

A7

Anesthesia Machine



Technical Specifications (2013. Ver.1.0)

Physical Specification

Dimensions and Weight

Height:	1400 mm \pm 25 mm
Width:	1050 mm \pm 25 mm (including breathing system)
Depth:	805 mm \pm 25 mm
Weight:	185 kg \pm 5kg (with AG module, Auxiliary work surface and 3 yokes, without vaporizers and gas cylinders)

Top Shelf

Width:	616 mm \pm 25 mm
Depth:	362 mm \pm 25 mm
Weight limit:	40 kg

Work Surface (Stainless steel)

Height:	850 mm \pm 25 mm
Width:	616 mm \pm 25 mm
Depth:	380 mm \pm 25 mm

Auxiliary Work Surface

Height:	750 mm \pm 25 mm
Width:	450 mm \pm 25 mm
Depth:	330 mm \pm 25 mm
Weight limit:	10 kg

Side mounting Rails

Supporting weight:	27 kg at a maximum distance of 0.41 m
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Drawer (Internal Dimensions)

Numbers:	3
Height:	135 mm \pm 10 mm
Width:	440 mm \pm 10 mm
Depth:	385 mm \pm 10 mm
Weight limit:	5 kg

Bag Arm

Height:	1150 mm \pm 10 mm
Length:	312 mm \pm 10 mm
Swiveling angle:	150 \pm 10 degrees

Casters

Diameter:	15 cm
Brakes:	central brake with lock/unlock indicator
Cable pusher:	cable pusher wish each caster

Handle

Length:	650 mm \pm 25 mm
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Work Light

Settings:	Off, Low, High
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Screen	
Display:	Color LCD, 15inch, 4:3 ratio diagonal TFT with touch screen
Display parameters:	All setting and alarm parameters (including Breath rate, I:E ratio, Tidal volume, Minute volume, PEEP, Pmean, Ppeak, Pplat, and O ₂ concentration)
Graphic waveforms:	Waves of Pressures-Time, Flow-Time
Spirometry Loops:	Pressure-Volume, Flow-Volume
Timer:	Display on the screen
Screen Control:	Touch pad /Touch screen / Mouse control
Ventilator Specifications	
Modes of ventilation	
Manual / Spontaneous Ventilation	
Volume Control Ventilation (VCV) with PLV function	
Pressure Control Ventilation (PCV) with/without volume guarantee (VG)	
Pressure Support Ventilation (PS) with apnea backup	
Synchronized Intermittent Mandatory Ventilation (SIMV-Volume Controlled and SIMV-Pressure Controlled)	
Patient Size	
Patient size:	Adult, Pediatric, Infant
Compensation	
Circuit gas leakage compensation and automatic compliance compensation	
Ventilation Parameters Ranges	
Tidal Volume Range:	20 -1500mL (increments of 1 mL) (VCV, SIMV-VC)
Pressure (Pinsp) Range:	5 - 70 cmH ₂ O (increments of 1 cmH ₂ O) (PCV, SIMV-PC)
Pressure (Plimit) Range:	10 -100 cmH ₂ O (increments of 1 cmH ₂ O) (VCV, SIMV-VC)
Pressure support (ΔP) Range:	3 - 50 cmH ₂ O (increments of 1 cmH ₂ O) (SIMV-VC, SIMV-PC, PS)
Respiration Rate Range:	4 - 100 bpm (increments of 1 bpm) (VCV, PCV, SIMV-VC, SIMV-PC)
Minimum Rate Range:	2 - 60 bpm (increments of 1 bpm) (PS)
I:E Range:	4:1 - 1:8 (increments of 0.5) (VCV, PCV)
Tpause Rang:	OFF, 5 - 60 % (increments of 1%) (VCV, SIMV-VC)
Tinsp Range:	0.2 - 5sec (increments of 0.1s) (SIMV-VC, SIMV-PC)
Trigger Range:	1 - 15L/min (increments of 1L/min) (SIMV-VC, SIMV-PC, PS)
Tslope Range:	0.0 -2.0sec (increments of 0.1s) (SIMV-VC, SIMV-PC, PCV, PS)
VtG Range:	OFF, 20 -1500mL (increments of 1 mL) (PCV)
PlimVG Range:	5 -100cmH ₂ O (increments of 1 cmH ₂ O) (PCV)
Apnea Ti Range:	0.2 -5sec (increments of 0.1s) (PS)
Positive End Expiratory Pressure (PEEP)	
Type:	Integrated, Electronically controlled
Range:	OFF, 3 to 30 mH ₂ O (increments of 1 cm H ₂ O) (VCV, PCV, SIMV-VC, SIMV-PC, PS)
Ventilator Performance	
Drive Pressure Range:	280 to 600kPa
Inspiratory flow range:	2.4 to 110 L/min
Ventilator Monitoring	
Minute Volume Range:	0 -100 L/min
Tidal Volume Range:	0 - 3000 mL
Inspired Oxygen (FiO ₂):	18 -100%
Peak Pressure (Peak):	-20 - 120 cmH ₂ O
Mean Pressure (Pmean):	-20 - 120 cmH ₂ O
Plateau Pressure(Pplateau):	-20 - 120 cmH ₂ O
PEEP Range:	0 -70 cmH ₂ O

Co₂ Absorber Assembly	
Absorber capacity:	1 Pre-Pak or 1500 ml ±100ml
Absorber Canister Contents:	1 Pre-Pak canister or Loose Fill absorbent
Water Collection Cup	
Mode:	Detachable separately
Capacity:	6 ml ±1ml
Inspiratory Airway Pressure Gauge	
Range:	-20 to 100 cmH ₂ O
Accuracy:	± (2% of full scale reading + 4% of actual reading)
Flow sensor	
Type:	Variable orifice flow sensor
Dimensions:	22 mm OD and 15 mm ID
Location:	Inspiratory and expiratory port
Oxygen sensor	
Type:	Galvanic fuel cell
Breathing system connections	
Exhalation connection:	22 mm OD ISO / 15 mm ID ISO conical
Inhalation connection:	22 mm OD ISO / 15 mm ID ISO conical
Manual bag port:	22 mm OD ISO / 15 mm ID ISO conical
Connections to a Gas Scavenger: 30 mm OD ISO	
Adjustable Pressure Limiting (APL) valve	
APL Type:	Manually control with quick relief function
Control Range:	SP, Approximately 0 to 75 cmH ₂ O
Adjustable Range of Motion:	330 ±10 degrees
Tactile Knob Indication:	≥30 cmH ₂ O
Bag-to-Ventilator Switch	
Type:	Bi-stable
Control:	The switch between manual ventilation and mechanical ventilation
Breathing System Temperature Controller	
Breathing System Temperature Maintained to: 35°C typical at 20°C ambient temperature	
Materials	
All materials in contact with exhaled patient's gas are autoclavable, except flow sensors, O ₂ cell, and mechanical pressure gauge.	
All materials in contact with patient's gas are latex-free.	
Breathing circuit parameters	
System Compliance:	≤ 2mL/cmH ₂ O
Volume of gas lost due to internal compliance (manual ventilation mode only)	
Internal Compliance:	≤ 4mL/cmH ₂ O
Impedance in Manual Mode:	≤ 6 cmH ₂ O (the gas under test is a bi-directional sine wave at a frequency of 20 with tidal volume of 1 L)
Impedance in Automatic Ventilation Mode:	≤ 6 cmH ₂ O (the gas under test is a semi-sine wave at a frequency of 20 with tidal volume of 1 L)
Ileakage:	≤ 150 mL @ 3kPa
System Safety Pressure on Patient Circuit: 110 ±10 cmH ₂ O@10-110L/min	
Vaporizer	
Anesthetic agent delivery	
Vaporizer:	Penlon Sigma Delta, Sigma Alpha or Mindray V60 anesthetic vaporizer
Type:	Halothane, Enflurane, Isoflurane, Sevoflurane, Desflurane
Vaporizer positions:	3 positisons (2 active, 1 inactive)
Mounting mode:	Selectatec® with interlocking function

Selectatec® is the registered trademark of GE/Detax-Ohmeda.

Rate Range:	0 - 120 bpm
Ventilator accuracy	
Control/Monitoring Accuracy	
Volume Control:	< 60mL, ±10mL
	≥ 60 mL and ≤ 210mL, ±15mL
	≥ 210mL , ±7% of the set value
Pressure Control:	Pinsp: ±2.5 cmH ₂ O or ±7% of the set value, whichever is greater
	Plimit: ±10% of the set value
PEEP Control:	3 to 30cmH ₂ O: ±2 cmH ₂ O or ± 10% of the displayed value, whichever is greater
	OFF: not defined
Respiration Control:	±1bpm or 10% of the set value, whichever is smaller
Volume Monitoring:	< 60mL, ±10mL
	≥60 mL and ≤210mL, ±18mL
	≥210mL ±9% of the set value
Airway Pressure Monitoring:	±2 cmH ₂ O or ± 5% of the set value, whichever is greater
PEEP Monitoring:	0 to 30 cmH ₂ O: ±2 cmH ₂ O or ± 10% of the displayed value, whichever is greater
	≥30 cmH ₂ O : not defined
Respiration Monitoring:	±1bpm or 10% of the set value, whichever is smaller
Minute Volume Monitoring:	0 to 30 L/min: ±15% of the displayed value, repeatable to ±5% over a 1 hour period
Alarm limits	
Paw High:	The greater of 10 and (Paw Low+1) to 100 cmH ₂ O
Paw Low:	0 to the lesser of 70 and (Paw High–1) cmH ₂ O
MV High:	The greater of 0.2 and (MV Low+0.1) to 25 L/min
MV Low:	0 to the lesser of 20 and (MV High–1) L/min
FiO ₂ High:	The greater of 21 and (FiO ₂ Low+1) to 100%, Off
FiO ₂ Low:	18 to the lesser of 98 and (FiO ₂ High–1)%
Data Storage (Non-Volatile) and Recording	
Configuration Storage:	One group of factory configuration, one group of user configuration
Patient types:	Adult, Pediatric and Infant for each Configuration
Log Storage:	500 entries of alarm log / 500 entries of activity log / 500 entries of error log / 500 entries of service log
Pneumatic Specifications	
Pipeline Supply	
Gas Configuration:	O ₂ , N ₂ O and Air
Pipeline input range:	280 to 600 kPa (40 to 87 psi)
Pipeline connections:	DISS or NIST
Cylinder Supply	
Cylinder Supply:	E Cylinder (American and UK style)
O ₂ Cylinder Input Range:	6.9 to 15.5 MPa (1000 to 2250 psi)
N ₂ O Cylinder Input Range:	4.2 to 6 MPa (600 to 870 psi)
Air Cylinder Input Range:	6.9 to 15.5 MPa (1000 to 2250 psi)
Cylinder Connections:	Pin-Index Safety System (PISS)
Yoke Configuration:	O ₂ , N ₂ O , Air
N₂ O Automatic Cutoff	
An N ₂ O automatic cutoff stops the flow of N ₂ O when O ₂ flow is less than 200 mL/min.	
O₂ Controls	
O ₂ supply failure alarm:	185.5 to 254.5 kPa (27 to 36 psi)
Auxiliary Common Gas Outlet	
Control type:	Electronical or Mechanical
Safety Pressure:	A relief valve limits fresh gas pressure at ACGO outlet port to not more than 125 cmH ₂ O

Fresh gas flow:	0.2 to 18L/min
Auxiliary O₂ and Air Flow meter	
Flow range:	For each meter 0 to 15 L/min
Indicator:	Flow tube
Auxiliary O₂ Gas Power Outlet	
Pressure range:	280 to 600 kPa
Maximum flow:	≥90 L/min
O₂ Flush	
Flow rate:	35 to 50 L/min
Electronic Flow control system(Electronic Mixer)	
Direct Flow Control Mode	
O ₂ flow range:	0 to 15 L/min
Air flow range:	0 to 15L/min
N ₂ O flow range:	0 to 12L/min
Electronic Encoders Rotations:	<4 (from minimum flow to maximum flow)
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
Total Flow Control Mode	
Total flow range:	0.2 to 18 L/min
Total flow accuracy:	±100 ml/min or ±5% of setting value, whichever is greater
	Leakage from one gas inlet to another gas inlet is less than 10 ml per hour.
O₂ concentration	
O ₂ concentration range:	21% to 100% (The balance gas is Air) or / 26% to 100% (The balance gas is N ₂ O)
O ₂ concentration accuracy:	±5% V/V for flows < 1 L/min or / 5% setting for flows ≥1 L/min
Compensation	
	Temperature and atmospheric pressure compensated to standard conditions of 20°C and 101.3 kPa (14.7 psi)
Backup Flow Control System	
Control Type	
	Mechanical (Control Needle Valve and Knob)
Flow Range	
Control Range (O ₂):	1+/-0.25 to 15 L/min
Control Range (Air):	0 to15L/min
Control Range (N ₂ O):	0 to10 L/min
Flow Range	
O ₂ :	3.5 to 4.5 (From minimum flow to maximum flow)
N ₂ O and Air:	4 to 5 (From minimum flow to maximum flow)
Flow meter order	
	O ₂ , N ₂ O, Air (left to right, viewing front of unit)
O₂ concentration	
Oxygen concentration:	Not lower than 21%
	With the N ₂ O open all the way, the ratio controller shall provide 25% +/- 4% O ₂ when the O ₂ flow is from 1 L/min to 3 L/min
Total flow meter	
Range:	0 to10 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	
Total volume:	2850ml ±100 ml(without bellows)

Monitor Module	
Anesthesia Gas (AG) Module	
Measurement mode:	Infrared absorption, Sidestream
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:	45s (ISO accuracy mode) 10min (full accuracy mode)
Sample rate:	Adu/Ped:120, 150, 200 ml/min Neo: 70, 90, 120 ml/min
Range:	CO ₂ : 0% ~ 30% AA: 0% ~ 30% O ₂ /N ₂ O: 0~100%
Agent Consumption Calculation	
Calculation range:	0 to 3000ml
Accuracy:	± 2mL, or ±15% of the displayed value, whichever is greater.
Anesthetic Gas Scavenging System (AGSS)	
Type of the Applicable Disposable System: Low flow	
Size:	430 mm x 132 mm x 114 mm
Extract Flow:	25 to 50 L/min
Type of the Applicable Disposable System: High flow	
Size:	430 mm x 132 mm x 114 mm
Extract Flow:	75 to 105 L/min
Electrical specifications	
Main Electrical Power	
Power Supply Input Voltage:	100-240 VAC, 50/60 Hz(7A max for A7 unit, 5A max for A7 auxiliary outlet)
	220-240 VAC, 50/60Hz, (6A max for A7 unit, 5A max for A7 auxiliary outlets)
Power Cord:	5m (length)
Battery Power	
Battery type:	Sealed Lithium-ion, 11.1 V, 4.5 Ah (2 batteries)
Battery Run-time:	New battery: minimum 90 minutes under typical operating conditions
Time to Shutdown from Lower Battery Alarm: 5 minutes minimum (new fully-charged battery)	
Battery Charge Time: 8 hours max from an initial charge of 10%.Charging occurs whenever AC is applied to the A7 System(New Battery)	
Auxiliary Electrical Outlets	
Number of Outlets:	4
Output Current:	3 A for each outlet, 5 A for total
Environmental specifications	
Operating Temperature:	+10 to +40°C, +50 to 104°F
Storage Temperature:	- 20 to +60°C, -4 to 140°F, Oxygen sensor: -20 to +50°C
Humidity (Operating and Storage): 15 to 90% RH, non-condensing	
Atmospheric Pressure (Operating): 70 kPa to 106.7 kPa	
Atmospheric Pressure (Storage): 50 kPa to 106.7 kPa	
Resistance to Ingress of Fluids:	
Complies with the requirements of clause 44.3 in IEC 60601-1 and also the requirements in IEC 60529 for non-protective equipment (IPX0)	
Interface Specification	
Communication Port (Sp1): RS-232C compatible serial interface (DB9)	
Network Port (Cs1):	RJ-45 network port
USB Ports (SB1, SB2):	Two USB ports
Data Port (DP1): One test port for connection of calibration equipment by a Mindray-authorized service representative	

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Mindray is listed on the NYSE under the symbol "MR"

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