

# FlowAnalyser PF-300, PF-301, PF-302

Technical Specifications



Flow and pressure measurements		Range	Accuracy
Flow	Measuring direction	Bidirectional	
	Temperature compensated	Automatic	
	Pressure compensated	Automatic	
	Humidity compensated	Automatic	
	O <sub>2</sub> compensated	Automatic	
	High Flow	± 300 L/min	± 1.75%* or ± 0.1 L/min (for 10..40°C)**
	Low Flow	± 20 L/min	± 1.75%* or ± 0.04 L/min (for 10..40°C)**
Pressure	High Pressure (P <sub>high</sub> )	0–10 bar	± 1%* or ± 10 mbar**
	Differential Pressure (P <sub>diff</sub> ) (PF-300 only)	± 150 mbar	± 0.75%* or ± 0.1 mbar**
	Relative Pressure (PF-301 and PF-302)	± 150 mbar	± 0.75%* or ± 0.1 mbar**
	Low Pressure (for PF-302 only)	0–5 mbar	± 1%* or ± 0.01 mbar**
	Pressure in High Flow Channel (P <sub>channel</sub> )	0–150 mbar	± 0.75%* or ± 0.1 mbar**
	Atmospheric Pressure (P <sub>atm</sub> )	0–1150 mbar (abs)	± 1%* or ± 5 mbar**
	Vacuum Pressure (for PF-301 only)	± 1000 mbar	± 0.5%* or ± 2 mbar**
Units	Flow	L/min, L/s, cfm, mL/min, mL/s	
	Pressure	bar, mbar, cmH <sub>2</sub> O, inH <sub>2</sub> O, Torr, inHg, hPa, kPa, mmHg, PSI	
Other measurements		Range	Accuracy
Oxygen	Concentration	0–100%	± 1% O <sub>2</sub> **
	Pressure compensated	≤ 150 mbar	
Temperature	In High Flow Channel	0–50 °C	± 1.75%* or ± 0.5 °C**
Dew point	In High Flow Channel	-10–50 °C	± 2%* or ± 1 °C**
Humidity	In High Flow Channel	0–100% RH (non condensing)	± 3% RH** from 10% RH to 80% RH ± 5% RH** for <10% and >80% RH
		0–15 vol%	± (0.2 vol% + 2% of reading)
CO <sub>2</sub>	Concentration (with optional OR-703)	15–25 vol%	unspecified
N <sub>2</sub> O	Concentration (with optional OR-703)	0–100 vol%	± (2% vol% + 2% of reading)
HAL, ISO, ENF	Concentration (with optional OR-703)	0–8 vol%	± (0.15 vol% + 5% of reading)
SEV	Concentration (with optional OR-703)	8–25 vol%	unspecified
		0–10 vol%	± (0.15 vol% + 5% of reading)
DES	Concentration (with optional OR-703)	10–25 vol%	unspecified
		0–22 vol%	± (0.15 vol% + 5% of reading)
Gas types		22–25 vol%	unspecified
		Air, O <sub>2</sub> , Air/O <sub>2</sub> , N <sub>2</sub> O/O <sub>2</sub> , He, He/O <sub>2</sub> , N <sub>2</sub> , N <sub>2</sub> O, CO <sub>2</sub> , customised gas types	
Gas standards		ATP, ATPD, ATPS, AP21, STP, STPH, BTPS, BTPS-A, BTPD, BTPD-A, 0/1013, 20/981, 15/1013, 25/991, 20/1013, NTPD, NTPS	
Ventilation parameters <sup>1</sup>		Range	Accuracy
Breath rate	Rate	1–1000 bpm	± 1 bpm or ± 2.5%**
Time	T <sub>i</sub> , T <sub>e</sub>	0.05–60 s	± 0.02 s
	I:E	1:300–300:1	± 2.5%*
Ratio	T/T <sub>total</sub>	0–100%	± 5%*
	V <sub>t</sub> , V <sub>e</sub> (@Low Flow)	± 10 L	± 1.75%* or ± 0.10 mL (> 2.4 sL/min)
Breath volumes	V <sub>t</sub> , V <sub>e</sub> (@High Flow)	± 10 L	± 1.75%* or ± 0.20 mL (> 6.0 sL/min)
	Minute volume	0–300 sL/min	± 2.5%*
Pressure	P <sub>Peak</sub> , P <sub>Mean</sub> , PEEP, P <sub>Plateau</sub>	0–150 mbar	± 0.75%* or ± 0.1 mbar**
Peakflow	PF <sub>resp</sub> , PF <sub>Exp</sub>	± 300 sL/min	± 1.75%* or ± 0.1 sL/min**
Compliance	C <sub>Stat</sub>	0–1000 mL/mbar	± 3%* or ± 1 mL/mbar**
Trigger	Adult, Pediatric, HFO, ext. Trigger	Adult, Pediatric, HFO; Adjustable on flow or pressure curves with user-defined limits.	
General information			
Power		100–240 VAC, 50/60 Hz	
Battery		3 hours (with OR-703 2 hours)	
Power consumption		25 VA	
Weight		3.7 kg	
Dimensions (w × d × h)		22 × 25 × 12 cm	
Data Storage		Internal	
Display		Intuitive user interface with numerical measuring values, statistics, volume trigger configuration, gas type selection and calibration menus.	
Interfaces		USB for Windows Software FlowLab, RS-232 for individual communication, TTL for external trigger and TSI4000 Protocol.	
Calibration		Annually	
Conditions Ambient temperature		15–40 °C (59–104 °F)	
Conditions Humidity		10–90% R.H.***	
Approvals		CE, CSA (North America), IEC 61010-1:2010, IEC 61326-2:2012	

The greater tolerance is valid:  
\*Tolerance related to the measured value, \*\* Absolute tolerance, with steady air flow, \*\*\* Non-condensing, \*\*\*\* The unit sL/min is based on ambient conditions of 0 °C and 1013.25 mbar (DIN 1343).  
<sup>1</sup> Tolerance related to the optimal calibration of the trigger.

# Accessories

CITREX and FlowAnalyser

## Meeting the Requirements in the Field

### MultiGasAnalyser OR-703 (Optional for FlowAnalyser and CITREX H5)

The MultiGasAnalyser OR-703 measures all anaesthesia and breathing gases and is the smallest multi-gas sensor in the world. It includes the most modern microsystems technology and has a direct data interface with the FlowAnalyser or CITREX H5. Key features include complete data collection and test reports.

### Oxygen measurement (CITREX)

Fast and precise measurement of oxygen concentration is an important function when verifying and calibrating ventilators. This option is available for new devices or can be acquired subsequently as a retrofit set.

### Inlet pipe (CITREX)

Test setup tool.

### USB car adapter (CITREX)

This adapter allows charging your CITREX device in every car.

### Protection filter RT019 (CITREX)

To protect your device from dust and dirt.

### CITREX H5 Protector (CITREX H5)

CITREX H5 Protector protects your device perfectly. The gas flow analyser stands absolutely stable on your workbench. CITREX H5 Protector makes your device even better.

### Carrying case (FlowAnalyser)

The FlowAnalyser case provides protection and order at work. This robust case includes storage space for your FlowAnalyser, adapter set, bacteria filter, power and USB cord, FlowLab software and user manual.

### Carrying case (CITREX H5/H4)

Custom-fit carrying bag for Citrex H5/H4 made out of high-quality materials. The compact bag offers enough space so that a secure transport of your device and all its accessories including TestLungs is ensured.

### SmartLung and EasyLung (CITREX and FlowAnalyser)

The most intelligent and cost-effective test lungs that safely test ventilators and anaesthesia machines for function and precision. SmartLung and EasyLung are extremely handy and user-friendly.

### Adapter set (CITREX and FlowAnalyser)

The adapters contained in the set allow connection of virtually any test object to the device.

These accessories represent only a selection from our product catalogue. Please ask for further information.

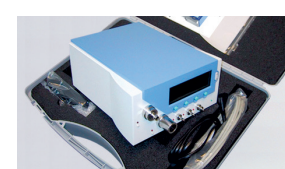
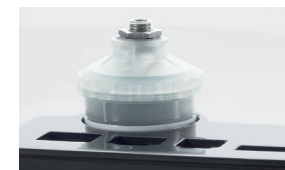
# IMT.Analytics

IMT Analytics AG . Gewerbestrasse 8 . 9470 Buchs . Switzerland  
T +41 81 750 67 10 . www.imtanalytics.com

# Highest Precision Analysers

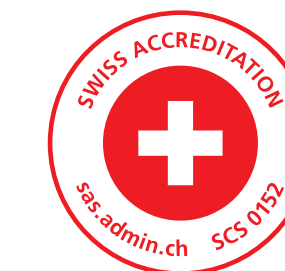
Technical Specifications and Accessories

analyser  
the art of measuring



Gas Flow Analysers and Ventilator Testers to test any Medical Device that exerts Pressure or produces Flow.

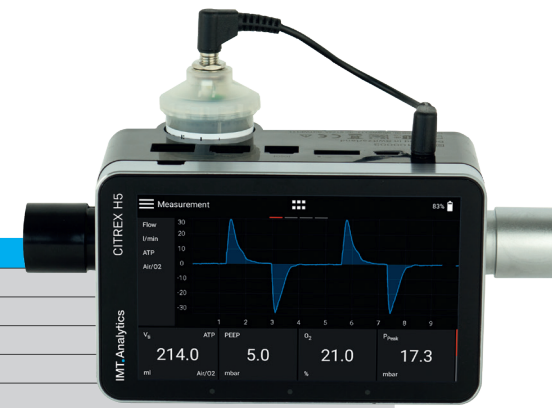
Our analysers precisely measure flows, pressures, gas temperature, humidity and oxygen concentration. They can be used to test many types of ventilators and a variety of medical gas flow and pressure devices such as oxygen concentrators, endoscopic insufflators, anaesthesia machines, flow meters, pressure gauges, suction devices and piped gases. Devices from IMT Analytics are designed to perform calibration or verification during preventive or periodic maintenance or repair service.



ISO 17025  
ISO 13485

# CITREX H5

## Technical Specifications



Flow and pressure measurements		Range	Accuracy
Flow	Measuring direction	Bidirectional	
	Temperature compensated	Automatic	
	Pressure compensated	Automatic	
	Humidity compensated	Manually	
	O <sub>2</sub> compensated	–	
	High Flow	± 300 L/min	± 1.9%* or ± 0.1 L/min (for 10..40°C)**
	Low Flow	–	
Pressure	High Pressure (P <sub>High</sub> )	-1 – 10 bar	± 1%* or ± 7 mbar**
	Differential Pressure (P <sub>Dif</sub> )	± 200 mbar	± 0.75%* or ± 0.1 mbar**
	Relative Pressure	–	
	Low Pressure	–	
	Pressure in High Flow Channel (P <sub>Channel</sub> )	-50 – 150 mbar	± 0.75%* or ± 0.1 mbar**
	Atmospheric Pressure (P <sub>Atmo</sub> )	500 – 1150 mbar	± 1%* or ± 5 mbar**
	Vacuum Pressure (see High Pressure)	-1 – 0 bar	± 1%* or ± 7 mbar**
Units	Flow	L/min, L/s, cfm, mL/min, mL/s	
	Pressure	bar, mbar, cmH <sub>2</sub> O, inH <sub>2</sub> O, Torr, inHg, hPa, kPa, mmHg, PSI	
Other measurements		Range	Accuracy
Oxygen	Concentration	0 – 100%	± 1% O <sub>2</sub> **
	Pressure compensated	≤ 150 mbar	
Temperature	In High Flow Channel	0 – 50 °C	± 1.75%* or ± 0.5 °C**
Dew point	–	–	
Humidity	–	–	
CO <sub>2</sub>	Concentration (with optional OR-703)	0 – 15 vol%	± (0.2 vol% + 2% of reading)
		15 – 25 vol%	unspecified
N <sub>2</sub> O	Concentration (with optional OR-703)	0 – 100 vol%	± (2% vol% + 2% of reading)
HAL, ISO, ENF	Concentration (with optional OR-703)	0 – 8 vol%	± (0.15 vol% + 5% of reading)
		8 – 25 vol%	unspecified
SEV	Concentration (with optional OR-703)	0 – 10 vol%	± (0.15 vol% + 5% of reading)
		10 – 25 vol%	unspecified
DES	Concentration (with optional OR-703)	0 – 22 vol%	± (0.15 vol% + 5% of reading)
		22 – 25 vol%	unspecified
Gas types	Air, O <sub>2</sub> , Air/O <sub>2</sub> , N <sub>2</sub> O, N <sub>2</sub> O/O <sub>2</sub> , He/O <sub>2</sub> , N <sub>2</sub> , CO <sub>2</sub>		
Gas standards	ATP, ATPD, ATPS, AP21, STP, STPH, BTPS, BTPS-A, BTPD, BTPD-A, 0/1013, 20/981, 15/1013, 25/991, 20/1013, NTPD, NTPS		
Ventilation parameters		Range	Accuracy
Breath rate	Rate	1 – 1000 bpm	± 1 bpm* or ± 2.5% **
Time	T <sub>i</sub> , T <sub>e</sub>	0.05 – 60 s	± 0.02 s
Ratio	I:E	1:300 – 300:1	± 2.5% *
	T <sub>i</sub> /T <sub>cyc</sub>	0 – 100%	± 5% *
Breath volumes	V		± 2%* or ± 0.20 mL (> 6 sL/min)**
	V <sub>t</sub> , V <sub>te</sub>	± 10 L	± 2%* or ± 0.20 mL (> 6 sL/min)**
Minute volume	V <sub>i</sub> , V <sub>e</sub>	0 – 300 sL/min	± 2.5% *
Pressure	P <sub>Peak</sub> , P <sub>Mean</sub> , PEEP, P <sub>Plateau</sub> , IPAP	0 – 150 mbar	± 0.75%* or ± 0.1 mbar**
Peakflow	PF <sub>Insp</sub> , PF <sub>Exp</sub>	± 300 sL/min	± 1.9%* or ± 0.1 sL/min**
Compliance	C <sub>Stat</sub>	0 – 1000 mL/mbar	± 3%* or ± 1 mL/mbar**
Trigger	Adult, Pediatric, HFO, ext. Trigger	Adult, Pediatric, HFO; Adjustable on flow or pressure curves with user-defined limits.	
General information			
Power	100 – 240 VAC, 50/60 Hz		
Battery	5 hours		
Power consumption	2.5 – 6 W		
Weight	0.52 kg		
Dimensions (w × d × h)	11.4 × 7 × 7.3 cm		
Data storage	Internal and microSD Card		
Display	4.3" Multi-Touch (color), Realtime curves		
Interfaces	RS-232, USB, Ethernet, CAN, Analog Out, TTL, WLAN, TSI4000 and Prima Protocol		
Calibration	Annually		
Conditions Ambient temperature	15 – 40 °C (59 – 104 °F)		
Conditions Humidity	10 – 90% R.H.***		
Approvals	CE, BC (Energy Efficiency for Battery Charging Systems), CSA (North America), IEC 61010-1:2010, IEC 61326-2:2012		

The greater tolerance is valid: \*Tolerance related to the measured value, \*\* Absolute tolerance, \*\*\* The unit sL/min is based on ambient conditions of 0 °C and 1013.25 mbar (DIN 1343).

# CITREX H4

## Technical Specifications



Flow and pressure measurements		Range	Accuracy
Flow	Measuring direction	Bidirectional	
	Temperature compensated	Automatic	
	Pressure compensated	Automatic	
	Humidity compensated	Manually	
	O <sub>2</sub> compensated	–	
	High Flow	± 300 sL/min***	± 1.9%* or ± 0.1 sL/min (for 10..40°C)**
	Low Flow	–	
Pressure	High Pressure (P <sub>High</sub> )	0 – 10 bar	± 1%* or ± 10 mbar**
	Differential Pressure (P <sub>Dif</sub> )	± 200 mbar	± 0.75%* or ± 0.1 mbar**
	Relative Pressure	–	
	Low Pressure	–	
	Pressure in High Flow Channel (P <sub>Channel</sub> )	-50 – 150 mbar	± 0.75%* or ± 0.1 mbar**
	Atmospheric Pressure (P <sub>Atmo</sub> )	500 – 1150 mbar	± 1%* or ± 5 mbar**
	Vacuum Pressure	–	
Units	Flow	L/min, L/s, cfm, mL/min, mL/s	
	Pressure	bar, mbar, cmH <sub>2</sub> O, inH <sub>2</sub> O, Torr, inHg, hPa, kPa, mmHg, PSI	
Other measurements		Range	Accuracy
Oxygen	Concentration	0 – 100%	± 1% O <sub>2</sub> **
	Pressure compensated	≤ 150 mbar	
Temperature	In High Flow Channel	0 – 50 °C	± 1.75%* or ± 0.5 °C**
Dew point	–	–	
Humidity	–	–	
CO <sub>2</sub>	Concentration (with optional OR-703)	0 – 15 vol%	± (0.2 vol% + 2% of reading)
		15 – 25 vol%	unspecified
N <sub>2</sub> O	Concentration (with optional OR-703)	0 – 100 vol%	± (2% vol% + 2% of reading)
HAL, ISO, ENF	Concentration (with optional OR-703)	0 – 8 vol%	± (0.15 vol% + 5% of reading)
		8 – 25 vol%	unspecified
SEV	Concentration (with optional OR-703)	0 – 10 vol%	± (0.15 vol% + 5% of reading)
		10 – 25 vol%	unspecified
DES	Concentration (with optional OR-703)	0 – 22 vol%	± (0.15 vol% + 5% of reading)
		22 – 25 vol%	unspecified
Gas types	Air, O <sub>2</sub> , Air/O <sub>2</sub> , N <sub>2</sub> O, N <sub>2</sub> O/O <sub>2</sub> , He/O <sub>2</sub> , N <sub>2</sub> , CO <sub>2</sub>		
Gas standards	ATP, ATPD, ATPS, AP21, STP, STPH, BTPS, BTPS-A, BTPD, BTPD-A, 0/1013, 20/981, 15/1013, 25/991, 20/1013, NTPD, NTPS		
Ventilation parameters		Range	Accuracy
Breath rate	Rate	1 – 1000 bpm	± 1 bpm* or ± 2.5%**
Time	T <sub>i</sub> , T <sub>e</sub>	0.05 – 60 s	± 0.02 s
Ratio	I:E	1:300 – 300:1	± 2.5% *
	T <sub>i</sub> /T <sub>cyc</sub>	0 – 100%	± 5% *
Breath volumes	V		± 2%* or ± 0.20 mL (> 6 sL/min)**
	V <sub>t</sub> , V <sub>te</sub>	± 10 L	± 2%* or ± 0.20 mL (> 6 sL/min)**
Minute volume	V <sub>i</sub> , V <sub>e</sub>	0 – 300 sL/min	± 2.5% *
Pressure	P <sub>Peak</sub> , P <sub>Mean</sub> , PEEP, P <sub>Plateau</sub> , IPAP	0 – 150 mbar	± 0.75%* or ± 0.1 mbar**
Peakflow	PF <sub>Insp</sub> , PF <sub>Exp</sub>	± 300 sL/min	± 1.9%* or ± 0.1 sL/min**
Compliance	C <sub>Stat</sub>	0 – 1000 mL/mbar	± 3%* or ± 1 mL/mbar**
Trigger	Adult, Pediatric, HFO, ext. Trigger	Adult, Pediatric, HFO	
General information			
Power	100 – 240 VAC, 50/60 Hz		
Battery	4 hours		
Power consumption	2.5 – 6 W		
Weight	0.40 kg		
Dimensions (w × d × h)	11.4 × 7 × 6 cm		
Data storage	microSD Card		
Display	1.7" with touch control elements (color), Realtime curves		
Interfaces	RS-232, USB, Ethernet, CAN, Analog Out, TTL (external Trigger Input), TSI4000 Protocol		
Calibration	Annually		
Conditions Ambient temperature	15 – 40 °C (59 – 104 °F)		
Conditions Humidity	10 – 90% R.H.***		
Approvals	CE, BC (Energy Efficiency for Battery Charging Systems), CSA (North America), IEC 61010-1:2010, IEC 61326-2:2012		

The greater tolerance is valid: \*Tolerance related to the measured value, \*\* Absolute tolerance, \*\*\* The unit sL/min is based on ambient conditions of 0 °C and 1013.25 mbar (DIN 1343).

# CITREX H3

## Technical Specifications



Flow and pressure measurements		Range	Accuracy
Flow	Measuring direction	Bidirectional	
	Temperature compensated	Automatic	
	Pressure compensated	Automatic	
	Humidity compensated	Manually	
	O <sub>2</sub> compensated	–	
	High Flow	± 300 sL/min***	± 1.9%* or ± 0.1 sL/min (for 10..40°C)**
	Low Flow	–	
Pressure	High Pressure (P <sub>High</sub> )	–	
	Differential Pressure (P <sub>Dif</sub> )	–	
	Relative Pressure	–	
	Low Pressure	–	
	Pressure in High Flow Channel (P <sub>Channel</sub> )	-50 – 150 mbar	± 0.75%* or ± 0.1 mbar**
	Atmospheric Pressure (P <sub>Atmo</sub> )	500 – 1150 mbar	± 1%* or ± 5 mbar**
	Vacuum Pressure	–	
Units	Flow	L/min, L/s, cfm	
	Pressure	bar, mbar, cmH <sub>2</sub> O, mmHg, inH <sub>2</sub> O	
Other measurements		Range	Accuracy
Oxygen	Concentration	0 – 100%	± 1% O <sub>2</sub> **
	Pressure compensated	≤ 150 mbar	
Temperature	In High Flow Channel	0 – 50 °C	± 1.75%* or ± 0.5 °C**
Dew point	–	–	
Humidity	–	–	
CO <sub>2</sub>	Concentration (with optional OR-703)	0 – 15 vol%	± (0.2 vol% + 2% of reading)
		15 – 25 vol%	unspecified
N <sub>2</sub> O	Concentration (with optional OR-703)	0 – 100 vol%	± (2% vol% + 2% of reading)
HAL, ISO, ENF	Concentration (with optional OR-703)	0 – 8 vol%	± (0.15 vol% + 5% of reading)
		8 – 25 vol%	unspecified
SEV	Concentration (with optional OR-703)	0 – 10 vol%	± (0.15 vol% + 5% of reading)
		10 – 25 vol%	unspecified
DES	Concentration (with optional OR-703)	0 – 22 vol%	± (0.15 vol% + 5% of reading)
		22 – 25 vol%	unspecified
Gas types	Air, O <sub>2</sub> , Air/O <sub>2</sub> , N <sub>2</sub> O, N <sub>2</sub> O/O <sub>2</sub>		
Gas standards	ATP, ATPD, ATPS, AP21, STP, STPH, BTPS, BTPS-A, BTPD		
Ventilation parameters		Range	Accuracy
Breath rate	Rate	1 – 1000 bpm	± 1 bpm** or ± 2.5%*
Time	T <sub>i</sub>	0.05 – 60 s	± 0.02 s
Ratio	I:E	1:300 – 300:1	± 2.5% *
	T <sub>i</sub> /T <sub>cyc</sub>	–	–
Breath volumes	V		± 2%* or ± 0.20 mL (> 6 sL/min)**
	V <sub>t</sub>	± 10 L	± 2%* or ± 0.20 mL (> 6 sL/min)**
Minute volume	V <sub>i</sub>	0 – 300 sL/min	± 2.5% *
Pressure	P <sub>Peak</sub> , P <sub>Mean</sub> , PEEP, P <sub>Plateau</sub>	0 – 150 mbar	± 0.75%* or ± 0.1 mbar**
Peakflow	PF <sub>Insp</sub> , PF <sub>Exp</sub>	± 300 sL/min	± 2.0%* or ± 0.1 sL/min**
Compliance	C <sub>Stat</sub>	–	–
Trigger	Adult, Pediatric, ext. Trigger	Adult, Pediatric	
General information			
Power	100 – 240 VAC, 50/60 Hz		
Battery	4 hours		
Power consumption	2.5 – 6 W		
Weight	0.38 kg		
Dimensions (w × d × h)	11.4 × 7 × 6 cm		
Data storage	microSD Card		
Display	1.7" with touch control elements (color), Realtime curves		
Interfaces	Ethernet		
Calibration	Annually		
Conditions Ambient temperature	15 – 40 °C (59 – 104 °F)		
Conditions Humidity	10 – 90% R.H.***		
Approvals	CE, BC (Energy Efficiency for Battery Charging Systems), CSA (North America), IEC 61010-1:2010, IEC 61326-2:2012		

The greater tolerance is valid: \*Tolerance related to the measured value, \*\* Absolute tolerance, \*\*\* The unit sL/min is based on ambient conditions of 0 °C and 1013.25 mbar (DIN 1343).