



Advanced and basic life-support

Philips M3535A HeartStart MRx Monitor/Defibrillator

PHILIPS

No compromises. That's how we created the HeartStart MRx, a combination transport monitor, cardiograph, manual defibrillator, and AED. HeartStart MRx unites our industry-leading patient monitoring capabilities with our patented biphasic defibrillation therapy in one comprehensive, easy-to-use, rugged, and lightweight device, optimized to meet a variety of user needs.

With carefully arranged controls, connections, and menus, HeartStart MRx efficiently provides comprehensive diagnostic measurements without compromising critical, lifesaving therapy. Monitoring and resuscitation functions are clearly delineated, with monitoring located on one side of the device and defibrillation, pacing, and cardioversion on the other.

The HeartStart MRx is 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 monitoring. Patient status and care data --- including numeric vital signs and up to four waves, as well as text prompts, alarms, an event timer, event markers, and battery status indicators --- are logically organized on the device's large, backlit, color display. Vital Signs Trending Reports and Event Summaries are also available.

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 compressions.

By using the IntelliVue Networking Option, the HeartStart MRx can connect to and communicate with the Philips IntelliVue Clinical Network via a wired network connection or wirelessly (where available). When on the network the HeartStart MRx performs similarly to a bedside monitor, sending waveforms and patient parameters along with alarms and INOP messages to the Information Center while still providing defibrillation and pacing capabilities at the bedside.

The HeartStart MRx also provides a suite of Data Transmission options. Combining various options allows you the flexibility of multiple transmissions avenues. It is our mission to produce the finest quality medical equipment, enabling you to deliver effective care and ultimately save lives. We strive to meet the evolving needs of the healthcare community with outstanding technology and innovation, while always focusing on what's most important - positive patient outcomes. Whether it's the long-life batteries, automated ready for use testing, industry-leading algorithms or a data management solution, HeartStart MRx has the capabilities you need and the performance you demand - no compromises.

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
- ECG out capability (analog)

Optional Features

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

Standard Accessories

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

Package

M3535A HeartStart MRx Monitor/Defibrillator

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

Ordering Option Information	
A01	SpO ₂
A02	SpO ₂ and NBP
A03	SpO ₂ , NBP, and EtCO ₂
A04	EtCO ₂
A05	SpO ₂ , NBP, EtCO ₂ and Temperature
A06	SpO ₂ , NBP, EtCO ₂ , Invasive Pressures and Temperature
A07	SpO ₂ , NBP, Invasive Pressures and Temperature
A11	EtCO ₂ and SpO ₂
B01	External Pacing
B02	12-Lead ECG Acquisition
B04	75 mm Printer
B05	Asian 75mm printer
B06	12-Lead ECG Transmission - Bluetooth® wireless technology
B07	12-Lead ECG Transmission - RS232 & Bluetooth
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)
B15	IntelliVue Network Enabled (Wired)
B16	IntelliVue Network Enabled w/radio (Wired and Wireless - Available in the U.S. only)
B17	ACI-TIPI and TPI
B18	Periodic Clinical Data Transmission

Ordering Option Information	
C01	Standard External Paddles
C02	Water Resistant External Paddles
C03	Data Card
C04	Carrying Case
C05	Additional Battery
C07	Barrel style Pad Cable (Replacement for Standard Pad Cable)
C15	5-Lead ECG Cable
LP1	Instructions for Use
LP2	User Training Video (English only)
LP3	User Training DVD (English only)
SM1	Service Manual (English only)
SM3	Service Training Video (DVD, English only)
W01	One-Year On-Site Warranty
W23	Two-Year Bench Warranty (Europe Only*)
W24	Five-Year Bench Warranty with Loaner (U.S. & Canada only)
WA1	Five-Year Biomed Warranty (U.S., Canada & Australia only)
WA2	Three-Year Biomed Warranty (U.S., Canada & Australia only)
W08	Three-Year Bench Warranty with Loaner (Australia & New Zealand only)

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Upgrades/Supplies/Accessories

Upgrades	
861325	Event Summary, Bluetooth
861326	12-lead transmission, Rosetta-Lt Interface (available in the U.S. only)
861356	IntelliVue Network Enabled
861357	IntelliVue Network Enabled w/radio (Wired and Wireless - 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 C01 - Standard Paddles Option C02 - Water Resistant Paddles

External Paddles	
M3542A	Standard External Paddles
M3543A	Water Resistant External Paddles
M4745A	Sterilizable External Paddles

Internal Paddles	
M1741A	7.5 cm Switchless
M1742A	6.0 cm Switchless
M1743A	4.5 cm Switchless
M1744A	2.8 cm Switchless
M4741A	7.5 cm Switched
M4742A	6.0 cm Switched
M4743A	4.5 cm Switched
M4744A	2.8 cm Switched
M4740A	Internal Paddles Adapter Cable (use with all M174xA series internal paddles)

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)

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)
M1672A	3-Lead ICU Grabber (IEC)
M1673A	3-Lead ICU Snaps (AAMI)
M1674A	3-Lead ICU Snaps (IEC)
M1675A	3-Lead OR Grabber (AAMI)
M1678A	3-Lead OR 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)

Sync Cables	
M1783A	Sync Cable 8 ft. (2.4 m)
M5526A	Sync Cable 25 ft. (7.6 m)

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 Cables	
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 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
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

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

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	Becton, Dickinson and Co.
Plus™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 Temp. Probe Extension Cables	
21082A	3.0 m 2-pin plug extension for minim phone plug
21082B	1.5 m 2-pin plug extension for minim phone plug

Power	
M3538A	Lithium Ion Battery with fuel gauge
M3539A	AC 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

Networking	
989803148551	Instrument Telemetry 1.4 GHz radio and A/C module (Available in the U.S. only.)
M4842-61300	1.4 GHZ replacement antenna. (Available in the U.S. only.)

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)

Color Handle	
M5521A	Green and color label set
M5522A	Blue and color label set
M5523A	Yellow and color label set
M5524A	Rose and color label set
M5525A	Gray and color label set

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
M3537A	Bedrail Hook mount
M3549A	Wide Bedrail Hook mount
M4737A	Display cover

Specifications

Defibrillator	
Waveform:	Biphasic Truncated Exponential. Waveform parameters adjusted as a function of patient impedance
Shock Delivery:	Via multifunction defib 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. Less than 15 seconds when operating without a battery, using the M3539A AC power module alone at 90% rated mains voltage.

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 J; maximum energy limited to 50 J for internal defibrillation
Controls:	On/Off Therapy Knob, Charge, Shock, Sync, Print, Mark Event, ECG Lead Select, Alarm Pause, Event Review, Disarm
Energy Selection Control:	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:	Ventricular fibrillation and certain ventricular tachycardias, including ventricular flutter and polymorphic ventricular tachycardia
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 wire 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
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)

ECG and Arrhythmia Monitoring	
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
CPR meter:	Type BF
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.
Capacity:	At least 5 hours of monitoring with ECG, SpO ₂ , CO ₂ , temperature and two invasive pressures monitored continuously, NBP measured every 15 minutes, and 20 200-joule discharges (on 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	
Range:	SpO ₂ : 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%, $\pm 2.0\%$
M1191AL sensor	- 1 standard deviation 70% to 100%, $\pm 2.0\%$
M1191B 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%, $\pm 2.0\%$

SpO ₂ Pulse Oximetry	
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)
SpO ₂ Alarm Range	
Low Limit:	50 to 99% (Adult/Pediatric)
High Limit:	51 to 100% (Adult/Pediatric)
SpO ₂ and Pulse High/Low Alarm Signal Generation Delay:	10 seconds
Pulse Alarm Range:	
Low Limit:	30 to 195 (adults); 30 to 235 (pediatric)
High Limit:	35 to 200 (adult); 35 to 240 (pediatric)

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 Safety Limits:	Maximum of 300 mmHg
Cuff Inflation Time:	75 second maximum (pediatric or adult)
Pressure Transducer Accuracy:	±3 mmHg
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 Repetition Time:	1, 2.5, 5, 10, 15, 30, 60, or 120 minutes
Measurement Time:	Auto/manual mode: 30 seconds (average) @ HR > 60 bpm, 170 seconds (maximum)
Interconnect Tube Length	
M1598B Connect tubing 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 (0.1kPa)
Accuracy:	For values between 0 and 38 mmHg: ±2 mmHg. For values between 39 and 99 mmHg: ±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 ± 12% of reading, whichever is greater.
Drift of Measurement Accuracy:	Over any 24-hour period, the accuracy claims above are maintained.
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.

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 100rpm ± 3 rpm 101 to 150rpm ± 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 System	
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: 10 L

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:	<0.1mmHg/ $^{\circ}$ 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 (0.5 kPa) whichever is greater
Measurement Range:	-40 to 361 mmHg (-5.3 to 48.1 kPa)
Measurement Resolution:	1 mmHg (0.1 kPa)
Noise:	<1 mmHg (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):	≤ 3 mmHg
Pulse Rate Range:	25-350 bpm
Pulse Rate Accuracy:	1% of full range
Pulse Rate Resolution:	1 bpm

Temperature	
Measurement Range:	0°-45°C (32° - 113°F)
Measurement Resolution:	0.1°C (0.2°F)
Measurement Accuracy (excluding any adapter cable):	+0.1°C from 25°C to 45°C; +0.3°C from 0°C to 24.9°C
Settling Time Constant:	<10 seconds
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	0.15 - 40 Hz
Bandwidth	0.05 - 40 Hz
Filters:	0.05 - 150 Hz
Cellular transmission via a device with Bluetooth® wireless technology or a cell phone with an RS232 connection. 12-Lead ECGs are transmitted through an ISP and 12-Lead Transfer Station to printer, fax and/or TraceMaster ECG Management System with version A.02.01 or greater.	
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 if a 64 megabyte card is 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 a 64 megabyte card is 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:	4.00-6.00 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	IP55. Meets ISO/IEC 60529
Resistance:	
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).	

Networking	
Connection:	Connects via Local Area Network (LAN) to the Philips IntelliVue Clinical Network (System J or later).
Connection types:	Wired or wireless. Wireless uses a radio module attached to the AC power supply and is available in the U.S. only.
Telemetry channels:	The maximum number of telemetry channels may be limited in some geographies.
Device meets FCC 47 CFR Part 15 and Part 95 for WMTS transmission.	

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: 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
Vibration:	Operating: Random vibration, 0.30 grms, 5-500 Hz for ≥10 minutes/axis PSD=0.0002 g ² /Hz from 5 to 350 Hz, -6 dB/octave slope from 350 to 500 Hz Storage: Random vibration, 2.41 grms, 5-500 Hz for ≥10 minutes/axis PSD = 0.02 g ² /Hz from 5 to 100 Hz, -6 dB/octave slope from 100 to 137 Hz, 0 dB/octave slope from 137 to 350 Hz, -6 dB/octave slope from 350 to 500 Hz
Water/Solids Resistance:	IP24 if used with water-resistant paddles (M3543A) or pads only. IP20 if used with other paddles.
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: 18V, 5A, 90W
Battery:	Minimum 14.4 V Rechargeable, Lithium Ion

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Please visit www.philips.com/heartstart



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