Ventilator specifications for COVID

SN	Parameter	Essential	Desirable
1	The ventilator should be microprocessor based with active exhalation valve.	Yes	
2	The ventilator should be turbine based/ run on compressor. The compressor (if available) should be stand alone and from the same manufacturer with price quoted separately	Yes	
3	Suitable for use in ICU for Adult, Pediatric patients	Yes	
4	Should undergo automatic calibration system on start-up.	Yes	
5	It should have in-built programmable ultrasonic nebulizer/ external nebuliser		Yes
6	Screen Size	6.5 inch or more in size.	10 inch or more
7	Modes available:	PC-CMV, PC-SIMV, PSV, VC-SIMV, VC-CMV, PRVC, ACV, CPAP, BPAP	APRV, Bi-phasic ventilation, Auto-weaning modes
8	Ventilator settings		
8.1	Peak Pressure	60 cmH_20	
8.2	Peak Respiratory rate	60 Breath per minute	
8.3	Inspiratory time	At least 0.3 -2.5	0.3-5 sec

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(Dr. M.K. Sen)

28/3/2020
(Dr. Akhilesh Gupta)

M Gulshan
H C Sachdeva

		seconds	
8.4	Tidal Volume	50 ml to 2000 ml	
8.5	Peak Flow rate	240 Litres per minute	
8.6	PEEP	0 cm H_2O to 30 cm H_2O (increments of 1 cm H_2O)	
8.7	Pressure Support	0-40 cm H20	
8.8	Inspiratory pause	Available	expiratory pause sustained exhalation
8.9	I:E ratio	1:4 to 4:1	
8.10	Trigger Flow Sensitivity	1 Litre per minute to 10 Litre per minute	0.1 litre-20 litre/ min
8.11	Programmable/ adjustable SIGH		Yes
8.12	Leak Volume Compensation		Yes
8.13	Volume Accuracy	2-3 % of the full scale between (10 L/min - 80L/min)	
9	Monitored Parameters		
9.1	Respiratory Phase and Type	Yes	
9.2	Exhaled Tidal and Minute volume	Yes	
9.3	Respiratory Rate	Yes	
9.4	Total leak percentage/ Leak volume	Yes	
9.5	Spontaneous Minute Volume	Yes	
9.6	I : E Ratio	Yes	
9.7	Peak Inspiratory and End	Yes	

28.3.20
(Dr M.K.Sen)

(D. Akhilesh Gupta)

H C Gaikwad

	Expiratory Pressure		
9.8	Mean and Plateau Pressure	Yes	
9.9	Auto/ Intrinsic PEEP	Yes	
9.10	RSBI		Yes
9.11	Static Compliance and Resistance		Yes
9.12	Low Inflection point (LIP) and upper inflection point (UIP)		Yes
9.13	Maximum Inspiratory Pressure		Yes
9.14	Lung recruitment maneuver & Monitoring.		Yes
10	Should have graphics mode with display of followings scalers: • Flow vs Time • Pressure vs time • Volume vs Time	Yes	
11.	Should have display of loops : • Flow/ Volume • Pressure/ Volume • Pressure/ Flow	-	Yes
12	**Alarms**		
12.1	Power Disconnected	Power Supply unplugged	

28.3.2020
(Dr M.K. Sen)

28/3/2020
(D. Ateliesh Gupta)

M Sachdeva
HC Sachdeva

12.2	Patient Disconnected	PIP < (Desired Pressure x 0.6)	
12.3	High Inspiratory Pressure	PIP < (Desired Pressure x 0.6)	
12.4	High PEEP	PEEP > Set PEEP + 2 or 6 Consecutive cycles	
12.5	High Respiratory Rate	RR > 70	
12.6	Power Sensor Failure	Power sensor fails to respond	
12.7	Read/Write Error	Settings saved in memory could not be read	
12.8	Ventilator Temperature Error	The core temperature of ventilator CPU greater than 85 ^{o}C	
12.9	System Failure (Safe Mode)	Vital components inactive	
12.10	Low Tidal Volume	VTi < Set VT * 0.75 for 6 consecutive cycles	
13	Alarm History of ≥ 100 alarms.	Yes	
14	Should have battery backup of atleast 2 hrs for ventilator	Yes	
15	Displayed Trends Values for 48 hours atleast for above parameters.	Yes	
16	Should be approved by reputed national/ international certifying agency	Yes	
17	Company should have local service centre and should provide service	Yes	

28/3/20 (Dr M.K. Sen)

28/3/2020 (D. Akhilesh Gupta)

H C Sachdeva

	24x7.		
18	Certified for meeting IEC 60601-1-4 Medical electrical equipment - Part 1-4: General requirements for safety - Collateral Standard: Programmable electrical medical systems	Yes (within 30 days of placing orfer)	
19	The service provider should have the necessary equipments recommended by the manufacturer to carry out preventive maintenance test as per guidelines provided in the service/maintenance manual.	Yes	
20	All equipment should be from the same manufacturer or OEM (original equipment manufacturer)	Yes	
21	Must submit user list and performance report within last 5 years from major Central Govt./State Govt./reputed private hospitals		Yes

22. Battery: 60 watt hour lithium ion battery (4 hours back up) Yes

28/3/20 (Dr. M. K. Sen)

28/3/2020 (Dr. Akhilesh Gupta)

M Chakraborty HC Chakraborty

22	**Packing List**	1 Ventilator Arm Holder and Humidifier (if not part of equipment, compatible humidifier and arm holder should be available as additional accessories) 1 User Manual 1 Warranty card 220-volt power cable 12 Volt power cable Stand Attachment	Patient tubing: Adult, Paeds: 2/ unit NIV mask: 2 for adult and pediatric/ unit Test lung: 1 (1 for adult and pediatric each) Flow sensor (reusable): 2

28/3/20
(Dr M.K. Sen)
Consultant & Professor
Deptt. of Pulmonary Medicine
Safdarjung Hospital, New Delhi

28/3/2020
(Dr. Ashutosh Gupta)
Prof, Anaesthesia
ABVIMS, Dr. RML Hosp.

J C Sachdeva
Consultant & Prof.
Anesthesia
VMMC & SJ Hospital

Any manufacturer / supplier having ventilators with higher specification may also apply. If any manufacturer/ Supplier is having ventilators with specifications differing from essential specifications, may also submit their proposals along with detailed technical specifications/ catalogues for examination by the technical committee of experts under Director General of Health Services.