

A5

Anesthesia system

Fusion for Safety



Integrated Solution, Together and Stronger



Combined intravenous-inhalational anesthesia (CIVIA) typically involves the use of multiple anesthetic drugs to achieve a balanced anesthesia state while reducing the dosage of any single drug and its potential adverse reactions. However, this method faces several challenges in anesthetic practice:



Multiple devices in scattered locations

Intravenous anesthetics are delivered via pumps, while inhalational anesthetics are delivered via anesthesia machines. Anesthesiologists must walk back and forth for observation and operation.



Vital signs on different interfaces

Due to patient variability, anesthesiologists need to closely monitor vital signs. However, this information is dispersed across different devices, making it hard to assess.



Lack of a combined drug effect indicator

Anesthesiologists need to understand the pharmacokinetics and pharmacodynamics of each anesthetic drug and consider the interaction between drugs, relying heavily on their experience.

AnaeSight™

AnaeSight™ is an integrated solution for combined intravenous-inhalational anesthesia that connects anesthesia machines, patient monitors, and pumps. This brings greater convenience to operation and more confidential decision-making, significantly improving the safety and efficiency of anesthesia.

Centralized control

Anesthesiologists can remotely control the pumps through the anesthesia machine, adjusting intravenous and inhalational anesthetics on the same interface.



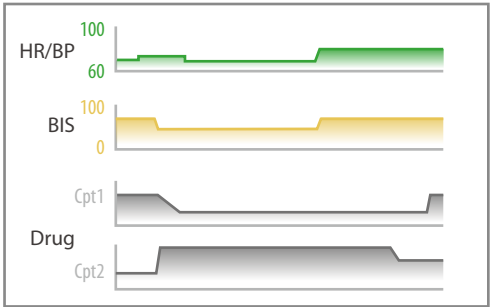
Administer intravenous anesthetics on anesthesia machine



Brand new V60 anesthetic vaporizers

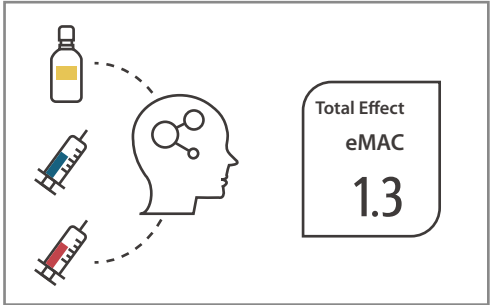
Integrated assessments

Vital sign parameters from the anesthesia machine and patient monitor, as well as historical medication from pumps, can be displayed on the same window, making it convenient to comprehensively assess the patient's status.



Combined drug effect

An innovative indicator of the combined drug effect of multiple anesthetics called eMAC™ is included in AnaeSight. This indicator is based on published pharmacokinetics and pharmacodynamics models, assisting with the administration of anesthetic drugs.



Diversified Ventilation, Professional Care

As the population ages and issues like obesity become more prevalent, optimizing ventilation management for patients during the perioperative period has become an important concern for anesthesiologists. A5 offers a range of ventilation methods, including both intubated and non-intubated anesthesia, to meet the needs of all patients.

High Flow Nasal Cannula *HFNC*

High flow nasal cannula (HFNC) plays an important role in maintaining safe oxygen saturation of patients as it extends the safe apnoeic oxygenation especially for patients with poor oxygen saturation such as bariatric, pediatric, critical ill or difficult airway.

- Direct setting of total flow and O₂ concentration with maximum flow up to 100L/min
- Built-in design with no additional gas or power source required, saving space and minimizing clutter



Jet ventilation *HFJV*

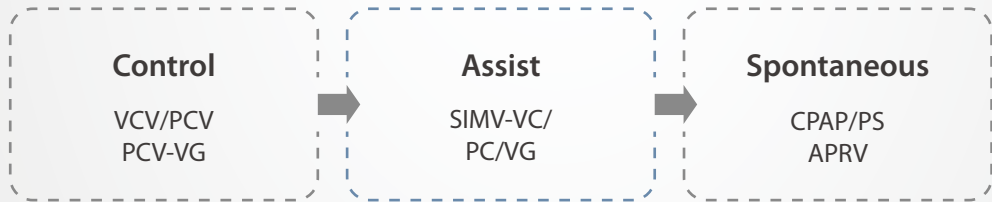
Jet ventilation can be used in shared airway surgeries, difficult airway cases, and more. It can improve patient safety by maintaining oxygenation while creating a better surgical field.

- Improved safety: superimposed jet ventilation to maintain patient oxygenation while avoiding CO₂ retention
- Smoother operation: quickly switch between jet and conventional ventilation
- More environmentally friendly: compact design, space-saving cluster



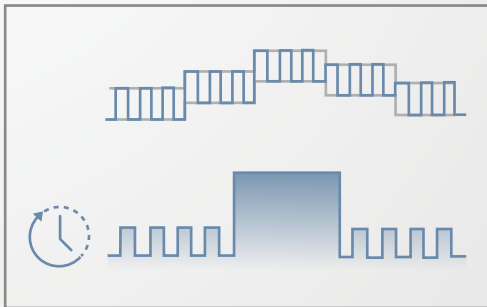
Experience optimal performance across all stages of anesthesia

A full range of ventilation modes is available to meet the needs of patients of all ages, from adults to neonates. This enables precise ventilation care throughout the entire anesthesia process.



Powerful Lung Recruitment Tool

- Two optional maneuvers: stepwise PEEP or sustained inflation
- A scheduled recruitment maneuver can be performed automatically



More Flexible, More Reliable

The operating room environment is complex due to the presence of numerous equipment. Anesthesiologists face heavy, fast-paced, and intense work every day. The new A5 anesthesia system is equipped with a flexible design, intuitive interaction, and reliable performance. It helps anesthesiologists deal with daily work easily in various anesthesia environments.



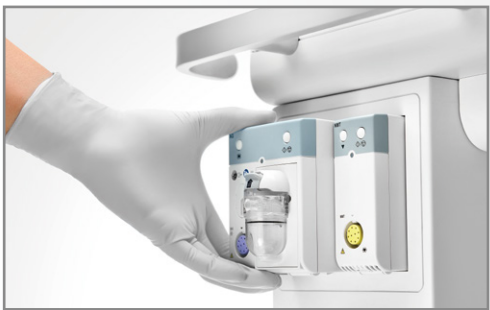
15.6 inch capacitive touchscreen
with flexible rotation for 360 degree angle of view



Neat cable management
clean and no tangle



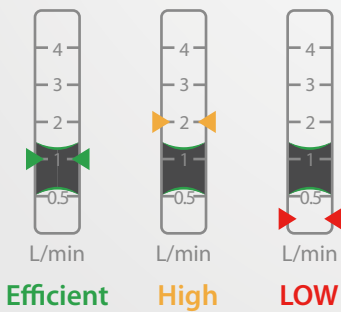
Integrated breathing system
- Reduce condensation to a minimum by the heating system
- Compatible with hot-steam sterilization, preventing cross-infection



Plug-and-Play monitoring modules
- Optional CO₂, AG, BIS modules
- compatible with the Mindray modular patient monitor to reduce cost

Optional low-flow assist toolkit

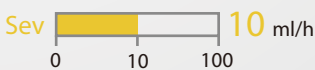
- Optimizer™: Real time guidance for cost-effective optimization of the fresh gas flow
- AA measurement: monitor the anesthetic agent consumption and keeps cost in mind



Anesthesia Consumption

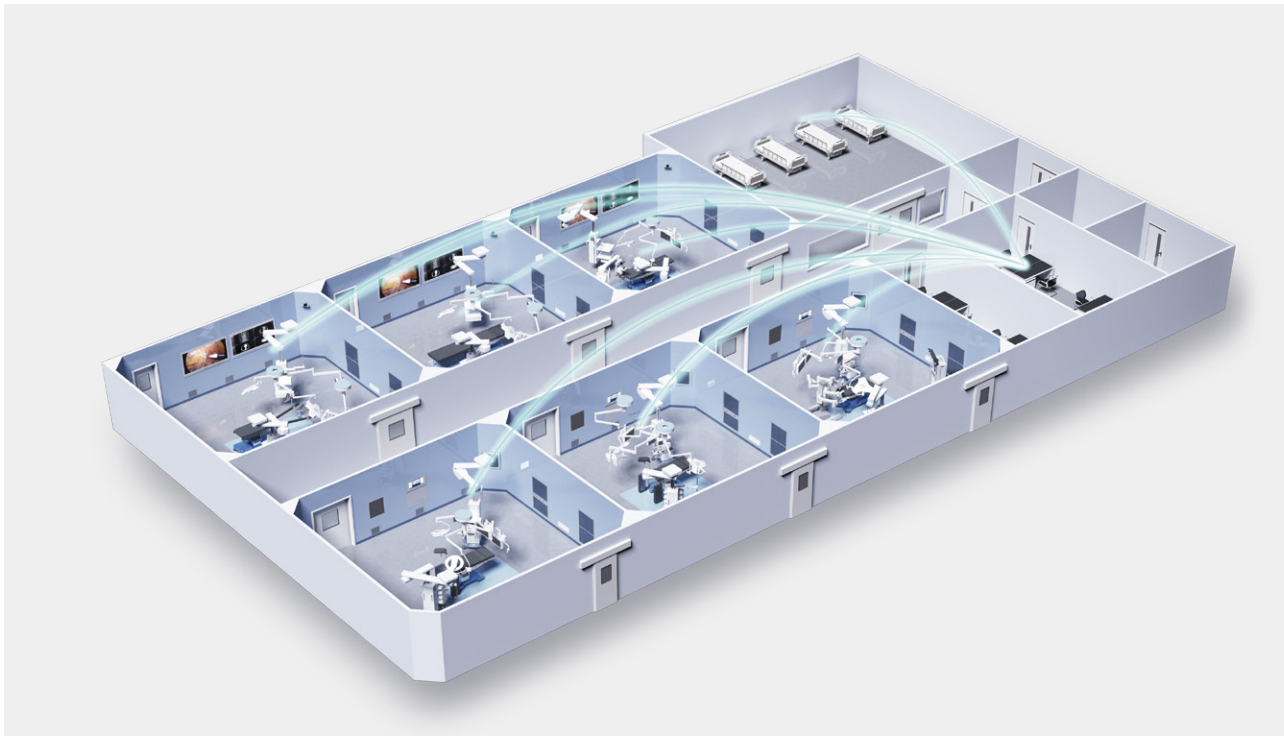
Start 09-09 08:30:00 AM
End 09-09 10:30:00 AM

Sev 25 ml



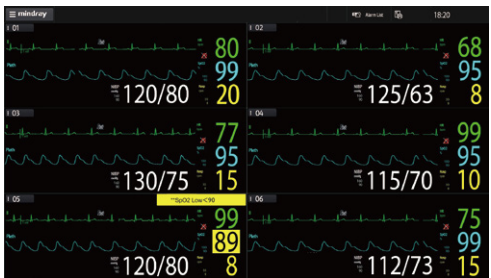
Stay Connected for Greater Efficiency

Comprehensively improve the operating efficiency of departments through information technology, make complicated work orderly, help clinical workers easily cope with various challenges, comprehensively improve the quality of medical services centered on patients, and realize lean management of all departments.



Overview of patient status in each operating room

- Monitor patient vital signs in real-time across all operating rooms
- Conveniently review the complete surgical process information of patients



Overview of the operational status of devices

- Overview of anesthesia machine distribution and utilization
- Summary of anesthesia machine self-test results
- Statistics of anesthetic gas consumption



Not all features are for sale in all countries.

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 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

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 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
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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
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O₂ Controls

Supply failure alarm	≤ 220 kPa
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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
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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 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 cmH ₂ O

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 H ₂ O @60 L/min
Inspiration resistance	< 6.0 cm H ₂ O @60 L/min
Leakage	≤ 50 mL @ 3 kPa
System safety pressure on patient circuit	110 ± 10 cmH ₂ O

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

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)

CO ₂ Resolution	± 10% of the real reading (77 ~152 mmHg) 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 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 %
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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
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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 , EtA _A , F _i O ₂ and EtO ₂ in the last 10 min and prediction trend waveforms of F _I A _A , EtA _A , F _i O ₂ and EtO ₂ in the next 20 min.
Prediction deviation	EtA _A =0: less than volume fraction of 0.05 % EtA _A ≠0: - 20 % to 30 % of the measured EtA _A , 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, 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
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

P/N:ENG-A5 Datasheet -210285X4P-20240103

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healthcare within reach