Datasheet

Panther 5 Series

Revision B

ORIGIN
medical devices

Technical Specifications

General Information

Intended Use	The PANTHER 5 ventilator is: • Intended for respiratory treatment in invasive and non-invasive of neonatal[N], pediatric and adult patients • Used in hospitals, professional healthcare facilities and transportation of patients within such facilities
Instructions for use	Please read the Panther 5 operator's manual
Legal Manufacturer	Origin Medical Devices Inc.
Size (W x D x H)	350 x 360 x 390 mm 13.7" x 14.2" x 15.4"
Weight (Ventilator)	11 Kg (24 lbs)
Power	110 to 240 V AC 50 to 60 Hz
Internal Battery	Li-ion, 98W, 14.4V
Operating Time on Battery	> 3 hours under standard conditions
Recharge Time	Approximately 3 hours

Oxygen Supply and Monitoring

High Pressure Range	35 to 87 PSI
Connector Type	DISS 1240, NIST or other per region
Low Pressure	Low flow/pressure inlet
Monitoring	O_2 sensor on outlet. Galvanic or Paramagnetic options available

[N] feature is currently not available in the USA

Operational

Enclosure Rating	IP22
Operating Temperature	10 to +40°C
Operating Humidity	10 to 90% Non-Condensing
Storage Temperature	-20 to +60°C
Storage Humidity	10 to 90% Non-Condensing
Barometric Pressure	700 to 1060 kPa internally compensated
Altitude - operation	0 to 3,280 m (0 to 10,000 ft)

Flow and Pressure

Pressure Range	-50 to +100 cmH_2O
Flow Range	0 to 240 lpm

Functionality and safety standards

CE 0344	Complies with requirements and classification IIb of Medical Device Directive 93/42/EEC.
	ISO 80601-2-12:2011 ISO 60601-1-2:2014 EN 60601-1 ISO 60601-1-8:2007 + A11:2017 IEC 60601-2-49:2011 ISO 80601-2-55:2018

User Interface

Display	15" TFT with PCAP touchscreen
Control Interface	Touchscreen Encoder knob with LED
Audible Indicators	Speaker and Buzzer
Additional Visual Indicators	RED, YELLOW, GREEN indicators for alarms, ventilation in power save
Additional Visual Sensors	Ambient light detector for automated display intensity control

Mode Selections

Types	Invasive Non-invasive High flow O_2 therapy

Invasive Ventilation Modes

Controlled Ventilation	Volume Control (VC) Pressure Control (PC) Pressure regulated volume flowcontrol (PRVC)
Support Ventilation	Pressure Support (PS) Volume Support (VS)
SIMV (synchronized intermittent mandatory ventilation)	VC + VS VC + PS PC + PS PRVC + PS PRVC + VS
SMART Mode ™ (Automatic transition between a control mode and a spont mode based on presence or absence of patient efforts	VC + VS VC + PS PC + PS PRVC + PS PRVC + VS
BiLevel	Dual PEEP with two defined PS levels
APRV	Dual PEEP CPAP

Non-Invasive Ventilation Modes

Controlled Ventilation	Volume Control (VC) Pressure Control (PC)
Support Ventilation	Pressure Support (PS)
SIMV (synchronized intermittent mandatory ventilation)	VC + PS PC + PS
SMART Mode ™	VC + PS PC + PS
NIPPV[N]	Nasal Intermittent Positive Pressure Ventilation (synchronized to patient efforts)

Non-Invasive compensation

Non-invasive max leak compensation	Adult • Inspiratory: 200 lpm • Expiratory: 60 lpm Pediatric and neonatal • Expiratory 25 lpm
Inspiratory volume compensation during VC	User selectable: ON/OFF When ON, volume is compensated for up to twice the defined volume

Invasive Compensation

Invasive max leak compensation when activated	Adult • Inspiratory: 200 lpm • Expiratory: 25 lpm • Pediatric and neonatal Expiratory 25 lpm
Inspiratory volume compensation during VC	User selectable: ON/OFF When ON, volume is compensated for up to an additional 50% of defined volume

High Flow O$_2$ therapy

Oxygen	21 to 100%
Flow	Adult: 1 to 80 lpm Pediatric: 1 to 80 lpm Neonate: 1 to 25 lpm

SBT (spontaneous breathing trial)

SBT Time	15 to 120 Minutes
Oxygen (O$_2$%)	21 to 100%
PEEP	0 to 40 cmH$_2$O
Support Pressure	0 to 75 cmH$_2$O
Support Slope	1 to 10
Termination	Analyzes patient degradation using a variety of indications and automatically resume normal ventilation when needed

Additional Functions

Speaking Valve	Automatically adjusts specific alarms, disables activation of conflicting features to enable safe use of a speaking valve. When turned off reactivates disabled features and returns alarms to normal
Demand Flow (in VC only)	Detects patient's need of additional flow and automatically transitions to PS for that specific breath
Auto exhalation Sensitivity (E$_{SENS}$)	Automatic Breath-by-Breath ventilator management of the exhalation sensitivity setting
SMART Trigger ™	Proprietary triggering mechanism which significantly improves trigger detection in high and varying leaks as well as COPD patients

IBW Calculation

Weight Ranges	Adult: 25 to 144 Kg Pediatric: 2.9 to 24 Kg Neonate: 0.4 to 2.8 Kg
High Ranges	Adult: 125 to 256 cm Pediatric: 48 to 124 cm Neonate: 26.5 to 47 cm
Units	Allows entry of height in cm or inches and weight in Kg or lbs
Gender	Male or female

Display Configurations

Waveforms	• Circuit Pressure • Flow • Volume • Circuit + Tracheal Pressure (TC) • CO$_2$ • SpO$_2$
Loops	• Pressure Volume (PV) • Flow Volume (FV) • Volume Flow (VF) • Single Breath CO$_2$ Curve
Reference Loops	Shows up to two out of eight saved loops superimposed on the live loops along with event information prior to the loop save
Trends	• Shows one live waveform, two selected trends and 25 monitored values corresponding to the trend cursor position. • Trend views can be selected from 25 trended parameters which are recorded per breath (no faster than once a second) • Views can be zoomed and scrolled with the x-axis or finger swipe • Trends record 72 hours of data

Maneuvers

P0.1 (P100)

User initiated automated maneuver to measure the patient's respiratory drive during the first 100 ms of inspiratory effort when the airway is occluded.

Max Time	Adult: 8 seconds
	Pediatric: 6 seconds

Smart NIF

User initiated automated maneuver to measure the patient's inspiratory muscle strength during airway occlusion. Provides visual and audible indications and automated analysis of patient fatigue to increase safety and patient synchronization.

Max maneuver Time	Adult: 20 seconds
	Ped/Neo: 10 seconds
Initiation	Audible BEEP and LED flashing indicated to the patient and clinician
Termination	Time and automated detection of patient fatigue

Suction Maneuver

Provides an automated safe management of suction procedure by automatically transitions between suction phases, adjusts alarms, and detects reconnection to resume ventilation.

Types	• Open Suction • Closed Suction
O_2 settings	21 – 100%
Phases	• Pre-Oxygenation at set O_2 level • Suction: auto detected on open suction, manual press in closed suction • Post-Oxygenation: auto detected on open suction, manual press in closed suction • Automated phase timeouts
Effects	Oxygen, alarms and delayed activation of alarms automated by the system.

PV (Slow Inflation/Deflation)

A slow inflation/deflation PV Maneuver is both a diagnostic and therapeutic tool that provides information that may be used to optimize PEEP, tidal volume and other ventilator settings to allow lung protective ventilation. Upon maneuver completion, ventilation transitions back to the settings prior to the maneuver at the user defined End PEEP setting.

Start PEEP	0 to 40 cmH$_2$O
PEEP EQ Time	0.0 to 30.0 sec
Inflation/Deflation	2 to 5 cmH$_2$O / sec
Target Pressure	5 to 60 cmH$_2$O
Pause at Target	0.0 to 30.0 sec
End PEEP	0 to 40 cmH2O
Time limit	60 sec
Safety Termination	Time and on patient effort (resumes ventilation)
Views	• PV loop during the maneuver, auto scaled • Maneuver graph shows expected maneuver progress and progress during the maneuver
Measurement	Four cursors for four inflection points

Recruitment

Single or multi step recruitment maneuver (RM) via continuous ventilation at user defined step settings. Upon maneuver completion, ventilation transitions back to the settings prior to the maneuver at the user defined End PEEP setting.

Number of steps	1 to 20
T High	1.0 to 59.0 sec
T Low	1.0 to 5.0 sec
P High	10 to 40 cmH$_2$O
P Low	0 to 30 cmH$_2$O
End PEEP	0 to 30 cmH$_2$O
Views	Graphical representation of the maneuver and its progress

Direct Access Functions

Elevated O_2	User adjustable O_2 level active for up to 120 seconds
Manual Breath	Activates a mandatory breath upon pressing during the expiratory phase

Tube Compensation

Activation	ON/OFF (restrictions apply)
Tube Type	• Endotracheal • Tracheostomy
Tube ID	Adult: 5.5 to 10.0 mm Pediatric: 4.0 to 6.5 mm Neonate: 2.0 to 4.5 mm
Length	Adult: 2.0 to 30.0 cm Pediatric: 2.0 to 26.0 cm Neonate: 2.0 to 15.0 cm
Support %	10 to 100%

Nebulization

Pneumatic

Flow	7 lpm, Oxygen
Operating Time	5, 10, 20, 30 minutes
Compensation	Volume is compensated for the added flow
Automation	Automated termination under violating conditions

Aerogen

Method	Direct drive to nebulizer
Supported Types	SOLO or PRO
Controls	• Selection of type • Continuous option • Run time and Extend time
Visuals	• Time since start • Time to run • Operational status

Capnography

Measurements	Measures $EtCO_2$ and real time inspired and expired CO_2

Calculated Parameters

End-Tidal CO_2	$EtCO_2$
Fractional End-Tidal CO_2 Concentration	$FetCO_2$
Partial Pressure of Mean Expired CO_2	$PeCO_2$
Fractional Concentration of Mean Expired CO_2	$FeCO_2$
Exhaled CO_2 Volume	$V_{TE}CO_2$
Inspired CO_2 Volume	$V_{TI}CO_2$
Exhaled Volume of CO_2 Per Minute	VCO_2
Alveolar Tidal Volume	Valv
Alveolar Minute Volume	Valv/min
Anatomical Dead Space	Vdana
Alveolar Dead Space	Vdalv
Physiological Dead Space to Tidal Volume Ratio	VD/VT Eng
Physiological Dead Space to Tidal Volume Ratio	VD/VT Bohr Est
Graphical	• Single breath CO_2 curve • Realtime exhaled CO_2 over time

Oximetry

Measurements	• SpO_2 • Heart Rate • SpO_2/O_2 (Ratio Approximation to PaO_2/FiO_2) • Signal Level

Log

Logged Information	• Changes • Alerts • Operations
Number of Entries	5,000

Settings

PEEP / CPAP	0 to 40 cmH$_2$O
Pressure (PC) (above PEEP)	5 to 90 cmH$_2$O
Support Pressure (PS) above PEEP	0 to 75 cmH$_2$O
Mandatory Slope (Mand Slope)	1 to 10 (1 is the fastest)
Spontaneous Slope (Support Slope)	1 to 10 (1 is the fastest)
Exhalation Sensitivity (Esens)	5 to 80 %
Max Spont Breath Time (Support TI)	Adult: 0.4 to 5.0 sec Pediatric: 0.4 to 3.0 sec Neonate: 0.2 to 2.0 sec
Tidal Volume (VT) Range	Adult: 100 to 2500 ml Pediatric: 20 to 500 ml Neonate$^{(N)}$: 2$^{(1)}$ to 100 ml
Waveform (VC)	Square / Decelerating
Inspiratory Time (TI)	Adult: 0.10 to 5.00 sec Pediatric: 0.10 to 4.00 sec Neonate: 0.10 to 3.00 sec BiLevel: Up to 59.8 sec
Plateau Time (Insp Hold)	0.0 to 3.0 sec
Respiratory Rate	Adult: 1 to 110 b/min Pediatric: 1 to 120 b/min Neonate: 1 to 150 b/min
SMART Time (Applies to SMART Mode ™)	3 to 15 sec
Rate NIPPV	1 to 150 b/min
Pressure Trigger	-15 to -0.1 cmH$_2$O
Flow Trigger	0.1 to 20 lpm
SMART Trigger ™	1 to 7
Oxygen (O$_2$%)	21 to 100%

$^{(1)}$ 5ml in VC, 2ml in pressure modes

$^{(N)}$ feature is currently not available in the USA

Apnea

Apnea Time	0 to 60 sec and OFF (OFF allowed in SPONT when PS is set $\leq$ 5 cmH$_2$O)
Oxygen (O$_2$%)	21 to 100%
Inspiratory Time (TI)	Adult: 0.10 to 5.00 sec Pediatric: 0.10 to 4.00 sec Neonate: 0.10 to 3.00 sec
Pressure (PC) (above PEEP)	5 to 90 cmH$_2$O
Respiratory Rate	Adult: 1 to 110 b/min Pediatric: 1 to 120 b/min Neonate: 1 to 150 b/min
Slope	Uses set Slope
Triggers	Uses set triggers

Operating Ranges

Peak Flow	240 lpm

Monitored Parameters

Pressure

Peak Pressure	Ppeak
End Inspiratory Pressure	PInsp
Mean Airway Pressure	Pmean
End Expiratory Pressure	PEEP
Calculated Tracheal Pressure	Ptrach Insp
Plateau Pressure	P Plateau
Intrinsic (Auto) PEEP	Intr. PEEP
Total PEEP	PEEP Tot
Delta Air Pressure	dPAW
Breathing Drive Occlusion Pressure	P0.1
Negative Inspiratory Pressure	NIF

Volume

Inspired Tidal Volume	V_{TI}
Exhaled Tidal Volume	V_{TE}
Spontaneous V_{TI}	Spont V_{TI}
Spontaneous V_{TE}	Spont V_{TI}
VTI Normalized to Patient Body Weight	V_{TI} /PBW
VTE Normalized to Patient Body Weight	V_{TE} /PBW
Inspired Minute Volume	$\dot{V}_I$
Exhaled Minute Volume	$\dot{V}e$
Spont Inspired Minute Volume	Spont $\dot{V}I$
Spont Exhaled Minute Volume	Spont $\dot{V}e$

Flow and Leak

Peak Inspiratory Flow	PIF
Peak Expiratory Flow	PEF
Delivered Oxygen	O_2
Inspiratory Leak (lpm)	Insp Leak lpm
Inspiratory Leak (%)	Insp Leak %
Average Total Leak Rate	Avg Leak lpm
Inspiratory Leak Volume	Vleak ml

Rate and Timing

Total Breath Rate	Total BR
Mandatory Respiratory Rate	Mand BR
Spontaneous Respiratory Rate	Spont BR
Inspiratory Time	Last Ti
Expiratory Time	Te
Spontaneous Inspiratory Time Ratio	TH/Ttot
Ratio between THigh and TLow	TH:TL
Inspiratory to Expiratory Ratio	I:E

Mechanics

Inspiratory Pressure Time Product	PTP
Static Compliance	Cstat
Dynamic Compliance	Cdyn
Static Resistance	RStat
Expiratory Resistance	RE
Inspiratory Time Constant	RCInsp
Expiratory Time Constant	RCExp
Rapid Shallow Breathing Index	RSBI
Work of Breathing Imposed	WOB Imposed

Capnography and Oximetry

See Capnography and Oximetry sections above.

Adjustable Alarms

Pressure High	6 to 100 cmH$_2$O
Pressure Low	3 to 97 cmH$_2$O
Minute Volume (V̇e) High	0.5 to 100 lpm Adult 0.5 to 30 lpm Pediatric 0.5 to 10 lpm Neonate
Minute Volume (V̇e) Low	OFF to 0.1 to 99.5 lpm Adult OFF to 0.05 to 29.5 lpm Pediatric OFF to 0.01 to 9.5 lpm Neonate
V$_{TE}$ High	25 to 3000 to OFF ml Adult 25 to 700 to OFF ml Pediatric 5 to 300 to OFF ml Neonate
V$_{TE}$ Low	OFF to 1 to 2500 ml Adult OFF to 1 to 690 ml Pediatric OFF to 1 to 295 ml Neonate
Spont V$_{TE}$ High	25 to 3000 to OFF ml Adult 25 to 700 to OFF ml Pediatric 5 to 300 to OFF ml Neonate
Spont V$_{TE}$ Low	OFF to 1 to 2500 ml Adult OFF to 1 to 690 ml Pediatric OFF to 1 to 295 ml Neonate
Rate High	10 to 110 b/min Adult 10 to 130 b/min Pediatric 10 to 170 b/min Neonate
Rate Low	1 to 109 b/min Adult 1 to 129 b/min Pediatric 1 to 169 b/min Neonate
Disconnect Sensitivity (Dsens)	20 to 95 %
V$_{TI}$ Limit	105 to 3000 ml Adult 25 to 750 ml Pediatric 6 to 300 ml Neonate

ETCO2 High	10 to 150 to OFF mmHg
ETCO2 Low	OFF to 5 to 60 mmHg
VteCO2 High	0.2 to 100 to OFF ml
VteCO2 Low	OFF to 0.1 to 99 ml
SBT Rate High	5 to 80 to OFF b/min
SBT Rate Low	OFF to 1 to 75 b/min
SBT RSBI High	5 to 900 to OFF
SBT RSBI Low	OFF to 5 to 895
Leak High	5 to 95 %
SPO2 High	71 to 100%
SPO2 Low	70 to 99%
Heart Rate High	45 to 245 bpm
Heart Rate Low	40 to 240 bpm

Non-Adjustable Alarms

Standby	Occlusion
Low PEEP	High PEEP
PRVC Limited by High P	VS Limited by High P
Circuit Open	Apnea
Low O$_2$	High O$_2$
No O$_2$ Inlet Pressure	Aerogen Fault
Battery Gauge Error	Battery Hot
Battery Low	Battery Empty
Shutting Down	Charger Fault

Additional Technical Alarms
Additional CO$_2$ module related error alarms
Additions SpO$_2$ module related error alarms

Communication Interfaces

Serial RS232

- Sends automatic data to nurse call station
- Can be configured to send the required data under different conditions
- Software plug-ins for required protocols

Ethernet

- Sending automatic data as well as provides online monitoring, log reading and remote control
- Software enables connection to dedicated control/monitoring software that run on remote computers/tablets/phones or standard control centers

- USB Host connection for saving of logs, screen images and uploading software updates from standard USB memory sticks

External Interfaces

Capnography Module	
SpO$_2$ Modules	
Direct Aerogen Nebulizer	
Dry contact remote alarm connections with/without cable disconnection detection	

[N] feature is currently not available in the USA

Ventilator Options

Software

Neonatal Suite[N]	Neo patient type, NIPPV mode
Synchrony Suite	Demand Flow
	Auto E$_{SENS}$
	Tube Comp
Diagnostic and Therapeutic Suite	PV Maneuver
	Recruitment Maneuver
	Suction Maneuver
Extended Monitoring Suite	Volumetric Capnography and Oximetry monitoring, alarms and trending

Hardware

O$_2$ Sensor	Paramagnetic sensor

The ventilator includes all hardware to fully support all features and all software options. There is no need to install additional internal hardware for any option.