EDISON S.R.L
Medical Solutions

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1	23	Salida auxiliar de gas fresco. Soporte o extensión para bolsa de reinhalación	SI	Salida Auxiliar de gas fresco, soporte auxiliar de bolsa inluído (bag arm)	36
1	24	Canister del absolvedor de gases entre 1 a 2 litros reusable. Montado por la máquina y extraíble. Montaje que permita la ventilación mecánica y manual (opcional)	SI	Canister de 1,5 litros reusalbe, montado y extraíble de la máquina de anestesia	34
1	25	Ventilador micro procesado a pistón o electrónico, fuelle o bolsa en botella o similar	SI	Ventilador microprocesado por fuelle	37
1	26	Vaporizadores para Isoflurano y Sevoflurano. Con dispositivo de bloqueo que evite la apertura simultánea de más de un vaporizador. Calibrado con escala en el dial entre 0,2 y 8%. Dependiendo del tipo de gas anestésico	SI	Vaporizadores para Iso y Sevoflurano, con bloqueo tipo Selectatec, calibrados de 0,2 a 8%.	31
1	27	Alimentación eléctrica de 220 V. Con batería de emergencia para interrupciones de energía de 120 minutos de autonomía como mínimo tanto para la máquina de anestesia y el monitor de Signos Vitales	SI	Batería incluída de 150 minutos. Alimentación del equipo 220V	35
1	28	Mangueras de aire comprimido, oxígeno y óxido nitroso de 3 metros, compatible con el sistema de conexión del hospital	SI	Mangueras con código de color compatibles con las conexiones del hospital	N/A
1	29	El equipo deberá permitir continuar con la ventilación mecánica del paciente en forma manual, y con suministro de agentes anestésicos, aun ante fallas en el suministro eléctrico y de su batería	SI	Ventilación manual y espontáneo (con el equipo apagado)	36
1	30	Circuito paciente pediátrico y adulto, 25 unidades de cada uno (POR MAQUINA DE ANESTESIA).	SI	CUMPLE	N/A
1	31	Trampa de agua o filtro para analizador de agente anestésico, 24 unidades (si lo requiere)	SI	CUMPLE	N/A
1	32	Línea de Capnografía 100 unidades (POR MAQUINA). Si la tecnología lo requiere.	SI	CUMPLE	N/A
1	33	Monitor multiparametrico: Integrado o ajustado a la máquina de anestesiología. Para uso en pacientes neonatales, pediátricos y adultos. Debiendo permitir visualización de curva ECG hasta 7 derivadas y análisis del segmento ST en dos derivadas, con detección de marcapasos. Respiración por transimpedancia torácica 2 temperaturas mínimo. Presión no invasiva - Presión invasiva - Oxipulsometria Alimentación eléctrica 220V,50 HZ, y batería interna recargable. Monitorización de Anestesia Profunda por medio de ondas de EEG. (Entropía) o módulo Biespectral (BIS) o similar, en el monitor multiparamétrico o integrado a la máquina de anestesia	SI	Monitor multiparamétrico, Integrado o ajustado a la máquina de anestesiología. Para uso en pacientes neonatales, pediátricos y adultos. Permite visualización de curva ECG hasta 7 derivadas y análisis del segmento ST en dos derivadas, con detección de marcapasos. Respiración por transimpedancia torácica 2 temperaturas mínimo. Presión no invasiva - Presión invasiva - Oxipulsometria Alimentación eléctrica 220V,50 HZ, y batería interna recargable. Monitorización de Anestesia Profunda por medio de ondas de EEG. (Entropía) o módulo Biespectral (BIS) o similar, en el monitor multiparamétrico o integrado a la máquina de anestesia	45- 47
1		ACCESORIOS DEL MONITOR:			
1	34	Latiguillos de 3 derivaciones, reusables, dos unidades (repuesto)	SI	CUMPLE	N/A
1	35	Latiguillos de 5 derivaciones, reusables, dos unidades (repuesto)	SI	CUMPLE	N/A

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1	36	Mangueras para presión no invasiva, una unidad	SI	CUMPLE	N/A
1	37	Brazal para presión no invasiva tamaño Adulto Grande, reusable, 2 unidades	SI	CUMPLE	N/A
1	38	Brazal para presión no invasiva tamaño Adulto Mediano, reusable, 2 unidades	SI	CUMPLE	N/A
1	39	Brazal para presión no invasiva tamaño Adulto pequeño, reusable, 2 unidades	SI	CUMPLE	N/A
1	40	Brazal para presión no invasiva tamaño pediátrico, reusable, 2 unidades	SI	CUMPLE	N/A
1	41	Sensor de saturación (dedal) reusable, adulto, 3 unidades Sensor de saturación (dedal).	SI	CUMPLE	N/A
1	42	Para Anestesia Profunda o entropía o módulo BIS: Cable de interfaz, Cantidad: 1 (uno) por cada equipo como mínimo. Sensores descartables, Cantidad: 50 (cincuenta) por cada equipo como mínimo	SI	CUMPLE	N/A

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WATO EX-55 Pro

The enhanced anesthesia workstation

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healthcare within reach

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P/N:ENG-WATO EX-55 Pro-210285ABP-20180628

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Since 2006 Mindray has successfully installed over 10,000 units from the anesthesia range to customers all over the world. International feedback from our installed bases has reached an overwhelming level of customer satisfaction of which Mindray is immensely proud.

For the last decade, Mindray has continued to work closely with clinicians across the globe, to recognize and understand the clinical challenges encountered everyday and overcome them with new innovative and intui-tive solutions. With this in mind Mindray is proud to bring you the enhanced WATO EX-55 Pro.

More Powerful

- Digital gas mixer
- Smarter ventilator technology
- Enhanced monitoring capabilities
- Complete range of ventilation mode

More Integrated

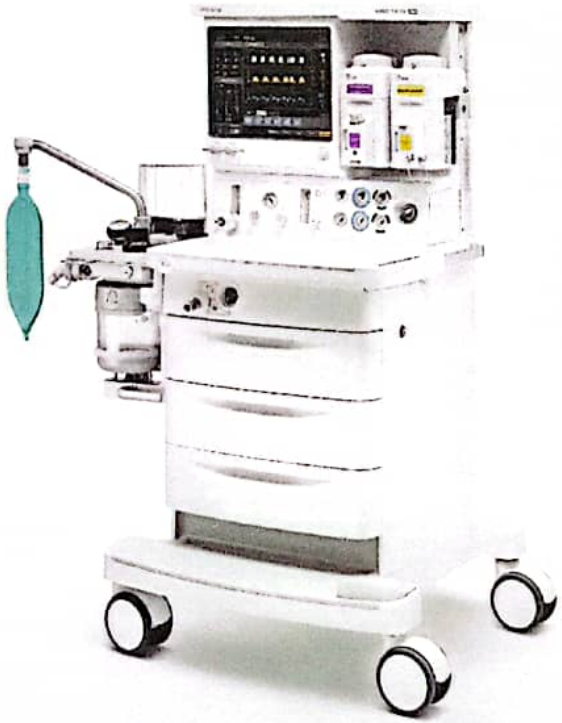
- Space saving design
- Plug-and-Play Multi-Gas module
- Built in optional patient suction system

More Cost Effective

- Optimizer

More User-friendly

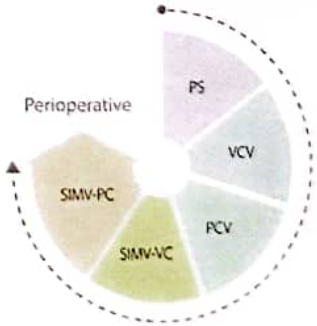
- 15.1 inch full color touch-screen
- Easy-to-use UI
- New flat-menu structure



More Powerful

Smarter Ventilator

The WATO EX-55 Pro offers a smarter ventilator supporting a complete range of control and support ventilation modes to fully meet the needs of all your patients.



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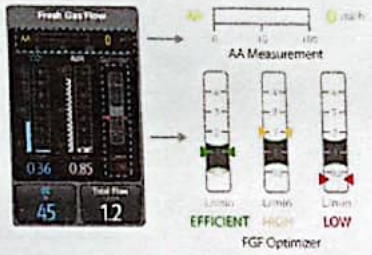
More Powerful

Precise digital gas mixer with safe low flow by Optimizer

The digital gas mixer makes fresh gas flow setting easier and more precise.
The fresh gas flow Optimizer indicates the recommended fresh gas flow setting against your current setting value and the minimum O_2 needed of the patient. It enables a safe low flow and minimize the waste of anesthetic agents and medical gases.



More Integrated

Driven Gas Auto-switch

To ensure the patient is ventilated at all times the WATO EX-55 Pro has a unique driven gas auto-switch function. Should the primary ventilator driven gas be lost the device will automatically switch to Air (or O_2; dependent on device configuration) without interruption to mechanical ventilation.

Integrated, Heated Breathing System

With an integrated, user-controlled, heating system rain-out is reduced to a minimum providing improved flow sensor accuracy and guaranteeing extensive stability of tidal volume delivery.
Both reusable and disposable soda lime canisters are compatible with the breathing circuit.

PnP Multi-Gas Module

With improved single slot CO_2 module or double slot anesthetic agent capability the Mindray Plug-and-Play Multi-Gas modules provide comprehensive breath-by-breath analysis of FiO_2, EtO_2, CO_2, N_2O, auto-detection of five anesthetic agents.

Optional Integrated Suction for Better PeriOP Management

The new built in patient suction system (optional) provides the user with immediate access to a user-controlled suction system that is both neat and convenient.

Compact Design, Smaller Footprint

The WATO EX-55 Pro with a minimal footprint is ideal for the modern, busy and crowded OR suite. A space saving device that doesn't compromise on features or functionality.

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More Cost Effective

Optimizer saves your anesthetic agent

The low flow Optimizer provides real time guidance for cost effective optimization of fresh gas flow, and thus anesthetic agent. During general inhalation anesthesia, the Optimizer continuous informs users whether the fresh gas flow is too high, appropriate or too low.
The availability of Optimizer results in large reduction in anesthetic consumption, it helps cost savings and reduced environmental pollution.

LOW FLOW

Price
dependent on fresh gas flow

Pollution
operation room, environment

Patient
temperature, humidity

Why Low Flow?

Optimizer

Why Optimizer can do it Better?

OR number	50
Inhalation anes per year per OR	750
Minute Volume (L/min)	6
Price of Sevo (per ml)	$0.6

FGF Flow (ml/min)	5.0	3.0	1.0	0.5
Cost per operation	$19.55	$11.63	$3.72	$1.74
Cost per OR per year	$14,660.45	$8,722.50	$2,786.55	$1,302.52
Agent & Gas Cost for anesthesia dept	$732,022.39	$436,175.01	$139,327.63	$65,115.79

How much Optimizer saves you?

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More User-friendly

Intuitive UI Simplifies Your Workflow

Configured with a high resolution, intuitive, 15.1 inch full color touch-screen users are able to view and configure parameters as required. The intuitive layout and simple flat-menu structure ensure all parameters are clearly displayed and only two steps required for ventilation mode setting.

Large Easy-to-clean Worktable

The large, new, seamless and easy-to-clean writing table provides an optimized work surface for writing all your documents and keeping drugs and intubation equipment in a handy location.

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WATO EX-55 Pro

Anesthesia Workstation

Physical Specifications

Dimensions and Weight

Height	1370 mm
Width	780 mm (not including breathing system) 945 mm (including breathing system)
Depth	690 mm
Weight	<145 kg (without vaporizers and cylinders)

Top Shelf

Weight limit	30 kg
Width	305 mm
Length	545 mm

Work Surface

Height	850 mm
Area	1635 cm^2

Drawer (3Xdrawers, Internal Dimension)

Height	130 mm
Width	415 mm
Depth	320 mm

Bag Arm

Height	1150 mm
Length	312 mm
Connection	ISO 22mm OD, 15mm ID

Casters

Diameter	125 mm
Brakes	All four casters with brakes

Ventilator Specifications

Modes of Ventilation

Manual/Spontaneous Ventilation/Bypass
Volume Control Ventilation (VCV) with PLV function
Pressure Control Ventilation (PCV) with/without volume guarantee (VG)
Synchronized Intermittent Mandatory Ventilation
(SIMV-Volume Controlled and SIMV-Pressure Controlled)
Pressure Support Ventilation (PS) with apnea backup

Compensation

Circuit gas leakage compensation and automatic compliance compensation

Ventilation Parameters Range

Patient Size	Adult, Pediatric, Infant
Tidal volume	20~1500 mL ((Volume Mode) (increments of 1 mL) 5~1500 mL (Pressure Mode)
Pinsp	5~70 cmH_2O (increments of 1 cmH_2O)
Plimit	10~100 cmH_2O (increments of 1 cmH_2O)
ΔPsupp	3~60 cmH_2O (increments of 1 cmH_2O)
Rate	4~100 bpm (increments of 1 bpm)
I:E	4:1 - 1:8 (increments of 0.5)
Inspiratory pause (Tip:Ti)	OFF, 5% - 60% (increments of 1%)
Inspiratory time (Tinsp)	0.2 - 10.0 s (increments of 0.1 s)
Trigger window	5% - 90% (increments of 5%)
Flow trigger	0.2 ~ 15 L/min (increments of 0.1L/min)
Pressure trigger	-20~ -1 cmH_2O (increments of 1 cmH_2O)
Expiration termination level	5% - 80% (increments of 1%)
Min Rate	2 - 60 bpm (increments of 1 bpm)
Tslope	0.0 - 2.0 s (increments of 0.1 s)
Apnea I: E	4:1~1:8 (increments of 0.5)
ΔPapnea	3 - 60 cmH_2O (increments of 1 cmH_2O)

Positive End Expiratory Pressure (PEEP)

Type	Integrated, electronic controlled
Range	OFF, 3~30 cmH_2O (increments of 1 cm H_2O)

Ventilator Performance

Driving pressure	280 kPa to 600 kPa
Peak gas flow	120 L/min + Fresh Gas Flow

Monitoring Parameters

Minute volume	0 ~ 100 L/min
Tidal volume	0~3000 ml
Inspired oxygen (FiO_2)	18% ~ 100%
Peak airway pressure	-20 ~ 120 cmH_2O
Mean pressure	-20 ~ 120 cmH_2O
Plateau pressure	-20 ~ 120 cmH_2O
I:E	4:1 ~ 1:10
Rate	0 ~120 bpm
PEEP	0 ~ 70 cmH_2O
Resistance (R)	0 ~ 600 $cmH_2O/(L/s)$
Compliance (C)	0 ~ 300 ml/cmH_2O

Control Accuracy

Volume delivery	20 mL to 60 mL: ±10 mL 60 mL to 210 mL: ±15 mL 210 mL to 1500 mL: ± 7% of the set value
Pinsp	± 2.5 cmH_2O or ± 7% of the set value, whichever is greater
Plimit	± 2.5 cmH_2O or ± 7% of the set value, whichever is greater
ΔPsupp	± 2.5 cmH_2O or ± 7% of the set value, whichever is greater
ΔPapnea	± 2.5 cmH_2O or ± 7% of the set value, whichever is greater
PEEP	OFF: ± 3.0 cmH_2O 3 to 30 cmH_2O: ± 2.0 cmH_2O, or ± 8% of the set value, whichever is greater
Rate	± 1bpm or ± 10% of the set value, whichever is greater
I:E	2:1 to 1:4: ± 10% of the set value Other range: ± 25% of the set value
Tip:Ti	± 8%
Tinsp	± 0.2s
Trigger Window	± 10%

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Flow Trigger	± 1L/min
Pressure Trigger	± 2cmH_2O
Exp%	± 10%

Monitoring Accuracy

Volume monitoring	0 mL to 60 mL: ± 10 mL 60 mL to 210 mL: ± 15 mL 210 mL to 1500 mL: ± 7% of the set value
Pressure monitoring	± 2.0 cmH_2O or ± 4% of the reading, whichever is greater
Rate	± 1bpm or ± 5% of the reading, whichever is greater
I:E	2:1 to 1:4: ± 10% of the reading Other range: ± 25% of the reading
MV	± 0.1L/min or ± 8% of the reading, whichever is greater

Trend Graph

Continuous trend information with time discrete events for the latest 48 hours

Trend Table

Continuous trend information together with time discrete events for the latest 48 hours

Alarm Log Book

500 events storage, first in first out

Alarm setting

Tidal volume	Low: 0 ~ 1595 ml High: 5 ~ 1600 ml
Minute volume	Low: 0 ~ 99 L/min High: 0.2 ~ 100 L/min
Inspired oxygen	Low: 18% ~ 98% High: OFF, 20% ~ 100%
Apnea alarm	VTe < 10ml measured in 20s Paw < (PEEP + 3) cmH_2O in 20s
Airway pressure low	0 ~98 cmH_2O
Airway pressure high	2 ~100 cmH_2O

Sustained airway pressure alarm: 15s

Subatmospheric pressure alarm: Paw < -10 cmH_2O

Alarm silence countdown timer: 120 to 0 seconds

Lung Recruitment Tool

Increasing PEEP progressively (with a maximum of 7 stages)

Ventilator Components

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

Ventilator Screen

Display type	Color active matrix TFT touch screen
Display size	15 in diagonal
Pixel format	1024 x 768
Brightness	Adjustable
Screen display	configurable
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_2O, Aesthesia gas concentration)
Display waveforms	P-T, F-T, V-T, CO_2 ,O_2, Anesthetic gas, N_2O
Spirometry loops	P-V, F-V and F-P
Timer	On screen timer

Communication Ports

One RS-232C connector and one DB9 connector

Ethernet (RJ-45)

USB

VGA

Vaporizers

Vaporizer	Mindray V60 Anesthetic Vaporizer or Penlon Sigma Delta Anesthetic Vaporizer
Support agents	Halothane, Enflurane, Isoflurane, Sevoflurane
Position	MAX.2
Mounting mode	Selectatec®, with interlocking function Plug-in®, with interlocking function

Modules

Anesthesia Gas (AG) Module

Monitor gases	CO_2, N_2O, Halothane, Enflurane, Isoflurane, Sevoflurane, Desflurane, MAC, Paramagnetic O_2 (optional)
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
Accuracy	± 10 mL/min or ± 10% of the set value, whichever is greater
Range	CO_2: 0% ~ 10% Des: 0% ~ 18 % Sev: 0% ~ 8% Enf, Iso, Hal: 0% ~ 5% O_2/N_2O: 0% ~ 100%

Carbon Dioxide (CO_2) Modules

Method	Infrared absorption
Module type	Mindray side-stream Capnostat mainstream Oridion micro-stream (optional)
Work mode	Standby or measurement
Displayed numerics	$EtCO_2$, $FiCO_2$
Waveform	Capnography

Side-Stream Carbon Dioxide (CO_2) Module

Measurement range	0 ~ 99 mmHg
Accuracy	± 2 mmHg (0 ~ 40 mmHg) ± 5% of the reading (41 ~ 76 mmHg) ± 10% of the reading (77 ~ 99 mmHg)
Resolution	1 mmHg
Sampling rate	Neonatal: 100 mL/min and 120 mL/min optional Adult/children: 120 mL/min and 150 mL/min optional
Sampling rate accuracy:	± 15% of the set value or ± 15 mL/min, whichever is greater
Warming-up time	< 1 min, enter the ISO accuracy mode After 1 min, enters the full accuracy mode
Response time	<4.5 s@100 mL/min <4.5 s@120 mL/min Measured by using neonatal watertrap and 2.5 m neonatal sampling line

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	<5.5 s@120 mL/min
	<5 s@150 mL/min
	Measured by using adult watertrap and 2.5 m adult sampling line

Capnostat Mainstream CO_2 Module

Measurement range	0 ~ 150 mmHg
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
Rise time	<60 ms
Response time	<2 s
Alarm limit	$EtCO_2$ High: OFF, 2 ~ 150 mmHg
	$EtCO_2$ Low: OFF, 0 ~ 148 mmHg
	$FiCO_2$ High: OFF, 1~ 150 mmHg

Micro-stream CO_2 Module

Measurement range	0 ~ 99 mmHg
Accuracy	0 ~ 38 mmHg: ± 2 mmHg
	39 ~ 99 mmHg: ± (5 % of the reading + 0.08 % of (the reading minus 38 mmHg))
Sampling rate	50 ml/min
Sampling accuracy	-7.5 ml/min ~ + 15 ml/min
Initialization time	30s
Response time	2.9s
Rising time	< 190 ms
Delay time	2.7s
Alarm range	$EtCO_2$ High: OFF, 2 ~ 99 mmHg
	$EtCO_2$ Low: OFF, 0 ~ 97 mmHg
	$FiCO_2$ High: OFF, 1 ~ 99 mmHg

Agent Consumption Calculation

Calculation range	0 to 3000 ml
Accuracy	± 2 mL, or ± 15% of the reading, whichever is larger

Agent consumption speed

Anesthetic agents	Desflurane, Enflurane, Isoflurane, Sevoflurane and Halothane
Consumption speed	Desflurane: 0 ~ 900 ml/h
	Sevoflurane: 0 ~ 450 ml/h
	Enflurane, Isoflurane and Halothane: 0 ~ 250 ml/h
Accuracy	± 2ml/h or ±15% of the displayed value, whichever is greater

Electrical Specifications

Current Leakage

100 ~ 240V	< 500 µA

Power And Battery Backup

Power input	220-240 Vac, 50/60 Hz, 6A
	100-120 Vac, 50/60 Hz, 7A
	100-240 Vac, 50/60 Hz, 7A
Auxiliary electrical outlets	Up to 4 outlets (3A for each, total 5A)
Battery backup	150 minutes for 2 standard pieces of battery (powered by new fully-charged batteries with 25°C ambient temperature)
Battery type	Build-in Li-ion battery, 11.1 VDC, 4500 mAh
Safety feature	In case of electricity and battery failure, manual ventilation, gas delivery and agent delivery are possible

Pneumatic Specifications

ACGO (Auxiliary Common Gas Outlet, Integrated)

Connector	ISO 22 mm OD and 15 mm ID

Pipeline Supply

Gas type	O_2, N_2O and Air
Pipeline input range	280 to 600 kPa
Pipeline connections	DISS or NIST

Pipeline Supply Pressure Gauges

Display type	Mechanical
Ranges	0 to 1000kPa
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
N_2O Input Range	4.2 to 6 MPa
Air Input Range	6.9 to 20 MPa
Cylinder Connections	Pin-Index Safety System (PISS)
Yoke Configuration	O_2, N_2O, Air

Cylinder Supply Pressure Gauges

Display type	Mechanical
Air Range	0 to 25 MPa
O_2 Range	0 to 25 MPa
N_2O Range	0 to 10 MPa
Accuracy	± (4% of the full scale reading+8% of the actual reading)

O_2 Controls

Method	N_2O shut off with loss of O_2 pressure
Supply failure alarm	≤ 220.6 kPa
O_2 Flush	25 ~ 75 L/min

Auxiliary O_2 Flowmeter

Range	0 ~ 15 L/min
Indicator	Flow tube

Electronic Flow control system (Electronic Mixer)

Direct Flow Control Mode

O_2 flow range	0 to 15 L/min
Air flow range	0 to 15 L/min
N_2O 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_2O) 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

O_2 concentration

Range	21% to 100% (The balance gas is Air) or 26% to 100% (The balance gas is N_2O)
Accuracy	± 5% V/V for flows < 1 L/min or 5% setting for flows ≥ 1 L/min

Environmental Specifications

Operating

Temperature	10 ~ 40°C
Relative humidity	15% ~ 95% (noncondensing)

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Barometric (Kpa)	70 ~ 106 kPa

Storage

Temperature	-20 ~ 60°C for main unit, -20 ~ 50°C for O_2 sensor
Relative humidity	10% ~ 95% (noncondensing)
Barometric	50 ~ 106 kPa

Electromagnetic Compatibility

Immunity	Complies with all requirements of IEC 60601-1-2
Emissions	Complies with all requirements of IEC 60601-1-2

Breathing System Specification

Breathing system volume (Pre-pak)

Automatic ventilation	2850 ml
Manual ventilation	1800 ml

Breathing system volume (Non Pre-pak)

Automatic ventilation	2600 ml
Manual ventilation	1800 ml

System Components

Carbon dioxide absorbent canister

Absorbent capacity: 1500 mL

Integrated expiratory limb water trap

Capacity: 6 mL

Breathing Circuit Parameters

Compliance	≤4 mL/100Pa (bag mode) Automatically compensates for compression losses within the breathing circuit in mechanical mode
Expiration resistance	< 6.0 cm H_2O @60 L/min
Inspiration resistance	< 6.0 cm H_2O @60 L/min

System Pressure Gauge

Range	-20 ~ 100 cmH_2O
Accuracy	± (2% of the full scale reading + 4% of the actual reading)

Ports and 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

Integrated Adjustable Pressure Limiting (APL) Valve

Range	SP, 5 ~ 75 cmH_2O

Tactile knob indication at above 30 cmH_2O

Accuracy	± 3 cmH_2O or ± 15% of the setting value, which is greater, but is not more than + 10 cmH_2O

Anesthetic Gas Scavenging System (AGSS)

Size (H x W x D)	430 x 132 x 114 mm
Type of disposal system	
	Active: High-flow or Low-flow Passive
Applicable standard	ISO 80601-2-13
Pump rate	75 ~ 105 L/min (High-flow) 25 ~ 50 L/min (Low-flow)

Pressure relief device: Pressure compensation opening to the air

State indication of the disposal system: The float falls below the "MIN" mark on the sight glass when the disposal system does not work or the pump rate is lower than 25 L/min (Low-flow) or 75 L/min (high-flow).

Connector of the disposal system: ISO 9170-2

Materials

All materials in contact with exhaled patient gases are autoclavable, except flow sensors (being not capable of being autoclaved), O_2 sensor, and mechanical pressure gauge.

All materials in contact with patient gas are latex free.

Suction Device

Venturi Suction Regulator

Gas source	Air, from system gas source
Minimum flow	20 L/min
Maximum vacuum	≥72 kPa at supply gas pressure of 280 kPa; ≥73 kPa at supply gas pressure of 600 kPa

Continuous Suction Regulator

Supply	Negative Pressure Suction
Maximum vacuum	517.5 mmHg to 540 mmHg (69 kPa to 72 kPa) with external vacuum applied of 540 mmHg and 40 L/min free flow
Maximum flow	39 L/min to 40 L/min with external vacuum applied of 540mmHg and 40 L/min free flow
Minimum flow	20 L/min

Please contact your local Mindray sales representative for the most current information.

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Medical Solutions
RUC: 80093090-8

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P/N: ENG-WATO EX-55 Pro datasheet-210285X4P-20180122

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4 Funcionamiento y ajuste del modo de ventilación

⚠ADVERTENCIA

- **Antes de usar el sistema de anestesia con un paciente, asegúrese de que el sistema está conectado correctamente y en buen estado, y de que se han realizado todas las pruebas que se describen en 6 Pruebas preoperatorias En caso de error en alguna prueba, no use el sistema. Solicite que un representante de servicio autorizado repare el sistema.**

4.1 Encienda el sistema

Al encender el sistema se realiza una autocomprobación para asegurarse de que el sistema de alarma (LED de alarma, altavoz y alarma sonora) y el hardware (placa del caudalímetro, placa del ventilador, placa del ventilador auxiliar, placa de alimentación y placa de la CPU) funcionan correctamente.

Para llevar a cabo una autocomprobación del sistema:

1. Enchufe el cable de alimentación a la fuente de alimentación de CA. Asegúrese de que se enciende el LED de alimentación de CA.
2. Ponga el interruptor del sistema en la posición ⊙.
3. El sistema se enciende y comienza la autocomprobación del sistema. La secuencia de la autocomprobación del sistema es la siguiente:

Elementos de la autocomprobación del sistema	Descripción	Comentarios
1. Autocomprobación de encendido	Al encender el sistema de anestesia se realiza una autocomprobación para asegurarse de que el sistema de alarma (LED de alarma, altavoz y alarma sonora) y el hardware (placa del caudalímetro, placa del ventilador, placa del ventilador auxiliar, placa de alimentación y placa de la CPU) funcionan correctamente.	La autocomprobación de encendido no se puede omitir después de encender el sistema. Cuando el indicador del elemento de autocomprobación actual se ilumina en rojo o amarillo, el sistema no puede pasar a otros

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NOTA

- **Si cuesta trabajo introducir o extraer el sistema de respiración del adaptador del circuito, debe aplicar un poco de lubricante (M6F-020003---: "lubricante con flúor de alto rendimiento de Dupont Krytox") a la junta hermética del conector neumático para reducir la fricción.**

14.3 Limpieza, desinfección y reinstalación del sistema de respiración

Las piezas marcadas con **134°C** se pueden desinfectar en autoclave. Las piezas metálicas y de cristal se pueden desinfectar con vapor en autoclave. La temperatura máxima recomendada es 134 °C. El uso de una autoclave para solidificar proteínas bacterianas constituye un método de esterilización rápido y fiable.
Estas piezas se pueden limpiar a mano. Enjuague y seque todas las piezas del sistema de respiración (excepto el sensor de O_2) con un detergente suave (con un pH de 7 a 10,5).
El sensor de flujo es de plástico. Para obtener información detallada sobre el procedimiento de limpieza, consulte *14.3.4 Sensor de* flujo.

⚠ADVERTENCIA

- **No use talco, estearato de zinc, carbonato cálcico, almidón de maíz o materiales equivalentes a fin de evitar adherencias. Estos materiales podrían llegar a los pulmones y vías respiratorias del paciente y causarle irritación o lesiones.**
- **No sumerja el sistema de respiración o el sensor de O_2 en líquido ni los desinfecte con una autoclave.**
- **Inspeccione las piezas para ver si están deterioradas. Cámbielas si es preciso.**

NOTA

El sistema de anestesia debe cumplir los requisitos de la norma ISO 17664.

Todas las piezas del sistema de respiración se pueden limpiar y desinfectar. Los métodos de limpieza y desinfección varían para las diferentes piezas.
Debe seleccionar el método apropiado para limpiar y desinfectar las piezas en función de las situaciones reales para evitar contaminación cruzada.
En la siguiente tabla se indican los productos de limpieza o desinfección y el procedimiento de esterilización en autoclave que se pueden usar para el sistema de anestesia.

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Valuable and Accessible IT Solutions

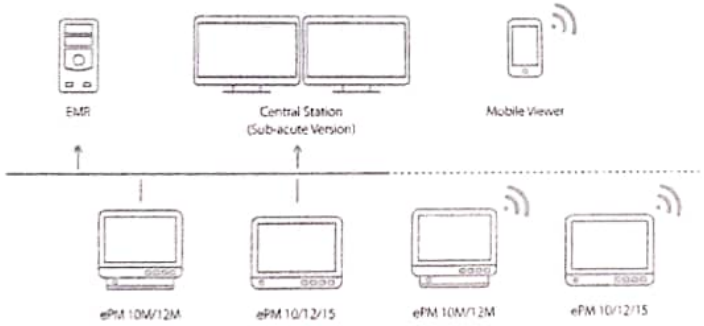
Mindray ePM devices can connect to the Central Monitoring Station (CMS) and eGateway through both wired and wireless networks, as well as interfacing with third-party electronic medical records (EMR) via HL7 output directly.

The ePM helps enhance clinical work flow and efficiency with it's flexible yet reliable connectivity capabilities.

- The View Other Patient function allows caregivers to see, in real-time, up to 12 other beds on a single ePM screen. This seamless information exchange between bedside monitors can help caregivers view all their patients at once, without the need for CMS.
- With the ePM Caregroups function caregivers can quickly find and review their assigned patients or ward when connected to the CMS.

Data from ePM devices can be easily connected to the CMS and Mobile Viewer, giving clinicians access to their patient data anytime and anywhere in the hospital.

- The CMS Early Warning Scores (EWS) dashboard provides an intuitive display of patient status, with dynamic updates pushed to the Mobile Viewer, alerting caregivers to changes in patient conditions and potential risk of deterioration.



www.mindray.com

P/N:ENG-ePM 10M/12M-210283,REP-20190329

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healthcare within reach

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ePM 10M/12M

Modular Patient Monitor

The evolution of simplicity

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Inspired by the needs of customers, Mindary patient monitors adopt advanced technologies and transform them into accessible innovation. The ePM delivers excellent visual experience, intelligent operation, accurate physiological measurements, smooth workflow and comprehensive connectivity options for demanding hospital settings, such as Emergency Rooms, Recovery Units, Sub-acute Units and General Wards.

Minimalist Design

Multi-touch capacitive screen
Supports gestures operations

Wide viewing angle
Makes display more visible

1280x800 pixel (10.1"/12.1")
Provides HD visual experience

Auto brightness
Reduces light interference at night

Fanless design
Reduces the [illegible] contamination

Durable and robust casing
Validated for cleaning with 49 leading disinfectants

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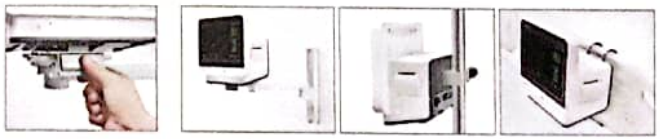
Expand Parameters to Meet Your Clinical Needs

- Expanding extension rack supports plug-and-play parameter modules, which are also compatible with Mindray BeneVision N series monitors
- Ergonomic, concealed handle without cleaning blind spot

Flexible Mounting Solutions

- A wide range of mounting solutions designed for various clinical settings
- The release mechanism allows for quick removal from the wall mount or rolling stand for transport



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Accurate, Reliable Parameters

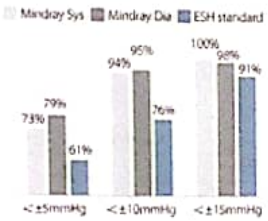
Comprehensive Monitoring

Integrated Platinum™ MPM parameters:
3/5/12-lead ECG, respiration, SpO_2, temperature and NIBP.

- Multi-lead ECG algorithm with ST & QT analysis
- Low perfusion SpO_2 algorithm
- Fast, accurate and motion tolerant NIBP algorithm, validated by British Hypertension Society (BHS)

Wide measurement range and anti-interference performance ensures excellent parameter accuracy and reliability.

ePM also provides advanced parameter options:
4-ch invasive blood pressure, $EtCO_2$ and cardiac output, multi-gas and BIS, making it suitable for a wide range of clinical settings.



Validated NIBP Technology
BHS evaluation results of NIBP accuracy

Reduce False Alarms with CrozFusion™

Innovative multi-parameter alarm analysis can reduce false arrhythmia alarms and promote the accuracy of heart rate and pulse rate, and help to alleviate alarm fatigue.

*The results are based on an evaluation by Mindray multi-parameter fusion database

Extensive Data Storage at the Bedside

2400 hrs	48 hrs	3000 sets	2000 sets	400 sets
Trends @ 10 minutes	Full disclosure waveforms for all parameters	NIBP measurement	Events	OxyCRG events

* These are the Maximum storage capacity of ePM devices with 16G storage

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Simplicity at Your Fingertips

Intelligent Operation Experience

- Operate with gestures, just like a tablet PC
- Access to the most common functions in 2 steps or fewer
- Quickly identify disconnected sensors with the innovative AlarmSight technology
- Screen lock for easy cleaning

Smooth Workflow

Based on clinical insight, the ePM has optimized workflows to support caregivers at the bedside, swiping the touchscreen to switch between commonly used functions and interfaces, enabling clinical tasks to be completed quickly and accurately.

View from a distance
Intuitive big numerics

View at bedside
Highlights abnormal readings

Ward rounds or nurses hand over
Quickly review the patient status changes

Review and analyze
24hrs waveform review and critical alarms

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Early Warning Scoring (EWS)

Mindray ePM monitors provide a point-of-care EWS calculator to help clinicians track and document signs of patient deterioration, aiding faster and more informed patient care decisions.

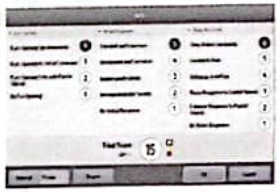
- Compliant with the National Early Warning Score (NEWS), National Early Warning Score 2 (NEWS2) and Modified Early Warning Score (MEWS) protocols
- Alternatively, create custom protocols to suit your hospital requirements
- Intuitive layout and trends review helps caregivers visualize data quicker
- Automate EWS calculations quickly at the bedside
- Display score escalation instructions on-screen to remind caregivers make rapid care decisions
- Integration to the Electronic Medical Record (EMR) for fast, accurate electronic vitals and early warning scoring documentation

The Early Warning Score tool, as displayed on ePM devices

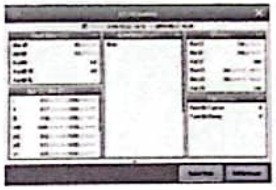
Clinical Assistive Applications (CAA)

The ePM provides efficient Clinical Assistive Applications (CAA) to help support safe and efficient decision making in mid-acuity and general ward areas.

ST Graphic ™



Glasgow Coma Scale



24 hours ECG summary

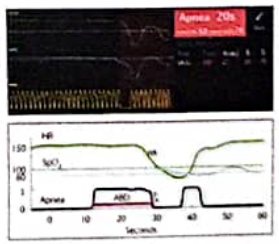
Supporting Safety in Neonates

SpO_2 Screen

- Intuitive SpO_2 target management dashboard helps to reduce risk of excessive oxygenation
- 24 hours of SpO_2 statistics helps caregivers to evaluate the treatment effects

OxyCRG

- Effectively identify apnea of prematurity as ABD event
- Detailed and complete records of events help caregivers quickly identify the cause



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ePM 10M/12M

Patient Monitor

Data Sheet

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Physical Specifications

Weight	ePM 10M: 4.0 Kg ePM 12M: 4.8 Kg (Standard configuration, excluding modules, recorder, battery and accessories.)
Size	ePM 10M: 269 x252 x159mm ePM 12M: 310 x289 x169mm
Display screen	Capacitive screen, support multi-touch operation. ePM 10M: 10.1-inch, 1280 x 800 pixels ePM 12M: 12.1-inch, 1280 x 800 pixels
Display channel	ePM 10M: Up to 8 waveform channels ePM 12M: Up to 10 waveform channels

ECG

Meet standards of IEC 60601-2-27 and IEC 60601-2-25.

Lead set	3-lead: I, II, III 5-lead: I, II, III, aVR, aVL, aVF, V ** 6-lead: I, II, III, aVR, aVL, aVF, Va, Vb 12-lead: I, II, III, aVR, aVL, aVF, V1 to V6 Automatic 3/5/6/12 - lead recognition.
Input signal range	± 10 mV (p-p)
Electrode offset potential tolerance	± 800 mV
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Gain	x 0.125, x 0.25, x 0.5, x 1, x 2, x 4, auto
Waveform format	Standard, Cabrera
Bandwidth	Diagnostic mode: 0.05 to 150 Hz Monitor mode: 0.5 to 40 Hz Surgical mode: 1 to 20 Hz ST mode: 0.05 to 40 Hz
CMRR	Diagnostic mode: > 90 dB Monitor, Surgical, ST mode: > 105 dB
Pace Detection	Amplitude: ± 2 mV to ± 700 mV Width: 0.1 to 2 ms Rise time: 10 to 100 µs
Defib. protection	Withstand 5000V (360J) defibrillation
Recovery time	<5 s

Provides glasgow resting 12-lead ECG algorithm.

Heart Rate

HR rang	Adult: 15 to 300 bpm Pediatric/Neonate: 15 to 350 bpm
HR accuracy	± 1 bpm or ± 1%, whichever is greater.
HR resolution	1 bpm

Arrhythmia Analysis

Intended use for adult, pediatric and neonate.

Multi-lead, 25 classifications. Asystole, VFib/VTac, Vtac, Vent. Brady, Extreme Tachy, Extreme Brady, Vrhythm, PVCs/min, Pauses/min, Couplet, Bigeminy, Trigeminy, R on T, Run PVCs, PVC, Tachy, Brady, Missed Beats, PNP, PNC, Multif. PVC, Nonsus. Vtac, Pause, Irr. Rhythm., Afib (for adult only).

ST Segment Analysis

Intended use for adult, pediatric and neonate.

ST range	- 2.5 to + 2.5 mV
ST accuracy	± 0.02 mV or ± 10%, whichever is greater (- 0.8 to + 0.8 mV)
ST resolution	0.01 mV

QT Analysis

Intended use for adult, pediatric, and neonate.

Parameters	QT, QTc, ΔQTc
QTc formula	Bazett, Fridericia, Framingham, or Hodges
QT/QTc range	200 to 800 ms
QT accuracy	± 30 ms
QT resolution	4 ms
QTc resolution	1 ms
QT-HR range	Adult: 15 to 150 bpm Pediatric/Neonate: 15 to 180 bpm

Respiration

Lead	I or II, auto
RR range	0 to 200 rpm
RR accuracy	± 1 rpm (0 to 120 rpm) ± 2 rpm (121 to 200 rpm)
RR resolution	1 rpm
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

SpO_2

Meet standards of ISO 80601-2-61.

SpO_2 module	Mindray SpO_2, Nellcor SpO_2
SpO_2 range	0 to 100 %
SpO_2 accuracy	Adult/Pediatric: ± 2 % (70 to 100%) Neonate: ± 3 % (70 to 100%)
Perfusion indicator (PI)	Yes, for Mindray SpO_2
Pitch tone	Yes
Dual-SpO_2	Yes, SpO_2, SpO_2b, ΔSpO_2
Refreshing rate	≤ 1 s

PR

PR range	20 to 300 bpm (from SpO_2) 20 to 350 bpm (from IBP) 30 to 300 bpm (from NIBP)
PR accuracy	± 3 bpm (20 to 300 bpm, from Mindray SpO_2) ± 3 bpm (20 to 300 bpm, from Nellcor SpO_2) ±1 bpm or ±1 %, whichever is greater (from IBP) ± 3 bpm or ±3 %, whichever is greater (from NIBP)
Refreshing rate	≤ 1 s

Temperature

Meet standard of ISO 80601-2-56.

Technique	Thermal resistance
Channels	2 channels
Temp range	0 to 50 °C (32 to 122 °F)
Temp accuracy	± 0.1 °C or ± 0.2 °F (without probe)
Temp resolution	0.1 °C
Refreshing rate	≤ 1 s

NIBP

Meet standards of ISO 80601-2-30.

Technique	Oscillometry
Operation mode	Manual, Auto, STAT, Sequence
Parameters	Systolic, diastolic, mean
Max measurement time	Adult/Pediatric: 180 s, Neonate: 90 s
Systolic range	Adult: 25 to 290 mmHg Pediatric: 25 to 240 mmHg Neonate: 25 to 140 mmHg
Diastolic range	Adult: 10 to 250 mmHg Pediatric: 10 to 200 mmHg Neonate: 10 to 115 mmHg
Mean range	Adult: 15 to 260 mmHg Pediatric: 15 to 215 mmHg Neonate: 15 to 125 mmHg
NIBP accuracy	Max mean error: ± 5 mmHg Max standard deviation: 8 mmHg
NIBP resolution	1 mmHg
Assisting venous puncture	Yes

IBP

Meet standard of IEC 60601-2-34.

Channels	Up to 4 channels
Sensitivity	5 µV/V/mmHg
Impedance range	300 to 3000 Ω
IBP range	-50 to 360 mmHg
IBP accuracy	±1 mmHg or ±2 %, whichever is greater
IBP resolution	1 mmHg
PPV range	0 to 50 %

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PAWP	Yes.
ICP measurement	Support

Support waveforms overlapping.

C.O.

Technique	Thermodilution
C.O. range	0.1 to 20 L/min
C.O. accuracy	±0.1 L/min or ±5%, whichever is greater
C.O. resolution	0.1 L/min
TB range	23 to 43 °C
TI range	0 to 27 °C
TB, TI accuracy	± 0.1 °C (without sensor)
TB, TI resolution	0.1 °C

Artema Sidestream CO_2

Meet standard of ISO 80601-2-55.

**Options: Paramagnetic O_2 sensor.

CO_2 sample flow rate	120 ml/min (DRYLINE II ™ watertrap for adult/pediatric) 90/70 ml/min (DRYLINE II ™ watertrap for neonate)
CO_2 sample flow rate accuracy	±15 ml/min or ±15 %, whichever is greater.
CO_2 Response time	≤ 5.0 s @ 120ml/min (for adult/pediatric) ≤4.5 s @ 90 ml/min (for neonate) ≤ 5.0 s @ 70 ml/min (for neonate)
O_2 Response time	≤ 5.0 s @ 120 ml/min ≤ 4.5 s @ 90ml/min
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO_2 range	0 to 150mmHg
CO_2 accuracy	Full accuracy mode: 0 - 40 mmHg: ± 2 mmHg 41 - 76 mmHg: ± 5% of reading 77 - 150 mmHg: ± 10% of reading ISO accuracy mode: Add ± 2 mmHg to the full accuracy mode
CO_2 resolution	1 mmHg
O_2 range	0 to 100 %
O_2 accuracy	±1 % (0 to 25 %) ±2 % (25.1 to 80 %) ±3 % (80.1 to 100 %)
O_2 resolution	0.1 %
awRR range	0 to 150 rpm
awRR accuracy	± 1 rpm (0 to 60 rpm) ± 2 rpm (61 to 150 rpm)
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Oridion Microstream CO_2

Meet standard of ISO 80601-2-55.

Sample flow rate	$50^{-7.5}_{+15}$ ml/min
Initialization time	30 s (typical)
Response time	2.9 s (typical)
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO_2 range	0 to 150 mmHg
CO_2 accuracy	±2 mmHg (0 to 38 mmHg) ±5 % of the reading (0.08 % increased in error for every 1 mmHg if the reading is more than 38mmHg) (39 to 99 mmHg)
awRR range	0 to 150 rpm
awRR accuracy	±1 rpm (0 to 70 rpm) ±2 rpm (71 to 120 rpm) ±3 rpm (121 to 150 rpm)
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Capnostat Mainstream CO_2

Meet standard of ISO 80601-2-55.

Rise time	< 60 ms
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO_2 range	0 to 150 mmHg
CO_2 accuracy	±2 mmHg (0 to 40 mmHg) ±5 % of the reading (41 to 70 mmHg) ±8 % of the reading (71 to 100 mmHg) ±10 % of the reading (101 to 150 mmHg)
awRR range	0 to 150 rpm
awRR accuracy	±1 rpm

Multi-gas

Meet standard of ISO 80601-2-55.

Technique	Infrared absorption, paramagnetic properties for O_2 monitoring
Gas	CO_2, O_2, N_2O, Des, Iso, Enf, Hal, Sev
Warm-up time	ISO accuracy mode: 45 s Full accuracy mode: 10 min

Sample flow rate (with DRYLINE II ™ watertrap)

Adult/pediatric watertrap: 200 ml/min

Neonate watertrap: 120 ml/min

Sample flow rate accuracy ±10 ml/min or ±10%, whichever is greater.

Delay time	< 4 s
Response time	DRYLINE II ™ watertrap for adult/pediatric, 200 ml/min: CO_2: ≤ 4.2 s N_2O: ≤ 4.3 s Enf/Iso/Hal/Sev/Des: ≤ 4.5 s O_2: ≤ 4 s DRYLINE II ™ watertrap for neonate, 120 ml/min: CO_2: ≤ 4 s N_2O: ≤ 4.2 s O_2: ≤ 4 s Enf/Iso/Hal/Sev/Des: ≤ 4.4 s
CO_2 range	0 to 30 %
CO_2 accuracy	±0.1%ABS (0 to 1%) ±0.2%ABS (1 to 5%) ±0.3%ABS (5 to 7%) ±0.5%ABS (7 to 10%)
O_2 range	0 to 100 %
O_2 accuracy	±1%ABS (0 to 25%REL) ±2%ABS (25 to 80%REL) ±3%ABS (80 to 100%REL)
N_2O range	0 to 100 %
N_2O accuracy	±2%ABS (0 to 20%REL) ±3%ABS (20 to 100%REL)
Enf/Iso/Hal/Sev/Des range	0 to 30 %
awRR range	2 to 100 rpm
awRR accuracy	±1 rpm (2 to 60 rpm)
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Provide MAC value (support calibrated by age).

Support two mixed gas identify and monitoring.

BISx/BISx4

Meet standard of IEC 60601-2-26.

Technique	Bispectral Index
Impedance range	>5 MΩ
EEG bandwidth	0.25 to 100 Hz
BIS range	0 to 100 (BIS, BIS L, BIS R)
SQI range	0 to 100 % (SQI, SQI L, SQI R)
ASYM	0 to 100%
DSA trend	Yes

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Data Review

For 2G storage

Trends data	Up to 120 hours @ 1min
Events	Up to 1000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
NIBP	Up to 1000 sets
Full disclosure	48 hours at Maximum. The specific storage time depends on the waveforms stored and

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	the number of stored waveforms.
For 16G storage	
Trends data	Up to 240 hours @ 1min, 2400 hours @ 10 min
Events	Up to 2000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
NIBP	Up to 3000 sets
Full disclosure	48 hours for all parameter waveforms.
For 2G & 16G storage	
Interpretation of resting	20 sets of 12-lead ECG results
OxyCRG	400 OxyCRG events
ST review	Up to 120 hours @ 1 min
Minitrend	Yes

Alarms

Audible indicator	Yes, 3 different alarm tones, and prompt tone
Visible indicator	Red/yellow/cyan LED, and alarm message display

Provide AlarmSight infographic alarm indicator.

Special Functions

Clinical Assistive Application (CAA): ST Graphic ™, EWS, GCS, 24h ECG summary, NIBP analysis.

Calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.

Wi-Fi Communications

Protocol	IEEE 802.11a/b/g/n
Modulation mode	DSSS and OFDM
Operating frequency	IEEE 802.11b/g/n (2.4G): ETSI/FCC/KC: 2.4 to 2.483 GHz MIC: 2.4 to 2.495 GHz IEEE 802.11a/n (5G): ETSI: 5.15 to 5.35 GHz, 5.47 to 5.725 GHz FCC: 5.15 to 5.35 GHz, 5.725 to 5.82 GHz MIC: 5.15 to 5.35 GHz KC: 5.15 to 5.35 GHz, 5.47 to 5.725 GHz, 5.725 to 5.82 GHz
Channel spacing	5 MHz @ 2.4 GHz, 20 MHz @ 5 GHz
Wireless baud rate	IEEE 802.11a: 6 to 54 Mbps IEEE 802.11b: 1 to 11 Mbps IEEE 802.11g: 6 to 54 Mbps IEEE 802.11n: 6.5 to 72.2 Mbps
Output power	< 20dBm (CE requirement: detection mode- RMS) < 30dBm (FCC requirement: detection mode- peak power)
Operating mode	Infrastructure
Data security	WPA-PSK, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise (EAP-FAST. EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, PEAP-TLS, LEAP) Encryption: TKIP and AES

Interfacing

Main unit	AC power connector (1) VGA port (1) Network connector (1), RJ45 USB 2.0 connector (2) Analog output/nurse call/defib. Sync. Port (1) Integrated module rack (1), for 2 slots
Barcode scanner	Support 1D and 2D barcode
Remote control	Support
Thermal recorder	3 traces (paper 50 mm width, 20 m length)
Network printer	Support

Power

Line voltage	100 to 240 VAC (±10 %)
Maximum current	2.0A
Frequency	50/60 Hz (±3 Hz)
Battery	Rechargeable lithium-ion battery, 2600mAh/4500mAh Rechargeable smart lithium-ion battery 5600mAh ePM 10M/12M:>2 hours run time (2600mAh) ePM 10M/12M:>4 hours run time (4500mAh) ePM 10M:>6 hours run time (5600mAh x1) ePM 12M:>4.5 hours run time (5600mAh x1) ePM 12M:>9 hours run time (5600mAh x2)
Recharge time (power off)	2.5 hours to 90%(2600mAh) 5 hours to 90% (4500mAh) 5 hours to 90% (5600mAh x1) 10 hours to 90% (5600mAh x2)

Environmental requirements

Temperature	Operating: 0 to 40 °C (without AG), 10 to 40 °C (with AG) Storage: -20 to 60 °C
Humidity	Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
Barometric	Operating: 427.5 to 805.5 mmHg (57.0 to 107.4 kPa) Storage: 120 to 805.5 mmHg (16.0 to 107.4 kPa)

Some of functions marked with an asterisk may not be available. Please contact your local Mindray sales representative for the most current information.

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P/N: ENG-ePM 10M/12M Datasheet-210285x4P-20190228

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[redacted]	[redacted]
Diariamente	Limpie las superficies externas.
Cada 72 horas	Realice la calibración al 21 % de O_2 (sensor de O_2 del sistema de respiración). El sistema solicitará al usuario que realice la calibración al 21% de O_2.
Cada dos semanas	Drene los vaporizadores.
Mensualmente	Calibración al 100 % de O_2 (sensor de O_2 del sistema de respiración).
	Limpie el agua acumulada en los colectores de agua del módulo de CO_2 y del módulo de GA.
Anualmente	Debe realizarse el mantenimiento periódico por parte de un técnico especializado. Calibre el medidor de gas. Póngase en contacto con la asistencia técnica de Mindray para obtener más información.
Cada tres años	Debe realizarse el mantenimiento periódico por parte de un técnico especializado. Póngase en contacto con la asistencia técnica de Mindray para obtener más información.
Según sea necesario	Realice la calibración al 100% de O_2 tras sustituir el sensor de O_2.
	Sustituya el sensor de O_2 si no se puede calibrar.
	Antes de instalar una bombona, coloque una nueva junta de bombona en el racor de conexión.
	Vacíe el colector de agua si hay agua acumulada.
	Sustituya la cal sodada del recipiente si detecta un cambio de color. Siga las instrucciones del fabricante.
	Sustituya el sensor de O_2 si, después de varias calibraciones, persiste una desviación importante en el valor medido por el sensor de O_2.
	Cambie el sensor de flujo si la junta del sensor está dañada, si la membrana interior del sensor está rajada o deformada, o si el sensor de flujo está rajado o deformado.
	Calibre el sensor de flujo tras volver a instalar el sensor de flujo limpio o desinfectado, tras sustituirlo por un sensor nuevo o cuando la medición del volumen corriente no es precisa.
	Sustituya el tubo de transferencia AGSS si está dañado.
	Sustituya la válvula APL si el alivio de presión de la válvula APL se desvía de forma notable.

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