

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 21 ventilator 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

Technical specifications

Power

100 V ac to 240 V ac, 50/60 H

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, O₂, CO₂, N₂, N₂O, 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 cmH₂O @ 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

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 cmH₂O @ 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 cmH₂O

Accuracy: ± 0.75 % of reading or ± 0.5 cmH₂O, whichever is greater

Frequency response:

> 25 Hz or t10-90 < 40 ms, whichever is greater

Resolution: 0.1 cmH₂O

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: $\pm 3\%$

Breath rate

Resolution: 0.1 BPM
 Range: 0.5 BPM to 150 BPM
 Accuracy: $\pm 1\%$

Inspiratory-to-expiratory time ratio (I:E ratio)

Resolution: 0.01
 Range: 1:200 to 200:1
 Accuracy: $\pm 2\%$ or ± 0.1 s

Inspiratory time

Resolution: 0.01 s
 Range: 0 s to 60 s
 Accuracy: $\pm 1\%$ or ± 0.02 s

Expiratory time

Resolution: 0.01 s
 Range: 0 s to 90 s
 Accuracy: $\pm 1\%$ or ± 0.01 s

Peak inspiratory pressure

Resolution: 0.1 cmH₂O
 Range: ± 120 cmH₂O
 Accuracy: $\pm 3\%$ or ± 1 cmH₂O

Inspiratory pause pressure

Resolution: 0.1 cmH₂O
 Range: ± 120 cmH₂O
 Accuracy: $\pm 3\%$ or ± 1 cmH₂O

Mean airway pressure

Resolution: 0.1 cmH₂O
 Range: ± 80 cmH₂O
 Accuracy: $\pm 3\%$ or ± 0.5 cmH₂O

Positive end-expiratory pressure (PEEP)

Resolution: 0.1 cmH₂O
 Range: -5 cmH₂O to 40 cmH₂O
 Accuracy: $\pm 3\%$ or ± 0.5 cmH₂O

Lung compliance

Resolution: 0.1 ml/cmH₂O
 Range: 0 ml/cmH₂O to 150 ml/cmH₂O
 Accuracy: $\pm 5\%$ or ± 5 ml/cmH₂O
 Inspiratory pause time: > 0.5 s

Inspiratory hold time

Resolution: 0.01 s
 Range: 0 s to 60 s
 Accuracy: $\pm 1\%$ or ± 0.1 s

Expiratory hold time

Resolution: 0.01 s
 Range: 0 s to 90 s
 Accuracy: $\pm 1\%$ or ± 0.1 s

Peak expiratory flow

Resolution: 0.01 lpm
 Range: 0 lpm to 300 lpm
 Accuracy: $\pm 3\%$ or ± 2 lpm

Peak inspiratory flow

Resolution: 0.01 lpm
 Range: 0 lpm to 300 lpm
 Accuracy: $\pm 3\%$ or ± 2 lpm

Flow bias

Resolution: 0.01 lpm
 Range: 0 lpm to 30 lpm
 Accuracy: $\pm 2\%$ or ± 0.5 lpm
 Expiratory pause time: > 0.5 s



VT for Windows PC Software



VT PLUS HF standard accessories

Ordering information

Models

- 2128272** VT PLUS HF—USA, 120 V
- 2399376** VT PLUS HF—Australia, 250 V
- 2399383** VT PLUS HF—Schuko, 250 V
- 2399390** VT PLUS HF—UK, 250 V

Premium precision ventilator test kits

- (VT PLUS HF Gas-Flow Analyzer; and ACCU LUNG portable precision test lung)
- 2387329** VT PLUS HF/ACCU LUNG—USA
 - 2425682** VT PLUS HF/ACCU LUNG—Australia
 - 2425694** VT PLUS HF/ACCU LUNG—Schuko
 - 2425701** VT PLUS HF/ACCU LUNG—UK

VT-Plus upgrades

- (adds HF capability and RT-200 mode)
- 2240945** 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

- 2137275** Operator's Manual
- 2392054** VT for Windows PC Software
- 2238659** Serial Cable
- 2133387** Tilt Stand
- XXXXXX** Power Cord (country specific)
- 2131367** Accessory Kit (includes 16 accessories)

Optional accessories

- 2222822** Soft Vinyl Carrying Case for VT PLUS HF
- 2248587** Hard-Sided Protective Carrying Case for VT PLUS HF (limited to stock on hand)
- 2397628** Soft-Sided Carrying Case for ACCU LUNG

Test lungs

- 2387318** ACCU LUNG Portable Precision Test Lung (with Soft-Sided Carrying Case for ACCU LUNG, Model 2397628)
- 2251049** Michigan Instruments Non-Instrumented Single-Adult Test Lung
- 2251008** Michigan Instruments Non-Instrumented Dual-Adult Test Lung
- 2251013** Michigan Instruments Non-Instrumented Adult/Infant Test Lung
- 2213774** Siemens 190 Test Lung

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

- 2212830** Parabolic Airway Resistor: RP5
- 2212934** Parabolic Airway Resistor: RP10
- 2212848** Parabolic Airway Resistor: RP20
- 2212853** Parabolic Airway Resistor: RP50
- 2212918** Parabolic Airway Resistor: RP200
- 2213140** Parabolic Airway Resistor: RP500

Printers

- 2248762** Printer 110 V, Citizen IDP 3110
- 2719653** Printer 220 V, Citizen IDP 3110
- 2238072** Parallel Printer Cable, D25M-C36M

Accessory kit parts

- 2133712** Filter, External (Bacterial), 1 each
- 2391777** Adapter, DISS O2 Nut and Nipple with 1/4 in I.D. Hose Barb, 1 each
- 2133310** Tubing Adapter, Directional (15 mm OD x 15 mm OD), 2 each
- 2133305** Tubing Adapter (22 mm OD x 22 mm ID), 2 each
- 2133291** Tubing Adapter (22 mm OD x 22 mm OD), 2 each
- 2133269** Tubing Adapter (15 mm OD x 22 mm OD), 2 each
- 2133278** Tubing Adapter (15 mm OD x 15 mm OD), 2 each
- 2133284** Tubing Adapter (15 mm ID x 15 mm OD), 2 each
- 2133322** Tubing Adapter, Narrow Bore, 2 each
- 2213679** Barb (Luer Lock – Male to 1/89 in ID tubing), 2 each
- 2133240** Tubing Adapter (1/4 " NPT Male to 1/8 in ID Tubing Barb Fitting), 2 each
- 2133202** Tubing Adapter (Luer Lock 1/16 in to Bulkhead Connection), 2 each
- 2133932** Fuse (500 mA)
- 2391848** 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.

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

- FDA Compliant
- 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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