Physical Specifications

Dimensions

Height	1420mm
Width	912mm
Depth	720mm
Weight (excluding vaporizers)	110kg
(including vaporizers)	130kg

Work surface

Height	850mm
Width	820mm
Depth	483mm
Material	PC+PBT
Weight limit	25kg

Drawers (internal dimensions)

Quantity	2
First drawer:	
Height	77mm
Width	460mm
Depth	365mm
Second drawer:	
Height	231mm
Width	460mm
Depth	371mm

Casters

Diameter	125mm
Brakes	Central control brake

Cylinder YOKE (optional)

Interface	Pin Index Safety System (PISS)
Type	E
Number	2 cylinders

Ventilator Operating Specifications

Modes of ventilation - standard

STANDBY, MANUAL, VCV, PCV, PCV-VG, SIMV-VC, SIMV-PC, SIMV-VG, PS/CPAP

Modes of ventilation - optional

BIVENT, APRV, VSV

Ventilator parameter ranges

Tidal volume range	Adults: 250 - 1500ml Children: 50 - 850ml Infants:10 - 150ml
Tidal volume Incremental settings	Adults: 10 ml (250 - 1000 ml); 50 ml (over 1000ml) Children: 5 ml (50 - 100 ml); 10 ml (100 - 850ml) Infants: 5 ml (10 - 100 ml); 10 ml (100 - 150 ml)
Pressure (P_{MAX}) range	10 to 100 cmH_2O (increments of 1 cmH_2O) (VCV, SIMV-VC/PC, PCV-VG and VSV vent modes)
Pressure (ΔP) range	3 to 60 cmH_2O (increments of 1 cmH_2O) (SIMV-VC/PC/VG, PS/CPAP, BIVENT and APRV vent modes)
Pressure (P_{TARGET}) range	5 to 70 cmH_2O (increments of 1 cmH_2O) (PCV and SIMV-PC vent modes)

Freq.	2 to 100 bpm (SIMV-VC, SIMV-PC and SIMV-VG vent modes) 2 to 60 bpm per minute for $Freq_{MIN}$ in PS/CPAP and VSV vent modes. 4 to 100 bpm in other modes (not including BIVENT and APRV) (increments of 1 bpm)
Inspiratory/ expiratory ratio	4 :1 to 1 :8 (increments of 0.5) (VCV, PCV and PCV-VG vent modes)
Inspiratory time	0.2s to 5s (increments of 0.1s) (SIMV-VC/PC/VG vent modes)
Inspiratory pause time	OFF, 5% to 60% (increments of 5%) (VCV and SIMV-VC vent modes)
Flow trigger (V_{SENS})	0.5 L/min to 15L/min (increments of 1L/min) (SIMV-VC/PC/VG, PS/CPAP, BIVENT and APRV vent modes)
Pressure trigger (P_{SENS})	-20 to -1 cmH_2O (increments of 1 cmH_2O) (SIMV-VC/PC/VG, PS/CPAP, BIVENT and APRV vent modes)
E_{SENS}	5 to 75% (increments of 5%) (SIMV-VC/PC/VG, PS/CPAP, BIVENT, APRV and VSV vent modes)
I_{SENS}	5 to 75% (increments of 5%) (APRV vent modes)
P_{HIGH}	5 to 70 cmH_2O (increments of 1 cmH_2O) (BIVENT and APRV vent modes)
P_{LOW}	3 to 50 cmH_2O (increments of 1 cmH_2O) (BIVENT and APRV vent modes)
T_{HIGH}	0.2s to 30s (increments of 0.1s) (BIVENT and APRV vent modes)
T_{LOW}	0.3s to 30s (increments of 0.1s) (BIVENT and APRV vent modes)
T_{SLOPE} (Inspiratory Slope Time)	0s to 2.0s (increments of 0.1s) (PCV,PCV-VG, SIMV-VC/PC/VG, PS/CPAP, BIVENT and APRV vent modes)
Trigger window	5 to 90%

	(increments of 5%) (SIMV-VC/PC/VG, BIVENT and APRV vent modes)

Positive End Expiratory Pressure (PEEP)

Type	Integrated electronically controlled
Range	OFF, 3 to 50 cm H_2O (increments of 1 cm H_2O)

Ventilator performance

Pressure range at inlet	280 kPa to 600kPa
Maximum inspiratory flow rate	75L/min

Ventilator monitoring

Minute volume range	0 to 30 L/min
Tidal volume range	0 to 3000ml
FiO_2	18% to 100%
Peak pressure (P_{PEAK})	-20cmH_2O to 110cmH_2O
Mean pressure (P_{MEAN})	-20cmH_2O to 110cmH_2O
Plat pressure (P_{PLAT})	-20cmH_2O to 110cmH_2O
PEEP	-20cmH_2O to 110cmH_2O
Frequency	0 to 110 bpm
PAW	-20cmH_2O to 110cmH_2O
$FiCO_2$	0 to 10 vol%
$EtCO_2$	0 to 10 vol%
V_{TI}	0 to 3000ml
V_{TE}	0 to 3000ml
I:E	4:1 to 1:8
Cstat	0 to 120ml/cmH_2O
Cdyn	0 to 120ml/cmH_2O
VO_2	Real time calculation
CO_2-T	Real time calculation
qCON	0-99
BSR	0-100
qNOX	0-99
EMG index	0-100

Trend Window

The trend window shows the waveform trend of different monitoring parameters over time, and the monitoring values can be viewed through the cursor.

Trend List

Click the monitoring parameters in the trend name, view trend and view time period to select the current test item.

The first time this tab is entered after the window opens, 2 hours of data are displayed.
The time period includes: 15 minutes, 30 minutes, 1 hour, 2 hours, 5 hours, 12 hours, 24 hours, 48 hours.

Parameters displayed in trend graph:
P_{PLAT}, P_{PEAK}, PEEP, P_{MEAN}, VT_{exp}, VT_{insp}, MV_{exp}, MV_{insp}, MVCO2, EtCO2, FiCO2, f_{Total}, f_{Spont}, FiO_2, SEV, DES, ISO, ENF, HAL, N_2O, xMAC, qNOX, EMG, qCON, BSR, Cstat, Cdyn, R, RC, RSBI, WOB

Stories alarms

All the alarm messages can be viewed from the log menu. Click the alarm area, the “Alarm Log” window pops up, showing the time, type, content, state and prompt message of alarm.

Alarm log stores 500 records and automatically covers the earliest records and cycles after full storage.

Delivery/monitoring accuracy

Volume delivery	Within 100 ml, the error is ± 15% or ± 10 ml, whichever is greater; 100 ml (inclusive) - 1500 ml(inclusive), the error is ± 15%, and the monitoring error for 1500 ml- 3000 ml is not defined
Pressure delivery	Error is ±10% or ±3cmH_2O, whichever is greater
PEEP delivery	Error is ±10% or ±2cmH_2O, whichever is greater
Volume monitoring	Within 100 ml, the error is ± 15% or ± 10 ml, whichever is greater; 100 ml (inclusive) - 1500 ml(inclusive), the error is ± 15%, and the monitoring error for 1500 ml- 3000 ml is not defined.
Pressure monitoring	Error is ± (2% of full scale + 4% of reading)

Alarm settings

Minute volume (MV_{exp})	Low: 0 to 20 L/min High: 1 to 30 L/min
Airway pressure (Paw)	Low : 0 to 70 cmH_2O High : 10 to 110cmH_2O
Breath Rate (Freq.)	Low : OFF,1-99 High : 2-110, OFF
PEEP	Low : OFF,1-49 High : 3-50, OFF
Vt_{exp}	Low : OFF, 5-1500 High : 10-1600, OFF
Inspired oxygen (FiO_2)	Low: 18 to 99% High: 21 to 100%
Exhalant CO_2 ($EtCO_2$)	Low: OFF, 0.1 to 9.8% or OFF, 0.1 to 9.8kPa or OFF, 1 to 74mmHg

	High: 0.1 to 9.9% or 0.1 to 9.9kPa or 1 to 75mmHg
Inspired CO_2 ($FiCO_2$)	High: 0.1 to 1.4% or 0.1 to 1.4kPa or 1 to 10mmHg
Insp. SEV	Low: OFF，0.1 to 9.8% High: 0.1 to 9.9%
Insp. ISO	Low: OFF，0.1 to 8.3% High: 0.1 to 8.4%
Insp. ENF	Low: OFF, 0.1 to 9.8% High: 0.1 to 9.9%
Insp. DES	Low: OFF, 0.1 to 21.8% High: 0.1 to 21.9%
Insp. HAL	Low: OFF, 0.1 to 9.8% High: 0.1 to 9.9%
Apnea alarm	Based on different ventilation modes, flow, and pressure
Apnea delay time	30s
Sustained airway pressure	Based on different ventilation modes and monitoring parameters
Subatmospheric pressure	Paw < -2 cmH_2O
Alarm silence countdown timer	120s to 0s

Ventilator Components

Flow transducer

Type	Variable aperture differential pressure

Transducer probe

Location	Installed in breathing system inspiratory/expiratory one each

Oxygen Sensor

Type	Build-in paramagnetic oxygen sensor
Precision(inherent error)	less than ±0.2%O_2
Life Cycle	8 years

Ventilator Screen

Display type	Color active matrix TFT touch screen
Display size	18.5 inches
Pixel format	1920×1080
Display parameters	All setting and alarm parameters (including P_{PEAK}, P_{PLAT}, P_{MEAN}, PEEP, Airway Paw, DP, VT_i, VT_e, VT/IBW, MV_i, MV_e, $MVCO_2$, f_{Total}, f_{Spont}, Ti, Ti_{spont}, I:E, FiO_2, $EtCO_2$, $FiCO_2$, $MVCO_2$, qCON, qNOX, EMG, BSR, Cdyn, Cstat, Rinsp, RSBI, WOB, BEP, Gas Source

	Pressure)
Display graphics	Waveforms: P-T, F-T, V-T, CO_2-T (option)，EEG (option), Agent-T(option); Loops: Paw-V，V-Flow , Paw -Flow, V-CO_2(option)
Communication ports	2×RS232 interfaces (one male and one female) 2×USB Type A interfaces 1×RJ45 network interface Support HL7 communication protocol

Integrated safety functions

In case of electricity and battery failure, manual ventilation, gas delivery and agent delivery are possible.

Positive pressure relief valve opens at 110 ± 10 cmH_2O.

Anesthetic Agent Delivery

Delivery

Anesthetic agent available	Halothane, Enflurane, Isoflurane, Sevoflurane Desflurane
Number of positions	2
Mounting	Selectatec® manifold Interlocks
Vaporizer	VP300(Halothane, Enflurane, Isoflurane, Sevoflurane)

Dimensions

Height	23 cm
Width	12 cm
Depth	21 cm
Weight	6.2 kg
Agent capacity	330ml

Accuracy

Flow range	0.2 to 15 l/min; 0.2 to 10 l/min (the concentration is more than 5%)
Operation temperature	15-35℃
Accuracy	OFF, ＜0.03 %, ±20% of the concentration setting or ±5% of the maximum setting
Agent setting range	Sevoflurane: OFF, 0.2%, 0.5%, 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8% Halothane, Enflurane, Isoflurane: OFF, 0.2%, 0.5%, 1%, 2%, 3%, 4%, 5%

Gas Monitor(optional)

Type	Side Stream
Module	ISA CO_2; ISA AX+; $EtCO_2$ module
Operating temperature	ISA CO_2: 0 to 50 °C (32 to 122 °F); ISA AX+: 5 to 50 °C (41 to 122 °F); $EtCO_2$ module: 5 to 50 °C (41 to 122 °F)
Storage temperature	ISA CO_2: -40 to 70 °C (-40 to 158 °F) ISA AX+: -40 to 70 °C (-40 to 158 °F) $EtCO_2$ module: -40 to 70 °C (-40 to 158 °F)
Operating humidity	ISA CO_2/ISA AX+: < 4 kPa H_2O (non-condensing) (95 %RH at 30 °C); $EtCO_2$ module: 10 to 90% RH,non-condensing
Operating atmospheric pressure	ISA CO_2/ISA AX+: 525 - 1200 hPa (<4572m) $EtCO_2$ module: 55-115kPa
Pre-heating time	ISA AX+: < 20 sec ISA CO_2: < 10 sec $EtCO_2$ module: The design error reached 97% within 45s and reached within 120s
Rise time	ISA CO_2 : CO_2 ≤200ms ISA AX+ : CO_2 ≤300ms; N_2O, O_2, ENF, ISO, SEV, DES ≤400ms; HAL ≤500ms; $EtCO_2$ module: 200ms (t10-90 %)
Sampling flow rate	ISA CO_2/ISA AX+: 50 ± 10 ml/min; $EtCO_2$ module:120ml/min (default), ± 10%
Breath detects	ISA CO_2/ISA AX+: Adaptive threshold, minimum 1 % CO_2 change; $EtCO_2$ module:0.1mmHg
Respiratory rate	ISA CO_2/ISA AX+: 0-150 bpm±1 bpm $EtCO_2$ module: 2-150 bpm, 1% ±1bpm
Compensation	ISA CO_2/ISA AX+: Automatic for atmospheric pressure, temperature and spectral interference $EtCO_2$ module: Automatic anesthetic gas compensation and atmospheric pressure compensation
Nomoline	
KM7002A Nomoline	2.4-2.5m

ISA Nomoline	Sampling line with proprietary water removal tubing. 2 m±0.1m versions

Carbon Dioxide (CO_2) Module (ISA CO_2)

Monitor Gas	CO_2
Measurement range	0-15 vol%
Accuracy	0-15 vol% ± (0.2 vol% + 2 % of reading)

Anesthesia Gas Module (ISA AX+)

Monitor Gases	CO_2; N_2O; HAL; ISO; ENF; SEV; DES
Measurement range	CO_2: 0-15 vol% N_2O: 0-100 vol% HAL: 0-8 vol% ISO: 0-8 vol% ENF: 0-8 vol% SEV: 0-10 vol% DES: 0-22 vol%

Accuracy

CO_2	0-15 vol% ± (0.2 vol% + 2 % of reading)
N_2O	±(2 vol% + 2 % of reading)
HAL, ISO, ENF	±(0.15 vol% + 5 % of reading)
SEV	±(0.15 vol% + 5 % of reading)
DES	±(0.15 vol% + 5 % of reading)

$EtCO_2$ module

Monitor Gas	CO_2
Measurement range	0-19.7% (0-150mmHg or 0-20kPa)
Resolution	0.1mmHg
Measurement accuracy	0 - 40 mmHg ± 2 mmHg 41 - 70 mmHg ± 5% 71 - 100 mmHg ± 8% 101 - 150 mmHg ± 10%

Anesthesia Depth Module (optional)

qCON range	0 - 99
BSR range	0-100
qNOX range	0-99
EMG index range	0-100
SQI	100
Lead detachment test	Continuous
Sensor impedance check	Automatic every 15 minutes or on request via panel button
Index update rate	1s

qCON alarm	Optional, high and low limits, audio and visual
Total index update time	10s
EEG Sensitivity	It is divided into four levels: 25, 50, 120 and 475, with tolerance of ± 10%
Input noise	When the EEG signal sensitivity is 50, with tolerance of ± 5μVp-p
CMRR	＞100dB
Input impedance	＞1MΩ（@10Hz）
Sampling rate	1024 samples per second, 24 bytes per sample
Input signal range	±374mV

Paramagnetic oxygen module

Range	0-100%O_2 (Out of range-15%O2-200%O_2)
Accuracy	＜±0.2% O_2
Pre-heating time	10s
Operation Temperature	5 °C to 50 °C (41°F to 122°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Storage Pressure	10kPa-200kPa(1.5psi-30psi)
Ambient Humidity	0-90% non-condensing
RoHS	ROHS Directive 2002/95/EC

Electrical Specifications

Power and battery backup

Power input	100-240V,50/60Hz, Max. ≤10A
Battery type	Internal rechargeable sealed lead acid 24VDC, 8AH
Backup power	Meet the mechanical ventilation of the anesthesia machine for at least 90 min when fully charged
Charge time	≤8 hours (in running status or standby mode)
Power cord	5m/16.4ft
Outlets	4 outlets on back
Maximum output valve of auxiliary AC power plug	1.5A(single plug); 6A (in total)

Pneumatic Specifications

Auxiliary common gas outlet

Connector	ISO 22 mm OD and 15 mm ID
Security	Anti-misconnection switch and prominent prompts on the screen

Gas supply

Gas type	O_2, N_2O, Air
Pipeline input range	280 kPa to 600 kPa/41 psi to 87 psi (2.8-6bar)
Pipeline connection	NIST/DISS
Cylinder input	Pin-index yokes
Primary regulator nominal output	250 kPa/36psig

O_2 controls

Method	Proportionate decrease of N_2O with reduction in O_2 pressure
Supply failure alarm	When oxygen pressure is less than 200kPa, alarm is activated
O_2 flush	Range: 25 to 75 L/min

Electrically-controlled Flowmeter (Electronic Mixer)

O_2 range	0 to 10 L/min
N_2O range	0 to 10 L/min
Air range	0 to 12 L/min
Total Flow Control Mode	Total range of electronically-controlled flowmeter: 0 to 18 L/min; O_2 concentration range: not less than 21%

Integrated safety functions

Guarantees a minimum O_2 concentration of 25% in an O_2/N_2O mixture

N_2O cut-off if O_2 pressure is less than 200kPa

Driven gas auto-switch

Use compressed air as the driving gas

When the compressed air supply is disrupted, the machine will automatically switch to O2 driving gas

Auxiliary oxygen inhalation

Range	0-15 L/min
Pressure	280-600kPa
Flow indicator	Flow tube

Auxiliary gas output

Gas	Oxygen
Pressure	280-600kPa
Flow rate	Max: 90L/min

Breathing Circuit Specifications

Carbon dioxide absorbent canister

Absorbent capacity	1500ml

CO2 bypass	Optional

Ports and connectors

Exhalation	22 mm OD ISO 15 mm ID taper
Inhalation	22 mm OD ISO 15 mm ID taper
Bag port	22 mm OD

Electronic pressure gauge

Scale range	0-1MPa, ± 2.5%

Bag-to-Ventilator switch

Type	Interface switch

Integrated Adjustable Pressure Limiting (APL) valve

Range	0 to 70 cmH_2O
Tactile knob indication at	30 cmH_2O and above
Adjustment range of rotation	0 to 30 cmH_2O 30 to 70 cmH_2O
Accuracy	＜30 cmH_2O:±3 cm H_2O; ≥30 cmH_2O:±15% of set value

Breathing circuit parameters

Compliance (Bag mode)	5 ml/cmH_2O
Compliance (Mechanical mode)	Automatically compensates for compression losses within the absorber and coil assembly
System compliance	< 150 ml/30hPa, for standard tubings
Circuit volume	Vent Mode 2.7 L (Not including soda lime canister) Bag Mode 0.3L+bag volume (Not including soda lime canister)
Expiratory resistance under manual condition	Flow: 3 L/min, Flow resistance: 0.05~3kPa; Flow: 30 L/min, Flow resistance: 0.1~0.5kPa
Inspiratory resistance under manual condition	Flow: 3 L/min, Flow resistance: 0.05~3kPa; Flow: 30 L/min, Flow resistance: 0.1~0.5kPa
Expiratory resistance under automatic	At the flow rate of 60 l/min, expiratory resistance is ≤0.6kPa;At the flow rate of 30 L/min, expiratory resistance is 2.2kPa To ensure compliance with the standard, use a patient circuit with a low flow resistance
Inspiratory resistance under automatic	At the flow rate of 60 L/min, inspiratory resistance is ≤0.6kPa; At the flow rate of 30 L/min, inspiratory resistance is 2.2kPa;

	To ensure compliance with the standard, use a patient circuit with a low flow resistance

Note: According to ISO 80601-2-13, test under peak flow 60L/min, fresh gas 10L/min

Heating system

Temperature	32 - 40℃

Materials

All the materials within breathing system that exposed to gas from patients are natural rubber latex free and autoclavable.

Anesthetic Gas Scavenging System (AGSS)

Size	445mm×142mm×95mm (height x width x depth)
Weight	2.25kg
Type of disposal system	Low-flow disposal system
Extract flow	35L/min-50L/min
Pressure relief device	Pressure compensation opening to the atmosphere
Filter	Stainless screen with hole diameter of 150μm
Spillage	<100ml/min
Maximum constant flow	50L/min
Maximum intermittent flow	35L/min

Environmental Specifications

System operation

Temperature	10 to 40℃
Humidity	Less than 95% relative humidity, non-condensing
Atmospheric pressure	54-106kPa

System storage

Temperature	–10 to 60℃
Humidity	15~90%RH, non-condensing
Barometric	16.5-106kPa

Electromagnetic compatibility

Immunity	Complies with all requirements of EN 60601-1-2

Emission	CISPR 11 group 1 class A Conforms to IEC 60601-1-2 standard

CE 0123

CE mark in this manual apply only to product with CE mark.

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