Monitor/defibrillator system

Modular form-factor

Tempus ALS specifications
Introduction

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

Key features

- Full range of vital signs monitoring parameters with manual, AED, synchronized cardioversion and pacing in a small, highly robust package.
- 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 3/4 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 (monitor and defibrillator).
- Plug-in sensor allows real-time CPR measurement and feedback.
- 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.
- 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.

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

- High resolution 110mm (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

- 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.

AED

- Indicated for coarse and fine VF & VT with a patient impedance of 25-250 Ω.
- Analyse time: 9 seconds.
- Mains filter: 50/60 Hz or OFF.
- AED algorithm: >90% sensitivity.
- AED protocol in accordance with AHA/ERC guidance.

Defibrillator ECG Monitoring

- 1-Lead 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.
- 50/60 Hz mains filter.

Defibrillator ETCO2 Monitoring

- Remote display of ETCO2 using data from Tempus Pro.

Pacer

- Fixed and demand modes provided, overdrive feature.
- 0–200 mA ±5 mA pulses.
- 40–240 bpm ±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 and 12-Lead interpretation.
- Input impedance: ≥100 MΩ.
- Dynamic range: ±5 mV ac.
- Accuracy: ±2%, 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.
- 5T elevation and depression and QT segment measurement with alarms.

Impedance Respiration

- Range: 3–350 RPM.
- Accuracy: ±2 RPM or ±2% whichever is greater.

Pulse Oximetry

- SpO2
  - 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 D2-20%.
  - Response: <1 second delay.
  - Employs patented Masimo rainbow SET technology.
  - Uses comfortable, waterproof soft-tip sensor.
  - Pleth Variability Index (PVI).

Pulse Oximetry
**Pulse Rate**
Range: 25 – 239 bpm
Accuracy (all ages): no motion ≤ 3 digits, motion ≤ 5 digits

**Total Haemoglobin (SpHb g/dL)**
Range: 0 - 25 g/dL
Accuracy (adults/infants/pediatrics): 8 - 17 g/dL ± 1 g/dL

**Methaemoglobin (SpMet)**
Range: 0 – 99%
Accuracy (adults/infants/pediatrics/neonates): 1 - 15% ± 1%

**Carboxyhaemoglobin (SpCO)**
Range: 0 – 99.9%
Accuracy (adults/infants/pediatrics): 1 - 40% ± 3%

**Non-Invasive Blood Pressure**
Accuracy: ±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 ± 1 BPM, 71-120 BPM ± 2 BPM, 121-149 BPM ± 3 BPM

**Microstream EtCO2**
Range: 0 – 150 mmHg
Flow rate: 50 (42.5 ≤ flow ≤ 65) ml/min, flow measured by volume
Uses Oridion Microstream™ technology
Accuracy: 0-38 mmHg ± 2 mmHg, 39-150 mmHg ± 5% of reading +0.08% per 1 mmHg over 38 mmHg

**Contact Temperature**
2 channel YSI 400 series compatible
Measurement range: 20 - 45 °C/68 - 113 °F
Resolution: ±0.1 °C/±0.2 °F, Accuracy: ±0.1 °C

**Invasive Pressure**
2 channels, 5 psi/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

**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
Images are included in the patient record

**Ultrasound and Video Laryngoscopy**
Optional Interson ultrasound probes general purpose
Optional Karl Storz C-MAC video laryngoscope imager and single use blades

**Anaesthetic Gas Monitoring**
Optional Masimo ISA OR+ Anaesthetic Gas module for display of AA gas values

**Battery and Power**
**Operating Time – Tempus LS**
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**
At least 10 ½ hours (display brightness at 60%, ECG, SpO2, EtCO2, temp x 2 and NIBP every 15 minutes)
At least 11 ½ hours (display brightness at 30%, ECG, SpO2, EtCO2, temp x 2 and NIBP every 15 minutes)
Up to 14 hours with battery saving mode activated

**Battery – Tempus LS and Tempus Pro**
Rechargeable, user replaceable lithium-ion battery
Charge time: 3 hours to 90% / 4.5 hours to 100%

**Power Supply – Tempus LS and Tempus Pro**
Small size: 133 x 60.7 x 41 mm (5.24” x 2.39” x 1.62”)
Rated 90 – 260 Vac, 47 – 440 Hz, maximum 0.6 A
Vehicle adapter 11-27 V dc available

**External Charger**
Optional external battery chargers

**Physical Dimensions**
**Tempus LS**
Physical Dimensions
Standalone size: 200 mm (7.9”) wide x 164 (6.5”) high x 72 (2.8”) deep, cube 942 (excluding rear clip)
Standalone weight: 1.95 kg (4.3 lbs) with battery (without accessories)

**Tempus Pro**
Standalone size (printer model): 263 mm (10.3”) wide x 236 mm (9.5”) high x 102 mm (3.9”) deep, cube 346"
Standalone weight: 2.9 kg (6.4 lbs) nominal including battery, excluding IP module, accessories and printer (with printer 3.2 kg (7 lbs)

**Environment – Tempus LS and Tempus Pro**
Operating temperature range: 0 °C to 50 °C
Relative humidity: 15%-95% (non-condensing) operating and storage
Altitude: -200 m to +18000’ (excluding rear clip)
Storage temperature range: -37 °C to +73.3 °C
Solid and liquid ingress protected to IP66 according IEC60529 standards

**Tempus LS 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 EN789
Operational shock: 40 g per MIL-STD-810G, 6 g per RTCA DO-160E

**Mounts and Bags**
Hard transit cases and saddle bags available
Mechanical and electromechanical mounts compliant with ground and air (fixed and rotary wing) vehicles available
Tempus ALS is a system comprised by Tempus Pro monitor and Tempus LS or Tempus LS-Manual professional defibrillator.

1. AED is not available in Tempus LS-Manual (Manual defibrillation only).
2. 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.
3. Limitations apply and contract required with relevant service provider.
4. Tempus ALS is a system comprised by Tempus Pro monitor and Tempus LS or Tempus LS-Manual professional defibrillator.
5. Display active 50% of the time.
6. Subject to conditions of storage and use, times are approximate.
7. Tempus switched off while charging, charging takes longer when the device is active.
8. One channel fitted as standard second channel is optional.
9. Test done without printing.
10. i2i ReachBak only.
11. GPS accuracy depends on the number of satellites visible to the device.
12. If enabled.