Committing to the future

testo 335

New Measurement Engineering For Monitoring Emissions In Industry

Increased efficiency and convenience

NEW!

°C

O_2

CO/H_2

CO_{low}/H_2

NO

NO_{low}

NO_2

SO_2

hPa

m^3/s

kg/h

qA

λ

The new analyser generation for industrial flue gas analysis

testo 335 is the flue gas analyser of the new generation, specially tailored to the requirements of industrial applications. testo 335 is highly versatile; it can be used by the operators of industrial combustion systems such as processing and power plants, by service technicians working for the manufacturers of boilers and burners, for plant construction and also for stationary engines. Even spot check measurements lasting up to two hours are possible.

Perfect applications planning

The new testo 335 opens up a whole new world of possibilities in applications planning. The times when an analyser let down the user are a thing of the past. testo 335's instrument diagnosis provides information on the quality level of functions and wear parts at the touch of a button. Also included is a quality check on measuring cells, filter status, condensate trap level indicator, leaks in analyser, pump capacity, charging status of rechargeable battery, date of last maintenance and sensor calibration data.

Highest flexibility

testo 335 is equipped with an O_2 measuring cell as standard. Two additional toxic measuring cells such as CO, CO_{low}, NO, NO_{low}, NO_2 or SO_2 can be fitted by the user as required. This guarantees highest flexibility when adapting to changing applications or measurement jobs.

testo 335

Measurement range extension

Very high CO concentrations may occur particularly when “starting up” combustion systems and when monitoring emissions in stationary engines. As a protection, the CO measuring cell can be diluted with fresh air. In this way, the CO measurement range is extended to 50,000 ppm.

An additional option: dilution of all measuring cells. The measurement range of each individual measuring cell is thus increased by a factor of 2. The measuring cell is then not under any greater pressure than in normal measurements.

Wide range of flue gas probes and accessories

New rechargeable batteries

Lithium ion rechargeable batteries – free from memory effect and total discharge – currently have an unbeatable service life. testo 335 makes it possible for the practical user to charge testo rechargeable batteries both inside the analyser and outside. The lithium ion rechargeable battery is highly compact and has a service life of more than six hours. The service cover, removeable without tools, makes care and maintenance very easy. The rechargeable battery and measuring cells can be easily changed by the user.

Spot check measurements lasting up to 2 hours

testo 335 allows measurement programs to run independently making spot check measurements lasting up to max. two hours possible. Five measurement programs are predefined as standard. They can be changed by the user at any time and stored as required.

Increased safety thanks to the built-in condensate trap

Testo design eliminates the possibility of condensate developing in the measuring cell. This factor and the special design of the gas paths in the analyser in conjunction with the positioning of the condensate trap prevents blockage and considerably prolongs service life. The gas pump is spared and its service life extended on account of the layout of the gas paths and an additional filter. The condensate trap is easily accessible for emptying. As soon as it is 90% full, a flashing red LED indicates that it should be emptied. If this is not done, the pump will switch off automatically after ten minutes. This protects the measuring cell when starting a measurement program, for example.

More convenience

The new, highly robust probe quick-connection for all gas paths eliminates all mix-ups. The single cable is stable, indestructible and saves space. When changing probes – probe can be attached quickly and easily – the analyser automatically recognises the request and the corresponding measurement menu appears immediately. The probe can remain positioned in the flue gas during the initialisation phase of the measuring cells. testo 335's calibration phase is complete after thirty seconds. Fuel selection, for example, can be made simultaneously and the analyser is ready for operation. The memory management system inside the analyser facilitates easy, user-friendly structuring of your data. testo 335 also has a USB interface as well as a built-in IRDA interface. This makes it possible for you to transfer and document results on your PDA or laptop. Additional calculations or individual measurement protocols can be generated using "**easyEmission**" software.

Straight Pitot tube for determining flow velocity

Gas sampling probe with probe pre-filter for dusty flue gases

Standard gas sampling probe

High-performance, automatically controlled diaphragm pump

The sample gas pump built-in in testo 335 is the ideal solution for typical situations in flue gas measurement such as negative or positive pressure. This is automatically controlled by the sample gas pump via a wide negative and positive pressure range (from -200 to +50 mbar) i.e. the pump flow is held constantly in this range. One further benefit: a blocked probe filter does not have any influence on the pump flow.

The new all-round infrared printer

The new testo printer
– wireless with an infrared interface
– stores the print data. This saves time, as the measuring instrument is immediately ready for use after the data transfer.

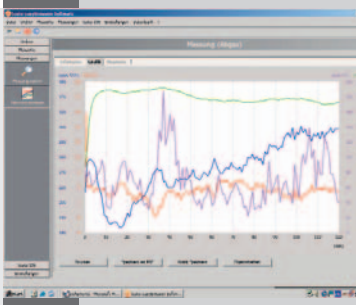
Bent Pitot tubes for simultaneous measurement of flow velocity

The right accessories for every application

Probes with particle filter

The robust handle fits perfectly in your hand making it easy to place in the position required. The probe has a quick opening device. All of the gas paths are therefore connected and mix-ups are avoided. The particle filter located in the handle efficiently separates out dirt particles. In addition, the probes require low maintenance and are easy to clean. Different lengths and diameters ensure a high level of flexibility for all applications. When changing, the probe shaft is simply attached to the probe handle and then clicks into place. The particle filter absorbs particles where they actually occur. That is why the filter cartridge is located in the probe's handle where it is easily accessible. Testo's patented engineering is a guarantee for reliable measurements when used in extreme conditions such as highly contaminated combustion systems or for dealing with particles when carrying out measurements on diesel engines.

“easyEmission”: New read out and configuration software



When developing software, user-friendly operation and handling were in the foreground. In addition, it is not only possible to read out data but also to file and manage it conveniently. Using the software, it is also possible to control the analyser during online measurements. Likewise, different types of calculations can also be carried out or the values can also be entered directly in Excel. Furthermore, a separate measurement protocol, in accordance with specifications or regulations, can be drawn up for every measurement site.

- User-defined measurement intervals (1 measurement/second up to 1 measurement/hour)
- Readings transmitted in seconds to Microsoft EXCEL®
- User-defined fuels
- Readings are shown in table or graphics form
- Easy generation of customer-specific measurement protocols

Measurement cell replacement by the user

The measurement cell can be easily and quickly replaced by the user himself without the use of test gas, as the adjustment data are stored in the measurement cell.

testo 335 at a glance

Instrument diagnosis
- Automatic instrument leak test
- Rechargeable battery status display
- Sensor status display
- Monitors level in condensate trap with message “FULL”
- Displays pump capacity (l/min.)
- Displays error status with description and diagnosis
- Displays last maintenance
- Displays analyser temperature
- Operation hours counter
- Graphic representation of sensor calibration data

Additional measurement jobs
- Temperature measurement
- ΔP measurement (optional)
- m/s measurement (optional)

Additional features
- 2 toxic sensors, freely selectable
- Automatically controlled gas pump
- Measurement range extensions for the CO sensor
- Measurement range extension for all sensors simultaneously (optional)
- Initialisation of gas sensors without removing probe from flue gas duct
- Calculated parameter: Flue gas dewpoint
- Graphics display
- Built-in impact protection with magnet, recessed display screen
- Protection class IP40
- Rechargeable battery life > 6 h with pump running
- Rechargeable battery can be charged inside or outside analyser
- 10 user-defined fuels
- Print out of sensor calibration data
- Gas sampling hose can be extended to max. 7.8 m

Automatic menu selection
- Recognises probe connected

Initialisation of probe sensor for draught measurement without removing probe
- Probe can remain in stack during initialisation

Memory management
- Up to 100 folders (customers/systems) can be saved
- Up to 10 sites can be saved in every folder
- Up to 200 data per site can be stored (limited by number of folders and sites)
- IRDA interface for data transfer to PDA/notebook
- USB interface for data transfer to PC

TÜV approval / EN standard
- Accuracy approved for O_2, CO_2, CO, NO, NO_{low}, °C, hPa to EN standard 50379 Part 2
- Approved measuring cell replacement (adjustment without test gas)

Technical data

	Meas. range	Accuracy	Resolution	Response time
O_2 measurement	0 to 25 Vol. %	±0.2 Vol. %	0.01 Vol. %	t_{90} <20 s
CO measurement (H_2 compensated)	0 to 10000 ppm	±10 ppm or ±10% of mv (0 to 200 ppm) ±20 ppm or ±5% of mv (201 to 2000 ppm) ±10% of mv (2001 to 10000 ppm)	1 ppm	t_{90} <40 s
CO_{low} measurement (H_2 compensated)	0 to 500 ppm	±2 ppm (0 to 39.9 ppm) ±5% of mv (remaining range)[X] [X]Data correspond to 20°C ambient temperature. Additional temperature coefficient 0.25% of mv/K.	0.1 ppm	t_{90} <40 s
NO measurement	0 to 3000 ppm	±5 ppm (0 to 99 ppm) ±5% of mv (100 to 1999 ppm) ±10% of mv (2000 to 3000 ppm)	1 ppm	t_{90} <30 s
NO_{low} measurement	0 to 300 ppm	±2 ppm (0 to 39.9 ppm) ±5% of mv (remaining range)	0.1 ppm	t_{90} <30 s
NO_2 measurement*	0 to 500 ppm	±10 ppm (0 to 199 ppm) ±5% of mv (remaining range)	0.1 ppm	t_{90} <40 s
SO_2 measurement*	0 to 5000 ppm	±10 ppm (0 to 99 ppm) ±10% of mv (remaining range)	1 ppm	t_{90} <40 s

Measurement range extension

Single dilution factor 5 (standard)

CO measurement (H_2 compensated)	Meas. range Accuracy Resolution	700 ppm to 50000 ppm ±10 % of mv (additional error) 1 ppm
CO_{low} measurement (H_2 compensated)	Meas. range Accuracy Resolution	500 ppm to 2500 ppm ±10 % of mv (additional error) 0.1 ppm
NO_2 measurement	Meas. range Accuracy Resolution	200 ppm to 2500 ppm ±10 % of mv (additional error) 0.1 ppm
SO_2 measurement	Meas. range Accuracy Resolution	500 ppm to 25000 ppm ±10 % of mv (additional error) 1 ppm

Dilution of all sensors, Factor 2 (option, Part no. 0440 3350)

O_2 measurement	If measurement range extension is activated on all sensors: **Accuracy:** ±1 vol.% additional error (0 to 4.99 vol.%) ±0.5 Vol.% additional error (5 to 25 vol.%)	
CO measurement (H_2 compensated)	Meas. range Accuracy Resolution	700 ppm to 20000 ppm ±10 % of mv (additional error) 1 ppm
CO_{low} measurement (H_2 compensated)	Meas. range Accuracy Resolution	500 ppm to 1000 ppm ±10 % of mv (additional error) 0.1 ppm
NO measurement	Meas. range Accuracy Resolution	500 ppm to 6000 ppm ±10 % of mv (additional error) 1 ppm
NO_{low} measurement	Meas. range Accuracy Resolution	300 ppm to 600 ppm ±10 % of mv (additional error) 0.1 ppm
NO_2 measurement	Meas. range Accuracy Resolution	200 ppm to 1000 ppm ±10 % of mv (additional error) 0.1 ppm
SO_2 measurement	Meas. range Accuracy Resolution	500 ppm to 10000 ppm ±10 % of mv (additional error) 1 ppm

	Meas. range	Accuracy	Resolution
Temperature meas. Probe type Type K (NiCr-Ni)	-40 to +1200 °C	±0.5 °C (0 to +99 °C) ±0.5 % of mv (remaining range)	0.1 °C
Draught measurement	-40 to +40 hPa	±0.03 hPa (-2.99 to +2.99 hPa) ±1.5 % of mv (remaining range)	0.01 hPa
Differential pressure measurement	-200 to 200 hPa	±0.5 hPa (-49.9 to 49.9 hPa) ±1.5 % of mv (remaining range)	0.1 hPa
Absolute pressure measurement	600 to +1150 hPa	±10 hPa	1 hPa
Derived parameters			
Efficiency	0 to 120 %		0.1 %
Flue gas loss	0 to 99.9 %		0.1 %
Exhaust gas dewpoint	0 to 99.9 °C		0.1 °C
CO_2 measurement (Calculated from O_2) Adjustment time t90 = < 40 sec.	0 to CO_2 max.	±0.2 Vol. %	0.1 Vol. %

General technical data

Memory	Maximum 100 folders Per folder max. 10 sites Per site max. 200 protocols Max. number of protocols is determined by the number of folders or sites
Controlled diaphragm pump:	Pump flow 0.6l/min (controlled) Hose length max. 7.8 m (corresponds to two probe hose extensions) Max positive pressure/Flue gas +50 mbar Max negative pressure/Flue gas -200 mbar
User-defineable fuels	10 user-defineable fuels incl. test gas as fuel
Weight	600 g
Dimensions	270 x 90 x 65 mm
Storage temp.	-20 to +50 °C
Oper. temp.	-5 to +50 °C
Display	Graphics display: 160 x 240 pixels
Power supply	Rech. block: 3.7V/2.2Ah Power: 6.3 V/1.2A
Material/Housing	TPE PC
Protection class	IP40
Warranty	Analyser 2 years (excluding wear parts, e.g. meas. cells) Rech. batt. 1 year Meas. cells CO, COlow,NO, NOlow, NO2, SO2 1 year O2 meas. cell: 1.5 years

*Max. measurement duration of 2 hours should not be exceeded in order to avoid absorption.

Affordable basic set

The compact flue gas analyser, testo 335, provides an affordable introduction to industrial flue gas analysis engineering. It can be used to carry out spot check measurements lasting up to 2 hours in pure gas, for burner tuning or process monitoring.

Benefits:

- Measurement range extension for CO to continue measuring even in high CO concentrations
- Automatically controlled gas pump for constant pump flow at a negative pressure of -200 mbar up to a positive pressure of max. 50 mbar

Set includes:

- testo 335 flue gas analyser (equipped with O2 and CO), incl. rechargeable battery and calibration protocol
- Modular flue gas probe, immersion depth 335 mm, Ø 8mm, Tmax 1000°C
- Mains unit 100-240 V for mains operation or recharging rechargeable battery in analyser
- Spare particle filters (10 off)
- Transport case

Recommended set: Professional set for measuring emissions

During quick checks on emissions, flow speed is also measured simultaneously with flue gas. In this way, for example, the position of a stationary sampling probe can be checked or mass flow can be calculated simultaneously.

Benefit:

- Measurement range extension for all sensors - measuring cells can be protected in the case of unexpectedly high concentrations of different gases and the measurement can continue

Set includes:

- testo 335 flue gas analyser (equipped O2, CO and NO), incl. rechargeable battery and calibration protocol
- Option of measurement range extension for all sensors
- Option of built-in flow/differential pressure measurement incl. calculation of volume flow, mass flow
- Modular flue gas probe, immersion depth 335 mm, Ø 8mm, Tmax 1000°C
- Pitot tube, stainless steel 0635 2041
- Mains unit 100-240 V for mains operation or charging rechargeable battery in analyser
- Spare particle filter (10 off)
- Transport case

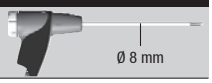
Ordering data

Qty.	Affordable basic set	Part no.
	- testo 335 flue gas analyser (equipped with O2 and CO), incl. rechargeable battery and calibration protocol - Modular flue gas probe, immersion depth 335 mm, Ø 8mm, Tmax 1000°C - Mains unit 100-240 V for mains operation or recharging rechargeable battery in analyser - Spare particle filters (10 off) - Transport case	0563 3317 70

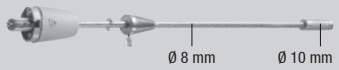
Qty.	Analyser / Options / Upgrades	Part no.
	testo 335 flue gas analyser, rechargeable battery and calibration protocol included, equipped with O2 sensor	0632 3350
	A second measurement module must be fitted in testo 335, the instrument will not be able to function otherwise. Only two additional measurement modules can be fitted.	
	Option: CO measurement module, 0 to 10000 ppm	0440 3988
	Option: COlow measurement module, 0 to 500 ppm	0440 3936
	Option: NO measurement module, 0 to +3000 ppm NO	0440 3935
	Option: NOlow measurement module, 0 to +300 ppm NO	0440 3928
	Option: NO2 measurement module, 0 to +500 ppm NO_2	0440 3926
	Option: SO2 measurement module, 0 to +5000 ppm SO_2	0440 3927
	Option: dilution of all sensors	0440 3350
	Option: pressure/flow measurement (not upgradable)	0440 3351
	Information on further instrument updates on request	

Qty.	Accessories	Part no.
	100-240 V mains unit, for mains operation or batt. recharging in analyser	0554 1086
	Testo printer with wireless IRDA and infrared interface, 1 roll of thermal paper and 4 AA batteries	0554 0547
	Holster (SoftCase) for testo 335 with belt	0516 0335
	Spare rech. batt. w/ charging station	0554 1087
	Transport case	0516 3350
	Spare particle filter (10 off)	0554 3385
	ISO calibration certificate/flue gas, calibration points 2.5% O2; 100 and 1000 ppm CO; 800 ppm NO; 80 ppm NO2; 1000 ppm SO2	0520 0003

Qty.	Software	Part no.
	"easyEmission" software for testo 335, with USB cable to connect instrument to PC	0554 3334
	Software upgrade from testo 335 "easyEmission" to testo 350-S/-XL "easyEmission"	0450 3334

Qty.	Probes	Part no.
	Modular flue gas probes, available in 2 lengths, incl. probe stop for positioning, NiCr-Ni thermocouple, 2.2 m hose and particle filter 	
	Flue gas probe, modular, 335 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni (Tl) Tmax 500°C and hose 2.2 m	0600 9766
	Flue gas probe, modular, 700 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni (Tl) Tmax 500°C and hose 2.2 m	0600 9767
	Flue gas probe, modular, 335 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni (Tl) Tmax 1000°C and hose 2.2 m	0600 8764
	Flue gas probe, modular, 700 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni Tmax 1000°C and hose 2.2 m	0600 8765
	Flue gas probe, modular, with preliminary filter, 335 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni (Tl) Tmax 1000°C and hose 2.2 m	0600 8766
	Flue gas probe, modular, with preliminary filter, 700 mm immersion depth, incl. probe stop, thermocouple NiCr-Ni (Tl) Tmax 1000°C and hose 2.2 m	0600 8767

Qty.	Gas sampling probes for industrial engines	Part no.
		
	Flue gas probe for industrial motors, 335 mm immersion depth, with probe stop, built-in condensate trap and heat protection plate, Tmax 1000 °C, special hose for NO_2/SO_2 measurements, 2.2 m long	0600 7560
	Flue gas probe for industrial motors with probe shaft prefilter, 335 mm immersion depth, with probe stop, built-in condensate trap and heat protection plate, Tmax 1000 °C, special hose for NO_2/SO_2 measurements, 2.2 m long	0600 7561

Qty.	Probe accessories	Part no.
	 	
	Hose extension, 2.8 m, extension cable for probe and analyser	0554 1202
	Probe shaft with preliminary filter, 335 mm long, with probe stop, Ø 8 mm, Tmax 1000 °C	0554 8766
	Probe shaft with preliminary filter, 700 mm long, with probe stop, Ø 8 mm, Tmax 1000 °C	0554 8767
	Spare sintered filter (2 off)	0554 3372
	Probe shaft, 335 mm long, with probe stop, Ø 8 mm, Tmax 500 °C	0554 9766
	Probe shaft, 700 mm long, with probe stop, Ø 8 mm, Tmax 500 °C	0554 9767
	Probe shaft, 335 mm long, with probe stop, Ø 8 mm, Tmax 1000 °C	0554 8764
	Probe shaft, 700 mm long, with probe stop, Ø 8 mm, Tmax 1000 °C	0554 8765

Qty.	Industrial gas sampling probes - modular system	Part no.
	Adapter, non-heated	0600 7911
	Extension pipe to +600 °C, stainless steel 1.4571	0600 7802
	Extension pipe to +1200 °C, Inconel 625	0600 7804
	Non-heated sampling pipe to +600 °C, stainless steel 1.4571	0600 7801
	Non-heated sampling pipe to +1200 °C, Inconel 625	0600 7803
	Non-heated sampling pipe to +1800 °C, Al-Oxide	0600 7805
	Preliminary filter for dusty flue gases, ceramic **Preliminary filter can only be mounted on extension pipe 0600 7802 or 0600 7804.**	0554 0710
	Gas sampling hose for accurate NO_2/SO_2 measurements with built-in condensate trap, 2.2 m long	0554 3352
	Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 1.2 m long	0430 0065
	Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 2.2 m long	0430 0066
	Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 3.2 m long	0430 0067
	Mounting flange, stainless steel 1.4571, adjustable quick-action fitting suitable for all sampling/extension pipes	0554 0760

Qty.	Temperature probes	Part no.
	Mini ambient air probe, Tmax +80°C, for separate ambient air temperature measurement	0600 3692
	Pipe wrap probe for pipes with diameter of up to 2", for flow/return temp. meas. in hydronic systems	0600 4593
	Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C	0604 0194
	Mini ambient air probe, 60 mm immersion depth, w. probe stop, magnetic clip, Tmax +100°C, for dual wall clearance temp. meas. in systems w. outside primary air intakes	0600 9797

Qty.	Pitot tubes	Part no.
	Pitot tube, 350 mm long	0635 2145
	Pitot tube, 1000 mm long	0635 2345
	Pitot tube made of stainless steel, -40 to +1000°C, 350 mm long	0635 2041
	Pitot tube, stainless steel, -40 to +1000 °C, 750 mm long	0635 2042
	ISO calibration certificate velocity, hot wire, vane anemometer, Pitot tube; calibration points 1; 2; 5; 10 m/s	0520 0004
	ISO calibration certificate velocity, hot wire, vane anemometer, Pitot tube; calibration points 5; 10; 15; 20 m/s	0520 0034

Qty.	Additional probe accessories	Part no.
	Connection hose, silicone, 5m long, max. load 700 hPa (mbar)	0554 0440
	Cable, 1.5 m long, connects probe with plug-in head to meas. instrument	0430 0143
	Cable, 5 m long, connects probe with plug-in head to measuring instrument	0430 0145

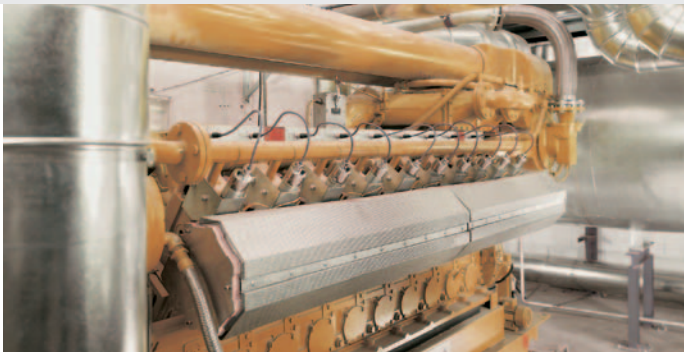
Application

Service and maintenance of industrial burners

During adjustments of industrial burners long-term measurements are often necessary. testo 335 allows measurement programs to run independently making spot check measurements lasting up to max. two hours possible.

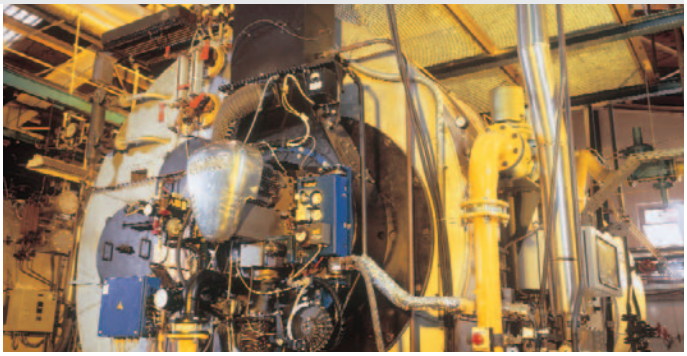
Short-time adjustments resp. control measurements at stationary block heat and power plant engines

For short routine checks at stationary gas engines the measurement of real NOx (separat sensors for NO and NO2) with the testo 335 enables controlling adjustments of these engines.



Start-up of furnaces

Very high CO concentrations may occure particularly when starting-up combustion systems. As protection, the CO sensor can be diluted with fresh air. In this way, the CO measurement range is extended to 50,000 ppm.



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