



# TRIONARA

*Innovative Caring*



## VITUS 18

- Complete & Reliable Solution for All Care Areas
- High Quality & Full Functionality
- 2 Years of Warranty and Reliable Customer Supports



CE 1984



ISO 13485

## VITUS 18 Bed side monitor

Vitus 18 is a large screen monitor suitable for Operation Room and Intensive Care Unit, Its 18.5" wide screen with LED back light provides bigger and brighter display for user. Vitus 18 offers a variety of advanced features and parameters such as Masimo Rainbow SET®, Cardiac Output and 12-Lead ECG, 4 IBPs, Drug Calculation and Oxy-CRG. The monitors could connect to Trionara Central station, Vitus CS, and communicate with HIS through Trionara Gateway or Vitus CS. While Vitus 12 as a light and compact monitor facilitates portable and bedside monitoring, Vitus 18 gives the advantage of bigger and brighter display bedside solution to user. Touch Screen and Thermal Recorder are also available as options for easier user operation and more functionality.



### Features:

- 18.5" LED-Backlight Color TFT / 1366×768: Advanced Bed Side Patient Care Monitor
- 6 to 8 signal traces and Up to 10 parameter: HR, NIBP, RESP, Gas interface, IBP (2 Channels), ECG (3/7 Leads), SPO2 Masimo SET, 2TEMPs
- Wire Networking with central system
- Direct AC power & internal rechargeable battery
- ARR and ST segment analyzer
- 6 Parameters Trend
- OXY-CRG



### Options:

- CO2 & Multi-Gas Analyzer (Main Stream / Side Stream)
- Cerebral State Monitoring (Dual Processor), Brain Assessment Function, BFA
- Intra Cranial Pressure Monitoring (ICP)
- 12 Leads ECG
- Trionara Thermal Recorder with 3 Traces
- Touch Screen
- Masimo Rainbow SET®
- Cardiac Output
- Dual display (Dual Processor Motherboard)
- Dual display, Slave monitor (Single Processor Motherboard)
- Wireless communication (Dual Processor Motherboard)
- 4 IBPs





# Technical Specification

CLASSIFICATION			
Protection against electroshock	Class I, Type CF for all modules (except Multi-gas, NIBP and CSM/BFA modules that are BF) (based on IEC 60601-1).		
Protection	Against Electro surgery and Defibrillator (Except BFA/CSM)		
Mode of operation	Continues operation equipment		
Harmful Liquid Proof Degree	IPX1		
Safety of anesthetic mixture	Not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.		
General			
Display	TFT/LED COLOR	768x1366	18.5
Waveforms	ECG, SPO2, IBP1, IBP2, RESP/GAS,EEG (Freezable), C.O.		
Numeric Parameters	HR,PVCs,ST,SPO2, PR, NIBP (SYS, DIA, MAP), IBP1(SYS,DIA,MAP), IBP2(SYS,DIA,MAP), RR, T1, T2, DT, EtCo2, Fico2, AWR, ETN20, FIn20, EtO2, FIO2, EtAA, FIAA, CSI/BFI, BS%, EMG%, SQI%, C.O, Alarm Limits.		
Operation Method	Membrane/Keys and rotary knob Touch Screen		
AC Power	100 - 240 VAC, 50/60 Hz, Ip: 0.9 - 0.4 A		
MotherBoard	Single Processor MB for normal application (Z2 Board) Dual Processors MB for advanced application (STM Board)		
ECG			
Lead & Wire Options	Selectable: 3, 5 or 12 Leads 3 ECG Leads I, II, III 5 Leads ECG: I,II,III,V,aVR,aVF,aVL 12 Leads ECG: I,II,III,V,aVR,aVF,aVL,C2, C3, C4, C5, C6		
Dynamic Range	± 5 mV		
Lead Off Current	< 90 nA		
Gain	4, 2, 1, 1/2, 1/4, Auto		
Calibration	1mV, 0.5 sec		
Filters	MONITOR: 0.5 - 24 Hz	NORMAL: 0.5 - 40 Hz	EXTENDED: 0.05-100 Hz
CMRR	> 98 dB		
Internal Noise	< 30 µV RTI		
Input Impedance	> 5 MΩ		
QRS Detection	Duration	40 to 120 msec	
	Amplitude	0.25 to 5 mV for Adult/Pediatric 0.2 to 5 mV for Neonate	
Heart Rate Range	15 - 300 BPM 15 - 350 BPM	for adult/Pediatric for neonate	
Accuracy	±1% or 2 BPM		
Tall T-Wave	Reject up to 1.2 mV Amp.		
Pacer Detection/Rejection	Duration	0.1 - 2 msec	
	Amp	±2 to ±700 mV (Without over/undershoot)	
	Reject from heart rate counter Re-insert into ECG to display on screen		
	Ineffective pace rejection	HR:0, Pace:60 HR:60, Pace:60 HR:30, Pace:80	
	Beside rejection of atrial paces precede ventricular paces by 150 or 250 ms		
Protection	Defibrillator and Electrosurgery		
ANALOG OUTPUT			
Signals	ECG		
Maximum delay	<30 ms		
Output range	± 5 V		
Signal gain	1000 (1V/mV)		
Gain accuracy	± 20 mV		
Maximum offset	± 50 mV		
ECG bandwidth	MONITOR: 5 - 24 Hz	NORMAL: 0.5 - 40 Hz	EXTENDED: 0.05-100 Hz
Pacemaker pulses	Amplitude: 5 V (nominal)	Duration: 5 ms	
ECG range	-5 to 5 mV		
Output impedance	249 Ω ± 5%		
Data rate	400 samples/sec		
ARRHYTHMIA ANALYSIS			
Type	ASY, VFIB, VTAC, RUN, AIVR, COUPLER, BIGEMINY, TRIGEMINY, TACHY, BRADY, AFIB, PAUS, FREQUENT PVCs		
Learning	Rapid Learning: only 20 seconds required for recognition of dominant rhythm.		
Method	Real time arrhythmia detection with innovative feature.		
Memory	Capability of storing the latest 150 ARR event (waveform and Parameters)		
ST ANALYSIS			
Display resolution	0.01 mV		
Measurement Range	-2mv to +2mv		
Alarm Range	-2mv to +2mv		
Features	User Adjustable Isoelectric and ST point trending of ST values		
Update period	5 Sec.		
NIBP			
SAADAT Module & CAS ND+ Module	Oscillometric		
Measurement method	Manual/Automatic/Stat		
Measurement mode	Manual/Automatic/Stat		
Measurement time	20-25 sec (excluding cuff pressurization time)		
Measurement Range (mmHg)	Adult: 30 ~ 255 DIA 15 ~ 220 MAP 20 ~ 235 Neonate: 30 ~ 135 DIA 15 ~ 110 MAP 20 ~ 125 Pediatric: 30 ~ 240 DIA 15 ~ 220 MAP 20 ~ 230		
Pressure Transducer accuracy	±3 mmHg full range		
Initial Inflation Target	Adult: 150 mmHg,	Pediatric: 150mmHg,	Neonate: 85 mmHg
Memory	500 Records		
SpO2 (MasimoRainbow Set)			
Spo2 Parameters	SPO2,PI,PR		
MethodSPO2	2 Wavelengths of light used		
Rainbow parameters	SpOC,SpCO, SpMe, SpHb, PVI		
MethodRainbow	7+Wavelengths of light used		
Range & Resolution	Parameters	Range	Resolution
	SPO2	0 - 100 %	1 %
	SpMet	0 - 99.9 %	0.1 %
	SpCO	0 - 99 %	1 %
	SpHb	0 - 25.0 g/dL	0.1 g/dL
	SpOC	0 - 35.0 ml/dL	0.1 ml/dL
	PR	25 - 240 bpm	1 BPM
	PI	0 - 20.0 %	0.1 %
	PVI	0 - 100 %	1 %
Accuracy			
Oxygen Saturation			
no motion conditions	Adult/Pediatric	±2% (SPO2 70 ~ 100%)	
	Neonate	±3% (SPO2 70 ~ 100%)	
motion conditions	Adult/Pediatric/Neonate	±3% (SPO2 70 ~ 100%)	
low perfusion conditions	Adult/Pediatric/Neonate	±2% (SPO2 70 ~ 100%)	
Pulse Rate			
no motion conditions	Adult/Pediatric/Neonate	±3bpm (PR 25 ~ 240)	
motion conditions	Adult/Pediatric/Neonate	±5bpm (PR 25 ~ 240)	
low perfusion conditions	Adult/Pediatric/Neonate	±5bpm (PR 25 ~ 240)	
Carboxyhemoglobin / Methemoglobin Saturation & Total Hemoglobin			
Carboxyhemoglobin Saturation	Adult/Pediatric	±3% (1 - 40)	
Methemoglobin Saturation	Adult/Pediatric/Neonate	±1% (1 - 15)	
Total Hemoglobin	Adult/Pediatric	±1g/dL (8 - 17) g/dL	

TEMPERATURE(2 Channel)		
Probe Type	YSI 400 Compatible	
Range	0 - 50 °C	
Accuracy	± 0.2 °C	
RESPIRATION		
Method	Impedance	
Base Resistance	250 -1250 Ohm	
Dynamic Range	0.2 - 2 Ohm	
Breath Rate Range	0 - 253 BrPM	
Accuracy	±2% or 2 BrPM	
IBP		
Number of Channels : 2&4 Channels		
Measurement Range :	SYS/DIA/MAP: -50 ~ 300 mmHg	
Pressure Filter	8Hz, 16Hz,22Hz selectable	
Press Sensor Sensitivity	5 µV / V / mmHg	
Press Sensor Impedance	300 ~ 2500 Ohm	
Resolution	1 mmHg	
Accuracy	2 % or 2mmHg (each one is greater) without transducer	
IBP Auto Scale		
Pump Page		
Multi-gas, Mainstream/IRMA, Sidestream/ISA (MASIMO SWEDEN AB)		
Interface	Modified RS-232 serial interface operating at 9600 bps.	
Mode of operation	CONTINUOUS OPERATION	
Degree of protection against harmful ingress of water or particulate matter :	IP44	
IRMA CO2/ISA CO2	CO2, CO2 waveform	
IRMA AX+	CO2, N2O, primary and secondary agents (HAL, ISO, ENF, SEV, DES)	
ISA AX+	CO2,O2, N2O, primary and secondary Agents (HAL, ISO, ENF, SEV, DES)	
ISA OR+	CO2,O2, N2O, primary and secondary Agents (HAL, ISO, ENF, SEV, DES)	
Accuracy - standard conditions Mainstream/IRMA		
The following accuracy specifications are valid for dry single gases at 22 ± 5 °C and 1013 ± 40 hPa		
Gas	Range	Accuracy
CO2	0 to 15 vol%	±(0.2 vol% +2% of reading)
N2O	0 to 100 vol%	±(2 vol% +2% of reading)
HAL,ISO,ENF	0 to 8 vol%	±(0.15 vol%+5% of reading)
SEV	0 to 10 vol%	±(0.15 vol%+5% of reading)
DES	0 to 22 vol%	±(0.15 vol%+5% of reading)
Accuracy standard conditions Sidestream/ISA		
The following accuracy specifications are valid with no drift for dry single gases at 22 ± 5 °C and 1013 ± 40 hPa:		
	Range	Accuracy
CO2	0 to 15 vol%	±(0.2 vol% +2% of reading)
	15 to 25 vol%	Unspecified
N2O	0 to 100 vol%	±(2 vol% +2% of reading)
	0 to 8 vol%	±(0.15 vol%+5% of reading)
HAL, ENF, ISO	8 to 25 vol%	Unspecified
SEV	0 to 10 vol%	±(0.15 vol%+5% of reading)
	10 to 25 vol%	Unspecified
DES	0 to 22 vol%	±(0.15 vol%+5% of reading)
	10 to 25 vol%	Unspecified
O2	0 to 100 vol%	±(1 vol% +2% of reading)
BFA (Brain Function Assessment)		
BFA Interface	Required for Integratrig BFAmodule and monitors	
EEG sensitivity	±450µV	
Noise	<2µVp-p <0.4µV RMS, 0.25-250 Hz	
CMRR	>140dB	
Input impedance	>50MΩ	
Sample rate	1000 samples/sec(16 bits equivalent)	
Brain Function Index (BFI)	0-100. Filter 1-47Hz, 1sec. update	
EMG	0-100. Filter 30-47 Hz, 1 sec. update	
BSR	0-100. Filter 2-47 Hz, 1 sec. update	
Signal Quality Index (SQI)	0-100. 1 sec. update	
EEG Waveform	±250µV, user-adjustable, 5 sec	
Alarms	Auditory and visual, user-adjustable limits	
Artifact rejection	Automatic	
Sensor impedance measurement	0-30kOhm / Manual-Automatic/ measurement current 0.06µA	
Power supply	5 VDC	
Power Consumption	Less than 0.5 W	
Weight	100 gr	
Dimensions	111x64x25 mm	
Classification	Class I, type BF, continuous use	
Sensors	Ambu Neuro Sensors	
Cable length	195 cm/ 77" with 35 cm/ 14" split	
Memory	Data recording (96 hours)	
Trend	BFI/EMG/SQI/BS, 10 sec. update	
Environment - Operation	Temperature	5-40°C
	Rel humidity	20~96%
	Altitude	-200~3000m
Cardiac Output		
Method :	Right Heart Thermodilution	Range: 0.5-18 l/min
Resolution :	0.01l/min	Reproducibility : ±3%
Thermal Recorder		
Channels:	Up to 3 waveforms	Printing Speed: 6,12,5,25 mm/sec
Paper Size:	57mm by 59 foot roll	
DRUG CALCULATE		
To calculate the dose and time of medication		
ALARM		
Sources	Error messages, All other parameter limits	
Alarm On/Off	Selectable for all parameters	
Alert	Blinking on Display, Volume Selectable Audio Alarms, Light indicator	
ALARM RECALL		
Displaying occurred alarms along with ECG/SPO2/IBP/RESP/GAS waveforms (20 recent alarm)		
TREND		
Sources :	HR,PVCs,ST,AFIB,SPO2, RR, T1, T2, IBP1(SYS,DIA,MAP), IBP2(SYS,DIA,MAP), IBP3(SYS,DIA,MAP), IBP4(SYS,DIA,MAP),EtCo2,Fico2,AWRR(sidestream, mainstream), ETN20,FIn20,Eto2,FIO2,EtAA,FIAA(ISO, DES, ENF, HAL, SEV)	
Trend Saving/ Recording time	96 Hours with 1 Second Resolution	
Retrieving/Viewing time frame	15, 30, 45 Min, 1, 2 and 4 Hours	
OXY-CRG		
6 Parameters Trend		
INPUT/OUTPUT		
Network	TCP/IP Protocol Ethernet LAN with RJ45 Interface Or Wifi	
VGA Connection	VGA output with same page (Available in Single Processor M.B) VGA output with different page (Available in Dual Processor M.B)	
Internal Battery		
Battery Type	Charge time	Usage
Lead Acid 12 V, 3.3 AH	~ 4 hours	~ 1:30 hours
Lithium Polymer: 11.1V,4.3AH	~ 6 hours	~ 3 hours
Physical Specification		
Dimension (Cm)	45 (W) x36 (H) x17 (D)	
Weight (approximately)	With Lithium Polymer Battery	6.9Kg
	With Sealed Lead Acid Battery	7.8 Kg
ENVIRONMENTAL		
Temperature	Operating:5 to 40 °C	Storage & Transport: -25 to 60 °C
Humidity	Operating:20-90 % (Noncondensing)	Storage & Transport: 10-100 % (Noncondensing)
Altitude	-200 to 3000 m	



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