testo

testo 350-S
testo 350-XL

Portable Flue Gas Analyzer System testo 350

Measurements on stationary engines and burners, gas turbines and complex thermoprocesses

NEW!

°C

O_2

CO

CO_{LOW}

NO

NO_{XLOW}

CO_2 (IR)

SO_2

λ / qA
CO_2

HC

H_2S

mA
mV

hPa

m/s

m³/h

t/y

Fuel savings - accurate measurement values in the name of efficiency and the environment

The testo 350-S/-XL is a versatile and portable measurement system. Depending on the wishes and requirements of the customer, it consists of a control unit, a flue gas analyzer and a gas sampling probe.

Accurate values are indispensable in emission control, thermoprocess control and when adjusting the economic effectivity of your system. The internationally tried and tested testo 350-S/-XL, with its large display for fast and easy readings, is the ideal tool for the professional adjustment and regular maintenance of your system.

Control unit,
removable with integrated printer and display

Flue gas analyzer
with integrated measurement modules and Peltier gas preparation

Tests and permits
• TÜV Bavaria RgG 211
• Conforms to DIN EN 50379 Part 2

Gas sampling probe

Different gas sampling probes for different applications

Suitable velocity and gas sampling probes as well as temperature probes are available for different applications. The gas sampling probes are equipped with probe shafts up to max. 3 metres, depending on the requirements. Optionally, we offer a probe pre-filter for dusty flue gases and special probe shafts for temperatures up to a maximum of 1800 °C. In order to avoid condensation, a heated handle and a heated probe shaft are available.

Standard gas sampling probes

Modular industrial gas sampling probe
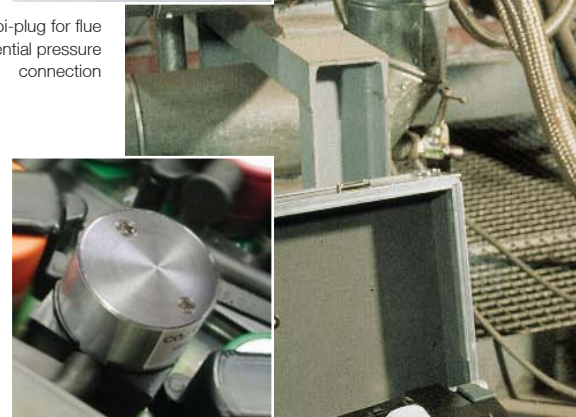
Bent Pitot tubes
for determining flow velocity
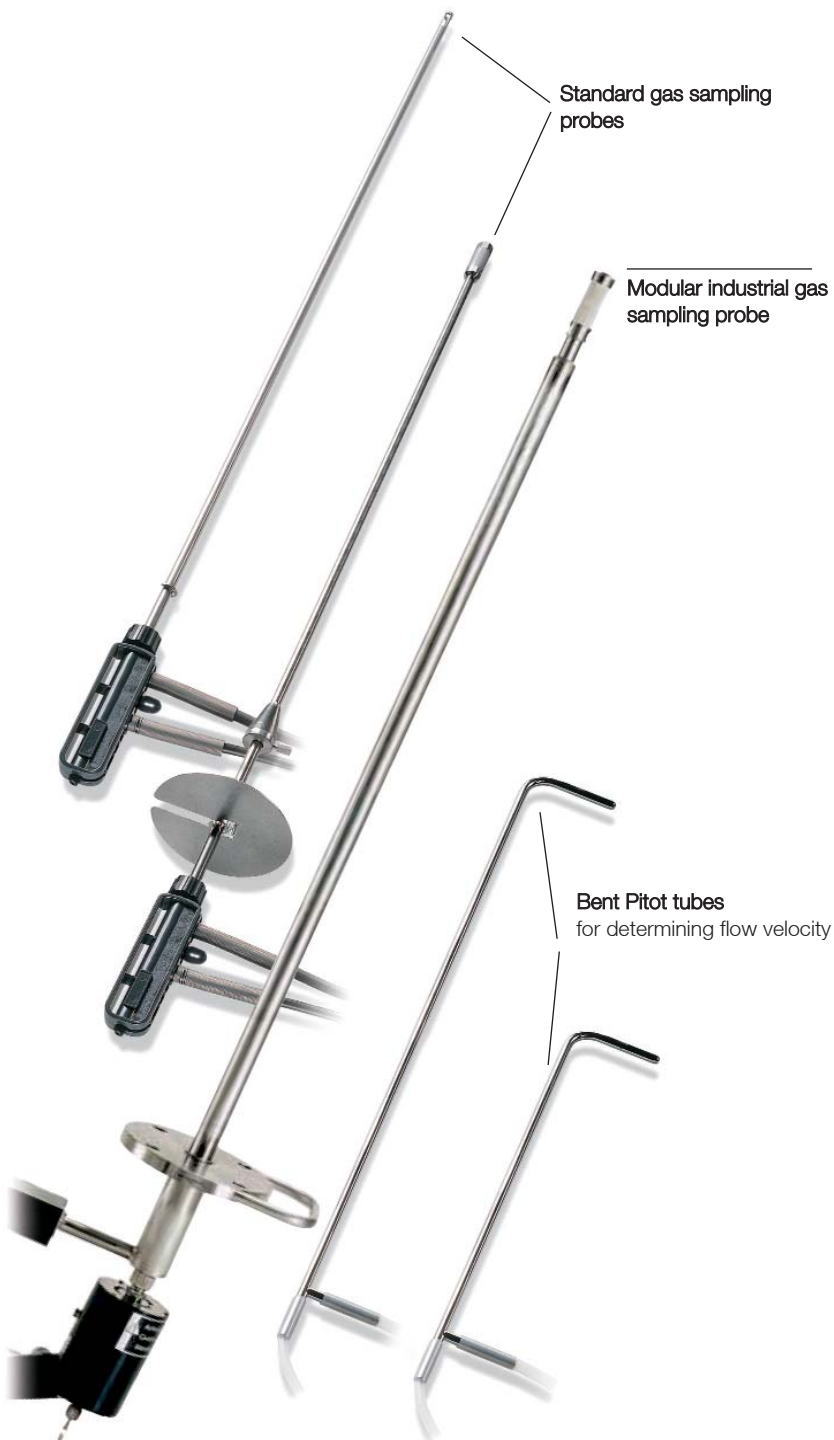
Measuring cells can be changed quickly and easily by the user on site

Robust combi-plug for flue gas and differential pressure connection

Infrared (NDIR) measuring module for direct CO_2 measurement

Measuring cell heating element – protects from damage caused by condensate and increases sensor reaction times in low ambient temperatures

3

The control unit

For portable applications in industrial systems, the measuring instrument must be as versatile, as easy to transport and as robust as possible.

For this reason, the control unit with which the flue gas analyzer testo 350-S/-XL is controlled, is removable.

Especially for applications in which there is a great distance between the gas sampling site and the burner (measurement site), the control unit can be connected to the flue gas analyzer with a databus cable. This allows even large distances to be bridged.

The measurement values are documented with the built-in printer in the control unit. In addition to this, the control unit testo 350-XL can be used as a separate hand-held measuring instrument for differential pressure (integrated), and for temperature, humidity, velocity etc., using the additional probe input.

Control unit testo 350-S

Testo databus connection

Connection RS232

Control unit testo 350-XL

Connection differential pressure/velocity measurement

Connection additional probes

Testo databus connection

Connection RS232

Differences between control units at a glance		
	testo 350 S control unit	testo 350 XL control unit
Built-in printer	■	■
Differential pressure measurement (-40 to +40 hPa / -200 to +200 hPa)	–	■
1 user-defined probe socket (for e.g. temperature, relative humidity measurement, etc.)	–	■
Touchscreen	–	○
Connection from a flue gas analyser to the Testo data bus	■	■
Connection of several flue gas analysers, analog output boxes and testo 454 loggers to the Testo data bus	–	■
NiMH rechargeable battery pack	–	■
Internal memory for 250,000 readings	–	■

■ = Standard   ○ = upgrade option   – = Not possible

The flue gas analyzer testo 350-S/-XL

The flue gas analyzer is the "heart" of the measuring system and is available in two different versions:

The basic version testo 350-S

The testo 350-S is equipped with a measuremnt cell for O_2 as standard. A 2nd measurement module must be installed. Up to a maximum of 5 further measurement modules can be retrofitted. The measurement modules NO_2, SO_2, NO, NO_{low}, CO, CO_{low}, H_2S, C_XH_Y or CO_2 by infrared measurement module are optionally available. Temperature and differential pressure are also measured and the usual parameters such as CO_2 and qA are calculated.

The extended version testo 350-XL

The testo 350-XL is equipped with measurement modules for O_2, CO, NO and NO_2 as standard. In addition to this, measurement modules for C_XH_Y, NO_{low}, CO_{low}, SO_2, H_2S or CO_2 by infrared module are optionally available. Parallel to the features of the S-version, the flue gas analyzer testo 350-XL has a Peltier gas preparation with a peristaltic hose pump for the controlled removal of condensate as well as a fresh air valve for long-term measurements over several hours. Both versions of the flue gas analyzer can be equipped with a maximum of up to 6 measurement modules, have as standard a built-in rechargeable battery (for mains-independent use), a measurement store (250,000 values), as well as a testo databus connection. All features of the flue gas analyzer testo 350-XL can be retrofitted in the testo 350-S.

For portable applications, the 3 permitted operating positions of the flue gas analyzer are interesting.

• lying (e.g. in the case)

• upright (as a data logger in combination with the wall-holder)

• hanging on the carrying strap

The system concept testo 350 S/-XL for simultaneous measurement at different measurement sites

In the area of industrial systems, a simultaneous gas or process analysis often has to take place at different measurement sites. To do this, the flue gas analyzers testo 350-S or testo 350-XL are positioned at the respective measurement site and connected via the testo databus. A complex measurement site switch is not necessary. The flue gas analyzers can then be operated either via the control unit or via a PC. Analog output boxes can be looped into the databus for the output of the measurement data as an analog signal (4 to 20 mA). The boxes all have 6 freely connectable channels each, which are freely scalable depending on the application.

Differences between flue gas analysers at a glance		testo 350 S	testo 350 XL
Maximum no. of measuring modules		6	6
O_2	0 – 25 Vol.	■	■
CO (H2)	0 – 10,000 ppm	○	■
CO_{low} (H2)	0 – 500 ppm	○	○
NO	0 – 3,000 ppm (0.1 ppm resolution)	○	■
NO_{low}	0 – 300 ppm (0.1 ppm resolution)	○	○
NO_2	0 – 500 ppm (0.1 ppm resolution)	○	■
SO_2	0 – 5,000 ppm	○	○
HC	0 – 4 Vol. % (0.001 % resolution)	○	○
H_2S	0 – 300 ppm (0.1 ppm resolution)	○	○
CO_2 (NDIR)	0 – 50 Vol. %	○	○
Built-in gas preparation unit (is recommended with high humidity levels in flue gas and during long-term measurements >2 hrs measuring time)		○	■
Automatic fresh air rinse with valve (incl. measurement range extension with dilution factor 5 for all sensors)		○	■
Measurement range extension for CO measuring module (with selectable dilution factors)		○	○
CO measuring module switch-off via adjustable switch-off threshold		■	■
Trigger input – stops and starts measurement externally		○	○
Differential pressure measurement (-40 to +40 hPa / -200 to +200 hPa)		■	■
Built-in rechargeable battery		■	■
2 temperature probe sockets (Type K NiCr-Ni)		■	■
Data logger (250,000 readings)		■	■
Testo data bus connection		■	■

■ = Standard   ○ = upgrade option

Standard gas sampling probe

The affordable standard sampling probe is available in lengths of 335 mm and 700 mm and for different temperature ranges. The outer shaft with filter is used for dusty flue gases. The hose has a standard length of 2.2 m (5 m, optional).

The selection of the right probe is critical for accurate and consistent measurements. Because the sampling locations are often different, it's beneficial to have a standard probe designed for a wide variety of applications. In addition to the standard sampling probes, Testo also offers probe systems for specific industrial applications.
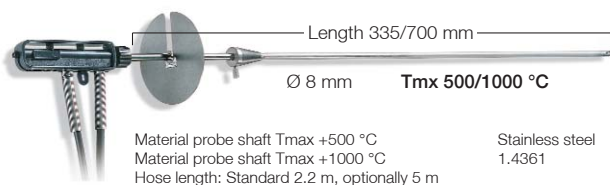
The probe has to endure extreme conditions when measuring flue gases:

• High temperatures
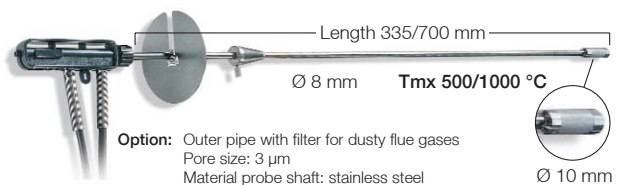• Corrosive condensate
• Dust
• Mechanical loads.

Standard gas sampling probes, available in the lengths 335 mm and 700 mm

Standard gas sampling probe

Length 335/700 mm
Ø 8 mm   **Tmx 500/1000 °C**

Material probe shaft Tmax +500 °C   Stainless steel
Material probe shaft Tmax +1000 °C   1.4361
Hose length: Standard 2.2 m, optionally 5 m

Outer pipe with sensor pre-filter (optional)

Length 335/700 mm
Ø 8 mm   **Tmx 500/1000 °C**

Option: Outer pipe with filter for dusty flue gases
Pore size: 3 µm
Material probe shaft: stainless steel

Ø 10 mm

Standard flue gas sampling probe, 335 mm long		Part no.
Basic flue gas probe, 335 mm immersion depth incl. probe stop, NiCr-Ni (TI) T/C Tmax 500°C, probe shaft: stainless steel 1.4361, 2.2 m hose, robust plug-in coupling	335 mm Ø 8 mm	0600 7451
Options: Outer shaft with filter, Tmax. +800 °C, 335 mm long, for dusty flue gases, 3 µm pore size, probe shaft stainless steel 1.4841 (Tmax +1000 °C)	335 mm Ø 8 mm Ø 10 mm	0440 7435
or: Heat-resistant probe shaft (material: stainless steel 1.4841) with heat-resistant plate, 335 mm long, Tmax + 1000 °C		0440 7437
Hose, 5 m long		0440 7443
Special hose for NO2/SO2 measurements, 2.2 m long*		0440 7442
Special hose for NO2/SO2 measurements, 5 m long*		0440 7445
Standard gas sampling probe, 700 mm long		Part no.
Basic flue gas probe, 700 mm immersion depth incl. probe stop, NiCr-Ni (TI) T/C Tmax 500°C, probe shaft: stainless steel 1.4361, 2.2 m hose, robust plug-in coupling	700 mm Ø 8 mm	0600 7452
Options: Outer shaft with filter, Tmax. +800°C, 700mm long, for dusty flue gases, 3 µm pore size, probe shaft: stainless steel 1.4841 (Tmax +1000 °C)	700 mm Ø 8 mm Ø 10 mm	0440 7436
or: Heat-proof probe pipe with heat protection plate, 700 mm long, Tmax +1000°C		0440 7438
Hose, 5 m long		0440 7444
Special hose for NO2/SO2 measurements, 2.2 m long*		0440 7442
Special hose for NO2/SO2 measurements, 5 m long*		0440 7446
* Use outer shaft with filter for dusty flue gases.		
Accessories for outer pipe with filter		Part no.
Spare sintered filter (2 off)		0554 3372

Industrial gas sampling probes – Modular system

We are dealing here with a modular, portable probe system. The basis for the system is the heated handle or the non-heated adapter to which the sampling hoses are connected.

A thermocouple, which is connected to the testo 350 S/XL flue gas analyser, is used for simultaneous temperature measurements. The probe can be adapted for larger flue gas ducts using extension pipes (up to max. 3m). A preliminary filter is screwed on to protect the probe in dusty gases.
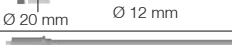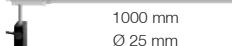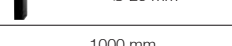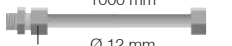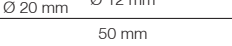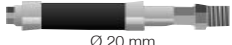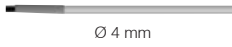
The heated probe is used for moist flue gases to avoid incorrect readings caused by the absorption of NO_2 and SO_2 . The probes are attached quickly and securely to the flue gas duct using the mounting flange.

Non-heated probe pipes are used for flue gases up to 1200 °C. The non-heated adapter can be used instead of a heated handle to measure O_2, CO and NO or dry flue gases.

Ceramic sampling pipes which can withstand the enormous thermal load are used for measurements at more than 1200 °C.

Industrial gas sampling probes, a modular probe system suitable for every application

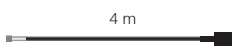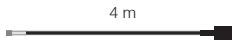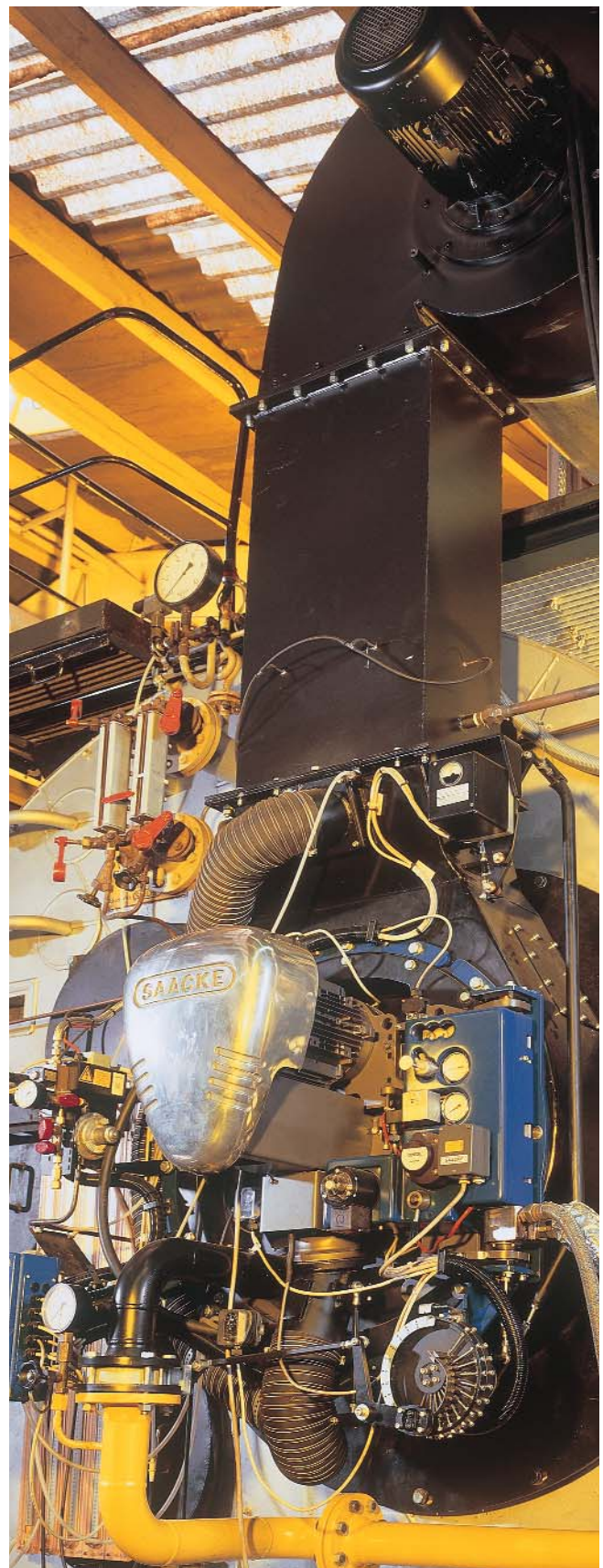| Industrial gas sampling probes - modular system			Part no.
Heated handle		Power consumption: 200 watts; Temp. gas path: > 180 °C; Ready to operate: after approx. 20 min; Length of mains cable: 3 m; Protection class: IP54; Ambient temp.: -20 to +50 °C; gas inlet: G1/4"; gas outlet: M 10x1 outer thread; weight: 1.7 kg	0600 7920
Adapter, non-heated		Ambient temp.: -20 to +50 °C; Protection class: IP54; Gas inlet: G1/4?; Gas outlet: M 10x1 outer thread; Weight: 0.4 kg	0600 7911
Sampling pipe, +600 °C, 1 m long, material: stainless steel 1.4571	1000 mm / Ø 20 mm / Ø 12 mm	Connection: G1/4"; Weight: 0.4 kg	0600 7801
Sampling pipe, +1200 °C, 1 m long, material: Inconel 625			0600 7803
Sampling pipe, +1800°C, 1 m long, material: Al-Oxide	1000 mm / Ø 20 mm / Ø 12 mm	Connection: G1/4"; Weight: 0.4 kg	0600 7805
Heated sampling pipe (230 V)	1000 mm / Ø 25 mm	Heating: > +180 °C; power consumption: 650 watts; Connection: electr. connection to heated handle, connection adapter with thread connection/screw socket G1/4"; Max. flue gas temp.: +600 °C	0600 7820
Heated sampling pipe (115V)			0600 7821
Extension pipe, +600°C, 1 m long, material: stainless steel 1.4571	1000 mm / Ø 20 mm / Ø 12 mm	Connection: Thread screw/screw socket G1/4"; Weight: 0.45 kg	0600 7802
Extension pipe +1200 °C, 1 m long, material: Inconel 625			0600 7804
Ceramic preliminary filter for dusty flue gases, Tmax +1000°C **Preliminary filter can only be mounted on extension pipe 0600 7802 or 0600 7804.**	50 mm / Ø 20 mm	Dust load: max. 20 g / m3; filter fineness: 20 µm; Temperature: max. 1000 °C; Material: ceramic; Connection: G1/4" thread nipple; Weight: 0.2 kg	0554 0710
Thermocouple, 1.2m long, for flue gas temp. meas., Tmax. +1000°C	Ø 4 mm	Connection: To analyser via 4 m connection cable with 8 pin plug; Weight: 0.15 kg. The length depends on the number of sampling and extension pipes used.	0430 0065
Thermocouple, 2.2m long, for flue gas temperature measurement, Tmax +1000°C			0430 0066
Thermocouple, 3.2m long, for flue gas temperature measurement, Tmax. +1000°C			0430 0067
Gas sampling hose, 4 m, standard version	4 m	Weight: 0.4 kg	0554 3382
Special sampling hose for accurate NO2/SO2 measurements, 4 m long	4 m	Hose material inside: PFFE hose with 2 mm inner diameter (lowest absorption, self-cleaning effect); Material outside: rubber; length: 4.0 m; Weight: 0.45 kg	0554 3384
Mounting flange, stainless steel, incl. quick-action chuck , adjustable quick-action fitting suitable for all sampling/extension pipes	130 mm / Ø 6.30 mm		0554 0760

Cases	Part no.
Transport case for industrial probes, aluminium, space for: handle, probes, flange and accessories, dimensions: 1270 x 320 x 140 mm	0516 7900

Measurement System and Practical Accessories

testo 350 S control unit	Part no.
Control unit displays measurement data and controls measurement system, built-in printer, connection for Testo data bus and terminal plug included	0563 0369

testo 350 XL control unit	Part no.
Control unit displays measurement data and controls the measurement system, incl. built-in printer, pressure measurement 40/200 hPa, 1 user defined probe socket, programmable measurements and memory space for 250,000 readings, connection for Testo data bus, incl. terminal plug	0563 0353

Additional options only for control unit testo 350 XL	
Touch screen with pen (available only with original order), for easy input of text and values	0440 0559
Spare thermal paper for printer (6 rolls)	0554 0569
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Power unit 230 V/ 8 V/ 1 A, for instrument (European plug)	0554 1084

testo 350 S flue gas analyser	
testo 350 S flue gas analyser, equipped with: O_2, differential pressure measurement, 2 temperature probe sockets, testo data bus connection, built-in rechargeable battery, data logger, can be upgraded to max. 6 measurement modules (with NO, NO_2, CO, H_2S, HC, SO_2, CO_2 NDIR)	0563 0368

A second measurement module must be installed in testo 350 S, otherwise the instrument is unable to function. Up to 5 additional measurement modules can be fitted.	
Option: COlow measurement module	0440 3936
Option: CO measurement module	0440 3988
Option: CO2 meas. module (infrared meas. principle, absolute pressure meas. and CO2 absorption filter with refill pack incl.)	0440 0417
Option: HC measurement module (nonburned hydrocarbons)	0440 3929
Option: H2S measurement module	0440 3930
Option: NO measurement module	0440 3935
Option: NOlow measurement module	0440 3928
Option: NO2 measurement module	0440 3926
Option: SO2 measurement module	0440 3927
Option: Peltier gas preparation with hose pump to empty condensate automatically	0440 0355
Fresh air valve for long-term measurement (measurement range extension with dilution factor 5 for all sensors included)	0440 0557
Measuring range extension for CO measurement module (dilution), built into analyser box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0440 0555
Event trigger socket, for starting and stopping measurement externally, built into analyser box	0440 3932

testo 350 XL flue gas analyser box	
testo 350 XL analyser box, equipped with O_2, CO (with switch-off and rinse function), NO, NO_2, differential pressure measurement, 2 temperature probe sockets, gas preparation, Testo data bus adapter, automatic fresh air rinse with valve (including measurement range extension with dilution factor 5 for all sensors), built-in rechargeable battery, data memory, can be upgraded to max. 6 measurement modules (with H_2S, HC, SO_2, CO_2 NDIR)	0563 0350
Option: COlow measurement module	0440 3925
Option: CO2 meas. module (infrared meas. principle, absolute pressure meas. and CO2 absorption filter with refill pack incl.)	0440 0417
Option: NOlow measurement module	0440 3934
Option: SO2 measurement module	0440 3927
Option: HC measurement module (nonburned hydrocarbons)	0440 3929
Option: H2S measurement module	0440 3930
Measuring range extension for CO measurement module (dilution), built into analyser box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0440 0555
Event trigger socket, for starting and stopping measurement externally, built into analyser box	0440 3932

Correct adjustment and maintenance of industrial furnace systems with testo 350-S/-XL

Measurement System and Practical Accessories

Transport case and accessories for flue gas analyser box	Part no.
Wall holder for analyser box incl. heat protection plate, can be locked	0554 0203
Protective cover for analyser box (can also be used with wall holder)	0554 0199
Carrying belt set for analyser box and control unit	0554 0434
Transport case for analyser, probes and accessories	0516 0351
System case (aluminium), with drawer for accessories, for transport and protection during measurement	0516 0352
Additional box for system case 0516 0352, can be snapped on	0516 0353
Transport case for industrial probes, aluminium; space for: handle, probes, flange and accessories	0516 7900
Calculation of fuel-specific factors to accurately display calculated variables in deviating fuels (calculation for one fuel)	0991 0030
Spare particle filter, pack of 20	0554 3381
Hose set to convey flue gas from analyser box, 5 m long	0554 0451
Refill pack of filter pellets for CO2 absorption filter	0554 0369
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

testo 454 logger and accessories	Part no.
Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder	0577 4540
Alarm/trigger cable	0554 0012
Holding unit/Theft-proof with lock for logger wall holder	0554 1782
Power box, connected to control unit to increase operating life, for a battery-operated measuring system	0554 1045
Mains unit for power box (110/230 V; 50/60 Hz, 12 V, 3 A)	0554 1143
Analog output box, 6 channels, 4 to 20 mA, for output on an analog recorder or process control, (please also order mains unit 0554 1084)	0554 0845
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Recharger for control unit or logger (with 4 standard rechargeable batteries), rechargeable batteries are recharged externally	0554 0110
Power unit 230 V/ 8 V/ 1 A, for instrument (European plug), for separate use of control unit	0554 1084

Accessories for Testo data bus	Part no.
Mains unit (110/230 V; 50/60 Hz, 12 V, 3 A) supplies power to Testo data bus, when using the Testo plug-in card	0554 1145
Terminal plug for Testo data bus, for loggers and special lengths	0554 0119
Connection cable, 2 m, for Testo data bus	0449 0042
Connection cable, 5 m, for Testo data bus	0449 0043
Connection cable, 20 m, for Testo data bus	0449 0044

Additional cable lengths up to 1000 m on request

PC software	Part no.
"easyEmission" software for testo 350 S/XL, RS232 cable for connecting instrument to PC included	0554 3335
"easyEmission" software for testo 350 S/XL, Testo data bus controller included, with USB to connect instrument to PC, cable for Testo data bus and terminal plug	0554 3336
Software upgrade of "easyEmission" testo 350 S/XL to "easyEmission" testo 335	0450 3335

Accessories for flue gas analyser	Part no.
Cable to connect measuring instrument to pulse counter for gas flow measurement	0554 0536
Electrical isolation for RS232 (connects measuring instrument to PC)	0554 0006

"easyEmission" software, RS232 cable included

The complete data management solution for flue gas analysis
- User-defined measurement intervals (1 measurement/s up to 1 measurement/hour)
- Readings transferred in seconds to Microsoft EXCEL®
- User-defined fuels
- Readings shown in tables or graphs
- Easy to produce custom-designed measurement logs

"easyEmission" software for testo 350 S/XL, RS232 cable for connecting instrument to

Part no.	0554 3335

Software with analysis and graphics functions, online measurement

"easyEmission" software, Testo data bus controller with USB connection

If, for example, several testo 350 S/ XL flue gas analysers are connected to the Testo data bus, they can then be controlled and read out on your PC. In this way, a faster measurement cycle (<5 s) can be set for each flue gas analyser than with the RS232 cable.

"easyEmission" software for testo 350 S/XL, Testo data bus controller included, with USB to connect instrument to PC, cable for Testo data bus and terminal plug

Part no.	0554 3336

Software with analysis and graphics functions, online measurement

Cases

1 Transport case for analyser, probes and accessories

Part no.	0516 0351

2 System case (aluminium), for analyser, probes, incl. drawer for accessories

Part no.	0516 0352

1 Transport case
2 System case

Analog output box (mA out)

Analog output boxes can be looped into the data bus to output the measurement data as an analog signal (4 – 20 mA). Each box has 6 user-defined channels which can be scaled according to application.

Analog output box for output on an analog recorder or for control purposes

Part no.	0554 0845

9

Technical Data for testo 350 S/XL control unit and testo 454 logger box

	testo 350 S control unit	testo 350 XL control unit	Logger, measures and saves readings	Analog output box (mA out)
Oper. temp.	-5 to +45 °C	-5 to +45 °C	-10 to +50 °C	-10 to +50 °C
Storage temp.	-20 to +50 °C	-20 to +50 °C	-25 to +60 °C	-25 to +60 °C
Battery type	4 AA batteries	4 AA batteries	Alkali manganese	–
Battery life	8 h	8 h	24 h	–
Memory	–	250000 readings	250000 readings	–
Weight	850 g	850 g	450 g	305 g
Dimensions	252 x 115 x 58 mm	252 x 115 x 58 mm	200 x 89 x 37 mm	200 x 89 x 37 mm
Warranty	2 years	2 years	3 years	3 years

Technical data for testo 350 XL control unit and testo 454 logger box

Probe type	Vane	Thermal	Testo humid. sensor, cap.	Pressure	
Meas. range	0 to +60 m/s	0 to +20 m/s	0 to +100 %RH	+10 to +30000 hPa	
Accuracy ±1 digit	See probe data for system accuracy	±0.01 m/s (0 to +1.99 m/s) ±0.02 m/s (+2 to +4.99 m/s) ±0.04 m/s (+5 to +20 m/s)	See probe data	Probe 0638 1345 Probe 0638 1445 Probe 0638 1545 Probe 0638 1645 ±0.1% of m.v.	
Resolution	0.01 m/s (for Ø 60/100 mm), 0.1 m/s (for remaining probes)	0.01 m/s (0 to +20 m/s)	0.1 %RH (0 to +100 %RH)	0.001 hPa (probe 0638 1345) 0.001 hPa (probe 0638 1445) 0.01 hPa (probe 0638 1545)	
Probe type	Pt100	Type K (NiCr-Ni)	Type S (Pt10Rh-Pt)	Type J (Fe-CuNi)	Type T (Cu-CuNi)
Meas. range	-200 to +800 °C	-200 to +1370 °C	0 to +1760 °C	-200 to +1000 °C	-40 to +350 °C
Accuracy ±1 digit	±0.1 °C (-49.9 to +99.9 °C) ±0.4 °C (-99.9 to -50 °C) ±0.4 °C (+100 to +199.9 °C) ±1 °C (-200 to -100 °C) ±1 °C (+200 to +800 °C)	±0.4 °C (-100 to +200 °C) ±1 °C (-200 to -100.1 °C) ±1 °C (+200.1 to +1370 °C)	±1 °C (0 to +1760 °C)	±0.4 °C (-150 to +150 °C) ±1 °C (-200 to -150.1 °C) ±1 °C (+150.1 to +199.9 °C)	±0.4 °C (-40 to +200 °C) ±1 °C (+200.1 to +350 °C)
Resolution	0.01 °C (-99.9 to +300 °C) 0.1 °C (-200 to -100 °C) 0.1 °C (+301 to +800 °C)	0.1 °C (-200 to +1370 °C)	1 °C (0 to +1760 °C)	0.1 °C (-200 to +1000 °C)	0.1 °C (-40 to +350 °C)
Probe type	NTC	CO probe	CO2 probe	CO2 probe	
Meas. range	-40 to +150 °C	0 to +500 ppm CO	0 to +1 Vol. % CO_2	0 to +10000 ppm CO_2	
Accuracy ±1 digit	±0.2 °C (-10 to +50 °C) ±0.4 °C (-40 to -11 °C) ±0.4 °C (+51 to +150 °C)	±5% of mv (0 to +500 ppm CO)	See probe data	See probe data	
Resolution	0.1 °C (-40 to +150 °C)				
Probe type	Mechanical	Current/voltage measurement	Current/voltage measurement	Control unit, integ. press. sensor	
Meas. range	+20 to +20000 rpm	0 to +20 mA	0 to +10 V	-200 to +200 hPa	-40 to +40 hPa
Accuracy ±1 digit	(+20 to +20000 rpm)	±0.04 mA (0 to +20 mA)	±0.01 V (0 to +10 V)	±1.5% of mv (-50 to -200 hPa) ±1.5% of mv (+50 to +200 hPa) ±0.5 hPa (-49.9 to +49.9 hPa)	±1.5% of mv (-3 to -40 hPa) ±1.5% of mv (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)
Resolution	1 rpm (+20 to +20000 rpm)	0.01 mA (0 to +20 mA)	0.01 V (0 to +10 V)	0.1 hPa (-200 to +200 hPa)	0.01 hPa (-40 to +40 hPa)

Technical data/testo 350 S/XL flue gas analyser

Probe type	Temperature measurement	O_2 measurement	CO (H2 compensated)	COlow meas. (H2 compensated)	CO_2	NO measurement	NOlow measurement	NO_2 measurement	SO2 measurement
Meas. range	-40 to +1200 °C	0 to +25 Vol. % O_2	0 to +10000 ppm CO	0 to +500 ppm CO	0 to CO_2 max Vol. % CO_2	0 to +3000 ppm NO	0 to +300 ppm NO	0 to +500 ppm NO_2	0 to +5000 ppm SO_2
Accuracy ±1 digit	±0.5% of mv (+100 to +1200 °C) ±0.5 °C (-40 to +99.9 °C)	±0.8% of fsv (0 to +25 Vol. % O_2)	±5% of mv (+200 to +2000 ppm CO) ±10% of mv (+2001 to +10000 ppm CO) ±10 ppm CO (0 to +199 ppm CO)	±5% of mv (+40 to +500 ppm CO) ±2 ppm CO (0 to +39.9 ppm CO)	Calculated from O_2	±5% of mv (+100 to +1999.9 ppm NO) ±10% of mv (+2000 to +3000 ppm NO) ±5 ppm NO (0 to +99 ppm NO)	±5% of mv (+40 to +300 ppm NO) ±2 ppm NO (0 to +39.9 ppm NO)	±5% of mv (+100 to +500 ppm NO_2) ±5 ppm NO_2 (0 to +99.9 ppm NO_2)	±5% of mv (+100 to +2000 ppm SO_2) ±10% of mv (+2001 to +5000 ppm SO_2) ±5 ppm SO_2 (0 to +99 ppm SO_2)
Resolution	0.1 °C (-40 to +1200 °C)	0.01 Vol. % O_2 (0 to +25 Vol. % O_2)	1 ppm CO (0 to +10000 ppm CO)	0.1 ppm CO (0 to +500 ppm CO)	0.01 Vol. % CO_2	1 ppm NO (0 to +3000 ppm NO)	0.1 ppm NO (0 to +300 ppm NO)	0.1 ppm NO_2 (0 to +500 ppm NO_2)	1 ppm SO_2 (0 to +5000 ppm SO_2)
Reaction time		20 s	40 s	40 s	20 s	30 s	30 s	40 s	30 s
Reaction type		t_{95}	t_{90}	t_{90}	t_{95}	t_{90}	t_{90}	t_{90}	t_{90}

Probe type	Efficiency	Flue gas loss	Differential pressure 1	Differential pressure 2	Velocity	CO_2 meas. (IR)	H2S measurement
Meas. range	0 to +120 %	-20 to +99.9 % qA	-200 to +200 hPa	-40 to +40 hPa	0 to +40 m/s	0 to +50 Vol. % CO_2	0 to +300 ppm H_2S
Accuracy ±1 digit			±1.5% of mv (-50 to -200 hPa) ±1.5% of mv (+50 to +200 hPa) ±0.5 hPa (-49.9 to +49.9 hPa)	±1.5% of mv (-40 to -3 hPa) ±1.5% of mv (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)		±0.3 Vol. % CO_2 + 1% of mv (0 to 25 Vol. % CO_2) ±0.5 Vol. % CO_2 + 1.5% of mv (>25 to 50 Vol. % CO_2)	±5% of mv (+40 to +300 ppm) ±2 ppm (0 to +39.9 ppm)
Resolution	0.1 % (0 to +120 %)	0.1 % qA (-20 to +99.9 % qA)	0.1 hPa (-200 to +200 hPa)	0.01 hPa (-40 to +40 hPa)	0.1 m/s (0 to +40 m/s)	0.01 Vol. % CO_2 (0 to 25 Vol. % CO_2) 0.1 Vol. % CO_2 (>25 Vol. % CO_2)	0.1 ppm (0 to +300 ppm)
Reaction time						<10 s	35 s
Reaction type						t_{90}	t_{90}

Measurement range extension

Single dilution with selectable dilution factor (option)

CO measurement (H_2 compensated) COlow meas. (H_2 compensated)	Meas. range	depending on factor selected
	Accuracy	±2 % of mv (additional error)
	Resolution	1 ppm or 0.1 ppm at CO_{low}

Dilution of all sensors by factor 5 (standard testo 350 XL)

O_2 measurement	Reading is not shown in display
HC measurement	Reading is not shown in display
CO_2(IR) meas.	Reading is not shown in display

CO measurement (H_2 compensated)	Meas. range	2500 to 50000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -150 to 0 mbar at probe tip
	Resolution	1 ppm
CO_{low} meas. (H_2 compensated)	Meas. range	500 to 2500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	0.1 ppm
NO measurement	Meas. range	1500 to 15000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	1 ppm
NO_{low} measurement	Meas. range	300 to 1500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -150 to 0 mbar at probe tip
	Resolution	0.1 ppm
NO_2 measurement	Meas. range	500 to 2500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -50 to 0 mbar at probe tip
	Resolution	0.1 ppm
SO_2 measurement	Meas. range	500 to 25000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	1 ppm
H_2S measurement	Meas. range	200 to 1500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	0.1 ppm

Technical data for HC module

Parameter	Methane	Propane	Butane
Meas. range [1]	100 to 40,000 ppm	100 to 21,000 ppm	100 to 18,000 ppm
Accuracy	less than 400 ppm (100 to 4000 ppm) less than 10 % of m.v. (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm) less than 10 % of m.v. (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm) less than 10 % of m.v. (greater than 4000 ppm)
Resolution	10 ppm	10 ppm	10 ppm
Min. 02 req. in flue gas	2% + (2 x methane reading)	2% + (5 x propane reading)	2% + (6.5 x butane reading)
Reaction time t90	less than 40 s	less than 40 s	less than 40 s
Response factor [2]	1	1.5	2

[1] Lower explosion limit must be adhered to.
[2] The HC module is adjusted to methane in the factory. It can be adjusted to another gas by the user.

Additional Technical data

Dimensions: 395 x 275 x 95 mm
Weight: 3200 g
Storage temperature: -20 to +50 °C
Operating temperature: -5 to +45 °C
Housing material: ABS
Memory: 250 000 readings
Power supply: Via built-in mains unit (90 V to 260 V, 47 to 63 Hz) or exchangeable rechargeable batteries
Electrical power consumption: 0.5 A (110 V AC), 0.3 A (230 V AC)
Dewpoint calculation: 0 to 99 °C td
Maximum positive pressure/Flue gas: 50 hPa (500 mm water column)
Maximum negative pressure: 200 hPa (2000 mm water column)
Pump flow: 1 l/min. with flow monitoring

Max. dust load: 20 g/m³ dust in flue gas
Max. humidity load: +70 °C
Dewpoint temperature at sample gas inlet of analyser box
Trigger input: Voltage 5 to 12 Volt (rising or falling edge)
Pulse width > 1 s
Load: 5 V/max, 5 mA, 12 V/max. 40 mA
Warranty: Analysers 2 years (excluding working parts, e.g. measurement cells...);
CO/NO/NO2/SO2/H2C/HC 1 year; O2 measurement cell 1 1/2 years; CO2 IR measurement module 2 years

Recommended for your applications

testo 350 S: Set for fast emission monitoring on industrial burners (O_2, CO, NO)

testo 350 S control unit	0563 0369
testo 350 S flue gas analyser	0563 0368
Option: NO measurement module	0440 3935
Option: CO measurement module	0440 3988
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Connection cable, 2 m, for Testo data bus	0449 0042
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
Transport case for analyser, probes and accessories	0516 0351
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Standard set for measurements on process systems (O_2, CO, NO, NO_2)

testo 350 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL flue gas analyser	0563 0350
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 2.2 m long	0440 7442
Connection cable, 2 m, for Testo data bus	0449 0042
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
Transport case for analyser, probes and accessories	0516 0351
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Portable measurements on motors (O_2, CO, NO, NO_2)

testo 350 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL flue gas analyser	0563 0350
Measurement range extension for CO measurement module (dilution)	0440 0555
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 2.2 m long	0440 7442
Connection cable, 5 m, for Testo data bus	0449 0043
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
System case (aluminium), incl. drawer	0516 0352
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Portable measurements on turbines (O_2, CO_{low}, NO_{low}, NO_2)

testo 350 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
Touchscreen with reader	0440 0559
testo 350 XL flue gas analyser	0563 0350
COlow measurement module, 0 to 500 ppm, built-in in analyser box	0440 3925
NOlow measurement module, 0 to 300 ppm, built-in in analyser box	0440 3934
Measurement range extension for CO measurement module (dilution)	0440 0555
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 5 m long	0440 7445
Connection cable, 5 m, for Testo data bus	0449 0043
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
System case (aluminium), incl. drawer	0516 0352
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569