

A5

Anesthesia system

Physical Specifications

Dimensions and Weight

Height	1445 mm
Width	763 mm
Depth	766 mm
Weight	≤140 kg (with 3 yokes, without vaporizers and gas cylinders)

Work Surface

Height	830 mm
Width	462 mm
Depth	352 mm
Weight limit	30 kg

Flip-up Work Surface

Length	379 mm
Width	303 mm
Weight limit	15 kg

Drawer (2 or 3 drawers, Internal Dimension)

Height	123 mm/ 72 mm
Width	275 mm
Depth	340 mm
Weight limit	5 kg

Bag Arm

Height	1108 mm
Length	510 mm
Swiveling angle	±90 degrees

Casters

Diameter	125 mm
Brake	Centre brake with Lock / Unlock icons
Cable pusher	Cable pusher for each caster

Work Light

Settings	OFF, Low, High
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Main Screen

Display size	15.6 inch
Display type	Capacitive touch screen
Resolution	1920 x 1080
Rotated	-60° to 60°
Tilted	-15° to +45°
Display parameters	All setting and alarm parameters (including Breath rate, I/E ratio, Tidal volume, Minute volume, PEEP, MEAN, PEAK, PLAT, and O ₂ concentration, EtCO ₂ , N ₂ O, Aesthesia gas concentration, BIS)
Graphic waveforms	Pressure, Flow, Volume, CO ₂ , O ₂ , Anesthetic gas, N ₂ O, BIS Up to 5 waveforms display simultaneously
Spirometry loops	Pressure-Volume, Flow-Volume and Pressure-Flow
Timer	Display on screen timer

System status display

Display size	5.5 inch
Display type	Color LCD
Display content	Gas supply pressure, Airway Pressure, Tidal volume

Ventilator Specifications

Modes of Ventilation

Manual/Spontaneous ventilation/CPB
Volume Control Ventilation (VCV) with PLV function
Pressure Control Ventilation (PCV)
Pressure Control Ventilation with volume guarantee (PCV-VG)



Continuous Positive Airway Pressure/Pressure Support Ventilation with apnea backup (CPAP/PS)

Pressure Support Ventilation (PS) with apnea backup

Synchronized Intermittent Mandatory Ventilation

(SIMV-Volume Controlled and SIMV-Pressure Controlled)

Synchronized Intermittent Mandatory Ventilation Volume Guarantee (SIMV-VG)

Airway Pressure Release Ventilation (APRV)

Compensation

Circuit gas leakage compensation and automatic compliance compensation

Ventilation Parameters Range

Tidal volume	10 to 1500 mL (VCV, SIMV-VC) 5 to 1500 mL (PCV-VG, SIMV-VG) With TV/IBW indicator
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Pinsp 3 to 80 cmH₂O

Plimit 10 to 100 cmH₂O

ΔPsupp 0, 3 to 60 cmH₂O (CPAP/PS)

Respiration rate 2 to 100 bpm

I:E 4:1 to 1:10

Tpause OFF, 5% to 60%

Tinsp 0.2 to 10.0 s

Trigger window 5% to 90%

Flow trigger 0.2 to 15 L/min

Pressure trigger -20 to -1 cmH₂O

Exp% 5% to 80%

Min rate 2 to 60 bpm

Tslope 0.0 to 2.0 s

Apnea I: E 4:1 to 1:10

ΔPapnea 3 to 60 cmH₂O

Phigh 3 to 80 cmH₂O

Plow OFF, 2 to 50 cmH₂O

Thigh 0.2 to 10.0 s

Tlow 0.2 to 10.0 s

Thigh:Tlow (I:E) 50:1 to 1:50

Positive End Expiratory Pressure (PEEP)

Type Integrated, electronic controlled

Range OFF, 2 to 50 cmH₂O

Monitoring Parameters

Tidal volume	0 to 3000 ml
Minute volume	0 to 100 L/min
Peak pressure	-20 to 120 cmH ₂ O
Mean pressure	-20 to 120 cmH ₂ O
Plateau pressure	-20 to 120 cmH ₂ O
I:E	50:1 to 1:50
Rate	0 to 150 bpm
PEEP	0 to 70 cmH ₂ O
Delta Tidal volume	0 to 3000 ml
Minute volume leakage	0 to 10.0 L/min
Driving Pressure	0 to 120 cmH ₂ O
Resistance (R)	0 to 600 cmH ₂ O/(L/s)
Compliance (C)	0 to 300 ml/cmH ₂ O
Elastance (E)	0.003 to 10 cmH ₂ O /mL

Mechanical Power	0.00 to 100.00 J/min
Inspired oxygen (FiO ₂)	18% to 100%
Control Accuracy	
Volume delivery	≤60 ml: ± 10 ml >60 ml and ≤ 210 ml: ±15 ml >210 ml: ±7 % of the set value
Pressure delivery	± 2.5 cmH ₂ O or ± 7% of the set value, whichever is greater
PEEP	± 2.0 cmH ₂ O or ± 7% of the set value, whichever is greater
Rate	± 1bpm or ± 10% of the reading, whichever is greater

Monitoring Accuracy	
Volume monitoring	≤60 mL: ± 10 mL >60 and ≤210 mL: ± 15 mL >210 mL: ± 7% of the reading
Pressure monitoring	± 2.0 cmH ₂ O or ± 4% of the reading, whichever is greater
Rate	± 1bpm or ± 5% of the reading, whichever is greater
MV	± 0.1L/min or ± 8% of the reading, whichever is greater

Alarm Setting	
Paw High	2 to 100 cmH ₂ O
Paw Low	0 to 98 cmH ₂ O
TV High	5 to 1600 mL
TV Low	OFF, 0 to 1595 mL
MV High	0.2 to 100 L/min
MV Low	0 to 99 L/min
Rate High	4 to 100 bpm, OFF
Rate Low	OFF, 2 to 98 bpm
FiO ₂ High	20% to 100%, OFF
FiO ₂ Low	18% to 98 %
Apnea alarm	No breath has been detected within the apnea time.
Apnea delay time	5 to 60 s (by volume or pressure) 10 to 40 s (by CO ₂ waveform)

Data Storage and Recording	
Configuration storage	up to 10 customized profiles
Log storage	10000 entries of alarm and activity logs
History trend	48 hours of continuous trend data
Screenshot	up to 50

Lung Recruitment Tool	
Multi-step recruitment	(Increasing PEEP progressively) a maximum of 7 steps
Control parameters	Δpsupp, PEEP, Breaths, I:E, Rate PEEP on exit
Preset procedure	up to 5
One-step recruitment (sustain inflation)	
Control parameters	Pressure Hold, Hold Time, PEEP on exit
Cycle Interval	OFF, 1 - 180 min

Jet Ventilation	
Jet pressure (HF)	10 to 200 kPa
Jet pressure (NF)	10 to 350 kPa
Jet Frequency (HF)	50 to 1500 bpm
Jet Frequency (NF)	1 to 100 bpm
I:E	3:1 to 1:5
FiO ₂	21 to 100 %
Laser safety mode	ON, OFF
Pressure monitoring	0 to 120 cmH ₂ O
PEEP monitoring	0 to 70 cmH ₂ O

Pneumatic Specifications

Pipeline Supply	
Gas type	O ₂ , N ₂ O and Air
Pipeline input range	280 to 600 kPa (40 to 87 psi)

Pipeline connections	DISS or NIST
Pipeline Supply Pressure Monitoring	
Display type	Electronic
Ranges	0 to 1000kPa (0 to 140 psi)
Accuracy	± (4% of the full scale reading + 8% of the actual reading)

Cylinder Supply	
Cylinder supply	E Cylinder (American style or UK style)
O ₂ input range	6.9 to 20 MPa (1000 to 2900 psi)
N ₂ O input range	4.2 to 6 MPa (600 to 870 psi)
Air input range	6.9 to 20 MPa (1000 to 2900 psi)
Cylinder connections	Pin-Index Safety System (PISS)
Yoke configuration	O ₂ , N ₂ O, Air

Cylinder Supply Pressure Gauges	
Display type	Mechanical or Electronic
Air range	0 to 25 MPa (0 to 3500 psi)
O ₂ range	0 to 25 MPa (0 to 3500 psi)
N ₂ O range	0 to 10 MPa (0 to 1400 psi)
Accuracy	± (4% of the full scale reading+8% of the actual reading)

Ventilator Performance	
Peak gas flow	180 L/min + Fresh Gas Flow

O₂ Controls	
Supply failure alarm	≤ 220 kPa
ACGO (Auxiliary Common Gas Outlet)	
Control type	Mechanical
Safety pressure	A relief valve limits fresh gas pressure at ACGO outlet port to not more than 12.5 kPa

O₂ Flush		
Flow rate	25 to 75 L/min	
Auxiliary Flowmeter (3 options)		
Auxiliary O ₂ Flowmeter	Range	0 ~ 15 L/min
	Indicator	Flow tube
Auxiliary O ₂ &Air Flowmeter	Flow range	0 to 15 L/min
	Oxygen concentration	21 % to 100 %
	Indicator	Glass tube and LED
High Flow Nasal Cannula	Flow range	2 to 100 L/min
	Oxygen concentration	21 to 100 %
	Indicator	Glass tube and LED

Anesthetic Gas Scavenging System (AGSS)	
Type of disposal system	Passive Active: High-flow or low-flow
Pump rate	75 to 105 L/min (High-flow) 25 to 50 L/min (Low-flow)

Venturi Suction Regulator	
Supply	Air, from system gas source
Gas supply range	280 to 600 kPa
Maximum vacuum	≥50 kPa
Maximum flow	≥25 L/min

Continuous Suction Regulator	
Supply	External vacuum
Gas supply range	-72 to -40 kPa
Maximum vacuum	≥ 65 kPa with external vacuum applied of 72 kPa
Maximum flow	≥ 40 L/min with external vacuum applied of 72 kPa

Electronic Flow Meters	
O ₂ flow range	0 to 15 L/min
Air flow range	0 to 15 L/min
N ₂ O flow range	0 to 12 L/min
Accuracy	± 10% of the indicated value or ± 0.12L/min, whichever is greater

Optimizer (Optional)

Available when CO₂ or AG module is loaded

Breathing System Specification

Breathing system volume

Automatic ventilation 1800 ml
Manual ventilation 1950 ml

CO₂ Absorber Assembly

Absorber capacity 1500 ml
Absorber type 1 Pre-Pak canister or Loose fill absorbent

Inspiratory Airway Pressure Gauge

Range -20 to 100 cmH₂O
Accuracy ± (2% of the full scale reading + 4% of the actual reading)

Flow Sensor

Type Variable orifice flow sensor
Location Inspiratory and expiratory port

Oxygen Sensor

Type Galvanic fuel cell
FiO₂ displayed 18% to 100%
Accuracy ± (volume fraction of 2.5 % +2.5 % gas level)
Response time < 20 seconds

Breathing System Connectors

Exhalation 22 mm OD / 15 mm ID conical
Inhalation 22 mm OD /15 mm ID conical
Manual bag port 22 mm OD /15 mm ID conical

Bag-to-Ventilator Switch

Type Bi-stable
Control Switch between manual and mechanical ventilation

Adjustable Pressure Limiting (APL) Valve

Type Manually control with quick relief function
Range Approximately 0 (SP), 5 to 70 cmH₂O
Tactile knob indication ≥ 30 cmH₂O

Breathing Circuit Parameters

System compliance ≤ 2 mL/cmH₂O in manual ventilation
Automatically compensates for compression losses within the breathing circuit in automatic ventilation mode
Expiration resistance < 6.0 cm H₂O @60 L/min
Inspiration resistance < 6.0 cm H₂O @60 L/min
Leakage ≤ 50 mL @ 3 kPa
System safety pressure on patient circuit 110 ± 10 cmH₂O

Breathing System Temperature Controller

Breathing system temperature maintained at least 31°C typical at 20°C ambient temperature in normal condition

Materials

All materials in contact with exhaled patient gases are autoclavable up to a maximum temperature of 134°C, except O₂ sensor and mechanical pressure gauge.

All materials in contact with patient gas are latex free.

Vaporizers

Anesthetic agent delivery

Vaporizer Mindray V60/V80 Anesthetic Vaporizer
Support agents Halothane, Isoflurane, Sevoflurane, Desflurane
Position Max.3 positisons (2 active, 1 inactive)
Mounting mode Selectatec®, with interlocking function

Monitor Modules

Side-stream CO₂ Module

CO₂ Measurement range 0 ~ 152 mmHg (0 to 20%)
CO₂ Accuracy ±2 mmHg (0 ~ 40 mmHg)
± 5% of the real reading (41 ~ 76 mmHg)

± 10% of the real reading (77 ~152 mmHg)
CO₂ Resolution 1 mmHg
O₂ Measurement range 0 to 100%
O₂ Accuracy ±1% (V/V) (0 ~ 25%)
±2% (V/V) (25 ~ 80%)
±3% (V/V) (80 ~ 100%)
O₂ Resolution 1%
Pump rate Neonatal: 100 mL/min or 120 mL/min
Adult/Pediatric: 120 mL/min or 150 mL/min
Response time <4.5 s@100 mL/min; <4.5 s@120 mL/min
<5 s@120 mL/min; <5 s@150 mL/min

Main-stream CO₂ Module

Measurement range 0 to 150 mmHg (0 to 20%)
Accuracy ± 2 mmHg (0 ~ 40 mmHg)
± 5% of the reading (41 ~ 70 mmHg)
± 8% of the reading (71 ~ 100 mmHg)
± 10% of the reading (101 ~ 150 mmHg)
Resolution 1 mmHg
Response time <2 s
Alarm limit EtCO₂ High: OFF, (low limit +2) to 99 mmHg
EtCO₂ Low: OFF, 0 to (high limit - 2) mmHg
FiCO₂ High: OFF, 1 to 99 mmHg

Anesthesia Gas (AG) Module

Measurement mode Infrared absorption, side-stream
Monitor gases CO₂, O₂ (Paramagnetic O₂ module), N₂O, and any of the five anesthetic agents: DES, ISO, ENF, SEV and HAL
Warm-up time <45 s (ISO accuracy mode)
<10min (full accuracy mode)
Sample rate Adu/Ped: 150, 180, 200 ml/min
Neo: 100, 110, 120 ml/min
Monitoring range CO₂: 0 to 30% (0.0 to 226mmHg)
O₂/N₂O: 0 to 100%
HAL, ISO, ENF: 0 to 30%
SEV: 0 to 30%
DES: 0 to 30%

BIS/BISx4 Module

Measured parameters EEG
BIS, BIS L/ BIS R 0 to 100
Sweep speed 6.25 mm/s, 12.5 mm/s, 25 mm/s or 50 mm/s
Alarm limit BIS high: (BIS low +2) to 100
BIS low: 0 to (BIS high -2)
Calculated parameters SQI/SQI L, SQI R; EMG/EMG L, EMG R; SR/SR L, SR R; SEF/SEF L, SEF R; TP/TP L, TP R; BC/BC L, BC R; sBIS L, sBIS R; sEMG L, sEMG R; ASYM

NMT Module

Stimulation output
Pulse width: 100, 200, or 300 µs;
Stimulation current range: 0 to 60 mA in increments of 5 mA
Maximum skin resistance: 3 kΩ @ 60 mA, 5 kΩ @ 40 mA
Block recovery OFF, 1,2, 3, 4, 5 %, 10 %, 20 %, 30 %, 40 %, 50 %, 60 %, 70 %,80 %, 90 %, 100 %

TOF (Train Of Four) mode

TOF-Ratio (response percentage): 5 % to 160 %
TOF-Count (number of responses): 0 to 4
TOF-T1% (response to the first stimulus as percentage of the reference value): 0 % to 200 %

ST (Single Twitch) mode

ST-Ratio (response percentage): 0 % to 200 %

DBS (Double-Burst Stimulation) 3.2/3.3 mode

DBS-Ratio (response percentage): 5 % to 160 %

DBS-Count (number of responses): 0 to 2

PTC (Post-Tetanic Count) mode

PTC-Count (number of responses): 0 to 20

Anesthesia Function

Agent Consumption Calculation

Usage speed range	HAL, ISO: 0 mL/h ~ 250 mL/h SEV: 0 mL/h ~ 450 mL/h DES: 0 mL/h ~ 900 mL/h
Accuracy	± 2 mL/h, or ± 15% of the reading, whichever is larger
Total usage range	0 to 3000 ml
Accuracy	± 2 mL, or ± 15% of the reading, whichever is larger

Anesthetic Prediction

Patient type	Height: 150 to 200 cm Weight: 40 to 140 kg Age: 18 to 90 years old
Anesthetic agents	Desflurane, Isoflurane, Sevoflurane and Halothane
Prediction trend and waveform	Dynamic short trend waveforms of F _I A _A , EtAA, F _I O ₂ and EtO ₂ in the last 10 min and prediction trend waveforms of F _I A _A , EtAA, F _I O ₂ and EtO ₂ in the next 20 min.
Prediction deviation	EtAA=0: less than volume fraction of 0.05 % EtAA≠0: - 20 % to 30 % of the measured EtAA, or - 5 % to 7.5 % of the vaporizer maximum setting, whichever is greater EtO ₂ : - 10 % to 15 % of the measured EtO ₂ , or volume fraction of - 5 % to 7.5 %, whichever is greater

AnaeSight™

Remote operation of the eMAC™	Infusion Pump/Syringe Pump Indication of the combined drug effect of the following drugs
Anesthetic agents	Sevoflurane, Desflurane, Isoflurane
Intravenous drugs	Propofol, Remifentanyl, Alfentanil, Sufentanyl
Patient type	Height: 150 to 200 cm Weight: 40 to 140 kg Age: 18 to 90 years old

Electrical Specifications

Main Electrical Power

Power input	220-240 V~, 50/60 Hz, 8A max 100-240 V~, 50/60 Hz, 8A max
Power consumption	OFF mode: <8W Standby mode: <65W Active mode: <80W (under typical condition)

Power cord	Maximum: <120W 5 m (length)
Battery Power	
Battery type	Li-ion, 14.4 VDC, 6.6Ah per battery
Run-time	One new battery: minimum 90 minutes under typical operating conditions Two new batteries: minimum 180 minutes under typical operating conditions
Battery charge time	≤ 8 hours
Time to shut down from the first Lower Battery Alarm	5 minutes minimum (new fully-charged battery)
Safety feature	in case of electricity and battery failure, manual ventilation, gas delivery and agent delivery are possible

Auxiliary Electrical Outlets

Number of outlets	3 or 4
Output current	3 A max. for each outlet, 5 A max. for total

Communication Port

Communication port	RS-232 compatible serial interface
LAN port	RJ-45 network port
USB port	2 USB ports
Video signal port	HDMI port for inputting the video signal of the main to external display

Environmental Specifications

Operating

Temperature	10 to 40°C
Relative humidity	15 to 95% (noncondensing)
Barometric	70 to 106.7 kPa

Storage

Temperature	-20 to 60°C for main unit, -20 to 50°C for O ₂ sensor
Relative humidity	10 to 95% (noncondensing)
Barometric	50 to 106.7 kPa

Resistance to Ingress of Fluids

Complies with the requirements of clause 11.6.3 in IEC 60601-1 and also the requirements in IEC 60529 for protection against vertically falling water drops equipment (IPX1)

Not all features are for sale in all countries.
Please contact your local Mindray sales representative for the most current information.

www.mindray.com

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