

The Tanabyte 72x Series of Photometric Ozone Analyzers

Precision instruments for the Measurement and Calibration of Ozone

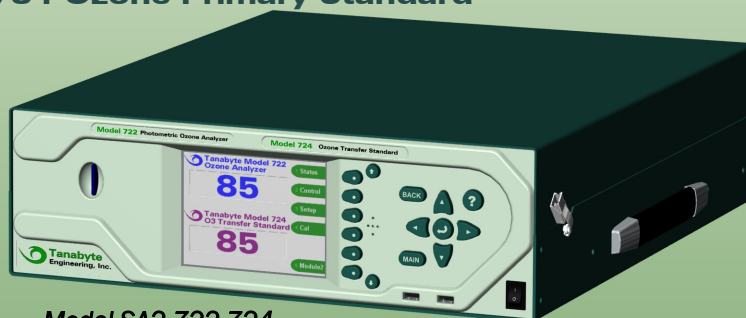
Direct Drop-In Replacements for the Dasibi Model 1008 series

USEPA APPROVED INSTRUMENTS

Model SA1-724
Ozone Transfer Standard
(SA1 Enclosure Type)



- **722 Ozone Analyzer**
- **722V Ozone Analyzer with C-S Valve**
- **723 Transfer Standard with Cal/Sample Valves**
- **724 Ozone Transfer Standard**
- **725 Ozone Analyzer with Internal Zero/Span**
- **734 Ozone Primary Standard**



Model SA2-722-724
Ozone Analyzer / Ozone Transfer Standard Combination
(SA2 Enclosure Type)

Tanabyte line of Easy-To-Operate Photometric Ozone Analyzers and Calibrators are designed as direct replacements for the industry standard Dasibi 1008 Series. The Analyzers and Calibrators exceeds the performance specifications of the Dasibi 1008 series while incorporating modern, advanced features.

All Tanabyte instruments are available as either a portable SA1 type or rack-mountable SA2 type, depending on the application needs. The SA1 Enclosure type supports one module and requires a minimal amount of bench space. In addition, its lightweight and rugged design is ideal for field auditors and traveling service personnel.

The SA2 Enclosure type supports one or two Modules and is rack or bench mountable. Its 5¼" (same as Dasibi) height requires less rack space than similar instruments on the market, which are typically 7" or higher.

The Tanabyte instruments shares many common components with the Dasibi Model 1008 series and inherit the Dasibi type "Dot Commands" protocol from the Dasibi Model 5008. The Audit Analog Input allows the Tanabyte calibrators to automatically generate Ozone Certification Reports.

Advantages and Features:

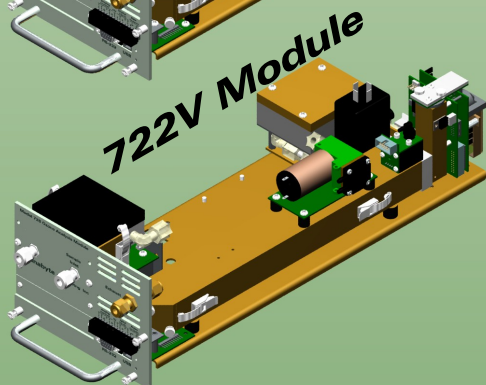
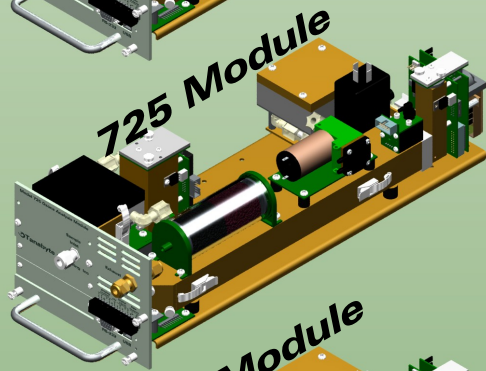
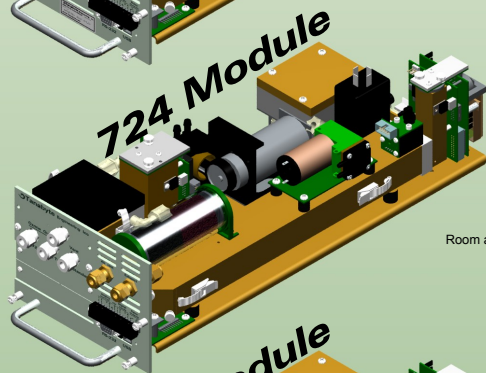
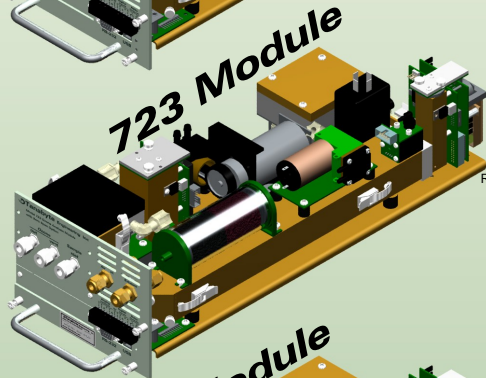
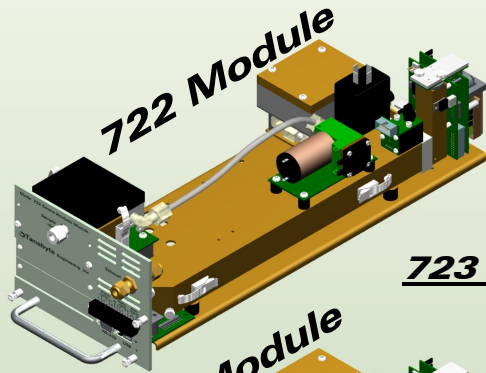
- U.S. E.P.A Equivalent Method Designation EQOA-0407-165
- Direct Replacements for the Dasibi 1008 series of ozone analyzers and ozone calibrators (including same physical dimensions).
- Utilizes the UV Photometric Measurement Technique, temperature and pressure correction.
- Tanabyte invented Dual USEPA Approved instruments combinations, for economical and engineering solutions.
- Superior performing Tanabyte designed Ozone Generator, producing the most accurate-stable-repeatable ozone even at very low concentrations.
- Tanabyte designed Audit Analog Input to certify another ozone analyzer.
- New smaller and light weight design (less than 20 Lbs), ideal for station monitoring, field auditors, QA Lab operators, and mobile air monitoring. Lowest instrument height profile of only 5.25 inches, rack space saving.
- Data storage, diagnostics, alarms, selectable units, RS232, Dasibi Dot Commands, Programmable Calibration Levels and Sequences.
- The modular design simplifies maintenance. By using an extension cable, the module can be decoupled and operated outside the SA1 and SA2 enclosure for easy servicing.

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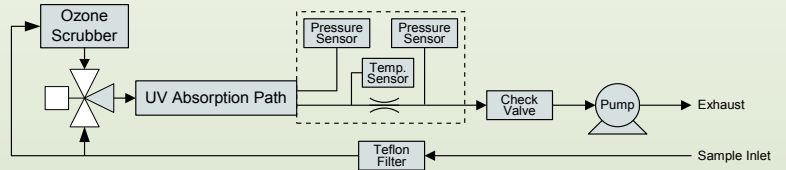
 **Tanabyte**
Engineering, Inc.

Ozone Analyzer and Ozone Calibrator

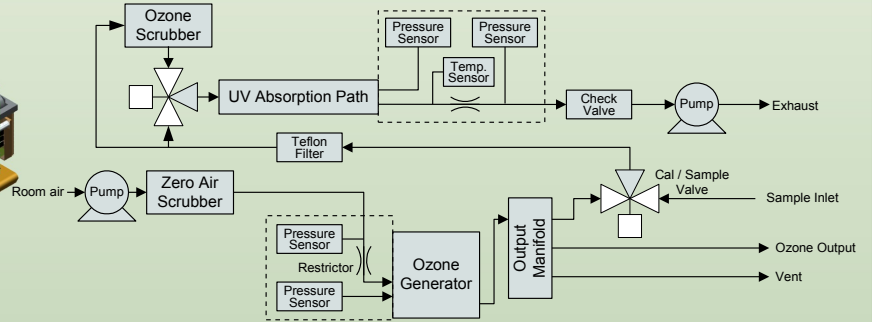
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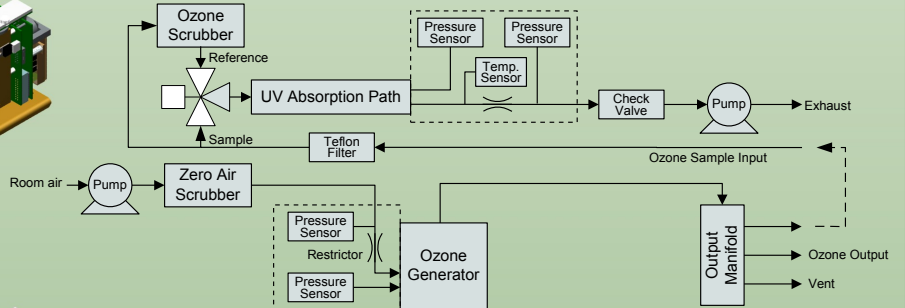
722 Ozone Module



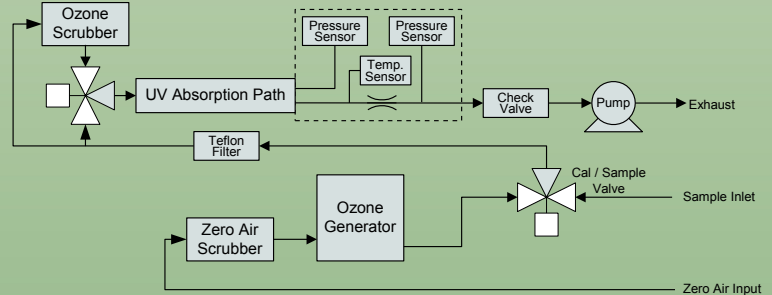
723 O3 Transfer Standard w/ Cal-Sample Valves Module



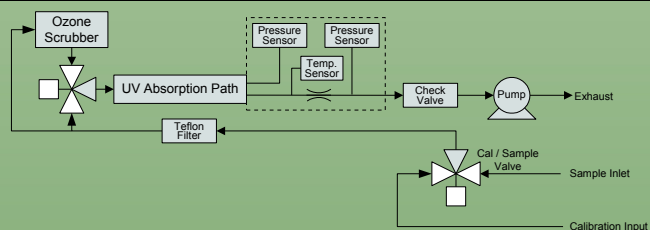
724 Ozone Transfer Standard Module



725 Ozone Analyzer with Internal Zero-Span Module



722V Ozone Analyzer with C-S Valves Module



Configurations

Tanabyte Ozone Analyzers and Calibrators comprise of two main sections, the analyzer or calibrator modules and the SA1 or SA2 enclosures. When one enclosure and one or two modules are coupled together they become one Analyzer or Calibrator.

Tanabyte offers two types of enclosures, the SA1 enclosure which support one module and the SA2 enclosure which can supports one or two modules.

The SA1 is very versatile, durable, and light weight with a small foot print of only 8" wide and is classified as our portable-bench mounting version.

The SA2 has the conventional width of 17" wide to fit instrument racks and can be configured for bench mounting or rack mounting and has a height of only 5.25" (same as Dasibi Model 1008 series) to economize space in instrument racks.

The SA1 enclosure supports one module



Ozone Analyzer and Ozone Calibrator Model Numbers

SA1-722:	Ozone Analyzer
SA1-722V:	Ozone Analyzer w/ C-S Valve
SA1-723:	Ozone Transfer Standard with Cal-Sample Valves
SA1-724:	Ozone Transfer Standard
SA1-725:	Ozone Analyzer with Internal Zero-Span
SA1-726:	Ozone Analyzer with Cal-Sample Valves
SA1-734:	Ozone Primary Standard
SA2-722:	Ozone Analyzer
SA2-722V:	Ozone Analyzer w/ C-S Valve
SA2-723:	Ozone Transfer Standard with Cal-Sample Valves
SA2-724:	Ozone Transfer Standard
SA2-725:	Ozone Analyzer with Internal Zero-Span
SA2-726:	Ozone Analyzer with Cal-Sample Valves
SA2-734:	Ozone Primary Standard
SA2-722-722:	Ozone Analyzer and Ozone Analyzer Combination
SA2-722-724:	Ozone Analyzer and Ozone Transfer Standard Combination
SA2-722V-724:	Ozone Analyzer with Cal/ Sample Valve and Ozone Transfer Standard Combination

Other Instrument Combinations are available upon request.

Physical Specifications

SA1 Dimensions: 8.1" W x 9" H x 23.4" L

Weight: SA1-722	=	19 Lbs
SA1-723	=	26 Lbs
SA1-724	=	24 Lbs
SA1-725	=	22 Lbs
SA1-726	=	20 Lbs
SA1-734	=	23 Lbs

SA2 Dimensions: 17" W x 5.25" H x 21" L

Weight: SA2-722	=	22 Lbs
SA2-723	=	29 Lbs
SA2-724	=	27 Lbs
SA2-725	=	25 Lbs
SA2-726	=	23 Lbs
SA2-734	=	26 Lbs
SA2-722-722	=	32 Lbs
SA2-722-724	=	36 Lbs

Environmental Specifications:

Operating Temperature:	5° to 45°C
Humidity:	0 to 90%, non-condensing

The SA2 enclosure with one module



SA2 enclosure with two modules



Ozone Analyzer and Ozone Calibrator Specifications:

Ozone Photometer:

Measurement Range:	0-500 PPB, 0-1000 PPB, 0-10 PPM, or auto-ranging Adjustable 0.5 to 2.0 LPM
Sample Flow Range:	Adjustable 0.5 to 2.0 LPM
Zero Noise:	< 0.3 PPB
Span Noise:	< 0.5% of reading (above 100 PPB)
Lower Detectable Limit (LDL):	<0.5 PPB
Precision:	< 0.5% of reading
Linearity:	< 1% of full scale
Zero Drift:	< .001 PPM per month
Span Drift:	< 1% of reading per 24 hrs
Lag/ Rise/ Fall:	10/ 20/ 20 Secs (Fast Cycle)
Resolution:	0.1 PPB

Ozone Generator:

Ozone Generator Range:	0 - 1500 PPB
Minimum Non-Zero Ozone Output:	1 PPB
Ozone Output Resolution:	0.5 PPB
Ozone Output Linearity:	+/- 1% of range
Zero Air Flow Rate:	5 to 7 LPM
Zero Air Pollutant Concentrations:	< 1 PPB O3, NO, NO2, H2S, SO2, Hydrocarbons

Analog Outputs:

Number of Analog Outputs:	3
Analog Output Full Scale Ranges:	100 mV to 10 V (Independently Selectable)
Analog Output Resolution:	16 Bits

Digital IOs:

Number of Digital IO:	4
Status Input Voltage Range:	0 - 5 VDC TTL
Control Output Voltage Range:	0 - 5 VDC
Number of Isolated Relay Output:	2 (722, 724)
Relay Contact Voltage Range:	24VDC

Digital Ports:

RS232 Ports	2 (9 Db)
Ethernet (Optional):	1 (RJ45)

Analog Input:

Number of Analog Inputs:	1
Analog Input Range:	0 - 1 VDC

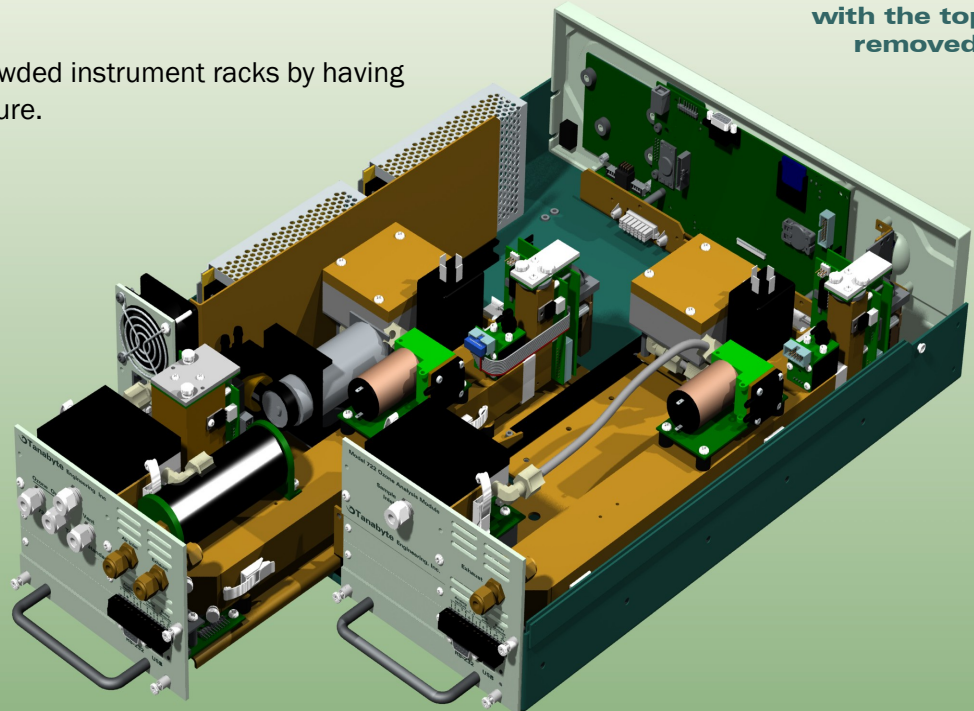
Power:

AC Input Power:	90 to 264 VAC, 50 or 60 Hz
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Instrument Combinations:

- Cost effective solution
- Space saving solution to crowded instrument racks by having 2 instruments in one enclosure.
- Split screen display

The Model SA2-722-724 Ozone Analyzer and Ozone Transfer Standard shown in a SA2 enclosure with the top removed.



**Analysis Modules
are easily removed
for calibration & service**

Model 322 Gas Dilution Calibrator

A precision instrument for the Calibration of gas analyzers

Model SA1-322-G-P
Dilution Calibrator with Photometer
(SA1 Enclosure Type)



Model 322 Gas Dilution Calibrator
(Drop-In Replacement for the Dasibi Model 5008 and
Tanabyte Model 300 and Tanabyte Model 300T)



Model SA2-322-G-732 Dilution Calibrator with Photometer
(SA2 Enclosure Type)

Tanabyte latest generation of gas calibration instruments are designed with the specific needs of field auditors, quality assurance engineers, laboratory researchers, CEM operators and air monitoring station operators in mind.

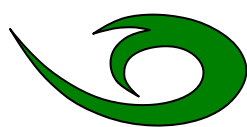
Tanabyte Model 322 Calibrator precisely dilutes high gas concentrations to user selected lower concentrations by blending it with zero air. Its specially designed O3 Generator is renown for its production of accurate-stable-repeatable concentrations of O3 gas. This superior performance of the O3 Generator also results in the creation of precise NO2 concentrations by means of GPT. An optional photometer can be added to compliment the O3 generation as a photometer feedback.

The 322 is very easy to operate and its operation is further simplified by the utilizations of the user programmable levels and sequences. The Model 322 Calibrator is a direct replacement for the industry standard Dasibi Model 5008 Calibrator in that it inherited all the 5008 main functions and also exceeds all 5008 specifications. The 322 shares many common components with the Model 5008, including the Dasibi "Dot Commands" protocol and LEADS compatibility.

Tanabyte Engineering, Inc.
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Advantages and Features:

- Gas Dilution, optional Ozone Generator and GPT to create NO2, and optional Photometer Feedback. Three Mass Flow Controllers option.
- Optional USEPA Approved Ozone Primary Standard (OPS) Photometer Feedback or Ozone Transfer Standard (OTS) Photometer Feedback. The Model 322 can also be operated as an Ozone Analyzer when the OTS Photometer is installed.
- Superior performing Tanabyte designed Ozone Generator, producing the most accurate-stable-repeatable ozone even at very low concentrations.
- New smaller and light weight design (less than 25 Lbs), ideal for station monitoring, field auditors, QA lab operators, and mobile air monitoring. Lowest instrument height profile of only 5.25 inches, rack space saving.
- Pre-programmed calibration Sequences and Levels may be entered and initiated manually, or automatically at preset times, or by digital input command, or by Dasibi "Dot Commands".
- Dasibi 5008 compatible. Similar menu system, easy to learn and easy to use.
- The modular design simplifies maintenance. By using an extension cable, the module can be decoupled and operated outside the SA1 or SA2 enclosure for easy servicing.

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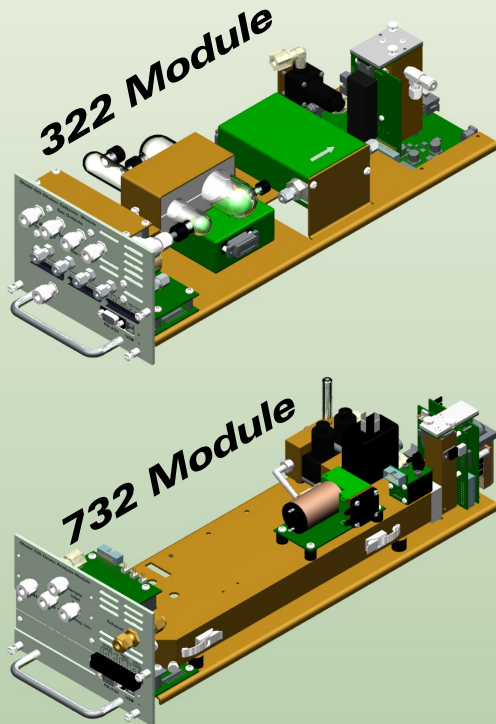
Calibrator Operations

Module: The heart of the Model 322 Calibrator is the 322 Gas Dilution Module. Each module consists of its tray and rear panel with all the pneumatics, electronics and software needed to perform the specific calibrations or analysis functions.

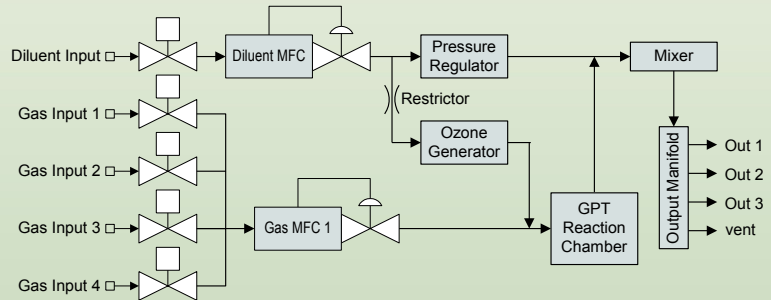
Dilution: The 322 dilution is accomplished by precisely commanding two (or 3) mass flow controllers to accurately blend zero air and input gases which are first feed into a mixing chamber (for NO + O₃ creation) then a dilution chamber, and finally to the output manifold.

Ozone Generator: Tanabyte has designed its Ozone Generator to excel as the most superior performing with accurate, stable, and repeatable ozone production. With this superiority of O₃ generation, very low ozone concentrations even below 5 ppb is easily attained. Similarly, NO₂ creation or GPT benefits greatly by this performance, resulting is very accurate NO₂ and NO_x gas concentrations.

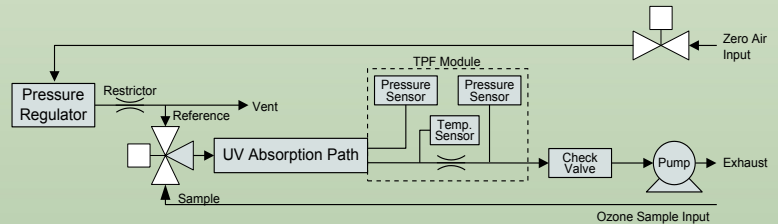
Photometer: When a US EPA Approved photometer is required, then the 732 Module with an Ozone Primary Standard (OPS) photometer or the 732-S Module with an Ozone Transfer Standard (OTS) photometer is added to provide the photometer feedback feature.



322 Module - Gas Dilution with Ozone Generator



Ozone Primary Standard Photometer



Specifications:

Model 322 Dilution System:

Accuracy of Flow Measurements:	+/- 0.5% of Full Scale
Repeatability of Flow Control:	+/- 0.1% of Full Scale
Linearity of Flow Measurements:	+/- 0.5% of Full Scale
MFC Ranges for Dilution Air::	0 – 5, 10, 20 SLPM
	(other ranges available on request)
MFC Ranges for Gases:	0 – 50, 100, 200 SCPM
	(other ranges available on request)

Model 322 Ozone Generator:

Range (at 5 SLPM dilution flow):	0.000 – 1.000 PPM
Accuracy (at 5 SLPM dilution flow):	+/- 1% of set point
Lowest Generated Concentration:	1 PPB
Nominal Ozone Flow:	100 SCCM

Ozone Photometer:

Measurement Range:	0.000 – 1.000 PPM
Sample Flow Rate:	Adjustable 0.5 to 2.0 LPM
Zero Noise:	< 0.3 PPB
Span Noise (above 100 PPB):	< 0.5% of reading
Lower Detectable Limit (LDL):	< 0.5 PPB
Precision:	< 1 PPB
Linearity:	< 1% of full scale
Zero Drift:	< .001 PPM per month
Span Drift (per 1 week)	< 1% of reading
Lag / Rise / Fall Times	10 / 20 / 20 seconds
(with fast cycle setting)	

Mass Flow Controller (MFC) Combinations:

Model 322 supports up to three MFCs

1 Air MFC + 0 Gas MFC	- Ozone only Calibrator
1 Air MFC + 1 Gas MFC	- Gas Dilution Calibrator
1 Air MFC + 2 Gas MFCs	- Gas Dilution Calibrator w/ two Gas ranges
2 Air MFCs + 1 Gas MFC	- Gas Dilution Calibrator w/ two Air ranges

Power:

AC Input Power:

90 to 264 VAC, 50 or 60 Hz

Model 322 Digital I/O:

Number of Digital I/Os:	16, selectable as input or output up to 35V, TTL, or contact closure
Status input voltage range:	35VDC
Control output maximum voltage:	500mA with all outputs active;
Control output maximum current :	1.2A with one output active

Number of Isolated Relay Outputs:

Relay Contact Output Voltage:	2 (Magnecraft W117SIP)
	24 VDC to operate external valve

Model 322 Analog I/O:

Number of Analog Outputs:	4, outputs
Analog Output Ranges:	100mV, 1V, 5V or 10V
Analog Output Resolution:	15 bits

Digital Ports:

RS232 Ports:	2 (9Db)
Ethernet (Optional):	1 (RJ45)

Configurations

Tanabyte 322 Calibrator comprise of two main sections, the calibration or analysis modules and the SA1 or SA2 enclosures. During production one enclosure with one or two modules are coupled together to produce one Model 322 Calibrator instrument.

Tanabyte offers two types of enclosures, the SA1 enclosure which support one module and the SA2 enclosure which can supports one or two modules.

The SA1 is very versatile, durable, and light weight with a small foot print of only 8" wide and is classified as our portable-bench mounting version.

The SA2 has the conventional width of 17" wide to fit instrument racks and can be configured for bench mounting or rack mounting and has a height of only 5.25" (same as Dasibi Model 1008 series) to economize space in instrument racks.

To implement the photometer feedback option the 732 Module with an Ozone Primary Standard (OPS) photometer or the 732-S Module with an Ozone Transfer Standard (OTS) photometer is positioned in the second docking bay of the SA2 Enclosure. For the SA1 version the OPS or OTS photometer is not tray mounted but installed directly onto the enclosure.

322 Calibrator Model Numbers

SA1-322:	Gas Dilution Calibrator
SA1-322-O:	Ozone Calibrator
SA1-322-G:	Gas Dilution Calibrator with ozone generator
SA1-322-G-P:	Gas Dilution Calibrator with ozone generator and (OPS) photometer
SA1-322-G-P-S:	Gas Dilution Calibrator with ozone generator and (OTS) photometer
SA2-322:	Gas Dilution Calibrator
SA2-322-O:	Ozone Calibrator
SA2-322-G:	Gas Dilution Calibrator with ozone generator
SA2-322-G-732:	Gas Dilution Calibrator with ozone generator and (OPS) photometer
SA2-322-G-732-S:	Gas Dilution Calibrator with ozone generator and (OTS) photometer

SA1 enclosure supports one module

(optional photometer is installed inside SA1 enclosure bottom compartment)



Physical Specifications

SA1 Calibrator Dimension: 8.1" W x 9" H x 23.4" L

Weight : SA1-322 = 20 Lbs

SA1-322-G = 25 Lbs

SA1-322-G-P = 30 Lbs

SA2 Calibrator Dimension: 17" W x 5.25" H x 21" L

Weight : SA2-322 = 22 Lbs

SA2-322-G = 27 Lbs

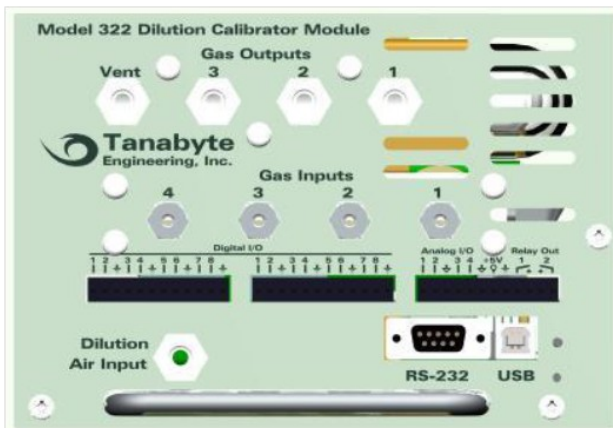
SA2-322-G-732 = 32 Lbs

Environmental Specifications

Operating Temperature: 5° to 45°C

Humidity: 0 to 90%, non-condensing

322 Gas Dilution Module Back Panel



Number of Gas Outputs:	4 Outputs
Gas Outputs Fittings Size:	1/4" Tube OD
Number of Gas Inputs:	4 Inputs
Gas Input Fittings Size:	1/8" Tube OD
Number of Analog Outputs:	4 Outputs
Number of Digital I/Os:	16 I/Os
Number of Air Inputs:	1 Input
Air Input Fitting Size:	1/4" Tube OD

SA2 enclosure with one Module ...



SA2 enclosure with two Modules



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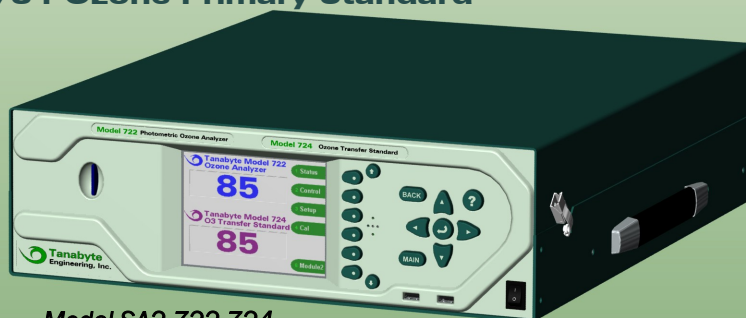
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Ozone Transfer Standard
(SA1 Enclosure Type)



- **722 Ambient Ozone Analyzer**
- **723 Transfer Standard with Cal/Sample Valves**
- **724 Ozone Transfer Standard**
- **725 Ozone Analyzer with Internal Zero/Span**
- **726 Ozone Analyzer with Cal/Sample Valves**
- **734 Ozone Primary Standard**



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(SA2 Enclosure Type)

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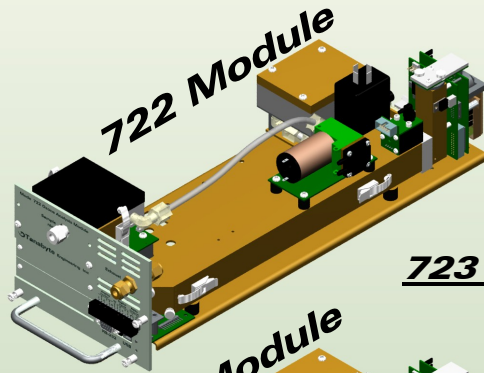
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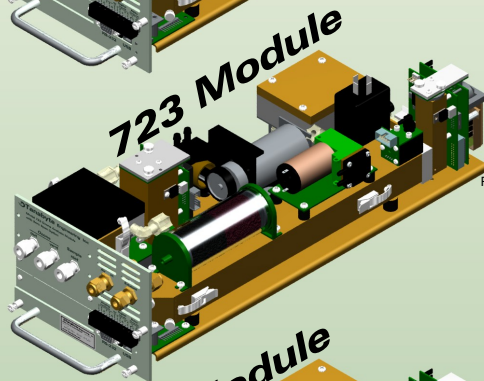
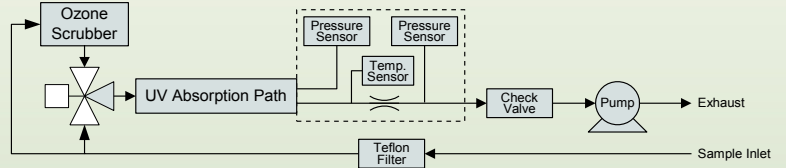
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Ozone Analyzer and Ozone Calibrator

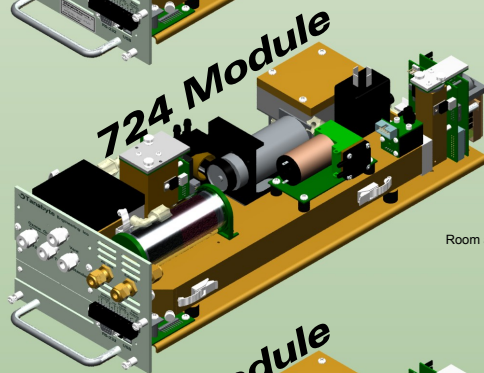
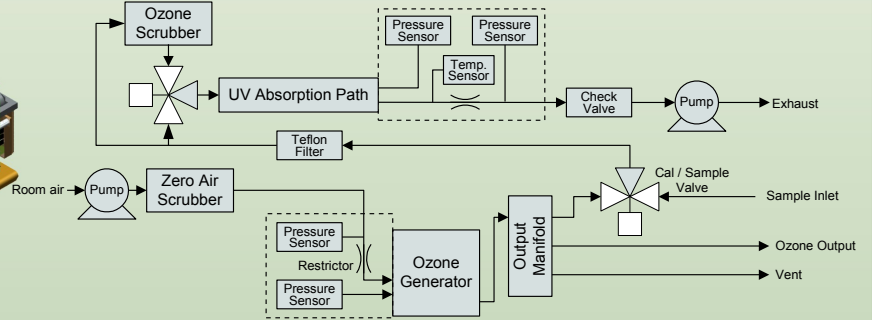
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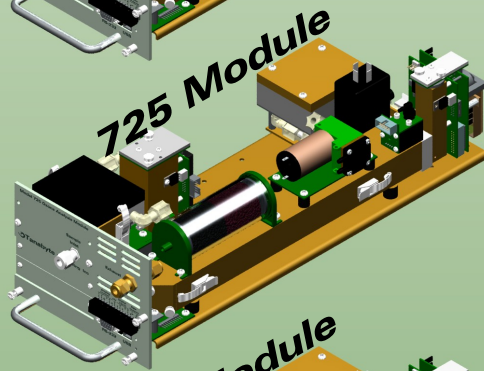
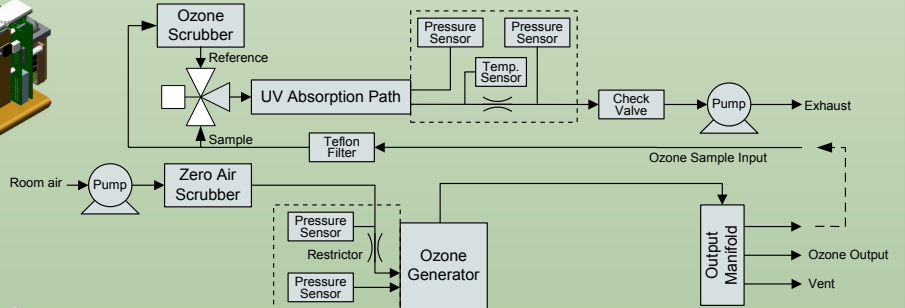
722 Ambient Ozone Module



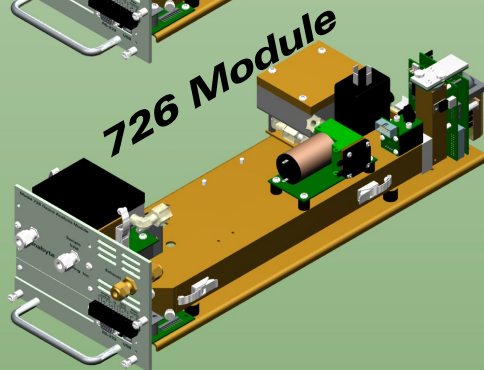
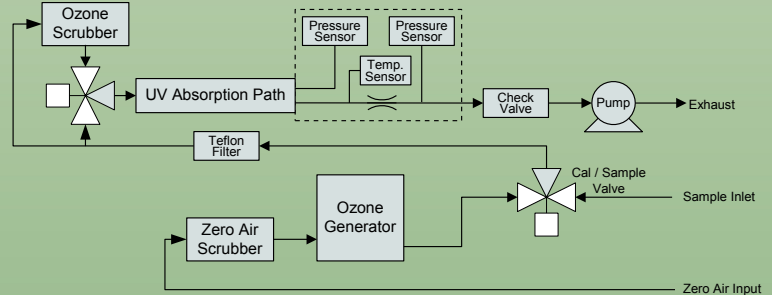
723 O3 Transfer Standard w/ Cal-Sample Valves Module



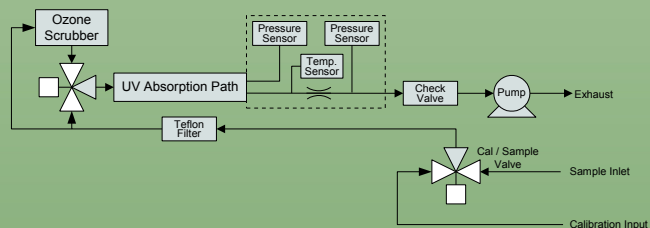
724 Ozone Transfer Standard Module



725 Ozone Analyzer with Internal Zero-Span Module



726 Ozone Analyzer with Cal-Sample Valves Module



Configurations

Tanabyte Ozone Analyzers and Calibrators comprise of two main sections, the analyzer or calibrator modules and the SA1 or SA2 enclosures. When one enclosure and one or two modules are coupled together they become one Analyzer or Calibrator.

Tanabyte offers two types of enclosures, the SA1 enclosure which support one module and the SA2 enclosure which can supports one or two modules.

The SA1 is very versatile, durable, and light weight with a small foot print of only 8" wide and is classified as our portable-bench mounting version.

The SA2 has the conventional width of 17" wide to fit instrument racks and can be configured for bench mounting or rack mounting and has a height of only 5.25" (same as Dasibi Model 1008 series) to economize space in instrument racks.

The SA1 enclosure supports one module



Ozone Analyzer and Ozone Calibrator Model Numbers

SA1-722:	Ozone Analyzer
SA1-723:	Ozone Transfer Standard with Cal-Sample Valves
SA1-724:	Ozone Transfer Standard
SA1-725:	Ozone Analyzer with Internal Zero-Span
SA1-726:	Ozone Analyzer with Cal-Sample Valves
SA1-734:	Ozone Primary Standard
SA2-722:	Ozone Analyzer
SA2-723:	Ozone Transfer Standard with Cal-Sample Valves
SA2-724:	Ozone Transfer Standard
SA2-725:	Ozone Analyzer with Internal Zero-Span
SA2-726:	Ozone Analyzer with Cal-Sample Valves
SA2-734:	Ozone Primary Standard
SA2-722-722:	Ozone Analyzer and Ozone Analyzer Combination
SA2-722-723:	Ozone Analyzer and Ozone Transfer Standard Combination
SA2-722-724:	Ozone Analyzer and Ozone Transfer Standard Combination
SA2-726-724:	Ozone Analyzer and Ozone Transfer Standard Combination

Other Instrument Combinations are available upon request.

Physical Specifications

SA1 Dimensions: 8.1" W x 9" H x 23.4" L

Weight: SA1-722	=	19 Lbs
SA1-723	=	26 Lbs
SA1-724	=	24 Lbs
SA1-725	=	22 Lbs
SA1-726	=	20 Lbs
SA1-734	=	23 Lbs

SA2 Dimensions: 17" W x 5.25" H x 21" L

Weight: SA2-722	=	22 Lbs
SA2-723	=	29 Lbs
SA2-724	=	27 Lbs
SA2-725	=	25 Lbs
SA2-726	=	23 Lbs
SA2-734	=	26 Lbs
SA2-722-722	=	32 Lbs
SA2-722-724	=	36 Lbs

Environmental Specifications:

Operating Temperature:	5° to 45°C
Humidity:	0 to 90%, non-condensing

The SA2 enclosure with one module



SA2 enclosure with two modules



Ozone Analyzer and Ozone Calibrator Specifications:

Ozone Photometer:

Measurement Range:	0-500 PPB, 0-1000 PPB, 0-10 PPM, or auto-ranging Adjustable 0.5 to 2.0 LPM
Sample Flow Range:	Adjustable 0.5 to 2.0 LPM
Zero Noise:	< 0.3 PPB
Span Noise:	< 0.5% of reading (above 100 PPB)
Lower Detectable Limit (LDL):	<0.5 PPB
Precision:	< 1 PPB
Linearity:	< 1% of full scale
Zero Drift:	< .001 PPM per month
Span Drift:	< 1% of reading per wk
Lag/ Rise/ Fall:	10/ 20/ 20 Secs (Fast Cycle)
Resolution:	0.1 PPB

Ozone Generator:

Ozone Generator Range:	0 - 1200 PPB
Minimum Non-Zero Ozone Output:	1 PPB
Ozone Output Resolution:	0.5 PPB
Ozone Output Linearity:	+/- 1% of range
Zero Air Flow Rate:	5 to 7 LPM
Zero Air Pollutant Concentrations:	< 1 PPB O ₃ , NO, NO ₂ , H ₂ S, SO ₂ , Hydrocarbons

Analog Outputs:

Number of Analog Outputs:	3
Analog Output Full Scale Ranges:	100 mV to 10 V (Independently Selectable)
Analog Output Resolution:	16 Bits

Digital IOs:

Number of Digital IO:	4
Status Input Voltage Range:	0 - 5 VDC TTL
Control Output Voltage Range:	0 - 5 VDC
Number of Isolated Relay Output:	2 (722, 724)
Relay Contact Voltage Range:	24VDC

Digital Ports:

RS232 Ports	2 (9 Db)
Ethernet (Optional):	1 (RJ45)

Analog Input:

Number of Analog Inputs:	1
Analog Input Range:	0 - 1 VDC

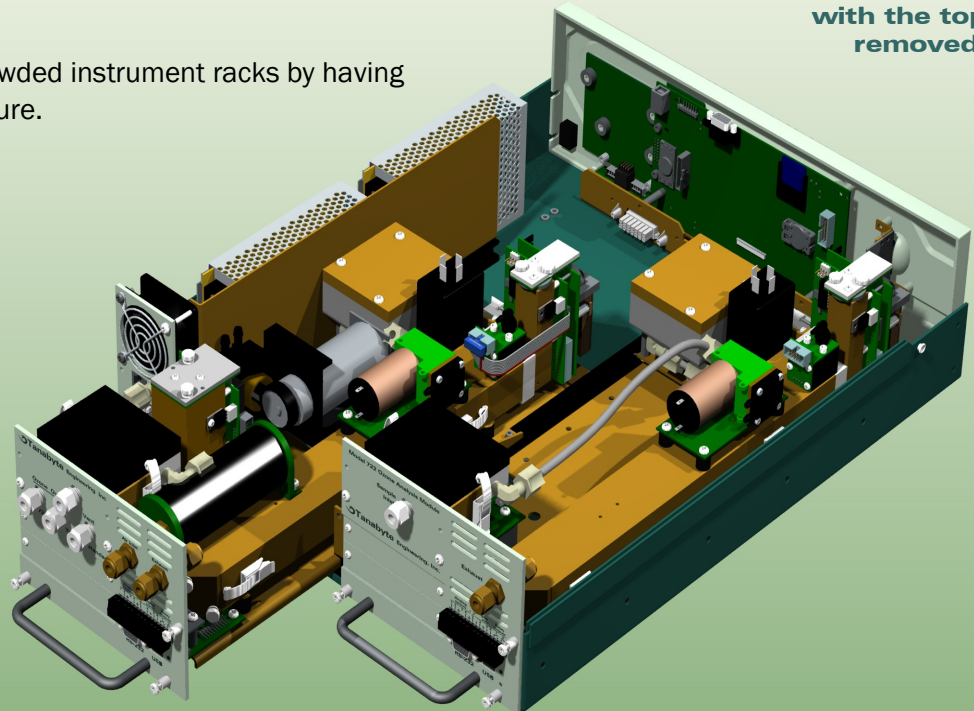
Power:

AC Input Power:	90 to 264 VAC, 50 or 60 Hz
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Instrument Combinations:

- Cost effective solution
- Space saving solution to crowded instrument racks by having 2 instruments in one enclosure.
- Split screen display

The Model SA2-722-724 Ozone Analyzer and Ozone Transfer Standard shown in a SA2 enclosure with the top removed.



**Analysis Modules
are easily removed
for calibration & service**