ALS life support on the run

Philips M3536A HeartStart MRx Monitor/Defibrillator

PHILIPS

Leading the way with meaningful innovations in emergency care. Clinical decision support that positively impacts patient care. Predictive instruments designed to help support confident decision-making. Enhanced resuscitation therapies. Seamless wireless data transmission to reduce workflow complexity. Rugged, durable and reliable. Intuitive and easy to use. This is the HeartStart MRx M3536A ALS monitor/defibrillator for emergency care.

The first thing you'll notice about the HeartStart MRx M3536A monitor/defibrillator is its large, color display. Look further and you'll see that it has much more to offer today's EMS professionals.

Designed with the EMS market specifically in mind, the HeartStart MRx M3536A combines a multi-parameter monitor with 12-Lead ECG acquisition/transmission capability, manual and semi-automated defibrillation, pacing and EMS-specific configuration options in one device. The M3536A unites Philips' industry-leading monitoring technologies with superior diagnostic measurements, predictive instruments, Vital Signs Trending reports, Event Summaries, an open systems approach to data transmission, and our patented resuscitation therapies. With Wireless Link, the M3536A provides fast and seamless data transmission via WiFi or cellular broadband for increased reliability and ease in workflow.

Monitoring starts once a patient cable is connected to the device. The HeartStart MRx is equipped for 3- and 5-Lead ECG monitoring with arrhythmia detection. Options include the advanced DXL 12-Lead ECG algorithm, pulse oximetry, noninvasive blood pressure, invasive pressures, temperature, and end-tidal CO_2. The HeartStart MRx is prepared for today's needs and upgradeable to meet tomorrow's – as your needs evolve so does your HeartStart MRx.

Its therapies – manual and semi automatic defibrillation and synchronized cardioversion – feature Philips' patented low-energy SMART Biphasic waveform, which is effective in emergency resuscitation and for decreasing post-resuscitation heart dysfunction. This external defibrillation waveform is supported by 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 and also provides notification of lack of CPR activity. Q-CPR supports AHA/ERC 2010 Guidelines and protocols. The CPR meter provides feedback 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 and also comes in your choice of colors – white or gray. 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, straightforward ready-for-use checks, data collection, and two long-life batteries make the device easy to operate.

For whatever situation faced during the EMS work day, the HeartStart MRx is built to be tough and ready for action. The M3536A model was subjected to extensive testing for rigorous and demanding environments and has received an Airworthiness Certificate from the United States Army.

All of these features, measurements, and therapies, plus its compact size, low weight (13.9 lbs./6.3 kg), and balanced shape mean that HeartStart MRx has the capabilities you need and the performance you demand for rapid intervention, and quality patient care.

Features/Options/Upgrades

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
- 50mm printer – white devices
- 75mm printer – gray devices
- 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
- One-Second Vitals
- Static IP address capability

Optional Features

- SpO_2 with Fourier Artifact Suppression Technology (FAST)
- Noninvasive Blood Pressure
- Invasive Pressures (2 channels)
- Temperature
- Microstream™ $EtCO_2$
- Noninvasive Pacing
- 12-Lead ECG with Philips DXL algorithm
- 12-Lead ECG Transmission
- 75mm printer – white devices only
- Q-CPR CPR measurement and feedback
- Q-CPR Data Capture
- ACI-TIPI and TPI analysis
- Periodic Clinical Data Transmission
- Batch LAN Data Transfer (via wired or wireless connection)
- Audio Recording
- Event Summary Transfer via FTP
- Wireless Link

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 Materials and Application Notes
- Quick reference cards

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

Option Ordering Information	
A01	SpO_2 – white
A02	SpO_2 and NBP – white
A03	SpO_2, NBP, and $EtCO_2$ – white
A04	$EtCO_2$ – white
A05	SpO_2, NBP, $EtCO_2$ and Temperature – white
A06	SpO_2, NBP, $EtCO_2$, Invasive Pressures and Temperature – white
A07	SpO_2, NBP, Invasive Pressures and Temperature – white
A11	$EtCO_2$ and SpO_2 – white
A20	Base Unit – gray
A21	SpO_2 – gray
A22	SpO_2 and NBP – gray
A23	SpO_2, NBP, and $EtCO_2$ – gray
A24	$EtCO_2$ – gray
A25	SpO_2, NBP, $EtCO_2$ and Temperature – gray
A26	SpO_2, NBP, $EtCO_2$, Invasive Pressures and Temperature – gray
A27	$EtCO_2$ and SpO_2 – gray
B01	External Pacing
B02	12-Lead ECG Acquisition
B04	75 mm Printer
B05	Asian 75mm Printer
B06	12-Lead ECG Transmission – Bluetooth® wireless technology
B08	Q-CPR
B09	Q-CPR Data Capture
B10	Event Summary – Bluetooth
B11	12-Lead Transmission, Rosetta-Lt™ Interface (Available in the U.S. only)
B12	Batch LAN Data Transfer
B14	Audio Recording (all modes)

Option Ordering Informatiozn	
B17	ACI-TIPI and TPI
B18	Periodic Clinical Data Transmission
C01	Standard External Paddles (water resistant for EMS use)
C03	Data Card
C05	Additional Battery
C06	AC Power Module
C07	Barrel style Pad Cable – (replacement for Standard Pad Cable)
C10	5/5 ECG lead set with grabbers
C11	Long (2.7m) ECG trunk cable
C12	3/7-Snap Lead set
C15	5-Lead ECG Cable
C16	Shielded 12-Lead ECG Cable set
C20	Red Carry Case – detachable pouches
C21	Black soft carry case – pads only
C22	Black carry case – detachable pouches
D01	Wireless Link – Generic
D02	Wireless Link – Verizon (available in US only)
D03	Wireless Link – AT&T (available in US only)
LP1	Instructions for Use (printed copy)
LP2	User Training Video (English only)
LP3	User Training DVD (English only)
LPK	Label for AED emphasis
SM1	Service Manual (English only)
SM3	Service Training DVD (English only)
W01	One-Year On-Site Warranty
W22	Two-Year Biomed Warranty (U.S. and Canada only)
WA2	Three-Year Bench Warranty with Loaner (U.S.,Canada and Australia only)

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Upgrades	
860376	Verizon Wireless Link (US only)
860377	AT&T Wireless Link (US only)
860378	Generic Wireless Link
860383	Generic Wireless Link for MRx with BT
860384	Verizon Wireless Link for MRx with BT (US only)
860385	AT&T Wireless Link for devices with BT (US only)
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
861485	EMS Software Upgrade
861492	Handle and Cap Plate (for Pads) – gray
989803153411	Internal Bluetooth Card
M3530A	SpO_2
M3531A	NBP
M3532A	$EtCO_2$
M3533A	Pacing
M3534A	12-Lead ECG Option B02 – Acquisition Option B04 – 75mm Printer
M3801A	12-Lead Transmission (Bluetooth)
M3802A	12-Lead Transmission (RS-232 and Bluetooth)
M3806A	Device Software
M3808A	Therapy PCA
M4760A	Handle and Cap Plate (for Pads) – white
M4765A	Option B02 - 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 CO_2 – Water Resistant Paddles

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Supplies

Multifunction Electrode Pads

White Barrel Connector	
M3501A	Adult/Child Pads, barrel connector
M3504A	Infant Pads, barrel connector
Gray Plug Connector	
M3713A	HeartStart Adult/Child Plus Pads
M3716A	HeartStart Adult/Child Radiolucent Pads
M3717A	HeartStart Infant Plus Pads
M3718A	HeartStart Adult/Child Radiotransparent/Reduced Skin Irritation Pads
M3719A	HeartStart Infant Radiotransparent/ Reduced Skin Irritation Pads
989803166021	HeartStart Adult/Child Preconnect Pads

Hands-Free Pads Therapy Cables	
M3507A	Defibrillator Pads Hands-Free Cable, barrel style (2.2 m/7 ft.)
M3508A	Defibrillator Pads Hands-Free Cable, plug style (2.2 m/7 ft.)
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 (10 pack)
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)

External Paddles	
M3543A	Water Resistant External Paddles

12-Lead ECG Cables	
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)
M1971A	10-electrode cable set, extremities, grabber (use with M1978A) (IEC)
M1976A	10-electrode cable set, chest, grabber (use with M1968A) (AAMI)
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)

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

3-Lead ECG Cables	
M1500A	3-Lead ECG trunk cable (AAMI)
M1510A	3-Lead ECG trunk cable (IEC)
M1605A	3-Lead ECG set with snaps (AAMI)
M1615A	3-Lead ECG set with snaps (IEC)
M1669A	3-Lead ECG trunk cable (AAMI/IEC)
M1671A	3-Lead ECG set grabber (AAMI/ICU)
M1672A	3-Lead ECG set ICU grabber (IEC)
M1673A	3-Lead ECG set with snaps (ICU)
M1674A	3-Lead ECG set with snaps (IEC, ICU)
M1675A	3-Lead ECG set with grabbers (OR)
M1678A	3-Lead ECG set, grabber (IEC, OR)
989803173121	3-Lead ECG disposable, bedside (AAMI)
989803173141	3-Lead ECG disposable, telemetry (AAMI)
989803174201	3-Lead ECG disposable, bedside (IEC)

5-Lead ECG Cables	
M1520A	5-Lead ECG trunk cable (AAMI)
M1530A	5-Lead ECG trunk cable (IEC)
M1602A	5-Lead chest ICU snaps (AAMI)
M1604A	5-Lead chest ICU snaps (IEC)
M1625A	5-Lead ECG set with snaps (AAMI)
M1635A	5-Lead ECG set with snaps (IEC)
M1644A	5-Lead ICU snaps (AAMI)
M1645A	5-Lead ICU snaps (IEC)
M1668A	5-Lead ECG trunk cable (AAMI/IEC)
M1949A	5 plus 5 ECG trunk cable (AAMI/IEC)
M1968A	5-Lead ICU grabber (AAMI)
M1971A	5-Lead ICU grabber (IEC)
M1973A	5-Lead OR grabber (AAMI)
M1974A	5-Lead OR grabber (IEC)
M1976A	5-Lead OR grabber (IEC)
M1978A	5-Lead chest ICU grabber (AAMI)
M1979A	5-Lead chest ICU grabber (IEC)
M1984A	5-Lead chest OR grabber (IEC)
989803173131	5-Lead ECG disposable, bedside (AAMI)
989803173151	5-Lead ECG disposable, telemetry (IEC)
989803174211	5-Lead ECG disposable, bedside (IEC)
989803176161	5-Lead shielded limb snap (AAMI)
989803176171	5-Lead shielded chest snap (AAMI)
989803176181	5-Lead shielded limb snap (IEC)
989803176191	5-Lead shielded chest snap (IEC)

SpO_2	
M1131A	Disposable SpO_2 Sensor – adult/pediatric finger
M1191A	Reusable SpO_2 Sensor – adult finger
M1191B	Reusable SpO_2 Sensor – adult finger
M1191AL	Reusable SpO_2 Sensor – adult finger (3m cable)
M1191BL	Reusable SpO_2 Sensor – adult finger (3m cable)
M1191T	Reusable SpO_2 Sensor – adult finger (9-pin connector)
M1192A	Reusable SpO_2 Sensor – pediatric/small adult
M1192T	Reusable SpO_2 Sensor – pediatric finger (9-pin connector)
M1193A	Reusable SpO_2 Sensor – neonatal hand/foot
M1194A	Reusable SpO_2 Sensor – adult/pediatric ear clip
M1195A	Reusable SpO_2 Sensor – infant
M1196A	Reusable SpO_2 Sensor – adult clip
M1196T	Reusable SpO_2 Sensor – adult clip (9-pin connector)
M1903B	Disposable SpO_2 Sensor – pediatric finger (available outside the U.S. only)
M1904B	Disposable SpO_2 Sensor – adult finger (available outside the U.S. only)
M1941A	SpO_2 Extension Cable (2m)
M1943A	Reusable SpO_2 Sensor Adapter Cable (1m) – use with M1903B/M1904B
989803164571	Cardinal Reusable SpO_2 Clip Sensor
989803164581	Cardinal Disposable Adult/Pediatric SpO_2 Sensor

NBP Interconnect Tubing	
M1598B	Adult Pressure Interconnect Cable (1.5m)
M1599B	Adult Pressure Interconnect Cable (3m)

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Reusable Blood Pressure Cuffs	
40400A	Reusable Cuff Kit, 3 sizes (pediatric, adult, large adult)
40400B	Reusable Cuff Kit, 5 sizes (infant, pediatric, adult, large adult, thigh)
40401A	Traditional Reusable Cuff – infant
40401B	Traditional Reusable Cuff – pediatric
40401C	Traditional Reusable Cuff – adult
40401D	Traditional Reusable Cuff – large adult
40401E	Traditional Reusable Cuff – thigh
M4552B	Easy Care Reusable Cuff – infant
M4552B5	Easy Care Reusable Cuff – infant (5)
M4553B	Easy Care Reusable Cuff – pediatric
M4553B5	Easy Care Reusable Cuff – pediatric (5)
M4554B	Easy Care Reusable Cuff – small adult
M4554B5	Easy Care Reusable Cuff – small adult (5)
M4555B	Easy Care Reusable Cuff – adult
M4555B5	Easy Care Reusable Cuff – adult (5)
M4556B	Easy Care Reusable Cuff – adult long
M4556B5	Easy Care Reusable Cuff – adult long (5)
M4557B	Easy Care Reusable Cuff – large adult
M4557B5	Easy Care Reusable Cuff – large adult (5)
M4558B	Easy Care Reusable Cuff – large adult X-Long
M4558B5	Easy Care Reusable Cuff – large adult X-Long (5)
M4559B	Easy Care Reusable Cuff – thigh
M4559B5	Easy Care Reusable Cuff – thigh (5)
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

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 PX212	Edwards Lifescience
DTX Plus DT-4812	Becton, Dickinson and Co.

*Available for purchase/service from the respective manufacturers.

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	3.0m 2-pin plug extension cable for mini phone plug
21082B	1.5m 2-pin plug extension cable for mini 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
M5528A	Vehicle wall mount
M5529A	DC power module
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	50mm Chemical Thermal, Gray Grid (10 rolls)
40457D	50mm Chemical Thermal, Gray Grid (80 rolls)
989803138171	75mm Chemical Thermal, Red Grid (10 rolls)
989803138181	75mm Chemical Thermal, Red Grid (80 rolls)

Sync Cables	
M1783A	Sync Cable (2.5m/8ft)
M5526A	Sync Cable (7.6m/25ft)

Miscellaneous	
M1781A	Test Load for use with M3507A Pad Cable
M3537A	Bedrail Hook mount
M3541A	Red Carrying Case (includes 3 accessory pouches and shoulder strap)
M3549A	Wide Bedrail Hook mount
M3725A	Test Load for use with M3508A Pad Cable
M4737A	Display cover
M4759A	Replacement adult paddle
M5525A	Handle – light gray (for white M3536A)
453564063841	Calibration Kit – NBP
453564063851	Calibration Kit – $EtCO_2$
989803180111	Handle – dark gray (for gray M3536A)
M5528A	Vehicle wall mount
989803146981	Data card and tray
989803174901	Green Hard Transport Case (pads only)
989803176411	Paddle tray kit
989803176541	Quick Disconnect DC Power Cable
989803179151	Night-Vision Goggle Compatible Display Cover
989803176541	Quick Disconnect DC power cable
989803172501	Black Soft Carry Bag
989803174261	Black Soft Carry bag – straps only
989803180871	Black Carrying Case (includes 3 accessory pouches and shoulder strap)
989803184471	Wireless Link Hardware – Generic
989803184691	Wirelss Link Cable Kit

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Specifications

Delivered Energy Accuracy

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

Accuracy: ±2J for 1–10J energy levels; ±15% for all other energy levels.

Defibrillator	
Waveform:	Biphasic Truncated Exponential. Waveform parameters adjusted as a function of patient impedance
Shock Delivery:	Via multifunction electrode pads, or paddles
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:	15ohm (internal defibrillation); 25ohm (external defibrillation)
Maximum:	180ohm

Note: Actual functional range may exceed the above values.

General	
Dimensions with pads:	12.4in (W) x 8.3in (D) x 11.7in (H) (31.5cm x 21.0cm x 29.5cm)
Dimensions with paddles:	13.4in (W) x 8.3in (D) x 13.6in (H) (34.0cm x 21.0cm x 34.5cm)
Weight:	13.9lbs (6.3kg) including pads, pads cable, full roll of paper, and battery. Incremental weight of external standard paddles and paddle tray is 2.5lbs. (1.1kg). Additional battery weighs less than 1.8lbs. (0.82kg)

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:	Ventricular fibrillation and certain ventricular tachycardias, including ventricular flutter and polymorphic ventricular tachycardia
Shock Advisory Algorithm Sensitivity and Specificity:	Meets AAMI DF-80

ECG and Arrhythmia Monitoring	
Inputs:	Up to four ECG waves may be viewed on display and up to two 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 two multifunction pads.
Lead Fault:	Device automatically switches to a source that has a good signal when the current signal is unavailable. Target ECG waveform can be configured.
Pad Fault:	Dashed line appears on the display if a pad becomes disconnected.
Heart Rate Display:	Digital readout on display from 15 to 300bpm, with an accuracy of ±10%
Heart Rate/ Arrhythmia Alarms:	HR, Asystole, VFIB/VTACH, VTACH, Extreme Tachy, Extreme Brady, PVC rate, Pacer not capture, Pacer not pacing
Pacemaker Pulse Rejection Capability:	Amplitude from ±2 mV to ±700 mV, width from 0.1ms to 2.0ms as per ANSI/AAMI EC13:1992 3.1.4.1.
ECG Cable Length:	9ft (2.7m)
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:	60Hz or 50Hz
3-Lead, 5-Lead, and Pads:	Pads ECG for Display: Monitor (0.15 – 40Hz) or EMS (1 – 30Hz); Pads ECG for Printer: Monitor (0.15 – 40Hz) or EMS (1 – 30Hz); Leads ECG for Display: Monitor (0.15 – 40Hz) or EMS (1 – 30Hz); Leads ECG for Printer: Diagnostic (0.05 – 150Hz) or Monitor (0.15 – 40Hz) or EMS (1 – 30Hz)
12-Lead:	ECG for Display: (0.05 – 150Hz), (0.05 – 40Hz), (0.15 – 40Hz); ECG for Report: (0.05 – 150Hz), (0.05 – 40Hz), (0.15 – 40Hz), (0.05 – 150Hz)

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:	8.4in diagonal (128mm x 171mm)
Type:	TFT Color LCD
Resolution:	640 x 480 pixels (VGA)
Wave Viewing Time:	5 seconds (ECG)
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

Battery	
Type:	Rechargeable, Lithium Ion; minimum 6.30Ah, 14.4V, 91Wh
Dimensions:	6.5in (H) x 3.8in (W) x 1.6in (D) (165mm x 95mm x 42mm)
Weight:	Less than 1.8lb (0.82kg)
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 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 remaining (with a new battery at room temperature, 25°C)

Battery Capacity*	
Shocks:	At least 50 200J charge/shock or disarm cycles
Monitoring only:	At least 9 hours of ECG monitoring with no other options installed
Monitoring and Shocks:	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
Monitoring and Pacing:	At least 3.5 hours while pacing at 180 ppm at 160 mA and monitoring as described above

*With a new, full-charged battery at 25°C (77°F).

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 50mm/s with an accuracy of ± 5%
Amplitude Accuracy:	± 5% or ± 40uV, whichever is greater
Paper Size:	50mm (W) by 30m (100ft) (L) 75mm (W) by 30m (100 ft) (L)

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

SpO_2 Pulse Oximetry	
SpO_2 Range:	0 – 100%
Pulse rate:	30 – 300bpm
Maximum Power Output:	< 15mW
Wavelength Range:	500 – 1000nm
Resolution:	1%
Display Update Period:	1 sec. typical numeric update rate
Accuracy with Sensor	
M1191A	1 standard deviation 70 – 100%, ± 2.0%
M1191AL	1 standard deviation 70 – 100%, ± 2.0%
M1191B	1 standard deviation 70 – 100%, ± 2.0%
M1191BL	1 standard deviation 70 – 100%, ± 2.0%
M1191T	1 standard deviation 70 – 100%, ± 2.0%
M1192A	1 standard deviation 70 – 100%, ± 2.0%
M1192T	1 standard deviation 70 – 100%, ± 2.0%
M1194A	1 standard deviation 70 – 100%, ± 3.0%
M1195A	1 standard deviation 70 – 100%, ± 3.0%
M1196A	1 standard deviation 70 – 100%, ± 3.0%
M1196T	1 standard deviation 70 – 100%, ± 3.0%
M1131A	1 standard deviation 70 – 100%, ± 3.0%
Pulse Rate Accuracy:	2% or 1bpm (whichever is greater)
Pulse Alarm Range:	Low limit: 30 – 195 (adults); 30 – 235 (pediatric) High limit: 35 – 200 (adult); 35 – 240 (pediatric)
SpO_2 Alarm Range:	Low limit: 50 – 99% (adult/pediatric) High limit: 51 – 100% (adult/pediatric)
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 SpO_2 module with Fourier Artifact Suppression Technology (FAST). This module is not available as a stand-alone device.

Non-Invasive Blood Pressure

Pressure Range	
Systolic:	40 – 260mmHg
Diastolic:	20 – 200mmHg
Initial Pressure:	160mmHg (adult); 120mmHg (pediatric)
Maximum Pressure:	280mmHg
Overpressure Safety Limits:	Maximum of 300mmHg
Cuff Inflation Time:	75 second maximum (pediatric or adult)
Pressure Transducer Accuracy:	±3mmHg
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)
Other	
Calibration Schedule:	Yearly or every 10,000 cycles
Auto Mode Repetition Time:	1, 2.5, 5, 10, 15, 30, 60, or 120 minutes
Measurement Time:	Auto/manual mode: 30 seconds (average) @ HR > 60bpm, 170 seconds (maximum)
Interconnect Tube Length:	M1598B Connect tubing 5ft (1.5m) M1599B Connect tubing 10ft (3m)

End-Tidal Carbon Dioxide	
Range:	0 – 99mmHg at sea level
Resolution:	1mmHg (0.1kPa)
Accuracy:	For values between 0 and 38mmHg: ±2mmHg. For values between 39 and 99mmHg: ±5% of reading + 0.08% for every 1mmHg (above 40mmHg). For breath rates above 80 and $EtCO_2$ values > 18mmHg: accuracy is 4mmHg or ±12% of reading, whichever is greater.
Alarm Range:	Low Limit: 10 – 94mmHg (adult/pediatric) High Limit: 20 – 95mmHg (adult/pediatric)
Calibration Schedule:	Yearly or every 4,000 hours
Sample Size:	50ml per min
Drift of Measurement Accuracy:	Over a 24-hour period, accuracy claims above are maintained.

Airway Respiration Rate	
Range:	0 – 150rpm
Resolution:	1 rpm
Accuracy:	0 – 40rpm ±1rpm 41 – 70rpm ±2rpm 71 – 100rpm ± 3rpm 101 – 150rpm ± 5rpm
Alarm Range:	Low Limit: 0 – 99rpm (adult/pediatric) High Limit: 10 – 100rpm (adult/pediatric)

Calibration Gas for CO_2	
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:	5µV/V mmHg (37.5µV/V/kPa)
Sensitivity Adjustment Range:	±10%
Transducer Load Resistance:	195 to 2200ohms
Transducer Output Resistance:	0 to 3000ohms
Frequency Response:	0 – 12Hz or 0 – 40Hz
Zero Adjustment Range:	±200mmHg (±26.7kPa)
Zero Adjustment Accuracy:	±1.0mmHg (±0.1kPa)
Zero Setting Drift:	< 0.1mmHg/°C (0.013kPa/°C)
Gain accuracy (excluding transducers):	±1% of reading or 1mmHg (0.1kPa) whichever is greater
Gain Drift:	less than 0.05%/°C
Overall Accuracy (included listed transducers):	±4% of reading or 4mmHg (0.5kPa) whichever is greater
Measurement Range:	-40 to 361mmHg (-5.3 to 48.1kPa)
Measurement Resolution:	1mmHg (0.1kPa)
Noise:	< 1mmHg (0.1kPa)
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 – 350bpm
Pulse Rate Accuracy:	1% of full range
Pulse Rate Resolution:	1bpm

Temperature	
Range:	0° – 45°C (32° – 113°F)
Resolution:	0.1°C (0.2°F)
Accuracy:	+0.1°C from 25°C to 45°C; +0.3°C from 0°C to 24.9°C (excluding any adapter cable)
Settling Time Constant:	< 10sec
Averaging Time:	1sec
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 – 40Hz, 0.05 – 40Hz, 0.05 – 150Hz
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 Telemedicine System, it can be displayed, printed, faxed, emailed, or forwarded to another Telemedicine System. 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 if you have a 64 megabyte card installed) of patient data, whichever comes first.
Data Card Event Summary:	The Data Card has a maximum capacity of 60 Event Summaries or 240 megabytes (62 megabytes if 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:	8.3oz. (235g)
Input Voltage:	4.0 – 6.0V at 170mA. The CPR meter is electrically and galvanically isolated from the defibrillator power and communication sources.
Storage Temperature:	-20° – 60°C (-4° – 140°F)
Operating Temperature:	0° – 50°C (32° – 122°F).
Storage Relative Humidity:	0 – 75%
Operating Relative Humidity:	0 – 95%
Solids/Water Resistance:	IP55. Meets ISO/IEC 60529.
EMC:	Meets IEC 60601-1-2 and RTCA/DO-160E.

CPR Meter Adhesive Pads	
Dimensions:	39mm x 90mm
Storage Temperature:	-20° – 60°C (-4° – 140°F).
Operating Temperature:	0° – 50°C (32° – 122°F).
Storage Relative Humidity:	0 – 75%
Operating Relative Humidity:	0 – 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).	

AC Power Module	
Input:	100 – 240VAC, 50-60Hz, 1-0.46A (Class 1)
Output:	18V, 5A, 90W
Battery:	Minimum 14.4V Rechargeable, Lithium Ion

DC Power Module	
Input:	10 – 32VDC, 11A
Output:	18V, 5A, 90W

Environmental	
Temperature:	0° – 45°C operating, -20° – 70°C storage
Humidity:	Up to 95% relative humidity
Atmospheric Pressure Range:	Operating and Storage – 1014hPa to 572hPa (0 to 15,000ft; 0 to 4,500m)
Shock – Operating Impact:	Half-sine waveform, duration < 3ms, acceleration > 145g, 1 time on all six faces.
Shock – Non-Operating:	Trapezoidal waveform, acceleration ≥ 30g, velocity change = 742cm/s ± 10% on all six faces.
Bump:	EN60068-2-29 Bump (Half-sine, 40g peak, 6msec 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) – 30in (76.2cm) with carrying case – 16in (40.6cm) without carrying case
Vibration – Operating Impact:	Operating: MIL STD 810E 514.4 Category 6 Helicopter, General Storage, UH60
Vibration – Non-Operating:	– IEC 68-2-6 Vibration (sinusoidal) (10 – 57Hz, ± 0.15mm; 58 – 150Hz, 2g; 20 sweeps x 3 axes) – IEC 68-2-64 Vibration, broad-band random (10 – 20Hz, $0.05g^2/Hz$; 20 – 150Hz, -3dB/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

Wireless Link

Specifications	
Weight:	12.8oz (362.9g)
Dimensions:	120mm x 90mm x 45mm (4.72in x 3.54in x 1.77in)
Cable Length:	352mm (13.85in)
Operating Temperature:	0° – 45°C (32° – 113°F)
Storage Temperature:	-20° – 70°C (-4° – 158°F)
Humidity:	Up to 95% relative humidity
Cellular Transmission (2G and 3G)	
Supported Frequency Bands:	GSM/GPRS/EDGE: 850/900/1800/1900 MHz
	UMTS/HSDPS/HSUPA: 800-850/900/1900/2100 MHz and AWS band (1700/2100MHz) (B1, B2, B4, B5, B8)
	CDMA 1xRTT/EV-DO revA: 800/1900 (BC0, BC1)
Maximum RF output power:	Power Class 4 (2 W, 33dBm) for GSM/GPRS 850/900MHz bands
	Power Class 1 (1W, 30dBm) for GSM/GPRS 1800/1900MHz bands
	Power Class E2 (0.5W, 27dBm) for EDGE 850/900MHz bands
	Power Class E2 (0.4W, 26dBm) for EDGE 1800/1900MHz bands
	Power Class 3 (0.25W, 24dBm) for UMTS 850/900/1900/2100MHz bands
	Power Class 3 (0.25W, 24dBm) for 1xRTT and EV-DO
WiFi Transmission	
ISM Band:	802.11b and 802.11g use the 2.4GHz ISM band
Transmit Power:	±15dBm typical for both 802.11b and 802.11g
Baseline Modulation:	OFDM (802.11g); DSSS/CCK (802.11b)
Security and Encription:	WEP (64/128bit), WPA-PSK (TKIP/AES), WPA2-PSK (AES/TKIP)

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