



PHILIPS

Remote Diagnostic
Technologies

Tempus ALS



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.¹

Key features

Full range of vital signs monitoring parameters with manual, AED, synchronized cardioversion and pacing in a small, highly robust package²

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 (monitor and defibrillator)

Plug-in sensor allows real-time CPR measurement and feedback³

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-time⁴

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 accessories⁵



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

Printer⁵

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 LS⁶

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

AED²

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, Accuracy: ±10%

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 acquisition⁵ 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 alarms⁵

Impedance Respiration

Range: 3 - 150 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: 0.02-20%

Response: <1 second delay

Employs patented Masimo rainbow SET technology

Uses comfortable, waterproof soft-tip sensor

Pleth Variability Index (PVI)⁵

Pulse Rate

Range: 25 – 239 bpm

Accuracy (all ages): no motion ≤ 3 digits, motion ≤ 5 digits

Total Haemoglobin (SpHb g/dl)⁵

Range 0 – 25 g/dl

Accuracy (adults/infants/pediatrics) 8 – 17 g/dL ± 1 g/dl

Methaemoglobin (SpMet)⁵

Range 0 – 99%

Accuracy (adults/infants/pediatrics/neonates) 1 – 15% ± 1 %

Carboxyhaemoglobin (SpCO)⁵

Range 0 – 99.9%

Accuracy (adults/infants/pediatrics) 1 – 40% ± 3 %

Total Oxygen Content (SpOC)⁵

Range 0 – 35ml of O₂/dL of blood

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 \leq flow \leq 65) ml/min, flow measured by volume

Uses Oridion Microstream™ technology

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

Contact Temperature

2 channel YSI 400 series compatible¹⁰

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

Resolution: ± 0.1 °C/ ± 0.2 °F, Accuracy: ± 0.1 °C

Invasive Pressure⁵

2 channels, 5 μ 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 module⁵

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 Laryngoscopy⁵

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

Anaesthetic Gas Monitoring⁵

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

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 Pro¹¹

At least 10 ³/₄ hours (display brightness at 60%, ECG, SpO₂, EtCO₂, temp x 2 and NIBP every 15 minutes)

At least 11 ¹/₂ hours (display brightness at 30%, ECG, SpO₂, EtCO₂, temp x 2 and NIBP every 15 minutes)

Up to 14 hours with battery saving mode activated⁷

Battery – Tempus LS and Tempus Pro

Rechargeable, user replaceable lithium-ion battery

Charge time: 3 hours to 90%^{8,9}

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

Vehicle adaptor 11-27 V dc available⁵

External Charger⁵

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 142" (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 216 mm (8.5") 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 +5486 m (-656' to +18000')

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 EN1789

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

Mounts and Bags

Hard transit cases and saddle bags available⁵

Mechanical and electromechanical mounts compliant with ground and air (fixed and rotary wing) vehicles available⁵



IntelliSpace Corsium licence options

IntelliSpace Corsium ReachBak licence⁵

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 licence⁵

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 headset⁴

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

Voice transmitted in real-time²

Image Communications

Images received from the Tempus can be annotated with text, colors, shapes and graphics which can be sent back to the Tempus Pro²

Video transmitted in real-time²

Integral Ethernet

Compatible with Inmarsat, BGAN, V-SAT and other broadband communications systems⁴

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 etc⁵

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 ± 10 m¹³

Integral 3G/GSM Cell Phone¹⁴

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 or Tempus LS-Manual professional defibrillator

2. AED is not available in Tempus LS-Manual (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 is not approved for commercial distribution in the US. Tempus LS-Manual is 510(k) cleared and available for sale in the US.

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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