

A7

Anesthesia system

Physical Specifications

Dimensions and Weight

Height	1495 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
----------	----------------

Main Screen

Display size	18.5 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)
Adaptive Minute Ventilation (AMV)

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
Pinsp	3 to 80 cmH ₂ O
Plimit	10 to 100 cmH ₂ O
ΔPsupp	0, 3 to 60 cmH ₂ O (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 cmH ₂ O
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 cmH ₂ O
Phigh	3 to 80 cmH ₂ O
Plow	OFF, 2 to 50 cmH ₂ O
Thigh	0.2 to 10.0 s
Tlow	0.2 to 10.0 s
Thigh:Tlow (I:E)	50:1 to 1:50
MV%	25% to 350%

Positive End Expiratory Pressure (PEEP)

Type	Integrated, electronic controlled
Range	OFF, 2 to 50 cmH ₂ O

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)
Control parameters	a maximum of 7 steps ΔP _{supp} , 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

Insp Hold & Exp Hold

Insp Hold Measurement	Cstat, Pplat, Ri
Exp Hold Measurement	PEEPi, PEEPtot

Jet Ventilation

Jet pressure (HF)	10 to 200 kPa (0.1 to 2 bar)
Jet pressure (NF)	10 to 350 kPa (0.1 to 3.5 bar)
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 to 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 control system (Electronic Mixer)

Direct Flow Control Mode

O ₂ flow range	0, 0.2 to 15 L/min
Air flow range	0 to 15 L/min
N ₂ O flow range	0 to 12 L/min
O ₂ flow accuracy	± 50 ml/min or ± 5% of setting value, whichever is greater

Balance gas (Air/N ₂ O) flow accuracy	± 50 ml/min or ±5% of setting value, whichever is greater
--	---

O₂ concentration in O₂/ N₂O mixture ≥ 25%

Total Flow Control Mode

Total flow range	0, 0.2 to 20 L/min
Total flow accuracy	± 100 ml/min or ± 5% of setting value, whichever is greater

O ₂ concentration	
Range	21% to 100% (The balance gas is Air) 26% to 100% (The balance gas is N ₂ O)
Accuracy	± 5% V/V for flows < 1 L/min ± 5% of setting for flows ≥ 1 L/min

Optimizer

Available when CO₂ or AG module is loaded

Flow Pause

The fresh gas flow and ventilation will be paused for 1 minute at default. (Maximum 2 minutes)

Backup Flow Control System

Control Type

Mechanical (Control needle valve and knob)

Flow Range

Control range (O ₂)	1 to 15 L/min
---------------------------------	---------------

Total flow meter

Range	0 to 15 L/min
Indicator	Flow tube
Indicator accuracy	± 10% of the indicated value for flows (between 10% and 100% of full scale with oxygen)

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 cmH ₂ O
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
FiO ₂ 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 cmH ₂ O
-------	--

Tactile knob indication ≥ 30 cmH₂O

Breathing Circuit Parameters

System compliance	≤ 2 mL/cmH ₂ O 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 positions (2 active, 1 inactive)
Mounting mode	Selectatec®, with interlocking function

Monitor Modules

Side-stream CO₂ Module

CO ₂ Measurement range	0 ~ 152 mmHg (0 to 20%)
CO ₂ Accuracy	±2 mmHg (0 ~ 40 mmHg) ± 5% of the real reading (41 ~ 76 mmHg) ± 10% of the real reading (77 ~152 mmHg)
CO ₂ Resolution	1 mmHg
O ₂ Measurement range	0 to 100%
O ₂ Accuracy	±1% (V/V) (0 ~ 25%) ±2% (V/V) (25 ~ 80%) ±3% (V/V) (80 ~ 100%)
O ₂ 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	EtCO ₂ High: OFF, (low limit +2) to 99 mmHg EtCO ₂ Low: OFF, 0 to (high limit - 2) mmHg FiCO ₂ High: OFF, 1 to 99 mmHg

Anesthesia Gas (AG) Module

Measurement mode	Infrared absorption, side-stream
Monitor gases	CO ₂ , O ₂ (Paramagnetic O ₂ module), N ₂ O, 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	CO ₂ : 0 to 30% (0.0 to 226mmHg) O ₂ /N ₂ O: 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 μ s;
Stimulation current range: 0 to 60 mA in increments of 5 mA
Maximum skin resistance: 3 k Ω @ 60 mA, 5 k Ω @ 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 \pm 2 mL/h, or \pm 15% of the reading, whichever is larger
Total usage range 0 to 3000 ml
Accuracy \pm 2 mL, or \pm 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 FiAA, EtAA, FiO₂ and EtO₂ in the last 10 min and prediction trend waveforms of FiAA, EtAA, FiO₂ and EtO₂ in the next 20 min.
Prediction deviation EtAA=0: less than volume fraction of 0.05 %
EtAA \neq 0: - 20 % to 30 % of the measured EtAA, or - 5 % to 7.5 % of the vaporizer maximum setting, whichever is greater
EtO₂: - 10 % to 15 % of the measured EtO₂, or volume fraction of - 5 % to 7.5 %, whichever is greater

AnaeSight™

Remote operation of the Infusion Pump/Syringe Pump eMAC™ Indication of the combined drug effect of the following drugs
Anesthetic agents Sevoflurane, Desflurane, Isoflurane
Intravenous drugs Propofol, Remifentanyl, Alfentanil, Sufentanil
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
100-120 V~, 50/60 Hz, 8A max
Power consumption OFF mode: <8W
Standby mode: <65W
Active mode: <80W (under typical condition)
Maximum: <120W
Power cord 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 \leq 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

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 O₂ 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

P/N:ENG-A7 Datasheet -210285X4P-20240103

©2024 Shenzhen Mindray Bio-Medical Electronics Co., Ltd. All rights reserved.

mindray
healthcare within reach