Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70 **Казахстан** +7(7172)727-132 **Киргизия** +996(312)96-26-47

www.getinge.nt-rt.ru | | gtw@nt-rt.ru

Технические характеристики на механические, неонатальные вентиляторы Servo-c, Servo-s 8.0, Servo-air 4.2, Servo-i-8.0, Servo-n 4.1, Servo-u 4.1 компании GETINGE

Datasheet

Servo-u
System version 4.1

This document is intended to provide information to an international audience outside of the US.

GETINGE

Contents

Datasheet **Servo-u**
System version 4.1

Servo-u

Technical specifications

General

Intended use	The Servo-u ventilator system is: • intended for respiratory support, monitoring and treatment of neonatal, pediatric and adult patients • to be used only by healthcare providers • to be used only in professional healthcare facilities and for transport within these facilities
Clinical benefits	Clinical benefits for Edi monitoring and NAVA: • to provide monitoring of the patient's breathing drive • to improve synchrony between the ventilator system and patient when the electrical signal from the brain to the diaphragm is active
Instructions for use	Please carefully read the user's manual
Legal manufacturer	Maquet Critical Care AB
Other products	See separate data sheets. Contact your local Getinge supplier for more information.

The ventilator – general

	Servo-u	Servo-u on mobile cart
Base system weight	Approximately 23 kg (50.7 lbs) • Patient unit 15 kg (33.0 lbs) • User interface 4 kg (8.8 lbs) • Handle 3 kg (6.6 lbs) • Cable holder and cable 1 kg (2.2 lbs)	Approximately 35 kg (77.2 lbs) • Base system approx. 23 kg (50.7 lbs) • Mobile cart 12.5 kg (27.6 lbs)
Dimensions of base (W x D), see dimensional drawings	368 x 205 mm (14.5" x 8.1")	647 x 547 mm (25.5" x 21.5") incl. wheels
Height (incl. user interface)	826 mm (32.5")	1368 mm (53.8")
Wheels	N/A	Four wheels with separate brakes
A-weighted sound pressure level (L_{pA})	<40 dB, measured at a distance of 1 m (3.3 ft)	
A-weighted sound power level (L_{WA})	<51 dB	

Ventilation – general

Patient range	• Standard configuration: 3–250 kg (6.6–551.2 lbs) • Neonatal option: 0.3–8 kg (0.7–17.6 lbs)
Bias flow	• Adult: 2 l/min • Pediatric and neonatal: 0.5 l/min
Internal compressible factor	Max. 0.1 ml/cmH_2O
Gas delivery system	Microprocessor controlled valves
Maximum airway pressure	125 cmH_2O
Method of triggering	Flow, pressure and Edi (with Edi module and Edi catheter)
Inspiratory flow range	• Adult: 0 to 200 l/min • Pediatric and neonatal: 0 to 33 l/min
Pressure drop	• Max. 6 cmH_2O at a flow of 60 l/min (insp. channel) • Max. 3 cmH_2O at a flow of 60 l/min (exp. channel)
PEEP regulation	Microprocessor controlled valve
Expiratory flow range	0 to 192 l/min

User interface

Type	TFT-LCD touchscreen
Size	366 x 300 x 50 mm (14.4" x 11.8" x 2.0")
Viewing area	15" XGA, 1024 x 768 pixels with a 24-bit color palette
Weight	Approximately 4 kg (8.8 lbs)

Power supply

Power supply, automatic range selection	• 100–120 V AC, 2 A, 50–60 Hz • 220–240 V AC, 1 A, 50–60 Hz
Plug-in battery module: • Battery backup (nickel-metal hydride, NiMH) • Battery capacity • Battery backup time • Recharge time	 • Six battery module slots. Two batteries are delivered with the ventilator. • Rechargeable, 12 V, 3.5 Ah each • Ranging from 60 minutes (2 batteries) to 180 minutes (6 batteries) • Approximately 3 h/battery
External 12 V DC	12.0 V–15.0 V DC, 10 A
Typical min. power consumption (no optional modules, no ongoing battery charging, normal panel backlight)	100 VA, 40 W at 230 V or 75 VA, 40 W at 110 V
Typical max. power consumption (with CO_2, Edi and Y sensor modules, ongoing battery charging, max. panel backlight)	200 VA, 80 W at 230 V or 170 VA, 80 W at 110 V

Gas supply

Inlet gas pressure air/ O_2	200–600 kPa / 2.0–6.0 bar / 29–87 PSI
Connection standards available air/ O_2	AGA, DISS, NIST, or French standard
Inlet gas pressure HeO_2 (option)	340–600 kPa / 3.4–6.0 bar / 49–87 PSI
Connection standards available HeO_2 (option)	AGA, DISS, NIST
Unavailable gas/loss of gas pressure	The flow from an unavailable gas (air or O_2) is automatically compensated for so that the patient gets the preset volume and pressure.
Patient system gas connectors	Male 22 mm / female 15 mm. In accordance with ISO 5356-1
Gas exhaust port	Male 30 mm cone

Operating conditions

Operating temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	15 to 95% non-condensing
Atmospheric pressure	660 to 1060 hPa
Lowest pressure in patient circuit	-400 cmH_2O

Non operating conditions

Temperature	-25 to +60°C (-13 to +140°F)
Relative humidity	<95% condensing
Atmospheric pressure	470 to 1060 hPa
Lowest pressure in patient circuit	N/A

Standards – safety and functionality

CE 0123	The device complies with requirements and classification IIb of Medical Device Directive 93/42/EEC. CE Mark Notified Body number: 0123.
Classification	IEC 60601-1: 2005 + A1:2012, Class I, continuous operation
Standards	• ISO 80601-2-12:2011, ISO 80601-2-55:2018, EN 13544-1:2007+A1:2009 • IEC 60601-1, Type B (equipment making physical contact with the patient and the gas pathways). • IEC 60601-1, Type BF (CO_2 analyzer, Y sensor, nebulizer patient unit and cable) • IEC 60601-1, Type CF-defibrillation proof (Edi catheter and cable)
Ingress protection	IP 21
Electromagnetic compatibility (EMC)	According to limits specified in IEC 60601-1-2:2014
The '**Electromagnetic Compatibility Servo-u/Servo-n Ventilator System'** is available from the manufacturer.	

Communication / Interface

Serial ports	Two RS-232C ports. For data communication via the Servo Communication Interface (SCI).
Servo Communication Interface (SCI)	A protocol for data communication with external devices
Alarm output connection (option)	4-pin modular connector for communication of all active alarms Switching capability: Max. 40 V DC, max. 500 mA, max. 20 W
Data transfer via USB port	For transfer of trends, logs, screenshots and recordings to a USB memory stick
Ethernet port	The network connection (LAN) port is for service use, and should only be used by personnel trained and authorized by the manufacturer
MSync, HL7 converter (optional)	See separate datasheet

Invasive ventilation – modes

Controlled ventilation	• PC (Pressure Control) • VC (Volume Control) • PRVC (Pressure Regulated Volume Control)
Supported ventilation:	• PS/CPAP (Pressure Support / Continuous Positive Airway Pressure) • VS (Volume Support)
Automode (option)	• Control mode: VC <–> Support mode: VS • Control mode: PC <–> Support mode: PS • Control mode: PRVC <–> Support mode: VS
Combined ventilation	• SIMV (VC) + PS (Synchronized Intermittent Mandatory Ventilation) • SIMV (PC) + PS • SIMV (PRVC) + PS • Bi-Vent/APRV (Airway Pressure Release Ventilation)
NAVA	• Neurally Adjusted Ventilatory Assist via endotracheal tube or tracheostomy
VC and SIMV (VC) + PS and Automode VC <–> VS are not available in the neonatal patient category.	

Invasive ventilation – leakage compensation

Max. leakage compensation level	• Neonatal: - 25 l/min

Non invasive ventilation – modes

Controlled ventilation	• NIV PC (option)
Supported ventilation	• NIV PS (option) • Nasal CPAP (option)
NIV NAVA	• Neurally Adjusted Ventilatory Assist via non-invasive patient interfaces (option)
NIV PS is not available in the neonatal patient category	

Non invasive ventilation – leakage compensation

Max. leakage compensation level	• Adult: - Inspiratory: up to 200 l/min - Expiratory: up to 65 l/min • Pediatric and neonatal: - Inspiratory: up to 33 l/min - Expiratory: up to 25 l/min - Nasal CPAP: up to 20 l/min
Disconnection flow (configurable)	• Low: - 7.5 l/min • High: - 40 l/min (Adult) - 15 l/min (Neonatal/pediatric) • Disabled: - Deactivates disconnection detection
Connection detection	Manual or automatic via bias flow

High Flow therapy (option)

Flow setting range	• Adult: 5–60 l/min • Pediatric: 0.5–30 l/min • Neonatal: 0.5–20 l/min

VT/PBW

Predicted Body Weight (PBW)	Automatically calculated for adult patients based on gender and height (130–200 cm)
Body Weight (BW)	Entered for neonatal and pediatric patients, as well as adult patients shorter than 130 cm or taller than 200 cm
VT/PBW (VT/BW) in ml/kg	Automatically calculated, displayed and trended

Stress Index

Patient category	Adult
Modes	VC, SIMV (VC)+PS, Automode VC <–>VS
Values	0.5 – 1.5 (A Stress Index above 1.05 suggest that the lungs are over-distended)

Display

Views	• Basic • Advanced • Loops • Servo Compass (option) • Pes & PL (option) • Distance • Family Each of the screen layout views offers a specific combination of displayed waveforms, loops and presented values.
Real time waveforms	• Airway pressure • Flow • Volume • Edi (option) • CO_2 (option) • Transpulmonary pressure (option) • Esophageal pressure (option)
Loops	• Pressure – Volume • Pressure – Flow • Volume – Flow A reference loop and three overlaying loops can be displayed.
Servo Compass	Visualizes volume (VT/PBW) and pressure (total or driving) in relation to set targets in invasive modes.
Short trends	• During ventilation in all ventilation modes, short trends of the numerical values in the first column can be displayed. • Trend time 15 minutes to 72 hours.
Trends	• Trending of measured and calculated values. • Trend time 1 to 72 hours. • Order of trended values can be set by the user.

Open Lung Tool trends (option)

OLT trends (option)

Graphical trend areas	1: - Pei (end-inspiratory pressure) - Pdrive * - PEEP 2: - $VTCO_2$ (when applicable) - SI * (Stress Index, adult patient category only) - Cdyn 3 (standard): - VTi - VTe 3 (option): - PL ei - PL ee - PL drive *
* Pdrive, PL drive and SI only shown as values – not graphical trends	
Modes	All invasive modes
Trend time	5, 10, 15, 30, or 60 minutes
Recruitment recording	Recording of recruitments for retrospective review of recruitments

Auto RM (option)

Automatic recruitment maneuver with two phases for adult and pediatric patients	Available in PC, PRVC and VC invasive ventilation modes
Maneuver phases	1. Recruitment made in PC mode with I:E set to 1:1. PEEP and inspiratory pressure increase according to a preset pattern. 2. Post-recruitment, where the system returns to the mode set prior to recruitment and sets a user-selected post-recruitment PEEP.
Recruitment parameters	• PEEPmax • RR • Pmax • Δ PEEP/step • Breaths/step • Breaths at Pmax • Post-RM PEEP
Recruitment analysis	Pre- and Post-recruitment measurements during 5 breaths each
Recruitment recording	Automatic recording of recruitments with retrospective review of recruitments possible in OLT trends or as recruitment recordings

Auto SRM (option)

Automatic stepwise recruitment maneuver including decremental PEEP titration to set a personalized PEEP for adult patients	Available in PC, PRVC and VC invasive ventilation modes
Maneuver phases	1. Recruitment made in PC mode with I:E set to 1:1. PEEP and inspiratory pressure increase according to a preset pattern. 2. PEEP titration: The system searches for the PEEP level with the highest Cdyn. If such an optimal Cdyn is found this marks closing PEEP. 3. Re-recruitment repeats phase 1 with half the numbers of breaths at each step. 4. Post-recruitment, where the system returns to the mode set prior to recruitment and suggests a new PEEP setting 2 cmH_2O above closing PEEP and a tidal volume setting or pressure level above PEEP setting to achieve the pre-set post recruitment VT/PBW.
Recruitment parameters	• PEEPmax • RR • Pmax • Δ PEEP/step • Breaths/step (Recruitment) • Breaths at Pmax • PEEPstart • VT/PBW • Breaths/step (PEEP titration)
Recruitment analysis	Display of Pre- and Post-recruitment Pdrive, Cdyn, PEEP, VTi and VT/PBW
Recruitment recording	Automatic recording of recruitments with retrospective review of recruitments possible in OLT trends or as recruitment recordings

Transpulmonary pressure measurement (option)

Esophageal pressure measurement via Auxiliary pressure (Paux) port on Y sensor module		
Pes Catheter Positioning		Automatic maneuver to validate Esophageal balloon positioning and filling
Waveforms	Pes	Esophageal pressure
	P_L	Transpulmonary pressure = Paw – Pes
Numerical values	P_L ei	End inspiratory P_L = Paw ei – Pes ei
	P_L ee	End expiratory P_L = PEEP – Pes ee
	P_L drive	P_L ei – P_L ee (passive ventilation) P_L max (inspiration) – P_L ee (active breathing)
	ΔPes	Pes max (inspiration) – Pes ee (positive Pes deflection) Pes min (inspiration) – Pes ee (negative Pes deflection)

Parameter settings

Parameter	Neonatal range	Pediatric range	Adult range
Tidal volume (ml)	2–50	10–350	100–4000
Minute volume (l/min)	0.1–7.5	0.3–20	0.5–60
Apnea, time to alarm (s)	1–45	2–45	15–45
Max. apnea time in Auto-mode (s)	3–15	3–15	7–12
Pressure level above PEEP (cmH_2O)	0–79	0–79	0–119
Pressure level above PEEP in NIV (cmH_2O)	0–60	0–60	0–60
PEEP (cmH_2O)	0–50	0–50	0–50
PEEP in NIV (cmH_2O)	2–20	2–20	2–20
CPAP pressure (cmH_2O)	2–20	2–20	–
Respiratory rate (breaths/min)	4–150	4–150	4–100
SIMV rate (breaths/min)	1–60	1–60	1–60
Breath cycle time, SIMV (s)	0.5–15	0.5–15	1–15
P_{High} (cmH_2O)	2–50	2–50	2–50
T_{High} (s)	0.2–30	0.2–30	0.2–30
T_{PEEP} (s)	0.1–10	0.1–10	0.1–10
PS above P_{High} (cmH_2O)	0–78	0–78	0–118
O_2 concentration (%)	21–100	21–100	21–100
I:E ratio	1:10–4:1	1:10–4:1	1:10–4:1
Ti (s)	0.1–5	0.1–5	0.1–5
NAVA level (cmH_2O/µV)	0–15	0–15	0–15
Edi trigger (µV)	0.1–2.0	0.1–2.0	0.1–2.0
T_{Pause} (s)	–	0–1.5	0–1.5
T_{Pause} (% of breath cycle time)	–	0–30	0–30
Flow trigger (l/min)	0–0.5	0–0.5	0–2.0
Pressure trigger (cmH_2O)	-1 to -20	-1 to -20	-1 to -20
Insp. rise time (% of breath cycle time)	0–20	0–20	0–20
Insp. rise time (s)	0–0.2	0–0.2	0–0.4
End inspiration (% of peak flow)	1–70	1–70	1–70
End inspiration (% of peak flow) in NIV	10–70	10–70	10–70
Decelerating flow pattern in VC (%)	--	0–100	0–100
Flow adaptation in VC	--	on/off	on/off

Backup parameter settings

Parameter	Neonatal range	Pediatric range	Adult range
Inspiratory tidal volume (ml)	2–50	10–350	100–4000
Pressure level above PEEP in backup (cmH_2O)	5–79	5–79	5–119
Pressure level above PEEP in NIV backup (cmH_2O)	5–60	5–60	5–60
Respiratory rate in backup (breaths/min)	4–150	4–150	4–100
I:E ratio	1:10–4:1	1:10–4:1	1:10–4:1
Ti (s)	0.1–5	0.1–5	0.1–5

Special functions

Special function	Setting range
Manual breath	Initiation of 1 breath (In SIMV mode initiation of 1 mandatory breath)
Static measurements	Insp. or exp. hold (0–30 seconds)
Nebulization	5–30 min/Continuous/Off
O_2 boost level	Off, 1–79 %
O_2 boost function	Activate O_2 boost up to 1 minute
Leakage compensation	On/Off
Circuit compensation	On/Off
Edi monitoring	In all ventilation modes, in High Flow therapy and in Standby (with Edi module and Edi catheter)
Previous mode	Activates previously used mode
Backup ventilation	Backup On/Off
Apnea management	Several parameters

Disconnection

Pre-oxygenation time	Max. 2 min
Post-oxygenation time	Max. 1 min
Patient disconnected	High priority alarm activated after 1 min
Adjustable oxygen level	21 – 100 %

Monitoring and trends

Peak airway pressure	Ppeak
Pause airway pressure	Pplat
Mean airway pressure	Pmean
Driving airway pressure	Pdrive
Positive end expiratory pressure	PEEP
Continuous positive airway pressure	CPAP
Spontaneous breaths per minute	RR sp
Respiratory rate	RR
Spontaneous expiratory minute volume	MVe sp
Inspired minute volume	MVi
Expired minute volume	MVe
Leakage fraction (%)	Leakage
Inspired tidal volume	VTi
Expired tidal volume	VTe
End expiratory flow	Flowee
Measured oxygen concentration	O_2 conc
CO_2 end tidal concentration	etCO_2
CO_2 minute elimination	VCO_2
CO_2 tidal elimination	VTCO_2
Dynamic compliance	Cdyn
Static compliance	Cstatic
Inspiratory resistance	Ri
Expiratory resistance	Re
Work of breathing, ventilator	WOBvent
Work of breathing, patient	WOBpat
Elastance	E
P 0.1	P 0.1
Shallow Breathing Index	SBI
Peak Edi value	Edipeak
Average Edipeak	Edipeak average (monitoring only)
Average Edimin	Edimin average (monitoring only)
Minimum Edi value	Edimin
Ratio of expired tidal volume to predicted body weight	VT/PBW
Ratio of expired tidal volume to body weight	VT/BW
Switches to backup per minute	Backup ∑ (trended value only)
Time in backup in percent per minute	Backup % (trended value only)
Stress Index	SI
Heliox gas consumption	HeO_2 (trended value only)

Alarms

Alarm	Neonatal range	Pediatric range	Adult range
Airway pressure (upper alarm limit)	16–90 cmH_2O	16–90 cmH_2O	16–120 cmH_2O
Airway pressure NIV (upper alarm limit)	16–70 cmH_2O	16–70 cmH_2O	16–70 cmH_2O
Respiratory rate (upper and lower alarm limits)	1–160 breaths/ min	1–160 breaths/ min	1–160 breaths/ min
Expired minute volume (upper alarm limit)	0.02–30 l/min	0.02–30 l/min	1–60 l/min
Expired minute volume (lower alarm limit)	0.01 – 20 l/min	0.01 – 20 l/min	0.05–40 l/min
End expiratory pressure (upper alarm limit)	1–55 cmH_2O	1–55 cmH_2O	1–55 cmH_2O
End expiratory pressure (lower alarm limit)	Off, 1–47 cmH_2O	Off, 1–47 cmH_2O	Off, 1–47 cmH_2O
No patient effort (Apnea) alarm	1–45 s	2–45 s	15–45 s Automatic return to support mode on patient triggering
No consistent patient effort	Yes, described in User's manual		
High continuous pressure	Yes, described in User's manual		
O_2 concentration	Set value ±5 vol% or ≤18 vol%		
Gas supply	Below 200 kPa (2.0 bar/29 PSI), above 600 kPa (6.0 bar/87 PSI)		
Battery	• Limited battery capacity: 10 min. • No battery capacity: less than 3 min • Low battery voltage.		
End tidal CO_2 (upper and lower limit)	0.5–20 %, 4–100 mmHg, 0.5–14 kPa		
Leakage too high	Yes, described in User's manual		
Technical	Yes, described in User's manual		

Autoset (alarm limits) specification

Autoset (alarm limits) specification	Invasive ventilation, controlled modes only
High airway pressure	Mean peak pressure +10 cmH_2O or at least 35 cmH_2O
Inspiratory tidal volume too high	The greater of VTi + 30 % or VTi +2 ml
Expiratory minute volume (upper alarm limit)	Mean expiratory minute volume +50 %
Expiratory minute volume (lower alarm limit)	Mean expiratory minute volume -50 %
Respiratory rate (upper alarm limit)	Mean respiratory rate +40 %
Respiratory rate (lower alarm limit)	Mean respiratory rate -40 %
End expiratory pressure (upper alarm limit)	Mean end expiratory pressure +5 cmH_2O
End expiratory pressure (lower alarm limit)	Mean end expiratory pressure -3 cmH_2O
End tidal CO_2 concentration (upper alarm limit)	Mean end tidal CO_2 concentration +25 %
End tidal CO_2 concentration (lower alarm limit)	Mean end tidal CO_2 concentration -25 %

Y sensor (option)

Y sensor (option)	Size	Weight
Y sensor module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	280 g (0.6 lbs)
Y sensor	W 18 x L 50 x H 27 mm (W 0.7" x L 2.0" x H 1.1")	11 g
Connectors and cables	• 15 mm male and female conical connector on flow sensor according to ISO 5356-1 • Pressure port on module, pressure line, 2.0 m (6.6 ft), phthalate free PVC • Flow sensor cable, 2.0 m (6.6 ft)	
Sensor material	• Single use: PC, Polycarbonate	
Power source	Powered by the ventilator system, 4.5 W during normal operation	
Measuring method	Hot Wire Anemometer (HWA)	
Parameters	• Airway pressure • Airway flow • Inspiratory and expiratory volumes • Trigger and End inspiration	
Measuring range	• Flow: 0.12 to 32 l/min • Pressure: -40 to 120 cmH_2O	
Y sensor resistance	10 cmH_2O/l/s at 30 l/min	
Dead space	≤1 ml	
Pressure line connector	Gable mounted bulk head connector to fit tubing with an inner diameter of 3-4 mm (0.12–0.16")	

CO_2 analyzer (option)

CO_2 analyzer (option)	Size	Weight
CO_2 analyzer module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	265 g (0.58 lbs)
Sensor (Capnostat 5)	32.0 x 47.0 x 21.6 mm (1.3" x 1.9" x 0.8")	20 g
Operating temperature	10 to 33 °C (50 to 91 °F)	
Airway adapter		10 g
Power source	Powered by the ventilator	
Connectors and cables	Sensor	2.8 m (9.2 ft) cable
Measuring method	Mainstream, dual-wavelength, non-dispersive infrared	
Parameters	• CO_2 end tidal concentration ($etCO_2$) • CO_2 minute elimination (VCO_2) • CO_2 tidal elimination ($VTCO_2$)	
Measuring range	• 0 to 100 mmHg CO_2 partial pressure • 0 to 13.3 kPa CO_2 partial pressure • 0 to 13.2 % CO_2 volume (at a barometric pressure of 1013 hPa)	
System response time CO_2	The total system response time of the CO_2 monitor when exposed first to air and then to a gas mix with 5.0 % CO_2 is <250 ms	
Warm-up time	15 s to initial CO_2 indication maximum 2 minutes to full specification	
Oxygen concentration compensation	Automatic. Values supplied from the ventilator system	
Barometric pressure compensation	Automatic. Values supplied from the ventilator system	
Digitizing rate	100 Hz	
Airway adapter dead space	• Neonatal/pediatric: <1 cm^3 • Adult: <6 cm^3	

Edi module (option)

Edi module (option)	Size	Weight
Edi module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	0.25 kg (0.6 lbs)
Edi catheter cable	2.0 m (6.6 ft)	-
Power source	Powered by the ventilator	
Power consumption	<3 W during normal operation	
Parameters	• Edi waveform • ECG leads waveforms • NAVA estimated pressure waveform (Pedi)	

Aerogen nebulizers

Aerogen nebulizers	Pro	Solo
Size	W 50 x L 50 x H 45 mm (W 2.0" x L 2.0" x H 1.8")	W 48 x L 25 x H 67 mm (W 1.9" x L 1.0" x H 2.6")
Weight	Approx. 25 g (0.88 oz)	Approx. 14 g (0.49 oz)
Particle size	1 – 5 µm mass median aerodynamic diameter (MMAD)	
Flow rate	>0.2 (average: ~0.4) ml/min	
Max. volume	10 ml	6 ml
Residual volume	<0.1 ml for 3 ml dose	
Control cable	1.8 m (5.9 ft)	

Log function

Event log	• Alarms • Ventilator settings • Apnea periods • Maneuvers and O_2 boost
Service log	• Technical alarms • Test results • Service records • Software installation • Configuration information

Saving of data

Recording of current waveform and parameter values	30 seconds of data will be recorded (15 seconds before and 15 seconds after activation). Up to 40 recordings can be stored.
Saving screenshots	Up to 40 screenshots can be stored.
Saving recruitments	Up to 12 manual and/or automatic recruitment recordings can be stored (option).
Export files	Recordings, screenshots, recruitments, trends and event log can be saved and exported to a USB memory stick.

Optional equipment

Optional equipment	Weight	Dimensions	Maximum load
Mobile cart	15.0 kg (33.1 lbs)	W 647 x L 547 x H 557 mm (W 25.5" x L 21.5" x H 21.9")	-
Drawer for mobile cart	0.6 kg (1.3 lbs)	W 247 x L 118 x H 302 mm (W 9.7" x L 4.6" x H 11.9")	-
Shelf base	2.5 kg (5.5 lbs)	W 207 x L 302 x H 43 mm (W 8.2" x L 4.6" x H 1.7")	-
Pendant/bed holder	3.2 kg (7.1 lbs)	W 302 x L 302 x H 393 mm (W 11.9" x L 11.9" x H 15.5")	-
Humidifier holder	0.6 kg (1.3 lbs)	W 243 x L 38 x H 185 mm (W 9.6" x L 1.5" x H 7.3")	5 kg (11.0 lbs)
Support arm 178	2.2 kg (4.8 lbs)	L 900 mm (35.4")	1–3 kg (2.2–6.6 lbs) *

* depending on angle

User interface holder	0.6 kg (1.3 lbs)	W 46 x L 90 x H 123 mm (W 1.8" x L 3.5" x H 4.8")	-
Cable holder for handle	0.1 kg (0.2 lbs)	W 138 x L 92 x H 155 mm (W 5.4" x L 3.6" x H 6.1")	5 kg (11.0 lbs)
Waterbag/IV pole	0.4 kg (0.9 lbs)	W 148 x L 26 x H 1007 mm (W 5.8" x L 1.0" x H 39.6")	1.5 kg (3.3 lbs)
Gas cylinder restrainer kit	1.0 kg (2.2 lbs)	Upper: W 104 x L 65 x H 48 mm (W 4.1" x L 2.5" x H 1.9") Lower: W 106 x L 162 x H 76 mm (W 4.1" x L 6.4" x H 3.0")	Two 4.5 liter bottles
Y piece holder		W 26 x L 52 x H 46 mm (W 1.0" x L 2.0" x H 1.8")	

Compressor Mini (option)

See sepate datasheet

Battery charger/calibrator (option)

See sepate datasheet

Service

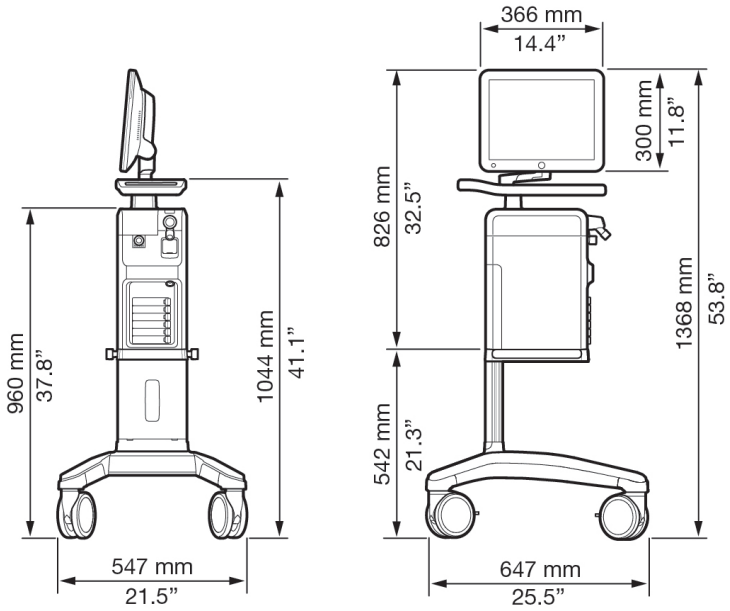
Regular maintenance	Preventive maintenance must be performed by authorized personnel at least once every 5000 hours of operation or once every 12 months, whichever comes first.

Ordering information

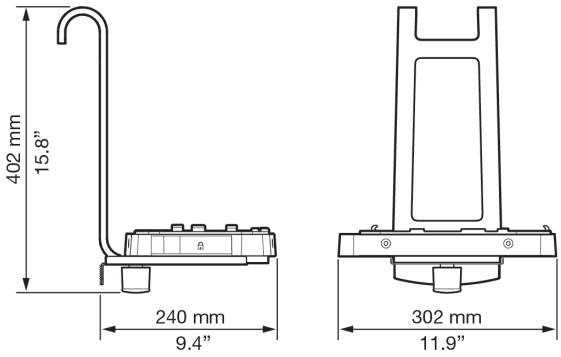
Servo-u, ventilator system and accessories:
See separate information in “System flowchart, Servo-u”

Dimensional drawings

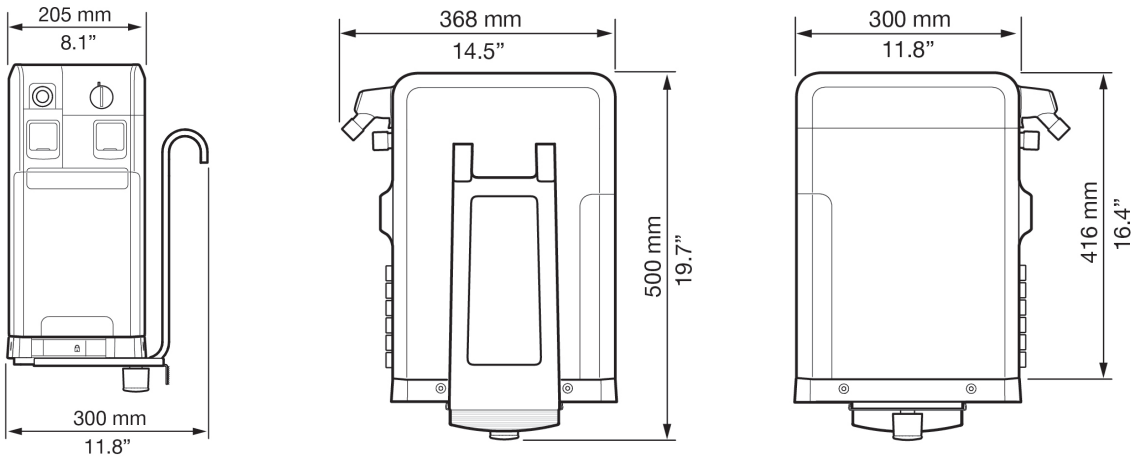
Servo-u on mobile cart



Servo-u holder



Servo-u (patient unit) on Servo-u holder



Contents

Datasheet

Servo-s
System version 8.0

Servo-s

Technical specifications

General

Instructions for use	Please carefully read the user's manual
Legal manufacturer	Maquet Critical Care AB
Other products	See separate data sheets. Contact your local Getinge supplier for more information.

The ventilator – general

Dimensions: • User interface and patient unit • User interface • Patient unit	(See dimensional drawings page 9) W 380 x D 300 x H 520 mm (W 15" x D 11.8" x H 20.5") W 355 x D 53 x H 295 mm (W 14" x D 2.1" x H 11.6") W 380 x D 300 x H 210 mm (W 15" x D 11.8" x H 8.3")
Weight	Approximately 20 kg (44 lbs)
Method of triggering	Flow and pressure
Max. airway pressure	Approximately 115 cmH_2O
Bias flow	2 l/min

The system – general

CE 0123	The device complies with requirements and classification IIb of Medical Device Directive 93/42/EEC. CE Mark Notified Body number: 0123.
Classification	Class I equipment. According to IEC/EN 60 601-1
Standards	• IEC 60601-1: 2005 • ISO 80601-2-12:2011 • ISO 80601-2-55: 2011
A-weighted sound pressure level (L_{pA})	<41 dB, measured at a distance of 1 m (3.3 ft)
IP classification	IP 21
Electromagnetic compatibility (EMC)	According to limits specified in IEC 60601-1-2:2007

The '**EMC Declaration, Information to the Responsible Organization**' is available from Getinge.

Patient range	Patient weight 10–250 kg (22–551 lbs)

Screen

Type	TFT-LCD module
Size	31 cm (12.1") diagonal
Viewing area	246.0 x 184.5 mm (9.7" x 7.3")

Power supply

Power supply, automatic range selection	100–120 V AC ±10%, 50–60 Hz, or 220–240 V AC ±10%, 50–60 Hz
External 12 V DC	12.0 V–15.0 V DC, 10 A
Battery capacity	2 rechargeable battery modules 12 V, 5 A, 3.5 Ah each
Battery backup time	At least 1 h with 2 fully charged batteries
Battery recharge time	Approximately 3h/battery
Max power consumption	At 100–120 V: 2 A, 190 VA, 140 W At 220–240 V: 1 A, 190 VA, 140 W

Gas supply

Inlet gas pressure air/O_2	200–600 kPa / 2.0–6.0 bar / 29–87 PSI
Connection standards available	AGA, DISS, NIST, or French standard
Unavailable gas/loss of gas pressure	The flow from an unavailable gas (air or O_2) is automatically compensated for so that the patient gets the preset volume and pressure.
Patient system gas connectors	Male 22 mm / female 15 mm. In accordance with ISO 5356-1
Gas exhaust port	Male 30 mm cone

Patient system gas connectors

Conical fittings	Male 22 mm / female 15 mm. In accordance with ISO 5356-1
Gas exhaust port	Male 30 mm cone

Inspiratory channel

Pressure drop	Max. 6 cmH_2O at a flow of 1 l/s
Internal compressible factor	Max. 0.1 ml/cmH_2O
Gas delivery system	Microprocessor controlled valve
Inspiratory flow range	0 to 3.3 l/s

Expiratory channel

Pressure drop	Max. 3 cmH_2O at a flow of 1 l/s
Internal compressible factor	Max. 0.1 ml/ cmH_2O
PEEP regulation	Microprocessor controlled valve
Rise time, expiratory flow measurement	<12 ms for 10–90 % response at flow of 0.05–3.2 l/s
Expiratory flow range	0 to 3.2 l/s

Operating conditions

Operating temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	15 to 95% non-condensing
Atmospheric pressure	660 to 1060 hPa
Lowest pressure in breathing system	-400 cmH_2O

Non operating conditions

Impact	• Peak acceleration: 15 g • Pulse duration: 6 ms • Number of impacts: 1000
Storage temperature	-25 to +60°C (-13 to +140°F)
Storage relative humidity	<95% condensing
Storage atmospheric pressure	470 to 1060 hPa

Waveform and loop presentations

Real time waveforms: • Up to 3 waveforms can be displayed simultaneously.	• Pressure • Flow • Volume
Loops	• Volume / Pressure • Flow / Volume

Ventilation modes –Invasive ventilation

Controlled ventilation: • PC (Pressure Control) • VC (Volume Control) • PRVC (Pressure Regulated Volume Control)	Can be configured with alternative flow patterns: - VC with flow adaptation, - VC without flow adaptation, - VC with decelerating flow
Supported ventilation: • PS/CPAP (Pressure Support / Continuous Positive Airway Pressure)	
Combined ventilation: • SIMV (PC) + PS (Synchronized Intermittent Mandatory Ventilation) • SIMV (VC) + PS • SIMV (PRVC) + PS • Bi-Vent/APRV (Airway Pressure Release Ventilation)	Optional, pressure controlled ventilation on two independently adjustable levels, allowing unrestricted spontaneous breathing on both levels.

Ventilation modes – Non invasive ventilation (optional)

NIV PC
NIV PS

Non invasive ventilation (optional)

Leakage compensation level	Inspiratory, up to 200 l/min Expiratory, up to 65 l/min
Leakage overrange detection	Automatic
Disconnect detection	Automatic
Disconnect flow: • Low • High • Disabled	 • Configurable 7.5 l/min • 40 l/min • Deactivates disconnect detection
Connect detection	Manual, or automatic via bias flow

Parameter settings

Parameter	Setting range
Inspiratory tidal volume (ml)	100–2000
Inspiratory minute volume (l/min)	0.5–60
Apnea, time to alarm (s)	15–45
PC/PS above PEEP (cmH_2O)	0–(120 - PEEP)
PC/PS above PEEP in NIV (cmH_2O)	0–(62 - PEEP)
PEEP (cmH_2O)	0–50
PEEP in NIV (cmH_2O)	2–20
CMV frequency (breaths/min)	4–100
SIMV frequency (breaths/min)	1–60
Breath cycle time, SIMV (s)	1–15
P_{High} (cmH_20)	(PEEP + 1)–50
T_{High} (s)	0.2–30
T_{PEEP} (s)	0.1–10
O_2 concentration (%)	21–100
I:E ratio	1:10–4:1
T_{Insp} (s)	0.1–5
T_{Pause} (% of breath cycle time)	0–30
Flow trigger sensitivity level	0–10
Press. trigg sensitivity (cmH_2O)	-20–0
Insp. rise time (% of breath cycle time)	0–20
Insp. rise time (s)	0–0.4
End inspiration (% of peak flow)	1–70
End inspiration in NIV (% of peak flow)	10–70
Oxygen breaths	100% for 1 minute
Start breath	Initiation of 1 breath (In SIMV mode initiation of 1 mandatory breath)
Pause hold	Insp. or exp (0–30 seconds)
Alarm silence/reset	2 minute silence and reset of latched alarms
Compliance compensation	On/Off
Backup ventilation	Backup On/Off

Backup parameter settings

Parameter	Setting range
Inspiratory tidal volume (ml)	100–2000
PC above PEEP (cmH_2O)	5–(120 - PEEP)
PC above PEEP in NIV (cmH_2O)	5–(62 - PEEP)
CMV frequency (breaths/min)	4–100
I:E ratio	1:10–4:1
T_{Insp} (s)	0.1–5

Suction support

Pre oxygenation time	Max. 2 min
Post oxygenation time	Max. 1 min
Suction phase time	No maximum level
Adjustable oxygen level	21–100 %

Monitoring

	Displayed value	Trended value*
Breathing frequency	Yes	Yes
Spontaneous breaths per minute (RRsp)	No	Yes
Peak airway pressure	Yes	Yes
Mean airway pressure	Yes	Yes
Pause airway pressure	Yes	Yes
Positive end expiratory pressure	Yes	Yes
Inspired tidal volume	Yes	Yes
Expired tidal volume	Yes	Yes
Inspired minute volume	Yes	Yes
Expired minute volume	Yes	Yes
Leakage fraction in NIV (%)	Yes	Yes
Ti/Ttot	Yes	No
I:E ratio	Yes	No
Total PEEP**	Yes	No
Switch to backup (b/min)	No	Yes
Backup (%/min)	No	Yes
O_2 concentration (measured)	Yes	Yes
MV_e sp / MV_e	Yes	No
Spontaneous exp. minute volume (MV_e sp):	Yes	Yes
End expiratory flow	Yes	Yes
Static compliance **	Yes	Yes
Dynamic compliance **	Yes	Yes
Inspiratory resistance **	Yes	Yes
Expiratory resistance **	Yes	Yes
Elastance **	Yes	Yes
Time constant **	Yes	No
P0.1 measurement **	Yes	Yes
Work of breathing patient **	Yes	Yes
Work of breathing ventilator **	Yes	Yes
Shallow Breathing Index (SBI) **	Yes	Yes
Supply pressure (O_2 and air) **	Yes	No
Battery remaining time	Yes	No
Barometric pressure	Yes	No

* Stored trend values for up to 24 hours

** Optional

Alarms

Airway pressure (upper): • Invasive ventilation • Non-invasive ventilation	 16–120 cmH_2O 16–70 cmH_2O
Expired minute volume (upper alarm limit)	0.5–60 l/min
Expired minute volume (lower alarm limit)	0.5–40 l/min
No patient effort (Apnea) alarm	15–45 s Automatic return to support mode on patient triggering
No consistent patient effort	Yes, described in User's manual
Respiratory frequency	1–160 breaths/min
High end expiratory pressure	0–55 cmH_2O
Low end expiratory pressure	0–47 cmH_2O Note. Setting the alarm to 0 (zero) is equal to alarm off
High continuous pressure	Obstruction leading to constant high airway pressure (>PEEP +15 cmH_2O) during: • >2 breaths or 5 seconds, whichever is greater, • 15 ±1.5 s if less than 2 breaths are triggered
O_2 concentration:	Set value ±5 vol% or ≤18 vol%
Gas supply	Below 200 kPa / 2.0 bar / 29 PSI and above 600 kPa / 6.0 bar / 87 PSI
Battery	• Limited battery capacity: 10 min • No battery capacity: less than 3 min • Low battery voltage
Leakage out of range in NIV	Yes, described in User's manual
Technical	Yes, described in User's manual

Autoset (alarm limits) specification

Autoset alarm limits specification	Invasive ventilation, controlled modes only
High airway pressure	Mean peak pressure +10 cmH_2O or at least 35 cmH_2O
Upper minute volume	Expiratory minute volume +50%
Lower minute volume	Expiratory minute volume -50%
Upper respiratory frequency	Breathing frequency +40%
Lower respiratory frequency	Breathing frequency -40%
High end expiratory pressure	Mean end expiratory pressure +5 cmH_2O
Low end expiratory pressure	Mean end expiratory pressure -3 cmH_2O

Communication/interface

Serial port	RS-232C - isolated. For data communication via the Communication Interface Emulator (CIE).
Alarm output connector (optional): • Connector • Ratings	 • 4-pole Modular connector • Max 40 V DC, Max 500 mA, Max 20 W

Log function

Event log	• Alarms • Ventilator settings • Apnea periods • Immediate functions
Service log	• Technical alarms • Test results • Preventive maintenance • Service history • Configuration log

Servo-s Mobile Cart (optional)

Weight	25 kg (55 lbs)
Dimensions	H 830 mm (with handles 1.030 mm) x L 650 mm x W 500 mm (H 32.7" (with handles 40.6") x L 25.6" x W 19.7") (see dimensional drawing page 10)

Servo-s Shelf base (optional)

Weight	0,1 kg (0.2 lbs)
Dimensions	H 8 mm x L 160 mm x W 80 mm (H 0.3" x L 6.3" x W 2.4") (see dimensional drawing page 10)

Gas cylinder restrainer (optional)

Max load	2 x 5-liter bottles

Compressor Mini (optional)

See separate datasheet	• Order number 66 84 417

Aerogen nebulizer systems (optional)

See separate datasheet	• Order number MX-7156 for Aerogen Pro • Order number MX-7154 for Aerogen Solo

Service

Regular maintenance	Once every 12 months or at least after 5000 operating hours

Note

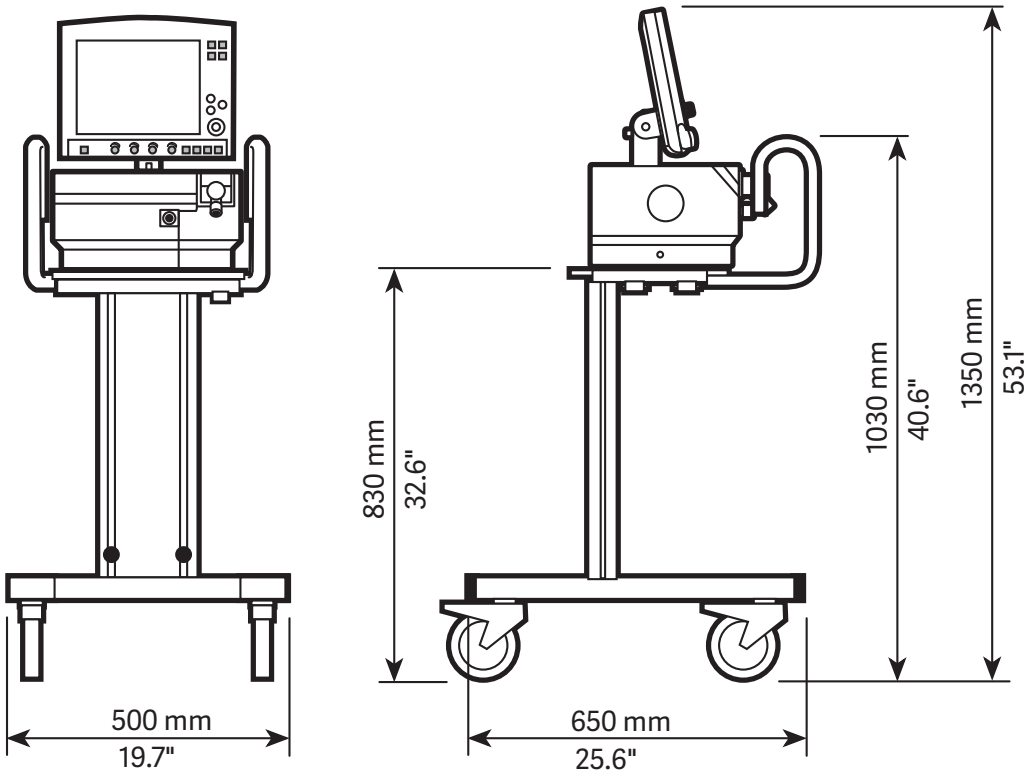
For inaccuracies and more detailed technical specifications please refer to the User's manual.

Ordering information

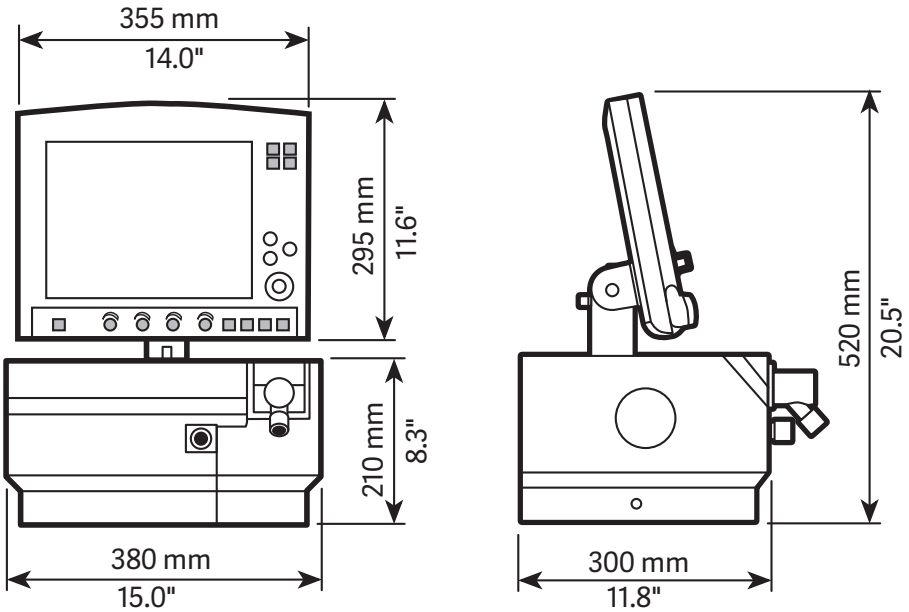
See separate information	• System flowchart, Servo-s, Order no: 66 70 112

Dimensional drawings

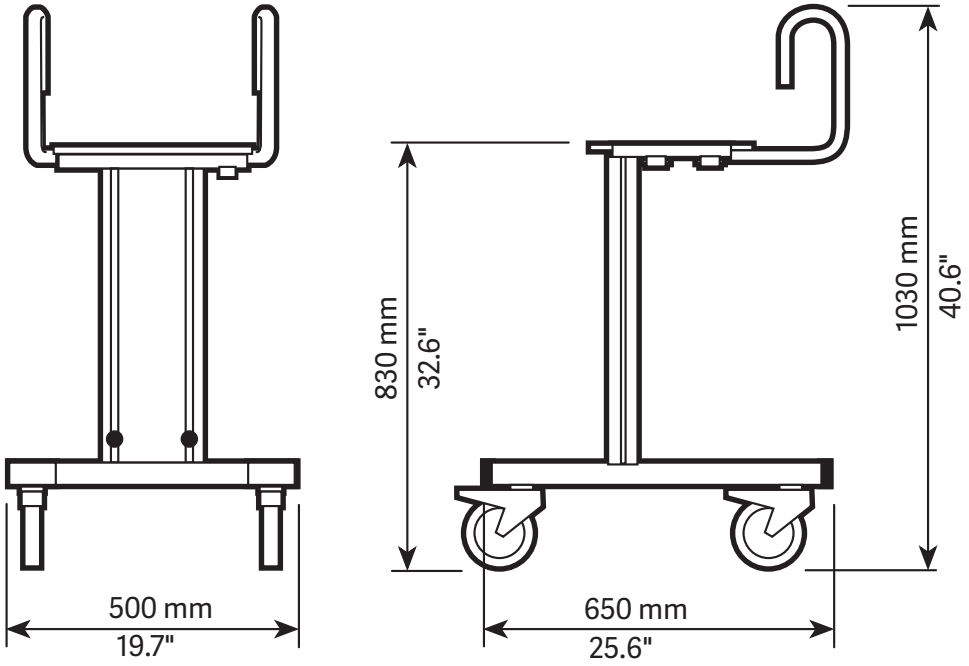
Servo-s on Mobile cart



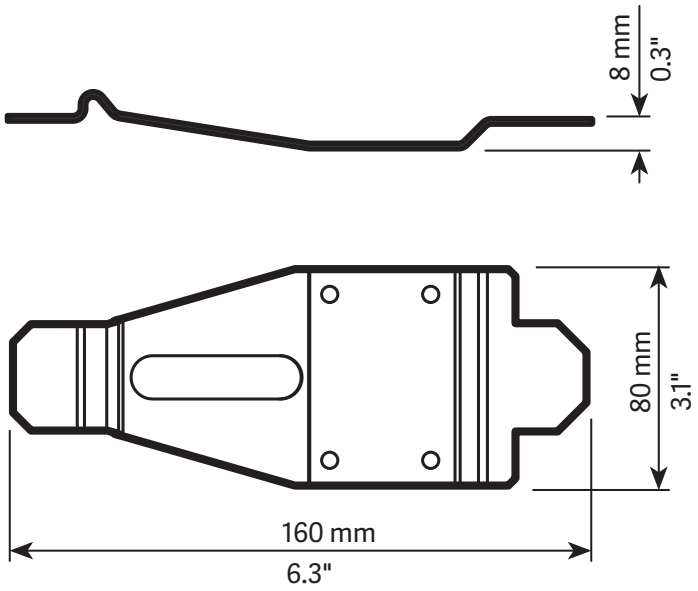
Servo-s on Shelf base



Mobile cart Servo-s



Shelf base Servo-s



Contents

Datasheet

Servo-n
System version 4.1

Servo-n

Technical specifications

General

Intended use	The Servo-n ventilator system is: • intended for respiratory support, monitoring and treatment of neonatal and pediatric patients • to be used only by healthcare providers • to be used only in professional healthcare facilities and for transport within these facilities
Clinical benefits	Clinical benefits for Edi monitoring and NAVA: • to provide monitoring of the patient's breathing drive • to improve synchrony between the ventilator system and patient when the electrical signal from the brain to the diaphragm is active
Instructions for use	Please carefully read the user's manual
Legal manufacturer	Maquet Critical Care AB
Other products	See separate data sheets. Contact your local Getinge supplier for more information.

The ventilator – general

	Servo-n	Servo-n on mobile cart
Base system weight	Approximately 23 kg (50.7 lbs) • Patient unit 15 kg (33.0 lbs) • User interface 4 kg (8.8 lbs) • Handle 3 kg (6.6 lbs) • Cable holder and cable 1 kg (2.2 lbs)	Approximately 35 kg (77.2 lbs) • Base system approx. 23 kg (50.7 lbs) • Mobile cart 13.0 kg (28.7 lbs)
Dimensions of base (W x D), see dimensional drawings	368 x 205 mm (14.5" x 8.1")	647 x 547 mm (25.5" x 21.5") incl. wheels
Height (incl. user interface)	826 mm (32.5")	1368 mm (53.8")
Wheels	N/A	Four wheels with separate brakes
A-weighted sound pressure level (L_{pA})	<40 dB, measured at a distance of 1 m (3.3 ft)	
A-weighted sound power level (L_{WA})	<51 dB	

Ventilation – general

Patient range	• Neonatal: 0.3–8 kg (0.7–17.6 lbs) • Pediatric: 3–30 kg (6.6–66.0 lbs)
Bias flow	0.5 l/min *
Internal compressible factor	Max. 0.1 ml/cmH_2O
Gas delivery system	Microprocessor controlled valves
Maximum airway pressure	125 cmH_2O
Method of triggering	Flow, pressure and Edi (with Edi module and Edi catheter)
Inspiratory flow range	0 to 33 l/min *
Pressure drop	• Max. 6 cmH_2O at a flow of 60 l/min (insp. channel) • Max. 3 cmH_2O at a flow of 60 l/min (exp. channel)
PEEP regulation	Microprocessor controlled valve
Expiratory flow range	0 to 192 l/min

* In HFOV, adaptive BIAS flow and extended flow range.

Power supply

Power supply, automatic range selection	• 100–120 V AC, 2 A, 50–60 Hz • 220–240 V AC, 1 A, 50–60 Hz
Plug-in battery module: • Battery backup (nickel-metal hydride, NiMH) • Battery capacity • Battery backup time • Recharge time	 • Six battery module slots. Two batteries are delivered with the ventilator. • Rechargeable, 12 V, 3.5 Ah each • Ranging from 60 minutes (2 batteries) to 180 minutes (6 batteries) • Approximately 3 h/battery
External 12 V DC	12.0 V–15.0 V DC, 10 A
Typical min. power consumption (no optional modules, no ongoing battery charging, normal panel backlight)	100 VA, 40 W at 230 V or 75 VA, 40 W at 110 V
Typical max. power consumption (with CO_2, Edi and Y sensor modules, ongoing battery charging, max. panel backlight)	200 VA, 80 W at 230 V or 170 VA, 80 W at 110 V

User interface

Type	TFT-LCD touchscreen
Size	366 x 300 x 50 mm (14.4" x 11.8" x 2.0")
Viewing area	15" XGA, 1024 x 768 pixels with a 24-bit color palette
Weight	Approximately 4 kg (8.8 lbs)

Gas supply

Inlet gas pressure air/ O_2	200–600 kPa / 2.0–6.0 bar / 29–87 PSI
Connection standards available air/ O_2	AGA, DISS, NIST, or French standard
Inlet gas pressure HeO_2 (option)	340–600 kPa / 3.4–6.0 bar / 49–87 PSI
Connection standards available HeO_2 (option)	AGA, DISS, NIST
Unavailable gas/loss of gas pressure	The flow from an unavailable gas (air or O_2) is automatically compensated for so that the patient gets the preset volume and pressure.
Patient system gas connectors	Male 22 mm / female 15 mm. In accordance with ISO 5356-1
Gas exhaust port	Male 30 mm cone

Operating conditions

Operating temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	15 to 95% non-condensing
Atmospheric pressure	660 to 1060 hPa (HFOV performance may be limited at high altitudes. See users instruction for details.)
Lowest pressure in patient circuit	-400 cmH_2O

Non operating conditions

Temperature	-25 to +60°C (-13 to +140°F)
Relative humidity	<95% condensing
Atmospheric pressure	470 to 1060 hPa
Lowest pressure in patient circuit	N/A

Standards – safety and functionality

CE 0123	The device complies with requirements and classification IIb of Medical Device Directive 93/42/EEC. CE Mark Notified Body number: 0123.
Classification	IEC 60601-1: 2005 + A1:2012, Class I, continuous operation
Standards	• ISO 80601-2-12:2011, ISO 80601-2-55:2018, EN 13544-1:2007+A1:2009 • IEC 60601-1, Type B (equipment making physical contact with the patient and the gas pathways). • IEC 60601-1, Type BF (CO_2 analyzer, Y sensor, nebulizer patient unit and cable) • IEC 60601-1, Type CF defibrillation proof (Edi catheter and cable)
Ingress protection	IP 21
Electromagnetic compatibility (EMC)	According to limits specified in IEC 60601-1-2:2014

The '**Electromagnetic Compatibility Servo-u/Servo-n Ventilator System**' is available from the manufacturer.

Communication / Interface

Serial ports	• Two RS-232C ports. For data communication via the Servo Communication Interface (SCI).
Servo Communication Interface (SCI)	A protocol for data communication with external devices
Alarm output connection (option)	• 4-pin modular connector for communication of all active alarms • Switching capability: Max. 40 V DC, max. 500 mA, max. 20 W
Data transfer via USB port	• For transfer of trends, logs, screenshots and recordings to a USB memory stick
Ethernet port	• The network connection (LAN) port is for service use, and should only be used by personnel trained and authorized by the manufacturer
MSync, HL7 converter (optional)	See separate datasheet
VGA interface	VGA connector for duplication of the user interface

Invasive ventilation – modes

Controlled ventilation	• PC (Pressure Control) • VC (Volume Control) • PRVC (Pressure Regulated Volume Control) • HFOV (Amplitude Control) • HFOV (V TGT) (Volume Target)
Supported ventilation:	• PS/CPAP (Pressure Support / Continuous Positive Airway Pressure) • VS (Volume Support)
Automode (option)	• Control mode: VC <–> Support mode: VS • Control mode: PC <–> Support mode: PS • Control mode: PRVC <–> Support mode: VS
Combined ventilation	• SIMV (VC) + PS (Synchronized Intermittent Mandatory Ventilation) • SIMV (PC) + PS • SIMV (PRVC) + PS • Bi-Vent/APRV (Airway Pressure Release Ventilation) (option)
NAVA	• Neurally Adjusted Ventilatory Assist via endotracheal tube or tracheostomy
VC and SIMV (VC) + PS and Automode VC <–> VS are not available in the neonatal patient category.	
HFOV and HFOV (V TGT) are only available in neonatal patient category	

Invasive ventilation – leakage compensation

Max. leakage compensation level	• Neonatal: - 25 l/min

Non invasive ventilation – modes

Controlled ventilation	• NIV PC (option)
Supported ventilation	• NIV PS (option) • Nasal CPAP
NIV NAVA	• Neurally Adjusted Ventilatory Assist via non-invasive patient interfaces
NIV PS is not available in the neonatal patient category	

Non invasive ventilation – leakage compensation

Max. leakage compensation level	• Pediatric and neonatal: - Inspiratory: up to 33 l/min - Expiratory: up to 25 l/min - Nasal CPAP: up to 20 l/min
Disconnection flow (configurable)	• Low: - 7.5 l/min • High: - 15 l/min • Disabled: the ventilator system will continue to deliver assist even when leakage is excessive.
Connection detection	Manual or automatic via bias flow

High flow therapy (option)

Flow setting range	• Pediatric: 0.5–30 l/min • Neonatal: 0.5–20 l/min

VT/PBW

Predicted Body Weight (PBW)	Automatically calculated for adult patients based on gender and height (130–200 cm)
Body Weight (BW)	Entered for neonatal and pediatric patients, as well as adult patients shorter than 130 cm or taller than 200 cm
VT/PBW (VT/BW) in ml/kg	Automatically calculated, displayed and trended

Display

Views	• Basic • Advanced • Loops • Servo Compass (option) • Pes & PL (option) • Distance • Family Each of the screen layout views offers a specific combination of displayed waveforms, loops and presented values.
Real time waveforms	• Airway Pressure • Flow • Volume • Edi (option) • CO_2 (option) • Transpulmonary pressure (option) • Esophageal pressure (option)
Loops	• Pressure – Volume • Pressure – Flow • Volume – Flow A reference loop and three overlaying loops can be displayed.
Servo Compass	Visualizes volume (VT/BW) and pressure (total or driving) in relation to set targets in invasive modes.
Short trends	• During ventilation in all ventilation modes, short trends of the numerical values in the first column can be displayed. • Trend time 15 minutes to 72 hours.
Trends	• Trending of measured and calculated values. • Trend time 1 to 72 hours. • Order of trended values can be set by the user.

Open Lung Tool trends (option)

OLT trends (option)

Graphical trend areas	1: - Pei (end-inspiratory pressure) - Pdrive * - PEEP 2: - $VTCO_2$ (when applicable) - SI * (Stress Index, adult patient category only) - Cdyn 3 (standard): - VTi - VTe 3 (option): - PL ei - PL ee - PL drive *
* Pdrive, PL drive and SI only shown as values – not graphical trends	
Modes	All invasive modes
Trend time	5, 10, 15, 30, or 60 minutes
Recruitment recording	Recording of recruitments for retrospective review of recruitments

Auto RM (option)

Automatic recruitment maneuver with two phases for adult and pediatric patients	Available in PC, PRVC and VC invasive ventilation modes
Maneuver phases	1. Recruitment made in PC mode with I:E set to 1:1. PEEP and inspiratory pressure increase according to a preset pattern. 2. Post-recruitment, where the system returns to the mode set prior to recruitment and sets a user-selected post-recruitment PEEP.
Recruitment parameters	• PEEPmax • RR • Pmax • Δ PEEP/step • Breaths/step • Breaths at Pmax • Post-RM PEEP
Recruitment analysis	Pre- and Post-recruitment measurements during 5 breaths each
Recruitment recording	Automatic recording of recruitments with retrospective review of recruitments possible in OLT trends or as recruitment recordings

Transpulmonary pressure measurement (option)

Esophageal pressure measurement via Auxiliary pressure (Paux) port on Y sensor module		
Pes Catheter Positioning		Automatic maneuver to validate Esophageal balloon positioning and filling
Waveforms	Pes	Esophageal pressure
	P_L	Transpulmonary pressure = Paw – Pes
Numerical values	P_L ei	End inspiratory P_L = Paw ei – Pes ei
	P_L ee	End expiratory P_L = PEEP – Pes ee
	P_L drive	P_L ei – P_L ee (passive ventilation) P_L max (inspiration) – P_L ee (active breathing)
	ΔPes	Pes max (inspiration) – Pes ee (positive Pes deflection) Pes min (inspiration) – Pes ee (negative Pes deflection)

Parameter settings

Parameter	Neonatal range	Pediatric range
Tidal volume (ml)	2–50	10–350
Minute volume (l/min)	0.1–7.5	0.3–20
Apnea, time to alarm (s)	1–45	2–45
Max. apnea time in Automode (s)	3–15	3–15
Pressure level above PEEP (cmH_2O)	0–79	0–79
Pressure level above PEEP (in NIV) (cmH_2O)	0–60	0–60
P_{mean} (HFOV) (cmH_2O)	5–40	–
P_{amp} (HFOV) (cmH_2O)	0–100	–
Tidal Volume (HFOV) (ml)	0.2–40	–
$I:E_{ratio}$ (HFOV)	1:3–1:1	–
Frequency (HFOV) (Hz)	5–20	–
PEEP (cmH_2O)	0–50	0–50
PEEP in NIV (cmH_2O)	2–20	2–20
CPAP pressure (cmH_2O)	2–20	2–20
Respiratory rate (breaths/min)	4–150	4–150
SIMV rate (breaths/min)	1–60	1–60
Breath cycle time, SIMV (s)	0.5–15	0.5–15
P_{High} (cmH_2O)	2–50	2–50
T_{High} (s)	0.2–30	0.2–30
T_{PEEP} (s)	0.1–10	0.1–10
PS above P_{High} (cmH_2O)	0–78	0–78
O_2 concentration (%)	21–100	21–100
I:E ratio	1:10–4:1	1:10–4:1
Ti (s)	0.1–5	0.1–5
NAVA level (cmH_2O/μV)	0–15	0–15
Edi trigger (μV)	0.1–2.0	0.1–2.0
T_{Pause} (s)	–	0–1.5
T_{Pause} (% of breath cycle time)	–	0–30
Flow trigger (l/min)	0–0.5	0–0.5
Pressure trigger (cmH_2O)	-1 to -20	-1 to -20
Insp. rise time (% of breath cycle time)	0–20	0–20
Insp. rise time (s)	0–0.2	0–0.2
End inspiration (% of peak flow)	1–70	1–70
End inspiration (% of peak flow) in NIV	10–70	10–70
Decelerating flow pattern in VC (%)	--	0–100
Flow adaptation in VC	--	on/off

Backup parameter settings

Parameter	Neonatal range	Pediatric range
Inspiratory tidal volume (ml)	2–50	10–350
Pressure level above PEEP in backup (cmH_2O)	5–79	5–79
Pressure level above PEEP in NIV backup (cmH_2O)	5–60	5–60
Respiratory rate in backup (breaths/min)	4–150	4–150
I:E ratio	1:10–4:1	1:10–4:1
Ti (s)	0.1–5	0.1–5

Special functions

Special function	Setting range
Manual breath	Initiation of 1 breath (In SIMV mode initiation of 1 mandatory breath)
Static measurements	Insp. or exp. hold (0–30 seconds)
Nebulization	5–30 min/Continuous/Off
O_2 boost level	Off, 1–79 %, 100%
O_2 boost function	Activate O_2 boost up to 1 minute
Leakage compensation	On/Off
Circuit compensation	On/Off
Edi monitoring	In all ventilation modes, in High Flow therapy and in Standby (with Edi module and Edi catheter)
Previous mode	Activates previously used mode
Backup ventilation	Backup On/Off
Apnea management	Several parameters
Pause oscillation	Pause oscillation during HFOV

Disconnection

Pre-oxygenation time	Max. 2 min
Post-oxygenation time	Max. 1 min
Patient disconnected	High priority alarm activated after 1 min
Adjustable oxygen level	21 – 100 %

Monitoring and trends

Peak airway pressure	Ppeak
Pause airway pressure	Pplat
Mean airway pressure	Pmean
Driving airway pressure	Pdrive
Positive end expiratory pressure	PEEP
Continuous positive airway pressure	CPAP
Spontaneous breaths per minute	RR sp
Respiratory rate	RR
Spontaneous expiratory minute volume	MVe sp
Inspired minute volume	MVi
Expired minute volume	MVe
Leakage fraction (%)	Leakage
Inspired tidal volume	VTi
Expired tidal volume	VTe
End expiratory flow	Flowee
Measured oxygen concentration	O_2 conc
CO_2 end tidal concentration	$etCO_2$
CO_2 minute elimination	VCO_2
CO_2 tidal elimination	$VTCO_2$
CO_2 Diffusion (HFOV)	DCO_2
Dynamic compliance	Cdyn
Static compliance	Cstatic
Inspiratory resistance	Ri
Expiratory resistance	Re
Work of breathing, ventilator	WOBvent
Work of breathing, patient	WOBpat
Elastance	E
P 0.1	P 0.1
Shallow Breathing Index	SBI
Peak Edi value	Edipeak
Average Edipeak	Edipeak average (monitoring only)
Average Edimin	Edimin average (monitoring only)
Minimum Edi value	Edimin
Ratio of expired tidal volume to body weight	VT/BW
Switches to backup per minute	Backup ∑ (trended value only)
Time in backup in percent per minute	Backup % (trended value only)
Tidal Volume (HFOV)	VT_{HF}
Pressure Amplitude (HFOV)	P_{amp}
I:E-ratio (HFOV)	$I:E_{HF}$
Heliox gas consumption	HeO_2 (trended value only)

Alarms

Alarm	Neonatal range	Pediatric range
Airway pressure (upper alarm limit)	16–90 cmH_2O	16–90 cmH_2O
Airway pressure NIV (upper alarm limit)	16–70 cmH_2O	16–70 cmH_2O
Respiratory rate (upper alarm limit)	2–160 breaths/min	2–160 breaths/min
Respiratory rate (lower alarm limit)	1–159 breaths/min	1–159 breaths/min
Expired minute volume (upper alarm limit)	0.02–30 l/min	0.02–30 l/min
Expired minute volume (lower alarm limit)	0.01 – 20 l/min	0.01 – 20 l/min
End expiratory pressure (upper alarm limit)	1–55 cmH_2O	1–55 cmH_2O
End expiratory pressure (lower alarm limit)	Off, 1–47 cmH_2O	Off, 1–47 cmH_2O
No patient effort (Apnea) alarm	1–45 s	2–45 s
Automatic return to support mode on patient triggering		
No consistent patient effort	Yes, described in User's manual	
High continuous pressure	Yes, described in User's manual	
O_2 concentration	Set value ±5 vol% or ≤18 vol%	
Gas supply	Below 200 kPa (2.0 bar/29 PSI), above 600 kPa (6.0 bar/87 PSI)	
Battery	• Limited battery capacity: 10 min. • No battery capacity: less than 3 min • Low battery voltage.	
End tidal CO_2 (upper and lower limit)	0.5–19.9 %, 4–99mmHg, 0.5–13.9kPa	
Leakage too high	Yes, described in User's manual	
Technical	Yes, described in User's manual	
Mean Airway Pressure (HFOV) High / Low	Yes	–
Pressure amplitude (HFOV) High / Low	Yes	–
VT_{HF} High / Low	Yes	–
VT_{HF} Limited	Yes	–

Autoset (alarm limits) specification

Autoset (alarm limits) specification	Invasive ventilation, controlled modes only
High airway pressure	Mean peak pressure +10 cmH_2O or at least 35 cmH_2O
Inspiratory tidal volume too high	The greater of VTi + 30 % or VTi +2 ml
Expiratory minute volume (upper alarm limit)	Mean expiratory minute volume +50 %
Expiratory minute volume (lower alarm limit)	Mean expiratory minute volume -50 %
Respiratory rate (upper alarm limit)	Mean respiratory rate +40 %
Respiratory rate (lower alarm limit)	Mean respiratory rate -40 %
End expiratory pressure (upper alarm limit)	Mean end expiratory pressure +5 cmH_2O
End expiratory pressure (lower alarm limit)	Mean end expiratory pressure -3 cmH_2O
End tidal CO_2 concentration (upper alarm limit)	Mean end tidal CO_2 concentration +25 %
End tidal CO_2 concentration (lower alarm limit)	Mean end tidal CO_2 concentration -25 %
High frequency Tidal Volume in HFOV (upper alarm limit)	High frequency Tidal Volume +22 % *
High frequency Tidal Volume in HFOV (lower alarm limit)	High frequency Tidal Volume -29 % *
Pressure amplitude in HFOV (V TGT) (upper alarm limit)	Mean Pressure amplitude in HFOV +40 % *
Pressure amplitude in HFOV (V TGT) (lower alarm limit)	Mean Pressure amplitude in HFOV -40 % *
* These alarm limits correspond to a 50 % increase / decrease of DCO_2	

Y sensor (option)

Y sensor (option)	Size	Weight
Y sensor module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	280 g (0.6 lbs)
Y sensor	W 18 x L 50 x H 27 mm (W 0.7" x L 2.0" x H 1.1")	11 g
Connectors and cables	• 15 mm male and female conical connector on flow sensor according to ISO 5356-1 • Pressure port on module, pressure line, 2.0 m (6.6 ft), phthalate free PVC • Flow sensor cable, 2.0 m (6.6 ft)	
Sensor material	• Single use: PC, Polycarbonate	
Power source	Powered by the ventilator system, ≤4.5 W during normal operation	
Measuring method	Hot Wire Anemometer (HWA)	
Parameters	• Airway pressure • Airway flow • Inspiratory and expiratory volumes • Trigger and End inspiration	
Measuring range	• Flow: 0.12 to 32 l/min • Pressure: -40 to 120 cmH_2O	
Y sensor resistance	10 cmH_2O/l/s at 30 l/min	
Dead space	≤1 ml	
Pressure line connector	Gable mounted bulk head connector to fit tubing with an inner diameter of 3-4 mm (0.12–0.16")	
Y sensor is recommended for conventional ventilation with small tidal volumes, and required during HFOV to get flow and tidal volumes measurements.		

CO_2 analyzer (option)

CO_2 analyzer (option)	Size	Weight
CO_2 analyzer module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	265 g (0.58 lbs)
Sensor (Capnostat 5)	32.0 x 47.0 x 21.6 mm (1.3" x 1.9" x 0.8")	20 g
Operating temperature	10 to 33 °C (50 to 91 °F)	
Airway adapter		10 g
Power source	Powered by the ventilator	
Connectors and cables	Sensor	2.8 m (9.2 ft) cable
Measuring method	Mainstream, dual-wavelength, non-dispersive infrared	
Parameters	• CO_2 end tidal concentration ($etCO_2$) • CO_2 minute elimination (VCO_2) • CO_2 tidal elimination ($VTCO_2$)	
Measuring range	• 0 to 100 mmHg CO_2 partial pressure • 0 to 13.3 kPa CO_2 partial pressure • 0 to 13.2 % CO_2 volume (at a barometric pressure of 1013 hPa)	
System response time CO_2	The total system response time of the CO_2 monitor when exposed first to air and then to a gas mix with 5.0 % CO_2 is <250 ms	
Warm-up time	15 s to initial CO_2 indication maximum 2 minutes to full specification	
Oxygen concentration compensation	Automatic. Values supplied from the ventilator system	
Barometric pressure compensation	Automatic. Values supplied from the ventilator system	
Digitizing rate	100 Hz	
Airway adapter dead space	• Neonatal/pediatric: <1 cm^3	

Edi module (option)

Edi module (option)	Size	Weight
Edi module	W 154 x L 90 x H 21 mm (W 6.1" x L 3.5" x H 0.8")	0.25 kg (0.6 lbs)
Edi catheter cable	2.0 m (6.6 ft)	-
Power source	Powered by the ventilator	
Power consumption	<3 W during normal operation	
Parameters	• Edi waveform • ECG leads waveforms • NAVA estimated pressure waveform (Pedi)	

Aerogen nebulizers

Aerogen nebulizers	Pro	Solo
Size	W 50 x L 50 x H 45 mm (W 2.0" x L 2.0" x H 1.8")	W 48 x L 25 x H 67 mm (W 1.9" x L 1.0" x H 2.6")
Weight	Approx. 25 g (0.88 oz)	Approx. 14 g (0.49 oz)
Particle size	1–5 µm mass median aerodynamic diameter (MMAD)	
Flow rate	>0.2 (average: ~0.4) ml/min	
Max. volume	10 ml	6 ml
Residual volume	<0.1 ml for 3 ml dose	
Control cable	1.8 m (5.9 ft)	

Log function

Event log	• Alarms • Ventilator settings • Apnea periods • Maneuvers and O_2 boost
Diagnostic log	• Technical alarms • Test results • Service records • Software installation • Configuration information

Saving of data

Recording of current waveform and parameter values	30 seconds of data will be recorded (15 seconds before and 15 seconds after activation). Up to 40 recordings can be stored.
Saving screenshots	Up to 40 screenshots can be stored.
Saving recruitments	Up to 12 manual and/or automatic recruitment recordings can be stored (option).
Export files	Recordings, screenshots, recruitments, trends and event log can be saved and exported to a USB memory stick.

Optional equipment

Optional equipment	Weight	Dimensions	Maximum load
Mobile cart	15.0 kg (33.1 lbs)	W 647 x L 547 x H 557 mm (W 25.5" x L 21.5" x H 21.9")	-
Drawer for mobile cart	0.6 kg (1.3 lbs)	W 247 x L 118 x H 302 mm (W 9.7" x L 4.6" x H 11.9")	-
Shelf base	2.5 kg (5.5 lbs)	W 207 x L 302 x H 43 mm (W 8.2" x L 4.6" x H 1.7")	-
Pendant/bed holder	3.2 kg (7.1 lbs)	W 302 x L 302 x H 393 mm (W 11.9" x L 11.9" x H 15.5")	-
Humidifier holder	0.6 kg (1.3 lbs)	W 243 x L 38 x H 185 mm (W 9.6" x L 1.5" x H 7.3")	5 kg (11.0 lbs)
Support arm 178	2.2 kg (4.8 lbs)	L 900 mm (35.4")	1–3 kg (2.2–6.6 lbs) *
* depending on angle			
User interface holder	0.6 kg (1.3 lbs)	W 46 x L 90 x H 123 mm (W 1.8" x L 3.5" x H 4.8")	-
Cable holder for handle	0.1 kg (0.2 lbs)	W 138 x L 92 x H 155 mm (W 5.4" x L 3.6" x H 6.1")	5 kg (11.0 lbs)
Waterbag/IV pole	0.4 kg (0.9 lbs)	W 148 x L 26 x H 1007 mm (W 5.8" x L 1.0" x H 39.6")	1.5 kg (3.3 lbs)
Gas cylinder restrainer kit	1.0 kg (2.2 lbs)	Upper: W 104 x L 65 x H 48 mm (W 4.1" x L 2.5" x H 1.9") Lower: W 106 x L 162 x H 76 mm (W 4.1" x L 6.4" x H 3.0")	Two 4.5 liter bottles
Y piece holder		W 26 x L 52 x H 46 mm (W 1.0" x L 2.0" x H 1.8")	

Compressor Mini (option)

See separate datasheet

Battery charger/calibrator (option)

See sepate datasheet

Service

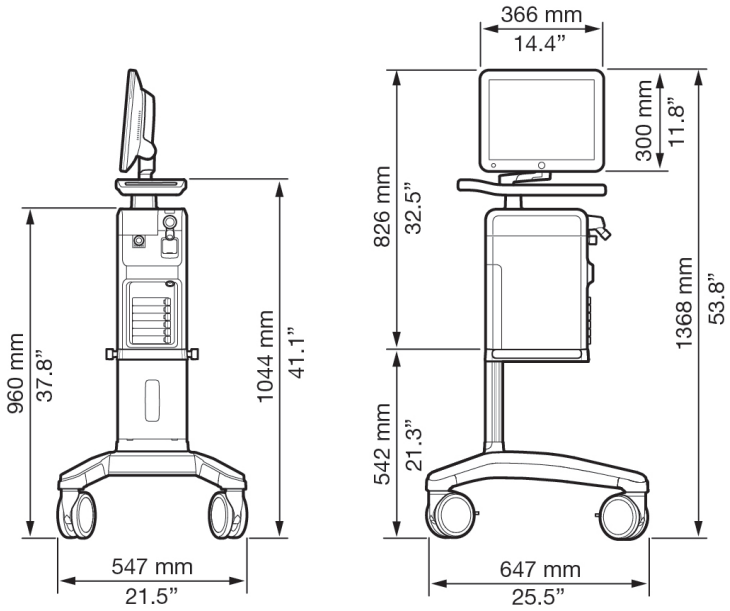
Regular maintenance	Preventive maintenance must be performed by authorized personnel at least once every 5000 hours of operation or once every 12 months, whichever comes first.

Ordering information

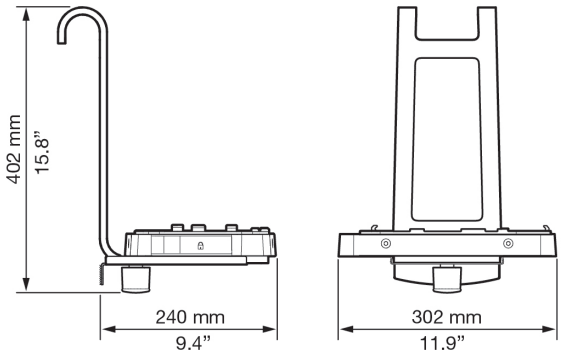
Servo-n, ventilator system and accessories:
See separate information in “System flowchart, Servo-n”

Dimensional drawings

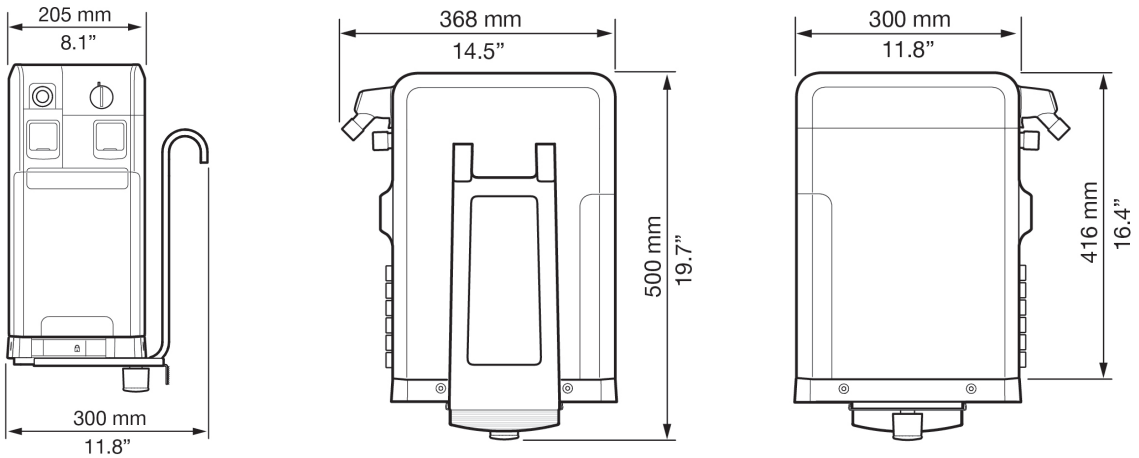
Servo-n on mobile cart



Servo-n holder



Servo-n (patient unit) on Servo-n holder



One system, multiple options

At Getinge we've been developing market-leading ventilators for more than 40 years. Today the Servo family installed base exceeds 100,000 units world-wide. We understand your need for ICU-quality ventilation that is easy to use – to help limit errors, save time, and contribute to better outcomes.

Servo-i delivers a high level of clinical performance for a variety of situations and for all patients. This helps clinicians provide cost-effective care throughout the hospital. Servo-i is also easily upgradeable as your needs change and ensures lasting value for you and your patients.

>100 k

The Servo family exceeds 100,000 units worldwide

>40 years

The Servo ventilator has been continuously refined since it was introduced in 1971

IDSA DESIGN of the DECADE Gold Award

A single ventilator to customize treatment

– for every patient, everywhere

A flexible solution

The Servo-i ventilation platform can satisfy the ventilatory needs of every patient, from neonatal to adult. It can handle the most acute phases of respiratory distress through recovery to the weaning phase. It continuously delivers outstanding ventilator treatment as gently as possible, thanks to its ventilator performance, monitoring capabilities, treatment options and tools.

Available everywhere

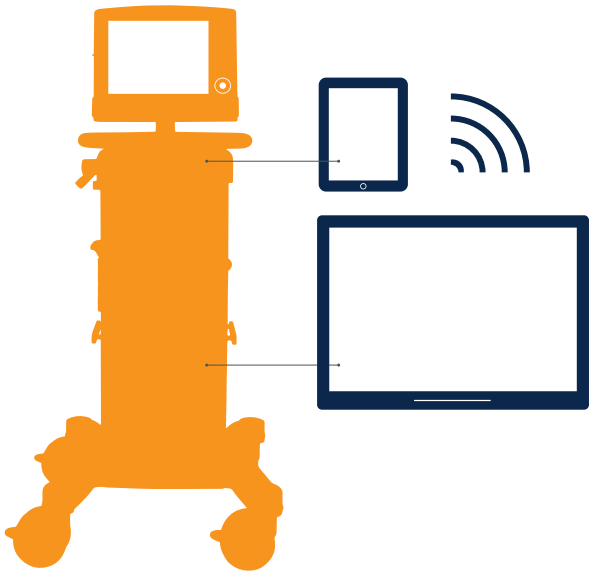
Servo-i makes excellent ventilation quality available in practically all environments: from ICUs to NICUs, via intrahospital transport to MR examinations and hyperbaric chambers. Allowing you to choose treatment options based on patient needs without having to worry about less or worse ventilatory capabilities, or having staff trained on different ventilators for each special application.

Controlled with ease

Servo-i is easy to learn and use. The system provides the information you need when you need it, allowing a fast and appropriate response from the user. An intuitive interface and simple, logical menus give easy access to all settings. You can reach the most important parameters through direct access knobs. You are always informed, in control and able to react.

Connected to the environment

Connectivity is essential to drive efficiency and outcomes in healthcare. Servo-i connects to a number of PDMS systems and patient monitors. Servo-i can also use MSync (optional) as HL7 converter, which makes the system conform to IHE technical framework.



A complete spectrum of treatment opportunities

All-in-one platform
Servo-i features all the modes you would expect from an advanced ventilation system in one adaptable platform. It also presents a wide range of tools to help you stabilize your patient and wean them off the ventilator.

Stress Index
In patients with ALI and ARDS, it is difficult to identify harmful ventilatory patterns, most importantly Baro-trauma, i.e. overdistension of the airways and lungs. Stress Index helps the clinician detect and prevent such potentially high-risk scenarios in adults, by analyzing changes in the compliance of the respiratory system during the constant flow of controlled breaths.[1,2]

Open Lung Tool
(OLT) is an option that assists during lung recruitment and PEEP titration. Measured and calculated values on-screen, including dynamic compliance, make it easier to assess recruitment efficacy. The OLT also provides a breath-by-breath trend of vital ventilation parameters.

Heliox, the low density gas mixture of helium and oxygen, is a widely-recognized therapy that minimizes turbulence and improves CO_2 elimination. Easing the work of breathing for patients from neonate to adult.[3] The Heliox option can be used in all invasive and non-invasive modes and ensures automatic adjustment of monitoring and flow delivery when switching from air to Heliox and back.

Automode
Starting in controlled ventilation and automatically switching to supported ventilation when the patient is triggering. Automode supports a smoother safer patient transition between start and steady states, which may reduce workload for clinicians.

Lung recruitment with the help of OLT.

NAVA
– personalized ventilation

The vital sign of respiration
The diaphragm is the "heart" of the respiratory system designed to be continuously active.[4] The Edi* is a bedside diagnostic tool that allows you to monitor and safeguard the patients' diaphragm activity.[5,6] The Edi guides weaning[7] and helps you to prevent muscular exhaustion during weaning trials, even after extubation.[8]

Deliver what the patient wants
NAVA[9,**] follows the Edi, and allows the patient to select tidal volume and respiratory pattern. NAVA promotes lung protective spontaneous breathing[10,11,12] with higher diaphragmatic efficiency,[13,14] and fewer periods of over and under-assist.[15,16] The patient's ICU experience is improved by reducing sedation, higher comfort scores[17,18,19] and improved sleep quality.[20,21]

For all patient groups
Edi and NAVA assures that breathing efforts from all patient categories are effectively assessed and responded to. NIV NAVA is also independent of leakage in patient interfaces, which may prevent respiratory failure and intubation.[22,23,24]

Servo-i visualizes diaphragm activity on screen for you to monitor and trend.

See diaphragm activity (Edi), reduce sedation and deliver breaths synchronized in time and assist (NAVA).

Seeing diaphragm activity helps you keep the diaphragm active and reduces the risk of ventilator induced diaphragm dysfunction.

NAVA mode automatically protects the lungs from asynchrony and over-assist while simplifying weaning.

*Edi = Electrical Activity of the Diaphragm
**NAVA = Neurally Adjusted Ventilatory Assist

Designed to meet your needs

Cost-effective care

Servo-i is a single system offering a broad range of treatment options, which means it is always ready to adapt to your changing clinical needs. Uptime is maximized thanks to the following features:

- Same system for invasive and non-invasive ventilation of adult, pediatric and neonatal patients, at the bedside and during intra-hospital transport, MR examinations and in the hyperbaric chamber.
- Interchangeable modules can be used on all Servo-i systems (CO_2 Analyzer, Y Sensor and Edi plug-in modules, batteries and expiratory cassettes)
- Plug-in modules and extra batteries can be inserted/removed during ventilation
- Semi-automatic pre-use check of entire system including breathing circuit
- Getinge Care Remote Services
- Original consumables and parts

The system can be used more frequently and in more situations, saving time, ensuring continuous care and simplifying training and maintenance.

Servo-i ventilatory configurations

	Infant	Adult	Universal
Hyperbaric oxygen therapy (HBO)	x	x	❋
MR environment use	■	■	■
Alarm output connection	■	■	■
Nebulizer	■	■	■
Y Sensor monitoring	■	■	■
CO_2 Analyzer	■	■	■
Heliox	■	■	■
STRESS INDEX	x	■	■
OPEN LUNG TOOL	■	■	■
Automode	■	■	■
NIV NAVA	■	■	■
NAVA	■	■	■
NIV	■	■	■
Nasal CPAP	■	x	■
Bi-Vent/APRV	■	■	●
VS	■	■	●
PRVC incl. SIMV (PRVC) + PS	●	●	●
VC incl. SIMV (VC) + PS	●	●	●
PC incl. SIMV (PC) + PS	●	●	●
PS/CPAP	●	●	●

● Standard Configuration

■ Options

✕ Not Applicable

❋ Please find Servo-i HBO information in separate sales flyer.

Dockable gas trolley enhances mobility within the hospital

Aerogen Solo Nebulizer

Servo Duo Guard filter

Compressor Mini – quiet and compact, ideal for bedside use

Servo-i interchangeable expiratory cassette

Designed for convenience

Servo-i comes with a number of value-adding features that enhance its convenience. Plug-in modules such as the CO_2 Analyzer, Edi Module and batteries, are interchangeable between systems: the same module can be used with other Servo ventilators. Servo-i has a one-piece cleanable and interchangeable expiratory cassette, so the system can be ready for the next patient almost instantly.

Getinge also offers a wide range of accessories and consumables tested with the Servo-i to guarantee optimal ventilation performance and patient comfort. The range includes active and passive humidifiers, patient breathing systems, NIV masks and the unique Servo Duo Guard filter.

Intermittent and continuous Aerogen nebulization is integrated and available for use with reusable or disposable units. All alternatives offer high performance in aerosol delivery without affecting the ventilatory settings, making it possible to provide treatment to everyone, including the smallest patients.

The Servo-i mobile cart carries all accessories and makes it easy to position the system to the right or left of the patient. The Compressor Mini provides added flexibility in hospitals with no regular piped air supply.

Protect your investment with Getinge Care

A Getinge Care service agreement maximizes the longterm value of your investment. Our four levels of service packages are designed with your hospital's success in mind to ensure your Getinge equipment always delivers peak performance.

Maximizing uptime does not have to break your budget. By following a routine preventive maintenance schedule, Getinge Care keeps things running smoothly with minimal interruption. And if something should need urgent attention, our certified field service representatives will be there to deliver original parts, maximizing the lifespan of your equipment.

Invasive ventilation

Inspiratory tidal volume	
Adult	100–4000 ml
Infant	2–350 ml
Inspiratory flow	≤200 l/min
PEEP	0–50 cmH_2O
Pressure above PEEP	
Adult	0–(120-PEEP) cmH_2O
Infant	0–(80-PEEP) cmH_2O

Non-invasive ventilation

PEEP	2–20 cmH_2O
Pressure above peep	0–(62-PEEP) cmH_2O*
Leakage compensation	
Adult	Inspiratory, up to 200 l/min Expiratory, up to 65 l/min
Infant	Inspiratory, up to 33 l/min Expiratory, up to 25 l/min Nasal CPAP, up to 20 l/min

General Specifications

Screen	12.1" TFT color
Dimensions user interface	W 355 x D 53 x H 295 mm
Dimensions patient unit	W 300 x D 205 x H 415 mm
Weight	~20kg (Patient Unit 15 kg, User Interface 5 kg) 41 kg with Mobile Cart
Batteries, hot swappable	6 (2 included)
Battery backup time	At least 3 h (with 6 batteries)
Integrated nebulization	Aerogen module
Integrated CO_2 analyzer	Capnostat plug-in module
Integrated respiratory vital sign	Edi plug-in module

Connectivity

External device interfaces	2xRS232, remote alarm, Getinge Care remote service
IHE technical framework	MSync HL7 converter

* Software version 8.0. For earlier software versions: 0-(32-PEEP) cmH_20

Introducing the new Servo for personalized ventilation

It's here! With your evolving needs for safe, high-quality ventilation and usability in mind, we're proud to introduce Getinge Servo-c, our next-generation ventilator for pediatrics and adults. Designed from the ground up to meet the needs of tomorrow and comply with the latest requirements for acuity care, it is a natural evolution of 50 years of refined and improved Servo performance.

Born from years of Servo performance

To create this new platform, we drew upon 50 years of ventilatory experience with our well-proven Servo concept. The result is Servo-c, a versatile ICU ventilator designed for the future, with a wide range of helpful monitoring and lung-protective therapeutic tools. You can use it for both invasive or non-invasive ventilation, including High Flow therapy. No need to switch ventilators.

Personalized care – one patient at a time

Safe and gentle personalized ventilation is enabled with tools like Servo Compass®, High Flow therapy and Open Lung Tool trends for recruitment. The wider intuitive 15" touchscreen, embedded workflows and sleek patient unit also make Servo-c easy to learn and start using.

All so you can *work with confidence* to tailor your ventilatory care.

Key benefits of Servo-c

Designed for ease and convenience

- Wide intuitive 15" touchscreen
- Clear and easy-to-use interface
- On-screen context-based guidance
- Embedded therapeutic workflows
- Ergonomic design
- Compact patient unit and mobile cart
- Hot-swappable batteries
- Integrated Aerogen® nebulizer

Personalized lung protection

Tailored lung-protective technologies with features like:

- Servo Compass® to monitor pre-defined targets
- Open Lung Tool trends for lung recruitment and PEEP titration
- CO_2 monitoring

Gentle and effective personalized weaning

Tailored high-performance tools to ease patients off the ventilator:

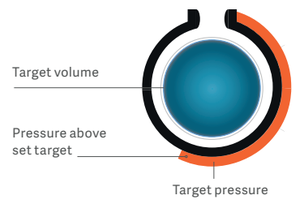
- High Flow therapy for accurate flow of heated and humidified oxygen
- Automode for automatically switching patients from controlled to supported modes, depending on patient effort
- NIV PC and NIV PS/CPAP
- PRVC and SIMV (PRVC)+PS

Cost-effective respiratory solution

- You decide the level of features – configured as needed (high performance or more)
- Easy to upgrade
- Optimized uptime and efficiency
- Interchangeable hardware parts

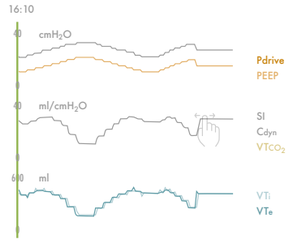
Personalize your lung protection with every breath

Lung-protection challenges come in many shapes and sizes. That is why Servo-c offers a range of tools for non-invasive and invasive ventilation that let you personalize your treatments and guard against ventilator-induced lung injuries. Tools like CO_2 monitoring, Servo Compass® to help you visualize your volume and pressure targets, and Open Lung Tool trends for recruitment. All so you can **care for your patients with confidence.**



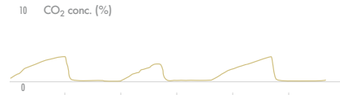
Servo Compass® intuitive monitoring

Featuring bold and colorful graphics, this intuitive monitoring tool helps you keep an eye on measured volume and pressure in relation to set targets during invasive ventilation. At a glance and even from a distance, you can see when the total or driving pressure or tidal volume per predicted body weight (VT/PBW) are off target and intervention is needed.



Open Lung Tool trends for lung recruitment

Open Lung Tool trends helps you assess lung mechanics and gas exchange – breath by breath, in real time and retrospectively. It provides flexibility and guidance when personalizing PEEP and driving pressure during recruitment maneuvers, prone positioning and extracorporeal life support. Stress index and carbon dioxide elimination are also incorporated.



Fast and reliable CO_2 monitoring

To measure carbon dioxide levels in real time during expiration (capnography), Servo-c comes with an easy-to-use CO_2 monitoring option. It helps you to improve the ventilation quality and efficiency for your patients. In other words, yet another tool on Servo-c to help you personalize your treatments.

Experience ease of use in every design detail

Providing your patients with just the right level of respiratory support can be complex. The Servo-c is designed to simplify this. From the new 15" touchscreen and intuitive user interface to the sleek ergonomic design, every detail is tailored to support your needs for safety and ease of use.

Intuitive user interface

Servo-c provides helpful guidance for everything from pre-use check to initial parameter settings and key information throughout the treatment. The 15" wide screen, with its intuitive user interface, makes Servo-c easy to learn and use. Contextual help, dynamic images, Servo Compass®, recommendations and prompts help staff to orientate quickly and follow guidelines. The interface also simplifies knowledge sharing, making it easy to retrieve screenshots and recordings or connect to a larger screen. You can easily switch between multiple screen views to tailor your needs, from Basic or Family View to Advanced View, Distance View and Loops.

When setting ventilation parameters, the Safety Scale™ tool allows you to tailor your settings quickly, intuitively and safely.

Alarm management

When an alarm is activated, the alarm lamp lights up and can easy be seen from any viewing point. Highlights, shortcuts and on-screen checklists help you to manage each active alarm and avoid undesired notifications. Autoset of alarms is also possible.

Designed to fit you

On the Servo-c, form follows function: Ergonomic handles, a slimmed down patient unit, and cart with small foot-print, and long-lasting, hot-swappable batteries that are easy to change, even during ventilation.

> "It's like having a text-book in the machine."
>
> Clinician during usability testing [1]

[1] Comparative usability study on Servo-u, which shares user interface commonalities with Servo-c.

Human-centric design wins prestigious IF award

Creating a clear and simple user experience for safe and effective clinical care has been a hallmark of Servo ventilators for more than 50 years. Our new GUIDE design system follows this tradition by being awarded the prestigious IF Design Award. Selected from among 11,000 entries in 57 countries, the award highlights our efforts to create a thoughtful, safe and calm user experience, thus allowing users to focus less on devices and more on their patients.

Scandinavian design philosophy

Based on our human-centric Scandinavian design philosophy, the new system places clinicians and patients at the center of attention. Clean shapes, lasting materials and bold graphics create a recognizable intuitive feeling across software and hardware. First introduced in the new Servo-c ventilator, it will gradually be implemented on all Getinge point of care devices. With its similar feel and consistent behavior, the system makes it easier for clinicians to learn and use multiple devices.

Efficient machine-human interface

Large buttons and distinct controls, together with helpful animations, add to the user-friendly feeling. A minimal use of outlines creates a light and calm feeling. By grouping buttons, controls and curves in a subconsciously logical way, we are able to create an efficient human-machine interface giving an intuitive user experience. Simply put, working with our GUIDE system should be second nature, where the user is alerted to anything that requires attention. In short, fewer surprises and compromises.

High Flow therapy provides an accurate flow of heated and humidified oxygen.

Avoid interruptions with safe and seamless transitions

Minimizing interruptions along your patient's journey toward spontaneous breathing is always a priority. From invasive to non-invasive ventilation and High Flow therapy to weaning, you want a smooth workflow to get the best outcomes. Servo-c lets you do just that – in one ventilator.

Avoid switching ventilators

It can be time consuming to switch ventilators or have to go to Standby mode when changing therapies. Designed for non-invasive and invasive therapy, Servo-c lets you provide uninterrupted respiratory support, without having to switch ventilators.

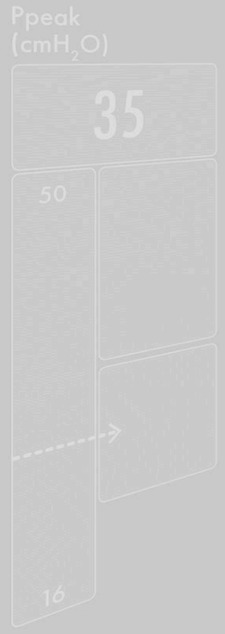
High Flow therapy

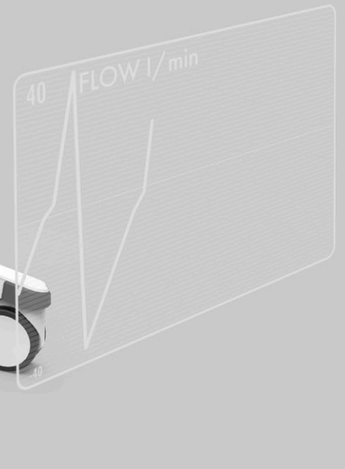
High Flow therapy is beneficial for patients who are spontaneously breathing but have an increased work of breathing. It gives your patient an precise flow of heated and humidified oxygen. High Flow therapy can be selected in in both invasive and non-invasive ventilation as well as in Standby. The intuitive on-screen workflow guides your implmentation and there's no need to switch to a separate high flow therapy system. Nebulization is also possible during High Flow therapy.

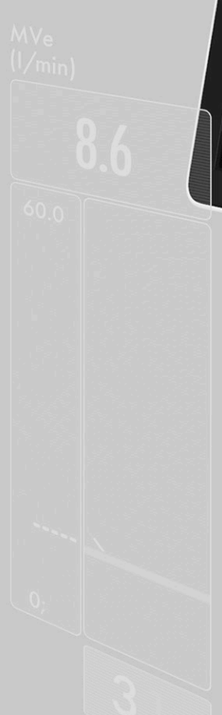
Long-lasting power

Power outages may present a challenge for hospitals. Such situations can be partly mitigated by Servo-c, which features two hot-swappable batteries, offering a total of three hours of power. The batteries charge automatically when the ventilator is plugged in and tell you exactly what exact time of battery power is remaining.


Two hot-swappable batteries with a total of three hours of run time.







Easing transitions and nebulization for personalized weaning

Servo-c offers a range of tailored tools to help stabilize your patient and gently ease them off the ventilator. Throughout the patient journey, Automode can help the patients transition between controlled and supported modes depending on their work of breathing. And with High Flow therapy, integrated nebulization and other tools you can ease them off the ventilator at just the right pace – safely and efficiently.

Automode eases transitions

Automode helps your patients transition to spontaneous breathing, potentially reducing the need for manual interaction. Starting with controlled ventilation, it switches to supported ventilation, depending on patient effort.

Built-in Aerogen® nebulizer

Servo-c comes with an integrated Aerogen® nebulizer. Convenient and easy to use, it can be applied in both invasive and non-invasive modes of ventilation as well as during High Flow therapy.

Servo-c is available for adult and pediatric patient categories.

Reduce lifecycle costs with a more sustainable solution

The Servo-c is designed for safe, easy and efficient use, but also with an eye to sustainable thinking. This as much about delivering lasting quality as it is about doing more with less. Like using just a few, easy-to-clean and interchangeable parts. And offering preventive service agreements that maximize your investment.

Efficiency through interchangeability

The Servo-c shares many of the same high-quality parts and essential components as other Servo ventilators, such as interchangeable expiratory cassettes. Not only does this streamline fleet operations, it can add efficiency and may help to drive down maintenance costs.

Protect your investment with Getinge Care

A Getinge Care service agreement maximizes the long-term value of your investment. Our four levels of service packages are designed with your hospital's success in mind – all to ensure that your Getinge equipment delivers peak performance at all times.

Maximizing your uptime

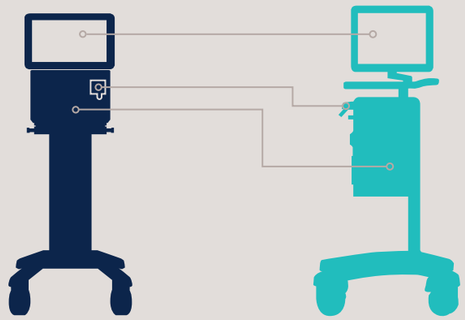
By following the routine preventive maintenance schedule recommended in Getinge Care, you are guaranteed to stay up and running smoothly. If something should need urgent attention, our certified field service representatives will be there to provide advice and deliver orginal parts, maximizing the lifespan of your equipment.

Backed by these additional services, Servo-c is prepared to help you care for your patients with confidence.

Similar look, feel and serviceability across your ventilation fleet

The Servo-c and the advanced Servo-u® have similar user-friendly interfaces. They also share many components, have the same interchangeable patient cassettes and come with the same easy-access service structure.

Ultimately, our aim is to keep you up and running at all times and bring you peace of mind.



Overview of Servo-c technical specifications

Therapies and tools

	High Flow therapy
	Open Lung Tool trends
	Stress Index
	Servo Compass
	CO_2 monitoring

Ventilation modes

Invasive ventilation	Automode
	Bi-Vent APRV
	PC
	PRVC
	PS/CPAP
	SIMV
	VC
	VS
Non-invasive ventilation	Nasal CPAP
	NIV PC
	NIV PS

Note: Not all modes are available in the standard configuration. Please contact your Getinge representative for information on standard and optional modes.

Invasive ventilation

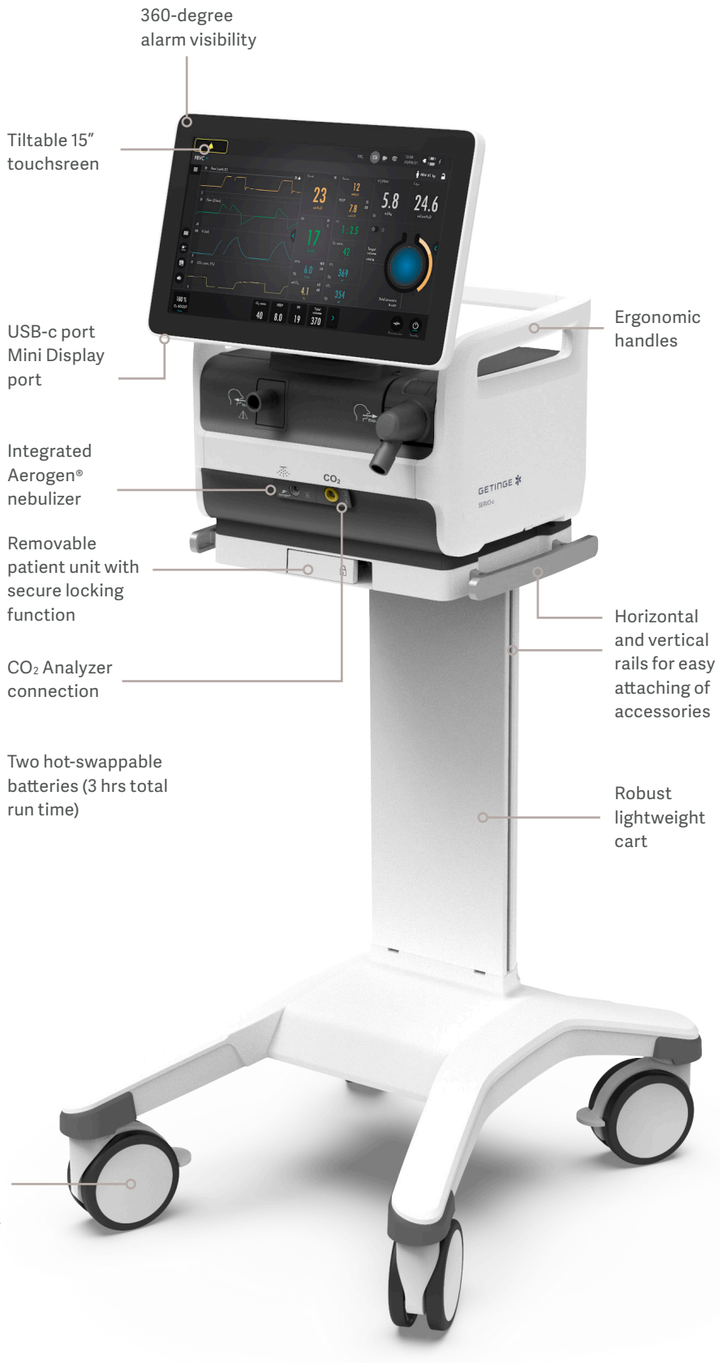
Inspiratory tidal volume	
Adult	100-4000 ml
Pediatric	10-350 ml
Inspiratory flow	0-200 l/min
PEEP	0-50 cmH_2O
Pressure above PEEP	
Adult	0-120 cmH_2O
Pediatric	0-80 cmH_2O

Non-invasive ventilation

PEEP	2-20 cmH_2O
Pressure above PEEP	0-60 cmH_2O
Leakage compensation	
Adult	Inspiratory up to 200 l/min Expiratory up to 65 l/min
Pediatric	Inspiratory up to 33 l/min Expiratory up to 55 l/min Nasal CPAP up to 20 l/min

Miscellaneous information

Screen	
Screen type	TFT LCD touchscreen
Viewing area	15,6" Full HD, 24 bit color extra wide angle
Touch glass coating	Anti reflective, Anti finger print
Dimensions patient unit	W 375 x D 350 x H489 mm Height including user interface
Weight	17 kg, 32 kg with cart
Battery	Lithium-ion, 1,5h standard, 3h optional. Hot swappable
Nebulization	Aerogen, integrated
CO_2 Analyzer	Capnostat V
External device interfaces	2x RS232, Ethernet, Remote alarm, USB-c and mini display port
Trends	Are updated every 60 seconds, logged and stored in a library for up to 72 hours.



Contents

Datasheet

Servo-air
System version 4.2

Servo-air

Technical specifications

General

Intended use	The Servo-air ventilator system is: • intended for respiratory support, monitoring and treatment of pediatric and adult patients • to be used only by healthcare providers • to be used only in professional healthcare facilities and for transport within these facilities
Instructions for use	Please carefully read the user's manual
Legal manufacturer	Maquet Critical Care AB
Other products	See separate datasheets. Contact your local Getinge supplier for more information.

The ventilator – general

	Servo-air	Servo-air on mobile cart
Base system weight	Approx. 15 kg (33 lbs)	Approx. 30 kg (66 lbs) • Base system approx. 15 kg (33 lbs) • Mobile cart approx. 15 kg (33 lbs)
Dimensions of base (W x D), see dimensional drawings	375 x 350 mm (14.8"x13.8")	647 x 547 mm (25.5"x21.5") incl. wheels
Height (incl. user interface)	489 mm (19.3")	1335 mm (52.6")
Wheels	N/A	Four wheels with separate brakes
A-weighted sound pressure level (L_{pA})	<49 dB, measured at a distance of 1 m (3.3 ft)	
A-weighted sound power level (L_{WA})	<57 dB	

Ventilation – general

Patient range	Tidal volume: • Pediatric: 20 – 350 ml • Adult: 100 – 2000 ml
Bias flow	2 l/min ±5 %
Internal compressible factor	Max. 0.1 ml/cmH_2O
Gas delivery system	Air turbine and O_2 valve
Maximum airway pressure	125 cmH_2O
Method of triggering	Flow and pressure
Inspiratory flow range	• Adult: 0 – 240 l/min • Pediatric: 0 – 240 l/min
Pressure drop	Max. 3 cmH_2O at a flow of 60 l/s (exp. channel)
PEEP regulation	Microprocessor controlled valve
Rise time, expiratory flow measurement	<12 ms for 10 – 90 % response at flow of 3 – 192 l/min
Expiratory flow range	0 – 192 l/min

User interface

Type	TFT-LCD touchscreen
Size	300 x 248 mm (11.8" x 9.8")
Viewing area	12" XGA, 1024x768 pixels with a 24-bit color palette

Power supply

Power supply, automatic range selection	100 –240 V AC ±10%, 50 – 60 Hz
Plug-in battery module: • Battery backup (Li-ion) • Battery capacity • Battery backup time • Recharge time	 • Two battery module slots. One battery is delivered with the ventilator. • Rechargeable, 14.4 V, 6.6 Ah each • Approximately 2 h (factory new battery) • Approximately 3 h/battery
External 12 V battery	12.0 V – 15.0 V DC, 15 A

Gas supply

Inlet gas pressure O_2	200 – 600 kPa / 2.0 – 6.0 bar / 29 – 87 PSI
Connection standards available	AGA, DISS, NIST, or French standard
Unavailable gas/loss of gas pressure	The flow from an unavailable gas (O_2) is automatically compensated for so that the patient gets the preset volume and pressure.
Patient system gas connectors	Male 22 mm / female 15 mm. In accordance with ISO 5356-1.
Gas exhaust port	Male 30 mm cone

Operating conditions

Operating temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	15 to 95% non-condensing
Atmospheric pressure	660 to 1060 hPa
Lowest pressure in patient circuit	-400 cmH_2O

Non-operating conditions

Storage temperature	-25 to +60°C (-13 to +140°F)
Storage relative humidity	10 to 95% non-condensing
Storage atmospheric pressure	470 to 1060 hPa

Standards – safety and functionality

CE 0123	The device complies with requirements and classification IIb of Medical Devices Regulation (EU) 2017/745. CE Mark Notified Body number: 0123.
Classification	IEC 60601-1: 2005 + A1:2012, Class I, continuous operation. Applied parts: - Equipment making physical contact with the patient and the gas path ways. Type B - Nebulizer patient unit and cable. Type BF
Standards	• Applied parts, i.e. equipment making physical contact with the patient, are described in **Ventilation patient connection – System flowchart**. • ISO 80601-2-12:2011 • ISO 80601-2-55:2018 • EN 13544-1:2007 + A1:2009
Ingress protection	IP 21
Electromagnetic compatibility (EMC)	According to limits specified in IEC 60601-1-2:2014

Display

Views	• Basic view • Advanced view • Loops view • Distance view • Family view • Servo Compass view (option) • Each of the screen layout views offers a specific combination of displayed waveforms, loops and presented values.
Real time waveforms	• Pressure • Flow • Volume
Loops	• Pressure – Volume • Volume – Flow
A reference loop and two overlaying loops can be displayed.	
Servo Compass	Visualizes volume (VT/PBW) and pressure (total or driving) in relation to set targets in invasive modes.

Ventilation modes – invasive ventilation

Controlled ventilation	• PC (Pressure Control) • VC (Volume Control) • PRVC (Pressure Regulated Volume Control), option
Supported ventilation:	• PS/CPAP (Pressure Support / Continuous Positive Airway Pressure) • VS (Volume Support), option
AUTOMODE (option)	• Control mode: VC <–> Support mode: VS • Control mode: PC <–> Support mode: PS • Control mode: PRVC <–> Support mode: VS
Combined ventilation	• SIMV (VC) + PS (Synchronized Intermittent Mandatory Ventilation) • SIMV (PC) + PS • SIMV (PRVC) + PS (option) • Bi-Vent/APRV (Airway Pressure Release Ventilation), option

Ventilation modes – non invasive ventilation

Controlled ventilation	NIV PC, option
Supported ventilation:	NIV PS, option

Non invasive ventilation

Max. leakage compensation level	• Adult: - Inspiratory: up to 240 l/min* - Expiratory: up to 65 l/min • Pediatric: - Inspiratory: up to 240 l/min* - Expiratory: up to 25 l/min * up to 180 l/min with 100% O_2 concentration
Disconnection flow (configurable)	• Low: 7.5 l/min • High: 40 l/min • Disabled: Deactivates disconnection detection
Connection detection	Manual or automatic via bias flow

High Flow therapy (option)

Flow setting range	• Adult: 5 – 60 l/min • Pediatric: 2 – 30 l/min

Parameter settings

Parameter	Adult range	Pediatric range
Tidal volume (ml)	100 – 2000	20 – 350
Minute volume (l/min)	0.5 – 60	0.3 – 20
Apnea, time to alarm (s)	15 – 45	2 – 45
Max. apnea time in Automode (s)	7 – 12	3 – 15
Pressure level above PEEP (cmH_2O)	0 – 100	0 – 80
Pressure level above PEEP in NIV (cmH_2O)	0 – 60	0 – 60
PEEP (cmH_2O)	0 – 50	0 – 50
PEEP in NIV (cmH_2O)	2 – 20	2 – 20
Respiratory rate (breaths/min)	4 – 100	4 – 150
SIMV rate (breaths/min)	1 – 60	1 – 60
Breath cycle time, SIMV (s)	1 – 15	0.5 – 15
P_{High} (cmH_2O)	2 – 50	2 – 50
T_{High} (s)	0.2 – 30	0.2 – 30
T_{PEEP} (s)	0.1 – 10	0.1 – 10
PS above Phigh in Bi-Vent/APRV (cmH_2O)	0 – 98	0 – 78
O_2 concentration (%)	21 – 100	21 – 100
I:E ratio	1:10 – 4:1	1:10 – 4:1
Ti (s)	0.1 – 5	0.1 – 5
T_{Pause} (s)	0 – 1.5	0 – 1.5
T_{Pause} (% of breath cycle time)	0 – 30	0 – 30
Flow trigger (l/min)	0 – 2	0–- 2
Pressure trigger (cmH_2O)	-1 to -20	-1 to -20
Insp. rise time (% of breath cycle time)	0 – 20	0 – 20
Insp. rise time (s)	0 – 0.4	0 – 0.2
End inspiration (% of peak flow)	1 – 70	1 – 70
End inspiration (% of peak flow) in NIV	10 – 70	10 – 70
Decelerating flow pattern in VC (%)	0–100	0–100
Flow adaptation in VC	on/off	on/off

Backup parameter settings

Parameter	Adult range	Pediatric range
Inspiratory tidal volume (ml)	100 – 2000	20 – 350
Pressure level above PEEP in backup (cmH_2O)	5 – 100	5 – 80
Pressure level above PEEP in NIV backup (cmH_2O)	5 – 60	5 – 60
Respiratory rate in backup (breaths/min)	4 – 100	4 – 150
I:E ratio	1:10 – 4:1	1:10 – 4:1
Ti (s)	0.1 – 5	0.1 – 5

Special functions

Special function	Setting range
Manual breath	Initiation of 1 breath (In SIMV mode initiation of 1 mandatory breath)
Static measurements	Insp. or exp. hold (0 – 30 seconds)
Nebulization	5 – 30 min/Continuous/Off
O_2 boost level	Off, 1 – 79 %
O_2 boost function	Activate O_2 boost up to 1 minute
Leakage compensation	Automatic in all non invasive modes
Circuit compensation (not available in NIV)	On/Off
Previous mode	Activates previously used mode
Backup ventilation	Backup On/Off
Apnea management	Several parameters

Disconnection / Suction

Pre-oxygenation time	Max. 2 min
Post-oxygenation time	Max. 1 min
Patient disconnected	High priority alarm activated after 1 min
Adjustable oxygen level	21 – 100 %

Monitoring and trends

Peak airway pressure	Ppeak
Pause airway pressure	Pplat
Mean airway pressure	Pmean
Driving pressure	Pdrive
Positive end expiratory pressure	PEEP
Spontaneous breaths per minute	RR sp
Respiratory rate	RR
Spontaneous expiratory minute volume	MVe sp
Inspired minute volume	MVi
Expired minute volume	MVe
Leakage fraction (%)	Leakage
Inspired tidal volume	VTi
Expired tidal volume	VTe
End expiratory flow	Flowee
Measured oxygen concentration	O_2 conc.
Dynamic compliance	Cdyn
Static compliance	Cstatic
Inspiratory resistance	Ri
Expiratory resistance	Re
Work of breathing, ventilator	WOBvent
Work of breathing, patient	WOBpat
Elastance	E
P 0.1	P 0.1
Shallow Breathing Index	SBI
Ratio of expired tidal volume to predicted body weight	VT/PBW
Ratio of expired tidal volume to body weight	VT/BW
Switch to backup (/minute)	Trended value only
Backup (%/min)	Trended value only

Alarms

Alarm	Adult range	Pediatric range
Airway pressure (upper alarm limit)	16 – 100 cmH_2O	16 – 90 cmH_2O
Airway pressure NIV (upper alarm limit)	16 – 70 cmH_2O	16 – 70 cmH_2O
Respiratory rate (upper alarm limit)	2 – 160 breaths/min	2 – 160 breaths/min
Respiratory rate (lower alarm limit)	1 – 159 breaths/min	1 – 159 breaths/min
Expired minute volume (upper alarm limit)	1 – 60 l/min	0.02 – 30 l/min
Expired minute volume (lower alarm limit)	0.5 – 40 l/min	0.01 – 20 l/min
End expiratory pressure (upper alarm limit)	1 – 55 cmH_2O	1 – 55 cmH_2O
End expiratory pressure (lower alarm limit)	0 – 47 cmH_2O	0 – 47 cmH_2O
No patient effort (Apnea) alarm	15 – 45 s Automatic return to support mode on patient triggering	2 – 45 s
No consistent patient effort	Yes, described in User's manual	
High continuous pressure	Yes, described in User's manual	
O_2 concentration	Set value ±5 vol% or ≤18 vol%	
Gas supply	Below 200 kPa (2.0 bar/29 PSI), above 600 kPa (6.0 bar/87 PSI)	
Battery	• Limited battery capacity: 10 min • No battery capacity: less than 3 min • Low battery voltage	
Leakage too high	Yes, described in User's manual	
Technical	Yes, described in User's manual	

Autoset (alarm limits) specification

Autoset (alarm limits) specification	Invasive ventilation, controlled modes only
High airway pressure:	Mean peak pressure +10 cmH_2O or at least 35 cmH_2O
Expiratory minute volume (upper alarm limit)	Mean expiratory minute volume +50 %
Expiratory minute volume (lower alarm limit)	Mean expiratory minute volume -50 %
Respiratory rate (upper alarm limit)	Mean respiratory rate +40 %
Respiratory rate (lower alarm limit)	Mean respiratory rate -40 %
End expiratory pressure (upper alarm limit)	Mean end expiratory pressure +5 cmH_2O
End expiratory pressure (lower alarm limit)	Mean end expiratory pressure -3 cmH_2O

Aerogen nebulizers

Aerogen nebulizers	Pro	Solo
Size	W 50 x L 50 x H 45 mm (W 2.0" x L 2.0" x H 1.8")	W 48 x L 25 x H 67 mm (W 1.9" x L 1.0" x H 2.6")
Weight	Approx. 25 g (0.88 oz)	Approx. 14 g (0.49 oz)
Particle size	1 – 5 µm mass median aerodynamic diameter (MMAD)	
Flow rate	>0.2 (average: ~0.4) ml/min	
Max. volume	10 ml	6 ml
Residual volume	<0.1 ml for 3 ml dose	
Control cable	1.8 m (5.9 ft)	

Communication / Interface

Serial ports	• Two RS-232C ports. For data communication via the Servo Communication Interface (SCI).
Servo Communication Interface (SCI)	A protocol for data communication with external devices
Alarm output connection (option)	• 4-pin modular connector for communication of all active alarms • Switching capability: Max. 40 V DC, max. 500 mA, max. 20 W
Data transfer via USB port	• For transfer of trends, logs, screenshots and recordings to a USB memory stick
Ethernet port	• The network connection (LAN) port is for service use

Log function

Event log	• Alarms • Ventilator settings • Apnea periods • Immediate functions
Service log	• Technical alarms • Test results • Service records • Software installation • Configuration information

Saving of data

Recording of current waveform and parameter values	30 seconds of data will be recorded (15 seconds before and 15 seconds after activation). Up to 40 recordings can be stored.
Saving screenshots	Up to 40 screenshots can be stored.
Export files	Recordings, screenshots and the event log can be saved together in an export file and transferred to a USB memory stick.

Optional equipment

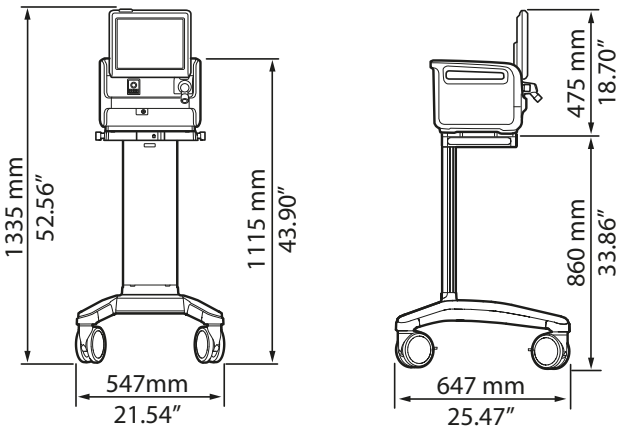
Optional equipment	Weight	Dimensions	Maximum load
Mobile cart	15.0 kg (33.0 lbs)	W 647 x L 547 x H 860 mm (W 25.5" x L 21.5" x H 33.9")	-
Shelf base	3.0 kg (6.6 lbs)	W 340 x L 270 x H 43 mm (W 13.4"x L 10.6" x H 1.7")	-
Humidifier holder	0.6 kg (1.3 lbs)	W 76 x L 125 x H 140 mm (W 3.0" x L 4.9" x H 5.5")	12 kg (26.5 lbs)
Support arm 179	1.9 kg (4.2 lbs)	Length 900 mm (35.4")	• 1 kg (2.2 lbs) at 180° • 1.5 kg (3.3 lbs) at 90° • 3 kg (6.6 lbs) at 45°
Cable holder for handle	0.1 kg (0.2 lbs)	W 138 x L 92 x H 155 mm (W 5.4" x L 3.6" x H 6.1")	5 kg (11.0 lbs)
Waterbag/IV pole	0.4 kg (0.9 lbs)	W 148 x L 26 x H 1007 mm (W 5.8" x L 1.0" x H 39.6")	1.5 kg (3.3 lbs)
Gas cylinder restrainer kit	1.0 kg (2.2 lbs)	Upper: W 104 x L 65 x H 48 mm (W 4.1" x L 2.5" x H 1.9") Lower: W 106 x L 162 x H 76 mm (W 4.1" x L 6.4" x H 3.0")	Two 4.5-liter bottles
Y piece holder	-	W 26 x L 52 x H 46 mm (W 1.0" x L 2.0" x H 1.8")	-

Ordering information

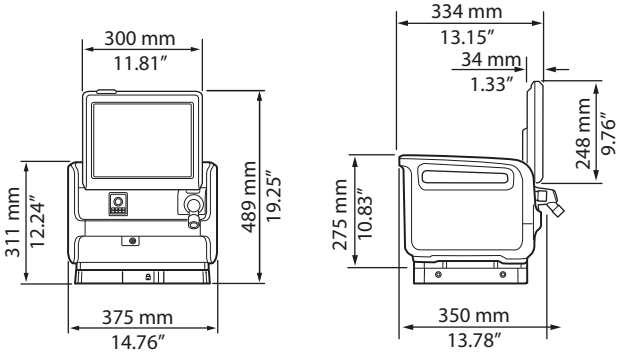
Servo-air, ventilator system and accessories: See separate information:
"System Flow Chart Servo-air" (Order no: 68 91 363).

Dimensional drawings

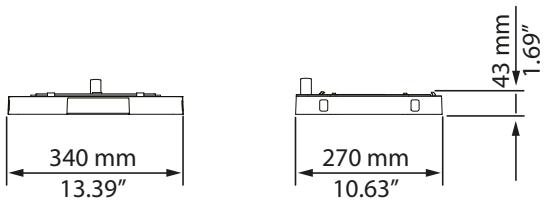
Servo-air on Mobile cart



Servo-air on shelf base



Servo-air shelf base



*Country specific part and directly removable parts excluded

Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70
Казахстан +7(7172)727-132
Киргизия +996(312)96-26-47

www.getinge.nt-rt.ru | | gtw@nt-rt.ru