Specification: V1

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2021 V 1.0

Ventilator

V1

Technical Specification

Physical Characteristics	
Dimensions	330 mm × 314 mm × 215 mm (Height × Width × Depth) (including handle) 330 mm × 247 mm × 215 mm (Height × Width × Depth) (excluding handle)
Weight	6.5 kg (main unit)
Air Supply	Integrated ultra-silent turbine
Oxygen inlet	External low-pressure oxygen inlet External high-pressure input port （41~81psi）
Oxygen conserve feature	Yes
Ingress Protection	IP24
Disinfection	Expiratory Valve Component with high-temperature high-pressure steam (temperature: 134ºC)
Materials	NO PVC
Screen	
Screen Size:	8.4” TFT tosuch screen
Resolution	800 × 600
Brightness:	Adjustable
	Typ. 1000 cd/m^2
Ventilator Specification	
Ventilation mode	P-A/C (Pressure assist/control) P-SIMV (Pressure - Synchronized Intermittent Mandatory Ventilation) CPAP/PSV, DuoVent, APRV, PRVC, PRVC-SIMV PSV-S/T High Flow O2 Therapy
Invasive Mode	P-A/C,P-SIMV,CPAP/PSV,DuoVent,PRVC,APRV,PRVC-SIMV
Non-invasive Mode	P-A/C,P-SIMV,CPAP/PSV,DuoVent,APRV,PSV-S/T
Controlled parameter ranges	
O_2%:	21 - 100% (increments of 1 %)
TV (Tidal Volume):	20 - 2200 mL (increments of 5 mL on 20ml~100ml,10ml on 100ml~1000ml,50ml on 1000ml~2200ml)
Respiratory Rate (RR):	1 - 80 bpm (increments of 1 bpm)
fSIMV (Ventilation frequency in SIMV mode):	1 - 80 bpm (increments of 1 bpm)
I:E range:	4:1~1:10
Tinsp (Inspiratory time):	0.10 - 12 s
Step:	0.01s in the range of0.10s~1.00s; 0.05s in the range of1.00s~3.00s: 0.1s in the range of3.00s~12.00s
Tslope (Time of Pressure Rising):	0 - 2.00 s (increments of 0.05 s).
High Pressure Time (Thigh)]:	0.10 – 40.00 s
Tlow (Low Pressure Time):	0.20 – 40.00 s
Max inspiratory Time (Timax):	1.00- 3.00 s
ΔPinsp(Inspiratory pressure):	3 - 65 cmH_2O (increments of 1 cmH_2O)
ΔPsupp:	0 - 65 cmH_2O (increments of 1

	cmH_2O)
Phigh (High Pressure Level):	0 - 65 cmH_2O (increments of 1 cmH_2O)
Plow (Low Pressure Level):	0 - 40 cmH_2O (increments of 1 cmH_2O)
PEEP:	0 - 40 cmH_2O (increments of 1 cmH_2O), Off
Flow trigger	1.0 -20.0 l/min (increments of 0.1 l/min), Off
Exp % (Expiration termination/trigger level)	5 - 80% (increments of 5%), Auto

Apnea Ventilation

TVapnea	20 - 2200 mL(increments of 5 mL on 20ml~100ml,10ml on 100ml~1000ml,50ml on 1000ml~2200ml)
ΔPapnea	3 - 65 cmH_2O (increments of 1 cmH_2O)
fapnea (Apnea Respiratory Rate)	1 - 80 bpm (increments of 1 bpm)
Apnea Tinsp	0.10 – 12.0 s

Monitoring

Airway pressure range	Ppeak, Pplat, Pmean (Range -20 - 85 cmH_2O)
PEEP	0 - 85 cmH2O
Tidal volume range:	0 - 9999 ml
Respiratory Rate	ftotal, fmand, fspn (Range 0 - 200 bpm)
Minute volume range	MV, MVspn, MVleak (Range 0 - 100 L/min)
Resistance	Rinsp, Rexp (0 - 600 cmH_2O/l/s)
Compliance	Cstat, Cdyn (0 - 300 ml/cmH_2O)
Inspired Oxygen (FiO_2)	0 - 100 %
RCexp (Expiratory Time Constant)	0.00 – 99.90 s
I:E	9.9:1 – 1:99
Tinsp	0.00 – 60.00s
PTP (Pressure time product)	0.0~100.0 cmH_2O*s
Waveforms	Airway pressure - time, Flow - time, Volume – time CO2-time

Weaning indicator

P0.1	-20.0 – 0.0 cmH_2O
RSBI (Rapid Shallow Breathing Index)	0 - 999 1/(l•min)

Special Function

Manual Breath	
Expiration Hold	
Inspiration Hold	
Nebulizer	
O2↑(O2 enrichment)	
Sputum Suction	
PulmoView	
Lung Recruitment Tool	
Sustained Insufflation	
PEEPi monitoring	
Loop	Paw - Volume, Flow - Volume, Paw - Flow,V-CO2
Smart Sync	IntelliSynTec
O2 consumption evaluation	
O2 Therapy	2-60 l/min
CO2 parameters	EtCO2,FiCO2
CO2 derived parameters	VDaw, VDaw/TVe, Vtalv, MValv, slopeCO2, MVCO2, VeCO2, ViCO2

Control accuracy

O_2 %	± (3 vol.% +1 % of setting)
TV	± (10 mL + 10% of the set value)
ΔPinsp	±(2cmH_2O + 5% of the set value)
Δ Psupp	±(2cmH_2O + 5% of the set value)
Tinsp	± 0.1 s or ± 10 % of setting, whichever is greater
I: E	1:4~2:1: ± 10% of the set value; Other range: ± 15% of the set value.
f	±1 bpm
fSIMV	±1 bpm
Tslope (Rising Time)	± (0.2s + 20% of the set value)
Phigh	± (2 cmH2O + 5% of the set value)
Plow	± (2 cmH2O + 5% of the set value)
Thigh	±0.1s or ± 10% of the set value, whichever is larger
Tlow	±0.1s or ± 10% of the set value, whichever is larger
Flow Trigger	± (1 L/min + 10% of the set value)
ΔPsupp	± (2 cmH2O + 5% of the set value)
Exp %	±10% (absolute error)

Fapnea (Apnea Frequency)	±1bpm
ΔPapnea	± (2 cmH2O + 5% of the set value)
TVapnea	± (10 mL + 10% of the set value)
Apnea Tinsp	±0.1s or ± 10% of the set value, whichever is larger

Monitoring Accuracy

Airway pressure (Ppeak, Pplat, Pmean, PEEP)	± (2 cmH2O + 4% of the actual reading)
Tidal Volume (TVi, TVe, TVe spn)	±10mL or ± 10% of the actual reading, whichever is larger in the range of 0 mL～9999 mL
Minute Volume (MV, MVspn, MVleak)	±10% of the actual reading or ±0.3 l/min, whichever is larger in the range of 0.0 l/min～100.0 l/min
Frequency (ftotal, fmand, fspn)	±1bpm in the range of 0bpm~200bpm
Inspired Oxygen (FiO_2)	±(3vol.%+1% of the set value)in the range of 0 vol.%～100 vol.%
Insp Flow	±1.2 l/min or ± 10% of the actual reading, whichever is larger in the range of 0.0 l/min～260.0 l/min
Exp Flow	±1.2 l/min or ± 10% of the actual reading, whichever is larger in the range of 0.0 l/min～260.0 l/min
Resistance	±10cmH_2O/(L/s) in the range of 5cmH_2O/(L/s)~20cmH_2O/(L/s) ±50% of the actual reading in the range of 20cmH_2O/(L/s)~500cmH_2O/(L/s)(not including 20 cmH2O/(L/s)) In the range of 0 cmH_2O/(l/s)～5 cmH_2O /(l/s) and 500 cmH_2O/(l/s)～600 cmH_2O /(l/s), the accuracy is not defined.
Compliance	Within the range of 0 mL/ cmH2O～300 mL/ cmH2O, ± (2 mL/ cmH2O + 20% of the actual reading).
RSBI	Within the range of 0 /(min·L)～999 /(min·L) , ± (3 /(min·L)+15% of the actual reading).
P0.1	Within the range of -20.0 cmH2O～0.0 cmH2O, ± (2 cmH2O + 4% of the actual reading).
RCexp	Within the range of 0.0s～10.0s, ± (0.2s + 20 % of the actual reading).

Alarm Settings

Tidal Volume	Upper alarm limit 10 mL～3000mL,OFF Lower alarm limit OFF, 10 mL ~3000mL
Minute Volume	Upper alarm limit: 0.2 l/min ~50.0 l/min Lower alarm limit: 0.1l/min ~49.0 l/min
Airway pressure	Upper alarm limit: 5~75 cmH2O. Lower alarm limit: OFF, 1cmH_2O~74 cmH_2O
Frequency (Respiratory Rate)	Upper alarm limit: 1bpm~100bpm Lower alarm limit: OFF, 1bpm ~99bpm
Inspired oxygen (FiO_2)	Upper alarm limit: 22 vol.%～100 vol.% Lower alarm limit: 21 vol.%～ 99 vol.%
Apnea alarm time	15~60s
Other alarms	Gas supply failure, Power failure, Low battery

SideStream CO2 module

Displayed numerics	$EtCO_2$
Measurement Range	Comen SideStream: 0 mmHg～150 mmHg, 0%～19.7%, 0 kPa～20 kPa (at 760 mmHg) Respironics Capno SideStream: 0 mmHg～99 mmHg, 0.0 %～13.0 %, 0 kPa～13.2 kPa (at 760 mmHg) Masimo ISA Capno SideStream: 0 mmHg～190 mmHg, 0 vol% ～ 25 vol% (at 760 mmHg)
Measurement accuracy	Comen SideStream: a) Within the range of 0 mmHg～40 mmHg, ± 2 mmHg; b) Within the range of 41 mmHg～70 mmHg, ± 5% of the reading; c) Within the range of 71 mmHg～

	100 mmHg, ± 8% of the reading; d) Within the range of 101 mmHg～150 mmHg, ± 10% of the reading. Respironics Capno SideStream: (Note: the gas temperature is 25℃, if respiratory rate is greater than 80 rpm, the accuracy is 12% of the reading): 0 mmHg～38 mmHg: ± 2 mmHg, 39 mmHg～99 mmHg: ± 10% of the actual reading. Masimo ISA Capno SideStream: CO2 accuracy (under the condition: 22℃ ± 5℃ 1013 ± 40 hPa; gas mixture of CO2 and N2.) a) Within the range of 0 mmHg ～114 mmHg, ± (1.52 mmHg + 2% of the reading). b) Within the range of 114 mmHg ～190 mmHg, the accuracy is not defined. CO2 accuracy (under all conditions): a) Within the range of 0 mmHg ～114 mmHg, ± (2.25 mmHg + 4% of the reading). b) Within the range of 115 mmHg ～190 mmHg, the accuracy is not defined
Waveforms	$EtCO_2$ - time
Resolution	
Sampling rate and accuracy	Comen SideStream: sampling rate: 50 mL/min; sampling rate control accuracy: ± 10mL/min; Respironics Capno SideStream: sampling rate: 50 mL/min; sampling rate control accuracy: ± 10 mL/min. Masimo ISA Capno SideStream: sampling rate: 50mL/min; sampling rate control accuracy: ± 10 mL/min.
System response time	Masimo mainstream: < 1 s; Masimo ISA Capno sidestream: < 3s (use a 2 m sampling line)
Rise time (Response time)	Masimo mainstream: < 1 s; Masimo ISA Capno sidestream: < 3s (use a 2 m sampling line)
$EtCO_2$ Alarm Upper Limits	Comen sidestream: (lower alarm limit + 2 mmHg) ～150 mmHg Respironics Capno sidestream: (lower alarm limit + 2 mmHg) ～99 mmHg Masimo ISA Capno sidestream: (lower alarm limit + 2 mmHg) ～ 190 mmHg
$EtCO_2$ Alarm Lower Limits	Comen sidestream:0 mmHg ～ (upper alarm limit － 2 mmHg) Respironics Capno sidestream: 0 mmHg ～ (upper alarm limit － 2 mmHg) Masimo ISA Capno sidestream: 0 mmHg ～ (upper alarm limit － 2 mmHg)
MainStream CO_2 Module	
Displayed numerics	$EtCO_2$
$EtCO_2$ Measurement range	Comen mainstream: 0 mmHg～150 mmHg,0%～19.7%,0 kPa～20 kPa (at 760 mmHg); Respironics CAPNOSTAT 5: 0 mmHg～150 mmHg, 0%～19.7%, 0 kPa～20 kPa (at 760 mmHg); Masimo IRMATM mainstream: 0 mmHg～190 mmHg, 0 vol% ～ 25 vol% (at 760 mmHg);
$EtCO_2$ Measurement Accuracy	Comen mainstream: a) Within the range of 0mmHg～40mmHg, ± 2 mmHg; b) Within the range of 41mmHg～70mmHg, ± 5% of the reading; c) Within the range of 71mmHg～100mmHg, ± 8% of the reading; d) Within the range of 101mmHg～150mmHg, ± 10% of the reading. Respironics CAPNOSTAT 5 mainstream: CO2 accuracy (Note: Temperature :35℃): a) Within the range of 0 mmHg～40 mmHg, ± 2 mmHg; b) Within the range of 41

	mmHg～70 mmHg, ± 5% of the reading; c) Within the range of 71 mmHg～100 mmHg, ± 8% of the reading; d) Within the range of 101 mmHg～150 mmHg, ± 10% of the reading. Masimo IRMATM mainstream: CO2 accuracy (under the condition: 22℃ ± 5℃ 1013 ± 40 hPa; gas mixture of CO2 and N2.): a) Within the range of 0 mmHg ～ 114 mmHg, ± (1.52 mmHg + 2% of the reading); b) Within the range of 114 mmHg ～190 mmHg, the accuracy is not defined; CO2 accuracy (under all conditions): a) Within the range of 0 mmHg ～ 114 mmHg, ± (2.25 mmHg + 4% of the reading); b) Within the range of 114 mmHg ～190 mmHg, the accuracy is not defined;
Resolution	
Waveforms	$EtCO_2$ - time, V - CO_2
$EtCO_2$ Alarm Upper Limits	Comen mainstream: (lower alarm limit + 2 mmHg) ～150 mmHg Respironics CAPNOSTAT 5 mainstream: (lower alarm limit +2mmHg) ～150 mmHg Masimo IRMATM mainstream: (lower alarm limit + 2 mmHg) ～ 190 mmHg
$EtCO_2$ Alarm Lower Limits	Comen mainstream: 0 mmHg ～ (upper alarm limit - 2 mmHg) Respironics CAPNOSTAT 5 mainstream: 0 mmHg～ (upper alarm limit - 2 mmHg) Masimo IRMATM mainstream: 0 mmHg～ (upper alarm limit - 2 mmHg)
SpO_2 module:	

Display	Pulse rate (PR) waveform/parameter, SpO2
SpO2 measurement range	Nellcor SpO2: 0%～100% Masimo SpO2: 1%～100% Comen SpO2: 0%～100%
SpO2 accuracy	Nellcor SpO2: Within the range of 70%～100%, Adult/Pediatric measurement accuracy is ±2% (during non-motion state); Within the range of 0%～69%, measurement accuracy is not defined. Masimo SpO2: Within the range of 70%～100%, Adult/Pediatric measurement accuracy is ±2% (during non-motion state), ±3% (during motion state); Within the range of 1%～69%, the measurement accuracy is not defined. Comen SpO2: Within the range of 70%～100%, Adult/ Pediatric measurement accuracy is ±2% (during non-motion state); Within the range of 0%～69%, the measurement accuracy is not defined.
PR measurement range	Nellcor SpO2: 20 bpm～300 bpm Masimo SpO2: 25 bpm～240 bpm Comen SpO2: 20 bpm～300 bpm
PR measurement resolution	Nellcor SpO2: resolution: 1 bpm Masimo SpO2: resolution: 1 bpm Comen SpO2: resolution: 1 bpm
PR measurement accuracy	Nellcor SpO2: 20 bpm～250 bpm: the measurement error should be ±3 bpm; 251～300 bpm: measurement accuracy is not defined. Masimo SpO2: the measurement error should be ±3 bpm (during non-motion state) and ±5 bpm (during motion state) Comen SpO2: the measurement error should be ±2 bpm
Perfusion index range	Nellcor SpO2: / (Note: Nellcor SpO2

	module has no perfusion index.) Masimo SpO2: 0.02%～20%, the accuracy is not defined. Comen SpO2: 0.05%～20%, the accuracy is not defined.
Data update period	≤ 2 s
Signal Quality Index (SIQ) indication function	Masimo SpO2 and Comen SpO2 should come with SIQ indication function
Regulatory compliance	should conform to the requirements of YY0784-2010
Upper SpO2 alarm limit	Nellcor SpO2: (Lower alarm limit +1%)~100% Masimo SpO2: (Lower alarm limit +1%)~100% Comen SpO2: (Lower alarm limit +1%)~100%
Lower SpO2 alarm limit	Nellcor SpO2: 20%~(Upper alarm limit -1%) Masimo SpO2: 1%~(Upper alarm limit -1%) Comen SpO2: 0%~(Upper alarm limit -1%)
Upper PR alarm limit	Nellcor SpO2: (Lower alarm limit +1 bpm)～300 bpm Masimo SpO2: (Lower alarm limit +1 bpm)～240 bpm Comen SpO2: (Lower alarm limit +1 bpm)～254 bpm
Lower PR alarm limit	Nellcor SpO2: 25bpm～(Upper alarm limit -1bpm) Masimo SpO2: 25bpm～(Upper alarm limit -1bpm) Comen SpO2: 20bpm～(Upper alarm limit -1bpm)
Trend	
Type	Tabular, Graphic
Length	72 hours
Content	Monitor Parameters, Setting Parameters (Setting Ventilation mode and Parameters) includes parameter alarm events and parameter waveforms related to the alarm time
Data Review	
Event logs	Up to 2000 event logs can be saved, including alarm logs and operation logs. The alarm log includes parameter alarm events and parameter waveforms related to the alarm time.
Freeze the waveform review	Freeze the waveform of the interface at the current time and use the knob to review the data. When freezing, 30 most recent historical waveforms can be reviewed by sliding the screen or rotating the knob.
Freeze the loop review	Up to 7 reference loops can be saved.
O_2 Therapy	
O_2 %	21 - 100 % (increments of 1 %) ± (3 vol.% +1 % of setting)
Flow	1 - 100 L/min ± (2 L/min +10 % of setting) (BTPS)
Gas Circuit Specification	
Gas type	O2
Gas source requirement	Medical compressed oxygen
High-pressure O_2 source	
Gas source pressure range	280～600 kPa
Rated flow rate requirement	Maximum of 200 l/min (STPD)
Input connector	NIST (ISO 5356-1) or DISS (CGA 1240)
Standards compliant	YY/T 0799-2010 EN ISO5359:2008
Low-pressure O_2 source	
Input pressure range	＜ 100 kPa
Maximum flow rate	15 l/min
Input connector	CPC quick coupling
Inspiratory module	
Peak flow rate	260 l/min
Nebulizer connector	Flow rate: 4 l/min～9 l/min
Inspiratory-side external connector	Coaxial 22 mm/15 mm conical connector
Regulatory compliance	YY1040.1-2003 EN ISO5356-1:2004

Expiratory module	
Expiratory-side external connector	Coaxial 22 mm/15 mm conical connector
Removable, sterilizable	can be entirety removed quickly; and can be entirety cleaned and disinfected.
Regulatory compliance	YY1040.1-2003 EN ISO5356-1:2004
System compliance and resistance	
Compliance	Two-limb circuit; with reusable adult circuit breathing tube: ≤2mL/cmH_2O Two-limb circuit, with reusable pediatric breathing tube: ≤2mL/cmH_2O Two-limb circuit, with reusable infant breathing tube:≤2mL/cmH_2O Coaxial circuit, with adult/pediatric disposable breathing tube:≤2mL/cmH_2O
Inspiratory resistance	≤ 6 cmH2O at the flow rate of 60 L/min (Adult); ≤ 6 cmH2O at the flow rate of 30 L/min (Pediatric); ≤ 6 cmH2O at the flow rate of 5 L/min (Infant).
Expiratory resistance	≤ 6 cmH2O at the flow rate of 60 L/min (Adult); ≤ 6 cmH2O at the flow rate of 30 L/min (Pediatric); ≤ 6 cmH2O at the flow rate of 5 L/min (Infant).

Environmental specifications	
Temperature	-18 - 50 °C (operating); -30 to 70 °C (storage and transport)
Relative Humidity	5 - 95 % (operating); 5 - 95 % (storage and transport)
Barometric Pressure	59 - 110 kPa (operating); 59 -110 kPa (storage and transport)
Power Specification	
External AC power supply	
Input voltage	100 - 240 V
Input frequency	50/60 Hz
Input current	1.8A～0.75A
Power consumption	50VA typical, 180VA maximum
External DC power supply	
Input voltage	12-30.3 V
Input current	12.5-4.95 A
Internal battery	
Number of batteries	One or Two
Battery type	Build-in Lithium-ion battery, 10.8V, 6600mAh
Battery life	280min (when a new fully charged battery is used in typical operating mode) 560min (when two new fully charged batteries are used in typical operating mode)
Charging time	Less than 6 hours
Other	Automatic switch from AC power electric-line mode to battery operating mode and vice versa.
I/O	
interface	Ethernet, USB port