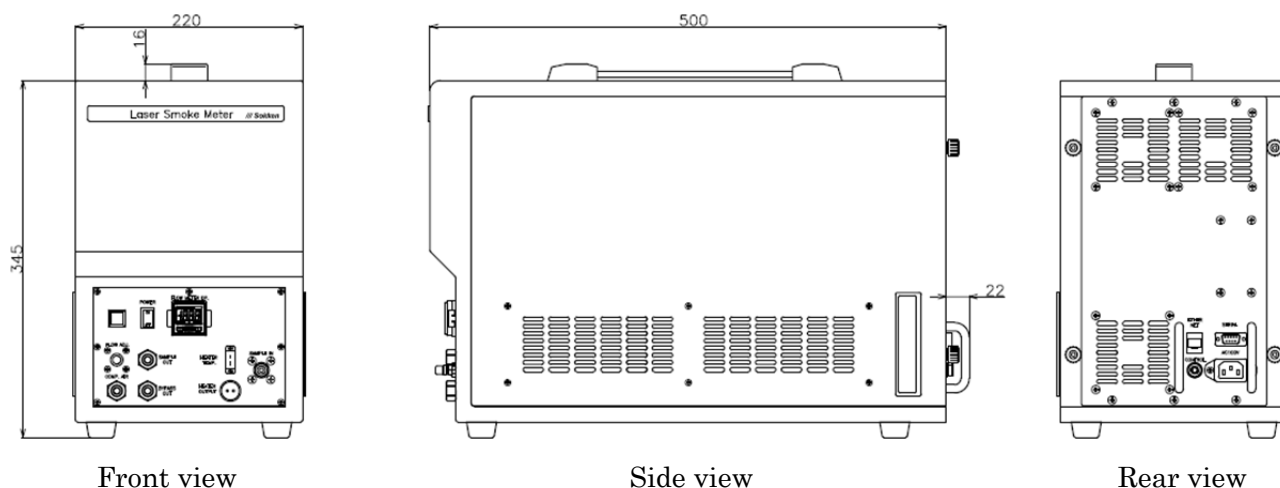
Correlation with the conventional instruments



Correlation with paper filter smoke meter: As shown in the left figure, the correlation is independent of sample locations (exit of engine, DOC and DPF), thus LEX-635s has a quite similar sensitivity to that of the paper filter smoke meter even in high HC or SOF concentration conditions.

Correlation with gravimetric PM measurement by micro tunnel: The right figure shows the clear correlation between cumulative soot mass by LEX-635s and PM mass measured by the micro-tunnel. The PM mass by the micro-tunnel tends to be higher than the soot mass by LEX-635s. It is considered that the mass of HC and SOF absorbed by the PM filter is included in the PM filter weight, but the laser smoke meter detects only carbonaceous particles and hardly detects HC and SOF components.

Exterior



Specifications

Component measured		Soot in engine exhaust
Principles		Light extinction and light scattering
Measurement range		0.01 ~ 1000mg/m ³
Sampling	Probe	Stainless tube, O.D.=1/8 inches, L=300mm
	Heated tube	Conductive PTFE tube, L=2000mm
	Flow rate	Approx. 3L/min
	Max. sample press.	+100kPa at sample probe inlet
	Max. sample temp.	600°C at sample probe inlet
Response time		Transfer time (physical delay time) = 600ms Rise time (physical response time) T ₁₀₋₉₀ = 300ms
Display and operation		4 inches LCD touch panel with 15m cable
Output	Analogue	0 - 10VDC, 100Hz BNC terminal
	Ethernet	Data acquisition software for Windows
External control		RS-232C
Dimensions	Main unit	W220, D500, H345mm, 16kg
	Operation unit	W180, D110, H100mm, 1kg
Operating	Ambient temp.	5 ~ 40°C
	Ambient humidity	10 ~ 90%RH (no condensation)
Laser class		3R
Power supply		100VAC, 50/60Hz, Max. 6A
Option		Anti-vibration table, JIS type probe for tail out sampling

Specifications are subject to change to improve performances.

<2013/10/31>

Sokken

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