



**PHILIPS**

Remote Diagnostic  
Technologies

Tempus ALS, US

# Monitor/defibrillator system

**Modular form-factor**

Tempus ALS, US specifications

# Introduction

Tempus ALS is an advanced monitor/defibrillator system, designed to enable prehospital caregivers to deliver care more efficiently.<sup>1</sup>

## Key features

- Full range of vital signs monitoring parameters with manual, synchronized cardioversion and pacing in a small, highly robust package<sup>2</sup>
- Utilizes the widely used, low energy 200 J biphasic BTE waveform
- Small enough to enable new choices in transport and deployment
- Long battery life – 10 ¾ hour of monitoring with display at 60% brightness (Tempus Pro) and 300 shocks with maximum energy (Tempus LS)
- Water and solid object ingress protection for austere environments with rating of IP66 for monitor (dust and water protection with rating of IP65 for defibrillator)
- Plug-in sensor allows real-time CPR measurement and feedback<sup>3</sup>
- Enables the capture of all vital signs, images and electronic records in an easy to use format that can be easily transmitted or shared with other devices and systems
- Fully integrated communications capability enables the transmission of all medical and vital signs data in real-time<sup>4</sup>
- Large color display with multiple waveform configurations and large numeric view
- Displays ultrasound and video laryngoscopy images on the large color display utilizing third party ultrasound probes and video laryngoscopy accessories<sup>5</sup>



### Control Interface

- Defibrillator interface is via clearly labelled buttons
- Monitor user interface is provided by a touch screen and simple graphically labelled buttons
- Drugs, fluids, therapies and interventions quickly added to the patient record through the Event button on monitor

### Monitor Alarms

- User configurable visual and audible alarms
- Adult, pediatric and neonate settings
- Adjustable alarms ≤85 dBA at 1m
- 360° alarm visible indicator lights

### Display

- Defibrillator – color 145 mm (5.7"), 640x480 pixels
- Monitor – color 165 mm (6.5") 640x480 pixels, 130 klux daylight readable display
- Multiple user-selectable display formats
- High-contrast mode, NVG compatible

### Printer<sup>5</sup>

- High resolution 4.3" integrated thermal printer

### On-Screen Trends & Events

- Graphical and tabular format for all vital signs parameters
- Summary record of care of drugs, fluids, therapies and interventions provided

## Tempus LS-Manual<sup>6</sup>

### Manual Defibrillation

- Biphasic Truncated Exponential (BTE) waveform for defibrillation and synchronized cardioversion
- 1-200 J user configurable energy levels (1-10, 15, 20, 30, 50, 70, 90, 100, 120, 150, 170 & 200 J)
- Adult and pediatric modes available
- Charge time: 9 seconds to 200 J from first charge
- Time to shock from cold start-up: <15 seconds to 200 J
- Disposable adult and child pads

### Defibrillator ECG Monitoring

- ECG monitoring using pads or 3-Lead via Tempus Pro-compatible ECG cable
- Speed: 12.5 mm/sec, 25 mm/sec, 50 mm/sec
- Heart rate range: 15-300 beats per minute (bpm) ±5, Accuracy: ±10%
- 50/60 Hz mains filter

### Pacer

- Fixed and demand modes provided
- 0-200 mA ±10% or ±5 mA (higher value applies)
- 40-180 ppm ±1.5% range
- 20 ms pulse width ±5%

### Synchronized Cardioversion

- Synchronizes to R wave markers displayed on-screen
- <60 ms from R wave peak
- Automatically reverts to asynchronous delivery after shock has been provided

### CPR Feedback

- Optional plug-in-sensor provides on-screen feedback of compressions, rate, depth and quality
- Audible feedback and on-screen messaging is provided to ensure compliance to AHA/ERC guidelines
- AHA/ERC guideline settings can be updated through USB with a manufacturer provided software update

## Tempus Pro

### ECG Monitoring

- 3-, 4-, 5- and 12-Lead monitoring via standard snap-on electrodes with automatic leadset detection
- Heart rate range: 30-300 bpm
- 12-Lead acquisition<sup>5</sup> and 12-Lead interpretation
- Input impedance: >100 MΩ, Dynamic range: ±5 mV ac
- Accuracy: ±3%, DC offset: ±300 mV dc
- Frequency response: 0.05 Hz to 175 Hz ±3dB
- Acquisition Sample rate: 500 Hz
- Common mode rejection: 95 dB minimum, additional filters include mains, muscle and low and high pass
- Arrhythmia monitoring & alarms
- ST elevation and depression and QT segment measurement with alarms<sup>5</sup>

### Impedance Respiration

- Range: 3 – 150 RPM
- Accuracy: ±2 RPM or ±2% whichever is greater

## Pulse Oximetry

### SpO<sub>2</sub>

- Range: 1 – 100%
- Accuracy (adults/child): no motion or low perfusion ±2 digits 70-100%, motion ±3 digits 70-100%
- Accuracy (neonate): motion, no motion and low perfusion ±3 digits 70-100%
- Signal strength indicator
- Perfusion index: 0.02-20%
- Response: <1 second delay
- Employs patented Masimo rainbow SET technology
- Uses comfortable, waterproof soft-tip sensor
- Pleth Variability Index (PVI)<sup>5</sup>

### Pulse Rate

Range: 25 – 239 bpm

Accuracy (all ages): no motion  $\leq 3$  digits, motion  $\leq 5$  digits

### Total hemoglobin (SpHb g/dl)<sup>5</sup>

Range 0 – 25 g/dl

Accuracy (adults/infants/pediatrics) 8 – 17 g/dL  $\pm 1$  g/dl

### Methemoglobin (SpMet)<sup>5</sup>

Range 0 – 99%

Accuracy (adults/infants/pediatrics/neonates) 1 – 15%  $\pm 1$ %

### Carboxyhemoglobin (SpCO)<sup>5</sup>

Range 0 – 99.9%

Accuracy (adults/infants/pediatrics) 1 – 40%  $\pm 3$ %

### Total Oxygen Content (SpOC)<sup>5</sup>

Range 0 – 35ml of O<sub>2</sub>/dL of blood

### Non-Invasive Blood Pressure

Accuracy:  $\pm 3$  mmHg

Adult range: 20 – 260 mmHg

Pediatric range: 20 – 230 mmHg

Neonate range: 20-130 mmHg

Cuffs: neonate disposable sizes 1-5, infant, child, adult, large adult, thigh, cuff kit

## Capnometry

### Respiration Rate

Range: 1 – 149 Breaths Per Minute (BPM)

Accuracy: 0-70 BPM  $\pm 1$  BPM, 71-120 BPM  $\pm 2$  BPM, 121-149 BPM  $\pm 3$  BPM

### Microstream EtCO<sub>2</sub>

Range: 0 – 150 mmHg

Flow rate: 50 (42.5  $\leq$  flow  $\leq$  65) ml/min, flow measured by volume

Uses Oridion Microstream™ technology

Accuracy: 0-38 mmHg  $\pm 2$  mmHg, 39-150 mmHg  $\pm 5\%$  of reading +0.08% per 1 mmHg over 38 mmHg

### Contact Temperature

2 channel YSI 400 series compatible<sup>10</sup>

Measurement range: 20 – 45 °C/68 – 113 °F

Resolution:  $\pm 0.1$  °C/ $\pm 0.2$  °F, Accuracy:  $\pm 0.1$  °C

### Invasive Pressure<sup>5</sup>

2 channels, 5  $\mu$ V/V/mmHg, Response: 0-20 Hz (-3 dB)

Filters: 50-60 Hz notch, Range: -99 – 310 mmHg

Expandable up to 4 channels via USB module<sup>5</sup>

### Trauma Record - Summary Record of Care

Unique, automatically-updating electronic trauma record

User-friendly interface and completely configurable through separate PC application

Semi-automatic patient record completion

Operable with a gloved hand

Record can be emailed or shared with any ePCR system through an easy to implement software development kit

Record can be passed from device to device to accompany the patient through the echelons of care

Data can be output as a PDF report

Record can be streamed for real-time decision support

### Integral Digital Camera

Color 3.2M pixel camera

Streams video using the H264 algorithm (bandwidth dependent)

Images are included in the patient record

### Ultrasound and Video Laryngoscopy<sup>5</sup>

Optional Interson ultrasound probes general purpose 3.5 MHz and line placement 7.5 MHz

Optional Karl Storz C-MAC video laryngoscope imager and single use blades

### Anesthetic Gas Monitoring<sup>5</sup>

Optional Masimo ISA OR+ Anaesthetic Gas module for display of AA gas vitals

## Battery and Power

### Operating Time – Tempus LS-Manual

At least 300 shocks at 200 J from a fully charged battery

>12 hours ECG monitoring from a fully charged battery

### Operating Time – Tempus Pro<sup>11</sup>

At least 10 <sup>3</sup>/<sub>4</sub> hours (display brightness at 60%, ECG, SpO<sub>2</sub>, EtCO<sub>2</sub>, temp x 2 and NIBP every 15 minutes)

At least 11 <sup>1</sup>/<sub>2</sub> hours (display brightness at 30%, ECG, SpO<sub>2</sub>, EtCO<sub>2</sub>, temp x 2 and NIBP every 15 minutes)

Up to 14 hours with battery saving mode activated<sup>7</sup>

### Battery – Tempus LS-Manual and Tempus Pro

Rechargeable, user replaceable lithium-ion battery

Charge time: 3 hours to 90%<sup>8,9</sup>

### Power Supply – Tempus LS-Manual and Tempus Pro

Small size: 133 x 60.7 x 41 mm (5.24" x 2.39" x 1.62")

Rated 90 – 264 Vac, 47 – 440 Hz, maximum 0.6 A

Vehicle adaptor 11-27 V dc available<sup>5</sup>

### External Charger<sup>5</sup>

Optional external battery chargers

## Physical Dimensions

### Tempus LS-Manual

Physical Dimensions

Standalone size: 200 mm (7.9") wide x 164 (6.5") high x 72 (2.8") deep, cube 142" (excluding rear clip)

Standalone weight: 4.3 lbs. with battery (without accessories)

### Tempus Pro

Standalone size (printer model): 263 mm (10.3") wide x 216 mm (8.5") high x 102 mm (3.9") deep, cube 346"

Standalone weight: 7 lbs. nominal including battery and printer, excluding IP module and accessories (without printer 6.4 lbs.)

### Environment – Tempus LS-Manual and Tempus Pro

Operating temperature range: 0 °C to 50 °C

Relative humidity: 15%-95% (non-condensing) operating and storage

Altitude: -200 m to +5486 m (-656' to +18000')

Storage temperature range: -37 °C to +73.3 °C

Water and solid object ingress protection for austere environments with rating of IP66 for monitor (dust and water protection with rating of IP65 for defibrillator)

### Tempus LS-Manual and Tempus Pro

Medical Electrical Equipment: IEC 60601-1-12

Airborne equipment: RTCA DO-160G, 2010 section 21 cat. M

Exceeds requirements of MIL-STD 810G 1.22 m (4') 26 drops all corners, edges and faces

Crash Safety: 20 g per DO160E Sec 7 Cat B

Vibration: MIL-STD 810G rotary wing (UH-60 & CH-47), fixed wing (jet profile), fixed wing (turboprop profile), composite wheeled vehicle; Ground Vehicle per EN1789

Operational shock: 40 g per MIL-STD 810G, 6 g per RTCA DO-160E

### Mounts and Bags

Hard transit cases and saddle bags available<sup>5</sup>

Mechanical and electromechanical mounts compliant with ground and air (fixed and rotary wing) vehicles available<sup>5</sup>



## IntelliSpace Corsium licence options

### IntelliSpace Corsium ReachBak licence<sup>5</sup>

All medical monitoring data, vital signs, ECGs, Summary Record of Care and images are transmitted in real-time

Transmits 12-Lead ECG in real-time and acquires 10 seconds of all 12-Leads

Provides 12-Lead ECG analysis and measurement tools on the transmitted ECG

ECG review results can be sent back to the Tempus Pro

Tempus Pro operator can acknowledge ECG results and provide estimated time of arrival

### IntelliSpace Corsium ECG licence<sup>5</sup>

Tempus Pro user can transmit 12-Lead ECGs

Provides 12-Lead ECG analysis and measurement tools on the transmitted ECG

Also transmits basic vitals recorded at the time of the transmitted ECG

## Communications

### Integral Bluetooth

Used for communication with the device's accessories

Version: V2 EDR class 2

### Voice Communications

Compatible with military headsets (Peltor, Liberator etc.)

Voice communications provided by an optional wired or wireless Bluetooth headset<sup>4</sup>

Voice channel is full duplex with low bandwidth utilization (12 kbps)

Voice transmitted in real-time<sup>2</sup>

### Image Communications

Images received from the Tempus can be annotated with text, colors, shapes and graphics which can be sent back to the Tempus Pro<sup>12</sup>

Video transmitted in real-time<sup>12</sup>

### Integral Ethernet

Compatible with Inmarsat, BGAN, V-SAT and other broadband communications systems<sup>4</sup>

Low bandwidth compatible (3 kbps)

LAN interface: 100Base-TX

Connected via an RJ-45 connection

Tempus can connect direct to a radio or via an access point or router

### Integral USB

2 latched sockets

USB 1.0 & 2.0

For use with plug-in invasive pressure modules, CPR sensor, USB sticks, video laryngoscope, ultrasound probes etc<sup>5</sup>

### Integral Wi-Fi

802.11b/g

Uses 128-bit encryption, WPA2 and WEP standards to ensure security

Smart Wi-Fi management allows the user to scan and connect to available networks

### Integral GPS Positioning

Provides position via ReachBak and allows automatic geo-tagging of drugs and therapies in the patient record/ Accuracy  $\pm 10$  m<sup>13</sup>

### Integral 3G/GSM Cell Phone<sup>14</sup>

Able to connect over 2G GPRS networks (GSM 850, EGSM 900, DCS 1800 & PCS 1900)

Able to connect over 3G GPRS networks (UMTS 850/ Band V, UMTS 900/Band VIII, UMTS 1900/ Band II & UMTS 2100/ Band I)

1. Tempus ALS is a system comprised by Tempus Pro monitor and Tempus LS-Manual professional defibrillator

2. Tempus LS-Manual for manual defibrillation only

3. Depending on network availability there may be a 2-3 second delay between display of the data on the Tempus Pro and display of the same data on IntelliSpace Corsium

4. Limitations apply and contract required with relevant service provider

5. Optional, additional feature

6. Tempus LS-Manual is 510(k) approved

7. Display active 50% of the time.

8. Subject to conditions of storage and use, times are approximate.

9. Tempus switched off while charging, charging takes longer when the device is active.

10. One channel fitted as standard second channel is optional.

11. Test done without printing.

12. i2i ReachBak only

13. GPS accuracy depends on the number of satellites visible to the device

14. If enabled





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