ADAPTIV Biphasic Technology

The *20e* is equipped with ADAPTIV biphasic technology, which adjusts the shock waveform duration and voltage based on the patient's impedance level. In AED mode, the device can provide optional, escalating shocks (up to 360 joules), depending on the patient's needs. In manual mode, the ALS clinician can give energy shocks according to established protocols.

cprMAX Technology

The *20e* in AED mode is also equipped with cprMAX technology, which supports the 2005 American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) and European Resuscitation Council (ERC) Guidelines for Resuscitation 2005. cprMAX technology is aimed at optimizing the timing and sequencing of CPR and defibrillation. The *20e* with cprMAX technology is highly flexible to accommodate various patient and CPR protocol requirements. cprMAX technology empowers users to customize the interaction of defibrillation and CPR, with options to:

- Provide a specified CPR interval before delivering the first shock
- Provide CPR while the device is charging
- Prompt for CPR after each single shock
- Customize the option for and timing of pulse checks

Use and Maintenance

QUIK-COMBO pacing/defibrillation/ECG electrodes are compatible with the entire LIFEPAK family of products, for standardization and continuity of care. Standard adult paddles with embedded pediatric electrodes, sterilizable adult paddles, and internal paddles provide flexible therapy options for response in various cardiac emergencies. The *20e* is easy to maintain and service, comes with a five-year, in-hospital warranty, and is equipped with AC power and a backup internal Lithium Ion battery.

The LIFEPAK 20e defibrillator/monitor extends and enhances the LIFEPAK family of products, providing flexible, compatible and standardized defibrillation solutions for patients across a range of hospital settings.

For further information please contact your local Physio-Control representative or visit www.physio-control.com

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PHYSIO CONTROL

LIFEPAK® 20e DEFIBRILLATOR/MONITOR

Features

AHA/ERC guidelines 2005 consistent

cprMAX™ technology

Simple yet sophisticated for responders of many skill levels

Highly intuitive for quick, effective AED use

Easily converts to Manual mode

ADAPTIV™ biphasic technology adjusts shock duration and voltage

Broad dosage capability up to 360J when needed

Lithium Ion battery provides extended monitoring time

On-screen "fuel gauge" displays battery capacity

Compact and lightweight for easy carrying and versatile use

Superb color graphics allow easy viewing from many angles

Flexible therapy options
(See options below)

Easy to maintain and service

Options

- **Masimo® SET® pulse oximetry**
- **Noninvasive pacing**
- **QUIK-COMBO® electrodes or hard paddles**
- **Docking station**

The world leader in defibrillation technology brings you the LIFEPAK 20e defibrillator/monitor, created specifically for hospitals and clinics. Designed with extensive input from clinicians around the world, the *20e* is simple yet sophisticated, providing a flexible and effective tool to meet diverse defibrillation needs.

The *20e* is highly intuitive, making it easy for infrequent AED-trained responders to quickly understand and use. Our proven Shock Advisory System™ guides the user with voice and visual prompts through each step and simple 1-2-3 operation. With an easy push of a latch, the *20e* automatically converts to a manual defibrillator, including waveform displays. In manual mode, all of the advanced cardiovascular life support tools become available. The *20e* offers noninvasive pacing, Masimo SET pulse oximetry (SpO_2), ECG monitoring (3- or 5-wire), and synchronized cardioversion.

Lithium Ion battery technology provides increased capacity for longer monitoring times and intra-hospital transport requirements. An on-screen "fuel gauge" displays real-time status of available battery capacity.

Designed for indoor use, the *20e* is compact, lightweight, and easy to rush to the scene or use during intra-hospital transport. A convenient, optional docking station enables the device to be firmly attached to the crash cart for safe and rapid transport, or easily released—whatever the situation requires. The docking station swivels, for multiple viewing angles.

Superb color graphics, easily viewed from many angles, enable clinicians to clearly see color matched waveforms and values for efficient and informed patient care decisions.

GENERAL

The LIFEPAK 20e defibrillator/monitor has seven main operating modes:

Manual Mode: Provides a normal operating capability for ALS users. Allows access to manual mode energy selections up to 360J, synchronous cardioversion and pacing. ECG waveform is displayed.

AED Mode: Provides a normal operating capability for BLS users. All user features are available except manual defibrillation, synchronous cardioversion, pacing, and access to archived patient records. Provides shock energy defaults up to 360J. User selectable option to display ECG waveforms and/or visual AED prompts.

Setup Mode: Allows the operator to configure the device settings

Service Mode: Allows the operator to execute diagnostic tests and calibrations, to display device module software and hardware versions, and to display and print the diagnostic code log

Inservice Mode: Simulated waveforms are available for demonstration purposes. The waveforms consist of short segments of realistic data, which are repeated to form a continuous waveform.

Archive Mode: Provides operator the opportunity to access records of previous patients for review, transmission, printing, editing or deletion

Auto Test Mode: Performs daily self tests

POWER

The device is an AC line operated device with an internal battery as backup.

AC Powered: 90–132 VAC 50/60Hz, 198–264 VAC 50/60 Hz, total power draw less than 120 Volt-Amperes (VA)

Internal Battery Backup: Lithium Ion. Battery charges while device operates from AC Power

Operating Time: A new fully charged internal backup battery will provide the following prior to shutdown:

	TOTAL	AFTER LOW BATTERY
Monitoring plus SpO_2: (minutes):	210	5
Monitoring, plus pacing (at 100 ma, 60 ppm), plus SpO_2 (minutes):	110	2
Defibrillation (360J discharges):	140	3

Battery Charge Time: <4 hours when device is powered off and AC power is applied

Low Battery Indication and Message: When the device is unplugged from AC power, it switches to battery. When the battery gets low, the battery status indicator displays one yellow segment and a "low battery" message and warning tone occurs. Shortly thereafter the status indicator displays one flashing red segment, the "low battery; connect to AC power" message appears, and a warning tone occurs.

Service Indicator: LED illuminates when service is required

PHYSICAL CHARACTERISTICS

Weight:

- Fully featured defibrillator/monitor (pacing, SpO_2 and door) 5.58 kg (12.3 lbs)
- QUIK-COMBO cable: .20 kg (.43 lbs)
- Standard (hard) paddles: .88 kg (1.95 lbs)

Height: 21.3 cm (8.4 in)

Width: 26.2 cm (10.3 in)

Depth: 26.2 cm (10.3 in)

DISPLAY

Size (active viewing area): 115.18 mm (4.53 in) wide x 86.38 mm (3.4 in) high

Resolution: 320 x 240 dot color active LCD

Displays a minimum of 4 seconds of ECG and alphanumerics for values, device instructions or prompts

Option to display one additional waveform

Waveform display sweep speed: 25 mm/sec for ECG

DATA MANAGEMENT

The device can easily print a CODE SUMMARY™ report, including an introduction with patient information and critical event record. The summary report also includes event and vital signs log, and waveforms associated with certain events. The device can print archived patient records and has two data communication ports—infrared (IrDA) and a direct serial port, which supports a serial data cable.

COMMUNICATIONS

The device is capable of transferring data records by IrDA version 1.0.

MONITOR

ECG

ECG can be monitored through 3-wire or 5-wire ECG cables.

Standard paddles or therapy electrodes (QUIK-COMBO pacing/defibrillation/ECG electrodes or FAST-PATCH® disposable defibrillation/ECG electrodes) are used for paddles lead monitoring.

Compatible with LIFEPAK 12 ECG and therapy cables.

Lead Selection:

Leads I, II and III, (3-wire ECG cable)

Leads I, II, III, AVR, AVL, and AVF, V (c) acquired simultaneously, (5-wire ECG cable)

ECG size: 4, 3, 2.5, 2, 1.5, 1, 0.5, 0.25 cm/mV

Heart Rate Display: 20–300 BPM digital display

Out of Range Indication: Display symbol "---"

Heart symbol flash for each QRS detection

Continuous Patient Surveillance System (CPSS): In AED mode, while Shock Advisory System is not active, CPSS monitors the patient via QUIK-COMBO paddles for potentially shockable rhythms.

Voice Prompts: Used for selected warnings and alarms (Configurable On/Off)

Analog ECG Output: 1V/mV X 1.0 gain < 30 ms delay

Common Mode Rejection: 90db at 50/60 Hz

SpO_2

Masimo SET

Saturation Range: 1 to 100%

Saturation Accuracy: (70–100%) (0–69% unspecified)

Adults/Pediatrics:
+/- 2 digits (during no motion conditions)
+/- 3 digits (during motion conditions)

Neonates:
+/- 3 digits (during no motion conditions)
+/- 3 digits (during motion conditions)

Dynamic signal strength bar graph

Pulse tone at the onset of the pleth waveform

SpO_2 Update Averaging Rate: User selectable 4, 8, 12 or 16 seconds

SpO_2 Measurement: Functional SpO_2 values are displayed and stored

Pulse Rate Range: 25 to 240 pulses per minute

Pulse Rate Accuracy: (Adults/Pediatrics/Neonates)
+/- 3 digits (during no motion conditions)
+/- 5 digits (during motion conditions)

SpO_2 waveform with autogain control

ALARMS

Quick Set: Activates alarms for all parameters

VF/VT Alarm: Activates continuous CPSS monitoring in Manual Mode

PRINTER

Prints continuous strips of the displayed patient information

Paper size: 50 mm (2.0 in)

Print speed: Continuous ECG 25 mm/sec +/- 5% (measured in accordance with AAMI EC-11, 4.2.5.2)

Delay: 8 seconds

Autoprint: Waveform events print automatically (user configurable)

Print Speed for CODE SUMMARY Reports: 25 mm/sec

FREQUENCY RESPONSE

Diagnostic: 0.05 to 150 Hz or 0.05 to 40 Hz (user configurable)

Monitor: 0.67 to 40 Hz or 1 to 30 Hz (user configurable)

Paddles: 2.5 to 30 Hz

Analog ECG Output: 0.67 to 32 Hz (except 2.5 to 30 Hz for paddles ECG)

DEFIBRILLATOR

Waveform: Biphasic Truncated Exponential. The following specifications apply from 25 to 200 ohms, unless otherwise specified.

Energy Accuracy: ±1 joule or 10% of setting, whichever is greater, into 50 ohms ±2 joule or 15% of setting, whichever is greater, into any impedance from 25–100 ohms

Voltage Compensation: Active when disposable therapy electrodes are attached. Energy output within ± 5% or ± 1 joule, whichever is greater, of 50 ohm value, limited to the available energy which results in the delivery of 360 joules into 50 ohms.

PATIENT IMPEDENCE	PHASE 1 DURATION (MS)			PHASE 2 DURATION (MS)	
	MIN.	MAX.		MIN.	MAX.
25	5.1	6.0		3.4	*4.0*
50	6.8	7.9		4.5	*5.3*
100	8.7	10.6		5.8	*7.1*
125	9.5	11.2		6.3	*7.4*

Paddle Options:

- QUIK-COMBO pacing/defibrillation/ECG electrodes (standard)
- Standard adult paddles with embedded pediatric paddles (optional)
- Internal handles with discharge control (optional)
- External sterilizable paddles (optional)
- FAST-PATCH disposable defibrillation/ECG electrodes (optional)

Cable length: 2.44 meter (8-foot) long QUIK-COMBO cable (not including electrode assembly)

MANUAL

Energy Select: 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 50, 70, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, and 360 joules and user configurable sequence of 100–360, 100–360, 100–360 joules

Charge time:

- Charge time to 200J <4 seconds with fully charged battery
- Charge time to 360J <7 seconds with fully charged battery
- Charge time to 360J <10 seconds while not in low battery operations

Synchronized Cardioversion:

- Energy transfer begins within 60 ms of the QRS peak
- Energy transfer begins within 25 ms of the External Sync Pulse
- External Sync Pulse; 0–5V (TTL Level) Pulse, active High, > 5 ms in duration, no closer than 200 ms apart and no further than 1 second apart

AED

Shock Advisory System is an ECG analysis system that advises the operator if the algorithm detects a shockable or nonshockable ECG rhythm. SAS acquires ECG via therapy electrodes only.

Shock Ready Time: Using a fully charged battery at normal room temperature, the device is ready to shock within 16 seconds of power on, if initial rhythm finding is “Shock Advised”

The AED mode of the LIFEPAK 20e defibrillator/monitor is not intended for use on children less than 8 years of age

cprMAX technology Setup Options (items marked with * are default settings)

- Stacked Shocks: Off*, On
- Initial CPR: Off*, Analyze First, CPR First
- Preshock CPR: Off*, 15, 30 seconds
- Pulse Check: Never*, After Second No Shock Advised, After Every No Shock Advised, Always
- CPR Time 1 & 2: 15, 30, 45, 60, 90, 120*, 180 seconds, 30 minutes

Users should refer to the LIFEPAK 20e defibrillator/monitor operating instructions for details on how to customize the configuration of their devices to hospital protocols.

PACER

Pacing Mode: Demand or nondemand rate and current defaults (user configurable)

Pacing Rate: 40 to 170 ppm

Rate Accuracy: +/- 1.5% over entire range

Output Waveform: Monophasic, amplitude stable to +/- 5% relative to leading edge for currents greater than or equal to 40 mA, Duration 20 +/- 1 ms, Rise/Fall times <= 1 ms [10–90% levels]

Output Current: 0 to 200 mA

Pause: Pacing pulse frequency reduced by a factor of 4 when activated

Refractory Period: 200 to 300 ms +/- 3% (function of rate)

ENVIRONMENTAL

Temperature, Operating: 5 to 40° C (41 to 104°F)

Temperature, Nonoperating: -20 to +60° C (-4 to +140° F) except therapy electrodes

Relative Humidity, Operating: 5 to 95%, noncondensing

Atmospheric Pressure, Operating: Ambient to 522 mmHg (0 to 3,049 meters) (0 to 10,000 feet)

Water Resistance, Operating (without accessories except for ECG Cable and hard paddles): IPX1 (spillage) per IEC 60601-1 clause 44.6

Vibration: MIL-STD-810E Method 514.4, Cat 1

Shock (Drop): 1 drop on each side from 457.2 mm (18 in.) onto a steel surface

EMC

IEC 60601-1-2: 2001/EN 60601-1-2:2001, Medical Equipment-General Requirements for Safety-Collateral Standard: Electromagnetic Compatibility-Requirements and Tests

IEC 60601-2-4:2002; Clause 36/EN 60601-2-4:2003; Clause 36, Particular Requirements for the Safety of Cardiac Defibrillators and Cardiac Defibrillator Monitors

All specifications are at 20° C (68° F) unless otherwise stated.