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Headquartered in Shenzhen, China, and listed on the New York Stock Exchange, Mindray possesses a sound distribution and service network with subsidiaries in 18 countries in North and Latin America, Europe, Africa and Asia-Pacific. While improving the quality of care, we help in reducing its cost, making it more accessible to a larger part of humanity.

Since its foundation in 1991, Mindray's development has been driven by innovation. Mindray has built up a global R&D network with research centers in Seattle, New Jersey, Miami, Stockholm, Shenzhen, Beijing, Nanjing, Chengdu, Xi'an and Shanghai.

Today, Mindray's products and services can be found in healthcare facilities in over 190 countries and regions. Inspired by the needs of our customers, we adopt advanced technologies and transform them into accessible innovation, bringing healthcare within reach.

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P/N: ENG-new WATO EX-65-420285X8P-20160112



# WATO EX-65 <sup>NEW</sup>

## Anesthesia Workstation



### Technical Specifications

#### Physical Specification

##### Dimensions And Weight

Height:	1370 mm
Width:	770 mm
Depth:	660 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 <sup>2</sup>

##### DIN Rail

Side of machine:	370 mm
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##### Drawer (3Xdrawers, Internal Dimension)

Height:	130 mm
Width:	415 mm
Depth:	320 mm

##### Bag Arm

Height:	980 mm
Length:	320 mm
Connection:	ISO 22mm OD, 15mm ID

##### Casters

Diameter:	125 mm
Brakes:	Centre brake system with Lock / Unlock icons

#### Ventilator Specifications

##### Modes Of Ventilation

Manual/Spontaneous Ventilation
Volume Control Ventilation (VCV) with tidal volume compensation
Pressure Control Ventilation (PCV)
Pressure Control Ventilation with volume guarantee (PCV-VG)
Synchronized Intermittent Mandatory Ventilation (SIMV-Volume And SIMV-Pressure)
Pressure Support Ventilation (PSV) with apnea backup
Synchronized Intermittent Mandatory Ventilation Volume Guarantee (SIMV-VG)
Continuous Positive Airway Pressure (CPAP/PS)

##### Ventilation Parameters Ranges

Tidal volume range:	20 ~ 1500 ml (VCV And SIMV-VC)
Incremental setting:	20 ~ 100 ml (increments of 5 ml)
	100 ~ 300 ml (increments of 10 ml)
	300 ~ 1500 ml (increments of 25 ml)

Pressure (P <sub>insp</sub> ) range:	5 ~ 70 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O) (PCV)
Pressure (P <sub>limit</sub> ) range:	10 ~100 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
Pressure (ΔP <sub>supp</sub> ) range:	3 ~ 60 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
Rate range:	4 ~ 100 bpm (increments of 1 bpm)
I:E range:	4:1 ~ 1:8 (increments of 0.5)
Inspiratory pause (Tip:Ti) :	Off, 5 - 60% (increments of 5%)
Inspiratory time (T <sub>insp</sub> ) range:	0.2 ~ 5s (increments of 0.1s)
Trigger window range:	5 ~ 90% (increments of 5%)
Flow trigger:	0.5 ~ 15 L/min (increments of 0.5 L/min)
Pressure trigger:	-20 ~ -1 cmH <sub>2</sub> O (increments of -1 cmH <sub>2</sub> O)
Expiration termination level:	5 ~ 60% (increments of 5%)
Min. frequency for apnea-ventilation (Min Rate in PSV):	2 - 30 bpm (increments of 1bpm)
<b>Positive End Expiratory Pressure (PEEP)</b>	
Type:	Integrated, electronic controlled
Range:	Off, 3 to 30 cmH <sub>2</sub> O (increments of 1 cmH <sub>2</sub> O)
<b>Ventilator Performance</b>	
Driving pressure:	280 kPa to 600 kPa
Peak gas flow:	120 L/min
<b>Monitoring Parameters</b>	
Minute volume range:	0 ~ 100 L/min
Tidal volume range:	0 ~ 2500 ml/min
Inspired oxygen (FiO <sub>2</sub> ):	16% ~ 100%
Peak airway pressure:	-20 ~ 120 cmH <sub>2</sub> O
Mean pressure :	-20 ~ 120 cmH <sub>2</sub> O
Plateau pressure:	-20 ~ 120 cmH <sub>2</sub> O
I:E	4:1 ~ 1:10
Rate:	0 ~ 120 bpm
Positive-End-Expiratory-Pressure (PEEP):	0 ~ 70 cmH <sub>2</sub> O
Resistance (R):	0 ~ 600 cmH <sub>2</sub> O/(L/s)
Compliance (C):	0 ~ 300 ml/cmH <sub>2</sub> O
<b>Trend Graph</b>	
Continuous trend information with time discrete events for the latest 24 hours	
TVe, MV, P <sub>peak</sub> , P <sub>plat</sub> , PEEP, P <sub>mean</sub> , Rate, FiO <sub>2</sub> , EtCO <sub>2</sub> and BIS	
Resolution:	5s, 30s, 1min, 2min, 4min adjustable
Refresh every time after the machine is restarted	
<b>Trend Table</b>	
Continuous trend information together with time discrete events for the latest 24 hours for TVe, P <sub>peak</sub> , MV, P <sub>plat</sub> , PEEP, P <sub>mean</sub> , Rate FiO <sub>2</sub> , EtCO <sub>2</sub> , BIS	
Resolution:	30s, 1min, 5min, 30min adjustable
Refresh every time after the machine is restarted	
<b>Alarm Log Book</b>	
100 events storage, first in first out	
<b>Ventilator Accuracy</b>	
<b>Control/Monitor Accuracy</b>	
Volume delivery:	< 75 ml, ± 15 ml
	≥ 75 ml, ± 20 ml or ± 10%
P <sub>insp</sub> :	± 3 cmH <sub>2</sub> O or ± 8%
P <sub>limit</sub> :	± 3.0 cmH <sub>2</sub> O or ± 8%
PEEP delivery:	3 cmH <sub>2</sub> O ~ 30 cmH <sub>2</sub> O: ± 2.0 cmH <sub>2</sub> O or ± 10% of the displayed value, whichever is greater
Volume monitoring:	< 75 ml, ± 15 ml
	≥ 75 ml: ± 20 ml or ± 10%

Pressure monitoring:	± 2 cmH <sub>2</sub> O
<b>Alarm</b>	
Tidal volume :	Low: 0 ~ 1595 ml
	High: 5 ~ 1600 ml
Minute volume :	Low: 0 ~ 10 L
	High: 0.2 ~ 30 L
Inspired oxygen (FiO <sub>2</sub> ):	Low: 18 ~ 98%
	High: 20 ~ 100%
Apnea alarm:	V <sub>Te</sub> < 10ml measured in 20s
	Paw < (PEEP + 3) cmH <sub>2</sub> O in 20s
Airway pressure low:	0 ~ 98 cmH <sub>2</sub> O
Airway pressure high:	2~ 100 cmH <sub>2</sub> O
Sustained airway pressure alarm: >15s	
Subatmospheric pressure alarm: Paw < -10 cmH <sub>2</sub> O	
Alarm silence countdown timer:120 to 0 seconds	
<b>Ventilator Components</b>	
<b>Flow Sensor</b>	
Type:	Variable orifice flow sensor
Dimensions:	22 mm OD and 15 mm ID
Location:	Inspiratory and expiratory port
<b>Oxygen Sensor</b>	
Type:	Galvanic fuel cell or paramagnetic O <sub>2</sub> sensor (optional)
<b>Ventilator Screen</b>	
Display type:	Color active matrix TFT touch screen
Display size:	12.1 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, P <sub>mean</sub> , P <sub>peak</sub> , P <sub>plat</sub> , and O <sub>2</sub> concentration, EtCO <sub>2</sub> , N <sub>2</sub> O, Aesthesia gas concentration, BIS)
Display waveforms:	P-T, F-T, V-T, EtCO <sub>2</sub> , BIS waveforms
Spirometry loops:	P-V, F-V and F-P
Timer:	On screen timer
<b>Communication Ports</b>	
One RS-232C connector and one DB9 connector	
Ethernet (RJ-45)	
USB	
VGA	
<b>Gas Monitor</b>	
<b>Anesthesia Gas (AG) Module</b>	
Measurement mode:	Infrared absorption
Monitor gases:	CO <sub>2</sub> , N <sub>2</sub> O, Halothane, Enflurane, Isoflurane, Sevoflurane, Desflurane, MAC, Paramagnetic O <sub>2</sub> (optional)
Warm-up time:	45s (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%
Range:	CO <sub>2</sub> : 0% ~ 10%
	AA: 0% ~ 30%
	O <sub>2</sub> /N <sub>2</sub> O: 0% ~ 100%

<b>Carbon Dioxide (CO<sub>2</sub>) Modules</b>	
Method:	Infrared absorption
Module type:	Mindray side-stream, Capnostat mainstream and Oridion micro-stream, optional
Work mode:	Standby or measurement
Displayed numerics:	EtCO <sub>2</sub> , FiCO <sub>2</sub>
Waveforms:	Capnography
Sweep:	6.25 mm/s, 12.5 mm/s
<b>Side-Stream Carbon Dioxide (CO<sub>2</sub>) Module</b>	
Measurement range:	0 ~ 99 mmHg
Accuracy:	± 2 mmHg (0 ~ 40 mmHg) ± 5% (41 ~ 76 mmHg) ± 10% (77 ~ 99 mmHg)
Resolution:	1 mmHg
Gas compensations:	N <sub>2</sub> O, O <sub>2</sub> and Anesthetic Gas ompensation (only for Desflurane)
Sampling rate:	70 or 100 ml/min
Sampling rate accuracy:	± 15% or 15 ml/min whichever is larger
Warming-up time:	< 1 min
Response time:	When measured with a neonatal watertrap and a 2.5 m-long neonatal sampling line: < 3s @ 100 ml/min < 3.5s @ 70 ml/min When measured with an adult watertrap and a 2.5 m-long adult sampling line: < 5s @ 100 ml/min < 6.5s @ 70 ml/min
Displayed numerics:	EtCO <sub>2</sub> , FiCO <sub>2</sub>
Sweep:	6.25 mm/s, 12.5 mm/s
<b>Capnostat Mainstream CO<sub>2</sub> Module</b>	
Measurement range:	0 ~ 150 mmHg
Accuracy:	± 2 mmHg (0 ~ 40 mmHg) ± 5% of reading (41 ~ 70 mmHg) ± 8% of reading (71 ~ 100 mmHg) ± 10% of reading (101 ~ 150 mmHg)
Resolution:	1 mmHg
Response time:	< 60 ms
Gas compensation:	O <sub>2</sub> compensation, AG compensation, balance gas (room air or N <sub>2</sub> O) compensation
Alarm limit:	EtCO <sub>2</sub> High: 2 ~ 150 mmHg EtCO <sub>2</sub> Low: 0 ~ 148 mmHg FiCO <sub>2</sub> High: 0 ~ 150 mmHg
Displayed numerics:	EtCO <sub>2</sub> , FiCO <sub>2</sub>
Sweep:	6.25 mm/s, 12.5 mm/s
<b>Micro-stream CO<sub>2</sub> Module</b>	
Measurement range:	0 ~ 99 mmHg
Accuracy:	0 ~ 38 mmHg: ± 2 mmHg 39 ~ 99 mmHg: ± 5% of reading (+ 0.08% for every 1 mmHg above 38 mmHg)
Resolution:	Waveform: 0.1 mmHg Value: 1 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 <sub>2</sub> High: 2 ~ 99 mmHg EtCO <sub>2</sub> Low: 0 ~ 97 mmHg FiCO <sub>2</sub> High: 0 ~ 99 mmHg
Displayed numerics:	EtCO <sub>2</sub> , FiCO <sub>2</sub>
Sweep:	6.25 mm/s, 12.5 mm/s
<b>BIS Module</b>	
Measured parameters:	EEG
BIS:	0 ~ 100
Sweep speed:	6.25 mm/s, 12.5 mm/s, 25 mm/s or 50 mm/s
Input impedance:	> 50 Mohm
Noise (RTI):	< 0.3 uV (0.25 ~ 50 Hz)
Input signal range:	± 1 mv
EEG Bandwidth:	0.25 ~ 100 Hz
Patient leakage:	< 10 uA
Alarm limit:	BIS high: 2 ~ 100 BIS low: 0 ~ 98
Calculated parameters:	SQI, EMG, SR, SEF, TP
Impedance range:	0 ~ 999 Kohm
<b>Agent Consumption Calculation</b>	
Calculation range:	0 to 3000 ml
Accuracy:	± 2 mL, or ± 25% of reading, whichever is larger
<b>Electrical Specifications</b>	
<b>Current Leakage</b>	
100 ~ 240V:	< 500 µA
<b>Power And Battery Backup</b>	
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:	90 minutes for 1 piece battery (powered by new fully-charged batteries with 25 ambient temperature) 240 minutes for 2 piece battery (powered by new fully-charged batteries with 25 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 Manual ventilation possible even under total power supply failure condition
<b>Pneumatic Specifications</b>	
<b>ACGO (Auxiliary Common Gas Outlet, Integrated)</b>	
Connector:	ISO 22 mm OD and 15 mm ID
<b>Gas Supply</b>	
Gas type:	O <sub>2</sub> , N <sub>2</sub> O and Air
Pipeline input range:	0.28 ~ 0.6 MPa
Pipeline connections:	NIST, DISS All fittings available for O <sub>2</sub> , N <sub>2</sub> O and Air

Cylinder input:	PISS (PIN Index Safety System)
Primary regulator nominal output:	207 kPa
<b>O<sub>2</sub> Controls</b>	
Method:	N <sub>2</sub> O shut off with loss of O <sub>2</sub> pressure
Supply failure alarm:	< 220.6 kPa
O <sub>2</sub> Flush:	25 ~ 75 L/min
<b>O<sub>2</sub> - N<sub>2</sub>O Link System (ORC)</b>	
Type:	Mechanical
Range:	O <sub>2</sub> concentration not lower than 21%
<b>Auxiliary O<sub>2</sub> Flowmeter</b>	
Range:	0 ~ 15 L/min
Indicator:	Flow tube
<b>Electronic Flow Meters</b>	
O <sub>2</sub> range:	0 ~ 15 L/min
N <sub>2</sub> O range:	0 ~ 10 L/min
Air range:	0 ~ 15 L/min
Accuracy:	between -10% and +10% of the indicated value (under 20°C and 101.3 kPa, for flow between 10% and 100% of full scale)
<b>Environmental Specifications</b>	
<b>Operating</b>	
Temperature:	10 ~ 40
Relative humidity:	15 ~ 95% (noncondensing)
Barometric (Kpa):	70 ~ 106 kPa
Storage	
Temperature:	-20 ~ 60 for main unit, -20 ~ 50 for O <sub>2</sub> sensor
Relative humidity:	10 ~ 95% (noncondensing)
Barometric (KPa):	50 ~ 106 kPa optional
<b>Electromagnetic Compatibility</b>	
Immunity:	Complies with all requirements of IEC 60601-1-2
Emissions:	CISPR 11 group 1 class B
<b>Breathing System Specification</b>	
<b>System Components</b>	
Circular breath system with ACGO option	
Carbon dioxide absorbent canister	
Absorbent capacity:	1500 mL
Integrated expiratory limb water trap	
Water trap	
Capacity:	6 mL
System Pressure Gauge	
Range:	-20 ~ 100 cmH <sub>2</sub> O
Accuracy:	± (2% of the full scale reading + 4% of the actual reading)
<b>Ports And Connectors</b>	
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
<b>Bag-to-Ventilator Switch</b>	
Type:	Bi-stable
Control:	Switch between manual and mechanical ventilation

<b>Integrated Adjustable Pressure Limiting (APL) Valve</b>	
Range:	5 ~ 75 cmH <sub>2</sub> O
Tactile knob indication at:	> 30 cmH <sub>2</sub> O
Accuracy:	± 10 cmH <sub>2</sub> O or + 15% of the measure value, whichever is greater
<b>Materials</b>	
All materials in contact with exhaled patient gases are autoclavable, except flow sensors, O <sub>2</sub> sensor, and mechanical pressure meter.	
All materials in contact with patient gas are latex free.	
<b>Anesthetic Gas Scavenging System (AGSS)</b>	
Size:	430 x 132 x 114 mm (height x width x depth)
Type of disposal system:	Active: High-flow or Low-flow Passive
Applicable standard:	ISO 8835-3: 2007
Pump rate:	75 ~ 105 L/min or 25 ~ 50 L/min
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 9170-2-2008	
<b>Suction Device</b>	
<b>Venturi Suction Regulator</b>	
Gas source:	Air, from system gas source
Minimum negative pressure:	25 kPa at supply gas pressure of 280 kPa
Minimum flow:	20 L/min
<b>Continuous Suction Regulator</b>	
Supply:	Negative Pressure Suction
Maximum vacuum:	≥72 kPa at supply gas pressure of 280 kPa; ≥73 kPa at supply gas pressure of 600 kPa
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

