Penlon Prima 465 Anaesthetic Machine Technical Specification

ANAESTHESIA SOLUTIONS

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Penlon

All the features and options you need to configure a system to your exact specification

1. 12.1" TFT touchscreen display with electronic gas mixer and digital flowmeters
2. Eight ventilation modes
3. Versatile top shelf with secure GCX™ mounting system for patient monitors
4. Territory-specific electrical outlet options
5. Selectatec® compatible backbar (two station)
6. Up to three cylinders
7. Illuminated work space with pull-out writing surface
8. GCX™ compatible aluminium uprights for additional accessory mounting
9. Large capacity drawer units
10. Integrated CO_2 absorber and bellows unit with ventilator interface
11. Backlit Auxiliary Common Gas Outlet (ACGO)
12. Oxygen therapy flowmeter

Physical Specifications

Dimensions	
Size (H × W × D)	1310 × 790 × 700 mm
Weight	125 kg
Top Shelf	
Size (W × D)	710 × 350 mm
Loading	30 kg - evenly distributed
Work Surface	
Height	860 mm
Size (W × D)	580 × 250 mm
Loading	30 kg - evenly distributed
Illumination	LED
Writing Tablet (Optional)	
Size (W × D)	300 × 220 mm
Loading	10 kg - evenly distributed
Rail	
Top Rail	Top shelf with GCX™ mounting system for patient monitors
Side Rail	GCX™ compatible aluminium uprights for accessory mounting
Medical Rail	200 mm on the machine side
Drawers	
Size (H × W × D)	120 × 545 × 350 mm
Number of Drawers	3
Loading	10 kg - evenly distributed
Castors	
Diameter	125 mm
Brakes	Individually braked (central brake)
Display	
Type	Colour TFT touchscreen
Size	12.1" / 307 mm
Resolution	800 × 600 pixels
Construction	
Material	Frame: Aluminium and plastic Base: Aluminium

Ventilator Specifications

Ventilator Specification	
Type	Fully integrated, electronically controlled and pneumatically driven
Modes	• Volume Control Ventilation (VCV) • Pressure Control Ventilation (PCV) • Pressure Regulated Volume Control (PRVC (PCV-VG)) • Synchronised Intermittent Mandatory Ventilation - Volume Control Ventilation (SIMV-VCV) • Synchronised Intermittent Mandatory Ventilation - Pressure Control Ventilation (SIMV-PCV) • Synchronised Intermittent Mandatory Ventilation - Pressure Regulated Volume Control (SIMV-PRVC) • SPONT/Pressure Support Ventilation (PSV) with apnea backup (VCV or PCV) • Manual
Bellows	Universal (adult and paediatric) ascending bellows
Drive Gas	Type: O_2/Air – Automatic changeover
	Inlet pressure: 290 to 600 kPa
	Max flow: ⩽ 120 L/min
Compensation	Compliance, Fresh Gas, Barometric
Flow Sensors	Inspiratory and expiratory (reusable)
Data Interface	1 × Serial port (for service only), 1 × VGA (for additional monitor)
Ventilator Settings	
Tidal Volume	Range: 10 to 1600 mL (0 to 1600ml measured in PCV) Increments: 10 to 100 mL (5 mL); 100 to 1600 mL (10 mL)
Inspiratory Tidal Volume (VTI)	Range: 0 to 2500 mL Resolution: 1 mL. Error of ±20 mL or actual value ±15%, whichever is greater
Expiratory Tidal Volume (VTE)	Range: 0 to 2500 mL Resolution: 1 mL. Error of ±20 mL or actual value ±15%, whichever is greater
Minute Ventilation (MV)	Range: 0 to 60 L / min Resolution: 0.1 L / min. Error of ±1 L/min or actual value ±15%, whichever is greater
Spontaneous Minute Ventilation (MVspn)	Range: 0 to 60 L / min Resolution: 0.1 L / min. Error of ±1 L/min or actual value ±15%, whichever is greater

Respiratory Rate (ftotal)	Range: 0 to 100 bpm Resolution: 1 bpm. Error of ±2 bpm or actual value ±10%, whichever is greater
Spontaneous Breathing Frequency (fspn)	Range: 0 to 100 bpm Resolution: 1 bpm. Error of ±2 bpm or actual value ±10%, whichever is greater
Peak Airway Pressure (Ppeak)	Range: 0 to 100 cmH_2O Resolution: 1 cmH_2O. Error of ±(2% + 4% of full scale actual reading)
Mean Airway Pressure (Pmean)	Range: 0 to 100 cmH_2O Resolution: 1 cmH_2O. Error of ±(2% + 4% of full scale actual reading)
Inspiratory Plateau Pressure (Pplat)	Range: 0 to 100 cmH_2O Resolution: 1 cmH_2O. Error of ±(2% + 4% of full scale actual reading)
Minimum Airway Pressure (Pmin)	Range: -20 to 100 cmH_2O Resolution: 1 cmH_2O. Error of ±(2% + 4% of full scale actual reading)
Compliance (Cdyn)	Range: 0 to 300 mL/cmH_2O Resolution: 1 mL/cmH_2O. Error of ±20% or ± 5 mL/cmH_2O, whichever is greater
Airway Resistance (Rst)	Range: 0 to 600 cmH_2O / (L / S) Resolution: 1 cmH_2O / (L / S). Error of ±20% or ±5 cmH_2O, whichever is greater
Fresh Gas Flow of O_2	Range: 0.2 to 15 L/m Resolution: 0 to 1 L/m: 0.01 L/m 1 to 15 L/m: 0.1 L/m
Fresh Gas Flow of N_2O	Range: 0 to 12 L/m Resolution: 0 to 1 L/m: 0.01 L/m 1 to 12 L/m: 0.1 L/m
Fresh Gas Flow Rate of AIR	Range: 0 to 15 L/m Resolution: 0 to 1 L/m: 0.01 L/m 1 to 15 L/m: 0.1 L/m
FiO_2	Range: 15 to 100% Resolution: 1%. Error is ±(2.5% +2.5% of full scale actual reading)
$EtCO_2$ (Optional)	Range: 0 to 100 mmHg Resolution: 1 mmHg. Error is ±(0.43% of the volume percentage +8% of the gas concentration) - equivalent to the optional units used to monitor kPa and mmHg.
Inhalation of Carbon Dioxide (Optional)	Range: 0 to 100 mmHg Resolution: 1 mmHg. Error is ±(0.43% of the volume percentage +8% of the gas concentration) - equivalent to the optional units used to monitor kPa and mmHg.
MAC Values (Optional)	Range: 0 to 10 Resolution: 0.01

Respiratory Rate	Range: 1 to 100 bpm Increments: 1 bpm
Inspiratory Rate	Range: 0.1 to 10.0 seconds Increments: 0.1 seconds
Respiratory Ratio (I:E)	Range: 30:1 to 1:150 Resolution: 0.1. Error of ±20%
Inspiratory Pause	Range: 0 to 60% Increments: 5%
PEEP	Range: 0 to 100 cmH_2O Resolution: 1 cmH_2O. Error of ±(2% + 4% of full scale actual reading)
Pressure Support	Range: 0 to 70 cmH_2O Increments: 1 cmH_2O
Pressure Control	Range: 5 to 70 cmH_2O Increments: 1 cmH_2O
Flow Trigger	Range: 1 to 20 L/min Increments: 0.1 L/min
Pressure Trigger	Range: 1 to 20 cmH_2O Increments: 1 cmH_2O
PSV Insp Termination Level	4 Range: 5 to 80% Increments: 5% hours
Ventilator Monitoring	
Standard Parameters	PEEP, Pmean, Pplat, Pmin, Ppeak, VTi, Vte, Fspn, MV, MVspn, Rst, Cdyn, I:E, FiO_2
Optional Parameters	Multi-Gas: MAC, Fi N_2O, EtN_2O, Fi CO_2, $EtCO_2$, Fi AA, EtAA SpO_2: SpO_2, Pulse, PI
Standard Waveforms	Flow, Volume, PAW, P-V (Loop), V-F (loop), P-F (loop)
Optional Waveforms	Multi-Gas: AA, CO_2, N_2O SpO_2: Pleth, PI
Anaesthetic Gas Monitoring	
Type	Dräger Sidestream
Sampling Rate	200 ± 20 mL/min
Automated Cyclical Zeroing and Duration	Zeroing: Once per day (first zeroing 35 minutes after power on, then once every 24 hours) Duration: ≤20 s
O_2 (Paramagnetic) if fitted	Range: 0 to 100 Vol.% Accuracy: ±(2.5 Vol.% +2.5 % rel.) Rise time (t10 ... 90): <500 ms
CO_2	Range: 0 to 13.6 Vol.% Accuracy: ±(0.43 Vol.% +8 % rel.) Rise time (t10 ... 90): <300 ms
N_2O	Range: 0 to 100 Vol.% Accuracy: ±(2 Vol.% + 8% rel.) Rise time (t10 ... 90): <300 ms

Anaesthetic Gases (Range)	Halothane: 0 to 8.5 Vol.% Isoflurane: 0 to 8.5 Vol.% Enflurane: 0 to 10 Vol.% Sevoflurane: 0 to 10 Vol.% Desflurane: 0 to 20 Vol.% Accuracy: ±(0.20 Vol.% +15 % rel.) Rise time (t10 ... 90): <450 ms
Operational Characteristics	
Voltage Input Range	12.0 V to 32.0 V -5 % +10 %
Power Consumption	Steady state ≤6 W (depending on variant) Warm up ≤18 W (depending on variant)
Data Sample Rate	20 ms (depending on setting)
Data Transfer Rate	19,200 kB/s (configurable)

Alarms

Settings	
Tidal Volume	High: 10 to 2000 ml, OFF Low: OFF, 10 to 1600 ml
Minute Ventilation	High: 1 to 99 l Low: 0 to 98 l
Respiratory Rate	High: 1 to 100 bpm Low: 0 to 99 bpm
Airway Pressure	High: 10 to 99 cmH_2O Low: 1 to 98 cmH_2O
Apnea Alarm	Range: 10 to 60 seconds Increments: 1 second
FiO_2 (Optional)	High: 19 to 100%, OFF Low: 18 to 99%
$EtCO_2$ (Optional)	High: 0.1 to 13.3% Low: 0 to 13.3%
$FiCO_2$ (Optional)	High: 0.1 to 13.3%
Inhalation Anaesthetic Gas (Optional) - Upper Limit	Sevoflurane: 0.1 to 9.9%, OFF Isoflurane: 0.1 to 7.9%, OFF Halothane: 0.1 to 7.9%, OFF Enflurane: 0.1 to 7.9%, OFF Desflurane: 0.1 to 19.9%, OFF
Inhalation Anaesthetic Gas (Optional) - Lower Limit	Sevoflurane: 0 to 9.8% Isoflurane: 0 to 7.8% Halothane: 0 to 7.8% Enflurane: 0 to 7.8% Desflurane: 0.1 to 19.8%
End Tidal Anaesthetic Gas (Optional) - Upper Limit	Sevoflurane: 0.1 to 9.9%, OFF Isoflurane: 0.1 to 7.9%, OFF Halothane: 0.1 to 7.9%, OFF Enflurane: 0.1 to 7.9%, OFF Desflurane: 0.1 to 19.9%, OFF
End Tidal Anaesthetic Gas (Optional) - Lower Limit	Sevoflurane: 0 to 9.8% Isoflurane: 0 to 7.8% Halothane: 0 to 7.8% Enflurane: 0 to 7.8% Desflurane: 0.1 to 19.8%
Pulse (Optional)	Upper limit: 31 to 250 bpm Lower limit: 30 to 249 bpm
SpO_2 (Optional)	Upper limit: 50 to 99%, OFF Lower limit: 49 to 99%
PI (Optional)	Upper limit: 0.1 to 20% Lower limit: 0 to 19.9%

Anaesthetic Agent Delivery

Vaporizer Mounting	
Vaporizers	Sigma Delta and Sigma EVA (Sev, Iso, Hal, Enf and Des)
Number of Positions	Two
Type	Selectatec® compatible backbar

Sigma Delta Vaporizer

Dimensions	
Cagemount	219 × 133 × 158 mm (H x W X D)
Selectatec compatible	242 × 120 × 190 mm (H x W X D)
Dräger compatible	242 × 100 × 190 mm (H x W X D)
Physical Specification	
Weight	4.8 kgs
Volume	Min: 35 ml Max: 250 ml
Anaesthetic Agents	Sevoflurane, Isoflurane, Halothane
Filling Systems	Key fill, Quik-Fil or Pour fill
Concentration Control Dial Scale	0 to 2% vol, increments of 0.2% ≥2%+, increments of 0.5%
Environmental	
Operating Temperature	Sev: 15 to 40°C (58 to 104°F) Iso: 15 to 35°C (58 to 95°F) Hal: 15 to 35°C (58 to 95°F)
Operating Temperature	-5 to 40°C (23 to 104°F)
Transport Temperature	-5 to 40°C (23 to 104°F)
Atmospheric Pressure	11.5 to 110 kPa

Flow range	
Operating flow	0.2 to 15 L/min
Pressure Range	
Operating Pressure Range	0 to 5 kPa (0 to 0.7 psi)
Maximum Manifold Pressure	38 kPa (5.5 psi)
Maximum Test Pressure	38 kPa (5.5 psi)

Electrical Specification

Power	
Input Voltage	100 to 240 V
Input Frequency	50/60 Hz
Overload Protection	10A thermal circuit breaker
Power Cable	3 m permanently attached lead
Power Outlets	4 (3 × rear, 1 × front) 2A max. per outlet
Fuses	T2AH 250 V ceramic (5 × 20 mm) high breaking capacity (on live and neutral on each outlet)
Electromagnetic Compatibility	Meets the requirements of EN 60601-1-2
Battery Back Up	
Type	Ni-MH
Back Up Power	90 minutes, approximate
Charge Time	4 hours
Battery	GRPH-18670 8400P 12 V

Pneumatic Specification

Auxiliary Common Gas Outlet (ACGO)	
Connector	22 mm male taper with coaxial 15 mm female taper connections
Gas Supply	
Pipeline Supply Pressure	280 to 600 kPa (40.6 to 87.0 psig)
Territory Specific Pipeline Connections	UK/Europe: NIST USA: DISS Australia: SIS
Connections	3 × Pipeline, with inlet filter Up to 3 × Pin-indexed cylinder, with inlet filter
Regulator Diaphragm Bursting Pressure	2800 kPa (406 psig)
Pipeline Flow Rate	Air/O_2: 40 to 100 L/min N_2O: ≤ 15 L/min
Cylinder Supply Pressure	19,985 kPa (2900 psig)
Fresh Gas Safety Valve	90 cmH_2O
Reduced pressure from regulator (at 5 L/min) - UK	310 kPa + 15 kPa / -35 kPa (45 psig + 2 psig / -5 psig)
Reduced pressure from regulator (at 5 L/min) - US/ Canada/Japan	380 kPa + 15 kPa / -35 kPa (55 psig + 2 psig / -5 psig)
Reduced pressure from secondary regulators (at 5 L/min) - O_2 and N_2O	152 to 241 kPa (22 to 35 psig)
Reduced pressure from secondary regulators (at 5 L/min) - Air	207 to 283 kPa (30 to 41 psig)
Auxiliary Gas Outlets	
Connections	2 × O_2, self-sealing 2 × Air, self-sealing
Supply Pressure	Pipeline: Supply pressure Cylinder: Reduced pressure from the cylinder supply secondary regulator
Flow Rate	60 L/min (maximum) per gas
Auxiliary Oxygen Flowmeter	
Range	0 to 10 L/min
O_2 Control	
O_2 Flush Range	25 to 75 L/min when button is fully depressed
Gas Mixer	
Type	Electronic
Anti-Hypoxic Fresh Gas Mixture	
Type	Electronic
Minimum O_2 concentration	25% +5%/-4% (of total O_2 and N_2O flow) minimum 21% O_2

Environmental

Operating Conditions	
Temperature	+10 to 40°C (50 to 104°F)
Atmospheric Pressure	70 to 106 kPa
Altitude	2438 m (8000 feet) maximum
Humidity	10 to 95% R.H. non-condensing
Transport and Storage Conditions	
Temperature	-5 to 40°C (23 to 104°F)
Atmospheric Pressure	50 to 106 kPa
Humidity	10 to 85% R.H. non-condensing
Electromagnetic Compatibility	
Immunity	Meets the requirements of EN 60601-1-2
Emissions	CISPR 11 group 1 class A
Approvals	EN 60601-1-2, 80601-2-13
European Notified Body	CE 0088

Breathing System/Absorber

CO_2 Absorber	
Absorbent Volume	1.5 L
Absorbent Type	Loose fill
Heater	Yes, integrated
APL Valve	
Range	Yes, Min. to 70 cmH_2O integrated
Bag/Vent Switch	
Type	Toggled bi-stable switch
Breathing System	
Valves	Visible inspiratory and expiratory check valves
Pressure Gauge	
Range	-2 to 10 kPa (-20 to 100 cmH_2O)
Cleaning and Disinfection	
O_2 Sensor (Cleaning)	Wipe with mild detergent, dry with a lint-free cloth
All parts of the breathing circuit except the O_2 sensor (Disinfecting)	Wash with mild detergent, soak for 30 minutes in 30 to 41°C detergent (pH 7.0 to 10.5)
All parts of the breathing circuit except the O_2 sensor, airway pressure gauge and relief valve assembly (Sterilisation)	Autoclave at a maximum temperature of 121°C for a minimum of 15 minutes and a maximum of 30 minutes.

Anaesthetic Gas Scavenging System (AGSS)

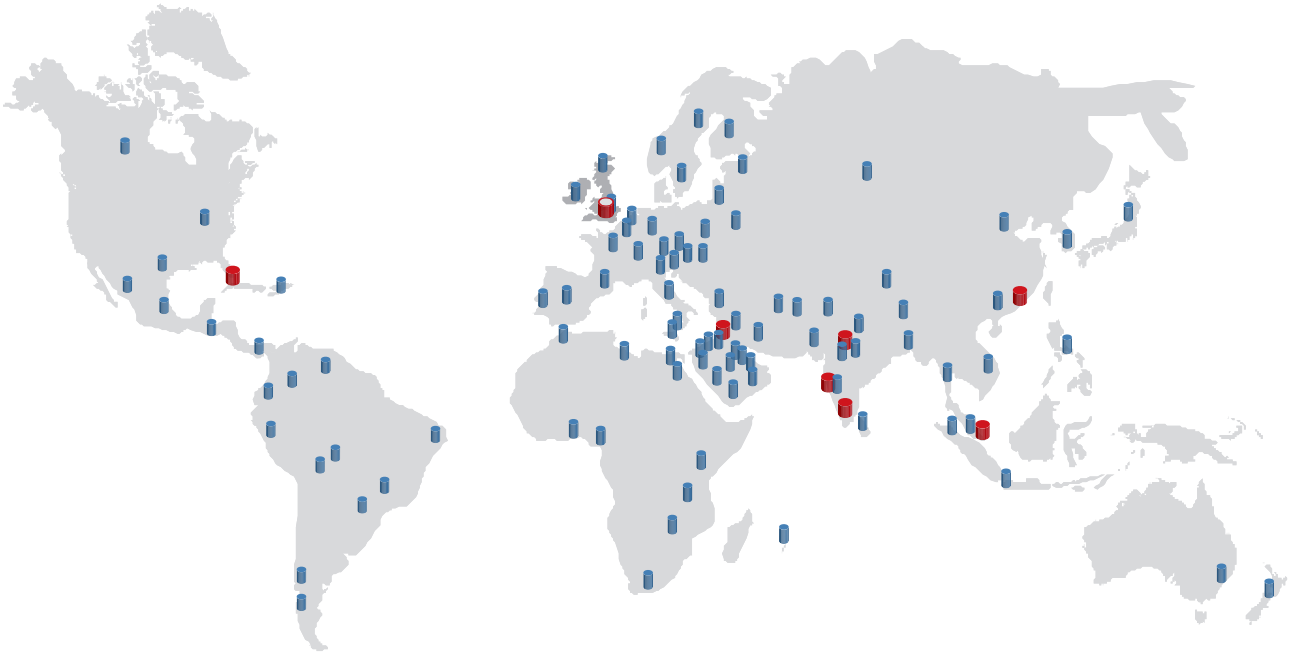
Physical	
Type	Active
Type of Disposal System	For use with a high flow rate disposal system
Dimensions	420 × 77 × 99 mm (H × W × D)
Mounting	Side of the system
Safety Indicator	If the flow rate falls below 60 L/min, the float will fall below the bottom of the window

About Penlon

Penlon was founded in 1943 by personnel from the Department of Anaesthesia at Oxford University. One of the first products was the Macintosh Laryngoscope, then a revolutionary design, and still the most widely used today, invented by the late Sir Robert Macintosh, Professor of Anaesthetics.

Today Penlon continues to design, engineer and build high quality anaesthesia products at its UK operations headquarters. The company is proud to have over 70 years' dedicated experience, many awards for product design, and an impressive four Queen's Awards for Enterprise, one for 'Innovation' and three for 'International Trade'.

Penlon devices feature intuitive user interfaces that require minimal operator training, putting clinicians in control, enabling them to focus on what is most important – patient safety and wellbeing.



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