



Servo-n

hands-on guide

Introduction

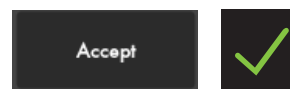
There are different ways to navigate the user interface, adjust settings and get support.

The objective with this Servo-n hands on guide is to guide you through some important steps you need to familiarize yourself with when starting to use the Servo-n ventilator.

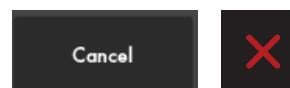
To go through these exercises you need a Servo-n ventilator system, O₂ and air supply, patient circuit, Y sensor and a test lung. The exercises can be done individually or in sections.

Knowledge Check questions with answers can be found at the end of the guide.

Note: Some modes are options and might not be included.



Confirm the settings by tapping Accept or the green check mark.



Exit settings without changing by tapping cancel or the red x.



Close by tapping the green x.

Servo-n 4.4. This guide is intended for hospital personnel as a hands-on training using the Servo-n ventilator. It does not cover all aspects of the Servo-n ventilator. Please see the user's manual for more information. Some modes and functions are options and might not be included.

Setting up the Servo-n

Follow step by step (see corresponding images and notes):

1. Plug in the power cord.
2. Open the hatch on the side and switch the ventilator on.
3. Connect the air and oxygen hoses.
4. Lock the wheels. It's important to lock the wheels when the ventilator is in use to avoid accidental movement of the ventilator.
5. Start the **Pre-use check**.
(You need the test tube during the Pre-use check).
6. Start the Pre-use check (PUC) and follow on-screen instructions.
7. Connect the patient circuit and the Y sensor.

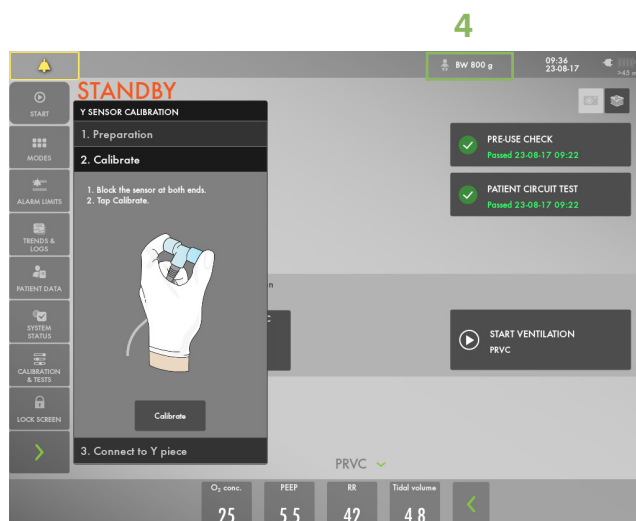
The patient circuit test (PCT) can be skipped during PUC and done separately and redone when the circuit has been changed.

The PCT must be performed with a complete patient circuit, including all accessories (e.g humidifier chamber filled with water, filter and nebulizer).

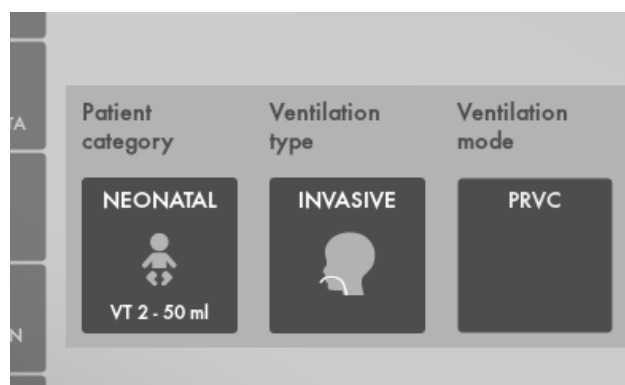
8. Connect a test lung to the patient circuit.
Note: Y sensor is only needed for tidal volumes below 5 ml and HFOV modes. Insert the Y sensor module and follow on screen instructions. If you would like to discontinue Y sensor measuring you need to disconnect the Y sensor module. For HFO ventilation the pressure line needs to be connected to the Y piece.
9. Choose patient category: **Neonatal. (1)**
10. Choose Ventilation type: **Invasive. (2)**
11. Tap on Ventilation mode **PRVC. (3)**
(Depending on start up the configuration a different mode can be shown here.)
12. Enter patient weight, Tap BW to open Patient data. Enter 800g. **(4)**



2



7



9-11

1

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3

NOTE: Some modes are options and might not be included.

13. Then tap and hold the **PRVC** tile. (1)
- Information is available for each mode.

14. Close by tapping **X**.

15. Select Mode by tapping **PRVC**.

16. Change the:
 - Tidal volume to 4.8 ml
 - Respiratory rate to 42 b/min
 - PEEP to 5.5 cm H₂O

17. **Accept** the mode settings. (2)

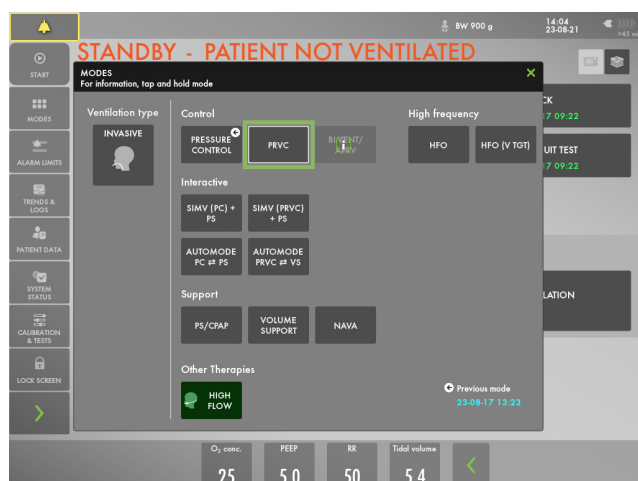
18. Go to **Alarm limits** in **Quick menu**. (3)

19. Change the alarm limits:
 - Alarm sound: 1
 - Ppeak: 30 cm H₂O
 - PEEP: 8 cm H₂O
 - RR (Respiration Rate): High 40 b/min
 - MVe (Minute volume): Low 3.0 L/min

Note: If the PEEP high alarm is activated the expiratory filter may need to be changed.

20. **Accept** the alarm settings. (4)

21. Tap **Start ventilation**.

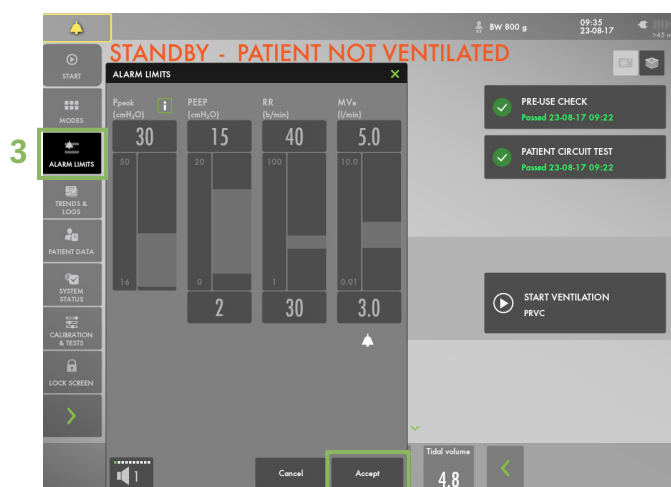


13



16-17

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18-21

4

Alarms

22. The alarms are turned off for 30 seconds after starting ventilation. (1)

NOTE: Alarms can be red, yellow or blue, depending on priority.

23. Tap the activated alarm in message bar (2) and read the messages.

NOTE: The number of alarms that are active are displayed in the status bar at (3)

24. Tap the red tile in the numerical values MVe alarm. (4)

NOTE: By tapping the activated alarm in the numerical values field, you gain access to the alarm setting (shortcut).

25. Go to alarm limits. Adjust the alarms so none are active.

NOTE: The arrow indicates the current measured value. (5)

26. Activate the Autoset function by tapping. (6)

NOTE: The alarm autoset function can only be used in controlled modes.

27. Tap the **i** placed next to Ppeak alarm setting. (7)
You can find more information about the alarm setting there.

NOTE: The information sign can be found in different positions on the Graphic User Interface.

28. **Accept** the alarm settings. (8)

29. When leakage compensation is activated, the delivered and measured volume and flow values are automatically leakage compensated, as indicated by the symbols on the affected values. (9)

30. Leakage is measured and presented in percent. (10)

31. When leakage compensation is used in invasive modes such as PRVC, it ensures volume delivery at the level set.



32. Increase the PEEP to 11 cm H₂O (use the direct access keys) and increase the scale by tapping the **+**. (1)
Cancel the settings by tapping the **✗**.

NOTE: The color changes when the settings are changed outside the normal range.



32

1

VT/BW

33. Tap **BW** 800g to open Patient data. (2)

34. Enter **Weight** 900 g.

NOTE: The weight should be updated when patient change.

35. Check the ml/kg calculated value. (3)

36. Go to the direct access bar and change the **Tidal Volume** so you receive 6ml/kg. (4)



33–35

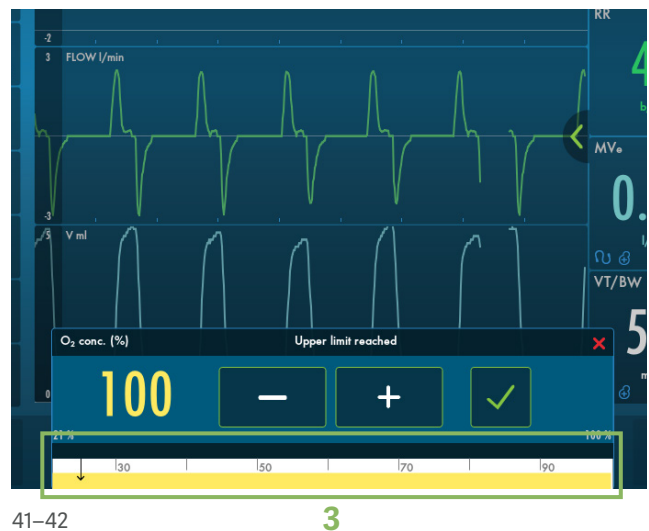


36

4

Mode setting

37. Tap the mode **PRVC (1)** and open the mode setting.
38. Change the **Trigger** value to pressure triggering -1 cm H₂O.
Note: Read the text by the scaling. Less patient effort and more patient effort.
39. Change the T.insp rise
Note: The changes of the dynamic images.
40. **Cancel** changes.
41. Make a quick change of O₂ to 100%. Change the O₂ setting in the direct access bar to 100% by tapping on the 100% directly on the sliding scale. **(2)**
42. Cancel the changes by tapping the **✗**.



HFOV modes

Note: If a circuit not recommended for HFOV is tested, information is presented after the patient circuit test. There is also additional information if you are using a non recommended HFOV circuit and switch to HFOV.

Add the pressure line at the Y piece.

43. For HFOV ventilation the Y sensor is needed with both the flow sensor and pressure line. Tap MODES and choose HFO (if available). Change the PampI to 30 and Pmean to 12. Accept.
 44. Go to maneuvers **PAUSE OSCILLATION**, and then resume. Note: The Pmean is kept during the pause.
 45. Choose HFO (V TGT) mode. Set the VT/HF so that you receive 2ml/kg.
 46. Go to alarm limits and set the PampI 5 cmH₂O above the measured PampI.
 47. Disconnect the Y sensor cable. Pmean will be estimated. Ventilation is switched to backup HFO.
- NOTE: The back up amplitude will never go above the upper alarm limit that is set. Its possible to adjust the PampI in backup.**
48. Calibrate the Y sensor. Note the mode change back to HFO (V TGT).



43



44



45

49. Change to PRVC mode. Go to **ALARM LIMITS** and read the text information available. Turn off the Leakage alarms. Accept. Make a small leakage in the circuit and note the leakage metric.
50. Remove the pressure line and the Y sensor from the circuit and disconnect the Y sensor module.
51. Change to PS/CPAP.
52. Change the **End inspiration** to 40 %. Look at how the dynamic image changes.
53. **Accept** 40%.
54. **Accept** PS/CPAP mode.
55. Compress the test lung to trigger breaths.

Note: The white indicates the triggering in the waveforms, depending on how the trigger is set (pressure or flow) the color indication changes - if pressure triggering is set- white indication in pressure waveform. If flow triggering is set- white indication in flow waveform. Also there is a lung on the screen indicating the triggered breath.

56. Stop compressing the test lung.

NOTE: The color changes to bold white for PC and the BACKUP settings. The mode and settings that are not active are grey. (1)

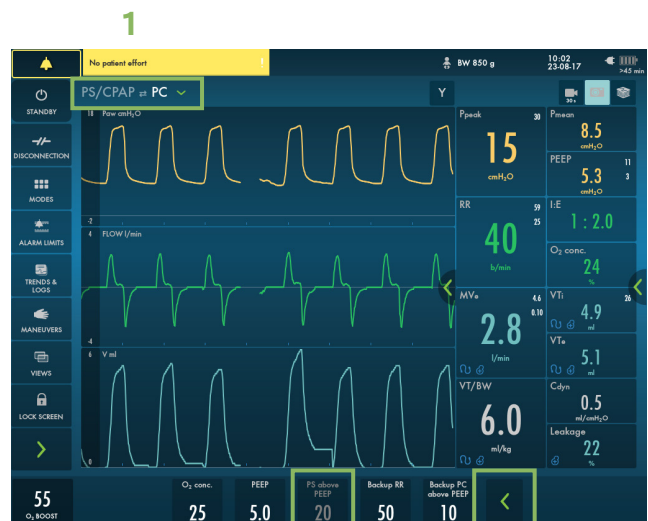
57. Tap the **>** in the direct access bar (2), you then have access to all the mode settings directly.
58. Go to **MODES** and change back to **PRVC**.

Note: It is marked previous. (3)

59. Accept previous settings.



51-55



56-57



58-59

Views

60. Go to **VIEWS** in **QUICK MENU**. (1)
Change to BASIC view.
61. Use the  to find additional values. (2)
62. Go through the different views; **DISTANCE**, **FAMILY**, **LOOPS** and **SERVO COMPASS** view.
63. Go to **SCREEN LAYOUT**.
64. Change to filled waveforms by tapping the waveform image. (3)
65. Tap and hold on the waveforms. Here you can access screen layout easily.



60–62

Library

66. Tap the **Recorder** once and tap the **Camera** in the status bar three times. (4)

NOTE: A 30 second recording will be made starting 15 seconds before and lasting until 15 seconds after the recording is initiated.

67. Choose (5) to access **Library**. Navigate between the different screenshots and the recording.

NOTE: Screenshots are displayed at the bottom of the window.

68. Find the USB port under the base of the screen.

NOTE: You can use a USB memory stick to export the data (e.g. screenshots).



63–65



66–68

NAVA & NIV NAVA

69. Go to **Edi & NAVA** in **QUICK MENU**. (1)
70. Find the workflow of NAVA/NIV NAVA under the **i**.
71. Go to **EDI CATHETER INSERTION**.
72. Choose **NASAL** insertion.
73. Choose **6 FR 49 CM EDI CATHETER**.

NOTE: If you are using the measuring tape included in the package the insertion distance is displayed. One side for oral insertion and one for nasal insertion. If you are using an ordinary measuring tape the calculation tool on the user interface can be used.

74. Enter **NEX** 18 cm.
75. Edi catheter insertion distance is presented.

NOTE: The insertion distance calculation often needs to be titrated using the ECG.

76. Go to **edi catheter positioning**.
77. Tap all the **i** symbols.
78. Go to **NAVA MODE**.

NOTE: The mode is divided in NAVA and PC (backup mode).



69–71



72–76



77–78

Disconnection

79. Go to **DISCONNECTION** in **QUICK MENU**. (1)
80. Change the **O₂ concentration** to 40%. (2)
81. Accept **DISCONNECTION** function.
82. Disconnect the test lung.
83. Reconnect the test lung.
84. **Cancel** post-oxygenation.

NOTE: When disconnection is activated the ventilator system is prevented from cycling without activating alarms. The disconnection function should not be used when closed suctioning is used.



82–84

Maneuvers

85. Go to **MANEUVERS** in **QUICK MENU**. (3)
86. Activate **MANUAL BREATH** by tapping. The ventilator system will initiate a new breath cycle according to the current ventilator settings.
87. Go to **STATIC MEASUREMENT**.
88. Here you can find **INSPIRATION** and **EXPIRATION HOLD**.
89. Go to **NEBULIZATION**.

NOTE: You can choose continuous nebulization  or a nebulization period . The time for nebulization can be changed. When nebulization is activated there will be the corresponding nebulization symbol on the screen. By tapping the symbol you can stop nebulization.



88–90



90. Unplug the mains cable.

91. Tap on the battery symbol . (1)

NOTE: You can see how much capacity remains for each battery.

Battery



89

92. **LOCK** the screen is found in Quick Menu. Lock the screen. (2)

93. Tap anywhere on the screen and see what happens.

94. **UNLOCK** the screen by tapping on the Locking Symbol.

Lock screen



90-94

95. Activate **O₂ BOOST** by tap and hold. (1)

NOTE: O₂ boost is active for one minute.

96. **Cancel** O₂ boost by tapping .

97. Go to **MANEUVERS** and select **O₂ BOOST LEVEL**. It is possible to change the desired level for the O₂ boost function. Change the O₂ boost to 20%.

98. Observe the new **O₂ BOOST** level .

O₂ boost

99. Go to **TRENDS. (2)**
100. Change the trend scale to 1 hour. **(3)**
101. Drag the cursor and note that each event/changes have been trended.
102. Tap **ORGANIZE** to change the order of the trends. **(4)**

Note: Trend values are stored every 60 seconds and retained for a maximum of 72 hours.



95–98

Trends

103. Put the RR sp, RR at the top by dragging and dropping TRENDS.
- Note:** you can see the trend of VT/BW and backup. and Backup %/min and switches to backup (/minute).
104. Close the window by tapping **X**.
105. Tap **STANDBY** in **QUICK MENU** and then tap and hold **STOP VENTILATION**.

NOTE: If Edi is connected it is possible to go directly to Edi Monitoring in standby.



99–104

3

Stop ventilation



105

Knowledge check

1. Why is it important to have the same patient circuit that will be used for the patient when performing the patient circuit test?

2. When is the Y sensor needed?

3. Where can you change the O₂ boost level?

4. Is pressure triggering of -1 easier or more difficult than Flow triggering of 1.6 l/min. (for the patient to trigger the breath)?

5. How can you see on the screen that the patient is triggering?

Answers

1. If the correct circuit is not tested, the following risks may arise:
 - In volume-based modes, the volume delivered to the patient will be incorrect.
 - In pressure-based modes, the volume measured will be incorrect.
2. The Y sensor is only needed for tidal volumes below 5 ml and during HFO ventilation. During HFO ventilation also the pressure line is needed.
3. Go to maneuvers to change the O₂ boost level. The value entered under O₂ boost (%) level specifies the number of percentage units that will be added to the value set for the O₂ concentration.
4. Flow triggering of 1.6l/min is easier to trigger the breath than pressure triggering of -1.
5. There is a lung on the screen indicating the triggered breath. Also there is a white indication in the waveforms. (if pressure triggering is set- white indication in pressure waveform and if Flow triggering is set- white indication in flow curve).



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