



Features - MGA-3050

- ◆ Displays anesthetic agent output in percentage values
- ◆ Easy-to-use
- ◆ Fast response time
- ◆ Very compact
- ◆ Connects directly to common gas outlet



MGA-3050 Multi-Gas Analyzer

The MGA-3050 Multi-gas Analyzer connects to any PFC-3000 series Flow Analyzer and is used to measure anesthetic agent concentrations for testing purposes.

The MGA-3050 measures Halothane, Enflurane, Isoflurane, Sevoflurane and Desflurane in percentage values. The MGA-3050 also measures percentage values of CO₂ and N₂O. The MGA-3050 is an excellent instrument for performing vaporizer efficacy tests, but a PFC-3000 series unit is required, since it uses its display to show measurement values.

SPECIFICATIONS

Measurements	Range		Accuracy
	CO ₂	0 - 10%	± (0.2% ABS + 2% REL)
		10 - 20%	± (0.3% ABS + 4% REL)
	N ₂ O	0 - 100%	± (2% ABS + 2% REL)
	HAL, ISO, ENF	0 - 8%	± (0.15% ABS + 5% REL)
		8 - 12%	± (0.2% ABS + 10% REL)
	SEV	0 - 10%	± (0.15% ABS + 5% REL)
		10 - 15%	± (0.2% ABS + 10% REL)
	DES	0 - 22%	± (0.15% ABS + 5% REL)
22 - 25%		± (0.2% ABS + 10% REL)	
Response Time	CO ₂ < 90 ms, N ₂ O, AA < 300 ms, O ₂ < 300 ms		
Monitoring	Numerical data available with the Flow Analyzer		
	Numerical data and real-time curves available with FlowLab software		
	Interface	through RS-232 port	
Physical Data	Weight	< 25 g (excluding cable)	
	Size	1.49 x 1.14 x 1.22 inches (38 x 29 x 31 mm)	
Environmental Data	Operating	10 - 40 °C (50 - 104 °F)	
	Storage	-20 - 50 °C (-4 - 122 °F)	
	Humidity	10 - 95%, non-condensing	
	Atm. pressure	700 - 1200 mbar (3048 m)	
Compliance and Approvals	CE marked according to the 93/42/EEC MDD		
	ISO 11196:1997, EN 864:1996, EN 12598:1999 ISO/DIN 21647:2003,		
	ISO 7767, ASTM-F 1452-92, ASTM-F 1456-92 and ASTM-F 1462-93		

Benchtop Flow Analyzer

Respiratory Parameters

16 respiratory parameters can be calculated including PEEP, VTI and Compliance.

Bidirectional Flow Measurement

Two measuring ports evaluate flow, pressure, temperature, humidity and O₂

Pressure Measurements

All pressure information included with up to 6 different pressure sensors.

Gas Standards

13 gas standards and 10 gas types adapt the unit to the tested device.

RT-200 Emulation Mode

The RT-200 emulation mode simulates the RT-200 operating mode while offering a contemporary replacement.

Data Storage

Internally stores all measured and respiratory parameters in order to simplify the testing procedure.

Battery Operation

Convenient and independent work when you are on the go.

USB, RS-232 and External Trigger

Communicates with your test software and ventilator.

Optional Multi-Gas Analyzer

The optional MGA-3050 Sensor offers instant gas concentration measurements of CO₂, N₂O, Halothane, Enflurane, Isoflurane, Sevoflurane and Desflurane.



PFC-3000

The PFC-3000 Series of instruments measures flow, pressure, temperature, humidity and O₂ concentrations bidirectionally. The one-of-a-kind Adult, Pediatric and High Frequency ventilation measuring modes make the PFC-3000 the ideal calibration tool for all ventilators, anesthesia machines and spirometers.

The PFC-3000 distinguishes itself from other calibration tools by combining a simple, intuitive, multilingual user interface with the highest precision. With the push of a button, all measured values can be stored directly on the PFC-3000 and later retrieved for documentation purposes.

SPECIFICATIONS

			PFC-3000A	PFC-3000V	PFC-3000L
Flow & Pressure Measurements		Range	Accuracy		
Flow	Measuring direction	bidirectional	•	•	•
	Temperature compensated	yes	•	•	•
	Pressure compensated	yes	•	•	•
	Humidity compensated	yes	•	•	•
	O ₂ compensated	yes	•	•	•
	High	± 300 L/min	± 1.75%* or ± 0.1 L/min**	•	•
Pressure	Low	± 20 L/min	± 1.75%* or ± 0.04 L/min**	•	•
	High	0 – 145 PSI	± 1%* or ± 0.15 PSI**	•	•
	Average	± 112.5 mmHg	± 0.75%* or ± 0.08 mmHg**	Differential	Relative
	Low	0 – 3.75 mmHg	± 1%* or ± 0.01 mmHg**	•	•
	High Flow Port	0 – 112.5 mmHg	± 0.75%* or ± 0.08 mmHg**	•	•
	Barometer	0 – 862.5 mmHg (abs)	± 1%* or ± 3.75 mmHg**	•	•
Measuring unit	Vacuum pressure	± 750 mmHg	± 0.5%* or ± 1.5 mmHg**	•	•
	Flow	L/min, L/s, cfm, mL/min, mL/s	•	•	•
	Pressure	bar, mbar, cmH ₂ O, inH ₂ O, Torr, inHg, hPa, kPa, mmHg, PSI	•	•	•
Additional Measuring Values		Range	Accuracy		
Oxygen	Concentration	0 - 100%	± 1% O ₂ **	•	•
	Pressure compensated	yes	•	•	•
Temperature	High Flow Port	0 - 50°C	± 1.75%* or ± 0.5°C**	•	•
Dew point	High Flow Port	-10 - 50°C	± 2%* or ± 1°C**	•	•
Air humidity	High Flow Port	0 - 100%RH	± 3%**	•	•
CO ₂	Concentration	0 - 10%	± (0.2% ABS + 2% REL)	w/ MGA-3050	w/ MGA-3050
		10 - 20%	± (0.3% ABS + 4% REL)	w/ MGA-3050	w/ MGA-3050
N ₂ O	Concentration	0 - 100%	± (2% ABS + 2% REL)	w/ MGA-3050	w/ MGA-3050
HAL, ISO, ENF	Concentration	0 - 8%	± (0.15% ABS + 5% REL)	w/ MGA-3050	w/ MGA-3050
		8 - 12%	± (0.2% ABS + 10% REL)	w/ MGA-3050	w/ MGA-3050
SEV	Concentration	0 - 10%	± (0.15% ABS + 5% REL)	w/ MGA-3050	w/ MGA-3050
		10 - 15%	± (0.2% ABS + 10% REL)	w/ MGA-3050	w/ MGA-3050
DES	Concentration	0 - 22%	± (0.15% ABS + 5% REL)	w/ MGA-3050	w/ MGA-3050
		22 - 25%	± (0.2% ABS + 10% REL)	w/ MGA-3050	w/ MGA-3050
Gas types		Air, Air/O ₂ , N ₂ O/O ₂ , Heliox (21% O ₂), He/O ₂ , N ₂ , CO ₂ , customized gas types	•	•	•
Gas Conditions		ATP, ATPD, ATPS, AP21, STP, STPH, BTPS, BTPD, 0/1013, 20/981, 15/1013, 25/991, 20/1013	•	•	•
Respiratory Parameters		Range	Accuracy		
Rate		1 - 1000 bpm	± 2.5%** or ±1 bpm	•	•
Time	T _i , T _E	0.05 - 60 s	± 0.02 s	•	•
I:E ratio		1:300 - 300:1	± 2.5%*	•	•
Ti/Ttotal		0 - 100%	± 5%*	•	•
Breath volumes	V _{ti} , V _{te} (@Flow Low)	± 10 L	± 1.75%* or ± 0.10 mL(>2.4 L/min)	•	•
	V _{ti} , V _{te} (@Flow High)	± 10 L	± 1.75%* or ± 0.20 mL(>6.0 L/min)	•	•
Minute volumes	V _i , V _e	0 - 300 L/min	± 2.5%* or ± 20 mL/min(High) ± 10 mL/min(low)	•	•
Pressure	P _{peak} , P _{mean} , P _{EEP} , P _{plateau}	0 – 152.96 cmH ₂ O	± 0.75%* or ± 0.1 cmH ₂ O**	•	•
Peakflow	Peakflow Insp./Exp.	± 300 L/min	± 1.75%* or ± 0.1 L/min**	•	•
Compliance	C _{stat}	0 - 1000 mL/mbar	± 3%* or ± 1 mL/mbar**	•	•
Trigger	Adult, Pediatric, HFO	Adjustable on flow or pressure curves with user-defined limits.	•	•	•
General Information					
Electrical & Physical Data	AC input	100 - 240 VAC, 50/60 Hz	•	•	•
	Battery (lead rechargeable battery)	3 hrs (with MGA-3050 2 hrs)	•	•	•
	Power consumption	25 VA(W)	•	•	•
	Weight	<8.5 Lbs (3.8 kg)	•	•	•
	Dimensions (w x d x h)	8.67 x 9.84 x 4.72 inches (220 x 250 x 120 mm)	•	•	•
Data Storage		all parameters (measured as well as respiratory values)	•	•	•
Display	Graphic display	Intuitive user interface with numerical measuring values, statistics, volume trigger configuration, gas type selection and calibration menus.	•	•	•
Communication Interfaces		USB for Windows Software FlowLab, Interfaces RS-232 for individual communication, TTL for external trigger.	•	•	•
Calibration		annually	•	•	•
Conditions	Ambient temperature	15 - 40 °C (59 - 104 °F)	•	•	•
	Humidity	10 - 90% RH, Non-condensing	•	•	•
Approvals		CE, CSA	•	•	•

Legend

* Tolerance related to the measured value

** Absolute tolerance (Whichever is greater)

TSI Certifier® FA Plus Ventilator Test System

CE

Certifier® FA Plus is the full-feature system capable of testing virtually all models of ventilators: adult, pediatric, anesthesia, neonatal and high-frequency.

Highlights

- ◆ Color touch screen graphical user interface
- ◆ Real-time graphing mode
- ◆ Bi-directional flow measurement
- ◆ Data storage using SD Flash card and internal memory
- ◆ Access stored data through USB interface
- ◆ Report printing capability
- ◆ Rechargeable battery plus AC operation

Test Parameters

- ◆ Flow
- ◆ Peak & Minimum Flow
- ◆ Volume (Inhaled and Exhaled)
- ◆ Minute Volume
- ◆ Low Pressure (Differential)
- ◆ Peak & PEEP Pressure
- ◆ Mean Airway Pressure
- ◆ High Pressure
- ◆ Barometric Pressure
- ◆ Inspiratory Time
- ◆ Expiratory Time
- ◆ I:E Ratio
- ◆ Respiratory Rate
- ◆ Flow & Volume modes - STP, ATP, BTPS, BTPD, plus user-defined
- ◆ Oxygen Concentration (with optional 4073 Kit)



TSI Certifier® FA Plus

Certifier® FA Plus Ventilator Test System 4080 can also test a variety of other medical equipment such as anesthesia gas delivery machines, insufflators and oxygen concentrators. Its compact size makes this ventilator tester ideal for use in field service, biomedical shops and manufacturing.

The fast response and bi-directional sensing sensors makes the Certifier® FA Plus Ventilator Test Systems 4080 capable of testing all types of ventilators including neo-natal and high frequency. This ventilator tester is designed to measure air, oxygen, and nitrous oxide flow and pressure in institutional, home care, field service, laboratory and production applications.



Optional LS-2000A Lung Simulator

Specifications

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Handheld Flow Analyzer

Certifier® FA PLUS	Gas/Mode	Range	Accuracy**
Flow—High Flow Module	Air, O ₂	-200 to +300 slpm*	±2% or ±0.075 slpm
	Air/O ₂ Mixtures	0 to 300 slpm	±4% or ±0.1 slpm
	N ₂	-200 to +300 slpm	±3% or ±0.1 slpm
	CO ₂	-40 to +40 slpm	±3% or ±0.1 slpm
Flow—Low Flow Module	Air, O ₂	0.01 to 20 slpm	±2% or ±0.01 slpm
	N ₂ , CO ₂	0.01 to 20 slpm	±3% or ±0.01 slpm
	N ₂ O	0.01 to 20 slpm	±4% or ±0.025 slpm
Volume-High Flow-Inhaled	Air, O ₂	0.01 to 10 liters STP	±2% Plus 0.02 liters
	Air/O ₂ Mixtures	0.01 to 10 liters STP	±4% Plus 0.02 liters
Volume-High Flow-Exhaled	Air, O ₂	0.01 to 10 liters STP	±3% Plus 0.03 liters
	Air/O ₂ Mixtures	0.01 to 10 liters STP	±4% Plus 0.04 liters
Volume-Low Flow-Inhaled	Air, O ₂	0.01 to 10 liters STP	±2% or ±0.01 liters
	N ₂ O	0.01 to 10 liters STP	±4% or ±0.01 liters
Minute Volume-High Flow	-	0.01 to 100 liters STP	±3%
Minute Volume-Low Flow	-	0 to 10 liters STP	±3%
Respiratory Times	Ti, Tip, Te	0.04 to 30 seconds	±2% or ±0.01 seconds
I:E Ratios	I:E, I:Eip	1:100 to 100:1	±4%
Respiratory Rate	f	1 to 1500 breaths per minute	±2% or 0.1 bpm
Low Pressure	All	-25 to +150 cmH ₂ O	±0.5% or ±0.15 cmH ₂ O
High Pressure	-	-10 to +150 PSI (-0.7 to 10 bar)	±1% or 0.1 PSI (7 mbar)
Barometric Pressure	-	7 to 23 PSI (500 to 1600 mbar)	±0.16 PSI (11 mbar)
Oxygen Concentration	-	21% to 100%	2% of concentration

*slpm = Standard Liters per Minute **Accuracy stated as a percent of reading at TSI standard gas conditions.

Certifier® FA Plus

Model	Description
4080	High-Flow Standard Kit

Optional Modules and Accessories

Model	Description
4073	Oxygen Sensor Kit
PSR-11-917-J	Replacement Oxygen Sensor
4082	Low-Flow Module



Part #	Description	
1208061	Extra battery pack and charger kit	4080 High-flow test system
1303860	Printer cable	4082 Low-flow kit (sold separately)
1602342	Low Flow Filter	
BC20-40702	High Flow Filter	

TSI Certifier® FA Ventilator Test System



Certifier® FA is a low-cost test system capable of testing multiple parameters of ventilator performance.

Highlights

- ◆ Simple, easy to read, user interface
- ◆ Backlit LCD display
- ◆ Entire kit weighs less than 3 Lbs (1.4 kg)
- ◆ Volumes and flow in BTPS, ATP or STP
- ◆ Powered by 4-AA Alkaline Batteries

Test Parameters

- ◆ Flow
- ◆ Peak Flow
- ◆ Volume
- ◆ Stacked Volume
- ◆ Minute Volume
- ◆ Low Pressure
- ◆ Peak & PEEP Pressure
- ◆ Barometric Pressure
- ◆ Inspiratory Time
- ◆ I:E Ratio
- ◆ Respiratory Rate
- ◆ Oxygen Concentration (with optional 4073 Kit)



Respiratory Ventilator Test System

The Certifier® FA Ventilator Test System 4070 is designed to measure air, oxygen and nitrous oxide flow and pressure in institutional, home care, field service, laboratory and production applications. The Certifier® FA ventilator test system is a battery-operated flow analyzer that can also test a variety of other medical equipment, such as anesthesia gas delivery machines and oxygen concentrators.

Their compact size makes these ventilator testers ideal for use in field service, biomedical shops and manufacturing.



Displays 2 test parameters

Specifications

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Certifier® FA	Gas	Range	Accuracy**
Flow—High Flow Module	Air, O ₂	0 to 300 slpm*	±2% or ±0.075 slpm
	Air/O ₂ Mixtures	0 to 300 slpm	±4% or ±0.1 slpm
Flow—Low Flow Module	Air, O ₂	0.01 to 15 slpm	±2% or ±0.01 slpm
	N ₂ O	0.01 to 15 slpm	±4% or ±0.025 slpm
Volume-High Flow-Inhaled	Air, O ₂	0.01 to 10 liters STP	±2% Plus 0.02 liters
	Air/O ₂ Mixtures	0.01 to 10 liters STP	±4% Plus 0.02 liters
Volume-Low Flow-Inhaled	Air, O ₂	0.01 to 9.999 liters STP	±2% or ±0.01 liters
	N ₂ O	0.01 to 10 liters STP	±4% or ±0.01 liters
Minute Volume-High Flow	-	0.01 to 99 liters STP	±7%
Minute Volume-Low Flow	-	0 to 9.999 liters STP	±7%
Inspiratory Time	-	0.25 to 60 seconds	±0.01 seconds
I:E Ratio— High Flow	-	1:100 to 100:1	±5%
I:E Ratio— Low Flow	-	1:15 to 15:1	±5%
Respiratory Rate	-	0.5 to 120 breaths per minute	±5%
Low Pressure	-	-25 to +150 cmH ₂ O	±0.75% or ±0.2 cmH ₂ O
Barometric Pressure	-	7 to 29 PSI (500 to 2000 mbar)	±0.16 PSI (11 mbar)
Oxygen Concentration	-	21% to 100%	2% of concentration

*slpm = Standard Liters per Minute **Accuracy stated as a percent of reading at TSI standard gas conditions.

Certifier® FA

Model	Description
4070	High-Flow Standard Kit

Optional Modules and Accessories

Model	Description
4073	Oxygen Sensor Kit
PSR-11-917-J	Replacement Oxygen Sensor
BC20-40701	Replacement Low Flow Filter
BC20-40702	Replacement High Flow Filter
4072	Low-Flow Module

Part #	Description
1319288	Hard shell carrying case

DPM-235175NNFC Digital Pressure Meter



Handheld Flow Analyzer

Lung Simulators

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General Features

- ◆ Easy to Use
- ◆ Ultra-Portable (< 1 Lbs)
- ◆ Quick Disassembly
- ◆ Simple Design
- ◆ Replacement Parts Available
- ◆ All Components can be Sterilized
- ◆ Connects Directly to your Ventilator's Existing Tubing

LS-2000 Series Features

- ◆ Adjustable Compliance Settings
- ◆ Adjustable Resistance Settings
- ◆ Variable Leakage Valve
- ◆ Simple Design
- ◆ Fraction of the Price and Size of any Comparable Lung Sim

LS-1000E Features

- ◆ Unique Double-conus Connector (OD 22 conical, OD 15 conical)
- ◆ Unbeatable Simplicity & Price

LS-1000M Features

- ◆ Two Compliances
- ◆ Two Separately Adjustable Resistances
- ◆ Leak Simulator on Each Lung



CE



LS-2000A, LS-2000I, LS-1000E



LS-1000M

LS-2000A, LS-2000I, LS-1000E, LS-1000M

BC Biomedical's Lung Simulator series is an affordable, ultra-portable and easy to maintain alternative to older models. The LS-2000(A/I) SmartLungs come in Adult and Infant models, offering all the performance and features of large and expensive test lungs in an compact, easy-to-use package. The LS-1000E EasyLung is a simple, low-cost, general purpose test lung with no variable controls. LS-1000M is the ideal tool to test neonatal and infant ventilators.

SPECIFICATIONS



Models	LS-1000E	LS-2000I	LS-2000A
Use	General Purpose	Infant	Adult
Resistance	20 mbar/L/s	5, 20, 50, 200 mbar/L/s	5, 20, 50, 200 mbar/L/s
Compliance	25 mL/mbar (Vt = 500mL, PEEP = 0 mbar)	1, 2, 3, 5 mL/mbar	10, 15, 20, 30 mL/mbar
Volume	0-1000 mL (with 1L bag)	0-200 mL (with 0.5L bag)	0-600 mL (with 1L bag)
Leak	N/A	0-10 L/min	0-10 L/min
Weight	< 0.5 Lbs (0.23 kg)	< 0.7 Lbs (0.32 kg)	< 0.8 Lbs (0.36 kg)
Dimensions (LxWxH)	11.9" x 4.6" x 1.7" (302.3 x 116.8 x 43.7 mm)	10.7" x 4.6" x 1.6" (271.8 x 116.8 x 40.6 mm)	11.9" x 4.6" x 1.6" (302.3 x 116.8 x 40.6 mm)
Replaceable Components	Yes	Yes	Yes
Sterilizable	Yes	Yes	Yes

The BC Biomedical LS-1000E EasyLung is an affordable, versatile, general purpose test lung that provides a broad spectrum of benefits to the respiratory care field. It is ideal for ventilator manufacturers validating the safety of their products, for ventilator training and for biomedical engineers performing general service procedures. The EasyLung combines singular design with high-quality, replaceable parts. Its unique double-conus multi-connector also ensures a direct connection to all tubing systems.

The SmartLung is unbeatable in terms of price/performance ratio. Resistance (airway resistance), lung compliance and leakage are all adjustable. Its size eliminates the cumbersome side tables needed by large test lungs. Different bag sizes ensure that virtually all patient lungs can be simulated; from babies to adults. The SmartLung does not require any additional adapters and the leak simulation is infinitely adjustable. The SmartLung enables verification of premature baby ventilators as well as mask ventilation. Even the sensitive function of patient flow triggering can be tested with the SmartLung.



These test lungs are manufactured in accordance with CE requirements.

For product pricing - Page 108