

Puritan Bennett™

980 Series Ventilator

Software Update Addendum



Operator's Manual Addendum

U.S. Patents: www.covidien.com/patents.

© 2020 Covidien. All rights reserved.

COVIDIEN, COVIDIEN with logo, and Covidien logo and Positive Results for Life are U.S. and internationally registered trademarks of Covidien AG. ^{TM*} brands are trademarks of their respective owner. Other brands are trademarks of a Covidien company.

The information contained in this addendum is the sole property of Covidien and may not be duplicated without permission. This addendum may be revised or replaced by Covidien at any time and without notice. Ensure this addendum is the most current applicable version. If in doubt, contact Covidien's technical support department.


While the information set forth herein is believed to be accurate, it is not a substitute for the exercise of professional judgment.


The ventilator should be operated and serviced only by trained professionals. Covidien's sole responsibility with respect to the ventilator and software, and its use, is as stated in the limited warranty provided.

Nothing in this document shall limit or restrict in any way Covidien's right to revise or otherwise change or modify the equipment (including its software) described herein, without notice. In the absence of an express, written agreement to the contrary, Covidien has no obligation to furnish any such revisions, changes, or modifications to the owner or user of the equipment (including its software) described herein.

Covidien is a Medtronic company.

Symbols

 CE Mark—Signifies compliance with Medical Device Directive 93/42/EEC

 European Community (EC) authorized representative


 Manufacturer—Ventilator manufacturer

Table of Contents

1 Software Enhancements	3
Overview	3
Update to 4.7.2 NIV Breathing Interfaces	3
Update to 4.7.3 NIV Setup	3
Update to 4.7.4 Conversion from Invasive to NIV Ventilation Type	4
Update to 5.4.2 Communication Setup	4
Update to 5.4.7 SNDF Command	4
Update to Table 5-2. MISCF Response	4
Update to 6.6.21 Driving Pressure (P_{DRIVE})	6
Update to Table 11-9. Ventilator Settings Range and Resolution	6
Update to Table 11-11. Patient Data Range and Resolution	6
Update to Table B-1. Maximum Leak Compensation Flow Based on Patient Type	6
Update to Table B-2. D_{SENS} Settings	7
Update to Table D-3. Humidifier Volumes—Neonatal Patients	7

1. Software Enhancements

1.1. Overview

This addendum describes enhancements to the 980 Ventilator System and changes to the 980 Ventilator System Operator's Manual.

1.2. Update to 4.7.2 NIV Breathing Interfaces

The following non-vented interfaces are compatible with the use of NIV/CPAP on the Puritan Bennett 980 ventilator:

Full-face mask — ResMed Mirage™* non-vented full face mask

Nasal mask — ResMed Ultra Mirage™* non-vented mask

Infant nasal prongs — Argyle™* nasal prongs, Hudson RCI™* Infant Nasal prongs, Fisher & Paykel™* nasal prongs, Medin™* nasal prongs, and Ram cannula

Uncuffed neonatal ET tube — Shiley™ Uncuffed tracheal tube, Murphy (3.0 mm)

1.3. Update to 4.7.3 NIV Setup

To function as intended, D_{SENS} needs to be set between the LEAK data value displayed while the patient is connected, and the LEAK data value displayed when the interface is open to ambient and not connected to the patient.

To set D_{SENS} with NIV interfaces when Leak Sync is enabled

1. After adjusting the patient settings, start ventilation.
2. Ensure that Leak Sync is enabled and set D_{SENS} to the highest setting.
3. Select LEAK (L/min) to be displayed in the patient data banner.
4. With the NIV interface connected to the breathing circuit and open to ambient, use the patient data value called LEAK to quantify the leak in L/min.
5. Set the D_{SENS} (in L/min) below the leak rate (in L/min) to ensure that the disconnect alarm is violated during a disconnect. Note that this will cause a CIRCUIT DISCONNECT alarm.
6. Connect the patient interface to the patient and ensure that the CIRCUIT DISCONNECT alarm is resolved.
7. D_{SENS} needs to be set higher than the LEAK data value displayed while the patient is connected and lower than the LEAK data value displayed when the interface is open to ambient and not connected to the patient.
8. Periodically assess the leak rate, especially with PEEP changes, and adjust the D_{SENS} setting as needed to ensure the presence of an alarm during disconnect and the absence of nuisance alarms while the interface is connected to the patient.
9. Always use alternative methods of monitoring during NIV.

1.4. Update to 4.7.4 Conversion from Invasive to NIV Ventilation Type

Note: Before switching to non-invasive ventilation from invasive ventilation when the EtCO₂ sensor was used, ensure the EtCO₂ option is disabled.

1.5. Update to 5.4.2 Communication Setup

To specify the communication configuration for the ventilator

1. Touch the configure icon in the constant access icons area of the GUI. A menu appears with several tabs.
2. Touch the Comm Setup tab. The Comm Setup screen appears allowing three ports to be configured. These ports can be designated as DCI, DCI 2.0, DCI 3.0, Philips, Spacelabs, or Waveforms.

1.6. Update to 5.4.7 SNDF Command

MISCF	1225*	169	<STX>	FIELD 5, ... FIELD 173,	<ETX>	<CR>
1	2	3	4	5	6	7
1	Response code to SNDF command			5	Data field, left-justified and padded with spaces	
2	Number of bytes between <STX> and <CR>			6	End of transmission (03 hex)	
3	Number of data fields between <STX> and <ETX>			7	Terminating carriage return	
4	Start of transmission (02 hex)			*	1229 if Philips is selected for serial port in communication setup	

Note: Ensure your external devices are compatible with the latest DCI software to prevent incompatibilities as data fields may have been modified.

1.7. Update to Table 5-2. MISCF Response

Component	Description
Field 8	Ventilation Type (NIV____ or Invasive_ or HFO2T____) (9 characters)
Field 9	Mode (A/C___, SIMV___, SPONT_ or CPAP___) (6 characters)
Field 11	Spontaneous Type (PS____, TC____, VS____, PA____) (6 characters)
Field 12	Trigger Type setting (V̇-Trig, P-Trig, IESYNC) (6 characters)
Field 18	PEEP/CPAP setting in cmH ₂ O (6 characters)
Field 56	Disconnect sensitivity (DSENS) setting in %, L/min or OFF (6 characters)
Field 78	Monitored Inspired tidal volume (V _{Ti}) in L [†] (6 characters) [‡] VTL (L), If Leak Sync ON.
Field 87	Monitored Positive end expiratory pressure (PEEP) in cmH ₂ O (6 characters)
Field 91	Monitored total PEEP (PEEP _{TOT}) from expiratory pause maneuver in cmH ₂ O (6 characters)
Field 101	Proximal Flow Sensor state (ON or OFF) (6 characters)

(continued)

Component	Description
Field 116	Inadvertent Power Off alarm* (6 characters)
Field 127	Procedure error alarm* (6 characters)
Field 128	Compliance limited tidal volume (V_{Ti}) alarm* (6 characters)
Field 146 ¹	Technical malfunction A50* (6 characters)
Field 147 ¹	Technical malfunction A55* (6 characters)
Field 148 ¹	Technical malfunction A60* (6 characters)
Field 149 ¹	Technical malfunction A65* (6 characters)
Field 150	Technical malfunction A70* (6 characters) ²
Field 151	Technical malfunction A75* (6 characters) ³
Field 152	Technical malfunction A80* (6 characters) ⁴
Field 153	High ETCO ₂ Alarm* (6 characters)
Field 158	LEAK in L/min (6 characters)
Field 159	V_{LEAK} in mL (6 characters)
Field 161	ETCO ₂ (mmHg) when COM port is set to DCI 2.0 or DCI 3.0 (6 characters). Otherwise Blank
Field 162 ⁵	Inspiratory Compliance ratio (C20/C) (6 characters)
Field 163 ⁵	Three times Inspiratory Time Constant (3Tau _i) in seconds (6 characters)
Field 164 ⁵	Delivered mL/kg Volume (VTI/PBW)#. # VTL/PBW (mL/kg), If Leak Sync ON. (6 characters)
Field 165 ⁵	Monitored Driving Pressure (P_{DRIVE}) in cmH ₂ O (6 characters)
Field 166 ⁵	Monitored Positive End Expiratory Pressure at Patient Interface (PEEP _{IF}) in cmH ₂ O (6 characters)
Field 167 ⁵	Monitored End Inspiratory Pressure at Patient Interface (PI _{END IF}) in cmH ₂ O (6 characters)
Field 168 ⁵	Monitored Constant Flow (\dot{V}_{CONST}) in L/min (6 characters)
Field 169 ⁵	IE Sync Trigger Sensitivity (I _{SYNC}) setting (6 characters)
Field 170 ⁵	IE Sync Cycle Sensitivity (E _{SYNC}) setting (6 characters)
Field 171 ⁵	Constant flow (\dot{V}_{CONST}) setting in L/min (6 characters)
Field 172 ⁵	Ventilator State ⁶ (6 characters)
Field 173 ⁵	Nebulizer State ⁷ (6 characters)
*Possible responses are: NORMAL, LOW, MEDIUM, HIGH, or RESET.	

¹ Fields 146 to 149 are blank for DCI 3.0.

² Nebulizer Inoperative Alarm*, when COM port is set to DCI 3.0.

³ CO₂ Monitor Inoperative Alarm* when COM port is set to DCI 3.0.

⁴ Low EtCO₂ Alarm*, when COM port is set to DCI 3.0.

⁵ Fields 162 to 173 are configured for DCI 3.0, otherwise Blank.

⁶ Possible Ventilator State responses are: STNDBY (Stand-By Mode), SAFPCV (Safety PCV), BREATH (Normal Breathing Mode), DISCON (Circuit Disconnect), OCCLUD (Occlusion), SVOPEN (Safety Valve Open), BUV (Backup Ventilation), MIX-BUV (Mixer Backup Ventilation), HFO2T, APNEA.

⁷ Possible Nebulizer State responses are: ON, OFF, SUSPND (Suspended).

1.8. Update to 6.6.21 Driving Pressure (P_{DRIVE})

While ventilating with PAV+™, Driving Pressure (P_{DRIVE}) is the difference between Plateau pressure and estimated PEEP_{TOT} and represents the amount of pressure required to overcome the elastic recoil of the lungs. P_{DRIVE} can also be calculated by dividing V_T by C_{PAV} (V_T/C_{PAV}).

PAV+™ software automatically performs a 300 ms end-inspiratory hold in a random pattern every four to ten PAV+™ breaths. Each time the end-inspiratory hold is conducted this pressure change is measured from the end expiratory lung pressure at the beginning of the breath to the pressure at the end of the plateau maneuver.

1.9. Update to Table 11-9. Ventilator Settings Range and Resolution

Setting	Description	Range and resolution
Disconnect sensitivity (D_{SENS})	<p>Leak Sync disabled: The percentage of returned volume lost, above which the ventilator declares a CIRCUIT DISCONNECT alarm.</p> <p>Leak Sync enabled: The leak at PEEP value in L/min, above which the ventilator declares a CIRCUIT DISCONNECT alarm.</p>	<p>Range (Leak Sync disabled): 20% to 95% or OFF</p> <p>Range (Leak Sync enabled):</p> <p>NEONATAL:</p> <p>Invasive: 1 L/min to 15 L/min</p> <p>NIV: 1 L/min to 30 L/min</p> <p>PEDIATRIC: 1 L/min to 40 L/min</p> <p>ADULT: 1 L/min to 65 L/min</p> <p>Resolution (Leak Sync disabled): 1%</p> <p>Resolution (Leak Sync enabled): 0.5 L/min for values < 10 L/min; 1 L/min for values \geq 10 L/min</p>

1.10. Update to Table 11-11. Patient Data Range and Resolution

Data value	Description	Range and resolution
Driving Pressure (P_{DRIVE})	During PAV+™, P_{DRIVE} is computed as the pressure difference between Plateau Pressure and the estimated PEEP _{TOT} .	<p>Range: 0 cmH₂O to 90 cmH₂O</p> <p>Resolution: 0.1 cmH₂O for 0 cmH₂O to 9.9 cmH₂O; 1.0 cmH₂O for values 10 cmH₂O to 90 cmH₂O</p>

1.11. Update to Table B-1. Maximum Leak Compensation Flow Based on Patient Type

Patient type	Maximum leak compensation flow at PEEP	Maximum total flow
Neonatal	Invasive: 15 L/min NIV: 30 L/min (25 L/min if compressor is the air source)	50 L/min

1.12. Update to Table B-2. D_{SENS} Settings

Breathing circuit type	D _{SENS} setting	Maximum total flow
Neonatal	Range: Invasive: 1 L/min to 15 L/min NIV: 1 L/min to 30 L/min Default: 2 L/min (Invasive ventilation) 5 L/min (NIV)	50 L/min
Pediatric	Range: 1 L/min to 40 L/min Default: 20 L/min	120 L/min
Adult	Range: 1 L/min to 65 L/min Default: 40 L/min	200 L/min

1.13. Update to Table D-3. Humidifier Volumes—Neonatal Patients

Manufacturer	Model	Description	SST humidifier volume setting (mL)
Fisher & Paykel™*	MR290	Neo/adult, disposable, auto-feed	550 ¹
Teleflex™* (Concha)	382-10	ConchaSmart	390
AirLife™*	AH290	Disposable, autofeed	520

¹If the following neonatal patient circuits are used with a Fisher & Paykel™* MR850 humidifier, enter 500 mL as the humidifier volume:

- DAR neonatal patient circuit with single heated wire (DAR 307S9910)—for incubator use
- DAR neonatal patient circuit with single heated wire (DAR 307/8682)—not for incubator use



Covidien llc,
15 Hampshire Street, Mansfield, MA 02048 USA
www.covidien.com
+1 800 255 8522 [T]

EC REP Covidien Ireland Limited,
IDA Business and Technology Park, Tullamore, Ireland.



PT00119947

© 2020 Covidien. All rights reserved.
PT00119947 Rev. A
2020-05-12