PHILIPS

Remote Diagnostic
Technologies

Tempus Pro

Advanced monitor
Rugged and lightweight

Tempus Pro specifications

Introduction

Tempus Pro is an advanced vital signs monitor with multiple and emerging capabilities providing full range of vital signs monitoring parameters in a small, highly robust package[1]

Key features

Small enough to enable new choices in transport and deployment
Long battery life – 10 $^3/_4$ hour of monitoring with display at 60% brightness
Water and solid object ingress protection for austere environments with rating of IP66
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[6]
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[5]

Control Interface

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

Alarms

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

Display

Color 165 mm (6.5") VGA screen
130 klux daylight readable display
Multiple user-selectable display formats
High-contrast mode
NVG compatible
Device can be set to an appropriate viewing angle with the integral foot
Optional extended display of vitals and waveforms on Android tablet with Corsium Crew app[5]

On-Screen Trends and Events

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

ECG Monitor

3-, 4-, 5- and 12-Lead monitoring via standard Snap-On electrodes
Automatic leadset detection
Heart rate range: 30 – 300 bpm
12-Lead acquisition[5]
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
Sample rate: 500 Hz
Common mode rejection: 95 dB minimum, additional filters include mains, muscle and low and high pass
Arrhythmia monitoring and alarms
ST elevation and depression measurement with alarms[5]
QT duration measurement with alarms[5]

Impedance Respiration

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

Pulse Oximetry

SpO$_2$

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 - 99.9%
Accuracy (adults/infants/pediatrics/neonates) 1 - 15% ± 1%

Carboxyhaemoglobin (SpCO)[5]

Range 0 - 99%
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 - 121 BPM ±2 BPM, 122 - 149 BPM ±3 BPM

Microstream EtCO$_2$

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[7]

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

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

Invasive Pressure[5]

2 channels, 5 µV/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[5]

Trauma Record

Electronic trauma record (TCCC, summary record of care)

User-friendly interface, 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)[9]

Images are included in the patient record

Ultrasound[5]

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

Video Laryngoscopy[5]

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

Anaesthetic Gas Monitoring[5]

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

Internal Printer[5]

High resolution 110mm (4.3") integrated thermal printer

Battery and Power

Operating Time

Over 10 $^3/_4$ hours (display brightness at 60%, ECG, SpO$_2$, EtCO$_2$, IP x 2, temp x 2 and NIBP every 15 minutes)

11 $^1/_2$ hours (display brightness at 30%, ECG, SpO$_2$, EtCO$_2$, IP x 2, temp x 2 and NIBP every 15 minutes)

Up to 14 hours with battery saving mode activated (typically 12.5 hours)[2]

Battery

Rechargeable, user replaceable lithium-ion battery

5 state battery gas gauge

Nominal 7.4 V 10.2 Ah / 75.5 Wh

Charge time: 3 hours to 90% and approximately 4 hours to 100%[3,4]

Power Supply

External power supply provided

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

Battery may optionally be charged by the Tempus Pro when running on mains power

Alternate vehicle adaptor 11 - 27 V dc available[5]

External Charger[5]

Optional external single bay battery charger

Charger PSU 100 – 240 V 50 – 60 Hz <0.9 A

Charge time: 5 hours to recharge to 100%[3]

Environmental and Storage

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

Soft bag or hard transit case available

Mechanical and electromechanical mounts compliant with ground and air (fixed and rotary wing) vehicles available[5]

Physical Dimensions

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.)

IntelliSpace Corsium licence options

IntelliSpace Corsium ReachBak licence:[5]

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:[5]

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[6]

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

Voice transmitted in real-time[9]

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[9]

Video transmitted in real-time[9]

Integral Ethernet

Compatible with Inmarsat, BGAN, V-SAT and other broadband communications systems[6]

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 and 2.0

For use with plug-in invasive pressure modules, CPR sensor, USB sticks, video laryngoscope, ultrasound probes etc

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 m[8]

Integral 3G/GSM Cell Phone[10]

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

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

Compliance

EMC

EMC emissions: RTCA DO160G Section 21 Cat Q

EMC emissions and immunity: IEC60601-1-2 Class B, 20 V/m radiated immunity

FCC Part 15 B and C compliant

Environmental Standards

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

Enclosure withstands a 500 g (1.1 lb) steel ball dropped from 1.3 m (4' 3")

Solid and liquid ingress protected to IP66 according to IEC60529

All connectors provided with dust covers for increased protection

Temperature: DO160E Sec 4, Para 4.5.1 – 4.5.4

Altitude: DO160E Sec 4, Para 4.6.1 and 4.6.2

Rapid Decompression: DO160E Sec 4.6.2, 2438 m to 5486 m (8000 - 18000 ft) in 15 seconds

Temperature Variation: DO160G Sec 5 Cat C: 2° C/min

Humidity: DO160E Sec 6 Cat A

Crash Safety: 20 g per DO160E Sec 7 Cat B

Vibration: MIL-STD 810G rotary wing (UH-60 and 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

Bump 15 g per EN1789

1. Tempus Pro is 510(k) cleared in the US and is CE marked in Europe
2. Display active 50% of the time
3. Subject to conditions of storage and use, times are approximate
4. Tempus switched off while charging, charging takes longer when the device is active
5. Optional, additional feature. AA gas feature is not available in US, Canada and Singapore
6. Limitations apply and contract required with relevant service provider
7. One channel fitted as standard second channel is optional
8. GPS accuracy depends on the number of satellites visible to the device
9. i2i ReachBak only
10. If enabled

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