

Power to see the big picture

Philips HeartStart MRx ALS Monitor

PHILIPS

The capabilities you and the performance



HeartStart MRx has the capabilities you need and the performance you demand for rapid intervention, thorough care and positive patient outcomes.

need you demand

All of these measurements, therapies and features, plus its compact size, low weight (13.2 pounds), and balanced shape make HeartStart MRx easy to carry, easy to stow, and above all, easy to operate.

- · Thoughtfully organized controls and ports clearly separate functions, monitoring from therapeutic.
- Monitoring starts once a patient cable is connected to the device.
- Monitoring and therapy data are clearly and logically arranged on-screen.
- · Large numeric measurements, waveforms, and alarm indicators enable the user to quickly locate information.

Measures

- The appearance of measurements and waveforms can be customized, and the screen organized to the user's preferences.
- · On-screen menus simplify navigation for configuring data, setting and responding to alarms, and accessing additional functionality.



Monitoring Capabilities

- · Monitoring through defibrillation pads
- · 3- and 5-lead ECG monitoring through electrodes
- ST/AR Basic[™] arrhythmia detection
- FAST-SpO₂ (Fourier Artifact Suppression Technology), optional
- Noninvasive Blood Pressure (NBP), optional
- Microstream[®] Capnography (etCO), optional
- 12-Lead ECG, optional
- Q-CPR[™] Measurement and Feedback, optional

Therapies

- SMART Biphasic waveform
- · Manual mode with shock delivery through defibrillation pads or paddles
- AED mode
- Synchronized cardioversion
- Noninvasive pacing, optional

Features

- · Adjustable ECG size and autogain
- 8.4 inch (diag.), 4-wave color display, largest in its class
- 12-lead data transmission
- Data collection and event summary
- Strip chart printer
- · Automated self-tests
- Operational checks
- · Individual, adjustable volume of QRS beeper, voice prompts, and alerts
- Lithium ion battery (2 bays) with capacity gauge
- "Ready-for-Use" indicator
- Configuration mode
- Diagnostic mode
- Carrying Case
- Bed rail hook
- AC and DC power modules, optional
- Ambulance mounting bracket, optional



A typical monitoring view shows some basic patient information, the date, time and battery status. Next are the numerics and waveforms. The bottom half of the screen shows additional monitoring numerics followed by their waveforms, and soft keys for customizing the display, setting and responding to alarms, and selecting parameters to view additional monitoring data.



In 12-lead preview mode, 12 waves are viewable on-screen, in addition to numeric vital sign values.

Superior Measurements

Arrhythmia Monitoring

- Philips' ST/AR Basic arrhythmia algorithm.
- Analyzes ECGs for heart rate, while continuously monitoring for ventricular arrhythmias.
- Detects 10 rhythm disturbances and irregularities, including 5 life-threatening arrhythmias: asystole, ventricular fibrillation, ventricular tachycardia, extreme bradycardia, and extreme tachycardia.
- Generates visible and audible alarms as needed.

SpO₂ with Fourier Artifact Suppression Technology (FAST-SpO₂)

- Low-noise hardware and patented digital processing to prevent false readings, drop-outs and false alarms in the presence of motion and other interferences.
- Applies rule-based analysis to technical and physiological criteria and quality indicators to generate the Fourier spectrum.
- Measures reliably even in the presence of low peripheral perfusion.

Noninvasive Blood Pressure (NBP)

- ADVANTAGE® oscillometric, motiontolerant, noninvasive blood pressure system from SunTech Medical Instruments.
- Measures systolic and diastolic pressure and calculates mean arterial pressure.

Microstream® Capnography (etCO₂)

- Microstream[®] CO₂ technology from Oridion Medical.
- No zeroing, no heating and no sensor to interfere with the patient's airway.
- Microstream's FilterLine® airway adapter and sample line inhibit the build-up of condensed water and secretions.
- Works on both intubated and nonintubated patients, adult and pediatric.

Philips 12-Lead ECG

- Philips' 12-Lead ECG algorithm.
- Removes noise and artifact before generating interpretive statements.
- Detects and stratifies early acute coronary syndromes, for patients with symptoms of ST-segment elevation acute myocardial infarction (STEMI).
- 12-Lead ECG algorithm employs its Pediatric Criteria Program, which recognizes 12 distinct age groups for patients under the age of 16.



Complete 12-lead reports can be transmitted from Heart-Start MRx to the receiving hospital, giving the ED and/or catheterization lab a head start in preparing for patient care. Utilizing the latest cell phone technologies, the speed and encryption capability of the Internet, and Philips HeartStart 12-Lead Transfer Station software, reports can be viewed online, faxed, printed, e-mailed and forwarded to TraceMaster ECG Management System or a central database for storage.

Q-CPR[™] Measurement and Feedback

- Q-CPR technology by Laerdal.
- Monitors and analyzes compression rate and depth, as well as ventilation volume and frequency in real-time.
- Provides on-screen measurements and indicators and audio feedback when needed.
- Reinforces CPR training with each use.

Proven Therapies

SMART Biphasic Technology

- Philips' patented low-energy SMART
 Biphasic (truncated exponential) waveform.
 No other external defibrillation waveform is
 supported by more peer-reviewed
 clinical data.
- Impedance compensation algorithm measures chest impedance and delivers a low-energy shock based on the patient's unique physical requirements.



All monitoring connections are located on the left side panel. A carrying case pouch covers and protects ports and cable connectors from damage.

AED Mode

- Clear, concise voice and text prompts, like those of our industry leading automated external defibrillators, guide the user through the defibrillation process.
- Preset150 Joules of non-escalating energy.

Manual Defibrillation

- Charges to its highest energy level,
 200 Joules, in less than 5 seconds.
- Defibrillates with either paddles or pads.

Synchronized Cardioversion

- Philips' SMART Biphasic waveform, supported by peer-reviewed evidence for its effectiveness in cardioverting atrial fibrillation.
- On-screen, R-wave markers are shown above (or on) each detected R-wave.

Noninvasive Pacing

- · Demand and fixed modes.
- 40 msec pulse width.
- Adjustable rate and output (mA).

HeartStart MRx can be equipped with a set of anterior/anterior, water resistant, external paddles for adult and pediatric use. They convert from adult to pediatric by removing the outer contacts.

Sensors in the external paddles' electrodes assess paddle-to-patient contact and display their readings in the Patient Contact Indicator (PCI) located on the sternum paddle's handle.



If pads are preferred, HeartStart MRx can be used with Philips HeartStart Multifunction Defibrillator Pads, which come in adult and pediatric sizes.

When connected to MRx, they can provide ECG monitoring, synchronized cardioversion, and noninvasive pacing, in addition to external defibrillation.



A flashing hourglass in the "Ready-for-Use" indicator window signals that HeartStart MRx has ample battery power to monitor and deliver a shock. When battery power is low, ECG capability is compromised,

or MRx detects that it cannot pace or shock, a red "X" replaces the hourglass and the monitor will audibly chirp until the situation is corrected.

Therapies – defibrillation, synchronized cardioversion, and pacing – are activated using the therapy knob and surrounding keys. For manual defibrillation, energy is selected (1) using the therapy knob. With the press of a button (2), MRx charges. Pressing the shock button (3), MRx delivers defibrillation therapy.



In code view, a single large ECG wave is shown in the top half of the display, the incident timer is prominent and all alarms are paused. CPR numerics and the compression wave appear in the middle. The bottom of the display accomodates the CO2 wave and active soft keys.

Feature-packed and still lightweight

Self-tests and operational checks

- · Ready-for-Use indicator.
- Automated hourly, daily and weekly self-tests.
- Easy-to-run routine operational checks.
- Test results are stored in internal memory and can be viewed on-screen and printed with the strip chart printer.

Strip chart printer

- Integrated strip chart printer:
 50 mm standard or 75 mm optional.
- Prints the primary ECG lead with event annotations and event summary reports, including ECG rhythm strips and 12-lead ECG reports.
- When configured, prints automatically on marked events, charge, shock and alarms.
- Prints measurements in real-time or with a 10-second delay.

Data collection, management and reporting

- Internal memory and an optional, removable CompactFlash® data card capture approximately 8 hours of continuous ECG waveforms and events (including drug and therapy markers), plus 50 12-lead ECG reports.
- Stored data can be printed as an event summary report on the device's strip chart printer or viewed on-screen.
- Data transferred to a PC running HeartStart Event Review Pro data management software can be compiled, edited, shared and archived for quality control and reporting.
- HeartStart MRx can accept a data card from Heartstream and HeartStart FR2series AEDs.

12-Lead Data Transmission

 Using a cell phone to establish a dial-up connection between HeartStart MRx and the Internet, access Philips HeartStart 12-Lead Transfer Station and send a report. Transmission capability is optional.

Carrying Case

- Semi-rigid structure covered with polyester.
- Modular pouches for segmenting and organizing accessories and supplies.
- Pouches snap on and can be easily removed for thorough cleaning.

Quick Reference Cards

- Highlight device's key functionality and operation.
- Laminated to resist wear and stains, the card set can be tethered to HeartStart MRx or stored in its carrying case.

Training materials

- Self-paced, interactive, web-based training familiarizes the user with the features and operation of HeartStart MRx.
- Users explore components and accessories, run simulations of hands-on procedures, and test their understanding of the material.
- Continuing education credit is available for completing the program.
- Optional instructor-based training material, in person instruction, and a training video are also available.

Rugged, reliable, and ready for use



The 8.4-inch color display is well protected against damage. Recessed behind a 3 mm non-reflective polycarbonate shield, framed and backed in an energy-absorbing foam blanket, and supported by a rigid magnesium casting, it endures routine impact from bumps, knocks, and even drops.



Internal assemblies are rugged. Latched connectors hold cables in place to ensure uninterrupted communications between circuit boards. And every circuit board is aggressively reinforced, braced and fastened at multiple points, keeping the device's internal structure rigid, even in high vibration environments.



Two rechargeable, lithium ion batteries, when new and fully charged, provide up to 10 hours of monitoring, more than any other monitor/defibrillator. Depleted batteries can be charged to full capacity in just 3 hours. No conditioning is required. Capacity gauges on the monitor's screen and on each battery show the remaining charge.

Product Specifications

Physical

Defibrillator Model HeartStart MRx (M3536A)

Dimensions Without external paddles: I2.4 in. (W) \times 7.7 in. (D) \times

11.7 in. (H) (313 mm × 195 mm × 295 mm) With external paddles: 12.4 in, (W) \times 7.7 in, (D) \times 13.4 in. (H) (313 mm x 195 mm x 340 mm)

Weight 13.2 lbs. (6 kg): base unit with 1 battery, pads and pads

cable. 13 lbs. (5.9 kg) with optional 75 mm strip chart printer. Paddle tray and external standard paddles add less than 2.5 lbs. (I.I kg). Carrying case adds 4.1 lbs. (I.86 kg).

Environmental and Physical Requirements

Solids/Water Resistance

Operating: 32° - 113° F (0° - 45° C) Temperature

Storage: -4° - 158° F (-20° - 70° C)

Operating: 0% to 95% relative

Humidity

Operating: 0 to 15,000 ft (0 to 4,500 m)

Altitude Storage: 0 to 15,000 ft (0 to 4,500 m)

Bump: IEC 68-2-29

Mechanical Shock Freefall: IEC 68-2-32

Operating: MIL STD 810E 514.4 Category 6 Helicopter, Vibration

General Storage, UH60

Non-Operating: IEC 68-2-6 Swept Sine Vibration and IEC

68-2-64 Random Vibration

Meets EN 60601-1, UL 2601-1, CSA C22.2 No. 601-1

Safety

Display

8.4" diagonal (128 mm × 171 mm) Dimensions

TFT color I CD Туре

Resolution 480 x 640 pixels (VGA)

Wave Viewing Time 5 seconds (ECG)

Defibrillation

Waveform Truncated Exponential Biphasic. Waveform parameters

adjusted as a function of patient impedance.

Manual (selected): I-10, 15, 20, 30, 50, 70, 100, 120, 150, Output Energy

170, 200 Joules into a 50 Ohm load

AED Mode (single energy output): 150 Joules into a 50

ohm load.

Less than 5 seconds to 200 Joules with a new, fully Charge Time

charged lithium ion battery at 25° C

Via multifunction defib electrode pads or paddles

Shock Delivery

Typically less than 20 seconds

Shock-to-Shock Cycle Time

Minimum: 15 Ohm (internal defibrillation); 25 Ohm

Patient Impedance (external defibrillation) Maximum: 180 Ohm Range

Shock advisory sensitivity and specificity meet AAMI

AED Mode DF-39 guidelines **Battery**

Туре 6.3 Ah, 14.8 V, rechargeable lithium ion

6.5" (H) $\times 3.8$ " (W) $\times 1.6$ " (D) (165 mm $\times 95$ mm $\times 42$ mm) Dimensions

Weight 1.6 lb. (0.73 kg)

Charge Time Approximately 3 hours to 100%, 90 minutes to 80%

At least 5 hours of continuous 12-lead ECG, SpO₂, and Capacity

CO, monitoring, with NBP every 15 minutes on one

new, fully charged battery

At least 3.5 hours of continuous 12-lead ECG, SpO₃, and CO, monitoring, with NBP every 15 minutes and pacing at 180 ppm at 160 mA on one new, fully charged battery

Battery gauge on battery, capacity indicator on display; **Battery Indicators**

> flashing RFU indicator, chirp, and 'Low Battery' message appears on display for low battery condition, when 10 minutes of monitoring time and 6 maximum energy discharges remain (with a new battery at room

temperature, 25° C)

Strip Chart Recorder

Recorder Standard: 50 mm (paper width) thermal array printer

Optional: 75 mm (paper width) thermal array printer

Continuous ECG Strip Prints primary ECG lead with event annotations and

measurements in real-time or with 10-second delay

Auto Printing Recorder can be configured to print marked events,

charge, shock and alarms

Event Summary, 12-Lead, Operational Check, Reports

Configuration, Status Log, and Device Information

1.97 in. (50 mm) W by 100 ft, (30 m) L Paper Size

2.95 in. (75 mm) W by 100 ft. (30 m) L

Data Storage

8 hours of continuous ECG waveforms and events, Internal

plus 50 12-lead ECG reports

Data Card 8 hours of continuous ECG waveforms and events,

plus 50 12-lead ECG reports, on a CompactFlash

memory card

ECG and Arrhythmia Monitoring

Up to 4 ECG waves displayed and up to 2 ECG waves Input

print simultaneously

Lead I, II, or III obtained through 3-lead ECG cable and separate monitoring electrodes. With 5-lead cable, obtain leads I, II, III, aVR, aVL, aVF, or V. Pads ECG obtained through 2 multifunction defibrillation

electrode pads.

Lead Fault 'Lead Off' message and dashed line displayed, if an

electrode or lead wire becomes disconnected

Pads Fault Dashed line displayed if a pad becomes disconnected.

Heart Rate Display Digital readout on display 15 to 300 bpm, accuracy $\pm 10\%$

Heart Rate/ HR, Asystole, VFIB/VTACH, VTACH, extreme tachycar-

Arrhythmia Alarms dia, extreme bradycardia, PVC rate

ECG Size 2.5, 5, 10, 20, 40 mm/mV, autogain

Resolution	1
Alarm Range	L

Range

Alarm Delay

Alarm Range

Sample Size

Alarm Range

Strip Record

Transmission

Compression Rate

Ventilation Volume

Ventilation Rate

Rate

Modes

Range Resolution

End-Tidal CO₂

SpO₂ Pulse Oximetry

% ow Limit: 50 to 99% (Adult/Pediatric)

High Limit: 51 to 100% (Adult/Pediatric)

Pressure Range Systolic: 40 to 260 mmHg

Diastolic: 20 to 200 mmHg

Adult: 160 mmHg

Initial Pressure Pediatric: 120 mmHg

280 mmHg

Maximum Pressure

Noninvasive Blood Pressure

10 seconds

0 to 100%

0 to 99 mmHg

I mmHg (0.1 kPa)

50 ml per minute

Low Limit: 10 to 95 mmHg (Adult/Pediatric)

High Limit: 20 to 100 mmHg (Adult/Pediatric)

All 12-leads print on the strip chart printer in 3x4 format

CompactFlash data card; cellular dial-up Internet connection

Target for breaths delivered before 60 seconds since last

Target for breaths delivered beyond 60 seconds since

Graphic indicator: empty, 1/3-full, 2/3-full, full

Systolic high limit: 30 - 270 (Adult), 35 - 180 (Pediatric) Systolic low limit: 30 - 265 (Adult), 30 - 175 (Pediatric) Diastolic high limit: 18 - 240 (Adult), 18 - 150 (Pediatric) Diastolic low limit: 10 - 240 (Adult), 10 - 145 (Pediatric)

12-Lead ECG 12-Lead cable: leads I, II, III, aVR, aVL, aVF, V/CI-V/C6

Input Display View All 12-lead ECG waves display simultaneously

CPR Measurement and Feedback

Target: -1.50 to -2.00 in. (-38 to -51 mm) Compression Depth

Target: 90 to 120 cpm

compression: 6 to 16 vpm

last compression: 9 to 16 vpm

Noninvasive Pacing

Waveform Monophasic Truncated Exponential

accuracy ± 1.5%

Current Pulse 10 mA to 160 mA (5 mA resolution); accuracy

Amplitude 10 mA to $50 \text{ mA} \pm 5 \text{ mA}$, $50 \text{ mA} - 160 \text{ m} \text{ A} \pm 10\%$ Pulse Width 40 ms with ± 10% accuracy

30 ppm to 180 ppm (10 ppm increments);

Demand or Fixed Rate 340 msec (30 to 80 ppm); 240 msec (90 to 180 ppm)

Refractory Period



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Built to Perform and Backed by Philips

Our dedication to excellence in design, manufacturing and customer support makes us a trusted supplier of patient monitors and defibrillators, serving the healthcare community for more than 35 years. HeartStart MRx is part of our cardiac resuscitation family of products, which includes ALS defibrillator/ monitors and automated external defibrillators used in private and public environments. Each is tailored to the needs and skills of a particular type of user, extending the reach of care from the home to the hospital.

Warranties, services, and support

So that our HeartStart MRx customers can continue delivering reliable and effective patient care, we provide a variety of warranty offerings and preventative maintenance programs. Philips backs HeartStart MRx with one year of on-site service. On-site service, requested through our Medical Response Center, is provided by an authorized Philips service representative. At the time of purchase, a 2-year repair and return warranty can be substituted for the standard 1-year on-site service warranty. To extend the coverage period of either warranty, service contracts can be purchased annually in 1-year increments (without limit).

Philips Medical Supplies

Philips is committed to producing and supporting the finest quality medical equipment and supplies. Our supplies are thoughtfully designed, tested and manufactured to deliver reliable and accurate results from your HeartStart MRx. For a complete list of supplies, please visit http://shop.medical.philips.com.

Microstream and FilterLine are registered trademarks of Oridion Medical Ltd. ADVANTAGE is a registered trademark of Sun Tech Medical Instruments. Q-CPR is a trademark of Laerdal Medical Corporation. CompactFlash is a registered trademark of SanDisk Corporation.



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