SPACELABS HEALTHCARE

Data Sheet

Command Module 2.20
91496

The Spacelabs 91496 Command Module is designed to provide a flexible selection of clinical measurements and compatibility with Spacelabs patient monitors. Choose the Command Module measurement offering based on your care unit needs or patient acuity. Durable and lightweight, Command Modules can easily be moved between monitors.

ECG

Available leads	
3-leadwire	I, II, or III
5-leadwire	I, II, III, aVR, aVL, aVF, V
10-leadwire	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6
Measurement range	Adult/Pediatric/Neonate: 15 to 300 bpm
Resolution	1 bpm
ECG size	Adjustable from 0.5 to 10 mV/cm
Numeric update rate	Every 3 seconds or immediately at onset of alarm
Heart rate accuracy	±1% or 3 bpm (whichever is greater)
Frequency range	• Monitoring: 0.5 to 40 Hz ±10% • Extended: 0.05 to 150 Hz ±25%
Gain accuracy	±5%
Maximum input	±5 mV (±10%)
Sample rate	896 samples per second
Arrhythmia classifications	Atrial Fibrillation, Asystole, Couplet, Paroxysmal Supraventricular Tachycardia, Pause, Ventricular Ectopic, Ventricular Fibrillation, Ventricular Run
Diagnostic ECG reports	12-leads; standard or Cabrera format
Diagnostic sample rate	500 samples per second
QRS detection	
Leads	Performed on up to 2 leads simultaneously, default II and V, with auto lead switch in event of lead off
Amplitude	• Adult/Pediatric: 0.2 to 5 mV • Neonate: 0.15 to 5 mV
Duration	40 to 120 ms
Pacemaker detection	Indicator of pace pulse on waveform display (user selectable)
Amplitude	±2 to ±200 mV
Width	0.25 to 2 ms
Rise time	10% of width not to exceed 100 µs
ST	
Measurement range	±9 mm
Leads	Up to 12 leads
Resolution	0.08 mm
ST segment review	Up to nine 1-second ST segment sets for up to 12 leads

Defibrillator sync input	
Input level	±1 V, hlo1
Input impedance	2,000 Ω minimum
Connector	hlo1 supports TT-253 plug, P/N 354171-001, for connection to external device
Input display	Defibrillator sync marker is displayed with the return signal for synchronization of defibrillators for cardioversion.
Analog output	
Signal selection	ECG1/ECG2, ECG1/RESP, ECG1/PRES1, PRES1/PRES2
Delay	<35 ms
Signal gain	• ECG: ×1,000 (±5%) • Invasive pressure (ART, PRS, UA, UV): 10 mV/mmHg (±5%) • Other pressure labels: 25 mV/mmHg (±5%) • Respiration: 0.6 V/Ω ±20%
Dynamic range	• ECG: ±5 mV (±10%) • Invasive Pressure: -0.5 to 3.5 V • Respiration: ±4 V minimum
ECG bandwidth	0 to 150 Hz
Pacemaker pulses	Not included
Connector	hlo2 supports TT-253 plug, P/N 354171-001, for connection to external device

Note:

Spacelabs Healthcare does not provide interface cables to third-party equipment. Cables constructed for use with 354171-001 must incorporate a ferrite bead with 200 Ω impedance at 100 MHz within 25 mm (1 in) of the plug for EMI compliance.

Respiration

Measurement method	Impedance pneumography
Sensing leads	User selected: RA/LA (R/L); RL/LL (N/F), RL/LA (N/L), or RA/LL (R/F)
Detection sensitivity	• Shallow: 0.1 Ω input source impedance • Normal: 0.25 Ω (normal) at 500 Ω input source impedance
Measurement range	0 to 200 breaths per minute
Resolution	1 breath per minute
Accuracy	±5% or 1 breath per minute (whichever is greater)
Signal bandwidth	• Adult/Pediatric: 0.12 to 3 Hz (±10%) • Neonate: 0.15 to 3.5 Hz (±10%)
Numeric update rate	Every 3 seconds or immediately at onset of apnea alarm
Apnea detection	User selectable, 5 to 40 seconds; apnea alarm automatically enabled for neonate patient type

Noninvasive Blood Pressure (NIBP)

Measurement method	Oscillometric, step-deflation method
Measurement operation	Automatic interval, manual
Interval times	User selectable: 1, 2, 2.5, 3, 4, 5, 10, 15, 20, 30 minutes; 1, 2, 4, 6, 8 hours
Measurement read time	<45 seconds, typical
Pulse measurement range	25 to 255 bpm
Measurement range (systolic/diastolic/mean)	• Adult/Pediatric 4: 30 to 260 mmHg (4 to 34.7 kPa) • Pediatric 2/3: 30 to 190 mmHg (4 to 25.4 kPa) • Neonate/Pediatric 1: 15 to 140 mmHg (2 kPa to 18.7 kPa)
Resolution	1 mmHg
Accuracy	• Standard deviation: ±7.3 mmHg • Mean error: ±4.5 mmHg • Meets or exceeds ANSI/AAMI standard SP-10
Initial cuff inflation	• Adult/Pediatric 4: 170 mmHg • Pediatric 2/3: 130 mmHg • Neonate/Pediatric 1: 115 mmHg
Maximum cuff inflation	• Adult/Pediatric 2/3/4: 290 mmHg • Neonate/Pediatric 1: 150 mmHg
Cuff deflation rate	• Adult/Pediatric: <10 seconds from 260 to 15 mmHg (34.7 to 2 kPa) • Neonate: <5 seconds from 150 to 5 mmHg (20 to 0.7 kPa)
Connector	• Adult/Pediatric: female bayonet plastic or metal fitting compliant with IEC 80369-5, with single airway tube • Neonate: male bayonet plastic or metal fitting compliant with IEC 80369-5, with single airway tube

Invasive Blood Pressure (IBP)

Transducer type	Strain-gauge, standardized to 5µV/V/mmHg ±1%
Transducer compatibility	Edwards, Abbott, BD
Measurement method	Resistive strain gauge transducer
Parameter labels	ART (Arterial Pressure), ART2 (Arterial Pressure 2), ART3 (Arterial Pressure 3), CVP (Central Venous Pressure), ICP (Intracranial Pressure), LAP (Left Atrial Pressure), PA (Pulmonary Artery), RAP (Right Atrial Pressure), UA (Umbilical Artery), UV (Umbilical Venous), Generic Pressure (PRS)
Measurement range	-50 to 300 mmHg (-6.7 to 40 kPa)
Accuracy	±2 mmHg (0.27 kPa) or 2% of reading (whichever is greater)
Signal bandwidth	0 to 40 Hz
Numeric update rate	Every 3 seconds

Cardiac Output (CO)

Measurement method	Thermodilution
Parameter	Cardiac output, blood temperature, injectate temperature
Measurement range	• Cardiac output: 0.1 to 18 L/min • Blood temperature: 17.2 to 43 °C • Injectate temperature: 0 to 27.4 °C
Cardiac output accuracy	±10%
Temperature accuracy	±0.2 °C
Calculated values	Body Surface Area (BSA), Cardiac Index (CI), Stroke Volume (SV), Stroke Volume Index (SVI), Systemic Vascular Resistance (SVR), Pulmonary Vascular Resistance (PVR), Left Ventricular Stroke Work (LVSW), Right Ventricular Stroke Work (RVSW), Systemic Vascular Resistance Index (SVRI), Pulmonary Vascular Resistance Index (PVRI), Left Ventricular Stroke Work Index (LVSWI), Right Ventricular Stroke Work Index (RVSWI)

Spacelabs Pulse Oximetry (SpO_2)

Measurement method	Functional saturation (oxygen saturation of functional hemoglobins)
Display parameters	%SpO_2, %SpO_2D (second SpO_2 available with 91496-L), pulse rate
Measurement range	• SpO_2: 30% to 100% • Pulse rate: 30 to 249 bpm
Resolution	• SpO_2: 1% • Pulse rate: 1 bpm
SpO_2 accuracy (A_{rms}) of Spacelabs sensors	• 70% to 100%: ±3% • 0% to 69%: unspecified Established accuracy is the root-mean-square of the error between measured values and reference values obtained from a laboratory hemoximeter during adult human blood studies. Assuming a normal distribution, A_{rms} encompasses 68% of the data population.
Numeric update rate	Every 3 seconds
Spacelabs sensors	Sensors operate at or near 660 nm and 940 nm; total radiated optical power from 500 to 1,000 nm does not exceed 60 mW • P/N 015-0660-00: Finger sensor, Adult, Reusable • P/N 015-0661-00: Y Multi-site sensor, Universal, Reusable • P/N 015-0662-00: Foam sensor, Adult, SPU • P/N 015-0664-00: Foam sensor, Pediatric, SPU • P/N 015-0663-00: Vinyl sensor, Adult, SPU • P/N 015-0665-00: Vinyl sensor, Pediatric, SPU • P/N 015-0666-00: Cloth sensor, Infant, SPU • P/N 015-0667-00: Cloth sensor, Neonate, SPU

Masimo SET Pulse Oximetry (SpO_2)

Measurement method	Functional saturation (oxygen saturation of functional hemoglobins)
Display parameters	%SpO_2, %SpO_2D (second SpO_2 available with 91496-L), pulse rate
Measurement range	• SpO_2: 1% to 100% • Pulse rate: 25 to 240 bpm

Resolution	• SpO_2: 1% • Pulse rate: 1 bpm
Numeric update rate	Every 3 seconds
Pulse accuracy	• No motion: ±3% • Motion: ±5% • Low perfusion: ±3%
SpO_2 Accuracy (70% to 100%) of Masimo sensors	
LNCS DC-I, LNCS DC-IP, LNCS TF-I**, LNCS Adtx, LNCS Pdtx, LNCS Inf	• No motion: ±2% • Low perfusion†: ±2%
LNCS TC-I**	• No motion: ±3.5% • Low perfusion†: ±3.5%
LNCS Neo	• No motion: <3 kg ±3%, >40 kg ±2% • Low perfusion†: <3 kg ±3%, >40 kg ±2%
RD SET Adt*, RD SET Pdt*, RD SET Inf*, RD SET DCI-P*	• No motion: ±2% • Low perfusion†: ±2%
RD SET TC-I*	• No motion: ±3.5% • Low perfusion†: ±3.5%
RD SET Neo*	• No motion: <3 kg ±3%, >40 kg ±2% • Low perfusion†: <3 kg ±3%, >40 kg ±2%
LNOP DC-I*, LNOP DC-IP*, LNOP Adt*, LNOP Pdt*, LNOP Inf-L*	• No motion: ±2% • Low perfusion†: ±2%
LNOP YI	• No motion: 1 to 3 kg ±3%, >3 kg ±2% • Low perfusion†: 1 to 3 kg ±3%, >3 kg ±2%
LNOP Neo*, LNOP NeoPt*, LNOP NeoPt-L*, LNOP TC-I**	• No motion: ±3.5% • Low perfusion†: ±3.5%
LNOP Neo-L	• No motion: <3 kg ±3%, >40 kg ±2% • Low perfusion†: <3 kg ±3%, >40 kg ±2%

** The accuracy specification under motion conditions is ±3%. Motion is defined as continuous rubbing and tapping motions at 2 to 4 Hz, at an amplitude of 1 to 2 cm, and continuous random frequency motion between 1 to 5 Hz, at an amplitude of 2 to 3 cm.*

*** These sensors were not validated under motion conditions.*

† Pulse amplitude >0.2%; % transmission >5%

Masimo sensors	Sensors operate at or near 660 nm and 905 nm; total radiated optical power from 500 to 1,000 nm does not exceed 0.79 mW

Nellcor OxiMax Pulse Oximetry (SpO_2)

Measurement method	Functional saturation (oxygen saturation of functional hemoglobins)
Display parameters	%SpO_2, %SpO_2D (second SpO_2 available with 91496-L), pulse rate
Measurement range	• SpO_2: 1% to 100% • Pulse rate: 25 to 300 bpm
Resolution	• SpO_2: 1% • Pulse rate: 1 bpm
Numeric update rate	Every 3 seconds
SpO_2 accuracy (70% to 100%) of Nellcor sensors	
MAX-A*, MAX-AL*, MAX-N*†, MAX-P*, MAX-I*, MAX-FAST	±2%
OxiCliq A, OxiCliq P, OxiCliq N (Adult)†, OxiCliq I	±2.5%
MAX-N*, D-YS (Infant to Adult), DS-100A, OXI-AN, OXI-P/I	±3%
MAX-R**, OxiCliq N (Neonate), D-YSE	±3.5%
D-YS (Neonate), OXI-A/N	±4%

** The accuracy specification under motion conditions is ±3%.*
*** The accuracy specification has been determined between saturations of 80% and 100%.*
† The MAX-N and the OxiCliq N were tested on patients >40 kg.

Neonatal accuracy	When sensors are used on neonatal subjects as recommended, the specified accuracy range is increased by ±1 digit as compared to adult usage to account for the theoretical effect on oximeter measurements of fetal hemoglobin in neonatal blood. For example, MAX-N accuracy on neonates is ±3 digits, rather than ±2 digits.
Nellcor sensors	Sensors operate at or near 660 nm and 880 nm; total radiated optical power from 500 to 1,000 nm does not exceed 15 mW

Temperature

Measurement method	Direct, continuous
Displayed parameters	T1, T2, delta temperature (DT) requires two probes
Temperature site labels	Esophageal (Tesoph), rectal (Trect), skin (Tskin), bladder (Tblad), tympanic (Ttymp), axillary (Taxil), pulmonary artery (Tpa), central venous (Tcv), blood (Tblood), myocardial (Tmyo), nasopharyngeal (Tnaso), core (Tcore), Temp1, Temp2
Sensor type	Skin, rectal, esophageal
Probe type	YSI 400 or YSI 700; automatically identifies series number and processes both
Heating transient time	• YSI 400 probe: 38 seconds • YSI 700 probe: 34 seconds

Cooling transient time	• YSI 400 probe: 37 seconds • YSI 700 probe: 30 seconds
Measurement range	0 to 50 °C
Resolution	0.1 °C
Numeric update rate	Every 3 seconds
Accuracy	±0.3 °C

Physical Specifications

Dimensions (Height × Width × Depth)	11.3 cm × 5.66 cm × 18 cm (4.45 in × 2.23 in × 7.1 in)
Weight	0.8 kg (1.75 lb)
Controls	Stop NIBP
Volatile memory	Data is preserved for at least 5 minutes but not longer than 10 minutes. Module ceases data collection when power is removed.

Electrical Specifications

Power source	Powered directly from monitor (Xprezzon® (91393), Qube® (91390), or Qube Mini (91389)) For monitor electrical specifications, refer to *Xprezzon, Qube, and Qube Mini Operations Manual* (P/N 070-2112-xx)
Protection against electric shock	Module is electrically isolated from host device.
Defibrillator protection	Meets IEC 60601-1. ECG recovery time is less than 5 seconds per IEC 60601-2-27, AAMI EC13.

Environmental Specifications

Ambient temperature	
Operating	0 to 50 °C (32 to 122 °F)
Storage and transport	-40 to 75 °C (-40 to 167 °F)
Relative humidity	
Operating	95% (non-condensing) up to 30 °C (86 °F), 10% to 75% up to 40 °C (104 °F), 10% to 45% up to 50 °C (122 °F)
Storage and transport	95% (non-condensing) up to 50 °C (122 °F), 10% to 50% up to 75 °C (167 °F)
Altitude	
Operating	0 to 3,000 m (0 to 9,843 ft)
Storage and transport	0 to 12,192 m (0 to 40,000 ft)
Water ingress	Meets EN 60529 IPX1 only when installed in 91393 Xprezzon, 91390 Qube, and 91389 Qube Mini patient monitors.

Ordering Information

Module configurations	
91496-A	ECG, respiration, NIBP, pulse oximetry, two temperatures
91496-B	ECG, respiration, NIBP, pulse oximetry, two invasive blood pressures, two temperatures
91496-C	ECG, respiration, NIBP, pulse oximetry, four invasive blood pressures, two temperatures, cardiac output
91496-I	NIBP, pulse oximetry, two temperatures
91496-L	Four invasive blood pressures, pulse oximetry (SpO_2D), two temperatures
Software options	• Arrhythmia* (F–Basic, G–Standard, or H–Advanced) • Diagnostic 12-lead reports* (D–with interpretation or E–without interpretation) • SpO_2 technology (M–Masimo SET, N–Nellcor OxiMax, or U–Spacelabs) • Respiration* (R) • ST segment analysis* (S) • Varitrend® oxycardiorespirogram* (V) ** Not available with 91496-I and 91496-L configurations.* For further ordering information and details on compatible accessories, please contact your Spacelabs Healthcare representative or refer to the product documentation. This product may not be approved for market release in all countries.

Documentation

This product ships with a complete set of comprehensive documentation.

For a full list of available supplies and accessories, go to https://www.spacelabshealthcare.com/supplies.

Regulatory Approvals

C SP® US	CSA certified. Meets CSA C22.2 No. 60601-1 and ANSI/AAMI ES60601-1. IEC 60601-1: basic safety; IEC 60601-2-25: ECG; IEC 60601-2-27: ECG; ISO 80601-2-30: NIBP; IEC 60601-2-34: IBP; IEC 60601-2-49: multiparameter monitors; ISO 80601-2-56: clinical thermometers; ISO 80601-2-61: SpO_2.
CE 0123	CE marked in accordance with the Medical Device Directive 93/42/EEC. EN 1060-3: NIBP; EN 60601-1: electrical safety; EN 60601-1-2: EMC; EN 60601-2-25: ECG; EN 60601-2-27: ECG; EN 80601-2-30: NIBP; EN 60601-2-34: IBP; EN 60601-2-49: multifunction monitors; EN 80601-2-56: clinical thermometers; EN 80601-2-61: SpO_2.
	Does not contain hazardous substances — China

Command Module complies with the following standards:

Identifier	Applicable standard editions or document number/revision and description
IEC 60601-1	IEC 60601-1:2005 (Third Edition) + CORR. 1:2006 + CORR. 2:2007 + A1:2012 (or IEC 60601-1: 2012 reprint) Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
CEI EN 60601-1	CEI EN 60601-1:2024 Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
IEC 60601-1-2	IEC 60601-1-2:2020 Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances - Requirements and tests - Edition 4.1
EN 60601-1-2	EN 60601-1-2:2021 Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances - Requirements and tests - Edition 4.1
IEC 60601-2-25	IEC 60601-2-25:2011 Medical electrical equipment – Part 2-25: Particular requirements for the basic safety and essential performance of electrocardiographs
EN 60601-2-25	EN 60601-2-25:2016 Medical electrical equipment - Part 2-25: Particular requirements for the basic safety and essential performance of electrocardiographs - Edition 2
IEC 60601-2-27	IEC 60601-2-27:2011 - Medical electrical equipment – Part 2-27: Particular requirements for the basic safety and essential performance of electrocardiographic monitoring equipment
EN 60601-2-27	EN 60601-2-27:2014 - Medical electrical equipment – Part 2-27: Particular requirements for the basic safety and essential performance of electrocardiographic monitoring equipment
IEC 60601-2-34	IEC 60601-2-34:2011 - Medical electrical equipment – Part 2-34: Particular requirements for the safety and essential performance of invasive blood pressure monitoring equipment
EN 60601-2-34	EN 60601-2-34: 2014 - Medical electrical equipment – Part 2-34: Particular requirements for the basic safety and essential performance of invasive blood pressure monitoring equipment
IEC 80601-2-30	IEC 80601-2-30:2018 - Medical electrical equipment – Part 2-30: Particular requirements for the basic safety and essential performance of automated non-invasive sphygmomanometers
EN 80601-2-30	EN 80601-2-30:2019 - Medical electrical equipment – Part 2-30: Particular requirements for the basic safety and essential performance of automated non-invasive sphygmomanometers - Edition 2
IEC 80601-2-49	IEC 80601-2-49:2018-03 Medical electrical equipment – Part 2-49: Particular requirements for the basic safety and essential performance of multifunction patient monitoring equipment
EN 80601-2-49	EN 80601-2-49:2019-10 Medical electrical equipment – Part 2-49: Particular requirements for the basic safety and essential performance of multifunction patient monitoring equipment
ISO 80601-2-56	ISO 80601-2-56:2018 Medical electrical equipment – Part 2-56: Particular requirements for basic safety and essential performance of clinical thermometers for body temperature measurement
EN ISO 80601-2-56	EN ISO 80601-2-56:2020 Medical electrical equipment – Part 2-56: Particular requirements for basic safety and essential performance of clinical thermometers for body temperature measurement
ISO 80601-2-61	ISO 80601-2-61:2017 Medical electrical equipment – Part 2-61: Particular requirements for basic safety and essential performance of pulse oximeter equipment
EN 80601-2-61	EN 80601-2-61:2019 Medical electrical equipment – Part 2-61: Particular requirements for basic safety and essential performance of pulse oximeter equipment
ISO 13485	ISO 13485:2016/AC:2018 Medical devices – Quality management systems – Requirements for regulatory purposes
EN ISO 13485	EN ISO 13485:2016/A11:2021 Medical devices – Quality management systems – Requirements for regulatory purposes
EN ISO 14971	EN ISO 14971:2019 Medical devices – Application of risk management to medical devices
IEC 60601-1-6	IEC 60601-1-6:2020 Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability
EN 60601-1-6	EN 60601-1-6:2021 Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability
IEC 62366-1	IEC 62366-1:2020 Medical devices – Part 1: Application of usability engineering to medical devices
IEC 62304	IEC 62304:2015 Medical device software – Software life cycle processes – Consolidated Text
EN 62304	EN 62304:2015 Medical device software – Software life cycle processes – Consolidated Text

Identifier	Applicable standard editions or document number/revision and description
MDCG 2019-16	Cybersecurity
ISO 15223-1	ISO 15223-1:2021 Medical devices – Symbols to be used with medical device labels, labelling and information to be supplied - Part 1: General requirements
EN ISO 15223-1	EN ISO 15223-1:2021 Medical devices – Symbols to be used with medical device labels, labelling and information to be supplied - Part 1: General requirements
ISO 20417	ISO 20417:2021 Medical devices — Information to be supplied by the manufacturer
EN ISO 20417	EN ISO 20417:2021 Medical devices — Information to be supplied by the manufacturer

We are continuously improving our products. Specifications are subject to change without notice. Product images are provided for general reference. This product may not be available for sale in all countries.

Please refer to https://www.spacelabshealthcare.com/trademarks for a full listing of Spacelabs Healthcare trademarks. Other brands and product names used herein are trademarks of their respective owners.

SPACELABS HEALTHCARE

35301 SE Center Street, Snoqualmie, WA 98065, USA | T: +1 425 396 3300 | F: +1 425 396 3301
www.spacelabshealthcare.com