



ALS life support on the run

Philips M3536A HeartStart MRx ALS Monitor

PHILIPS

The first thing you'll notice about the HeartStart MRx is its large, color display. Look further and you'll see that it has much more. This combination multi-parameter monitor with 12-lead ECG acquisition/transmission capability, defibrillator, and AED, unites Philips' industry-leading monitoring and display technologies with superior diagnostic measurements, Vital Signs Trending reports, Event Summaries, suite of data transmission options and our patented resuscitation therapies.

Monitoring starts once a patient cable is connected to the device. Equipped for 3- and 5-Lead ECG monitoring with arrhythmia detection, and optional 12-Lead ECG, pulse oximetry, noninvasive blood pressure, invasive pressures, temperature and end-tidal CO₂, HeartStart MRx is prepared for today's needs and upgradeable to meet tomorrow's.

Its therapies - manual and semi-automatic defibrillation and synchronized cardioversion - feature Philips' patented low-energy SMART Biphasic waveform, which is proven effective in emergency resuscitation and for minimizing post-resuscitation heart dysfunction. No other external defibrillation waveform is supported by more peer-reviewed clinical data. Transcutaneous pacing can be added and the MRx will pace in either demand or fixed mode.

To help caregivers perform high-quality CPR, the Q-CPR® option is available. It offers real-time, measurement and corrective feedback on the rate, depth, and duration of compressions, as well as the frequency of ventilations. It also provides notification of lack of CPR activity. Now with the CPR meter, feedback appears on a graphical display right in the line of site of the caregiver performing CPR.

HeartStart MRx displays measurements and patient care data on an easy-to-read, backlit, 8.4-inch screen. Numerics and waveforms can be reconfigured, and the screen reorganized, enabling you to quickly locate the information you need most. With wide viewing angles, it displays an event timer, event markers, numeric vital signs, and up to four waves, as well as text prompts, alarms, and battery status indicators. On-screen menus simplify navigation for configuring data, setting and responding to alarms, and accessing additional functionality. Automated self-tests, straight-forward ready-for-use checks, data collection, and two long-life batteries make the device easy to operate.

All of these features, measurements, and therapies, plus its compact size, low weight (13.2 lbs./5.9 kg), and balanced shape mean that HeartStart MRx has the capabilities you need and the performance you demand for rapid intervention, thorough care, and positive patient outcomes – that's the big picture.

Features

Standard Features

- ST/AR Basic algorithm for arrhythmia detection
- ECG monitoring through monitoring electrodes and defibrillation pads
- Synchronized cardioversion
- Adjustable ECG size and autogain
- Manual and AED operation
- SMART Biphasic waveform for defibrillation therapy
- Large 4-wave color display
- Strip chart printer
- Individual, adjustable volume of QRS beeper, voice prompts, and alerts
- Event summary
- Vital Signs Trending Report
- Configuration mode
- Service mode
- Operational checks
- Automated self-tests with “ready-for-use” indicator
- Lithium ion battery with fuel gauge

Optional Features

- SpO₂ with Fourier Artifact Suppression Technology (FAST)
- Noninvasive Blood Pressure
- Invasive Pressures (2 channels)
- Temperature
- Microstream™ EtCO₂
- Noninvasive Pacing
- 12-Lead ECG with Philips DXL algorithm
- 12-Lead ECG Transmission
- 75 mm Printer
- Q-CPR CPR measurement and feedback
- Q-CPR Data Capture
- ACI-TIPI and TPI analysis
- Periodic Clinical Data Transmission
- Batch LAN Data Transfer (via LAN cable)

Standard Accessories

- Lithium ion battery with fuel gauge
- Hands-free multifunction electrode cable
- 5-Lead ECG cable
- Disposable monitoring electrodes
- Printer paper
- Carrying case
- Defibrillator test load
- Documentation CD containing Instructions for Use, User training workbook and Application notes
- Quick reference cards

Product Ordering Information

M3536A HeartStart MRx ALS Monitor

Option Ordering Information		Option Ordering Information	
A01	SpO ₂	B12	Batch LAN Data Transfer
A02	SpO ₂ and NBP	B14	Audio Recording (all modes)
A03	SpO ₂ , NBP, and EtCO ₂	B17	ACI-TIPI and TPI
A04	EtCO ₂	B18	Periodic Clinical Data Transmission
A05	SpO ₂ , NBP, EtCO ₂ and Temperature	C02	Water Resistant External Paddles
A06	SpO ₂ , NBP, EtCO ₂ , Invasive Pressures and Temperature	C03	Data Card
A07	SpO ₂ , NBP, Invasive Pressures and Temperature	C05	Additional Battery
A11	EtCO ₂ and SpO ₂	C06	AC Power Module
B01	External Pacing	C07	Barrel style Pad Cable (Replacement for Standard Pad Cable)
B02	12-Lead ECG Acquisition	C10	5/5 ECG lead set with grabbers
B04	75 mm Printer	C11	Long (2.7m) ECG Trunk Cable
B05	Asian 75mm Printer	C12	3/7-Snap Lead set
B06	12-Lead ECG Transmission - Bluetooth® wireless technology	LP1	Instructions for Use (printed copy)
B07	12-Lead ECG Transmission - RS232 and Bluetooth	LP2	User Training Video (English only)
B08	Q-CPR	LP3	User Training DVD (English only)
B09	Q-CPR Data Capture	SM1	Service Manual (English only)
B10	Event Summary - Bluetooth	SM3	Service Training Video (DVD, English only)
B11	12-Lead Transmission, Rosetta-Lt™ Interface (Available in the U.S. only)	W01	One-Year On-Site Warranty
		WA2	Three-Year Biomed Warranty (U.S., Canada, and Australia only)
		W22	Two-Year Bench Warranty with Loaner (U.S. and Canada only)

Some options, upgrades and accessories are not available in all countries. Contact your local Philips Sales Representative for specific information.

Upgrades/Supplies/Accessories

Upgrades	
861325	Event Summary, Bluetooth
861326	12-Lead Transmission, Rosetta-Lt Interface (Available in the U.S. only)
861359	Invasive Pressures
861360	Temperature
861442	ACI-TIPI and TPI
861443	Periodic Clinical Data Transmission
861444	CPR meter
861447	Batch LAN Data Transfer
989803153411	Internal Bluetooth Card
M3530A	SpO ₂
M3531A	NBP
M3532A	EtCO ₂
M3533A	Pacing
M3534A	12-Lead ECG Option B02 - Acquisition Option B04 - 75 mm Printer
M3801A	12-Lead Transmission (Bluetooth)
M3802A	12-Lead Transmission (RS232 and Bluetooth)
M3806A	Device Software
M3808A	Therapy PCA
M4760A	Handle and Cap Plate (for Pads)
M4765A	Option BO2 - B-Level Hardware Upgrade
M4770A	Q-CPR CPR Measurement and Feedback
M4771A	Q-CPR Data Capture Upgrade
M4772A	Audio Recording Upgrade
M5527A	External Paddles with Paddle Tray Option C02 - Water Resistant Paddles

External Paddles

M3543A	Water Resistant External Paddles
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Multifunction Electrode Pads	
White barrel connector	
M3501A	Defib Adult, AAMI
M3502A	Defib Adult, IEC
M3503A	Defib Pediatric, IEC
M3504A	Defib Pediatric, AAMI
Gray plug connector	
M3713A	Adult Plus
M3716A	Adult Radiolucent
M3717A	Pediatric Plus
M3718A	Adult Radiotransparent/Reduced Skin
M3719A	Pediatric Radiotransparent/Reduced Skin

Pads Cable

M3507A	Defib Hands-free, barrel style 7 ft. (2.2 m)
M3508A	Defib Hands-free, plug style 7 ft. (2.2 m)
05-10200	Pads Adapter (use with M3507A)
989803158661	Defibrillator Pads Hands-Free Cable, HeartStart pads, CPR meter cable and connector

Q-CPR Accessories

989803162401	CPR meter
989803163291	CPR meter Adhesive Pads
989803158661	Pads/CPR meter Cable
M4761A	Compression Sensor
M4762A	Sensor Adhesive Pads (Package of 10)
M4763A	Compression Sensor Pads/CPR cable

ECG Monitoring Electrodes

M2202A	High-Tack Foam, 5 electrodes/pack (60 packs/case)
M4612A	Solid Gel Electrodes, 5 electrodes/pack (60 packs/case)
M4613A	Solid Gel Electrodes, 30 electrodes/pack (10 packs/case)

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ECG Cables	
12-Lead Cable Set	
M3525A	2.7 meter 10-lead ECG Trunk Cable, 12-pin Connector (for 3-Lead, 5-Lead and 12-Lead use)
989803147691	1.3 meter 10-lead ECG Trunk Cable, 12-pin Connector (for 3-Lead, 5-Lead and 12-Lead use)
M3526A	3-lead ECG Set and Plug with Snap (AAMI)
M3527A	Add 7-lead ECG Set for 12-Lead use (AAMI)
M3528A	3-lead ECG Set and Plug with Snap (IEC)
M3529A	Add 7-lead ECG Set for 12-Lead use (IEC)
M5530A	Combiner Plug for 3-wire Lead Set for use with M3526A/M3528A
M1663A	10-Lead ECG Patient Trunk Cable, 12-pin ECG Input Connector (for 5-Lead and 12-Lead use)
M1949A	10-lead ECG Patient Trunk Cable, 12-pin ECG Input Connector (for 5-Lead and 12-Lead use)
M1968A	10-electrode Cable Set, Extremities, Grabber (use with M1976A) (AAMI)
M1976A	10-electrode Cable Set, Chest, Grabber (use with M1968A) (AAMI)
M1971A	10-electrode Cable Set, Extremities, Grabber (use with M1978A) (IEC)
M1978A	10-electrode Cable Set, Chest, Grabber (use with M1971A) (IEC)
989803158061	5-Lead ECG Lead Set; Limb Leads; Snaps; Shielded Electrode (AAMI)
989803158071	5-Lead ECG Lead Set; Chest Leads; Snaps; Shielded Electrode (AAMI)
989803158081	5-Lead ECG Lead Set; Limb Leads; Snaps; Shielded Electrode (IEC)
989803158091	5-Lead ECG Lead Set; Chest Leads; Snaps; Shielded Electrode (IEC)

ECG Cables	
3-Lead Cable Set	
M1669A	3-Lead Trunk Cable
M1500A	3-Lead ECG Trunk Cable (AAMI)
M1605A	3-Lead ECG Snaps (AAMI)
M1510A	3-Lead ECG Trunk Cable (IEC)
M1615A	3-Lead ECG Snaps (IEC)
M1671A	3-Lead ICU Grabber (AAMI)
M1673A	3-Lead ICU Snaps (AAMI)
M1674A	3-Lead ICU Snaps (IEC)
M1675A	3-Lead OR Grabber (AAMI)
M1678A	3-Lead OR Grabber (IEC)
M1672A	3-Lead ICU Grabber (IEC)
5-Lead Cable Set	
M1668A	5-Lead Trunk Cable
M1520A	5-Lead ECG Trunk Cable (AAMI)
M1625A	5-Lead ECG Snaps (AAMI)
M1530A	5-Lead ECG Trunk Cable (IEC)
M1635A	5-Lead ECG Snaps (IEC)
M1968A	5-Lead ICU Grabber (AAMI)
M1971A	5-Lead ICU Grabber (IEC)
M1644A	5-Lead ICU Snaps (AAMI)
M1645A	5-Lead ICU Snaps (IEC)
M1973A	5-Lead OR Grabber (AAMI)
M1974A	5-Lead OR Grabber (IEC)
M1976A	5-Lead Chest ICU Grabber (AAMI)
M1978A	5-Lead Chest ICU Grabber (IEC)
M1979A	5-Lead Chest OR Grabber (AAMI)
M1984A	5-Lead Chest OR Grabber (IEC)
M1602A	5-Lead Chest ICU Snaps (AAMI)
M1604A	5-Lead Chest ICU Snaps (IEC)

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SpO ₂ Sensors/Cables	
M1191A	Reusable SpO ₂ Sensor - Adult Finger (2 m)
M1191AL	Reusable SpO ₂ Sensor - Adult Finger (3 m)
M1191B	Reusable SpO ₂ Sensor - Adult Finger (2 m)
M1191BL	Reusable SpO ₂ Sensor - Adult Finger (3 m)
M1191T	Reusable Adult Finger Sensor (Nellcor® 9-pin D-sub connector)
M1192A	Reusable SpO ₂ Sensor-Pediatric/Small Adult Finger
M1192T	Reusable Pediatric Finger Sensor (Nellcor® 9-pin D-sub connector)
M1194A	Reusable SpO ₂ Sensor - Adult Ear Clip
M1195A	Reusable SpO ₂ Sensor - Infant
M1196A	Reusable Clip Adult Sensor
M1196T	Reusable Clip Adult Sensor (Nellcor 9-pin D-sub connector)
M1941A	SpO ₂ Extension Cable, 2 m (6.5 ft.)
M1943A	1m Nellcor adapter
M1131A	Disposable SpO ₂ Sensor - Adult/Pediatric

NBP	
Interconnect Cable	
M1598B	Adult Pressure 5 ft. (1.5 m)
M1599B	Adult Pressure 10 ft. (3 m)
Reusable Blood Pressure Cuffs	
40400A	Reusable NBP Cuff Kit, 3 sizes (pediatric, adult, large adult)
40400B	Reusable NBP Cuff Kit, 5 sizes (infant, pediatric, adult, large adult, thigh)
40401A	Traditional Reusable NBP Cuff - Infant
40401B	Traditional Reusable NBP Cuff - Pediatric
40401C	Traditional Reusable NBP Cuff - Adult
40401D	Traditional Reusable NBP Cuff - Large Adult
40401E	Traditional Reusable NBP Cuff - Thigh
M4552B	Easy Care Reusable NBP Cuff - Infant
M4553B	Easy Care Reusable NBP Cuff - Pediatric
M4554B	Easy Care Reusable NBP Cuff - Small Adult
M4555B	Easy Care Reusable NBP Cuff - Adult
M4557B	Easy Care Reusable NBP Cuff - Large Adult
M4559B	Easy Care Reusable NBP Cuff - Thigh
M1572A	Multi-Patient Comfort Cuffs - Pediatric
M1573A	Multi-Patient Comfort Cuffs - Small Adult
M1574A	Multi-Patient Comfort Cuffs - Adult
M1575A	Multi-Patient Comfort Cuffs - Large Adult

NBP	
Disposable Blood Pressure Cuffs	
M4572B	Soft Single-Patient Disposable Cuff - Infant
M4573B	Soft Single-Patient Disposable Cuff - Pediatric
M4574B	Soft Single-Patient Disposable Cuff - Small Adult
M4575B	Soft Single-Patient Disposable Cuff - Adult
M4576B	Soft Single-Patient Disposable Cuff - Adult X-Long
M4577B	Soft Single-Patient Disposable Cuff - Large Adult
M4578B	Soft Single-Patient Disposable Cuff - Large Adult X-Long
M4579B	Soft Single-Patient Disposable Cuff - Thigh

Invasive Pressures	
CPJ840J6	Reusable Pressure Transducer
CPJ84022	Sterile disposable pressure dome for use with CPJ840J6
CPJ84046	Transducer holder for CPJ840J6
M1567A	Single channel disposable blood pressure kit (Available in Europe and Asia only)
M1568A	Dual Line blood pressure kit for measuring CVP, ABP and other pressure measurements (available in Europe and Asia only)
M1634A	Reusable adapter cable (available in Europe and Asia only)
Disposable Transducers*	
TransPac® IV	ICU Medical, Inc.
TruWave®	Edwards Lifescience
PX212	
DTX Plus™	Becton, Dickinson and Co.
DT-4812	

* Available for purchase/service from their respective manufacturers.

Temperature	
Disposable Temperature Probes	
21090A	Esophageal/rectal
21091A	Skin surface
21093A	Esophageal stethoscope
21094A	Esophageal stethoscope
21095A	Esophageal stethoscope
21096A	Foley Catheter
21097A	Foley Catheter
M1837A	Esophageal/rectal
M2255A	Foley Catheter
Reusable Temperature Probes	
21075A	Esophageal/rectal - adult
21076A	Esophageal/rectal - pediatric
21078A	Skin surface
Reusable Temperature Probe Extension Cables	
21082A	3.0 m 2-pin plug extension cable for minim phone plug
21082B	1.5 m 2-pin plug extension cable for minim phone plug

EtCO ₂	
Intubated Circuits	
M1920A	FilterLine® Set - Adult/Pediatric (25 sets/case)
M1921A	Filter H Set - Humidified Adult/Pediatric (25 sets/case)
M1923A	Filter H Set - Humidified Infant/Neonatal (yellow, 25 sets/case)
Non-Intubated Dual Purpose Circuits (CO ₂ + O ₂)	
M2520A	Smart CapnoLine™ - Pediatric
M2522A	Smart CapnoLine - Adult
Non-Intubated Single Purpose Circuits (CO ₂)	
M2524A	Smart CapnoLine - Pediatric
M2526A	Smart CapnoLine - Adult

Power	
M3538A	Lithium Ion Battery with fuel gauge
M3539A	AC Power Module
M5529A	DC Power Module
M5528A	DC Power Module Mounting Bracket
989803135301	2-Bay Battery Support System for Lithium Ion Batteries
989803135331	4-Bay Battery Support System for Lithium Ion Batteries
989803135341	4-Bay Battery Support System for Sealed Lead Acid and Lithium Ion Batteries

Paper	
40457C	50 mm Chemical Thermal, Gray Grid (10 rolls)
40457D	50 mm Chemical Thermal, Gray Grid (80 rolls)
989803138171	75 mm Chemical Thermal, Red Grid (10 rolls)
989803138181	75 mm Chemical Thermal, Red Grid (80 rolls)

Miscellaneous	
M1781A	Test Load for use with M3507A Pad Cable
M3725A	Test Load for use with M3508A Pad Cable
M3541A	Carrying Case (includes 3 accessory pouches and shoulder strap)
989803146981	Data Card and Tray
M5528A	Vehicle Wall Mount
M3537A	Bedrail Hook mount
M3549A	Wide Bedrail Hook mount
M4737A	Display cover

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Specifications

Defibrillator

Waveform: Biphasic Truncated Exponential. Waveform parameters adjusted as a function of patient impedance

Shock Delivery: Via multifunction electrode pads, or paddles

Delivered Energy Accuracy:

Selected Energy	Nominal Delivered Energy vs. Patient Impedance							Accuracy
	Load Impedance							
	25	50	75	100	125	150	175	
1 J	1.2	1.3	1.2	1.1	1.0	0.9	0.8	±2 J
2 J	1.8	2.0	2.0	1.9	1.7	1.6	1.5	±2 J
3 J	2.8	3.0	3.0	3.1	3.0	2.9	2.7	±2 J
4 J	3.7	4.0	4.0	4.1	4.2	4.2	4.0	±2 J
5 J	4.6	5.0	5.1	5.1	5.2	5.2	5.0	±2 J
6 J	5.5	6.0	6.1	6.2	6.3	6.3	6.1	±2 J
7 J	6.4	7.0	7.1	7.2	7.3	7.3	7.1	±2 J
8 J	7.4	8.0	8.1	8.2	8.4	8.3	8.1	±2 J
9 J	8.3	9.0	9.1	9.3	9.4	9.4	9.1	±2 J
10 J	9.2	10	10	10	10	10	10	±2 J
15 J	14	15	15	15	16	16	15	±15%
20 J	18	20	20	21	21	21	20	±15%
30 J	28	30	30	31	31	31	30	±15%
50 J	46	50	51	51	52	52	50	±15%
70 J	64	70	71	72	73	73	71	±15%
100 J	92	100	101	103	104	104	101	±15%
120 J	110	120	121	123	125	125	121	±15%
150 J	138	150	152	154	157	156	151	±15%
170 J	156	170	172	175	177	177	172	±15%
200 J	184	200	202	206	209	209	202	±15%

Charge Time: Less than 5 seconds to 200 joules with a new, fully charged Lithium Ion battery pack at 25°C.

Patient Impedance Range	
Minimum:	15 ohm (internal defibrillation); 25 Ohm (external defibrillation)
Maximum:	180 ohm

Note: Actual functional range may exceed the above values

General	
Dimensions with pads:	12.4 in. (W) x 8.3 in. (D) x 11.7 in. (H) (31.5 cm x 21.0 cm x 29.5 cm)
Dimensions with paddles:	13.4 in. (W) x 8.3 in. (D) x 13.6 in. (H) (34.0 cm x 21.0 cm x 34.5 cm)
Weight:	13.2 lbs. (5.99 kg) including pads, pads cable, full roll of paper, and battery. Incremental weight of external standard paddles and paddle tray is 2.5 lbs. (1.1 kg). Additional battery weighs less than 1.8 lbs. (0.82 kg)

Manual Mode	
Manual Output Energy (Selected):	1-10, 15, 20, 30, 50, 70, 100, 120, 150, 170, 200 joules
Controls:	On/Off Therapy Knob, Charge, Shock, Sync, Print, Mark Event, ECG Lead Select, Alarm Pause, Event Review, Disarm
Energy Selection:	Front panel Therapy Knob
Charge Control:	Front panel button; button on external paddles
Shock Control:	Front panel button; buttons on external or switched internal paddles
Synchronized Control:	Front panel SYNC button
Indicators:	Text prompts, audio alerts, QRS beeper, battery status, Ready For Use, external power, Sync mode
Armed Indicators:	Charging tone, charged tone, flashing Shock button, and energy level indicated on display

AED Mode	
AED Energy Profile:	150 joules nominal into a 50 ohm test load
Text and Voice Prompts:	Extensive text/audible messages guide user through configured protocol
AED Controls:	On/Off, Shock
Indicators:	Monitor display messages and prompts, voice prompts, battery status, Ready For Use, external power
Armed Indicators:	Charging tone, charged tone, flashing Shock button, energy level indicated on display, and voice prompts
ECG Analysis:	Evaluates patient ECG and signal quality to determine if a shock is appropriate and evaluates connection impedance for proper defibrillation pad contact
Shockable Rhythms:	Shockable Rhythms: Ventricular fibrillation and certain ventricular tachycardias, including ventricular flutter and polymorphic ventricular tachycardia

AED Mode	
Shock Advisory Algorithm Sensitivity and Specificity:	Meets AAMI DF-39

ECG and Arrhythmia Monitoring

Inputs:	Up to four (4) ECG waves may be viewed on display and up to 2 waves printed simultaneously. Lead I, II, or III is obtained through the 3-lead ECG cable and separate monitoring electrodes. With a 5-lead cable, leads aVR, aVL, aVF, and V can also be obtained. Pads ECG is obtained through 2 multifunction electrode pads.
Lead Fault:	Leads Off message and dashed line appear on the display if an electrode or lead becomes disconnected. Lead Off indicator in wave sector
Pad Fault:	Dashed line appears on the display if a pad becomes disconnected.
Heart Rate Display:	Digital readout on display from 15 to 300 bpm, with an accuracy of $\pm 10\%$
Heart Rate/Arrhythmia Alarms:	HR, Asystole, VFIB/VTACH, VTACH, Extreme Tachy, Extreme Brady, PVC rate, Pacer not capture, Pacer not pacing
ECG Cable Length:	9 ft. (2.7 m)
Common Mode Rejection:	Greater than 90 dB measured per AAMI standard for cardiac monitors (EC 13)
ECG Size:	2.5, 5, 10, 20, 40 mm/mV, autogain
Frequency Response (Bandwidth)	
AC Line Filter:	60 Hz or 50 Hz

ECG and Arrhythmia Monitoring	
3-lead, 5-lead, and Pads:	Pads ECG for Display: Monitor (0.15-40 Hz) or EMS (1-30 Hz) Pads ECG for Printer: Monitor (0.15-40 Hz) or EMS (1-30 Hz) Leads ECG for Display: Monitor (0.15-40 Hz) or EMS (1-30 Hz) Leads ECG for Printer: Diagnostic (0.05-150 Hz) or Monitor (0.15-40 Hz) or EMS (1-30 Hz)
12-lead:	ECG for Display: (0.05 - 150 Hz), (0.05 - 40 Hz), (0.15 - 40 Hz) ECG for Report: (0.05 - 150 Hz), (0.05 - 40 Hz), (0.15 - 40 Hz), (0.05 - 150 Hz)
Patient Isolation (defibrillation proof)	
ECG:	Type CF
SpO ₂ :	Type CF
EtCO ₂ :	Type CF
NBP:	Type CF
Invasive Pressures:	Type CF
Temperature:	Type CF
External Defib:	Type BF
Internal Defib:	Type CF

Display	
Size:	8.4 in. diagonal (128 mm x 171 mm)
Type:	TFT Color LCD
Resolution:	640 x 480 pixels (VGA)
	Sweep Speed: 25 mm/s nominal (stationary trace; sweeping erase bar) for ECG, Invasive Pressures and SpO ₂ ; 6.25 mm/s for CO ₂
Wave Viewing Time:	5 seconds (ECG)

Battery	
Type:	Rechargeable, Lithium Ion; minimum 6.45 Ah, 14.4 V, 92 WH
Dimensions:	6.5 in. (H) x 3.8 in. (W) x 1.6 in. (D) (165 mm x 95 mm x 42 mm)
Weight:	Less than 1.8 lb. (0.82 kg)
Charge Time:	Approximately 3 hours to 100%. Approximately 2 hours to 80%, indicated by battery fuel gauge. Charging the battery at temperatures above 45°C may degrade battery life.

Battery	
Capacity:	At least 5 hours of monitoring with ECG, SpO ₂ , CO ₂ , temperature, and 2 invasive pressures monitored continuously, NBP measured every 15 minutes, and 20 200-joule discharges (with a new, fully charged battery at room temperature, 25° C). At least 3.5 hours while pacing at 180 ppm at 160 mA and monitoring as described above
Battery Indicators:	Fuel gauge on battery, capacity indicator on display; flashing RFU indicator, chirp, and LOW BATTERY message appears on display for low battery condition*
Storage:	Storing the battery for extended periods at temperatures above 40°C will reduce battery capacity and degrade battery life.

* Low battery condition triggered with at least 10 minutes of monitoring time and 6 maximum energy discharges remain (with a new battery at room temperature, 25°C)

Thermal Array Printer	
Continuous ECG Strip:	The Print key starts and stops the strip. The printer can be configured to run real time or with a 10-second delay. The strip prints the primary ECG lead with event annotations and measurements.
Auto Printing:	The printer can be configured to automatically print on Marked Events, Charge, Shock, and Alarm. When an alarm condition occurs, the unit prints the primary ECG wave and the alarming wave, if configured.
Reports:	The following reports can be printed: Event Summary, Vital Signs Trending, 12-Lead, Operational Check, Configuration, Status Log, and Device Information
Speed:	25 or 50 mm/s with an accuracy of ± 5%
Amplitude Accuracy:	± 5% or ± 40 uV, whichever is greater
Paper Size:	50 mm (W) by 30 m (100 ft.) (L) 75 mm (W) by 30 m (100 ft.) (L)

Noninvasive Pacing	
Waveform:	Monophasic Truncated Exponential
Current Pulse Amplitude:	10 mA to 175 mA (5 mA increments); accuracy 10% or 5 mA, whichever is greater
Pulse Width:	40 ms with $\pm 10\%$ accuracy
Rate: 30 ppm to 180 ppm (10 ppm increments);	accuracy $\pm 1.5\%$
Modes:	Demand or Fixed Rate
Refractory Period:	340 msec (30 to 80 ppm); 240 msec (90 to 180 ppm)

SpO ₂ Pulse Oximetry	
SpO ₂ Range:	0-100%
Pulse rate:	30 to 300 bpm
Maximum Power Output:	< 15 mW
Wavelength Range:	500 - 1000 nm
Resolution:	1%
Display Update Period:	1 sec. typical numeric update rate
Accuracy with	
M1191A sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1191B sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1191AL sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1191BL sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1191T sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1192A sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1192T sensor - 1 standard deviation	70% to 100%, $\pm 2.0\%$
M1194A sensor - 1 standard deviation	70% to 100%, $\pm 3.0\%$
M1195A sensor - 1 standard deviation	70% to 100%, $\pm 3.0\%$
M1196A sensor - 1 standard deviation	70% to 100%, $\pm 3.0\%$
M1196T sensor - 1 standard deviation	70% to 100%, $\pm 3.0\%$
M1131A sensor - 1 standard deviation	70% to 100%, $\pm 3.0\%$
Pulse Rate Accuracy:	2% or 1 bpm (whichever is greater)
Pulse Alarm Range:	
Low Limit:	30 to 195 (adults); 30 to 235 (pediatric)
High Limit:	35 to 200 (adult); 35 to 240 (pediatric)
SpO ₂ Alarm Range:	
Low Limit:	50 to 99% (Adult/Pediatric)
High Limit:	51 to 100% (Adult/Pediatric)

SpO ₂ Pulse Oximetry	
SpO ₂ and Pulse High/Low Alarm Signal Generation	
Delay: 10 seconds	

Note: The above referenced sensors were validated for use with the HeartStart MRx using the Philips picoSAT II SpO₂ module with Fourier Artifact Suppression Technology (FAST). This module is not available as a stand-alone device.

Noninvasive Blood Pressure	
Pressure Range	
Systolic:	40-260 mmHg
Diastolic:	20-200 mmHg
Initial Pressure:	160 mmHg (Adult); 120 mmHg (Pediatric)
Maximum Pressure:	280 mmHg
Overpressure	Maximum of 300 mmHg
Safety Limits:	
Cuff Inflation Time:	75 second maximum (pediatric or adult)
Pressure	± 3 mmHg
Transducer	
Accuracy:	
Alarm Range	
Systolic high limit:	35 - 270 (Adult), 35 - 180 (Pediatric)
Systolic low limit:	30 - 265 (Adult), 30 - 175 (Pediatric)
Diastolic high limit:	15 - 245 (Adult), 15 - 150 (Pediatric)
Diastolic low limit:	10 - 240 (Adult), 10 - 145 (Pediatric)
Mean high limit:	25 - 255 (Adult), 25 - 160 (Pediatric)
Mean low limit:	20 - 250 (Adult), 20 - 155 (Pediatric)
Calibration schedule:	yearly or every 10,000 cycles
Auto Mode	1, 2.5, 5, 10, 15, 30, 60, or
Repetition Time:	120 minutes
Measurement Time:	Auto/manual mode: 30 seconds (average) @ HR > 60 bpm, 170 seconds (maximum)
Interconnect Tube	M1598B Connect tubing
Length:	5 ft. (1.5 m) M1599B Connect tubing 10 ft. (3 m)

End-Tidal Carbon Dioxide	
Range:	0 to 99 mmHg at sea level
Resolution:	1mmHg (0.1 kPa)
Accuracy:	For values between 0 and 38 mmHg: ± 2 mmHg. For values between 39 and 99 mmHg: $\pm 5\%$ of reading + 0.08% for every 1 mmHg (above 40 mmHg). For breath rates above 80 and EtCO ₂ values >18 mmHg, accuracy is 4 mmHg or $\pm 12\%$ of reading, whichever is greater.
Alarm Range:	Low Limit: 10 to 94 mmHg (Adult/Pediatric) High Limit: 20 to 95 mmHg (Adult/Pediatric)
Calibration schedule:	yearly or every 4,000 hours
Sample Size:	50 ml per min
Drift of Measurement Accuracy:	Over a 24-hour period, accuracy claims above are maintained.

Airway Respiration Rate	
Range:	0 to 150 rpm
Resolution:	1 rpm
Accuracy:	0 to 40 rpm ± 1 rpm 41 to 70 rpm ± 2 rpm 71 to 100 rpm ± 3 rpm 101 to 150 rpm ± 5 rpm
Alarm Range:	Low Limit: 0 to 99 rpm (Adult/Pediatric) High Limit: 10 to 100 rpm (Adult/Pediatric) Apnea Alarm Time: 10-40 seconds, in increments of 5

Calibration Gas for CO ₂ Measurement	
Ingredients:	5% Carbon Dioxide, 21% Oxygen, 74% Nitrogen
Cylinder Size:	BD
Method of Preparation:	Gravimetric
Blend Tolerance:	0.03%
Accuracy:	0.03% absolute
Moisture:	10 PPM Maximum
Expiration Period:	2 years
Pressure:	144 PSIG, Volume: 10L

Invasive Pressures	
Transducer Sensitivity:	5uV/V mmHg (37.5uV/V/kPa)
Sensitivity Adjustment Range:	$\pm 10\%$
Transducer Load Resistance:	195 to 2200 ohms
Transducer Output Resistance:	0 to 3000 ohms
Frequency Response:	0-12 Hz or 0-40 Hz
Zero Adjustment Range:	± 200 mmHg (± 26.7 kPa)
Zero Adjustment Accuracy:	± 1.0 mmHg (± 0.1 kPa)
Zero Setting Drift:	<0.1 mmHg/ $^{\circ}$ C (0.013 kPa/ $^{\circ}$ C)
Gain accuracy (excluding transducers):	$\pm 1\%$ of reading or 1 mmHg (0.1 kPa) whichever is greater
Gain Drift:	less than 0.05% / $^{\circ}$ C
Overall Accuracy (included listed transducers):	$\pm 4\%$ of reading or 4mmHg (0.5kPa) whichever is greater
Measurement Range:	-40 to 361 mmHg (-5.3 to 48.1 kPa)
Measurement Resolution:	1mmHg (0.1 kPa)
Noise:	<1mmHg (0.1 kPa)
Transducer/Dome Volume Displacement:	Refer to the specific device's specifications.
Additional Noise from EMI if operating under conditions according to EMC standard EN60601-1-2 (Radiated Immunity 3 V/m or Conducted Immunity 3 VRMS):	<3mmHg
Pulse Rate Range:	25-350 bpm
Pulse Rate Accuracy:	1% of full range
Pulse Rate Resolution:	1 bpm

Temperature	
Measurement Range:	0 $^{\circ}$ - 45 $^{\circ}$ C (32 $^{\circ}$ - 113 $^{\circ}$ F)
Measurement Resolution:	0.1 $^{\circ}$ C (0.2 $^{\circ}$ F)
Resolution:	
Measurement Accuracy (excluding any adapter cable):	+0.1 $^{\circ}$ C from 25 $^{\circ}$ C to 45 $^{\circ}$ C; +0.3 $^{\circ}$ C from 0 $^{\circ}$ C to 24.9 $^{\circ}$ C
Settling Time Constant:	<10 seconds

Temperature	
Averaging Time:	1 second
Minimum measurement time:	See the probe's Instructions for Use to obtain minimum measurement times for accurate readings. The HeartStart MRx does not add any clinically significant time to obtain accurate readings.

12-Lead ECG	
Inputs: With a 10-Lead cable, leads I, II, III, aVR, aVL, aVF, V/C1-V/C6 can be obtained. All 12-Lead ECG waves can be viewed on the display simultaneously. All 12 leads can be printed on the strip chart printer in 3x4 format.	
ECG Bandwidth Filters:	0.15 - 40 Hz 0.05 - 40 Hz 0.05 - 150 Hz
Cellular transmission via a device with Bluetooth® wireless technology or a cell phone with an RS-232 connection. 12-Lead ECGs are transmitted through an ISP to the 12-Lead Transfer Station.	
Bluetooth wireless transmission to an external computer which supports File Transfer Profile Server 1.1	
Two-way radio transmission of 12-Lead ECGs in conjunction with General Devices' Rosetta-Lt device.	
Destinations: Once a 12-lead reaches the 12-Lead Transfer Station, it can be displayed, printed, faxed, emailed, or forwarded to another 12-Lead Transfer Station. It can also be forwarded to the TraceMaster ECG Management System or other ECG management systems (via the DatamedFT).	

Patient Data Storage	
Internal Event Summary:	The internal Event Summary stores up to 12 hours of 2 continuous ECG waves, 1 CO ₂ wave and 2 invasive pressure waves, events and trending per event summary. There is a maximum capacity of 55 Event Summaries or 240 megabytes (62 megabytes is you have a 64 megabyte card installed) of patient data, whichever comes first.

Patient Data Storage	
Data Card Event Summary:	The Data Card has a maximum capacity of 60 Event Summaries or 240 megabytes (62 megabytes is you have a 64 megabyte card installed) of patient data, whichever comes first.

Q-CPR	
Measurements	
Compressions:	Depth, rate, release (complete or incomplete), and duty cycle
Ventilations:	Volume, rate, and inflation time
Feedback Type	
Verbal:	Prioritized, corrective, verbal feedback for all measurements
Numerical:	Measurement values for compression rate, ventilation rate, and no flow time
Graphical:	Compression wave with correct depth target zone. Lung icon for ventilation volume.
User Interface:	Integrated into Code (ALS resuscitation) and AED (BLS resuscitation) views

CPR Meter	
Dimensions:	154mm x 64mm x 28mm) with a .91m integrated cable.
Weight:	6 oz. (170 g)
Input voltage:	4.0-6.0V at 170mA. The CPR meter is electrically and galvanically isolated from the defibrillator power and communication sources.
Temperature	
Storage:	-20°C to 60°C (-4°F to 140°F)
Operating:	0°C to 50°C (32°F to 122°F)
Relative Humidity	
Storage:	0% to 75%
	Operating: 0% to 95%
Solids/Water Resistance:	IP55. Meets ISO/IEC 60529
EMC:	Meets IEC 60601-1-2 and RTCA/DO-160E

Patient Adhesive Pads	
Dimensions:	39mm x 90 mm
Temperature	
Storage:	-20°C to 60°C (-4°F to 140°F)
Operating:	0°C to 50°C (32°F to 122°F)
Relative Humidity	
Storage:	0% to 75%
Operating:	0% to 95%
Material:	Foam pad with biocompatible adhesive on both sides
Shelf life:	2 years when applied to the CPR meter or 4 years in an unopened package

Bluetooth Wireless Technology Card	
Bluetooth Class I:	100 meters (approximately 300 feet) maximum transmission range. Dependent upon transmission range of lowest class Bluetooth device. Most Bluetooth devices are Class II, which transmit at maximum ranges of up to 10 meters (33 feet).
Bluetooth Stacks:	Tested with Toshiba™ 4.20.11, IVT™ 2.1.2.0 (Product)/05.04.11.20060301 (stack), Widcomm™ 4.0.1.2400.
Bluetooth Version:	1.1 or greater
Bluetooth devices used with the MRx must support the Bluetooth Dialup Networking Profile (DUN) or the File Transfer Profile (FTP). DUN devices must also have a data transfer plan that supports packet data transmission. Event summaries can only be transmitted via Bluetooth File Transfer Profile (not DUN).	

Environmental	
Temperature:	0°C to 45°C operating, -20° to 70°C storage
Humidity:	Up to 95% relative humidity
Atmospheric Pressure Range	
Operating and Storage:	1014 hPa to 572 hPa (0 to 15,000 ft.; 0 to 4,500 m)
Shock	
Operating Impact:	Half-sine waveform, duration < 3 ms, acceleration > 145 g, 1 time on all six faces
Non-operating:	Trapezoidal waveform, acceleration ≥ 30 g, velocity change=742 cm/s ± 10% on all six faces

Environmental	
Bump:	EN60068-2-29 Bump (Half-sine, 40 g peak, 6 msec duration, 1,000 bumps x 3 axes)
Free fall:	EC 68-2-32 Free fall. Drops on all faces onto a steel surface (excluding bed rail hook) - 30 in. (76.2 cm) with carrying case - 16 in. (40.6 cm) without carrying case
Vibration	
Operating:	MIL STD 810E 514.4 Category 6 Helicopter, General Storage, UH60; - IEC 68-2-6 Vibration (sinusoidal) (10-57 Hz, + 0.15mm; 58-150 Hz, 2g; 20 sweeps x 3 axes) - IEC 68-2-64 Vibration, broad-band random (10-20 Hz, 0.05 g ² /Hz; 20-150 Hz, -3 dB/octave; 150Hz, 0.0065g ² /Hz; 1.5 hours x 3 axes)
Solids/Water Resistance:	IP24. Water testing performed with cables connected to the device
EMC:	Complies with the requirements of standard EN 60601-1-2:2001
Safety:	Meets the UL 2601-1, CSA C22.2 No. 601-1, EN 60601-1 and 60601-2-4 standards.
Other Considerations:	Device not suitable for use in the presence of concentrated oxygen or a flammable anesthetic mixture with air, oxygen, or nitrous oxide
Mode of Operation:	Continuous
AC Power Module	
Input:	100-240 VAC, 50-60 Hz, 1-0.46 A (Class 1)
Output:	18 V, 5 A, 90 W
Battery:	Minimum 14.4 V Rechargeable, Lithium Ion
DC Power Module	
Input:	10-32 VDC, 11 A
Output:	18V, 5 A, 90W

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