testo

testo 350-S
testo 350-XL

Portable Emission Analyzer System

For Compliance, Tuning, and Maintenance – The Testing Solution for Your Combustion Application

NEW!

O_2

CO

CO_{LOW}

NO / NO_2

NO_{LOW}

NO_X

CO_2 (NDIR & Calc)

SO_2

HC

H_2S

Temp

Pressure

Flow

Velocity

Efficiency

Mass

Humidity

testo 350 - the total solution for emission testing and combustion analysis

The testo 350 emission analyzer - the world's most advanced - provides compliance level accuracy, extreme testing flexibility, and the highest performance. It's no wonder why the testo 350 is chosen by more professionals for emission testing and process monitoring. Simply put, for every combustion application, it's the only choice.

The testo 350 helps meet ever increasing demands of regulations through continued R&D innovation. Exclusive sensor design, patented sample gas paths, active sample conditioning all come together for a perfect, lightweight, simple-to-use emission monitoring solution. So, whether you are testing for state or EPA compliance, or to troubleshoot and tune your combustion process, the testo 350 will do it all and do it with ease.

Analyzer Box

- Greater accuracy with Testo exclusive Low NO_X and Low CO sensors
- Continuous temperature compensation and sensor temperature control
- Wide testing ranges with integrated sample dilution systems
- Advanced NDIR technology for accurate CO_2 measurement
- Superior sample conditioning for True NO_X results
- Powerful pumps for fast response

Control Unit

- Simple handheld operation provides greater testing flexibility
- Display and print the values you want
- Operate docked or remotely

US EPA
ETV Verified
Advanced Testing Program

Sampling probes

The widest and most complete line available

Recommended for testing using:

- US EPA CTM-030
- US EPA CTM-034
- ASTM D6522
- And state and local testing

Designed for the most important application - yours!

The 350's modular design provides vast opportunities to configure an analyzer system for your specific testing requirement. Plug and play sensors give you optimum versatility. High-velocity sample transport and the integrated thermoelectric cooler make sampling - hassle free! Remote control convenience makes it easy. Application configured kits make the testo 350 perfect for you.

- The most accurate sensors for low range NOx (NO & NO$_2$) and CO (0.1 ppm) or swap out for higher range testing

- Superior sample conditioning proven to be effective, convenient, and vital for ultimate accuracy

- Integrated dilution system for extended testing ranges, greater sensor protection and unlimited testing possibilities

- Easy data logging with on-board, user defined, automatic testing programs that can last for minutes or months

- Powerful software options that provide a wealth of information and complete control from your keyboard

Standard gas sampling probes

13" & 28" lengths with or without pre-filtering

Modular industrial gas sampling probe

3 ft. lengths (from 1200 to 2200°F) with optional pre-filtering, thermocouples, and heated lines
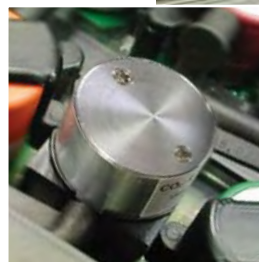
Pitot tubes

for stack flow and velocity measurements. Simply attach for real time display of mass emissions (lbs./hr., etc.)

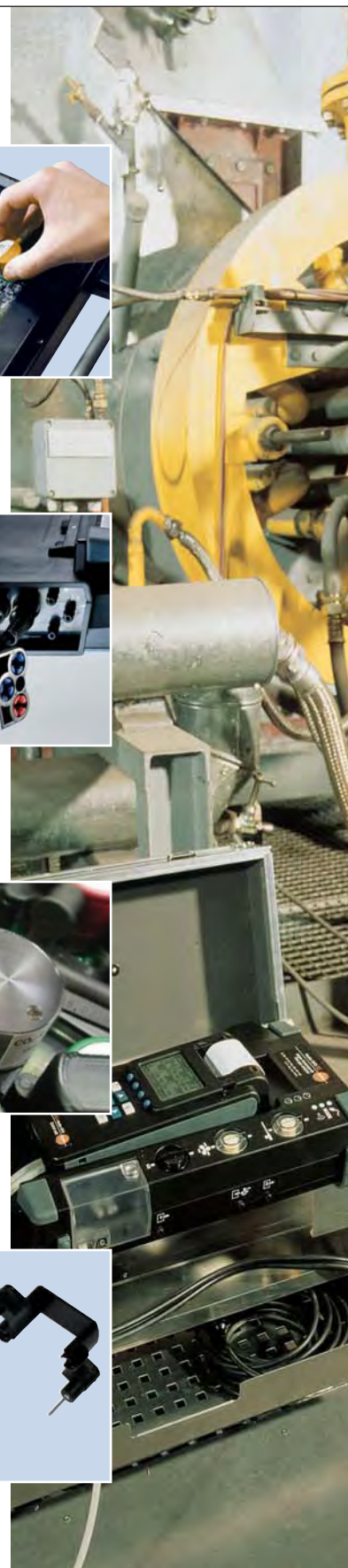Plug and play smart sensors are field replaced in seconds. Delivered factory-calibrated for immediate accuracy

Simple rugged connector for sample gas and differential pressure

NDIR Infrared technology for direct accurate measurements of CO$_2$

Temperature controlled thermal-module extends ambient testing range for increased accuracy

3

The Control Unit - "S" or "XL" model

The "S" version control unit is a handheld device that communicates with the analyzer while either docked securely in the analyzer box for standard testing or removed and placed remotely (i.e. truck, control room or thousands of feet away). Have total control of the system at your fingertips during engine or boiler tunings and display real time measurements on the large backlit display. You can also print the results of your testing on the integrated thermal printer or use the RS 232 computer interface for immediate software display.

The XL control unit is an upgrade from the "S" version. It offers multi-unit data bus capability, a differential pressure sensor and an additional socket for many other measurement probes. A touch screen option is available on the XL version only.

Control unit testo 350-S

Remote cable connection

RS 232 connection

Control unit testo 350-XL

Additional ΔP sensor

Additional probe socket

Remote cable connection

RS 232 connection

Compare Control Unit Models S and XL		
	S control unit	XL control unit
Built-in printer	■	■
Differential pressure measurement (-16" to +16" H_2O / -80" to +80" H_2O)	–	■
1 user defined probe socket (for i.e. temperature, relative humidity measurement, etc.)	–	■
Touchscreen	–	O
Connection from a flue gas analyzer to the Testo data bus	■	■
Connection of several flue gas analyzers	–	■
NiMH rechargeable battery pack	–	■
Internal memory for 250,000 readings	–	■

■ = Standard   O = Upgrade Option   – = Not Available

The Analyzer Box - "S" or "XL" model

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

The basic 350-S model

The testo 350-S comes standard with an O_2 cell and one other module of your choice. However, up to five additional modules (NO_2, SO_2, NO, NO_{Low}, CO, CO_{Low}, H_2S, C_xH_y or CO_2) can also be retrofitted for a maximum of six cells. Temperature and differential pressure are standard while efficiency and excess air are calculated. Upgrades to the "S" model include a sample conditioning system, dilution system and/or fresh air valve for long-term monitoring.

The advanced 350-XL model

All of the "S" model upgrades are standard in the "XL" version.
- Test up to six gases simultaneously or swap them for additional parameters with convenient plug and play sensors (C_xH_y, NO_{Low}, CO_{Low}, SO_2, H_2S, CO_2)

- Advanced sample conditioning utilizes an integrated Peltier chiller for moisture drop-out, a peristaltic hose pump for controlled water removal, and quick-change particulate filters

- Proven sample gas path with Teflon® lined hoses

- Continuous temperature compensation for assured accuracy

- Innovative dilution systems for the widest testing ranges and greatest sensor protection. CO to 400,000 ppm! NO, NO_2, SO_2, H_2S to 5 times the sensor range

- User defined programs with onboard memory to 250,000 values

- Integrated pressure measurement for draft, ΔP, velocity and mass emission

- Rechargeable battery with outboard DC connection and AC operation

- Flow rate and sensor temperature monitoring for US EPA CTM-030, -034 and ASTM D6522 requirements

- Comprehensive calculations including O_2 corrections for NO_x, CO, and SO_2, mass measurement with pitot and stack dimension input

- Simple on-site sensor calibration capability including diagnostics and sensor output (0 – 100%)
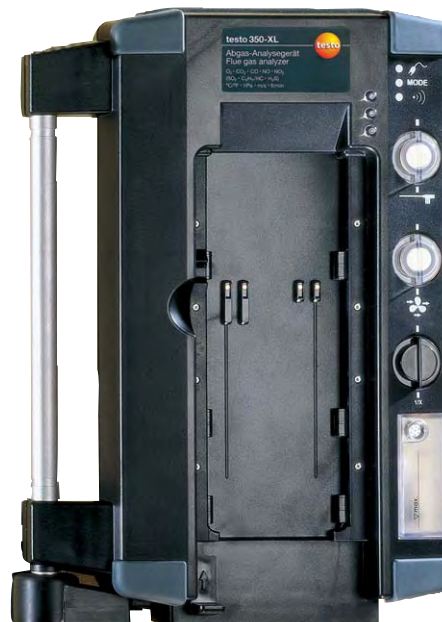
Compare Analyzer Box Models S and XL		testo 350 S	testo 350 XL
Maximum no. of sensors		6	6
O_2	0 – 25 Vol.	■	■
CO (H_2)	0 – 10,000 ppm	O	■
CO_{Low} (H_2)	0 – 500 ppm	O	O
NO	0 – 3,000 ppm (0.1 ppm resolution)	O	■
NO_{Low}	0 – 300 ppm (0.1 ppm resolution)	O	O
NO_2	0 – 500 ppm (0.1 ppm resolution)	O	■
SO_2	0 – 5,000 ppm	O	O
HC	0 – 4 Vol. % (0.001 % resolution)	O	O
H_2S	0 – 300 ppm (0.1 ppm resolution)	O	O
CO_2 (NDIR)	0 – 50 Vol. %	O	O
Built-in gas preparation unit (is recommended with high humidity levels in flue gas and during long-term measurements >2 hrs measuring time)		O	■
Automatic fresh air rinse with valve (incl. measurement range extension with dilution factor 5 for all sensors)		O	■
Measurement range extension for CO measuring module (with selectable dilution factors)		O	O
CO measuring module switch-off via adjustable switch-off threshold		■	■
Trigger input – stops and starts measurement externally		O	O
Differential pressure measurement (-16" to +16" H_2O/-80" to +80" H_2O)		■	■
Built-in rechargeable battery		■	■
2 temperature probe sockets (Type K NiCr-Ni)		■	■
Data logger (250,000 readings)		■	■
Testo data bus connection		■	■

■ = Standard   O = Upgrade Option

350 Data Bus System for Multi-Unit, Simultaneous Testing

Understand your process inside and out with multiple 350 XL analyzer boxes. Real time, user defined measurements are displayed individually from each analyzer or simultaneously as a graph or table in our software package. Six channel analog output boxes can be looped in the bus system to provide a user scaled 4-20mA output.

Exclusive testo 350 XL data bus system (max 16)

4-20mA analog output box

Ideal for: SCR optimizing, determining catalyst efficiency and performing overall trend analysis.

Sampling probes for every application

Our hose and probe options cover virtually every sampling requirement. The standard stainless steel probes are available in 13" or 28" lengths and are equipped with integrated thermocouples. Each can be upgraded with a sintered pre-filter for high particulate loading.

Our patented hoses offer high performance reference sampling at a fraction of the price. The powerful pumps are uniquely engineered to combine both high velocity transport and minimal surface area contact. Hoses are available in 7 ft. and 16 ft. lengths.

The industrial sampling probes incorporate rugged sample transport lines and handles specifically designed for the rigors of industrial stack gas sampling.

The industrial probe shafts come in lengths of 39 inches (one meter) long with rugged screw connections. Three probe shafts can be connected for a probe length of nearly 10 feet. The probe shafts are available in two materials - stainless steel for temperatures to 1112°F or Inconel for temperatures to 2192°F. Ceramic pre-filters can be quickly added for high particulate loading. The Al-oxide ceramic probe can withstand enormous thermal loads to 3272°F.

With our ample selection of industrial thermocouples, thermocouple adapters, and heated sample lines, Testo is able to provide a sampling solution for your specific needs. Additional hoses and probes are available:

• For engine testing and high pressure applications
• For high particulate loading
• For compliance or cold weather sampling with heated lines

Standard gas sampling probe

Material probe shaft Tmax +1832 °F
Hose length: Standard 7 ft., optional 16 ft.
Stainless steel 1.4841.

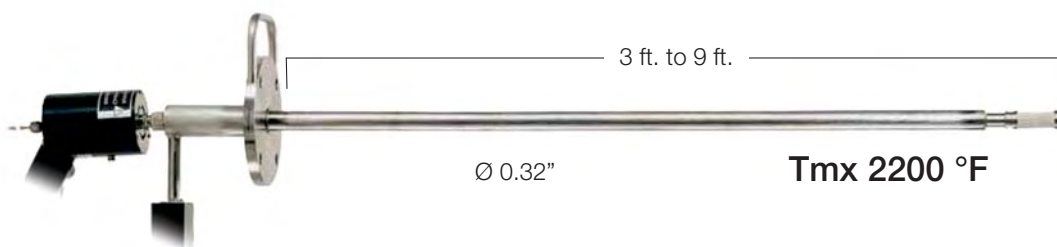Length 13"/28"

Ø 0.32"

Up to 1832 °F
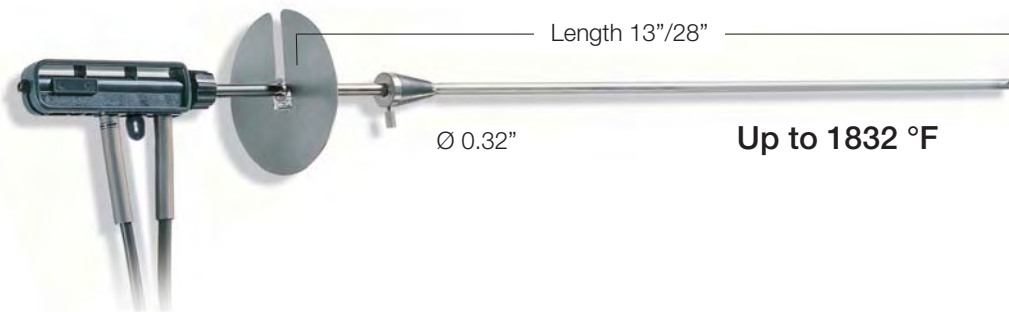
Outer pipe with sensor pre-filter (optional)

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

Length 13"/28"

Ø 0.32"   **Up to 1832 °F**

Ø 0.4"
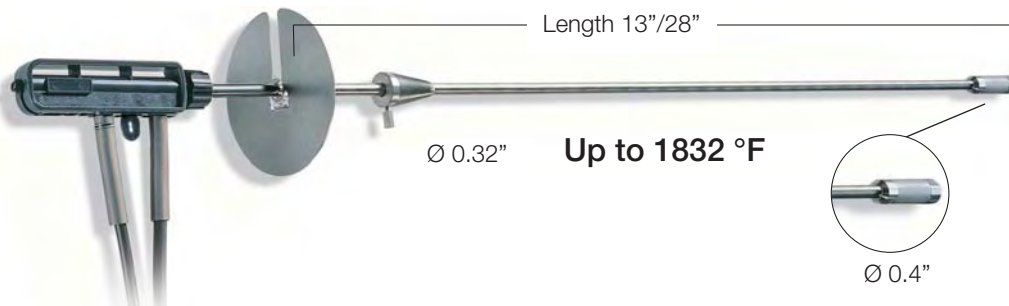
Industrial gas sampling probes

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

3 ft. to 9 ft.

Ø 0.32"   **Tmx 2200 °F**

Ordering Information

testo 350 S Control unit	Part no.
Control unit displays data and controls system, includes built-in printer, connection for Testo data bus and terminal plug	0563 0369
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL Control unit	Part no.
Control unit displays data and controls the system, incl. built-in printer, pressure measurement 16"/80" H_2O, 1 user defined probe socket, programmable measurements and memory connection for Testo data bus, incl. terminal plug	0563 0353
Additional options for 350 XL control unit model only:	
Touch screen with pen (available only with original order), for easy input of text and values	0440 0559
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097

testo 350 S Analyzer box	Part no.
350 S analyzer box is 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 sensors, i.e. (NO, NO_2, CO, H_2S, HC, SO_2, CO_2 NDIR)	0563 0368
Note: In order to function, a second sensor must be installed in the 350 S or up to 5 additional modules can be retrofitted to the system as well.	
Option: CO_{Low} sensor	0554 3936
Option: CO sensor	0554 3988
Option: CO_2 sensor (infrared meas.)	0554 0417
Option: HC sensor (nonburned hydrocarbons)	0554 3929
Option: H_2S sensor	0554 3930
Option: NO sensor	0554 3935
Option: NO_{Low} sensor	0554 3928
Option: NO_2 sensor	0554 3926
Option: SO_2 sensor	0554 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 sensor (dilution), built into analyzer box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0554 0555
Event trigger socket, for starting and stopping measurement externally, built into analyzer box	0554 3932

testo 350 XL Analyzer box	Part no.
350 XL analyzer box, is 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 sensors: (H_2S, HC, SO_2, CO_2 NDIR)	0563 0350
Option: CO_{Low} sensor	0554 3925
Option: CO_2 sensor (infrared meas. principle, absolute pressure meas. and CO_2 absorption filter with refill pack incl.)	0554 0417
Option: NO_{Low} sensor	0554 3934
Option: SO_2 sensor	0554 3927
Option: HC sensor (nonburned hydrocarbons)	0554 3929
Option: H_2S sensor	0554 3930
Measuring range extension for CO sensor (dilution), built into analyzer box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0440 0555
Event trigger socket, for starting and stopping measurement externally, built into analyzer box	0440 3932
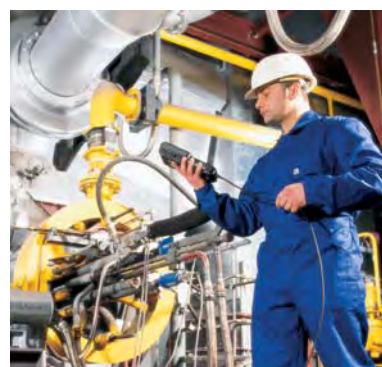
EasyEmissions, the powerful software tool for the testo 350

The easyEmissions software package allows the user to control every function of the 350 S/XL. The software provides extraordinary data management capability and the ability to import/export data from a number of different formats, effectively increasing the versatility and flexibility of the 350 S/XL to meet the user's testing and data management needs.

EasyEmission has the intuitive user interface of today's common Windows® based applications. Display screens can be customized to match the most commonly used functions. Prepare custom reports and documents with the powerful data management features. (i.e. site name/location/measurement/field comment, etc.).

Some of the incredible user defined capabilities include:

• Real Time Analyzer Control with a PC, showing tabular, graphical and picture box results

• Logging intervals 1/sec to 1/hr

• Real Time Analyzer Control with a PC, showing tabular & graphical results

• Custom formulas for specific report calculations

• Custom report generation

• Quick data transfer into Microsoft EXCEL® and PDF file formats

• User defined Oxygen (O_2) reference values

• Extensive customer/location management functions

• Calculations of Maximum, Minimum, and Mean values

Data bus and RS 232 software options

The Testo data bus system allows for operating up to 16 analyzers simultaneously. This has proven to be an extremely important feature for 350 users in many different industries. From the manufacturing to power generation markets, this Testo exclusive feature has proven itself time and again. For any environment that requires multiple sampling points this is an ideal solution. RS 232 to USB connectivity.
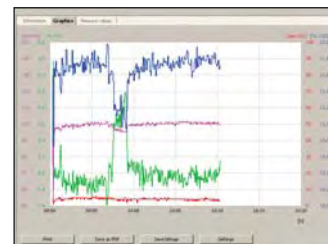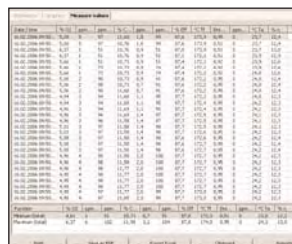
Part no. 0554 3336

Software with analysis and graphics functions, online measurement and reporting capabilities

EasyEmissions software allows for PC based controlled operations of the 350. This versatile software application is described above in detail. RS 232 to serial cable included.

Part no. 0554 3335

Accessories

AC Battery Charger/Adapter

For continuous operation and easy AC charging using a car port terminal.

Part no. 0554 1336   to cigarette lighter

Part no. 0554 1337   to battery clamps

Pelican Outer Case

Sturdy plastic case for safe storage and transportation of analyzer, probes, filters, sensors and hoses. Foam sections have been customized to fit items exactly.

Part no. 400516 3511

For use with standard case

Cases

1 Transport case for analyzer, probes and accessories

Part no. 0516 0351

2 System case (aluminum), for analyzer, probes, incl. drawer for accessories

Part no. 0516 0352

1 Transport case 2 System case

Analog output box (mA out)   *Only for 350 XL Control Unit*

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.

Part no. 0554 0845

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

testo 350 Technical Data

	O$_2$	CO	CO$_{LOW}$	NO	NO$_{LOW}$	NO$_2$	SO$_2$	H$_2$S	C$_X$H$_Y$
Range	0 to 25% vol.	0 to 10,000 ppm H$_2$ comp.	0 to 500 ppm H$_2$ comp.	0 to 3,000 ppm	0 to 300 ppm	0 to 500 ppm	0 to 5,000 ppm	0 to 300 ppm	0.01 to 4%
Accuracy	< 0.2% of m.v.	< 5 ppm 0 to 99 ppm < 5% of m.v. 100 to 2,000 ppm < 10% of m.v. 2,001 to 10,000 ppm	< 2 ppm 0 to 39.9 ppm < 5% of m.v. 40 to 500 ppm	< 5 ppm 0 to 99 ppm < 5% of m.v. 100 to 2,000 ppm < 10% of m.v. 2,001 to 3,000 ppm	< 2 ppm 0 to 39.9 ppm < 5% of m.v. 300 ppm	< 5 ppm 0 to 99 ppm < 5% of m.v. 500 ppm	< 5 ppm 0 to 99 ppm < 5% of m.v. 100 to 2,000 ppm < 10% of m.v. 2,001 to 5,000 ppm	< 2 ppm 0 to 39.9 ppm < 5% of m.v. 40 to 300 ppm	< 400 ppm 100 to 4,000 ppm < 10% of m.v. > 4,000 ppm
Resolution	0.1 vol. %	1 ppm	0.1 ppm	1 ppm	0.1 ppm	0.1 ppm	1 ppm	0.1 ppm	0.001 vol. % =10 ppm
Resp. Time	20 s (t95)	40 s (t90)	40 s (t90)	30 s (t90)	30 s (t90)	40 s (t90)	30 s (t90)	35 s (t90)	40 s (t90)

	CO$_2$	CO$_2$ Calculated	Differential Pressure 1	Differential Pressure 2	Efficiency	Flow Velocity	Current Voltage	RPM	Temperature
Range	0 to 50% vol.	0 - CO$_2$ max vol. %	±80" H$_2$O	±16" H$_2$O	0 to 100%	0 to 7900 ft/min	0 to 20 mA 0 to 10 V	20 to 20,000 rpm	-40 to 2192°F
Accuracy	±0.3% vol. +1% of m.v. (0 to 25% vol.) ±0.5% vol. +1.5% of m.v. (> 25 to 50% vol.)	Calculated from O$_2$	< 1% m.v. -20" to -80" H$_2$O < 1% m.v. +20" to +80" H$_2$O < 0.5% -19" to +19" H$_2$O	< 1% m.v. -16" to 1.2" H$_2$O < 1% m.v. +16" to +1.2" H$_2$O < 0.5% -1.2" to +1.2" H$_2$O			±0.04 mA ±0.01 V		< 33°F -40 to +212°F < 0.5% m.v. +212 to +2192°F
Resolution	0.01% vol. (0 to 25% vol.) 0.01% vol. (> 25% vol.)	0.01 vol. %	0.01" H$_2$O	0.01" H$_2$O	0.1%	10 ft/min	±0.01 mA ±0.01 V	1 ppm	

Dimensions: 16" x 11" x 4"

Weight: 9 lbs.

Storage temperature: -40 to +120 °F

Operating temperature: 23 to +113 °F

Housing material: ABS

Memory: 250,000 readings

Power supply: Via built-in power supply (90 V to 260 V, 47 to 63 Hz) or exchangeable rechargeable batteries or external 12 V cables

Electrical power consumption:
0.5 A (110 V AC), 0.3 A (230 V AC)

Dewpoint calculation: 32 to 210 °F td

Maximum positive pressure/Flue gas: 20" H$_2$O

Maximum negative pressure: 80" H$_2$O

Pump flow: 1 l/min. with flow monitoring

Max. dust load: 20 g/m³ dust in flue gas

Max. humidity load:
+158 °F Dewpoint temperature at sample gas inlet of analyzer 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: Analyzers 2 years (excluding working parts, e.g. measurement cells...); CO/NO/NO$_2$/SO$_2$/H$_2$S/HC 1 year; O$_2$ measurement cell 1 1/2 years; CO$_2$ IR measurement module 2 years

testo 350 Supplemental Technical Data

CO dilution with selectable dilution factor (option)	
CO measurement (H_2 compensated) CO_{LOW} meas. (H_2 compensated)	Meas. range: depending on factor selected Accuracy: ±2 % of mv (additional error) Manual user selectable factors 5-40 or auto 5x dilution
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 rdg (additional error) Pressure range -60 to 0" H_2O at probe tip
CO_{LOW} meas. (H_2 compensated)	Meas. range: 500 to 2500 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -40 to 0" H_2O at probe tip
NO measurement	Meas. range: 1500 to 15000 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -40 to 0" H_2O at probe tip
NO_{LOW} measurement	Meas. range: 300 to 1500 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -60 to 0" H_2O at probe tip
NO_2 measurement	Meas. range: 500 to 2500 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -20 to 0" H_2O at probe tip
SO_2 measurement	Meas. range: 500 to 25000 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -40 to 0" H_2O at probe tip
H_2S measurement	Meas. range: 200 to 1500 ppm Accuracy: ±5 % of rdg (additional error) Pressure range -40 to 0" H_2O at probe tip

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 rdg (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm) less than 10% of rdg (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm) less than 10% of rdg (greater than 4000 ppm)
Resolution	10 ppm	10 ppm	10 ppm
Min. O_2 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.

More Products

Borescope fiber optic inspection scope

318 series features powerful optics for easier examination of areas normally hidden from sight. Comfortable handle grip, convenient on/off light switch and 0.4" diameter shaft (10 mm). Ideal for internal inspections during industrial applications

830 Infrared Thermometer

Fast, easy, and affordable infrared temperature measurement from -25 °F to +572 °F. Audible and visual alarms when user adjustable set points are exceeded. Includes backlit display, convenient trigger operation, HOLD function, ½ second response time, and adjustable emissivity.

330-2 Combustion Analyzer

Ideal for commercial / industrial burner-boiler service. Automatically measures O_2, CO, Temperature, Draft, Pressure, Efficiency, Excess air and critical CO_2 calculations. An integrated CO dilution system expands High range CO testing to 30,000 ppm. Optional NO sensor for High NO_x or Low NO_x testing

335 Three Gas Industrial Analyzer

Ideal for engine tuning and maintenance plus the demands of industrial combustion analysis. Measures oxygen and up to two other user selected gases such as CO, CO_{Low}, NO, CO_{Low}, NO_2 and SO_2 for the greatest testing flexibility.

Contact Information

Distributor

For more information:
testo, Inc., 35 Ironia Rd., Flanders, NJ 07836
800-227-0729 • Fax 973-252-1729

Visit www.testo350.com

Committing to the Future!