PHILIPS

Power to see the big picture

Philips HeartStart MRx ALS Monitor

Product information

The capabilities you need and
the performance

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

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.

- 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.

Measures
12.4 x 7.7 x11.7 inches

Monitoring Capabilities
- Monitoring through defibrillation pads
- 3- and 5-lead ECG monitoring through electrodes
- ST/AR Basic™ arrhythmia detection
- FAST-SpO$_2$ (Fourier Artifact Suppression Technology), optional
- Noninvasive Blood Pressure (NBP), optional
- Microstream® Capnography (etCO$_2$), 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

Superior Measurements

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.

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, motion-tolerant, noninvasive blood pressure system from SunTech Medical Instruments.
- Measures systolic and diastolic pressure and calculates mean arterial pressure.

Microstream® Capnography (etCO2)

- Microstream® CO_2 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 HeartStart 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 on-line, 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.

All waves print on the strip chart printer in 3x4 format.

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 CO_2 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 FR2-series 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.
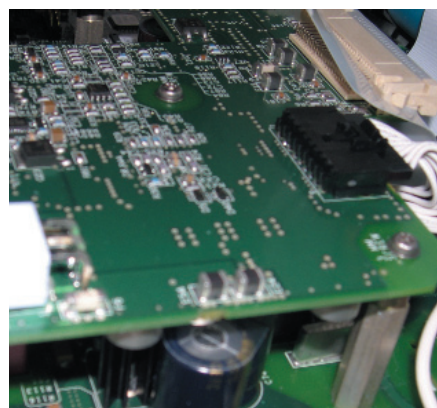
Internal assemblies are rugged. Latched connectors hold cables in place to ensure uninterrupted communications between circuit boards. And every circuit board is aggressively reinforced, braced and fastened at multiple points, keeping the device's internal structure rigid, even in high vibration environments.

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: 12.4 in. (W) × 7.7 in. (D) × 11.7 in. (H) (313 mm × 195 mm × 295 mm) With external paddles: 12.4 in. (W) × 7.7 in. (D) × 13.4 in. (H) (313 mm × 195 mm × 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. (1.1 kg). Carrying case adds 4.1 lbs. (1.86 kg).

Environmental and Physical Requirements

Solids/Water Resistance	IP24
Temperature	Operating: 32° - 113° F (0° - 45° C) Storage: -4° - 158° F (-20° - 70° C)
Humidity	Operating: 0% to 95% relative
Altitude	Operating: 0 to 15,000 ft (0 to 4,500 m) Storage: 0 to 15,000 ft (0 to 4,500 m)
Mechanical Shock	Bump: IEC 68-2-29 Freefall: IEC 68-2-32
Vibration	Operating: MIL STD 810E 514.4 Category 6 Helicopter, General Storage, UH60 Non-Operating: IEC 68-2-6 Swept Sine Vibration and IEC 68-2-64 Random Vibration
Safety	Meets EN 60601-1, UL 2601-1, CSA C22.2 No. 601-1

Display

Dimensions	8.4" diagonal (128 mm × 171 mm)
Type	TFT color LCD
Resolution	480 × 640 pixels (VGA)
Wave Viewing Time	5 seconds (ECG)

Defibrillation

Waveform	Truncated Exponential Biphasic. Waveform parameters adjusted as a function of patient impedance.
Output Energy	Manual (selected): 1-10, 15, 20, 30, 50, 70, 100, 120, 150, 170, 200 Joules into a 50 Ohm load AED Mode (single energy output): 150 Joules into a 50 ohm load.
Charge Time	Less than 5 seconds to 200 Joules with a new, fully charged lithium ion battery at 25° C
Shock Delivery	Via multifunction defib electrode pads or paddles
Shock-to-Shock Cycle Time	Typically less than 20 seconds
Patient Impedance Range	Minimum: 15 Ohm (internal defibrillation); 25 Ohm (external defibrillation) Maximum: 180 Ohm
AED Mode	Shock advisory sensitivity and specificity meet AAMI DF-39 guidelines

Battery

Type	6.3 Ah, 14.8 V, rechargeable lithium ion
Dimensions	6.5" (H) × 3.8" (W) × 1.6" (D) (165 mm × 95 mm × 42 mm)
Weight	1.6 lb. (0.73 kg)
Charge Time	Approximately 3 hours to 100%, 90 minutes to 80%
Capacity	At least 5 hours of continuous 12-lead ECG, SpO_2, and CO_2 monitoring, with NBP every 15 minutes on one new, fully charged battery At least 3.5 hours of continuous 12-lead ECG, SpO_2, and CO_2 monitoring, with NBP every 15 minutes and pacing at 180 ppm at 160 mA on one new, fully charged battery
Battery Indicators	Battery gauge on battery, capacity indicator on display; 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
Reports	Event Summary, 12-Lead, Operational Check, Configuration, Status Log, and Device Information
Paper Size	1.97 in. (50 mm) W by 100 ft. (30 m) L 2.95 in. (75 mm) W by 100 ft. (30 m) L

Data Storage

Internal	8 hours of continuous ECG waveforms and events, 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

Input	Up to 4 ECG waves displayed and up to 2 ECG waves 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 ±10%
Heart Rate/ Arrhythmia Alarms	HR, Asystole, VFIB/VTACH, VTACH, extreme tachycardia, extreme bradycardia, PVC rate
ECG Size	2.5, 5, 10, 20, 40 mm/mV, autogain

SpO$_2$ Pulse Oximetry

Range	0 to 100%
Resolution	1%
Alarm Range	Low Limit: 50 to 99% (Adult/Pediatric) High Limit: 51 to 100% (Adult/Pediatric)
Alarm Delay	10 seconds

Noninvasive Blood Pressure

Pressure Range	Systolic: 40 to 260 mmHg Diastolic: 20 to 200 mmHg
Initial Pressure	Adult: 160 mmHg Pediatric: 120 mmHg
Maximum Pressure	280 mmHg
Alarm Range	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)

End-Tidal CO$_2$

Range	0 to 99 mmHg
Resolution	1 mmHg (0.1 kPa)
Sample Size	50 ml per minute
Alarm Range	Low Limit: 10 to 95 mmHg (Adult/Pediatric) High Limit: 20 to 100 mmHg (Adult/Pediatric)

12-Lead ECG

Input	12-Lead cable: leads I, II, III, aVR, aVL, aVF, V/C1-V/C6
Display View	All 12-lead ECG waves display simultaneously
Strip Record	All 12-leads print on the strip chart printer in 3x4 format
Transmission	CompactFlash data card; cellular dial-up Internet connection

CPR Measurement and Feedback

Compression Depth	Target: -1.50 to -2.00 in. (-38 to -51 mm)
Compression Rate	Target: 90 to 120 cpm
Ventilation Volume	Graphic indicator: empty, 1/3-full, 2/3-full, full
Ventilation Rate	Target for breaths delivered before 60 seconds since last compression: 6 to 16 vpm Target for breaths delivered beyond 60 seconds since last compression: 9 to 16 vpm

Noninvasive Pacing

Waveform	Monophasic Truncated Exponential
Current Pulse Amplitude	10 mA to 160 mA (5 mA resolution); accuracy 10 mA to 50 mA ± 5 mA, 50 mA - 160 m A ± 10%
Pulse Width	40 ms with ± 10% accuracy
Rate	30 ppm to 180 ppm (10 ppm increments); accuracy ± 1.5%
Modes	Demand or Fixed Rate
Refractory Period	340 msec (30 to 80 ppm); 240 msec (90 to 180 ppm)

QCPR™
by Laerdal

Q-CPR is the first and
only CPR measurement
and feedback tool
integrated into an
ALS monitor.

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.

Philips Medical Systems is part of Royal Philips Electronics

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