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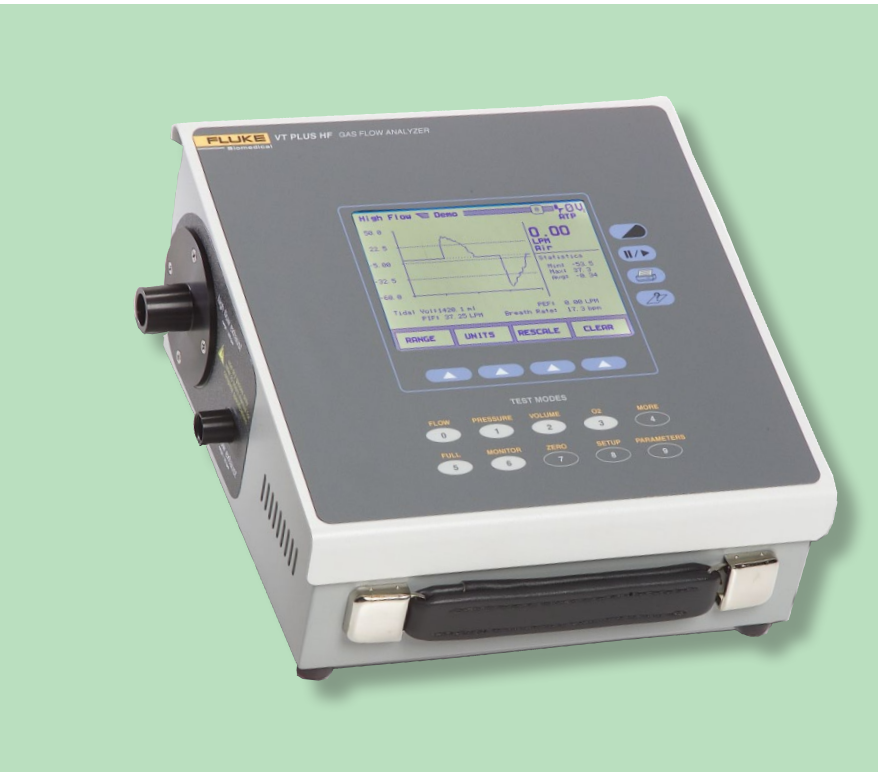
Biomedical

VT PLUS HF
Gas-Flow Analyzer

Technical Data



The VT PLUS HF is Fluke Biomedical's premier general-purpose gas-flow analyzer. In addition, special display modes and bi-directional flow make it perfect for fully and efficiently testing both conventional mechanical ventilators and high-frequency ventilators. EC.6.20 now requires 100 % completion of scheduled life-support device preventive maintenance every year, and VT PLUS HF can help meet those requirements. Multiple special-function tests make troubleshooting quick and efficient.

VT PLUS HF has the capability to measure either high- or low-flow and pressure, replacing the need for gauges and flow meters. It measures 21 ventilator parameters and can display all of them on one screen. Results can be printed directly from the unit or from a PC with included Windows-compatible software. VT PLUS HF also has onboard graphing capability and shows the minimum, maximum, average, and absolute measurement for all parameters.

Learning to use the VT PLUS HF is simple. Technicians control the unit using the VT PLUS HF user-friendly command system, or, if they're familiar with the RT-200, they can switch to a special control mode that uses RT-200-style commands.

VT PLUS HF can be operated with a variety of precision test lungs to ensure that ventilators are tested to manufacturers' specifications and clinical expectations with a fully NIST-traceable testing system.

Key features

- Bi-directional flow, pressure, volume, and oxygen concentration, and pressure measurements
- Low- and high-pressure, and flow measurement capability
- Special HF mode—up to 900 BPM (15 Hz)
- RS-232 and printer ports
- Included Windows-compatible graphics software
- All 21ventilator parameters displayed at once on one screen
- Operation by user-friendly VT PLUS HF command mode or special RT-200 command mode
- Minimum, maximum, average, absolute, and graph for all parameters
- Multiple special-function tests for efficient troubleshooting

Optional features

- Operation with a variety of precision test lungs available from Fluke Biomedical to complete a fully NIST-traceable ventilator testing system

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Specifications

Power	100 V ac to 240 V ac, 50/60 Hz	
Maximum over-voltage	264 V ac	
Power consumption	< 132 V A	
Fuse rating	0.5 A, slow blow	
Display	320 x 240 LCD with CFL backlight	
Viewing area	10.1 cm x 8.2 cm (3 in x 4 in), blue on white background	
Operational modes	Manual mode for simple tests or troubleshooting; computer-control mode, using RS-232 serial port for special applications; use of VT PLUS HF with VT for Windows software for recording graphs and logging data to a computer	
Output ports	RS-232 serial port, and parallel-printer port	
Oxygen measurement		
Range	0 % to 100 %	
Accuracy	± 2 % FSO	
Resolution	0.1 % O2	
Transducer location	Internal	
Gas		
Compatibility	Air, O_2, CO_2, N_2, N_2O, He, mixtures, or user-defined	
Reference units	ATP, STPDO, STPD21 and BTPS	
Test parameters		
Continuous flow	Low flow	± (2 % of reading and 1 % of range)
	High flow	± (2 % of reading and 1 % of range)
Volumetric flow	**Low-flow**	
	Flow range	-25 lpm to 25 lpm
	Accuracy	± 2 % of reading or ± 1 % of range, whichever is greater
	Frequency response	> 25 Hz or t10-90 < 40 ms, whichever is greater
	Low-flow dropout	0.01 lpm
	Breath-detect threshold	0.5 lpm
	Maximum-flow rate	50 lpm
	Volume range	> ± 60 l
	Sample rate	100 Hz
	Resolution	0.01 lpm flow > 1 lpm; 0.001 lpm flow < 1 lpm
	Dynamic resistance	< 2.5 cmH_2O @ 5 lpm
	Fittings	15 mm OD, 1:40 conical male; 0.25 in NPT ID per ASTM F-1054 aluminum with black anodized finish
	Notes: • Tidal-volume accuracy: ± 3 % of reading or ± 2 ml, whichever is greater • Volume accuracy tested to 1 liter • Flow accuracy is specified for dry air or oxygen • Below 3.0 lpm, measurement accuracy is obtained by allowing the VT PLUS HF to fully warm up or manually zeroing before reading or documenting measurement	
	High-flow	
	Flow range	-300 lpm to 300 lpm
	Accuracy	± 2 % of reading or ± 2 % of range, whichever is greater

Volumetric flow cont.	Frequency response	> 25 Hz
	High-flow dropout	25 lpm
	Breath-detect threshold	2 lpm
	Maximum-flow rate	500 lpm
	Volume range	> ± 60 l
	Dynamic resistance	< 2 cmH_2O @ 60 lpm
	Sample rate	100 Hz
	Resolution	0.01 lpm
	Fittings	22 mm OD, 1:40 conical male; 15 mm ID, 1:40 conical female per ASTM F-1054 aluminum with black anodized finish
	Notes: • Tidal-volume accuracy: ± 3 % of reading or ± 10 ml, whichever is greater • Volume accuracy tested to 7 liters • Flow accuracy is specified for dry air or oxygen	
	Low-pressure	
	Range	± 500 mmHg (10 psi)
	Accuracy	± 0.8 % of reading or ± 1.5 mmHg, whichever is greater
	Frequency response	> 10 Hz
	Resolution	0.1 mmHg
	Fittings	Luer lock, stainless steel
	Maximum applied pressure	60 psi
	Sample rate	100 Hz
	Operating pressure	30 psi
	Note: Fluid pressure may be applied to the positive port; however, fluids should be kept from entering the pressure port by using a suitable length of connection tubing	
	High-pressure	
	Maximum applied pressure	150 psi
	Range	± 100 psi
	Accuracy	± 1 % of reading or ± 0.3 psig, whichever is greater
	Frequency response	> 10 Hz
	Resolution	0.1 psi
	Sample rate	100 Hz
	Fittings	DISS connector, stainless steel
	Airway-pressure	
	Maximum applied pressure	20 psi
	Range	± 120 cmH_2O
	Accuracy	± 0.75 % of reading or ± 0.5 cmH_2O, whichever is greater
	Frequency response	> 25 Hz or t10-90 < 40 ms, whichever is greater
	Resolution	0.1 cmH_2O
	Sample rate	100 Hz
	Fittings	Internally connected at the transducer distal end
	Note: Airway pressure is internally tapped off the proximal-flow sensor port, which is the port closest to the exhaust port on the VT PLUS HF	

Ventilator parameter		
Inspiratory and expiratory tidal volume	Resolution	0.1 ml
	Range	As specified in high-flow/low-flow specification
	Accuracy	As specified in high-flow/low-flow specification
Expiratory minute volume	Resolution	0.001 lpm
	Range	0 L to 60 L
	Accuracy	± 3 %
Breath rate	Resolution	0.1 BPM
	Range	0.5 BPM to 150 BPM
	Accuracy	± 1 %
Inspiratory-to-expiratory time ratio (I:E ratio)	Resolution	0.01
	Range	1:200 to 200:1
	Accuracy	± 2 % or ± 0.1 s
Inspiratory time	Resolution	0.01 s
	Range	0 s to 60 s
	Accuracy	± 1 % or ± 0.02 s
Expiratory time	Resolution	0.01 s
	Range	0 s to 90 s
	Accuracy	± 1 % or ± 0.01 s
Peak inspiratory pressure	Resolution	0.1 cmH_2O
	Range	± 120 cmH_2O
	Accuracy	± 3 % or ± 1 cmH_2O
Inspiratory pause pressure	Resolution	0.1 cmH_2O
	Range	± 120 cmH_2O
	Accuracy	± 3 % or ± 1 cmH_2O
Mean airway pressure	Resolution	0.1 cmH_2O
	Range	± 80 cmH_2O
	Accuracy	± 3 % or ± 0.5 cmH_2O
Positive end-expiratory pressure (PEEP)	Resolution	0.1 cmH_2O
	Range	-5 cmH_2O to 40 cmH_2O
	Accuracy	± 3 % or ± 0.5 cmH_2O
Lung compliance	Resolution	0.1 ml/cmH_2O
	Range	0 ml/cmH_2O to 150 ml/cmH_2O
	Accuracy	± 5 % or ± 5 ml/cmH_2O
	Inspiratory pause time	> 0.5 s
Inspiratory hold time	Resolution	0.01 s
	Range	0 s to 60 s
	Accuracy	± 1 % or ± 0.1 s
Expiratory hold time	Resolution	0.01 s
	Range	0 s to 90 s
	Accuracy	± 1 % or ± 0.1 s

Peak expiratory flow	Resolution	0.01 lpm
	Range	0 lpm to 300 lpm
	Accuracy	± 3 % or ± 2 lpm
Peak inspiratory flow	Resolution	0.01 lpm
	Range	0 lpm to 300 lpm
	Accuracy	± 3 % or ± 2 lpm
Flow bias	Resolution	0.01 lpm
	Range	0 lpm to 30 lpm
	Accuracy	± 2 % or ± 0.5 lpm
	Expiratory pause time	> 0.5 s
Operating environment conditions		
Temperature range	10 °C to 40 °C	
Ambient humidity	0 % to 80 % non-condensing to 31 °C, decreasing to 50 % at 40 °C	
Barometric pressure	8 psig to 18 psig	
Storage environment conditions		
Temperature range	-25 °C to -50 °C	
Humidity	0 to 95 % non-condensing	
Dimensions (WxDxH)	25.4 cm x 25.4 cm x 12.7 cm (10 in x 10 in x 5 in)	
Weight	4.53 kg (10 lb)	

Ordering information

Models

VT+HF-US120 United States, 120 V
VT+HF-AUS250V Australia, 250 V
VT+HF-SHK250V Schuko, 250 V
VT+HF-BRAZ250 Brazil, 250 V
VT+HF-UK250V United Kingdom, 250 V

Premium precision ventilator test kits
(VT PLUS HF Gas-Flow Analyzer; and ACCU LUNG portable precision test lung)
VT+HF/ACCULUNG-US United States
VT+HF/ACCULUNG-AUS Australia
VT+HF/ACCULUNG-SHK Schuko
VT+HF/ACCULUNG-BRAZ Brazil
VT+HF/ACCULUNG-UK United Kingdom

VT-Plus upgrades
(adds HF capability and RT-200 mode)
8831007 VT PLUS HF hardware and firmware factory service upgrade (for units lower than hardware v1.01.01; additional flat-rate charge required for factory service/calibration)

Standard accessories

9VT0015 Users Manual
8830200FG VT for Windows PC Software
75034 Serial Cable
1HD0011 Tilt Stand Power Cord (country specific)
VT-PLUS-7001 Accessory Kit (includes 16 accessories)

VT for Windows PC Software

VT PLUS HF standard accessories

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Optional accessories

5022010 Soft Vinyl Carrying Case for VT PLUS HF

9530-0066 Hard-Sided Protective Carrying Case for VT PLUS HF (limited to stock on hand)

Test lungs

ACCU LUNG ACCU LUNG Portable Precision Test Lung (with Soft-Sided Carrying Case

MI-14900 Michigan Instruments Non-Instrumented Single-Adult Test Lung

MI-11000 Michigan Instruments Non-Instrumented Dual-Adult Test Lung

MI-12952 Michigan Instruments Non-Instrumented Adult/Infant Test Lung

48499 Siemens 190 Test Lung

Parabolic airway resistors (for use with Michigan Instruments test lungs)

48129 Parabolic Airway Resistor ring

Printers

PRINTR/CTZ-US120V Printer 110 V, Citizen IDP 3110

PRINTR/CTZ-US220V Printer 220 V, Citizen IDP 3110

71072 Parallel Printer Cable, D25M-C36M

61096 Printer 120 V Power Supply

61097 Printer 220 V Power Supply

97116 DPU-414 and DPU-411 Printer Paper (minimum 7 rolls – price is per roll)

Accessory kit parts

1XX0015 Filter, External (Bacterial), 1 each

49343FG Adapter, DISS O2 Nut and Nipple with 1/4 in I.D. Hose Barb, 1 each

1FT0050 Tubing Adapter, Directional 15 mm OD x 15 mm OD), 2 each

1FT0049 Tubing Adapter (22 mm OD x 22 mm ID), 2 each

1FT0048 Tubing Adapter (22 mm OD x 22 mm OD), 2 each

1FT0045 Tubing Adapter (15 mm OD x 22 mm OD), 2 each

1FT0046 Tubing Adapter (15 mm OD x 15 mm OD), 2 each

1FT0047 Tubing Adapter (15 mm ID x 15 mm OD), 2 each

1FT0051 Tubing Adapter, Narrow Bore, 2 each

48478 Barb (Luer Lock – Male to 1/89 in ID tubing), 2 each

1FT0043 Tubing Adapter (1/4 in NPT Male to 1/8 in ID Tubing Barb Fitting), 2 each

1FT0005 Tubing Adapter (Luer Lock 1/16 in to Bulk-head Connection), 2 each

2FU0005 Fuse (500 mA)

67535 Tubing 1/8 in 4 ft long, 2 each

About Fluke Biomedical

Fluke Biomedical is the world's leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance. Highly credentialed and equipped with a NVLAP Lab Code 200566-0 accredited laboratory, Fluke Biomedical also offers the best in quality and customer service for all your equipment calibration needs.

Today, biomedical personnel must meet the increasing regulatory pressures, higher quality standards, and rapid technological growth, while performing their work faster and more efficiently than ever. Fluke Biomedical provides a diverse range of software and hardware tools to meet today's challenges.

Fluke Biomedical Regulatory Commitment

As a medical test device manufacturer, we recognize and follow certain quality standards and certifications when developing our products. We are ISO 9001 and ISO 13485 medical device certified and our products are:

- CE Certified, where required
- NIST Traceable and Calibrated
- UL, CSA, ETL Certified, where required
- NRC Compliant, where required

Fluke Biomedical.
Better products. More choices. One company.

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